Power Resistor for Mounting onto a Heatsink Thick Film Technology

FEATURES

- Compliant with requirement #26 of NF-EN45545-2
- High power rating
- Low thermal radiation of the case
- Wide ohmic value range
- Easy mounting
- High overload capabilities
- Reduced size and weight
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

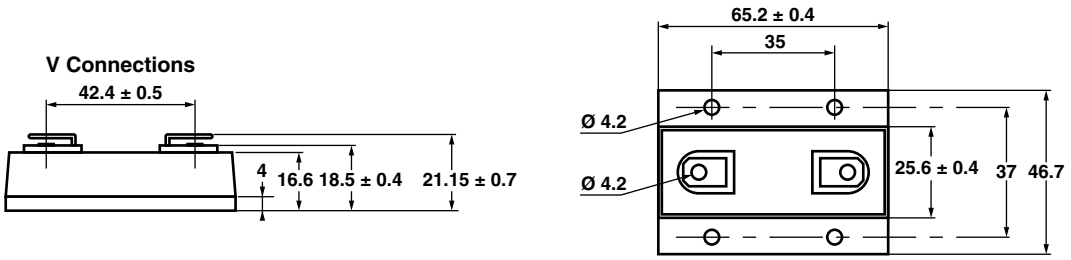
RoHS COMPLIANT

LINKS TO ADDITIONAL RESOURCES

3D Models

This new style has been developed as an extension to RCH range. Through the use of thick film technology, a non-inductive solution for power resistors is available which are rated up to 100 W at +25 °C. The terminations position prevents any risk of an electrical arc to the heatsink. This resistor series can replace and offer advantages to standard wirewound devices.

DIMENSIONS in millimeters



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
RPH 100	100	0.092 to 1M (1)	100	1900	1, 2, 5, 10	150

Note

(1) E24 series

MECHANICAL SPECIFICATIONS

Flammability	Insulated case UL 94 V-0
Resistive Element	Cermet
Substrate	Alumina on metallic base of nickel coated aluminum
End Connections	V connections: Screws M4 x 6
Tightening Torque Connections	1 Nm
Tightening Torque Heatsink	3 Nm
Weight	60 g ± 10 %

ENVIRONMENTAL SPECIFICATIONS

Thermal Resistance	$R_{th\,(j\,-\,c)}$ 0.55 °C/W
Temperature Range	-55 °C to +125 °C
Climatic Category	55 / 125 / 56

TECHNICAL SPECIFICATIONS

Power Rating	**Continuous**	100 W at 25 °C chassis mounted 0.45 °C/W
	Momentary	10 W at 25 °C free air
Temperature Coefficient	**Standard**	± 300 ppm/°C < 1 Ω ± 150 ppm/°C > 1 Ω
Thermal Resistance		0.55 °C/W
Dielectric Strength MIL STD 202		5 kV_{RMS}, 1 min, 10 mA max.
Insulation Resistance		> 10^6 MΩ
Inductance		< 0.1 µH

PERFORMANCE		
TESTS	**CONDITIONS**	**REQUIREMENTS**
Short Time Overload	NF EN 140 000 CEI 115_1 4 Pr / 5 s $U_S < 2\ U_L$	< ± (0.25 % + 0.05 Ω)
Rapid Temperature Change	NF EN 140000 CEI 68214 Test Na 5 cycles, -55 °C, +125 °C	< ± (0.25 % + 0.05 Ω)
Load Life (Chassis Mounted 0.45 °C/W)	NF EN 140 000 Pr at 25 °C, 1000 h	< ± (0.5 % + 0.05 Ω)
Humidity (Steady State)	MIL STD 202 Method 103 B Test D 56 days, 95 % RH	< ± (0.5 % + 0.05 Ω)

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Ohmic Value	< 1 Ω	> 1 Ω
Standard Tolerance	± 5 %	± 5 %
Standard TCR	± 300 ppm/°C	± 150 ppm/°C
Tolerance On Request	± 1 % to ± 2 %	

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) 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 two screws (not supplied).

Tightening Torque on Heatsink	RPH 100
	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).

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: 0.55 °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.

Example:

$R_{TH\ (c\ -\ a)}$ for RPH 100 power rating 80 W at ambient temperature +40 °C.

$\Delta T \leq 125\ °C - 40\ °C \leq 85\ °C$

$R_{TH\ (j\ -\ c)} + R_{TH\ (c\ -\ h)} + R_{TH\ (h\ -\ a)} = \frac{\Delta T}{P} = \frac{85}{80} = 1.06\ °C/W$

$R_{TH\ (c\ -\ h)} + R_{TH\ (h\ -\ a)} \leq 1.06°C/W - 0.55\ °C/W \leq 0.51\ °C/W$

OVERLOADS

In any case the applied voltage must be lower than 2 U_n. $U_{max.} < 2\ U_n < 3800$ V.

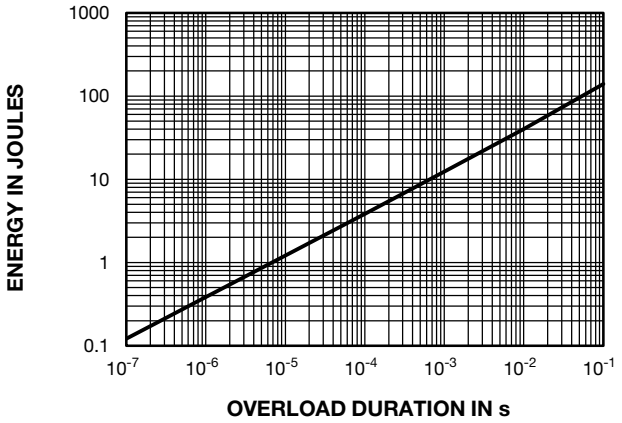
Short time overload: 4 x Pr/5 s

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

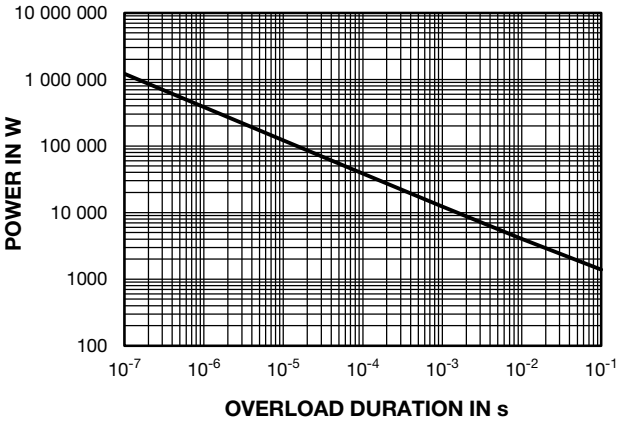
MARKING

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

ENERGY CURVE

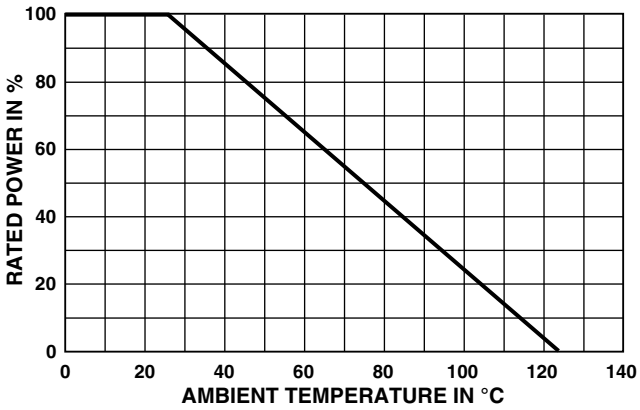


POWER CURVE



POWER RATING

For resistor mounted onto a heatsink with thermal resistance of 0.45 °C/W.



ORDERING INFORMATION

RPH	100	3.3 kΩ	± 5 %	V	xxx
MODEL	STYLE	RESISTANCE VALUE	TOLERANCE ± 1 % ± 2 % ± 5 %	CONNECTIONS V: M4 screw	CUSTOM DESIGN optional on request: special TCR, shape etc.

GLOBAL PART NUMBER INFORMATION

R	P	H	1	0	0	V	1	0	0	0	0	J	B	

GLOBAL MODEL	SIZE	LEADS	OHMIC VALUE	TOLERANCE	PACKAGING	SPECIAL
RPH	**100**	**V** = M4 screw	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 **48701** = 48 700 Ω **10002** = 100 kΩ **R0100** = 0.01 Ω **R6800** = 0.68 Ω **27000** = 2700 Ω = 2.7 kΩ	**F** = 1 % **G** = 2 % **J** = 5 % **K** = 10 %	**B** = box 5 pieces	As applicable **Ex** = XXX

RELATED DOCUMENTS

APPLICATION NOTES	
Pulse Capabilities for Thick Film Power Resistors	www.vishay.com/doc?50060
Guidelines for Vishay Sfernice Resistive and Inductive Components	www.vishay.com/doc?52029

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.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. 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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

RPH100V75R00FB RPH100V27001JB RPH100V27001KB RPH100V22R00JB RPH100V18001JB
RPH100V47001KB RPH100V56001JB RPH100V10002JB RPH100V68R00JB RPH100V12000JB
RPH100V15001JB RPH100V27000JB RPH100V5R000JB RPH100V10002FB RPH100V4R700JB
RPH100V22002KB RPH100V82001KB RPH100V6R200JB RPH100V33001JB RPH100V33R00JB
RPH100V330R0JB RPH100VR4700JB RPH100V220R0JB RPH100V82000JB RPH100V47000JB
RPH100V36000JB RPH100V100R0FB RPH100V2R000JB RPH100V50R00JB RPH100V10003KB
RPH100V6R800JB RPH100V60R00FB RPH100V17002FB RPH100V51R00JB RPH100V10001JB
RPH100V20001KB RPH100V3R000JB RPH100V33000JB RPH100V43001KB RPH100V5R100JB
RPH100V2R200JB RPH100VR1000JB RPH100V22001JB RPH100V200R0JB RPH100V18R00JB
RPH100V17852FB RPH100V24R00JB RPH100V10001KB RPH100V75000JB RPH100V1R000JB
RPH100V100R0JB RPH100V12R00JB RPH100V15000FB RPH100VR2200JB RPH100V910R0JB
RPH100V56000JB RPH100V13001JB RPH100V27R00JB RPH100V10002KB RPH100V47001JB
RPH100V60R40FB RPH100V33002FB RPH100V33002JB RPH100VR1500JB RPH100V30R00JB
RPH100V7R500JB RPH100V7R000JB RPH100V51000JB RPH100VR1100JB RPH100V13002JB
RPH100V33001FB RPH100V12001JB RPH100V91000JB