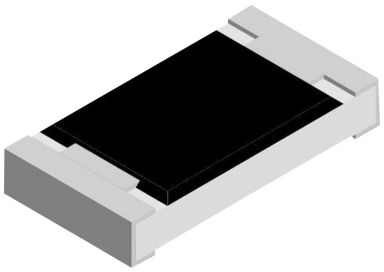
# Thick Film Chip Resistor

multicomp PRO



RoHS Compliant

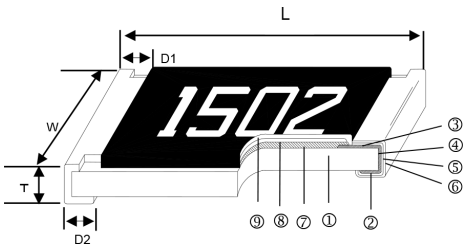
## Features

- AEC-Q200 Compliance
- Small size and light weight
- Highly reliable multilayer electrode construction
- Compatible with all soldering process
- 100% CCD inspection

## Applications

- Telecommunication Equipment
- Car Media
- Digital Cameras, Watches, Pocket Calculators
- Computers, Instruments
- Medical Equipment

## Construction



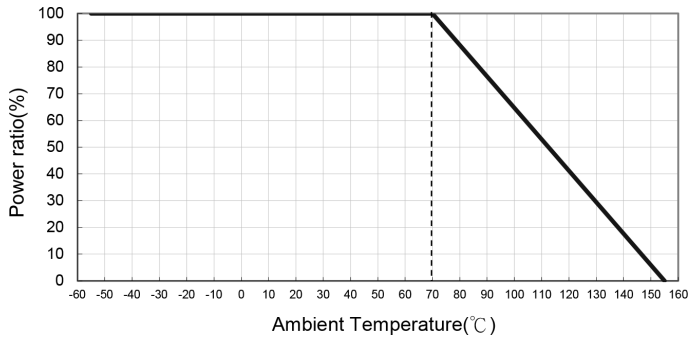

| | | | | | |
|---|---|---|---|---|---|
| 1 | Alumina Substrate | 4 | Edge Electrode | 7 | Resistor Layer |
| 2 | Bottom Electrode | 5 | Barrier Layer | 8 | Primary Overcoat |
| 3 | Top Electrode | 6 | External Electrode | 9 | Secondary Overcoat |

Dimensions : Millimetres

## Dimensions

| Type | Size (Inch) | L (mm) | W (mm) | T (mm) | D1 (mm) | D2 (mm) | Weight (g) (1000pcs) |
|---|---|---|---|---|---|---|---|
| MPCR-01 | 0201 | 0.6 ±0.03 | 0.3 ±0.03 | 0.23±0.03 | 0.15 ±0.05 | 0.15 ±0.05 | 0.15 |
| MPCR-02 | 0402 | 1 ±0.05 | 0.5 ±0.05 | 0.35 ±0.05 | 0.2 ±0.1 | 0.2 ±0.1 | 0.62 |
| MPCR-03 | 0603 | 1.6 ±0.1 | 0.8 ±0.1 | 0.45 ±0.1 | 0.3 ±0.2 | 0.3 ±0.2 | 2.042 |
| MPCR-05 | 0805 | 2 ±0.1 | 1.25 ±0.1 | 0.5 ±0.1 | 0.35 ±0.2 | 0.4 ±0.2 | 4.368 |
| MPCR-06 | 1206 | 3.1 ±0.1 | 1.55 ±0.1 | 0.55 ±0.1 | 0.5 ±0.25 | 0.5 ±0.2 | 8.947 |
| MPCR-10 | 1210 | 3.1 ±0.1 | 2.6 ±0.15 | 0.55 ±0.1 | 0.5 ±0.25 | 0.5 ±0.2 | 15.959 |
| MPCR-12 | 2512 | 6.35 ±0.1 | 3.1 ±0.15 | 0.55 ±0.1 | 0.6 ±0.25 | 0.5 ±0.2 | 39.448 |

## Derating Curve



## Standard Electrical Specifications

| Item / Type | Power Rating at 70° | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range ±1% (E24,E96) | Resistance Range ±5% (E24) | TCR (PPM/°C) |
|---|---|---|---|---|---|---|---|
| MPCR-01 (0201) | 1/20W | -55°C to +155°C | 25V | 50V | 1Ω to10 MΩ | | ±200 |
| MPCR-02 (0402) | 1/16W | | 50V | 100V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02 MΩ to 20MΩ<br>20.5 MΩ to 100MΩ | | ±200<br>±100<br>±200<br>±400 |
| MPCR-03 (0603) | 1/10W | | 75V | 150V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02MΩ to 20MΩ<br>20.5MΩ to 100MΩ | | ±200<br>±100<br>±200<br>±400 |
| MPCR-05 (0805) | 1/8W | | 150V | 300V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02MΩ to 20MΩ<br>20.5MΩ to 100MΩ | | ±200<br>±100<br>±200<br>±400 |
| MPCR-06 (1206) | 1/4W | | 200V | 400V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02MΩ to 20MΩ<br>20.5MΩ - 100MΩ | | ±200<br>±100<br>±200<br>±400 |
| MPCR-10 (1210) | 1/3W | | 200V | 400V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02MΩ to 20MΩ<br>20.5MΩ to 39MΩ | | ±200<br>±100<br>±200<br>±400 |
| MPCR-12 (2512) | 1W | | 250V | 500V | 1Ω to 9.76Ω<br>10Ω to 1MΩ<br>1.02MΩ to 20MΩ<br>20.5MΩ to 100MΩ | | ±200<br>±100<br>±200<br>±400 |

## High Precision Electrical Specifications

| Item / Type | Power Rating at 70° | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range (E24, E96) ±1% | ±0.25% | ±0.5% | TCR (PPM/°C) |
|---|---|---|---|---|---|---|---|---|
| MPCR-02 (0402) | 1/16W | -55°C to +155°C | 50V | 100V | - | | 10Ω to 1MΩ | ±100 |
| | | | | | - | | 1.02M to 10MΩ | ±200 |
| MPCR-03 (0603) | 1/10W | | 75V | 150V | 10Ω to 1MΩ | | | ±100 |
| | | | | | | 1.02M to 10MΩ | | ±200 |
| MPCR-05 (0805) | 1/8W | | 150V | 300V | 10Ω to 1MΩ | | | ±100 |
| | | | | | - | 1.02M to 10MΩ | | ±200 |
| MPCR-06 (1206) | 1/4W | | 200V | 400V | 10Ω to 1MΩ | | | ±100 |
| | | | | | - | 1.02M to 10MΩ | | ±200 |
| MPCR-10 (1210) | 1/3W | | 200V | 400V | 10Ω to 1MΩ | | | ±100 |
| | | | | | - | 1.02M to 10MΩ | | ±200 |
| MPCR-12 (2512) | 1W | | 250V | 500V | 10Ω to 1MΩ | | | ±100 |
| | | | | | - | 1.02M to 10MΩ | | ±200 |

## TC50 Electrical Specifications

| Item / Type | Power Rating at 70° | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range (E24, E96) | | | | TCR (PPM/°C) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | ±0.1% | ±0.25% | ±0.5% | ±1% | |
| MPCR-02 (0402) | 1/16W | -55°C to +155°C | 50V | 100V | - | | 100Ω to 1MΩ | | ±50 |
| MPCR-03 (0603) | 1/10W | | 75V | 150V | 10Ω to 1MΩ | 10Ω to 10MΩ | | | |
| MPCR-05 (0805) | 1/8W | | 150V | 300V | | | | | |
| MPCR-06 (1206) | 1/4W | | 200V | 400V | | | | | |
| MPCR-10 (1210) | 1/3W | | 200V | 400V | | | | | |
| MPCR-12 (2512) | 1W | | 250V | 500V | | | | | |

## High Power Ultra High Power Rating Electrical Specifications

| Item / Type | Power Rating at 70° | Function Code | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | TCR (PPM/°C) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | ±0.5% (E24, E96) | ±0.1% (E24, E96) | ±5% (E24) | |
| MPCR-02 (0402) | 1/10W | M | -55°C to +155°C | 50V | 100V | - 10Ω to 1MΩ | 1Ω to 9.76Ω 10Ω to 1MΩ | 1Ω to 9.76Ω 10Ω to 1MΩ | ±200 ±100 |
| | 1/8W | P | | | | | | | |
| MPCR-03 (0603) | 1/W | P | | 75V | 150V | | | | |
| MPCR-05 (0805) | 1/3W | P | | 150V | 300V | | | | |
| MPCR-06 (1206) | 1/3W | P | | 200V | 400V | | | | |
| | *1/2W | H | | | | | | | |
| MPCR-10 (1210) | 1/2W | P | | 200V | 400V | | | | |
| | *3/4W | H | | | | | | | |
| MPCR-12 (2512) | 2W | P | | 250V | 500V | | | | |

*: Ultra High Power

Operating Voltage=

Voltage=√(P*R ) or Max. Operating Voltage listed above, whichever is lower.

Overload Voltage=2.5*√(P*R or Max. Overload Voltage listed above, whichever is lower.

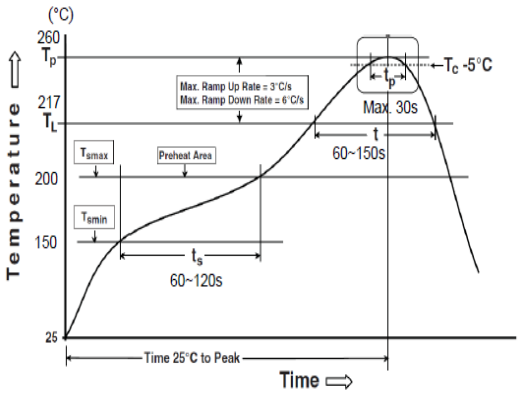
## Jumper(0Ω)

| Item / Type | Rated Current | Function Code | Resistance 5% | Operating Temp. Range |
|---|---|---|---|---|
| MPCR-01 (0201) | 1A | L | <50mΩ | -55°C to +155°C |
| MPCR-02 (0402) | | | | |
| MPCR-03 (0603) | | | | |
| MPCR-05 (0805) | 2A | | | |
| MPCR-06 (1206) | | | | |
| MPCR-10 (1210) | 2.5A | | | |
| MPCR-12 (2512) | 4A | | | |

## High Current Jumper(0Ω)

| Item / Type | Rated Current | Function Code | Resistance 5% | Operating Temp. Range |
|---|---|---|---|---|
| MPCR-02 (0402) | 1.5A | P | <20mΩ | -55°C to +155°C |
| MPCR-03 (0603) | 2A | | | |
| MPCR-05 (0805) | 2.5A | | | |
| MPCR-06 (1206) | 3.5A | | | |
| MPCR-10 (1210) | 5A | | | |
| MPCR-12 (2512) | 7A | | | |

## Soldering Condition (Ref. IPC/JEDEC J-STD-020 & J-STD-002)



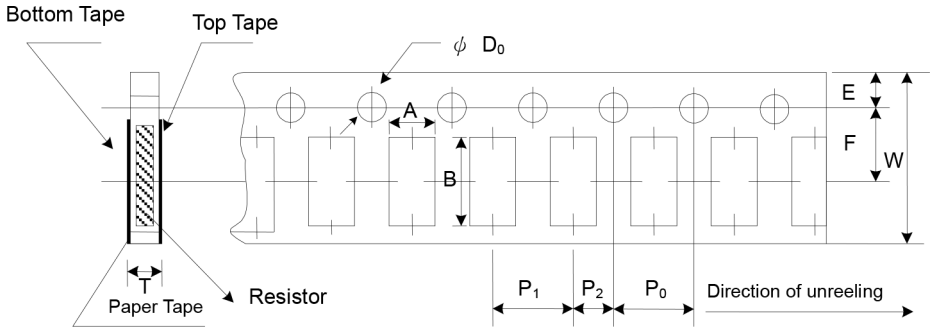

| Reflow Profiles | |
|---|---|
| **Profile Feature** | **Pb-Free Assembly** |
| Preheat<br>Min. Temperature (Tsmin)<br>Max Temperature (Tsmax)<br>Preheating time (ts) from (Tsmin to Tsmax) | <br>150°C<br>200°C<br>60-120 seconds |
| Ramp-up rate ($T_L$ to Tp) | 3°C/second max. |
| Liquidous temperature ($T_L$)<br>Time ($t_L$) maintained above $T_L$ | 217°C<br>60-150 seconds |
| Min. Peak temperature (Tp min) | 235°C |
| Max. Peak temperature (Tp max) | 260°C |
| Time (tp) within 5°C of the specified classification temperature (Tc) | 30 seconds max. |
| Ramp-down rate (Tp to $T_L$) | 6°C/second max. |
| Time 25°C to peak temperature | 8 minutes max. |

## Environmental Characteristics

| Item | Requirement | | | Test Method |
|---|---|---|---|---|
| | ±5% and Below | ±5% | Jumper | |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | | | JIS-C-5201-1 4.8<br>IEC-60115-1 4.8<br>At 25°C/ -55°C and 25°CC/+125°C, 25°C is the reference temperature |
| Short Time Overload | ±(1.0%+0.05Ω) | ±(2%+0.05 Ω) | <50mΩ | JIS-C-5201-1 4.13<br>IEC-60115-1 4.13<br>RCWV*2.5 or Max. Overload Voltage whichever is lower for 5 seconds , 2 seconds for high power series |
| Insulation Resistance | ≥10G | | | JIS-C-5201-1 4.6<br>IEC-60115-1 4.6<br>Max. Overload Voltage for 1 minute |
| Endurance | ±(1.0%+0.1Ω) | ±(2%+0.1Ω) | <100mΩ | JIS-C-5201 -1 4.25<br>IEC -6011560115-1 4.25.1<br>70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF” |
| Damp Heat with Load | ±(1.0%+0.01Ω) | ±(2%+0.1Ω) | <100mΩ | JIS-C-5201 -1 4.24<br>IEC -6011560115-1 4.24<br>40±2°C, 90~95% R.H. H., RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hr “OFF” |
| Dry Heat | ±(1.0%+0.05Ω) | ±(1.5%+0.1Ω) | <50mΩ | JIS-C-5201 -1 4.23<br>IEC -6011560115-1 4.23.2<br>At +155°C for 1000 hrs |
| Bending Strength | ±(1.0%+0.05Ω) | ±(1%+0.05Ω) | <50mΩ | JIS-C-5201 -1 4.33<br>IEC -6011560115-1 4.33<br>Bending once for 60 seconds<br>2010, 2512 sizes: 2mm<br>Other sizes: 3mm |
| Solderability | 95% min. Coverage | | | JIS-C-5201-1 4.17<br>IEC-60115-1 4.17<br>245±5°C for 3 seconds |
| Resistance to Soldering Heat | ±(0.5%+0.05Ω) | ±(1%+0.05Ω) | <50mΩ | JIS-C-5201-1 4.18<br>IEC-60115-1 4.18<br>260±5°C for 10 seconds |
| Voltage Proof | No breakdown or flashover | | | JIS-C-5201-1 4.7<br>IEC-60115-1 4.7<br>1.42 times Max. Operating Voltage for 1 minute |
| Leaching | Individual leaching area ≤5%<br>Total leaching area ≤10% | | | JIS-C-5201-1 4.18<br>IEC-60068-2-58 8.2.1<br>260±5°C for 30 seconds |
| Rapid Change of Temperature | ±(0.5%+0.05Ω) | ±(1%+0.05Ω) | <50mΩ | JIS-C-5201 -1 4.19<br>IEC -6011560115-1 4.19<br>-55°C to +155°C, 5cycles |

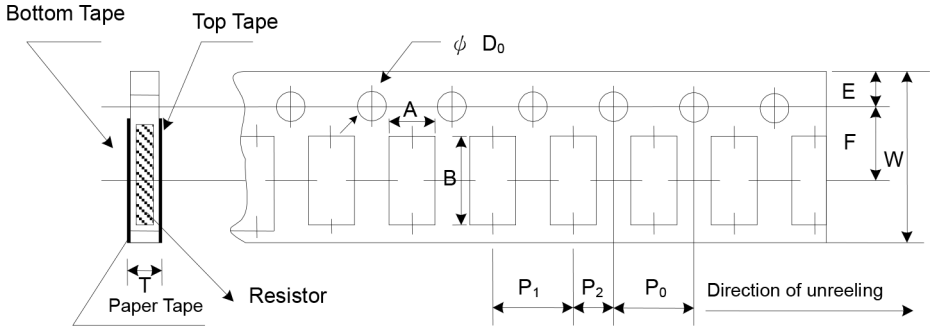
RCWV(Rated continuous working voltage)= √(P*R) or Max. Operating voltage whichever is lower
Storage Temperature: 15°C to 28°C; Humidity < 80%RH
Shelf Life: 2 years from production date.

## Paper Tape Specifications



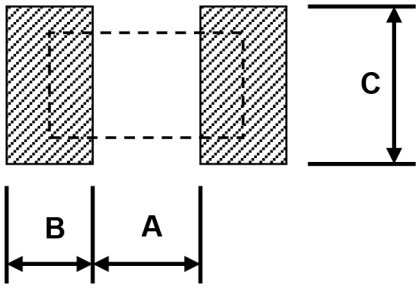

| Type | A mm | B mm | W mm | E mm | F mm | P0 mm | P1 mm | P2 mm | ΦD0 mm | T mm |
|---|---|---|---|---|---|---|---|---|---|---|
| MPCR-01 | 0.38 ±0.05 | 0.68 ±0.05 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 2 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.42±0.20 |
| MPCR-02 | 0.65 ±0.1 | 1.15 ±0.1 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 2 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.45±0.10 |
| MPCR-03 | 1.1 ±0.1 | 1.90 ±0.1 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 4 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.70±0.10 |
| MPCR-05 | 1.6 ±0.1 | 2.40 ±0.2 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 4 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.85±0.10 |
| MPCR-06 | 1.9 ±0.1 | 3.50 ±0.2 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 4 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.85±0.10 |
| MPCR-10 | 2.9 ±0.1 | 3.50 ±0.2 | 8.0 ±0.2 | 1.75 ±0.1 | 3.5 ±0.05 | 4 ±0.1 | 4 ±0.05 | 2 ±0.05 | 1.5+0.1,-0 | 0.85±0.10 |

## Embossed Plastic Tape Specifications

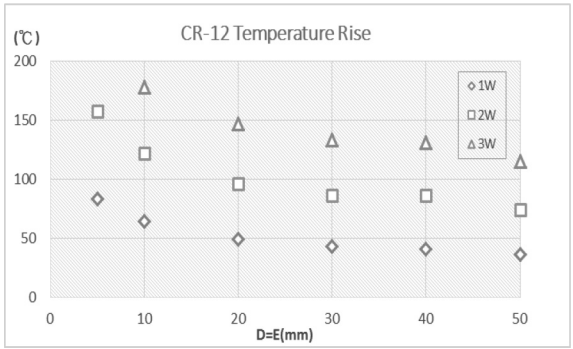


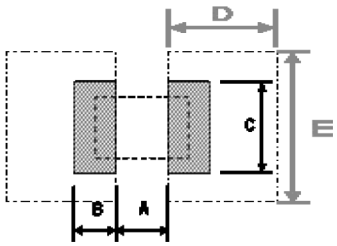

Dimensions : Millimetres

| Type | A mm | B mm | W mm | E mm | F mm | P0 mm | P1 mm | P2 mm | ΦD0 mm | T mm |
|---|---|---|---|---|---|---|---|---|---|---|
| MPCR-12 | 3.5 ±0.1 | 6.7 ±0.1 | 12 ±0.3 | 1.75 ±0.1 | 5.5 ±0.05 | 4 ±0.1 | 4 ±0.1 | 2 ±0.05 | 1.5+0.1, -0 | $1.2^{+0}$ |




| Type | A (mm) | B (mm) | C (mm) |
|---|---|---|---|
| MPCR-01 | 0.3 | 0.25 | 0.3 |
| MPCR-02 | 0.5 | 0.45 | 0.6 |
| MPCR-03 | 0.9 | 0.6 | 0.9 |
| MPCR-05 | 1.2 | 0.7 | 1.3 |
| MPCR-06 | 2 | 0.9 | 1.6 |
| MPCR-10 | 2 | 0.9 | 2.8 |
| MPCR-12 | 4.9 | 1.6 | 3.5 |




*FR4 copper board , 35 μ m of copper pad thickness

## Marking

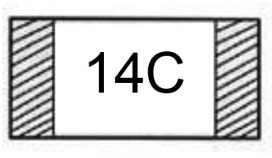
No Marking for 0201 and 0402
Jumper for all: Letter 0
1% for 0805/1206/1210/2010/2512: 4 digit s marking

| Resistance | 5.6Ω | 97.6Ω | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
|---|---|---|---|---|---|---|---|
| marking | 5R60 | 97R6 | 1000 | 2201 | 1002 | 4992 | 1003 |

5% for 0603/0805/1206/1210/2010/2512: 3 digit s marking in E24
Example: 101=100Ω 102=1KΩ (1st and 2nd are E24 code and 3rd code is multiplier)

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

1% for 0603(E24): 3 digits marking in E24, When the E24 and E96 are the same resistance , this marking in E96
Example: 01A= 1 00 Ω 05C=11K Ω 123=12K Ω 273=27K Ω




3 digits marking for Example: 14C=13K7Ω 13C=13K3Ω 68B=4K99Ω 68X=49.9 Ω

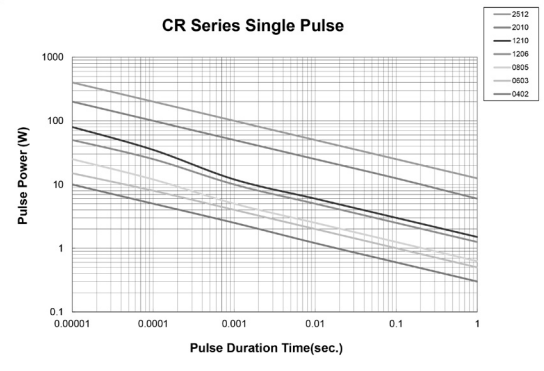
## Marking Table

| Code | E96 | Code | E96 | Code | E96 | Code | E96 |
|---|---|---|---|---|---|---|---|
| **01** | 100 | 25 | 178 | **49** | 316 | **73** | 562 |
| **02** | 102 | 26 | 182 | **50** | 324 | **74** | 576 |
| **03** | 105 | 27 | 187 | **51** | 332 | **75** | 590 |
| **04** | 107 | 28 | 191 | **52** | 340 | **76** | 604 |
| **05** | 110 | 29 | 196 | **53** | 348 | **77** | 619 |
| **06** | 113 | 30 | 200 | **54** | 357 | **78** | 634 |
| **07** | 115 | 31 | 205 | **55** | 365 | **79** | 649 |
| **08** | 118 | 32 | 210 | **56** | 374 | **80** | 665 |
| **09** | 121 | 33 | 215 | **57** | 383 | **81** | 681 |
| **10** | 124 | 34 | 221 | **58** | 392 | **82** | 698 |
| **11** | 127 | 35 | 226 | **59** | 402 | **83** | 715 |
| **12** | 130 | 36 | 232 | **60** | 412 | **84** | 732 |
| **13** | 133 | 37 | 237 | **61** | 422 | **85** | 750 |
| **14** | 137 | 38 | 243 | **62** | 432 | **86** | 768 |
| **15** | 140 | 39 | 249 | **63** | 442 | **87** | 787 |
| **16** | 143 | 40 | 255 | **64** | 453 | **88** | 806 |
| **17** | 147 | 41 | 261 | **65** | 464 | **89** | 825 |
| **18** | 150 | 42 | 267 | **66** | 475 | **90** | 845 |
| **19** | 154 | 43 | 274 | **67** | 487 | **91** | 866 |
| **20** | 158 | 44 | 280 | **68** | 499 | **92** | 887 |
| **21** | 162 | 45 | 287 | **69** | 511 | **93** | 909 |
| **22** | 165 | 46 | 294 | **70** | 523 | 94 | 931 |
| **23** | 169 | 47 | 301 | **71** | 536 | 95 | 953 |
| **24** | 174 | 48 | 309 | **72** | 549 | 96 | 976 |

| Code | A | B | C | D | E | F | G | X | Y | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Multiplier** | $10^0$ | $10^1$ | $10^2$ | $10^3$ | $10^4$ | $10^5$ | $10^6$ | $10^{-1}$ | $10^{-2}$ | | |

**Pulse withstanding capacity**

The limit of acceptance was a shift in resistance of less than 1% from the initial value. The power applied was subject to the restrictions of the maximum permissible impulse voltage.




**Note:**

The limit of the applicable voltage is the max. overload voltage. Please consult us about the resistance characteristic when pulse is applied continuously. This data is a reference value, please be sure to test the products on the actual circuit before you use them.

| Part Number Table | |
|---|---|
| **Description** | **Part Number** |
| Thick Film Chip Resistor, 0201, 5%, 1/20W, 10KΩ | MPCR-01JL6---10KAC |
| Thick Film Chip Resistor, 0201, 5%, 1/20W, 4.7KΩ | MPCR-01JL6---4K7AC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 10Ω | MPCR-06JL7---10RAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 100Ω | MPCR-06JL7--100RAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 1KΩ | MPCR-06JL7----1KAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 10KΩ | MPCR-06JL7---10KAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 100KΩ | MPCR-06JL7--100KAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 220Ω | MPCR-06JL7--220RAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 3.3Ω | MPCR-06JL7---3R3AC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 470Ω | MPCR-06JL7--470RAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 4.7KΩ | MPCR-06JL7---4K7AC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 47KΩ | MPCR-06JL7---47KAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 4.7Ω | MPCR-06JL7---4R7AC |
| Thick Film Chip Resistor, 2512, 5%, 1W, 10Ω | MPCR-12JL4---10RAC |
| Thick Film Chip Resistor, 2512, 5%, 1W, 100Ω | MPCR-12JL4--100RAC |
| Thick Film Chip Resistor, 2512, 5%, 1W, 120Ω | MPCR-12JL4--120RAC |
| Thick Film Chip Resistor, 0402, 1%, 1/10W, 10KΩ | MPCR-02FM6---10KAC |
| Thick Film Chip Resistor, 0603, 1%, 1/10W, 2.2KΩ | MPCR-03FL7---2K2AC |
| Thick Film Chip Resistor, 0603, 1%, 1/10W, 4.7KΩ | MPCR-03FL7---4K7AC |
| Thick Film Chip Resistor, 0402, 1%, 1/10W, 49.9Ω | MPCR-02FM6--49R9AC |
| Thick Film Chip Resistor, 0201, 1%, 1/20W, 10KΩ | MPCR-01FL6---10KAC |
| Thick Film Chip Resistor, 0603, 1%, 1/4W, 1KΩ | MPCR-03FP7----1KAC |
| Thick Film Chip Resistor, 0603, 1%, 1/10W, 10KΩ | MPCR-03FL7---10KAC |
| Thick Film Chip Resistor, 0603, 1%, 1/10W, 1MΩ | MPCR-03FL7----1MAC |
| Thick Film Chip Resistor, 0603, 1%, 1/10W, 3.3KΩ | MPCR-03FL7---3K3AC |
| Thick Film Chip Resistor, 0805, 1%, 1/3W, 10Ω | MPCR-05FP7---10RAC |
| Thick Film Chip Resistor, 0805, 1%, 1/3W, 22KΩ | MPCR-05FP7---22KAC |
| Thick Film Chip Resistor, 0402, 5%, 1/10W, 0Ω | MPCR-02JP6----0RAC |
| Thick Film Chip Resistor, 0805, 5%, 1/3W, 0Ω | MPCR-05JL7----0RAC |
| Thick Film Chip Resistor, 1206, 5%, 1/4W, 0Ω | MPCR-06JL7----0RAC |
| Thick Film Chip Resistor, 1210, 5%, 1/3W, 0Ω | MPCR-10JL7----0RAC |