

1206 Series Thick Film Chip Resistor

1. Scope

This specification applies to 1.6mm x 3.2mm (1206) size, fixed metal chip resistors rectangular type for use in electronic equipment.

2. Type Designation

PFR16	X	—	XXXX	—	X
(1)	(2)		(3)		(4)
PFR16	X	—	00R0	—	X
(1)	(2)		(3)		(5)

Where (1) Series No.

(2) Tolerance of TCR :

X = Jumper

Other T.C.R refer to paragraph 3

(3) Nominal resistance value :

For example —

Four digits of number (E-24 Series)

00R0 = Jumper

10R0 = 10Ω

1004 = 1MΩ

(4) Resistance tolerance :

F = ± 1.0%

J = ± 5.0%

(5) Resistance tolerance :

X = Jumper (Below 50mΩ)

3. Electrical Specifications

Power Rating*	1/10 W			
Resistance Values	E-24 series			
Resistance Tolerance	$\pm 1.0\%(F)$, $\pm 2.0\%(G)$, $\pm 5.0\%(J)$		$\pm 1.0\%(F)$, $\pm 2.0\%(G)$	$\pm 5.0\%(J)$
Resistance Range (Ω)	10~1M	3.9~9.1, 1.1M~5.1M	1~3.6, 5.6M~10M	1~3.6, 5.6M~22M
T.C.R. (Temperature Coefficient of Resistance) ppm/°C (code)	$\pm 200(S)$	$\pm 250(S)$	$\pm 350(S)$	$\pm 350(S)$
Operating Temperature Range	-55°C to +125°C			
Max. Operating Voltage**	150V			

Note: *Package Power Temperature Derating Curve

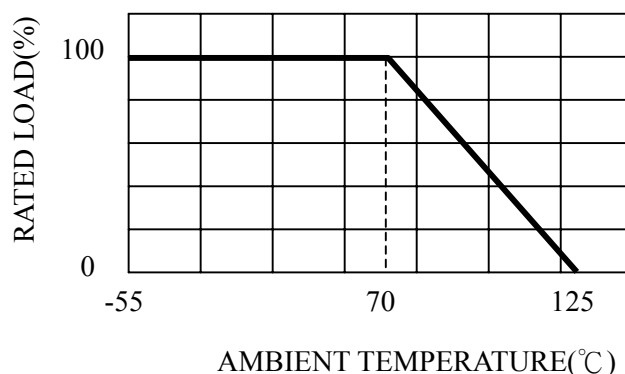


Figure 1. : Power Temperature Derating Cure

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

$$V = \sqrt{P \times R}$$

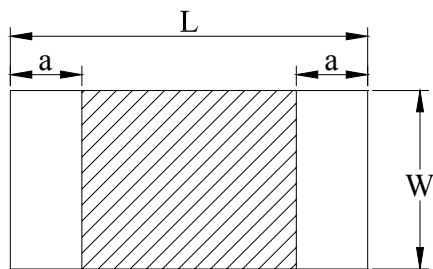
Where V : Rated voltage (V)

P : Rated power (W)

R : Nominal resistance (Ω)

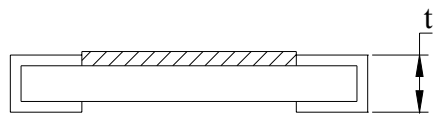
If the voltage so obtained exceeds the maximum operating voltage, this maximum voltage shall be the rated voltage.

4. Outline dimensions



Code Letter	Dimension
L	3.20 ±0.15
W	1.60 ±0.15
t	0.60 ±0.10
a	0.50 ±0.25

Unit : mm



5. Marking

5-1 Marking in E-24 Series :

A rated resistance shall be marked on the protect coating with three digits of number.

Example :

$3.9k\Omega \rightarrow 39 \times 10^2 \rightarrow \boxed{392}$

5-2 Marking in E-96 Series :

A rated resistance shall be marked on the protect coating with four digits of number.

Example :

$10.2\Omega \rightarrow 102 \times 10^{-1} \rightarrow \boxed{10R2}$

$10.2k\Omega \rightarrow 102 \times 10^2 \rightarrow \boxed{1022}$

5-3 Marking in Jumper :

Example :

$0\Omega \rightarrow \boxed{R00}$

6. Life Tests

6-1 Electrical

Item	Specification and Requirement		Test Method
	Resistor	Jumper	
Short Time Overload	$\Delta R: \pm(2.0\% + 0.1 \Omega)$ Without damage by flashover, spark, arcing, burning or breakdown	Max. 50m Ω	(1) Applied voltage: 2.5 times rated voltage or max. overload voltage whichever is lower (2) Test time : 5 seconds
Insulation Resistance	Over 100 M Ω on Overcoat layer face up Over 1,000 M Ω 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	No mechanical damage		(1) Setup as figure 2 (2) Test voltage: 100 V _{AC} (rms) (3) Test time: 60 + 10 / -0 seconds

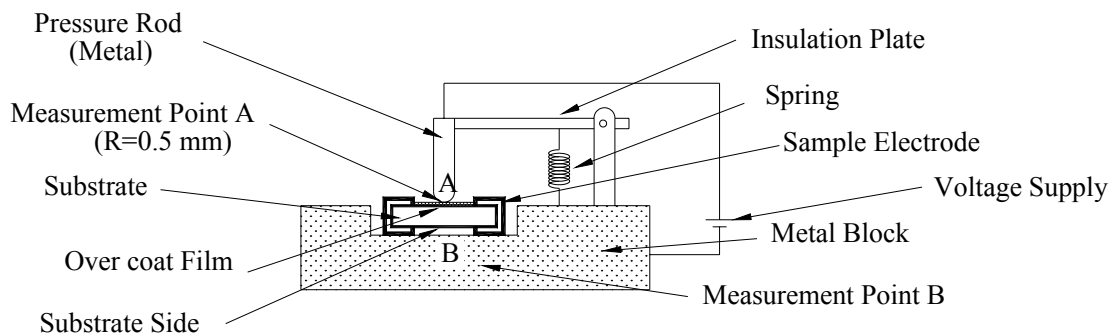


Figure 2 : Measurment Setup

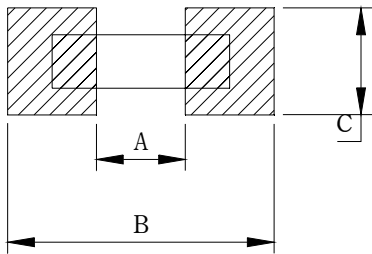
6-2 Mechanical

Item	Specification and Requirement		Test Method
	Resistor	Jumper	
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 $245 \pm 5^{\circ}\text{C}$ molten solder bath for 3 ± 0.5 seconds
Resistance to Solder Heat	$\Delta R: \pm(1.0\% + 0.1 \Omega)$ Without distinct deformation in appearance	Max. $50\text{m}\Omega$	(1) Pre-heat: $100\sim 110^{\circ}\text{C}$ for 30 seconds (2) Immersed at solder bath of $270 \pm 5^{\circ}\text{C}$ for 10 ± 1 seconds Measuring resistance 1 hour after test
Shock	$\Delta R: \pm(0.25\% + 0.05) \Omega$ 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	$\Delta R: \pm(1.0\% + 0.1 \Omega)$ Without mechanical damage such as break	Max. $50\text{m}\Omega$	Bending value: 3 mm for 30 ± 1 seconds
Resistance to solvent	No remarkable abnormality		(1) Solvent: Isopropyl alcohol (2) Immersed in solvent at room temperature for 60 ± 10 seconds

6-3 Endurance

Item	Specification and Requirement		Test Method
	Resistor	Jumper	
Rapid change of Temperature	$\Delta R: \pm(1.0\% + 0.1 \Omega)$ Without distinct damage in appearance	Max. 50m Ω	(1) Repeat 5 cycle as follow: (-55 $\pm 3^{\circ}\text{C}$, 30minutes) →(Room temperature, 2~3 minutes) →(+125 $\pm 2^{\circ}\text{C}$, 30minutes) →(Room temperature, 2~3 minutes) Measuring resistance 1 hour after test
Moisture with Load	$\Delta R: \pm(3.0\% + 0.1 \Omega)$ Without distinct damage in appearance Marking should be legible	Max. 100m Ω	(4) Environment condition: 60 $\pm 2^{\circ}\text{C}$, 90~95% RH (5) Applied Voltage: rated voltage (6) Test period: (1.5 hour ON) →(0.5 hour OFF) cycled for total 1,000 + 48 / - 0 hours (7) Measuring resistance 1 hour after test
Load Life	$\Delta R: \pm(3.0\% + 0.1 \Omega)$ Without distinct damage in appearance	Max. 100m Ω	(1) Test temperature: 70 $\pm 3^{\circ}\text{C}$ (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	$\Delta R: \pm(1.0\% + 0.1 \Omega)$ Without distinct damage in appearance	Max. 100m Ω	(1) Store temperature: -55 $\pm 3^{\circ}\text{C}$ for total 1,000 + 48 / - 0 hours (2) Measuring resistance 1 hour after test
High Temperature Store	$\Delta R: \pm(1.0\% + 0.1 \Omega)$ Without distinct damage in appearance	Max. 100m Ω	(1) Store temperature: +125 $\pm 2^{\circ}\text{C}$ for total 1,000 + 48 / - 0 hours (2) Measuring resistance 1 hour after test

7. Recommend Land Pattern Dimensions

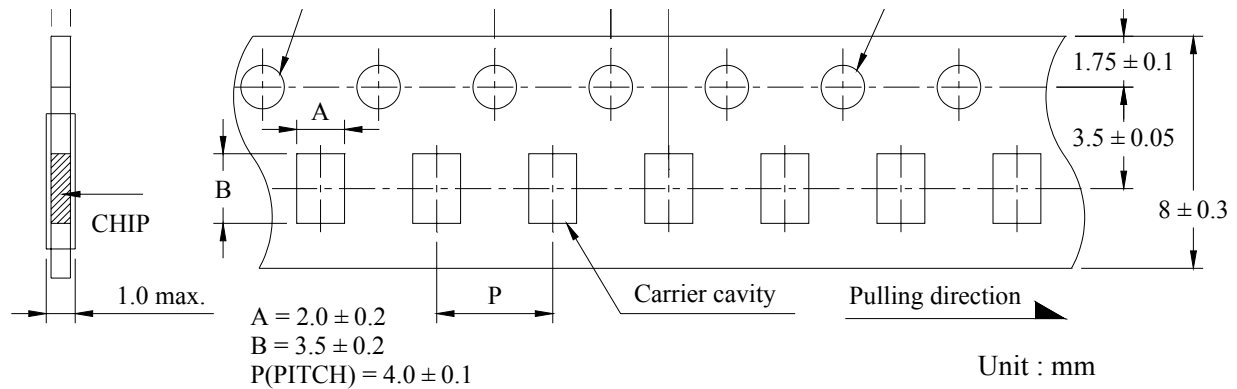


A	0.9~1.1
B	3.5
C	1.1~1.3

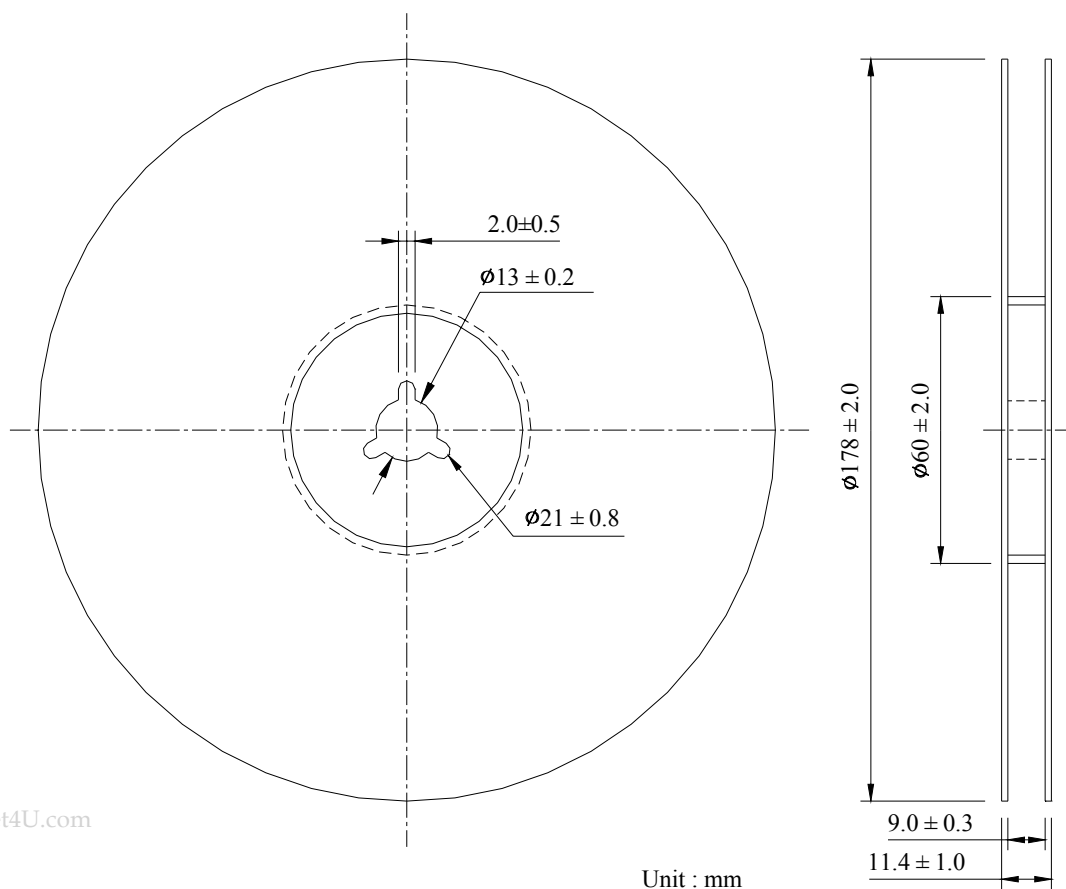
8. Packaging

8-1 Dimensions

8-1-1 Tape packaging dimensions



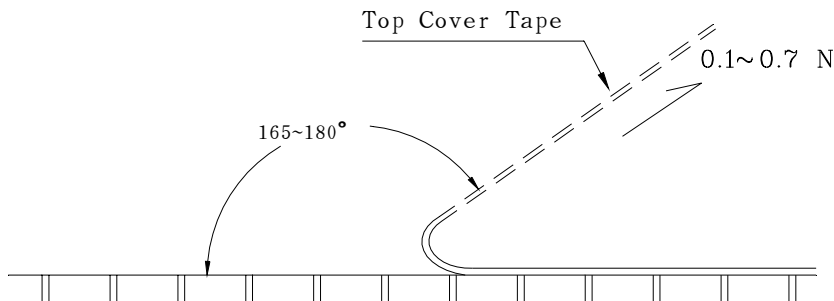
8-1-2 Reel dimensions



8-2 Peel force of top cover tape

The peel speed shall be about 300 mm/minute

The peel force of top cover tape shall be between 0.1 to 0.7 N



8-3 Numbers of taping

5,000 pieces/reel

8-4 Label marking

The following items shall be marked on the production and shipping Label on the reel.

8-4-1 Production Label

- (1) Part No.
- (2) Description
- (3) Quantity
- (4) Taping No.

8-4-2 Shipping Label

- (1) *Customer's name
- (2) *Customer's part No.
- (3) Manufacturer's part No.
- (4) Manufacturer's name
- (5) Manufacturer's country

*Note : Item (1) and (2) are listed by request

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°C 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.