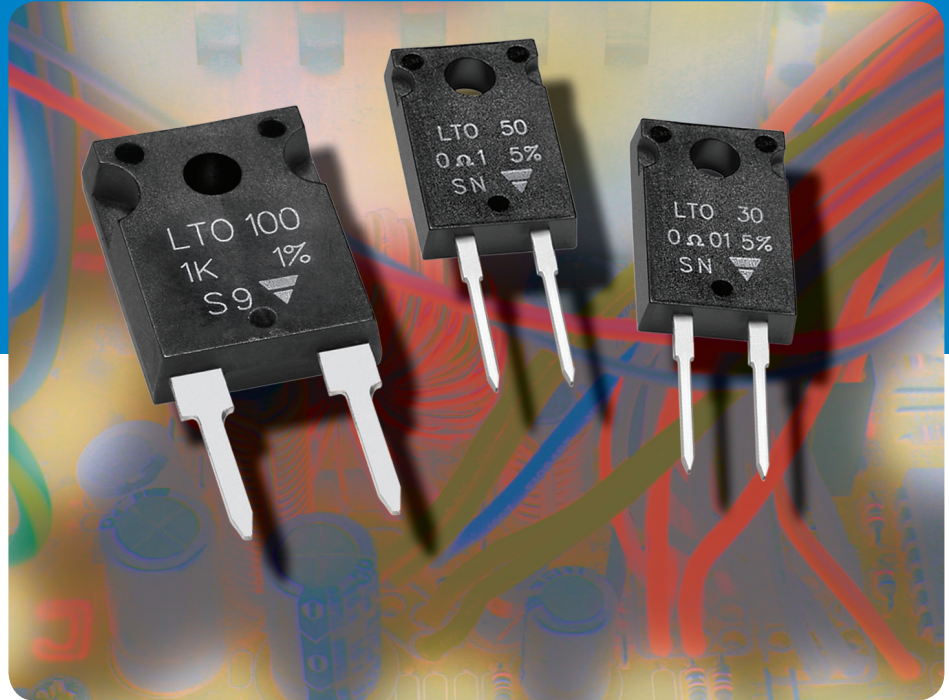




# THICK FILM POWER RESISTOR

LTO 30, LTO 50, LTO 100



## 30 W, 50 W, and 100 W Thick Film Power Resistor

### KEY BENEFITS

- Standard TO-220 and TO-247 packages
- Non-inductive
- Compact, low-profile 3.2 mm thickness
- Wide resistance range; low values available from R01 in 1 % tolerance
- Compliant to RoHS directive 2002/95/EC
- Direct mounting of exposed ceramic on heatsink

### APPLICATIONS

- Power conversion
- High-speed switching
- RF applications
- Current sensing

Datasheet is available on our web site at [www.vishay.com](http://www.vishay.com)  
 for LTO 30 - <http://www.vishay.com/doc?50049>  
 for LTO 50 - <http://www.vishay.com/doc?50050>  
 for LTO 100 - <http://www.vishay.com/doc?50051>

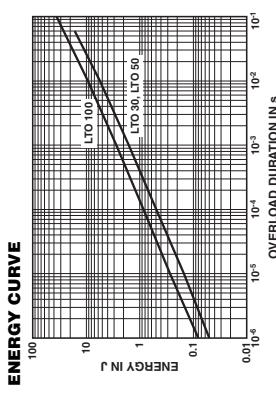
### 30 W, 50 W, and 100 W Power Resistor Thick Film Technology

#### FEATURE

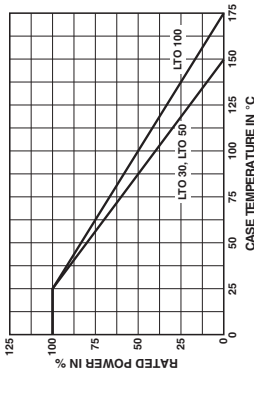
- 30 W, 50 W, and 100 W at 25 °C case temperature heatsink mounted
- Direct mounting ceramic on heatsink
- Broad resistance range: 0.010 Ω to 1 MΩ
- Non-inductive
- TO-220 and TO-247 package: Compact and easy to mount
- Compliant to RoHS directive 2002/95/EC



**OVERLOADS**  
In any case the applied voltage must be lower than the maximum overload voltage of 375 V (560 V for LTO 100). The values indicated on the graph below are applicable to resistors in air or mounted onto a heatsink.



**POWER RATING**  
The temperature of the case should be maintained within the limits specified.  
To improve the thermal conductivity, surfaces in contact should be coated with a silicone grease and the torque applied on the screw for tightening should be around 1 Nm.



#### CHOICE OF THE HEATSINK

The user must choose according to the working conditions of the component (power, room temperature). Maximum working temperature must not exceed 150 °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<sub>TH(j-c)</sub>: Thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component.

R<sub>TH(c-a)</sub>: Thermal resistance value measured between outer side of the resistor and room temperature. It is the thermal resistance of the heatsink itself (type, shape) and the quality of the fastening device, and the thermal resistance of the thermal compound.

#### Example:

R<sub>TH(j-c-a)</sub> for LTO 30 power rating 10 W at ambient temperature + 25 °C

Thermal resistance R<sub>TH(j-c)</sub>: 4.2 °C/W

Considering equation (1) we have:

$$\Delta T = 150 \text{ °C} - 25 \text{ °C} = 125 \text{ °C}$$

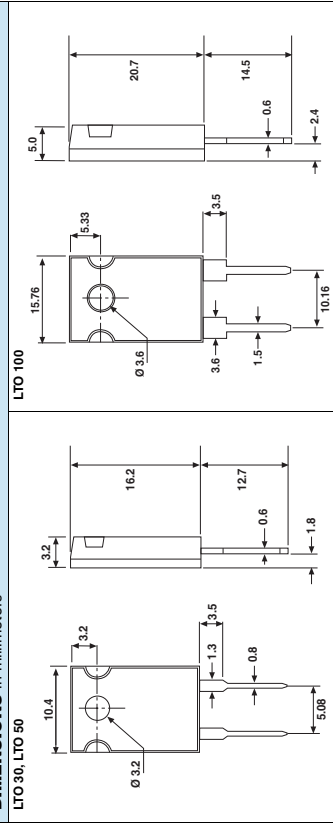
$$R_{TH(j-c)} + R_{TH(c-a)} = \frac{\Delta T}{P} = \frac{125}{10} = 12.5 \text{ °C/W}$$

$$R_{TH(c-a)} = 12.5 \text{ °C/W} - 4.2 \text{ °C/W} = 8.3 \text{ °C/W}$$

with a thermal grease R<sub>TH(c-h)</sub> = 1 °C/W, we need a heatsink with R<sub>TH(h-a)</sub> = 7.3 °C/W.

LTO series are the extension of RTO types. We used the direct ceramic mounting design (no metal tab) of our RCH power resistors applied to semiconductor packages.

#### DIMENSIONS in millimeters



Note

\* Tolerances unless stated: ± 0.3 mm

#### MECHANICAL SPECIFICATIONS

Mechanical Protection	Molded
Resistive Element	Thick film
Substrate	Alumina
Connections	Trimmed copper
Weight	2 g max. (3.5 g for LTO 100)
Mounting Torque	1 Nm

#### DIMENSIONS

Standard Package TO-220, TO-247 Isolated case

#### ENVIRONMENTAL SPECIFICATIONS

Temperature Range	- 55 °C to + 155 °C (- 55 °C to + 175 °C for LTO 100)
Climatic Category	55/155/56
Flammability	IEC 60695-11-5 2 applications: 30 s separated by 60 s

#### ELECTRICAL SPECIFICATIONS

Resistance Range	0.010 Ω to 1 MΩ
Tolerance (Standard)	± 1 % to ± 10 %
Dissipation and Associated	Onto a heatsink 30 W, 50 W, and 100 W at + 25 °C (case temp.) R <sub>TH(j-c)</sub> : 4.2 °C/W, 2.5 W at + 25 °C, Fre. 2.95 W, 2.5 W, 3.5 W at + 25 °C.
Power Rating and Thermal Resistance of the Component	150 ppm/°C, ± 250 ppm/°C, ± 700 ppm/°C, ± 900 ppm/°C, ± 150 ppm/°C
Temperature Coefficient	Standard 250 V, 375 V (for LTO 100)
Limiting Element Voltage U <sub>L</sub>	1500 V <sub>RMS</sub> - 1 min 10 mA max.
Dielectric Strength MIL-STD 202	≥ 10 <sup>6</sup> MΩ
Insulation Resistance	≤ 0.1 μH
Inductance	2.08 kΩ, 1.25 kΩ, 1.41 kΩ
Critical Resistance	

#### GLOBAL PART NUMBER INFORMATION

GLOBAL MODEL	LTO	SIZE	030 050 100	LEADS	F = Radial leads	OHMIC VALUE	The first four digits are significant figures and the last digit specifies the multiplier as follows: R designates decimal point. 48870 = 48.7 Ω 48701 = 48 700 Ω 10002 = 100 000 Ω R0100 = 0.01 Ω R4700 = 0.47 Ω 27000 = 27 000 Ω = 2.7 kΩ	TOLERANCE	F = 1 % G = 2 % J = 5 % K = 10 %	PACKAGING	T = Tube Tube 30 pieces (50 pieces for LTO-100)	LEAD (Pb)-FREE	E3 = Pure tin
L T O 0 0 3 0 0 F 2 7 0 0 0 J T E 3													

Revision 29-Jul-09

**DISCLAIMER** All product specifications and data are subject to change without notice. Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product. Vishay disclaims any and all liability arising out of the use or application of any product described herein or any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed herein, which apply to these products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Vishay products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Vishay for any damages arising or resulting from such use or sale. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications. Product names and markings noted herein may be trademarks of their respective owners.

For technical questions, contact [sfer@vishay.com](mailto:sfer@vishay.com)

Build Vishay into your Design