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The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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About our Company - An Introduction to EBG

EBG is a leading international electronic components manufacturer concentrating on highly specialized electronic resistive components. EBG’s corporate headquarters is located in Austria. In addition, we have operational facilities throughout Europe, the USA and East Asia.

Since 1977, EBG has been adding numerous quality electronic components to its product portfolio. From its Austrian plant, EBG exports more than 85% of its production to customers all over the world.

EBG specializes in high-technology electronic components rather than in run-of-the-mill products. 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 meet applicable environmental requirements according to European and US military specifications.

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

EBG is EN ISO 9001:2008 certified. Our customer base consists of many of the top FORTUNE 500 companies around the world.

We encourage you to contact our technical staff to help assist you in the development/design of your individual resistor needs. EBG’s research and evaluation capabilities include but are not limited to operation of sophisticated X-ray facilities as well as thermal imaging systems.

The EBG Customer Relationship

EBG focuses on cutting-edge electronic components technology. Avoiding mass-produced commodity items with less exacting requirement, 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 it is within the scope of our know-how of thick film technology, thin film technology, computer programming, laser isolation and processing, our engineers will be delighted to work with you ... and for you to help solve your resistor needs now and in the future.

EBG is EN ISO 9001:2008 certified

Example of EBG’s new X-Ray and thermal imaging capabilities:
High-Voltage Resistors

Series SGT Low TCR • U.S. Patent-No. 4,859,981
TC of 25 ppm/°C combined with precision tolerances (0.1%–1%), ohmic range (100 KΩ–1 GΩ)

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 EBG’s patented Non-Inductive Design. Typical applications are medical systems like X-ray, nuclear spin tomography as well as power supplies or instruments.

General Characteristics
- Resistance range: from 100 KΩ to 1 GΩ (others on request)
- Resistance tolerance: from ±0.1% to ±1.0%
- Standard Temperature coefficient: 25 ppm/°C
- Load life stability: 0.25% per 1,000 hours at +125°C.
- Patented NON-INDUCTIVE DESIGN
- Max. cont. operating temperature: +225°C.
- Voltages up to 60% higher than the values listed may be specially ordered by adding “S” to the model designation.

Specifications
- Resistance tolerance: standard: ±1% to ±10% (tolerances down to ±0.1% upon special request) **
- Temperature coefficient: ±25 ppm/°C referenced to 25°C, ΔR taken at -15°C and +85°C (other temperatures on request).
- Voltage coefficient: –0.2 ppm/V max. as to MIL-Std-202, Method 309, 10 kV DC max.
- Dielectric strength: 1,000 V DC
- Insulation resistance: 10 GΩ min.
- Overload/overvoltage: 5 times rated power with applied voltage not to exceed 1.5 times maximum continuous operating voltage for 5 seconds. ΔR 0.20% max.
- Load life: 1,000 hours at rated voltage not exceeding rated power, typical ΔR (2 s) = 0.1%, ΔR=0.25% max.
- 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: OFHC copper, tin-plated
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

** If you need very close tolerances (±0.1% to ±0.5%), we recommend not to use the full power rating but rather to select the next larger size to achieve ultimate stability.
For details, please contact your nearest EBG representative.

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High-Voltage Resistors

Series SGP/OGP • U.S. Patent-No. 4,859,981
TC of 80 ppm/°C combined with precision tolerances (0.1%-10%) and wide ohmic range (100 Ω – 10 GΩ)

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 Specifications

- **Resistance tolerance:** standard: ±1% to ±10% (±1% to ±10% above 1 GΩ) (tolerances down to ±0.1% upon special request)
- **Temperature coefficient:** standard ±80 ppm/°C (from -15°C to +105°C), referenced to +25°C (other TCR or other temperatures on request)
- **Voltage coefficient:** see page 7
- **Dielectric strength:** 1,000 V DC max. (25°C, 75% relative humidity)
- **Insulation resistance:** 10 GΩ 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. ΔR 0.5% max.
- **Load life:** 1,000 hours at 125°C and rated power, components with 1% tol. ΔR 0.2% max., extended range (“S”) ΔR = 0.5% max.
- **Moisture resistance:** MIL-Std-202, Method 106, AR 0.4% max.
- **Thermal shock:** MIL-Std-202, Method 107, Cond. C, AR 0.25% max.
- **Encapsulation:** silicone conformal
- **Lead material:** OFHC copper, tin-plated
- **Standard storage conditions:** 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

**Voltage coefficients** up to 60% higher than the values listed may be specially ordered by adding “S” to the model designation.

EBG’s special patented (U.S. Patent-No. 4,859,981) Non-Inductive Design 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, which frequently results in a weak section. EBG’s patented process avoids this potential problem.

** Our resistors are designed for operation in air and non-aggressive atmospheres. For special applications (i.e., oil, casting, molding, SF6, etc.), please contact our nearest EBG representative. The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
High-Voltage Resistors - Overview

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Cylindrical Power Resistors
Series SSP/OSP

Power and High-Voltage Resistors with high temperature operation, standard TC of 50 ppm/°C and ohmic range from 0R1 to 30M.

The SSP series meets the requirements of power ratings of up to 40 W while at the same time offering voltage ratings of up to 6,000 V. These Power Film Resistors cover a wide resistance range and operate at up to 275°C in axial lead construction.

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

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 1,400°F/800°C and become an inherent part of the ceramic surface, which brings about 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: standard: ±1% to ±10%**
- Temperature coefficient: for 10 Ω and above 50 ppm/°C (other TCR on request). TC referenced to 25°C, ΔR taken at –15°C and +105°C (other TCR on request) (other temperatures on request).
- Dielectric strength: 1,000 VDC
- Insulation resistance: 10 GΩ 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 0.5 Ω max., whichever is greater (not applicable to SSP 148!)
- Load life: 1,000 hours at rated power, ΔR 0.5% max. or 0.5 Ω max., whichever is greater.
- Thermal shock: MILStd-202, Method 107, Cond. C, ΔR 0.5% max. or 0.5 Ω max., whichever is greater.
- Max. operating temperature: +275°C
- Encapsulation: silicone conformal
- Lead material: OFHC copper, tin-plated
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

**Version L:
Resistance tolerances down to ±0.5% or ±0.1%, lower max. power (like SGP Series)

*F*: enforced cooling
- Resistor in open air position, air flow >1.5 m/sec. at ≤25°C ambient temperature
- Resistor in case, air flow >2 m/sec. at ≤25°C ambient temperature

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Precision High-Voltage Resistors

Precision High-Voltage Resistor Series OSX/SSX/SOX

Power- and Precision High-Voltage Resistors, standard TC of 100 ppm/°C and wide ohmic range (100 Ω - 10 GΩ)

The low-cost OSX/SSX/SOX series meets a general set of requirements. These products are available with a silicone or epoxy coating and feature a wide range of tolerances and temperature coefficients of resistance.

General Characteristics

- Silicone coating for ambient temperatures up to 225°C
- Epoxy coating for excellent humidity protection available under the label SOX
- Resistance tolerances: ±0.1% to ±10%
- Standard temperature coefficient: ±100 ppm/°C
- Power ratings: up to 19.4 W
- 16 models with voltage ratings: from 1,5 KV to 60 KV
- Load life stability: 0.20% per 1,000 hours at 70°C
- Resistance range: from 100 Ω to 10 GΩ
- Full encapsulation over the entire resistor length.

All SSX types are also available with M4 or 6/32 screw end caps.

Specifications

- Resistance tolerance: ±1%, ±2%, ±5%, or ±10% (tolerance to ±0.1%, ±0.25%, ±0.5% upon special request) *(typically measured at room-temperature about +25°C, typical measuring voltage of 20 Volts)
- Temperature coefficient: standard: 100 ppm/°C referenced to 25°C, ΔR taken at +85°C, other TCR upon request.
- Load life: 1,000 hours at rated power at 70°C, ΔR 0.20% 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
- Lead material: OFHC copper, tin-plated
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

Model no.

<table>
<thead>
<tr>
<th>Model no.</th>
<th>Watt-</th>
<th>Max. cont.</th>
<th>Max.</th>
<th>Resis-</th>
<th>Dimensions in millimeters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>age at 70°C</td>
<td>oper. KV</td>
<td>KV **</td>
<td>tance</td>
<td>(inch)</td>
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<tr>
<td>VSX 10</td>
<td>0.30</td>
<td>3.0</td>
<td>100</td>
<td>1G</td>
<td>0.42</td>
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<tr>
<td>VSX 13</td>
<td>0.50</td>
<td>5.0</td>
<td>100</td>
<td>1G</td>
<td>0.50</td>
</tr>
<tr>
<td>VSX 20</td>
<td>0.70</td>
<td>7.0</td>
<td>100</td>
<td>1G</td>
<td>0.70</td>
</tr>
<tr>
<td>VSX 25</td>
<td>1.00</td>
<td>10.0</td>
<td>100</td>
<td>2G</td>
<td>1.00</td>
</tr>
<tr>
<td>VSX 30</td>
<td>1.50</td>
<td>15.0</td>
<td>100</td>
<td>5G</td>
<td>1.50</td>
</tr>
</tbody>
</table>

* In case you need very tight tolerances (±0.1% to ±0.5%), we suggest not to use the full power rating, but rather the next larger size to achieve ultimate stability.

For details, please contact your nearest EBG representative.

** Our resistors are designed for operation in air and non-aggressive atmospheres. For special applications (e.g., oil, casting, molding, SF₆ etc.) please contact your nearest EBG representative.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Precision High-Voltage Resistors

Series MTX 968

Precision High-Voltage Resistors with wide ohmic range (400 Ω–100 GΩ)

The MTX 968 resistor series is designed for use in voltage dividers, medical equipment, electrostatic devices, measuring equipment and current limiting devices where high stability, low TCR, high ohmic values and high short-term loads are required.

For use in oil- or potted applications, EBG recommends the use of polyimide coating instead of silicone conformal coating. Please ask for details!

Specifications

- Resistance tolerance: ±0.1% to ±10%
- Temperature coefficient: ±15 ppm/°C to ±200 ppm/°C. Specified TCR granted at +85°C related to room temp. +25°C!
  (Others upon special request!)
- Load life: ΔR/R 0.5% max., 1,000 hours at rated power
- Dielectric strength: 1,000 V max. (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: silicone conformal (A), polyimide coating (P) (suggested for oil- and potted applications) Please ask for details!
- Lead material: copper wire, gold-plated
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

<table>
<thead>
<tr>
<th>Specifications</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance</td>
<td>±0.1% to ±10%</td>
</tr>
<tr>
<td>Temperature</td>
<td>±15 ppm/°C to ±200 ppm/°C</td>
</tr>
<tr>
<td>Load life</td>
<td>ΔR/R 0.5% max, 1,000 hours at rated power</td>
</tr>
<tr>
<td>Dielectric</td>
<td>1,000 V max. (25°C, 75% relative humidity)</td>
</tr>
<tr>
<td>Thermal shock</td>
<td>ΔR/R 0.25% max</td>
</tr>
<tr>
<td>Moisture</td>
<td>ΔR/R 0.25% max</td>
</tr>
<tr>
<td>Operating temp.</td>
<td>–55°C to +225°C</td>
</tr>
<tr>
<td>Encapsulation</td>
<td></td>
</tr>
<tr>
<td>Lead material</td>
<td>copper wire, gold-plated</td>
</tr>
<tr>
<td>Storage</td>
<td>0 to 85°C at 80% RH max. for min. 12 months</td>
</tr>
</tbody>
</table>

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The MTX 969 resistor series is designed for use in voltage dividers, medical equipment, electrostatic devices, measuring equipment and current limiting devices where high stability, low TCR, high ohmic values and high short-term loads are required.

For use in oil- or potted applications, EBG recommends the polyimide coating instead of the silicone conformal coating. Please ask for details!

Specifications
- Resistance tolerance: ±0.1% to ±10%
- Temperature coefficient: ±10 ppm/°C to ±200 ppm/°C. Specified TCR granted at +85°C related to room temperature +25°C!
- Load life: ΔR/R 0.25% max., 1,000 hours at rated power
- Dielectric strength: 1,000 V max. (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: silicone conformal, polyimide coating (suggested for oil and potted applications) Please ask for details! 
- Lead material: caps, nickel-plated
- Max. torque: 2Nm for M4, 4Nm for M8
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

Specifications
Dimensions (mm)

<table>
<thead>
<tr>
<th>Type</th>
<th>L</th>
<th>B</th>
<th>Ø</th>
<th>D</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>969.11</td>
<td>81 ± 1</td>
<td>14.5 ± 0.2</td>
<td>13.5 ± 0.5</td>
<td>10 ± 0.2</td>
<td>M4</td>
</tr>
<tr>
<td>969.23</td>
<td>156 ± 2</td>
<td>14.5 ± 0.2</td>
<td>13.5 ± 0.5</td>
<td>10 ± 0.2</td>
<td>M4</td>
</tr>
<tr>
<td>969.54</td>
<td>160 ± 2</td>
<td>31.5 ± 0.2</td>
<td>30.5 ± 0.5</td>
<td>18 ± 0.2</td>
<td>M8</td>
</tr>
<tr>
<td>969.71</td>
<td>210 ± 2.5</td>
<td>31.5 ± 0.2</td>
<td>30.5 ± 0.5</td>
<td>18 ± 0.2</td>
<td>M8</td>
</tr>
<tr>
<td>969.105</td>
<td>308 ± 3.5</td>
<td>31.5 ± 0.2</td>
<td>30.5 ± 0.5</td>
<td>18 ± 0.2</td>
<td>M8</td>
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</table>

Standard Resistance ranges (other on request)

<table>
<thead>
<tr>
<th>Type</th>
<th>Tolerance 2 – 10% TC ppm / °C 150, 200</th>
<th>Tolerance 0.5 – 10% TC ppm / °C 50, 100</th>
<th>Tolerance 0.1 – 10% TC ppm / °C 15, 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>969.11</td>
<td>500 R – 5 G</td>
<td>500 R – 1 G</td>
<td>50 K – 500 M</td>
</tr>
<tr>
<td>969.23</td>
<td>700 R – 10 G</td>
<td>700 R – 1 G</td>
<td>100 K – 1 G</td>
</tr>
<tr>
<td>969.54</td>
<td>2 R – 10 G</td>
<td>2 R – 1 G</td>
<td>100 K – 1 G</td>
</tr>
<tr>
<td>969.71</td>
<td>20 R – 15 G</td>
<td>20 R – 1.5 G</td>
<td>100 K – 1.5 G</td>
</tr>
<tr>
<td>969.105</td>
<td>80 R – 25 G</td>
<td>80 R – 2 G</td>
<td>100 K – 2 G</td>
</tr>
</tbody>
</table>
Precision High-Voltage Divider

Series MTX 2000
High-Power/High-Voltage Dividers up to 50 W

The MTX 2000 series consists of 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 TCRs.

For use in oil or potted applications, EBG recommends polyimide coating instead of silicone conformal coating. Please ask for details!

**Specifications**
- Resistance tolerance: ±0.1% to ±1%
- Ratio tolerance: 0.1% to 1%
- Temperature coefficient: ±25 ppm/°C to ±50 ppm/°C. Specified TCR granted at +85°C related to room temperature of +25°C!
- Ratio temperature coefficient: 10 ppm/°C to 15 ppm/°C
- Load life: ΔR/R 0.15% max., 1,000 hours at rated power
- Dielectric strength: >1,000 V (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: silicone conformal, polyimide coating
- Max. torque: 2Nm for M4, 4Nm for M8
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

<table>
<thead>
<tr>
<th>Type</th>
<th>L</th>
<th>B</th>
<th>Ø</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>I</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000.23</td>
<td>156 ± 2</td>
<td>14.5 ± 0.2</td>
<td>13.5 ± 0.5</td>
<td>10 ± 0.2</td>
<td>8.5 ± 0.2</td>
<td>5 ± 0.5</td>
<td>M4</td>
<td>1.0 ± 0.1</td>
<td>30.0 ± 1</td>
</tr>
<tr>
<td>2000.105</td>
<td>308 ± 2.5</td>
<td>31.8 ± 0.3</td>
<td>30.5 ± 0.5</td>
<td>18 ± 0.2</td>
<td>40 ± 2.0</td>
<td>7 ± 0.5</td>
<td>M8</td>
<td>1.0 ± 0.1</td>
<td>30.0 ± 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Watt 40°C</th>
<th>U kVDC</th>
<th>TK abs.</th>
<th>50 ppm / °C</th>
<th>25 ppm / °C</th>
<th>15 ppm / °C</th>
</tr>
</thead>
</table>

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High-Power Water-Cooled Resistor

Series MTX 969W
High-Power Water-Cooled Single Resistors and Voltage Dividers up to 1,700 W!

Our resistor series 969W is designed for use in high-power applications. Direct water cooling renders these resistors suitable for a very high continuous power load.

Easy M4 mounting, wide ohmic range, precise tolerance and temperature coefficient values as well as high dielectric strength capability are only some of the features of this resistor series. There is also an option for voltage dividers!

Specifications
- Standard resistance values: 0.5 Ω to 10 MΩ
- Resistance tolerance: ±5%, ±10% (standard)
- Temperature coefficient: ±100 ppm/°C (standard) ≤10 R: + 250 ppm/°C. Specified TCR granted at +85°C related to room temp. +25°C!
- Inductivity: 80–100 nH typical
- Isolation voltage: 10 kV DC (between Contact 1 and Isolation Contact) - for 969-W and 969-W-L; 3 kV DC for 969-W-S
- Cooling medium: must be non-conductive (e.g., distilled water or distilled water-glycol mixture)
- Max. cooling medium pressure: 10 bar
- Contact material: CrNi (stainless)
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

<table>
<thead>
<tr>
<th>Type</th>
<th>P max</th>
<th>U max</th>
<th>L</th>
<th>L1</th>
<th>L2</th>
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<tr>
<td>969 W-S</td>
<td>500 W</td>
<td>5 kV DC</td>
<td>117</td>
<td>100</td>
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<tr>
<td>969 W</td>
<td>1000 W</td>
<td>7 kV DC</td>
<td>195</td>
<td>178</td>
<td>15</td>
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<tr>
<td>969 W-L</td>
<td>1700 W</td>
<td>10 kV DC</td>
<td>337</td>
<td>320</td>
<td>15</td>
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</tbody>
</table>

(max. Power at cooling medium temp. < 50°C, flow > 7 l / min.)
If (power)-resistors are used in an enforced cooling application, coolant flow may not be interrupted!

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
High-Voltage Resistors

High-Voltage Flat Style Resistor Series FSX, FEX, and FBX

TC of 80 ppm/°C combined with precision tolerances (±0.5% to ±10%) and wide ohmic range (200 Ω–2 GΩ)

Low-cost, high-voltage resistors that provide high-density packaging in large volume applications.

- Three different coatings available
  - Series FSX: silicone conformal for high-temperature operation (225°C)
  - Series FEX with epoxy coating for maximum moisture protection
  - Series FBX with surface silicone print as an inexpensive alternative
- High voltage withstanding up to 24,000 V
- Six different sizes
- Thickness max. 3 mm (0.118 inch) only for high-density packaging
- Non-Inductive Design

Specifications

- Resistance range: 200 Ω to 2 GΩ
- Resistance tolerance: ±0.5% to ±10%
- Temperature coefficient (up to 100 MΩ): ±80 ppm/°C from –5°C to +105°C referenced to +25°C R > 100 MΩ: 150 ppm/°C
- Max. operating voltage: “S” upon request up to 35% higher than listed (please contact our local representative)
- Voltage coefficient (typically): see below
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

![Typical Voltage Coefficient](image)

### Model no. Voltage at 70°C | Max. continuous oper. KV
---|---
FSX1/2 | 0.50 | 3,000* | 12.90 | ±0.02 | 3.40 | ±0.02 | 10.20 | ±0.02 |
FSX3 | 3.00 | 9,000* | 39.30 | ±0.02 | 6.60 | ±0.02 | 35.50 | ±0.02 |
FSX4 | 4.00 | 11,500* | 51.00 | ±0.02 | 6.60 | ±0.02 | 48.20 | ±0.02 |
FSX5 | 5.00 | 16,500* | 51.00 | ±0.02 | 12.90 | ±0.02 | 48.20 | ±0.02 |
FSX6 | 6.50 | 24,000* | 51.00 | ±0.02 | 12.90 | ±0.02 | 48.20 | ±0.02 |

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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High-Voltage Resistors

High-Voltage Flat Style Resistors Series FPX and FLX
TC of 100 ppm/°C combined with precision tolerances (0.5%–10%) and wide ohmic range

Low-cost power resistors that provide high-density packaging in large volume applications.
- Series FPX and FLX printed on surface with silicone conformal black coating for high-temperature operation (225°C)
- High voltage withstanding up to 16,500 V
- Five different sizes
- Thickness max. 3 mm (0.118 inch) for high-density packaging
- Non-Inductive Design

Specifications
- Resistance range: FPX: 200 Ω to 2 GΩ, FLX: 100 to 1 GW
- Resistance tolerance: FPX: ±1% to 10%, FLX: ±0.5% to 10%
- Temperature coefficient: 100 ppm/°C, measured at +85°C, referenced to +25°C (other TCR or temperatures on request)
- Voltage coefficient (typically): Resistance range – ppm/V
- Temperature coefficient: ±100 ppm/°C, measured at +85°C, referenced to +25°C (other TCR or temperatures on request)
- Max. operating voltage: “S”; upon request up to 35% higher than listed
- Standard storage conditions: 0 to 85°C at 80% RH max.
- Moisture resistance: ΔR/R 0.25% max.
- Overload: ΔR/R 0.25% max 1.5 x Pnom, 5 sec
- Thermal shock: ΔR/R 0.2% max
- Dielectric strength: >1000 V (25°C, 75% relative humidity)
- Insulation resistance: >10,000 MΩ (500 V , 25°C, 75% relative humidity)
- Tolerance: ±10% to ±0.1% (on request)
- Operating temperature: –55 to +175°C
- Resistance range – ppm/°C
- Voltage coefficient: Resistance range – ppm/V
- Non-Inductive Design
- Insulation resistance: >10,000 MΩ (500 V , 25°C, 75% relative humidity)
- Resistance tolerance: FPX: ±1% to 10%, FLX: ±0.5% to 10%
- Non-Inductive Design
- Temperature coefficient: ±100 ppm/°C, measured at +85°C, referenced to +25°C (other TCR or temperatures on request)
- Max. operating voltage: “S”; upon request up to 35% higher than listed
- Standard storage conditions: 0 to 85°C at 80% RH max.
- Moisture resistance: ΔR/R 0.25% max.
- Overload: ΔR/R 0.25% max 1.5 x Pnom, 5 sec
- Thermal shock: ΔR/R 0.2% max
- Dielectric strength: >1000 V (25°C, 75% relative humidity)
- Insulation resistance: >10,000 MΩ (500 V , 25°C, 75% relative humidity)
- Tolerance: ±10% to ±0.1% (on request)
- Operating temperature: –55 to +175°C
- Resistance range – ppm/°C
- Voltage coefficient: Resistance range – ppm/V

High-Voltage Flat Style Resistors Series MTX 967

Operating temperature: –55 to +175°C
Resistance range: 10 Ω to 30 GΩ (depending on type)
Temperature coefficient: ±10 to ±200 ppm/°C measured at +25°C (other TCR or temperatures on request)
Tolerance: ±10% to ±0.1%
Insulation resistance: >10,000 MΩ (500 V , 25°C, 75% relative humidity)
Dielectric strength: >1000 V (25°C, 75% relative humidity)
Thermal shock: ΔR/R 0.2% max
Overload: ΔR/R 0.25% max 1.5 x Pnom, 5 sec
(ΔR/R 0.25% max 1.5 x V max.)
Moisture resistance: ΔR/R 0.25% max
Lead life: ΔR/R 0.25% max
Encapsulation: silicone conformal (other coatings with different dielectric strengths upon request)
Lead material: tinned copper

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Precision High-Voltage Divider
Series HVT

The new HVT series of high-voltage dividers is available in six 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 5 KV to 20 KV
- Ratio TCR 25 ppm/°C (10 ppm/°C upon request)
- Typical voltage coefficient 0.4 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.
- Abs. TCR: ± 100 ppm/°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: silicone conformal with dielectric withstanding voltage of 1,000 V on HVT 11, 16, 21. HVT 5, 7, and 12 have a printed silicone coating.
- Other resistance values upon request.
- Please do not hesitate to contact our local representative.
- Lead material: OFHC copper, tin-plated, 0.60 mm
- Operating temperature: –55°C to 155°C

Series MTX 1000

Specifications
- Operating temperature: –55 to +125°C
- Abs. temperature coefficient: 50 to 15 ppm/°C depending on ohmic value
- Ratio temperature coefficient: 15 to 5 ppm/°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 MΩ (500 V, 25°C, 75% relative humidity)
- Dielectric strength: 1000 V (25°C, 75% relative humidity)
- Thermal shock: ΔRR 0.2% max
- Overload: ΔRR 0.25% max 1.5 x Pnom, 5 sec (do not exceed 1.5 x Vmax)
- Moisture resistance: ΔRR 0.25% max
- Load life: ΔRR 0.15% max, 1,000 hours at rated power
- Encapsulation: silicone conformal (U), glass coating (G), or polyimide coating
- Lead material: tin coated copper

Dimensions (mm)

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Precision Decade Voltage Dividers

Series 1776-X
Input Voltage Dividers for multimeters and other instruments

Series 1776 – ceramic-protected X Precision Decade Voltage Divider; 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 uses the special EBG METOXFILM.

General Characteristics
- 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. For special requirements, please ask your EBG representative or directly at EBG.

Specifications
- Ratio tolerance: 0.05% to 0.25%
- Absolute tolerance: ±0.1% to ±0.5%
- Ratio temperature coefficient: 10 ppm/°C to 50 ppm/°C
- Absolute temperature coefficient: ±25 ppm/°C to ±50 ppm/°C
- Voltage coefficient: ±0.05 ppm/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: 900 Ω to 10 MΩ

<table>
<thead>
<tr>
<th>Model no.</th>
<th>Resistance values</th>
<th>Image</th>
<th>Voltage range</th>
<th>Base temperature</th>
<th>Load life</th>
<th>Shelf life</th>
<th>Over-voltage</th>
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<td>R2</td>
<td>R3</td>
<td>R4</td>
<td>R5</td>
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<td>90K</td>
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<td>90K</td>
<td>9</td>
<td>750</td>
</tr>
</tbody>
</table>

for “X” in model no., please select (surface finish): B - printed silicone, E - epoxy encapsulation, C - ceramic cover plate (if available), S - silicone conformal
Thick Film Precision Resistors Networks
Custom-designed elements available

The various types of multiple METOXFILM circuits feature the same excellent performance characteristic of other EBG metal oxide devices. Careful attention is devoted to the individual customer’s design so as to comply not only 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 thus avoid any possibility of “hot spot” long-term deterioration. In addition, trimming is accomplished in digital step fashion by computer-controlled lasers.

EBG owns several US- and European-manufactured lasers, which enable us to meet 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 neglecting your important requirements.

We encourage you to consult our Applications Engineering Department about your special requirements.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Power Resistors

Series LXP 18TO-220
18 W Thick Film Power Resistors for high-frequency and pulse-loading applications

EBG offers the completely encapsulated and insulated TO-220 package for low ohmic value and Non-Inductive Design for high-frequency and pulse-loading applications. Ideal use for power supplies. This series is rated at 18 W mounted to a heat sink.

General Characteristics
- 18 W power rating at 25°C case temperature
- TO-220 package configuration
- Single-screw mounting simplifies attachment to the heat sink.
- A fully molded housing for environmental protection.
- Non-Inductive Design
- Resistor package completely insulated from heat sink.
- Housing material acc. to UL94-V0

Specifications
- Resistance range: 0.05 Ω to 1 MΩ, other values upon request
- Resistance tolerance: ±1%, ±2%, ±5%, ±10% (0.5% upon request)
- Temperature coefficient: 10 Ω and above, ±50 ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1 Ω and 10 Ω, ± (100 ppm+0.002 Ω)/°C, referenced to 25°C, ΔR taken at +105°C
- Max. operating voltage: 350 V
- Dielectric strength: 1,800 V AC
- 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% + 0.001 Ω) max.
- Load life: MILR-39009, 2,000 hours at rated power, ΔR ± (1.0% + 0.001 Ω).
- Moisture resistance: MIL-Std-202, Method 106, ΔR ± (0.5% + 0.001 Ω) max.
- Thermal shock: MIL-Std-202, Method 107, Cond. F, ΔR ± (0.3% + 0.001 Ω) max.
- Terminal strength: MIL-Std-202, Method 211, Cond. A (Pull Test) 2.4 N, ΔR ± (0.2% + 0.001 Ω) max.
- Vibration, high frequency: MIL-Std-202, Method 204, Cond. D, ΔR ± (0.2% + 0.001 Ω) max.
- Lead material: tinned copper
- Mounting - max. torque: 0.9 Nm using a screw and a compression washer mounting technique
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

Derating (thermal resistance): 0.144 W/K (6.94 kW/°K). Without a heat sink, when in open air at 25°C, the LXP18 is rated for 2.25 W. Derating for temperature above 25°C is 0.018 W/°K.

Case temperature must be used for definition of the applied power limit. 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.

![Image of LXP18 TO-220 Resistor](image)

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Millimeter</th>
<th>Inches</th>
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<tbody>
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<td></td>
<td>Min.</td>
<td>Max.</td>
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<tr>
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</tr>
<tr>
<td>B</td>
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<td>16.52</td>
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<tr>
<td>C</td>
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<tr>
<td>D</td>
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<td>F</td>
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<td>R</td>
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</tbody>
</table>

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Power Resistors

Series LXP 20 TO-220
20 W Film Power Resistors for high-frequency and pulse-loading applications

EBG offers the completely encapsulated and insulated TO-220 package for low ohmic value and Non-Inductive Design for high-frequency and pulse-loading applications. Ideal use for power supplies. This series is rated at 20 W mounted to a heat sink.

General Characteristics
- 20 W power rating at 25°C case temperature
- High pulse tolerant design
- TO-220 package configuration
- Snap-on style TO-220 heat sink required
- A fully molded housing for environmental protection.
- Non-Inductive Design
- Resistor package completely insulated from heat sink.
- Housing material acc. to UL94-V0

Specifications
- Resistance range: 0.05 Ω to 1 MΩ other values upon request
- Resistance tolerance: ±1%, ±2%, ±5%, ±10% (0.5% upon request)
- Temperature coefficient: 10 Ω and above, ±50 ppm/°C, referenced to 25°C, ΔR taken at +105°C. Between 1 Ω and 10 Ω, ±100 ppm + 0.002 Ω/°C, referenced to 25°C, ΔR taken at +105°C
- Max. operating voltage: 350 V
- Dielectric strength: 1,800 V AC
- Power rating: 20 W at 25°C. Depends on 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% + 0.001 Ω) max.
- Load life: MIL-R-39009, 2,000 hours at rated power, ΔR ≤(0.1% + 0.001 Ω).
- Moisture resistance: MIL-Std-202, Method 106, ΔR ≤(0.5% + 0.001 Ω) max.
- Thermal shock: MIL-Std-202, Method 107, Cond. F, ΔR ≤(0.3% + 0.001 Ω) max.
- Terminal strength: MIL-Std-202, Method 211, Cond. A (Pull Test) 2.4 N, ΔR ≤(0.2% + 0.001 Ω) max.
- Vibration, high frequency: MIL-Std-202, Method 204, Cond. D, ΔR ≤(0.2% + 0.001 Ω) max.
- Lead material: tinned copper
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

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

Case temperature must be used for definition of the applied power limit. 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.

Derating curve:

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Power Resistors

Series LXP 100 TO-247
100 W Thick Film Power Resistor for high-frequency and pulse-loading applications, version B for enforced mechanical stability

EBG offers the completely encapsulated and insulated TO-247 package for low ohmic value and Non-Inductive Design for high-frequency and pulse-loading applications. Ideal use for power supplies. This series is rated at 100 W mounted to a heat sink.

**General Characteristics**
- 100 W power rating at 25°C case temperature
- TO-247 package configuration
- Single-screw mounting simplifies attachment to the heat sink
- Fully molded housing for environmental protection.
- Non-Inductive Design
- Resistor package completely insulated from heat sink.
- Tube packing available (packing unit: 35 pcs./tube)
- For perfect heat dissipation, the use of mounting clamps is suggested. Please ask for details!
- Housing material acc. to UL94-V0

**Specifications**
- Resistance range: 0.05 Ω to 1 MΩ other values upon request
- Resistance tolerance: ±1% ±2% ±5% ±10%
- Temperature coefficient: >10 Ω: ±50 ppm/°C, referenced to 25°C, ΔR taken at +105°C, others upon request
- Max. operating voltage: 350 V max. 500 V upon request
- Dielectric strength: 1,800 V AC
- Insulation resistance: 10 GΩ min.
- Power rating: 100 W at 25°C case temperature derated to 0 W at 175°C
- Short time overload: 1.5x rated power with applied voltage not to exceed 1.5x V max. for 5 seconds, ΔR < ± (0.50% + 0.0005 Ω)
- Dielectric strength: MIL-Std-202 method 301 (1,800 V AC, 60 s) ΔR < ± (0.15% + 0.0005 Ω)
- Load life: MIL-R-39099D 4.8.13, 2,000 hours at rated power ΔR < ± (1.0% + 0.0005 Ω)
- Moisture resistance: -10°C to +65°C, RH>90% cycle 240 h ΔR < ± (0.50% + 0.0005 Ω)
- Thermal shock: MIL-Std-202, Method 107, Cond. F ΔR < ± (0.50% + 0.0005 Ω)
- Terminal strength: MIL-Std-202, Method 211, Cond. A (Pull Test) 2.4 N ΔR < ± (0.20% + 0.0005 Ω)
- Vibration, high frequency: MIL-Std-202, Method 204, Cond. D ΔR < ± (0.40% + 0.0005 Ω)
- Lead material: tinned copper
- Mounting - max. torque: 0.9 Nm using a M3 screw and a compression washer mounting technique
- Inductance (serial): typical 20nH
- Standard storage conditions: 0 to 85°C at 80% RH max. formin. 12 months.

For different conditions please contact your local EBG representative!

### Power Dissipation Chart
- **Bottom Case Temperature, °C**
- **Rated Power, %**

![Power Dissipation Chart](image)

**Derating (thermal resistance): 0.66 W/K (1.5 K/W). Without a heat sink, when in open air at 25°C, the LXP 100 is rated for 3 W. Derating for temperature above 25°C is 0.023 W/K.**

**Case temperature must be used for definition of the applied power limit. Case temperature measurement must be done 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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The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Power Resistors

Series MXP 35 TO 220

35 W Thick Film Power Resistors for high-frequency and pulse-loading applications

General Characteristics

- 35 W power rating at 25°C
- TO-220 package configuration
- Single-screw mounting simplifies attachment to heat sink
- Heat resistance to cooling plate: $R_{th}=4.28 \, ^\circ\text{K/W}$
- Molded case for environmental protection.
- Resistor element is electrically insulated from the metal sink tab.
- Standard lead form for easier fit.
- Housing material acc. to UL94-V0

Specifications

- Resistance range: 0.05 Ω to 1 MΩ, other values upon request
- Resistance tolerance: ±1% to ±10% (0.5% upon request)
- Temperature coefficient: 10 Ω and above, ±50 ppmy°C, referenced to 25°C, $\Delta R$ taken at $+105^\circ\text{C}$.
- Max. operating voltage: 350 V
- Dielectric strength: 1,800 V AC
- 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, $\Delta R = 0.3\% + 0.01 \, \Omega$ max.
- Power rating: depends on case temperature. See derating curve.
- Moisture resistance: MIL-Std-202, Method 106, $\Delta R = (0.5\% + 0.01 \, \Omega)$ max.
- Thermal shock: MIL-Std-202, Method 107, Cond. F, $\Delta R = (0.3\% + 0.01 \, \Omega)$ max.
- Working temperature range: −55°C to +175°C
- Terminal strength: MIL-Std-202, Method 211, Cond. A (Pull Test) 2.4N, $\Delta R = (0.2\% + 0.01 \, \Omega)$ max.
- Vibration, high frequency: MIL-Std-202, Method 204, Cond. D, $\Delta R = (0.2\% + 0.01 \, \Omega)$ max.
- Lead material: tinned copper
- Maximum torque: 0.9 Nm
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

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

Without a heat sink, when in open air at 25°C, the MXP is rated for 2.50 W. Derating for temperature above 25°C is 0.02 W/K.

Case temperature must be used for definition of the applied power limit. 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.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Power Resistors

Series MSP 35 SMD (MHP 35 for high temperature soldering) – TO 220
35 Watt Thick Film Power Resistors for Surface Mount including Metal Tab

General Characteristics

- 35 W power rating at 25°C
- SMD – TO-220 package configuration
- Heat resistance to cooling plate: Rth< 4.28 °K/W
- Molded case for environmental protection.
- Resistor element is electrically insulated from the metal sink tab.
- Housing material acc. to UL94-V0

Specifications

- Resistance range: 0.1 Ω to 1 MΩ, other values upon request
- Resistance tolerance: ±1% to ±10% (±0.5% upon request)
- Temperature coefficient: 10 Ω and above, ±50 ppm/°C, referenced to 25°C, ΔR taken at +105°C.
- Between 3 Ω and 10 Ω, ±(100 ppm + 0.002 Ω)/°C, referenced to 25°C, ΔR taken at +105°C, < 3Ω please ask for details.
- Max. operating voltage: 350 V
- Dielectric strength: 1,800 V AC
- 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% + 0.01 Ω) max.
- Load life: MILR-39009, 2,000 hours at rated power, ΔR ±(1.0% + 0.01Ω).
- Power rating: depends on case temperature. See derating curve.
- Moisture resistance: MILStd-202, Method 106, ΔR = (0.5% + 0.01 Ω) max.
- Thermal shock: MIL-Std-202, Method 107, Cond. F, ΔR = (0.3% + 0.01 Ω) 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% + 0.01 Ω) max.
- Vibration, high frequency: MIL-Std-202, Method 204, Cond. D, ΔR = (0.2% + 0.01 Ω) max.
- Lead material: nickel-plated copper, dip-tinned
- Ground plate material: German silver
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

Soldering Template

Soldering Note:
During surface mount soldering, the soldering temperature profile must not cause the metal tab of this device to exceed 215°C. If the solder profile is higher than 215°C (up to 260°C), please use our alternative type MHP-3S SMD TO 220. Please contact us for further information!

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Power Resistors
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
- Electrical strength: 5 kV DC (3 kV AC, higher values upon request)
- Internal electric strength between R1 and R2: 5kV DC
- 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)
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

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 (1.015°K/W). (for conf. 1, 2 and 3)

<table>
<thead>
<tr>
<th>Bottom Case Temperature, °C</th>
<th>Rated Power, W</th>
<th>Rated Power, %</th>
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<tr>
<td>0</td>
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<tr>
<td>100</td>
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**Configurations (P/package)**

![Diagram of configurations](image)

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

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Power Resistors

Series AXP 100
100 W Power Resistor with four wire terminals, version B for enforced mechanical stability

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 1,500 V DC upon 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 lengths are available upon special request)
- Electric strength: 5kV DC (3 kV AC, higher values upon request)
- Internal electric strength between R1 and R2: 5kV DC
- Mounting- max. torque: 1.2 Nm
- Working temperature range: –55 up to 155 °C
- Standard cable: PVC 0.75 mm², 20-AWG black,
  length = 100mm (others on request)
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for
  min. 12 months. For different conditions please contact your local EBG representative!

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.

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

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

Series AXM
100 W Low Ohm Pulse Power Resistor

This is a new model designed for high pulse withstanding 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 withstanding requirements are common such as welding equipment, variable speed drives and motor controls and other switching devices.

Specifications

- Resistance range: 0.05 Ω to 0.5 Ω
- Standard tolerance: ±10% standard (±5% upon request)
- Temperature coefficient: typical +500 ppm/°C (at +105°C ref. to +25°C)
- Max. work. voltage: up to 500 V (depending on pulse load scenario)
- Power rating: at 85°C BCT
- Standard wire length: L = 10 mm
- Electric strength: 3 kV DC (1.5 kV AC, higher values upon request)
- Mounting - max. torque: 1.2 Nm
- Working temperature range: −55 up to 155 °C
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

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.

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.
Power Resistors

Series GXP 120, SOT 227
120 W Power Resistor in “ISOTOP” power device (1x120 W/2x50 W/3x30 W acc. configurations)

Thanks to our Non-Inductive Design, these elements are ideally suited for high-frequency and pulse-loading applications. Through direct mounting on a heat sink, significant cost advantages can be realized. Type GXP can be supplied in a two- or four-terminal version. Even triple resistors are available. Main applications are: variable speed drives; power supplies; control devices; telecommunications; robotics; motor controls and other switching devices. Special and custom-designed components upon request.

Specifications
- Resistance range: 0.1 Ω to 1 MΩ
- Tolerance: ±1%, 2%, 5%, 10%
- Temperature coefficient (>1 ohm): ±250 ppm/°C (at +105°C referred to +25°C), better TCR on request
- Max. work. voltage: 500 V (up to 1,000 V upon special request)
- Power rating at 85°C: 120 W (see derating)
- Short time overload: 1.5 x rated power at 85°C bottom case temp. for 10 sec, ΔR = 0.4% max. (for conf. 1, 2 and 3)
- Partial discharge: up to 2,000 Vrms/80 pC
- Voltage proof: dielectric strength up to 4,000 V DC against ground
- Insulation resistance: 10 GΩ Min. at 1 kV DC
- Isolation voltage between R1 and R2: 500 V, 1,000 V upon special request
- Protection class: acc. to IEC 950/CSA22.2 950/ M-89 and EN 60960.88: 2
- Heat resistance to cooling plate: Rth <0.45 kW
- Capacitance/mass: 45 pF (typical)
- Working temperature range: −55°C to +155°C
- Mounting - max. torque for base plate (static): 1.5 Nm, M4 screws
- Mounting - max. torque for contacts (static): 1.3 Nm, M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

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.

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

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Power Resistors

Series HPP 150
Non-Inductive 150 W Power Resistors according to VDE 0160 and UL 94-V0

EBG’s HPP series is rated at 150 W 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.

General Characteristics
- 150 W at 85°C
- Non-Inductive Design
- Four configurations of resistive patterns
- Up to three resistors in one package
- Easy mounting using already existing infrastructure

Specifications
- Resistance range: 1 Ω to 1 MΩ (other values upon request)
- Tolerance: ±1%, ±2%, ±5%, ±10%
- Temperature coefficient: ±250 ppm (at +105°C ref. to +25°C), better TCR on request
- Max. working voltage: 500 V (up to 1,000 V upon special request)
- Power rating at 85°C: 150 W (others upon request)
- Voltage proof: 5,000 V DC, 3,000 V AC
- Insulation resistance: 10 GΩ min. at 1 kV DC
- Isolation voltage between R1 and R2: 500 V (1000 V upon special request)
- Heat resistance to cooling plate: <0.47°K/W
- Capacitance/mass: 45 pF (typical)
- Working temperature range: –65°C to +155°C
- Mounting - max. torque for base plate (static): 1.5 Nm. M5 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

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.

Derating (thermal resistance): 2.14 W/K (0.47°K/W) (for conf. 3)

Air distance contact to contact:

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

Creeping distance:

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

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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EBG’s VHP series is rated at 180 W 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.

**General Characteristics**
- 180 W at 85°C
- Non-Inductive Design
- Four configurations of resistive patterns
- Up to three resistors in one package
- Easy mounting using already existing infrastructure

**Specifications**
- Resistance range: 1 Ω to 1 MΩ (other values upon request)
- Tolerance: ±1%, ±2%, ±5%, ±10%
- Temperature coefficient: ±250 ppm (at +105°C ref. to +25°C), better TCR on request
- Max. working voltage: 500 V (up to 1,000 V upon special request)
- Power rating at 85°C: 180 W (others upon request)
- Voltage proof: 5,000 V DC, 3,000 V AC
- Insulation resistance: 10 GΩ min. at 1 kV DC
- Isolation voltage between R1 and R2: 500 V (1,000 V upon special request)
- Heat resistance to cooling plate: <0.47°K/W
- Capacitance/mass: 45 pF (typical)
- Working temperature range: -55°C to +155°C
- Mounting - max. torque for base plate (static): 1.5 Nm, M5 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/... for sample pulse load information. For details please contact your local EBG representative!

**Derating (thermal resistance):** 2.5 W/K (0.40°K/W). *(for conf. 3)*

**Air distance contact to contact:**
1. Contacts 1 and 2 resp. 3 and 4
   - without fast-on-Plug: 9.2 mm
   - with fast-on-Plug: 8.2 mm
2. Contacts 1 and 4 resp. 2 and 3
   - without fast-on-Plug: 21.9 mm
   - with fast-on-Plug: 20.9 mm
3. Contacts 2 resp. 3 and M5 - mounting screw with washer
   - without fast-on-Plug: 16.3 mm
   - with fast-on-Plug: 15.9 mm
4. Contacts 1 resp. 4 and M5 - mounting screw with washer
   - without fast-on-Plug: 15.5 mm
   - with fast-on-Plug: 15.0 mm

**Creeping distance:**
1. Contacts 1 and 2 resp. 3 and 4
   - without fast-on-Plug: 20.0 mm
   - with fast-on-Plug: 19.0 mm
2. Contacts 1 and 4 resp. 2 and 3
   - without fast-on-Plug: 27.4 mm
   - with fast-on-Plug: 25.8 mm
3. Contacts 2 resp. 3 to base plate
   - without fast-on-Plug: 20.2 mm
   - with fast-on-Plug: 19.8 mm
4. Contacts 1 resp. 4 to base plate
   - without fast-on-Plug: 19.5 mm
   - with fast-on-Plug: 18.9 mm

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.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Power Resistors

Series HPS 150
Non-Inductive 150 W Power Resistor according to VDE 0160 and UL 94-V0

EBG's HPS series is rated at 150 W 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.

General Characteristics
- 150 W at 85°C
- Non-Inductive Design
- Easy mounting using already existing infrastructure

Specifications
- Resistance range: 1 Ω to 1 MΩ (other values upon request)
- Tolerance: ±1, ±2, ±5, ±10%
- Temperature coefficient: ±250 ppm/°C (at +105°C ref. to +25°C), better TCR on request
- Power rating at 85°C: 150 W (others upon request)
- Max. working voltage: 500 V, up to 1,000 V upon special request = "S"-version
- Voltage proof: 5,000 V DC, 3,000 V AC
- Insulation resistance: 10 GΩ Min. at 1 kV DC
- Heat resistance to cooling plate: <0.47 °K/W
- Capacitance/μF: 45 μF (typical)
- Working temp. range: -55°C to +155°C
- Mounting - max. torque for base plate (static): 1.5 Nm M5 screws
- Mounting - max. torque for contacts (static): 1.3 Nm M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

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

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

Configuration:

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Power Resistors

Series HXP 200, SOT 227
200 W Power Resistor in "ISOTOP" power device

Thanks to our Non-Inductive Design, these elements are ideally suited for high-frequency and pulse-loading applications. Through direct mounting on a heat sink, significant cost advantages can be realized. Type HXP can be supplied in a two- or four-terminal version. Even double resistors are available. Main applications are: variable speed drives; power supplies; control devices; telecommunications; robotics; motor controls and other switching devices.

Special and custom-designed components upon request.

Specifications

- Resistance range: 0.1 Ω to 1 MΩ
- Tolerance: ±1%, 2%, 5%, 10%
- Temperature coefficient (>1ohm): ±250 ppm (at +105°C ref. to +25°C), better TCR on request
- Max. work. voltage: 500 V (up to 1,000 V upon special request)
- Power rating at 85°C: 200 W (see derating)
- Short time overload: 1.25 x rated power at 85°C bottom case temp. for 10 sec, ΔR = 0.4% max. (for conf. 1, 2 and 3)
- Partial discharge: up to 2,000 Vrms/80 pC
- Voltage proof: dielectric strength up to 4,000 V DC against ground
- Isolation voltage between R1 and R2: 500 V
- Protection class: acc. to IEC 950/CSA22.2 960 M-89 and EN 60950.88: 2
- Heat resistance to cooling plate: Rth <0.35 K/W
- Capacitance/mass: 45 pF (typical)
- Serial inductivity: HXP-1 typical 40 nH
- Working temp. range: –55°C to +155°C
- Mounting - max. torque for base plate (static): 1.5 Nm M4 screws
- Mounting - max. torque for contacts (static): 1.3 Nm M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

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The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Shunts
PCS – Precision Current Sense Resistors

The PCS series uses 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 control applications.

- Available in two different designs
- Values starting at 0.5 mΩ
- Non-Inductive Design
- Four-terminal Kelvin connection
- 100% QC measurement
- Housing material acc. to UL94-V0

PCS - 100 / PCS - 60
C = current connection (source)
S = voltage connection (sense)

For dimensions, please see our catalog datasheet HXP

Power Rating Curve (for all types):

Ambient Temperature, °C (PCS-3)
Bottom Case Temperature, °C (PCS-60, PCS-100)

Standard resistance values: 0.5 mΩ–1 Ω (others upon request)
Resistance tolerances: ±1%, ±2%, ±5%
Pulse current up to 500 A/0.5 sec, depending on ohmic value
Temperature coefficient: TC referenced to 25°C, ΔR taken at −15°C and +105°C; for values >60 mΩ

Power rating: 100 W (at 70°C case temperature) 50 A permanent (higher upon request)
Dielectric strength: 1,000 V DC higher value upon request
Dielectric strength: 1,000 V DC higher value upon request
Heat resistance: Rth = <0.56°K/W
Protection class acc. to IEC 950/CSA22.2
950/M – 89 and EN 60990.88.2
Operating temperature: −55°C to +150°C
Storage temperature: −40°C to +85°C
Mounting - max. torque for contacts: 1.3 Nm B (static)
Mounting - max. torque for base plate: 1.5 Nm (static)

PCS - 3
Standard resistance values: 1 mΩ – 60 mΩ
(60 mΩ – 1 Ω upon request)
Resistance tolerances: ±1%, ±2%, ±5%
Pulse current up to 200 A/0.5 sec, depending on ohmic value
Temperature coefficient: 60 ppm/°C typically, TC referenced to 25°C, ΔR taken at −15°C and +105°C; for values >60 mΩ
Please ask for details!
Power rating: 3 W at 70°C 40 A permanent (higher upon request)
Dielectric strength: 1,800 V AC (housing) – other on request
Load life: 1,000 hours at rated power at +70°C, DR 0.2% max.
Thermal shock: MIL-Std-202, Method 107, Cond. A, DR 0.2% max.
Moisture resistance: MIL-Std-202, Method 106, DR 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: 0.5 mΩ–1 Ω (others upon request)
Resistance tolerances: ±1%, ±2%, ±5%
Pulse current up to 500 A/0.5 sec, depending on ohmic value
Temperature coefficient: TC referenced to 25°C, ΔR taken at 15°C and +105°C; <60 ppm/°C (TC <500 ppm/°C for resistance range from 27 mΩ to 49 mΩ)
Power rating: 100 W (at 70°C case temperature) 50 A permanent (higher upon request)
Dielectric strength: 1,000 V DC higher value upon request
Heat resistance: Rth = <0.56°K/W
Protection class acc. to IEC 950/CSA22.2
950/M – 89 and EN 60990.88.2
Operating temperature: −55°C to +150°C
Storage temperature: −40°C to +85°C
Mounting - max. torque for contacts: 1.3 Nm B (static)
Mounting - max. torque for base plate: 1.5 Nm (static)

PCS - 60
This resistor equals PCS-100 except:
Power rating: 60 W (at 70°C case temperature)
Dielectric strength: up to 4,000 V DC or 2,800 V AC, higher values upon request
Temperature coefficient: TC referenced to 25°C, ΔR taken at −15°C and +105°C, <60 ppm/°C (TC <500 ppm/°C for resistance range from 20 mΩ to 49 mΩ)
Operating temperature: −55°C to +150°C
Storage temperature: −40°C to +85°C

PCS - 3
Standard resistance values: 1 mΩ – 60 mΩ
(60 mΩ – 1 Ω upon request)
Resistance tolerances: ±1%, ±2%, ±5%
Pulse current up to 200 A/0.5 sec, depending on ohmic value
Temperature coefficient: 60 ppm/°C typically, TC referenced to 25°C, ΔR taken at −15°C and +105°C; for values >60 mΩ
Please ask for details!
Power rating: 3 W at 70°C 40 A permanent (higher upon request)
Dielectric strength: 1,800 V AC (housing) – other on request
Load life: 1,000 hours at rated power at +70°C, DR 0.2% max.
Thermal shock: MIL-Std-202, Method 107, Cond. A, DR 0.2% max.
Moisture resistance: MIL-Std-202, Method 106, DR 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

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Ultra-High-Power Resistors
Series UXP 300
300 W 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 metalized on 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. (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 the local representative of EBG.

**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:** 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 GO Min. at 500 V
- **Creeping distance:** 42 mm min. (higher on request)
- **Air distance:** 14 mm min. (higher on request)
- **Inductance:** 80 nH (typical)
- **Capacity/mass:** 110 pF (typical)
- **Capacity/parallel:** 40 pF (typical)
- **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
- **Housing material acc. to UL94-V0**
- **Standard storage conditions:** 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- **Pulse load rating:** please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

Derating (thermal resist.) UXP 300: 4.35 W/°K (0.23°K/W)
Power rating: 300 W at 85°C bottom case temp.*
Please ask for detailed mounting procedure!

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*This value is only applicable when using a thermal transfer compound with a heat conductivity of 1 W/mK.

The flatness of the cooling plate must be better than 0.06 mm overall. Surface roughness should not exceed 6.4 μm.
Ultra-High-Power Resistors

Series UXP 600
600 W Resistor · US Patent-No. 5,355,281

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.

General Characteristics

Electric support:
- High alumina ceramic metalized 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 METOX/FILM, 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 (M4+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.

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 upon 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. (higher on request)
- Air distance: 14 mm min. (higher on request)
- Inductance: 80 nH typical
- Capacitance/mass: 110 pF (typical)
- Capacitance/parallel: 40 pF (typical)
- Operating temperature: –55°C to +150°C
- Capacity/parallel: 40 pF (typical)
- Mounting - max. torque for contacts: 2 Nm
- Mounting - max. torque: 1.8 Nm M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!
- Derating (thermal resist.) UXP 600: 8.33 W/K (0.12°K/W)
- Power rating: 600 W at 85°C bottom case temp.*

Please ask for detailed mounting procedure!

* This value is only applicable when using a thermal conduction to the 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.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Ultra-High-Power Resistors

Series UXP 800

800 W Resistor · US Patent-No. 5,355,281

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.

**General Characteristics**

**Electric support:**
- High alumina ceramic metalized with EBG 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 85 mm or potted cable connections are available upon special request

**Specifications**

- Resistance values: 0.5Ω 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 (1,500 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. (higher on request)
- Air distance: 14 mm min. (higher on request)
- Inductance: 80 nH (typical)
- Capacity/mass: 140 pF (typical)
- Capacitance/parallel: 40 pF (typical)
- Operating temperature: –55°C to +150°C
- Capacity/mass: 140 pF (typical)
- Mounting - max. torque: 1.8 Nm M4 screws
- Mounting - max. torque: 1.8 Nm M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...). For sample pulse load information. For details please contact your local EBG representative!

**Derating (thermal resist.) UXP 800: 9.09 W/K (0.11°K/W)**

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

*Please ask for detailed mounting procedure!*

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<th>Test</th>
<th>Method</th>
<th>Typical results</th>
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The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Ultra-High-Power Resistors

Series UPT 400
400 W Resistor · US Patent-No. 5,355,281

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.

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).

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, (higher on 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)
- Capacitance/mass: 110 pf (typical)
- Capacitance/parallel: 40 pf (typical)
- Operating temperature: −55°C to +150°C
- Mounting - max. torque for contacts: 2 Nm
- Mounting - Max. torque: 1.8 Nm M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

For other configurations, please contact EBG.
Ultra-High-Power Resistors
Series UPT 600
600 W Resistor · US Patent-No. 5,355,281

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.

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 your 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: 1,000 W at 70°C for 10sec., ΔT = 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 (for conf. 4)
- 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 (typical)
- Capacity/parallel: 40 pF (typical)
- Operating temperature: –55°C to +150°C
- Mounting - max. torque for contacts: 2 Nm
- Mounting - max. torque: 1.8 Nm, M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!
- Derating (thermal resist.) UPT 600: 8.33W/°K (0.12°K/W) (for conf. 2 and 3)
- Power rating: 600 W at 85°C bottom case temp.*
- Please ask for detailed mounting procedure!

<table>
<thead>
<tr>
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<tbody>
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</table>

* This value is only applicable if using thermal conduction to heat sink Rth=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.

Derating (thermal resist.) UPT 600: 8.33W/°K (0.12°K/W) (for conf. 2 and 3)
Power rating: 600 W at 85°C bottom case temp.*
Please ask for detailed mounting procedure!

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Ultra High Power Resistors
Series UPT 800
800 W Resistor · US Patent-No. 5,355,281

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.

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: 1,000 W at 70°C for 10 sec.,
R = 0.4% max. (for conf. 2 and 3)
- Power rating: up to 800 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: >5 kV DC (for conf. 4)
- 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 800 V
- Inductance: 80 nH (typical)
- Capacitance/mass: 140 pF (typical)
- Capacitance/parallel: 40 pF (typical)
- Operating temperature: –55°C to +150°C
- Mounting - max. torque for contacts: 2 Nm
- Mounting - max. torque: 1.8 Nm, M4 screws
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for
min. 12 months. For different conditions please contact your local EBG
representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for
sample pulse load information. For details please contact your local
EBG representative!
- Derating (thermal resis.) UPT 800: 9.09W/°K (0.111°K/W) for conf. 2 and 3
Power rating: 800W 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

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Millimeter</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>59.2</td>
<td>2.331</td>
</tr>
<tr>
<td>B</td>
<td>35.8</td>
<td>1.409</td>
</tr>
<tr>
<td>C</td>
<td>13.5</td>
<td>0.521</td>
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<tr>
<td>D</td>
<td>33.8</td>
<td>1.331</td>
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<td>E</td>
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<td>2.244</td>
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<td>F</td>
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<td>2.527</td>
</tr>
<tr>
<td>G</td>
<td>9.5</td>
<td>0.374</td>
</tr>
<tr>
<td>H</td>
<td>4.05</td>
<td>0.159</td>
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<tr>
<td>K</td>
<td>24.0</td>
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<tr>
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<tr>
<td>M</td>
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<td>1.004</td>
</tr>
<tr>
<td>O</td>
<td>56.8</td>
<td>2.236</td>
</tr>
</tbody>
</table>

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

www.ebg-at.com · sales@ebg-at.com, www.ebg-us.com · sales@ebg-us.com
Ultra-High Pulse Load Resistors
Series UXM 400
400 W High Pulse Load 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.

General Characteristics

Electric support:
- High alumina ceramic metalized with EBG 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.

Specifications

- Resistance values: 0.1 Ω to 10 Ω (others upon request)
- 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, (higher on request)
- Partial discharge: upon request
- Insulation resistance: 10 GΩ min. at 1000 V
- Creeping distance: 42 mm min. (higher on request)
- Air distance: 14 mm min. (higher on request)
- 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
- Housing material acc. to UL94-V0
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

Test Method Typical results

<table>
<thead>
<tr>
<th>Test</th>
<th>Method</th>
<th>Typical results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short time overload</td>
<td>1,000 W/10sec</td>
<td>0.4%</td>
</tr>
<tr>
<td>Humidity steady state</td>
<td>56 days/40°C/95%</td>
<td>0.25%</td>
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<tr>
<td>Temp. cycling</td>
<td>-55/-125/6cycles</td>
<td>0.20%</td>
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<tr>
<td>Shock</td>
<td>40g/4,000 times</td>
<td>0.25%</td>
</tr>
<tr>
<td>Vibrations</td>
<td>2-500Hz/10g</td>
<td>0.25%</td>
</tr>
<tr>
<td>Load life 3,000 cycles</td>
<td>50 min. on / 30 min off</td>
<td>0.40%</td>
</tr>
<tr>
<td>Terminal strengths f. contacts</td>
<td>200N</td>
<td>0.06%</td>
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</table>

<table>
<thead>
<tr>
<th>Dim.</th>
<th>Millimeter</th>
<th>Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>59.2</td>
<td>2.331</td>
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<tr>
<td>B</td>
<td>35.8</td>
<td>1.409</td>
</tr>
<tr>
<td>C</td>
<td>13.5</td>
<td>0.531</td>
</tr>
<tr>
<td>D</td>
<td>33.8</td>
<td>1.331</td>
</tr>
<tr>
<td>E</td>
<td>57.0</td>
<td>2.244</td>
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<tr>
<td>F</td>
<td>64.2</td>
<td>2.527</td>
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<tr>
<td>G</td>
<td>9.5</td>
<td>0.374</td>
</tr>
<tr>
<td>H</td>
<td>4.05</td>
<td>0.159</td>
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<td>J</td>
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<td>L</td>
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<td>0.571</td>
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<td>O</td>
<td>56.8</td>
<td>2.236</td>
</tr>
</tbody>
</table>

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Ultra-High-Power Resistors
Series ULX 600 (Very low component height)
600 W Resistor · US Patent-No. 5,355,281

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

General Characteristics
Electric Support:
- High-purity ceramic metalized with EBG 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.

Specifications
- Resistance values: 0.5 Ω to 1 MΩ (others upon request)
- 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: 1,000 W at 70°C for 10 sec., 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.
- Dielectric strength between R1-R2: >5kV DC (for conf. 4)
- 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
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!
- Pulse load rating: please see our website (www.ebg-at.com/...) for sample pulse load information. For details please contact your local EBG representative!

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Metal Film
Series UPR / UPSC
Radial Resistors, extremely precise

- Precision tolerances: ±0.1% is standard, and tolerances as close as ±0.01% are available
- Low temperature coefficient: better than 3 ppm/°C, 5 ppm/°C, 10 ppm/°C or 15 ppm/°C
- Long-term stability: better than ±0.05% per 2,000 hours of operation.
- Wide resistance range: from 10 Ω to 255 KΩ

Specifications
- Resistance tolerance: ±1.0% (tolerances to ±0.01% upon special request)
- 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%
- 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%
- Insulation resistance: 10,000 MΩ
- Low temperature operation: ΔR less than 0.02%
- Dielectric withstanding voltage: ΔR less than 0.02%
- Vibration: ΔR less than 0.01%
- Shock: ΔR less than 0.02%
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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<table>
<thead>
<tr>
<th>Dim.</th>
<th>Dimensions in millimeters</th>
<th>Dimensions in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>750±20 (.295±008)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>8.50±20 (.335±008)</td>
<td>10.50±.30 (.413±.012)</td>
</tr>
<tr>
<td>C</td>
<td>6.50±20 (.256±008)</td>
<td>9.00±.30 (.354±.012)</td>
</tr>
<tr>
<td>D</td>
<td>2.59±.05 (.010±002)</td>
<td>3.81±.38 (.150±.015)</td>
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<tr>
<td>E</td>
<td>25.1±1 (.984±.041)</td>
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<td>F</td>
<td>25.1±1 (.984±.041)</td>
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<table>
<thead>
<tr>
<th>Model no.</th>
<th>Temperature coefficient ppm/°C</th>
<th>Voltage +75°C</th>
<th>Max. working voltage</th>
<th>Dielectric strength U DC</th>
<th>Resistance</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>UPR</td>
<td>±3 to ±15</td>
<td>0.60</td>
<td>0.60</td>
<td>300</td>
<td>100R</td>
<td>1M</td>
</tr>
<tr>
<td>UPSC</td>
<td>±3 to ±15</td>
<td>0.60</td>
<td>0.60</td>
<td>400</td>
<td>10R</td>
<td>1M</td>
</tr>
</tbody>
</table>

Tests
- Power conditioning (108): 100 hours/rated power at +125°C, 95/85°C cycle
- Thermal shock (107): 5 cycles -65°C / +150°C
- Short time overload: 6.25 times rated power / 5sec
- Low temperature storage and operation: 1h stor. 45 min rated pow. at -65°C
- Terminal strength (211): 2lb pull test
- Dielectric withstand voltage (301): 300 V Atmospheric / 100,000 ft.
- Resist to soldering (210): 350°C / 3 sec.
- Moisture resistance (106): 10 days
- Shock: 10 shocks 100g 6ms sawtooth
- Vibration (204): 10 to 200 Hz, 20 g 8 hours
- Load life (108): 2000 hours at rated power at +25°C, 85°C or +125°C
- Storage Life: 10,000 h. no load at room conditions

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
Metal Film
Series NE
Precision Metal Film Resistors, molded style

EBG’s NE series features extremely low ranges heretofore 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 fracturial resistance value availability, but with low temperature coefficient of resistance and high stability.

- Resistance values as low as 0.05 Ω

Electro-Dynamics of Materials in the Industry

Specifications
- Resistance tolerance: from ±0.05% to ±5%
- Temperature coefficient: according to drawing
- Operating temperature: ~55°C to + 155°C
- Insulation resistance: 104 MΩ at 500 V DC
- Noise: less than 0.05 μV/V

Series EE
Precision Metal Film Resistors, molded style

EBG’s EE styles conform dimensionally to the RN styles of MIL-R-10509 and the RNR styles of MIL-R-55182. All of EBG’s Metal Film Resistor styles offer performances that exceed the requirements of both of these specifications. All EE styles can be used for automatic insertion and/or encapsulation.

Specifications
- Resistance tolerance: from ±0.02% to ±1%
- Temperature coefficient: from ±5 ppm/°C to ±50 ppm/°C all TCR referenced to 25°C, ΔR taken at +25°C and +85°C, other temperature ranges upon 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
- Standard storage conditions: 0 to 85°C at 80% RH max. for min. 12 months. For different conditions please contact your local EBG representative!

Upon request, EBG will conduct a “burn-in” of these elements for ultimate stability. Please refer to the UAR (Ultra Accurate Resistor) series and ask for a detailed datasheet!

Table 1: Specifications

<table>
<thead>
<tr>
<th>Model no.</th>
<th>Wattage</th>
<th>Resistance</th>
<th>Dimensions in millimeters (inches)</th>
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<tbody>
<tr>
<td>NE 1/10</td>
<td>0.25</td>
<td>0.025Ω</td>
<td>20Ω 600kΩ</td>
</tr>
<tr>
<td>NE 1/8</td>
<td>0.50</td>
<td>0.1Ω</td>
<td>20Ω 600kΩ</td>
</tr>
<tr>
<td>NE 1/4</td>
<td>1.00</td>
<td>0.1Ω</td>
<td>20Ω 600kΩ</td>
</tr>
<tr>
<td>NE 1/2</td>
<td>1.50</td>
<td>0.1Ω</td>
<td>20Ω 600kΩ</td>
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Table 2: Dimensions

<table>
<thead>
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<th>Model no.</th>
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<th>D</th>
<th>A</th>
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<tbody>
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<td>200</td>
<td>20R</td>
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<tr>
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<td>250</td>
<td>250</td>
<td>20R</td>
</tr>
<tr>
<td>EE 1/8</td>
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<td>300</td>
<td>20R</td>
</tr>
<tr>
<td>EE 1/4</td>
<td>750</td>
<td>300</td>
<td>20R</td>
</tr>
<tr>
<td>EE 1/2</td>
<td>1,000</td>
<td>350</td>
<td>20R</td>
</tr>
</tbody>
</table>

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!

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Custom-designed

EBG is 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 100 W 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 msec. for 0.1Ω value.

The above spec. sheet features our standard products. For further options, please contact our local EBG representative or contact us directly. For updated information, please visit our website!
EBG Inquiry Form for High Power Resistors

1. **Resistor type:** (if already known)

2. **Ohmic value:**

3. **Tolerance:**

4. **TCR:** (if requested)

5. **Working load:** (rated power)

   At what heat sink temperature:

6. **Pulses:**
   a. Shape of pulse
   b. Frequency (how often does pulse occur)
   c. Length of pulse / tau
   d. Peak voltage or current
   e. Value of capacitor

7. **Insulation tests:** (if you need different than our standard performed testing specified in our catalogue data sheets, please subscribe)
   a. Dielectric strength test at
   b. Partial discharge test at

8. **Application details:**
   a. Single resistor needed
   b. Function of requested resistor: (please select)
   c. Requested resistor is intended to be used in the following application (please subscribe):
   d. Cooling requirement for requested resistor (please select):

9. **Requested quantity:**

10. **Form completed by:**
    Date:
EBG Inquiry Form for High-Voltage Resistors

1. **Resistor type:** (if already known)

2. **Ohmic value:**

3. **Tolerance:**

4. **TCR:** (if requested)

   Over which temperature range: °C up to °C

5. **VCR:** (if requested)

6. **Operating voltage:**

7. **Impuls voltage / Peaks**

   a. Shape of pulse
   - square type
   - pulse graph enclosed
   - e-function type

   b. Frequency (how often does pulse occur)

   c. Length of pulse / tau

8. **Continuous load:**

   Over which temperature range: °C up to °C

9. **Where do you use the requested resistor / ambient condition (please select):**

   - air
   - oil
   - potting
   - other: 

10. **Special type of coating requested:**

    (Conformal Silicone, High Temperature Silicone, Printed Silicone (U2), Epoxy, Printed Epoxy (U3), Polyimide, Glass)

11. **Currently used part numbers (also other than EBG):**

12. **Application details:**

   a. **Single resistor needed or can multiple be used:** (please describe)

   b. **Function of requested resistor:** (please select)

   - Snubber resistor
   - Pre-charge resistor
   - Heater resistor
   - Others: (please subscribe)

   - Balancing resistor
   - Filter cap. discharge resistor
   - DC coupling cap. discharge resistor
   - Measuring resistor
   - HV-Divider
   - Filter resistor

   c. **Requested resistor is intended to be used in the following application (please subscribe):**

   - Motor Drive (traction, stationary)
   - HVDC-Energy Transmission
   - X-Ray
   - Medical Instruments
   - Laser
   - Electrical Vehicle
   - Aerospace
   - Mining
   - Electrostatic Ionization
   - Other (please subscribe): 

13. **Requested quantity:** pcs

14. **Form completed by:**

   **Date:**
Example of how to order

<table>
<thead>
<tr>
<th>Model #</th>
<th>Ohmic value</th>
<th>Tolerance</th>
<th>TCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>HXP-2</td>
<td>1 ohm = 1 R 10 kOhm = 10 k</td>
<td>F = ± 1 %  J = ± 5 %  K = ± 10 %</td>
<td>50 ppm 100 ppm 250 ppm</td>
</tr>
<tr>
<td>FBX 8/5</td>
<td>100 kOhm = 100k</td>
<td>D = ± 0,5 %</td>
<td>80 ppm</td>
</tr>
</tbody>
</table>