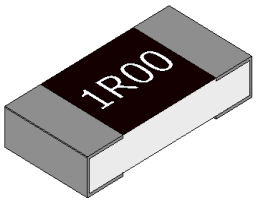
The history of revision change for the specification

Date	Revision	Changes
2022/03/23	A0	New approval
2022/08/05	A1	Update TCR specifications

1W, 1206, Anti-Surge, High Power Chip Resistor

Features / Applications :

- Telecommunication Equipment, Digital Cameras Watches, Pocket Calculators, Computers, Instruments
- Excellent surge resistance characteristics
- Halogen Free Epoxy
- RoHS compliant, No RoHS exemption

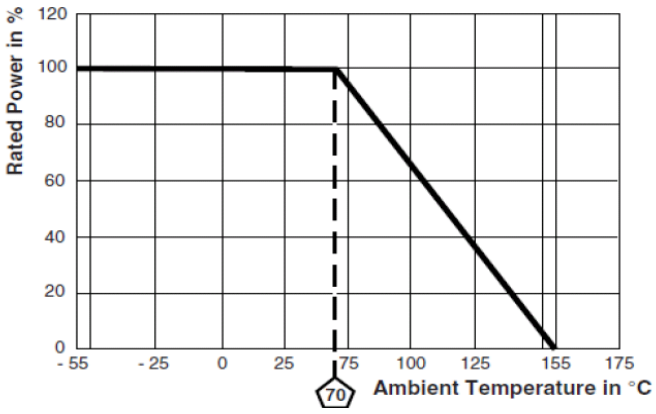


Electrical Specifications :

Characteristics	Feature		
Power Rating*	1 W		
Resistance Values	E-24 & E-96 series		
Resistance Range	1Ω～<10Ω	10Ω～100Ω	>100Ω～1KΩ
Temperature Coefficient of Resistance(ppm/℃)	±150	±100	±150
Resistance Tolerance	±0.5%(D), ±1%(F), ±2%(G), ±5%(J)		
Operation Temperature Range	-55℃ ～ +155℃		

*Note :

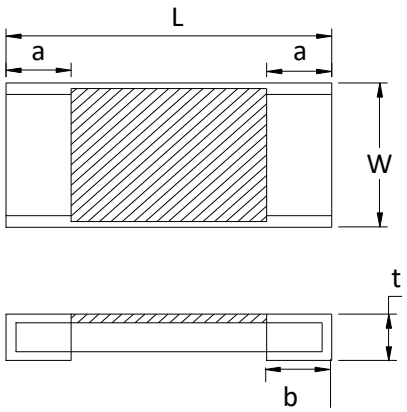
For sensor operated at ambient temperature in excess of 70℃, the maximum load shall be derated in accordance with the following curve.



**Note: Resistors shall have a rated DC or AC(rms.) continuous operating voltage corresponding to the power rating, as calculated from the following formula $V = \sqrt{P \times R}$. If the voltage obtained exceeds the maximum operating voltage, this maximum operating voltage shall be the rated voltage.

Outline Drawing :

Dimensions



L	3.20 ± 0.20
W	1.60 ± 0.20
t	0.70 ± 0.20
a	0.60 ± 0.30
b	0.60 ± 0.30

Unit: mm

Type Designation :

HPFR16S - □ □ □ □ - □ 6 TF

(1) (2) (3) (4) (5)

Note :

(1) Series No.

(2) Resistance value:

Three digits of number (E-24 Series)

100 = 10Ω

102 = 1KΩ

Four digits of number (E-96 Series)

11R3 = 11.3Ω

(3) Tolerance (%): D=±0.5%, F=±1%, G=±2%, J=±5%

(4) Power Rating: 6 = 1W

(5) TF is total lead free (without RoHS exemption)

Characteristics :

Electrical

Item	Specification and Requirement	Test Method (JIS 5201)
Temperature Coefficient of Resistance(ppm/℃)	As electrical specifications	Room temperature Room temperature +100℃
Short Time Overload	△R: ±(2%+ 0.0005Ω) Without damage by flashover, spark, arcing, burning or breakdown	(1) Preconditioning (2) 2.5 * rated voltage for 5seconds
Insulation Resistance	Over 100 MΩ on Overcoat layer face up Over 1,000 MΩ on Substrate side face up	(3) Setup as figure 1 (4) Test voltage: 100VDC (5) Test time: 60 + 10 / - 0 seconds
Voltage Proof	△R: ± (0.5%+ 0.0005Ω) Without damage by flashover, spark, arcing, burning or breakdown	(1) Setup as figure 1 (2) Test voltage: 50VAC(rms.) (3) Test time: 60 + 10 / - 0 seconds

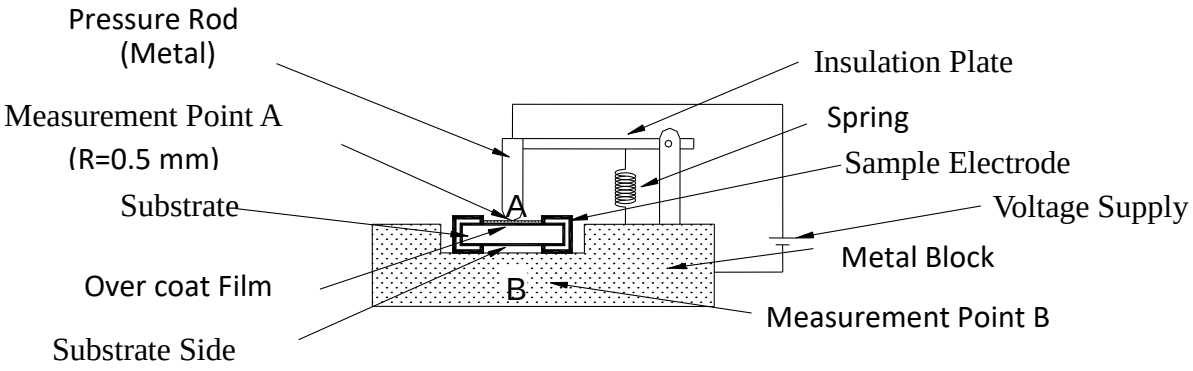


Figure 1 : Measurement Setup

Mechanical

Item	Specification and Requirement	Test Method (JIS 5201)
Lead Solderability	△R: ±(0.5%+ 0.0005Ω) The surface of terminal immersed shall be minimum of 95% covered with a new coating of solder	(1) Pretest Requirement: All samples shall be subjected to steam aging for a period of 8 hours as a precondition to testing (2) Lead Solderability 245 ± 5°C for 5+0/ 0.5 seconds
Reflow Soldering	△R: ±(2.0%+ 0.0005Ω) Without distinct deformation in appearance	(1) Reflow at 260°C for 10 seconds, 3 cycles, and cool down in still (2) Measuring resistance 1 hours after test
Solder Cycles	△R: ±(2.0%+ 0.0005Ω) Without distinct deformation in appearance	(1) One Reflow cycle; (2) Followed by cool down; then Hand Soldering: (3) Immersion in molten solder 260°C for 10 seconds
Vibration Test	△R: ±(0.5%+ 0.0005Ω) Without mechanical damage such as break	(1) Preconditioning (2) Parts are tested at10Hz to 2kHz at 15g, 20min,12 times per 3 mutually perpendicular directions, total 12hours
Mechanical Shock Test	△R: ±(0.5%+ 0.0005Ω) Without mechanical damage such as break	(1) Preconditioning (2) Parts are tested at 50 ± 5G, 11ms,3 shocks per 3 mutually perpendicular axes, total 18 shocks
Flexure Strength	△R: ±(0.5%+ 0.0005Ω) Without mechanical damage such as break	(1) Bending value: 2 mm for 60 ± 1 seconds

Endurance

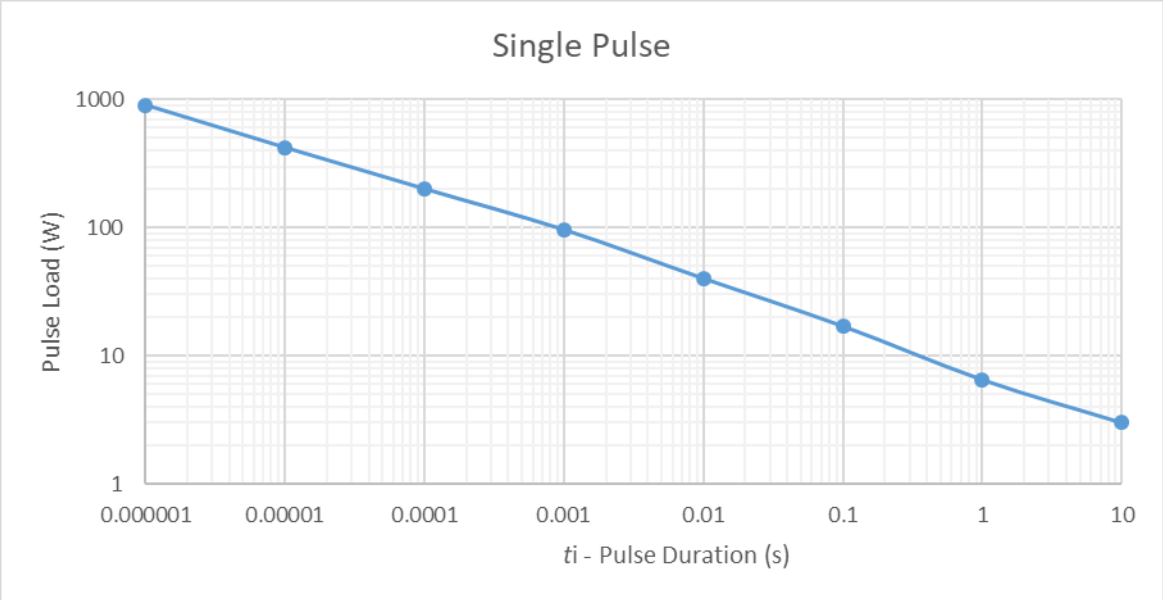
Item	Specification and Requirement	Test Method (JIS 5201)
Thermal cycling (Air to Air) Test	△R: ±(2.0%+ 0.0005Ω) Without distinct damage in appearance	(1) Preconditioning (2) Parts are tested at-55 ± 3°C to 125 ± 3°C with 30 min dwell time at each temperature, 1min max transition time, 1000 cycles. (3) Measuring resistance 1 hour after test
Temperature Humidity Test	△R: ±(3.0%+ 0.0005Ω) Without distinct damage in appearance Marking should be legible	(1) Preconditioning (2) Soldering heat (3) Flexure strength (4) Parts are tested at 1,000 hours at 60°C ± 2°C, 90-95% RH
Load Life (Endurance) Test (Power Cycling)	△R: ±(2.0%+ 0.0005Ω) Without distinct damage in appearance	(1) Preconditioning (2) Parts must be cycled at 70°C at full rated power for 1.5hr power on and 0.5hr power off for 1000 hours
Load Life (Endurance) Test	△R: ±(2.0%+ 0.0005Ω) Without distinct damage in appearance	(1) Preconditioning Parts are tested at a temperature of 125 ± 2°C and rated power (or maximum rated temperature) for 1,000 hours
HAST(Autoclave) (This test should be performed after resistance to soldering heat and flexure strength tests)	△R: ±(3.0%+ 0.0005Ω) Without distinct damage in appearance	(1) Preconditioning (2) Soldering heat (3) Flexure strength Part are tested for 48 hours, 121ºC, 100% R.H., 29.7 psia
Terminal Strength	△R: ±(0.5%+ 0.0005Ω) Without mechanical damage such as break	(1) Thrust 17.7 N (2) Times: 60 seconds

*Preconditioning: 125*24H、85℃/ 85%RH*168H、3 reflow cycles

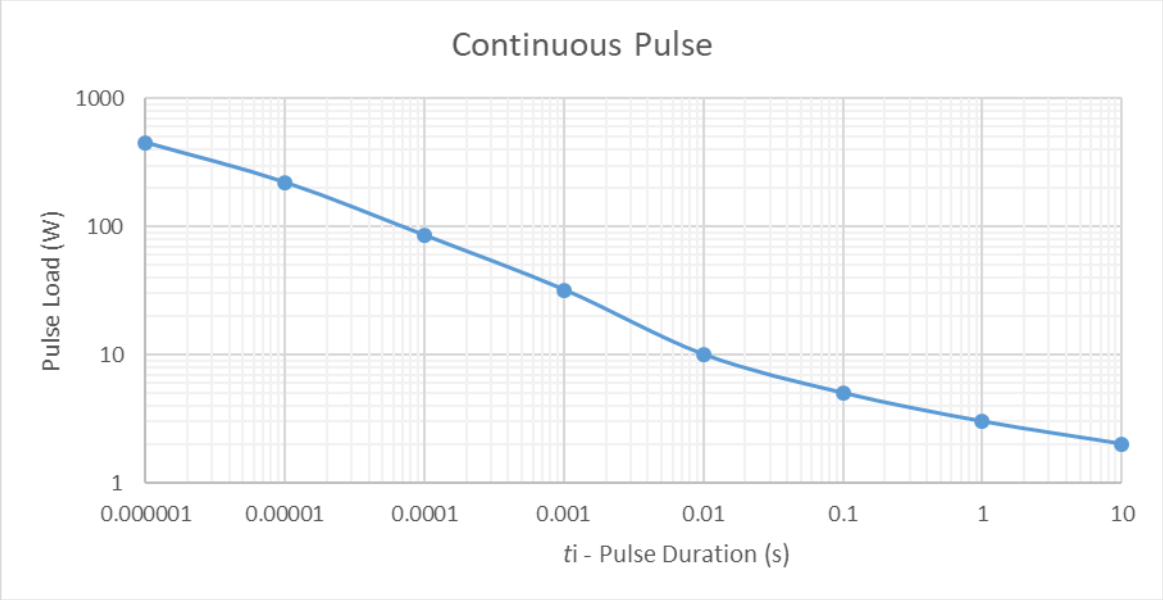
Pulse test

Item	Specification and Requirement	Test Method (JIS 5201)
Single pulsed operational life	△R: ± 1.0% Without distinct damage in appearance	(1) Preconditioning (2) Applied for the single pulse and its duration is 1us to 10s (3) The maximum power load is shown in Table 1
Continuous pulsed operational life	△R: ± 1.0% Without distinct damage in appearance	(1) Preconditioning (2) Applied for the continuous pulse, its one cycle: ON time is 1us to 10s (ti), OFF time is 10*ti. (3) Test cycles: 1000 cycles (4) The maximum power load is shown in Table 2

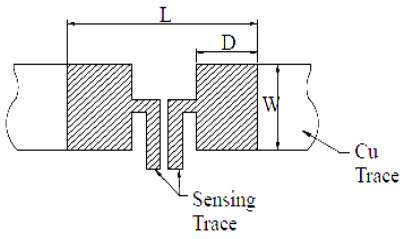
Single Pulse (Table 1)



Continuous Pulse (Table 2)



Recommend Land Pattern Dimensions :



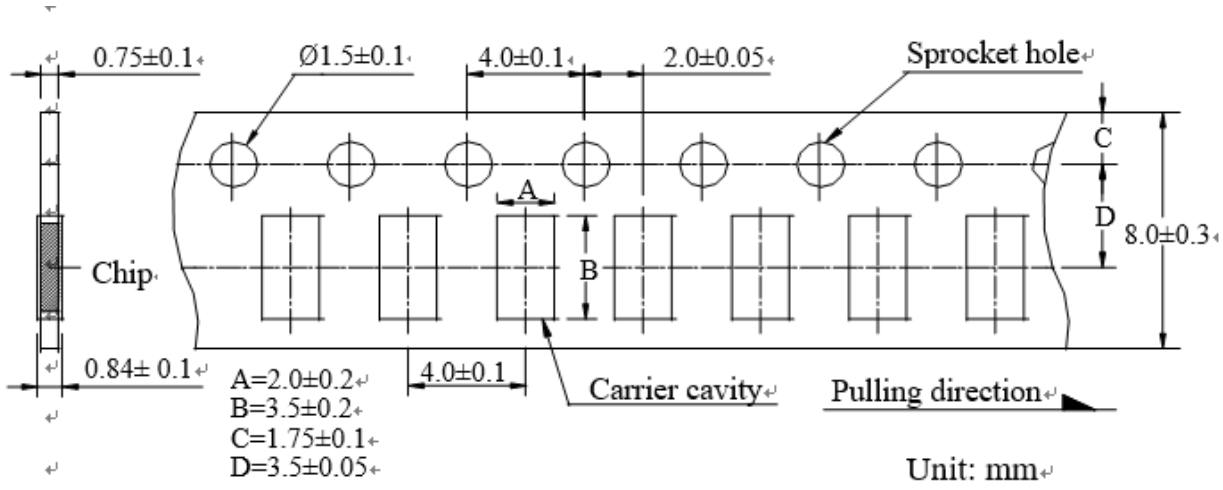
Size	W (mm)	L (mm)	D (mm)	t (um)
1632	1.78	4.14	1.37	105

Unit : mm

t：copper toil minimum thickness of PCB

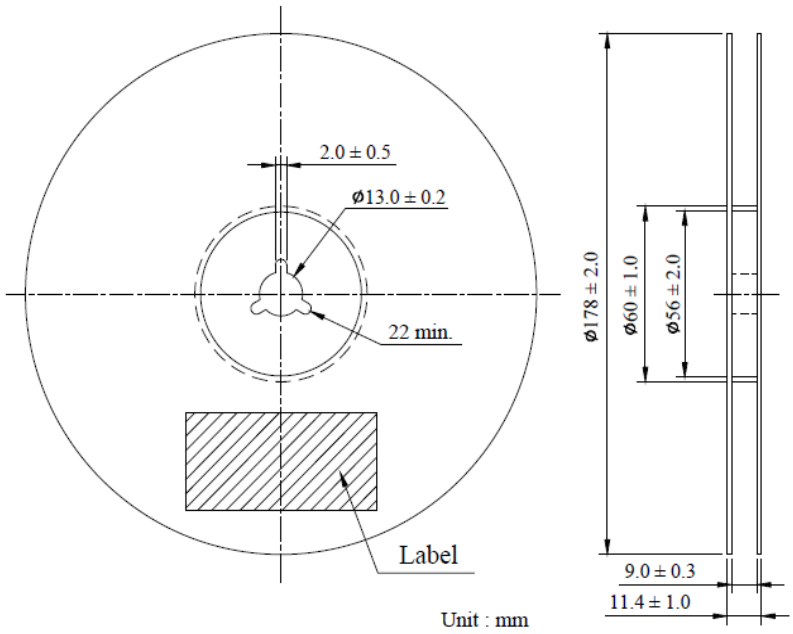
Packaging :

Tape packaging dimensions



Remark: Leader tape length≧30 cm(150 Hollow carrier cavity)

Reel dimensions



Numbers of Taping : 5,000 pieces /reel

The following items shall be marked on the reel.

(1) Type designation.

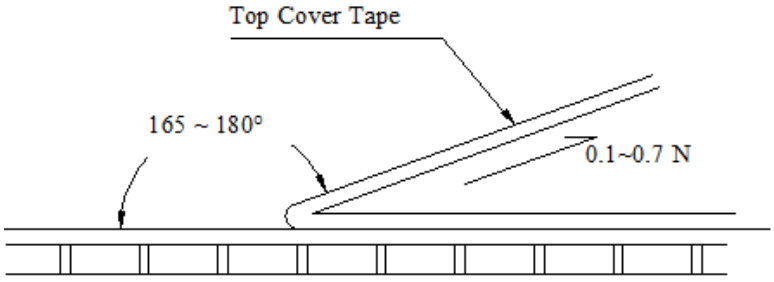
(2) Quantity

(3) Manufacturing date code

(4) Manufacturer's name

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 0.7 N.



Care Note :

Care note for storage

(1) Chip resistor shall be stored in a room where temperature and humidity must be controlled. (temperature 5 to 35℃, humidity 30 to 80% 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).

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.