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1. INTRODUCTION

To fill the function gap of carbon film resistors, metal oxide film resistors or wire wound resistors SYNTON-TECH mages metal film resistors. The resistive element is a high contests of AL203 ceramic rod on which a thin film of Ni/Cr alloy is deposited by vacuum sputtering system. Then contact caps are pressed onto the ends of the rod and a helical grove cut through the film to give the required resistance value. Connecting copper wire are welded to the end caps. Finally the resistors are coated with multiple layers of insulation lacquer. **SYNTON-TECH's** MF series are suitable for all circuit applications especially tighter tolerance and low temperature coefficient are required.

2. FEATURES

- Meet American military specification MIL-R-10509F!
- Very low current noise!
- Major applications are switching power supplies, communications equipment, monitors, testing meters.

3. EXPLANATIONS OF ORDERING CODE

DESCRIPTION : MF 1/4W 1% 100Ω

SYNTON CODE : MF 025 F 1000 T

SERIES	POWER	TOLERANCE	RESISTANCE	PACKAGE
METAL FILM FIXED RESISTOR MF TYPE	012 : 1/8W 025 : 1/4W 040S : 0.4W 033S : 1/3W 050S : 1/2W 060S : 0.6W 050 : 1/2W 100 : 1W 200 : 2W 300S : 3W 500SS:5W 100 S : 1W small Size 200 B : 2W big Size (Please see detail of Figure1)	F : ±1% D : ±0.5% C : ±0.25% B : ±0.1% A : ±0.05% AA : ±0.01% J : ±5%	VALUE E96 Series 1% 4 Digits : 2R20 : 2.2Ω 1000 : 100Ω 1002 : 10K 1004 : 1M E24 Series 5% 3 Digits : 2R2 : 2.2Ω 101 : 100Ω 103 : 10K 105 : 1M (Please see detail of Figure7)	T=Tape Box S=Tape 26mm TR=Tape Reel B=Bulk M / MK / MB= Forming horizontal type F / FK / FKK= Forming vertical type (Please see detail of Figure4&5.6)

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4. ELECTRICAL CHARACTERISTICS

TYPE	MF-12	MF-25S	MF-40S	MF-33S	MF-25	MF-50S	MF-60S	MF-50	MF-100S	MF-100	MF-200S	MF-200	MF-300S	MF-500SS
Power Rating at 70℃	1/16W 1/8W 1/6W	1/4W	0.4W	1/3W	1/4W	1/2W	0.6W	1/2W	1W	1W	2W	2W	3W	5W
Operating Temp. Range	—55℃～＋155℃													
Maximum Working Volt.	200V	250V	350V	250V	250V	350V	350V	350V	500V	500V	500V	500V	500V	500V
Maximum Overload Volt.	400V	500V	700V	500V	500V	700V	700V	700V	1000V	1000V	1000V	1000V	1000V	1000V
Dielectric withstanding Volt.	400V	500V	700V	500V	500V	700V	700V	700V	1000V	1000V	1000V	1000V	1000V	1000V
Value Range ±0.5%. ±1%	STANDARD 10Ω~1MΩ													
	SPECIAL Low to 0.1Ω high to 30MegΩ													
±0.25%	100Ω~100KΩ													
±0.1%	100Ω~47KΩ													
	SPECIAL VALUES AVAILABLE UPON REQUEST													
Temp. Coefficient	±10ppm/℃、±15ppm/℃、±25ppm/℃、±50ppm/℃、±100ppm/℃													

Figure 1

5. POWER RATING

(1)Power Derating : The rated power at the temperature in excess of 70℃ shall be derated in accordance with figure2

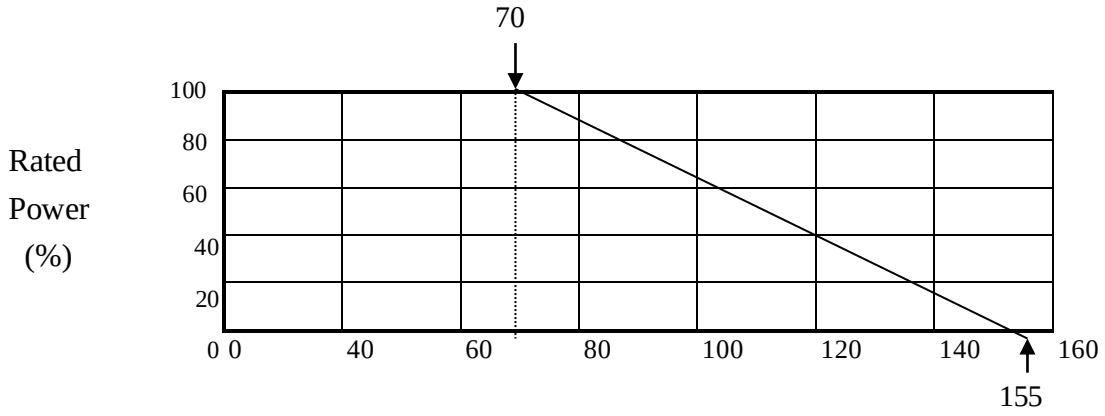
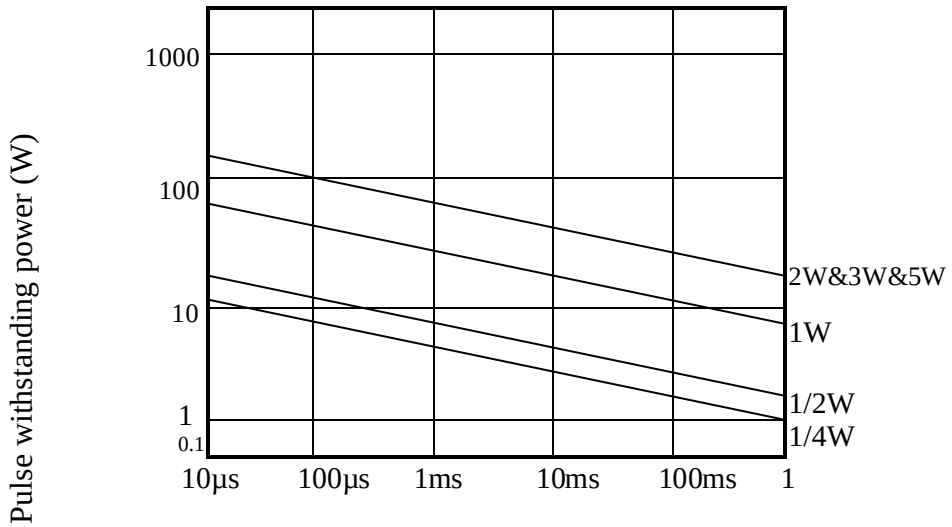


Figure2

(2)Pulse Loading Characteristics



(2)Rated Voltage : The DC or AC(rms) continuous working voltage corresponding to the rated power is determined by the following formula:

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

Where E : Continuous rated DC or AC (rms) working voltage (v)
P : Rated power (w)
R : Resistance value (Ω)

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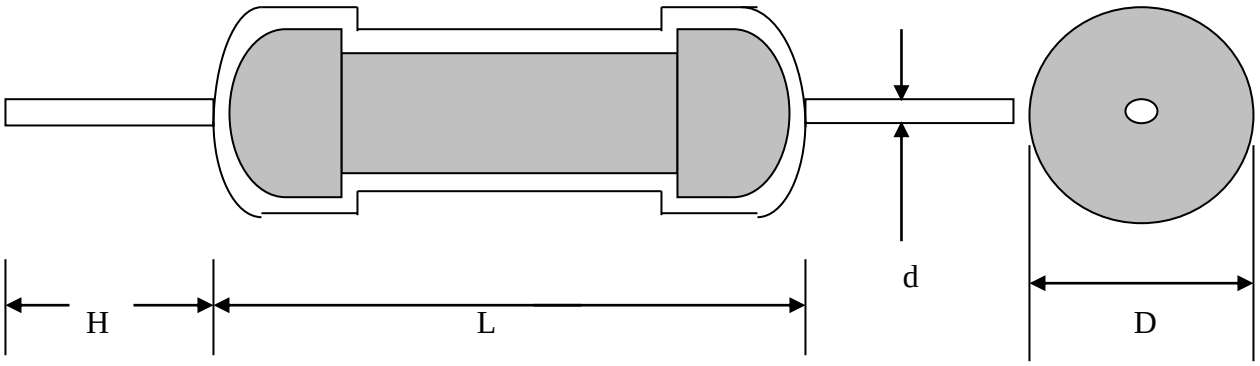
6. DIMENSIONS



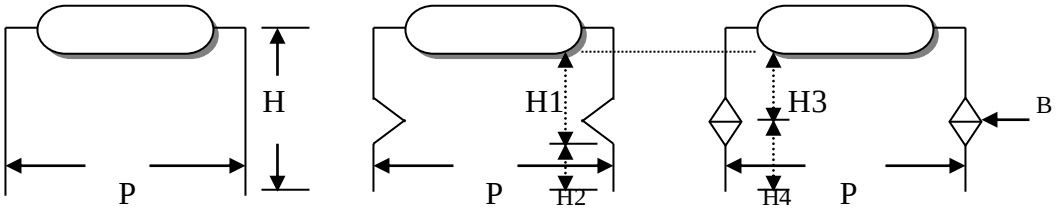
Unit: m/m

TYPE	POWER	L	D	H	d
MF-12	1/16W 1/6W 1/8W	3.5 ± 0.3	1.8 ± 0.3	25 ± 3	0.40 ± 0.05
MF-25S	1/4W				
MF-40S	0.4W				
MF-33S	1/3W	6.0 ± 0.5	2.3 ± 0.3	25 ± 3	0.45 ± 0.05
MF-25	1/4W				
MF-50S	1/2W				
MF-60S	0.6W				
MF-50	1/2W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.5 ± 0.1
MF-100S	1W				
MF-100	1W	11 ± 1.0	4.5 ± 0.5	35 ± 3	0.65 ± 0.1
MF-200S	2W				
MF-200	2W	15 ± 1.0	5.0 ± 0.5	35 ± 3	0.7 ± 0.1
MF-300S	3W				
MF-500SS	5W				

Figure3

(1) FORMING PACKING

M / MK / MB= Forming horizontal type



M TYPE **MK TYPE** **MB TYPE**

Unit : m/m

TYPE	POWER	FORMING Type	P ± 1	H ± 2.5	H1 ± 1	H2 ± 1	H3 ± 1	H4 ± 1
MF-12 MF-25S MF-40S	1/8W 1/4W 0.4W	M	5~	5~	—	—	—	—
MF-33S MF-25 MF-50S MF-60S	1/3W 1/4W 1/2W 0.6W	M	10~	5~	—	—	—	—
		MK		—	5 8	3~	—	—
MF-50 MF-100S	1/2W 1W	M	12.5~	10~	—	—	—	—
		MK.MB		—	5 8	3~	5 8	5~
MF-100 MF-200S	1W 2W	M	15~	10~	—	—	—	—
		MK.MB		—	5 8	3~	5 8	5~
MF-200 MF-300S	2W 3W	M	20~	10~	—	—	—	—
		MK MB		—	5 8	3~	5 8	5~

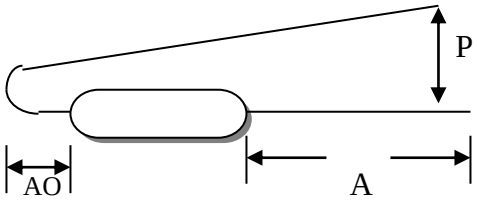
Remark : 1. B = 1.15 ~

2. ***ALTERNATE MARKING METHOD ALSO AVAILABLE ON REQUEST.***

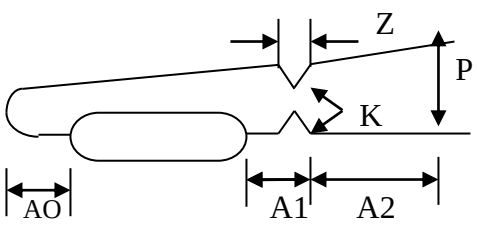
Figure4

(2) FORMING PACKING

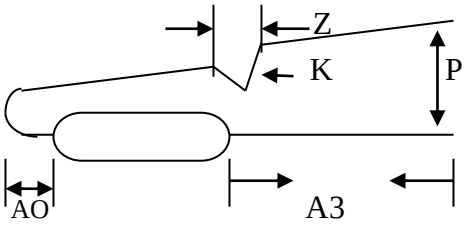
F / FK / FKK=Forming vertical type



F TYPE



FKK TYPE



FK TYPE

Unit : m/m

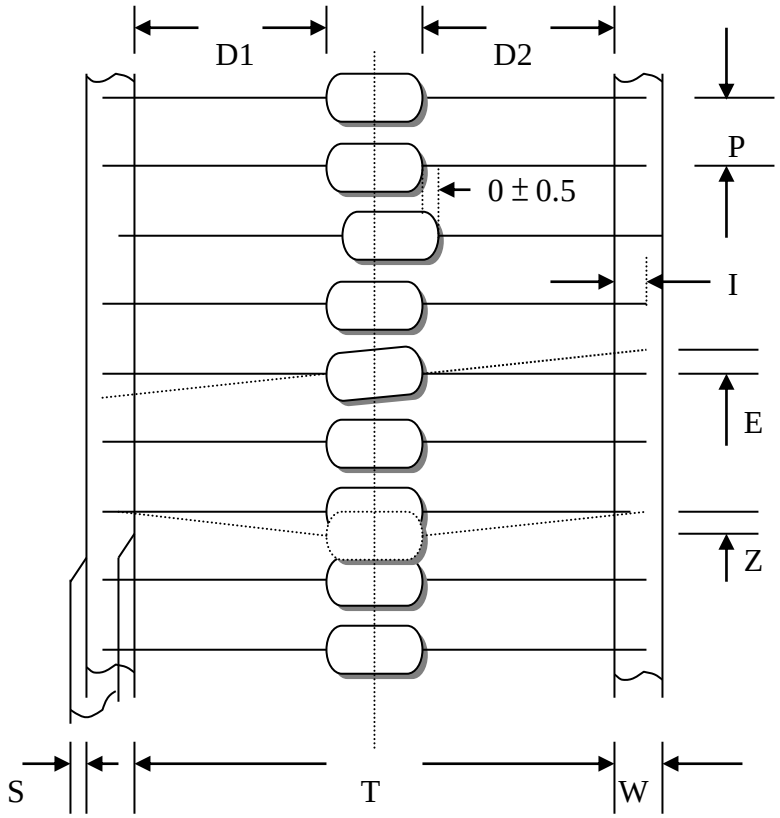
TYPE	POWER	FORMING Type	P ± 1	A ± 1	A1 ± 1	A2 ± 1	A3 ± 1	A0 Max
MF-12 MF-25S MF-40S	1/8W 1/4W 0.4W	F	—	25±3	—	—	—	4.0
MF-33S MF-25 MF-50S MF-60S	1/3W 1/4W 1/2W 0.6W	F	5~10	25±3	—	—	—	4.0
		FK	5~10	—	—	—	25±3	4.0
		FK FKK	5~10	—	4	3~	5~	4.0
MF-50 MF-100S	1/2W 1W	F	5~10	5~	—	—		4.0
		FK	5~10				25±3	4.0
		FK FKK	5~10		4	3~	5~	4.0
MF-100 MF-200S	1W 2W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3~	5~	4.0
MF-200 MF-300S	2W 3W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3~	5~	4.0

Remark : 1. Z = 3 ±1. K = 2 ±0.5,

2. ***ALTERNATE MARKING METHOD ALSO AVAILABLE ON REQUEST.***

Figure5

(3) TAPE PACKING (T-TYPE)



Unit:m/m

TYPE	SIZE	T	P ±0.5	W ±0.5	D1—D2 Max.	E Max.	Z Max.	S Max.	I Min.
MF-12 MF-25S MF-40S	T-26	26±1.0	5	6	0.8	1	1.2	1	3
	T-52	52±2.0	5	6	0.8	1	1.2	1	3
MF-33S MF-25 MF-50S MF-60S	T-26	26±1.0	5	6	1.0	1	1.2	1	3
	T-52	52±2.0	5	6	1.0	1	1.2	1	3
MF-50 MF-100S	T-52	52±2.0	5	6	1.2	1	1.2	1	3
MF-100 MF-200S	T-52	52±2.0	5	6	1.2	1	1.2	1	3
	T-63	63±2.0	5	6	1.4	1	1.2	1	3
	T-74	74±2.0	5	6	1.4	1	1.2	1	3
MF-200 MF-300S MF-500SS	T-52	52±2.0	10	6	1.2	1	1.2	1	3
	T-63	63±2.0	10	6	1.4	1	1.2	1	3
	T-74	74±2.0	10	6	1.4	1	1.2	1	3

Figure6

7. CHARACTERISTICS

(1) Insulation Resistance

Test Method : Resistors shall be clamped in the trough of a 90 degree metallic V-block, apply DC 100V between this electrode and another lead wire for 1 minute.

Acceptance Standard : 1,000 M ohm above

(2) Terminal Strength

Test Method : Pull a resistor with a weight of 1 kg for 30 seconds. Bend the terminal lead wire with 500gs weight for 90 degree and bend it for 90 degree oppositely and return to normal.

Acceptance Standard : Resistance shall not change more than ±0.2%. No evidence of mechanical damage.

(3) Vibration

Test Method : Total amplitude of 1.5mm. The frequency shall vary from 10 HZ to 55 HZ, for approximate 1 second. Make this test in the direction parallel to the resistor axis, and up/down for 2 hours respectively. (altogether 6 hours.)

Acceptance Standard : Resistance shall not change more than ±0.25%. No evidence of mechanical damage.

(4) Short Time Overload

Test Method : Resistors shall be tested 2.5 times rated voltage for 5 seconds at ambient room temperature.

Acceptance Standard : Resistance shall not change more than ±0.5%. No evidence of mechanical damage.

(5) Load Life

Test Method : Thermostatic chamber at a temperature of 70±5℃ under a rated DC voltage for 1.5 hours on and 1/2 hour off repeat this cycle for 1000±12 hours.

Acceptance Standard : Resistance shall not change more than ±1.5%.
No evidence of mechanical damage.

(6) Moisture Resistance

Test Method : At temperature of 40±2℃ and a relative humidity of 90-95% for 1000±12 hours, under a rating DC voltage for hours on and 1/2 hour off.

Acceptance Standard : Resistance shall not change more than ±1%.
No evidence of mechanical damage.

(7) Temperature Cycling

Test Method :

STEP	1	2	3	4
TEMP	-55℃	25℃	155℃	25℃
TIME	30min.	10~15min.	30min.	10~15min.

Form 1 to 4 is a cycle as shown above, repeat 5 cycles
Measure resistance after 1 hour in normal temperature.

Acceptance Standard : Resistance shall not change more than ±0.5%.
No evidence of mechanical damage.

(8) Resistance to Soldering Heat

Test Method : Immerse each terminal wire of a resistor up to 4±0.8mm away from the resistor body in the solder tank at 350±10℃ for 3±0.5 seconds.
Measure resistance in 3 hours.

Acceptance Standard : .Resistance shall not change more than ±0.25%.
No evidence of mechanical damage.

(9) Resistance to Solvent

Test Method : immerse a resistor completely in reagent at a temperature of 20~25℃ for 30±5 seconds.

Acceptance Standard : No evidence of mechanical damage.

(10) Dielectric Withstanding Voltage

Test Method : Resistors shall be clamped in the trough of a 90 degree metallic V-black, apply AC between this electrode and another lead wire for 1 minute.

Acceptance Standard : Resistance shall not change more than ±0.5%. No evidence of mechanical damage.

(11) Solderability

Test Method : apply flux to the terminal wire of a resistor up to 4±0.8mm away from the resistor body and immerse the flux applied portion in the solder tank at 260±5℃ for 3±0.5 seconds

Acceptance Standard : more than 95% of a circumference of the immersed portion shall be completely covered with new solder.

(12) Discontinuous Overload

Test Method : 3 times power rating . 1 second on 25 seconds off cycles 1000 $^{+100}_{0}$.

Acceptance Standard : Resistance shall not change more than ±(0.5%.+0.05Ω).

(13) Soldering Recommendation

Test Method : The Standard Length of epoxy on the terminal of our product is less than 1.5mm. Also, the Standard Welding Point must be over than 1.6mm from Resistor body.

- **Rated continuous Working Voltage (RCWV)**
  = $\sqrt{\text{power rating} \times \text{resistance value}}$

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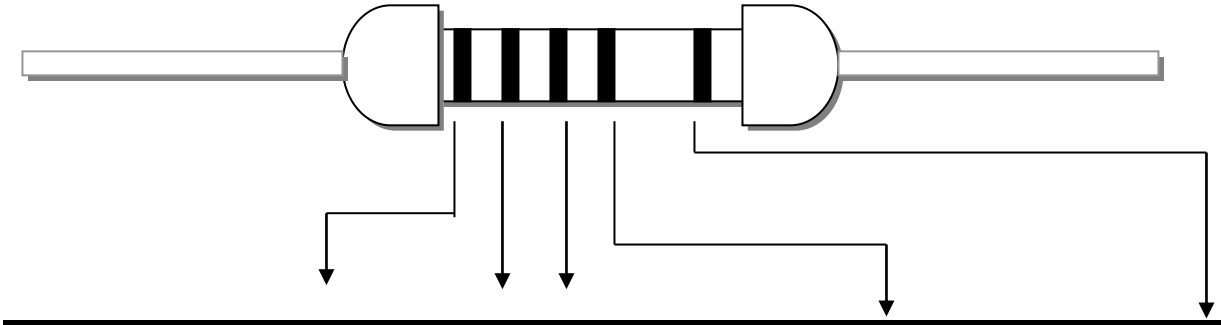
8. COLOR CODING



Color	1st, 2nd 3rd (Significant Figure)			(Multiplier)	(Tolerance)
Black	0	0	0	10^0	—
Brown	1	1	1	10^1	F (±1%)
Red	2	2	2	10^2	G (±2%)
Orange	3	3	3	10^3	—
Yellow	4	4	4	10^4	—
Green	5	5	5	10^5	D (±0.5%)
Blue	6	6	6	10^6	C (±0.25%)
Violet	7	7	7	10^7	B (±0.1%)
Gray	8	8	8	10^8	A (±0.05%)
White	9	9	9	10^9	AA (±0.01%)
Gold	—	—	—	10^{-1}	J (±5%)
Silver	—	—	—	10^{-2}	—
Plain	—	—	—	10^{-3}	—

Figure7