TOKEN

HIGH VOLTAGE RESISTOR

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Product Index

Information

Voltage Resistors

Notice: Specification Changed or Version Updated will be posted at irregular intervals.
All Updated and Final Specifications, Please Confirm with TOKEN ELECTRONICS REPRESENITIVES.

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Information of High Voltage Resistors

Cost Effective High Voltage Resistor

Token high voltage resistors can be specified for use in industrial and general purpose high voltage systems, as well as a complete selection of high resistance, Hi-Meg, high-voltage, high frequency, and bulk ceramic resistors for higher average power dissipation. These High Resistance, High Frequency, Hi-Meg resistors combine the proven performance of Token resistance system with new cost efficient design elements and high voltage applications.

Detailed specifications, both mechanical and electrical, please contact our sales representative for more information.

High Voltage Applications

Resistors produced from Serpentine Pattern Screen Printing Design or bulk ceramic materials have displayed several key advantages in demanding high-voltage situations, including both continuous-wave and pulse applications. These include radar and broadcast transmitters, x-ray systems, defibrillators, lasers, and high-voltage semiconductor process equipment applications, where resistors must handle peak voltage anywhere from 8KV to 75KV.

Typical applications include current limit in capacitor charge/discharge, crowbar, and tube-arc circuits. In these uses, bulk ceramic resistors provide low inductance, high average power per unit size, stability at high voltage, and durability at extreme peak-power levels. Film resistors typically cannot withstand high-voltage pulse applications.

RF/Digital Loads and High-Frequency Applications

Token Non-Inductive Voltage Resistors are used extensively for high-frequency RF loads in broadcast and communication equipment because of their non-inductive characteristics. They provide excellent non-inductive power-handling capacity at frequencies upto the gigahertz range, with no sacrifice in power dissipation.

Film resistors may provide the needed non-inductive characteristics required by such RF applications, but they have size limitations and present reliability problems due to potential film burnout. This is especially true in advanced digital applications such as digital radio and TV transmitters involving pulses at high frequencies.

High Voltage Applications

- Due to the high voltage which can appear between the end cap and any adjacent metal part, resistors should be mounted at an adequate distance from other conductors.
- An appropriate number of resistors may be screwed together as a stick to provide an assembly which will be capable to withstanding any desired voltage, providing no individual resistor is subject to a greater stress or power dissipation than is recommended in its data sheet, and that appropriate anticorona devices are fitted.
- The axial termination should not be bent closer than twice the diameter of the terminal wire from the body of the resistor.When resistors are required to be potted, the preferred encapsulant is a silicone compound.

High Voltage Applications

For some high voltage applications it is required to immerse the components in oil or gas to reduce the effects of corona and surface tracking. A special lacquer protected version of the resistor is available, suitable for immersion in transformer oil or SF6.

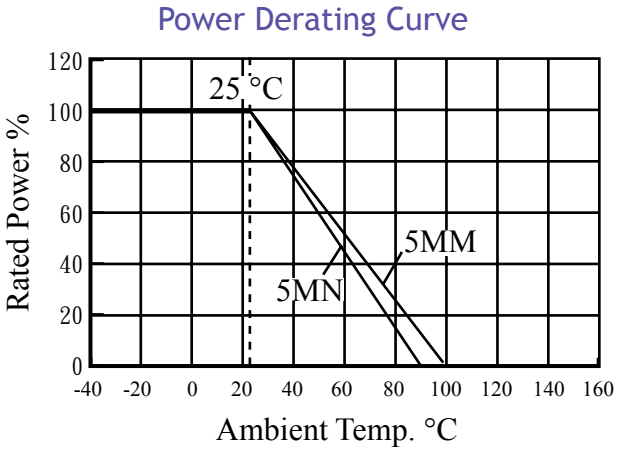
Terminology Glossary of High Voltage Resistors

Cermet

A cermet resistive element is made from a mixture of glass and metal oxides. The metal oxide is typically RuO2 or an AgPt alloy. Applying cermet materials to a flat or cylindrical substrate, and then firing them at 850°C produce thick Film resistors. In the electronic industry cermet material is typically called Thick Film paste or ink.

Critical Resistance Value

The maximum nominal resistance value at which the rated power can be applied continuously without exceeding the maximum working voltage is the critical resistance value. The rated voltage is equal to the maximum working voltage in the critical resistance value. If the circuit designs permits, the choice of a high ohmic value resistor or divider network will eliminate this consideration.



Derating Curve

The curve that describes the relationship between the resistors's operating temperature and the maximum value of continuous power permitted at that temperature. If the circuit designs permits, the choice of a high ohmic value resistor or divider network will minimize this consideration and improve the resistor's performance because it will operate at lower power.

Maximum Working Voltage

The maximum voltage applied continuously to a resistor or a resistor element. The maximum value of the applicable voltage is the rated voltage at the critical resistance value or lower. If the circuit designs permits, the choice of a high ohmic value resistor or divider network will improve the resistor's performance because it will operate at lower power.

Noise

Resistive noise can have a devastating effect on low-level signals, charge amplifiers, high gain amplifiers, and other applications sensitive to noise. The best approach is to use resistor types with low or minimal noise in applications that are sensitive to noise. Because of their construction and manufacturing processes.

Power Rating

Power ratings are based on physical size, allowable change in resistance over life, thermal conductivity of materials, insulating and resistive materials, and ambient operating conditions. For best results, employ the largest physical size resistors at the less than their maximum rated temperature and power. Never use them continuously at their maximum rating unless you are prepared to accept the maximum allowed life cycle changes. If the circuit designs permits, the choice of a high ohmic value resistor or divider network will minimize the power level and improve the resistor's performance as it is operating at a lower power level.

Rated Power

Rated power is the maximum value of power (watts), which can be continuously applied to a resistor at a rated ambient temperature. The basic mathematical relationship is **Equation: Power (watts) = (Current (Amps))2 × Resistance (Ohms).**

Rated power is the maximum value of power (watts), which can be continuously applied to a resistor at a rated ambient temperature. The basic mathematical relationship is Equation: Power (watts) = (Current (Amps))2 × Resistance (Ohms).

Rated Voltage

The maximum voltage applied continuously to a resistor at the rated ambient temperature. Rated voltage is calculated from the following formula, but it must not exceed the maximum working voltage. **Equation: Rated Voltage (V) = (Rated Power (W) × Nominal Resistance Value (Ω))1/2.**

High voltage resistors often are potted or operated in oil as the arc over voltage, in air, is approximately 10,000 volts per inch. Token's resistors feature higher voltage ratings due to their high square count and associated design characteristics.

Resistor Tolerance

Resistor Tolerance is expressed as the deviation from nominal value in percent and is measured at 25°C only with no appreciable load applied. A resistors value will also change with applied voltage (VCR) and temperature (TCR). For networks, absolute resistor tolerance refers to the overall tolerance of the network. Ratio tolerance refers to the relationship of each resistor to the others. It is often practical to specify tight ratio tolerances and loose absolute tolerances.

Temperature Coefficient of Resistance (TCR)

The Temperature Coefficient of Resistance (TCR) is expressed as the change in resistance in ppm (0.0001%) with each degree of change in temperature Celsius (°C). For example, a resistor with a TCR of +100 ppm/°C will change +0.1% total over a 10-degree change and +1% total over a 100-degree change.

The TCR value quoted on specification sheets is typically quoted as being referenced at +25°C and is the +25°C to +75°C slope of the TCR curve. TCR is typically not linear, but parabolic with temperature, as illustrated by the accompanying fig-1. Often the circuit designer treats the TCR as being linear unless very accurate measurements are needed. MIL STD 202 Method 304 is often referenced as a standard for measuring TCR. The following formula expresses the rate of change in resistance value per 1 °C in a prescribed temperature range:

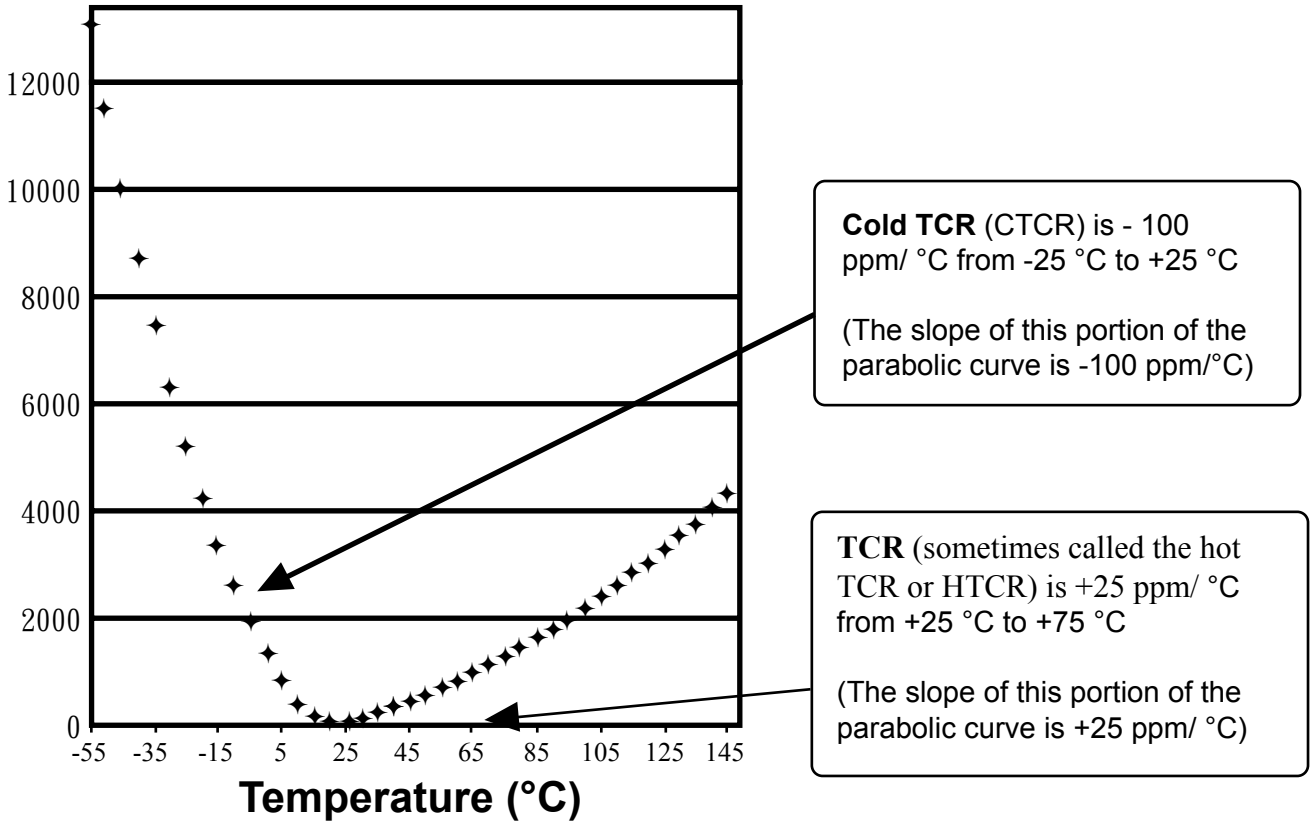
- **TCR (ppm/°C) = (R - Ro) / Ro × 1 / (T - To) × 10^6**
- **R: Measured resistance (Ω) at T °C; Ro: Measured resistance (Ω) at To °C**
- **T: Measured test temperature (°C); To: Measured test temperature (°C)**

In the context of a resistor network, this TCR value is called the absolute TCR in that it defines the TRC of a specific resistor element.

Voltage Coefficient of Resistance (VCR)

The Voltage Coefficient is the change in resistance with applied voltage. This is entirely different and in addition to the effects of self-heating when power is applied. A resistor with a VCR of 100 ppm/V will change 0.1% over a 10 Volt change and 1% over a 100 Volt change. The rate of change in resistance value per 1 Volt in the prescribed voltage range is expressed by the following formula:

- **VCR (ppm/V) = (Ro - R) / Ro × 1 / (Vo - V) × 106**
- **R: Measured resistance (Ω) at base voltage; V: Base voltage**
- **Ro: Measured resistance (Ω) at upper voltage; Vo: Upper voltage**



Metal Glaze Impulse Resistors

Serpentine Pattern Design Achieves High Power Voltage (RI80)

Preview

The type RI80 precision high voltage resistors were specifically designed for general purpose high voltage systems in industrial.

The RI80 uses Token's proprietary thick film Metal Glaze resistive element and Serpentine Pattern Design which provides ideal cost efficient, stability, precision and high voltage characteristics for a wide range of measurement, voltage divider circuits, and control functions in high voltage power electronics applications.

Token RI80 Precision Voltage Resistors are able to absorb large amounts of energy at high voltage while remaining non-inductive and heavy load characteristics. The RI80 conforms to the RoHS directives and Lead-free. Customed design, and tighter tolerances are available on request.

By utilizing specific ceramic core materials with optimum processing, Token are able to control, very tightly in manufacturing, the important ultra-stable performance parameters in operating temperatures from -55°C to +70°C.

Voltage handle up to 35 KV. This unique process is offered in specific resistance values in a wide variety of sizes and terminations. The extraordinary operating stability of the Type RI80 resistors will improve the performance of your high voltage system.

The RI80 Precision Voltage Series is RoHS compliant and lead free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

Applications

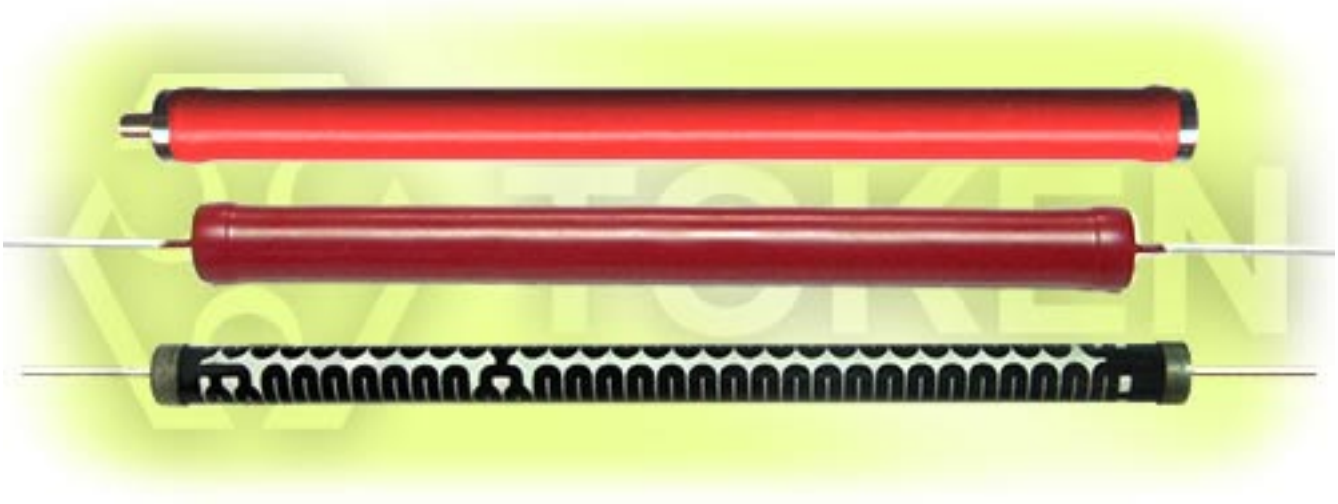
- Impulse voltage generators,
- Arc furnace damping, Energy research,
- Pulse modulators, Radar Pulse-forming networks,
- Capacitor crowbar circuits, High voltage snubber circuits,
- X-ray/imaging equipment, and EMI/lightning supression.

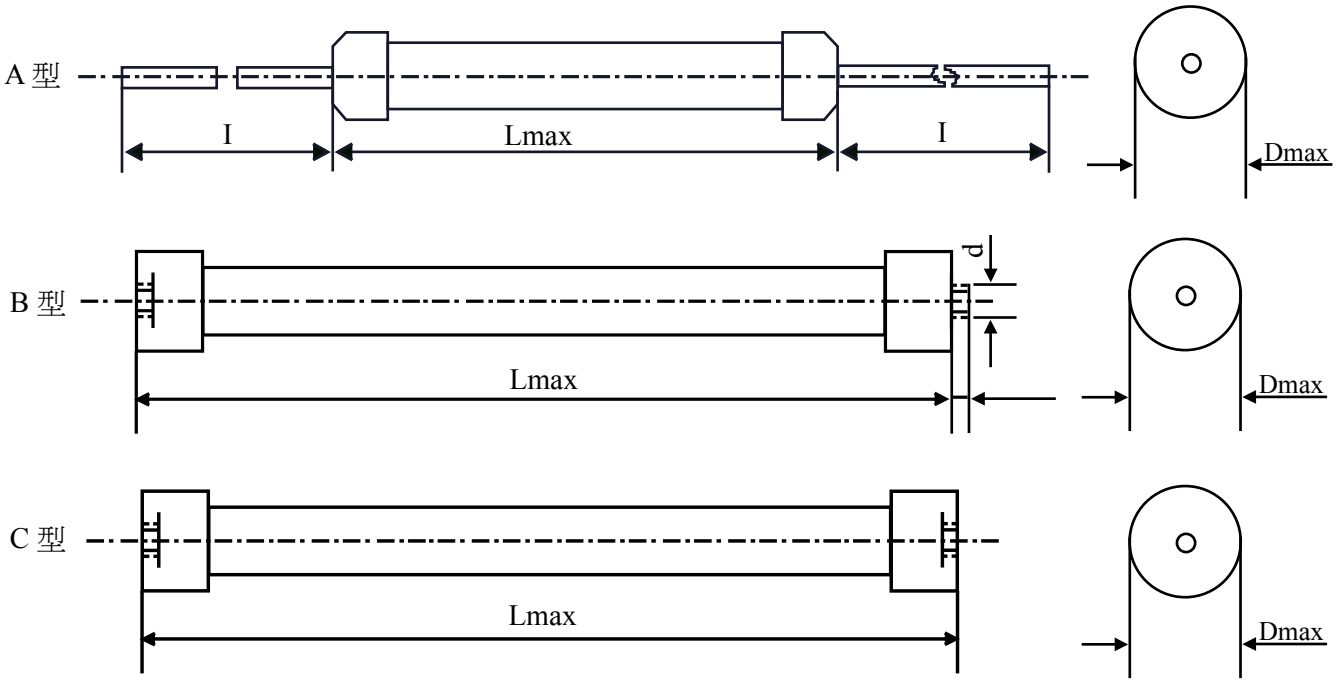
Features

- Rated Wattage from 1W to 300W.
- Max Working Voltage from 10KV to 35KV.
- Resistance Tolerance G(±2%), J(±5%), K(±10%).
- Temperature Coefficient: 200 ppm/°C to 400 ppm/°C.
- High Resistance Range from 1 Megohm to 1,000 Megohms.

RI80 Metal Glaze Impulse Resistors

General Specifications (Unit: mm)





Part Number	Rated Wattage	Style	Dimensions				Resistance Range (M Ω)	Temp Coefficient (10^{-6}/°C)	Max Working Voltage (kv)	Operating Temp	Resis-tance tolerance
			L max	D max	I	D					
RI80-1	1	a	30±2	9±1	30±3	0.7	10-1000	≤200	10	-55°C ~ +70°C	G(±2%) J(±5%) K(±10%)
RI80-2	2	a	50±2	9±1	30±3	0.7	10-1000	≤200	15		
RI80-3	3	a	65±2	9±1	30±3	0.7	10-1000	≤200	15		
RI80-5	5	a	100±2	9±1	30±3	1	10-1000	≤300	25		
RI80-10	10	b	147±2	11±1	6	M4	10-1000	≤300	30		
RI80-20	20	c	116±2	17±1			10-100	≤400	30		
RI80-25	25	c	116±2	19±1			10-100	≤400	30		

Surface Mount (LRC) Emboss Plastic Tape Specifications

Part Number	Rated Wattage	Style	Dimensions				Resistance Range (M Ω)	Temp Coefficient (10^{-6}/°C)	Max Working Voltage (kv)	Operating Temp	Resistance tolerance
			L max	D max	I	D					
RI80-30	30	c	116±2	19±1			10-100	≤400	30	-55°C ~ +70°C	G(±2%) J(±5%) K(±10%)
RI80-50	50	c	116±2	21±1			10-100	≤400	30		
RI80-80	80	c	130±2	27±1			10-51	≤400	30		
RI80-100	100	c	160±2	27±1			10-51	≤400	35		
RI80-150	150	c	210±2	27±1			10-51	≤400	35		
RI80-200	200	c	260±2	27±1			10-51	≤400	35		
RI80-300	300	c	310±2	33±1			1-51	≤400	35		

Remark : Rated Continus Working Voltage (RCWW) shall be determined from RCWW = $\sqrt{\text{Power Rating} \times \text{Resistance Value}(\Omega)}$ or Max.Working voltage listed above , whichever two.

RI80 Non-Inductive & Serpentine Pattern - Advance Technique

Non-Inductive Performance:

- RI80 Non-Inductive Design which uses a serpentine resistive pattern that offers for zigzagging lines to carry current in opposite directions, thereby achieving maximum neutralizationof flux fields over the entire length of the resistor.

- This efficient non-inductive construction without derating of any performance advantages is ideal for applications where high frequency is required.

Serpentine Pattern Screen Printing Design:

- Type RI80 Precision High Voltage Resistors combine Token's Non-Inductive serpentine pattern, high thru-put screen printed silicone coating.
- The alignment of the gap in the serpentine resistor pattern with the gap in the coating pattern provides a complete encapsulation of the resistor element.
- The cap and lead assemblies are pressed onto the resistor core, finishing the resistor and providing rugged terminal attachment.

How to Order

RI80 ❶ 1W ❷ a ❸ 51M ❹ G ❺

❶ Part Number: RI80

❷ Rated Power (W): 1W, 2W, 3W, 5W, 10W

❸ Style: a Style, b Style, c Style

❹ Resistance Value (Ω)

Code	Resistance Value (Ω)
5M1	5.1MΩ
51M	51MΩ
510M	510MΩ

❺ Resistance Tolerance

Code	Resistance Tolerance
G	±2%
J	±5%
M	±10%

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High Power Voltage Resistors

Token High Voltage Resistors (RI85) Break Through 800 Wattage in High Power Applications

Preview

Token Electronics RI85 series has been developed to provide design engineers with high quality, high power, high voltage dividers for use in sophisticated system.

The RI85 resistors use Token's proprietary thick film metal glaze resistive element and Serpentine Pattern Design which provides ideal cost efficient, stability, high power and high voltage characteristics for a wide range of measurement, voltage divider circuits, and control functions in high voltage power electronics applications.

Token RI85 Power Voltage Resistors are able to absorb large amounts of energy at high voltage while remaining non-inductive and heavy load characteristics. RI85 Resistors conform to the RoHS directives and Lead-free. Customed design, low TCR, resistance values, and tighter tolerances are available on request.

The RI85 non-inductive metal glazed resistors are manufactured on proceeding of tube designed with tab terminal, thick-film printing, firing and laser trimming.

By utilizing specific ceramic core materials with optimum processing, Token are able to control, very tightly in manufacturing, the important ultra-stable performance parameters TCR less than 100 ppm/°C. Voltage handle up to 100 KV and Wattage available 200W to 800W. This unique process is also offered in specific resistance values in a wide variety of sizes and terminations. The extraordinary operating stability of the Type RI85 resistors will improve the performance of your high voltage system.

The RI85 Power Voltage Series is RoHS compliant and lead free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact us.

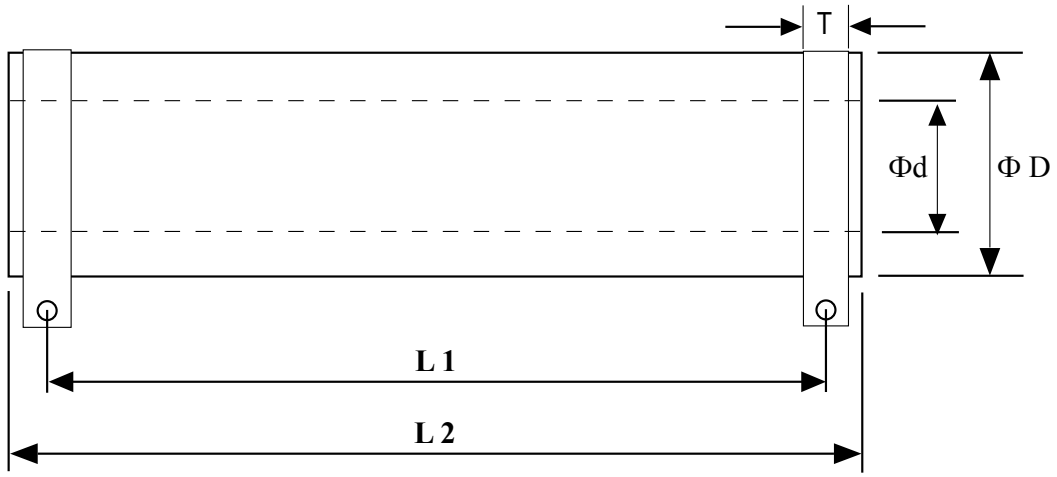
Features

- Rated Wattage from 200W to 800W.
- Temperature Coefficient ≤ 100 ppm/°C.
- Resistance Range from 100KΩ to 1TeraΩ.
- Resistance Tolerance K(±10%), M(±20%).
- Max Working Voltage from 50KV to 100KV.

Applications

- X-ray/imaging equipment,
- EMI/lightning supression, Energy research,
- Pulse modulators, Radar Pulse-forming networks,
- Impulse voltage generators, Arc furnace damping,
- Capacitor crowbar circuits, High voltage snubber circui

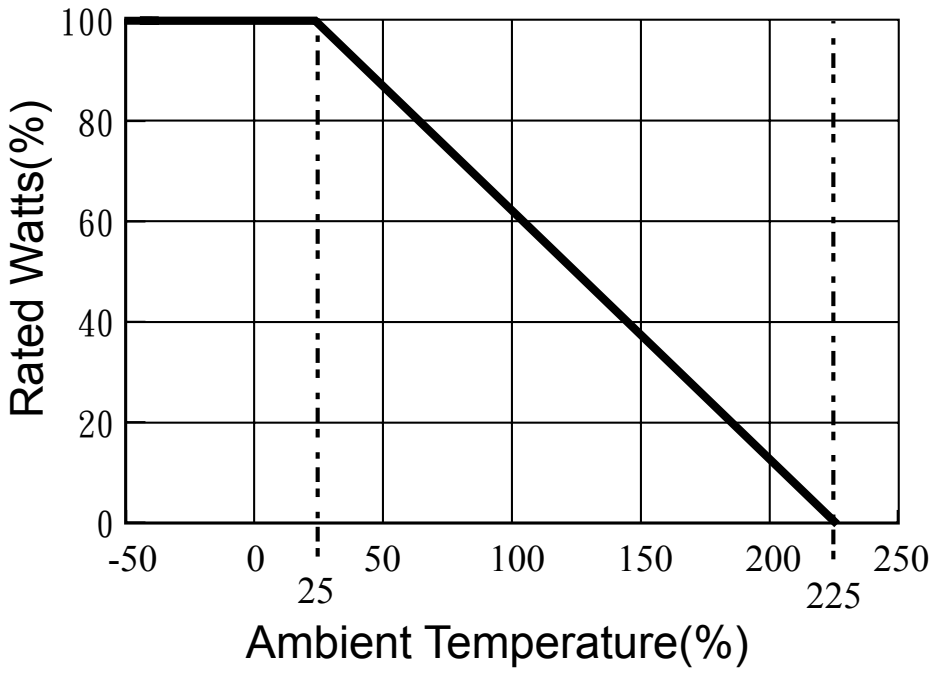
Dimensions & Specification



Type	Power Rating	Resistance Value (Ω)	Resistance Tolerance	Temperature Coefficient (PPM/°C)	Dimensions (Unit: mm)					Max working voltage
					ΦD±2	Φd±2	L1±5	L2±5	T±1	
RI85	200W	100K~100G	10% (K) 20% (M)	≤100	28	15	185	200	10.5	50KV
RI85	500W	100K~500G		≤100	34	20	205	220	15	50KV
RI85	800W	100K~1T		≤100	55	40	205	220	15	100KV

Remark: Rated Continuous Working Voltage (RCWV) shall be determined from
RCWV = square root (power rating × resistance value) or Max Working Voltage listed above, whichever less.

Power Derating Curve



Performance Specifications

Test Item	Test Methods	Characteristics
Moisture resistance	MIL Std. 202, method 106 (IEC68-2-3)	ΔR/R≤±0.1% typ., 0.25% Max.
Insulation resistance	500V 25°C 75% relative humidity	10GΩ Min.
Dielectric strength	25°C 75% relative humidity	1000V Min.
Overload	1.5×Pnom. 5 sec (do not exceed max. voltage)	ΔR/R≤±0.1% typ., 0.25% Max.
Thermal shock	MIL Std. 202, method 107 Cond. C (IEC68-2-14)	ΔR/R≤±0.1% typ., 0.2% Max.
Load life	1000h at rated power (IEC115-1)	ΔR/R≤±0.1% typ., 0.25% Max.

RI85 Non-Inductive & Serpentine Pattern - Advance Technique

Non-Inductive Performance:

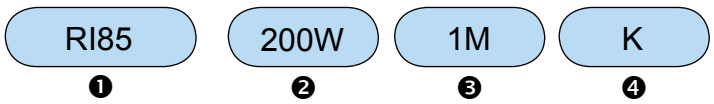
- RI85 Non-Inductive Design which uses a serpentine resistive pattern that offers for zigzagging lines to carry current in opposite directions, thereby achieving maximum neutralizationof flux fields over the entire length of the resistor.

- This efficient non-inductive construction without derating of any performance advantages is ideal for applications where high frequency is required.

Serpentine Pattern Screen Printing Design:

- Type RI85 Precision High Voltage Resistors combine Token's Non-Inductive serpentine pattern, high thru-put screen printed silicone coating.
- The alignment of the gap in the serpentine resistor pattern with the gap in the coating pattern provides a complete encapsulation of the resistor element.
- The cap and lead assemblies are pressed onto the resistor core, finishing the resistor and providing rugged terminal attachment.

How to Order



❶ Product Type.

❷ Rated Power.(W)

❸ Resistance Value. (Ω)

❹ Resistance Tolerance.

Back to 1st Page -High Power Voltage Resistors (RI85)

High Voltage Network Dividers

Token (NTK) High Voltage Network Dividers can be customised to order

Preview

RoHS-compliant resistor network, high-value high-voltage resistors and potential dividers in a wide variety of configurations are now available from Token Electronics as custom versions of its standard ranges of resistive products.

This advanced film resistor technology provides the performance characteristics required by the precision input signal circuits of both bench-type and laboratory digital instruments. In addition to requiring less board space, these compact voltage network dividers deliver higher performance than selected discrete resistor sets and thin-film dividers.

Manufactured using advance thick-film technology from existing tooling ensures fast turnaround of samples prior to low to medium volume in-house production. These custom dividers are ideal for high performance voltage division applications in medical equipment, laboratory equipment, analytical instruments, etc. The custom high voltage network divider can be supplied in various packages and packaging materials including glass, epoxy resin, silicon options.

By applying this technology to the low-profile, single-in-line package configuration, the Type (NTK) Custom SIP Resistor Networks are available with a combination of features. which include: Low TCR 250 ppm/°C (100 ppm/°C or tighter upon request), operating temperature range -55°C ~ +125°C (higher temperature upon request), flat style, non-inductive, low noise, and also custom divider design.

For complete information on quantity price and delivery, contact our Sales Office.

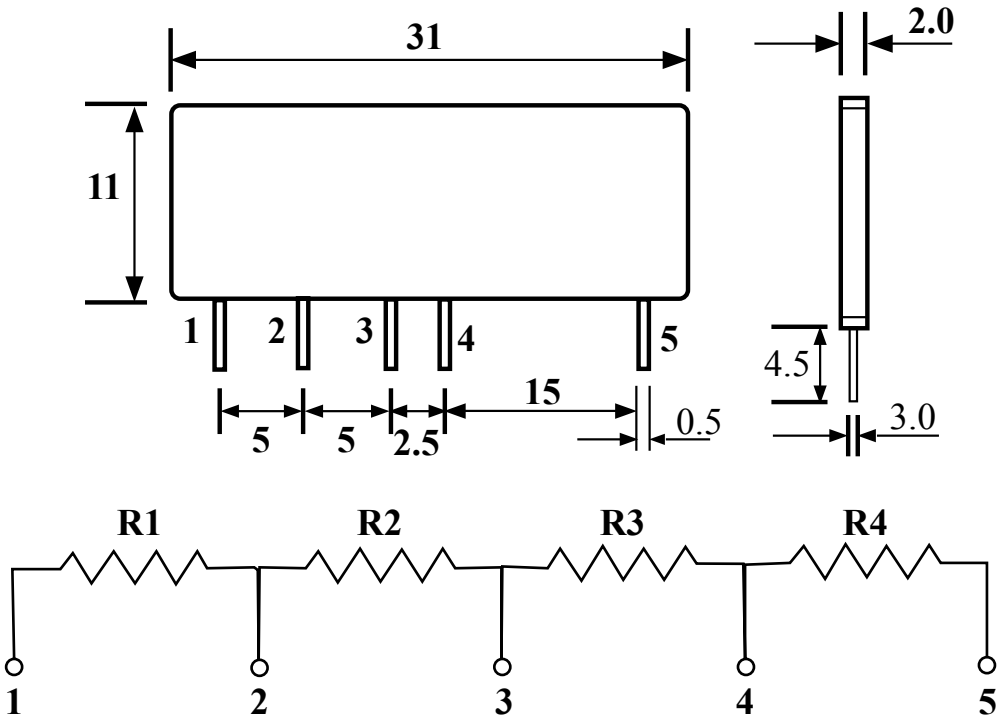
Specifications

- Low TCR Available: 250 ppm/°C. (ppm/°C or tighter upon request).
- Temperature Range: -55°C ~ +125°C (higher temp. upon request).
- Low VCR: 1ppm / 5ppm / 10ppm upon request.
- High Voltage Withstanding: Up to 30 ~ 50KV.
- Thick film on Aluminum > 96% Al2O3.
- Resistance Tolerance: ±1% ~ ±30%.
- Resistance Range: 1KΩ ~ 10GΩ.

Features

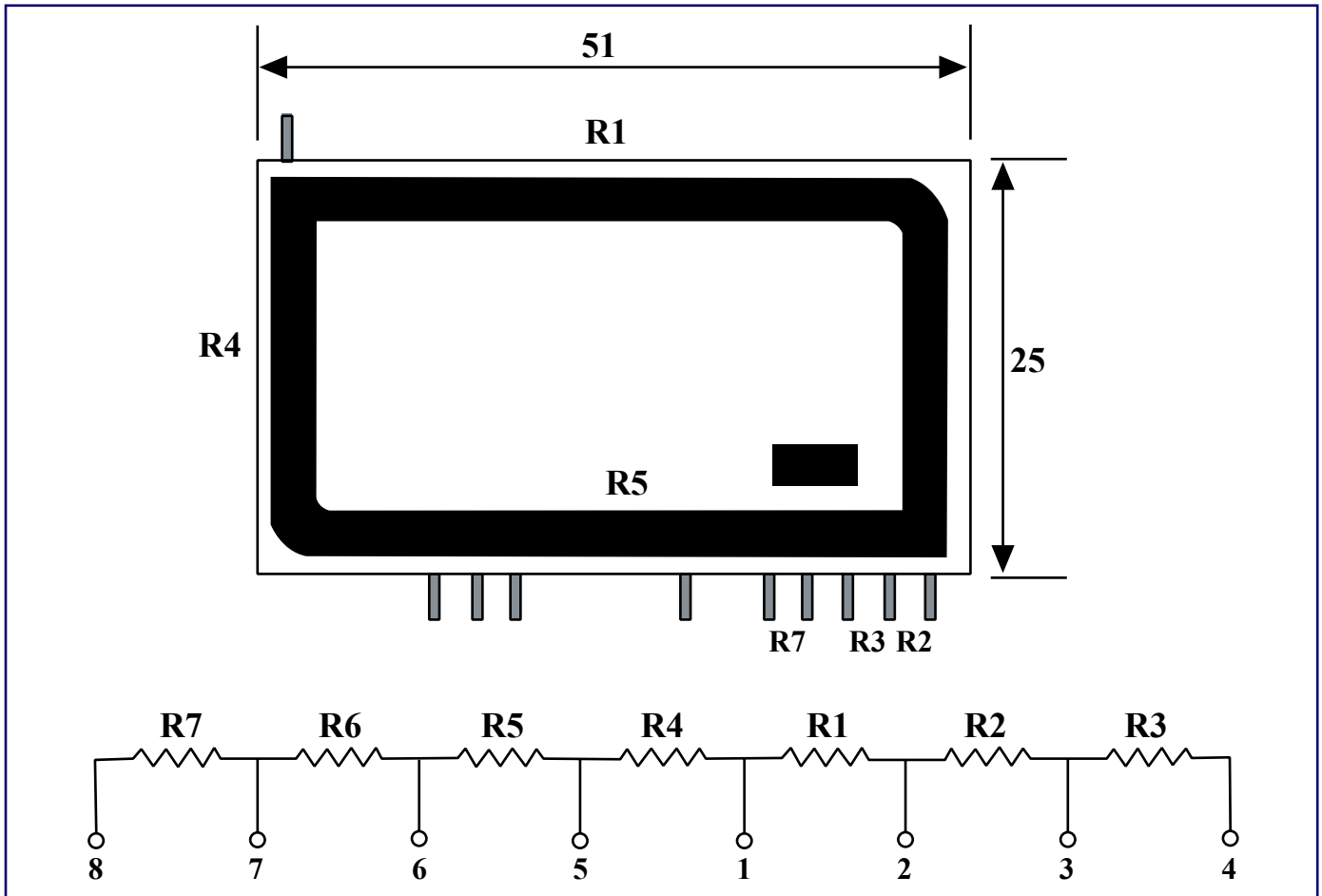
- Flat style, Low Resistor Noise.
- Non Inductive Design.
- Divider Design upon Request.
- Pb-free Production: Meet RoHS.
- Different Coating Available: Glass / Epoxy resin / Silicon.
- Solderable Leads (Tin coated copper leads): Type Φ0.5 (Φ0.6 / Φ0.8 upon request).

(NTK-A) Electrical Parameters



Type	PIN	Resistance Value (Ω)		Resistance Tolerance	Pressure parameters	Rated Power (W)
NTK-A	1 ~ 2	R1	30M	K (±10%)	4KV Min.	0.6W Min.
	2 ~ 3	R2	30M	K (±10%)	4KV Min.	0.6W Min.
	3 ~ 4	R3	1M	J (±5%)	500V Min.	0.3W Min.
	4 ~ 5	R4	800M	K (±10%)	10KV Min.	1W Min.

(NTK-B) Electrical Parameters



Type	Serial Number	Resistance Value (Ω)	Rated Power	Resistance Tolerance	Temperature Coefficient	Operating Voltage
NTK-B	R1	52M	52	±5%	±250PPM/°C	8500V
	R2	10K	-			-
	R3	10K	-			-
	R4	16M2	4W			4200V
	R5	17M3	3W			4400V
	R6	3M3	1W			800V
	R7	8K	-			-

Back to 1st Page - High Voltage Network Dividers (NTK)

Thick Film High Voltage Resistors

An Excellent Solution for The Voltage Trend in Power Impulse Products

Preview

The High Voltage RI82 Precision Series provides an excellent solution for design engineers looking for a compact product with high-voltage capabilities to enable them to design within the voltage trend for power impulse products.

The RI82 resistors use Token's proprietary thick film Metal Glaze resistive element and Serpentine Pattern Design which provides ideal cost efficient, stability, precision, non-Inductive, and high voltage characteristics for a wide range of measurement, voltage divider circuits, and control functions in high voltage power electronics applications.

By utilizing specific 96 % pure alumina materials with optimum processing, Token are able to control, very tightly in manufacturing, the important ultra-stable performance tolerance F(±1%), G(±2%), J(±5%), K(±10%), and M(±20%). Voltage handle up to 30 KV. This unique process is offered in specific resistance values in a wide variety of sizes and terminations. The extraordinary operating stability of the Type RI82 resistors will improve the performance of your high voltage system in precision.

The Precision RI82 High Voltage Series is RoHS compliant and lead free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

Applications

- Rated Wattage from 0.1W to 30W
- Max Working Voltage from 2KV to 30KV.
- Designs built from customer supplied schematics
- Tough epoxy-based coating and high voltage stability
- Temperature Coefficient: 200 ppm/°C to 300 ppm/°C.
- Resistance Range from 10 Megohm to 1KK Megohms (1 Gegaohms).
- Resistance Tolerance F(±1%), G(±2%), J(±5%), K(±10%), and M(±20%).
- Stable cermet resistive element bonded to a high-purity alumina substrate.

Applications

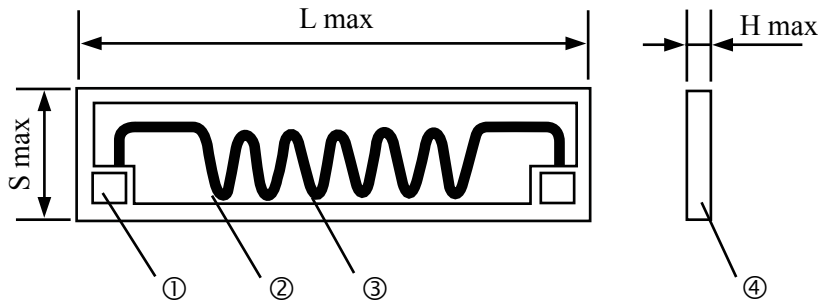
- Resistive Element: Thick film
- Substrate: 96 % pure alumina
- Encapsulation: Epoxy base, conformal coating (c style only)
- Terminals: Silver palladium pole, tin plated copper leads

Features

- X-ray/imaging equipment, Impulse voltage generators,
- Capacitor crowbar circuits, High voltage snubber circuits, Arc furnace damping,
- Pulse modulators, Radar Pulse-forming networks, Energy research, and EMI/lightning supression.
- Applications include power supplies, transformers and any application requiring operation within an environment where high voltages are used.

CHIP Type General Specifications (Unit:mm)

① Silver Palladium Pole
② Resistent Film
③ Insulation Coating
④ 96%A1023 Ceramic Base

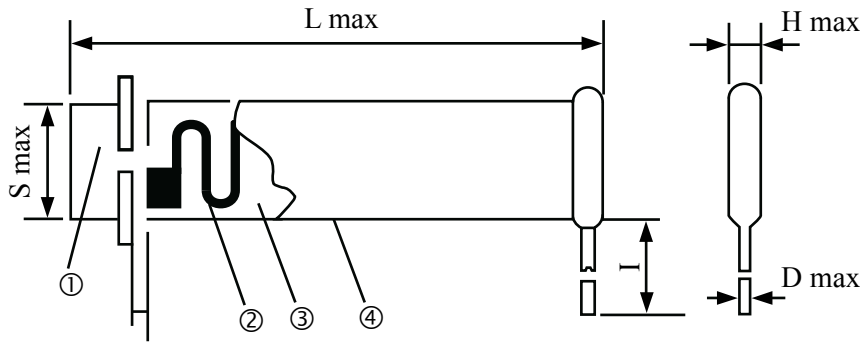


Part Number	Rated Wattage (w)	Style	Dimensions					Resistance Range (MΩ)	Temp Coefficient (10^{-6}/ °C)	Resistance Tolerance	Max Working Voltage (KV)
			Lmax	Smax	Hmax	I	dmax				
RI82-2	2	a	33	8	0.8			10-1000	≤200	J(±5%) K(±10%) M(±20%)	15
RI82-2	2	a	25	10	0.8						

Remark : Rated Continus Working Voltage (RCWW) shall be determined from RCWW = $\sqrt{\text{Power Rating} \times \text{Resistance Value}(\Omega)}$ or Max.Working voltage listed above , whichever two.

Dip Type General Specification (Unit:mm)

① Silver Palladium Pole
② Resistent Film
③ Insulation Coating (c style only)
④ 96%A1023 Ceramic Base



Part Number	Rated Wattage (w)	Dimensions					Resistance Range (MΩ)	Temp Coefficient (10^{-6}/ °C)	Max Working Voltage (KV)	Resistance Tolerance
		L ± 2	S ± 2	H max	I	D max				
RI82-0.125	0.125	8	3.5	2.5	20.0min	0.56	100-4.7K	≤200	4	
RI82-0.125	0.125	10	5	2.5	24.0min	0.56	100-10K	≤200	4	
RI82-0.25S	0.25S	10	5	2.5	20.0min	0.56	10-1000	≤200	4	
RI82-0.25	0.25	22	4	2.5	20.0min	0.56	100-10K	≤200	4	
RI82-0.25	0.25	25	5	2.5	20.0min	0.56	100-10K	≤200	10	
RI82-0.5	0.5	35	5	2.5	24.0max	0.56	100-10K	≤200	15	
RI82-0.5	0.5	41	5	2.5	42.0max	0.56	100-1KK	≤200	4	F(±1%)
RI82-1	1	25	10	2.5	30.0max	0.56	100-10K	≤200	15	
RI82-1	1	30	8	2.5	30.0max	0.56	100-10K	≤200	15	G(±2%)
RI82-1	1	33	8	2.5	35.0max	0.56	100-10K	≤200	15	
RI82-1	1	38	10	3	45.0max	0.80	10-1000	≤200	20	J(±5%)
RI82-2	2	38	10	3	40.0max	0.80	100-10K	≤200	20	
RI82-2	2	45	10	3	45.0max	0.80	100-10K	≤200	20	K(±10%)
RI82-3	2	50	10	3	45.0max	0.80	100-10K	≤200	20	
RI82-3	3	30	15	3	35.0max	0.80	100-10K	≤200	25	M(±20%)
RI82-3	3	60	10	3	55.0max	0.80	100-100K	≤300	25	
RI82-5	5	80	20	4	60.0max	0.80	100-200	≤300	25	
RI82-10	10	97	23	4	80.0max	0.80	100-200	≤300	30	
RI82-20	20	100	35	4	80.0max	1	100-200	≤300	30	
RI82-30	30	100	48	4	80.0max	1	100-200	≤300	30	

Remark : Rated Continus Working Voltage (RCWW) shall be determined from RCWW = $\sqrt{\text{Power Rating} \times \text{Resistance Value}(\Omega)}$ or Max.Working voltage listed above , whichever two.

RI82 Non-Inductive & Serpentine Pattern - Advance Technique

Non-Inductive Performance:

1. Token's RI82 Non-Inductive Design which uses a serpentine resistive pattern that offers for zigzag-ging lines to carry current in opposite directions, thereby neutralizing maximum of flux fields over the entire length of the resistor.

2. This efficient non-inductive construction retains performance advantages and heavy load characteris-tics which is ideal for high frequency applications.

Serpentine Pattern Screen Printing Design:

1. Type RI82 Precision High Voltage Resistors combine Token's Non-Inductive serpentine pattern, high thru-put screen printed silicone coating.

2. The alignment of the gap in the serpentine resistor pattern with the gap in the coating pattern provides a complete encapsulation of the resistor element.

3. The lead assemblies are pressed onto the resistor core, finishing the resistor and providing rugged terminal attachment.

How to Order

RI82	0.125W	c	47M	K
❶	❷	❸	❹	❺

❶ Part Number: RI82

❷ Rated Power (W): 0.125W, 0.25W, 0.5W, 1W

❸ Style: a Style, b Style, c Style

❹ Resistance Value (Ω)

Code	Resistance Value (Ω)
4M7	4.7MΩ
47M	47MΩ
47M5	47.5MΩ
470M	470MΩ

❺ Resistance Tolerance

Code	Resistance Tolerance
F	±1%
G	±2%
J	±5%
K	±10%
M	±20%

Back to 1st Page - High Voltage Resistors (RI82)

Ceramic Composition Resistors

Enhanced Performance for High Voltage Applications - Ignition Non-Inductive (RMCA, RMCB)

Preview

The RMCA, RMCB Series MELF type of fixed ceramic resistors from Token Electronics offers automotive designers a compact solution for applications involving high voltages, surges, high peak power, or high-energy pulses. They offer enhanced performance in R-C snubber circuits, high voltage power supplies, and inrush limiters.

Token's RMCA, RMCB series now offers the industry a direct replacement carbon composition resistor based on a bulk resistive element comprising carbon in a ceramic filler. Due to the need for higher peak voltages, the RMCA, RMCB range is perfect for vehicle ignition system applications.

The RMCA, RMCB Series conform to RoHS compliant and lead free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

Ceramic Composition Resistor Construction :

- Bulk ceramic resistors that consists of a clay, alumina, and ceramic filler that has been blended and pressurized into a resistive core and then covered with a molded outer insulating core.

Replacement Carbon-Composition Resistors :

- Design requirements for custom sizes, surface mount, or special footprints can be met easily.
- In cases where several carbon-composition resistors have been used together in an array to achieve a particular rating, they have been replaced with a single bulk ceramic resistor, frequently at a lower installed cost.

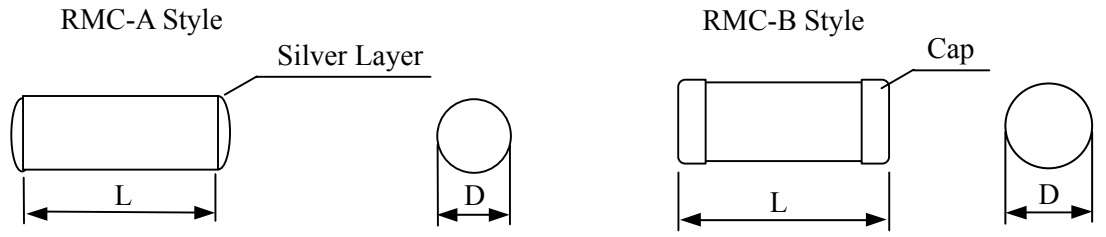
Features

- Operating Temperature -40°C ~ 155°C.
- Resistance Tolerance K(±10%), M(±20%).
- Typical resistance range 470 ohm ~ 100 Kohm.
- Replaces 1 and 2 watt carbon composition resistors.
- Suitable for noise suppressor of engine ignition system.
- High peak power, Reliable with non-disconnection failure.
- Rated Wattage up 5W, meets high energy density demands.

Applications

- Inrush limiters
- R-C snubber circuits
- Vehicle ignition system
- High voltage power supplies

General Specifications (Unit: mm)



Model	Style	Rated Wattage	Dimensions (mm)	
			L	D
RMC	A	1	7 ± 1.5	4.0 ± 0.4
			9 ± 1.5	4.0 ± 0.4
			10 ± 1.5	4.0 ± 0.4
	B		11 ± 1.5	4.6 ± 0.5
RMC	A	2	18 ± 1.5	4.0 ± 0.4
	B		19 ± 1.5	4.6 ± 0.5
RMC	A	3	24 ± 2.0	4.0 ± 0.4
	B		25 ± 2.0	4.6 ± 0.5
RMC	A	5	24 ± 2.0	7.0 ± 0.5
	B		25 ± 2.0	7.6 ± 0.5

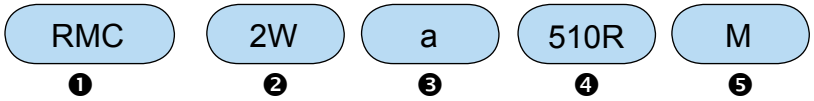
Electrical Characterisics

Item		RMCA, RMCB			
Power Rating at 25°C (W)		1	2	3	5
Operating Temp. Range (°C)		-40 ~ 155			
Resistance Tolerance		K(±10%), M(±20%)			
Resistance Range (Ω)		470 ~ 33K	1K ~ 56K	1K ~ 100K	470 ~ 33K
Max. Working Voltage (V)		300	350	400	500
T.C.R (PPM/°C)	-40°C ~ 25°C	-750 ~ 3300	-750 ~ 3300	-750 ~ 3300	-750 ~ 3300
	25°C~155°C	-750 ~ 2600	-750 ~ 2600	-750 ~ 2600	-750 ~ 2600
Max. Pulse Voltage (KV)		8	15	20	25
Moisture Resistance (%)		10	10	10	10

Note: Non-Inductive Performance:

1. Chemically inert and thermally stable, the resistors are inherently non-inductive because of their bulk ceramic construction, which allows energy and power to be uniformly distributed through the entire ceramic resistor body with no film or wire to fail.
2. The bulk ceramic material also allows simple efficient resistor designs that enable the designer to minimize the resistor package size while providing the required performance and reliability.

How to Order



❶ Part Number: RMC

❷ Rated Power (W): 1W, 2W, 3W, 5W

❸ Style: a Style, b Style

❹ Resistance Value (Ω)

Code	Resistance Value (Ω)
510R	510Ω
5K1	5.1KΩ
51K	51KΩ
68K	68KΩ

❺ Resistance Tolerance

Code	Resistance Tolerance
K	±10%
M	±20%

Back to 1st Page - Ceramic Resistors (RMCA, RMCB)

Surge Metal Ceramic Resistors

(RMCC) The Way Allows Energy and Power to be Uniformly Distributed

Preview

Following market demands, Token Electronics provided an extent of Bulk Ceramic Composition RMCA, RMCB Series to RMCC Series. The cap and lead assemblies are pressed onto the RMCC resistor core, finishing the resistor and providing rugged terminal attachment.

Token Surge Resistors - RMCC Series are primarily designed for high voltage, power charging/discharging circuits,, surge energy applications and conform to the RoHS directive and Lead-free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

Bulk Ceramic Construction :

- Bulk metal ceramic resistors that consists of a clay, alumina, and ceramic filler that has been blended and pressurized into a resistive core and then covered with a molded outer insulating core.

Replacement Carbon-Composition Resistors :

- Design requirements for custom sizes, surface mount, or special footprints can be met easily.
- In cases where several carbon-composition resistors have been used together in an array to achieve a particular rating, they have been replaced with a single bulk ceramic resistor, frequently at a lower installed cost.

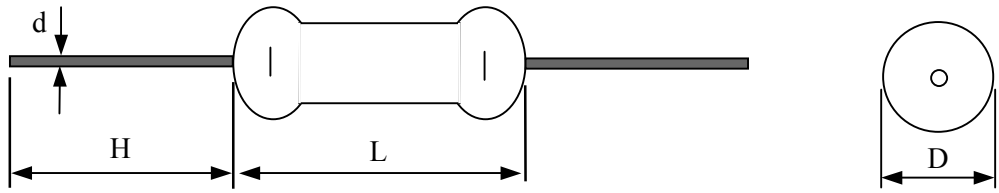
Applications

- Radar, Motor Drives, Broadcast Transmitters,
- X-Ray, Lasers, Medical Defibrillators,
- Dynamic Braking, Soft-start/Current-limit,
- Snubber Circuits, Dummy Loads, Energy Research
- RF Amplifiers, Semiconductor Process, Power Conditioning

Features

- Operating Temperature -40°C ~ 155°C.
- Resistance Tolerance K(±10%), M(±20%).
- Typical resistance range 470 ohm ~ 100 Kohm.
- Replaces 1 and 2 watt carbon composition resistors.
- Suitable for noise suppressor of engine ignition system.
- High peak power, Reliable with non-disconnection failure.
- Rated Wattage up 5W, meets high energy density demands.

General Specifications (Unit: mm)



Model	Style	Rated Wattage	Dimensions (mm)			
			L	D	H	d
RMC	C	1	11±1.5	4.8±0.5	25±2	0.8±0.05
RMC	C	2	19±1.5	4.8±0.5	25±2	0.8±0.05
RMC	C	3	25±2.0	4.8±0.5	25±2	0.8±0.05
RMC	C	5	25±2.0	7.8±0.5	30±3	1.0±0.05

Electrical Characterisics

Item		RMCC			
Power Rating at 25°C (W)		1	2	3	5
Operating Temp. Range (°C)		-40 ~ 155			
Resistance Tolerance		K(±10%), M(±20%)			
Resistance Range (Ω)		510 ~ 33K	1K ~ 56K	1K ~ 100K	470 ~ 33K
Max. Working Voltage (V)		300	350	400	500
T.C.R (PPM/°C)	25°C~ 40°C	-750 ~ 3300	-750 ~ 3300	-750 ~ 3300	-750 ~ 3300
	25°C~155°C	-750 ~ 2600	-750 ~ 2600	-750 ~ 2600	-750 ~ 2600
Max. Pulse Voltage (KV)		8	15	20	25
Moisture Resistance (%)		10	10	10	10

Note: Non-Inductive Performance:

1. Chemically inert and thermally stable, the resistors are inherently non-inductive because of their bulk ceramic construction, which allows energy and power to be uniformly distributed through the entire ceramic resistor body with no film or wire to fail.
2. The bulk ceramic material also allows simple efficient resistor designs that enable the designer to minimize the resistor package size while providing the required performance and reliability.

How to Order

RMC ❶ 2W ❷ c ❸ 51K ❹ K ❺

❶ Part Number: RMC

❷ Rated Power (W): 1W, 2W, 3W, 5W

❸ Style: c Style

❹ Resistance Value (Ω)

Code	Resistance Value (Ω)
510R	510Ω
5K1	5.1KΩ
51K	51KΩ
68K	68KΩ

❺ Resistance Tolerance

Code	Resistance Tolerance
K	±10%
M	±20%

Back to 1st Page -Metal Ceramic Resistors (RMCC)

Anti-Surge Resistors

Thick-Film Power Resistors Handles Large Surges

Preview

A new range of Antisurge axial leaded power resistors, metal glaze resistive element on ceramic substrates, from Token Electronics.

A carbon film resistor replacement, the new RCR series thick-film style resistors offer numerous benefits over the previous style devices, namely reduced costs, excellent thermal compliance, optimised a variety of surge capabilities and better solder joint reliability against temperature cycles.

Token succeeded in commercialising the compact thick-film type leaded resistors with high power and high antisurge characteristics, meeting latest design engineer requirements and making the parts suitable for industrial, measurement and telecommunication applications as well as for automotive circuits, like Electrical Control Units (ECU) and Air-Bag Systems.

The antisurge characteristics of Token's latest metal glaze power film style resistors are superior to standard metal film resistors. The power film types of RCR resistors are available: 0.25W to 10W power rating, max working voltage up to 3000V and max overload voltage 5000V. The resistance range is 1Ω ~ 100MΩ at operating temperature range -20°C~+155°C.

All RCR series devices are RoHS-compliant, and compatible with high temperature soldering processes normally employed for lead free solders. Resistors are also available in various forming styles and different leads for different applications. Contact us with your specific needs.information.

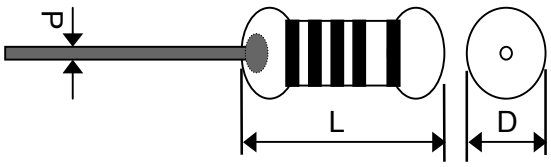
Applications

- Ballasts
- Amplifiers
- Industrial power supplies
- Telecommunications
- Household appliances
- Automotive circuits, Computer, Instrumentation

Features

- High power at small sizes
- Max working voltage up to 3000V
- Lead (Pb)-free and RoHS compliant
- Operating temperature range: -20°C~+155°C
- Metal glaze power film, axial leaded type
- Max overload voltage 5000V, Tolerances: J (±5%)

Specifications & Dimensions (Unit: mm)

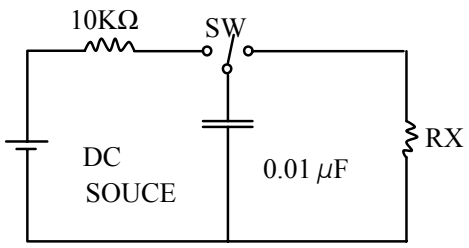


Type	Power Rating	L	D	d ± 0.05	H
RCR25	1/4W	6.5±1	2.3±0.5	0.5 ~ 0.6	26±3
RCR50	1/2W	9.5±1	3.4±0.5		
RCR100	1W	12.0±1	4.0±0.5	0.7 ~ 0.8	
RCR200	2W	16.0±1	6.1±0.5		
RCR300	3W	17.0±1	7.0±0.5		
RCR500	5W	24.0±1	8.0±0.5		
RCR1000	10W	max.50	max.10		

Power Rating

Type	Power Rating	Max Working Voltage	Max Overload Voltage	Dielectric With-standing Voltage	TCP. (ppm/°C)	Resistance Range E24. J(±5%)(Ω)	Operating Temp.range
RCR25	1/4W	500V	700V	500V	±350	1 ~ 33M	-20°C~+155°C
RCR50	1/2W	1000V	1500V	600V	±350	1 ~ 68M	
RCR100	1W	1500V	2500V	800V	±350	1 ~ 100M	
RCR200	2W	2000V	3000V	800V	±350	1 ~ 100M	
RCR300	3W	2500V	4000V	1000V	±350	1 ~ 100M	
RCR500	5W	3000V	5000V	1000V	±350	1 ~ 100M	

Power Rating



Test Circuit

Power	Resistance Range (Ω)	Surge Voltage	Anti-Surge Characteristics	Surge Test Condition
0.25 W	50K < R	3KV	(2.5 Sec. ON + 2.5 Sec. Off) × 10 Cycles ΔR ≤ ±(50%R+0.1Ω)	In accordance with IEC65 Safety specification.
0.5 W	10K ≤ R < 100K	3KV		
	100K ≤ R < 360K	5KV		
	360K ≤ R < 1M	7KV		
	1M ≤ R	10KV		

How to Order

RCR50 ❶ 1/2W ❷ 220KR ❸ J ❹ TB ❺

❶ Part Number: RCR

❷ Rated Power (W)

❸ Resistance Value (Ω)

Code	Resistance Value (Ω)
1R0	1.0Ω
100R	100Ω
220K	220KΩ
22M	22MΩ

❹ Resistance Tolerance (%)

Code	Resistance Tolerance
J	±5%

❺ Package

Code	Resistance Tolerance
P	Bulk
TB	Taping Box

Back to 1st Page - Anti-Surge Resistors (RCR)

Non-Inductance Ceramic Tubular Resistors

Tubular Resistor Offers Higher Energy Power Dissipation & Higher Voltage Withstand

Preview

Power High Voltage Dividers and Resistors Type RMCD extend Token Electronic's advanced proprietary high voltage resistor technology to larger devices than have previously been available on the market.

The RMCD is the non-inductive tubular ceramic resistor. Because of the larger volume of resistive material, these resistors are capable of handling significantly higher pulsed power than their wirewound or metal film counterparts, making them suitable for rapid energy dumping and high energy pulse work.

This RMCD offer higher average power dissipation while retaining the advantages of high surge energy, high voltage withstand, and non-inductance. It is especially useful in RF applications such as transmitters and modulators, where the tube configuration provides more effective convection cooling.

In addition, this RMCD HV resistor and divider provides high peak voltage and power energy combined with extremely high working voltage. These specifications can provide important improvements in performance in many types of advanced electronic systems, including TWT power supplies, radar systems, X-ray systems, analytical equipment and high resolution CRT displays.

Token will also produce devices outside these specifications to meet customer requirements, with comprehensive application engineering and design support available for customers worldwide. Contact us for details with your specific needs.

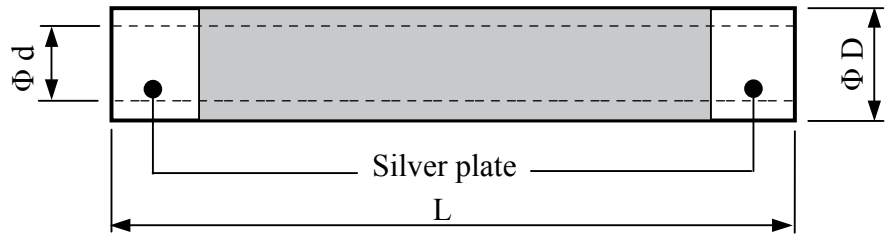
Features

- Heavy load characteristics
- Inductance only 0.4µH max.
- Resistance tolerance K(±10%).
- Typical resistance range 75 ohm ~ 1 Kohm.
- Peak voltage up to 74 KV, Power (W) up to 100W.

Applications

- X-Ray, Lasers, Medical Defibrillators,
- Dynamic Braking, Soft-start/Current-limit,
- Radar, Motor Drives, Broadcast Transmitters,
- Snubber Circuits, Dummy Loads, Energy Research
- RF Amplifiers, Semiconductor Process, Power Conditioning

General Specifications (Unit: mm)



Type	Dimensions (mm)			Resistance (Ω)	Tolerance (%)	Energy (KJ)	Peak Voltage (KV)	Power (W)
	L±3.0	ΦD±2.0	Φd±2.0					
RMCD-100	305	25.4	15.5	75 ~ 1K	±10	30	75	100
RMCD-90	250	25.4	15.5			25	60	90
RMCD-70	200	25.4	15.5			20	45	70
RMCD-50	150	25.4	15.5			15	30	50
RMCD-35	100	25.4	15.5			10	15	35

Electrical Characterisics

Type	Power Rating	Temperature Coefficient	Resistivity	Specific Heat	Inductance	Density	Max. Operating Temperature
RMCD	35 ~ 100W	-500 ~ -1500PPM/°C	5 ~ 80Ω·cm	2J/cm3·°C	0.4μH max	2.25g/cm3	220°C max

How to Order

RMCD ❶ 100W ❷ 100R ❸ K ❹ S ❺ B ❻

❶ Part Number: RMCD

❷ Rated Power (W): 35W, 502W, 70W, 90W, 100W

❸ Resistance Value (Ω)

Code	Resistance Value (Ω)
82R	82Ω
100R	100Ω
470R	470Ω
820R	820Ω
1K	1KΩ

❹ Resistance Tolerance (%)

Code	Resistance Tolerance
K	±10%

❺ Silver plate terminal

❻ Color: B (black)

Code	Color
B	black

Back to 1st Page - High Voltage Resistors (RMCD)

High-Frequency High Load Resistors

A Perfect Choice for High Frequency Circuit Designs (RY31A)

Preview

RY31A speciality MELF resistors combine the advanced pulse load capability and the suitability for RF applications in a single component.

They are the perfect choice in high frequency circuit designs where the parasitic inductance of regular, helical trimmed resistors can not be accepted, but where also pulse energies apply. Typical applications are in the fields of telecommunication equipment and industrial electronics.

RY31A - High Frequency Oxide Film, with the inner and outer surfaces coated with a special glass, features higher thermal resistance and larger electric power capacity for the compact volume. Unlike conventional wire wound type, the volumetric resistance will provide superior stability versus frequency and excellent durability against transient voltage. RY31A is suitable for the application with large current as well as high frequency circuit.

In very low resistance values, between 1.0 and 100 ohm, these are available in rated wattage 10W, 25W, 50W, 100W, and 150W packages.

The High-Frequency RY31A Series is RoHS compliant and lead free. For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

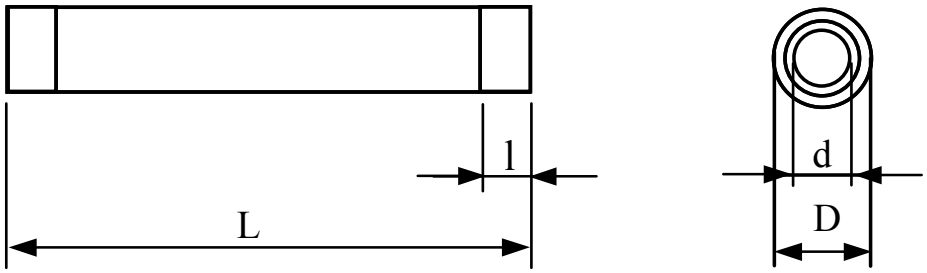
Features

- Special Oxide Film technology
- Speciality product for RF applications
- Low-inductance non-helical trimmed product
- Lead (Pb)-free and RoHS compliant

Applications

- Telecommunication equipment
- Industrial electronics

Electrical Characterisics (Unit: mm)



Rated power (W)	T.C.R (PPM/°C)	Resistance range (Ω)	Tolerance (%)	Pulse test voltage (KV)	Ambient Temp. (70°C Full Power)	D max. (mm)	L max. (mm)	d max. (mm)	l max. (mm)
10	(+20°C ~ +125°C) ±400	50	±5(J) ±10(K)	3.2	-55°C~ +125°C	Φ 15.1	77	Φ 10.7	5±0.5
		75		4					
25		50		5		Φ 25.1	121	Φ17.9	10±1
		70		6.5					
50		50		7.5			162		
		75		8.7					
100		50		11		Φ 35.1	202	Φ23.1	12±1
		75		12.5					
150		50		12.5			302		20+2 20-1
		75		12.5					

Note: Resistance rage is 1~100.

The resistors with the standard resistance values as showed as above. will be supplied with a shorter delivery.

How to Order

RY31A ❶ 10W ❷ 50R ❸ K ❹

❶ Part Number: RY31A

❷ Rated Power (W): 10W, 25W, 50W, 100W, 150W

❸ Resistance Value (Ω)

Code	Resistance Value (Ω)
51R	51Ω
56R	56Ω
62R	62Ω
68R	68Ω
75R	75Ω

❹ Resistance Tolerance (%)

Code	Resistance Tolerance
J	±5%
K	±10%

Back to 1st Page - High Load & High Frequency Resistors (RY31A)

High Resistance Hi-Meg Hermetic Resistors

Hermetic Lead to a High Ohmic Resistance Values

Preview

Token Hi-Meg Hermetically Sealed Resistors are designed for use in electrometer circuits where a high order of performance is required an extended period of time under adverse environmental conditions.

The RH1 metal glaze resistor is disclosed as being encapsulated in a glass tube, the enclosure being hermetically sealed to conductive caps mounted on the resistor ends. The metal glaze film of the resistance path of the resistor is protected from thermal damage during heat sealing by spacing the resistance path from the conductive caps and providing an electrical path there between in the form of an extended termination.

By being vacuum sealed in a glass envelope with its resistance glaze glass characteristic, these high resistance resistors are suitable for ultra-high vacuum applications, micro current circuit measurement, and pulse load equipments.

These RH1 Series features a high degree of stability and accuracy, and operate at this high performance level for long-term stability. The Hi-Meg Hermetic RH1 Series conform to RoHS compliant and lead free.

For customed designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales for more information.

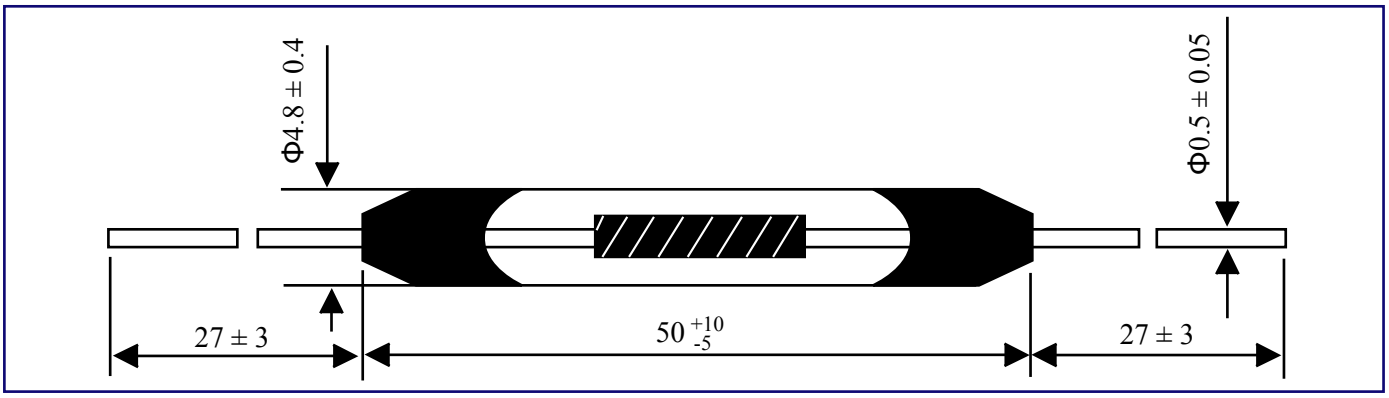
Features

- Metal Glaze resistive elements
- Stability temperature and voltage
- Glass vacuum sealed hermetic resistors
- Resistance Tolerance (J±5%) (K±10%)
- High Resistance Range 1 × 107 ~ 1 × 1012(Ω)

Applications

- Ultra-High Vacuum Applications
- Surge Protection and Voltage Divider
- Mains Protection and Discharge Path Resistor
- Current Pulse Limiters and Pulse Load Equipments
- Micro Current Circuit Measurement, Medical Instrumentation

Dimensions (Unit: mm)



Specifications

Resistance Range	$1 \times 10^7 \sim 1 \times 10^{12}(\Omega)$
Resistance Tolerance	(J±5%) (K±10%)
Operating Temperature	-55°C ~ +125°C
Temperature Coefficient	±500PPM/°C (-55 ~ +125°C)
Damp Heat	$\Delta R \leq \pm$ (5%R+0.1Ω)
Working Voltage	1000V

Cleaning & Handling

Hermetic Hi-Meg Resistors Cleaning & Handling

- It should be handled by the leads, unless gloves are worn.
- If cleaning should become necessary, use isopropyl alcohol and lightly wipe dry with lint free tissues.
- These glass encapsulated (hermetic) resistors with high resistance value is required extraordinary cleanliness.
- Fingerprints on the surface of the resistor will attract contaminants and moisture, which will cause a parallel resistance path, reducing the resistance value of the device.

How to Order

RH1 ❶ 1T ❷ J ❸

❶ Part Number: RH1

❷ Resistance Value (Ω)

Code	Resistance Value (Ω)
1T	1TΩ
10T	10TΩ
100T	100TΩ

❸ Resistance Tolerance (%)

Code	Resistance Tolerance
J	±5%
K	±10%

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