



CR-Series Thick Film Chip Resistor Product Specifications

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■ Thick Film Chip Resistor — CR 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

■ Parts Number Explanation

Example:

| CR | 0603 | J | 10R0 | P | 05 | Z |
|---------------------|--|---|---|---|--|---|
| Product Type | Size (Inch) | Resistor Tolerance | Resistor Value | Package | Quantity | Optional |
| CR: Thick Film | 0201 0402 0603 0805 1206 1210 1812 2010 2512 | B : ±0.1% D : ±0.5% F : ±1% G : ±2% J : ±5% | 10mR=R010 100mR=R100 1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00 | P : Paper Taping (0603~1210) Q : Paper Taping (0201、0402) E : Embossed Taping | 01 : 1000PCS 02 : 2000PCS 04 : 4000PCS 05 : 5000PCS 10 : 10000PCS 20 : 20000PCS 40 : 40000PCS 50 : 50000PCS | Z : Default code (Resistor Paste). S : TCR ±100ppm. R : Metal Paste. |



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■ Standard Electrical Specifications

| Type | Item | Rated Power at 70℃ | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/℃) | Resistance Range | | | |
|--------|------|--------------------|---------------------|----------------------|----------------|------------------|----------------|----------------|------------------|
| | | | | | | B(±0.1%) | D(±0.5%) | F(±1%) | G(±2%) J(±5%) |
| CR0201 | | 0.05 W | 25V | 50V | -200/+400 | - | - | 1Ω ≤ R < 10Ω | |
| | | | | | ±200 | - | - | 10Ω ≤ R ≤ 10MΩ | |
| CR0402 | | 0.063 W | 50V | 100V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR0603 | | 0.1 W | 75V | 150V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR0805 | | 0.125 W | 150V | 300V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR1206 | | 0.25 W | 200V | 400V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR1210 | | 0.5 W | 200V | 400V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR1812 | | 0.75 W | 200V | 400V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR2010 | | 0.75 W | 200V | 400V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |
| CR2512 | | 1 W | 200V | 400V | ±400 | - | 1Ω ≤ R < 10Ω | | |
| | | | | | ±100 | 10Ω ≤ R ≤ 1MΩ | 10Ω ≤ R ≤ 10MΩ | | |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55℃ ~ +155℃
- Type CR0603/0805/1206/1210/1812/2010/2512 1Ω ≤ R ≤ 10Ω optional code 「S」 is TCR: ±100 PPM/℃

| Type | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2010 | 2512 |
|---|----------|------|------|------|------|------|------|------|------|
| Jumper Resistance Value | 50mΩ Max | | | | | | | | |
| Jumper Rated Current | 0.5A | 1A | | | 2A | | | | |
| Max. Over Load Current <1 second and 1 times | 1A | 3A | | | 10A | | | | |



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● Low Ohm Chip Resistor ■ Standard Electrical Specifications

| Item Type | Rated Power at 70°C | Rated Voltage Range | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range (mΩ) |
|--------------|------------------------|------------------------|-------------------------|--------------------|--------------------------|
| | | | | | F(±1%)、J±(5%) |
| CR0402 | 0.063 W | 0.12~0.25V | 0.624 V | ±1000 | 220 ≤ R ≤ 450 |
| | | | | ±800 | 450 < R < 1000 |
| CR0603 | 0.1 W | 0.09~0.31V | 0.775 V | ±1000 | 75 ≤ R < 100 |
| | | | | ±800 | 100 ≤ R ≤ 330 |
| | | | | ±600 | 330 < R < 1000 |
| CR0805 | 0.125 W | 0.04~0.35V | 0.875 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| CR1206 | 0.25 W | 0.05~0.5V | 1.25 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| CR1210 | 0.5 W | 0.07~0.7V | 1.75 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| CR1812 | 0.75 W | 0.08~0.8V | 2.15 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| CR2010 | 0.75 W | 0.08~0.8V | 2.15 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| CR2512 | 1 W | 0.1~0.99V | 2.475V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.
- Type CR1206/1210/1812/2010/2512 100 mΩ ≤ R < 1000mΩ optional code 「R」 is Metal Paste.
TCR ±200 PPM/°C (100mΩ ≤ R ≤ 200 mΩ), TCR ±100 PPM/°C (200mΩ < R < 1000 mΩ)
- Type CR1206 10 mΩ ≤ R < 100mΩ optional code 「R」 is Metal Paste.
TCR ±1800 PPM/°C (10mΩ ≤ R < 20 mΩ), TCR ±1200 PPM/°C (20mΩ ≤ R < 50 mΩ), TCR ±300 PPM/°C (50mΩ ≤ R < 100 mΩ)
- Type CR2512 10 mΩ ≤ R < 100mΩ optional code 「R」 is Metal Paste.
TCR ±1800 PPM/°C (10mΩ ≤ R < 20 mΩ), TCR ±800 PPM/°C (20mΩ ≤ R < 50 mΩ), TCR ±200 PPM/°C (50mΩ ≤ R < 100 mΩ)



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● High Ohm Chip Resistor

■ Standard Electrical Specifications

| Type | Item | Rated Power at 70 °C | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range | |
|--------|------|-------------------------|------------------------|-------------------------|--------------------|-----------------------|-----------------------|
| | | | | | | F(±1%) | J(±5%) |
| CR0402 | | 0.063 W | 50V | 100V | ±200 | 10.1 MΩ ~ 30 MΩ | 10.1 MΩ ~ 30 MΩ |
| CR0603 | | 0.1 W | 75V | 150V | | | |
| CR0805 | | 0.125 W | 150V | 300V | | | |
| CR1206 | | 0.25 W | 200V | 400V | | | |
| CR1210 | | 0.5 W | | | | | |
| CR2010 | | 0.75 W | | | | | |
| CR2512 | | 1 W | | | | | |

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

■ Type Dimension



CR0201 / CR0402 / CR0603 / CR0805 / CR1206
CR1210 / CR1812 / CR2010 / CR2512

| TYPE | L | W | H | l ₁ | l ₂ |
|--------|-------------|-------------|-------------|----------------|----------------|
| CR0201 | 0.60 ± 0.03 | 0.30 ± 0.03 | 0.23 ± 0.05 | 0.15 ± 0.05 | 0.15 ± 0.05 |
| CR0402 | 1.00 ± 0.10 | 0.50 ± 0.05 | 0.30 ± 0.05 | 0.15 ± 0.10 | 0.20 ± 0.10 |
| CR0603 | 1.60 ± 0.20 | 0.80 ± 0.15 | 0.40 ± 0.10 | 0.30 ± 0.20 | 0.30 ± 0.10 |
| CR0805 | 2.00 ± 0.20 | 1.25 ± 0.15 | 0.50 ± 0.15 | 0.30 ± 0.15 | 0.40 ± 0.15 |
| CR1206 | 3.05 ± 0.10 | 1.60 ± 0.20 | 0.55 ± 0.15 | 0.40 ± 0.20 | 0.50 ± 0.20 |
| CR1210 | 3.05 ± 0.10 | 2.50 ± 0.20 | 0.55 ± 0.15 | 0.50 ± 0.20 | 0.50 ± 0.20 |
| CR1812 | 4.50 ± 0.10 | 3.10 ± 0.20 | 0.55 ± 0.05 | 0.55 ± 0.20 | 0.70 ± 0.20 |
| CR2010 | 5.00 ± 0.20 | 2.50 ± 0.20 | 0.55 ± 0.10 | 0.60 ± 0.20 | 0.60 ± 0.20 |
| CR1218 | 3.10 ± 0.10 | 4.60 ± 0.10 | 0.55 ± 0.05 | 0.40 ± 0.20 | 0.50 ± 0.20 |
| CR2512 | 6.30 ± 0.20 | 3.20 ± 0.20 | 0.55 ± 0.10 | 0.60 ± 0.20 | 0.60 ± 0.20 |



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● General Information

■ Recommend Land Pattern Design



■ Dimension

Unit:mm

| Item \ Type | 0201 | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2010 | 2512 |
|-------------|------|------|------|------|------|------|------|------|------|
| A | 0.25 | 0.60 | 0.80 | 1.30 | 2.20 | 2.00 | 3.11 | 3.80 | 4.90 |
| B | 1.10 | 1.60 | 2.40 | 2.90 | 4.20 | 4.40 | 5.91 | 6.60 | 8.10 |
| C | 0.32 | 0.70 | 1.00 | 1.40 | 1.70 | 2.70 | 3.00 | 2.70 | 3.40 |

■ 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)



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● Reliability Test and Requirement

| Test Item | Test Method | Procedure | Requirements |
|---|---|--|---|
| Temperature Coefficient of Resistance (T.C.R) | JIS-C-5201-1 4.8 IEC-60115-1 4.8 | At 25 / -55°C and 25°C / +155°C, 25°C is the reference temperature | As Spec |
| Short Time Overload | JIS-C-5201-1 4.13 IEC-60115-1 4.13 | 2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds. Jumper : Over Load Current for 5 seconds 0201=1A , 0402/0603/0805=2.5A 1206/1210/1812/2010/2512=5A | 1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(2.0\%+0.10\Omega)$ Jumper : Max 0.05Ω after test. |
| Leaching | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 | 260±5°C for 30 seconds. | Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$ |
| Resistance to Soldering Heat | JIS-C-5201-1 4.18 IEC-60115-1 4.18 | 260±5°C for 10 seconds. | 1% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.05\Omega)$ |
| Rapid Change of Temperature | JIS-C-5201-1 4.19 IEC-60115-1 4.19 | -55°C to +155°C, 5 cycles | 1% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.10\Omega)$ |
| Resistance to Solvent | JIS-C-5201-1 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% and below : $\pm(0.5\%+0.05\Omega)$ 2%、5% : $\pm(0.5\%+0.05\Omega)$ Jumper : Max 0.05Ω after test. |
| Damp Heat with Load | JIS-C-5201-1 4.24 IEC-60115-1 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 hrs "OFF" . | 1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(2.0\%+0.05\Omega)$ Value <1Ω : $\pm(2.0\%+0.05\Omega)$ Jumper : Max 0.1Ω after test. |
| Load Life (Endurance) | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 | 70±2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" . | 1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(3.0\%+0.10\Omega)$ Value <1Ω : $\pm(3.0\%+0.10\Omega)$ Jumper : Max 0.1Ω after test. |
| Insulation Resistance | JIS-C-5201-1 4.6 IEC-60115-1 4.6 | Apply 100VDC for 1 minute. | $\geq 10G\Omega$ |
| Bending Strength | JIS-C-5201-1 4.33 IEC-60115-1 4.33 | Bending once for 5 seconds D : 0402、0603、0805=5mm 1206、1210、1812=3mm 2010、2512=2mm | 1% and below : $\pm(1.0\%+0.05\Omega)$ 2%、5% : $\pm(1.0\%+0.05\Omega)$ |



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■ Recommended Customer Soldering Parameters

■ Wave solder Temperature condition



■ Solder reflow Temperature condition



■ Solder reflow Temperature condition

■ Rework temperature (hot air equipment) : 350°C, 3~5seconds

■ Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.



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■ Appendix For SMD Chip Resistor

● Packaging Information



■ Dimension

Unit:mm

| TYPE | SIZE | A | ϕB | ϕC | ϕD | W | ϕM |
|---------------------|---|---------|----------|----------|----------|----------|----------|
| 0201/0402 | 7" 10K/Reel (0201 & 0402) 15K/Reel (0201 only) | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 0402 | 13" 40K/50K Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 330±2.0 |
| 0603/0805/1206/1210 | 7" 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 0603/0805/1206 | 10" 10K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 254±2.0 |
| | 13" 20K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 330±2.0 |
| 2010/2512/1812 | 7" 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0 | 178±2.0 |



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■ Tapping Specification



■ Dimension

Unit:mm

| Packaging | Type | A | B | W | E | F | G | H | T | ϕD | P |
|------------|------|----------|----------|---------|----------|----------|---------|----------|----------|---------------------|---------|
| Paper Type | 0201 | 0.45±0.1 | 0.75±0.1 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.35±0.1 | 1.50 +0.10 -0 | 2.0±0.1 |
| | 0402 | 0.70±0.1 | 1.20±0.1 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.45±0.1 | | |
| | 0603 | 1.05±0.2 | 1.80±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.60±0.1 | | 4.0±0.1 |
| | 0805 | 1.55±0.2 | 2.30±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 | | |
| | 1206 | 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 | | |
| | 1210 | 2.85±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 | | |



■ Dimension

Unit: mm

| Packaging | Type | A | B | W | E | F | G | H | T | ϕD | $\psi D1$ | T1 | P |
|---------------|------|-----------|-----------|---------|-----------|----------|----------|----------|-----------|---------------------|-----------|-----------|---------|
| Embossed Type | 2010 | 2.80±0.20 | 5.60±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 | 1.50 +0.10 -0 | 1.50±0.10 | 0.85±0.15 | 4.0±0.1 |
| | 2512 | 3.40±0.20 | 6.70±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 | | 1.50±0.10 | 0.85±0.15 | |
| | 1812 | 3.30±0.20 | 4.60±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 | | 1.50±0.10 | 0.85±0.15 | |



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■ 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: $25 \pm 5^\circ\text{C}$ & humidity: $60 \pm 20\%$ is valid for one year from the date of delivery.

■ Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-foot 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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■ Marking

■ General Resistance Codes



0402: no marking



0603: 3 digits code



0805~2512: 3 digits code(5%)



0805~2512: 4 digits code
(1% and below)

■ No marking on 0402 and 0201 type

■ 3 digits code for 0603 type

● Standard E96 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 |

● E96 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 |

1. 0603 3 digits coding formula for E96 values as following:

CODING FORMULA



EX.: 7.5Ω=85Y ; 11Ω=05X ; 130Ω=12A ; 2KΩ= 30B ; 10KΩ=01C ; 150KΩ=18D

| | | | | | | | | | | | | | | | | | | | | | | | | |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| E24 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

■ 0603 ~2512 3 digits for E24 values (±5%)

Examples:

| | | | | | | |
|---------------|------|-----|------|-------|------|-------|
| Resistance | 4.7Ω | 33Ω | 470Ω | 5.6KΩ | 62KΩ | 680KΩ |
| 3 digits code | 4R7 | 330 | 471 | 562 | 623 | 684 |

("R"= decimal point)

■ 4 digits code for 0805 ~ 2512 type

First 3 digits are the significant figures, the 4th digit is the multiplier. "R"= decimal point.

Examples:

| | | | | | | | | |
|---------------|------|------|-------|------|-------|------|-------|------|
| Resistance | 5.6Ω | 10Ω | 22.6Ω | 100Ω | 1.1KΩ | 10KΩ | 332KΩ | 1MΩ |
| 4 digits code | 5R60 | 10R0 | 22R6 | 1000 | 1101 | 1002 | 3323 | 1004 |



CR-Series Thick Film Chip Resistor Product Specifications

| | |
|---------------|---------------|
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■ mΩ Resistance Codes



0402: no marking



0603: 3 digits



0805~2512: 4 digits

■ 0402 : No marking

■ 0603 : 3 digit marking

1. For E-24 values:

| Resistance value | Code | Example |
|------------------|------------|-------------|
| 10mΩ ~ 99mΩ | 0XX | 068 = 68mΩ |
| 100mΩ ~ 990mΩ | RXX | R68 = 680mΩ |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| E-24 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
|------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

2. For E-96 values: excluding values 10/11/13/15/20/75 of E-24 series.

● 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 |

● 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 |

● 0603 3 digits coding formula for E-96 values as following:

CODING FORMULA



Example: $499 \text{ m}\Omega = 499 \times 10^{-3} \Omega = \mathbf{68Z}$

68 Z

■ 0805~2512 : 4 digit marking

1. For E-24 values:

| Resistance value | Code | Example |
|------------------|-------------|--------------|
| 10mΩ ~ 990mΩ | RXXX | R680 = 680mΩ |

■ Note: jumper zero ohm resistor marking code is one 「0」 (except type below 0402).

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