

# Power Resistors

## Series VHP

180 W Power Resistor according to VDE 0160 und UL 94 V-0

EBG Resistors's VHP series is rated at 180 W mounted to a heat sink. The increased height of the package makes the resistor ideal in applications where creeping distance must meet the VDE 0160 and UL 94 V-0 standards.

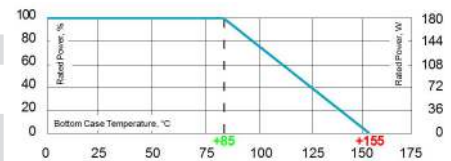
### Features

- 1x180 W / 2x70 W / 3x40 W operating power
- Easy mounting using already existing infrastructure
- Non-Inductive design
- ROHS compliant
- Materials in accordance with UL 94 V-0 and VDE 0160



### Technical Specifications

<b>Resistance value</b>	1 Ω ≤ 1 MΩ (higher values on special request)
<b>Resistance tolerance</b>	±10 % to ±1 %
<b>Temperature coefficient</b>	±250 ppm/°C (at +85°C ref. to +25°C) lower TCR on special request for limited ohmic values
<b>Power rating</b>	up to 180 W at 85°C bottom case temperature (see configurations)
<b>Maximum working voltage</b>	500 V (up to 1,000 V DC on special request = "S"-version)
<b>Voltage proof</b>	5,000 V DC, 3,000 V AC
<b>Insulations resistance</b>	10 GΩ min. at 1 kV DC
<b>Insolation voltage between R1 &amp; R2</b>	500 V (1,000 V on special request)
<b>Comparative Tracking Index (CTI)</b>	standard > 200 V (> 500 V on special request = "H"-version)
<b>Heat resistance to cooling plate</b>	Rth < 0.40 K/W
<b>Capacitance/mass</b>	45 pF (typical), measuring frequency 10 kHz
<b>Working temperatur range</b>	-55°C to +155°C
<b>Mounting - max. torque for base plate (static)</b>	1.5 Nm M5 screws
<b>Weight</b>	~38 g



Derating (thermal resist.) VHP:  
2.5 W/K (0.40 K/W) (for conf. 3)

Best results can be reached by using a thermal transfer compound with a heat conductivity of at least 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.

### How to make a request

VHP-Configuration\_Ohmic Value\_Tolerance

For example:

VHP-5 2x2R 10% or VHP-6 3x8K 5%

Example for higher working voltage:

VHP-5-S 10R 5%

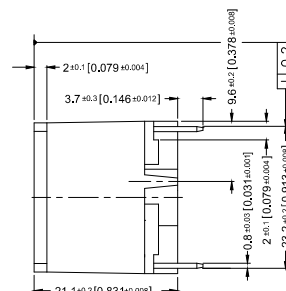
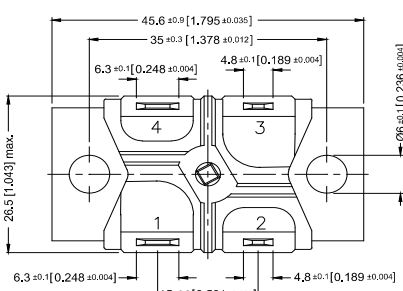
#### Air distance contact to contact:

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

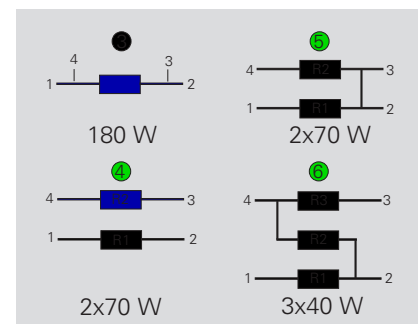
#### Creeping distance:

- |   |   |
|---|---|
| ③ | Contacts 1 and 2 resp. 3 and 4<br>- without fast-on-Plug: 20.2 mm<br>- with fast-on-Plug: 19.0 mm   |
| ④ | Contacts 1 and 4 resp. 2 and 3<br>- without fast-on-Plug: 27.4 mm<br>- with fast-on-Plug: 25.8 mm   |
| ⑤ | Contacts 2 resp. 3 to base plate<br>- without fast-on-Plug: 20.2 mm<br>- with fast-on-Plug: 19.8 mm |
| ⑥ | Contacts 1 resp. 4 to base plate<br>- without fast-on-Plug: 19.5 mm<br>- with fast-on-Plug: 18.9 mm |

### Dimensions in mm [inches]



### Configurations (P / package)



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

The above spec. sheet features our standard products. For further options please contact our local EBG representative or contact us directly.

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## Series VHP

180 W Power Resistor according to VDE 0160 und UL 94 V-0

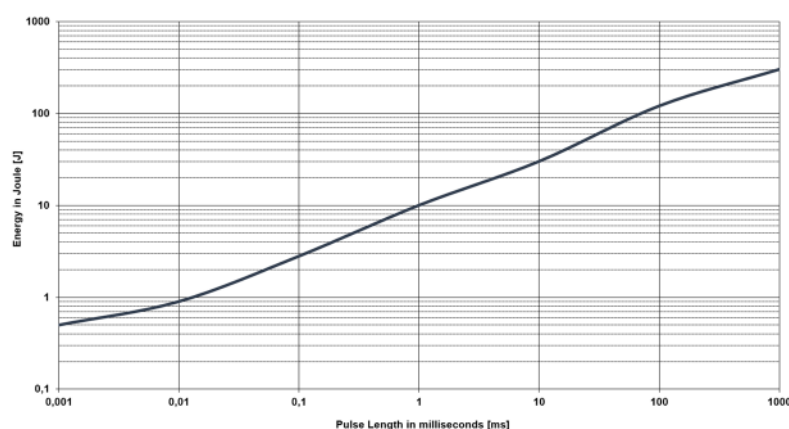
### Pulse Energy Curve (typical rating for VHP)

Note: These energy values are reference values → depending on ohmic value e.g. 1 Ω to 10 Ω and used resistive paste, a variation in max. energy load capability is possible

#### Test procedure

Every test resistor was mounted with thermal compound (0.9 W/mK) on a water cooled heatsink

- Constant inlet water temperature: +50°C
- The test time of each tested resistor: 10min.
- Break time between two pulses: 1sec.
- To determine good / defect parts the ohmic value was measured before and after tests:  
a change of tolerance of more than 0.1% means defect



#### Description of Pulse Energy Curve

- Shape of pulse = e-function
- Time between two pulses = 1 second
- Pulse length = time constant of 1 tau  
(1 means ... tau = 1ms)

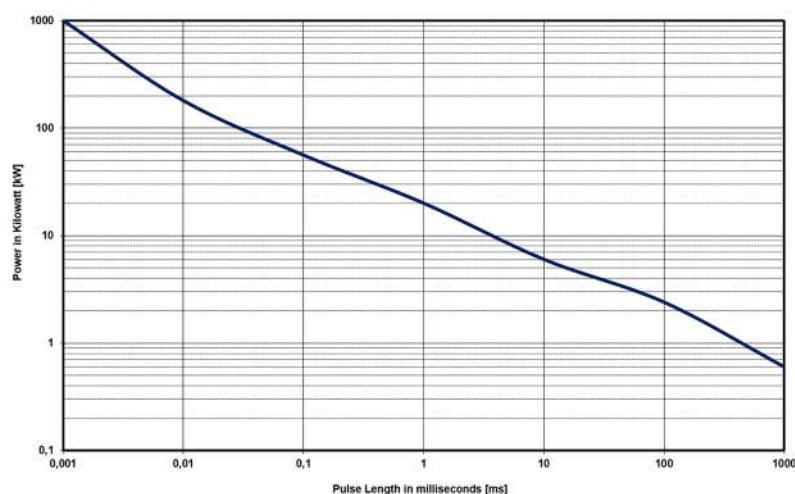
#### Example

At 1 ms tau the VHP with e.g. 1 Ω to 10 Ω can withstand an energy level of about 10 J, when the pulse pause time is ≥ 1s

**At a symmetrical frequency > 1 kHz at pulse length ≥ 10 μsec. the maximum applied pulse energy for VHP is a result out of the nominal power 180 W divided by the operating frequency  
(at 85°C bottom case) ( $E = 180 \text{ W} / F$ )**

### Pulse Power Curve (typical rating for VHP)

The power curve shows the max. possible power which can be applied for a certain duration.  
Referring to the same test procedure as described above.



#### Description of Pulse Power Curve

- Shape of pulse = e-function
- Time between two pulses = 1 second
- Pulse length = time constant of 1 tau  
(1 means ... tau = 1ms)

#### Example

For the time-constant of 1 ms you can apply about 20 kW max., if the time between two such peaks is ≥ 1s