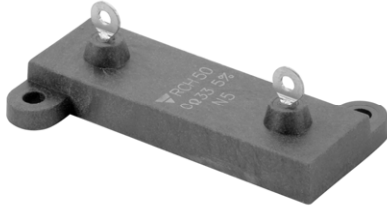


## Power Resistor, for Mounting Onto a Heatsink Thick Film Technology



### FEATURES

- Compliant with requirement #26 of NF-EN45545-2
- 5 W to 50 W
- High power rating
- High overload capabilities up to 2500 V<sub>RMS</sub>
- Wide resistance range from 0.24 Ω to 1 MΩ
- High thermal capacity up to 0.8 °C/W
- Easy mounting
- Reduced size and weight
- High insulation: 10<sup>6</sup> MΩ
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

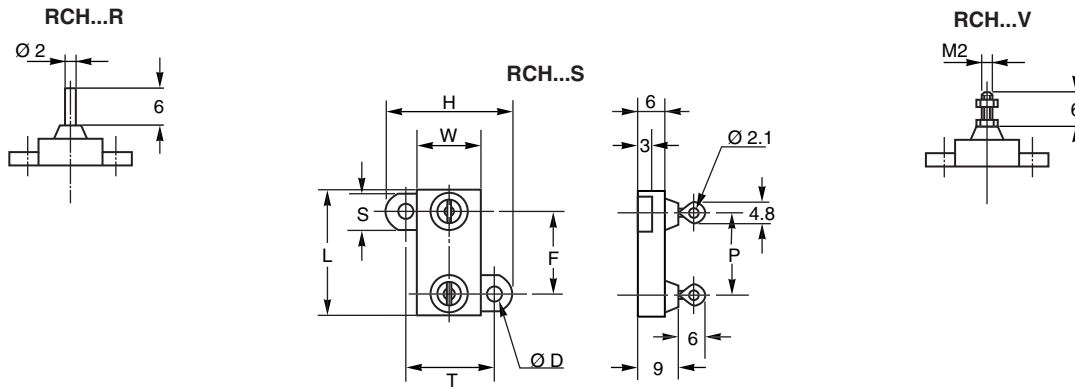

**RoHS**  
COMPLIANT

### LINKS TO ADDITIONAL RESOURCES



Manufactured in cermet thick film technology, these power resistors exhibit remarkable characteristics and the series includes 4 types ranging from 5 W to 50 W. Designed to be mounted onto a heatsink, the resistors can bear high short time overloads and 3 types of terminations are available. The resistors are non inductive and are particularly suitable for high frequency operation and cut-out circuits.

### DIMENSIONS in millimeters



MODEL	RCH5	RCH10	RCH25	RCH50
L	16.6	19	28	47.8
W	9	11	14	15.5
H	16.4	20.6	27.5	29.5
P Leads Pitch	10.2	12.7	18.3	30.5
F Connection Pitch	11.3	14.3	18.3	39.7
T	12.5	15.9	19.8	21.4
S	5.3	5	7.7	8
Ø D	2.4	2.4	3.2	3.2
Weight (g)	4	5	7	12

#### Note

- Tolerances unless stated: ± 0.3 mm



STANDARD ELECTRICAL SPECIFICATIONS					
MODEL	RESISTANCE RANGE $\Omega$	RATED POWER $P_{25\text{ }^\circ\text{C}}$ W	TOLERANCE $\pm \%$	TEMPERATURE COEFFICIENT $\pm \text{ppm}/^\circ\text{C}$	SERIES
RCH 5	0.24 to 1M	5	1, 2, 5, 10	150, 250	E24 range
RCH 10	0.24 to 1M	10	1, 2, 5, 10	150, 250	E24 range
RCH 25	0.24 to 1M	25	1, 2, 5, 10	150, 250	E24 range
RCH 50	0.24 to 1M	50	1, 2, 5, 10	150, 250	E24 range

MECHANICAL SPECIFICATIONS	
Mechanical Protection	Insulated case
Resistive Element	Cermet
Substrate	Alumina
Connections	Tinned copper alloy

TECHNICAL SPECIFICATIONS	
Dissipation and Associated	Onto a heatsink
Power Rating: Chassis Mounted Unmounted	5 W to 50 W 2 W to 5.5 W
Temperature Coefficient	$\pm 150 \text{ ppm}/^\circ\text{C}$
Insulation Resistance	$10^6 \text{ M}\Omega$
Total Inductance	$\leq 0.1 \mu\text{H}$

ENVIRONMENTAL SPECIFICATIONS	
Temperature Range	$-55\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$
Climatic Category	55 / 125 / 56
Flammability	IEC 60695-11-5 2 applications 30 s separated by 60 s

PERFORMANCE		
TESTS	CONDITIONS	REQUIREMENTS
Momentary Overload	NF EN140000 CEI 115_1 2 Pr/5 s $U_S < 1.5 U_L$	$< \pm (0.25\% + 0.05\ \Omega)$
Rapid Temperature Change	NF EN140000 125 $^\circ\text{C}$ CEI 68215 Test Na 5 cycles $-55\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$	$< \pm (0.25\% + 0.05\ \Omega)$
Load Life	NF EN140000 CEI 115_1 1000 h Pr at $+25\text{ }^\circ\text{C}$	$< \pm (0.5\% + 0.05\ \Omega)$
Humidity (Steady State)	56 days RH 95 % MIL-STD-202 Method 103 B and C	$< \pm (0.5\% + 0.05\ \Omega)$

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Resistance Values	$< 1\ \Omega$	$> 1\ \Omega$
Standard Tolerances	$\pm 5\%$ $\pm 10\%$	
Standard TCR	$\pm 250 \text{ ppm}/^\circ\text{C}$	$\pm 150 \text{ ppm}/^\circ\text{C}$
Tolerance on Request	$\pm 1\%$ to $\pm 2\%$	

SPECIAL FEATURES				
MODEL	RCH 5	RCH 10	RCH 25	RCH 50
Power Rating-Chassis Mounted	5 W	10 W	25 W	50 W
Power Rating-Unmounted	2 W	2.5 W	4 W	5.5 W
Thermal Resistance $R_{th(j-c)}$	$4.8\text{ }^\circ\text{C}/\text{W}$	$3.2\text{ }^\circ\text{C}/\text{W}$	$1.4\text{ }^\circ\text{C}/\text{W}$	$0.8\text{ }^\circ\text{C}/\text{W}$
Limiting Element Voltage ( $V_{RMS}$ )	160 V	250 V	550 V	1285 V
Dielectric Strength ( $V_{RMS}$ ) 50 Hz, 1 min MIL-STD-202 Method 301 10 mA max.	2000 V	2000 V	3500 V	3500 V
Critical Resistance	$5120\ \Omega$	$6250\ \Omega$	$12\ 100\ \Omega$	$33\ 024\ \Omega$



**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 (not supplied).

Tightening Torque on heatsink	RCH 5	RCH 10	RCH 25	RCH 50
	0.5 Nm	0.6 Nm	0.7 Nm	1 Nm

- In order to improve the dissipation, either forced-air cooling or liquid cooling may be used.
- A low thermal radiation of the case allows several resistors to be mounted onto the same heatsink.
- 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.
- Tests should be performed by the user.

**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:

$$P = \frac{\Delta T}{R_{TH(j-c)} + R_{TH(c-h)} + R_{TH(h-a)}} \quad (1)$$

P: Expressed in W

ΔT: Difference between maximum working temperature and room temperature or fluid cooling temperature.

R<sub>th(j-c)</sub>: Thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component.

R<sub>th(c-h)</sub>: 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<sub>th(h-a)</sub>: Thermal resistance of the heatsink.

**Example:**

R<sub>TH(c-a)</sub> for RCH 25 power rating 20 W at ambient temperature +50 °C

Thermal resistance R<sub>TH(j-c)</sub>: 2.5 °C/W

Considering equation (1) we have:

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

$$R_{TH(j-c)} = 1.4 \text{ °C/W (Special Features)}$$

$$R_{TH(j-c)} + R_{TH(c-h)} + R_{TH(h-a)} = \frac{\Delta T}{P} = \frac{75}{20} = 3.75 \text{ °C/W}$$

$$R_{TH(c-h)} + R_{TH(h-a)} \leq 3.75 \text{ °C/W} - 1.4 \text{ °C/W} \leq 2.35 \text{ °C/W}$$

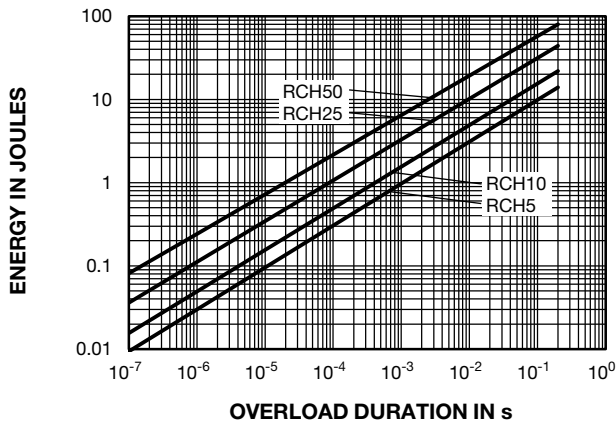
with a thermal grease R<sub>TH(c-h)</sub> = 1 °C/W, we need a heatsink with R<sub>TH(h-a)</sub> = 1.35 °C/W

**OVERLOADS**

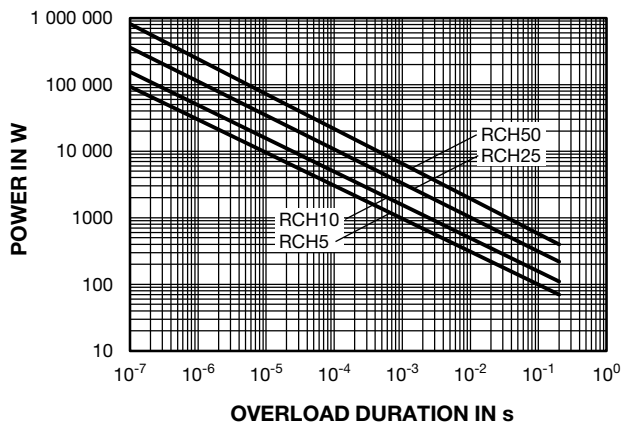
The applied voltage must always be lower than the maximum overload voltage as shown in the special features table.

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

**ENERGY CURVE**



**POWER CURVE**



**POWER RATING**

For resistors mounted onto heatsink and thermal resistance of 1 °C/W.

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

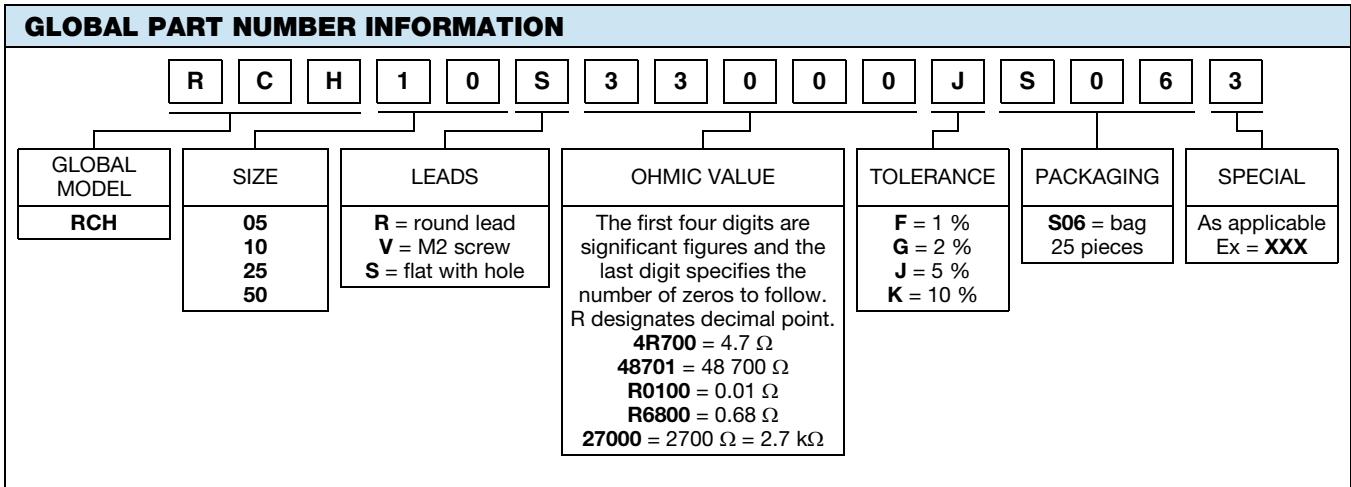


**MARKING**

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



ORDERING INFORMATION					
<b>RCH</b>	<b>25</b>	<b>3.3 kΩ</b>	<b>± 5 %</b>	<b>R</b>	<b>xxx</b>
MODEL	STYLE	RESISTANCE VALUE	TOLERANCE	CONNECTIONS	CUSTOM DESIGN
			Optional ± 1 % ± 2 % ± 5 % ± 10 %	Optional S: flat with hole R: round lead V: M2 screw	Optional





## **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.