

## Thick Film Power Resistor With NTC (Optional)



### 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
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### LINKS TO ADDITIONAL RESOURCES



### APPLICATIONS

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

STANDARD ELECTRICAL SPECIFICATIONS					
MODEL	RESISTANCE RANGE $\Omega$ <sup>(1)</sup>	MAX. RATED POWER <i>BC</i> <sub>85 °C</sub> W	TOLERANCE <sup>(2)</sup> $\pm$ %	TEMPERATURE COEFFICIENT $\pm$ ppm/°C	E-SERIES OHMIC VALUES
ISOA	0.47 to 3	120	10, 5	300	E24
	3 to 220	120	10, 5	150	
	220 to 1M	120	10, 5	100	

#### Notes

- <sup>(1)</sup> Minimum value down to 0R1 available on request  
<sup>(2)</sup>  $\pm$  2 % or  $\pm$  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	ISOA
Nominal power at 85 °C bottom case temperature	120 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 <sub>RMS</sub> (50 Hz / 1 min)
Dielectric strength power resistor to NTC resistor	1500 V <sub>RMS</sub> (50 Hz / 1 min)
CTI	> 600
Creepage distance	> 4.2 mm
Clearance distance	> 3.6 mm
Insulation	$\geq$ 10 G $\Omega$ at 1000 V <sub>DC</sub>
Inductance	$\leq$ 50 nH
NTC characteristics (option)	Vishay NTCS0603E3103FLT Vishay NTC is AEC-Q200 qualified Temperature cycling test -55 °C / +150 °C "Resistance Value vs. Temperature" curve, see below
Weight (max.)	< 16 g

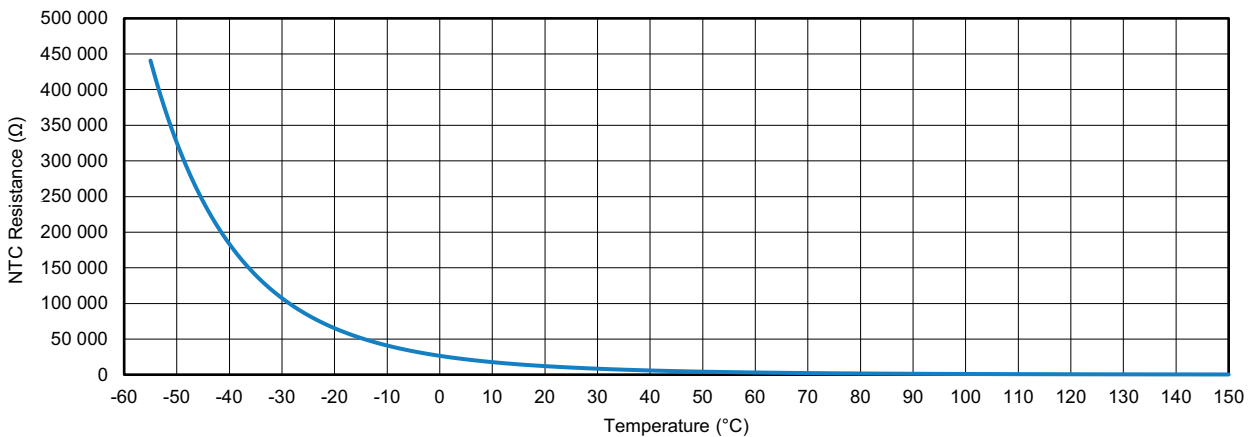


PERFORMANCES (AEC-Q200 Revision D Qualification Type Tests)		
TESTS	CONDITIONS	REQUIREMENTS
High temperature exposure	MIL-STD-202 method 108 Condition: 1000 h at T = 155 °C. Unpowered	$\leq \pm (2 \% + 0.1 \Omega)$
Temperature cycling	JESD22 method JA-104 1000 cycles (-55 °C to +125 °C)	$\leq \pm (2 \% + 0.1 \Omega)$
Biased humidity	MIL-STD-202 method 103 Condition: 1000 h 85 °C / 85 % RH, 10 % of operating power 10 W	$\leq \pm (5 \% + 0.1 \Omega)$
Operational life	MIL-STD-202 method 108 Condition: D steady state $T_A = 85 \text{ °C}$ of bottom case at rated power 120 W 90' On / 30' off / 1000 h	$\leq \pm (2 \% + 0.1 \Omega)$
ESD	AEC-Q200-002 Condition: 6 kV to 25 kV	$\leq \pm (0.5 \% + 0.05 \Omega)$
Vibration	MIL-STD-202 method 204 Condition B: 10 g's for 20 min for 1 cycle, 12 cycles each of 3 orientations (total of 36). Test from 10 Hz to 2000 Hz	$\leq \pm (0.5 \% + 0.05 \Omega)$
Mechanical shock	MIL-STD-202 method 213 Fig. 1 Condition C: 100 g's/6 ms 3.75 m/s 3 shock/direction, 2 directions along 3 axes (18 shocks)	$\leq \pm (0.5 \% + 0.05 \Omega)$
Terminal strength (lead)	MIL-STD-202 method 211 Test leaded device lead integrity only. Conditions: A (2.27 kg)	$\leq \pm (0.5 \% + 0.05 \Omega)$

Note

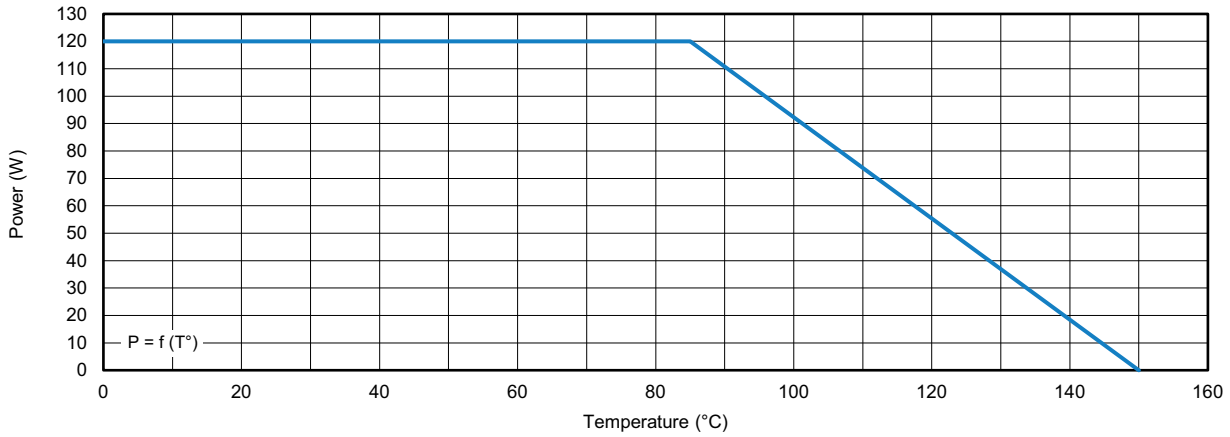
- All tests were done in Vishay MCB laboratories conditions

RESISTANCE VALUE VS. TEMPERATURE FOR NTCS0603E3103FLT



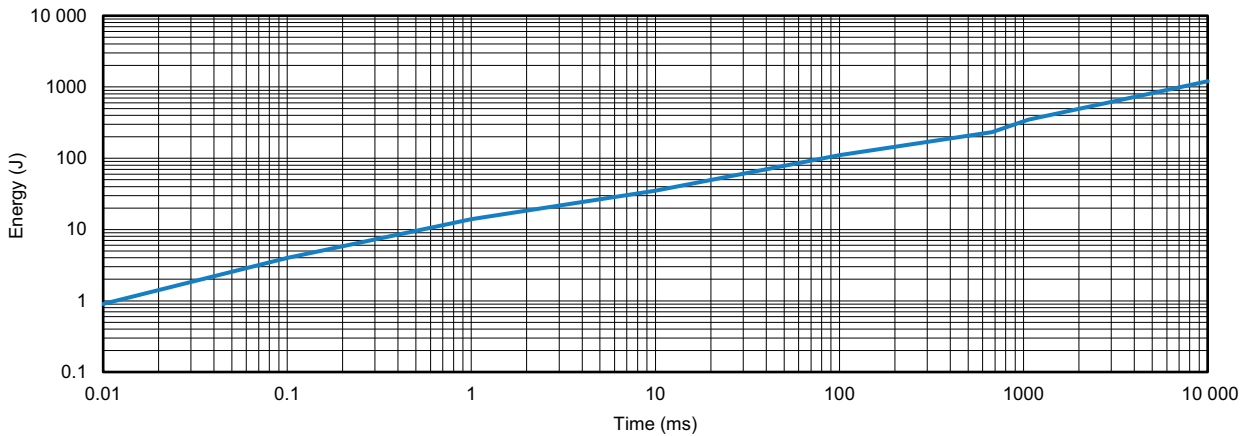


### POWER DISSIPATION

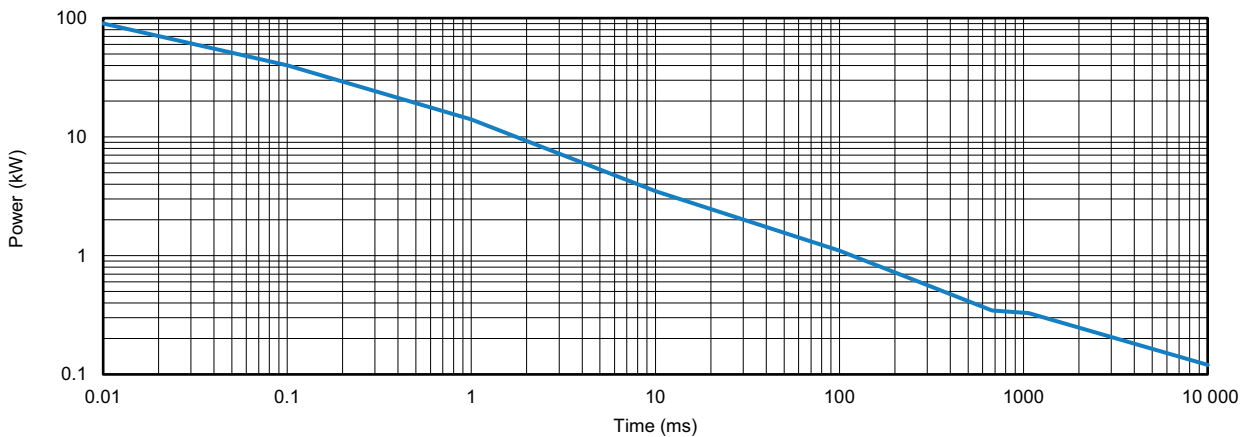


Permanent applicable power (W) as a function of bottom case temperature (°C)

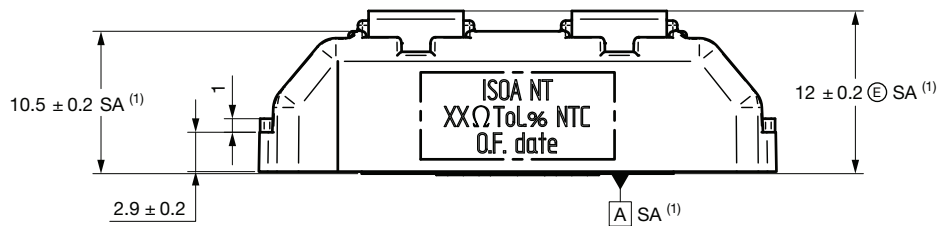
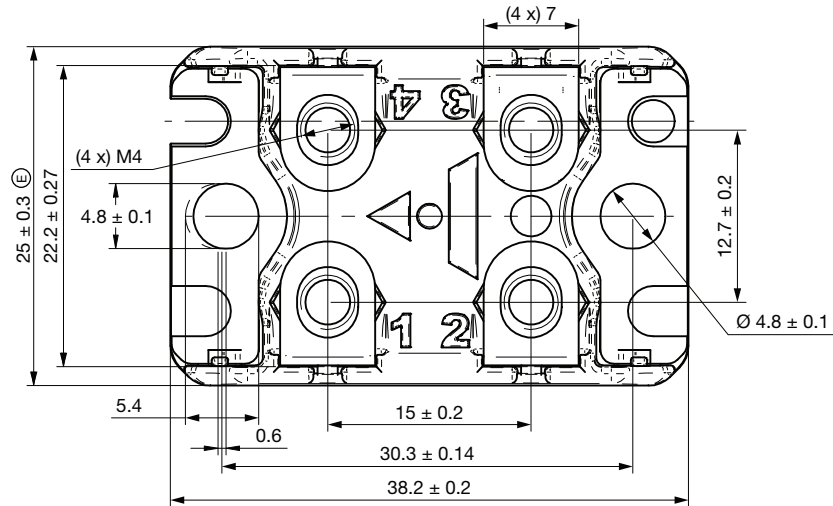
### PULSE ENERGY



### POWER VS. TIME



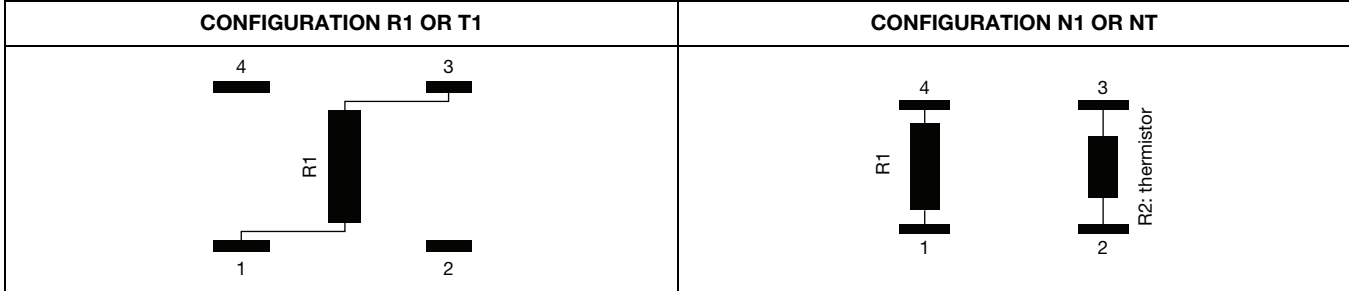
**DIMENSIONS** in millimeters



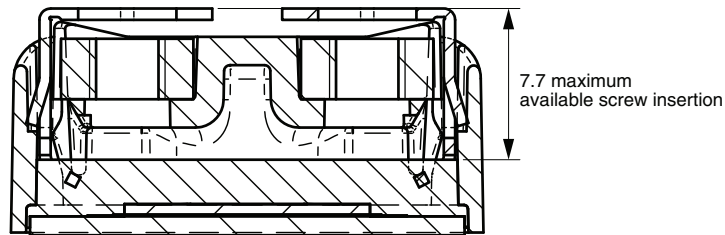
**Note**

(1) SA: under alumina

**INTERNAL CONFIGURATION**



**ASSEMBLY**



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



**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 see application notes [www.vishay.com/doc?32600](http://www.vishay.com/doc?32600) (without PC-TIM option) or [www.vishay.com/doc?32601](http://www.vishay.com/doc?32601) (with PC-TIM option)

**Note**

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

ORDERING INFORMATION						
ISOA	100	R1	1301	5 %	XXX	TU10
MODEL	STYLE	CONFIGURATION	RESISTANCE VALUE	TOLERANCE	CUSTOM DESIGN	PACKAGING
		Single resistor or Resistor and NTC		± 5 % ± 10 % Other on request		

GLOBAL PART NUMBER INFORMATION																	
I	S	O	A	1	0	0	R	1	1	3	0	1	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	100 = 120 W	R1: 1 resistor only N1: 1 resistor and NTC T1: 1 resistor and TIM 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. 1301 = 1300 Ω			J = 5 % K = 10 %	T = tube 10 pieces	3 specific digits (if applicable)							



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