1. INTRODUCTION

There are some similarities between Resistors and Fuses in material and structure. Fusible Resistors contain both functions, as being resistor in normal condition and changed into fuse while abnormal current comes in protect machines and equipment. Since two functions performed by one resistor, the cost therefore saved. **SYNTON-TECH** fusible resistor series are produced with precision technique to get exact fusing time. It is also for telephone sets which demand 600V.

2. FEATURES

- It is suitable for protecting circuit boards.
- Small in size.
- Noncombustible insulating coat.
- Low temperature coefficient.
- Uniform in fusing time.
- Body coating is in gray or green, with 4 or 5 color bands or stamping.
- Too low or too high ohmic value can be supplied only case by case.

3. EXPLANATIONS OF ORDERING CODE

DESCRIPTION : FRN 1/2W 5% 100Ω

SYNTON CODE : FRN 050 J 101 T

SERIES	POWER	TOLERANCE	RESISTANCE	PACKAGE
FUSIBLE RESISTOR FRN TYPE	012 : 1/8W 025 : 1/4W 050 : 1/2W 100 : 1W 200 : 2W 300 : 3W 500 : 5W 100 S : 1W small Size 200 B : 2W big Size (Please see detail of Figure1)	J : ±5% G : ±2% F : ±1%	VALUE E24 Series 3 Digits : 2R2 : 2.2Ω 101 : 100Ω 103 : 10K E96 Series 4 Digits : 2R20 : 2.2Ω 1000 : 100Ω 1002 : 10K (Please see detail of Figure7&8)	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)

4. ELECTRICAL CHARACTERISTICS

TYPE	FRN-12	FRN-25	FRN-33S	FRN-50S	FRN-50	FRN-100S	FRN-100	FRN-200S	FRN-200	FRN-300S	FRN-300	FRN-500S
Power Rating at 70℃	1/8W	1/4W	1/3W	1/2W	1/2W	1W	1W	2W	2W	3W	3W	5W
Operating Temp. Range	—55℃～+155℃											
Maximum Working Volt.	200V	200V	200V	250V	250V	300V	300V	350V	350V	350V	350V	350V
Maximum Overload Volt.	250V	300V	300V	350V	350V	450V	450V	500V	500V	500V	500V	500V
Dielectric withstanding Volt.	200V	250V	250V	300V	300V	350V	350V	400V	400V	400V	400V	400V
Value Range	STANDARD 1Ω~10KΩ										1Ω~100Ω	
	SPECIAL 0.1Ω~0.9Ω										0.1Ω~0.9Ω	
Temp. Coefficient	±300 ppm / ℃											

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

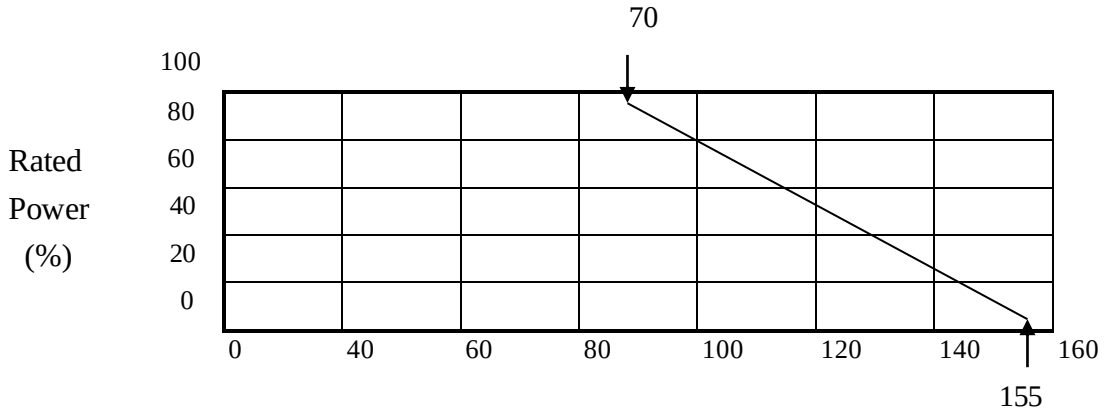


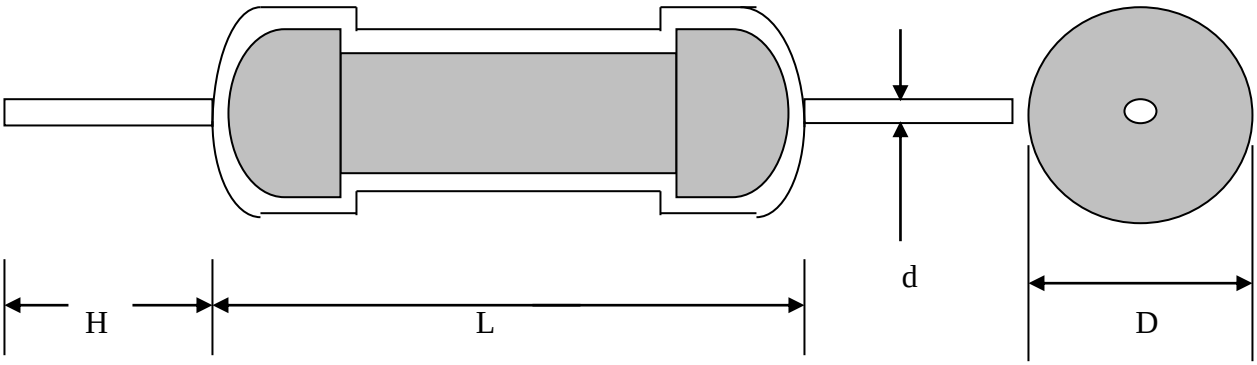
Figure2

(2)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)

6. DIMENSIONS



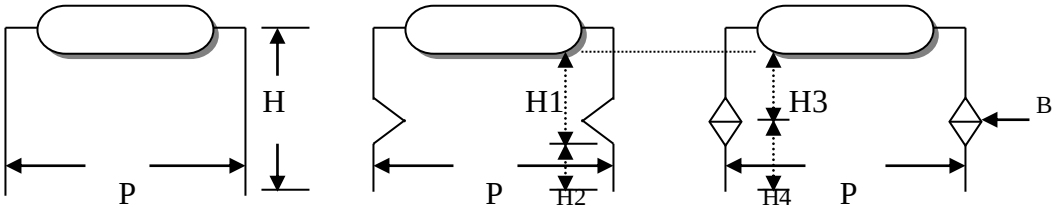
Unit: m/m

TYPE	POWER	L Max	D Max	H	d
FRN-12	1/8W	3.8	2.1	25 ± 3	0.4 ± 0.05
FRN-25	1/4W	6.8	2.5	25 ± 3	0.45 ± 0.05
FRN-33S	1/3W				
FRN-50S	1/2W				
FRN-50	1/2W	9.5	3.7	25 ± 3	0.5 ± 0.1
FRN-100S	1W				
FRN-100	1W	12	5.0	35 ± 3	0.65 ± 0.1
FRN-200S	2W				
FRN-200	2W	16	5.5	35 ± 3	0.7 ± 0.1
FRN-300S	3W				
FRN-300	3W	17.5	7	35 ± 3	0.7 ± 0.1
FRN-500S	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
FRN-25 FRN-33S FRN-50S	1/4W 1/3W 1/2W	M	10~	5~	—	—	—	—
		MK		—	8~	3~	—	—
FRN-50 FRN-100S	1/2W 1W	M	12.5~	10~	—	—	—	—
		MK.MB		—	8~	3~	8~	5~
FRN-100 FRN-200S	1W 2W	M	15~	10~	—	—	—	—
		MK.MB		—	8~	3~	8~	5~
FRN-200 FRN-300S	2W 3W	M	20~	10~	—	—	—	—
		MK MB		—	8~	3~	8~	5~
FRN-300 FRN-500S	3W 5W	M	25~	10~	—	—	—	—
		MK MB		—	6~	3~	6~	5~

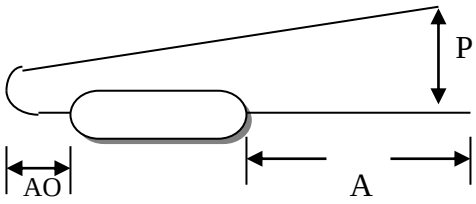
Remark: 1. B = 1.15 ~

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

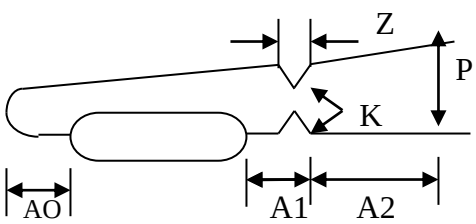
Figure4

(2) FORMING PACKING

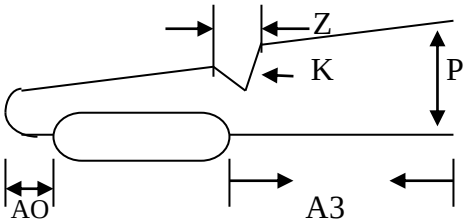
F / FK / FKK=Forming vertical type



F TYPE



FKK TYPE



FK TYPE

Unit : m/m

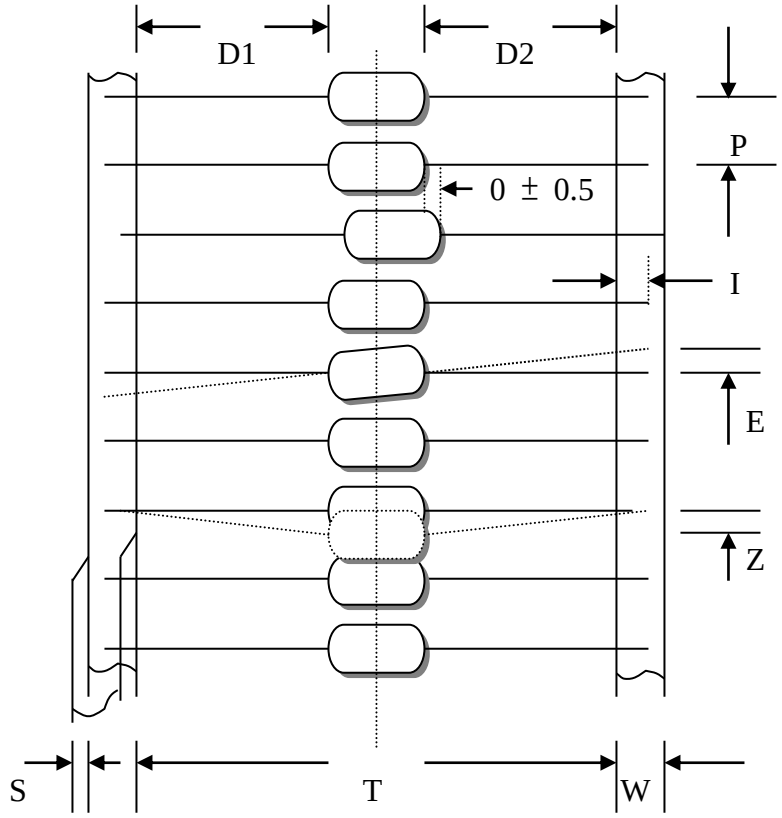
TYPE	POWER	FORMING Type	P ± 1	A ± 1	A1 ± 1	A2 ± 1	A3 ± 1	A0 Max
FRN-25 FRN-33S FRN-50S	1/4W 1/3W 1/2W	F	5~10	—	—	—	25±3	4.0
		FK FKK	5~10	—	4	3	5~	4.0
FRN-50 FRN-100S	1/2W 1W	F	5~10	5~	—	—		4.0
		FK	5~10				25±3	4.0
		FK FKK	5~10		4	3	5~	4.0
FRN-100 FRN-200S	1W 2W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3	5~	4.0
FRN-200 FRN-300S	2W 3W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3	5~	4.0
FRN-300 FRN-500S	3W 5W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	5~	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	D_1–D_2 Max.	E Max.	Z Max.	S Max.	I Min.
FRN-25 FRN-33S FRN-50S	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
FRN-50 FRN-100S	T-52	52±2.0	5	6	1.2	1	1.2	1	3
FRN-100 FRN-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
FRN-200 FRN-300S	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) Resistance Temperature Characteristic

Test Method : -30℃ ~ 150℃

Acceptance Standard : ±300ppm/℃

(2) Temperature Cycling

Test Method : -30℃ ~ 85℃ for 5 Cycles

Acceptance Standard : ± (1%+0.1Ω)

(3) Short-Time Overload

Test Method : 4 times of rated wattage for 5 sec.

Acceptance Standard : ± (2%+0.1Ω)

(4) Resistance to Soldering Heat

Test Method : 350℃ for 3 sec.

Acceptance Standard : ± (1%+0.1Ω)

(5) Insulation Resistance

Test Method : 500V megger

Acceptance Standard : 1,000MΩ MIN.

(6) Load Life

Test Method : 70℃ on-off cycle 1,000 hours.

Acceptance Standard : ± (5%+0.1Ω)

(7) Solderability

Test Method : 260℃±5 for 3±0.5 seconds

Acceptance Standard : 95% min. coverage

(8) Moisture Load life

Test Method : 40℃ 95% RH on-off cycle 1,000 hours.

Acceptance Standard : ± (5%+0.1Ω)

(9) Fusing Characteristics

RESISTANCE RANGE	MAGNIFICATION OF POWER RATING	FUSING TIME
0.1Ω~ 0.2Ω	RATED POWER X 64	60 Sec MAX
0.22Ω~ 1Ω	RATED POWER X 32	
1.1Ω~ 2Ω	RATED POWER X 25	
2.1Ω~ 10KΩ	RATED POWER X 16	

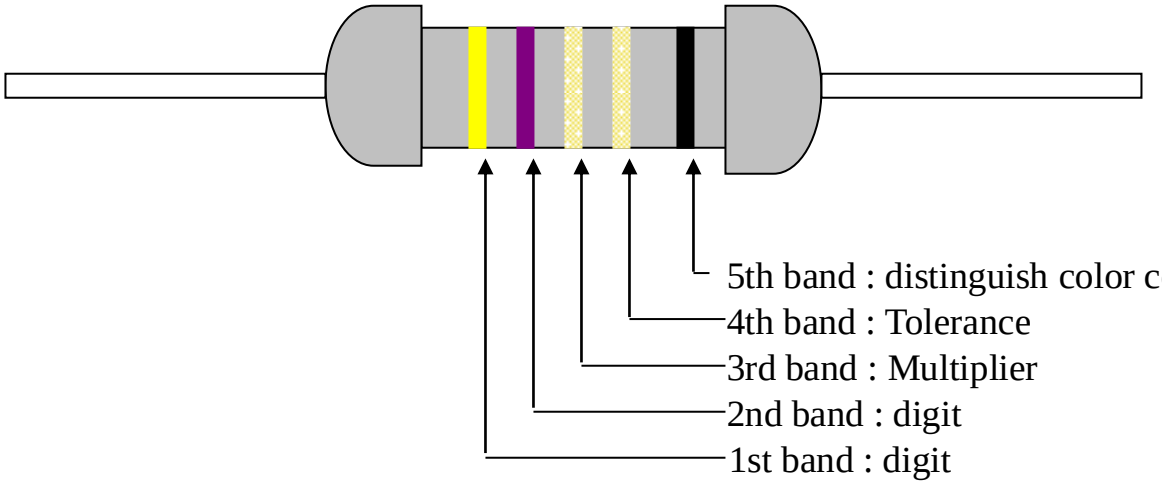
(10) Soldering Recommendation

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.

8. COLOR CODING

8.1 J (±5%)

**** Fusible type distinguish color code (WHITE)**



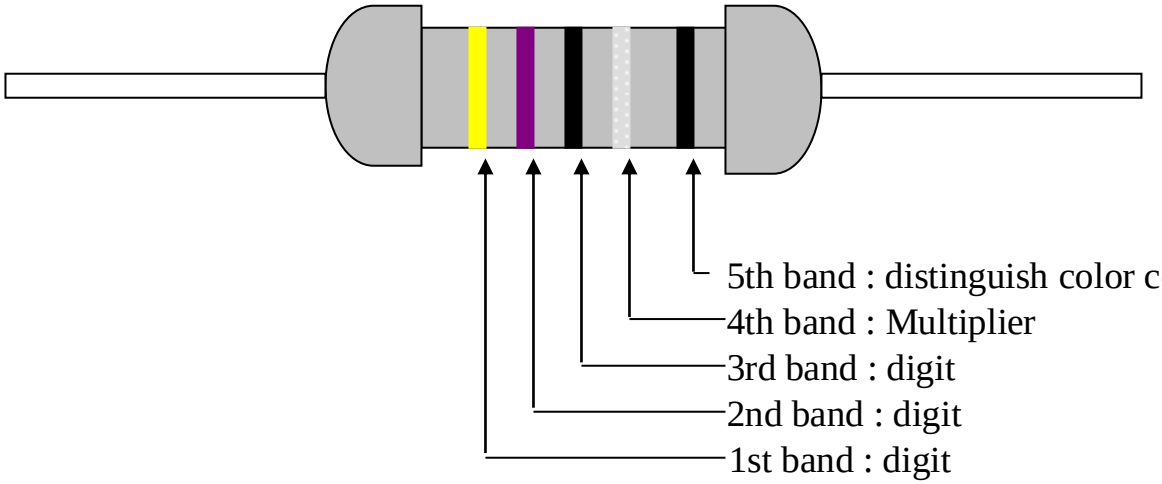
Color	1st, 2nd (Significant Figure)		3rd (Multiplier)	4th (Tolerance)	5th (Distinguish color code)
Black	0	0	10^{0}	—	White
Brown	1	1	10^{1}	—	
Red	2	2	10^{2}	—	
Orange	3	3	10^{3}	—	
Yellow	4	4	10^{4}	—	
Green	5	5	10^{5}	—	
Blue	6	6	10^{6}	—	
Violet	7	7	10^{7}	—	
Gray	8	8	10^{8}	—	
White	9	9	10^{9}	—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

Figure7

8.2 F (±1%) & G (±2%)

** **Fusible type distinguish color code (WHITE)**

** **Does not indicate the color code of tolerance**



Color	1st, 2nd, 3rd (Significant Figure)			4th (Multiplier)	5th (Distinguish color code)
Black	0	0	0	10^0	White
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}	

Figure8