APPROVAL SHEET

WR01X

±5%, ±1%

Thick Film General Purpose chip resistors

Size 01005

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

FEATURE

1. Ultra small and high precision size and light weight
2. High reliability and stability
3. Reduced size of final equipment
4. Suitable for high density print circuit board assembly
5. Higher component and equipment reliability
6. Lead free product

APPLICATION

- Mobile phone
- PDA, MP3, Ipod, iPHONE
- DSC, DVs
- Palmtop computers
- Mini module

DESCRIPTION

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to nominated value within tolerance which controlled by laser trimming of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a pure Tin.

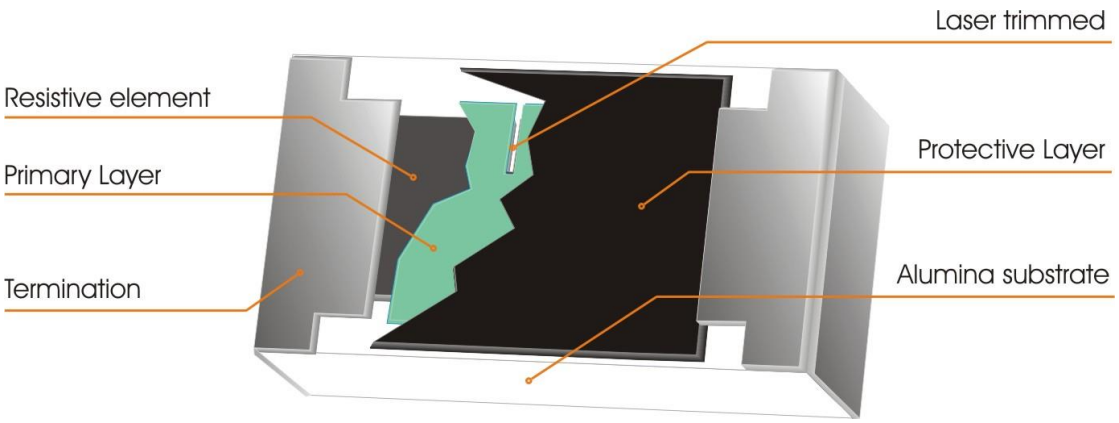


Fig 1. Construction of Chip-R WR01X

QUICK REFERENCE DATA

Item	General Specification	
Series No.	WR01X	
Size code	01005 (0402)	
Resistance Range	4.7Ω ~ 1MΩ (±5%, ±1%), Jumper	
Resistance Tolerance	±1% E96/E24	±5% E24
TCR (ppm/°C)	100Ω - 1MΩ, ≤ ±200 ppm 10Ω - 91Ω, ≤ ±300 ppm 4.7 - 9.1Ω, +600~ -200 ppm	
Max. dissipation @ T_{amb}=70°C	1/32 W	
Max. Operation Voltage (DC or RMS)	15V	
Max. Overload Voltage (DC or RMS)	30V	
Climatic category (IEC 60068)	55/125/56	

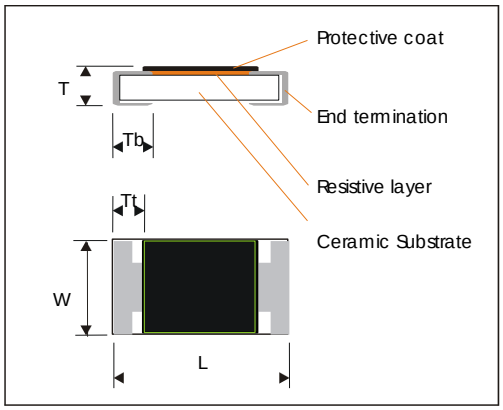
Note :

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.

DIMENSION(unit : mm)

	WR01X
L	**0.40 ± 0.02**
W	**0.20 ± 0.02**
T	**0.13 ± 0.02**
Tb	**0.10 ± 0.03**
Tt	**0.08 ± 0.03**



MARKING

WR01X has no marking.

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24/E96 series for resistors with a tolerance of ±5% & ±1%. The values of the E24/E96 series are in accordance with "IEC publication 60063"

Derating

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

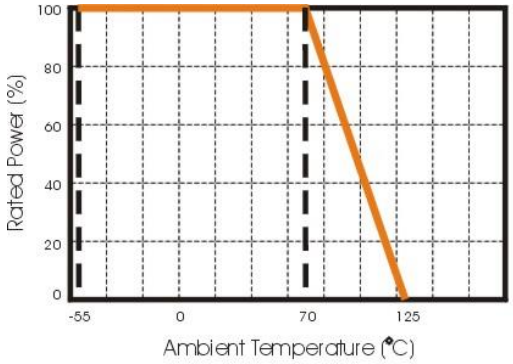
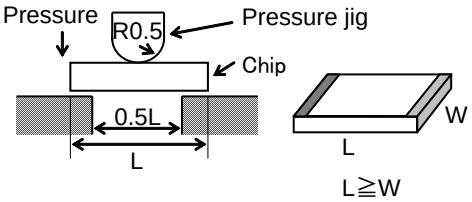


Figure 2. Maximum dissipation in percentage of rated power

As a function of the ambient temperature

MOUNTING

Due to its rectangular shape and ultra small size, Surface Mountable Resistors 01005 should be carefully handling by automatic placement systems. 01005 chip can withstand pressure force min. 1.9N by applying φ0.18 pressure jig as shown drawing below. For mounting application, please contact Walsin group for details.



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 245°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.

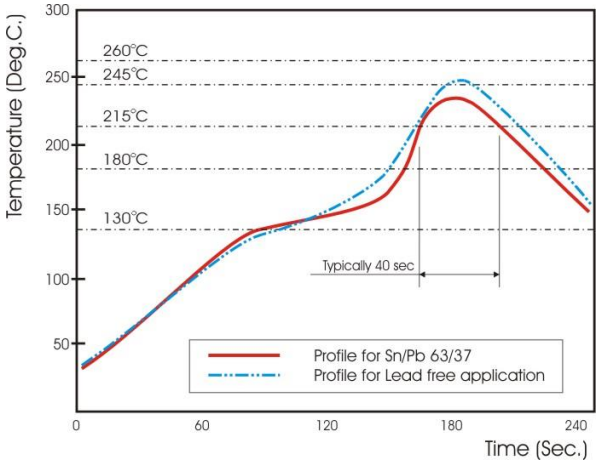


Fig 3. Infrared soldering profile for Chip Resistors WR01X

CATALOGUE NUMBERS

The resistors have a catalogue number starting with :

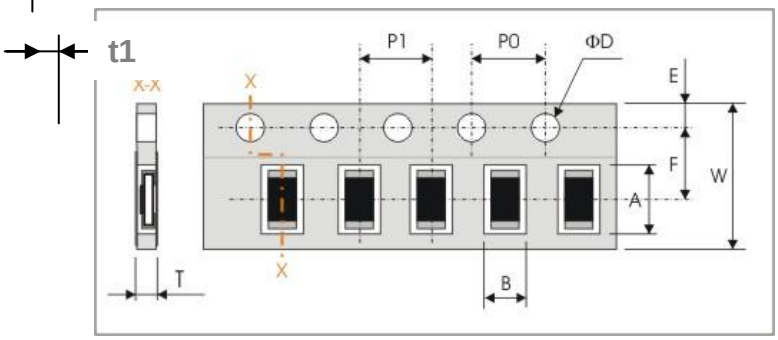
WR01	X	472_	J	D	L
Size code WR01 : 01005	**Type code** X : Normal W : 1%, < 10ohm	**Resistance code** 5% E24 : 2 significant digits followed by no. of zeros and a blank 4.7Ω =4R7_ 10Ω =100_ 220Ω =221_ Jumper =000_ ("_" means a blank) 1%, E24+E96: 3 significant digits followed by no. of zeros 100Ω =1000 37.4KΩ =3742	**Tolerance** J : ±5% F : ±1% P : Jumper	**Packaging code** **D** : 7" Reeled paper taping (20Kpcs/Reel) **L** : 7" Reeled embossed taping (35Kpcs/Reel)	**Termination code** L = Sn base (lead free)

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

TEST	PROCEDURE / TEST METHOD	REQUIREMENT	
		Resistor	0Ω
DC resistance **Clause 4.5**	DC resistance values measured at the test voltages specified below : <10Ω@0.1V, <100Ω@0.3V, <1KΩ@1.0V, <10KΩ@3V, <100KΩ@10V, <1MΩ@25V, <10MΩ@30V	Within the specified tolerance	<50mΩ
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) 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"	N/a
Short time overload (S.T.O.L) **Clause 4.13**	Permanent resistance change after a 2 second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	ΔR/R max. ±(1%+0.05Ω)	<50mΩ
Resistance to soldering heat(R.S.H) **IEC 60068-2-58: 2004**	Un-mounted chips completely immersed for 10±0.5second in a SAC solder bath at 260℃±5°C	△R/R max. ±(1%+0.05Ω) no visible damage	<50mΩ
Solderability **IEC 60068-2-58: 2004**	Un-mounted chips completely immersed for 2±0.3second in a SAC solder bath at 235℃±5℃	95% coverage min., good tinning and no visible damage	
Temperature cycling **Clause 4.19**	30 minutes at -55°C±3°C, 2~3 minutes at 20°C+5°C-1°C, 30 minutes at +125°C±3°C, 2~3 minutes at 20°C+5°C-1°C, total 5 continuous cycles	ΔR/R max. ±(1%+0.05Ω)	< 50mΩ
Damp Heat (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,	ΔR/R max. ±(5%+0.10Ω) no visible damage	< 50mΩ
Load Life (Endurance) **Clause 4.25**	1000+48/-0 hours; loaded with RCWV or V_{max} in chamber controller 70±2°C, 1.5 hours on and 0.5 hours off	ΔR/R max. ±(5%+0.10Ω) no visible damage	< 50mΩ
Endurance at the upper category temperature	125°C, no load, 1000 hours	ΔR/R max. ±(5%+0.10Ω) no visible damage	< 50mΩ
Bending strength **Clause 4.33**	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once 3mm for 10sec.	No visual damage, ΔR/R max. ±(1%+0.05Ω)	< 50mΩ
Adhesion **Clause 4.32**	Pressurizing force: 2N, Test time: 10±1sec.	No visual damage	

PACKAGING

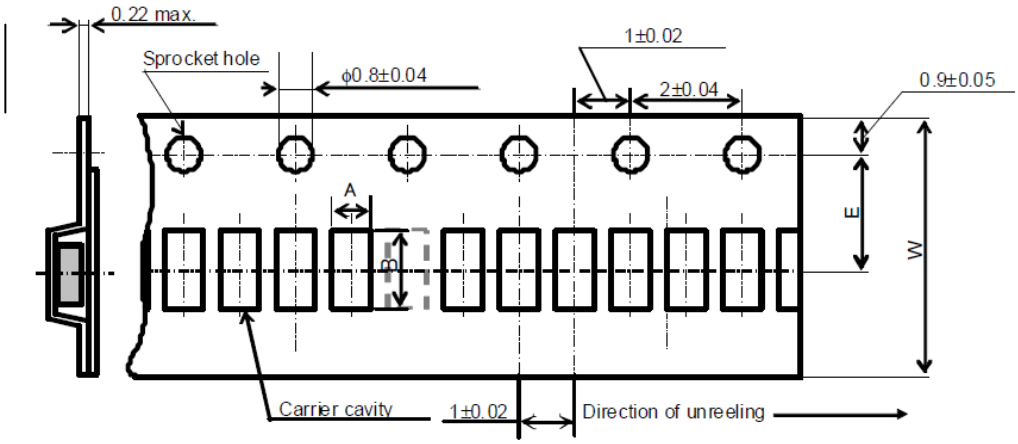
1. **Paper Tape specifications** (unit :mm)



Series No.	A	B	W	F	E
WR01X	0.45±0.03	0.24±0.03	8.00±0.20	3.50±0.05	1.75±0.10

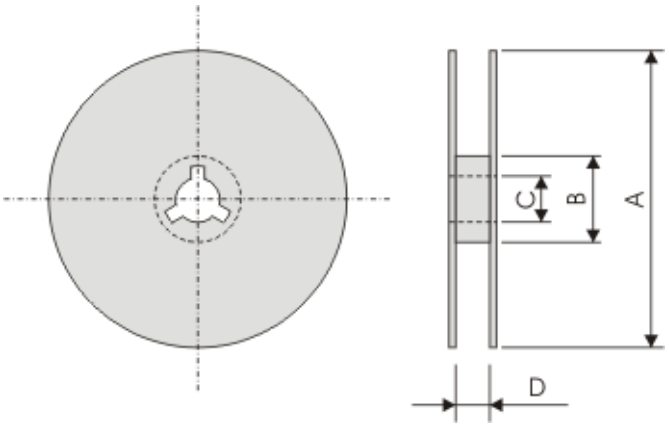
Series No.	P1	P0	ΦD	t1	T
WR01X	2.00±0.05	4.00±0.05	$\Phi 1.50^{+0.1}_{-0.0}$	0.31±0.03	0.36±0.03

2. **Embossed Narrow Tape specifications (unit: mm)**



Series No.	A	B	W	E
WR01X	0.24±0.02	0.44±0.02	4.00±0.08	1.80±0.02

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ180.0+0/-1.5	Φ60.0+1/-0	13.0±0.2	Paper tape: 9.0+1/-0 Emboss tape: 4.2±0.8

Taping quantity and Tape material

- Chip resistors 20,000 pcs/reel, Paper tape.
- Chip resistors 35,000 pcs/reel, Embossed tape.
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