APPROVAL SHEET

WW20M

±1%, ±5%

Ultra low ohmic chip resistors

Size 2010 (5025) 1/2W

Sensing Type

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 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 Tin(Lead free) soder .

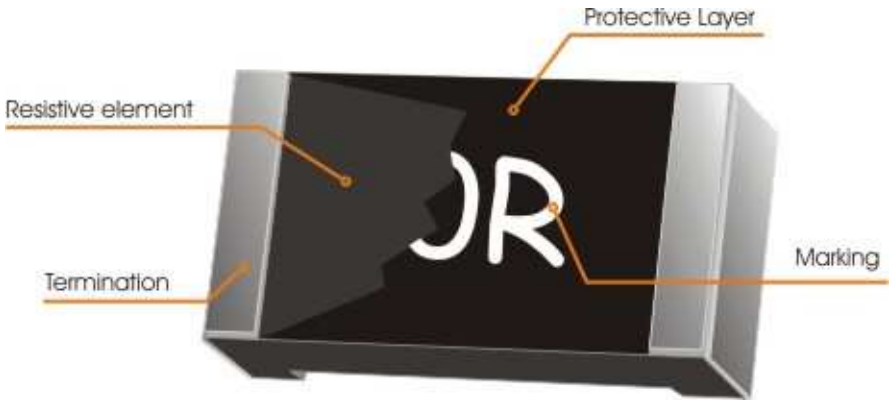


Fig 1. Consctruction of Chip-R

QUICK REFERENCE DATA

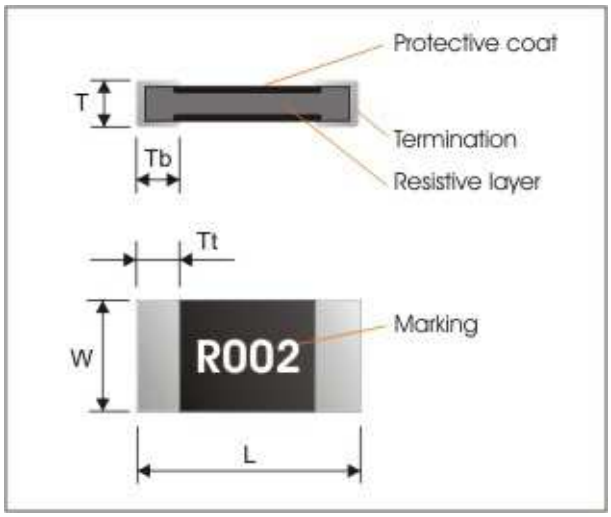
Item	General Specification
Series No.	WW20M
Size code	2010 (5025)
Resistance Tolerance	±5%; ±1%
Resistance Range	0.005Ω, 0.010Ω, 0.015Ω, 0.020Ω,
TCR (ppm/°C)	≤ ±75 ppm/°C
Max. dissipation at T_{amb}=70°C	1/2 W
Max. Operation Voltage (DC or RMS)	250V
Max. Overload Voltage (DC or RMS)	500V
Climatic category (IEC 60068)	55/155/56

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

   $RCWV = \sqrt{Rated\,Power \times Resistance\,Value}$ or Max. RCWV listed above, whichever is lower.
3. Resistance value will be changed by soldering condition and design of soldering pad , please design products in consideration of the change of resistance value.

MECHANICAL DATA



Symbol	Dimensions (mm)
L	5.00±0.20
W	2.50±0.20
T	0.60±0.15
Tt	0.65±0.25
Tb	0.65±0.25

MARKING

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

Example:

R005 = 0.005Ω
R010 = 0.010Ω

FUNCTIONAL DESCRIPTION

Derating curve

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

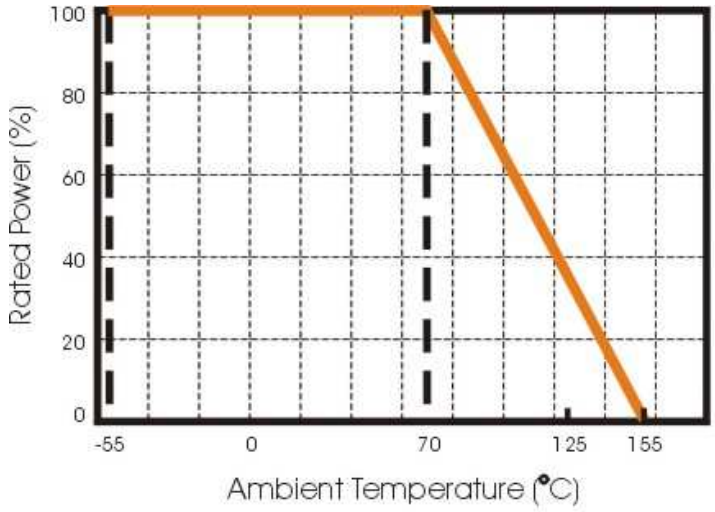


Fig.2 Maximum dissipation in percentage of rated power
As a function of the ambient temperature

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.

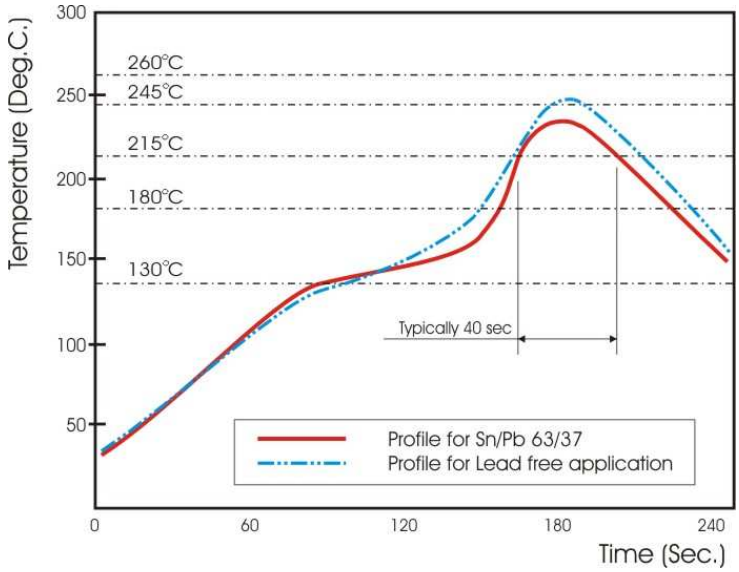


Fig 3. Infrared soldering profile for Chip Resistors

CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WW20	M	R005	J	T	L
Size code WW20 : 2010	**Type code** M : 1/2W Sensing type	**Resistance code** R is first digit followed by 3 significant digits. 0.010Ω = R010 0.005Ω = R005	**Tolerance** J : ±5% F : ±1%	**Packaging code** T : 7" reeled in tape	**Termination code** L = Sn base (lead free)

Reeled tape packaging : 12mm width plastic emboss taping 4,000pcs 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 : **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%.

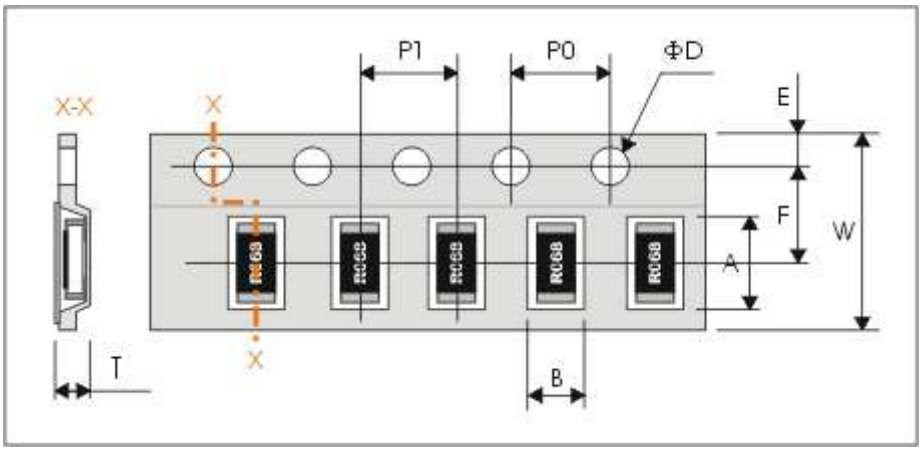
Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar).

All soldering tests are performed with midly activated flux.

TEST	PROCEDURE	REQUIREMENT
Temperature Coefficient of Resistance(T.C.R) **Clause 4.8**	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6$ (ppm/°C) R_1 : Resistance at reference temperature R_2 : Resistance at test temperature t_1 : 20℃+5℃-1℃	Refer to “QUICK REFERENCE DATA”
Short time overload (S.T.O.L) **Clause 4.13**	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	no visible damage ΔR/R max. ±(1%+0.0001Ω)
Resistance to soldering heat(R.S.H) **Clause 4.18**	Un-mounted chips completely immersed for 10±1second in a SAC solder bath at 260℃±5°C	no visible damage ΔR/R max. ±(1%+0.0001Ω)
Solderability **Clause 4.17**	Un-mounted chips completely immersed for 2±0.5second in a SAC solder bath at 235℃±5℃	good tinning (>95% covered) no visible damage
Temperature cycling **Clause 4.19**	30 minutes at -55°C±3°C, 2~3 minutes at 20℃+5℃-1℃, 30 minutes at +155°C±3°C, 2~3 minutes at 20℃+5℃-1℃, total 5 continuous cycles	no visible damage ΔR/R max. ±(1%+0.0001Ω)
Load life (endurance) **Clause 4.25**	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off	no visible damage ΔR/R max. ±(2%+0.0001Ω)
Load life in Humidity **Clause 4.24**	1000 +48/-0 hours, loaded with RCWV or Vmax 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 ΔR/R max. ±(2%+0.0001Ω)
Adhesion **Clause 4.32**	Pressurizing force: 5N, Test time: 10±1sec.	No remarkable damage or removal of the terminations

PACKAGING

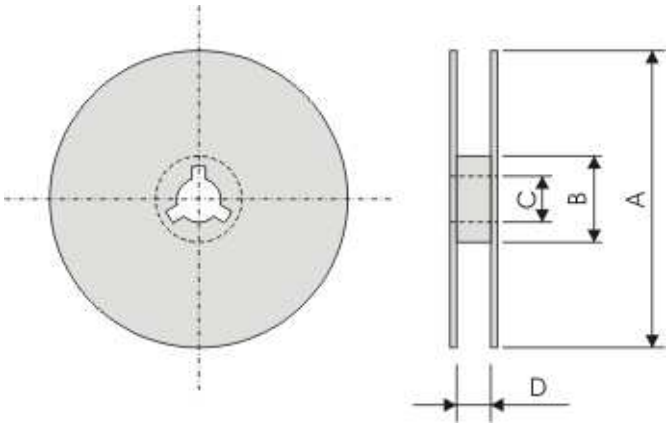
Plastic Tape specifications (unit :mm)



Symbol	A	B	W	F	E
Dimensions	5.50±0.20	2.80±0.20	12.00±0.30	5.50±0.1	1.75±0.10

Symbol	P1	P0	ΦD	T
Dimensions	4.00±0.10	4.00±0.10	$\Phi 1.50^{+0.1}_{-0.0}$	Max. 1.2

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0±2.0	Φ60.0±1.0	13.0±0.2	14.0±0.2

Taping quantity

- Chip resistors 4,000 pcs per reel.