香港電阻

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HONG KONG RESISTORS MANUFACTORY

(wholly owned by Hong Kong Resistors Manufactory International Ltd.)

AN ISO 9001:2015 CERTIFIED MANUFACTURER

AN ISO 45001: 2018 MANUFACTURER

AN ISO 14001: 2015 MANUFACTURER

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DATASHEET

Name of Product: Automotive Grade Metal Foil Chip Fixed Resistor–AMF Series

Sales Executive:_____ Date:_____

制造 Prepared by	品质 Quality by	业务 Sales by	核准 Authorized by
客户 customer approval	客户 customer approval	客户 customer approval	客户 customer approval

Spec. No. 2023 AMF

Rev. No.: 2023 Apr

Automotive Grade Metal Foil Chip Fixed Resistor



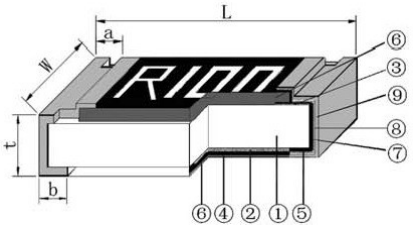
Features

- AEC-Q200 Compliance
- High power rating up to 2 Watts
- Low TCR down to ±50 PPM/°C
- Current detecting resistors for power supply, etc
- Superior mechanical and frequency characteristics
- Compliant with RoHS directive
- Halogen free requirement

Applications

- Switching Power Supply, Over Current Protection
- Voltage Regulation Module(VRM)
- DC-DC Converter, Charger
- Automotive Engine Control, Portable Devices etc.

Construction



①	Ceramic Substrate	④	Primary Overcoat	⑦	Edge Electrode
②	Alloy Plate	⑤	Cu Plating	⑧	Barrier Layer
③	Top Electrode	⑥	Secondary Overcoat	⑨	External Electrode

Dimensions

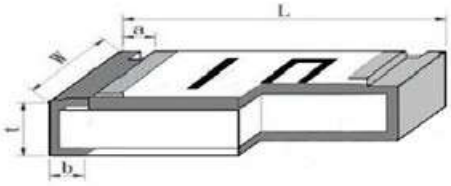


Figure1

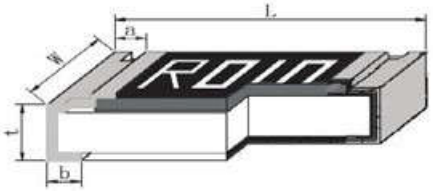


Figure2

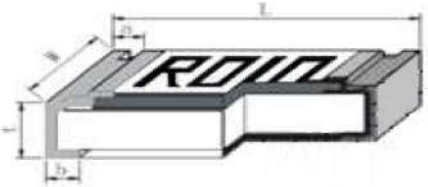


Figure3

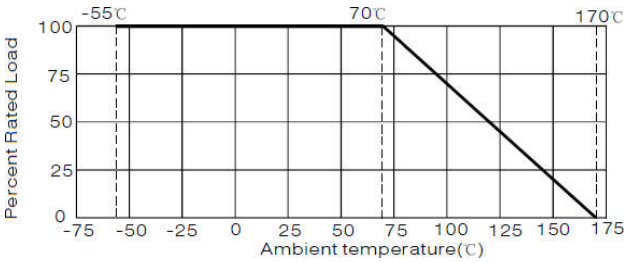
Type	Size (Inch)	Resistance (mΩ)	L mm	W mm	t mm	a mm	b mm
AMF03	0603	5-20	1.60±0.20	0.80±0.20	0.70±0.15	0.35±0.25	0.35±0.20
AMF05	0805	3-4	2.00±0.20	1.25±0.20	0.70±0.15	0.40±0.25	0.70±0.30
		5-47					0.40±0.30
AMF06	1206	3-4	3.20±0.20	1.60±0.20	0.75±0.15	0.50±0.30	0.90±0.30
		5-56					0.50±0.30
AMF20	2010	3	5.00±0.20	2.50±0.20	0.75±0.20	0.60±0.30	1.60±0.30
		4-5					1.30±0.30
		6-100					0.80±0.30
AMF25	2512	2	6.40±0.20	3.20±0.20	0.75±0.20	0.90±0.30	2.30±0.30
		3					1.90±0.30
		4					1.70±0.30
		5-6					1.20±0.30
		7					1.10±0.30
		8-200					0.90±0.30

Figure 1 for AMF03 type ; Figure 2 for AMF05≥10mΩ / AMF06 type / AMF12 type ; Figure 3 for AMF05<10mΩ / AMF10 type

Part Numbering

AMF	06	0R008	F	C1	1/2W
Type	Size	Value	Tolerance	TCR	Power
	03 : 0603		F : ±1%	±200PPM	1/4W
	05 : 0805		G : ±2%	C1: ±100PPM	1/3W
	06 : 1206		J : ±5%	C2: ±50PPM	1/2W
	20 : 2010				2W
	25 : 2512				1W
					2W

Derating Curve



Standard Electrical Specifications

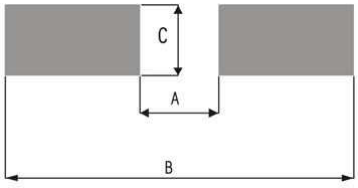
Item / Type	Power Rating at 70°C	Operating Temp. Range	Limiting Element Current(A)	Max. Overload Current (A)	Resistance Range(mΩ) ±1%	±2%	±5%	TCR (PPM/°C)
AMF03	1/4W	-55 ~ +170°C	5.0	11.2	9			±200
					10-20			±100
	1/3W, 1/2W		10.0	22.4	5-9			±200
					10			±100
AMF05	1/4W	-55 ~ +170°C	3.5	7.9	19-47			±50
	1/3W, 1/2W		12.9	28.9	3-9			±100
					10-20			±50
AMF06	1/2W	-55 ~ +170°C	5.0	11.2	19-56			±50
	1/2W, 1W		18.3	40.8	3-9			±100
					10-20			±50
AMF20	1W	-55 ~ +170°C	18.3	40.8	3-9			±100
					10-100			±50
AMF25	1W	-55 ~ +170°C	3.2	7.1	99-200			±50
	1W, 2W		31.6	63.3	2			±200
					3-9			±100
					10-100			±50

Current of DC or AC RMS value.
Rated current=√(P/R) or Limiting element voltage whichever is lower.

Environmental Characteristics

Item	Requirement	Test Method
Temperature Coefficient of Resistance (T.C.R.)	As Spec.	**IEC 60115-1 4.8** +20/+125/+20°C
Short Time Overload	No mechanical damage ΔR≦±1%	**IEC 60115-1 4.13** 1/2W&1W: 5xrated power for 5s; 2W: 4xrated power for 5s
High Temperature Exposure	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 108** 1000 hrs.@T=170±2°C .Unpowered.
Temperature Cycling	No mechanical damage ΔR≦±1%	**JESD22 Method JA-104** -55°C(30min)~ normal temperature(≤ 1min)~ 155°C (30min), 1000 cycles.
Biased Humidity	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 103** 85 C/85%RH. 1000 hours, Apply 10% of operating power or limiting element current whichever is lower
Component Solvent Resistance	Clearly marked No mechanical damage	**MIL-STD-202 Method 215** Immersed in three solvents after 3min immersion, brush wipe 10 times, a total of 3 times, washing with washing and cleaning agent, room temperature on the surface of the ventilation drying
Solderability	95% min. coverage	**IEC 60115-1 4.17** 245±5°C for 3±0.3 seconds
Resistance to Soldering Heat	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 210** 270±5°C for 10±1 seconds
Mechanical shock	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 213** Positive half wave, peak acceleration:100g's, pulse duration:6ms, three axis six to each 3 times, a total of 18 times
Insulation Resistance	>1000MΩ	**IEC 60115-1 4.6** Apply DC 100V±15V between substrate and terminations for 1min, then check insulation resistance
Voltage Proof	No breakdown or flashover	**IEC 60115-1 4.7** Apply max. overload voltage of AC RMS at a rate of approximately 100V/s between substrate and terminations for 60±5 seconds
Vibration	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 204** Frequency:10Hz~2000Hz,acceleration:5g S, a loop 20 min, X,Y,Z three directions, each direction 12 cycles,36 cycles
Thermal Shock	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 107** -55°C(15min)~ normal temperature(≤20sec)~ 155°C (30min), 300 cycles
Operational Life	No mechanical damage ΔR≦±1%	**MIL-STD-202 Method 108** 70± 2°C, 1000hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5hrs "OFF" 125± 2°C, 1000hrs, de-rated current for 1.5 hrs "ON" and 0.5hrs "OFF"
Operation at Low Temperature	No mechanical damage ΔR≦±1%	**IEC 60115-1 4.36** -55±5°C , 1h without load rated voltage or limiting element voltage whichever is lower for 45min, 15min without load.
Flammability	No ignition of the tissue paper or scorching or the pinewood board	**UL-94** V-0 or V-1 are acceptable. Electrical test not required.
Substrate Bending Test	No mechanical damage ΔR≦±1%	**AEC-Q200-005** Bending distance: 2mm Duration: 60±5s.
Terminal Strength	No mechanical damage ΔR≦±1%	**AEC-Q200-006** Appling force 17.7N for 60±1s

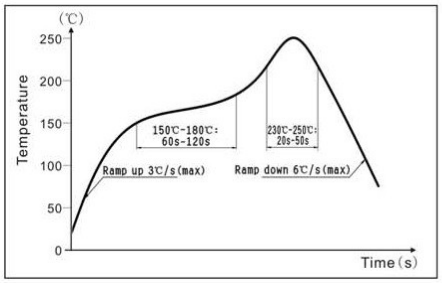
Recommend Land Pattern



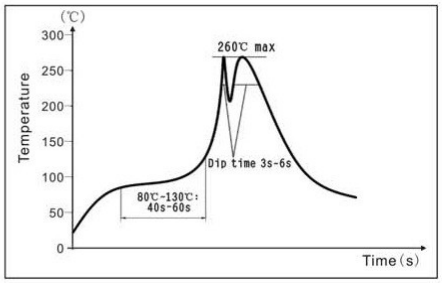
Type	Resistance	A mm	B mm	C mm
AMF03	5mΩ - 20mΩ	0.6	2.8	1.0
AMF05	3mΩ - 4mΩ	0.5	3.2	1.4
	5mΩ - 47mΩ	0.8		
AMF06	3mΩ - 4mΩ	0.8	4.4	1.8
	5mΩ - 56mΩ	1.8		
AMF20	3mΩ - 9mΩ	1.6	6.3	2.9
	10mΩ - 100mΩ	2.7		
AMF25	2mΩ - 4mΩ	1.0	8.0	3.4
	5mΩ - 200mΩ	3.8		

Soldering Condition

Recommended reflow profile



Recommended wave solder profile

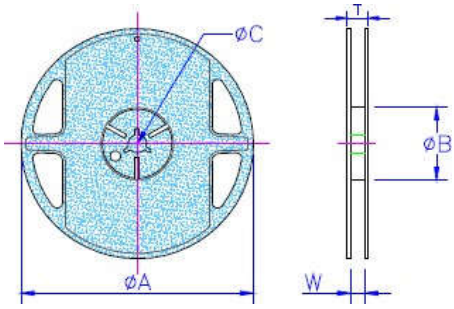


Packaging

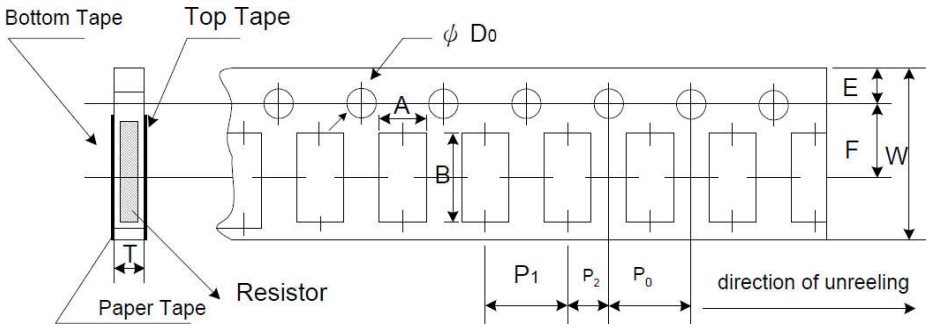
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
AMF03	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
AMF05	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
AMF06	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
AMF20	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5	-	4,000
AMF25	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5	-	4,000



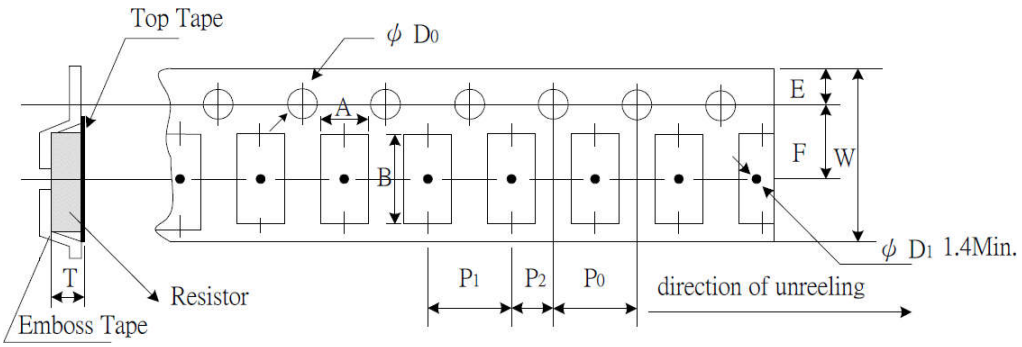
Paper Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	øD_0	T
AMF03	1.10±0.10	1.85±0.10	8.00±0.20	1.75±0.10	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10
AMF05	1.65±0.10	2.35±0.10	8.00±0.20	1.75±0.10	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.95±0.10
AMF06	1.90±0.20	3.50±0.20	8.00±0.20	1.75±0.10	3.5±0.05	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.95±0.10

Emboss Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P_0	P_1	P_2	øD_0	T
AMF20	2.82±0.15	5.50±0.15	12.0±0.10	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	0.84±0.10
AMF25	3.45±0.15	6.78±0.15	12.0±0.10	1.75±0.10	5.5±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.50+0.10	1.00±0.10