

# MFMV series Metal Film MELF Resistor Automotive



## ■ Features

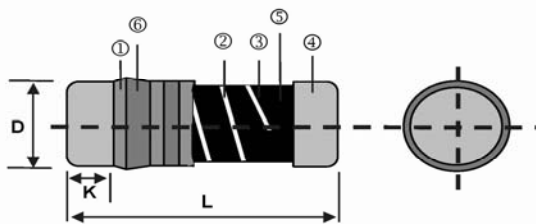
- AEC-Q200 Compliance
- Thin film technology
- Excellent overall stability
- Sn termination on Ni barrier layer
- Tight tolerance down to  $\pm 0.1\%$
- Extremely low TCR down to  $\pm 10$  PPM/°C
- High power rating up to 1 Watts
- SMD enabled structure
- Lead-free and RoHS compliant

## ■ Applications

- Automotive
- Industrial
- Telecommunication
- Medical Equipment
- Measurement/Testing Equipment

TECHNICAL SPECIFICATIONS							
DESCRIPTION	0102			0204		0207	
Resistance range	8.2Ω-1MΩ; 0Ω			0.1Ω-3.4MΩ; 0Ω		0.1Ω-3.4MΩ; 0Ω	
Resistance tolerance	$\pm 5\%; \pm 1\%; \pm 0.5\%; \pm 0.25\%; \pm 0.1\%$						
Temperature coefficient	$\pm 100\text{ppm}/^\circ\text{C}; \pm 50\text{ppm}/^\circ\text{C}; \pm 25\text{ppm}/^\circ\text{C}; \pm 15\text{ppm}/^\circ\text{C}$			$\pm 100\text{ppm}/^\circ\text{C}; \pm 50\text{ppm}/^\circ\text{C}; \pm 25\text{ppm}/^\circ\text{C}; \pm 15\text{ppm}/^\circ\text{C}$			
Operation mode	Standard	High power		Standard	High power	Standard	High power
Power rating $P_{70}$	1/8W	1/5W	0.3W	1/4W	2/5W	1/2W	1W
Operating voltage $U_{\text{max}}$	150V	200V	200V	200V	200V	300V	350V
Operating temperature range	$-55^\circ\text{C} \sim 155^\circ\text{C}$						
Max. resistance change at P70 for resistance range, $\Delta R/R$ max., after 1000 h	$\leq 0.5\%$			$\leq 0.5\%$		$\leq 0.5\%$	

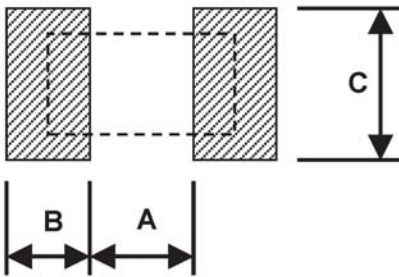
## ■ Construction & Dimension



① Insulation Coating	④ Electrode Cap
② Trimming Line	⑤ Resistor Layer
③ Ceramic Rod	⑥ Marking

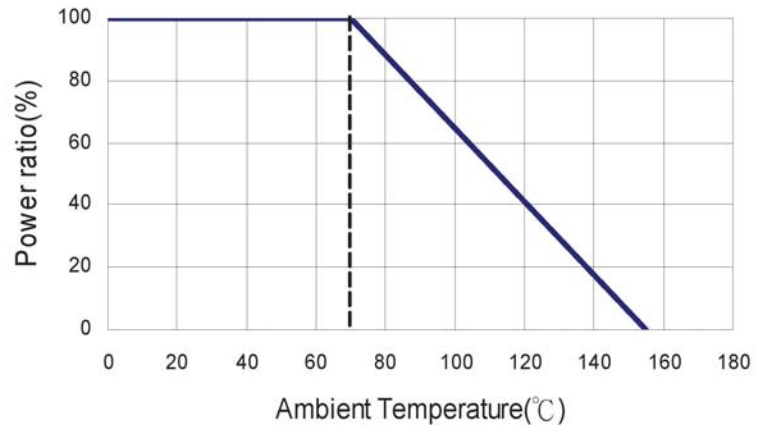
Type	L (mm)	ΦD (mm)	K (mm)	Weight 1,000EA (g)
0102	2.20±0.10	1.10±0.10	0.45±0.05	7.7
0204	3.50±0.2	1.40±0.15	0.8±0.1	18.7
0207	5.90±0.2	2.20±0.20	1.3±0.1	80.9

### Recommend Land Pattern

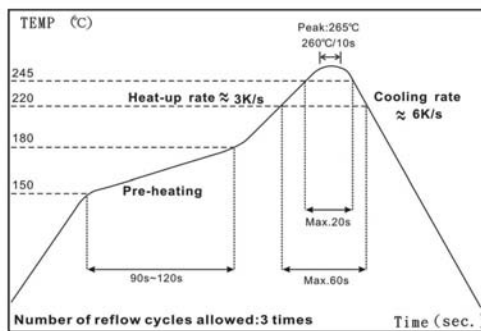


Type	A (mm)	B (mm)	C (mm)
0102	1.0	0.8	1.5
0204	1.6	1.2	1.6
0207	3.0	1.7	2.4

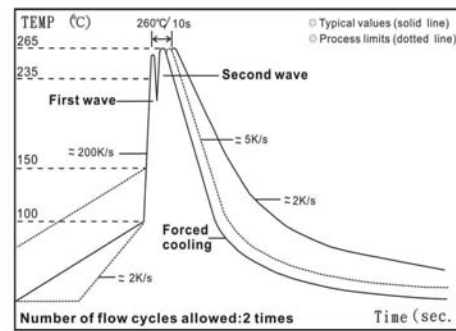
### Derating Curve



### Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

### ◆ Part Number

MFMV	B	25	F	C2	R	-	1K
Series code	Size code	Power Rating	Tolerance	T.C.R ppm	Packing Code	Special code	Resistance Value
MFMV	A=0102 B=0204 C=0207	100=1W 50=1/2W 25=1/4W 40=2/5W 20=1/5W 12=1/8W 30=0.3W	B= $\pm 0.1\%$ C= $\pm 0.25\%$ D= $\pm 0.5\%$ F= $\pm 1\%$ J= $\pm 5\%$	C1= $\pm 100$ C2= $\pm 50$ C3= $\pm 25$ C4= $\pm 15$ C5= $\pm 10$	Taping/Reel		1K=1000R

**Standard Electrical Specifications**

Item Type	Power Rating at 70 °C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range					TCR (PPM/°C)
					±0.1%	±0.25%	±0.5%	±1%	±5%	
0102	1/8W Jumper:2A	-55 ~ +155°C	150V	300V	100Ω-56KΩ				-	±15
					100Ω-82KΩ	49.9Ω-200KΩ	49.9Ω-390KΩ	-	±25	
					-	8.2Ω-1MΩ			±50	
					-	40Ω-1MΩ			±100	
					0Ω(<15mΩ)				-	
0204	1/4W Jumper:2A	-55 ~ +155°C	200V	400V	49.9Ω-20KΩ				±10	
					10Ω-300KΩ				±15	
					10Ω-1MΩ	10Ω-3.4MΩ	4.02Ω-3.4MΩ	±25		
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50	
					-	0.1Ω-1MΩ			±100	
0Ω(<15mΩ)				-						
0207	1/2W Jumper:4A	-55 ~ +155°C	300V	600V	49.9Ω-20KΩ				±10	
					10Ω-300KΩ				±15	
					10Ω-1MΩ	10Ω-3.4MΩ	4.02Ω-3.4MΩ	±25		
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50	
					-	0.1Ω-1MΩ			±100	
0Ω(<15mΩ)				-						

**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)
					±0.1%	±0.25%	±0.5%	±1%	±5%	
0102	1/5W 0.3W	-55 ~ +155°C	200V	400V	100Ω-56KΩ				-	±15
					-	100Ω-82KΩ	49.9Ω-200KΩ	49.9Ω-390KΩ	-	±25
					-	8.2Ω-1MΩ			±50	
					-	40Ω-1MΩ			±100	
0204	2/5W	-55 ~ +155°C	200V	400V	10Ω-300KΩ				±15	
					10Ω-1MΩ	10Ω-3.4MΩ	4.02Ω-3.4MΩ	±25		
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50	
					-	0.1Ω-1MΩ			±100	
0207	1W	-55 ~ +155°C	350V	700V	10Ω-300KΩ				±15	
					10Ω-1MΩ	10Ω-3.4MΩ	4.02Ω-3.4MΩ	±25		
					10Ω-1MΩ	1Ω-1MΩ	1Ω-3.4MΩ	0.2Ω-3.4MΩ	±50	
					-	0.1Ω-1MΩ			±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.  
 RCWV(Rated Continuous Working Voltage)= $\sqrt{P \cdot R}$  or Max. Operating Voltage whichever is lower.

**Environmental Characteristics**

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec	JIS-C-5201-1 4.8 IEC-60115-1 4.8 -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	10Ω-270KΩ: ±(0.1%+0.05Ω) <10Ω & >270KΩ: ±(0.15%+0.05Ω) 0102: ±(0.15%+0.05Ω)	JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCVV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds
Insulation Resistance	≥10G	JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. Overload Voltage for 1 minute
Endurance	10Ω-270KΩ: ±(0.25%+0.05Ω) <10Ω & >270KΩ: ±(0.5%+0.05Ω) 0102: ±(0.5%+0.05Ω)	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 MIL-STD-202 Method 108 70±2°C, RCVV for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"
Biased Humidity	10Ω-270KΩ: ±(0.5%+0.05Ω) <10Ω & >270KΩ: ±(1%+0.05Ω) 0102: ±(2%+0.05Ω)	MIL-STD-202 Method 103 1000 hrs 85°C/85%RH 10% of operating power.
High Temperature Exposure	10Ω-270KΩ: ±(0.25%+0.05Ω) <10Ω & >270KΩ: ±(1%+0.05Ω) 0102: ±(1%+0.05Ω)	MIL-STD-202 Method 108 at +155°C for 1000 hrs
Board Flex	10Ω-270KΩ: ±(0.1%+0.05Ω) <10Ω & >270KΩ: ±(0.5%+0.05Ω) 0102: ±(0.5%+0.05Ω)	AEC-Q200-005 Bending once for 60 seconds with 2mm
Solderability	95% min. coverage	JIS-C-5201-1 4.17 IEC-60115-1 4.17 J-STD-002 245±5°C for 3 seconds
Resistance to Soldering Heat	10Ω-270KΩ: ±(0.1%+0.05Ω) <10Ω & >270KΩ: ±(0.25%+0.05Ω) 0102: ±(0.25%+0.05Ω)	MIL-STD-202 Method 210 260±5°C for 10 seconds
Voltage Proof	No breakdown or flashover	JIS-C-5201-1 4.7 IEC-60115-1 4.7 1.42 times Max. Operating Voltage for 1 minute
Leaching	Individual leaching area ≤ 5% Total leaching area ≤ 10%	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260±5°C for 30 seconds
Temperature Cycling	10Ω-270KΩ: ±(0.25%+0.05Ω) <10Ω & >270KΩ: ±(0.5%+0.05Ω) 0102: ±(1%+0.05Ω)	JESD22 Method JA-104 -55°C to +125°C, 1000 cycles
Mechanical Shock	±(0.25%+0.05Ω)	MIL-STD-202 Method 213 Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6.
Vibration	±(0.5%+0.05Ω)	MIL-STD-202 Method 204 5 g's for 20 min., 12 cycles each of 3 orientations, 10-2000 Hz
ESD	±(0.5%+0.05Ω)	AEC-Q200-002 Human body, 2KV
Resistance to Solvents	No visible damage on appearance and marking.	MIL-STD-202 Method 215 Add Aqueous wash chemical - OKEM Clean or equivalent. Do not use banned solvents.
Terminal Strength	No broken	AEC-Q200-006 Force of 1.8kg for 60 seconds.
Flammability	No ignition of the tissue paper or scorching of the pinewood board	UL-94 V-0 or V-1 are acceptable. Electrical test not required.

RCVV(Rated Continuous Working Voltage)=√(P\*R) or Max. Operating Voltage whichever is lower.

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