

# PRODUCT SELECTION GUIDE

## 2012

SMD RESISTORS + MLCC

SMD CERAMIC EMI FILTER CAPACITORS - X2Y®

HIGH FREQUENCY PRODUCTS

MULTILAYER CHIP VARISTORS







## Part numbering system and ordering

You can order components from this catalogue in two ways. Both ways give logistic and packing information.

- **Clear text ordering code**

This unique number is an easily-readable code.

- 15 digits code (PHYCOMP CTC )

- 14 to 17 digits code (GLOBAL PART NUMBER for both Yageo and Phycomp branded products)

- **12 digits ordering code**

This unique 12NC number forms the basis of the Phycomp logistic system.

You will find details for ordering in the "*Ordering*" section next to each selection chart.

Minimum shipment quantities, prices and delivering details can be obtained from the Yageo sales organization in your country or from one of our franchised distributors.

## Case size codes

Throughout this catalogue, inch-based codes are used for the component sizes. According to IEC 60384-10, amendment 2 of September 2000 for MLCCs, and IEC 60115-8, amendment 1 of July 2000 for R-chip. Values for length and width should be in millimeters rather than in inches. To distinguish between inch-based codes and metric-based codes, metric-based codes will temporarily have the suffix "M". The table right next shows the relation between inch-based case sizes versus the recommended metric case size designators. Please note that HF products use metric case size only.

| Case size designation and cross-reference |        |            |        |            |        |
|-------------------------------------------|--------|------------|--------|------------|--------|
| Inch-based                                | Metric | Inch-based | Metric | Inch-based | Metric |
| 01005                                     | 0402M  | 0612       | 1632M  | 1224       | 3250M  |
| 0201                                      | 0603M  | 0616       | 1640M  | 1225       | 3264M  |
| 0202                                      | 0605M  | 0805       | 2012M  | 1812       | 4532M  |
| 0402                                      | 1005M  | 0815       | 2037M  | 2007       | 5320M  |
| 0404                                      | 1010M  | 0830       | 2075M  | 2010       | 5025M  |
| 0408                                      | 1020M  | 1008       | 2520M  | 2220       | 5750M  |
| 0508                                      | 1220M  | 1206       | 3216M  | 2512       | 6432M  |
| 0603                                      | 1608M  | 1210       | 3225M  | 3014       | 7836M  |
| 0606                                      | 1616M  | 1218       | 3245M  | 4527       | 11070M |

## Contact us

Founded in 1977, the Yageo Corporation has become a world-class provider of passive-component services with capabilities on a global scale, including production and sales facilities in Asia, Europe and America. The corporation is uniquely positioned to provide one-stop-shopping, offering its complete product portfolio of resistors, capacitors and inductors in both commodity and specialty versions, plus design-in capability, distribution, e-commerce connection and logistics. Yageo markets its products under the product brand names Yageo, Phycomp and Vitrohm. All products can be obtained from our Yageo sales offices, of which contact details can be found on the backcover of this catalogue. For most up-to-date information, as well as contact details of our franchise distributors, please refer to our website: [www.yageo.com](http://www.yageo.com)



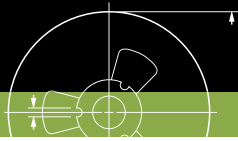


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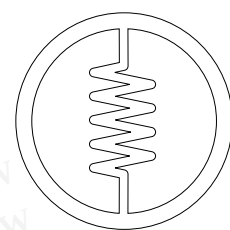
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## SURFACE-MOUNT CHIP RESISTORS





# Chip Resistors General Information

## Specification overview

| Global part number | Series | Size   | Power rating | Max. voltage | Operating Temp. range          | Resistance range                | Tolerance                                                    | T. C. R.                                                                              |
|--------------------|--------|--------|--------------|--------------|--------------------------------|---------------------------------|--------------------------------------------------------------|---------------------------------------------------------------------------------------|
| ! RC0100xR-07xxxxL | RC     | 01005  | 1/32W        | 15V          | -55°C to 125°C                 | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ  | ±1%<br>±5%                                                   | 10Ω ≤ R ≤ 1MΩ ±250 ppm/°C                                                             |
| RC0201xR-07xxxxL   |        | 0201   | 1/20W        | 25V          |                                | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ  | Max./Min.: 1MΩ/10Ω ±0.5%<br>Max.: 10MΩ ±1%,±5%               | 1Ω ≤ R ≤ 10Ω -100/+350 ppm/°C<br>10Ω < R ≤ 10MΩ ±200 ppm/°C                           |
| RC0402xR-07xxxxL   |        | 0402   | 1/16W        | 50V          | -55°C to 155°C                 | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ  | Max./Min.: 1MΩ/10Ω ±0.5%<br>Max.: 10MΩ ±1%<br>Max.: 22MΩ ±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C<br>10MΩ < R ≤ 22MΩ ±200 ppm/°C |
| RC0603xR-07xxxxL   |        | 0603   | 1/10W        | 50V          |                                |                                 |                                                              |                                                                                       |
| RC0805xR-07xxxxL   |        | 0805   | 1/8W         | 150V         |                                |                                 |                                                              |                                                                                       |
| RC1206xR-07xxxxL   |        | 1206   | 1/4W         | 200V         |                                |                                 |                                                              |                                                                                       |
| RC1210xR-07xxxxL   |        | 1210   | 1/2W         | 200V         |                                |                                 |                                                              |                                                                                       |
| RC1218xK-07xxxxL   |        | 1218   | 1W           | 200V         |                                | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   |                                                              |                                                                                       |
| RC2010xK-07xxxxL   |        | 2010   | 3/4W         | 200V         |                                | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ  |                                                              |                                                                                       |
| RC2512xK-07xxxxL   |        | 2512   | 1W           | 200V         |                                | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ  |                                                              |                                                                                       |
| ! RC0603xR-7WxxxxL |        | 0603   | 1/5W         | 50V          |                                | 1Ω ≤ R ≤ 10 KΩ<br>Jumper < 50mΩ | ±1%<br>±5%                                                   | ±200 ppm/°C                                                                           |
| RC0805xR-7WxxxxL   |        | 0805   | 1/4W         | 150V         |                                | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   |                                                              |                                                                                       |
| RC1206xR-7WxxxxL   |        | 1206   | 1/2W         | 200V         |                                | 1Ω ≤ R ≤ 150Ω<br>Jumper < 50mΩ  |                                                              |                                                                                       |
| RC2512xK-7WxxxxL   |        | 2512   | 2W           | 200V         |                                | 24MΩ ≤ R ≤ 100MΩ                | ±5%, ±10%, ±20%                                              | ±300 ppm/°C                                                                           |
| RC0805xR-07xxxxL   |        | 0805   | 1/8W         | 150V         |                                | 24MΩ ≤ R ≤ 100MΩ                |                                                              |                                                                                       |
| RC1206xR-07xxxxL   |        | 1206   | 1/4W         | 200V         |                                |                                 |                                                              |                                                                                       |
| RE0402xRE07xxxxL   | RE     | 0402   | 1/16W        | 50V          | -55°C to 155°C                 | 10Ω ≤ R ≤ 1MΩ                   | ±0.5%<br>±1%<br>±5%                                          | ±50 ppm/°C                                                                            |
| RE0603xRE07xxxxL   |        | 0603   | 1/10W        | 50V          |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RE0805xRE07xxxxL   |        | 0805   | 1/8W         | 150V         |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RE1206xRE07xxxxL   |        | 1206   | 1/4W         | 200V         |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RT0402xRx07xxxxL   | RT     | 0402   | 1/16W        | 50V          | -55°C to 155°C                 | 10Ω ≤ R ≤ 121KΩ                 | ±0.05%<br>±0.1%<br>±0.25%<br>±0.5%<br>±1%                    | ±10 ppm/°C<br>±15 ppm/°C<br>±25 ppm/°C<br>±50 ppm/°C                                  |
| RT0603xRx07xxxxL   |        | 0603   | 1/10W        | 75V          |                                | 5.1Ω ≤ R ≤ 681KΩ                |                                                              |                                                                                       |
| RT0805xRx07xxxxL   |        | 0805   | 1/8W         | 150V         |                                | 5.1Ω ≤ R ≤ 1.5MΩ                |                                                              |                                                                                       |
| RT1206xRx07xxxxL   |        | 1206   | 1/4W         | 200V         | -55°C to 125°C                 | 5.1Ω ≤ R ≤ 1.5MΩ                |                                                              |                                                                                       |
| RT1210xRx07xxxxL   |        | 1210   | 1/4W         |              |                                | 5.1Ω ≤ R ≤ 1MΩ                  |                                                              |                                                                                       |
| RT2010xKx07xxxxL   |        | 2010   | 1/2W         |              |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RT2512xKx07xxxxL   |        | 2512   | 3/4W         |              |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RJ0402FRE07xxxxL   | RJ     | 0402   | 1/16W        | 25V          | -55°C to 125°C                 | 10Ω ≤ R ≤ 121KΩ                 | ±1%                                                          | ±50 ppm/°C                                                                            |
| RJ0603FRE07xxxxL   |        | 0603   | 1/16W        | 50V          |                                | 5.1Ω ≤ R ≤ 681KΩ                |                                                              |                                                                                       |
| RJ0805FRE07xxxxL   |        | 0805   | 1/10W        | 100V         |                                | 5.1Ω ≤ R ≤ 1.5MΩ                |                                                              |                                                                                       |
| RJ1206FRE07xxxxL   |        | 1206   | 1/8W         | 150V         |                                | 5.1Ω ≤ R ≤ 1.5MΩ                |                                                              |                                                                                       |
| RJ1210FRE07xxxxL   |        | 1210   | 1/4W         |              |                                | 5.1Ω ≤ R ≤ 1MΩ                  |                                                              |                                                                                       |
| RJ2010FKE07xxxxL   |        | 2010   | 1/2W         |              |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| RJ2512FKE07xxxxL   |        | 2512   | 3/4W         |              |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| YC102-xR-07xxxxL   | YC     | 2*0201 | 1/32W        | 15V          | -55°C to 125°C                 | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ  | ±1%<br>±5%                                                   | ±200 ppm/°C                                                                           |
| ! YC104-xR-07xxxxL |        | 4*0201 | 1/32W        | 12.5V        |                                | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   |                                                              |                                                                                       |
| YC122-xR-07xxxxL   |        | 2*0402 | 1/16W        | 50V          | -55°C to 155°C                 | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   | ±1%<br>±5%                                                   | 1Ω ≤ R < 10Ω ±250 ppm/°C<br>10Ω ≤ R ≤ 1MΩ ±200 ppm/°C                                 |
| YC124-xR-07xxxxL   |        | 4*0402 | 1/16W        | 25V          |                                | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   | ±1%<br>±5%                                                   |                                                                                       |
| YC162-xR-07xxxxL   |        | 2*0603 | 1/16W        | 50V          | -55°C to 125°C                 | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ  | ±5%                                                          | ±200 ppm/°C                                                                           |
| YC164-xR-07xxxxL   |        | 4*0603 | 1/16W        | 50V          |                                | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ   | ±1%<br>±5%                                                   |                                                                                       |
| YC248-xR-07xxxxL   |        | 8*0602 | 1/16W        | 50V          | -55°C to 155°C                 | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ  |                                                              |                                                                                       |
| YC324-xR-07xxxxL   |        | 4*1206 | 1/8W         | 200V         |                                | 10Ω ≤ R ≤ 1MΩ                   |                                                              |                                                                                       |
| TC122-xR-07xxxxL   |        | TC     | 2*0402       | 1/16W        | 50V                            | -55°C to 125°C                  | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ                               | ±1%<br>±5%                                                                            |
| TC124-xR-07xxxxL   | 4*0402 |        | 1/16W        | 50V          | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ |                                 |                                                              |                                                                                       |
| TC164-xR-07xxxxL   | 4*0603 |        | 1/16W        | 50V          | -55°C to 155°C                 | 1Ω ≤ R ≤ 1MΩ                    |                                                              |                                                                                       |

Note: " ! " is the symbol for new product





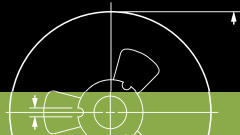
# Chip Resistors General Information

## Specification overview

| Global part number  | Series | Size         | Power rating | Max. voltage         | Operating Temp. range | Resistance range               | Tolerance         | T. C. R.                                                                                      |                                                                                               |                 |                   |             |
|---------------------|--------|--------------|--------------|----------------------|-----------------------|--------------------------------|-------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------|-------------------|-------------|
| YC158TJR-07xxxxL    | YC158  | 10P8R (0612) | 1/16W        | 25V                  | -55°C to 155°C        | 10Ω ≤ R ≤ 100KΩ                | ±5%               | ±200 ppm/°C                                                                                   |                                                                                               |                 |                   |             |
| YC358xJK-07xxxxL    | YC358  | 10P8R (1225) | 1/16W        | 50V                  |                       | 10Ω ≤ R ≤ 330KΩ                |                   | ±200 ppm/°C                                                                                   |                                                                                               |                 |                   |             |
| RL0402xR-07xxxxL    | RL     | 0402         | 1/16W        | (PxR) <sup>1/2</sup> | -55°C to 125°C        | 50mΩ ≤ R < 1Ω                  | ±1%<br>±2%<br>±5% | See page 31,<br>table "T. C. R. - RL series"                                                  |                                                                                               |                 |                   |             |
| RL0603xR-07xxxxL    |        | 0603         | 1/10W        |                      |                       | 10mΩ ≤ R < 1Ω                  |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL0805xR-07xxxxL    |        | 0805         | 1/8W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL0805xR-7WxxxxL    |        |              | 1/4W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL1206xR-07xxxxL    |        | 1206         | 1/4W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL1206xR-7WxxxxL    |        |              | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL1210xR-07xxxxL    |        | 1210         | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL1218xK-07xxxxL    |        | 1218         | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL2010xK-07xxxxL    |        | 2010         | 3/4W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| RL2512xK-07xxxxL    |        | 2512         | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PT0402xR-07xxxxL  | PT     | 0402         | 1/16W        | (PxR) <sup>1/2</sup> | -55°C to 155°C        | 50mΩ ≤ R < 1Ω                  | ±1%<br>±2%<br>±5% | 50mΩ ≤ R < 68mΩ ±600 ppm/°C<br>68mΩ ≤ R < 100mΩ ±300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C     |                                                                                               |                 |                   |             |
| ! PT0402xR-7WxxxxL  |        |              | 1/8W         |                      |                       | 68mΩ                           |                   | 50mΩ ≤ R < 1Ω<br>Jumper < 8mΩ                                                                 | 50mΩ < R < 68mΩ 0/+400 ppm/°C<br>68mΩ ≤ R < 100mΩ 0/+300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C |                 |                   |             |
| ! PT0402xR-7TxxxxL  |        |              | 1/6W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PT0603xR-07xxxxL  |        | 0603         | 1/10W        |                      |                       | 50mΩ ≤ R < 1Ω<br>Jumper < 8mΩ  |                   | 50mΩ ≤ R ≤ 68mΩ                                                                               | 50mΩ < R < 68mΩ 0/+350 ppm/°C<br>68mΩ ≤ R < 100mΩ 0/+300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C |                 |                   |             |
| ! PT0603xR-7WxxxxL  |        |              | 1/5W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PT0603xR-7TxxxxL  |        |              | 1/3W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PT0805xR-07xxxxL  |        | 0805         | 1/8W         |                      |                       | 50mΩ ≤ R < 1Ω                  |                   | 50mΩ < R < 68mΩ 0/+350 ppm/°C<br>68mΩ ≤ R < 100mΩ 0/+300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C |                                                                                               |                 |                   |             |
| ! PT0805xR-7WxxxxL  |        |              | 1/4W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PT1206xR-07xxxxL  |        | 1206         | 1/4W         |                      |                       | 100mΩ ≤ R < 1Ω<br>Jumper < 5mΩ |                   | 100mΩ ≤ R < 1Ω ±100 ppm/°C<br>100mΩ < R < 1Ω ±75 ppm/°C                                       |                                                                                               |                 |                   |             |
| ! PT1206xR-7WxxxxL  |        |              | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PT2010xK-07xxxxL    |        | 2010         | 3/4W         |                      |                       | 100mΩ ≤ R < 1Ω                 |                   |                                                                                               |                                                                                               |                 |                   |             |
| PT2010xK-7WxxxxL    |        |              | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PT2512xK-07xxxxL    |        | 2512         | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PT2512xK-7WxxxxL    |        |              | 2W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PT0815xK-07xxxxL    |        | PT (Wide)    | 0815         |                      |                       | 1/2W                           |                   | (PxR) <sup>1/2</sup>                                                                          | -55°C to 155°C                                                                                | 25mΩ ≤ R ≤ 50mΩ | ±1%<br>±2%<br>±5% | ±100 ppm/°C |
| PT0815xK-7WxxxxL    |        |              |              |                      |                       | 1W                             |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PR1206xKx07xxxxxx | PR     | 1206         | 1/4W         | (PxR) <sup>1/2</sup> | -55°C to 155°C        | 1mΩ ≤ R ≤ 6mΩ                  | ±1%<br>±2%<br>±5% | ±50 ppm/°C                                                                                    |                                                                                               |                 |                   |             |
| ! PR1206xKx7Wxxxxxx |        |              | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PR1206xKx47xxxxxx |        |              | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PR2010xKx07xxxxxx   |        | 2010         | 1/2W         |                      |                       | 1mΩ ≤ R < 100mΩ                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PR2010xKx7Wxxxxxx   |        |              | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PR2512xKx07xxxxxx   |        | 2512         | 1W           |                      |                       | 0.5mΩ ≤ R ≤ 5mΩ                | ±1%<br>±2%<br>±5% | 0.5mΩ ≤ R ≤ 2mΩ ±200 ppm/°C<br>3mΩ ≤ R ≤ 5mΩ ±100 ppm/°C                                      |                                                                                               |                 |                   |             |
| PR2512xKx7Wxxxxxx   |        |              | 2W           |                      |                       | 0.5mΩ ≤ R ≤ 10mΩ               |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PR2512xKx7Txxxxxx |        |              | 3W           |                      |                       | 7mΩ ≤ R ≤ 75mΩ                 | ±0.5%             | ±50 ppm/°C                                                                                    |                                                                                               |                 |                   |             |
| ! PR2512DKx07xxxxxx |        |              | 1W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PR2512DKx7Wxxxxxx |        | 2W           |              |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PA2512xKF07xxxxL  | PA     | 2512         | 1W           | (PxR) <sup>1/2</sup> | -55°C to 155°C        | 1mΩ ≤ R ≤ 10mΩ                 | ±1%<br>±5%        | ±100 ppm/°C                                                                                   |                                                                                               |                 |                   |             |
| ! PA2512xKF7WxxxxL  |        |              | 2W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PA2512xKF7TxxxxL  |        |              | 3W           |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PF0603xRx57xxxxxx | PF     | 0603         | 1/2W         | (PxR) <sup>1/2</sup> | -55°C to 155°C        | 5mΩ ≤ R ≤ 100mΩ                | ±1%<br>±2%<br>±5% | ±75 ppm/°C                                                                                    |                                                                                               |                 |                   |             |
| PF0805xRx07xxxxxx   |        | 0805         | 1/8W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PF0805xRx7Wxxxxxx   |        |              | 1/4W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PF0805xRx7Txxxxxx   |        |              | 1/3W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PF0805xRx47xxxxxx |        |              | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PF1206xxx07xxxxxx   |        | 1206         | 1/4W         |                      |                       | 3mΩ ≤ R < 100mΩ                |                   |                                                                                               |                                                                                               |                 |                   |             |
| PF1206xxx7Wxxxxxx   |        |              | 1/2W         |                      |                       |                                |                   |                                                                                               |                                                                                               |                 |                   |             |
| ! PF2010xKx7Wxxxxxx |        | 2010         | 1W           |                      |                       | 5mΩ ≤ R < 100mΩ                |                   |                                                                                               |                                                                                               |                 |                   |             |

Note: "!" is the symbol for new product





# Chip Resistors General Information

## Specification overview

| Global part number  | Series    | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range               | Tolerance                            | T. C. R.                                                                              |
|---------------------|-----------|------|--------------|--------------|-----------------------|--------------------------------|--------------------------------------|---------------------------------------------------------------------------------------|
| PF2512xKx07xxxxxx   | PF        | 2512 | 1W           | (PxR)^1/2    | -55°C to 155°C        | 1mΩ ≤ R < 100mΩ                | ±1%<br>±2%<br>±5%                    | ±75 ppm/°C                                                                            |
| PF2512xKx7Wxxxxxx   |           |      | 2W           |              |                       | 1mΩ ≤ R ≤ 50mΩ                 |                                      |                                                                                       |
| ! PF2512xKx7Txxxxxx |           |      | 3W           |              |                       |                                |                                      |                                                                                       |
| ! PF4527xKx7Wxxxxxx |           | 4527 | 3W           | 6mΩ ≤ R < 1Ω |                       |                                |                                      |                                                                                       |
| ! PF0612xKx07xxxxxx | PF (Wide) | 0612 | 1W           | (PxR)^1/2    | -55°C to 155°C        | 1mΩ ≤ R ≤ 50mΩ                 | ±1%<br>±2%<br>±5%                    | ±75 ppm/°C                                                                            |
| ! PF0815xKx7Wxxxxxx |           | 0815 | 1W           |              |                       | 1mΩ ≤ R ≤ 20mΩ                 |                                      |                                                                                       |
| ! PF0830xKx07xxxxxx |           | 0830 | 2W           |              |                       | 1mΩ ≤ R ≤ 100mΩ                |                                      |                                                                                       |
| ! PH0805xR-07xxxxxx | PH        | 0805 | 4/5W         | (PxR)^1/2    | -55°C to 155°C        | 4mΩ ≤ R ≤ 50mΩ                 | ±1%<br>±2%<br>±5%                    | ±75 ppm/°C                                                                            |
| PH1206xR-07xxxxxx   |           | 1206 | 1W           |              |                       |                                |                                      |                                                                                       |
| ! PE0603xR-57xxxxxx | PE        | 0603 | 1/2W         | (PxR)^1/2    | -55°C to 155°C        | 5mΩ ≤ R < 100mΩ                | ±1%<br>±2%<br>±5%                    | ±75 ppm/°C                                                                            |
| ! PE0805xR-47xxxxxx |           | 0805 | 1/2W         |              |                       | 4mΩ ≤ R < 100mΩ                |                                      |                                                                                       |
| ! PE1206xR-47xxxxxx |           | 1206 | 1W           |              |                       | 3mΩ ≤ R < 100mΩ                |                                      |                                                                                       |
| PE2512xKx7Wxxxxxx   |           | 2512 | 2W           |              |                       | 1mΩ ≤ R < 100mΩ                |                                      |                                                                                       |
| AR0402xR-07xxxxL    | AR        | 0402 | 1/16W        | 50V          | -55°C to 155°C        | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | ±1%<br>±5%                           | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C                                |
| AR0603xR-07xxxxL    |           | 0603 | 1/10W        |              |                       |                                |                                      |                                                                                       |
| AR0805xR-07xxxxL    |           | 0805 | 1/8W         |              |                       |                                |                                      |                                                                                       |
| AR1206xR-07xxxxL    |           | 1206 | 1/4W         |              |                       |                                |                                      |                                                                                       |
| SR0805xR-07xxxxL    | SR        | 0805 | 1/8W         | 150V         | -55°C to 155°C        | 1Ω ≤ R ≤ 100KΩ                 | ±5%<br>±10%<br>±20%                  | ±200 ppm/°C                                                                           |
| SR1206xR-07xxxxL    |           | 1206 | 1/4W         |              |                       |                                |                                      |                                                                                       |
| SR1218xK-07xxxxL    |           | 1218 | 1W           |              |                       |                                |                                      |                                                                                       |
| SR2010xK-07xxxxL    |           | 2010 | 3/4W         |              |                       |                                |                                      |                                                                                       |
| SR2512xK-07xxxxL    |           | 2512 | 1W           |              |                       |                                |                                      |                                                                                       |
| RV0805xR-07xxxxL    | RV        | 0805 | 1/8W         | 400V         | -55°C to 155°C        | 100KΩ ≤ R ≤ 10MΩ               | ±1%<br>±5%                           | ±200 ppm/°C                                                                           |
| RV1206xR-07xxxxL    |           | 1206 | 1/4W         | 500V         |                       | 100KΩ ≤ R ≤ 27MΩ               | Max.: 10MΩ ±1%<br>Max.: 27MΩ ±5%     |                                                                                       |
| RV2512JK-07xxxxL    |           | 2512 | 1W           |              |                       | 4.7MΩ ≤ R ≤ 16MΩ               | ±5%                                  |                                                                                       |
| TR0402xR-07xxxxL    | TR        | 0402 | 1/16W        | 50V          | -55°C to 125°C        | 1Ω ≤ R ≤ 10MΩ                  | +0/-10%<br>+0/-20%<br>+0/-30%        | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 1MΩ ±100 ppm/°C<br>1MΩ < R ≤ 10MΩ ±200 ppm/°C   |
| TR0603xR-07xxxxL    |           | 0603 | 1/16W        |              | -55°C to 155°C        |                                |                                      |                                                                                       |
| TR0805xR-07xxxxL    |           | 0805 | 1/8W         |              |                       |                                |                                      |                                                                                       |
| TR1206xR-07xxxxL    |           | 1206 | 1/4W         |              |                       |                                |                                      |                                                                                       |
| AF0402xR-07xxxxL    | AF        | 0402 | 1/16W        | 50V          | -55°C to 155°C        | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ | Max.: 10MΩ ±1%<br>Max.: 22MΩ ±5%     | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C<br>10MΩ < R ≤ 22MΩ ±200 ppm/°C |
| AF0603xR-07xxxxL    |           | 0603 | 1/10W        |              |                       |                                |                                      |                                                                                       |
| AF0805xR-07xxxxL    |           | 0805 | 1/8W         |              |                       |                                |                                      |                                                                                       |
| AF1206xR-07xxxxL    |           | 1206 | 1/4W         |              |                       |                                |                                      |                                                                                       |
| ! AC0402xR-07xxxxL  | AC        | 0402 | 1/16W        | 50V          | -55°C to 155°C        | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | ±1%<br>±5%                           | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C                                |
| ! AC0603xR-07xxxxL  |           | 0603 | 1/10W        | 50V          |                       |                                |                                      |                                                                                       |
| ! AC0805xR-07xxxxL  |           | 0805 | 1/8W         | 150V         |                       |                                |                                      |                                                                                       |
| ! AC1206xR-07xxxxL  |           | 1206 | 1/4W         | 200V         |                       |                                |                                      |                                                                                       |
| ! AC1210xR-07xxxxL  |           | 1210 | 1/2W         | 200V         |                       |                                |                                      |                                                                                       |
| ! AC1218xK-07xxxxL  |           | 1218 | 1W           | 200V         |                       |                                |                                      |                                                                                       |
| ! AC2010xK-07xxxxL  |           | 2010 | 3/4W         | 200V         |                       |                                |                                      |                                                                                       |
| ! AC2512xK-07xxxxL  |           | 2512 | 1W           | 200V         |                       |                                |                                      |                                                                                       |
| ATV321xR-07xxxxL    | AT        | 0404 | 40mW         | 50V          | -55°C to 125°C        | -1dB to -20dB                  | ±0.3dB<br>±0.5dB<br>±1.0dB<br>±2.0dB | ---                                                                                   |

Note: " ! " is the symbol for new product

# Chip Resistors General Information

## Ordering information - Global part number

### Global part number - Single resistor <sup>(3)</sup>

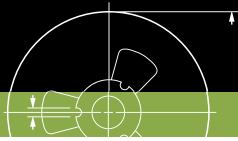
|                                                | R C | 0 4 02 | J | R | — | 7 D | 1 0 R | L |                                         |
|------------------------------------------------|-----|--------|---|---|---|-----|-------|---|-----------------------------------------|
| Series name (code 1-2)                         |     |        |   |   |   |     |       |   | Default code <sup>(1/2)</sup> (code 17) |
| RC = Thick film general purpose                |     |        |   |   |   |     |       |   |                                         |
| RE = Thick film precision grade                |     |        |   |   |   |     |       |   |                                         |
| RT = Thin film high precision high stability   |     |        |   |   |   |     |       |   | Resistance (code 12-16)                 |
| RJ = Thin film general purpose                 |     |        |   |   |   |     |       |   | 0R = Jumper                             |
| RL = Thick film low ohmic                      |     |        |   |   |   |     |       |   | 0R1 = 0.1Ω                              |
| PT = Thick film low ohmic low T. C. R.         |     |        |   |   |   |     |       |   | 1R = 1Ω                                 |
| PR/PA/PF/PH/PE = Current sensor - low T. C. R. |     |        |   |   |   |     |       |   | 10R = 10Ω                               |
| TR = Trimmable                                 |     |        |   |   |   |     |       |   | 100R = 100Ω                             |
| SR = Surge                                     |     |        |   |   |   |     |       |   | 1K = 1 000Ω                             |
| AR = NiAu termination                          |     |        |   |   |   |     |       |   | 1M = 1 000 000Ω                         |
| RV = High voltage                              |     |        |   |   |   |     |       |   | 100M = 100 000 000Ω                     |
| AF = Anti-sulfurated                           |     |        |   |   |   |     |       |   | Taping reel (code 10-11)                |
| AC = Automotive grade                          |     |        |   |   |   |     |       |   | 07 = 7 inch Dia. reel                   |
|                                                |     |        |   |   |   |     |       |   | 10 = 10 inch Dia. reel                  |
|                                                |     |        |   |   |   |     |       |   | 13 = 13 inch Dia. reel                  |
|                                                |     |        |   |   |   |     |       |   | 7D = 7 inch Dia. reel                   |
|                                                |     |        |   |   |   |     |       |   | 2 x standard quantity                   |
| Size code (code 3-6)                           |     |        |   |   |   |     |       |   | T. C. R. (code 9)                       |
| (inch / metric)                                |     |        |   |   |   |     |       |   | B = ±10 ppm/°C (on request)             |
| 0100 = 0.4 x 0.2                               |     |        |   |   |   |     |       |   | C = ±15 ppm/°C (on request)             |
| 0201 = 0.6 x 0.3                               |     |        |   |   |   |     |       |   | D = ±25 ppm/°C                          |
| 0402 = 1.0 x 0.5                               |     |        |   |   |   |     |       |   | E = ±50 ppm/°C                          |
| 0603 = 1.6 x 0.8                               |     |        |   |   |   |     |       |   | M = ±75 ppm/°C                          |
| 0612 = 1.6 x 3.2                               |     |        |   |   |   |     |       |   | F=±100 ppm/°C                           |
| 0805 = 2.0 x 1.25                              |     |        |   |   |   |     |       |   | G = ±200 ppm/°C                         |
| 0815 = 2.15 x 3.75                             |     |        |   |   |   |     |       |   | “—” = Based on spec.                    |
| 0830 = 2.0 x 7.5                               |     |        |   |   |   |     |       |   | (— for thick film only)                 |
| 1206 = 3.2 x 1.6                               |     |        |   |   |   |     |       |   |                                         |
| 1210 = 3.2 x 2.6                               |     |        |   |   |   |     |       |   | Packing style (code 8 )                 |
| 1218 = 3.2 x 4.5                               |     |        |   |   |   |     |       |   | R = Paper tape reel                     |
| 2010 = 5.0 x 2.5                               |     |        |   |   |   |     |       |   | K = Embossed plastic tape               |
| 2512 = 6.35 x 3.2                              |     |        |   |   |   |     |       |   | C = Bulk cassette                       |
| 4527 = 11.0 x 7.0                              |     |        |   |   |   |     |       |   | S = ESD safe reel                       |
| Tolerance (code 7)                             |     |        |   |   |   |     |       |   |                                         |
| W = ±0.05%                                     |     |        |   |   |   |     |       |   |                                         |
| B = ±0.1%                                      |     |        |   |   |   |     |       |   |                                         |
| C = ±0.25%                                     |     |        |   |   |   |     |       |   |                                         |
| D = ±0.5%                                      |     |        |   |   |   |     |       |   |                                         |
| F = ±1%                                        |     |        |   |   |   |     |       |   |                                         |
| G = ±2%                                        |     |        |   |   |   |     |       |   |                                         |
| J = ±5% (for RC/AR/AF/AC Jumper ordering)      |     |        |   |   |   |     |       |   |                                         |
| K = ±10% (for TR = 0/-10%)                     |     |        |   |   |   |     |       |   |                                         |
| M = ±20% (for TR = 0/-20%)                     |     |        |   |   |   |     |       |   |                                         |
| N = ±30% (for TR = 0/-30%)                     |     |        |   |   |   |     |       |   |                                         |
| “—” for PT Jumper ordering                     |     |        |   |   |   |     |       |   |                                         |

Note: 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. Letter L is system default code for ordering only

3. Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products.





# Chip Resistors General Information

## Ordering information - Global part number

### Global part number - Power enhancement

|                                                                                                                                                       |    |      |   |   |   |    |       |   |                                                                                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|---|---|---|----|-------|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Series name (code 1-2)                                                                                                                                | RL | 0805 | J | R | — | 7W | 0R015 | L | Default code (code 17)<br>L / Z = Default code                                                                                                                                                                                                                    |
| RC = Thick film general purpose<br>RL = Thick film low ohmic<br>PT = Thick film low ohmic low T. C. R.<br>PR/PA/PF/PE = Current sensor - low T. C. R. |    |      |   |   |   |    |       |   |                                                                                                                                                                                                                                                                   |
| Size code (code 3-6)<br>(inch / metric)<br>0805 = 2.0 x 1.25<br>0815 = 2.15 x 3.75<br>1206 = 3.2 x 1.6<br>2010 = 5.0 x 2.5<br>2512 = 6.35 x 3.2       |    |      |   |   |   |    |       |   | Resistance (code 12-16)<br>0R01 = 0.01Ω<br>0R1 = 0.1Ω                                                                                                                                                                                                             |
| Tolerance (code 7)<br>F = ±1%<br>G = ±2%<br>J = ±5%                                                                                                   |    |      |   |   |   |    |       |   | Taping reel (code 10-11)<br>07 = 7 inch Dia. reel<br>7W = 7 inch Dia. reel<br>2 x standard power type<br>7T = 7 inch Dia. reel<br>3 x standard power type<br>47 = 7 inch Dia. reel<br>4 x standard power type<br>57 = 7 inch Dia. reel<br>5 x standard power type |
| Packing style (code 8)<br>R = Paper tape reel<br>K = Embossed plastic tape reel                                                                       |    |      |   |   |   |    |       |   | T. C. R. (code 9)<br>E = ±50 ppm/°C<br>M = ±75 ppm/°C<br>F = ±100 ppm/°C<br>G = ±200 ppm/°C<br>"—" = Based on spec.<br>(— for thick film only)                                                                                                                    |

### Global part number - Arrays & Networks

|                                                                                                                                                                                                                                                              |    |    |   |   |   |   |   |    |     |   |                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|---|---|---|---|---|----|-----|---|--------------------------------------------------------------------------------------------------------------------------------|
| Series name (code 1-2)                                                                                                                                                                                                                                       | YC | 16 | 4 | — | J | R | — | 07 | 10R | L | Default code (code 17)                                                                                                         |
| YC = Array & Network (convex) thick film<br>TC = Array (concave) thick film                                                                                                                                                                                  |    |    |   |   |   |   |   |    |     |   |                                                                                                                                |
| Size code (inch) (code 3-4)<br>10 = 0201 x 2 (0202)<br>0201 x 4 (0204)<br>12 = 0402 x 2 (0404)<br>0402 x 4 (0408)<br>15 = 10Pin/8R (0612)<br>16 = 0603 x 2 (0606)<br>0603 x 4 (0612)<br>24 = 0602 x 8 (0616)<br>32 = 1206 x 4 (1224)<br>35 = 10Pin/8R (1225) |    |    |   |   |   |   |   |    |     |   | Resistance (code 12-16)<br>0R = Jumper<br>0R1 = 0.1Ω<br>1R = 1Ω<br>10R = 10Ω<br>100R = 100Ω<br>1K = 1 000Ω<br>1M = 100 000 000 |
| Number of resistors (code 5)<br>2 = 2 resistors<br>4 = 4 resistors<br>8 = 8 resistors                                                                                                                                                                        |    |    |   |   |   |   |   |    |     |   | Taping reel (code 10-11)<br>07 = 7 inch Dia. reel<br>10 = 10 inch Dia. reel<br>13 = 13 inch Dia. reel                          |
| Schematic (code 6)<br>L = L-type (for YC358)<br>T = T-type (for YC158/358)<br>"—" = Based on spec.                                                                                                                                                           |    |    |   |   |   |   |   |    |     |   | T. C. R. (code 9)<br>"—" = Based on spec.                                                                                      |
| Tolerance (code 7)<br>F = ±1%<br>J = ±5% (for Jumper ordering)                                                                                                                                                                                               |    |    |   |   |   |   |   |    |     |   | Packing style (code 8)<br>R = Paper tape reel<br>K = Embossed plastic tape reel                                                |



# Chip Resistors General Information

Ordering information - North America

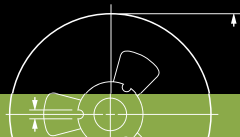
Phycomp CTC ordering code - North America

Ordering example: 9C06031A10R0FKHFT = R-Chip 0603, 10R0, 1%, 5K reel

| 1-2                                                                             | 3-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7-8                                                                                                                                                                                                                                      | 9-12                                                                                                                                                                                                                                                                 | 13                                                                                                                                                           | 14                                                                                                                                                                                                                                                                                                                                     | 15-16                                    | 17                                                                                                                       |
|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| XX                                                                              | XXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | XX                                                                                                                                                                                                                                       | XXXX                                                                                                                                                                                                                                                                 | X                                                                                                                                                            | X                                                                                                                                                                                                                                                                                                                                      | XX                                       | X                                                                                                                        |
| Series name (code 1-2)                                                          | Size code (standard resistors, code 3-6)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Power rating (code 7-8)                                                                                                                                                                                                                  | Resistance value (code 9-12)                                                                                                                                                                                                                                         | Tolerance (code 13)                                                                                                                                          | T. C. R. (code 14)                                                                                                                                                                                                                                                                                                                     | Special coding (code 15-16)              | Packing style (code 17)                                                                                                  |
| 9C = Phycomp thick film chip resistors<br>9T = Phycomp thin film chip resistors | 0201 0201 (0603)<br>0402 0402 (1005)<br>0603 0603 (1608)<br>0805 0805 (2012)<br>1206 1206 (3216)<br>1210 1210 (3225)<br>1218 1218 (3248)<br>2010 2010 (5025)<br>2512 2512 (6432)<br>AC34 0603 (1608) 4R concave array<br>AV34 0603 (1608) 4R convex array<br>AV22 0402 (1005) 2R convex array<br>AV24 0402 (1005) 4R convex array<br>AV28 0402 (1005) 8R convex array<br>RN31 10P8R in 1206 convex network<br>FR01 1206 (3216) Fusible<br>FR21 0603 (1608) Fusible<br>SR01 1206 (3216) Surge<br>VR01 1206 (3216) High voltage 5%<br>VR02 1206 (3216) High voltage 1%<br>VR11 0805 (2012) High voltage 5%<br>VR12 0805 (2012) High voltage 1%<br>VR21 2512 (6432) High voltage 5%<br>MR22 2512 (6432) Current sensor - low T. C. R.<br>MF22 2512 (6432) Current sensor - low T. C. R.<br>V321 0404 (1010) RF attenuator | 1A 1/16W 0.063W (0402)<br>1A 1/10W 0.10W (0603)<br>2A 1/8W 0.125W (0805)<br>3A 1/4W 0.25W (1206)<br>5A 1/2W 0.5W (1210)<br>7A 1/20W 0.05W (0201)<br>8A 1/32W 0.03125W (RN31)<br>12 3/4W 0.75W (2010)<br>1W 1W 1W (1218/2512)<br>2W 2W 2W | 0R00 = Jumper<br>R0XX < 0.1Ω<br>RXXX = 0.1Ω - 0.976Ω<br>XRXX = 1Ω - 9.76Ω<br>XXRX = 10Ω - 97.6Ω<br>XXX0 = 100Ω - 976Ω<br>XXX1 = 1K - 9.76K<br>XXX2 = 10K - 97.6K<br>XXX3 = 100K - 978K<br>XXX4 = 1M - 9.76M<br>XXX5 = 10M - 97.6M<br>XXX6 = 100M+<br>XXDB = 1 - 20DB | E = ±0.01%<br>A = ±0.05%<br>B = ±0.1%; 0.2dB<br>C = ±0.25%; 0.3dB<br>D = ±0.5%; 0.5dB<br>F = ±1%; 1dB<br>G = ±2%; 2dB<br>J = ±5%<br>N = 0/-20%<br>R = 0/-30% | C = ±10 ppm/°C<br>D = ±15 ppm/°C<br>A = ±25 ppm/°C<br>B = ±50 ppm/°C<br>K = ±100 ppm/°C<br>L = ±200 ppm/°C<br>E = ±250 ppm/°C<br>M = ±300 ppm/°C<br>G = ±500 ppm/°C<br>F = 0/+500 ppm/°C<br>R = ±600 ppm/°C<br>Q = -100/+600 ppm/°C<br>P = ±750 ppm/°C<br>H = ±1000 ppm/°C<br>I = ±1500 ppm/°C<br>J = ±2000 ppm/°C<br>N = ±3000 ppm/°C | HF = SnPb<br>PF = Lead-free<br>AF = NiAu | T = 5K paper<br>3 = 10K paper<br>4 = 20K paper<br>5 = 4K blister<br>6 = 5K blister<br>7 = 50K paper<br>P = 25K bulk case |

dB values apply to  
attenuators

Right values apply to  
trimmable resistors



# Chip Resistors General Information

IEC publication 63, SPQ, last digit of 12NC

| Standard of values in a decade according to "IEC publication 63" |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| E24 series                                                       | 10  | 11  | 12  | 13  | 15  | 16  | 18  | 20  | 22  | 24  | 27  | 30  |
|                                                                  | 33  | 36  | 39  | 43  | 47  | 51  | 56  | 62  | 68  | 75  | 82  | 91  |
| E96 series                                                       | 100 | 102 | 105 | 107 | 110 | 113 | 115 | 118 | 121 | 124 | 127 | 130 |
|                                                                  | 133 | 137 | 140 | 143 | 147 | 150 | 154 | 158 | 162 | 165 | 169 | 174 |
|                                                                  | 178 | 182 | 187 | 191 | 196 | 200 | 205 | 210 | 215 | 221 | 226 | 232 |
|                                                                  | 237 | 243 | 249 | 255 | 261 | 267 | 274 | 280 | 287 | 294 | 301 | 309 |
|                                                                  | 316 | 324 | 332 | 340 | 348 | 357 | 365 | 374 | 383 | 392 | 402 | 412 |
|                                                                  | 422 | 432 | 442 | 453 | 464 | 475 | 487 | 499 | 511 | 523 | 536 | 549 |
|                                                                  | 562 | 576 | 590 | 604 | 619 | 634 | 649 | 665 | 681 | 698 | 715 | 732 |
|                                                                  | 750 | 768 | 787 | 806 | 825 | 845 | 866 | 887 | 909 | 931 | 953 | 976 |

| Packing quantities |            |                  |               |                   |                   |          |           |                 |
|--------------------|------------|------------------|---------------|-------------------|-------------------|----------|-----------|-----------------|
| Size code          | Tape width | 178mm / Ø7" reel |               | 254mm / Ø10" reel | 330mm / Ø13" reel |          | Weight    | Volume          |
|                    |            | Paper            | Embossed      | Paper             | Paper             | Embossed | g /100pcs | mm <sup>3</sup> |
| 0100               | 8mm        | 20 000           | ---           | ---               | ---               | ---      | 0.007     | 0.0104          |
| 0201               | 8mm        | 10 000 / 20 000  | ---           | ---               | 50 000            | ---      | 0.016     | 0.041           |
| 0402               | 8mm        | 10 000 / 20 000  | ---           | 20 000            | 50 000            | ---      | 0.058     | 0.175           |
| 0603               | 8mm        | 5 000            | ---           | 10 000            | 20 000            | ---      | 0.192     | 0.576           |
| 0612               | 8mm        | ---              | 5 000         | ---               | ---               | ---      | 0.862     | 2.728           |
| 0805               | 8mm        | 4 000 / 5 000    | ---           | 10 000            | 20 000            | ---      | 0.450     | 1.250           |
| 0815               | 8mm        | ---              | 4 000         | ---               | ---               | ---      | 1.71      | 4.44            |
| 0830               | 12mm       | ---              | 4 000         | ---               | ---               | ---      | 4.594     | 5.55            |
| 1206               | 8mm        | 4 000 / 5 000    | 4 000         | 10 000            | 20 000            | ---      | 0.862     | 2.728           |
| 1210               | 8mm        | 5 000            | ---           | 10 000            | 20 000            | ---      | 1.471     | 4.030           |
| 1218               | 12mm       | ---              | 4 000         | ---               | ---               | ---      | 2.703     | 7.590           |
| 2010               | 12mm       | ---              | 4 000 / 2 000 | ---               | ---               | 16 000   | 2.273     | 6.875           |
| 2512               | 12mm       | ---              | 4 000 / 2 000 | ---               | ---               | ---      | 3.704     | 10.827          |
| 4527               | 24mm       | ---              | 2 000         | ---               | ---               | ---      | 16.225    | 48.3            |
| YC102              | 8mm        | 10 000           | ---           | ---               | ---               | ---      | 0.052     | ---             |
| YC104              | 8mm        | 10 000           | ---           | ---               | ---               | ---      | 0.099     | ---             |
| YC122              | 8mm        | 10 000           | ---           | ---               | 50 000            | ---      | 0.100     | ---             |
| TC122              | 8mm        | 10 000           | ---           | ---               | 50 000            | ---      | 0.112     | ---             |
| ATV321             | 8mm        | 10 000           | ---           | ---               | ---               | ---      | 0.100     | ---             |
| YC124              | 8mm        | 10 000           | ---           | 20 000            | 40 000            | ---      | 0.281     | ---             |
| TC124              | 8mm        | 10 000           | ---           | 20 000            | 40 000            | ---      | 0.311     | ---             |
| YC162              | 8mm        | 5 000            | ---           | ---               | ---               | ---      | 0.376     | ---             |
| YC164              | 8mm        | 5 000            | ---           | 10 000            | 20 000            | ---      | 0.833     | ---             |
| TC164              | 8mm        | 5 000            | ---           | 10 000            | 20 000            | ---      | 1.030     | ---             |
| YC158              | 8mm        | 5 000            | ---           | ---               | 20 000            | ---      | 0.855     | ---             |
| YC248              | 12mm       | 5 000            | 4 000         | ---               | ---               | ---      | 0.885     | ---             |
| YC324              | 12mm       | ---              | 4 000         | ---               | ---               | ---      | 2.703     | ---             |
| YC358              | 12mm       | ---              | 4 000         | ---               | ---               | ---      | 3.333     | ---             |

## 12NC Ordering information

The first 8 or 9 digits of the 12 digit catalogue number are given under section "Phycomp worldwide - Traditional type" on following pages.

The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in table on the right.

Example:

0.001 Ω = 0010 or 010

0.02 Ω = 0200 or 200

0.3 Ω = 3007 or 307

1 Ω = 1008 or 108

33 kΩ = 3303 or 333

10 MΩ = 1006 or 106

| Last digit of 12NC |            |
|--------------------|------------|
| Resistance         | Last digit |
| 0.001 to 0.0976 Ω  | 0          |
| 0.1 to 0.976 Ω     | 7          |
| 1 to 9.76 Ω        | 8          |
| 10 to 97.6 Ω       | 9          |
| 100 to 976 Ω       | 1          |
| 1 to 9.76 kΩ       | 2          |
| 10 to 97.6 kΩ      | 3          |
| 100 to 976 kΩ      | 4          |
| 1 to 9.76 MΩ       | 5          |
| 10 to 97.6 MΩ      | 6          |





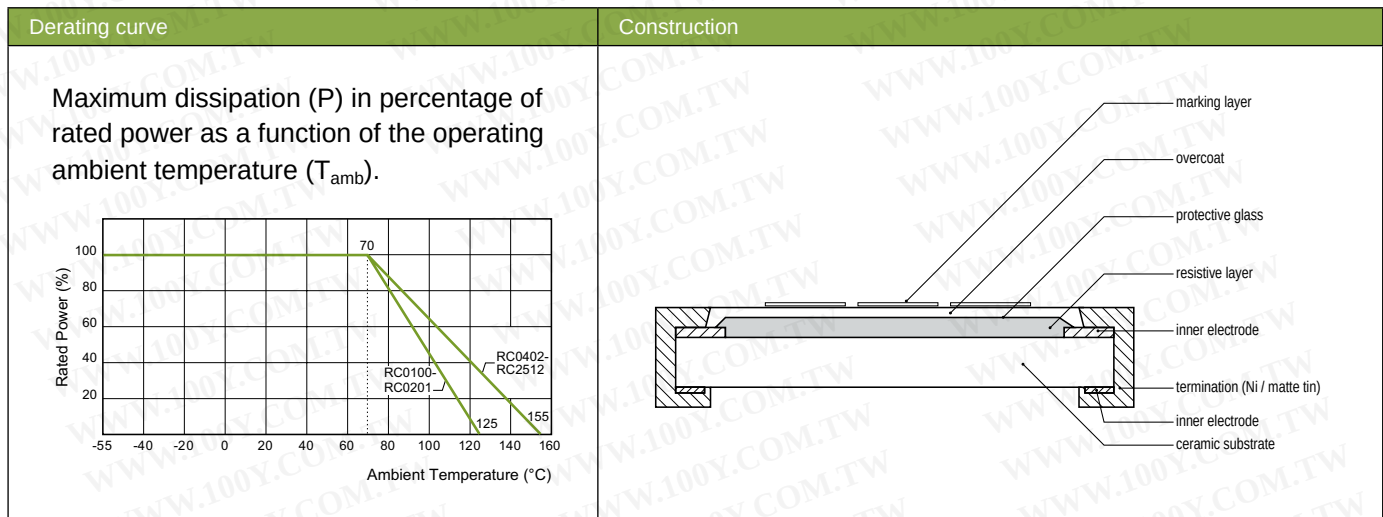
# Chip Resistors Selection Charts

Thick film general purpose chip resistors, 01005 to 2512



## Features

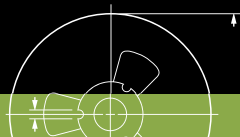
- Extremely thin and light
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Jumper is available
- Available in 8mm tape & reel per IEC 60286-3 (EIA -RS 481)



## Dimensions

unit: mm

| Type   | L          | W          | H          | $l_1$      | $l_2$      |
|--------|------------|------------|------------|------------|------------|
| RC0100 | 0.40 ±0.02 | 0.20 ±0.02 | 0.13 ±0.02 | 0.10 ±0.03 | 0.10 ±0.03 |
| RC0201 | 0.60 ±0.03 | 0.30 ±0.03 | 0.23 ±0.03 | 0.10 ±0.05 | 0.15 ±0.05 |
| RC0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RC0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RC0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RC1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.50 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| RC1218 | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| RC2512 | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |



# Chip Resistors Selection Charts

Thick film general purpose chip resistors, 01005 to 2512

| Electrical characteristics |                   |                          |      |      |      |                                                   |                                                                                                                 |                                                                                                   |                      |                               |             |
|----------------------------|-------------------|--------------------------|------|------|------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------|-------------------------------|-------------|
| Type                       | Power<br>$P_{70}$ | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance                      |                                                                                                                 | T. C. R.<br>(ppm/°C)                                                                              |                      | Jumper criteria<br>(unit: A)  |             |
| RC0100                     | 1/32W             | -55°C to +125°C          | 15V  | 30V  | 30V  | E24 ±1%, 5%<br>Jumper                             | $10\Omega \leq R \leq 1M\Omega$<br><50mΩ                                                                        | $10\Omega \leq R \leq 1M\Omega$                                                                   | ±250                 | Rated current<br>Max. current | 0.5<br>1.0  |
| RC0201                     | 1/20W             | -55°C to +125°C          | 25V  | 50V  | 50V  | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 10M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ  | $10\Omega < R \leq 10M\Omega$<br>$1\Omega \leq R \leq 10\Omega$                                   | ±200<br>-100/+350    | Rated current<br>Max. current | 0.5<br>1.0  |
| RC0402                     | 1/16W             | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 22M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ  | $1\Omega \leq R \leq 10\Omega$<br>$10\Omega < R \leq 10M\Omega$<br>$10M\Omega < R \leq 22M\Omega$ | ±200<br>±100<br>±200 | Rated current<br>Max. current | 1.0<br>2.0  |
| RC0603                     | 1/10W             | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 1K\Omega$<br>$1\Omega \leq R \leq 1K\Omega$<br><50mΩ                                       | $1\Omega \leq R \leq 10K\Omega$                                                                   | ±200                 | Rated current<br>Max. current | 1.0<br>2.0  |
|                            | 1/5W              | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 1K\Omega$<br>$1\Omega \leq R \leq 1K\Omega$<br><50mΩ                                       | $1\Omega \leq R \leq 10K\Omega$                                                                   | ±200                 | Rated current<br>Max. current | 1.0<br>2.0  |
| RC0805                     | 1/8W              | -55°C to +155°C          | 150V | 300V | 300V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 22M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ  | $1\Omega \leq R \leq 10\Omega$<br>$10\Omega < R \leq 10M\Omega$<br>$10M\Omega < R \leq 22M\Omega$ | ±200<br>±100<br>±200 | Rated current<br>Max. current | 2.0<br>5.0  |
|                            | 1/4W              | -55°C to +155°C          | 150V | 300V | 300V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 1M\Omega$<br>$1\Omega \leq R \leq 1M\Omega$<br><50mΩ                                       | $1\Omega \leq R \leq 1M\Omega$                                                                    | ±200                 | Rated current<br>Max. current | 2.0<br>5.0  |
| RC1206                     | 1/4W              | -55°C to +155°C          | 200V | 400V | 500V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $10\Omega \leq R \leq 22M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ | $1\Omega \leq R \leq 10\Omega$<br>$10\Omega < R \leq 10M\Omega$<br>$10M\Omega < R \leq 22M\Omega$ | ±200<br>±100<br>±200 | Rated current<br>Max. current | 2.0<br>10.0 |
|                            | 1/2W              | -55°C to +155°C          | 200V | 400V | 500V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 1M\Omega$<br>$1\Omega \leq R \leq 1M\Omega$<br><50mΩ                                       | $1\Omega \leq R \leq 1M\Omega$                                                                    | ±200                 | Rated current<br>Max. current | 3.0<br>7.5  |
| RC1210                     | 1/2W              | -55°C to +155°C          | 200V | 500V | 500V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 22M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ  | $1\Omega \leq R \leq 10\Omega$<br>$10\Omega < R \leq 10M\Omega$<br>$10M\Omega < R \leq 22M\Omega$ | ±200<br>±100<br>±200 | Rated current<br>Max. current | 2.0<br>10.0 |
| RC1218                     | 1W                | -55°C to +155°C          | 200V | 500V | 500V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 1M\Omega$<br>$1\Omega \leq R \leq 1M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><20mΩ    |                                                                                                   |                      | Rated current<br>Max. current | 6.0<br>10.0 |
| RC2010                     | 3/4W              | -55°C to +155°C          | 200V | 500V | 500V | E24 ±5%<br>E24/E96 ±1%<br>E24/E96 ±0.5%<br>Jumper | $1\Omega \leq R \leq 22M\Omega$<br>$1\Omega \leq R \leq 10M\Omega$<br>$10\Omega \leq R \leq 1M\Omega$<br><50mΩ  |                                                                                                   |                      | Rated current<br>Max. current | 2.0<br>10.0 |
| RC2512                     | 1W                | -55°C to +155°C          | 200V | 500V | 500V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 150\Omega$<br>$1\Omega \leq R \leq 150\Omega$<br><50mΩ                                     |                                                                                                   |                      | Rated current<br>Max. current | 2.0<br>10.0 |
|                            | 2W                | -55°C to +155°C          | 200V | 400V | 500V | E24 ±5%<br>E24/E96 ±1%<br>Jumper                  | $1\Omega \leq R \leq 150\Omega$<br>$1\Omega \leq R \leq 150\Omega$<br><50mΩ                                     | $1\Omega \leq R \leq 150\Omega$                                                                   | ±200                 | Rated current<br>Max. current | 6.0<br>15.0 |

# Chip Resistors Selection Charts

## Thick film general purpose chip resistors, 01005 to 2512

| Environmental characteristics |                              |                          |                                                                                                                             |                                                                                                                                                       |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                   | Requirements                                                                                                                                          |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                      | 01005: ±(3% +0.05Ω)<br>< 100mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(3% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper                       |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                          | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper                         |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | 01005: ±(2.0% +0.05Ω)<br>< 100mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper                   |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                          | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper                       |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds        | Well tinned (≥95% covered)<br>No visible damage                                                                                                       |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                          | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05 Ω) for 5% tol.<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature                              | 01005: ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper<br>No visible damage    |





# Chip Resistors Selection Charts

## Thick film general purpose chip resistors, 01005 to 2512

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RC0402JR-07100KL

| RC                                                        | 0402 | J                                                                                                                                                                                                                                                 | R | —                                                                                                                                                                                                        | 07 | 100K                                                                                                    | L |
|-----------------------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------------------------------------|---|
| Series name (code 1-2)<br>RC = General purpose thick film |      | Size code (code 3-6)<br>(inch / metric)<br>0100 = 0.4 x 0.2<br>0201 = 0.6 x 0.3<br>0402 = 1.0 x 0.5<br>0603 = 1.6 x 0.8<br>0805 = 2.0 x 1.25<br>1206 = 3.2 x 1.6<br>1210 = 3.2 x 2.6<br>1218 = 3.2 x 4.5<br>2010 = 5.0 x 2.5<br>2512 = 6.35 x 3.2 |   | Tolerance (code 7)<br>D = $\pm 0.5\%$<br>F = $\pm 1\%$<br>J = $\pm 5\%$ (for Jumper ordering)                                                                                                            |    | Resistance (code 12-16)<br>0R = Jumper<br>10R = $10\Omega$<br>100R = $100\Omega$<br>100K = $100K\Omega$ |   |
|                                                           |      |                                                                                                                                                                                                                                                   |   | Taping reel (code 10-11)<br>07 = 7 inch Dia. reel<br>10 = 10 inch Dia. reel<br>13 = 13 inch Dia. reel<br>7D = 7 inch Dia. reel,<br>2 x standard quantity<br>7W = 7 inch Dia. reel,<br>2 x standard power |    | Default code <sup>(1/2)</sup> (code 17)                                                                 |   |
|                                                           |      |                                                                                                                                                                                                                                                   |   | T. C. R. (code 9)<br>"—" = Based on spec.<br>(— for thick film only)                                                                                                                                     |    |                                                                                                         |   |
|                                                           |      |                                                                                                                                                                                                                                                   |   | Packing style (code 8)<br>R = Paper tape reel<br>K = Embossed plastic tape reel<br>C = Bulk cassette<br>S = ESD safe reel                                                                                |    |                                                                                                         |   |

Note: 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

# Chip Resistors Selection Charts

Thick film general purpose chip resistors, 01005 to 2512

| Phycomp worldwide - Traditional type   |             |                 |                |                 |                 |                 |                 |                 |                |
|----------------------------------------|-------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|
| General purpose thick film / RC series |             |                 |                |                 |                 |                 |                 |                 |                |
| Size: inch (mm)                        | 0201 (0603) |                 | 0402 (1005)    |                 | 0603 (1608)     |                 | 0805 (2012)     |                 |                |
| Power                                  | 1/20 W      |                 | 1/16 W         |                 | 1/10 W          |                 | 1/8 W           |                 |                |
| Tolerance                              | +5%         | +1%             | +5%            | +1%             | +5%             | +1%             | +5%             | +1%             |                |
| Resistance                             | E24         | E24 / E96       | E24            | E24 / E96       | E24             | E24 / E96       | E24             | E24 / E96       |                |
| Packing                                | paper tape  |                 | paper tape     |                 | paper tape      |                 | paper tape      |                 |                |
| Quantity                               | 5 000       | ---             | ---            | ---             | 2322 702 60...L | 2322 704 6...L  | 2322 730 61...L | 2322 734 6...L  |                |
|                                        | 10 000      | 2322 803 70...L | 2322 806 7...L | 2322 705 70...L | 2322 706 7...L  | 2322 702 70...L | 2322 704 7...L  | 2322 730 71...L | 2322 734 7...L |
|                                        | 20 000      | 2322 806 80...L | 2322 806 8...L | ---             | ---             | 2322 702 81...L | 2322 704 8...L  | 2322 730 81...L | 2322 734 8...L |
|                                        | 50 000      | 2322 803 60...L | 2322 806 6...L | 2322 705 87...L | 2322 706 8...L  | ---             | ---             | ---             | ---            |
| Jumper                                 | 5 000       | ---             | ---            | ---             | 2322 702 96001L | ---             | 2322 730 91002L | ---             |                |
|                                        | 10 000      | 2322 803 91001L | ---            | 2322 705 91001L | ---             | 2322 702 97001L | ---             | 2322 730 91003L | ---            |
|                                        | 20 000      | ---             | ---            | ---             | 2322 702 92002L | ---             | 2322 730 92002L | ---             | ---            |
|                                        | 50 000      | ---             | ---            | 2322 705 91007L | ---             | ---             | ---             | ---             | ---            |

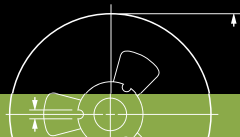
For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type   |             |                 |                |                 |                 |                |                 |                |                 |
|----------------------------------------|-------------|-----------------|----------------|-----------------|-----------------|----------------|-----------------|----------------|-----------------|
| General purpose thick film / RC series |             |                 |                |                 |                 |                |                 |                |                 |
| Size: inch (mm)                        | 1206 (3216) |                 | 1210 (3225)    |                 | 1218 (3248)     |                | 2010 (5025)     |                | 2512 (6432)     |
| Power                                  | 1/4 W       |                 | 1/2 W          |                 | 1 W             |                | 3/4 W           |                | 1 W             |
| Tolerance                              | +5%         | +1%             | +5%            | +1%             | +5%             | +1%            | +5%             | +1%            | +5%             |
| Resistance                             | E24         | E24 / E96       | E24            | E24 / E96       | E24             | E24 / E96      | E24             | E24 / E96      | E24 / E96       |
| Packing                                | paper tape  |                 | paper tape     |                 | blister tape    |                | blister tape    |                | blister tape    |
| Quantity                               | 4 000       | ---             | ---            | ---             | 2322 735 64...L | 2322 735 7...L | 2322 760 60...L | 2322 761 6...L | 2322 762 60...L |
|                                        | 5 000       | 2322 711 61...L | 2322 724 6...L | 2390 735 70...L | 2390 735 3...L  | ---            | ---             | ---            | ---             |
|                                        | 10 000      | 2322 711 51...L | 2322 724 7...L | ---             | ---             | ---            | ---             | ---            | ---             |
|                                        | 20 000      | 2322 711 81...L | 2322 724 8...L | 2390 735 71...L | 2390 735 5...L  | ---            | ---             | ---            | ---             |
| Jumper                                 | 4 000       | ---             | ---            | ---             | 2322 735 90007L | ---            | 2322 760 90003L | ---            | 2322 762 90000L |
|                                        | 5 000       | 2322 711 91032L | ---            | 2390 735 90001L | ---             | ---            | ---             | ---            | ---             |
|                                        | 10 000      | 2322 711 91005L | ---            | ---             | ---             | ---            | ---             | ---            | ---             |
|                                        | 20 000      | 2322 711 92004L | ---            | ---             | ---             | ---            | ---             | ---            | ---             |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |  |  |  |  |  |  |  |  |  |





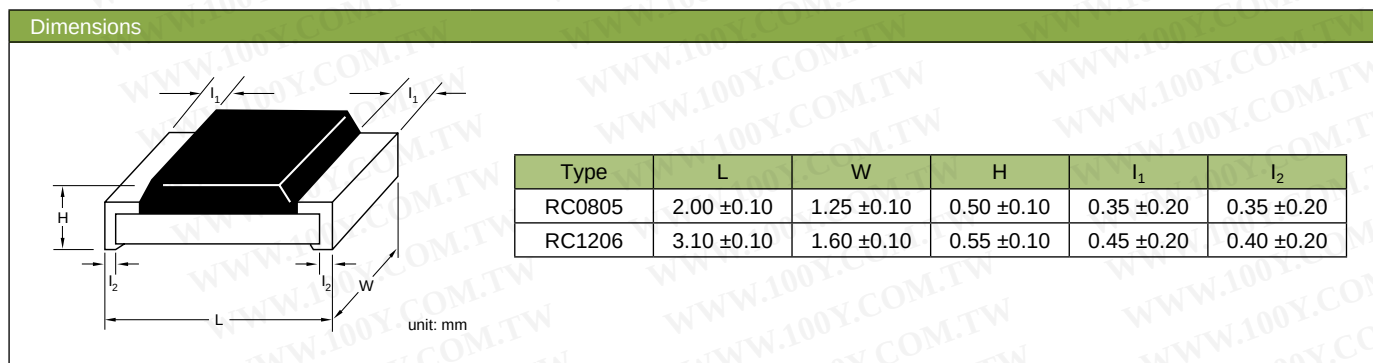
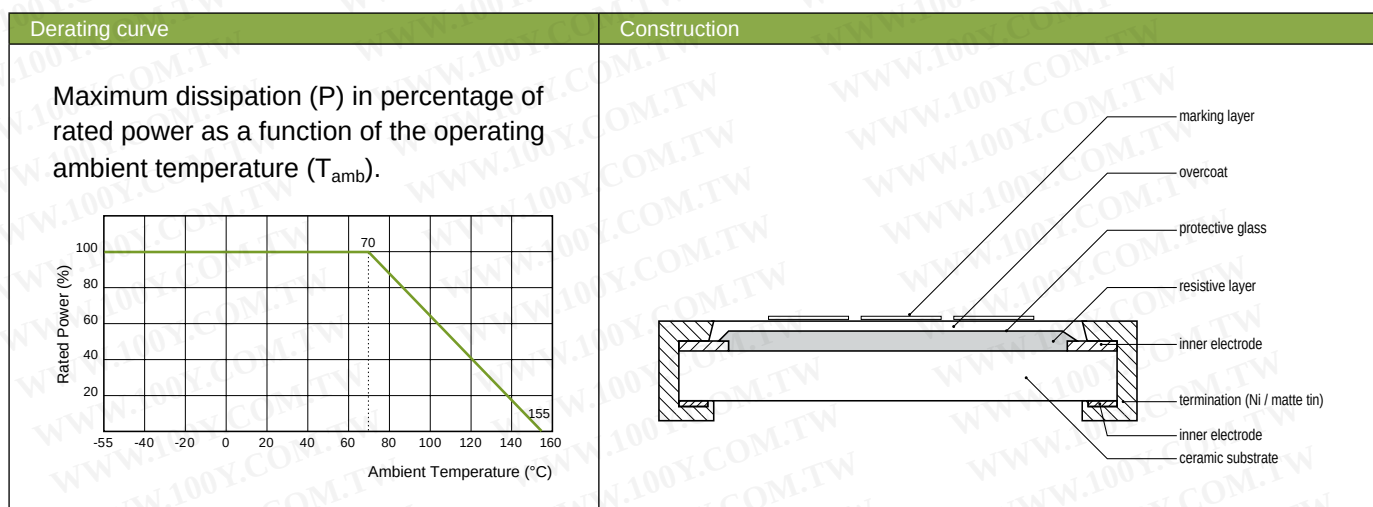
# Chip Resistors Selection Charts

Thick film high ohmic chip resistors, 0805 / 1206



## Features

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- High ohmic values up to 100MΩ
- Suitable for power supplies in small equipment





# Chip Resistors Selection Charts

## Thick film high ohmic chip resistors, 0805 / 1206

| Electrical characteristics |                   |                          |      |      |      |                                         |                                                  |                                      |
|----------------------------|-------------------|--------------------------|------|------|------|-----------------------------------------|--------------------------------------------------|--------------------------------------|
| Type                       | Power<br>$P_{70}$ | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance            |                                                  | T. C. R.                             |
| RC0805                     | 1/8W              | -55°C to +155°C          | 150V | 300V | 300V | E24 $\pm 5\%$ , $\pm 10\%$ , $\pm 20\%$ | $24\text{M}\Omega \leq R \leq 100\text{M}\Omega$ | $\pm 300 \text{ ppm}/^\circ\text{C}$ |
| RC1206                     | 1/4W              | -55°C to +155°C          | 200V | 400V | 500V |                                         |                                                  |                                      |

**Note:** See page 11 for ordering code. For more detailed, please contact our sales offices, distributors and representatives in your region.

| Environmental characteristics |                              |                          |                                                                                                                                                         |
|-------------------------------|------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Performance test              |                              | Test method              | Requirements                                                                                                                                            |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at $70 \pm 5^\circ\text{C}$ applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                                 |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                                                   |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with $25^\circ\text{C}$ / $65^\circ\text{C}$ 95% R.H |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                                      |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at $245 \pm 3^\circ\text{C}$<br>Dipping time: $3 \pm 0.5$ seconds              |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, $260^\circ\text{C}$ , 10 seconds immersion time                                                                                       |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature                                                          |



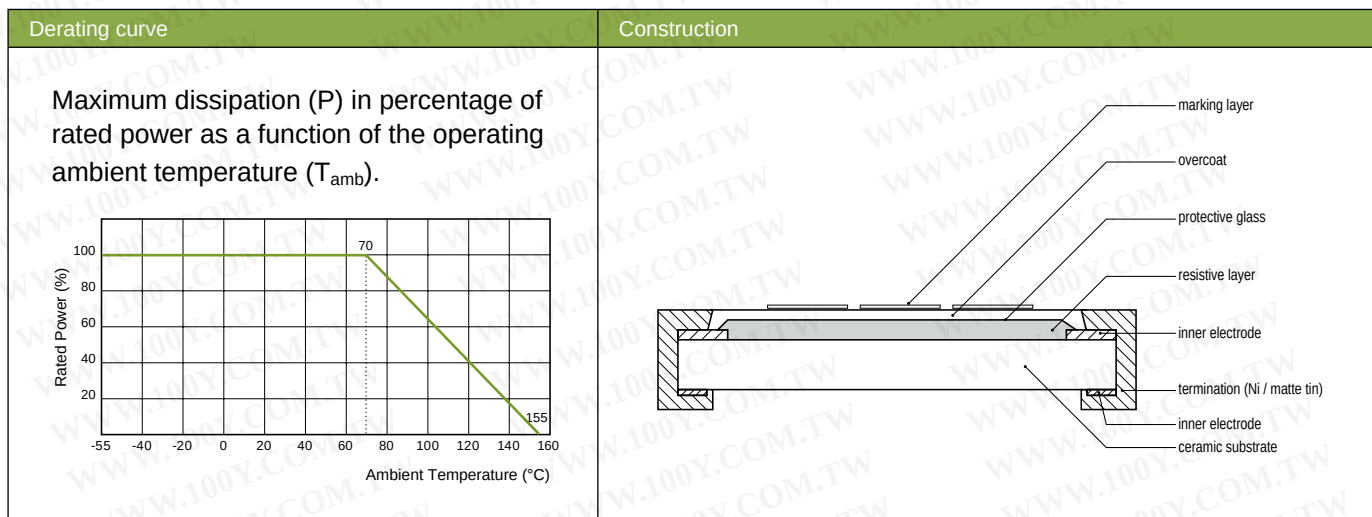
# Chip Resistors Selection Charts

Thick film precision grade chip resistors, 0402 to 1206



## Features

- Narrow tolerance
- Low T. C. R.
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Suitable for auto-placement surface mounting applications
- Available in 8mm tape & reel per EIA RS481



## Dimensions

A 3D perspective diagram of a chip resistor. The dimensions are labeled as follows:  $L$  is the length,  $W$  is the width,  $H$  is the height,  $I_1$  is the distance from the end face to the start of the resistive element, and  $I_2$  is the distance from the end face to the end of the resistive element. The resistive element is shown as a black rectangular area on top of the resistor body.

unit: mm

| Type   | L               | W               | H               | $I_1$           | $I_2$           |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|
| RE0402 | $1.00 \pm 0.05$ | $0.50 \pm 0.05$ | $0.32 \pm 0.05$ | $0.20 \pm 0.10$ | $0.25 \pm 0.10$ |
| RE0603 | $1.60 \pm 0.10$ | $0.80 \pm 0.10$ | $0.45 \pm 0.10$ | $0.25 \pm 0.15$ | $0.25 \pm 0.15$ |
| RE0805 | $2.00 \pm 0.10$ | $1.25 \pm 0.10$ | $0.50 \pm 0.10$ | $0.35 \pm 0.20$ | $0.35 \pm 0.20$ |
| RE1206 | $3.10 \pm 0.10$ | $1.60 \pm 0.10$ | $0.55 \pm 0.10$ | $0.45 \pm 0.20$ | $0.40 \pm 0.20$ |

# Chip Resistors Selection Charts

Thick film precision grade chip resistors, 0402 to 1206

| Electrical characteristics |                   |                       |      |      |      |                                 |                                 |                                     |
|----------------------------|-------------------|-----------------------|------|------|------|---------------------------------|---------------------------------|-------------------------------------|
| Type                       | Power<br>$P_{70}$ | Operating Temp. range | MWV  | RCOV | DWV  | Resistance range & tolerance    |                                 | T. C. R.                            |
| RE0402                     | 1/16W             | -55°C to +155°C       | 50V  | 100V | 100V | E24/E96 $\pm 0.5\%$ , $\pm 1\%$ | $10\Omega \leq R \leq 1M\Omega$ | $\pm 50 \text{ ppm}/^\circ\text{C}$ |
| RE0603                     | 1/10W             | -55°C to +155°C       | 50V  | 100V | 100V |                                 |                                 |                                     |
| RE0805                     | 1/8W              | -55°C to +155°C       | 150V | 300V | 300V |                                 |                                 |                                     |
| RE1206                     | 1/4W              | -55°C to +155°C       | 200V | 400V | 500V |                                 |                                 |                                     |

| Environmental characteristics |                              |                           |                                                                                                                                                               |                                                         |
|-------------------------------|------------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Performance test              |                              | Test method               | Procedure                                                                                                                                                     | Requirements                                            |
| Life                          |                              | MIL-STD-202G-method 108A  | 1 000 hours at $70 \pm 5^\circ\text{C}$ applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                                       | $\pm(3\% + 0.05\Omega)$                                 |
| High temperature exposure     |                              | MIL-STD-202G-method 108A  | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                                                         | $\pm(3\% + 0.05\Omega)$                                 |
| Moisture resistance           |                              | MIL-STD-202G-method 106F  | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with $25^\circ\text{C}$ / $65^\circ\text{C}$ 95% R.H | $\pm(3\% + 0.05\Omega)$                                 |
| Thermal shock                 |                              | MIL-STD-202G-method 107G  | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                                            | $\pm(1\% + 0.05\Omega)$                                 |
| Solderability                 | Wetting                      | IPC/JEDECJ-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at $245 \pm 3^\circ\text{C}$<br>Dipping time: $3 \pm 0.5$ seconds                    | Well tinned ( $\geq 95\%$ covered)<br>No visible damage |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F  | Lead-free solder, $260^\circ\text{C}$ , 10 seconds immersion time                                                                                             | $\pm(0.5\% + 0.05\Omega)$<br>No visible damage          |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5  | 2.5 times RCWV or maximum overload voltage which-<br>ever is less for 5 seconds at room temperature                                                           | $\pm(1\% + 0.05\Omega)$<br>No visible damage            |



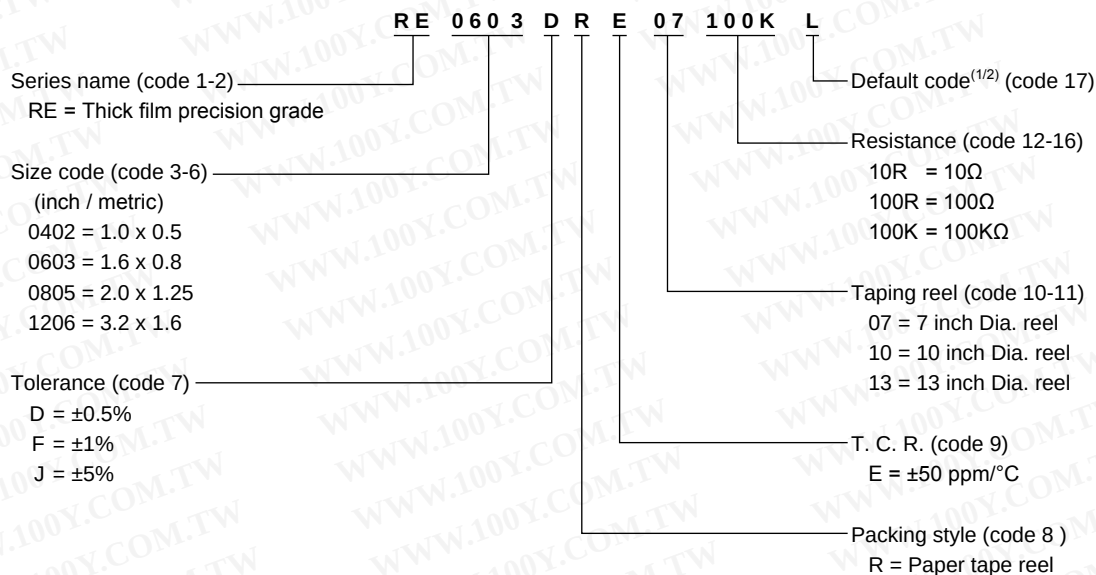


# Chip Resistors Selection Charts

## Thick film precision grade chip resistors, 0402 to 1206

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RE0603DRE07100KL



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only  
3. RE series products are available by "Global part number" only

Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.



# Chip Resistors Selection Charts

Thin film high precision high stability chip resistors, 0402 to 2512

## Features

RT series

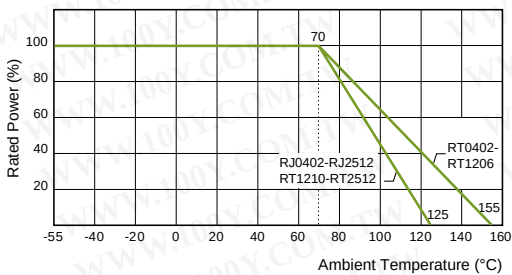
- High precision - High stability
- Low T. C. R. / low noise
- High accuracy ( $\pm 0.05\%$ ,  $\pm 0.1\%$ ,  $\pm 0.25\%$ ,  $\pm 0.5\%$ ,  $\pm 1\%$ )

RJ series

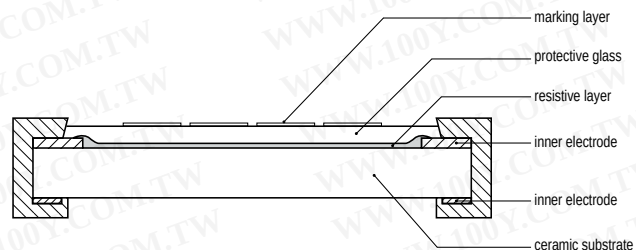
- General purpose
- T. C. R.:  $\pm 50 \text{ ppm}/^\circ\text{C}$
- Tolerance:  $\pm 1\%$

### Derating curve

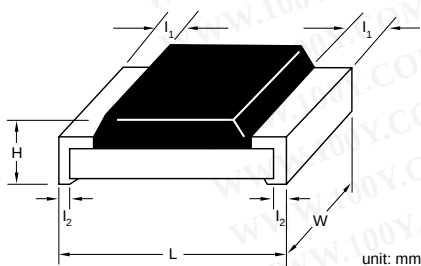
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ( $T_{\text{amb}}$ ).



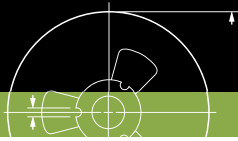
### Construction



### Dimensions



| Type         | L               | W               | H               | $l_1$           | $l_2$           |
|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| RT / RJ0402  | $1.00 \pm 0.10$ | $0.50 \pm 0.05$ | $0.30 \pm 0.05$ | $0.20 \pm 0.10$ | $0.25 \pm 0.10$ |
| RT / RJ0603  | $1.60 \pm 0.10$ | $0.80 \pm 0.10$ | $0.45 \pm 0.10$ | $0.25 \pm 0.15$ | $0.25 \pm 0.15$ |
| RT / RJ 0805 | $2.00 \pm 0.10$ | $1.25 \pm 0.10$ | $0.50 \pm 0.10$ | $0.35 \pm 0.20$ | $0.35 \pm 0.20$ |
| RT / RJ1206  | $3.10 \pm 0.10$ | $1.60 \pm 0.10$ | $0.55 \pm 0.10$ | $0.45 \pm 0.20$ | $0.40 \pm 0.20$ |
| RT / RJ1210  | $3.10 \pm 0.10$ | $2.60 \pm 0.15$ | $0.55 \pm 0.10$ | $0.50 \pm 0.20$ | $0.50 \pm 0.20$ |
| RT / RJ2010  | $5.00 \pm 0.10$ | $2.50 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.20$ | $0.50 \pm 0.20$ |
| RT / RJ2512  | $6.35 \pm 0.10$ | $3.20 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.20$ | $0.50 \pm 0.20$ |



# Chip Resistors Selection Charts

Thin film high precision high stability chip resistors, 0402 to 2512

| Electrical characteristics |                   |                          |      |      |      |                                                                                   |                                    |                                                                          |
|----------------------------|-------------------|--------------------------|------|------|------|-----------------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------|
| Type                       | Power<br>$P_{70}$ | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance                                                      |                                    | T. C. R.                                                                 |
| RT0402                     | 1/16W             | -55°C to +155°C          | 50V  | 100V | 75V  | E24/E96<br>$\pm 0.05\%$ , $\pm 0.1\%$ ,<br>$\pm 0.25\%$ , $\pm 0.5\%$ , $\pm 1\%$ | $10\Omega \leq R \leq 121K\Omega$  | $\pm 50$ ppm/°C<br>$\pm 25$ ppm/°C<br>$\pm 15$ ppm/°C<br>$\pm 10$ ppm/°C |
| RT0603                     | 1/10W             |                          | 75V  | 150V | 100V |                                                                                   | $5.1\Omega \leq R \leq 681K\Omega$ |                                                                          |
| RT0805                     | 1/8W              |                          | 150V | 300V | 200V |                                                                                   | $5.1\Omega \leq R \leq 1.5M\Omega$ |                                                                          |
| RT1206                     | 1/4W              |                          | 200V | 400V | 300V |                                                                                   | $5.1\Omega \leq R \leq 1M\Omega$   |                                                                          |
| RT1210                     | 1/4W              | -55°C to +125°C          | 200V | 400V | 400V | E24/E96 $\pm 1\%$                                                                 | $10\Omega \leq R \leq 1M\Omega$    | $\pm 50$ ppm/°C                                                          |
| RT2010                     | 1/2W              |                          | 200V | 400V | 400V |                                                                                   | $10\Omega \leq R \leq 1M\Omega$    |                                                                          |
| RT2512                     | 3/4W              |                          | 200V | 400V | 400V |                                                                                   | $10\Omega \leq R \leq 1M\Omega$    |                                                                          |
| RJ0402                     | 1/16W             |                          | 25V  | 100V | 100V |                                                                                   | $10\Omega \leq R \leq 121K\Omega$  |                                                                          |
| RJ0603                     | 1/16W             |                          | 50V  | 100V | 100V |                                                                                   | $5.1\Omega \leq R \leq 681K\Omega$ |                                                                          |
| RJ0805                     | 1/10W             |                          | 100V | 200V | 250V |                                                                                   | $5.1\Omega \leq R \leq 1.5M\Omega$ |                                                                          |
| RJ1206                     | 1/8W              |                          | 150V | 250V | 250V |                                                                                   | $5.1\Omega \leq R \leq 1.5M\Omega$ |                                                                          |
| RJ1210                     | 1/4W              |                          | 150V | 300V | 400V |                                                                                   | $10\Omega \leq R \leq 1M\Omega$    |                                                                          |
| RJ2010                     | 1/2W              |                          | 150V | 300V | 400V |                                                                                   | $10\Omega \leq R \leq 1M\Omega$    |                                                                          |
| RJ2512                     | 3/4W              |                          | 150V | 300V | 400V |                                                                                   | $10\Omega \leq R \leq 1M\Omega$    |                                                                          |

| Environmental characteristics |                                 |                          |                                                                                                                                            |                                                                                         |
|-------------------------------|---------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Performance test              |                                 | Test method              | Procedure                                                                                                                                  | Requirements                                                                            |
| Life                          |                                 | MIL-STD-202G-method 108A | 1 000 hours at 70 $\pm 5^\circ\text{C}$ applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                    | $\pm(0.5\% + 0.05\Omega)$ for RT<br>$\pm(1\% + 0.05\Omega)$ for RJ                      |
| High temperature exposure     |                                 | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                                      | $\pm(0.5\% + 0.05\Omega)$                                                               |
| Moisture resistance           |                                 | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours<br>(method 106F), 3 cycles / 24 hours for 10d with<br>25°C / 65°C 95% R.H          | $\pm(0.5\% + 0.05\Omega)$                                                               |
| Thermal shock                 |                                 | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                         | $\pm(0.5\% + 0.05\Omega)$                                                               |
| Short time overload           |                                 | MIL-R-55342D-para 4.7.5  | 2.5 times RCWV or maximum overload voltage which-<br>ever is less for 5 seconds at room temperature                                        | $\pm(0.5\% + 0.05\Omega)$ for RT<br>$\pm(1\% + 0.05\Omega)$ for RJ<br>No visible damage |
| Solderability                 | Resistance to<br>soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                         | $\pm(0.5\% + 0.05\Omega)$<br>No visible damage                                          |
|                               | Wetting                         | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 $\pm 3^\circ\text{C}$<br>Dipping time: 3 $\pm 0.5$ seconds | Well tinned ( $\geq 95\%$ covered)<br>No visible damage                                 |

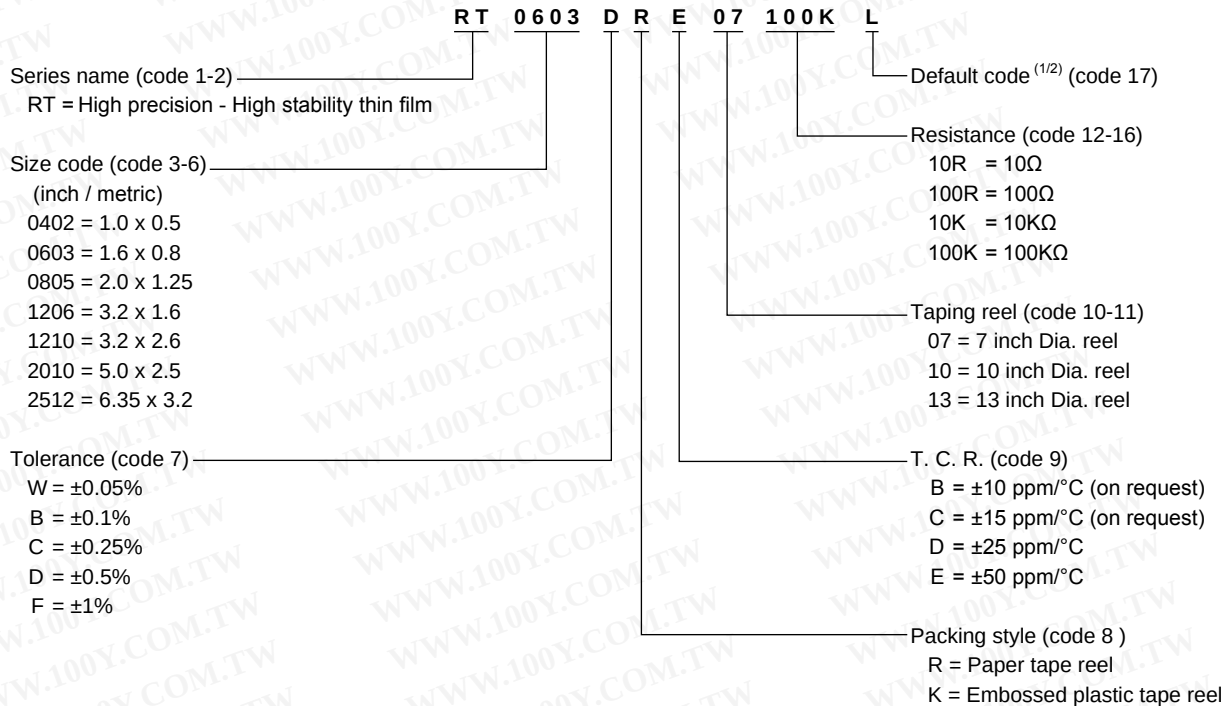


# Chip Resistors Selection Charts

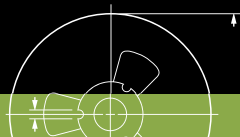
Thin film high precision high stability chip resistors, 0402 to 2512

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RT0603DRE07100KL



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only



# Chip Resistors Selection Charts

Thin film high precision high stability chip resistors, 0402 to 2512

| Phycomp worldwide - Traditional type |                 |                 |                 |                 |                 |                 |                 |                 |
|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| High precision - High stability      |                 |                 |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                      | 0402 (1005)     |                 |                 |                 | 0603 (1608)     |                 |                 |                 |
| Power                                | 1/16 W          |                 |                 |                 | 1/10 W          |                 |                 |                 |
| Tolerance                            | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           |
| Resistance                           | E24 / E96       |                 |                 |                 | E24 / E96       |                 |                 |                 |
| Packing                              | paper tape      |                 |                 |                 | paper tape      |                 |                 |                 |
| Quantity <b>TC25</b> 5 000           | ---             | ---             | ---             | ---             | 2390 604 7....L | 2390 604 6....L | 2390 604 5....L | 2390 604 4....L |
| <b>TC50</b> 5 000                    | ---             | ---             | ---             | ---             | 2390 404 7....L | 2390 404 6....L | 2390 404 5....L | 2390 404 4....L |
| <b>TC25</b> 10 000                   | 2390 607 7....L | 2390 607 6....L | 2390 607 5....L | 2390 607 4....L | ---             | ---             | ---             | ---             |
| <b>TC50</b> 10 000                   | 2390 407 7....L | 2390 407 6....L | 2390 407 5....L | 2390 407 4....L | ---             | ---             | ---             | ---             |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| High precision - High stability      |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                      | 0805 (2012)     |                 |                 |                 | 1206 (3216)     |                 |                 |                 | 1210 (3225)     |                 |                 |                 |
| Power                                | 1/8 W           |                 |                 |                 | 1/4 W           |                 |                 |                 | 1/2 W           |                 |                 |                 |
| Tolerance                            | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           |
| Resistance                           | E24 / E96       |                 |                 |                 | E24 / E96       |                 |                 |                 | E24 / E96       |                 |                 |                 |
| Packing                              | paper tape      |                 |                 |                 | paper tape      |                 |                 |                 | paper tape      |                 |                 |                 |
| Quantity <b>TC10</b> 5 000           | 2390 801 7....L | 2390 801 6....L | 2390 801 5....L | 2390 801 4....L | 2390 811 7....L | 2390 811 6....L | 2390 811 5....L | 2390 811 4....L | 2390 812 7....L | 2390 812 6....L | 2390 812 5....L | 2390 812 4....L |
| <b>TC15</b> 5 000                    | 2390 701 7....L | 2390 701 6....L | 2390 701 5....L | 2390 701 4....L | 2390 711 7....L | 2390 711 6....L | 2390 711 5....L | 2390 711 4....L | 2390 712 7....L | 2390 712 6....L | 2390 712 5....L | 2390 712 4....L |
| <b>TC25</b> 5 000                    | 2390 601 7....L | 2390 601 6....L | 2390 601 5....L | 2390 601 4....L | 2390 611 7....L | 2390 611 6....L | 2390 611 5....L | 2390 611 4....L | 2390 612 7....L | 2390 612 6....L | 2390 612 5....L | 2390 612 4....L |
| <b>TC50</b> 5 000                    | 2390 401 7....L | 2390 401 6....L | 2390 401 5....L | 2390 401 4....L | 2390 411 7....L | 2390 411 6....L | 2390 411 5....L | 2390 411 4....L | 2390 412 7....L | 2390 412 6....L | 2390 412 5....L | 2390 412 4....L |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type |                 |                 |                 |                 |                 |                 |                 |                 |
|--------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| High precision - High stability      |                 |                 |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                      | 2010 (5025)     |                 |                 |                 | 2512 (6432)     |                 |                 |                 |
| Power                                | 1/2 W           |                 |                 |                 | 3/4 W           |                 |                 |                 |
| Tolerance                            | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           | ±1%             | ±0.5%           | ±0.25%          | ±0.1%           |
| Resistance                           | E24 / E96       |                 |                 |                 | E24 / E96       |                 |                 |                 |
| Packing                              | blister tape    |                 |                 |                 | blister tape    |                 |                 |                 |
| Quantity <b>TC10</b> 4 000           | 2390 815 7....L | 2390 815 6....L | 2390 815 5....L | 2390 815 4....L | 2390 818 7....L | 2390 818 6....L | 2390 818 5....L | 2390 818 4....L |
| <b>TC15</b> 4 000                    | 2390 731 7....L | 2390 731 6....L | 2390 731 5....L | 2390 731 4....L | 2390 735 7....L | 2390 735 6....L | 2390 735 5....L | 2390 735 4....L |
| <b>TC25</b> 4 000                    | 2390 615 7....L | 2390 615 6....L | 2390 615 5....L | 2390 615 4....L | 2390 618 7....L | 2390 618 6....L | 2390 618 5....L | 2390 618 4....L |
| <b>TC50</b> 4 000                    | 2390 415 7....L | 2390 415 6....L | 2390 415 5....L | 2390 415 4....L | 2390 418 7....L | 2390 418 6....L | 2390 418 5....L | 2390 418 4....L |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |  |
|--------------------------------------------------------------------------------------|--|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |  |

| Thin film product range against tolerance / T. C. R. (ordering code) |             |             |             |            |            |            |            |            |            |            |            |            |            |            |
|----------------------------------------------------------------------|-------------|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Tolerance                                                            | ±0.05% (W)  |             |             | ±0.1% (B)  |            |            |            | ±0.25% (C) |            |            |            | ±0.5% (D)  |            | ±1% (F)    |
| T. C. R. (ppm/°C)                                                    | ±10 (B)     | ±15 (C)     | ±25 (D)     | ±10 (B)    | ±15 (C)    | ±25 (D)    | ±50 (E)    | ±10 (B)    | ±15 (C)    | ±25 (D)    | ±50 (E)    | ±25 (D)    | ±50 (E)    | ±50 (E)    |
| RT0402                                                               | --          | --          | --          | 10R - 100K | 10R - 100K | 10R - 121K | 10R - 121K | 10R - 100K | 10R - 100K | 10R - 121K | 10R - 121K | 10R - 121K | 10R - 121K | 10R - 121K |
| RT0603                                                               | 1K - 47K    | 1K - 47K    | 1K - 47K    | 10R - 100K | 10R - 100K | 10R - 681K | 10R - 681K | 10R - 100K | 10R - 100K | 10R - 681K | 5R1 - 681K | 10R - 681K | 5R1 - 681K | 5R1 - 681K |
| RT0805                                                               | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1.5M | 10R - 1.5M | 10R - 100K | 10R - 100K | 10R - 1.5M | 5R1 - 1.5M | 10R - 1.5M | 5R1 - 1.5M | 5R1 - 1.5M |
| RT1206                                                               | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1.5M | 10R - 1.5M | 10R - 100K | 10R - 100K | 10R - 1.5M | 5R1 - 1.5M | 10R - 1.5M | 5R1 - 1.5M | 5R1 - 1.5M |
| RT1210                                                               | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M   | 10R - 1M   | 10R - 100K | 10R - 100K | 10R - 1M   | 5R1 - 1M   | 10R - 1M   | 5R1 - 1M   | 5R1 - 1M   |
| RT2010                                                               | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M   | 10R - 1M   | 10R - 100K | 10R - 100K | 10R - 1M   | 10R - 1M   | 10R - 1M   | 10R - 1M   | 10R - 1M   |
| RT2512                                                               | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M   | 10R - 1M   | 10R - 100K | 10R - 100K | 10R - 1M   | 10R - 1M   | 10R - 1M   | 10R - 1M   | 10R - 1M   |



# Chip Resistors Selection Charts

## Thin film general purpose chip resistors, 0402 to 2512

| Global part number - Preferred type for ordering Yageo / Phycomp branded products                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: RJ0603FRE07100KL                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>R J 0 6 0 3 F R E 0 7 1 0 0 K L</b></p> <p>Series name (code 1-2) <b>RJ</b><br/>RJ = General purpose thin film</p> <p>Size code (code 3-6) <b>0603</b><br/>(inch / metric)<br/>0402 = 1.0 x 0.5<br/>0603 = 1.6 x 0.8<br/>0805 = 2.0 x 1.25<br/>1206 = 3.2 x 1.6<br/>1210 = 3.2 x 2.6<br/>2010 = 5.0 x 2.5<br/>2512 = 6.35 x 3.2</p> <p>Tolerance (code 7) <b>F</b><br/>F = ±1%</p> | <p><b>0 7 1 0 0 K L</b></p> <p>Resistance (code 12-16)<br/>10R = 10Ω<br/>100R = 100Ω<br/>10K = 10KΩ<br/>100K = 100KΩ</p> <p>Taping reel (code 10-11)<br/>07 = 7 inch Dia. reel<br/>10 = 10 inch Dia. reel<br/>13 = 13 inch Dia. reel</p> <p>T. C. R. (code 9)<br/>E = ±50 ppm/°C</p> <p>Packing style (code 8)<br/>R = Paper tape reel<br/>K = Embossed plastic tape reel</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type  |             |                 |                 |                 |                 |                 |                 |
|---------------------------------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| General purpose thin film / RJ series |             |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                       | 0402 (1005) | 0603 (1608)     | 0805 (2012)     | 1206 (3216)     | 1210 (3225)     | 2010 (5025)     | 2512 (6432)     |
| Power                                 | 1/16 W      | 1/16 W          | 1/10 W          | 1/8 W           | 1/4 W           | 1/2 W           | 3/4 W           |
| Tolerance                             | +1%         | +1%             | +1%             | +1%             | +1%             | +1%             | +1%             |
| Resistance                            | E24 / E96   | E24 / E96       | E24 / E96       | E24 / E96       | E24 / E96       | E24 / E96       | E24 / E96       |
| Packing                               | paper tape  | paper tape      | paper tape      | paper tape      | paper tape      | blister tape    | blister tape    |
| Quantity                              | 4 000       | ---             | ---             | ---             | ---             | 2390 415 8....L | 2390 418 8....L |
|                                       | 5 000       | ---             | 2390 404 8....L | 2390 401 8....L | 2390 411 8....L | 2390 412 0....L | ---             |
|                                       | 10 000      | 2390 407 8....L | 2391 424 8....L | 2391 421 8....L | 2391 431 8....L | 2391 432 8....L | ---             |
|                                       | 20 000      | 2390 427 8....L | 2392 444 8....L | 2392 441 8....L | 2392 451 8....L | 2392 412 8....L | ---             |
|                                       | 50 000      | 2390 447 8....L | ---             | ---             | ---             | ---             | ---             |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |
|--------------------------------------------------------------------------------------|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |

| Thin film product range against tolerance / T. C. R. (ordering code) |            |
|----------------------------------------------------------------------|------------|
| Tolerance                                                            | ±1% (F)    |
| T. C. R. (ppm/°C)                                                    | ±50 (E)    |
| RJ0402                                                               | 10R - 121K |
| RJ0603                                                               | 5R1 - 681K |
| RJ0805                                                               | 5R1 - 1.5M |
| RJ1206                                                               | 5R1 - 1.5M |
| RJ1210                                                               | 10R - 1M   |
| RJ2010                                                               | 10R - 1M   |
| RJ2512                                                               | 10R - 1M   |



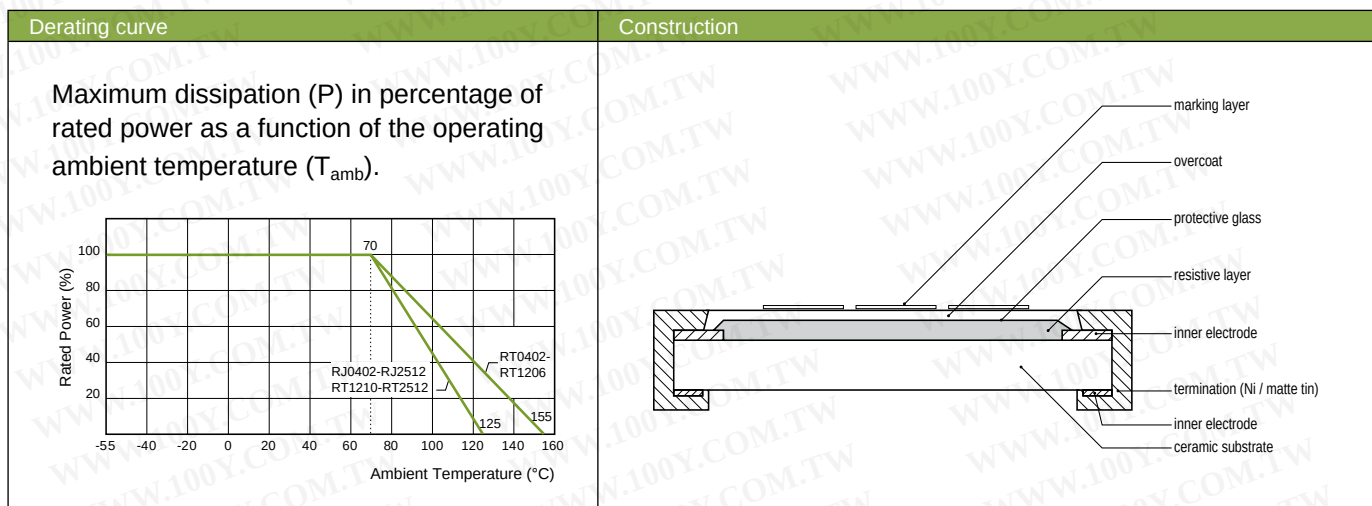
# Chip Resistors Selection Charts

## Thick film low ohmic chip resistors, 0402 to 2512



### Features

- Current sensing of desktop & notebook PC
- Resistance values down to  $0.01\Omega$
- Highly reliable multilayer electrode construction
- Low inductance
- High speed logic circuits



## Dimensions

A 3D perspective diagram of a chip resistor. The dimensions are labeled as follows: L is the length of the resistor body, W is the width, H is the height, I<sub>1</sub> is the length of the top lead, and I<sub>2</sub> is the length of the bottom lead. The unit is specified as mm.

| Type   | L          | W          | H          | I <sub>1</sub> | I <sub>2</sub> |
|--------|------------|------------|------------|----------------|----------------|
| RL0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10     | 0.25 ±0.10     |
| RL0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15     | 0.25 ±0.15     |
| RL0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20     | 0.35 ±0.20     |
| RL1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20     | 0.45 ±0.20     |
| RL1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.55 ±0.10 | 0.50 ±0.20     | 0.50 ±0.20     |
| RL1218 | 3.05 ±0.15 | 4.60 ±0.20 | 0.55 ±0.10 | 0.45 ±0.25     | 0.50 ±0.25     |
| RL2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20     | 0.50 ±0.20     |
| RL2512 | 6.35 ±0.10 | 3.20 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20     | 0.50 ±0.20     |



# Chip Resistors Selection Charts

## Thick film low ohmic chip resistors, 0402 to 2512

| Electrical characteristics |                          |                          |                              |               |                                         |
|----------------------------|--------------------------|--------------------------|------------------------------|---------------|-----------------------------------------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | Resistance range & tolerance |               | T. C. R.<br>( ppm/°C)                   |
| RL0402                     | 1/16W                    | -55°C to +125°C          | E24 ±1%, ±2%, ±5%            | 50mΩ ≤ R < 1Ω | See following table “T.C.R.- RL series” |
| RL0603                     | 1/10W                    | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
| RL0805                     | 1/8W                     | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
|                            | 1/4W                     | -55°C to +125°C          |                              | 15mΩ ≤ R < 1Ω |                                         |
| RL1206                     | 1/4W                     | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
|                            | 1/2W                     | -55°C to +125°C          |                              | 15mΩ ≤ R < 1Ω |                                         |
| RL1210                     | 1/2W                     | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
| RL1218                     | 1W                       | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
| RL2010                     | 3/4W                     | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |
| RL2512                     | 1W                       | -55°C to +125°C          |                              | 10mΩ ≤ R < 1Ω |                                         |

Note: The partial values of 25 / 40 / 50 / 60 / 250 / 400 / 500 mΩ are also available

| T. C. R. - RL series |                          |                     |               |               |               |              |               |
|----------------------|--------------------------|---------------------|---------------|---------------|---------------|--------------|---------------|
| Type                 | Operating<br>Temp. range | Resistance<br>range | T. C. R.      |               |               |              |               |
|                      |                          |                     | 50mΩ≤R<100mΩ  | 100mΩ≤R<500mΩ | 500mΩ≤R<1Ω    |              |               |
| RL0402               | -55°C to +125°C          | 50mΩ≤R<1Ω           | ±1000 ppm/°C  | ±800 ppm/°C   | ±300 ppm/°C   |              |               |
|                      |                          |                     | 10mΩ≤R≤36mΩ   | 36mΩ≤R≤91mΩ   | 91mΩ≤R≤500mΩ  | 500mΩ≤R<1Ω   |               |
| RL0603               | -55°C to +125°C          | 10mΩ≤R<1Ω           | ±1 500 ppm/°C | ±1 200 ppm/°C | ±800 ppm/°C   | ±300 ppm/°C  |               |
|                      |                          |                     | 10mΩ≤R≤18mΩ   | 18mΩ≤R≤47mΩ   | 47mΩ≤R≤91mΩ   | 91mΩ≤R≤360mΩ | 360mΩ≤R≤500mΩ |
| RL0805               | -55°C to +125°C          | 10mΩ≤R<1Ω           | ±1 500 ppm/°C | ±1 200 ppm/°C | ±1 000 ppm/°C | ±600 ppm/°C  | ±300 ppm/°C   |
| RL1206               |                          |                     |               |               |               |              |               |
| RL1210               | -55°C to +125°C          | 10mΩ≤R<1Ω           | ±1 500 ppm/°C | ±1 000 ppm/°C | ±800 ppm/°C   | ±600 ppm/°C  | ±300 ppm/°C   |
|                      |                          |                     | 10mΩ≤R≤30mΩ   | 30mΩ≤R≤56mΩ   | 56mΩ≤R≤180mΩ  | 180mΩ≤R<1Ω   |               |
| RL1218               | -55°C to +125°C          | 10mΩ≤R<1Ω           | ±2 000 ppm/°C | ±1 000 ppm/°C | ±700 ppm/°C   | ±250 ppm/°C  |               |
|                      |                          |                     | 10mΩ≤R≤18mΩ   | 18mΩ≤R≤47mΩ   | 47mΩ≤R≤91mΩ   | 91mΩ≤R≤360mΩ | 360mΩ≤R≤500mΩ |
| RL2010               | -55°C to +125°C          | 10mΩ≤R<1Ω           | ±1 500 ppm/°C | ±1 200 ppm/°C | ±1 000 ppm/°C | ±600 ppm/°C  | ±300 ppm/°C   |
| RL2512               |                          |                     |               |               |               |              |               |

| Environmental characteristics |                              |                          |                                                                                                                                                                 |                                                    |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                                                       | Requirements                                       |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70°C ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                                                        | ±2%                                                |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                                                              | ±1%                                                |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H                                     | ±2%                                                |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                                              | ±1%                                                |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds                                            | Well tinned<br>(≥95% covered)<br>No visible damage |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                                              | ±1%<br>No visible damage                           |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | RL standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>RL high power:<br>5 times of rated power for 5 seconds at room temperature | ±2%<br>No visible damage                           |



# Chip Resistors Selection Charts

## Thick film low ohmic chip resistors, 0402 to 2512

| Global part number - Preferred type                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: RL0603JR-070R01L                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <p>Series name (code 1-2)</p> <p>RL = Thick Film Low ohmic</p> <p>Size code (code 3-6)</p> <p>(inch / metric)</p> <p>0402 = 1.0 x 0.5</p> <p>0603 = 1.6 x 0.8</p> <p>0805 = 2.0 x 1.25</p> <p>1206 = 3.2 x 1.6</p> <p>1210 = 3.2 x 2.6</p> <p>1218 = 3.2 x 4.5</p> <p>2010 = 5.0 x 2.5</p> <p>2512 = 6.35 x 3.2</p> <p>Tolerance (code 7)</p> <p>F = <math>\pm 1\%</math></p> <p>G = <math>\pm 2\%</math></p> <p>J = <math>\pm 5\%</math></p> | <p>Default code<sup>(1/2)</sup> (code 17)</p> <p>Resistance (code 12-16)</p> <p>0R01 = 0.01<math>\Omega</math></p> <p>0R1 = 0.1<math>\Omega</math></p> <p>0R2 = 0.2<math>\Omega</math></p> <p>Taping reel (code 10-11)</p> <p>07 = 7 inch Dia. reel</p> <p>10 = 10 inch Dia. reel</p> <p>13 = 13 inch Dia. reel</p> <p>T. C. R. (code 9)</p> <p>"—" = Based on spec.</p> <p>(— for thick film only)</p> <p>Packing style (code 8)</p> <p>R = Paper tape reel</p> <p>K = Embossed plastic tape reel</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. Letter L is system default code for ordering only

# Chip Resistors Selection Charts

## Thick film low ohmic chip resistors, 0402 to 2512

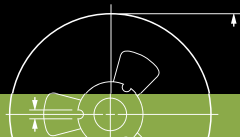
| Phycomp worldwide - Traditional type |             |                 |                 |                 |                 |                 |                 |                 |
|--------------------------------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Low ohmic chip resistors             |             |                 |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                      | 0402 (1005) |                 | 0603 (1608)     |                 | 0805 (2012)     |                 | 1206 (3216)     |                 |
| Power                                | 1/16 W      |                 | 1/10 W          |                 | 1/8 W           |                 | 1/4 W           |                 |
| Tolerance                            | +5%         | +1%             | +5%             | +1%             | +5%             | +1%             | +5%             | +1%             |
| Resistance                           | E24         | E24             | E24             | E24             | E24             | E24             | E24             | E24             |
| Packing                              | paper tape  |                 | paper tape      |                 | paper tape      |                 | paper tape      |                 |
| Quantity                             | 5 000       | ---             | 2350 512 10...L | 2350 512 12...L | 2350 511 10...L | 2350 511 12...L | 2350 510 10...L | 2350 510 12...L |
|                                      | 10 000      | 2350 513 20...L | 2350 513 22...L | ---             | ---             | ---             | ---             | ---             |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type |             |                          |                 |                |                          |                         |                          |                         |
|--------------------------------------|-------------|--------------------------|-----------------|----------------|--------------------------|-------------------------|--------------------------|-------------------------|
| Low ohmic chip resistors             |             |                          |                 |                |                          |                         |                          |                         |
| Size: inch (mm)                      | 1210 (3225) |                          | 1218 (3248)     |                | 2010 (5025)              |                         | 2512 (6432)              |                         |
| Power                                | 1/2 W       |                          | 1 W             |                | 3/4 W                    |                         | 1 W                      |                         |
| Tolerance                            | +5%         | +1%                      | +5%             | +1%            | +5%                      | +1%                     | +5%                      | +1%                     |
| Resistance                           | E24         | E24                      | E24             | E24            | E24                      | E24                     | E24                      | E24                     |
| Packing                              | paper tape  |                          | blister tape    |                | blister tape             |                         | blister tape             |                         |
| Quantity                             | 4 000       | ---                      | 2322 735 64...L | 2322 735 7...L | 2322 760 90...0L/60...7L | 2322 761 90...0L/6...7L | 2322 762 90...0L/60...7L | 2322 763 90...0L/6...7L |
|                                      | 5 000       | 2390 735 90...0L/60...7L | 2390 735 3...L  | ---            | ---                      | ---                     | ---                      | ---                     |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |  |
|--------------------------------------------------------------------------------------|--|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |  |

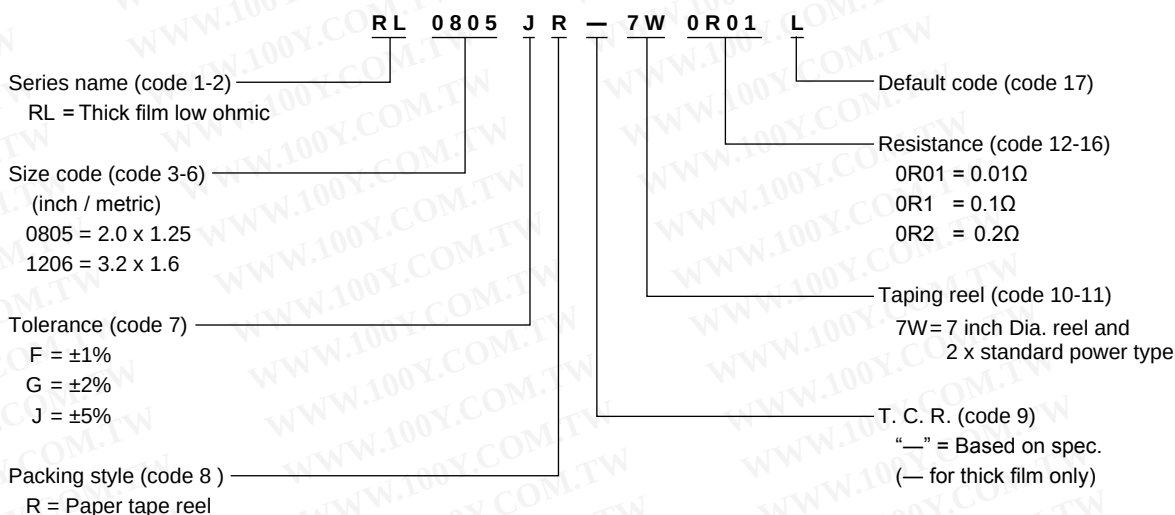


# Chip Resistors Selection Charts

## Thick film low ohmic, high power chip resistors, 0805 / 1206

Global part number - Preferred type

Ordering example: RL0805JR-7W0R01L



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

Phycomp worldwide - Traditional type

Low ohmic high power chip resistors

| Size: inch (mm) | 0805 (2012) |                 | 1206 (3216)     |                |
|-----------------|-------------|-----------------|-----------------|----------------|
| Power           | 1/4 W       |                 | 1/2 W           |                |
| Tolerance       | +5%         | +1%             | +5%             | +1%            |
| Resistance      | E24         | E24 / E96       | E24             | E24 / E96      |
| Packing         | paper tape  |                 | paper tape      |                |
| Quantity        | 5 000       | 2350 511 15...L | 2350 519 01...L | 2350 519 1...L |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.





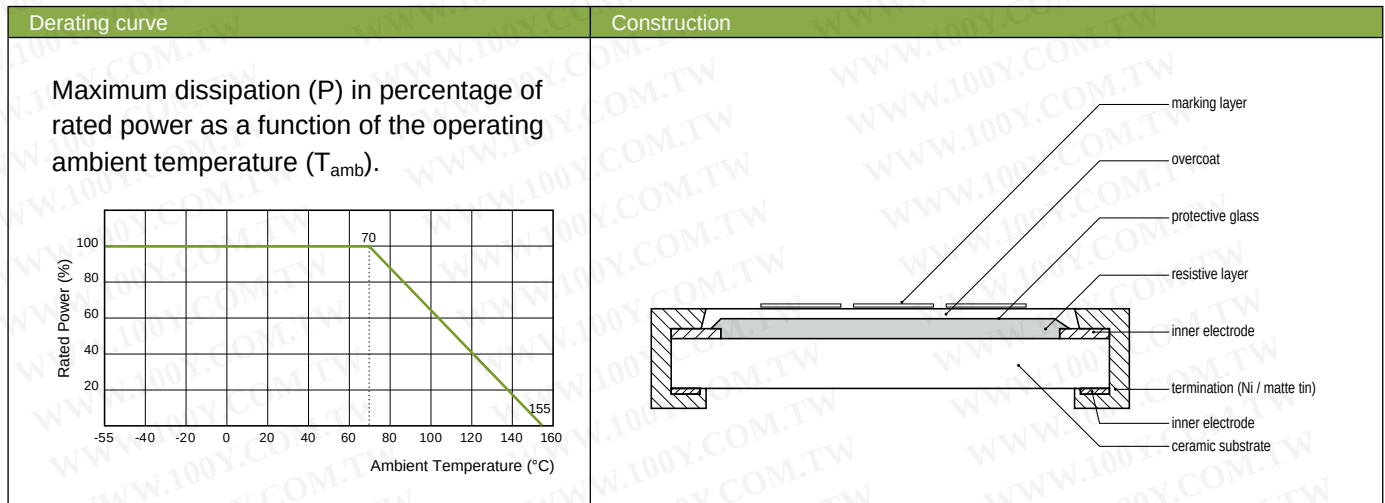
# Chip Resistors Selection Charts

Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512



## Features

- Excellent T. C. R.
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power



| Dimensions                                                                                                                                                                                              |        |            |            |            |            |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------|------------|------------|------------|------------|
| <p>unit: mm</p>                                                                                                                                                                                         | Type   | L          | W          | H          | $l_1$      | $l_2$      |
|                                                                                                                                                                                                         | PT0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
|                                                                                                                                                                                                         | PT0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
|                                                                                                                                                                                                         | PT0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.55 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
|                                                                                                                                                                                                         | PT1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.45 ±0.20 |
|                                                                                                                                                                                                         | PT2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
|                                                                                                                                                                                                         | PT2512 | 6.35 ±0.10 | 3.20 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
| <p><b>Note:</b> For relevant physical dimensions, please refer to above construction outlines<br/>Please contact our sales offices, distributors and representatives in your region before ordering</p> |        |            |            |            |            |            |



# Chip Resistors Selection Charts

Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512

| Electrical characteristics |                          |                          |                         |                             |                             |               |                 |                 |               |     |
|----------------------------|--------------------------|--------------------------|-------------------------|-----------------------------|-----------------------------|---------------|-----------------|-----------------|---------------|-----|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | Max.<br>working voltage | Tolerance                   | Resistance range & T. C. R. |               | Jumper criteria |                 |               |     |
| PT0402                     | 1/16W                    | -55°C to +155°C          | (PxR) <sup>1/2</sup>    | E24 ±2%, ±5%<br>E24/E96 ±1% | 50mΩ ≤ R < 68mΩ             | ±600 ppm/°C   | Max. resistance | ---             |               |     |
|                            | 68mΩ ≤ R < 100mΩ         |                          |                         |                             | ±300 ppm/°C                 | Rated current |                 |                 | ---           |     |
|                            | 100mΩ ≤ R < 1Ω           |                          |                         |                             | ±200 ppm/°C                 |               |                 |                 |               |     |
| PT0603                     | 1/10W                    |                          |                         |                             | 68mΩ                        |               | ±300 ppm/°C     | Max. resistance |               | 8mΩ |
|                            | 1/5W                     |                          |                         |                             | 50mΩ                        | 0/+400 ppm/°C | Rated current   |                 | 5A            |     |
|                            |                          |                          |                         |                             | 50mΩ < R < 68mΩ             | 0/+350 ppm/°C |                 |                 |               |     |
|                            |                          |                          |                         |                             | 68mΩ ≤ R < 100mΩ            | 0/+300 ppm/°C |                 |                 |               |     |
| PT0805                     | 1/8W                     |                          |                         |                             | 100mΩ ≤ R < 1Ω              | ±100 ppm/°C   | Max. resistance | ---             |               |     |
|                            | 1/4W                     |                          |                         |                             |                             |               |                 |                 | Rated current | --- |
|                            | 1/2W                     |                          |                         |                             |                             |               |                 |                 |               |     |
| PT1206                     | 1/4W                     |                          |                         |                             | 100mΩ < R < 1Ω              | ±100 ppm/°C   | ±75 ppm/°C      | Max. resistance |               |     |
|                            | 1/2W                     |                          |                         |                             |                             |               |                 |                 | Rated current | 10A |
| PT2010                     | 3/4W                     |                          |                         |                             |                             |               |                 | Max. resistance |               |     |
|                            | 1W                       |                          |                         |                             |                             |               |                 |                 | Rated current | --- |
| PT2512                     | 1W                       |                          |                         |                             |                             |               |                 | Max. resistance |               |     |
|                            | 2W                       | Rated current            | ---                     |                             |                             |               |                 |                 |               |     |

| Environmental characteristics |                              |                          |                                                                                                                                                                                                                                               |                                                            |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                                                                                                                                     | Requirements                                               |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                                                                                                                                        | ±(1% +0.0005Ω)<br>< 20mΩ for jumper                        |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                                                                                                                                            | ±(1% +0.0005Ω)<br>< 20mΩ for jumper                        |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H                                                                                                                   | ±(0.5% +0.0005Ω)<br>< 20mΩ for jumper                      |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                                                                                                                            | ±(1% +0.0005Ω)<br>< 10mΩ for jumper                        |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds                                                                                                                          | Well tinned<br>(≥95% covered)<br>No visible damage         |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                                                                                                                            | ±(0.5% +0.0005Ω)<br>No visible damage<br>< 10mΩ for jumper |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | PT standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>PT high power:<br>5 times of rated power for 5 seconds at room temperature<br>PT jumper:<br>2.5 times of rated current for 5 seconds at room temperature | ±(1% +0.0005Ω)<br>No visible damage<br>< 10mΩ for jumper   |



# Chip Resistors Selection Charts

Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512

| Global part number - Preferred type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: PT2512FK-070R01L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>Series name (code 1-2) ————</p> <p>PT = Thick film low ohmic low T. C. R.</p> <p>Size code (code 3-6) ————</p> <p>(inch / metric)</p> <p>0402 = 1.0 x 0.5</p> <p>0603 = 1.6 x 0.8</p> <p>0805 = 2.0 x 1.25</p> <p>1206 = 3.2 x 1.6</p> <p>2010 = 5.0 x 2.5</p> <p>2512 = 6.35 x 3.2</p> <p>Tolerance (code 7) ————</p> <p>F = <math>\pm 1\%</math></p> <p>G = <math>\pm 2\%</math></p> <p>J = <math>\pm 5\%</math></p> <p>“—” for Jumper ordering</p> <p>Packing style (code 8) ————</p> <p>R = Paper tape reel</p> <p>K = Embossed plastic tape reel</p> | <p>PT 2512 FK — 07 0R01 L</p> <p>Resistance (code 12-16)</p> <p>0R = Jumper</p> <p>0R1 = 0.1<math>\Omega</math></p> <p>0R2 = 0.2<math>\Omega</math></p> <p>Taping reel (code 10-11)</p> <p>07 = 7 inch Dia. reel</p> <p>13 = 13 inch Dia. reel</p> <p>7W = 7 inch Dia. reel and<br/>2 x standard power type</p> <p>T. C. R. (code 9)</p> <p>“—” = Based on spec.</p> <p>Default code<sup>(1/2)</sup> (code 17)</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
 2. Letter L is system default code for ordering only  
 3. PT series products are available by "Global part number" only

| Phycomp CTC ordering code - Traditional type - North America                         |
|--------------------------------------------------------------------------------------|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |



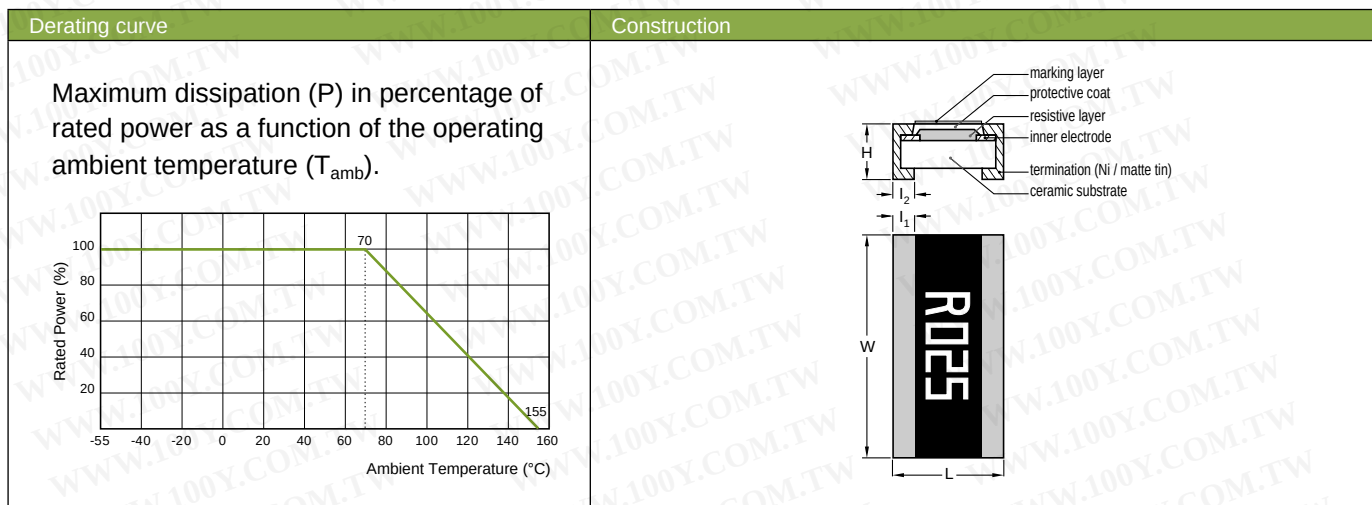
# Chip Resistors Selection Charts

Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815



## Features

- Excellent T. C. R.
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power



| Dimensions |            |            |            |                |                |
|------------|------------|------------|------------|----------------|----------------|
| Type       | L          | W          | H          | I <sub>1</sub> | I <sub>2</sub> |
| PT0815     | 2.00 ±0.10 | 3.70 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20     | 0.40 ±0.20     |

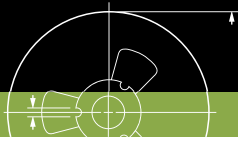


# Chip Resistors Selection Charts

## Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

| Electrical characteristics |                   |                          |                         |                                                |                                                            |
|----------------------------|-------------------|--------------------------|-------------------------|------------------------------------------------|------------------------------------------------------------|
| Type                       | Power<br>$P_{70}$ | Operating Temp.<br>range | Max.<br>working voltage | Tolerance                                      | Resistance range & T. C. R.                                |
| PT0815                     | 1/2W              | -55°C to +155°C          | (PxR) <sup>1/2</sup>    | E24 $\pm 2\%$ , $\pm 5\%$<br>E24/E96 $\pm 1\%$ | 25m $\Omega$ $\leq$ R $\leq$ 50m $\Omega$ $\pm 100$ ppm/°C |
|                            | 1W                |                          |                         |                                                |                                                            |

| Environmental characteristics |                              |                          |                                                                                                                                                                 |                                                         |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                                                       | Requirements                                            |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 $\pm 5^\circ\text{C}$ applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                                         | $\pm(1\% + 0.0005\Omega)$                               |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                                                           | $\pm(1\% + 0.0005\Omega)$                               |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with 25°C / 65°C 95% R.H                               | $\pm(0.5\% + 0.0005\Omega)$                             |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 $\pm 3^\circ\text{C}$<br>Dipping time: 3 $\pm 0.5$ seconds                      | Well tinned ( $\geq 95\%$ covered)<br>No visible damage |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                                              | $\pm(0.5\% + 0.0005\Omega)$<br>No visible damage        |
| Short time overload           |                              | MIL-R-55342D-para 4.7.5  | PT standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>PT high power:<br>5 times of rated power for 5 seconds at room temperature | $\pm(1\% + 0.0005\Omega)$<br>No visible damage          |

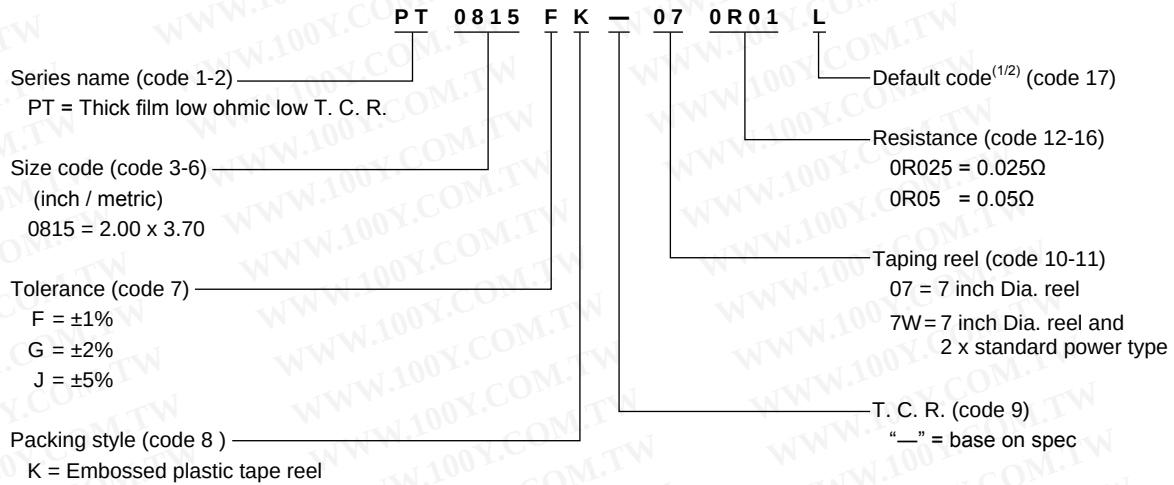


# Chip Resistors Selection Charts

## Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

Global part number - Preferred type

Ordering example: PT0815FK-070R01L



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only  
3. PT series products are available by "Global part number" only

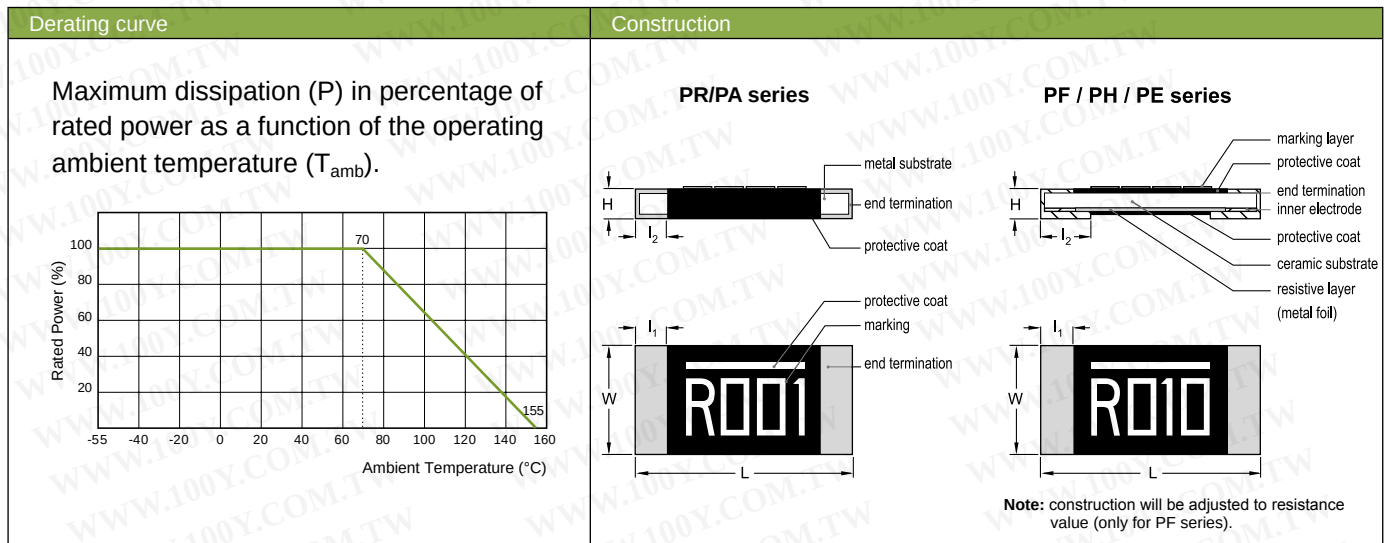
# Chip Resistors Selection Charts

Current sensors - low T. C. R. chip resistors, 0603 to 4527



## Features

- Excellent T. C. R. compared to thick film low ohmic
- Precision current sensing control
- Excellent performance for current sensing applications
- Ultra low ohmic down to 0.0005Ω



Dimensions

PR series

unit: mm

| Type                  | Resistance range                                | L               | W               | H               | $l_1$           | $l_2$           |
|-----------------------|-------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| PR1206                | $1\text{m}\Omega \leq R \leq 6\text{m}\Omega$   | $3.20 \pm 0.25$ | $1.60 \pm 0.25$ | $0.64 \pm 0.25$ | $0.50 \pm 0.25$ | $0.50 \pm 0.25$ |
| PR2010                | $1\text{m}\Omega \leq R \leq 3\text{m}\Omega$   | $5.10 \pm 0.25$ | $2.54 \pm 0.25$ | $0.80 \pm 0.25$ | $1.30 \pm 0.25$ | $1.30 \pm 0.25$ |
|                       | $4\text{m}\Omega \leq R \leq 100\text{m}\Omega$ | $5.10 \pm 0.25$ | $2.54 \pm 0.25$ | $0.64 \pm 0.25$ | $0.80 \pm 0.25$ | $0.80 \pm 0.25$ |
| PR2512 <sup>(1)</sup> | $1\text{m}\Omega \leq R \leq 2\text{m}\Omega$   | $6.40 \pm 0.20$ | $3.20 \pm 0.20$ | $0.75 \pm 0.15$ | $1.20 \pm 0.20$ | $1.20 \pm 0.20$ |
|                       | $3\text{m}\Omega \leq R \leq 5\text{m}\Omega$   |                 |                 | $0.55 \pm 0.10$ | $0.60 \pm 0.20$ | $0.60 \pm 0.20$ |
| PR2512 <sup>(2)</sup> | $0.5\text{m}\Omega \leq R \leq 4\text{m}\Omega$ | $6.25 \pm 0.25$ | $3.30 \pm 0.25$ | $0.78 \pm 0.25$ | $1.88 \pm 0.25$ | $1.88 \pm 0.25$ |
|                       | $5\text{m}\Omega \leq R \leq 75\text{m}\Omega$  |                 |                 | $0.64 \pm 0.25$ | $1.11 \pm 0.25$ | $1.11 \pm 0.25$ |

PA series

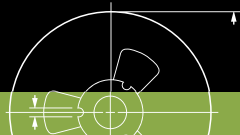
unit: mm

| Type   | Resistance range                               | L               | W               | H               | $l_1$           | $l_2$           |
|--------|------------------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| PA2512 | $1\text{m}\Omega \leq R \leq 10\text{m}\Omega$ | $6.50 \pm 0.20$ | $3.20 \pm 0.20$ | $0.65 \pm 0.15$ | $0.90 \pm 0.20$ | $0.90 \pm 0.20$ |

Note: 1. Apply to ordering codes ending in "L"

2. Apply to ordering codes ending in "Z"

Please contact sales offices, distributors and representatives in your region before ordering



# Chip Resistors Selection Charts

Current sensors - low T. C. R. chip resistors, 0603 to 4527

| Dimensions                      |                                                      |                  |                 |                 |                 |                 |
|---------------------------------|------------------------------------------------------|------------------|-----------------|-----------------|-----------------|-----------------|
| PF / PH / PE series             |                                                      |                  |                 |                 |                 | unit: mm        |
| Type                            | Resistance range                                     | L                | W               | H               | $l_1$           | $l_2$           |
| PF / PE0603 <sup>(2)</sup>      | $5\text{m}\Omega \leq R < 100\text{m}\Omega$         | $1.60 \pm 0.20$  | $0.80 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $0.30 \pm 0.15$ |
| PF / PH0805 <sup>(1)</sup>      | $10\text{m}\Omega < R \leq 50\text{m}\Omega$         | $2.03 \pm 0.25$  | $1.27 \pm 0.25$ | $0.33 \pm 0.12$ | $0.38 \pm 0.25$ | $0.38 \pm 0.25$ |
| PF / PH / PE0805 <sup>(2)</sup> | $4\text{m}\Omega$                                    | $2.00 \pm 0.20$  | $1.25 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $0.70 \pm 0.15$ |
|                                 | $5\text{m}\Omega$                                    |                  |                 |                 |                 | $0.63 \pm 0.15$ |
|                                 | $6\text{m}\Omega \leq R \leq 7\text{m}\Omega$        |                  |                 |                 |                 | $0.55 \pm 0.15$ |
|                                 | $8\text{m}\Omega \leq R < 100\text{m}\Omega$         |                  |                 |                 |                 | $0.40 \pm 0.15$ |
| PF / PH1206 <sup>(1)</sup>      | $10\text{m}\Omega < R \leq 50\text{m}\Omega$         | $3.20 \pm 0.25$  | $1.60 \pm 0.25$ | $0.60 \pm 0.25$ | $0.50 \pm 0.25$ | $0.65 \pm 0.25$ |
| PF / PH / PE1206 <sup>(2)</sup> | $3\text{m}\Omega$                                    | $3.20 \pm 0.20$  | $1.60 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $1.30 \pm 0.20$ |
|                                 | $4\text{m}\Omega$                                    |                  |                 |                 |                 | $1.20 \pm 0.20$ |
|                                 | $5\text{m}\Omega \leq R \leq 8\text{m}\Omega$        |                  |                 |                 |                 | $1.15 \pm 0.20$ |
|                                 | $9\text{m}\Omega \leq R < 100\text{m}\Omega$         |                  |                 |                 |                 | $0.58 \pm 0.20$ |
| PF2010 <sup>(2)</sup>           | $5\text{m}\Omega \leq R \leq 9\text{m}\Omega$        | $5.00 \pm 0.20$  | $2.50 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $1.50 \pm 0.20$ |
|                                 | $10\text{m}\Omega \leq R < 100\text{m}\Omega$        |                  |                 |                 |                 | $0.60 \pm 0.20$ |
| PF2512 <sup>(1)</sup>           | $6\text{m}\Omega$                                    | $6.45 \pm 0.25$  | $3.25 \pm 0.25$ | $0.70 \pm 0.25$ | $0.75 \pm 0.25$ | $1.85 \pm 0.25$ |
|                                 | $7\text{m}\Omega \leq R \leq 15\text{m}\Omega$       |                  |                 |                 |                 | $1.55 \pm 0.25$ |
|                                 | $20\text{m}\Omega \leq R \leq 50\text{m}\Omega$ (1W) |                  |                 |                 | $1.30 \pm 0.25$ | $0.75 \pm 0.25$ |
|                                 | $20\text{m}\Omega \leq R \leq 50\text{m}\Omega$ (2W) |                  |                 |                 | $0.75 \pm 0.25$ | $1.30 \pm 0.25$ |
| PF / PE2512 <sup>(2)</sup>      | $1\text{m}\Omega$                                    | $6.30 \pm 0.20$  | $3.10 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $2.93 \pm 0.20$ |
|                                 | $2\text{m}\Omega$                                    |                  |                 |                 |                 | $2.70 \pm 0.20$ |
|                                 | $3\text{m}\Omega$                                    |                  |                 |                 |                 | $2.50 \pm 0.20$ |
|                                 | $4\text{m}\Omega$                                    |                  |                 |                 |                 | $2.15 \pm 0.20$ |
|                                 | $5\text{m}\Omega$                                    |                  |                 |                 |                 | $1.95 \pm 0.20$ |
|                                 | $6\text{m}\Omega \leq R \leq 8\text{m}\Omega$        |                  |                 |                 |                 | $1.90 \pm 0.20$ |
|                                 | $9\text{m}\Omega \leq R < 100\text{m}\Omega$         |                  |                 |                 |                 | $0.95 \pm 0.20$ |
|                                 |                                                      |                  |                 |                 |                 |                 |
| PF4527 <sup>(2)</sup>           | $6\text{m}\Omega \leq R < 1\Omega$                   | $11.50 \pm 0.20$ | $7.00 \pm 0.20$ | $0.60 \pm 0.15$ | ---             | $2.60 \pm 0.20$ |

**Note:** 1. Apply to ordering codes ending in "L"  
 2. Apply to ordering codes ending in "Z"  
 3. For relevant physical dimensions, please refer to above construction outlines.  
 Please contact with sales offices, distributors and representatives in your region before ordering





# Chip Resistors Selection Charts

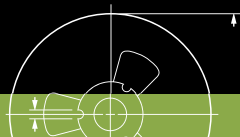
Current sensors - low T. C. R. chip resistors, 0603 to 2512

| Electrical characteristics |             |      |           |                       |                      |               |                  |                                                          |  |            |  |
|----------------------------|-------------|------|-----------|-----------------------|----------------------|---------------|------------------|----------------------------------------------------------|--|------------|--|
| Type                       | Technology  | Size | Power P70 | Operating Temp. range | Max. working voltage | Tolerance     | Resistance range | Min. T. C. R.                                            |  |            |  |
| PE                         | Metal Foil  | 0603 | 1/2W      | -55°C to 155°C        | (PxR)^1/2            | ±1%, ±2%, ±5% | 5mΩ ≤ R < 100mΩ  | ±75 ppm/°C                                               |  |            |  |
|                            |             | 0805 | 1/2W      |                       |                      |               | 4mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             | 1206 | 1W        |                       |                      |               | 3mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             | 2512 | 2W        |                       |                      |               | 1mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
| PF                         | Metal Foil  | 0603 | 1/2W      | -55°C to 155°C        | (PxR)^1/2            | ±1%, ±2%, ±5% | 5mΩ≤ R < 100mΩ   | ±75 ppm/°C                                               |  |            |  |
|                            |             | 0805 | 1/8W      |                       |                      |               | 4mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             |      | 1/4W      |                       |                      |               |                  |                                                          |  |            |  |
|                            |             |      | 1/3W      |                       |                      |               |                  |                                                          |  |            |  |
|                            |             |      | 1/2W      |                       |                      |               |                  |                                                          |  |            |  |
|                            |             | 1206 | 1/4W      |                       |                      |               | 3mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             |      | 1/2W      |                       |                      |               | 5mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             | 2512 | 1W        |                       |                      |               | 1mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             |      | 1W        |                       |                      |               | 1mΩ ≤ R ≤ 50mΩ   |                                                          |  |            |  |
|                            |             |      | 2W        |                       |                      |               | 6mΩ ≤ R < 1Ω     |                                                          |  |            |  |
| PH                         | Metal Foil  | 0805 | 4/5W      | -55°C to 155°C        | (PxR)^1/2            | ±1%, ±2%, ±5% | 4mΩ ≤ R ≤ 50mΩ   | ±75 ppm/°C                                               |  |            |  |
|                            |             | 1206 | 1W        |                       |                      |               |                  |                                                          |  |            |  |
| PR                         | Metal Plate | 1206 | 1/4W      | -55°C to 155°C        | (PxR)^1/2            | ±1%, ±2%, ±5% | 1mΩ ≤ R ≤ 6mΩ    | ±50 ppm/°C                                               |  |            |  |
|                            |             |      | 1/2W      |                       |                      |               | 1mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             |      | 1W        |                       |                      |               |                  |                                                          |  |            |  |
|                            |             | 2010 | 1/2W      |                       |                      | ±1%, ±2%, ±5% | 1mΩ ≤ R < 100mΩ  |                                                          |  |            |  |
|                            |             |      | 1W        |                       |                      |               |                  |                                                          |  |            |  |
|                            |             | 2512 | 1W        |                       |                      | ±0.5%         | 7mΩ ≤ R ≤ 75mΩ   | 0.5mΩ ≤ R ≤ 2mΩ ±200 ppm/°C<br>3mΩ ≤ R ≤ 5mΩ ±100 ppm/°C |  |            |  |
|                            |             |      | 1W        |                       |                      | ±1%, ±2%, ±5% | 0.5mΩ ≤ R ≤ 5mΩ  |                                                          |  |            |  |
|                            |             |      | 1W        |                       |                      | ±0.5%         | 7mΩ ≤ R ≤ 75mΩ   |                                                          |  | ±50 ppm/°C |  |
|                            |             |      | 2W        |                       |                      | ±1%, ±2%, ±5% | 0.5mΩ ≤ R ≤ 5mΩ  |                                                          |  |            |  |
| PA                         | Metal Plate | 2512 | 3W        | -55°C to 155°C        | (PxR)^1/2            | ±1%, ±5%      | 1mΩ ≤ R ≤ 10mΩ   | ±100 ppm/°C                                              |  |            |  |

Note: Please contact with sales offices, distributors and representatives in your region before ordering

| Environmental characteristics |                              |                          |                                                                                                                             |                                       |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                   | Requirements                          |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                      | ±(1% +0.0005Ω)                        |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                          | ±(1% +0.0005Ω)                        |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω)                      |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                          | ±(0.5% +0.0005Ω)                      |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds        | Well tinned<br>(≥95% covered)         |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                          | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 5 times of rated power for 5 seconds at room temperature                                                                    | ±(0.5% +0.0005Ω)<br>No visible damage |





# Chip Resistors Selection Charts

## Current sensors - low T. C. R. chip resistors, 0603 to 2512

| Global part number - Preferred type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: PF2512FKF070R01L                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <p>Series name (code 1-2) <b>PF</b></p> <p>PR/PA/PF/PH/PE = Current sensors - low T. C. R.</p> <p>Size code (code 3-6) <b>2512</b></p> <p>(inch / metric)</p> <p>0603 = 1.6 x 0.8</p> <p>0805 = 2.0 x 1.25</p> <p>1206 = 3.2 x 1.6</p> <p>2010 = 5.0 x 2.5</p> <p>2512 = 6.35 x 3.2</p> <p>4527 = 11.0 x 7.0</p> <p>Tolerance (code 7) <b>F</b></p> <p>F = <math>\pm 1\%</math></p> <p>G = <math>\pm 2\%</math></p> <p>J = <math>\pm 5\%</math></p> <p>Packing style (code 8) <b>K</b></p> <p>R = Paper tape reel</p> <p>K = Embossed plastic tape reel</p> | <p><b>F</b> <b>K</b> <b>F</b> <b>07</b> <b>0R01</b> <b>L</b></p> <p>Default code<sup>(1/2)</sup> (code 17)</p> <p>L / Z = Default code</p> <p>Resistance (code 12-16)</p> <p>0R01 = 0.01<math>\Omega</math></p> <p>0R1 = 0.1<math>\Omega</math></p> <p>0R2 = 0.2<math>\Omega</math></p> <p>Taping reel (code 10-11)</p> <p>07 = 7 inch Dia. reel</p> <p>7W = 7 inch Dia. reel</p> <p>2 x standard power type</p> <p>7T = 7 inch Dia. reel</p> <p>3 x standard power type</p> <p>47 = 7 inch Dia. reel</p> <p>4 x standard power type</p> <p>57 = 7 inch Dia. reel</p> <p>5 x standard power type</p> <p>T. C. R. (code 9)</p> <p>E = <math>\pm 50</math> ppm/<math>^{\circ}\text{C}</math></p> <p>M = <math>\pm 75</math> ppm/<math>^{\circ}\text{C}</math></p> <p>F = <math>\pm 100</math> ppm/<math>^{\circ}\text{C}</math></p> <p>G = <math>\pm 200</math> ppm/<math>^{\circ}\text{C}</math></p> |

Note: 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. PH series products are available by "Global part number" only

| Phycomp worldwide - Traditional type      |              |                 |                 |                 |                 |                 |                 |                 |
|-------------------------------------------|--------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Current Sensor - Low T. C. R. / PR series |              |                 |                 |                 |                 |                 |                 |                 |
| Size: inch (mm)                           | 2010 (5025)  |                 |                 |                 | 2512 (6432)     |                 |                 |                 |
| Power                                     | 1/2 W        |                 | 1 W             |                 | 1 W             |                 | 2 W             |                 |
| Tolerance                                 | +5%          | +1%             | +5%             | +1%             | +5%             | +1%             | +5%             | +1%             |
| Packing                                   | blister tape |                 |                 |                 | blister tape    |                 |                 |                 |
| Quantity                                  | 4 000        | 2322 760 63..0L | 2322 761 11..0L | 2322 760 65..0L | 2322 761 13..0L | 2322 762 94..0L | 2322 763 95..0L | 2322 762 10..0L |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type      |              |                |                |                |
|-------------------------------------------|--------------|----------------|----------------|----------------|
| Current Sensor - Low T. C. R. / PF series |              |                |                |                |
| Size: inch (mm)                           | 2512 (6432)  |                |                |                |
| Power                                     | 1 W          |                | 2 W            |                |
| Tolerance                                 | +5%          | +1%            | +5%            | +1%            |
| Packing                                   | blister tape |                |                |                |
| Quantity                                  | 4 000        | 2322 764 96..L | 2322 764 97..L | 2322 764 10..L |

For ordering rules: See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |  |
|--------------------------------------------------------------------------------------|--|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |  |



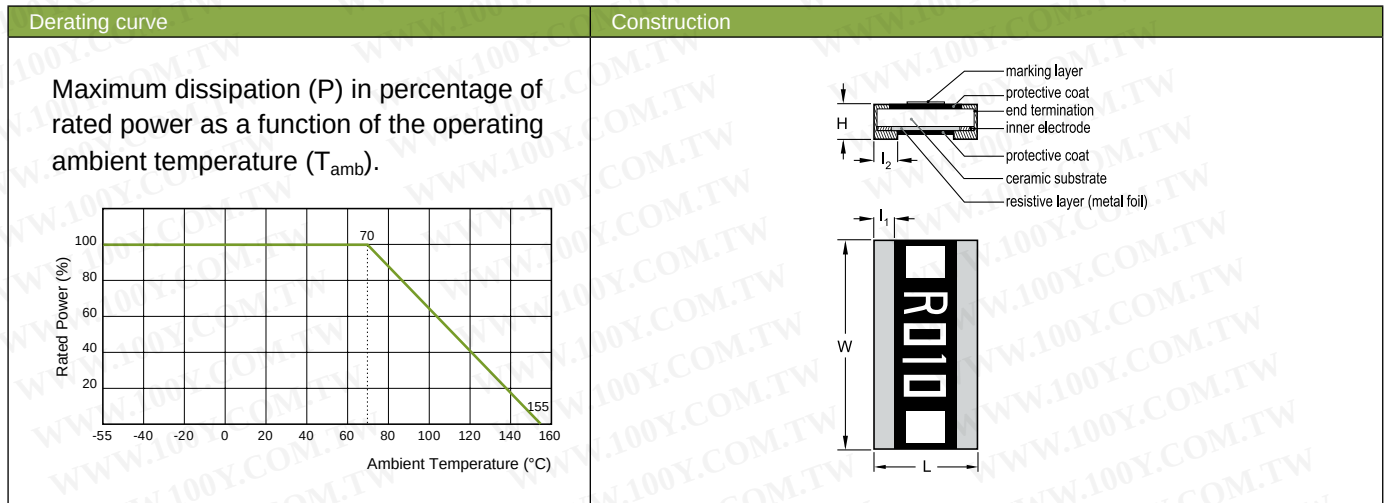
# Chip Resistors Selection Charts

Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830



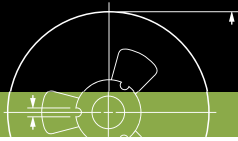
## Features

- Excellent T. C. R. compared to thick film low ohmic
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power



| Dimensions            |                                    |                 |                 |                  |                 |                 |
|-----------------------|------------------------------------|-----------------|-----------------|------------------|-----------------|-----------------|
| Type                  | Resistance range                   | L               | W               | H                | $l_1$           | $l_2$           |
| PF0612 <sup>(2)</sup> | $1m\Omega \leq R \leq 50m\Omega$   | $1.60 \pm 0.20$ | $3.20 \pm 0.20$ | $0.60 \pm 0.15$  | ---             | $0.60 \pm 0.20$ |
| PF0815 <sup>(2)</sup> | $1m\Omega \leq R \leq 20m\Omega$   | $2.15 \pm 0.20$ | $3.75 \pm 0.20$ | $0.60 \pm 0.125$ | ---             | $0.60 \pm 0.20$ |
| PF0815 <sup>(1)</sup> | 10 / 15 / 20mΩ                     | $2.15 \pm 0.20$ | $3.75 \pm 0.25$ | $0.65 \pm 0.25$  | $0.65 \pm 0.25$ | $0.70 \pm 0.25$ |
| PF0830 <sup>(2)</sup> | $1m\Omega \leq R \leq 9m\Omega$    | $2.5 \pm 0.20$  | $7.50 \pm 0.30$ | $0.60 \pm 0.15$  | ---             | $0.60 \pm 0.15$ |
|                       | $10m\Omega \leq R \leq 100m\Omega$ | $2.5 \pm 0.20$  | $7.50 \pm 0.30$ | $0.60 \pm 0.15$  | ---             | $0.58 \pm 0.15$ |

**Note:** 1. Apply to ordering codes ending in "L"  
2. Apply to ordering codes ending in "Z"  
Please contact sales offices, distributors and representatives in your region before ordering



# Chip Resistors Selection Charts

## Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830

| Electrical characteristics |                                |      |                          |                          |                         |               |                             |            |
|----------------------------|--------------------------------|------|--------------------------|--------------------------|-------------------------|---------------|-----------------------------|------------|
| Type                       | Technology                     | Size | Power<br>P <sub>70</sub> | Operating Temp.<br>range | Max.<br>working voltage | Tolerance     | Resistance range & T. C. R. |            |
| PF                         | Metal Foil<br>wide termination | 0612 | 1W                       | -55°C to 155°C           | (P×R)^1/2               | ±1%, ±2%, ±5% | 1mΩ ≤ R ≤ 50mΩ              | ±75 ppm/°C |
|                            |                                | 0815 | 1W                       |                          |                         |               | 1mΩ ≤ R ≤ 20mΩ              |            |
|                            |                                | 0830 | 2W                       |                          |                         |               | 1mΩ ≤ R ≤ 100mΩ             |            |

**Note:** Please contact with sales offices, distributors and representatives in your region before ordering

| Environmental characteristics |                                 |                              |                                                                                                                                   |                                       |
|-------------------------------|---------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| Performance test              |                                 | Test method                  | Procedure                                                                                                                         | Requirements                          |
| Life                          |                                 | MIL-STD-202G-<br>method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                            | ±(1% +0.0005Ω)                        |
| High temperature exposure     |                                 | MIL-STD-202G-<br>method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                             | ±(1% +0.0005Ω)                        |
| Moisture resistance           |                                 | MIL-STD-202G-<br>method 106F | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω)                      |
| Solderability                 | Wetting                         | J-STD-002B testB             | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds              | Well tinned<br>(≥95% covered)         |
|                               | Resistance to<br>soldering heat | MIL-STD-202G-<br>method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload           |                                 | MIL-R-55342D-<br>para 4.7.5  | 5 times of rated power for 5 seconds at room temperature                                                                          | ±(0.5% +0.0005Ω)<br>No visible damage |



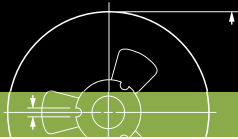
# Chip Resistors Selection Charts

## Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830

| Global part number - Preferred type                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: PF0815FKF070R01L                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><b>Series name (code 1-2)</b> — PF</p> <p>PF = current sensors - low T. C. R., wide termination</p> <p><b>Size code (code 3-6)</b> — 0815</p> <p>(inch / metric)</p> <p>0612 = 1.6 x 3.2</p> <p>0815 = 2.15 x 3.75</p> <p>0830 = 2.0 x 7.5</p> <p><b>Tolerance (code 7)</b> — F</p> <p>F = <math>\pm 1\%</math></p> <p>G = <math>\pm 2\%</math></p> <p>J = <math>\pm 5\%</math></p> <p><b>Packing style (code 8)</b> — K</p> <p>K = Embossed plastic tape reel</p> | <p><b>Default code<sup>(1/2)</sup> (code 17)</b> — L</p> <p>L / Z = Default code</p> <p><b>Resistance (code 12-16)</b> — 0R01</p> <p>0R01 = 0.01<math>\Omega</math></p> <p>0R02 = 0.02<math>\Omega</math></p> <p><b>Taping reel (code 10-11)</b> — 07</p> <p>07 = 7 inch Dia. reel</p> <p>7W = 7 inch Dia. reel</p> <p>2 x standard power type</p> <p><b>T. C. R. (code 9)</b> — F</p> <p>F = <math>\pm 100</math> ppm/<math>^{\circ}\text{C}</math></p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. PF series wide termination type products are available by "Global part number" only



# Chip Resistors Selection Charts

## Thick film array / network chip resistors

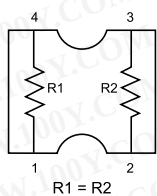


### Features

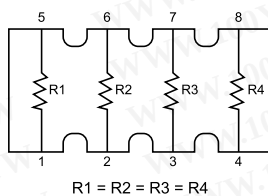
- Integrated discrete chip resistors from 2 to 8 pcs
- More efficient in pick & place application
- Low assembly costs
- Reduced size of final equipment
- Higher component and equipment reliability

### Schematics

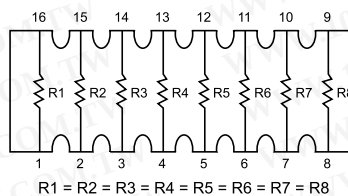
**YC102/122/162**



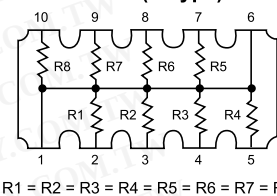
**YC104/124/164/324**



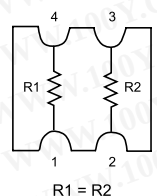
**YC248**



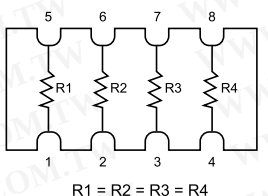
**YC358 (L-Type)**



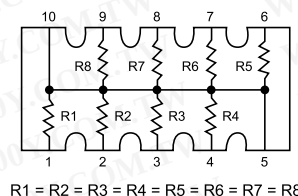
**TC122**



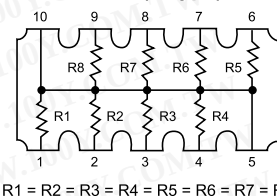
**TC124/164**



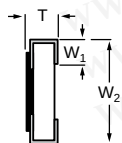
**YC158**



**YC358 (T-Type)**

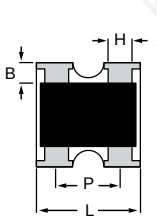


### Dimensions

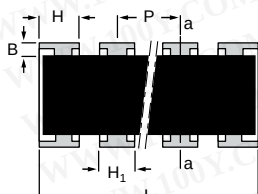


Side view for all types

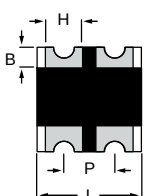
**YC 102/122/162**



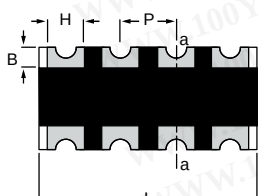
**YC 104/124/164/324  
158/358/248**



**TC 122**



**TC 124/164**



unit: mm

| Type  | H / H <sub>1</sub>                           | B          | P                 | L          | T          | W <sub>1</sub> | W <sub>2</sub> |
|-------|----------------------------------------------|------------|-------------------|------------|------------|----------------|----------------|
| YC102 | H: 0.35 ±0.10                                | 0.20 ±0.10 | 0.50 ±0.05        | 0.80 ±0.10 | 0.35 ±0.10 | 0.15 ±0.10     | 0.60 ±0.10     |
| YC104 | H: 0.20 ±0.10                                | 0.15 ±0.05 | 0.40<br>(Typical) | 1.40 ±0.10 | 0.35 ±0.10 | 0.15 ±0.10     | 0.60 ±0.10     |
| YC122 | H: 0.21 +0.10/-0.05                          | 0.20 ±0.10 | 0.67 ±0.05        | 1.00 ±0.10 | 0.30 ±0.10 | 0.25 ±0.10     | 1.00 ±0.10     |
| YC162 | H: 0.30 ±0.10                                | 0.30 ±0.10 | 0.80 ±0.05        | 1.60 ±0.10 | 0.40 ±0.10 | 0.30 ±0.10     | 1.60 ±0.10     |
| YC124 | H: 0.45 ±0.05<br>H <sub>1</sub> : 0.30 ±0.05 | 0.20 ±0.15 | 0.50 ±0.05        | 2.00 ±0.10 | 0.45 ±0.10 | 0.30 ±0.15     | 1.00 ±0.10     |
| YC164 | H: 0.65 ±0.05<br>H <sub>1</sub> : 0.50 ±0.15 | 0.30 ±0.15 | 0.80 ±0.05        | 3.20 ±0.15 | 0.60 ±0.10 | 0.30 ±0.15     | 1.60 ±0.15     |
| YC324 | H: 1.10 ±0.15<br>H <sub>1</sub> : 0.90 ±0.15 | 0.50 ±0.20 | 1.27 ±0.05        | 5.08 ±0.20 | 0.60 ±0.10 | 0.50 ±0.15     | 3.20 ±0.20     |
| YC248 | H: 0.45 ±0.05<br>H <sub>1</sub> : 0.30 ±0.05 | 0.30 ±0.15 | 0.50 ±0.05        | 4.00 ±0.20 | 0.45 ±0.10 | 0.40 ±0.15     | 1.60 ±0.15     |
| TC122 | H: 0.30 ±0.05                                | 0.25 ±0.15 | 0.50 ±0.05        | 1.00 ±0.10 | 0.30 ±0.10 | 0.25 ±0.15     | 1.00 ±0.10     |
| TC124 | H: 0.30 ±0.10                                | 0.20 ±0.10 | 0.50 ±0.05        | 2.00 ±0.10 | 0.40 ±0.10 | 0.25 ±0.10     | 1.00 ±0.10     |
| TC164 | H: 0.60 ±0.15                                | 0.30 ±0.15 | 0.80 ±0.05        | 3.20 ±0.15 | 0.60 ±0.10 | 0.30 ±0.15     | 1.60 ±0.15     |
| YC158 | H: 0.45 ±0.05                                | 0.30 ±0.15 | 0.64 ±0.05        | 3.20 ±0.20 | 0.60 ±0.10 | 0.35 ±0.15     | 1.60 ±0.15     |
| YC358 | H: 1.10 ±0.15<br>H <sub>1</sub> : 0.90 ±0.15 | 0.50 ±0.15 | 1.27 ±0.05        | 6.40 ±0.20 | 0.60 ±0.10 | 0.50 ±0.15     | 3.20 ±0.20     |

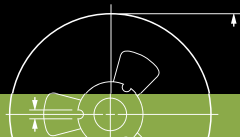
# Chip Resistors Selection Charts

## Thick film array / network chip resistors

| Electrical characteristics |                          |                          |       |      |      |                                  |                                           |                                |                            |                               |             |
|----------------------------|--------------------------|--------------------------|-------|------|------|----------------------------------|-------------------------------------------|--------------------------------|----------------------------|-------------------------------|-------------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV   | RCOV | DWV  | Resistance range & tolerance     |                                           | T. C. R.                       |                            | Jumper criteria<br>(unit: A)  |             |
| YC102                      | 1/32W                    | -55°C to +125°C          | 15V   | 30V  | 30V  | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω | ±200 ppm/°C                    |                            | Rated current<br>Max. current | 0.5<br>1.0  |
| YC104                      | 1/32W                    | -55°C to +125°C          | 12.5V | 25V  | 25V  | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω |                                |                            | Rated current<br>Max. current | 0.5<br>1.0  |
| YC122                      | 1/16W                    | -55°C to +125°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω  |                                |                            | Rated current<br>Max. current | 0.5<br>1.0  |
| YC162                      | 1/16W                    | -55°C to +125°C          | 50V   | 100V | 100V | E24 ±5%<br>Jumper                | 10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω                  |                                |                            | Rated current<br>Max. current | 1.0<br>2.0  |
| YC124                      | 1/16W                    | -55°C to +155°C          | 25V   | 50V  | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 1MΩ<br>1Ω ≤ R ≤ 1MΩ<br>< 0.05Ω   | 1Ω ≤ R ≤ 10MΩ<br>10Ω ≤ R ≤ 1MΩ | ±250 ppm/°C<br>±200 ppm/°C | Rated current<br>Max. current | 1.0<br>2.0  |
| YC164                      | 1/16W                    | -55°C to +155°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 1MΩ<br>1Ω ≤ R ≤ 1MΩ<br>< 0.05Ω   | ±200 ppm/°C                    |                            | Rated current<br>Max. current | 1.0<br>2.0  |
| YC324                      | 1/8W                     | -55°C to +155°C          | 200V  | 500V | 500V | E24 ±5%<br>E24/E96 ±1%           | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ            |                                |                            | --                            | --          |
| YC248                      | 1/16W                    | -55°C to +155°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω |                                |                            | Rated current<br>Max. current | 2.0<br>10.0 |
| TC122                      | 1/16W                    | -55°C to +125°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω |                                |                            | Rated current<br>Max. current | 1.0<br>1.5  |
| TC124                      | 1/16W                    | -55°C to +125°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω |                                |                            | Rated current<br>Max. current | 1.0<br>1.5  |
| TC164                      | 1/16W                    | -55°C to +155°C          | 50V   | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 10Ω ≤ R ≤ 1MΩ<br>10Ω ≤ R ≤ 1MΩ<br>< 0.05Ω |                                |                            | Rated current<br>Max. current | 1.0<br>2.0  |
| YC158                      | 1/16W                    | -55°C to +155°C          | 25V   | 50V  | 50V  | E24 ±5%                          | 10Ω ≤ R ≤ 100KΩ                           |                                |                            | --                            | --          |
| YC358                      | 1/16W                    | -55°C to +155°C          | 50V   | 100V | 100V | E24 ±5%                          | 10Ω ≤ R ≤ 330KΩ                           |                                |                            | --                            | --          |

| Environmental characteristics |                                 |                              |                                                                                                                                   |                                                                               |
|-------------------------------|---------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Performance test              |                                 | Test method                  | Procedure                                                                                                                         | Requirements                                                                  |
| Life                          |                                 | MIL-STD-202G-<br>method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                            | ±(2% +0.05Ω)<br>< 100mΩ for jumper                                            |
| High temperature exposure     |                                 | MIL-STD-202G-<br>method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                             | ±(1% +0.05Ω)<br>< 50mΩ for jumper                                             |
| Moisture resistance           |                                 | MIL-STD-202G-<br>method 106F | Each temperature / humidity cycle is defined as 8 hours<br>(method 106F), 3 cycles / 24 hours for 10d with<br>25°C / 65°C 95% R.H | ±(2% +0.05Ω)<br>< 100mΩ for jumper                                            |
| Thermal shock                 |                                 | MIL-STD-202G-<br>method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others<br>< 50mΩ for jumper |
| Solderability                 | Wetting                         | J-STD-002B<br>testB          | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds              | Well tinned (≥95% covered)                                                    |
|                               | Resistance to<br>soldering heat | MIL-STD-202G-<br>method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                | ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage                        |
| Short time overload           |                                 | MIL-R-55342D-<br>para 4.7.5  | 2.5 times RCWV or maximum overload voltage which-<br>ever is less for 5 seconds at room temperature                               | ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage                        |





# Chip Resistors Selection Charts

## Arrays, convex / concave

| Global part number - Arrays                |  |  |  |                         |  |  |  |                                |  |  |  |
|--------------------------------------------|--|--|--|-------------------------|--|--|--|--------------------------------|--|--|--|
| Ordering example: YC122-JR-07100KL         |  |  |  |                         |  |  |  |                                |  |  |  |
| <div>Y C 1 2 2 — J R — 0 7 1 0 0 K L</div> |  |  |  |                         |  |  |  |                                |  |  |  |
| Series name (code 1-2)                     |  |  |  | Resistance (code 12-16) |  |  |  | Default code (code 17)         |  |  |  |
| YC = Array & Network (convex) thick film   |  |  |  | 0R = Jumper             |  |  |  |                                |  |  |  |
| TC = Array (concave) thick film            |  |  |  | 10R = 10Ω               |  |  |  |                                |  |  |  |
| Size code (inch) (code 3-4)                |  |  |  | 100R = 100Ω             |  |  |  | Taping reel (code 10-11)       |  |  |  |
| 10 = 0201 x 2 (0202)                       |  |  |  | 100K = 100KΩ            |  |  |  | 07 = 7 inch Dia. reel          |  |  |  |
| 0201 x 4 (0204)                            |  |  |  |                         |  |  |  | 10 = 10 inch Dia. reel         |  |  |  |
| 12 = 0402 x 2 (0404)                       |  |  |  |                         |  |  |  | 13 = 13 inch Dia. reel         |  |  |  |
| 0402 x 4 (0408)                            |  |  |  |                         |  |  |  |                                |  |  |  |
| 16 = 0603 x 2 (0606)                       |  |  |  |                         |  |  |  | T. C. R. (code 9)              |  |  |  |
| 0603 x 4 (0612)                            |  |  |  |                         |  |  |  | "—" = Based on spec.           |  |  |  |
| 24 = 0602 x 8 (0616)                       |  |  |  |                         |  |  |  | Packing style (code 8)         |  |  |  |
| 32 = 1206 x 4 (1224)                       |  |  |  |                         |  |  |  | R = Paper tape reel            |  |  |  |
| Number of resistors (code 5)               |  |  |  |                         |  |  |  | K = Embossed plastic tape reel |  |  |  |
| 2 = 2 resistors                            |  |  |  |                         |  |  |  |                                |  |  |  |
| 4 = 4 resistors                            |  |  |  |                         |  |  |  | Tolerance (code 7)             |  |  |  |
| 8 = 8 resistors                            |  |  |  |                         |  |  |  | F = ±1%                        |  |  |  |
| Schematic (code 6)                         |  |  |  |                         |  |  |  | J = ±5% (for Jumper ordering)  |  |  |  |
| "—" = Based on spec.                       |  |  |  |                         |  |  |  |                                |  |  |  |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type |                              |                              |                              |                              |                              |                              |                              |                              |                              |                               |                              |
|--------------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|
| Array thick film chip resistors      |                              |                              |                              |                              |                              |                              |                              |                              |                              |                               |                              |
| Size: inch / mm                      | 2 X 0402 / 1 X 1             |                              | 4 X 0402 / 2 X 1             |                              | 8 X 0602 / 4.0 X 1.6         |                              | 4 X 0603 / 3.2 X 1.3         |                              |                              |                               | 4 X 1206 / 5.2 X 3.1         |
| Power                                | 1/16 W                       |                              | 1/16 W                       |                              | 1/16 W                       |                              | 1/16 W                       |                              |                              |                               | 1/8 W                        |
| Tolerance                            | +5%                          | +1%                          | +5%                          | +1%                          | +5%                          | +1%                          | +5%                          | +1%                          | +5%                          | +1%                           | +5%                          |
| Type                                 | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (concave) | R-array / R-network (convex) |
| Resistance                           | E24                          | E24 / E96                    | E24                          | E24 / E96                    | E24                          | E24 / E96                    | E24                          | E24 / E96                    | E24                          | E24/E96                       | E24                          |
| Packing                              | paper tape                   |                              | paper tape                   |                              | paper tape                   |                              | paper tape                   |                              |                              |                               | blister tape                 |
| Quantity                             | 4 000                        | ---                          | ---                          | ---                          | ---                          | ---                          | ---                          | ---                          | ---                          | ---                           | 2350 039 10...L              |
|                                      | 5 000                        | ---                          | ---                          | ---                          | 2350 053 10...L              | 2350 043 1...L               | 2350 035 10...L              | 2350 025 1...L               | 2350 034 10...L              | 2350 024 1...L                | ---                          |
|                                      | 10 000                       | 2350 013 11...L              | 2350 013 2...L               | 2350 033 11...L              | 2350 023 2...L               | ---                          | ---                          | ---                          | ---                          | ---                           | ---                          |
| Jumper                               | 5 000                        | ---                          | ---                          | ---                          | 2350 053 91001L              | ---                          | 2350 035 91001L              | ---                          | 2350 034 91001L              | ---                           | ---                          |
|                                      | 10 000                       | 2350 013 91001L              | ---                          | 2350 033 91001L              | ---                          | ---                          | ---                          | ---                          | ---                          | ---                           | ---                          |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |  |  |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |  |  |  |  |  |  |  |  |  |  |  |





# Chip Resistors Selection Charts

## Networks, T-type / L-type

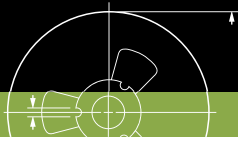
| Global part number - Networks                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: YC158TJR-07100KL                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                 |
| <p>Series name (code 1-2)<br/>YC = Array &amp; Network (convex) thick film</p> <p>Size code (inch) (code 3-4)<br/>15 = 10Pin/8R (0612)<br/>35 = 10Pin/8R (1225)</p> <p>Number of resistors (code 5)<br/>8 = 8 resistors</p> <p>Schematic (code 6)<br/>L = L-type (for YC358)<br/>T = T-type (for YC158/358)</p> | <p>Resistance (code 12-16)<br/>OR = Jumper<br/>10R = 10Ω<br/>100R = 100Ω<br/>100K = 100KΩ</p> <p>Taping reel (code 10-11)<br/>07 = 7 inch Dia. reel<br/>13 = 13 inch Dia. reel</p> <p>T. C. R. (code 9)<br/>"—" = Based on spec.</p> <p>Packing style (code 8)<br/>R = Paper tape reel<br/>K = Embossed plastic tape reel</p> <p>Tolerance (code 7)<br/>F = ±1%<br/>J = ±5%</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type |                                                      |                                                      |                                                     |
|--------------------------------------|------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|
| Network thick film chip resistors    |                                                      |                                                      |                                                     |
| Size: inch (mm)                      | 0612 (1632)                                          | 1225 (3264)                                          |                                                     |
| Power                                | 1/16 W                                               | 1/16 W                                               |                                                     |
| Tolerance                            | +5%                                                  | +5%                                                  |                                                     |
| Type                                 | T-type 10 Pin / 8R<br>PIN 5 and PIN 10 no resistance | T-type 10 Pin / 8R<br>PIN 5 and PIN 10 no resistance | L-type 10 Pin / 8R<br>PIN 1 and PIN 6 no resistance |
| Resistance                           | E24                                                  | E24                                                  | E24                                                 |
| Packing                              | paper tape                                           | blister tape                                         |                                                     |
| Quantity                             | 4 000                                                | 2350 201 10...L                                      | 2350 200 10...L                                     |
|                                      | 5 000                                                | 2350 230 10...L                                      | ---                                                 |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |
|--------------------------------------------------------------------------------------|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |



# Chip Resistors Selection Charts

NiAu termination chip resistors, 0402 to 1206

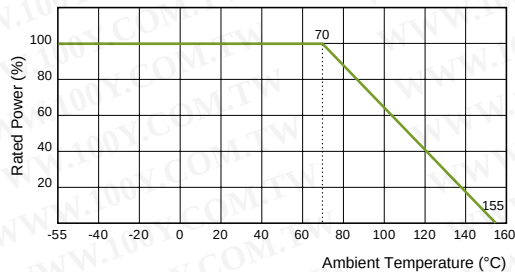


## Features

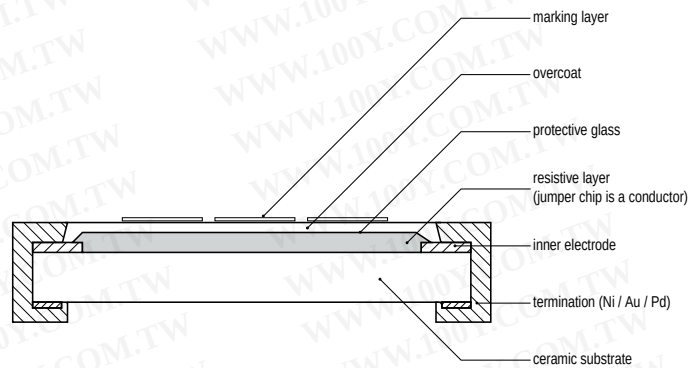
- New NiAu terminations provide special application for hybrid board gluing
- Competitive with AgPd terminations
- Special use in high temperature environment
- Higher component and equipment reliability

### Derating curve

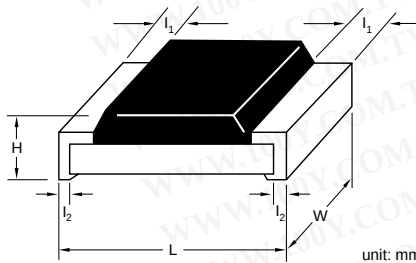
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ( $T_{amb}$ ).



### Construction



### Dimensions



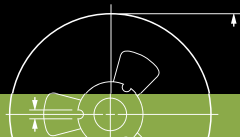
| Type   | L               | W               | H               | $l_1$           | $l_2$           |
|--------|-----------------|-----------------|-----------------|-----------------|-----------------|
| AR0402 | $1.00 \pm 0.05$ | $0.50 \pm 0.05$ | $0.35 \pm 0.05$ | $0.20 \pm 0.10$ | $0.25 \pm 0.10$ |
| AR0603 | $1.60 \pm 0.10$ | $0.80 \pm 0.10$ | $0.45 \pm 0.10$ | $0.25 \pm 0.15$ | $0.25 \pm 0.15$ |
| AR0805 | $2.00 \pm 0.10$ | $1.25 \pm 0.10$ | $0.50 \pm 0.10$ | $0.35 \pm 0.20$ | $0.35 \pm 0.20$ |
| AR1206 | $3.10 \pm 0.10$ | $1.60 \pm 0.10$ | $0.55 \pm 0.10$ | $0.45 \pm 0.20$ | $0.40 \pm 0.20$ |

# Chip Resistors Selection Charts

NiAu termination chip resistors, 0402 to 1206

| Electrical characteristics |                          |                          |      |      |      |                                  |                                           |                                |              |                              |      |
|----------------------------|--------------------------|--------------------------|------|------|------|----------------------------------|-------------------------------------------|--------------------------------|--------------|------------------------------|------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance     |                                           | T. C. R.<br>( ppm/°C)          |              | Jumper criteria<br>(unit: A) |      |
| AR0402                     | 1/16W                    | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 10MΩ<br>1Ω ≤ R ≤ 10MΩ<br>< 0.05Ω | 10Ω < R ≤ 10MΩ<br>1Ω ≤ R ≤ 10Ω | ±100<br>±200 | Rated current                | 1.0  |
| AR0603                     | 1/10W                    | -55°C to +155°C          | 50V  | 100V | 100V |                                  |                                           |                                |              | Max. current                 | 2.0  |
| AR0805                     | 1/8W                     | -55°C to +155°C          | 150V | 300V | 300V |                                  |                                           |                                |              | Rated current                | 2.0  |
| AR1206                     | 1/4W                     | -55°C to +155°C          | 200V | 500V | 500V |                                  |                                           |                                |              | Max. current                 | 5.0  |
|                            |                          |                          |      |      |      |                                  |                                           |                                |              | Rated current                | 2.0  |
|                            |                          |                          |      |      |      |                                  |                                           |                                |              | Max. current                 | 10.0 |

| Environmental characteristics |                              |                          |                                                                                                                                            |                                                                                                            |
|-------------------------------|------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                                  | Requirements                                                                                               |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 $\pm 5^\circ\text{C}$ applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                    | $\pm(2\% + 0.05\Omega)$<br>$< 100m\Omega$ for jumper                                                       |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                                      | $\pm(1\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper                                                        |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours<br>(method 106F), 3 cycles / 24 hours for 10d with<br>25°C / 65°C 95% R.H          | $\pm(2\% + 0.05\Omega)$<br>$< 100m\Omega$ for jumper                                                       |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                         | $\pm(0.5\% + 0.05\Omega)$ for 10K to 10M<br>$\pm(1\% + 0.05\Omega)$ for others<br>$< 50m\Omega$ for jumper |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 $\pm 3^\circ\text{C}$<br>Dipping time: 3 $\pm 0.5$ seconds | Well tinned ( $\geq 95\%$ covered)<br>No visible damage                                                    |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                         | $\pm(1\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper<br>No visible damage                                   |
| Short time overload           |                              | MIL-R-55342D-para 4.7.5  | 2.5 times RCWV or maximum overload voltage which-<br>ever is less for 5 seconds at room temperature                                        | $\pm(2\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper<br>No visible damage                                   |

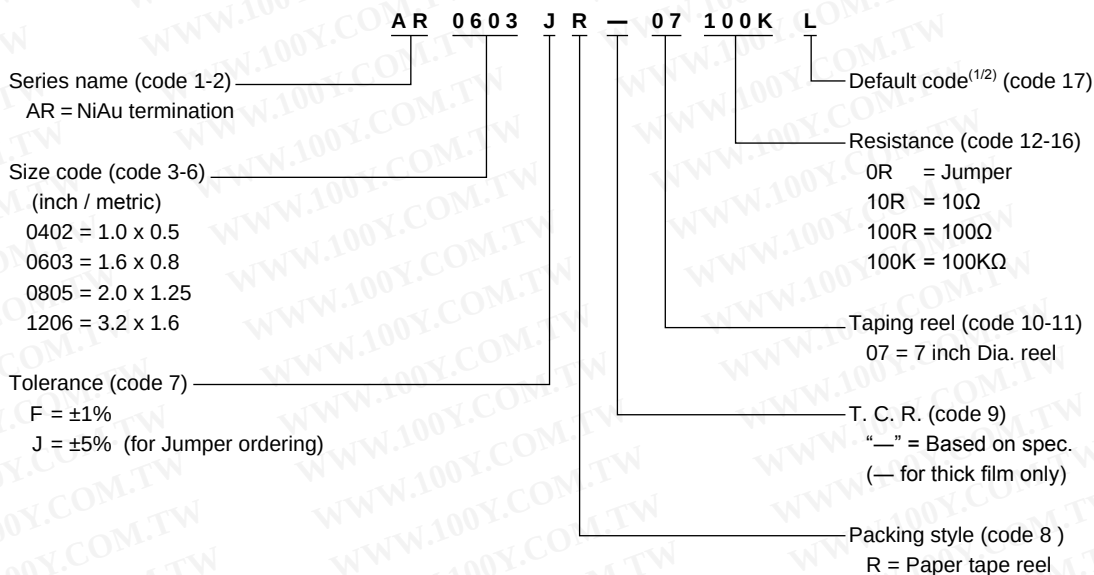


# Chip Resistors Selection Charts

## NiAu termination chip resistors, 0402 to 1206

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: AR0603JR-07100KL



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

| Chip resistors with Ni/Au terminations |                  |                |                 |                |                 |                |                 |                |
|----------------------------------------|------------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|
| Size: inch (mm)                        | 0402 (1005)      |                | 0603 (1608)     |                | 0805 (2012)     |                | 1206 (3216)     |                |
| Power                                  | 1/16 W           |                | 1/10 W          |                | 1/8 W           |                | 1/4 W           |                |
| Tolerance                              | +5%              | +1%            | +5%             | +1%            | +5%             | +1%            | +5%             | +1%            |
| Resistance                             | E24              | E24 / E96      | E24             | E24 / E96      | E24             | E24 / E96      | E24             | E24 / E96      |
| Packing                                | paper tape       |                | paper tape      |                | paper tape      |                | paper tape      |                |
| Quantity 5 000                         | ---              | ---            | 2322 702 11...L | 2322 704 1...L | 2322 730 11...  | 2322 734 1...L | 2322 711 11...L | 2322 729 1...L |
| 10 000                                 | 2322 705 12...L  | 2322 706 2.... | ---             | ---            | ---             | ---            | ---             | ---            |
| Jumper 5 000                           | ---              | ---            | 2322 702 19001L | ---            | 2322 730 19001L | ---            | 2322 711 19001L | ---            |
| 10 000                                 | 2322 705 19001 L | ---            | ---             | ---            | ---             | ---            | ---             | ---            |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.





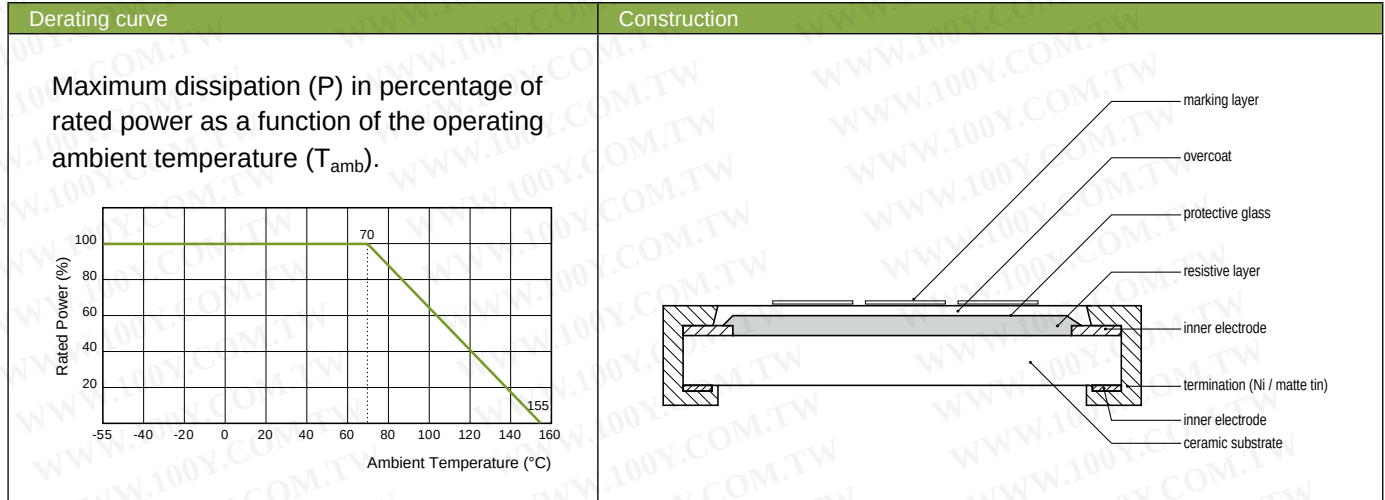
# Chip Resistors Selection Charts

Surge chip resistors, 0805 to 2512



## Features

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Excellent performance at pulse loading



| Dimensions      |            |            |            |            |            |
|-----------------|------------|------------|------------|------------|------------|
| <p>unit: mm</p> |            |            |            |            |            |
| Type            | L          | W          | H          | $l_1$      | $l_2$      |
| SR0805          | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| SR1206          | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| SR1218          | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| SR2010          | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.55 ±0.15 | 0.50 ±0.20 |
| SR2512          | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

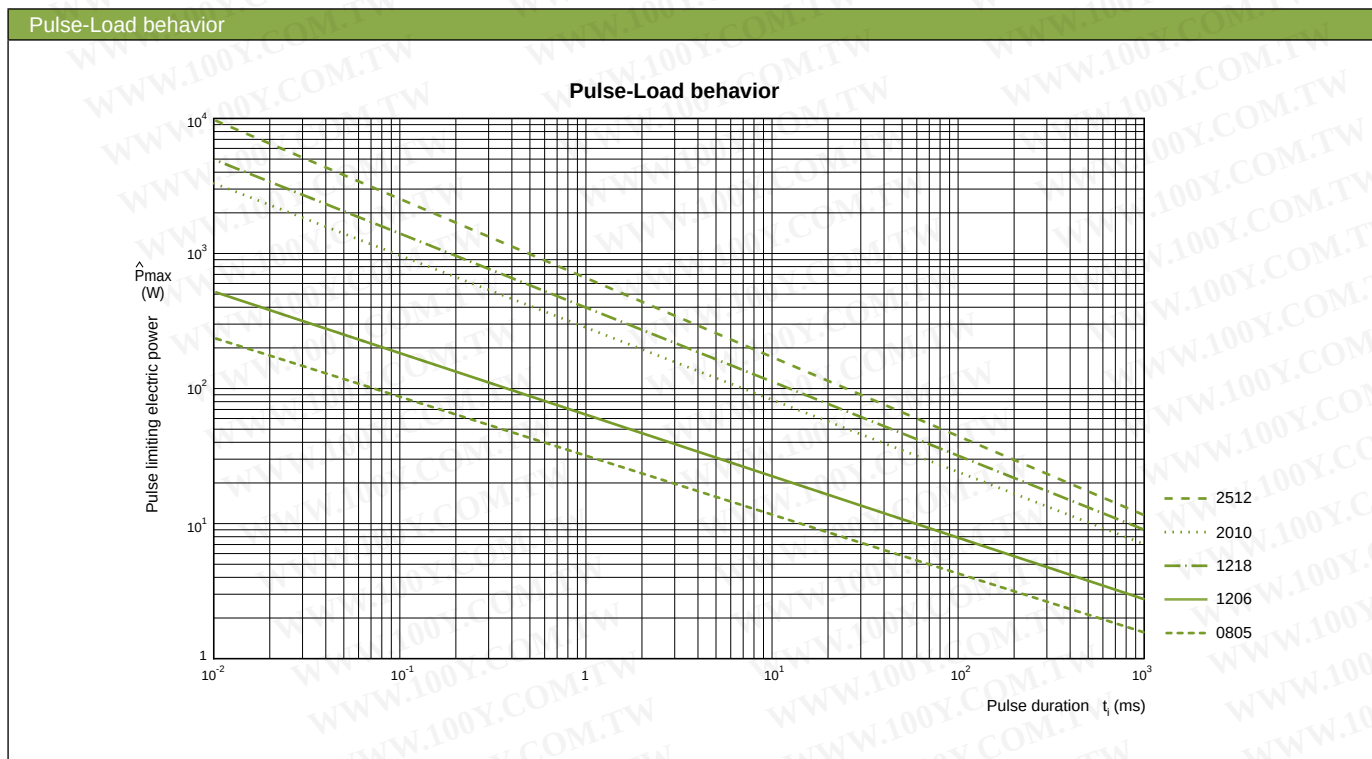


# Chip Resistors Selection Charts

## Surge chip resistors, 0805 to 2512

| Electrical characteristics |                          |                          |      |      |      |                              |                |             |
|----------------------------|--------------------------|--------------------------|------|------|------|------------------------------|----------------|-------------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance |                | T. C. R.    |
| SR0805                     | 1/8W                     | -55°C to +155°C          | 150V | 300V | 300V | E24 ±5%, ±10%, ±20%          | 1Ω ≤ R ≤ 100KΩ | ±200 ppm/°C |
| SR1206                     | 1/4W                     | -55°C to +155°C          | 150V | 400V | 500V |                              |                |             |
| SR1218                     | 1W                       | -55°C to +155°C          | 200V | 400V | 500V |                              |                |             |
| SR2010                     | 3/4W                     | -55°C to +155°C          | 200V | 400V | 500V |                              |                |             |
| SR2512                     | 1W                       | -55°C to +155°C          | 200V | 400V | 500V |                              |                |             |

| Environmental characteristics |                              |                          |                                                                                                                      |                                                 |
|-------------------------------|------------------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                            | Requirements                                    |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                               | ±(3% +0.05Ω)                                    |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                   | ±(3% +0.05Ω)                                    |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                   | ±(1% +0.05Ω)<br>No visible damage               |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage which-ever is less for 5 seconds at room temperature                      | ±(2% +0.05Ω)<br>No visible damage               |



# Chip Resistors Selection Charts

## Surge chip resistors, 0805 to 2512

| Global part number - Preferred type for ordering Yageo / Phycomp branded products                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: SR0805MR-07100KL                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>Series name (code 1-2)</p> <p>SR = Surge</p> <p>Size code (code 3-6)</p> <p>(inch / metric)</p> <p>0805 = 2.0 x 1.25</p> <p>1206 = 3.2 x 1.6</p> <p>1218 = 3.2 x 4.5</p> <p>2010 = 5.0 x 2.5</p> <p>2512 = 6.35 x 3.2</p> <p>Tolerance (code 7)</p> <p>J = <math>\pm 5\%</math></p> <p>K = <math>\pm 10\%</math></p> <p>M = <math>\pm 20\%</math></p> | <p>Default code<sup>(1/2)</sup> (code 17)</p> <p>Resistance (code 12-16)</p> <p>10R = 10<math>\Omega</math></p> <p>100K = 100K<math>\Omega</math></p> <p>Taping reel (code 10-11)</p> <p>07 = 7 inch Dia. reel</p> <p>10 = 10 inch Dia. reel</p> <p>13 = 13 inch Dia. reel</p> <p>T. C. R. (code 9)</p> <p>"—" = Based on spec.</p> <p>(— for thick film only)</p> <p>Packing style (code 8)</p> <p>R = Paper tape reel</p> <p>K = Embossed plastic tape reel</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type |             |                 |                 |                 |                 |                 |
|--------------------------------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Surge chip resistors                 |             |                 |                 |                 |                 |                 |
| Size: inch (mm)                      | 0805 (2012) | 1206 (3216)     | 1218 (3248)     | 2512 (6432)     |                 |                 |
| Power                                | 1/8 W       | 1/4 W           | 1 W             | 1 W             |                 |                 |
| Tolerance                            | +10%        | +5%             | +10%            | +5%             | +10%            | +20%            |
| Resistance                           | E24         | E24             | E24             | E24             | E24             | E24             |
| Packing                              | paper tape  | paper tape      | paper tape      | paper tape      | paper tape      | paper tape      |
| Quantity                             | 4 000       | ---             | 2350 557 10...L | 2350 556 11...L | 2350 556 10...L | 2350 556 13...L |
|                                      | 5 000       | 2350 554 12...L | 2350 550 10...L | ---             | ---             | ---             |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America                         |
|--------------------------------------------------------------------------------------|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |



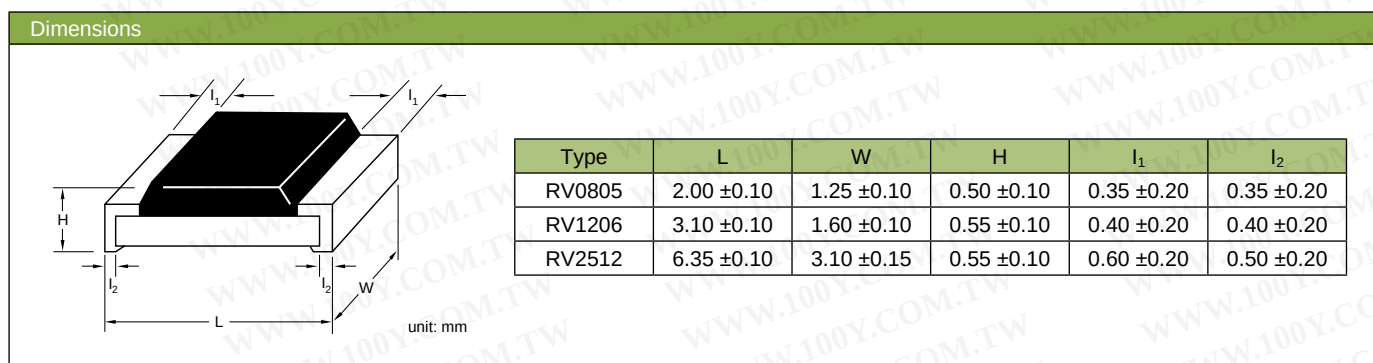
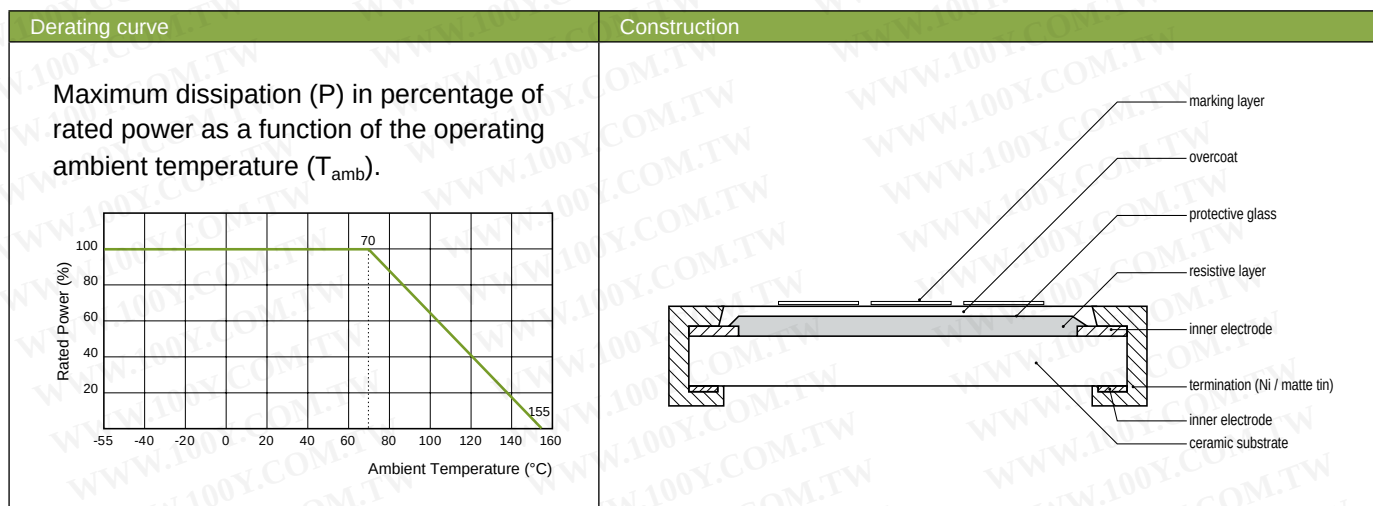
# Chip Resistors Selection Charts

High voltage chip resistors, 0805 to 2512



## Features

- Higher maximum working voltage compared to RC series
- Extremely thin and light
- Reliable electrode construction
- Compatible with lead containing and lead-free soldering processes
- Highly stable in auto-placement surface mounting



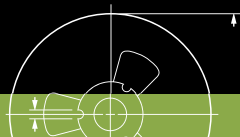


# Chip Resistors Selection Charts

## High voltage chip resistors, 0805 to 2512

| Electrical characteristics |                          |                          |      |       |       |                              |                                      |             |
|----------------------------|--------------------------|--------------------------|------|-------|-------|------------------------------|--------------------------------------|-------------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV  | RCOV  | DWV   | Resistance range & tolerance |                                      | T. C. R.    |
| RV0805                     | 1/8W                     | -55°C to +155°C          | 400V | 800V  | 800V  | E24 ±5%<br>E24/E96 ±1%       | 100KΩ ≤ R ≤ 10MΩ                     | ±200 ppm/°C |
| RV1206                     | 1/4W                     | -55°C to +155°C          | 500V | 1000V | 1000V | E24 ±5%<br>E24/E96 ±1%       | 100KΩ ≤ R ≤ 27MΩ<br>100KΩ ≤ R ≤ 10MΩ |             |
| RV2512                     | 1W                       | -55°C to +155°C          | 500V | 1000V | 1000V | E24 ±5%                      | 4.7MΩ ≤ R ≤ 16MΩ                     |             |

| Environmental characteristics |                              |                          |                                                                                                                             |                                                          |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                   | Requirements                                             |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                      | ±(2% +0.05Ω)                                             |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered                                          | ±(1% +0.05Ω)                                             |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω)                                             |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                          | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds        | Well tinned (≥95% covered)<br>No visible damage          |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                          | ±(1% +0.05Ω)<br>No visible damage                        |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature                              | ±(2% +0.05Ω)<br>No visible damage                        |

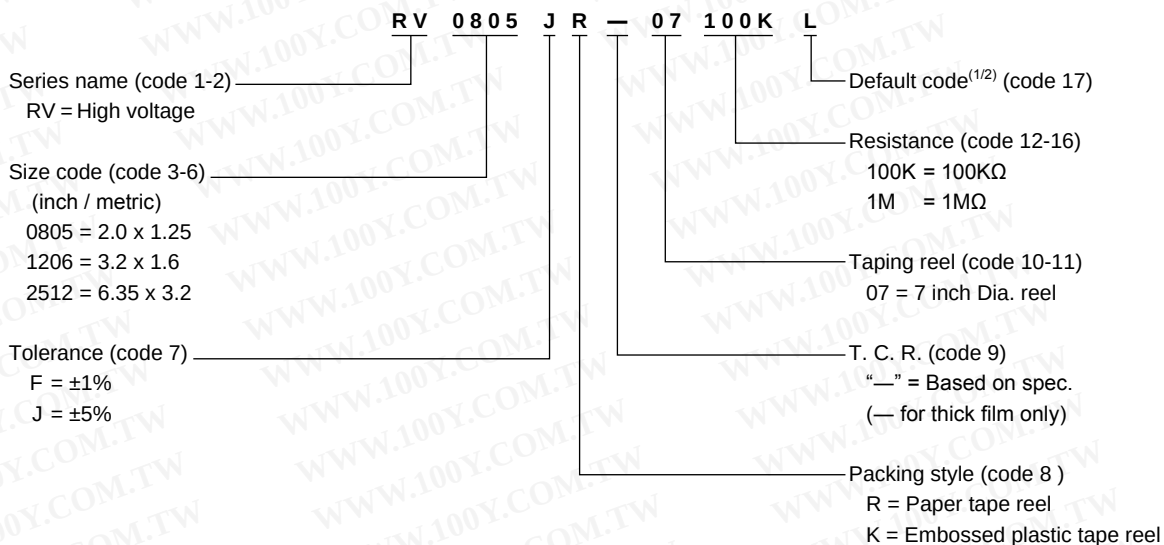


# Chip Resistors Selection Charts

## High voltage chip resistors, 0805 to 2512

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RV0805JR-07100KL



**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

| High voltage chip resistors |             |                 |                |                 |                 |
|-----------------------------|-------------|-----------------|----------------|-----------------|-----------------|
| Size: inch (mm)             | 0805 (2012) |                 | 1206 (3216)    |                 | 2512 (6432)     |
| Power                       | 1/8 W       |                 | 1/4 W          |                 | 1 W             |
| Tolerance                   | +5%         | +1%             | +5%            | +1%             | +5%             |
| Resistance                  | E24         | E24 / E96       | E24            | E24 / E96       | E24             |
| Packing                     | paper tape  |                 | paper tape     |                 | blister tape    |
| Quantity                    | 4 000       | ---             | ---            | ---             | 2322 762 98...L |
|                             | 5 000       | 2322 792 61...L | 2322 793 6...L | 2322 790 61...L | 2322 791 6...L  |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.



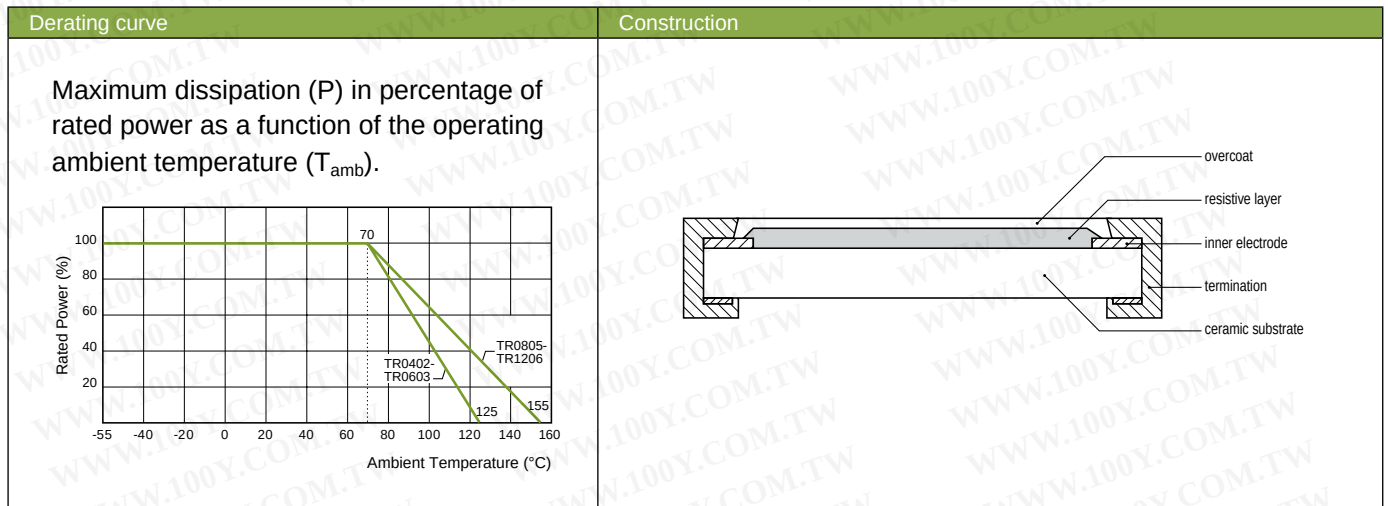
# Chip Resistors Selection Charts

Trimmable chip resistors, 0402 to 1206



## Features

- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Improved performance at high frequency
- Low noise, when not trimmed



| Dimensions      |        |            |            |            |            |            |
|-----------------|--------|------------|------------|------------|------------|------------|
| <p>unit: mm</p> | Type   | L          | W          | H          | $l_1$      | $l_2$      |
|                 | TR0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
|                 | TR0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
|                 | TR0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
|                 | TR1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |



# Chip Resistors Selection Charts

## Trimmable chip resistors, 0402 to 1206

| Electrical characteristics |                   |                          |      |      |      |                               |                                 |                                |      |
|----------------------------|-------------------|--------------------------|------|------|------|-------------------------------|---------------------------------|--------------------------------|------|
| Type                       | Power<br>$P_{70}$ | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance  |                                 | T. C. R.<br>(ppm/°C)           |      |
| TR0402                     | 1/16W             | -55°C to +125°C          | 50V  | 100V | 100V | E24 +0/-10%, +0/-20%, +0/-30% | $1\Omega \leq R \leq 10M\Omega$ | $1\Omega \leq R \leq 10\Omega$ | ±200 |
| TR0603                     | 1/16W             | -55°C to +125°C          | 50V  | 100V | 100V |                               |                                 | $10\Omega < R \leq 1M\Omega$   | ±100 |
| TR0805                     | 1/8W              | -55°C to +155°C          | 150V | 300V | 500V |                               |                                 | $1M\Omega < R \leq 10M\Omega$  | ±200 |
| TR1206                     | 1/4W              | -55°C to +155°C          | 200V | 500V | 500V |                               |                                 |                                |      |

| Environmental characteristics |                              |                          |                                                                                                                                   |                                                 |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                         | Requirements                                    |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                            | ±(1% +0.05Ω)                                    |
| High temperature exposure     |                              | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                             | ±(1% +0.05Ω)                                    |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω)                                    |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                | ±(1% +0.05Ω)                                    |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds              | Well tinned (≥95% covered)<br>No visible damage |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                | ±(1% +0.05Ω)<br>No visible damage               |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage<br>whichever is less for 5 seconds at room temperature                                 | ±(1% +0.05Ω)<br>No visible damage               |

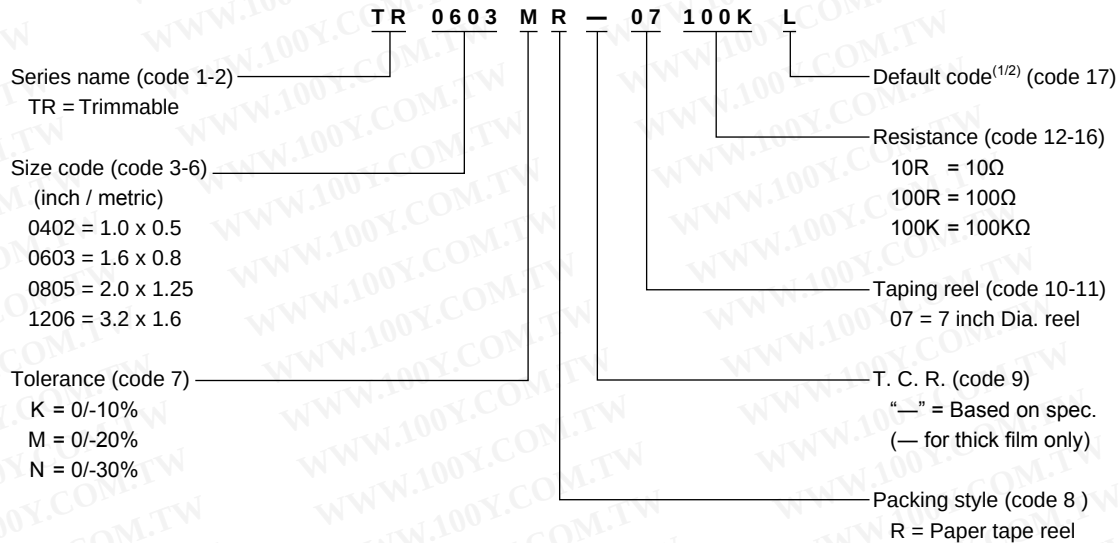


# Chip Resistors Selection Charts

## Trimmable chip resistors, 0402 to 1206

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: TR0603MR-07100KL



**Note:** 1. All of our RSMD products are RoHS compliant. “LFP” of the internal 2D reel label mentions “Lead Free Process”  
 2. Letter L is system default code for ordering only

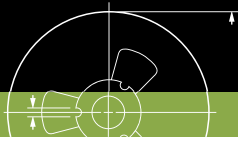
### Phycomp worldwide - Traditional type

| Trimmable chip resistors |                 |                 |                 |                 |
|--------------------------|-----------------|-----------------|-----------------|-----------------|
| Size: inch (mm)          | 0402 (1005)     | 0603 (1608)     | 0805 (2012)     | 1206 (3216)     |
| Power                    | 1/16 W          | 1/10 W          | 1/8 W           | 1/4 W           |
| Tolerance                | E24             | E24             | E24             | E24             |
| Resistance               | paper tape      | paper tape      | paper tape      | paper tape      |
| Packing                  | 2350 503 21...L | 2350 502 11...L | 2350 501 11...L | 2350 500 11...L |
| Quantity 5 000 0/-20%    | 2350 503 20...L | 2350 502 10...L | 2350 511 10...L | 2350 500 10...L |
| 5 000 0/-30%             | on request      | on request      | on request      | 2322 724 94...L |
| Europe 5 000             | 2322 792 61...L | 2322 793 6...L  | 2322 791 6...L  | ---             |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.



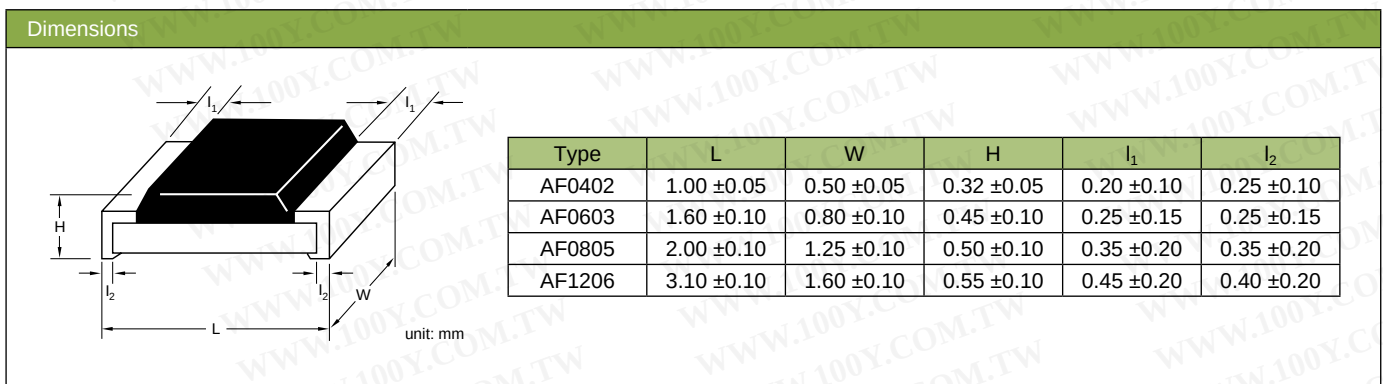
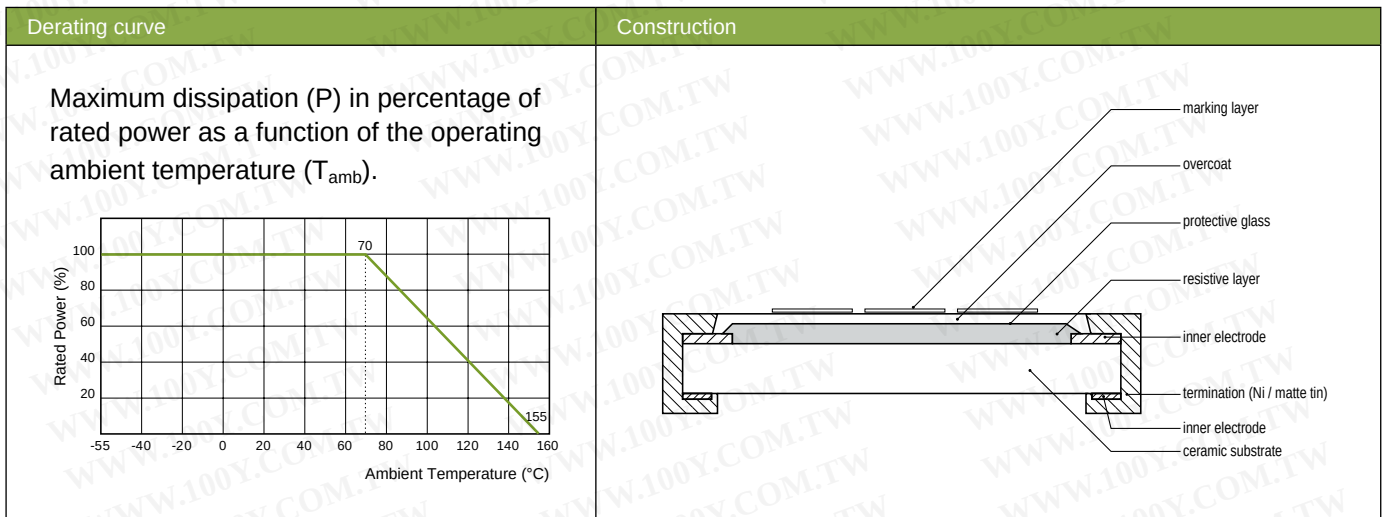
# Chip Resistors Selection Charts

Anti-sulfurated chip resistors, 0402 to 1206



## Features

- Superior resistance against sulfur containing atmosphere
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Halogen free product and production

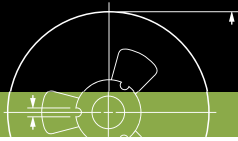


# Chip Resistors Selection Charts

## Anti-sulfurated chip resistors, 0402 to 1206

| Electrical characteristics |                          |                          |      |      |      |                                  |                                           |                                                   |                      |                              |      |
|----------------------------|--------------------------|--------------------------|------|------|------|----------------------------------|-------------------------------------------|---------------------------------------------------|----------------------|------------------------------|------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance     |                                           | T. C. R.<br>( ppm/°C)                             |                      | Jumper criteria<br>(unit: A) |      |
| AF0402                     | 1/16W                    | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 22MΩ<br>1Ω ≤ R ≤ 10MΩ<br>< 0.05Ω | 1Ω ≤ R ≤ 10Ω<br>10Ω < R ≤ 10MΩ<br>10MΩ < R ≤ 22MΩ | ±200<br>±100<br>±200 | Rated current                | 1.0  |
| AF0603                     | 1/10W                    | -55°C to +155°C          | 50V  | 100V | 100V |                                  |                                           |                                                   |                      | Max. current                 | 2.0  |
| AF0805                     | 1/8W                     | -55°C to +155°C          | 150V | 300V | 300V |                                  |                                           |                                                   |                      | Rated current                | 2.0  |
|                            |                          |                          |      |      |      |                                  |                                           |                                                   |                      | Max. current                 | 5.0  |
| AF1206                     | 1/4W                     | -55°C to +155°C          | 200V | 400V | 500V |                                  |                                           |                                                   |                      | Rated current                | 2.0  |
|                            |                          |                          |      |      |      |                                  |                                           |                                                   |                      | Max. current                 | 10.0 |

| Environmental characteristics |                                 |                          |                                                                                                                                   |                                                                              |
|-------------------------------|---------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Performance test              |                                 | Test method              | Procedure                                                                                                                         | Requirements                                                                 |
| Life                          |                                 | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                            | ±(1% +0.05Ω)<br>< 100mΩ for jumper                                           |
| High temperature exposure     |                                 | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature<br>depending on specification, unpowered                                             | ±(1% +0.05Ω)<br>< 100mΩ for jumper                                           |
| Moisture resistance           |                                 | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Thermal shock                 |                                 | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                | ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Solderability                 | Wetting                         | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds              | Well tinned<br>(≥95% covered)<br>No visible damage                           |
|                               | Resistance to<br>soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                                | ±(1% +0.05Ω)<br>No visible damage                                            |
| Short time overload           |                                 | MIL-R-55342D-para 4.7.5  | 2.5 times RCWV or maximum overload voltage which-<br>ever is less for 5 seconds at room temperature                               | ±(1% +0.05Ω)<br>No visible damage                                            |
| Anti-FOS                      |                                 | ASTM-B-809-95            | Sulfur (saturated vapor) 1000 hours, 60±2°C, 91~93<br>%RH, Rating with no power                                                   | ±(1% +0.05Ω)                                                                 |

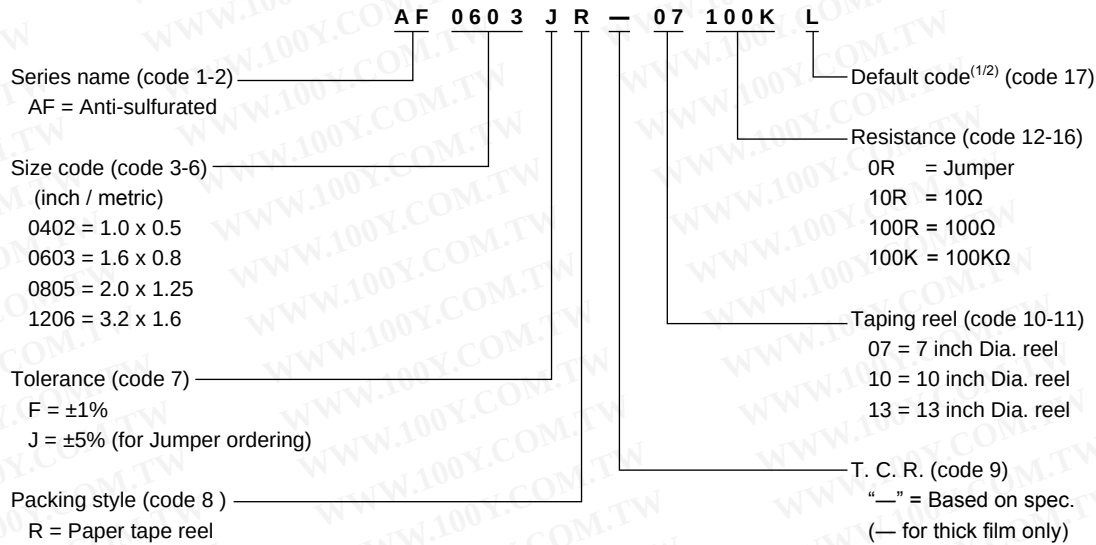


# Chip Resistors Selection Charts

## Anti-sulfurated chip resistors, 0402 to 1206

Global part number - Preferred type

Ordering example: AF0603JR-07100KL



**Note:** 1. All our RSMD products meet RoHS Compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for order only  
3. AF series products are available by "Global part number" only



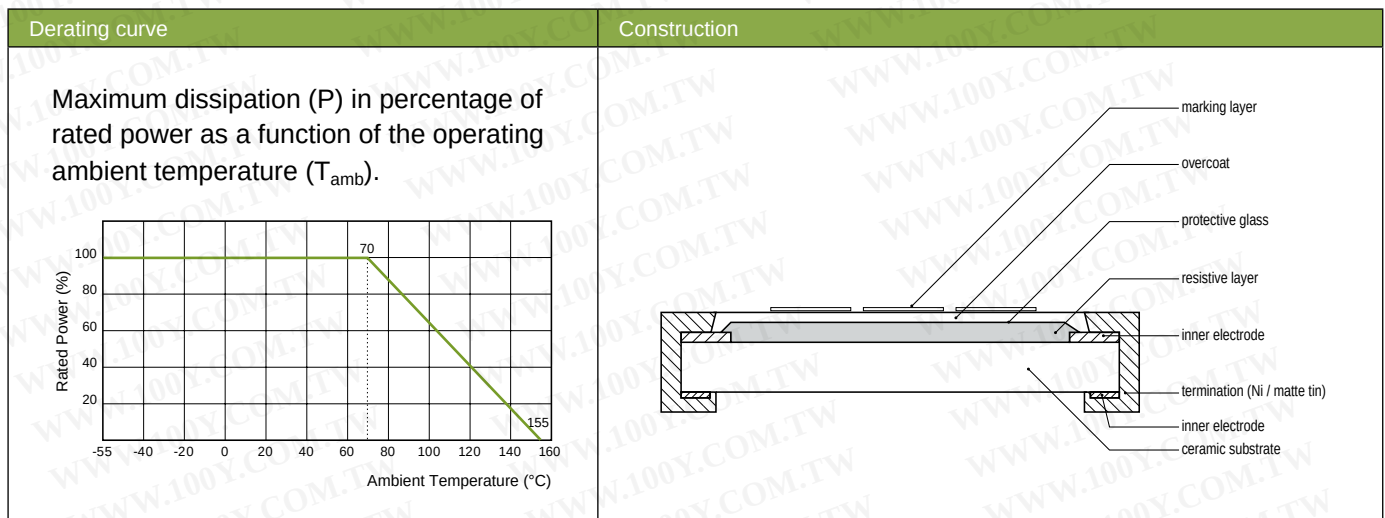
# Chip Resistors Selection Charts

Automotive grade chip resistors, 0402 to 2512



## Features

- AEC-Q200 compliant
- Production part approval process (PPAP) support
- High reliability
- High quality level
- Superior resistance against sulfur containing atmosphere



| Dimensions      |            |            |            |            |            |
|-----------------|------------|------------|------------|------------|------------|
| <p>unit: mm</p> |            |            |            |            |            |
| Type            | L          | W          | H          | $l_1$      | $l_2$      |
| AC0402          | 1.00 ±0.05 | 0.50 ±0.05 | 0.32 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| AC0603          | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| AC0805          | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| AC1206          | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| AC1210          | 3.10 ±0.10 | 2.60 ±0.15 | 0.50 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| AC1218          | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| AC2010          | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.55 ±0.15 | 0.50 ±0.20 |
| AC2512          | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |



# Chip Resistors Selection Charts

## Automotive grade chip resistors, 0402 to 2512

| Electrical characteristics |                          |                          |      |      |      |                                  |                                           |                                 |              |                              |      |
|----------------------------|--------------------------|--------------------------|------|------|------|----------------------------------|-------------------------------------------|---------------------------------|--------------|------------------------------|------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MWV  | RCOV | DWV  | Resistance range & tolerance     |                                           | T. C. R.<br>( ppm/°C)           |              | Jumper criteria<br>(unit: A) |      |
| AC0402                     | 1/16W                    | -55°C to +155°C          | 50V  | 100V | 100V | E24 ±5%<br>E24/E96 ±1%<br>Jumper | 1Ω ≤ R ≤ 10MΩ<br>1Ω ≤ R ≤ 10MΩ<br>< 0.05Ω | 1Ω ≤ R ≤ 10Ω<br>10Ω < R ≤ 10 MΩ | ±200<br>±100 | Rated current                | 1.0  |
| AC0603                     | 1/10W                    | -55°C to +155°C          | 50V  | 100V | 100V |                                  |                                           |                                 |              | Max. current                 | 2.0  |
| AC0805                     | 1/8W                     | -55°C to +155°C          | 150V | 300V | 300V |                                  |                                           |                                 |              | Rated current                | 2.0  |
| AC1206                     | 1/4W                     | -55°C to +155°C          | 200V | 400V | 500V |                                  |                                           |                                 |              | Max. current                 | 5.0  |
| AC1210                     | 1/2W                     | -55°C to +155°C          | 200V | 500V | 500V |                                  |                                           |                                 |              | Rated current                | 2.0  |
| AC1218                     | 1W                       | -55°C to +155°C          | 200V | 500V | 500V |                                  |                                           |                                 |              | Max. current                 | 10.0 |
| AC2010                     | 3/4W                     | -55°C to +155°C          | 200V | 500V | 500V |                                  |                                           |                                 |              | Rated current                | 2.0  |
| AC2512                     | 1W                       | -55°C to +155°C          | 200V | 500V | 500V |                                  |                                           |                                 |              | Max. current                 | 10.0 |

| Environmental characteristics |                                 |                                                  |                                                                                                                                    |                                                                                                           |
|-------------------------------|---------------------------------|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| Performance test              |                                 | Test method                                      | Procedure                                                                                                                          | Requirements                                                                                              |
| Life                          |                                 | AEC-Q200-REV C-Test 8<br>MIL-STD-202 Method 108  | 1 000 hours at 125°C applied RCWV<br>1.5 hours on, 0.5 hours off                                                                   | $\pm(1\% + 0.05\Omega)$<br>$< 100m\Omega$ for jumper                                                      |
| High temperature exposure     |                                 | AEC-Q200-REV C-Test 3<br>MIL-STD-202 Method 108  | 1 000 hours at maximum operating temperature<br>depending on specification                                                         | $\pm(1\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper                                                       |
| Moisture resistance           |                                 | AEC-Q200-REV C-Test 6<br>MIL-STD-202 Method 106  | Each temperature / humidity cycle is defined as<br>8 hours (method 106F), 3 cycles / 24 hours<br>for 10d with 25°C / 65°C 95% R.H. | $\pm(0.5\% + 0.05\Omega)$ for 1% tol.<br>$\pm(2\% + 0.05\Omega)$ for 5% tol.<br>$< 100m\Omega$ for jumper |
| Biased humidity               |                                 | AEC-Q200-REV C-Test 7<br>MIL-STD-202 Method 103  | 1 000 hours; + 85°C 85% R.H.; 10% of operating<br>power<br>Measured at 24 $\pm$ 2 hours after test                                 | $\pm(1\% + 0.05\Omega)$<br>$< 100m\Omega$ for jumper                                                      |
| Thermal shock                 |                                 | AEC-Q200-REV C-Test 16<br>MIL-STD-202 Method 107 | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                                 | $\pm(1\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper                                                       |
| Solderability                 | Wetting                         | AEC-Q200-REV C-Test 18<br>J-STD-002B testB       | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 $\pm$ 3°C<br>Dipping time: 3 $\pm$ 0.5 seconds     | Well tinned<br>( $\geq 95\%$ covered)<br>No visible damage                                                |
|                               | Resistance to<br>soldering heat | AEC-Q200-REV C-Test 15<br>MIL-STD-202 Method 215 | Lead-free solder, 260°C, 10 seconds immersion time                                                                                 | $\pm(1\% + 0.05\Omega)$<br>$< 50m\Omega$ for jumper<br>No visible damage                                  |
| Short time overload           |                                 | MIL-R-55342D-<br>para 4.7.5                      | 2.5 times RCWV or maximum overload voltage<br>whichever is less for 5 seconds at room temperature                                  | $\pm(1\% + 0.05\Omega)$<br>$< 100m\Omega$ for jumper<br>No visible damage                                 |

# Chip Resistors Selection Charts

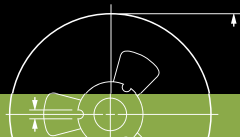
Automotive grade chip resistors, 0402 to 2512

| Global part number - Preferred type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: AC0603JR-07100KL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <p>Series name (code 1-2) ————</p> <p>AC = Automotive grade</p> <p>Size code (code 3-6) ————</p> <p>(inch / metric)</p> <p>0402 = 1.0 x 0.5</p> <p>0603 = 1.6 x 0.8</p> <p>0805 = 2.0 x 1.25</p> <p>1206 = 3.2 x 1.6</p> <p>1210 = 3.2 x 2.6</p> <p>1218 = 3.2 x 4.5</p> <p>2010 = 5.0 x 2.5</p> <p>2512 = 6.35 x 3.2</p> <p>Tolerance (code 7) ————</p> <p>F = <math>\pm 1\%</math></p> <p>J = <math>\pm 5\%</math> (for jumper ordering)</p> <p>Packing style (code 8 ) ————</p> <p>R = Paper tape reel</p> <p>K = Embossed plastic tape reel</p> | <p>AC 0603 J R — 07 100 K L</p> <p>Resistance (code 12-16)</p> <p>0R = Jumper</p> <p>10R = 10<math>\Omega</math></p> <p>100R = 100<math>\Omega</math></p> <p>100K = 100K<math>\Omega</math></p> <p>Taping reel (code 10-11)</p> <p>07 = 7 inch Dia. reel</p> <p>10 = 10 inch Dia. reel</p> <p>13 = 13 inch Dia. reel</p> <p>T. C. R. (code 9)</p> <p>“—” = Based on spec.</p> <p>(— for thick film only)</p> <p>Default code<sup>(1/2)</sup> (code 17)</p> |

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"

2. Letter L is system default code for ordering only

3. AC series products are available by "Global part number" only



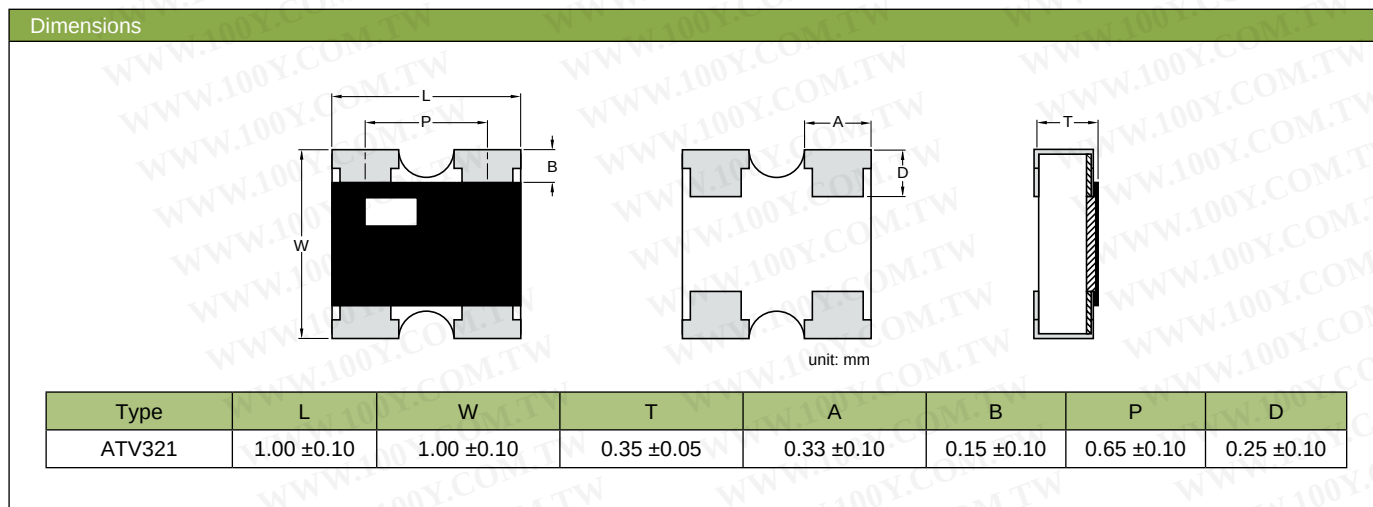
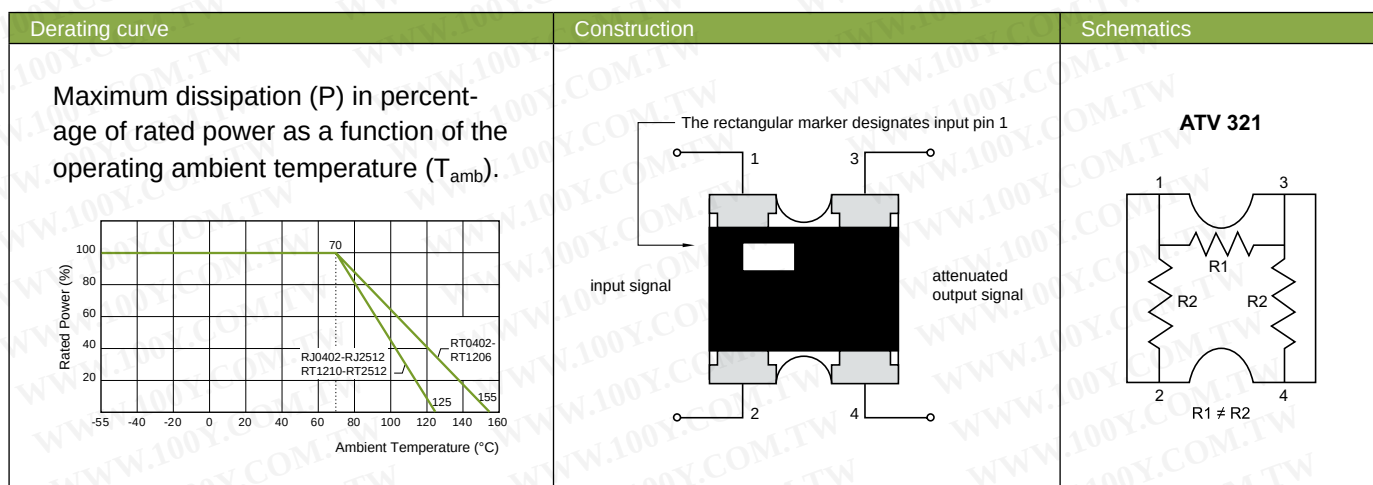
# Chip Resistors Selection Charts

## RF attenuator chip resistors, 0404



### Features

- Reduce system size
- Low assembly cost
- Higher component and system reliability
- Suitable for applications of mobile phones, receivers, battery chargers, palmtop computers and tablets



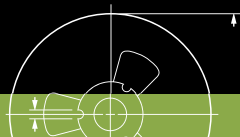


# Chip Resistors Selection Charts

## RF attenuator chip resistors, 0404

| Electrical characteristics |                          |                          |     |                |           |                               |         |                                |
|----------------------------|--------------------------|--------------------------|-----|----------------|-----------|-------------------------------|---------|--------------------------------|
| Type                       | Power<br>P <sub>70</sub> | Operating Temp.<br>range | MPV | VSWR<br>(Max.) | Impedance | Attenuation range & tolerance |         | Frequency range                |
| ATV321                     | 40mW                     | -55°C to +125°C          | 50V | 1.3            | 50Ω       | -1dB to -5dB                  | ±0.3 dB | -1dB to -10dB   DC to 2.5 GHz  |
|                            |                          |                          |     |                |           | -6dB to -10dB                 | ±0.5 dB |                                |
|                            |                          |                          |     |                |           | -15dB                         | ±1.0 dB | -15dB to -20dB   DC to 2.0 GHz |
|                            |                          |                          |     |                |           | -20dB                         | ±2.0 dB |                                |

| Environmental characteristics |                              |                          |                                                                                                                             |                               |
|-------------------------------|------------------------------|--------------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| Performance test              |                              | Test method              | Procedure                                                                                                                   | Requirements                  |
| Life                          |                              | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required                                      | Max.: ±0.3 dB                 |
| Humidity<br>(steady state)    |                              | JIS C 5202 7.5           | 1 000 hours, 40 ±2°C, 93(+2/-3)% RH<br>RCWV applied for 1.5 hours on and 0.5 hour off                                       | Max.: ±0.3 dB                 |
| Moisture resistance           |                              | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | Max.: ±0.3 dB                 |
| Thermal shock                 |                              | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds                                          | Max.: ±0.3 dB                 |
| Solderability                 | Wetting                      | J-STD-002B testB         | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds        | Well tinned<br>(≥95% covered) |
|                               | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time                                                                          | Max.: ±0.1 dB                 |
| Short time overload           |                              | MIL-R-55342-D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature                              | Max.: ±0.3 dB                 |

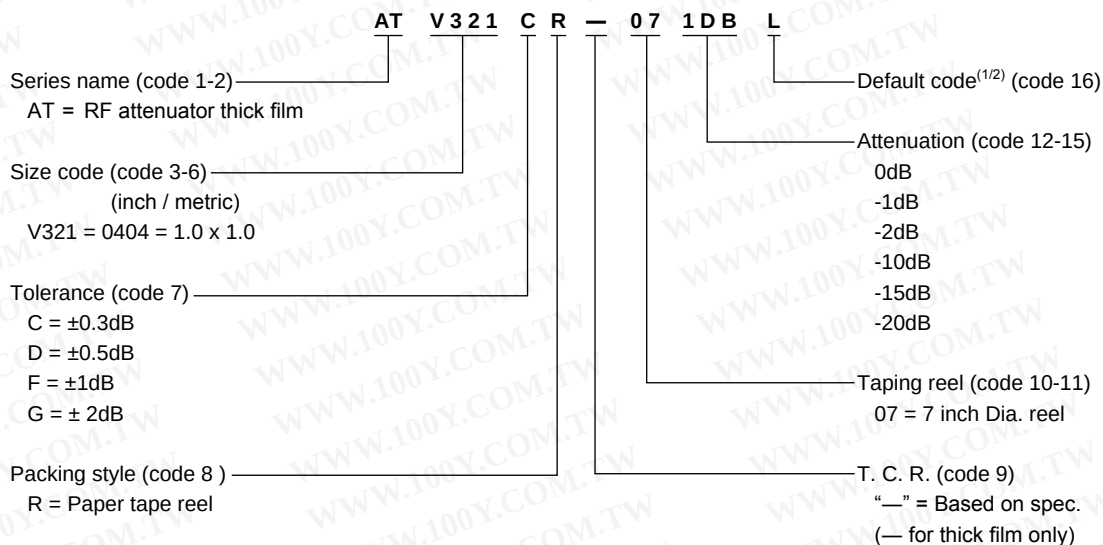


# Chip Resistors Selection Charts

## RF attenuator chip resistors, 0404

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: ATV321CR-071DBL



Note: 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"  
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

|                 |                                                                |
|-----------------|----------------------------------------------------------------|
| Packing         | paper tape                                                     |
| Quantity 10 000 | 2350 703 11...L                                                |
| Remark          | For last three digits, see following table "Attenuation codes" |

Note: L = Default code

### Phycomp CTC ordering code - Traditional type - North America

|                 |                                                                      |
|-----------------|----------------------------------------------------------------------|
| Packing         | paper tape                                                           |
| Quantity 10 000 | 9CV3218AXXXX-PF3                                                     |
| Remark          | For last 9th to 13th digits, see following table "Attenuation codes" |

### Attenuation codes

| Standard   |                |                               |                                      |
|------------|----------------|-------------------------------|--------------------------------------|
| Value (dB) | Tolerance (dB) | Phycomp worldwide code (12NC) | Phycomp North America code (NA code) |
| 1          | $\pm 0.3$      | 012                           | 01DBC                                |
| 2          | $\pm 0.3$      | 022                           | 02DBC                                |
| 3          | $\pm 0.3$      | 032                           | 03DBC                                |
| 4          | $\pm 0.3$      | 042                           | 04DBC                                |
| 5          | $\pm 0.3$      | 052                           | 05DBC                                |
| 6          | $\pm 0.5$      | 063                           | 06DBD                                |
| 7          | $\pm 0.5$      | 073                           | 07DBD                                |
| 8          | $\pm 0.5$      | 083                           | 08DBD                                |
| 9          | $\pm 0.5$      | 093                           | 09DBD                                |
| 10         | $\pm 0.5$      | 103                           | 10DBD                                |
| 15         | $\pm 1.0$      | 154                           | 15DBF                                |
| 20         | $\pm 2.0$      | 205                           | 20DBG                                |



| Thick film chip resistors |                                                          |       |           |            |                  |                 |            |
|---------------------------|----------------------------------------------------------|-------|-----------|------------|------------------|-----------------|------------|
| Global CTC (Preferred)    | Description                                              | Size  | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| RC0100-R-SKE24L           | RC0100, $\pm 1\%$ & $\pm 5\%$ , RoHS compliant, + Jumper | 01005 | F / J     | 1/32W      | 10 - 1M          | 100             | 100        |
| RC0201-R-SKE24L           | RC0201, $\pm 1\%$ & $\pm 5\%$ , RoHS compliant, + Jumper | 0201  | F / J     | 1/20 W     | 10 - 1M          | 100             | 120        |
| RC0402JR-SKE24L           | RC0402, $\pm 5\%$ , RoHS compliant, + Jumper             | 0402  | J         | 1/16 W     | 10 - 1M          | 100             | 110        |
| RC0402FR-SKE96L           | RC0402, $\pm 1\%$ , RoHS compliant, + Jumper             | 0402  | F         | 1/16 W     | 10 - 1M          | 100             | 450        |
| RC0603JR-SKE24L           | RC0603, $\pm 5\%$ , RoHS compliant, + Jumper             | 0603  | J         | 1/10 W     | 10 - 1M          | 50              | 110        |
| RC0603FR-SKE96L           | RC0603, $\pm 1\%$ , RoHS compliant, + Jumper             | 0603  | F         | 1/10 W     | 10 - 1M          | 50              | 450        |
| RC0805JR-SKE24L           | RC0805, $\pm 5\%$ , RoHS compliant, + Jumper             | 0805  | J         | 1/8 W      | 10 - 1M          | 50              | 110        |
| RC0805FR-SKE96L           | RC0805, $\pm 1\%$ , RoHS compliant, + Jumper             | 0805  | F         | 1/8 W      | 10 - 1M          | 50              | 280        |
| RC1206JR-SKE24L           | RC1206, $\pm 5\%$ , RoHS compliant, + Jumper             | 1206  | J         | 1/4 W      | 10 - 1M          | 50              | 110        |
| RC1206FR-SKE96L           | RC1206, $\pm 1\%$ , RoHS compliant, + Jumper             | 1206  | F         | 1/4 W      | 10 - 1M          | 50              | 350        |

| Thick film array chip resistors (convex) |                                                     |                      |           |            |                  |                 |            |
|------------------------------------------|-----------------------------------------------------|----------------------|-----------|------------|------------------|-----------------|------------|
| Global CTC (Preferred)                   | Description                                         | Size                 | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| YC12X-JR-SK001L                          | YC124 / YC122, $\pm 5\%$ , +Jumper, RoHS compliant, | 0402 X 2<br>0402 X 4 | J         | 1/16 W     | 10 - 1M          | 100             | 75         |

| Engineering design kit for current sensing application |                                                         |             |           |            |                  |                 |            |
|--------------------------------------------------------|---------------------------------------------------------|-------------|-----------|------------|------------------|-----------------|------------|
| Global CTC (Preferred)                                 | Description                                             | Size        | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| CS0402-R-SK001L                                        | RL0402 - RL2512, $\pm 1\%$ & $\pm 5\%$ , RoHS compliant | 0402 - 2512 | F / J     | ---        | 100m - 910m      | 30              | 160        |

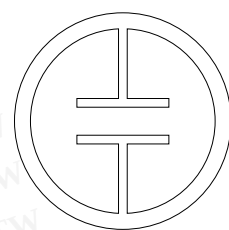
| Engineering design kit for mobile application |                                     |      |           |            |                  |                 |            |
|-----------------------------------------------|-------------------------------------|------|-----------|------------|------------------|-----------------|------------|
| Global CTC (Preferred)                        | Description                         | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| MD0402-R-SK001L                               | Chip resistors / MLCC / Attenuators | ---  | ---       | ---        | ---              | 50 - 100        | 44         |

**Note:** Before ordering, please contact our sales force for detail of resistance

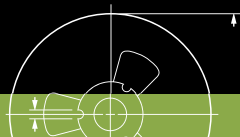
| Engineering design kit for automotive application |                                                                   |             |           |            |                  |                 |            |
|---------------------------------------------------|-------------------------------------------------------------------|-------------|-----------|------------|------------------|-----------------|------------|
| Global CTC (Preferred)                            | Description                                                       | Size        | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| AC0402-R-SK001L                                   | AC0402 - AC1206, $\pm 1\%$ & $\pm 5\%$ , RoHS compliant, + Jumper | 0402 - 1206 | F/J       | ---        | 1 - 10M          | 50-100          | 200        |







## SMD CERAMIC MULTILAYER CAPACITORS

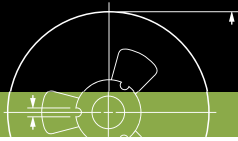


# MLCC General Information

## Specification overview

| Specification overview        |         |                                    |                   |                |                                          |
|-------------------------------|---------|------------------------------------|-------------------|----------------|------------------------------------------|
| Description                   | TC code | Series                             | Capacitance range | Voltage range  | Size                                     |
| Discrete                      | NP0     | General purpose                    | 10 pF to 10 nF    | 16 V to 25 V   | 0201, 0402, 0603, 0805, 1206, 1210       |
|                               |         | General purpose                    | 0.47 pF to 22 nF  | 50 V           | 0201, 0402, 0603, 0805, 1206, 1210, 1812 |
|                               |         | Medium voltage                     | 10 pF to 10 nF    | 100 V to 630 V | 0402, 0603, 0805, 1206, 1210             |
|                               |         | High voltage                       | 10 pF to 1 nF     | 1 kV to 3 kV   | 0805, 1206, 1808, 1812                   |
|                               |         | High frequency                     | 0.22 pF to 8.2 pF | 50 V           | 0402, 0603, 0805                         |
|                               | X7R     | General purpose & High capacitance | 100 pF to 47 µF   | 6.3 V to 50 V  | 0201, 0402, 0603, 0805, 1206, 1210, 1812 |
|                               |         | Medium voltage                     | 100 pF to 2.2 µF  | 100 V to 630 V | 0603, 0805, 1206, 1210, 1812             |
|                               |         | High voltage                       | 100 pF to 33 nF   | 1 kV to 3 kV   | 1206, 1210, 1808, 1812                   |
|                               |         | Low inductance                     | 10 nF to 220 nF   | 10 V to 50 V   | 0306, 0508, 0612                         |
|                               |         | Soft termination                   | 100 pF to 1 µF    | 16 V to 630 V  | 0603, 0805, 1206                         |
|                               | X5R     | General purpose & High capacitance | 100 pF to 100 µF  | 6.3 V to 50 V  | 0201, 0402, 0603, 0805, 1206, 1210, 1812 |
|                               |         | Low profile                        | 10 nF to 10 µF    | 6.3 V to 25 V  | 0402, 0603, 0805                         |
|                               | Y5V     | General purpose & High capacitance | 10 nF to 47 µF    | 6.3 V to 50 V  | 0201, 0402, 0603, 0805, 1206, 1210       |
| Automotive grade products     | NP0     | Automotive grade                   | 10 pF to 10 nF    | 50 V to 630 V  | 0402, 0603, 0805, 1206, 1210             |
|                               | X7R     | Automotive grade                   | 100 pF to 2.2 µF  | 16 V to 630 V  | 0402, 0603, 0805, 1206, 1210             |
| Safety certification products | NP0     | High voltage SC type               | 2.0 pF to 470 pF  | X1/Y2, X2/Y3   | 1808, 1812                               |
|                               | X7R     | High voltage SC type               | 150 pF to 1.5 nF  | X1/Y2, X2/Y3   | 1808, 1812                               |
| C-Arrays                      | NP0     | 4C arrays                          | 10 pF to 470 pF   | 50 V           | 0508, 0612                               |
|                               | X7R     | 4C arrays                          | 180 pF to 100 nF  | 16 V to 50 V   | 0508, 0612                               |
|                               | Y5V     | 4C arrays                          | 10 nF to 100 nF   | 25 V           | 0612                                     |

| Global part number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: CC0201KRX7R8BB102                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <p>Series name (code 1-2)</p> <p>CA = 4 x Capacitors array<br/> CC = Multilayer chip capacitors<br/> CL = Low inductance capacitors<br/> CH = High frequency<br/> SC = Safety certification capacitors<br/> AC = Automotive grade capacitors<br/> CS = Soft termination capacitors</p> <p>Size code (code 3-6)</p> <p>0201<br/> 0402<br/> 0603<br/> 0805<br/> 1206<br/> 1210<br/> 1808<br/> 1812<br/> 0306<br/> 0508<br/> 0612</p> <p>Capacitance tolerance (code 7)</p> <p>B = <math>\pm 0.1</math> pF<br/> C = <math>\pm 0.25</math> pF<br/> D = <math>\pm 0.5</math> pF<br/> F = <math>\pm 1\%</math><br/> G = <math>\pm 2\%</math><br/> J = <math>\pm 5\%</math><br/> K = <math>\pm 10\%</math><br/> M = <math>\pm 20\%</math><br/> Z = <math>-20\%</math> to <math>+80\%</math></p> <p>Packing style (code 8)</p> <p>R = Paper / PE tape reel <math>\varnothing 7</math> inch<br/> P = Paper / PE tape reel <math>\varnothing 13</math> inch<br/> K = Embossed plastic tape reel <math>\varnothing 7</math> inch<br/> F = Embossed plastic tape reel <math>\varnothing 13</math> inch<br/> C = Bulk case</p> <p>TC material (code 9-11)</p> <p>NP0<br/> X5R<br/> X7R<br/> Y5V</p> | <p>Capacitance value (code 15-17)</p> <p>102 = 1 000 pF<br/> (2 significant digits+number of zeros;<br/> the 3rd digit signifies the multiplying<br/> factor, and letter R is decimal point)<br/> 0 = x 1<br/> 1 = x <math>10^1</math><br/> 2 = x <math>10^2</math><br/> 3 = x <math>10^3</math><br/> 4 = x <math>10^4</math><br/> 5 = x <math>10^5</math><br/> 6 = x <math>10^6</math><br/> 7 = x <math>10^7</math><br/> X X R = Special capacitance<br/> (X X: capacitance before decimal point)</p> <p>Process code (code 14)</p> <p>N = NP0<br/> B = Class 2 product</p> <p>Termination (code 13)</p> <p>B = Ni-Barrier</p> <p>Rated voltage (code 12)</p> <p>5 = 6.3 V<br/> 6 = 10 V<br/> 7 = 16 V<br/> 8 = 25 V<br/> 9 = 50 V<br/> 0 = 100 V<br/> A = 200 V<br/> B = 500 V<br/> C = 1 kV<br/> D = 2 kV<br/> E = 3 kV<br/> G = 35 V<br/> S = 2.5 kV<br/> T = X2 / Y3 for TUV / UL (3 kV)<br/> W = X1 / Y2 for TUV / UL (4 kV)<br/> U = X1 / Y2 for TUV / UL (5 kV)<br/> Y = 250 V<br/> Z = 630 V</p> |



# MLCC Selection Charts

## Ordering information - Global part number

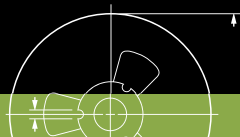
| Global part number                                                                                                                                                                                                                                               |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|---|----|---|---|---|---|---|---|---|---|---|----|---|--|
| Ordering example: CCxxxxKRX5RxBBxxx (for Low profile)                                                                                                                                                                                                            |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Series name (code 1-2)                                                                                                                                                                                                                                           |  | CC | 1 | 05 | 9 | K | R | X | 7 | R | 8 | B | B | 10 | 2 |  |
| CC = Multilayer chip capacitors<br>CT = Low profile capacitors                                                                                                                                                                                                   |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Number of cap (code 3)                                                                                                                                                                                                                                           |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 4 = 4 cap<br>2 = 2 cap<br>1 = Single                                                                                                                                                                                                                             |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Size code (code 4-5)                                                                                                                                                                                                                                             |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 01 = 0201<br>02 = 0402<br>03 = 0603<br>05 = 0805<br>06 = 1206, 0306<br>08 = 1808, 0508<br>10 = 1210<br>12 = 1812, 0612                                                                                                                                           |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Thickness (code 6)                                                                                                                                                                                                                                               |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 3 = 0.3 mm<br>4 = 0.45 mm<br>5 = 0.5 mm<br>6 = 0.6 mm<br>8 = 0.8 mm<br>9 = 0.85 mm<br>A = 1.0 mm<br>B = 1.25 mm<br>C = 1.6 mm<br>D = 2.0 mm<br>E = 2.5 mm<br>F = 1.7 mm<br>M = 1.15 mm<br>N = 1.35 mm<br>Q = 1.5 mm<br>R = 1.8 mm                                |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Capacitance tolerance (code 7)                                                                                                                                                                                                                                   |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| B = ±0.1 pF<br>C = ±0.25 pF<br>D = ±0.5 pF<br>F = ±1%<br>G = ±2%<br>J = ±5%<br>K = ±10%<br>M = ±20%<br>Z = -20% to +80%                                                                                                                                          |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Packing style (code 8)                                                                                                                                                                                                                                           |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| R = Paper / PE tape reel Ø7 inch<br>P = Paper / PE tape reel Ø13 inch<br>K = Embossed plastic tape reel Ø7 inch<br>F = Embossed plastic tape reel Ø13 inch<br>C = Bulk case                                                                                      |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Capacitance value (code 15-17)                                                                                                                                                                                                                                   |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 102 = 1 000 pF<br>(2 significant digits+number of zeros;<br>the 3rd digit signifies the multiplying<br>factor, and letter R is decimal point)                                                                                                                    |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 0 = x 1<br>1 = x 10 <sup>1</sup><br>2 = x 10 <sup>2</sup><br>3 = x 10 <sup>3</sup><br>4 = x 10 <sup>4</sup><br>5 = x 10 <sup>5</sup><br>6 = x 10 <sup>6</sup><br>7 = x 10 <sup>7</sup><br>X X R = Special capacitance<br>(X X: capacitance before decimal point) |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Process code (code 14)                                                                                                                                                                                                                                           |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| N = NP0<br>B = Class 2 product                                                                                                                                                                                                                                   |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Termination (code 13)                                                                                                                                                                                                                                            |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| B = Ni-Barrier                                                                                                                                                                                                                                                   |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| Rated voltage (code 12)                                                                                                                                                                                                                                          |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| 5 = 6.3 V<br>6 = 10 V<br>7 = 16 V<br>8 = 25 V<br>9 = 50 V<br>0 = 100 V<br>A = 200 V<br>B = 500 V<br>C = 1 kV<br>D = 2 kV<br>E = 3 kV<br>G = 35 V<br>S = 2.5 kV<br>Y = 250 V<br>Z = 630 V                                                                         |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| TC material (code 9-11)                                                                                                                                                                                                                                          |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |
| NP0<br>X5R<br>X7R<br>Y5V                                                                                                                                                                                                                                         |  |    |   |    |   |   |   |   |   |   |   |   |   |    |   |  |



# MLCC General Information

## Ordering information - North America

| Phycomp CTC ordering code - North America |                            |                     |                   |            |             |                             |                |                                    |
|-------------------------------------------|----------------------------|---------------------|-------------------|------------|-------------|-----------------------------|----------------|------------------------------------|
| Ordering example: 02012R102K8B20          |                            |                     |                   |            |             |                             |                |                                    |
| 0201                                      | 2R                         | 102                 | K                 | 8          | B           | 2                           | 0              | 0                                  |
| Size code                                 | Temperature characteristic | Capacitance (pF)    | Tolerance         | Voltage    | Termination | Packing                     | Marking        | Range identifier                   |
| 0201                                      | CG = NP0                   | 102 = 1 000 pF      | B = $\pm 0.1$ pF  | 5 = 6.3 V  | B = NiSn    | 2 = 180mm / 7" paper / PE   | 0 = No marking | 0 = Conventional ceramic           |
| 0402                                      | 2B = X5R                   | The third digit     | C = $\pm 0.25$ pF | 6 = 10 V   |             | 3 = 330 mm / 13" paper / PE |                | D = Class 2 MLCC                   |
| 0603                                      | 2R = X7R                   | signifies the       | D = $\pm 0.5$ pF  | 7 = 16 V   |             | B = 180mm / 7" blister      |                | L = Low inductance                 |
| 0805                                      | 2F = Y5V                   | multiplying factor: | F = $\pm 1\%$     | 8 = 25 V   |             | F = 330 mm / 13" blister    |                | S = Safety certification capacitor |
| 1206                                      |                            | 8 = x 0.01          | G = $\pm 2\%$     | 9 = 50 V   |             | P = Bulk case               |                | H = High frequency                 |
| 1210                                      |                            | 9 = x 0.1           | J = $\pm 5\%$     | 0 = 100 V  |             |                             |                |                                    |
| 1808                                      |                            | 0 = x 1             | K = $\pm 10\%$    | B = 200 V  |             |                             |                |                                    |
| 1812                                      |                            | 1 = x 10            | M = $\pm 20\%$    | C = 250 V  |             |                             |                |                                    |
| 0306                                      |                            | 2 = x 100           | Z = -20% to +80%  | D = 500 V  |             |                             |                |                                    |
| 0508                                      |                            | 3 = x 1 000         |                   | E = 1 kV   |             |                             |                |                                    |
| 0612                                      |                            | 4 = x 10 000        |                   | F = 2 kV   |             |                             |                |                                    |
|                                           |                            | 5 = x 100 000       |                   | G = 3 kV   |             |                             |                |                                    |
|                                           |                            | 6 = x 1 000 000     |                   | Z = 630 V  |             |                             |                |                                    |
|                                           |                            | 7 = x 10 000 000    |                   | S = 2.5 kV |             |                             |                |                                    |
|                                           |                            |                     |                   | T = X2/Y3  |             |                             |                |                                    |
|                                           |                            |                     |                   | W = X1     |             |                             |                |                                    |
|                                           |                            |                     |                   | U = Y2     |             |                             |                |                                    |



# MLCC General Information

## Thickness classes and packing quantities for all series

| Thickness classes and packing quantities |           |                               |            |                   |               |              |         |                        |
|------------------------------------------|-----------|-------------------------------|------------|-------------------|---------------|--------------|---------|------------------------|
| Description                              | Size code | Thickness classification (mm) | Tape width | Quantity per reel |               |              |         | Quantity per bulk case |
|                                          |           |                               |            | 180 mm / 7"       |               | 330 mm / 13" |         |                        |
|                                          |           |                               |            | Paper             | Blister       | Paper        | Blister |                        |
| Discrete capacitors                      | 0201      | 0.3 ±0.03 / ±0.05             | 8 mm       | 15 000            | ---           | 50 000       | ---     | ---                    |
|                                          | 0402      | 0.5 ±0.05 / ±0.15 / ±0.20     |            | 10 000            | ---           | 50 000       | ---     | 50 000                 |
|                                          | 0603      | 0.8 ±0.1 / ±0.2               |            | 4 000             | ---           | 15 000       | ---     | 15 000                 |
|                                          | 0805      | 0.6 ±0.1                      |            | 4 000             | ---           | 20 000       | ---     | 10 000                 |
|                                          |           | 0.85/1.0 ±0.1                 |            | 4 000             | ---           | 15 000       | ---     | 8 000                  |
|                                          |           | 1.25 ±0.2                     |            | ---               | 3 000         | ---          | 10 000  | 5 000                  |
|                                          | 1206      | 0.6 ±0.1                      |            | 4 000             | ---           | 20 000       | ---     | ---                    |
|                                          |           | 0.85 ±0.1                     |            | 4 000             | ---           | 15 000       | ---     | ---                    |
|                                          |           | 1.00 / 1.15 ±0.1              |            | ---               | 3 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.25 ±0.2                     |            | ---               | 3 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.6 ±0.15                     |            | ---               | 2 500         | ---          | 10 000  | ---                    |
|                                          |           | 1.6 ±0.2 / ±0.3               |            | ---               | 2 000         | ---          | 10 000  | ---                    |
|                                          | 1210      | 0.6 / 0.7 ±0.1                |            | ---               | 4 000         | ---          | 15 000  | ---                    |
|                                          |           | 0.85 ±0.1                     |            | ---               | 4 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.0 ±0.15                     |            | ---               | 3 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.15 ±0.1                     |            | ---               | 3 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.15 ±0.15                    |            | ---               | 3 000         | ---          | 10 000  | ---                    |
|                                          |           | 1.25 ±0.2                     |            | ---               | 3 000         | ---          | ---     | ---                    |
|                                          |           | 1.5 ±0.1                      |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          |           | 1.6 / 1.9 ±0.2                |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          |           | 2.0 ±0.2                      |            | ---               | 2 000 / 1 000 | ---          | ---     | ---                    |
|                                          |           | 2.5 ±0.2 / ±0.3               |            | ---               | 1 000 / 500   | ---          | ---     | ---                    |
|                                          | 1808      | 1.15 ±0.15                    | 12 mm      | ---               | 3 000         | ---          | ---     | ---                    |
|                                          |           | 1.25 ±0.2                     |            | ---               | 3 000         | ---          | ---     | ---                    |
|                                          |           | 1.35 ±0.15                    |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          |           | 1.5 ±0.1                      |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          |           | 1.6 ±0.2                      |            | ---               | 2 000         | ---          | 8 000   | ---                    |
|                                          |           | 2.0 ±0.2                      |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          |           | 0.6 / 0.85 ±0.1               |            | ---               | 2 000         | ---          | ---     | ---                    |
|                                          | 1812      | 1.15 ±0.1                     |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 1.15 ±0.15                    |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 1.25 ±0.2                     |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 1.35 ±0.15                    |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 1.5 ±0.1                      |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 1.6 ±0.2                      |            | ---               | 1 000         | ---          | ---     | ---                    |
|                                          |           | 2.0 ±0.2                      |            | ---               | 1 000         | ---          | ---     | ---                    |
| Low inductance                           | 0306      | 0.5 ±0.1                      | 8 mm       | 4 000             | ---           | 15 000       | ---     | ---                    |
|                                          | 0508      | 0.85 ±0.1                     |            | 4 000             | ---           | 15 000       | ---     | ---                    |
|                                          | 0612      | 0.85 ±0.1                     |            | 4 000             | ---           | 15 000       | ---     | ---                    |
| Arrays                                   | 0508      | 0.6 ±0.1                      |            | 4 000             | ---           | ---          | ---     | ---                    |
|                                          | 0612      | 0.8 ±0.1                      |            | 4 000             | ---           | ---          | ---     | ---                    |



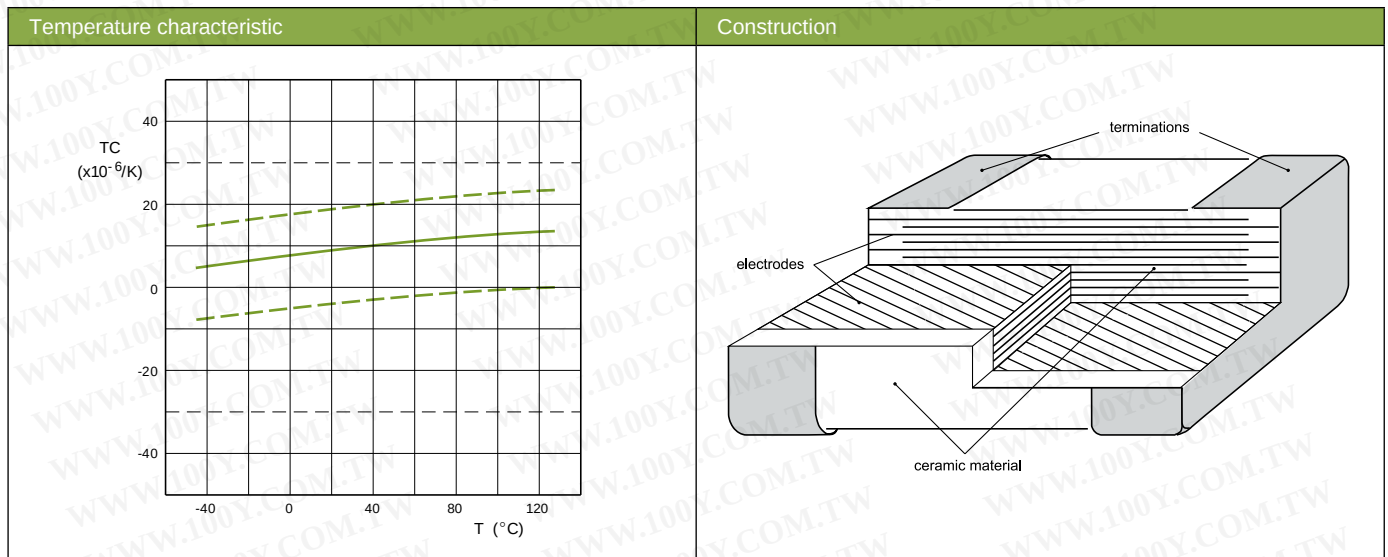
# MLCC Selection Charts

NPO - General purpose 16 to 50V, 0201 to 1812



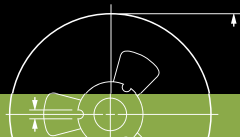
## Features

- Ultra-stable on capacitance
- Tight tolerance available
- High reliability
- Low ESR
- Good frequency performance
- No aging of capacitance



| Case dimensions                       |                       |        |                          |                           |                                     |                                     |                    |
|---------------------------------------|-----------------------|--------|--------------------------|---------------------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - General purpose |                       |        |                          |                           |                                     |                                     |                    |
|                                       | Case size designation |        | Dimensions in mm         |                           |                                     |                                     |                    |
|                                       | Inch-based            | Metric | L <sub>1</sub>           | W                         | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                       | 0201                  | 0603M  | 0.6 ±0.03                | 0.3 ±0.03                 | 0.10                                | 0.20                                | 0.20               |
|                                       | 0402                  | 1005M  | 1.0 ±0.05                | 0.5 ±0.05                 | 0.15                                | 0.30                                | 0.40               |
|                                       | 0603                  | 1608M  | 1.6 ±0.10                | 0.8 ±0.10                 | 0.20                                | 0.60                                | 0.40               |
|                                       | 0805                  | 2012M  | 2.0 ±0.10 <sup>(1)</sup> | 1.25 ±0.10 <sup>(1)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                       |                       |        | 2.0 ±0.20 <sup>(2)</sup> | 1.25 ±0.20 <sup>(2)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                       | 1206                  | 3216M  | 3.2 ±0.15 <sup>(1)</sup> | 1.6 ±0.15 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                       |                       |        | 3.2 ±0.30 <sup>(2)</sup> | 1.6 ±0.20 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                       | 1210                  | 3225M  | 3.2 ±0.20 <sup>(1)</sup> | 2.5 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                       |                       |        | 3.2 ±0.40 <sup>(2)</sup> | 2.5 ±0.30 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                       | 1812                  | 4532M  | 4.5 ±0.20 <sup>(1)</sup> | 3.2 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 2.20               |
|                                       |                       |        | 4.5 ±0.40 <sup>(2)</sup> | 3.2 ±0.40 <sup>(2)</sup>  | 0.25                                | 0.75                                | 2.20               |

Note: 1. Dimension for size 0805 to 1812, C ≤ 1 nF  
 2. Dimension for size 0805 to 1812, C > 1 nF



# MLCC Selection Charts

## NPO - General purpose 16 to 25V, 0201 to 0603

| NPO             |                      |           |           |           |          |          |
|-----------------|----------------------|-----------|-----------|-----------|----------|----------|
| General purpose |                      |           |           |           |          |          |
| Capacitance     | Last 2-digit of 12NC | 0201      | 0402      |           | 0603     |          |
|                 |                      | 25 V      | 16 V      | 25 V      | 16 V     | 25 V     |
| 10 pF           | 23                   | 0.3 ±0.03 | 0.5 ±0.05 | 0.5 ±0.05 | 0.8 ±0.1 | 0.8 ±0.1 |
| 12 pF           | 24                   |           |           |           |          |          |
| 15 pF           | 25                   |           |           |           |          |          |
| 18 pF           | 26                   |           |           |           |          |          |
| 22 pF           | 27                   |           |           |           |          |          |
| 27 pF           | 28                   |           |           |           |          |          |
| 33 pF           | 29                   |           |           |           |          |          |
| 39 pF           | 31                   |           |           |           |          |          |
| 47 pF           | 32                   |           |           |           |          |          |
| 56 pF           | 33                   |           |           |           |          |          |
| 68 pF           | 34                   |           |           |           |          |          |
| 82 pF           | 35                   |           |           |           |          |          |
| 100 pF          | 36                   |           |           |           |          |          |
| 120 pF          | 37                   |           |           |           |          |          |
| 150 pF          | 38                   |           |           |           |          |          |
| 180 pF          | 39                   |           |           |           |          |          |
| 220 pF          | 41                   |           |           |           |          |          |
| 270 pF          | 42                   |           |           |           |          |          |
| 330 pF          | 43                   |           |           |           |          |          |
| 390 pF          | 44                   |           |           |           |          |          |
| 470 pF          | 45                   |           |           |           |          |          |
| 560 pF          | 46                   |           |           |           |          |          |
| 680 pF          | 47                   |           |           |           |          |          |
| 820 pF          | 48                   |           |           |           |          |          |
| 1 000 pF        | 49                   |           |           |           |          |          |
| 1.2 nF          | 51                   |           |           |           |          |          |
| 1.5 nF          | 52                   |           |           |           |          |          |
| 1.8 nF          | 53                   |           |           |           |          |          |
| 2.2 nF          | 54                   |           |           |           |          |          |
| 2.7 nF          | 55                   |           |           |           |          |          |
| 3.3 nF          | 56                   |           |           |           |          |          |
| 3.9 nF          | 57                   |           |           |           |          |          |
| 4.7 nF          | 58                   |           |           |           |          |          |
| Tape width      |                      | 8 mm      |           |           |          |          |

**Note:** Values in shaded cells indicate thickness class (unit: mm)





# MLCC Selection Charts

NPO - General purpose 16 to 25V, 0805 to 1210

| NPO             |                      |           |           |           |           |      |
|-----------------|----------------------|-----------|-----------|-----------|-----------|------|
| General purpose |                      |           |           |           |           |      |
| Capacitance     | Last 2-digit of 12NC | 0805      |           | 1206      |           | 1210 |
|                 |                      | 16 V      | 25 V      | 16 V      | 25 V      | 25 V |
| 10 pF           | 23                   | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |      |
| 12 pF           | 24                   |           |           |           |           |      |
| 15 pF           | 25                   |           |           |           |           |      |
| 18 pF           | 26                   |           |           |           |           |      |
| 22 pF           | 27                   |           |           |           |           |      |
| 27 pF           | 28                   |           |           |           |           |      |
| 33 pF           | 29                   |           |           |           |           |      |
| 39 pF           | 31                   |           |           |           |           |      |
| 47 pF           | 32                   |           |           |           |           |      |
| 56 pF           | 33                   |           |           |           |           |      |
| 68 pF           | 34                   |           |           |           |           |      |
| 82 pF           | 35                   |           |           |           |           |      |
| 100 pF          | 36                   |           |           |           |           |      |
| 120 pF          | 37                   |           |           |           |           |      |
| 150 pF          | 38                   |           |           |           |           |      |
| 180 pF          | 39                   |           |           |           |           |      |
| 220 pF          | 41                   |           |           |           |           |      |
| 270 pF          | 42                   |           |           |           |           |      |
| 330 pF          | 43                   |           |           |           |           |      |
| 390 pF          | 44                   |           |           |           |           |      |
| 470 pF          | 45                   |           |           |           |           |      |
| 560 pF          | 46                   |           |           |           |           |      |
| 680 pF          | 47                   |           |           |           |           |      |
| 820 pF          | 48                   |           |           |           |           |      |
| 1 000 pF        | 49                   |           |           |           |           |      |
| 1.2 nF          | 51                   | 0.85 ±0.1 | 0.85 ±0.1 |           |           |      |
| 1.5 nF          | 52                   |           |           |           |           |      |
| 1.8 nF          | 53                   |           |           |           |           |      |
| 2.2 nF          | 54                   |           |           |           |           |      |
| 2.7 nF          | 55                   | 1.25 ±0.2 | 1.25 ±0.2 | 0.85 ±0.1 | 0.85 ±0.1 |      |
| 3.3 nF          | 56                   |           |           |           |           |      |
| 3.9 nF          | 57                   |           |           |           |           |      |
| 4.7 nF          | 58                   |           |           |           |           |      |
| 5.6 nF          | 59                   |           |           |           |           |      |
| 6.8 nF          | 61                   |           |           |           |           |      |
| 8.2 nF          | 62                   |           |           |           |           |      |
| 10 nF           | 63                   |           |           |           |           |      |
| 12 nF           | 64                   |           |           |           |           |      |
| 15 nF           | 65                   |           |           |           |           |      |
| 18 nF           | 66                   |           |           |           |           |      |
| 22 nF           | 67                   |           |           |           |           |      |
| 33 nF           | 69                   |           |           |           |           |      |
| Tape width      |                      | 8 mm      |           |           |           |      |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## NP0 - General purpose 16 to 25V, 0201 to 1210

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only

|                                    |     |     |     |   |   |   |   |                       |
|------------------------------------|-----|-----|-----|---|---|---|---|-----------------------|
| Carrier tape                       | 2 2 | X X | X X | X | X | 1 | X | X X                   |
| 50 = Blister ( $\geq 1\text{kV}$ ) |     |     |     |   |   |   |   | Capacitance value     |
| 22 = Blister                       |     |     |     |   |   |   |   | See selection chart   |
| 38 = Paper / PE                    |     |     |     |   |   |   |   | Tolerance             |
| 54 = Bulk                          |     |     |     |   |   |   |   | 4 = $\pm 2\%$         |
|                                    |     |     |     |   |   |   |   | 5 = $\pm 5\%$         |
|                                    |     |     |     |   |   |   |   | 6 = $\pm 10\%$        |
| Voltage                            |     |     |     |   |   |   |   | TC material           |
| 78 = 16 V                          |     |     |     |   |   |   |   | 1 = NP0               |
| 91 = 25 V                          |     |     |     |   |   |   |   | Packing               |
| 60 = 100 V                         |     |     |     |   |   |   |   | 1 = 180 mm / 7" reel  |
| 93 = 200 V                         |     |     |     |   |   |   |   | 5 = 330 mm / 13" reel |
| 83 = 250 V                         |     |     |     |   |   |   |   | 4 = Bulk case         |
| 97 = 500 V                         |     |     |     |   |   |   |   | Size                  |
| 98 = 630 V                         |     |     |     |   |   |   |   | 8 = 0201              |
| 00 = 1 kV                          |     |     |     |   |   |   |   | 7 = 0402              |
| 02 = 2 kV                          |     |     |     |   |   |   |   | 6 = 0603              |
| 99 = 2.5 kV                        |     |     |     |   |   |   |   | 0 = 0805              |
| 04 = 3 kV                          |     |     |     |   |   |   |   | 1 = 1206              |
|                                    |     |     |     |   |   |   |   | 2 = 1210              |
|                                    |     |     |     |   |   |   |   | 3 = 1808              |
|                                    |     |     |     |   |   |   |   | 4 = 1812              |

### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



# MLCC Selection Charts

**NP0 - General purpose 50V, 0201 to 1812**

| NP0             |                      |           |           |          |          |          |      |      |
|-----------------|----------------------|-----------|-----------|----------|----------|----------|------|------|
| General purpose |                      |           |           |          |          |          |      |      |
| Capacitance     | Last 3-digit of 12NC | 0201      | 0402      | 0603     | 0805     | 1206     | 1210 | 1812 |
|                 |                      | 50 V      | 50 V      | 50 V     | 50 V     | 50 V     | 50 V | 50 V |
| 0.47 pF         | 477                  | 0.3 ±0.03 | 0.5 ±0.05 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |      |      |
| 0.56 pF         | 567                  |           |           |          |          |          |      |      |
| 0.68 pF         | 687                  |           |           |          |          |          |      |      |
| 0.82 pF         | 827                  |           |           |          |          |          |      |      |
| 1 pF            | 108                  |           |           |          |          |          |      |      |
| 1.2 pF          | 128                  |           |           |          |          |          |      |      |
| 1.5 pF          | 158                  |           |           |          |          |          |      |      |
| 1.8 pF          | 188                  |           |           |          |          |          |      |      |
| 2.2 pF          | 228                  |           |           |          |          |          |      |      |
| 2.7 pF          | 278                  |           |           |          |          |          |      |      |
| 3.3 pF          | 338                  |           |           |          |          |          |      |      |
| 3.9 pF          | 398                  |           |           |          |          |          |      |      |
| 4.7 pF          | 478                  |           |           |          |          |          |      |      |
| 5.6 pF          | 568                  |           |           |          |          |          |      |      |
| 6.8 pF          | 688                  |           |           |          |          |          |      |      |
| 8.2 pF          | 828                  |           |           |          |          |          |      |      |
| 10 pF           | 109                  |           |           |          |          |          |      |      |
| 12 pF           | 129                  |           |           |          |          |          |      |      |
| 15 pF           | 159                  |           |           |          |          |          |      |      |
| 18 pF           | 189                  |           |           |          |          |          |      |      |
| 22 pF           | 229                  |           |           |          |          |          |      |      |
| 27 pF           | 279                  |           |           |          |          |          |      |      |
| 33 pF           | 339                  |           |           |          |          |          |      |      |
| 39 pF           | 399                  |           |           |          |          |          |      |      |
| 47 pF           | 479                  |           |           |          |          |          |      |      |
| 56 pF           | 569                  |           |           |          |          |          |      |      |
| 68 pF           | 689                  |           |           |          |          |          |      |      |
| 82 pF           | 829                  |           |           |          |          |          |      |      |
| 100 pF          | 101                  |           |           |          |          |          |      |      |
| 120 pF          | 121                  |           |           |          |          |          |      |      |
| 150 pF          | 151                  |           |           |          |          |          |      |      |
| 180 pF          | 181                  |           |           |          |          |          |      |      |
| 220 pF          | 221                  |           |           |          |          |          |      |      |
| 270 pF          | 271                  |           |           |          |          |          |      |      |
| 330 pF          | 331                  |           |           |          |          |          |      |      |
| 390 pF          | 391                  |           |           |          |          |          |      |      |
| 470 pF          | 471                  |           |           |          |          |          |      |      |
| 560 pF          | 561                  |           |           |          |          |          |      |      |
| 680 pF          | 681                  |           |           |          |          |          |      |      |
| 820 pF          | 821                  |           |           |          |          |          |      |      |
| 1 000 pF        | 102                  |           |           |          |          |          |      |      |
| 1.2 nF          | 122                  |           |           |          |          |          |      |      |
| 1.5 nF          | 152                  |           |           |          |          |          |      |      |
| 1.8 nF          | 182                  |           |           |          |          |          |      |      |
| 2.2 nF          | 222                  |           |           |          |          |          |      |      |
| 2.7 nF          | 272                  |           |           |          |          |          |      |      |
| 3.3 nF          | 332                  |           |           |          |          |          |      |      |
| 3.9 nF          | 392                  |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
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|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |
|                 |                      |           |           |          |          |          |      |      |





# MLCC Selection Charts

## NP0 - General purpose 50V, 0201 to 1812

| NP0             |                      |              |              |              |              |              |              |              |
|-----------------|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| General purpose |                      |              |              |              |              |              |              |              |
| Capacitance     | Last 3-digit of 12NC | 0201<br>50 V | 0402<br>50 V | 0603<br>50 V | 0805<br>50 V | 1206<br>50 V | 1210<br>50 V | 1812<br>50 V |
| 4.7 nF          | 472                  |              |              | 0.80 ±0.1    | 1.25 ±0.2    | 0.85 ±0.1    | 1.0 ±0.15    | 1.25 ±0.2    |
| 5.6 nF          | 562                  |              |              |              |              |              |              |              |
| 6.8 nF          | 682                  |              |              |              |              |              |              |              |
| 8.2 nF          | 822                  |              |              |              |              | 1.25 ±0.2    |              |              |
| 10 nF           | 103                  |              |              |              |              |              | 1.25 ±0.2    |              |
| 12 nF           | 123                  |              |              |              |              |              |              |              |
| 15 nF           | 153                  |              |              |              |              |              |              |              |
| 18 nF           | 183                  |              |              |              |              |              |              |              |
| 22 nF           | 223                  |              |              |              |              |              | 2.0 ±0.2     |              |
| Tape width      |                      | 8 mm         |              |              |              |              |              | 12 mm        |

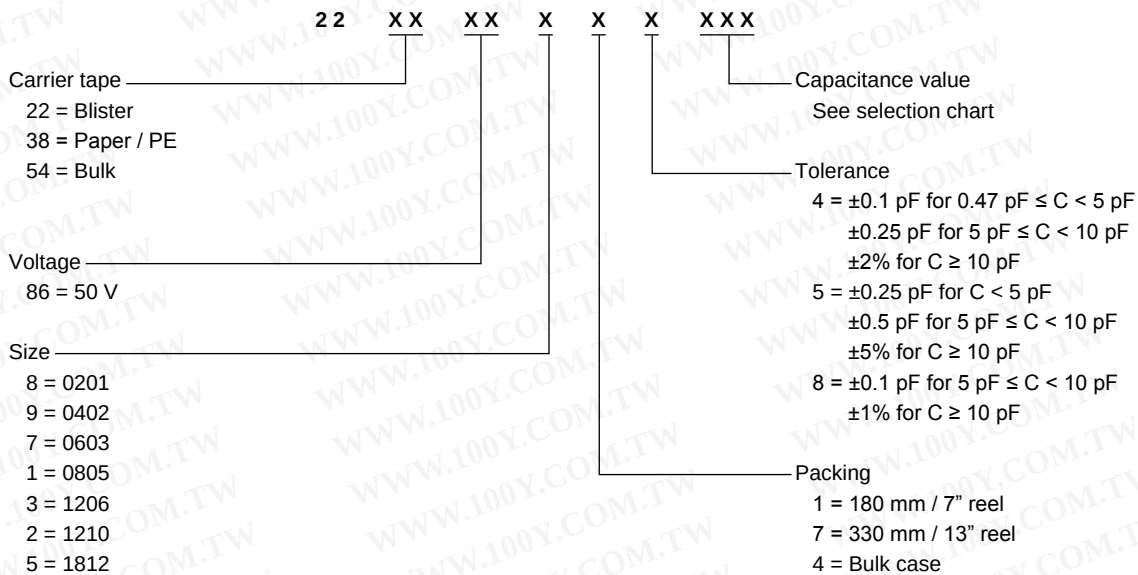
Note: Values in shaded cells indicate thickness class (unit: mm)



### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



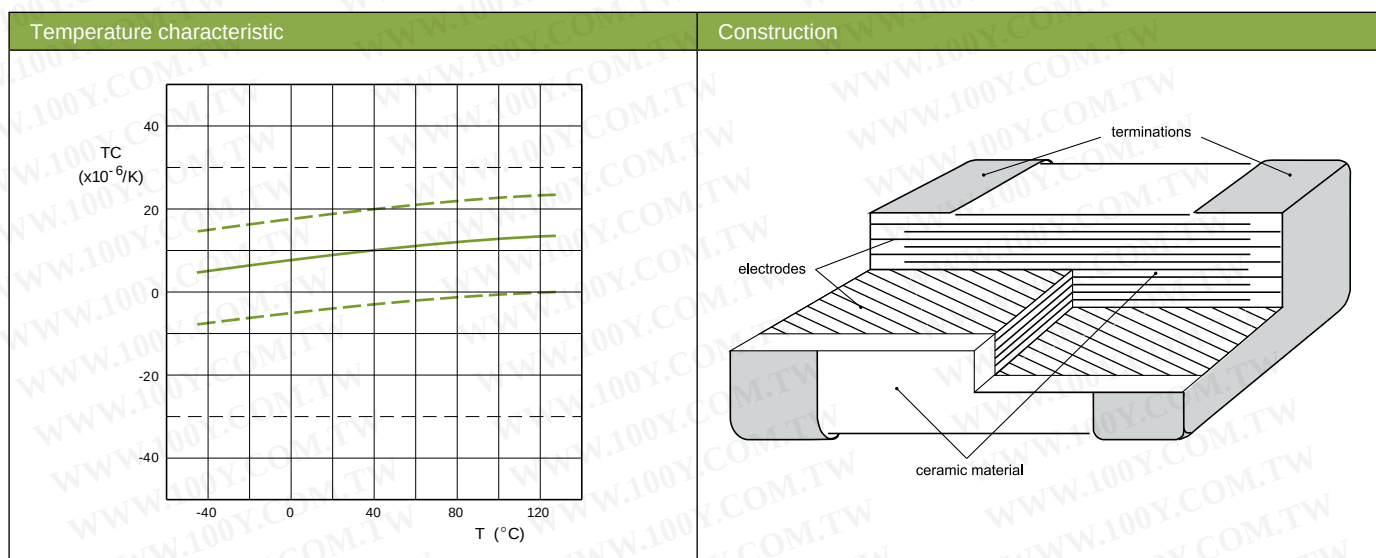
# MLCC Selection Charts

## NPO - Medium & High voltage, 0402 to 1812



### Features

- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling / smoothing function



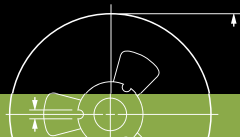
| Dimensions                                    |                       |        |                  |            |                                     |                                     |                    |
|-----------------------------------------------|-----------------------|--------|------------------|------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - Medium and High voltage |                       |        |                  |            |                                     |                                     |                    |
|                                               | Case size designation |        | Dimensions in mm |            |                                     |                                     |                    |
|                                               | Inch-based            | Metric | L <sub>1</sub>   | W          | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                               | 0402                  | 1005M  | 1.0 ±0.05        | 0.5 ±0.05  | 0.15                                | 0.30                                | 0.40               |
|                                               | 0603                  | 1608M  | 1.6 ±0.10        | 0.8 ±0.10  | 0.20                                | 0.60                                | 0.40               |
|                                               | 0805                  | 2012M  | 2.0 ±0.20        | 1.25 ±0.20 | 0.25                                | 0.75                                | 0.55               |
|                                               | 1206                  | 3216M  | 3.2 ±0.30        | 1.6 ±0.20  | 0.25                                | 0.75                                | 1.40               |
|                                               | 1210                  | 3225M  | 3.2 ±0.40        | 2.5 ±0.30  | 0.25                                | 0.75                                | 1.40               |
|                                               | 1808                  | 4520M  | 4.5 ±0.40        | 2.0 ±0.30  | 0.25                                | 0.75                                | 2.20               |
|                                               | 1812                  | 4532M  | 4.5 ±0.40        | 3.2 ±0.30  | 0.25                                | 0.75                                | 2.20               |

# MLCC Selection Charts

## NPO - Medium voltage, 0402 to 0805

| NPO            |                      |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
|----------------|----------------------|-----------|-------|-------|-------|-----------|-----------|-----------|-----------|-------|------|--|--|--|--|--|--|--|--|
| Medium voltage |                      |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| Capacitance    | Last 2-digit of 12NC | 0402      | 0603  |       |       | 0805      |           |           |           |       |      |  |  |  |  |  |  |  |  |
|                |                      | 100V      | 100 V | 200 V | 250 V | 100 V     | 200 V     | 250 V     | 500 V     | 630 V |      |  |  |  |  |  |  |  |  |
| 10 pF          | 23                   | 0.5 ±0.05 |       |       |       | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |       |      |  |  |  |  |  |  |  |  |
| 12 pF          | 24                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 15 pF          | 25                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 18 pF          | 26                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 22 pF          | 27                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 27 pF          | 28                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 33 pF          | 29                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 39 pF          | 31                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 47 pF          | 32                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 56 pF          | 33                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 68 pF          | 34                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 82 pF          | 35                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 100 pF         | 36                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 120 pF         | 37                   | 0.8 ±0.1  |       |       |       | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |       |      |  |  |  |  |  |  |  |  |
| 150 pF         | 38                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 180 pF         | 39                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 220 pF         | 41                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 270 pF         | 42                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 330 pF         | 43                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 390 pF         | 44                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 470 pF         | 45                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 560 pF         | 46                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 680 pF         | 47                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 820 pF         | 48                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 1 000 pF       | 49                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 1.2 nF         | 51                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 1.5 nF         | 52                   |           |       |       |       | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |           |       |      |  |  |  |  |  |  |  |  |
| 1.8 nF         | 53                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 2.2 nF         | 54                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 2.7 nF         | 55                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 3.3 nF         | 56                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 3.9 nF         | 57                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 4.7 nF         | 58                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 5.6 nF         | 59                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 6.8 nF         | 61                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 8.2 nF         | 62                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| 10 nF          | 63                   |           |       |       |       |           |           |           |           |       |      |  |  |  |  |  |  |  |  |
| Tape width     |                      |           |       |       |       |           |           |           |           |       | 8 mm |  |  |  |  |  |  |  |  |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## NP0 - Medium voltage, 1206 / 1210

| NP0            |                      |           |           |           |           |           |           |           |       |           |           |
|----------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|-----------|-----------|
| Medium voltage |                      |           |           |           |           |           |           |           |       |           |           |
| Capacitance    | Last 2-digit of 12NC | 1206      |           |           |           |           | 1210      |           |       |           |           |
|                |                      | 100 V     | 200 V     | 250 V     | 500 V     | 630 V     | 100 V     | 200 V     | 250 V | 500 V     | 630 V     |
| 10 pF          | 23                   |           |           |           |           |           |           |           |       |           |           |
| 12 pF          | 24                   |           |           |           |           |           |           |           |       |           |           |
| 15 pF          | 25                   |           |           |           |           |           |           |           |       |           |           |
| 18 pF          | 26                   |           |           |           |           |           |           |           |       |           |           |
| 22 pF          | 27                   |           |           |           |           |           |           |           |       |           |           |
| 27 pF          | 28                   |           |           |           |           |           |           |           |       |           |           |
| 33 pF          | 29                   |           |           |           |           |           |           |           |       |           |           |
| 39 pF          | 31                   |           |           |           |           |           |           |           |       |           |           |
| 47 pF          | 32                   |           |           |           |           |           |           |           |       |           |           |
| 56 pF          | 33                   |           |           |           |           |           |           |           |       |           |           |
| 68 pF          | 34                   |           |           |           |           |           |           |           |       |           |           |
| 82 pF          | 35                   |           | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |           |           |           |       |           |           |
| 100 pF         | 36                   |           |           |           |           | 1.25 ±0.2 |           |           |       |           | 1.25 ±0.2 |
| 120 pF         | 37                   |           |           |           |           |           |           |           |       |           |           |
| 150 pF         | 38                   |           |           |           |           |           |           |           |       |           |           |
| 180 pF         | 39                   | 0.6 ±0.1  |           |           |           |           |           |           |       |           |           |
| 220 pF         | 41                   |           |           |           |           |           |           |           |       |           |           |
| 270 pF         | 42                   |           |           |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 |       |           |           |
| 330 pF         | 43                   |           |           |           |           |           |           |           |       | 1.25 ±0.2 |           |
| 390 pF         | 44                   |           |           |           |           |           |           |           |       |           |           |
| 470 pF         | 45                   |           |           |           |           |           |           |           |       |           |           |
| 560 pF         | 46                   |           |           |           |           |           |           |           |       |           |           |
| 680 pF         | 47                   |           |           |           |           |           | 1.25 ±0.2 |           |       |           |           |
| 820 pF         | 48                   |           |           |           |           |           |           |           |       |           |           |
| 1 000 pF       | 49                   |           | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |       |           |           |
| 1.2 nF         | 51                   |           |           |           |           |           |           |           |       |           |           |
| 1.5 nF         | 52                   |           |           |           |           |           |           |           |       |           |           |
| 1.8 nF         | 53                   |           |           |           | 1.25 ±0.2 |           |           |           |       |           |           |
| 2.2 nF         | 54                   |           | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |       |           |           |
| 2.7 nF         | 55                   |           |           |           |           |           |           |           |       |           |           |
| 3.3 nF         | 56                   |           |           |           |           |           |           |           |       |           |           |
| 3.9 nF         | 57                   |           |           |           |           |           |           |           |       |           |           |
| 4.7 nF         | 58                   | 0.85 ±0.1 |           |           |           |           |           |           |       |           |           |
| 5.6 nF         | 59                   |           |           |           |           |           |           |           |       |           |           |
| 6.8 nF         | 61                   |           |           |           |           |           |           |           |       |           |           |
| 8.2 nF         | 62                   | 1.25 ±0.2 |           |           |           |           |           |           |       |           |           |
| 10 nF          | 63                   |           |           |           |           |           |           |           |       |           |           |
| 12 nF          | 64                   |           |           |           |           |           |           |           |       |           |           |
| 15 nF          | 65                   |           |           |           |           |           |           |           |       |           |           |
| Tape width     |                      | 8 mm      |           |           |           |           |           |           |       |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



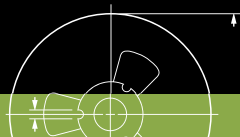


# MLCC Selection Charts

NP0 - Medium voltage, 1808 / 1812

| NP0            |                      |           |           |           |           |           |           |           |           |           |           |
|----------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Medium voltage |                      |           |           |           |           |           |           |           |           |           |           |
| Capacitance    | Last 2-digit of 12NC | 1808      |           |           |           |           | 1812      |           |           |           |           |
|                |                      | 100 V     | 200 V     | 250 V     | 500 V     | 630 V     | 100 V     | 200 V     | 250 V     | 500 V     | 630 V     |
| 10 pF          | 23                   |           |           |           |           |           |           |           |           |           |           |
| 12 pF          | 24                   |           |           |           |           |           |           |           |           |           |           |
| 15 pF          | 25                   |           |           |           |           |           |           |           |           |           |           |
| 18 pF          | 26                   |           |           |           |           |           |           |           |           |           |           |
| 22 pF          | 27                   |           |           |           |           |           |           |           |           |           |           |
| 27 pF          | 28                   |           |           |           |           |           |           |           |           |           |           |
| 33 pF          | 29                   |           |           |           |           |           |           |           |           |           |           |
| 39 pF          | 31                   |           |           |           |           |           |           |           |           |           |           |
| 47 pF          | 32                   |           |           |           |           |           |           |           |           |           |           |
| 56 pF          | 33                   |           |           |           |           |           |           |           |           |           |           |
| 68 pF          | 34                   |           |           |           |           |           |           |           |           |           |           |
| 82 pF          | 35                   |           |           |           |           |           |           |           |           |           |           |
| 100 pF         | 36                   |           |           |           |           |           |           |           |           |           | 1.25 ±0.2 |
| 120 pF         | 37                   |           |           |           |           |           |           |           |           |           |           |
| 150 pF         | 38                   |           |           |           |           |           |           |           |           |           |           |
| 180 pF         | 39                   |           |           |           |           | 1.25 ±0.2 |           |           |           | 1.25 ±0.2 |           |
| 220 pF         | 41                   |           |           |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |
| 270 pF         | 42                   |           |           |           | 1.25 ±0.2 |           |           |           |           |           |           |
| 330 pF         | 43                   |           |           |           |           |           |           |           |           |           |           |
| 390 pF         | 44                   | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |           |           |           |
| 470 pF         | 45                   |           |           |           |           |           |           |           |           |           |           |
| 560 pF         | 46                   |           |           |           |           |           |           |           |           |           |           |
| 680 pF         | 47                   |           |           |           |           |           |           |           |           |           |           |
| 820 pF         | 48                   |           |           |           |           |           |           |           |           |           |           |
| 1 000 pF       | 49                   |           |           |           |           |           |           |           |           |           |           |
| 1.2 nF         | 51                   |           |           |           |           |           |           |           |           |           |           |
| 1.5 nF         | 52                   |           |           |           |           |           |           |           |           |           |           |
| 1.8 nF         | 53                   |           |           |           |           |           |           |           |           |           |           |
| 2.2 nF         | 54                   |           |           |           |           |           |           |           |           |           |           |
| 2.7 nF         | 55                   |           |           |           |           |           |           |           |           |           |           |
| 3.3 nF         | 56                   |           |           |           |           |           |           |           |           |           |           |
| 3.9 nF         | 57                   |           |           |           |           |           |           |           |           |           |           |
| 4.7 nF         | 58                   |           |           |           |           |           |           |           |           |           |           |
| 5.6 nF         | 59                   |           |           |           |           |           |           |           |           |           |           |
| 6.8 nF         | 61                   |           |           |           |           |           |           |           |           |           |           |
| 8.2 nF         | 62                   |           |           |           |           |           |           |           |           |           |           |
| 10 nF          | 63                   |           |           |           |           |           |           |           |           |           |           |
| 12 nF          | 64                   |           |           |           |           |           |           |           |           |           |           |
| 15 nF          | 65                   |           |           |           |           |           |           |           |           |           |           |
| 18 nF          | 66                   |           |           |           |           |           |           |           |           |           |           |
| 22 nF          | 67                   |           |           |           |           |           |           |           |           |           |           |
| Tape width     |                      | 12 mm     |           |           |           |           |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## NPO - High voltage, 0805 to 1812

| NPO          |                      |           |           |           |           |           |           |          |           |           |           |
|--------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|
| High voltage |                      |           |           |           |           |           |           |          |           |           |           |
| Capacitance  | Last 2-digit of 12NC | 0805      | 1206      | 1210      |           | 1808      |           |          | 1812      |           |           |
|              |                      | 1KV       | 1 kV      | 1 kV      | 2 kV      | 1 kV      | 2 kV      | 3 kV     | 1 kV      | 2 kV      | 3 kV      |
| 10 pF        | 23                   | 0.85 ±0.1 |           |           |           |           |           |          | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 12 pF        | 24                   |           |           |           |           |           |           |          |           |           |           |
| 15 pF        | 25                   |           |           |           |           |           |           |          |           |           |           |
| 18 pF        | 26                   |           |           |           |           |           |           |          |           |           |           |
| 22 pF        | 27                   |           |           |           |           |           |           |          |           |           |           |
| 27 pF        | 28                   |           |           |           |           |           |           |          |           |           |           |
| 33 pF        | 29                   |           |           |           |           |           |           |          |           |           |           |
| 39 pF        | 31                   |           |           |           |           |           |           |          |           |           |           |
| 47 pF        | 32                   |           | 1.25 ±0.2 |           |           |           |           | 1.6 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 56 pF        | 33                   |           |           |           |           |           |           |          |           |           |           |
| 68 pF        | 34                   |           |           |           |           |           |           |          |           |           |           |
| 82 pF        | 35                   |           |           | 1.25 ±0.2 | 1.25 ±0.2 |           | 1.25 ±0.2 |          |           |           |           |
| 100 pF       | 36                   |           |           |           |           |           |           |          |           |           |           |
| 120 pF       | 37                   |           |           |           |           |           |           |          |           |           |           |
| 150 pF       | 38                   |           |           |           |           |           |           |          |           |           |           |
| 180 pF       | 39                   |           |           |           |           |           |           |          |           |           |           |
| 220 pF       | 41                   |           |           |           |           | 1.25 ±0.2 |           | 2.0 ±0.2 |           |           |           |
| 270 pF       | 42                   |           |           |           |           |           |           |          |           |           |           |
| 330 pF       | 43                   |           |           |           |           |           |           |          |           |           |           |
| 390 pF       | 44                   |           |           |           |           |           |           |          |           |           |           |
| 470 pF       | 45                   |           |           |           |           |           |           |          |           |           |           |
| 560 pF       | 46                   |           |           |           |           |           |           |          |           |           |           |
| 680 pF       | 47                   |           |           |           |           |           |           |          |           |           |           |
| 820 pF       | 48                   |           |           |           |           |           |           |          |           |           |           |
| 1 000 pF     | 49                   |           |           |           |           |           |           |          |           |           |           |
| 1.2 nF       | 51                   |           |           |           |           |           |           |          |           |           |           |
| 1.5 nF       | 52                   |           |           |           |           |           |           |          |           |           |           |
| 1.8 nF       | 53                   |           |           |           |           |           |           |          |           |           |           |
| 2.2 nF       | 54                   |           |           |           |           |           |           |          |           |           |           |
| 2.7 nF       | 55                   |           |           |           |           |           |           |          |           |           |           |
| Tape width   |                      | 12 mm     |           |           |           |           |           |          |           |           |           |

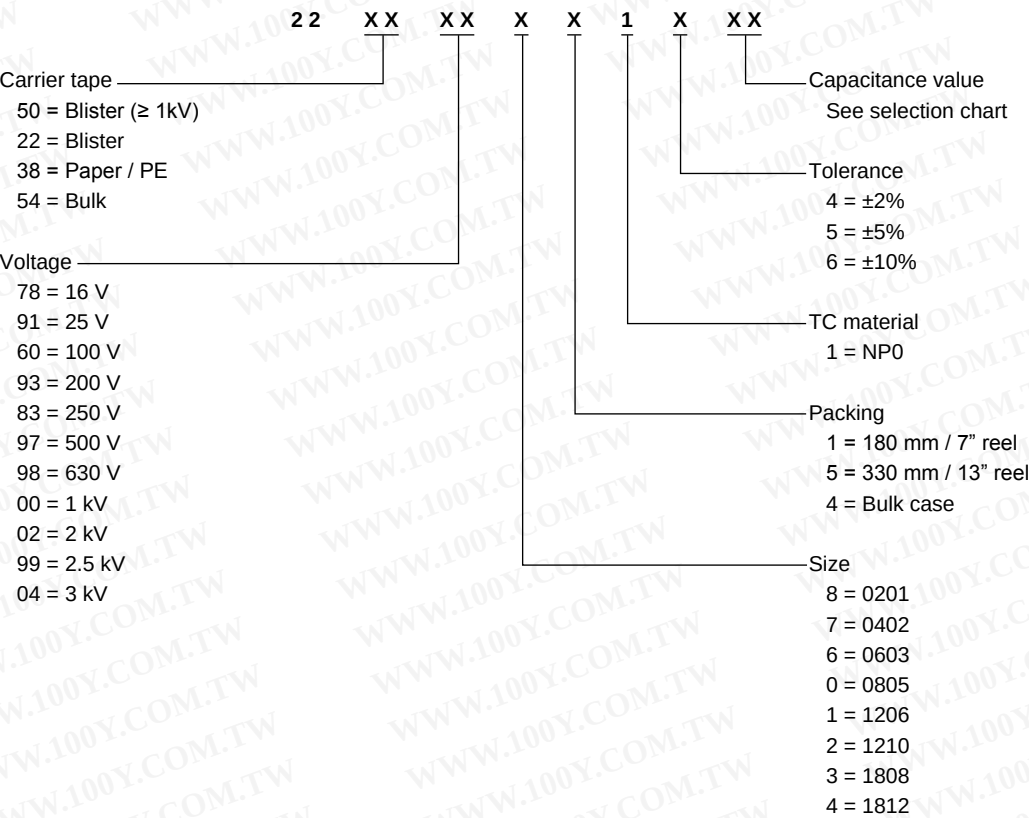
Note: Values in shaded cells indicate thickness class (unit: mm)



Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

12NC ordering code - Phycomp branded products only



Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



# MLCC Selection Charts

## NPO - High frequency, 0402 to 0805

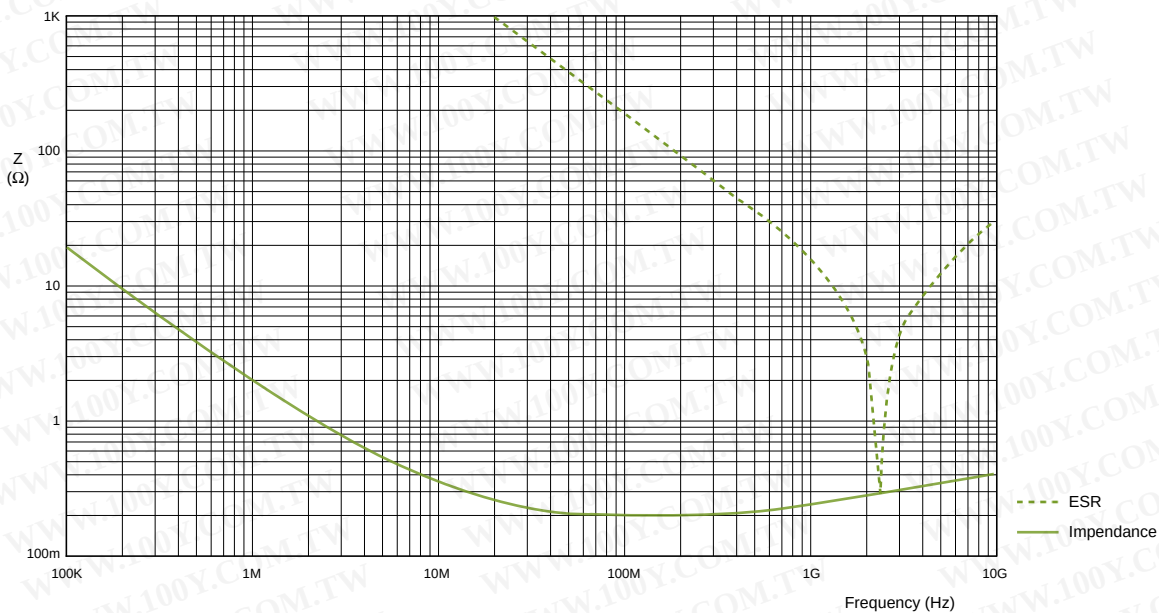


### Features

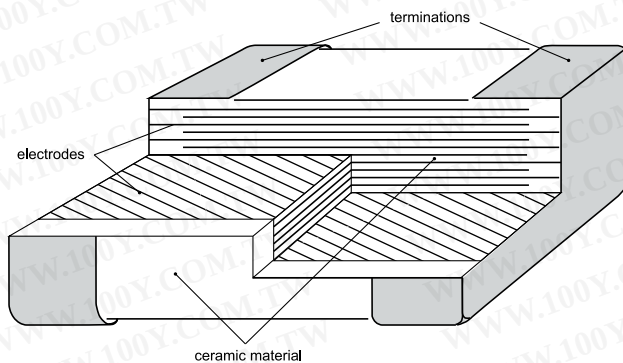
- Lowest ESR in high frequency
- Ultra small
- Noise filtering

### ESR characteristic

Impedance and ESR @ 20°C



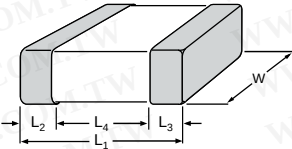
### Construction





# MLCC Selection Charts

## NP0 - High frequency, 0402 to 0805

| Case dimensions                                                                   |                       |        |                  |            |                                     |                                     |                    |
|-----------------------------------------------------------------------------------|-----------------------|--------|------------------|------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - High Frequency                                              |                       |        |                  |            |                                     |                                     |                    |
|  | Case size designation |        | Dimensions in mm |            |                                     |                                     |                    |
|                                                                                   | Inch-based            | Metric | L <sub>1</sub>   | W          | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                                                                   | 0402                  | 1005M  | 1.0 ±0.05        | 0.5 ±0.05  | 0.15                                | 0.30                                | 0.40               |
|                                                                                   | 0603                  | 1608M  | 1.6 ±0.10        | 0.8 ±0.10  | 0.20                                | 0.60                                | 0.40               |
|                                                                                   | 0805                  | 2012M  | 2.0 ±0.10        | 1.25 ±0.10 | 0.25                                | 0.75                                | 0.55               |

| NP0            |                      |              |              |              |
|----------------|----------------------|--------------|--------------|--------------|
| High frequency |                      |              |              |              |
| Capacitance    | Last 3-digit of 12NC | 0402<br>50 V | 0603<br>50 V | 0805<br>50 V |
| 0.22 pF        | 227                  | 0.5 ±0.05    | 0.8 ±0.1     | 0.6 ±0.1     |
| 0.47 pF        | 477                  |              |              |              |
| 0.56 pF        | 567                  |              |              |              |
| 0.68 pF        | 687                  |              |              |              |
| 0.82 pF        | 827                  |              |              |              |
| 1 pF           | 108                  |              |              |              |
| 1.2 pF         | 128                  |              |              |              |
| 1.5 pF         | 158                  |              |              |              |
| 1.8 pF         | 188                  |              |              |              |
| 2.2 pF         | 228                  |              |              |              |
| 2.7 pF         | 278                  |              |              |              |
| 3.3 pF         | 338                  |              |              |              |
| 3.9 pF         | 398                  |              |              |              |
| 4.7 pF         | 478                  |              |              |              |
| 5.6 pF         | 568                  |              |              |              |
| 6.8 pF         | 688                  |              |              |              |
| 8.2 pF         | 828                  |              |              |              |
| 10 pF          | 109                  |              |              |              |
| 12 pF          | 129                  |              |              |              |
| 15 pF          | 159                  |              |              |              |
| 18 pF          | 189                  |              |              |              |
| 22 pF          | 229                  |              |              |              |
| 27 pF          | 279                  |              |              |              |
| 33 pF          | 339                  |              |              |              |
| 39 pF          | 399                  |              |              |              |
| 47 pF          | 479                  |              |              |              |
| 56 pF          | 569                  |              |              |              |
| 68 pF          | 689                  |              |              |              |
| 82 pF          | 829                  |              |              |              |
| 100 pF         | 101                  |              |              |              |
| Tape width     |                      | 8 mm         |              |              |

Note: Values in shaded cells indicate thickness class (unit: mm)



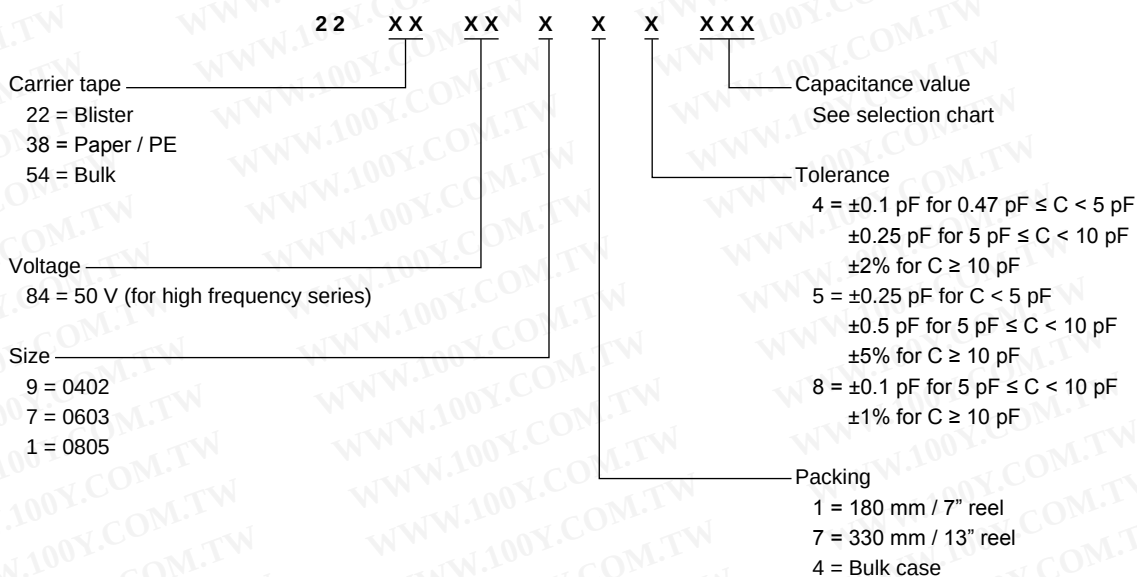
# MLCC Selection Charts

## NPO - High frequency, 0402 to 0805

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.

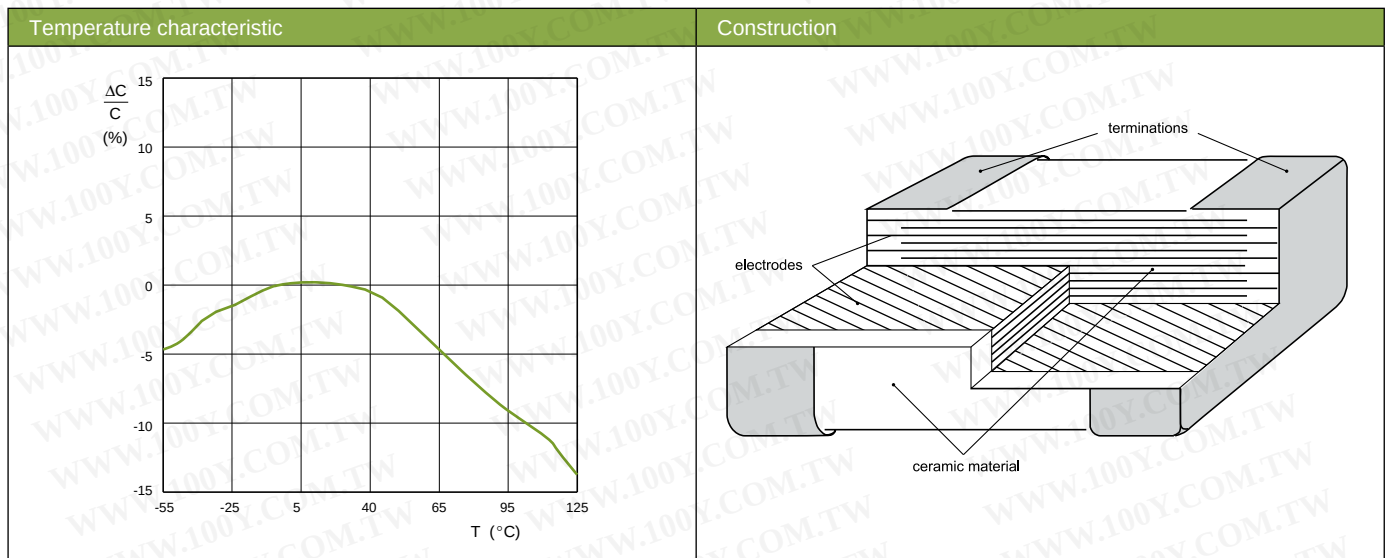
# MLCC Selection Charts

## X7R - General purpose & High capacitance, 0201 to 1812



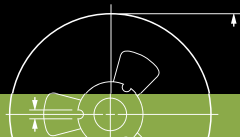
### Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance



| Case dimensions                                          |                       |        |                          |                           |                                     |                                     |                    |
|----------------------------------------------------------|-----------------------|--------|--------------------------|---------------------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - General purpose & High capacitance |                       |        |                          |                           |                                     |                                     |                    |
|                                                          | Case size designation |        | Dimensions in mm         |                           |                                     |                                     |                    |
|                                                          | Inch-based            | Metric | L <sub>1</sub>           | W                         | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                                          |                       |        |                          |                           |                                     |                                     |                    |
|                                                          | 0201                  | 0603M  | 0.6 ±0.03                | 0.3 ±0.03                 | 0.10                                | 0.20                                | 0.20               |
|                                                          |                       |        | 0.6 ±0.05                | 0.3 ±0.05                 | 0.10                                | 0.20                                | 0.20               |
|                                                          | 0402                  | 1005M  | 1.0 ±0.05 <sup>(1)</sup> | 0.5 ±0.05 <sup>(1)</sup>  | 0.15                                | 0.30                                | 0.40               |
|                                                          |                       |        | 1.0 ±0.20 <sup>(2)</sup> | 0.5 ±0.20 <sup>(2)</sup>  | 0.15                                | 0.30                                | 0.40               |
|                                                          | 0603                  | 1608M  | 1.6 ±0.10 <sup>(1)</sup> | 0.8 ±0.10 <sup>(1)</sup>  | 0.20                                | 0.60                                | 0.40               |
|                                                          |                       |        | 1.6 ±0.15 <sup>(2)</sup> | 0.8 ±0.15 <sup>(2)</sup>  | 0.20                                | 0.60                                | 0.40               |
|                                                          | 0805                  | 2012M  | 2.0 ±0.10 <sup>(1)</sup> | 1.25 ±0.10 <sup>(1)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                                          |                       |        | 2.0 ±0.20 <sup>(2)</sup> | 1.25 ±0.20 <sup>(2)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                                          | 1206                  | 3216M  | 3.2 ±0.15 <sup>(1)</sup> | 1.6 ±0.15 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          |                       |        | 3.2 ±0.30 <sup>(2)</sup> | 1.6 ±0.20 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          | 1210                  | 3225M  | 3.2 ±0.20 <sup>(1)</sup> | 2.5 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          |                       |        | 3.2 ±0.40 <sup>(2)</sup> | 2.5 ±0.30 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          | 1808                  | 4520M  | 4.5 ±0.40                | 2.0 ±0.30                 | 0.25                                | 0.75                                | 2.20               |
|                                                          | 1812                  | 4532M  | 4.5 ±0.20 <sup>(1)</sup> | 3.2 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 2.20               |
|                                                          |                       |        | 4.5 ±0.40 <sup>(2)</sup> | 3.2 ±0.40 <sup>(2)</sup>  | 0.25                                | 0.75                                | 2.20               |

Note: 1. Dimension for size 0402, C < 4.7 μF; 0603, C < 10 μF; 0805 to 1812, C ≤ 100 nF  
 2. Dimension for size 0402, C ≥ 4.7 μF; 0603, C ≥ 10 μF; 0805 to 1812, C > 100 nF



# MLCC Selection Charts

## X7R - General purpose, 0201 / 0402

| X7R             |                      |           |           |           |           |           |                 |           |           |           |           |
|-----------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------|
| General purpose |                      |           |           |           |           |           |                 |           |           |           |           |
| Capacitance     | Last 2-digit of 12NC | 0201      |           |           |           |           | 0402            |           |           |           |           |
|                 |                      | 6.3 V     | 10 V      | 16 V      | 25 V      | 50 V      | 6.3 V           | 10 V      | 16 V      | 25 V      | 50 V      |
| 100 pF          | 09                   |           |           |           |           |           |                 |           |           |           |           |
| 150 pF          | 12                   |           |           |           |           |           |                 |           |           |           |           |
| 220 pF          | 14                   |           |           |           |           |           |                 |           |           |           |           |
| 330 pF          | 16                   |           |           |           |           |           |                 |           |           |           |           |
| 470 pF          | 18                   |           |           |           |           |           |                 |           |           |           |           |
| 680 pF          | 21                   |           |           |           |           |           |                 |           |           |           |           |
| 1 000 pF        | 23                   | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 |                 |           |           |           | 0.5 ±0.05 |
| 1.5 nF          | 25                   |           |           |           |           |           |                 |           |           |           |           |
| 2.2 nF          | 27                   |           |           |           |           |           |                 |           |           |           |           |
| 3.3 nF          | 29                   |           |           |           |           |           | 0.5 ±0.05       | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |           |
| 4.7 nF          | 32                   |           |           |           |           |           |                 |           |           |           |           |
| 6.8 nF          | 34                   |           |           |           |           |           |                 |           |           |           |           |
| 10 nF           | 36                   |           |           |           |           |           |                 |           |           |           |           |
| 15 nF           | 38                   |           |           |           |           |           |                 |           |           |           |           |
| 22 nF           | 41                   |           |           |           |           |           |                 |           |           |           |           |
| 33 nF           | 43                   |           |           |           |           |           |                 |           |           |           |           |
| 47 nF           | 45                   |           |           |           |           |           |                 |           |           |           |           |
| 68 nF           | 47                   |           |           |           |           |           |                 |           |           |           |           |
| 100 nF          | 49                   |           |           |           |           |           |                 |           |           |           |           |
| 150 nF          | 52                   |           |           |           |           |           |                 |           |           |           |           |
| 220 nF          | 54                   |           |           |           |           |           | 0.5 ±0.05       | 0.5 ±0.05 | 0.5 ±0.05 |           |           |
| 330 nF          | 56                   |           |           |           |           |           |                 |           |           |           |           |
| 470 nF          | 58                   |           |           |           |           |           | 0.5 ±0.05       |           |           |           |           |
| 680 nF          | 61                   |           |           |           |           |           |                 |           |           |           |           |
| 1 000 nF        | 63                   |           |           |           |           |           | 0.5 ±0.05 (X6S) |           |           |           |           |
| Tape width      |                      | 8 mm      |           |           |           |           |                 |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



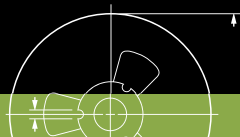


# MLCC Selection Charts

## X7R - General purpose & High capacitance, 0603 / 0805

| X7R                                |                      |          |          |          |          |          |           |           |           |           |           |
|------------------------------------|----------------------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                      |          |          |          |          |          |           |           |           |           |           |
| Capacitance                        | Last 2-digit of 12NC | 0603     |          |          |          |          | 0805      |           |           |           |           |
|                                    |                      | 6.3 V    | 10 V     | 16 V     | 25 V     | 50 V     | 6.3 V     | 10 V      | 16 V      | 25 V      | 50 V      |
| 100 pF                             | 09                   | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |           |           |           |           |           |
| 150 pF                             | 12                   |          |          |          |          |          |           |           |           |           |           |
| 220 pF                             | 14                   |          |          |          |          |          |           |           |           |           |           |
| 330 pF                             | 16                   |          |          |          |          |          |           |           |           |           |           |
| 470 pF                             | 18                   |          |          |          |          |          |           |           |           |           |           |
| 680 pF                             | 21                   |          |          |          |          |          |           |           |           |           |           |
| 1 000 pF                           | 23                   |          |          |          |          |          |           |           |           |           |           |
| 1.5 nF                             | 25                   |          |          |          |          |          |           |           |           |           |           |
| 2.2 nF                             | 27                   |          |          |          |          |          | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |
| 3.3 nF                             | 29                   |          |          |          |          |          |           |           |           |           |           |
| 4.7 nF                             | 32                   |          |          |          |          |          |           |           |           |           |           |
| 6.8 nF                             | 34                   |          |          |          |          |          |           |           |           |           |           |
| 10 nF                              | 36                   |          |          |          |          |          |           |           |           |           |           |
| 15 nF                              | 38                   |          |          |          |          |          |           |           |           |           |           |
| 22 nF                              | 41                   |          |          |          |          |          |           |           |           |           |           |
| 33 nF                              | 43                   |          |          |          |          |          |           |           |           |           |           |
| 47 nF                              | 45                   |          |          |          |          |          |           |           |           |           |           |
| 68 nF                              | 47                   |          |          |          |          |          |           |           |           |           |           |
| 100 nF                             | 49                   |          |          |          |          |          | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 150 nF                             | 52                   |          |          |          |          |          |           |           |           |           |           |
| 220 nF                             | 54                   |          |          |          |          |          |           |           |           |           |           |
| 330 nF                             | 56                   |          |          |          |          |          |           |           |           |           |           |
| 470 nF                             | 58                   |          |          |          |          |          |           |           |           |           |           |
| 680 nF                             | 61                   |          |          |          |          |          |           |           |           |           |           |
| 1 000 nF                           | 63                   |          |          |          |          |          | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 2.2 µF                             | 67                   |          |          |          |          |          |           |           |           |           |           |
| 4.7 µF                             | 72                   |          |          |          |          |          |           |           |           |           |           |
| 10 µF                              | 76                   |          |          |          |          |          |           |           |           |           |           |
| Tape width                         |                      | 8 mm     |          |          |          |          |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - General purpose & High capacitance, 1206 to 1812

| X7R                                |                     |           |           |           |           |           |           |           |           |           |           |
|------------------------------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                     |           |           |           |           |           |           |           |           |           |           |
| Capacitance                        | Last 2-digit of 2NC | 1206      |           |           |           |           | 1210      |           |           |           | 1812      |
|                                    |                     | 6.3 V     | 10 V      | 16 V      | 25 V      | 50 V      | 10 V      | 16 V      | 25 V      | 50 V      | 50 V      |
| 220 pF                             | 14                  |           |           |           |           |           |           |           |           |           |           |
| 330 pF                             | 16                  |           |           |           |           |           |           |           |           |           |           |
| 470 pF                             | 18                  |           |           |           |           |           |           |           |           |           |           |
| 680 pF                             | 21                  |           |           |           |           |           |           |           |           |           |           |
| 1 000 pF                           | 23                  |           |           |           |           |           |           |           |           |           |           |
| 1.5 nF                             | 25                  |           |           |           |           |           |           |           |           |           |           |
| 2.2 nF                             | 27                  |           |           |           |           |           |           |           |           |           |           |
| 3.3 nF                             | 29                  |           |           |           |           |           |           |           |           |           |           |
| 4.7 nF                             | 32                  |           |           |           |           |           |           |           |           |           |           |
| 6.8 nF                             | 34                  |           |           |           |           |           |           |           |           |           |           |
| 10 nF                              | 36                  | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |           | 0.85 ±0.1 |
| 15 nF                              | 38                  |           |           |           |           |           |           |           |           |           |           |
| 22 nF                              | 41                  |           |           |           |           |           |           |           |           |           |           |
| 33 nF                              | 43                  |           |           |           |           |           | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |
| 47 nF                              | 45                  |           |           |           |           |           |           |           |           |           |           |
| 68 nF                              | 47                  |           |           |           |           |           |           |           |           |           |           |
| 100 nF                             | 49                  |           |           |           |           |           |           |           |           |           |           |
| 150 nF                             | 52                  |           |           |           |           | 1.15 ±0.1 |           |           |           |           | 1.25 ±0.2 |
| 220 nF                             | 54                  |           |           |           |           |           |           |           |           | 1.15 ±0.1 |           |
| 330 nF                             | 56                  |           |           |           |           | 1.0 ±0.1  |           |           |           |           |           |
| 470 nF                             | 58                  |           |           |           |           |           | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.25 ±0.2 | 1.6 ±0.2  |
| 680 nF                             | 61                  |           |           |           |           |           |           |           |           |           |           |
| 1 000 nF                           | 63                  | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 |           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |
| 2.2 µF                             | 67                  |           |           |           |           |           | 1.9 ±0.2  | 1.9 ±0.2  | 1.9 ±0.2  | 1.9 ±0.2  |           |
| 4.7 µF                             | 72                  |           |           | 1.6 ±0.2  | 1.6 ±0.2  |           |           |           |           |           |           |
| 10 µF                              | 76                  | 1.6 ±0.2  | 1.6 ±0.2  |           |           |           |           |           |           | 2.5 ±0.2  |           |
| 22 µF                              | 81                  |           |           |           |           |           | 2.5 ±0.2  | 2.5 ±0.2  | 2.5 ±0.2  |           |           |
| 47 µF                              | 85                  |           |           |           |           |           |           |           |           |           |           |
| Tape width                         |                     | 8 mm      |           |           |           |           |           |           |           |           | 12mm      |

Note: Values in shaded cells indicate thickness class (unit: mm)

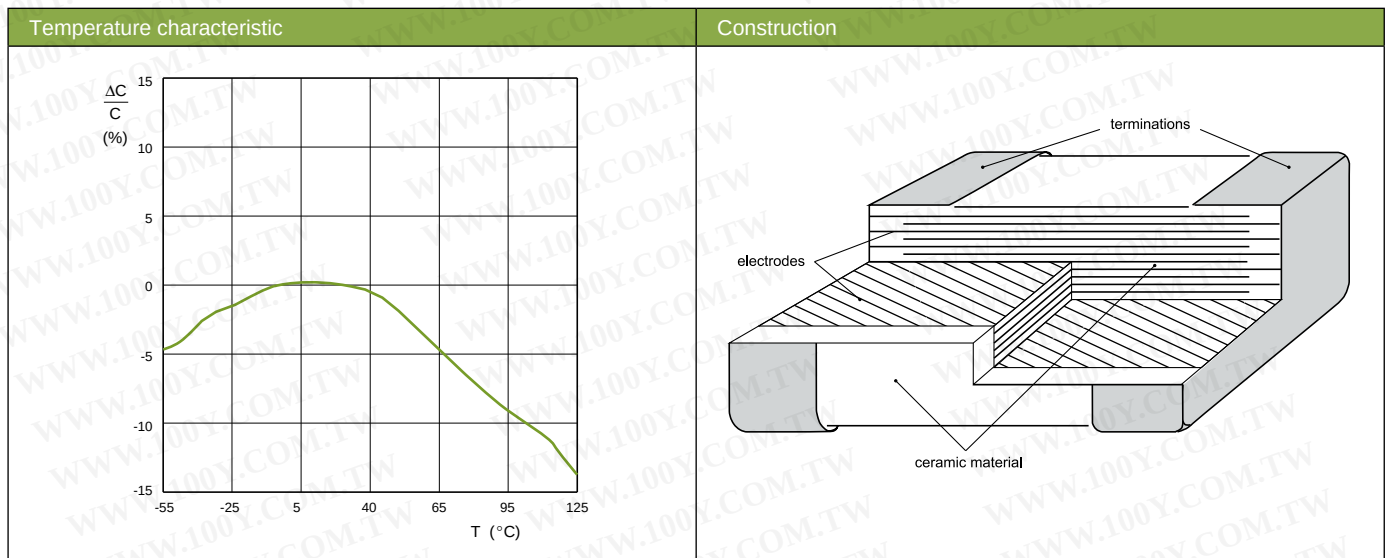
# MLCC Selection Charts

## X7R - Medium & High voltage, 0603 to 1812

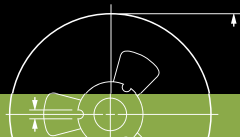


### Features

- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling / smoothing function



| Dimensions                                    |                       |        |                  |            |                                     |                                     |                    |
|-----------------------------------------------|-----------------------|--------|------------------|------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - Medium and High voltage |                       |        |                  |            |                                     |                                     |                    |
|                                               | Case size designation |        | Dimensions in mm |            |                                     |                                     |                    |
|                                               | Inch-based            | Metric | L <sub>1</sub>   | W          | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                               | 0603                  | 1608M  | 1.6 ±0.10        | 0.8 ±0.10  | 0.20                                | 0.60                                | 0.40               |
|                                               | 0805                  | 2012M  | 2.0 ±0.20        | 1.25 ±0.20 | 0.25                                | 0.75                                | 0.55               |
|                                               | 1206                  | 3216M  | 3.2 ±0.30        | 1.6 ±0.20  | 0.25                                | 0.75                                | 1.40               |
|                                               | 1210                  | 3225M  | 3.2 ±0.40        | 2.5 ±0.30  | 0.25                                | 0.75                                | 1.40               |
|                                               | 1808                  | 4520M  | 4.5 ±0.40        | 2.0 ±0.30  | 0.25                                | 0.75                                | 2.20               |
|                                               | 1812                  | 4532M  | 4.5 ±0.40        | 3.2 ±0.30  | 0.25                                | 0.75                                | 2.20               |



# MLCC Selection Charts

## X7R - Medium voltage, 0603 / 0805

| X7R            |                      |          |           |           |           |           |
|----------------|----------------------|----------|-----------|-----------|-----------|-----------|
| Medium voltage |                      |          |           |           |           |           |
| Capacitance    | Last 2-digit of 12NC | 0603     | 0805      |           |           |           |
|                |                      | 100V     | 100 V     | 200 V     | 250 V     | 500 V     |
| 100 pF         | 9                    | 0.8 ±0.1 |           |           |           |           |
| 150 pF         | 12                   |          |           |           |           |           |
| 220 pF         | 14                   |          | 0.6 ±0.1  | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 330 pF         | 16                   |          |           |           |           |           |
| 470 pF         | 18                   |          |           |           |           |           |
| 680 pF         | 21                   |          |           |           |           |           |
| 1 000 pF       | 23                   |          |           |           |           |           |
| 1.5 nF         | 25                   |          |           |           |           |           |
| 2.2 nF         | 27                   |          |           |           |           |           |
| 2.7 nF         | 28                   |          |           |           |           |           |
| 3.3 nF         | 29                   |          |           |           |           |           |
| 4.7 nF         | 32                   |          |           |           |           |           |
| 6.8 nF         | 34                   |          |           |           |           |           |
| 10 nF          | 36                   |          |           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 15 nF          | 38                   |          |           |           |           |           |
| 22 nF          | 41                   |          | 0.85 ±0.1 |           |           |           |
| 33 nF          | 43                   |          | 1.25 ±0.2 |           |           |           |
| 47 nF          | 45                   |          |           |           |           |           |
| 68 nF          | 47                   |          |           |           |           |           |
| 100 nF         | 49                   |          |           |           |           |           |
| 220 nF         | 54                   |          |           |           |           |           |
| Tape width     |                      |          | 8 mm      |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - Medium voltage, 1206 / 1210

| X7R            |                      |           |           |           |           |           |           |           |           |           |           |
|----------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Medium voltage |                      |           |           |           |           |           |           |           |           |           |           |
| Capacitance    | Last 2-digit of 12NC | 1206      |           |           |           |           | 1210      |           |           |           |           |
|                |                      | 100V      | 200V      | 250V      | 500V      | 630V      | 100 V     | 200 V     | 250 V     | 500 V     | 630 V     |
| 220 pF         | 14                   | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |           |
| 330 pF         | 16                   |           |           |           |           |           |           |           |           |           |           |
| 470 pF         | 18                   |           |           |           |           |           |           |           |           |           |           |
| 680 pF         | 21                   |           |           |           |           |           |           |           |           |           |           |
| 1 000 pF       | 23                   |           |           |           |           |           |           |           |           |           |           |
| 1.5 nF         | 25                   |           |           |           |           |           |           |           |           |           |           |
| 2.2 nF         | 27                   |           |           |           |           |           |           |           |           |           |           |
| 3.3 nF         | 29                   |           |           |           |           |           |           |           |           |           |           |
| 4.7 nF         | 32                   |           |           |           |           |           |           |           |           |           |           |
| 6.8 nF         | 34                   |           |           |           |           |           |           |           |           |           |           |
| 10 nF          | 36                   | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.6 ±0.2  | 1.6 ±0.2  | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |
| 15 nF          | 38                   |           |           |           |           |           |           |           |           |           |           |
| 22 nF          | 41                   |           |           |           |           |           |           |           |           |           |           |
| 33 nF          | 43                   |           |           |           |           |           |           |           |           |           |           |
| 47 nF          | 45                   |           |           |           |           |           |           |           |           |           |           |
| 68 nF          | 47                   |           |           |           |           |           |           |           |           |           |           |
| 100 nF         | 49                   |           |           |           |           |           |           |           |           |           |           |
| 150 nF         | 52                   |           |           |           |           |           |           |           |           |           |           |
| 220 nF         | 54                   |           |           |           |           |           |           |           |           |           |           |
| 330 nF         | 56                   |           |           |           |           |           |           |           |           |           |           |
| 470 nF         | 58                   | 1.6 ±0.2  |           |           |           |           |           |           |           |           |           |
| 680 nF         | 61                   |           |           |           |           |           |           |           |           |           |           |
| 1 000 nF       | 63                   |           |           |           |           |           |           |           |           |           |           |
| 2.2 µF         | 67                   |           |           |           |           |           |           |           |           |           |           |
| Tape width     |                      | 8 mm      |           |           |           |           |           |           |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - Medium voltage, 1812

| X7R            |                      |           |           |           |           |           |
|----------------|----------------------|-----------|-----------|-----------|-----------|-----------|
| Medium voltage |                      |           |           |           |           |           |
| Capacitance    | Last 2-digit of 12NC | 1812      |           |           |           |           |
|                |                      | 100 V     | 200 V     | 250 V     | 500 V     | 630 V     |
| 1 000 pF       | 23                   | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |
| 1.5 nF         | 26                   |           |           |           |           |           |
| 2.2 nF         | 28                   |           |           |           |           |           |
| 3.3 nF         | 29                   |           |           |           |           |           |
| 4.7 nF         | 32                   |           |           |           |           |           |
| 6.8 nF         | 34                   |           |           |           |           |           |
| 10 nF          | 36                   |           |           |           |           |           |
| 15 nF          | 38                   |           |           |           |           |           |
| 22 nF          | 41                   |           |           |           |           |           |
| 33 nF          | 43                   |           |           |           |           |           |
| 47 nF          | 45                   | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.6 ±0.2  |           |
| 68 nF          | 47                   |           |           |           |           |           |
| 100 nF         | 49                   |           |           |           |           |           |
| 150 nF         | 52                   |           |           |           |           |           |
| 220 nF         | 54                   | 1.25 ±0.2 | 1.25 ±0.2 | 1.6 ±0.2  |           |           |
| 330 nF         | 56                   |           |           |           |           |           |
| 470 nF         | 58                   |           |           |           |           |           |
| 560 nF         | 59                   |           |           |           |           |           |
| 680 nF         | 61                   | 1.6 ±0.2  | 1.6 ±0.2  | 1.6 ±0.2  |           |           |
| 820 nF         | 62                   |           |           |           |           |           |
| 1 000 nF       | 63                   |           |           |           |           |           |
|                |                      |           |           |           |           |           |
| Tape width     |                      | 12 mm     |           |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

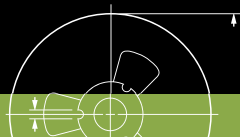


# MLCC Selection Charts

## X7R - High voltage, 1206 / 1210

| X7R          |                      |      |      |      |      |
|--------------|----------------------|------|------|------|------|
| High voltage |                      |      |      |      |      |
| Capacitance  | Last 2-digit of 12NC | 1206 |      | 1210 |      |
|              |                      | 1 kV | 2 kV | 1 kV | 2 kV |
| 100 pF       | 09                   |      |      |      |      |
| 150 pF       | 12                   |      |      |      |      |
| 220 pF       | 14                   |      |      |      |      |
| 330 pF       | 16                   |      |      |      |      |
| 470 pF       | 18                   |      |      |      |      |
| 680 pF       | 21                   |      |      |      |      |
| 1 000 pF     | 23                   |      |      |      |      |
| 1.5 nF       | 25                   |      |      |      |      |
| 2.2 nF       | 27                   |      |      |      |      |
| 3.3 nF       | 29                   |      |      |      |      |
| 4.7 nF       | 32                   |      |      |      |      |
| 6.8 nF       | 34                   |      |      |      |      |
| 10 nF        | 36                   |      |      |      |      |
| 15 nF        | 38                   |      |      |      |      |
| 22 nF        | 41                   |      |      |      |      |
| 33 nF        | 43                   |      |      |      |      |
| Tape width   |                      | 8 mm |      |      |      |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - High voltage, 1808 / 1812

| X7R          |                      |           |           |          |          |           |           |          |
|--------------|----------------------|-----------|-----------|----------|----------|-----------|-----------|----------|
| High voltage |                      |           |           |          |          |           |           |          |
| Capacitance  | Last 2-digit of 12NC | 1808      |           |          | 1812     |           |           |          |
|              |                      | 1 kV      | 2 kV      | 3 kV     | 1 kV     | 2 kV      | 3 kV      |          |
| 150 pF       | 12                   |           |           | 1.6 ±0.2 |          |           |           |          |
| 220 pF       | 14                   |           |           |          |          |           |           |          |
| 330 pF       | 16                   | 1.35 ±0.2 | 1.35 ±0.2 |          |          |           |           |          |
| 470 pF       | 18                   |           |           |          |          |           |           |          |
| 680 pF       | 21                   |           |           |          |          |           |           |          |
| 1 000 pF     | 23                   |           |           |          | 2.0 ±0.2 | 1.35 ±0.2 | 1.35 ±0.2 | 1.6 ±0.2 |
| 1.5 nF       | 25                   |           |           |          |          |           |           |          |
| 2.2 nF       | 27                   | 1.6 ±0.2  |           |          |          |           |           |          |
| 3.3 nF       | 29                   |           |           |          |          |           |           |          |
| 4.7 nF       | 32                   |           |           |          |          |           |           |          |
| 6.8 nF       | 34                   | 1.6 ±0.2  |           |          | 1.6 ±0.2 |           |           |          |
| 10 nF        | 36                   |           |           |          | 2.0 ±0.2 |           |           |          |
| 15 nF        | 38                   |           |           |          |          |           |           |          |
| 22 nF        | 41                   |           |           |          |          |           |           |          |
| 33 nF        | 43                   |           |           |          | 1.6 ±0.2 |           |           |          |
| Tape width   |                      | 12 mm     |           |          |          |           |           |          |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



## X7R - General purpose, High Capacitance, Medium & High voltage

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only

| 2 2                                   | X X | X X | X | X | X | X | X X                                                                       |
|---------------------------------------|-----|-----|---|---|---|---|---------------------------------------------------------------------------|
| Carrier tape                          |     |     |   |   |   |   | Capacitance value<br>See selection chart                                  |
| 38 = Paper / PE ( $\geq 10$ V )       |     |     |   |   |   |   | Tolerance<br>5 = $\pm 5\%$<br>6 = $\pm 10\%$<br>7 = $\pm 20\%$            |
| 22 = Blister ( $\geq 10$ V )          |     |     |   |   |   |   | TC material<br>5 = X7R                                                    |
| 50 = Blister (6.3 V / $\geq 1$ kV)    |     |     |   |   |   |   | Packing<br>1 = 180 mm / 7" reel<br>5 = 330 mm / 13" reel<br>4 = Bulk case |
| 55 = Paper / PE (6.3 V / $\geq 1$ kV) |     |     |   |   |   |   |                                                                           |
| 54 = Bulk                             |     |     |   |   |   |   |                                                                           |
| Voltage                               |     |     |   |   |   |   |                                                                           |
| 20 = 6.3 V                            |     |     |   |   |   |   |                                                                           |
| 24 = 10 V                             |     |     |   |   |   |   |                                                                           |
| 78 = 16 V                             |     |     |   |   |   |   |                                                                           |
| 91 = 25 V                             |     |     |   |   |   |   |                                                                           |
| 58 = 50 V                             |     |     |   |   |   |   |                                                                           |
| 60 = 100 V                            |     |     |   |   |   |   |                                                                           |
| 93 = 200 V                            |     |     |   |   |   |   |                                                                           |
| 83 = 250 V                            |     |     |   |   |   |   |                                                                           |
| 97 = 500 V                            |     |     |   |   |   |   |                                                                           |
| 98 = 630 V                            |     |     |   |   |   |   |                                                                           |
| 00 = 1 kV                             |     |     |   |   |   |   |                                                                           |
| 02 = 2 kV                             |     |     |   |   |   |   |                                                                           |
| 99 = 2.5 kV                           |     |     |   |   |   |   |                                                                           |
| 04 = 3 kV                             |     |     |   |   |   |   |                                                                           |
| Size                                  |     |     |   |   |   |   |                                                                           |
| 8 = 0201                              |     |     |   |   |   |   |                                                                           |
| 7 = 0402                              |     |     |   |   |   |   |                                                                           |
| 6 = 0603                              |     |     |   |   |   |   |                                                                           |
| 0 = 0805                              |     |     |   |   |   |   |                                                                           |
| 1 = 1206                              |     |     |   |   |   |   |                                                                           |
| 2 = 1210                              |     |     |   |   |   |   |                                                                           |
| 3 = 1808                              |     |     |   |   |   |   |                                                                           |
| 4 = 1812                              |     |     |   |   |   |   |                                                                           |

### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



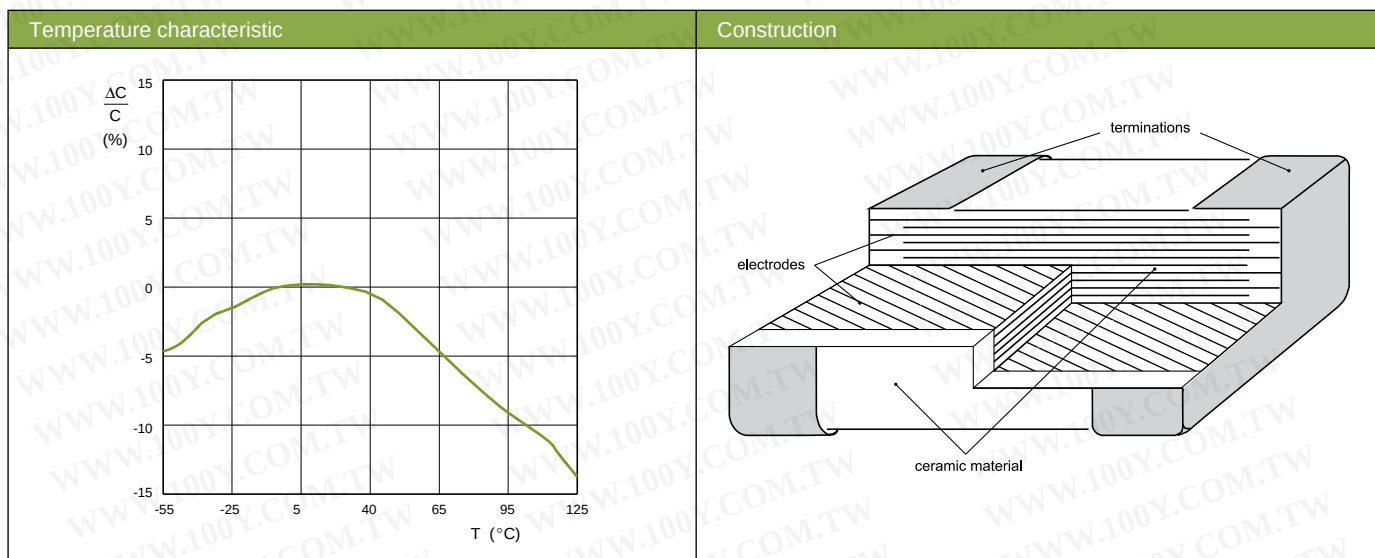
# MLCC Selection Charts

## X7R - Low inductance, 0306 to 0612



### Features

- Good solution for anti resonance reduction with controlled ESR
- Suitable for high speed IC decoupling due to low inductance type



| Dimensions                                      |                       |        |                  |           |            |                                     |                                     |                    |
|-------------------------------------------------|-----------------------|--------|------------------|-----------|------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - Low inductance types only |                       |        |                  |           |            |                                     |                                     |                    |
|                                                 | Case size designation |        | Dimensions in mm |           |            |                                     |                                     |                    |
|                                                 | Inch-based            | Metric | L <sub>1</sub>   | W         | T          | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                                 | 0306                  | 0816M  | 0.8 ±0.15        | 1.6 ±0.20 | 0.50 ±0.10 | 0.10                                | 0.30                                | 0.20               |
|                                                 | 0508                  | 1220M  | 1.25 ±0.20       | 2.0 ±0.20 | 0.85 ±0.10 | 0.13                                | 0.46                                | 0.38               |
|                                                 | 0612                  | 1632M  | 1.6 ±0.20        | 3.2 ±0.20 | 0.85 ±0.10 | 0.13                                | 0.46                                | 0.50               |

# MLCC Selection Charts

## X7R - Low inductance, 0306 to 0612

| X7R            |                      |          |           |           |           |
|----------------|----------------------|----------|-----------|-----------|-----------|
| Low inductance |                      |          |           |           |           |
| Capacitance    | Last 2-digit of 12NC | 0306     | 0508      | 0508      | 0612      |
|                |                      | 10 V     | 16 V      | 25 V      | 50 V      |
| 10 nF          | 36                   |          |           | 0.85 ±0.1 | 0.85 ±0.1 |
| 22 nF          | 41                   |          |           |           |           |
| 47 nF          | 45                   |          |           |           |           |
| 100 nF         | 49                   |          |           |           |           |
| 220 nF         | 54                   | 0.5 ±0.1 | 0.85 ±0.1 |           |           |
| Tape width     |                      | 8 mm     |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



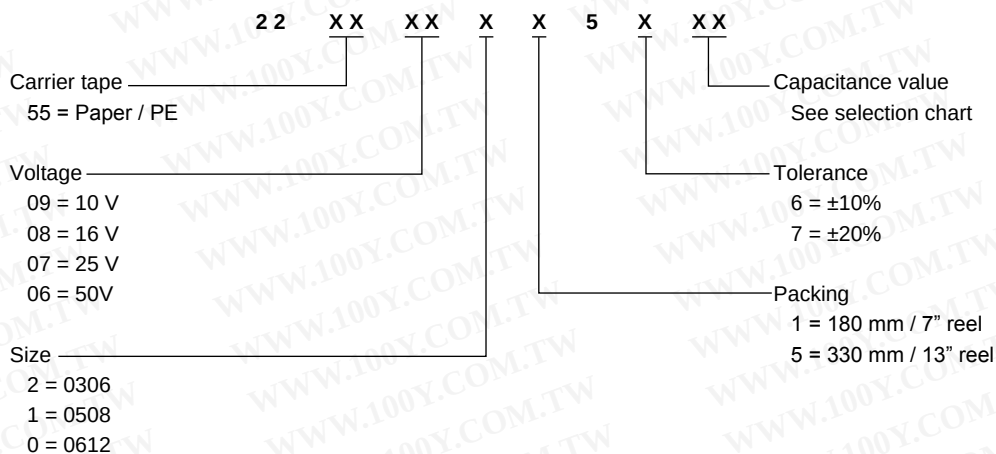
# MLCC Selection Charts

## X7R - Low inductance, 0306 to 0612

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

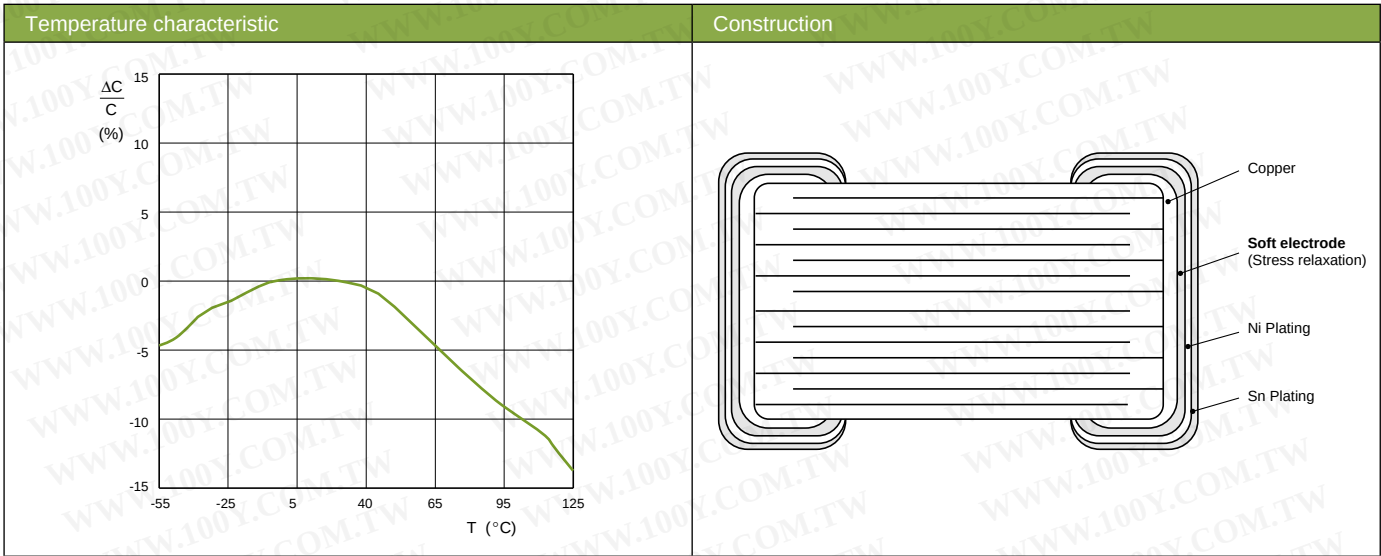
Regional code for ordering Phycomp branded products. For details, please see page 79.



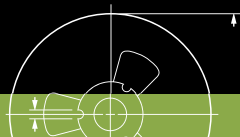


Features

- Flexible termination system
- Improved resistance to thermal stresses
- Increased mechanical performance



| Dimensions                             |                       |        |                  |            |             |             |        |
|----------------------------------------|-----------------------|--------|------------------|------------|-------------|-------------|--------|
| Discrete capacitors - Soft termination |                       |        |                  |            |             |             |        |
|                                        | Case size designation |        | Dimensions in mm |            |             |             |        |
|                                        | Inch-based            | Metric | L1               | W          | L2 / L3 min | L2 / L3 max | L4 min |
|                                        | 0603                  | 1608M  | 1.6 ±0.20        | 0.8 ±0.15  | 0.20        | 0.50        | 0.40   |
|                                        | 0805                  | 2012M  | 2.0 ±0.30        | 1.25 ±0.20 | 0.25        | 0.75        | 0.55   |
|                                        | 1206                  | 3216M  | 3.2 ±0.40        | 1.6 ±0.20  | 0.25        | 0.85        | 1.40   |



# MLCC Selection Charts

## X7R - Soft termination, 0603 / 0805

| X7R              |                      |          |          |          |          |           |           |           |           |           |           |
|------------------|----------------------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Soft termination |                      |          |          |          |          |           |           |           |           |           |           |
| Capacitance      | Last 2-digit of 12NC | 0603     |          |          |          | 0805      |           |           |           |           |           |
|                  |                      | 16 V     | 25 V     | 50 V     | 100 V    | 16 V      | 25 V      | 50 V      | 100 V     | 200 V     | 250 V     |
| 100 pF           | 09                   |          |          |          |          |           |           |           |           |           |           |
| 150 pF           | 12                   |          |          |          |          |           |           |           |           |           |           |
| 180 pF           | 13                   |          |          |          |          |           |           |           |           |           |           |
| 220 pF           | 14                   |          |          |          |          |           |           |           |           |           |           |
| 330 pF           | 16                   |          |          |          |          |           |           |           |           |           |           |
| 390 pF           | 17                   |          |          |          |          |           |           |           |           |           |           |
| 470 pF           | 18                   |          |          |          |          |           |           |           |           |           |           |
| 680 pF           | 21                   |          |          |          | 0.8 ±0.1 |           |           |           | 0.6 ±0.1  | 0.85 ±0.1 | 0.85 ±0.1 |
| 1 000 pF         | 23                   |          |          |          |          |           |           |           |           |           |           |
| 1.5 nF           | 25                   |          | 0.8 ±0.1 | 0.8 ±0.1 |          | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |           |           |           |
| 2.2 nF           | 27                   |          |          |          |          |           |           |           |           |           |           |
| 3.3 nF           | 29                   | 0.8 ±0.1 |          |          |          |           |           |           |           |           |           |
| 4.7 nF           | 32                   |          |          |          |          |           |           |           |           |           |           |
| 6.8 nF           | 34                   |          |          |          |          |           |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 |
| 10 nF            | 36                   |          |          |          |          |           |           |           |           |           |           |
| 15 nF            | 38                   |          |          |          |          |           |           |           |           |           |           |
| 18 nF            | 39                   |          |          |          |          |           |           |           |           |           |           |
| 22 nF            | 41                   |          |          |          |          |           |           |           | 0.85 ±0.1 |           |           |
| 27 nF            | 42                   |          |          |          |          |           |           |           |           |           |           |
| 33 nF            | 43                   |          |          |          |          |           |           |           |           |           |           |
| 47 nF            | 45                   |          |          |          |          |           |           |           |           |           |           |
| 68 nF            | 47                   |          |          |          |          | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |
| 100 nF           | 49                   |          |          |          |          |           |           |           |           |           |           |
| 150 nF           | 52                   |          |          |          |          |           |           |           |           |           |           |
| 220 nF           | 54                   |          |          |          |          |           |           |           |           |           |           |
| 270 nF           | 55                   |          |          |          |          |           |           |           |           |           |           |
| 330 nF           | 56                   |          |          |          |          |           |           |           |           |           |           |
| 390 nF           | 57                   |          |          |          |          |           |           |           |           |           |           |
| 470 nF           | 58                   |          |          |          |          |           |           |           |           |           |           |
| 680 nF           | 61                   |          |          |          |          |           |           |           |           |           |           |
| 1 000 nF         | 63                   |          |          |          |          |           |           |           |           |           |           |
| Tape width       |                      | 8mm      |          |          |          |           |           |           |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

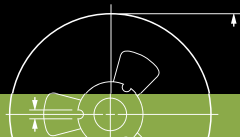


# MLCC Selection Charts

X7R - Soft termination, 1206

| X7R              |                      |           |           |           |           |           |           |           |           |           |
|------------------|----------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Soft termination |                      |           |           |           |           |           |           |           |           |           |
| Capacitance      | Last 2-digit of 12NC | 1206      |           |           |           |           |           |           |           |           |
|                  |                      | 16V       | 25V       | 50V       | 100V      | 200V      | 250V      | 500V      | 630V      | 1KV       |
| 100 pF           | 09                   |           |           |           |           |           |           |           |           |           |
| 150 pF           | 12                   |           |           |           |           |           |           |           |           |           |
| 180 pF           | 13                   |           |           |           |           |           |           |           |           |           |
| 220 pF           | 14                   |           |           |           |           |           |           |           |           |           |
| 330 pF           | 16                   |           |           |           |           |           |           |           |           |           |
| 390 pF           | 17                   |           |           |           |           |           |           |           |           |           |
| 470 pF           | 18                   |           |           |           |           |           |           |           |           |           |
| 680 pF           | 21                   |           |           |           |           |           |           |           |           | 1.25 ±0.2 |
| 1 000 pF         | 23                   |           |           |           |           | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |           |
| 1.5 nF           | 25                   |           |           |           |           |           |           |           |           |           |
| 2.2 nF           | 27                   |           |           |           |           |           |           |           |           |           |
| 3.3 nF           | 29                   |           |           |           |           |           |           |           |           |           |
| 4.7 nF           | 32                   |           |           |           | 0.85 ±0.1 |           |           |           |           |           |
| 6.8 nF           | 34                   |           |           | 0.85 ±0.1 |           |           |           |           |           |           |
| 10 nF            | 36                   |           | 0.85 ±0.1 |           |           |           |           |           |           |           |
| 15 nF            | 38                   | 0.85 ±0.1 |           |           |           |           |           |           |           |           |
| 18 nF            | 39                   |           |           |           |           |           |           |           |           |           |
| 22 nF            | 41                   |           |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |
| 27 nF            | 42                   |           |           |           |           |           |           |           |           |           |
| 33 nF            | 43                   |           |           |           |           |           |           |           |           |           |
| 47 nF            | 45                   |           |           |           |           |           |           |           |           |           |
| 68 nF            | 47                   |           |           |           | 1.25 ±0.2 |           |           |           |           |           |
| 100 nF           | 49                   |           |           |           |           |           |           |           |           |           |
| 150 nF           | 52                   |           |           | 1.15 ±0.2 |           |           |           |           |           |           |
| 220 nF           | 54                   |           |           |           |           |           |           |           |           |           |
| 270 nF           | 55                   |           | 1.15 ±0.2 |           |           |           |           |           |           |           |
| 330 nF           | 56                   |           |           |           |           |           |           |           |           |           |
| 390 nF           | 57                   |           |           |           |           |           |           |           |           |           |
| 470 nF           | 58                   |           |           |           |           |           |           |           |           |           |
| 680 nF           | 61                   | 1.15 ±0.2 |           |           |           |           |           |           |           |           |
| 1 000 nF         | 63                   |           |           |           |           |           |           |           |           |           |
| Tape width       |                      | 8mm       |           |           |           |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



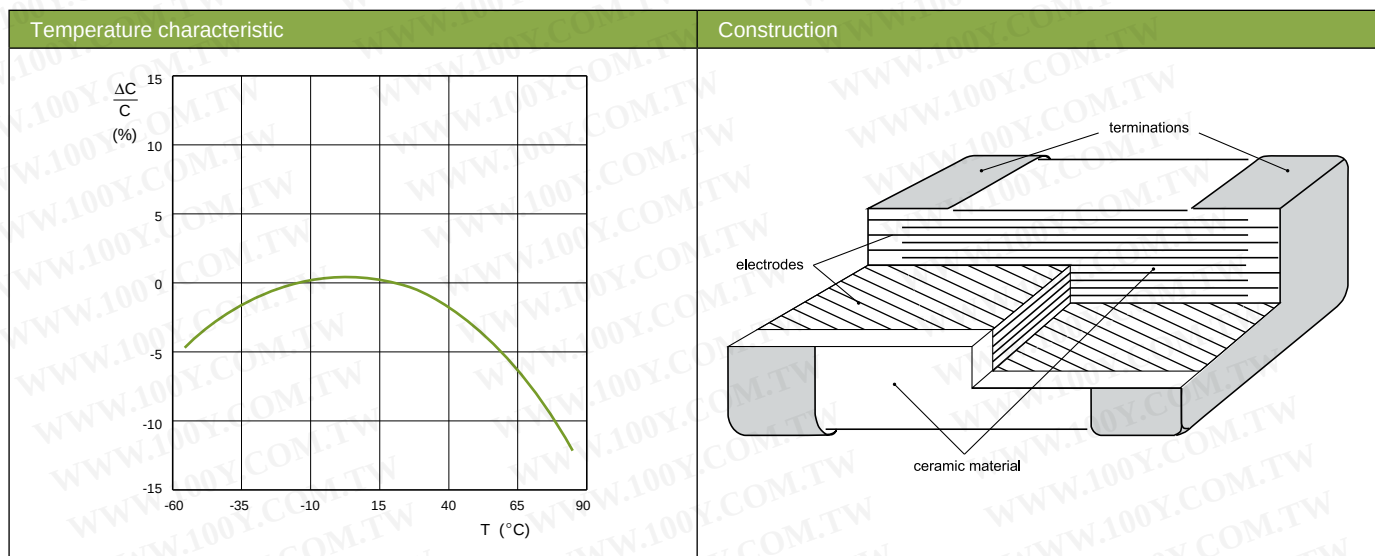
# MLCC Selection Charts

## X5R - General purpose & High capacitance, 0201 to 1812



### Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance



| Case dimensions                                          |        |                          |                           |                                     |                                     |                    |  |
|----------------------------------------------------------|--------|--------------------------|---------------------------|-------------------------------------|-------------------------------------|--------------------|--|
| Discrete capacitors - General purpose & High capacitance |        |                          |                           |                                     |                                     |                    |  |
| Case size designation                                    |        | Dimensions in mm         |                           |                                     |                                     |                    |  |
| Inch-based                                               | Metric | L <sub>1</sub>           | W                         | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |  |
| 0201                                                     | 0603M  | 0.6 ±0.03 <sup>(1)</sup> | 0.3 ±0.03 <sup>(1)</sup>  | 0.10                                | 0.20                                | 0.20               |  |
|                                                          |        | 0.6 ±0.05 <sup>(2)</sup> | 0.3 ±0.05 <sup>(2)</sup>  | 0.10                                | 0.20                                | 0.20               |  |
| 0402                                                     | 1005M  | 1.0 ±0.05 <sup>(1)</sup> | 0.5 ±0.05 <sup>(1)</sup>  | 0.15                                | 0.30                                | 0.40               |  |
|                                                          |        | 1.0 ±0.20 <sup>(2)</sup> | 0.5 ±0.20 <sup>(2)</sup>  | 0.15                                | 0.30                                | 0.40               |  |
| 0603                                                     | 1608M  | 1.6 ±0.10 <sup>(1)</sup> | 0.8 ±0.10 <sup>(1)</sup>  | 0.20                                | 0.60                                | 0.40               |  |
|                                                          |        | 1.6 ±0.20 <sup>(2)</sup> | 0.8 ±0.20 <sup>(2)</sup>  | 0.20                                | 0.60                                | 0.40               |  |
| 0805                                                     | 2012M  | 2.0 ±0.10 <sup>(1)</sup> | 1.25 ±0.10 <sup>(1)</sup> | 0.25                                | 0.75                                | 0.55               |  |
|                                                          |        | 2.0 ±0.20 <sup>(2)</sup> | 1.25 ±0.20 <sup>(2)</sup> | 0.25                                | 0.75                                | 0.55               |  |
| 1206                                                     | 3216M  | 3.2 ±0.15 <sup>(1)</sup> | 1.6 ±0.15 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |  |
|                                                          |        | 3.2 ±0.30 <sup>(2)</sup> | 1.6 ±0.20 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |  |
| 1210                                                     | 3225M  | 3.2 ±0.20 <sup>(1)</sup> | 2.5 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |  |
|                                                          |        | 3.2 ±0.40 <sup>(2)</sup> | 2.5 ±0.30 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |  |
| 1808                                                     | 4520M  | 4.5 ±0.40                | 2.0 ±0.30                 | 0.25                                | 0.75                                | 2.20               |  |
|                                                          |        | 4.5 ±0.20 <sup>(1)</sup> | 3.2 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 2.20               |  |
| 1812                                                     | 4532M  | 4.5 ±0.40 <sup>(2)</sup> | 3.2 ±0.40 <sup>(2)</sup>  | 0.25                                | 0.75                                | 2.20               |  |

Note: 1. Dimension for size 0201, C < 1 µF; 0402, C < 4.7 µF; 0603, C < 10 µF; 0805 to 1812, C ≤ 100 nF  
 2. Dimension for size 0201, C ≥ 1 µF; 0402, C ≥ 4.7 µF; 0603, C ≥ 10 µF; 0805 to 1812, C > 100 nF

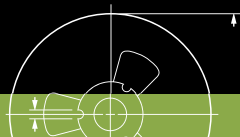


# MLCC Selection Charts

## X5R - General purpose & High capacitance, 0201 / 0402

| X5R                                |                      |           |           |           |      |      |           |           |           |           |           |
|------------------------------------|----------------------|-----------|-----------|-----------|------|------|-----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                      |           |           |           |      |      |           |           |           |           |           |
| Capacitance                        | Last 2-digit of 12NC | 0201      |           |           |      |      | 0402      |           |           |           |           |
|                                    |                      | 6.3 V     | 10 V      | 16 V      | 25 V | 50 V | 6.3 V     | 10 V      | 16 V      | 25 V      | 50 V      |
| 100 pF                             | 09                   |           |           |           |      |      |           |           |           |           |           |
| 150 pF                             | 12                   |           |           |           |      |      |           |           |           |           |           |
| 220 pF                             | 14                   |           |           |           |      |      |           |           |           |           |           |
| 330 pF                             | 16                   |           |           |           |      |      |           |           |           |           |           |
| 470 pF                             | 18                   |           |           |           |      |      |           |           |           |           |           |
| 680 pF                             | 21                   |           |           |           |      |      |           |           |           |           |           |
| 1.0 nF                             | 23                   |           |           |           |      |      |           |           |           |           |           |
| 1.5 nF                             | 25                   |           |           |           |      |      |           |           |           |           |           |
| 2.2 nF                             | 27                   |           |           |           |      |      |           |           |           |           |           |
| 3.3 nF                             | 29                   | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 |      |      |           |           |           | 0.5 ±0.05 | 0.5 ±0.05 |
| 4.7 nF                             | 32                   |           |           |           |      |      |           |           | 0.5 ±0.05 |           |           |
| 6.8 nF                             | 34                   |           |           |           |      |      |           |           |           |           |           |
| 10 nF                              | 36                   |           |           |           |      |      |           |           |           |           |           |
| 15 nF                              | 39                   |           |           |           |      |      | 0.5 ±0.05 | 0.5 ±0.05 |           |           |           |
| 22 nF                              | 41                   |           |           |           |      |      |           |           |           |           |           |
| 33 nF                              | 43                   |           |           |           |      |      |           |           |           |           |           |
| 47 nF                              | 45                   |           |           |           |      |      |           |           |           |           |           |
| 68 nF                              | 47                   |           |           |           |      |      |           |           |           |           |           |
| 100 nF                             | 49                   |           |           |           |      |      |           |           |           |           |           |
| 150 nF                             | 52                   |           |           |           |      |      |           |           |           |           |           |
| 220 nF                             | 54                   | 0.3 ±0.03 | 0.3 ±0.03 |           |      |      |           |           |           | 0.5 ±0.05 | 0.5 ±0.05 |
| 330 nF                             | 56                   |           |           |           |      |      |           |           |           |           |           |
| 470 nF                             | 58                   | 0.3 ±0.03 |           |           |      |      |           |           | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 680 nF                             | 61                   |           |           |           |      |      |           |           |           |           |           |
| 1 000 nF                           | 63                   | 0.3 ±0.05 |           |           |      |      |           |           | 0.5 ±0.05 | 0.5 ±0.05 |           |
| 2.2 µF                             | 65                   |           |           |           |      |      |           |           |           |           |           |
| 4.7 µF                             | 67                   |           |           |           |      |      | 0.5 ±0.15 |           |           |           |           |
| 10 µF                              | 76                   |           |           |           |      |      | 0.5 ±0.2  |           |           |           |           |
| Tape width                         |                      | 8 mm      |           |           |      |      |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X5R - General purpose & High capacitance, 0603 / 0805

| X5R                                |                      |          |          |          |          |          |           |           |           |           |           |
|------------------------------------|----------------------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                      |          |          |          |          |          |           |           |           |           |           |
| Capacitance                        | Last 2-digit of 12NC | 0603     |          |          |          |          | 0805      |           |           |           |           |
|                                    |                      | 6.3 V    | 10 V     | 16 V     | 25 V     | 50 V     | 6.3 V     | 10 V      | 16 V      | 25 V      | 50 V      |
| 100 pF                             | 09                   | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |           |           |           |           |           |
| 150 pF                             | 12                   |          |          |          |          |          |           |           |           |           |           |
| 220 pF                             | 14                   |          |          |          |          |          |           |           |           |           |           |
| 330 pF                             | 16                   |          |          |          |          |          |           |           |           |           |           |
| 470 pF                             | 18                   |          |          |          |          |          |           |           |           |           |           |
| 680 pF                             | 21                   |          |          |          |          |          |           |           |           |           |           |
| 1.0 nF                             | 23                   |          |          |          |          |          |           |           |           |           |           |
| 1.5 nF                             | 25                   |          |          |          |          |          |           |           |           |           |           |
| 2.2 nF                             | 27                   |          |          |          |          |          |           |           |           |           |           |
| 3.3 nF                             | 29                   |          |          |          |          |          | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |
| 4.7 nF                             | 32                   |          |          |          |          |          |           |           |           |           |           |
| 6.8 nF                             | 34                   |          |          |          |          |          |           |           |           |           |           |
| 10 nF                              | 36                   |          |          |          |          |          |           |           |           |           |           |
| 15 nF                              | 39                   |          |          |          |          |          |           |           |           |           |           |
| 22 nF                              | 41                   |          |          |          |          |          |           |           |           |           |           |
| 33 nF                              | 43                   |          |          |          |          |          |           |           |           |           |           |
| 47 nF                              | 45                   |          |          |          |          |          |           |           |           |           |           |
| 68 nF                              | 47                   |          |          |          |          |          |           |           |           |           |           |
| 100 nF                             | 49                   |          |          |          |          |          | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 150 nF                             | 52                   |          |          |          |          |          |           |           |           |           |           |
| 220 nF                             | 54                   |          |          |          |          |          |           |           |           |           |           |
| 330 nF                             | 56                   |          |          |          |          |          |           |           |           |           |           |
| 470 nF                             | 58                   |          |          |          |          |          |           |           |           |           |           |
| 680 nF                             | 61                   |          |          |          |          |          |           |           |           |           |           |
| 1 000 nF                           | 63                   |          |          |          |          |          |           |           |           |           |           |
| 2.2 µF                             | 65                   |          |          |          |          |          |           |           |           |           |           |
| 4.7 µF                             | 67                   |          |          |          |          |          |           |           |           |           |           |
| 10 µF                              | 76                   | 0.8 ±0.2 | 0.8 ±0.2 |          |          |          |           |           |           |           |           |
| 22 µF                              | 81                   |          |          |          |          |          |           |           |           |           |           |
| 47 µF                              | 85                   |          |          |          |          |          |           |           |           |           |           |
| 100 µF                             | 89                   |          |          |          |          |          |           |           |           |           |           |
| Tape width                         |                      | 8 mm     |          |          |          |          |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)

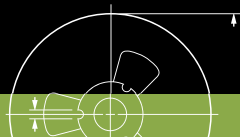


# MLCC Selection Charts

## X5R - High capacitance, 1206

| X5R                                |                      |       |      |      |      |      |
|------------------------------------|----------------------|-------|------|------|------|------|
| General purpose & High capacitance |                      |       |      |      |      |      |
| Capacitance                        | Last 2-digit of 12NC | 1206  |      |      |      |      |
|                                    |                      | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 100 pF                             | 09                   |       |      |      |      |      |
| 150 pF                             | 12                   |       |      |      |      |      |
| 220 pF                             | 14                   |       |      |      |      |      |
| 330 pF                             | 16                   |       |      |      |      |      |
| 470 pF                             | 18                   |       |      |      |      |      |
| 680 pF                             | 21                   |       |      |      |      |      |
| 1.0 nF                             | 23                   |       |      |      |      |      |
| 1.5 nF                             | 25                   |       |      |      |      |      |
| 2.2 nF                             | 27                   |       |      |      |      |      |
| 3.3 nF                             | 29                   |       |      |      |      |      |
| 4.7 nF                             | 32                   |       |      |      |      |      |
| 6.8 nF                             | 34                   |       |      |      |      |      |
| 10 nF                              | 36                   |       |      |      |      |      |
| 15 nF                              | 39                   |       |      |      |      |      |
| 22 nF                              | 41                   |       |      |      |      |      |
| 33 nF                              | 43                   |       |      |      |      |      |
| 47 nF                              | 45                   |       |      |      |      |      |
| 68 nF                              | 47                   |       |      |      |      |      |
| 100 nF                             | 49                   |       |      |      |      |      |
| 150 nF                             | 52                   |       |      |      |      |      |
| 220 nF                             | 54                   |       |      |      |      |      |
| 330 nF                             | 56                   |       |      |      |      |      |
| 470 nF                             | 58                   |       |      |      |      |      |
| 680 nF                             | 61                   |       |      |      |      |      |
| 1 000 nF                           | 63                   |       |      |      |      |      |
| 2.2 µF                             | 65                   |       |      |      |      |      |
| 4.7 µF                             | 67                   |       |      |      |      |      |
| 10 µF                              | 76                   |       |      |      |      |      |
| 22 µF                              | 81                   |       |      |      |      |      |
| 47 µF                              | 85                   |       |      |      |      |      |
| 100 µF                             | 89                   |       |      |      |      |      |
| Tape width                         |                      | 8 mm  |      |      |      |      |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X5R - High capacitance, 1210 / 1812

| X5R                                |                      |       |      |      |      |      |      |
|------------------------------------|----------------------|-------|------|------|------|------|------|
| General purpose & High capacitance |                      |       |      |      |      |      |      |
| Capacitance                        | Last 2-digit of 12NC | 1210  |      |      |      |      | 1812 |
|                                    |                      | 6.3 V | 10 V | 16 V | 25 V | 50 V | 50 V |
| 100 pF                             | 09                   |       |      |      |      |      |      |
| 150 pF                             | 12                   |       |      |      |      |      |      |
| 220 pF                             | 14                   |       |      |      |      |      |      |
| 330 pF                             | 16                   |       |      |      |      |      |      |
| 470 pF                             | 18                   |       |      |      |      |      |      |
| 680 pF                             | 21                   |       |      |      |      |      |      |
| 1.0 nF                             | 23                   |       |      |      |      |      |      |
| 1.5 nF                             | 25                   |       |      |      |      |      |      |
| 2.2 nF                             | 27                   |       |      |      |      |      |      |
| 3.3 nF                             | 29                   |       |      |      |      |      |      |
| 4.7 nF                             | 32                   |       |      |      |      |      |      |
| 6.8 nF                             | 34                   |       |      |      |      |      |      |
| 10 nF                              | 36                   |       |      |      |      |      |      |
| 15 nF                              | 39                   |       |      |      |      |      |      |
| 22 nF                              | 41                   |       |      |      |      |      |      |
| 33 nF                              | 43                   |       |      |      |      |      |      |
| 47 nF                              | 45                   |       |      |      |      |      |      |
| 68 nF                              | 47                   |       |      |      |      |      |      |
| 100 nF                             | 49                   |       |      |      |      |      |      |
| 150 nF                             | 52                   |       |      |      |      |      |      |
| 220 nF                             | 54                   |       |      |      |      |      |      |
| 330 nF                             | 56                   |       |      |      |      |      |      |
| 470 nF                             | 58                   |       |      |      |      |      |      |
| 680 nF                             | 61                   |       |      |      |      |      |      |
| 1 000 nF                           | 63                   |       |      |      |      |      |      |
| 2.2 µF                             | 65                   |       |      |      |      |      |      |
| 4.7 µF                             | 67                   |       |      |      |      |      |      |
| 10 µF                              | 76                   |       |      |      |      |      |      |
| 22 µF                              | 81                   |       |      |      |      |      |      |
| 47 µF                              | 85                   |       |      |      |      |      |      |
| 100 µF                             | 89                   |       |      |      |      |      |      |
| Tape width                         |                      | 8 mm  |      |      |      |      |      |

Note: Values in shaded cells indicate thickness class (unit: mm)

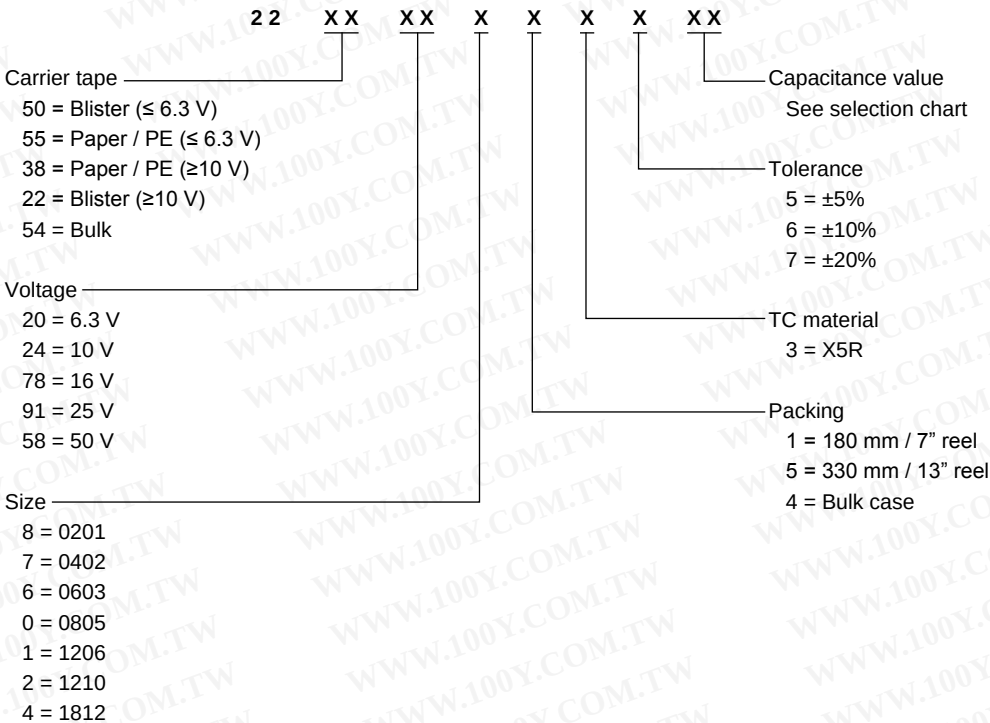


## X5R - General purpose & High Capacitance, 0201 to 1812

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products.  
For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



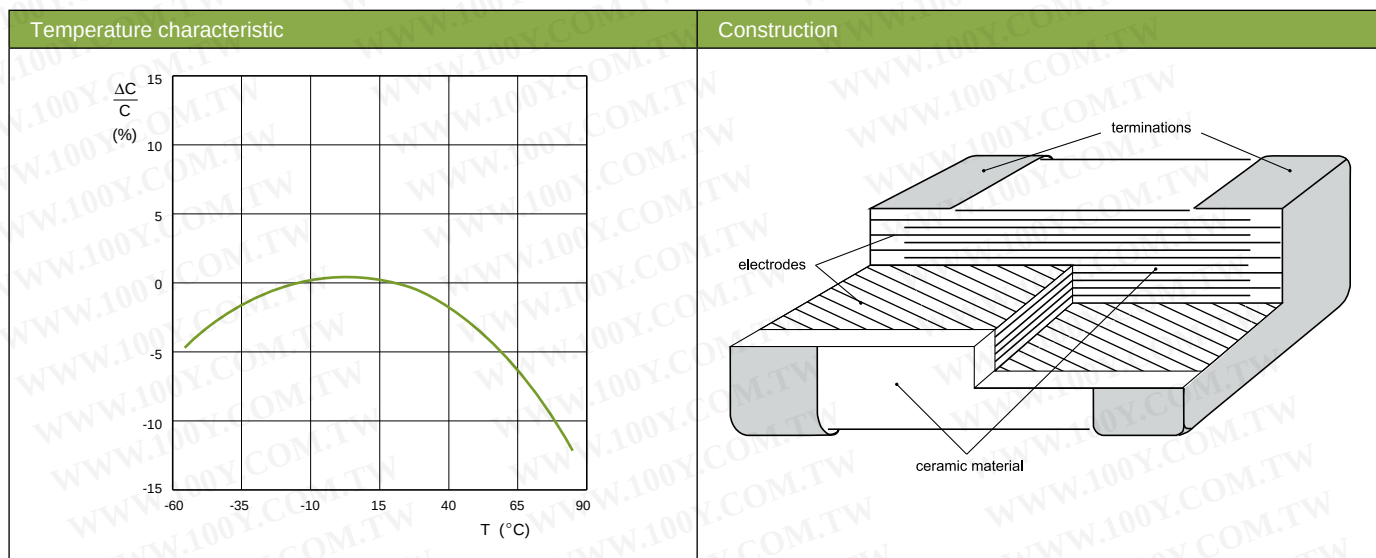
# MLCC Selection Charts

## X5R - Low profile, 0402 to 0805



### Features

- Low ESR
- Increased allowable ripple current
- Excellent reliability with high insulation resistance



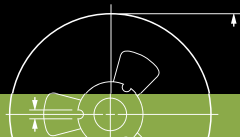
| Dimensions                        |                       |        |                  |                 |                 |                 |           |
|-----------------------------------|-----------------------|--------|------------------|-----------------|-----------------|-----------------|-----------|
| Discrete capacitors - Low profile |                       |        |                  |                 |                 |                 |           |
|                                   | Case size designation |        | Dimensions in mm |                 |                 |                 |           |
|                                   | Inch-based            | Metric | $L_1$            | W               | $L_2 / L_3$ min | $L_2 / L_3$ max | $L_4$ min |
|                                   | 0402                  | 1005M  | $1.0 \pm 0.05$   | $0.5 \pm 0.05$  | 0.15            | 0.30            | 0.40      |
|                                   | 0603                  | 1608M  | $1.6 \pm 0.10$   | $0.8 \pm 0.10$  | 0.20            | 0.60            | 0.40      |
|                                   | 0805                  | 2012M  | $2.0 \pm 0.20$   | $1.25 \pm 0.20$ | 0.25            | 0.75            | 0.55      |

# MLCC Selection Charts

## X5R - Low profile, 0402 to 0805

| X5R         |           |           |           |           |            |      |            |            |            |            |
|-------------|-----------|-----------|-----------|-----------|------------|------|------------|------------|------------|------------|
| Low Profile |           |           |           |           |            |      |            |            |            |            |
| Capacitance | 0402      |           |           |           | 0603       |      |            |            | 0805       |            |
|             | 6.3 V     | 10 V      | 16 V      | 25 V      | 6.3 V      | 10 V | 16 V       | 25 V       | 6.3 V      | 10 V       |
| 10 nF       | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 |            |      |            |            |            |            |
| 22 nF       |           |           |           |           |            |      |            |            |            |            |
| 47 nF       |           |           |           |           |            |      |            |            |            |            |
| 100 nF      | 0.3 ±0.03 | 0.3 ±0.03 |           |           |            |      |            |            |            |            |
| 220 nF      |           |           |           |           |            |      |            |            |            |            |
| 470 nF      | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 |           | 0.45 ±0.05 |      |            |            |            |            |
| 1 000 nF    |           |           |           |           |            |      | 0.45 ±0.05 | 0.45 ±0.05 |            |            |
| 2.2 µF      |           |           |           |           |            |      |            |            |            |            |
| 4.7 µF      |           |           |           |           |            |      |            |            |            |            |
| 10 µF       |           |           |           |           |            |      |            |            | 0.45 ±0.05 | 0.45 ±0.05 |
| Tape width  | 8 mm      |           |           |           |            |      |            |            |            |            |

Note: Values in shaded cells indicate thickness class (unit: mm)



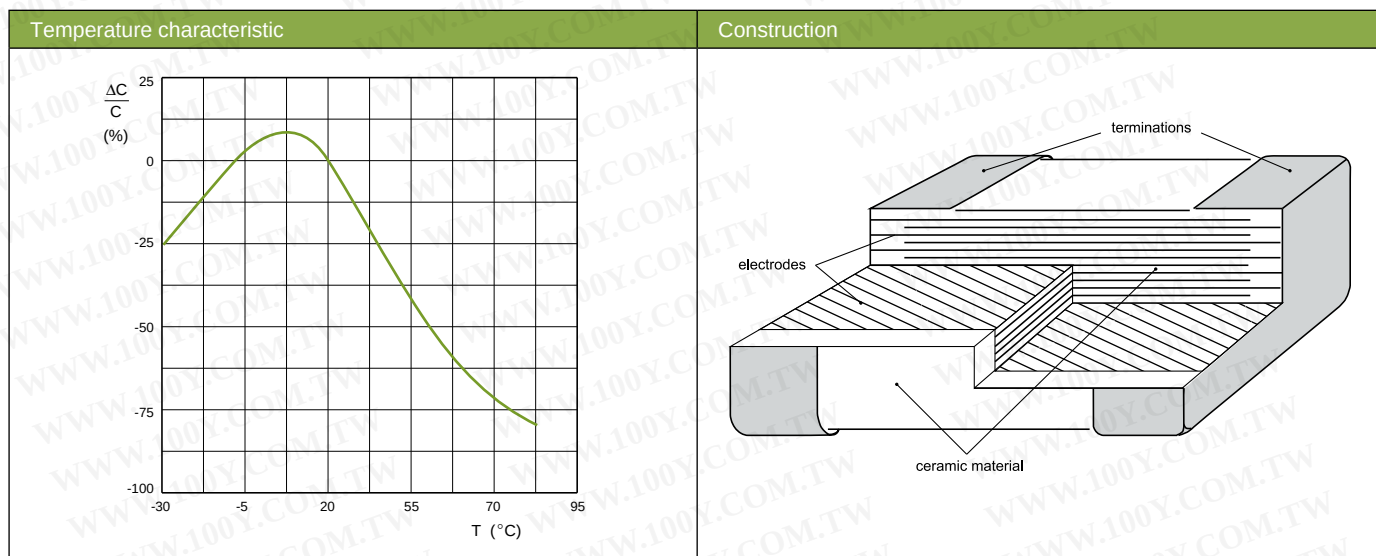
# MLCC Selection Charts

## Y5V - General purpose & High capacitance, 0201 to 1210



### Features

- High volumetric efficiency
- Non-polar construction



| Case dimensions                                          |                       |        |                          |                           |                                     |                                     |                    |
|----------------------------------------------------------|-----------------------|--------|--------------------------|---------------------------|-------------------------------------|-------------------------------------|--------------------|
| Discrete capacitors - General purpose & High capacitance |                       |        |                          |                           |                                     |                                     |                    |
|                                                          | Case size designation |        | Dimensions in mm         |                           |                                     |                                     |                    |
|                                                          | Inch-based            | Metric | L <sub>1</sub>           | W                         | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                                                          |                       |        |                          |                           |                                     |                                     |                    |
|                                                          | 0201                  | 0603M  | 0.6 ±0.03                | 0.3 ±0.03                 | 0.10                                | 0.20                                | 0.20               |
|                                                          |                       |        | 0.6 ±0.05                | 0.3 ±0.05                 | 0.10                                | 0.20                                | 0.20               |
|                                                          | 0402                  | 1005M  | 1.0 ±0.05 <sup>(1)</sup> | 0.5 ±0.05 <sup>(1)</sup>  | 0.15                                | 0.30                                | 0.40               |
|                                                          |                       |        | 1.0 ±0.20 <sup>(2)</sup> | 0.5 ±0.20 <sup>(2)</sup>  | 0.15                                | 0.30                                | 0.40               |
|                                                          | 0603                  | 1608M  | 1.6 ±0.10 <sup>(1)</sup> | 0.8 ±0.10 <sup>(1)</sup>  | 0.20                                | 0.60                                | 0.40               |
|                                                          |                       |        | 1.6 ±0.15 <sup>(2)</sup> | 0.8 ±0.15 <sup>(2)</sup>  | 0.20                                | 0.60                                | 0.40               |
|                                                          | 0805                  | 2012M  | 2.0 ±0.10 <sup>(1)</sup> | 1.25 ±0.10 <sup>(1)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                                          |                       |        | 2.0 ±0.20 <sup>(2)</sup> | 1.25 ±0.20 <sup>(2)</sup> | 0.25                                | 0.75                                | 0.55               |
|                                                          | 1206                  | 3216M  | 3.2 ±0.15 <sup>(1)</sup> | 1.6 ±0.15 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          |                       |        | 3.2 ±0.30 <sup>(2)</sup> | 1.6 ±0.20 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          | 1210                  | 3225M  | 3.2 ±0.20 <sup>(1)</sup> | 2.5 ±0.20 <sup>(1)</sup>  | 0.25                                | 0.75                                | 1.40               |
|                                                          |                       |        | 3.2 ±0.40 <sup>(2)</sup> | 2.5 ±0.30 <sup>(2)</sup>  | 0.25                                | 0.75                                | 1.40               |

Note: 1. Dimension for size 0402, C < 4.7 μF; 0603, C < 10 μF; 0805 to 1210, C ≤ 100 nF  
 2. Dimension for size 0402, C ≥ 4.7 μF; 0603, C ≥ 10 μF; 0805 to 1210, C > 100 nF

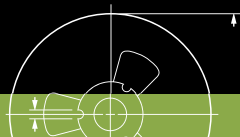


# MLCC Selection Charts

## Y5V - General purpose & High capacitance 6.3 to 25V, 0201 / 0402

| Y5V                                |                      |           |           |           |           |           |
|------------------------------------|----------------------|-----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                      |           |           |           |           |           |
| Capacitance                        | Last 2-digit of 12NC | 0201      | 0402      |           |           |           |
|                                    |                      | 6.3 V     | 6.3 V     | 10 V      | 16 V      | 25 V      |
| 10 nF                              | 36                   | 0.3 ±0.03 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 22 nF                              | 41                   |           |           |           |           |           |
| 47 nF                              | 45                   |           |           |           |           |           |
| 100 nF                             | 49                   |           |           |           |           |           |
| 220 nF                             | 54                   |           |           |           |           |           |
| 470 nF                             | 58                   |           |           |           |           |           |
| 1 000 nF                           | 63                   |           |           |           |           |           |
| Tape width                         |                      | 8 mm      |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## Y5V - General purpose & High capacitance 6.3 to 25V, 0603 / 0805

| Y5V                                |                      |          |          |          |          |           |           |           |           |
|------------------------------------|----------------------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|
| General purpose & High capacitance |                      |          |          |          |          |           |           |           |           |
| Capacitance                        | Last 2-digit of 12NC | 0603     |          |          |          | 0805      |           |           |           |
|                                    |                      | 6.3 V    | 10 V     | 16 V     | 25 V     | 6.3 V     | 10 V      | 16 V      | 25 V      |
| 10 nF                              | 36                   | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |
| 22 nF                              | 41                   |          |          |          |          |           |           |           |           |
| 47 nF                              | 45                   |          |          |          |          |           |           |           |           |
| 100 nF                             | 49                   |          |          |          |          | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 220 nF                             | 54                   |          |          |          |          |           |           |           |           |
| 470 nF                             | 58                   |          |          |          |          |           |           |           |           |
| 1 000 nF                           | 63                   |          |          |          |          |           |           |           |           |
| 2.2 µF                             | 67                   |          |          |          |          | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 4.7 µF                             | 72                   |          |          |          |          |           |           |           |           |
| 10 µF                              | 76                   |          |          |          |          |           |           |           |           |
| 22 µF                              | 81                   |          |          |          |          |           |           |           |           |
| Tape width                         |                      | 8 mm     |          |          |          |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)

# MLCC Selection Charts

## Y5V - General purpose & High capacitance 6.3 to 25V, 1206 / 1210

| Y5V                                |                      |           |           |           |           |           |          |          |          |
|------------------------------------|----------------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|
| General purpose & High capacitance |                      |           |           |           |           |           |          |          |          |
| Capacitance                        | Last 2-digit of 12NC | 1206      |           |           |           | 1210      |          |          |          |
|                                    |                      | 6.3 V     | 10 V      | 16 V      | 25 V      | 6.3 V     | 10 V     | 16 V     | 25 V     |
| 10 nF                              | 36                   | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  |           |          |          |          |
| 22 nF                              | 41                   |           |           |           |           |           |          |          |          |
| 47 nF                              | 45                   |           |           |           |           |           |          |          |          |
| 100 nF                             | 49                   |           |           |           |           |           |          |          |          |
| 220 nF                             | 54                   |           |           |           |           |           |          |          |          |
| 470 nF                             | 58                   | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |          |          |          |
| 1 000 nF                           | 63                   |           |           |           |           |           |          |          |          |
| 2.2 μF                             | 67                   |           |           |           |           |           |          |          |          |
| 4.7 μF                             | 72                   |           |           |           |           |           |          |          |          |
| 10 μF                              | 76                   |           |           |           |           | 1.15 ±0.1 | 1.6 ±0.2 | 1.5 ±0.1 | 1.5 ±0.1 |
| 22 μF                              | 81                   | 1.6 ±0.2  | 1.6 ±0.2  | 1.6 ±0.2  | 1.6 ±0.2  | 1.6 ±0.2  |          | 1.6 ±0.2 |          |
| 47 μF                              | 85                   |           |           |           |           | 2.0 ±0.2  |          |          |          |
| Tape width                         |                      | 8 mm      |           |           |           |           |          |          |          |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## Y5V - General purpose & High capacitance 50V, 0402 to 1206

| Y5V                                |                      |              |              |              |              |
|------------------------------------|----------------------|--------------|--------------|--------------|--------------|
| General purpose & High capacitance |                      |              |              |              |              |
| Capacitance                        | Last 2-digit of 12NC | 0402<br>50 V | 0603<br>50 V | 0805<br>50 V | 1206<br>50 V |
| 10 nF                              | 05                   | 0.5 ±0.05    | 0.8 ±0.1     | 0.6 ±0.1     | 0.6 ±0.1     |
| 22 nF                              | 07                   |              |              |              |              |
| 47 nF                              | 09                   |              |              |              |              |
| 100 nF                             | 12                   |              |              | 0.85 ±0.1    | 0.85 ±0.1    |
| 220 nF                             | 14                   |              |              |              |              |
| 470 nF                             | 16                   |              |              | 1.25 ±0.2    |              |
| 1 000 nF                           | 18                   |              |              |              |              |
| 2.2 µF                             | 23                   |              |              |              | 1.15 ±0.1    |
| Tape width                         |                      | 8 mm         |              |              |              |

Note: Values in shaded cells indicate thickness class (unit: mm)

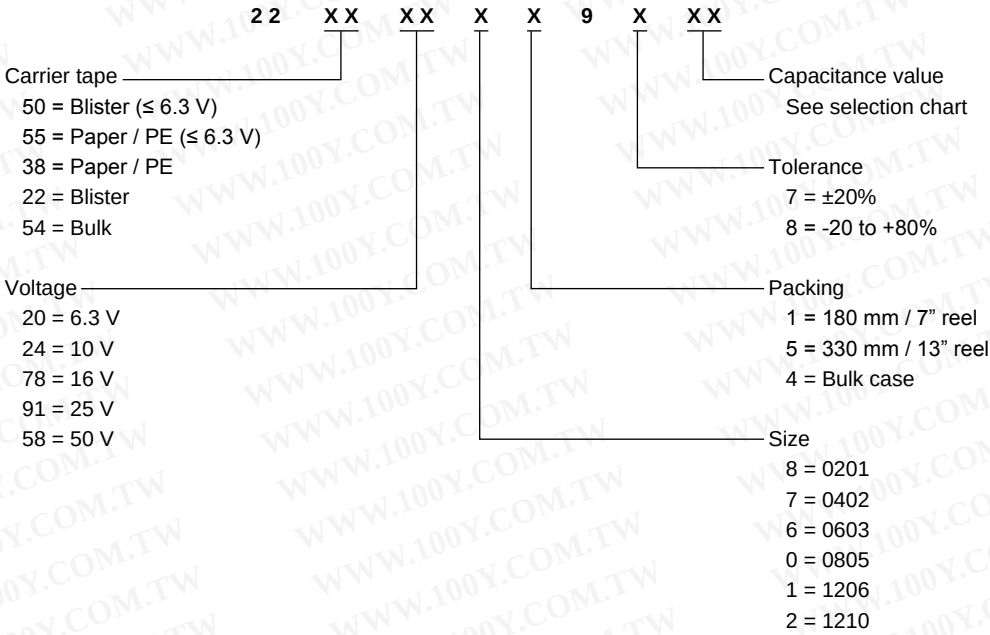


## Y5V - General purpose & High Capacitance, 0201 to 1210

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products.  
For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



# MLCC Selection Charts

**NPO / X7R - Automotive grade, 0402 to 1210**



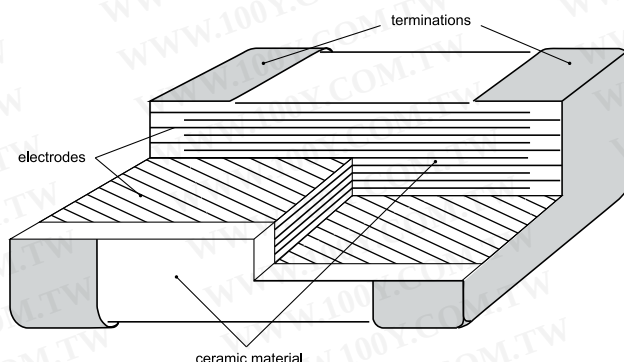
## Features

- Comply with AEC-Q200 standard
- MSL class: MSL 1
- J-STD-020D and TS-16949 compliant
- Halogen free epoxy
- RoHS compliant

## Application

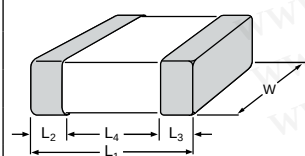
- All general purpose applications
- Entertainment applications
- Comfort / security applications
- Information applications

## Construction



## Dimensions

### Discrete capacitors - Automotive grade



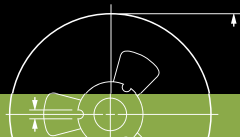
| Case size designation |        | Dimensions in mm |            |             |             |        |  |
|-----------------------|--------|------------------|------------|-------------|-------------|--------|--|
| Inch-based            | Metric | L1               | W          | L2 / L3 min | L2 / L3 max | L4 min |  |
| 0402                  | 1005M  | 1.0 ±0.05        | 0.5 ±0.05  | 0.15        | 0.30        | 0.40   |  |
| 0603                  | 1608M  | 1.6 ±0.20        | 0.8 ±0.10  | 0.20        | 0.60        | 0.40   |  |
| 0805                  | 2012M  | 2.0 ±0.20        | 1.25 ±0.20 | 0.25        | 0.75        | 0.55   |  |
| 1206                  | 3216M  | 3.2 ±0.30        | 1.6 ±0.20  | 0.25        | 0.75        | 1.40   |  |
| 1210                  | 3225M  | 3.2 ±0.30        | 2.5 ±0.20  | 0.25        | 0.75        | 1.40   |  |

# MLCC Selection Charts

NPO - Automotive grade, 0402 to 0805

| NPO              |           |           |           |           |           |          |          |          |          |
|------------------|-----------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|
| Automotive Grade |           |           |           |           |           |          |          |          |          |
| Capacitance      | 0402      | 0603      |           |           | 0805      |          |          |          |          |
|                  | 50 V      | 50 V      | 100V      | 250V      | 50 V      | 100 V    | 250 V    | 500 V    | 630 V    |
| 10 pF            | 0.5 ±0.05 | 0.8 ±0.1  | 0.8 ±0.1  | 0.8 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 12 pF            |           |           |           |           |           |          |          |          |          |
| 15 pF            |           |           |           |           |           |          |          |          |          |
| 18 pF            |           |           |           |           |           |          |          |          |          |
| 22 pF            |           |           |           |           |           |          |          |          |          |
| 27 pF            |           |           |           |           |           |          |          |          |          |
| 33 pF            |           |           |           |           |           |          |          |          |          |
| 39 pF            |           |           |           |           |           |          |          |          |          |
| 47 pF            |           |           |           |           |           |          |          |          |          |
| 56 pF            |           |           |           |           |           |          |          |          |          |
| 68 pF            |           |           |           |           |           |          |          |          |          |
| 82 pF            |           |           |           |           |           |          |          |          |          |
| 100 pF           |           |           |           |           |           |          |          |          |          |
| 120 pF           |           |           |           |           |           |          |          |          |          |
| 150 pF           |           |           |           |           |           |          |          |          |          |
| 180 pF           |           |           |           |           |           |          |          |          |          |
| 220 pF           |           |           |           |           |           |          |          |          |          |
| 270 pF           |           |           |           |           |           |          |          |          |          |
| 330 pF           | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |          |          |          |          |
| 390 pF           |           |           |           |           |           |          |          |          |          |
| 470 pF           |           |           |           |           |           |          |          |          |          |
| 560 pF           |           |           |           |           |           |          |          |          |          |
| 680 pF           |           |           |           |           |           |          |          |          |          |
| 820 pF           | 1.25 ±0.2 |           |           |           |           |          |          |          |          |
| 1 000 pF         |           |           |           |           |           |          |          |          |          |
| 1.2 nF           |           |           |           | 0.85 ±0.1 | 0.85 ±0.1 |          |          |          |          |
| 1.5 nF           |           |           |           |           |           |          |          |          |          |
| 1.8 nF           |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 |          |          |          |          |
| 2.2 nF           |           |           |           |           |           |          |          |          |          |
| 2.7 nF           |           |           |           |           |           |          |          |          |          |
| 3.3 nF           |           |           |           |           |           |          |          |          |          |
| 3.9 nF           |           |           |           |           |           |          |          |          |          |
| 4.7 nF           |           |           |           |           |           |          |          |          |          |
| 5.6 nF           |           |           |           |           |           |          |          |          |          |
| 6.8 nF           |           |           |           |           |           |          |          |          |          |
| 8.2 nF           |           |           |           |           |           |          |          |          |          |
| 10 nF            |           |           |           |           |           |          |          |          |          |
| Tape width       | 8mm       |           |           |           |           |          |          |          |          |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## NPO - Automotive grade, 1206 / 1210

| NPO              |           |           |           |           |           |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Automotive Grade |           |           |           |           |           |           |           |           |           |
| Capacitance      | 1206      |           |           |           |           | 1210      |           |           |           |
|                  | 50 V      | 100 V     | 250 V     | 500 V     | 630 V     | 50 V      | 100 V     | 250 V     | 500 V     |
| 10 pF            |           |           |           |           |           |           |           |           |           |
| 12 pF            |           |           |           |           |           |           |           |           |           |
| 15 pF            |           |           |           |           |           |           |           |           |           |
| 18 pF            |           |           |           |           |           |           |           |           |           |
| 22 pF            |           |           |           |           |           |           |           |           |           |
| 27 pF            |           |           |           |           |           |           |           |           |           |
| 33 pF            |           |           |           |           |           |           |           |           |           |
| 39 pF            |           |           |           |           |           |           |           |           |           |
| 47 pF            |           |           |           |           |           |           |           |           |           |
| 56 pF            |           |           |           |           |           |           |           |           |           |
| 68 pF            |           |           |           |           |           |           |           |           |           |
| 82 pF            |           |           | 0.6 ±0.1  | 0.6 ±0.1  |           |           |           |           |           |
| 100 pF           |           |           |           |           | 1.25 ±0.2 |           |           |           | 1.25 ±0.2 |
| 120 pF           |           |           |           |           |           |           |           |           |           |
| 150 pF           | 0.6 ±0.1  | 0.6 ±0.1  |           |           |           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |
| 180 pF           |           |           |           |           |           |           |           |           |           |
| 220 pF           |           |           |           |           |           |           |           |           |           |
| 270 pF           |           |           |           |           |           |           |           |           |           |
| 330 pF           |           |           |           |           |           |           |           |           |           |
| 390 pF           |           |           |           |           |           |           |           |           |           |
| 470 pF           |           |           |           |           |           |           |           |           |           |
| 560 pF           |           |           |           |           |           |           |           |           |           |
| 680 pF           |           |           |           |           |           |           |           |           |           |
| 820 pF           |           |           |           |           |           |           |           |           |           |
| 1 000 pF         |           |           | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |           |           |
| 1.2 nF           |           |           |           |           |           |           |           |           |           |
| 1.5 nF           |           |           |           |           |           |           |           |           |           |
| 1.8 nF           |           |           | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |           |
| 2.2 nF           |           |           |           |           |           |           |           |           |           |
| 2.7 nF           |           |           |           |           |           |           |           |           |           |
| 3.3 nF           |           |           |           |           |           |           |           |           |           |
| 3.9 nF           |           |           |           |           |           |           |           |           |           |
| 4.7 nF           | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |           |           |           |           |
| 5.6 nF           |           |           |           |           |           |           |           |           |           |
| 6.8 nF           |           |           |           |           |           |           |           |           |           |
| 8.2 nF           | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |           |           |           |
| 10 nF            |           |           |           |           |           |           |           |           |           |
| Tape width       | 8mm       |           |           |           |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



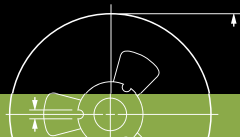
# MLCC Selection Charts

X7R - Automotive grade, 0402 / 0603

| X7R              |           |           |           |           |          |          |          |          |          |
|------------------|-----------|-----------|-----------|-----------|----------|----------|----------|----------|----------|
| Automotive grade |           |           |           |           |          |          |          |          |          |
| Capacitance      | 0402      |           |           |           | 0603     |          |          |          |          |
|                  | 10 V      | 16 V      | 25 V      | 50 V      | 10 V     | 16 V     | 25 V     | 50 V     | 100V     |
| 100 pF           |           |           |           |           |          |          |          |          |          |
| 150 pF           |           |           |           |           |          |          |          |          |          |
| 180 pF           |           |           |           |           |          |          |          |          |          |
| 220 pF           |           |           |           |           |          |          |          |          |          |
| 330 pF           |           |           |           |           |          |          |          |          |          |
| 390 pF           |           |           |           |           |          |          |          |          |          |
| 470 pF           |           |           |           |           |          |          |          |          |          |
| 680 pF           |           |           |           | 0.5 ±0.05 |          |          |          |          |          |
| 1 000 pF         |           |           |           |           |          |          |          |          |          |
| 1.5 nF           |           |           |           |           |          |          |          |          |          |
| 2.2 nF           |           |           | 0.5 ±0.05 |           |          |          |          |          |          |
| 3.3 nF           | 0.5 ±0.05 | 0.5 ±0.05 |           |           |          |          | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |
| 4.7 nF           |           |           |           |           |          |          |          |          |          |
| 6.8 nF           |           |           |           |           |          |          |          |          |          |
| 10 nF            |           |           |           |           |          |          |          |          |          |
| 15 nF            |           |           |           |           | 0.8 ±0.1 | 0.8 ±0.1 |          |          |          |
| 18 nF            |           |           |           |           |          |          |          |          |          |
| 22 nF            |           |           |           |           |          |          |          |          |          |
| 27 nF            |           |           |           |           |          |          |          |          |          |
| 33 nF            |           |           |           |           |          |          |          |          |          |
| 47 nF            |           |           |           |           |          |          |          |          |          |
| 68 nF            |           |           |           |           |          |          |          |          |          |
| 100 nF           |           |           |           |           |          |          |          |          |          |
| 150 nF           |           |           |           |           |          |          |          |          |          |
| 220 nF           |           |           |           |           |          |          |          |          |          |
| 270 nF           |           |           |           |           |          |          |          |          |          |
| 330 nF           |           |           |           |           |          |          |          |          |          |
| 390 nF           |           |           |           |           |          |          |          |          |          |
| 470 nF           |           |           |           |           |          |          |          |          |          |
| 680 nF           |           |           |           |           |          |          |          |          |          |
| 1000 nF          |           |           |           |           |          |          |          |          |          |
| 2.2 µF           |           |           |           |           |          |          |          |          |          |
| 4.7 µF           |           |           |           |           |          |          |          |          |          |
| 10 µF            |           |           |           |           |          |          |          |          |          |
| Tape width       | 8mm       |           |           |           |          |          |          |          |          |

Note: Values in shaded cells indicate thickness class (unit: mm)





# MLCC Selection Charts

## X7R - Automotive grade, 0805

| X7R              |           |           |           |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Automotive grade |           |           |           |           |           |           |           |
| Capacitance      | 0805      |           |           |           |           |           |           |
|                  | 10 V      | 16 V      | 25 V      | 50 V      | 100 V     | 250 V     | 500 V     |
| 100 pF           |           |           |           |           |           |           |           |
| 150 pF           |           |           |           |           |           |           |           |
| 180 pF           |           |           |           |           |           |           |           |
| 220 pF           |           |           |           |           |           |           |           |
| 330 pF           |           |           |           |           |           |           |           |
| 390 pF           |           |           |           |           |           |           |           |
| 470 pF           |           |           |           |           |           |           |           |
| 680 pF           |           |           |           |           |           |           |           |
| 1 000 pF         |           |           |           |           |           |           |           |
| 1.5 nF           |           |           |           |           |           |           |           |
| 2.2 nF           |           |           |           |           |           |           |           |
| 3.3 nF           | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.6 ±0.1  | 0.85 ±0.1 | 0.85 ±0.1 |
| 4.7 nF           |           |           |           |           |           |           |           |
| 6.8 nF           |           |           |           |           |           |           |           |
| 10 nF            |           |           |           |           |           |           | 1.25 ±0.2 |
| 15 nF            |           |           |           |           |           |           |           |
| 18 nF            |           |           |           |           | 0.85 ±0.1 | 1.25 ±0.2 |           |
| 22 nF            |           |           |           |           |           |           |           |
| 27 nF            |           |           |           |           |           |           |           |
| 33 nF            |           |           |           |           |           |           |           |
| 47 nF            |           |           |           |           | 1.25 ±0.2 |           |           |
| 68 nF            |           |           |           |           |           |           |           |
| 100 nF           | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |
| 150 nF           |           |           |           |           |           |           |           |
| 220 nF           |           |           |           | 1.25 ±0.2 |           |           |           |
| 270 nF           |           |           |           |           |           |           |           |
| 330 nF           |           |           |           |           |           |           |           |
| 390 nF           |           |           |           |           |           |           |           |
| 470 nF           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |           |           |
| 680 nF           |           |           |           |           |           |           |           |
| 1000 nF          |           |           |           |           |           |           |           |
| 2.2 µF           |           |           |           |           |           |           |           |
| 4.7 µF           |           |           |           |           |           |           |           |
| 10 µF            |           |           |           |           |           |           |           |
| Tape width       | 8mm       |           |           |           |           |           |           |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

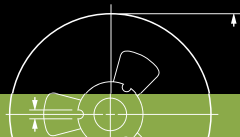


# MLCC Selection Charts

X7R - Automotive grade, 1206

| X7R              |           |           |           |           |           |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Automotive grade |           |           |           |           |           |           |           |           |           |
| Capacitance      | 1206      |           |           |           |           |           |           |           |           |
|                  | 6.3 V     | 10 V      | 16 V      | 25V       | 50V       | 100V      | 250 V     | 500 V     | 630 V     |
| 100 pF           |           |           |           |           |           |           |           |           |           |
| 150 pF           |           |           |           |           |           |           |           |           |           |
| 180 pF           |           |           |           |           |           |           |           |           |           |
| 220 pF           |           |           |           |           |           |           |           |           |           |
| 330 pF           |           |           |           |           |           |           |           |           |           |
| 390 pF           |           |           |           |           |           |           |           |           |           |
| 470 pF           |           |           |           |           |           |           |           |           |           |
| 680 pF           |           |           |           |           |           |           |           |           |           |
| 1 000 pF         |           |           |           |           |           |           |           |           |           |
| 1.5 nF           |           |           |           |           |           |           | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |
| 2.2 nF           |           |           |           |           |           |           |           |           |           |
| 3.3 nF           |           |           |           |           |           |           |           |           |           |
| 4.7 nF           |           |           |           |           |           |           |           |           |           |
| 6.8 nF           |           |           |           |           |           |           |           |           |           |
| 10 nF            |           |           |           |           |           |           |           |           |           |
| 15 nF            | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |           |           |           |
| 18 nF            |           |           |           |           |           |           | 1.25 ±0.2 |           |           |
| 22 nF            |           |           |           |           |           |           |           |           |           |
| 27 nF            |           |           |           |           |           |           |           |           |           |
| 33 nF            |           |           |           |           |           |           |           |           |           |
| 47 nF            |           |           |           |           |           |           |           |           |           |
| 68 nF            |           |           |           |           |           |           |           |           |           |
| 100 nF           |           |           |           |           |           |           |           |           |           |
| 150 nF           |           |           |           |           |           | 1.25 ±0.2 |           |           |           |
| 220 nF           |           |           |           |           | 1.15 ±0.2 |           |           |           |           |
| 270 nF           |           |           |           |           |           |           |           |           |           |
| 330 nF           |           |           |           |           |           | 1.6 ±0.2  |           |           |           |
| 390 nF           |           |           |           |           |           |           |           |           |           |
| 470 nF           |           |           |           |           | 1.6 ±0.2  |           |           |           |           |
| 680 nF           | 1.15 ±0.2 | 1.15 ±0.2 | 1.15 ±0.2 | 1.15 ±0.2 |           |           |           |           |           |
| 1000 nF          |           |           |           |           |           |           |           |           |           |
| 2.2 µF           |           |           |           |           |           |           |           |           |           |
| 4.7 µF           |           |           |           |           |           |           |           |           |           |
| 10 µF            |           |           |           |           |           |           |           |           |           |
| Tape width       | 8mm       |           |           |           |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - Automotive grade, 1210

| X7R              |           |           |           |           |           |           |           |           |
|------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Automotive grade |           |           |           |           |           |           |           |           |
| Capacitance      | 1210      |           |           |           |           |           |           |           |
|                  | 6.3 V     | 10 V      | 16 V      | 25V       | 50V       | 100V      | 250 V     | 500 V     |
| 100 pF           |           |           |           |           |           |           |           |           |
| 150 pF           |           |           |           |           |           |           |           |           |
| 180 pF           |           |           |           |           |           |           |           |           |
| 220 pF           |           |           |           |           |           |           |           |           |
| 330 pF           |           |           |           |           |           |           |           |           |
| 390 pF           |           |           |           |           |           |           |           |           |
| 470 pF           |           |           |           |           |           |           |           |           |
| 680 pF           |           |           |           |           |           |           |           |           |
| 1 000 pF         |           |           |           |           |           |           |           |           |
| 1.5 nF           | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 |
| 2.2 nF           |           |           |           |           |           |           |           |           |
| 3.3 nF           |           |           |           |           |           |           |           |           |
| 4.7 nF           |           |           |           |           |           |           |           |           |
| 6.8 nF           |           |           |           |           |           |           |           |           |
| 10 nF            |           |           |           |           |           |           |           |           |
| 15 nF            |           |           |           |           |           |           |           |           |
| 18 nF            |           |           |           |           |           |           |           |           |
| 22 nF            |           |           |           |           |           |           |           |           |
| 27 nF            |           |           |           |           |           |           | 1.25 ±0.2 |           |
| 33 nF            |           |           |           |           |           |           |           |           |
| 47 nF            |           |           |           |           |           |           |           |           |
| 68 nF            |           |           |           |           |           |           |           |           |
| 100 nF           |           |           |           |           |           |           | 1.6 ±0.2  |           |
| 150 nF           | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |           |           |
| 220 nF           |           |           |           |           |           |           |           |           |
| 270 nF           |           |           |           |           |           |           |           |           |
| 330 nF           |           |           |           |           |           |           |           |           |
| 390 nF           |           |           |           |           |           |           |           |           |
| 470 nF           |           |           |           |           |           |           |           |           |
| 680 nF           |           |           |           |           |           |           |           |           |
| 1000 nF          |           |           |           |           |           |           |           |           |
| 2.2 µF           |           |           |           |           |           |           |           |           |
| 4.7 µF           |           |           |           |           |           |           |           |           |
| 10 µF            |           |           |           |           |           |           |           |           |
| Tape width       | 8mm       |           |           |           |           |           |           |           |

Note: Values in shaded cells indicate thickness class (unit: mm)

# MLCC Selection Charts

**NP0 / X7R - High voltage SC type, 1808 / 1812**

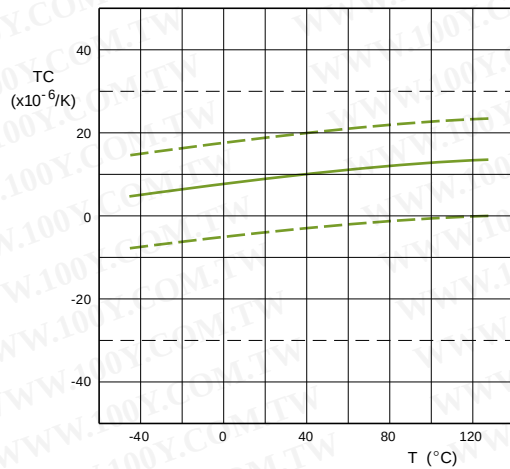


## Features

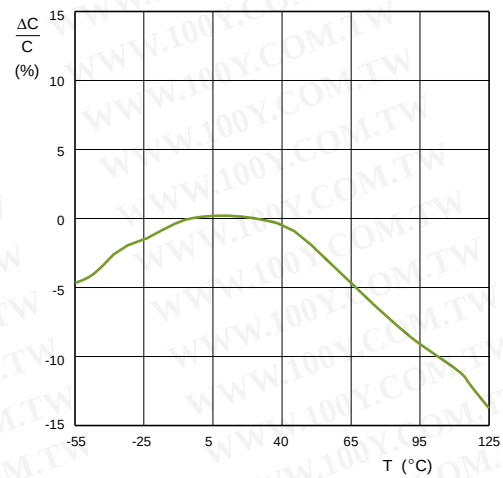
- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling/ Smoothing function
- TUV certificate No.: 50031668
- UL certificate No.: E238900

## Temperature characteristic

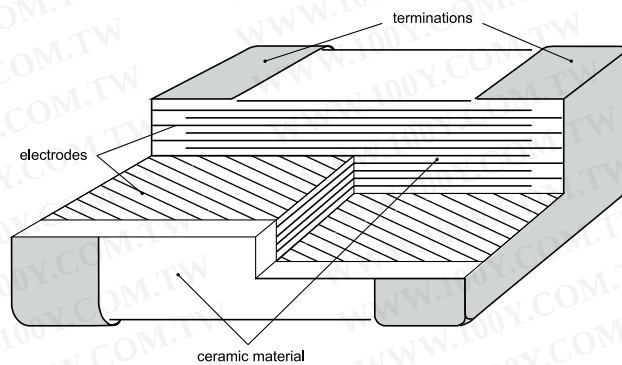
**NP0**



**X7R**

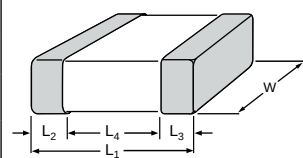


## Construction

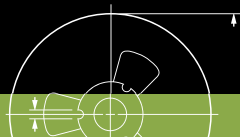


## Dimensions

**Discrete capacitors - High voltage SC type**



| Case size designation |        | Dimensions in mm |           |                                     |                                     |
|-----------------------|--------|------------------|-----------|-------------------------------------|-------------------------------------|
| Inch-based            | Metric | L <sub>1</sub>   | W         | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max |
| 1808                  | 4520M  | 4.8 ±0.30        | 2.0 ±0.30 | 0.25                                | 0.75                                |
| 1812                  | 4532M  | 4.8 ±0.30        | 3.2 ±0.30 | 0.25                                | 0.75                                |



# MLCC Selection Charts

## NP0 - High voltage SC type, 1808 / 1812

| NP0                  |                      |               |              |               |              |               |              |          |          |
|----------------------|----------------------|---------------|--------------|---------------|--------------|---------------|--------------|----------|----------|
| High voltage SC type |                      |               |              |               |              |               |              |          |          |
| Capacitance          | Last 2-digit of 12NC | 1808          |              | 1812          |              | 1808          |              |          |          |
|                      |                      | X1/Y2 for TUV | X1/Y2 for UL | X1/Y2 for TUV | X1/Y2 for UL | X2/Y3 for TUV | X2/Y3 for UL |          |          |
| 10 pF                | 23                   | 1.6 ±0.2      | 1.6 ±0.2     |               |              | 1.6 ±0.2      | 1.6 ±0.2     |          |          |
| 12 pF                | 24                   |               |              |               |              |               |              |          |          |
| 15 pF                | 25                   |               |              |               |              |               |              |          |          |
| 18 pF                | 26                   |               |              |               |              |               |              |          |          |
| 22 pF                | 27                   |               |              |               |              |               |              |          |          |
| 27 pF                | 28                   |               |              |               |              |               |              |          |          |
| 33 pF                | 29                   |               |              |               |              |               |              |          |          |
| 39 pF                | 31                   |               |              | 1.6 ±0.2      | 1.6 ±0.2     |               |              | 1.6 ±0.2 | 1.6 ±0.2 |
| 47 pF                | 32                   |               |              |               |              |               |              |          |          |
| 56 pF                | 33                   |               |              |               |              |               |              |          |          |
| 68 pF                | 34                   |               |              |               |              |               |              |          |          |
| 82 pF                | 35                   |               |              |               |              |               |              |          |          |
| 100 pF               | 36                   | 2.0 ±0.2      | 2.0 ±0.2     |               |              | 2.0 ±0.2      | 2.0 ±0.2     |          |          |
| 120 pF               | 37                   |               |              |               |              |               |              |          |          |
| 150 pF               | 38                   |               |              |               |              |               |              |          |          |
| 180 pF               | 39                   |               |              |               |              |               |              |          |          |
| 220 pF               | 41                   |               |              | 2.0 ±0.2      | 2.0 ±0.2     |               |              | 2.0 ±0.2 | 2.0 ±0.2 |
| 270 pF               | 42                   |               |              |               |              |               |              |          |          |
| 330 pF               | 43                   |               |              |               |              |               |              |          |          |
| 390 pF               | 44                   |               |              |               |              |               |              |          |          |
| 470 pF               | 45                   |               |              |               |              |               |              |          |          |
| 560 pF               | 46                   |               |              |               |              |               |              |          |          |
| 680 pF               | 47                   |               |              |               |              |               |              |          |          |
| 820 pF               | 48                   |               |              |               |              |               |              |          |          |
| 1 000 pF             | 49                   |               |              |               |              |               |              |          |          |
| Tape width           |                      | 12 mm         |              |               |              |               |              |          |          |

Note: Values in shaded cells indicate thickness class (unit: mm)



# MLCC Selection Charts

## X7R - High voltage SC type, 1808 / 1812

| X7R                  |                      |               |              |               |              |               |              |          |          |
|----------------------|----------------------|---------------|--------------|---------------|--------------|---------------|--------------|----------|----------|
| High voltage SC type |                      |               |              |               |              |               |              |          |          |
| Capacitance          | Last 2-digit of 12NC | 1808          |              | 1812          |              | 1808          |              |          |          |
|                      |                      | X1/Y2 for TUV | X1/Y2 for UL | X1/Y2 for TUV | X1/Y2 for UL | X2/Y3 for TUV | X2/Y3 for UL |          |          |
| 150 pF               | 12                   | 1.6 ±0.2      | 1.6 ±0.2     |               |              | 1.6 ±0.2      | 1.6 ±0.2     |          |          |
| 180 pF               | 13                   |               |              |               |              |               |              |          |          |
| 220 pF               | 14                   |               |              |               |              |               |              |          |          |
| 270 pF               | 15                   | 2.0 ±0.2      | 2.0 ±0.2     | 1.6 ±0.2      | 1.6 ±0.2     |               |              | 2.0 ±0.2 | 2.0 ±0.2 |
| 330 pF               | 16                   |               |              |               |              |               |              |          |          |
| 390 pF               | 17                   |               |              |               |              |               |              |          |          |
| 470 pF               | 18                   |               |              |               |              |               |              |          |          |
| 560 pF               | 19                   |               |              |               |              |               |              |          |          |
| 680 pF               | 21                   | 2.0 ±0.2      | 2.0 ±0.2     | 2.0 ±0.2      | 2.0 ±0.2     | 2.0 ±0.2      | 2.0 ±0.2     |          |          |
| 820 pF               | 22                   |               |              |               |              |               |              |          |          |
| 1 000 pF             | 23                   |               |              |               |              |               |              |          |          |
| 1.2 nF               | 24                   |               |              |               |              |               |              |          |          |
| 1.5 nF               | 25                   |               |              |               |              |               |              |          |          |
| Tape width           |                      | 12 mm         |              |               |              |               |              |          |          |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



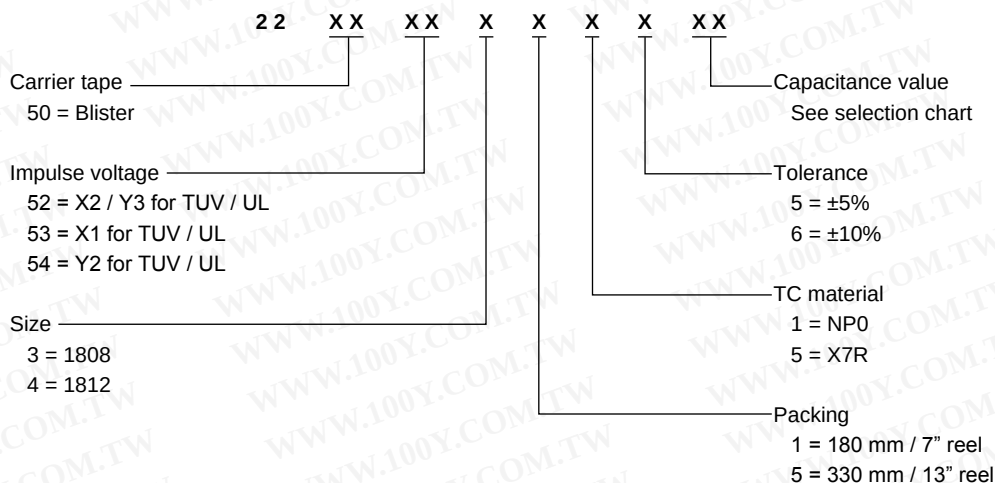
# MLCC Selection Charts

## NP0 / X7R - High voltage SC type, 1808 / 1812

### Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

### 12NC ordering code - Phycomp branded products only



### Phycomp CTC ordering code - North America

Regional code for ordering Phycomp branded products. For details, please see page 79.



# MLCC Selection Charts

NPO / X7R / Y5V - 4C Arrays, 0508 / 0612

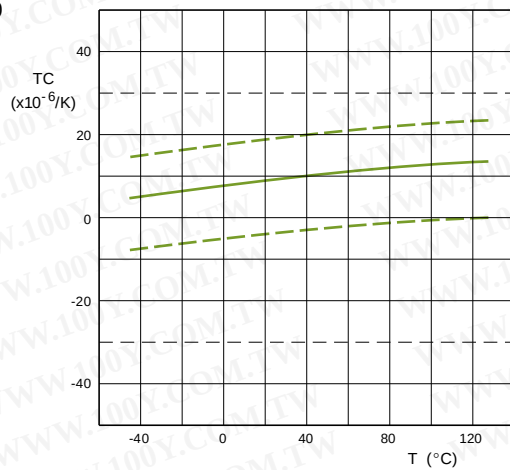


## Features

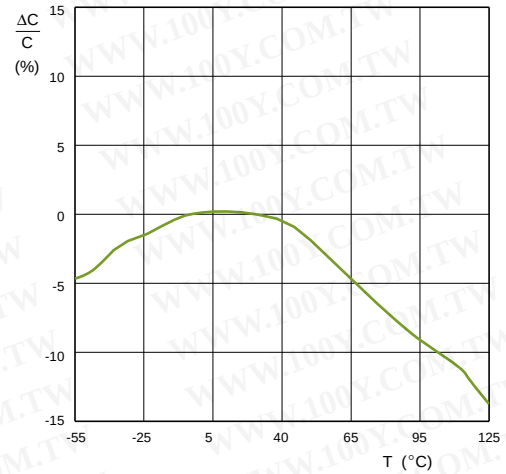
- Less than 50% board space of an equivalent discrete component
- High volumetric efficiency
- Increased throughput, by time saved in mounting

### Temperature characteristic

NPO

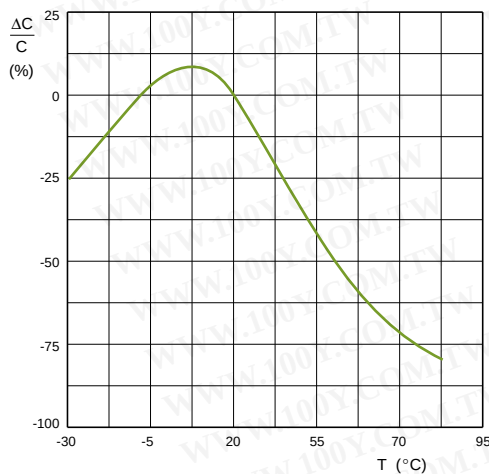


X7R

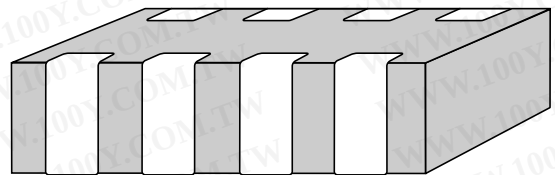


### Temperature characteristic

Y5V



### Construction





# MLCC Selection Charts

NP0 / X7R / Y5V - 4C Arrays, 0508 / 0612

| Dimensions |                       |                     |                  |            |                     |                     |            |           |           |
|------------|-----------------------|---------------------|------------------|------------|---------------------|---------------------|------------|-----------|-----------|
| 4C arrays  |                       |                     |                  |            |                     |                     |            |           |           |
|            | Case size designation |                     | Dimensions in mm |            |                     |                     |            |           |           |
|            | Inch-based            | Metric              | L                | W          | T <sub>min</sub>    | T <sub>max</sub>    | A          | B         | P         |
|            | 0508<br>(4 x 0402)    | 1220M<br>(4 x 1005) | 2.0 ±0.15        | 1.25 ±0.15 | 0.50                | 0.70                | 0.28 ±0.10 | 0.2 ±0.10 | 0.5 ±0.10 |
|            | 0612<br>(4 x 0603)    | 1632M<br>(4 x 1608) | 3.2 ±0.15        | 1.60 ±0.15 | 0.70 <sup>(1)</sup> | 0.90 <sup>(1)</sup> | 0.4 ±0.10  | 0.3 ±0.20 | 0.8 ±0.10 |
|            |                       |                     |                  |            | 0.50 <sup>(2)</sup> | 0.70 <sup>(2)</sup> |            |           |           |

Note: 1. Available for NP0 and X7R  
2. Available for Y5V

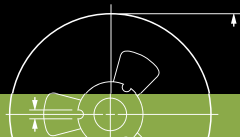
# MLCC Selection Charts

NP0 - 4C Arrays, 0508 / 0612

| NP0         |                      |          |          |
|-------------|----------------------|----------|----------|
| 4C arrays   |                      |          |          |
| Capacitance | Last 2-digit of 12NC | 0508     | 0612     |
|             |                      | 50 V     | 50 V     |
| 10 pF       | 23                   | 0.6 ±0.1 | 0.8 ±0.1 |
| 15 pF       | 25                   |          |          |
| 18 pF       | 26                   |          |          |
| 22 pF       | 27                   |          |          |
| 27 pF       | 28                   |          |          |
| 47 pF       | 32                   |          |          |
| 100 pF      | 36                   |          |          |
| 150 pF      | 38                   |          |          |
| 180 pF      | 39                   |          |          |
| 220 pF      | 41                   |          |          |
| 270 pF      | 42                   |          |          |
| 330 pF      | 43                   |          |          |
| 390 pF      | 44                   |          |          |
| 470 pF      | 45                   |          |          |
| 560 pF      | 46                   |          |          |
| 680 pF      | 47                   |          |          |
| 820 pF      | 48                   |          |          |
| 1 000 pF    | 49                   |          |          |
| Tape width  |                      | 8 mm     |          |

Note: Values in shaded cells indicate thickness class (unit: mm)





# MLCC Selection Charts

## X7R - 4C Arrays, 0508 / 0612

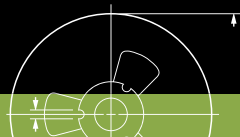
| X7R         |                      |      |      |      |      |      |      |
|-------------|----------------------|------|------|------|------|------|------|
| 4C arrays   |                      |      |      |      |      |      |      |
| Capacitance | Last 2-digit of 12NC | 0508 |      |      | 0612 |      |      |
|             |                      | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V |
| 180 pF      | 13                   |      |      |      |      |      |      |
| 220 pF      | 14                   |      |      |      |      |      |      |
| 270 pF      | 15                   |      |      |      |      |      |      |
| 330 pF      | 16                   |      |      |      |      |      |      |
| 390 pF      | 17                   |      |      |      |      |      |      |
| 470 pF      | 18                   |      |      |      |      |      |      |
| 560 pF      | 19                   |      |      |      |      |      |      |
| 680 pF      | 21                   |      |      |      |      |      |      |
| 820 pF      | 22                   |      |      |      |      |      |      |
| 1 000 pF    | 23                   |      |      |      |      |      |      |
| 1.2 nF      | 24                   |      |      |      |      |      |      |
| 1.5 nF      | 25                   |      |      |      |      |      |      |
| 1.8 nF      | 26                   |      |      |      |      |      |      |
| 2.2 nF      | 27                   |      |      |      |      |      |      |
| 2.7 nF      | 28                   |      |      |      |      |      |      |
| 3.3 nF      | 29                   |      |      |      |      |      |      |
| 3.9 nF      | 31                   |      |      |      |      |      |      |
| 4.7 nF      | 32                   |      |      |      |      |      |      |
| 5.6 nF      | 33                   |      |      |      |      |      |      |
| 6.8 nF      | 34                   |      |      |      |      |      |      |
| 8.2 nF      | 35                   |      |      |      |      |      |      |
| 10 nF       | 36                   |      |      |      |      |      |      |
| 12 nF       | 37                   |      |      |      |      |      |      |
| 15 nF       | 38                   |      |      |      |      |      |      |
| 18 nF       | 39                   |      |      |      |      |      |      |
| 22 nF       | 41                   |      |      |      |      |      |      |
| 27 nF       | 42                   |      |      |      |      |      |      |
| 33 nF       | 43                   |      |      |      |      |      |      |
| 47 nF       | 45                   |      |      |      |      |      |      |
| 56 nF       | 46                   |      |      |      |      |      |      |
| 68 nF       | 47                   |      |      |      |      |      |      |
| 82 nF       | 48                   |      |      |      |      |      |      |
| 100 nF      | 49                   |      |      |      |      |      |      |
| Tape width  |                      | 8 mm |      |      |      |      |      |

Note: Values in shaded cells indicate thickness class (unit: mm)



| Y5V         |                      |          |
|-------------|----------------------|----------|
| 4C arrays   |                      |          |
| Capacitance | Last 2-digit of 12NC | 0612     |
|             |                      | 25 V     |
| 10 nF       | 36                   | 0.6 ±0.1 |
| 22 nF       | 41                   |          |
| 47 nF       | 45                   |          |
| 100 nF      | 49                   |          |
| Tape width  |                      | 8 mm     |

**Note:** Values in shaded cells indicate thickness class (unit: mm)



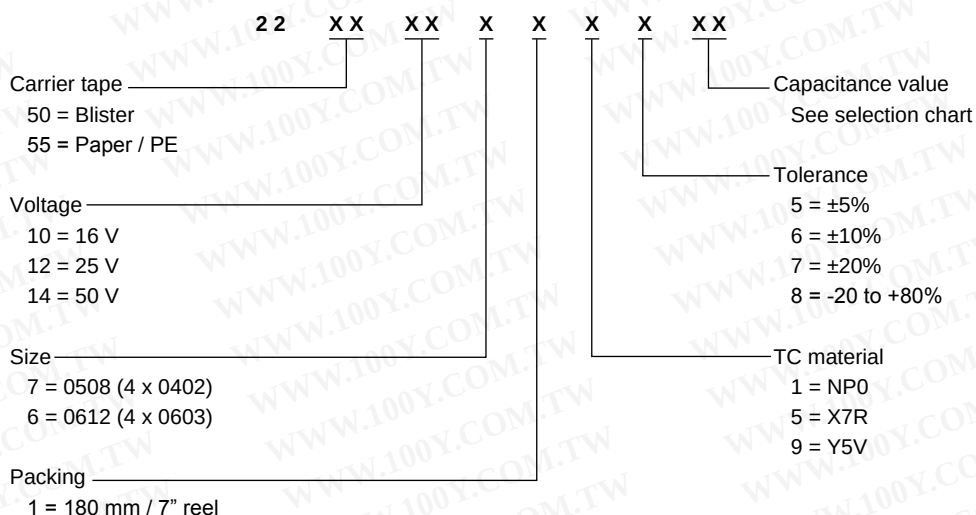
# MLCC Selection Charts

**NP0 / X7R / Y5V - 4C Arrays, 0508 / 0612**

## Global part number - Preferred type

Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products. For details, please see page 77.

## 12NC ordering code - Phycomp branded products only



## Phycomp CTC ordering code - North America

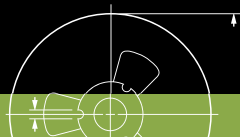
Regional code for ordering Phycomp branded products. For details, please see page 79.

| 0201 sample kits |           |                  |              |                  |           |
|------------------|-----------|------------------|--------------|------------------|-----------|
| NP0 50 V         |           | NP0 25 V         |              | X7R 50 V         |           |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance    | Capacitance (pF) | Tolerance |
| 1                | ±0.25 pF  | 27               | ±5%          | 47               | ±10%      |
| 1.2              | ±0.25 pF  | 33               | ±5%          | 68               | ±10%      |
| 1.5              | ±0.25 pF  | 39               | ±5%          | 100              | ±10%      |
| 1.8              | ±0.25 pF  | 47               | ±5%          | 150              | ±10%      |
| 2.2              | ±0.25 pF  | 56               | ±5%          | 220              | ±10%      |
| 2.7              | ±0.25 pF  | 68               | ±5%          | 330              | ±10%      |
| 3.3              | ±0.25 pF  | 82               | ±5%          | 470              | ±10%      |
| 3.9              | ±0.25 pF  | 100              | ±5%          | X7R 25 V         |           |
| 4.7              | ±0.25 pF  | Y5V 6.3V         |              | Capacitance (pF) | Tolerance |
| 5.6              | ±0.50 pF  | Capacitance (pF) | Tolerance    | 680              | ±10%      |
| 6.8              | ±0.50 pF  | 100 000          | -20% to +80% | 1 000            | ±10%      |
| 8.2              | ±0.50 pF  | X5R 6.3V         |              | X7R 16V          |           |
| 10               | ±5%       | Capacitance (pF) | Tolerance    | Capacitance (pF) | Tolerance |
| 12               | ±5%       | 100 000          | ±10%         | 1 500            | ±10%      |
| 15               | ±5%       |                  |              | 2 200            | ±10%      |
| 18               | ±5%       |                  |              | 3 300            | ±10%      |
| 22               | ±5%       |                  |              | X7R 10 V         |           |
|                  |           |                  |              | Capacitance (pF) | Tolerance |
|                  |           |                  |              | 10 000           | ±10%      |

**Note:** 100 pieces per value. Ordering code 432204407111 for Phycomp brand product, CC02010000000000 for Yageo brand product

| 0402 sample kits |           |                  |           |                  |           |
|------------------|-----------|------------------|-----------|------------------|-----------|
| NP0 50 V         |           | Y5V 16 V         |           | X7R 50 V         |           |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 0.47             | ±0.25 pF  | 10 000           | ±20%      | 100              | ±10%      |
| 0.68             | ±0.25 pF  | 22 000           | ±20%      | 150              | ±10%      |
| 1                | ±0.25 pF  | 47 000           | ±20%      | 220              | ±10%      |
| 1.5              | ±0.25 pF  | 100 000          | ±20%      | 330              | ±10%      |
| 2.2              | ±0.25 pF  | X5R 25V          |           | 470              | ±10%      |
| 3.3              | ±0.25 pF  | Capacitance (pF) | Tolerance | 680              | ±10%      |
| 4.7              | ±0.25 pF  | 100 000          | ±10%      | 1 000            | ±10%      |
| 6.8              | ±0.50 pF  |                  |           | 1 500            | ±10%      |
| 10               | ±5%       |                  |           | 2 200            | ±10%      |
| 15               | ±5%       |                  |           | 3 300            | ±10%      |
| 22               | ±5%       |                  |           | X7R 25 V         |           |
| 33               | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 47               | ±5%       |                  |           | 4 700            | ±10%      |
| 68               | ±5%       |                  |           | 100 000          | ±10%      |
| 100              | ±5%       |                  |           | X7R 16 V         |           |
| 150              | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 220              | ±5%       |                  |           | 6 800            | ±10%      |
|                  |           |                  |           | 10 000           | ±10%      |
|                  |           |                  |           | 15 000           | ±10%      |
|                  |           |                  |           | 22 000           | ±10%      |

**Note:** 95 pieces per value. Ordering code 432204409911 for Phycomp brand product, CC04020000000000 for Yageo brand product



# MLCC Engineering Design Kits

Sample kits for 0603 / 0805

| 0603 sample kits |           |                  |           |                  |           |
|------------------|-----------|------------------|-----------|------------------|-----------|
| NP0 50 V         |           | NP0 25 V         |           | X7R 50 V         |           |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 0.47             | ±0.25 pF  | 1 000            | ±5%       | 100              | ±10%      |
| 0.68             | ±0.25 pF  | 1 500            | ±5%       | 150              | ±10%      |
| 1                | ±0.25 pF  | Y5V 50 V         |           | 220              | ±10%      |
| 1.5              | ±0.25 pF  | Capacitance (pF) | Tolerance | 330              | ±10%      |
| 2.2              | ±0.25 pF  | 10 000           | ±20%      | 470              | ±10%      |
| 3.3              | ±0.25 pF  | 22 000           | ±20%      | 680              | ±10%      |
| 4.7              | ±0.25 pF  | 47 000           | ±20%      | 1 000            | ±10%      |
| 6.8              | ±0.50 pF  | 100 000          | ±20%      | 1 500            | ±10%      |
| 10               | ±5%       | Y5V 16 V         |           | 2 200            | ±10%      |
| 15               | ±5%       | Capacitance (pF) | Tolerance | 3 300            | ±10%      |
| 22               | ±5%       | 220 000          | ±20%      | 4 700            | ±10%      |
| 33               | ±5%       | 470 000          | ±20%      | 6 800            | ±10%      |
| 47               | ±5%       |                  |           | 10 000           | ±10%      |
| 68               | ±5%       |                  |           | X7R 25 V         |           |
| 100              | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 150              | ±5%       |                  |           | 15 000           | ±10%      |
| 220              | ±5%       |                  |           | 22 000           | ±10%      |
| 330              | ±5%       |                  |           | X7R 16 V         |           |
| 470              | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 680              | ±5%       |                  |           | 33 000           | ±10%      |
|                  |           |                  |           | 47 000           | ±10%      |
|                  |           |                  |           | 68 000           | ±10%      |
|                  |           |                  |           | 100 000          | ±10%      |

Note: 48 pieces per value. Ordering code 432204407121 for Phycomp brand product, CC060300000000000 for Yageo brand product

| 0805 sample kits |           |                  |           |                  |           |
|------------------|-----------|------------------|-----------|------------------|-----------|
| NP0 50 V         |           | NP0 25 V         |           | X7R 50 V         |           |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 0.47             | ±0.25 pF  | 3 300            | ±5%       | 220              | ±10%      |
| 0.68             | ±0.25 pF  | 4 700            | ±5%       | 330              | ±10%      |
| 1                | ±0.25 pF  | Y5V 50 V         |           | 470              | ±10%      |
| 1.5              | ±0.25 pF  | Capacitance (pF) | Tolerance | 680              | ±10%      |
| 2.2              | ±0.25 pF  | 10 000           | ±20%      | 1 000            | ±10%      |
| 3.3              | ±0.25 pF  | 22 000           | ±20%      | 1 500            | ±10%      |
| 4.7              | ±0.25 pF  | 47 000           | ±20%      | 2 200            | ±10%      |
| 6.8              | ±0.50 pF  | 100 000          | ±20%      | 3 300            | ±10%      |
| 10               | ±5%       | 220 000          | ±20%      | 4 700            | ±10%      |
| 15               | ±5%       | Y5V 16 V         |           | 6 800            | ±10%      |
| 22               | ±5%       | Capacitance (pF) | Tolerance | 10 000           | ±10%      |
| 33               | ±5%       | 470 000          | ±20%      | 15 000           | ±10%      |
| 47               | ±5%       | 1 000 000        | ±20%      | 22 000           | ±10%      |
| 68               | ±5%       |                  |           | 33 000           | ±10%      |
| 100              | ±5%       |                  |           | 47 000           | ±10%      |
| 150              | ±5%       |                  |           | 68 000           | ±10%      |
| 220              | ±5%       |                  |           | 100 000          | ±10%      |
| 330              | ±5%       |                  |           | X7R 16 V         |           |
| 470              | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 680              | ±5%       |                  |           | 150 000          | ±10%      |
| 1 000            | ±5%       |                  |           | 220 000          | ±10%      |
| 1 500            | ±5%       |                  |           | 330 000          | ±10%      |
| 2 200            | ±5%       |                  |           | 470 000          | ±10%      |

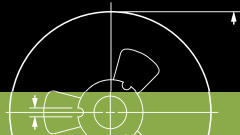
Note: 48 pieces per value. Ordering code 432204407131 for Phycomp brand product, CC080500000000000 for Yageo brand product





| 1206 sample kits |           |                  |           |                  |           |
|------------------|-----------|------------------|-----------|------------------|-----------|
| NP0 50 V         |           | NP0 25 V         |           | X7R 50 V         |           |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1                | ±0.25 pF  | 10 000           | ±5%       | 220              | ±10%      |
| 1.5              | ±0.25 pF  | Y5V 50 V         |           | 330              | ±10%      |
| 2.2              | ±0.25 pF  |                  |           | 470              | ±10%      |
| 3.3              | ±0.25 pF  | 100 000          | ±20%      | 680              | ±10%      |
| 4.7              | ±0.25 pF  | 220 000          | ±20%      | 1 000            | ±10%      |
| 6.8              | ±0.50 pF  | 470 000          | ±20%      | 1 500            | ±10%      |
| 10               | ±5%       | 1 000 000        | ±20%      | 2 200            | ±10%      |
| 15               | ±5%       |                  |           | 3 300            | ±10%      |
| 22               | ±5%       |                  |           | 4 700            | ±10%      |
| 33               | ±5%       |                  |           | 6 800            | ±10%      |
| 47               | ±5%       |                  |           | 10 000           | ±10%      |
| 68               | ±5%       |                  |           | 15 000           | ±10%      |
| 100              | ±5%       |                  |           | 22 000           | ±10%      |
| 150              | ±5%       |                  |           | 33 000           | ±10%      |
| 220              | ±5%       |                  |           | 47 000           | ±10%      |
| 330              | ±5%       |                  |           | 68 000           | ±10%      |
| 470              | ±5%       |                  |           | 100 000          | ±10%      |
| 680              | ±5%       |                  |           | 150 000          | ±10%      |
| 1 000            | ±5%       |                  |           | 220 000          | ±10%      |
| 1 500            | ±5%       |                  |           | X7R 16 V         |           |
| 2 200            | ±5%       |                  |           | Capacitance (pF) | Tolerance |
| 3 300            | ±5%       |                  |           | 330 000          | ±10%      |
| 4 700            | ±5%       |                  |           | 470 000          | ±10%      |
| 6 800            | ±5%       |                  |           | 680 000          | ±10%      |
|                  |           |                  |           | 1 000 000        | ±10%      |

**Note:** 48 pieces per value. Ordering code 432204407141 for Phycomp brand product, CC120600000000000 for Yageo brand product



# MLCC Engineering Design Kits

## Sample kits for high capacitance series

| High capacitance sample kits |               |           |             |               |           |             |               |              |  |  |  |
|------------------------------|---------------|-----------|-------------|---------------|-----------|-------------|---------------|--------------|--|--|--|
| X5R 0402                     |               |           | X7R 0603    |               |           | Y5V 0402    |               |              |  |  |  |
| Capacitance                  | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance    |  |  |  |
| 1 μF                         | 6.3 V         | ±10%      | 1 μF        | 16 V          | ±10%      | 1 μF        | 6.3 V         | -20% to +80% |  |  |  |
| 1 μF                         | 10 V          | ±10%      | X7R 0805    |               |           | 1 μF        | 10 V          | -20% to +80% |  |  |  |
| 2.2 μF                       | 6.3 V         | ±20%      | Capacitance | Rated voltage | Tolerance | Y5V 0603    |               |              |  |  |  |
| X5R 0603                     |               |           | 1 μF        | 25 V          | ±10%      | Capacitance | Rated voltage | Tolerance    |  |  |  |
| Capacitance                  | Rated voltage | Tolerance | 2.2 μF      | 16 V          | ±10%      | 1 μF        | 10 V          | -20% to +80% |  |  |  |
| 1 μF                         | 16 V          | ±10%      | 2.2 μF      | 25 V          | ±10%      | 1 μF        | 16 V          | -20% to +80% |  |  |  |
| 1 μF                         | 25 V          | ±10%      | X7R 1206    |               |           | 2.2 μF      | 10 V          | -20% to +80% |  |  |  |
| 2.2 μF                       | 6.3 V         | ±10%      | Capacitance | Rated voltage | Tolerance | 2.2 μF      | 16 V          | -20% to +80% |  |  |  |
| 2.2 μF                       | 10 V          | ±10%      | 1 μF        | 25 V          | ±10%      | 4.7 μF      | 6.3 V         | -20% to +80% |  |  |  |
| 2.2 μF                       | 16 V          | ±10%      | 2.2 μF      | 25 V          | ±10%      | Y5V 0805    |               |              |  |  |  |
| 4.7 μF                       | 6.3 V         | ±10%      | 4.7 μF      | 25 V          | ±10%      | Capacitance | Rated voltage | Tolerance    |  |  |  |
| 4.7 μF                       | 10 V          | ±10%      | 10 μF       | 16 V          | ±10%      | 1 μF        | 16 V          | -20% to +80% |  |  |  |
| 10 μF                        | 6.3 V         | ±20%      |             |               |           | 1 μF        | 25 V          | -20% to +80% |  |  |  |
| X5R 0805                     |               |           |             |               |           | 1 μF        | 50 V          | -20% to +80% |  |  |  |
| Capacitance                  | Rated voltage | Tolerance |             |               |           | 2.2 μF      | 16 V          | -20% to +80% |  |  |  |
| 2.2 μF                       | 25 V          | ±10%      |             |               |           | 4.7 μF      | 10 V          | -20% to +80% |  |  |  |
| 4.7 μF                       | 6.3 V         | ±10%      |             |               |           | 10 μF       | 10 V          | -20% to +80% |  |  |  |
| 4.7 μF                       | 10 V          | ±10%      |             |               |           | Y5V 1206    |               |              |  |  |  |
| 4.7 μF                       | 16 V          | ±10%      |             |               |           | Capacitance | Rated voltage | Tolerance    |  |  |  |
| 10 μF                        | 6.3 V         | ±10%      |             |               |           | 4.7 μF      | 16 V          | -20% to +80% |  |  |  |
| 10 μF                        | 10 V          | ±10%      |             |               |           | 10 μF       | 10 V          | -20% to +80% |  |  |  |
| 10 μF                        | 16 V          | ±10%      |             |               |           | 10 μF       | 16 V          | -20% to +80% |  |  |  |
| 22 μF                        | 6.3 V         | ±20%      |             |               |           | 22 μF       | 16 V          | -20% to +80% |  |  |  |
| X5R 1206                     |               |           |             |               |           |             |               |              |  |  |  |
| Capacitance                  | Rated voltage | Tolerance |             |               |           |             |               |              |  |  |  |
| 4.7 μF                       | 16 V          | ±10%      |             |               |           |             |               |              |  |  |  |
| 4.7 μF                       | 25 V          | ±10%      |             |               |           |             |               |              |  |  |  |
| 10 μF                        | 16 V          | ±10%      |             |               |           |             |               |              |  |  |  |
| 10 μF                        | 25 V          | ±10%      |             |               |           |             |               |              |  |  |  |
| 22 μF                        | 6.3 V         | ±20%      |             |               |           |             |               |              |  |  |  |

**Note:** 50 pieces per value. Ordering code 432204510001 for Phycomp brand product, CC88880000000000 for Yageo brand product

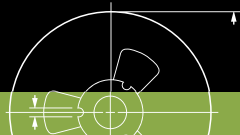
| High capacitance sample kits for smart phone |               |           |             |               |           |             |               |           |
|----------------------------------------------|---------------|-----------|-------------|---------------|-----------|-------------|---------------|-----------|
| X5R 0201                                     |               |           | X5R 0603    |               |           | X5R 0805    |               |           |
| Capacitance                                  | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 100 nF                                       | 6.3 V         | ±10%      | 1 μF        | 16 V          | ±10%      | 2.2 μF      | 16 V          | ±10%      |
| 100 nF                                       | 10 V          | ±10%      | 1 μF        | 25 V          | ±10%      | 2.2 μF      | 25 V          | ±10%      |
| 220 nF                                       | 6.3 V         | ±20%      | 2.2 μF      | 10 V          | ±10%      | 4.7 μF      | 6.3 V         | ±10%      |
| 470 nF                                       | 6.3 V         | ±20%      | 2.2 μF      | 16 V          | ±10%      | 4.7 μF      | 10 V          | ±10%      |
| 1 μF                                         | 6.3 V         | ±20%      | 4.7 μF      | 6.3 V         | ±10%      | 4.7 μF      | 16 V          | ±10%      |
| X5R 0402                                     |               |           | 4.7 μF      | 10 V          | ±10%      | 4.7 μF      | 25 V          | ±10%      |
| Capacitance                                  | Rated voltage | Tolerance | 10 μF       | 6.3 V         | ±20%      | 10 μF       | 6.3 V         | ±10%      |
| 1 μF                                         | 6.3 V         | ±10%      |             |               |           | 10 μF       | 10 V          | ±10%      |
| 1 μF                                         | 10 V          | ±10%      |             |               |           | 10 μF       | 16 V          | ±10%      |
| 1 μF                                         | 16 V          | ±10%      |             |               |           | 22 μF       | 6.3 V         | ±20%      |
| 2.2 μF                                       | 6.3 V         | ±20%      |             |               |           | 47 μF       | 6.3 V         | ±20%      |
| 4.7 μF                                       | 6.3 V         | ±20%      |             |               |           | X5R 1206    |               |           |
| 10 μF                                        | 6.3 V         | ±20%      |             |               |           | Capacitance | Rated voltage | Tolerance |
|                                              |               |           |             |               |           | 10 μF       | 16 V          | ±10%      |
|                                              |               |           |             |               |           | 10 μF       | 25 V          | ±10%      |
|                                              |               |           |             |               |           | 22 μF       | 6.3 V         | ±10%      |
|                                              |               |           | 47 μF       | 6.3 V         | ±20%      |             |               |           |

**Note:** 50 pieces per value. Ordering code SP88880000000000 for Yageo brand product



| High voltage sample kits for general applications |               |           |             |               |           |
|---------------------------------------------------|---------------|-----------|-------------|---------------|-----------|
| NP0 1206                                          |               |           | X7R 1206    |               |           |
| Capacitance                                       | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 10 pF                                             | 1 kV          | ±5%       | 10 nF       | 1 kV          | ±10%      |
| 100 pF                                            | 1 kV          | ±5%       | 1 nF        | 2 kV          | ±10%      |
| 1 nF                                              | 1 kV          | ±5%       | 1 nF        | 1 kV          | ±10%      |
| 10 pF                                             | 2 kV          | ±5%       | X7R 1210    |               |           |
| 100 pF                                            | 2 kV          | ±5%       | Capacitance | Rated voltage | Tolerance |
| NP0 1210                                          |               |           | 1 nF        | 1 kV          | ±10%      |
| Capacitance                                       | Rated voltage | Tolerance | 10 nF       | 1 kV          | ±10%      |
| 10 pF                                             | 1 kV          | ±5%       | 1 nF        | 2 kV          | ±10%      |
| 100 pF                                            | 1 kV          | ±5%       | X7R 1808    |               |           |
| 1 nF                                              | 1 kV          | ±5%       | Capacitance | Rated voltage | Tolerance |
| 10 pF                                             | 2 kV          | ±5%       | 10 nF       | 1 kV          | ±10%      |
| 100 pF                                            | 2 kV          | ±5%       | 1 nF        | 3 kV          | ±10%      |
| NP0 1808                                          |               |           | 1 nF        | 1 kV          | ±10%      |
| Capacitance                                       | Rated voltage | Tolerance | 1 nF        | 2 kV          | ±10%      |
| 10 pF                                             | 1 kV          | ±5%       | X7R 1812    |               |           |
| 100 pF                                            | 1 kV          | ±5%       | Capacitance | Rated voltage | Tolerance |
| 1 nF                                              | 1 kV          | ±5%       | 10 nF       | 2 kV          | ±10%      |
| 10 pF                                             | 3 kV          | ±5%       | 1 nF        | 1 kV          | ±10%      |
| 100 pF                                            | 3 kV          | ±5%       | 10 nF       | 1 kV          | ±10%      |
| 10 pF                                             | 2 kV          | ±5%       |             |               |           |
| 100 pF                                            | 2 kV          | ±5%       |             |               |           |
| NP0 1812                                          |               |           |             |               |           |
| Capacitance                                       | Rated voltage | Tolerance |             |               |           |
| 10 pF                                             | 2 kV          | ±5%       |             |               |           |
| 100 pF                                            | 2 kV          | ±5%       |             |               |           |
| 1 nF                                              | 2 kV          | ±5%       |             |               |           |
| 10 pF                                             | 1 kV          | ±5%       |             |               |           |
| 100 pF                                            | 1 kV          | ±5%       |             |               |           |
| 1 nF                                              | 1 kV          | ±5%       |             |               |           |
| 10 pF                                             | 3 kV          | ±5%       |             |               |           |
| 100 pF                                            | 3 kV          | ±5%       |             |               |           |

**Note:** 50 pieces per value. Ordering code 432204510013 for Phycomp brand product, HV77770000000000 for Yageo brand product



# MLCC Engineering Design Kits

## High voltage sample kits for safety certification MLCCs

| High voltage sample kits for safety certification MLCCs |                      |           |                   |                      |           |
|---------------------------------------------------------|----------------------|-----------|-------------------|----------------------|-----------|
| NP0 1808 TUV / UL                                       |                      |           | X7R 1808 TUV / UL |                      |           |
| Capacitance                                             | Safety certification | Tolerance | Capacitance       | Safety certification | Tolerance |
| 10 pF                                                   | X1 / Y2              | ±5%       | 150 pF            | X1 / Y2              | ±10%      |
| 22 pF                                                   | X1 / Y2              | ±5%       | 220 pF            | X1 / Y2              | ±10%      |
| 47 pF                                                   | X1 / Y2              | ±5%       | 330 pF            | X1 / Y2              | ±10%      |
| 100 pF                                                  | X1 / Y2              | ±5%       | 470 pF            | X1 / Y2              | ±10%      |
| 150 pF                                                  | X1 / Y2              | ±5%       | 680 pF            | X1 / Y2              | ±10%      |
| 220 pF                                                  | X1 / Y2              | ±5%       | 1 nF              | X1 / Y2              | ±10%      |
| 330 pF                                                  | X1 / Y2              | ±5%       | X7R 1812 TUV / UL |                      |           |
| NP0 1812 TUV / UL                                       |                      |           | Capacitance       | Safety certification | Tolerance |
| Capacitance                                             | Safety certification | Tolerance | 220 pF            | X1 / Y2              | ±10%      |
| 10 pF                                                   | X1 / Y2              | ±5%       | 330 pF            | X1 / Y2              | ±10%      |
| 22 pF                                                   | X1 / Y2              | ±5%       | 470 pF            | X1 / Y2              | ±10%      |
| 47 pF                                                   | X1 / Y2              | ±5%       | 680 pF            | X1 / Y2              | ±10%      |
| 100 pF                                                  | X1 / Y2              | ±5%       | 1 nF              | X1 / Y2              | ±10%      |
| 150 pF                                                  | X1 / Y2              | ±5%       | 1.5 nF            | X1 / Y2              | ±10%      |
| 220 pF                                                  | X1 / Y2              | ±5%       | X7R 1808 TUV / UL |                      |           |
| NP0 1808 TUV / UL                                       |                      |           | Capacitance       | Safety certification | Tolerance |
| Capacitance                                             | Safety certification | Tolerance | 470 pF            | X2 / Y3              | ±10%      |
| 10 pF                                                   | X2 / Y3              | ±5%       | 680 pF            | X2 / Y3              | ±10%      |
| 22 pF                                                   | X2 / Y3              | ±5%       | 1 nF              | X2 / Y3              | ±10%      |
| 47 pF                                                   | X2 / Y3              | ±5%       | 1.5 nF            | X2 / Y3              | ±10%      |
| 100 pF                                                  | X2 / Y3              | ±5%       |                   |                      |           |
| 150 pF                                                  | X2 / Y3              | ±5%       |                   |                      |           |
| 220 pF                                                  | X2 / Y3              | ±5%       |                   |                      |           |

**Note:** 50 pieces per value. Ordering code 432204510014 for Phycomp brand product, SC999990000000000 for Yageo brand product



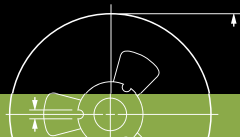
| 0402 high frequency sample kits |               |           |
|---------------------------------|---------------|-----------|
| NPO                             |               |           |
| Capacitance                     | Rated voltage | Tolerance |
| 0.22 pF                         | 50 V          | ±0.1 pF   |
| 0.47 pF                         | 50 V          | ±0.1 pF   |
| 0.68 pF                         | 50 V          | ±0.1 pF   |
| 0.82 pF                         | 50 V          | ±0.1 pF   |
| 1 pF                            | 50 V          | ±0.25 pF  |
| 1.2 pF                          | 50 V          | ±0.25 pF  |
| 1.5 pF                          | 50 V          | ±0.25 pF  |
| 1.8 pF                          | 50 V          | ±0.25 pF  |
| 2.2 pF                          | 50 V          | ±0.25 pF  |
| 2.7 pF                          | 50 V          | ±0.25 pF  |
| 3.3 pF                          | 50 V          | ±0.25 pF  |
| 3.9 pF                          | 50 V          | ±0.25 pF  |
| 4.7 pF                          | 50 V          | ±0.25 pF  |
| 5.6 pF                          | 50 V          | ±0.5 pF   |
| 6.8 pF                          | 50 V          | ±0.5 pF   |
| 8.2 pF                          | 50 V          | ±0.5 pF   |

**Note:** 50 pieces per value. Ordering code 432204409912 for Phycomp brand product, CH040200000000000 for Yageo brand product

| 0603 high frequency sample kits |               |           |
|---------------------------------|---------------|-----------|
| NPO                             |               |           |
| Capacitance                     | Rated voltage | Tolerance |
| 0.22 pF                         | 50 V          | ±0.1 pF   |
| 0.47 pF                         | 50 V          | ±0.1 pF   |
| 0.68 pF                         | 50 V          | ±0.1 pF   |
| 0.82 pF                         | 50 V          | ±0.1 pF   |
| 1 pF                            | 50 V          | ±0.25 pF  |
| 1.2 pF                          | 50 V          | ±0.25 pF  |
| 1.5 pF                          | 50 V          | ±0.25 pF  |
| 1.8 pF                          | 50 V          | ±0.25 pF  |
| 2.2 pF                          | 50 V          | ±0.25 pF  |
| 2.7 pF                          | 50 V          | ±0.25 pF  |
| 3.3 pF                          | 50 V          | ±0.25 pF  |
| 3.9 pF                          | 50 V          | ±0.25 pF  |
| 4.7 pF                          | 50 V          | ±0.25 pF  |
| 5.6 pF                          | 50 V          | ±0.5 pF   |
| 6.8 pF                          | 50 V          | ±0.5 pF   |
| 8.2 pF                          | 50 V          | ±0.5 pF   |

**Note:** 50 pieces per value. Ordering code 432204407122 for Phycomp brand product, CH060300000000000 for Yageo brand product





# MLCC Engineering Design Kits

Sample kits for all sizes, all types, E1 series only

| All sizes, all types, E1 series only |                  |           |                  |           |                  |           |                  |              |
|--------------------------------------|------------------|-----------|------------------|-----------|------------------|-----------|------------------|--------------|
| General purpose & High capacitance   |                  |           |                  |           |                  |           |                  |              |
| 0402                                 | NP0 50 V         |           | X7R 50 V         |           | X7R 16 V         |           | Y5V 16 V         |              |
|                                      | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance    |
|                                      | 1                | ±0.25 pF  | 100              | ±10%      | 10 000           | ±10%      | 100 000          | ±20%         |
|                                      | 10               | ±5%       | 1 000            | ±10%      |                  |           |                  |              |
| 0603                                 | NP0 50 V         |           | X7R 50 V         |           | X7R 16 V         |           | Y5V 10 V         |              |
|                                      | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance    |
|                                      | 1                | ±0.25 pF  | 100              | ±10%      | 100 000          | ±10%      | 1 000 000        | -20% to +80% |
|                                      | 10               | ±5%       | 1 000            | ±10%      |                  |           |                  |              |
| 0805                                 | NP0 50 V         |           | X7R 50 V         |           | X7R 10 V         |           | Y5V 10 V         |              |
|                                      | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance    |
|                                      | 1                | ±0.25 pF  | 1 000            | ±10%      | 1 000 000        | ±10%      | 4 700 000        | -20% to +80% |
|                                      | 10               | ±5%       | 10 000           | ±10%      |                  |           |                  |              |
| 1206                                 | NP0 50 V         |           | X7R 50 V         |           | X7R 16 V         |           | Y5V 10 V         |              |
|                                      | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance    |
|                                      | 1                | ±0.25 pF  | 1 000            | ±10%      | 1 000 000        | ±10%      | 10 000 000       | -20% to +80% |
|                                      | 10               | ±5%       | 10 000           | ±10%      |                  |           |                  |              |

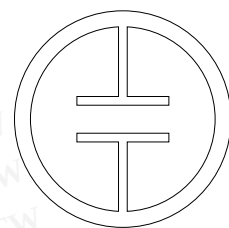
| Microwave |                  |           |
|-----------|------------------|-----------|
| Size      | NP0 50 V         |           |
|           | Capacitance (pF) | Tolerance |
| 0603      | 1                | ±0.25 pF  |
| 0805      | 3.3              | ±0.25 pF  |
| 1206      | 3.9              | ±0.25 pF  |

| Array (4 x 0603) |                  |           |                  |           |                  |           |
|------------------|------------------|-----------|------------------|-----------|------------------|-----------|
| Size             | NP0 50 V         |           | X7R 25 V         |           | X7R 16 V         |           |
|                  | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 0612             | 100              | ±5%       | 10 000           | ±10%      | 100 000          | ±10%      |
|                  | 1 000            | ±5%       |                  |           |                  |           |

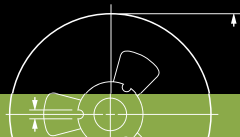
| High voltage |                  |           |                  |           |
|--------------|------------------|-----------|------------------|-----------|
| Size         | NP0 3 kV         |           | X7R 1 kV         |           |
|              | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1808         | 10               | ±5%       |                  |           |
| 1812         | 100              | ±5%       | 10 000           | ±10%      |

**Note:** 48 pieces per value (95 pieces for 0402 and 25 pieces for 1812). Ordering code 432204500581 for Phycomp brand product, CC99990000000000 for Yageo brand product





# SMD CERAMIC EMI FILTER CAPACITORS X2Y® PRODUCTS



# X2Y® Product Selection Charts

## SMD ceramic EMI filter capacitors X2Y® series

| NP0  |                  |                    |                  |                    |                |                        |
|------|------------------|--------------------|------------------|--------------------|----------------|------------------------|
| Size | Y-Capacitor      |                    | X-Capacitor      |                    | Thickness (mm) | Global part number     |
|      | Capacitance (nF) | Voltage rating (V) | Capacitance (nF) | Voltage rating (V) |                |                        |
| 0805 | 0.01             | 50                 | 0.005            | 100                | 0.85           | CX 0805 MR NPO 9BB 100 |
|      | 0.022            | 50                 | 0.011            | 100                | 0.85           | CX 0805 MR NPO 9BB 220 |
|      | 0.047            | 50                 | 0.023            | 100                | 0.85           | CX 0805 MR NPO 9BB 470 |

| X7R  |                  |                    |                  |                    |                |                        |
|------|------------------|--------------------|------------------|--------------------|----------------|------------------------|
| Size | Y-Capacitor      |                    | X-Capacitor      |                    | Thickness (mm) | Global part number     |
|      | Capacitance (nF) | Voltage rating (V) | Capacitance (nF) | Voltage rating (V) |                |                        |
| 0603 | 1                | 100                | 0.5              | 200                | 0.65           | CX 0603 MR X7R 0BB 102 |
|      | 1.5              | 100                | 0.75             | 200                |                | CX 0603 MR X7R 0BB 152 |
|      | 2.2              | 100                | 1.1              | 200                |                | CX 0603 MR X7R 0BB 222 |
|      | 4.7              | 100                | 2.4              | 200                |                | CX 0603 MR X7R 0BB 472 |
|      | 5.6              | 50 / 63            | 2.8              | 100                |                | CX 0603 MR X7R 9BB 562 |
|      |                  | 100                |                  | 200                |                | CX 0603 MR X7R 0BB 562 |
|      | 10               | 50 / 63            | 5                | 100                |                | CX 0603 MR X7R 9BB 103 |
|      | 22               | 25                 | 11               | 50                 |                | CX 0603 MR X7R 8BB 223 |
|      | 47               | 16                 | 24               | 25                 |                | CX 0603 MR X7R 7BB 473 |
|      | 56               | 16                 | 28               | 25                 |                | CX 0603 MR X7R 7BB 563 |
|      | 100              | 10                 | 50               | 16                 |                | CX 0603 MR X7R 6BB 104 |
|      |                  |                    |                  |                    |                |                        |
| 0805 | 1                | 100                | 0.5              | 200                | 0.85           | CX 0805 MR X7R 0BB 102 |
|      | 4.7              | 100                | 2.4              | 200                |                | CX 0805 MR X7R 0BB 472 |
|      | 10               | 100                | 5                | 200                |                | CX 0805 MR X7R 0BB 103 |
|      | 15               | 50 / 63            | 8                | 100                |                | CX 0805 MR X7R 9BB 153 |
|      | 18               | 50 / 63            | 9                | 100                |                | CX 0805 MR X7R 9BB 183 |
|      | 22               | 50 / 63            | 11               | 100                |                | CX 0805 MR X7R 9BB 223 |
|      | 39               | 25                 | 20               | 50                 |                | CX 0805 MR X7R 8BB 393 |
|      | 47               | 16                 | 24               | 25                 |                | CX 0805 MR X7R 7BB 473 |
|      | 100              | 16                 | 50               | 25                 |                | CX 0805 MR X7R 7BB 104 |
|      | 180              | 10                 | 90               | 16                 |                | CX 0805 MR X7R 6BB 184 |
|      |                  |                    |                  |                    |                |                        |
| 1206 | 47               | 50 / 63            | 24               | 100                | 1.20           | CX 1206 MK X7R 9BB 473 |
|      | 100              | 50 / 63            | 50               | 100                |                | CX 1206 MK X7R 9BB 104 |
|      | 220              | 16                 | 110              | 25                 |                | CX 1206 MK X7R 7BB 224 |
|      | 390              | 16                 | 195              | 25                 |                | CX 1206 MK X7R 7BB 394 |
|      | 470              | 10                 | 235              | 25                 |                | CX 1206 MK X7R 7BB 474 |
| 1210 | 470              | 25                 | 235              | 50                 | 1.60           | CX 1210 MK X7R 8BB 474 |
|      | 560              | 25                 | 280              | 50                 | 1.60           | CX 1210 MK X7R 8BB 564 |
|      | 820              | 16                 | 410              | 25                 | 1.60           | CX 1210 MK X7R 7BB 824 |
|      | 1000             | 16                 | 500              | 25                 | 1.60           | CX 1210 MK X7R 7BB 105 |

| X5R  |                  |                    |                  |                    |                |                        |
|------|------------------|--------------------|------------------|--------------------|----------------|------------------------|
| Size | Y-Capacitor      |                    | X-Capacitor      |                    | Thickness (mm) | Global part number     |
|      | Capacitance (nF) | Voltage rating (V) | Capacitance (nF) | Voltage rating (V) |                |                        |
| 0603 | 220              | 10                 | 110              | 16                 | 0.65           | CX 0603 MR X5R 6BB 224 |
|      | 330              |                    | 165              |                    |                | CX 0603 MR X5R 6BB 334 |
|      | 470              |                    | 235              |                    |                | CX 0603 MR X5R 6BB 474 |

Note: 1. Special values are available on request

2. Ordering codes for preferred versions (20% tolerance, 180 mm reel). For packing and tolerance information, see section "Thickness classes and packing quantities" on next page

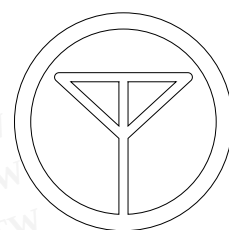


| Global part number                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: CX0603MKX7R6BB104                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <p>Series name (code 1-2)<br/>CX = X2Y®-series</p> <p>Size code (code 3-6)<br/>EIA mm<br/>0603 (1608M)<br/>0805 (2012M)<br/>1206 (3216M)<br/>1210 (3225M)<br/>1410 (3625M)<br/>1812 (4632M)</p> <p>Capacitance tolerance (code 7)<br/>M = ±20%</p> <p>Packing style (code 8)<br/>R = Paper tape reel Ø7"<br/>K = Embossed plastic tape reel Ø7"</p> <p>TC material (code 9-11)<br/>NP0<br/>X7R<br/>X5R</p> | <p>Capacitance value (code 15-17)<br/>104 = 100 000 pF<br/>(2 significant digits+number of zeros;<br/>the 3rd digit signifies the multiplying<br/>factor, and letter R is decimal point)<br/>0 = x 1<br/>1 = x 10<sup>1</sup><br/>2 = x 10<sup>2</sup><br/>3 = x 10<sup>3</sup><br/>4 = x 10<sup>4</sup><br/>5 = x 10<sup>5</sup><br/>6 = x 10<sup>6</sup></p> <p>Process code (code 14)<br/>B = BME</p> <p>Termination (code 13)<br/>B = Ni-barrier</p> <p>Rated voltage (code 12)<br/>5 = 6.3 V<br/>6 = 10 V<br/>7 = 16 V<br/>8 = 25 V<br/>9 = 50 V<br/>0 = 100 V</p> |

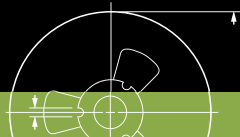
| Thickness classes and packing quantities |                   |         |
|------------------------------------------|-------------------|---------|
| Thickness<br>Classification<br>(mm)      | Quantity per reel |         |
|                                          | 8 mm tape width   |         |
|                                          | Ø180mm / 7"       |         |
|                                          | Paper             | Blister |
| 0.65 ±0.10                               | 4 000             | ---     |
| 0.85 ±0.10                               | 4 000             | ---     |
| 1.20 ±0.15                               | ---               | 2 500   |
| 1.60 ±0.15                               | ---               | 2 500   |







HIGH FREQUENCY PRODUCTS



# HF Product Selection Charts

## Specification overview - Antenna

### Wireless communication - networks & applications



- Wireless Wide Area Network (WWAN)\_IEEE 802.20
- Wireless Metropolitan Area Network (WMAN)\_IEEE 802.16 (Mobile/Fixed)  
► **WiMAX**
- Wireless Local Area Network (WLAN)\_IEEE 802.11 a/b/g/n  
► **WiFi, MIMO**
- Wireless Personal Area Network (WPAN)\_IEEE 802.15  
► **Bluetooth, ZigBee, UWB**

| Function | Networking | Application | Operating Frequency | Polarization | Impedance   | Temp. Range     |
|----------|------------|-------------|---------------------|--------------|-------------|-----------------|
| Antenna  | WPAN       | Bluetooth   | 2400-2484 MHz       | Linear       | 50 $\Omega$ | -40 °C to 90 °C |
|          |            | UWB_BG1     | 3168-4752 MHz       |              |             |                 |
|          |            | UWB_BG3     | 6336-7920 MHz       |              |             |                 |
|          |            | RFID        | 13.56 MHz           |              |             |                 |
|          | WLAN       | WiFi        | 2400-2484 MHz       |              |             |                 |
|          |            |             | 5150-5850 MHz       |              |             |                 |
|          | WMAN       | WiMAX       | 2300-2700 MHz       |              |             |                 |
|          |            |             | 3300-3800 MHz       |              |             |                 |
|          |            |             | 5150-5850 MHz       |              |             |                 |
|          | WWAN       | GSM-850     | 824-894 MHz         |              |             |                 |
|          |            | GSM-900     | 880-960 MHz         |              |             |                 |
|          |            | GSM-1800    | 1710-1880 MHz       |              |             |                 |
|          |            | GSM-1900    | 1850-1990 MHz       |              |             |                 |
|          |            | UMTS        | 1920-2170 MHz       |              |             |                 |
|          |            | Active GPS  | 1575 MHz            |              |             |                 |
|          |            | LTE-Band 17 | 704-746 MHz         |              |             |                 |
|          |            | LTE-Band 13 | 746-787 MHz         |              |             |                 |
|          |            | LTE-Band 40 | 2300-2400 MHz       |              |             |                 |
|          |            | LTE-Band 07 | 2500-2690 MHz       |              |             |                 |

# HF Product Selection Charts

## Antenna for WWAN - GSM/LTE, Satellite Communication - GPS

| WWAN - GSM/LTE antenna |                                     |               |                   |              |                       |
|------------------------|-------------------------------------|---------------|-------------------|--------------|-----------------------|
| Function               | Frequency Range                     | Type*         | Dimensions** (mm) | Polarization | Radiation Pattern     |
| Triple-band GSM_US ant | 824-894 / 1850-2170 MHz             | Planar        | 60x10             | Linear       | Near Omni-Directional |
|                        |                                     | 3-D Structure | 55x9x2.5          |              |                       |
| Triple-band GSM_EU ant | 880-960 / 1710-1990 MHz             | Planar        | 55x10             |              |                       |
|                        |                                     | 3-D Structure | 55x9x2            |              |                       |
| Quad-band GSM_US ant   | 824-894 / 1710-2170 MHz             | Planar        | 63x10             |              |                       |
|                        |                                     | 3-D Structure | 55x10x2.5         |              |                       |
| Quad-band GSM_EU ant   | 880-960 / 1710-2170 MHz             | Planar        | 60x10             |              |                       |
|                        |                                     | 3-D Structure | 55x10x2.5         |              |                       |
| Penta-band GSM ant     | 824-960 / 1710-2170 MHz             | Planar        | 65x10             |              |                       |
|                        |                                     | 3-D Structure | 55x10x3           |              |                       |
| Six-band GSM/LTE ant   | 704-960 / 1710-2170 MHz             | Planar        | 75x13             |              |                       |
|                        |                                     | 3-D Structure | 75x12x3           |              |                       |
| Seven-band GSM/LTE ant | 824-960 / 1710-2170 / 2300-2690 MHz | Planar        | 75x13             |              |                       |
|                        |                                     | 3-D Structure | 70x12x3           |              |                       |
| Eight-band GSM/LTE ant | 704-960 / 1710-2170 / 2300-2690 MHz | Planar        | 85x14             |              |                       |
|                        |                                     | 3-D Structure | 80x12x3           |              |                       |

| Satellite Communication - GPS antenna |                 |               |                   |              |                       |
|---------------------------------------|-----------------|---------------|-------------------|--------------|-----------------------|
| Function                              | Frequency Range | Type*         | Dimensions** (mm) | Polarization | Radiation Pattern     |
| GPS antenna                           | 1575 MHz        | Planar        | 20x8.5            | Linear       | Near Omni-Directional |
|                                       |                 | 3-D Structure | 15x8x2            |              |                       |
| Active GPS antenna                    | 1575 MHz        | Planar        | n/a               | Linear       | Near Omni-Directional |
|                                       |                 | 3-D Structure | 35x8x3            |              |                       |

**Note:** \* The antenna can be implemented by material of PCB/Metal/FPC/LDS as the planar or 3-D structure.

\*\* Dimensions depend on the layout and environment of practical application. The shown dimensions are tested by demoboard.



# HF Product Selection Charts

## Antenna for WPAN / WLAN / WMAN

| WPAN - Bluetooth / Ultra wideband / Radio frequency identification antenna |                           |               |                      |              |                          |
|----------------------------------------------------------------------------|---------------------------|---------------|----------------------|--------------|--------------------------|
| Function                                                                   | Frequency Range           | Type*         | Dimensions**<br>(mm) | Polarization | Radiation Pattern        |
| Bluetooth antenna                                                          | 2400-2484 MHz             | Planar        | 10x10                | Linear       | Near<br>Omni-Directional |
|                                                                            |                           | 3-D Structure | 10x9x2               |              |                          |
| UWB antenna_BG1                                                            | 3168-4752 MHz             | Planar        | 30x10                |              |                          |
|                                                                            |                           | 3-D Structure | 30x8.5x2             |              |                          |
| UWB antenna_BG1+BG3                                                        | 3168-4752 / 6336-7920 MHz | Planar        | 30x10                |              |                          |
|                                                                            |                           | 3-D Structure | 30x9x2               |              |                          |
| RFID antenna                                                               | 13.56 MHz                 | PCB           | 40x30                | NFC          |                          |
|                                                                            |                           | FPC           | 40x40                |              |                          |

| WLAN - WiFi antenna      |                           |               |                   |              |                       |
|--------------------------|---------------------------|---------------|-------------------|--------------|-----------------------|
| Function                 | Frequency Range           | Type*         | Dimensions** (mm) | Polarization | Radiation Pattern     |
| Single-band WiFi antenna | 2400-2484 MHz             | Planar        | 13x10             | Linear       | Near Omni-Directional |
|                          |                           | 3-D Structure | 13x9x2            |              |                       |
| Dual-band WiFi antenna   | 2400-2484 / 5150-5850 MHz | Planar        | 15x10             |              |                       |
|                          |                           | 3-D Structure | 15x9x2            |              |                       |

| WMAN - WiMAX antenna      |                                       |               |                   |              |                       |
|---------------------------|---------------------------------------|---------------|-------------------|--------------|-----------------------|
| Function                  | Frequency Range                       | Type*         | Dimensions** (mm) | Polarization | Radiation Pattern     |
| Dual-band WiMAX antenna   | 2300-2700 / 5150-5850 MHz             | Planar        | 25x10             | Linear       | Near Omni-Directional |
|                           |                                       | 3-D Structure | 25x9x2            |              |                       |
| Triple-band WiMAX antenna | 2400-2484 / 3300-3800 / 5150-5850 MHz | Planar        | 30x10             |              |                       |
|                           |                                       | 3-D Structure | 30x9x3            |              |                       |

Note: \* The antenna can be implemented by material of PCB/Metal/FPC/LDS as the planar or 3-D structure.

\*\* Dimensions depend on the layout and environment of practical application. The shown dimensions are tested by demoboard.

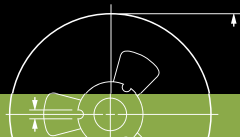
# HF Product Selection Charts

## Specification overview - Chip antenna

| Function |                         | Application  | Frequency                        | Size* (metric-based)                                                           | Unit   |
|----------|-------------------------|--------------|----------------------------------|--------------------------------------------------------------------------------|--------|
| Antenna  | Chip antenna            | Bluetooth    | 2.45 GHz                         | 2012, 2516, 3012, 3216, 4018, 5010, 5320<br>6020, 6522, 7355, 7836, 8010, 9520 | 0.1 mm |
|          |                         |              |                                  | 1004, 1204, 1903                                                               | mm     |
|          |                         | WiFi         | 2.45 GHz, 5 GHz,<br>2.45 / 5 GHz | 2012, 2516, 3012, 3216, 4018, 5010, 5320<br>6020, 6522, 7355, 7836, 8010, 9520 | 0.1 mm |
|          |                         |              |                                  | 1004, 1204, 1903                                                               | mm     |
|          |                         | UHF          | 433 MHz, 570 MHz, 870 MHz        | 1204, 1614, 3807                                                               | mm     |
|          |                         | FM           | 88-108 MHz                       | 1105, 2405                                                                     | mm     |
|          |                         | WiMAX        | 2.3-2.7 GHz, 3.3-3.9 GHz         | 3216, 8010                                                                     | 0.1 mm |
|          |                         | GPS          | 1.575 GHz                        | 1266                                                                           | mm     |
|          |                         |              |                                  | 3216, 5320, 6230                                                               | 0.1 mm |
|          |                         | DECT / WCDMA | 1.8 / 2 GHz                      | 8868                                                                           | mm     |
|          |                         | GSM          | 900 MHz / 1.8 GHz                | 2112                                                                           | mm     |
|          | Patch antenna           | GPS          | 1.575 GHz                        | 1010, 1212, 1313, 1515, 1818, 2525                                             | mm     |
|          |                         | Glionass     | 1.6 GHz                          |                                                                                |        |
|          |                         | SDARS        | 2.3 GHz                          |                                                                                |        |
| Fittler  | Band pass filter        | Bluetooth    | 2.45 GHz                         | 1608, 2012, 2520                                                               | 0.1 mm |
|          |                         | WiFi         | 2.45 GHz, 5 GHz                  |                                                                                | 0.1 mm |
|          | Low pass filter         | Bluetooth    | 2.45 GHz                         | 1608, 2012                                                                     | 0.1 mm |
|          |                         | WiFi         | 2.45 GHz, 5 GHz                  |                                                                                | 0.1 mm |
|          |                         | WiMAX        | 2.3-2.7 GHz, 3.3-3.9 GHz         |                                                                                | 0.1 mm |
|          | Diplexer                | WiFi         | 2.45 / 5 GHz                     | 2012                                                                           | 0.1 mm |
| Balancer | Balun                   | Bluetooth    | 2.45 GHz                         | 1608, 2012                                                                     | 0.1 mm |
|          |                         | WiFi         | 2.45 GHz, 5 GHz                  |                                                                                |        |
|          |                         | WiMAX        | 2.3-2.7 GHz, 3.3-3.9 GHz         | 2012                                                                           |        |
|          | Balanced filter (combo) | Bluetooth    | 2.45 GHz                         | 2012, 2520                                                                     | 0.1 mm |

Note: Measurement of size code: 20 (length) 12 (width) equals to 20 (unit) 12 (unit)





# HF Product Selection Charts

## Patch antenna for GPS / SDARS / Glonass

| GPS patch antenna (CP) |                 |                  |                   |              |             |       |                  |                   |
|------------------------|-----------------|------------------|-------------------|--------------|-------------|-------|------------------|-------------------|
| Dimensions (mm)        | Frequency range | Bandwidth* (MHz) | Gain* (dBic/Max.) | Polarization | Axial ratio | VSWR* | Temp. range (°C) | Packing (Bulk)    |
| 12x12x2                | 1575±2 MHz      | 6                | -3.5              | Circular     | < 3         | < 2.0 | -25 to 85        | CAN43134220C1581B |
| 12x12x4                |                 | 6                | -1                |              |             |       |                  | CAN43134220D1581B |
| 13x13x4                |                 | 6                | 0                 |              |             |       |                  | CAN43134229D1581B |
| 15x15x2                |                 | 6                | -1                |              |             |       |                  | CAN43134230C1581B |
| 15x15x4                |                 | 7                | 1.5               |              |             |       |                  | CAN43134230D1581B |
| 18x18x2                |                 | 5                | 2                 |              |             |       |                  | CAN43134240C1581B |
| 18x18x4                |                 | 10               | 4                 |              |             |       |                  | CAN43134240D1581B |
| 25x25x2                |                 | 10               | 5                 |              |             |       |                  | CAN43134250C1581B |
| 25x25x4                |                 | 20               | 5.5               |              |             |       |                  | CAN43134250D1581B |

| GPS patch antenna (LP) |                 |                 |                  |              |       |                  |                   |
|------------------------|-----------------|-----------------|------------------|--------------|-------|------------------|-------------------|
| Dimensions (mm)        | Frequency range | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | VSWR* | Temp. range (°C) | Packing (Bulk)    |
| 10x4x4                 | 1575±2 MHz      | 20              | 1.61             | Linear       | < 2.0 | -25 to 85        | CAN4311441001581K |
| 15x10x4                |                 | 6               | 0                |              |       |                  | CAN43134450D1581B |
| 16x06x4                |                 | 8               | -0.5             |              |       |                  | CAN43134460D1581B |

| GPS active module |                 |              |                     |                            |                               |                  |                   |
|-------------------|-----------------|--------------|---------------------|----------------------------|-------------------------------|------------------|-------------------|
| Dimensions (mm)   | Frequency range | Polarization | LNA Gain* (dB/Max.) | Noise Figure* (dB/Typical) | Current Consumption (mA/Max.) | Temp. range (°C) | Packing (Bulk)    |
| 13x13x5.5         | 1575±2 MHz      | Circular     | 17                  | 1.5                        | 6                             | -25 to 85        | CAN4313434881581B |
| 13x13x7.5         |                 |              | 17                  | 1.5                        | 6                             |                  | CAN4313434861581B |
| 15x15x7.5         |                 |              | 15.1                | 2.5                        | 3                             |                  | CAN4313434621581B |
| 15x15x7.5         |                 |              | 15.1                | 2.5                        | 3                             |                  | CAN4313435621581B |
| 16x16x7.5         |                 |              | 16                  | 1.5                        | 5                             |                  | CAN4313435921581B |
| 19x19x5.5         |                 |              | 30                  | 1.5                        | 6                             |                  | CAN4313437951581B |
| 19x19x7.5         |                 |              | 30                  | 1.5                        | 6                             |                  | CAN4313437931581B |
| 20x06x6.4         |                 | Linear       | 15                  | 1.5                        | 8                             |                  | CAN4313466621581B |
|                   |                 |              | 20                  | 1                          | 5                             |                  | CAN4313466641581B |
|                   | 25              |              | 1.5                 | 15                         | CAN4313466661581B             |                  |                   |

Note: " \* " marks that the value depends on the Yageo demoboard

# HF Product Selection Charts

## Chip antenna for FM / UHF / GPS / GSM / WIMAX

| FM chip antenna |                  |                 |                  |              |                  |       |                  |         |                   |
|-----------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|-------------------|
| Dimensions (mm) | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                   |
|                 |                  |                 |                  |              |                  |       |                  | Bulk    | Tape              |
| 11x5x1.3        | 88-108 MHz       | ---             | ---              | Linear       | Omni-directional | ---   | -25 to 85        | ---     | CAN4311629000882K |
| 24x5x1.6        |                  |                 |                  |              |                  |       |                  |         | CAN4311050010882K |

| UHF chip antenna (433 MHz) |                  |                 |                  |              |                  |       |                  |                   |                   |
|----------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|-------------------|-------------------|
| Dimensions (mm)            | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing           |                   |
|                            |                  |                 |                  |              |                  |       |                  | Bulk              | Tape              |
| 12x4x1.5                   | 400-500 MHz      | > 20            | 0.83             | Linear       | Omni-directional | < 3.0 | -40 to 125       | ---               | CAN4311129200431K |
| 12x4x1.6                   |                  |                 | 0.79             |              |                  |       | -25 to 85        | ----              | CAN4311029020431K |
| 37.5x6.8x0.9               | 433 MHz          |                 | 0.5              |              |                  | < 3.0 | -55 to 125       | CAN4313121200431B | CAN4311121200431K |

| UHF chip antenna (870 MHz) |                  |                 |                  |              |                  |                   |                  |         |                   |
|----------------------------|------------------|-----------------|------------------|--------------|------------------|-------------------|------------------|---------|-------------------|
| Dimensions (mm)            | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR*             | Temp. range (°C) | Packing |                   |
|                            |                  |                 |                  |              |                  |                   |                  | Bulk    | Tape              |
| 12x4x1.0 (P)               | 800-900 MHz      | > 15            | 1.05             | Linear       | Omni-directional | < 2.8             | -25 to 85        | ---     | CAN4311129100871K |
| 12x4x1.6                   | 800-900 MHz      | > 20            | 0.5              |              |                  | < 2.0             | -40 to 125       | ---     | CAN4311129040871K |
|                            |                  |                 |                  |              |                  | CAN4311129050871K |                  |         |                   |
|                            |                  |                 |                  |              |                  | CAN4311129060871K |                  |         |                   |
|                            |                  |                 |                  |              |                  | CAN4311129070871K |                  |         |                   |
|                            |                  |                 |                  |              |                  | CAN4311129080871K |                  |         |                   |
| 16.5x14x0.9                | 790-880 MHz      | > 80            | -0.25            | < 2.5        | -55 to 125       | CAN4313119000871B | ---              |         |                   |

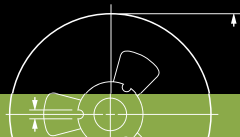
| GPS chip antenna |                  |                 |                  |              |                  |       |                  |         |                    |
|------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|--------------------|
| Dimensions (mm)  | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                    |
|                  |                  |                 |                  |              |                  |       |                  | Bulk    | Tape               |
| 3.2x1.6x1.2 (P)  | 1.575 GHz        | > 90            | 7.32             | Linear       | Omni-Directional | < 2.5 | -25 to 85        | ---     | CAN43111712151583K |
| 5.3x2.0x1.2 (P)  |                  |                 | 3.16             |              |                  | < 2.0 |                  | ---     | CAN4311153141582K  |
| 6.2x3.0x1.5      |                  | 55              | 2.52             |              |                  | < 2.0 | -55 to 125       | ---     | CAN4311113011582K  |

| DECT/WCDMA chip antenna |                  |                 |                  |              |                  |       |                  |         |                   |
|-------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|-------------------|
| Dimensions (mm)         | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                   |
|                         |                  |                 |                  |              |                  |       |                  | Bulk    | Tape              |
| 8.8x6.8x0.9             | 1.88-2.1 GHz     | > 100           | 2.0              | Linear       | Omni-directional | < 2.0 | -55 to 125       | ---     | CAN4311112001881K |

| WiMAX chip antenna |                  |                 |                  |              |                  |       |                  |         |                    |
|--------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|--------------------|
| Dimensions (mm)    | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                    |
|                    |                  |                 |                  |              |                  |       |                  | Bulk    | Tape               |
| 3.2x1.6x1.3        | 3.3-3.9 GHz      | > 100           | 2.8              | Linear       | Omni-directional | < 2.0 | -25 to 85        | ---     | CAN43111712063503K |
| 10x0.6x1.2         | 2.3-2.7 GHz      |                 | 2.0              |              |                  | < 3.0 |                  | ---     | CAN4311861002371K  |

Note: " \* " marks that the value depends on the Yageo demoboard  
 " (P) " represents PIFA mode antenna





# HF Product Selection Charts

## Chip antenna for Dual-band / Chip-on-Board / WWAN

| Dual-band WiFi chip antenna |                  |                 |                  |              |                  |       |                  |         |                   |
|-----------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|-------------------|
| Dimensions (mm)             | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                   |
|                             |                  |                 |                  |              |                  |       |                  | Bulk    | Tape              |
| 5.3x2.0x1.2                 | 2.45 / 5.2 GHz   | 150 / 900       | 2.72 / 3.85      | Linear       | Omni-directional | < 2.8 | -25 to 85        | ---     | CAN4311153042522K |
|                             |                  |                 |                  |              |                  |       |                  | ---     | CAN4311153062522K |

| Dual-band GPS / WiFi chip antenna |                  |                 |                  |              |                  |       |                  |         |                   |
|-----------------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|---------|-------------------|
| Dimensions (mm)                   | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing |                   |
|                                   |                  |                 |                  |              |                  |       |                  | Bulk    | Tape              |
| 5.3x2.0x1.2 (P)                   | 1.575 / 2.45 GHz | 20 / 100        | 2.47 / 2.04      | Linear       | Omni-directional | < 2.0 | -25 to 85        | ----    | CAN4311853071522K |

| Dual-band chip antenna (900/1800 MHz) |                  |                 |                  |              |                  |       |                  |                   |                   |
|---------------------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|-------------------|-------------------|
| Dimensions (mm)                       | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing           |                   |
|                                       |                  |                 |                  |              |                  |       |                  | Bulk              | Tape              |
| 12x4.4x1.2                            | 880-960 MHz      | > 20            | 0.5 -1           | Linear       | Omni-directional | < 3.0 | -40 to 125       | ---               | CAN4311116719181K |
|                                       | 1710-1880 MHz    | > 170           |                  |              |                  |       |                  |                   |                   |
| 21x12x0.9                             | 880-960 MHz      | > 30            | 0.5 -1           |              |                  | < 2.7 | -25 to 85        | CAN4313118009181B | ---               |
|                                       | 1710-1880 MHz    | > 170           |                  |              |                  |       |                  |                   |                   |

| Chip-on-Board antenna (with Cable & Connector) |                  |                 |                  |              |                  |       |                  |                   |      |
|------------------------------------------------|------------------|-----------------|------------------|--------------|------------------|-------|------------------|-------------------|------|
| Dimensions (mm)                                | Frequency range* | Bandwidth (MHz) | Gain* (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing           |      |
|                                                |                  |                 |                  |              |                  |       |                  | Bulk              | Tape |
| 10x4x2.6                                       | 2450 MHz         | 100             | 1.22             | Linear       | Omni-directional | < 2.8 | -25 to 85        | CAN4313A81042451B | ---- |
|                                                |                  |                 |                  |              |                  |       |                  | CAN4313B81042451B | ---- |
|                                                |                  |                 |                  |              |                  |       |                  | CAN4313C81042451B | ---- |
|                                                |                  |                 |                  |              |                  |       |                  | CAN4313D81042451B | ---- |
|                                                |                  |                 |                  |              |                  |       |                  | CAN4313A29A20871B | ---- |
| 30x5x5.3                                       | 800-900 MHz      | 60              | 1.7              | Linear       | Omni-directional | < 2.0 | -25 to 85        | CAN4313A29A20871B | ---- |
|                                                | 433 MHz          | 15              | 3.85             |              |                  |       |                  | CAN4313A29A20431B | ---- |

| WWAN chip antenna |                  |                 |                   |              |                  |       |                  |                   |      |
|-------------------|------------------|-----------------|-------------------|--------------|------------------|-------|------------------|-------------------|------|
| Dimensions (mm)   | Frequency range* | Bandwidth (MHz) | Gain * (dBi/Max.) | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing           |      |
|                   |                  |                 |                   |              |                  |       |                  | Bulk              | Tape |
| 35x5x6            | 824-960 MHz      | > 140           | 2.91              | Linear       | Omni-directional | < 2.8 | -40 to 85        | CAN4313449009181B | ---  |
|                   | 1710-2170 MHz    | > 470           |                   |              |                  | < 3.5 |                  |                   |      |

Note: " \* " marks that the value depends on the Yageo demoboard



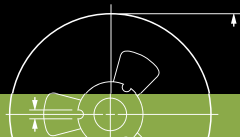
# HF Product Selection Charts

## Chip antenna for Bluetooth / WiFi

| Bluetooth / WiFi antennna |                 |                  |                   |              |                  |       |                  |                   |
|---------------------------|-----------------|------------------|-------------------|--------------|------------------|-------|------------------|-------------------|
| Dimensions (mm)           | Frequency range | Bandwidth* (MHz) | Gain* (dBi/Max.)  | Polarization | Azimuth          | VSWR* | Temp. range (°C) | Packing (Tape)    |
| 2.0x1.2x1.1               | 2.45 GHz        | < 200            | 3.12              | Linear       | Omni-Directional | < 2.8 | -40 to 85        | CAN4311714002454K |
| 3.2x1.6x1.2               |                 |                  | 5.0               |              |                  |       |                  | CAN4311712002453K |
| 3.2x1.6x1.2 (P)           |                 |                  | 3.68              |              |                  |       |                  | CAN4311712112453K |
| 5.0x1.0x1.0               |                 |                  | 2.28              |              |                  |       |                  | CAN4311851062453K |
| 5.3x2.0x1.3               |                 |                  | 5.5               |              |                  |       |                  | CAN4311153002451K |
| 5.3x2.0x1.2 (P)           |                 |                  | 2.78              |              |                  |       |                  | CAN4311153232452K |
| 6.0x2.0x1.0               |                 | > 200            | 5.1               |              |                  |       |                  | CAN4311860052452K |
| 7.3x5.5x1.3               |                 |                  | 1.2               |              |                  |       |                  | CAN4311111002451K |
| 7.8x3.6x0.9               |                 |                  | 4.1               |              |                  |       |                  | CAN4311115002451K |
| 8.0x1.0x1.0               |                 |                  | 5.88              |              |                  |       |                  | CAN4311881042453K |
| 9.5x2.0x1.1               | 2.85            |                  | CAN4311895052452K |              |                  |       |                  |                   |
| 12x4.0x2.0 (P)            | 2.45 GHz        | > 300            | 6.66              |              |                  | < 2.0 |                  | CAN4311029012451K |
| 19x3.0x3.6 (P)            |                 |                  | 5.0               |              |                  |       |                  | CAN4311093012451K |

Note: " \* " marks that value depends on the Yageo demoboard  
 " (P) " represents PIFA mode antenna





# HF Product Selection Charts

## Band pass filter

| Band pass filter      |                       |                       |                       |                       |                       |                   |                     |                   |
|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-------------------|---------------------|-------------------|
| Dimensions (mm)       | Frequency range*      | Pass band (MHz)       | Impedance             | Insertion loss        | Ripple                | VSWR*             | Attenuation (Min.)  | Packing (Tape)    |
| 1.6x0.8x0.65          | 2.45 GHz              | 2400-2500             | 50 ohm                | 2.4 dB                | 0.5 dB                | < 2.0             | 30 dB @ 880-960 MHz | CFL4111515012454K |
|                       |                       |                       |                       | 20 dB @ 1710-1990 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 8.5 dB @ 2170 MHz     |                       |                   |                     |                   |
| 30 dB @ 4800-5000 MHz |                       |                       |                       |                       |                       |                   |                     |                   |
| 25 dB @ 7200-7500 MHz |                       |                       |                       |                       |                       |                   |                     |                   |
| 40 dB @ 1000-1600 MHz |                       |                       |                       | CFL4111714032454K     |                       |                   |                     |                   |
| 40 dB @ 4900 MHz      |                       |                       |                       |                       |                       |                   |                     |                   |
| 20 dB @ 7500 MHz      |                       |                       |                       |                       |                       |                   |                     |                   |
| 2.0x1.25x1.0          |                       |                       |                       | 2.0 dB                | 0.6 dB                |                   | 30 dB @ 880-960 MHz | CFL4111714062454K |
| 2.0x1.25x0.85         |                       |                       |                       | 30 dB @ 1710-1990 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 25 dB @ 4800-5000 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 30 dB @ 7200-7500 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 40 dB @ 880-960 MHz   | CFL4111514172454K     |                   |                     |                   |
|                       |                       |                       |                       | 40 dB @ 1710-1990 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 20 dB @ 2110-2170 MHz |                       |                   |                     |                   |
|                       |                       |                       |                       | 30 dB @ 4800-5000 MHz |                       |                   |                     |                   |
|                       | 30 dB @ 7200-7500 MHz | CFL4111714192454K     |                       |                       |                       |                   |                     |                   |
|                       | 40 dB @ 1600 MHz      |                       |                       |                       |                       |                   |                     |                   |
|                       | 38 dB @ 3200 MHz      |                       |                       |                       |                       |                   |                     |                   |
| 20 dB @ 4800 MHz      |                       |                       |                       |                       |                       |                   |                     |                   |
| 2.8 dB                | 0.5 dB                | 25 dB @ 7200 MHz      | CFL4111514892454K     |                       |                       |                   |                     |                   |
| 1.2 dB                | 0.6 dB                | 15 dB @ 1600 MHz      |                       |                       |                       |                   |                     |                   |
| 25 dB @ 3200 MHz      |                       |                       |                       |                       |                       |                   |                     |                   |
| 2.0x1.25x0.8          | 5 GHz                 | 5150-5850             | 1.8 dB                | 0.5 dB                | 20 dB @ 4800-5000MHz  | CFL4111714055004K |                     |                   |
| 2.5x2.0x0.95          | 2.45 GHz              | 2400-2500             | 2.5 dB                | 0.6 dB                | 30 dB @ 2400-2500 MHz |                   |                     |                   |
|                       |                       |                       | 1.5 dB                |                       | 20 dB @ 4700 MHz      |                   |                     |                   |
|                       |                       |                       |                       |                       | 40 dB @ 880-960 MHz   | CFL4111713022453K |                     |                   |
|                       |                       |                       |                       |                       | 30 dB @ 2100 MHz      |                   |                     |                   |
|                       |                       |                       |                       | 30 dB @ 4800-5000 MHz |                       |                   |                     |                   |
|                       |                       |                       | 30 dB @ 7200-7500 MHz | CFL4111713032453K     |                       |                   |                     |                   |
|                       |                       |                       | 2.2 dB                |                       | 40 dB @ 880-960 MHz   |                   |                     |                   |
|                       |                       |                       |                       |                       | 30 dB @ 1710-1785 MHz |                   |                     |                   |
|                       |                       |                       |                       |                       | 30 dB @ 1850-1910 MHz |                   |                     |                   |
|                       |                       |                       |                       | 20 dB @ 4800-5000 MHz |                       |                   |                     |                   |
| 25 dB @ 7200-7500 MHz | CFL4111713182453K     |                       |                       |                       |                       |                   |                     |                   |
|                       |                       | 30 dB @ 7200-7500 MHz |                       |                       |                       |                   |                     |                   |
|                       |                       | 30 dB @ 1600 MHz      |                       |                       |                       |                   |                     |                   |
|                       |                       | 35 dB @ 3200 MHz      |                       |                       |                       |                   |                     |                   |
|                       |                       |                       | 25 dB @ 4800-5000 MHz |                       |                       |                   |                     |                   |
|                       |                       |                       | 30 dB @ 7200-7500 MHz |                       |                       |                   |                     |                   |

Note: " \* " marks that the value depends on the Yageo demoboard



| Low pass filter |                  |                 |           |                  |                  |                   |                    |                           |
|-----------------|------------------|-----------------|-----------|------------------|------------------|-------------------|--------------------|---------------------------|
| Dimensions (mm) | Frequency range* | Pass Band (MHz) | Impedance | Insertion loss   | Ripple           | VSWR*             | Attenuation (Min.) | Packing (Tape)            |
| 1.6x0.8x0.65    | 2.37 GHz         | 2300-2700       | 50 ohm    | < 0.6 dB         | 0.6 dB           | < 1.5             | 35 dB @ 4800 MHz   | CFL4111715522374K         |
|                 |                  |                 |           | 25 dB @ 7200 MHz |                  |                   |                    |                           |
|                 | 2.45 GHz         | 2400-2500       |           | 0.45 dB          | 25 dB @ 5000 MHz | CFL4111715502454K |                    |                           |
|                 |                  |                 |           |                  | 18 dB @ 7500 MHz |                   |                    |                           |
| 2.0x1.25x0.85   | 2.45 GHz         | 2400-2500       |           | 0.5 dB           | 0.6 dB           | < 1.8             | 27 dB @ 5000 MHz   | CFL4111714502454K         |
|                 |                  |                 |           |                  |                  |                   | 25 dB @ 7500 MHz   |                           |
|                 | 3.5 GHz          | 3000-4000       |           |                  |                  | < 2.0             | 25 dB @ 10,000 MHz | CFL4111714503504K         |
|                 |                  |                 |           |                  |                  |                   | 35 dB @ 6800 MHz   |                           |
|                 |                  |                 |           |                  |                  |                   |                    | 30 dB @ 11,000 MHz (Ref.) |

Note: " \* " marks that the value depends on the Yageo demoboard



# HF Product Selection Charts

## Diplexer

| Diplexer        |                 |                 |                |       |                                |                               |                   |
|-----------------|-----------------|-----------------|----------------|-------|--------------------------------|-------------------------------|-------------------|
| Dimensions (mm) | Frequency range | Pass band (MHz) | Insertion loss | VSWR  | Attenuation (Min.)             | Packing (Tape)                |                   |
| 2.0x1.25x0.75   | 2.4 / 5 GHz     | 2400-2500       | < 0.7 dB       | < 2.0 | 17 dB @ 4800-6000 MHz          | CFL4111714822504K             |                   |
|                 |                 |                 |                |       | 20 dB @ 7200-7500 MHz          |                               |                   |
|                 |                 | 4900-5900       | < 1.6 dB       |       | 17 dB @ 1800-2500 MHz          |                               |                   |
|                 |                 |                 |                |       | 20 dB @ 10300-10700 MHz (Ref.) |                               |                   |
| 2.0x1.25x0.85   |                 | 2400-2500       | < 0.7 dB       |       |                                | 20 dB @ 4900-5900 MHz         | CFL4111714852504K |
|                 |                 | 4900-5900       | < 0.9 dB       |       |                                | 20 dB @ 2400-2500 MHz         |                   |
|                 |                 | 2400-2500       | < 0.6 dB       |       |                                | 20 dB @ 4900-5900 MHz         | CFL4111714862504K |
|                 |                 | 4900-5900       | < 0.9 dB       |       |                                | 25 dB @ 2400-2500 MHz         |                   |
| 2.0x1.25x0.9    |                 | 2400-2500       | < 0.5 dB       |       |                                | 20 dB @ 4800-6000 MHz         | CFL4111714882504K |
|                 |                 |                 |                |       |                                | 20 dB @ 7200-7500 MHz         |                   |
|                 |                 | 4900-5900       | < 0.9 dB       |       |                                | 25 dB @ 1800-2500 MHz         |                   |
|                 |                 |                 |                |       |                                | 25 dB @ 9800-11800 MHz (Ref.) |                   |

# HF Product Selection Charts

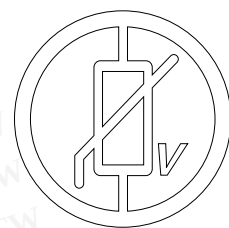
## Balun and Balanced filter

| Balun           |                  |                 |            |                |        |       |                   |                    |                   |                   |
|-----------------|------------------|-----------------|------------|----------------|--------|-------|-------------------|--------------------|-------------------|-------------------|
| Dimensions (mm) | Frequency range* | Pass band (MHz) | Impedance  | Insertion loss | Ripple | VSWR* | Amplitude balance | Phase differential | Packing (Tape)    |                   |
| 1.6x0.8x0.65    | 2.45 GHz         | 2400-2500       | 50/50 ohm  | < 1.2 dB       | 0.6 dB | < 2.0 | < 1.0 dB          | 180°±10°           | CBA4711715002454K |                   |
|                 | 5 GHz            | 4900-5950       | 50/100 ohm |                |        |       | < 1.2 dB          |                    | CBA4711715015004K |                   |
| 2.0x1.25x0.80   | 2.45 GHz         | 2400-2500       | 50/50 ohm  | < 1.0 dB       |        |       | 2.0 dB            |                    |                   | CBA4711714002454K |
|                 |                  |                 | 50/100 ohm |                |        |       |                   |                    |                   | CBA4711714012454K |
|                 |                  |                 | 50/200 ohm |                |        |       |                   |                    |                   | CBA4711714022454K |
|                 | 5 GHz            | 4900-5900       | 50/100 ohm | < 1.2 dB       |        |       |                   |                    |                   | CBA4711714015004K |

| Balanced filter (combo) |                  |                 |                      |                                          |                |                   |                    |                        |                   |
|-------------------------|------------------|-----------------|----------------------|------------------------------------------|----------------|-------------------|--------------------|------------------------|-------------------|
| Dimensions (mm)         | Frequency range* | Pass band (MHz) | Unbalanced impedance | Balanced impedance                       | Insertion loss | Amplitude balance | Phase differential | Attenuation (MHz/Min.) | Packing (Tape)    |
| 2.0x1.2x0.9             | 2.45 GHz         | 2400-2500       | 50 ohm               | Conjugate match to CSR BC03/04/05 series | < 3.5 dB       | < 1.0 dB          | 180°±10°           | 40 dB @ 880-960        | CBA4711714982454K |
|                         |                  |                 |                      |                                          |                |                   |                    | 25 dB @ 1300-1600      |                   |
|                         |                  |                 |                      |                                          |                | < 1.3 dB          | 180°±13°           | 35 dB @ 4800-5000      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 7200-7500      |                   |
| 2.0x1.2x0.8             | 2.45 GHz         | 2400-2500       | 50 ohm               | Conjugate match to CSR BC03/04/05 series | < 3.5 dB       | < 1.3 dB          | 180°±13°           | 40 dB @ 880-960        | CBA4711814572454K |
|                         |                  |                 |                      |                                          |                |                   |                    | 25 dB @ 1300-1600      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 35 dB @ 4800-5000      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 25 dB @ 7200-7500      |                   |
|                         |                  |                 |                      | Conjugate match to CSR BC03/04/05 series | < 3.3 dB       | < 1.2 dB          | 180°±13°           | 40 dB @ 880-960        | CBA4711814472454K |
|                         |                  |                 |                      |                                          |                |                   |                    | 25 dB @ 1300-1600      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 4800-5000      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 25 dB @ 7200-7500      |                   |
|                         |                  |                 |                      | Conjugate match to CSR BC04/05/06 series | < 2.8 dB       | < 1.5 dB          | 180°±10°           | 35 dB @ 880-960        | CBA4711514372454K |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 1710-1880      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 20 dB @ 1880-1990      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 4800-5000      |                   |
|                         |                  |                 |                      | Conjugate match to MTK MT 6616 series    | < 3.1 dB       | < 1.5 dB          | 180°±10°           | 35 dB @ 880-960        | CBA4711514312454K |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 1710-1880      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 20 dB @ 1880-1990      |                   |
|                         |                  |                 |                      |                                          |                |                   |                    | 30 dB @ 4800-5000      |                   |

Note: " \* " marks that the value depends on the Yageo demoboard





## MULTILAYER CHIP VARISTORS





# MLV Product Selection Charts

## Case dimensions and specification for 0402

| Case dimensions |                       |                  |           |                  |                  |                                     |                                     |                    |
|-----------------|-----------------------|------------------|-----------|------------------|------------------|-------------------------------------|-------------------------------------|--------------------|
|                 | Case size designation | Dimensions in mm |           |                  |                  |                                     |                                     |                    |
|                 | Inch-based            | L <sub>1</sub>   | W         | T <sub>min</sub> | T <sub>max</sub> | L <sub>2</sub> / L <sub>3</sub> min | L <sub>2</sub> / L <sub>3</sub> max | L <sub>4</sub> min |
|                 | 0402                  | 1.0 ±0.10        | 0.5 ±0.10 | 0.45             | 0.55             | 0.15                                | 0.30                                | 0.40               |
|                 | 0603                  | 1.6 ±0.20        | 0.8 ±0.10 | 0.70             | 0.90             | 0.20                                | 0.60                                | 0.40               |

| MLV              |           |             |            |          |            |          |             |
|------------------|-----------|-------------|------------|----------|------------|----------|-------------|
| General purpose  |           |             |            |          |            |          |             |
| 0402             |           |             |            |          |            |          |             |
| Working voltage  | 5.5 V     | 5.5 V       | 9 V        | 14 V     | 14 V       | 18 V     | 18 V        |
| Varistor voltage | 10 ~ 14 V | 7.2 ~ 10.8V | 10.2~13.8V | 18~24 V  | 16.2~19.8V | 24~32 V  | 21.6~26.4 V |
| 1 pF             | 0.5 ±0.1  | 0.5 ±0.1    | 0.5 ±0.1   | 0.5 ±0.1 | 0.5 ±0.1   | 0.5 ±0.1 | 0.5 ±0.1    |
| 3 pF             |           |             |            |          |            |          |             |
| 10 pF            |           |             |            |          |            |          |             |
| 22 pF            |           |             |            |          |            |          |             |
| 33 pF            |           |             |            |          |            |          |             |
| 50 pF            |           |             |            |          |            |          |             |
| 82 pF            |           |             |            |          |            |          |             |
| 100 pF           |           |             |            |          |            |          |             |
| 120 pF           |           |             |            |          |            |          |             |
| 160 pF           |           |             |            |          |            |          |             |
| 200 pF           |           |             |            |          |            |          |             |
| 250 pF           |           |             |            |          |            |          |             |
| 360 pF           |           |             |            |          |            |          |             |
| 470 pF           |           |             |            |          |            |          |             |
| 650 pF           |           |             |            |          |            |          |             |
| 900 pF           |           |             |            |          |            |          |             |
| Tape width       | 8 mm      |             |            |          |            |          |             |

# MLV Product Selection Charts

Specification for 0603

| MLV              |           |             |             |             |          |           |           |
|------------------|-----------|-------------|-------------|-------------|----------|-----------|-----------|
| General purpose  |           |             |             |             |          |           |           |
| 0603             |           |             |             |             |          |           |           |
| Working voltage  | 5.5 V     | 5.5 V       | 9 V         | 14 V        | 14 V     | 18 V      | 30 V      |
| Varistor voltage | 10 ~ 14 V | 7.2 ~ 10.8V | 9.6 ~ 14.4V | 9.6 ~ 14.4V | 18 ~ 24V | 24 ~ 32 V | 38 ~ 46 V |
| 1 pF             |           |             |             |             |          |           |           |
| 3 pF             |           |             |             |             |          |           |           |
| 10 pF            |           |             |             |             |          |           |           |
| 22 pF            |           |             |             |             |          |           |           |
| 33 pF            |           |             |             |             |          |           |           |
| 50 pF            |           |             |             |             |          |           |           |
| 82 pF            |           |             |             |             |          |           |           |
| 100 pF           |           |             |             |             |          |           |           |
| 120 pF           |           |             |             |             |          |           |           |
| 160 pF           |           |             |             |             |          |           |           |
| 200 pF           |           |             |             |             |          |           |           |
| 250 pF           |           |             |             |             |          |           |           |
| 360 pF           |           |             |             |             |          |           |           |
| 470 pF           |           |             |             |             |          |           |           |
| 650 pF           |           |             |             |             |          |           |           |
| 900 pF           |           |             |             |             |          |           |           |
| Tape width       | 8 mm      |             |             |             |          |           |           |



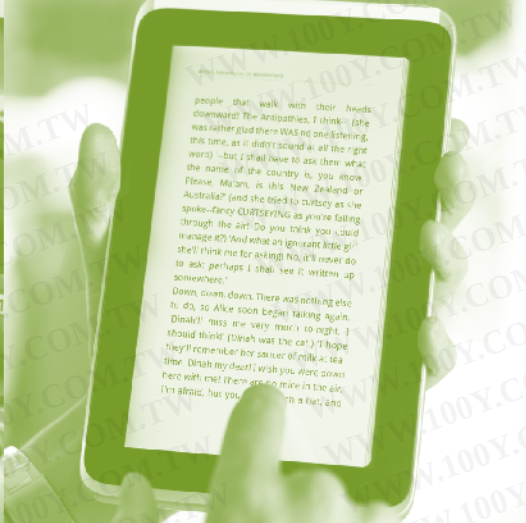
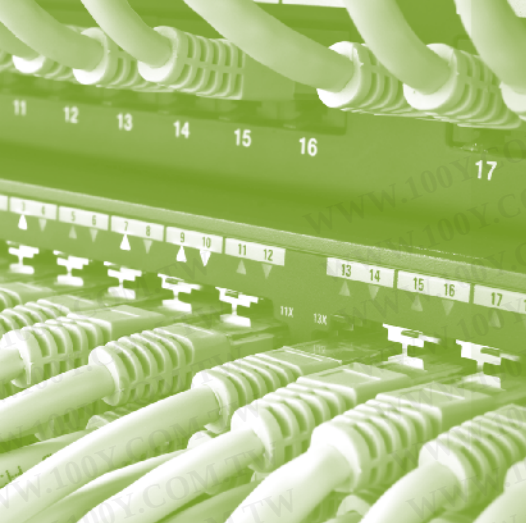
# MLV Product Selection Charts

## Ordering information for 0402 / 0603

| Global part number                                                                            |                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ordering example: VRS0402KR55R680N                                                            |                                                                                                                                                                                                                                   |
| Series name (code 1-2)<br>VR = Varistor                                                       | Process code (code 16)<br>N = Normal<br>S = ESD up to 15 kV                                                                                                                                                                       |
| Chip type (code 3)<br>S = Single chip                                                         | Capacitance value (code 13-15)<br>680 = 68 pF<br>(2 significant digits+number of zeros;<br>the 3rd digit signifies the multiplying<br>factor, and letter R is decimal point)<br>0 = x 1<br>1 = x 10 <sup>-1</sup>                 |
| Size code (code 4-7)<br>0402<br>0603                                                          | Working voltage (code 10-12)<br>33R = 3.3 V<br>55R = 5.5 V<br>090 = 9 V<br>110 = 11 V<br>120 = 12 V<br>140 = 14 V<br>150 = 15 V<br>160 = 16 V<br>180 = 18 V<br>220 = 22 V<br>260 = 26 V<br>300 = 30 V<br>310 = 31 V<br>380 = 38 V |
| Varistor voltage tolerance (code 8)<br>K = ±10%<br>L = ±15%<br>M = ±20 %<br>S = Special range |                                                                                                                                                                                                                                   |
| Packing style (code 9)<br>R = paper tape reel Ø7 inch                                         |                                                                                                                                                                                                                                   |

| Thickness classification and packing quantities |                               |                          |
|-------------------------------------------------|-------------------------------|--------------------------|
| Type                                            | Thickness classification (mm) | 8 mm tape width per reel |
|                                                 |                               | 180 mm / 7"              |
| 0402                                            | 0.50 ±0.05                    | Paper<br>10 000          |
| 0603                                            | 0.80 ±0.10                    | 4 000                    |





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