

CARBON FILM RESISTORS

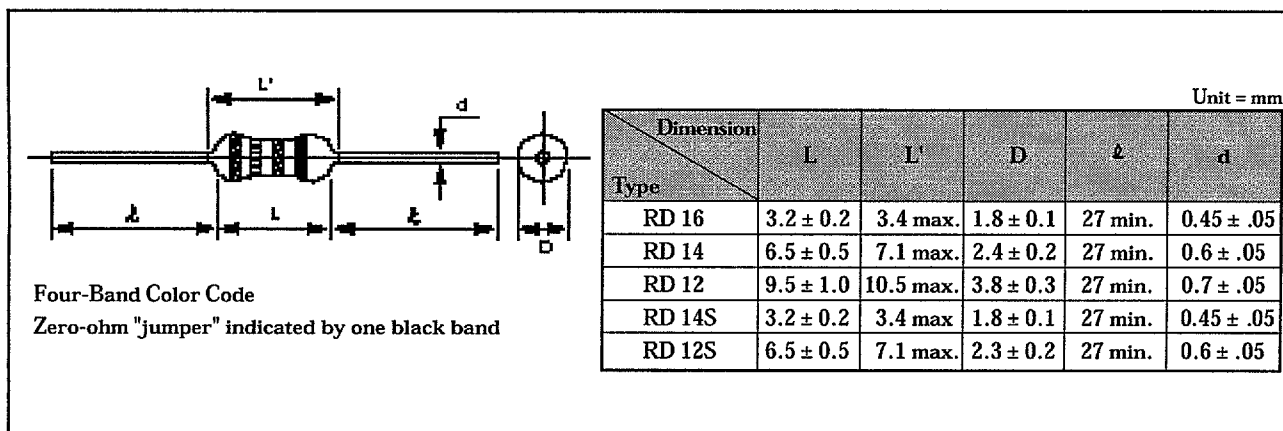
RD 16, 14, 12, 14S, 12S

Kamaya carbon film resistors offer uniform and reliable performance at a very economical cost. Available in a variety of power ratings, they are the resistor of choice for most general purpose applications.

● FEATURES

1. 1/6 watt through 1/2 watt power ratings available.
2. RD 16 and RD 14S types can be P.C. board mounted on 5.0 mm centers.
3. RD 14S type offers full 1/4 watt power rating in 1/6 watt body size.
4. RD 12S type offers full 1/2 watt power rating in 1/4 watt body size.

● DIMENSIONS



● RATINGS

Type	Rated Power @ 70°C W	Maximum Working Voltage V	Maximum Overload Voltage V	Resistance Range And Tolerance (E ₂₄ Series)		Operating Temperature Range
				± 2% (G)	± 5% (J)	
RD 16	0.16	200	400	10 Ω to 470 KΩ	1.0 Ω to 2.2 MΩ	-55°C to 155°C
RD 14	0.25	250	500	10 Ω to 1.0 MΩ	1.0 Ω to 10 MΩ	
RD 12	0.50	350	700	10 Ω to 1.0 MΩ	1.0 Ω to 10 MΩ	
RD 14S	0.25	250	500	10 Ω to 470 KΩ	1.0 Ω to 2.2 MΩ	
RD 12S	0.50	350	700	—	1.0 Ω to 2.2 MΩ	

Zero-ohm "jumper" available in all types. Maximum DCR 50 mΩ. Maximum current rating: RD 16 = 3A, RD 14 = 5A.

● PERFORMANCE CHARACTERISTICS

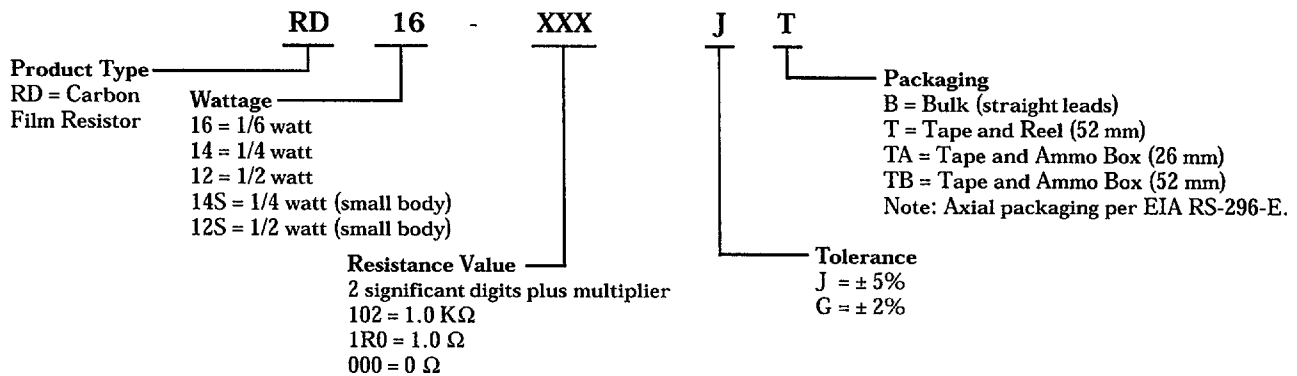
DESCRIPTION	PERFORMANCE	TEST METHOD IIS C5202	
Short-time Overload	± 1.0% maximum	section 5.5	Rated voltage x2.5, 5 seconds
Insulation Resistance	1,000 MΩ minimum	section 5.6	100Vdc 1 minute
Dielectric Strength	± 0.25% maximum	section 5.7	Condition A. RN1/6 :300Vac 1 minute RN1/4 :500Vac 1 minute
Terminal Strength	No mechanical damage	section 6.1.2(1)	RD1/6, 1/4S : 5N (0.51kgf) RD1/4, 1/2, 1/2S : 10N (1.02kgf) for 5~10 seconds
		section 6.1.2(2)	360° revolution 5 times
Vibration	± 1.0% maximum	section 6.3	10Hz→55Hz→10Hz 3 directions X, Y, Z 2 hours each Amplitude 1.5mm
Solder-Heat Resistance	± 1.0% maximum	section 6.4	Dip into 260°C solder bath for 10 seconds
Solderability	95% minimum coverage	section 6.5	After dipping into flux dip into 235°C solder bath for 2 seconds
Temperature Cycle	± 1.0% maximum	section 7.4	Cycle between -55°C and + 125°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

● TYPICAL PERFORMANCE

Resistance Range	Type				
	RD 16	RD 14	RD 12	RD 14S	RD 12S
1.0 Ω to 100 Ω	± 350	± 350	± 350	± 350	± 350
100 Ω to 36 KΩ	- 450	- 350	- 350	- 450	- 350
36 KΩ to 470 KΩ	- 700	- 650	- 550	- 700	- 650
470 KΩ to 2.2 MΩ	- 1200	- 1200	- 1000	- 1200	- 1200
2.2 MΩ to 10 MΩ	—	- 2000	- 1800	—	—

Resistance temperature coefficient (ppm/°C maximum)

● PART NUMBER SYSTEM



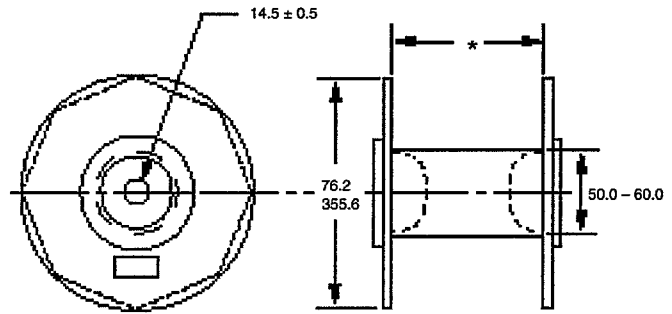
AXIAL LEAD PRODUCT PACKAGING

PER EIA 296-E

Product Type	Tape And Reel (52 mm)	Tape And Ammo Box	
		(26 mm)	(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

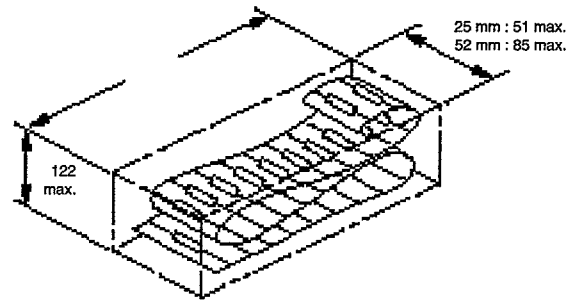
Unit = mm



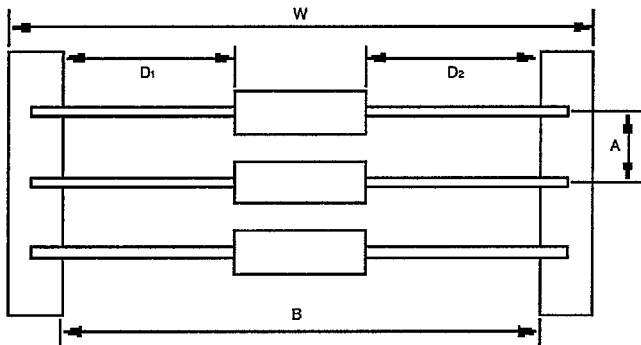
* Reel flange to be 1.5 mm to 8.0 mm greater than overall taped component width (W). See below.

AMMO BOX DIMENSIONS

Unit = mm



LEAD TAPING DIMENSIONS



Unit = mm

Dimension Type	B	D ₁ - D ₂	A	W
26 mm	26.0 ± 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_0 ± 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_0 ± 20%	E_{12} ± 10%	E_{24} ± 2% And ± 5%	E_{96} ± 0.1% To ± 1%
22	22	22	215
			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_0 ± 20%	E_{12} ± 10%	E_{24} ± 2% And ± 5%	E_{96} ± 0.1% To ± 1%
47	47	47	464
			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%				