APPROVAL SHEET

WW25K, WW25J

±1%, ±5%

Metal Ultra low ohm power chip resistors
Size 2512, WW25K 2W, WW25J 1W
Metal Current Sensing Type
RoHS Exemption free and Lead free products
Halogen free
Low EMF

FEATURE

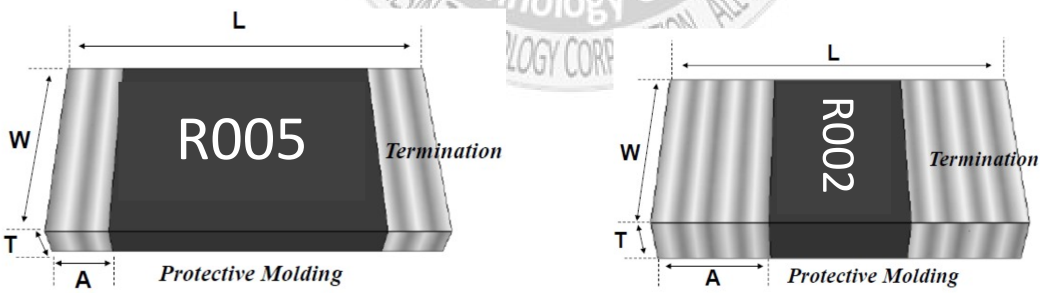
1. Ultra low and stable TCR performance
2. High power rating and low EMF <+/-3uV/°C
3. High reliability and stability
4. Reduced size of final equipment
5. RoHS Exemption free and Lead free products
6. Inductance below 1nH

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 soder.



Item	Protective Molding	Resistive Element	Internal Terminal	External Terminal
Material	Resin	Alloy Metal	Copper	Solder

Fig 1. Construction of Chip-R

QUICK REFERENCE DATA

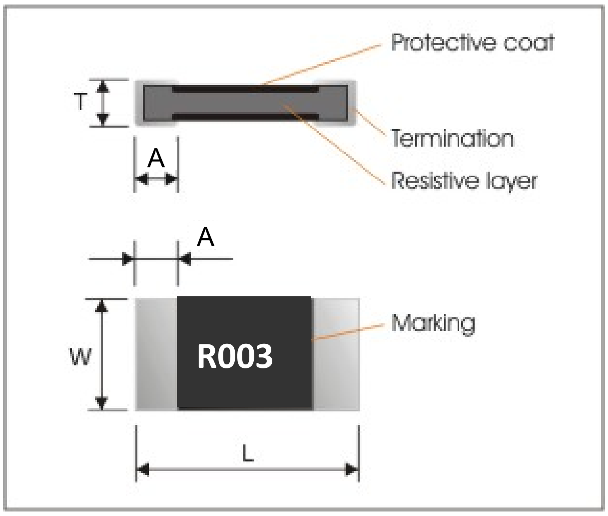
Item	General Specification	General Specification
Series No.	WW25J	WW25K
Size code	2512 (6432)	2512 (6432)
Resistance Tolerance	±5%; ±1%	±5%; ±1%
Resistance Value	0.001Ω, 0.002Ω, 0.003Ω, 0.004Ω, 0.005Ω, 0.006Ω, 0.007Ω, 0.008Ω, 0.009Ω, 0.010Ω, 0.015Ω, 0.020Ω, 0.025Ω	0.001Ω, 0.002Ω, 0.003Ω, 0.004Ω, 0.005Ω, 0.006Ω, 0.007Ω, 0.008Ω, 0.009Ω, 0.010Ω, 0.015Ω, 0.020Ω. 0.025Ω
TCR (ppm/°C)**	±70	±70
Max. dissipation at T_{amb}=70°C	1W	2W
Max.Working Current (Voltage)*	31.6A (158mV)	44.7A (224mV)
Max.Overload Current (Voltage)*	70.7A (354mV)	100A (500mV)
Operation temperature	-55/+170°C	-55/+170°C

Note :

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

   $RCWV = \sqrt{RatedPower \times ResistanceValue}$ or Max. RCWV listed above, whichever is lower.
3. Please keep the surface temperature do not exceed 105°C when operating.
4. ** : TCR Hot (+25~+155°C)
5. R-value might be variance depend on soldering conditions and please consider this influence before use milli-ohm resistors, and strongly suggest use the recommend solder pad to design your circuits
6. *Max. working &. Max. overload current details please refer Annex. 1

MECHANICAL DATA



Symbol	R001, R002	R003 ~ R025
L	6.40±0.25	6.20±0.25
W	3.25±0.20	3.25±0.20
T	0.75±0.20	0.60±0.20
A	2.00±0.20	0.80±0.20

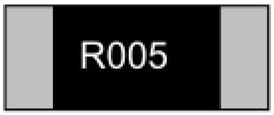
CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

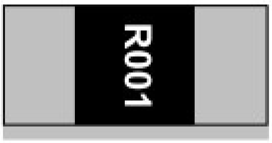
WW25	K	R010	F	T	L
Size code WW25 : 2512	**Type code** K : 2512 2W J : 2512 1W Metal strip Low EMF	**Resistance code** R is first digit followed by 3 significant digits. 0.010Ω = R010	**Tolerance** J : ±5% F : ±1%	**Packaging code** T : 7" reeled taping 4K pcs	**Termination code** L = Sn base (lead free)

MARKING

TOP：Marking. (4 Digits marking to identify the resistance value.)



R005=5mΩ，R020=20mΩ



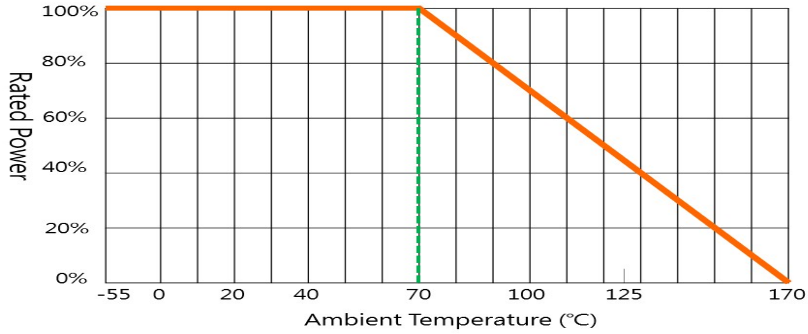
R001=1mΩ ; R002=2mΩ

FUNCTIONAL DESCRIPTION

Derating curve

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

Operating Temperature Range: -55 to +170°C



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.

Storage and Handling Conditions:

1. Products are recommended to be used up within two years since operation date as ensured shelf life. Check solderability in case shelf life extension is needed.
2. To store products with following condition:

   Temperature :5 to 40°C

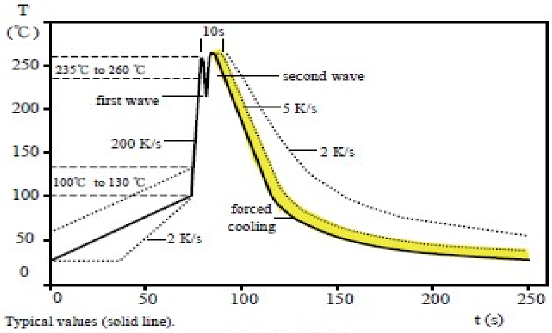
   Humidity :20 to 70% relative humidity
3. Caution:
   - a. Don't store products in a corrosive environment such as sulfide, chloride gas, or acid.

     It may cause oxdization of electrode, which easily be resulted in poor soldering.
   - b. To store products on the shelf and avoid exposure to moisture.
   - c. Don't expose products to excessive shock, vibration, direct sunlight and so on.

SOLDERING CONDITION

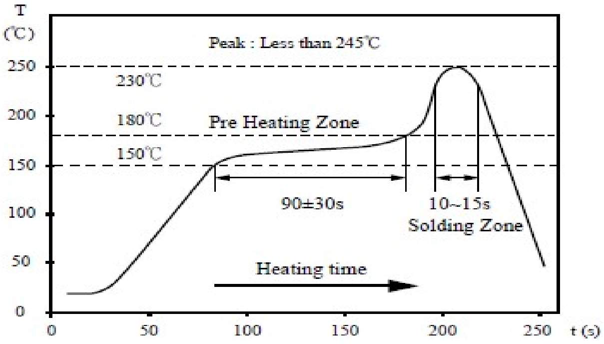
The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

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.



Typical values (solid line).
Process limits (dotted line).

WAVE soldering.



IR Reflow soldering.

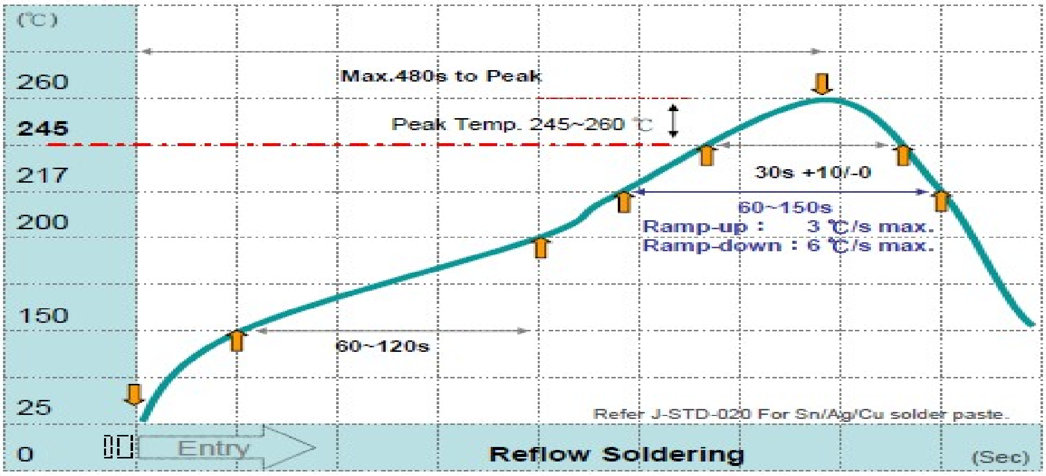
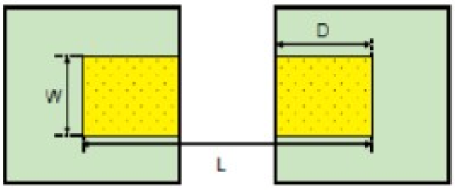


Fig 3. Infrared soldering profile for Chip Resistors WW25

Recommend Solder Pad Dimensions :



Type	W	D	L
3~25 mOhm	3.70	1.60	7.60
1-2 mOhm	4.00	3.00	7.30

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 : **L**ower **C**ategory **T**emperature, **U**pper **C**ategory **T**emperature; 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).

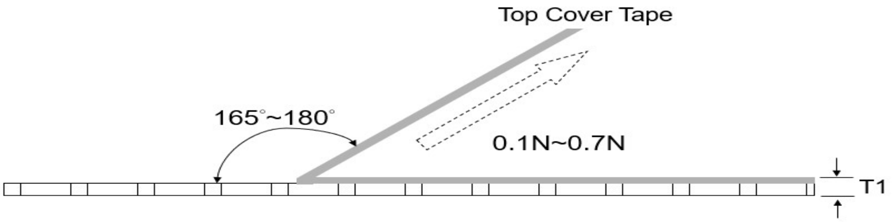
All soldering tests are performed with midly activated flux.

TEST	PROCEDURE	REQUIREMENT
DC Resistance	IEC 60115-1 / JIS C 5201-1, Clause 4.5 Measure the resistance Value.	J: ±5% F: ±1%
Short time overload (S.T.O.L)	IEC 60115-1/ JIS C 5201-1, Clause 4.13 Permanent resistance change after a 5 second application of 5 times rated power specified in the above list	no visible damage J: ΔR/R max. ±(2%+0.5mΩ) F: ΔR/R max. ±(1%+0.5mΩ)
Solderability	IEC 60115-1/ JIS C 5201-1, Clause 4.17 Un-mounted chips completely immersed for 3±0.5 second in a SAC solder bath at 235°C±2°C	good tinning (>95% covered) no visible damage
Resistance to soldering heat (R.S.H)	IEC 60115-1/ JIS C 5201-1, Clause 4.18 Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 270°C±5°C	no visible damage J: ΔR/R max. ±(1%+0.5mΩ) F: ΔR/R max. ±(0.5%+0.5mΩ)
Temperature cycling	IEC 60115-1/ JIS C 5201-1, Clause 4.19 30 minutes at -55°C±3°C, 2~3 minutes at 25°C+2°C-1°C, 30 minutes at +155°C±3°C, 2~3 minutes at 25°C+2°C-1°C, total 5 continuous cycles	no visible damage J: ΔR/R max. ±(1%+0.5mΩ) F: ΔR/R max. ±(0.5%+0.5mΩ)
Load life in Humidity	IEC 60115-1/ JIS C 5201-1, Clause 4.24 1000 hours, at rated continuous working voltage 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 J: ΔR/R max. ±(3%+0.5mΩ) F: ΔR/R max. ±(1%+0.5mΩ)
Temperature Coefficient of Resistance(T.C.R)	IEC 60115-1, Clause 4.8 Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) t_1 : 20°C+5°C-1°C R_1 : Resistance at reference temperature R_2 : Resistance at test temperature	Refer to “QUICK REFERENCE DATA”
Load life (endurance)	IEC 60115-1, Clause 4.25 70±2°C, 1000 hours, loaded with RCWV or Vmax,1.5 hours on and 0.5 hours off	no visible damage J: ΔR/R max. ±(3%+0.5mΩ) F: ΔR/R max. ±(1%+0.5mΩ)
Insulation Resistance	IEC 60115-1, Clause 4.6 Resistance between termination and overcoat. test voltage 100+/-15V	Min. 1Gohm
Bending Strength	IEC 60115-1/ JIS C 5201-1, Clause 4.33 Resistance change after bended 3mm on the 90mm PCB. 2mm for 1206/ 2512	no visible damage J: ΔR/R max. ±(1%+0.5mΩ) F: ΔR/R max. ±(0.5%+0.5mΩ)

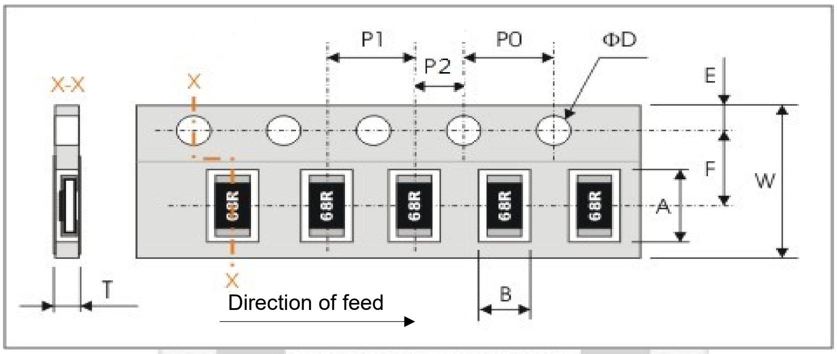
PACKAGING

Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min
The peel force of top cover tape shall between 0.1 to 0.7N



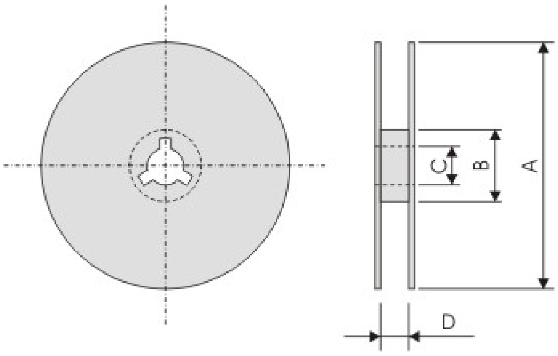
Plastic Tape specifications (unit :mm)



Series No.	A	B	W	F	E
WW25J/ WW25K	6.75±0.20	3.50±0.20	12.00±0.30	5.50±0.10	1.75±0.10

Series No.	P1	P0	P2	ΦD	T
WW25J/ WW25K	4.00±0.10	4.00±0.10	2.00±0.10	$\Phi1.50^{+0.1}_{-0.0}$	1.2±0.20

Reel dimensions



Size	A	B	C	D
2512	Φ178.0±2.0	Φ60.0±1.0	13.0±0.5	13.8±1.5

Taping Qty: WW25J/ WW25K: 4,000pcs per reel

Annex. 1 Max. working &. Max. overload current

2512 Rating Power 1.0W			2512 Rating Power 2.0W		
R_Value (mΩ)	Max. Working (A)	Max. Overload (A)	R_Value (mΩ)	Max. Working (A)	Max. Overload (A)
1	31.6	70.7	1	44.7	100.0
2	22.4	50.0	2	31.6	70.7
2.5	20.0	44.7	2.5	28.3	63.2
3	18.3	40.8	3	25.8	57.7
4	15.8	35.4	4	22.4	50.0
5	14.1	31.6	5	20.0	44.7
6	12.9	28.9	6	18.3	40.8
7	12.0	26.7	7	16.9	37.8
8	11.2	25.0	8	15.8	35.4
9	10.5	23.6	9	14.9	33.3
10	10.0	22.4	10	14.1	31.6
12	9.1	20.4	12	12.9	28.9
15	8.2	18.3	15	11.5	25.8
18	7.5	16.7	18	10.5	23.6
20	7.1	15.8	20	10.0	22.4
22	6.7	15.1	22	9.5	21.3
25	6.3	14.1	25	8.9	20.0
30	5.8	12.9	30	8.2	18.3
33	5.5	12.3	33	7.8	17.4
35	5.3	12.0	35	7.6	16.9
40	5.0	11.2	40	7.1	15.8
50	4.5	10.0	50	6.3	14.1
60	4.1	9.1	60	5.8	12.9
70	3.8	8.5	70	5.3	12.0
75	3.7	8.2	75	5.2	11.5
80	3.5	7.9	80	5.0	11.2
100	3.2	7.1	100	4.5	10.0
			150	3.7	8.2