Power Resistor for Mounting onto a Heatsink  
Thick Film Technology

**FEATURES**
- Compliant with requirement #26 of NF-EN45545-2
- LPS high power: 1100 W
- Wide resistance range: 1 Ω to 1.3 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

**DESIGN SUPPORT TOOLS AVAILABLE**

- 3D Models

**DIMENSIONS** in millimeters

**STANDARD ELECTRICAL SPECIFICATIONS**
<table>
<thead>
<tr>
<th>MODEL</th>
<th>RESISTANCE RANGE Ω</th>
<th>RATED POWER P_{25°C} W</th>
<th>TOLERANCE ± %</th>
<th>TEMPERATURE COEFFICIENT ± ppm/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPS 1100</td>
<td>1 to 1.3K</td>
<td>1100</td>
<td>1, 2, 5, 10</td>
<td>150</td>
</tr>
</tbody>
</table>

**MECHANICAL SPECIFICATIONS**
- Mechanical Protection: Insulated case and resin for potting UL 94 V-0
- Resisitive Element: Thick film
- End Connections: Screws M4
- Tightening Torque Connections: 2 Nm
- Tightening Torque Heatsink: 2 Nm
- Maximum Torque: 2.5 Nm
- Weight: 79 g ± 10 %

**ENVIRONMENTAL SPECIFICATIONS**
- Temperature Range: -55 °C to +200 °C
- Climatic Category: 55 / 200 / 56

**TECHNICAL SPECIFICATIONS**
- Power Rating and Thermal Resistance: 1100 W at +25 °C  
  On heatsink R_{th(j-c)}: 0.039 °C/W
- Temperature Coefficient: 
  -1 ≤ R < 10 Ω: ± 500 ppm/°C  
  10 Ω < R ≤ 100 Ω: ± 300 ppm/°C  
  100 Ω < R ≤ 1 kΩ: ± 150 ppm/°C
- Dielectric Strength: 
  - IEC 60115-1, 1 min, 10 mA max.: 7 kV RMS or 12 kV RMS
- Lightning test 1.2/50 μs: Until 12 kV
- Insulation: ≥ 10^6 MΩ
- Inductance: ≤ 0.1 μH
- Partial Discharge: 
  - (for LPS 1100 D only): ≤ 100 pC/7 kV  
  ≤ 10 pC/5 kV  
  Other cases: Consult us
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 (ceramic, heatsink) should be coated with a silicone grease (type Bluesil Past 340 from Blue Star Silicones). Thermal film (type Q-pad II from Berquist) is also possible, easier and faster to install than grease but with a lower efficiency for the power dissipation.
- The fastening of the resistor to the heatsink is under pressure control of two screws tightened at 2 Nm for full power availability.

CHOICE OF THE HEATSINK AND THE THERMAL INTERFACE

The user must choose the heatsink according to the working conditions of the component (power, room temperature). Maximum working temperature must not exceed 200 °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
\(\Delta T:\) Difference between maximum working temperature and room temperature or fluid cooling 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: 0.039 °C/W.
\(R_{th(c-h)}:\) 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:

\(R_{th(c-h)} + R_{th(h-a)}\) for LPS 1100 power dissipation 850 W at + 18 °C fluid temperature

\[
\Delta T \leq 200 \, ^\circ C - 18 \, ^\circ C = 182 \, ^\circ C
\]

\[
R_{th(j-c)} + R_{TH(c-h)} + R_{TH(h-a)} = \frac{\Delta T}{P} = \frac{182}{850} = 0.214 \, ^\circ C/W
\]

\[
R_{th(j-c)} = 0.039 \, ^\circ C/W
\]

\[
R_{th(c-h)} + R_{th(h-a)} = 0.214 \, ^\circ C/W - 0.039 \, ^\circ C/W = 0.175 \, ^\circ C/W
\]
Note
- Configuration 1: Water cooling heatsink (CP15 from Lytron (304 mm x 95.3 mm x 8 mm) with water flow rate 4LPM 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 4LPM 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

**OVERLOAD**
In any case the applied voltage must be lower than \( U_I = 6600 \) V.

**Short time overload:** 2 \( \times \) Pr/10 s for heatsink with \( R_{th(h-a)} \geq 0.26 \) °C/W (maximum power: 700 W) and 1.6 \( \times \) Pr/1 s for heatsink with \( 0.26 \) °C/W > \( R_{th(h-a)} \geq 0.059 \) °C/W (maximum power: 1800 W).

**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 Ω), tolerance (in %), manufacturing date, Vishay Sfernice trademark.

**POWER RATING**
The temperature of the case should be maintained within the limit 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
## ORDERING INFORMATION

<table>
<thead>
<tr>
<th>MODEL</th>
<th>STYLE</th>
<th>RESISTANCE VALUE</th>
<th>TOLERANCE</th>
<th>CUSTOM DESIGN</th>
<th>PACKAGING</th>
<th>LEAD (Pb)-FREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPS</td>
<td>1100</td>
<td>1 kΩ</td>
<td>± 1 %</td>
<td></td>
<td>BO15</td>
<td>e</td>
</tr>
</tbody>
</table>

Tolerance options:
- ± 1 %
- ± 2 %
- ± 5 %
- ± 10 %

Optional on request:
- special TCR,
- shape, etc.

## GLOBAL PART NUMBER INFORMATION

<table>
<thead>
<tr>
<th>GLOBAL MODEL</th>
<th>DIELECTRIC</th>
<th>OHMIC VALUE</th>
<th>TOLERANCE</th>
<th>PACKAGING</th>
<th>SPECIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPS 1100</td>
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<td></td>
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</table>

Dielectric:
- **L**: dielectric strength 7 kV
- **H**: dielectric strength 12 kV
- **D**: partial discharge ≤ 100 pC/7 kV and ≤ 10 pC/5 kV

Ohmic Value:
- 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

Tolerance:
- **F**: 1 %
- **G**: 2 %
- **J**: 5 %
- **K**: 10 %

Packaging:
- **B**: box 15 pieces

Special:
- As applicable
- **ZAx**
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