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0201 SERIES THICK FILM CHIP RESISTOR

1. Scope

This specification applies to 0.3mm x 0.6mm (0201) size, fixed metal film chip resistors rectangular type for use in electronic equipment.

2. Type Designation

Where

- (1) Series No.
- (2) Nominal resistance value :

For example -

Three digits of number (E-24 Series)

000 = Jumper

 $100 = 10\Omega$

 $102 = 1k\Omega$

Four digits of number (E-96 Series)

 $11R3 = 11.3\Omega$

 $1131 = 1.13k\Omega$

(3) Tolerance of Resistance

 $X = \text{Jumper}(\text{Below } 50\text{m}\Omega)$

 $F = \pm 1.0\%$

 $G = \pm 2.0\%$

 $J = \pm 5.0\%$

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3. Electrical Specifications

Table 1.:

*Power rating	1/20W				
Resistance Values	E-24 series , E-96 series		E-24 series		
Resistance Tolerance	± 1.0%(F)		± 5.0%(J)	$\pm 2.0\%$ (G), $\pm 5.0\%$ (J)	
Resistance Range (Ω)	10 ~ 91	100 ~ 1M	1.0 ~ 9.1	10 ~ 91	100 ~ 10M
Temperature Coefficient of Resistance ppm/°C	± 300	± 200	+600 ~ -200	± 300	± 200
Operating temperature range	- 55°C to + 125°C				
Max. operating voltage**	25V				

Note: *Package Power Temperature Derating Curve

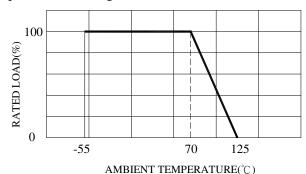


Figure 1.: Power Temperature Derating Cure

Note: **Resistors shall have a rated DC or AC(rms.) continuous operating voltage corresponding to the power rating, as calculated from the following formula

$$V = \sqrt{P \times R}$$
 Where V : Rated voltage (V)

P : Rated power (W)

R : Nominal resistance (Ω)

If the voltage so obtained exceeds the maximum operating voltage, this maximum voltage shall be the rated voltage.

Table 2.: Jumper:

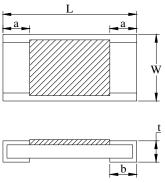
Resistance Tolerance	Below 50 m Ω
Rated current	1A
Operating Temperature Range	-55°C to 125°C

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4. Construction and Physical Dimension



Code Letter	Dimension
L	0.6 ± 0.03
W	0.3 ± 0.03
t	0.23 ± 0.03
a	0.10 ± 0.05
b	0.15 ± 0.05

Unit: mm

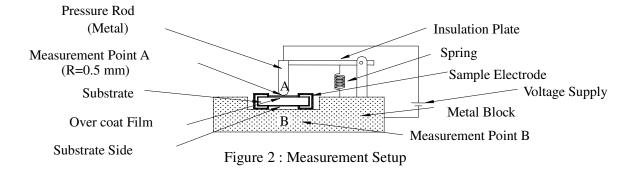
5. Marking

No marking on the protect coating

6. Life Tests

6-1 Electrical

Item	Specification and Requirement		Test Method	
Item	Resistor	Jumper	Test Wethod	
Short Time Overload	\triangle R: $\pm (2\% + 0.1)\Omega$ Without damage by flashover, spark, arcing, burning or breakdown	Max. 50mΩ	 (1) Applied voltage: 2.5 x rated voltage or 2 x maximum operating voltage which ever is less (2) Test time: 5 seconds 	
Insulation Resistance	Over $100 \ M\Omega$ on Overcoat layer face up Over $1{,}000 \ M\Omega$ on Substrate side face up		(1) Setup as figure 2 (2) Test voltage: 100 V _{DC} (3) Test time: 60 + 10 / -0 seconds	
Voltage Proof	\triangle R: \pm (2%+ 0.1) Ω Without damage by flashover, spark, arcing, burning or breakdown	Max. 50mΩ	(1) Setup as figure 2 (2) Test voltage: 100 V _{AC} (rms.) (3) Test time: 60 +10 / -0 seconds	



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Specification and Requirement		Toot Mathod		
Item	Resistor	Jumper	Test Method	
Solderability	The surface of terminal immersed shall be minimum of 95% covered with a new coating of solder		Solder bath: After immersing in flux, dip in $245 \pm 5^{\circ}$ C molten solder bath for 2 ± 0.5 seconds	
Resistance to Solder Heat	\triangle R: $\pm (1.0\% + 0.05)\Omega$ Without distinct deformation in appearance	Max. 50mΩ	 (1) Pre-heat: 100~110°C for 30 seconds (2) Immersed at solder bath of 270 ± 5°C for 10 ± 1 seconds (3) Measuring resistance 1 hour after test 	
Vibration	\triangle R: $\pm (0.5\% + 0.05)\Omega$ Without mechanical damage such as break		 (1) Vibration frequency: 10Hz to 55Hz to10Hz in 60 seconds as a period (2) Vibration time: period cycled for 2 hours in each of 3 mutual perpendicular directions (3) Amplitude: 1.5mm 	
Shock	$\triangle R$: $\pm (0.25\% + 0.05)\Omega$ Without mechanical damage such as break		(1) Peak value: 490N(2) Duration of pulse: 11ms(3) 3 times in each positive and negative direction of 3 mutual perpendicular directions	
Bending Test	\triangle R: $\pm (1.0\% + 0.05)\Omega$ Without mechanical damage such as break		Bending value: 3 mm for 30 ± 1 seconds	
Solvent Resistance	Marking should be legible Without mechanical and distinct damage in appearance	Max. 50mΩ	 (1) Solvent: Trichloroethane or Isopropyl alcohol (2) Immersed in solvent at room temperature for 90 seconds 	

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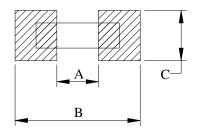
Item	Specification and Requirement		Test Method	
Item	Resistor	Jumper	Test Method	
Rapid change of Temperature	\triangle R: $\pm (1.0\% + 0.05)\Omega$ Without distinct damage in appearance	Max. 50mΩ	(1) Repeat 5 cycle as follow: (-55 ± 3°C,30minutes) →(Room temperature, 2~3 minutes) → (+125 ± 2°C,30minutes) →(Room temperature, 2~3 minutes) (2) Measuring resistance 1 hour after test	
Moisture with Load	\triangle R: $\pm (5.0\% + 0.1)\Omega$ Without distinct damage in appearance Marking should be legible	Max. 50mΩ	 (1) Environment condition: 40 ± 2°C,90~95% RH (2) Applied Voltage: rated voltage (3) Test period: (1.5 hour ON) →(0.5 hour OFF) cycled for total 1,000 + 48 / - 0 hours (4) Measuring resistance 1 hour after test 	
Load Life	\triangle R: $\pm (5.0\% + 0.1)\Omega$ Without distinct damage in appearance	Max. 100mΩ	 (1) Test temperature: 70 ± 2°C (2) Applied Voltage: rated Voltage (3) Test period: (1.5 hour ON) →(0.5 hour OFF) cycled for total 1,000 + 48 / - 0 hours (4) Measuring resistance 1 hour after test 	
Low Temperature Store	\triangle R: $\pm (5.0\% + 0.1)\Omega$ Without distinct damage in appearance	Max. 100mΩ	 (1) Store temperature: -55 ± 3°C for total 1,000 + 48 / - 0 hours (2) Measuring resistance 1 hour after test 	
High Temperature Store	\triangle R: $\pm (5.0\% + 0.1)\Omega$ Without distinct damage in appearance	Max. 100mΩ	 (1) Store temperature: +125 ± 2°C for total 1,000 + 48 / - 0 hours (2) Measuring resistance 1 hour after test 	

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7. Recommend Land Pattern Dimensions



A	0.3
В	1.0
С	0.3 ~ 0.7

Unit: mm

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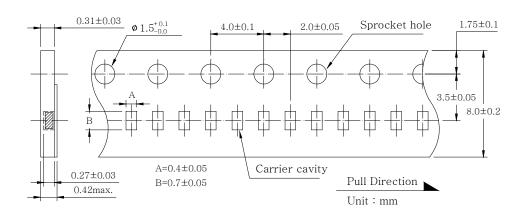
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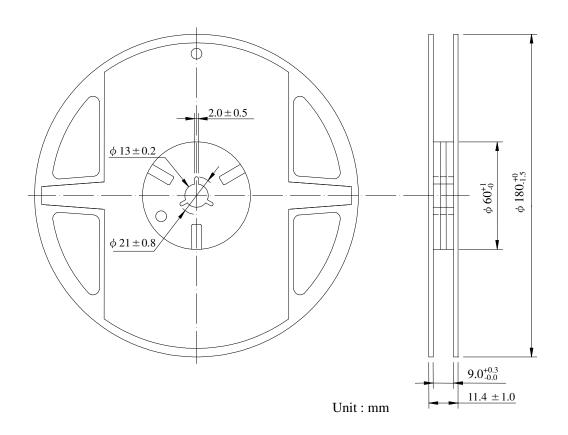
8. Packaging

8-1 Dimensions

8-1-1 Tape packaging dimensions



8-1-2 Reel dimensions



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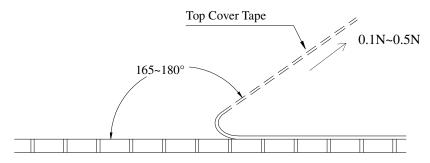
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8-2 Peel force of top cover tape

The peel speed shall be about 300 mm/min.

The peel force of top cover tape shall be between 0.1 to 0.5 N.



8-3 Numbers of taping

10,000 pieces/reel

8-4 Making

The following items shall be marked on the reel.

- (1) Type designation.
- (2) Quantity
- (3) Manufacturing date code
- (4) Manufacturer's name

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9. Care note

- 9-1 Care note for storage
 - (1) Chip resistor shall be stored in a room where temperature and humidity must be controlled. (temperature 5 to 35°C, humidity 45 to 85% RH) However, a humidity keep it low, as it is possible.
 - (2) Chip resistor shall be stored as direct sunshine doesn't hit on it.
 - (3) Chip resistor shall be stored with no moisture, dust, a material that will make solderability inferior, and a harmful gas (Chloridation hydrogen, sulfurous acid gas, and sulfuration hydrogen)

9-2 Care note for operating and handling

- (1) It is necessary to protect the edge and protection coat of resistors from mechanical stress.
- (2) Handle with care when printing circuit board (PCB) is divided or fixed on support body, because bending of printing circuit board (PCB) mounting will make mechanical stress for resistors.
- (3) Resistors shall be used with in rated range shown in specification. Especially, if voltage more than specified value will be loaded to resistor, there is a case it will make damage for machine because of temperature rise depending on generating of heat, and increase resistance value or breaks.
- (4) In case that resistor is loaded a rated voltage, it is necessary to confirms temperature of a resistor and to reduce a load power according to load reduction curve, because a temperature rise of a resistor depends on influence of heat from mounting density and neighboring element.
- (5) Observe Limiting element voltage and maximum overload voltage specified in each specification
- (6) If there is possibility that a large voltage (pulse voltage, shock voltage) charge to resistor, it is necessary that operating condition shall be set up before use.