

## 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<br>$\Omega$ | RATED POWER<br>$P_{25\text{ }^\circ\text{C}}$<br>W | TOLERANCE<br>$\pm \%$ | TEMPERATURE COEFFICIENT<br>$\pm \text{ppm}/^\circ\text{C}$ |
|-------|------------------------------|----------------------------------------------------|-----------------------|------------------------------------------------------------|
| RCH   | 0.24 to 1 M<br>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<br>2 applications 30 s<br>separated by 60 s |

**TECHNICAL SPECIFICATIONS**

|                                               |                                      |
|-----------------------------------------------|--------------------------------------|
| Dissipation and Associated                    | Onto a heatsink                      |
| Power Rating:<br>Chassis Mounted<br>Unmounted | 5 W to 50 W<br>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<br>2 Pr/5 s<br>$U_S < 1.5 U_L$                    | $< \pm (0.25 \% + 0.05 \Omega)$ |
| Rapid Temperature Change | NF EN140000 125 °C CEI 68215 Test Na<br>5 cycles<br>- 55 °C to + 125 °C | $< \pm (0.25 \% + 0.05 \Omega)$ |
| Load Life                | NF EN140000 CEI 115_1<br>1000 h Pr at + 25 °C                           | $< \pm (0.5 \% + 0.05 \Omega)$  |
| Humidity (Steady State)  | 56 days RH 95 %<br>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  | $\pm 5 \%$<br>$\pm 10 \%$            |                                      |
| 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<br>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<br>± 1 %<br>± 2 %<br>± 5 %<br>± 10 % | Optional<br>S: Flat with hole<br>R: Round lead<br>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.**

## Данный компонент на территории Российской Федерации

### Вы можете приобрести в компании MosChip.

Для оперативного оформления запроса Вам необходимо перейти по данной ссылке:

<http://moschip.ru/get-element>

Вы можете разместить у нас заказ для любого Вашего проекта, будь то серийное производство или разработка единичного прибора.

В нашем ассортименте представлены ведущие мировые производители активных и пассивных электронных компонентов.

Нашей специализацией является поставка электронной компонентной базы двойного назначения, продукции таких производителей как XILINX, Intel (ex.ALTERA), Vicor, Microchip, Texas Instruments, Analog Devices, Mini-Circuits, Amphenol, Glenair.

Сотрудничество с глобальными дистрибьюторами электронных компонентов, предоставляет возможность заказывать и получать с международных складов практически любой перечень компонентов в оптимальные для Вас сроки.

На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

moschip.ru

moschip.ru\_4

moschip.ru\_6

moschip.ru\_9