

FMF series
Metal Strip Type
Lead Free Current Sensing Resistors



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FMF series Metal Strip Type Lead Free Current Sensing Resistors



1. Features

- High power rating and low TCR.
- Low resistance and high precision (1%).
- Inductance less than 1.0nH.
- Excellent reliability and suitable cost.
- Suitable for lead free soldering.

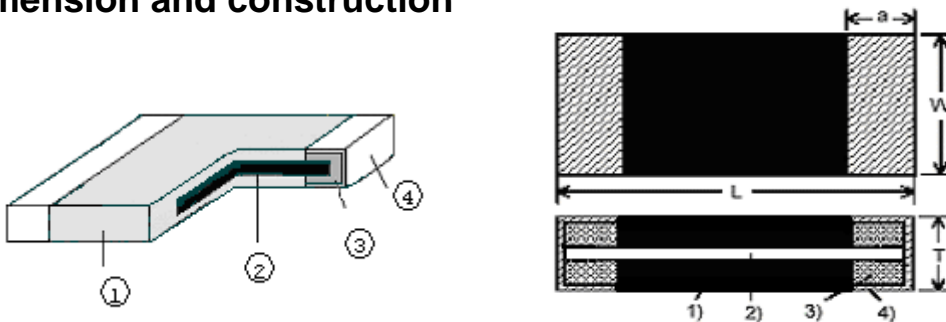


2.Applications

- Switching model power supply.
- Battery pack.
- Notebook, personal computer.
- Test Instrument.
- Power Amplifier.



3.Dimension and construction

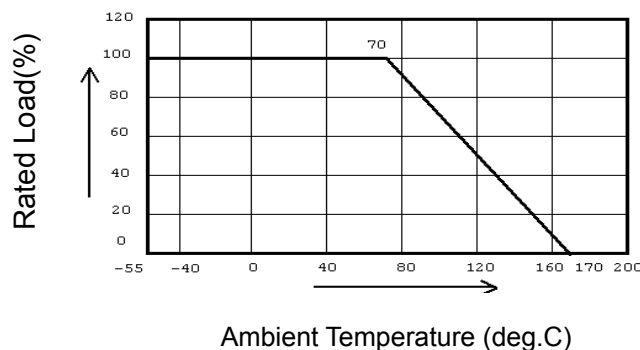


TYPE	1.Protective Coating	2.Resistive Element	3.Terminal	4.Outer Terminal
FMF	Resin	Alloy Metal	Copper	Tin Plating

Type	L	W	T	a
FMF25 1m,2m	6.20+/-0.25	3.20+/-0.25	0.70+/-0.20	2.0+/-0.30
FMF25 3m~50m	6.20+/-0.20	3.20+/-0.20	0.60+/-0.20	0.80+/-0.20
FMF20 5m~20m	5.00+/-0.20	2.50+/-0.20	0.60+/-0.20	0.60+/-0.20
FMF06 5m~20m	3.10+/-0.15	1.60+/-0.20	0.60+/-0.20	0.65+/-0.20
FMF59 5m	15.0+/-0.20	7.8+/-0.20	0.70+/-0.20	3.50+/-0.20

4.Power Derating Curve

Operating Temperature Range: -55 to +170 deg.C



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5. Rating

Rating Type	Power Rating at 70 (W)	Max Working Voltage	Max Overload Voltage	Resistance Tolerance (%)	Temperature coefficient of Resistance (ppm/)	Resistance Range (m)
FMF25 2512	2	224mV	448mV	±1%(F)	±100	1,2,3,4
				±5%(J)	±70	5,6,7,8,9,10,15,20,25
FMF25 2512	1	158mV	316mV	±1%(F)	±100	1,2,3,4
				±5%(J)	±70	5,6,7,8,9,10,15,20,25 30,40,50
FMF20 2010	1	141mV	282mV	±1%(F) ±5%(J)	±70	5,10,15,20
FMF06 1206	1	141mV	282mV	±1%(F) ±5%(J)	±70	5,10,15,20,25
FMF06 1206	1/2	100mV	200mV	±1%(F) ±5%(J)	±70	5,10,15,20,25
FMF59 5931	5	158mV	316mV	±1%(F) ±5%(J)	±70	5

Note: Power testing with total solder-pad and trace size of 300 mm²

$$E = \sqrt{P * R} \quad E : \text{Working Voltage(V)} , P : \text{Rated Power (W)} , R : \text{Resistance Value}(\Omega)$$

6. Part Number

<u>□□□</u>	<u>□□</u>	<u>□</u>	<u>□</u>	<u>□</u>	<u>□□□□</u>	<u>-</u>	<u>□</u>
Type	Size	Tolerance	Packing	Watt	R Value		Special Code
FMF	25-2512	F: ±1%	P-PlasticTape-4Kpcs	H:1W	4 digit		L : Horizontal
	20-2010	J : ±5%	(For 2512,2010)	J :2W			Marking
	06-1206		T-PaperTape-4Kpcs	F :1/2W			B : Customer
	59-5931		(For 1206)	M :5W			Make
			Q-Plastic Tape-3Kpcs				
			(For 5931)				

7. Resistance Marking



For 1~2 m



For 3~50 m

R001 = 1 m

R020 = 20m

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8. Reliability Performance

Test Item	Specification	Test Method
DC Resistance	F : $\pm 1\%$. J : $\pm 5\%$	IEC 60115-1 / JIS C 5201-1 , Clause 4.5 Measure the resistance Value.
Short Time Overload	R $\pm(1\%+0.1m)$)	IEC 60115-1 / JIS C 5201-1 , Clause 4.13 5 × Rated power for 5 seconds 5 × Rated power for 2 seconds(for 5931) Measure resistance after 30 minutes
Solderability	Over 95% of termination must be covered with (Sn+Ag+Cu)	IEC 60115-1 / JIS C 5201-1 , Clause 4.17 After immersing flux, dip in the 245 \pm 2 molten solder bath for 3 \pm 0.5 sec.
Resistance to solder Heat	R $\pm(1\%+0.1m)$) No mechanical damage	IEC 60115-1/JIS C 5201-1 , Clause 4.18 With 260 \pm 5 for 10 \pm 1sec.
Load Life Humidity	R $\pm(1\%+0.5m)$)	IEC 60115-1 / JIS C 5201-1 , Clause 4.24 40 \pm 2 with relative humidity 90% ~ 95% D.C. rated voltage for 1.5 hours ON 30 minutes OFF. Cycle repeated 1000 hours.
Temperature Coefficient of Resistance (TCR)	$\pm 100\text{ppm/}$ $\pm 70\text{ppm/}$	IEC 60115-1 / JIS C 5201-1 , Clause 4.8 IEC 60115-1 4.8.4.2 / JIS C 5202 5.2 T_1 T_2 Test temperature : 25 ~-55 25 ~155 $\text{TCR}(\text{ppm/}) = (R_2 - R_1) / R_1 \times 1 / (T_2 - T_1) \times 10^6$
Load Life	R $\pm(1\%+0.5m)$)	IEC 60115-1 / JIS C 5201-1 , Clause 4.25 Rated voltage for 1.5hours for followed by a pause 0.5 hour at 70 \pm 2 . Cycle repeated 1000 hours
Temperature Cycle	R $\pm(1\%+0.5m)$) No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.19 Repeat 5 cycles as follows -55 (30min.) + 25 (2~3min.) + 155 (30min.) + 25 (2~3min.)
Insulation Resistance	Between termination and coating must be over 1000M	IEC 60115-1 / JIS C 5201-1 , Clause 4.6 Test voltage : 100 \pm 15V
Bending strength	R $\pm(1\%+0.5m)$) No mechanical damage	IEC 60115-1 / JIS C 5201-1 , Clause 4.33 Resistance change after bended on the 90mm PCB. Bending :2mm

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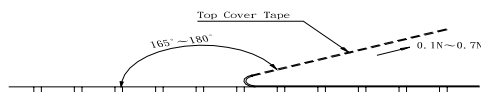


9. PACKAGING

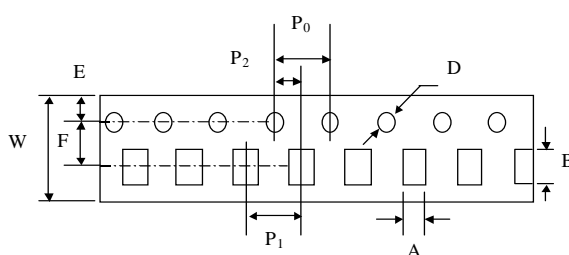
9.1 Peel Strength of Top Cover Tape

The peel speed shall be about 300 mm/min

The peel force of top cover tape shall between 0.1 to 0.7N



9.2 Tape Packaging Dimensions

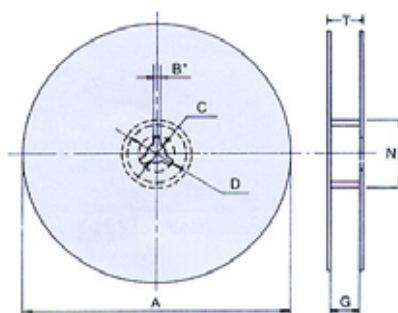


Accumulated dimensional tolerance $40 \pm 0.2 \text{mm}$

Size	A	B	W	F	E	P1	P2	P0	D
2512	3.50 ± 0.20	6.75 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
2010	2.80 ± 0.20	5.55 ± 0.20	12.00 ± 0.30	5.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
1206	2.00 ± 0.20	3.60 ± 0.20	8.00 ± 0.30	3.50 ± 0.05	1.75 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	4.00 ± 0.10	$1.50 + 0.10 / -0$
5931	8.2 ± 0.10	15.4 ± 0.10	24 ± 0.30	11.5 ± 0.10	1.75 ± 0.10	12 ± 0.10	2 ± 0.10	4 ± 0.10	1.5 ± 0.10

unit : mm

9.3 Reel Dimensions



Size	Packaging Q'ty	A	N	C	D	B	G	T
2512 2010	4kpcs/Reel	178.0 ± 2.0	60.0 ± 0.5	13.0 ± 0.5	20(Min.)	2.0 ± 0.5	13.8 ± 1.5	16.7max.
	8kpcs/Reel	254.0 ± 2.0	100.0 ± 0.5	13.5 ± 0.5	20(Min.)	2.0 ± 0.5	13.8 ± 1.5	20.0max.
	16kpcs/Reel	330.0 ± 2.0	100.0 ± 1.0	13.5 ± 0.5	20(Min.)	2.0 ± 0.5	13.8 ± 1.5	20.0max.
1206	4kpcs/Reel	178.0 ± 2.0	60.0 ± 0.5	13.0 ± 0.5	20(Min.)	2.0 ± 0.5	10.0 ± 1.5	14.9max.
5931	3kpcs/Reel	330.0 ± 2.0	99.5 ± 1.0	13.0 ± 0.5	20(Min.)	2.0 ± 0.5	24.0 ± 1.0	28.6max.

All product specification and data are subject to change without notice.