FUSING RESISTORS

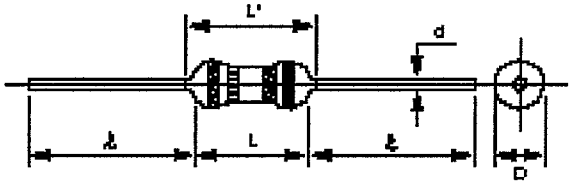
FRN 14, 12, 01

Kamaya metal film fusing resistors operate as a typical resistor under normal load conditions. During an abnormal overload, this resistor's internal conductive film disintegrates creating an open circuit. It is suitable for use in any circuit where overload conditions might constitute a safety hazard.

● FEATURES

1. Low cost circuit protection.
2. Flameproof conformal coating.
3. No flaming or arcing under all overload conditions.
4. 1/4 watt through 1.0 watt power ratings available.

● DIMENSIONS



Four-Band Color Code

Unit = mm

Type \ Dimension	L	L'	D	ℓ	d
FRN 14	6.5 ± 0.5	7.5 max.	2.3 ± 0.5	27 min.	0.6 ± 0.5
FRN 12	8.5 ± 1.0	9.5 max.	3.0 ± 0.5	27 min.	0.6 ± 0.5
FRN 01	11.0 ± 1.0	12.0 max.	4.0 ± 1.0	27 min.	0.7 ± 0.5

● RATINGS

Type	Rated Power @ 70°C W	Resistance Range And Tolerance (E_{24} Series) ± 5% (J)	Fusing Characteristics Opening Time * 15 x Rated Power	Operating Temperature Range
FRN 14	0.25	1.0 Ω to 4.3 Ω 4.7 Ω to 1.0 KΩ	30 seconds max. 24 seconds max.	-55°C to 155°C
FRN 12	0.50	1.0 Ω to 1.0 KΩ	24 seconds max.	
FRN 01	1.0	1.0 Ω to 1.0 KΩ	24 seconds max.	

* Resistor is open when resistance value increases to more than 50 times nominal resistance value.

● PERFORMANCE CHARACTERISTICS

DESCRIPTION	PERFORMANCE	TEST METHOD JIS C5202	
Resistance Temperature Coefficient	± 300 ppm/°C	section 5.2	Measuring temperature +25°C/-55°C/+25°C/+125°C
Short-time Overload	± 1.5% maximum	section 5.5	Condition A Rated power x 2.5, 5 seconds
Insulation Resistance	1,000 MΩ minimum	section 5.6	Condition A. 100Vdc 1 minute
Dielectric Strength 500 Volt	± 0.5% maximum	section 5.7	FRN1/4:300Vac 1 Minute FRN1/2,1:350Vac 1 Minute
Terminal Strength — Pulling	No mechanical damage	section 6.1.2(1)	FRN 12 : 5N (0.51kgf) FRN 14, 01 : 10N (1.02kgf) for 5~10 seconds
Terminal Strength — Bending	No mechanical damage	section 6.1.2(2)	360° revolution 5 times
Vibration	± 1.0% maximum	section 6.3	Type A. 10~55Hz 3 directions 2 hours each
Solder-Heat Resistance	± 1.0% maximum	section 6.4	350°C 2~2.5mm from the body 3.5 seconds
Solderability	95% minimum coverage	section 6.5	235°C 5 seconds
Temperature Cycle	± 1.0% maximum	section 7.4	-25°C/ + 85°C for 5 cycles
Load Life in Moisture	± 3.0% maximum	section 7.9	Rated voltage 1.5 hours "ON" 0.5 hours "OFF" 40°C 95%RH 1,000 Hours
Load Life	± 3.0% maximum	section 7.10	Rated voltage 1.5 hours "ON" 0.5 hours "OFF" 70°C 1,000 Hours

● PART NUMBER SYSTEM

FRN 14 - XXX J T

Product Type
FRN = Fusing Resistor

Wattage
14 = 1/4 watt
12 = 1/2 watt
01 = 1 watt

Resistance Value
2 significant digits plus multiplier
102 = 1.0 KΩ
1R0 = 1.0 Ω

Packaging
B = Bulk
T = Tape and Reel (52 mm)
TA = Tape and Ammo Box (26 mm)
TB = Tape and Ammo Box (52 mm)

Note: Axial packaging per EIA RS-296-E

Tolerance
J = ± 5%

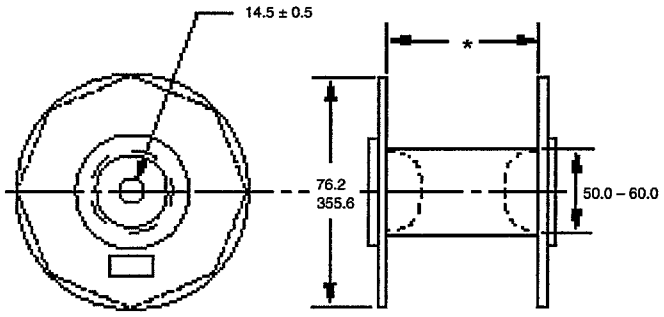
AXIAL LEAD PRODUCT PACKAGING

PER EIA 296-E

Product Type	Tape And Reel (52 mm)	Tape And Ammo Box (26 mm)	Tape And Ammo Box (52 mm)
RD 16	5,000	5,000	5,000
RD 14	5,000	5,000	5,000
RD 12	2,000	2,000	2,000
RD 14S	5,000	5,000	5,000
RD 12S	5,000	5,000	5,000
RN 16	5,000	5,000	5,000
RN 14	5,000	5,000	5,000
RN 12	2,000	2,000	2,000
RN 14S	5,000	5,000	5,000
RSI 12S	5,000	5,000	5,000
RSI 1S	3,000	3,000	3,000
RSI 2S	2,000	2,000	2,000
RSI 3S	1,000	1,000	1,000
RSI 5S	Bulk packaging only; 1,000 pcs.		
FRN 14	5,000	5,000	5,000
FRN 12	—	2,000	2,000
FRN 01	Bulk packaging only; 1,000 pcs.		
RM 12			
RM 1			
RM 2			
RNV 1	1,500	—	1,000

● REEL DIMENSIONS

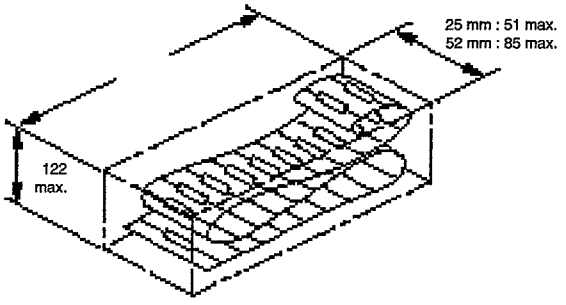
Unit = mm



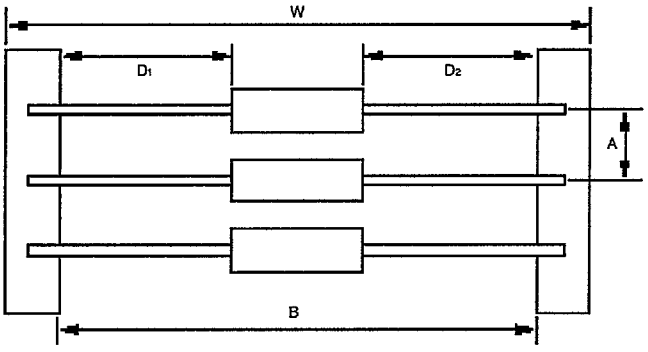
* Reel flange to be 1.5 mm to 8.0 mm greater than overall taped component width (W). See below.

● AMMO BOX DIMENSIONS

Unit = mm



● LEAD TAPING DIMENSIONS



Unit = mm

Dimension / Type	B	$D_1 - D_2$	A	W
26 mm	$26.0 \pm \frac{1.5}{0.0}$	1.0 max.	5.0 ± 0.5	40.2 max.
52 mm	52.4 ± 1.5	1.4 max.	5.0 ± 0.5 10.0 ± 0.5	66.6 max.

STANDARD RESISTANCE VALUES AND DESIGNATORS

● SYMBOLS OF RESISTANCE TEMPERATURE CHARACTERISTICS

Symbol	Resistance-Temperature Characteristic
E	+ 25 ppm/°C
C	+ 50 ppm/°C
K	+ 100 ppm/°C
D	+ 200 ppm/°C

● SYMBOLS OF RESISTANCE VALUE TOLERANCE

Symbol	Tolerance
B	+ 0.1%
C	+ 0.25%
D	+ 0.5%
F	+ 1.0%
G	+ 2.0%
J	+ 5.0%
K	+ 10%
L	+ 15%
M	+ 20%

● STANDARD RESISTANCE VALUES

E_6 ± 20%	E_{12} ± 10%	E_{24} ± 2% And ± 5%	E_{96} ± 0.1% To ± 1%
10	10	10	100
			102
			105
			107
		11	110
			113
			115
			118
	12	12	121
			124
			127
		13	130
			133
			137
			140
			143
			147
15	15	15	150
			154
		16	158
			162
			165
			169
			174
	18	18	178
			182
			187
			191
			196
		20	200
			205
			210

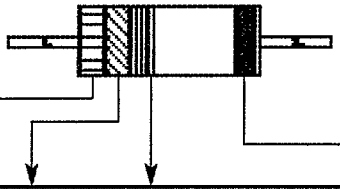
E_6 ± 20%	E_{12} ± 10%	E_{24} ± 2% And ± 5%	E_{96} ± 0.1% To ± 1%
			215
22	22	22	221
			226
			232
		24	237
			243
			249
			255
			261
	27	27	267
			274
			280
			287
		30	294
			301
			309
			316
33	33	33	324
			332
			340
			348
		36	357
			365
			374
	39	39	383
			392
			402
			412
		43	422
			432
			442
			453

E_6 ± 20%	E_{12} ± 10%	E_{24} ± 2% And ± 5%	E_{96} ± 0.1% To ± 1%
			464
47	47	47	475
			487
		51	499
			511
			523
			536
	56	56	549
			562
			576
			590
			604
		62	619
			634
			649
68	68	68	665
			681
			698
			715
		75	732
			750
			768
			787
	82	82	806
			825
			845
			866
		91	887
			909
			931
			953
			976

● NUMERICAL SYMBOLS AND MULTIPLIER

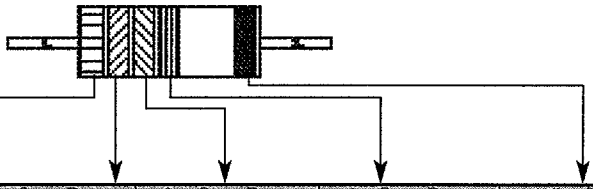
Symbol	T (tera)	G (giga)	M (mega)	K (kilo)	m (milli)	μ (micro)	n (nano)	p (pico)	Å (angstrom)	ppm
Multiplier	10^{12}	10^{9}	10^{6}	10^{3}	10^{-3}	10^{-6}	10^{-9}	10^{-12}	10^{-7} mm	10^{-6}

● RESISTOR COLOR CODES



Four-Band Color Code

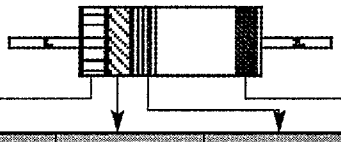
Color	1st Color Band 1st Figure	2nd Color Band 2nd Figure	3rd Color Band Multiplier	4th Color Band Resistance Tolerance
Black	0	0	10^0	—
Brown	1	1	10^1	+ 1% (F)
Red	2	2	10^2	+ 2% (G)
Orange	3	3	10^3	—
Yellow	4	4	10^4	—
Green	5	5	10^5	—
Blue	6	6	10^6	—
Purple	7	7	10^7	—
Gray	8	8	10^8	—
White	9	9	10^9	—
Gold	—	—	10^{-1}	+ 5% (J)
Silver	—	—	10^{-2}	+ 10% (K)
No Band	—	—	—	+ 20% (M)



Five-Band Color Code

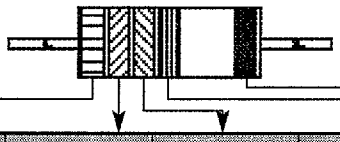
Color	1st Color Band 1st Figure	2nd Color Band 2nd Figure	3rd Color Band 3rd Figure	4th Color Band Multiplier	5th Color Band Resistance Tolerance
Black	0	0	0	10^0	—
Brown	1	1	1	10^1	+ 1% (F)
Red	2	2	2	10^2	+ 2% (G)
Orange	3	3	3	10^3	—
Yellow	4	4	4	10^4	—
Green	5	5	5	10^5	+ 0.5% (D)
Blue	6	6	6	10^6	+ 0.25% (C)
Purple	7	7	7	10^7	+ 0.1% (B)
Gray	8	8	8	10^8	—
White	9	9	9	10^9	—
Gold	—	—	—	10^{-1}	—
Silver	—	—	—	10^{-2}	—

● EXAMPLE



1st Color Band	2nd Color Band	3rd Color Band	4th Color Band
Brown	Red	Yellow	Gold
1	2	10^4	+ 5%
12 x 10,000 W (J)			
120 KW + 5%			

● EXAMPLE



1st Color Band	2nd Color Band	3rd Color Band	4th Color Band	5th Color Band
Purple	Blue	Gray	Gold	Brown
7	6	8	10^{-1}	+ 1%
768 x 0.1 W (F)				
76.8 W + 1%				