APPROVAL SHEET

WA02I

±5%, ±1%

Thick Film
General purpose chip resistors array
Size 0201x2 Flat Type

RoHS 2 Compliant with exemption 7C-I
Halogen free

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

FEATURE

1. Small size and light weight
2. Reduced size of final equipment
3. Lower surface mounted assembly costs
4. Higher component and equipment reliability
5. RoHS compliant with exemption 7C-I and Halogen free products

APPLICATION

- Consumer electrical equipment, PDA, Digital Cam-coder, …
- EDP, Computer application
- Mobile phone, Telecom
- Ram module

DESCRIPTION

The resistors array is 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 within tolerance by laser cutting 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 Tin (lead free) solder alloy.

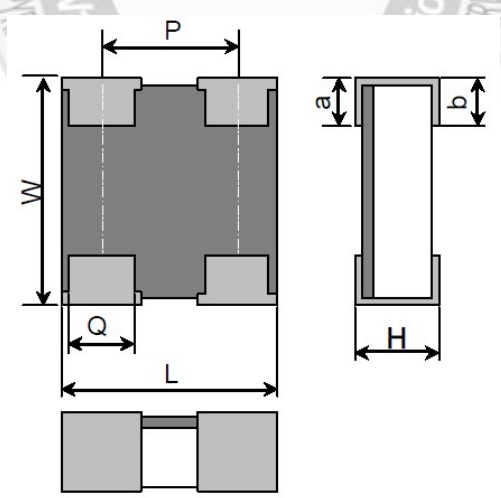


Fig 1. Outline of chip-R array WA02I

QUICK REFERENCE DATA

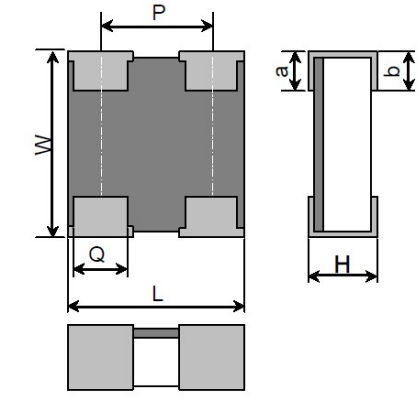
Item	General Specification	
Series No.	WA02I	
Size	0201x2 (0603x2)	
Termination construction	Flat type	
Resistance Tolerance	±5% (E24 series), jumper	±1% (E24 series)
Resistance Range	10Ω ~ 1MΩ	100Ω ~ 100KΩ
TCR (ppm/°C)	10Ω ~ 27Ω: ≤ ± 350 ppm/°C 30Ω ~ 1MΩ: ≤ ± 200 ppm/°C	
Rated element dissipation (W)	0.031W	
Rated network dissipation (W)	0.063W	
Max. Operation Voltage (DC or RMS)	12.5V	
Max. overload voltage	25V	
Rated current for Jumper	1A	
Operation temperature	-55 ~ +125'C	

Note :

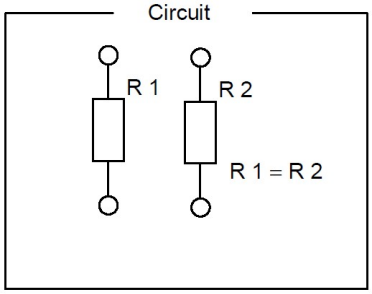
1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
2. Max. Operation Voltage : So called RCWV (Rated Continuous Working Voltage) is determined by

   $RCWV = \sqrt{Rated\,Power \times Resistance\,Value}$ or Max. RCWV listed above, whichever is lower.
3. Jumper is defined as max. 50mΩ

DIMENSIONS(unit：mm)



Dimension (mm)	WA02I
L	0.80 ± 0.05
W	0.60 ± 0.05
H	0.23 ± 0.10
P	0.50 typical
Q	0.20 ± 0.10
a	0.20 ± 0.10
b	0.20 ± 0.10



MARKING

No marking for WA02I chip resistors array

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 series for resistors with a tolerance of ±5%, and ±1%.The values of the E24 series are in accordance with “IEC publication 60063”

Derating

The derated values of dissipation (or current rating in case of chip jumper) at temperature in excess of 70°C shall be as indicated by the following curve.

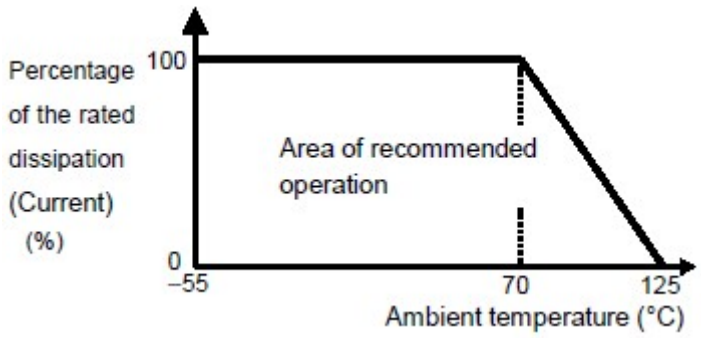


Figure 2. Maximum dissipation in percentage of rated power
As a function of the ambient temperature

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.

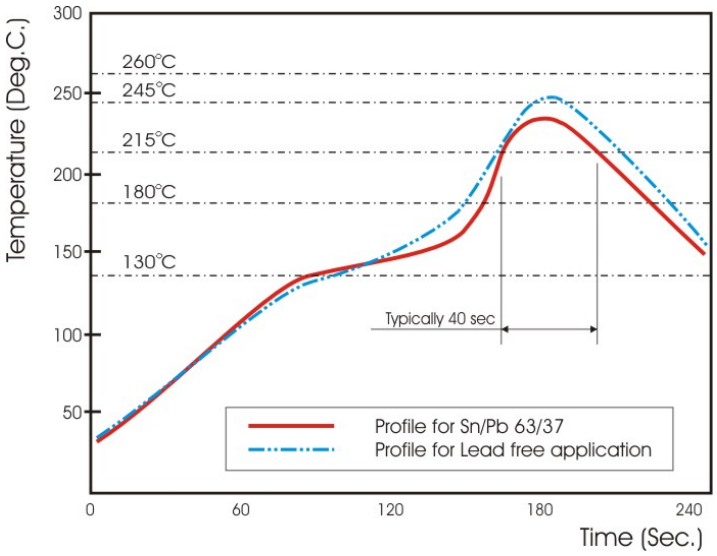


Fig 3. Infrared soldering profile for Chip Resistors array

CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

WA02	I	472_	J	T	L
Size code WA02: 0201	**Type code** I: x2, Flat Array	**Resistance code** 5% E24 : 2 significant digits followed by no. of zeros and a blank 10Ω =100_ 220Ω =221_ Jumper =000_ ("_" means a blank) 1%, E24: 3 significant digits followed by no. of zeros 100Ω =1000 220Ω =2200	**Tolerance** J : ±5% F : ±1% P : Jumper	**Packaging code** T : 7" 10kpcs Reel taping	**Termination code** L = Sn base (lead free)

Reeled tape packaging : 8mm width paper taping 7" reel 10,000pcs per reel,

TEST AND REQUIREMENTS

The standard condition for tests shall be in accordance with Sub-clause 4.2, JIS C 5201-1:2011.

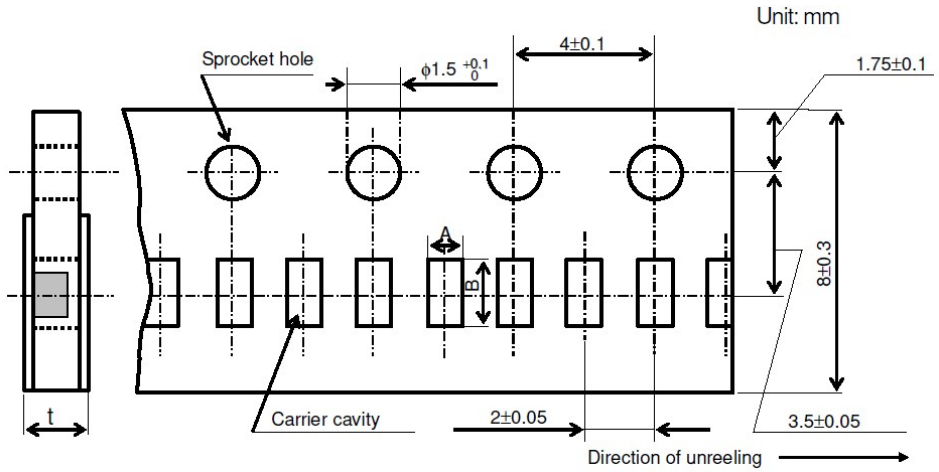
The performance shall be satisfied in follows.

<table>
<tr><th>No</th><th>Test items</th><th>Condition of test (JIS C 5201-1)</th><th>Performance requirements</th></tr>
<tr><td>1</td><td>Resistance</td><td>Sub-clause 4.5</td><td>As in 4.5.2
The resistance value shall correspond with the rated resistance talking into account the specified tolerance.
Chip Jumper: 50mΩMax.</td></tr>
<tr><td>2</td><td>Temperature characteristic of resistance</td><td>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)
t1: 20°C+5°C-1°C t2: 125°C+5°C-1°C
R1 : Resistance at t1 temperature
R2 : Resistance at t2 temperature</td><td>See “QUICK REFERENCE DATA”</td></tr>
<tr><td>3</td><td>Short time overload</td><td>4.13
Test voltage 2.5 times RCWV
Test period; 5s
Test potential should not exceed max. overload voltage as shown in “QUICK REFERENCE DATA”</td><td>Resistor:
ΔR/R:With ±(2%+0.1Ω)
Chip Jumper: 50mΩ max.
No visible damage</td></tr>
<tr><td>4</td><td>Resistance to solder heat</td><td>4.18
Test by a piece.
Temp. of solder bath : 260℃±5ºC
Immersion time: 10±1s
After immersion into solder leaving the room temp. for 1hr or more, and then measure the resistance.</td><td>Resistor:
ΔR/R:With ±(1%+0.05Ω)
Chip Jumper: 50mΩ max.
No evidence of appearance damage</td></tr>
<tr><td>5</td><td>Solderability</td><td>4.17
Test by a piece.
Flax: Rosin-Methanol
Temp. of solder bath : 235℃±5ºC
Immersion time: 2±0.5s</td><td>95% coverage min., good tinning and no visible damage</td></tr>
<tr><td>6</td><td>Temperature cycling</td><td>4.19
Test cycle:5 cycles for duty cycle as specified below
<table>
<tr><th>Step</th><th>Temperature(ºC)</th><th>Time(min.)</th></tr>
<tr><td>1</td><td>-55±3°C</td><td>30</td></tr>
<tr><td>2</td><td>20+5°C-1°C</td><td>2~3</td></tr>
<tr><td>3</td><td>+125±2°C</td><td>30</td></tr>
<tr><td>4</td><td>20+5°C-1°C</td><td>2~3</td></tr>
</table></td><td>Resistor:
ΔR/R:With ±(1%+0.05Ω)
Chip Jumper: 50mΩ max.
No visible damage</td></tr>
</table>

No	Test items	Condition of test (JIS C 5201-1)	Performance requirements
7	Load life	4.25 Test temp.:70±2ºC Test voltage: Cycle of 1h 30min. "ON" and 30min. "OFF" at dc rated voltage. Test period: 1000+48/-0 hours	Resistor: ΔR/R:With ±(3%+0.1Ω) Chip Jumper: 50mΩ max. No visible damage
8	Load life in Humidity	4.24 Test condition: :40±2ºC & 90~95% R.H. Test voltage: Cycle of 1h 30min. "ON" and 30min. "OFF" at dc rated voltage. Test period: 1000+48/-0 hours	Resistor: ΔR/R:With ±(3%+0.1Ω) Chip Jumper: 50mΩ max. No visible damage
9	Adhesion	4.32 Pressurizing force: 3N, Test time: 10±1sec	No remarkable damage or removal of the terminations.
10	Insulation resistance	4.6 Test voltage: Max. overload voltage (DC) Test period: 1min.	R≥1GΩ
11	Dielectric withstanding voltage	4.7 Test voltage: Max. overload voltage (AC) Test period: 1min.	No flashover, fire and breakdown.

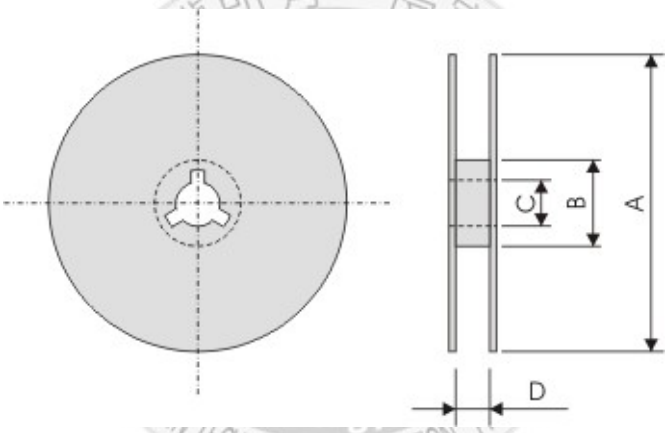
PACKAGING

Paper Tape Specifications (unit: mm)



Dimension(mm)	
A	0.7 ± 0.1
B	0.9 ± 0.1
t	0.5 ± 0.1

Reel dimensions



Symbol	A	B	C	D
(unit : mm)	Φ178.0 ± 2.0	Φ60.0 ± 1.0	13.0 ± 0.2	9.0 ± 0.3

Taping Qty

10,000pieces per 7" reel