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 pro-duce 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 **SYNTON-TECH's** CR series.

2. FEATURES

- Meet requirements of JIS-C-5201 and MIL-R-22684B!
- The most economic industrial investment!
- Quicker dissipation of heat!
- Lower temperature rise!
- Small shelf life drift!

3. EXPLANATIONS OF ORDERING CODE

DESCRIPTION : CR 1/4W 5% 100Ω

SYNTON CODE : CR 025 J 101 T

SERIES

CARBON FILM FIXED RESISTOR

CR TYPE

POWER

012 : 1/8W
025 : 1/4W
033 : 1/3W
050 : 1/2W
100 : 1W
200 : 2W
300 : 3W
400 : 4W

100 S : 1W small Size

200 B : 2W big Size

(Please see detail of Figure1)

TOLERANCE

F : ±1%
G : ±2%
J : ±5%

RESISTANCE

VALUE

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)

PACKAGE

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℃	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-300S	3W	500V	1000V	1000V
CR-300	3W	500V	1000V	1000V
CR-400S	4W	500V	1000V	1000V

Operating Temp. Range	—55℃～+155℃	
Value Range	STANDARD 10Ω~1MΩ SPECIAL LOW TO 0.05Ω HIGH TO 100MΩ	
Temp. Coefficient	10Ω below	±200PPM/℃
	56KΩ below	±300PPM/℃
	56KΩ~ 470KΩ	-500PPM/℃
	470KΩ~1MΩ	-700PPM/℃
	1MΩ up	-1000PPM/℃

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

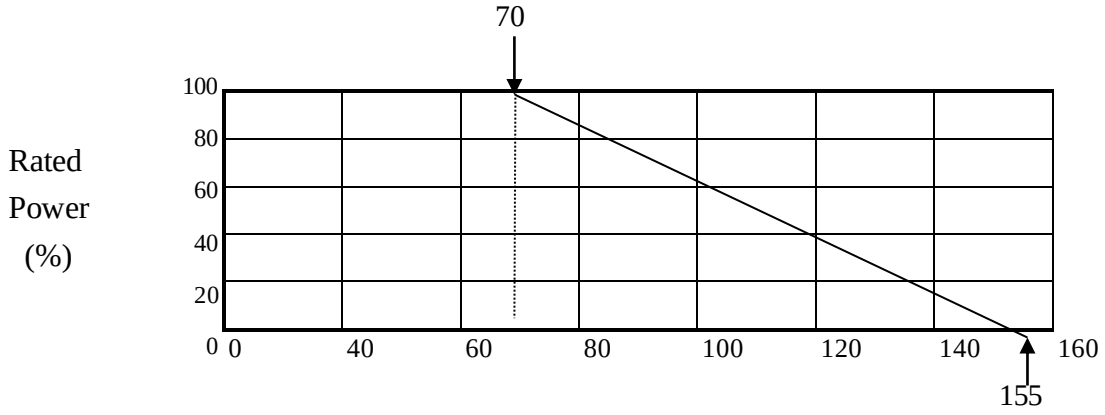
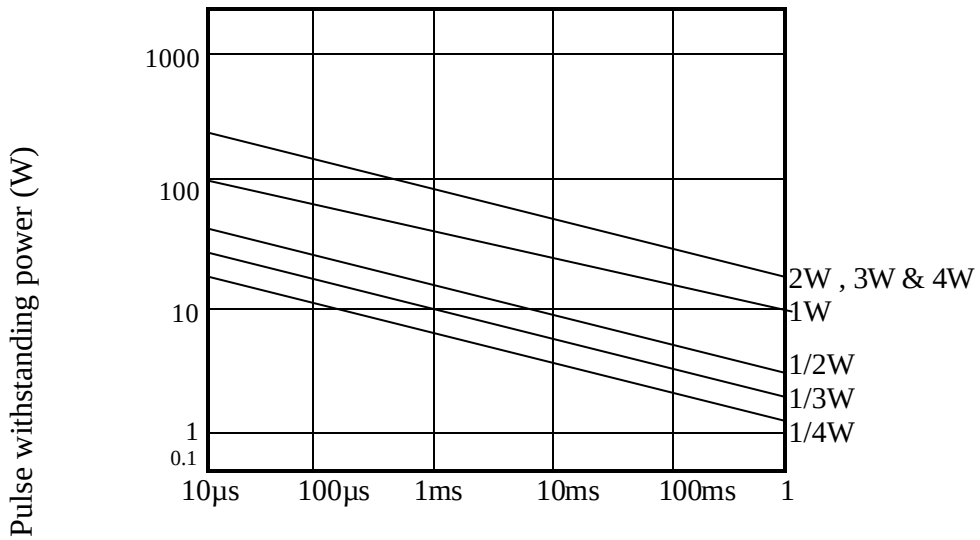


Figure2

(2)Pulse Loading Characteristics

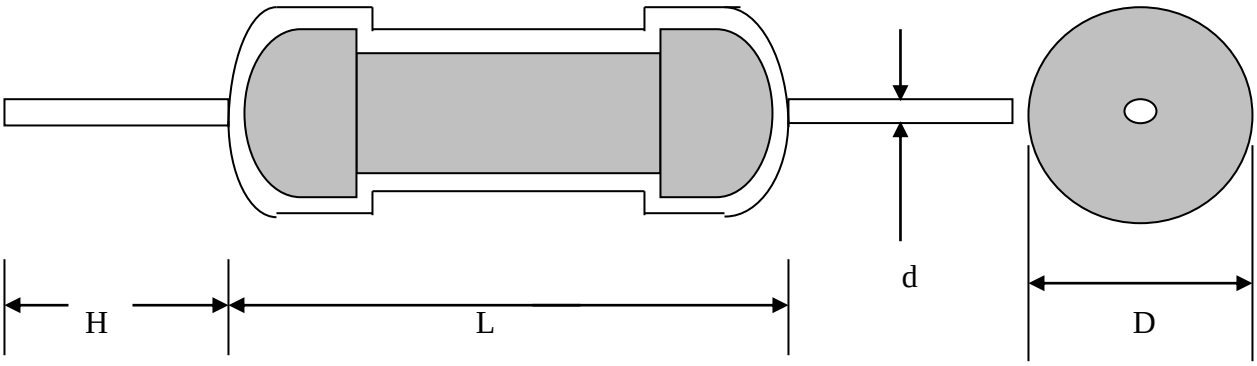


(2)Rated Voltage : The DC or AC(rms) continuous working voltage corresponding to the rated power is determined by the following formula:

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

Where E : Continuous rated DC or AC (rms) working voltage (v)
P : Rated power (w)
R : Resistance value (Ω)

6. DIMENSIONS



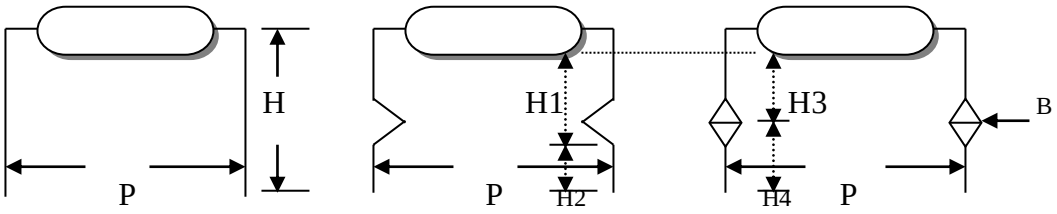
Unit: m/m

TYPE	POWER	L	D	H	d
CR-12	1/16W 1/6W 1/8W	3.5 ± 0.3	1.8 ± 0.3	25 ± 3	0.4 ± 0.05
CR-25S	1/4W				
CR-25	1/4W	6.0 ± 0.5	2.3 ± 0.3	25 ± 3	0.45 ± 0.05
CR-33S	1/3W				
CR-50S	1/2W				
CR-50	1/2W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.5 ± 0.1
CR-100SS	1W	6.0 ± 0.5	2.3 ± 0.5	25 ± 3	0.45 ± 0.05
CR-100S	1W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.5 ± 0.1
CR-100	1W	11 ± 1.0	4.5 ± 0.5	35 ± 3	0.65 ± 0.1
CR-200SS	2W	9.0 ± 0.5	3.2 ± 0.5	25 ± 3	0.5 ± 0.1
CR-200S	2W	11 ± 1.0	4.5 ± 0.5	35 ± 3	0.65 ± 0.1
CR-200	2W	15 ± 1.0	5.0 ± 0.5	35 ± 3	0.7 ± 0.1
CR-300S	3W	15 ± 1.0	5.0 ± 0.5	35 ± 3	0.7 ± 0.1
CR-300	3W	17 ± 1.0	6.0 ± 0.5	35 ± 3	0.7 ± 0.1
CR-400S	4W	17 ± 1.0	6.0 ± 0.5	35 ± 3	0.7 ± 0.1

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
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-300 CR-400S	3W 4W	M	25~	10~	—	—	—	—
		MK MB		—	6~	3~	8~	5~

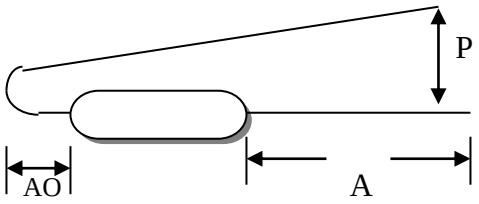
Remark : 1. B = 1.15~

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

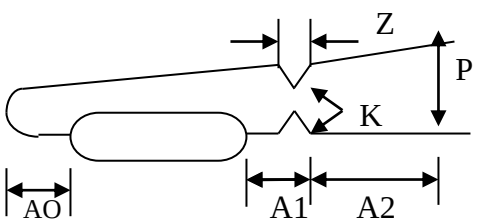
Figure4

(2) FORMING PACKING

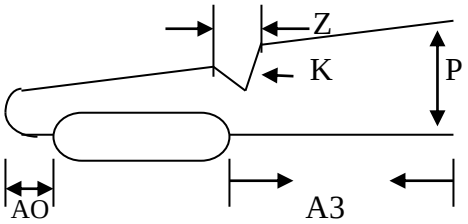
F / FK / FKK=Forming vertical type



F TYPE



FKK TYPE



FK TYPE

Unit : m/m

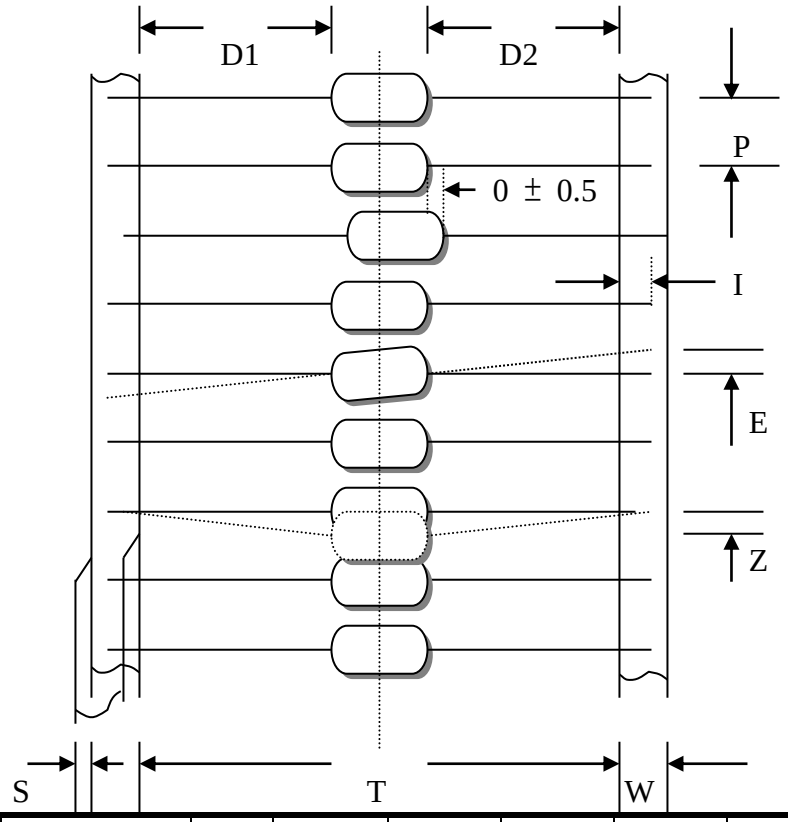
TYPE	POWER	FORMING Type	P ± 1	A ± 1	A1 ± 1	A2 ± 1	A3 ± 1	A0 Max
CR-12 CR-25S	1/16,1/6,1/8W 1/4W	F		25±3				4.0
CR-25 CR-33S CR-50S CR-100SS	1/4W 1/3W 1/2W 1W	F	5~10	—	—	—	25±3	4.0
		FK FKK	5~10	—	4	3	5~	4.0
CR-50 CR-100S CR-200SS	1/2W 1W 2W	F	5~10	5~	—	—		4.0
		FK	5~10				25±3	4.0
		FK FKK	5~10		4	3	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-300 CR-400S	3W 4W	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 CR-25S	1/16,1/8,1/6W 1/4W	T-26	26±1.0	5	6	0.8	1	1.2	1	3
		T-52	52±2.0	5	6	0.8	1	1.2	1	3
CR-25 CR-33S CR-50S CR-100SS	1/4W 1/3W 1/2W 1W	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
CR-50 CR-100S CR-200SS	1/2W 1W 2W	T-52	52±2.0	5	6	1.2	1	1.2	1	3
CR-100 CR-200S	1W 2W	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
CR-200 CR-300S	2W 3W	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
CR-300 CR-400S	3W 4W	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) 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 ±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 ±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 ±1%. No evidence of mechanical damage.

(5) Load Life

Test Method : Thermostatic chamber at a temperature of 70±5℃ 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 ±3%. No evidence of mechanical damage.

(6) Moisture Resistance

Test Method : At temperature of 40±2℃ 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 ±3%. No evidence of mechanical damage.

(7) Temperature Cycling

Test Method :

STEP	1	2	3	4
TEMP	-55℃	25℃	155℃	25℃
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 ±1%. No evidence of mechanical damage.

(8) Resistance to Soldering Heat

Test Method : Immerse each terminal wire of a resistor up to 4±0.8mm away from the resistor body in the solder tank at 350±10℃ for 3±0.5 seconds. Measure resistance in 3 hours.

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

(9) Resistance to Solvent

Test Method : immerse a resistor completely in reagent at a temperature of 20~25℃ 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℃ for 3±0.5 seconds

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

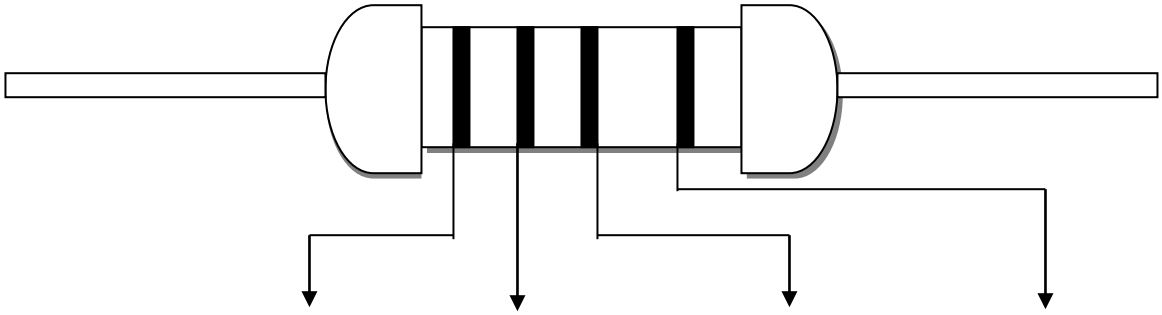
(12) Soldering Recommendation

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)**

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

8. COLOR CODING



Color	1st, 2nd (Significant Figure)		3rd (Multiplier)	4th (Tolerance)
Black	0	0	10^{0}	—
Brown	1	1	10^{1}	F (±1%)
Red	2	2	10^{2}	G (±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