

## Data Sheet

**Customer:**

**Product:** Metal Film Flame-Proof Resistors — FMR Series

**Sizes.:** 0623/0932/1145/1550

**Issued Date:** 30-Jul-16

**Edition:** REV.A6



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## Metal Film Flame-Proof Resistors



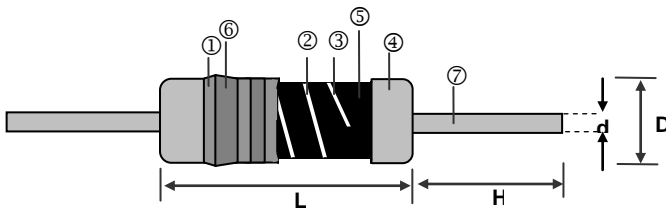
### ■ Features

- Low Noise
- Low TCR from  $\pm 15 \sim 100 \text{PPM}/^\circ\text{C}$
- High Precision from  $\pm 0.1\% \sim 1\%$
- Complete Flameproof Construction UL-1412 .
- Coating meets UL94V-0

### ■ Applications

- Telecommunication
- Medical Equipment
- Consumer Product

### ■ Construction



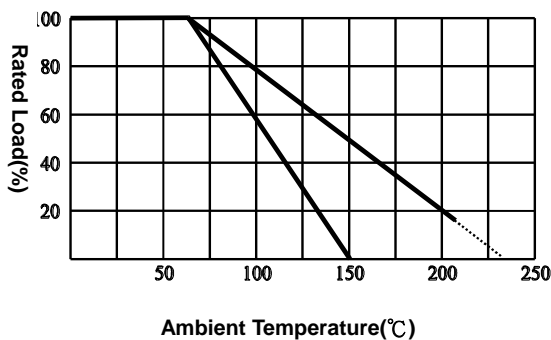
①	Insulation Coating	⑤	Resistor Layer
②	Trimming Line	⑥	Marking
③	Ceramic Core	⑦	Lead Wire
④	Electrode Cap		

### ■ Dimensions

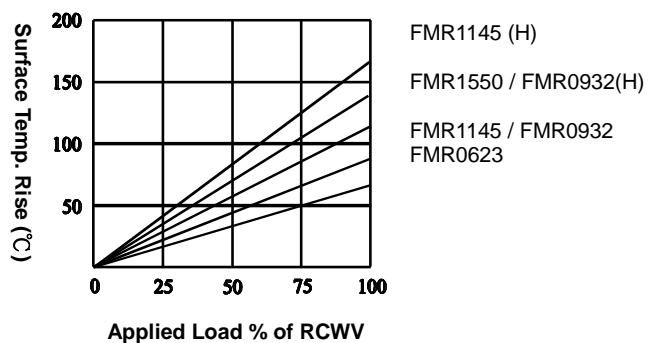
Unit: mm

Type	L	D	H	d
FMR0623	6.3 $\pm$ 0.5	2.3 $\pm$ 0.3	28 $\pm$ 2.0	0.55 $\pm$ 0.03
FMR0932	9.0 $\pm$ 0.5	3.2 $\pm$ 0.5	26 $\pm$ 2.0	0.65 $\pm$ 0.03
FMR1145	11.5 $\pm$ 1.0	4.5 $\pm$ 0.5	35 $\pm$ 2.0	0.78 $\pm$ 0.03
FMR1550	15.5 $\pm$ 1.0	5.0 $\pm$ 0.5	32 $\pm$ 2.0	0.78 $\pm$ 0.03

### ■ Derating Curve



### ■ Hot-spot Temperature



**Metal Film Flame-Proof Resistors**

**Part Numbering**

FMR	0318	B	T	N	W	1001	
Product Type	Dimensions (LxD)	Resistance Tolerance	Packaging Code	TCR (PPM/C)	Power Rating	Resistance	Special
	0623: 6.3x2.3 0932: 9.0x3.2 1145: 11.5x4.5 1550: 15.5x5.0	B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%	A: Ammo B: Bulk T: Taping Reel	N: ±15 C: ±25 D: ±50 E: ±100	R: 3W S: 2W T: 1W U: 1/2W V: 1/4W	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. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Resistance Range ≤0.25% E192	Resistance Range ≥0.50% E96	TCR (±PPM/°C)
0623	1/4W	-55 ~ +155°C	250V	500V	400V	100Ω   100KΩ	10Ω   1MΩ	±15 ±25 ±50 ±100
0932	1/2W		350V	700V	500V			
1145	1W		450V	1000V	750V			
1550	2W		500V	1000V	750V			

**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 ≤0.25% E192	Resistance Range ≥0.50% E96	TCR (±PPM/°C)
0623	1/2W	-55 ~ +155°C	300V	500V	400V	100Ω   100KΩ	10Ω   1MΩ	±15 ±25 ±50 ±100
0932	1W		400V	800V	600V			
1145	2W		500V	1000V	750V			
1550	3W		500V	1000V	750V			

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 : Grey**

**Metal Film Flame-Proof Resistors**

**■ Environmental Characteristics**

Item	Specification	Test Method
Short Time Overload	$\pm(0.25\%+0.05\Omega)$	<b>JIS-C-5202-5.5</b> RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds
Temperature Coefficient	By Type	Resistance value at room temperature and room temperature+100°C
Dielectric Withstanding Voltage	By Type	<b>JIS-C-5202-5.7</b> In V-Block for 60 seconds
Pulse Overload	$\pm(0.75\%+0.05\Omega)$	<b>JIS -C5202 5.8</b> 4 times RCWV for 10000cycles (1sec.on · 25secs.off)
Insulation Resistance	> 1000MΩ	<b>JIS -C5202 5.6</b> In V-Block for 60 seconds
Load Life	$\pm(1.5\%+0.05\Omega)$	<b>JIS -C5202 7.10</b> RCWV · 70°C · 1.5 hours ON · 0.5 hours OFF, total 1000 hours
Humidity ( Steady State )	$\pm(1.5\%+0.05\Omega)$	<b>JIS -C5202 7.9</b> 40±2°C , 90~95%RH,RCWV 1.5 hours ON,0.5 hours OFF, total 1000 hours
Solderability	95% Min. Coverage	<b>JIS -C5202 6.5</b> 235°C±5°C , 2±0.5 (sec)
Resistance To Solvent	No deterioration of coatings and markings	<b>JIS -C5202 6.9</b> Trichroethane for 1 min. with ultrasonic
Terminal Strength	Tensile: $\geq 2.5\text{kg}$	Direct Load for 10 sec. In the direction off the terminal leads.
Shelf Life	$\Delta R = \pm 0.1\%$	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

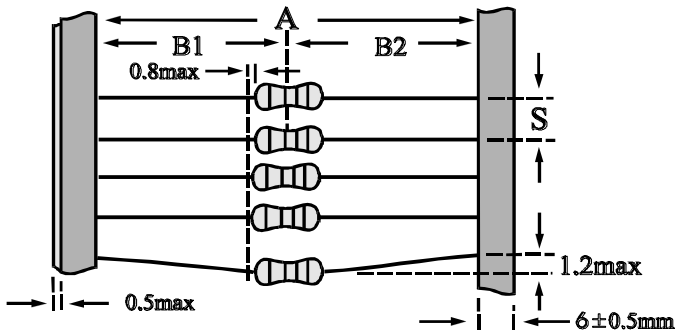
**■ Storage Temperature: 15~28°C; Humidity < 80%RH**

**Metal Film Flame-Proof Resistors**

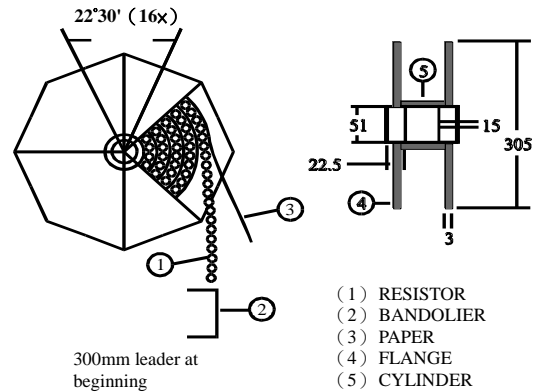
**■ Taping/Packing Specifications**

**1. Standard Type (Reel & Ammo)**

Packing Methods



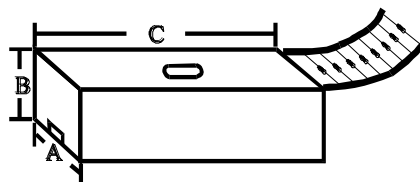
Reel Packing



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				

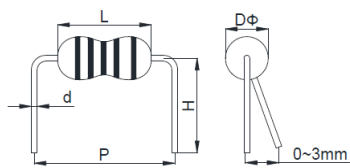
Ammo Packing



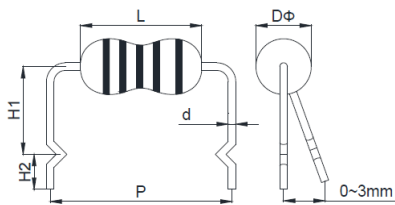
Unit: mm

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						

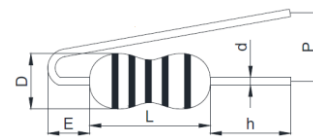
**2. Special Type (Bulk)**



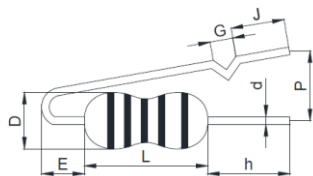
**MA Type**



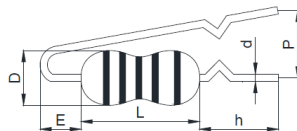
**MC Type**



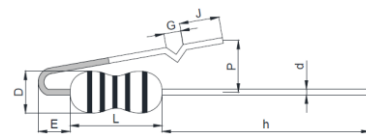
**FA Type**



**FB Type**



**FC Type**



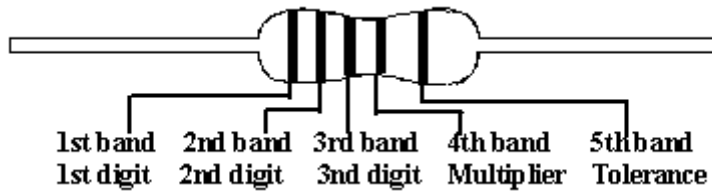
**FD Type**

Unit: mm

Codes	Type	P	H /H1/h	H2/G	J	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	5.0±1	6.0±2	-	2.3±0.3	6.3±0.5	0.55±0.03	-
	FA	5~15	5.0±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	3±1	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	5.0±1	4.0±2	-	3.2±0.5	9.0±0.5	0.65±0.03	-
	FA	5~15	5.0±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±1	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	8.0±1	6.0±1.0	-	4.5±0.5	11.5±1.0	0.78±0.03	-
	FA	5~15	5.0±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	3±1	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	12.0±1	5.0±1.0	-	5.0±0.5	15.5±1.0	0.78±0.03	-
	FA	5~15	5.0±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	3±1	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	-

**Metal Film Flame-Proof Resistors**

**■ Marking & Resistance Tolerance**



Color	Digit	Multiplier	Tolerance	
Without	-	-	-	-
Silver	-	10 <sup>-2</sup>	-	-
Gold	-	10 <sup>-1</sup>	-	-
Black	0	10 <sup>0</sup>	-	-
Brown	1	10 <sup>1</sup>	±1.0%	F
Red	2	10 <sup>2</sup>	-	-
Orange	3	10 <sup>3</sup>	-	-
Yellow	4	10 <sup>4</sup>	-	-
Green	5	10 <sup>5</sup>	±0.50%	D
Blue	6	10 <sup>6</sup>	±0.25%	C
Violet	7	10 <sup>7</sup>	±0.10%	B
Grey	8	10 <sup>8</sup>	-	-
White	9	10 <sup>9</sup>	-	-

±1.00% ±0.50%	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
±0.25% ±0.10%	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
		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