ROYALOHM

C O N F I D E N T I A L D O C U M E N T

SPECIFICATION FOR APPROVAL

RAPID ELECTRONICS LTD.

Description : Coated Type Kit Resistors (CFR)

Royalohm Part no.:

Kit resistors (with resistors) 86 Values

CFR0W4JE012KIT (CR 1/4W +/- 5% E-12 series KIT Resistors)

Approved by

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

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Approved	Checked	Prepared
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Issue Date: 2015/02/26

CHANGE NOTIFICATION HISTORY			
Version	**Date of Version**	**History**	**Remark**
1	2015/02/26	Issued E-12 series	

Customer: RAPID ELECTRONICS LTD.	**Part No.: CFR0W4JE012KIT**

1. Scope:

This specification for approval relates to Coated Type Kit Resistors (CFR) manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form :

(Ex.)	CR	1/4W	J	10Ω
	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	0Ω / 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)

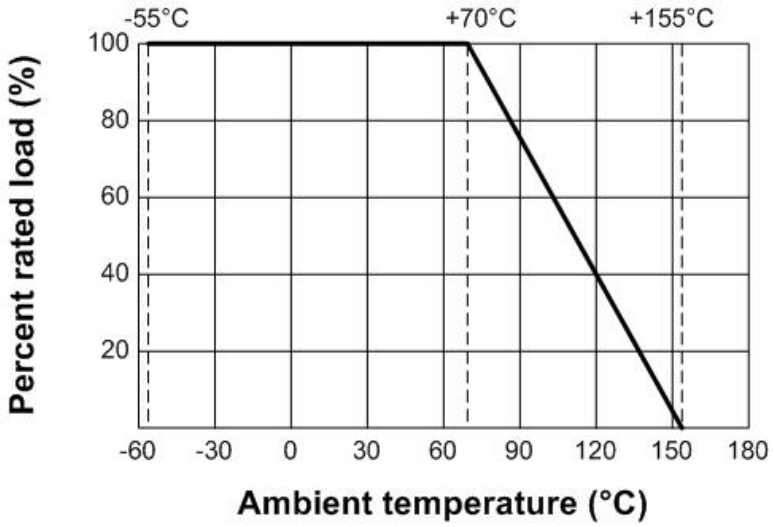
P = Power Rating (watt)

R = Nominal Resistance (ohm)

Coated Type Kit Resistors (CFR)

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

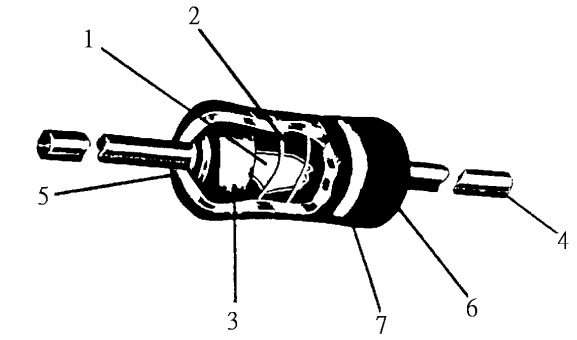
Figure 1.



3.3 Nominal resistance :

Effective figures of nominal resistance shall be in accordance with E-12 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

Coated Type Kit Resistors (CFR)

5. Characteristics :

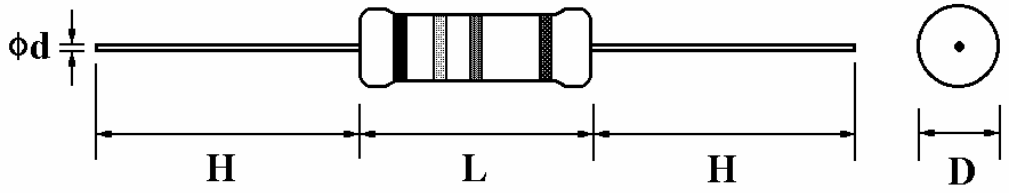
Characteristics	Limits		Test Methods (JIS C 5201-1)
DC. resistance	Must be within the specified tolerance.		The limit of error of measuring apparatus shall not exceed allowable range or 5% of resistance tolerance (Sub-clause 4.5)
Insulation resistance	Insulation resistance is 10,000 MΩ Min		Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at DC potential respectively specified in the above list for 60 +10/-0 secs. (Sub-clause 4.6)
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down		Resistors shall be clamped in the trough of a 90° metallic V-block or foil method use a metal foil shall be wrapped closely around the body of the resistor. After that shall be tested at AC potential respectively specified in the table 1. for 60 +10/-0 secs. (Sub-clause 4.7)
Temperature coefficient	Resis.Range	T.C.R. (PPM/℃)	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) (Sub-clause 4.8)
	≦ 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		Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds. (Sub-clause 4.13)
Terminal strength	No evidence of mechanical damage.		**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. (Sub-clause 4.16)

Coated Type Kit Resistors (CFR)

<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td>Solderability</td><td>95 % coverage Min.</td><td>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
(Sub-clause 4.17)</td></tr>
<tr><td>Soldering temp. reference</td><td>Electrical characteristics shall be satisfied. Without distinct deformation in appearance.
(95 % coverage Min.)</td><td>The leads immersed into solder bath to 3.2 to 4.8 mm. from the body. Permanent resistance change shall be checked.
<u>Wave soldering condition: (2 cycles Max.)</u>
Pre-heat : 100 ~ 120 ℃, 30 ± 5 sec.
Suggestion solder temp.: 235 ~ 255 ℃, 10 sec. (Max.)
Peak temp.: 260 ℃
<u>Hand soldering condition:</u>
Hand Soldering bit temp. : 380 ± 10 ℃
Dwell time in solder : 3 +1/-0 sec.</td></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>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
(Sub-clause 4.18)</td></tr>
<tr><td>Temperature cycling</td><td>Resistance change rate is ± (1% + 0.05Ω) Max. with no evidence of mechanical damage.</td><td>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>
(Sub-clause 4.19)</td></tr>
<tr><td>Vibration</td><td>Resistance change rate is ± (1% + 0.05Ω) Max.</td><td>55Hz, 3 planes 2hrs each
Total amplitude = 1.5mm
(Sub-clause 4.22)</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>＜ 100KΩ</td><td>± 3 %</td></tr>
<tr><td>≧100KΩ</td><td>± 5 %</td></tr>
</table>
</td><td>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
(Sub-clause 4.24.2.1)</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>＜ 56KΩ</td><td>± 2 %</td></tr>
<tr><td>≧56KΩ</td><td>± 3 %</td></tr>
</table>
</td><td>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
(Sub-clause 4.25.1)</td></tr>
<tr><td>Resistance to solvent</td><td>No deterioration of protective coatings and markings</td><td>Specimens shall be immersed in a bath of trichroethane completely for 3 minutes with ultrasonic
(Sub-clause 4.30)</td></tr>
</table>

Coated Type Kit Resistors (CFR)

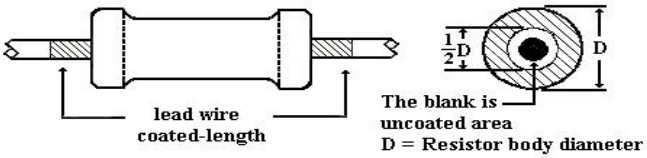
6. Dimension : Unit : mm



Type	Power Rating	D (Max.)	L (Max.)	d ± 0.05	H ± 3
CR	1/4W	2.5 mm	6.8 mm	0.54 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.

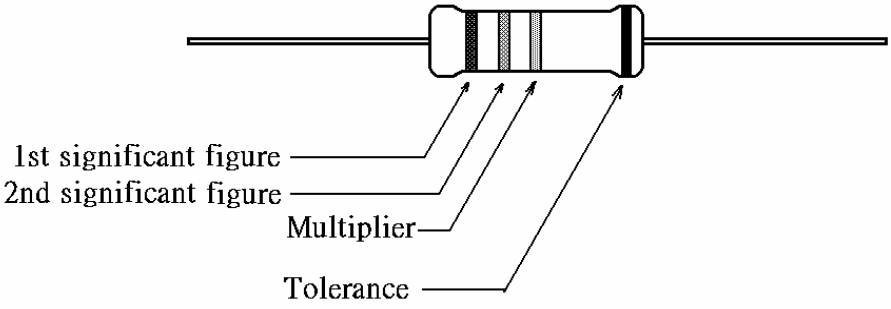


7. Marking :

7.1 Resistor :

Resistors shall be marked with color coding

colors shall be in accordance with JIS C 0802

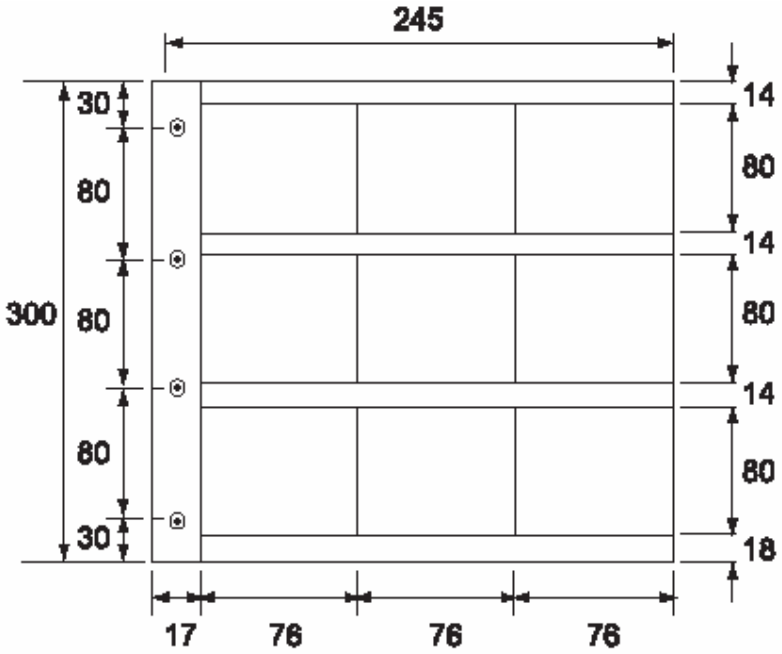


Coated Type Kit Resistors (CFR)

8. Kit resistors :

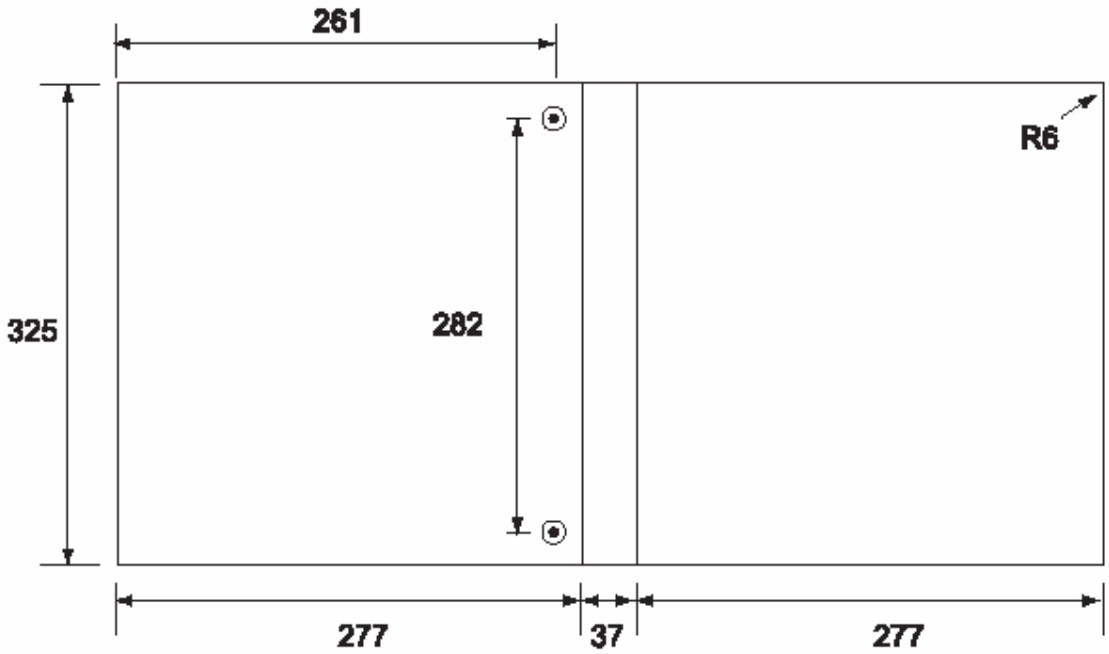
8.1 Insert for Coated Kit

Dimension (mm)



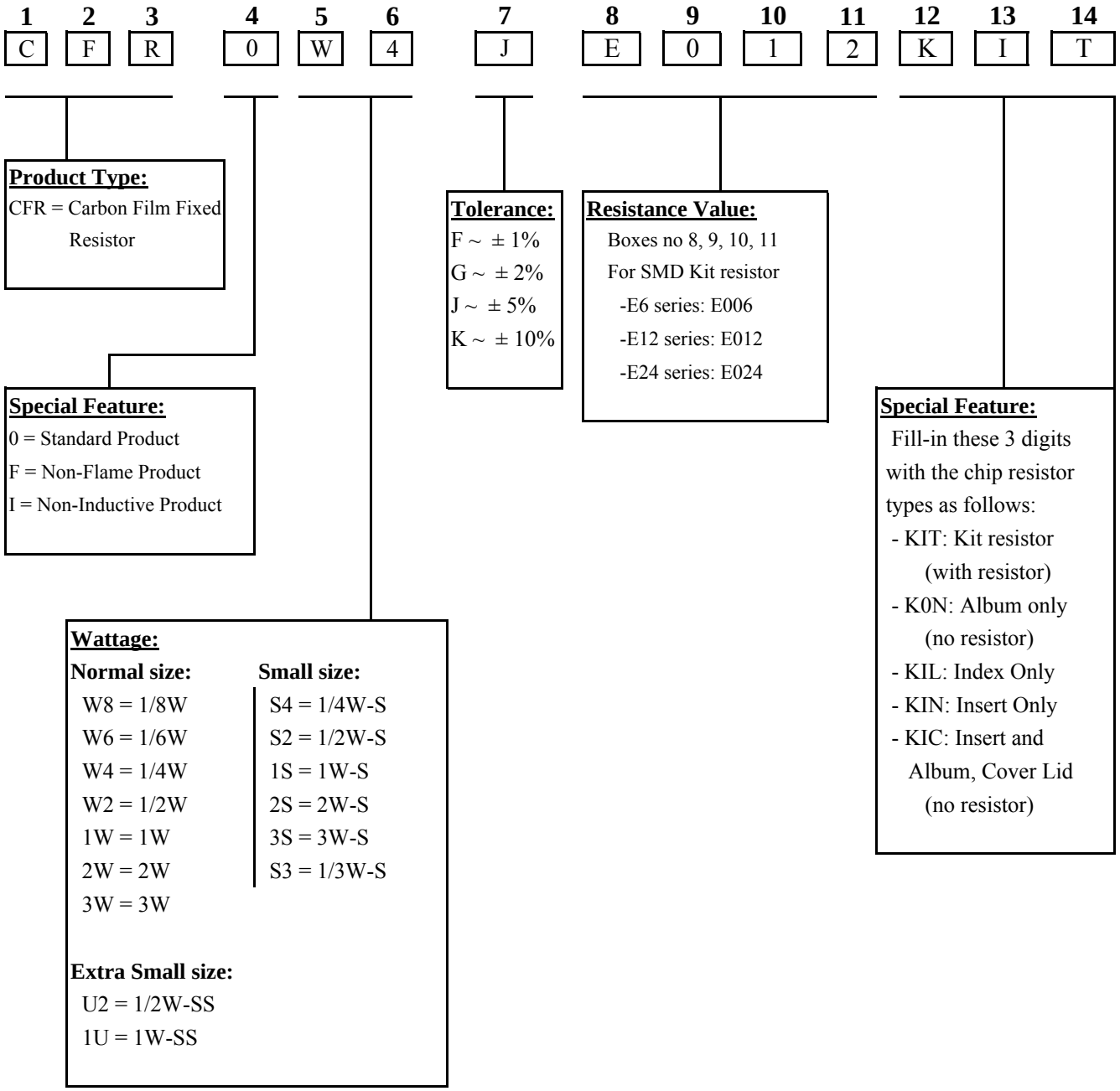
8.2 Album for Coated Kit

Dimension (mm)



Part Number System

Explanation of Part Number System
(Coated Type Kit Resistors (CFR))



Sample: CR 1/4W +/- 5% E-12 series KIT Resistors → CFR0W4JE012KIT

Coated Type Kit Resistors (CFR)

Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.
This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 25°C ± 5°C and a relative humidity of 60%RH ± 10%RH

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2, H_2S, NH_3, SO_2, or NO_2
2. In direct sunlight

Coated Type Kit Resistors (CFR)

PRODUCT: CR 1/4W 5% (2.5x6.8) E12 Series (86 Values)

Item	Value
1	1R0
2	1R2
3	1R5
4	1R8
5	2R2
6	2R7
7	3R3
8	3R9
9	4R7
10	5R6
11	6R8
12	8R2
13	10R
14	12R
15	15R
16	18R
17	22R
18	27R
19	33R
20	39R
21	47R
22	56R
23	68R
24	75R
25	82R

Item	Value
26	100R
27	120R
28	150R
29	180R
30	220R
31	270R
32	330R
33	390R
34	470R
35	560R
36	680R
37	820R
38	1K
39	1K2
40	1K5
41	1K8
42	2K2
43	2K7
44	3K3
45	3K9
46	4K7
47	5K6
48	6K8
49	8K2
50	10K

Item	Value
51	12K
52	15K
53	18K
54	22K
55	27K
56	33K
57	39K
58	47K
59	56K
60	68K
61	82K
62	100K
63	120K
64	150K
65	180K
66	220K
67	270K
68	330K
69	390K
70	470K
71	560K
72	680K
73	820K
74	1M
75	1M2

Item	Value
76	1M5
77	1M8
78	2M2
79	2M7
80	3M3
81	3M9
82	4M7
83	5M6
84	6M8
85	8M2
86	10M