



# Power Resistor for Mounting onto a Heatsink Thick Film Technology

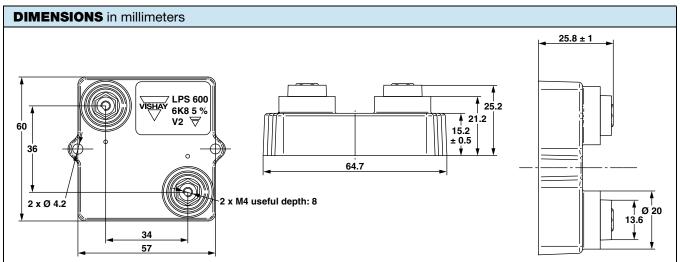


#### **FEATURES**

- 600 W at 85 °C bottom case temperature



- Non inductive
- Easy mounting
- · Low thermal radiation of the case
- Material categorization: For definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>



#### Note

• Tolerances unless stated: ± 0.2 mm

STANDARD ELECTRICAL SPECIFICATIONS						
MODEL	RESISTANCE RANGE $\Omega$	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 600	0.3 to 900K	600	5K	1, 2, 5, 10	150, 300, 500	41.66K

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 %		

ENVIRONMENTAL SPECIFICATIONS			
Temperature Range	- 55 °C to 155 °C		
Climatic Category	55/155/56		

TECHNICAL SPECIFICATIONS			
Power Rating and Thermal Resistance	600 W at + 85 °C bottom case temperature R <sub>TH (j - c)</sub> : 0.112 °C/W		
Temperature Coefficient - 55 °C/155 °C IEC 60115-1 Standard	$R \le 1 \ \Omega$ : ± 500 ppm/°C 1 $\Omega < R \le 10 \ \Omega$ : ± 300 ppm/°C 10 $\Omega < R$ : ± 150 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 600 D only)	≤ 100 pC/7 kV ≤ 10 pC/5 kV Other cases: Consult us		



PERFORMANCE				
TESTS	CONDITIONS	REQUIREMENTS		
Momentary Overload	IEC 60115-1 $2 \times P_r/10 \text{ s}$ $U_{\text{max.}} \le U_{\text{L}} = 5000 \text{ V}$	$\pm (0.25 \% + 0.05 \Omega)$		
Rapid Temperature Change	IEC 60115-1/IEC 60068-2-14 Test Na 50 cycles - 55 °C to + 155 °C	± (0.5 % + 0.05 Ω)		
Load Life	IEC 60115-1 1000 h (90/30) P <sub>r</sub> at 85 °C	$\pm (0.5 \% + 0.05 \Omega)$		
Humidity (Steady State)	IEC 60115-1 56 days RH 95 %/40 °C	$\pm (0.5 \% + 0.05 \Omega)$		
Vibration	MIL STD 202 method 204 cond. D (10 g; 5/500 Hz)	$\pm (0.25 \% + 0.05 \Omega)$		
Climatic Sequence	IEC 60115-1 (55/155/56)	± (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 600		
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 155 °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

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<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.

 $R_{TH (h-a)}$ : Thermal resistance of the heatsink.

#### Example:

R<sub>TH (c - a)</sub> for LPS 600 power dissipation 180 W at + 50 °C room temperature.

$$\Delta T \le 155 \,^{\circ}\text{C} - 50 \,^{\circ}\text{C} = 105 \,^{\circ}\text{C}$$

$$R_{TH (j-c)} + R_{TH (c-h)} + R_{TH (h-a)} = \frac{\Delta T}{P} = \frac{105}{180} = 0.58 \text{ °C/W}$$

 $R_{TH (i - c)} = 0.112 \, ^{\circ}C/W$ 

 $R_{TH (c-h)} + R_{TH (h-a)} = 0.58 \text{ °C/W} - 0.112 \text{ °C/W} = 0.468 \text{ °C/W}$ 

## Vishay Sfernice

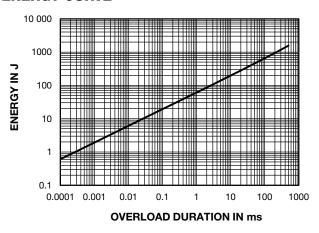
#### **OVERLOADS**

In any case the applied voltage must be lower than  $U_1 = 5000 \text{ V}$ .

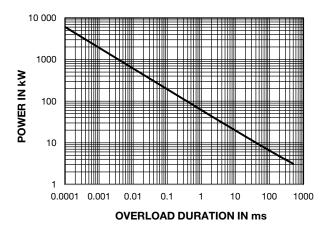
Short time overload: 2 x P<sub>r</sub>/10 s

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

#### **ENERGY CURVE**



#### **POWER CURVE**



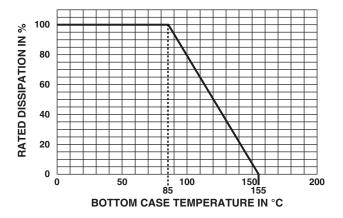
#### **MARKING**

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

#### **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.



#### **PACKAGING**

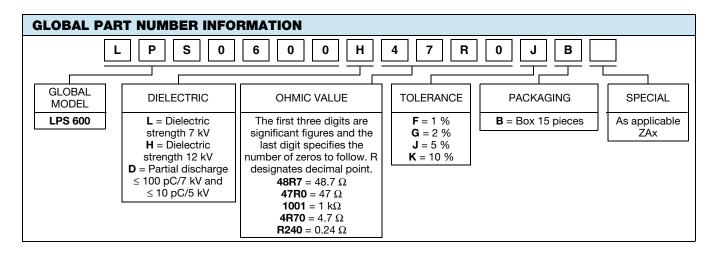
Box of 15 units



www.vishay.com

# Vishay Sfernice

ORDERING INFORMATION							
LPS	600	100 kΩ	± 1 %	XXX	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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- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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