

# Data Sheet for Precision Resistors

SMD Resistor (metal foil)

Series MMP/MMQ



MMQ



MMP

- SMD - Resistor
- Resistance value from 30Ω..60kΩ
- Resistance tolerance up to ±0,05%
- Standard TCR up to ±5ppm/°C (≥ ±1ppm/°C on request)
- Temperature range -65°C up to +175°C
- Tape on Reel Packaging or Bulk

Electrical Specification	MMP	MMQ
Resistance range	30Ω..30kΩ	30Ω..60kΩ
Resistance tolerance	±0.05%, ±0.1% (optional ±0.02%, ±0.01%)	
Power rating @ 125°C (0W @ +175°C)	0.1W	0.125W
Max. working voltage	50V	100V
Max. working current	350 mA	
TCR-rate	±5ppm/°C@ R =100Ω..30kΩ, ±10ppm/°C R =30..100Ω (±1ppm/°C on request)	±5ppm/°C@ R =100Ω..60kΩ, ±10ppm/°C R =30..100Ω (±1ppm/°C on request)
Working temperature range (max.)	-55 °C up to +125 °C (-65..+175°C)	

## Mechanical Specification

Resistance technology / material	Metal foil
Housing material	Epoxy moulded
Connections	Radial brass silver plated

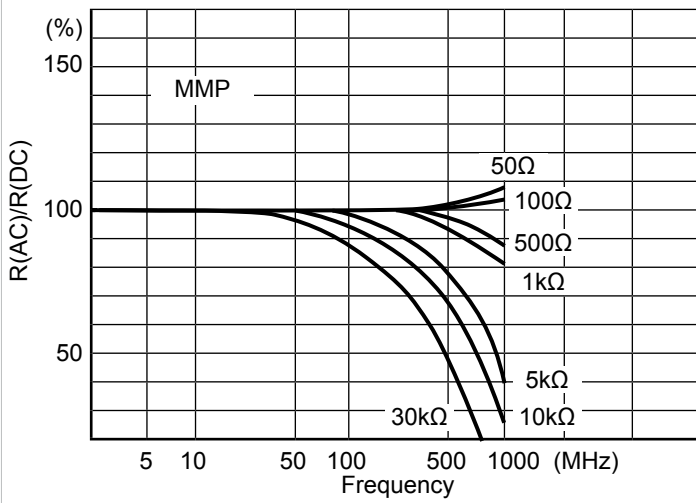
Parameters	Test Conditions	Specification
Short time overload	2.5 x rated voltage, 5 sec.	ΔR ±0.01%
Life span (biased)	125°C, rated power, 90 min. on 30 min. off, 2000 h	ΔR ±0.03%
High temperature / humidity	+65°C ..-10°C, 90..98% RH rated voltage, 10 cycles, 240h	ΔR ±0.03%
Temperature shock	-65°C (30 min.)..+175°C (30 min.), 5 cycles	ΔR ±0.01%
High temperature exposure	+175°C, no load 2000 h	ΔR ±0.03%
Resistance to soldering heat	260°C, 10 sec.	ΔR ±0.01%
Isolation resistance	100 VDC, 1 min.	>10000MΩ
Dielectric strength	200 VAC, 1 min.	ΔR ±0.005%
Low temperature operation	-65°C, 45 min. rated voltage	ΔR ±0.01%
Shock	100G, 6 ms, halfsine, X, Y, Z each 10 shocks	ΔR ±0.01%
High frequency vibration	20G, 10Hz to 2kHz to 10Hz, 20 min. X, Y, Z each 2.5 h	ΔR ±0.01%

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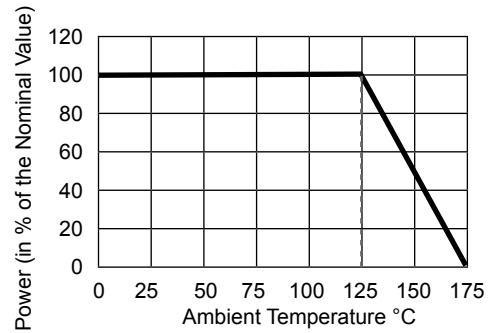
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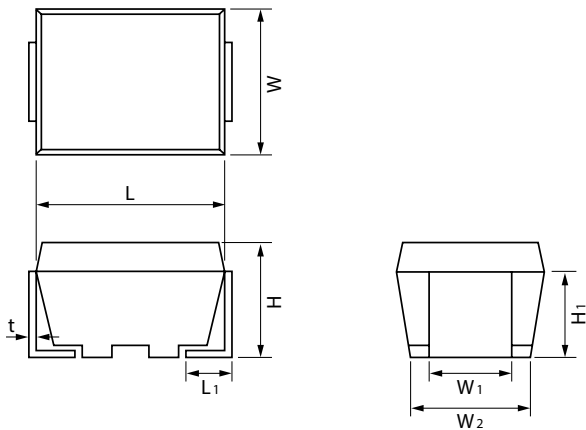
## Frequency Characteristics



## Power Derating Curve



## Drawing



Type	MMP	MMQ
L	3.2±0.2	4.5±0.2
W	2.5±0.2	3.2±0.2
H	2.0±0.2	
L <sub>1</sub>	0.6±0.2	0.8±0.2
W <sub>1</sub>	1.4±0.3	
W <sub>2</sub>	2.3±0.2	3.0±0.2
H <sub>1</sub>	1.5±0.3	
t	0.15±0.05	

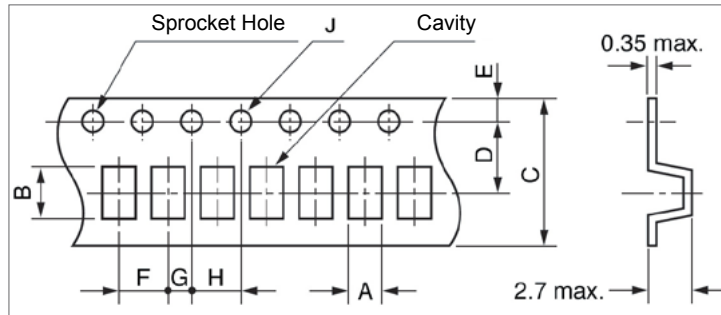
Dimensions in mm

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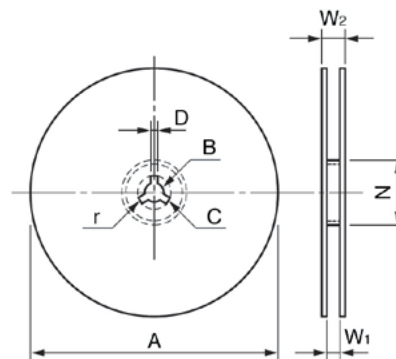
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## Tape Dimensions



Dimensions in mm	A	B	C	D	E	F	G	H	J
MMP	2.8 ±0.2	3.9 ±0.2	12 ±0.3	5.5 ±0.05	1.75 ±0.1	4 ±0.1	2 ±0.05	4 ±0.1	Ø1.5 ±0.1
MMQ	3.6 ±0.2	5.2 ±0.2	12 ±0.3	5.5 ±0.05	1.75 ±0.1	8 ±0.1	2 ±0.05	4 ±0.1	Ø1.5 ±0.1

## Reel Dimensions



Dimensions in mm	A	N	B	C	D	W <sub>1</sub>	W <sub>2</sub>	r
in mm	Ø178 ±0.2	Ø60 min	Ø13 ±0.5	Ø21 ±0.8	2 ±0.5	12.4 +2	18.4 max.	1 ±0.5

Packaging	MMP	MMQ
Reel Capacity	1200	800

## Processing and storage instructions

- Do not store in high temperatures (>40°C) high humidity (>70% RH).
- Hand Soldering: soldering temperature 240°C..265°C with soldering tip ≤ 3 mm
- Soldering furnace: max. temperature 250°C+0/-5°C, holding time max. 10sec.
- Dip Soldering: max. temperature of the soldering bath 260°C max. 10sec.
- After the different soldering methods an even cooling down has to be ensured. Avoid parts from any mech. stress.

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## Order code

Description	Selection: <b>standard=black/bold</b> , possible <i>options=grey/italic</i>			
<b>Series:</b> <b>MMP (max. 30kΩ)</b> <b>MMQ (max. 60kΩ)</b>	<b>MMP</b> <b>MMQ</b>			
<b>Resistance tolerance:</b> <b>±0.05% @ R ≤100Ω</b> <b>±0.1% @ R &gt;100Ω</b> <i>Option ±0.02 @ R &gt;100Ω</i> <i>Option ±0.01 @ R &gt;1kΩ</i>		<b>W0,05%</b> <b>W0,1%</b> <i>W0,02%</i> <i>W0,01%</i>		
<b>Temperature coefficient:</b> <b>±10ppm/°C @ R ≤100Ω</b> <b>±5ppm/°C @ R &gt;100Ω</b> <i>Option ±5ppm/°C &gt; TKx.x &gt; ±1ppm/°C</i> <i>Option ±1ppm/°C @ R ≥0.1...40kΩ for MMQ</i> <i>Option ±1ppm/°C @ R ≥1...20kΩ for MMP</i>			<b>TK10</b> <b>TK5</b> <i>TKx,x</i> <i>TK1</i> <i>TK1</i>	
<b>Resistance value - please choose:</b> <b>From 30Ω to ≤ see series</b>				<b>xxkxxx</b>

Order Example	Series	Resistance tolerance	Temperature coefficient	Resistance value
Choice	MMP	±0.1%	5ppm/°C	10.1kΩ
Code	MMP	W0.1%	TK5	10k100