ROYALOHM

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

SPECIFICATION FOR APPROVAL

MOUSER

Description : Extra - High Power Thick Film Chip Resistors (KIT)

Royalohm Part no.:

SP123WJE024KIT (KIT SP12 3W +/-5% E-24 Series)

Approved by

RoHS V3 Compliant (EU) 2015/863

REACH Compliant

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Approved	Checked	Prepared
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Issue Date: 2024/01/16

CHANGE NOTIFICATION HISTORY			
Version	**Date of Version**	**History**	**Remark**
1	2024/01/16	1. KIT (SP12) Series.	
		2. Power Rating : 3W	
		3. Resistance tolerance: ±5% & Jumper	
		4. 92 Values	

Extra - High Power Thick Film Chip Resistors (KIT)

1. Scope:

This specification for approval relates to Extra - High Power Thick Film Chip Resistors (KIT) manufactured by ROYALOHM 's specifications.

2. Type designation:

The type designation shall be in the following form:

	Type	Power Rating	Resistance tolerance	Nominal Resistance
Ex.	SP12 (2512)	3W	J	10Ω

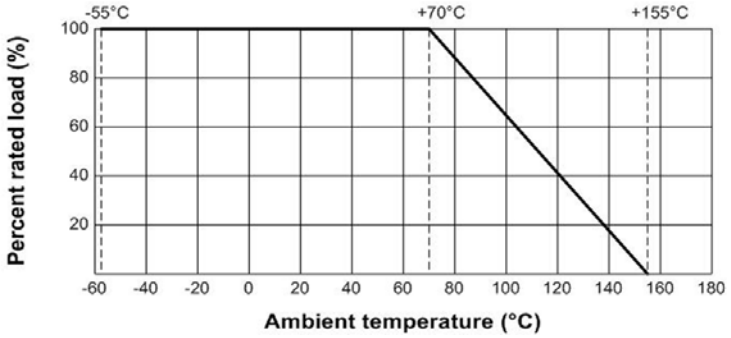
3. Ratings:

Type	SP12 (2512)
Power Rating at 70 ℃	3W
Rated Current (Jumper)	2 A
Max. Overload Current (Jumper)	10 A
Max. Working Voltage	250 V
Max. Overload Voltage	500 V
Diclectric Withstanding Voltage	500 V
Temperature Range	-55℃～ +155℃
Ambient Temperature	70 ℃

3.1 Power rating:

Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70 ℃ . For temperature in excess of 70 ℃ , The load shall be derate as shown in figure 1.

Figure 1



3.2 Nominal Resistance

Effective figures of nominal resistance shall be in accordance with E-24 series

3.3 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 :

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

Note : Max. Working Voltage or $\sqrt{P \times R}$ whichever is lesser

Max. Overload Voltage or $2.5\sqrt{P \times R}$ whichever is lesser

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

P = Power Rating (watt)

R = Nominal Resistance (ohm)

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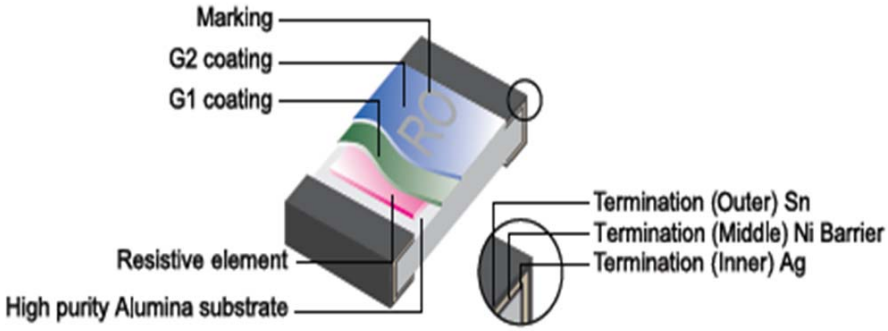
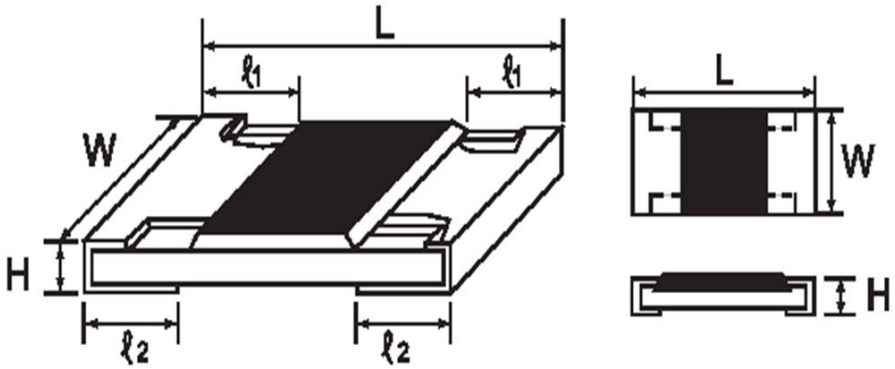
4. Construction :



5. Power rating and dimensions



Dimension :

Type	Dimension (mm)				
	L ± 0.10	W ± 0.15	H ± 0.10	ℓ1 ± 0.25	ℓ2 ± 0.20
SP12 (2512)	6.35	3.20	1.10	0.60	1.80

Power Rating :

Type	Power Rating at 70 ℃	Tolerance %	Resistance Range	Standard Series
SP12 (2512)	3W	Jumper	< 50mΩ	
		± 5	1Ω ~ 10MΩ	E-24

Extra - High Power Thick Film Chip Resistors (KIT)

6. Marking :

6.1 Resistors

A. Marking for E-24 series 5% in SP12 size : 3 Digits

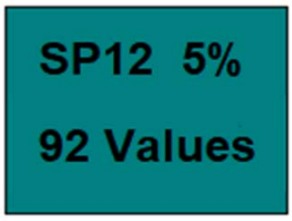
*The first 2 digits are singnificant figures of resistance and the 3rd digit denoted number of zeros.

Ex. | | 102 | | 1KΩ

*For ohmic values below 10 Ω, letter"R" is for decimal point.

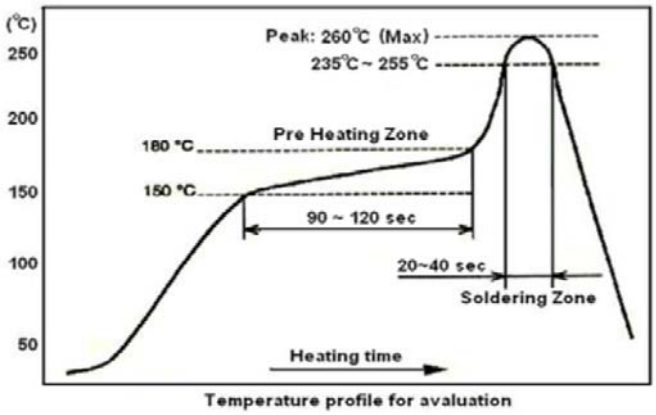
Ex. | | R68 | | 0.68Ω

6.2 Labels



Extra - High Power Thick Film Chip Resistors (KIT)

7. Performance specification :

Characteristics	Limits	Test Methods (JIS C 5201-1)
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down	4.7 Clamped in the trough of a 90℃ metallic v-block and shall be tested at ac potential respectively specified in the type for 60-70 seconds
Temperature Coefficient	1Ω~10Ω ≤± 200PPM/℃ 10.1Ω~10MΩ ≤± 100PPM/℃	4.8 Natural resistance change per temp. degree centigrade. $\frac{R2-R1}{R1(t2-t1)} \times 10^6$ (PPM/℃) R1: Resistance value at room temperature (T1) R2: Resistance value at room temp. plus 100 ℃(T2) Test pattern: room temp. (T1), room temp. +100℃(T2)
Short time overload	Resistance change rate is ± (2.0% + 0.1Ω) Max.	4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds
Soldering temp. reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	Wave soldering condition: (2 cycles Max.) Pre-heat : 100 ~ 120 ℃, 30 ± 5 sec. Suggestion solder temp.: 235 ~ 255 ℃, 10 sec. (Max.) Peak temp.: 260 ℃ Reflow soldering condition: (2 cycles Max.) Pre-heat : 150 ~ 180 ℃, 90 ~ 120 sec. Suggestion solder temp.: 235 ~ 255 ℃, 20 ~ 40 sec. Peak temp.: 260 ℃  Temperature profile for avaluation Hand soldering condition: The soldering iron tip temperature should be less than 300℃and maximum contract time should be 5 sec.
Soldering heat	Resistance change rate is: ± (1.0%+0.05Ω) Max.	4.18 Dip the resistor into a solder bath having a temperature of 260°C±3°C and hold it for 10±1 seconds.

Extra - High Power Thick Film Chip Resistors (KIT)

7. Performance specification :

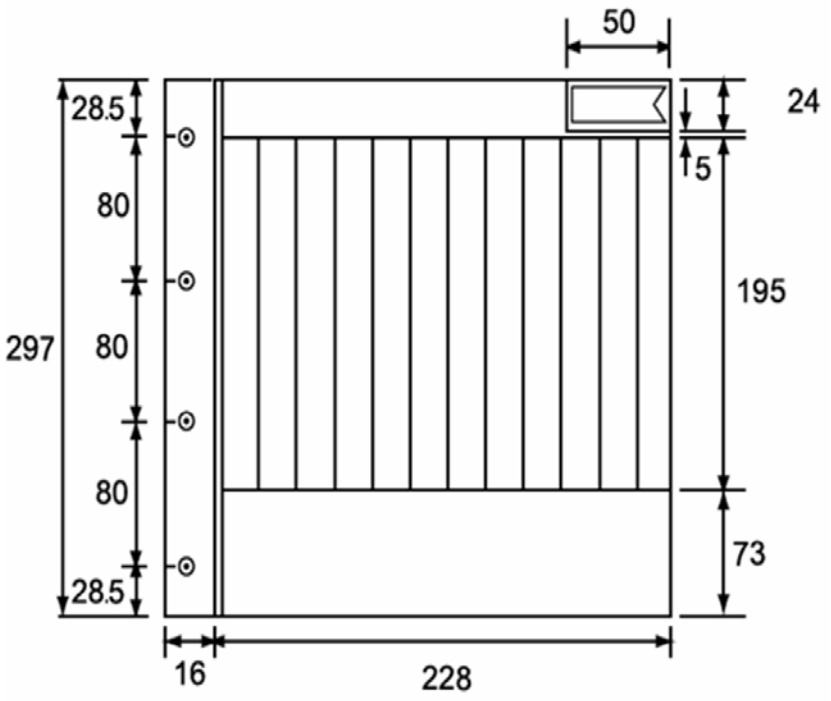
<table>
<tr><th>Characteristics</th><th>Limits</th><th>Test Methods
(JIS C 5201-1)</th></tr>
<tr><td rowspan="2">Temperature cycling</td><td rowspan="2">Resistance change rate is
± (1.0% + 0.1Ω) Max.</td><td>4.19 Resistance change after continuous
100 cycles for duty cycle specified below :
<table>
<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></td></tr>
<tr><td>Humidity</td><td>Resistance change rate is
± (3.0% + 0.1Ω) Max.</td><td>4.24 Temporary resistance change after 240 hours
exposure in a humidity test chamber controlled at
40±2°C and 90-95% relative humidity</td></tr>
<tr><td>Load life in humidity</td><td>Resistance change rate is
± (3.0% + 0.1Ω) Max.</td><td>7.9 Resistance change after 1,000 hours
(1.5 hours "on", 0.5 hour "off") at RCWV
in a humidity chamber controlled at
40℃ ± 2℃ and 90 to 95 % relative humidity</td></tr>
<tr><td>Load Life</td><td>Resistance change rate is
± (3.0% + 0.1Ω) Max.</td><td>4.25.1 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>Terminal bending</td><td>Resistance change rate is
± (1.0% + 0.05Ω) Max.</td><td>4.33 Twist of Test Board :
Y/X = 3/90 mm for 60 seconds</td></tr>
<tr><td></td><td></td><td></td></tr>
</table>

Extra - High Power Thick Film Chip Resistors (KIT)

8. Kit resistors :

8.1 Insert for Chip Kit

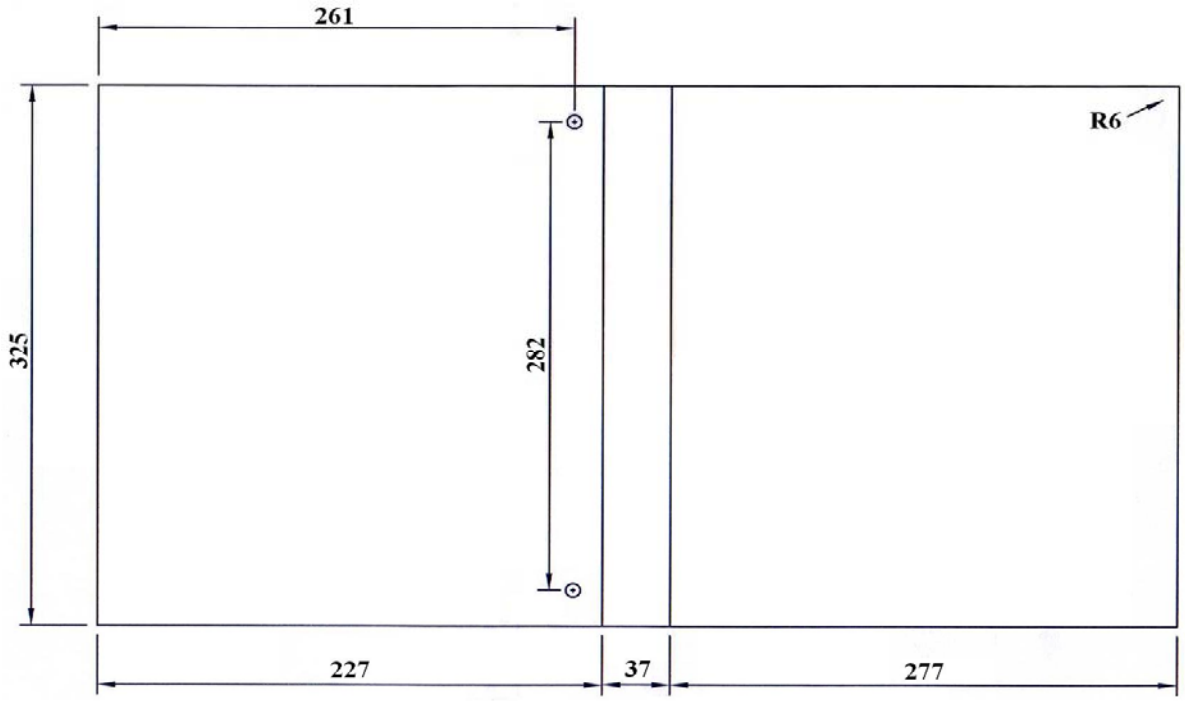
Dimension (mm)



8.2 Album for Chip Kit

Dimension (mm)

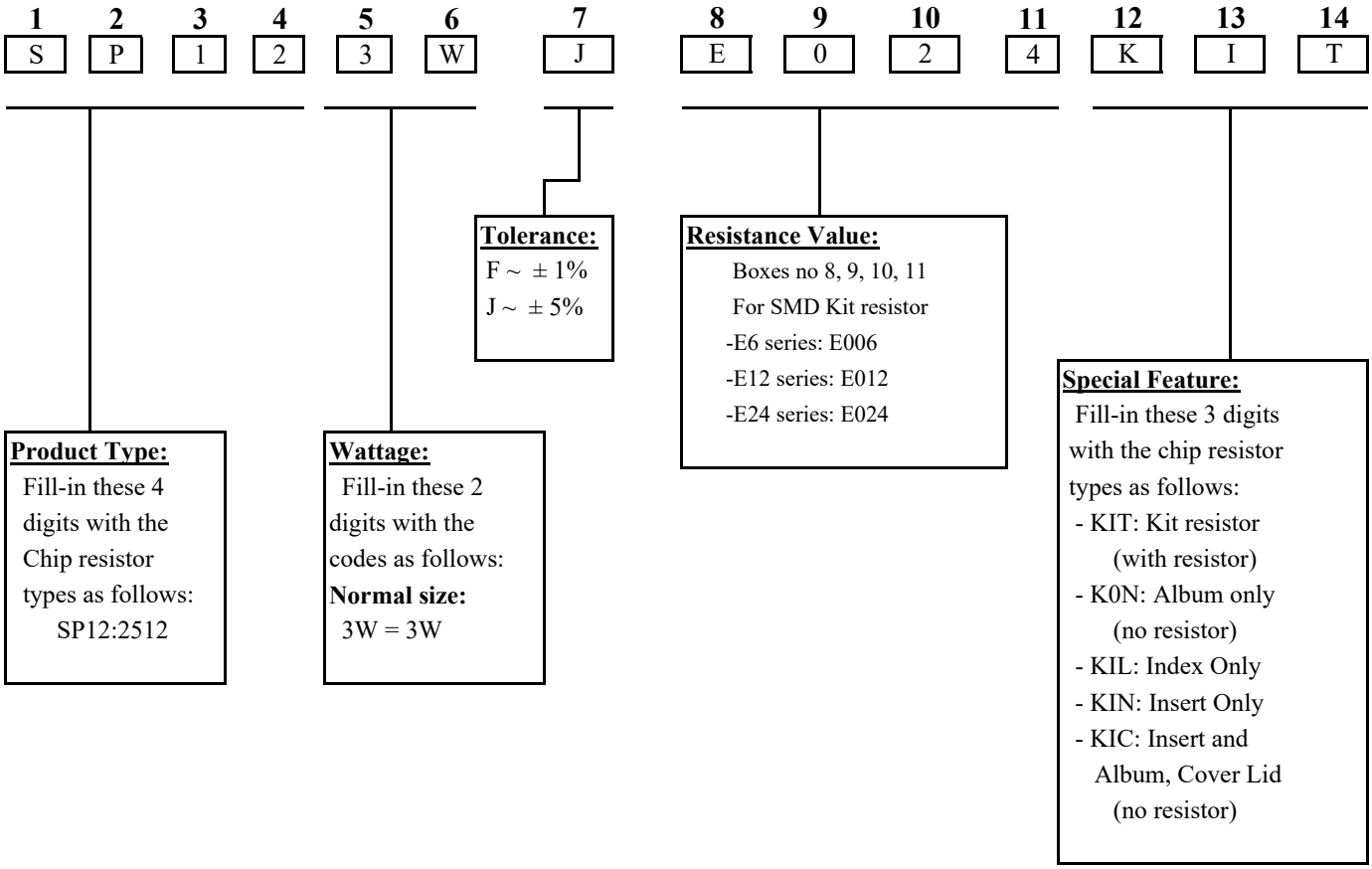
* Green Album



Part Number System

Explanation of Part Number System

(Extra - High Power Thick Film Chip Resistors (KIT))



Sample : SP12 3W (2512) +/-5% KIT E-24 Series → SP123WJE024KIT

Extra - High Power Thick Film Chip Resistors (KIT)

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.

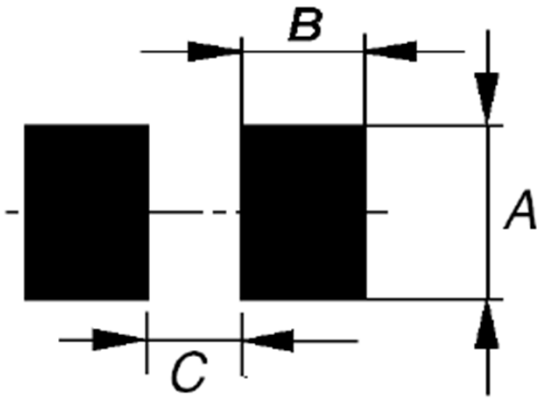
Storage Condition (MSL1)

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 ± 10°C and a relative humidity of 60%RH ± 10%RH, chemical and dust free atmosphere

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

Recommended solder pad



A	B	C
3.7 mm.	2.8 mm.	2.7 mm.

4 layers PCB specification:

1) Outside 2 layers (Top and Bottom) with copper foil thickness at 2oz.

2) Inside 2 layers (Middle layers) with copper foil thickness at 4 oz.

Extra - High Power Thick Film Chip Resistors (KIT)

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Regardless of the application of ROYALOHM products, it is recommended to carry out safety tests while using measures such as protective circuits and redundant circuits to protect the safety of equipment.

Extra - High Power Thick Film Chip Resistors (KIT)

PRODUCT: Kit (SP12) +/-5%
E24 Series = 92 values (0R/1R to 10M)
(With resistor 2 strip per value)
Total Qty: (SP12) 9,200pcs.)

NO.	Value
1	0R
2	1R
3	1R2
4	1R5
5	1R8
6	2R2
7	2R7
8	3R3
9	3R9
10	4R7
11	5R1
12	5R6
13	6R8
14	8R2
15	10R
16	12R
17	15R
18	18R
19	22R
20	24R
21	27R
22	33R
23	39R
24	47R
25	56R

NO.	Value
26	68R
27	82R
28	100R
29	120R
30	150R
31	180R
32	200R
33	220R
34	270R
35	300R
36	330R
37	390R
38	470R
39	560R
40	680R
41	750R
42	820R
43	1K
44	1K2
45	1K5
46	1K8
47	2K2
48	2K7
49	3K3
50	3K9

NO.	Value
51	4K7
52	5K6
53	6K8
54	8K2
55	10K
56	12K
57	15K
58	16K
59	18K
60	22K
61	27K
62	33K
63	39K
64	47K
65	56K
66	68K
67	82K
68	100K
69	120K
70	150K
71	180K
72	220K
73	270K
74	330K
75	390K

NO.	Value
76	470K
77	560K
78	680K
79	820K
80	1M
81	1M2
82	1M5
83	1M8
84	2M2
85	2M7
86	3M3
87	3M9
88	4M7
89	5M6
90	6M8
91	8M2
92	10M

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