

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


**RoHS**  
COMPLIANT

**FEATURES**

- 5 W to 50 W
- High power rating
- High overload capabilities up to 2500 V<sub>RMS</sub>
- Wide resistance range from 0.24 MΩ 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)

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 $\pm \text{ppm}/^\circ\text{C}$
RCH	0.24 to 1 M E24 range	5 to 50	1, 2, 5, 10	150, 250

**MECHANICAL SPECIFICATIONS**

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

**ENVIRONMENTAL SPECIFICATIONS**

Temperature Range	- 55 °C to + 125 °C
Climatic Category	55/125/56
Flammability	IEC 60695-11-5 2 applications 30 s separated by 60 s

**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	$\leq 0.1 \mu\text{H}$

**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 °C CEI 68215 Test Na 5 cycles - 55 °C to + 125 °C	$< \pm (0.25 \% + 0.05 \Omega)$
Load Life	NF EN140000 CEI 115_1 1000 h Pr at + 25 °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 °C/W	3.2 °C/W	1.4 °C/W	0.8 °C/W
Limiting Element Voltage ( $V_{RMS}$ )	160 V	250 V	550 V	1285 V
Max. Overload Voltage ( $V_{RMS}$ )	320 V	500 V	1100 V	2500 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:

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

- 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: 0.039 °C/W.
- 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:

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

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

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

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



**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.

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.

## Material Category Policy

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Vishay documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Vishay Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Vishay documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.