Power Resistor, Thick Film Technology

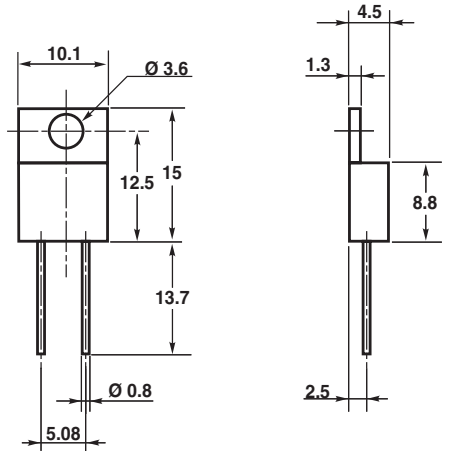
FEATURES

- 50 Watt at 25°C Heatsink Mounted
- Adjusted by sand trimming
- Leaded or surface mount versions
- High power to size ratio
- Non inductive element

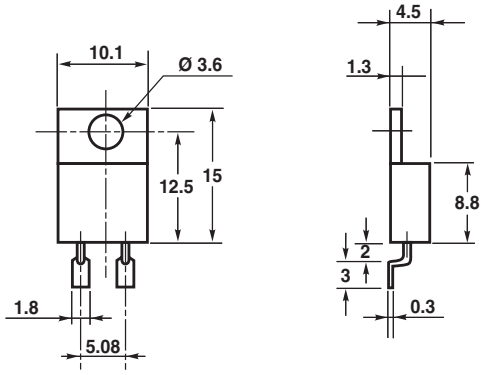
Because of the knowledge and experience in Thick Film technology, Vishay Sfernice has been able to develop a high power resistor in a TO 220 package called RTO 50. The special design of this component allows the dissipation of 50W when mounted on a heatsink. The ohmic value is adjusted by sand trimming. This process does not generate hot spots as in laser trimming, which could lead to microcracks on each side of the curve. This process improves the reliability and the stability of the resistor and at the same time gives a good overload capability.

DIMENSIONS in millimeters

RTO 50F - LEADED



RTO 50C - FOR SURFACE MOUNTING



• Tolerance unless otherwise specified: ± 0.4mm

MECHANICAL SPECIFICATIONS

Mechanical Protection	Molded
Resistive Element	Thick Film
Connections	Tinned copper alloy
Weight	2g max.

DIMENSIONS

Standard Package	TO 220 Insulated Case

ENVIRONMENTAL SPECIFICATIONS

Temperature Range	- 55°C to + 155°C
Climatic Category	55/155/156
Sealing	Sealed container Solder immersion

ELECTRICAL SPECIFICATIONS	
Resistance Range	0.010Ω to 1MΩ
Tolerances Standard	± 1% to ± 10%
Dissipation and Associated	Onto a heatsink
Thermal Resistance and Nominal Power	50W at + 25°C R_{TH} (j-c): 2.6°C/W free air: 2.25W at + 25°C
Temperature Coefficient	See Performance table
Standard	± 150ppm/°C
Limiting Element Voltage	300V
Dielectric Strength MIL STD 202 (301)	2000V_{RMS} - 1 Minute - 10mA Max
Insulation Resistance	≥ 10^6 MΩ
Inductance	≤ 0.1 µH
Critical Resistance	1.8 kΩ

PERFORMANCE		
TESTS	**CONDITIONS**	**TYPICAL DRIFTS**
Momentary Overload Us < 1.5UL	NF EN 140000 2Pr/5s	± (0.25% + 0.05Ω)
Rapid Temperature Change 5 cycles - 55°C to + 155°C	NF EN 140000 CEI 68214 Tests Na	± (0.5% + 0.05Ω)
Load Life	NF EN 140000 Pr at + 25°C CEI 115_1	± (1% + 0.05Ω)
Humidity (Steady State) Method 103 B Cond. D	MIL STD 202	± (0.5% + 0.05Ω)
Vibration Method 204 Cond. D	MIL STD 202	± (0.2% + 0.05Ω)
Terminal Strength Method 211 Cond. A1	MIL STD 202	± (0.2% + 0.05Ω)

SPECIAL FEATURES					
Resistance Values		≥ 0.010Ω	≥ 0.015Ω	≥ 0.1Ω	≥ 0.5Ω
Tolerances			± 1% at ± 10%		
Temperature Coefficient	**Standard**	± 900ppm/°C	± 700ppm/°C	± 250ppm/°C	± 150ppm/°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 155°C. The dissipated power is simply calculated by the following ratio:

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

P: expressed in W

T: 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: (Special Features Table)

R_{TH}: (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) and the quality of the fastening device.

Example:

R_{TH}: (c-a) for RTO 50 power rating 13 W at ambient temperature + 30°C.

Thermal resistance R_{TH} (j-c): 25°C/W

Considering equation (1) we have:

$\Delta T \leq 155°C - 30°C \leq 125°C$

$RTH\ (j\text{-}c) + RTH\ (c\text{-}a) = \frac{\Delta T}{P} = \frac{125}{13} = 9.6°C/W$

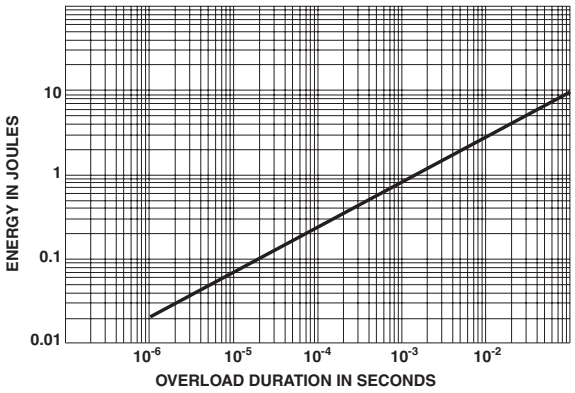
$RTH\ (c\text{-}a) \leq 9.6°C/W - 2.6°C/W \leq 7°C/W$

OVERLOADS

The applied voltage must always be lower than the maximum overload voltage of 450V.

The values indicated on the graph below are applicable to resistors in air or mounted onto a heatsink.

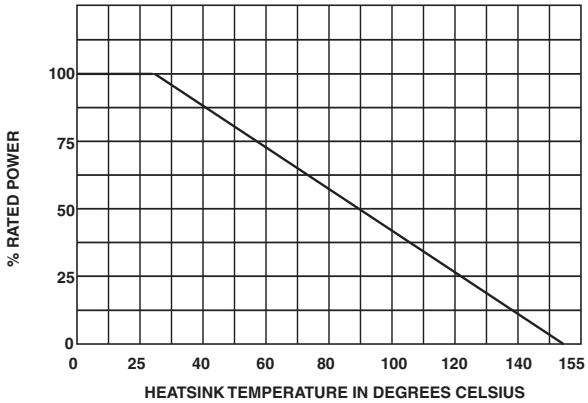
ENERGY CURVE



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 1Nm.



MARKING

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

PACKAGING

Tube of 50 units

ORDERING INFORMATION

RTO	50	F	100 k	± 1%	xxx
MODEL	STYLE	CONNECTIONS	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN
		F: Leaded C: Surface Mount		± 1% ± 2% ± 5% ± 10%	Optional on request: special TCR, shap, etc.

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