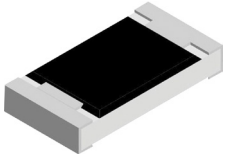


Thick Film Low ohm Chip Resistors **multicomp** PRO

**RoHS
Compliant**

Description



The resistors are constructed in a high grade ceramic body (aluminium 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.

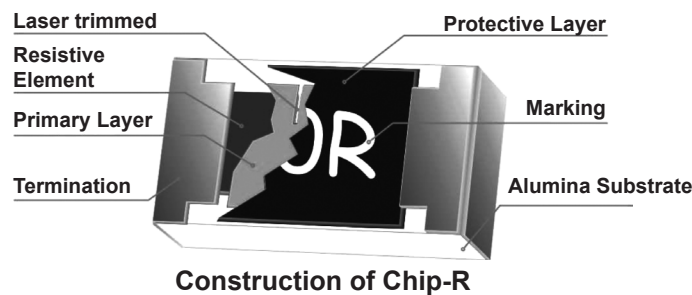
The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy.

Features

- High power rating and compact size
- High reliability and stability
- Reduced size of final equipment
- Lead free products

Application:

- Power supply
- PDA, Digital meter and Computer
- Automotive and Battery charger
- DC-DC power converter



Quick Reference Data

Item	General Specification								
Series No.	MCWW12X								
Size code	1206 (3216)								
Resistance Tolerance	±5%, ±1%								
Resistance Range	0.010Ω ~ 0.976Ω								
TCR (ppm/°C)	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">0.01Ω ≤ Rn < 0.05Ω</td> <td style="width: 50%;">≤ 2100 ppm/°C</td> </tr> <tr> <td>0.05Ω ≤ Rn < 0.10Ω</td> <td>≤ 1000 ppm/°C</td> </tr> <tr> <td>0.10Ω ≤ Rn < 0.50Ω</td> <td>≤ 500 ppm/°C</td> </tr> <tr> <td>0.50Ω ≤ Rn < 1Ω</td> <td>≤ 400 ppm/°C</td> </tr> </table>	0.01Ω ≤ Rn < 0.05Ω	≤ 2100 ppm/°C	0.05Ω ≤ Rn < 0.10Ω	≤ 1000 ppm/°C	0.10Ω ≤ Rn < 0.50Ω	≤ 500 ppm/°C	0.50Ω ≤ Rn < 1Ω	≤ 400 ppm/°C
0.01Ω ≤ Rn < 0.05Ω	≤ 2100 ppm/°C								
0.05Ω ≤ Rn < 0.10Ω	≤ 1000 ppm/°C								
0.10Ω ≤ Rn < 0.50Ω	≤ 500 ppm/°C								
0.50Ω ≤ Rn < 1Ω	≤ 400 ppm/°C								
Max. Dissipation @ Tamb = 70°C	1/4 W								
Max. Operation Voltage (DC or RMS)	200V								
Max. Overload Voltage (DC or RMS)	400V								
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. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

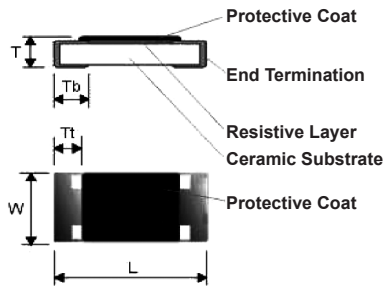
$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}}$$
 or Max. RCWV listed above, whichever is lower.

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Mechanical Data



Part Number	MCWW12X
L	3.1 ±0.1
W	1.6 ±0.1
T	0.6 ±0.15
Tt	0.5 ±0.2
Tb	0.45 ±0.2

Dimensions : Millimetres

Marking

Each resistor is marked with a four-digit code on the protective coating to designate the nominal resistance value

Example:

0.002R = R002

0.020R = R020

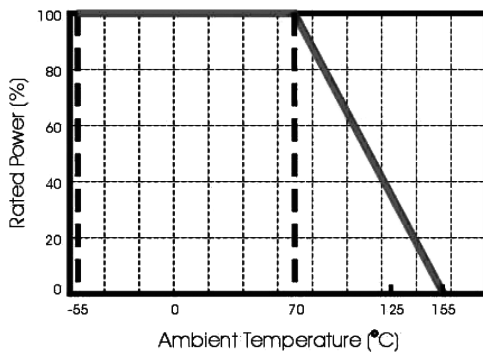
Functional Description

Product characterization

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



**Max. 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.

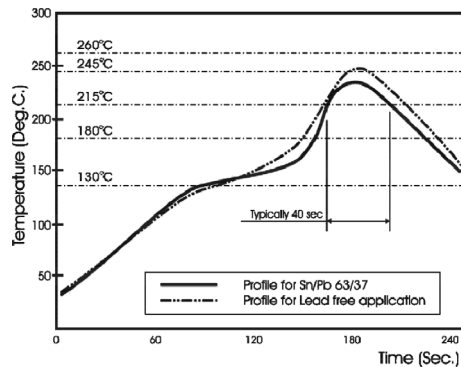
The end terminations guarantee a reliable contact.

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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 below figure.



Infrared soldering profile for Chip Resistor

Catalogue Numbers

The resistors have a catalogue number starting with

MCWW12	X	R100	J	T	L
Size code MCWW12: 1206	Type code X : Normal	Resistance code E96 +E24: "R" is first digit followed by 3 significant digits. e.g: 0.020W = R020 0.510W = R510 0.025W = R025 0.400W = no marking	Tolerance J : ±5% G : ±2% F : ±1%	Packaging Code T : 7" Reel taping	Termination Code L = Sn base (Lead free)

Tape packaging MCWW12 : 8mm width paper taping 5,000pcs per 7" reel. 20,000pcs per 13" reel.

Test And Requirements

Basic specification : JIS C 5201-1 : 1998

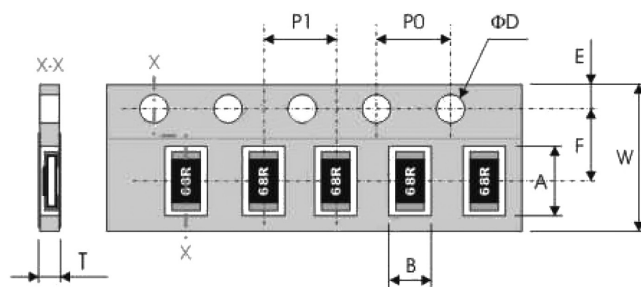
Test	Procedure	Requirement
Clause 4.8 Temperature Coefficient of Resistance (TCR)	Natural resistance change per change in degree Centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{ppm}/^\circ\text{C})$ R ₁ : Resistance at reference temperature R ₂ : Resistance at test temperature t ₁ : 20°C +5°C -1°C.	Refer to quick reference data for T.C.R specification

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Test	Procedure	Requirement
Clause 4.13 Short time overload	Permanent resistance change after 5 second application of a power 5.0 times of rated power or the maximum overload voltage specified in the above list, whichever is less.	$\Delta R/R$ max. J : $\leq \pm(2\% + 0.5m\Omega)$ F : $\leq \pm(1\% + 0.5m\Omega)$
Clause 4.18 Resistance to soldering heat (R.S.H)	Un-mounted chips completely immersed for 10 ± 1 second in a SAC solder bath at $260^\circ\text{C} \pm 5^\circ\text{C}$.	No visible damage $\Delta R/R$ max. J : $\leq \pm(1\% + 0.5m\Omega)$ F : $\leq \pm(0.5\% + 0.5m\Omega)$
Clause 4.17 Solderability	Un-mounted chips completely immersed for 2 ± 0.5 second in a SAC solder bath at $235^\circ\text{C} \pm 5^\circ\text{C}$.	Good tinning (>95% covered) No visible damage
Clause 4.19 Temperature cycling	1. 30 minutes at $-55^\circ\text{C} \pm 3^\circ\text{C}$, 2. 2~3 minutes at $20^\circ\text{C} + 5^\circ\text{C} - 1^\circ\text{C}$, 3. 30 minutes at $+155^\circ \pm 3^\circ\text{C}$, 4. 2~3 minutes at $20^\circ\text{C} + 5^\circ\text{C} - 1^\circ\text{C}$, Total 5 continuous cycles.	No visible damage $\Delta R/R$ max. J : $\leq \pm(1\% + 1m\Omega)$ F : $\leq \pm(0.5\% + 1m\Omega)$
Clause 4.25 Load life (endurance)	1000 +48/-0 hours, loaded with RCWV or V_{max} in chamber controller $70 \pm 2^\circ\text{C}$, 1.5 hours on and 0.5 hours off.	No visible damage $\Delta R/R$ max. J : $\leq \pm(3\% + 0.5m\Omega)$ F : $\leq \pm(1\% + 0.5m\Omega)$
Clause 4.24 Load life in Humidity	1000 +48/-0 hours, loaded with RCWV or V_{max} in humidity chamber controller at $40^\circ\text{C} \pm 2^\circ\text{C}$ and 90~95% relative humidity, 1.5 hours on and 0.5 hours off.	No visible damage $\Delta R/R$ max. J : $\leq \pm(3\% + 0.5m\Omega)$ F : $\leq \pm(1\% + 0.5m\Omega)$
Clause 4.33 Bending strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 2 mm(2512;2010) 3mm(1206), once for 10 seconds	No visible damage $\Delta R/R$ max. J : $\leq \pm(1\% + 1m\Omega)$ F : $\leq \pm(0.5\% + 1m\Omega)$
Clause 4.32 Adhesion	Pressurizing force: 5N, Test time: 10 ± 1 sec.	No remarkable damage or removal of the terminations
Clause 4.6 Insulation Resistance	Apply the maximum overload voltage (DC) for 1minute	$R \geq 1G\Omega$
Clause 4.7 Dielectric Withstand Voltage	Apply the maximum overload voltage (AC) for 1 minute	No breakdown or flashover

Packaging

Paper Tape (MCWW12X) specifications



Series No.	A	B	W	F	E	P1	P0	D	T
MCWW12X	3.6 ± 0.2	2 ± 0.2	8 ± 0.3	3.5 ± 0.2	1.75 ± 0.1	4 ± 0.1	4 ± 0.1	$1.5^{+0.1}_0$	Max. 1

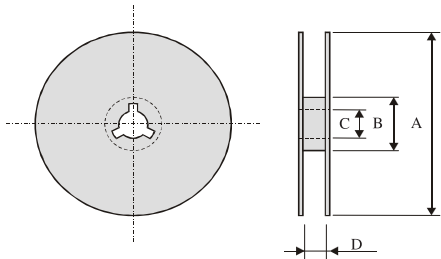
Dimensions : Millimetres

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Reel dimensions



Reel / Tape	A	B	C	D
7" reel for 8mm tape	$\Phi 178 \pm 2$	$\Phi 60 \pm 1$	13 ± 0.2	9 ± 0.5

Dimensions : Millimetres

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