KOA SPEER ELECTRONICS, INC.

RoHS COMPLIANT

spec sheet

SS-263 R4
AHA 6/20/07

Fixed Carbon Composition Resistor

ISO 9001:2000 CERTIFIED
TS-16949 CERTIFIED

RC 1/4, 1/2, 1 Series

1. Features

- Improved pulse endurance characteristics compared to carbon-film devices
- Wide resistance range is available, 1 ohm - 22M ohm
- Stability class: 10%

2. Type Designation

Type designation shall be as the following form.

RC	1/2	T	T52	A	104	J
Type	Power Rating	Termination Material	Taping & Forming	Packaging	Nominal Resistance	Tolerance
	1/4: 0.25W 1/2: 0.5W 1: 1W	T: Sn	T52 H forming: 1/2 only H60, H62: 1/4 only	A: Ammo R: Reel Bulk: No Designation (RC 1: Bulk Only, 500 pcs.)	2 significant figures + 1 multiplier	J: ±5% K: ±10%

3. Dimensions

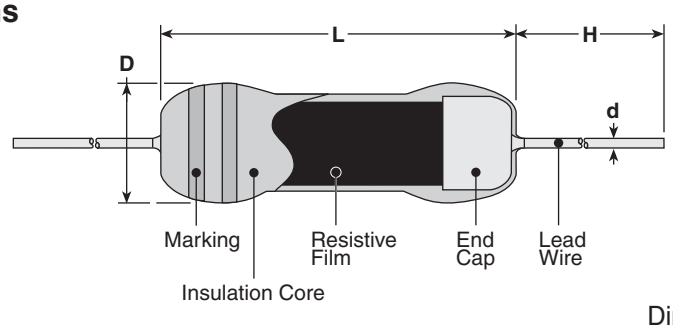

Table 1

Dimensions in inches (mm)

Type	L	D	H	d
RC 1/4	0.248±0.028 (6.3±0.7)	0.094±0.004 (2.4±0.1)	1.181±0.118 (30±3.0)	0.024±0.002 (0.6±0.05)
RC 1/2	$0.374^{+0.031}_{-0.028}$ $(9.5^{+0.8}_{-0.7})$	0.142±0.008 (3.6±0.2)	1.102±0.118 (28±3.0)	$0.028^{+0.003}_{-0.002}$ $(0.7^{+0.07}_{-0.05})$
RC 1	0.562±0.02 (14.3±0.7)	0.224±0.01 (5.7±0.3)	1.02±0.01 (26±0.3)	0.035±0.002 (0.9±0.05)

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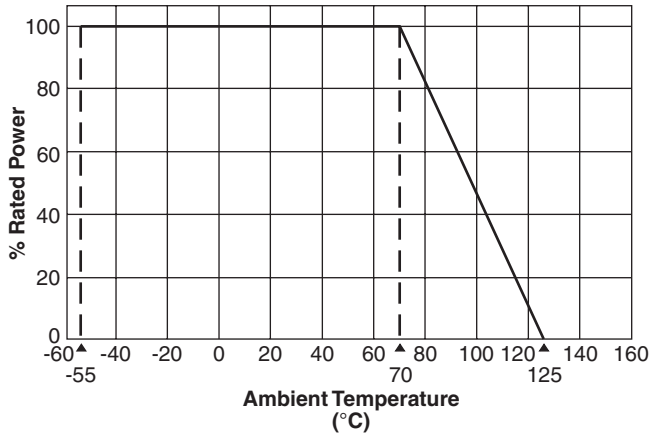
4. Standard Specifications

Style	Rated Dissipation at 70°C W	Limiting Element Voltage V	Rated Resistance Range	Temp. Coefficient of Resistance %			Rated Resistance Range	Tolerance	Isolation Voltage V	Operating Temperature Range °C
				@ -55°C	@ +100°C	@ +125°C				
RC 1/4	0.2	250	1 ohm ~ 5.6M ohm	+6.5 ~ 0	—	+1 ~ -5	1 ohm ~ 1k ohm	J (±5%): E24 series K (±10%): E12 series	100	-55°C to 125°C
				+10 ~ 0	—	0 ~ -6	1.1k ohm ~ 10k ohm			
				+13 ~ 0	—	0 ~ -7.5	11k ohm ~ 100k ohm			
RC 1/2	0.5	350	1 ohm ~ 22M ohm	+15 ~ 0	—	0 ~ -10	110k ohm ~ 1M ohm		500	
				+20 ~ 0	—	0 ~ -15	1.1M ohm ~ 22M ohm			
RC 1	1.0	500	2.2 ohm ~ 1.0M ohm	+6.5 ~ -3	+5 ~ -4	—	2.2 ohm ~ 1k ohm	K (±10%): E12 series	1000	-55°C to 100°C
				+10 ~ -3	+6 ~ -5	—	12k ohm ~ 10k ohm			
				+13 ~ -3	+7.5 ~ -6	—	12k ohm ~ 100k ohm			
				+15 ~ -3	+1 ~ -7	—	120k ohm ~ 1M ohm			

Note 1 Rated Voltage: $\sqrt{\text{(Rated dissipation) x (Rated resistance)}}$ (d.c. or a.c. r.m.s. voltage)
Note 2 Limited Element Voltage can only be applied to resistors when the resistance value is equal to or higher than the critical resistance value.

5. Derating Curve

The derated values of dissipation for temperatures in excess of 70°C shall be indicated by the following curve.



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6. Performance Characteristics JIS C5201-1:1998

Item	Requirement	Conditions
Visual Examination	Markings shall be legible, as checked by visual examination	Clause 4.4.1 Checked by visual examination
Resistance	Resistance value shall correspond with the rated resistance taking into account the specific tolerance	Clause 4.5
Voltage Proof	No breakdown or flashover	Clause 4.7 V-block method RC 1/4 100 Va.c., 60s RC 1/2 500 Va.c., 60s RC 1 1000 Va.c, 60s
Variation of Resistance with Temperature	See ratings table	Clause 4.8 Measuring temperature: +20°C/-55°C/ +20°C/+125°C/+20°C
Overload	ΔR≤±(2%+0.1 ohm) No visible damage, legible marking	Clause 4.13 The applied voltage shall be 2.5 times of the rated voltage or twice of the limiting element voltage, whichever is the less severe, 5s.
Robustness of Terminations	Tensile ΔR≤±(2%+0.1 ohm) No visible damage	Clause 4.16.2 10N for 5~10s; RC 1: 20N for 5~10s
	Bending ΔR≤±(2%+0.1 ohm) No visible damage	Clause 4.16.3 5N twice; RC 1: 10N
	Torsion ΔR≤±(2%+0.1 ohm) No visible damage	Clause 4.16.4 180°C, 2 rotation
Solderability	In accordance with Clause 4.17.4.5	Clause 4.17 235°C, 5s
Resistance to Soldering Heat	ΔR≤±(3%+0.1 ohm) No visible damage, legible marking	Clause 4.18 After immersion into the flux, the immersion into solder shall be carried out 4mm from the body at 350°C for 3.5s; RC 1: 350°C for 3.0s
Rapid Change of Temperature	ΔR≤±(2%+0.1 ohm) No visible damage	Clause 4.19 5 cycles between -55°C and +125°C RC 1: -55°C and +85°C
Climatic sequence	ΔR≤±(10%+0.5 ohm) Insulation resistance: R≥100M ohm, No visible damage	Clause 4.23 Dry/damp heat(12+12h cycle), first cycle/ cold/damp heat(12+12h cycle), remaining cycle/D.C.load
Damp Test, Steady State	ΔR≤±(10%+0.5 ohm) Insulation resistance: R≥100M ohm, No visible damage, legible marking	Clause 4.24 40°C, 95%R.H., 56 days, test a) , b) and c) of Clause 4.24.2.1
Endurance at 70°C	ΔR≤±(10%+0.5 ohm) No visible damage Insulation resistance : R≥1G ohm	Clause 4.25.1 Rated voltage, 1.5h “ON”, 0.5h “OFF”, 70°C, 1,000h
Endurance at the Upper Category Temperature	ΔR≤±(10%+0.5 ohm) No visible damage Insulation resistance : R≥1G ohm	Clause 4.25.3 125°C, no-load, 1,000h

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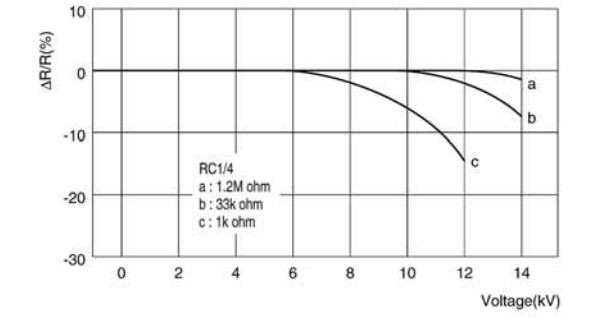
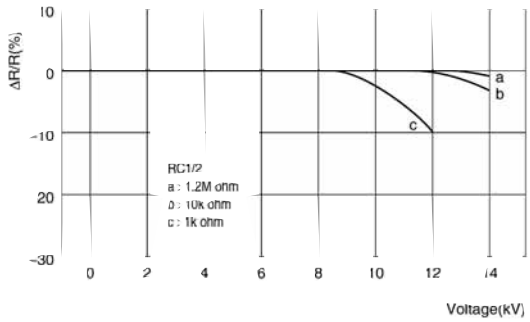
7. Typical Characteristics

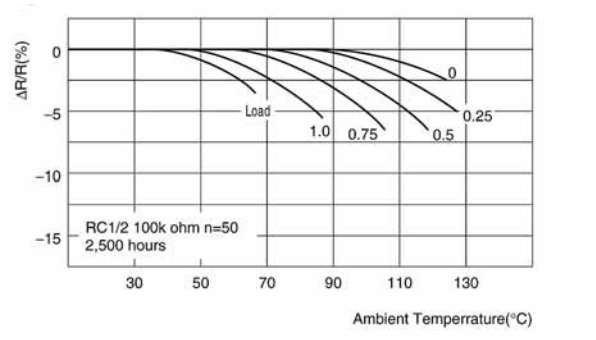
Surge Resistance Characteristics

Charging and discharging a 2,000 pF capacitor for 100 cycles.

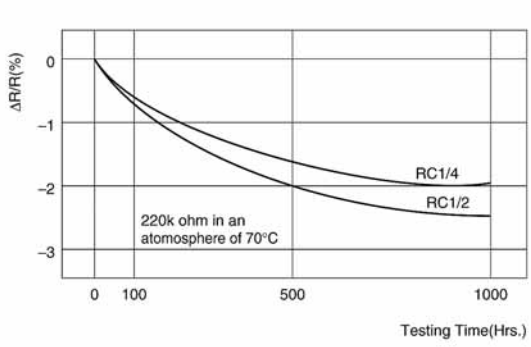




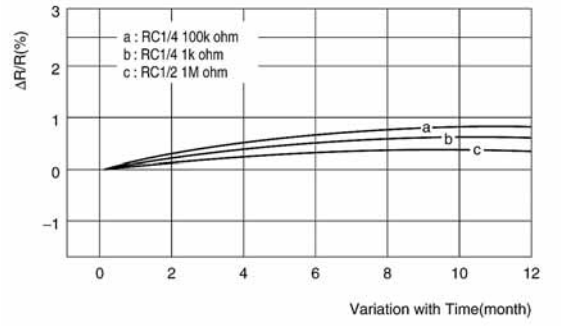
Relationship Between Load Ratio and Category Temperature



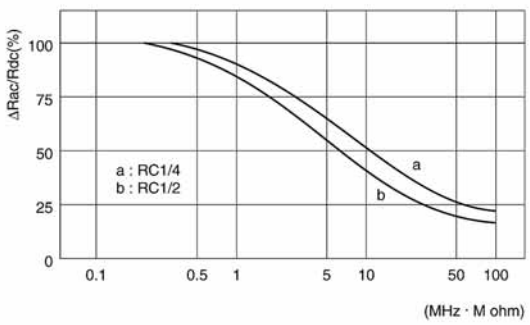
Endurance at 70°C



Variation with Time



Frequency Characteristics



"Typical characteristics indicate the mean values of ΔR/R etc."

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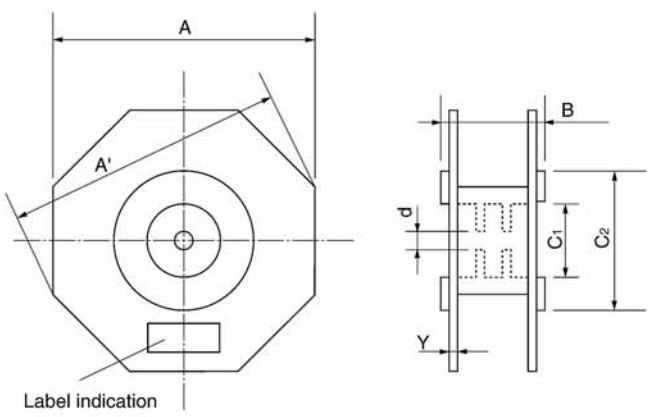
8. Packaging

Carbon composition resistors can be packaged in bulk, tape and reel, and tape and ammo box. All resistors are packaged in sealed poly bags with desiccant to maintain a consistent humidity during storage. If parts are removed from the protective plastic bag they should be used as soon as possible or resealed in the plastic bag.

(1) Dimensions of Tape and Reel

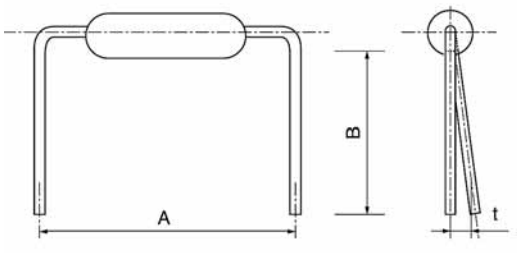


Dimensions in inches (mm)

	Code	A	*A'	B	C_1	C_2	d	*Y
RC 1/4, 1/2	R	10.24 ± 0.20 (260 ± 5)	11.02 (280)	2.95 ± 0.20 (75 ± 5)	2.38 ± 0.04 (60.4 ± 1)	3.07 ± 0.04 (78 ± 1)	0.57 ± 0.02 (14.5 ± 0.5)	0.12 (3)

* Values for reference

(2) Dimensions of Horizontal Forming



Dimensions in inches (mm)

Style	Code	A	B	t
RC 1/4	H60	0.394 ± 0.020 (10.0 ± 0.5)	0.197 ± 0.020 (5.0 ± 0.5)	0.059 (1.5 max.)
RC 1/4	H62	0.492 ± 0.020 (12.5 ± 0.5)	0.197 ± 0.020 (5.0 ± 0.5)	0.059 (1.5 max.)
RC 1/2	H	0.591 ± 0.020 (15.0 ± 0.5)	0.197 ± 0.020 (5.0 ± 0.5)	0.071 (1.8 max.)

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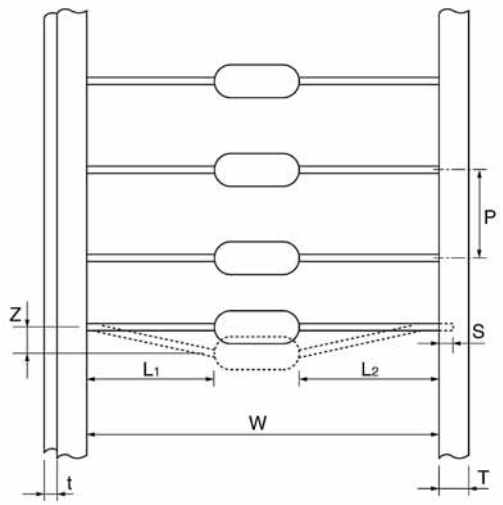
8. Packaging Cont.

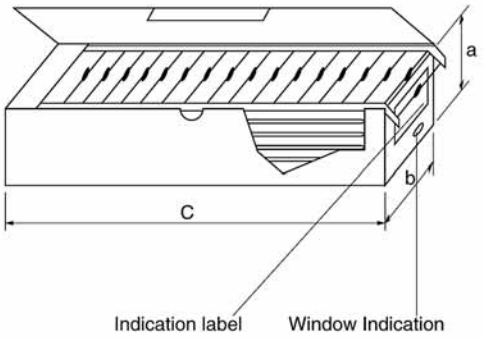
(3) Dimensions of Tape



Dimensions in inches (mm)

Style	W	L_1-L_2	T	t	P	Z	S
RC 1/4, 1/2	$2.063^{+0.063}_{-0.055}$ ($52.4^{+1.6}_{-1.4}$)	0.039 (1.0 max.)	0.236 ±0.020 (6.0 ± 0.5)	0.020 (0.5 max.)	0.200 ± 0.015 (5.08 ± 0.38)	0.039 (1.0 max.)	0.126 (3.2 min.)

(4) Ammo Box



Dimensions in inches (mm)

Style	Code	a	b	c
RC 1/4	T52: 2.047 (52.0) Width Tape	2.362 ± 0.197 (60.0 ± 5.0)	2.953 ± 0.197 (75.0 ± 5.0)	10.827 ± 0.197 (275.0 ± 5.0)
RC 1/2	T52: 2.047 (52.0) Width Tape	2.559 ± 0.197 (65.0 ± 5.0)	2.953 ± 0.197 (75.0 ± 5.0)	17.913 ± 0.197 (455.0 ± 5.0)

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9. Packaging Specifications

Style	Tape & Reel	
	Quantity/Reel (pcs)	Reel Size (mm)
RC 1/4	5000	260
RC 1/2	3000	260

Style	Bulk (pcs)
RC 1	500

Style	Ammo Box	
	Width of Taping (mm)	Quantity/Box (pcs)
RC 1/4	52	2000
RC 1/2	52	2000

10. Marking

10.1 Marking of product

The rated resistance and tolerance shall be marked by four color coding bands on the surface of resistor.
The color coding shall be based on JIS C 5062-1997 “Marking codes for resistors and capacitors”.

10.2 Marking of Package

The label of a minimum package shall be legibly marked with follows;

1.) Type

2.) Rated resistance

3.) Tolerance on rated resistance

4.) Lot No.

5.) Quantity

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11. Storage

KOA Speer Electronics, Inc. recommends storing carbon composition resistors in a controlled environment at a temperature of 5°C to 35°C and relative humidity of less than 60%. Inventory should always be used on a First - in - First - out basis.

12. Product

Carbon composition resistors are manufactured by extruding a blend of carbon and organic binders inside a phenolic outer body. The extrusion is cut to length, leads inserted, cured and marked to form a finished resistor. The carbon and binder mixture is adjusted to produce different resistance values. The resistors are sorted for 5%, 10% and 20% tolerance values.

Carbon composition resistors are able to withstand larger short-term pulses and higher voltages than film resistors and are virtually impervious to ESD events (Electro-static discharge). Carbon composition resistors are also sensitive to moisture and, therefore, storage recommendations should be adhered to. Generally, any moisture absorbed during storage will be “baked out” during the solder operation. If the product is stored properly the resistance shift during the soldering operation will be minimal, less than 2% or 3%.

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