

# Thick Film Power Low Ohm Chip Resistor



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.

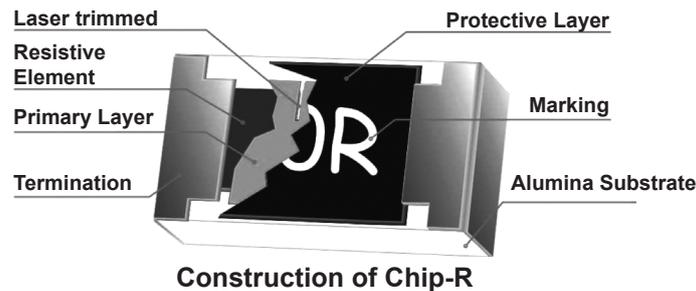
The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is Tin (lead free) alloy.

## Features:

- High power rating and low TCR
- High reliability and stability
- Reduced size of final equipment

## Application:

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



## Quick Reference Data

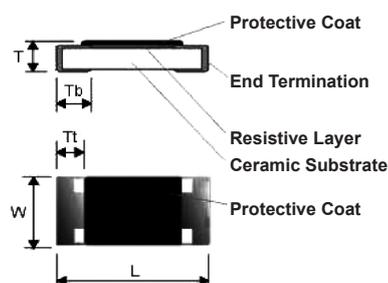
Item	General Specification		
	MCWW25W	MCWW20W	MCWW10W
Series No.	MCWW25W	MCWW20W	MCWW10W
Size code	2512 (6432)	2010 (5025)	1210 (3225)
Resistance Tolerance	±5%, ±1%		
Resistance Range	0.01Ω ~ 0.91Ω, E24	0.05Ω ~ 0.91Ω, E24	0.05Ω ~ 0.91Ω, E24
TCR (ppm/°C)	10-20mΩ: ±1000 22-39mΩ: ±600 40-47mΩ: ±200 50-91mΩ: ±100 100-910mΩ: ±100	50-91mΩ: ±100 100-910mΩ: ±100	50-91mΩ: ±100 100-910mΩ: ±100
Max. Dissipation @ T amb = 70°C	2 W	1 W	3/4 W
Operation Temperature	-55°C ~ +155°C		

# Thick Film Power Low Ohm Chip Resistor



Item	General Specification		
	Series No.	MCWW12W	MCWW08W
Size code	1206 (3216)	0805 (2012)	0603 (1608)
Resistance Tolerance	±5%, ±1%		
Resistance Range	0.01Ω ~ 0.91Ω, E24	0.01Ω ~ 0.91Ω, E24	0.05Ω ~ 0.91Ω, E24
TCR (ppm/°C)	10-20mΩ: ±1000 22-39mΩ: ±600 40-47mΩ: ±200 50-91mΩ: ±100 100-910mΩ: ±100	10-20mΩ: ±1000 22-39mΩ: ±600 40-47mΩ: ±400 50-91mΩ: ±200 100-910mΩ: ±100	50-91mΩ: ±400 100-910mΩ: ±200
Max. Dissipation @ T <sub>amb</sub> = 70°C	3/4 W	1/2 W	1/4 W
Operation Temperature	-55°C ~ +155°C		

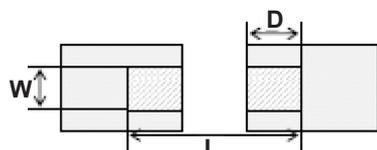
## Mechanical Data



Symbol	MCWW25W	MCWW20W	MCWW10W	MCWW12W	MCWW08W	MCWW06W
L	6.3 ±0.2	5 ±0.2	3.1 ±0.1	3.1 ±0.1	2 ±0.1	1.6 ±0.1
W	3.1 ±0.2	2.5 ±0.2	2.6 ±0.1	1.6 ±0.1	1.25 ±0.1	0.8 ±0.1
T	0.65 ±0.15	0.6 ±0.1	0.55 ±0.1	0.55 ±0.1	0.5 ±0.1	0.45 ±0.1
Tt	0.6 ±0.25	0.6 ±0.25	0.5 ±0.25	0.5 ±0.25	0.4 ±0.2	0.3 ±0.2
Tb	0.9 ±0.25	0.6 ±0.25	0.9 ±0.25	0.5 ±0.25	0.4 ±0.2	0.3 ±0.2

Dimensions : Millimetres

## Recommended Soldering Pad



Symbol	MCWW25W	MCWW20W	MCWW10W	MCWW12W	MCWW08W	MCWW06W
WL	3.7mm	3mm	3mm	1.8mm	1.3mm	0.9mm
D	1.6mm	1.5mm	1.3mm	1.3mm	1.15mm	1mm
L	7.6mm	6.8mm	4.7mm	4.7mm	3.5mm	3mm

# Thick Film Power Low Ohm Chip Resistor



## Marking

4-digits marking for 2512, 2010, 1210, 1206, 0805 size

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

3-digits marking for 0603 size

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

## Resistance Marking (E-24 Series)

<b>R150</b>	4 digit Marking for $\pm 1\%$ , $\pm 5\%$ - 0805, 1206, 1210, 2010, 2512 Examples. R150 = 150m $\Omega$ , R020 = 20m $\Omega$
<b>R50</b>	3 digit Marking for $\pm 1\%$ , $\pm 5\%$ - 0603 Examples. R12 = 120m $\Omega$ , R50 = 500m $\Omega$
<b>47M</b>	3 digit Marking for $\pm 1\%$ , $\pm 5\%$ - 0603 (47m $\Omega$ ~ 91m $\Omega$ ) Examples. 20M = 20m $\Omega$

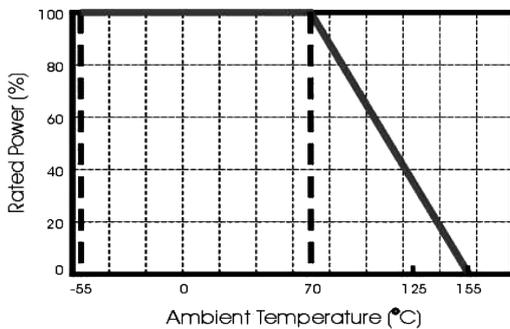
## Functional Description:

### Product characterization

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

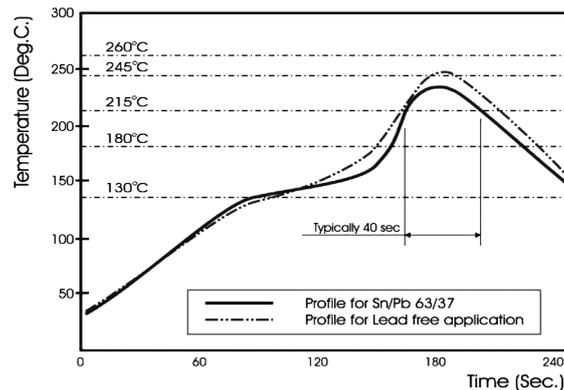
# Thick Film Power Low Ohm Chip Resistor



## 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

MCWW12	W	R020	F	T	L	-	G	H
<b>Size code</b> MCWW25:2512 MCWW20:2010 MCWW10:1210 MCWW12:1206 MCWW08:0805 MCWW06:0603	<b>Type code</b> W : Thick film power low ohm low TCR	<b>Resistance code</b> 0.02Ω = R020 0.51Ω = R510 0.025Ω = R025	<b>Tolerance</b> J : ±5% F : ±1%	<b>Packaging code</b> T : 7" Reel taping Q : 10" Reel taping G : 13" Reel taping	<b>Termination code</b> L = Sn base (lead free)		<b>Power code</b> G = 3/4W	<b>TCR code</b> H = 1000

### 14 Power Code

Code	Power										
A	1/16W	S	1/5W	E	1/3W	G	3/4W	J	2W	M	5W
B	1/10W	R	2/5W	F	1/2W	H	1W	K	3W	N	10W
C	1/8W	D	1/4W	Q	2/3W	I	1.5W	L	4W		

### 15 TCR Code

Code	TCR	Code	TCR	Code	TCR	Code	TCR	Code	TCR
G	1200	J	600	Y	150	P	50	V	10
H	1000	K	400	N	100	Q	25	W	5
I	800	L	200	X	70	S	15		



# Thick Film Power Low Ohm Chip Resistor



Tape packaging      MCWW10, MCWW12, MCWW08, MCWW06 : 8mm width paper taping  
                                  5,000pcs per 7" reel;  
                                  10,000pcs per 10" reel;  
                                  20,000pcs per 13" reel.

                                 WW25, WW20: 12mm width emboss taping  
                                  4,000pcs per 7" reel;  
                                  8,000pcs per 10" reel;  
                                  16,000pcs per 13" reel.

## Test And Requirements

Basic specification : JIS C 5201-1 : 1998

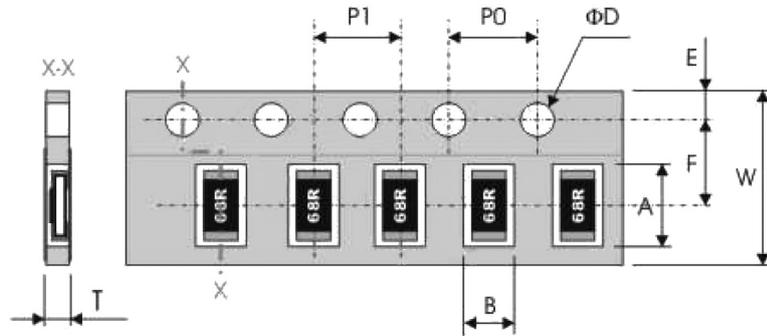
Test	Procedure	Requirement
<b>Clause 4.8</b> Temperature Coefficient of Resistance (TCR )	Natural resistance change per change in degree Centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{ppm}/^\circ\text{C}) \quad t_1 : 25^\circ\text{C}$ R1 : Resistance at reference temperature 25°C R2 : Resistance at test temperature 155°C	Refer to quick reference data
<b>Clause 4.13</b> Short time overload	Permanent resistance change after a 5second application of a 5 times rated power.	J : $\Delta R/R$ max. $\pm(2\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$
<b>Clause 4.17</b> Solderability	Un-mounted chips completely immersed for 2 $\pm$ 0.5 second in a SAC solder bath at 235°C $\pm$ 5°C.	Good tinning (>95% covered) No visible damage
<b>Clause 4.18</b> Leach Test	Un-mounted chips completely immersed for 60 $\pm$ 1second in a solder bath at 260°C $\pm$ 5°C	No visible damage J : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(0.5\% + 0.5\text{m}\Omega)$
<b>Clause 4.19</b> Temperature cycling	1. 30 minutes at -55°C $\pm$ 3°C, 2. 2~3 minutes at 20°C +5°C-1°C, 3. 30 minutes at +155° $\pm$ 3°C, 4. 2~3 minutes at 20°C +5°C-1°C, Total 5 continuous cycles.	No visible damage J : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(0.5\% + 0.5\text{m}\Omega)$
<b>Clause 4.25</b> Load life (endurance)	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.	J : $\Delta R/R$ max. $\pm(3\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$
<b>Clause 4.24</b> Load life in Humidity	1000 +48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C $\pm$ 2°C and 90~95% relative humidity, 1.5 hours on and 0.5 hours off.	J : $\Delta R/R$ max. $\pm(3\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$
<b>Clause 4.33</b> Bending strength	Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 3mm for 0603/0805, 2mm for 1206 and above sizes, once for 10 seconds	No visible damage J : $\Delta R/R$ max. $\pm(1\% + 0.5\text{m}\Omega)$ F : $\Delta R/R$ max. $\pm(0.5\% + 0.5\text{m}\Omega)$
<b>Clause 4.32</b> Adhesion	Pressurizing force: 5N, Test time: 10 $\pm$ 1sec.	No remarkable damage or removal of the terminations
<b>Clause 4.6</b> Insulation Resistance	Test voltage: 100 $\pm$ 15V	I.R $\geq$ 10G $\Omega$

# Thick Film Power Low Ohm Chip Resistor



## Packaging:

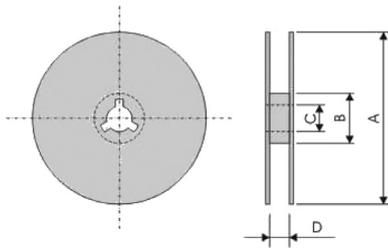
### Paper Tape specifications



Series No.	A	B	W	F	E	P1	P0	ΦD	T
MCWW25W	6.7 ±0.2	3.5 ±0.2	12 ±0.3	3.5 ±0.2	1.75 ±0.1	4 ±0.1	4 ±0.1	15 <sup>+0.1</sup> <sub>-0</sub>	Max. 1.2
MCWW20W	5.5 ±0.2	2.8 ±0.2	12 ±0.3						Max. 1.2
MCWW10W	3.6 ±0.2	3 ±0.2	8 ±0.3						Max. 1
MCWW12W	3.6 ±0.2	2 ±0.2							
MCWW08W	2.4 ±0.2	1.65 ±0.2							
MCWW06W	1.9 ±0.2	1.1 ±0.2							Max. 0.8

Dimensions : Millimetres

## Reel dimensions:



Symbol	A	B	C	D
7" reel	Φ178 ±2	Φ60 ±1	13 ±0.5	10 ±1.5 (8mm tape) 13.8 ±1.5 (12mm tape)
10" reel	Φ254 ±2	Φ100 ±1		
13" reel	Φ330 ±2	Φ6100 ±1		

Dimensions : Millimetres

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