



WW10P

±1%, ±5%

Thick Film Low ohm chip resistors (Power) Size 1210

*Contents in this sheet are subject to change without prior notice.



FEATURE

- 1. High reliability and stability
- 2. Reduced size of final equipment
- 3. Lower assembly costs
- 4. Higher component and equipment reliability
- 5. RoHS compliant and Lead free products

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 Tin (lead free) alloy.

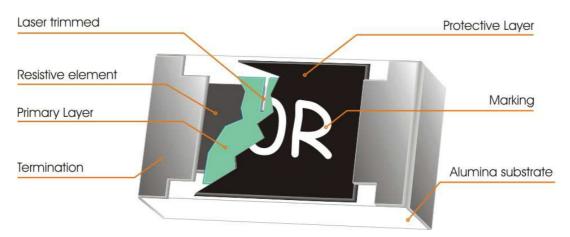


Fig 1. Construction of Chip-R

QUICK REFERENCE DATA

Item	General Specification
Series No.	WW10P
Size code	1210 (3225)
Resistance Tolerance	±1%, ±5%
Resistance Range	0.102Ω ~ 0.976Ω
TCR (ppm/°C) -55°C ~ +155°C	
0.100Ω ~ 0.976	±200 ppm/°C
Max. dissipation at T _{amb} =70°C	1/2 W
Max. Operation Current	5A
Max. Overload Current	10A
Operation temperature	- 55 ~ +155'C

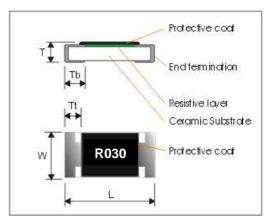
Note :

- 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 RCWC (Rated Continuous Working Current) is determined by

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

DIMENSIONS(unit :mm)

Part No	WW10P
L	3.10 ± 0.10
w	2.60 ± 0.10
Tt	0.50 ± 0.20
Tb	0.50 ± 0.20
t	0.55 ± 0.10



MARKING

4-digits marking for 1% & 5%

Example

RESISTANCE	0.102Ω	0.5Ω
4-digits marking	R102	R500

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E96 & E24 series for resistors with a tolerance of $\pm 1\%$, $\pm 5\%$. 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

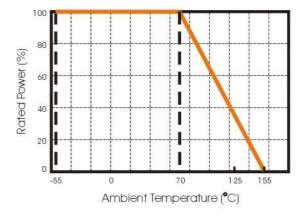


Figure 2 Maximum dissipation in percentage of rated power as a function of the ambient temperature

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).

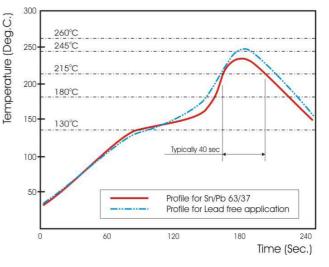
Electrical connection to the circuit is by individual soldering condition.

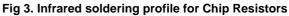
The end terminations guarantee a reliable contact.

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. 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 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 3.





CATALOGUE NUMBERS

WW10	Р	R500	J	т	L
Size code	Type code	Resistance code – 4 digits	Tolerance	Packaging code	Termination code
WW10: 1210	P : 1/2W	R100 = 0.1 OHM	J: ± 5%	T: 7" Reeled taping	L = Sn base (lead free)
		R500 = 0.5 OHM	F: ± 1%		

The resistors have a catalogue number starting with .

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

TEST AND REQUIREMENTS(JIS C 5201-1: 1998)

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category LCT/UCT/56(rated temperature range : Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS.

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 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied :

Temperature: 15°C to 35°C.

Relative humidity: 45% to 75%.

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

All soldering tests are performed with midly activated flux.

TEST	TEST PROCEDURE			
Temperature Coefficient of Resistance(T.C.R) Clause 4.8	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)} t_1 : 20^\circ \text{C} + 5^\circ \text{C} - 1^\circ \text{C}$ R ₁ : Resistance at reference temperature R ₂ : Resistance at test temperature	Refer to "QUICK REFERENCE DATA"		
Short time overload (S.T.O.L) Clause 4.13	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload current specified in the above list, whichever is less.	ΔR/R max. ±(2%+0.005Ω)		
Resistance to soldering heat(R.S.H) Clause 4.18	Un-mounted chips completely immersed for 10±1 second in a SAC solder bath at $260^{\circ}C \pm 5 \circ C$	no visible damage Δ R/R max.±(1%+0.005 Ω)		
Solderability Clause 4.17	Un-mounted chips completely immersed for 2±0.5 second in a SAC solder bath at 235 $^\circ\!C$ ±5 $^\circ\!C$	good tinning (>95% covered) no visible damage		
Temperature cycling Clause 4.19	30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +155°C±3°C, 2~3 minutes at 20°C+5°C-1°C, total 5 continuous cycles	no visible damage $\Delta R/R$ max. ±(1%+0.005 Ω)		
Load life (endurance) Clause 4.25	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70 \pm 2 °C, 1.5 hours on and 0.5 hours off	Δ R/R max. ± (5%+0.005 Ω)		
Load life in Humidity Clause 4.24	1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at $40^{\circ}C\pm2^{\circ}C$ and $90\sim95\%$ relative humidity, 1.5hours on and 0.5 hours off	Δ R/R max. ± (5%+0.005 Ω)		

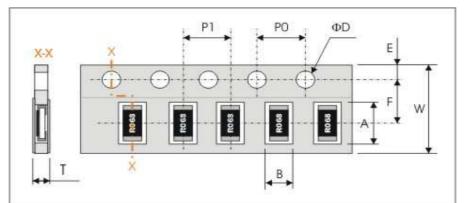


TEST	PROCEDURE	REQUIREMENT				
Bending strength		ΔR/R max. ±(1%+0.005Ω)				
Clause 4.33	bending : 3 mm, once for 10 seconds					
Adhesion	Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or				
Clause 4.32		removal of the terminations				
Insulation Resistance	Apply the maximum overload voltage (DC) for 1 minute	R≧10GΩ				
Clause 4.6						
Dielectric Withstand	Apply the maximum overload voltage (AC) for 1 minute	No breakdown or flashover				
Voltage						
Clause 4.7						

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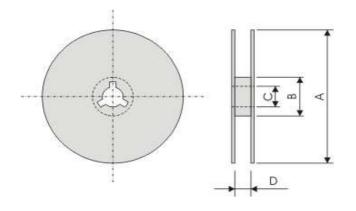
PACKAGING

Paper Tape specifications (unit :mm)



Component Size / Series	W		F E		E P0			ΦD
WW10P	8.00±0.30	3	.50±0.20	1.75±	±0.10	4.00±0.1	0	$\Phi 1.50^{+0.1}_{-0.0}$
Component Size / Series	А	В		F		P1		Т
WW10P	3.60±0.20	3.00±0.		.20 4.00±0.10			Max. 1.0	

Reel dimensions



Symbol	А	В	С	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5

Taping quantity

- Chip resistors 5,000 pcs/reel