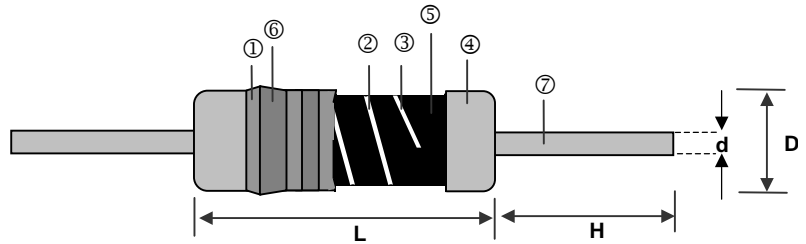


Metal Film Leaded Precision Resistor – MFR Series

Construction



① Insulation Coating (Expose resin)	⑤ Resistor Layer (Nickel alloy)
② Trimming Line	⑥ Marking (Expose)
③ Ceramic Rod (Alumina ceramic)	⑦ Lead Wire (Tinned annealed copper wire)
④ Electrode Cap (Tinned iron cap)	

Features

- Excellent overall stability
- Very tight tolerance down to $\pm 0.05\%$
- Extremely low TCR down to $\pm 5 \text{ PPM}/^\circ\text{C}$
- High power rating up to 3 Watts
- Excellent ohmic contact

Applications

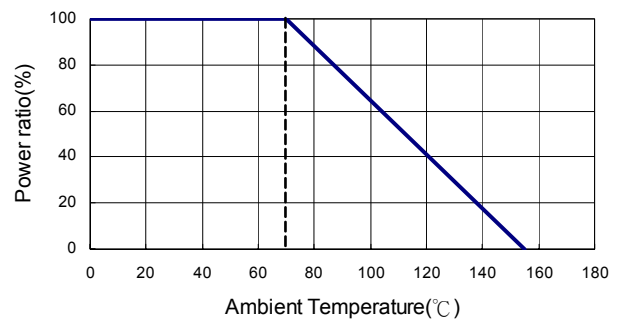
- Automotive
- Telecommunication
- Medical Equipment

Dimensions

Unit: mm

Type	L	D	H	d	Weight (g) (1000pcs)
MFR0318	3.3+0.7/-0.2	1.8±0.30	29±2.0	0.45±0.03	90
MFR0623	6.3±0.5	2.3±0.30	28±2.0	0.55±0.03	150
MFR0932	9.0±0.5	3.2±0.50	26±2.0	0.65±0.03	350
MFR1145	11.5±1.0	4.5±0.50	35±2.0	0.78±0.03	770
MFR1550	15.5±1.0	5.0±0.50	32±2.0	0.78±0.03	1040

Derating Curve



Part Numbering

MFR	0318	B	T	N	W	1001	MA
Product Type	Dimensions (L×D)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance	Special
	0318: 3.3x1.8 0623: 6.3x2.3 0932: 9.0x3.2 1145: 11.5x4.5 1550: 15.5x5.0	A: $\pm 0.05\%$ B: $\pm 0.1\%$ C: $\pm 0.25\%$ D: $\pm 0.5\%$ F: $\pm 1\%$	A: Ammo B: Bulk T: Taping Reel	S: ± 5 B: ± 10 N: ± 15 C: ± 25 D: ± 50 E: ± 100	R: 3W S: 2W T: 1W U: 1/2W V: 1/4W F: 3/5W G: 2/5W W: 1/8W	R100: 0.1Ω 0010: 1Ω 1000: 100Ω 2201: 2200Ω 1001: 1KΩ 1004: 1MΩ	: Standard MA: MA-type MB: MB-type MC: MC-type FA: FA-type FB: FB-type FC: FC-type

Standard Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
						±0.05%	±0.1%	±0.25%	±0.5%	±1%	
0318	1/8W	-55 ~ +155°C	200V	400V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25 ±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
0623	1/4W	-55 ~ +155°C	250V	500V	10Ω-1MΩ					±5 ±10	
					10Ω-1MΩ		10Ω-10MΩ			±15 ±25	
					-	10Ω-1MΩ		10Ω-10MΩ			±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
0932	1/2W	-55 ~ +155°C	350V	700V	10Ω-1MΩ					±5 ±10	
					10Ω-1MΩ		10Ω-10MΩ			±15 ±25	
					-	10Ω-1MΩ		10Ω-10MΩ			±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
1145	1W	-55 ~ +155°C	450V	1000V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25 ±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
1550	2W	-55 ~ +155°C	500V	1000V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25 ±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		

High Power & Ultra High Power Rating Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
						±0.05%	±0.1%	±0.25%	±0.5%	±1%	
0318	1/4W	-55 ~ +155°C	200V	400V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25 ±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
0318	2/5W	-55 ~ +155°C	250V	500V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25 ±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
0623	1/2W	-55 ~ +155°C	300V	600V	10Ω-1MΩ					±5 ±10	
					10Ω-1MΩ		10Ω-10MΩ			±15 ±25	
					-	10Ω-1MΩ		10Ω-10MΩ			±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
0623	3/5W	-55 ~ +155°C	350V	700V	-	10Ω-1MΩ		10Ω-4.99MΩ			±15
					-	10Ω-1MΩ		10Ω-10MΩ			±25
					-	10Ω-1MΩ		10Ω-10MΩ	1Ω-10MΩ	±50	
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		

High Power & Ultra High Power Rating Electrical Specifications

Type	Item	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
						±0.05%	±0.1%	±0.25%	±0.5%	±1%	
0932	1W	-55 ~ +155°C	400V	800V	10Ω-1MΩ					±5 ±10	
					10Ω-1MΩ		10Ω-10MΩ			±15 ±25	
					-	10Ω-1MΩ		10Ω-10MΩ			±50
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
1145	2W	-55 ~ +155°C	500V	1000V	-	10Ω-1MΩ		10Ω-4.99MΩ		±15	
					-	10Ω-1MΩ		10Ω-10MΩ		±25 ±50	
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		
1550	3W	-55 ~ +155°C	500V	1000V	-	10Ω-1MΩ		10Ω-4.99MΩ		±15	
					-	10Ω-1MΩ		10Ω-10MΩ		±25 ±50	
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100		

Environmental Characteristics

Item	Requirement	Test Method
Short Time Overload	±0.25%	RCWV*2.5 or Max. overload voltage for 5 seconds
Insulation Resistance	> 1000MΩ	Apply 100V _{DC} for 1 minute
Endurance	±0.2%	70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±0.3%	40±2°C, 90~95% R.H. Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	90% min. Coverage	245±5°C for 3 seconds
Temperature Coefficient	By Type	Resistance value at room temperature and room temperature+100°C
Pulse Overload	±0.75%	4 times RCWV for 10000 cycles with 1 second "ON" and 25 seconds "OFF"
Resistance To Solvent	No deterioration of coatings and markings	Trichroethane for 1 min. with ultrasonic
Terminal Strength	Tensile: ≥ 2.5kg	Direct Load for 10 sec. In the direction off the terminal leads
Shelf life	△R=±0.1%	12 months at room temperature 25±3°C, 80%RH Max.

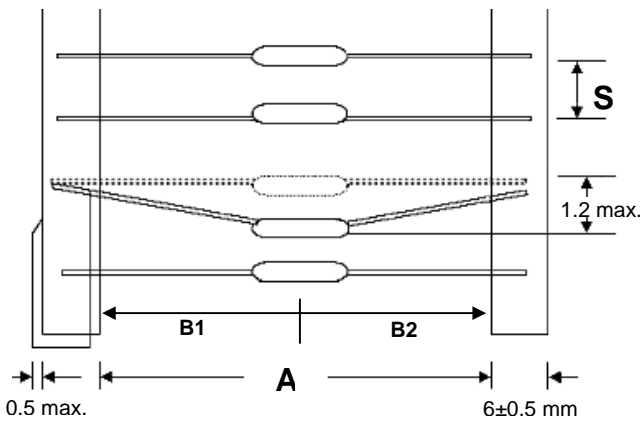
■ Reference Standards: MIL-STD-202, JIS-C 5201-1

■ Storage Temperature: 25±3°C; Humidity < 80%RH

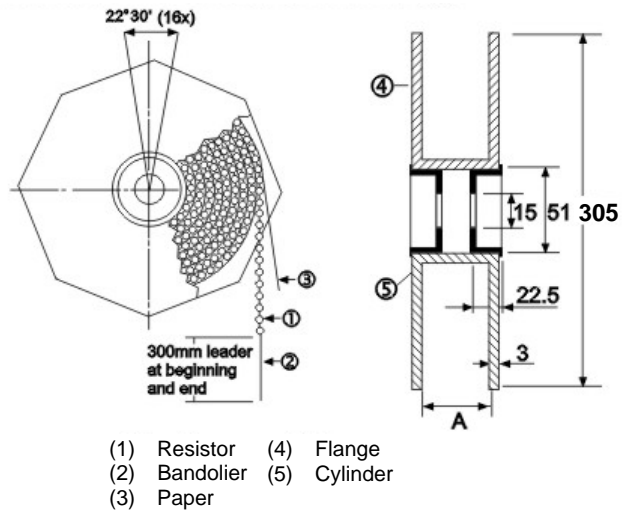
■ Taping/Packing Specifications (For MFR / MOF / CFR)

1. Standard Type (Reel & Ammo)

Packing Methods



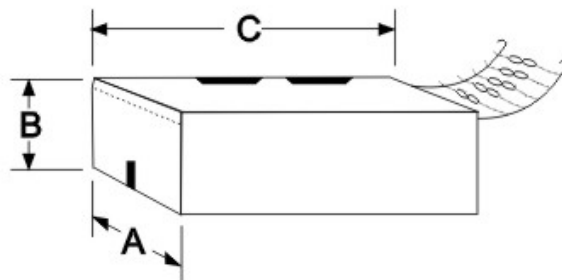
Reel Packing



Unit: mm

Type	Packing Methods			Reel Packing			
	A	B1-B2	S	Across Flange (A)	MFR Qty	CFR Qty	MOF Qty
0318	52+1/-0	1.2	5	72	5,000	5,000	-
0623	52+1/-0	1.2	5	72	5,000	5,000	5,000
0932	52+1/-0	1.2	5	72	2,500	2,500	2,500
1145	52+1/-0	1.5	5	95	2,000	2,000	2,000
1550	52+1/-0	1.5	10	95	1,000	1,000	1,000
1765	73+1/-0	1.5	10	95	-	-	1,000
2485	88+1/-0	1.5	10	110	-	-	500

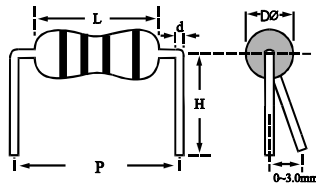
Ammo Packing



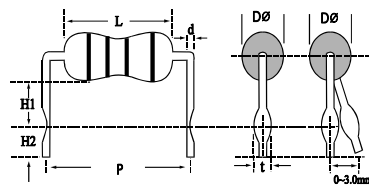
Unit: mm

Type	Packing Methods			Ammo Packing					
	A	B1-B2	S	A	B	C	MFR Qty	CFR Qty	MOF Qty
0318	26+1/-0	1.0	5	80	75	264	5,000	5,000	-
0623	26+1/-0	1.0	5	80	105	264	5,000	5,000	5,000
0932	52+1/-0	1.2	5	80	46	264	1,000	1,000	1,000
1145	73+1/-0	1.5	5	103	82	265	1,000	1,000	1,000
1550	73+1/-0	1.5	10	103	96	265	1,000	1,000	1,000
1765	73+1/-0	1.5	10	105	75	270	-	-	500
2485	88+1/-0	1.5	10	115	75	270	-	-	250

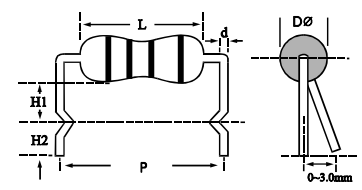
2. Special Type (Bulk)



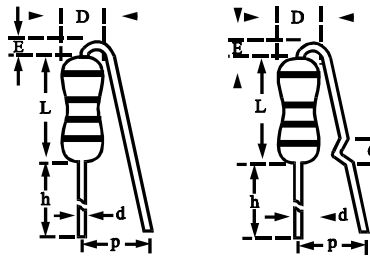
MA Type



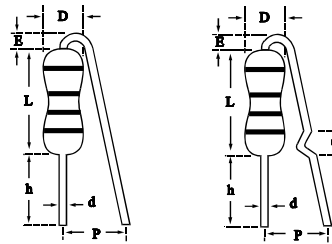
MB Type



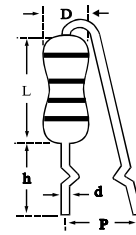
MC Type



FA Type



FB Type



FC Type

Unit: mm

Product Type	Type	P	H /H1/h	H2/G	t	D	L	d	E
0318	MA	5.00±1	5.00±1	-	-	1.8±0.3	3.30±0.4	0.45±0.03	-
0623	MA	10.0±1	10.0±1	-	-	2.3±0.3	6.30±0.5	0.55±0.03	-
	FA	10.0±1	28.0±2	2.00±0.5	-	2.3±0.3	6.30±0.5	0.55±0.03	2.00±0.5
	FB	10.0±1	8.00±1	2.00±0.5	-	2.3±0.3	6.30±0.5	0.55±0.03	2.00±0.5
0932	MA	12.5±1	10.0±1	-	-	3.2±0.5	9.00±0.5	0.65±0.03	-
	FC	6.00±1	10.0±1	-	-	3.2±0.5	9.00±0.5	0.65±0.03	-
1145	MA	15.0±1	12.5±1	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	MB	15.0±1	6.00±1	5.00±1.0	1.4±0.2	4.5±0.5	11.5±1.0	0.78±0.03	-
	MC	15.0±1	6.00±1	5.00±1.0	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	FC	6.00±1	10.0±1	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
1550	MA	20.0±1	15.0±1	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	MB	20.0±1	10.0±1	5.00±1.0	1.4±0.2	5.0±0.5	15.5±1.0	0.78±0.03	-
	MC	20.0±1	10.0±1	5.00±1.0	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	FC	6.00±1	10.0±1	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-