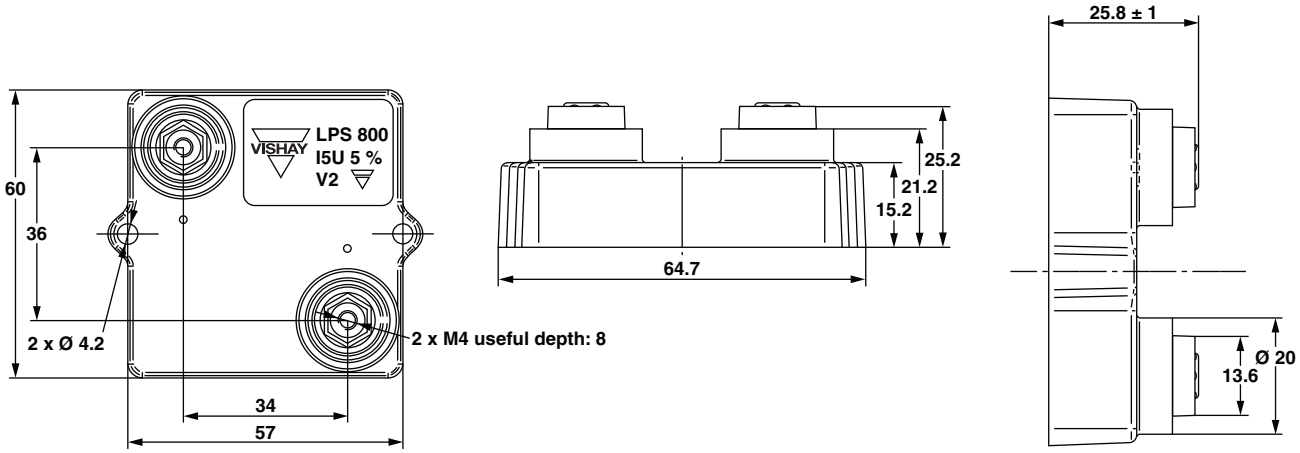
Power Resistor for Mounting onto a Heatsink Thick Film Technology

FEATURES

- 800 W at 85 °C bottom case temperature
- Wide resistance range: 0.3 Ω to 900 kΩ E24 series
- Non inductive
- Easy mounting
- Low thermal radiation of the case
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

DIMENSIONS in millimeters



Note

- Tolerances unless stated: ± 0.2 mm

STANDARD ELECTRICAL SPECIFICATIONS

MODEL	RESISTANCE RANGE Ω	RATED POWER $P_{85\,°C}$ W	LIMITING ELEMENT VOLTAGE U_L V	TOLERANCE ± %	TEMPERATURE COEFFICIENT ± ppm/°C	CRITICAL RESISTANCE (Ω)
LPS 800	0.3 to 900K	800	5K	1, 2, 5, 10	150, 300, 500	31.25K

MECHANICAL SPECIFICATIONS

Mechanical Protection	Insulated case UL 94 V-0
Resistive Element	Thick film
Substrate	Alumina
End Connections	Screws M4
Tightening Torque Connections	2 Nm
Tightening Torque Heatsink	2 Nm
Maximum Torque	2.5 Nm
Weight	83 g ± 10 %

TECHNICAL SPECIFICATIONS

Power Rating and Thermal Resistance	800 W at + 85 °C bottom case temperature $R_{TH\,(j-c)}$: 0.112 °C/W
Temperature Coefficient - 55 °C/175 °C IEC 60115-1 Standard	$R \leq 1\ \Omega$: ± 500 ppm/°C $1\ \Omega < R \leq 10\ \Omega$: ± 300 ppm/°C $10\ \Omega < R$: ± 150 ppm/°C
Dielectric Strength IEC 60115-1, 1 min, 10 mA max.	7 kV_{RMS} or 12 kV_{RMS}
Insulation Resistance	$\geq 10^4$ MΩ
Inductance	≤ 0.1 µH

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	- 55 °C to 175 °C
Climatic Category	55/175/56

For technical questions, contact: sfer@vishay.com

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PERFORMANCE		
TESTS	**CONDITIONS**	**REQUIREMENTS**
Momentary Overload	IEC 60115-1 1.5 x P_r/10 s $U_{max.} \leq U_L$ = 5000 V	± (0.25 % + 0.05 Ω)
Rapid Temperature Change	IEC 60115-1/IEC 30068-2-14 Test Na 50 cycles - 55 °C to + 175 °C	± (0.5 % + 0.05 Ω)
Load Life	IEC 60115-1 1000 h (90/30) P_r at 85 °C	± (0.5 % + 0.05 Ω)
Humidity (Steady State)	IEC 60115-1 56 days RH 95 %/40 °C	± (0.5 % + 0.05 Ω)
Vibration	MIL STD 202 method 204 cond. D (10 *g*; 5/500 Hz)	± (0.25 % + 0.05 Ω)
Climatic Sequence	IEC 60115-1 (55/175/56)	± (1 % + 0.05 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, heatsink) should be coated with a silicone grease (type SI 340 from Rhône-Poulenc or Dow 340 from Dow Corning) or a thermal film (type Q Pad II) easier and faster to install than the grease.
- The fastening of the resistor to the heatsink is under pressure control of two screws tightened at 2 Nm for full power availability.

Tightening Torque on Heatsink	LPS 800
	2 Nm

- The following accessories are supplied with each product:
  - 2 screws CHC M4 x 25 class 8.8 and 2 M4 contact lock washers for heatsink mounting
  - 2 screws TH M4 x 6/6 and 2 M4 contact lock washers for connections.

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 175 °C. The dissipated power is simply calculated by the following ratio:

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

P: Expressed in W

ΔT: 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 thermal interface, the heatsink (type, shape) and the quality of the fastening device.

Example:

$R_{TH\ (c\ -\ a)}$ for LPS 800 power dissipation 180 W at + 50 °C room temperature.

$\Delta T \leq 175\ °C - 50\ °C = 125\ °C$

$R_{TH\ (j\ -\ c)} + R_{TH\ (c\ -\ a)} = \frac{\Delta T}{P} = \frac{125}{180} = 0.69\ °C/W$

$R_{TH\ (j\ -\ c)} = 0.112\ °C/W$

$R_{TH\ (c\ -\ a)} = 0.69\ °C/W - 0.112\ °C/W = 0.578\ °C/W$

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	CONFIG. 1: WATER COOLING HEATSINK CP15 AND THERMAL GREASE SI340	CONFIG. 2: AIR COOLING HEATSINK P207/250 AND THERMAL GREASE SI340	CONFIG. 3: WATER COOLING HEATSINK CP15 AND THERMAL PAD Q-PAD II	CONFIG. 4: AIR COOLING HEATSINK P207/250 AND THERMAL PAD Q-PAD II
Power dissipation (W)	710	282	307	180
T° resistive element (°C)	175	175	175	175
$R_{TH\ (j\ -\ c)}$ max. (°C/W)	0.112	0.112	0.112	0.112
$R_{TH\ (c\ -\ h)}$ typ. (°C/W)	0.05	0.13	0.34	0.43
$R_{TH\ (h\ -\ a)}$ max. (°C/W)	0.059	0.29	0.059	0.29
Fluid T° (°C)	18	25	18	25

Notes

- **Configuration 1:** Water cooling heatsink CP15 from Lytron (304 mm x 95.3 mm x 8 mm) with water flow rate 4 LPM and thermal grease SI340 from BlueStar silicones.
- **Configuration 2:** Air cooling heatsink P207/250 from Semikron (250 mm x 200 mm x 72 mm) and thermal grease SI340 from BlueStar silicones.
- **Configuration 3:** Water cooling heatsink CP15 from Lytron (304 mm x 95.3 mm x 8 mm) with water flow rate 4 LPM and thermal pad Q-Pad II from Berquist.
- **Configuration 4:** Air cooling heatsink P207/250 from Semikron (250 mm x 200 mm x 72 mm) and thermal pad Q-Pad II from Berquist.

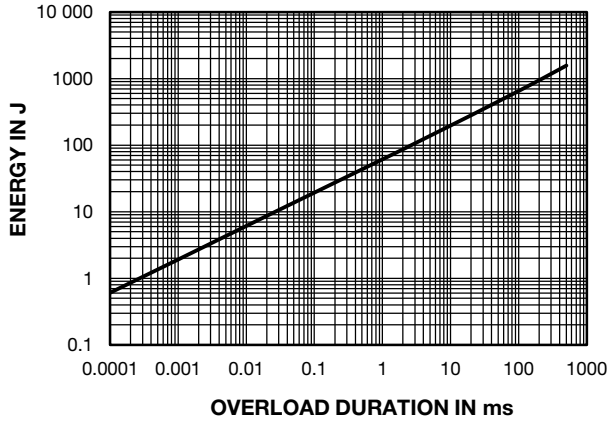
OVERLOADS

In any case the applied voltage must be lower than U_L = 5000 V.

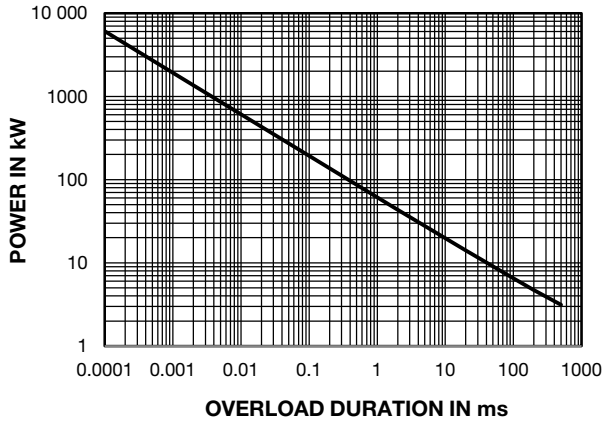
Short time overload: 1.5 x P_r/10 s

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

ENERGY CURVE



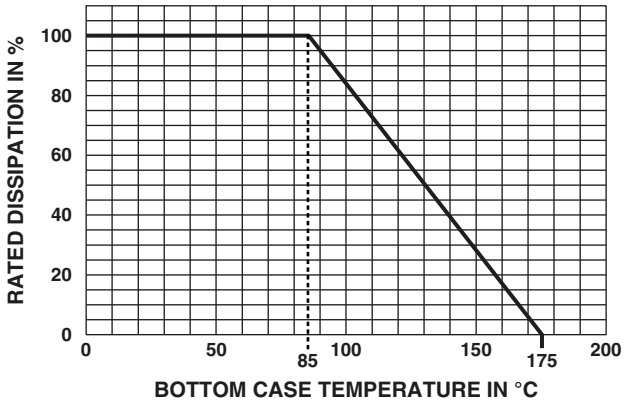
POWER CURVE



POWER RATING

The temperature of the case should be maintained within the limits specified in the following figure.

To optimize the thermal conduction, contacting surfaces should be coated with silicone grease or thermal film, and heatsink mounting screws tightened to 2 Nm.



MARKING

Series, style, ohmic value (in Ω), tolerance (in %), manufacturing date, Vishay Sfernice trademark.

PACKAGING

Box of 15 units

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ORDERING INFORMATION

LPS	800	100 kΩ	± 1 %	xxx	BO15	e
MODEL	STYLE	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN	PACKAGING	LEAD (Pb)-FREE
			± 1 % ± 2 % ± 5 % ± 10 %	Optional on request: Special TCR, shape etc.		

GLOBAL PART NUMBER INFORMATION

L	P	S	0	8	0	0	H	4	7	R	0	J	B	

GLOBAL MODEL	DIELECTRIC	OHMIC VALUE	TOLERANCE	PACKAGING	SPECIAL
LPS 800	**L** = Dielectric strength 7 kV **H** = Dielectric strength 12 kV	The first three digits are significant figures and the last digit specifies the number of zeros to follow. R designates decimal point. **48R7** = 48.7 Ω **47R0** = 47 Ω **1001** = 1 kΩ **4R70** = 4.7 Ω **R240** = 0.24 Ω	**F** = 1 % **G** = 2 % **J** = 5 % **K** = 10 %	**B** = Box 15 pieces	As applicable ZAx

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