

Extra - High Power Thick Film Chip Resistor Kit

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**RoHS
Compliant**

1. **Scope:** This specification for approval relates to Extra - High Power Thick Film Chip Resistors (KIT).
2. Type designation: The type designation shall be in the following form:

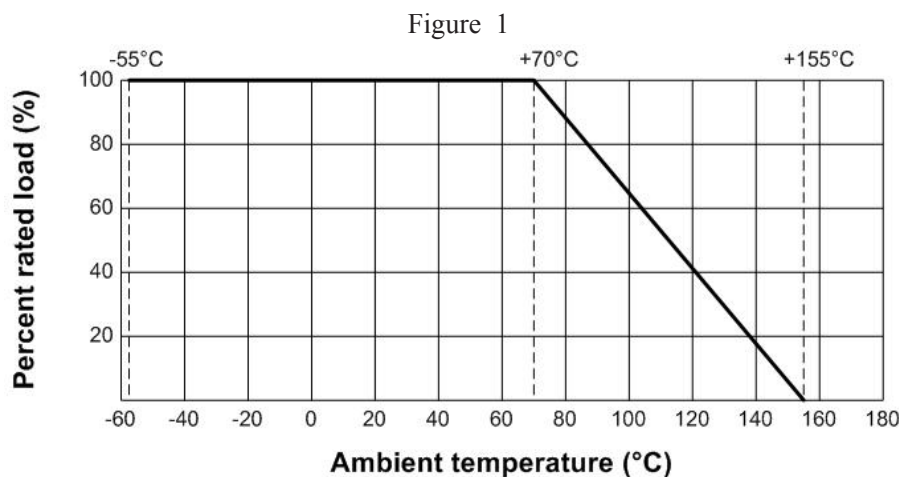
Type	Power Rating	Resistance tolerance	Nominal Resistance
2512	3W	F	10Ω

3. Ratings:

Type	2512
Power Rating at 70°C	3W
Max. Working Voltage	250 V
Max. Overload Voltage	500 V
Dielectric Withstanding Voltage	500 V
Temperature Range	-55°C to +155°C
Ambient Temperature	70°C

3.1 Power rating:

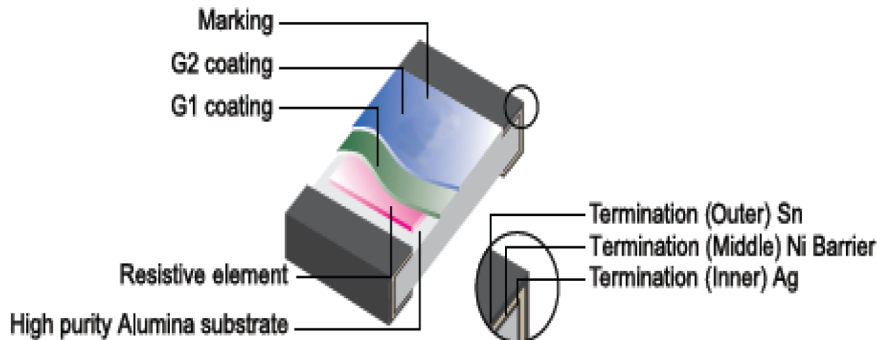
Resistors shall have a power rating based on continuous load operation at an ambient temperature of 70°C . For temperature in excess of 70°C , The load shall be derate as shown in figure 1.



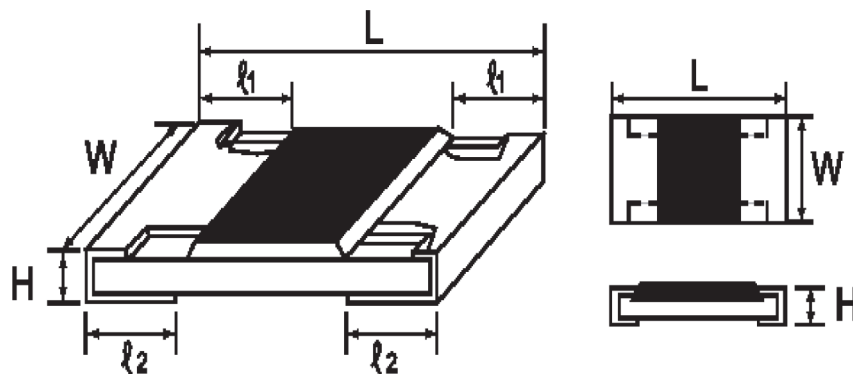
3.2 Nominal Resistance : Effective figures of nominal resistance shall be in accordance with E-24 series

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4. Construction :



5. Power rating and dimensions



Dimension :

Type	Dimension (mm)				
	L ±0.1	W ±0.15	H ±0.1	l1 ±0.25	l2 ±0.2
2512	6.35	3.2	1.1	0.6	1.8

Power Rating :

Type	Power Rating	Tolerance	Resistance	Standard
2512	3W	± 1	1Ω to 10mΩ	E-24

6. Marking :

6.1 Resistors

A. Marking for E-24 series 1% in size: 4 Digits

*The first 3 digits are significant figures of resistance and the 4th digit denoted number of zeros.

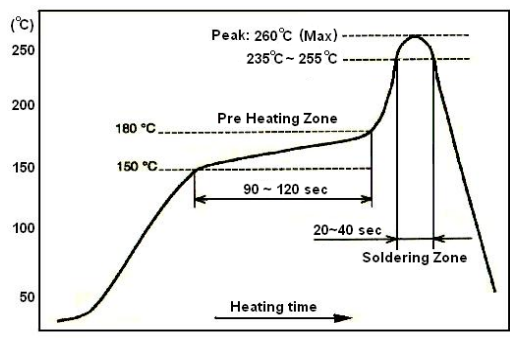


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*For ohmic values below 100 Ω, letter "R" is for decimal point.

Ex.	1R80	1.8Ω
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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°C metallic v-block and shall be tested at ac potential respectively specified in the type for 60-70 seconds
Temperature Coefficient	1Ω~10Ω ≤± 200PPM/°C 10.1Ω~10MΩ ≤± 100PPM/°C	4.8 Natural resistance change per temp. degree centigrade. R2-R1 ———— x 10 ⁶ (PPM/) R1(t2-t1) R1: Resistance value at room temperature (T1) R2: Resistance value at room temp. plus 100°C (T2) Test pattern: room temp. (T1), room temp. +100°C (T2)
Short time overload	Resistance change rate is ± (1% + 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.)	<p>Wave soldering condition: (2 cycles Max.) Pre-heat : 100°C to 120°C, 30 ± 5 sec. Suggestion solder temp.: 235°C to 255°C, 10 sec. (Max.) Peak temp.: 260°C</p> <p>Reflow soldering condition: (2 cycles Max.) Pre-heat : 150°C to 180°C, 90°C to 120 sec. Suggestion solder temp.: 235°C to 255°C, 20 to 40 sec. Peak temp.: 260°C</p>  <p style="text-align: center;">Temperature profile for evaluation</p> <p>Hand soldering condition: The soldering iron tip temperature should be less than 300°C and maximum contract time should be 5 sec.</p>

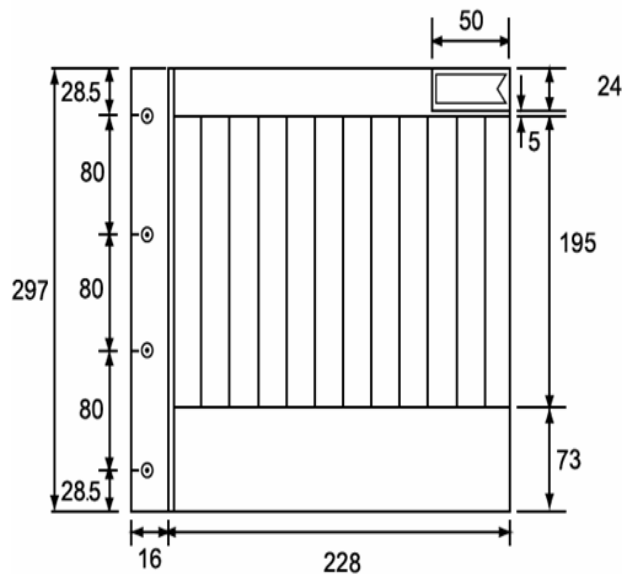
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Characteristics	Limits	Test Methods (JIS C 5201-1)															
Soldering heat	Resistance change rate is: $\pm (1\% + 0.05\Omega)$ Max.	4.18 Dip the resistor into a solder bath having a temperature of $260^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and hold it for 10 ± 1 seconds.															
Temperature cycling	Resistance change rate is $\pm (0.5\% + 0.1\Omega)$ Max.	4.19 Resistance change after continuous 5 cycles for duty cycle specified below :															
		<table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 to 15 mins</td> </tr> <tr> <td>3</td> <td>$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 to 15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$	30 mins	2	Room temp.	10 to 15 mins	3	$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$	30 mins	4	Room temp.	10 to 15 mins
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3	$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$	30 mins															
4	Room temp.	10 to 15 mins															
Humidity	Resistance change rate is $\pm (0.5\% + 0.1\Omega)$ Max.	4.24 Temporary resistance change after 240 hours exposure in a humidity test chamber controlled at $40 \pm 2^{\circ}\text{C}$ and 90-95% relative humidity															
Load life	Resistance change rate is $\pm (1\% + 0.1\Omega)$ Max.	7.9 Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity chamber controlled at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90 to 95 % relative humidity															
Load Life	Resistance change rate is $\pm (1\% + 0.1\Omega)$ Max.	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 $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient															
Terminal bending	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max.	4.33 Twist of Test Board : Y/X = 3/90 mm for 60 seconds															

8. Kit resistors :

8.1 Insert for Chip Kit
Dimension (mm)



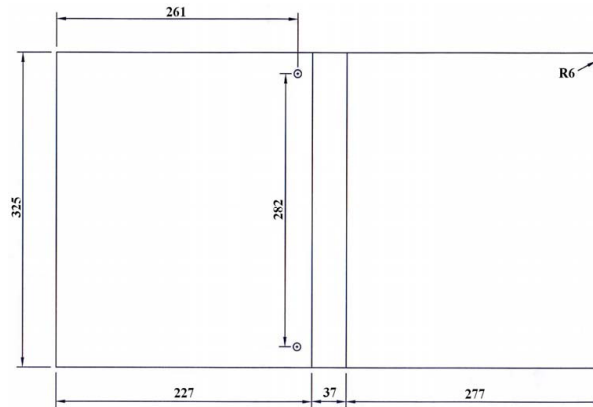
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8.2 Album for Chip Kit

Dimension (mm)

* Green Album



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

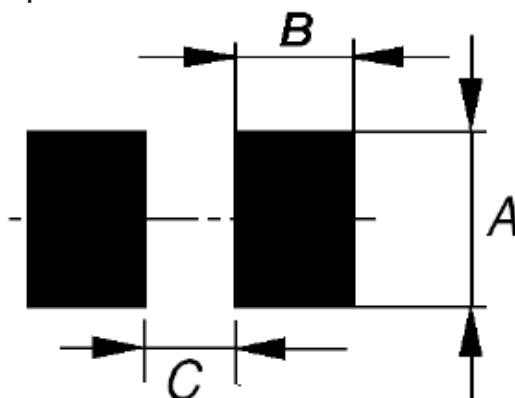
The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of 25°C ± 10°C and a relative humidity of 60%RH ± 10%RH, chemical and dust free atmosphere

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 Cl₂, H₂S, NH₃, SO₂, or NO₂
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.



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PRODUCT: Kit +/-1%
 E24 Series = 134 values (1R to 10M)
 (With resistor 1 strip per value)
 Total Qty: 6,050pcs.)

NO.	Value
1	1E
2	1.5E
3	2.2E
4	3.3E
5	4.7E
6	5.1E
7	6.8E
8	10E
9	11E
10	12E
11	13E
12	15E
13	16E
14	18E
15	20E
16	22E
17	24E
18	27E
19	30E
20	33E
21	36E
22	39E
23	43E
24	47E
25	51E
26	56E
27	62E
28	68E
29	75E
30	82E
31	91E
32	100E
33	110E
34	120E
35	130E

NO.	Value
36	150E
37	160E
38	180E
39	200E
40	220E
41	240E
42	270E
43	300E
44	330E
45	360E
46	390E
47	430E
48	470E
49	510E
50	560E
51	620E
52	680E
53	750E
54	820E
55	910E
56	1K
57	1.1K
58	1.2K
59	1.3K
60	1.5K
61	1.6K
62	1.8K
63	2K
64	2.2K
65	2.4K
66	2.7K
67	3K
68	3.3K
69	3.6K
70	3.9K

NO.	Value
71	4.3K
72	4.7K
73	5.1K
74	5.6K
75	6.2K
76	6.8K
77	7.5K
78	8.2K
79	9.1K
80	10K
81	11K
82	12K
83	13K
84	15K
85	16K
86	18K
87	20K
88	22K
89	24K
90	27K
91	30K
92	33K
93	36K
94	39K
95	43K
96	47K
97	51K
98	56K
99	62K
100	68K
101	75K
102	82K
103	91K
104	100K
105	110K

NO.	Value
106	120K
107	130K
108	150K
109	160K
110	180K
111	200K
112	220K
113	240K
114	270K
115	300K
116	330K
117	360K
118	390K
119	430K
120	470K
121	510K
122	560K
123	620K
124	680K
125	750K
126	820K
127	910K
128	1M
129	1.5M
130	2.2M
131	3.3M
132	4.7M
133	6.8M
134	10M

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Part Number Table

Description	Part Number
Chip Resistor Kit, 3W, 1%, 1R to 10M, E24, 2512, 6050 Pcs	MP002930

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