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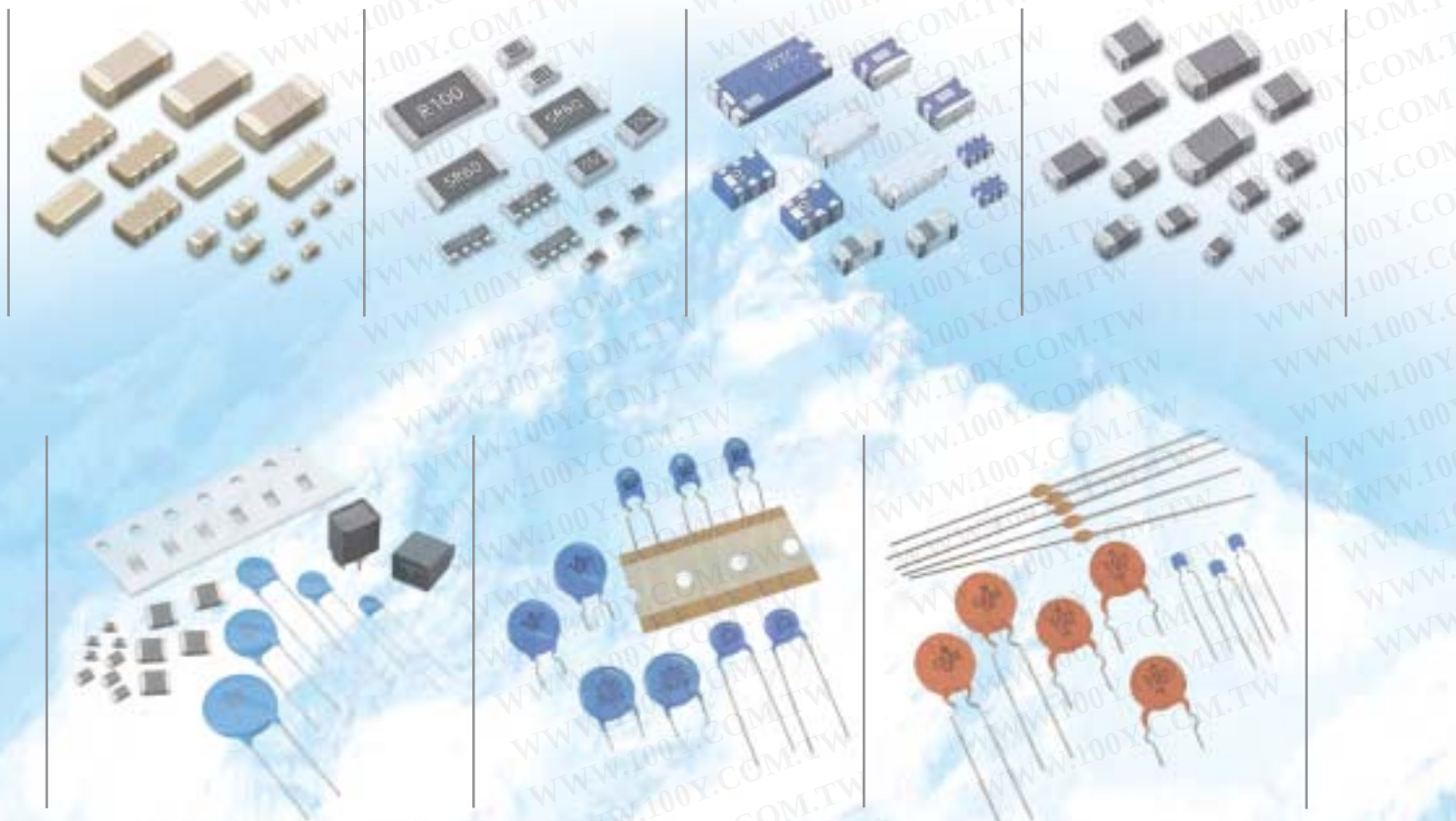
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Walsin Technology Corporation

Chip Resistors



Walsin Full Product Range

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MULTILAYER CERAMIC CAPACITORS (MLCC)



CHIP RESISTORS



FERRITE CHIP BEADS & INDUCTORS



HIGH FREQUENCY INDUCTORS & RF DEVICES



VARISTORS & SMD-VARISTORS



POSITIVE TEMPERATURE COEFFICIENT RESISTOR (PTCR)



INDEX

How to Order	1
Chip Resistors Selection Guide.....	2~3
General Purpose Chip Resistors ($1\Omega\sim10M\Omega$)	4
Low Ohmic Chip Resistors ($0.02\Omega\sim1\Omega$).....	5
Ultra Low Ohmic Sensing Chip Resistors ($0.01\Omega\sim0.002\Omega$)	6
Chip Resistors Array : Convex Termination.....	7
WA06W Chip Resistors Array 16P8R	8
Chip Resistors Array : Concave Termination	9
WT04X Chip Resistors Network	10
WA04P Chip Attenuator	11
Special Chip Resistors	12
WFxxY Series of Gold Terminations	12
WFxxG Series of High Ohmic Chip Resistors.....	12
WFxxM Series of Trimmable Chip Resistors	13
Precision Chip Resistors	13
Test and Requirements.....	14
Packing on Tape and Reel	15
Footprint Design.....	16

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Chip Resistors

How to Order

WR	06	X	1000	F	T	L
Type code R : Discrete 1~10MR	Size code 25 : 2512 (6432) 20 : 2010 (5025) 18 : 1218 (3248) 12 : 1206 (3216) 08 : 0805 (2012) 220ohm=221_ 04 : 0402 (1005) 02 : 0201 (0603)	Functional code X : Normal W : 1% for < 10ohm and >1Mohm	Resistance E24 : 2 significant digits followed by No. of zeros and a blank e.g.: 3ohm=3R0 10ohm=100_ 56Kohm=563_ (" " means blank) E96 : 3 significant digits followed by No. of zeros	Tolerance F : +/- 1% J : +/- 5% P : Jumper	Packaging code T : 7" reel taping Q : 10" reel taping G : 13" reel taping R : 0603 2mm pitch taping B : Bulk K : Bulkcase	Termination code _ = SnPb base (" " means blank) L = Sn base (Lead free) 06 : 0603 (1608)
WW	25	M	R002	F	T	L
Type code W : < 1ohm	Size code 25 : 2512 (6432) 20 : 2010 (5025) 18 : 1218 (3248) 12 : 1206 (3216) 08 : 0805 (2012) 06 : 0603 (1608) 04 : 0402 (1005)	Functional code X : Normal M : Sensing type L : Sensing type, wide termination W : Thick film low TCR type P : Power (2010 size=0.75 watt, 1206 size 0.5 watt, 0805 size 0.25 watt, 0603 size 0.125 watt)	Resistance "R" followed by 3 significant digits e.g.: 0.1ohm=R100 0.033ohm=R033 0.56ohm=R560	Tolerance F : +/- 1% G : +/- 2% J : +/- 5%	Packaging code T : 7" reel taping Q : 10" reel taping G : 13" reel taping B : Bulk K : BulkcaseK = Ni base	Termination code _ = SnPb base (" " means blank) L = Sn base (Lead free) G = Au base S = Ag base
WF	04	H	1001	B	T	L
Type code F : Special function	Size code 25 : 2512 (6432) 20 : 2010 (5025) 18 : 1218 (3248) 12 : 1206 (3216) 08 : 0805 (2012) 06 : 0603 (1608) 04 : 0402 (1005)	Functional code G : High ohmic (>10Mohm) H : Thick film, Precision tolerance <1% K : Thick film, TCR50ppm M : Trimmable P : Power (> WR and WW series) S : Surge T : Thin film, TCR50ppm U : Thin film, TCR25ppm V : High voltage W : Fillet less X : Special resistance Y : E24/E96 resistance with special termination (non SnPb or Sn base), ≥1%	Resistance E24 : 2 significant digits followed by No. of zeros and a blank e.g.: 3ohm=3R0 10ohm=100_ 220ohm=221_ 56Kohm=563_ (" " means blank) E96 : 3 significant digits followed by No. of zeros	Tolerance B : +/- 0.1% C : +/- 0.25% D : +/- 0.5% F : +/- 1% G : +/- 2% J : +/- 5% M : 0/- 20% K : 0/-30% P : Jumper	Packaging code T : 7" reel taping Q : 10" reel taping G : 13" reel taping B : Bulk K : BulkcaseK = Ni base	Termination code _ = SnPb base (" " means blank) L = Sn base (Lead free) G = Au base S = Ag base
WA	04	Y	103_	J	T	L
Type code A : Isolated Resistor Array	Size code 06 : 0603 (1608) 04 : 0402 (1005)	No. of element, term, style X : *4, convex Y : *2, convex W : *8, convex T : *4, concave P : *3, convex (Attenuator)	Resistance E24 : 2 significant digits followed by No. of zeros and a blank e.g.: 3ohm=3R0 10ohm=100_ 220ohm=221_ 56Kohm=563_ (" " means blank) E96 : 3 significant digits followed by No. of zeros	Tolerance F : +/- 1% J : +/- 5% P : Jumper	Packaging code T : 7" reel taping B : Bulk	Termination code _ = SnPb base (" " means blank) L = Sn base (Lead free)
WT	04	X	103_	J	T	L
Type code T : Bussed/Network Resistors	Size per elements 04: total package size 1206 (3216)	No. of element, term, style X : *8, convex	Resistance E24 : 2 significant digits followed by No. of zeros e.g.: 3ohm=3R0 10ohm=100_ 220ohm=221_ 56Kohm=563_ (" " means blank)	Tolerance J : +/- 5%	Packaging code T : 7" reel taping B : Bulk	Termination code _ = SnPb base (" " means blank) L = Sn base (Lead free)

Remark: 1. Detail product part number, functional code, tolerance combination,...please refer to specific data sheet.

2. Example: (" " means blank)

Chip-R 0805 size, 4.3ohm, 5% Normal type, SnPb termination, 5000pcs taped in reel: WR08X4R3_JT_

Chip-R 0805 size, 4.3ohm, 5% Normal type, Sn Lead free termination, 5000pcs taped in reel: WR08X4R3_JTL

Chip-R 0603 size, 100ohm, 5% Normal type, SnPb termination, 5000pcs taped in reel: WR06X101_JT_

Low ohmic Chip-R 2512 size, 0.1ohm, 1% Normal type, SnPb termination, 4000pcs taped in reel: WW25XR100FT_

Low ohmic Chip-R 2512 size, 0.1ohm, 1% Normal type, Sn Lead free termination, 4000pcs taped in reel: WW25XR100FTL

Chip-R array 0603x4, 10Kohm, 5% convex with SnPb termination, 5000pcs taped in reel: WA06X103_JT_

Chip-R 0402 size, 220ohm, Normal type, Gold termination, 5% 10,000pcs taped in reel: WF04Y221_JTG

Chip-R 0603 size, 0ohm, Normal type, SnPb termination, 5000pcs taped in reel: WR06X000_PT_

Chip Resistors

■ Chip Resistors Selection Guide

■ General Purpose Chip-R

Series	Size	Rated Power	TCR (ppm/°C)	Tolerance	Resistance
WR02X	0201 (0603)	1/20W	300	±1%	10W ~ 1MW
			300	±5%	
WR04X	0402 (1005)	1/16W	200	±1%	
			200*	±5%	
WR06X	0603 (1608)	1/10W	100	±1%	1W ~ 10MW
			200	±5%	
WR08X	0805 (2012)	1/8W	100	±1%	
			200	±5%	
WR12X	1206 (3216)	1/4W	100	±1%	
			200	±5%	
WR18X	1218 (3248)	1W	100	±1%	
			100	±5%	
WR20X	2010 (5025)	1/2W	200	±1%	
			200*	±5%	
WR25X	2512 (6432)	1W	200	±1%	
			200*	±5%	

Remark : 1. Means TCR200ppm@10W ~ 1MW. Detail resistance v.s. TCR and ordering code please refer to specific specifications.
 2. Pb free terminations upon customer requested.

■ Low Ohmic Chip-R

Series	Size	Rated Power	TCR (ppm/°C)	Tolerance	Resistance
WW25X	2512 (6432)	1W	£1500**	±1%	0.020W ~ 0.976W
				±5%	0.015W ~ 0.910W
WW18X	1218 (3248)	1W		±1%	0.020W ~ 0.976W
				±5%	0.015W ~ 0.910W
WW20X	2010 (5025)	1/2W		±1%	0.020W ~ 0.976W
				±5%	0.015W ~ 0.910W
WW12X	1206 (3216)	1/4W	£500**	±1%, ±2%, ±5%	0.020W ~ 0.976W
WW08X	0805 (2012)	1/8W		±1%, ±2%, ±5%	0.10W ~ 0.976W
WW06X	0603 (1608)	1/10W		±1%, ±2%, ±5%	0.10W ~ 0.976W
WW04X	0402 (1005)	1/16W		±1%, ±5%	0.10W ~ 0.976W
			£600**	±1%, ±5%	0.10W ~ 0.976W

Remark : 1. "*" Detail resistance v.s. TCR please refer to specification.
 2. Pb free terminations upon customer requested.

■ Ultra Low Ohmic Sensing Chip-R

Series	Size	Rated Power	TCR (ppm/°C)	Tolerance	Resistance
WW25M	2512 (6432)	1W	£100	±1%, ±5%	0.002W ~ 0.010W

■ Chip Resistors Array

Series	Size	Rated Power	TCR (ppm/°C)	Termination Type	Tolerance	Resistance
WA06X	1206 (0603x4)	1/10W	£200	Convex	±5%	10W ~ 1MW
WA04X	0805 (0402x4)	1/16W	£300	Convex	±5%	
WA04Y	0404 (0402x2)	1/16W	£300	Convex	±5%	
WA06T	1206 (0603x4)	1/10W	£200	Concave	±5%	
WA06W	1606 (0602x8)	1/16W	£200	Convex	±5%	10W ~ 100KW

Remark : Pb free terminations upon customer requested.

■ Chip Resistors Network

Series	Size	Rated Power	TCR (ppm/°C)	Termination Type	Tolerance	Resistance
WT04X	1206 (10P8R)	1/16W	£200	Convex	±5%	10W ~ 100KW

Remark : Pb free terminations upon customer requested.

Chip Resistors

■ Special Functionality Chip-R

Type	Series	Size	Rated Power	TCR (ppm/°C)	Tolerance	Resistance
Gold Termination	WF06Y	0603 (1608)	1/10W	100	±1%	10W ~ 1MW
				200	±5%	1W ~ 10MW
	WF04Y	0402 (1005)	1/16W	100	±1%	10W ~ 1MW
				200	±5%	1W ~ 10MW
High Ohmic	WF12G	1206 (3216)	1/4W	300	±5%	11MW ~ 30MW
	WF08G	0805 (2012)	1/8W			
	WF06G	0603 (1608)	1/16W			
Trimmable	WF20M	2010 (5025)	1/2W	200	0/-20% 0/-30%	1W ~ 10MW
	WF12M	1206 (3216)	1/4W			
	WF08M	0805 (2012)	1/8W			
	WF06M	0603 (1608)	1/10W			
High Precision	WF12H	1206 (3216)	1/4W	100	±0.1% ±0.5%	10W ~ 1MW
	WF08H	0805 (2012)	1/8W			
	WF06H	0603 (1608)	1/10W			
	WF04H	0402 (1005)	1/16W	200	±0.1% ±0.5%	10W ~ 1MW

Remark : Pb free terminations upon customer requested.

■ Chip Attenuator

Series	Size	Type	Termination Type	Tolerance	Attenuation	Impedance
WA04P	0402x2 (1005x2)	4p3R, p type	Convex	±0.2dB ~ 1dB	1dB ~ 10dB	50W

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Chip Resistors

General Purpose Chip Resistors (1Ω~10MΩ)

Feature

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly costs
4. Higher component and equipment reliability

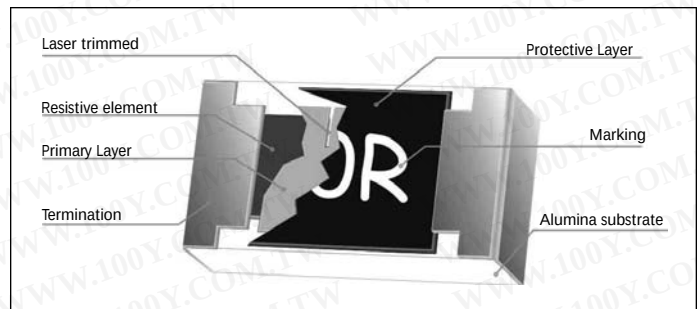
Description

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin or Tin solder alloy.

Application

1. Consumer electrical equipment, PDA, Digital Camcorder, ...
2. EDP, Computer application
3. Mobile phone, Telecom
4. Power supply, Battery charger, DC-DC power converter
5. Digital meter
6. Automotives



Quick Reference Data

Series No.	WR25X	WR20X	WR18X	WR12X	WR08X	WR06X	WR04X	WR02X
Size Code	2512 (6432)	2010 (5025)	1218 (3248)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)	0201 (0603)
Resistance Range	1W ~ 10MW, 0W			1W ~ 10MW, 0W			10W ~ 1MW, 0W	
±5% Tolerance (E24)	Ditto			10W ~ 1MW				
±1% Tolerance (E24+E96)								
TCR (ppm/°C)								
>10W	£ ± 200			£ ± 200			£ ± 300	
£10W	£ ± 300			-300 ~ +500			-	
Max. dissipation @ Tamb=70°C	1.0 Watt	1/2 Watt	1.0 Watt	1/4 Watt	1/8 Watt	1/10 Watt	1/16 Watt	1/20 Watt
Max. Operation Voltage (DC or RMS)	250V	200V	200V	200V	150V	50V	50V	15V
Climatic category (IEC 60068)	55/155/56							55/125/56
Basic Specification	JIS C 5202 / IEC 60115-1							

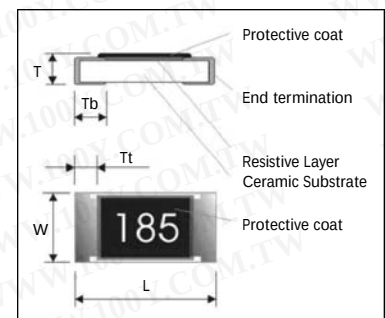
Note :

1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by
 $RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$ or Max. RCWV listed above, whichever is lower.
3. Lead Free (Pb free) products are upon customer request.
4. The resistance range 1 ~ 10W and 1M ~ 10MW with 1% tolerance please refer to WR12W / WR08W / WR06W / WR04W series specification.

Physical Dimensions

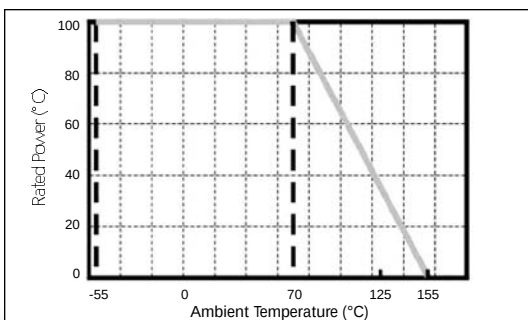
Unit: mm

Size	2512(6432)	2010(5025)	1218(3248)	1206(3216)	0805(2012)	0603(1608)	0402(1005)	0201(0603)
L	6.40±0.20	5.00±0.20	3.05±0.15	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10	1.00 ± 0.05	0.60 ± 0.03
W	3.20±0.20	2.50±0.20	4.60±0.20	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10	0.50 ± 0.05	0.30 ± 0.03
T	0.60±0.10	0.55±0.10	0.55±0.10	0.60 ± 0.15	0.50 ± 0.15	0.45 ± 0.15	0.35 ± 0.05	0.25 ± 0.05
Tb	0.90±0.25	0.60±0.25	0.50±0.25	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.15	0.25 ± 0.10	0.15 ± 0.05
Tt	0.65±0.25	0.65±0.25	0.45±0.25	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10	0.20 ± 0.10	0.15 ± 0.05

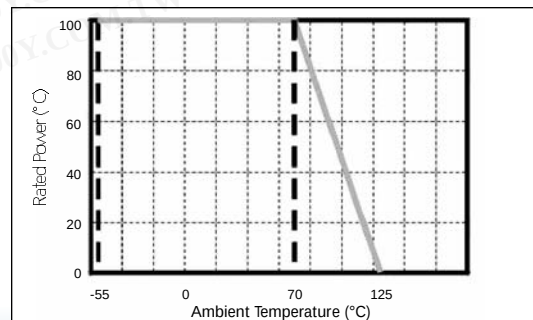


Power Deration Curve

For resistors operated in ambient temperature over 70°C, power rating should be derated in accordance with the following figures.



For Climatic category (IEC 60068) 55/155/56



For Climatic category (IEC 60068) 55/125/56

Low Ohmic Chip Resistors (0.02Ω~1Ω)

Function For Low Ohmic Chip Resistors

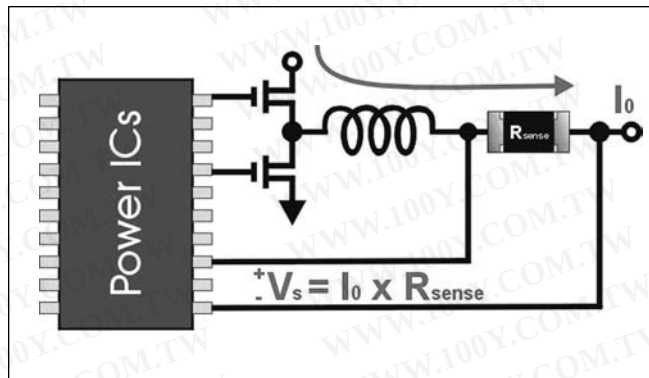
The low ohmic resistors are used to sense output current in power supply, automotive and engine control management system, and other power sensing application. As shows in figure below, the typical function of low ohmic (power) chip resistor is to be a current sensor (R_{sense}) to generate the sensing voltage (V_s) for the purpose of feedback control when output current (I_o) passed on it. The sensing voltage be treated as a signal to trigger the switches (CMOS) ON/OFF duration so that to monitor and/or adjust the output current from inductor.

Simplify to say, $V_s = I_o \times R_{sense}$.

On general case, this feedback voltage is setting around 100mV for considering both on power saving and noise robustness. To sense a 5 ampere average output current, the R_{sense} resistance value therefore be required as $100\text{mV} / 5\text{A} = 20\text{m}\Omega$, the power dissipation will be :

$$P = I^2 \times R = 5\text{A}^2 \times 20\text{m}\Omega = 0.5\text{ Watt}$$

A low ohmic chip resistor with a power rating of 1.0 watt is recommended on this application in case the power safety margin is taken into account.



Quick Reference Data

Series No.	WW25X	WW20X	WW18X	WW12X	WW08X	WW06X	WW04X
Size code	2512 (6432)	2010 (5025)	1218 (3248)	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	$\pm 5\%, \pm 1\%$			$\pm 5\%, \pm 2\%, \pm 1\%$		$\pm 5\%, \pm 1\%$	
Resistance Range	0.015W ~ 0.976W			0.020W ~ 0.976W		0.100W ~ 0.976W	
TCR (ppm/°C)							
0.02W $\epsilon R_n < 0.05\text{W}$							
0.05W $\epsilon R_n < 0.10\text{W}$							
0.10W $\epsilon R_n < 0.50\text{W}$							
0.50W $\epsilon R_n < 1\text{W}$							
Max. dissipation at $T_{amb}=70^\circ\text{C}$	1 Watt	0.5 Watt	1 Watt	1/4 Watt	1/8 Watt	1/10 Watt	1/16 Watt
Max. Operation Voltage ^① (DC or RMS)	250V	200V	200V	200V	100V	50V	50V
Climatic category (IEC 60068)	55/155/56						55/125/56
Basic Specification	JIS C 5202 / IEC 60115-1						

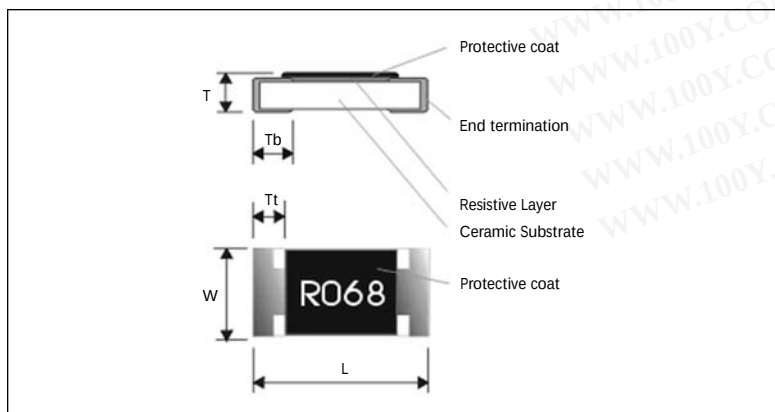
Note :

1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Tolerance of TCR= $\pm 200\text{ppm}/^\circ\text{C}$
3. Power derating curve, and detail specification please refer to specific data sheets.
4. Lead Free (Pb free) products are available upon customer's request.

Physical Dimensions

Unit: mm

Size	2512(6432)	2010(5025)	1218(3248)	1206(3216)	0805(2012)	0603(1608)	0402(1005)
L	6.40 ± 0.20	5.00 ± 0.20	3.05 ± 0.15	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10	1.00 ± 0.05
W	3.20 ± 0.20	2.50 ± 0.20	4.60 ± 0.20	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10	0.50 ± 0.05
T	0.60 ± 0.10	0.55 ± 0.10	0.55 ± 0.10	0.60 ± 0.15	0.50 ± 0.15	0.45 ± 0.15	0.35 ± 0.05
Tb	0.90 ± 0.25	0.60 ± 0.25	0.50 ± 0.25	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.15	0.25 ± 0.10
Tt	0.65 ± 0.25	0.65 ± 0.25	0.45 ± 0.25	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10	0.20 ± 0.10

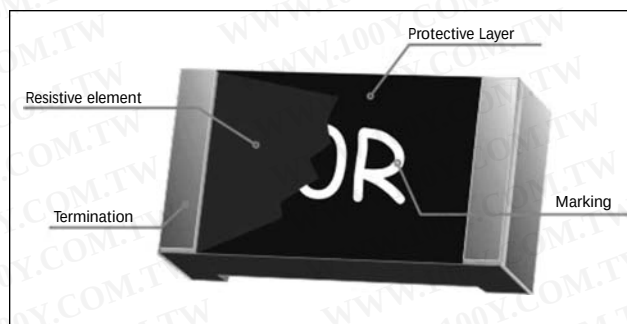


Chip Resistors

Ultra Low Ohmic Sensing Chip Resistors (0.01Ω~0.002Ω)

Description

The resistors are constructed in a high grade low resistive metal body. The resistive layer is covered with a protective coat and printed a resistance marking code over it. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin alloy, lead free terminations are available upon customer's request.



Quick Reference Data

Item	General Specification	
Series No.	WW25M	
Size code	2512 (6432)	
Resistance Tolerance	±5%	±1%
Resistance Range	0.01W ~ 0.002W, any value	
TCR (ppm/°C)	£ 100 ppm/°C	
Max. dissipation at T _{amb} =70°C	1 W	
Max. Operation Voltage (DC or RMS)	250V	
Max. Overload Voltage (DC or RMS)	500V	
Climatic category (IEC 60068)	55/155/56	

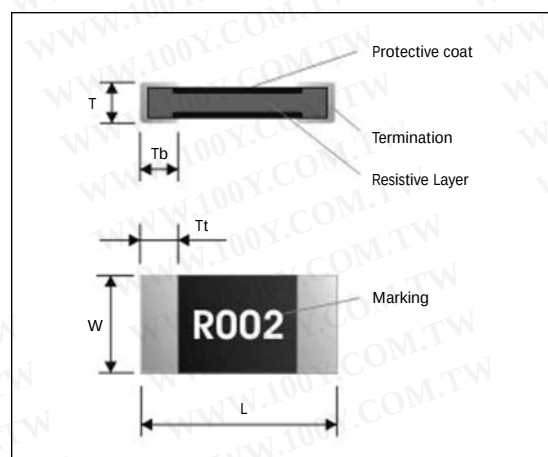
Note :

1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Power derating curve, and detail specification please refer to specific data sheets.
3. Lead Free (Pb free) products are available upon customer's request.

Physical Dimensions

Unit: mm

Symbol	Dimensions
L	6.40±0.20
W	3.20±0.20
T	0.60±0.10
Tt	0.65±0.25
Tb	0.65±0.25



■ Chip Resistors Array : Convex Termination

■ Feature

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly cost and higher surface mounted efficiency
4. Higher component and equipment reliability

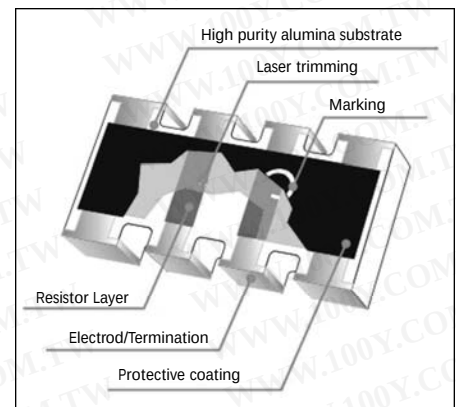
■ Application

1. Consumer electrical equipment, PDA, Digital Camcorder, ...
2. EDP, Computer application
3. Mobile phone, Telecom
4. DIMM

■ Description and Physical Dimensions

The resistors array is constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

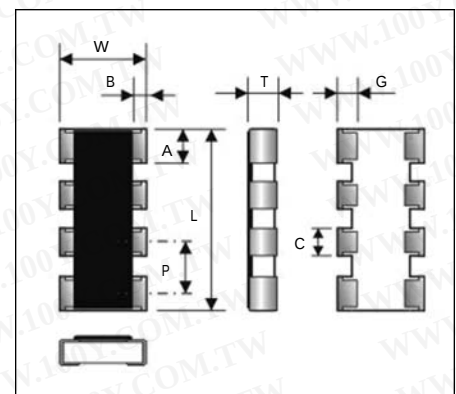
The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin or Tin solder alloy. Marking code description is depended on component size and tolerance. Following figure shown the construction of a Chip-R array.



■ Physical Dimensions

Unit: mm

Type	WA06X	WA04X	WA04Y
L	3.20 ± 0.10	2.00 ± 0.10	1.00 ± 0.10
W	1.60 ± 0.10	1.00 ± 0.10	1.00 ± 0.10
T	0.50 ± 0.10	0.45 ± 0.10	0.35 ± 0.10
P	0.80 ± 0.10	0.50 ± 0.05	0.65 ± 0.10
A	0.60 ± 0.10	0.4 ± 0.10	0.34 ± 0.10
B	0.30 ± 0.10	0.20 ± 0.10	0.20 ± 0.15
C	0.40 ± 0.10	0.30 ± 0.05	-
G	0.30 ± 0.20	0.25 ± 0.10	0.25 ± 0.17



■ Quick Reference Data

Series No.	WA06X	WA04X	WA04Y
Size	0603x4 (1608x4)	0402x4 (1005x4)	0402x2 (1005x2)
Termination construction	8p4R, Convex	8p4R, Convex	4p2R, Convex
Resistance Tolerance	±5% (E24 series)		
Resistance Range	10W ~ 1MW (E24 series), Jumper (0W)		
TCR (ppm/°C)	£ ± 200 ppm/°C	£ ± 300 ppm/°C	£ ± 300 ppm/°C
Max. dissipation at T _{amb} =70°C	1/10 Watt	1/16 Watt	1/16 Watt
Max. Operation Voltage (DC or RMS)	50V	25V	25V
Max. overload voltage	100V	50V	50V
Climatic category (IEC 60068)	55/155/56		
Basic Specification	JIS C 5202 / IEC 60115-1		
Circuit Mode : R1=R2(=R3=R4)			

Note :

1. Power derating curve, and detail specification please refer to specific data sheets.
2. Lead Free (Pb free) products are available upon customer's request.

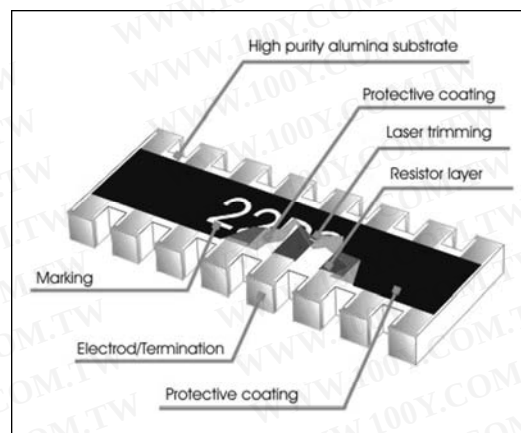
Chip Resistors

WA06W Chip Resistors Array 16P8R

Description

The resistors array is constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin or Tin (Pb free) solder alloy.



Quick Reference Data

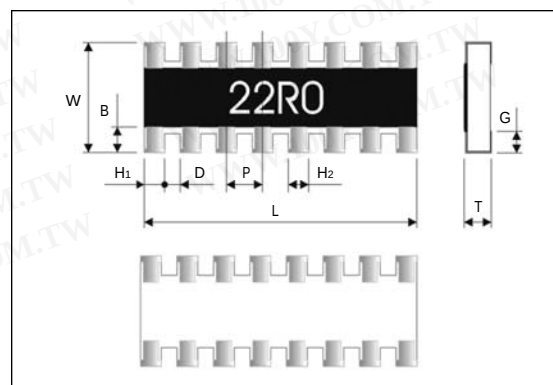
Item	General Specification
Series No.	WA06W
Size	1606 (0602x8)
Termination construction	Convex type
Resistance Tolerance	±5% (E24 series)
Resistance Range	10W~ 100KW, Jumper (0W)
TCR (ppm/°C)	± 200 ppm/°C
Max. dissipation at T _{amb} =70°C	1/16 W
Max. Operation Voltage (DC or RMS)	25V
Max. overload voltage	50V
Climatic category (IEC 60068)	55/125/56
Circuit Mode	 R1=R2=R3=R4=R5=R6=R7=R8

Note :
 1. Power derating curve, and detail specification please refer to specific data sheets.
 2. Lead Free (Pb free) products are available upon customer's request.

Physical Dimensions

Unit: mm

	WA06W
L	4.00 ± 0.20
W	1.60 ± 0.15
T	0.45 ± 0.10
B	0.30 ± 0.20
G	0.30 ± 0.20
D	0.20 ± 0.10
P	0.50 ± 0.20
H1	0.40 ± 0.20
H2	0.30 ± 0.10



Chip Resistors

■ Chip Resistors Array : Concave Termination

■ Feature

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly costs and higher surface mounted efficiency
4. Higher component and equipment reliability
5. Strong body and terminations
6. Excellence performance in surface mounting assembly.

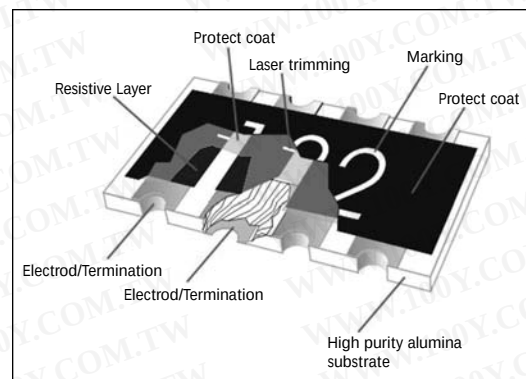
■ Application

1. Consumer electrical equipment, PDA, Digital Camcoder, ...
2. EDP, Computer application
3. Mobile phone, Telecom
4. DIMM

■ Description

The resistors array is constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin or Tin solder alloy. Marking code description is depended on component size and tolerance. Following figure shown the construction of a Chip-R array.



■ Quick Reference Data

Item	General Specification	
Series No.	WA06T	
Size	0603x4 (1608x4)	
Termination construction	Concave type	
Resistance Tolerance	±5% (E24 series)	
Resistance Range	10W~ 1MW, Jumper (0W)	
TCR (ppm/°C)	E ± 200 ppm/°C	
Max. dissipation at T _{amb} =70°C	1/16 W	
Max. Operation Voltage (DC or RMS)	50V	
Max. overload voltage	100V	
Climatic category (IEC 60068)	55/125/56	
Circuit Mode	R1=R2=R3=R4	
	L	3.20 +0.20/-0.10 mm
	W	1.60 +0.20/-0.10 mm
	T	0.60 ± 0.20 mm
	P	0.80 ± 0.10 mm
	A	0.60 ± 0.15 mm
	B	0.35 ± 0.15 mm
	C	0.50 ± 0.15 mm
	G	0.50 ± 0.15 mm

Note :

1. Power derating curve, and detail specification please refer to specific data sheets.
2. Lead Free (Pb free) products are available upon customer's request.

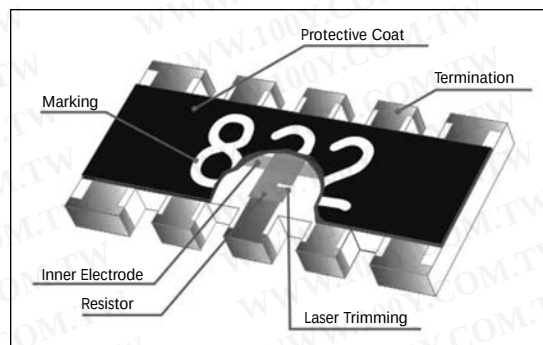
Chip Resistors

WT04X Chip Resistors Network

Description

The resistors array is constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance by laser cutting of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead-tin solder alloy.



Quick Reference Data

Item	General Specification
Series No.	WT04X
Size	1206 (3216)
Termination construction	Convex type
Resistance Tolerance	±5% (E24 series)
Resistance Range	10W ~ 100KW
TCR (ppm/°C)	± 200 ppm/°C
Max. dissipation at T _{amb} =70°C	1/16 Watt
Max. Operation Voltage (DC or RMS)	25V
Max. overload voltage	50V
Climatic category (IEC 60068)	55/155/56
Basic Specification	JIS C 5202 / IEC 60115-1
Circuit Mode Resistor elements on pin1~pin4, pin6~pin9; R1=R2=R3=R4=R6=R7=R8=R9 pin5 and pin10 common (Grounded).	

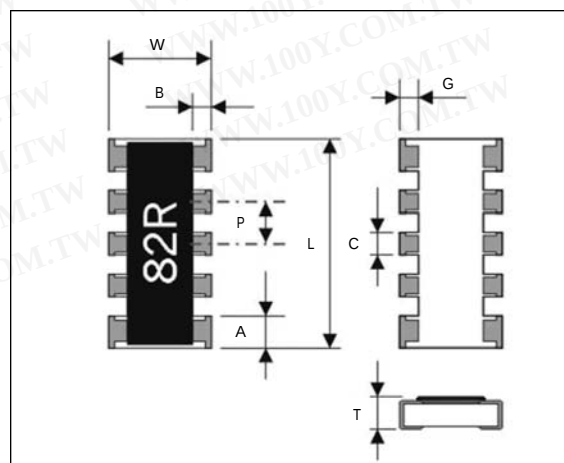
Note :

1. Power derating curve, and detail specification please refer to specific data sheets.
2. Lead Free (Pb free) products are available upon customer's request.

Physical Dimensions

Unit: mm

	WT04X
L	3.30 ± 0.20
W	1.60 ± 0.15
T	0.55 ± 0.10
P	0.64 ± 0.05
A	0.50 ± 0.05
B	0.40 ± 0.15
C	0.40 ± 0.15
G	0.40 ± 0.15



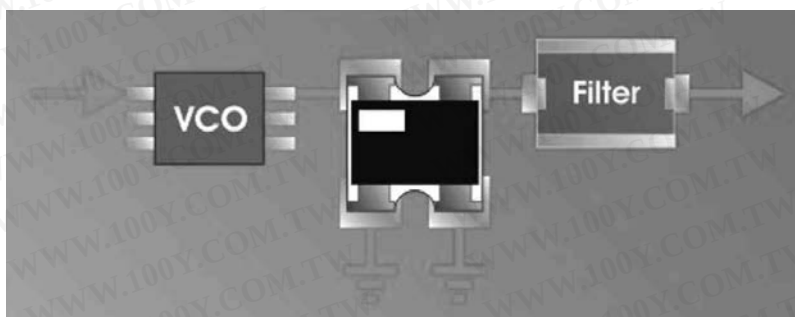
Chip Resistors

WA04P Chip Attenuator

Typical Application of Chip Attenuator

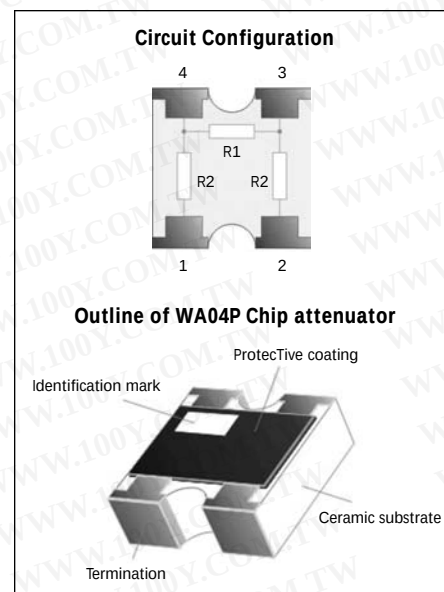
WA04	P	001	X	B	T	—
Size code	Type code	Attenuation code	Impedance	Tolerance	Packaging code	Termination code
WA04: 0402 per element	P: convex, p type attenuator	001=1dB 002= 2dB 003= 3dB 004= 4dB 005= 5dB 006=6dB 010= 10dB	X: 50W	A: $\pm 0.2\text{dB}$ B: $\pm 0.3\text{dB}$ C: $\pm 0.5\text{dB}$ D: $\pm 1.0\text{dB}$	T: 7" reel taped	_ = SnPb base ("_" means a blank) L= Sn base (lead free)

p-Type Attenuator (-6dB, 50W) for VSWR improvement and output frequency level matching on VCO application.



Quick Reference Data

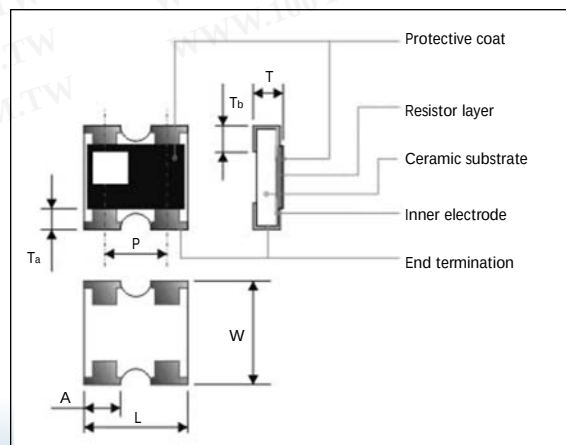
Item	General Specification
Series No.	WA04P
Size	0402x2 (1005x2)
Termination construction	Convex type
Attenuation Range	1dB, 2dB, 3dB, 4dB, 5dB, 6dB, 10dB
Attenuation Tolerance	
1dB ~ 5dB	$\pm 0.3\text{dB}$
6dB ~ 10dB	$\pm 0.5\text{dB}$
Characteristic impedance	50W
Rated power at $T_{\text{amb}}=70^{\circ}\text{C}$	0.04 W / package
Limiting voltage (DC)	50V
Frequency range (DC)	Max. 2GHz
VSWR (Voltage Standing Wave Ratio)	Max. 1.3
Number of Resistors	3 resistors
Number of Terminals	4 terminals
Climatic category (IEC60068)	55/125/56



Physical Dimensions

Unit: mm

	WA04P
L	1.00 ± 0.10
W	1.00 ± 0.10
T	0.35 ± 0.10
P	0.65 ± 0.10
A	0.34 ± 0.10
Ta	0.20 ± 0.15
Tb	0.25 ± 0.17



Chip Resistors

Special Chip Resistors

Feature

1. Provided gold terminations (WFxxD series) provide special application for hybrid board gluing & can replace Pd/Ag terminations
2. Provided ultra high ohmic resistance (WFxxG series) upto 30Mohm for special application
3. Provided trimmable resistors (WFxxM series) for customer special tolerance requirement.
4. Provided precision tolerance (WFxxH) to $\pm 0.1\%$ and TCR down to 50ppm/ $^{\circ}\text{C}$ (WF12K) for voltage sensing application.
5. High reliability and stability
6. Reduced size of final equipment
7. Lower assembly costs
8. Higher component and equipment reliability.
9. Special resistance, tolerance are available upon customer's request.

WFxxY Series of Gold Terminations

Feature

1. High reliability and stability
2. Gold terminations provide special application for hybrid board gluing & can replace Pd/Ag terminations
3. Miniature size 0603(1608) and 0402(1005)

Quick Reference Data

Series No.	WF06YxxxxxxG	WF04YxxxxxxG
Size code	0603 (1608)	0402 (1005)
Resistance Tolerance	$\pm 1\%$ (E96 series), $\pm 5\%$ (E24 series)	
Resistance Range	1W~10MW ($\pm 5\%$ tolerance), 10W~1MW ($\pm 1\%$ tolerance)	
TCR (ppm/ $^{\circ}\text{C}$)	± 200 ppm/ $^{\circ}\text{C}$	
$\geq 10\text{W}$ $\pm 5\%$ Tolerance	± 200 ppm/ $^{\circ}\text{C}$	± 200 ppm/ $^{\circ}\text{C}$
$\geq 10\text{W}$ $\pm 1\%$ Tolerance	± 100 ppm/ $^{\circ}\text{C}$	± 200 ppm/ $^{\circ}\text{C}$
$< 10\text{W}$	-300~+500 ppm/ $^{\circ}\text{C}$	300ppm/ $^{\circ}\text{C}$ ~ +500 ppm/ $^{\circ}\text{C}$
Max. dissipation at $T_{\text{amb}}=70^{\circ}\text{C}$	1/10 Watt	1/16 Watt
Max. Operation Voltage (DC or RMS)	50V	50V
Climatic category (IEC 60068)	55/125/56	
Basic Specification	JIS C 5202 / IEC 60115-1	

(Detail specification please refer to specific data sheets)

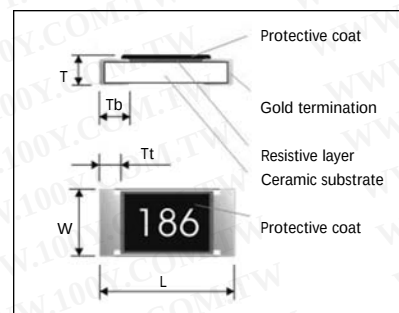
Application

1. Automotive application
2. Consumer electrical equipment
3. EDP, Computer application
4. Telecom application

Physical Dimensions

Unit: mm

	WF06Y	WF04Y
L	1.60 ± 0.10	1.00 ± 0.05
W	0.80 ± 0.10	0.50 ± 0.05
T	0.45 ± 0.15	0.35 ± 0.05
Tb	0.30 ± 0.20	0.25 ± 0.10
Tt	0.30 ± 0.10	0.20 ± 0.10



WFxxG Series of High Ohmic Chip Resistors

Quick Reference Data

Series No.	WF12G	WF08G	WF06G	WF04G
Size code	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Range and tolerance $\pm 5\%$ tolerance	10MW < R $\leq$ 30MW (E24 series)			
TCR (ppm/ $^{\circ}\text{C}$)	± 300 ppm/ $^{\circ}\text{C}$			
Max. dissipation at $T_{\text{amb}}=70^{\circ}\text{C}$	1/4 Watt	1/8 Watt	1/10 Watt	1/16 Watt
Max. Operation Voltage (DC or RMS)	200V	150V	50V	50V
Climatic category (IEC 60068)	55/125/56			
Basic Specification	JIS C 5202 / IEC 60115-1			

(Detail specification please refer to specific data sheets)

Physical Dimensions

Unit: mm

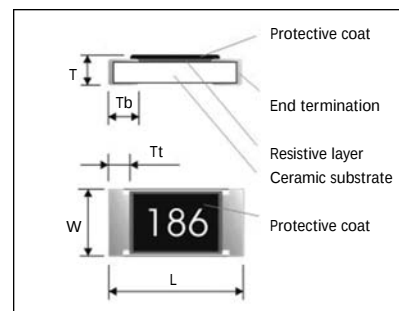
	WF12G	WF08G	WF06G	WF04G
L	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10	1.00 ± 0.05
W	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10	0.50 ± 0.05
Tt	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10	0.20 ± 0.10
Tb	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.20	0.25 ± 0.10
T	0.65 ± 0.15	0.50 ± 0.15	0.45 ± 0.15	0.35 ± 0.05

Feature

1. High precision, reliability and stability
2. Miniature size to 0603(1608)
3. Small and stable TCR

Application

1. Power supply
2. Digital meter
3. Measuring instruments
4. EDP, Computer application



WFxxM Series of Trimmable Chip Resistors

Feature

1. High precision, reliability and stability
2. Miniature size to 0603(1608)

Description

The resistors are constructed on a high-grade ceramic body (aluminum oxide). Internal metal electrodes are added at each and connected by a resistive paste, which is applied to the substrate. The composition of the paste is adjusted to give the approximate resistance required.

The resistive layer is converted with a transparent protective coating. Finally the two external end terminations are added. For case of soldering the outer of theses end terminations is a lead-tin alloy.

Physical Dimensions

Unit: mm

	WF20M	WF12M	WF08M	WF06M
L	5.00 ± 0.20	3.10 ± 0.10	2.00 ± 0.10	1.60 ± 0.10
W	2.50 ± 0.20	1.60 ± 0.10	1.25 ± 0.10	0.80 ± 0.10
T	0.55 ± 0.15	0.60 ± 0.15	0.50 ± 0.15	0.45 ± 0.15
Tb	0.65 ± 0.25	0.45 ± 0.20	0.40 ± 0.20	0.30 ± 0.20
Tt	0.60 ± 0.25	0.50 ± 0.20	0.40 ± 0.20	0.30 ± 0.10

Quick Reference Data

Series No.	WF20M	WF12M	WF08M	WF06M
Size code	2010 (5025)	1206 (3216)	0805 (2012)	0603 (1608)
Resistance Tolerance	0/-20% and 0/-30% (E24 series)			
Resistance Range	1W ~ 10MW			
TCR (ppm/°C)	≥10W £ ± 200 ppm/°C <10W -300~+500 ppm/°C			
Max. dissipation at T _{amb} =70°C	1/2Watt	1/4 Watt	1/8Watt	1/10Watt
Max. Operation Voltage (DC or RMS)	200V	200V	100V	50V
Climatic category (IEC 60068)	55/125/56			
Basic Specification	JIS C 5202 / IEC 60115-1			

Precision Chip Resistors

Narrow Tolerance WFxxH Series

Quick Reference Data

Series No.	WF12H	WF08H	WF06H	WF04H
Size code	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	±0.5%, ±0.1%			
Resistance Range	10W ~ 1MW (E96+E24 series)			
TCR (ppm/°C) 10WER £ 1MW	£ ± 100 ppm/°C			
Max. dissipation at T _{amb} =70°C	1/4 Watt	1/8 Watt	1/10 Watt	1/16Watt
Max. Operation Voltage (DC or RMS)	200V	100V	50V	50V
Climatic category (IEC 60068)	55/155/56			
Basic Specification	JIS C 5202 / IEC 60115-1			

(Detail specification please refer to specific data sheets)

Narrow Tolerance WFxxT Series

Quick Reference Data

Series No.	WF12T	WF08T	WF06T	WF04T
Size code	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	± 0.5%, ± 0.1%			
TCR (ppm/°C)	£ 50 ppm/°C			
Max. dissipation at T _{amb} =70°C	1/8 Watt	1/10 Watt	1/16 Watt	1/20 Watt
Max. Operation Voltage (DC or RMS)	200V	100V	50V	50V
Climatic category (IEC 60068)	55/155/56			
Basic Specification	JIS C 5202 / IEC 60115-1			

(Detail specification please refer to specific data sheets)

Narrow Tolerance WFxxU Series

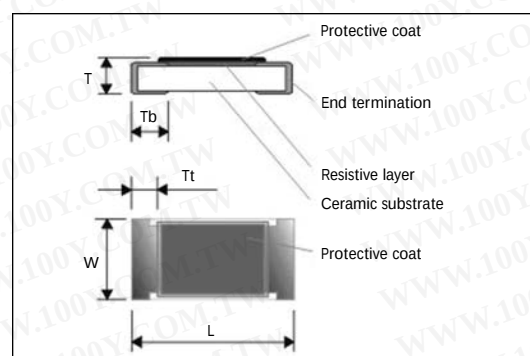
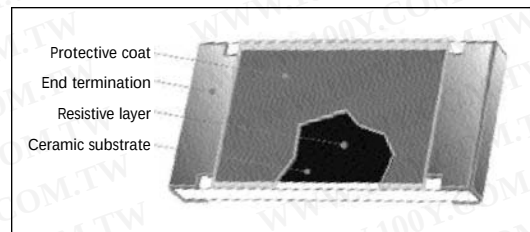
Quick Reference Data

Series No.	WF12U	WF08U	WF06U	WF04U
Size code	1206 (3216)	0805 (2012)	0603 (1608)	0402 (1005)
Resistance Tolerance	± 0.5%, ± 0.1%			
TCR (ppm/°C)	£ 25 ppm/°C			
Max. dissipation at T _{amb} =70°C	1/8 Watt	1/10 Watt	1/16 Watt	1/20 Watt
Max. Operation Voltage (DC or RMS)	200V	100V	50V	50V
Climatic category (IEC 60068)	55/155/56			
Basic Specification	JIS C 5202 / IEC 60115-1			

(Detail specification please refer to specific data sheets)

Application

1. Digital meter
2. LED display module
3. Measuring instruments
4. Automotive



Trimming Conditions

Please refer to specific data sheet.

Typical Resistance Change

The resistors can meet the specification in long time stability test for 1000 hours, no load at 125°C

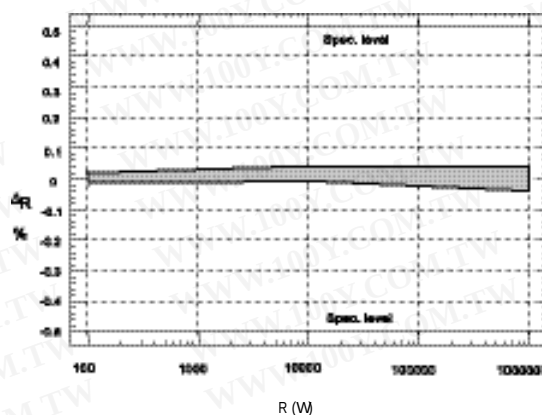


Figure. WFxxK series Resistance changed after 1000hrs, no load@125°C

Chip Resistors

Test and Requirements

For WR Series, WA Series, and WT Series

(Detail please refer to specific data sheet)

Test	Procedure / Test Method	Requirement	
		Resistor	Jumper
DC resistance	JIS C 5202 5.1 / IEC 60115-1 4.5 DC resistance values measured at the test voltages specified below : <10W@0.1V, <100W@0.3V, <1KW@1.0V, <10KW@3V, <100KW@10V, <1MW@25V, <10MW@30V	Within the specified tolerance	< 50mW
Temperature Coefficient of Resistance	JIS C 5202 5.2 / IEC 60115-1 4.8.4.2 $\frac{R_2 - R_1}{R_1 (t_2 - t_1)} \times 10^6 \quad (\text{ppm}/^\circ\text{C})$ R1 : Resistance at reference temperature R2 : Resistance at test temperature t1 : room temperature; t2 : LCT or UCT	Within the specified TCR	N/a
Short Time Overload	JIS C 5202 5.5 / IEC 60115-1 4.13 Permanent resistance change after a 5sec application of a voltage $2.5 \times U_R$ or max. overload voltage, whichever is less.	D R/R max. $\pm(2\%+0.10W)$	< 50mW
Resistance to Solder Heat	JIS C 5202 6.4 / IEC 60115-1 4.18 Unmounted chip with a solder bath, $260^\circ\text{C} \pm 5^\circ\text{C}$, 10 ± 1 sec	D R/R max. $\pm(1\%+0.05W)$	< 50mW
Solderability	JIS C 5202 6.5 / IEC 60115-1 4.17 Termination SnPb base : Unmounted chips completely immersed for 2 ± 0.5 sec. in a solder bath at $230 \pm 5^\circ\text{C}$ Termination Sn base (lead free) : Unmounted chip completely immersed in a lead free solder bath, $245^\circ\text{C} \pm 5^\circ\text{C}$, 3 ± 1 sec	95% coverage min., good tinning and no visible damage	
Leaching Test	JIS C 5202 6.4 / IEC 60115-1 4.18 Unmounted chip with a solder bath, $260^\circ\text{C} \pm 5^\circ\text{C}$, 60 ± 1 sec	Ditto	
Temperature Cycling	JIS C 5202 7.4 / IEC 60115-1 4.19 30min at LCT, 30min at UCT, 5 cycles	D R/R max. $\pm(1\%+0.05W)$	< 50mW
Damp heat (Humidity loaded in steady state)	JIS C 5202 7.9 1000+48/-0 hours@ $40 \pm 2^\circ\text{C}$, 90~95% RH; loaded with Pn or Vmax; 1.5 hours ON, 0.5 hours OFF	10W/R<1MW : D R/R max. $\pm(3\%+0.10W)$ R<10W, R≥1MW : D R/R max. $\pm(5\%+0.10W)$	< 50mW
Load Life (Endurance)	JIS C 5202 7.10 / IEC 60115-1 4.25.1 1000+48/-0 hours@ $70 \pm 2^\circ\text{C}$; loaded with Pn or Vmax; 1.5 hours ON, 0.5 hours OFF	Ditto	Ditto
Bending	JIS C 5202 6.1.4 / IEC 115-1 4.33 Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once or 10sec : >2mm for 2512 and 2010; >3mm for 1206, 0805, 0603, and 0402	No visual damaged, D R/R max. $\pm(1\%+0.05W)$	< 50mW

For WWxxX Series

(Detail please refer to specific data sheet.)

Test	Procedure / Test Method	Requirement	
		Resistor	Jumper
Temperature Coefficient of Resistance	JIS C 5202 5.2 / IEC 60115-1 4.8.4.2 $\frac{R_2 - R_1}{R_1 (t_2 - t_1)} \times 10^6 \quad (\text{ppm}/^\circ\text{C})$ R1 : Resistance at reference temperature R2 : Resistance at test temperature t1 : room temperature; t2 : LCT or UCT	Within the specified TCR	
Short Time Overload	JIS C 5202 5.5 / IEC 60115-1 4.13 Permanent resistance change after a 5sec application of a voltage $2.5 \times U_R$ or max. overload voltage, whichever is less.	D R/R max. $\pm(2\%+0.005W)$	
Resistance to Solder Heat	JIS C 5202 6.4 / IEC 60115-1 4.18 Unmounted chip with a solder bath, $260^\circ\text{C} \pm 5^\circ\text{C}$, 10 ± 1 sec	D R/R max. $\pm(1\%+0.005W)$	
Solderability	JIS C 5202 6.5 / IEC 60115-1 4.17 Termination SnPb base : Unmounted chips completely immersed for 2 ± 0.5 sec. in a solder bath at $230 \pm 5^\circ\text{C}$ Termination Sn base (lead free) : Unmounted chip completely immersed in a lead free solder bath, $245^\circ\text{C} \pm 5^\circ\text{C}$, 3 ± 1 sec	95% coverage min., good tinning and no visible damage	
Leaching Test	JIS C 5202 6.4 / IEC 60115-1 4.18 Unmounted chip with a solder bath, $260^\circ\text{C} \pm 5^\circ\text{C}$, 60 ± 1 sec	Ditto	
Temperature Cycling	JIS C 5202 7.4 / IEC 60115-1 4.19 30min at LCT, 30min at UCT, 5 cycles	D R/R max. $\pm(1\%+0.005W)$	
Damp heat (Humidity loaded in steady state)	JIS C 5202 7.9 1000+48/-0 hours@ $40 \pm 2^\circ\text{C}$, 90~95% RH; loaded with Pn or Vmax; 1.5 hours ON, 0.5 hours OFF	D R/R max. $\pm(3\%+0.005W)$	
Load Life (Endurance)	JIS C 5202 7.10 / IEC 60115-1 4.25.1 1000+48/-0 hours@ $70 \pm 2^\circ\text{C}$; loaded with Pn or Vmax; 1.5 hours ON, 0.5 hours OFF	Ditto	
Bending	JIS C 5202 6.1.4 / IEC 115-1 4.33 Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once for 10sec : >2mm for 2512 and 2010; >3mm for 1206, 0805, 0603	No visual damaged, D R/R max. $\pm(1\%+0.005W)$	

Chip Resistors

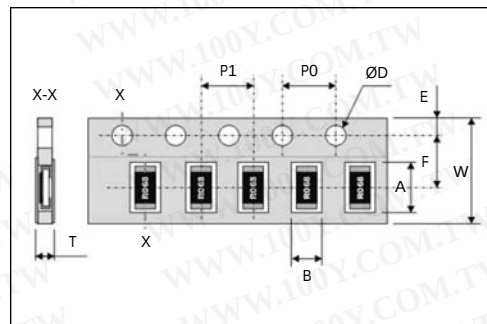
Packing on Tape and Reel

Paper Tape Specifications for WR, WF, WW Series and WA, WT Series

Unit: mm

Component Size / Series	W	F	E	P0	ØD
1206, 0805, 0603, 0402, WA06X, WA06T, WA04X, WA04Y, WA04P, WT04X	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	Ø1.50 ^{+0.1} _{-0.0}
WA06W	12.0±0.10	5.50±0.05			
WR02W	8.00±0.20	3.50±0.05			

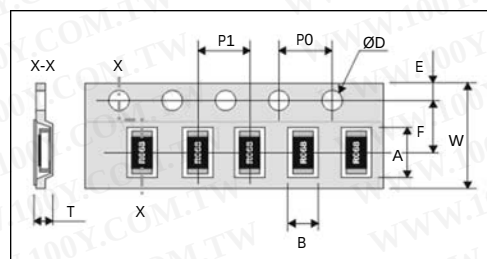
Component Size / Series	A	B	P1	T
1206 (3216), WA06X, WA06T	3.60±0.20	2.00±0.20	4.00±0.10	Max. 1.0
0805 (2012)	2.40±0.20	1.65±0.20		
0603 (1608)	1.90±0.20	1.10±0.20		0.65±0.05
0402 (1005)	1.20±0.10	0.70±0.10	2.00±0.10	0.40±0.05
WA04X	2.20±0.20	1.20±0.20	2.00±0.05	Max. 0.6
WA04Y, WA04P	1.15±0.10	1.15±0.10	2.00±0.05	0.45±0.05
WT04X	3.45±0.20/-0	1.85±0.20/-0	4.00±0.10	0.85±0.05
WA06W	1.80±0.2/-0	4.20±0.2/-0	4.00±0.10	0.65±0.05
WR02X	0.70±0.05	0.40±0.05	2.00±0.05	0.30±0.05



Plastic Tape Specifications for WR, WF, WW Series of Chip-R

Unit: mm

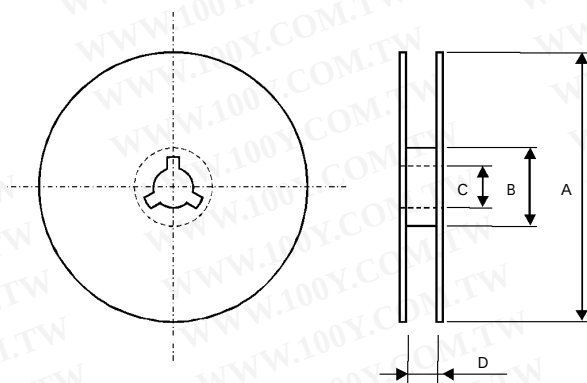
Component Size	2512 (6432)	2010 (5025)	1218 (3248)
A	6.90±0.20	5.50±0.20	3.55±0.30
B	3.60±0.20	2.80±0.20	4.90±0.20
W		12.00±0.30	
F		5.50±0.1	
E		1.75±0.10	
P1		4.00±0.10	
P0		4.00±0.10	
ØD		Ø1.50 ^{+0.1} _{-0.0}	
T		Max. 1.2	



Reel Dimensions

Unit: mm

Reel / Tape	A	B	C	D
7" reel for 8mm tape	Ø178.0±2.0	Ø60.0±1.0	13.0±0.2	9.0 ± 0.50
7" reel for 12mm tape				12.4 ± 1.00
10" reel for 8mm tape	Ø254.0±2.0	Ø100.0±1.0	13.0±0.2	9.0 ± 0.50
10" reel for 12mm tape	Ø254.0±2.0	Ø100.0±1.0	13.0±0.2	14.0 ± 0.20
13" reel for 8mm tape	Ø330.0±2.0	Ø100.0±1.0	13.0±0.2	9.0 ± 0.50



Typical Taping Quantity

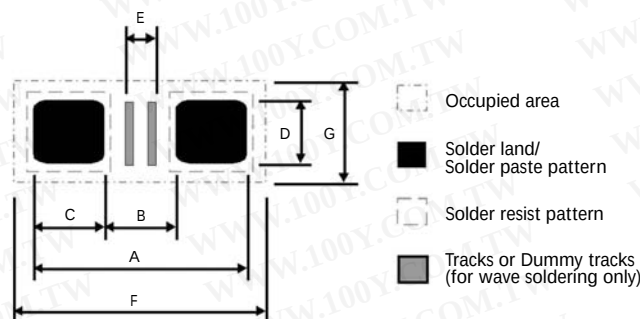
Component Size / Series	Q'ty per reel	Reel diameter
1206, 0805, 0603, WA06X, WA06T, WT04X	5,000 pcs	7" reel
0201, 0402, WA04X, WA04Y, WA04P	10,000 pcs	7" reel
WA06W	5,000 pcs	7" reel
2512, 2010	4,000 pcs	7" reel
1218	3,000 pcs	10" reel
1206, 0805, 0603	10,000 pcs	10" reel
0402, WA04X, WA04Y	20,000 pcs	10" reel
0402	70,000 pcs	13" reel
WA04X, WA04Y	40,000 pcs	13" reel
1206, 0805, 0603	20,000 pcs	13" reel

Chip Resistors

勝特力材料 886-3-5753170
 勝特力电子(上海) 86-21-54151736
 勝特力电子(深圳) 86-755-83298787
[Http://www.100y.com.tw](http://www.100y.com.tw)

Footprint Design

Footprint Design for WRxx Series, WFxx Series, WWxx Series :



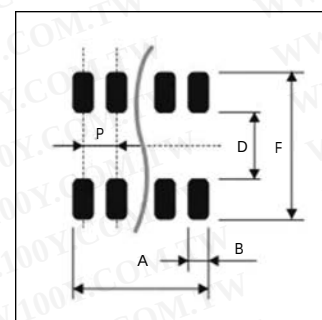
Unit: mm

Size	Reflow Soldering							Processing remarks	Placement Accuracy
	A	B	C	D	E	F	G		
0201	0.75	0.30	0.30	0.30	0.20	1.10	0.50	IR or hot plate soldering	± 0.05
0402	1.50	0.50	0.50	0.60	0.10	1.90	1.00		± 0.15
0603	2.10	0.90	0.60	0.90	0.50	2.35	1.45		± 0.25
0805	2.60	1.20	0.70	1.30	0.75	2.85	1.90		± 0.25
1206	3.80	2.00	0.90	1.60	1.60	4.05	2.25		± 0.25
1218	3.80	2.00	0.90	4.80	1.40	4.20	5.50		± 0.25
2010	5.60	3.80	0.90	2.80	3.40	5.85	3.15		± 0.25
2512	7.00	3.80	1.60	3.50	3.40	7.25	3.85		± 0.25
Size	Wave Soldering							Proposed number & Dimensions of dummy tracks	Placement Accuracy
	A	B	C	D	E	F	G		
0603	2.70	0.90	0.90	0.80	0.15	3.40	1.90	1x (0.15x0.80)	± 0.25
0805	3.40	1.30	1.05	1.30	0.20	4.30	2.70	1x (0.20x1.30)	± 0.25
1206	4.80	2.30	1.25	1.70	1.25	5.90	3.20	3x (0.25x1.70)	± 0.25
1218	4.80	2.30	1.25	4.80	1.30	5.90	5.60	3x (0.25x4.80)	± 0.25
2010	6.30	3.50	1.40	2.50	3.00	7.00	3.60	3x (0.75x2.50)	± 0.25
2512	8.50	4.50	2.00	3.20	3.00	9.00	4.30	3x (1.00x3.20)	± 0.25

Footprint Design for Array Resistor/Attenuator :

Unit: mm

Symbol	0603*4 array	0402*4 array	WA04Y, WA04P	WA06W
A	2.85 +0.10/-0.05	1.80 +0.15/-0.05	1.20 ± 0.05	3.85 +0.20/-0.05
B	0.45 ± 0.05	0.30 ± 0.05	0.40 +0/-0.05	0.28 +0/-0.05
D	0.80 ± 0.10	0.50 ± 0.1	0.50 ± 0.05	1.00 +0.10/-0.20
P	0.80	0.50	0.65	0.50
F	3.10 ± 0.30	2.00 +0.40/-0.20	1.50 +0.20/-0.10	3.20 ± 0.40



Footprint Design for 10P8R Network Resistor :

Unit: mm

Symbol	WT04X
W1	0.35 ± 0.05
W2	0.50 ± 0.05
H2	0.80 ± 0.10
P1	0.70 ± 0.05
P2	0.65 ± 0.05
A	3.20 ± 0.10
F	2.80 +0.40/-0.20

