ROYALOHM

SPECIFICATION FOR APPROVAL

TRELIK

Description : Carbon Film Fixed Resistors

(Tin plated copper steel lead wire H=28mm)

Royalohm Part no.: CTO0W4JxxxxA50 (CR 1/4W +/- 5% T/B)

Approved by

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

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Issued Date: 2007/09/07

CHANGE NOTIFICATION HISTORY			
Version	**Date of Version**	**History**	**Remark**
1	2004/11/3	1. Resistance range: 1Ω----10MΩ	
		2. Tin plated copper steel lead wire H=28mm	
2	2005/3/17	Change from JIS C 5202 to JIS C 5201-1	

Customer: TRELIK	Part No.: CTO0W4JxxxxA50

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	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	0.25 W at 70℃
Max. Working Voltage	250 V
Max. Overload Voltage	500 V
Dielectric Withstanding Voltage	500 V
Rated Ambient Temp.	70 ℃
Operating Temp.Range.	-55℃ --- +155℃
Resistance Tolerance	± 5 %
Resistance Range	1Ω----10MΩ

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 :

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

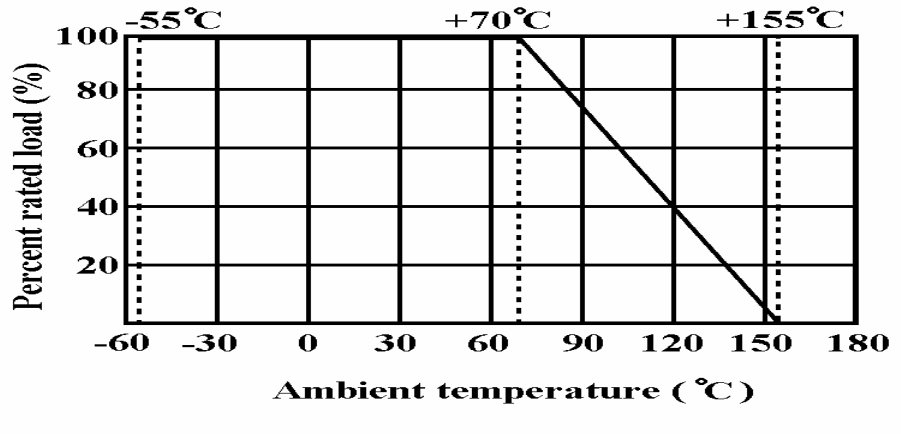
Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

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

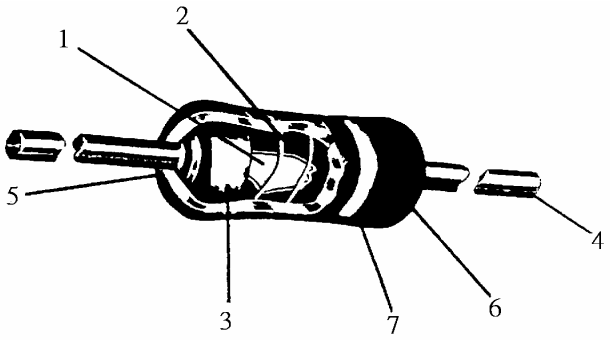
Figure 1.



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	Tin plated copper steel lead wire
5	Joint	By welding
6	Coating	Insulated resin (Color : Beige)
7	Color Code	Epoxy Resin

Carbon Film Fixed Resistors

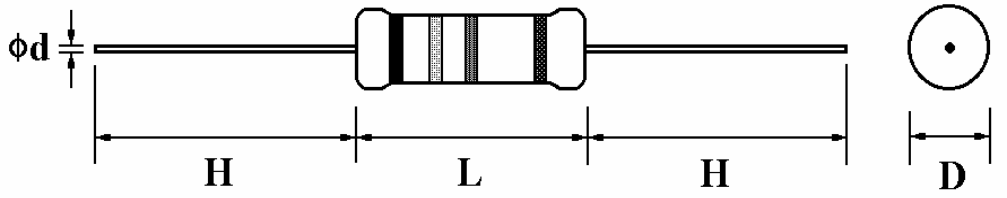
5. Characteristics :

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	**Resist. 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 rowspan="2">Normal Type</td><td>Less than 100KΩ</td><td>± 3 %</td></tr>
<tr><td>100KΩ or more</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 rowspan="2">Normal Type</td><td>Less than 56KΩ</td><td>± 2 %</td></tr>
<tr><td>56KΩ or more</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>

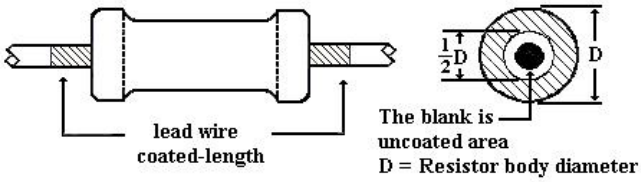
6. Dimension : Unit : mm



Type	Power Rating	D (Max.)	L (Max.)	d ± 0.02	H ± 3
CR	1/4W	2.5 mm	6.8 mm	0.50 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 are angle.

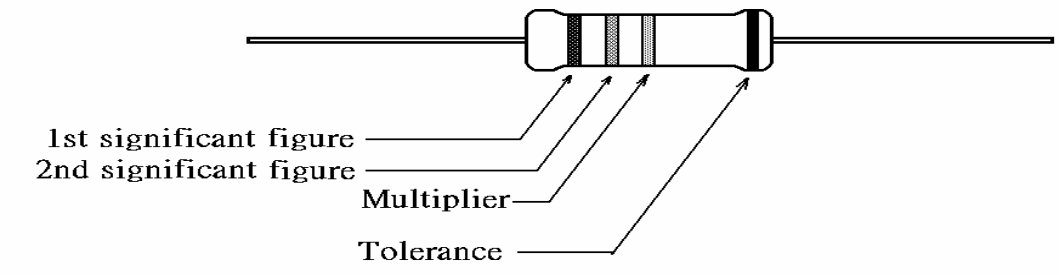


7. Marking :

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:

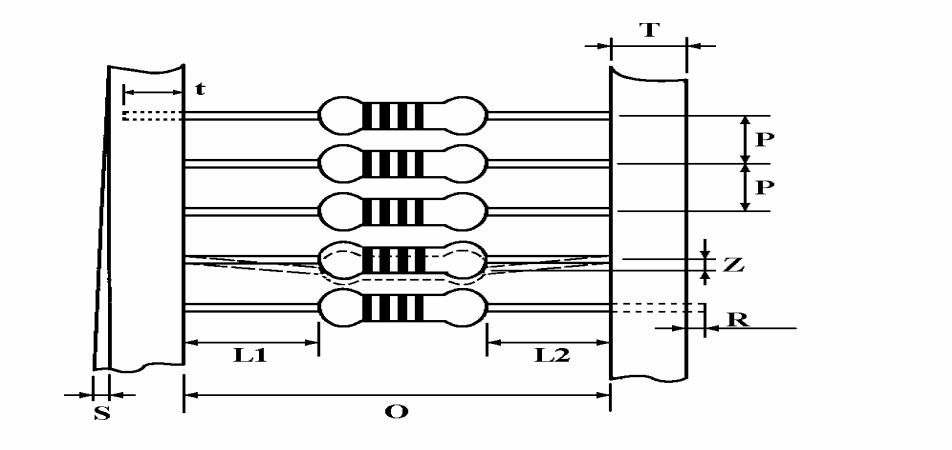
(1) Type and style
(2) Nominal resistance
(3) Resistance tolerance
(4) Quantity
(5) Lot number
(6) PPM

Example :

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

8. Packing specification :

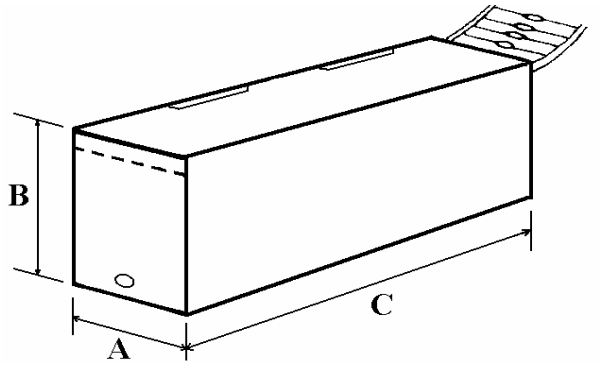
8.1 Taping dimension :



Dimensions (mm)

Type	Style	O	P	L_1-L_2	T	Z	R	t	S
CR-25	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 :



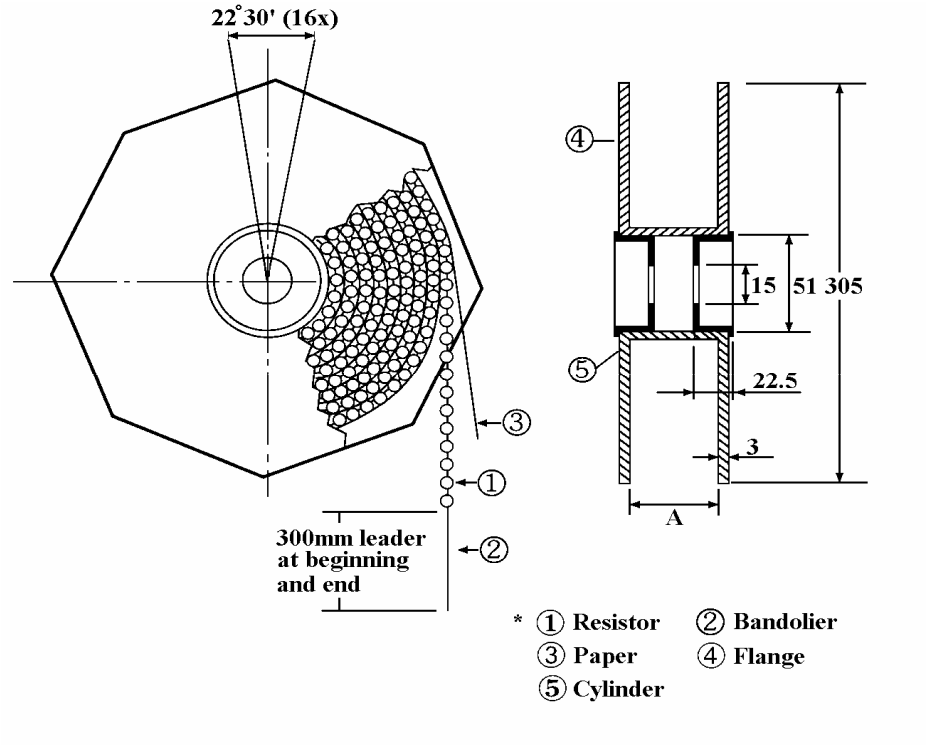
Bandoliers may also be contained in a cardboard box ("Ammopack")

Dimension (mm)

Type	Style	L (C) ±5	W (A) ±5	H (B) ±5	Quantity Per Box (pcs.)
CR-25	PT-52	250	75	96	5,000

"Ammopack" is an abbreviation of "ammunition pack"

8.3 Tape on reel packing :

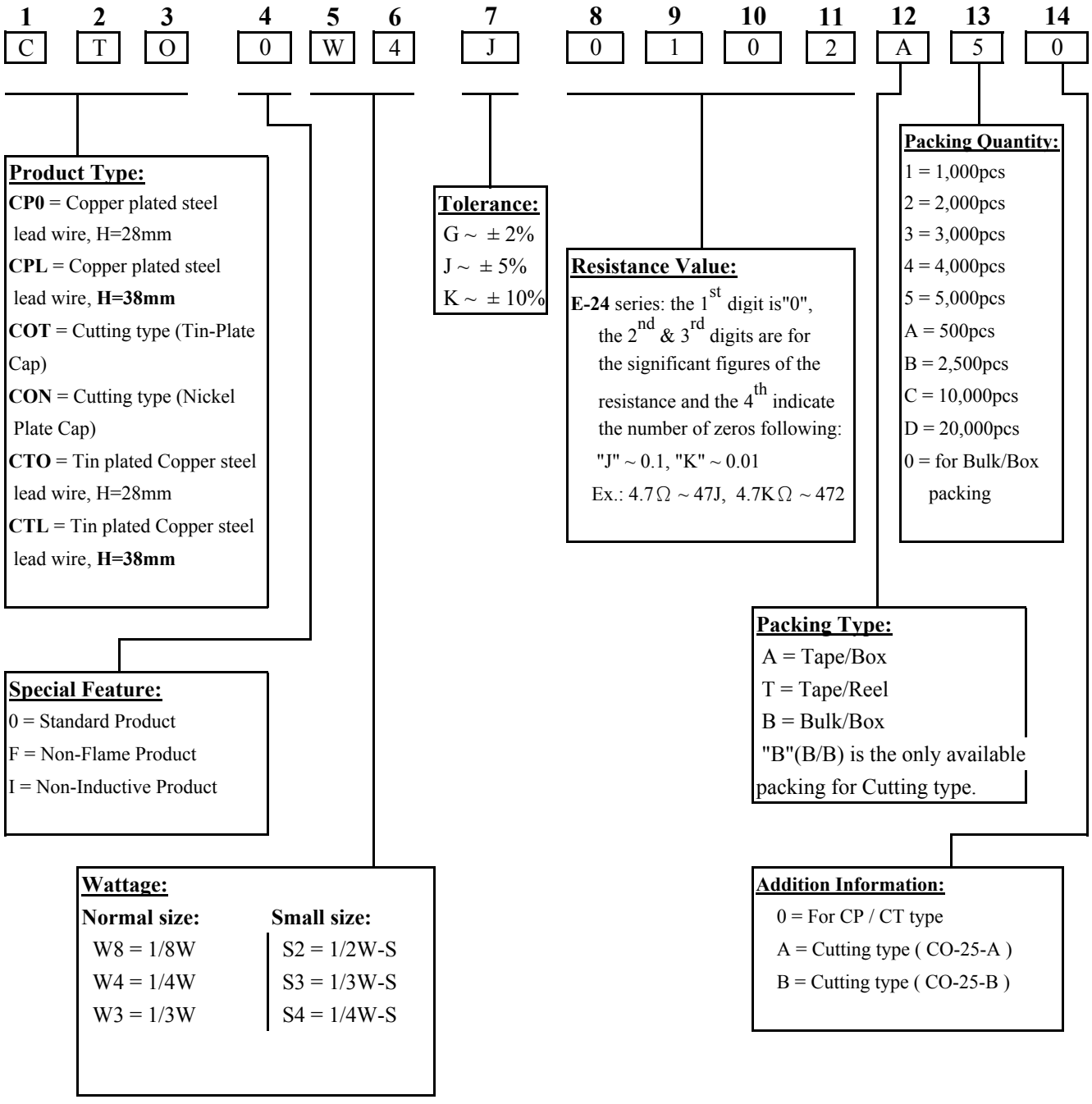


Dimension (mm) :

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

Part Number System

Explanation of Part Number System
(Carbon Film Fixed Resistors)



Sample: CR 1/4W +/-5% (Tin plated Copper steel lead wire H=28mm) 1KΩ T/B → CTO0W4J0102A50