

MMF Series

FEATURES

- AEC-Q200 qualified
- MELF SMD package, Advanced Metal Film Technology
- Excellent pulse withstanding capability
- Wide resistance range
- RoHS and REACH compliant and halogen free

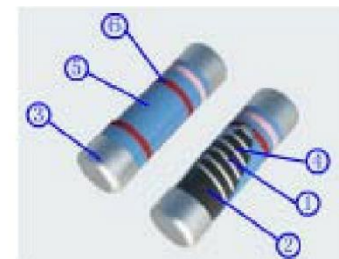


APPLICATIONS

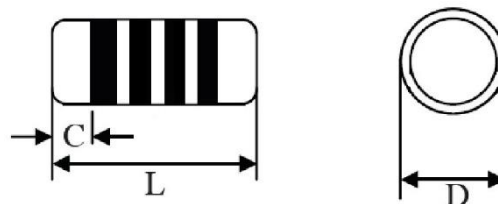
- General purpose applications
- Power applications
- Energy smart meter
- Medical equipment
- Industrial applications

CONSTRUCTION

- ① Ceramic base
- ② Metal film
- ③ Tin-plated steel caps
- ④ Trimming line
- ⑤ Insulating resin
- ⑥ Marking



DIMENSION

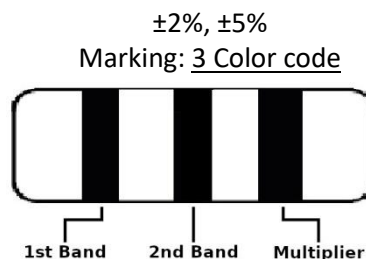
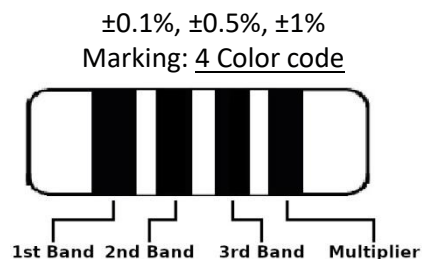


Type		Dimensions (mm)			Resistance range	Tolerance
		L	C Min	D Max		
0102	1/8W 1/5WS	2.2±0.1	0.45	1.2	1Ω~560Ω	±0.1% ±0.5% ±1% ±5%
0204	1/8W 1/6W 1/4WS 1/2WSS 2/5W	3.5±0.2	0.6	1.55	1Ω~10MΩ 0Ω	
0207	1/4W 1/2WS 1WSS	5.9±0.2	1.0	2.4	1Ω~10MΩ 0Ω	
0309	1/2W 1WS 2WSS	8.5±0.3	1.2	3.5	1Ω~10MΩ	
0411	1W 2WS 3WSS	10.5±0.3	2.3	4.3	1Ω~10MΩ	

Note: 0Ω Resistance Value <30mΩ

EXPLANATION OF COLOR

Coating color: Blue



Color	1 st Band	2 nd Band	3 rd Band	Multiplier
Black	0	0	0	1x
Brawn	1	1	1	10x
Red	2	2	2	100x
Orange	3	3	3	1000x
Yellow	4	4	4	10000x
Green	5	5	5	-
Blue	6	6	6	-
Violet	7	7	7	-
Gray	8	8	8	-
White	9	9	9	-
Gold				0.1x
Silver				0.01x

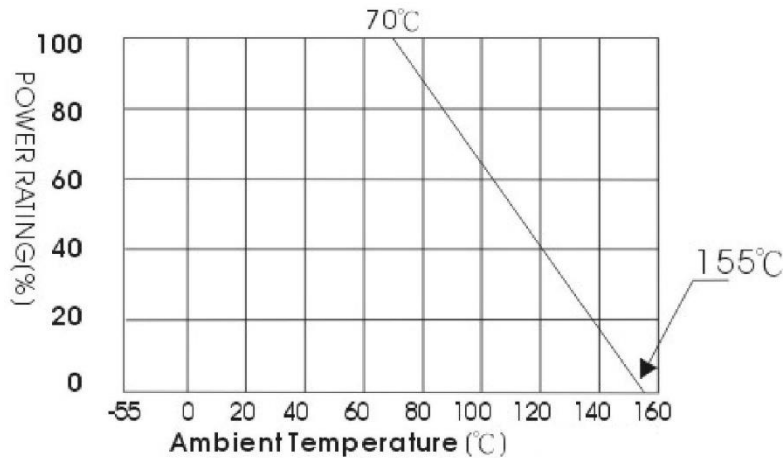
Notice: 0Ω mark with one Black color

PARTS NUMBER EXPLANATION

MMF		1/4W	T		04	F	1R3	50
Product Type		Watt	Package Type		Size and Dimension		Resistance (ohm)	T.C.R
MMF	MELF Metal Film Resistor	1/8W	T	Taped on reel	02	0102	B ±0.1%	5 ±5 PPM
		1/6W			04	0204	C ±0.25%	10 ±10 PPM
		1/4W			07	0207	D ±0.5%	15 ±15 PPM
		1/2W			09	0309	F ±1%	25 ±25 PPM
		2/5W			11	0411	G ±2%	50 ±50 PPM
		1W					J ±5%	100 ±100 PPM
		2W						
		3W						
QMMF	AEC-Qualified MELF Metal Film Resistor						1R3 1.3	
							10R 10	
							49R9 49.9	
							120R 120	
							1K 1K	
							1M 1M	

POWER DERATING CURVE

Rated power is maximum power which can be continuously loaded at specified ambient temperature 70°C, however when the ambient temperature exceeds 70°C, rated power should be determined from the derating curve.



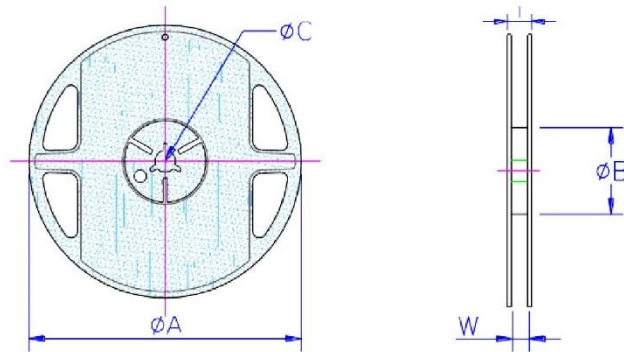
CHARACTERISTICS

Characteristics	Specifications				
Type	0102	0204	0207	0309	0411
Rated voltage	$U = \sqrt{P \times R}$	$U = \sqrt{P \times R}$	$U = \sqrt{P \times R}$	$U = \sqrt{P \times R}$	$U = \sqrt{P \times R}$
Max continuous working voltage	150V	200V	350V	350V	500V
Max overload voltage	300V	400V	700V	700V	800V
0Ωcurrent strength	/	2A	4A	/	/
0ΩMax overload current strength	/	4A	6A	/	/
Operating temp range	-55°C ~ +155°C				

PERFORMANCE

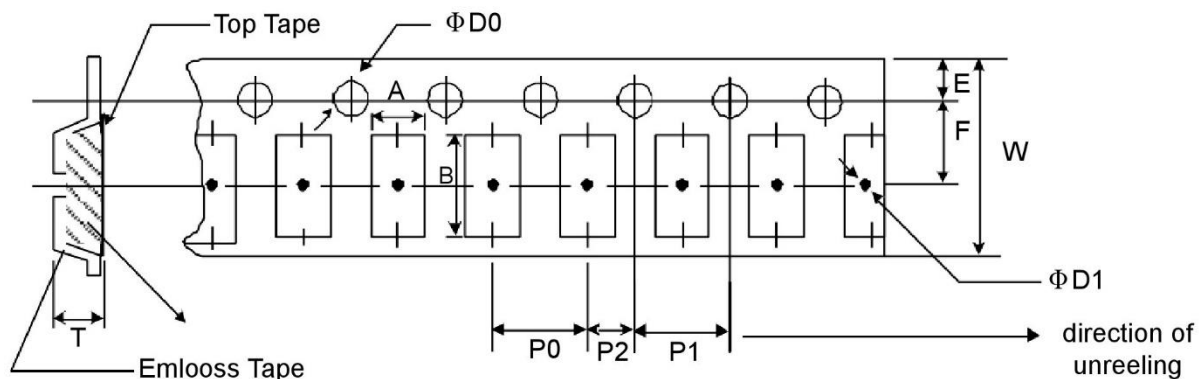
Characteristics	Specifications	Test methods						
T.C.R	±100PPM	$\frac{R2 - R1}{R1 \times (T2 - T1)} \times 10^6 / ^\circ\text{C}$ R1: Resistance value at room temperature (T1). R2: Resistance value at room temperature+100°C.						
Short time over load	±(0.5%R+0.05Ω)	Resistance change after the application of a potential of 2.5 time rated voltage for 5 seconds.						
Load life in humidity	Resistance change rate less than ±(1%R+0.05Ω) With no evidence of mechanical damage.	Resistance change after 1000 hrs (1.5hrs ON 0.5hrs OFF)at rated voltage in a humidity chamber controlled at 40±2°C and 90-95% relative humidity.						
Load life	Resistance change ±(1%R+0.05Ω) MAX. With no evidence of mechanical damage.	Resistance change after 1000hrs operating at rated voltage with duty cycle of 1.5hrs ON 0.5hrs OFF at 70°C±2°C.						
Resistance to soldering heat	Resistance change is ±(0.5%R+0.05Ω).MAX. With no evidence of mechanical damage.	<table><tr><td>Temperature</td><td>Dip Time</td></tr><tr><td>350°C ±10°C</td><td>3±0.5 sec</td></tr><tr><td>260°C ±5°C</td><td>10±1 sec</td></tr></table>	Temperature	Dip Time	350°C ±10°C	3±0.5 sec	260°C ±5°C	10±1 sec
Temperature	Dip Time							
350°C ±10°C	3±0.5 sec							
260°C ±5°C	10±1 sec							
Solder ability	95% coverage minimum	Test temperatures of solder: 255±5°C Dwell time in solder:3±0.5 sec						

TAPE PACKING IN EVERY BOX



Packaging Quantity & Reel Specifications

Type	Reel Diameter	ΦA (mm)	ΦB (mm)	ΦC (mm)	W (mm)	T (mm)	Emboss Plastic Tape (EA)
0102	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
0204	7 inch	178.5±1.5	60.0+1.0	13.0±0.2	9.0±0.5	12.5±0.5	3,000
0207	7 inch	178.5±1.5	60.0+1.0	13.0±0.5	13.0±0.5	15.5±0.5	2,000
0309	13 inch	330±1.5	100.0+1.0	13.0±0.5	17.0±0.5	19.0±0.5	2,500
0411	13 inch	330±1.5	100.0+1.0	13.0±0.5	17.0±0.5	19.0±0.5	1,500

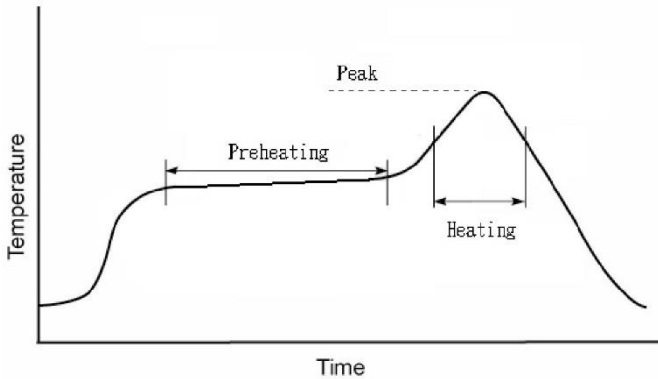


Emboss Plastic Tape Specifications

Type	A (mm)	B (mm)	W (mm)	E (mm)	F (mm)	P0 (mm)	P1 (mm)	P2 (mm)	ΦD0 (mm)	T (mm)
0102	1.30±0.10	2.40±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.50±0.10
0204	1.55±0.10	3.65±0.10	8.0±0.10	1.75±0.10	3.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	1.45±0.20
0207	2.40±0.10	6.15±0.10	12.0±0.10	1.75±0.10	5.50±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	2.50±0.30
0309	3.30±0.10	9.00±0.10	16.0±0.10	1.75±0.10	7.50±0.05	4.00±0.10	8.00±0.10	2.00±0.05	1.50±0.10	3.30±0.50
0411	4.30±0.10	11.0±0.10	24.0±0.30	1.75±0.10	11.5±0.05	4.00±0.10	8.00±0.10	2.00±0.05	1.50±0.10	4.30±0.10

SUGGESTION

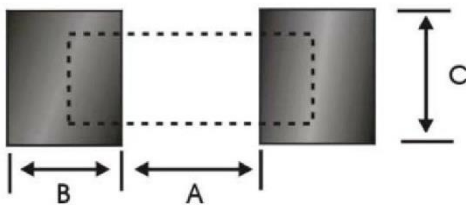
- Reflow soldering (lead-free)



Status	Temperature MAX	Time Max
Preheating	180°C	120 sec
Heating	220°C	60 sec
Peak	260°C	3 sec

- Pad design

Recommend Land Pattern



Type	A(mm)	B(mm)	C(mm)
0102	1.0	0.8	1.5
0204	1.6	2.0	2.2
0207	3.2	3.0	3.5
0309	5.6	4.0	4.0
0411	8.2	5.0	5.0

CAUTION

- Storage and usage method
- Humidity gives damage to cap solderability, therefore, please keep environment.
Temperature : +5°C~+40°C
Humidity : 55%~75%RH
Storage limited : 12 months
- Please follow the instruction to keep the material when it is unpacked.
- When ambient temperature exceeds a rated ambient temperature, the resistance shall be applied on the derating curve by derating the load power.
- Please avoid join many resistors in series or parallel when apply high voltage or high electric current.
- Molding products by using resin might bring out resistance value change. Please keep away from Molding.
- This products meet the RoHS Compliant.