

Thick Film Panel Mount Power Resistors

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RoHS
Compliant



100 Model



101 Model



102 / 103 Models



250 Model



250T Model



252 / 254 Models



600 Model



800 Model

Features

- Ideal for snubber and filter application
- Compact housed resistors with excellent heat conduction
- Must be used with external heatsink
- Molded housing which can withstand strong environmental conditions
- Optimized construction with high thermal conduction
- Large creep distance
- All internal electrical connections are welded
- Mounting M5 screws and washers are included

Applications

Thick Film Resistors are ideally suited in electrical filters and snubbers because of their low parasitic inductance and easy to use. Thick film resistors must be mounted on a heatsink to take full advantage of their power ratings. The base plate is electrically insulated. No additional insulation foil is required. Thermal grease is necessary to provide a good thermal contact between resistor base and heatsink. Recommended is a conductivity of 1W/mK or better. They are available in 4 housing types and 4 power ratings, ranging from 100W to over 800W.

Construction

Thick Film Resistors are produced by firing a special paste onto an alumina ceramic substrate. The electrical connections are tin welded to the thick film through copper wire, making a stable connection. The substrate on the bottom side has a metal finish to minimize partial discharge. The substrate is slightly outside the molded housing. When the housing is mounted to the heat sink, sufficient force for pressing the substrate to the heat sink is automatically applied. All materials are UL94-V0 listed.

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Mounting

The thick film resistors must be mounted on a heat sink. Between the heat sink and the resistor module, a thin layer of thermal grease must be applied (60-100 micrometers). Alternatively, high quality, thermal conductive, non-electrical insulating foils can be used. For proper mounting, please consult the mounting instructions. Mounting M5 screws and washers are included.

De-rating

The nominal power depends on the heat sink temperature. When the resistor is used at higher temperatures, the nominal power must be linearly de-rated. Graph 1 and 2 give the nominal power values for 100W and 250W, based on heatsink temperature. Graph 3 and 4 give the nominal power for 600W and 800W, based on resistor base temperature.

Heat sink requirements

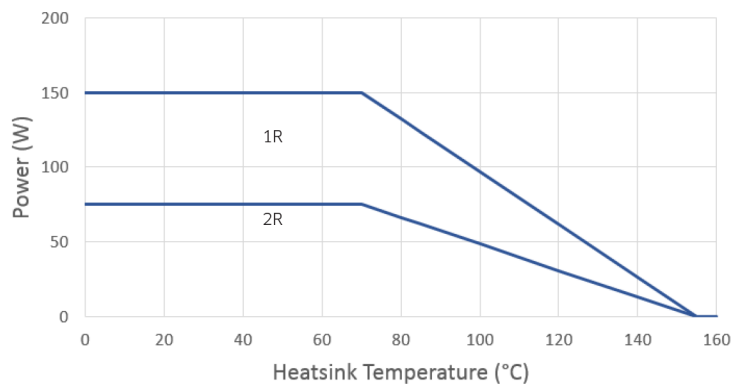
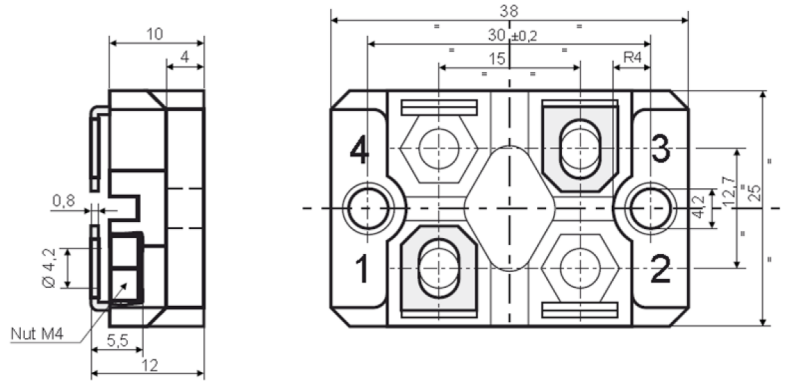
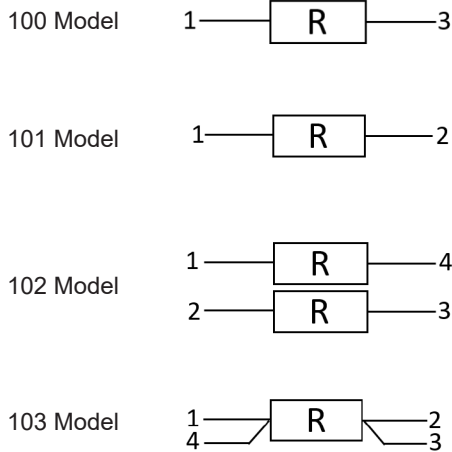
Depending on the total power which needs to be dissipated, a correct heat sink must be used. The maximum power the resistor can dissipate depends on the heat sink temperature and with that, on the thermal resistance of the heat sink and ambient temperature. The surface where the resistor will be mounted needs to be machined to a planarity of 50 micrometer and roughness of less than 6.3 micrometer.

General Specifications	Remark	100, 101, 102 & 103 Models
Power Rating	100 Model	100W
	102 Model	2 × 50W
Max Power	Not Trimmed	150W
Resistance Range	E12	1R0 to 100R
Tolerance	Standard	10%
Temperature Coefficient		±100ppm/K
Max Working Voltage		1500V AC
Working Temperature Range		-55°C to +155°C
Dielectric Strength	1 minute 50Hz	2500V AC
Insulation Resistance	@ 500V	> 10 ⁵ MΩ
Partial Discharge	On Request	< 80pC @ 2000V AC
Self Inductance		40nH
Capacitance to Heatsink		< 30pF
Overload	10s	2xPn
Thermal Resistance		0.5K/W
Heatsink Flatness		0.05mm
Heatsink Surface Finish		6.3µm
Max Torque for Contacts		1.2Nm
Max Torque for Mounting		1.5Nm
Weight	100 Model/101 Model	18g
	102 Model/103 Model	24g

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Configurations



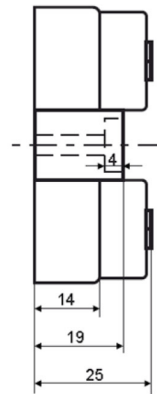
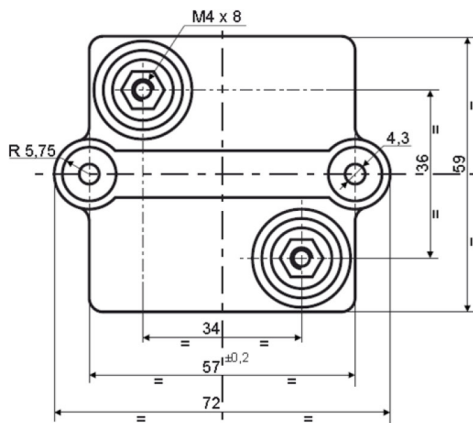
General Specifications	Remark	250, 250T, 252 & 254 Models
Power Rating	@ Heatsink 100°C	250W
Max Power	Not Trimmed @ 70°C	500W
Resistance Range	E12	1R0 to 100R
Tolerance	Standard	10%
Temperature Coefficient		±100ppm/K
Max Working Voltage		5000V AC
Working Temperature Range		-55°C to +155°C
Dielectric Strength	250 Model	7000V AC
	250T Model	12000V AC
Insulation Resistance	@ 500V	> 10 ⁵ MΩ
Creepage Distance	250 Model	42mm
	250T Model	65mm
Airgap Distance	250 Model	16mm
	250T Model	29mm
Partial Discharge		<10pC @ 5000V AC
Self Inductance		80nH

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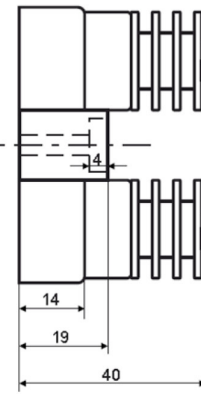
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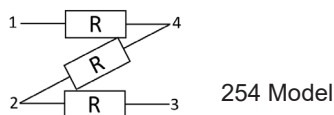
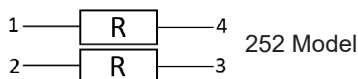
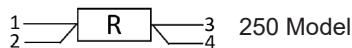
General Specifications	Remark	250, 250T, 252 & 254 Models
Capacitance to Heatsink		< 120pF
Overload	10s	4 × Pn
Thermal Resistance		0.15K/W
Heatsink Flatness		0.05mm
Heatsink Surface Finish		6.3µm
Max Torque for Contacts		2Nm
Max Torque for Mounting		2Nm
Weight	250 Model	100g
	250T Model	130g
Cable Terminals	Optional	



250 Model



250T Model



Heatsink Calculation

These resistors must be mounted on a heatsink to take full advantage of the power capability. The maximum thermal resistance of the heatsink can be calculated by the following formula:

$$P = \frac{\Delta T}{R_{TH j-c} + R_{TH c-h} + R_{TH h-a}}$$

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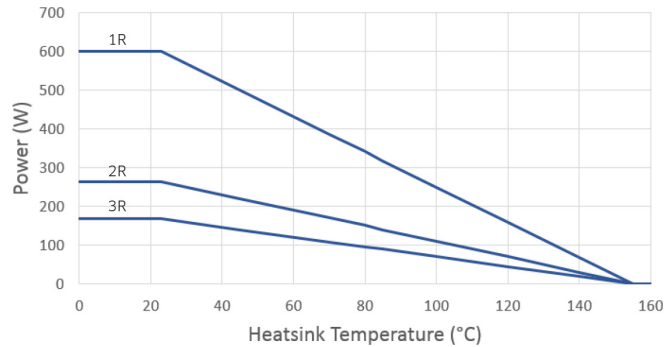
P is dissipated power in the resistor in Watts.

ΔT is the difference between maximum working temperature (155°C) and room temperature.

$R_{TH\ j-c}$ is the thermal resistance of the resistor between junction and case. 0.5K/W for 100 Model and 0.15K/W for 250 Model

$R_{TH\ c-h}$ is the thermal resistance between the base plate of the resistor and the heatsink This value is determined by the thickness and the properties of the paste, and the surface area size. Recommended is a paste with conductivity of 1W/mK or better.

$R_{TH\ h-a}$ is the thermal resistance of the heatsink to ambient. This value is given by the manufacturer of the heatsink.



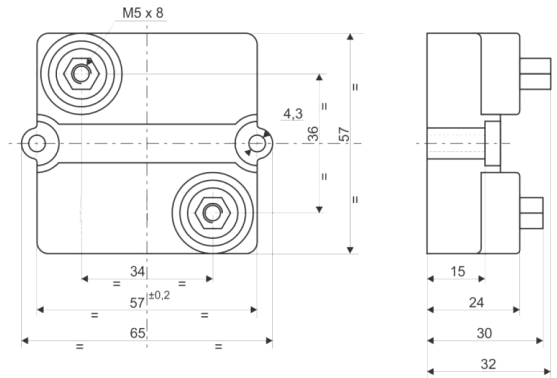
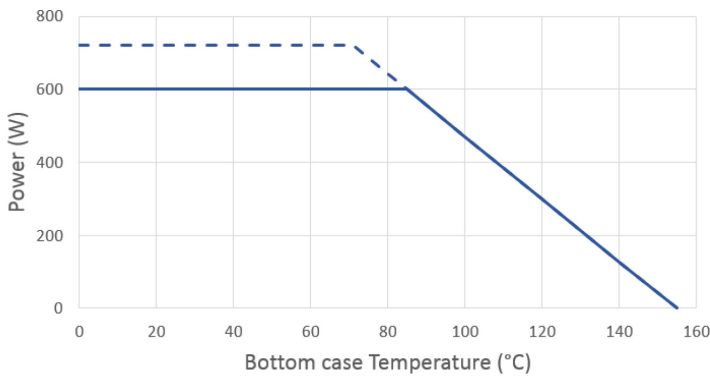
General Specifications	Remark	600 Model	800 Model
Power Rating	@ Bottom Base 85°C	600W	800W
Max Power		700W	950W
Resistance Range	E12	1R0 to 100K	
Tolerance	Standard	10%	
Temperature Coefficient		±100 ppm/K	
Max Working Voltage		5000V AC	
Working Temperature Range		-55°C - +155°C	
Dielectric Strength	Standard	7000V AC	
	On Request	12000V AC	
Insulation Resistance	@ 500V	> 10 ⁵ MΩ	
Creepage Distance		42mm	
Airgap Distance		16mm	
Partial Discharge		< 10pC @ 5000V AC	
Self Inductance		80nH	
Parallel Capacitance		40pF	
Capacitance to Heatsink		< 110pF	< 150pF
Overload	10s	1kW	
Thermal Resistance		0.115K/W	0.11K/W
Heatsink Flatness		0.05mm	
Heatsink Surface Finish		6.3µm	
Max Torque for Contacts		2Nm	
Max Torque for Mounting		2Nm	
Weight		95g	100g

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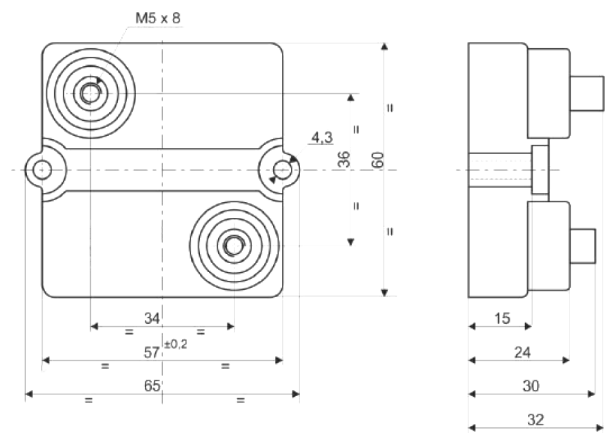
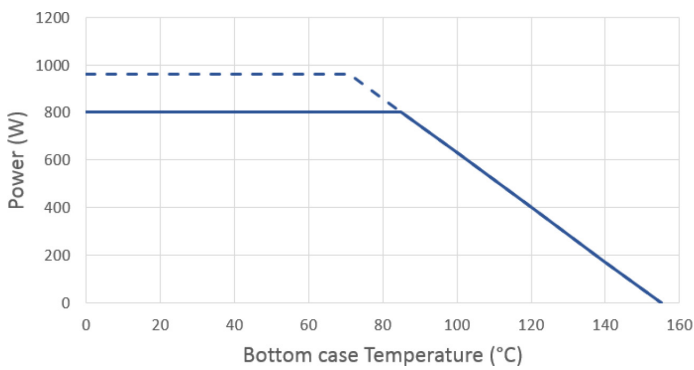
Pulse load / overload capability.

These resistors can be overloaded during a certain time. The energy the resistor can take is in relation to the duration of the overload. For repetitive overloads, a minimum cool down time must be observed before the resistor can take another pulse load.

600 Model



800 Model



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Part Number Table

Description	Models	Part Number
Power Resistor, Thick Film, 100W, 1R, 10%, Panel Mount	100	MP005151
Power Resistor, Thick Film, 100W, 10R, 10%, Panel Mount	100	MP005152
Power Resistor, Thick Film, 100W, 22R, 10%, Panel Mount	100	MP005153
Power Resistor, Thick Film, 100W, 47R, 10%, Panel Mount	100	MP005154
Power Resistor, Thick Film, 100W, 68R, 10%, Panel Mount	100	MP005155
Power Resistor, Thick Film, 100W, 100R, 10%, Panel Mount	100	MP005156
Power Resistor, Thick Film, 100W, 1R, 10%, Panel Mount	101	MP005157
Power Resistor, Thick Film, 100W, 10R, 10%, Panel Mount	101	MP005158
Power Resistor, Thick Film, 100W, 22R, 10%, Panel Mount	101	MP005159
Power Resistor, Thick Film, 100W, 47R, 10%, Panel Mount	101	MP005160
Power Resistor, Thick Film, 100W, 68R, 10%, Panel Mount	101	MP005161
Power Resistor, Thick Film, 100W, 100R, 10%, Panel Mount	101	MP005162
Power Resistor, Thick Film, 100W, 1R, 10%, Panel Mount	102	MP005163
Power Resistor, Thick Film, 100W, 10R, 10%, Panel Mount	102	MP005164
Power Resistor, Thick Film, 100W, 22R, 10%, Panel Mount	102	MP005165
Power Resistor, Thick Film, 100W, 47R, 10%, Panel Mount	102	MP005166
Power Resistor, Thick Film, 100W, 68R, 10%, Panel Mount	102	MP005167
Power Resistor, Thick Film, 100W, 100R, 10%, Panel Mount	102	MP005168
Power Resistor, Thick Film, 100W, 1R, 10%, Panel Mount	103	MP005169
Power Resistor, Thick Film, 100W, 10R, 10%, Panel Mount	103	MP005170
Power Resistor, Thick Film, 100W, 22R, 10%, Panel Mount	103	MP005171
Power Resistor, Thick Film, 100W, 47R, 10%, Panel Mount	103	MP005172
Power Resistor, Thick Film, 100W, 68R, 10%, Panel Mount	103	MP005173
Power Resistor, Thick Film, 100W, 100R, 10%, Panel Mount	103	MP005174
Power Resistor, Thick Film, 250W, 1R, 10%, Panel Mount	250	MP005175
Power Resistor, Thick Film, 250W, 10R, 10%, Panel Mount	250	MP005176
Power Resistor, Thick Film, 250W, 22R, 10%, Panel Mount	250	MP005177
Power Resistor, Thick Film, 250W, 47R, 10%, Panel Mount	250	MP005178
Power Resistor, Thick Film, 250W, 100R, 10%, Panel Mount	250	MP005179
Power Resistor, Thick Film, 250W, 1R, 10%, Panel Mount	250T	MP005180
Power Resistor, Thick Film, 250W, 10R, 10%, Panel Mount	250T	MP005181
Power Resistor, Thick Film, 250W, 22R, 10%, Panel Mount	250T	MP005182
Power Resistor, Thick Film, 250W, 47R, 10%, Panel Mount	250T	MP005183
Power Resistor, Thick Film, 250W, 100R, 10%, Panel Mount	250T	MP005184
Power Resistor, Thick Film, 250W, 1R, 10%, Panel Mount	252	MP005185
Power Resistor, Thick Film, 250W, 10R, 10%, Panel Mount	252	MP005186

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Description	Models	Part Number
Power Resistor, Thick Film, 250W, 22R, 10%, Panel Mount	252	MP005187
Power Resistor, Thick Film, 250W, 47R, 10%, Panel Mount	252	MP005188
Power Resistor, Thick Film, 250W, 100R, 10%, Panel Mount	252	MP005189
Power Resistor, Thick Film, 250W, 1R, 10%, Panel Mount	254	MP005190
Power Resistor, Thick Film, 250W, 10R, 10%, Panel Mount	254	MP005191
Power Resistor, Thick Film, 250W, 22R, 10%, Panel Mount	254	MP005192
Power Resistor, Thick Film, 250W, 47R, 10%, Panel Mount	254	MP005193
Power Resistor, Thick Film, 250W, 100R, 10%, Panel Mount	254	MP005194
Power Resistor, Thick Film, 600W, 1R, 10%, Panel Mount	600	MP005195
Power Resistor, Thick Film, 600W, 22R, 10%, Panel Mount	600	MP005196
Power Resistor, Thick Film, 600W, 50R, 10%, Panel Mount	600	MP005197
Power Resistor, Thick Film, 600W, 75R, 10%, Panel Mount	600	MP005198
Power Resistor, Thick Film, 600W, 100R, 10%, Panel Mount	600	MP005199
Power Resistor, Thick Film, 600W, 100K, 10%, Panel Mount	600	MP005200
Power Resistor, Thick Film, 800W, 1R, 10%, Panel Mount	800	MP005201
Power Resistor, Thick Film, 800W, 1.5R, 10%, Panel Mount	800	MP005202
Power Resistor, Thick Film, 800W, 10R, 10%, Panel Mount	800	MP005203
Power Resistor, Thick Film, 800W, 22R, 10%, Panel Mount	800	MP005204
Power Resistor, Thick Film, 800W, 50R, 10%, Panel Mount	800	MP005205
Power Resistor, Thick Film, 800W, 100R, 10%, Panel Mount	800	MP005206

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