

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 : Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

Royalohm Part no.:

CQ02WGFE024KIT	(CQ02 1/16W +/-1% KIT (E-24 Series))
CQ03WAFE024KIT	(CQ03 1/10W +/-1% KIT (E-24 Series))
CQ05W8FE024KIT	(CQ05 1/8W +/-1% KIT (E-24 Series))
CQ06W4FE024KIT	(CQ06 1/4W +/-1% KIT (E-24 Series))
CQ07W2FE024KIT	(CQ07 1/2W +/-1% KIT (E-24 Series))
CQ1007FE024KIT	(CQ10 3/4W +/-1% KIT (E-24 Series))
CQ121WFE024KIT	(CQ12 1W +/-1% KIT (E-24 Series))

Approved by

RoHS V3 Compliant (EU) 2015/863

REACH Compliant

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Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

1. Scope:

This specification for approve relates to the Automotive Thick Film Chip Resistors (KIT) manufactured by ROYALOHM. Application 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
Ex. CQ03	0.10W (1/10W)	F	10KΩ

3. Ratings:

Type	CQ02	CQ03	CQ05	CQ06	CQ07	CQ10	CQ12
Power Rating	1/16W	1/10W	1/8W	1/4W	1/2W	3/4W	1W
Rated Current Jumper	1A	1A	2A	2A	2A	2A	2A
Max. Rated Current Jumper	2A	2A	5A	10A	10A	10A	10A
Max. Working Voltage	50 V	75V	150V	200V	200V	200V	200V
Max. Overload Voltage	100 V	150V	300V	400V	500V	500V	500V
Dielectric Withstanding Voltage	100 V	300V	500V	500V	500V	500V	500V
Temperature Range	-55°C ~ +155°C						
Ambient Temperature	70 °C						
Resistance Range	1Ω ~ 1MΩ						

3.1 Nominal Resistance

Effective figures of nominal resistance shall be in accordance :

E-24 values – these are preferred and will have standard MOQ

E-96 values – are available on case by case basis and availability and MOQ need to be confirmed with factory first

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 :

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

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

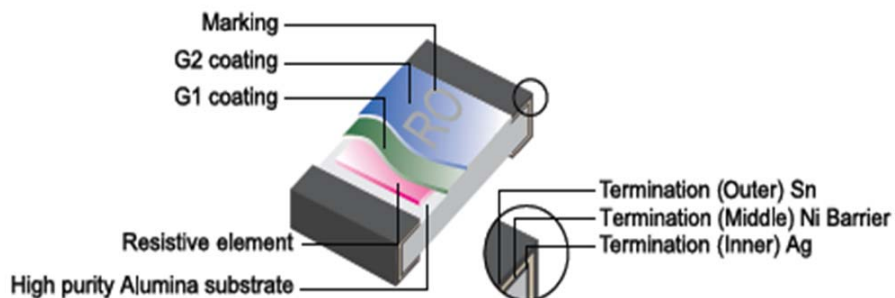
Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

R = Nominal Resistance (ohm)

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

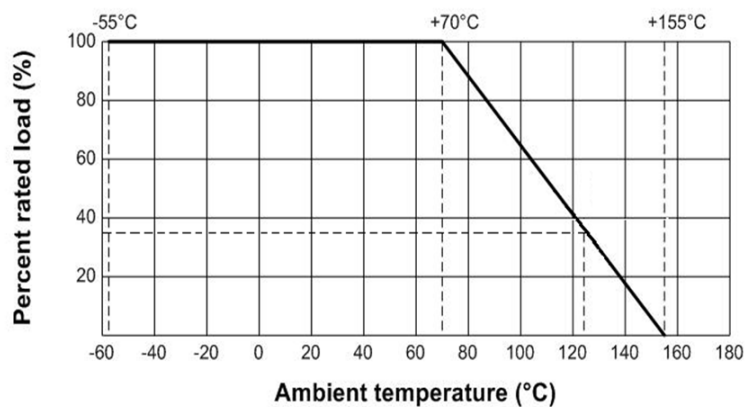
4. Construction :



5. Power rating and dimensions

5.1 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

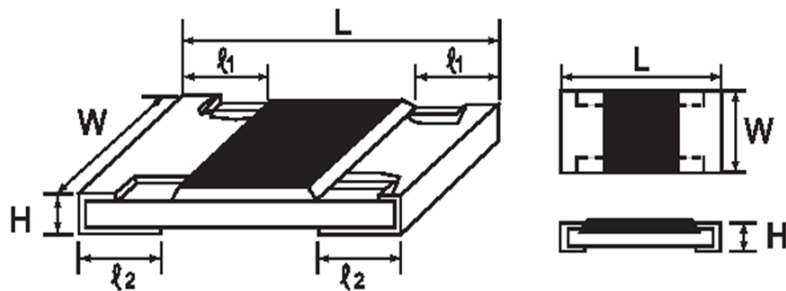


Power Rating :

Type	Power Rating at 70 °C	Tolerance	Resistance Range	Standard Series
CQ02	1/16W	± 1%	1Ω ~ 1MΩ	KIT E-24 Series
CQ03	1/10W			
CQ05	1/8W			
CQ06	1/4W			
CQ07	1/2W			
CQ10	3/4W			
CQ12	1W			

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

5.2 Dimension:



Type	Dimension (mm)				
	L	W	H	ℓ_1	ℓ_2
CQ02	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
CQ03	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
CQ05	2.00±0.15	1.25+0.15 -0.10	0.55±0.10	0.40±0.20	0.40±0.20
CQ06	3.10±0.15	1.55+0.15 -0.10	0.55±0.10	0.45±0.20	0.45±0.20
CQ07	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25	0.50±0.20
CQ10	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25	0.50±0.20
CQ12	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25	0.50±0.20

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

6. Marking :

6.1 Resistors

A. Chip Resistors type CQ02 No marking

B.) $\pm 1\%$ of CQ03 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.

Multiplier Code :

Code	A	B	C	D	E	F	G	H	X	Y	Z
	⁰	¹	²	³	⁴	⁵	⁶	⁷	⁻¹	⁻²	⁻³
Multiplier	10	10	10	10	10	10	10	10	10	10	10

Coding

XX

Resistance Code

Formula

X

Multiplier Code

Example :

$$\begin{array}{rcl}
 10.2\text{K}\Omega & = & 102 \times 10^2 \Omega = 02C \\
 & & \downarrow \quad \downarrow \\
 & & 02 \quad C \\
 33.2\Omega & = & 332 \times 10^{-1} \Omega = 51X \\
 & & \downarrow \quad \downarrow \\
 & & 51 \quad X
 \end{array}$$

Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	08	191	28	309	48	499	68	806	88
121	09	196	29	316	49	511	69	825	89
124	10	200	30	324	50	523	70	845	90
127	11	205	31	332	51	536	71	866	91
130	12	210	32	340	52	549	72	887	92
133	13	215	33	348	53	562	73	909	93
137	14	221	34	357	54	576	74	931	94
140	15	226	35	365	55	590	75	953	95
143	16	232	36	374	56	604	76	976	96
147	17	237	37	383	57	619	77		
150	18	243	38	392	58	634	78		
154	19	249	39	402	59	649	79		
158	20	255	40	412	60	665	80		

*Marking for CQ03 1%, 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.

	<u>122</u>	
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1.2k Ω

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C. Marking for 1% series in CQ05, CQ06, CQ07, CQ10, CQ12 size : 4 Digits

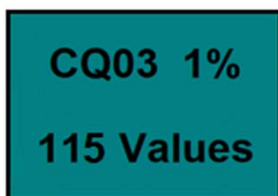
*The first 3 digits are significant figures of resistance and the 4th digit denotes number of zeros.

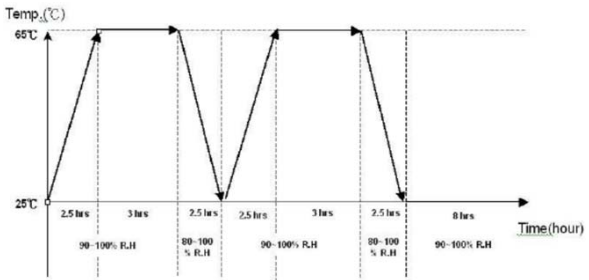
Ex.	<table border="1"><tr><td></td><td>1003</td><td></td></tr></table>		1003		100KΩ
	1003				

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

Ex.	<table border="1"><tr><td></td><td>1R80</td><td></td></tr></table>		1R80		1.8Ω
	1R80				

6.2 Labels



Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant		
7. Performance specification :		
Characteristics	Limits	Test Methods (AEC - Q200)
Operational Life	Resistance change rate is $\pm(1\%+0.1\Omega)$ Max	125°C, at 35% of operating power, 1000H(1.5 hours “ON”, 0.5 hour “OFF”). (MIL-STD-202) (MIL-STD-202 Method 108)
Temperature Coefficient of Resistance	CQ02-CQ12: $1\Omega \sim 10\Omega : \pm 200\text{PPM}/^{\circ}\text{C}$ $> 10\Omega : \pm 100\text{PPM}/^{\circ}\text{C}$	Natural resistance change per temp. degree centigrade. $\frac{R2-R1}{R1(t2-t1)} \times 10^6 \text{ (PPM}/^{\circ}\text{C)}$ 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)
External Visual	No Mechanical Damage	Electrical test not required. Inspect device construction, marking and workmanship (MIL-STD-883 Method 2009)
Physical Dimension	Reference 5.2 Dimension Standards	Verify physical dimensions to the applicable device detail specification. Note: User(s) and Suppliers spec. Electrical test not required. (JESD22 MH Method JB-100)
Resistance to Solvent	Marking Unsmear	Note: Add Aqueous wash chemical – OKEM Clean or equivalent. Do not use banned solvents. (MIL-STD-202 Method 215)
Terminal Strength	Not broken	Force of 1.8kg for 60 seconds. (MIL-STD-202 Method 213)
High Temperature Exposure (Storage)	$\pm (1.0\% + 0.1 \Omega)$ Max.	1000hrs. at T=155°C. Unpowered. Measurement at 24±2 hours after test conclusion. (MIL-STD-202 Method 108)
Temperature Cycling	Resistance change rate is $\pm(0.5\%+0.1\Omega)$ Max	1000 Cycles (-55°C to +155°C). Measurement at 24±2 hours after test conclusion. (JESD22 Method JA-104)
Moisture Resistance	Resistance change rate is $\pm(1\%+0.1\Omega)$ max	 T=24 hours /cycle. Unpowered. Measurement at 24±2 hours after test conclusion. (MIL-STD-202 Method 106)
Biased Humidity	Resistance change rate is $\pm(1\%+0.1\Omega)$ Max	10% rated power, 85°C/85%RH, 1000H, Measurement at 24 hours after test conclusion. (MIL-STD-202 Method 103)

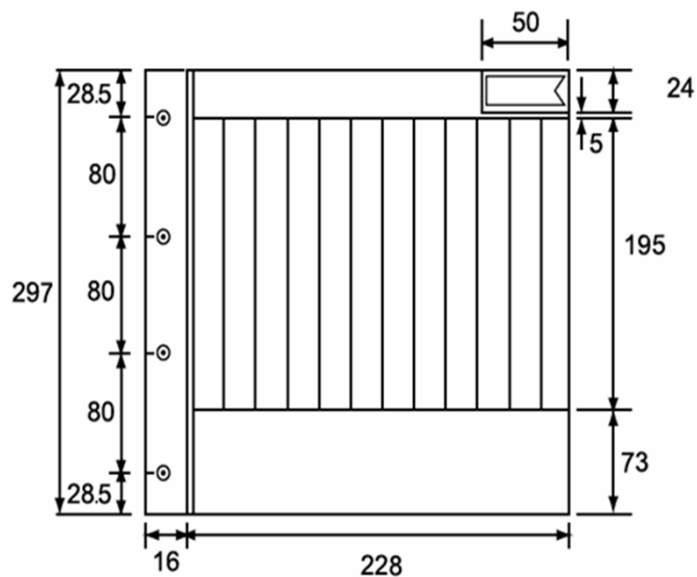
Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant		
7. Performance specification :		
Characteristics	Limits	Test Methods (AEC - Q200)
Mechanical Shock	Resistance change rate is $\pm (1\%+0.1\Omega)\text{max}$	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6. (MIL-STD-202 Method 213)
Vibration	Resistance change rate is $\pm (1\%+0.1\Omega)\text{Max}$	5g's for 20 min., 12cycle each of 3 orientations. Note: Use 8***5**PCB. 031** thick 7 secure points (onone) long side and 2 secure points at corners of opposite sides. Parts mounted within 2' from any secure point. Test from 10-2000Hz. (MIL-STD-202 Method 204)
Short Time Overload	Resistance change rate is $\pm (1.0\% + 0.1\Omega)\text{Max.}$	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds. (IEC60115 4.13)
ESD	Resistance change rate is $\pm (10\%+0.1\Omega)\text{Max}$	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 800V. (AEC-Q200-002 or ISO/DIS 10605)
Solderability	95% coverage Min.	For both leaded & SMD. Electrical test not required. Magnification 50X. Conditions: a) Method B 4hrs at 155°C dry heat, the dip in bath with 245°C, 5s. b) Method B: at 215°C, 5s. c) Method D: at 260°C, 60s. (J-STD-002)
Flammability	No ignition of the tissue paper or scorching or the pinewood board	V-0 or V-1 are acceptable. Electrical test not required. (UL-94)
Board Flex	Resistance change rate is $\pm (1\%+0.05\Omega)\text{Max}$	CQ01 - CQ05 Bending 3 mm for 60 ± 5 seconds. CQ06 - CQ12 Bending 2 mm for 60 ± 5 seconds. (JIS-C-6429)
Flame Retardance	No flame	Temperature sensing at 500°C, Voltage power subjected to 32VDC current clamped up to 500ADC and decreased in 1.0VDC/hour. (AEC-Q200-001)
Resistance to Soldering Heat	Resistance change rate is $\pm (1\%+0.05\Omega)\text{Max.}$	Condition B No per-heat of samples. Note: Single Wave Solder-Procedure 2 for SMD and Procedure 1 for Leaded with solder within 1.5mm of device body. (MIL-STD-202 Method 210)
Dielectric Withstanding Voltage	No evidence of flashover mechanical damage, arcing or insulation break down	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 secs.
* Sulfuration test: H2S 3~5PPM 50°C $\pm$ 2°C 91%~93%RH 1000H		

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

8. Kit resistors :

8.1 Insert for Chip Kit

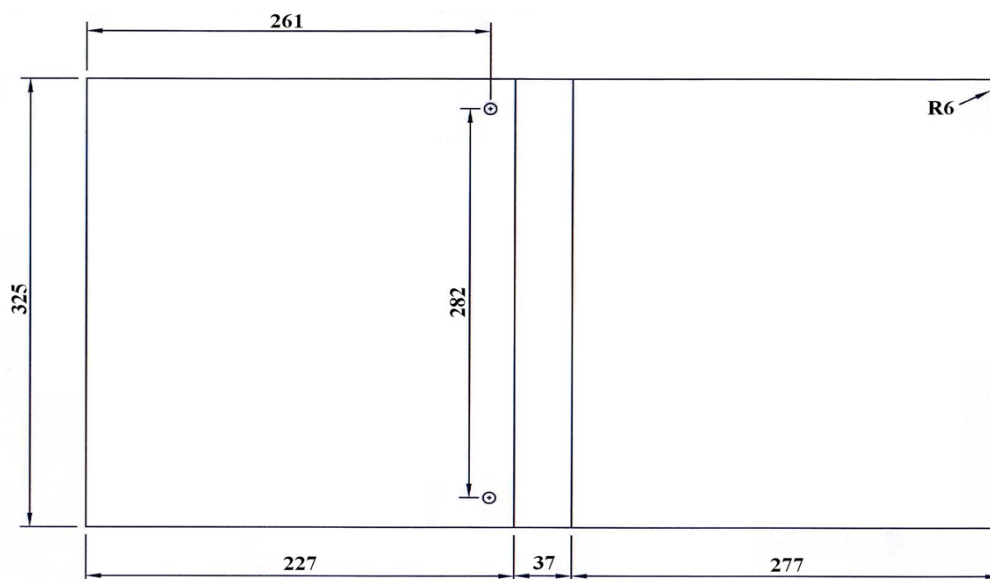
Dimension (mm)

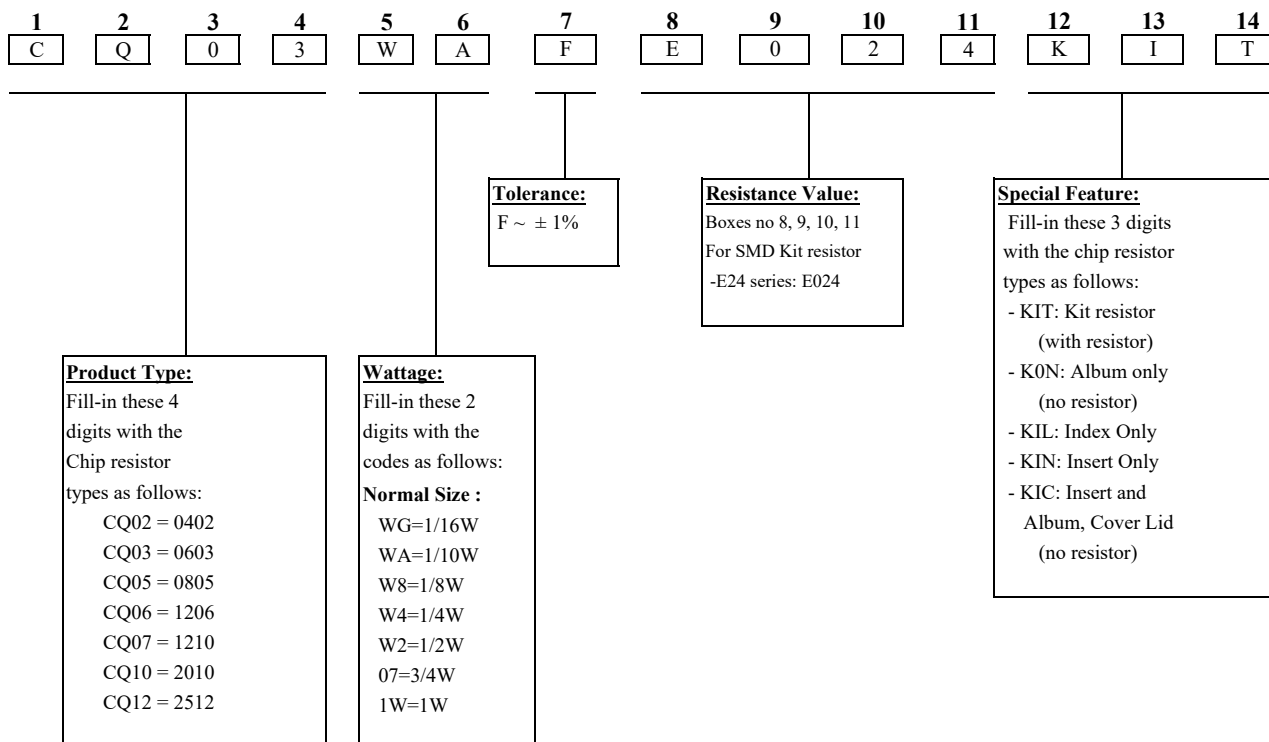


8.2 Album for Chip Kit

Dimension (mm)

* Green Album



Part Number System**Explanation of Part Number System**
(Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant)**This CQ series is meet AEC-Q200 requirements**

Sample : CQ03 1/10W +/-1% KIT E-24 Series → CQ03WAFE024KIT

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant**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 $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and a relative humidity of $60\%\text{RH} \pm 10\%\text{RH}$, chemical and dust free atmosphere

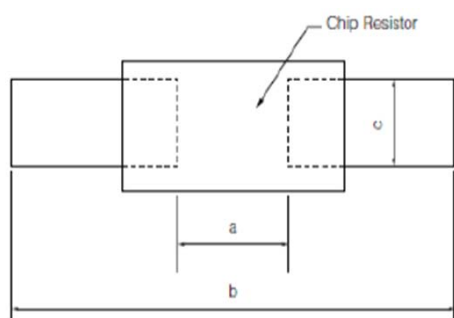
Even within the above guarantee periods, do not store these products in the following conditions.

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

This production is used for automotive electronics, ROYALOHM will not be responsible for any damage, expense or loss caused by the use of this specification in any special environment. This series of product are suitable for automotive electronics applications, as show below, if there are other application, you need to confirm with ROYALOHM whether they are applicable:

- a. Control unit for information, entertainment, navigation, audio;
- b. Control unit for comfortable doors, windows, seat;
- c. Control unit for internal lighting.

Secommended solder pad

Size	a (mm.)	b (mm.)	c (mm.)
CQ02	0.45 to 0.55	1.35 to 1.45	0.45 to 0.55
CQ03	0.85 to 0.95	2.05 to 2.15	0.75 to 0.85
CQ05	0.90 to 1.10	2.90 to 3.10	1.20 to 1.40
CQ06	1.90 to 2.10	4.10 to 4.30	1.50 to 1.70
CQ07	1.90 to 2.10	4.10 to 4.30	2.50 to 2.70
CQ10	3.50 to 3.70	6.10 to 6.30	2.50 to 2.70
CQ12	4.90 to 5.10	8.10 to 8.30	3.20 to 3.40

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant**Legal Disclaimer**

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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.

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ02) +/-1%
E24 Series = 89 values (1R to 1M)
(With resistor 1 strip per value)
Total Qty: (QC02) 8,900pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	12R
7	15R
8	18R
9	20R
10	22R
11	27R
12	33R
13	39R
14	47R
15	56R
16	68R
17	82R
18	91R
19	100R
20	120R
21	130R
22	150R
23	160R
24	180R
25	200R
26	220R
27	240R
28	270R
29	330R
30	390R
31	470R
32	510R
33	560R
34	620R
35	680R

NO.	Value
36	750R
37	820R
38	1K
39	1K1
40	1K2
41	1K5
42	1K8
43	2K
44	2K2
45	2K4
46	2K7
47	3K
48	3K3
49	3K6
50	3K9
51	4K7
52	5K1
53	5K6
54	6K8
55	8K2
56	9K1
57	10K
58	12K
59	15K
60	18K
61	20K
62	22K
63	27K
64	30K
65	33K
66	36K
67	39K
68	47K
69	51K
70	56K

NO.	Value
71	68K
72	82K
73	91K
74	100K
75	120K
76	150K
77	160K
78	180K
79	220K
80	240K
81	270K
82	300K
83	330K
84	390K
85	470K
86	560K
87	680K
88	820K
89	1M

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ03) +/-1%
E24 Series = 115 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC03) 11,500pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	11R
7	12R
8	15R
9	18R
10	22R
11	27R
12	33R
13	36R
14	39R
15	47R
16	51R
17	56R
18	62R
19	68R
20	75R
21	82R
22	91R
23	100R
24	110R
25	120R
26	130R
27	150R
28	160R
29	180R
30	200R
31	220R
32	270R
33	300R
34	330R
35	360R

NO.	Value
36	390R
37	430R
38	470R
39	510R
40	560R
41	620R
42	680R
43	750R
44	820R
45	910R
46	1K
47	1K1
48	1K2
49	1K3
50	1K5
51	1K6
52	1K8
53	2K
54	2K2
55	2K4
56	2K7
57	3K
58	3K3
59	3K6
60	3K9
61	4K3
62	4K7
63	5K1
64	5K6
65	6K2
66	6K8
67	7K5
68	8K2
69	9K1
70	10K

NO.	Value
71	11K
72	12K
73	13K
74	15K
75	16K
76	18K
77	20K
78	22K
79	24K
80	27K
81	30K
82	33K
83	36K
84	39K
85	43K
86	47K
87	51K
88	56K
89	62K
90	68K
91	75K
92	82K
93	91K
94	100K
95	110K
96	120K
97	130K
98	150K
99	160K
100	180K
101	200K
102	220K
103	270K
104	300K
105	330K

NO.	Value
106	360K
107	390K
108	430K
109	470K
110	560K
111	620K
112	680K
113	750K
114	820K
115	1M

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ05) +/-1%
E24 Series = 108 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC05) 10,800pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	4R7
5	10R
6	12R
7	15R
8	16R
9	18R
10	20R
11	22R
12	27R
13	30R
14	33R
15	36R
16	39R
17	47R
18	51R
19	56R
20	68R
21	75R
22	82R
23	91R
24	100R
25	110R
26	120R
27	130R
28	150R
29	160R
30	180R
31	200R
32	220R
33	270R
34	300R
35	330R

NO.	Value
36	360R
37	390R
38	430R
39	470R
40	510R
41	560R
42	620R
43	680R
44	750R
45	820R
46	1K
47	1K1
48	1K2
49	1K3
50	1K5
51	1K6
52	1K8
53	2K
54	2K2
55	2K4
56	2K7
57	3K
58	3K3
59	3K6
60	3K9
61	4K3
62	4K7
63	5K1
64	5K6
65	6K8
66	7K5
67	8K2
68	9K1
69	10K
70	11K

NO.	Value
71	12K
72	13K
73	15K
74	16K
75	18K
76	20K
77	22K
78	27K
79	30K
80	33K
81	36K
82	39K
83	47K
84	51K
85	56K
86	62K
87	68K
88	75K
89	82K
90	91K
91	100K
92	110K
93	120K
94	150K
95	180K
96	200K
97	220K
98	240K
99	270K
100	300K
101	330K
102	390K
103	470K
104	560K
105	680K

NO.	Value
106	750K
107	820K
108	1M

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ06) +/-1%
E24 Series = 119 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC06) 11,900pcs.)

NO.	Value
1	0R
2	1R
3	2R2
4	3R
5	3R3
6	4R7
7	9R1
8	10R
9	11R
10	12R
11	15R
12	16R
13	18R
14	20R
15	22R
16	27R
17	30R
18	33R
19	36R
20	39R
21	43R
22	47R
23	51R
24	56R
25	62R
26	68R
27	75R
28	82R
29	91R
30	100R
31	110R
32	120R
33	130R
34	140R
35	150R

NO.	Value
36	160R
37	180R
38	200R
39	220R
40	240R
41	270R
42	300E
43	330E
44	360E
45	390E
46	430E
47	470E
48	510E
49	560E
50	604E
51	620E
52	680E
53	750E
54	820E
55	910E
56	1K
57	1K1
58	1K2
59	1K3
60	1K5
61	1K6
62	1K8
63	2K
64	2K2
65	2K4
66	2K7
67	3K
68	3K3
69	3K6
70	3K9

NO.	Value
71	4K3
72	4K7
73	5K1
74	5K6
75	6K2
76	6K8
77	7K5
78	8K2
79	10K
80	11K
81	12K
82	13K
83	15K
84	18K
85	20K
86	22K
87	24K
88	27K
89	30K
90	33K
91	36K
92	39K
93	43K
94	47K
95	51K
96	56K
97	62K
98	68K
99	75K
100	82K
101	100K
102	110K
103	120K
104	130K
105	150K

NO.	Value
106	160K
107	180K
108	200K
109	220K
110	270K
111	300K
112	330K
113	390K
114	470K
115	510K
116	560K
117	680K
118	820K
119	1M

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ07) +/-1%
E24 Series = 92 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC07) 9,200pcs.)

NO.	Value
1	0R
2	3R3
3	10R
4	12R
5	15R
6	16R
7	18R
8	20R
9	22R
10	24R
11	27R
12	30R
13	33R
14	39R
15	43R
16	47R
17	51R
18	56R
19	62R
20	68R
21	75R
22	82R
23	91R
24	100R
25	110R
26	120R
27	130R
28	150R
29	160R
30	180R
31	200R
32	220R
33	240R
34	270R
35	300R

NO.	Value
36	330R
37	360R
38	390R
39	430R
40	470R
41	510R
42	560R
43	620R
44	680R
45	750R
46	820R
47	910R
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	4K3
64	4K7
65	5K6
66	6K8
67	8K2
68	10K
69	12K
70	15K

NO.	Value
71	18K
72	22K
73	27K
74	33K
75	39K
76	47K
77	56K
78	68K
79	82K
80	100K
81	120K
82	150K
83	180K
84	220K
85	270K
86	330K
87	390K
88	470K
89	560K
90	680K
91	820K
92	1M

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ10) +/-1%
E24 Series = 85 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC10) 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

Automotive Thick Film Chip Resistors (KIT) AEC-Q200 Compliant

PRODUCT: Kit (CQ12) +/-1%
E24 Series = 78 values (1R to 1M)
(With resistor 2 strip per value)
Total Qty: (QC12) 7,800pcs.)

NO.	Value
1	0R
2	1R
3	1R5
4	2R2
5	6R8
6	10R
7	12R
8	15R
9	16R
10	18R
11	22R
12	24R
13	27R
14	33R
15	39R
16	47R
17	56R
18	68R
19	82R
20	91R
21	100R
22	110R
23	120R
24	130R
25	150R
26	160R
27	180R
28	200R
29	220R
30	270R
31	330R
32	360R
33	390R
34	430R
35	470R

NO.	Value
36	510R
37	536R
38	560R
39	680R
40	820R
41	1K
42	1K2
43	1K5
44	1K8
45	2K2
46	2K7
47	3K3
48	3K9
49	4K7
50	5K6
51	6K8
52	7K5
53	8K2
54	10K
55	12K
56	15K
57	18K
58	22K
59	27K
60	33K
61	39K
62	47K
63	56K
64	68K
65	82K
66	100K
67	120K
68	150K
69	180K
70	220K

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