Power Resistor for Mounting onto a Heatsink
Thick Film Technology

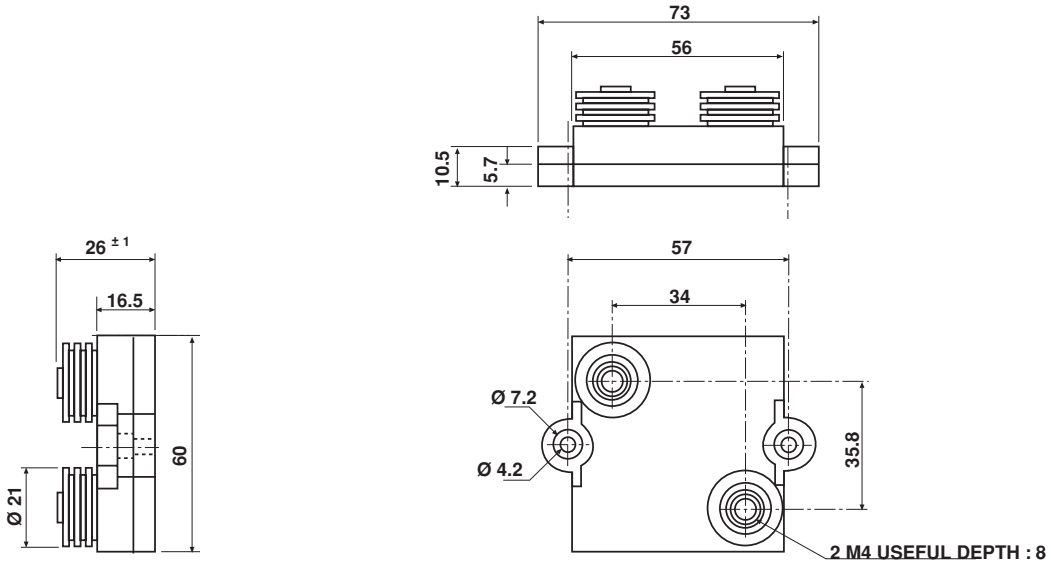
FEATURES

- High power rating
- High overload capability
- Easy mounting
- Low thermal radiation of the case

Developed for specific applications such as railroad electrical traction, this series can bear short overloads as high as fifteen times the nominal power. Designed to be mounted onto a heatsink, compact and hermetically sealed, these power resistors exhibit remarkable characteristics.

DIMENSIONS in millimeters

RPS 250D



• **Tolerance unless stated: ± 0.2mm**

MECHANICAL SPECIFICATIONS

Mechanical Protection	Insulated case
Substrate	Alumina onto aluminum base
Resistive Element	Cermet
End Connections	Screws M4, (M5 on request)
Tightening Torque on connections	2Nm
Weight	170g ± 10%

ENVIRONMENTAL SPECIFICATIONS

Thermal Resistance	R_{TH} (j-c) 0.22°C/W
Temperature Range	- 55°C + 125°C
Climatic Category	55/125/56

ELECTRICAL SPECIFICATIONS

Resistance Range		0.24Ω to 1M E24 series
Tolerances		± 1% to ± 10%
Power Rating chassis mounted	**250W** **1000W**	at 50°C continuous at 25°C for 10 seconds
Temperature Coefficient	**Standard**	± 250ppm/°C < 1 ± 150ppm/°C > 1
Limiting Element Voltage		5kVRMS
Dielectric Strength		L connections 7kVRMS H connections 14kVRMS
Insulation Resistance		> 10^6MΩ
Inductance		< 50 nH
Capacitance	**Resistor** **/ground**	< 40pF < 120pF

PERFORMANCE		
TESTS	**CONDITIONS**	**TYPICAL DRIFTS**
Momentary Overload	4 Pr/10 s	< ± (0.25% ± 0.05Ω)
Climatic Sequence	5 cycles - 55°C + 125°C	< ± (0.25% ± 0.05)
Load Life	1000h Pr at 70°C	< ± (0.5% ± 0.05Ω)
Humidity (steady state)	56 days R.H. 95%	< ± (0.5% ± 0.05Ω)

RESISTANCE VALUE IN RELATION TO TOLERANCE AND TCR		
Ohmic Value	< 1Ω	> 1Ω
Standard Tolerance	± 5%	± 5%
Standard T.C.	± 250ppm/°C	± 150ppm/°C
Tolerance On Request	± 1% - ± 2% - ± 10%	

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:

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

P: expressed in W

T: difference between maximum working temperature and room temperature.

R_{TH}: (j-c): thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component (see specifications environmental paragraph).

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 RPS 250 power dissipation 180W at + 50˚C room temperature.

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

$R_{TH}(j\text{-}c) + RTH(c\text{-}a) = \frac{\Delta T}{P} = \frac{75}{180} = 0.42°C/W$

$R_{TH}(j\text{-}c) = 0.22°C/W$

$R_{TH}(c\text{-}a) \leq 0.42°C/W - 0.22°C/W \leq 0.20°C/W$

RECOMMENDATIONS FOR MOUNTING ONTO A HEATSINK

Surfaces in contact must be carefully cleaned. The heatsink must have an acceptable flatness: from 0.05mm to 0.1mm/100mm.

Roughness of the heatsink must be around 6.3µm. In order to improve thermal conductivity, surfaces in contact 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 (tightening torque 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 1kV/mm).

In any case the hot spot temperature, measured locally on the case must not exceed 125°C.

Test should be performed by the user.

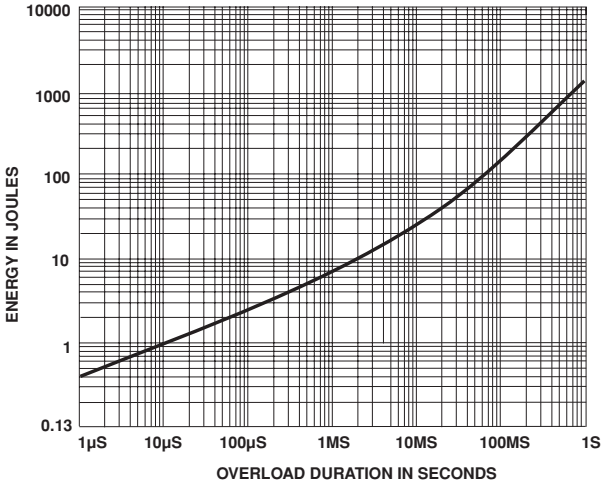
OVERLOADS

In any case the applied voltage must be lower than 2.5Un. U maxi < 2.5Un < 12500V.

Short time overload: 4 Pn/10 seconds

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

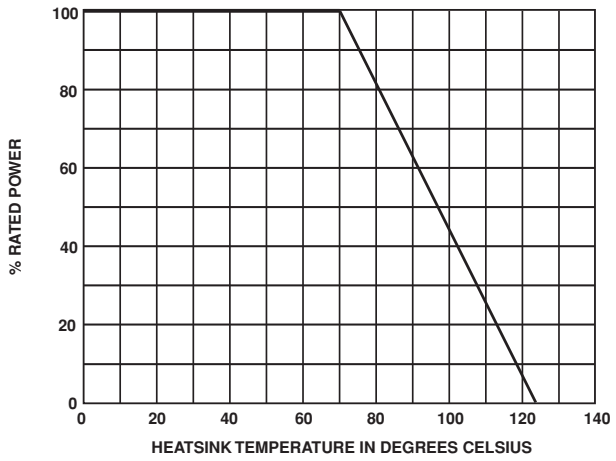
ENERGY CURVE



POWER RATING CHART

The temperature of the heatsink should be maintained in the limit specified.

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



MARKING

Series. style, ohmic value (in). tolerance in %, manufacturing date, VISHAY trademark

ORDERING INFORMATION

RPS	250D	H	100Ω	± 10%	xxx
MODEL	STYLE	CONNECTIONS	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN
		Optional H: dielectric strength 14 kV L: dielectric strength 7 kV		Optional ± 1% ± 2% ± 5% ± 10%	Options on request special T.C., shape, etc.