# Thick Film Power Resistor




## FEATURES

- AEC-Q200 qualified
- Cold system without external radiation
- High power / volume ratio
- Cooled by auxiliary heatsink (not supplied)
- Non-inductive
- Pre-applied phase change thermal interface PC-TIM (optional)
- Internal temperature monitoring with a NTC thermistor (optional)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS COMPLIANT

## LINKS TO ADDITIONAL RESOURCES

3D Models

## APPLICATIONS

- Automotive: precharge, discharge, and active discharge
- Industrial and AMS: power conversion and snubber

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | RESISTANCE RANGE Ω | MAX. RATED POWER $BC_{85\,°C}$ W | TOLERANCE (1) ± % | TEMPERATURE COEFFICIENT ± ppm/°C | E-SERIES OHMIC VALUES |
|---|---|---|---|---|---|
| ISOA | 10 to 220 | 200 | 10, 5 | 150 | E24 |
| | 220 to 1M | 200 | 10, 5 | 100 | E24 |

**Note**

(1) ± 2 % or ± 1 % on special request for limited resistance value and with reduction of maximum power and pulse rating (contact us for details)

## MECHANICAL SPECIFICATIONS

| | |
|---|---|
| UL 94 flame classifications | Housing and potting materials comply with UL 94 V-0 standard |
| Resistive element | Cermet |
| Substrate | Alumina |
| Encapsulation | Resin filled case |

## TECHNICAL SPECIFICATIONS

| PARAMETER | ISOA200 |
|---|---|
| Nominal power at 85 °C bottom case temperature | 200 W |
| Operating temperature range | -55 °C to +150 °C |
| Maximum operating voltage | 1500 V |
| Dielectric strength with all terminals connected as one pole | 4000 $V_{RMS}$ (50 Hz / 1 min) |
| Dielectric strength power resistor to NTC resistor | 1500 $V_{RMS}$ (50 Hz / 1 min) |
| CTI | > 600 |
| Creepage distance | > 4.2 mm |
| Clearance distance | > 3.6 mm |
| Insulation | ≥ 10 GΩ at 1000 $V_{DC}$ |
| Inductance | ≤ 50 nH |
| NTC characteristics (option) | Vishay NTCS0603E3103FLT www.vishay.com/ppg?29056 |
| Weight (max.) | < 16 g |



For technical questions, contact: mcbfixedresistors@vishay.com

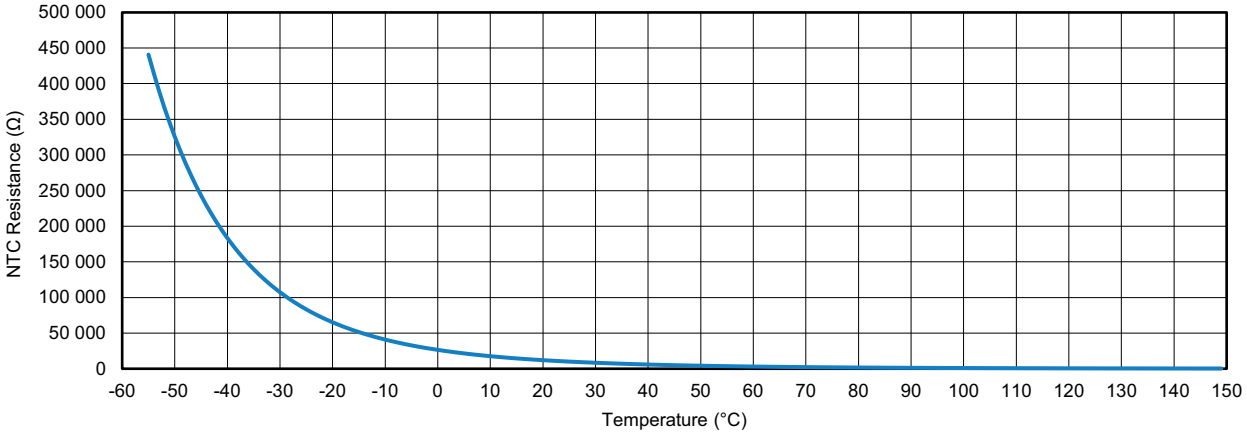
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| **PERFORMANCES** (AEC-Q200 Revision E Qualification Type Tests) | | |
|---|---|---|
| **TESTS** | **CONDITIONS** | **REQUIREMENTS** |
| High temperature exposure | MIL-STD-202 method 108<br>Condition: 1000 h at T = 155 °C.<br>Unpowered | ≤ ± (2 % + 0.1 Ω) |
| Temperature cycling | JESD22 method JA-104<br>1000 cycles (-55 °C to +125 °C) | ≤ ± (2 % + 0.1 Ω) |
| Biased humidity | MIL-STD-202 method 103<br>Condition: 1000 h 85 °C / 85 % RH | ≤ ± (5 % + 0.1 Ω) |
| Operational life | MIL-STD-202 method 108<br>Condition: D steady state $T_A$ = 85 °C<br>of bottom case at rated power 200 W<br>90' On / 30' off / 1000 h | ≤ ± (2 % + 0.1 Ω) |
| ESD | AEC-Q200-002<br>Condition: 6 kV to 25 kV | ≤ ± (0.5 % + 0.05 Ω) |
| Vibration | MIL-STD-202 method 204<br>Condition B: 10 *g*'s for 20 min for 1 cycle,<br>12 cycles each of 3 orientations (total of 36).<br>Test from 10 Hz to 2000 Hz | ≤ ± (0.5 % + 0.05 Ω) |
| Mechanical shock | MIL-STD-202 method 213 Fig. 1<br>Condition C: 100 *g*'s/6 ms 3.75 m/s<br>3 shock/direction, 2 directions along 3 axes<br>(18 shocks) | ≤ ± (0.5 % + 0.05 Ω) |
| Terminal strength (leaded) | MIL-STD-202 method 211<br>Test leaded device lead integrity only.<br>Conditions: A (2.27 kg) | ≤ ± (0.5 % + 0.05 Ω) |

**Note**

- All tests were done in Vishay MCB laboratories conditions

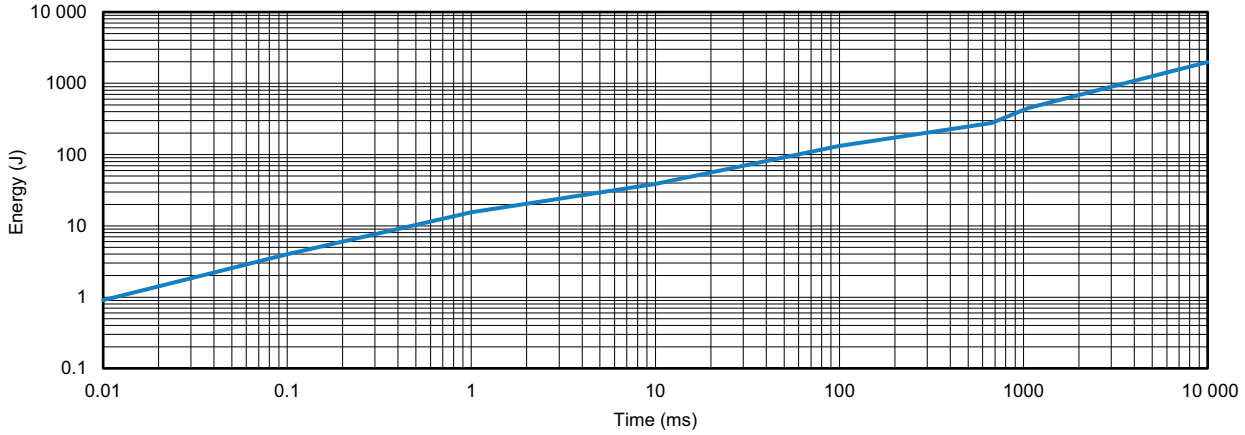
## RESISTANCE VALUE VS. TEMPERATURE FOR NTC0603E3103FLT



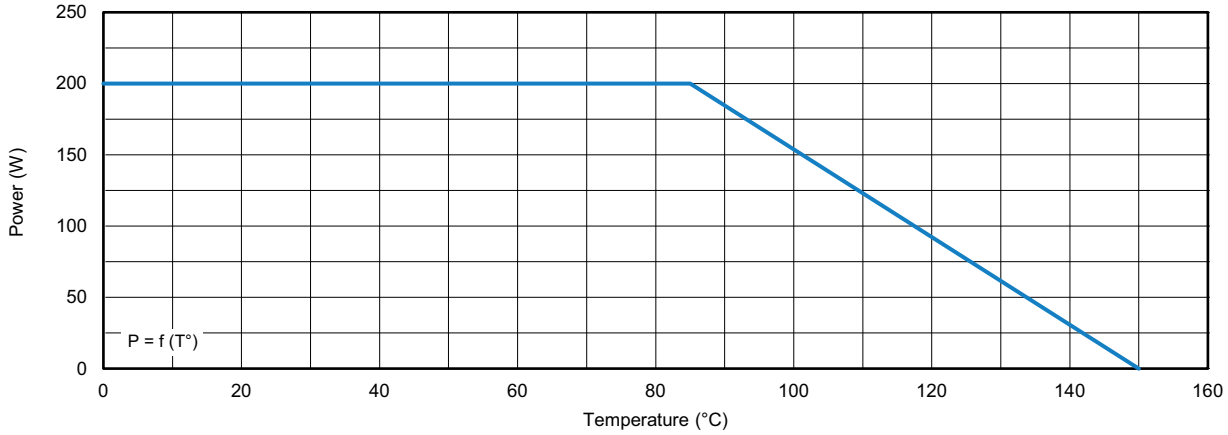


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## PULSE ENERGY

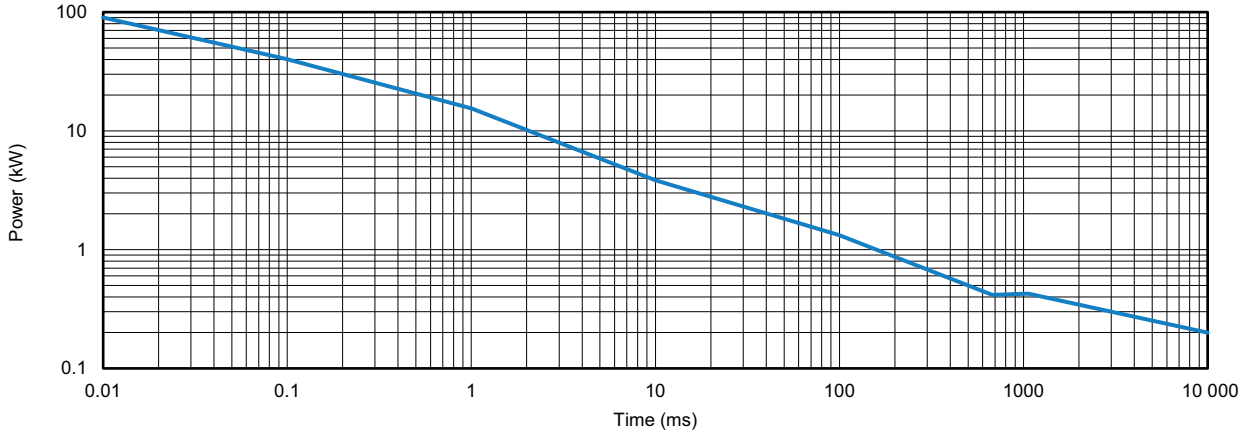



## POWER DISSIPATION




Permanent applicable power (W) as a function of bottom case temperature (°C)

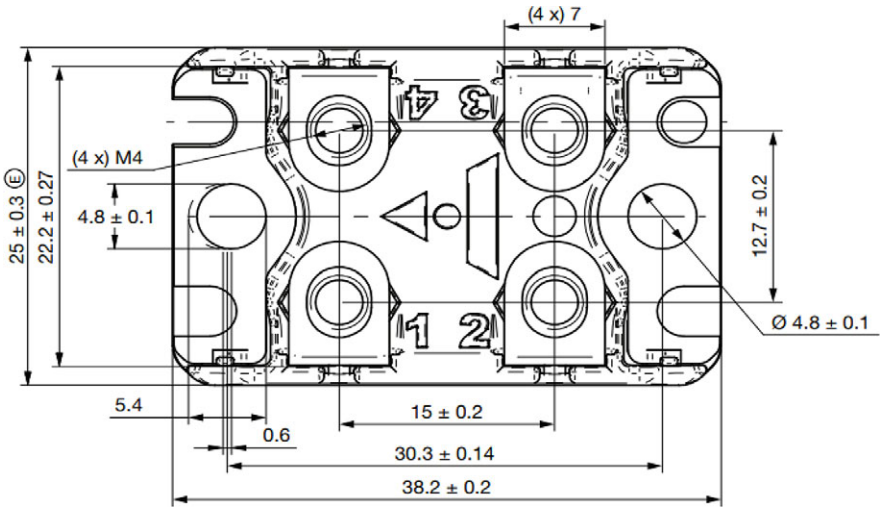
## POWER VS. TIME

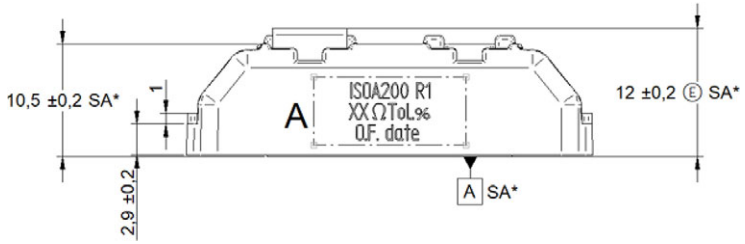




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## DIMENSIONS in millimeters

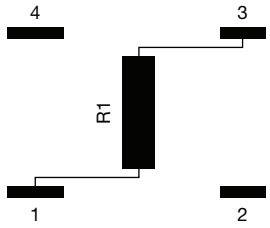
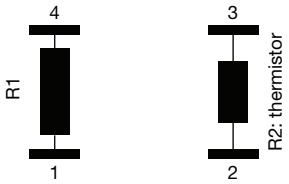



**Note**

(1) SA: under alumina

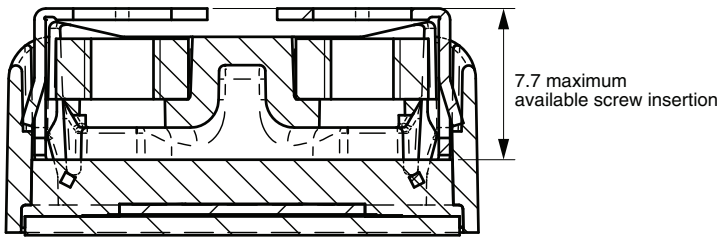
## INTERNAL CONFIGURATION

| CONFIGURATION R1 OR T1 | CONFIGURATION N1 OR NT |
|---|---|
|  |  |





## ASSEMBLY




| | |
|---|---|
| Tightening torque for mechanical fixation | 1.8 Nm ± 0.2 Nm |
| Tightening torque for electrical connections | 1.3 Nm ± 0.2 Nm |



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## STORAGE CONDITIONS

Parts shall be stored in a dry place from 0 °C to +40 °C at 80 % RH maximum.

## COOLING

The temperature of the heatsink may be maintained at the specified values with:

- Forced air ventilation or internal circulation of a liquid cooling
- Heatsink contact surface: < Ra 6.3 µ
- Evenness defect: 0.05 mm / 50 mm and 0.025 mm / 25 mm
- Surface temperature gradient (isotherm): 20 °C max.
- Thermal compound not supplied (resistance < 0.025 °C / W / 0.05 mm preconized)
- For mounting recommendations please contact wmcbfixedresistors@vishay.com

**Note**

- The user must select the thermal resistance of the heatsink according to the power applied

## ORDERING INFORMATION

| ISOA | 200 | R1 | 200 | 5 % | XXX | TU10 |
|---|---|---|---|---|---|---|
| MODEL | STYLE | CONFIGURATION | RESISTANCE VALUE | TOLERANCE | CUSTOM DESIGN | PACKAGING |
| | | Single resistor<br>or<br>Resistor and NTC | | ± 5 %<br>± 10 %<br>Other on request | | |

## GLOBAL PART NUMBER INFORMATION

| I | S | O | A | 2 | 0 | 0 | R | 1 | 2 | 0 | 0 | 0 | J | T | X | X | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | 2 | | | 3 | | 4 | | | | 5 | 6 | 7 | | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|
| TYPE | POWER | OPTIONS | OHMIC VALUE | TOLERANCE | PACKAGING | INDUSTRIALIZATION NUMBER |
| **ISOA** | **200 = 200 W** | **R1: 1 resistor only<br>N1: 1 resistor and NTC<br>T1: 1 resistor and TIM<br>NT: 1 resistor and NTC and TIM** | **The first three digits are significant figures and the last specifies the number of zeros to follow, R designates decimal point.<br>1301 = 1300 Ω** | **J = 5 %<br>K = 10 %<br>A = other on request** | **T = tube<br>10 pieces** | **3 specific digits (if applicable)** |



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