

**CIC COMPONENTS IND CO., LTD.****CARBON FILM FIXED RESISTORS**

File No.:	CR-02
Version:	B
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Date:	2011.05.13

1. INTRODUCTION

The earliest and most popular type of resistor is carbon film resistor which can be used in almost all kinds of electronic products. The resistive element is a high grade ceramic rod on which a homogenous film of pure carbon is deposited by vacuum heating process to produce electricity conductivity on the surface. Fully automation and mass production on capping, sorting, cutting, welding, coating and double-checking which comes out stable quality, high reliability and economic cost for CR series.

2. FEATURES

- Meet requirements of JIS-C-5202 and MIL-R-22684B!
- The most economic industrial investment!
- Quicker dissipation of heat!
- Lower temperature rise!
- Small shelf life drift!

APPROVED	CHECKED	DESIGNED	REMARK	DOCUMENT NO.
Carol	May	Chen	5/13 RE:SGS	0201010010

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3. EXPLANATIONS OF ORDERING CODE

DESCRIPTION : CR 1/4W 5% 100Ω

CODE : CR 025 J 101 T

<u>SERIES</u>	<u>POWER</u>	<u>TOLERANCE</u>	<u>RESISTANCE</u>	<u>PACKAGE</u>
CARBON FILM FIXED RESISTOR	012 : 1/8W 025 : 1/4W 033 : 1/3W 050 : 1/2W 100 : 1W 200 : 2W 300 : 3W 100[S] : 1W small Size 200[B] : 2W big Size (Please see detail of Figure1)	F : ±1% G : ±2% J : ±5%	<u>VALUE</u> E24 Series 3 Digits : 2R2 : 2.2Ω 101 : 100Ω 103 : 10K 105 : 1M E96 Series 4 Digits : 2R20 : 2.2Ω 1000 : 100Ω 1002 : 10K 1004 : 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)

4. ELECTRICAL CHARACTERISTICS

TYPE	Power Rating at 70°C	Maximum Working Volt.	Maximum Overload Volt.	Dielectric withstanding Volt.
CR-12	1/6W 1/8W 1/16W	200V	400V	400V
CR-25S	1/4W	250V	500V	500V
CR-25	1/4W	250V	500V	500V
CR-33S	1/3W	350V	700V	700V
CR-50S	1/2W	350V	700V	700V
CR-50	1/2W	350V	700V	700V
CR-100SS	1W	350V	700V	700V
CR-100S	1W	500V	1000V	1000V
CR-100	1W	500V	1000V	1000V
CR-200SS	2W	500V	1000V	1000V
CR-200S	2W	500V	1000V	1000V
CR-200	2W	500V	1000V	1000V
CR-200B	2W	500V	1000V	1000V
CR-300S	3W	500V	1000V	1000V
CR-300	3W	500V	1000V	1000V
Operating Temp. Range	-55°C ~ +155°C			
Value Range	STANDARD 1Ω~10MΩ SPECIAL LOW TO 0.05Ω HIGH TO 100MΩ			
Temp. Coefficient	10Ω below		±200PPM/°C	
	56KΩ below		±300PPM/°C	
	56KΩ~470KΩ		-500PPM/°C	
	470KΩ~1MΩ		-800PPM/°C	
	1MΩ up		-1000PPM/°C	

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

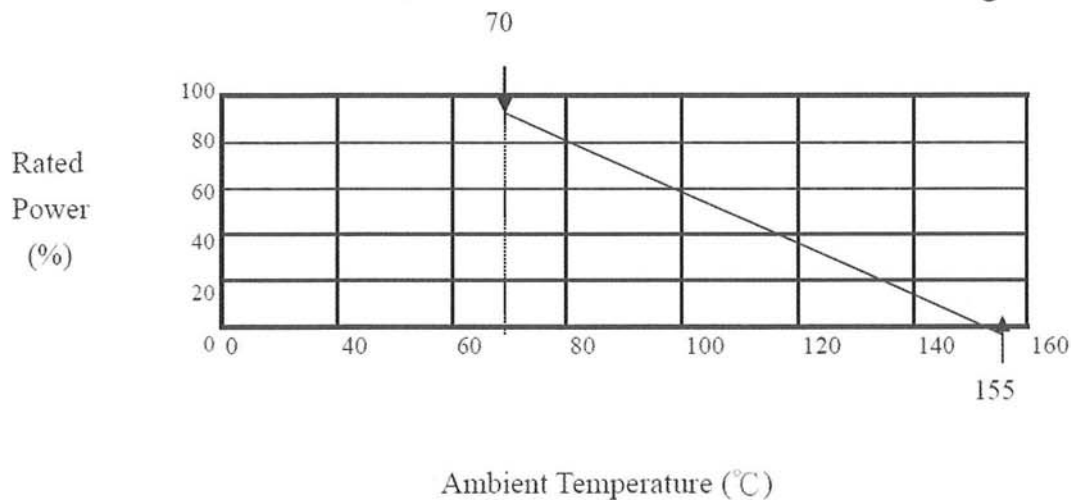
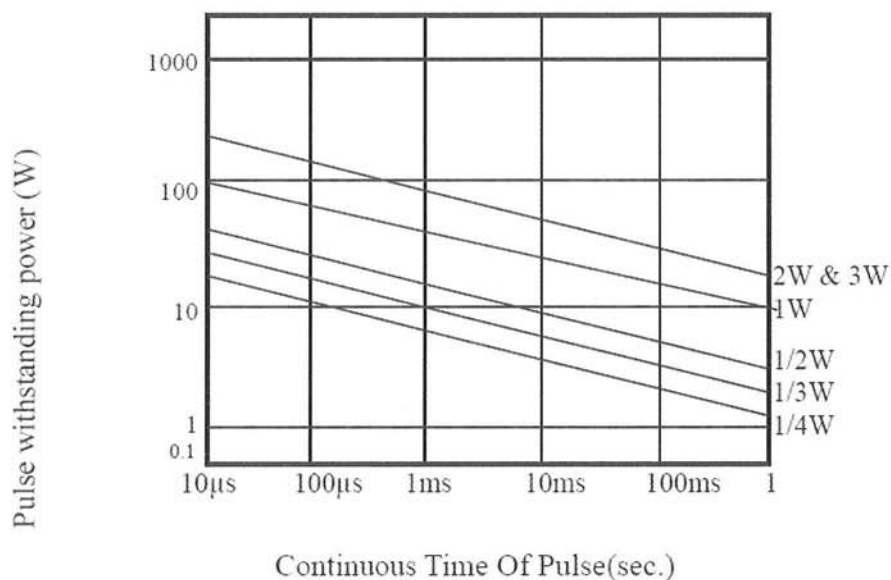


Figure2

(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:

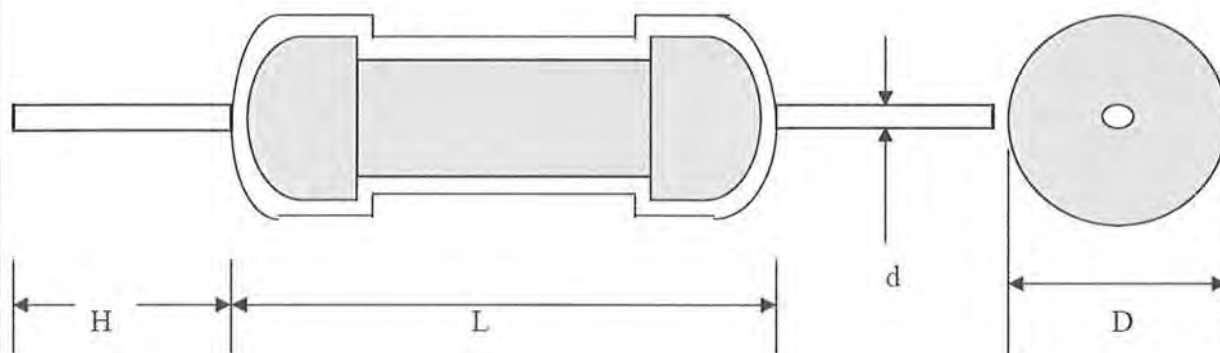
$$E = \sqrt{R \times P}$$

Where E : Continuous rated DC or AC (rms) working voltage (v)

P : Rated power (w)

R : Resistance value (Ω)

6. DIMENSIONS



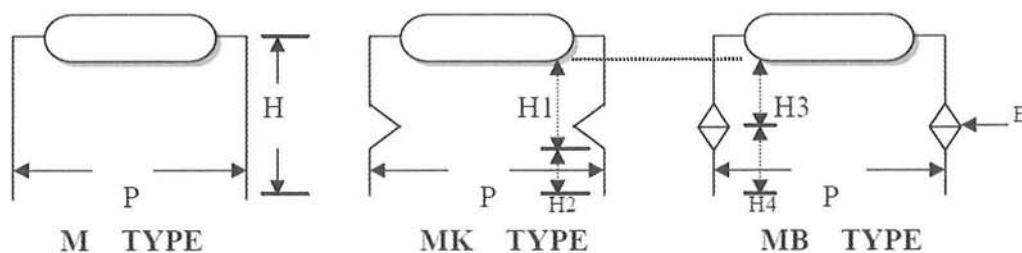
Unit: mm

TYPE	POWER	L	D	H	d
CR-12	1/16W 1/6W 1/8W	3.5 ± 0.3	1.8 ± 0.3	25 ± 3	0.43 ± 0.05
CR-25S	1/4W				
CR-25	1/4W	6.0 ± 0.5	2.3 ± 0.3	25 ± 3	0.54 ± 0.1
CR-33S	1/3W				
CR-50S	1/2W				
CR-50	1/2W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.58 ± 0.1
CR-100SS	1W	6.0 ± 0.5	2.3 ± 0.5	25 ± 3	0.54 ± 0.1
CR-100S	1W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.58 ± 0.1
CR-100	1W	11 ± 1.0	4.5 ± 0.5	35 ± 3	0.75 ± 0.1
CR-200SS	2W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.58 ± 0.1
CR-200S	2W	11 ± 1.0	4.5 ± 0.5	35 ± 3	0.75 ± 0.1
CR-200	2W	15 ± 1.0	5.0 ± 0.5	35 ± 3	0.75 ± 0.1
CR-200B	2W	17 ± 1.0	6.0 ± 0.5	35 ± 3	0.75 ± 0.1
CR-300S	3W	15 ± 1.0	5.0 ± 0.5	35 ± 3	0.75 ± 0.1
CR-300	3W	17 ± 1.0	6.0 ± 0.5	35 ± 3	0.75 ± 0.1

Figure3

(1) FORMING PACKING

M / MK / MB= Forming horizontal type



Unit : m/m

TYPE	POWER	FORMING Type	P ± 1	H ±2.5	H1 ± 1	H2 ± 1	H3 ± 1	H4 ± 1
CR-12 CR-25S	1/16, 1/6, 1/8W 1/4W	M	5~	5~	—	—	—	—
CR-25 CR-33S CR-50S CR-100SS	1/4W 1/3W 1/2W 1W	M	10~	5~	—	—	—	—
		MK		—	8~	3~	—	—
CR-50 CR-100S CR-200SS	1/2W 1W 2W	M	12.5~	10~	—	—	—	—
		MK.MB		—	8~	3~	8~	5~
CR-100 CR-200S	1W 2W	M	15~	10~	—	—	—	—
		MK.MB		—	8~	3~	8~	5~
CR-200 CR-300S	2W 3W	M	20~	10~	—	—	—	—
		MK MB		—	8~	3~	8~	5~
CR-200B CR-300	2W 3W	M	25~	10~	—	—	—	—
		MK MB		—	8~	3~	8~	5~

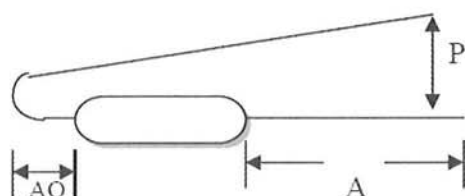
Remark : 1. B = 1.15~

2. ALTERNATE MARKING METHOD ALSO AVAILABLE ON REQUEST.

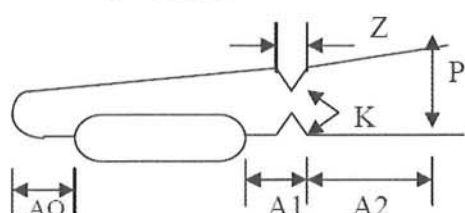
Figure4

(2) FORMING PACKING

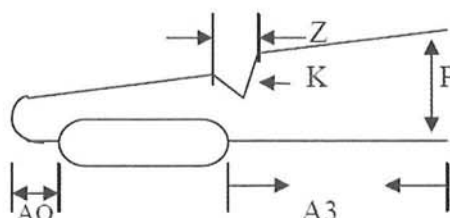
F / FK / FKK=Forming vertical type



F TYPE



FKK TYPE



FK TYPE

Unit : m/m

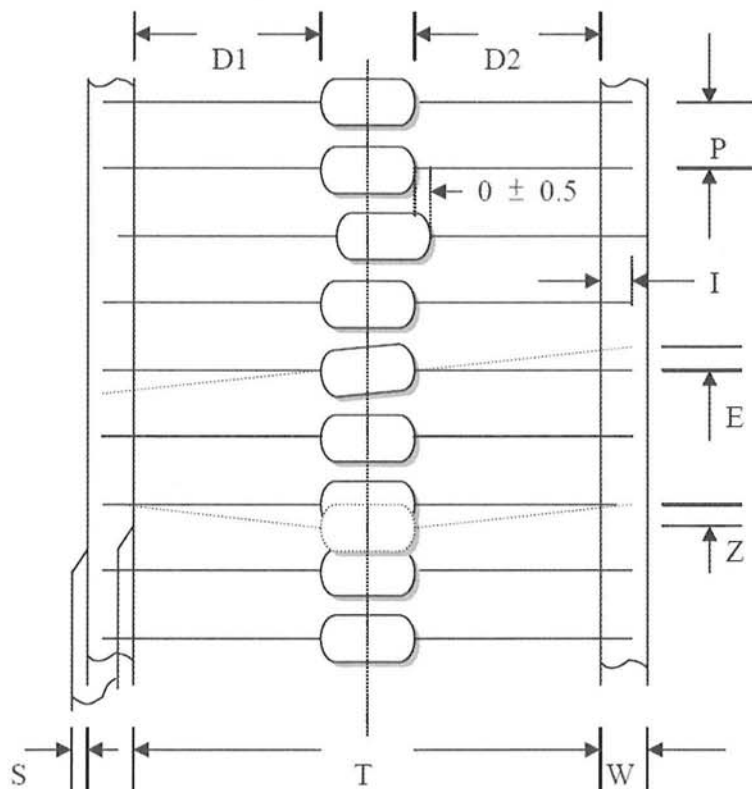
TYPE	POWER	FORMING Type	P ± 1	A ± 1	A1 ± 1	A2 ± 1	A3 ± 1	A0 Max
CR-12 CR-25S	1/16, 1/6, 1/8W 1/4W	F		25±3				4.0
CR-25 CR-33S	1/4W 1/3W	F	5~10	—	—	—	25±3	4.0
CR-50S CR-100SS	1/2W 1W	FK FKK	5~10	—	4	3	5~	4.0
CR-50 CR-100S	1/2W 1W	F	5~10	5~	—	—		4.0
CR-100S CR-200SS	1W 2W	FK	5~10				25±3	4.0
		FK FKK	5~10		4	3	5~	4.0
CR-100 CR-200S	1W 2W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3	5~	4.0
CR-200 CR-300S	2W 3W	F	5~10	5~	—	—	—	4.0
		FK FKK	5~10	—	4	3	5~	4.0
CR-200B CR-300	2W 3W	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	POWER	SIZE	T	P ± 0.5	W ± 0.5	D1-D2 Max.	E Max.	Z Max.	S Max.	I Min.
CR-12	1/16W	T-26	26 ± 1.0	5	6	0.8	1	1.2	1	3
CR-25S	1/8W	T-52	52 ± 2.0	5	6	0.8	1	1.2	1	3
CR-25	1/4W	T-26	26 ± 1.0	5	6	1.0	1	1.2	1	3
CR-33S	1/3W	T-52	52 ± 2.0	5	6	1.0	1	1.2	1	3
CR-50S	1/2W	T-52	52 ± 2.0	5	6	1.0	1	1.2	1	3
CR-100SS	1W	T-52	52 ± 2.0	5	6	1.2	1	1.2	1	3
CR-50	1/2W	T-52	52 ± 2.0	5	6	1.2	1	1.2	1	3
CR-100S	1W	T-52	52 ± 2.0	5	6	1.2	1	1.2	1	3
CR-200SS	2W	T-52	52 ± 2.0	5	6	1.2	1	1.2	1	3
CR-100	1W	T-74	74 ± 2.0	5	6	1.4	1	1.2	1	3
CR-200S	2W	T-74	74 ± 2.0	5	6	1.4	1	1.2	1	3
CR-200	2W	T-74	74 ± 2.0	10	6	1.4	1	1.2	1	3
CR-300S	3W	T-74	74 ± 2.0	10	6	1.4	1	1.2	1	3
CR-200B	2W	T-74	74 ± 2.0	10	6	1.4	1	1.2	1	3
CR-300	3W	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 5 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 $\pm 1\%$.
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 $\pm 1\%$.
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 $\pm 1\%$.
No evidence of mechanical damage.

(5) Load Life

Test Method : Thermostatic chamber at a temperature of $70\pm 5^{\circ}\text{C}$ 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 $\pm 3\%$.
No evidence of mechanical damage.

(6) Moisture Resistance

Test Method : At temperature of $40\pm 2^{\circ}\text{C}$ 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 $\pm 3\%$.
No evidence of mechanical damage.

(7) Temperature Cycling

Test Method :

STEP	1	2	3	4
TEMP	$-55\pm 3^{\circ}\text{C}$	$20\pm 5^{\circ}\text{C}$	$85\pm 2^{\circ}\text{C}$	$20\pm 5^{\circ}\text{C}$
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 $\pm 1\%$.
No evidence of mechanical damage.

(8) Resistance to Soldering Heat

Test Method : Immerse each terminal wire of a resistor up to $4\pm 0.8\text{mm}$ away from the resistor body in the solder tank at $350\pm 10^{\circ}\text{C}$ for 3 ± 0.5 seconds.
Measure resistance in 3 hours.

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

(9) Resistance to Solvent

Test Method : immerse a resistor completely in reagent at a temperature of 20~25°C 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 ±1%.
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°C for 3±0.5 seconds

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

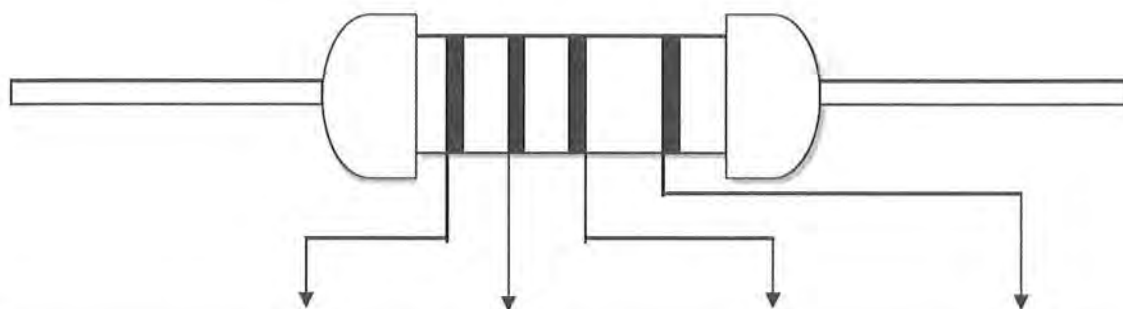
(12) Soldering Recommendation

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)

$$= \sqrt{\text{power rating} \times \text{resistance value}}$$

8. COLOR CODING



Color	1st, 2nd (Significant Figure)		3rd (Multiplier)	4th (Tolerance)
Black	0	0	10^0	—
Brown	1	1	10^1	F ($\pm 1\%$)
Red	2	2	10^2	G ($\pm 2\%$)
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 ($\pm 5\%$)
Silver	—	—	10^{-2}	—
Plain	—	—	10^{-3}	—

Figure7