1. EXPLANATIONS OF ORDERING CODE

DESCRIPTION : MFH 1W 5% 10MΩ 3.5KV

SYNTON CODE : MFH 100 J 106 / 3.5KV T

POWER	TOLERANCE	RESISTANCE VALUE	MAX. WORKING VOLTAGE	PACKAGE
012 : 1/8W 025 : 1/4W 050 : 1/2W 100 : 1W 200 : 2W 300 : 3W 100 S : 1W small Size	F : ±1% G : ±2% J : ±5% K : ±10%	3 Digits : 106 : 10M 4 Digits : 1005 : 10M	300V ~ 10KV	T : Tape Box
(Please see detail of Figure1)		(Please see detail of Figure5,6)	(Please see detail of Figure1)	(Please see detail of Figure4)

APPROVED	CHECKED	DESIGNED	REMARK	DOCUMENT NO.
Carol	May	Chen		0201010476

2. ELECTRICAL CHARACTERISTICS

Type	MFH-12	MFH-25S	MFH-25	MFH-50S	MFH-50	MFH-100S	MFH-100	MFH-200S	MFH-200	MFH-300S
Power	1/8W	1/4W	1/4W	1/2W	1/2W	1W	1W	2W	2W	3W
Max. Working Voltage	300V		1600V		3500V		7000V		10000V	
Dielectric Withstanding Voltage	300V		700V		700V		700V		700V	
Resistance Range	10Ω ~<100M		10Ω ~<100M		10Ω ~<100M		10Ω ~<100M		10Ω ~<100M	
Short-Time Overload	±1.0%									
Impulse Test	±2.0%									
Load Life Test	±5.0%									
Humidity Test	±5.0%									
Temperature Cycling Test	±1.0%									
Effective Soldering Test	±1.0%									
Temperature Coefficient	<1K = ±500PPM/℃ ≤100K = ±300PPM/℃ >100K = ±200PPM/℃									
Vibration Test	±1.0%									
Terminal Strength Test	±0.5%									
Working Temp. Range	-55℃ ~ +155℃									
Resistance Tolerance	F(±1%), G(±2%) , J(±5%), K(±10%)									

**Small size type available on your request

**Working Voltage=√(P*R) or Max. working voltage listed above, whichever is lower.

Figure 1

3. POWER RATING

(1) Power Derating

The Rated Power means the allowed continuous and maximum Power and voltage under the ambient temperature of 70℃. If the temperature exceeds 70℃ the rated power shall be derated as according to the following curve.

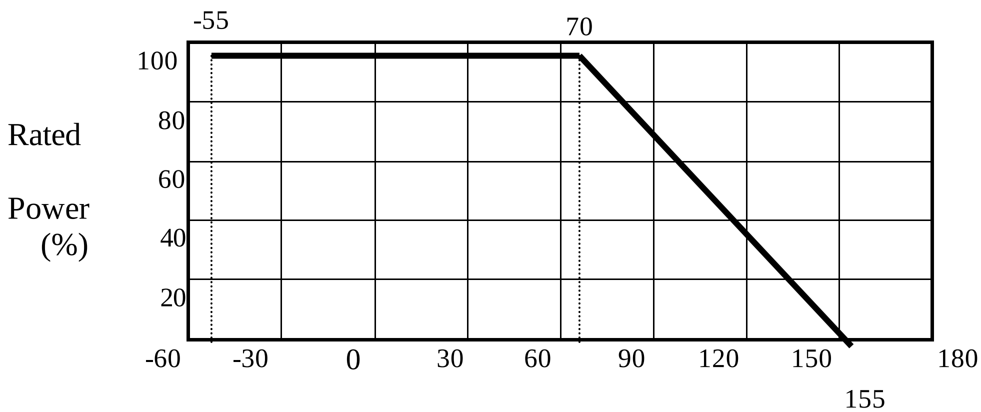


Figure2

(2) Rated Voltage

Rated Voltage means the equivalent of rated power to the D.C. or A. C. (Commercial effective cycles) voltage. The result can be obtained from the following equation. If the rated voltage exceeds the maximum voltage, the maximum working voltage will apply.

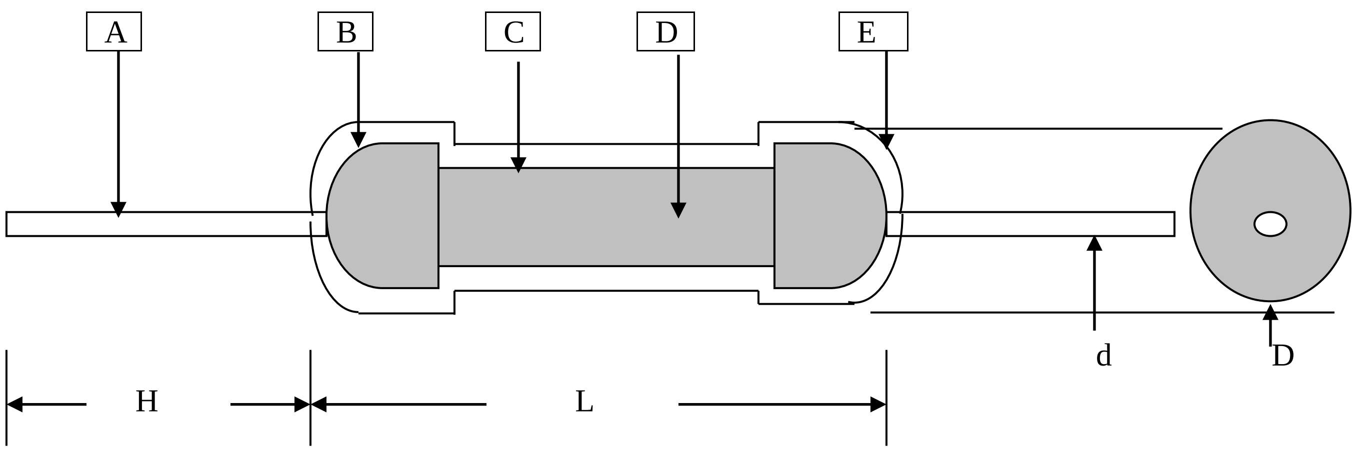
$$E = \sqrt{P \times R}$$

E : Rated Voltage (V)
P : Rated Power (W)
R : Nominal Value (Ω)

4. CONSTRUCTION AND DIMENSIONS

4.1 Construction

A. Tinned Copper Wire
B. Tinned Iron Cap
C. Metal Glazed Film
D. Ceramic Rod
E. Silicon Paint



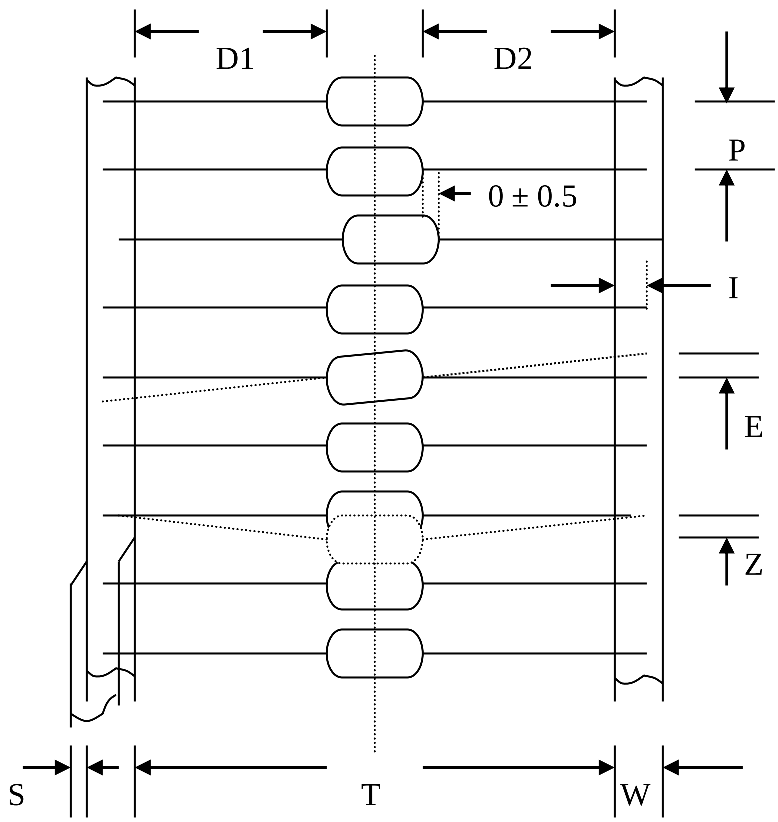
4.2 Dimensions

Unit:m/m

TYPE	POWER	L	D	H	d
MFH-12	1/8W	3.3±0.3	1.8±0.2	28±2	0.45±0.05
MFH-25S	1/4W				
MFH-25	1/4W	6.0±0.3	2.4±0.1	28±2	0.60±0.05
MFH-50S	1/2W				
MFH-50	1/2W	9.0±0.5	3.3±0.5	30±3	0.60±0.05
MFH-100S	1W				
MFH-100	1W	12/+1-2	4.5±0.5	38±3	0.80±0.05
MFH-200S	2W				
MFH-200	2W	16/+1-2	5.5±0.5	38±3	0.80±0.05
MFH-300S	3W				

Figure3

4.3 Tape packing (T-TYPE)



Unit : m/m

TYPE	SIZE	T	P ±0.5	W ±0.5	D_1–D_2 Max.	E Max.	Z Max.	S Max.	I Min.
MFH-12 MFH-25S	T-52	52±2.0	5	6	1.2	1	1.2	1	3.2
MFH-25 MFH-50S	T-52	52±2.0	5	6	1.2	1	1.2	1	3.2
MFH-50 MFH-100S	T-52	52±2.0	5	6	1.4	1	1.2	1	3.2
MFH-100 MFH-200S	T-52	52±2.0	5	6	1.4	1	1.2	1	3.2
MFH-200 MFH-300S	T-64	64±2.0	10	6	1.4	1	1.2	1	3.2

Figure4

5. CHARACTERISTICS

5.1. Tensile Strength

When the lead wire is welded and fixed at one terminal, the other terminal on the axial direction of the body is applied a load of 2.5Kgs for 5 ~ 10 seconds. The terminal lead wire shall not break or loosen.

5.2. Twist Strength

At the point of 6 mm. from the body of the resistor nearing the cap, a 90° bend with a radius of 0.75~0.8 mm is made. Then the free end of the terminal is clamped at a point 1.2±0.4 mm away from the bend. After the resistor is held in a fixed position, the terminal lead wire is twisted around the axis, making a 360°rotation, in both directions, at the rate of 5 seconds per one revolution. There should be no breakage or loosening. The same action can be applied if the lead wire is fixed while twisting the body of the resistor.

5.3. Bending Strength

The terminal lead wire shall hold a load of 500gms at vertical position. The terminal lead wire shall be bent at 90° twice for each direction. Time required is 5 seconds. The terminal lead wire shall not break or loosen.

5.4.Vibration Test

Both lead wires are at 10 mm. distance from the resistor. They shall be securely soldered or fixed to the holding terminals of the rigid mounting stand. The mounting stand is securely fixed on a vibration tester which repeats harmonic vibration cycle of the amplitude of 0.75 mm. (full amplitude 1.5 mm). Next, apply frequency reading gradually from 10 Hz up to 55 Hz and return to 10 Hz within one minute then decrease cycles the following minute. After subjecting this test for 5 hours, the change of resistance value from the value before the test shall be within ±1%. Moreover, the resistor shall be free from mechanical damage.

5.5. Dielectric Withstanding Voltage

The resistor is placed on the metal V block. Apply to the A.C. voltage (Sine Wave Voltage) as indicated in Table 1, between the terminals connected together with the block for about 5 seconds. The resistor shall be able to withstand the voltage without any sign of a breakdown or flashover.

5.6. Short Time Overload Test

After applying 2.5 times the rated voltage (Sine Wave Voltage A.C. or D.C., if the voltage exceeds the maximum load voltage, the maximum load voltage will be used as the rated voltage) for 5 seconds to the resistor, the resistors should be free from defects after the resistor is released from load for about 30 min. The change of the resistance value should be within ±1%.

5.7. Impulse Test

The resistor shall be applied 4 times working voltage (when the voltage exceeds maximum impulse voltage given in Table 1, however, the maximum impulse voltage shall be applied) for 50 micro-second on and 5 seconds off, continuously for 50 cycles. The change of the resistance value before and after the test shall be within ±2%.

5.8. Load Life Test

Placed in a constant temperature chamber of 40℃±3℃ the resistor shall be connected to the lead wire at the point of 25 mm length with each terminal. The resistor shall be arranged so that the temperature of one resistor cannot affect that of another, and there should be no excessive ventilation. The rated D. C. voltage is applied for 90 minutes on and 30 minuets off, continuously for 1000±12 hours. Then the resistor will be left at no-load for 1 hour. The change of the resistance value measured at this time from the value before the test shall be within ±5%.

5.9. Humidity Test

Put the resistor in a 40℃ at the RH 95% chamber for 1,000±12 hours, the change of the resistance value before and after the test shall be within ±5%.

5.10. 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 at the end of the fifth cycle. After leaving the resistor in room temperature for about 1 hour, the change shall be within ±(1% + 0.05Ω). After the test, the resistor shall be free from the electrical or mechanical damage.

Step	Temperature	Time
1	–55± 3℃	30 minutes
2	20± 5℃	10 ~ 15 minutes
3	155± 2℃	30 minutes
4	20±5℃	10 ~ 15 minutes

5.11. Effective Soldering

The terminal lead shall be dipped in to molten solder of 350±10℃ for 3±0.5 seconds up to a level of 3.2 to 4.8mm. from the body of the resistor. Then the resistor is left in room temperature for 3 hours. The change of the resistance value shall be within ±(1% + 0.05Ω) as compared with the value before the test. No remarkable change in appearance or mechanical damage should be observed.

5.12. Temperature Coefficient Test

Test resistors above room temperature 40℃ ~ 60℃ (Testing Temp.) at a constant temperature oven for 30 ~ 40 minutes. Then measure the resistance. The Temperature Coefficient can be calculated by the following equation, and its value should be within ±500PPM/℃.

$$\text{Resistor Temp. Coefficient} = \frac{R-R_0}{R_0} \times \frac{1}{t-t_0} \times 10^6 \ (\text{PPM/℃})$$

R : Resistance value under the testing temperature.
R_0 : Resistance value at the room temperature.
T : The testing temperature.
t_0 : Room temperature.

5.13. Pulse Voltage Experiment

will supply to try the resistor level to put in on experimental, will exert direct current of standard beginnings and ends of wire to the resistor (for example attached list) (commercial frequency Effective value) the voltage, will exert the testing voltage time will be 2.5 seconds ON, 2.5 seconds OFF 50 cycles.
after again will determine the experiment the resistance value.
The above experiment around the resistance value rate of change must be bigger than ±20%.

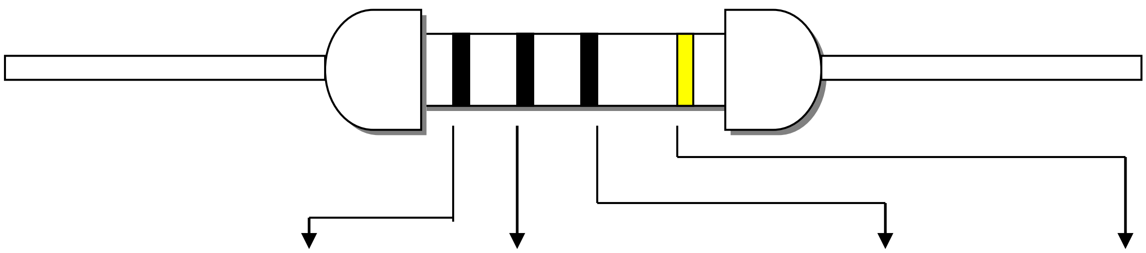
<table>
<tr><th>TYPE</th><th>MFH-12</th><th>MFH-25S</th><th>MFH-25</th><th>MFH-50S</th><th>MFH-50</th><th>MFH-100S</th><th>MFH-100</th><th>MFH-200S</th><th>MFH-200</th><th>MFH-300S</th></tr>
<tr><td>Rated power</td><td>1/8W</td><td>1/4W</td><td>1/4W</td><td>1/2W</td><td>1/2W</td><td>1W</td><td>1W</td><td>2W</td><td>2W</td><td>3W</td></tr>
<tr><td rowspan="3">Pulse voltage</td><td rowspan="3" colspan="2">10Ω ~ 100MΩ
(3KV)</td><td colspan="8"><100KΩ
(3KV)</td></tr>
<tr><td colspan="8">100KΩ ~ 620KΩ
(5KV)</td></tr>
<tr><td colspan="8">>620KΩ
(10KV)</td></tr>
</table>

- **Rated continuous Working Voltage (RCWV)**

$$= \sqrt{\textbf{power rating} \times \textbf{resistance value}}$$

6. COLOR CODING

6.1 J (±5%)



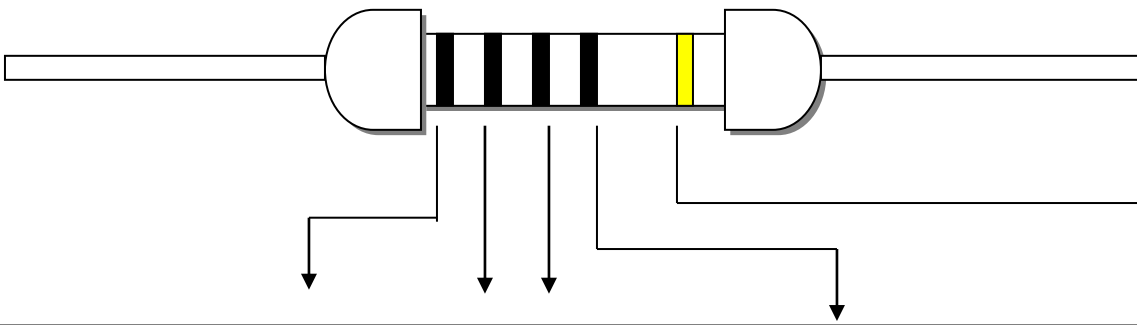
Color	1st, 2nd (Significant Figure)		3rd (Multiplier)	4th (Distinguish color code)
Black	0	0	10^{0}	Yellow
Brown	1	1	10^{1}	
Red	2	2	10^{2}	
Orange	3	3	10^{3}	
Yellow	4	4	10^{4}	
Green	5	5	10^{5}	
Blue	6	6	10^{6}	
Violet	7	7	10^{7}	
Gray	8	8	10^{8}	
White	9	9	10^{9}	
Gold	—	—	10^{-1}	
Silver	—	—	10^{-2}	
Plain	—	—	10^{-3}	

Figure5

*Coating color : Dark Blue & Color Code for 1/8W, 1/4W

*Coating color : Pink & Stamping for Marking of 1/2W and up

6.2 F (±1%)



Color	1st, 2nd 3rd (Significant Figure)			4th (Multiplier)	5th (Distinguish color code)
Black	0	0	0	10^0	Yellow
Brown	1	1	1	10^1	
Red	2	2	2	10^2	
Orange	3	3	3	10^3	
Yellow	4	4	4	10^4	
Green	5	5	5	10^5	
Blue	6	6	6	10^6	
Violet	7	7	7	10^7	
Gray	8	8	8	10^8	
White	9	9	9	10^9	
Gold	—	—	—	10^{-1}	
Silver	—	—	—	10^{-2}	
Plain	—	—	—	10^{-3}	

Figure6

*Coating color : Dark Blue & Color Code for 1/8W, 1/4W

*Coating color : Pink & Stamping for Marking of 1/2W and up