

RoHS
Compliant



1. Scope

This specification for approve relates to the Common Quality Lead-Free and Anti-Sulfurated Thick Film Chip Resistors. Used in automobile. The test items follow the test standard of AEC-Q200.

2. Type designation

The type designation shall be in the following form:

Type	Power Rating	Resistance tolerance	Nominal Resistance
0603	0.1W (1/10W)	F	10Ω

3. Ratings:

Type	0402	0603	0805	1206	1210	2010	2512
Power Rating	1/16W	1/10W	1/8W	1/4W	1/2W	3/4W	1W
Jumper Rated Current	1A	1A	2A	2A	2A	2A	2A
Max. Jumper Rated Current	2A	2A	5A	10A	10A	10A	10A
Max. Working Voltage	50V	75V	150V	200V	200V	200V	200V
Max. Overload Voltage	100V	150V	300V	400V	500V	500V	500V
Dielectric Withstanding Voltage	100V	300V	500V	500V	500V	500V	500V
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 from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derate as shown in figure 1

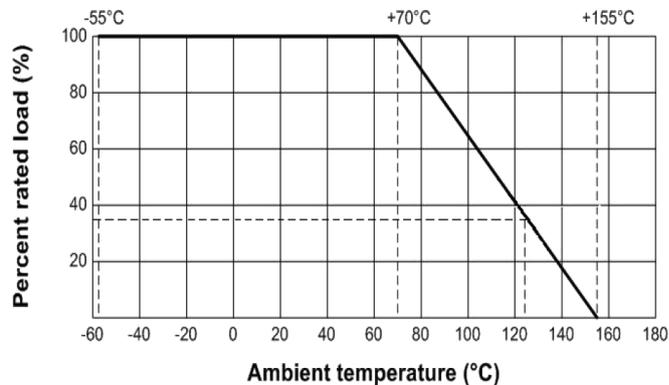


Figure 1

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:

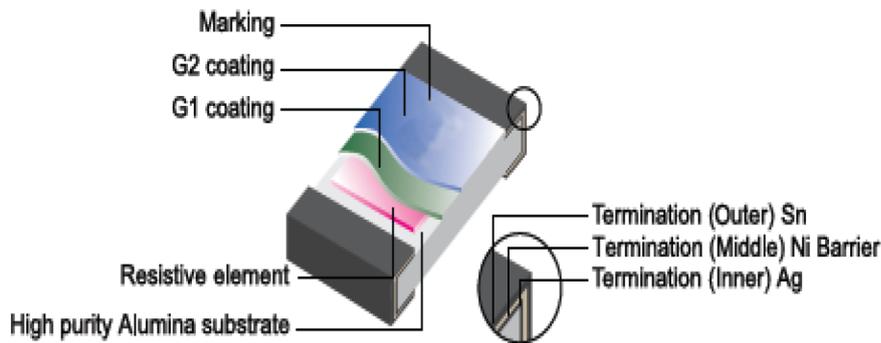
$$RCWV = \sqrt{P \times R}$$

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

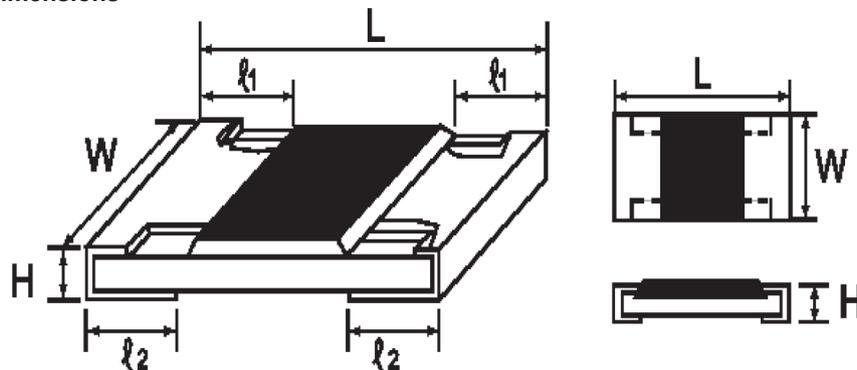
P = Power Rating (watt)

R = Nominal Resistance (ohm)

4. Construction :



5. Power rating and dimensions



Dimension

Type	Dimension (mm)				
	L	W	H	l1	l2
0402	1 ±0.1	0.5 ±0.05	0.35 ±0.05	0.2 ±0.1	0.25 ±0.1
0603	1.6 ±0.1	0.8 ±0.1	0.45 ±0.1	0.3 ±0.2	0.3 ±0.2
0805	2 ±0.15	1.25 ±0.15 -0.1	0.55 ±0.1	0.4 ±0.2	0.4 ±0.2
1206	3.1 ±0.15	1.55 ±0.15 -0.1	0.55 ±0.1	0.45 ±0.2	0.45 ±0.2
1210	3.1 ±0.1	2.6 ±0.2	0.55 ±0.1	0.5 ±0.25	0.5 ±0.2
2010	5 ±0.1	2.5 ±0.2	0.55 ±0.1	0.6 ±0.25	0.5 ±0.2
2512	6.35 ±0.1	3.2 ±0.2	0.55 ±0.1	0.6 ±0.25	0.5 ±0.2

Power Rating :

Type	Power Rating at 70	Tolerance	Resistance Range	Standard Series
		Jumper	< 50mΩ	E-24
0402	1/16W	±1%	1Ω to 10MΩ	
0603	1/10W			
0805	1/8W			
1206	1/4W			
1210	1/2W			
2010	3/4W			
2512	1W			

6. Marking :

6.1 Resistors

A. Chip Resistors type 0402 No marking

B. Standard E-96 series values(±1% tolerance) of 0603 size. Due the small size of the resistor's body, 3 digits marking will be used to indicate the accurate resistance value by using the following multiplier & resistance code

Marking for CQ03 E-96 series, the resistance value that no have multiplier code indicate marking follow this:

The first two digits are significant figures of resistance and the third one denoted number of zeros and under line the marking letters.

Ex.

	122		1.2KΩ
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C. Marking for E-96 series in 0805, 1206, 1210, 2010 , 2512 size : 4 Digits

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

Ex.

	1003		100KΩ
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*For ohmic values below 100 Ω, letter "R" is for decimal point.

Ex.

	1R80		1.8Ω
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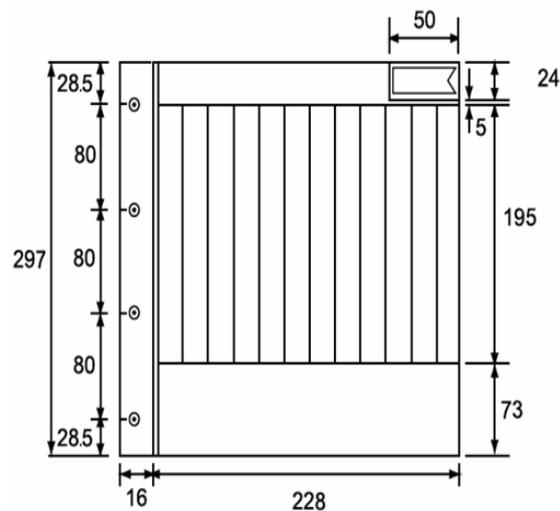
7. Performance specification :

Characteristics	Limits	Test Methods
Load life	$\pm 1\%: \pm(1\% + 0.1\Omega)\text{Max.}$	125°C, 35% power, at RCWV or Max. Working Voltage whichever less, 1,000 hours (1.5 hours "ON", 0.5 hours "OFF"), Measurement at 24 \pm 2 hours after test conclusion. (MIL-STD-202 Method 108)
Temperature Coefficient	$1\Omega \leq R \leq 100\Omega : \pm 200\text{PPM}/^\circ\text{C}$ $>10\Omega : \pm 100\text{PPM}/^\circ\text{C}$	Measure between -55°C to +125°C
Short time overload	$\pm 1\%: \pm(1\% + 0.1\Omega)\text{Max.}$	2.5x Rated voltage or Max. Overload Voltage whichever is lower for 5 seconds, then check the resistance.
Terminal Bending	$\pm(1\% + 0.05\Omega)\text{Max}$	Bending Distance 3mm, Duration: 60s \pm 5s, then check the resistance.
Solderability	95% coverage Min.	245 \pm 3°C; 2~3s
Soldering heat	$\pm(1\% + 0.05\Omega)\text{Max}$	260 \pm 5°C; 10 \pm 1s
Biased Humidity	1%: $\pm(1\% + 0.05\Omega)\text{Max.}$	10% rated power, 85°C/85%RH, 1000Hr, Measurement at 24 hours after test conclusion. (MIL-STD-202 Method 103)
Dielectric withstanding voltage	No evidence of flashover, mechanical damage, arcing or insulation breakdown	Resistor shall be clamped in the trough of 90° metallic V-block and shall be tested at AC potential respectively specified in the given list of each product type for 60~70s.
Temperature cycling	1%: $\pm(0.5\% + 0.1\Omega)\text{Max.}$	-55 \pm 3°C 30min ~normal temperature 10min-15min~155 \pm 2°C 30min~normal temperature 10min-15min 100 cycles, Measurement at 24 hours after test conclusion. (JESD22 Method JA-104)
ESD	$\pm(1\% + 0.05\Omega)\text{Max}$	With the electrometer in direct contact with the discharge tip, verify the voltage setting at levels of $\pm 500\text{V}$, $\pm 1\text{KV}$, $\pm 2\text{KV}$, $\pm 4\text{KV}$, $\pm 8\text{KV}$, The electrometer reading shall be within $\pm 10\%$ for voltages from 500V to $\leq 800\text{V}$. (AEC-Q200-002)
Sulfuration test	1%: $\pm(1\% + 0.05\Omega)\text{Max.}$	H2S 3 to 5PPM 50°C \pm 2°C 91% to 93% RH 1000H

8. Kit resistors :

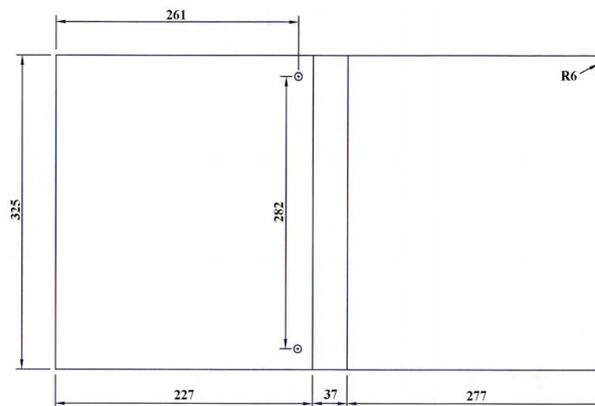
8.1 Insert for Chip Kit

Dimension (mm)



8.2 Album for Chip Kit

Dimension (mm)



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 $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and a relative humidity of $60\%\text{RH} \pm 10\%\text{RH}$, 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

Chip Resistor Kits

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PRODUCT: 0402 Kit +/-1%
E24 Series = 80 values (0R & 1R to 1M)
(With 100 resistors 2 strip per value)
Total Qty: 16,000pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	12R
7	15R
8	18R
9	22R
10	27R
11	33R
12	39R
13	47R
14	56R
15	68R
16	82R
17	100R
18	120R
19	130R
20	150R
21	160R
22	180R
23	200R
24	220R
25	270R
26	330R
27	390R
28	470R
29	510R
30	560R
31	620R
32	680R
33	820R
34	1K
35	1K2

NO.	Value
36	1K5
37	1K8
38	2K
39	2K2
40	2K7
41	3K
42	3K3
43	3K6
44	3K9
45	4K7
46	5K1
47	5K6
48	6K8
49	8K2
50	10K
51	12K
52	15K
53	18K
54	20K
55	22K
56	27K
57	30K
58	33K
59	36K
60	39K
61	47K
62	51K
63	56K
64	68K
65	82K
66	91K
67	100K
68	120K
69	150K
70	180K

NO.	Value
71	220K
72	270K
73	300K
74	330K
75	390K
76	470K
77	560K
78	680K
79	820K
80	1M

Chip Resistor Kits

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PRODUCT: 0603 Kit +/-1%
E24 Series = 80 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 8,000pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	12R
7	15R
8	18R
9	22R
10	27R
11	33R
12	39R
13	47R
14	56R
15	68R
16	82R
17	100R
18	120R
19	130R
20	150R
21	160R
22	180R
23	200R
24	220R
25	270R
26	330R
27	390R
28	470R
29	510R
30	560R
31	620R
32	680R
33	820R
34	1K
35	1K2

NO.	Value
36	1K5
37	1K8
38	2K
39	2K2
40	2K7
41	3K
42	3K3
43	3K6
44	3K9
45	4K7
46	5K1
47	5K6
48	6K8
49	8K2
50	10K
51	12K
52	15K
53	18K
54	20K
55	22K
56	27K
57	30K
58	33K
59	36K
60	39K
61	47K
62	51K
63	56K
64	68K
65	82K
66	91K
67	100K
68	120K
69	150K
70	180K

NO.	Value
71	220K
72	270K
73	300K
74	330K
75	390K
76	470K
77	560K
78	680K
79	820K
80	1M

Chip Resistor Kits

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PRODUCT: 0805 Kit +/-1%
E24 Series = 80 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 8,000pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	12R
7	15R
8	18R
9	22R
10	27R
11	33R
12	39R
13	47R
14	56R
15	68R
16	82R
17	100R
18	120R
19	130R
20	150R
21	160R
22	180R
23	200R
24	220R
25	270R
26	330R
27	390R
28	470R
29	510R
30	560R
31	620R
32	680R
33	820R
34	1K
35	1K2

NO.	Value
36	1K5
37	1K8
38	2K
39	2K2
40	2K7
41	3K
42	3K3
43	3K6
44	3K9
45	4K7
46	5K1
47	5K6
48	6K8
49	8K2
50	10K
51	12K
52	15K
53	18K
54	20K
55	22K
56	27K
57	30K
58	33K
59	36K
60	39K
61	47K
62	51K
63	56K
64	68K
65	82K
66	91K
67	100K
68	120K
69	150K
70	180K

NO.	Value
71	220K
72	270K
73	300K
74	330K
75	390K
76	470K
77	560K
78	680K
79	820K
80	1M

Chip Resistor Kits

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PRODUCT: 1206 Kit +/-1%
E24 Series = 99 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 9,900pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	3R
5	3R3
6	4R7
7	9R1
8	10R
9	12R
10	15R
11	18R
12	22R
13	27R
14	30R
15	33R
16	39R
17	47R
18	56R
19	68R
20	75R
21	82R
22	91R
23	100R
24	120R
25	130R
26	140R
27	150R
28	160R
29	180R
30	200R
31	220R
32	240R
33	270R
34	300E
35	330E

NO.	Value
36	360E
37	390E
38	430E
39	470E
40	510E
41	560E
42	604E
43	620E
44	680E
45	750E
46	820E
47	910E
48	1K
49	1K1
50	1K2
51	1K3
52	1K5
53	1K6
54	1K8
55	2K
56	2K2
57	2K4
58	2K7
59	3K
60	3K3
61	3K6
62	3K9
63	4K7
64	5K6
65	6K8
66	7K5
67	8K2
68	10K
69	11K
70	12K

NO.	Value
71	13K
72	15K
73	18K
74	22K
75	24K
76	27K
77	33K
78	36K
79	39K
80	43K
81	47K
82	51K
83	56K
84	68K
85	82K
86	100K
87	120K
88	150K
89	180K
90	200K
91	220K
92	270K
93	330K
94	390K
95	470K
96	560K
97	680K
98	820K
99	1M

Chip Resistor Kits

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PRODUCT: 1210 Kit +/-1%
E24 Series = 63 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 6,300pcs.)

NO.	Value	NO.	Value
1	3R3	36	5K6
2	10R	37	6K8
3	12R	38	8K2
4	15R	39	10K
5	18R	40	12K
6	22R	41	15K
7	27R	42	18K
8	33R	43	22K
9	39R	44	27K
10	47R	45	33K
11	56R	46	39K
12	68R	47	47K
13	82R	48	56K
14	100R	49	68K
15	110R	50	82K
16	120R	51	100K
17	150R	52	120K
18	180R	53	150K
19	220R	54	180K
20	270R	55	220K
21	330R	56	270K
22	390R	57	330K
23	470R	58	390K
24	560R	59	470K
25	680R	60	560K
26	820R	61	680K
27	1K	62	820K
28	1K2	63	1M
29	1K5		
30	1K8		
31	2K2		
32	2K7		
33	3K3		
34	3K9		
35	4K7		

Chip Resistor Kits

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PRODUCT: 2010 Kit +/-1%
E24 Series = 85 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 8,500pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	10R
5	12R
6	15R
7	16R
8	18R
9	20R
10	22R
11	24R
12	27R
13	28R
14	30R
15	33R
16	36R
17	39R
18	43R
19	47R
20	56R
21	62R
22	68R
23	82R
24	91R
25	100R
26	110R
27	120R
28	130R
29	140R
30	150R
31	160R
32	180R
33	200R
34	220R
35	240R

NO.	Value
36	270R
37	316R
38	330R
39	360R
40	390R
41	470R
42	510R
43	560R
44	620R
45	680R
46	750R
47	820R
48	1K
49	1K2
50	1K5
51	1K8
52	2K2
53	2K7
54	3K3
55	3K9
56	4K7
57	5K1
58	5K6
59	6K8
60	8K2
61	10K
62	12K
63	15K
64	18K
65	22K
66	27K
67	33K
68	39K
69	47K
70	56K

NO.	Value
71	68K
72	82K
73	100K
74	120K
75	150K
76	180K
77	220K
78	270K
79	330K
80	390K
81	470K
82	560K
83	680K
84	820K
85	1M

Chip Resistor Kits

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PRODUCT: 2512 Kit +/-1%
E24 Series = 68 values (0R & 1R to 1M)
(With 50 resistors 2 strip per value)
Total Qty: 6,800pcs.)

NO.	Value	NO.	Value
1	0R	36	2K2
2	1R	37	2K7
3	1R5	38	3K3
4	2R2	39	3K9
5	6R8	40	4K7
6	10R	41	5K6
7	12R	42	6K8
8	15R	43	8K2
9	18R	44	10K
10	22R	45	12K
11	27R	46	15K
12	33R	47	18K
13	39R	48	22K
14	47R	49	27K
15	56R	50	33K
16	68R	51	39K
17	82R	52	47K
18	91R	53	56K
19	100R	54	68K
20	120R	55	82K
21	150R	56	100K
22	180R	57	120K
23	220R	58	150K
24	270R	59	180K
25	330R	60	220K
26	390R	61	270K
27	470R	62	330K
28	536R	63	390K
29	560R	64	470K
30	680R	65	560K
31	820R	66	680K
32	1K	67	820K
33	1K2	68	1M
34	1K5		
35	1K8		

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Part Number Table

Description	Part Number
Chip Resistor Kit, 1/16W, $\pm 1\%$, 0R to 1M, 0402	MP003362
Chip Resistor Kit, 1/10W, $\pm 1\%$, 0R to 1M, 0603	MP003363
Chip Resistor Kit, 1/8W, $\pm 1\%$, 0R to 1M, 0805	MP003364
Chip Resistor Kit, 1/4W, $\pm 1\%$, 0R to 1M, 1206	MP003365
Chip Resistor Kit, 1/2W, $\pm 1\%$, 0R to 1M, 1210	MP003366
Chip Resistor Kit, 3/4W, $\pm 1\%$, 0R to 1M, 2010	MP003367
Chip Resistor Kit, 1W, $\pm 1\%$, 0R to 1M, 2512	MP003368

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