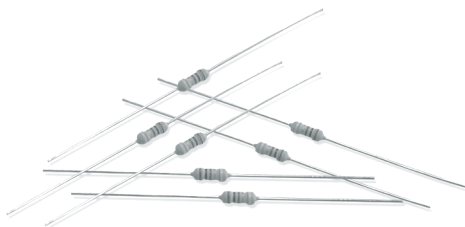


Metal Film Resistors

Fusible & Flame-Proof Type

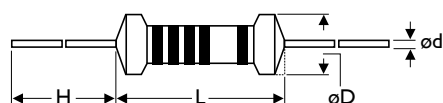
Normal & Miniature Style [FRM Series]



INTRODUCTION

The FRM Series Metal Film Fusible & Flame-Proof Resistors are manufactured using a vacuum sputtering system to deposit multiple layers of mixed metal alloys and passive materials onto a carefully treated high grade ceramic substrate. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper are welded to the end-caps. The resistors are coated with layers of gray color lacquer for normal size & pink color lacquer for miniature size. Overload protection without risk of fire. Wide range of overload currents.

DIMENSIONS



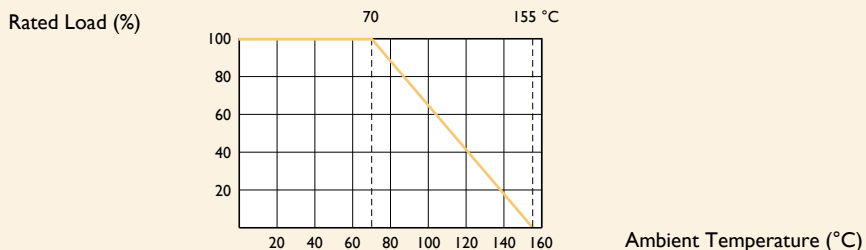
5th color code: white

FEATURES

Power Rating	1/4W, 1/2W, 1W, 2W, 3W
Resistance Tolerance	±2%, ±5%
T.C.R.	±200ppm/°C
Flameproof Multi-layer Coating Meets	UL-94V-0
Flameproof Feature Meets Overload Test	UL-1412

DERATING CURVE

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.



FUSING CHARACTERISTICS

$R \leq 2.0 \Omega$ Fusing time within 60 seconds at 36 times of rated power

$R \geq 2.2 \Omega$ Fusing time within 60 seconds at 25 times of rated power

Fusing residual resistive value at least 100 times rated resistance

Unit: mm

STYLE		DIMENSION			
Normal	Miniature	L	øD	H	ød
FRM-25	FRM50S	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
FRM-50	FRM1WS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
FRM100	FRM2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05
FRM200	FRM3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05

Note:

ELECTRICAL CHARACTERISTICS

STYLE	FRM-25	FRM50S	FRM-50	FRMIWS	FRMI00	FRM2WS	FRM200	FRM3WS
Power Rating at 70°C	1/4W	1/2W		1W		2W		3W
Maximum Working Voltage	200V		250V		300V		350V	
Maximum Overload Voltage	400V		500V		600V		700V	
Voltage Proof	250V				350V			
Resistance Range	4.7 Ω - 560 Ω ($\pm 2\%$) for E24 series value & 2.2 Ω - 560 Ω ($\pm 5\%$) for E24 series value							
Operating Temp. Range	-55°C to +155°C							
Temperature Coefficient	± 200 ppm/°C							

Note: Special value is available on request

ENVIRONMENTAL CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV for 5 Sec.	$\pm 2.0\% + 0.05 \Omega$
Voltage Proof	IEC 60115-1 4.7	in V-block for 60 Sec., test voltage by type	By type
Temperature Coefficient	IEC 60115-1 4.8	-55°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	$> 100M \Omega$
Solderability	IEC 60115-1 4.17	235 ± 5 °C for 3 ± 0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5 ± 0.5 Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	≥ 2.5 kg (24.5N)
Periodic-pulse Overload	IEC 60115-1 4.39	4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off)	$\pm 1.0\% + 0.05 \Omega$
Damp Heat Steady State	IEC 60115-1 4.24	40 ± 2 °C, 90-95% RH for 56 days, loaded with 0.1 times RCWV	$\pm 5.0\% + 0.05 \Omega$
Endurance at 70°C	IEC 60115-1 4.25	70 ± 2 °C at RCWV for 1,000 Hr. (1.5 Hr. on, 0.5 Hr. off)	$\pm 5.0\% + 0.05 \Omega$
Temperature Cycling	IEC 60115-1 4.19	-55°C $\Rightarrow$ Room Temp. $\Rightarrow$ +155°C $\Rightarrow$ Room Temp. (5 cycles)	$\pm 2.0\% + 0.05 \Omega$
Resistance to Soldering Heat	IEC 60115-1 4.18	260 ± 3 °C for 10 ± 1 Sec., immersed to a point 3 ± 0.5 mm from the body	$\pm 1.0\% + 0.05 \Omega$
Accidental Overload Test	IEC 60115-1 4.26	4 times RCWV for 1 Min.	No evidence of flaming or arcing

Note: Rated Continuous Working Voltage (RCWV) = $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$

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