

Power Resistor for Mounting Onto a Heatsink Thick Film Technology



FEATURES

- Compliant with requirement #26 of NF-EN45545-2
- High power rating: 250 W
- High overload capability up to 4 times nominal power (see Energy Curve)
- Easy mounting
- Low thermal radiation of the case
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

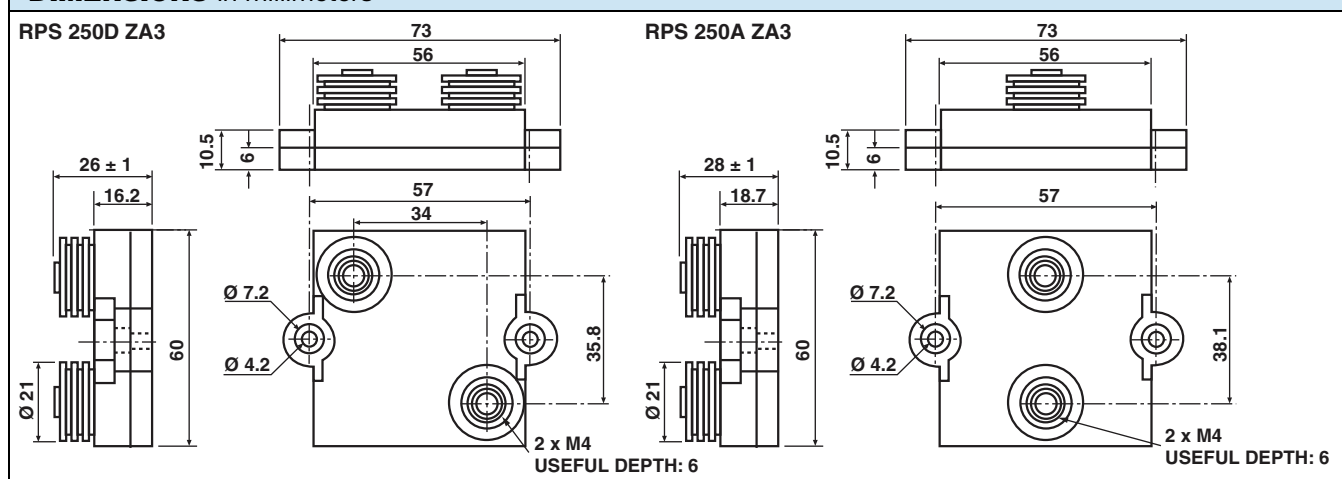
LINKS TO ADDITIONAL RESOURCES



3D Models

Developed for specific applications such as railroad electrical traction, this series can bear short overloads as high as fifteen times the nominal power. Designed to be mounted onto a heatsink, these power resistors exhibit remarkable characteristics.

DIMENSIONS in millimeters



Note

- Tolerance unless stated: ± 0.2 mm

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	SIZE	RESISTANCE RANGE Ω	RATED POWER $P_{25^\circ\text{C}}$ W	LIMITING ELEMENT VOLTAGE U_L V	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C
RPS 250	250	0.24 to 1M ⁽¹⁾	250	5000	1, 2, 5, 10	150

Note

- ⁽¹⁾ E24 series

MECHANICAL SPECIFICATIONS

Flammability	Insulated case and resin for potting UL 94 V-0
Resistive Element	Cermet
Substrate	Alumina onto aluminum base
End Connections	Screws M4 (M5 on request)
Tightening Torque Connections	2 Nm
Weight	170 g ± 10 %

ENVIRONMENTAL SPECIFICATIONS

Thermal Resistance	$R_{th(j-e)}$ 0.22 °C/W
Temperature Range	-55 °C to +125 °C
Climatic Category	55 / 125 / 56

TECHNICAL SPECIFICATIONS

Power Rating	250 W at 50 °C continuous
Chassis Mounted	1000 W at 25 °C for 10 s
Temperature Coefficient	± 250 ppm/°C < 1 Ω ± 150 ppm/°C > 1 Ω
Dielectric Strength	L connections 7 kV _{RMS} H connections 12 kV _{RMS}
MIL STD 202 (301), 1 min, 10 mA max.	
Insulation Resistance	> 10 ⁶ M Ω
Inductance	< 50 nH
Capacitance Resistor / Ground	< 40 pF < 120 pF

PERFORMANCE		
TESTS	CONDITIONS	REQUIREMENTS
Momentary Overload	NF EN 140000 CEI 115_1 4 Pr / 10 s / $U_L = 5000$ V	$< \pm (0.25 \% + 0.05 \Omega)$
Rapid Temperature Change	NF EN 140000 CEI 68214 Test Na 5 cycles -55 °C +125 °C	$< \pm (0.25 \% + 0.05 \Omega)$
Load Life	NF EN 140000 CEI 115_1 1000 h Pr at 70 °C	$< \pm (0.5 \% + 0.05 \Omega)$
Humidity (Steady State)	MIL STD 202 Method 103 B and D 56 days RH 95 %	$< \pm (0.5 \% + 0.05 \Omega)$

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Ohmic Value	$< 1 \Omega$	$> 1 \Omega$
Standard Tolerance	$\pm 5 \%$	$\pm 5 \%$
Standard TCR (-55 °C to +125 °C)	± 250 ppm/°C	± 150 ppm/°C
Tolerance on Request	$\pm 1 \% / \pm 2 \% / \pm 10 \%$	

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 μ m. In order to improve thermal conductivity, surfaces in contact (alumina, heatsink) should be 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 four screws (not supplied).

Tightening Torque on Heatsink	RPS 250
	3 Nm

- In order to improve the dissipation, either forced-air cooling or liquid cooling may be used.
- Do not forget to respect an insulation value between two resistors (dielectric strength in dry air 1 kV/mm).
- In any case the hot spot temperature, measured locally on the case must not exceed 125 °C.
- Test should be performed by the user.

CHOICE OF THE HEATSINK

The user must choose the heatsink 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: (see Environmental Specifications).

$R_{th(c-h)}$: 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.

Example:

$R_{th(c-a)}$: for RPS 250 power dissipation 180 W at +50 °C room temperature.

$$\Delta T \leq 125 \text{ °C} - 50 \text{ °C} \leq 75 \text{ °C}$$

$$R_{th(j-c)} + R_{th(c-h)} + R_{th(h-a)} = \frac{\Delta T}{P} = \frac{75}{180} = 0.42 \text{ °C/W}$$

$$R_{th(j-c)} = 0.22 \text{ °C/W}$$

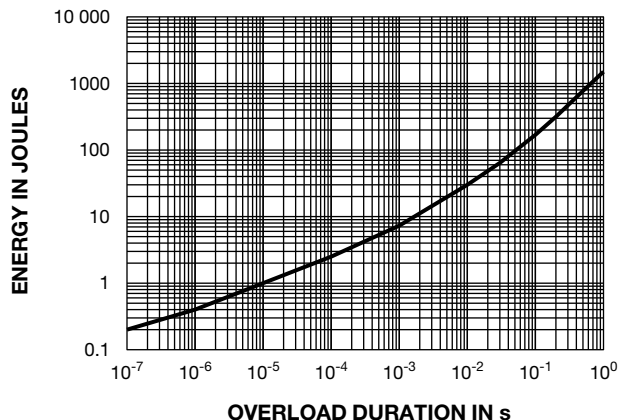
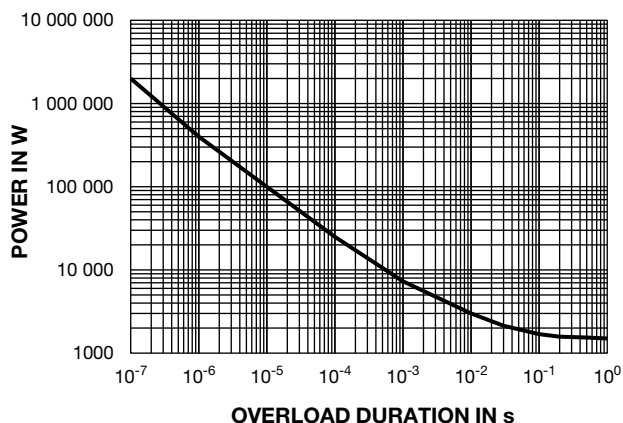
$$R_{th(c-h)} + R_{th(h-a)} \leq 0.42 \text{ °C/W} - 0.22 \text{ °C/W} \leq 0.20 \text{ °C/W}$$

**OVERLOADS**

In any case the applied voltage must be lower than $2.5 U_n$.
 $U_{max.} < 2.5 U_n < 12\,500\text{ V}$.

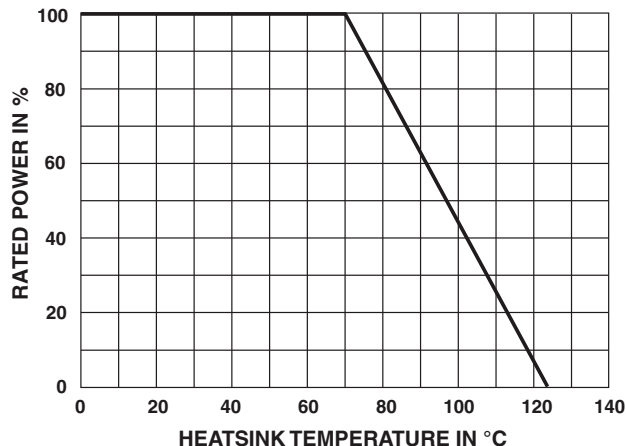
Short time overload: 4 Pr/10 s

Accidental overload: The values indicated on the graph below are applicable to resistors in air or mounted onto a heatsink.

ENERGY CURVE**POWER CURVE****POWER RATING**

The temperature of the heatsink should be maintained in the limit specified.

To improve the thermal conductivity, surfaces in contact should be coated with a silicone grease.

**PACKAGING**

Box of 15 units

MARKING

Series, style, ohmic value (in Ω), tolerance in %, manufacturing date, Vishay Sfernice trademark

GLOBAL PART NUMBER INFORMATION

R	P	S	0	2	5	0	D	L	2	R	2	0	J	B	Z	A	3
GLOBAL MODEL	STYLE	DIELECTRIC	OHMIC VALUE			TOLERANCE			PACKAGING			TYPE					
RPS250	D = diagonal connections A = straight connections	H = dielectric strength 12 kV L = dielectric strength 7 kV	The first three digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. 2R20 = 2.20 Ω 48R7 = 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 pcs N = box, 15 pcs N/A (1 to 14 pcs by box)			Square sole = blank Cropped sole = ZA3 As applicable = ZAx					



Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Vishay products are not designed for use in life-saving or life-sustaining applications or any application in which the failure of the Vishay product could result in personal injury or death unless specifically qualified in writing by Vishay. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.