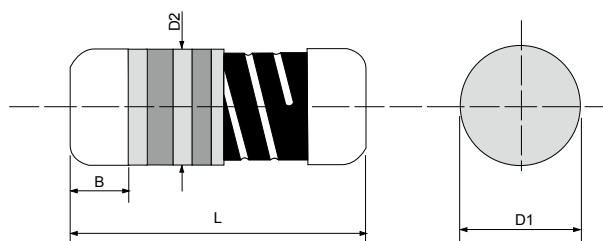


MMP – Metal Film MELF Precision Resistor

Quality • Reliability
Cost-Down via Innovation

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Specifications Per

- IEC 60115-1
- EN140401-803

Features

- SMD enabled structure
- Excellent solderability termination
- 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
MMP16	3.52 ± 0.08	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.	17 grams
MMP204	3.52 ± 0.08	1.35 ± 0.1	D1+0.02/ -0.15	0.6 Min.	17 grams
MMP207	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	66 grams
MMP52	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	66 grams
MMP101	5.90 ± 0.20	2.20 ± 0.1	D1+0.02/ -0.2	1.0 Min.	66 grams

GENERAL SPECIFICATIONS

Type	Power Rating (at 70°C)	Maximum Working Voltage (AC/DC)	Maximum Overload Voltage (AC/DC)	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
MMP16	1/6W	200V	400V	10Ω	1MΩ	± 0.5%	E-24/E192
				22Ω	510KΩ	± 0.25%	
				43Ω	510KΩ	± 0.1%	
MMP204	1/4W	200V	400V	10Ω	1MΩ	± 0.5%	E-24/E192
				22Ω	510KΩ	± 0.25%	
				43Ω	510KΩ	± 0.1%	
MMP207	1/3W	300V	500V	10Ω	1MΩ	± 0.5%	E-24/E192
				15Ω	1MΩ	± 0.25%	
				33Ω	1MΩ	± 0.1%	
MMP52	1/2W	300V	500V	10Ω	1MΩ	± 0.5%	E-24/E192
				15Ω	1MΩ	± 0.25%	
				33Ω	1MΩ	± 0.1%	
MMP101	1W	300V	500V	10Ω	1MΩ	± 0.5%	E-24/E192
				22Ω	1MΩ	± 0.25%	
				43Ω	1MΩ	± 0.1%	

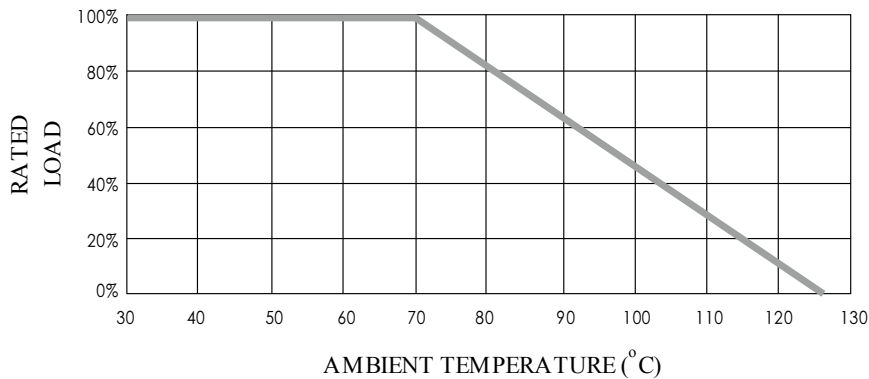
For zero-ohm jumper, please see ZMM series. For values between 10mΩ & 510mΩ, please see CSM series. Special sizes, values, and specifications not listed available on special order.

TECHNICAL SUMMARY

Characteristics	Ranges & Limits	
Operating Temperature Range, °C	-55 ~ +125	
Temperature Coefficient, PPM / °C*	±5, ±10, ±15, ±25, ±50 (See below for availability)	
Dielectric Withstanding Voltage, VAC or DC	MMP16, MMP204	300
	MMP207, MMP52, MMP101	500
Insulation Resistance, MΩ	>10 ⁴	
Film Temperature	MMP16, MMP204	MMP207, MMP52
	125°C	125°C
Failure Rate, pcs/10 ⁹ device hours	MMP16, MMP207	MMP204, MMP52, MMP101
	<1	<1.5
Tin Whisker (JESD201 Temperature Cycling & High Temp./Humidity Storage), μm	<5	

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

POWER DERATING CURVE



TEMPERATURE COEFFICIENT AVAILABILITY

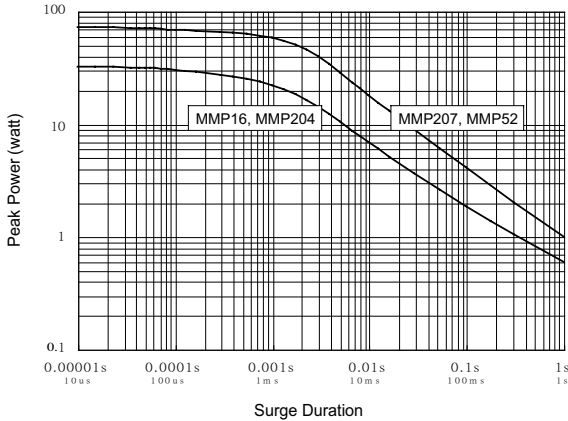
Specifications		Resistance Values Available				
TC	Tolerance	MMP16	MMP204	MMP207	MMP52	MMP101
±5 PPM / °C	±0.5%	100Ω~10KΩ		75Ω~15KΩ		
	±0.25%					
	±0.1%					
±10, ±15 PPM / °C	±0.5%	10Ω~510KΩ	10Ω~330KΩ	10Ω~750KΩ	10Ω~680KΩ	10Ω~680KΩ
	±0.25%	22Ω~510KΩ	22Ω~330KΩ	15Ω~680KΩ	15Ω~510KΩ	15Ω~510KΩ
	±0.1%	43Ω~510KΩ	43Ω~330KΩ	33Ω~680KΩ	33Ω~510KΩ	33Ω~510KΩ
±25 PPM / °C	±0.5%	10Ω~750KΩ		10Ω~1MΩ		
	±0.25%	22Ω~510KΩ		15Ω~1MΩ		
	±0.1%	43Ω~510KΩ		33Ω~1MΩ		
±50 PPM / °C	±0.5%	10Ω~1MΩ		10Ω~1MΩ		
	±0.25%	22Ω~510KΩ		15Ω~1MΩ		
	±0.1%	43Ω~510KΩ		33Ω~1MΩ		

MMP – Metal Film MELF Precision Resistor

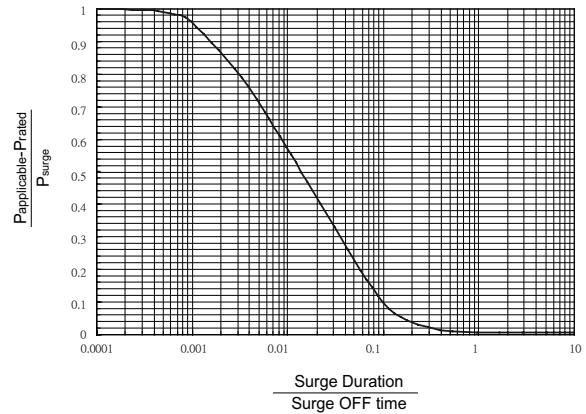
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■ SINGLE SURGE PERFORMANCE



■ SURGE POWER DERATING CURVE



Notes:

• SINGLE SURGE PERFORMANCE graph is good for NON REPETITIVE applications operating in an ambient temperature of 70°C or less. For temperatures above 70°C, the graph power must be derated further linearly down to zero at 125°C.

- To determine applicable surge power in continuous-surge applications:
 1. Identify allowable duration and peak power P_{surge} of single surge;
 2. Determine ratio of surge duration/surge OFF time in application;
 3. Calculate P_{applicable} backwardly according to Y-axis of SURGE POWER DERATING CURVE.

■ PART NUMBER

Example: MMP52B2K61TKQTR2K0

MMP52	B	2K61	TKQ	TR2K0
Type	Tolerance*	Resistance	TCR*	Packaging
	B (0.1%) C (0.25%) D (0.5%)	2.61KΩ 4-character code containing - 3 significant digits 1 letter multiplier OHM MULTIPLIER R = 1 K = 10 ³ M = 10 ⁶ G = 10 ⁹	25ppm 3-character code TKM = ± 5 ppm TKN = ± 10 ppm TKP = ± 15 ppm TKQ = ± 25 ppm TKR = ± 50 ppm	5-character code TR = Tape Reel (pieces per reel) MMP16/MMP204 3K0 = 3,000 6K0 = 6,000** 10K = 10,000** MMP207/MMP52/ MMP101 2K0 = 2,000 6K0 = 6,000** 10K = 10,000**

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

** upon request

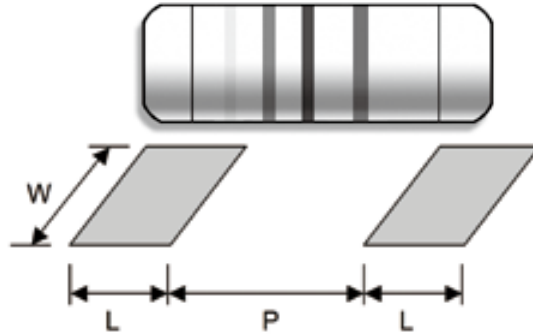
■ PERFORMANCE SPECIFICATIONS

Characteristics	Test Conditions	Limits	
Short Time Overload	IEC 60115-1 4.13 5 seconds 2.5x rated voltage (not over max. overload voltage)	± 0.25%	
Load Life	IEC 60115-1 4.25.1 Rated load (not over max. working voltage) 1,000 hrs with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C	10Ω to 332KΩ	±0.5%
		>332KΩ	±0.75%
Load Life In Humidity	IEC 60115-1 4.24 56 days rated load (not over max. working voltage) at (40±2)°C and (93±3)% relative humidity	10Ω to 332KΩ	±0.75%
		>332KΩ	±1.0%
Load Life In Humidity (accelerated mode)	IEC 60115-1 4.37 1,000 hours at 85°C and 85% relative humidity with 0.1x rated voltage (not over 100V)	10Ω to <10KΩ	±1.0%
		10KΩ to 332KΩ	±1.5%
		>332KΩ	±3.0%
Periodic Electric Overload	IEC 60115-1 4.39 3.9x rated voltage (not over max. overload voltage) with 0.1s ON, 2.5s OFF for 1,000 cycles	± 0.5%	
Resistance To Soldering Heat	IEC 60115-1 4.18.2 Dip the resistor into a solder bath measured (260±5)°C and hold it for a 10±1 seconds	± 0.5%	
Thermal Endurance	IEC 60115-1 4.25.3 1,000 hours without load	MMP16 MMP204 MMP207 MMP52	85°C ± 0.25%
			125°C ± 0.75%
		MMP101	85°C ± 0.5%
			125°C ± 1.0%
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +125°C 30minutes	5 Cycles	± 0.25%
		1,000 Cycles	± 1.0%
Single pulse high voltage overload	IEC 60115-1 4.27 Severity no.4 10 pulses of 10/700µs at 10x rated voltage (not over max. overload voltage) with interval of 60 sec.	± 0.5%	
Electrostatic discharge (Human body model)	IEC 60115-1 4.38 3 positive & 3 negative discharges with 2KV for MMP16 & MMP204 or 4KV for MMP207 & MMP52 & MMP101 (For continuous surge application please see Surge Performance paragraph)	± 1.0%	
Climatic test	IEC 60115-1 4.23 4.23.2 - dry heat: 16 hours 125°C 4.23.3 - damp heat: 24 hours 55°C with 95% relative humidity 4.23.4 - cold: 2 hours -55°C 4.23.5 - negative air pressure: 2 hour 8.5KPa at (25±10)°C 4.23.6 - damp heat cyclic: 5 days 55°C with 95% relative humidity 4.23.7 - DC load: rated voltage at -55°C and 125°C each 1 Min.	± 1.0%	
Solderability	IEC 60115-1 4.17.2 Solder area covered after (235±3)°C/(2±0.2) seconds with flux applied	95% min. coverage	
Vibration	IEC 60115-1 4.22 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.	± 1.0%	
Bending test	IEC 60115-1 4.33 Pressing depth 2mm, 3 times	± 0.25%	
Flammability	IEC 60115-1 4.35 Needle flame test 10s	No burning after 30s	

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■ SUGGESTED PAD LAYOUT



Type	Soldering Mode	Pad Length (L, mm, Min.)	Pad Spacing (P, mm)	Pad Width (W, mm, Min.)
MMP16 MMP204	Reflow	1.3	1.6 ± 0.1	1.6
	Wave	1.5	1.5 ± 0.1	1.8
MMP207 MMP52 MMP101	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.

■ COVER TAPE PEELING SPECIFICATION

Recommended peeling force: 50±5gf

