ROYAL OHM

SPECIFICATION FOR APPROVAL

MARITEX

Description : Carbon Film Fixed Resistors

Royal Ohm Part no.: CFR0S4JxxxxA50 (CR 1/4W-S +/-5%)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

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Issue Date: 2006/04/07

CHANGE NOTIFICATION HISTORY			
Version	**Date of Version**	**History**	**Remark**
1	2004/11/3	Resistance range: 1Ω----1MΩ	
2	2005/3/17	Change from JIS C 5202 to JIS C 5201-1	
3	2005-07-07	Lead wire diameter: 0.45 ± 0.05 (Unit: mm)	

Customer: MARITEX	Part No.: CFR0S4JxxxxA50

1. Scope:

This specification for approval relates to Carbon Film Fixed Resistors manufactured by ROYAL OHM 's specifications.

2. Type designation:

The type designation shall be in the following form :

(Ex.)	CR	1/4W-S	J	1KΩ
	Type	Power Rating	Resistance Tolerance	Nominal Resistance

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	CR
Rated Power at 70¤	0.25 W at 70 ¤
Max. Working Voltage	200 V
Max. Overload Voltage	400 V
Dielectric Withstanding Voltage	400 V
Rated Ambient Temp.	70 ¤
Operating Temp.Range.	-55¤ --- +155¤
Resistance Tolerance	± 5 %
Resistance Range	1Ω----1MΩ

3.1 Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 ¤. For temperature in excess of 70 ¤ , the load shall be derated as shown in the figure 1.

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform curresponding to the power rating , as determined from the following formula :

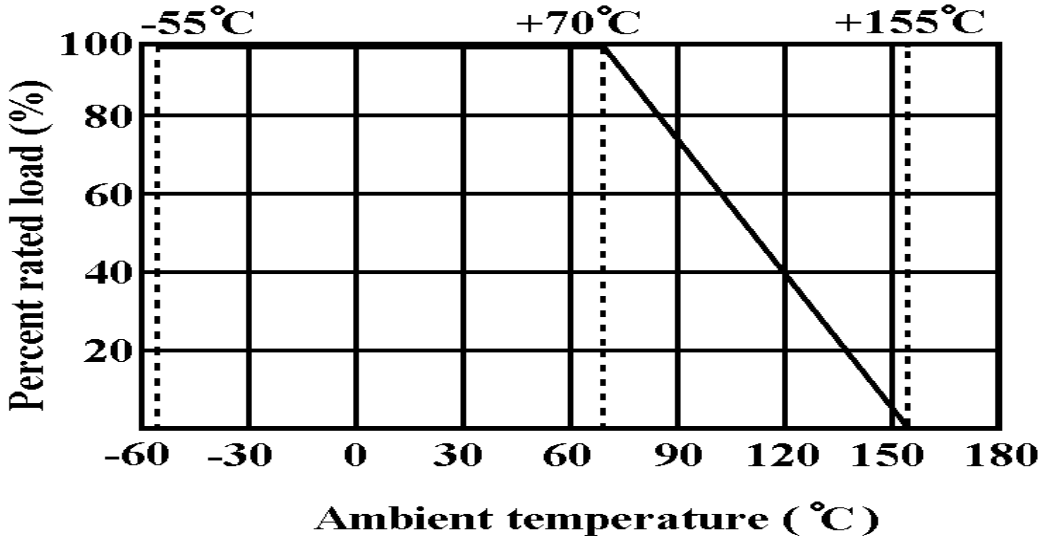
$$RCWV = \sqrt{P \times R}$$

Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

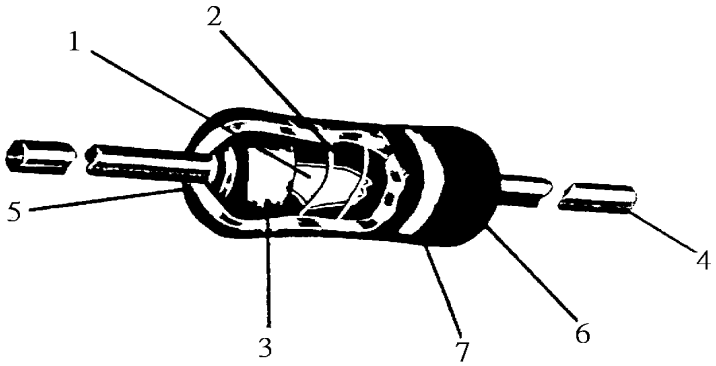
Figure 1.



3.3 Nominal resistance :

Effective figures of nominal resistance shall be in accordance with E-24 series, and resistance tolerance shall be shown by table 1.

4. Construction :



No.	Name	Material
1	Basic Body	Rod Type Ceramics
2	Resistance Film	Carbon Film
3	End Cap	Steel (Tin plated iron surface)
4	Lead Wire	Annealed copper wire (Electrosolder plated surface) **Pb Free**
5	Joint	By welding
6	Coating	Insulated resin (Color : Beige)
7	Color Code	Epoxy Resin

Carbon Film Fixed Resistors

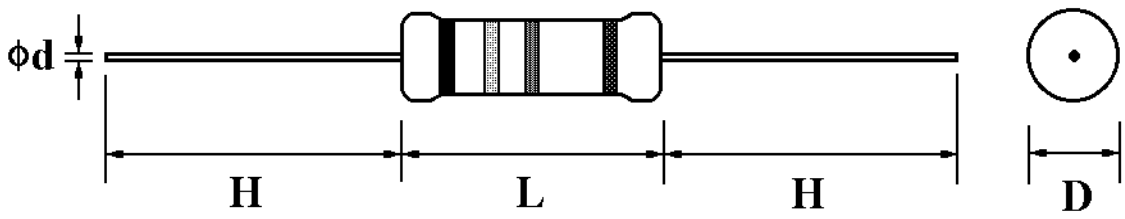
5. Characteristics :

Characteristics	Limits	Test Methods (JIS C 5201-1)
DC. Resistance	Must be within the specified tolerance.	5.1 The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance
Temperature coefficient	**Resis.Range** / **T.C.R. (PPM/□)** □ 10 Ω / 0 □ ±350 11Ω □ 99K / 0 □ -450 100K □ 1M / 0 □ -700 1.1M □ 10M / 0 □ -1500	5.2 Natural resistance change per temp. degree centigrade. $\frac{R_2-R_1}{R_1(t_2-t_1)} \times 10^6$ (PPM/□) R_1: Resistance value at room temperature (t_1) R_2: Resistance value at room temp.plus 100□ (t_2)
Short time overload	Resistance change rate is ± (1 % + 0.05Ω) Max. with no evidence of mechanical damage	5.5 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds.
Insulation Resistance	Insulation resistance is 10,000 MΩ Min	5.6 Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at DC potential respectively specified in the above list for 60 +10/ -0 seconds.
Dielectric withstanding voltage	No evidence of flashover mechanical damage,arcing or insulation break down.	5.7 Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the table 1. for 60 + 10/-0 seconds.
Terminal strength	No evidence of mechanical damage.	6.1 **Direct load** : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads. **Twist test :** Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations.

Carbon Film Fixed Resistors

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td>Resistance to soldering heat</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage.</td><td>6.4 Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in 350¤ ± 10 ¤ solder for 3 ± 0.5 seconds</td></tr>
<tr><td>Solderability</td><td>95 % coverage Min.</td><td>6.5 The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes.
Test temp. of solder : 245¤ ± 3¤
Dwell time in solder : 2 ~ 3 seconds</td></tr>
<tr><td>Temperature cycling</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage.</td><td>7.4 Resistance change after continuous 5 cycles for duty shown below:
<table>
<tr><th>Step</th><th>Temperature</th><th>Time</th></tr>
<tr><td>1</td><td>-55¤ ±3¤</td><td>30 mins</td></tr>
<tr><td>2</td><td>Room temp.</td><td>10□15 mins</td></tr>
<tr><td>3</td><td>+155¤ ±2¤</td><td>30 mins</td></tr>
<tr><td>4</td><td>Room temp.</td><td>10□15 mins</td></tr>
</table></td></tr>
<tr><td>Load life in humidity</td><td>
<table>
<tr><th colspan="2">Resistance value</th><th>¤R/R</th></tr>
<tr><td>Normal</td><td>□ 100KΩ</td><td>± 3 %</td></tr>
<tr><td>Type</td><td>¤100KΩ</td><td>± 5 %</td></tr>
</table></td><td>7.9 Resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") in a humidity test chamber controlled at 40 ¤ ± 2 ¤ and 90 to 95 % relative humidity</td></tr>
<tr><td>Load life</td><td>
<table>
<tr><th colspan="2">Resistance value</th><th>¤R/R</th></tr>
<tr><td>Normal</td><td>□ 56KΩ</td><td>± 2 %</td></tr>
<tr><td>Type</td><td>¤56KΩ</td><td>± 3 %</td></tr>
</table></td><td>7.10 Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at 70¤ ± 2¤ ambient</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

6. Dimension : Unit: mm



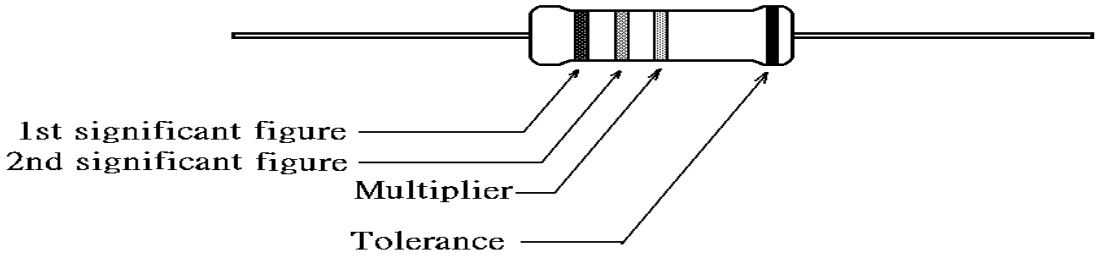
Type	Power Rating	D (Max.)	L (Max.)	d ± 0.05	H ± 3
CR	1/4W-S	1.85 mm	3.5 mm	0.45 mm	28 mm

7. Marking :

7.1 Resistor :

Resistors shall be marked with color coding

colors shall be in accordance with JIS C 0802



7.2 Label :

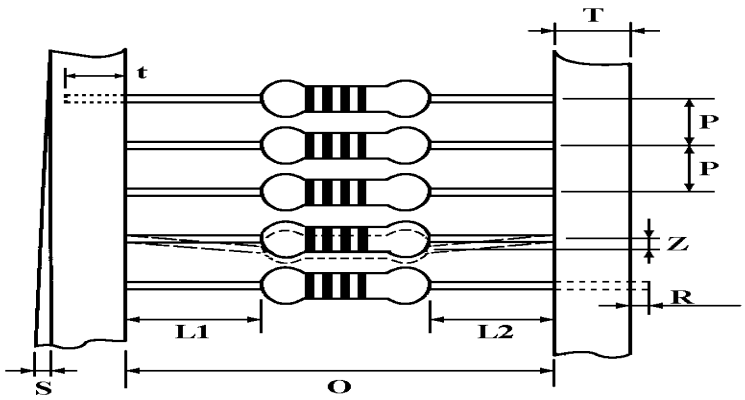
Label shall be marked with following items:

(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

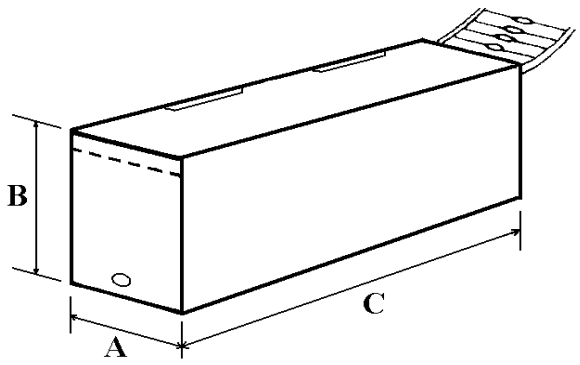
Example :

Carbon Film Resistors

Watt :	1/4W-S	Val :	10E
Q'TY :	5 000	Tol :	5%
Lot :	813478	PPM :	



Type	Style	O	P	L_1-L_2	T	Z	R	t	S
CR-25s	PT-52	52±1	5±0.3	1 Max.	6±1	1 Max.	0	4 ±1	0.5 Max.



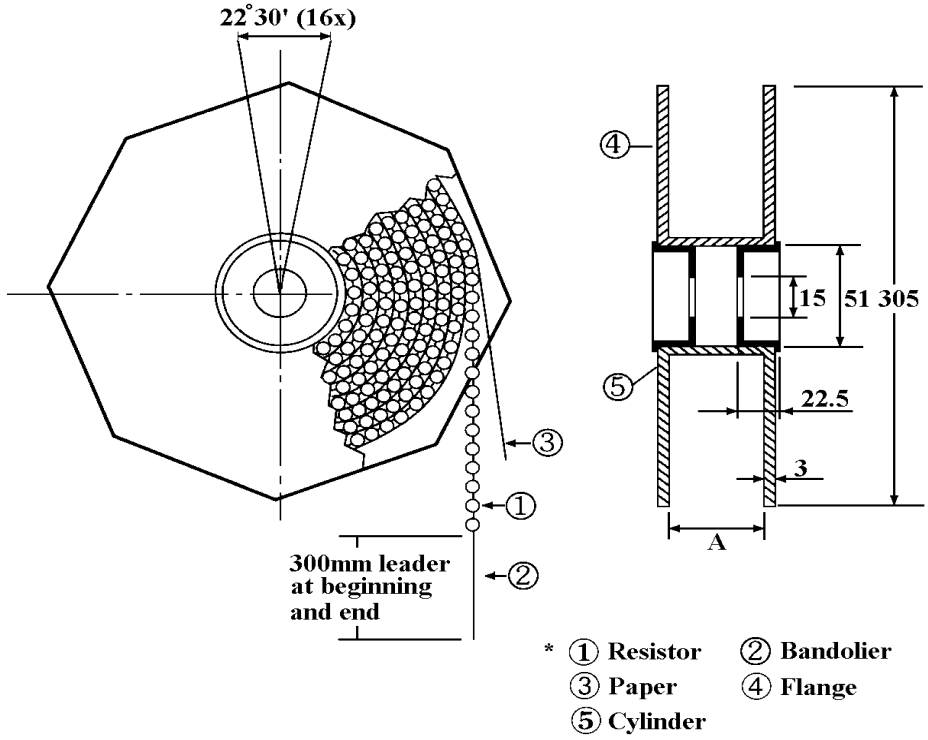
Bandoliers may also be contained in a cardboard box ("Ammopack")

Dimension (mm)

Type	Style	L (C) ±5	W (A) ±5	H (B) ±5	Quantity Per Box (pcs.)
CR-25s	PT-52	250	75	66	5 000

"Ammopack" is an abbreviation of "ammunition pack"

8.3 Tape on reel packing :



Dimension (mm) :

Type	Style	Across Flange (A)	Quantity Per Reel
CR-25s	PT-52	73 ± 2	5,000 pcs.

Part Number System

Explanation of Part Number System
(Carbon Film Fixed Resistors)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
C	F	R	0	S	4	J	0	1	0	0	A	5	0

Resistor Type:
CFR = Carbon Film Fixed Resistor

Special Feature:
0 = Standard Product
F = Non-Flame Product
1 = Non-Inductive Product

Wattage:

Normal size:	Small size:
W8 = 1/8W	S4 = 1/4W-S
W6 = 1/6W	S2 = 1/2W-S
W4 = 1/4W	1S = 1W-S
W2 = 1/2W	2S = 2W-S
1W = 1W	3S = 3W-S
2W = 2W	S3 = 1/3W-S
3W = 3W	

Extra Small size:
U2 = 1/2W-SS

Tolerance:
F ~ ± 1%
G ~ ± 2%
J ~ ± 5%
K ~ ± 10%

Resistance Value:
E-24 series: the 1st digit is"0", the 2nd & 3rd digits are for the significant figures of the resistance and the 4th indicate the number of zeros following: "J" ~ 0.1, "K" ~ 0.01
Ex.: 4.7Ω ~ 47J, 4.7KΩ ~ 472
E--96 Series: the 1st to 3rd digits are significant figures of resistance and the fourth one denotes number of zeros following:
Ex.: 1.33KΩ = 1331

Packing Quantity:
1 = 1,000pcs
2 = 2,000pcs
3 = 3,000pcs
4 = 4,000pcs
5 = 5,000pcs
A = 500pcs
B = 2,500pcs
0 = for Bulk/Box packing

Packing Type:
A = Tape/Box
T = Tape/Reel
B = Bulk/Box
P = Tape/Box of PT-26mm

Addition Information:
0 = PT-52mm, NIL for PT-26mm
8 = PT-58mm
9 = PT-64mm
P = Panasert type
1 = Avisert type 1
2 = Avisert type 2
3 = Avisert type 3
7 = Lead wire(H) 38mm

Ex. Sample: CR 1/4W-S +/- 5% 10Ω T/B 5,000 → CFR0S4J0100A50