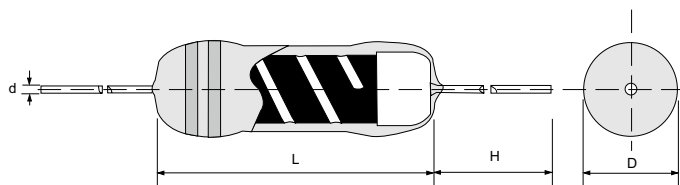


M-Series Metal Film Fixed Resistor

Quality • Reliability
Cost-Down via Innovation

M-Series



Specifications Per

• IEC 60115-1

• MIL-R-10509

Features

- Conformal multi-layer coating
- Color code per MIL & EIA standards
- Special tin-plated electrolytic copper lead wire
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

DIMENSIONS

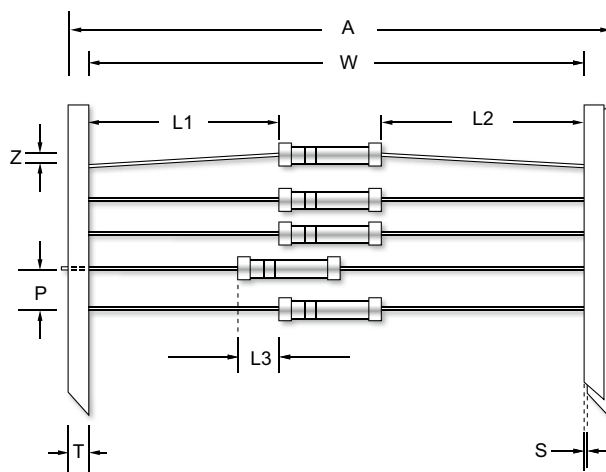
Type	Body Length (L, mm)	Body Diameter (D, mm)	Lead Wire Length (H, mm)	Lead Wire Diameter (d, mm)	Net Weight Per 1000Pcs
M16	3.20 ± 1.0	1.9 ± 0.2	28 ± 3.0	0.45 ± 0.02	145 Grams
M20	3.20 ± 1.0	1.9 ± 0.2	28 ± 3.0	0.45 ± 0.02	145 Grams
M25	6.50 ± 1.0	2.4 ± 0.2	26 ± 3.0	0.55 ± 0.03	220 Grams
M207	6.50 ± 1.0	2.4 ± 0.2	26 ± 3.0	0.55 ± 0.03	220 Grams
M51	9.00 ± 1.0	3.2 ± 0.2	26 ± 3.0	0.60 ± 0.03	340 Grams
M100	11.0 ± 1.0	4.5 ± 0.5	26 ± 3.0	0.70 ± 0.03	600 Grams
M200	15.5 ± 1.0	5.5 ± 0.5	26 ± 3.0	0.80 ± 0.03	1200 Grams

GENERAL SPECIFICATIONS

Type	Power Rating At 70°C	Maximum Working Voltage	Maximum Overload Voltage	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
M16	1/6W	200V	400V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				47Ω	510KΩ	±0.1%~0.5%	E-24/E-192
M20	1/4W	250V	400V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				47Ω	510KΩ	±0.1%~0.5%	E-24/E-192
M25	1/4W	250V	500V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				20Ω	1MΩ	±0.1%~0.5%	E-24/E-192
M207	3/5W	350V	700V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				20Ω	1MΩ	±0.1%~0.5%	E-24/E-192
M51	1/2W	350V	700V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				15Ω	1MΩ	±0.1%~0.5%	E-24/E-192
M100	1W	500V	1000V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				10Ω	1MΩ	±0.1%~0.5%	E-24/E-192
M200	2W	500V	1000V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				10Ω	1MΩ	±0.1%~0.5%	E-24/E-192

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

TAPING/PACKING SPECIFICATIONS

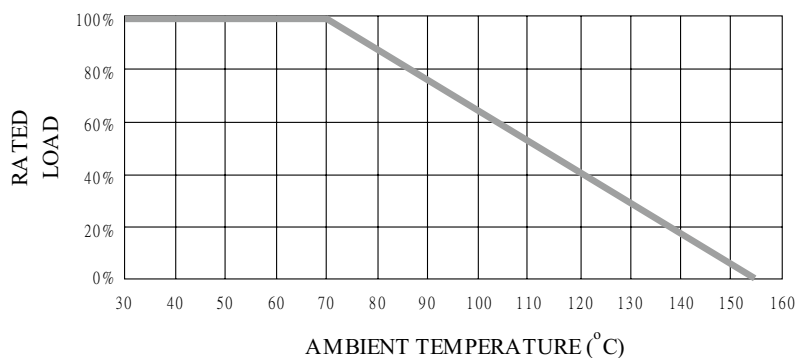


Unit (mm)

Type	A Max.	L1-L2 (Max.)	L3 (Max.)	P ±0.5	S (Max.)	T ±0.5	W ±1.5	Z (Max.)
M16	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M20	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M25	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M207	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M51	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M100	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M200	76	±1.5	1.0	10.0	0.8	6.0	63.5	1.2

Type	Packing Type	M16	M20	M25	M207	M51	M100	M200
Minimum Packing QTY (pcs)	Ammo pack	5000	5000	5000	5000	2000	1000	500

POWER DERATING CURVE



M-Series Metal Film Fixed Resistor

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■ PART NUMBER

Example: M51F49K9TKRTB2K0

M51	F	49K9	TKR	TB2K0
Type	Tolerance*	Resistance	TCR*	Packaging
	B (0.1%) C (0.25%) D (0.5%) F (1%) G (2%) J (5%)	49.9KΩ 4-character code containing - 3 significant digits 1 letter multiplier <u>OHM MULTIPLIER</u> R = 1 K = 10 ³ M = 10 ⁶ G = 10 ⁹	50ppm 3-character code TKQ = ± 25ppm TKR = ± 50ppm TKS = ± 100ppm	5-character code TB = Tape Box (pieces per box) <u>M16/20/25/207</u> 5K0 = 5,000 <u>M51</u> 2K0 = 2,000 <u>M100</u> 1K0 = 1,000 <u>M200</u> 500 = 500

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

■ TECHNICAL SUMMARY

Characteristics	Limits	
Dielectric Withstanding Voltage, VAC or DC	M16 / M20 M25 / M207 M51 M100 / M200	300 500 700 1000
Temperature Coefficient, PPM / °C*	±25, ±50, ±100	
Operating Temperature Range, °C	-55 ~ +155	
Insulation Resistance, MΩ	10 ⁴	

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

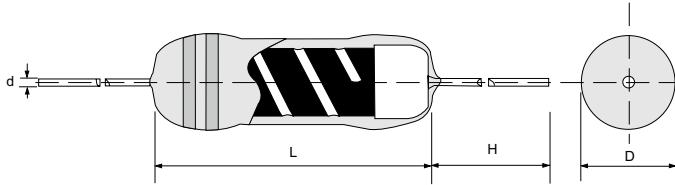
■ PERFORMANCE SPECIFICATIONS

Characteristics	Test Conditions	Limits
Short Time Over Load	IEC 60115-1 4.13 5 seconds 2.5x rated voltage (not over max. overload voltage)	±0.2%
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	±0.75%
Load Life	IEC 60115-1 4.25.1 Rated load (not over max. working voltage) 1,000 hours with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C	±0.75%
Resistance To Soldering Heat	IEC 60115-1 4.18.2 Leads immersed till 3mm from the body in (260±5)°C solder for 10±1 seconds	±0.2%
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 0.75mm and 10 to 500 Hz.	±0.1%
Thermal Endurance	IEC 60115-1 4.25.3 1000 hours at 155°C without load	±0.2%
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +155°C 30minutes, 5 cycles	±0.2%

M-Series (S) MINIATURE SIZE Metal Film Fixed Power Resistor

Quality • Reliability
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M-Series



Specifications Per

- IEC 60115-1
- MIL-R-10509

Features

- Conformal multi-layer coating (flame proof coating available)
- Color code per MIL & EIA standards
- Special tin-plated electrolytic copper lead wire
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

DIMENSIONS

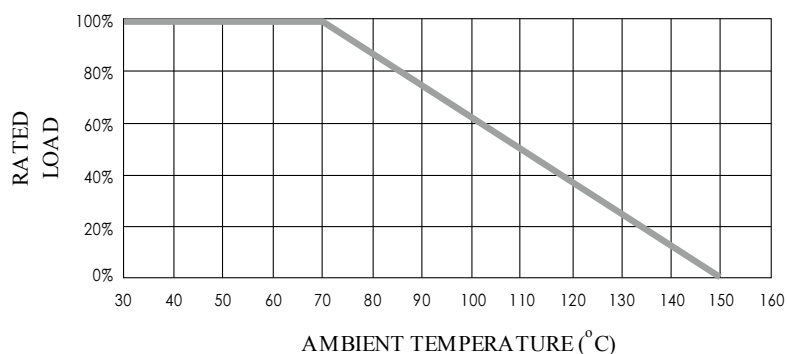
Type	Body Length (L, mm)	Body Diameter (D, mm)	Lead Wire Length (H, mm)	Lead Wire Diameter (d, mm)	Net Weight Per 1000Pcs
M100S	9.00 ± 1.0	3.2 ± 0.2	26 ± 3.0	0.60 ± 0.03	340 Grams
M200S	11.0 ± 1.0	4.5 ± 0.5	26 ± 3.0	0.70 ± 0.03	600 Grams
M300S	15.5 ± 1.0	5.5 ± 0.5	26 ± 3.0	0.80 ± 0.03	1200 Grams

GENERAL SPECIFICATIONS

Type	Power Rating At 70°C	Maximum Working Voltage	Maximum Overload Voltage	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
M100S	1W	350V	700V	1Ω	1MΩ	±1%	E-24/E-96
M200S	2W	500V	1000V	1Ω	1MΩ	±1%	E-24/E-96
M300S	3W	500V	1000V	1Ω	1MΩ	±1%	E-24/E-96

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

POWER DERATING CURVE



M-Series (S) MINIATURE SIZE Metal Film Fixed Power Resistor

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■ PART NUMBER

Example: M100SF10K0TKSTB2K0

M100S	F	10K0	TKS	TB2K0
Type	Tolerance	Resistance	TCR*	Packaging
	F (1%)	10KΩ 4-character code containing - 3 significant digits 1 letter multiplier <u>OHM MULTIPLIER</u> R = 1 K = 10 ³ M = 10 ⁶ G = 10 ⁹	100ppm 3-character code TKR = ± 50ppm TKS = ± 100ppm	5-character code TB = Tape Box (pieces per box) <u>M100S</u> 2K0 = 2,000 <u>M200S</u> 1K0 = 1,000 <u>M300S</u> 500 = 500

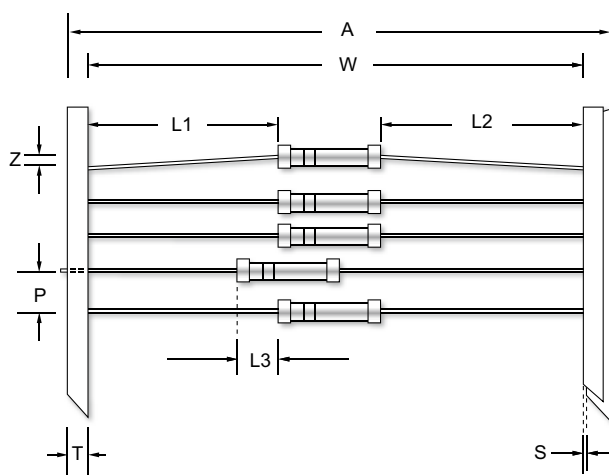
* Listed values may not be applicable across product types or to all resistance values. Please check with us before placing order.

■ TECHNICAL SUMMARY

Characteristics	Limits	
Dielectric Withstanding Voltage, V AC or DC	M100S M200S / M300S	700 1000
Temperature Coefficient, PPM / °C*	±50, ±100	
Operating Temperature Range, °C	-55~+150	
Insulation Resistance, MΩ	10 ⁴	

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

TAPING/PACKING SPECIFICATIONS



Unit (mm)

Type	A Max.	L1-L2 (Max.)	L3 (Max.)	P ±0.5	S (Max.)	T ±0.5	W ±1.5	Z (Max.)
M100S	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M200S	65	±1.0	0.5	5.0	0.8	6.0	52.5	1.2
M300S	76	±1.5	1.0	10.0	0.8	6.0	63.5	1.2

Type	Packing Type	M100S	M200S	M300S
Minimum Packing QTY (pcs)	Ammo pack	2000	1000	500

M-Series (S)^{MINIATURE SIZE} Metal Film Fixed Power Resistor

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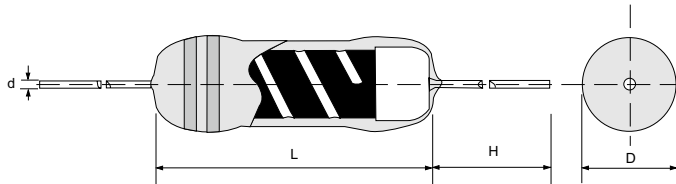
■ PERFORMANCE SPECIFICATIONS

Characteristics	Test Conditions	Limits
Short Time Over Load	IEC 60115-1 4.13 5 seconds 2.5x rated voltage (not over max. overload voltage)	±2%
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	±2%
Load Life	IEC 60115-1 4.25.1 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%
Resistance To Soldering Heat	IEC 60115-1 4.18.2 Leads immersed till 3mm from the body in (260±5)°C solder for 10±1 seconds	±1%
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 0.75mm and 10 to 500 Hz.	±1%
Thermal Endurance	IEC 60115-1 4.25.3 1000 hours at 150°C without load	±1%
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +150°C 30minutes, 5 cycles	±2%

M-Series (T) MINIATURE SIZE Metal Film Fixed Power Resistor

Quality • Reliability
Cost-Down via Innovation

M-Series



Specifications Per

- IEC 60115-1
- MIL-R-10509

Features

- Conformal multi-layer coating (flame proof coating available)
- Color code per MIL & EIA standards
- Special tin-plated electrolytic copper lead wire
- Products meet RoHS requirements and do not contain substances of very high concern identified by European Chemicals Agency

DIMENSIONS

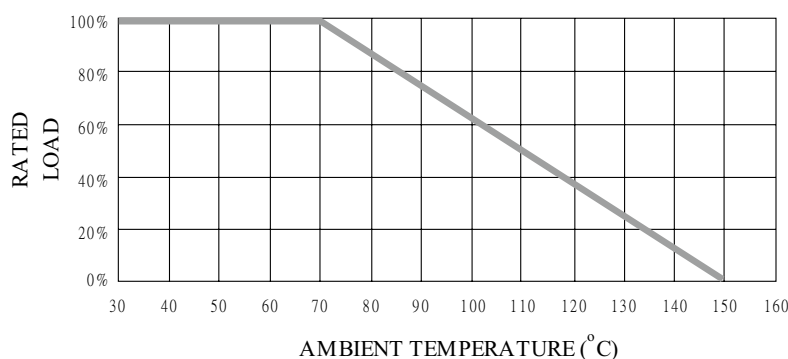
Type	Body Length (L, mm)	Body Diameter (D, mm)	Lead Wire Length (H, mm)	Lead Wire Diameter (d, mm)	Net Weight Per 1000Pcs
M204 M204T	3.2 ± 1.0	1.9 ± 0.2	28 ± 3.0	0.45 ± 0.02	145 Grams

GENERAL SPECIFICATIONS

Type	Power Rating At 70°C	Maximum Working Voltage	Maximum Overload Voltage	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
M204	0.4W	200V	400V	1Ω	10MΩ	±1%, 5%	E-24/E-96
M204T	1/2W	250V	400V	1Ω	4.7MΩ	±1%, 5%	E-24/E-96

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

POWER DERATING CURVE



M-Series (T) MINIATURE SIZE Metal Film Fixed Power Resistor

Quality • Reliability
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■ PART NUMBER

Example: M204TF10K0TKSTB5K0

M204T	F	10K0	TKS	TB5K0
Type	Tolerance*	Resistance	TCR*	Packaging
	F (1%) J (5%)	10KΩ 4-character code containing - 3 significant digits 1 letter multiplier MULTIPLIER R = 1 K = 10 ³ M = 10 ⁶ G = 10 ⁹	100ppm 3-character code TKR = ± 50ppm TKS = ± 100ppm TKU = ± 250ppm	5-character code TB = Tape Box (pieces per box) <u>M204/M204T</u> 5K0 = 5,000

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

■ TECHNICAL SUMMARY

Characteristics	Limits	
Dielectric Withstanding Voltage, V AC or DC	400	
Temperature Coefficient, PPM / °C*	M204	±50, ±100
	M204T	11Ω~1MΩ: ±100 1Ω~10Ω, 1M1~4M7Ω: ±250
Operating Temperature Range, °C	-55~+150	
Insulation Resistance, MΩ	M204	10 ⁵ Min.
	M204T	10 ⁴ Min.

* 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 Over Load	IEC 60115-1 4.13 2 seconds 2.5x rated voltage (not over max. overload voltage)	±1%
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	±2.5%
Load Life	IEC 60115-1 4.25.1 Rated load (not over max. working voltage) 1,000 hours with 1.5 hours ON, 0.5 hours OFF, at (70±2)°C	±2.5%
Resistance To Soldering Heat	IEC 60115-1 4.18 Leads immersed till 3mm from the body in (260±5)°C solder for 10±1 seconds	±1%
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 0.75mm and 10 to 500 Hz.	±1%
Thermal Endurance	IEC 60115-1 4.25.3 1000 hours at 150°C without load	±1%
Thermal Shock	IEC 60115-1 4.19 -55°C 30minutes, +150°C 30minutes, 5 cycles	±1%