

## Specifications Per

- IEC 60115-1
- EN 140401-803

## Features

- SMD enabled structure
- Anti-sulfuration test qualified
- Excellent solderability termination
- Excellent in heat dissipation than chip resistor
- Stronger mechanical structure to endure vibration and thermal shock
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

## DIMENSIONS

Type	Body Length (L, mm)	Cap Diameter (D1, mm)	Body Diameter (D2, mm)	Soldering Spot (B, mm)	Net Weight Per 1000 pcs
MM16P	3.52 ± 0.15	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.	17 grams
MM204P	3.52 ± 0.15	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.	17 grams
MM207P	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	80 grams
MM52P	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	80 grams

## GENERAL SPECIFICATIONS

Type	Power Rating At 70°C	Maximum Working Voltage*	Maximum Overload Voltage**	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
MM16P	1/6W	200V	400V	0.1Ω	100KΩ	±1%	E-96
						±2%, ±5%	E-48/E-24
MM204P	1/4W	200V	400V	0.1Ω	100KΩ	±1%	E-96
						±2%, ±5%	E-48/E-24
MM207P	1/3W	300V	500V	0.1Ω	330KΩ	±1%	E-96
						±2%, ±5%	E-48/E-24
MM52P	1/2W	300V	500V	0.1Ω	330KΩ	±1%	E-96
						±2%, ±5%	E-48/E-24

For a better life cycle under normal usage, 50% of the rated power is recommended.

For zero-ohm jumper, please see ZMM series. For 10~510mΩ please see CSM series.

Special sizes, values, and specifications not listed available on special order.

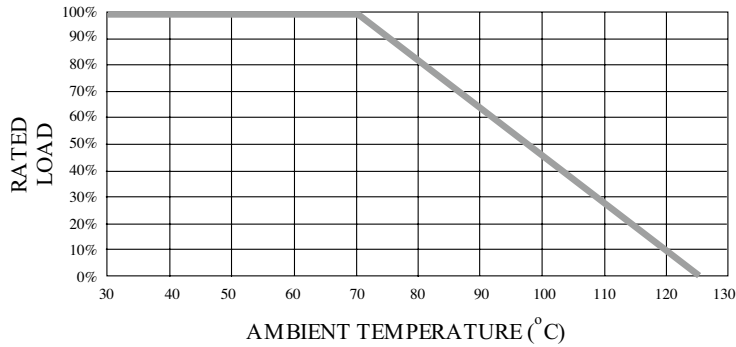
\* Rated Continuous Maximum Working Voltage (RCWV) should be determined from  $RCWV = \sqrt{\text{Power Rating} \times \text{Resistance Values Max.}}$  RCWV listed above.

\*\* Short-time Overload (STOL) test should be determined from  $STOL = 2.5 \times \sqrt{\text{Power Rating} \times \text{Resistance Values}}$  or maximum overload voltage listed above, whichever is lower.

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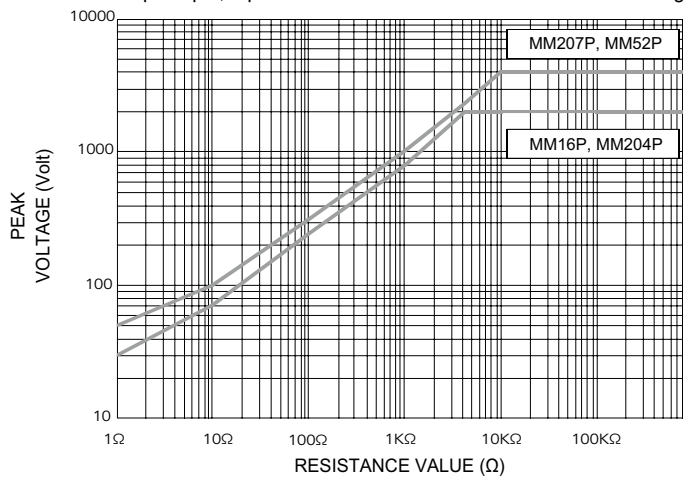
MM(P)

## POWER DERATING CURVE



## SURGE PERFORMANCE

Pulse load rating in accordance with IEC 60115-1, 4.27  
1.2µs/50µs ; 5 pulses at 12s interval for ±0.5% resistance change



## PART NUMBER

Example: MM52PJ10K0TKSTR2K0

MM52P	J	10K0	TKS	TR2K0
Type	Tolerance*	Resistance	TCR*	Packaging
	F (1%) G (2%) J (5%)	10KΩ <b>4-character code</b> containing - 3 significant digits 1 letter multiplier  <b>OHM MULTIPLIER</b> R = 1 K = 10 <sup>3</sup> M = 10 <sup>6</sup> G = 10 <sup>9</sup>	100ppm <b>3-character code</b>  TKR = ± 50ppm TKS = ± 100ppm	<b>5-character code</b>  TR = Tape Reel  (pieces per reel) <b>MM16P/MM204P</b> 3K0 = 3,000 pcs 6K0 = 6,000 pcs** 10K = 10,000 pcs**  <b>MM207P/MM52P</b> 2K0 = 2,000 pcs 6K0 = 6,000 pcs** 10K = 10,000 pcs**

\* Listed values may not be applicable across product types or to all resistance values. Please check with us before placing order.  
\*\* upon request

## TECHNICAL SUMMARY

Characteristics	Limits			
Dielectric Withstanding Voltage, VAC or DC	MM16P, MM204P: 200 MM207P, MM52P: 500			
Temperature Coefficient, PPM / °C*	±1%, ±2%		±50	
	±5%		±100	
Operating Temperature Range, °C	-55 ~ +125			
Film Temperature, °C	MM16P	MM204P	MM207P	MM52P
	125	125	125	140
Insulation Resistance, MΩ	>10 <sup>4</sup>			
Tin Whisker (JESD201 Temperature Cycling & High Temp. / Humidity Storage), μm	< 5			
Failure Rate in Time, pcs / 10 <sup>9</sup> device hours	<1			

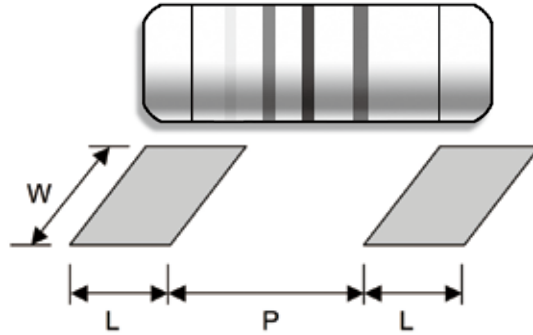
\* Not applicable to all resistance values. Please check with us regarding the PPM of specific resistance value(s).

## PERFORMANCE SPECIFICATIONS

Characteristics	Test Conditions	Limits
Short Time Overload	<b>IEC 60115-1 4.13</b> 5 seconds 2.5x rated voltage (not over max. overload voltage)	±(0.5%+0.01Ω)
Load Life In Humidity	<b>IEC 60115-1 4.24</b> 56 days rated load (not over max. working voltage) at (40±2)°C and (93±3)% relative humidity	±(1.5%+0.01Ω)
Load Life	<b>IEC 60115-1 4.25.1</b> Rated load (not over max. working voltage) 1,000 hours with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C	±(1.5%+0.01Ω)
Resistance To Soldering Heat	<b>IEC 60115-1 4.18.2</b> Dip the resistor into a solder bath measured (260±5)°C and hold it for a 10±1 seconds	±(0.5%+0.01Ω)
Solderability	<b>IEC 60115-1 4.17.2</b> Solder area covered after (235±3)°C/(2±0.2) seconds with flux applied	95% min.coverage
Vibration	<b>IEC 60115-1 4.22</b> Six hours in each parallel and axial direction with a simple harmonic motion having an amplitude of 1.52mm and 10 to 2,000 Hz.	±(0.25%+0.01Ω)
Thermal Endurance	<b>IEC 60115-1 4.25.3</b> 1000 hours at 125°C without load	±(1%+0.01Ω)
Thermal Shock	<b>IEC 60115-1 4.19</b> -55°C 30minutes, +125°C 30minutes, 5 cycles	±(0.5%+0.01Ω)

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■ SUGGESTED PAD LAYOUT



MM(P)

Type	Soldering Mode	Pad Length (L, mm, Min.)	Pad Spacing (P, mm)	Pad Width (W, mm, Min.)
MM16P MM204P	Reflow	1.3	1.6 ± 0.1	1.6
	Wave	1.5	1.5 ± 0.1	1.8
MM207P MM52P	Reflow	2.0	3.0 ± 0.1	3.0
	Wave	2.5	3.0 ± 0.1	3.0

For better heat dissipation / lower heat resistance, increase W & L.