

# APPROVAL SHEET

## WW12K\_J

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

Metal Ultra low ohm power chip resistors

Size 1206 1W

Metal Current Sensing Type

Automotive AEC Q200 Compliant

Anti-Sulfuration EIA 977 105°C 750hrs

RoHS Exemption free and Lead free products

Halogen free

Low EMF

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

## FEATURE

1. Ultra low and stable TCR performance
2. High power rating and low EMF  $\lt \pm 3\mu\text{V}/\text{degreeC}$
3. High reliability and stability
4. Reduced size of final equipment
5. RoHS exemption free and Lead free product
6. Inductance below 1nH
7. Automotive AEC Q200 compliant
8. Anti-Sulfuration EIA 977 105'C 750hrs

## 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 solder.

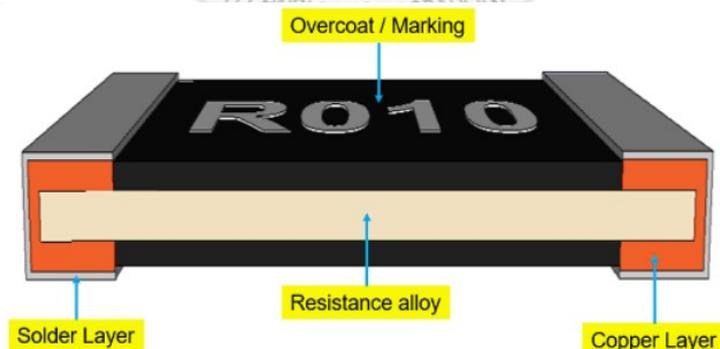


Fig 1. Construction of Chip-R

## QUICK REFERENCE DATA

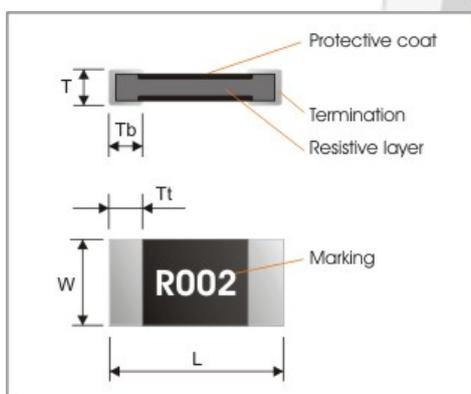
Item	Specification	
Series No.	WW12K	
Size code	1206 ( 3216 )	
Resistance Tolerance	±5%; ±1%	
Resistance Value	0.001Ω, 0.002Ω	0.003Ω, 0.004Ω, 0.005Ω, 0.006Ω, 0.007Ω, 0.008Ω, 0.009Ω, 0.010Ω, 0.015Ω, 0.020Ω, 0.025Ω
TCR (ppm/°C)	±75	±70
Max. dissipation at T <sub>amb</sub> =70°C	1 W	
Operation temperature	-55 ~ +170°C	

Note :

- This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
- Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

$$RCWV = \sqrt{\text{Rated Power} \times \text{Resistance Value}} \text{ or Max. RCWV listed above, whichever is lower.}$$

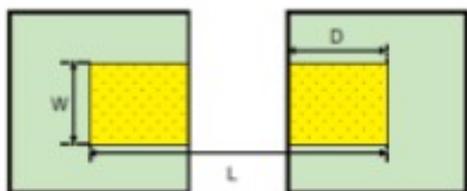
## MECHANICAL DATA



Symbol	R001, R002	R003 - R025
L	3.20±0.20	3.10±0.20
W	1.70±0.20	1.65±0.20
T	0.70±0.20	0.60±0.20
Tt	1.10±0.25	0.60±0.20
Tb	1.10±0.25	0.60±0.20

## Recommended Solder Pads:

Strongly suggest use recommend solder pad to design your circuits



Resistance	1m, 2mΩ	3m ~ 25mΩ
W	1.8mm	1.8mm
D	2.3mm	1.3mm
L	5.6mm	4.7mm

## MARKING

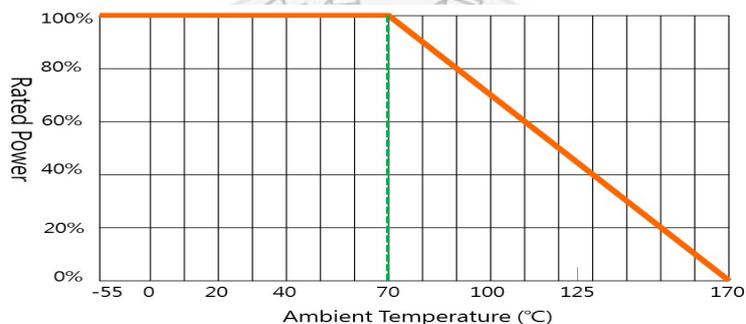
Each resistor is marked with a one or four-digit code on the protective coating to designate the nominal resistance value.

PN	Resistance	Marking digit	Marking
R001	1 mΩ	one -digit	
R005	5 mΩ	four -digit	

## FUNCTIONAL DESCRIPTION

### Derating curve

The power that the resistor can dissipate depends on the operating 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 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 3 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.

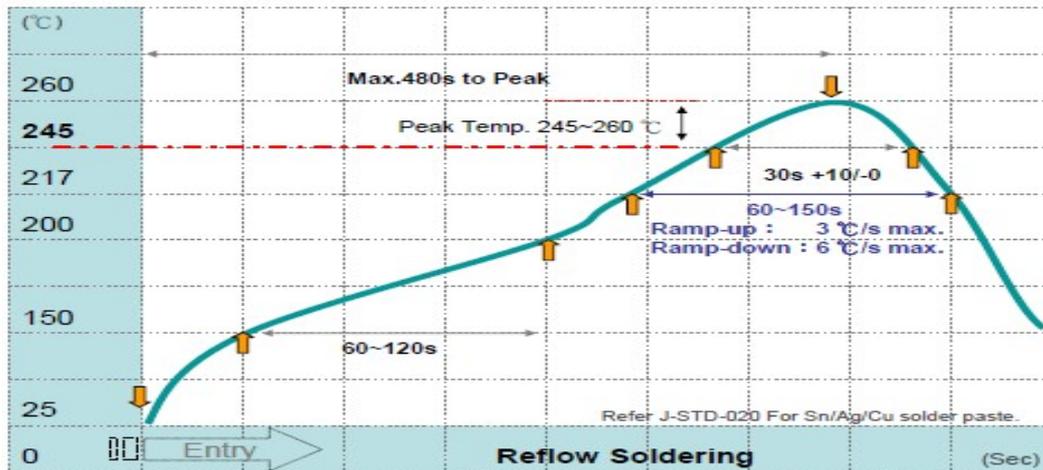


Fig 3. Infrared soldering profile for Chip Resistors WW12

## CATALOGUE NUMBERS

The resistors have a catalogue number starting with

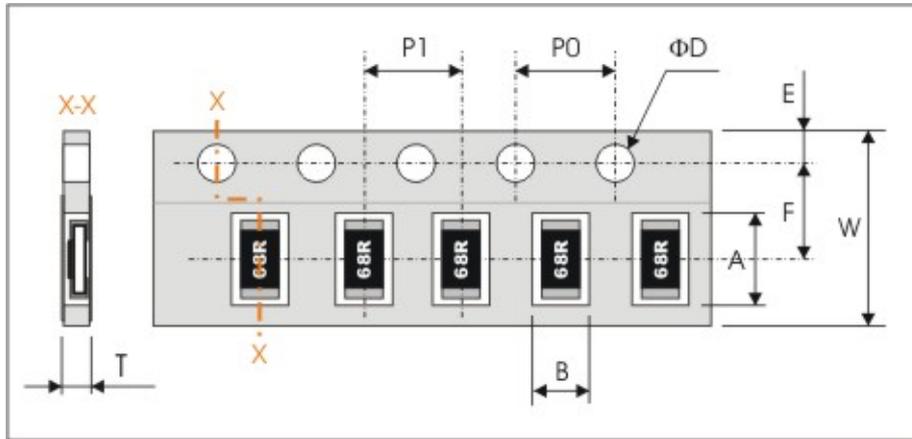
WW12	K	R010	F	T	L	J
<b>Size code</b> WW12 : 1206	<b>Type code</b> K : 1206 - 1W Metal strip Low EMF	<b>Resistance code</b> R is first digit followed by 3 significant digits.  0.010Ω = R010	<b>Tolerance</b> J : ±5% F : ±1%	<b>Packaging code</b> T : 7" reeled in tape 4,000pcs G: 13" reeled in tape, 16,000pcs	<b>Termination code</b> L = Sn base (lead free)	<b>Special code</b> J = AEC Q200 compliant

### TEST AND REQUIREMENTS ( AEC Q200 )

TEST	PROCEDURE	REQUIREMENT
Temperature Coefficient of Resistance(T.C.R) Clause 4.8	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"
High Temperature Exposure (Storage) MIL-STD-202 Method 108	Test 1000 hrs./ @T=170°C / Un-powered. Measurement at 24±2 hours after test conclusion.	ΔR/R max. ±(1%+0.5mΩ) no visible damage
Temperature cycling JESD22 Method JA-104	Test 1000 cycles (-55°C to +125°C). Measurement at 24±2 hours after test conclusion	no visible damage ΔR/R max. ±(0.5%+1mΩ)
Moisture Resistance MIL-STD-202 Method 106	Test 65°C / 80~100%RH/ 10Cycles(t=24hrs/cycle). Measurement at 24±2 hours after test conclusion.	no visible damage ΔR/R max. ±(0.5%+0.5mΩ)
Bias Humidity MIL-STD-202 Method 103	Test 1000 hours/ @85°C/85% RH./ 10% of operation power. Measurement at 24±2 hours after test conclusion.	no visible damage ΔR/R max. ±(1%+0.5mΩ)
Operation life MIL-STD-202 Method 108	Test 1000 hrs./ TA=125°C / 35% of operating power. Measurement at 24±2 hours after test conclusion	no visible damage ΔR/R max. ±(1%+0.5mΩ)
External Visual MIL-STD-883 Method 2009	Inspect device construction, marking and workmanship	no visible damage
Physical Dimensions JESD22 Method JB-100	The chip dimension (L, W, T, D) prescribed in the detail specification shall be checked by Protech 2.5D.	Within the specified tolerance
Mechanical Shock MIL-STD-202 Method 213	Test Peak value:100g's / Wave:Hail-sine / Duration:6ms / Velocity:12.3ft/sec.	Within product specification tolerance and no visible damage
Vibration MIL-STD-202 Method 204	Test 5g's for 20min., 12 cycles each of 3 orientations.	no visible damage ΔR/R max. ±(0.5%+0.5mΩ)
Resistance to soldering heat (R.S.H) MIL-STD-202 Method 210	Solder dipping @ 270°C±5°C for 10sec.±1sec.	no visible damage ΔR/R max. ±(0.5%+0.5mΩ)
Thermal Shock MIL-STD-202 Method 107	Test -55 to 155°C / dwell time 15min/ Max transfer time 20sec/ 300cycles.	no visible damage ΔR/R max. ±(0.5%+0.5mΩ)
ESD AEC-Q200-002	Test contact 1KV (Min)	no visible damage ΔR/R max. ±(1%+0.5mΩ)
Solderability J-STD-002	a) Bake the sample for 155°C dwell time 4hrs/ solder dipping 235°C/ 5sec. b) Steam the sample dwell time 8 hour/ solder dipping 215°C/ 5sec. c) Steam the sample dwell time 8 hour/ solder dipping 260°C/ 7sec.	good tinning (>95% covered) no visible damage
Board Flex AEC-Q200-005	Bending 2mm	no visible damage ΔR/R max. ±(0.5%+1mΩ)
Terminal Strength AEC-Q200-006	Force: 1.8kg for 60sec.	No cracking or no part being sheared off from its pad.
Short time overload (S.T.O.L) Clause 4.13	5×Rated power for 5 seconds.	no visible damage ΔR/R max.±1%
Anti-Sulfur	EIA-977(Test B) Sulfur 750 hours, 105±2°C	ΔR/R max.±1%

## PACKAGING

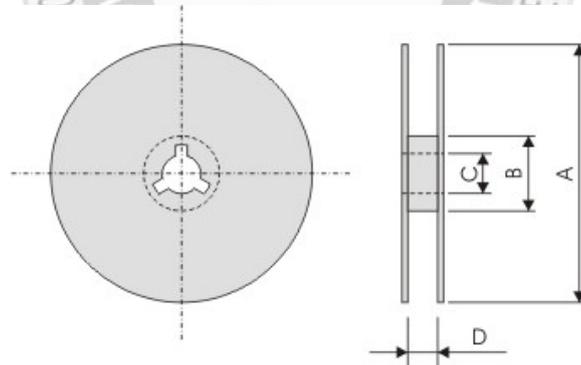
Paper Tape specifications (unit :mm)



Series No.	A	B	W	F	E
WW12K	3.60±0.20	2.00±0.20	8.00±0.30	3.50±0.05	1.75±0.10

Series No.	P1	P0	ΦD	T
WW12K	4.00±0.10	4.00±0.10	Φ1.50 <sup>+0.1</sup> <sub>-0.0</sub>	Max. 1.2

## Reel dimensions



Size	Symbol (unit : mm)	A	B	C	D
1206	7" reel	Φ178.0±2.0	Φ60.0±1.0	13.0±0.5	10.0±1.5
1206	13" reel	Φ330.0±2.0	Φ100.0±1.0	13.0±0.5	10.0±1.5

Taping Qty: 4,000pcs per 7" reel; 16,000pcs per 13" reel