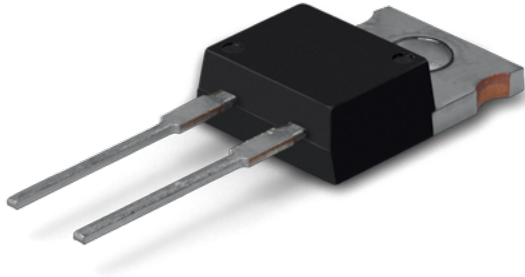


# Data Sheet for Precision Resistors

Power Resistor (thin film)

Series M220



- Power rating up to 50 Watt (with heat-sink)
- Resistance range from 0.01Ω..51kΩ
- Resistance tolerance ±1%
- TCR up to ±50ppm/°C
- TO-220 housing
- Low inductance (<10nH)

Electrical Specification	M220-2	M220-3	M220-5
Resistance range	0.02Ω..51kΩ	0.01Ω..51kΩ	0.02Ω..51kΩ
Resistance tolerance	±1%..±5%		
Power rating @ 25°C (0W @ +175°C)	20 W with heat-sink 1 W without heat-sink	35 W with heat-sink 1 W without heat-sink	50 W with heat-sink 1 W without heat-sink
Max. working voltage	500V or $\sqrt{P \cdot R}$		
TCR-rate	±50ppm/°C @ $R \geq 10\Omega$ ±100ppm/°C @ $0.1\Omega \leq R < 10\Omega$ ±250ppm/°C @ $R < 0.1\Omega$		
Working temperature range (max.)	-55 °C up to +175 °C		

## Mechanical Specification

Resistance technology / material	Thin film
Housing material	Epoxy moulded
Design	TO-220
Connections	Radial cooper tinned

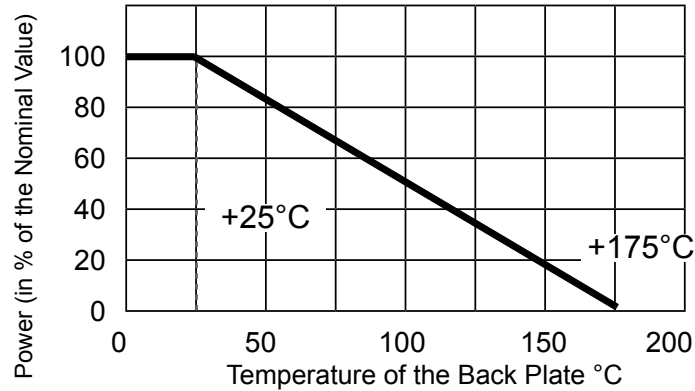
Parameters	Test Conditions	Specification $\Delta R$
Load life	90 min on, 30 min off, 1000h @25 °C	±1%
Moisture resistance	90..95% RH, 0,1W, 1000h @ 40 °C	±1%
Thermal shock	-55 °C 30 min., +155 °C 30min. 1000h	±0.25%
Resistance to soldering heat	350 °C, 3 sec.	±0.1%
Vibration	IEC60068-2-6	±0.25%
Dielectric strength: 2000 VAC		
Inductance: 8.38 nH (M220-2 / M220-3) / 9.65 nH (M220-5)		
Isolation resistance: >1 GΩ		
Thermal resistance: 4.9°C/W (M220-2) / 3.3°C/W (M220-3) / 2.3°C/W (M220-5)		

# Data Sheet for Precision Resistors

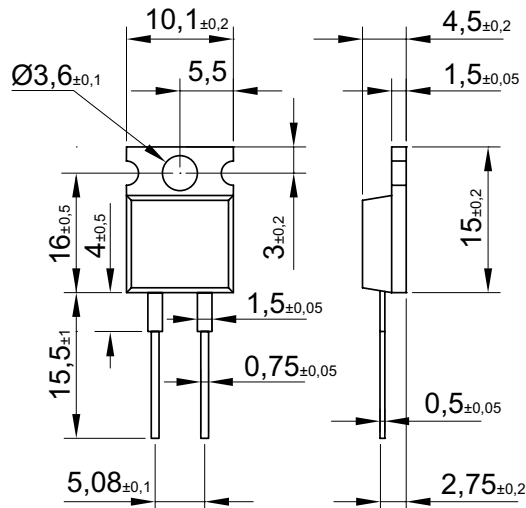
Power Resistor (thin film)

Series M220

## Power Derating Curve



## Technical Drawing



### Power Rating Notes:

The M220 series resistors have to be combined with a correctly dimensioned heat-sink. The internal temperature of the resistor should not exceed 175°C.

Formula for the calculation of an appropriate heat-sink:

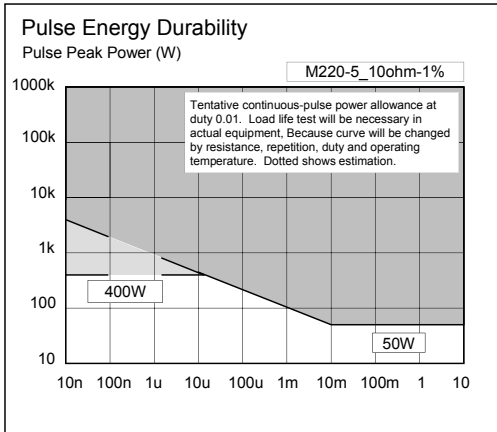
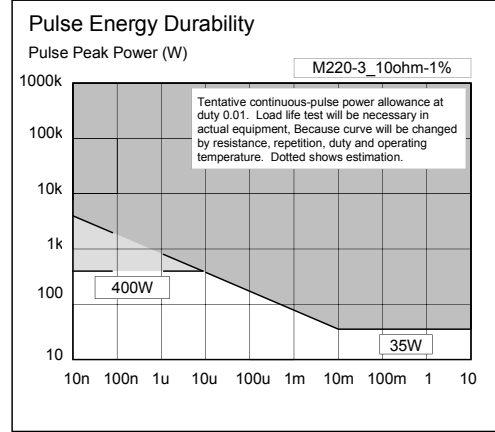
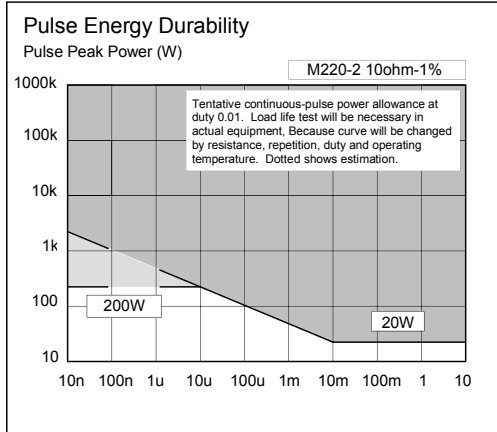
$$R_{\Theta H} = \frac{T_{\max} - (P \times R_{\Theta R}) - T_U}{P}$$

$R_{\Theta H}$	Thermal Resistance of the Heat-Sink (°C/W)
$R_{\Theta R}$	Thermal Resistance of the Resistor (°C/W)
$T_{\max}$	Maximum Temperature of the Resistor
$T_U$	Ambient Temperature of the Heat-Sink (°C)
$P$	Power applied to the Resistor (W)

### Mounting Notes:

The resistor must be attached to a suitable heat-sink. Mount resistor using thermal grease to a clean, flat surface. Use a compression washer to provide 665 to 1330N of mounting force. Torque mounting screw to 0,9 Nm. Back plate is isolated from both pins.

## Pulse Energy Durability



## Order code

Description					
<b>Series:</b>	<b>M220</b>				
<b>Power rating:</b>					
Type 2 @ 20W			-2		
Type 3 @ 35W			-3		
Type 5 @ 50W			-5		
<b>Resistance tolerance:</b>					
±1% @ R ≥ 0,1 Ω				W1%	
±5				W5%	
<b>Temperature coefficient:</b>					
±50ppm/°C @ R ≥ 10Ω					TK50
±100ppm/°C @ 0,1Ω ≤ R <10Ω					TK100
±250ppm/°C @ R < 0,1Ω					TK250
<b>Resistance value - please choose:</b>					
From 0,01Ω to ≤ 51kΩ					xxxkxxx

Order Example	Series	Power Rating	Resistance tolerance	Temperature coefficient	Resistance value
Choice	M220	20W	±1%	50ppm/°C	10,1kΩ
Code	M220	-2	W1%	TK50	10k100