



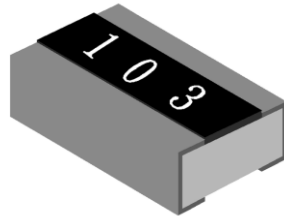
CRW-Series Thick Film Wide Terminal Chip Resistor Product Specifications

文件編號/版本 S-10-12-19-02

製作日期 2019/01/14

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■ Thick Film Wide Terminal Chip Resistor— CRW Series



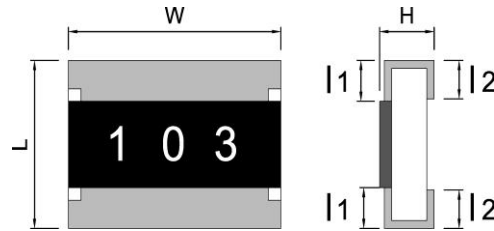
■ Application

- Navigation equipment
- Power equipment: Power supply, Illumination equipment
- Indoor lighting, Central door locking

■ Features

- Small size and light weight
- Reliability, high quality
- Chip resistor of the wide terminal type.

■ Type Dimension



■ Dimension

Unit: mm

| TYPE | L | W | H | l ₁ | l ₂ |
|---------|-------------|-------------|-------------|----------------|----------------|
| CRW0612 | 1.60 ± 0.20 | 3.20 ± 0.20 | 0.55 ± 0.10 | 0.30 ± 0.20 | 0.50 ± 0.20 |
| CRW1020 | 2.50 ± 0.20 | 5.00 ± 0.20 | 0.55 ± 0.10 | 0.40 ± 0.20 | 0.75 ± 0.20 |
| CRW1218 | 3.10 ± 0.10 | 4.60 ± 0.10 | 0.55 ± 0.05 | 0.40 ± 0.20 | 0.50 ± 0.20 |
| CRW1225 | 3.20 ± 0.20 | 6.50 ± 0.20 | 0.55 ± 0.20 | 0.40 ± 0.20 | 0.75 ± 0.20 |
| CRW2030 | 5.10 ± 0.10 | 7.60 ± 0.10 | 1.20 ± 0.10 | 0.80 ± 0.20 | 0.80 ± 0.20 |

■ Standard Electrical Specifications

| Item Type | Rated Power at 70°C | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range | |
|--------------|------------------------|------------------------|-------------------------|--------------------|------------------|----------|
| | | | | | F(±1%) | J(±5%) |
| CRW0612 | 0.75 W | 200V | 400V | ±400 | 1Ω~9.9Ω | |
| | | | | ±200 | - | 10Ω~10MΩ |
| | | | | ±100 | 10Ω~10MΩ | - |
| CRW1020 | 1 W | | | ±400 | 1Ω~9.9Ω | |
| | | | | ±200 | - | 10Ω~10MΩ |
| | | | | ±100 | 10Ω~10MΩ | - |
| CRW1218 | 1 W | | | ±400 | 1Ω~9.9Ω | |
| | | | | ±200 | - | 10Ω~10MΩ |
| | | | | ±100 | 10Ω~10MΩ | - |
| CRW1225 | 2W | ±400 | 1Ω~9.9Ω | | | |
| | | ±200 | - | 10Ω~10MΩ | | |
| | | ±100 | 10Ω~10MΩ | - | | |
| CRW2030 | 3W | | | ±100 | 1Ω~1KΩ | |



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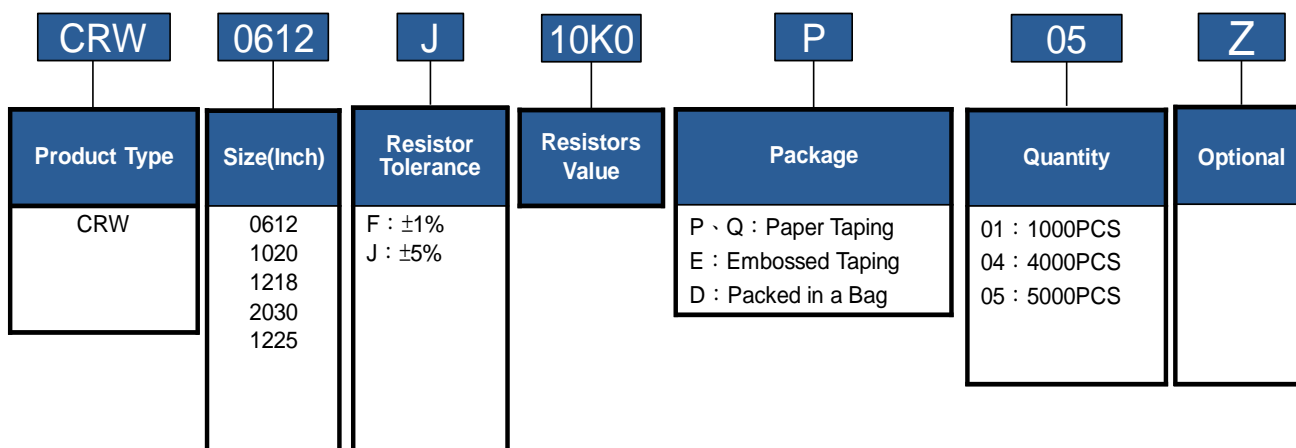
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Low Ohm Chip Resistor Electrical Specifications

| Item Type | Rated Power at 70℃ | Rated Voltage Range | Max Overload Voltage | T.C.R. (PPM/℃) | Resistance Range (mΩ) |
|--------------|-----------------------|------------------------|-------------------------|-------------------|--------------------------|
| | | | | | F(±1%) - J(±5%) |
| CRW0612 | 0.75W | 0.15~0.86V | 2.154V | ±1800 | 30~50 |
| | | | | ±800 | 51~100 |
| | | | | ±600 | 101~990 |
| CRW1020 | 1W | 0.1~0.99V | 2.475V | ±1800 | 10~50 |
| | | | | ±800 | 51~100 |
| | | | | ±600 | 101~990 |
| CRW1218 | 1W | 0.1~0.99V | 2.475V | ±1800 | 10~50 |
| | | | | ±800 | 51~100 |
| | | | | ±600 | 101~990 |
| CRW1225 | 2W | 0.14~1.41V | 3.518 V | ±1800 | 10~50 |
| | | | | ±800 | 51~100 |
| | | | | ±600 | 101~990 |
| CRW2030 | 3W | 0.17~1.72V | 4.308V | ±1800 | 10~50 |
| | | | | ±800 | 51~100 |
| | | | | ±600 | 101~990 |

Parts Number Explanation

Example:



Appendix For SMD Chip Resistor

● Packaging Information



Dimension

Unit: mm

| TYPE | SIZE | A | φB | φC | φD | W | φM |
|----------------|------------|---------|----------|--------|--------|----------|---------|
| 0612 | 7" 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 1020/1218/1225 | 7" 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |
| 2030 | 7" 1K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 19.0±2.0 | 178±2.0 |

■ Tapping Specification



Dimension

Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | φD | P |
|------------|------|----------|----------|---------|----------|----------|---------|----------|----------|-------------------------------------|---------|
| Paper Type | 0612 | 1.90±0.2 | 3.50±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 | 1.50 ^{+0.10} ₋₀ | 4.0±0.1 |



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Dimension

Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | ϕD | $\phi D1$ | T1 | P |
|---------------|------|----------|----------|--------|----------|----------|---------|----------|----------|-------------------------------------|-----------|-----------|---------|
| Embossed Type | 1020 | 2.80±0.2 | 5.60±0.2 | 12±0.1 | 1.75±0.1 | 5.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.23±0.1 | 1.50 ^{+0.10} ₋₀ | 1.50±0.1 | 0.85±0.15 | 4.0±0.1 |
| | 1225 | 3.40±0.2 | 6.70±0.2 | 12±0.1 | 1.75±0.1 | 5.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.23±0.1 | | 1.50±0.1 | 0.85±0.15 | |
| | 1218 | 3.30±0.2 | 4.60±0.2 | 12±0.1 | 1.75±0.1 | 5.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.23±0.1 | | 1.50±0.1 | 0.85±0.15 | |
| | 2030 | 5.50±0.2 | 7.90±0.2 | 16±0.1 | 1.75±0.1 | 7.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.25±0.1 | | 1.50±0.1 | 1.30±0.1 | |

Packing Material Data/Storage Data

Front & Back Lead Dimension



Top Adhesive Peel Off Strength : 10~70g





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■ 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 or +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. | 1% : ±(1.0%+0.05Ω) 5% : ±(2.0%+0.1Ω) |
| IR Reflow | Sony SS-00254 | <p>Peak : 250⁺⁵ °C 230°C or higher Pre Heating Zone 180°C 150°C 90 ± 30 s 30 ± 10 s Soldering Zone Heating Time</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 | 1% : ±(0.5%+0.05Ω) 5% : ±(1.0%+0.10Ω) |



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| | | | |
|---------------------------|-----------------------------|---|--|
| Electric Iron | Sony SS-00254-5 | Preheating temperature : $350\pm 10^{\circ}\text{C}$ Electric iron preheating time : $3+1/-0$ sec | 1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.05\Omega)$ |
| Resistance to Solvent | JIS C 5201-1 clause 4.29 | The tested resistor be immersed into isopropyl alcohol of $20\sim 25^{\circ}\text{C}$ for 60 secs. Then the resistor is left in the room for 48 hrs. | 1% : $\pm(0.5\%+0.05\Omega)$ 5% : $\pm(0.5\%+0.05\Omega)$ |
| Load Life in Humidity | JIS C 5201-1 clause 4.24 | $40\pm 2^{\circ}\text{C}$, 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" . | 1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(2.0\%+0.05\Omega)$ |
| Load Life (Endurance) | JIS C 5201-1 clause 4.25 | $70\pm 2^{\circ}\text{C}$, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF" . | 1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(3.0\%+0.10\Omega)$ |
| Insulation Resistance | JIS C 5201-1 clause 4.6 | 100V for 1 minute. | $\geq 10\text{G}\Omega$ |
| Terminal Bending Strength | JIS C 5201-1 clause 4.33 | Bending once for 5 seconds D : 0612、1218、1020、1225、2030=2mm | 1% : $\pm(1.0\%+0.05\Omega)$ 5% : $\pm(1.0\%+0.05\Omega)$ |

● General Information

■ Recommend Land Pattern Design



■ Dimension

Unit: mm

| Type | 0201 | 0402 | 0603 | 0805 | 1206 |
|------|------|------|------|------|------|
| A | 0.60 | 0.75 | 2.04 | 0.85 | 3.50 |
| B | 2.90 | 3.40 | 4.24 | 3.70 | 7.50 |
| C | 3.20 | 5.00 | 4.80 | 6.40 | 7.80 |



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■ 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)

■ 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.



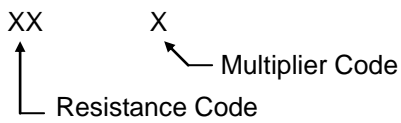
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0603 E-96 Multiplier Code

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

CODING FORMULA



Example: 10.2KΩ = $\frac{102}{02} \times \frac{10^2 \Omega}{C}$ = 02C
 33.2Ω = $\frac{332}{51} \times \frac{10^{-1} \Omega}{X}$ = 51X

0603 Standard E-96 Values and 0603 Resistance Codes

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



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■ 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: 0402 series resistor has no marking code.
- Type: 0603 1% marking code, please refer to E-96 multiplier code.
- Note: jumper zero ohm resistor marking code is one 「0」 (except type below 0402).

| 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 | | | | |
| 126 | | | 213 | | | 361 | | | 612 | | | | | |
| 127 | 127 | 127 | 215 | 215 | 215 | 365 | 365 | 365 | 619 | 619 | 619 | 10 | 10 | 10 |
| 129 | | | 218 | | | 370 | | | 626 | | | 11 | 12 | |
| 130 | 130 | | 221 | 221 | | 374 | 374 | | 634 | 634 | | 12 | | |
| 132 | | | 223 | | | 379 | | | 642 | | | 13 | | |
| 133 | 133 | 133 | 226 | 226 | 226 | 383 | 383 | 383 | 649 | 649 | 649 | 15 | 15 | 15 |
| 135 | | | 229 | | | 388 | | | 657 | | | 16 | | |
| 137 | 137 | | 232 | 232 | | 392 | 392 | | 665 | 665 | | 18 | 18 | |
| 138 | | | 234 | | | 397 | | | 673 | | | 20 | | |
| 140 | 140 | 140 | 237 | 237 | 237 | 402 | 402 | 402 | 681 | 681 | 681 | 22 | 22 | 22 |
| 142 | | | 240 | | | 407 | | | 690 | | | 24 | | |
| 143 | 143 | | 243 | 243 | | 412 | 412 | | 698 | 698 | | 27 | 27 | |
| 145 | | | 246 | | | 417 | | | 706 | | | 30 | | |
| 147 | 147 | 147 | 249 | 249 | 249 | 422 | 422 | 422 | 715 | 715 | 715 | 33 | 33 | 33 |
| 149 | | | 252 | | | 427 | | | 723 | | | 36 | | |
| 150 | 150 | | 255 | 255 | | 432 | 432 | | 732 | 732 | | 39 | 39 | |
| 152 | | | 258 | | | 437 | | | 741 | | | 43 | | |
| 154 | 154 | 154 | 261 | 261 | 261 | 442 | 442 | 442 | 750 | 750 | 750 | 47 | 47 | 47 |
| 156 | | | 264 | | | 448 | | | 759 | | | 51 | | |
| 158 | 158 | | 267 | 267 | | 453 | 453 | | 768 | 768 | | 56 | 56 | |
| 160 | | | 271 | | | 459 | | | 777 | | | 62 | | |
| 162 | 162 | 162 | 274 | 274 | 274 | 464 | 464 | 464 | 787 | 787 | 787 | 68 | 68 | 68 |
| 164 | | | 277 | | | 470 | | | 796 | | | 75 | | |
| 165 | 165 | | 280 | 280 | | 475 | 475 | | 806 | 806 | | 82 | 82 | |
| 167 | | | 284 | | | 481 | | | 816 | | | 91 | | |

According to IEC publication 63

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