Power Resistors

High Voltage - High Power - Non Inductive

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High Voltage Resistors

click here

Power Resistors

Ultra High Power Resistors

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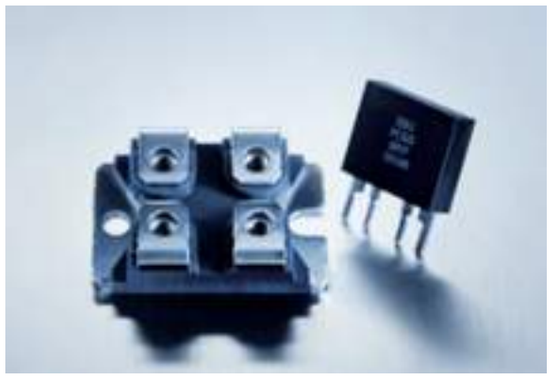

- Series **PCS** Shunt Resistors - 4 Terminal Connection >0.5 Milliohm - 3 Watt, 60 Watt & 100 Watt - Page 39

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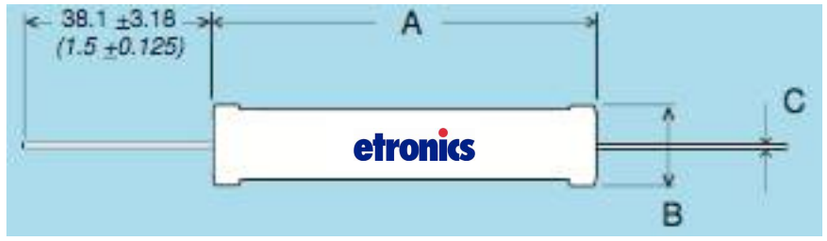
High Voltage Resistors

The models in the **SGT** series meet the most stringent requirements regarding temperature coefficient in connection with high stability performance at high operating voltages. The low temperature coefficient minimizes ohmic value change generated through the warm-up due to power dissipation. The **SGT** series is produced using **Etronics**' patented Non-Inductive Design. Typical applications are medical systems like X-ray, nuclear spin tomography as well as power supplies or instruments.

• Series SGT Low TCR - USPatent-Nr. 4,859,981

TC of 25ppm/°C combined with Precision Tolerances (0.1%-1%), Ohmic Range (100KΩ-1GΩ)

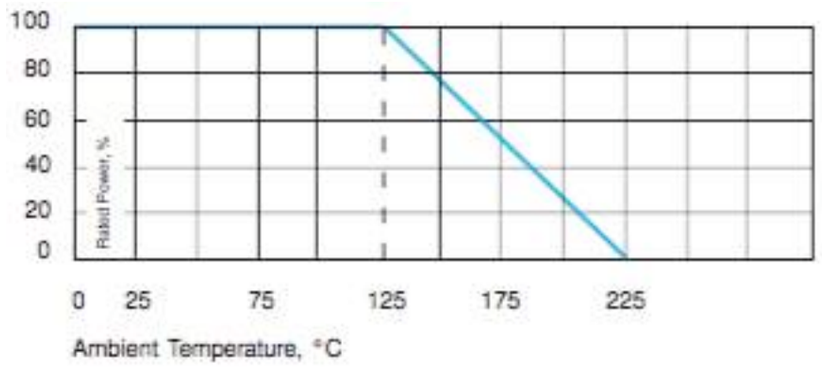


General Characteristics:

- Resistance Range from 100KΩ to 1GΩ
- Resistance Tolerance from ±0.1% to ±1.0%
- Temperature Coefficient: 25ppm/°C from -15°C to +85°C.
- Load Life Stability of 0.25% per 1,000 hours at +125°C.
- Patented NON-INDUCTIVE DESIGN
- Max. Cont. Operating Temp. of +225°C.
- Voltages up to 60% higher than the table values may be obtained in special order by adding "S" to the model designation.

Specifications:

- **Resistance Tolerance:** Standard: ±1% to ±10% (tolerances down to ±0.1% on special request), contact us.
- **Temperature Coefficient:** ±25ppm/°C referenced to 25°C, ΔR taken at -15°C and +85°C.
- **Voltage Coefficient:** max. -0.2ppm/V as to MIL-Std-202, Method 309, 10 KV DC max.
- **Dielectric Strength:** 1,000VDC
- **Insulation Resistance:** 10 GΩ min.
- **Overload/Over-voltage:** 5 times rated power with applied voltage not to exceed 1.5 times max. continuous operatingvoltage for 5 seconds. ΔR 0.20% max.
- **Load Life:** 1,000 hours at rated voltage not exceeding rated power, typical ΔR (2s)=0.1%, max. ΔR=0.25%
- **Moisture Resistance:** MIL–Std–202, Method 106, ΔR 0.4% max.
- **Thermal Shock:** MIL–Std–202, Method 107, Cond. B, ΔR 0.20% max.
- **Encapsulation:** Silicone Conformal
- **Lead Material:** O.F.H.C. Copper, tin plated



Model No.	Wattage	Max. Cont. Oper. Volt.	MIN Ω	MIN "S" Ω	Max. (1% Tol.) Ω	Dimensions in millimeters / Dimensions in inches A	B	C
SGT 26	1.0	4,000	100K	40M	250M	26.90 / *1.059*	8.20 / *0.323*	1.00 / *0.040*
SGT 32	1.25	5,000	120K	50M	300M	33.00 / *1.300*	8.20 / *0.323*	1.00 / *0.040*
SGT 39	1.5	6,000	150K	60M	400M	39.50 / *1.555*	8.20 / *0.323*	1.00 / *0.040*
SGT 52	2.0	10,000	200K	80M	500M	52.10 / *2.051*	8.20 / *0.323*	1.00 / *0.040*
SGT 78	3.0	15,000	300K	120M	700M	77.70 / *3.059*	8.20 / *0.323*	1.00 / *0.040*
SGT 103	4.0	20,000	400K	160M	1G	102.90 / *4.051*	8.20 / *0.323*	1.00 / *0.040*
SGT 124	5.0	25,000	500K	190M	1G	123.70 / *4.870*	8.20 / *0.323*	1.00 / *0.040*
SGT 154	6.0	30,000	600K	250M	1G	153.70 / *6.051*	8.20 / *0.323*	1.00 / *0.040*

High Voltage Resistors

• Series SGP/OGP - USPatent-Nr. 4,859,981

TC of 80ppm/°C combined with Precision Tolerances (0.1%-10%) and wide Ohmic Range (100Ω-10GΩ)

The **SGP** series meets the requirements of high resistance values in combination with very high voltage. It is produced using **Etronics'** patented Non-Inductive Design complete with in-process digital trimming to exact value. This series employs our special **METOXFILM**, which demonstrates excellent stability while covering resistance ranges from 100 Ω to 10 GΩ – all at high operating temperatures of up to 225°C. Power ratings and voltage ratings are for continuous operation and have all been pretested for steady- state performance as well as momentary overload conditions.

Voltages up to 60% higher than the table values may be obtained in special order by adding "S" to the model designation. **Etronics'** Special patented (USPatent-Nr. 4,859,981) non-inductive construction offers an outstanding advantage over other techniques. The design incorporates a unique method of **DIGITAL TRIMMING** to value. Other less desirable methods include an "analog" method of abrading and removing the resistive material, frequently resulting in a weak section. **Etronics** patented process avoids this potential problem.

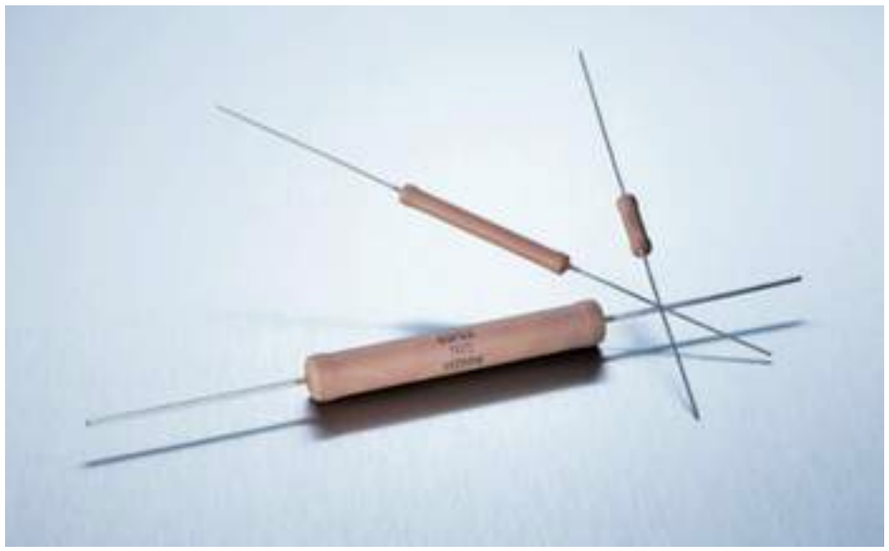
Model no.	Watt-age 25°C	Watt-age 75°C	Watt-age 125°C	Max. cont. oper. V (kV)	Max. KV "S" **	Resistance F (=1%) Min.	Resistance F (=1%) Max.	s-Resistance max. (2% Tol.)	Dimensions in millimeters / Dimensions in inches A ±0.50 ±0.02	B ±0.50 ±0.02	C ±0.50 ±0.002
						ohmic values					
OGP 13	1.0	1.0	0.60	1.5	2.4	100	50M	500M	13.30 *0.524*	4.20 *0.165*	0.60 *0.024*
OGP 20	1.5	1.5	1.00	2.0	3.2	200	100M	1G	19.70 *0.776*	4.20 *0.165*	0.60 *0.024*
OGP 26	1.9	1.9	1.25	4.0	6.4	300	150M	2G	26.20 *1.031*	4.20 *0.165*	0.60 *0.024*
OGP 30	2.5	2.5	1.50	5.0	8.0	500	250M	3G	32.30 *1.272*	4.20 *0.165*	0.60 *0.024*
OGP 39	3.0	3.0	2.00	6.0	9.6	700	300M	5G	39.40 *1.551*	4.20 *0.165*	0.60 *0.024*
OGP 52	3.3	3.3	2.50	10.0	12.0	400	2G	-	49.50 *1.949*	4.20 *0.165*	0.60 *0.024*
SGP 20	2.5	2.5	1.50	3.0	4.8	200	250M	1G	20.20 *0.795*	8.20 *0.323*	1.00 *0.040*
SGP 26	3.7	3.7	2.50	4.0	6.4	250	300M	1G	26.90 *1.059*	8.20 *0.323*	1.00 *0.040*
SGP 32	4.5	4.5	3.00	5.0	8.0	300	400M	1.5G	33.00 *1.3*	8.20 *0.323*	1.00 *0.040*
SGP 39	5.2	5.2	3.50	8.0	12.8	400	500M	1.5G	39.50 *1.555*	8.20 *0.323*	1.00 *0.040*
SGP 52	7.5	7.5	5.00	10.0	16.0	500	750M	2.5G	52.10 *2.051*	8.20 *0.323*	1.00 *0.040*
SGP 78	11	11	7.50	15.0	24.0	900	1G	4G	77.70 *3.059*	8.20 *0.323*	1.00 *0.040*
SGP 103	12	12	8.00	20.0	32.0	1K2	1G	2G	102.90 *4.051*	8.20 *0.323*	1.00 *0.040*
SGP 124	15	15	10.00	25.0	40.0	1K5	1G	8G	123.70 *4.870*	8.20 *0.323*	1.00 *0.040*
SGP 148	30	30	20.00	45.0	-	10K	3G	10G	148.00 *5.83*	16.00 *0.63*	- -
SGP 154	20	20	15.00	30.0	48.0	2K0	2G	10G	153.70 *6.051*	8.20 *0.323*	1.00 *0.040*

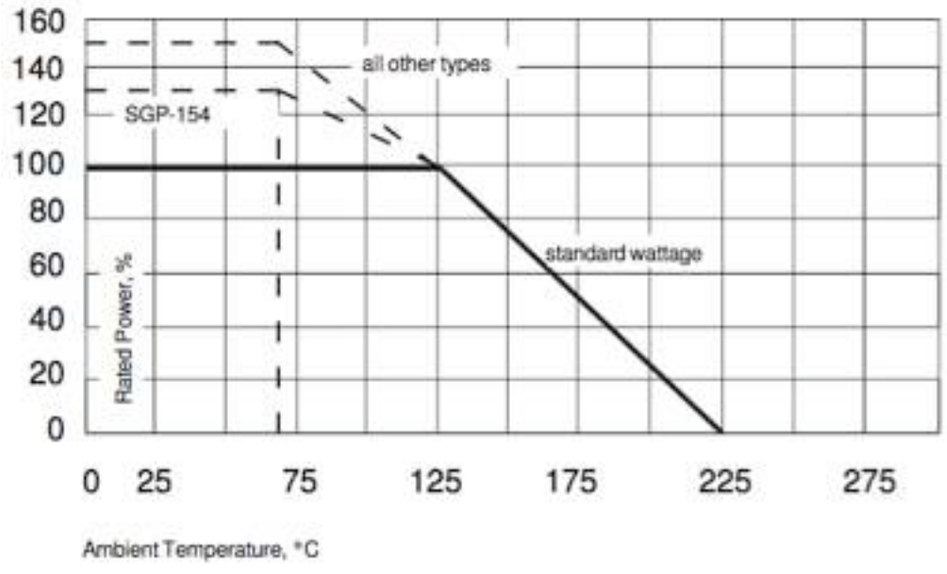
• Series SGT/OGP - USPatent-Nr. 4,859,981

TC of 80ppm/°C combined with Precision Tolerances (0.1%-10%) and wide Ohmic Range (100Ω-10GΩ)

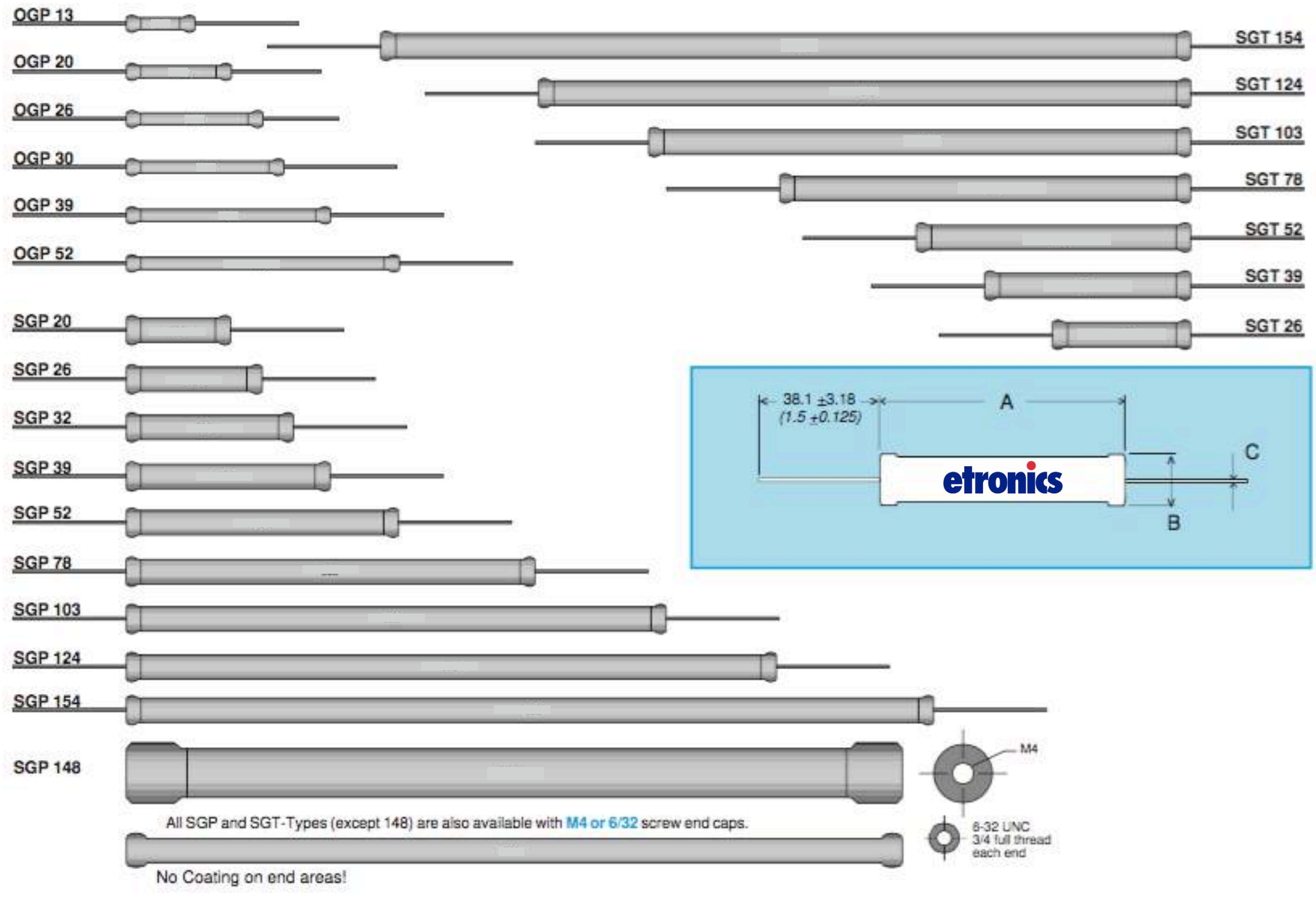
Specifications:

- **Resistance Tolerance:** Standard: ±1% to ±10% (±2% to ±10% above 1Gohms) (tolerances down to ±0,1% on special request)
- **Temperature Coefficient:** Standard ±80ppm/°C from -15°C to +105°C, referenced to +25°C
- **Voltage Coefficient:** see diagram
- **Dielectric Strength:** 1,000VDC
- **Insulation Resistance:** 10GΩ, min.
- **Overload/Over-voltage:** 5 times rated power125°C with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. Overload/Over-voltage, ΔR 0.5% max.
- **Load Life:** 1,000 hours at 125°C and rated power, components with 1% Tol. ΔR 0.5% max., extended range (“S“) ΔR=0.8% max.
- **Moisture Resistance:** MIL-Std-202, Method 106, ΔR 0.4% max.
- **Thermal Shock:** MIL-Std-202, Method 107, Cond.C, ΔR 0.25% max.
- **Encapsulation:** Silicone Conformal
- **Lead Material:** O.F.H.C. Copper tin plated.

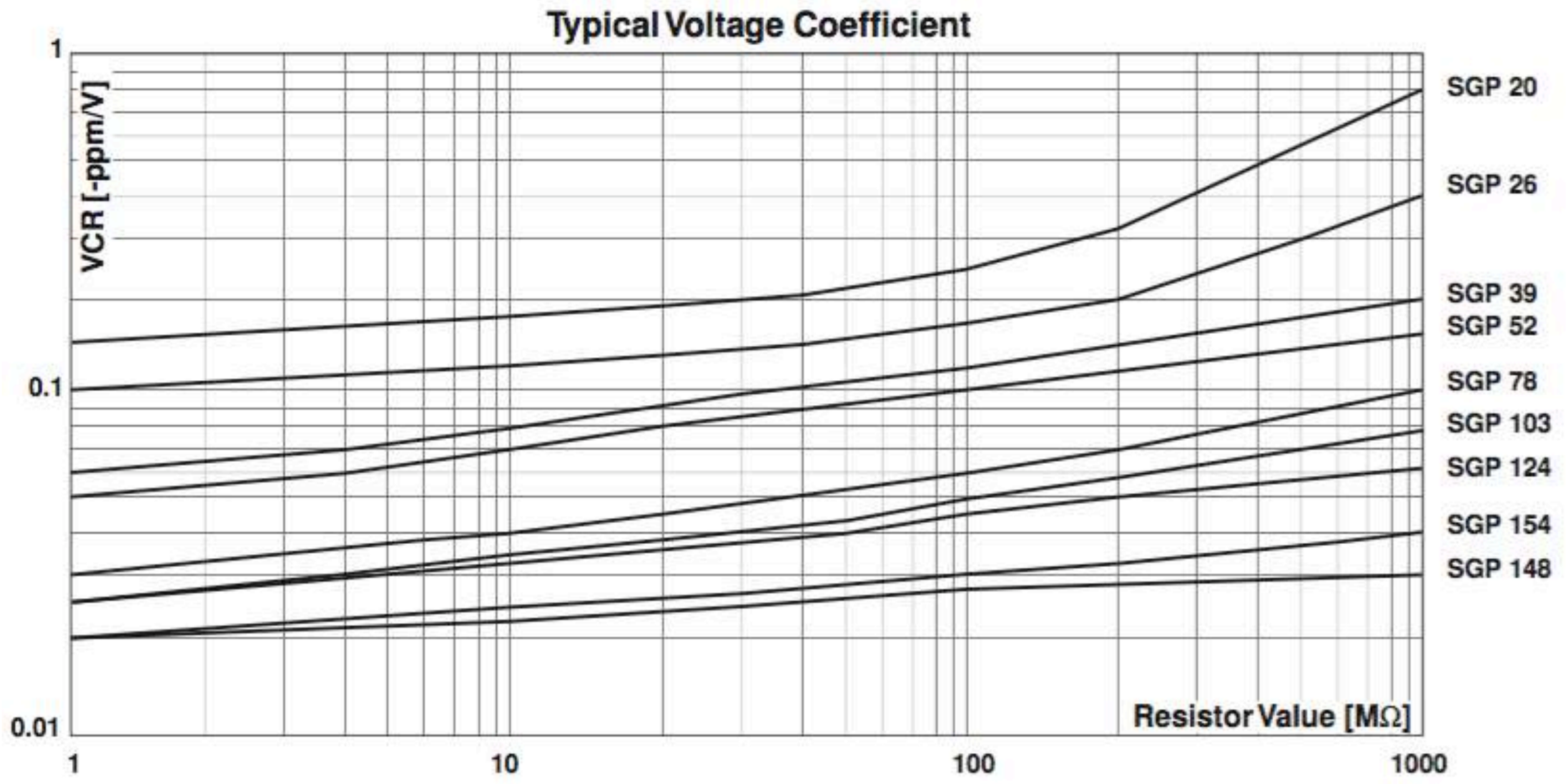




• High Voltage Resistors - Overview



• High Voltage Resistors - Overview



• Series SSP / OSP

Power and High Voltage Resistors with high Maximum Temperature Operation, TC of 50ppm/°C

Model No.	Watt-age	Max. Voltage	Resistance Min. Ω	Resistance Max. Ω	Dimensions in millimeters (inches) A ± 0.50 ± 0.02	B ±0.50 ±0.02	C ±0.05 ±0.002
OSP 10	2.00	1,000	0.1	10M	10.90 *0.429*	4.20 *0.165*	0.60 *0.024*
OSP 13	2.40	1,000	0.1	12M	13.70 *0.539*	4.20 *0.165*	0.60 *0.031*
OSP 20	3.00	1,000	0.1	15M	19.70 *0.776*	4.20 *0.165*	0.60 *0.024*
SSP 20	4.00	800	0.1	15M	20.20 *0.795*	8.20 *0.323*	1.00 *0.040*
SSP 26	6.00	2,000	0.1	15M	26.90 *1.059*	8.20 *0.323*	1.00 *0.040*
SSP 32	8.00	4,500	0.1	20M	33.00 *1.3*	8.20 *0.323*	1.00 *0.040*
SSP 32 F*	10.00	4,500	1	10M	33.0 1.3	8.20 0.323	1.00 0.040
SSP 39	10.00	4,500	0.1	20M	39.50 *1.555*	8.20 *0.323*	1.00 *0.040*
SSP 52	12.50	6,000	0.1	30M	52.10 *2.051*	8.20 *0.323*	1.00 *0.040*
SSP 52 F*	15.00	6,000	1	30M	52.10 *2.051*	8.20 *0.323*	1.00 *0.040*
SSP 148	40.00	6,000	1	100K	148.0 *5.83*	16.0 *0.63*	– –

F*: enforced cooling
• Resistor in free air position, air flow >1,5m/sec. at ≤25°C ambient temperature
• Resistor in case, air flow >2m/sec. at ≤25°C ambient temperature

**Version L:
• Resistance tolerances down to ±0,5% or ±0,1%, lower max. power (like SGP Series)

Etronics offers the **SSP** series to meet the requirements of power ratings up to 40 Watts while at the same time offering voltage ratings up to 6,000 Volts.

These Power Film Resistors cover a wide resistance range and operation up to 275°C in axial lead construction.

General Characteristics:

- **Non-inductive Performance** (**Etronics'** patented process)
- Full power and voltage ratings (derating not required)
- **Very high resistance values** (see table) up to 30MΩ

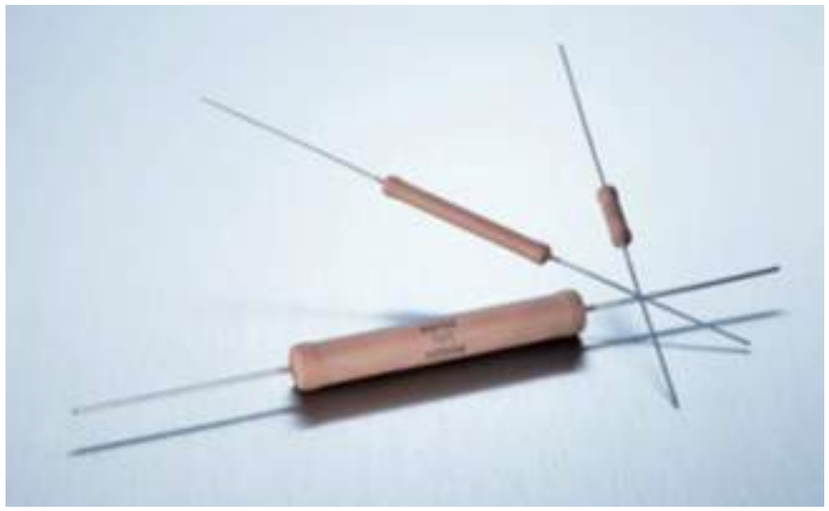
To accomplish this objective of high stability, high value, high voltage and high power in the **SSP** series, **Etronics** employs a special variation of its **METOXFILM** formulations. These films are annealed on special ceramic bodies at temperatures above 1400°F / 800°C and become an inherent part of the surface of the ceramic, resulting in their unusual performance characteristics. As a result of **Etronics'** unique non-inductive patented process, these resistors are ideally suited for high frequency applications, minimum distortion of the signals and faster settling times.

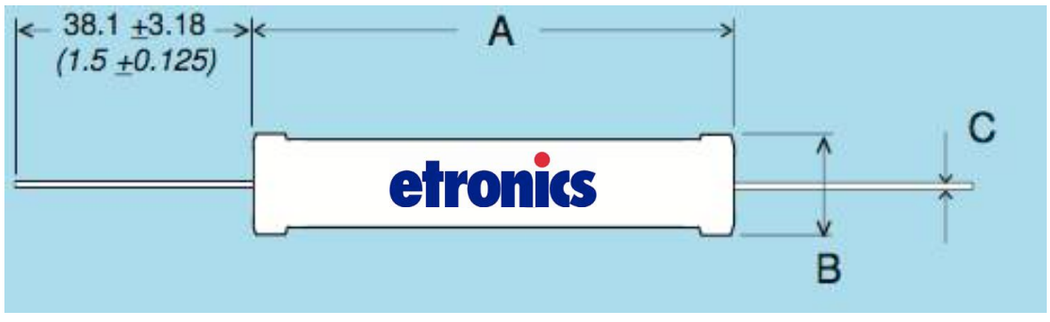
• Series SSP / OSP

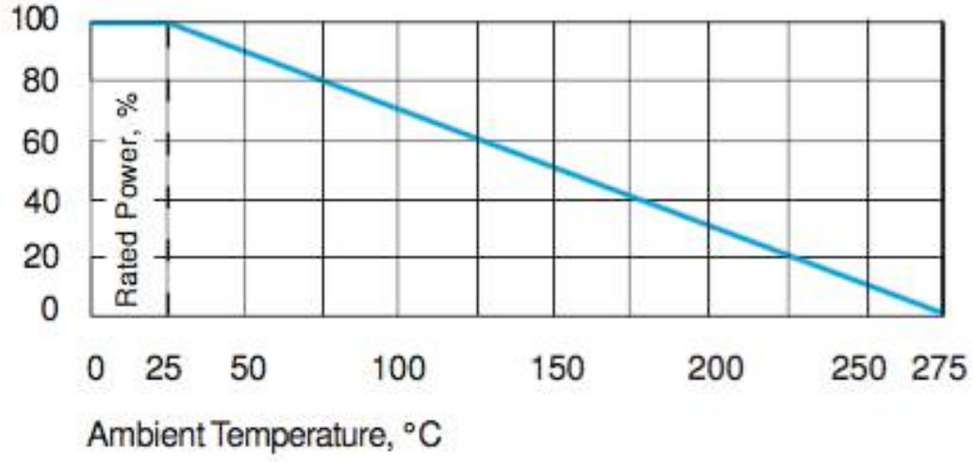
Power and High Voltage Resistors with high Maximum Temperature Operation, TC of 50ppm/°C

Specifications:

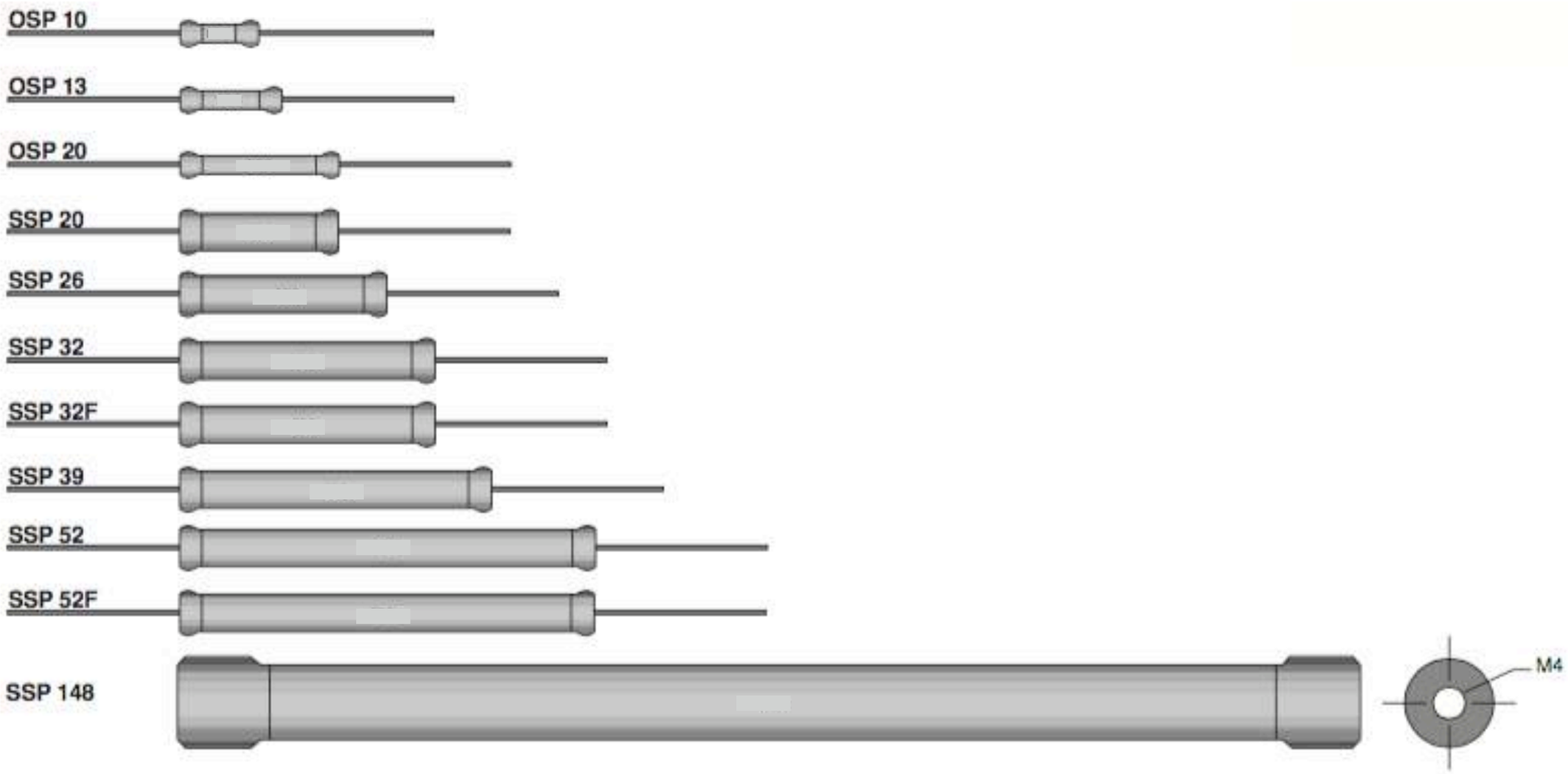
- **Resistance Tolerance:** Standard: ±1% to ±10%**
- **Temperature Coefficient:** for 10Ω and above 50ppm/°C. TC referenced to 25°C, ΔR taken at - 5°C and +105°C.
- **Dielectric Strength:** 1,000 V DC
- **Insulation Resistance:** 10GΩ, min.
- **Overload/Over-voltage:**
  5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. ΔR 0.5% max. or 0.5Ω max., whichever is greater. (not valid for SSP 148!)
- **Load Life:** 1,000 hours at rated power, ΔR 0.5% max. or 0.5Ω max., whichever is greater.
- **Thermal Shock:**
  MIL–Std–202, Method 107, Cond. C, ΔR 0.5% max. or 0.5Ω max., whichever is greater.
- **Max. Operating Temp.:** +275°C
- **Encapsulation:** Silicone Conformal
- **Lead Material:** O.F.H.C. Copper, tin plated



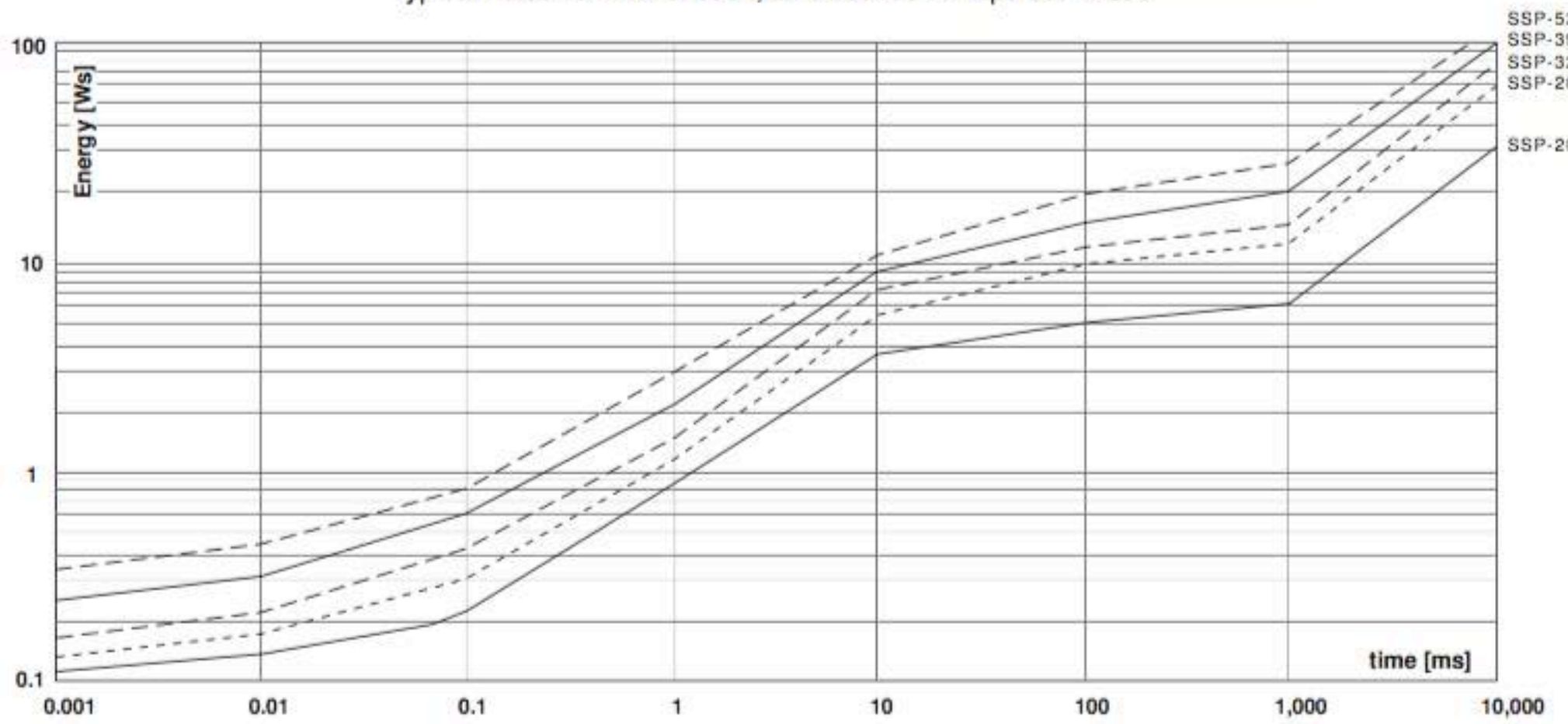




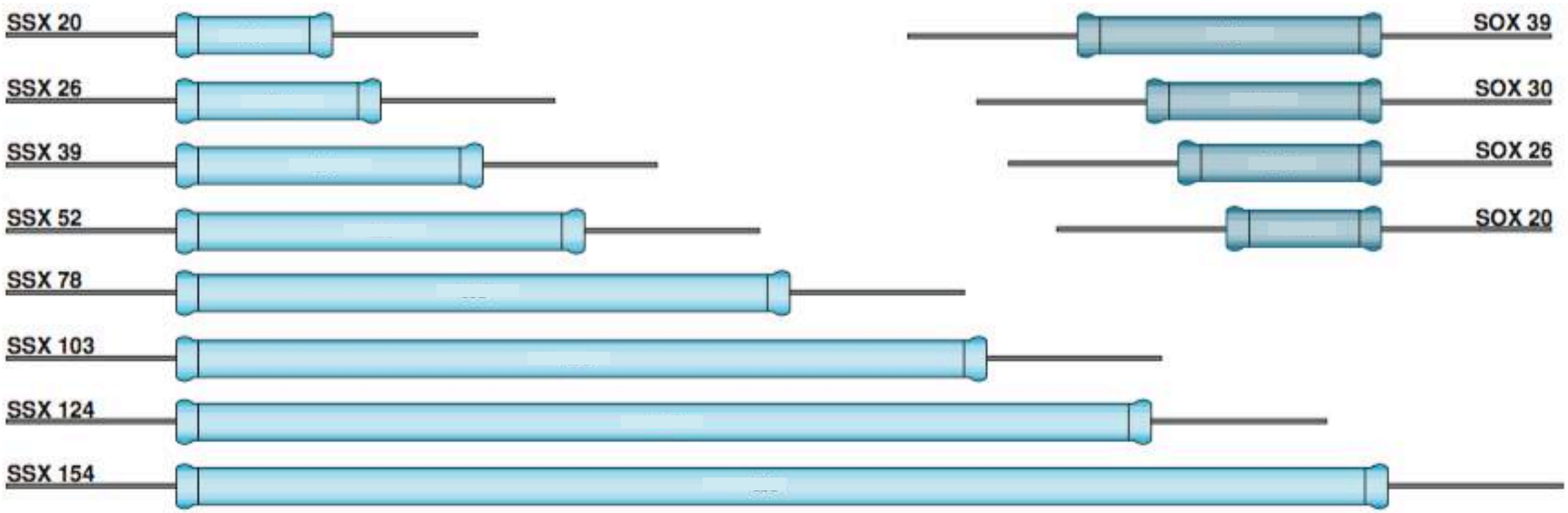
Power Resistors



Typical Pulse-form: e-function, time between two pulses: 1 sec.



Power Resistors



• Precision High Voltage Resistor Series OSX/SSX/SOX

Power and Precision High Voltage Resistors, TC of 100ppm/°C and wide Ohmic Range (300Ω-10GΩ)

Etronics offers the **OSX/SSX/SOX** series to meet general set of requirements at economical prices. This product is available with a silicone or epoxy coating and has a wide range of tolerances and temperature coefficients of resistance available. A summary of the features of the **OSX/SSX/SOX** series are:

- **Silicone coating** for ambient temperatures up to 225°C
- **Epoxy coating** for excellent humidity protection available under the name **SOX**
- **Resistance tolerances** offered from ±0.1% to ±10%
- **Temperature coefficients**: ±100ppm/°C to ±250ppm/°C
- **Standard temperature coefficient:** ±100ppm/°C
- **Power Ratings** up to 19.4 Watts
- **16 Models** with Voltage Ratings from 5 KV to 60 KV
- **Load Life Stability** of 0.50% per 1,000 hours
- **Resistance Range** from 300Ω to 10GΩ.
- Full encapsulation over the entire resistor length. All SSX-Types are also available with **M4 or 6/32** screw end caps.

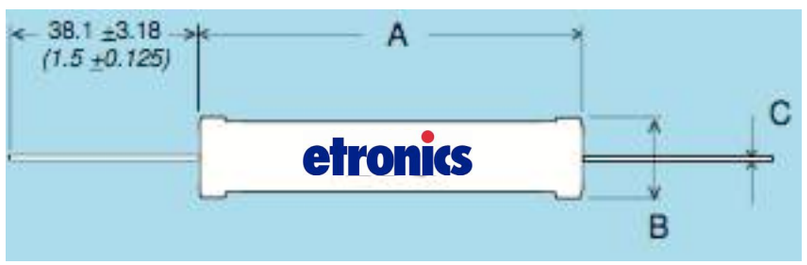
Model No.	Wattage at 70°C	Max. Cont. Oper. KV	Max. KV "S" **	Resistance Min. Ω	Resistance Max. Ω	Dimensions in millimeters / Dimensions in inches A ±0.50 ±0.020	B ±0.50 ±0.020	C ±0.05 ±0.002
OSX 10	0.80	1.5	1.9	100	1G	10.80 *0.425*	4.00 *0.157*	0.60 *0.024*
OSX 13	1.00	1.5	1.9	100	5G	13.40 *0.528*	4.00 *0.157*	0.60 *0.024*
OSX 20	1.50	3.0	3.7	100	10G	19.70 *0.776*	4.00 *0.157*	0.60 *0.024*
OSX 26	1.95	4.0	5.0	100	10G	26.00 *1.024*	4.00 *0.157*	0.60 *0.024*
OSX 30	2.30	6.0	7.5	100	10G	32.40 *1.276*	4.00 *0.157*	0.60 *0.024*
OSX 39	3.10	6.0	7.5	100	10G	39.40 *1.551*	4.00 *0.157*	0.60 *0.024*
SOX 20	1.20	5.0	6.2	300	10G	21.30 *0.839*	8.60 *0.339*	1.00 *0.040*
SOX 26	1.60	7.5	9.4	450	10G	27.50 *1.083*	8.60 *0.339*	1.00 *0.040*
SOX 39	2.50	11.0	13.8	500	10G	40.20 *1.583*	8.60 *0.339*	1.00 *0.040*
SOX 52	3.40	16.0	20.0	400	10G	52.50 *2.067*	8.60 *0.339*	1.00 *0.040*
SOX 78	5.00	24.0	30.0	600	10G	78.70 *3.098*	8.60 *0.339*	1.00 *0.040*
SOX 103	6.50	32.0	40.0	800	10G	104.10 *4.098*	8.60 *0.339*	1.00 *0.040*
SOX 124	8.20	40.0	50.0	1M	10G	124.20 *4.890*	8.60 *0.339*	1.00 *0.040*
SOX 154	10.60	48.0	60.0	1M	10G	154.50 *6.083*	8.60 *0.339*	1.00 *0.040*
SSX 20	2.30	5.0	6.2	600	10G	20.20 *0.795*	8.20 *0.323*	1.00 *0.040*
SSX 26	3.90	7.5	9.4	600	10G	27.20 *1.071*	8.20 *0.323*	1.00 *0.040*
SSX 32	4.20	8.5	11.0	550	10G	33.00 *1.299*	8.20 *0.323*	1.00 *0.040*
SSX 39	4.60	11.0	13.8	500	10G	39.50 *1.555*	8.20 *0.323*	1.00 *0.040*
SSX 52	7.80	16.0	20.0	400	10G	52.00 *2.047*	8.20 *0.323*	1.00 *0.040*
SSX 78	11.70	24.0	30.0	600	10G	77.60 *3.055*	8.20 *0.323*	1.00 *0.040*
SSX 103	12.50	32.0	40.0	800	10G	103.20 *4.063*	8.20 *0.323*	1.00 *0.040*
SSX 124	15.50	40.0	50.0	1M	10G	123.70 4.870	8.20 0.323	1.00 0.040
SSX 154	19.40	48.0	60.0	1M	10G	153.70 6.051	8.20 0.323	1.00 0.040

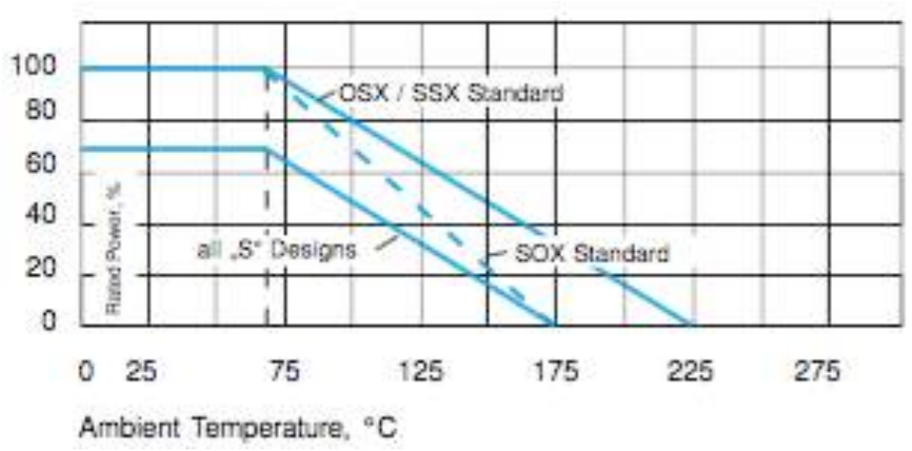
• Precision High Voltage Resistor Series OSX/SSX/SOX

Power and Precision High Voltage Resistors, TC of 100ppm/°C and wide Ohmic Range (300Ω-10GΩ)

Specifications:

- **Resistance Tolerance:** ±1%, ±2%, ±5% or ±10% (tolerance to ±0.1%, ±0.25%, ±0.5% on special request *)
- **Temperature Coefficient:** Standard 100ppm/°C referenced to 25°C, ΔR taken at 0°C and +70°C, other TCR on request.
- **Load Life:** 1,000 hours at rated power at 70°C, ΔR, 0.50% max.
- **Thermal Shock:** MIL–Std–202, Method 107, Cond. A, ΔR 0.20% max.202, Method 106, ΔR, 0.40 max.
- **Encapsulation:** Silicone or epoxy coating over the whole element
- **Lead Material:** O.F.H.C. Copper, tin plated





• Series MTX 968

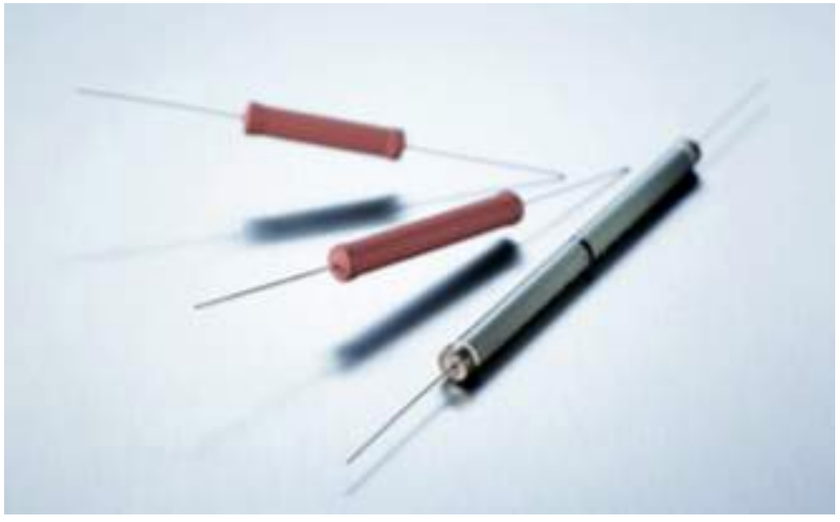
Precision High Voltage Resistors with wide Ohmic Range (400Ω-30GΩ)

The **MTX 968** resistor series is designed for the usage in voltage dividers, medical equipment, electrostatic devices, measuring equipment, current limiting devices, where high stability, low TCR, high ohmic values and high short-term loads are required.
For usage in oil- or potted applications, **Etronics** suggests to use the polyimide coating instead of the conformal silicone coating. Please ask for details!

Specifications:

- **Resistance Tolerance:** ±0.1% to ±10%
- **Temperature Coefficient:** ±15ppm/°C to ±200ppm/°C
- **Load Life:** ΔR/R 0.5% max., 1000 hours at rated power
- **Dielectric Strength:** > 1000V (25°C, 75% relative humidity)
- **Thermal Shock:** ΔR/R 0.25% max.
- **Moisture Resistance:** ΔR/R 0.25% max.
- **Operating Temperature:** -55°C to +225°C
- **Encapsulation:** Conformal silicone coating, Polyimide coating (suggested for oil and potted applications)
Ask for details!
- **Lead Material:** Gold plated copper wire

Type	P 40 °C Watt	U KVdc A in air	U KVdc P in air	U KVdc P in oil	Resistance ranges Tolerance 1 – 10% TC ppm / °C 200	Tolerance 0.5 – 10% TC ppm / °C 100	Tolerance 0.25 – 10% TC ppm / °C 50	Tolerance 0.1 – 10% TC ppm / °C 25, 15	L mm
968.2	3.8	9	5.4	2 to 5 times voltage (A), depending on quality of isolation oil	400 R – 10 G	400 R – 1 G	400 R – 1 G	60 K – 500 M	27 ± 1
968.3	5	12	7.2		500 R – 15 G	500 R – 1.5 G	500 R – 1.5 G	80 K – 750 M	37 ± 1
968.5	7.5	18	11		900 R – 20 G	900 R – 2 G	900 R – 2 G	120 K – 1 G	52 ± 1
968.7	10	24	14.4		1.2 K – 30 G	1.2 K – 3 G	1.2 K – 3 G	180 K – 1.5 G	78 ± 1.5
968.10	12.5	36	21.6		1.7 K – 30 G	1.7 K – 4 G	1.7 K – 3 G	240 K – 2 G	103 ± 1.5
968.12	15	42	25.2		2.6 K – 30 G	2.6 K – 5 G	2.6 K – 3 G	300 K – 2 G	128 ± 2
968.15	17	54	32.4		3.2 K – 30 G	3.2 K – 6 G	3.2 K – 3 G	350 K – 2 G	153 ± 2

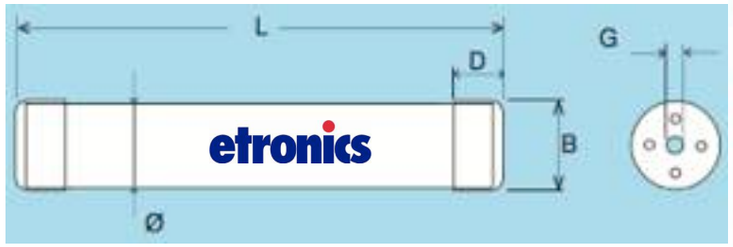


Precision High Voltage / High Power Resistors

• Series MTX 969

High Power and High Voltage Resistors up to 96 kV and 105 Watts

The **MTX 969** resistor series is designed for the usage in voltage dividers, medical equipment, electrostatic devices, measuring equipment, current limiting devices, where high stability, low TCR, high ohmic values and high short-term loads are required.
For usage in oil- or potted applications, **Etronics** suggests to use the polyimide coating instead of the conformal silicone coating. Please ask for details!

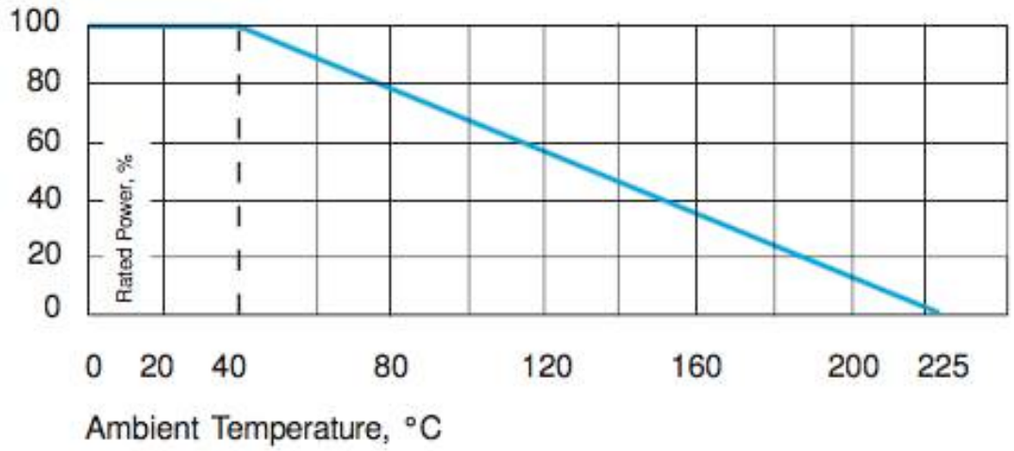


Specifications
Dimensions (mm)

Type	L	B	Ø	D	G
969.11	81 ±1	14.5 ±0.2	13.5 ±0.5	10 ±0.2	M4
969.23	156 ±2	14.5 ±0.2	13.5 ±0.5	10 ±0.2	M4
969.54	160 ±2	31.5 ±0.2	30.5 ±0.5	18 ±0.2	M8
969.71	210 ±2.5	31.5 ±0.2	30.5 ±0.5	18 ±0.2	M8
969.105	308 ±3.5	31.5 ±0.2	30.5 ±0.5	18 ±0.2	M8

Specifications :

- **Resistance Tolerance:** ±0.1% to ±10%
- **Temperature Coefficient:** ±10ppm/°C to ±200ppm/°C
- **Load Life:** ΔR/R 0.5% max., 1000 hours at rated power
- **Dielectric Strength:** > 1000V (25°C, 75% relative humidity)
- **Thermal Shock:** ΔR/R 0.25% max.
- **Moisture Resistance:** ΔR/R 0.25% max.
- **Operating Temperature:** -55°C to +225°C
- **Encapsulation:** Conformal silicone coating, Polyimide coating (suggested for oil and potted applications)
  Ask for details!
- **Lead Material:** Nickel plated caps



Type	P 40 °C Watt	U KVdc	Resistance Ranges: Tolerance 2 – 10% TC ppm / °C 150, 200	Tolerance 0.5 – 10% TC ppm / °C 50, 100	Tolerance 0.1 – 10% TC ppm / °C 15, 25
969.11	11	24	500 R – 5 G	500 R – 1 G	50 K – 500 M
969.23	23	48	700 R – 10 G	700 R – 1 G	100 K – 1 G
969.54	54	48	2 R – 10 G	2 R – 1 G	100 K – 1 G
969.71	71	64	20 R – 15 G	20 R – 1.5 G	100 K – 1.5 G
969.105	105	96	80 R – 25 G	80 R – 2 G	100 K – 2 G

Precision High Voltage Divider

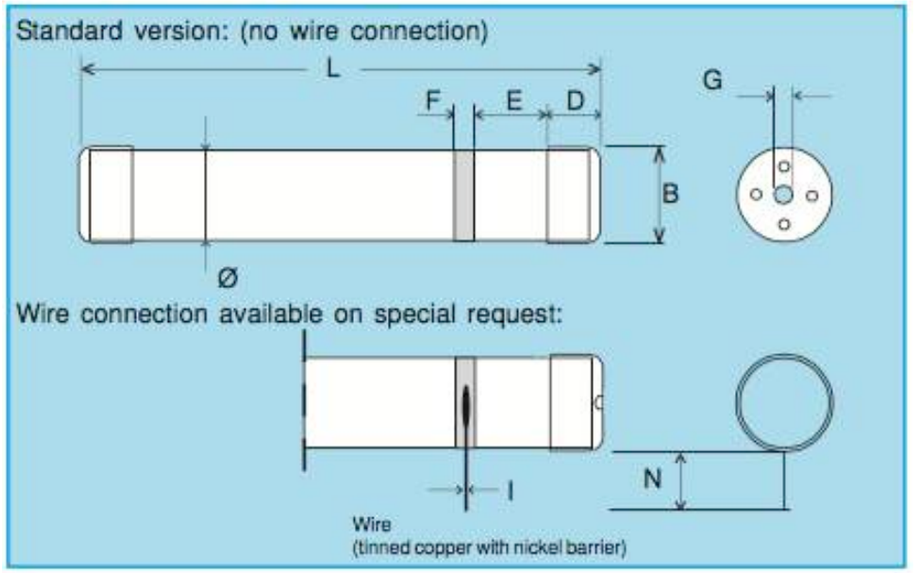
• Series MTX 2000

High Power / High Voltage Dividers up to 50 Watts

The **MTX 2000** series are high quality, high precision, high power, high voltage dividers for use in sophisticated resistor networks. These custom designs support a wide range of resistance values, tight voltage ratios, close tolerances, and low TCR's.
For usage in oil- or potted applications, Etronics suggests to use the polyimide coating instead of the conformal silicone coating. Please ask for details!

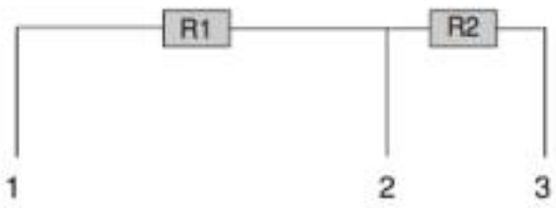
Specifications
Dimensions (mm)

Type	L	B	Ø	D	E	F	G	I	N
2000.23	156 ±2	14.5 ±0.2	13.5 ±0.5	10 ±0.2	6.5 ±0.5	5 ±0.5	M4	1.0 ±0.1	30.0 ±1
2000.105	308 ±2.5	31.8 ±0.3	30.5 ±0.5	18 ±0.2	40 ±2	7 ±0.5	M8	1.0 ±0.1	30.0 ±1



Specifications :

- **Resistance Tolerance:** ±0.1% to ±1%
- **Ratio Tolerance:** 0.1% to 1%
- **Temperature Coefficient:** ±25ppm/°C to ±50ppm/°C
- **Ratio Temperature Coefficient:** 10ppm/°C to 15ppm/°C
- **Load Life:** ΔR/R 0.15% max.,1000 hours at rated power
- **Dielectric Strength:** > 1000V (25°C, 75% relative humidity)
- **Thermal Shock:** ΔR/R 0.2% max.
- **Moisture Resistance:** ΔR/R 0.25% max.
- **Operating Temperature:** -55°C to +125°C
- **Encapsulation:** Conformal coating, Polyimide coating
- **Lead Material:** Nickel plated caps



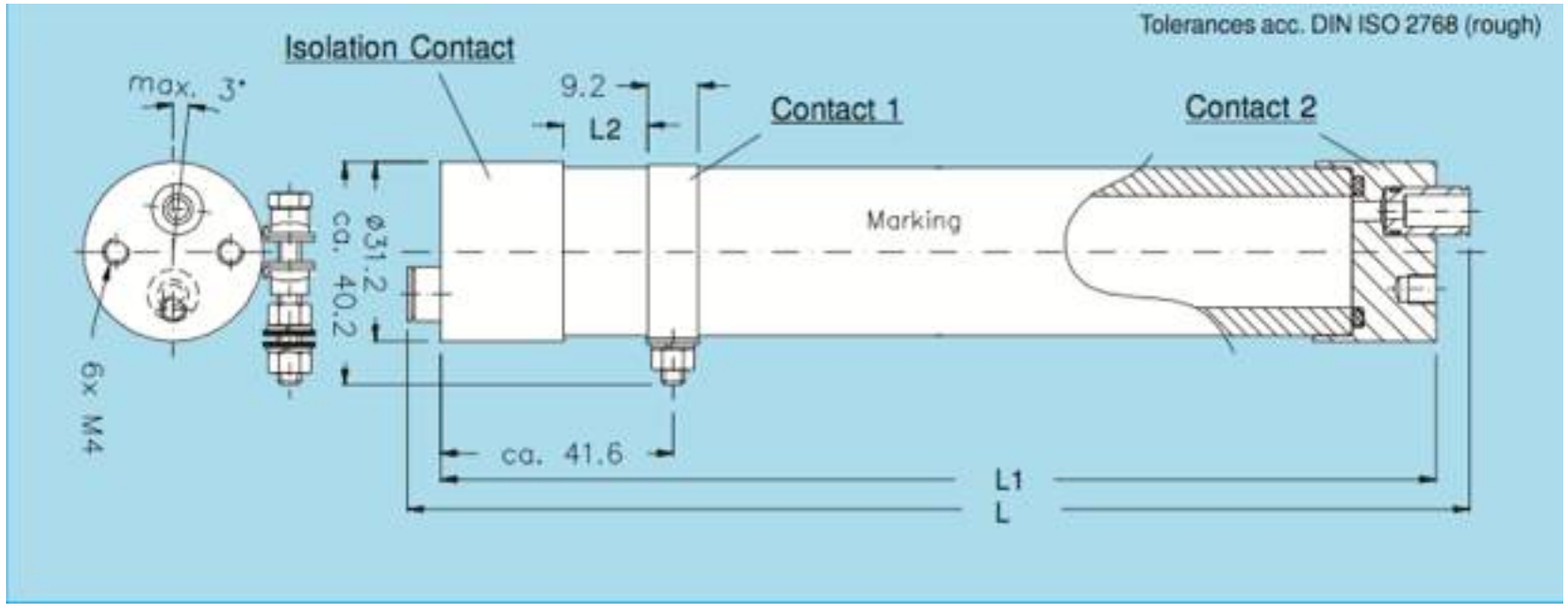
$$\text{Ratio} = \frac{R1+R2}{R2}$$

	Pwatt 40°C	U kVDC				
			TK abs.	50 ppm / °C	25 ppm / °C	15 ppm / °C
			Tol. abs	1% – 0.25%	1% – 0.1%	1% – 0.1%
			TK Ratio	25 ppm / °C	15 ppm / °C	15 / 10 ppm / °C
			Tol. Ratio	0.5% - 0.25%	0.5% – 0.1%	0.5% – 0.1%
2000.23	10	40	R1 + R2 Ratio	2 M – 2 G 1 : 1000 – 1 : 20000	20 M – 1 G 1 : 1000 – 1 : 20000	20 M – 500 M 1 : 1000 – 1 : 10000
2000.105	50	80	R1 + R2 Ratio	20 M – 3 G 1 : 1000 – 1 : 20000	20 M – 2 G 1 : 1000 – 1 : 20000	20 M – 1 G 1 : 1000 – 1 : 10000

High Power Watercooled Resistor

• Series MTX 969W

High Power Watercooled single Resistors and Voltage Dividers up to 1700 Watts



Our resistor series **969W** is designed for usage in high power applications. Due to the direct water-cooling these resistors are good for a very high continuous power load.
The easy M4 mounting, wide ohmic range, precise tolerance and temperature coefficient values as well as a high dielectric strength capability are only some of the features of this resistor series. Also voltage dividers are possible!

Specifications :

- **Standard Resistance Values:** 0.5Ω to 10MΩ
- **Resistance Tolerance:** ±5%, ±10% (standard)
- **Temperature Coefficient:** ±100ppm/°C (standard) < 10R: + 250ppm/°C
- **Inductivity:** 80 - 100 nH typical
- **Isolation Voltage:**10kV DC
(between Contact 1 and Isolation Contact)
-valid for 969-W and -W-L 3kV DC for 969 W-S
- Cooling medium has to be **non-conductive**
(e.g. Distilled Water or Distilled Water - Glycol mixture)
- **Connecting type of cooling medium:** 6mm tube
(other connections on request)
- **Max. Cooling medium pressure:** 10 bar
- **Contact material:** CrNi (stainless)

Specifications:
Dimensions (mm)

Type	P max	U max	L	L1	L2
969 W-S	500 W	5 kV DC	117	100	5
969 W	1000 W	7 kV DC	195	178	15
969 W-L	1700 W	10 kV DC	337	320	15

High Voltage Resistors

• High Voltage Flat Resistor Series FSX - FEX & FBX

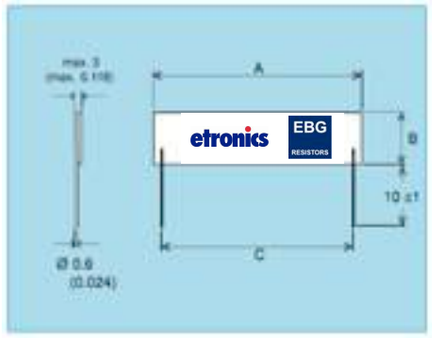
TC of 80ppm/°C combined with Precision Tolerances (±0.5% to ±10%) and wide Ohmic Range (200Ω-2GΩ)

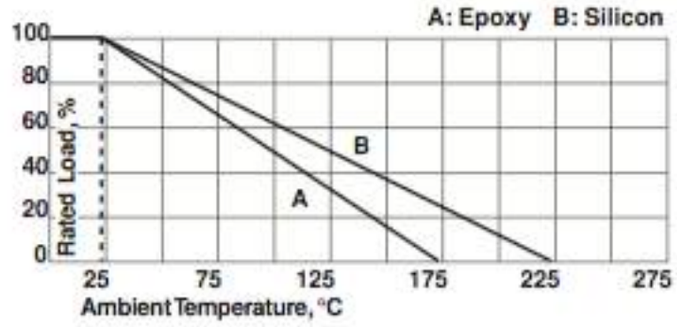
These are the low cost high voltage resistors that provide high density packaging in large volume applications.

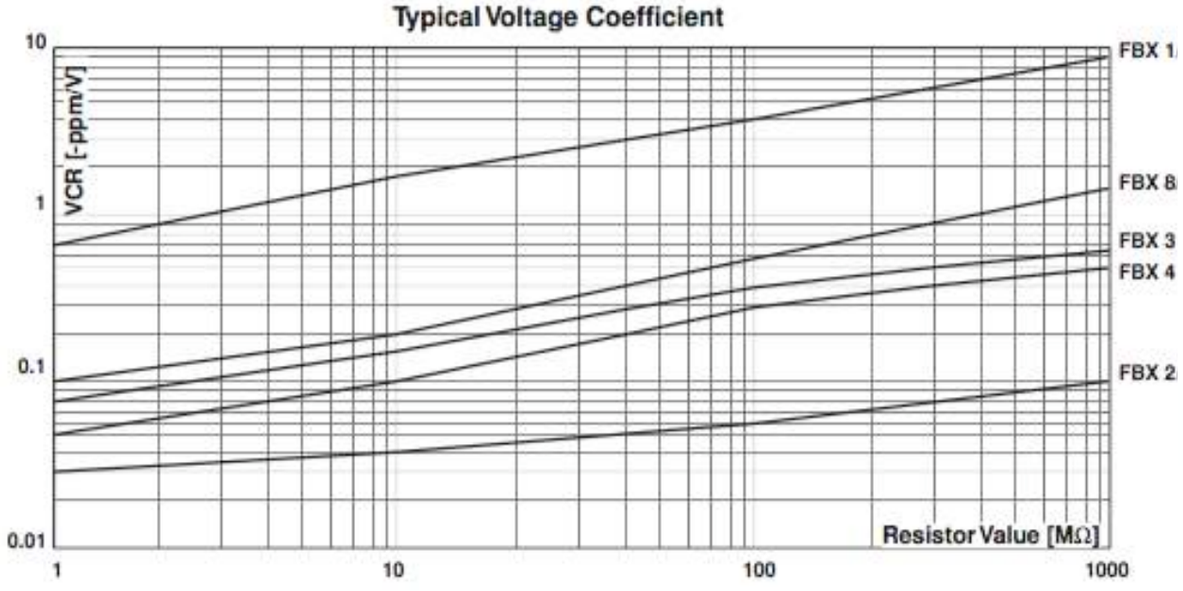
- 3 different coatings available
  -Series **FSX** with conformal silicone for high temperature operation (225°C)
  -Series **FEX** with epoxy coat for maximal moisture protection
  -Series **FBX** with surface silicone print as an inexpensive alternative
- High Voltage Withstanding up to 24,000 Volts
- 6 different sizes
- Thickness max. 3mm (0.118 inch) only for High Density Packaging
- Non Inductive Design

Specifications :

- **Resistance Range:** 200Ω to 2GΩ
- **ResistanceTolerance:** ±0.5% to ±10%
- **Temp. Coefficient** (up to 100MΩ): ±80 ppm/°C from -5°C to +105°C referenced to +25°C
- **Max. Operating Voltage:** "S" on request up to 35% higher than listed (please contact your local representative)
- **Voltage Coefficient** (typically): see below







	Model No.	Wattage	Max. Continuous Oper. Volt.	Dimensions in millimeters / Dimensions in inches A (max.)	B (max.)	C
Series FBX with Surface Silicone Print	FBX1/2	0.50	4,000*	12.90 / *0.51*	3.40 / *0.13*	10.20 / *0.40*
	FBX5/5	0.65	6,000*	17.15 / 0.68	3.40 / 0.13	15.24 / 0.60
	FBX8/5	1.60	8,000*	25.60 / *1.01*	5.30 / *0.21*	22.90 / *0.90*
	FBX3	3.00	12,000*	38.30 / *1.51*	6.60 / *0.26*	35.50 / *1.4*
	FBX4	4.00	15,000*	51.00 / *2.01*	6.60 / *0.26*	48.20 / *1.9*
	FBX2/2	5.00	22,000*	51.00 / *2.01*	12.90 / *0.51*	48.20 / *1.9*
Series FEX with Epoxy Protection	FEX1/4	0.25	4,000	13.80 / *0.54*	5.00 / *0.20*	10.20 / *0.40*
	FEX5/5	0.35	7,000	19.05 / *0.75*	5.08 / *0.20*	15.24 / *0.60*
	FEX4/5	0.80	9,000	26.10 / *1.03*	6.70 / *0.26*	22.90 / *0.9*
	FEX3/2	1.50	13,000	38.90 / *1.53*	7.90 / *0.31*	35.50 / *1.40*
	FEX2	2.00	17,000	51.50 / *2.03*	8.10 / *0.32*	48.20 / *1.90*
	FEX2/2	3.00	24,000	51.50 / *2.03*	14.40 / *0.57*	48.20 / *1.90*
Series FSX with Conformal Silicone Protection	FSX1/2	0.50	4,000	13.60 / *0.54*	4.50 / *0.18*	10.2 / *0.40*
	FSX5/5	0.65	6,000	17.85 / *0.70*	4.50 / *0.18*	15.24 / *0.60*
	FSX8/5	1.60	8,000	25.90 / *1.02*	6.30 / *0.25*	22,90 / *0.90*
	FSX3	3.00	12,000	38.70 / *1.52*	7.50 / *0.30*	35.50 / *1.40*
	FSX4	4.00	15,000	51.3 / *2.02*	7.50 / *0.30*	48.20 / *1.90*
	FSX2/2	5.00	22,000	51.30 / *2.02*	14.20 / *0.56*	48.2 / *1.90*

** values can be reached in clean air ambient condition*

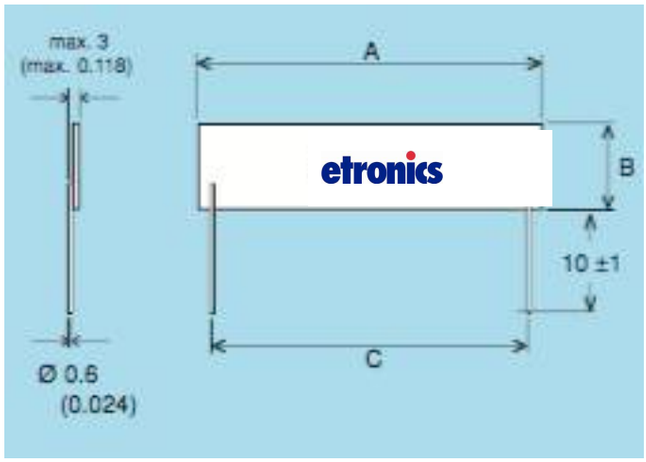
High Voltage Resistors

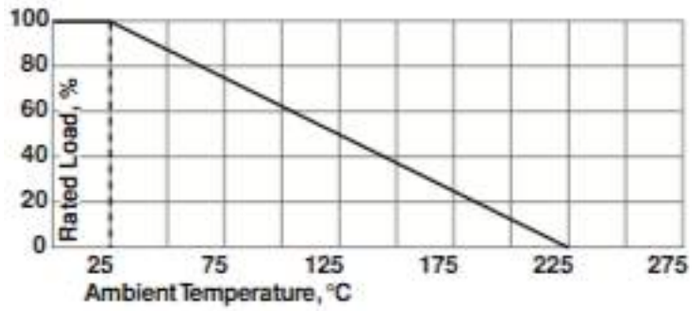
• High Voltage Flat Style Resistor Series FPX & FLX

TC of 100ppm/°C combined with Precision Tolerances (0.5% to -10%) and wide Ohmic Range (200Ω-2GΩ)

Here are the low cost power resistors that provide high density packaging in large volume applications.

- Series **FPX** and **FLX** printed on surface with conformal black silicone for high temperature operation (225°C)
- High Voltage Withstanding up to 22,000V
- 5 different sizes
- Thickness only max. 3mm (0.118 inch) for High Density Packaging
- Non Inductive Design





Specifications :

- **Resistance Range:** FPX: 200Ω to 2GΩ FLX: 10Ω to 1GΩ
- **Resistance Tolerance:** FPX: ±1% to 10% FLX: ±0.5% to 10%
- **Temperature Coefficient:** ±100 ppm/°C , measured from +25°C to 85°C
- **Voltage Coefficient** (typically): ResistanceRange -ppm/V

200 R	1M	0,1- 1,0
1M	100M	0,2- 3,0
100M	2,000M	0,5- 10,0

- **Max. Operating Voltage:** "S" on request up to 35% higher than listed

	Model No.	Wattage	Max. Continuous Oper. Volt.	Dimensions in millimeters *Dimensions in inches* A (max.) ±0.50 ±0.02	B (max.) ±0.50 ±0.02	C ±0.50 ±0.02
Series FPX with Surface Silicone Print	FPX1/2	1.50	4,000	12.90 *0.51*	3.40 *0.13*	10.20 *0.40*
	FPX8/5	2.50	8,000	25.60 *1.01*	5.30 *0.21*	22.90 *0.90*
	FPX3	4.00	12,000	38.30 *1.51*	6.60 *0.26*	35.50 *1.40*
	FPX4	5.00	15,000	51.00 *2.01*	6.60 *0.26*	48.20 *1.90*
	FPX2/2	7.50	22,000	51.00 *2.01*	12.90 *0.51*	48.20 *1.90*
Series FLX with Conformal Silicone Protection	FLX1/2	1.50	300	12.90 *0.51*	3.40 *0.13*	10.20 *0.40*
	FLX8/5	2.50	500	25.60 *1.01*	5.30 *0.21*	22.90 *0.90*
	FLX3	4.00	800	38.30 *1.51*	6.60 *0.26*	35.50 *1.40*
	FLX4	5.00	1,000	51.00 *2.01*	6.60 *0.26*	48.20 *1.90*
	FLX2/2	7.50	1,000	51.00 *2.01*	12.90 *0.51*	48.20 *1.90*

High Voltage Resistors

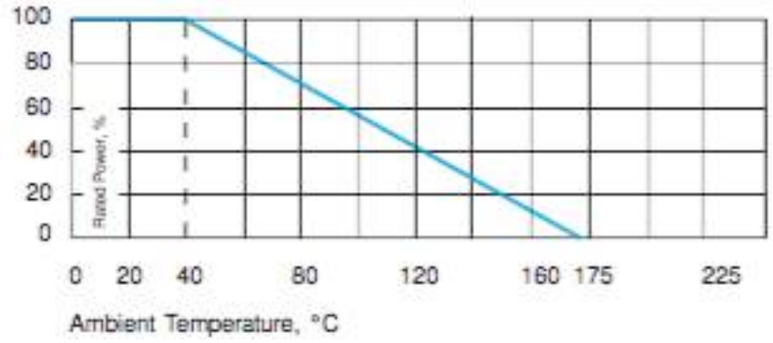
• High Voltage Flat Resistor Series MTX 967

Specifications

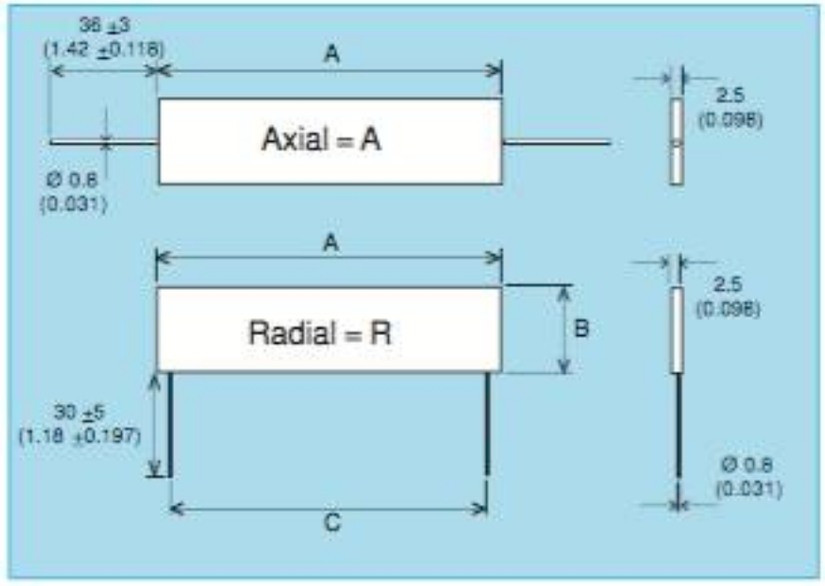
Dimensions (mm)

Type	P_{Watt}	U_{kvDC}	A	B	C
967.3.25	1	8	25.4	3.8	22.9
967.3.38	1.5	10	38	3.8	35.7
967.5.13*	1	5	12.7	5	10.2
967.5.51	2	20	50.8	5	48.3
967.10.25	2	10	25.4	10	22.9
967.10.51	3	30	50.8	10	48.3
967.15.38	3	15	38	15	35.7
967.15.51	4.5	30	50.8	15	48.3
967.15.76	5.5	35	76.2	15	73.4
967.25.99	10	35	101.6	24	98.6

*Pins: L=9 ±1mm ⊡ = 0,6 x 0,3mm



Operating Temperature	55 to +175°C
Resistance Range	10Ω to 30GΩ
Temperature Coefficient	±10 to ±200ppm/°C
Tolerance	±10% to ±0.1%
Insulation Resistance ----	> 10,000 Mohm ------ (500 Volts, 25°C, 75% relative humidity)
Dielectric Strength --------	> 1000 Volts ---------- (25°C, 75% relative humidity)
Termal Shock ----------	ΔR/R 0.2% max
Overload	ΔR/R 0.25% max 1.5 x Pnom, 5 sec (do not exceed 1.5 x Vmax)
Moisture Resistance Load	ΔR/R 0.25% max
Life	ΔR/R 0.25% max
Encapsulation	Conformal coating or glass coating
Lead Material	Tinned copper



Precision High Voltage Divider

Etronics introduce the new series of High Voltage Dividers called **HVT**. Available in 6 different sizes from 5 KV to 20 KV Voltage rating. In these highly reliable components Etronics combines its state of the art high voltage technology with the unique **METOXFILM** stability. The **HVT** components provide tight ratio tolerance, TCR tracking and custom designed values.

- Voltage ratings from 5KV to 20KV
- Ratio TCR 25 ppm/°C (10 ppm/°C upon request)
- Typical Voltage Coefficient 0.3 ppm/V
- Voltage Division:

1,000:1 or 100:1 (others upon request)

$$\text{RATIO} = \frac{R1 + R2}{R2}$$

• Series HVT

Type	Voltage [KV]	Resist. [MΩ]	Pmax	Dim. in mm ±0.4 *(inches ±0.016)* A	B	C	D
HVT 5	5 KV	100	0.3	25.4 *1.00*	18.0 *0.709*	7.62 *0.300*	5.08 *0.200*
HVT 7	7 KV	100	0.5	25.4 *1.00*	18.0 *0.709*	12.7 *0.500*	5.08 *0.200*
HVT 11	10 KV	100	1.0	38.1 *1.500*	28.0 *1.102*	26.4 *1.039*	5.08 *0.200*
HVT 12	12 KV	200	1.0	52.0 *2.047*	33.0 *1.299*	12.7 *0.500*	15.24 *0.600*
HVT 16	15 KV	200	1.5	52.0 2.047	42.0 1.654	18.0 0.709	5.08 0.200
HVT 21	20 KV	200	2.0	52.0 *2.047*	42.0 *1.654*	25.4 *1.00*	5.08 *0.200*

Specifications :

- **Absolute Tolerance:** ±1.0% for all resistors
- **Over-voltage**: 1.5 times rated voltage for 5 seconds ΔR ratio 0.5% max.
- **abs TCR** ± 100ppm/°C

TCR measured between +25°C and +85°C, referenced to +25°C

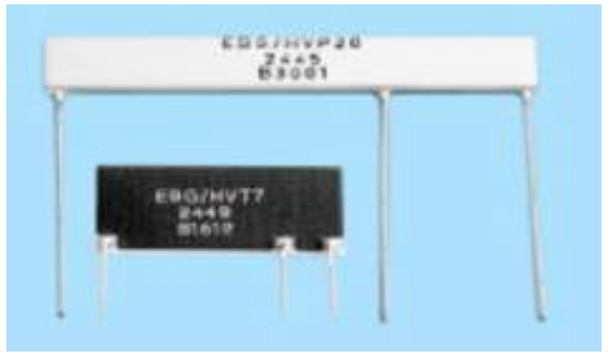
- **Load Life:**

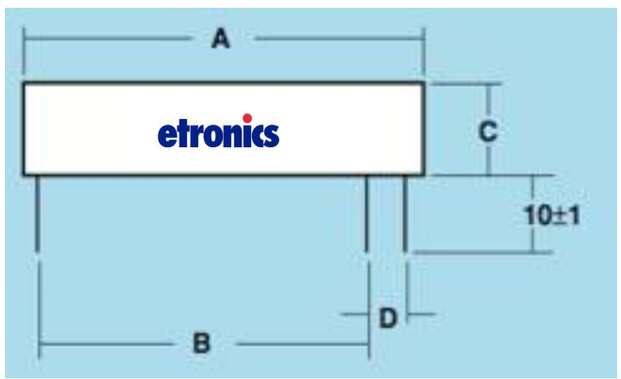
Ratio ΔR with rated voltage applied for 1,000 hours 0.4% max.

- **Moisture Resistance:** Mil-Std-202, Method 106, ratio ΔR 0.5% max.
- **Thermal Shock:** Mil-Std-202, Method 107, Cond. C, ratio ΔR 0.25% max.
- **Encapsulation:** Silicon conformal coating with Dielect. withstanding Voltage of 1,000V on HVT 11, 16, 21. HVT 5, 7 and 12 have a printed silicon coating
- Other Resistance Values on request. Please do not hesitate to contact our **Etronics** sales department.
- **Lead Material:**

O.F.H.C. Copper tin plated: diam. 0.60 mm

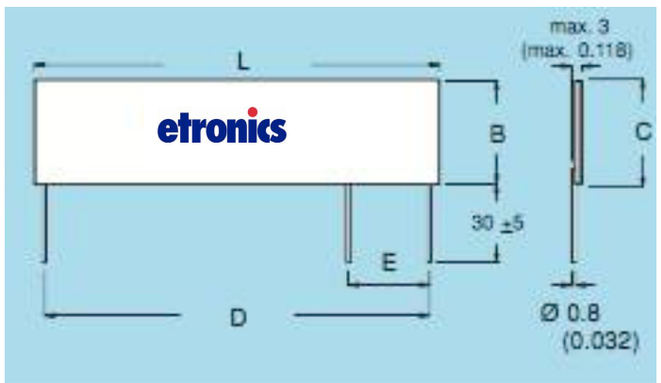
- **Operating temp.:** -55°C to 155°C





Precision High Voltage Divider

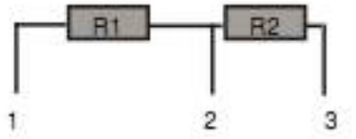
• Series MTX 1000



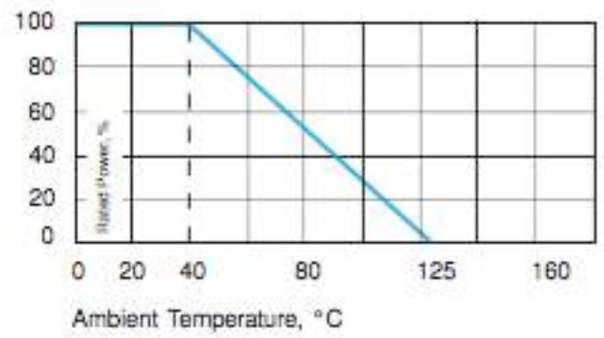
Specifications

Dimensions (mm)

Type	PWatt	UkvDC	L	B	C	D	E
1000.2	0.5	8	26	8	9.1	22.9	5.08
1000.3	1.2	15	38.5	13	14.2	35.6	7.62
1000.4	1.8	24	51.5	15.5	16.6	48.3	10.16
1000.5	2.4	32	77.5	15.5	16.6	73.4	10.16



$$\text{Ratio} = \frac{R1+R2}{R2}$$



Operating Temperature	55 to +125°C	
Abs. Temperature Coefficient	50 to 15ppm/°C	depending on ohmic value
Ratio Temperature Coefficient	15 to 5ppm/°C	depending on ohmic value
Absolute Tolerance	±1% to ±0.1%	depending on ohmic value
Ratio Tolerance	1% to 0.1%	depending on ohmic value
Insulation Resistance	> 10,000 Mohm	(500 Volts, 25°c, 75% relative humidity)
Dielectric Strength	> 1000 Volts	(25°c, 75% relative humidity)
Termal Shock	ΔR/R 0.2% max	
Overload	ΔR/R 0.25% max (do not exceed 1.5 x Vmax)	
Moisture Resistance	ΔR/R 0.25% max	
Load Life	ΔR/R 0.15% max (1000 hours at rated power)	
Encapsulation	Conformal coating (U) or glass coating (G) Tinned copper	
Lead Material		

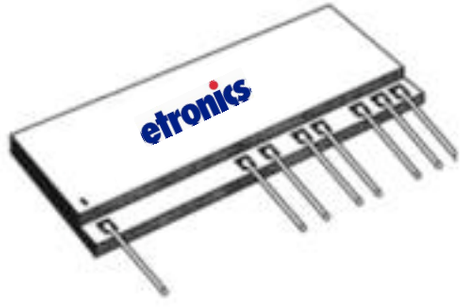
Precision Decade Voltage Divider

• Series 1776-X

Series 1776 - X Precision Decade Voltage Divider's Ceramic Protected Family of Input Voltage Dividers for Multimeters and other Instruments
Etronics offers a family of Voltage Dividers for a variety of applications, including Digital Multimeters, Multi range instrumentation, and other range switching devices. This line of products utilizes the special **Etronics' METOXFILM** resulting in a family of Series **1776-X** models:
A summary of the features of the **1776-X** series are:

- Compact precision resistor networks
- Easy to install package
- Absolute tolerances to ±0.1, ±0.25 and ±0.5%
- Relative tolerances to 0.05, 0.10 and 0.25%
- Ratio Temperature Coefficients from 10 to 50 ppm/°C
- High stability under load <0.02%
- Excellent Shelf Life: <0.02%

Many special combinations of ratios, absolute tolerances, relative tolerances and absolute temperature coefficients of resistance are available. Consult your Etronics' agent or the factory direct for your special requirements.

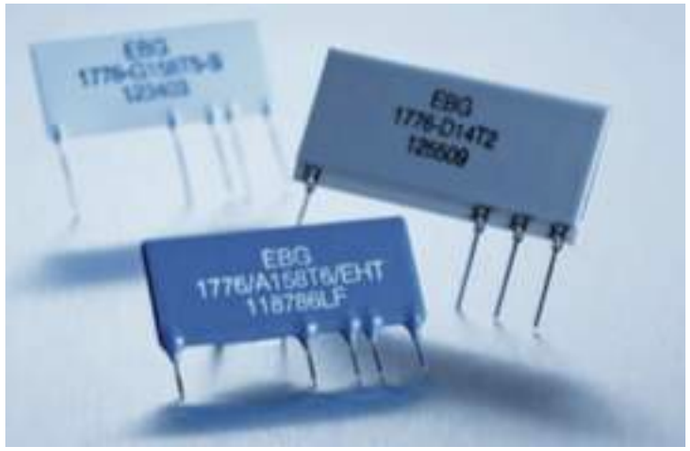


Specifications :

- **Ratio Tolerance:** 0.05% to 0.25%
- **Absolute Tolerance:** ±0.1% to ±0.5%
- **Ratio Temp. Coefficient:** 10ppm/°C to 50ppm/°C
- **Absolute Temp. Coefficient:**

±25ppm/°C to ±50ppm/°C • Voltage Coefficient: <0.05ppm/V

- **Storage Temperature:** -55°C to + 165°C
- **Load Life (ratio stability):** <0.04%
- **Shelf Life (ratio stability):** <0.02% (six months)
- **Number of Decades:** 3 to 6
- **Values of Single Resistors:** 900Ω to 10MΩ



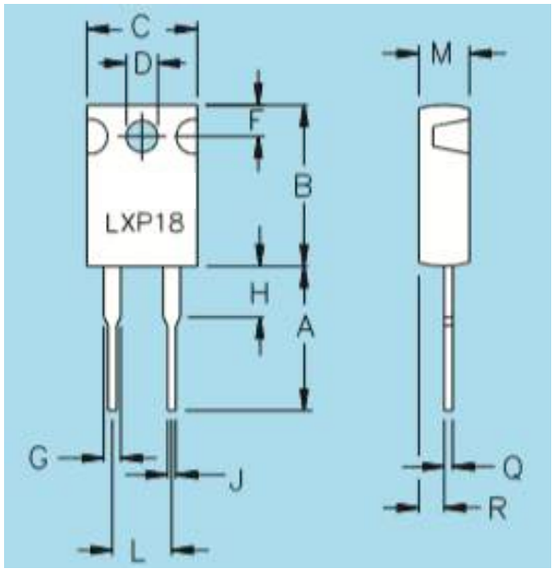
Model-Nr.	Resistance Values R1 Ω	R2 Ω	R3 Ω	R4 Ω	R5 Ω	Figure	Voltage Rating	Absolute Tol.%	Ratio Tol.%	Absol. TCppm/°C	Ratio TC ppm/°C	Vol.Coef. Ratio ppm/V	Ratio Stability % Change in Ratio Load Life	Shelf Life	Over-Voltage	
B169 T3	9M	900K	90K	9K	900	1	1200	0.1	0.1	30	10	0.1	0.02	0.01	0.01	C
B168 T3	9M	900K	90K	9K	1K	1	1200	0.1	0.1	30	10	0.1	0.02	0.01	0.01	C
E167 T1	9M	900K	90K	9K	900	2	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04	C
B167 T1	9M	900K	90K	9K	900	2	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04	C
E166 T1	9M	900K	90K	9K	1K	2	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04	C
B166 T1	9M	900K	90K	9K	1K	2	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04	C
E16 T1	9M	900K	90K	9K	900	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04	C
B16 T1	9M	900K	90K	9K	900	3	1200	0.1	0.1	50	50	0.2	0.02	0.01	0.02	C
A16 T1	9M	900K	90K	9K	900	3	1200	0.1	0.05	50	50	0.2	0.02	0.01	0.02	C
E161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04	C
D161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.1	50	50	0.2	0.02	0.01	0.02	C
C161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.05	50	50	0.2	0.02	0.01	0.02	C
F37 T3	9M	900K	90K	10K	N/A	4	1200	+0-0.5	0.1	30	10	0.02	0.02	0.01	0.01	
F379 T3	9M	900K	90K	10K	N/A	5	1200	+0-0.5	0.1	30	10	0.02	0.02	0.01	0.01	
C15 T3	9M	900K	90K	10K	N/A	6	1200	0.25	0.05	30	10	0.02	0.02	0.01	0.01	
D15 T3	9M	900K	90K	10K	N/A	6	1200	0.25	0.1	30	10	0.02	0.02	0.01	0.01	
D14 T2	9.9M	90K	10K	N/A	N/A	7	1200	0.25	0.1	30	25	0.2	0.02	0.01	0.02	C
D14 T3	9.9M	90K	10K	N/A	N/A	7	1200	0.25	0.1	30	10	0.02	0.02	0.01	0.01	C
E39 T3	10M	1.111M	101.01K	10.01K	1.0001K	8	1200	0.25	0.25	30	10	0.1	0.02	0.01	0.01	C
B39 T3	10M	1.111M	101.01K	10.01K	1.0001K	8	1200	0.1	0.1	30	10	0.1	0.02	0.01	0.01	C
G39 T1	10M	1.111M	101.01K	10.01K	1.0001K	8	1200	0.5	0.5	50	50	0.5	0.04	0.02	0.04	C
E39 T1	10M	1.111M	101.01K	10.01K	1.0001K	8	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04	C
E159 T5	900K	90K	9K	900	N/A	9	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02	C
B159 T6	900K	90K	9K	900	N/A	9	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02	C
A159 T6	900K	90K	9K	900	N/A	9	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02	C
G158 T5	900K	90K	9K	1K	N/A	9	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02	C
B158 T6	900K	90K	9K	1K	N/A	9	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02	C
A158T6	900K	90K	9K	1K	N/A	9	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02	C

• Series LXP 18 to 220

18 WattThick Film Power Resistors for High Frequency and Pulse Loading Applications

Etronics offers the totally encapsulated and insulated TO-220 package for low ohmic value and non-inductive design for high frequency and pulsing applications. Ideal use is for power supplies. This series is rated at 18 Watts mounted to a heat sink.
The special features include:

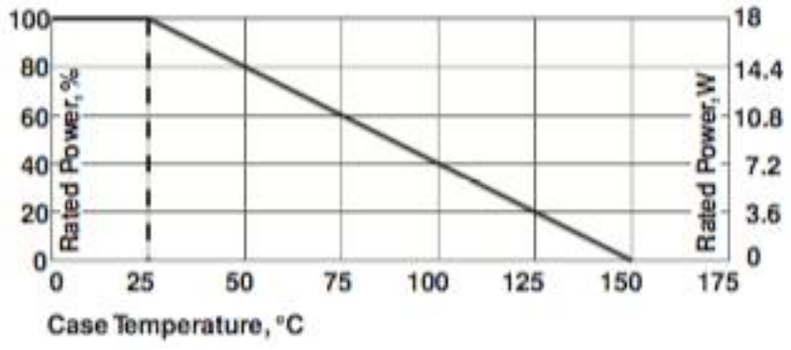
- 18 Watt power rating at 25°C case temperature
- TO-220 package configuration
- Single screw mounting simplifies attachment to the heat sink.
- A totally molded housing for environmental protection.
- Non-Inductive design
- Resistor package totally insulated from heat sink.

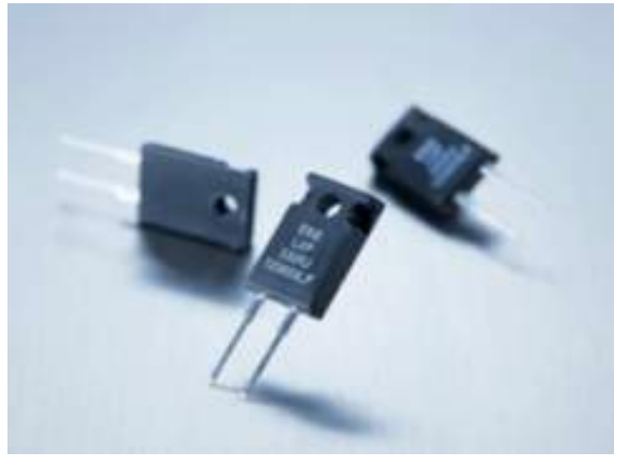


Specifications :

- **Resistance Range:** 0.05Ω to 1MΩ other values on request
- **Resistance Tolerance:** ±1%, ±2%, ±5%, ±10% (0.5% on request)
- **Temperature Coefficient:** 10Ω and above, ±50ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1Ω and 10Ω, ± (100ppm+0.002Ω)/°C, referenced to 25°C, ΔR taken at +105°C
- **Max. Operating Voltage:** 350V
- **Dielectric Strength:** 1,800VAC
- **Power Rating:** 18 W at 25°C. Depends upon case temperature. See Derating Curve.
- **Insulation Resistance:** 10 GΩ min.
- **Momentary Overload:** 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ± (0.3% + 0.001Ω) max.
- **Load Life:** MIL–R–39009, 2,000 hours at rated power, ΔR ±(1.0% + 0.001Ω).
- **Moisture Resistance:** MIL–Std–202, Method 106, ΔR ±(0.5% + 0.001Ω) max.
- **Thermal Shock:** MIL–Std–202, Method 106, ΔR ±(0.5% + 0.001Ω) max.
- **Terminal Strength:** MIL–Std–202, Method 211, Cond. A (Pull Test) 2.4N., ΔR ±(0.2% + 0.001Ω) max.
- **Vibration, High Frequency:** MIL–Std–202, Method 204, Cond. D, ΔR ±(0.2% + 0.001Ω) max.
- **LeadMaterial:** TinnedCopper
- **Max. Torque:** Using a screw and a compression washer mounting technique is 0.9 Nm
- For pulse power details, please see page 32 (datasheet UXP- 300)!

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	11.43	13.97	0.450	0.550
B	16.00	16.52	0.630	0.650
C	10.15	10.67	0.400	0.420
D	3.08	3.28	0.121	0.129
F	2.92	3.44	0.115	0.135
G	1.14	1.40	0.045	0.055
H	2.54	4.06	0.100	0.160
J	0.66	0.86	0.026	0.034
L	4.82	5.34	0.190	0.210
M	2.92	3.44	0.115	0.135
Q	0.40	0.60	0.016	0.024
R	1.52	2.04	0.060	0.080





• Series LXP 20 to 220

20 WattThick Film Power Resistors for High Frequency and Pulse Loading Applications

Etronics offers the totally encapsulated and insulated TO-220 package for low ohmic value and non-inductive design for high frequency and pulsing applications. Ideal use is for power supplies. This series is rated at 20 Watts mounted to a heat sink.

The special features include:

- 20 Watt power rating at 25°C case temperature
- High pulse tolerant design
- TO-220 package configuration
- Snap-on style TO-220 heat sink required
- A totally molded housing for environmental protection.
- Non-Inductive design
- Resistor package totally insulated from heat sink.

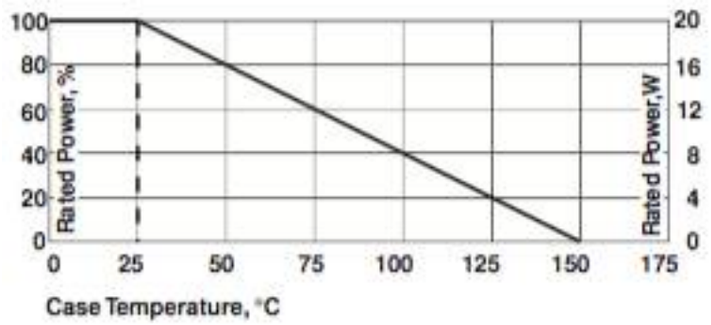
Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	11.43	13.97	0.450	0.550
B	16.00	16.52	0.630	0.650
C	10.15	10.67	0.400	0.420
G	1.14	1.40	0.045	0.055
H	2.54	4.06	0.100	0.160
J	0.66	0.86	0.026	0.034
L	4.82	5.34	0.190	0.210
M	2.92	3.44	0.115	0.135
Q	0.40	0.60	0.016	0.024
R	1.52	2.04	0.060	0.080

Specifications :

- **Resistance Range:** 0.05Ω to 1MΩ other values on request
- **Resistance Tolerance:** ±1%, ±2%, ±5%, ±10% (0.5% on request)
- **Temperature Coefficient:** 10Ω and above, ±50ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1Ω and 10Ω, ±(100ppm + 0.002Ω)/°C, referenced to 25°C, ΔR taken at +105°C
- **Max. Operating Voltage:** 350V
- **DielectricStrength:**1,800VAC
- **Power Rating:**

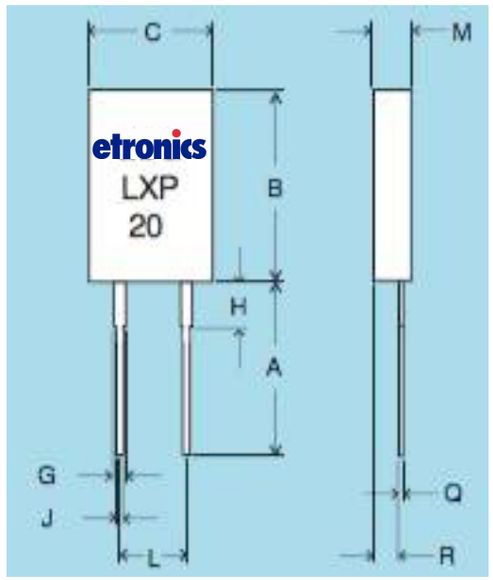
20W at 25°C. Depends upon case temperature. See Derating Curve.

- **Insulation Resistance:** 10GΩ min.
- **Momentary Overload:** 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ± (0.3% + 0.001Ω) max.
- **Load Life:** MIL–R–39009, 2,000 hours at rated power, ΔR ±(1.0% + 0.001Ω).
- **Moisture Resistance:** MIL–Std–202, Method 106, ΔR ±(0.5% + 0.001Ω) max.
- **Thermal Shock:** MIL–Std–202, Method 107, Cond. F, ΔR ±(0.3% + 0.001Ω) max.
- **Terminal Strength:** MIL–Std–202, Method 211, Cond. A (PullTest)2.4N,ΔR±(0.2%+0.001Ω) max.
- **Vibration, High Frequency:** MIL–Std–202, Method 204, Cond. D, ΔR ±(0.2% + 0.001Ω) max.
- **LeadMaterial:** TinnedCopper
- For pulse power details, datasheet UXP- 300



Derating (thermal resistance): 0.16W/°K (6.25°K/W). Without a heatsink, when in free air at 25°C, the LXP20 is rated for 3W. By using the element with a snap-on heat sink the resistor is rated for 5W. Derating for temp. above 25°C is 0.018W/ °K.

The case temperature is to be used for the definition of the applied power limit. The case temperature measurement must be made with a thermocouple contacting the center of the component mounted on the designed heat sink. Thermal grease should be applied properly.



Power Resistors

• Series LXP 100 to 247

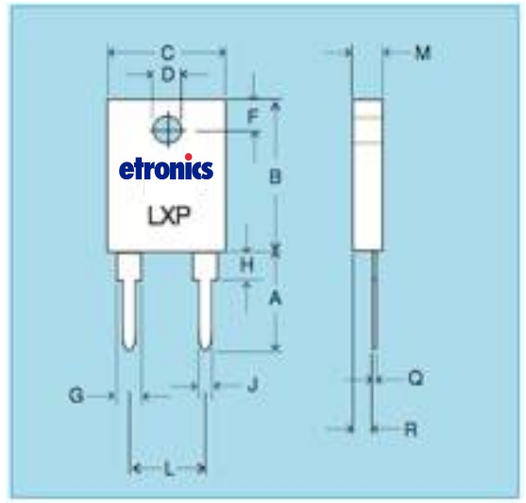
100 Watt Thick Film Power Resistors for High Frequency and Pulse Loading Applications

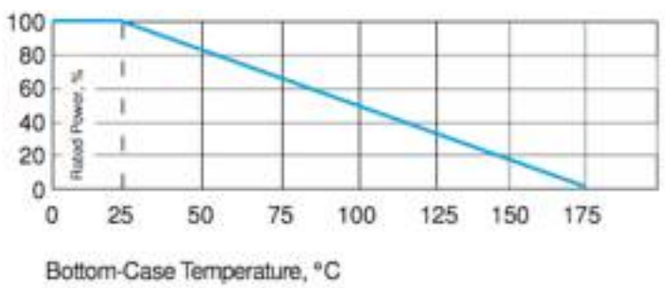
Etronics offers the totally encapsulated:
and insulated TO-247 package for low ohmic value and non-inductive design for high frequency and pulsing applications. Ideal use is for power supplies. This series is rated at 100 Watts mounted to a heatsink.

The special features include:
- 100 Watt power rating at 25°C case temperature
- TO-247 package configuration
- Single screw mounting simplifies attachment to the heatsink
- A totally molded housing for environmental protection.
- Non-Inductive design
- Resistor package totally insulated from heat sink.
- Tube packing available! (packing unit: 35 pcs./ tube)
- For perfect heat dissipation, usage of mounting clamp is suggested.

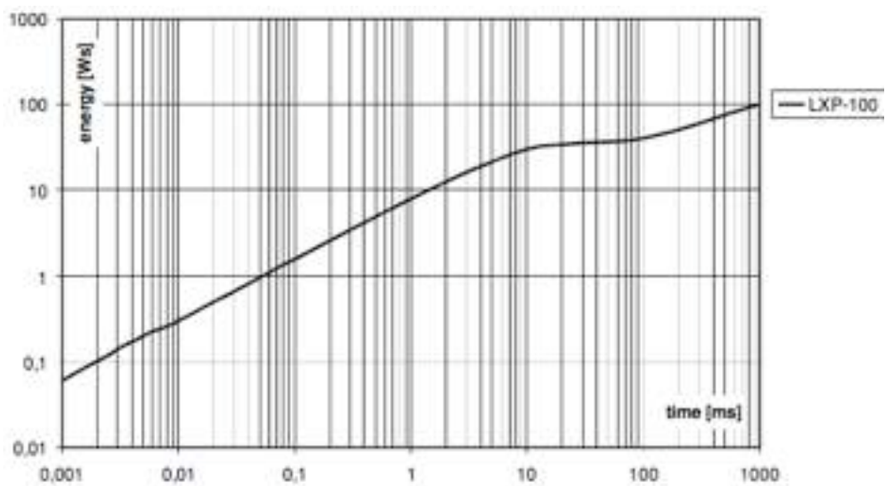
Specifications :

- **Resistance Range:** 0.05Ω to 1MΩ other values on request
- **Resistance Tolerance:** ±1% ±2% ±5% ±10%
- **Temperature Coefficient:**
>10Ω: ±50ppm/°C, referenced to 25°C, ΔR taken at +105°C others on request
- **Max. Operating Voltage:** 350 V max. 500V on request
- **Dielectric Strength:** 1,800V AC
- **Insulation Resistance:** 10GΩ min. • Power Rating: 100 W at 25°C case temperature derated to 0 Watt at 175°C
- **Short Time Overload:** 1.5x rated power with applied voltage not to exceed 1.5x Vmax. for 5 seconds. ΔR < ± (0.50% + 0.0005Ω)
- **Dielectric strength:** Mil-Std-202 method 301 (1.800V AC, 60s) ΔR < ± (0.15% + 0.0005Ω) Life: MIL–R–39009D 4.8.13 - 2.000 hours at rated power
ΔR < ±(1.0% + 0.0005Ω)
- **Moisture Resistance:** -10°C to +65°C, RH>90% cycle 240 h ΔR < ±(0.50% + 0.0005Ω)
- **Thermal Shock:** Mil-Std-202 method 107, Cond. F ΔR < ±(0.50% + 0.0005Ω)
- **Terminal Strength:** Mil-Std-202 method 211, Cond. A (Pull Test) 2.4 N ΔR < ±(0.20% + 0.0005Ω)
- **Vibration, High Frequency:** Mil-Std-202 method 204, Cond. D ΔR < ±(0.40% + 0.0005Ω)
- **Lead Material:** Tinned Copper
- **Installation - max. Torque:** Using a M3 screw and a compression washer mounting technique is 0.9 Nm





Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	13.21	15.75	0.520	0.620
B	20.44	20.96	0.805	0.825
C	15.49	16.01	0.610	0.630
D	3.53	3.73	0.139	0.147
F	5.07	5.59	0.200	0.220
G	3.45	3.81	0.136	0.150
H	2.03	3.55	0.080	0.140
J	1.37	1.67	0.054	0.066
L	9.90	10.42	0.390	0.410
M	4.69	5.21	0.185	0.205
Q	0.55	1.07	0.310	0.330
R	2.15	2.67	0.085	0.105



• Series MXP 35 to 220

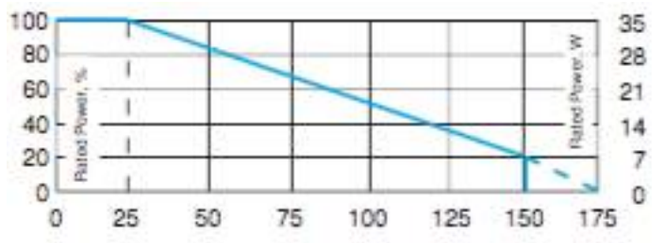
35 Watt Thick Film Power Resistors for High Frequency and Pulse Loading Applications

The special performance features of the Type **MXP** include:

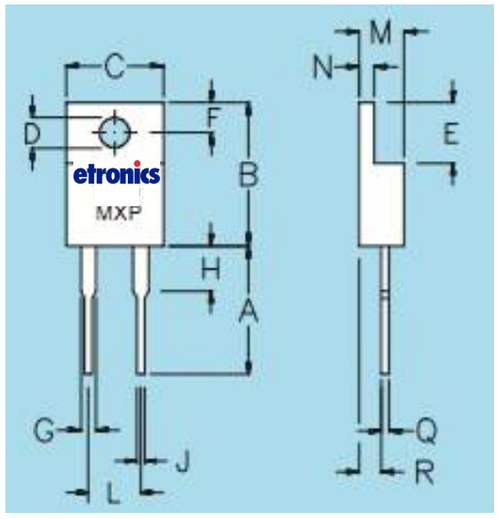
- 35 Watt power rating at 25°C
- TO-220 package configuration
- Single screw mounting simplifies attachment to heat sink
- Heat resistance to cooling plate: R_{th}< 4.28 °K/W
- A molded case for environmental protection.
- Resistor element is electrically insulated from the metal sink tab.
- Standard lead form for easier fit.

Derating (thermal resistance): 0.23W/°K (4.28°K/W)

Without a heatsink, when in free air at 25°C, the MXP is rated for 2.50W. Derating for temp. above 25°C is 0.02W/°K.



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	12.70	14.70	*0.500*	*0.579*
B	14.50	15.00	*0.571*	*0.591*
C	9.91	10.41	*0.390*	*0.410*
D	3.55	3.75	*0.139*	*0.148*
E	5,85	6.35	*0.230*	*0.250*
F	2.85	3.05	*0.112*	*0.120*
G	1.17	1.37	*0.046*	*0.054*
H	– –	4.00	– –	*0.157*
J	0.70	0.86	*0.027*	*0.034*
L	4.83	5.33	*0.190*	*0.210*
M	4.06	4.82	*0.159*	*0.190*
N	1.20	1.40	*0.047*	*0.055*
Q	0.55	0.70	*0.022*	*0.028*
R	2.05	2.25	*0.080*	*0.089*



Specifications:

- **Resistance Range:** 0.05Ω to 1MΩ other values on request
- **Resistance Tolerance:** ±1% to ±10% (0.5% on request)
- **Temperature Coefficient:**

10Ω and above, ± 50ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1Ω and 10Ω, ± (100ppm+0.002Ω)/°C, referenced to 25°C, ΔR taken at +105°C.

- **Max. Operating Voltage:** 350V • Dielectric Strength: 1,800VAC
- **Insulation Resistance:**10GΩ min.
- **Momentary Overload:**

2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.3% + 0.01Ω) max.

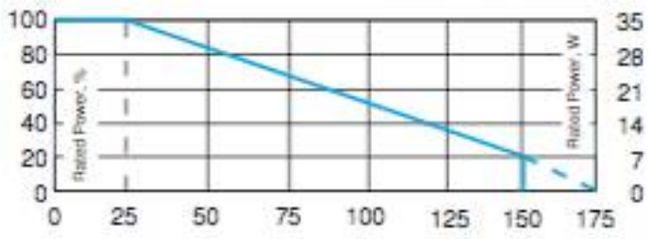
- **Load Life:** MIL–R–39009, 2,000 hours at rated power, ΔR ±(1.0% + 0.01Ω).
- **Power Rating:** Depends upon case temperature. See Derating Curve.
- **Moisture Resistance:** MIL–Std–202, Method 106, ΔR =(0.5% + 0.01Ω) max.
- **Thermal Shock:** MIL–Std–202, Method 107, Cond. F, ΔR =(0.3% + 0.01Ω) max.
- **Working Temperature Range:** -55°C to +175°C
- **Terminal Strength:** MIL–Std–202, Method 211, Cond. A (Pull Test) 2.4N, ΔR =(0.2% + 0.01Ω) max.
- **Vibration, High Frequency:** MIL–Std–202, Method 204, Cond. D, ΔR =(0.2% + 0.01Ω) max.
- **LeadMaterial:** TinnedCopper
- **Maximum Torque:** 0.9 Nm
- For pulse power details, please see page 32 (datasheet UXP- 300)!

Power Resistors

• Series MSP 35 SMD to 220

35 Watt Thick Film Power Resistors for High Frequency and Pulse Loading Applications

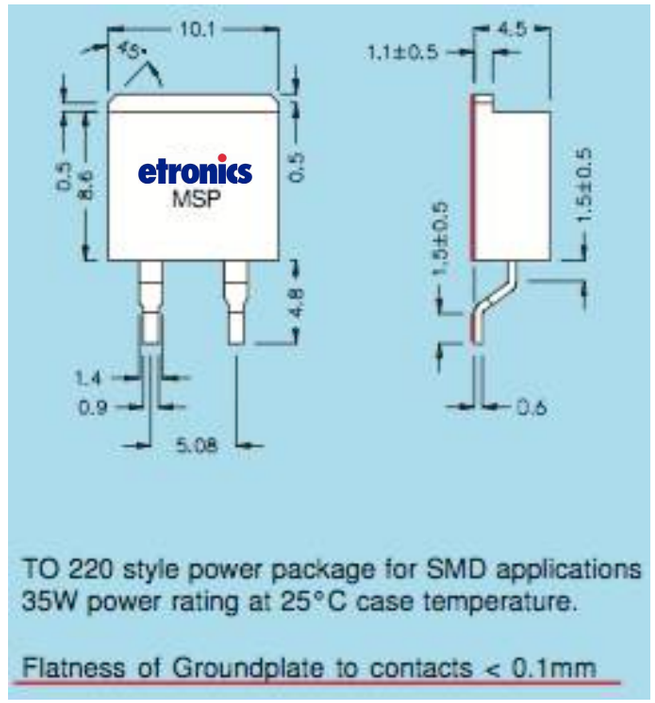
The special performance feature of the Type **MSP** include:
- 35 Watt power rating at 25°C
- **SMD - TO-220** package configuration
- Heat resistance to cooling plate: R < 4.28 °K/W th
- A molded case for environmental protection.
- Resistor element is electrically insulated from the metal sink tab.



Soldering Note:
During surface mount soldering the soldering temperature profile must not cause the metal tab of this device to exceed 220°C.
If the solder profile is higher than 220°C, please use our alternative type **MHP-35 SMD TO 220.**
Please contact us for further information!

Specifications:

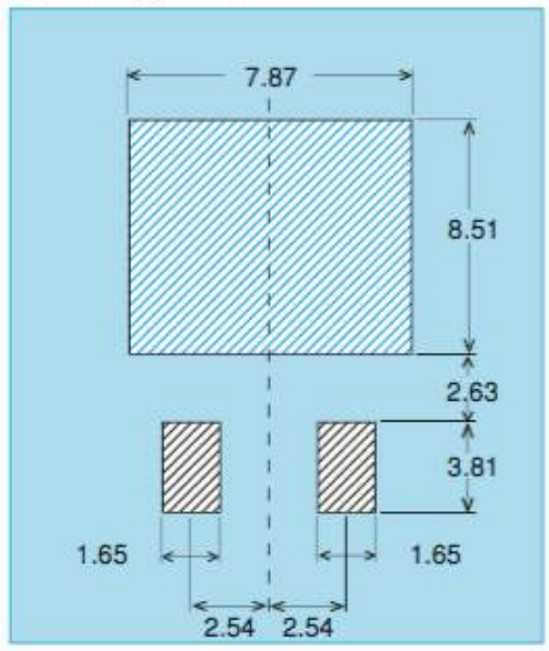
- **Resistance Range:** 0.1Ω to 1 MΩ other values on request
- **Resistance Tolerance:** ±1% to ±10% (±0.5% on request)
- **Temperature Coefficient:** 10Ω and above, ± 50ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1Ω and 10Ω, ±(100ppm +0.002Ω)/°C, referenced to 25°C, ΔR taken at +105°C.
- Max. Operating Voltage: 350V
- **Dielectric Strength:** 1,800VAC
- **Insulation Resistance:**10GΩ min.
- **Momentary Overload:** 2 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds, ΔR ±(0.3% + 0.01Ω) max.
- **Load Life:** MIL–R–39009, 2,000 hours at rated power, ΔR ±(1.0% + 0.01Ω).
- **Power Rating:** Depends upon case temperature. See Derating Curve.
- **Moisture Resistance:** MIL–Std–202, Method 106, ΔR =(0.5% + 0.01Ω) max. • Thermal Shock: MIL–Std–202, Method 107, Cond. F, ΔR =(0.3% + 0.01Ω) max.
- **Working Temperature Range:** -55°C to +175°C
- **Terminal Strength:** MIL–Std–202, Method 211, Cond. A (Pull Test) 2.4N, ΔR =(0.2% + 0.01Ω) max.
- **Vibration, High Frequency:** MIL–Std–202, Method 204, Cond. D, ΔR =(0.2% + 0.01Ω) max.
- **Lead Material:** Ni-plated copper - dip-tinned



TO 220 style power package for SMD applications
35W power rating at 25°C case temperature.

Flatness of Groundplate to contacts < 0.1mm

Soldering Template:



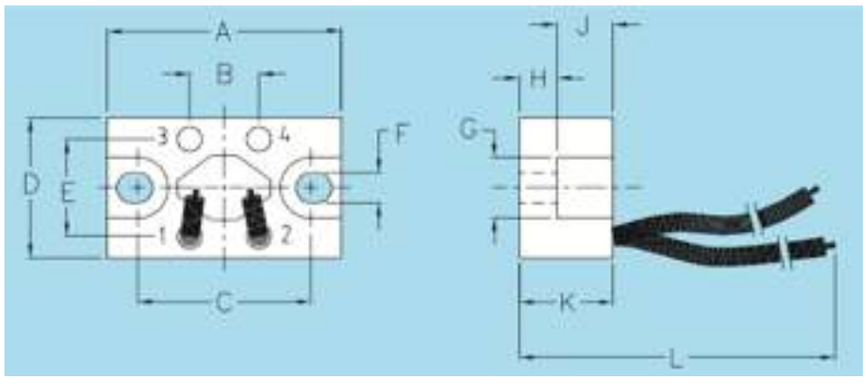
• Series AXP 50

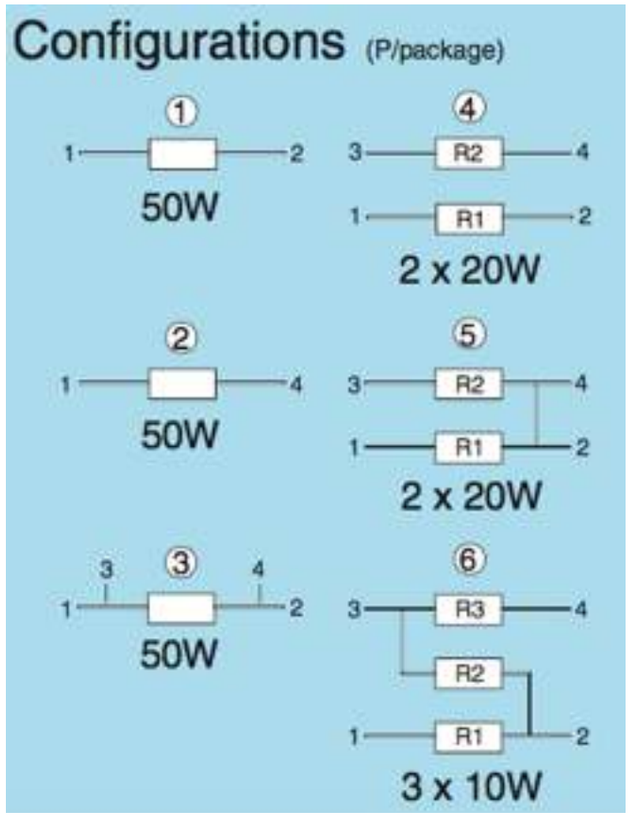
50 W Power Resistor with four wire terminals

The new design with its non-inductive thick film Metal Oxide Technology prevents potential problems with clearance and creepage distance from terminal to base plate by means of flexible connecting leads. This unique design will allow you to use this element in the following areas: variable speed drives; power supplies; control devices; telecommunications; robotics; motor controls and other switching devices.

Specifications:

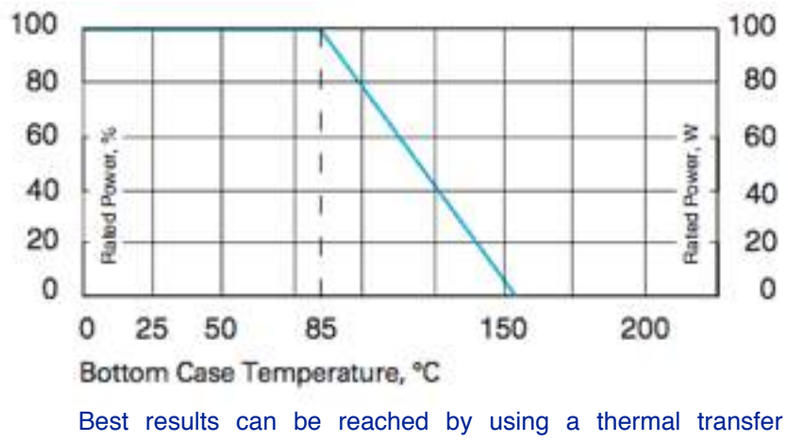
- **Resistance range:** 1 Ω to 1 MΩ
- **Standard tolerance:** ±1% to ±10%
- **Temperature coefficient:** ±50, ±100 ppm, ±250 ppm (at +105°C ref. to +25°C)
- **Max. work. voltage:** 500 V (up to 1,000 VDC upon special request)
- **Power rating:** at 85°C BCT
- **Standard wire length:** L = 100 mm (other lengths available upon special request)
- **Electric strength:** 5 kV DC (3 kV AC, higher values upon request)
- **Mounting - max. torque:** 1.2 Nm
- **Working temperature range:** –55 up to 155 °C
- **Standard cable:** 4GKW, 0,5mm2, black, length = 100mm (others on request)





Suggested Mounting Procedure:

1) Position component and press down by hand.
2) Fix both mounting screws (M3) with 0.1 to 0.2 Nm torque.
3) Apply final torque to mounting screws of 1.0 to 1.2 Nm max.



Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1 W/mK. The flatness of the cooling plate must be better than 0.05 mm overall. Surface roughness should not exceed 6.4 µm.
Derating (thermal resistance): 0.995 W/°K (1.005°K/W). (for conf. 1, 2 and 3)

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	24.8	25.2	1.764	1.779
B	6.9	7.9	0.642	0.681
C	18.3	18.7	1.169	1.185
D	14.8	15.2	1.031	1.047
E	9.9	10.9	0.866	0.906
F	3.0	3.4	0.161	0.169
G	6.3	6.7	0.315	0.331
H	3.8	4.2	0.161	0.173
J	5.8	6.2	0.228	0.244
K	10.0	10.5	0.394	0.413
L	100.0	105.0	3.937	4.134

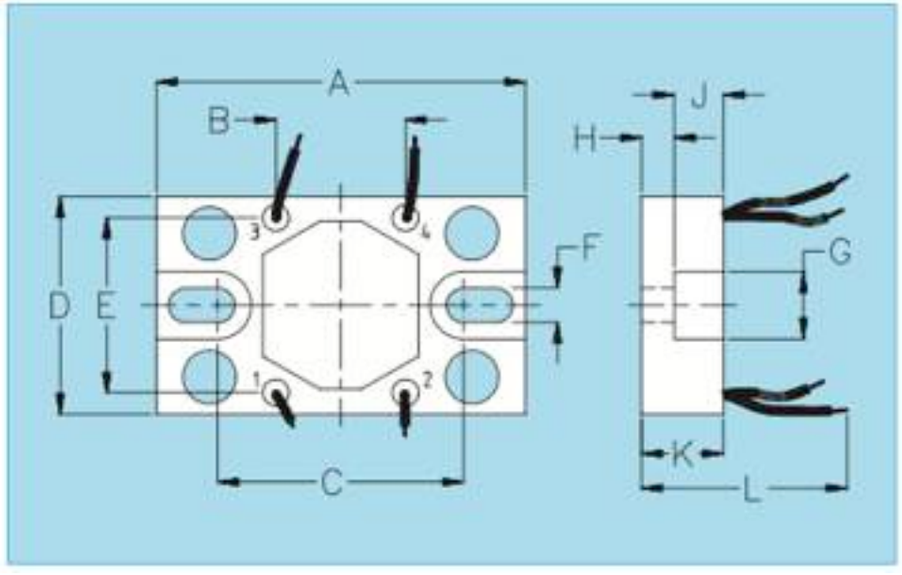
• Series AXP 100

100 Watt Power Resistor with (4) wire Terminals, Version B for enforced mechanical stability

This new design of the non– inductive thick film Metal Oxide Technology with the wire terminals eliminates the possibility for problems regarding creeping distance from terminal to ground. This unique design will allow you to use this element in the following areas: Variable Speed Drives; Power Supplies; Control Devices; Telecommunications; Robotics; Motor Controls and other Switching Devices.
Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.

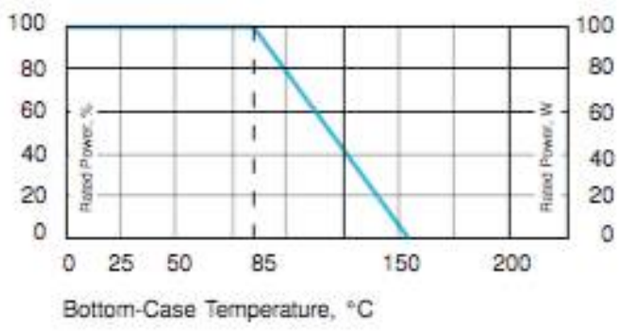
Suggested Mounting Procedure:

1. Position component and press down by hand.
2. Fix both mounting screws (M4) with 0.1 to 0.2 Nm torque.
3. Apply final torque to mounting screws of 1.0 to 1.2Nm max.

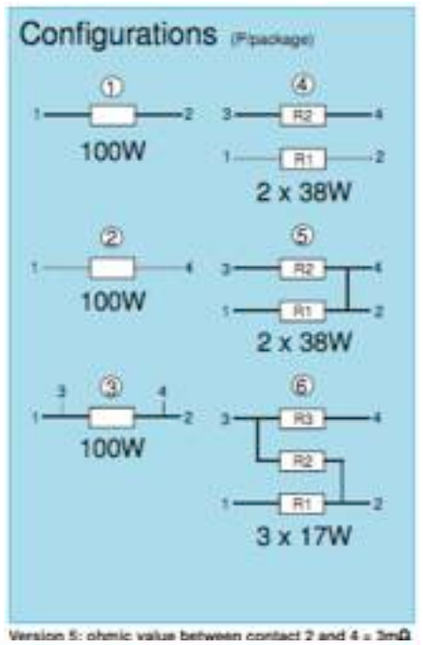


Specifications:

- **Resistance Range:**1Ω to 1MΩ
- **Standard tolerance:**±1% to ±10%
- T**emperature coefficient:** ±50, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Max. Work. Voltage:** 500V (up to 1,500V DC on special request)
- **Power rating:** at 85°C BCT • Short Time Overload: 1.5 x rated power for 10 sec, ΔR = 0.4% max. (for conf. 1, 2 and 3)
- **Standard wire length:** L = 100mm (other lenghts are available on special request)
- **Electric strength:** 5kV DC (3kV AC higher values on request
- **Mounting Max. Torque:** 1.2Nm
- **Working temp. range:** - 55 up to 155 °C



Derating (thermal resistance):
1.42W/°K (0.70°K/W).
(for conf. 1, 2 and 3)



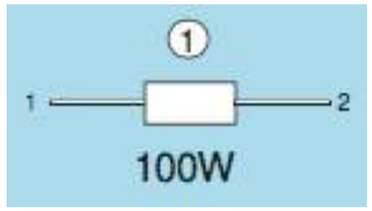
Version 5: ohmic value between contact 2 and 4 = 3mΩ

Dim.	Millimeters Min.	Max.	Inches Min.	Max.
A	44.8	45.2	1.764	1.779
B	16.3	17.3	0.642	0.681
C	29.7	30.1	1.169	1.185
D	26.2	26.6	1.031	1.047
E	22.0	23.0	0.866	0.906
F	4.1	4.3	0.161	0.169
G	8.0	8.4	0.315	0.331
H	4.1	4.4	0.161	0.173
J	5.8	6.2	0.228	0.244
K	10.0	10.5	0.394	0.413
L	100.0	105.0	3.937	4.134

• Series AXM

100 Watt low Ohm Pulse Power Resistor

This is a new model designed for high pulse withstand capabilities. Please let us have your exact pulse parameters to offer you the best option / design details.
These elements are usually used in areas where stringent pulse withstand requirements are common such as Welding Equipment, Variable Speed Drives and Motor Controls & Switching Devices.



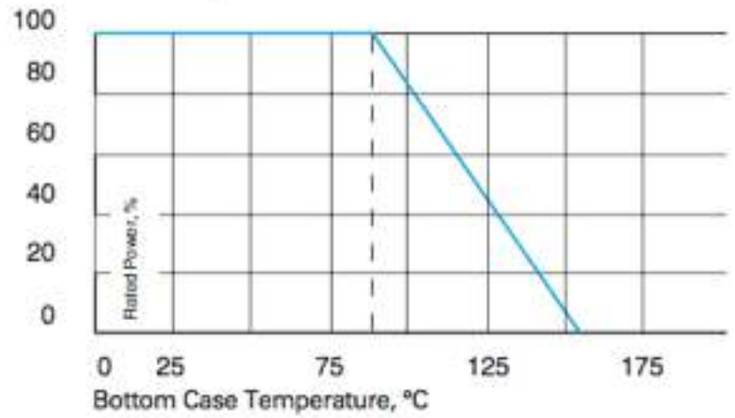
Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK.The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.

Suggested Mounting Procedure:
1) Position component and press down by hand.
2) Fix both mounting screws (M4) with 0.1 to 0.2 Nm torque.
3) Apply final torque to mounting screws of 1.0 to 1.2 Nm max.

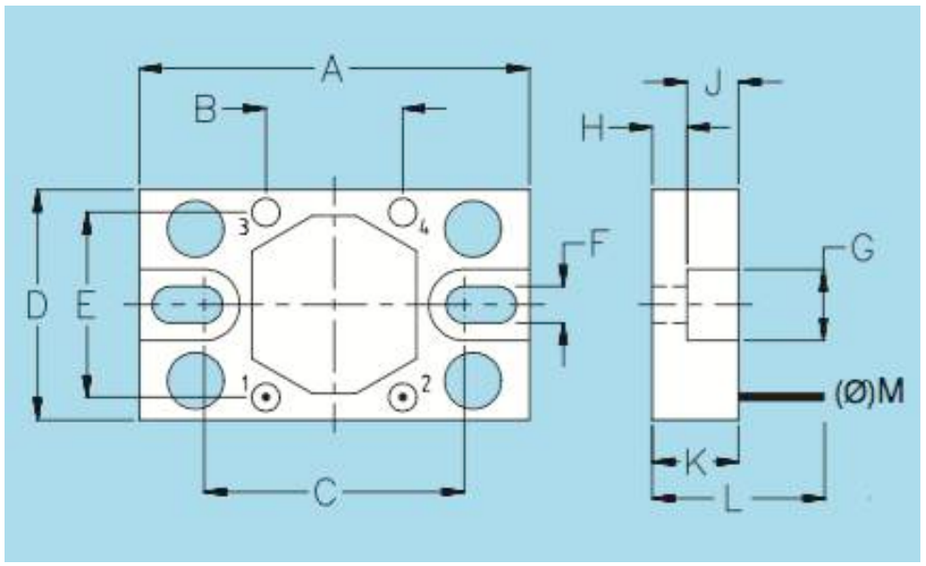
Specifications:

- **Resistance Range:** 0.05Ω to 0.5Ω
- **Standard tolerance:**±10% standard (±5% on request)
- **Temperature coefficient:** typical +500 ppm/°C (at +105°C ref. to +25°C)
- **Max. Work. Voltage:** up to 500V (depending on pulse load scenario)
- **Power rating:** at 85°C BCT
- **Standard wire length:** L = 10mm (other lenghts are available on special request)
- **Electric strength:** 3kV DC (1.5kV AC, higher values on request)
- **Max. Torque:** 1.2Nm
- **Working temp. range:** -55 up to 155°c

Derating:



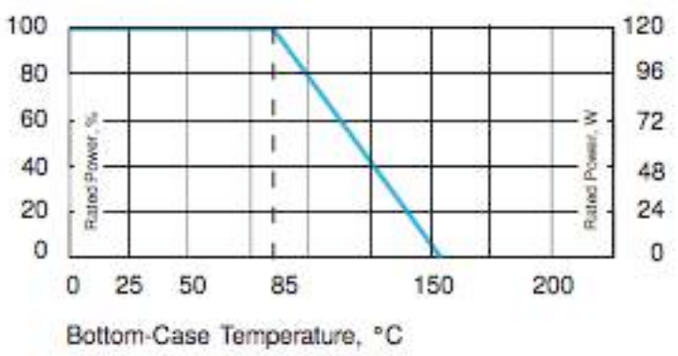
Dim.	Millimeters Min.	Max.	Inches Min.	Max.
A	44.8	45.2	1.764	1.779
B	16.3	17.3	0.642	0.681
C	29.7	30.1	1.169	1.185
D	26.2	26.6	1.031	1.047
E	22.0	23.0	0.866	0.906
F	4.1	4.3	0.161	0.169
G	8.0	8.4	0.315	0.331
H	4.1	4.4	0.161	0.173
J	5.8	6.2	0.228	0.244
K	10.0	10.5	0.394	0.413
L	19.0	21.0	0.748	0.827
M	0.95	1.05	0.037	0.041



• Series GXP 120, SOT 227

120 WattPower Resistor in the «ISOTOP» Power device (1x120W / 2x50W / 3x30w acc Configurations)

Due to a non inductive design these elements are ideally suited for high frequency and pulse load applications. By direct mounting on a heatsink significant cost advantages can be realized. The type **GXP** can be supplied in a 2-terminal or 4-terminal version. Even triple resistors are available. Main applications are: Variable speed Drives, Power Supplies, Control Devices, Telecom, Robotics, Motor Controls and other switching designs.
Specials and custom designed components on request.

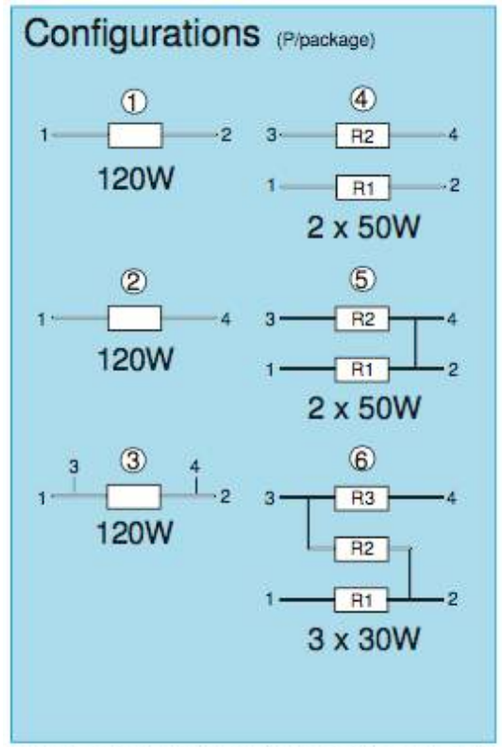


Derating (thermal resistance): 2.22W/°K (0.45°K/W).
(for conf. 1, 2 and 3)

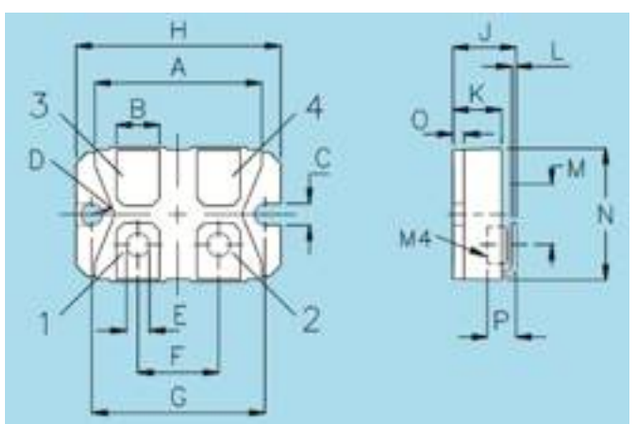
Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.

Specifications:

- **Resistance Range:** 0.1Ω to 1MΩ
- **Tolerance:** ±1%, 2%, 5%,10%
- **Temperature coefficient:** ±50, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Max. Work.Voltage:** 500V (up to 1,000V on special request)
- **Power Rating at 85°C:** 120W (see derating) • **Short Time Overload:** 1.5 x rated power @ 85°C Bottom Case Temp. for 10sec, ΔR = 0.4% max. (for conf. 1, 2 and 3)
- **Partial Discharge:** up to 2,000Vrms/80 pC
- **Voltage Proof:** Dielectric Strength up to 4,000V DC against ground
- **Insulation Resistance:** 10GΩ Min. @ 1kV DC
- **Isolation voltage between R1 and R2:** 500V 1000V on special request
- **Protection class:** acc. to IEC 950/CSA22.2 950/ M-89 and EN 60950.88: 2
- **Heat Resistance to Cooling Plate:** R_{th} <0.35 K/W
- **Capacitance/Mass:** 45pF
- **Working Temp. Range:** -55°C to +155°C
- **Max.Torque for Base Plate(static):** 1.5 Nm. M4 screws
- **Max. Torque for Contacts (static):**1.3Nm.M4screws



Version 5: ohmic value between contact 2 and 4 = 3mΩ



Dim.	Millimeters Min.	Max.	Inches Min.	Max.
A	31.0	32.0	1.220	1.260
B	7.8	8.2	0.307	0.323
C	4.1	4.3	0.162	0.169
D	4.0	– –	0.158	– –
E	4.1	4.3	0.162	0.169
F	14.9	15.1	0.587	0.595
G	30.1	30.3	1.186	1.193
H	37.7	38.3	1.484	1.508
J	11.8	12.2	0.465	0.481
K	8.9	9.1	0.351	0.359
L	0.75	0.85	0.030	0.033
M	12.6	12.8	0.496	0.504
N	24.4	25.4	0.960	1.001
O	1.95	2.05	0.077	0.081
P	5.3	– –	0.209	– –

Power Resistors

• Series HPP 150

Non-Inductive 150 Watt Power Resistors according to VDE 0160 and UL 94-V0

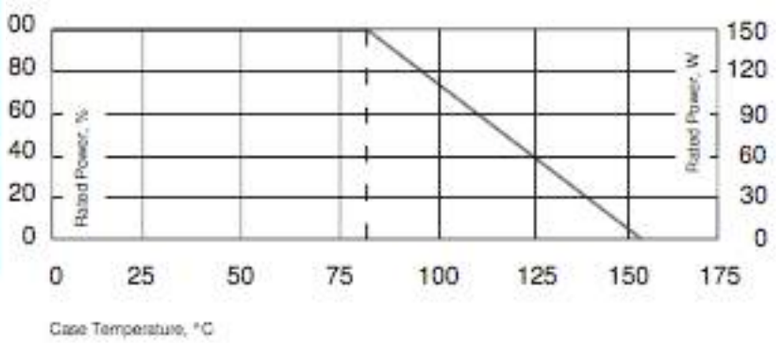
Etronics' series **HPP** is rated at 150 Watts mounted to a heat sink. There are four configurations of resistive patterns available in the package. The increased height of the package makes this resistor ideal in applications where creeping distance must meet **VDE 0160** and **UL 094-V0** standards. A few features of the **HPP** include:

- 150 Watts at 85°C
- Non-Inductive Design
- Four configurations of resistive patterns
- Up to 3 resistors in 1 package
- Easy mounting using already existing infra-structure

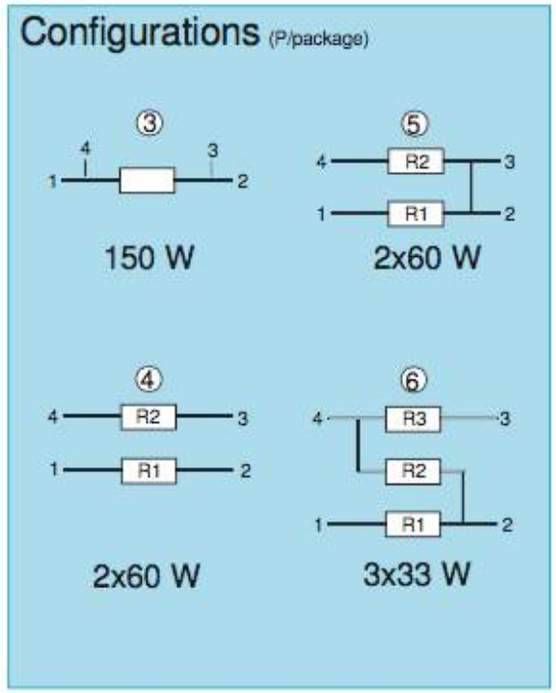
Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	44.7	46.5	*1.760*	*1.831*
B	34.7	35.3	*1.366*	*1.390*
C	14.8	15.2	*0.583*	*0.598*
D	– –	26.5	– –	*1.043*
E	6.2	6.4	*0.244*	*0.252*
F	4.7	4.9	*0.185*	*0.193*
G	5.9	6.1	*0.232*	*0.240*
H	20.9	21.3	*0.823*	*0.839*
J	1.9	2.1	*0.075*	*0.083*
K	3.4	4.0	*0.134*	*0.157*
L	0.77	0.83	*0.0303*	*0.0326*
M	23.0	23.4	*0.905*	*0.921*
N	9.4	9.8	*0.370*	*0.386*
O	1.9	2.1	*0.075*	*0.083*

Specifications:

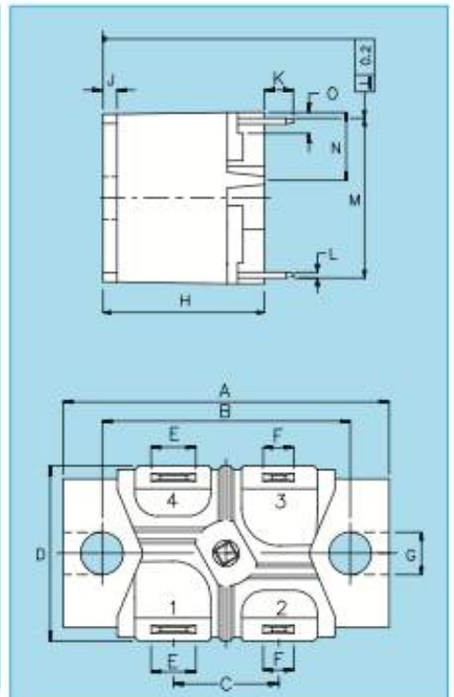
- **Resistance Range:** 1Ω to1MΩ (other values on request)
- **Tolerance:** ±1%, ±2%, ±5%, ±10%
- **Temperature Coefficient:** ±50ppm, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Max. Working Voltage:** 500V (up to 1,000V on special request)
- **Power Rating at 85°C:** 150W (others upon request)
- **Voltage Proof:** 5,000 VDC, 3,000 VAC
- **Insulation Resistance:** 10GΩ Min. @ 1kV DC
- **Isolation voltage between R1 and R2:** 500V 1000V on special request
- **Heat resistance to cooling plate:** < 0.47 °K/W
- **Capacitance/mass:** 45 pF
- **Working temperature range:** -55°C to +155°C
- **Max. torque for base plate (static):**1.5 Nm. M5 screws
- For pulse power details, please see page 32 (datasheet UXP- 300)!



Derating (thermal resistance): 2.14W/°K (0.47°K/W). (for conf. 3) Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.



Version 5: ohmic value between contact 2 and 3 = 3mΩ



Creeping distance:

- ③ Contacts 1 and 2 resp. 3 and 4 — without Fast-on-Plug: 20.0mm; with Fast-on-Plug: 19.0mm
- ④ Contacts 1 and 4 resp. 2 and 3 — without Fast-on-Plug: 27.4mm; with Fast-on-Plug: 25.8mm
- ⑤ Contacts 2 resp. 3 to base plate — without Fast-on-Plug: 20.2mm; with Fast-on-Plug: 19.8mm
- ⑥ Contacts 1 resp. 4 to base plate — without Fast-on-Plug: 19.5mm; with Fast-on-Plug: 18.9mm

Air distance contact to contact:

- ③ Contacts 1 and 2 resp.3 and 4 — without Fast-on-Plug: 9.2mm; withFast-on-Plug: 8.2mm
- ④ Contacts 1 and 4 resp. 2 and 3 — without Fast-on-Plug: 21.9mm; with Fast-on-Plug: 20.9mm
- ⑤ Contacts 2 resp. 3 and M5 - mounting screw with washer — without Fast-on-Plug: 16.3mm; with Fast-on-Plug: 15.9mm
- ⑥ Contacts 1 resp. 4 and M5 - mounting screw with washer — without Fast-on-Plug: 15.5mm; with Fast-on-Plug:

• Series VHP

Non-Inductive 180 Watt Power Resistors according to VDE 0160 and UL 94-V0

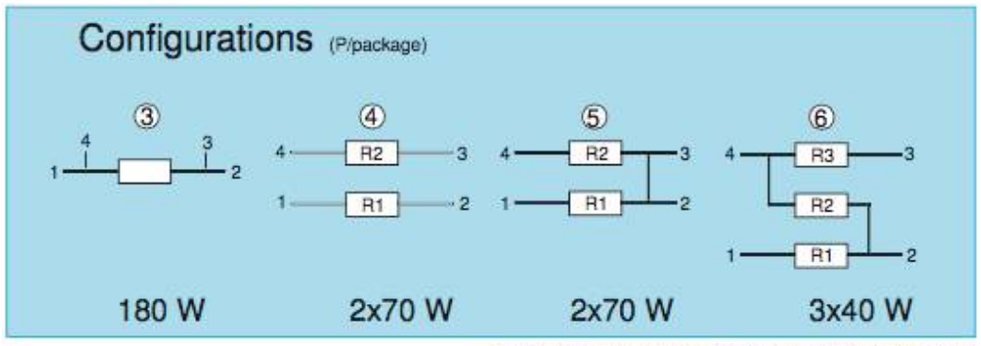
Etronics' series **VHP** is rated at 180 Watts mounted to a heat sink. There are four configurations of resistive patterns available in the package. The increased height of the package makes this resistor ideal in applications where creeping distance must meet **VDE 0160** and **UL 094-V0** standards.
A few features of the VHP include:

- 180 Watts at 85°C
- Non-Inductive Design
- Four configurations of resistive patterns
- Up to 3 resistors in 1 package
- Easy mounting using already existing infrastructure

Specifications:

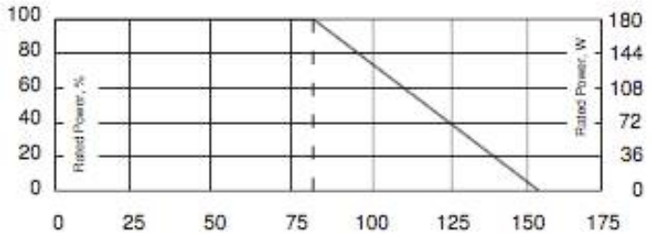
- **Resistance Range:** 1Ω to1MΩ (other values on request)
- **Tolerance:** ±1%, ±2%, ±5%, ±10%
- **Temperature Coefficient:** ±50ppm, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Max. Working Voltage:** 500V (up to 1,000V on special request)
- **Power Rating at 85°C:** 180W (others upon request)
- **Voltage Proof:** 5,000 VDC, 3,000 VAC
- **Insulation Resistance:** 10GΩ Min. @ 1kV DC
- **Isolation voltage** between R1 and R2: 500V 1000V on special request
Heat resistance to cooling plate: < 0.47 °K/W
- **Capacitance/mass:** 45 pF
- **Working temperature range:** -55°C to +155°C
- **Max. torque** for base plate (static):1.5 Nm. M5 screws

	Air distance contact to contact:		Creeping distance:	
③	• Contacts 1 and 2 resp.3 and 4		• Contacts 1 and 2 resp. 3 and 4	
	without Fast-on-Plug:	9.2mm	without Fast-on-Plug:	20.0mm
	withFast-on-Plug:	8.2mm	with Fast-on-Plug:	19.0mm
④	• Contacts 1 and 4 resp. 2 and 3		• Contacts 1 and 4 resp. 2 and 3	
	without Fast-on-Plug:	21.9mm	without Fast-on-Plug:	27.4mm
	with Fast-on-Plug:	20.9mm	with Fast-on-Plug:	25.8mm
⑤	• Contacts 2 resp. 3 and M5 - mounting screw with washer		• Contacts 2 resp. 3 to base plate	
	without Fast-on-Plug:	16.3mm	without Fast-on-Plug:	20.2mm
	with Fast-on-Plug:	15.9mm	with Fast-on-Plug:	19.8mm
⑥	• Contacts 1 resp. 4 and M5 - mounting screw with washer		• Contacts 1 resp. 4 to base plate	
	without Fast-on-Plug:	15.5mm	without Fast-on-Plug:	19.5mm
	with Fast-on-Plug:	15.0mm	with Fast-on-Plug:	18.9mm

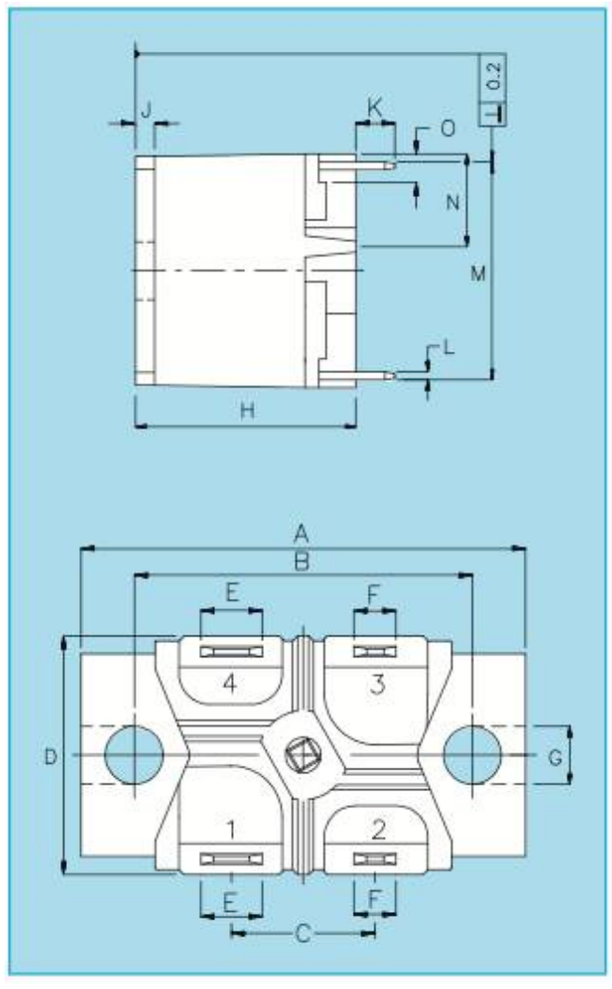


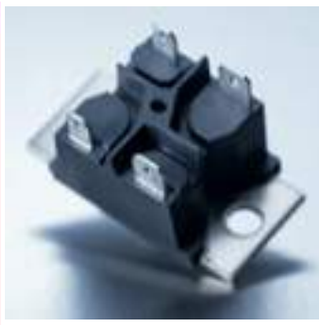
Version 5: ohmic value between contact 2 and 3 = 3mΩ

Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	44.7	46.5	*1.760*	*1.831*
B	34.7	35.3	*1.366*	*1.390*
C	14.8	15.2	*0.583*	*0.598*
D	– –	26.5	– –	*1.043*
E	6.2	6.4	*0.244*	*0.252*
F	4.7	4.9	*0.185*	*0.193*
G	5.9	6.1	*0.232*	*0.240*
H	20.9	21.3	*0.823*	*0.839*
J	1.9	2.1	*0.075*	*0.083*
K	3.4	4.0	*0.134*	*0.157*
L	0.77	0.83	*0.0303*	*0.0326*
M	23.0	23.4	*0.905*	*0.921*
N	9.4	9.8	*0.370*	*0.386*
O	1.9	2.1	*0.075*	*0.083*



Derating (thermal resistance): 2.5W/°K (0.40°K/W). (for conf. 3)
Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.





• Series HPS 150

Non-Inductive 150 Watt Power Resistors according to VDE 0160 and UL 94-V0

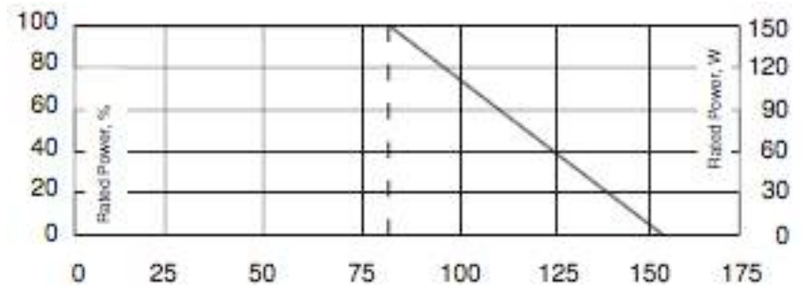
Etronics series **HPS** is rated at 150 Watts mounted to a heat sink. The increased height of the package makes this resistor ideal in applications where creeping distance must meet **VDE 0160** and **UL 094-V0** standards.

A few features of the HPS include:

- 150Watts at 85°C
- Non-InductiveDesign
- Easy mounting using already existing infrastructure

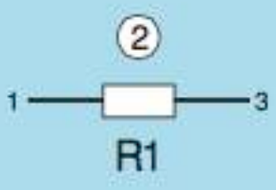
Specifications

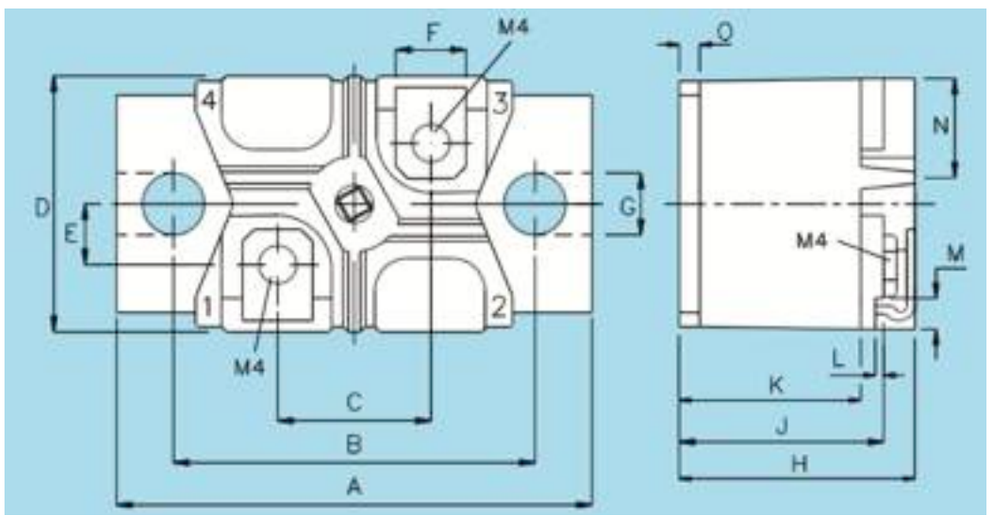
- **Resistance Range:** 1Ω to 1MΩ (other values on request)
- **Tolerance:** ±1, ±2, ±5, ±10%
- **Temperature Coefficient:** ±50ppm, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- **Power Rating at 85°C:** 150 W (others upon request)
- **Max. Working Voltage:** 500V (up to 1,000V on special request)
- **Voltage Proof:** 5,000 VDC, 3,000 VAC
- **Insulation Resistance:** 10GΩ Min. @ 1kV DC
- **Heat Resistance to Cooling Plate:** < 0.47 °K/W
- **Capacitance/Mass:** 45pF
- **Working Temp. Range:** -55°C to +155°C
- **Max. Torque for Base Plate (static):** 1.5 Nm M5 screws
- **Max. Torque for Contacts (static):** 1.3 Nm M4 screws
- For pulse power details, please see page 32 (datasheet UXP-300)!



Derating (thermal resistance): 2.14W/°K (0.47°K/W).
Best results can be reached by using a thermal transfer compound with a heat conductivity of better than 1W/mK. The flatness of the cooling plate must be better than 0.05mm overall. The roughness of the surface should not exceed 6.4µm.

Configuration:





Air distance contact to contact:
- Contact to contact > 9.2mm
- Contact to base plate >13.2mm (with mounting screw M5 and washer)

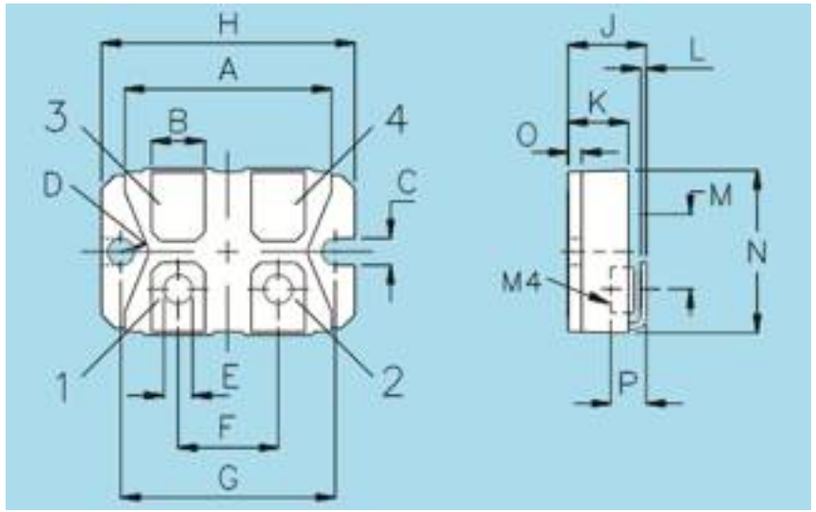
Creeping distance:
- Contact to base plate >17.0mm
- Contact to contact
  –> without PT-screw >22.8mm
  –> with PT-screw >20.2mm

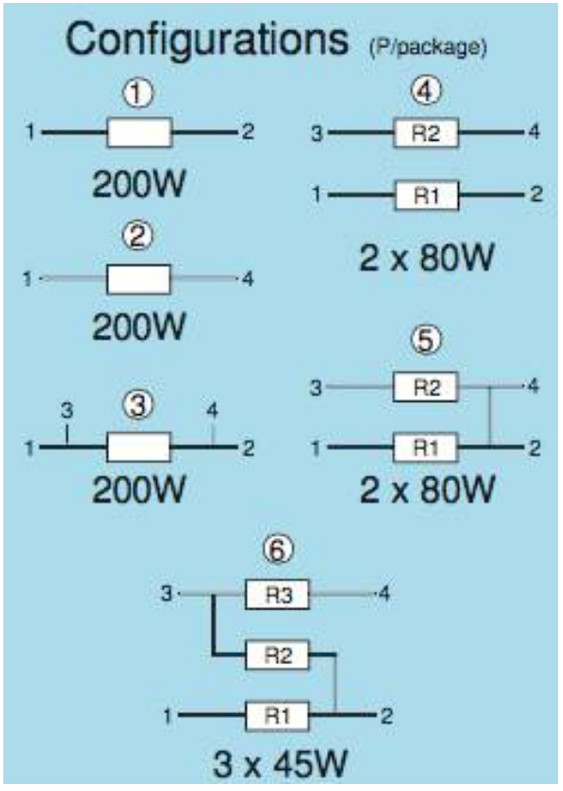
Dim.	Millimeter Min.	Millimeter Max.	Inches Min.	Inches Max.
A	44.7	46.5	*1.760*	*1.831*
B	34.7	35.3	*1.366*	*1.390*
C	14.8	15.2	*0.583*	*0.598*
D	– –	26.5	– –	*1.043*
E	6.25	6.45	*0.246*	*0.254*
F	7.4	7.8	*0.291*	*0.307*
G	5.9	6.1	*0.232*	*0.240*
H	20.9	21.3	*0.823*	*0.839*
J	18.0	18.4	*0.709*	*0.724*
K	16.0	16.4	*0.630*	*0.646*
L	0.77	0.83	*0.0303*	*0.0326*
M	2.9	3.1	*0.114*	*0.122*
N	9.4	9.8	*0.370*	*0.386*
O	1.9	2.1	*0.075*	*0.083*

Power Resistors

• Series HXP 200, SOT 227

200 Watt Power Resistor in the «ISOTOP» Power Device

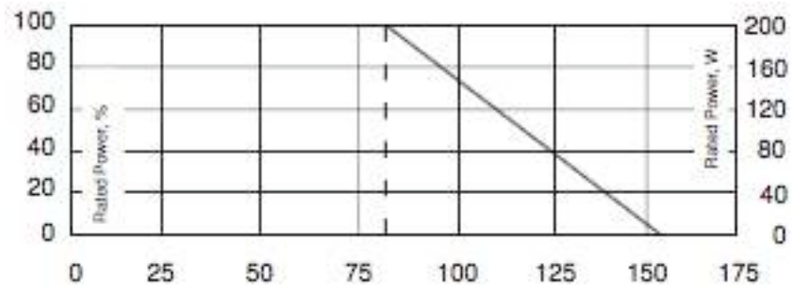




Due to a non inductive design these elements are ideally suited for high frequency and pulse load applications. By direct mounting on a heatsink significant cost advantages can be realized. The type **HXP** can be supplied in a 2-terminal or 4-terminal version. Even double resistors are available. Main applications are: Variable speed Drives, Power Supplies, Control Devices, Telecom, Robotics, Motor Controls and other switching designs.
Specials and custom designed components on request.

Specifications:

- **Resistance Range:** 0.1Ω to 1MΩ
- **Tolerance:** ±1%, 2%, 5%,10%
- **Temperature coefficient:** ±50, ±100ppm, ±250ppm (at+105°C ref. to +25°C)
- **Max. Work.Voltage:** 500V (up to 1,000V on special request)
- **Power Rating at 85°C:** 200W (see derating)
- **Short Time Overload:** 1.25 x rated power @ 85°C Bottom Case Temp. for 10sec, ΔR = 0.4% max.(for conf. 1, 2 and 3)
- **Partial Discharge:** up to 2,000Vrms/80 pC
- **Voltage Proof:** Dielectric Strength up to 4,000V DC against ground
- **Insulation Resistance:** 10GΩ Min. @ 1kV DC
- **Isolation voltage between R1 and R2:** 500V 1000V on special request
- **Protection class:** acc. to IEC 950/CSA22.2 950/ M-89 and EN 60950.88: 2
- **Heat Resistance to Cooling Plate:** R_{th} <0.35 K/W
- **Capacitance/Mass:** 45pF
- **Serial Inductivity:** HXP-1 typical 40 nH
- **Working Temp. Range:** -55°C to +155°C
- **Max. Torque for Base Plate(static):** 1.5 Nm M4 screws
- **Max. Torque for Contacts (static):** 1.3 Nm. M4 screws
- For pulse power details, please see page 32 (datasheet UXP-300)!



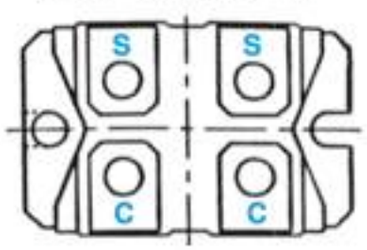
Dim.	Millimeters Min.	Max.	Inches Min.	Max.
A	31.0	32.0	1.220	1.260
B	7.8	8.2	0.307	0.323
C	4.1	4.3	0.162	0.169
D	4.0	--	0.158	--
E	4.1	4.3	0.162	0.169
F	14.9	15.1	0.587	0.595
G	30.1	30.3	1.186	1.193
H	37.7	38.3	1.484	1.508
J	11.8	12.2	0.465	0.481
K	8.9	9.1	0.351	0.359
L	0.75	0.85	0.030	0.033
M	12.6	12.8	0.496	0.504
N	24.4	25.4	0.960	1.001
O	1.95	2.05	0.077	0.081
P	5.3	--	0.209	--

• PCS - Precision Current Sense Resistors

The resistor family line, **PCS**, utilizes **Etronics**' state of the art technology to provide a highly reliable resistor with a non inductive design.
This makes the PCS resistor ideal for many current monitoring and controls applications.

- Available in two different designs
- Values beginning at 0.5mΩ
- Non Inductive Design
- Four terminal Kelvin connection
- 100% QC measurement

PCS – 100 / PCS - 60



C = current connection (source)
S = voltage connection (sense)
For the Dimensions please see our type **HXP** in this catalogue on page 37!

PCS–3

- Standard Resistance Values: 1 mΩ - 60mΩ (60mΩ - 1Ω on request)
- Resistance Tolerances: 1%, 2%, 5%
- Pulse current up to 200A / 0.5sec, depending on ohmic value
- Temperature Coefficient: 60ppm/°C typically, TC referenced to 25°C, ΔR taken at -15°C and +105°C; for values > 60mΩ please ask for details
- PowerRating:3W at 70°C 40Amp permanent (higher on request)
- Load Life: 1,000 hours at rated power at +70°C, ΔR 0.2% max.
- Thermal Shock: Mil-Std-202, Method 107, Cond. A, ΔR 0.2% max.
- Moisture Resistance: Mil-Std-202, Method 106, ΔR 0.2% max.
- Terminal Material: Kelvin Terminals; tinned copper • Encapsulation: Polyester over resistance element
- Operating temperature: -55°C to +150°C
- Storage temperature: -40°C to +85°C

PCS - 100

- Standard Resistance Values: 0.5mΩ – 1Ω (others on request)
- Resistance Tolerances: 1%, 2%, 5%
- Pulse current up to 500A / 0.5sec, depending on ohmic value
- Temperature Coefficient: TC referenced to 25°C,ΔR taken at 15°C and +105°C, < 60ppm/°C (TC < 500ppm/°C for resistance range from 27mΩ to 49mΩ)
- Power Rating: 100W (at 70°C case temperature) 50Amp permanent (higher on request)
- Dielectric strength: 1000VDC higher value on request
- Heat Resistance: Rth = < 0.56K/W
- Protection class acc. to IEC 950/ CSA22.2 950/M - 89 and EN 60950.88:2
- Working Temp. Range: -55°C to +155°C
- Max. Torque for Contacts: 1.3Nm 8 (static)
- Max Torque for Base Plate:1.5 Nm (static)
- Operating temperature :-55°C to +150°C
- Storage temperature: -40°C to+85°C

PCS - 60

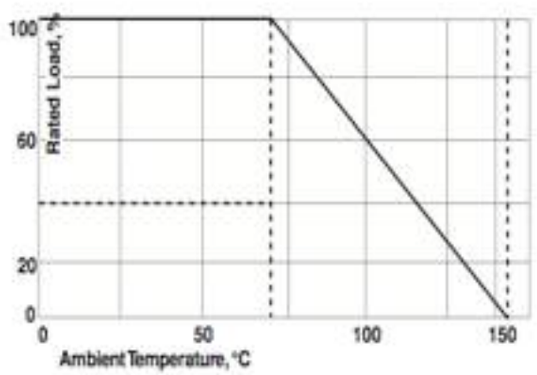
This resistor type is equal to the PCS-100 apart from following points:

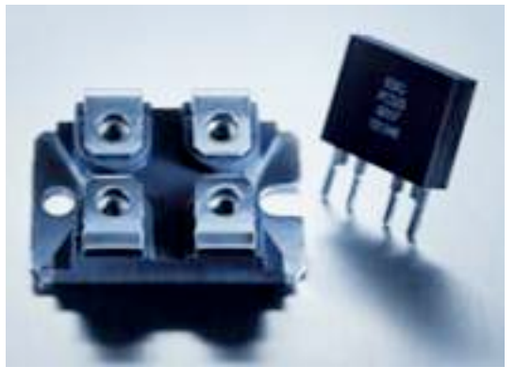
- Power Rating: 60W (at 70°C case temperature)
- Dielectric strength: up to 4000VDC or 2800VAC, higher values on request
- Temperature Coefficient: TC referenced to 25°C, ΔR taken at - 15°C and +105°C, < 60ppm/°C (TC < 500ppm/°C for resistance range from 20mΩ to 49mΩ)
- Operating temperature: -55°C to +150°C
- Storage temperature: -40°C to +

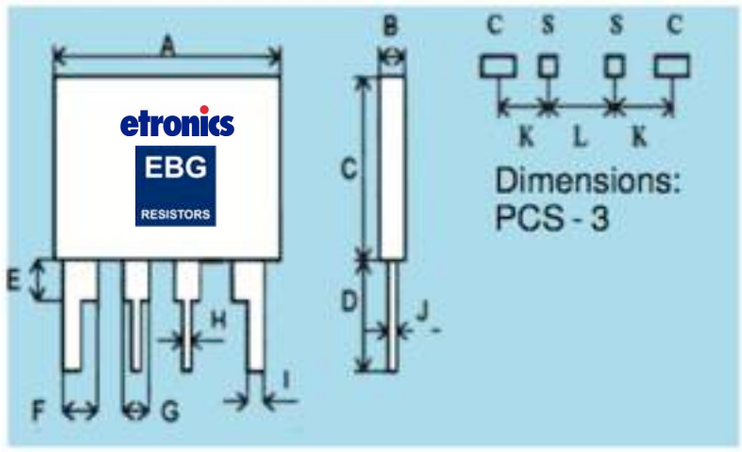
PCS – 3

Dim.	Millimeter	Inches
A	20.5 ±1.20	(0.807±0.008)
B	5.35 ±0.10	(0.211±0.004)
C	16.4 ±0.20	(0.646±0.008)
D	8.00 ±0.20	(0.315±0.008)
E	3.00 ±0.20	(0.118±0.008)
F	3.00	(0.118)
G	2.00	(0.079)
H	1.10	(0.043)
I	1.50	(0.059)
J	0.80	(0.031)
K	5.08	(0.2)
L	7.62	(0.3)

Power Rating Curve (for all types):







Ultra High Power Resistor

Mainly used as a snubber resistor to compensate the C-R peaks in traction power supplies.

• Series UXP 300

300 Watt power Resistor, Non Inductive Design

General Characteristics:

Electric support:

• High alumina ceramic metalized on top side with **Etronics'** METOXFILM placed on a solid A1 heat distribution plate for perfect connection to the main heat sink.

Encapsulation:

• Special resin-filled epoxy casing with large creeping distance to mass, large air distance between the terminals and high insulation resistance (CTI 600).

Resistance Element:

• Special design for perfect current yield over the entire resistor area.

Contacts:

• Easy load connecting with M4 or M5 screws. (Inch thread terminals upon special request)

• Connector height (M+N) available from 25 to 42 mm.

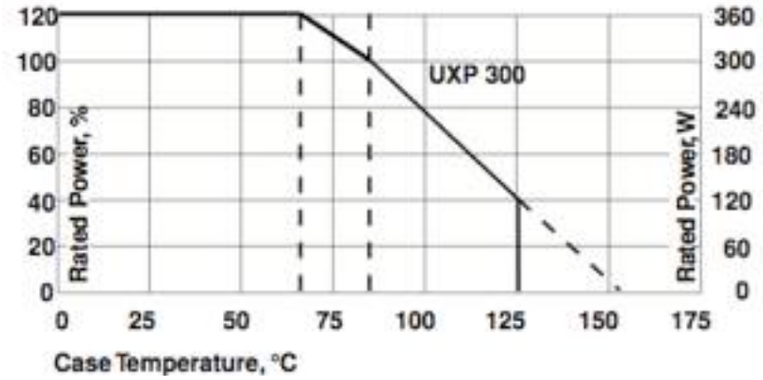
• Various sleeves for increased creeping distance up to 85 mm or potted cable connections are available upon special request.

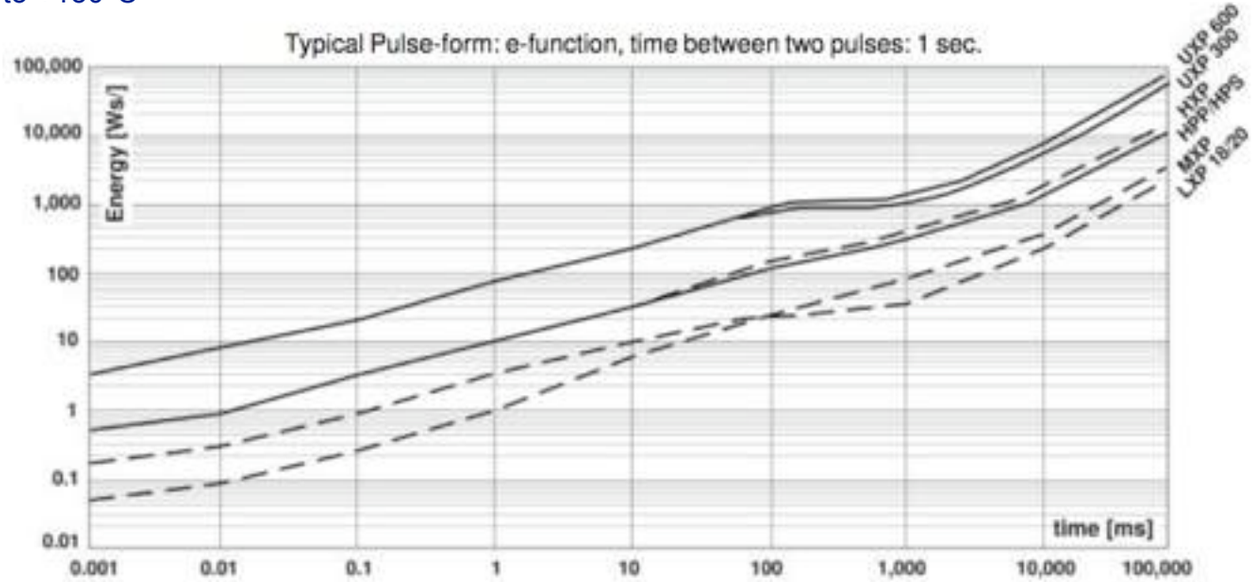
• The model **UXP 300** introduced on this page can be changed according to customer specification.

Please note that almost all of our **UXP** customers have their own **custom** designed drawing. Therefore please do not hesitate to discuss your special need with our **Etronics**' sales team

Specifications:

• **Resistance values:** 0.5 Ω to 1 MΩ
• **Resistance tolerance:** ±5% to ±10% (1% on special request)
• **Temperature coefficient:** ±150 ppm/°C (others upon request)
• **Maximum working voltage:** 5,000 VDC; higher voltage upon request, not exceeding max. power
• **Short time overload:** 1.5x rated power = 450 W at 70°C for 10 sec, ΔR = 0.4% max.
• **Power rating:** 300 W at 85°C bottom case temperature.
• Electric strength voltage: 6 kVrms, 50 Hz,1 min., up to 8,000 Vrms upon special request
• **Single shot voltage:** up to 12 kV norm wave (1.5/50 µsec)
• **Partial discharge:** 3 kVrms <10pC, up to 5 kV upon special request
• **Insulation resistance:** 10 GΩ Min. at 500 V
• **Creeping distance:** 42 mm min.
• **Air distance:** 14 mm min.
• **Inductance:** –80 nH (typical)
• **Capacity/mass:** –110 pF
• **Capacity/parallel:** –40 pF
• **Operating temperature:** –55°C to +150°C
• **Mounting - max. torque** for contacts: 2 Nm
• **Mounting - max. torque:** 1.8 Nm M4 screws
• Dimensions: please see datasheet UXP-600



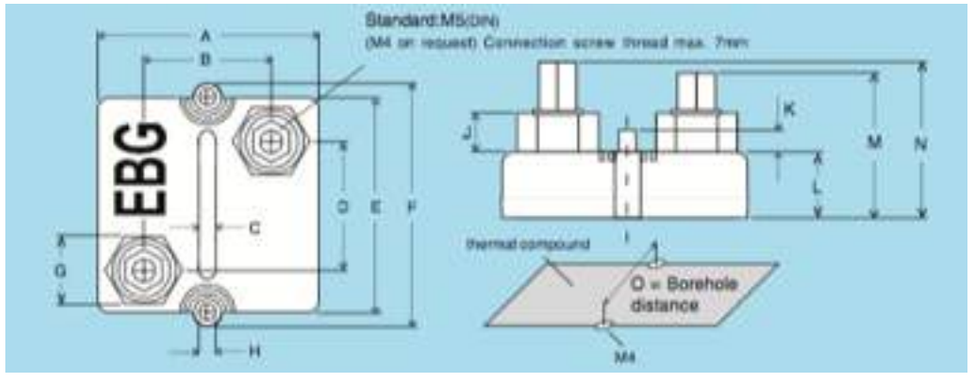


Ultra High Power Resistor

For variable speed drives, power supplies, control devices, robotics, motor control and other power designs, the easy mounting fixture guarantees an auto-calibrated pressure to the cooling plate of about 120 to 160 N.

• Series UXP 600

600 Watt power Resistor. US Patent-No. 5,355,281



General Characteristics:

Electric support:

• High alumina ceramic metalized with **Etronics ALTOX** film on the bottom for better heat transfer and optimum discharge.

Encapsulation:

• Special resin-filled epoxy casing with large creeping distance to mass, large air distance between the terminals and high insulation resistance (CTI 600).

Resistance Element:

• Special design for low inductance and capacitance values. The element employs our special **METOXFILM**, which demonstrates stability while covering high wattage and pulse loading.

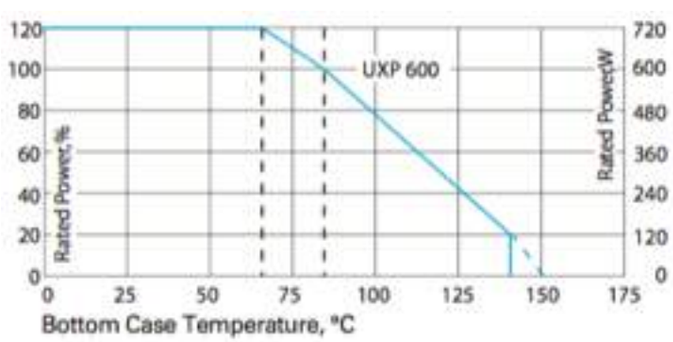
Contacts

• Easy load connecting with M4 or M5 screws. (Inch thread terminals upon special request.)

• Connector height (M+N) available from 25 to 42mm

• Various sleeves for increased creeping distance up to 85 mm or potted cable connections are available upon special request

• Materials in accordance with UL94-V0



Specifications:

• **Resistance values:** 0.5 Ω to 1 MΩ

• **Resistance tolerance:** ±5% to ±10% (1% on special request)

• **Temperature coefficient:** ±150 ppm/°C (others upon request)

• **Maximum working voltage:** 5,000 V DC, higher voltage upon request, not exceeding max. power

• **Short time overload:** 1,000 W at 70°C for 10 sec., ΔR = 0.4% max.

• **Power rating:** 600 W at 85°C bottom case temperature.

• **Peak current:** up to 1,500 A depending on pulse length and frequency
Please ask for details!

• **Electric strength voltage:** 6 kVrms, 50 Hz,
up to 12 kVrms or up to 20 kV DC onon special request.

• **Single shot voltage:** up to 12 kV norm wave (1.5/50 µsec)

• **Partial discharge:**4 KVrms, <10pC, up to 7 kV upon special request

• **Insulation resistance:** 10 GΩ min. at 500 V

• **Creeping distance:** 42 mm min.

• **Air distance:**14 mm min.

• **Inductance:** –80 nH (typical)

• **Capacity/mass:** –110 pF

• **Capacity/parallel:** –40 pF

• **Operating temperature:** –55°C to +150°C

• **Mounting - max. torque for contacts:** 2 Nm

• **Mounting - max. torque:** 1.8 Nm M4 screws

• For pulse power details, please see UXP-300 datasheet

Test	Method	Typical results
Short time overload	1,000 W/10sec	0.4%
Humidity steady state	56 days/40°C/95%	0.25%
Temp. sycling	-55/+125/5cycles	0.20%
Shock	40g/4,000 times	0.25%
Vibrations	2-500Hz/10g	0.25%
Load life 3,000cyl	Pn 30 min. on / 30 min off	0.40%
Terminal strengths f. contacts	200N	0.05%

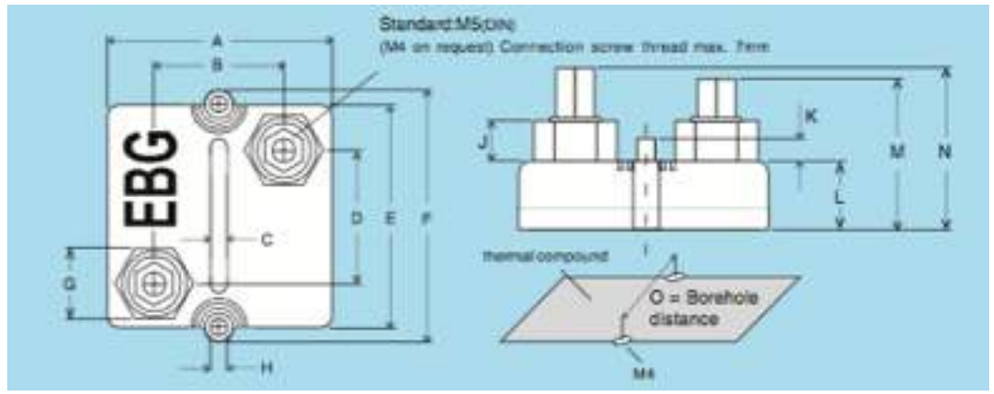
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	59.2	60.8	2.331	2.394
B	35.8	36.2	1.409	1.425
C	4.5	5.5	0.177	0.216
D	33.8	34.2	1.331	1.346
E	57.0	58.0	2.244	2.283
F	64.2	65.8	2.527	2.591
G	17.5	18.5	0.689	0.728
H	4.05	4.3	0.159	0.169
J	6.5	7.5	0.256	0.295
K	4.5	5.5	0.177	0.216
L	14.5	15.5	0.571	0.610
M	29.5	30.5	1.161	1.201
N	31.5	32.5	1.240	1.279
O	56.8	57.2	2.236	2.252

Ultra High Power Resistor

For variable speed drives, power supplies, control devices, robotics, motor control and other power designs, the easy mounting fixture guarantees an auto-calibrated pressure to the cooling plate of about 120 to 160 N.

• Series UXP 800

800 Watt power Resistor. US Patent-No. 5,355,281



General Characteristics:

Electric support:

• High alumina ceramic metalized with **Etronics ALTOX** film on bottom for better heat transfer and optimum discharge.

Encapsulation:

• Special resin-filled epoxy casing with large creeping distance to mass, large air distance between the terminals and high insulation resistance (CTI 600).

Resistance Element:

• Special design for low inductance and capacitance values. The element employs our special **METOXFILM**, which demonstrates stability while covering high wattage and pulse loading.

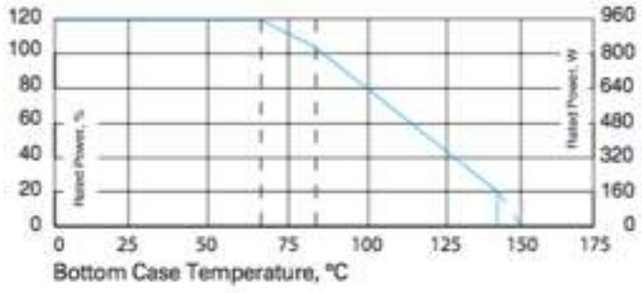
Contacts:

• Easy load connecting with M4 or M5 screws. (Inch thread terminals on special request.)

• Connector height (M+N) available from 25 to 42 mm.

• Various sleeves for increased creeping distance up to 85mm or potted cable connections are available upon special request.

• Materials in accordance with UL94-v0



Specifications:

• **Resistance values:** 0.5 Ω to 1 MΩ

• **Resistance tolerance:** ±5% to ±10%

• **Temperature coefficient:** ±150 ppm/°C (others upon request)

• **Maximum working voltage:** 5,000 V DC, higher voltage upon request, not exceeding max. power

• **Short time overload:** 1,200 W at 70°C for 10 sec., ΔR = 0.4% max.

• **Power rating:** 800 W at 85°C bottom case temperature.

• **Peak current:** up to 1,500 A depending on pulse length and frequency
Please ask for details!

• **Electric strength voltage:** 6 kVrms, 50 Hz, up to 12 kVrms or up to 20kV
DC on special request.

• **Single shot voltage:** up to 12 kV norm wave (1.5/50 µsec)

• **Partial discharge:** 4 KVrms, <10 pC, up to 7 kV upon special request

• **Insulation resistance:** 10 GΩ min. at 500 V

• **Creeping distance:** 42 mm min.

• **Air distance:** 14 mm min.

• **Inductance:** –80 nH (typical)

• **Capacity/mass:** –140 pF

• **Capacity/parallel:** –40 pF

• **Operating temperature:** –55°C to +150°C

• **Mounting - max. torque for contacts:** 2 Nm

• **Mounting - max. torque:** 1.8 Nm M4 screws

Test	Method	Typical results
Short time overload	1,000 W/10sec	0.4%
Humidity steady state	56 days/40°C/95%	0.25%
Temp. cycling	-55/+125/5cycles	0.20%
Shock	40g/4,000 times	0.25%
Vibrations	2-500Hz/10g	0.25%
Load life 3,000cyl	Pn 30 min. on / 30 min off	0.40%
Terminal strengths f. Contacts	200N	0.05%

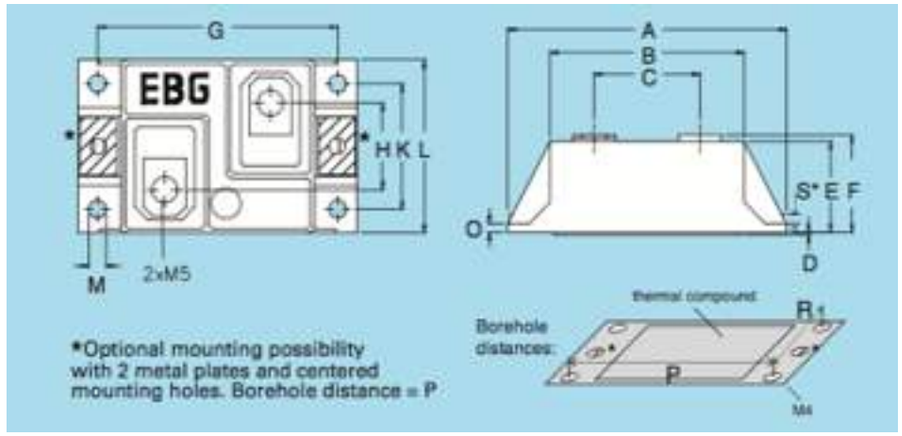
Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	59.2	60.8	2.331	2.394
B	35.8	36.2	1.409	1.425
C	4.5	5.5	0.177	0.216
D	33.8	34.2	1.331	1.346
E	57.0	58.0	2.244	2.283
F	64.2	65.8	2.527	2.591
G	17.5	18.5	0.689	0.728
H	4.05	4.3	0.159	0.169
J	6.5	7.5	0.256	0.295
K	4.5	5.5	0.177	0.216
L	14.5	15.5	0.571	0.610
M	29.5	30.5	1.161	1.201
N	31.5	32.5	1.240	1.279
O	56.8	57.2	2.236	2.252

Ultra High Power Resistor

For variable speed drives, power supplies, control devices, robotics, motor control and other power devices, the easy mounting fixture guarantees an auto-calibrated pressure to the cooling plate of about 120 to 160 N.

• Series UPT 400

400 Watt power Resistor. US Patent-No. 5,355,281



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	65.2	66.8	2.567	2.630
B	45.2	46.8	1.780	1.843
C	24.5	25.5	0.965	1.004
D	0.1	0.2	0.004	0.008
E	20.5	21.5	0.807	0.846
F	22.0	23.0	0.866	0.906
G	56.2	57.8	2.213	2.276
H	19.5	20.5	0.768	0.807
K	28.5	29.5	1.122	1.161
L	39.2	40.8	1.543	1.606
M	4.1	4.3	0.161	0.169
O	1.85	2.15	0.073	0.085
P	56.8	57.2	2.236	2.252
R	28.8	29.2	1.134	1.150
S*	1.3	1.7	0.051	0.067

General Characteristics:

Encapsulation:

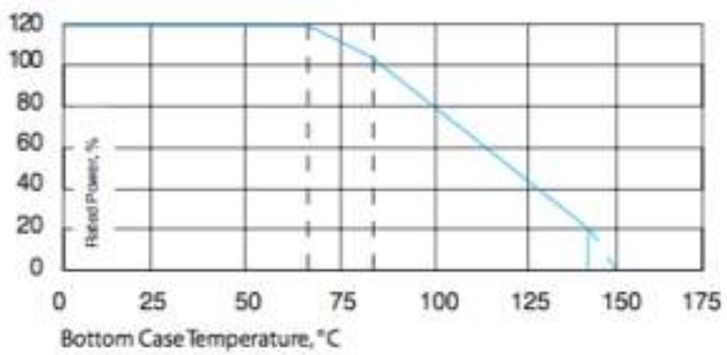
• Special resin-filled epoxy casing with large creeping distance to mass, large air distance between the terminals and high insulation resistance.

Resistance Element:

• Special design for low inductance and capacitance values. The element employs our special **METOXFILM**, which demonstrates stability while covering high wattage and pulse loading.

Contacts:

• Easy load connecting with M5 screws (others upon special request). Materials in accordance with UL94-V0



Derating (thermal resist.) UPT 400: 5.55W/°K (0.18°K/W)
Power rating: 400W at 85°C bottom case temp.*
Please ask for detailed mounting procedure!

* This value is only applicable if using thermal conduction to heat sink Rth-cs<0.025°K/W.
This value can be obtained by using a thermal transfer compound with a heat conductivity of 1 W/mK. The flatness of the cooling plate must be better than 0.05 mm overall. Surface roughness should not exceed 6.4 µm.

Specifications:

• **Resistance values**: 0.5 Ω to 1 MΩ
• **Resistance tolerance**: ±5% to ±10%, tighter tolerances are available upon request, with reduction of max. power/pulse rating. Please ask our local representative!
• **Temperature coefficient**: ±150 ppm/°C (others upon request)
• **Maximum working voltage**: 5,000 V DC, higher voltage upon request, not exceeding max. power
• **Short time overload**: 700 W at 70°C for 10 sec., ΔR = 0.4% max.
• **Power rating**: up to 400 W at 85°C bottom case temperature
• **Electric strength voltage**: 6 kVrms, 50 Hz, up to 12 kVrms or 23 kV DC upon special request.
• **Single shot voltage**: up to 12 kV norm wave (1.5/50 µsec)
• **Partial discharge**: 4 KVrms, <10 pC, up to 7kV upon special request
• **Insulation resistance**: 10 GΩ min. at 500 V
• **Inductance:** –80 nH (typical)
• **Capacity/mass**: –110 pF
• **Capacity/parallel**: –40 pF
• **Operating temperature**: –55°C to +150°C
• **Mounting - max. torque for contacts**: 2 Nm
• **Mounting - Max. torque** : 1.8 Nm M4 screws

Ultra High Power Resistor

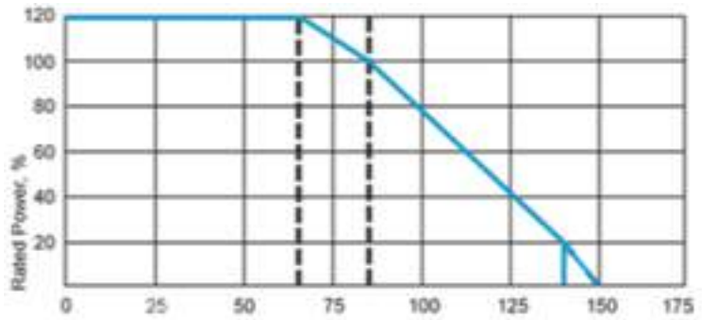
For variable speed drives, power supplies, control devices, robotics, motor control and other power devices, the easy mounting fixture guarantees an auto-calibrated pressure to the cooling plate of about 120 to 160 N. Materials in accordance with UL94-V0

• Series UPT 600

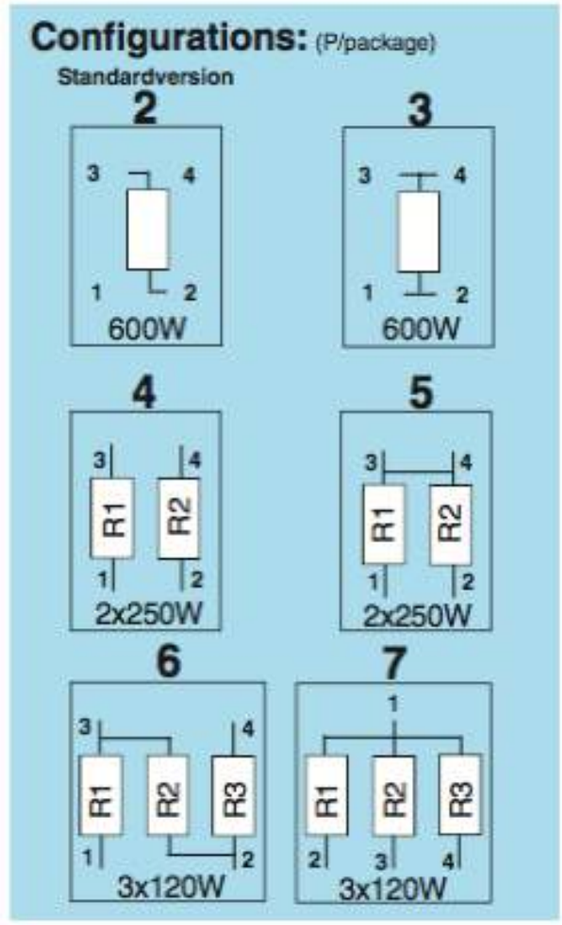
600 Watt power Resistor. US Patent-No. 5,355,281

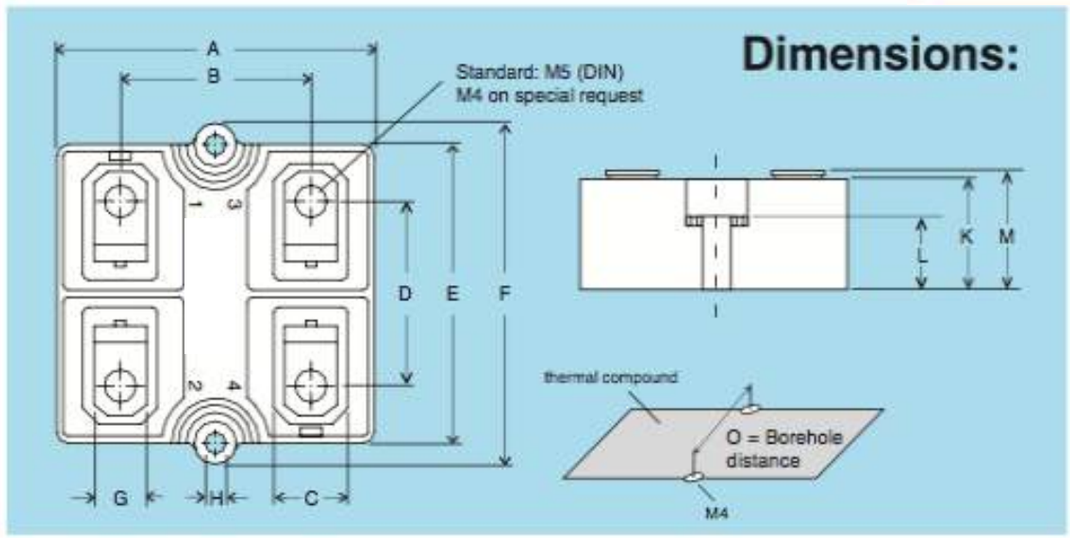
Specifications:

- **Resistance values:** 0.5 Ω to 1 MΩ
- **Resistance tolerance:** ±5% to ±10%, tighter tolerances are available upon request, with the reduction of the max. power/pulse rating. Please ask our **sales team** !
- **Temperature coefficient:** ±150 ppm/°C (others upon request)
- Maximum working voltage: 5,000 V DC, higher voltage upon request, not exceeding max. power
- **Short time overload:** 1,000 W at 70°C for 10sec., ΔR = 0.4% max. (for conf. 2 and 3)
- Power rating: up to 600 W at 85°C bottom case temperature, see configurations
- **Electric strength voltage:** 6 kVrms, 50 Hz, up to 12 kVrms or 23 kV DC upon special request.
- **Dielectric strength between R1–R2**: >5kV DC
- **Single shot voltage**: up to 12 kV norm wave (1.5/50 µsec)
- **Partial discharge**: 4 KVrms, <10 pC, up to 7 kV upon special request
- **Insulation resistance**: 10 GΩ min. at 500 V
- **Inductance**: –80 nH
- **Capacity/mass**: –110 pF
- **Capacity/parallel:** –40 pF
- **Operating temperature:** –55°C to +150°C



Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	59.2	60.8	2.331	2.394
B	35.8	36.2	1.409	1.425
C	13.5	14.5	0.531	0.571
D	33.8	34.2	1.331	1.346
E	57.0	58.0	2.244	2.283
F	64.2	65.8	2.527	2.591
G	9.5	10.5	0.374	0.413
H	4.05	4.3	0.159	0.169
K	24.0	25.0	0.945	0.984
L	14.5	15.5	0.571	0.610
M	25.5	26.5	1.004	1.043
O	56.8	57.2	2.236	2.252





Ultra-High Pulse Load Resistors

For variable speed drives, power supplies, control devices, robotics, motor control and other power devices, the easy mounting fixture guarantees an auto-calibrated pressure to the cooling plate of about 120 to 160 N.

• Series UXM
400 Watt High Pulse Load Resistor

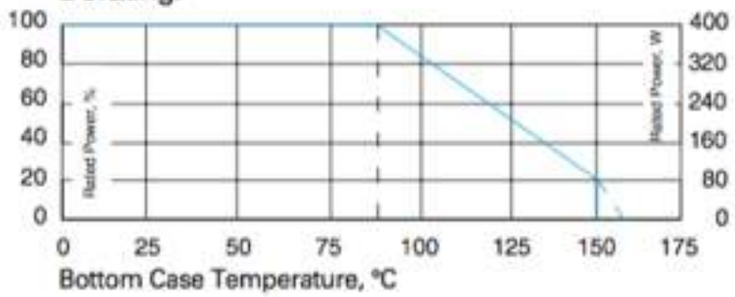
General Characteristics:

Electric support:
• High alumina ceramic metalized with **Etronics** ALTOX film on bottom for better heat transfer and optimum discharge.
Encapsulation:
• Special resin-filled epoxy casing with large creeping distance to mass, large air distance between the terminals and high insulation resistance (CTI 600).
Contacts:
• Easy load connecting with M4 or M5 screws.
• Connector height (M+N) available from 25 to 42 mm.
• Various sleeves for increased creeping distance up to 85 mm or potted
cable connections are available upon special request
• Materials in accordance with UL94-V0

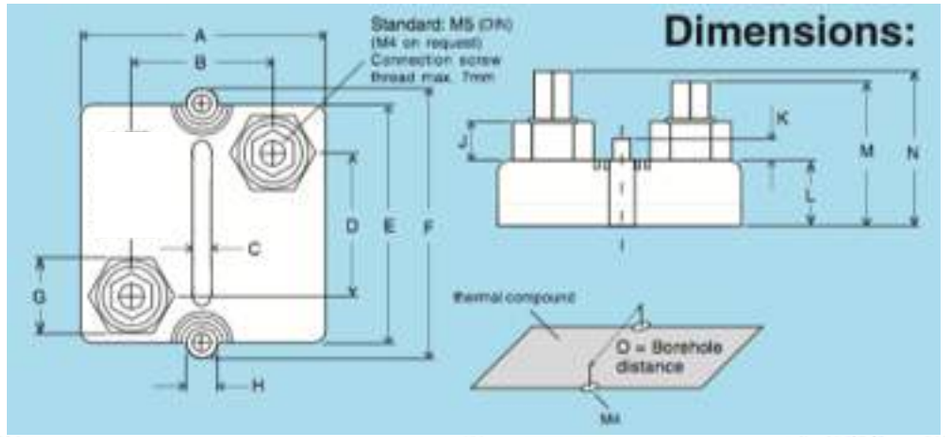
Specifications:

• Resistance values: 0.1 Ω to 5 Ω
• Resistance tolerance: ±5% to ±10% (others upon request)
• Temperature coefficient: +500 ppm/°C typical (others upon request)
• Maximum working voltage: Depending on max. pulse load capability.
Please ask for details!
• Short time overload: 600 W at 70°C for 10 sec., ΔR = 0.4% max.
• Power rating: 400 W at 85°C bottom case temperature.(higher upon request)
• Electric strength voltage: Standard: 6 kV DC, up to 12 kV DC upon request
• Partial discharge: upon request
• Insulation resistance: 10 GΩ min. at 1000 V
• Creeping distance: 42 mm min.
• Air distance: 14 mm min.
• Inductance: 400 nH ÷ 1µH (typical)
• Capacity/mass: 110 pF (typical)
• Operating temperature: –55°C to +150°C
• Mounting - max. torque for contacts: 2 Nm
• Mounting- max. torque: 1.8 Nm M4 screws

Derating:



Dimensions:



Test	Method	Typical results
Short time overload	1,000 W/10sec	0.4%
Humidity steady state	56 days/40°C/95%	0.25%
Temp. cycling	-55/+125/5cycles	0.20%
Shock	40g/4,000 times	0.25%
Vibrations	2-500Hz/10g	0.25%
Load life 3,000cyl	Pn 30 min. on / 30 min off	0.40%
Terminal strengths f. contacts	200N	0.05%

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	59.2	60.8	2.331	2.394
B	35.8	36.2	1.409	1.425
C	13.5	14.5	0.531	0.571
D	33.8	34.2	1.331	1.346
E	57.0	58.0	2.244	2.283
F	64.2	65.8	2.527	2.591
G	9.5	10.5	0.374	0.413
H	4.05	4.3	0.159	0.169
J	6.5	7.5	0.256	0.295
K	4.5	5.5	0.177	0.216
L	14.5	15.5	0.571	0.610
M	29.5	30.5	1.161	1.201
N	31.5	32.5	1.240	1.279
O	56.8	57.2	2.236	2.252

Best results can be obtained by using a thermal transfer compound with a heat conductivity of better than 1 W/mK. The flatness of the cooling plate must be better than 0.05 mm overall. Surface roughness should not exceed 6.4 µm.

Ultra-High Pulse Load Resistors

For variable speed drives, power supplies, control devices, robotics, motor control and other power designs.

General Characteristics:

Electric Support:

- High-purity ceramic metalized with **Etronics'** ALTOX film on bottom for better heat transfer and optimum discharge.

Encapsulation:

- Special resin-filled epoxy casing. High insulation resistance (CTI 600), high dielectric strength and partial discharge capability.

Resistance Element:

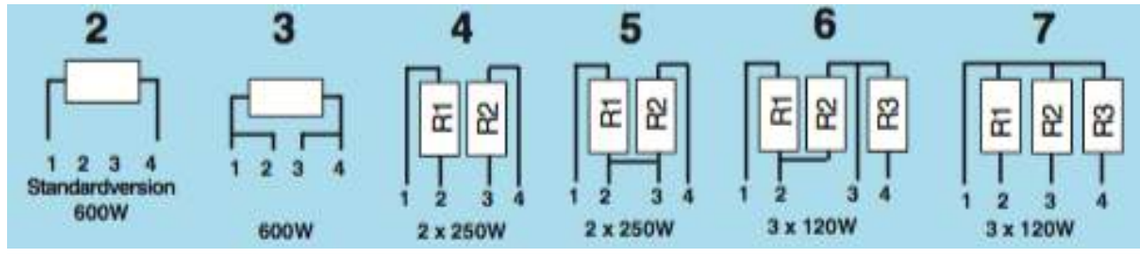
- Special design for low inductance and capacitance values. The element employs our special **METOXFILM**, which demonstrates stability while covering high wattage and pulse loading.
- Materials in accordance with UL94-V0

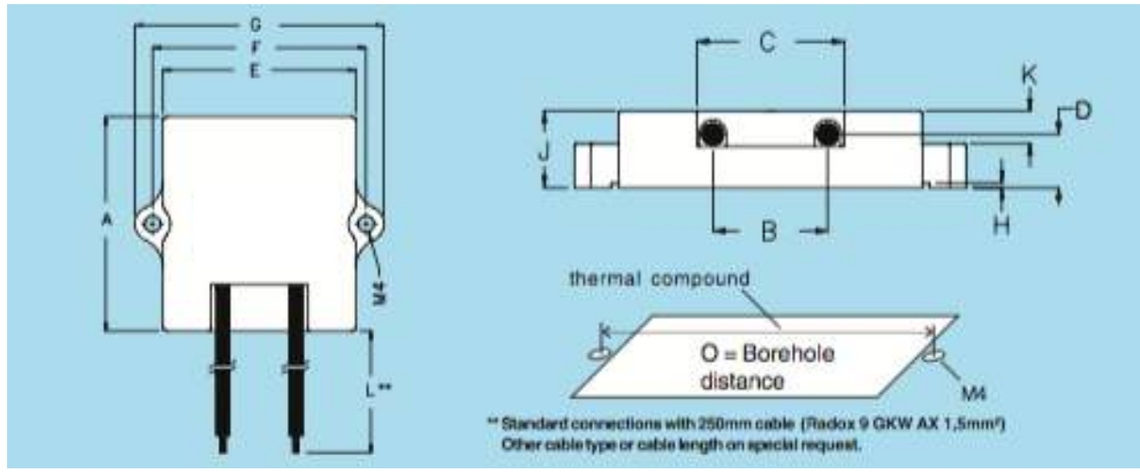
Specifications:

- **Resistance values:** 0.5 Ω to 1 MΩ (others upon request) 100
- **Resistance tolerance:** ±5% to ±10% 80
- **Temperature coefficient**: ±150 ppm/°C (others upon request)
- **Maximum working voltage:** 5,000 V DC, higher voltage upon request, 60 not exceeding max. power
- **Short time overload:** 1,000 W at 70°C for 10sec., ΔR = 0.4% max. (for conf. 2 and 3)
- **Power rating:** 600 W at 85°C bottom case temperature (others upon request)
- **Peak current:** up to 1,500 A depending on pulse length and frequency Please ask for details!
- **Electric strength voltage:** 6 kVrms, 50 Hz,up to 12 kVrms upon special request.
- **Single shot voltage:** up to 12 kV norm wave (1.5/50 µsec)
- **Partial discharge:** 4 KVrms, <10 pC, up to 7 kV upon special request
- **Insulation resistance:** 10 GΩ min. at 500 V
- Inductance: –80 nH (typical)
- **Capacity/mass:** –110 pF
- Capacity/parallel: –40 pF
- Operating temperature: res. body: –55°C to +150°C
- std. cables: –40°C to +120°C (other cables upon request)
- Mounting- max. torque: 1.8 Nm, M4 screws
- For pulse power details, please see datasheet UXP-600

• Series ULX 600 (Very low component height)

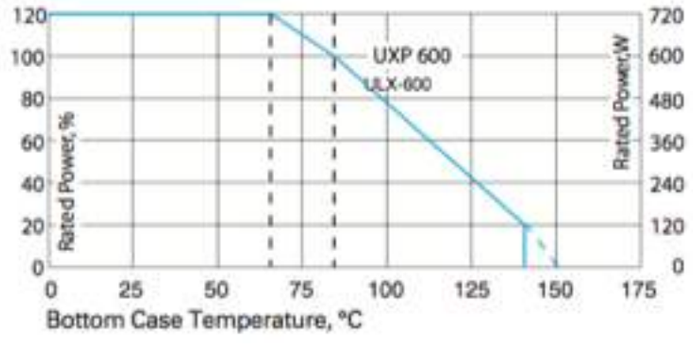
600 Watt Resistor . US Patent-No 5,355,281





Test	Method	Typical results
Short time overload	1,000 W/10sec (for 600 W Element)	0.4%
Humidity steady state	56 days/40°C/95%	0.25%
Temp. cycling	-55/+125/5cycles	0.20%
Shock	40g/4,000 times	0.25%
Vibrations	2-500Hz/10g	0.25%
Load life 3,000cyl	Pn 30 min. on / 30 min off	0.40%

Dim.	Millimeter		Inches	
	Min.	Max.	Min.	Max.
A	57.0	58.0	2.244	2.283
B	19.5	20.5	0.767	0.807
C	25.5	26.5	1.004	1.043
D	8.0	9.5	0.315	0.374
E	51.0	52.0	2.007	2.047
F	56.5	575	2.224	2.264
G	66.2	66.7	2.606	2.626
H	0.5	0.8	0.019	0.032
J	12.5	13.5	0.492	0.532
K	5.3	5.8	0.208	0.228
L	250	255	9.843	10.039
O	56.8	57.2	2.236	2.252



Custom Designed

Etronics & EBG are pleased to introduce our strength in custom-designed passive components. Listed below are just some of the components we have developed in close cooperation with our valued customers.

• **INX**
3 x 70 up to 3 x 100W Thick Film Resistor with four or six terminals. All resistor values available from 1 Ω to 1 MΩ. Insulation voltage >2500 V, Non-Inductive Design

• **SMG & ESP**
High Pulse Load Resistors; different versions available: 1 Ω to 1 MΩ as standard, easy M4 mounting and connecting

• **UMT 400**
High Pulse Load Resistor with two internal resistors, based on a specially selected metal alloy. The design for the resistive layers shows best results regarding power and pulse load energy relative to available active area size!

• **DISC 120**
Press Pack Ultra-High-Power Resistor (up to 10 kW) for ohmic values <1 Ohm. Designed for high current peaks! With high creeping distance design!

• **MODULE**
Ultra Compact Custom-Designed Resistor/Hybrid Module. This solution offers many options for different internally connected resistors/components. Easy connection through use of standardized multiple pin strips. Extremely high- insulating potting material used to cover the active area! Easy mounting and handling!

• **RXP**
High-Power Resistor solution with integrated air-cooled heat sink! Up to three internal resistors with four terminal contacts available! High insulation rating!
Dimensions comply with standard electrolytic capacitors. Low air flow needed for high power rating performance!

• **GWN**
1,800 W Non-Inductive Discharge Resistor for traction application.

• **SWS**
High Current Pulse Load Resistor, <0.5Ω, e.g. 3,500A for 100 m sec. for 0.1Ω value.

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