APPROVAL SHEET

WR10X

±1%, ±5%

General purpose chip resistors

Size 1210

Customer : _____

Approval No : _____

Issue Date : _____

Customer Approval :

FEATURE

1. High reliability and stability
2. Reduced size of final equipment
3. Lower assembly costs
4. Higher component and equipment reliability
5. Lead free products upon customer requested

APPLICATION

- Consumer electrical equipment
- Automotive application
- EDP, Computer application
- Telecom application

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 nominated value within tolerance which controlled by laser trimming 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 Tin (lead free) alloy.

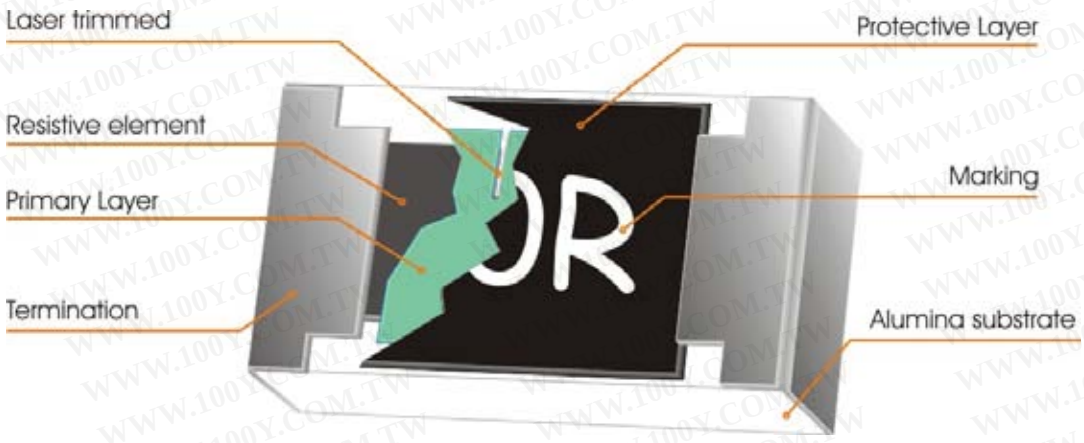


Fig 1. Consctruction of Chip-R

QUICK REFERENCE DATA

Item	General Specification
Series No.	**WR10X**
Size code	**1210 (3226)**
Resistance Tolerance	**±1% (E-96), ±5% (E-24)**
Resistance Range	**Jumper, 1Ω ~ 10MΩ (E96+E24 series)**
TCR (ppm/°C) -55°C ~ +155°C	**10R ~ 1M0, ≤ ± 100 ppm/°C** **< 10R; > 1M0, ≤ ± 200 ppm/°C**
Max. dissipation at T_{amb}=70°C	**1/3 W (0.33 W)**
Max. Operation Voltage (DC or RMS)	**200V (I = 2.6 Amp. for jumper)**
Climatic category (IEC 60068)	**55/155/56**
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"

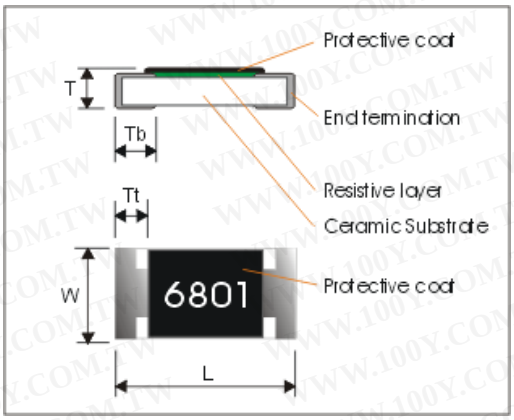
2. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

$$RCWV = \sqrt{Rated\,Power \times Resistance\,Value}$$ or Max. RCWV listed above, whichever is lower.

Dimensions:

Part No	WR10X
L	**3.10 ± 0.10**
W	**2.60 ± 0.10**
Tt	**0.50 ± 0.20**
Tb	**0.50 ± 0.20 *1**
t	**0.55 ± 0.10**

*1 original 0.45+/-0.20



Marking

4-digits marking for 1%, 3-digits marking for 5%

Example

RESISTANCE	90Ω	100Ω	6800Ω	47000Ω
4-digits marking	90R0	1000	6801	4702
3-digits marking	-	101	682	473

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E96 & E24 series for resistors with a tolerance of ±1%, ±5%. The values of the E24/E96 series are in accordance with "IEC publication 60063".

Derating

The power that the resistor can dissipate depends on the operating temperature; see Fig.2

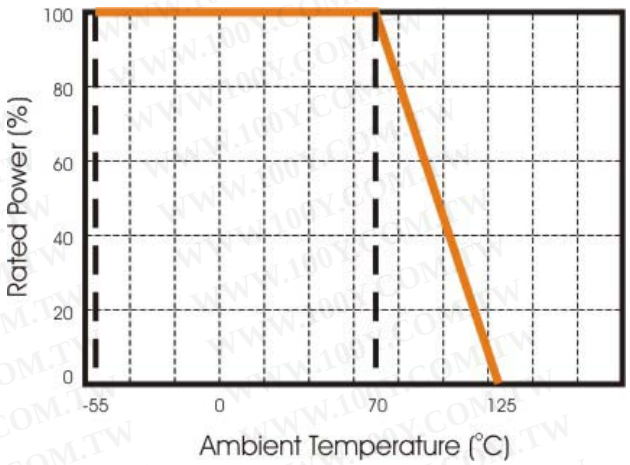


Fig 2. Maximum dissipation in percentage of rated power

As a function of the ambient temperature

MOUNTING

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems.

Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for one minute. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 245°C during 3 seconds. The test condition for no leaching is 260°C for 60 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.

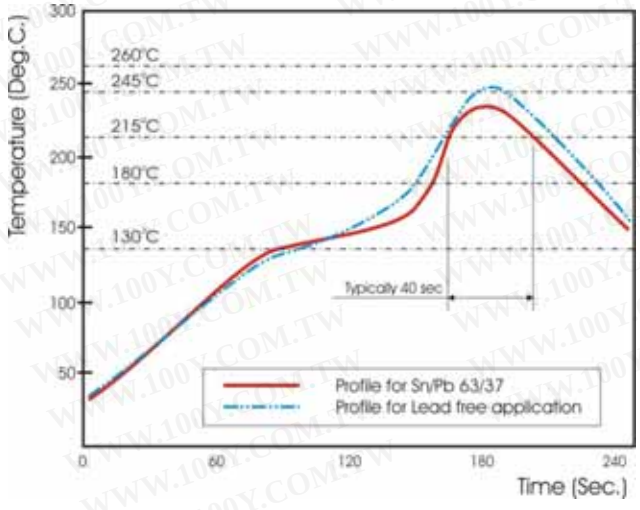


Fig 3. Infrared soldering profile for Chip Resistors

CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WR10	X	4702	J	T	_
Size code **WR10: 1210**	**Type code** **X** : Thick film, 10R ~ 1M **W: < 10R ;** **> 1M0**	**Resistance code** E96 +E24: 3 significant digits followed by no. of zeros 102Ω =1020 37.4KΩ =3742 220Ω =2200	**Tolerance** **J: ± 5%** **F: ± 1%**	**Packaging code** **T: 7" Reeled taping**	**Termination code** _ = SnPb base ("_" means a blank) **L** = Sn base (lead free)

■ **Reeled tape packaging : 8mm width paper taping 5000pcs per 7" reel.**

TEST AND REQUIREMENTS

Basic specification : JIS C 5202 / IEC 60115-1

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 68-1, subclause 5.3, unless otherwise specified.

Temperature: 15ºC to 35ºC.

Relative humidity: 45% to 75%.

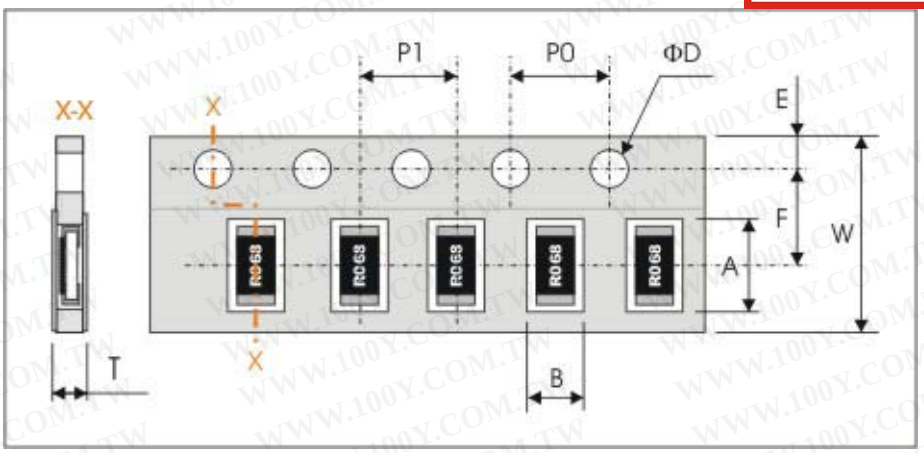
Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

TEST	PROCEDURE	REQUIREMENT
Temperature Coefficient of Resistance (TCR)	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) R_1 : Resistance at reference temperature R_2 : Resistance at test temperature t_1 : 25°C	Test temperature –55~+155°C 10R ~ 1M0, ≤ ± 100 ppm/°C < 10R; > 1M0, ≤ ± 200 ppm/°C
Short time overload (STOL)	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	ΔR/R max. ±(2%+0.1Ω)
Resistance to soldering heat	Unmounted chips 10±1 seconds, 260±5°C	no visible damage Δ R/R max. ±(1%+0.05Ω)
Solderability	Termination Sn base (lead free) : Unmounted chip completely immersed in a lead free solder bath, 245°C±5°C, 3±1 sec	good tinning (>95% covered) no visible damage
Temperature cycling	1. 30 minutes at -55°C±3°C, 2. 2~3 minutes at room temperature, 3. 30 minutes at +155°±3°C, 4. 2~3 minutes at room temperature, Total 5 continuous cycles	no visible damage ΔR/R max. ±(1%+0.05Ω)
Load life (endurance)	70±2°C, 1000 hours, loaded with RCWV or Vmax,1.5 hours on and 0.5 hours off	10R-1M0, ΔR/R max. ± (3%+0.1Ω) R<10R, R>1M0, ΔR/R max. ± (5%+0.1Ω)

Load life in Humidity	1000 hours, at rated continuous working voltage in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, 1.5hours on and 0.5 hours off	10R-1M0, ΔR/R max. ± (3%+0.1Ω) R<10R, R>1M0, ΔR/R max. ± (5%+0.1Ω)
Bending and Termination strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 3 mm, once for 10 seconds Pulling test : 500grams, 30seconds	ΔR/R max. ±(1%+0.05Ω)

PACKAGING

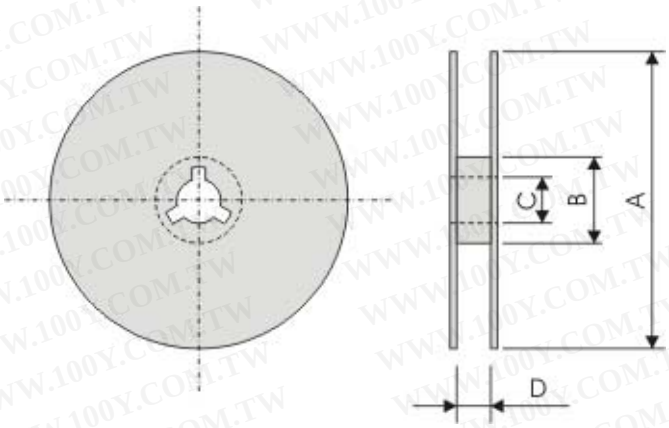
Paper Tape specifications (unit :mm)



Component Size / Series	W	F	E	P0	ΦD
WR10X	8.00±0.30	3.50±0.20	1.75±0.10	4.00±0.10	$\Phi 1.50^{+0.1}_{-0.0}$

Component Size / Series	A	B	P1	T
WR10X	3.60±0.20	3.00±0.20	4.00±0.10	Max. 1.0

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5