

HIGH VOLTAGE • HIGH POWER • NON INDUCTIVE

EN ISO 9002



EBG Austria - Issue 307

About our company – An Introduction to EBG

EBG

- EBG is a leading international electronics components manufacturer, concentrating on highly specialized electronic resistive components.

- EBG has its corporate headquarters in Austria. In addition, we have operational facilities throughout Europe, USA and the Asian basin.

- Since 1977, EBG has added many quality electronic component products, and from its Austrian plant, EBG exports more than 85% of its production to its customers all over the world via Air Freight in 3 days or less.

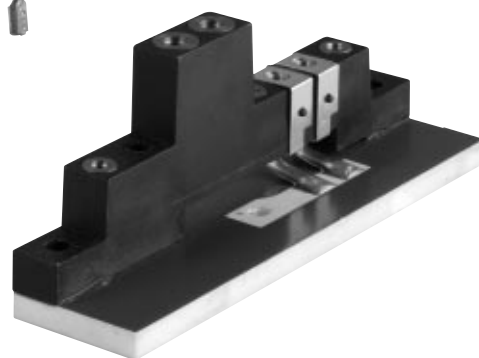
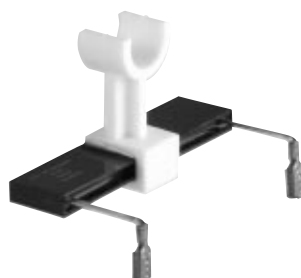
- EBG does not produce the commodity type electronic components; rather, we concentrate in the high technology components spectrum.

- EBG's resistive components offer such characteristics as very low and controlled temperature and voltage coefficients, high stability, high temperature operations and very tight tolerances. All products comply with applicable environmental tests as required by European and USA military specifications.

- The EBG resistor product lines consist of an extensive variety of metal oxide products made with our exclusive METOX - FILM formulation. We offer different style options such as flats, cylindricals, dividers and networks.

- EBG is ISO 9002 certified. Our customer base consists of many of the top FORTUNE 500 companies throughout the world.

- We encourage you to contact our technical staff to help assist you in your development/design of your individual resistor needs.



Ordering Information (How to order EBG standard products):

SGT 78	10k5	$\pm 1\%$
HXP 200 -4	2 x 3k7	$\pm 5\%$
Model No _____	Resistor Value(s) _____	Tolerance _____
Version _____		

High Voltage Resistors

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

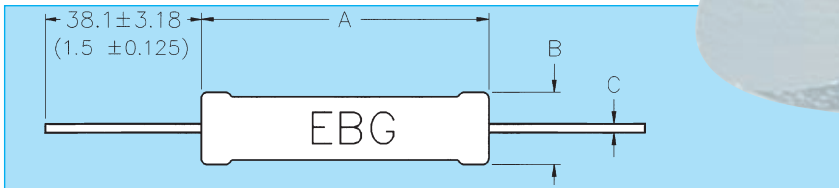
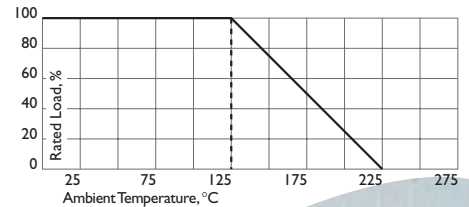
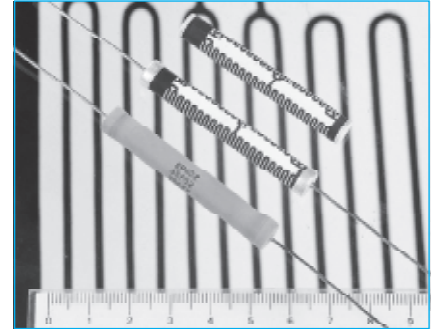
TC of 25ppm/°C combined with Precision Tolerances (0.1%-1%), Ohmic Range (100KΩ-1GΩ)

EBG is producing these models in order to meet the most stringent requirements regarding temperature coefficient in connection with high stability performance at high operating voltages. The low temperature coefficient minimizes the selfdrift generated through the warm-up due to power dissipation. The series SGT are produced with EBG's patented Non-Inductive Design. Typical applications are Medical Systems like X-Ray, Nucleus spin tomographes as well as Power Supplies or instruments. The features of the Type SGT Low TC Precision High Voltage Resistors are:

- 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. Contin. 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: ±1% (tolerances to ±0.1% on special order)
- 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/Overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times max. continuous operating voltage for 5 seconds. ΔR 0.20% max.
- Load Life: 1,000 hours at rated voltage not exceeding rated power, typical ΔR (2σ)=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 ± 0.02	B ± 0.50 ± 0.02	C ± 0.03 ± 0.002
SGT 26	1.0	4,000	100K	40M	250M	26.90 1.059	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

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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)

EBG offers the SGP series to meet the requirements of high resistance values combined with very high voltage requirements, while utilizing EBG's 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 100Ω to 10GΩ, -all at high operating temperatures to 225°C. The power ratings and voltage ratings are for continuous operation, and have all been pre-tested to these requirements for steady state performance, as well as momentary overload conditions.

A summary of the features of the SGP series are:

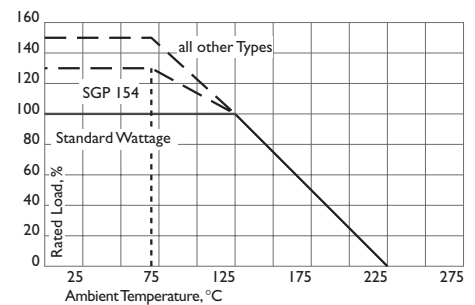
- Resistance values up to 10GΩ
- Resistance tolerance from $\pm 0.1\%$ to $\pm 10\%$
- Temperature Coefficient: 80ppm/°C
- Maximum continuous Operating Voltage to 48,000 V
- Life Stability: Typical $\pm 0.02\%$ per 1,000 hours
- Maximum operating temp. up to +225°C

Voltages up to 60% higher than the table values may be obtained in special order by adding "S" to the model designation.

EBG's 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. EBG's patented process avoids this potential problem.

Specifications:

- Resistance Tolerance: Standard $\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$, $\pm 1\%$, $\pm 2\%$, $\pm 5\%$, $\pm 10\%$
- Temperature Coefficient: Standard $\pm 80\text{ppm}/^\circ\text{C}$ from -15°C to $+105^\circ\text{C}$, referenced to $+25^\circ\text{C}$
- Voltage Coefficient: see diagram
- Dielectric Strength: 1,000VDC
- Insulation Resistance: 10G, min.
- Overload/Overvoltage: 5 times rated power 125°C with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. Overload/Overvoltage, 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.



Model No.	Watt-age 75°C	Watt-age 125°C	Max. Cont. Oper. V (kV)	Max. kV "S"	Resistance F(=1%)		s-Resistance Max. (2% Tol.)	Dimensions in millimeters		
					Min. ohmic values	Max.		A ± 0.02	B ± 0.50 ± 0.02	C ± 0.05 ± 0.002
OGP 13	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	1.00	2.0	3.2	200	100M	1G	19.70 0.776	4.20 0.165	0.60 0.024
OGP 26	1.9	1.25	4.0	6.4	300	150M	2G	26.20 1.031	4.20 0.165	0.60 0.024
OGP 30	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	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	2.50	10.0	12.0	400	2G	—	49.50 1.949	4.20 0.165	0.60 0.024
SGP 20	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	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	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	5.00	8.0	12.8	400	500M	1.5G	39.50 1.555	8.20 0.323	1.00 0.040
SGP 52	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	7.50	15.0	24.0	900	1G	4G	77.70 3.059	8.20 0.323	1.00 0.040
SGP 103	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	10.00	25.0	40.0	1K5	1G	8G	123.70 4.870	8.20 0.323	1.00 0.040
SGP 148	30	20.00	45.0	—	10K	3G	10G	148.0 5.83	16.0 0.63	—
SGP 154	20	15.00	30.0	48.0	2K0	2G	10G	153.70 6.051	8.20 0.323	1.00 0.040

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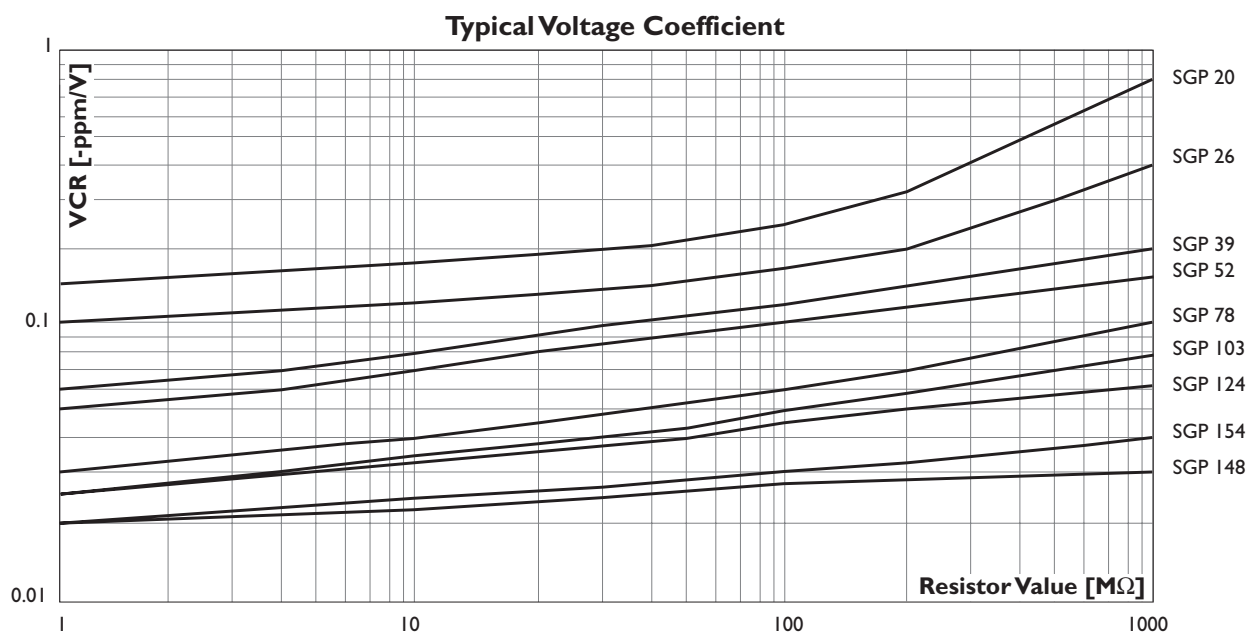
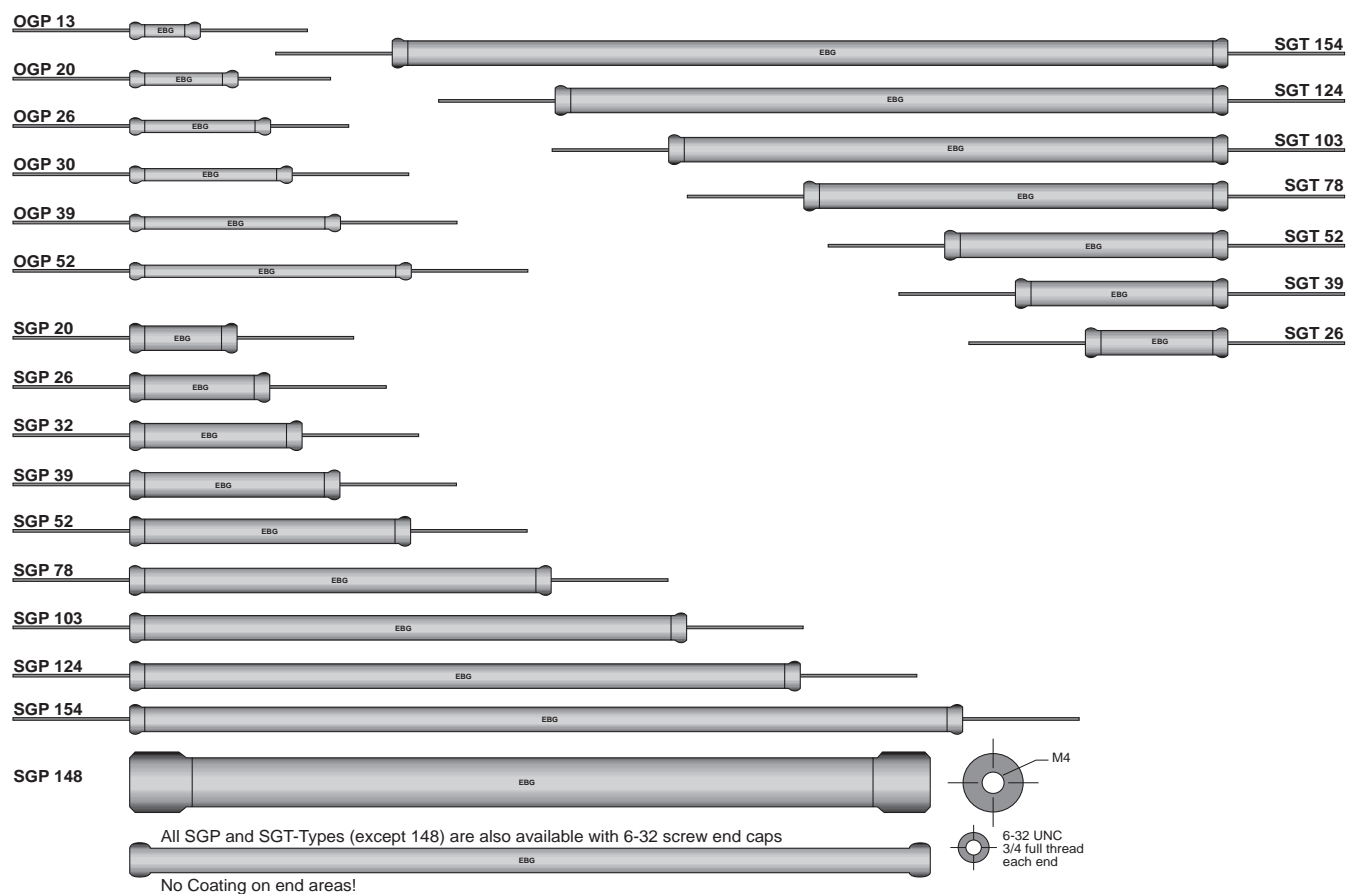
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High Voltage Resistors – Overview

EBG



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High Voltage Resistors

High Voltage Flat Style Resistor Series FSX, FEX and FBX

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

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

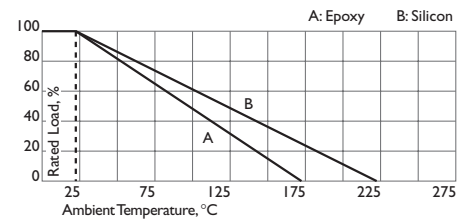
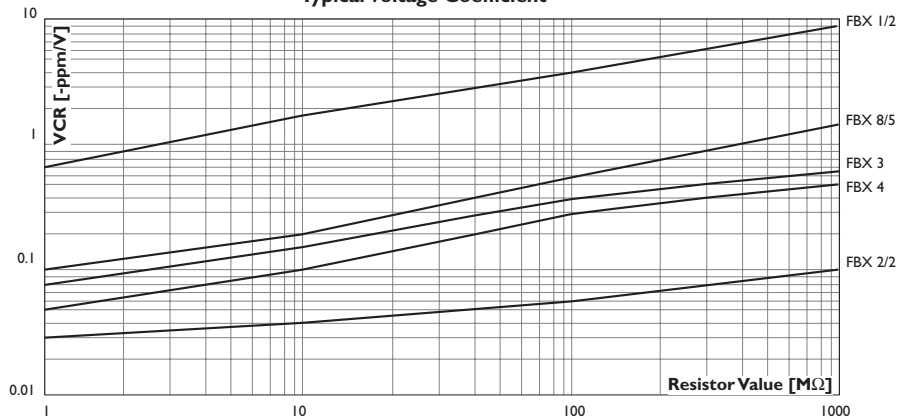
- 3 different coatings available
 - Series FSX with conformal silicone for high temperature operation (225°C)
 - Series FEX with epoxy coat for maximal moisture protection
 - Series FBX with surface silicone print as an inexpensive alternative
- High Voltage Withstanding up to 24,000 Volts
- 5 different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

Specifications:

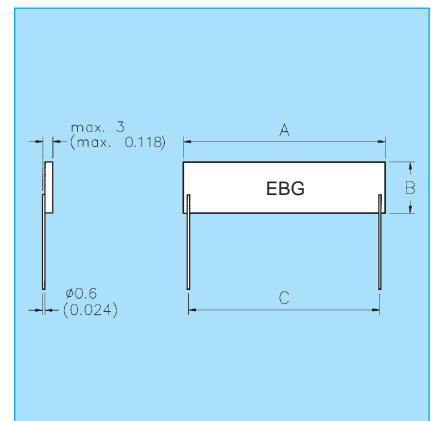
- Resistance Range: 200Ω to 2GΩ
- Resistance Tolerance: ±0.5% to ±10%
- Temp. Coefficient (up to 100MΩ): ±80 ppm/°C from -5°C to +105°C referenced to +25°C

- Max. Operating Voltage: "S" on request up to 35% higher than listed (please contact your local representative)
- Voltage Coefficient (typically): see below

Typical Voltage Coefficient



	Model No.	Watt-age	Max. Continuous Oper. Volt.	Dimensions in millimeters		
				Dimensions in inches	A (max.)	B (max.)
Series FBX with Surface Silicone Print	FBX1/2	0.50	4,000	12.90 0.51	3.40 0.13	10.20 0.40
	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
	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
	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



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High Voltage Resistors

High Voltage Flat Style Resistors Series FPX and FLX

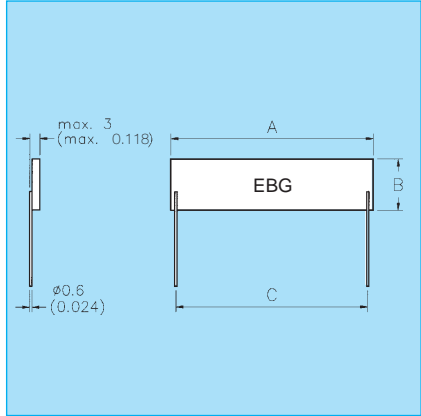
TC of 100ppm/°C combined with Precision Tolerances (0.5%-10%) and wide Ohmic Range

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

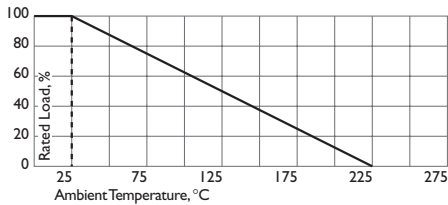
- Series FPX and FLX printed on surface with conformal black silicone for high temperature operation (225°C)
- High Voltage Withstanding up to 22,000V
- 5 different sizes
- Thickness only max. 3mm (0.118 inch) for High Density Packaging
- Non Inductive Design

Specifications:

- Resistance Range:
FPX: 200Ω to 2GΩ
FLX: 10Ω to 1KΩ
- 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):
Resistance Range -ppm/V
200R - 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

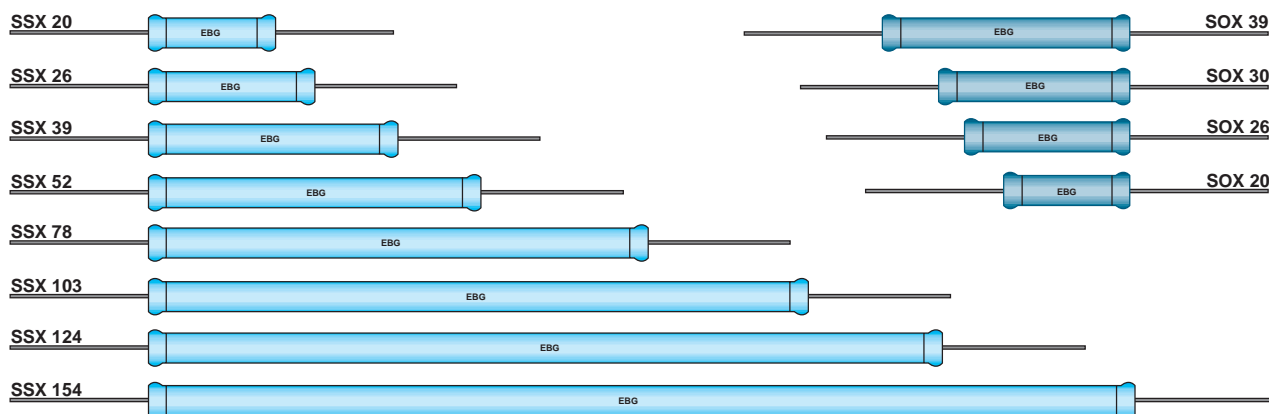


	Model No.	Wattage	Max. Continuous Oper. Volt.	Dimensions in millimeters		
				Dimensions in inches A (max.) ±0.50 ±0.02	B (max.) ±0.50 ±0.02	C ±0.50 ±0.02
Series FPX with Surface Silicone Print	FPX1/2	1.50	4,000	13.60 0.51	4.50 0.18	10.20 0.40
	FPX8/5	2.50	8,000	25.90 1.02	6.30 0.25	22.90 0.90
	FPX3	4.00	12,000	38.70 1.52	7.50 0.30	35.50 1.40
	FPX4	5.00	15,000	51.00 2.02	7.50 0.30	48.20 1.90
	FPX2/2	7.50	22,000	51.30 2.02	14.20 0.56	48.20 1.90
Series FLX with Conformal Silicone Protection	FLX1/2	1.50	300	13.60 0.54	4.50 0.18	10.20 0.40
	FLX8/5	2.50	500	25.90 1.02	6.30 0.25	22.90 0.90
	FLX3	4.00	800	38.70 1.52	7.50 0.30	35.50 1.40
	FLX4	5.00	1,000	51.30 2.02	7.50 0.30	48.20 1.90
	FLX2/2	7.50	1,000	51.30	14.20	48.20

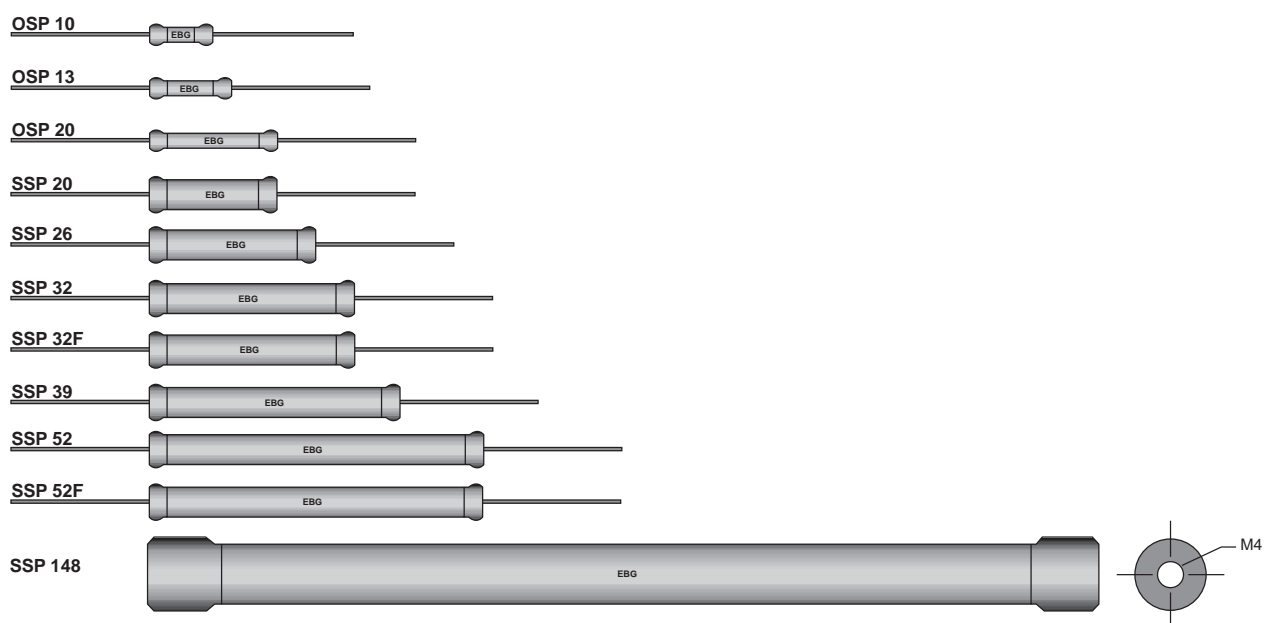
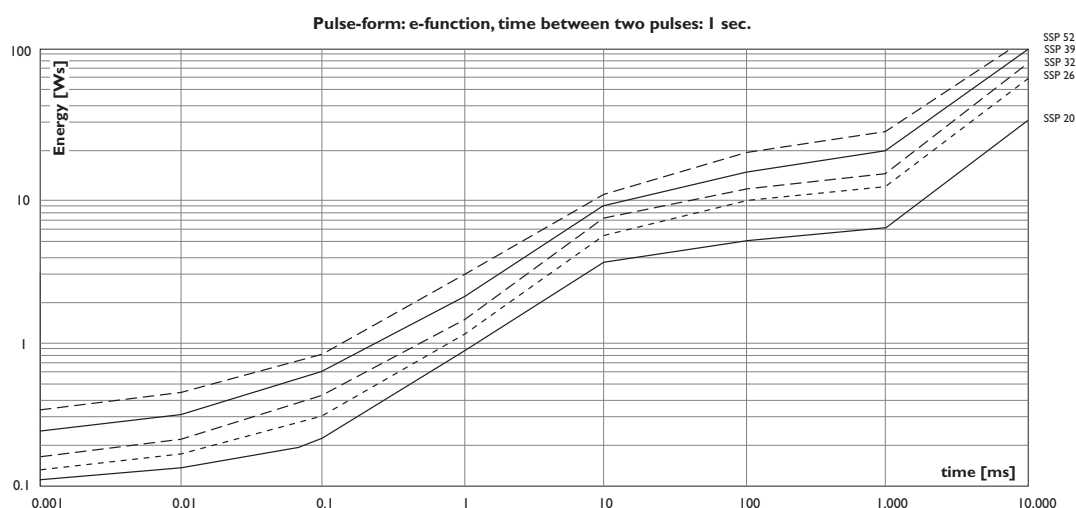


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Datasheet on page 10



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Power Resistors

Series SSP/OSP

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

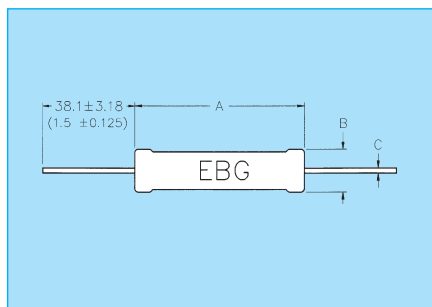
EBG offers the SSP series to meet the requirements of power ratings up to 40Watts while at the same time offering voltage ratings up to 6,000 Volts.

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

A summary of the features of the SSP series are:

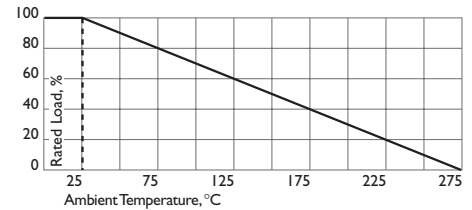
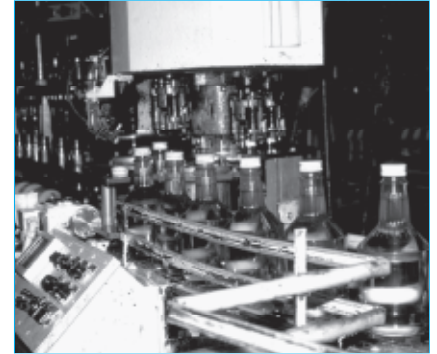
- Non-inductive Performance (EBG's patented process)
- Full power and voltage ratings (derating not required)
- Very high resistance values (see table) up to 30MΩ

To accomplish this objective of high stability, high value, high voltage and high power in the SSP series, EBG 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 EBG's unique non-inductive patented process, these resistors are ideally suited for high frequency applications, and result in less "ringing" with minimum distortion of the signals and faster settling times.



Specifications:

- Resistance Tolerance: ±1% to ±10%
- Temperature Coefficient: for 10Ω and above 50ppm/°C. TC referenced to 25°C, ΔR taken at -15°C and +105°C.
- Dielectric Strength: 1,000 V DC
- Insulation Resistance: 10GΩ, min.
- Overload/Overvoltage: 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.
- 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



Model No.	Wattage	Max. Voltage	Resistance		Dimensions in millimeters (inches)		
			Min. Ω	Max. Ω	A ±0.50 ±0.02	B ±0.50 ±0.02	C ±0.50 ±0.02
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	0.80 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	I	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	I	30M	52.10 2.051	8.20 0.323	1.00 0.040
SSP 148	40.00	6,000	I	10K	148.0 5.83	16.0 0.63	— —

F*: enforced cooling

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Precision High Voltage Resistors

Precision High Voltage Resistor Series SSX/SOX

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

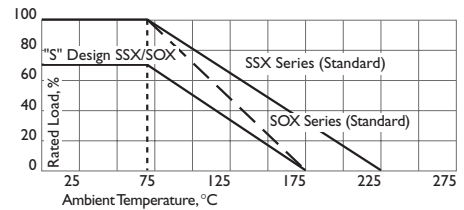
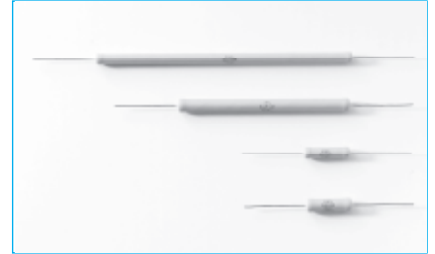
EBG offers the SSX/SOX series to meet general set of requirements at economical prices. This product is available with a silicone or epoxy coating and has a wide range of tolerances and temperature coefficients of resistance available.

A summary of the features of the SSX/SOX series are:

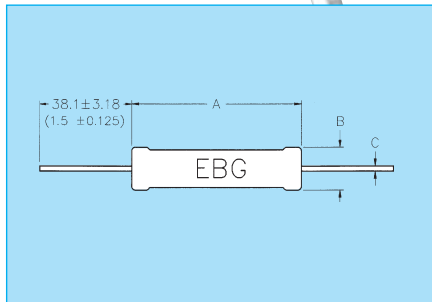
- Silicone coating for ambient temperatures up to 225°C
- Epoxy coating for excellent humidity protection available under the name SOX
- Resistance tolerances offered from $\pm 0.1\%$ to $\pm 10\%$
- Temperature coefficients: $\pm 100\text{ppm}/^\circ\text{C}$ to $\pm 250\text{ppm}/^\circ\text{C}$
- Standard temperature coefficient: $\pm 100\text{ppm}/^\circ\text{C}$
- 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

Specifications:

- Resistance Tolerance: $\pm 1\%$, $\pm 2\%$, $\pm 5\%$ or $\pm 10\%$ (tolerance to $\pm 0.1\%$, $\pm 0.25\%$, $\pm 0.5\%$ or on special order)
- 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.
- Moisture Resistance: MIL-Std-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



Model No.	Wattage at 70°C	Max. Cont. Oper. KV	Max. KV "S"	Resistance		Dimensions in millimeters		
				Min. Ω	Max. Ω	Dimensions in inches		
						A ± 0.50 ± 0.002	B ± 0.50 ± 0.002	C ± 0.05 ± 0.002
SOX 20	1.60	5.0	6.2	300	10G	21.30 0.839	8.60 0.339	1.00 0.040
SOX 26	2.10	7.5	9.4	450	10G	27.50 1.083	8.60 0.339	1.00 0.040
SOX 39	3.20	11.0	13.8	500	10G	40.20 1.583	8.60 0.339	1.00 0.040
SOX 52	4.30	16.0	20.0	400	10G	52.50 2.067	8.60 0.339	1.00 0.040
SOX 78	6.50	24.0	30.0	600	10G	78.70 3.098	8.60 0.339	1.00 0.040
SOX 103	8.50	32.0	40.0	800	10G	104.10 4.098	8.60 0.339	1.00 0.040
SOX 124	10.50	40.0	50.0	1M	10G	124.20 4.890	8.60 0.339	1.00 0.040
SOX 154	13.90	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 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



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Power Resistors

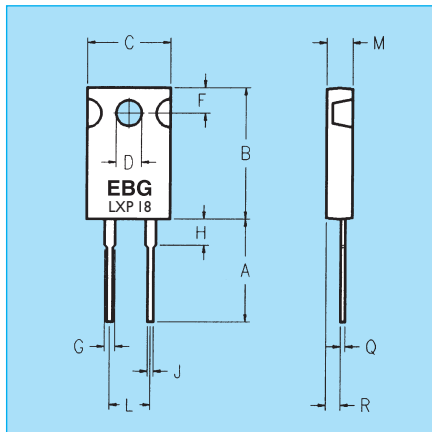
Series LXP 18 TO 220

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

EBG 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:

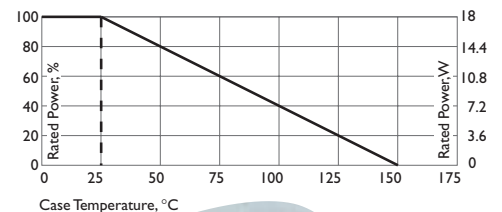
- 18 Watt power rating at 25°C case temperature
- TO-220 package configuration
- Single screw mounting simplifies attachment to the heat sink.
- A totally molded housing for environmental protection.
- Non-Inductive design
- Resistor package totally insulated from heat sink.



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

Specifications:

- Resistance Range: 0.05Ω to 10KΩ 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: 350 V
- Dielectric Strength: 1,800V AC
- Power Rating: 18W 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 107, Cond. F, ΔR ± (0.3% + 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.
- Lead Material: Tinned Copper
- Max. Torque: Using a screw and a compression washer mounting technique is 0.9 Nm



Derating (thermal resistance): 0.144W/°K (6.94K/W). Without a heatsink, when in free air at 25°C, the LXP18 is rated for 2.25W. Derating for temp. above 25°C is 0.018W/°K.

The case temperature is to be used for purposes of establishing 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.

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Power Resistors

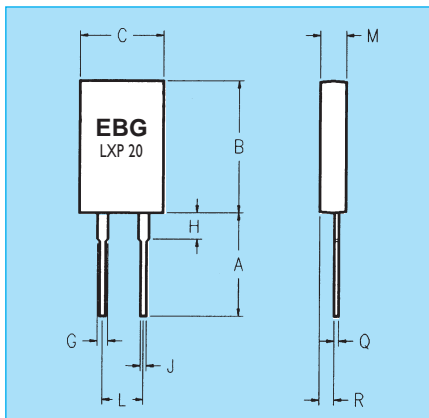
Series LXP 20 TO 220

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

EBG 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 snap-on style heat sink.

The special features include:

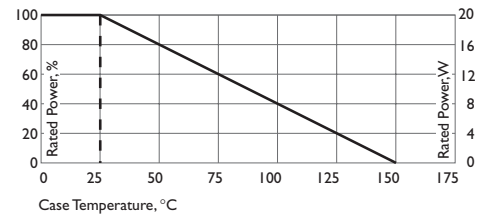
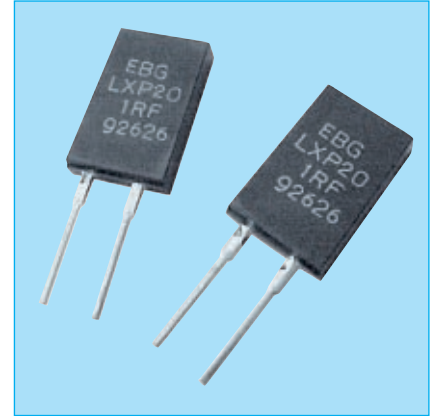
- 20 Watt power rating at 25°C case temperature
- High pulse tolerant design
- TO-220 package configuration
- Snap-on style TO-220 heat sink required
- A totally molded housing for enviromental protection.
- Non-Inductive design
- Resistor package totally insulated from heat sink.



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
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: 0.01Ω to 10KΩ 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: 1,800V AC
- 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 (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.
- Lead Material: Tinned Copper



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 purposes of establishing 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.

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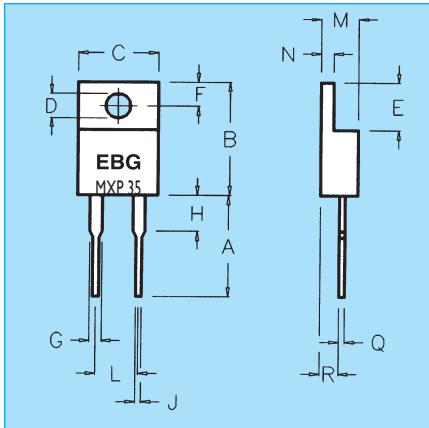
Power Resistors

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:

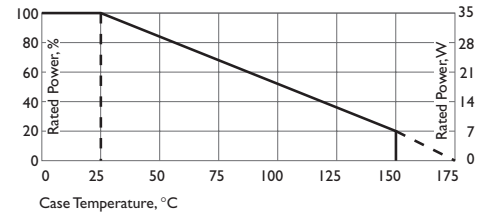
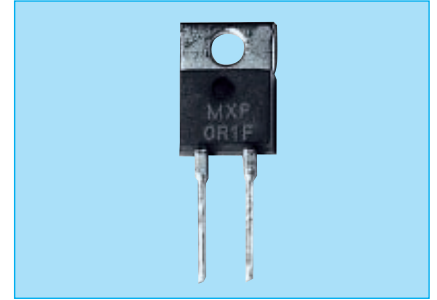
- 35 Watt power rating at 25°C
- TO-220 package configuration
- Single screw mounting simplifies attachment to heat sink
- Heat resistance to cooling plate:
 $R_{th} < 4.28 \text{ }^{\circ}\text{K/W}$
- A molded case for environmental protection.
- Resistor element is electrically insulated from the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



Dim.	Min.	Millimeter	Max.	Min.	Inches	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: 0.01Ω to 10KΩ 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: Tinned Copper
- Maximum Torque: 0.9 Nm



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.

The case temperature is to be used for purposes of establishing 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.

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Power Resistors

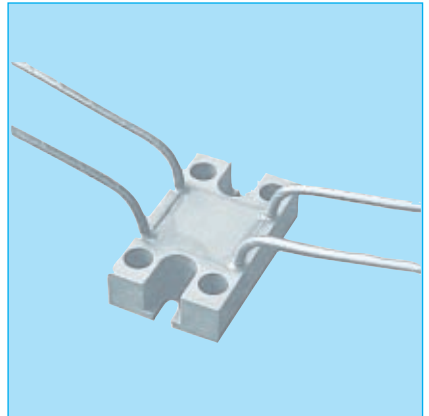
Series AXP 100

100 Watt Power Resistor with (4) wire Terminals

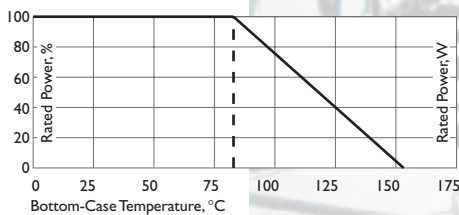
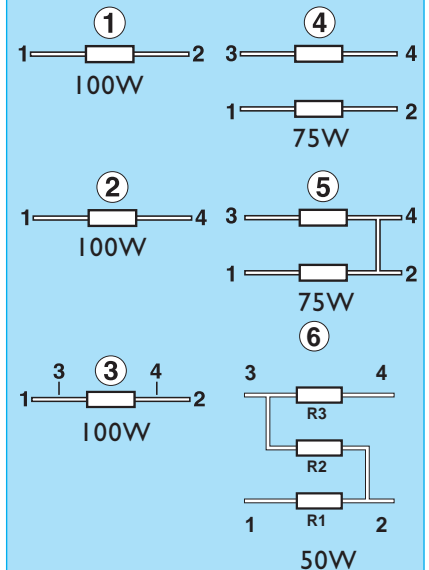
This new design of the non-inductive thick film Metal Oxide Technology with the wire terminals eliminates the possibility for problems regarding creeping distance from terminal to ground. This unique design will allow you to use this element in the following areas: Variable Speed Drives; Power Supplies; Control Devices; Telecommunications; Robotics; Motor Controls and other Switching Devices.

Specifications

Resistance Range: 1Ω to $1M\Omega$
 Tolerance: $\pm 1\%$, 2% , 5% , 10%
 Max. Work. Voltage: 500V
 (up to 1,000V on special request)
 Power rating: see configurations
 Standard wire length: 100mm
 (other lengths are available on special request)
 Max. Torque: 1.2Nm

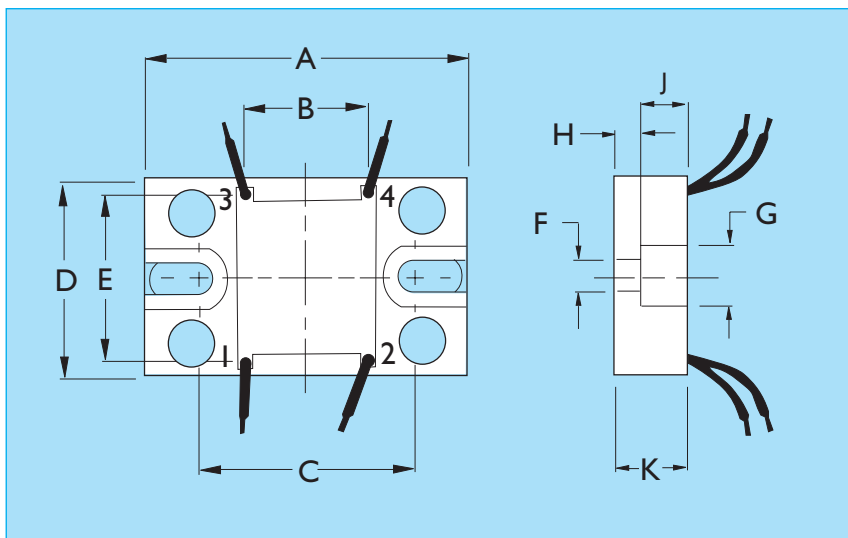
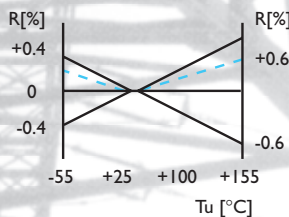


Configurations



Derating (thermal resistance):
 $2.86W/^{\circ}K$ ($0.35^{\circ}K/W$).

Typical TCR – Curve



Dim.	Millimeters		Inches	
	Min.	Max.	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	0.083	0.095
J	5.8	6.2	0.307	0.323
K	10.0	10.5	0.394	0.413

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Power Resistors

Series GXP 120, SOT 227

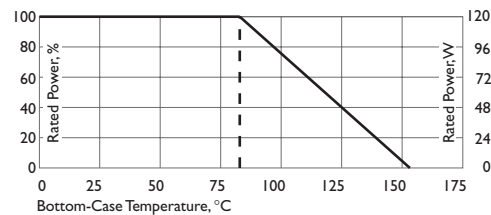
120 Watt Power Resistor in the "ISOTOP" Power Device (1x120W/2x50W/3x30W acc. Configurations)

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.

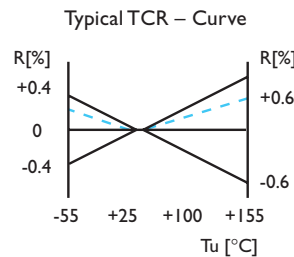
Specials and custom designed components on request.

Specifications

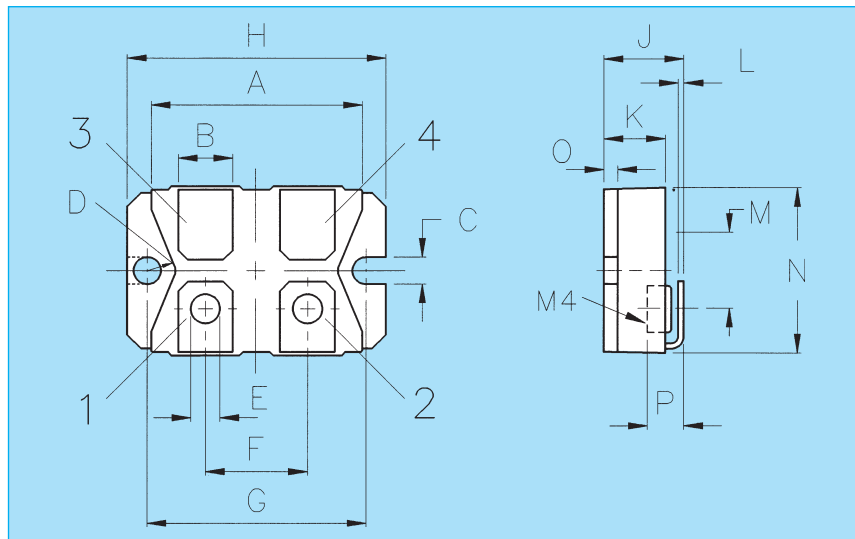
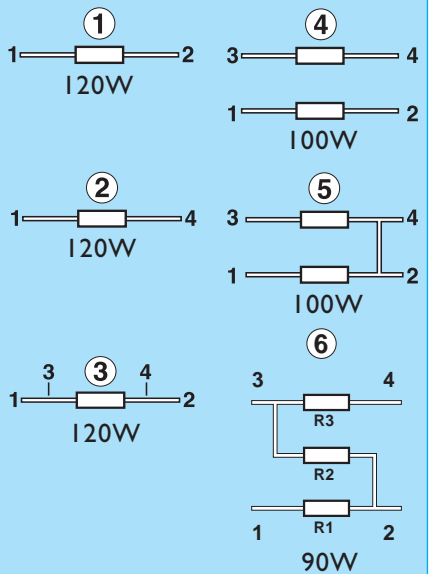
- Resistance Range: 0.1Ω to 1MΩ
- Tolerance: ±1%, 2%, 5%, 10%
- Temperature coefficient: ±50, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- Max. Work.Voltage: 500V (up to 1,000V on special request)
- Power Rating at 85°C: 120W (see derating)
- Partial Discharge: up to 2,000Vrms/80 pC
- Voltage Proof: Dielectric Strength up to 4,000V DC against ground
- Protectionclass: acc. to IEC 950/CSA22.2 950/M-89 and EN 60950.88: 2
- Heat Resistance to Cooling Plate: $R_{th} < 0.35 \text{ K/W}$
- Capacitance/Mass: 45pF
- Working Temp. Range: -55°C to +155°C
- Max.Torque for Base Plate (static): 1.5 Nm
- Max.Torque for Contacts (static): 1.3 Nm. M4 screws



Derating (thermal resistance):
2.86W/°K (0.35°K/W).



Configurations



Dim.	Min.	Max.	Min.	Max.
A	31.0	31.7	1.220	1.249
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	38.0	38.2	1.497	1.505
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	—

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Power Resistors

Series HPP 150

Non-Inductive 150 Watt Power Resistors according to VDE 0160 and UL 94V-0

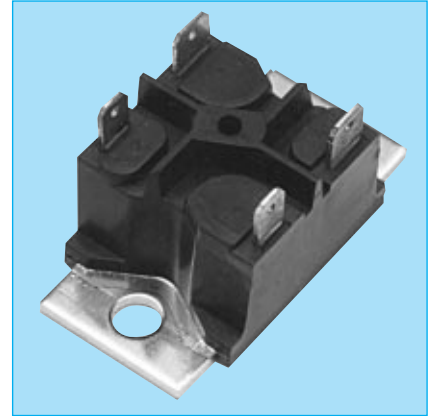
EBG's series HPP is rated at 150 Watts mounted to a heat sink. There are four configurations of resistive patterns available in the package. The increased height of the package makes this resistor ideal in applications where creeping distance must meet VDE 0160 and UL 094-0 standards.

A few features of the HPP include:

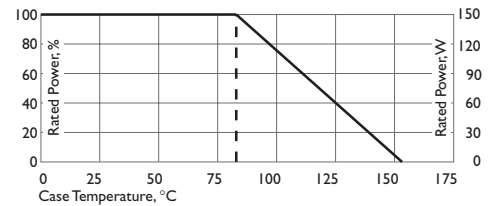
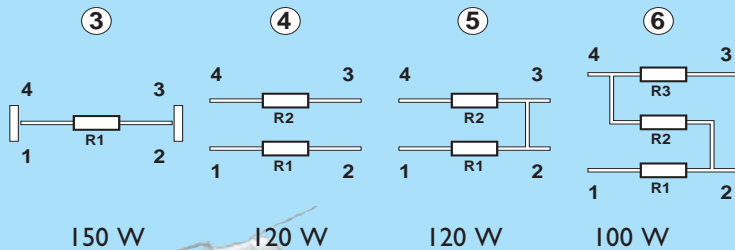
- 150 Watts at 85°C
- Non-Inductive Design
- Four configurations of resistive patterns
- Up to 3 resistors in 1 package
- Easy mounting using already existing infrastructure

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)
- Max. Working Voltage: 500V (up to 1,000V on special request)
- Power Rating at 85°C: 150W (others upon request)
- Voltage Proof: 5,000VDC, 3,000VAC
- 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



Configurations



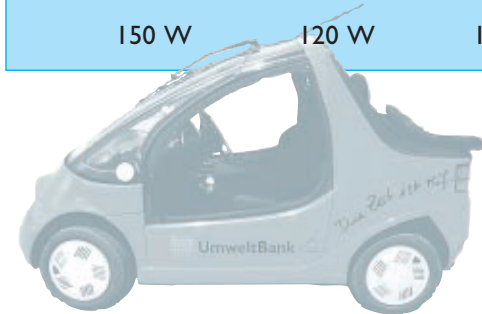
Derating (thermal resistance):
2.14W/°K (0.47°K/W).

Air distance contact to contact:

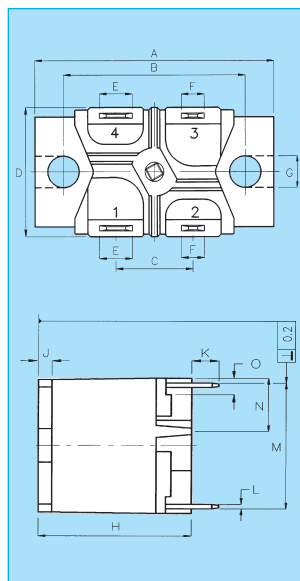
- ③ • Contacts 1 and 2 resp. 3 and 4
without Fast-on-Plug: 9.2mm
with Fast-on-Plug: 8.2mm
- ④ • Contacts 1 and 4 resp. 2 and 3
without Fast-on-Plug: 21.9mm
with Fast-on-Plug: 20.9mm
- ⑤ • Contacts 2 resp. 3 and M5 -
mounting screw with washer
without Fast-on-Plug: 16.3mm
with Fast-on-Plug: 15.9mm
- ⑥ • Contacts 1 resp. 4 and M5 -
mounting screw with washer
without Fast-on-Plug: 15.5mm
with Fast-on-Plug: 15.0mm

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



Dim.	Min.	Max.	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	2.9	3.1	0.114	0.122



In the above spec sheet, you will find our standard product, please contact your local manufacturing representative or call us direct to find out details of other options available regarding this style:

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EBG Austria · Issue 307/16

Power Resistors

Series HPS 150

Non-Inductive 150 Watt Power Resistor according to VDE 0160 and UL 94V-0

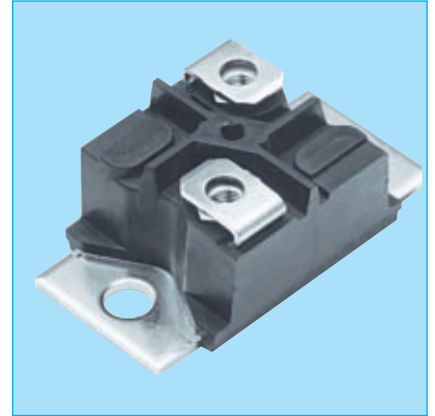
EBG's series HPS is rated at 150 Watts mounted to a heat sink. The increased height of the package makes this resistor ideal in applications where creeping distance must meet VDE 0160 and UL 094-0 standards.

A few features of the HPS include:

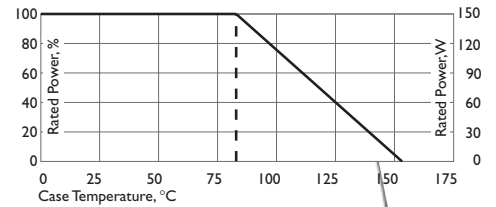
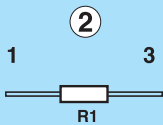
- 150 Watts at 85°C
- Non-Inductive Design
- Easy mounting using already existing infrastructure

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
- 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
- Max. Torque for Contacts (static): 1.3 Nm M4 screws

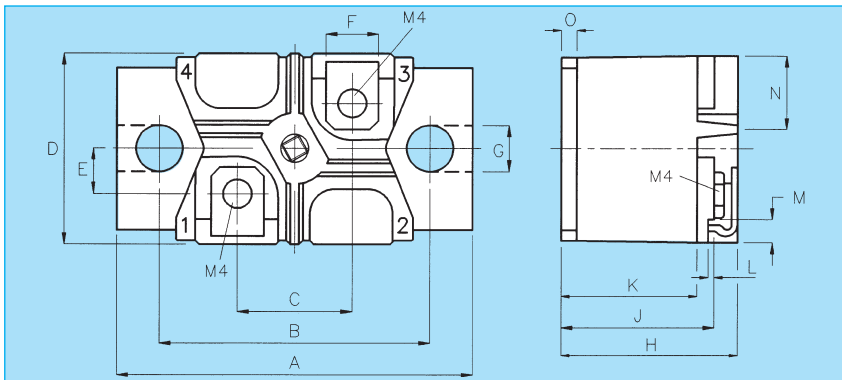
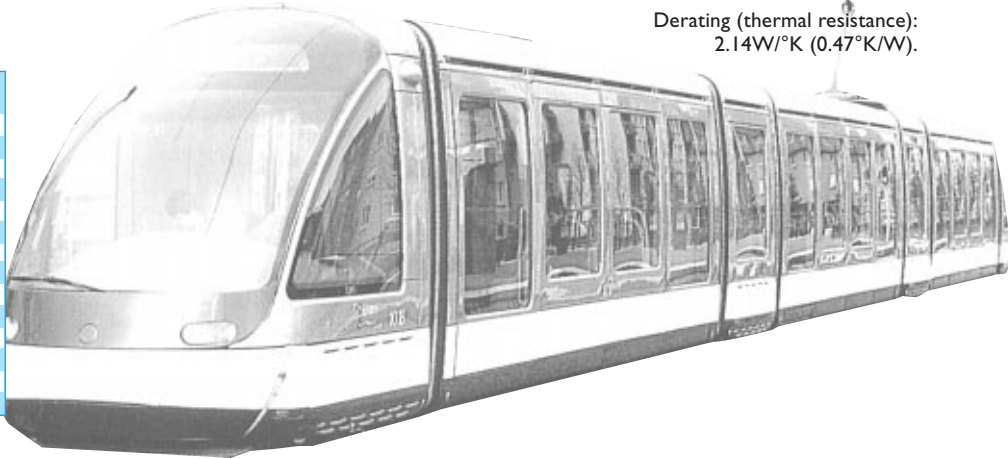


Configurations



Derating (thermal resistance):
2.14W/°K (0.47°K/W).

Dim.	Min.	Max.	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	6.25	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	2.9	3.1	0.114	0.122



- ② Air distance contact to contact:
- Contact to contact > 9.2mm
 - Contact to base plate > 13.2mm (with mounting screw M5 and washer)

- ② Creeping distance:
- Contact to base plate > 17.0mm
 - Contact to contact
 - without PT-screw > 22.8mm
 - with PT-screw > 20.2mm

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Power Resistors

Series HXP 200, SOT 227

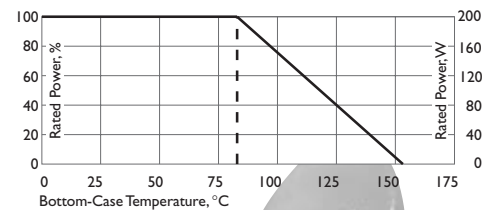
200 Watt Power Resistor in the "ISOTOP" Power Device

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

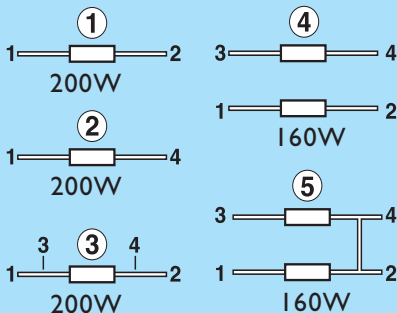
- Resistance Range: 0.1Ω to 1MΩ
- Tolerance: ±1%, 2%, 5%, 10%
- Temperature coefficient: ±50, ±100ppm, ±250ppm (at +105°C ref. to +25°C)
- Max. Work.Voltage: 500V (up to 1,000V on special request)
- Power Rating at 85°C: 200W (see derating)
- Partial Discharge: up to 2,000Vrms/80 pC
- Voltage Proof: Dielectric Strength up to 4,000V DC against ground
- Protectionclass: acc. to IEC 950/CSA22.2 950/M-89 and EN 60950.88: 2
- Heat Resistance to Cooling Plate: $R_{th} < 0.35 \text{ K/W}$
- Capacitance/Mass: 45pF
- Working Temp. Range: -55°C to +155°C
- Max.Torque for Base Plate (static): 1.5 Nm
- Max.Torque for Contacts (static): 1.3 Nm. M4 screws



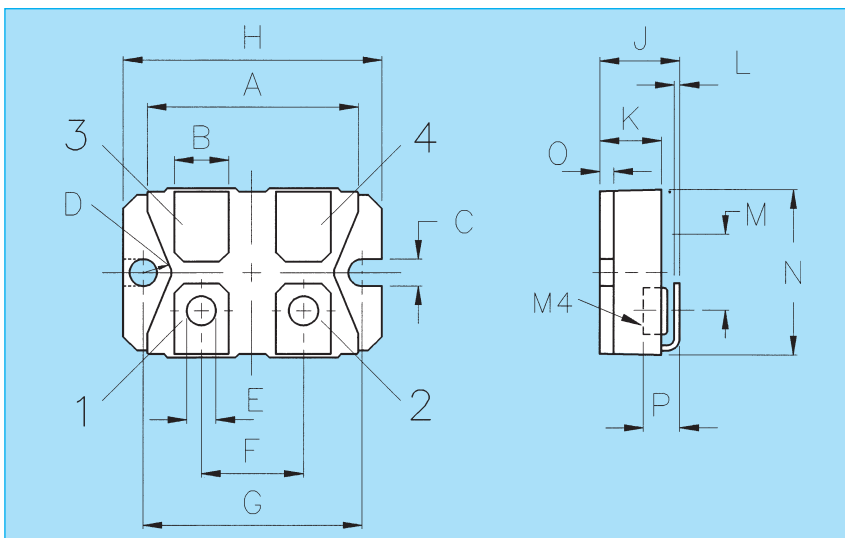
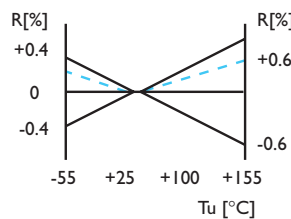
Derating (thermal resistance):
2.86W/°K (0.35°K/W).



Configurations



Typical TCR – Curve



Dim.	Min.	Max.	Min.	Max.
A	31.0	31.7	1.220	1.249
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	38.0	38.2	1.497	1.505
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	—

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Ultra High Power Resistors

Series UXP 300

300 Watt Power Resistor, Non Inductive Design

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

General Characteristics

Electric support:

- High alumina ceramic metallized on the top side with EBG Metoxfilm placed on a solid Al 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.

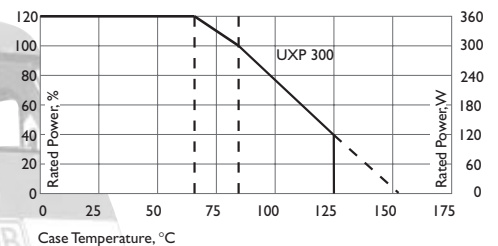
Contacts:

- Easy load connecting with M4 or M5 screws.
- Connector height (M+N) available from 25 to 42mm.
- Various sleeves for increased creeping distance up to 85mm or potted cable connections are available on special request.
- Materials in accordance with UL 94-V0
- The model UXP 300 introduced on this page can be changed according to customers 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 the local representative of EBG.

Specifications

- Resistance Values: 0.5Ω to 100KΩ
- Resistance Tolerance: ±5% to ±10%
- Temperature Coefficient: ±150ppm/°C (others upon request)
- Maximum Working Voltage: 5,000VDC; higher voltage on request, not exceeding max. power
- Short Time Overload: 2x rated power = 600W at 70°C for 10 sec, ΔR = 0.4% max.
- Power Rating: 300W at 70°C heatsink temperature.
- Electric Strength Voltage: 6kVrms, 50Hz, 1Min., up to 8,000Vrms on special request
- Single Shot Voltage: up to 12 kV Normwave (1.5/50 μsec)
- Partial Discharge: 3kVrms <10pC, up to 5kV on special request
- Insulation Resistance: 10GΩ Min. at 500V
- Creeping Distance: 42 mm Min.
- Air Distance: 14 mm Minimum
- Inductance: 80 nH
- Capacity/Mass: 110 pF
- Capacity/Parallel: 40 pF
- Operation Temperature: -55°C to +150°C
- Max. Torque for Contacts: 2 Nm
- Max. Torque for Mounting: 1.8 Nm



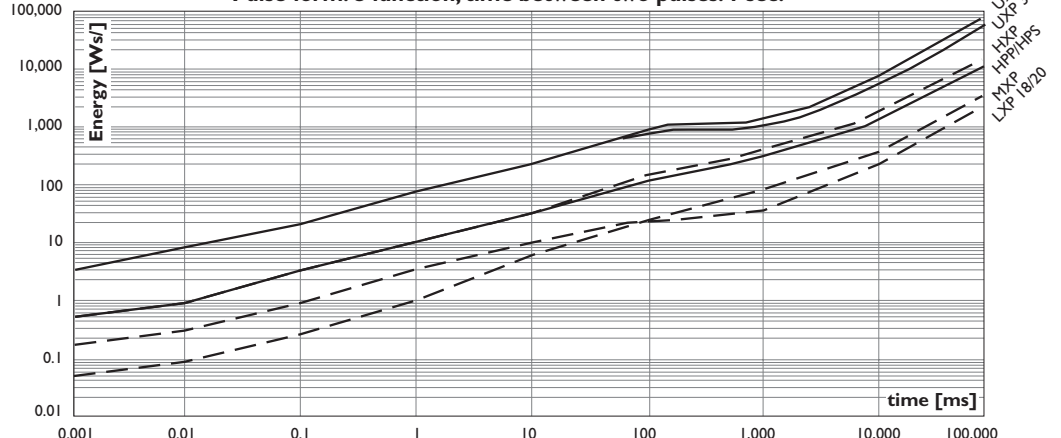
Derating (thermal resist.) UXP 300: 4.36W/°K (0.229°K/W)

Power Rating: 300W at 70°C heatsink temp.*

*This value is only valid by using a thermal conduction to the heatsink $R_{th-cs} < 0.025^{\circ}\text{K/W}$.

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

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



In the above spec sheet, you will find our standard product, please contact your local manufacturing representative or call us direct to find out details of other options available regarding this style:

<http://www.ebgusa.com> & e-mail: sales@ebg.at & sales@ebgusa.com

Ultra High Power Resistors

Series UXP 600

600 Watt Resistor, US Patent # 5,355,281

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

General Characteristics

Electric support:

- High alumina ceramic metallized with EBG 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.

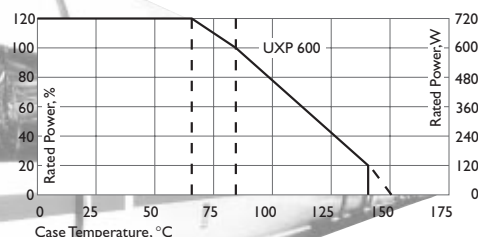
Contacts:

- Easy load connecting with M4 or M5 screws.
- Connector height (M+N) available from 25 to 42mm.
- Various sleeves for increased creeping distance up to 85mm or potted cable connections are available on special request

Materials in accordance with UL94-V0

Specifications

- Resistance Values: 0.5Ω to 100KΩ
- Resistance Tolerance: ±5% to ±10%
- Temperature Coefficient: ±150ppm/°C (others upon request)
- Maximum Working Voltage: 5,000V DC, higher voltage on request, not exceeding max. power
- Short Time Overload: 1,000W at 70°C for 10sec., ΔR = 0.4% max.
- Power Rating: 600W at 70°C heatsink temperature.
- Electric Strength Voltage: 6kVrms, 50Hz, upto 12kVrms on special request.
- Single Shot Voltage: up to 12 kV Normwave (1.5/50 μsec)
- Partial Discharge: 4KVRms, <10pC, up to 7kV on special request
- Insulation Resistance: 10GΩ Min. at 500V
- Creeping Distance: 42 mm Min.
- Air Distance: 14 mm Minimum
- Inductance: 80 nH
- Capacity/Mass: 110 pF
- Capacity/Parallel: 40 pF
- Operation Temperature: -55°C to +150°C
- Max. Torque for Contacts: 2 Nm
- Max. Torque for Mounting: 1.8 Nm



Derating (thermal resist.) UXP 600:

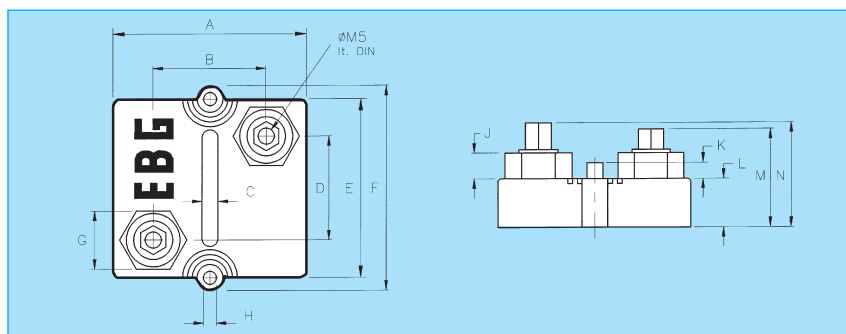
8.73W/°K (0.115°K/W)

Power Rating: 600W at 70°C heatsink temp.*

* This value is only valid by using a thermal conduction to the heatsink $R_{th-cs} < 0.025^{\circ}\text{K/W}$.

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

Test	Method	Typical Results
• Short time overload	1,000 W/10sec	0.4%
• Humidity	56days/40°C/	
Steady State	95°C	0.25%
• Temp.	-55/+125/5	
Cycling	cycles	0.20%
• Shock	40g/4,000 times	0.25%
• Vibrations	2-500Hz/10g	0.25%
• Load Life	Pn 30 min. on/	
1,000cyl	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	56.8	57.2	2.236	2.252
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	7.5	8.5	0.295	0.335
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

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Precision Decade Voltage Divider's

Series 1776-X

Family of Input Voltage Dividers for Multimeters and other Instruments

Series 1776 - X Precision Decade Voltage Divider's Ceramic Protected

Family of Input Voltage Dividers for Multimeters and other Instruments

EBG 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 EBG METOXFILM resulting in a family of Series 1776-X models:

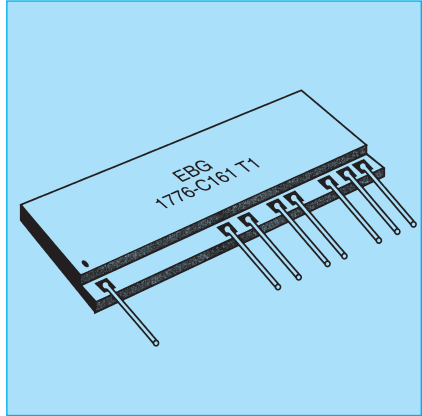
A summary of the features of the 1776-X series are:

- Compact precision resistor networks
- Easy to install package
- Absolute tolerances to ± 0.1 , ± 0.25 and $\pm 0.5\%$
- Relative tolerances to 0.05, 0.10 and 0.25%
- Ratio Temperature Coefficients from 10 to 50 ppm/ $^{\circ}\text{C}$
- 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 EBG agent or the factory direct for your special requirements.

Specifications

- Ratio Tolerance: 0.05% to 0.25%
- Absolute Tolerance: $\pm 0.1\%$ to $\pm 0.5\%$
- Ratio Temp. Coefficient: 10ppm/ $^{\circ}\text{C}$ to 50ppm/ $^{\circ}\text{C}$
- Absolute Temp. Coefficient: $\pm 25\text{ppm}/^{\circ}\text{C}$ to $\pm 50\text{ppm}/^{\circ}\text{C}$
- Voltage Coefficient: $< 0.05\text{ppm}/\text{V}$
- Storage Temperature: -55°C to $+165^{\circ}\text{C}$
- 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 $10\text{M}\Omega$



Model-Nr.	Resistance Values					Figure	Voltage Rating	Absolute Tol. %	Ratio Tol. %	Absol. TC ppm/ $^{\circ}\text{C}$	Ratio TC ppm/ $^{\circ}\text{C}$	Vol. Coef. Ratio ppm/V	Ratio Stability % Change in Ratio		
	R1 Ω	R2 Ω	R3 Ω	R4 Ω	R5 Ω								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
B168 T3	9M	900K	90K	9K	1K	1	1200	0.1	0.1	30	10	0.1	0.02	0.01	0.01
E167 T1	9M	900K	90K	9K	900	2	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
B167 T1	9M	900K	90K	9K	900	2	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04
E166 T1	9M	900K	90K	9K	1K	2	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
B166 T1	9M	900K	90K	9K	1K	2	1200	0.1	0.1	50	50	0.5	0.04	0.02	0.04
E16 T1	9M	900K	90K	9K	900	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04
B16 T1	9M	900K	90K	9K	900	3	1200	0.1	0.1	50	50	0.2	0.02	0.01	0.02
A16 T1	9M	900K	90K	9K	900	3	1200	0.1	0.05	50	50	0.2	0.02	0.01	0.02
E161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.25	50	50	0.3	0.04	0.02	0.04
D161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.1	50	50	0.2	0.02	0.01	0.02
C161 T1	9M	900K	90K	9K	1K	3	1200	0.25	0.05	50	50	0.2	0.02	0.01	0.02
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
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
E39 T3	10M	1.111M	101.01	10.01	1.0001	8	1200	0.25	0.25	30	10	0.1	0.02	0.01	0.01
B39 T3	10M	1.111M	101.01	10.01	1.0001	8	1200	0.1	0.1	30	10	0.1	0.02	0.01	0.01
G39 T1	10M	1.111M	101.01	10.01	1.0001	8	1200	0.5	0.5	50	50	0.5	0.04	0.02	0.04
E39 T1	10M	1.111M	101.01	10.01	1.0001	8	1200	0.25	0.25	50	50	0.5	0.04	0.02	0.04
E159 T5	900K	90K	9K	900	N/A	9	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02
B159 T6	900K	90K	9K	900	N/A	9	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02
A159 T6	900K	90K	9K	900	N/A	9	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02
G158 T5	900K	90K	9K	1K	N/A	9	750	0.25	0.25	25	25	0.4	0.02	0.01	0.02
B158 T6	900K	90K	9K	1K	N/A	9	750	0.1	0.1	25	15	0.3	0.02	0.01	0.02
A158 T6	900K	90K	9K	1K	N/A	9	750	0.1	0.05	25	15	0.3	0.02	0.01	0.02

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Thick Film Precision Resistors Networks

Also Custom Designed Elements Available

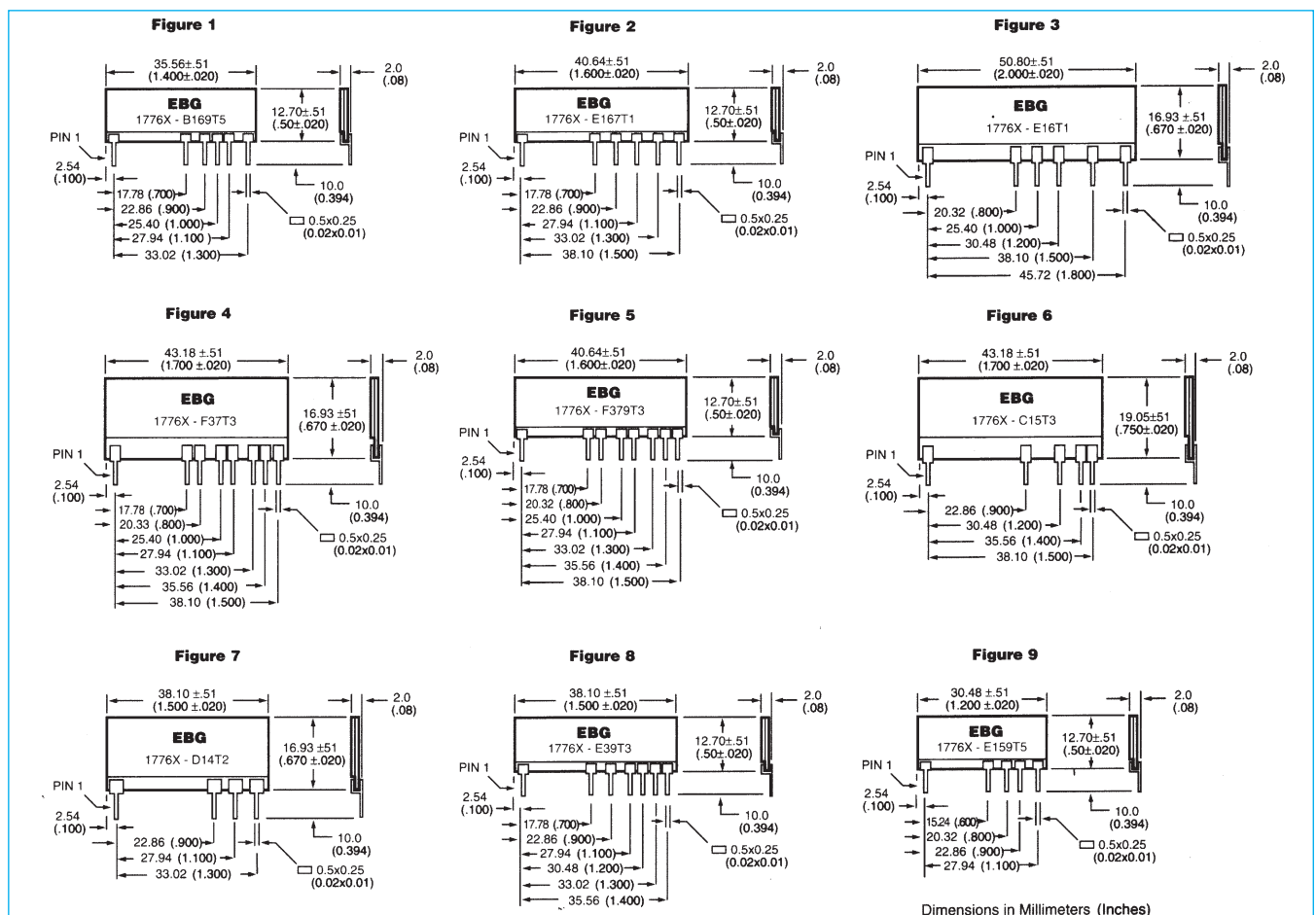
EBG

The same excellent performance that characterises the other EBG metal oxide types is also inherent in the various types of multiple METOXFILM circuits. Careful attention is devoted to the individual customer's design so as to not only comply with the requirements of resistance value, tolerance and TCR, but also power handling and stability during life, even under adverse conditions.

Most of EBG's multiple component designs are computer generated, and therefore avoid any possibility of "hot spot" long time deterioration. In addition, trimming is accomplished in digital step fashion by computer controlled lasers, of which EBG has several from both American and European laser companies, thus permitting us to cover a wide range of requirements.

While EBG has developed a standard product line of voltage divider models as shown here, we are also well suited to develop an exact custom designed circuit for you, employing high precision, high stability, low TCR and wide resistance range coverage without sacrifice of your important requirements.

We encourage you to consult our Applications Engineering Department with your special needs.



In the above spec sheet, you will find our standard product, please contact your local manufacturing representative or call us direct to find out details of other options available regarding this style:

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EBG Austria · Issue 307/22

Precision High Voltage Divider

Series HVT

EBG

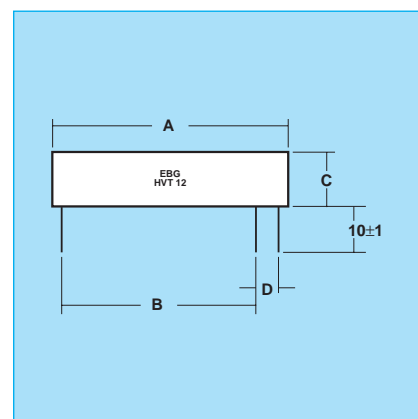
EBG introduces the new series of High Voltage Dividers called HVT. Available in 6 different sizes from 5 KV to 20 KV Voltage rating. In these highly reliable components EBG combines its state of the art high voltage technology with the unique METOXFILM stability.

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)

Specifications

- Absolute Tolerance:
± 1.0% for all resistors
- Overvoltage:
1.5 times rated voltage for 5 seconds
ΔR ratio 0.5% max.
- 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 local representative.
- Lead Material:
O.F.H.C. Copper tin plated:
diam. 0.60 mm



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	25.4 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



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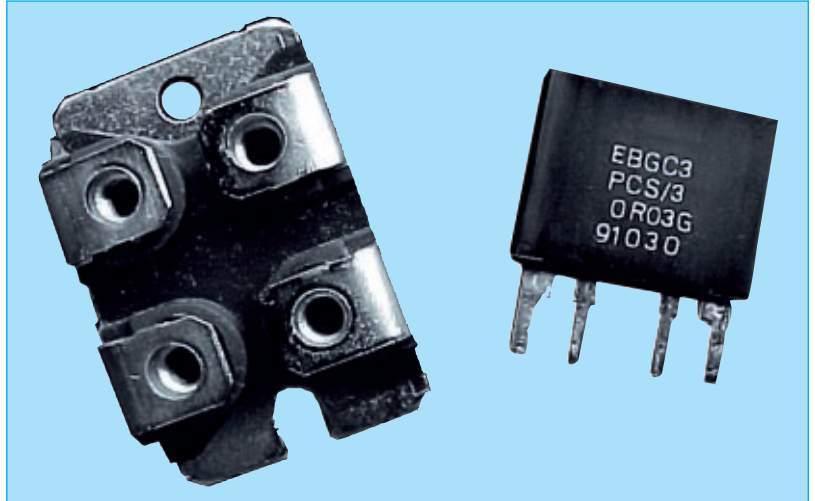
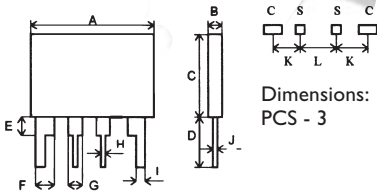
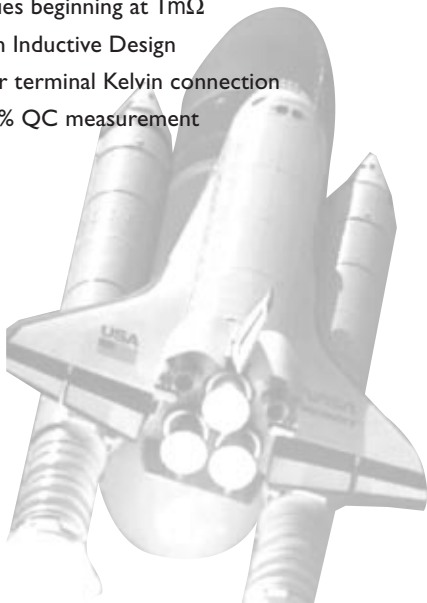
Shunts

PCS – Precision Current Sense Resistors

The resistor family line, PCS, utilizes EBG's 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 $1\text{m}\Omega$
- Non Inductive Design
- Four terminal Kelvin connection
- 100% QC measurement



PCS – 3

- Standard Resistance Values:
 $1\text{m}\Omega$ - 1Ω (others on request)
- Resistance Tolerances: 1%, 2%, 5%
- Temperature Coefficient:
TC referenced to 25°C , ΔR taken at -15°C and $+105^\circ\text{C}$, 60ppm/ $^\circ\text{C}$
- Power Rating: 3W at 70°C
max. 40Amp permanent
- Load Life:
1,000 hours at rated power at $+70^\circ\text{C}$, 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; silver plated & tinned
- Encapsulation:
Polyester over resistance element

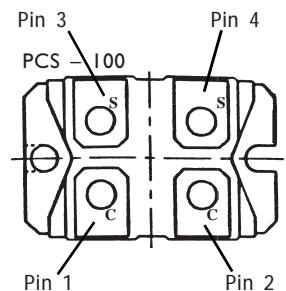
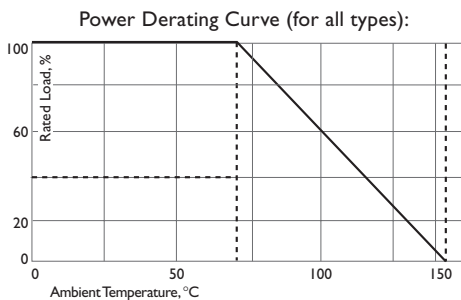
PCS – 100

- Standard Resistance Values:
 $0.5\text{m}\Omega$ - 1Ω (others on request)
- Resistance Tolerances: 1%, 2%, 5%
- Temperature Coefficient:
TC referenced to 25°C , ΔR taken at -15°C and $+105^\circ\text{C}$, 60ppm/ $^\circ\text{C}$
- Power Rating:
100W (at 70°C case temperature)
max. 50Amp permanent
- Heat Resistance: $R_{th} = < 0.35\text{K/W}$
- Protectionclass
acc. to IEC 950/CSA22.2 950/M - 89 and EN 60950.88:2
- Working Temp. Range:
 -55°C to $+155^\circ\text{C}$
- Max.Torque for Contacts:
1.3Nm 8 (static)
- Max Torque for Base Plate: 1.5 Nm (static)

Dimensions: see our type – HXP in this catalogue

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)



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Metal Film

Series UPR / UPSC

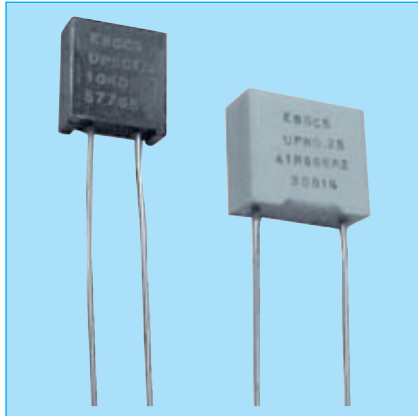
Extreme precise radial Resistors

- Precision Tolerances:
±0.1% is standard, and tolerances as close as ±0.01% are available
- Low Temperature Coefficient:
better than 3ppm/°C, 5ppm/°C, 10ppm/°C or 15ppm/°C
- Long-Term Stability:
better than ±0.05% per 2000 hours of operation.
- Wide Resistance Range:
from 10 Ohms to 255 KOhms

Specifications

- Resistance Tolerance:
±1.0% (tolerances to ±0.01% on special order)
- Std. Operating Temperature:
-55°C to + 85°C
- TC Temperature Range:
-20°C to + 85°C
- Overload:
6.25 times rated power for 5 seconds at voltage not to exceed 1.5 times maximum rated working voltage, ΔR less than 0.05%
- Load Life:
2000 hours at + 125°C, ΔR less than 0.05%
- Moisture Resistance:
Mil-Std-202, Method 106, ΔR less than 0.02%
- Thermal Shock:
Mil-Std-202, Method 107, Cond. B, ΔR less than 0.05%
- Isulation Resistance:
10,000 Megohms

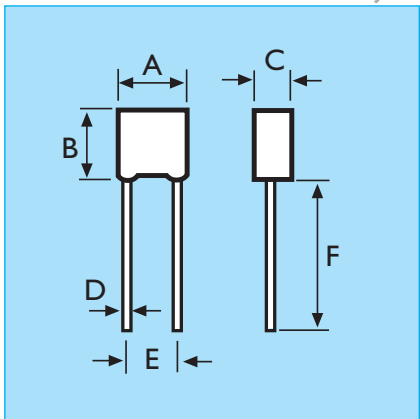
- Low Temperature Operation:
ΔR less than 0.02%
- Dielect. Withstanding Voltage:
ΔR less than 0.02%
- Vibration:
ΔR less than 0.01%
- Shock: ΔR less than 0.02%



Types UPSC and UPR Low TC Precision Radial-Lead Resistors - Standard Characteristics							
Model No.	Temperature Coefficient ppm/°C	Wattage +70°C	Max. Working Voltage	Dielect Strength	Resistance Min. Max.		Dimensions
UPSC	±3 to ±15	0.60	300	300	100R	100K	see Matrix
UPR	±3 to ±15	0.60	250	400	10R	255K	see Matrix

Dim.	UPSC	UPR
A	7.50±.20 (.295±.008)	10.50±.30 (.413±.012)
B	8.50±.20 (.335±.008)	9.00±.30 (.354±.012)
C	2.50±.20 (.098±.008)	4.00±.30 (.157±.012)
D	0.63±.05 (.025±.002)	0.63±.05 (.025±.002)
E	3.81±.38 (.150±.015)	7.62±.38 (.300±.015)
F	38.10±.50 (1.500±.197)	

Dimensions in millimeters (inches)



TESTS	CONDITIONS	MIL-R-55182/9	TYPICAL DRIFTS
POWER CONDITIONING (108)	100 hours/rated power at + 125°C 90°/30° cycle	-	±.02% combined test
THERMAL SHOCK (107)	5 cycles -65°C/+150°C	±.05%	combined tests
SHORT TIME OVERLOAD	6.25 times rated power/5sec	±.05%	
LOW TEMPERATURE STORAGE AND OPERATION	1h stor. 45 min rated pow. at -65°C 24 h stor. 45 min rated pow. at -65°C	-	±.01%
TERMINAL STRENGTH (211)	2lb pull test	±.02%	±.01%
DIELECTRIC WITHSTANDING VOLTAGE (301)	300V ATMOSPHERIC 200V/100,000 ft.	±.02%	±.01%
RESIST TO SOLDERING (210)	350°C/3 sec.	±.02%	±.01%
MOISTURE RESISTANCE (106)	10 days	±.05%	±.01%
SHOCK	10 shocks 100 g 6 ms sawtooth	±.01%	±.01%
VIBRATION (204)	10 to 2000 Hz. 20 g 8 hours	±.02%	±.01%
LOAD LIFE (108)	2000 hours at rated power at + 25°C, +85°C, or + 125°C	±.05%	±.05%
	10,000 hour at rated power at + 125°C	±.5%	±.2%
STORAGE LIFE	10,000 h. no load at room conditions	-	±.005%

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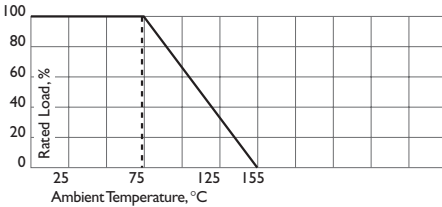
Metal Film

Series NE / EE

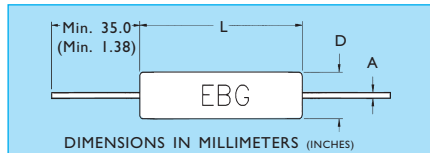
Precision Metal Film Resistors Molded Style

The EBG NE styles feature extremely low ranges hereto fore unavailable in the industry. As a result of a special proprietary filming method, a nickel film is employed with controlled amounts of other metals, which results in fractural ohm availability yet with low temperature coefficient of resistance and high stability.

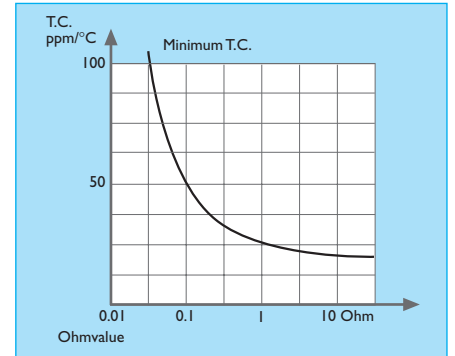
- Resistance Values as low as 0.025 Ohms



- Specifications:
- Resistance Tolerance: from $\pm 0.05\%$ to $\pm 5\%$
- Temperature Coefficient: according to drawing
- Operating Temperature: -55°C to $+155^{\circ}\text{C}$
- Isulation Resistance: 10^4 Mohm at 500 VDC

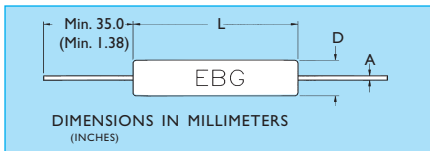


- Noise less than $0.05\mu\text{V/V}$



Model (inches) No.	Watt-age	Resistance Range		Dimensions in millimeters		
		Min.	Max.	L	D	A
NE 1/10	0.25	0.025R	20R	6.80±.30 (.268±.01)	2.50±.40 (.098±.02)	.60±.05 (.024±.002)
NE 1/8	0.50	0.1R	20R	10.00±.30 (.394±.01)	3.70±.40 (.146±.02)	.60±.05 (.024±.002)
NE 1/4	1.00	0.1R	20R	14.80±.30 (.583±.01)	5.20±.40 (.205±.02)	.60±.05 (.024±.002)
NE 1/2	1.50	0.1R	20R	18.30±.30 (.720±.01)	6.50±.40 (.256±.02)	.81±.05 (.032±.002)

The EBG EE styles conform dimensionally to the RN styles of MIL-R-10509 and the RNR styles of MIL-R-55182. All of the EBG styles of Metal Film Resistors offer performance superior to the requirements of both of these specifications. All the EE styles can be used for automatic insertion and/or encapsulation.



Type	EE 1/20	EE 1/10	EE 1/8	EE 1/4	EE 1/2
MIL 10509	RN 50	RN 55	RN 60	RN 65	RN 70
Power rating (W at 125°C)	.05	.10	.125	.25	.50
Max. working voltage (V)	200	250	300	300	350

- Specifications:
- Resistance Tolerance: from $\pm 0.02\%$ to $\pm 1\%$
- Temperature Coefficient: from $\pm 5\text{ppm}/^{\circ}\text{C}$ to $\pm 50\text{ppm}/^{\circ}\text{C}$ all TCR referenced to 25°C , ΔR taken at $+25^{\circ}\text{C}$ and $+85^{\circ}\text{C}$, other temperature ranges on request
- Elements are produced and tested in accordance with MIL-R-10509 and MIL-R-55182 as well as MIL-STD-202.

- Special Feature - Series UAR
On request EBG does a "burn-in" to these elements for ultimate stability. Please refer to series UAR (Ultra Accurate Resistor) and ask for detailed datasheet.

Model No.	Watt-age 70°C	Max. Continuous Oper. Volt.	Resistance Range	
			Min.	Max.
EE 1/20	.125	200	20R	600K
EE 1/10	.250	250	20R	3M
EE 1/8	.500	300	20R	5M
EE 1/4	.750	300	20R	10M
EE 1/2	1.000	350	20R	15M

Model No.	Dimensions in millimeters (inches)		
	LD		A
EE 1/20	3.90±.30 (.154±.01)	1.80±.40 (.071±.02)	.45±.05 (.018±.002)
EE 1/10	6.80±.30 (.268±.01)	2.50±.40 (.098±.02)	.60±.05 (.024±.002)
EE 1/8	10.00±.30 (.394±.01)	3.70±.40 (.146±.02)	.60±.05 (.024±.002)
EE 1/4	14.80±.30 (.583±.01)	5.20±.40 (.205±.02)	.60±.05 (.024±.002)
EE 1/2	18.30±.30 (.720±.01)	6.50±.40 (.256±.02)	.81±.05 (.032±.002)

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Custom designed

EBG

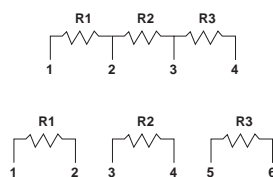


EBG is pleased to introduce our strength in custom designed passive components. Listed below are just a few components we have created in close cooperation with our valued customers.

INR Planar Kanthal AI Resistor
3 x 50 Watt / 6 Terminals
standard values: 0R25 and 0R5



INX 3 x 70 up to 3 x 100 Watt
thick film resistor
with 4 or 6 terminals
any resistor value available
1Ω to 1MΩ.
Insulation voltage > 2500V
non inductive design



SKY Snubber resistor 50W
for mainframe computer
power supplies
Surface temperature within
±15°C over the full area of
resistor (no hot spot).

LAR Non inductive bleeder resistor
for laser and x-ray applications.

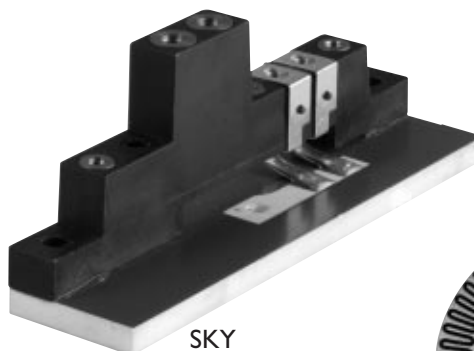
GWN 1800W - non inductive discharge
resistor for traction application.



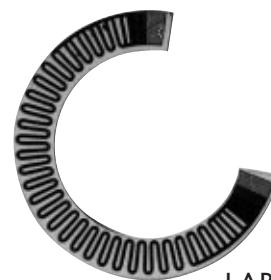
INR



INX



SKY



LAR



GWN

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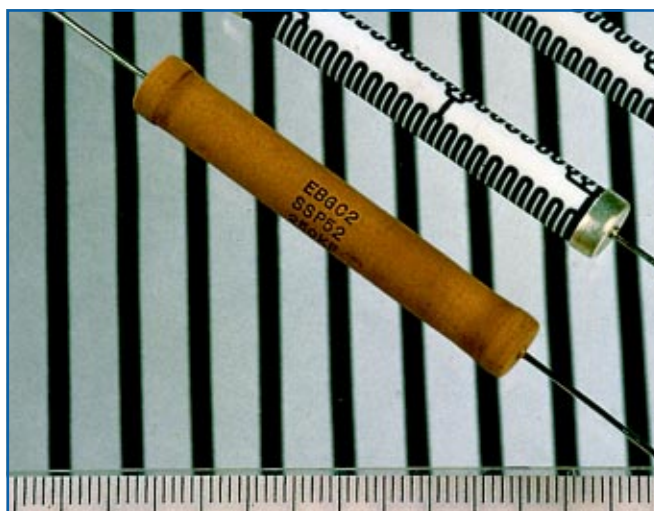
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The EBG Customer Relationship

EBG concentrates its attention on the leading edge of electronic component technology. Avoiding the mass produced commodity items with less exacting requirements, **EBG** develops highly reliable product lines to fill the creative requirements of the design and development engineer in today's fast moving world.

Our company has always welcomed the opportunity to participate in new product development for engineers with imagination and vision. If its within the scope of our knowledge of thick film technology, thin film technology, computer programming, laser isolation and processing, our engineers will work with you ... and for you to help solve your resistor needs now and in the future.

EBG is certified acc. to EN ISO 9002



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