

Version:
July 27, 2017



(HI83)

**Thick Film Planar
Dividers, High
Voltage Resistors**

Token Electronics Industry Co., Ltd.

Taiwan: No.137, Sec. 1, Zhongxing Rd., Wugu District,
New Taipei City, Taiwan, R.O.C. 24872
Tel: +886 2981 0109 Fax: +886 2988 7487

China: 12F, Zhong Xing Industry Bld., Chuang Ye Road,
Nan Shan District, Shen Zhen City,
Guang Dong, China 518054
Tel: +86 755 26055363; Fax: +86 755 26055365

[Web: www.token.com.tw](http://www.token.com.tw)

<mailto:rfq@token.com.tw>



▶ Product Introduction

Token electronic printing technology to achieve a superior precision, thick film planar high voltage dividers.

Features :

- High precision, Non-Inductance design.
- High voltage, Wide range of resistance.
- Custom design services. RoHS compliant.

Applications :

- Pulse Modulator, Radar Pulse Forming Network.
- X-ray/Imaging Equipment, and EMI lightning suppression.
- Capacitor Arc Suppression Circuit, High Voltage Buffer Circuit.
- Impulse Voltage Generator. Electric Arc Furnace Damping, Energy Research.

Through-hole (HI83) thick film planar divider, high voltage resistor series is a new generation of Token Electronic Technology Co., Ltd. Taking advantage of high-quality ruthenium oxide resistance material to 96% alumina planar ceramic matrix, dividers (HI83) features good thermal conductivity, small size, and high reliability. Custom dividers available with leadwire terminals or with leadless conductive pads.

The planar thick film divider resistor (HI83) provides stable performance over a wide range of resistance values with a voltage rating up to 35KV. The maximum resistance ratio is 1000: 1 (ratio greater than 1000: 1, such as 2000: 1, 4000: 1, and 5000: 1 is available on request) with a minimum resistance ratio of 40: 1.

Low temperature coefficient can be used for high stability circuit applications. Space-saving planar packages provide an alternative to traditional high-voltage resistors. (HI83) is mainly used in precision instruments, drive circuits, power supplies, transformers, high voltage power equipment, and any need to operate in high voltage electrical appliances and other fields.

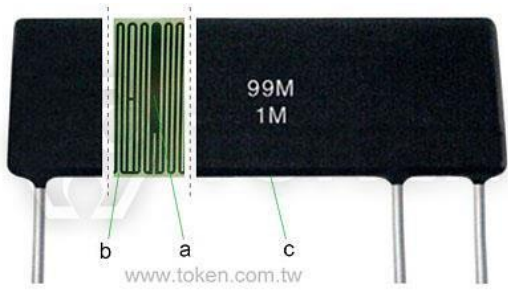
The main structure of the planar thick film voltage divider (HI83): The terminal connecting conductor and the ruthenium oxide resistive material were printed on the surface of the 96% alumina substrate in a non-inductive pattern. Then apply the screen printing protection, after connect the terminals. Phosphor bronze solder is welded to the lead frame terminal and is immersed in SnAgCu to meet the following IEC weldability requirements.

Thick film (HI83) voltage dividers are RoHS compliant and 100% lead free. For conventional parameters, specifications outside the parameters, or technical requirements, please contact Token, or link to Token official website "[High Voltage Resistors](http://www.token.com.tw)" to get more information.



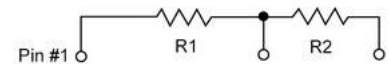
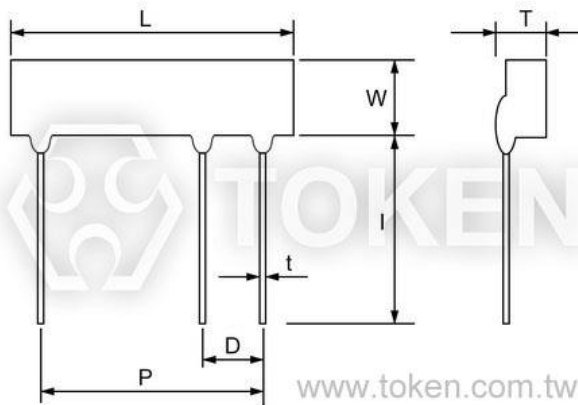
General Specifications

Composition Structure (HI83)

	Membrane Material (a)	Ruthenium Paste
	Base Material (b)	95% Aluminum Oxide, Al ₂ O ₃
	Encapsulating Material (c)	High Temperature Silicone Resin

Dimension Specifications (Unit: mm) (HI83)

Part Number	Power Rating (W)	Max. Working Voltage (KV)	L ±0.5 mm	W ±0.5 mm	D ±0.5 mm	I ±1 mm	T ±0.5 mm	t ±0.05 mm
HI83-04	1/4W	10	25	5	4	20	2	0.6
HI83-02	1/2W	15	35	5	5	20	2	0.6
HI83-10	1W	15	38	8	6	20	2	0.6
HI83-20	2W	20	45	10	6	20	2	0.6
HI83-30	3W	25	60	10	8	40	3.5	1
HI83-50	5W	30	80	20	10	40	3.5	1



Divider Dimension Specifications (Unit: mm) - (HI83)

Electrical Characteristics

Technical Characteristics - (HI83)

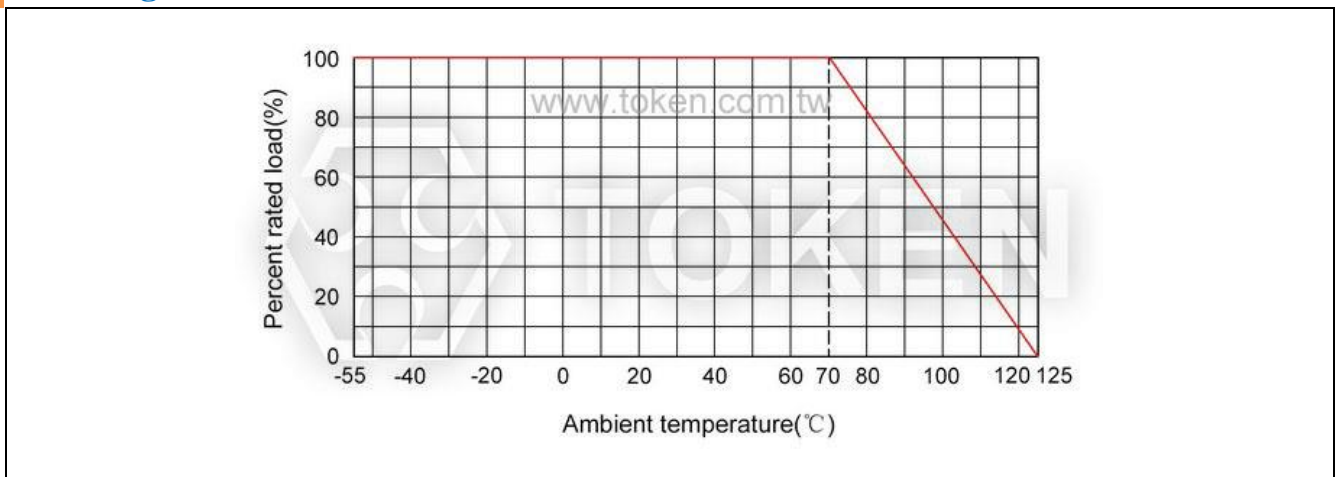
Part Number	HI83-04	HI83-02	HI83-10	HI83-20	HI83-30	HI83-50
Power rating at 70°C (W)	1/4W	1/2W	1W	2W	3W	5W
Limiting element voltage in air dc or ac pk (KV)	6KV	10KV	15KV	15KV	20KV	25KV
Resistance value (Ω)	10K-1G	50K-1G	100K-1G	100K-1G	100K-1G	100K-1G
Resistance tolerance (%)	1, 5					
Ratio tolerance (%)	0.25, 0.5, 1					
TCR (20°C to 70°C) (ppm/°C)	50, 100					
Tracking TCR (20°C to 70°C) (ppm/°C)	25, 50					
Standard values	E24 preferred for (R1 + R2) and R2					
Ambient temperature range (°C)	-55 to +125					
Insulation resistance at 500V (Ω)	>10G					
Dielectric strength of insulation (V)	>1000					

Environmental Characteristics

Environmental characteristics - (HI83)

Test Items	Condition	Spec.
Resistance Temp. Coeff.	-55°C ~ 125°C	±200 ~ ±300 ppm/°C
Overload	1.5 times of rated voltage, 15 min (do not exceed max. voltage)	$\Delta R \leq \pm(1\%R + 0.05\Omega)$
Load Life	96 hours at rated power	$\Delta R \leq \pm(1\%R + 0.1\%\Omega)$

Derating Curve



▶ Serpentine Pattern

Advance Technique of Non-Inductive & Serpentine Pattern (HI83)

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.

▶ Application Notes

High Voltage Divider Application Notes (HI83)

- Due to the high voltage that may occur between the terminals and any adjacent metal parts, the voltage divider should be installed at a sufficient distance from other conductors.
- For some ultra-high voltage applications, it is necessary to immerse the component in oil or SF6 gas or place it in a void-free silicone compound to reduce surface tracking or corona. The printed protection is right for these applications.
- The planar voltage divider consists of high value R1 and low value R2. The voltage division ratio of the divider is specified by Ratio R2: (R1 + R2).

Order Codes

Order Codes (HI83)

Example:

HI83-20 for a voltage ratio of 1:1000, with R1 = 99.9 megohms and R2 = 100 kilohms (total R1 + R2 = 100 megohms) at 50ppm/°C absolute and 25ppm/°C tracking TCR, 1% absolute and 0.5% ratio tolerance.

HI83	20		C2C3		100M		100K		FD	
型號	Size		TCR (ppm/°C)		R1 + R2 (Ω)		R2 (Ω)		Resistance Tolerance (%)	
HI83	04	1/4W	C1C2	100ppm absolute and 50ppm tracking	100M	99MΩ + 1MΩ	1M	1MΩ	JF	5% absolute and 1% ratio
	02	1/2W			100M	99.9MΩ + 100KΩ	100K	100KΩ		
	10	1W			150M	148.5MΩ + 1.5MΩ	1M5	1.5MΩ		
	20	20W	C1C3	100ppm absolute and 25ppm tracking					FD	1% absolute and 0.5% ratio
	30	30W								
	50	5W	C2C3	50ppm absolute and 25ppm tracking					FC	1% absolute and 0.25% ratio

Order Codes (HI80P) High-Power High Voltage Resistor

HI80P	20		a	1G		F	
Part Number	Rated Power (W)		Type	Resistance Value (Ω)		Resistance Tolerance (%)	
HI80P	20	20W	a	10	10 Ω	D	$\pm 0.5\%$
	30	30W	b	1K1	1.1K Ω	F	$\pm 1\%$
	150	150W	c	110K	110K Ω	J	$\pm 5\%$
	300	300W		1M1	1.1M Ω	K	$\pm 10\%$
				110M	110M Ω		
				10G	10G Ω		

Order Codes (HI80T) Ultra-Precision High Voltage Resistor

HI80T	32		500M		B	
Part Number	Rated Power (W)		Resistance Value (Ω)		Resistance Tolerance (%)	
HI80T	20	0.8W	10	10 Ω	B	$\pm 0.1\%$
	32	1.2W	1K1	1.1K Ω	D	$\pm 0.5\%$
	52	2W	110K	110K Ω	F	$\pm 1\%$
	154	6W	1M1	1.1M Ω		
			500M	500M Ω		