

# APPROVAL SHEET

**WW12D, WW08D**

**±1%, ±5%**

Metal Foil low ohm power chip resistors

Size 1206 (1W), 0805 (1/2W)

**Sensing Type**

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

**FEATURE**

1. Ultra low and stable TCR performance
2. High power rating and compact size
3. High reliability and stability
4. Reduced size of final equipment
5. RoHS compliant & Lead free

**APPLICATION**

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

**DESCRIPTION**

The resistors are constructed in a high grade low resistive metal foil which adhere on top of ceramic substrate body. The resistive layer is covered with a protective coat and printed a resistance marking code over it. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Lead free terminations.

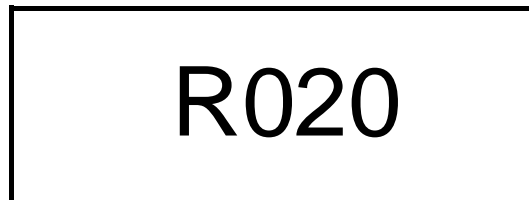


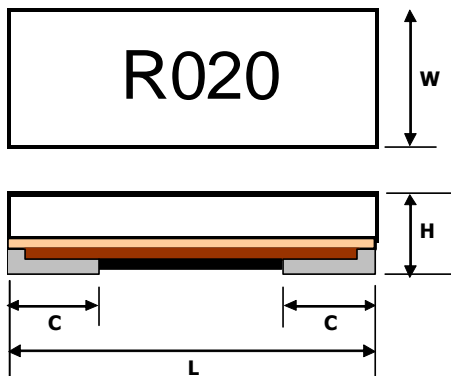
Fig 1. Construction of Chip-R

**QUICK REFERENCE DATA**

Item	General Specification	
Series No.	WW08D	WW12D
Size code	0805 (2012)	1206 (3216)
Resistance Tolerance	±5% , ±1%	
Resistance Range	20, 25, 30, 40, 50 mΩ	20, 25, 30, 40, 50 mΩ
TCR (ppm/°C) +20 ~ 155°C	±100 ppm/°C	
Max. power at T <sub>amb</sub> =70°C	1/2W	1W
Max. Operation Current (DC or RMS)	5A, 4.4A, 4A, 3.5A, 3.1A	7A, 6.3A, 5.7A, 5A, 4.4A
Climatic category (IEC 60068)	55/155/56	

Note : Max. Operation Current : So called RCWC (Rated Continuous Working Current) is determined by

$$RCWC = \sqrt{\text{Rated Power} / \text{Resistance Value}} \text{ listed above.}$$

**MECHANICAL DATA**

Unit: mm

Type	Size (inch)	Resistance	L (mm)	W (mm)	H (mm)	C (mm)
WW12D	1206	20mΩ	3.2±0.15	1.6±0.15	0.55±0.10	1.0±0.25
		25mΩ			0.55±0.10	0.8±0.25
		30mΩ			0.55±0.10	0.5±0.25
		40mΩ			0.50±0.10	0.8±0.25
		50mΩ			0.50±0.10	0.6±0.25
WW08D	0805	20mΩ	1.95±0.15	1.2±0.15	0.55±0.10	0.50±0.20
		25mΩ			0.55±0.10	0.35±0.20
		30mΩ			0.50±0.10	0.30±0.20
		40mΩ			0.50±0.10	0.55±0.20
		50mΩ			0.50±0.10	0.45±0.20

## MARKING

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

Example:

$$R020 = 0.02\Omega$$

$$R040 = 0.04\Omega$$

## FUNCTIONAL DESCRIPTION

### Derating curve

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

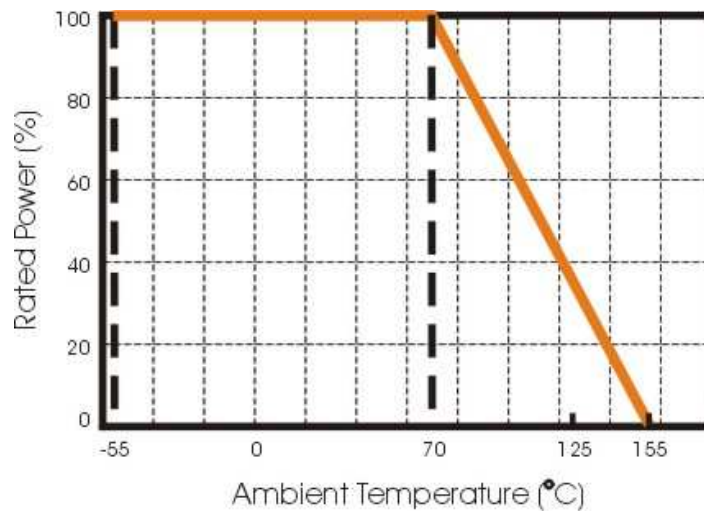


Fig.2 Maximum dissipation in percentage of rated power  
As a function of the ambient temperature

## 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.

### SOLDERING CONDITIONS

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 within lead-free solder bath. 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

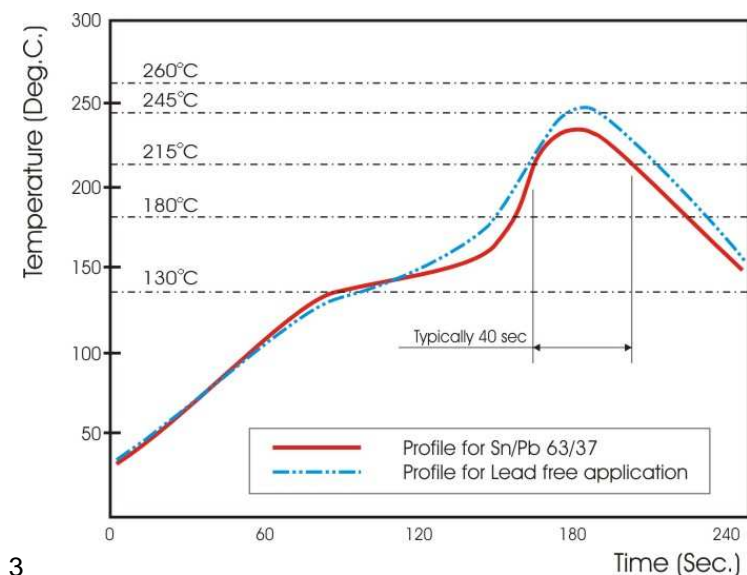


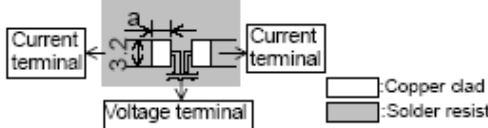
Fig 3. Infrared soldering profile for Chip Resistors WW12/08D

### CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WW12	D	R020	F	T	L
<b>Size code</b> WW12 : 1206 WW08 : 0805	<b>Type code</b> D : Metal foil	<b>Resistance code</b> R is first digit followed by 3 significant digits. 0.020Ω = R020 0.040Ω = R040	<b>Tolerance</b> J : ±5% F : ±1%	<b>Packaging code</b> T : 7" reeled in tape	<b>Termination code</b> L = Sn base (lead free)

Reeled tape packaging : 8mm width paper taping 5,000pcs per reel.

Table- 4(1)			
No.	Test items	Condition of test (JIS C 5201-1)	Performance requirements
1	Visual examination	Sub-clause 4.4.1 Checked by visual examination.	As in 4.4.1 The marking shall be legible, as checked by visual examination.
2	Dimension Resistance	Sub-clause 4.4.2 Resistance value shall be measured by mounting the substrate of the following condition.  a: 2.9mm (2mΩ, 3mΩ, 4mΩ), 1.8mm (5mΩ) Thickness of copper clad: 0.035mm 4-Terminal method Measurement current: 1(A) Note: The measuring apparatus corresponding to DC Low-ohm Meter (1A) of AX-1152D for ADEX CORPORATION.	As specified in Table-3 of this specification. As in 4.5.2 The resistance value shall correspond with the rated resistance taking into account the specified tolerance.
3	Voltage proof	Sub-clause 4.7 Method: 4.6.1.4(See Figure-5) Test voltage: Alternating voltage with a peak value of 1.42 times the insulation voltage. Duration: 60 s±5 s Insulation resistance Test voltage: Insulation voltage Duration: 1 min.	No breakdown or flash over  $R \geq 1 \text{ G}\Omega$
4	Solderability	Sub-clause 4.17 Without aging Flux: The resistors shall be immersed in a non-activated soldering flux for 2 s. Bath temperature: 235 °C±5 °C Immersion time: 2 s±0.5 s	As in 4.17.4.5 The terminations shall be covered with a smooth and bright solder coating.
5	Mounting Overload (in the mounted state) Solvent resistance of the marking	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4.13 The applied voltage shall be 2.5 times the rated voltage or the current corresponding to. Duration: 2 S Visual examination Resistance Sub-clause 4.30 Solvent: 2-propanol Solvent temperature: 23 °C±5 °C Method 1 Rubbing material: cotton wool Without recovery	No visible damage $\Delta R \leq \pm 1\%$ Legible marking

## TEST & REQUIREMENTS

Table-4(2)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
6	Mounting  Bound strength of the end face plating  Final measurements	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-4 Sub-clause 4.33 Bent value: 3 mm Resistance Sub-clause 4.33.6 Visual examination	$\Delta R \leq \pm 1\%$  No visible damage
7	Resistance to soldering heat   Component resistance solvent	Sub-clause 4.18 Solder temperature: 260 °C±5 °C Immersion time: 10 s±0.5 s Visual examination  Resistance Sub-clause 4.29 Solvent: 2-propanol Solvent temperature: 23 °C±5 °C Method 2 Recovery: 48 h Visual examination Resistance	As in 4.18.3.4 No sign of damage such as cracks. $\Delta R \leq \pm 1\%$  No visible damage $\Delta R \leq \pm 1\%$
8	Mounting  Adhesion  Rapid change temperature	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3 Sub-clause 4.32 Force: 10N Duration: 10 s±1 s Visual examination Sub-clause 4.19 Lower category temperature: -55 °C Upper category temperature: +155 °C Duration of exposure at each temperature: 30 min. Number of cycles: 5 cycles. Visual examination Resistance	No visible damage      No visible damage $\Delta R \leq \pm 1\%$

Table-4(3)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
9	Climatic sequence -Dry heat  -Damp heat, cycle (12+12hour cycle) First cycle  -Cold  -Damp heat, cycle (12+12hour cycle) Remaining cycle  -D.C. load	Sub-clause 4.23 Sub-clause 4.23.2 Test temperature: +155 °C Duration: 16 h  Sub-clause 4.23.3 Test method: 2 Test temperature: 55 °C [Severity(2)]  Sub-clause 4.23.4 Test temperature -55 °C Duration: 2h  Sub-clause 4.23.6 Test method: 2 Test temperature: 55 °C [Severity (2)] Number of cycles: 5 cycles Sub-clause 4.23.7 The applied current shall be the rated current. Duration: 1 min. Visual examination Resistance	No visible damage $\Delta R \leq \pm 5 \%$
10	Mounting   Endurance at 70 °C	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3  Sub-clause 4.25.1 Ambient temperature: 70 °C $\pm$ 2 °C Duration: 1000 h The current shall be applied in cycles of 1.5 h on and 0.5 h. The applied current shall be the rated current Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	No visible damage $\Delta R \leq \pm 3\%$

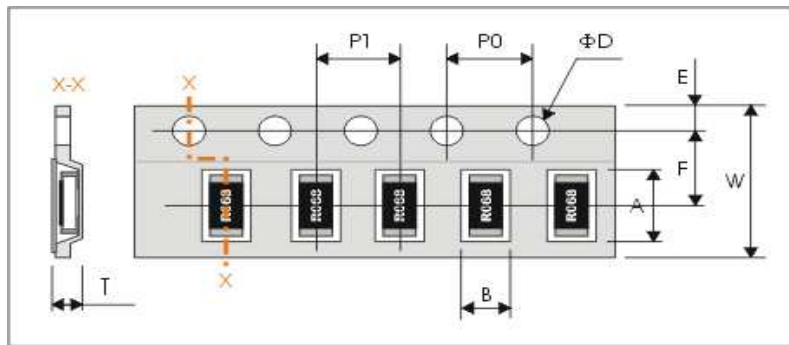


Table-4(4)

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
11	Mounting  Variation of resistance with temperature	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3  Sub-clause 4.8 +20 °C / +155 °C	As in Table-1
12	Mounting  Damp heat, steady state	Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3  Sub-clause 4.24 Ambient temperature: 60 ±2 °C Relative humidity: 93 <sup>+2</sup> / <sub>3</sub> % Without current applied. Visual examination  Resistance	No visible damage Legible marking Δ R ≤ ±1%
13	Dimensions (detail)  Mounting  Endurance at upper category temperature	Sub-clause 4.4.3  Sub-clause 4.31 Substrate material: Epoxide woven glass Test substrate: Figure-3  Sub-clause 4.25.3 Ambient temperature: 155 °C ±2 °C Duration: 1000 h Examination at 48 h, 500 h and 1000 h: Visual examination Resistance	As in Table-4          No visible damage Δ R ≤ ±5%

**PACKAGING**

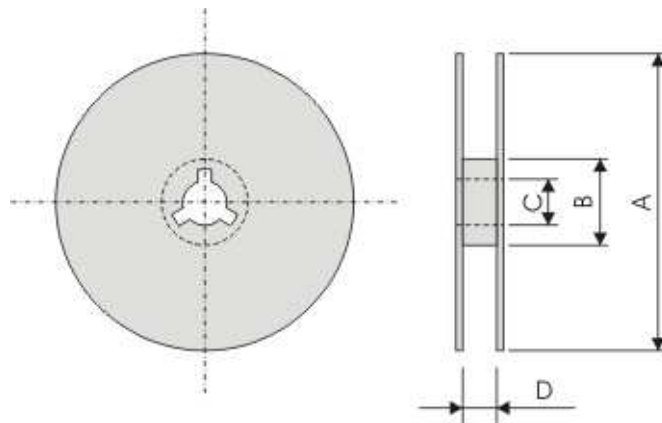
Plastic Tape specifications (unit :mm)



Symbol	A	B	W	F	E
WW12D	3.60±0.20	2.00±0.15	8.00±0.20	3.50±0.05	1.75±0.10
WW08D	2.50±0.20	1.65±0.15	8.00±0.20	3.50±0.05	1.75±0.10

Symbol	P1	P0	ΦD	T
WW12D	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	1.0 max.
WW08D	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	1.0 max.

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ180.0 -1.5	Φ60.0±1.0	13.0±0.2	9.0 +1.0

Taping quantity

- Chip resistors 5,000 pcs per reel.