Data Sheet

Customer:	
Product:	**Metal Foil Chip Fixed Resistor - MF Series**
Sizes:	**0402/0603/0805/1206/2010/2512**
Issued Date:	**31-Mar-25**
Edition:	**REV.A7**

RoHS Compliant

HONG KONG HELISTO INDUSTRIAL LIMITED
香港海利斯特实业有限公司

SHENZHEN HELISTO TECHNOLOGYCOLTD
深圳市海利斯特科技有限公司

ADD:5/F., A Block, Hongdu Industrial Park, Fanshen Road, 45 Area, Baoan, Shenzhen, China
TEL:+86-755-29741555 29749555
FAX:+86-755-29742111
E-mail:donnyhai@helisto.com
www.Helisto.com

Produced by (QC)	Checked (QC)	Approved by (QC)	Prepared by (Sales)	Accepted by (Customer)
31-Mar-25	31-Mar-25	31-Mar-25		
Mandy Chang	*Ben Chang*	*Ben Chang*		

Metal Foil Chip Fixed Resistor

■Features

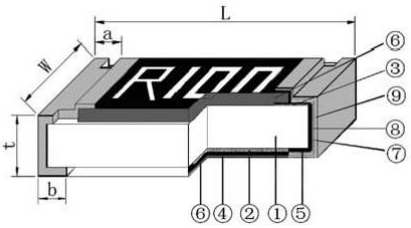
- High power rating up to 2 Watts
- Low TCR down to ±50 PPM/°C
- Current detecting resistors
- Superior mechanical and frequency characteristics
- Compliant with RoHS directive
- Halogen free requirement



■Applications

- Switching Power Supply, Over Current Protection
- Voltage Regulation Module(VRM)
- DC-DC Converter, Charger
- 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

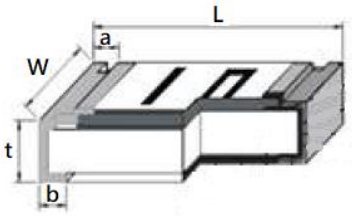


Figure1

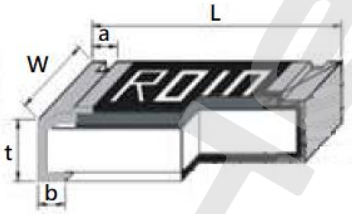


Figure2

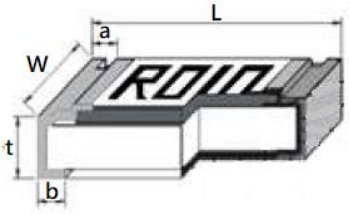


Figure3

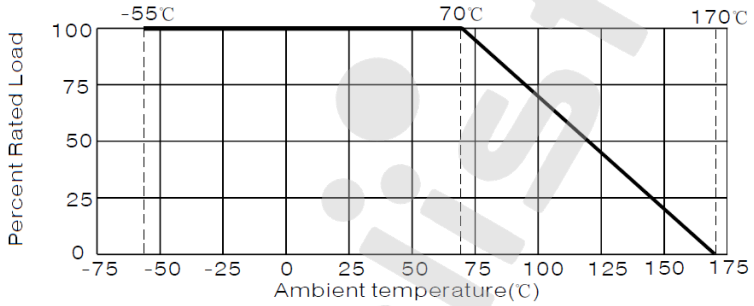
Type	Size (Inch)	Resistance (mΩ)	L mm	W mm	t mm	a mm	b mm
MF02	0402	10	1.00±0.10	0.50±0.10	0.40±0.10	≦0.35	0.30±0.15
MF03	0603	≧5	1.60±0.20	0.80±0.20	0.70±0.15	≦0.60	0.35±0.20
MF05	0805	3-4	2.00±0.20	1.25±0.20	0.70±0.15	0.40±0.25	0.70±0.30
		≧5					0.40±0.30
MF06	1206	3-4	3.20±0.20	1.60±0.20	0.75±0.15	0.50±0.30	0.90±0.30
		≧5					0.50±0.30
MF10	2010	2	5.00±0.20	2.50±0.20	0.75±0.20	0.60±0.30	1.80±0.30
		3					1.60±0.30
		4-5					1.30±0.30
		>5					0.80±0.30
MF12	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
		>7					0.90±0.30

■Figure 1 for MF03 type；Figure 2 for MF05≥10mΩ / MF06 type / MF12 type ; Figure 3 for MF05<10mΩ / MF10 type
■MF02 chip resistor is without marking.

■Part Numbering

MF	06	J	T	E	U	R005
Product Type	Dimensions (L×W)	Resistance Tolerance	Packaging Code	TCR (PPM/°C)	Power Rating	Resistance
	02: 0402 03: 0603 05: 0805 06: 1206 10: 2010 12: 2512	F: ±1% G: ±2% J: ±5%	T: Taping Reel	D: ±50 E: ±100 F: ±200	P: 1/5W V: 1/4W O: 1/3W U: 1/2W Q: 3/4W T: 1W S: 2W	R005: 0.005Ω R010: 0.01Ω R100: 0.1Ω

■Derating Curve



■Standard Electrical Specifications

Item / Type	Power Rating at 70°C	Operating Temp. Range	Limiting Element Current	Max. Overload Current	Resistance Range(mΩ) ±1%	Resistance Range(mΩ) ±2%	Resistance Range(mΩ) ±5%	TCR (PPM/°C)
MF02	1/5W	-55 ~ +170°C	4.5A	10A	10			±100
MF03	1/2W	-55 ~ +170°C	12.9A	28.9A	5 - 9			±200
					10 - 30			±100
MF05	3/4W	-55 ~ +170°C	15.8A	35.4A	3 - 9			±100
					10			±50
	1/4W, 1/3W, 1/2W		12.9A	28.9A	3 - 9			±100
					10 - 50			±50
MF06	1/2W, 1W	-55 ~ +170°C	18.3A	40.8A	3 - 4			±100
					5 - 9			±50 ±100
					10 - 68			±50
MF10	1W	-55 ~ +170°C	22.4A	50A	2			±200
					3 - 9			±100
					10 - 100			±50
MF12	1W	-55 ~ +170°C	3.2A	7.1A	101 - 200			±50
	2W		31.6A	63.3A	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.

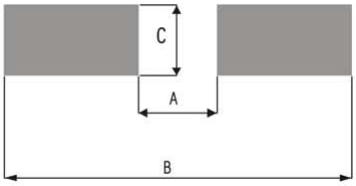
■Environmental Characteristics

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** 1/5W ~ 1W: 5xrated power for 5s; 2W: 4xrated power for 5s
Endurance		**IEC 60115-1 4.25.1** 70±2°C, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF"
Endurance at upper Category Temperature		**IEC 60115-1 4.25.3** at 170±2°C for 1000 hrs
Damp Heat Steady State		**IEC 60115-1 4.24** 40±2°C, 93±3% RH, 1000 hrs, rated current or limiting element current whichever is lower for 1.5 hrs "ON" and 0.5 hr "OFF"
Rapid Change of Temperature		**IEC 60115-1 4.19** -55°C(30min) →normal temperature(5min) →125°C(30min), 100 cycles
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%	**IEC 60115-1 4.18** 270±5°C for 10±1 seconds
Substrate Bending Test		**IEC 60115-1 4.33** 2010, 2512 sizes:2mm Other sizes:3mm Duration: 60±5 seconds
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
Component Solvent Resistance	No mechanical damage ΔR≦±1%	**IEC 60115-1 4.29** Iso-propyl alcohol (IPA), 23±5°C, 10hrs

■Storage Temperature: 5~30°C; Humidity 30~70%RH

■Shelf life: 6 months max

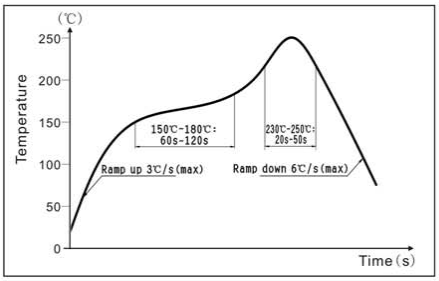
■Recommend Land Pattern



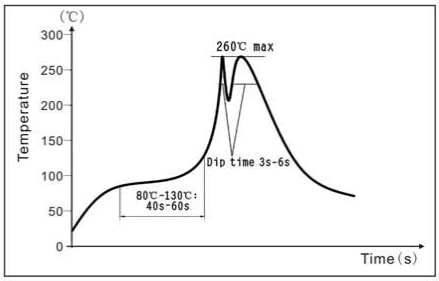
Type	Resistance	A mm	B mm	C mm
MF02	10mΩ	0.35	1.45	0.6
MF03	5mΩ - 30mΩ	0.6	2.8	1.0
MF05	3mΩ - 4mΩ	0.5	3.2	1.4
	5mΩ - 50mΩ	0.8		
MF06	3mΩ - 4mΩ	0.8	4.4	1.8
	5mΩ - 68mΩ	1.8		
MF10	2mΩ	1.0	6.3	2.9
	3mΩ - 9mΩ	1.6		
	10mΩ - 100mΩ	2.7		
MF12	2mΩ - 4mΩ	1.0	8.0	3.4
	5mΩ - 200mΩ	3.8		

■Soldering Condition

Recommended reflow profile



Recommended wave solder profile

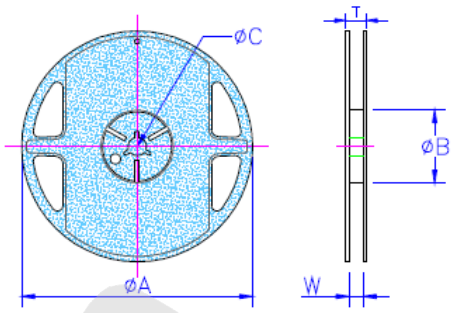


■Packaging

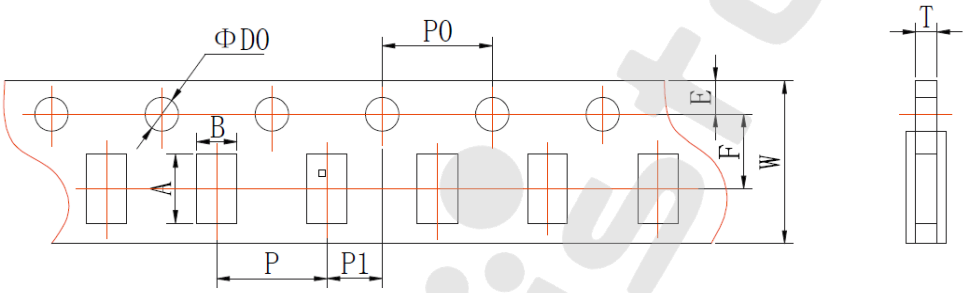
Packing Quantity & Reel Specifications

Unit :mm

Type	ØA	ØB	ØC	W	T	Paper Tape (EA)	Emboss Plastic Tape (EA)
MF02	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	10,000	-
MF03	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
MF05	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
MF06	178.0±2.0	58.0±2.0	13.0±0.5	9.5±1.0	12.5±1.5	5,000	-
MF10	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5	-	4,000
MF12	178.0±2.0	57.0±2.0	13.0±0.5	13.0±0.5	15.5±1.5	-	4,000



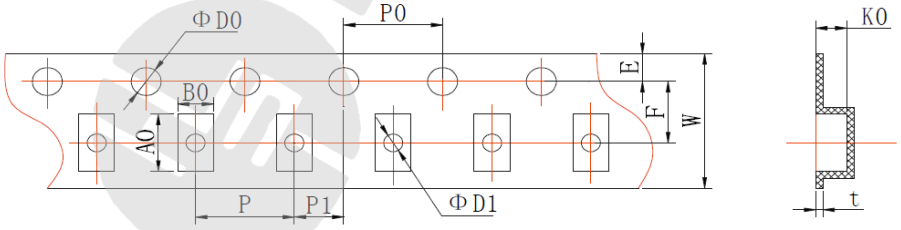
Paper Tape Specifications



Unit: mm

Type	A	B	W	F	E	P	P0	P1	ØD0	T
MF02	1.15±0.10	0.65±0.10	8.00±0.20	3.50±0.05	1.75±0.10	2.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	0.44±0.05
MF03	1.80±0.10	1.05±0.10	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10
MF05	2.30±0.10	1.50±0.10	8.00±0.20	3.50±0.05	1.75±0.10	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.95±0.10
MF06	3.50±0.20	1.90±0.20	8.00±0.20	3.50±0.05	1.75±0.10	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	A0	B0	W	F	E	t	P	P0	P1	D0	D1	K0
MF10	5.50±0.15	2.82±0.15	12.0±0.10	5.50±0.10	1.75±0.10	0.25±0.05	4.00±0.10	4.00±0.10	2.00+0.05	1.50 +0.10/-0	1.50±0.10	0.84±0.10
MF12	6.78±0.15	3.45±0.15	12.0±0.10	5.50±0.10	1.75±0.10	0.25±0.05	4.00±0.10	4.00±0.10	2.00+0.05	1.50 +0.10/-0	1.50±0.10	1.00±0.10

REVISION HISTORY

REVISION	DATE	CHANGE NOTIFICATION	DESCRIPTION
Version A7	Mar 31,2025		-Add Shelf life.