

# ROYALOHM

## SPECIFICATION FOR APPROVAL

**TRELIK COMERCIAL IMPORTADORA LTD.**

Description : Carbon Film Fixed Resistors

Royalohm Part no.: CFR0S4JxxxxA50 (CR 1/4W-S +/-5% T/B)

Approved by

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

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Approved	Checked	Prepared
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Issued Date: 2008/06/23



## 1. Scope:

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

## 2. Type designation:

The type designation shall be in the following form :

(Ex.)	CR	1/4W-S	J	100Ω
	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 Watt 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 corresponding 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)

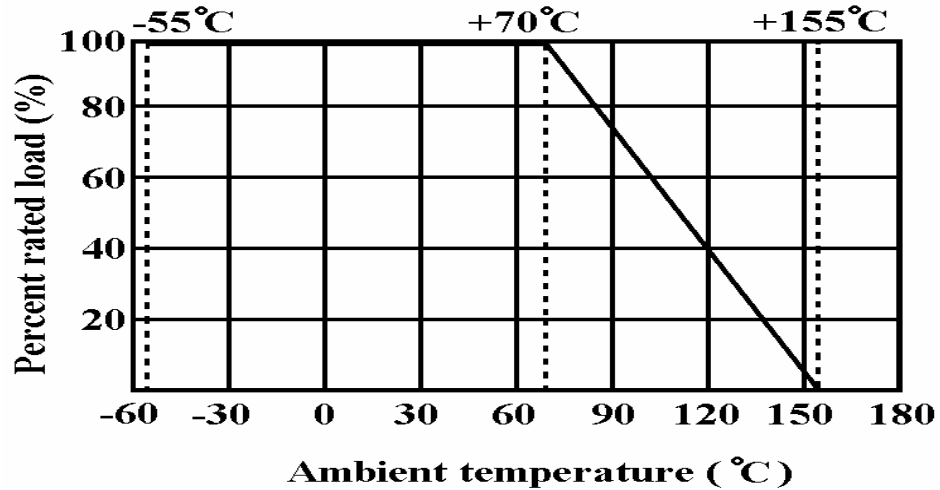
P = Power Rating (watt)

R = Nominal Resistance (ohm)

## Carbon Film Fixed Resistors

In no case shall the rated DC or RMS AC continuous working voltage be greater than the applicable maximum value.

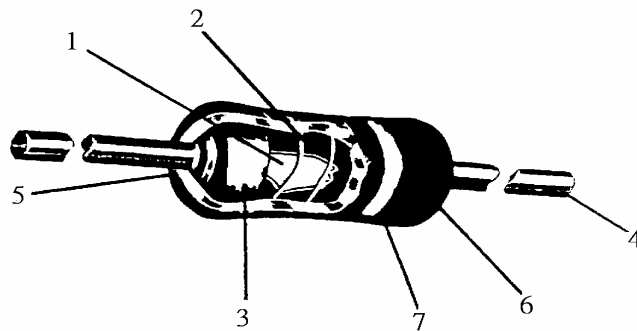
Figure 1.



### 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 coated with tin
5	Joint	By welding
6	Coating	Insulated epoxy 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	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Resis.Range</th> <th style="text-align: center;">T.C.R. (PPM/ )</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">□ 10 Ω</td> <td style="text-align: center;">0 □ ±350</td> </tr> <tr> <td style="text-align: center;">11Ω □ 99K</td> <td style="text-align: center;">0 □ -450</td> </tr> <tr> <td style="text-align: center;">100K □ 1M</td> <td style="text-align: center;">0 □ -700</td> </tr> <tr> <td style="text-align: center;">1.1M □ 10M</td> <td style="text-align: center;">0 □ -1500</td> </tr> </tbody> </table>	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. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \quad (\text{PPM}/\square)$ R1: Resistance value at room temperature (t <sub>1</sub> ) R2: Resistance value at room temp.plus 100□ (t <sub>2</sub> )
Resis.Range	T.C.R. (PPM/ )											
□ 10 Ω	0 □ ±350											
11Ω □ 99K	0 □ -450											
100K □ 1M	0 □ -700											
1.1M □ 10M	0 □ -1500											
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 <b>Direct load :</b> Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads. <b>Twist test :</b> 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.										

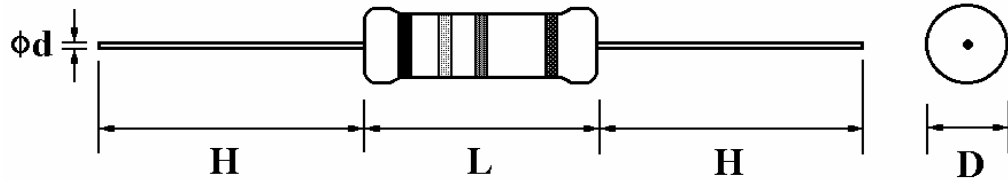
## Carbon Film Fixed Resistors

Characteristics	Limits	Test Methods ( JIS C 5201-1 )															
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max. with no evidence of mechanical damage.	6.4 Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in $350 \square \pm 10 \square$ solder for $3 \pm 0.5$ seconds															
Solderability	95 % coverage Min.	6.5 The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes. Test temp. of solder : $245 \square \pm 3 \square$ Dwell time in solder : 2 ~ 3 seconds															
Temperature cycling	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max. with no evidence of mechanical damage.	7.4 Resistance change after continuous 5 cycles for duty shown below:															
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Step</th> <th style="width: 50%;">Temperature</th> <th style="width: 40%;">Time</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;"><math>-55 \square \pm 3 \square</math></td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10 <math>\square</math> 15 mins</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;"><math>+155 \square \pm 2 \square</math></td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10 <math>\square</math> 15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-55 \square \pm 3 \square$	30 mins	2	Room temp.	10 $\square$ 15 mins	3	$+155 \square \pm 2 \square$	30 mins	4	Room temp.	10 $\square$ 15 mins
		Step	Temperature	Time													
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		2	Room temp.	10 $\square$ 15 mins													
3	$+155 \square \pm 2 \square$	30 mins															
4	Room temp.	10 $\square$ 15 mins															
Load life in humidity	<b>Resistance value</b>	$\square$ R/R															
	Normal	$\square$ 100K $\Omega$ $\pm 3 \%$															
	Type	$\square$ 100K $\Omega$ $\pm 5 \%$															
		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 $40 \square \pm 2 \square$ and 90 to 95 % relative humidity															
Load life	<b>Resistance value</b>	$\square$ R/R															
	Normal	$\square$ 56K $\Omega$ $\pm 2 \%$															
	Type	$\square$ 56K $\Omega$ $\pm 3 \%$															
		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 $70 \square \pm 2 \square$ ambient															

## Carbon Film Fixed Resistors

6. Dimension :

Unit: mm

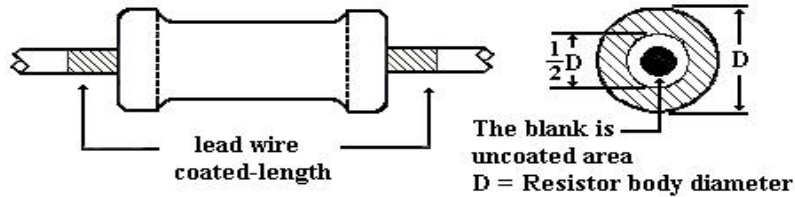


Type	Power Rating	D (Max.)	L (Max.)	d ± 0.05	H ± 3
CR	1/4W-S	1.85 mm	3.5 mm	0.45 mm	28 mm

Painting method:

Welding point, terminal and lead wire, is permissible to be exposed without the outer coated cover.

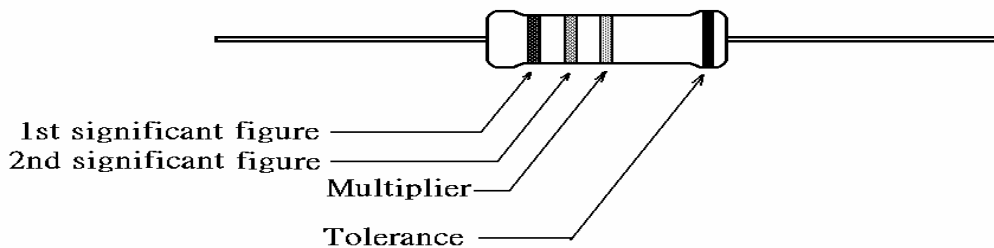
The extent should be within 1/2 of the arc angle.



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

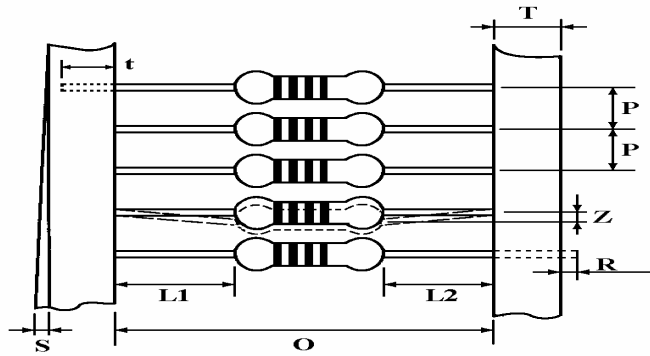
Example :

Carbon Film Fixed Resistors			
Watt :	1/4W-S	Val :	100E
Q'TY :	5,000	Tol :	5%
Lot :	813478	PPM :	
ROYALOHM		Pb Free	

## Carbon Film Fixed Resistors

### 8. Packing specification :

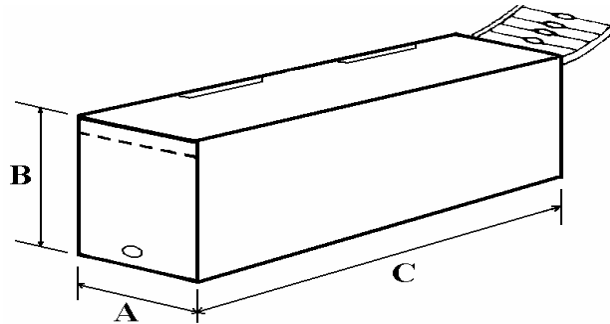
#### 8.1 Taping dimension :



#### Dimensions (mm)

Type	Style	O	P	L1-L2	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.

#### 8.2 Tape in box packing :



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

#### Dimension (mm)

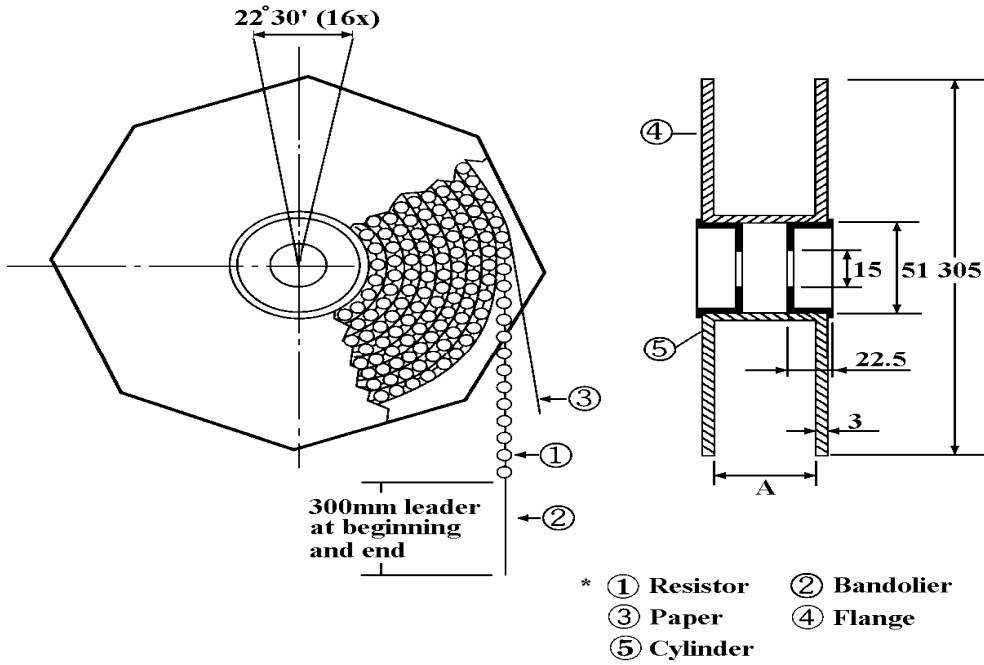
Type	Style	L (C)	W (A)	H (B)	Quantity Per Box (pcs.)
CR-25s	PT-52	±5	±5	±5	5,000

"Ammopack" is an abbreviation of "ammunition pack"



## Carbon Film Fixed Resistors

8.3 Tape on reel packing :



Dimension (mm) :

Type	Style	Across Flange (A)	Quantity Per Reel
CR-25s	PT-52	$73 \pm 2$	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   1   A   5   0

**Resistor Type:**  
CFR = Carbon Film Fixed Resistor

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

**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

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

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

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

**Wattage:**

<b>Normal size:</b>	<b>Small size:</b>
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

**Addition Information:**  
0 = PT-52mm, NIL for PT-26mm  
8 = PT-58mm  
9 = PT-64mm  
7 = Lead wire(H) 38mm

Sample: CR 1/4W-S +/- 5% 100Ω T/B 5,000 → CFR0S4J0101A50