

# APPROVAL SHEET

**WW12W**

**±1%, ±5%**

Thick Film High Power Low Ohm Chip Resistors

Size 1206 1W

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

## FEATURE

1. High power rating and compact size
2. High reliability and stability
3. Reduced size of final equipment
4. RoHS compliant and lead free products.

## APPLICATION

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

## 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.

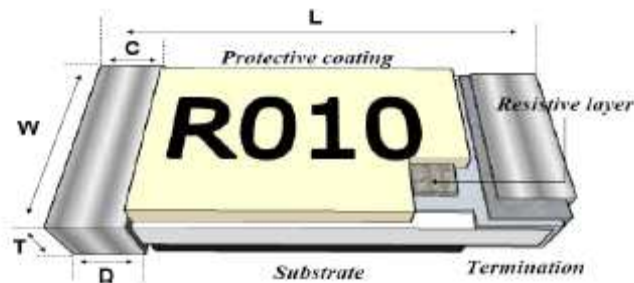
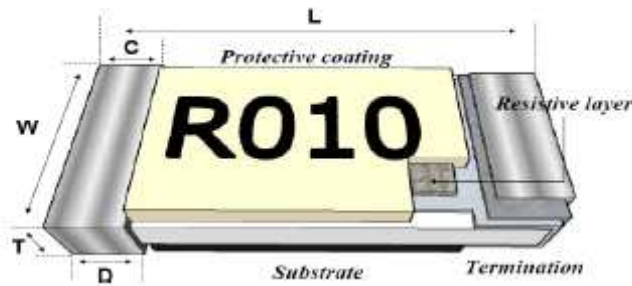


Fig 1. Construction of Chip-R

**QUICK REFERENCE DATA**

| Item                                       | General Specification |
|--|-----------------------|
| Series No.                                 | WW12W                 |
| Size code                                  | 1206 ( 3216 )         |
| Resistance Tolerance                       | ±1%, ±5%              |
| Resistance Range                           | 10mΩ, 20mΩ            |
| TCR (ppm/°C)                               | ±200ppm               |
| Max. dissipation at T <sub>amb</sub> =70°C | 1 W                   |
| Climatic category (IEC 60068)              | 55/155/56             |

**MECHANICAL DATA**



Unit: mm

| Symbol | WW12W       |
|--------|-------------|
| L      | 3.10 ± 0.10 |
| W      | 1.60 ± 0.10 |
| T      | 0.55 ± 0.10 |
| c      | 0.50 ± 0.25 |
| d      | 0.50 ± 0.25 |

**MARKING**

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

Example:

R010 = 10mΩ

R020 = 20mΩ

**FUNCTIONAL DESCRIPTION**

**Derating curve**

The power that the resistor can dissipate depends on the operating temperature; see Fig.2

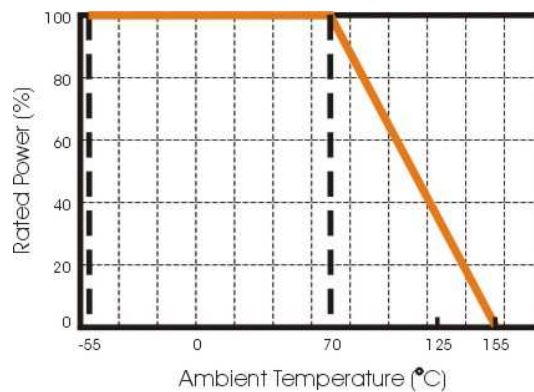


Figure 2 Maximum dissipation in percentage of rated power as a function of the ambient temperature

**Approval sheet**

**MOUNTING**

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems.

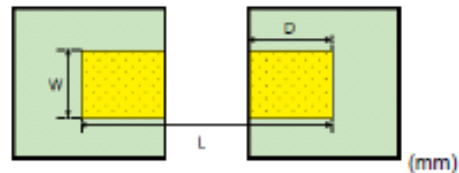
Chip placement can be on ceramic substrates and printed-circuit boards (PCBs).

Electrical connection to the circuit is by individual soldering condition.

The end terminations guarantee a reliable contact.

**Recommend Solder Pad Dimensions :**

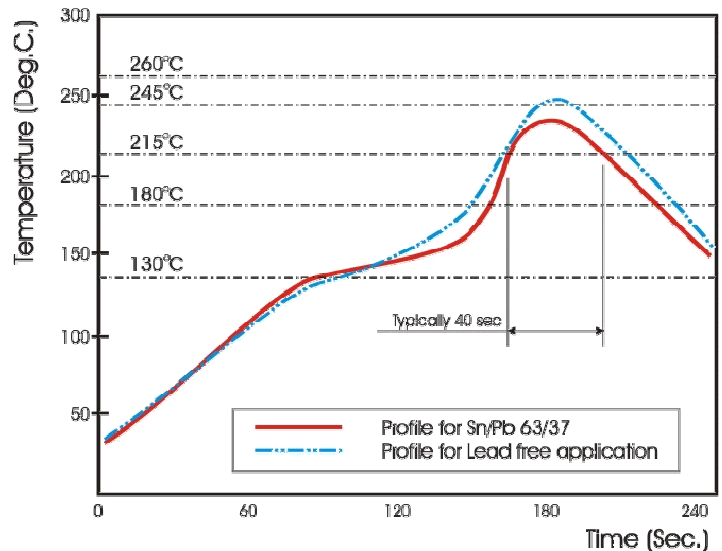
| Type  | W    | D    | L    |
|-------|------|------|------|
| WW12W | 1.80 | 1.30 | 4.70 |



**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.



**Fig 3. Infrared soldering profile for Chip Resistors**

**CATALOGUE NUMBERS**

The resistors have a catalogue number starting with.

| WW12                            | W  | R010   | F                                      | T  | L   | - | H                           | L                             |
|---------------------------------|--|--|--|--|---|---|-----------------------------|-------------------------------|
| <b>Size code</b><br>WW12 : 1206 | <b>Type code</b><br>W :Power<br>low ohm, | <b>Resistance code</b><br>R010 = 10mΩ<br>R020 = 20mΩ | <b>Tolerance</b><br>J : ±5%<br>F : ±1% | <b>Packaging code</b><br>T : 7" Reel<br>taping | <b>Termination code</b><br>L = Sn base<br>(lead free) |   | <b>Power code</b><br>H = 1W | <b>TCR code</b><br>L = 200ppm |

Tape packaging WW12W: 8mm width paper taping 5,000pcs per reel.

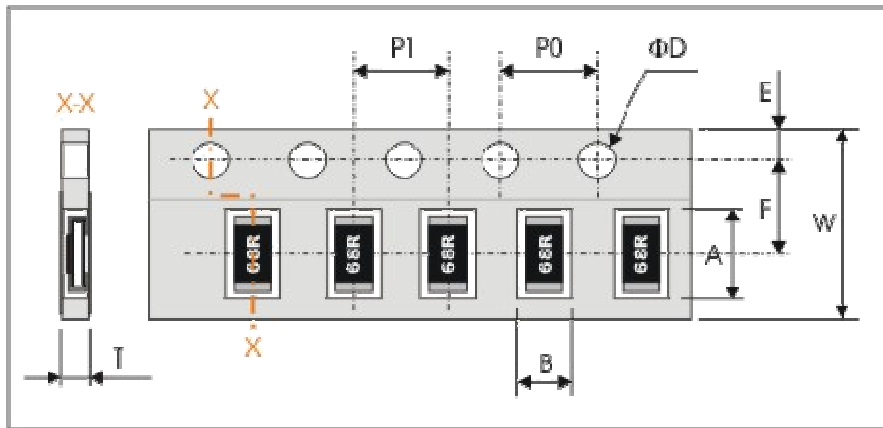
## TEST AND REQUIREMENTS

Basic specification : JIS C 5201-1 : 1998

| TEST  | PROCEDURE  | REQUIREMENT  |
|---|--|--|
| <b>Clause 4.8</b><br>Temperature Coefficient of Resistance (TCR ) | Natural resistance change per change in degree centigrade.<br>$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/}^\circ\text{C)}$ R <sub>1</sub> : Resistance at reference temperature 25°C<br>R <sub>2</sub> : Resistance at test temperature 155°C | Refer to quick reference data for T.C.R specification  |
| <b>Clause 4.13</b><br>Short time overload                         | 5 x rated power for 5sec.  | $\Delta R/R \text{ max. J: } \leq \pm(2\%+0.5m\Omega)$<br>$F: \leq \pm(1\%+0.5m\Omega)$                        |
| <b>Clause 4.18</b><br>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<br>$\Delta R/R \text{ max. J: } \leq \pm(1\%+0.5m\Omega)$<br>$F: \leq \pm(0.5\%+0.5m\Omega)$ |
| <b>Clause 4.17</b><br>Solderability                               | Un-mounted chips completely immersed for 3±0.5second in a SAC solder bath at 245°C±2°C   | Good tinning (>95% covered)<br>No visible damage   |
| <b>Clause 4.19</b><br>Temperature cycling                         | 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<br>$\Delta R/R \text{ max. J } \leq \pm(1\%+1m\Omega)$<br>$F \leq \pm(0.5\%+1m\Omega)$       |
| <b>Clause 4.25</b><br>Load life (endurance)                       | 1000 hours, loaded with RCWV or Vmax in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off  | No visible damage<br>$\Delta R/R \text{ max. J } \leq \pm(3\%+0.5m\Omega)$<br>$F \leq \pm(1\%+0.5m\Omega)$     |
| <b>Clause 4.24</b><br>Load life in Humidity                       | 1000 hours, loaded with RCWV or Vmax in humidity chamber controller at 40°C±2°C and 90~95% relative humidity, 1.5hours on and 0.5 hours off  | No visible damage<br>$\Delta R/R \text{ max. J } \leq \pm(3\%+0.5m\Omega)$<br>$F \leq \pm(1\%+0.5m\Omega)$     |
| <b>Clause 4.33</b><br>Bending strength                            | Resistors mounted on a 90mm glass epoxy resin PCB(FR4); bending : 2 mm, once for 10 seconds  | No visible damage<br>$\Delta R/R \text{ max. J } \leq \pm(1\%+1m\Omega)$<br>$F \leq \pm(0.5\%+1m\Omega)$       |
| Insulation Resistance<br><b>Clause 4.6</b>                        | Test voltage: 100 ±15V   | R ≥ 1GΩ  |

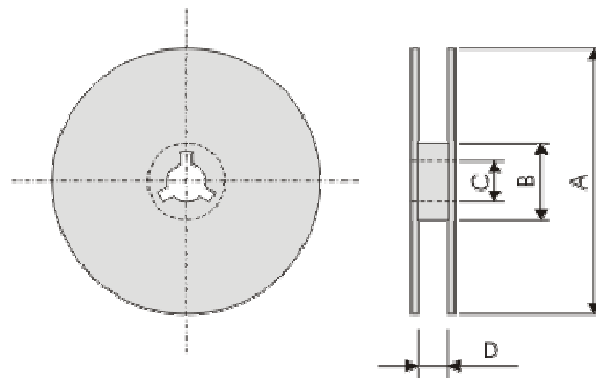
**PACKAGING**

Paper Tape specifications (unit :mm)



|            |           |           |                                       |           |           |
|------------|-----------|-----------|---------------------------------------|-----------|-----------|
| Series No. | A         | B         | W                                     | F         | E         |
| WW12W      | 3.60±0.20 | 2.00±0.20 | 8.00±0.30                             | 3.50±0.10 | 1.75±0.10 |
| Series No. | P1        | P0        | ΦD                                    | T         |           |
| WW12W      | 4.00±0.10 | 4.00±0.10 | Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub> | Max. 1.2  |           |

**Reel dimensions**



(unit : mm)

|                      |            |           |          |          |
|----------------------|------------|-----------|----------|----------|
| Reel / Tape          | A          | B         | C        | D        |
| 7" reel for 8mm tape | Φ178.0±2.0 | Φ60.0±0.5 | 13.0±0.5 | 10.0±1.5 |