Approval Sheet

for

Metal Film Resistors
High Ohmic Type

MFH series

±1%、±2% & ±5%

YAGEO CORPORATION

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Rev.	Description	Issue Date	Drawn	Approved
00	issue new spec.	Apr. 10, 2018	Mingfa Liu	Feng Ye
01	MFH204 & MFH207 types are included.	Jan. 31, 2019	Mingfa Liu	Feng Ye
02	Revised the dimension “A” of tape on reel packing , Add dimension “B” for tape on reel packing.	Feb. 25, 2020	Mingfa Liu	Feng Ye

Description	Metal Film Resistors, High Ohmic Type		
Series	MFH	**Rev.**	02

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1. PRODUCT:

HIGH OHMIC TYPE METAL FILM RESISTORS
(Normal & Miniature Style)
Body colour: Blue

2. PART NUMBER:

Part number of the general type metal film resistor is identified by the name, power, tolerance, packing, temperature coefficient, special type and resistance value.

Example:

MFH	200	F	T	E	73-	5M1
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Series Name	Power Rating	Resistance Tolerance	Packing Style	Temperature Coefficient of Resistance	Special Type	Resistance Value

(1) Style: MFH SERIES

(2) Power Rating: -12=1/6W、 25S=1/4W、204=0.4W、-25=1/4W、50S=1/2W、
207=0.6W、-50=1/2W、 1WS=1W、 200=2W

(3) Tolerance: F=±1% G=±2% J=±5%

(4) Packaging Type: R = Paper Taping Reel
T = Tape on Box Packing
B = Bulk Packing

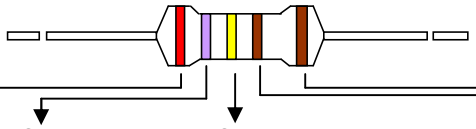
(5) Temperature Coefficient: E=±50ppm/℃ F=±100ppm/℃ G=±200ppm/℃
"- "=base on spec.

(6) Special Type: 26- = 26mm
26G = 26mm with Φd ≥ 0.6mm
52- = 52.4mm
52A = 52.4mm with 0.4±0.02mm Φd
52B = 52.4mm with 0.45±0.02mm Φd
52C = 52.4mm with 0.5±0.02mm Φd
52G = 52.4mm with Φd ≥ 0.6mm
52T = 52.4mm with 0.45±0.02mm Φd (CP wire)
52H = 52.4mm without lacquer on soldering spots
73- = 73mm
73G = 73mm with Φd ≥ 0.6mm
M = M Type Forming for Bulk
MB = MB Type Forming for Bulk
F = F Type Forming for Bulk
FK = FK Type Forming
FFK = FFK Type Forming
FKK = FKK Type Forming
MT = MTsert (rated watts -12&25S size only)
PN = PANAsert (rated watts from -25 to 1WS applicable only)
AV = Avlsert (rated watts from -25 to 1WS applicable only)

(7) Resistance Value: E24 & E96 & E192 Series,.
Example: 10M、12M、15M、18M……

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3. BAND-CODE:



COLOR	1ST BAND	2ND BAND	3ND BAND	MULTIPLIER	TOLERANCE
BLACK	0	0	0	1Ω	
BROWN	1	1	1	10Ω	± 1 % (F)
RED	2	2	2	100Ω	± 2 % (G)
ORANGE	3	3	3	1KΩ	
YELLOW	4	4	4	10KΩ	
GREEN	5	5	5	100K	
BLUE	6	6	6	1MΩ	
VIOLET	7	7	7	10MΩ	
GREY	8	8	8	0.001Ω	
WHITE	9	9	9	0.0001Ω	
GOLD				0.1Ω	± 5 % (J)
SILVER				0.01Ω	

For E192 & E-96 series

4. ELECTRICAL CHARACTERISTICS

Table I

STYLE	MFH-12	MFH25S	MFH-25	MFH50S	MFH-50	MFH1WS	MFH200
Power Rating at 70 ℃	1/6W	1/4W	1/4W	1/2W	1/2W	1W	2W
Maximum Working Voltage	200V		250V	250V	500V	500V	500V
Maximum Overload Voltage	400V		500V	600V	700V	800V	1000V
Voltage Proof	450V	450V	450V	450V	750V	750V	900V
Operating Temp. Range	- 55 ℃ to + 155℃						

Table II

STYLE	MFH204	MFH207
Power Rating at 70 ℃	0.4W	0.6W
Maximum Working Voltage	250V	350V
Maximum Overload Voltage	500V	700V
Voltage Proof	300V	500V
Operating Temp. Range	- 55 ℃ to + 155℃	
Resistance Range	4M75~10M for E24 & E96 series value	
Temperature Coefficient	50± ppm/℃, 100± ppm/℃	

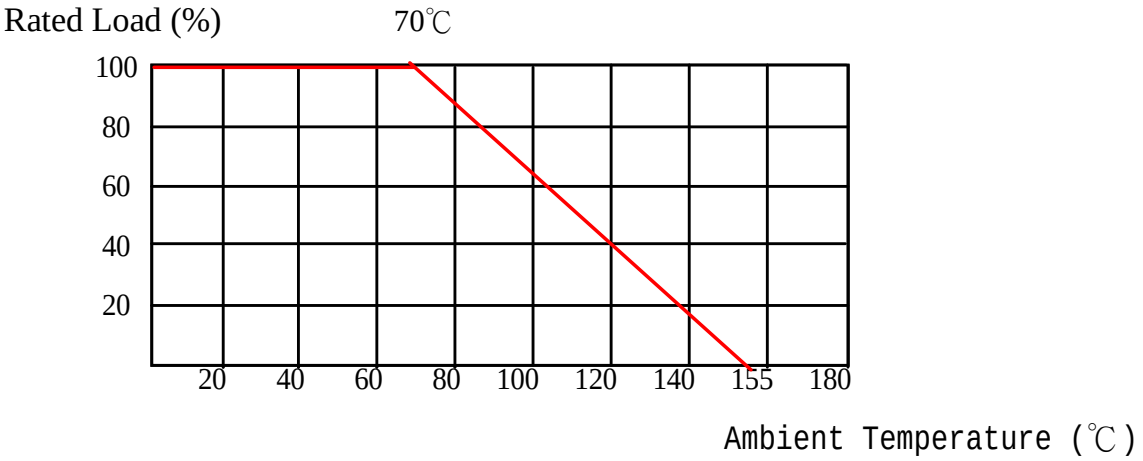
Table III

Normal	Miniature	Resistance Range Ω	Tolerance ±%	Temperature Coefficient ± ppm/℃
MFH-12	MFH25S	4M75 ~ 22M	1,2,5	200
MFH-25	MFH50S	4M75 ~ 5M	1,2,5	50
		4M75 ~ 22M1	1,2,5	100
		4M75 ~ 50M	1,2,5	200
MFH-50	MFH1WS	4M75 ~ 10M	1,2,5	50
		4M75 ~ 15M	1,2,5	100
		4M75 ~ 22M	1,2,5	200
MFH200	-	4M75 ~ 10M	1,2,5	50
		4M75 ~ 15M	1,2,5	100
		4M75 ~ 22M	1,2,5	200

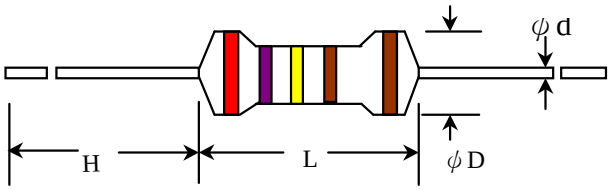
∗ Below or over this resistance range on request

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5. DERATING CURVE



6. DIMENSIONS



Unit: mm

STYLE		DIMENSION			
Normal	Miniature	L	ΨD	H	ψd
MFH-12	MFH25S	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05
-	MFH204	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05
MFH-25	MFH50S	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
-	MFH207	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
MFH-50	MFH1WS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
MFH200	-	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05

7. ENVIRONMENTAL CHARACTERISTICS

(1) Short Time Over Load Test

At 2.5 times of the rated voltage or max. overload voltage for 5 seconds, whichever is less; the resistor should be free from defects after the resistor is released from load for about 30 minutes,

Rated Voltage = $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$

The change of the resistance value should be within ± 0.1 % + 0.05Ω for all types except MFH204 and MFH207 types.
The change of the resistance value should be within ± 1.0 % + 0.05Ω for MFH204 type.
The change of the resistance value should be within ± 0.25 % + 0.05Ω for MFH207 type.

(2) Voltage Proof

The resistor shall be clamped in the trough of a 90° metal V Block. Apply the insulation voltage specified in the “Table I “ between the terminals connected together with the block for about 60 seconds.
The resistor shall be able to withstand without breakdown or flashover.

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(3) Temperature Coefficient Test

Test of resistors above room temperature 100°C ± 2°C (Testing Temperature 115°C to 130°C) at the constant temperature silicon plate for over 5 minutes. Then measure the resistance value.
The Temperature Coefficient is calculated by the following equation and its value should be within the range of requested.

$$\text{Resistor Temperature Coefficient} = \frac{R - R_0}{R_0} \times \frac{1}{t - t_0} \times 10^6$$

R = Resistance value under the testing temperature
R_0 = Resistance value at the room temperature
t = The testing temperature
t_o = Room temperature

(4) Insulation Resistance

Apply "measuring voltage" between protective coating and termination for 1 min.,then measure. The measuring voltage shall be either 100V±15V d.c. for resistors with an insulation voltage lower than 500V or 500V±50V d.c. for resistors with an insulatin voltage equal to or greater than 500V.
The test resistance should be high than 10,000M ohm.

(5) Solderability

Immerse the specimen into the solder pot at 245 ± 5 °C for 3 ± 0.5 seconds.
At least 95% solder coverage on the termination.

(6) Solvent Resistance of Marking

The specimen into the appropriate solvent of IPA condition of ultrasonic machine for 5± 0.5 minutes.
The specimen is no deterioration of coatings and color code

(7) Robustness of Terminations

Direct Load – Resistors shall be held by one terminal and the load shall be gradually applied in the direction of the longitudinal axis of the resistor unit the applied load reached the requirement.
The load shall be held for 10 seconds. The load of weight shall be ≧ 2.5 kg (24.5N).

(8) Damp Heat Steady State

Place the specimen in a test chamber at 40 ± 2 °C and 90 ~ 95 % relative humidity. Apply the 0.1 times rated voltage to the specimen at the 1.5 hours on and 0.5 hour off cycle. The total length of test is 56 days.
The change of the resistance value shall be within ± 2.0 % + 0.05 Ω

(9) Endurance at 70 °C

Placed in the constant temperature chamber of 70 ± 3 °C the resistor shall be connected to the lead wire at the point of 25mm. Length with each terminal, the resistors shall be arranged not much effected mutually by the temperature of the resistors and the excessive ventilation shall not be performed, for 90 minutes on and 30 minutes off under this condition the rated D.C. voltage is applied continuously for 1000+48/-0 hours then left at no-load for 1hour, measured at this time the resistance value.

The change of the resistance value shall be within ± 1.0 % + 0.05 Ω for all types except MFH204 and MFH207 types.
The change of the resistance value shall be within ± 1.5 % + 0.05 Ω for MFH204 and MFH207 types.
There shall be no remarkable change in the appearance and the color code shall be legible after the test.

(10) Temperature Cycling Test

The temperature cycle shown in the following table shall be repeated 5 times consecutively. The measurement of the resistance value is done before the first cycle and after ending the fifth cycle, leaving in the room temperature for about 1 hour.
Temperature Cycling Conditions:

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Step	Temperature(°C)	Time (minute)
1	-55 ± 3	30
2	25 ± 3	2 ~ 3
3	155 ± 3	30
4	25 ± 3	2 ~ 3

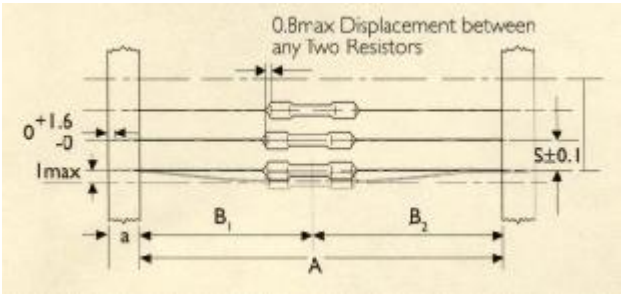
The change of the resistance value shall be within ± 0.15 % + 0.05 Ω for all types except MFH204 and MFH207 types.
The change of the resistance value shall be within ± 0.75 % + 0.05 Ω for MFH204 and MFH207 types.
After the test the resistor shall be free from the electrical or mechanical damage.

(11) Resistance to Soldering Heat

The terminal lead shall be dipped into the solder pot at 260 ± 3 °C for 10 ± 1.0 seconds up to 2.5 ~ 3.5 mm.
The change of the resistance value shall be within ± 0.05 % + 0.05 Ω for all types except MFH204 and MFH207 types.
The change of the resistance value shall be within ± 0.25 % + 0.05 Ω for MFH204 and MFH207 types.

8. PACKING METHODS

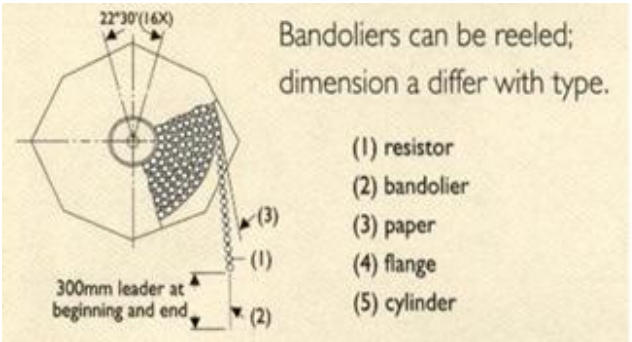
Bandolier for Axial leads

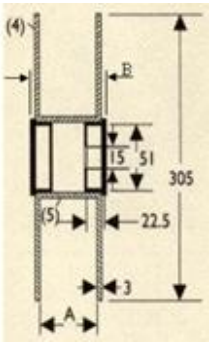


STYLE DIMENIONS Unit:： mm

Normal	Miniature	a	A	B1-B2	S (spacing)	T (max. deviation of spacing)
MFH-12	MFH25S	6 ± 0.5	52.4 ± 1.0	1.2	5	1 mm per 10 spacing
	MFH204		26.0 ± 1.0	1.0		
MFH-25	MFH50S	6 ± 0.5	52.4 ± 1.0	1.2	5	
	MFH207		26.0 ± 1.0	1.0		
MFH-50	MFH1WS	6 ± 0.5	52.4 ± 1.0	1.2	5	0.5 mm per 5 spacing
MFH200	-	6 ± 0.5	73.0 ± 1.5	1.5	10	
			52.4 ± 1.0	1.2		

9. TAPE ON REEL PACKING

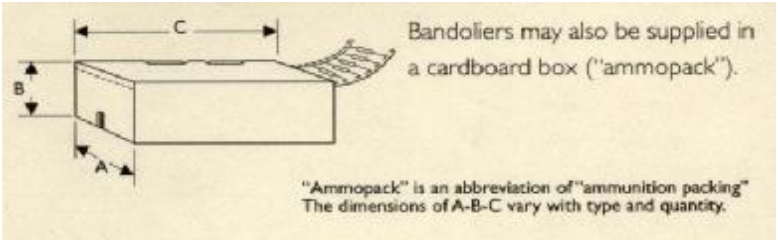




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STYLE		TAPE ON REEL		
Normal	Miniature	ACROSS FLANGE (A)	B	Qty per reel
MFH-12	MFH25S	66.5	75.5	5,000
-	MFH204	66.5	75.5	5,000
MFH-25	MFH50S	66.5	75.5	5,000
-	MFH207	66.5	75.5	5,000
MFH-50	MFH1WS	66.5	75.5	2,500
MFH200	-	87	96	1,000

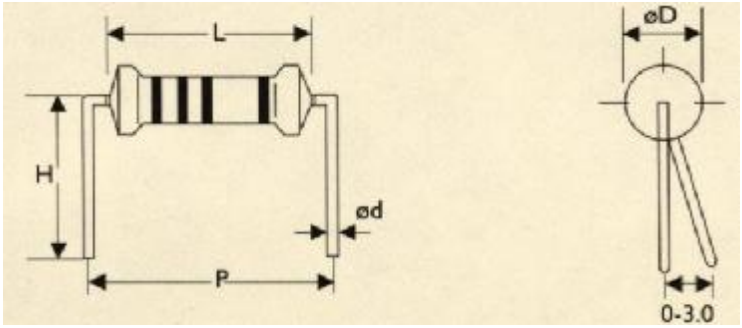
10. TAPE ON BOX PACKING



STYLE		Standard Lead Length			Short Lead Length			Qty per box
Normal	Miniature	W (A)	H (B)	L (C)	W (A)	H (B)	L (C)	
MFH-12	MFH25S	81	70	260	48	102	255	5,000
-	MFH204	81	70	260	48	102	255	5,000
MFH-25	MFH50S	81	104	260	48	102	255	5,000
-	MFH207	81	104	260	48	102	255	5,000
MFH-50	MFH1WS	73	45	258	———	———	———	1,000
MFH200	-	103	94	260	81	91	260	1,000

11. SPECIAL TYPE (FORMING DIMENSIONS)

M TYPE

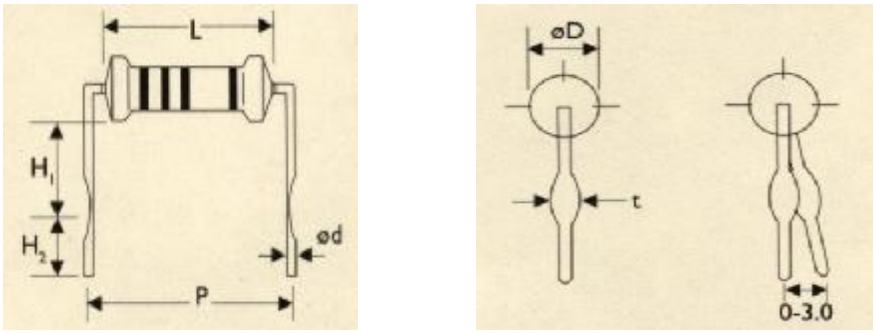


STYLE		DIMENSIONS				UNIT: mm
Normal	Miniature	L	ψD	ψd	P	H
MFH-12	MFH25S	3.4± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0±1.0	10.0 ±1
-	MFH204	3.4± 0.3	1.9 ± 0.2	0.45 ± 0.05	6.0±1.0	10.0 ±1
MFH-25	MFH50S	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	10.0 ± 1

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-	MFH207	6.3 ± 0.5	2.4 ± 0.2	0.55 ± 0.05	10.0 ± 1	10.0 ± 1
MFH-50	MFH1WS	9.0 ± 0.5	3.3± 0.3	0.55 ± 0.05	12.5 ± 1	10.0 ± 1
MFH200	-	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	15.0 ± 1

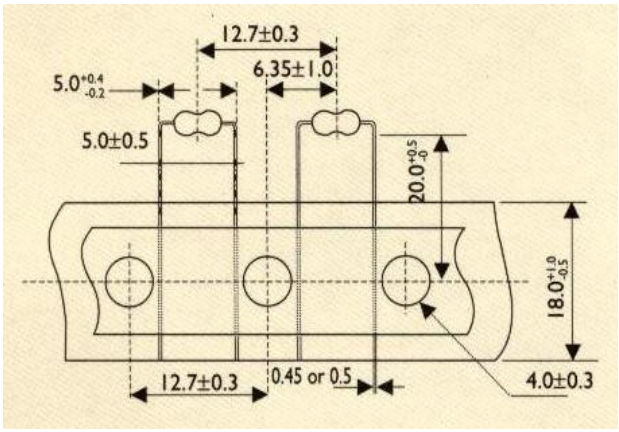
MB TYPE



STYLE DIMENSIONS UNIT: mm

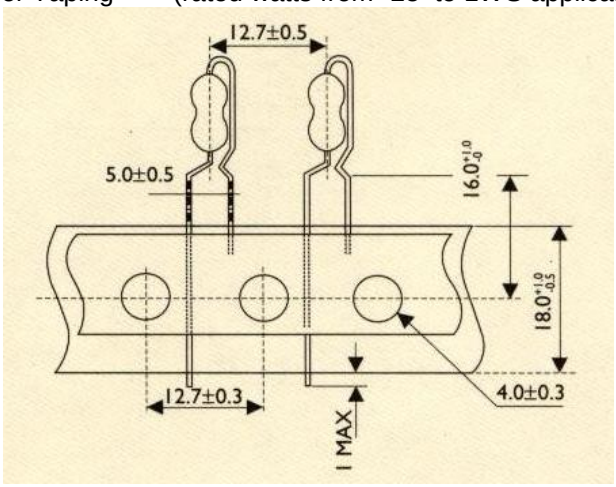
Normal	Miniature	L	ψD	ψd	P	H 1	H 2	t
MFH-25	MFH50S	6.3 ± 0.5	2.4± 0.2	0.55 ± 0.05	10.0 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2
-	MFH207	6.3 ± 0.5	2.4± 0.2	0.55 ± 0.05	10.0 ± 1	6.0 ± 1	5.0 ± 1	1.2 ± 0.2
MFH-50	MFH1WS	9.0 ± 0.5	3.3± 0.3	0.8± 0.05	12.5 ± 1	6.0 ± 1	5.0 ± 1	1.4 ± 0.2
MFH200	-	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	20.0 ± 1	10.0 ± 1	5.0 ± 1	1.4 ± 0.2

MT Type Forming for Taping (Rated Watts -12 & 25S &204 size only)

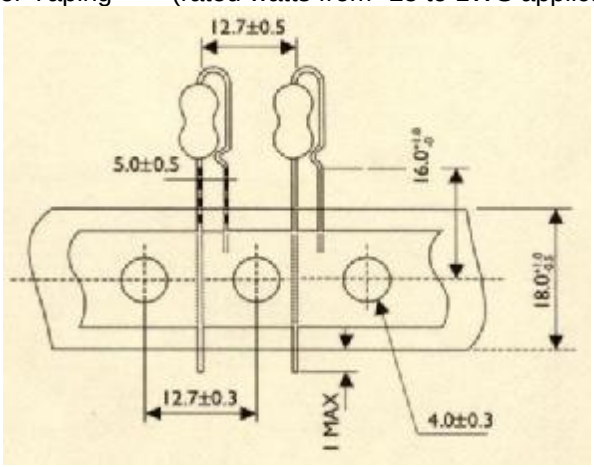


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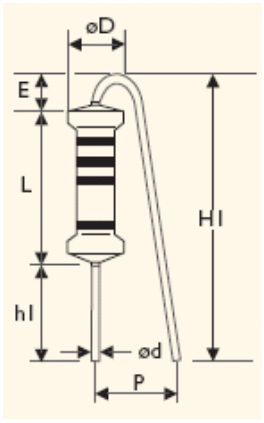
PN Type Forming for Taping (rated watts from -25 to 1WS applicable only)



AV Type Forming for Taping (rated watts from -25 to 1WS applicable only)



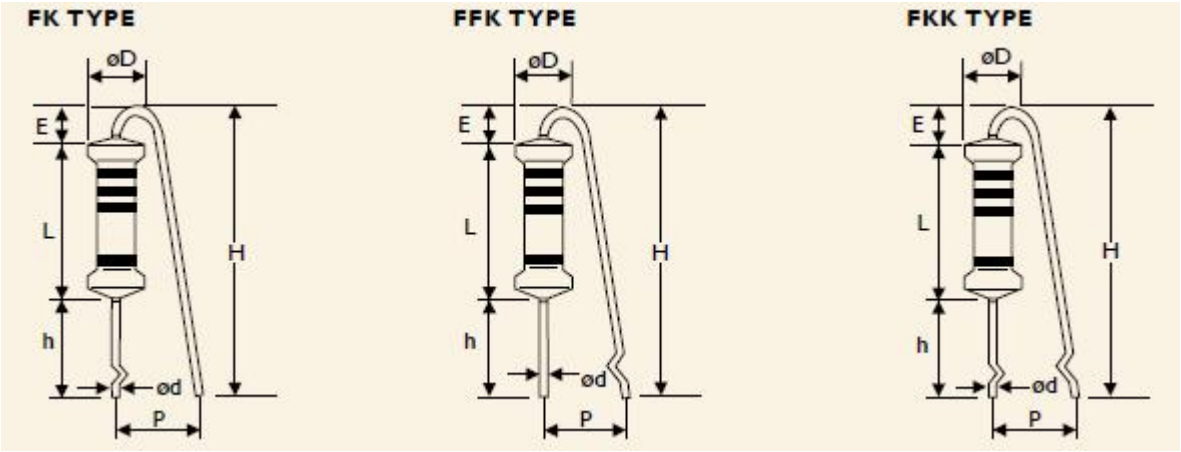
F TYPE



STYLE DIMENSIONS UNIT: mm

Normal	Miniature	L	ψD	ψd	P	h1	H1 max	E max
MFH-25	MFH50S	6.3±0.5	2.4 ± 0.2	0.55 ± 0.05	5.0 ± 1	5.0 ± 1	16.5	3.5
-	MFH207	6.3±0.5	2.4 ± 0.2	0.55 ± 0.05	5.0 ± 1	5.0 ± 1	16.5	3.5
MFH-50	MFH1WS	9.0±0.5	3.3 ± 0.3	0.55 ± 0.05	6.0 ± 1	5.0 ± 1	18.5	3.5
MFH200	-	15.5± 1.0	5.0 ± 0.5	0.8 ± 0.05	8.0 ± 1	5.0 ± 1	25	3.5

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STYLE DIMENSIONS UNIT: mm

Normal	Miniature	L	ψD	ψd	P	h	H max	E max
MFH-50	MFH1WS	9.0± 0.5	3.3 ± 0.3	0.55 ± 0.05	6.0 ± 1	8.0 ± 1	22	3.5
MFH200	-	15.5 ± 1.0	5.0 ± 0.5	0.8 ± 0.05	8.0 ± 1	8.0 ± 1	28	3.5

* MFH-25/50S is available

12. Plant Address

A. China Dongguan Plant
7-1, Gaoli Road, Gaoli Industrial Zone
Tangxia Zhen, Dongguan, Guangdong, China
(廣東省東莞市塘廈鎮高麗工業區高麗路 7-1 號)
Tel. 86-769-8772 0275
Fax. 86-769-8772 0275 #4333

B. China Suzhou Plant
No.158, Jinchang Road, No.1 Building of Nan Bang IND. Zone,
Mu Du New District, Suzhou, China
(江蘇省蘇州市木瀆新區金長路 158 號南濱工業區 1 號)
Tel. 86-512-66518889
Fax. 86-512-66519889

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