Power Resistor for Mounting onto a Heatsink
Thick Film Technology

FEATURES
- Compliant with requirement #26 of NF-EN45545-2
- High power 600 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

Note
- Tolerances unless stated: ± 0.2 mm

DIMENSIONS in millimeters

STANDARD ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>RESISTANCE RANGE (Ω)</th>
<th>RATED POWER P85°C (W)</th>
<th>LIMITING ELEMENT VOLTAGE UL (V)</th>
<th>TOLERANCE ±%</th>
<th>TEMPERATURE COEFFICIENT ± ppm/°C</th>
<th>CRITICAL RESISTANCE (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPS 600</td>
<td>0.3 to 900K</td>
<td>600</td>
<td>5K</td>
<td>1, 2, 5, 10</td>
<td>150, 300, 500</td>
<td>41.66K</td>
</tr>
</tbody>
</table>

MECHANICAL SPECIFICATIONS

- Mechanical Protection: Insulated case UL 94 V-0
- Resistant 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
- RTH(j-c) ≤ 0.112 °C/W
- Temperature Coefficient:
  - -55 °C/155 °C
    - IEC 60115-1 Standard
    - R ≤ 1 Ω: ± 500 ppm/°C
    - 1 Ω < R ≤ 10 Ω: ± 300 ppm/°C
    - 10 Ω < R: ± 150 ppm/°C
- Dielectric Strength:
  - IEC 61011-5-1, 1 min, 10 mA max.
  - 7 kV RMS or 12 kV RMS
- Lightning test 1.2/50 μs
  - IEC 61000-4-5
  - Until 12 kV
- Insulation Resistance:
  - ≥ 10⁴ MΩ
- Inductance:
  - ≤ 0.1 μH
- Partial Discharge:
  - (for LPS 600 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 (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.

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<th>TESTS</th>
<th>CONDITIONS</th>
<th>REQUIREMENTS</th>
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<td>IEC 60115-1 2 x P / 10 s U\textsubscript{max} ≤ U\textsubscript{L} = 5000 V</td>
<td>± (0.25 % + 0.05 Ω)</td>
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<td>Rapid Temperature Change</td>
<td>IEC 60115-1/IEC 60068-2-14 Test Na 50 cycles -55 °C to +155 °C</td>
<td>± (0.5 % + 0.05 Ω)</td>
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<td>Load Life</td>
<td>IEC 60115-1 1000 h (90/30) P\textsubscript{T} at 85 °C</td>
<td>± (0.5 % + 0.05 Ω)</td>
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Humidity (Steady State)

Vibration

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<th>PERFORMANCE</th>
<th>CONDITIONS</th>
<th>REQUIREMENTS</th>
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<td>REQUIREMENTS</td>
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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:

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

- P: Expressed in W
- \(\Delta T\): Difference between maximum working temperature and room temperature
- \(R_{\text{TH (j-c)}}\): Thermal resistance between maximum working temperature and room temperature
- \(R_{\text{TH (c-h)}}\): Thermal resistance measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component (see specifications environmental paragraph).
- \(R_{\text{TH (h-a)}}\): Thermal resistance 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.

Example:

- \(R_{\text{TH (c-a)}}\) for LPS 600 power dissipation 180 W at + 50 °C room temperature.
- \(\Delta T \leq 155 °C - 50 °C = 105 °C\)
- \(R_{\text{TH (j-c)}} + R_{\text{TH (c-h)}} + R_{\text{TH (h-a)}} = \frac{\Delta T}{P} = \frac{105}{180} = 0.58 °C/W\)
- \(R_{\text{TH (j-c)}} = 0.112 °C/W\)
- \(R_{\text{TH (c-h)}} + R_{\text{TH (h-a)}} = 0.58 °C/W - 0.112 °C/W = 0.468 °C/W\)
OVERLOADS
In any case the applied voltage must be lower than $U_L = 5000$ V.

Short time overload: $2 \times P_r/10$ 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

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
### ORDERING INFORMATION

<table>
<thead>
<tr>
<th>LPS MODEL</th>
<th>600 STYLE</th>
<th>100 kΩ RESISTANCE VALUE</th>
<th>± 1 % TOLERANCE</th>
<th>xxx CUSTOM DESIGN</th>
<th>BO15 PACKAGING</th>
<th>e LEAD (Pb)-FREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 1 %</td>
<td>± 2 %</td>
<td>± 5 %</td>
<td>± 10 %</td>
<td>Optional</td>
<td>on request: special TCR, shape etc.</td>
<td></td>
</tr>
</tbody>
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### GLOBAL PART NUMBER INFORMATION

- **GLOBAL MODEL**
  - **LPS 600**

- **DIELECTRIC**
  - **L** = dielectric strength 7 kV
  - **H** = dielectric strength 12 kV
  - **D** = partial discharge
    - ≤ 100 pC/7 kV
    - ≤ 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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