## LPS 800



Vishay Sfernice

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



#### LINKS TO ADDITIONAL RESOURCES



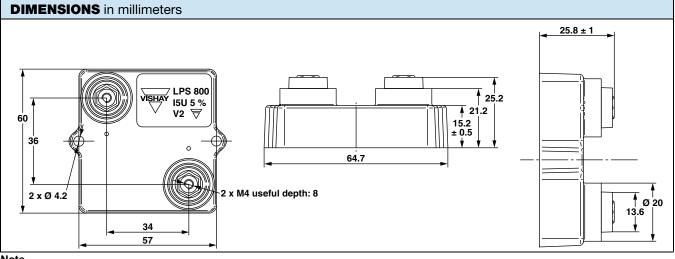
### FEATURES

 Compliant with requirement #26 of NF-EN45545-2



COMPLIANT

- High power 800 W at 85 °C bottom case temperature
- Wide resistance range: 0.3  $\Omega$  to 900 k $\Omega$  E24 series
- Non inductive
- Easy mounting
- Low thermal radiation of the case
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>



Note

Tolerances unless stated: ± 0.2 mm

STANDA	STANDARD ELECTRICAL SPECIFICATIONS							
MODEL	RESISTANCE RANGE Ω	RATED POWER P <sub>85 °C</sub> W	LIMITING ELEMENT VOLTAGE U <sub>L</sub> 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				
Flammability 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 %				
ENVIRONMENTAL SPECIFICATIONS				
Temperature Range-55 °C to +175 °C				
Climatic Category 55 / 175 / 56				

TECHNICAL SPECIFICATIONS					
Power Rating and Thermal Resistance	800 W at +85 °C bottom case temperature R <sub>TH (j - c)</sub> : 0.112 °C/W				
Temperature Coefficient -55 °C / +175 °C IEC 60115-1 Standard	$R \le 1 \ \Omega: \pm 500 \ \text{ppm/°C}$ 1 $\Omega < R \le 10 \ \Omega: \pm 300 \ \text{ppm/°C}$ 10 $\Omega < R: \pm 150 \ \text{ppm/°C}$				
Dielectric Strength IEC 60115-1, 1 min, 10 mA max.	7 kV <sub>RMS</sub> or 12 kV <sub>RMS</sub>				
Lightning test 1.2/50 µs IEC 61000-4-5	Until 12 kV				
Insulation Resistance	$\geq 10^4 \text{ M}\Omega$				
Inductance	≤ 0.1 μH				
Partial Discharge (for LPS 800 D only)	≤ 100 pC/7 kV ≤ 10 pC/5 kV Other cases: Consult us				

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PERFORMANCE					
TESTS	CONDITIONS	REQUIREMENTS			
Momentary Overload	IEC 60115-1 1.5 x P <sub>r</sub> / 10 s $U_{max.} \le U_L = 5000 \text{ V}$	± (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 <sub>r</sub> 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 Bluesil Past 340 from BlueStar Silicones) 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
Tightening Torque on Heatsink	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:

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

P:	Expressed in W
ΔΤ:	Difference between maximum working temperature and room temperature
R <sub>TH (j</sub> - 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 <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 dev
R <sub>TH (h - a)</sub> :	Thermal resistance of the heatsink.

#### Example:

R<sub>TH (c - a)</sub> for LPS 800 power dissipation 180 W at +50 °C room temperature.

$$\begin{split} &\Delta T \leq 175 ~^{\circ}C - 50 ~^{\circ}C = 125 ~^{\circ}C \\ &R_{TH ~(j - c)} + R_{TH ~(c - h)} + R_{TH ~(h - a)} = \frac{\Delta T}{P} = \frac{125}{180} = 0.69 ~^{\circ}C/W \\ &R_{TH ~(j - c)} = 0.112 ~^{\circ}C/W \\ &R_{TH ~(c - h)} + R_{TH ~(h - a)} = 0.69 ~^{\circ}C/W - 0.112 ~^{\circ}C/W = 0.578 ~^{\circ}C/W \end{split}$$

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device.



# LPS 800

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	CONFIG. 1: WATER COOLING HEATSINK CP15 AND THERMAL GREASE BLUESIL PAST 340	CONFIG. 2: AIR COOLING HEATSINK P207/250 AND THERMAL GREASE BLUESIL PAST 340	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 <sub>TH (j - c)</sub> max. (°C/W)	0.112	0.112	0.112	0.112
R <sub>TH (c - h)</sub> typ. (°C/W)	0.05	0.13	0.34	0.43
R <sub>TH (h - a)</sub> 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 Bluesil Past 340 from BlueStar silicones.
- Configuration 2: Air cooling heatsink P207/250 from Semikron (250 mm x 200 mm x 72 mm) and thermal grease Bluesil Past 340 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.

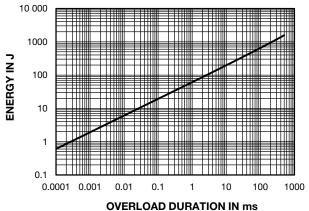
#### **OVERLOADS**

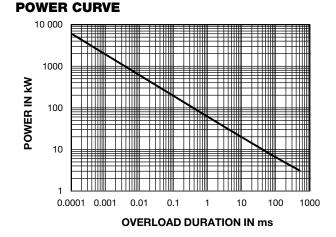
In any case the applied voltage must be lower than  $U_{\rm L} = 5000 \text{ V}.$ 

Short time overload: 1.5 x Pr/10 s

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

#### **ENERGY CURVE**

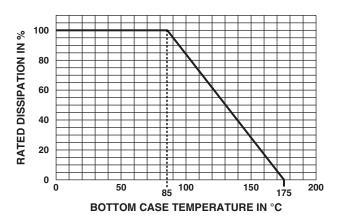




#### **POWER RATING**

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  $\Omega$ ), tolerance (in %), manufacturing date, Vishay Sfernice trademark.

#### PACKAGING

Box of 15 units

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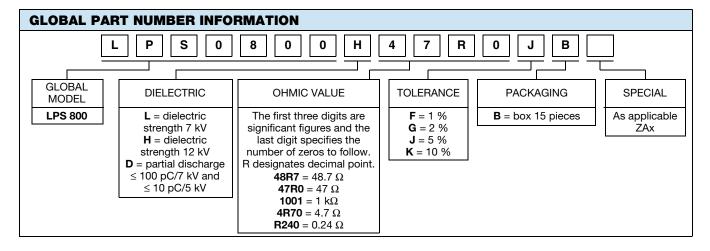
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ORDERING INFORMATION							
LPS	800	<b>100 k</b> Ω	±1%	ххх	BO15	е	
MODEL	STYLE	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN	PACKAGING	LEAD (Pb)-FREE	
			±1%	Optional			
			±2%	on request:			
			±5%	special TCR,			
			± 10 %	shape etc.			





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