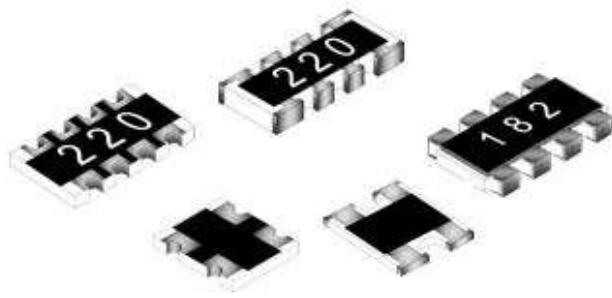


■ Thick Film Array Chip Resistor — CRA Series



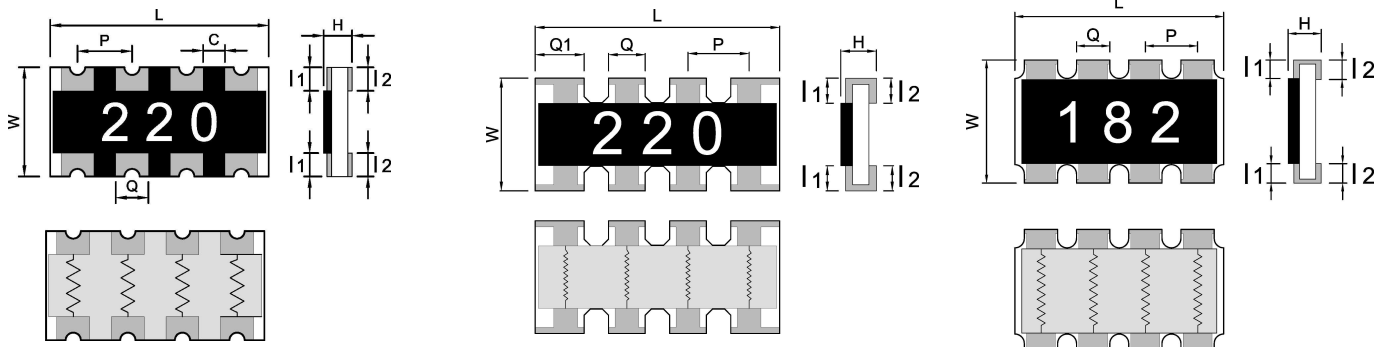
■ Application

- Entertainment: Stereo, TV tuners, Tape recorder
- Appliance: Air conditioner, Refrigerator
- Computer & relative products: Main board, PDA
- Communication equipment: Cell phone, Fax machine
- Power equipment: Power supply, Illumination equipment
- Measuring instrument: Electric meter, Navigation equipment

■ Features

- Small size and light weight
- Reduction of assembly costs and matching with placement machines
- Reliability, high quality and fast delivery

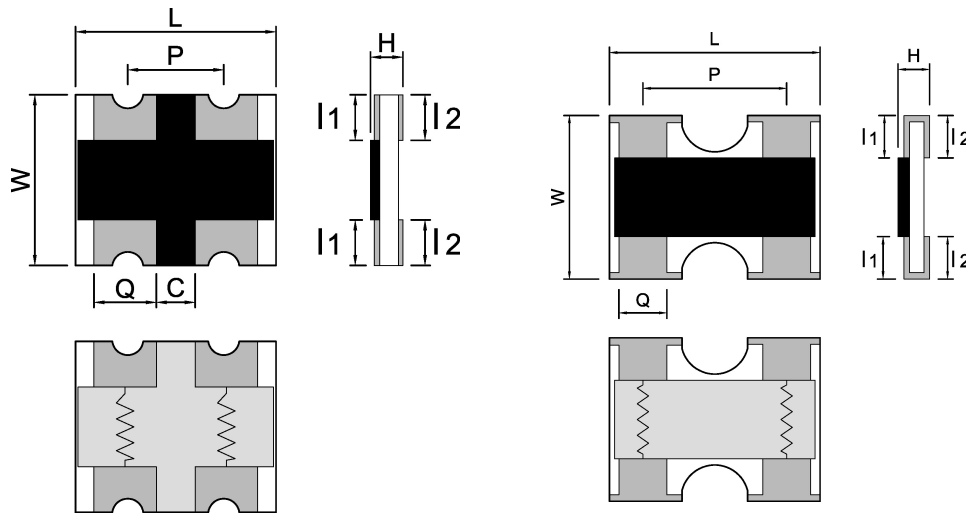
■ Type Dimension



CRA024C

CRA024R/CRA034R

CRA064R



CRA022C

CRA022R

■ Dimension

Unit: mm

| TYPE | L | W | H | I ₁ | I ₂ | P | Q | Q1 | C |
|---------|-----------|-----------|-----------|----------------|----------------|-----------|-----------|-----------|-----------|
| CRA022R | 1.00±0.10 | 1.00±0.10 | 0.33±0.05 | 0.15±0.10 | 0.25±0.10 | 0.67±0.10 | 0.34±0.10 | --- | --- |
| CRA024R | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.20±0.10 | 0.20±0.10 | 0.50±0.10 | 0.30±0.10 | 0.43±0.10 | --- |
| CRA034R | 3.20±0.20 | 1.60±0.15 | 0.50±0.10 | 0.30±0.20 | 0.30±0.20 | 0.80±0.20 | 0.50±0.15 | 0.61±0.10 | --- |
| CRA064R | 5.10±0.20 | 3.10±0.20 | 0.55±0.15 | 0.55±0.15 | 0.55±0.15 | 1.30±0.20 | 0.90±0.10 | --- | --- |
| CRA022C | 1.00±0.10 | 1.00±0.10 | 0.30±0.10 | 0.25±0.15 | 0.25±0.15 | 0.50±0.10 | 0.35±0.10 | --- | 0.15±0.10 |
| CRA024C | 2.00±0.10 | 1.00±0.10 | 0.40±0.10 | 0.15±0.10 | 0.20±0.10 | 0.50±0.10 | 0.35±0.10 | --- | 0.15±0.10 |

■ Standard Electrical Specifications

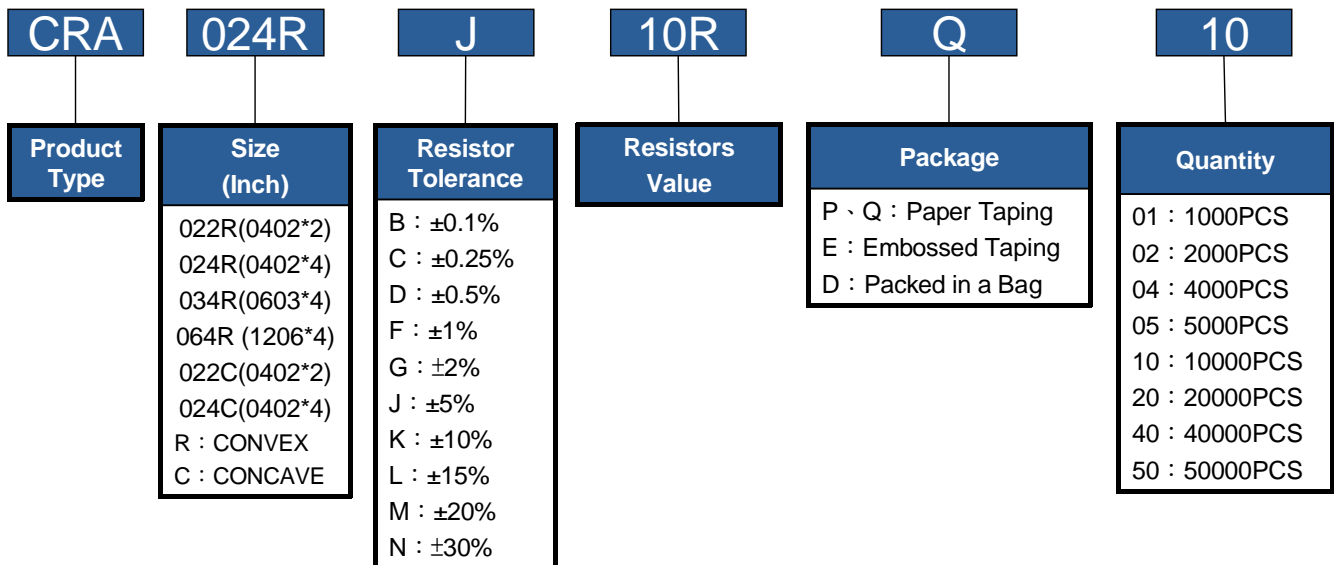
| Item Type | Rating Power at 70°C | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range | Operating Temperature |
|--------------|----------------------------|---------------------------|----------------------------|--------------------|--------------------|--------------------------|
| | | | | | F(±1%) J(±5%) | |
| CRA022R | 0.063 W | 25V | 50V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | -55°C ~ +155°C |
| CRA024R | 0.063 W | 25V | 50V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | |
| CRA034R | 0.1 W | 50V | 100V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | |
| CRA022C | 0.063 W | 25V | 50V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | |
| CRA024C | 0.063 W | 25V | 50V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | |
| CRA064R | 0.25 W | 200V | 400V | 0~+400 ±200 | 1Ω~9.9Ω 10Ω~1MΩ | |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

| Type | 022R | 024R | 034R | 022C | 024C | 064R |
|----------------------|------|------|------|------|------|------|
| Jumper Rated Current | 1A | | | | | 2A |

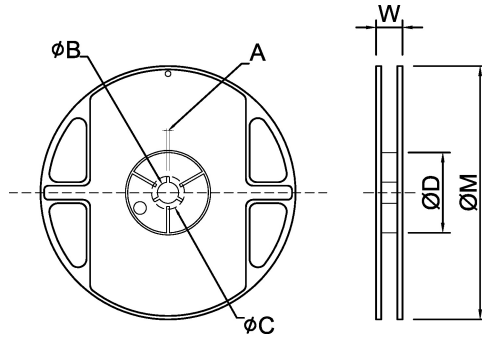
■ Parts Number Explanation

■ Example:



Appendix For SMD Chip Resistor

● Packaging Information

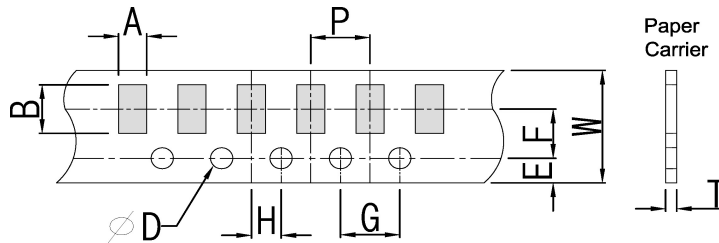


Dimension

Unit: mm

| TYPE | SIZE | | A | ϕB | ϕC | ϕD | W | ϕM |
|------------------------|------|----------|---------|----------|----------|----------|----------|----------|
| 022R/024R 022C/024C | 7" | 10K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 034R | 7" | 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 064R | 7" | 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |

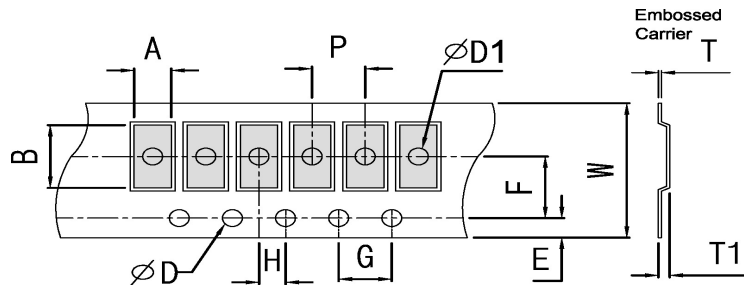
■ Tapping Specification



Dimension

Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | ϕD | P |
|------------|------|-----------|-----------|----------|-----------|----------|----------|----------|-----------|---------------------|---------|
| Paper Type | 022R | 1.25±0.10 | 1.25±0.10 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.45±0.10 | +0.10 -0 1.50 | 2.0±0.1 |
| | 024R | 1.20±0.10 | 2.20±0.10 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.60±0.10 | | |
| | 022C | 1.25±0.10 | 1.25±0.10 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.45±0.10 | | |
| | 024C | 1.20±0.10 | 2.20±0.10 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.60±0.10 | | |
| | 034R | 1.90±0.20 | 3.50±0.20 | 8.0±0.20 | 1.75±0.10 | 3.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.75±0.10 | | 4.0±0.1 |



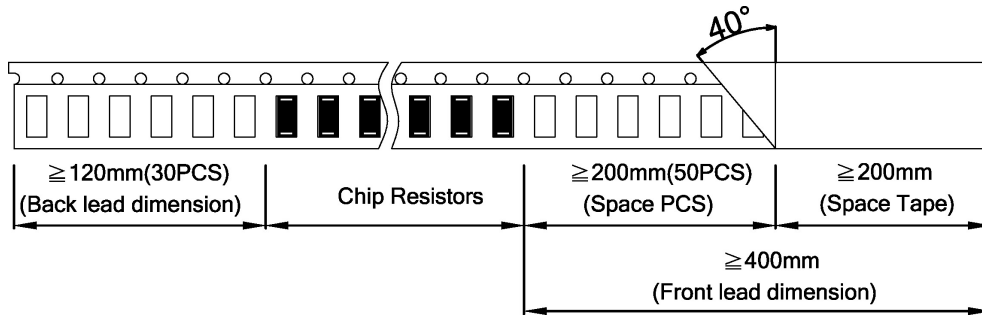
Dimension

Unit: mm

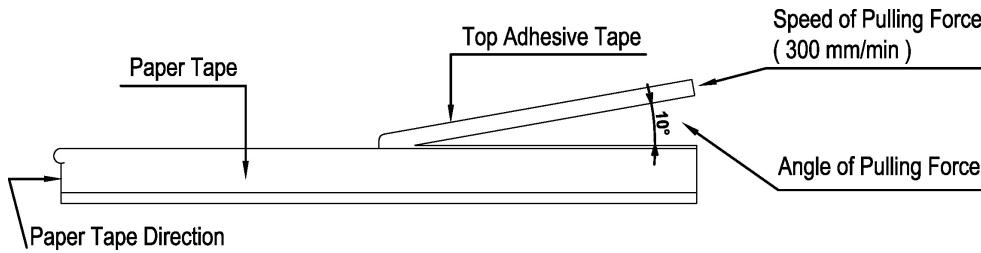
| Packaging | Type | A | B | W | E | F | G | H | T | ϕD | $\phi D1$ | T1 | P |
|---------------|------|-----------|-----------|---------|-----------|----------|----------|----------|-----------|---------------------|---------------------|-----------|---------|
| Embossed Type | 064R | 3.55±0.20 | 5.55±0.20 | 12±0.30 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.25±0.10 | +0.10 -0 1.50 | +0.25 -0 1.50 | 0.85±0.15 | 4.0±0.1 |

■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension

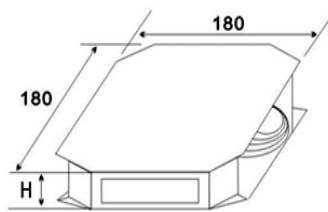


■ Top Adhesive Peel Off Strength : 10~70g

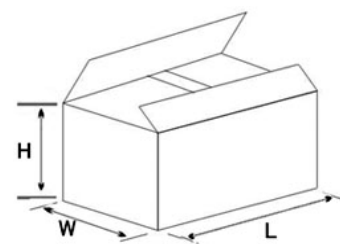


■ Package

| Inner Box Size | |
|----------------|------------|
| Reel | Size H(mm) |
| 1 | 13 |
| 2 | 24 |
| 3 | 36 |
| 5 | 60 |
| 10 | 113 |



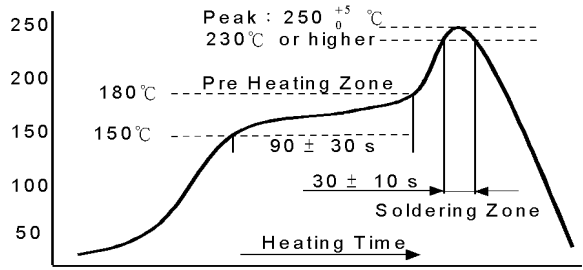
| External Box Size | | | |
|-------------------|-------------|------------|-------------|
| Contain (Kpcs) | Length (mm) | Width (mm) | Height (mm) |
| 25K | 180 | 180 | 60 |
| 50K | 180 | 180 | 110 |
| 150K | 430 | 200 | 200 |
| 300K | 400 | 400 | 200 |



■ Storage Data :

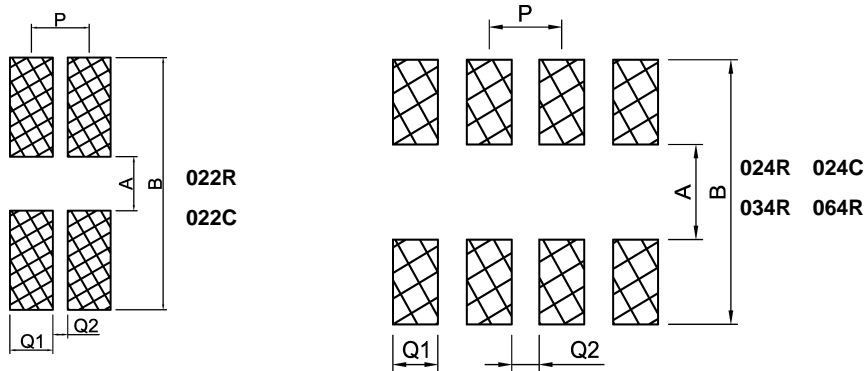
Storage time at the environment temp: 25±5°C & humidity: 60±20% is valid for one year from the date of delivery.

● Reliability Test and Requirement

| Test Item | Test Method | Procedure | Requirements |
|---|--------------------------|---|---|
| Temperature Coefficient of Resistance (T.C.R) | JIS C 5201-1 clause 4.8 | -55°C ~+155°C, 25°C is the reference temperature | Refer to Ratings |
| Short Time Overload | JIS C 5201-1 clause 4.13 | General : 2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds. High Power : 2.5 times RCWV or Max. Overload voltage whichever is less for 2 seconds. | ±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω) |
| IR Reflow | Sony SS-00254 |  <p>The graph shows a temperature profile for IR reflow. The y-axis represents temperature in °C, ranging from 50 to 250. The x-axis represents time. Key points include: a peak temperature of 250 ± 5 °C (or 230 °C or higher); a pre-heating zone at 180 °C; a heating time of 90 ± 30 s; and a soldering zone at 30 ± 10 s.</p> | ±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω) |
| Leaching | Sony SS-00254-9 | 260±5°C for 30 seconds. | >95% Coverage |
| Soldering Heat | JIS C 5201-1 clause 4.18 | 260±5°C for 10 seconds. | ±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω) |
| Temperature Cycling | JIS C 5201-1 clause 4.19 | -55°C to +155°C, 5 cycles | 0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(1.0%+0.10Ω) |
| Electric Iron | Sony SS-00254-5 | Preheating temperature : 350±10°C Electric iron preheating time : 3+1/-0 sec | ±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω) |
| Resistance to Solvent | JIS C 5201-1 clause 4.29 | The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs. | ±1 : ±(0.5%+0.05Ω) ±5 : ±(0.5%+0.05Ω) |
| Load Life in Humidity | JIS C 5201-1 clause 4.24 | 40±2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" . | 0.1%、0.5%、1% : ±(0.5%+0.05Ω) 2%、5% : ±(2.0%+0.05Ω) |
| Load Life (Endurance) | JIS C 5201-1 clause 4.25 | 70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" . | 0.1%、0.5%、1% : ±(1.0%+0.05Ω) 2%、5% : ±(3.0%+0.10Ω) |
| Insulation Resistance | JIS C 5201-1 clause 4.6 | 100V for 1 minute. | ≥ 10GΩ |

● General Information

■ Recommend Land Pattern Design (For Reflow Soldering)



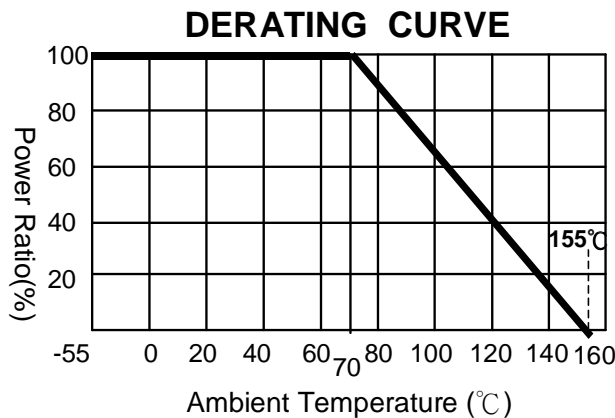
■ Dimension

Unit: mm

| Type | 022R | 024R 024C | 034R | 022C | 064R |
|------|------|--------------|------|------|-------|
| A | 0.50 | 0.50 | 1.00 | 0.50 | 2.00 |
| B | 2.00 | 2.00 | 2.60 | 2.00 | 4.75 |
| P | 0.67 | 0.50 | 0.80 | 0.50 | 1.30 |
| Q1 | 0.33 | 0.28 | 0.40 | 0.33 | 0.90 |
| Q2 | 0.34 | 0.22 | 0.40 | 0.17 | 0.375 |

■ Performance Characteristics

■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

■ Voltage Rating or Current Rating

Resistance Range: $\geq 1 \Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)

P=Power rating(W)

R=Nominal resistance(Ω)

■ Operation and Storage Temperature

| | MIN | MAX |
|-----------------------|-------|------|
| Operation temperature | -55°C | 70°C |
| Storage temperature | 20°C | 30°C |
| Storage humidity | 40% | 80% |

■ Equipments Applicable:

Our company's products are produced under low temperature processing applicable to IR reflow surface mounting devices. It is comparatively not applicable to wave soldering which will possibly cause the risk ablating the element protection layer and the front conductor and cause the drift of the resistance value and ablation of the markings.

■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-feet probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.

Standard Resistance Values in a Decade

Marking code:

- 1%: marking code, please refer to E96 and E24 data form as below
 Ex: 120K, The marking code is 1203 in E24
 121K, The marking code is 1213 in E96
- 5%: marking code, please refer to E24 data form as below
 Ex: 120K, The marking code is 124 in E24
- Note: 022C / 022R series resistor has no marking code.

| E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 | E192 | E96 | E48 | |
|------|-----|-----|------|-----|-----|------|-----|-----|------|-----|-----|------------|------------|-----------|-----------|
| 100 | 100 | 100 | 169 | 169 | 169 | 287 | 287 | 287 | 487 | 487 | 487 | 825 | 825 | 825 | |
| 101 | | | 172 | | | 291 | | | 493 | | | 835 | | | |
| 102 | 102 | | 174 | 174 | | 294 | 294 | | 499 | 499 | | 845 | 845 | | |
| 104 | | | 176 | | | 298 | | | 505 | | | 856 | | | |
| 105 | 105 | 105 | 178 | 178 | 178 | 301 | 301 | 301 | 511 | 511 | 511 | 866 | 866 | 866 | |
| 106 | | | 180 | | | 305 | | | 517 | | | 876 | | | |
| 107 | 107 | | 182 | 182 | | 309 | 309 | | 523 | 523 | | 887 | 887 | | |
| 109 | | | 184 | | | 312 | | | 530 | | | 898 | | | |
| 110 | 110 | 110 | 187 | 187 | 187 | 316 | 316 | 316 | 536 | 536 | 536 | 909 | 909 | 909 | |
| 111 | | | 189 | | | 320 | | | 542 | | | 920 | | | |
| 113 | 113 | | 191 | 191 | | 324 | 324 | | 549 | 549 | | 931 | 931 | | |
| 114 | | | 193 | | | 328 | | | 556 | | | 942 | | | |
| 115 | 115 | 115 | 196 | 196 | 196 | 332 | 332 | 332 | 562 | 562 | 562 | 953 | 953 | 953 | |
| 117 | | | 198 | | | 336 | | | 569 | | | 965 | | | |
| 118 | 118 | | 200 | 200 | | 340 | 340 | | 576 | 576 | | 976 | 976 | | |
| 120 | | | 203 | | | 344 | | | 583 | | | 988 | | | |
| 121 | 121 | 121 | 205 | 205 | 205 | 348 | 348 | 348 | 590 | 590 | 590 | | | | |
| 123 | | | 208 | | | 352 | | | 597 | | | | | | |
| 124 | 124 | | 210 | 210 | | 357 | 357 | | 604 | 604 | | E24 | E12 | E6 | E3 |
| 126 | | | 213 | | | 361 | | | 612 | | | 10 | 10 | 10 | 10 |
| 127 | 127 | 127 | 215 | 215 | 215 | 365 | 365 | 365 | 619 | 619 | 619 | 11 | | | |
| 129 | | | 218 | | | 370 | | | 626 | | | 12 | 12 | | |
| 130 | 130 | | 221 | 221 | | 374 | 374 | | 634 | 634 | | 13 | | | |
| 132 | | | 223 | | | 379 | | | 642 | | | 15 | 15 | 15 | |
| 133 | 133 | 133 | 226 | 226 | 226 | 383 | 383 | 383 | 649 | 649 | 649 | 16 | | | |
| 135 | | | 229 | | | 388 | | | 657 | | | 18 | 18 | | |
| 137 | 137 | | 232 | 232 | | 392 | 392 | | 665 | 665 | | 20 | | | |
| 138 | | | 234 | | | 397 | | | 673 | | | 22 | 22 | 22 | 22 |
| 140 | 140 | 140 | 237 | 237 | 237 | 402 | 402 | 402 | 681 | 681 | 681 | 24 | | | |
| 142 | | | 240 | | | 407 | | | 690 | | | 27 | 27 | | |
| 143 | 143 | | 243 | 243 | | 412 | 412 | | 698 | 698 | | 30 | | | |
| 145 | | | 246 | | | 417 | | | 706 | | | 33 | 33 | 33 | |
| 147 | 147 | 147 | 249 | 249 | 249 | 422 | 422 | 422 | 715 | 715 | 715 | 36 | | | |
| 149 | | | 252 | | | 427 | | | 723 | | | 39 | 39 | | |
| 150 | 150 | | 255 | 255 | | 432 | 432 | | 732 | 732 | | 43 | | | |
| 152 | | | 258 | | | 437 | | | 741 | | | 47 | 47 | 47 | 47 |
| 154 | 154 | 154 | 261 | 261 | 261 | 442 | 442 | 442 | 750 | 750 | 750 | 51 | | | |
| 156 | | | 264 | | | 448 | | | 759 | | | 56 | 56 | | |
| 158 | 158 | | 267 | 267 | | 453 | 453 | | 768 | 768 | | 62 | | | |
| 160 | | | 271 | | | 459 | | | 777 | | | 68 | 68 | 68 | |
| 162 | 162 | 162 | 274 | 274 | 274 | 464 | 464 | 464 | 787 | 787 | 787 | 75 | | | |
| 164 | | | 277 | | | 470 | | | 796 | | | 82 | 82 | | |
| 165 | 165 | | 280 | 280 | | 475 | 475 | | 806 | 806 | | 91 | | | |
| 167 | | | 284 | | | 481 | | | 816 | | | | | | |

According to IEC publication 63