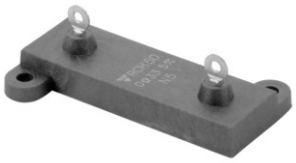
Power Resistors, for Mounting onto a Heatsink Thick Film Technology



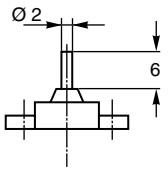
Manufactured in cermet thick film technology, these power resistors exhibit remarkable characteristics and the series includes 4 types ranging from 5 W to 50 W.
Designed to be mounted onto a heatsink, the resistors can bear high short time overloads and 3 types of terminations are available.
The resistors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

FEATURES

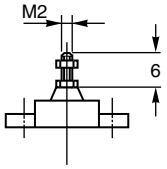
- 5 W to 50 W
- High power rating
- High overload capabilities up to 2500 V_{RMS}
- Wide resistance range from 0R24 to 1 MΩ
- High thermal capacity up to 0.8 °C/W
- Easy mounting
- Reduced size and weight
- High insulation: 10^6 MΩ

DIMENSIONS in millimeters

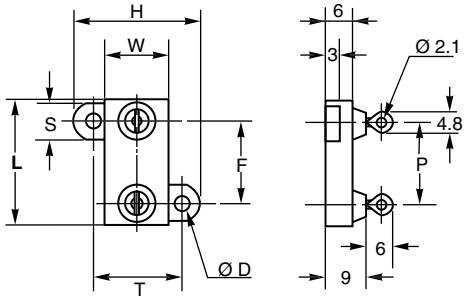
RCH...R



RCH...V



RCH...S



General tolerance: ± 0.3 mm

DIMENSIONS				
MODEL	**RCH 5**	**RCH 10**	**RCH 25**	**RCH 50**
L	16.6	19	28	47.8
W	9	11	14	15.5
H	16.4	20.6	27.5	29.4
P Leads Pitch	10.2	12.7	18.3	30.5
F Connections 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
V Leads	M2	M2	M3	M3
Weight (g)	4	5	7	12

MECHANICAL SPECIFICATIONS

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

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	- 55 °C to + 125 °C
Climatic Category	55/125/56

ELECTRICAL SPECIFICATIONS	
Resistance Range	0.24 Ω to 1 MΩ E24 series
Standard Resistance Tolerances	± 1 %, ± 2 %, ± 5 %, ± 10 %
Power Rating:	
Chassis Mounted	5 W to 50 W
Unmounted	2 W to 5.5 W
Temperature Coeffi cient	± 150 ppm/°C (R > 1 Ω)
Insulation Resistance	10^6 MΩ
Total Inductance	≤ 0.1 µH

PERFORMANCE		
TESTS	**CONDITIONS**	**TYPICAL DRIFTS**
Momentary Overload	NF EN 140 000 CEI 115_1 2 P_r/5 s U_s < 2 UL	< ± (0.25 % + 0.05 Ω)
Rapid Temperature Change	NF EN 140 000 125 °C CEI 68215 Test Na 5 cycles - 55 °C to + 125 °C	< ± (0.25 % + 0.05 Ω)
Load Life	NF EN 140 000 CEI 115_1 1000 h P_r at + 25 °C	< ± (0.5 % + 0.05 Ω)
Humidity (Steady State)	56 days RH 95 % MIL STD 202 Method 103 B and C	< ± (0.5 % + 0.05 Ω)

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Resistance Value	< 1 Ω	> 1 Ω
Standard Tolerances	± 5 % ± 10 %	
Standard TCR	± 250 ppm/°C	± 150 ppm/°C
Tolerance on Request	± 1 % to ± 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 Ω	6250 Ω	12 100 Ω	33 024 Ω

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, heat-sink) 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 the heatsink according to 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

T: Difference between maximum working temperature and room temperature.

R_{TH}: (j-c): Thermal resistance value measured between resistance layer and outer side of the resistor. It is the thermal resistance of the component (See Special Features table).

R_{TH}: (c-a): Thermal resistance value measured between outer side of the resistor and room temperature. It is the thermal resistance of the heatsink depending on the heatsink itself (type, shape) and the quality of the fastening device.

Example:

R_{TH}: (c-a) for RCH 25 power rating 20 W at ambient temperature + 50 °C.

$\Delta T \leq 125\ °C - 50\ °C \leq 75\ °C$

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

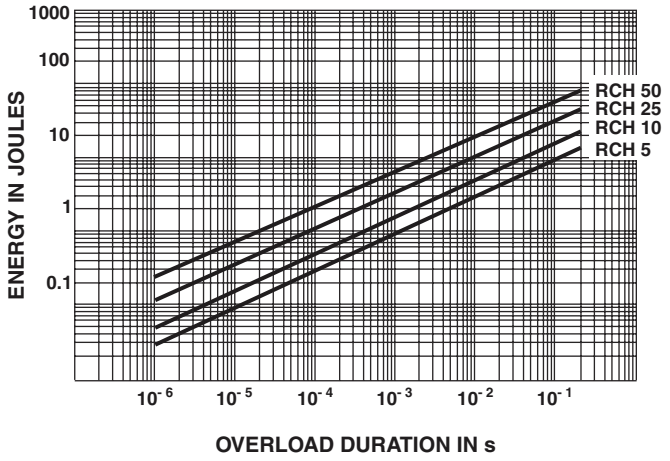
$R_{TH}(j\text{-}c) + R_{TH}(c\text{-}a) = \frac{\Delta T}{P} = \frac{75}{20} = 3.75\ °C/W$

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

OVERLOADS

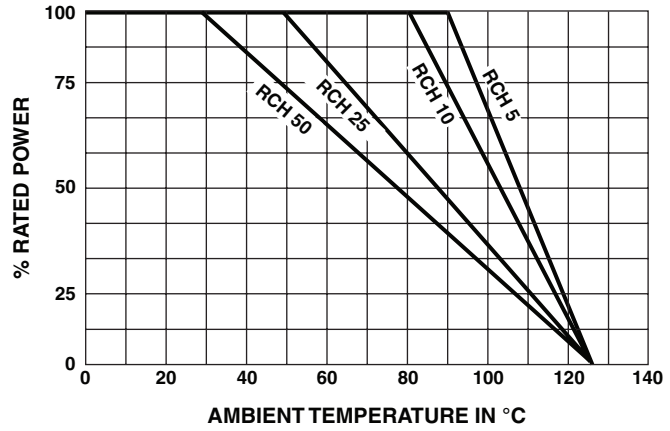
The applied voltage must always be lower than the maximum overload voltage as shown in the special features table.
The values indicated on the graph below are applicable to resistors in air or mounted onto a heatsink.

ENERGY CURVE



POWER RATING CHART

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 trade mark.

ORDERING INFORMATION

RCH	25	3.3 kΩ	± 5 %	R	XXX
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

GLOBAL PART NUMBER INFORMATION

R	C	H	1	0	S	3	3	0	0	0	J	S	0	6	

GLOBAL MODEL	SIZE	LEADS	OHMIC VALUE	TOLERANCE	PACKAGING	SPECIAL
RCH	**05** **10** **25** **50**	**R** = Round lead **V** = M2 screw **S** = Flat with hole	The firts four digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. **4R700** = 4.7 Ω **48701** = 48 700 Ω **33000** = 33 000 Ω **R0100** = 0.01 Ω **R6800** = 0.68 Ω **27000** = 2700 Ω = 2K7 Ω	**F** = 1 % **G** = 2 % **J** = 5 % **K** = 10 %	**S06** = Bag 25 pieces	As applicable Ex = **XXX**