

# APPROVAL SHEET

**WW12R, WW08R, WW06R**

**$\pm 1\%$ ,  $\pm 5\%$**

Metal low ohm power chip resistors

Size 1206 (1W), 0805 (0.5W), 0603 (0.33W)

**Sensing Type**

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

## FEATURE

1. Metal 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 & Halogen free & 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 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.



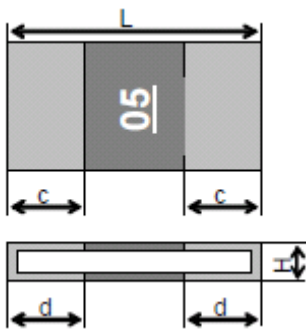
Fig 1. Construction of Chip-R

**QUICK REFERENCE DATA**

Item	General Specification		
Series No.	WW06R	WW08R	WW12R
Size code	0603 ( 1608 )	0805 ( 2012 )	1206 (3216)
Resistance Tolerance	±5% , ±1%		
Resistance Range	5, 10, 15mΩ	4, 5, 10mΩ,	1 ~ 15 mΩ
TCR (ppm/°C)	±70 ppm/°C		
Max. power at T <sub>amb</sub> =70°C	1/3 W	1/2 W	1W
Max. Operation Current (DC or RMS)	8.1A, 5.7A, 4.7A	7A, 10A, 11.1A	31.6A ~ 8.2A
Operation temperature	-55 ~ +155°C		

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)	d (mm)
WW06R	0603	5mΩ	1.60±0.10	0.80±0.10	0.33±0.10	0.20±0.10	0.50±0.10
		10mΩ			0.30±0.10	0.20±0.10	0.30±0.10
		15mΩ			0.22±0.10	0.20±0.10	0.20±0.10
WW08R	0805	4mΩ	2.0±0.15	1.25±0.15	0.30±0.10	0.30±0.10	0.65±0.10
		5mΩ			0.30±0.10	0.30±0.10	0.58±0.20
		10mΩ			0.22±0.10	0.30±0.10	0.47±0.20
WW12R	1206	1mΩ	3.2±0.15	1.60±0.15	0.32±0.10	1.10±0.25	
		2mΩ			0.32±0.10	0.50±0.25	
		3mΩ			0.35±0.10	0.70±0.25	1.30±0.25
		4mΩ			0.35±0.10	1.10±0.25	
		5mΩ			0.35±0.10	1.00±0.25	
		6mΩ			0.35±0.1	0.80±0.25	

	7mΩ	0.35±0.1	0.70±0.25
	8mΩ	0.35±0.1	0.50±0.25
	9mΩ	0.28±0.1	0.55±0.25
	10mΩ	0.28±0.1	0.50±0.25
	11mΩ	0.22±0.1	0.80±0.25
	12mΩ	0.22±0.1	0.70±0.25
	13mΩ	0.22±0.1	0.60±0.25
	14mΩ	0.22±0.1	0.55±0.25
	15mΩ	0.22±0.1	0.50±0.25

**MARKING**

WW12R/WW08R each resistor is marked with a 2-digit code with underline on the protective coating to designate the nominal resistance value. WW06R has no marking !

Example:

$$\underline{05} = 0.005\Omega$$

$$\underline{10} = 0.010\Omega$$

**FUNCTIONAL DESCRIPTION**

**Derating curve**

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

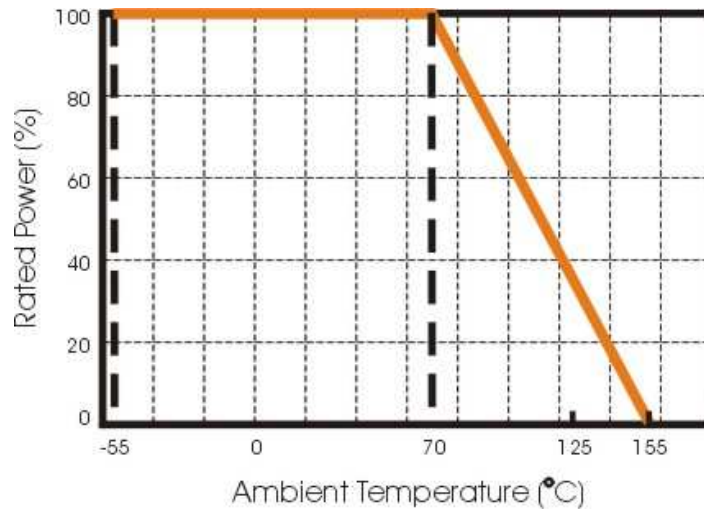


Fig.2 Maximum dissipation in percentage of rated power  
As a function of the ambient temperature

### 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 245°C during 3 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

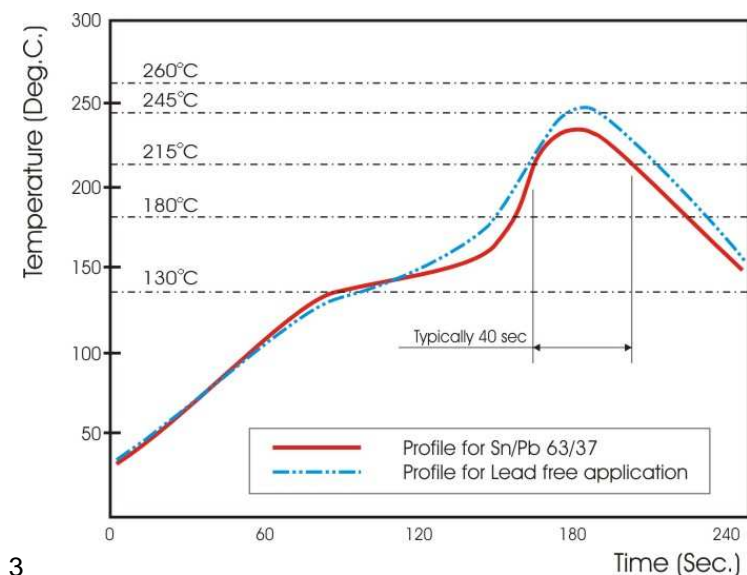


Fig 3. Infrared soldering profile for Chip Resistors WWxxR

### CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WW06	R	R005	J	T	L
<b>Size code</b>	<b>Type code</b>	<b>Resistance code</b>	<b>Tolerance</b>	<b>Packaging code</b>	<b>Termination code</b>
WW06 : 0603	R : 1/3W, 0603	R is first digit followed by 3 significant digits.	J : ±5%	T : 7" reel	L = Sn base (lead free)
WW08 : 0805	1/2W, 0805	0.010Ω = R010	F : ±1%	Q : 10" reel	
WW12 : 1206	1W, 1206	0.005Ω = R005			

Reeled tape packaging : 8mm width paper taping 5,000pcs per 7" reel. 10,000pcs per 10" reel.

## TEST &amp; REQUIREMENTS

Table- 4(1)

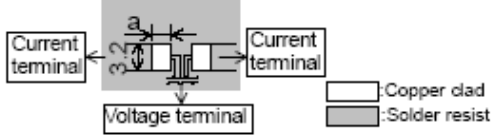
No.	Test items	Condition of test (JIS C 5201-1)	Performance requirements
1	Visual examination	Sub-clause 4.4.1 Checked by visual examination.	As in 4.4.1 The marking shall be legible, as checked by visual examination.
2	Dimension Resistance	Sub-clause 4.4.2 Resistance value shall be measured by mounting 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 ±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

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: 1 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: 5 N 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 $\Delta R \leq \pm 1\%$



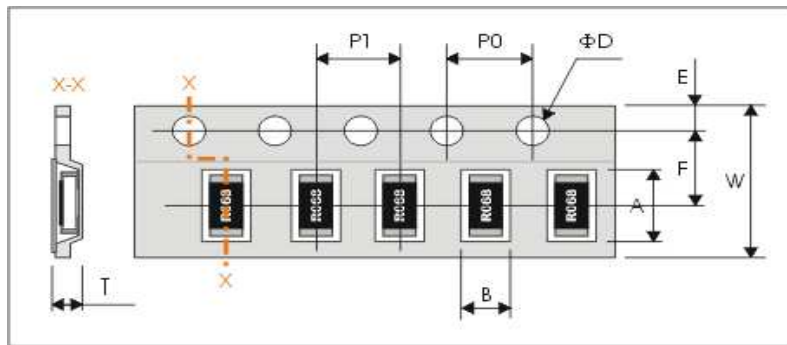


Table-4(4)

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: 40 °C±2 °C Relative humidity: 93 <sup>+2</sup> / <sub>3</sub> % Without current applied. Visual examination  Resistance	No visible damage Legible marking $\Delta R \leq \pm(1\%+0.0005\text{ohm})$
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 $\Delta R \leq \pm(1\%+0.0005\text{ohm})$

**PACKAGING**

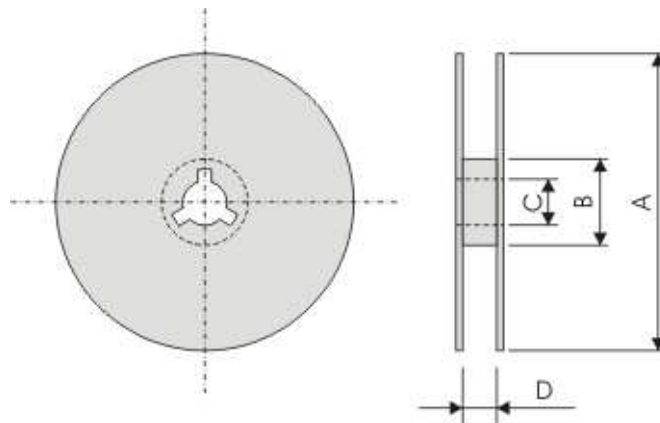
Paper Tape specifications (unit :mm)



Symbol	A	B	W	F	E
WW06R	1.90±0.20	1.15±0.15	8.00±0.20	3.50±0.05	1.75±0.10
WW08R	2.50±0.20	1.65±0.15			
WW12R	3.60±0.20	2.00±0.15			

Symbol	P1	P0	ΦD	T
WW06R	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	0.8 max.
WW08R				1.0 max.
WW12R				1.0 max.

**Reel dimensions**



Symbol	A	B	C	D
7"	Φ180.0 -1.5	Φ60.0±1.0	13.0±0.2	9.0 +1.0
10"	Φ254.0 ±2.0	Φ100.0±1.0	13.0±0.2	9.0 +1.0

**Taping quantity**

- Chip resistors 5,000 pcs per 7" reel; 10,000pcs per 10" reel.