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DIRECT

Electronics Tech.

(RI82)

High Voltage Resistors

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▶ Product Introduction**An Excellent Solution for The High Voltage Trend in Power Impulse Products.****Features :**

- 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 100K Megohms (100 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 :

- 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.

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 Direct'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, Direct 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 handles 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 us, or link to Direct official website "[High Voltage Resistors](http://www.direct-token.com)" to get more information.



► **Chip General Specifications**

Chip Type General Specifications (Unit:mm) (RI82)

Part Number	Rated Wattage (W)	Style	Dimensions (Unit:mm)					Resistance Range (Ω)	Temp Coefficient (10-6/ °C)	Resistance Tolerance	Max Working Voltage (KV)
			L Max	S Max	H Max	I	d Max				
RI82-2	2	a	33	8	0.8			10M-1T	≤200	J(±5%) K(±10%) M(±20%)	15
RI82-2	2	a	25	10	0.8						

A Style Dimensions - High Voltage Chip Resistor (RI82)

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

● **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, $RCWV = \text{Max. Working Voltage}$.

DIP General Specifications

Dip Type General Specification (Unit: mm) (RI82)

Part Number	Rated Wattage (w)	Dimensions (Unit: mm)					Resistance Range (Ω)	Temp Coefficient (10-6/°C)	Max Working Voltage(KV)	Resistance Tolerance
		L±2	S±2	H Max	I	d±0.1				
RI82-0.125	0.125	8	3.5	2.5	20.0Min	0.56	100M-4.7G	1R≤R<1G, (±100PPM) 1G≤R<10G, (±200PPM) 10G≤R<100G, (±300PPM) 100G≤R≤1T, (±500PPM)	4	F(±1%) G(±2%) J(±5%) K(±10%) M(±20%)
RI82-0.125	0.125	10	5	2.5	24.0Min	0.56	100M-10G		4	
RI82-0.25S	0.25S	10	5	2.5	20.0Min	0.56	10M-1T		4	
RI82-0.25	0.25	22	4	2.5	20.0Min	0.56	100M-10G		4	
RI82-0.25	0.25	25	5	2.5	20.0Min	0.56	100M-10G		10	
RI82-0.5	0.5	35	5	2.5	24.0Max	0.56	100M-10G		15	
RI82-0.5	0.5	41	5	2.5	42.0Max	0.56	10M-1T		4	
RI82-1	1	25	10	2.5	30.0Max	0.56	100M-10G		15	
RI82-1	1	30	8	2.5	30.0Max	0.8	100M-10G		15	
RI82-1	1	33	8	2.5	35.0Max	0.56	100M-10G		20	
RI82-1	1	38	10	3	45.0Max	0.80	100M-1T		20	
RI82-2	2	38	10	3	40.0Max	0.80	100M-1T		20	
RI82-2	2	45	10	3	45.0Max	0.80	100M-10G		20	
RI82-3	3	50	10	3	45.0Max	0.80	100M-1T		20	
RI82-3	3	30	15	3	35.0Max	0.80	100M-10G		25	
RI82-3	3	60	10	3	55.0Max	0.80	100M-1T		25	
RI82-5	5	80	20	4	60.0Max	0.80	100M-200M		25	
RI82-10	10	97	23	4	80.0Max	0.80	100M-200M		30	
RI82-20	20	100	35	4	80.0Max	1	100M-200M		30	
RI82-30	30	100	48	4	80.0Max	1	100M-200M		30	

B & C Style Dimensions - High Voltage Dip Type (RI82)

- ① Silver Palladium Pole
- ② Resistent Film
- ③ 96% A1023 Ceramic Base
- ④ b style: Insulate Dielectric Glass;
c style: High Temperature Silicone Resin

● 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.

▶ Advance Technique

Advance Technique of Non-Inductive & Serpentine Pattern (RI82)

Non-Inductive Performance:

- Direct's RI82 Non-Inductive Design which uses a serpentine resistive pattern that offers for zigzagging lines to carry current in opposite directions, thereby neutralizing maximum of flux fields over the entire length of the resistor.
- This efficient non-inductive construction retains performance advantages and heavy load characteristics which is ideal for high frequency applications.



Serpentine Pattern Screen Printing Design:

- Type RI82 High Voltage Impulse Resistors combine Direct'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 lead assemblies are pressed onto the resistor core, finishing the resistor and providing rugged terminal attachment.

▶ Order Codes

Order Codes (RI82)

RI82	0.125W	c	47M		K	
Part Number	Rated Power (W)	Style	Resistance Value (Ω)		Resistance Tolerance (%)	
RI82	0.125W	a Style	4M7	4.7MΩ	F	±1%
	0.25W	b Style	47M	47MΩ	G	±2%
	0.5W	c Style	47M5	47.5MΩ	J	±5%
	1W		470M	470MΩ	K	±10%
					M	±20%

► General Information

Cost Effective Complete Selection of High Voltage Components

Direct 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 Direct 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

Direct 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.

