Vishay Sfernice



Power Resistor Thick Film Technology



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.

FEATURES

 50 Watt at 25 °C Case Temperature Heatsink Mounted



· Direct mounting ceramic on heatsink

• Broad Resistance Range: R010 to 550K

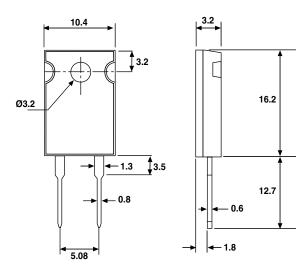
Non Inductive

• TO-220 package: Compact and easy to mount

· RoHS compliant

· Isolated case

DIMENSIONS in millimeters



[•] Tolerance unless otherwise specified: ± 0.3 mm

MECHANICAL SPECIFICATIONS

Mechanical ProtectionMoldedResistive ElementThick FilmSubstrateAluminaConnectionsTinned CopperWeight2 g max

Weight 2 g max.

Mounting Torque 1 N-m

DIMENSIONS

Standard Package TO-220 Isolated case

ENVIRONMENTAL SPECIFICATIONS

Temperature Range - 55 °C to + 150 °C

Climatic Category 55/155/56

ELECTRICAL SPECIFICATIONS				
Resistance Range	$0.010~\Omega$ to 550 k Ω			
Tolerances (Standard)	± 1 % to ± 10 %			
Dissipation and Associated	Onto a heatsink			
Power Rating	50 W at + 25 °C (case temperature)			
and Thermal Resistance	Rтн (j-c): 2.5 °C/W			
of the component	free air:			
	2.5 W at + 25 °C			
Temperature Coefficient	See Performance table			
Standard	± 150 ppm/°C			
Limiting Element Voltage	250 V			
Dielectric Strength MIL STD 202	1500 VRMS - 1 minute - 10 mA max.			
Insulation Resistance	$\geq 10^4 \text{ M}\Omega$			
Inductance	≤ 0.1 μH			
Critical Resistance	1.25 kΩ			



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PERFORMANCE						
TESTS	CONDITIONS	TYPICAL DRIFTS				
Momentary Overload	EN60115-1 1.5 Pr/5 s Us < 1.5 UL	± (0.5 % + 0.005 Ω)				
Rapid Temperature Change	rature Change $EN60115-1$ IEC 60068-2-14 Tests Na \pm (0.5 % + 0.005 Ω) \pm (0.5 % + 0.005 Ω) \pm (0.5 % + 0.005 Ω)					
Load Life	EN60115-1 1000 h Pr at + 25 °C	± (1 % + 0.005 Ω)				
Humidity (Steady State)	MIL STD 202 Method 103 B Cond. D	± (0.5 % + 0.005 Ω)				
Vibration	MIL STD 202 Method 204 Cond. D	± (0.2 % + 0.005 Ω)				
Terminal Strength	inal Strength $MIL STD 202$ Method 211 Cond. A1 $\pm (0.2 \% + 0.005 \Omega)$					
Shock 100G, MIL STD 202 Method 213 Cond. I		± (0.5 % + 0.005 Ω)				

SPECIAL FEATURES							
Resistance Values	≥ 0.010	≥ 0.015	≥ 0.1	≥ 0.5			
Tolerances	± 1 % at ± 10 %						
Typical Temperature Coefficient (- 55 °C/+ 150 °C)	cient ± 900 ppm/°C ± 700 ppm/°C ± 25		± 250 ppm/°C	± 150 ppm/°C			

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:

$$P = \frac{\Delta T}{[R_{TH} (j-c) + R_{TH} (c-a)]}$$
 (1)

P: expressed in W

 ΔT : difference between maximum working temperature and room temperature.

RTH: (j-c): thermal resistance value measured between resistive layer and outer side of the resistor. It is the thermal resistance of the component.

RTH: (c-a): thermal resistance value measured between outer side of the resistor and room temperature. It is the thermal resistance of the heatsink itself (type, shape), the quality of the fastening device, and the thermal resistance of the thermal compound.

Example

RTH: (c-a) for LTO50 power rating 10 W at ambient temperature + 25 °C.

Thermal resistance RTH (j-c): 2.5 °C/W

Considering equation (1) we have:

$$\Delta T = 150 \,^{\circ}\text{C} - 25 \,^{\circ}\text{C} = 125 \,^{\circ}\text{C}$$

RTH (j-c) + RTH (c-a) = $\frac{\Delta T}{P} = \frac{125}{10} = 12.5 \,^{\circ}\text{C/W}$

RTH (c-a) = 12.5 $^{\circ}\text{C/W} - 2.5 \,^{\circ}\text{C/W} = 10 \,^{\circ}\text{C/W}$

with a thermal grease R_{TH} (c - h) = 1 °C/W, we need a heat sink with R_{TH} (h - a) = 9 °C/W.

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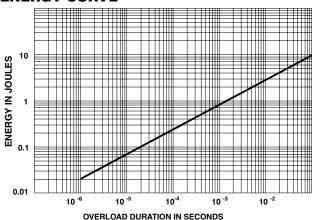
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OVERLOADS

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

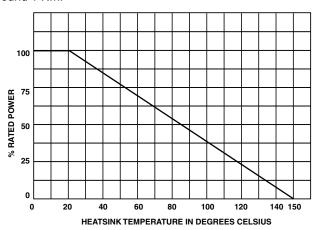
ENERGY CURVE



POWER RATING CHART

The temperature of the heatsink 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.



MARKING

Model, Style, Resistance Value (in Ω), Tolerance (in %), Manufacturing Date, VISHAY trademark

PACKAGING

Tube of 50 units

ORDERING INFORMATION								
LTO MODEL	50 STYLE	F CONNECTIONS	100 $\mathbf{k}\Omega$ RESISTANCE VALUE	± 1 % TOLERANCE	XXX CUSTOM DESIGN	TU50 PACKAGING	e3 LEAD (Pb)-FREE	
				± 1 % ± 2 % ± 5 % ± 10 %	Optional on request: special TCR, shape etc.			
SAP PART NUMBERING GUIDELINES								
	T MODEL Number L	O 0 ST	5 0 F YLE CONNECTION 3		0 0 2 SISTANCE VALUE	F T	E 3	

Legal Disclaimer Notice



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