

Surface Mount Thick Film Resistor MCWR Series



**RoHS
Compliant**

Description



The lead free resistors are constructed in a high grade ceramic body (aluminium oxide). Internal metal electrodes are added at each end and connected by a lead free 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.

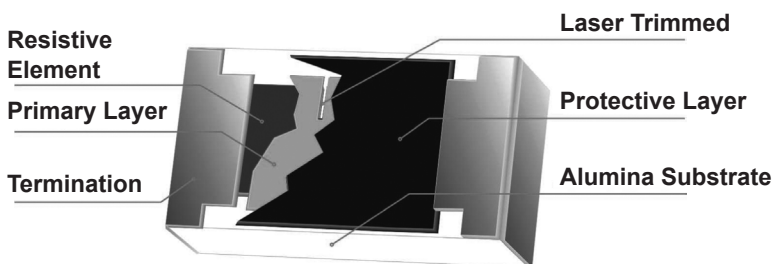
Features

- Small size and light weight
- High reliability and stability
- Reduced size of final equipment
- Higher component and equipment reliability
- Higher component and equipment reliability

Applications

- Mobile phone
- PDA
- Camcorders
- Palmtop computers
- Hybrid module

Construction



Quick Reference Data

Item	General Specification	
Series No.	MCWR02X	
Size code	0201(0603)	
Resistance Range	1Ω ~ 10MΩ (±5% tolerance), Jumper 1Ω ~ 1MΩ (±1% tolerance)	
Resistance Tolerance	±1% E96/E24	±5% E24
TCR (ppm/°C)	100Ω - 10MΩ, ±200 10Ω - 97.6Ω, +600 ~ 0 1 - 9.76Ω, +800 ~ -100	
Max. Dissipation @ Tamb = 70°C	1/20 W	
Max. Operation Voltage (DC or RMS)	25V	
Max. Overload Voltage (DC or RMS)	50V	
Climatic category (IEC 60068)	55/125/56	

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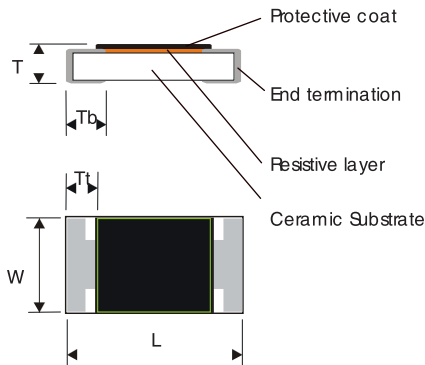
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Note:

Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by
 $RCWV = \text{Rated Power} \times \text{Resistance Value}$ or Max. RCWV listed above, whichever is lower.

Dimension



Type	MCWR02X(W)
L	0.6 ±0.03
W	0.3 ±0.03
T	0.23 ±0.03
Tb	0.15 ±0.05
Tt	0.1 ±0.05

Dimensions : Millimetres

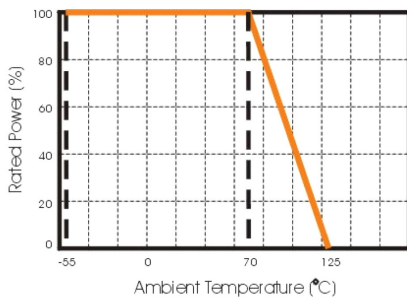
Functional Description:

Product characterization

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

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.



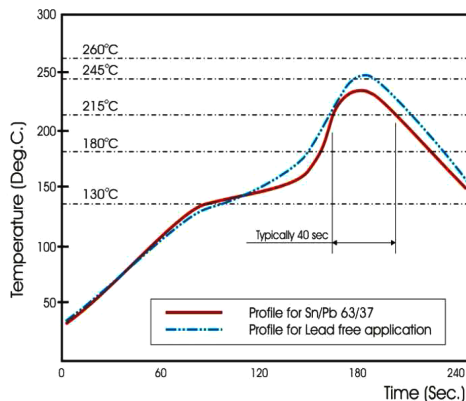
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Soldering Condition:

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 below.



**Infrared soldering profile for Chip Resistors
MCWR02X(W)**

Test and Requirements:

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 / Test Method	Requirement	
		Resistor	0Ω
DC resistance	DC resistance values measured at the test voltages specified below : <10Ω @ 0.1V, <100Ω @ 0.3V, <1kΩ @ 1.0V, <10kΩ @ 3V, <100kΩ @ 10V, <1MΩ @ 25V, <10MW@30V	Within the specified tolerance	<50mΩ
Temperature coefficient of resistance (T.C.R)	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1 (t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ $t_1 : 20^\circ\text{C} + 5^\circ\text{C} - 1^\circ\text{C}$ R_1 : Resistance at reference temperature R_2 : Resistance at test temperature	Refer to "Quick Reference Data"	NA



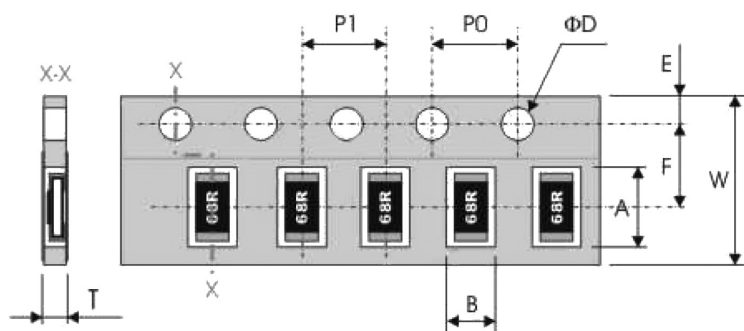
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Test	Procedure / Test Method	Requirement	
		Resistor	0Ω
Short time overload (S.T.O.L)	Permanent resistance change after a 2 second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	$\Delta R/R$ max. $\pm(1\%+0.05\Omega)$	<50mΩ
Resistance to soldering heat (R.S.H)	Un-mounted chips completely immersed for 10 ± 1 second in a SAC solder bath at $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$	$\Delta R/R$ max. $\pm(1\%+0.05\Omega)$ no visible damage	<50mΩ
Solderability	Un-mounted chips completely immersed for 2 ± 0.8 second in a SAC solder bath at $235^{\circ}\text{C} \pm 5^{\circ}\text{C}$	95% coverage min., good tinning and no visible damage	
Temperature cycling	30 minutes at $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$, 2~3 minutes at $20^{\circ}\text{C} + 5^{\circ}\text{C} - 1^{\circ}\text{C}$, 30 minutes at $+125^{\circ}\text{C} \pm 3^{\circ}\text{C}$, 2~3 minutes at $20^{\circ}\text{C} + 5^{\circ}\text{C} - 1^{\circ}\text{C}$, total 5 continuous cycles	$\Delta R/R$ max. $\pm(1\%+0.05\Omega)$	<50mΩ
Damp heat (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	$\Delta R/R$ max. $\pm(5\%+0.1\Omega)$	<50mΩ
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	$\Delta R/R$ max. $\pm(5\%+0.1\Omega)$	<50mΩ
High temperature	$125^{\circ}\text{C} \times 1000$ hrs, no load	$\Delta R/R$ max. $\pm(5\%+0.1\Omega)$	<50mΩ
Bending strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once 3mm for 10sec.	No visual damaged, $\Delta R/R$ max. $\pm(1\%+0.05\Omega)$	<50mΩ
Adhesion	Pressurizing force: 3N, Test time: 10 ± 1 sec.	No remarkable damage or removal of the terminations	

Packaging:

Paper Tape specifications



Series No.	A	B	W	F	E
MCWR02X	0.67 ± 0.05	0.37 ± 0.05	8 ± 0.2	3.5 ± 0.05	1.75 ± 0.1

Series No.	P1	P0	ØD	T
MCWR02X	2 ± 0.05	4 ± 0.05	$1.5^{+0.1}_{-0.0}$	0.45 ± 0.05

Dimensions : Millimetres

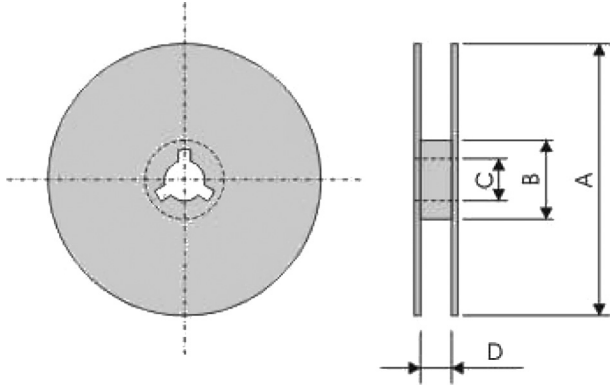
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Reel Dimensions:



Symbol	A	B	C	D
7" Reel	178 ±0.2	60 ±1	13 ±0.2	9 ±0.5
10" Reel	254 ±2	100 ±1	13 ±0.2	9 ±0.5
13" Reel	330 ±2	100 ±1	13 ±0.2	9 ±0.5

Dimensions : Millimetres

Part Number Explanation

MCWR02	X	472_	J	A	L
Size code MCWR02 : 0201	Type code X : Normal W : 1% For <10Ω and >1MΩ	Resistance code 5%, E24: 2 significant digits followed by no. of zeros and a blank. 4.7Ω = 4R7_ 100Ω = 101_ 10kΩ = 103_ 1%, E24+E96: 3 significant digits followed by no. of zeros 100Ω = 1000 37.4kΩ = 3742	Tolerance J : ±5% F : ±1% P : Jumper	Packaging code A : 7" Reeled taping (15Kpcs/Reel) T : 7" Reeled taping (10Kpcs/Reel) D : 7" Reeled taping (20Kpcs/Reel) H : 13" Reeled taping (50Kpcs/Reel) G : 13" Reeled taping (70Kpcs/Reel)	Termination code L = Sn base (lead free)

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