

APPROVAL SHEET

WW12M_J, WW12N_J

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

Metal low ohm current sensing chip resistors

Size 1206 (3216) 1/2W, 1W

Automotive AEC Q200 Compliant

Anti-Sulfuration ASTM B-809 105°C 1000hrs

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

FEATURE

1. Metal low ohm and stable TCR performance
2. Automotive grade AEC Q-200 compliant
3. 100% CCD inspection
4. RoHS exemption free and Halogen free products
5. ASTM B-809 105°C 1000hrs compliant

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.

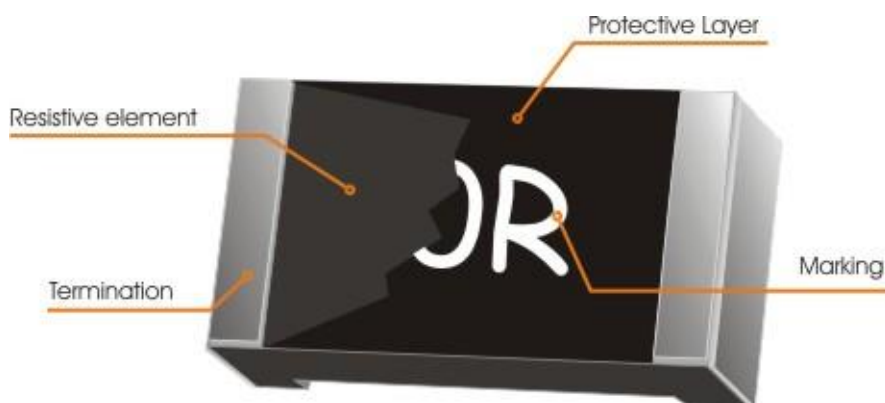
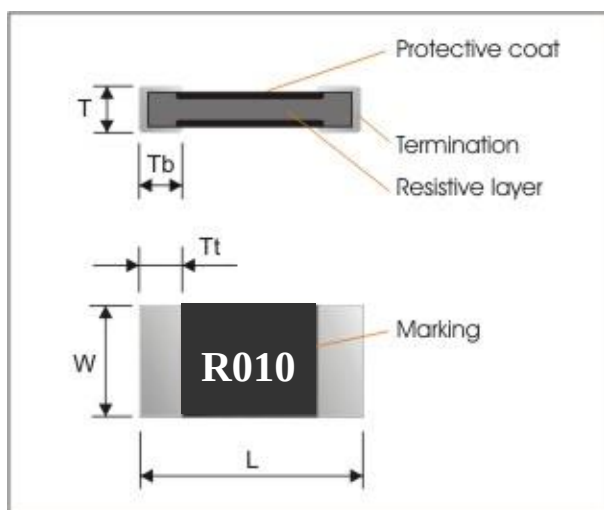


Fig 1. Construction of Chip-R

QUICK REFERENCE DATA

Item	General Specification	
Series No.	WW12M	WW12N
Size code	1206 (3216)	
Resistance Tolerance	$\pm 5\%$; $\pm 1\%$	
Resistance Value	0.005 Ω , 0.010 Ω , 0.015 Ω , 0.018 Ω , 0.020 Ω , 0.025 Ω , 0.030 Ω	
TCR (ppm/ $^{\circ}\text{C}$)	≤ 70 ppm/ $^{\circ}\text{C}$	
Max. dissipation at $T_{\text{amb}}=70^{\circ}\text{C}$	1/2W	1 W
Operation temperature	$-55 \sim +155^{\circ}\text{C}$	

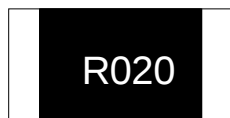
MECHANICAL DATA



Symbol	Dimensions (mm)
L	3.10 $\pm$ 0.20
W	1.60 $\pm$ 0.20
T	0.60 $\pm$ 0.20
Tt	0.60 $\pm$ 0.20
Tb	0.60 $\pm$ 0.20

MARKING

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



R020 = 20mΩ

FUNCTIONAL DESCRIPTION

Derating curve

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

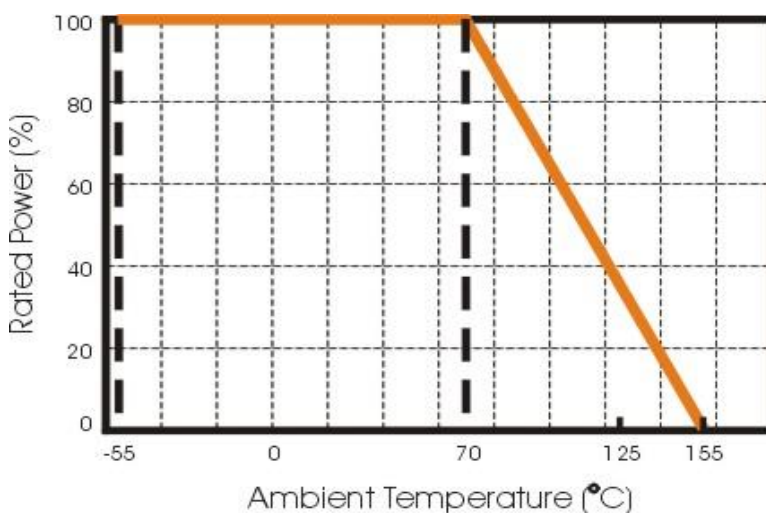


Fig.2 Maximum dissipation in percentage of rated power
As a function of the ambient temperature

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 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.

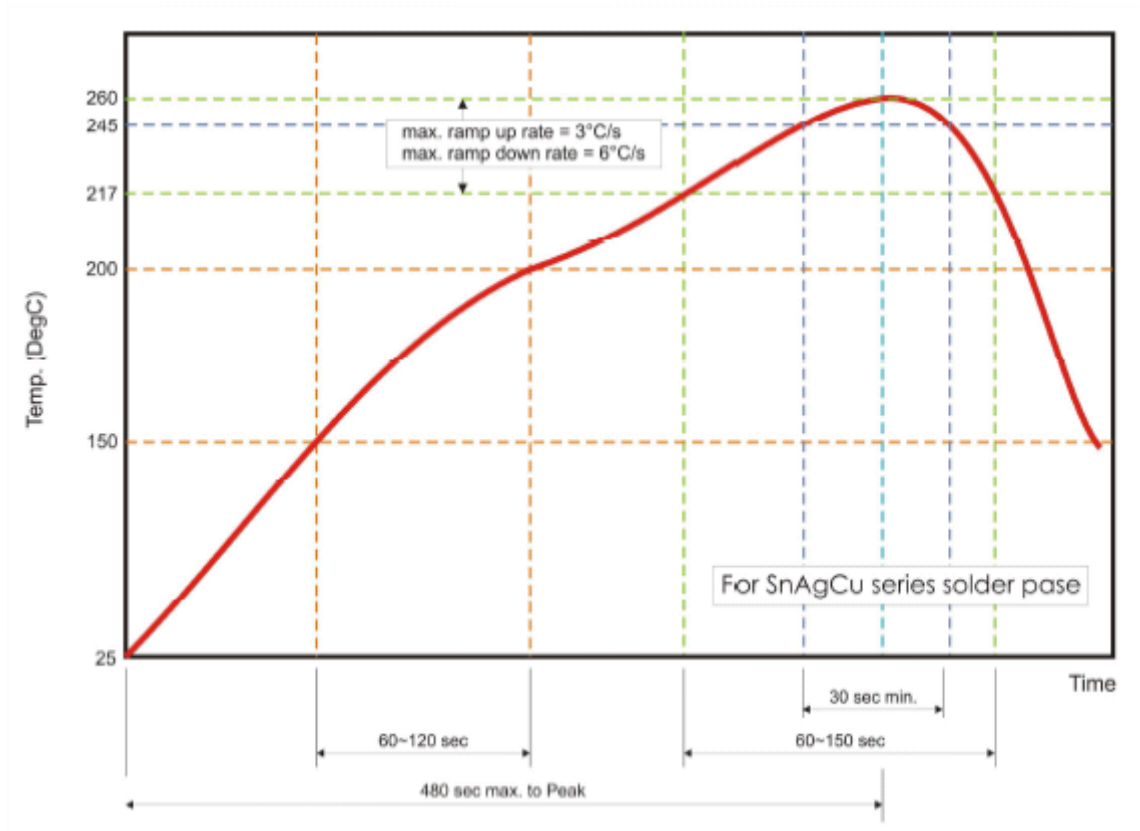


Fig 3. Infrared soldering profile for Chip Resistors WW12

CATALOGUE NUMBERS

The resistors have a catalogue number starting with:

WW12	N	R010	J	U	L	J
Size code WW12: 1206	Type code M : 1/2W N : 1W Sensing type	Resistance code R is first digit followed by 3 significant digits. 0.010Ω = R010	Tolerance J : ±5% F : ±1%	Packaging code U : 7" reeled in tape 4,000pcs	Termination code L = Sn base (lead free)	Special code J = Automotive grade AEC Q200 compliant ASTM B-809 Compliant

Chip resistors 4,000 pcs per reel.

TEST AND REQUIREMENTS (JIS C 5201-1 : 1998)

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category **LCT/UCT/56**(rated temperature range : **Lower Category Temperature, Upper Category Temperature**; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS.

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied :

Temperature: 15°C to 35°C.

Relative humidity: 45% to 75%.

Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

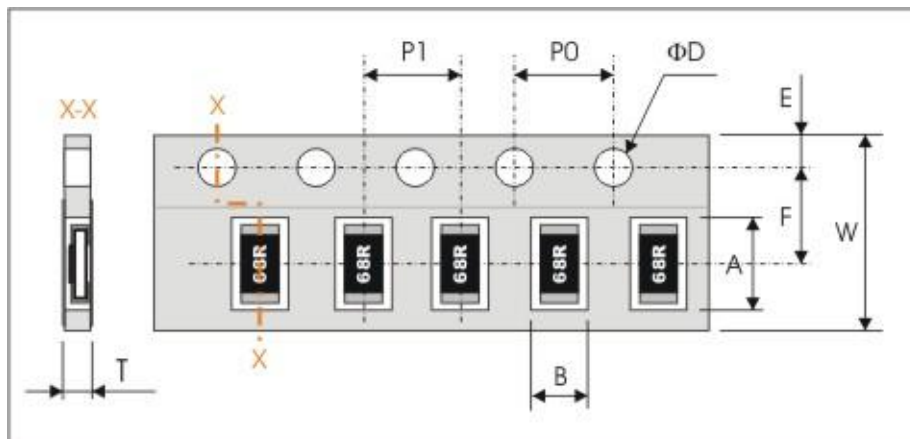
All soldering tests are performed with mildly activated flux.

TEST	PROCEDURE	REQUIREMENT
High temperature exposure MIL-STD-202 Method 108	Test 1000 hrs./ @T=125°C / Un-powered. Measurement at 24±2 hours after test conclusion.	Δ R/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	Δ R/R max. ±(1%+0.5mΩ) no visible damage
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.	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Biased 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.	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Operational Life MIL-STD-202 Method 108	Test 1000 hrs./ TA=125°C / 35% of operating power. Measurement at 24±2 hours after test conclusion	Δ R/R max. ±(1%+0.5mΩ) no visible damage
External Visual MIL-STD-883 Method 2009	Electrical test not required. Inspect device construction, marking and workmanship	No visual damage and refer WTC marking code.
Physical Dimensions JESD22 Method JB-100	The chip dimension (L, W, T, D) prescribed in the detail specification shall be checked	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.	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Resistance to Soldering Heat MIL-STD-202 Method 210	Solder dipping @ 260°C±5°C for 10±1sec.	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Thermal Shock MIL-STD-202 Method 107	Test -55 to 125°C / dwell time 15min/ Max transfer time 20sec/ 300cycles.	Δ R/R max. ±(1%+0.5mΩ) no visible damage
ESD AEC-Q200-002	Test contact 8KV	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Solderability J-STD-002	a) Bake 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

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”
Board flex AEC-Q200-005	Bending 2mm (Min).	Δ R/R max. ±(1%+0.5mΩ) no visible damage
Termination strength AEC-Q200-006	Force: 1.8kg for 60sec.	No cracking or no part being sheared off from its pad.

PACKAGING

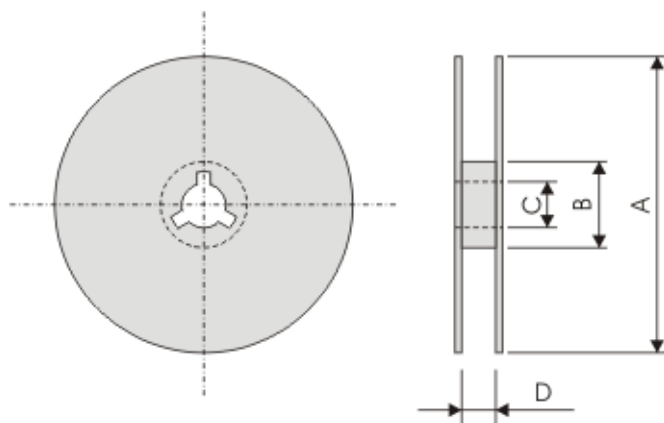
Paper Tape specifications (unit :mm)



Series No.	A	B	W	F	E
WW12M, WW12N	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
WW12M, WW12N	4.00±0.10	4.00±0.10	Φ1.50 ^{+0.1} _{-0.0}	Max. 1.2

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	9.0±0.5

Taping qty: 4000pcs per reel