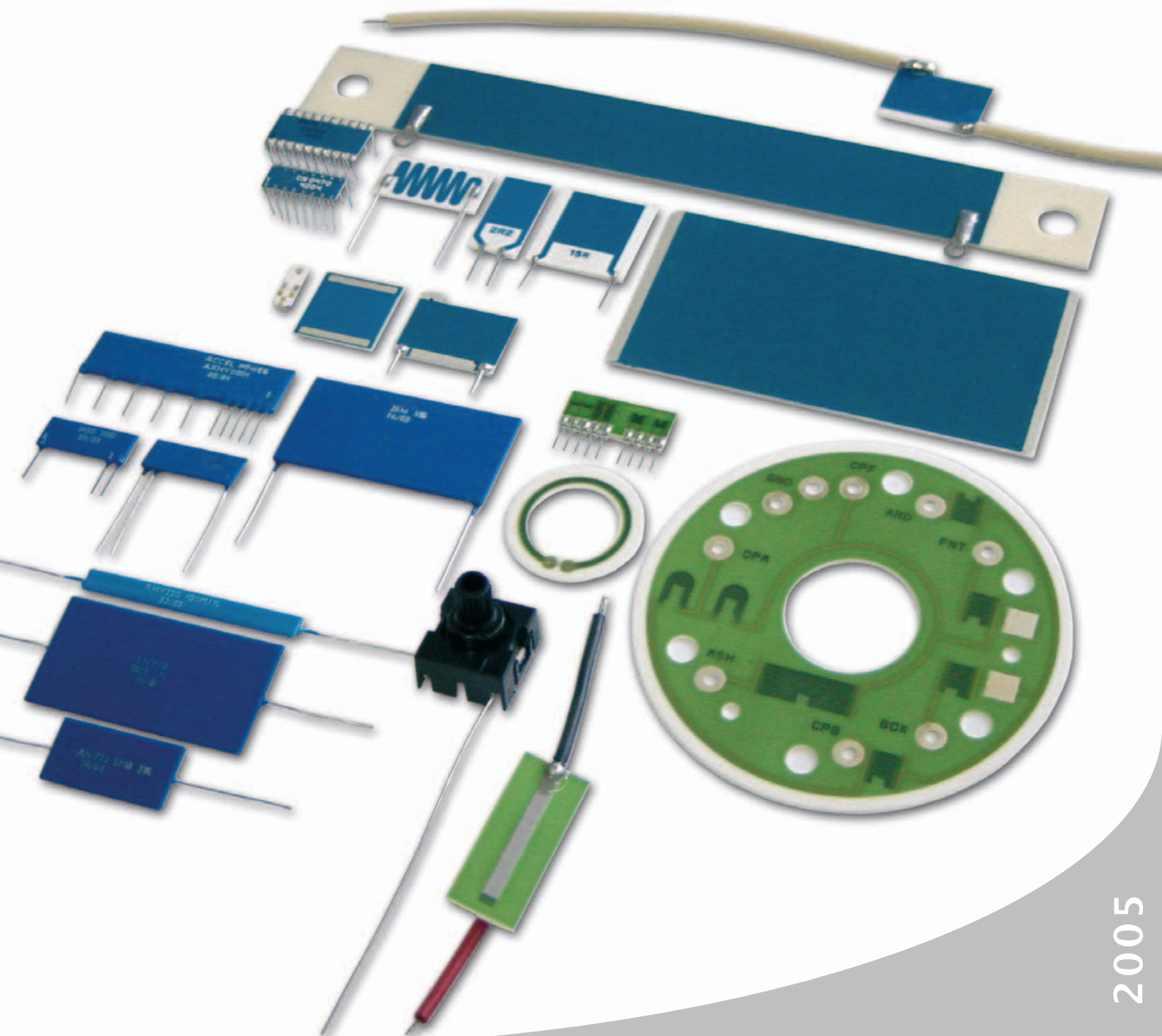


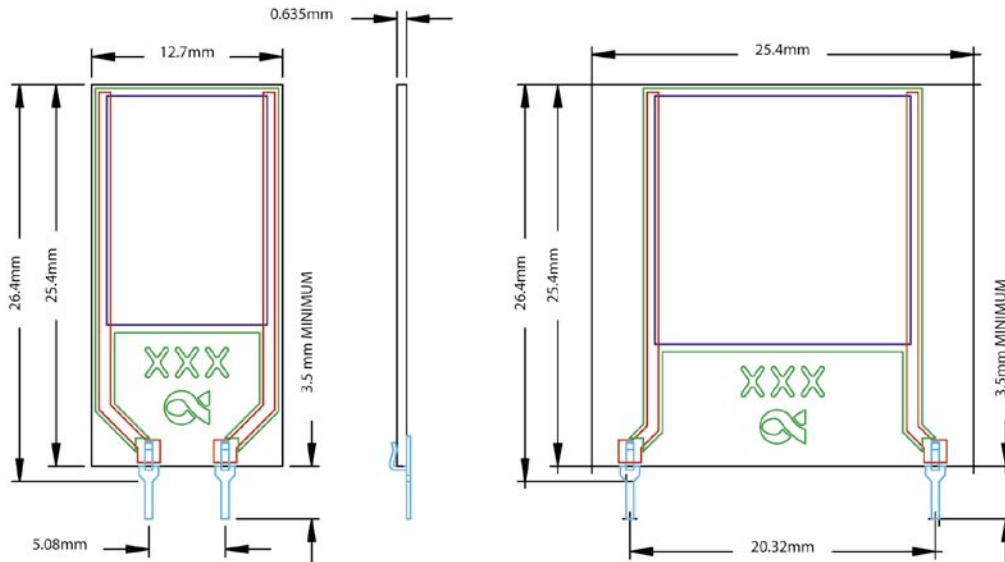
THICKFILM RESISTORS

- ▶ Power Thickfilm Resistors
- ▶ High Voltage Thickfilm Resistors
- ▶ Automotive Thickfilm Resistors
- ▶ Custom Thickfilm Resistors
- ▶ Low Ohmic Power Resistors



STANDARD THICKFILM POWER RESISTORS

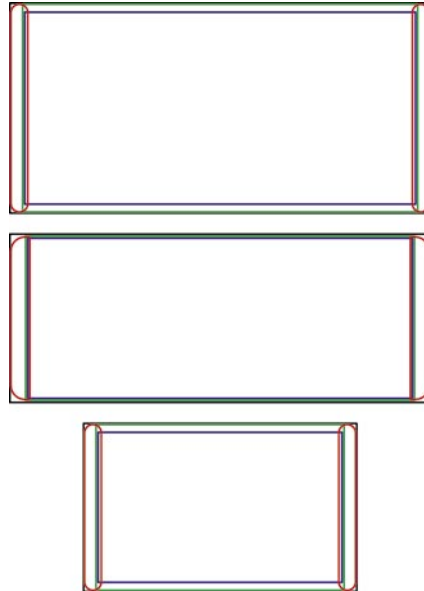
HPC SERIES



Specification		
	HPC5 Series	HPC10 Series
Power Dissipation	5 W maximum @ 70°C	10 W maximum @ 70°C
Nominal Resistance	Customer Specified ±5%	
Resistore Range	1 R ... 200 K	
Derating	Linearly from rated dissipation at 125°C to + 155°C	
Operational Temperature Range	- 55°C ... + 125°C	
Temperature Coefficient	± 100 ppm / °C	
Maximum Voltage	300 VAC / 500 VDC	
Dielectric Strength	5 kV	
Standard Leadframe Configuration (Shown in above Diagram, Custom solutions available upon request)		
Length: Standard Leadframe - 3.5 mm Minimum, 7 mm Maximum, Customer Specification		
Pitch	5.08 mm	20.32 mm
Nominal Dimensions	25.4 mm H x 12.7 mm W	25.4 mm H x 25.4 mm W
Maximum Thickness	2.54 mm	2.54 mm

* Denotes Power Dissipation

PULSE THICKFILM RESISTORS



Specification	
Nominal Resistance	Customer Specification
Resistor Range	1 R ... 2 M ± 20% ... ± 1%
Maximum Voltage	Customer Specification (Currently Manufactured: 80 kV)
Maximum Power Dissipation	Depending on Application
Pulse Energy	Depending on Application
Temperature Coefficient	±300 ppm / °C
Operational Temperature Range	-40 °C ... 125 °C - Depending on Application
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires, Standard Leadframe
Protection	Screen Printed Blue Polymer

Custom pulse resistors for use in various high voltage applications, primarily in medical equipment, power supplies. Above diagrams are examples of some current manufacture configurations at HIPAS. These resistors are normally immersed in temperature controlled transformer oil to ensure maximum electrical performance.

Customers are requested to supply specifications with as much information as possible to allow us to better understand requirements, and information should incorporate nominal resistor value, tolerance, TCR, operational voltage as well as maximum peak voltage, any dimensional constraints and required termination type as well as length of wires / pins.

HIPAS currently have three main resistor designs in current manufacture - HCR 0133, HCR 0392 and HCR 0455 - Which all are used in various high voltage pulse applications to protect expensive high voltage electronics.

Examples of known operational characteristics are shown for each resistor design below ;

HCR 0133 This resistor is 100 mm x 40 mm on a 1 mm thick ceramic substrate and has predominantly been used in high voltage loadbanks up to 140 kV where multiple resistors are connected in series and / or parallel to withstand the power requirements - 25 kW applications are in use, with each resistor subject to 200 W to 300 W.

These characteristics were achieved with the resistor immersed in mineral oil on 70 °C temperature control through use of heat exchangers.

HCR 0392 This resistor is 100 mm x 50 mm on a 1 mm thick ceramic substrate and has predominantly been used in high voltage loadbanks up to 140 kV where multiple resistors are connected in series and / or parallel to withstand the power requirements - 25 kW applications are in use, with each resistor subject to 200 W to 450 W.

These characteristics were achieved with the resistor immersed in mineral oil on 70 °C temperature control through use of heat exchangers, and is the most commonly used of our high power / pulse resistor.

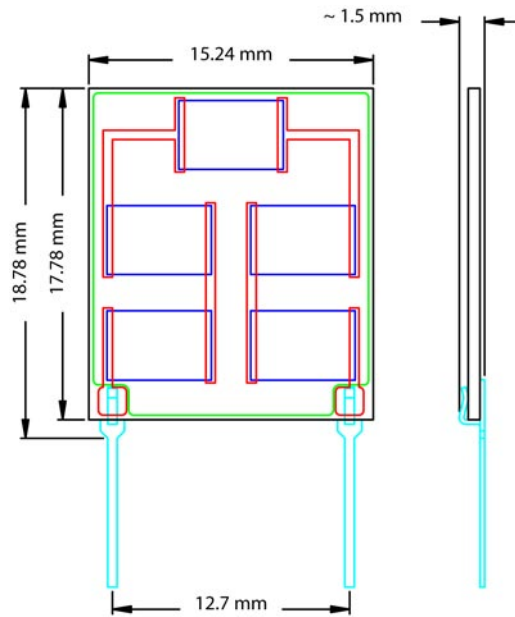
HCR 0455 This resistor is 65 mm x 40 mm on a 1 mm thick ceramic substrate and has been used in applications with energy pulse on the resistor of 1.2 Joules @ 60 kV, with I_{MAX} 60 A and P_{MAX} 3600 kW and pulse t 0.25 μs.

These characteristics were achieved with the resistor immersed in High Voltage Silicone.

Maximum ceramic substrate area: 177 mm x 127 mm

HIGH VOLTAGE THICKFILM RESISTORS

HHVTR 05 SERIES

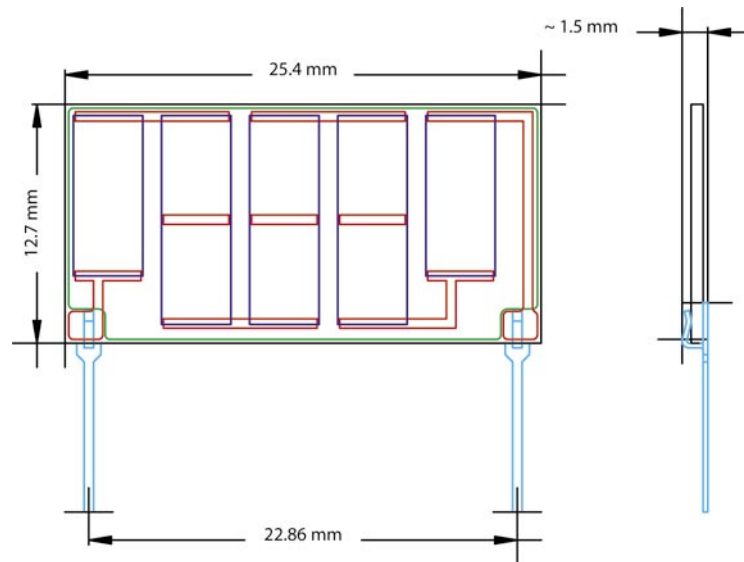


Specification

Nominal Resistance	1 K ... 800 M $\pm 20\% \dots \pm 1\%$ @ 100 V
Maximum Voltage	5 kV
Maximum Power Dissipation	5 W @ 70 °C
Temperature Coefficient	± 25 ppm / °C
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr:	< 0.5% 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... + 125 °C
Termination	Standard Leadframe ONLY
Protection	Screen Printed Grey Polymer

HIGH VOLTAGE THICKFILM RESISTORS

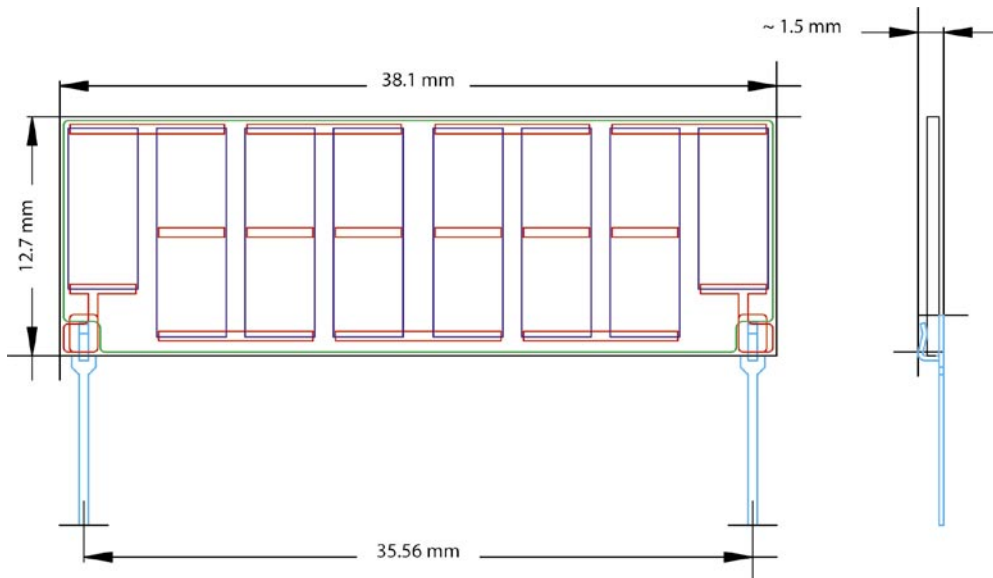
HHVTR 10 SERIES



Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	10 kV
Maximum Power Dissipation	5 W @ 70 °C
Temperature Coefficient	±25 ppm / °C
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr:	< 0.5% 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... + 125 °C
Termination	Standard Leadframe ONLY
Protection	Screen Printed Grey Polymer

HIGH VOLTAGE THICKFILM RESISTORS

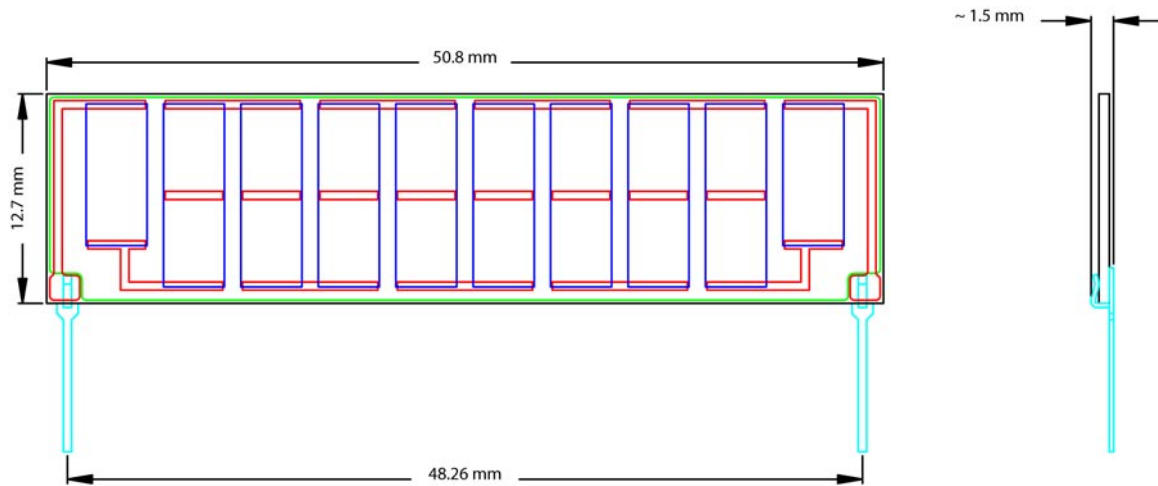
HHVTR 15 SERIES



Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	15 kV
Maximum Power Dissipation	7.5 W @ 70 °C
Temperature Coefficient	±25 ppm / °C
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr:	< 0.5% 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... + 125 °C
Termination	Standard Leadframe ONLY
Protection	Screen Printed Grey Polymer

HIGH VOLTAGE THICKFILM RESISTORS

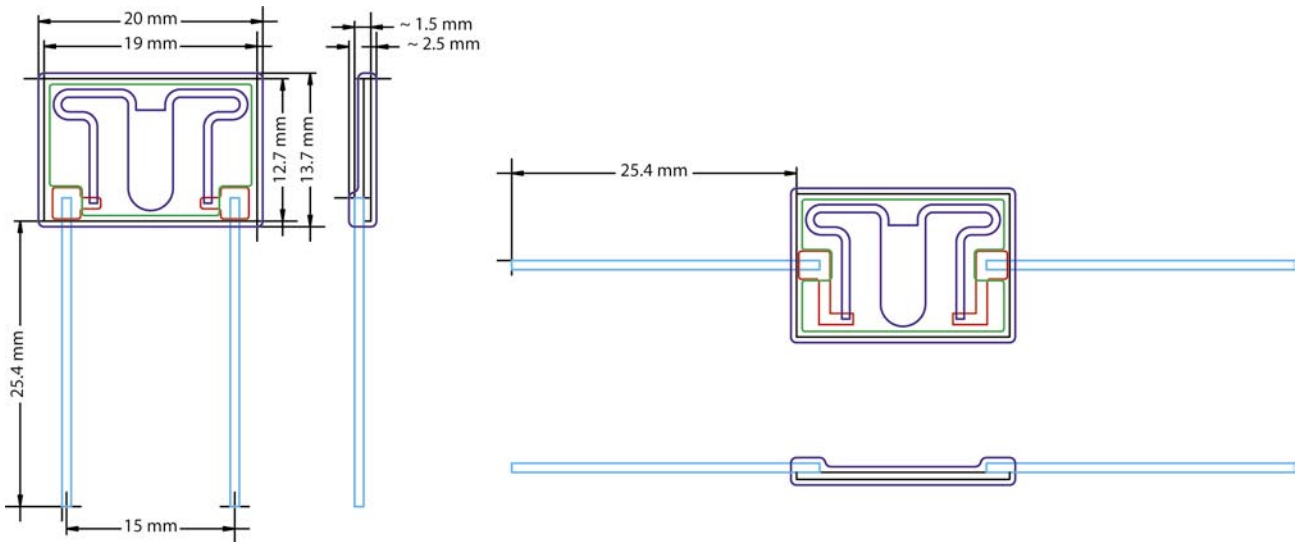
HHVTR 20 SERIES



Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	20 kV
Maximum Power Dissipation	10 W @ 70 °C
Temperature Coefficient	±25 ppm / °C
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr:	< 0.5% 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... + 125 °C
Termination	Standard Leadframe ONLY
Protection	Screen Printed Grey Polymer

HIGH VOLTAGE THICKFILM RESISTORS

HHVR 15 SERIES

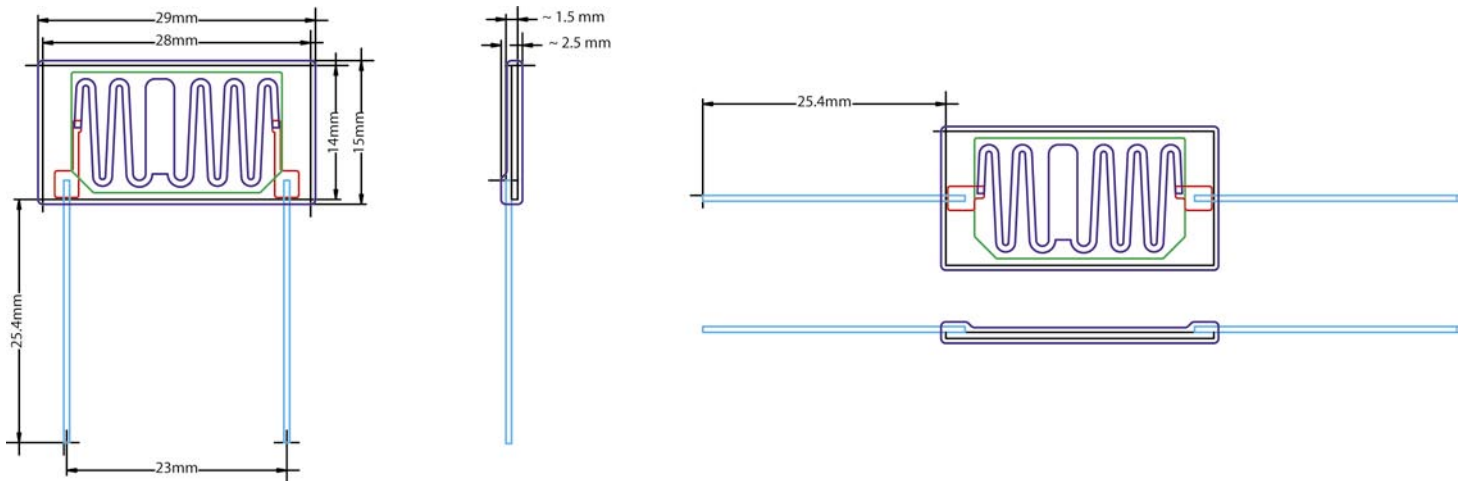


Specification	
Nominal Resistance	1 K ... 700 M ± 20% ... ± 1% @ 100 V
Maximum Voltage	5 kV Free Air, 10 kV Epoxy
Maximum Power Dissipation	2.3 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 15	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

HIGH VOLTAGE THICKFILM RESISTORS

HHVR 25 SERIES



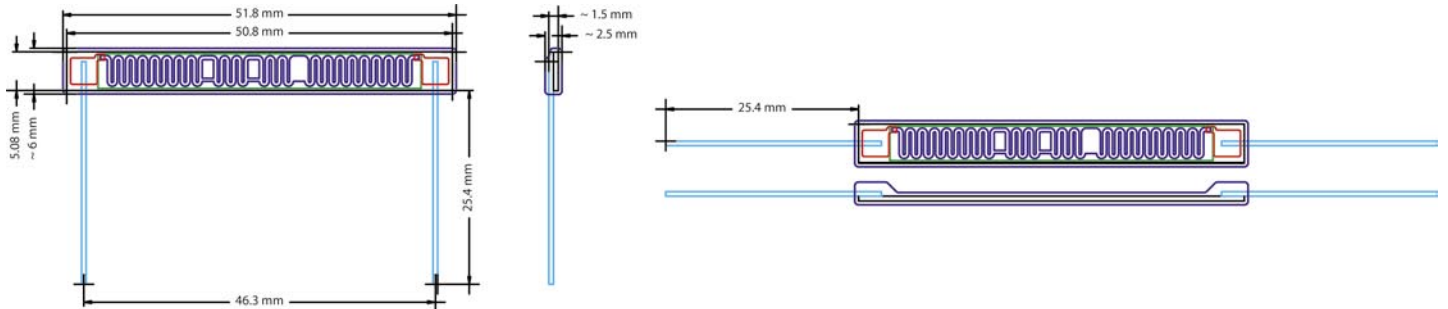
Specification

Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	9 kV Free Air, 15 kV Epoxy
Maximum Power Dissipation	5.8 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 25	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

HIGH VOLTAGE THICKFILM RESISTORS

HHVR 30 SERIES

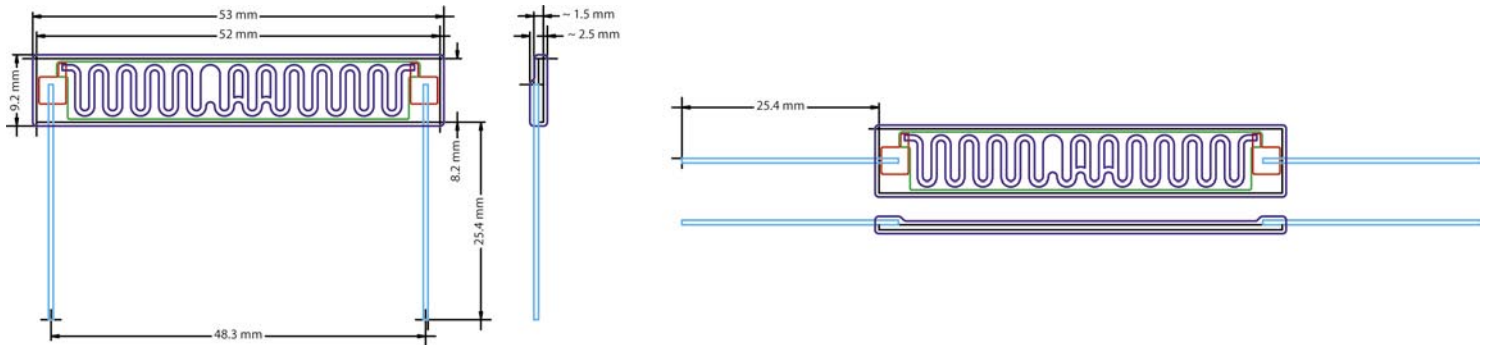


Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	19 kV Free Air, 30 kV Epoxy
Maximum Power Dissipation	12.5 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 30	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

HIGH VOLTAGE THICKFILM RESISTORS

HHVR 35 SERIES

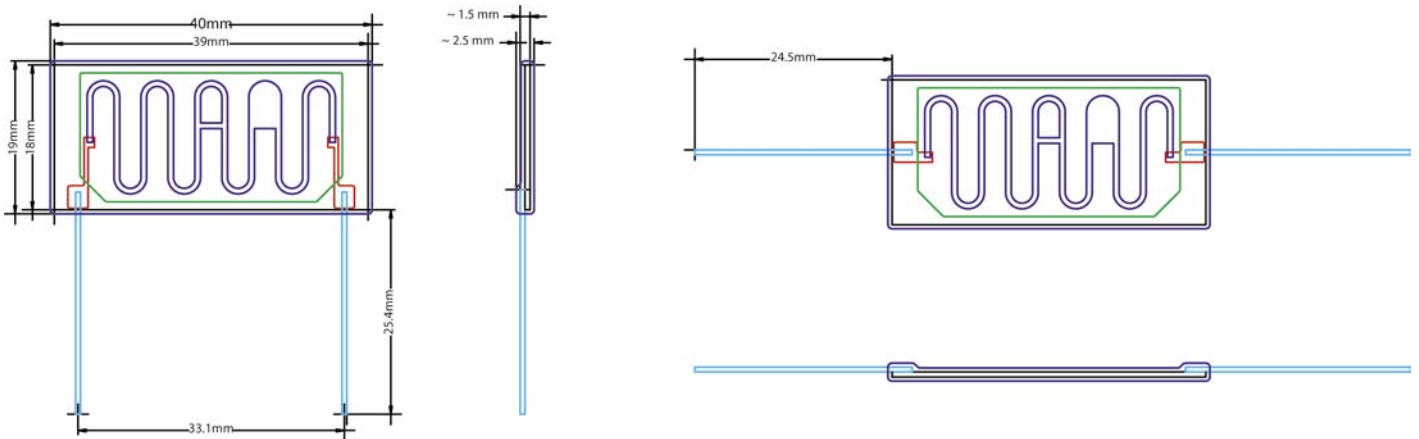


Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	19 kV Free Air, 20 kV Epoxy
Maximum Power Dissipation	8.0 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 35	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

HIGH VOLTAGE THICKFILM RESISTORS

HHVR 45 SERIES

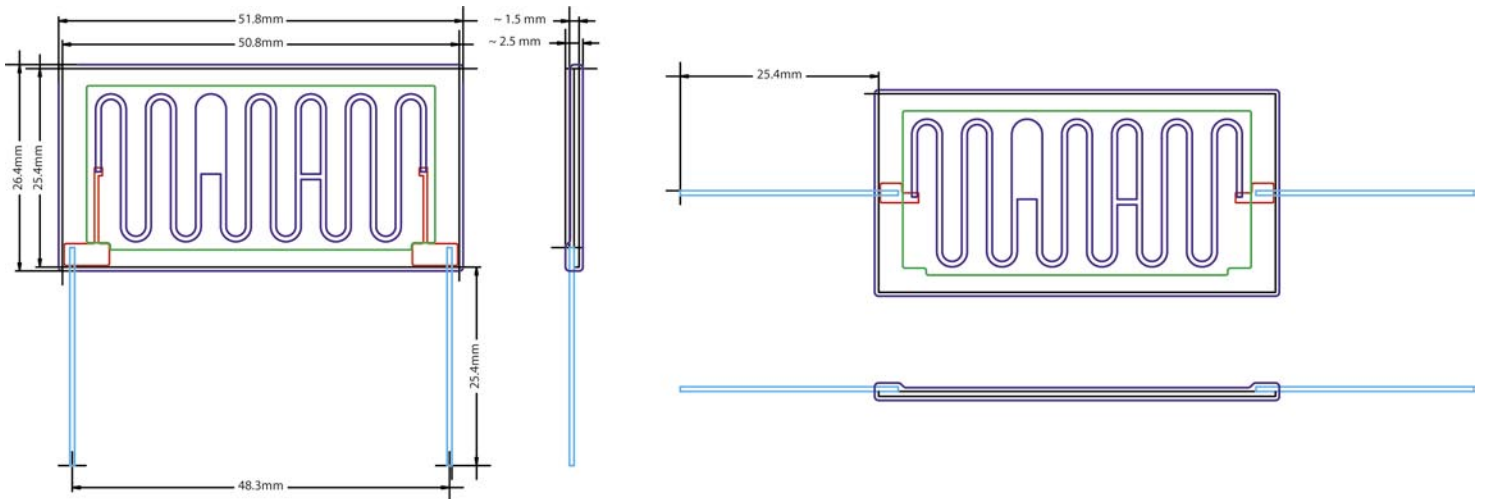


Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	13 kV Free Air, 15 kV Epoxy
Maximum Power Dissipation	6.6 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 45	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

HIGH VOLTAGE THICKFILM RESISTORS

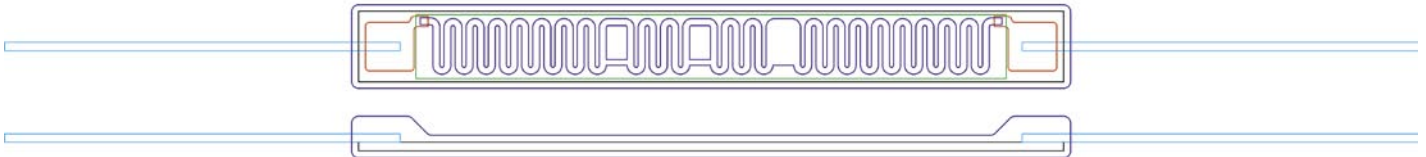
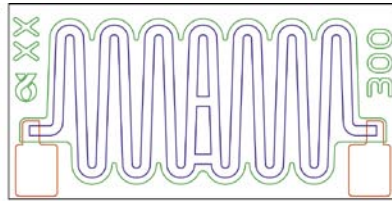
HHVR 50 SERIES



Specification	
Nominal Resistance	1 K ... 1 G ± 20% ... ± 1% @ 100 V
Maximum Voltage	19 kV Free Air, 30 kV Epoxy
Maximum Power Dissipation	12.5 W @ 70 °C
Temperature Coefficient	± 300 ppm / °C (Standard) ± 100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Voltage Coefficient	< 2 ppm / V (Typical)
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Load stability Dr	< 0.5%, 1000 hrs @ Rated Power Dissipation
Operational Temperature Range	-55 °C ... +125 °C
Termination	Customer Specification - Conductor Pads, Axial Wires, Radial Wires
Protection	Screen Printed Blue Polymer or Conformal Epoxy

	Configuration	Resistance	Tolerance	TCR Range
HHVR 50	AE - Axial, Epoxy	xxx	F ± 1%	O - Optional S - Standard
	AS - Axial, Silicone	Nominal Resistance	G ± 2%	
	RE - Radial, Epoxy	Ohms	J ± 5%	
	RS - Radial, Silicone	kOhms	K ± 10%	
	S - No Wires, Silicone	MOhms	M ± 20%	

BLEEDER RESISTORS



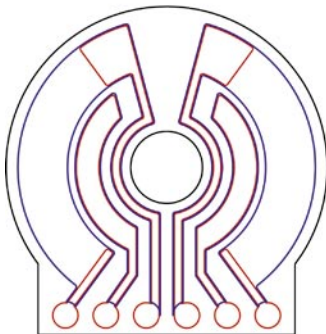
Specification	
Power Dissipation	Customer Specification
Nominal Resistance	1 R ... 1 G ±20% ... ±1%
Derating	Linearly from rated dissipation at 70 °C to zero at 125 °C
Operational Temperature Range	- 25 °C ... + 125 °C
Temperature Coefficient	±300 ppm / °C (Standard) ±100 ppm / °C (Optional) ± 50 ppm / °C (Optional)
Maximum Voltage	up to 100 kV
Load Stability Δr	<1% 1.000 hrs @ Rated Power Dissipation
Termination	Conductor Pads, Axial Wires, Radial Wires, Standard Leadframe or according to Customer Specification
Protection	Screen Printed Blue Polymer or Conformal Epoxy

Bleeder resistors to customer specifications for use in high voltage applications in TVs, monitors, medical equipment and power supplies. Above diagrams are examples of some common manufacture configurations.

Customers are requested to supply specifications with as much information as possible to allow us to better understand requirements, and information should incorporate nominal resistor value, tolerance, TCR, operational voltage as well as maximum peak voltage, any dimensional constraints and required termination type as well as length of wire pins.

Products may, upon request, be manufactured with customer reference numbers, batch codes and / or nominal resistor value where feasible to add such information.

AUTOMOTIVE THICKFILM RESISTORS

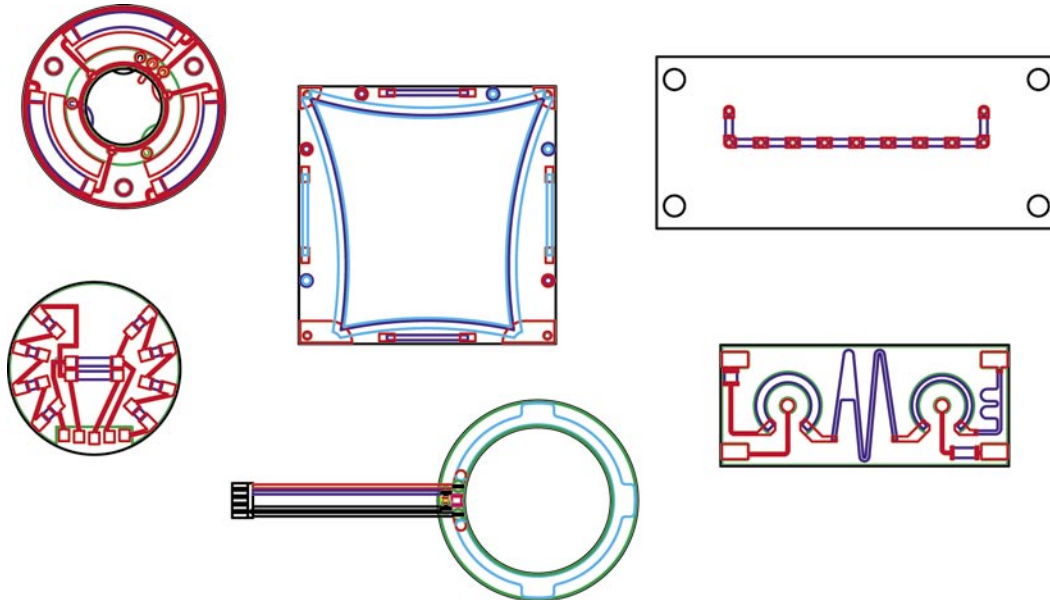


Specification	
Nominal Resistance	Customer Specification
Resistor Range	1 R ... 1 G ± 20% ... ± 1%
Maximum Voltage	500 VDC
Maximum Power Dissipation	500 W
Temperature Coefficient	±25 ppm / °C ±50 ppm / °C ±100 ppm / °C ±300 ppm / °C
Operational Temperature Range	-55 °C ... +150 °C - Custom Operational Range May Be Available Upon Request
Termination	Conductor Pads, Wires, Standard Leadframe or according to Customer Specification
Protection	Screen Printed Blue Polymer or OverGlaze

Automotive resistors to customer specifications for use in various automotive applications - Throttle Potentiometers, Temperature Sensors, Pressure Sensors, Fuel Senders. Above diagrams are examples of some manufacture configurations that have previously been manufactured.

Customers are requested to supply specifications with as much information as possible to allow us to better understand requirements, and information should incorporate nominal resistor value, tolerance, TCR, operational voltage as well as maximum peak voltage, any dimensional constraints and required termination type as well as length of wires / pins.

CUSTOM THICKFILM RESISTORS



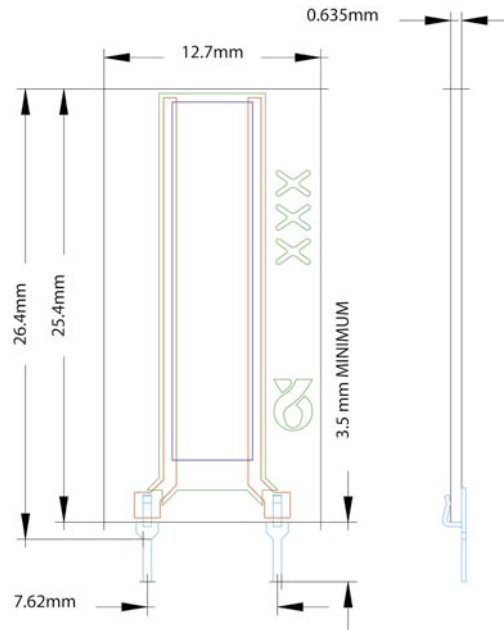
Specification	
Nominal Resistance	Customer Specification
Resistor Range	1 R ... 1 G ± 20% ... ± 1%
Maximum Voltage	100 kV
Maximum Power Dissipation	500 W
Temperature Coefficient	±25 ppm / °C ±50 ppm / °C ±100 ppm / °C ± 300ppm / °C
Operational Temperature Range	-40 °C ... +150 °C - Custom Operational Range May Be Available Upon Request
Termination	Conductor Pads, Axial Wires, Radial Wires, Standard Leadframe or according to Customer Specification
Protection	Screen Printed Blue Polymer or OverGlaze

Custom resistor shapes to customer specifications for use in various low to high voltage applications in TVs, monitors, medical equipment, power supplies, pressure sensors and scanners. Above diagrams are examples of some manufacture configurations that have previously been manufactured.

Customers are requested to supply specifications with as much information as possible to allow us to better understand requirements, and information should incorporate nominal resistor value, tolerance, TCR, operational voltage as well as maximum peak voltage, any dimensional constraints and required termination type as well as length of wires / pins.

STANDARD LOW OHMIC POWER RESISTORS

HLO SERIES



Specification	
Power Dissipation	5 W maximum @ 70 °C
Nominal Resistance	up to 0 R 25 ±5%
Derating	Linearly from rated dissipation at 125 °C to zero at 155 °C
Operational Temperature Range	- 55 °C ... + 125 °C
Temperature Coefficient	± 100 ppm / °C
Maximum Voltage	300 VAC / 500 VDC
Dielectric Strength	5 kV
Standard Leadframe Configuration (Shown in above Diagram, Custom solutions available upon request)	
Length:	Standard Leadframe - 3.5 mm Minimum, 7 mm Maximum, Customer Specification
Pitch	7.62 mm
Nominal Dimensions	25.4 mm H x 12.7 mm W
Maximum Thickness	2.54 mm

HIPAS GmbH

Straßfeld 1
Commercial Area Großnöbich
85777 Fahrenzhausen

Tel +49 8133 - 99 69 06
Fax +49 8133 - 99 69 077
info@hipas.net
www.hipas.net