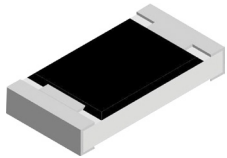


High Voltage Chip Resistor



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.

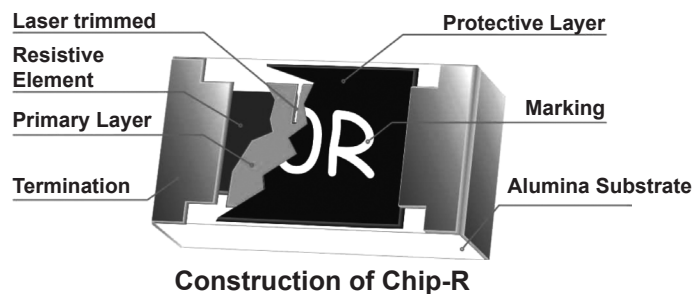
The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy.

Features:

- Special material and design for high working voltage require.
- Compatible with flow and reflow soldering
- Suitable for lead free soldering
- High limiting voltage

Application:

- Power supply
- Automotive industry and measurement instrument
- Back light inverter
- Medical or Military equipment



Quick Reference Data

Item	General Specification	
Series No.	MCWK08V	MCWK12V
Size code	0805 (2012)	1206 (3216)
Resistance Tolerance	±1%, ±2%, ±5%	
Resistance Range	±5% : 47Ω ~ 51MΩ ±1%, ±2% : 47Ω ~ 10MΩ	
TCR (ppm/°C)	-	
+500 to -200	47Ω ~ 97.6Ω	
±200	100Ω ~ 51MΩ	
±100		
Max. Dissipation @ T amb = 70°C	1/8 W	1/4 W
Max. Operation Voltage (DC or RMS)	400V	500V
Max. Overload Voltage (DC or RMS)	800V	1000V
Climatic category (IEC 60068)	55/125/56	

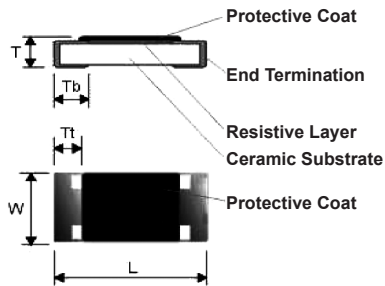
Note:

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.

High Voltage Chip Resistor

Mechanical Data



Part Number	MCWK08V	MCWK12V
L	2 ±0.1	3.2 ±0.15
W	1.25 ±0.1	1.6 ±0.15
T	0.55 ±0.1	0.55 ±0.1
Tt	0.4 ±0.2	0.5 ±0.25
Tb	0.4 ±0.2	0.5 ±0.25

Dimensions : Millimetres

Marking

For E24 series, Each resistor is marked with a three-digit code on the protective coating to designate the nominal resistance value.

For E96 series, Each resistor is marked with a four-digit code on the protective coating to designate the nominal resistance value

Example:

105 = 1MΩ

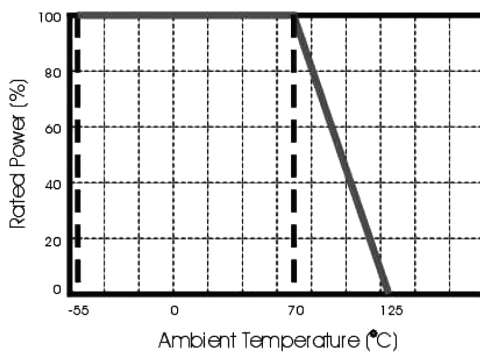
Functional Description:

Product characterization

Standard values of nominal resistance are taken from the E24/E96 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.



**Max. Dissipation in percentage of rated power
As a function of the ambient temperature**

Mounting

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

Electrical connection to the circuit is by individual soldering condition.

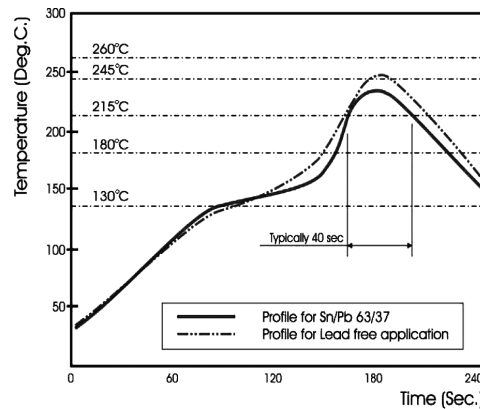
The end terminations guarantee a reliable contact.

High Voltage Chip Resistor

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

Catalogue Numbers:

The resistors have a catalogue number starting with

MCWK08	V	104	J	T	L
Size code MCWK08 : 0805 MCWK12 : 1206	Type code V : High Voltage	Resistance code 5%, E24: 2 significant digits followed by no. of zeros 100Ω = 101_ 10kΩ = 103 1%, E24+E96: 3 significant digits followed by no. of zeros 100Ω = 1000 37.4kΩ = 3742	Tolerance B : ±0.1%	Packaging code T : 7" inch reel	Termination code L = Sn base (lead free)

Tape packaging MCWK12 & MCWK08 : 8mm width paper taping 5,000pcs per reel

Marking code : For E24 series , 3 digit marking code for J tolerance.

High Voltage Chip Resistor

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 mildly activated flux.

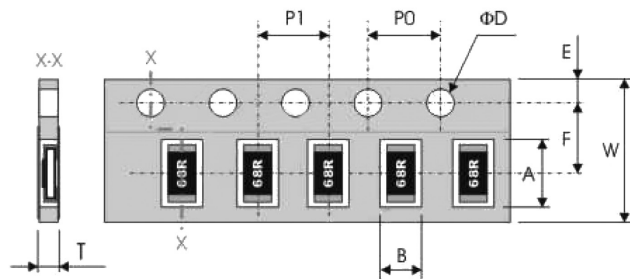
Test	Procedure	Requirement
Clause 4.8 Temperature Coefficient of Resistance (TCR)	Natural resistance change per change in degree Centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{ppm}/^\circ\text{C})$ R1 : Resistance at reference temperature R2 : Resistance at test temperature t1 : 20°C +5°C -1°C.	Refer to quick reference data for T.C.R specification
Clause 4.13 Short time overload	Permanent resistance change after a 2 second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	No visible damage $\Delta R/R$ max. $\pm(1\% + 0.05\Omega)$
Clause 4.18 Resistance to soldering heat (R.S.H)	Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 260°C ±5°C.	No visible damage $\Delta R/R$ max. $\pm(1\% + 0.05\Omega)$
Clause 4.17 Solderability	Un-mounted chips completely immersed for 2 ±0.5 second in a SAC solder bath at 235°C ±5°C.	Good tinning (>95% covered) No visible damage
Clause 4.19 Temperature cycling	1. 30 minutes at -55°C ±3°C, 2. 2~3 minutes at 20°C +5°C-1°C, 3. 30 minutes at +155° ±3°C, 4. 2~3 minutes at 20°C +5°C-1°C, Total 5 continuous cycles.	No visible damage $\Delta R/R$ max. $\pm(1\% + 0.05\Omega)$
Clause 4.25 Load life (endurance)	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off.	No visible damage $\Delta R/R$ max. $\pm(5\% + 0.1\Omega)$
Clause 4.24 Load life in Humidity	1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, 1.5 hours on and 0.5 hours off.	No visible damage $\Delta R/R$ max. $\pm(5\% + 0.1\Omega)$
Clause 4.25.3 Endurance at high temperature	125°C, no load, 1000 hours	No visible damage $\Delta R/R$ max. $\pm(5\% + 0.1\Omega)$
Clause 4.33 Bending strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), 1206 & 0805 bending: 3mm once for 10 seconds	$\Delta R/R$ max. $\pm(1\% + 0.05\Omega)$
Clause 4.32 Adhesion	Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or removal of the terminations

High Voltage Chip Resistor

Test	Procedure	Requirement
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:

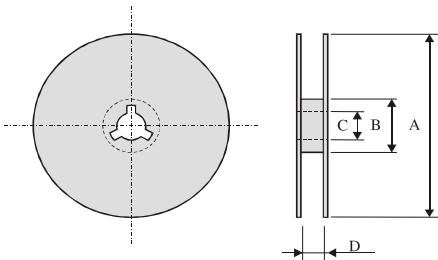
Paper Tape specifications



Series No.	A	B	W	F	E	P1	P0	D	T
MCWK12V	3.6 ± 0.2	2 ± 0.15	8 ± 0.3	3.5 ± 0.2	1.75 ± 0.1	4 ± 0.1	4 ± 0.1	$1.5^{+0.1}_{-0}$	Max. 1
MCWK08V	2.5 ± 0.2	1.65 ± 0.15							

Dimensions : Millimetres

Reel dimensions:



Reel / Tape	A	B	C	D
7" reel for 8mm tape	$\Phi 180.0 +0 / -1.5$	$\Phi 60 \pm 1$	13 ± 0.2	$9 \pm 1/10$

Dimensions : Millimetres

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