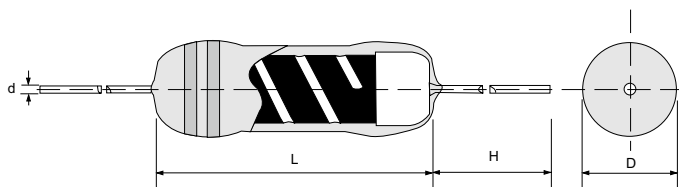


# M-Series Metal Film Fixed Resistor

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

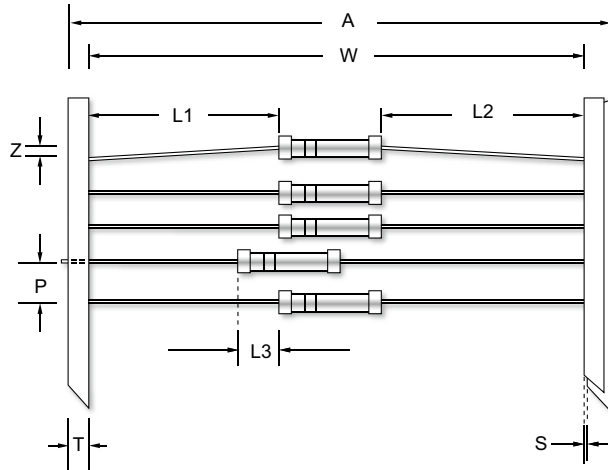
Type	Power Rating At 70°C	Maximum Working Voltage	Maximum Overload Voltage	Minimum Resistance	Maximum Resistance	Resistance Tolerance	Available Resistance Values
M16	1/6W	200V	400V	0.1Ω	10MΩ	±5%	E-24
				1Ω	1MΩ	±1%	E-24/E-96
				47Ω	510KΩ	±0.1%~0.5%	E-24/E-192
M20	1/4W	250V	400V	0.1Ω	10MΩ	±5%	E-24
				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.

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■ TAPING/PACKING SPECIFICATIONS

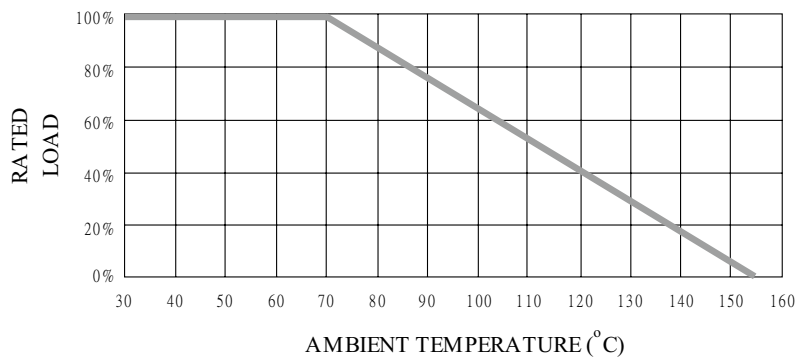


Unit (mm)

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



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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 <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>	50ppm <b>3-character code</b>  TKQ = ± 25ppm TKR = ± 50ppm TKS = ± 100ppm	<b>5-character code</b>  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 <sup>4</sup>	

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

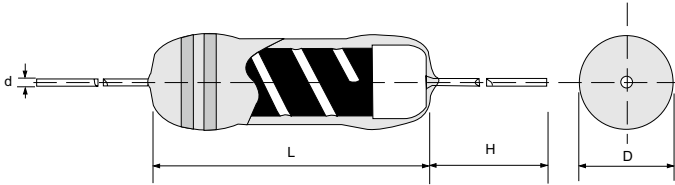
## ■ PERFORMANCE SPECIFICATIONS

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

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

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## 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

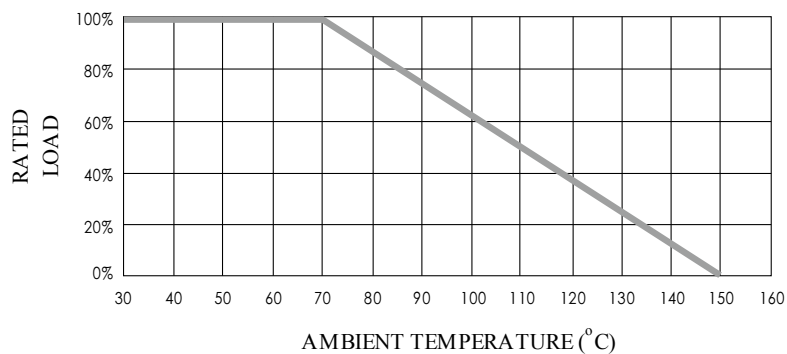
Type	Body Length (L, mm)	Body Diameter (D, mm)	Lead Wire Length (H, mm)	Lead Wire Diameter (d, mm)	Net Weight Per 1000Pcs
M100S	9.00 ± 1.0	3.2 ± 0.2	26 ± 3.0	0.60 ± 0.03	340 Grams
M200S	11.0 ± 1.0	4.5 ± 0.5	26 ± 3.0	0.70 ± 0.03	600 Grams
M300S	15.5 ± 1.0	5.5 ± 0.5	26 ± 3.0	0.80 ± 0.03	1200 Grams

## 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 <b>4-character code</b> containing - 3 significant digits 1 letter multiplier  <u>OHM MULTIPLIER</u> 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>  TB = Tape Box  (pieces per box) M100S 2K0 = 2,000  M200S 1K0 = 1,000  M300S 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

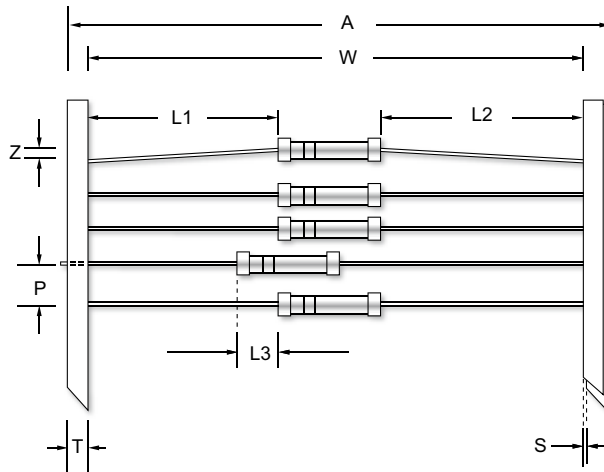
Characteristics	Limits	
	Dielectric Withstanding Voltage, V AC or DC	M100S M200S / M300S
Temperature Coefficient, PPM / °C*	±50, ±100	
Operating Temperature Range, °C	-55~+150	
Insulation Resistance, MΩ	10 <sup>4</sup>	

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

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## ■ 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

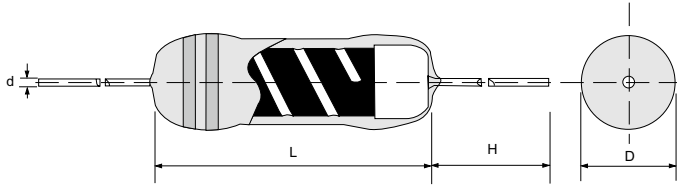
## ■ PERFORMANCE SPECIFICATIONS

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



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## 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

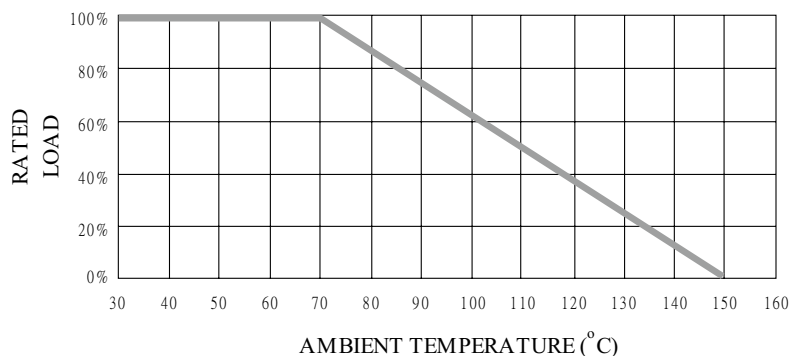
Type	Body Length (L, mm)	Body Diameter (D, mm)	Lead Wire Length (H, mm)	Lead Wire Diameter (d, mm)	Net Weight Per 1000Pcs
M204 M204T	3.2 ± 1.0	1.9 ± 0.2	28 ± 3.0	0.45 ± 0.02	145 Grams

## 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

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## ■ PART NUMBER

Example: M204TF10K0TKSTB5K0

M204T	F	10K0	TKS	TB5K0
Type	Tolerance*	Resistance	TCR*	Packaging
	F (1%) J (5%)	10KΩ <b>4-character code</b> containing - 3 significant digits 1 letter multiplier  <b>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 TKU = ± 250ppm	<b>5-character code</b>  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 <sup>5</sup> Min.
	M204T	10 <sup>4</sup> 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	<b>IEC 60115-1 4.13</b> 2 seconds 2.5x rated voltage (not over max. overload voltage)	±1%
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	±2.5%
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	±2.5%
Resistance To Soldering Heat	<b>IEC 60115-1 4.18</b> Leads immersed till 3mm from the body in (260±5)°C solder for 10±1 seconds	±1%
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 0.75mm and 10 to 500 Hz.	±1%
Thermal Endurance	<b>IEC 60115-1 4.25.3</b> 1000 hours at 150°C without load	±1%
Thermal Shock	<b>IEC 60115-1 4.19</b> -55°C 30minutes, +150°C 30minutes, 5 cycles	±1%