



# 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 (	0402mm)		
Resistance Range	1Ω ~ 1MΩ (±59	%, ±1%), Jumper		
Resistance Tolerance	±1%: 4.7Ω ~ 1MΩ	±5%: 1Ω ~ 1MΩ		
	E96/E24	E24		
TCR (ppm/°C)	$100\Omega$ - 1MΩ, ≤±200 ppm			
	10Ω - 91Ω, ≤±300 ppm			
	1 - 9.1Ω, +600~ -200 ppm			
Max. dissipation @ T <sub>amb</sub> =70°C	1/32 W			
Max. Operation Voltage (DC or RMS)	15V			
Max. Overload Voltage (DC or RMS)	30V			
Operation temperature	-55 ~ +125°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

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

#### **DIMENSION(unit : mm)**

	WR01X	
L	$\textbf{0.40} \pm \textbf{0.02}$	
W	$\textbf{0.20} \pm \textbf{0.02}$	
Т	$\textbf{0.13} \pm \textbf{0.02}$	
Tb	$\textbf{0.10} \pm \textbf{0.03}$	
Tt	$\textbf{0.08} \pm \textbf{0.03}$	



#### 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  $\pm 5\%$  &  $\pm 1\%$ . 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  $\varphi$  0.18 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	Type code	Resistance code	Tolerance	Packaging code	Termination code
WR01 : 01005	X : Normal W : 1%, < 10ohm	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	J : ±5% F : ±1% P : Jumper	<ul> <li>D : 7" Reeled paper taping (20Kpcs/Reel)</li> <li>L : 7" Reeled embossed taping (35Kpcs/Reel)</li> </ul>	L = Sn base (lead free)

## TEST CONDITION FOR JUMPER (0 $\Omega$ )

Item	WR01X	
Power Rating At 70°C	1/32W	
Resistance	MAX.50m $\Omega$	
Rated Current	0.8A	
Peak Current within 5 sec	2A	
Operating Temperature	-55 ~ +125°C	



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

терт		REQUIREMENT		
IESI	PROCEDORE / TEST METHOD	Resistor	0Ω	
DC resistance <b>Clause 4.5</b>	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) <b>Clause 4.8</b>	Natural resistance change per change in degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)}  t_1 : 20^\circ\text{C+5°C-1°C}$ R <sub>1</sub> : Resistance at reference temperature R <sub>2</sub> : 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±0.5 second in a SAC solder bath at 260°C±5°C	$\Delta$ R/R max. ±(1%+0.05 $\Omega$ ) no visible damage	<50mΩ	
Solderability IEC 60068-2-58: 2004	Un-mounted chips completely immersed for 2±0.3 second in a SAC solder bath at 235 $^\circ\!C$ ±5 $^\circ\!C$	95% coverage min., good tinni visible damage	ng and no	
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) <b>Clause 4.24</b>	1000+48/-0 hours, loaded with RCWV or Vmax in humidity chamber controller at $40^{\circ}C\pm2^{\circ}C$ and $90\sim95\%$ relative humidity,	$\Delta$ R/R max. ±(5%+0.10 $\Omega$ ) 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	$\Delta$ R/R max. ±(5%+0.10 $\Omega$ ) no visible damage	< 50mΩ	
Endurance at the upper category temperature	125°C, no load, 1000 hours	$\Delta$ R/R max. ±(5%+0.10 $\Omega$ ) no visible damage	< 50mΩ	
Bending strength <b>Clause 4.33</b>	Resistors mounted on a 90mm glass epoxy resin PCB(FR4), bending once 3mm for 10sec.	No visual damage, $\Delta$ R/R max. ±(1%+0.05 $\Omega$ )	< 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	В	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	*t2	*t1	Т
WR01X	2.00±0.05	4.00±0.05	Ф <b>1</b> .50 <sup>+0.1</sup> <sub>-0.0</sub>	0.15±0.02	0.31±0.03	0.36±0.03

t2: cavity depth, t1: paper thickness

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



Series No.	А	В	W	E
WR01X	0.24±0.02	0.44±0.02	4.00±0.08	1.80±0.02

#### **Reel dimensions**





Symbol	А	В	С	D
(unit : mm)	#400 0 · 0/ 4 F	ACO 0 1 4 / 0	12.010.2	Paper tape: 9.0+1/-0
	Ψ160.0+0/-1.5	Ψ00.0+1/-0	13.0±0.2	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. -
- \_

# **Mouser Electronics**

Authorized Distributor

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#### Walsin:

WR01X1301FDL WR01X1002FDL WR01X1203FDL WR01X1401FDL WR01X1601FDL WR01X1603FDL WR01X1741FDL WR01X2002FDL WR01X2053FDL WR01X2701FDL WR01X6192FDL WR01X7323FDL WR01X80R6FDL WR01X9092FDL WR01X9102FDL WR01X101 JDL WR01X114 JDL WR01X160 JDL WR01X361 JDL WR01X393 JDL WR01X472 JDL WR01X560 JDL WR01X623 JDL WR01X913 JDL WR01X1023FDL WR01X1202FDL WR01X1543FDL WR01X17R8FDL WR01X2402FDL WR01X3601FDL WR01X3602FDL WR01X3903FDL WR01X4321FDL WR01X4322FDL WR01X4751FDL WR01X51R1FDL WR01X6041FDL WR01X60R4FDL WR01X64R9FDL WR01X6801FDL WR01X6802FDL WR01X2743FDL WR01X2801FDL WR01X3242FDL WR01X4703FDL WR01X4992FDL WR01X6201FDL WR01X112 JDL WR01X131 JDL WR01X184 JDL WR01X221 JDL WR01X223 JDL WR01X302 JDL WR01X474 JDL WR01X562 JDL WR01X621 JDL WR01X6R2 JDL WR01X822 JDL WR01X824 JDL WR01X1004FDL WR01X1303FDL WR01X1541FDL WR01X1801FDL WR01X1802FDL WR01X2403FDL WR01X3401FDL WR01X34R8FDL WR01X3921FDL WR01X6043FDL WR01X6803FDL WR01X7501FDL WR01X7502FDL WR01X7503FDL WR01X163 JDL WR01X164 JDL WR01X240 JDL WR01X433 JDL WR01X471 JDL WR01X752 JDL WR01X754 JDL WR01X73R2FDL WR01X121 JDL WR01X162 JDL WR01X224 JDL WR01X331 JDL WR01X332 JDL WR01X333 JDL WR01X334 JDL WR01X434 JDL WR01X563 JDL WR01X820 JDL WR01X1373FDL WR01X2401FDL WR01X2702FDL WR01X3011FDL WR01X3301FDL WR01X3603FDL WR01X3901FDL WR01X4301FDL WR01X6191FDL