

Viking Tech Corporation

Carbon Film Leaded Resistor

■ Features

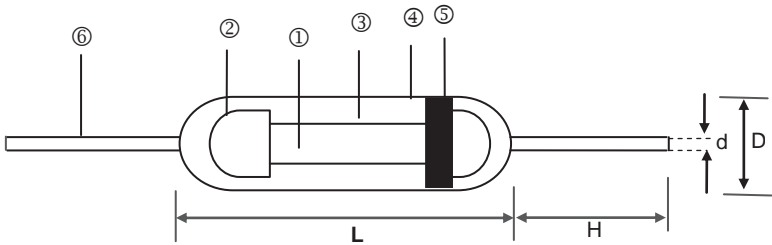
- The most economic industrial investment
- Standard tolerance: +/-5% (available +/-2%)
- Excellent long term stability
- Termination: Standard solder-plated copper lead

■ Applications

- Automotive
- Telecommunication
- Medical Equipment



■ Construction



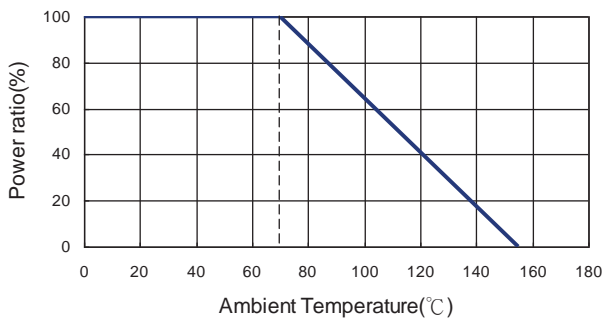
① Ceramic Rod	④ Non-flame Paint With Sol Vent-proof
② Tinned Iron Caps	⑤ Color Code
③ Carbon Film	⑥ Lead Wire

■ Dimensions

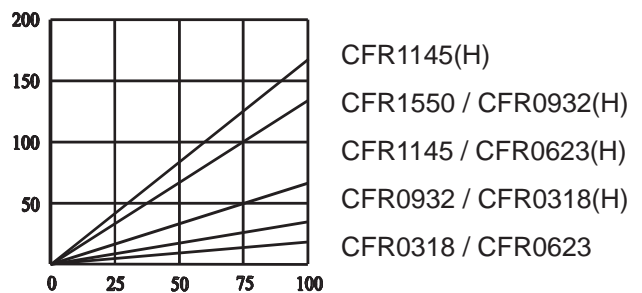
Unit: mm

Type	L	D	H	d	Weight (g) (1000pcs)
CFR0318	3.3+0.4/-0.2	1.8±0.3	29±2.0	0.41~0.48	92
CFR0623	6.3±0.5	2.3±0.3	28±2.0	0.43~0.58	155
CFR0932	9.0±0.5	3.2±0.5	26±2.0	0.58~0.68	352
CFR1145	11.5±1.0	4.5±0.5	35±2.0	0.68~0.81	775
CFR1550	15.5±1.0	5.0±0.5	32±2.0	0.75~0.81	1042

■ Derating Curve



■ Hop-Spot Temperature



- CFR1145(H)
- CFR1550 / CFR0932(H)
- CFR1145 / CFR0623(H)
- CFR0932 / CFR0318(H)
- CFR0318 / CFR0623

Metal Oxide Leaded Film Resistor



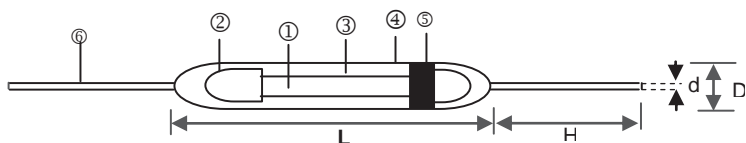
■ Features

- Excellent Long-Time stability
- High surge / overload capability
- Wide resistance range : 0.1Ω~10MΩ
- Controlled temperature coefficient
- Resistance standard tolerance: ±5% (consult factory for ±2%, 1%)
- Electrical and mechanical stability and high reliability

■ Applications

- Automotive
- Telecommunication
- Medical Equipment

■ Construction



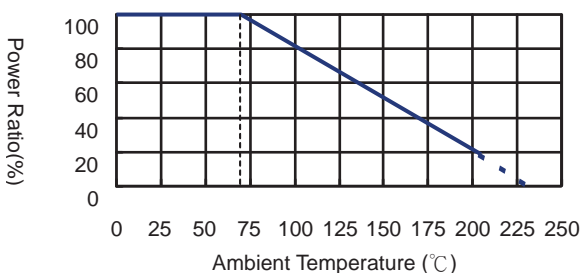
①	Ceramic Rod	④	Non-flame Paint With Sol Vent-proof
②	Tinned Iron Caps	⑤	Color Code
③	Metal Oxide Film	⑥	Lead Wire

■ Dimensions

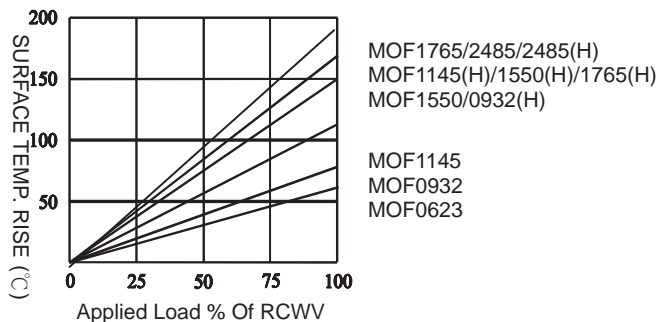
Unit: mm

Type	L	D	H	d	Weight (g) (1000pcs)
MOF0623	6.3±0.5	2.3±0.3	28±2.0	0.55±0.03	156
MOF0932	9.0±0.5	3.2±0.5	26±2.0	0.65±0.03	355
MOF1145	11.5±1.0	4.5±0.5	35±2.0	0.78±0.03	760
MOF1550	15.5±1.0	5.0±0.5	32±2.0	0.78±0.03	1040
MOF1765	17.0±1.0	6.0±0.5	35±2.0	0.78±0.03	1800
MOF2485	24.0±1.0	8.0±0.5	35±2.0	0.78±0.03	4000

■ Derating Curve



■ Hot-Spot Temperature



Part Numbering

MOF	0623	F	A	F	U	1001	MA
Product Type	Dimensions (LxD) 0623: 6.3x2.3 0932: 9.0x3.2 1145: 11.5x4.5 1550: 15.5x5.0 1765: 17.0x6.0 2485: 24.0x8.0	Resistance Tolerance F: ±1% G: ±2% J: ±5%	Packaging Code A: Ammo B: Bulk T: Taping Reel	TCR (PPM/°C) F: ±200	Power Rating E: 7W D: 5W R: 3W S: 2W T: 1W U: 1/2W V: 1/4W	Resistance R500: 0.5Ω 0010: 1Ω 1000: 100Ω 2201: 2200Ω 1001: 1KΩ 1004: 1MΩ	Special : Standard MA: MA-type MB: MB-type MC: MC-type FA: FA-type FB: FB-type FC: FC-type FD: FD-type

Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range			TCR (PPM/°C)
						±1%	±2%	±5%	
0623	1/4W	-55 ~ +155°C	200V	350V	350V	0.1Ω - 10MΩ		0.1Ω-22MΩ	±200
0932	1/2W		250V	400V	350V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1145	1W		500V	600V	500V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1550	2W		550V	600V	500V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1765	3W		800V	1000V	750V	0.1Ω - 470KΩ	0.1Ω - 560KΩ	0.1Ω - 1MΩ	
2485	5W		1000V	1000V	750V	0.1Ω - 470KΩ	0.1Ω - 560KΩ	0.1Ω - 1MΩ	

High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range			TCR (PPM/°C)
						±1%	±2%	±5%	
0623	1/2W	-55 ~ +155°C	250V	400V	350V	0.1Ω - 10MΩ			±200
0932	1W		300V	500V	400V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1145	2W		500V	600V	500V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1550	3W		750V	700V	600V	0.1Ω - 1MΩ	0.1Ω - 10MΩ		
1765	5W		1000V	1000V	750V	0.1Ω - 470KΩ	0.1Ω - 560KΩ	0.1Ω - 1MΩ	
2485	7W		1000V	1000V	750V	0.1Ω - 470KΩ	0.1Ω - 560KΩ	0.1Ω - 1MΩ	

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

■ Resistor body color: Standard Power Rating: Grey

High Power Rating : Grey or Pink are available

■ Environmental Characteristics

Item	Requirement	Test Method
Short Time Overload	$\pm(0.25\%+0.05\Omega)$	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	> 1000M Ω	JIS-C-5201-1 5.6 Apply 100V _{DC} for 1 minute
Endurance	$\pm(1.5\%+0.05\Omega)$	JIS-C-5201-1 7.10 70 \pm 2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(1.5\%+0.05\Omega)$	JIS-C-5201-1 7.9 40 \pm 2 C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	90% min. Coverage	JIS-C-5201-1 6.5 245 \pm 5 C for 3 seconds
Dielectric Withstanding Voltage	By Type	JIS-C-5201-1 5.7 Apply Max. Overload Voltage for 1 minute
Temperature Coefficient	By Type	Resistance value at room temperature and room temperature+100 C
Pulse Overload	$\pm(1\%+0.05\Omega)$	JIS-C-5201-1 5.8 4 times RCWV for 10000 cycles with 1second "ON" and 25 seconds "OFF"
Resistance To Solvent	No deterioration of coatings and markings	JIS-C-5201-1 6.9 Trichroethane for 1 min. with ultrasonic
Terminal Strength	Tensile: \geq 2.5kg	Direct Load for 10 seconds In the direction off the terminal leads

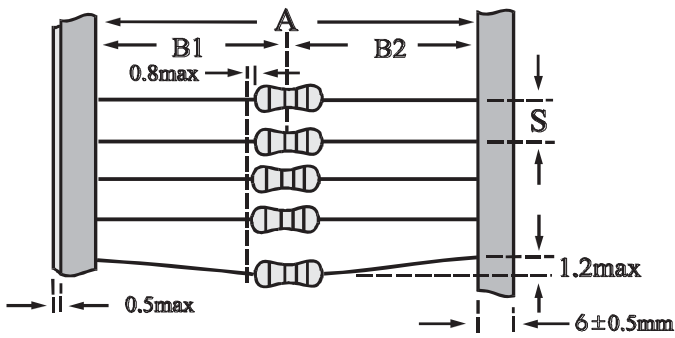
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

■ **Storage Temperature: 25 \pm 3°C; Humidity < 80%RH**

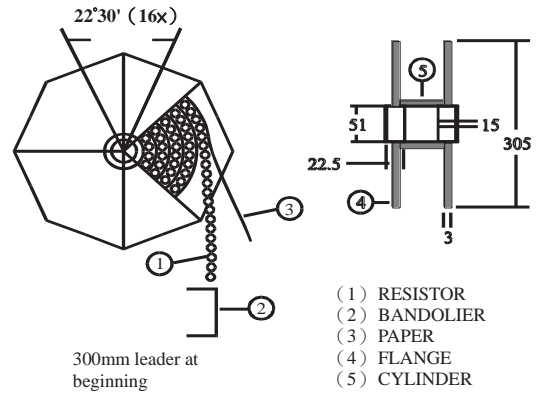
Taping/Packing Specifications

1. Standard Type (Reel & Ammo)

Packing Methods



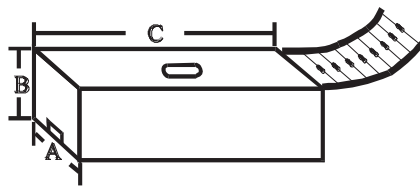
Reel Packing



Unit: mm

Packaging Type	Packing Methods			Reel Packing	
	A	B1-B2	S	Across Flange (A)	Qty
0623	52+1/-0	1.2	5	72	5,000
	26+1/-0	1.0			
0932	52+1/-0	1.2	5	72	2,500
1145	52+1/-0	1.5	5	95	2,000
	73+1/-0				
1550	52+1/-0	1.5	10	95	1,000
	73+1/-0				
1765	73+1/-0	1.5	10	95	1,000
2485	88+1/-0	1.5	10	110	500

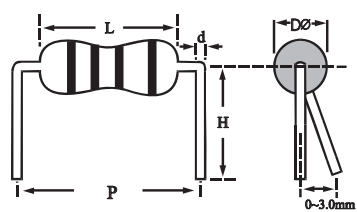
Ammo Packing



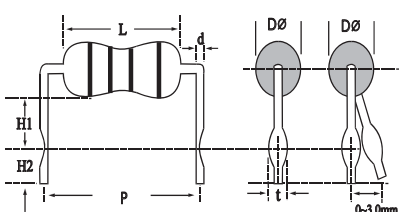
Unit: mm

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

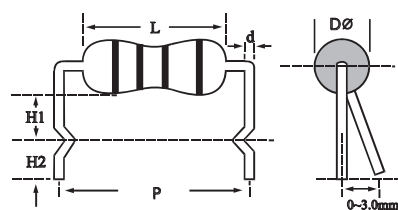
2. Special Type (Bulk)



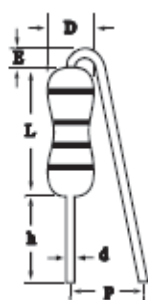
MA Type



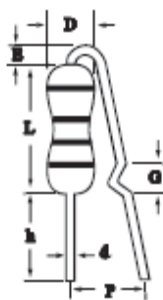
MB Type



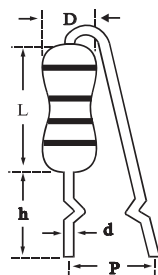
MC Type



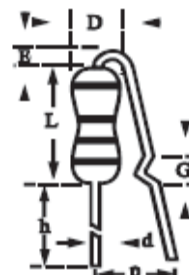
FA Type



FB Type



FC Type

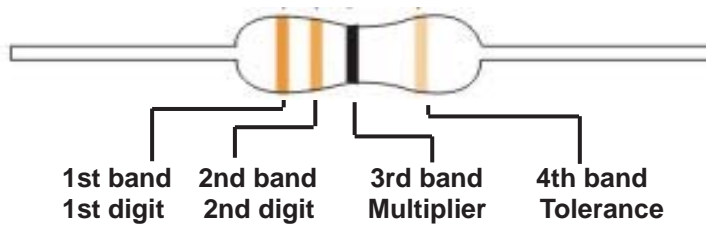


FD Type

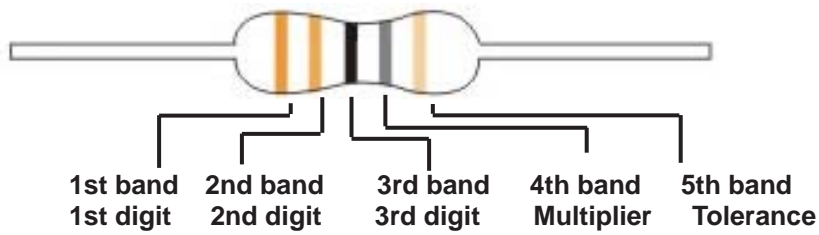
Unit: mm

Codes	Type	P	H /H1/h	H2/G	t	D	L	d	E
0623	MA	10±1	10.0±1	-	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	MC	10±1	4.0±1	4.0±1	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	FA	5~15	4.0±2	-	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FD	5~15	27.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
0932	MA	12.5±1	10.0±1	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	MC	12.5±1	4.0±1	4.0±1	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	FA	5~15	4.0±2	-	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FC	5~15	10.0±3	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
1145	MA	15±1	12.5±1	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	MC	15±1	6.0±1	5.0±1.0	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
1550	MA	20±1	15.0±1	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	MC	20±1	10.0±1	5.0±1.0	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-
1765	MA	25±1	15.0±1	-	-	6.0±0.5	17.0±1.0	0.78±0.03	-
	MB	25±1	8.0±1	5.5±1	1.4±0.2	6.0±0.5	17.0±1.0	0.78±0.03	-
	MC	24±1	10.0±1	7.5±1	-	6.0±0.5	17.0±1.0	0.78±0.03	-
2485	MA	30±1	18.0±1	-	-	8.0±0.5	24.0±1.0	0.78±0.03	-
	MB	30±1	12.0±1	5.0±1	1.4±0.2	8.0±0.5	24.0±1.0	0.78±0.03	-

Marking & Resistance Tolerance



±5.00%	E-24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1
±2.00%																									



±1.00%	E-96	1.00	1.02	1.05	1.07	1.10	1.13	1.15	1.18	1.21	1.24	1.27	1.30	1.33	1.37	1.40	1.43	1.47	1.50	1.54	1.58	1.62	1.65	1.69	1.74
		1.78	1.82	1.87	1.91	1.96	2.00	2.05	2.10	2.15	2.21	2.26	2.32	2.37	2.43	2.49	2.55	2.61	2.67	2.74	2.80	2.87	2.94	3.01	3.09
		3.16	3.24	3.32	3.40	3.48	3.57	3.65	3.74	3.83	3.92	4.02	4.12	4.22	4.32	4.42	4.53	4.64	4.75	4.87	4.99	5.11	5.23	5.36	5.49
		5.62	5.76	5.90	6.04	6.19	6.34	6.49	6.65	6.81	6.98	7.15	7.32	7.50	7.68	7.87	8.06	8.25	8.45	8.66	8.87	9.09	9.31	9.53	9.76

Color	Digit	Multiplier	Tolerance	
Without	-	-	-	-
Silver	-	10 ⁻²	-	-
Gold	-	10 ⁻¹	±5%	J
Black	0	10 ⁰	-	-
Brown	1	10 ¹	±1%	F
Red	2	10 ²	±2%	G
Orange	3	10 ³	-	-
Yellow	4	10 ⁴	-	-
Green	5	10 ⁵	-	-
Blue	6	10 ⁶	-	-
Violet	7	10 ⁷	-	-
Grey	8	10 ⁸	-	-
White	9	10 ⁹	-	-

Metal Film Leaded Precision Resistor



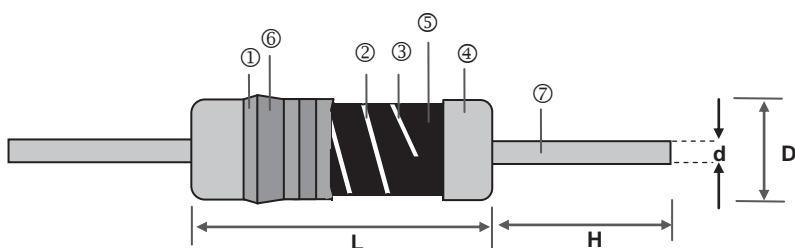
Features

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

Applications

- Automotive
- Telecommunication
- Medical Equipment

Construction



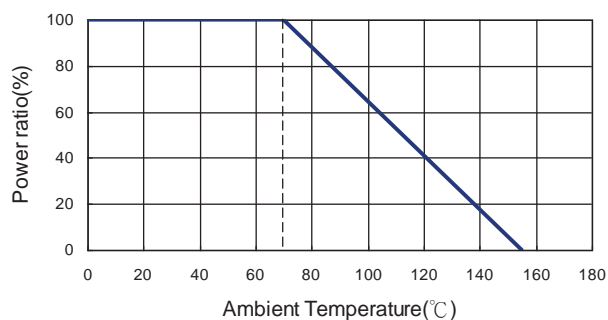
① Insulation Coating (Expose resin)	⑤ Resistor Layer (Nickel alloy)
② Trimming Line	⑥ Marking (Expose)
③ Ceramic Core (Alumina ceramic)	⑦ Lead Wire (Tinned annealed copper wire)
④ Electrode Cap (Tinned iron cap)	

Dimensions

Unit: mm

Type	L	D	H	d	Weight (g) (1000pcs)
MFR0318	3.3 \pm 0.7/-0.2	1.8 \pm 0.3	29 \pm 2.0	0.45 \pm 0.03	90
MFR0623	6.3 \pm 0.5	2.3 \pm 0.3	28 \pm 2.0	0.55 \pm 0.03	150
MFR0932	9.0 \pm 0.5	3.2 \pm 0.5	26 \pm 2.0	0.65 \pm 0.03	350
MFR1145	11.5 \pm 1.0	4.5 \pm 0.5	35 \pm 2.0	0.78 \pm 0.03	770
MFR1550	15.5 \pm 1.0	5.0 \pm 0.5	32 \pm 2.0	0.78 \pm 0.03	1040

Derating Curve



Part Numbering

MFR	0318	B	T	N	W	1001	
Product Type	Dimensions (LxD)	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: ±0.05% B: ±0.1% C: ±0.25% D: ±0.5% F: ±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 F: 3/5W U: 1/2W G: 2/5W V: 1/4W 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 FD: FD-type

Standard Electrical Specifications

Item Type	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	
					10Ω-1MΩ				±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	
					10Ω-1MΩ				±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

Item Type	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	
	2/5W		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	
					10Ω-1MΩ					±10
					10Ω-1MΩ		10Ω-10MΩ		±15 ±25	
					-	10Ω-1MΩ	10Ω-10MΩ		±50	
	3/5W		350V	700V	-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100	
					-	10Ω-1MΩ	10Ω-4.99MΩ		±15	
					-	10Ω-1MΩ	10Ω-10MΩ		±25	
					-	10Ω-1MΩ	10Ω-10MΩ	1Ω-10MΩ	±50	
0932	1W	-55 ~ +155°C	400V	800V	10Ω-1MΩ			-	±5	
					10Ω-1MΩ					±10
					10Ω-1MΩ		10Ω-10MΩ		±15 ±25	
					-	10Ω-1MΩ	10Ω-10MΩ		±50	
					-	1Ω-1MΩ	1Ω-10MΩ	0.1Ω-10MΩ	±100	
					-	10Ω-1MΩ	10Ω-4.99MΩ		±15	
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	

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

Environmental Characteristics

Item	Requirement	Test Method
Short Time Overload	±0.25%	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	> 1000MΩ	MIL-STD-202F Method 302 Apply 100V _{DC} for 1 minute
Endurance	±0.2%	MIL-STD-202F Method 108A 70±2 C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±0.3%	MIL-STD-202F Method 103B 40±2 C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	90% min. Coverage	MIL-STD-202F Method 208H 245±5°C for 3 seconds
Dielectric Withstanding Voltage	By Type	MIL-STD-202F Method 301 Apply Max. Overload Voltage for 1 minute
Temperature Coefficient	By Type	Resistance value at room temperature and room Temperature+100°C
Pulse Overload	±0.75%	JIS-C-5201-1 5.8 4 times RCWV for 10000 cycles with 1sec "ON" and 25 sec "OFF"
Resistance To Solvent	No deterioration of coatings and markings	JIS-C-5201-1 6.9 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	Δ R=±0.1%	12 months at room temperature 25±3 C, 80%RH Max.

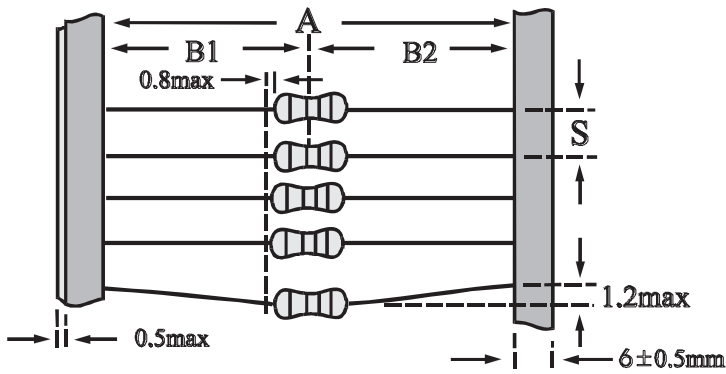
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

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

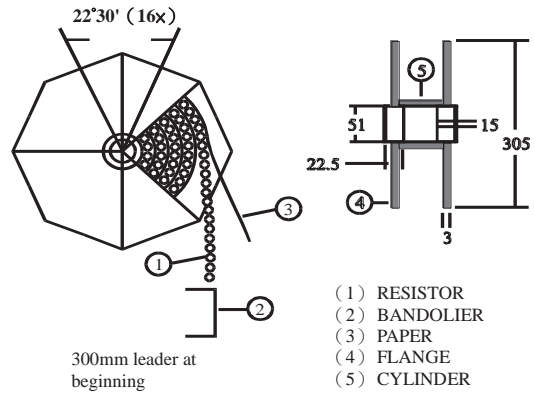
■ Taping/Packing Specifications

1. Standard Type (Reel & Ammo)

Packing Methods



Reel Packing

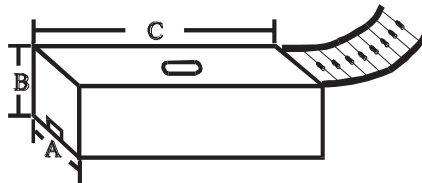


- (1) RESISTOR
- (2) BANDOLIER
- (3) PAPER
- (4) FLANGE
- (5) CYLINDER

Unit: mm

Packaging Type	Packing Methods			Reel Packing	
	A	B1-B2 Max	S	Across Flange (A)	Qty
0318	52+1/-0	1.2	5	72	5,000
	26+1/-0	1.0			
0623	52+1/-0	1.2	5	72	5,000
	26+1/-0	1.0			
0932	52+1/-0	1.2	5	72	2,500
1145	52+1/-0	1.5	5	95	2,000
	73+1/-0				
1550	52+1/-0	1.5	10	95	1,000
	73+1/-0				

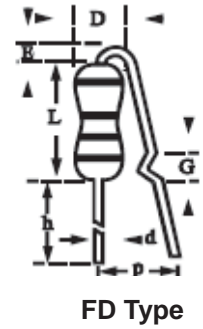
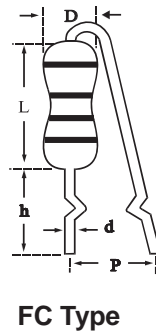
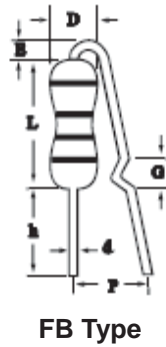
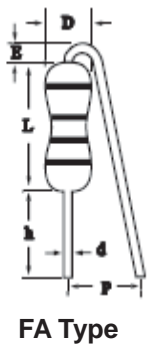
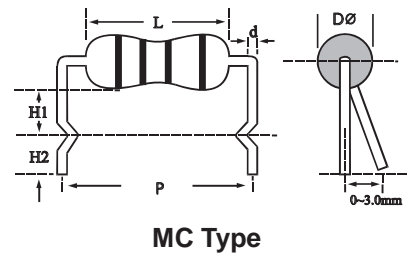
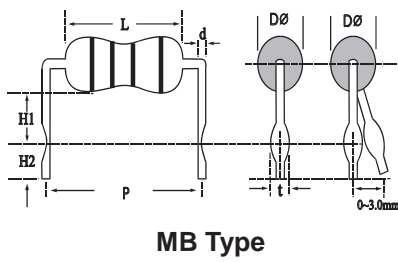
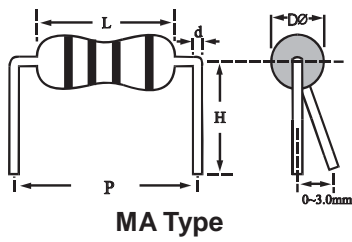
Ammo Packing



Unit: mm

Packaging Type	Packing Methods			Ammo Packing			
	A	B1-B2 Max	S	A	B	C	Qty
0318	52+1/-0	1.2	5	80	75	264	5,000
	26+1/-0	1.0					
0623	52+1/-0	1.2	5	80	105	264	5,000
	26+1/-0	1.0					
0932	52+1/-0	1.2	5	80	46	264	1,000
1145	52+1/-0	1.5	5	103	82	265	1,000
	73+1/-0						
1550	52+1/-0	1.5	10	103	96	265	1,000
	73+1/-0						

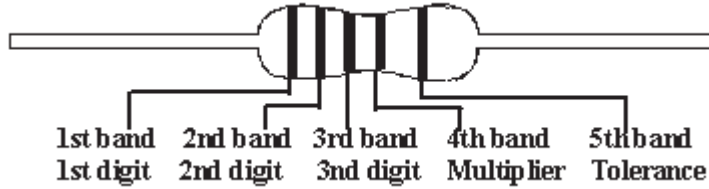
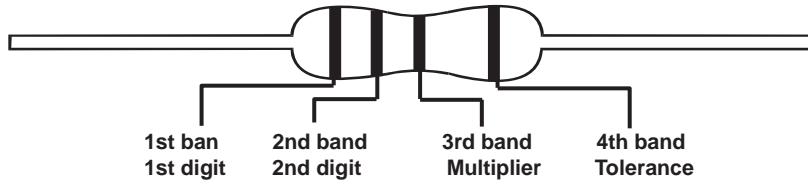
2. Special Type (Bulk)



Unit: mm

Codes	Type	P	H /H1/h	H2/G	t	D	L	d	E
0623	MA	10±1	10.0±1	-	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	MC	10±1	4.0±1	4.0±1	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	FA	5~15	4.0±2	-	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FD	5~15	27.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
0932	MA	12.5±1	10.0±1	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	MC	12.5±1	4.0±1	4.0±1	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	FA	5~15	4.0±2	-	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FC	5~15	10.0±3	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
1145	MA	15±1	12.5±1	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	MC	15±1	6.0±1	5.0±1.0	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
1550	MA	20±1	15.0±1	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	MC	20±1	10.0±1	5.0±1.0	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-

■ Marking & Resistance Tolerance



Color	Digit	Multiplier	Tolerance	
Without	-	-	±20%	M
Silver	-	10 ⁻²	±10%	K
Gold	-	10 ⁻¹	±5.0%	J
Black	0	10 ⁰	-	-
Brown	1	10 ¹	±1.0%	F
Red	2	10 ²	±2.0%	G
Orange	3	10 ³	-	-
Yellow	4	10 ⁴	-	-
Green	5	10 ⁵	±0.50%	D
Blue	6	10 ⁶	±0.25%	C
Violet	7	10 ⁷	±0.10%	B
Grey	8	10 ⁸	±0.05%	A
White	9	10 ⁹	-	-

±10%	E-6	1.0	-	-	-	1.5	-	-	-	2.2	-	-	-	3.3	-	-	-	4.7	-	-	-	6.8	-	-	-
	E-12	1.0	-	1.2	-	1.5	-	1.8	-	2.2	-	2.7	-	3.3	-	3.9	-	4.7	-	5.6	-	6.8	-	8.2	-
	E-24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1
±2.0%	E-48	1.00	1.05	1.10	1.15	1.21	1.27	1.33	1.40	1.47	1.54	1.62	1.69	1.78	1.87	1.96	2.05	2.15	2.26	2.37	2.37	2.61	2.74	2.87	3.01
		3.16	3.32	3.48	3.65	3.83	4.02	4.22	4.22	4.64	4.87	5.11	5.36	5.62	5.90	6.19	6.49	6.81	7.15	7.50	7.87	8.25	8.66	9.09	9.53
	E-96	1.00	1.02	1.05	1.07	1.10	1.13	1.15	1.18	1.21	1.24	1.27	1.30	1.33	1.37	1.40	1.43	1.47	1.50	1.54	1.58	1.62	1.65	1.69	1.74
		1.78	1.82	1.87	1.91	1.96	2.00	2.05	2.10	2.15	2.21	2.26	2.32	2.37	2.43	2.49	2.55	2.61	2.67	2.74	2.80	2.87	2.94	3.01	3.09
		3.16	3.24	3.32	3.40	3.48	3.57	3.65	3.74	3.83	3.92	4.02	4.12	4.22	4.32	4.42	4.53	4.64	4.75	4.87	4.99	5.11	5.23	5.36	5.49
±1.0%		5.62	5.76	5.90	6.04	6.19	6.34	6.49	6.65	6.81	6.98	7.15	7.32	7.50	7.68	7.87	8.06	8.25	8.45	8.66	8.87	9.09	9.31	9.53	9.76
±1.00%	E-192	10.0	10.1	10.2	10.4	10.5	10.6	10.7	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	12.0	12.1	12.3	12.4	12.6	12.7	12.9	13.0	13.2
		13.3	13.5	13.7	13.8	14.0	14.2	14.3	14.5	14.7	14.9	15.0	15.2	15.4	15.6	15.8	16.0	16.2	16.4	16.5	16.7	16.9	17.2	17.4	17.6
		17.8	18.0	18.2	18.4	18.7	18.9	19.1	19.3	19.6	19.8	20.0	20.3	20.5	20.8	21.0	21.3	21.5	21.8	22.1	22.3	22.6	22.9	23.2	23.4
		23.7	24.0	24.3	24.6	24.9	25.2	25.5	25.8	26.1	26.4	26.7	27.1	27.4	27.7	28.0	28.4	28.7	29.1	29.4	29.8	30.1	30.5	30.9	31.2
		31.6	32.0	32.4	32.8	33.2	33.6	34.0	34.4	34.8	35.2	35.7	36.1	36.5	37.0	37.4	37.9	38.3	38.8	39.2	39.7	40.2	40.7	41.2	41.7
		42.2	42.7	43.2	43.7	44.2	44.8	45.3	45.9	46.4	47.0	47.5	48.1	48.7	49.3	49.9	50.5	51.1	51.7	52.3	53.0	53.6	54.2	54.9	55.6
		56.2	56.9	57.6	58.3	59.0	59.7	60.4	61.2	61.9	62.6	63.4	64.2	64.9	65.7	66.5	67.3	68.1	69.0	69.8	70.6	71.5	72.3	73.2	74.1
±0.50%		75.0	75.9	76.8	77.7	78.7	79.6	80.6	81.6	82.5	83.5	84.5	85.6	86.6	87.6	88.7	89.8	90.9	92.0	93.1	94.2	95.3	96.5	97.6	98.8

High Precision Metal Film Led Resistor

Features

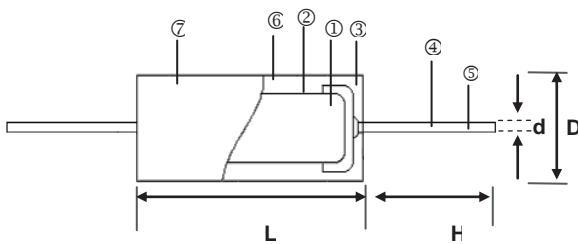
- Very tight tolerance down to $\pm 0.02\%$
- Extremely low TCR down to $\pm 5\text{PPM}/^\circ\text{C}$
- High precision
- Excellent stability

Applications

- Precision Equipment
- Measurement Equipment



Construction



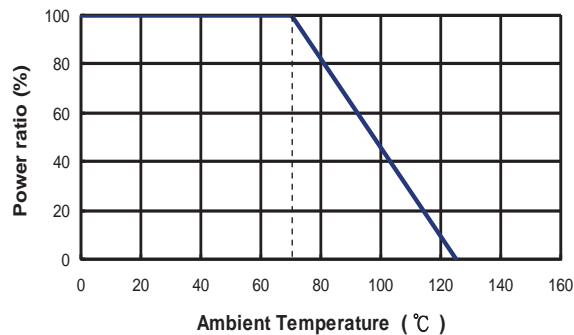
① Ceramic Core (Alumina ceramic)	⑤ Lead Wire (Tinned annealed copper wire)
② Resistor Element (Nickel alloy)	⑥ Molding (Expose)
③ Terminal (Tinned iron cap)	⑦ Marking (Expose based ink)
④ Connection	

Dimensions

Unit : mm

Type	L	D	H	d	Weight (g) (1000pcs)
MFD0727	7.0 \pm 0.3	2.7 \pm 0.4	26 \pm 3	0.6 \pm 0.05	230
MFD1040	10.2 \pm 0.3	4.0 \pm 0.4	25 \pm 3	0.6 \pm 0.05	430

Derating Curve



Part Numbering

MFD	0727	B	A	C	V	1001
Product Type	Dimensions (LxD) 0727: 7.0x2.7 1040: 10.2x4.0	Resistance Tolerance Q: ±0.02% A: ±0.05% B: ±0.1%	Packaging Code A: Ammo B: Bulk	TCR (PPM/°C) S: ±5 B: ±10 N: ±15 C: ±25	Power Rating U: 1/2W V: 1/4W	Resistance 0100: 10Ω 2201: 2200Ω 1002: 10000Ω 1001: 1KΩ 1004: 1MΩ

Standard Electrical Specifications

Item Type	Power Rating 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range			TCR (PPM/°C)
					±0.02%	±0.05%	±0.1%	
0727	1/4W	-55 ~ +125°C	250V	500V	10Ω -500KΩ			±5
					10Ω -1MΩ			±10 ±15 ±25
1040	1/2W	-55 ~ +125°C	300V	600V	10Ω -500KΩ			±5
					10Ω -1MΩ			±10 ±15 ±25

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

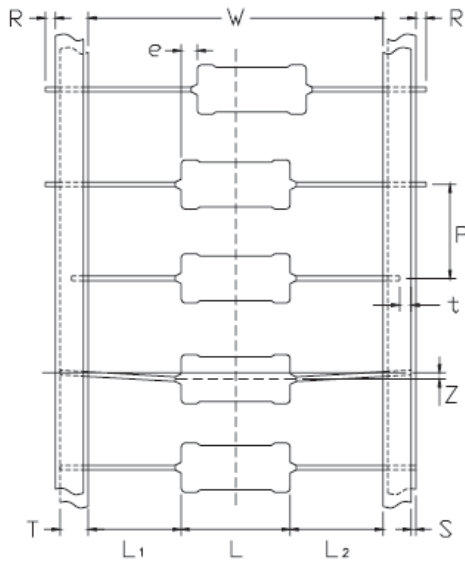
Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	Resistance value at room temperature and room temperature+60 C
Short Time Overload	±(0.05%+0.05Ω)	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Insulation Resistance	> 1,000MΩ	MIL-STD-202F Method 302 Apply 500V _{DC} for 1 minute
Endurance	±(0.2%+0.05Ω)	MIL-STD-202F Method 108A 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	±(0.2%+0.05Ω)	MIL-STD-202F Method 103B 40±2 C, 90~95% R.H., RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	95% min. Coverage	MIL-STD-202F Method 208H 245±5°C for 5 seconds
Resistance to Soldering Heat	±(0.05%+0.01Ω)	350±10 C for 3 seconds or 260±5 C for 10 seconds
Terminal Strength	Tensile: ≥2.5kg	Tensile strength: for 10 sec. Torsional strength: Rotated through 360°, 5 rotations.
Pulse Overload	±(0.1%+0.01Ω)	JIS-C-5201-1 5.8 4 times RCWV for 10000 cycles with 1second "ON" and 25 seconds "OFF"
Temperature Cycle	±(0.05%+0.05Ω)	-25°C (30min)/+85°C (30min), 5 cycles
Resistance to Solvent	No deterioration of coatings and markings	JIS-C-5201-1 6.9 Trichroethane for 3 min. with ultrasonic

RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

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

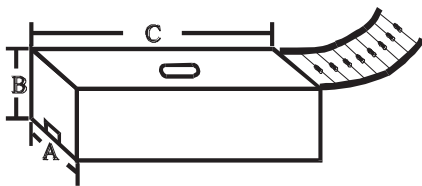
■ Taping/Packing Specifications



Unit: mm

Packaging Type	Packing Methods									
	L	W	P	L1-L2 Max.	T	Z Max.	R Max.	t Max.	e Max.	S Max.
0727	7.0±0.3	52±1	5±0.3	1.0	6±0.5	0.8	0	2.5	0.5	0.5
1040	10.2±0.3	52±1	5±0.3	1.0	6±0.5	0.8	0	2.5	0.5	0.5

■ Ammo Packing



Unit: mm

Packaging Type	Ammo Packing			
	A	B	C	Qty
0727	79	53	258	2,000
1040	79	53	258	1,000

Part Numbering

CFR	0318	J	T	-	W	1001	
Product Type	Dimensions (LxD)	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	G: ±2% J: ±5%	A: Ammo B: Bulk T: Taping Reel	-:No specified	R: 3W S: 2W T: 1W U: 1/2W V: 1/4W W: 1/8W	R500: 0.5Ω 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 FD: FD-type

Standard Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	
						±2%	±5%
0318	1/8W	-55 ~ +155 C	150V	300V	300V	—	0.1Ω - 22MΩ
0623	1/4W		250V	500V	500V	1Ω - 10MΩ	
0932	1/2W		350V	700V	700V	1Ω - 10MΩ	
1145	1W		450V	1000V	1000V	—	0.1Ω - 10MΩ
1550	2W		500V	1000V	1000V	1Ω - 10MΩ	

High Power Rating Electrical Specifications

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range	
						±2%	±5%
0318	1/4W	-55 ~ +155 C	200V	400V	400V	—	1Ω - 10MΩ
0623	1/2W		300V	500V	500V	—	0.1Ω - 22MΩ
0932	1W		400V	800V	800V	1Ω - 10MΩ	
1145	2W		500V	1000V	1000V	—	0.1Ω - 10MΩ
1550	3W		500V	1000V	1000V	1Ω - 10MΩ	

Operating Voltage= $\sqrt{(P \cdot R)}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2.5 \cdot \sqrt{(P \cdot R)}$ or Max. overload voltage listed above, whichever is lower

Resistor body color:

Standard power rating: Light Brown

High power rating 0318 size: Light Brown is available only other sizes: Light Brown or Pink are available.

Please specify which color is acceptable else the light brown is a top priority.

■ Environmental Characteristics

Item	Requirement	Test Method
Short Time Overload	$\pm(0.75\%+0.05\Omega)$	JIS-C-5201-1 5.5 RCWV*2.5 or Max. overload voltage for 5 seconds
Insulation Resistance	$> 1000M\Omega$	JIS-C-5201-1 5.6 Apply 100V _{DC} for 1 minute
Endurance	$\pm(3\%+0.05\Omega)$	JIS-C-5201-1 7.10 70 \pm 2 C, Max. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\leq 100K\Omega\pm 3\%$ $\leq 100K\Omega\pm 5\%$	JIS-C-5201-1 7.9 40 \pm 2 C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Solderability	90% min. Coverage	JIS-C-5201-1 6.5 245 \pm 5°C for 3 seconds
Dielectric Withstanding Voltage	By Type	JIS-C-5201-1 5.7 Apply Max. Overload Voltage for 1 minute
Temperature Coefficient	$< 100K\Omega +350ppm\sim\sim 500ppm$ $100K\Omega\sim 1M\Omega -0ppm\sim\sim 700ppm$ $> 1 M\Omega -0ppm\sim\sim 1500ppm$	Resistance value at room temperature and room Temperature+100°C
Pulse Overload	$\pm(1\%+0.05\Omega)$	JIS-C-5201-1 5.8 4 times RCWV for 10000 cycles with 1 second "ON" and 25 seconds "OFF"
Resistance To Solvent	No deterioration of coatings and markings	JIS-C-5201-1 6.9 Trichroethane for 1 min. with ultrasonic
Terminal Strength	Tensile: ≥ 2.5 kg	Direct Load for 10 seconds In the direction off the terminal leads

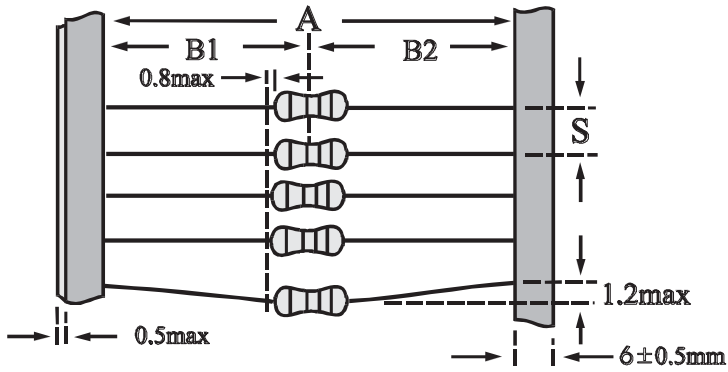
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

■ **Storage Temperature: 25 \pm 3°C; Humidity < 80%RH**

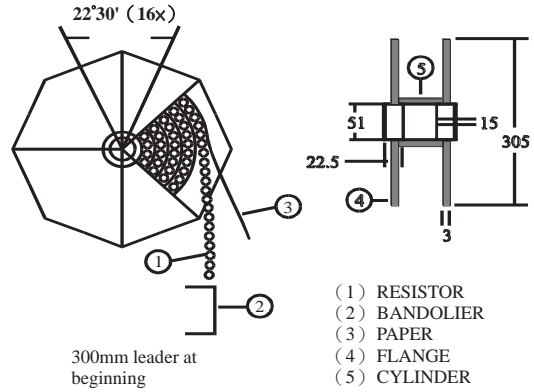
■ Taping/Packing Specifications

1. Standard Type (Reel & Ammo)

Packing Methods



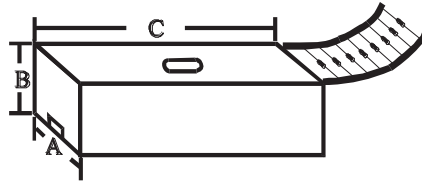
Reel Packing



Unit: mm

Packaging Type	Packing Methods			Reel Packing	
	A	B1-B2 Max	S	Across Flange (A)	Qty
0318	52+1/-0	1.2	5	72	5,000
	26+1/-0	1.0			
0623	52+1/-0	1.2	5	72	5,000
	26+1/-0	1.0			
0932	52+1/-0	1.2	5	72	2,500
1145	52+1/-0	1.5	5	95	2,000
	73+1/-0				
1550	52+1/-0	1.5	10	95	1,000
	73+1/-0				

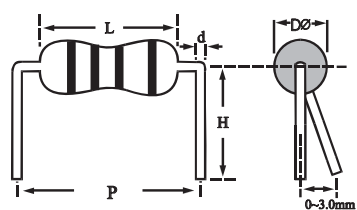
Ammo Packing



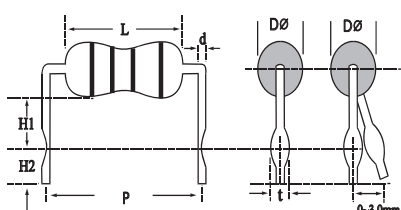
Unit: mm

Packaging Type	Packing Methods			Ammo Packing			
	A	B1-B2 Max	S	A	B	C	Qty
0318	52+1/-0	1.2	5	80	75	264	5,000
	26+1/-0	1.0					
0623	52+1/-0	1.2	5	80	105	264	5,000
	26+1/-0	1.0					
0932	52+1/-0	1.2	5	80	46	264	1,000
1145	52+1/-0	1.5	5	103	82	265	1,000
	73+1/-0						
1550	52+1/-0	1.5	10	103	96	265	1,000
	73+1/-0						

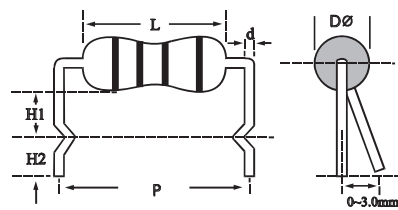
2. Special Type (Bulk)



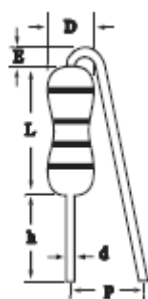
MA Type



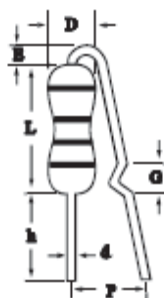
MB Type



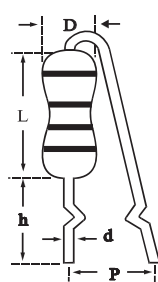
MC Type



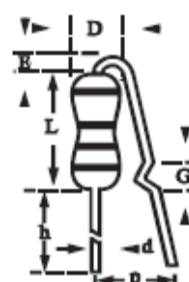
FA Type



FB Type



FC Type

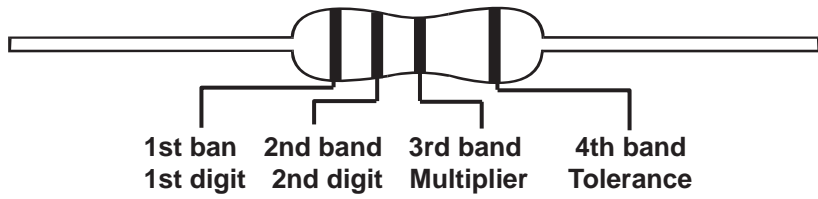


FD Type

Unit: mm

Codes	Type	P	H /H1/h	H2/G	t	D	L	d	E
0623	MA	10±1	10.0±1	-	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	MC	10±1	4.0±1	4.0±1	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	FA	5~15	4.0±2	-	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
	FD	5~15	27.0±2	3.0±0.5	-	2.3±0.3	6.3±0.5	0.55±0.03	3±1
0932	MA	12.5±1	10.0±1	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	MC	12.5±1	4.0±1	4.0±1	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	FA	5~15	4.0±2	-	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	3.2±0.5	9.0±0.5	0.65±0.03	3±1
	FC	5~15	10.0±3	-	-	3.2±0.5	9.0±0.5	0.65±0.03	-
1145	MA	15±1	12.5±1	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	MC	15±1	6.0±1	5.0±1.0	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	4.5±0.5	11.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	4.5±0.5	11.5±1.0	0.78±0.03	-
1550	MA	20±1	15.0±1	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	MC	20±1	10.0±1	5.0±1.0	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	FA	5~15	4.0±2	-	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FB	5~15	4.0±2	3.0±0.5	-	5.0±0.5	15.5±1.0	0.78±0.03	3±1
	FC	5~15	10.0±3	-	-	5.0±0.5	15.5±1.0	0.78±0.03	-

■ Marking & Resistance Tolerance



±2%	E-24	1.0	1.1	1.2	1.3	1.5	1.6	1.8	2.0	2.2	2.4	2.7	3.0	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5	8.2	9.1
±5%																									

Color	Digit	Multiplier	Tolerance	
Without	-	-	-	-
Silver	-	10^{-2}	-	-
Gold	-	10^{-1}	±5.0%	J
Black	0	10^0	-	-
Brown	1	10^1	-	-
Red	2	10^2	±2.0%	G
Orange	3	10^3	-	-
Yellow	4	10^4	-	-
Green	5	10^5	-	-
Blue	6	10^6	-	-
Violet	7	10^7	-	-
Grey	8	10^8	-	-
White	9	10^9	-	-