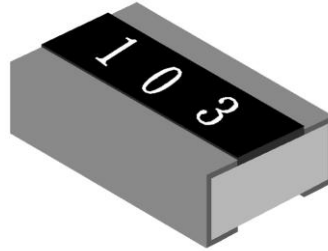




QRW Series Automotive Wide Terminal Chip Resistor Product Specifications

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Automotive Wide Terminal Chip Resistor— QRW Series



Application

- Automotive electronics
- Navigation equipment, TPMS
- Heating, Ventilating and Air conditioning
- Indoor lighting, Central door locking, Wiper module

Features

- Small size and light weight
- Reliability, high quality
- CCD visual quality inspection
- AEC-Q200 Compliance

Parts Number Explanation

Example:

| QRW | 0612 | L | 10R0 | P | 05 | Z |
|--------------|--------------------------------------|--------------------|---|---|--|---------------------------------|
| Product Type | Size (Inch) | Resistor Tolerance | Resistor Value | Package | Quantity | Optional |
| QRW | 0612 1020 1218 1225 2030 | F : ±1% J : ±5% | 10mR=R010 100mR=R100 1R=1R00 10R=10R0 100R=100R 1K=1K00 1M=1M00 | P : Paper Taping (0612) E : Embossed Taping (1020~2030) B : Packed in a Bag | 01 : 1000PCS 04 : 4000PCS 05 : 5000PCS | Z : Default 7 : TCR ± 200ppm |



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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%) |
| QRW0612 | 0.75 W | 200V | 400V | ±400 | 1Ω ≤ R < 10Ω | |
| | | | | ±100 | 10Ω ≤ R ≤ 10MΩ | |
| QRW1020 | 1 W | | | ±400 | 1Ω ≤ R < 10Ω | |
| | | | | ±100 | 10Ω ≤ R ≤ 10MΩ | |
| QRW1218 | 1 W | | | ±400 | 1Ω ≤ R < 10Ω | |
| | | | | ±100 | 10Ω ≤ R ≤ 10MΩ | |
| QRW1225 | 2W | | | ±400 | 1Ω ≤ R < 10Ω | |
| | | | | ±100 | 10Ω ≤ R ≤ 10MΩ | |
| QRW2030 | 3W | | | ±400 | 1Ω ≤ R < 10Ω | |
| | | | | ±100 | 10Ω ≤ R ≤ 10MΩ | |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C
- Type QRW0612/1020/1218/1225/2030 1Ω ≤ R < 10Ω optional code 「7」 is TCR: ±200PPM

Low Ohm Chip Resistor 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%) |
| QRW0612 | 0.75W | 0.087~0.86V | 2.154V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| QRW1020 | 1W | 0.1~0.99V | 2.475V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| QRW1218 | 1W | 0.1~0.99V | 2.475V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| QRW1225 | 2W | 0.14~1.41V | 3.518 V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |
| QRW2030 | 3W | 0.17~1.72V | 4.308V | ±1800 | 10 ≤ R < 50 |
| | | | | ±800 | 50 ≤ R < 100 |
| | | | | ±600 | 100 ≤ R < 1000 |

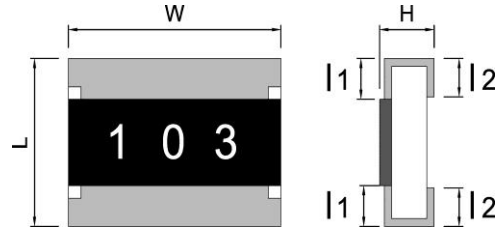
- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C



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■ Type Dimension



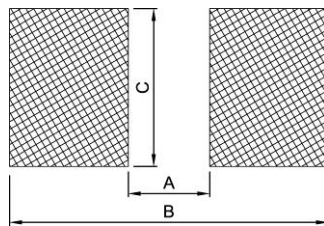
■ Dimension

Unit: mm

| TYPE | L | W | H | l_1 | l_2 |
|---------|-----------------|-----------------|-----------------|-----------------|-----------------|
| QRW0612 | 1.60 ± 0.20 | 3.20 ± 0.20 | 0.55 ± 0.10 | 0.30 ± 0.20 | 0.50 ± 0.20 |
| QRW1020 | 2.50 ± 0.20 | 5.00 ± 0.20 | 0.55 ± 0.10 | 0.40 ± 0.20 | 0.75 ± 0.20 |
| QRW1218 | 3.10 ± 0.10 | 4.60 ± 0.10 | 0.55 ± 0.05 | 0.40 ± 0.20 | 0.50 ± 0.20 |
| QRW1225 | 3.20 ± 0.20 | 6.50 ± 0.20 | 0.55 ± 0.20 | 0.40 ± 0.20 | 0.75 ± 0.20 |
| QRW2030 | 5.10 ± 0.10 | 7.60 ± 0.10 | 1.20 ± 0.10 | 0.80 ± 0.20 | 0.80 ± 0.20 |

● General Information

■ Recommend Land Pattern Design



■ Dimension

Unit:mm

| Type | 0612 | 1020 | 1218 | 1225 | 2030 |
|--------|------|------|------|------|------|
| Item A | 0.60 | 0.75 | 2.04 | 0.85 | 3.50 |
| Item B | 2.90 | 3.40 | 4.24 | 3.70 | 7.50 |
| Item C | 3.20 | 5.00 | 4.80 | 6.40 | 7.80 |

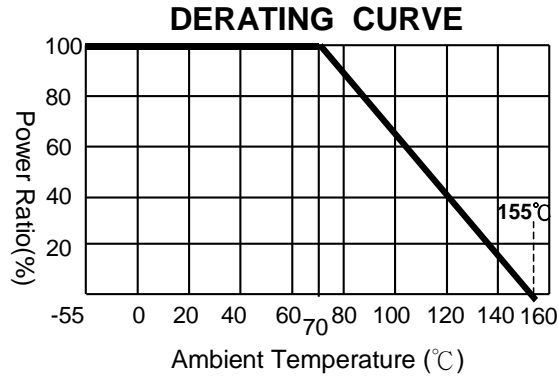


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■ Performance Characteristics

■ 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)



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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. | ±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω) Value <1Ω : ±(2.0%+0.1Ω) |
| Leaching | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 | 260±5°C for 30 seconds. | Individual leaching area ≤5% Total leaching area ≤ 10% |
| Resistance to Soldering Heat | JIS-C-5201-1 4.18 IEC-60115-1 4.18 | 260±5°C for 10 seconds. | ±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω) Value <1Ω : ±(1.0%+0.05Ω) |
| Insulation Resistance | JIS-C-5201-1 4.6 IEC-60115-1 4.6 | Apply 100VDC for 1 minute. | ≥ 10GΩ |
| Temperature Cycling | JESD22 Method JA-104 | 1000 Cycles (-55°C to +125°C) Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. | 1% : ±(0.5%+0.05Ω) 5% : ±(1.0%+0.10Ω) |
| Resistance to Solvent | MIL-STD-202 Method 215 | Add Aqueous wash chemical - OKEM Clean or equivalent. | 1% : ±(0.5%+0.05Ω) 5% : ±(0.5%+0.05Ω) |
| Biased Humidity | MIL-STD-202 Method 103 | 1,000 hours; 85°C / 85% RH, 10% of operating power. Measurement at 24±4 hours after test conclusion. | 1% : ±(1.0%+0.05Ω) 5% : ±(3.0%+0.05Ω) |
| High Temperature Exposure (Storage) | MIL-STD-202 Method 108 | 1000 hrs. @ T=125°C. Unpowered. Measurement at 24±4 hours after test conclusion. | 1% : ±(0.5%+0.05Ω) 5% : ±(2.0%+0.05Ω) |
| Operation Life | MIL-STD-202 Method 108 | Condition D Steady State TA=125°C at derated power. Measurement at 24±4 hours after test conclusion. | 1% : ±(1.0%+0.05Ω) 5% : ±(3.0%+0.10Ω) |
| External Visual | MIL-STD-883 Method 2009 | Electrical test not required. Inspect device construction, marking and workmanship. | — |
| Mechanical Shock | MIL-STD-202 Method 213 |)Test ½ Sine Pulse, Peak value: 100g, normal duration: 6ms, Velocity change:12.3ft/sec. 10 shocks in each direction, total30 shocks. | ±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω) |
| Vibration | MIL-STD-202 Method 204 | 5 g's for 20 min., 12 cycles each of 3 orientations. Note: Test from 10-2000 H | ±1 : ±(1.0%+0.05Ω) ±5 : ±(2.0%+0.1Ω) |
| ESD | AEC-Q200- 002 or ISO/DIS 10605 | Human body model 0612 : 1KV 1020 and above : 2KV | ±(3%+0.05Ω) |
| Solderability | J-STD-002 | (1) 4 hrs 155°C dry heat (2) 245±5°C 3 sec. | ±1 : ±(0.5%+0.05Ω) ±5 : ±(1.0%+0.05Ω) |
| Terminal Strength (SMD) | AEC Q200-006 | Pressurizing force for 60 seconds 0612 : 8N ; 1020 and above : 17.7N | No broken |
| Board Flex | AEC Q200-005 | Beading once for 60 seconds 0612/1020/1218/1225/2030: 3mm | ±1 : ±(1.0%+0.05Ω) ±5 : ±(1.0%+0.05Ω) |

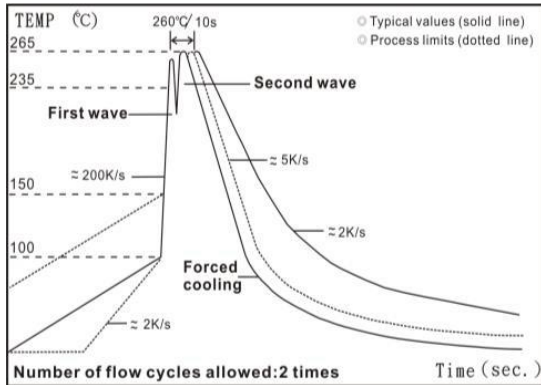


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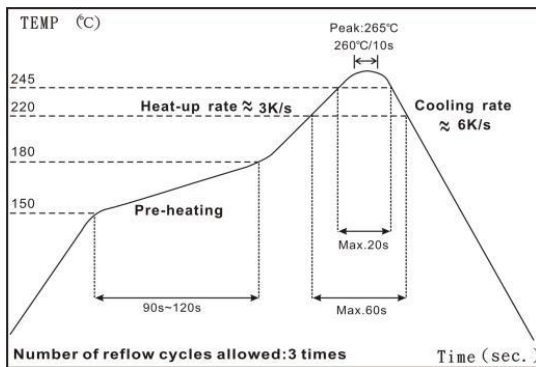
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Recommended Customer Soldering Parameters

Wave solder 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.

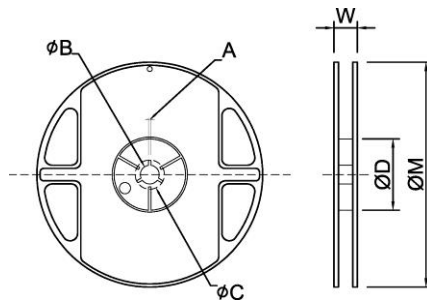


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■ Appendix For SMD Chip Resistor

● Packaging Information



■ Dimension

Unit:mm

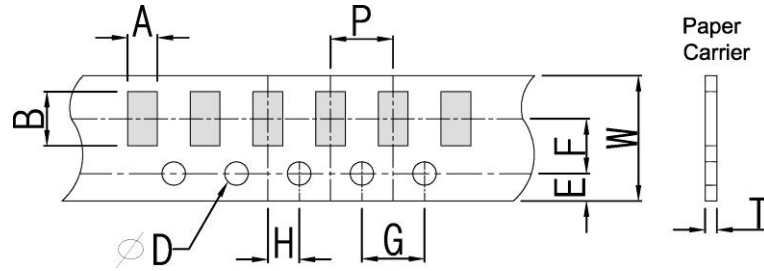
| TYPE | SIZE | | A | φB | φC | φD | W | φM |
|----------------|------|---------|---------|----------|--------|--------|----------|---------|
| 0612 | 7" | 5K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 11.5±2.0 | 178±2.0 |
| 1020/1218/1225 | 7" | 4K/Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0 | 16.0±2.0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



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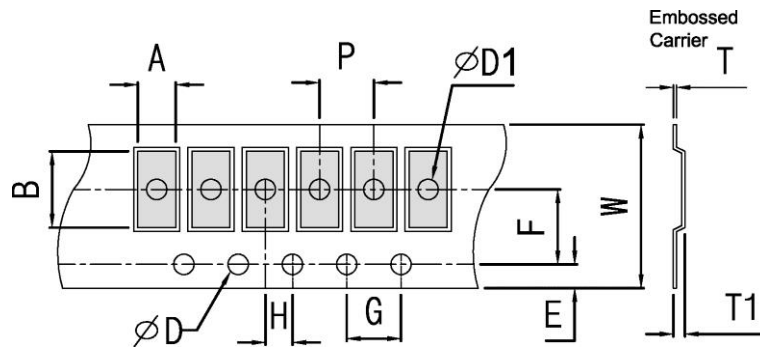
■ Tapping Specification



■ 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 |



■ 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 | 8.0±0.2 |

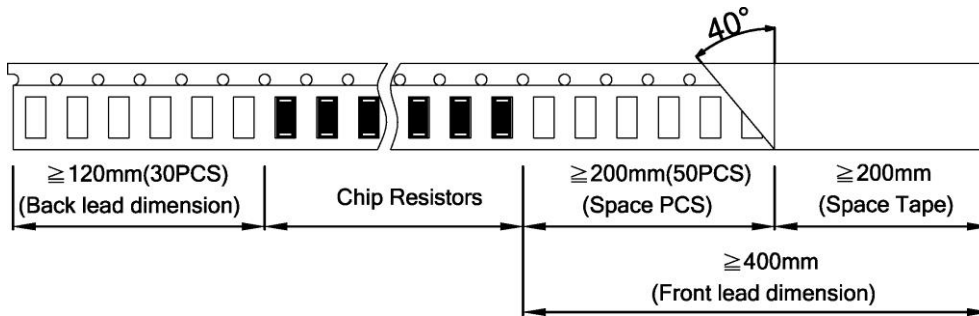


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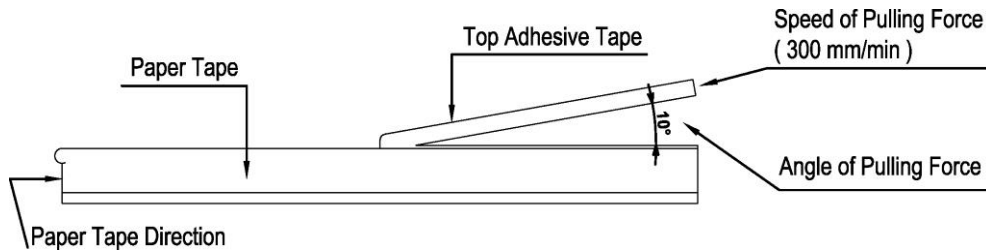
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■ Packing Material Data/Storage Data

■ Front & Back Lead Dimension

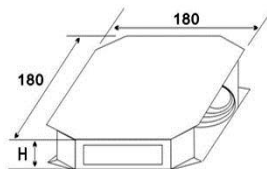


■ Top Adhesive Peel Off Strength : 10~70g

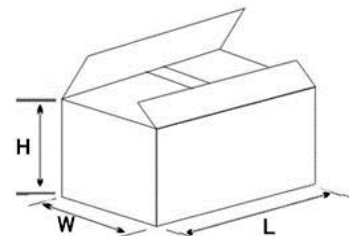


■ Package

| 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.



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■ 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.

■ mΩ Resistance Codes

| Resistance | Code | 060 Code | Resistance | Code | 0603 Code | Resistance | Code | 0603 Code | Resistance | Code | 0603 Code | Resistance | Code | 0603 Code |
|------------|------|----------|------------|------|-----------|------------|------|-----------|------------|------|-----------|------------|------|-----------|
| 10mΩ | R010 | 010 | 65mΩ | R065 | 065 | 0.12Ω | R120 | R12 | 0.27Ω | R270 | R27 | 0.56Ω | R560 | R56 |
| 15mΩ | R015 | 015 | 68mΩ | R068 | 068 | 0.13Ω | R130 | R13 | 0.30Ω | R300 | R30 | 0.60Ω | R600 | R60 |
| 20mΩ | R020 | 020 | 70mΩ | R070 | 070 | 0.15Ω | R150 | R15 | 0.33Ω | R330 | R33 | 0.65Ω | R650 | R65 |
| 30mΩ | R030 | 030 | 75mΩ | R075 | 075 | 0.16Ω | R160 | R16 | 0.36Ω | R360 | R36 | 0.68Ω | R680 | R68 |
| 40mΩ | R040 | 040 | 80mΩ | R080 | 080 | 0.18Ω | R180 | R18 | 0.40Ω | R400 | R40 | 0.70Ω | R700 | R70 |
| 50mΩ | R050 | 050 | 90mΩ | R090 | 090 | 0.20Ω | R200 | R20 | 0.43Ω | R430 | R43 | 0.75Ω | R750 | R75 |
| 56mΩ | R056 | 056 | 0.10Ω | R100 | R10 | 0.22Ω | R220 | R22 | 0.47Ω | R470 | R47 | 0.80Ω | R800 | R80 |
| 60mΩ | R060 | 060 | 0.11Ω | R110 | R11 | 0.25Ω | R250 | R25 | 0.50Ω | R500 | R50 | 0.90Ω | R900 | R90 |



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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: 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 | | |
| 130 | 130 | | 221 | 221 | | 374 | 374 | | 634 | 634 | | 12 | 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 | | | 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 |
| 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