Power Resistor for Mounting onto a Heatsink Thick Film Technology

FEATURES

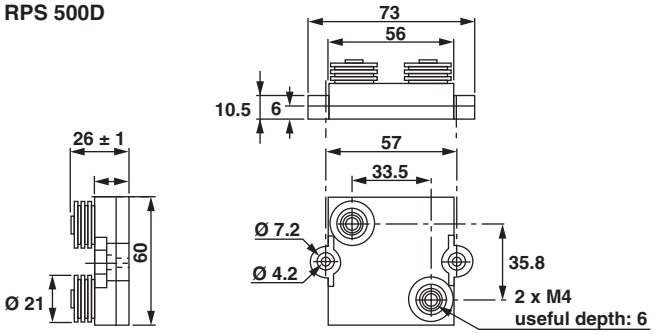
- High power rating: 500 W
- High overload capability up to 2 times rated Power (see energy curve
- Heatsink mounting
- Low thermal radiation of the case
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

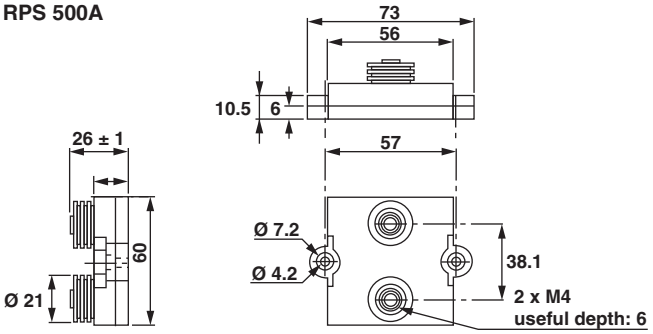
This range has been developed specifically for electrical traction applications and is capable of dissipating 500 W at +70 °C. The remarkable performance characteristics are evident when used in severe pulse conditions. The copper base allows easy mounting on the heatsink and provides optimal dissipation conditions.

DIMENSIONS in millimeters

RPS 500D



RPS 500A



Note

- Tolerances unless stated: ± 0.2 mm

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE Ω	RATED POWER $P_{25\,°C}$ W	LIMITING ELEMENT VOLTAGE U_L V	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C
RPS 500	500	0.24 to 1M (1)	500	5000	1, 2, 5, 10	150

Note

(1) E24 series

MECHANICAL SPECIFICATIONS

Mechanical Protection	Insulated case and resin for potting UL 94 V-0
Resistive Element	Cermet
Substrate	Alumina onto base of nickel coated copper
End Connections	Screws M4 (M5 on request)
Weight	250 g ± 10 %
Tightening Torque on Connections	2 Nm
Tightening Torque on Heatsink	4 Nm

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	-55 °C to +125 °C
Flammability	IEC 60695-11-5 2 applications 30 s separated by 60 s

TECHNICAL SPECIFICATIONS

Rated Power (P_{70}) Chassis Mounted at 70 °C (Case Temperature)	500 W continuous load
Thermal Resistance of the Component	$R_{th\,(j-c)}$: 0.11 °C/W
Temperature Coefficient	± 300 ppm/°C < 1 Ω ± 150 ppm/°C > 1 Ω
Dielectric Strength	L: 7 kV_{RMS} - H: 12 kV_{RMS} MIL STD 202 Method 301: 1 min/10 mA max.
Insulation Resistance	> 10^6 MΩ under U_{ins} = 500 V_{DC} IEC 60115-1
Inductance	< 50 nH

PERFORMANCE		
TESTS	**CONDITIONS**	**REQUIREMENTS**
Momentary Overload	EN 60115-1 2 Pr/10 s U_L = 5000 V	< ± (0.25 % + 0.05 Ω)
Rapid Temperature Change	IEC 60115-1/IEC60068-2-14 Test Na 5 cycles -55 °C to +125 °C	< ± (0.25 % + 0.05 Ω)
Load Life	IEC 60115-1 Pr (i.e. 500 W)/1000 h/70 °C (no cycling) (1)	< ± (0.5 % + 0.05 Ω)
Humidity (Steady State)	MIL STD 202 Method 103 B and D 56 days 95 % RH/40 °C	< ± (0.5 % + 0.05 Ω)

Note

(1) Resistors are not tested and guaranteed in cycling conditions

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Resistance Values	< 1 Ω	> 1 Ω
Standard Tolerances	± 5 %	
Standard TCR (- 55 °C to + 125 °C)	± 300 ppm/°C	± 150 ppm/°C
Tolerance on Request	± 1 %, ± 2 %, 10 %	

RECOMMENDATIONS FOR MOUNTING ONTO A HEATSINK

- Surfaces in contact must be carefully cleaned.
- The heatsink must have an acceptable flatness: From 0.05 mm to 0.1 mm/100 mm.
- Roughness of the heatsink must be around 6.3 µm. In order to improve thermal conductivity, surfaces in contact (alumina, heatsink) are coated with a silicone grease (type SI 340 from Rhône-Poulenc or Dow 340 from Dow Corning).
- The fastening of the resistor to the heatsink is under pressure control of two screws tightened at 4 Nm for full power availability.

Tightening Torque on Heatsink	**RPS 500**
	4 Nm

- The following accessories are supplied with each product: 2 off CHC M4 x 16/16 class 8.8 for heatsink mounting, 2 off TH M4 x 6/6 and 2 M4 contact lock washers for connections.

CHOICE OF THE HEATSINK

The user must choose according to the working conditions of the component (power, room temperature).
Maximum working temperature must not exceed 125 °C.
The dissipated power is simply calculated by the following ratio:

$$P = \frac{\Delta T}{[R_{th\ (j-c)}] + [R_{th\ (c-h)}] + [R_{th\ (h-a)}]}$$

P: Expressed in W

ΔT: Difference between maximum working temperature and room temperature

$R_{th\ (j-c)}$: Thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component: 0.11 °C/W.

$R_{th\ (c-h)}$: Thermal resistance value measured between outer side of the resistor and upper side of the heatsink. This is the thermal resistance of the interface (grease, thermal pad), and the quality of the fastening device.

$R_{th\ (h-a)}$: Thermal resistance of the heatsink.

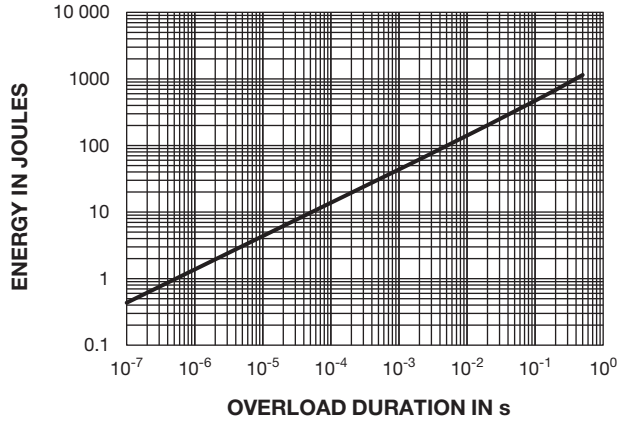
OVERLOADS

Short time overload: 2 Pr/10 s
Accidental overload: The values indicated in the graph below are applicable to resistors in air or mounted onto a heatsink.

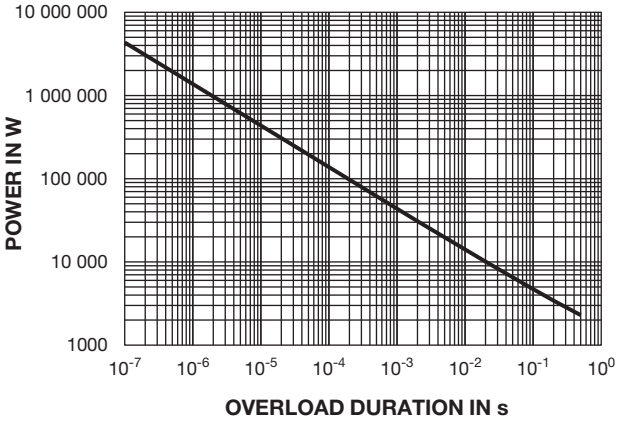
MARKING

Model, style, resistance value (in Ω), tolerance (in %), manufacturing date, Vishay Sfernice trademark.

ENERGY CURVE

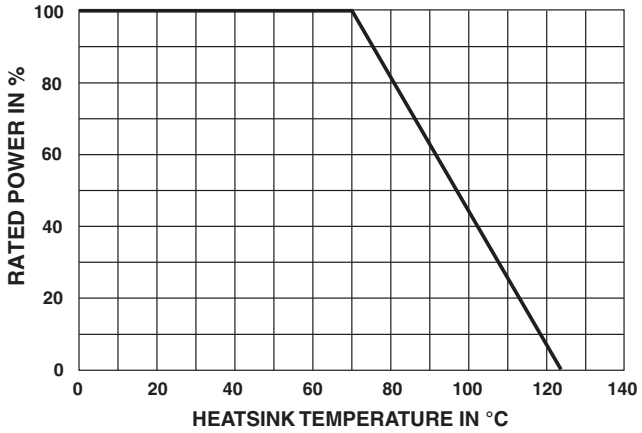


POWER CURVE



POWER RATING

The heatsink temperature should be maintained at the values specified in fig. 2.
To optimise the thermal conduction, contacting surfaces should be coated with silicone grease and heatsink mounting screws tightened to 4 Nm.



PACKAGING

Box of 15 units

ORDERING INFORMATION

RPS	500	DH	100 kΩ	± 10 %	xxx	BO15	e
MODEL	STYLE	CONNECTIONS Optional **H**: Dielectric strength 12 kV **L**: Dielectric strength 7 kV	RESISTANCE VALUE	TOLERANCE ± 1 % ± 2 % ± 5 % ± 10 %	CUSTOM DESIGN Optional on request: Special TCR, shape etc.	PACKAGING	LEAD (Pb)-FREE

GLOBAL PART NUMBER INFORMATION

R	P	S	0	5	0	0	D	H	4	7	R	0	J	B	

GLOBAL MODEL	STYLE	DIELECTRIC	OHMIC VALUE	TOLERANCE	PACKAGING	SPECIAL
RPS500	**D** = Diagonal connections **A** = Straight connections	**H**: Dielectric strength 12 kV **L**: Dielectric strength 7 kV	The first four digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. **48R70** = 48.7 Ω **47R0** = 47 Ω **1001** = 1 kΩ **4R70** = 4.7 Ω **R240** = 0.24 Ω	**F** = 1 % **G** = 2 % **J** = 5 % **K** = 10 %	**B** = Box 15 pieces **N** = Box 15 pieces N/A (1 to 14 pieces by Box)	As applicable ZAx.

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