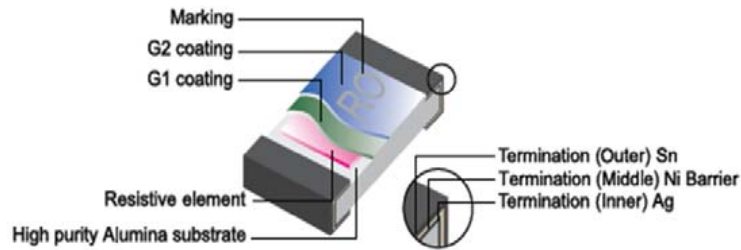


# Automotive Thick Film Chip Resistor Kit

## 1. Ratings:

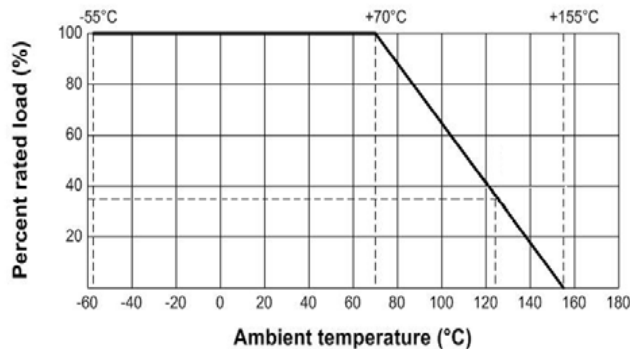
Type	RND 155CQ02	RND 155CQ03	RND 155CQ05	RND 155CQ06	RND 155CQ07	RND 155CQ10	RND 155CQ12
Power Rating	62.5 mW	100 mW	125 mW	250 mW	500 mW	750 mW	1 W
Jumper Rated Current	1 A	1 A	2 A	2 A	2 A	2 A	2 A
Max. Jumper Rated Current	2 A	2 A	5 A	10 A	10 A	10 A	10 A
Max. Working Voltage	50 V	75 V	150 V	200 V	200 V	200 V	200 V
Max. Overload Voltage	100 V	150 V	300 V	400 V	500 V	500 V	500 V
Dielectric Withstand Voltage	100 V	300 V	500 V	500 V	500 V	500 V	500 V
Temperature Range	-55 ... 155 °C						
Ambient Temperature	70 °C						
Resistance Range	1 Ω ... 1 MΩ						
Resistance Tolerance	1%						

## 2. Construction :



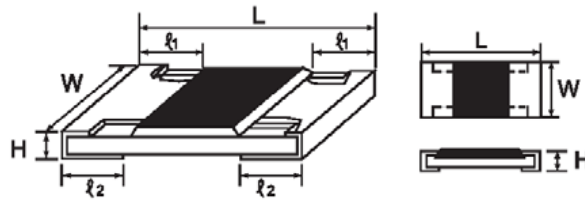
## 3. Power Rating

Resistors should be rated for power based on continuous load operation within an ambient temperature range of -55°C to 70°C. If the temperature exceeds 70°C, the load must be derated, as illustrated in Figure 1.



# Automotive Thick Film Chip Resistor Kit

## 4. Dimensions:



Type	Dimensions (mm)			
	L	W	H	l1
RND 155CQ02	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10
RND 155CQ03	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20
RND 155CQ05	2.00±0.15	1.25±0.15	0.55±0.10	0.40±0.20
RND 155CQ06	3.10±0.15	1.55±0.15	0.55±0.10	0.45±0.20
RND 155CQ07	3.10±0.10	2.60±0.20	0.55±0.10	0.50±0.25
RND 155CQ10	5.00±0.10	2.50±0.20	0.55±0.10	0.60±0.25
RND 155CQ12	6.35±0.10	3.20±0.20	0.55±0.10	0.60±0.25

# Automotive Thick Film Chip Resistor Kit



## 5. Performance specification :

Characteristics	Limits	Test Methods ( AEC - Q200 )
Operational Life	Resistance change rate is $\pm 1\%$ : $\pm(1\%+0.1\Omega)$ 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	Resistance change rate is 1 $\Omega$ ~ 10 $\Omega$ : $\pm 400$ PPM/°C 10.1 $\Omega$ ~ 100 $\Omega$ : $\pm 200$ PPM/°C > 100 $\Omega$ : $\pm 100$ PPM/°C	Natural resistance change per temp. degree centigrade. $\frac{R2-R1}{R1(t2-t1)}$ 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)
External Visual	No Mechanical Damage	Electrical test not required. Inspect device construction, marking and workmanship (MIL-STD-883 Method 2009)
Physical Dimension	Reference 2.0 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 Unsmearred	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 $\pm$ 2 hours after test conclusion. (MIL-STD-202 Method 108)
Temperature Cycling	Resistance change rate is $\pm 1\%$ : $\pm(0.5\%+0.1\Omega)$ Max	1000 Cycles (-55°C to +155°C). Measurement at 24 $\pm$ 2 hours after test conclusion. (JESD22 Method JA-104)
Moisture Resistance	Resistance change rate is $\pm 1\%$ : $\pm(1\%+0.1\Omega)$ max	<p>T=24 hours /cycle. Unpowered. Measurement at 24<math>\pm</math>2 hours after test conclusion. (MIL-STD-202 Method 106)</p>
Biased Humidity	Resistance change rate is $\pm 1\%$ : $\pm(1\%+0.1\Omega)$ 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 Resistor Kit



## 5. Performance specification :

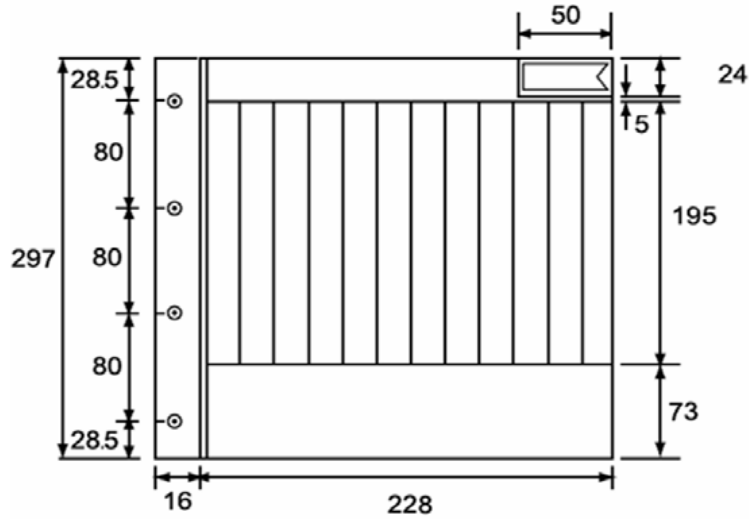
Characteristics	Limits	Test Methods ( AEC - Q200 )
Mechanical Shock	Resistance change rate is $\pm (1\%+0.1\Omega)\text{max}$	Wave Form: Tolerance for half sine shock pulse. Peak value is 100g's. Normal duration (D) is 6. (MIL-STD-202 Method 213)
Vibration	Resistance change rate is $\pm (1\%+0.1\Omega)\text{Max}$	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 $\pm 1\% (1.0\% + 0.1\Omega)\text{Max.}$	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	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 $\pm$ 5 seconds. CQ06 - CQ12 Bending 2 mm for 60 $\pm$ 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 $\pm(1\%+0.05\Omega)\text{Max.}$	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 Resistor Kit

## 6. Kit resistors :

### 6.1 Insert for Chip

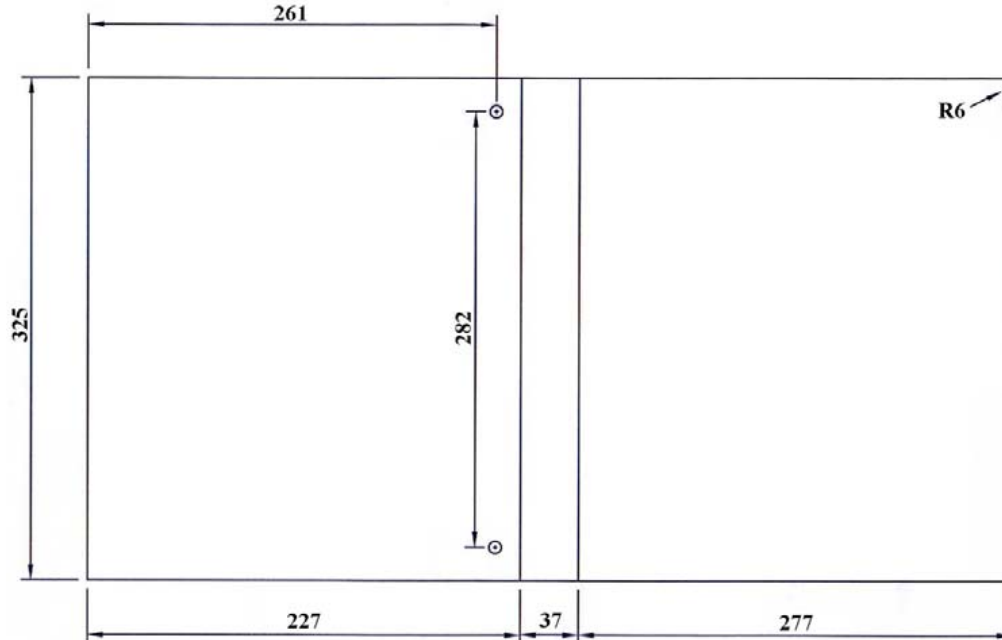
Kit Dimension (mm)



### 6.2 Album for Chip Kit

Dimension (mm)

\* Green Album



# Automotive Thick Film Chip Resistor 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  $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$  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  $\text{Cl}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ ,  $\text{SO}_2$ , or  $\text{NO}_2$
2. In direct sunlight

This production is used for automotive electronics, RND 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 RND 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.

# Automotive Thick Film Chip Resistor Kit



PRODUCT: RND 155CQ02WGFE024KIT

Contents: 89 values of resistors(0R/10R to 1M)

(2 strips - with 200 PCS resistors each)

No.	Value
1	0R
2	1R
3	2.2R
4	4.7R
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

No.	Value
26	220R
27	240R
28	270R
29	330R
30	390R
31	470R
32	510R
33	560R
34	620R
35	680R
36	750R
37	820R
38	1K
39	1.1K
40	1.2K
41	1.5K
42	1.8K
43	2K
44	2.2K
45	2.4K
46	2.7K
47	3K
48	3.3K
49	3.6K
50	3.9K

No.	Value
51	4.7K
52	5.1K
53	5.6K
54	6.8K
55	8.2K
56	9.1K
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
71	68K
72	82K
73	91K
74	100K
75	120K

No.	Value
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 Resistor Kit



PRODUCT: RND 155CQ03WAFE024KIT

Contents: 128 values of resistors(0R/10R to 1M)

(2 strips - with 100 PCS resistors each)

No.	Value
1	0R
2	1R
3	2.2R
4	4.7R
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	1.1K
48	1.2K
49	1.3K
50	1.5K
51	1.6K
52	1.8K
53	2K
54	2.2K
55	2.4K
56	2.7K
57	3K
58	3.3K
59	3.6K
60	3.9K
61	4.3K
62	4.7K
63	5.1K
64	5.6K
65	6.2K
66	6.8K
67	7.5K
68	8.2K
69	9.1K
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
116	60.4R
117	61.9R
118	1.54K
119	2.87K
120	3.57K
121	21.5K
122	25.5K
123	30.1K
124	30.9K
125	40.2K
126	52.3K
127	59K
128	226K



# Automotive Thick Film Chip Resistor Kit



PRODUCT: RND 155CQ05W8FE024KIT

Contents: 119 values of resistors (0R/10R to 1M)

(2 strips - with 100 PCS resistors each)

No.	Value
1	0R
2	1R
3	2.2R
4	4.7R
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	1.1K
48	1.2K
49	1.3K
50	1.5K
51	1.6K
52	1.8K
53	2K
54	2.2K
55	2.4K
56	2.7K
57	3K
58	3.3K
59	3.6K
60	3.9K
61	4.3K
62	4.7K
63	5.1K
64	5.6K
65	6.8K
66	7.5K
67	8.2K
68	9.1K
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
109	5.1R
110	6.8R
111	42.2R
112	4.22K
113	37.4K
114	45.3K
115	53.6K
116	54.9K
117	71.5K
118	243K
119	412K

# Automotive Thick Film Chip Resistor Kit



PRODUCT: RND 155CQ06W4FE024KIT

Contents: 132 values of resistors 0R/10R to 1M)

(2 strips - with 100 PCS resistors each)

No.	Value
1	0R
2	1R
3	2.2R
4	3R
5	3.3R
6	4.7R
7	9.1R
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	300R
43	330R
44	360R
45	390R
46	430R
47	470R
48	510R
49	560R
50	604R
51	620R
52	680R
53	750R
54	820R
55	910R
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	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
120	1.5R
121	1.6R
122	7.5R
123	8.2R
124	13.3R
125	14R
126	383R
127	412R
128	590R
129	1.33K
130	2.15K
131	3.32K
132	237K

# Automotive Thick Film Chip Resistor Kit



PRODUCT: RND 155CQ07W2FE024KIT

Contents: 92 values of resistors (0R/10R to 1M)

(2 strips - with 100 PCS resistors each)

No.	Value
1	0R
2	3.3R
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

No.	Value
26	120R
27	130R
28	150R
29	160R
30	180R
31	200R
32	220R
33	240R
34	270R
35	300R
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	1.1K
50	1.2K

No.	Value
51	1.3K
52	1.5K
53	1.6K
54	1.8K
55	2K
56	2.2K
57	2.4K
58	2.7K
59	3K
60	3.3K
61	3.6K
62	3.9K
63	4.3K
64	4.7K
65	5.6K
66	6.8K
67	8.2K
68	10K
69	12K
70	15K
71	18K
72	22K
73	27K
74	33K
75	39K

No.	Value
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 Resistor Kit



PRODUCT: RND 155CQ1007FE024KIT

Contents: 85 values of resistors (0R/10R to 1M)

(2 strips - with 100 PCS resistors each)

No.	Value
1	0R
2	1R
3	2.2R
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

No.	Value
26	110R
27	120R
28	130R
29	140R
30	150R
31	160R
32	180R
33	200R
34	220R
35	240R
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	1.2K
50	1.5K

No.	Value
51	1.8K
52	2.2K
53	2.7K
54	3.3K
55	3.9K
56	4.7K
57	5.1K
58	5.6K
59	6.8K
60	8.2K
61	10K
62	12K
63	15K
64	18K
65	22K
66	27K
67	33K
68	39K
69	47K
70	56K
71	68K
72	82K
73	100K
74	120K
75	150K

No.	Value
76	180K
77	220K
78	270K
79	330K
80	390K
81	470K
82	560K
83	680K
84	820K
85	1M