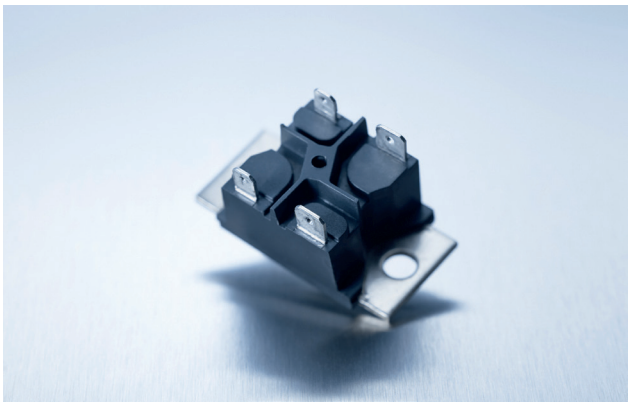
Series VHP

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

EBG RESISTORS
A Miba Group Company

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.

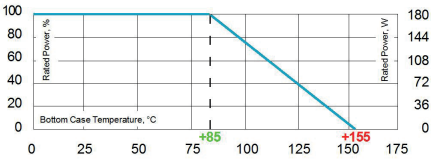


Features

- multiple resistors in 1 package
- Easy mounting using already existing infrastructure
- Non-Inductive design
- ROHS compliant
- Materials in accordance with UL 94 V-0 and VDE 0160

Technical Specifications

Resistance value	1 Ω ≤ 1 MΩ (higher values on special request)
Resistance tolerance	±1 % to ±10 %
Temperature coefficient	±250 ppm/°C (at +85°C ref. to + 25°C) lower TCR on special request for limited ohmic values
Power rating	up to 180 W at 85°C bottom case temperature (see configurations)
Maximum working voltage	500 V **(up to 1,000 V DC on special request = "S"-version)**
Voltage proof	5,000 V DC, 3,000 V AC
Insulations resistance	10 GΩ min. at 1 kV DC
Insolation voltage between R1 & R2	500 V (1,000 V on special request)
Comparative Tracking Index (CTI)	standard > 200 V **(> 500 V on special request = "H"-version)**
Heat resistance to cooling plate	Rth < 0.40 K/W
Capacitance/mass	45 pF (typical), measuring frequency 10 kHz
Working temperatur range	-55°C to +155°C
Mounting - torque for base plate (static)	1.3 Nm to 1.5 Nm M5 screws
Weight	~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.

Air distance contact to contact:

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

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

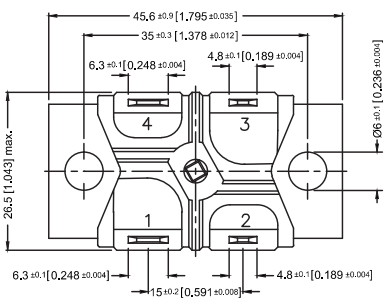
How to make a request

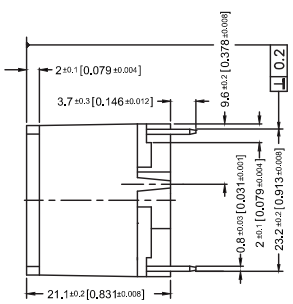
VHP-Configuration_Ohmic Value_Tolerance

For example:
VHP-5 2x2R 10% or VHP-6 3x8K 5%

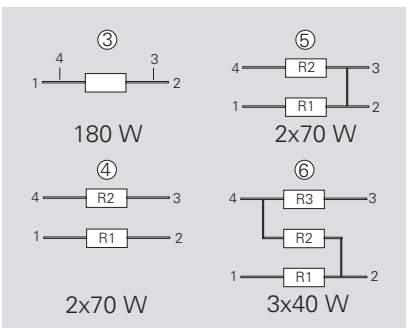
Example for higher working voltage:
VHP-5-S 10R 5%

Dimensions in mm [inches]





Configurations (P / package)



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

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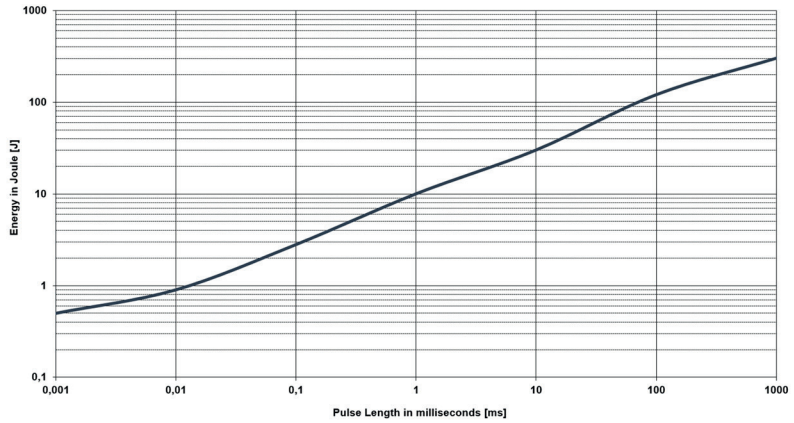
Pulse Energy Curve (typical rating for VHP)

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)

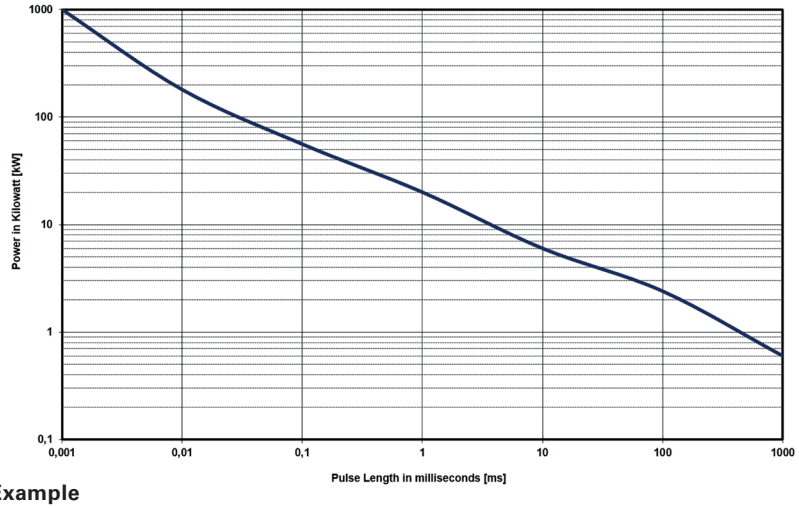
Example

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 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. (Pp = 2*E / T)→, if the time between two such peaks is ≥ 1s