

Version:  
December 22, 2017



**(RI80)**  
**High Voltage**  
**Surge Resistor**

**Token Electronics Industry Co., Ltd.**

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## ▶ Product Introduction

### Serpentine Pattern Design Achieves High Power Voltage Resistors (RI80).

#### 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.

#### 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 suppression.

The tubular RI80 high voltage precision 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. Customized 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.

(RI80) can handle up to 35KV voltage. 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 for customized designs, tighter tolerances, non-standard technical requirements, or custom special applications, please contact our sales, or link to Token official website "[High Voltage Resistors](http://www.token.com.tw)" to get more information.



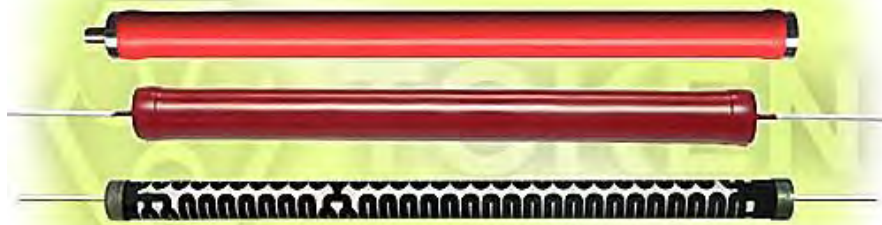
## General Specifications

### General Specifications (RI80) (Unit: mm)

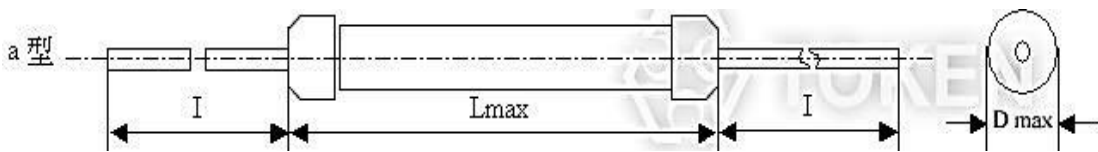
Part Number	Rated Wattage (W)	Style	Dimensions (Unit:mm)				Resistance Range ( $\Omega$ )	Temp Coefficient (10-6/ $^{\circ}$ C)	Max Working Voltage (KV)	Operating Temp ( $^{\circ}$ C)	Resistance tolerance (%)
			Lmax	Dmax	I	D					
RI80-1	1	a	30 $\pm$ 2	9 $\pm$ 1	30 $\pm$ 3	0.7 $\pm$ 0.1	1R ~ 1T	1R $\leq$ R<1G, ( $\pm$ 100ppm)	-55 $^{\circ}$ C ~ +70 $^{\circ}$ C	F( $\pm$ 1%) G( $\pm$ 2%) J( $\pm$ 5%) K( $\pm$ 10%)	
RI80-2	2	a	50 $\pm$ 2	9 $\pm$ 1	30 $\pm$ 3	0.7 $\pm$ 0.1					
RI80-3	3	a	65 $\pm$ 2	9 $\pm$ 1	30 $\pm$ 3	0.7 $\pm$ 0.1					
RI80-5	5	a	100 $\pm$ 2	9 $\pm$ 1	30 $\pm$ 3	1 $\pm$ 0.1					
RI80-10	10	a	144 $\pm$ 2	11 $\pm$ 1	30 $\pm$ 3	1 $\pm$ 0.1					
RI80-10	10	b/c	147 $\pm$ 2	11 $\pm$ 1	6 $\pm$ 1	M4					
RI80-20	20	b/c	116 $\pm$ 2	17 $\pm$ 1	10 $\pm$ 1	M6	1R ~ 1G	1G $\leq$ R<10G, ( $\pm$ 200ppm)			
RI80-25	25	b/c	116 $\pm$ 2	19 $\pm$ 1	10 $\pm$ 1	M6					
RI80-30	30	b/c	116 $\pm$ 2	19 $\pm$ 1	10 $\pm$ 1	M6					
RI80-50	50	b/c	116 $\pm$ 2	21 $\pm$ 1	10 $\pm$ 1	M6					
RI80-80	80	b/c	130 $\pm$ 2	27 $\pm$ 1	10 $\pm$ 1	M6					
RI80-100	100	b/c	160 $\pm$ 2	27 $\pm$ 1	10 $\pm$ 1	M6					
RI80-150	150	b/c	210 $\pm$ 2	27 $\pm$ 1	10 $\pm$ 1	M6	1R ~ 200M	100G $\leq$ R $\leq$ 1T, ( $\pm$ 500ppm)			
RI80-200	200	b/c	260 $\pm$ 2	27 $\pm$ 1	10 $\pm$ 1	M6					
RI80-300	300	b/c	310 $\pm$ 2	33 $\pm$ 1	10 $\pm$ 1	M6					

## Construction & Dimensions

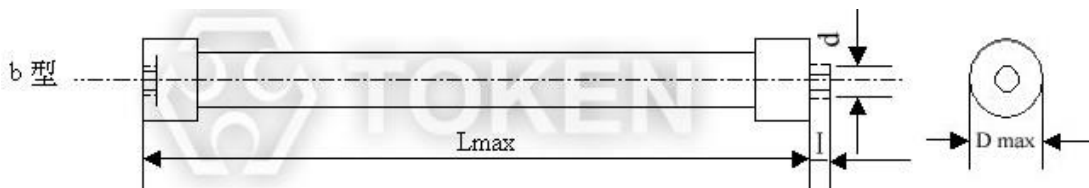
### High Voltage Resistors (RI80)



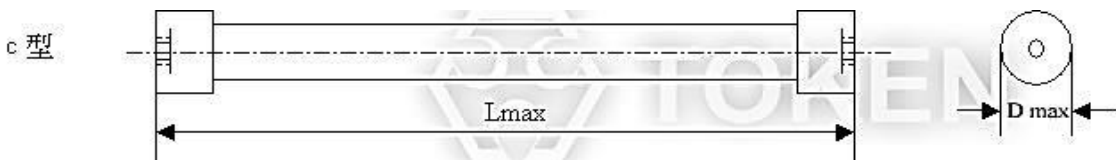
Metal Glaze Serpentine Pattern Impulse Resistors (RI80)



A style Tubular (RI80) - Dimensions (Unit: mm)



B style Tubular (RI80) - Dimensions (Unit: mm)



C style Tubular (RI80) - Dimensions (Unit: mm)

● Remark:

Rated continuous Working Voltage (RCWV) shall be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Value}(\Omega)}$   
 When  $RCWV \geq \text{Max. Working Voltage}$  listed above,  $RCWV = \text{Max. Working Voltage}$ .

## ▶ Advance Technique

### Advance Technique of Non-Inductive & Serpentine Pattern (RI80)

#### 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 neutralization of 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 High Voltage RI80 Precision 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.

## ▶ Order Codes

### High Voltage Resistors (RI80)

RI80	1W	a	51M		G	
Part Number	Rated Power (W)	Style	Resistance Value ( $\Omega$ )		Resistance Tolerance (%)	
RI80	1W	a Style	5M1	5.1M $\Omega$		
	2W	b Style	51M	51M $\Omega$	G	$\pm 2\%$
	3W	c Style	510M	510M $\Omega$	J	$\pm 5\%$
	5W				K	$\pm 10\%$
	10W					

## ► General Information

### Cost Effective Complete Selection of High Voltage Components

Token high voltage series 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, High Resistance 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 up to 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.

### Application Notes

- 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.

### Oil Immersion

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.

