Innovative Service Around the Globe YAGEO

# PRODUCT SELECTION GUIDE

## 2014

SMD RESISTORS + MLCC

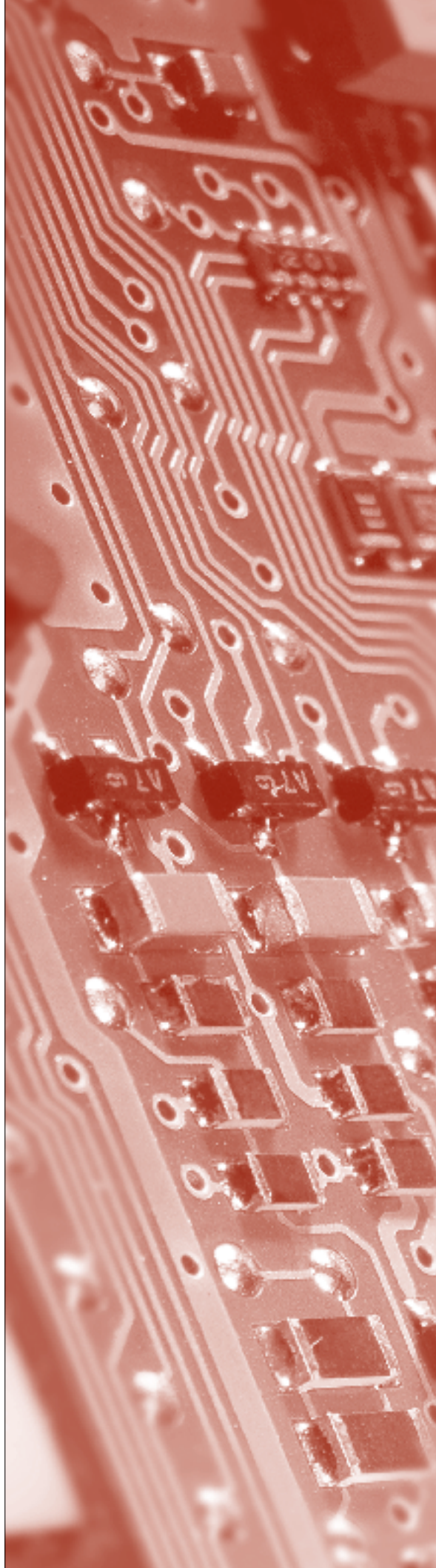
SMD CERAMIC EMI FILTER CAPACITORS - X2Y®

WIRELESS COMPONENTS

MULTILAYER CHIP VARISTORS

www.yageo.com

YAGEO Phycomp



## Part numbering system and ordering

You can order components from this catalogue in two ways. Both ways give logistic and packing information.

- **Clear text ordering code**
  This unique number is an easily-readable code.
  - 15 digits code (PHYCOMP CTC )
  - 14 to 17 digits code (GLOBAL PART NUMBER for both Yageo and Phycomp branded products)
- **12 digits ordering code**
  This unique 12NC number forms the basis of the Phycomp logistic system.

You will find details for ordering in the "*Ordering"* section next to each selection chart.

Minimum shipment quantities, prices and delivering details can be obtained from the Yageo sales organization in your country or from one of our franchised distributors.

## Case size codes

Throughout this catalogue, inch-based codes are used for the component sizes. According to IEC 60384-10, amendment 2 of September 2000 for MLCCs, and IEC 60115-8, amendment 1 of July 2000 for R-chip. Values for length and width should be in millimeters rather than in inches. To distinguish between inch-based codes and metric-based codes, metric-based codes will temporarily have the suffix ''M''. The table right next shows the relation between inch-based case sizes versus the recommended metric case size designators. Please note that HF products use metric case size only.

| Case size designation and cross-reference | | | | | |
|---|---|---|---|---|---|
| Inch-based | Metric | Inch-based | Metric | Inch-based | Metric |
| 0050 | 0201M | 0606 | 1616M | 1224 | 3250M |
| 0075 | 03015M | 0612 | 1632M | 1225 | 3264M |
| 01005 | 0402M | 0616 | 1640M | 1812 | 4532M |
| 0201 | 0603M | 0805 | 2012M | 2007 | 5320M |
| 0202 | 0605M | 0815 | 2037M | 2010 | 5025M |
| 0402 | 1005M | 0830 | 2075M | 2220 | 5750M |
| 0404 | 1010M | 1008 | 2520M | 2512 | 6432M |
| 0408 | 1020M | 1206 | 3216M | 3014 | 7836M |
| 0508 | 1220M | 1210 | 3225M | 4527 | 11070M |
| 0603 | 1608M | 1218 | 3245M | | |

## Contact us

Founded in 1977, the Yageo Corporation has become a world-class provider of passive-component services with capabilities on a global scale, including production and sales facilities in Asia, Europe and America. The corporation is uniquely positioned to provide one-stop-shopping, offering its complete product portfolio of resistors, capacitors and inductors in both commodity and specialty versions, plus design-in capability, distribution, e-commerce connection and logistics. Yageo markets its products under the product brand names Yageo, Phycomp and Vitrohm. All products can be obtained from our Yageo sales offices, of which contact details can be found on the backcover of this catalogue. For most up-to-date information, as well as contact details of our franchise distributors, please refer to our website: **www.yageo.com**

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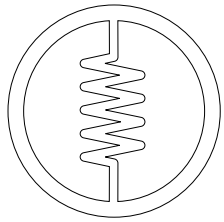
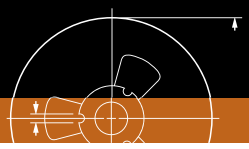


# SURFACE-MOUNT CHIP RESISTORS



# Chip Resistors General Information

## Specification overview

| Global part number | Series | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range | Tolerance | T. C. R. |
|---|---|---|---|---|---|---|---|---|
| RC0100xR-07xxxxL | RC | 01005 | 1/32W | 15V | -55°C to 125°C | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω -200~600 ppm/°C<br>10Ω ≤ R ≤ 1MΩ ±250 ppm/°C |
| RC0201xR-07xxxxL | | 0201 | 1/20W | 25V | | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | Max./Min.: 1MΩ/10Ω ±0.5%<br>Max.: 10MΩ ±1%,±5% | 1Ω ≤ R ≤ 10Ω -100/+350 ppm/°C<br>10Ω < R ≤ 10MΩ ±200 ppm/°C |
| RC0402xR-07xxxxL | | 0402 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ | Max./Min.: 1MΩ/10Ω ±0.1%<br>±0.5%<br>Max.: 10MΩ ±1%<br>Max.: 22MΩ ±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C<br>10MΩ < R ≤ 22MΩ ±200 ppm/°C |
| RC0603xR-07xxxxL | | 0603 | 1/10W | 50V | | | | |
| RC0805xR-07xxxxL | | 0805 | 1/8W | 150V | | | | |
| RC1206xR-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| RC1210xR-07xxxxL | | 1210 | 1/2W | 200V | | | | |
| RC1218xK-07xxxxL | | 1218 | 1W | 200V | | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | | |
| RC2010xK-07xxxxL | | 2010 | 3/4W | 200V | | 1Ω ≤ R ≤ 22MΩ<br>Jumper < 50mΩ | | |
| RC2512xK-07xxxxL | | 2512 | 1W | 200V | | | | |
| RC0603xR-7WxxxxL | | 0603 | 1/5W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 1MΩ | ±1%<br>±5% | ±200 ppm/°C |
| RC0805xR-7WxxxxL | | 0805 | 1/4W | 150V | | 1Ω ≤ R ≤ 1MΩ | | |
| RC1206xR-7WxxxxL | | 1206 | 1/2W | 200V | | | | |
| RC2512xK-7WxxxxL | | 2512 | 2W | 200V | | 1Ω ≤ R ≤ 150Ω | | |
| RC0805xR-07xxxxL | | 0805 | 1/8W | 150V | | 24MΩ ≤ R ≤ 100MΩ | ±5%, ±10%, ±20% | ±300 ppm/°C |
| RC1206xR-07xxxxL | | 1206 | 1/4W | 200V | | 24MΩ ≤ R ≤ 100MΩ | | |
| RE0402xRE07xxxxL | RE | 0402 | 1/16W | 50V | -55°C to 155°C | 10Ω ≤ R ≤ 1MΩ | ±0.1%<br>±0.5%<br>±1% | ±50 ppm/°C |
| RE0603xRE07xxxxL | | 0603 | 1/10W | 50V | | 10Ω ≤ R ≤ 1MΩ | | |
| RE0805xRE07xxxxL | | 0805 | 1/8W | 150V | | 10Ω ≤ R ≤ 1MΩ | | |
| RE1206xRE07xxxxL | | 1206 | 1/4W | 200V | | 10Ω ≤ R ≤ 1MΩ | | |
| RT0402xRx07xxxxL | RT | 0402 | 1/16W | 50V | -55°C to 155°C | 10Ω ≤ R ≤ 121KΩ | ±0.05%<br>±0.1%<br>±0.25%<br>±0.5%<br>±1% | ±10 ppm/°C<br>±15 ppm/°C<br>±25 ppm/°C<br>±50 ppm/°C |
| RT0603xRx07xxxxL | | 0603 | 1/10W | 75V | | 5.1Ω ≤ R ≤ 681KΩ | | |
| RT0805xRx07xxxxL | | 0805 | 1/8W | 150V | | 5.1Ω ≤ R ≤ 1.5MΩ | | |
| RT1206xRx07xxxxL | | 1206 | 1/4W | 200V | | 5.1Ω ≤ R ≤ 1.5MΩ | | |
| RT1210xRx07xxxxL | | 1210 | 1/4W | | -55°C to 125°C | 5.1Ω ≤ R ≤ 1MΩ | | |
| RT2010xKx07xxxxL | | 2010 | 1/2W | | | 10Ω ≤ R ≤ 1MΩ | | |
| RT2512xKx07xxxxL | | 2512 | 3/4W | | | 10Ω ≤ R ≤ 1MΩ | | |
| YC102-xR-07xxxxL | YC | 2*0201 | 1/32W | 15V | -55°C to 125°C | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | ±200 ppm/°C |
| YC104-xR-07xxxxL | | 4*0201 | 1/32W | 12.5V | | | | |
| YC122-xR-07xxxxL | | 2*0402 | 1/16W | 50V | | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | Max./Min.: 1MΩ/10Ω ±1%<br>Max.: 1MΩ ±5% | |
| YC124-xR-07xxxxL | | 4*0402 | 1/16W | 25V | -55°C to 155°C | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | 1Ω ≤ R < 10Ω ±250 ppm/°C<br>10Ω ≤ R ≤ 1MΩ ±200 ppm/°C |
| YC162-xR-07xxxxL | | 2*0603 | 1/16W | 50V | -55°C to 125°C | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±5% | ±200 ppm/°C |
| YC164-xR-07xxxxL | | 4*0603 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | |
| YC248-xR-07xxxxL | | 8*0602 | 1/16W | 50V | | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | | |
| YC324-xK-07xxxxL | | 4*1206 | 1/8W | 200V | | 10Ω ≤ R ≤ 1MΩ | | |
| TC122-xR-07xxxxL | TC | 2*0402 | 1/16W | 50V | -55°C to 125°C | 10Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | ±200 ppm/°C |
| ! TC122HxR-07xxxxL | | | | | | | | |
| ! TC122MxR-07xxxxL | | | | | | | | |
| TC124-xR-07xxxxL | | 4*0402 | 1/16W | 50V | | | | |
| ! TC124HxR-07xxxxL | | | | | | | | |
| ! TC124MxR-07xxxxL | | | | | | | | |
| TC164-xR-07xxxxL | | 4*0603 | 1/16W | 50V | | 1Ω ≤ R ≤ 1MΩ | | |

**Note:** " ! " is the symbol for new product

| Global part number | Series | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range | Tolerance | T. C. R. |
|---|---|---|---|---|---|---|---|---|
| YC158TJR-07xxxxL | YC158 | 10P8R (0612) | 1/16W | 25V | -55°C to 155°C | 10Ω ≤ R ≤ 100KΩ | ±5% | ±200 ppm/°C |
| YC358xJK-07xxxxL | YC358 | 10P8R (1225) | 1/16W | 50V | | 10Ω ≤ R ≤ 330KΩ | | ±200 ppm/°C |
| RL0402xR-07xxxxL | RL | 0402 | 1/16W | (PxR)^1/2 | -55°C to 125°C | 50mΩ ≤ R < 1Ω<br>Jumper < 20mΩ | ±1%<br>±2%<br>±5% | See page 36, table “T. C. R. - RL series“ |
| RL0603xR-07xxxxL | | 0603 | 1/10W | | | 10mΩ ≤ R < 1Ω<br>Jumper < 20mΩ | | |
| RL0805xR-07xxxxL | | 0805 | 1/8W | | | | | |
| RL1206xR-07xxxxL | | 1206 | 1/4W | | | | | |
| RL1210xR-07xxxxL | | 1210 | 1/2W | | | 10mΩ ≤ R < 1Ω | | |
| RL1218xK-07xxxxL | | 1218 | 1W | | | | | |
| RL2010xK-07xxxxL | | 2010 | 3/4W | | | | | |
| RL2512xK-07xxxxL | | 2512 | 1W | | | | | |
| RL0805xR-7WxxxxL | | 0805 | 1/4W | | | 10mΩ ≤ R < 1Ω | | |
| RL1206xR-7WxxxxL | | 1206 | 1/2W | | | | | |
| PT0402xR-07xxxxL | PT | 0402 | 1/16W | (PxR)^1/2 | -55°C to 155°C | 50mΩ ≤ R < 1Ω<br>Jumper < 10mΩ | ±1%<br>±2%<br>±5% | See page 41, table "T.C.R. - PT series" |
| PT0603xR-07xxxxL | | 0603 | 1/10W | | | 50mΩ ≤ R < 1Ω<br>Jumper < 8mΩ | | |
| PT0805xR-07xxxxL | | 0805 | 1/8W | | | 50mΩ ≤ R < 1Ω<br>Jumper < 5mΩ | | |
| PT1206xR-07xxxxL | | 1206 | 1/4W | | | | | |
| PT2010xK-07xxxxL | | 2010 | 3/4W | | | 100mΩ ≤ R < 1Ω | | |
| PT2512xK-07xxxxL | | 2512 | 1W | | | | | |
| PT0402xR-7WxxxxL | | 0402 | 1/8W | | | 50mΩ ≤ R < 1Ω | | |
| PT0603xR-7WxxxxL | | 0603 | 1/5W | | | | | |
| PT0805xR-7WxxxxL | | 0805 | 1/4W | | | | | |
| PT1206xR-7WxxxxL | | 1206 | 1/2W | | | | | |
| PT2010xK-7WxxxxL | | 2010 | 1W | | | 100mΩ ≤ R < 1Ω | | |
| PT2512xK-7WxxxxL | | 2512 | 2W | | | | | |
| PT0402xR-7TxxxxL | | 0402 | 1/6W | | | 68mΩ | | |
| PT0603xR-7TxxxxL | | 0603 | 1/3W | | | 50mΩ ≤ R ≤ 68mΩ | | |
| PT0815xK-07xxxxL | PT (Wide) | 0815 | 1/2W | (PxR)^1/2 | -55°C to 155°C | 25mΩ ≤ R ≤ 50mΩ | ±1%<br>±2%<br>±5% | ±100 ppm/°C |
| PT0815xK-7WxxxxL | | | 1W | | | | | |

**Note:** “ ! “ is the symbol for new product

## Specification overview

| Global part number | Series | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range | Toler-ance | T. C. R. |
|---|---|---|---|---|---|---|---|---|
| PR1206xKx07xxxxxx | PR | 1206 | 1/4W | (PxR)^1/2 | -55°C to 170°C | 1mΩ ≤ R ≤ 6mΩ | ±1%<br>±2%<br>±5% | ±50 ppm/°C |
| PR1206xKx7Wxxxxxx | | | 1/2W | | | | | |
| PR1206xKx47xxxxxx | | | 1W | | | | | |
| PR2010xKx07xxxxxx | | 2010 | 1/2W | | | 1mΩ ≤ R < 100mΩ | | |
| PR2010xKx7Wxxxxxx | | | 1W | | | | | |
| PR2512xKx07xxxxxx | | 2512 | 1W | | | 0.5mΩ ≤ R ≤ 5mΩ | ±1%<br>±2%<br>±5% | 0.5mΩ ≤ R ≤ 2mΩ ±200 ppm/°C<br>3mΩ ≤ R ≤ 5mΩ ±100 ppm/°C |
| PR2512xKx7Wxxxxxx | | | 2W | | | | | |
| PR2512xKx7Txxxxxx | | | 3W | | | 0.5mΩ ≤ R ≤ 10mΩ | | ±50 ppm/°C |
| PR2512DKx07xxxxxx | | | 1W | | | 7mΩ ≤ R ≤ 75mΩ | ±0.5% | |
| PR2512DKx7Wxxxxxx | | | 2W | | | | | |
| PA2512xKF07xxxxL | PA | 2512 | 1W | (PxR)^1/2 | -55°C to 155°C | 1mΩ ≤ R ≤ 10mΩ | ±1%<br>±5% | ±100 ppm/°C |
| PA2512xKF7WxxxxL | | | 2W | | | | | |
| PA2512xKF7TxxxxL | | | 3W | | | | | |
| ! PF0402xRx07xxxxxx | PF | 0402 | 1/16W | (PxR)^1/2 | -55°C to 155°C | 10mΩ ≤ R ≤ 50mΩ | ±1%<br>±2%<br>±5% | ±100 ppm/°C |
| ! PF0402xRx7Wxxxxxx | | | 1/8W | | | | | |
| ! PF0402xRx47xxxxxx | | | 1/4W | | | | | |
| PF0603xRx07xxxxxx | | 0603 | 1/10W | | -55°C to 170°C | 5mΩ ≤ R ≤ 100mΩ | | ±50 ppm/°C<br>±75 ppm/°C<br>±100 ppm/°C |
| PF0603xRx7Wxxxxxx | | | 1/5W | | | | | |
| PF0603xRx7Txxxxxx | | | 1/3W | | | | | |
| PF0603xRx47xxxxxx | | | 2/5W | | | | | |
| PF0603xRx57xxxxxx | | | 1/2W | | | | | |
| PF0805xRx07xxxxxx | | 0805 | 1/8W | | | 3mΩ ≤ R ≤ 100mΩ | | |
| PF0805xRx7Wxxxxxx | | | 1/4W | | | | | |
| PF0805xRx7Txxxxxx | | | 1/3W | | | | | |
| PF0805xRx47xxxxxx | | | 1/2W | | | | | |
| PF1206xxx07xxxxxx | | 1206 | 1/4W | | | 3mΩ ≤ R ≤ 100mΩ | | |
| PF1206xxx7Wxxxxxx | | | 1/2W | | | | | |
| PF1206xxx47xxxxxx | | | 1W | | | | | |
| PF2010xKx07xxxxxx | | 2010 | 1/2W | | | 5mΩ ≤ R ≤ 100mΩ | | |
| PF2010xKx7Wxxxxxx | | | 1W | | | | | |
| PF2512xKx07xxxxxx | | 2512 | 1W | | | 6mΩ ≤ R ≤ 100mΩ | | |
| PF2512xKx7Wxxxxxx | | | 2W | | | | | |
| PF2512xKx7Txxxxxx | | | 3W | | | | | |
| PF4527xKx07xxxxxx | | 4527 | 2W | | | 5mΩ ≤ R ≤ 1Ω | | |
| PF4527xKx7Wxxxxxx | | | 3W | | | | | |
| PF4527xKx7Txxxxxx | | | 5W | | | | | |
| PF4527xKx7Wxxxxxx | | 4527 | 3W | | | 5mΩ ≤ R ≤ 1Ω | ±1%<br>±2%<br>±5% | ±50 ppm/°C<br>±75 ppm/°C<br>±100 ppm/°C |
| PF4527xKx7Txxxxxx | | | 5W | | | | | |
| PF0612xKx07xxxxxx | PF (Wide) | 0612 | 1W | (PxR)^1/2 | -55°C to 170°C | 1mΩ ≤ R ≤ 300mΩ | ±1%<br>±2%<br>±5% | ±75 ppm/°C<br>±100 ppm/°C |
| PF0612xKx7Wxxxxxx | | | 2W | | | | | |
| PF0815xKx07xxxxxx | | 0815 | 1/2W | | | 1mΩ ≤ R ≤ 100mΩ | | |
| PF0815xKx7Wxxxxxx | | | 1W | | | | | |
| PF0830xKx07xxxxxx | | 0830 | 2W | | | 1mΩ ≤ R ≤ 100mΩ | | |
| PF0830xKx7Wxxxxxx | | | 3W | | | | | |

| Global part number | Series | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range | Toler-ance | T. C. R. |
|---|---|---|---|---|---|---|---|---|
| ! PE0612xKx07xxxxxx | PE (Wide) | 0612 | 1W | (PxR)^1/2 | -55°C to 170°C | 1mΩ ≤ R ≤ 300mΩ | ±1% ±2% ±5% | ±75 ppm/°C ±100 ppm/°C |
| ! PE0612xKx7Wxxxxxx | | | 2W | | | | | |
| ! PE0815xKx07xxxxxx | | 0815 | 1/2W | | | 1mΩ ≤ R ≤ 100mΩ | | |
| ! PE0815xKx7Wxxxxxx | | | 1W | | | | | |
| ! PE0830xKx07xxxxxx | | 0830 | 2W | | | 1mΩ ≤ R ≤ 100mΩ | | |
| ! PE0830xKx7Wxxxxxx | | | 3W | | | | | |
| PH0805xRx07xxxxxx | PH | 0805 | 4/5W | (PxR)^1/2 | -55°C to 155°C | 4mΩ ≤ R ≤ 50mΩ | ±1% ±2% ±5% | ±75 ppm/°C |
| PH1206xRx07xxxxxx | | 1206 | 1W | | | | | |
| ! PE0402xRx07xxxxxx | PE | 0402 | 1/16W | (PxR)^1/2 | -55°C to 155°C | 10mΩ ≤ R ≤ 50mΩ | ±1% ±2% ±5% | ±100 ppm/°C |
| ! PE0402xRx7Wxxxxxx | | | 1/8W | | | | | |
| ! PE0402xRx47xxxxxx | | | 1/4W | | | | | |
| PE0603xRx07xxxxxx | | 0603 | 1/10W | | -55°C to 170°C | 5mΩ ≤ R ≤ 100mΩ | | ±50 ppm/°C ±75 ppm/°C ±100 ppm/°C |
| PE0603xRx7Wxxxxxx | | | 1/5W | | | | | |
| PE0603xRx7Txxxxxx | | | 1/3W | | | | | |
| PE0603xRx47xxxxxx | | | 2/5W | | | | | |
| PE0603xRx57xxxxxx | | | 1/2W | | | | | |
| PE0805xRx07xxxxxx | | 0805 | 1/8W | | | 3mΩ ≤ R ≤ 100mΩ | | |
| PE0805xRx7Wxxxxxx | | | 1/4W | | | | | |
| PE0805xRx7Txxxxxx | | | 1/3W | | | | | |
| PE0805xRx47xxxxxx | | | 1/2W | | | | | |
| PE1206xxx07xxxxxx | | 1206 | 1/4W | | | 3mΩ ≤ R ≤ 100mΩ | | |
| PE1206xxx7Wxxxxxx | | | 1/2W | | | | | |
| PE1206xxx47xxxxxx | | | 1W | | | | | |
| ! PE2010xKx07xxxxxx | | 2010 | 1/2W | | | 5mΩ ≤ R ≤ 100mΩ | | |
| ! PE2010xKx7Wxxxxxx | | | 1W | | | | | |
| ! PE2512xKx07xxxxxx | | 2512 | 1W | | | 6mΩ ≤ R ≤ 100mΩ | | |
| PE2512xKx7Wxxxxxx | | | 2W | | | | | |
| ! PE2512xKx7Txxxxxx | | | 3W | | | | | |
| ! PE4527xKx07xxxxxx | | 4527 | 2W | | | 5mΩ ≤ R < 1Ω | | |
| ! PE4527xKx7Wxxxxxx | | | 3W | | | | | |
| ! PE4527xKx7Txxxxxx | | | 5W | | | | | |
| ! PS0306xRx07xxxxxx | PS (4 Terminal) | 0306 | 1/8W | (PxR)^1/2 | -55°C to 155°C | 10mΩ ≤ R ≤ 50mΩ | ±1% ±5% | ±75 ppm/°C ±100 ppm/°C |
| ! PS0306xRx7Wxxxxxx | | | 1/4W | | | | | |
| ! PS0508xRx07xxxxxx | | 0508 | 1/8W | | -55°C to 170°C | | | |
| ! PS0508xRx7Wxxxxxx | | | 1/4W | | | | | |
| ! PS0508xRx7Txxxxxx | | | 1/2W | | | | | |
| ! PS0612xKx07xxxxxx | | 0612 | 1W | | | 0.5mΩ, 0.75mΩ 1mΩ ≤ R ≤ 5mΩ | | 0.5mΩ, 0.75mΩ ±700 ppm/°C 1mΩ ≤ R ≤ 2mΩ ±400 ppm/°C 3mΩ ≤ R ≤ 5mΩ ±150 ppm/°C |
| ! PS1225xKx07xxxxxx | | 1225 | 3W | | | 4mΩ ≤ R ≤ 50mΩ | | ±75 ppm/°C ±100 ppm/°C |

**Note:** " ! " is the symbol for new product

## Specification overview

| Global part number | Series | Size | Power rating | Max. voltage | Operating Temp. range | Resistance range | Tolerance | T. C. R. |
|---|---|---|---|---|---|---|---|---|
| AR0402xR-07xxxxL | AR | 0402 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C |
| AR0603xR-07xxxxL | | 0603 | 1/10W | 50V | | | | |
| AR0805xR-07xxxxL | | 0805 | 1/8W | 150V | | | | |
| AR1206xR-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| ! SR0402xR-07xxxxL | SR | 0402 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 100KΩ | ±5%<br>±10%<br>±20% | ±200 ppm/°C |
| ! SR0402xR-7WxxxxL | | | 1/8W | | | | | |
| ! SR0603xR-07xxxxL | | 0603 | 1/10W | 50V | | | | |
| ! SR0603xR-7WxxxxL | | | 1/5W | | | | | |
| SR0805xR-07xxxxL | | 0805 | 1/8W | 150V | | | | |
| ! SR0805xR-7WxxxxL | | | 1/4W | | | | | |
| SR1206xR-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| ! SR1206xR-7WxxxxL | | | 1/2W | | | | | |
| SR1218xK-07xxxxL | | 1218 | 1W | 200V | | | | |
| SR2010xK-07xxxxL | | 2010 | 3/4W | 200V | | | | |
| SR2512xK-07xxxxL | | 2512 | 1W | 200V | | | | |
| ! RV0603xR-07xxxxL | RV | 0603 | 1/10W | 350V | -55°C to 155°C | 10KΩ ≤ R ≤ 1MΩ | ±1%<br>±5% | ±200 ppm/°C |
| RV0805xR-07xxxxL | | 0805 | 1/8W | 400V | | 100KΩ ≤ R ≤ 10MΩ | | |
| RV1206xR-07xxxxL | | 1206 | 1/4W | 500V | | 100KΩ ≤ R ≤ 27MΩ | Max.: 10MΩ ±1%<br>Max.: 27MΩ ±5% | |
| RV2512JK-07xxxxL | | 2512 | 1W | | | 4.7MΩ ≤ R ≤ 16MΩ | ±5% | |
| TR0402xR-07xxxxL | TR | 0402 | 1/16W | 50V | -55°C to 125°C | 1Ω ≤ R ≤ 10MΩ | +0/-10%<br>+0/-20%<br>+0/-30% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 1MΩ ±100 ppm/°C<br>1MΩ < R ≤ 10MΩ ±200 ppm/°C |
| TR0603xR-07xxxxL | | 0603 | 1/16W | | | | | |
| TR0805xR-07xxxxL | | 0805 | 1/8W | 150V | -55°C to 155°C | | | |
| TR1206xR-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| ! AF0201xR-07xxxxL | | 0201 | 1/20W | 25V | -55°C to 125°C | 1Ω ≤ R ≤ 10MΩ<br>Jumper<50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω -100/+350 ppm/°C<br>10Ω < R ≤ 10MΩ ±200 ppm/°C |
| AF0402xRx-07xxxxL | | 0402 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 22MΩ<br>Jumper<50mΩ | Max:10MΩ ±1%<br>Max:22MΩ ±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C<br>10MΩ < R ≤ 22MΩ ±200 ppm/°C |
| AF0603xRx-07xxxxL | | 0603 | 1/10W | 50V | | | | |
| AF0805xRx-07xxxxL | | 0805 | 1/8W | 150V | | | | |
| AF1206xRx-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| ! AF1210xRx-07xxxxL | | 1210 | 1/2W | 200V | | 1Ω ≤ R ≤ 10MΩ<br>Jumper<50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C |
| ! AF1218xKx-07xxxxL | | 1218 | 1W | 200V | | | | |
| ! AF2010xKx-07xxxxL | | 2010 | 3/4W | 200V | | | | |
| ! AF2512xKx-07xxxxL | | 2512 | 1W | 200V | | | | |
| ! AF122-xR-07xxxxL | | 2*0402 | 1/16W | 50V | -55°C to 125°C | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω ±250 ppm/°C<br>10Ω < R ≤ 1MΩ ±200 ppm/°C |
| ! AF124-xR-07xxxxL | | 4*0402 | 1/16W | 25V | -55°C to 155°C | | | |
| AC0402xR-07xxxxL | AC | 0402 | 1/16W | 50V | -55°C to 155°C | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | ±1%<br>±5% | 1Ω ≤ R ≤ 10Ω ±200 ppm/°C<br>10Ω < R ≤ 10MΩ ±100 ppm/°C |
| AC0603xR-07xxxxL | | 0603 | 1/10W | 50V | | | | |
| AC0805xR-07xxxxL | | 0805 | 1/8W | 150V | | | | |
| AC1206xR-07xxxxL | | 1206 | 1/4W | 200V | | | | |
| AC1210xR-07xxxxL | | 1210 | 1/2W | 200V | | | | |
| AC1218xK-07xxxxL | | 1218 | 1W | 200V | | 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | | |
| AC2010xK-07xxxxL | | 2010 | 3/4W | 200V | | 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | | |
| AC2512xK-07xxxxL | | 2512 | 1W | 200V | | | | |
| ATV321xR-07xxxxL | AT | 0404 | 40mW | 50V | -55°C to 125°C | -1dB to -20dB | ±0.3dB<br>±0.5dB<br>±1.0dB<br>±2.0dB | --- |

**Note:** " ! " is the symbol for new product

## Global part number - Single resistor [3]

**R C  0 4 0 2  J  R  —  7 D  1 0 R  L**

Series name (code 1-2)
- RC = Thick film general purpose
- RE = Thick film precision grade
- RT = Thin film high precision high stability
- RL = Thick film low ohmic
- PT = Thick film low ohmic low T. C. R.
- PR/PA/PF/PH/PE = Current sensor - low T. C. R.
- PS = Current sensor - low T.C.R, 4 termination
- TR = Trimmable
- SR = Surge
- AR = NiAu termination
- RV = High voltage
- AF = Sulfur resistant
- AC = Automotive grade

Size code (code 3-6)
(inch / metric)
- 0100 = 0.4 x 0.2
- 0201 = 0.6 x 0.3
- 0402 = 1.0 x 0.5
- 0603 = 1.6 x 0.8
- 0612 = 1.6 x 3.2
- 0805 = 2.0 x 1.25
- 0815 = 2.15 x 3.75
- 0830 = 2.0 x 7.5
- 1206 = 3.2 x 1.6
- 1210 = 3.2 x 2.6
- 1218 = 3.2 x 4.5
- 2010 = 5.0 x 2.5
- 2512 = 6.35 x 3.2
- 4527 = 11.0 x 7.0

Tolerance (code 7)
- W = ±0.05%
- B = ±0.1%
- C = ±0.25%
- D = ±0.5%
- F = ±1%
- G = ±2%
- J = ±5% (for RC/AR/AF/AC Jumper ordering)
- K = ±10% (for TR = 0/-10%)
- M = ±20% (for TR = 0/-20%)
- N = ±30% (for TR = 0/-30%)
- "—" for RL/PT Jumper ordering

Packing style (code 8 )
- R = Paper tape reel
- K = Embossed plastic tape reel
- C = Bulk cassette
- S = ESD safe reel

T. C. R. (code 9)
- B = ±10 ppm/°C (on request)
- C = ±15 ppm/°C (on request)
- D = ±25 ppm/°C
- E = ±50 ppm/°C
- M = ±75 ppm/°C
- F = ±100 ppm/°C
- L = ± 150 ppm/°C
- G = ±200 ppm/°C
- P = ± 400 ppm/°C
- Q = ± 700 ppm/°C
- "—" = Based on spec.
- (— for thick film only)

Taping reel (code 10-11)
- 07 = 7 inch Dia. reel
- 10 = 10 inch Dia. reel
- 13 = 13 inch Dia. reel
- 7D = 7 inch Dia. reel
  2 x standard quantity

Resistance (code 12-16)
- 0R = Jumper
- 0U5 = 0.0005Ω
- 0R1 = 0.1Ω
- 1R = 1Ω
- 10R = 10Ω
- 100R = 100Ω
- 1K = 1 000Ω
- 1M = 1 000 000Ω
- 100M = 100 000 000Ω

Default code [1/2] (code 17)

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only
3. Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products.

## Ordering information - Global part number

### Global part number - Power enhancement

**RL 0805 J R — 7W 0R015 L**

Series name (code 1-2)
- RC = Thick film general purpose
- RL = Thick film low ohmic
- PT = Thick film low ohmic low T. C. R.
- PR/PA/PF/PE = Current sensor - low T. C. R.
- PS = Current sensor - low T.C.R, 4 termination

Size code (code 3-6) (inch / metric)
- 0306 = 0.8 x 1.6
- 0508 = 1.25 x 2.0
- 0612 = 1.6 x 3.2
- 0805 = 2.0 x 1.25
- 0815 = 2.15 x 3.75
- 1206 = 3.2 x 1.6
- 1225 = 3.2 x 6.35
- 2010 = 5.0 x 2.5
- 2512 = 6.35 x 3.2
- 4527 = 11.0 x 7.0

Tolerance (code 7)
- F = ±1%
- G = ±2%
- J = ±5%

Packing style (code 8 )
- R = Paper tape reel
- K = Embossed plastic tape reel

Default code (code 17)
- L / Z = Default code

Resistance (code 12-16)
- 0U5 = 0.0005Ω
- 0R01 = 0.01Ω
- 0R1 = 0.1Ω

Taping reel (code 10-11)
- 07 = 7 inch Dia. reel
- 7W = 7 inch Dia. reel 2 x standard power type
- 7T = 7 inch Dia. reel 3 x standard power type
- 47 = 7 inch Dia. reel 4 x standard power type
- 57 = 7 inch Dia. reel 5 x standard power type

T. C. R. (code 9)
- E = ±50 ppm/°C
- M = ±75 ppm/°C
- F = ±100 ppm/°C
- G = ±200 ppm/°C
- "—" = Based on spec.
- (— for thick film only)

### Global part number - Arrays & Networks

**YC 16 4 — J R — 07 10R L**

Series name (code 1-2)
- YC = Array & Network (convex / flat) thick film
- TC = Array (concave) thick film
- AF = Sulfur resistant array (Convex) thick film

Size code (inch) (code 3-4)
- 10 = 0201 x 2 (0202), 0201 x 4 (0204)
- 12 = 0402 x 2 (0404), 0402 x 4 (0408)
- 15 = 10Pin/8R (0612)
- 16 = 0603 x 2 (0606), 0603 x 4 (0612)
- 24 = 0602 x 8 (0616)
- 32 = 1206 x 4 (1224)
- 35 = 10Pin/8R (1225)

Number of resistors (code 5)
- 2 = 2 resistors
- 4 = 4 resistors
- 8 = 8 resistors

Schematic (code 6)
- L = L-type (for YC358)
- T = T-type (for YC158/358)
- M = Reverse type
- H = Reverse & Half type
- "—" = Based on spec.

Default code (code 17)

Resistance (code 12-16)
- 0R = Jumper
- 0R1 = 0.1Ω
- 1R = 1Ω
- 10R = 10Ω
- 100R = 100Ω
- 1K = 1 000Ω
- 1M = 100 000 000

Taping reel (code 10-11)
- 07 = 7 inch Dia. reel
- 10 = 10 inch Dia. reel
- 13 = 13 inch Dia. reel

T.C.R. (code 9)
- "—" = Based on spec.

Packing style (code 8 )
- R = Paper tape reel
- K = Embossed plastic tape reel

Tolerance (code 7)
- F = ±1%
- J = ±5% (for Jumper ordering)

## Phycomp CTC ordering code - North America

Ordering example: 9C06031A10R0FKHFT = R-Chip 0603, 10R0, 1%, 5K reel

| 1-2 | 3-6 | 7-8 | 9-12 | 13 | 14 | 15-16 | 17 |
|---|---|---|---|---|---|---|---|
| X X | X X X X | X X | X X X X | X | X | X X | X |

**Series name (code 1-2)**
- 9C = Phycomp thick film chip resistors
- 9T = Phycomp thin film chip resistors

**Size code (standard resistors, code 3-6)**

| | |
|---|---|
| 0201 | 0201 (0603) |
| 0402 | 0402 (1005) |
| 0603 | 0603 (1608) |
| 0805 | 0805 (2012) |
| 1206 | 1206 (3216) |
| 1210 | 1210 (3225) |
| 1218 | 1218 (3248) |
| 2010 | 2010 (5025) |
| 2512 | 2512 (6432) |
| AC34 | 0603 (1608) 4R concave array |
| AV34 | 0603 (1608) 4R convex array |
| AV22 | 0402 (1005) 2R convex array |
| AV24 | 0402 (1005) 4R convex array |
| AV28 | 0402 (1005) 8R convex array |
| RN31 | 10P8R in 1206 convex network |
| FR01 | 1206 (3216) Fusible |
| FR21 | 0603 (1608) Fusible |
| SR01 | 1206 (3216) Surge |
| VR01 | 1206 (3216) High voltage 5% |
| VR02 | 1206 (3216) High voltage 1% |
| VR11 | 0805 (2012) High voltage 5% |
| VR12 | 0805 (2012) High voltage 1% |
| VR21 | 2512 (6432) High voltage 5% |
| MR22 | 2512 (6432) Current sensor - low T. C. R. |
| MF22 | 2512 (6432) Current sensor - low T. C. R. |
| V321 | 0404 (1010) RF attenuator |

**Power rating (code 7-8)**

| | | | |
|---|---|---|---|
| 1A | 1/16W | 0.063W | (0402) |
| 1A | 1/10W | 0.10W | (0603) |
| 2A | 1/8W | 0.125W | (0805) |
| 3A | 1/4W | 0.25W | (1206) |
| 5A | 1/2W | 0.5W | (1210) |
| 7A | 1/20W | 0.05W | (0201) |
| 8A | 1/32W | 0.03125W | (RN31) |
| 12 | 3/4W | 0.75W | (2010) |
| 1W | 1W | 1W | (1218/2512) |
| 2W | 2W | 2W | |

**Resistance value (code 9-12)**
- 0R00 = Jumper
- R0XX < 0.1Ω
- RXXX = 0.1Ω - 0.976Ω
- XRXX = 1Ω - 9.76Ω
- XXRX = 10Ω - 97.6Ω
- XXX0 = 100Ω - 976Ω
- XXX1 = 1K - 9.76K
- XXX2 = 10K - 97.6K
- XXX3 = 100K - 9.78K
- XXX4 = 1M - 9.76M
- XXX5 = 10M - 97.6M
- XXX6 = 100M+
- XXDB = 1 - 20DB

**Packing style (code 17 )**
- T = 5K paper
- 3 = 10K paper
- 4 = 20K paper
- 5 = 4K blister
- 6 = 5K blister
- 7 = 50K paper
- P = 25K bulk case

**Special coding (code 15-16)**
- HF = SnPb
- PF = Lead-free
- AF = NiAu

**T. C. R. (code 14)**
- C = ±10 ppm/°C
- D = ±15 ppm/°C
- A = ±25 ppm/°C
- B = ±50 ppm/°C
- K = ±100 ppm/°C
- L = ±200 ppm/°C
- E = ±250 ppm/°C
- M = ±300 ppm/°C
- G = ±500 ppm/°C
- F = 0/+500 ppm/°C
- R = ±600 ppm/°C
- Q = -100/+600 ppm/°C
- P = ±750 ppm/°C
- H = ±1000 ppm/°C
- I = ±1500 ppm/°C
- J = ±2000 ppm/°C
- N = ±3000 ppm/°C

**Tolerance (code 13)**
- E = ±0.01%
- A = ±0.05%
- B = ±0.1%; 0.2dB (dB values apply to attenuators)
- C = ±0.25%; 0.3dB (dB values apply to attenuators)
- D = ±0.5%; 0.5dB (dB values apply to attenuators)
- F = ±1%; 1dB (dB values apply to attenuators)
- G = ±2%; 2dB (dB values apply to attenuators)
- J = ±5%
- N = 0/-20% (Right values apply to trimmable resistors)
- R = 0/-30% (Right values apply to trimmable resistors)

## IEC publication 63, SPQ, last digit of 12NC

| Standard of values in a decade according to "IEC publication 63" | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E24 series | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 |
| | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
| E96 series | 100 | 102 | 105 | 107 | 110 | 113 | 115 | 118 | 121 | 124 | 127 | 130 |
| | 133 | 137 | 140 | 143 | 147 | 150 | 154 | 158 | 162 | 165 | 169 | 174 |
| | 178 | 182 | 187 | 191 | 196 | 200 | 205 | 210 | 215 | 221 | 226 | 232 |
| | 237 | 243 | 249 | 255 | 261 | 267 | 274 | 280 | 287 | 294 | 301 | 309 |
| | 316 | 324 | 332 | 340 | 348 | 357 | 365 | 374 | 383 | 392 | 402 | 412 |
| | 422 | 432 | 442 | 453 | 464 | 475 | 487 | 499 | 511 | 523 | 536 | 549 |
| | 562 | 576 | 590 | 604 | 619 | 634 | 649 | 665 | 681 | 698 | 715 | 732 |
| | 750 | 768 | 787 | 806 | 825 | 845 | 866 | 887 | 909 | 931 | 953 | 976 |

| Packing quantities | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size code | Tape width | 178mm / Ø7" reel | | 254mm / Ø10" reel | 330mm / Ø13" reel | | Weight | Volume |
| | | Paper | Embossed | Paper | Paper | Embossed | g /100pcs | $mm^3$ |
| 0100 | 8mm | 20 000 | --- | --- | --- | --- | 0.007 | 0.0104 |
| 0201 | 8mm | 10 000 / 20 000 | --- | --- | 50 000 | --- | 0.016 | 0.041 |
| 0402 | 8mm | 10 000 / 20 000 | --- | 20 000 | 50 000 | --- | 0.058 | 0.175 |
| 0603 | 8mm | 5 000 | --- | 10 000 | 20 000 | --- | 0.192 | 0.576 |
| 0612 | 8mm | --- | 5 000 | --- | --- | --- | 0.862 | 2.728 |
| 0805 | 8mm | 4 000 / 5 000 | --- | 10 000 | 20 000 | --- | 0.450 | 1.250 |
| 0815 | 8mm | --- | 4 000 | --- | --- | --- | 1.71 | 4.44 |
| 0830 | 12mm | --- | 4 000 | --- | --- | --- | 4.594 | 5.55 |
| 1206 | 8mm | 4 000 / 5 000 | 4 000 | 10 000 | 20 000 | --- | 0.862 | 2.728 |
| 1210 | 8mm | 5 000 | --- | 10 000 | 20 000 | --- | 1.471 | 4.030 |
| 1218 | 12mm | --- | 4 000 | --- | --- | --- | 2.703 | 7.590 |
| 2010 | 12mm | --- | 4 000 / 2 000 | --- | --- | 16 000 | 2.273 | 6.875 |
| 2512 | 12mm | --- | 4 000 | --- | --- | --- | 3.704 | 10.827 |
| 4527 | 24mm | --- | 1 000 | --- | --- | --- | 16.225 | 48.3 |
| YC102 | 8mm | 10 000 | --- | --- | --- | --- | 0.052 | --- |
| YC104 | 8mm | 10 000 | --- | --- | --- | --- | 0.099 | --- |
| AF/YC122 | 8mm | 10 000 | --- | --- | 50 000 | --- | 0.100 | --- |
| TC122 | 8mm | 10 000 | --- | --- | 50 000 | --- | 0.112 | --- |
| ATV321 | 8mm | 10 000 | -- | --- | --- | --- | 0.100 | --- |
| AF/YC124 | 8mm | 10 000 | --- | 20 000 | 40 000 | --- | 0.281 | --- |
| TC124 | 8mm | 10 000 | --- | 20 000 | 40 000 | --- | 0.311 | --- |
| YC162 | 8mm | 5 000 | --- | -- | --- | --- | 0.376 | --- |
| YC164 | 8mm | 5 000 | --- | 10 000 | 20 000 | --- | 0.833 | --- |
| TC164 | 8mm | 5 000 | --- | 10 000 | 20 000 | --- | 1.030 | --- |
| YC158 | 8mm | 5 000 | --- | --- | 20 000 | --- | 0.855 | --- |
| YC248 | 12mm | 5 000 | 4 000 | --- | --- | --- | 0.885 | --- |
| YC324 | 12mm | --- | 4 000 | --- | --- | --- | 2.703 | --- |
| YC358 | 12mm | --- | 4 000 | --- | --- | --- | 3.333 | --- |

### 12NC Ordering information

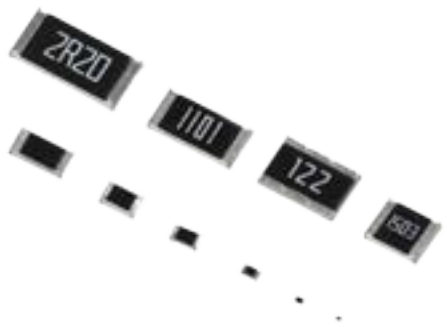
The first 8 or 9 digits of the 12 digit catalogue number are given under section "Phycomp worldwide - Traditional type" on following pages.
The remaining 4 or 3 digits represent the resistance value with the last digit indicating the multiplier as shown in table on the right.

Example:

0.001 Ω = 0010 or 010
0.02 Ω = 0200 or 200
0.3 Ω = 3007 or 307
1 Ω = 1008 or 108
33 kΩ = 3303 or 333
10 MΩ = 1006 or 106

| Last digit of 12NC | |
|---|---|
| Resistance | Last digit |
| 0.001 to 0.0976 Ω | 0 |
| 0.1 to 0.976 Ω | 7 |
| 1 to 9.76 Ω | 8 |
| 10 to 97.6 Ω | 9 |
| 100 to 976 Ω | 1 |
| 1 to 9.76 kΩ | 2 |
| 10 to 97.6 kΩ | 3 |
| 100 to 976 kΩ | 4 |
| 1 to 9.76 MΩ | 5 |
| 10 to 97.6 MΩ | 6 |

## RC - Thick film general purpose chip resistors, 01005 to 2512

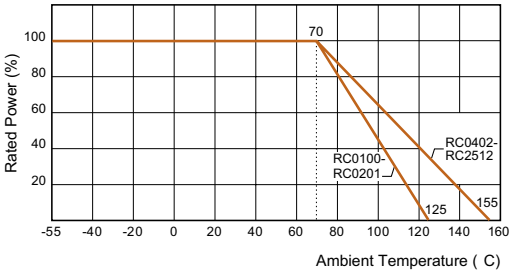


### Features

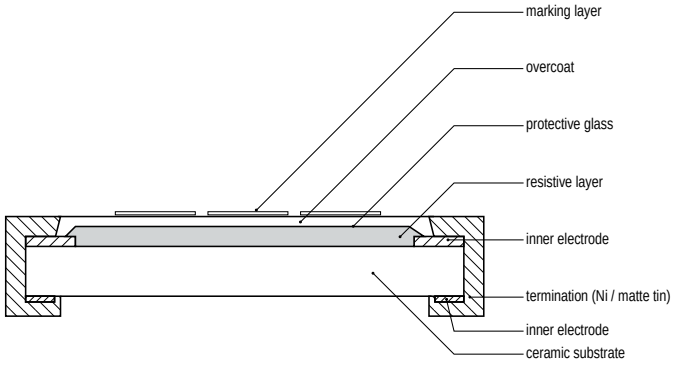
- Extremely thin and light
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Jumper is available
- Available in 8mm tape & reel per IEC 60286-3 (EIA -RS 481)

### Derating curve

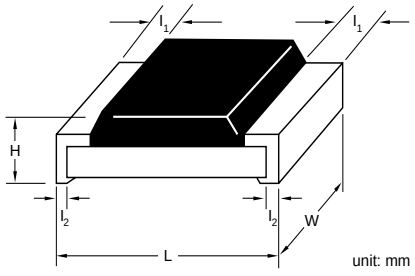
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RC01005 | 0.40 ±0.02 | 0.20 ±0.02 | 0.13 ±0.02 | 0.10 ±0.03 | 0.10 ±0.03 |
| RC0201 | 0.60 ±0.03 | 0.30 ±0.03 | 0.23 ±0.03 | 0.10 ±0.05 | 0.15 ±0.05 |
| RC0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RC0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RC0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RC1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.50 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| RC1218 | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RC2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| RC2512 (1W) | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
| RC2512 (2W) | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 1.15 ±0.20 |

## RC - Thick film general purpose chip resistors, 01005 to 2512

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. ( ppm/°C) | Jumper criteria (unit: A) |
| RC01005 | 1/32W | -55°C to +125°C | 15V | 30V | 30V | E24 ±1%, 5% 1Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω -200~600<br>10Ω≤R≤1MΩ ±250 | Rated current 0.5<br>Max. current 1.0 |
| RC0201 | 1/20W | -55°C to +125°C | 25V | 50V | 50V | E24 ±5% 1Ω≤R≤10MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 10Ω<R≤10MΩ ±200<br>1Ω≤R≤10Ω -100/+350 | Rated current 0.5<br>Max. current 1.0 |
| RC0402 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 1Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω ±200<br>10Ω<R≤10MΩ ±100<br>10MΩ<R≤22MΩ ±200 | Rated current 1.0<br>Max. current 2.0 |
| RC0603 | 1/10W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 1Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω ±200<br>10Ω<R≤10MΩ ±100<br>10MΩ<R≤22MΩ ±200 | Rated current 1.0<br>Max. current 2.0 |
| | 1/5W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 1Ω≤R≤1MΩ<br>E24/E96 ±1% 1Ω≤R≤1MΩ | 1Ω≤R≤1MΩ ±200 | -- -- |
| RC0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | E24 ±5% 1Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω ±200<br>10Ω<R≤10MΩ ±100<br>10MΩ<R≤22MΩ ±200 | Rated current 2.0<br>Max. current 5.0 |
| | 1/4W | -55°C to +155°C | 150V | 300V | 300V | E24 ±5% 1Ω≤R≤1MΩ<br>E24/E96 ±1% 1Ω≤R≤1MΩ | 1Ω≤R≤1MΩ ±200 | -- -- |
| RC1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | E24 ±5% 10Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω ±200<br>10Ω<R≤10MΩ ±100<br>10MΩ<R≤22MΩ ±200 | Rated current 2.0<br>Max. current 10.0 |
| | 1/2W | -55°C to +155°C | 200V | 400V | 500V | E24 ±5% 1Ω≤R≤1MΩ<br>E24/E96 ±1% 1Ω≤R≤1MΩ | 1Ω≤R≤1MΩ ±200 | -- -- |
| RC1210 | 1/2W | -55°C to +155°C | 200V | 500V | 500V | E24 ±5% 1Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96 ±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | 1Ω≤R≤10Ω ±200<br>10Ω<R≤10MΩ ±100<br>10MΩ<R≤22MΩ ±200 | Rated current 2.0<br>Max. current 10.0 |
| RC1218 | 1W | -55°C to +155°C | 200V | 500V | 500V | E24 ±5% 1Ω≤R≤1MΩ<br>E24/E96 ±1% 1Ω≤R≤1MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <20mΩ | | Rated current 6.0<br>Max. current 10.0 |
| RC2010 | 3/4W | -55°C to +155°C | 200V | 500V | 500V | E24 ±5% 1Ω≤R≤22MΩ<br>E24/E96 ±1% 1Ω≤R≤10MΩ<br>E24/E96<br>±0.1%,±0.5% 10Ω≤R≤1MΩ<br>Jumper <50mΩ | | Rated current 2.0<br>Max. current 10.0 |
| RC2512 | 1W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| | 2W | -55°C to +155°C | 200V | 400V | 500V | E24 ±5% 1Ω≤R≤150Ω<br>E24/E96 ±1% 1Ω≤R≤150Ω | 1Ω≤R≤150Ω ±200 | -- -- |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | 01005: ±(3% +0.05Ω)<br>< 100mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(3% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | 01005: ±(2.0% +0.05Ω)<br>< 100mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | 01005: ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05 Ω) for 5% tol.<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | 01005: ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>Others: ±(1% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 50mΩ for jumper<br>No visible damage |

## RC - Thick film general purpose chip resistors, 01005 to 2512

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RC0402JR-07100KL

**RC 0402 J R — 07 100K L**

Series name (code 1-2)
RC = General purpose thick film

Size code (code 3-6)
(inch / metric)
0100 = 0.4 x 0.2
0201 = 0.6 x 0.3
0402 = 1.0 x 0.5
0603 = 1.6 x 0.8
0805 = 2.0 x 1.25
1206 = 3.2 x 1.6
1210 = 3.2 x 2.6
1218 = 3.2 x 4.5
2010 = 5.0 x 2.5
2512 = 6.35 x 3.2

Tolerance (code 7)
B = ±0.1%
D = ±0.5%
F = ±1%
J = ±5% (for Jumper ordering)

Default code(1/2) (code 17)

Resistance (code 12-16)
0R = Jumper
10R = 10Ω
100R = 100Ω
100K = 100KΩ

Taping reel (code 10-11)
07 = 7 inch Dia. reel
10 = 10 inch Dia. reel
13 = 13 inch Dia. reel
7D = 7 inch Dia. reel, 2 x standard quantity
7W = 7 inch Dia. reel, 2 x standard power

T. C. R. (code 9)
"—" = Based on spec.
(— for thick film only)

Packing style (code 8 )
R = Paper tape reel
K = Embossed plastic tape reel
C = Bulk cassette
S = ESD safe reel

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| General purpose thick film / RC series | | | | | | | | | |
| Size: inch (mm) | **0201 (0603)** | | **0402 (1005)** | | **0603 (1608)** | | **0805 (2012)** | | |
| Power | 1/20 W | | 1/16 W | | 1/10 W | | 1/8 W | | |
| Tolerance | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% | |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | |
| Packing | paper tape | | paper tape | | paper tape | | paper tape | | |
| Quantity 5 000 | --- | --- | --- | --- | 2322 702 60...L | 2322 704 6....L | 2322 730 61...L | 2322 734 6....L | |
| 10 000 | 2322 803 70...L | 2322 806 7....L | 2322 705 70...L | 2322 706 7....L | 2322 702 70...L | 2322 704 7....L | 2322 730 71...L | 2322 734 7....L | |
| 20 000 | 2322 806 80...L | 2322 806 8....L | --- | --- | 2322 702 81...L | 2322 704 8....L | 2322 730 81...L | 2322 734 8....L | |
| 50 000 | 2322 803 60...L | 2322 806 6....L | 2322 705 87...L | 2322 706 8....L | --- | --- | --- | --- | |
| Jumper 5 000 | --- | --- | --- | --- | 2322 702 96001L | --- | 2322 730 91002L | --- | |
| 10 000 | 2322 803 91001L | --- | 2322 705 91001L | --- | 2322 702 97001L | --- | 2322 730 91003L | --- | |
| 20 000 | --- | --- | --- | --- | 2322 702 92002L | --- | 2322 730 92002L | --- | |
| 50 000 | --- | --- | 2322 705 91007L | --- | --- | --- | --- | --- | |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| General purpose thick film / RC series | | | | | | | | | | |
| Size: inch (mm) | **1206 (3216)** | | **1210 (3225)** | | **1218 (3248)** | | **2010 (5025)** | | **2512 (6432)** | |
| Power | 1/4 W | | 1/2 W | | 1 W | | 3/4 W | | 1 W | |
| Tolerance | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 |
| Packing | paper tape | | paper tape | | blister tape | | blister tape | | blister tape | |
| Quantity 4 000 | --- | --- | --- | --- | 2322 735 64...L | 2322 735 7....L | 2322 760 60...L | 2322 761 6....L | 2322 762 60...L | 2322 763 6....L |
| 5 000 | 2322 711 61...L | 2322 724 6....L | 2390 735 70...L | 2390 735 3....L | --- | --- | --- | --- | --- | --- |
| 10 000 | 2322 711 51...L | 2322 724 7....L | --- | --- | --- | --- | --- | --- | --- | --- |
| 20 000 | 2322 711 81...L | 2322 724 8....L | 2390 735 71...L | 2390 735 5....L | --- | --- | --- | --- | --- | --- |
| Jumper 4 000 | --- | --- | --- | --- | 2322 735 90007L | --- | 2322 760 90003L | --- | 2322 762 90000L | --- |
| 5 000 | 2322 711 91032L | --- | 2390 735 90001L | --- | --- | --- | --- | --- | --- | --- |
| 10 000 | 2322 711 91005L | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 20 000 | 2322 711 92004L | --- | --- | --- | --- | --- | --- | --- | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America |
|---|
| Regional code for ordering Phycomp branded products. Please see page 15 for details. |

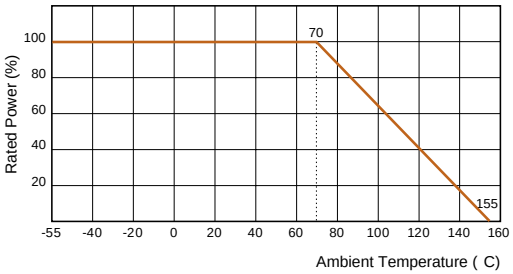
## RC - Thick film high ohmic chip resistors, 0805 / 1206

### Features

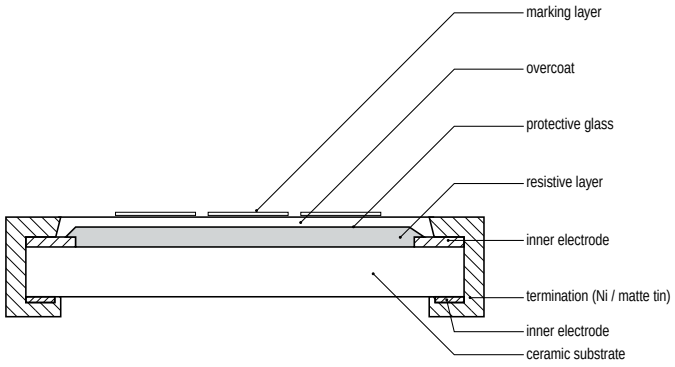
- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- High ohmic values up to 100MΩ
- Suitable for power supplies in small equipment

### Derating curve

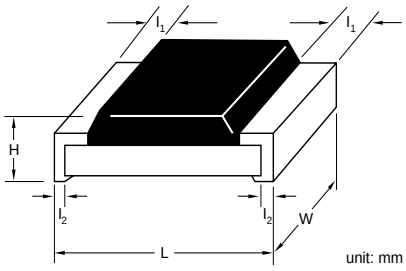
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RC0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RC1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |

## RC - Thick film high ohmic chip resistors, 0805 / 1206

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. |
| RC0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | E24 ±5%, ±10%, ±20% 24MΩ ≤ R ≤ 100MΩ | ±300 ppm/°C |
| RC1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | | |

**Note:** See page 11 for ordering code. For more detailed, please contact our sales offices, distributors and representatives in your region.

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(2% +0.05Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(1% +0.05Ω) |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>No visible damage |

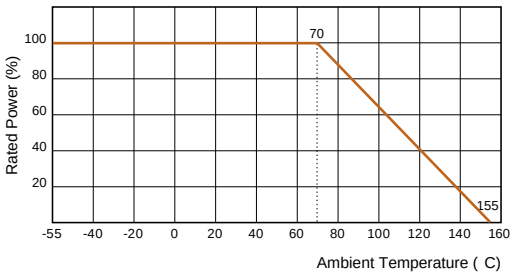
## RE - Thick film precision grade chip resistors, 0402 to 1206

### Features

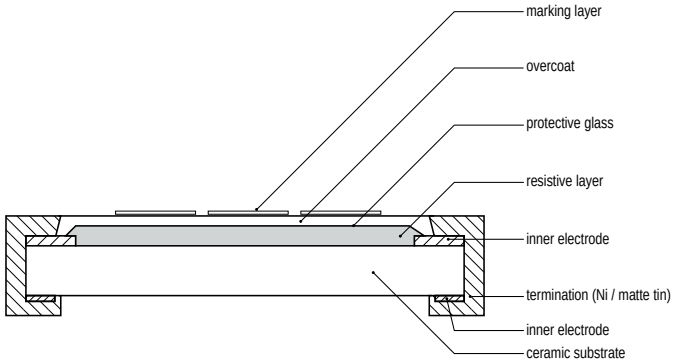
- Narrow tolerance
- Low T. C. R.
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Suitable for auto-placement surface mounting applications
- Available in 8mm tape & reel per EIA RS481

### Derating curve

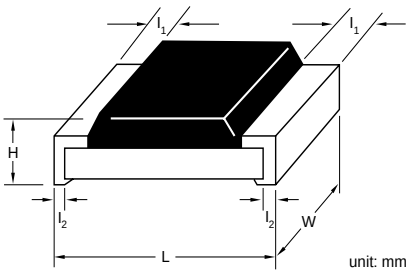
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RE0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.32 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RE0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RE0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RE1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |

## RE - Thick film precision grade chip resistors, 0402 to 1206

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. |
| RE0402 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24/E96 ±0.1%,±0.5%, ±1% 10Ω ≤ R ≤ 1MΩ | ±50 ppm/°C |
| RE0603 | 1/10W | -55°C to +155°C | 50V | 100V | 100V | | |
| RE0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | | |
| RE1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(3% +0.05Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(3% +0.05Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(3% +0.05Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(1% +0.05Ω) |
| Solderability | Wetting | IPC/JEDECJ-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5%+ 0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(1%+ 0.05Ω)<br>No visible damage |

## RE - Thick film precision grade chip resistors, 0402 to 1206

### Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RE0603DRE07100KL

**RE 0603 D R E 07 100K L**

- **RE** — Series name (code 1-2)
  - RE = Thick film precision grade
- **0603** — Size code (code 3-6) (inch / metric)
  - 0402 = 1.0 x 0.5
  - 0603 = 1.6 x 0.8
  - 0805 = 2.0 x 1.25
  - 1206 = 3.2 x 1.6
- **D** — Tolerance (code 7)
  - B = ±0.1%
  - D = ±0.5%
  - F = ±1%
- **R** — Packing style (code 8 )
  - R = Paper tape reel
- **E** — T. C. R. (code 9)
  - E = ±50 ppm/°C
- **07** — Taping reel (code 10-11)
  - 07 = 7 inch Dia. reel
  - 10 = 10 inch Dia. reel
  - 13 = 13 inch Dia. reel
- **100K** — Resistance (code 12-16)
  - 10R = 10Ω
  - 100R = 100Ω
  - 100K = 100KΩ
- **L** — Default code(1/2) (code 17)

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only
3. RE series products are available by "Global part number" only

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

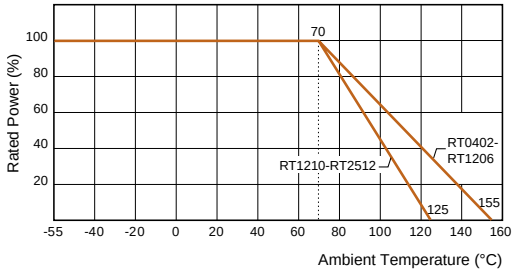
## RT - Thin film high precision high stability chip resistors, 0402 to 2512

### Features

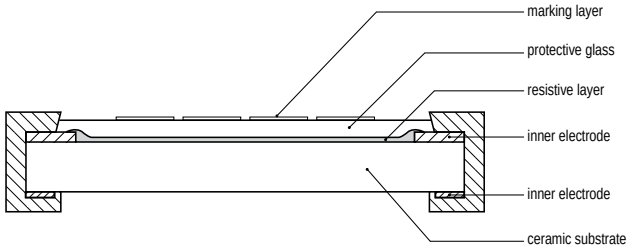
- High precision - High stability
- Low T. C. R. / low noise
- High accuracy (±0.05%, ±0.1%, ±0.25%, ±0.5%, ±1%)

### Derating curve

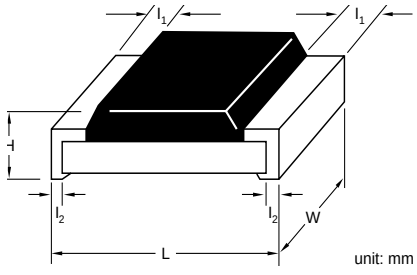
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RT0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.30 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RT0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RT0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RT1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| RT1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.55 ±0.10 | 0.50 ±0.20 | 0.50 ±0.20 |
| RT2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
| RT2512 | 6.35 ±0.10 | 3.20 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

## RT - Thin film high precision high stability chip resistors, 0402 to 2512

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | | T. C. R. |
| RT0402 | 1/16W | -55°C to +155°C | 50V | 100V | 75V | E24/E96 ±0.05%, ±0.1%, ±0.25%, ±0.5%, ±1% | 10Ω ≤ R ≤ 121KΩ | ±50 ppm/°C<br>±25 ppm/°C<br>±15 ppm/°C<br>±10 ppm/°C |
| RT0603 | 1/10W | | 75V | 150V | 100V | | 5.1Ω ≤ R ≤ 681KΩ | |
| RT0805 | 1/8W | | 150V | 300V | 200V | | 5.1Ω ≤ R ≤ 1.5MΩ | |
| RT1206 | 1/4W | | 200V | 400V | 300V | | | |
| RT1210 | 1/4W | -55°C to +125°C | 200V | 400V | 400V | | 5.1Ω ≤ R ≤ 1MΩ | |
| RT2010 | 1/2W | | 200V | 400V | 400V | | 10Ω ≤ R ≤ 1MΩ | |
| RT2512 | 3/4W | | 200V | 400V | 400V | | | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(0.5%+ 0.05Ω) for RT |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(0.5%+ 0.05Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5%+ 0.05Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5%+ 0.05Ω) |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(0.5%+ 0.05Ω) for RT<br>No visible damage |
| Solderability | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.05Ω)<br>No visible damage |
| | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |

## RT - Thin film high precision high stability chip resistors, 0402 to 2512

Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RT0603DRE07100KL

**RT 0603 D R E 07 100K L**

Series name (code 1-2)
RT = High precision - High stability thin film

Size code (code 3-6)
(inch / metric)
0402 = 1.0 x 0.5
0603 = 1.6 x 0.8
0805 = 2.0 x 1.25
1206 = 3.2 x 1.6
1210 = 3.2 x 2.6
2010 = 5.0 x 2.5
2512 = 6.35 x 3.2

Tolerance (code 7)
W = ±0.05%
B = ±0.1%
C = ±0.25%
D = ±0.5%
F = ±1%

Default code (1/2) (code 17)

Resistance (code 12-16)
10R = 10Ω
100R = 100Ω
10K = 10KΩ
100K = 100KΩ

Taping reel (code 10-11)
07 = 7 inch Dia. reel
10 = 10 inch Dia. reel
13 = 13 inch Dia. reel

T. C. R. (code 9)
B = ±10 ppm/°C (on request)
C = ±15 ppm/°C (on request)
D = ±25 ppm/°C
E = ±50 ppm/°C

Packing style (code 8 )
R = Paper tape reel
K = Embossed plastic tape reel

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| High precision - High stability | | | | | | | | | |
| Size: inch (mm) | | 0402 (1005) | | | | 0603 (1608) | | | |
| Power | | 1/16 W | | | | 1/10 W | | | |
| Tolerance | | ±1% | ±0.5% | ±0.25% | ±0.1% | ±1% | ±0.5% | ±0.25% | ±0.1% |
| Resistance | | E24 / E96 | | | | E24 / E96 | | | |
| Packing | | paper tape | | | | paper tape | | | |
| Quantity | **TC25** 5 000 | --- | --- | --- | --- | 2390 604 7….L | 2390 604 6….L | 2390 604 5….L | 2390 604 4….L |
| | **TC50** 5 000 | --- | --- | --- | --- | 2390 404 7….L | 2390 404 6….L | 2390 404 5….L | 2390 404 4….L |
| | **TC25** 10 000 | 2390 607 7….L | 2390 607 6….L | 2390 607 5….L | 2390 607 4….L | --- | --- | --- | --- |
| | **TC50** 10 000 | 2390 407 7….L | 2390 407 6….L | 2390 407 5….L | 2390 407 4….L | --- | --- | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High precision - High stability | | | | | | | | | | | | | |
| Size: inch (mm) | | 0805 (2012) | | | | 1206 (3216) | | | | 1210 (3225) | | | |
| Power | | 1/8 W | | | | 1/4 W | | | | 1/2 W | | | |
| Tolerance | | ±1% | ±0.5% | ±0.25% | ±0.1% | ±1% | ±0.5% | ±0.25% | ±0.1% | ±1% | ±0.5% | ±0.25% | ±0.1% |
| Resistance | | E24 / E96 | | | | E24 / E96 | | | | E24 / E96 | | | |
| Packing | | paper tape | | | | paper tape | | | | paper tape | | | |
| Quantity | **TC10** 5 000 | 2390 801 7....L | 2390 801 6....L | 2390 801 5....L | 2390 801 4....L | 2390 811 7....L | 2390 811 6....L | 2390 811 5....L | 2390 811 4....L | 2390 812 7....L | 2390 812 6....L | 2390 812 5....L | 2390 812 4....L |
| | **TC15** 5 000 | 2390 701 7....L | 2390 701 6....L | 2390 701 5....L | 2390 701 4....L | 2390 711 7....L | 2390 711 6....L | 2390 711 5....L | 2390 711 4....L | 2390 712 7....L | 2390 712 6....L | 2390 712 5....L | 2390 712 4....L |
| | **TC25** 5 000 | 2390 601 7....L | 2390 601 6....L | 2390 601 5....L | 2390 601 4....L | 2390 611 7....L | 2390 611 6....L | 2390 611 5....L | 2390 611 4....L | 2390 612 7....L | 2390 612 6....L | 2390 612 5....L | 2390 612 4....L |
| | **TC50** 5 000 | 2390 401 7....L | 2390 401 6....L | 2390 401 5....L | 2390 401 4....L | 2390 411 7....L | 2390 411 6....L | 2390 411 5....L | 2390 411 4....L | 2390 412 7....L | 2390 412 6....L | 2390 412 5....L | 2390 412 4....L |

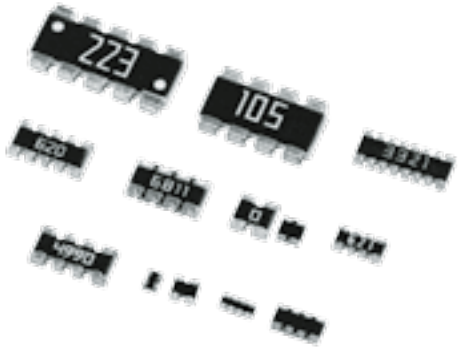
**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| High precision - High stability | | | | | | | | | |
| Size: inch (mm) | | 2010 (5025) | | | | 2512 (6432) | | | |
| Power | | 1/2 W | | | | 3/4 W | | | |
| Tolerance | | ±1% | ±0.5% | ±0.25% | ±0.1% | ±1% | ±0.5% | ±0.25% | ±0.1% |
| Resistance | | E24 / E96 | | | | E24 / E96 | | | |
| Packing | | blister tape | | | | blister tape | | | |
| Quantity | **TC10** 4 000 | 2390 815 7....L | 2390 815 6....L | 2390 815 5....L | 2390 815 4....L | 2390 818 7....L | 2390 818 6....L | 2390 818 5....L | 2390 818 4....L |
| | **TC15** 4 000 | 2390 731 7....L | 2390 731 6....L | 2390 731 5....L | 2390 731 4....L | 2390 735 7....L | 2390 735 6....L | 2390 735 5....L | 2390 735 4....L |
| | **TC25** 4 000 | 2390 615 7....L | 2390 615 6....L | 2390 615 5....L | 2390 615 4....L | 2390 618 7....L | 2390 618 6....L | 2390 618 5....L | 2390 618 4....L |
| | **TC50** 4 000 | 2390 415 7....L | 2390 415 6....L | 2390 415 5....L | 2390 415 4....L | 2390 418 7....L | 2390 418 6....L | 2390 418 5....L | 2390 418 4....L |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America |
|---|
| Regional code for ordering Phycomp branded products. Please see page 13 for details. |

| Thin film product range against tolerance / T. C. R. (ordering code) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tolerance | ±0.05% (W) | | | ±0.1% (B) | | | | ±0.25% (C) | | | | ±0.5% (D) | | ±1% (F) |
| T. C. R. (ppm/°C) | ±10 (B) | ±15 (C) | ±25 (D) | ±10 (B) | ±15 (C) | ±25 (D) | ±50 (E) | ±10 (B) | ±15 (C) | ±25 (D) | ±50 (E) | ±25 (D) | ±50 (E) | ±50 (E) |
| RT0402 | -- | -- | -- | 10R - 100K | 10R - 100K | 10R - 121K | 10R - 121K | 10R - 100K | 10R - 100K | 10R - 121K | 10R - 121K | 10R - 121K | 10R - 121K | 10R - 121K |
| RT0603 | 1K - 47K | 1K - 47K | 1K - 47K | 10R - 100K | 10R - 100K | 10R - 681K | 10R - 681K | 10R - 100K | 10R - 100K | 10R - 681K | 5R1 - 681K | 10R - 681K | 5R1 - 681K | 5R1 - 681K |
| RT0805 | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1.5M | 10R - 1.5M | 10R - 100K | 10R - 100K | 10R - 1.5M | 5R1 - 1.5M | 10R - 1.5M | 5R1 - 1.5M | 5R1 - 1.5M |
| RT1206 | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1.5M | 10R - 1.5M | 10R - 100K | 10R - 100K | 10R - 1.5M | 5R1 - 1.5M | 10R - 1.5M | 5R1 - 1.5M | 5R1 - 1.5M |
| RT1210 | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M | 10R - 1M | 10R - 100K | 10R - 100K | 10R - 1M | 5R1 - 1M | 10R - 1M | 5R1 - 1M | 5R1 - 1M |
| RT2010 | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M | 10R - 1M | 10R - 100K | 10R - 100K | 10R - 1M | 10R - 1M | 10R - 1M | 10R - 1M | 10R - 1M |
| RT2512 | 100R - 100K | 100R - 100K | 100R - 100K | 10R - 100K | 10R - 100K | 10R - 1M | 10R - 1M | 10R - 100K | 10R - 100K | 10R - 1M | 10R - 1M | 10R - 1M | 10R - 1M | 10R - 1M |

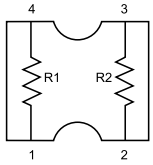


## Features

- Integrated discrete chip resistors from 2 to 8 pcs
- More efficient in pick & place application
- Low assembly costs
- Reduced size of final equipment
- Higher component and equipment reliability

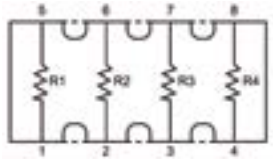
## Schematics

**YC102/122/162**



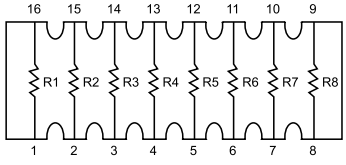

R1 = R2

**YC104/124/164/324**(1)



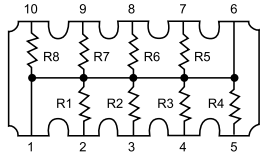

R1 = R2 = R3 = R4

**YC248**



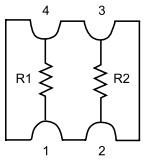

R1 = R2 = R3 = R4 = R5 = R6 = R7 = R8

**YC358 (L-Type)**



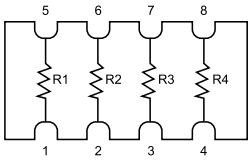

R1 = R2 = R3 = R4 = R5 = R6 = R7 = R8

**TC122**



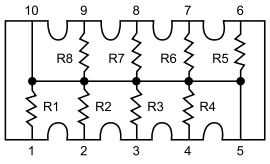

R1 = R2

**TC124/164**



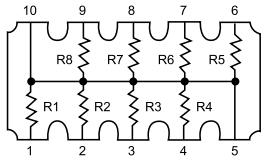

R1 = R2 = R3 = R4

**YC158**



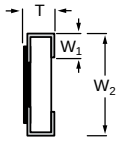

R1 = R2 = R3 = R4 = R5 = R6 = R7 = R8

**YC358 (T-Type)**



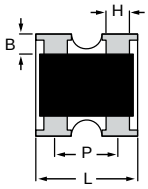

R1 = R2 = R3 = R4 = R5 = R6 = R7 = R8

## Dimensions

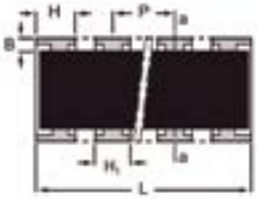



**Side view for all types**

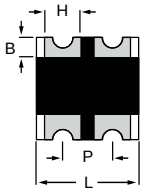
**YC 102/122/162**



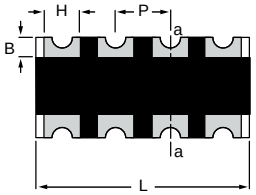

**YC 104/124/164/324**
**158/358/248**(1)




**TC 122**




**TC 124/164**




unit: mm

**Note:** 1. YC104 is flat type

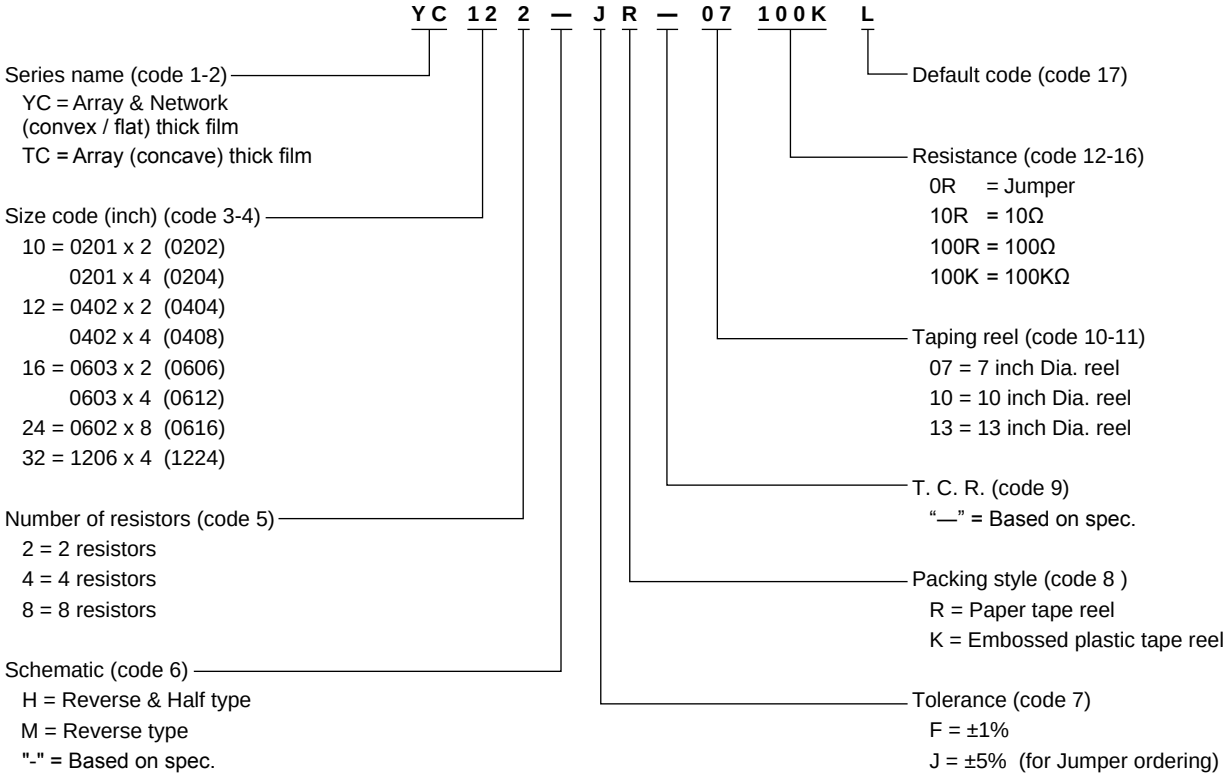
| Type | H / $H_1$ | B | P | L | T | $W_1$ | $W_2$ |
|---|---|---|---|---|---|---|---|
| YC102 | H: 0.35 ±0.10 | 0.20 ±0.10 | 0.50 ±0.05 | 0.80 ±0.10 | 0.35 ±0.10 | 0.15 ±0.10 | 0.60 ±0.10 |
| YC104 | H: 0.20 ±0.10 | 0.15 ±0.05 | 0.40 (Typical) | 1.40 ±0.10 | 0.35 ±0.10 | 0.15 ±0.10 | 0.60 ±0.10 |
| YC122 | H: 0.21 +0.10/-0.05 | 0.20 ±0.10 | 0.67 ±0.05 | 1.00 ±0.10 | 0.30 ±0.10 | 0.25 ±0.10 | 1.00 ±0.10 |
| YC124 | H: 0.45 ±0.05<br>$H_1$: 0.30 ±0.05 | 0.20 ±0.15 | 0.50 ±0.05 | 2.00 ±0.10 | 0.45 ±0.10 | 0.30 ±0.15 | 1.00 ±0.10 |
| YC162 | H: 0.30 ±0.10 | 0.30 ±0.10 | 0.80 ±0.05 | 1.60 ±0.10 | 0.40 ±0.10 | 0.30 ±0.10 | 1.60 ±0.10 |
| YC164 | H: 0.65 ±0.05<br>$H_1$: 0.50 ±0.15 | 0.30 ±0.15 | 0.80 ±0.05 | 3.20 ±0.15 | 0.60 ±0.10 | 0.30 ±0.15 | 1.60 ±0.15 |
| YC248 | H: 0.45 ±0.05<br>$H_1$: 0.30 ±0.05 | 0.30 ±0.15 | 0.50 ±0.05 | 4.00 ±0.20 | 0.45 ±0.10 | 0.40 ±0.15 | 1.60 ±0.15 |
| YC324 | H: 1.10 ±0.15<br>$H_1$: 0.90 ±0.15 | 0.50 ±0.20 | 1.27 ±0.05 | 5.08 ±0.20 | 0.60 ±0.10 | 0.50 ±0.15 | 3.20 ±0.20 |
| TC122 | H: 0.30 ±0.05 | 0.25 ±0.15 | 0.50 ±0.05 | 1.00 ±0.10 | 0.30 ±0.10 | 0.25 ±0.15 | 1.00 ±0.10 |
| TC122H | H : 0.40 ±0.05 | 0.25 ±0.15 | 0.50 ±0.05 | 1.00 ±0.10 | 0.30 ±0.10 | -- | 1.00 ±0.10 |
| TC122M | H : 0.30 ±0.05 | 0.25 ±0.15 | 0.50 ±0.05 | 1.00 ±0.10 | 0.30 ±0.10 | 0.25 ±0.15 | 1.00 ±0.10 |
| TC124 | H: 0.30 ±0.10 | 0.20 ±0.10 | 0.50 ±0.05 | 2.00 ±0.10 | 0.40 ±0.10 | 0.25 ±0.10 | 1.00 ±0.10 |
| TC124H | H : 0.30 ±0.05 | 0.20 ±0.10 | 0.50 ±0.05 | 2.00 ±0.10 | 0.40 ±0.10 | -- | 1.00 ±0.10 |
| TC124M | H : 0.30 ±0.05 | 0.20 ±0.10 | 0.50 ±0.05 | 2.00 ±0.10 | 0.40 ±0.10 | 0.25 ±0.10 | 1.00 ±0.10 |
| TC164 | H: 0.60 ±0.15 | 0.30 ±0.15 | 0.80 ±0.05 | 3.20 ±0.15 | 0.60 ±0.10 | 0.30 ±0.15 | 1.60 ±0.15 |
| YC158 | H: 0.45±0.05<br>H1: 0.32±0.05 | 0.30 ±0.15 | 0.64 ±0.05 | 3.20 ±0.20 | 0.60 ±0.10 | 0.35 ±0.15 | 1.60 ±0.15 |
| YC358 | H: 1.10 ±0.15<br>$H_1$: 0.90 ±0.15 | 0.50 ±0.15 | 1.27 ±0.05 | 6.40 ±0.20 | 0.60 ±0.10 | 0.50 ±0.15 | 3.20 ±0.20 |

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. | Jumper criteria (unit: A) |
| YC102 | 1/32W | -55°C to +125°C | 15V | 30V | 30V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | ±200 ppm/°C | Rated current 0.5<br>Max. current 1.0 |
| YC104 | 1/32W | -55°C to +125°C | 12.5V | 25V | 25V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 0.5<br>Max. current 1.0 |
| YC122 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 0.5<br>Max. current 1.0 |
| YC124 | 1/16W | -55°C to +155°C | 25V | 50V | 100V | E24 ±5% 1Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | 1Ω ≤ R ≤ 10Ω ±250 ppm/°C<br>10Ω ≤ R ≤ 1MΩ ±200 ppm/°C | Rated current 1.0<br>Max. current 2.0 |
| YC162 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | ±200 ppm/°C | Rated current 1.0<br>Max. current 2.0 |
| YC164 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | ±200 ppm/°C | Rated current 1.0<br>Max. current 2.0 |
| YC248 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 2.0<br>Max. current 10.0 |
| YC324 | 1/8W | -55°C to +155°C | 200V | 500V | 500V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ | | -- -- |
| TC122<br>TC122H<br>TC122M | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 1.0<br>Max. current 1.5 |
| TC124<br>TC124H<br>TC124M | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 1.0<br>Max. current 1.5 |
| TC164 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 10Ω ≤ R ≤ 1MΩ<br>Jumper < 0.05Ω | | Rated current 1.0<br>Max. current 2.0 |
| YC158 | 1/16W | -55°C to +155°C | 25V | 50V | 50V | E24 ±5% 10Ω ≤ R ≤ 100KΩ | | -- -- |
| YC358 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 10Ω ≤ R ≤ 330KΩ | | -- -- |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(2% +0.05Ω)<br>< 100mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω)<br>< 50mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω)<br>< 100mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others<br>< 50mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |

## Global part number - Arrays

Ordering example: YC122-JR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

## Phycomp worldwide - Traditional type

Array thick film chip resistors

| Size: inch / mm | 2 X 0402 / 1 X 1 | | 4 X 0402 / 2 X 1 | | 8 X 0602 / 4.0 X 1.6 | | 4 X 0603 / 3.2 X 1.3 | | | | 4 X1206 / 5.2 X 3.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Power | 1/16 W | | 1/16 W | | 1/16 W | | 1/16 W | | | | 1/8 W |
| Tolerance | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% | +5% |
| Type | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network (convex) | R-array / R-network R-network (concave) | R-array / R-network (concave) | R-array / R-network (convex) |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24/E96 | E24 |
| Packing | paper tape | | paper tape | | paper tape | | paper tape | | | | blister tape |
| Quantity 4 000 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | 2350 039 10...L |
| 5 000 | --- | --- | --- | --- | 2350 053 10...L | 2350 043 1....L | 2350 035 10...L | 2350 025 1....L | 2350 034 10...L | 2350 024 1...L | --- |
| 10 000 | 2350 013 11...L | 2350 013 2....L | 2350 033 11...L | 2350 023 2....L | --- | --- | --- | --- | --- | --- | --- |
| Jumper 5 000 | --- | --- | --- | --- | 2350 053 91001L | --- | 2350 035 91001L | --- | 2350 034 91001L | --- | --- |
| 10 000 | 2350 013 91001L | --- | 2350 033 91001L | --- | --- | --- | --- | --- | --- | --- | --- |

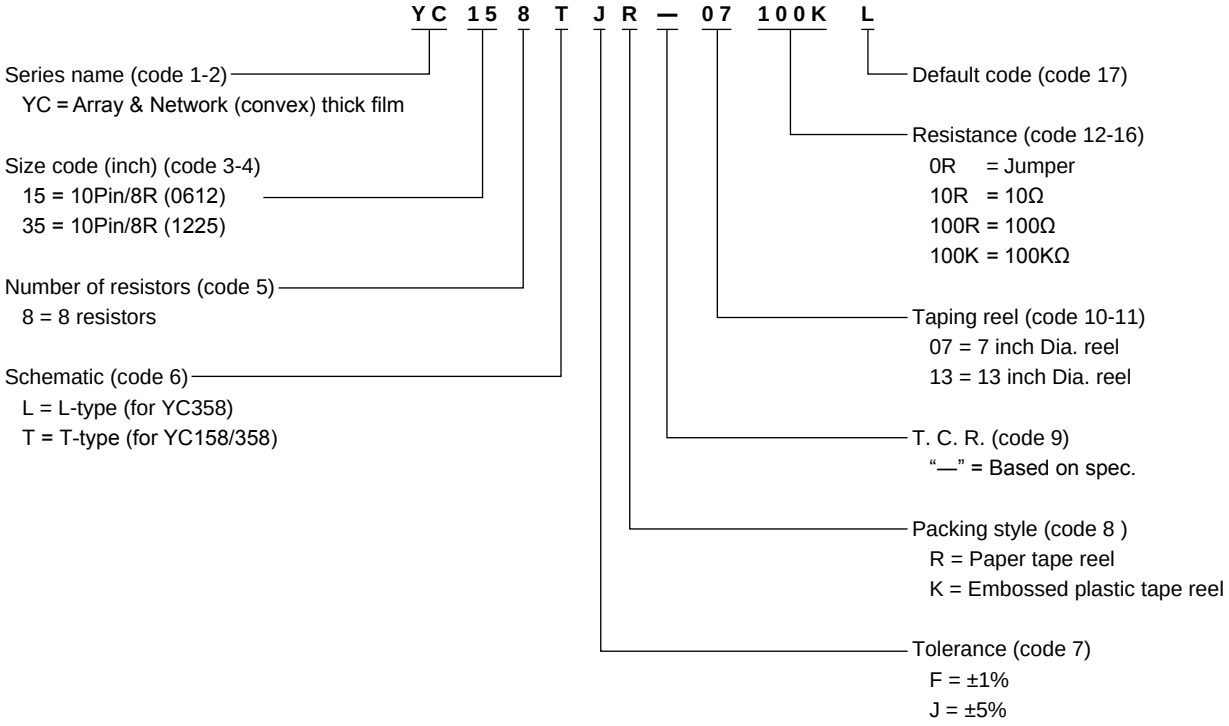
**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

## Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

## Global part number - Networks

Ordering example: YC158TJR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

## Phycomp worldwide - Traditional type

| Network thick film chip resistors | | | |
|---|---|---|---|
| Size: inch (mm) | **0612 (1632)** | **1225 (3264)** | |
| Power | 1/16 W | 1/16 W | |
| Tolerance | +5% | +5% | |
| Type | T-type 10 Pin / 8R<br>PIN 5 and PIN 10 no resistance | T-type 10 Pin / 8R<br>PIN 5 and PIN 10 no resistance | L-type 10 Pin / 8R<br>PIN 1 and PIN 6 no resistance |
| Resistance | E24 | E24 | E24 |
| Packing | paper tape | blister tape | |
| Quantity 4 000 | --- | 2350 201 10...L | 2350 200 10...L |
| 5 000 | 2350 230 10...L | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

## Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

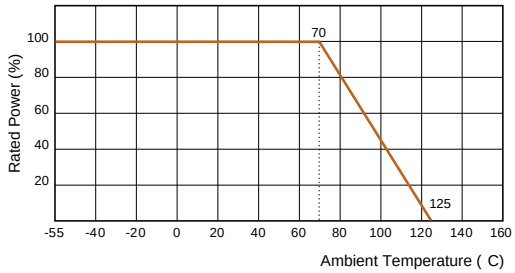
## RL - Thick film low ohmic chip resistors, 0402 to 2512

### Features

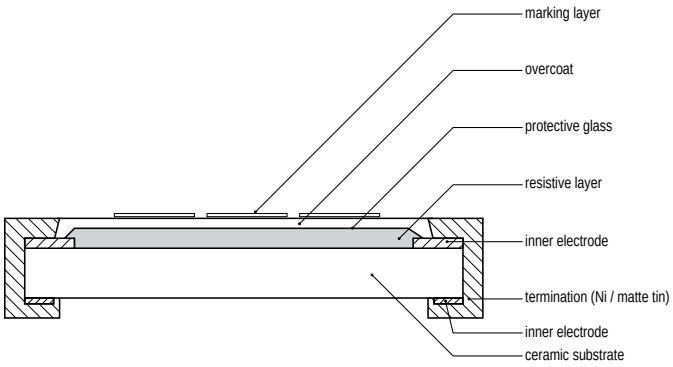
- Current sensing of desktop & notebook PC
- Resistance values down to 0.01Ω
- Highly reliable multilayer electrode construction
- Low inductance
- High speed logic circuits

### Derating curve

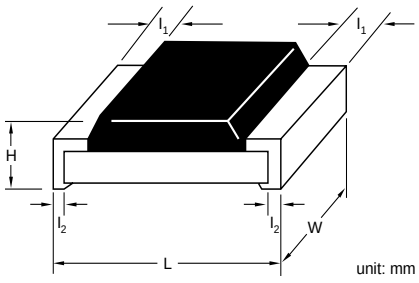
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RL0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| RL0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RL0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RL1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.45±0.20 |
| RL1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.55 ±0.10 | 0.50 ±0.20 | 0.50 ±0.20 |
| RL1218 | 3.05 ±0.15 | 4.60 ±0.20 | 0.55 ±0.10 | 0.45 ±0.25 | 0.50 ±0.25 |
| RL2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
| RL2512 | 6.35 ±0.10 | 3.20 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

## RL - Thick film low ohmic chip resistors, 0402 to 2512

| Electrical characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | Resistance range & tolerance | | T. C. R. ( ppm/°C) | Jumper criteria |
| RL0402 | 1/16W | -55°C to +125°C | E24 ±1%, ±2%, ±5% | 50mΩ ≤ R < 1Ω | See following table "T.C.R.- RL series" | Max. resistance 20mΩ<br>Rated current 1.5A |
| RL0603 | 1/10W | | | 10mΩ ≤ R < 1Ω | | Max. resistance 20mΩ<br>Rated current 2A |
| RL0805 | 1/8W | | | 10mΩ ≤ R < 1Ω | | Max. resistance 20mΩ<br>Rated current 2.5A |
| | 1/4W | | | 10mΩ ≤ R < 1Ω | | -- -- |
| RL1206 | 1/4W | | | 10mΩ ≤ R < 1Ω | | Max. resistance 20mΩ<br>Rated current 3.5A |
| | 1/2W | | | 10mΩ ≤ R < 1Ω | | -- -- |
| RL1210 | 1/2W | | | 10mΩ ≤ R < 1Ω | | -- -- |
| RL1218 | 1W | | | 10mΩ ≤ R < 1Ω | | -- -- |
| RL2010 | 3/4W | | | 10mΩ ≤ R < 1Ω | | -- -- |
| RL2512 | 1W | | | 10mΩ ≤ R < 1Ω | | -- -- |

**Note:** The partial values of 25 / 40 / 50 / 60 / 250 / 400 / 500 mΩ are also available

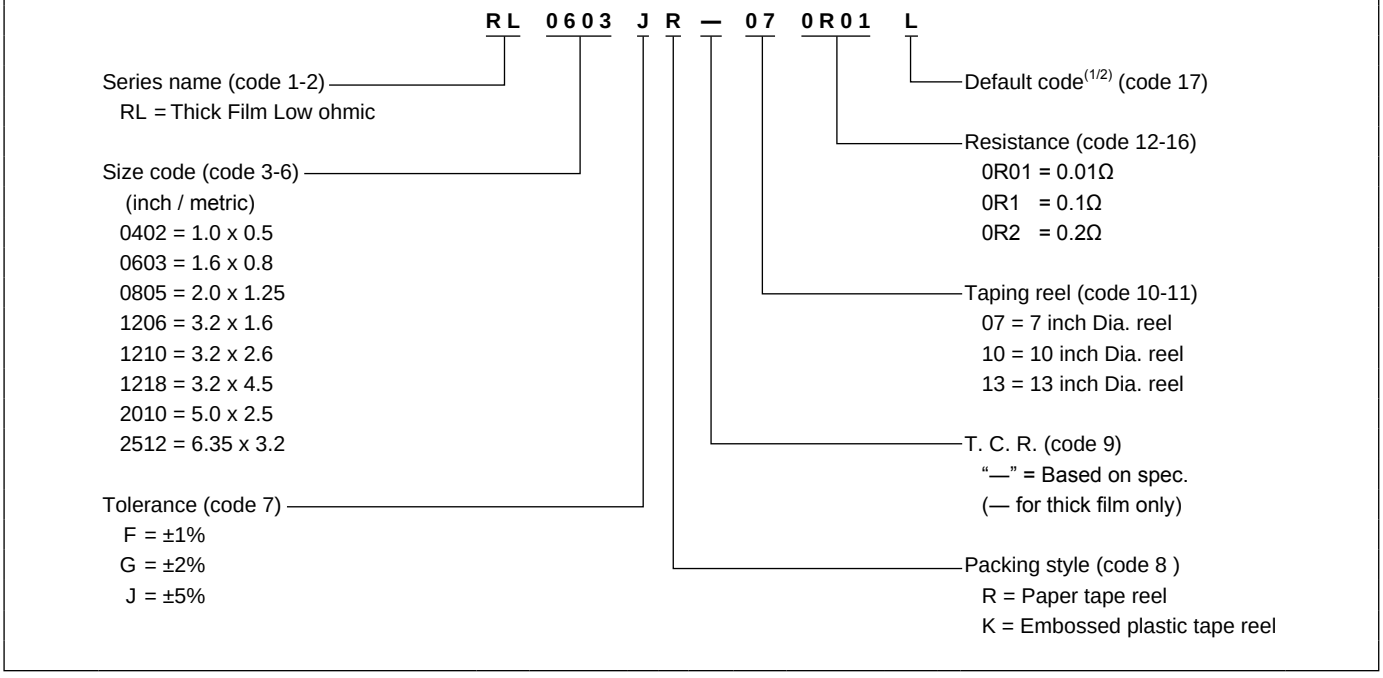
| T. C. R. - RL series | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Operating Temp. range | Resistancec range | T. C. R. | | | | | |
| | | | 50mΩ≤R<100mΩ | 100mΩ≤R<500mΩ | | 500mΩ≤R<1Ω | | |
| RL0402 | -55°C to +125°C | 50mΩ≤R<1Ω | ±1000 ppm/°C | ±800 ppm/°C | | ±300 ppm/°C | | |
| | | | 10mΩ≤R≤36mΩ | 36mΩ≤R≤91mΩ | 91mΩ<R≤500mΩ | 500mΩ<R<1Ω | | |
| RL0603 | -55°C to +125°C | 10mΩ≤R<1Ω | ±1 500 ppm/°C | ±1 200 ppm/°C | ±800 ppm/°C | ±300 ppm/°C | | |
| | | | 10mΩ≤R≤18mΩ | 18mΩ<R≤47mΩ | 47mΩ<R≤91mΩ | 91mΩ<R≤360mΩ | 360mΩ<R≤500mΩ | 500mΩ<R<1Ω |
| RL0805 | -55°C to +125°C | 10mΩ≤R<1Ω | ±1 500 ppm/°C | ±1 200 ppm/°C | ±1 000 ppm/°C | ±600 ppm/°C | ±300 ppm/°C | ±200 ppm/°C |
| RL1206 | | | | | | | | |
| RL1210 | | | ±1 500 ppm/°C | ±1 000 ppm/°C | ±800 ppm/°C | ±600 ppm/°C | ±300 ppm/°C | ±200 ppm/°C |
| | | | 10mΩ≤R≤30mΩ | 30mΩ<R≤56mΩ | 56mΩ<R≤180mΩ | 180mΩ<R<1Ω | | |
| RL1218 | -55°C to +125°C | 10mΩ≤R<1Ω | ±2 000 ppm/°C | ±1 000 ppm/°C | ±700 ppm/°C | ±250 ppm/°C | | |
| | | | 10mΩ≤R≤18mΩ | 18mΩ<R≤47mΩ | 47mΩ<R≤91mΩ | 91mΩ<R≤360mΩ | 360mΩ<R≤500mΩ | 500mΩ<R<1Ω |
| RL2010 | -55°C to +125°C | 10mΩ≤R<1Ω | ±1 500 ppm/°C | ±1 200 ppm/°C | ±1 000 ppm/°C | ±600 ppm/°C | ±300 ppm/°C | ±200 ppm/°C |
| RL2512 | | | ±1 500 ppm/°C | ±1 200 ppm/°C | ±800 ppm/°C | ±600 ppm/°C | ±300 ppm/°C | ±200 ppm/°C |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70°C ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±2% |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±1% |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±2% |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±1% |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±1%<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | RL standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>RL high power:<br>5 times of rated power for 5 seconds at room temperature | ±2%<br>No visible damage |

## RL - Thick film low ohmic chip resistors, 0402 to 2512

Global part number - Preferred type

Ordering example: RL0603JR-070R01L




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

## RL - Thick film low ohmic chip resistors, 0402 to 2512

| Phycomp worldwide - Traditional type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Low ohmic chip resistors | | | | | | | | | |
| Size: inch (mm) | | **0402 (1005)** | | **0603 (1608)** | | **0805 (2012)** | | **1206 (3216)** | |
| Power | | 1/16 W | | 1/10 W | | 1/8 W | | 1/4 W | |
| Tolerance | | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% |
| Resistance | | E24 | E24 | E24 | E24 | E24 | E24 | E24 | E24 |
| Packing | | paper tape | | paper tape | | paper tape | | paper tape | |
| Quantity | 5 000 | --- | --- | 2350 512 10…L | 2350 512 12…L | 2350 511 10…L | 2350 511 12…L | 2350 510 10…L | 2350 510 12…L |
| | 10 000 | 2350 513 20…L | 2350 513 22…L | --- | --- | --- | --- | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp worldwide - Traditional type | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Low ohmic chip resistors | | | | | | | | | |
| Size: inch (mm) | | **1210 (3225)** | | **1218 (3248)** | | **2010 (5025)** | | **2512 (6432)** | |
| Power | | 1/2 W | | 1 W | | 3/4 W | | 1 W | |
| Tolerance | | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% |
| Resistance | | E24 | E24 | E24 | E24 | E24 | E24 | E24 | E24 |
| Packing | | paper tape | | blister tape | | blister tape | | blister tape | |
| Quantity | 4 000 | --- | --- | 2322 735 64...L | 2322 735 7....L | 2322 760 90..0L/60..7L | 2322 761 90..0L/6...7L | 2322 762 90..0L/60..7L | 2322 763 90..0L/6...7L |
| | 5 000 | 2390 735 90..0L/60..7L | 2390 735 3....L | --- | --- | --- | --- | --- | --- |

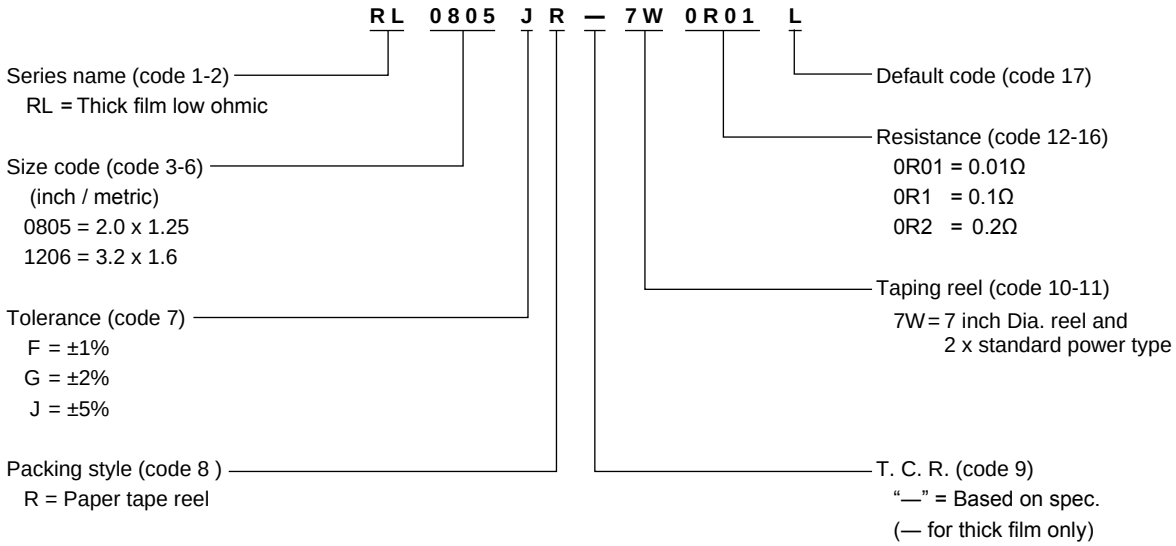
**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

| Phycomp CTC ordering code - Traditional type - North America |
|---|
| Regional code for ordering Phycomp branded products. Please see page 15 for details. |

## RL - Thick film low ohmic, high power chip resistors, 0402 / 1206

### Global part number - Preferred type

Ordering example: RL0805JR-7W0R01L




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

| Low ohmic high power chip resistors | | | | |
|---|---|---|---|---|
| Size: inch (mm) | **0805 (2012)** | | **1206 (3216)** | |
| Power | 1/4 W | | 1/2 W | |
| Tolerance | +5% | +1% | +5% | +1% |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 |
| Packing | paper tape | | paper tape | |
| Quantity 5 000 | 2350 511 15…L | 2350 511 17…L | 2350 519 01…L | 2350 519 1….L |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

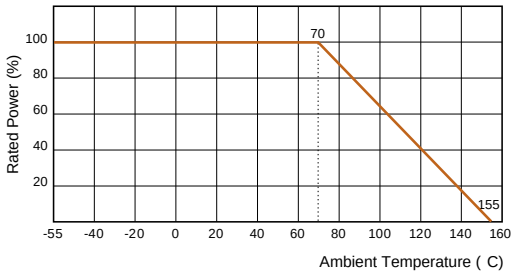
## PT - Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512

### Features

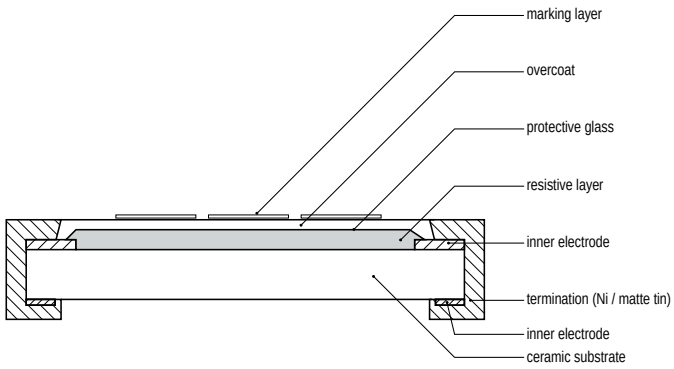
- Excellent T. C. R.
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power

### Derating curve

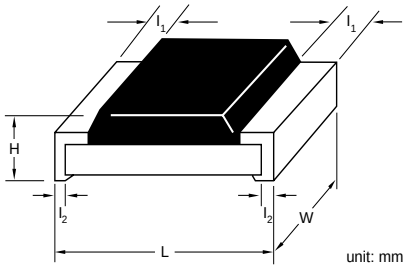
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| PT0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| PT0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| PT0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.55 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| PT1206 ( 50mΩ ≤ R < 75mΩ & 91mΩ ≤ R < 1Ω) | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.45 ±0.20 |
| PT1206 (75mΩ≤R<91mΩ) | 3.10±0.10 | 1.60±0.10 | 0.55±0.10 | 0.75±0.20 | 0.45±0.20 |
| PT2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |
| PT2512 | 6.35 ±0.10 | 3.20 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

**Note:** For relevant physical dimensions, please refer to above construction outlines
Please contact our sales offices, distributors and representatives in your region before ordering

## PT - Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512

| Electrical characteristics | | | | | | |
|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | Max. working voltage | Tolerance | Resistance range & T. C. R. | Jumper criteria |
| PT0402 | 1/16W | -55°C to +155°C | (PxR)^1/2 | E24 ±2%, ±5%<br>E24/E96 ±1% | 50mΩ ≤ R < 68mΩ ±600 ppm/°C<br>68mΩ ≤ R < 100mΩ ±300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C | Max. resistance 5mΩ<br>Rated current 3A |
| | 1/8W | | | | | |
| | 1/6W | | | | 68mΩ ±300 ppm/°C | |
| PT0603 | 1/10W | | | | 50mΩ 0/+400 ppm/°C<br>50mΩ < R < 68mΩ 0/+350 ppm/°C<br>68mΩ ≤ R < 100mΩ 0/+300 ppm/°C<br>100mΩ ≤ R < 1Ω ±200 ppm/°C | Max. resistance 8mΩ<br>Rated current 5A |
| | 1/5W | | | | | |
| | 1/3W | | | | 50mΩ 0/+400 ppm/°C<br>50mΩ < R < 68mΩ 0/+350 ppm/°C<br>68mΩ 0/+300 ppm/°C | |
| PT0805 | 1/8W | | | | 50mΩ 0/+350 ppm/°C<br>50mΩ < R < 68mΩ 0/+300 ppm/°C<br>68mΩ ≤ R < 100mΩ 0/+250 ppm/°C<br>100mΩ ≤ R < 1Ω ±100 ppm/°C | Max. resistance 5mΩ<br>Rated current 6A |
| | 1/4W | | | | | |
| PT1206 | 1/4W | | | | 50mΩ ≤ R < 75mΩ ±350ppm<br>75mΩ ≤ R ≤ 100mΩ ±100ppm<br>100mΩ < R < 1Ω ±75ppm | Max. resistance 5mΩ<br>Rated current 10A |
| | 1/2W | | | | | |
| PT2010 | 3/4W | | | | 100mΩ ±100 ppm/°C<br>100mΩ < R < 1Ω ±75 ppm/°C | Max. resistance ---<br>Rated current --- |
| | 1W | | | | | |
| PT2512 | 1W | | | | | Max. resistance ---<br>Rated current --- |
| | 2W | | | | | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.0005Ω)<br>< 20mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.0005Ω)<br>< 20mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω)<br>< 20mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(1% +0.0005Ω)<br>< 10mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.0005Ω)<br>No visible damage<br>< 10mΩ for jumper |
| Short time overload | | MIL-R-55342D-para 4.7.5 | PT standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>PT high power:<br>5 times of rated power for 5 seconds at room temperature<br>PT jumper:<br>2.5 times of rated current for 5 seconds at room temperature | ±(1% +0.0005Ω)<br>No visible damage<br>< 10mΩ for jumper |

## PT - Thick film low ohmic low T. C. R. chip resistors, 0402 to 2512

### Global part number - Preferred type

Ordering example: PT2512FK-070R01L

**PT 2512 F K — 07 0R01 L**

Series name (code 1-2)
PT = Thick film low ohmic low T. C. R.

Size code (code 3-6)
(inch / metric)
0402 = 1.0 x 0.5
0603 = 1.6 x 0.8
0805 = 2.0 x 1.25
1206 = 3.2 x 1.6
2010 = 5.0 x 2.5
2512 = 6.35 x 3.2

Tolerance (code 7)
F = ± 1%
G = ± 2%
J= ± 5%
"—" for Jumper ordering

Packing style (code 8 )
R = Paper tape reel
K = Embossed plastic tape reel

Default code(1/2) (code 17)

Resistance (code 12-16)
0R = Jumper
0R1 = 0.1Ω
0R2 = 0.2Ω

Taping reel (code 10-11)
07 = 7 inch Dia. reel
13 = 13 inch Dia. reel
7W = 7 inch Dia. reel and 2 x standard power type
7T = 7 inch Dia. reel and 3 x standard power type

T. C. R. (code 9)
"—" = Based on spec.

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only
3. PT series products are available by "Global part number" only

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

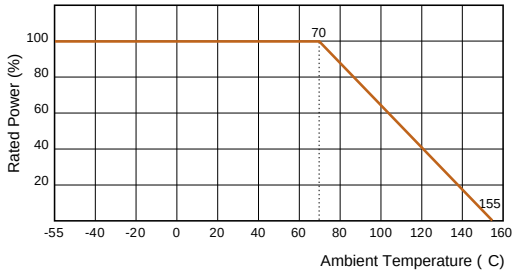
## PT - Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

### Features

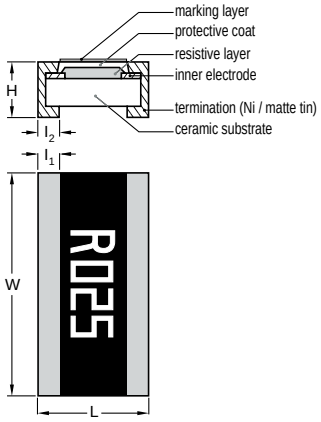
- Excellent T. C. R.
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power

### Derating curve

Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions

| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| PT0815 | 2.00 ±0.10 | 3.70 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.40 ±0.20 |

## PT - Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

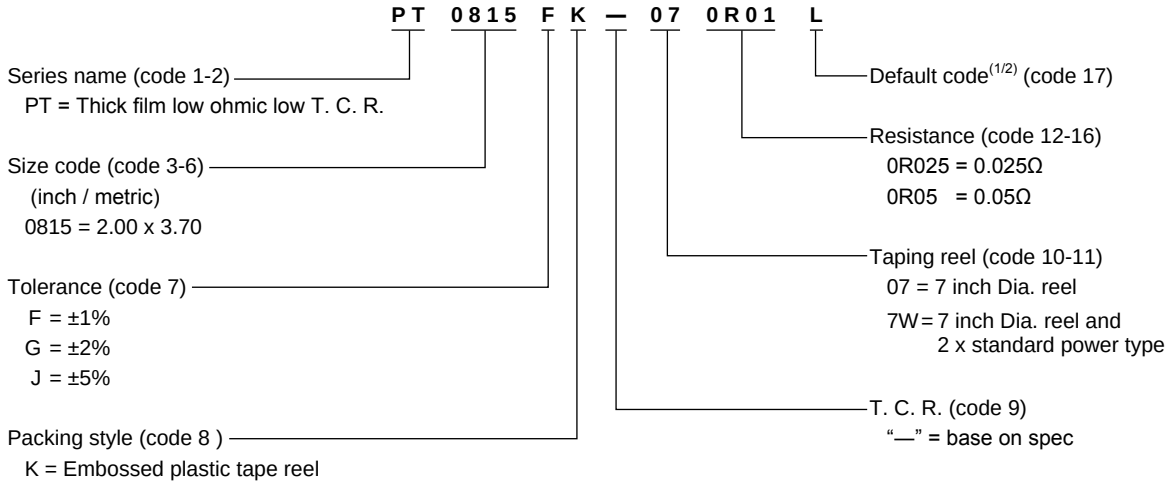
| Electrical characteristics | | | | | |
|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | Max. working voltage | Tolerance | Resistance range & T. C. R. |
| PT0815 | 1/2W<br>1W | -55°C to +155°C | (PxR)^1/2 | E24 ±2%, ±5%<br>E24/E96 ±1% | 25mΩ ≤ R ≤ 50mΩ ±100 ppm/°C |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.0005Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.0005Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω) |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | PT standard power:<br>6.25 times of rated power for 5 seconds at room temperature<br>PT high power:<br>5 times of rated power for 5 seconds at room temperature | ±(1% +0.0005Ω)<br>No visible damage |

## PT - Thick film low ohmic low T. C. R. chip resistors, wide termination, 0815

Global part number - Preferred type

Ordering example: PT0815FK-070R01L



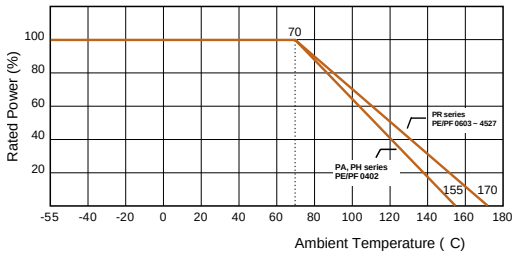

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only
3. PT series products are available by "Global part number" only

## Features

- Excellent T. C. R. compared to thick film low ohmic
- Precision current sensing control
- Excellent performance for current sensing applications
- Ultra low ohmic down to 0.0005Ω

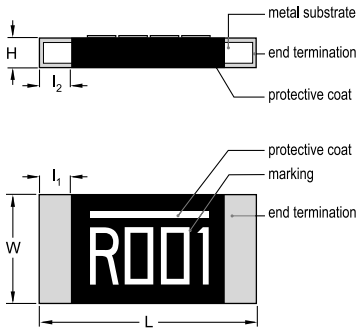
### Derating curve

Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).

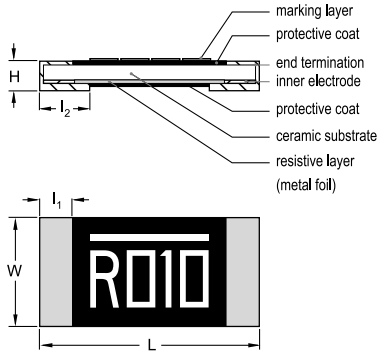



### Construction

**PR/PA series**




**PF / PH / PE series**




**Note:** construction will be adjusted to resistance value (only for PF series).

### Dimensions

**PR series** unit: mm

| Type | Resistance range | L | W | H | $l_1$ | $l_2$ |
|---|---|---|---|---|---|---|
| PR1206 | 1mΩ ≤ R ≤ 6mΩ | 3.20 ±0.25 | 1.60 ±0.25 | 0.64 ±0.25 | 0.50 ±0.25 | 0.50 ±0.25 |
| PR2010 | 1mΩ ≤ R ≤ 3mΩ | 5.10 ±0.25 | 2.54 ±0.25 | 0.80 ±0.25 | 1.30 ±0.25 | 1.30 ±0.25 |
| | 4mΩ ≤ R ≤ 100mΩ | 5.10 ±0.25 | 2.54 ±0.25 | 0.64 ±0.25 | 0.80 ±0.25 | 0.80 ±0.25 |
| PR2512 (1) | 1mΩ ≤ R ≤ 2mΩ | 6.40 ±0.20 | 3.20 ±0.20 | 0.75 ±0.15 | 1.20 ±0.20 | 1.20 ±0.20 |
| | 3mΩ ≤ R ≤ 5mΩ | | | 0.55 ±0.10 | 0.60 ±0.20 | 0.60 ±0.20 |
| PR2512 (2) | 0.5mΩ ≤ R ≤ 4mΩ | 6.25 ±0.25 | 3.30 ±0.25 | 0.78 ±0.25 | 1.88 ±0.25 | 1.88 ±0.25 |
| | 5mΩ ≤ R ≤ 75mΩ | | | 0.64 ±0.25 | 1.11 ±0.25 | 1.11 ±0.25 |

**PA series** unit: mm

| Type | Resistance range | L | W | H | $l_1$ | $l_2$ |
|---|---|---|---|---|---|---|
| PA2512 | 1mΩ ≤ R ≤ 10mΩ | 6.50 ±0.20 | 3.20 ±0.20 | 0.65 ±0.15 | 0.90 ±0.20 | 0.90 ±0.20 |

**Note:** 1. Apply to ordering codes ending in "L"
2. Apply to ordering codes ending in "Z"
Please contact sales offices, distributors and representatives in your region before ordering

## Dimensions

**PF / PH / PE series**

unit: mm

| Type | Resistance range | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|---|
| PF / PE0402 | 10mΩ ≤ R ≤ 50mΩ | 1.00 ± 0.30 | 0.50 ± 0.20 | 0.45 ± 0.20 | 0.25 ± 0.10 | --- |
| PF / PE0603 (2) | 5mΩ ≤ R < 100mΩ | 1.60 ± 0.20 | 0.80 ± 0.20 | 0.60 ± 0.15 | --- | 0.30 ± 0.15 |
| PF / PH0805 (1) | 10mΩ < R ≤ 50mΩ | 2.03 ± 0.25 | 1.27 ± 0.25 | 0.33 ± 0.12 | 0.38 ± 0.25 | 0.38 ± 0.25 |
| PF / PH / PE0805 | 3mΩ | 2.10 ± 0.20 | 1.35 ± 0.20 | 0.65 ± 0.20 | 0.75 ± 0.15 | --- |
| PF / PH / PE0805 (2) | 4mΩ | 2.00 ± 0.20 | 1.25 ± 0.20 | 0.60 ± 0.15 | --- | 0.70 ± 0.15 |
| | 5mΩ | | | | | 0.63 ± 0.15 |
| | 6mΩ ≤ R ≤ 7mΩ | | | | | 0.55 ± 0.15 |
| | 8mΩ ≤ R < 100mΩ | | | | | 0.40 ± 0.15 |
| PF / PH1206 (1) | 10mΩ < R ≤ 50mΩ | 3.20 ± 0.25 | 1.60 ± 0.25 | 0.60 ± 0.25 | 0.50 ± 0.25 | 0.65 ± 0.25 |
| PF / PH / PE1206 (2) | 3mΩ | 3.20 ± 0.20 | 1.60 ± 0.20 | 0.60 ± 0.15 | --- | 1.30 ± 0.20 |
| | 4mΩ | | | | | 1.20 ± 0.20 |
| | 5mΩ ≤ R ≤ 8mΩ | | | | | 1.15 ± 0.20 |
| | 9mΩ ≤ R < 100mΩ | | | | | 0.58 ± 0.20 |
| PF / PE2010 | 5mΩ ≤ R ≤ 9mΩ | 5.00 ± 0.20 | 2.50 ± 0.20 | 0.60 ± 0.15 | --- | 1.50 ± 0.20 |
| | 10mΩ ≤ R < 100mΩ | | | | | 0.60 ± 0.20 |
| PF2512 (1) | 6mΩ | 6.45 ± 0.25 | 3.25 ± 0.25 | 0.70 ±0 .25 | 0.75 ± 0.25 | 1.85 ± 0.25 |
| | 7mΩ ≤ R ≤ 15mΩ | | | | | 1.55 ± 0.25 |
| | 20mΩ ≤ R ≤ 50mΩ (1W) | | | | 1.30 ± 0.25 | 0.75 ± 0.25 |
| | 20mΩ ≤ R ≤ 50mΩ (2W) | | | | 0.75 ± 0.25 | 1.30 ± 0.25 |
| PF / PE2512 (2) | 1mΩ | 6.30 ± 0.20 | 3.10 ± 0.20 | 0.60 ± 0.15 | --- | 2.93 ± 0.20 |
| | 2mΩ | | | | | 2.70 ± 0.20 |
| | 3mΩ | | | | | 2.50 ± 0.20 |
| | 4mΩ | | | | | 2.15 ± 0.20 |
| | 5mΩ | | | | | 1.95 ± 0.20 |
| | 6mΩ ≤ R ≤ 8mΩ | | | | | 1.90 ± 0.20 |
| | 9mΩ ≤ R < 100mΩ | | | | | 0.95 ± 0.20 |
| PF / PE4527 | 5mΩ | 11.50±0.20 | 7.00±0.20 | 0.60±0.15 | 2.90±0.20 | --- |
| | 6mΩ ≤ R <1Ω | 11.50 ± 0.20 | 7.00 ± 0.20 | 0.60 ± 0.15 | --- | 2.60 ± 0.20 |

**Note:** 1. Apply to ordering codes ending in "L"
2. Apply to ordering codes ending in "Z"
3. For relevant physical dimensions, please refer to above construction outlines
Please contact with sales offices, distributors and representatives in your region before ordering

## PR/PA/PF/PH/PE - Current sensors - low T. C. R. chip resistors, 0402 to 2512

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Technology | Size | Power P70 | Operating Temp. range | Max. working voltage | Tolerance | Resistance range | Min. T. C. R. |
| PE | Metal Foil | 0402 | 1/16W | -55°C to 155°C | (PxR)^1/2 | ±1%<br>±2%<br>±5% | 10mΩ ≤ R ≤ 50mΩ | ±100 ppm/°C |
| | | | 1/8W | | | | | |
| | | | 1/4W | | | | | |
| | | 0603 | 1/10W | -55°C to 170°C | | | 5mΩ ≤ R<100mΩ | ±50 ppm/°C<br>±75 ppm/°C<br>±100 ppm/°C |
| | | | 1/5W | | | | | |
| | | | 1/3W | | | | | |
| | | | 2/5W | | | | | |
| | | | 1/2W | | | | | |
| | | 0805 | 1/8W | | | | 3mΩ ≤ R<100mΩ | |
| | | | 1/4W | | | | | |
| | | | 1/3W | | | | | |
| | | | 1/2W | | | | | |
| | | 1206 | 1/4W | | | | 3mΩ ≤ R<100mΩ | |
| | | | 1/2W | | | | | |
| | | | 1W | | | | | |
| | | 2010 | 1/2W | | | | 5mΩ ≤ R<100mΩ | |
| | | | 1W | | | | | |
| | | 2512 | 1W | | | | 6mΩ ≤ R<100mΩ | |
| | | | 2W | | | | | |
| | | | 3W | | | | | |
| | | 4527 | 2W | | | | 5mΩ ≤ R<1Ω | |
| | | | 3W | | | | | |
| | | | 5W | | | | | |
| PF | Metal Foil | 0402 | 1/16W | -55°C to 155°C | (PxR)^1/2 | ±1%<br>±2%<br>±5% | 10mΩ ≤ R ≤ 50mΩ | ±100 ppm/°C |
| | | | 1/8W | | | | | |
| | | | 1/4W | | | | | |
| | | 0603 | 1/10W | -55°C to 170°C | | | 5mΩ ≤ R < 100mΩ | ±50 ppm/°C<br>±75 ppm/°C<br>±100 ppm/°C |
| | | | 1/5W | | | | | |
| | | | 1/3W | | | | | |
| | | | 2/5W | | | | | |
| | | | 1/2W | | | | | |
| | | 0805 | 1/8W | | | | 3mΩ ≤ R < 100mΩ | |
| | | | 1/4W | | | | | |
| | | | 1/3W | | | | | |
| | | | 1/2W | | | | | |
| | | 1206 | 1/4W | | | | 3mΩ ≤ R < 100mΩ | |
| | | | 1/2W | | | | | |
| | | | 1W | | | | | |
| | | 2010 | 1/2W | | | | 5mΩ ≤ R < 100mΩ | |
| | | | 1W | | | | | |
| | | 2512 | 1W | | | | 6mΩ ≤ R < 100mΩ | |
| | | | 2W | | | | | |
| | | | 3W | | | | | |
| | | 4527 | 2W | | | | 5mΩ ≤ R < 1Ω | |
| | | | 3W | | | | | |
| | | | 5W | | | | | |
| PH | Metal Foil | 0805 | 4/5W | -55°C to 155°C | (PxR)^1/2 | ±1%, ±2%, ±5% | 4mΩ ≤ R ≤ 50mΩ | |
| | | 1206 | 1W | | | | | |

**Note:** Please contact with sales offices, distributors and representatives in your region before ordering

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Technology | Size | Power P70 | Operating Temp. range | Max. working voltage | Tolerance | Resistance range | Min. T. C. R. |
| PR | Metal Plate | 1206 | 1/4W | -55°C to 170°C | (PxR)^1/2 | ±1%, ±2%, ±5% | 1mΩ ≤ R ≤ 6mΩ | ±50 ppm/°C |
| | | | 1/2W | | | | | |
| | | | 1W | | | | | |
| | | 2010 | 1/2W | | | ±1%, ±2%, ±5% | 1mΩ ≤ R < 100mΩ | |
| | | | 1W | | | | | |
| | | 2512 | 1W | | | ±0.5% | 7mΩ ≤ R ≤ 75mΩ | |
| | | | | | | ±1%, ±2%, ±5% | 0.5mΩ ≤ R ≤ 2mΩ | ±200 ppm/°C |
| | | | | | | | 3mΩ ≤ R ≤ 5mΩ | ±100 ppm/°C |
| | | | 2W | | | ±0.5% | 7mΩ ≤ R ≤ 75mΩ | ±50 ppm/°C |
| | | | | | | ±1%, ±2%, ±5% | 0.5mΩ ≤ R ≤ 2mΩ | ±200 ppm/°C |
| | | | | | | | 3mΩ ≤ R ≤ 5mΩ | ±100 ppm/°C |
| | | | 3W | | | ±1%, ±2%, ±5% | 0.5mΩ ≤ R ≤ 10mΩ | ±50 ppm/°C |
| PA | Metal Plate | 2512 | 1W | -55°C to 155°C | (PxR)^1/2 | ±1%, ±5% | 1mΩ ≤ R ≤ 10mΩ | ±100 ppm/°C |
| | | | 2W | | | | | |
| | | | 3W | | | | | |

**Note:** Please contact with sales offices, distributors and representatives in your region before ordering

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.0005Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.0005Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.0005Ω) |
| Solder-ability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 5 times of rated power for 5 seconds at room temperature | ±(0.5% +0.0005Ω)<br>No visible damage |

## PR/PA/PF/PH/PE - Current sensors - low T. C. R. chip resistors, 0402 to 2512

### Global part number - Preferred type

Ordering example: PF2512FKF070R01L

**PF 2512 F K F 07 0R01 L**

Series name (code 1-2)
PR/PA/PF/PH/PE = Current sensors - low T. C. R.

Size code (code 3-6)
(inch / metric)
0402 = 1.0 x 0.5
0603 = 1.6 x 0.8
0805 = 2.0 x 1.25
1206 = 3.2 x 1.6
2010 = 5.0 x 2.5
2512 = 6.35 x 3.2
4527 = 11.0 x 7.0

Tolerance (code 7)
F = ±1%
G = ±2%
J = ±5%

Packing style (code 8 )
R = Paper tape reel
K = Embossed plastic tape reel

T. C. R. (code 9)
E = ±50 ppm/°C
M = ±75 ppm/°C
F = ±100 ppm/°C
G = ±200 ppm/°C

Taping reel (code 10-11)
07 = 7 inch Dia. reel
7W = 7 inch Dia. reel
2 x standard power type
7T = 7 inch Dia. reel
3 x standard power type
47 = 7 inch Dia. reel
4 x standard power type
57 = 7 inch Dia. reel
5 x standard power type

Resistance (code 12-16)
0U5=0.0005Ω
0R01 = 0.01Ω
0R1 = 0.1Ω
0R2 = 0.2Ω

Default code(1/2) (code 17)
L / Z = Default code

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. PH series products are available by "Global part number" only

### Phycomp worldwide - Traditional type

Current Sensor - Low T. C. R. / PR series

| Size: inch (mm) | 2010 (5025) | | | | 2512 (6432) | | | |
|---|---|---|---|---|---|---|---|---|
| Power | 1/2 W | | 1 W | | 1 W | | 2 W | |
| Tolerance | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% |
| Packing | blister tape | | | | blister tape | | | |
| Quantity 4 000 | 2322 760 63..0L | 2322 761 11.. 0L | 2322 760 65.. 0L | 2322 761 13.. 0L | 2322 762 94..0L | 2322 763 95..0L | 2322 762 10..0L | 2322 763 10..0L |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp worldwide - Traditional type

Current Sensor - Low T. C. R. / PF series

| Size: inch (mm) | 2512 (6432) | | | |
|---|---|---|---|---|
| Power | 1 W | | 2 W | |
| Tolerance | +5% | +1% | +5% | +1% |
| Packing | blister tape | | | |
| Quantity 4 000 | 2322 764 96..L | 2322 764 97..L | 2322 764 10..L | 2322 764 30..L |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

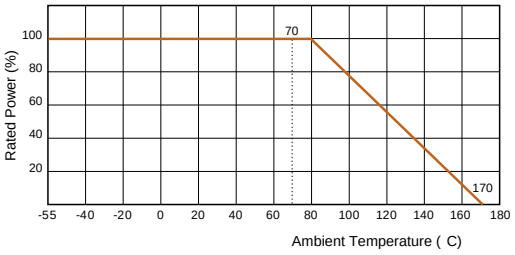
## PE/PF - Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830

### Features

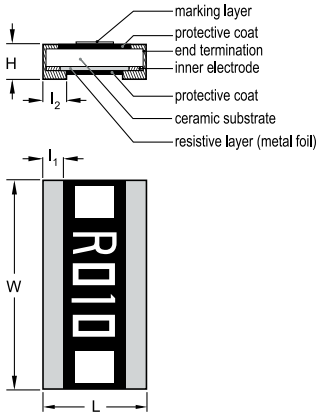
- Excellent T. C. R. compared to thick film low ohmic
- Precision current sensing control
- Excellent performance for current sensing applications
- Low ohmic and high power

### Derating curve

Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions

| Type | Resistance range | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|---|
| PE / PF0612 (2) | 1mΩ | 1.60 ±0.20 | 0.32 ±0.20 | 0.60 ±0.15 | --- | 0.55±0.20 |
| | 2mΩ ≤ R ≤ 4mΩ | 1.60 ±0.20 | 0.32 ±0.20 | 0.60 ±0.15 | --- | 0.40±0.20 |
| | 5mΩ ≤ R ≤ 300mΩ | 1.60 ±0.20 | 0.32 ±0.20 | 0.60 ±0.15 | --- | 0.30±0.15 |
| PE / PF0815 (2) | 1mΩ | 2.50±0.20 | 3.70±0.20 | 0.60±0.15 | --- | 0.95±0.20 |
| | 2mΩ | 2.50±0.20 | 3.70±0.20 | 0.60±0.15 | --- | 0.75±0.20 |
| | 3mΩ ≤ R ≤ 100mΩ | 2.50±0.20 | 3.70±0.20 | 0.60±0.15 | --- | 0.60±0.20 |
| PE / PF0815 (1) | 10 / 15 / 20mΩ | 2.15 ±0.20 | 3.75 ±0.25 | 0.65 ±0.25 | 0.65 ±0.25 | 0.70 ±0.25 |
| PE / PF0830 (2) | 6 / 8 / 10mΩ | 2.00 ±0.20 | 7.50 ±0.30 | 0.60 ±0.15 | --- | 0.60 ±0.15 |
| | 1mΩ ≤ R ≤ 100mΩ (except 6/8/10mΩ) | 2.50 ±0.20 | 7.50 ±0.30 | 0.60 ±0.15 | --- | 0.58 ±0.15 |

**Note:** 1. Apply to ordering codes ending in "L"
2. Apply to ordering codes ending in "Z"
Please contact sales offices, distributors and representatives in your region before ordering

## PE/PF - Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Technology | Size | Power $P_{70}$ | Operating Temp. range | Max. working voltage | Tolerance | Resistance range & T. C. R. |
| PF | Metal Foil wide termination | 0612 | 1W | -55°C to 170°C | (PxR)^1/2 | ±1%, ±2%, ±5% | 1mΩ ≤ R ≤ 300mΩ ±75 ppm/°C<br>1mΩ ≤ R ≤ 100mΩ ±100 ppm/°C<br>1mΩ ≤ R ≤ 100mΩ |
| | | | 2W | | | | |
| | | 0815 | 1/2W | | | | |
| | | | 1W | | | | |
| | | 0830 | 2W | | | | |
| | | | 3W | | | | |
| PE | Metal Foil wide termination | 0612 | 1W | -55°C to 170°C | (PxR)^1/2 | ±1%, ±2%, ±5% | 1mΩ ≤ R ≤ 300mΩ ±75 ppm/°C<br>1mΩ ≤ R ≤ 100mΩ ±100 ppm/°C<br>1mΩ ≤ R ≤ 100mΩ |
| | | | 2W | | | | |
| | | 0815 | 1/2W | | | | |
| | | | 1W | | | | |
| | | 0830 | 2W | | | | |
| | | | 3W | | | | |

**Note:** Please contact with sales offices, distributors and representatives in your region before ordering

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.0005Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.0005Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω) |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 5 times of rated power for 5 seconds at room temperature | ±(0.5% +0.0005Ω)<br>No visible damage |

## PE/PF - Current sensors - low T. C. R. chip resistors, wide termination, 0612 to 0830

Global part number - Preferred type

Ordering example: PF0815FKF070R01L

**PF 0815 F K F 07 0R01 L**

Series name (code 1-2)
PE /PF = current sensors - low T. C. R., wide termination

Size code (code 3-6)
(inch / metric)
0612 = 1.6 x 3.2
0815 = 2.15 x 3.75
0830 = 2.0 x 7.5

Tolerance (code 7)
F = ±1%
G = ±2%
J = ±5%

Packing style (code 8 )
K = Embossed plastic tape reel

T. C. R. (code 9)
M = ±75 ppm/°C
F = ±100 ppm/°C

Taping reel (code 10-11)
07 = 7 inch Dia. reel
7W = 7 inch Dia. reel
2 x standard power type

Resistance (code 12-16)
0R01 = 0.01Ω
0R02 = 0.02Ω

Default code(1/2) (code 17)
L / Z = Default code

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. PF series wide termination type products are available by "Global part number" only

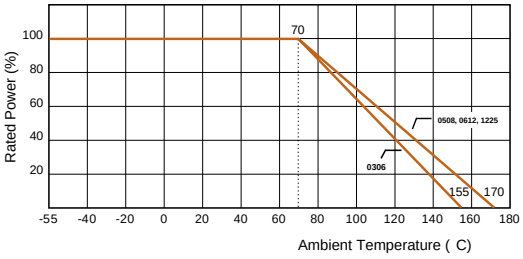
## PS - Current sensors - low T.C.R. chip resistors, 4 termination, 0306 to 1225

### Features

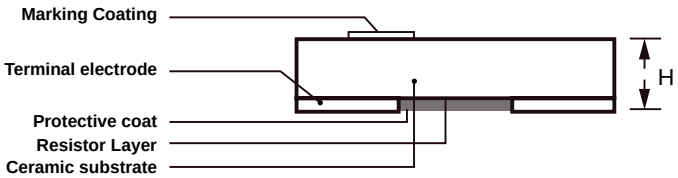
- Excellent T. C. R. compared to thick film low ohmic
- Precision current sensing control
- Excellent performance for current sensing applications
- Ultra-low resistance and narrow tolerance are suitable for current detection

### Derating curve

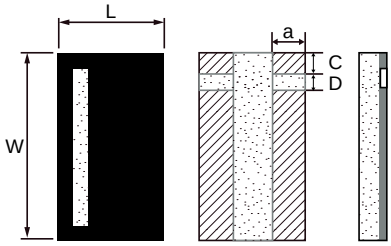
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).



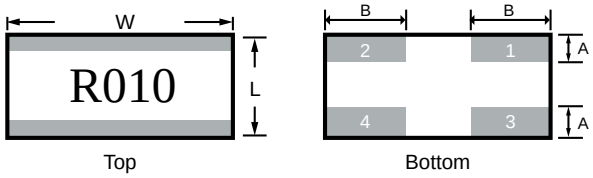

### Construction




PS0306 / PS0508 / PS0612




PS1225




### Dimensions

| Type | L | W | a | D | c | H |
|---|---|---|---|---|---|---|
| PS0306 | 0.80±0.20 | 1.60±0.20 | 0.25±0.20 | 0.30±0.15 | 0.30±0.15 | 0.55±0.20 |
| PS0508 | 1.25±0.20 | 2.00±0.20 | 0.25±0.20 | 0.20±0.15 | 0.30±0.20 | 0.55±0.20 |
| PS0612 | 1.50±0.25 | 3.15±0.25 | 0.35±0.20 | 0.38±0.20 | 0.66±0.20 | 0.75±0.25 |

| Type | L | W | A | B | H |
|---|---|---|---|---|---|
| PS1225 | 3.10±0.20 | 6.30±0.20 | 0.80±0.20 | 2.20±0.20 | 0.60±0.15 |

**Note:** Apply to ordering codes ending in "Z"
Please contact sales offices, distributors and representatives in your region before ordering

## PS - Current sensors - low T.C.R. chip resistors, 4 termination, 0306 to 1225

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Technology | Size | Power $P_{70}$ | Operating Temp. range | Max. working voltage | Tolerance | Resistance range & T. C. R. |
| PS | Metal Foil 4 termination | 0306 | 1/8W | -55°C to 155°C | (PxR)^1/2 | ±1%, ±5% | 10mΩ ≤ R ≤ 50mΩ ±75 ppm/°C ±100 ppm/°C |
| | | | 1/4W | | | | |
| | | 0508 | 1/8W | -55°C to 170°C | | | |
| | | | 1/4W | | | | |
| | | | 1/2W | | | | |
| | | 0612 | 1W | -55°C to 170°C | | | 0.5mΩ, 0.75mΩ ±700 ppm/°C<br>1mΩ ≤ R ≤ 2mΩ ±400 ppm/°C<br>3mΩ ≤ R ≤ 5mΩ ±150 ppm/°C |
| | | 1225 | 3W | -55°C to 170°C | | | 4mΩ ≤ R ≤ 50mΩ ±75 ppm/°C ±100 ppm/°C |

**Note:** Please contact with sales offices, distributors and representatives in your region before ordering

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.0005Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.0005Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.0005Ω) |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(0.5% +0.0005Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 5 times of rated power for 5 seconds at room temperature | ±(0.5% +0.0005Ω)<br>No visible damage |

## PS - Current sensors - low T.C.R. chip resistors, 4 termination, 0306 to 1225

Global part number - Preferred type

Ordering example: PS0612FKF070R01L

**PS 0612 F K F 07 0R01 L**

Series name (code 1-2)
PS = current sensors - low T.C.R., 4 termination

Size code (code 3-6)
(inch / metric)
0306 = 0.8 x 1.6
0508 = 1.25 x 2.0
0612 = 1.6 x 3.2
1225 = 3.2 x 6.35

Tolerance (code 7)
F = ±1%
J = ±5%

Packing style (code 8 )
R = Paper tape reel
K = Embossed plastic tape reel

T. C. R. (code 9)
M = ±75 ppm/°C
F = ±100 ppm/°C
L = ±150 ppm/°C
P = ±400 ppm/°C
Q = ±700 ppm/°C

Taping reel (code 10-11)
07 = 7 inch Dia. reel
7W = 7 inch Dia. reel
2 x standard power type
7T = 7 inch Dia. reel
3 x standard power type

Resistance (code 12-16)
0U5 = 0.0005Ω
0R01 = 0.01Ω
0R02 = 0.02Ω

Default code(1/2) (code 17)
Z = Default code

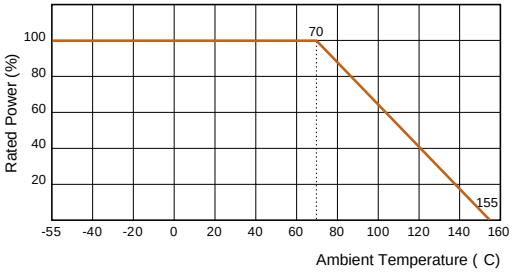
**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. PS series 4 termination type products are available by "Global part number" only

## Features

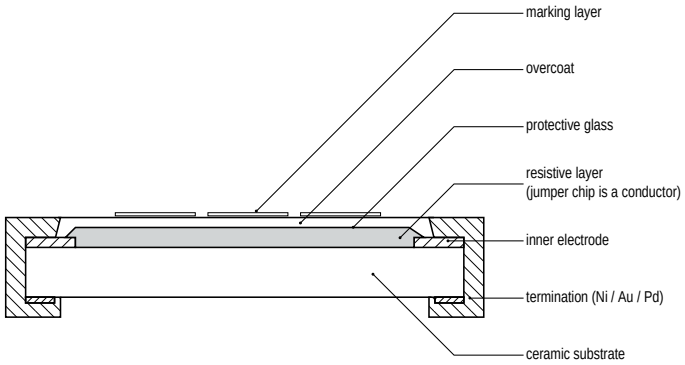
- New NiAu terminations provide special application for hybrid board gluing
- Competitive with AgPd terminations
- Special use in high temperature environment
- Higher component and equipment reliability

### Derating curve

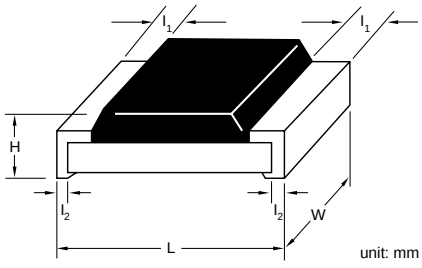
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




unit: mm

| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| AR0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| AR0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| AR0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| AR1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |

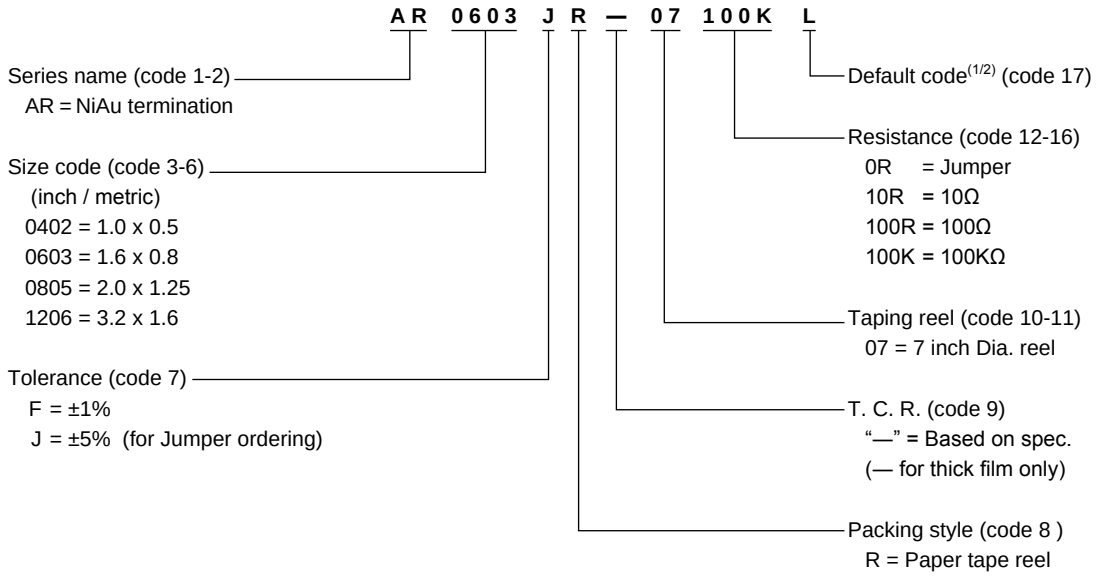
## AR - NiAu termination chip resistors, 0402 to 1206

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. ( ppm/°C) | Jumper criteria (unit: A) |
| AR0402 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 10MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50MΩ | 10Ω < R ≤ 10MΩ ±100<br>1Ω ≤ R ≤ 10Ω ±200 | Rated current 1.0<br>Max. current 2.0 |
| AR0603 | 1/10W | -55°C to +155°C | 50V | 100V | 100V | | | Rated current 1.0<br>Max. current 2.0 |
| AR0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | | | Rated current 2.0<br>Max. current 5.0 |
| AR1206 | 1/4W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(2% +0.05Ω)<br>< 100mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω)<br>< 50mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω)<br>< 100mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others<br>< 50mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |

## Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: AR0603JR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

## Phycomp worldwide - Traditional type

| Chip resistors with Ni/Au terminations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size: inch (mm) | 0402 (1005) | | 0603 (1608) | | 0805 (2012) | | 1206 (3216) | |
| Power | 1/16 W | | 1/10 W | | 1/8 W | | 1/4 W | |
| Tolerance | +5% | +1% | +5% | +1% | +5% | +1% | +5% | +1% |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 | E24 | E24 / E96 |
| Packing | paper tape | | paper tape | | paper tape | | paper tape | |
| Quantity 5 000 | --- | --- | 2322 702 11…L | 2322 704 1….L | 2322 730 11… | 2322 734 1….L | 2322 711 11...L | 2322 729 1….L |
| 10 000 | 2322 705 12…L | 2322 706 2…. | --- | --- | --- | --- | --- | --- |
| Jumper 5 000 | --- | --- | 2322 702 19001L | --- | 2322 730 19001L | --- | 2322 711 19001L | --- |
| 10 000 | 2322 705 19001 L | --- | --- | --- | --- | --- | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

## Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 13 for details.

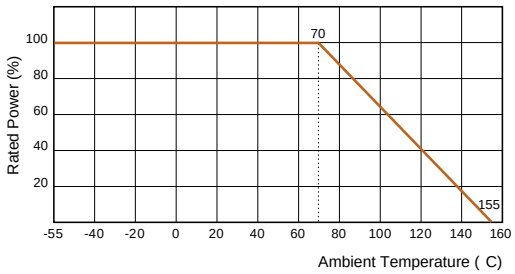
## SR - Surge chip resistors, 0402 to 2512

### Features

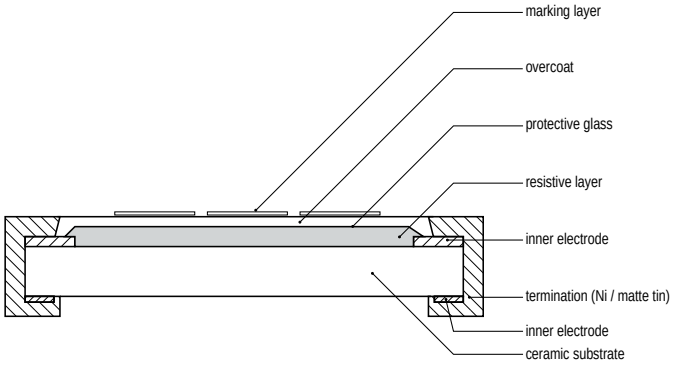
- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Excellent performance at pulse loading

### Derating curve

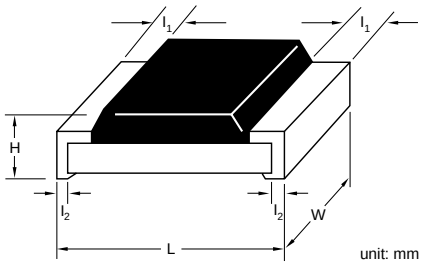
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions

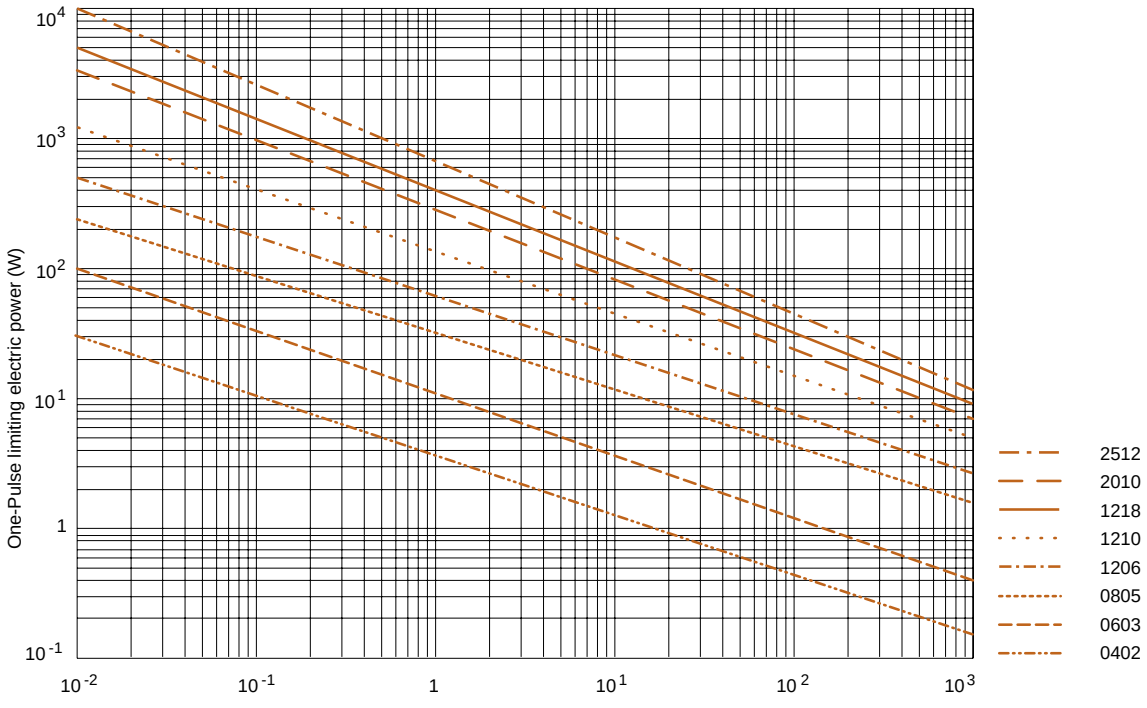



| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| SR0402 | 1.00±0.05 | 0.50±0.05 | 0.35±0.05 | 0.20±0.10 | 0.25±0.10 |
| SR0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.25±0.15 | 0.25±0.15 |
| SR0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| SR1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| SR1218 | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| SR2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.55 ±0.15 | 0.50 ±0.20 |
| SR2512 | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | | T. C. R. |
| SR0402 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5%, ±10%, ±20% | 1Ω ≤ R ≤ 100KΩ | ±200 ppm/°C |
| | 1/8W | -55°C to +155°C | 50V | 100V | 100V | | | |
| SR0603 | 1/10W | -55°C to +155°C | 50V | 100V | 100V | | | |
| | 1/5W | -55°C to +155°C | 50V | 100V | 100V | | | |
| SR0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | | | |
| | 1/4W | -55°C to +155°C | 150V | 300V | 300V | | | |
| SR1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | | | |
| | 1/2W | -55°C to +155°C | 200V | 400V | 500V | | | |
| SR1218 | 1W | -55°C to +155°C | 200V | 400V | 500V | | | |
| SR2010 | 3/4W | -55°C to +155°C | 200V | 400V | 500V | | | |
| SR2512 | 1W | -55°C to +155°C | 200V | 400V | 500V | | | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(3% +0.05Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(3% +0.05Ω) |
| Solder-ability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>No visible damage |

Pulse-Load behavior



## SR - Surge chip resistors, 0402 to 2512

### Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: SR0805MR-07100KL

**SR 0805 M R — 07 100K L**

- Series name (code 1-2)
  - SR = Surge
- Size code (code 3-6)
  - (inch / metric)
  - 0402 = 1.0 x 0.5
  - 0603 = 1.6 x 0.8
  - 0805 = 2.0 x 1.25
  - 1206 = 3.2 x 1.6
  - 1218 = 3.2 x 4.5
  - 2010 = 5.0 x 2.5
  - 2512 = 6.35 x 3.2
- Tolerance (code 7)
  - J = ±5%
  - K=±10%
  - M = ±20%
- Packing style (code 8 )
  - R = Paper tape reel
  - K = Embossed plastic tape reel
- T. C. R. (code 9)
  - "—" = Based on spec.
  - (— for thick film only)
- Taping reel (code 10-11)
  - 7W = 7 inch Dia. reel
  - 2 x standard power type
  - 07 = 7 inch Dia. reel
  - 10 = 10 inch Dia. reel
  - 13 = 13 inch Dia. reel
- Resistance (code 12-16)
  - 10R = 10Ω
  - 100K = 100KΩ
- Default code(1/2) (code 17)

**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

| Surge chip resistors | | | | | | |
|---|---|---|---|---|---|---|
| Size: inch (mm) | 0805 (2012) | 1206 (3216) | 1218 (3248) | 2512 (6432) | | |
| Power | 1/8 W | 1/4 W | 1 W | 1 W | | |
| Tolerance | +10% | +5% | +10% | +5% | +10% | +20% |
| Resistance | E24 | E24 | E24 | E24 | E24 | E24 |
| Packing | paper tape | paper tape | paper tape | paper tape | paper tape | paper tape |
| Quantity 4 000 | --- | --- | 2350 557 10…L | 2350 556 11…L | 2350 556 10…L | 2350 556 13…L |
| 5 000 | 2350 554 12…L | 2350 550 10…L | --- | --- | --- | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

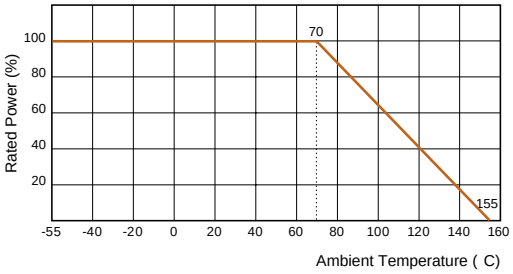
## RV - High voltage chip resistors, 0603 to 2512

### Features

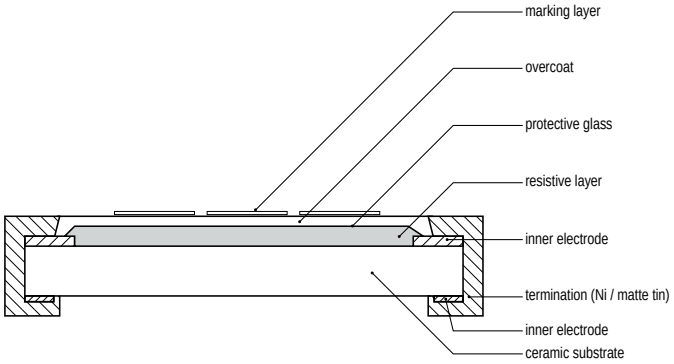
- Higher maximum working voltage compared to RC series
- Extremely thin and light
- Reliable electrode construction
- Compatible with lead containing and lead-free soldering processes
- Highly stable in auto-placement surface mounting

### Derating curve

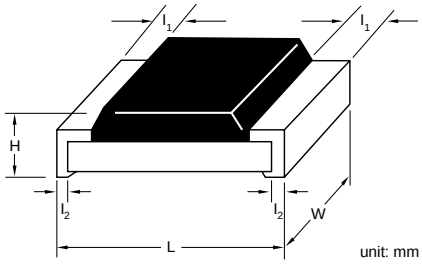
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




unit: mm

| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| RV0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| RV0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| RV1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.40 ±0.20 | 0.45 ±0.20 |
| RV2512 | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

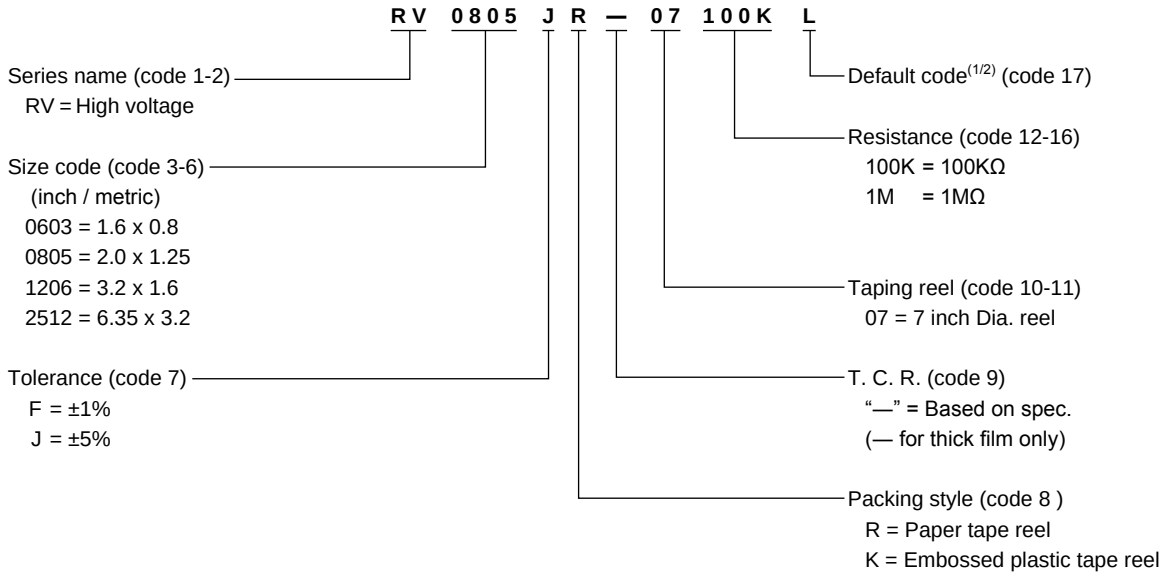
## RV - High voltage chip resistors, 0603 to 2512

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. |
| RV0603 | 1/10W | -55°C to +155°C | 350V | 500V | 500V | E24 ±5% 10KΩ ≤ R ≤ 1MΩ<br>E24/E96 ±1% | ±200 ppm/°C |
| RV0805 | 1/8W | -55°C to +155°C | 400V | 800V | 800V | E24 ±5% 100KΩ ≤ R ≤ 10MΩ<br>E24/E96 ±1% | |
| RV1206 | 1/4W | -55°C to +155°C | 500V | 1000V | 1000V | E24 ±5% 100KΩ ≤ R ≤ 27MΩ<br>E24/E96 ±1% 100KΩ ≤ R ≤ 10MΩ | |
| RV2512 | 1W | -55°C to +155°C | 500V | 1000V | 1000V | E24 ±5% 4.7MΩ ≤ R ≤ 16MΩ | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(2% +0.05Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>No visible damage |

## Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: RV0805JR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

## Phycomp worldwide - Traditional type

| High voltage chip resistors | | | | | |
|---|---|---|---|---|---|
| Size: inch (mm) | 0805 (2012) | | 1206 (3216) | | 2512 (6432) |
| Power | 1/8 W | | 1/4 W | | 1 W |
| Tolerance | +5% | +1% | +5% | +1% | +5% |
| Resistance | E24 | E24 / E96 | E24 | E24 / E96 | E24 |
| Packing | paper tape | | paper tape | | blister tape |
| Quantity 4 000 | --- | --- | --- | --- | 2322 762 98...L |
| 5 000 | 2322 792 61...L | 2322 793 6....L | 2322 790 61...L | 2322 791 6....L | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

## Phycomp CTC ordering code - Traditional type - North America

Regional code for ordering Phycomp branded products. Please see page 15 for details.

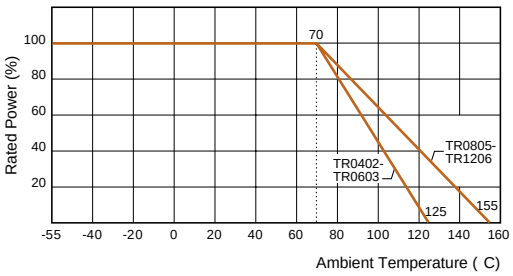
## TR - Trimmable chip resistors, 0402 to 1206

### Features

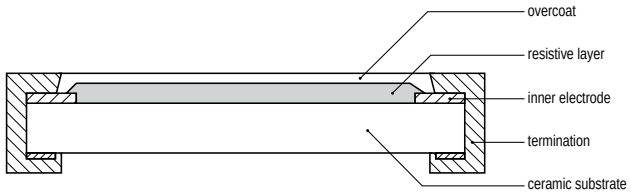
- Reduced size of final equipment
- Low assembly costs
- Higher component and equipment reliability
- Improved performance at high frequency
- Low noise, when not trimmed

### Derating curve

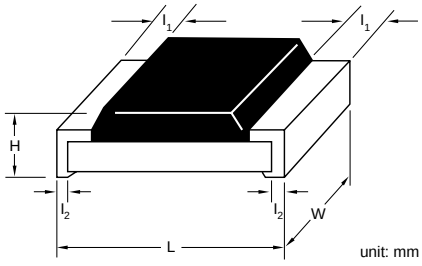
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




unit: mm

| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| TR0402 | 1.00 ±0.10 | 0.50 ±0.05 | 0.35 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| TR0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| TR0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| TR1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |

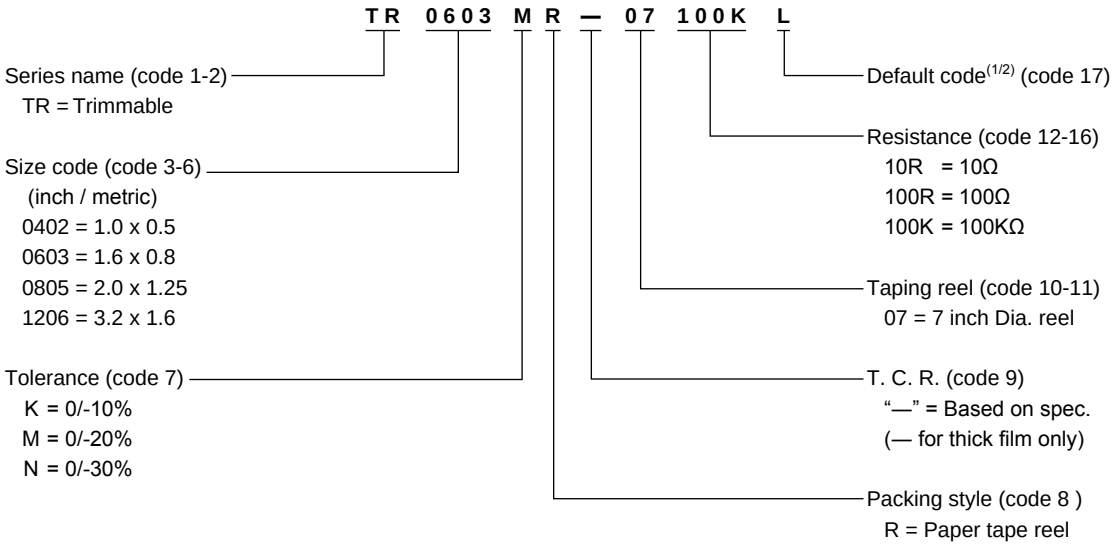
| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. ( ppm/°C) |
| TR0402 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 +0/-10%, +0/-20%, +0/-30% 1Ω ≤ R ≤ 10MΩ | 1Ω ≤ R ≤ 10Ω ±200<br>10Ω < R ≤ 1MΩ ±100<br>1MΩ < R ≤ 10MΩ ±200 |
| TR0603 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | | |
| TR0805 | 1/8W | -55°C to +155°C | 150V | 300V | 500V | | |
| TR1206 | 1/4W | -55°C to +155°C | 200V | 500V | 500V | | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.05Ω) |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω) |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω) |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(1% +0.05Ω) |
| Solder-ability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(1% +0.05Ω)<br>No visible damage |

## TR - Trimmable chip resistors, 0402 to 1206

### Global part number - Preferred type for ordering Yageo / Phycomp branded products

Ordering example: TR0603MR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

### Phycomp worldwide - Traditional type

| Trimmable chip resistors | | | | |
|---|---|---|---|---|
| Size: inch (mm) | 0402 (1005) | 0603 (1608) | 0805 (2012) | 1206 (3216) |
| Power | 1/16 W | 1/10 W | 1/8 W | 1/4 W |
| Tolerance | E24 | E24 | E24 | E24 |
| Resistance | paper tape | paper tape | paper tape | paper tape |
| Packing | 2350 503 21…L | 2350 502 11…L | 2350 501 11…L | 2350 500 11…L |
| Quantity 5 000 0/-20% | 2350 503 20…L | 2350 502 10…L | 2350 511 10…L | 2350 500 10…L |
| 5 000 0/-30% | on request | on request | on request | 2322 724 94…L |
| Europe 5 000 | 2322 792 61...L | 2322 793 6....L | 2322 791 6....L | --- |

**For ordering rules:** See page 14 for E24 / E96 values and the last 4 or 3 digits of the 12NC catalogue number

### Phycomp CTC ordering code - Traditional type - North America

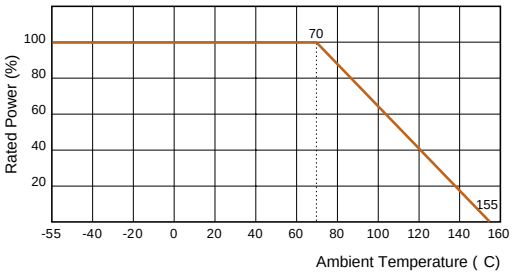
Regional code for ordering Phycomp branded products. Please see page 15 for details.

## Features

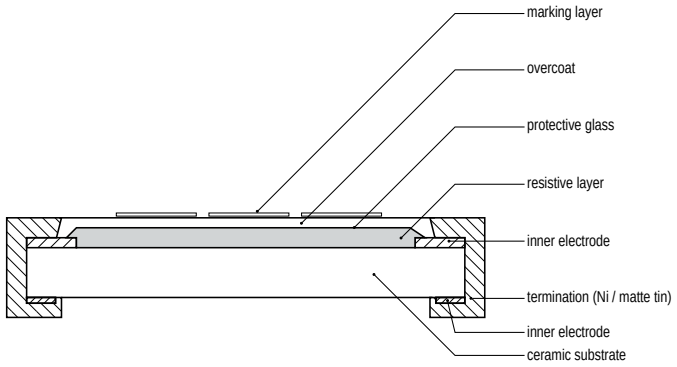
- Superior resistance against sulfur containing atmosphere
- Hightly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Halogen free product and production

### Derating curve

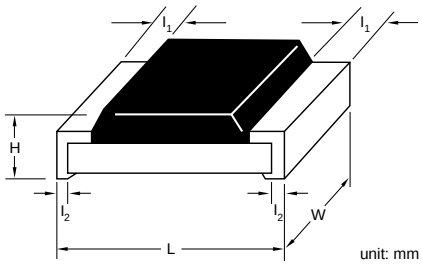
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $I_1$ | $I_2$ |
|---|---|---|---|---|---|
| AF0201 | 0.60±0.03 | 0.30±0.03 | 0.23 ±0.03 | 0.10±0.05 | 0.15±0.05 |
| AF0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.32 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| AF0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| AF0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| AF1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| AF1210 | 3.10±0.10 | 2.60±0.15 | 0.50 ±0.10 | 0.45±0.15 | 0.50±0.20 |
| AF1218 | 3.10±0.10 | 4.60±0.10 | 0.55 ±0.10 | 0.45±0.20 | 0.40±0.20 |
| AF2010 | 5.00±0.10 | 2.50±0.15 | 0.55±0.10 | 0.55±0.15 | 0.50±0.20 |
| AF2512 | 6.35±0.10 | 3.10±0.15 | 0.55±0.10 | 0.60±0.20 | 0.50±0.20 |

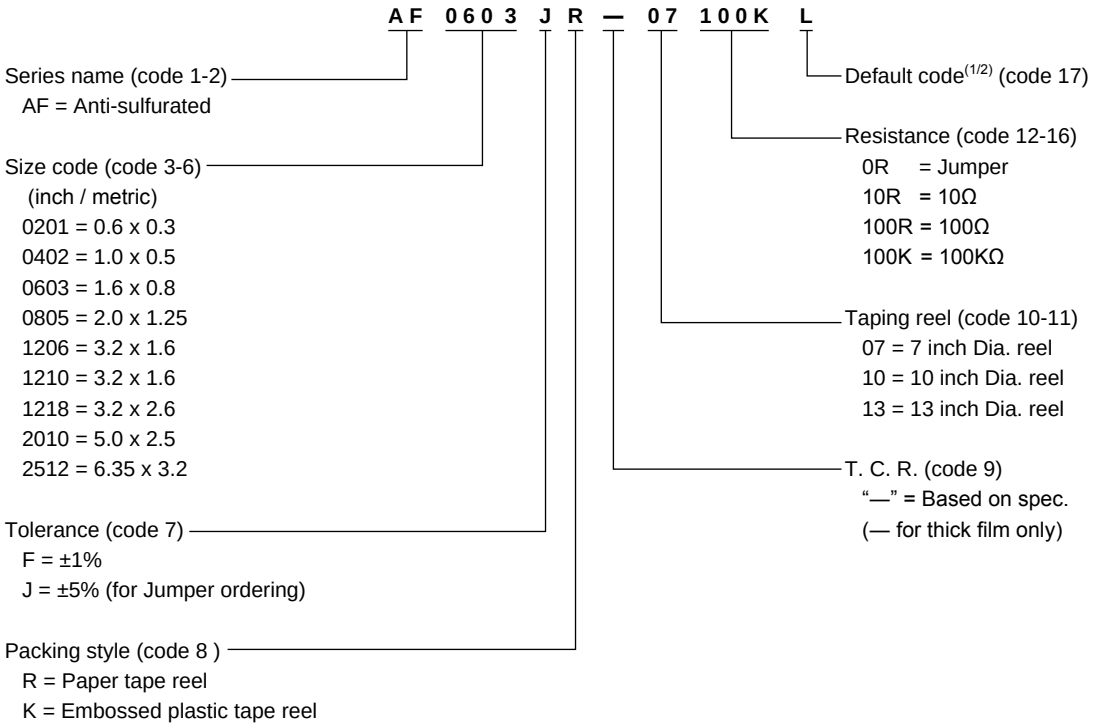
## AF - Sulfur resistant chip resistors, 0201 to 2512

| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. ( ppm/°C) | Jumper criteria (unit: A) |
| AF0201 | 1/20W | -55°C to +125°C | 25V | 50V | 50V | E24 ±5% 1Ω ≤ R ≤ 10MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | 1Ω ≤ R ≤ 10Ω -100/+350<br>10Ω < R ≤ 10MΩ ±200 | Rated current 0.5<br>Max. current 1.0 |
| AF0402 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 22MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | 1Ω ≤ R ≤ 10Ω ±200<br>10Ω < R ≤ 10MΩ ±100<br>10MΩ < R ≤ 22MΩ ±200 | Rated current 1.0<br>Max. current 2.0 |
| AF0603 | 1/10W | -55°C to +155°C | 50V | 100V | 100V | | | Rated current 1.0<br>Max. current 2.0 |
| AF0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | | | Rated current 2.0<br>Max. current 5.0 |
| AF1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AF1210 | 1/2W | -55°C to +155°C | 200V | 500V | 500V | E24 ±5% 1Ω ≤ R ≤ 10MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 10MΩ<br>Jumper < 50mΩ | 1Ω ≤ R ≤ 10Ω ±200<br>10Ω < R ≤ 10MΩ ±100 | Rated current 2.0<br>Max. current 10.0 |
| AF1218 | 1W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AF2010 | 3/4W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AF2512 | 1W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(1% +0.05Ω)<br>< 100mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω)<br>< 100mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.05Ω) for 1% tol.<br>±(1% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage which-ever is less for 5 seconds at room temperature | ±(1% +0.05Ω)<br>No visible damage |
| Anti-FOS | | ASTM-B-809-95 | Sulfur (saturated vapor) 1000 hours, 60±2°C, 91~93 %RH, Rating with no power | ±(1% +0.05Ω) |

Global part number - Preferred type

Ordering example: AF0603JR-07100KL

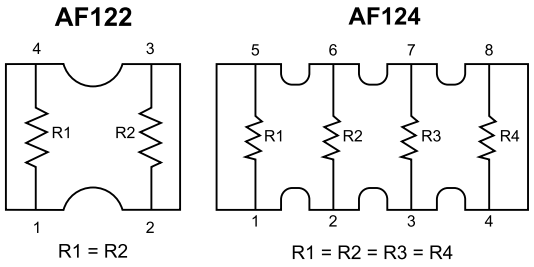



**Note:** 1. All our RSMD products meet RoHS Compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for order only
3. AF series products are available by "Global part number" only

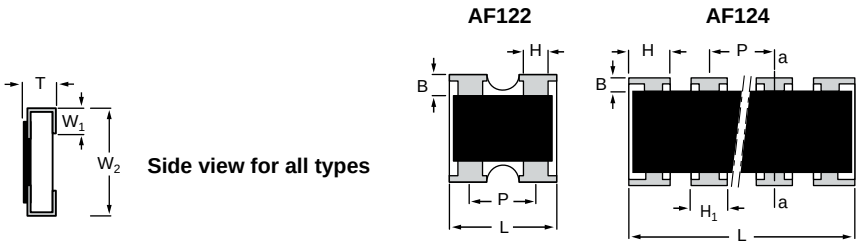
## Features

- Superior resistance against sulfur containing atmosphere
- Highly reliable multilayer electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Barrier layer end termination
- Halogen free product and production

### Schematics




### Dimensions




| Type | H / H1 | B | P | L | T | W1 | W2 |
|---|---|---|---|---|---|---|---|
| AF122 | 0.30 +0.10/-0.05 | 0.24 ± 0.10 | 0.67 ± 0.05 | 1.00 ± 0.10 | 0.30 ±0.10 | 0.25 ± 0.10 | 1.00 ± 0.10 |
| AF124 | H : 0.45 ± 0.05<br>H1 : 0.30 ± 0.05 | 0.20 ± 0.15 | 0.50 ± 0.05 | 2.00 ± 0.10 | 0.45 ± 0.10 | 0.30 ± 0.15 | 1.00 ± 0.10 |

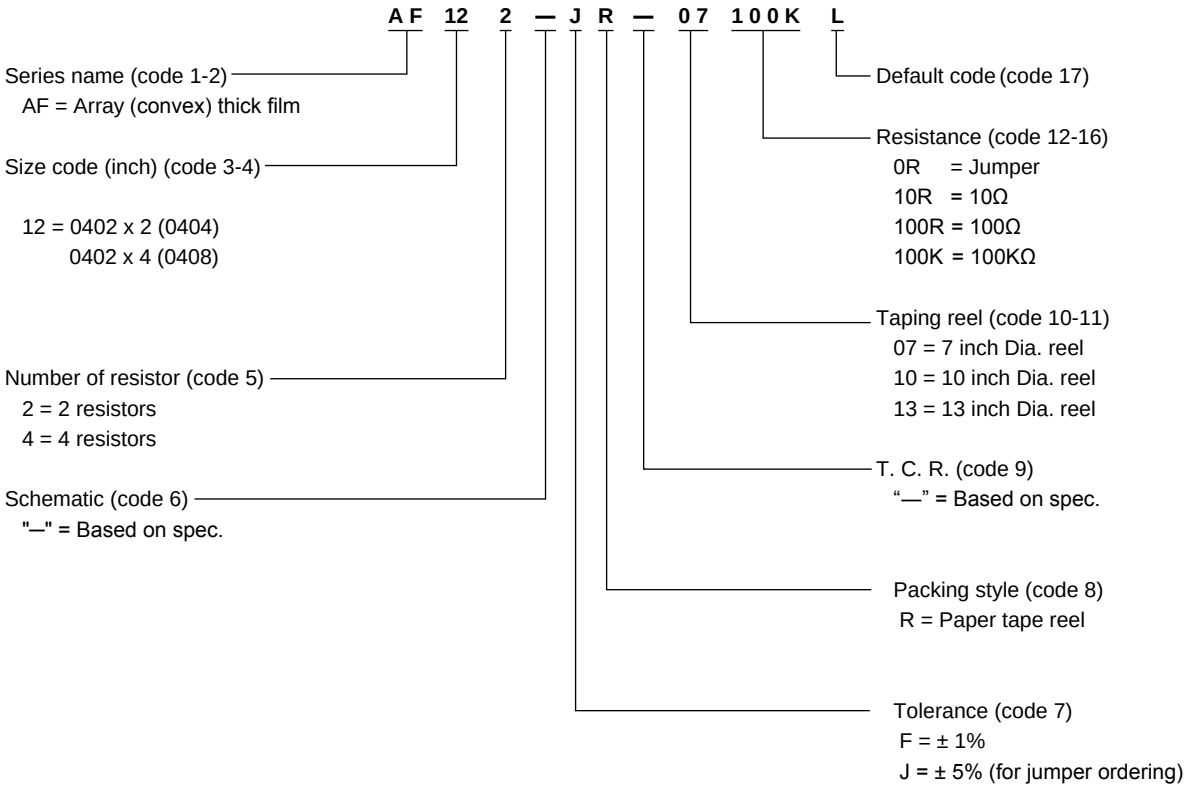
| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power rating | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. | Jumper criteria (unit: A) |
| AF122 | 1/16W | -55°C to +125°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 1MΩ<br>E24/E96 ±1% 1Ω ≤ R ≤ 1MΩ<br>Jumper < 50mΩ | 1Ω ≤ R < 10Ω ±250ppm/°C<br>10Ω < R < 1MΩ ±200ppm/°C | Rated current 0.5A<br>Max. current 1.0A |
| AF124 | 1/16W | -55°C to +155°C | 25V | 50V | 100V | | | Rated current 1.0A<br>Max. current 2.0A |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | ±(2% +0.05Ω)<br>< 100mΩ for jumper |
| High temperature exposure | | MIL-STD-202G-method 108A | 1 000 hours at maximum operating temperature depending on specification, unpowered | ±(1% +0.05Ω)<br>< 50mΩ for jumper |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | ±(2% +0.05Ω)<br>< 50mΩ for jumper |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(0.5% +0.05Ω) for 10K to 10M<br>±(1% +0.05Ω) for others<br>< 50mΩ for jumper |
| Solderability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage which-ever is less for 5 seconds at room temperature | ±(2% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |
| Anti-FOS | | ASTM-B-809-95 | Sulfur (saturated vapor) 1000 hours, 60±2°C, 91~93 %RH, Rating with no power | ±(1% +0.05Ω) |

## AF - Sulfur resistant chip resistors, Arrays

Global part number - Array

Ordering example: AF122-JR-07100KL



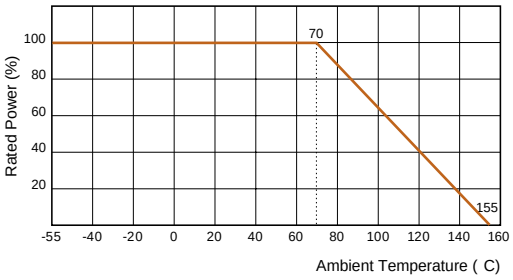

**Note:** 1. All our RSMD products meet RoHS Compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for order only

## Features

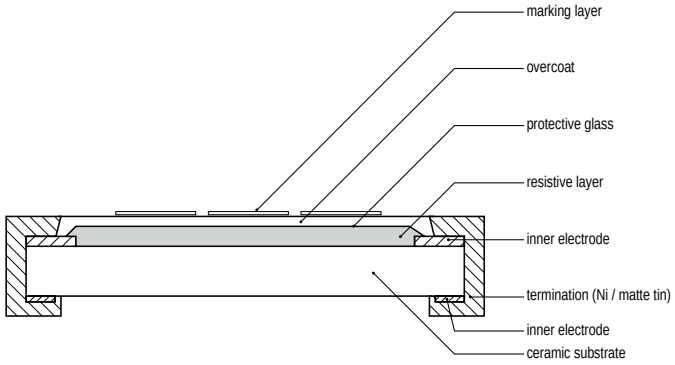
- AEC-Q200 qualified
- Production part approval process (PPAP) support
- High reliability
- High quality level

### Derating curve

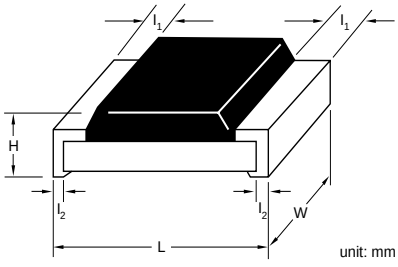
Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).




### Construction




### Dimensions




| Type | L | W | H | $l_1$ | $l_2$ |
|---|---|---|---|---|---|
| AC0402 | 1.00 ±0.05 | 0.50 ±0.05 | 0.32 ±0.05 | 0.20 ±0.10 | 0.25 ±0.10 |
| AC0603 | 1.60 ±0.10 | 0.80 ±0.10 | 0.45 ±0.10 | 0.25 ±0.15 | 0.25 ±0.15 |
| AC0805 | 2.00 ±0.10 | 1.25 ±0.10 | 0.50 ±0.10 | 0.35 ±0.20 | 0.35 ±0.20 |
| AC1206 | 3.10 ±0.10 | 1.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| AC1210 | 3.10 ±0.10 | 2.60 ±0.15 | 0.50 ±0.10 | 0.45 ±0.15 | 0.50 ±0.20 |
| AC1218 | 3.10 ±0.10 | 4.60 ±0.10 | 0.55 ±0.10 | 0.45 ±0.20 | 0.40 ±0.20 |
| AC2010 | 5.00 ±0.10 | 2.50 ±0.15 | 0.55 ±0.10 | 0.55 ±0.15 | 0.50 ±0.20 |
| AC2512 | 6.35 ±0.10 | 3.10 ±0.15 | 0.55 ±0.10 | 0.60 ±0.20 | 0.50 ±0.20 |

## AC - Automotive grade chip resistors, 0402 to 2512

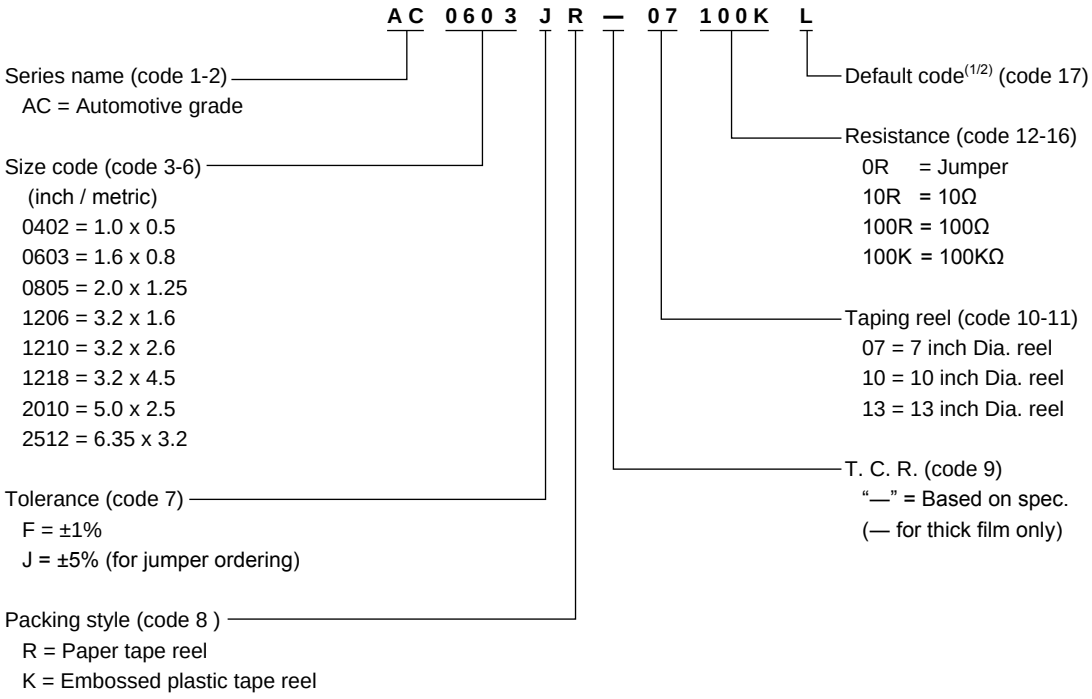
| Electrical characteristics | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MWV | RCOV | DWV | Resistance range & tolerance | T. C. R. ( ppm/°C) | Jumper criteria (unit: A) |
| AC0402 | 1/16W | -55°C to +155°C | 50V | 100V | 100V | E24 ±5% 1Ω ≤ R ≤ 10MΩ<br>E24/E96 ±0.5%, ±1% 1Ω ≤ R ≤ 10MΩ<br>Jumper < 0.05Ω | 1Ω ≤ R ≤ 10Ω ±200<br>10Ω < R ≤ 10 MΩ ±100 | Rated current 1.0<br>Max. current 2.0 |
| AC0603 | 1/10W | -55°C to +155°C | 50V | 100V | 100V | | | Rated current 1.0<br>Max. current 2.0 |
| AC0805 | 1/8W | -55°C to +155°C | 150V | 300V | 300V | | | Rated current 2.0<br>Max. current 5.0 |
| AC1206 | 1/4W | -55°C to +155°C | 200V | 400V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AC1210 | 1/2W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AC1218 | 1W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 6.0<br>Max. current 10.0 |
| AC2010 | 3/4W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |
| AC2512 | 1W | -55°C to +155°C | 200V | 500V | 500V | | | Rated current 2.0<br>Max. current 10.0 |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | AEC-Q200-REV C-Test 8<br>MIL-STD-202 Method 108 | 1 000 hours at 125°C applied RCWV<br>1.5 hours on, 0.5 hours off | ±(1% +0.05Ω)<br>< 100mΩ for jumper |
| High temperature exposure | | AEC-Q200-REV C-Test 3<br>MIL-STD-202 Method 108 | 1 000 hours at maximum operating temperature depending on specification | ±(1% +0.05Ω)<br>< 50mΩ for jumper |
| Moisture resistance | | AEC-Q200-REV C-Test 6<br>MIL-STD-202 Method 106 | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H. | ±(0.5% +0.05Ω) for 1% tol.<br>±(2% +0.05Ω) for 5% tol.<br>< 100mΩ for jumper |
| Biased humidity | | AEC-Q200-REV C-Test 7<br>MIL-STD-202 Method 103 | 1 000 hours; + 85°C 85% R.H.; 10% of operating power<br>Measured at 24 ±2 hours after test | ±(1% +0.05Ω)<br>< 100mΩ for jumper |
| Thermal shock | | AEC-Q200-REV C-Test 16<br>MIL-STD-202 Method 107 | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | ±(1% +0.05Ω)<br>< 50mΩ for jumper |
| Solderability | Wetting | AEC-Q200-REV C-Test 18<br>J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered)<br>No visible damage |
| | Resistance to soldering heat | AEC-Q200-REV C-Test 15<br>MIL-STD-202 Method 215 | Lead-free solder, 260°C, 10 seconds immersion time | ±(1% +0.05Ω)<br>< 50mΩ for jumper<br>No visible damage |
| Short time overload | | MIL-R-55342D-<br>para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | ±(1% +0.05Ω)<br>< 100mΩ for jumper<br>No visible damage |

## AC - Automotive grade chip resistors, 0402 to 2512

Global part number - Preferred type

Ordering example: AC0603JR-07100KL




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only
3. AC series products are available by "Global part number" only

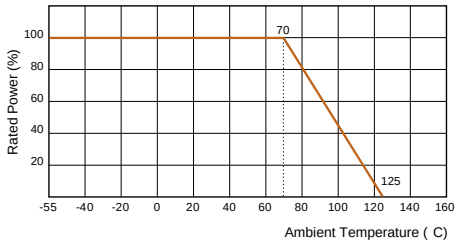
## AT - RF attenuator chip resistors, 0404

### Features

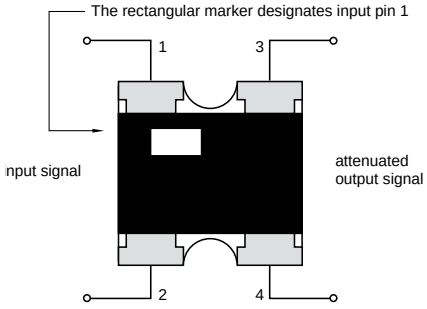
- Reduce system size
- Low assembly cost
- Higher component and system reliability
- Suitable for applications of mobile phones, receivers, battery chargers, palmtop computers and tablets

#### Derating curve

Maximum dissipation (P) in percentage of rated power as a function of the operating ambient temperature ($T_{amb}$).

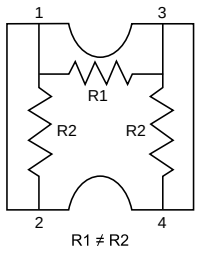



#### Construction

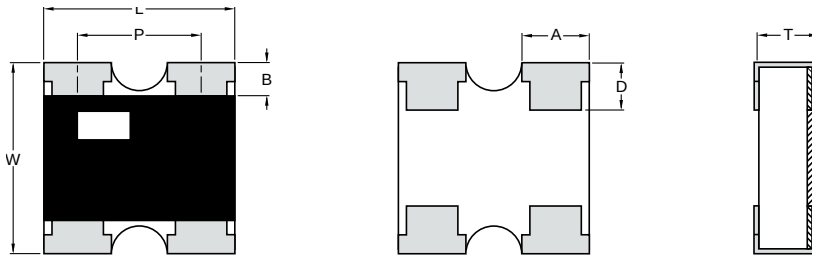



#### Schematics

**ATV 321**




#### Dimensions




unit: mm

| Type | L | W | T | A | B | P | D |
|---|---|---|---|---|---|---|---|
| ATV321 | 1.00 ±0.10 | 1.00 ±0.10 | 0.35 ±0.05 | 0.33 ±0.10 | 0.15 ±0.10 | 0.65 ±0.10 | 0.25 ±0.10 |

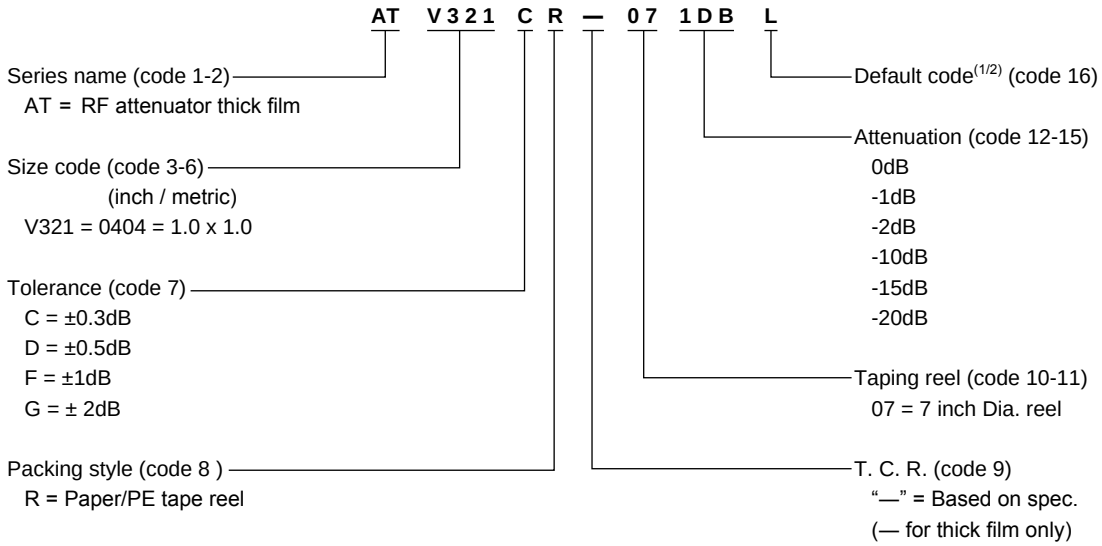
## AT - RF attenuator chip resistors, 0404

| Electrical characteristics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Type | Power $P_{70}$ | Operating Temp. range | MPV | VSWR (Max.) | Impedance | Attenuation range & tolerance | Frequency range |
| ATV321 | 40mW | -55°C to +125°C | 50V | 1.3 | 50Ω | -1dB to -5dB ±0.3 dB | -1dB to -10dB DC to 2.5 GHz |
| | | | | | | -6dB to -10dB ±0.5 dB | |
| | | | | | | -15dB ±1.0 dB | -15dB to -20dB DC to 2.0 GHz |
| | | | | | | -20dB ±2.0 dB | |

| Environmental characteristics | | | | |
|---|---|---|---|---|
| Performance test | | Test method | Procedure | Requirements |
| Life | | MIL-STD-202G-method 108A | 1 000 hours at 70 ±5°C applied RCWV<br>1.5 hours on, 0.5 hours off, still air required | Max.: ±0.3 dB |
| Humidity (steady state) | | JIS C 5202 7.5 | 1 000 hours, 40 ±2°C, 93(+2/-3)% RH<br>RCWV applied for 1.5 hours on and 0.5 hour off | Max.: ±0.3 dB |
| Moisture resistance | | MIL-STD-202G-method 106F | Each temperature / humidity cycle is defined as 8 hours (method 106F), 3 cycles / 24 hours for 10d with 25°C / 65°C 95% R.H | Max.: ±0.3 dB |
| Thermal shock | | MIL-STD-202G-method 107G | LCT / UCT, number of cycles required is 300<br>Maximum transfer time is 20 seconds | Max.: ±0.3 dB |
| Solder-ability | Wetting | J-STD-002B testB | Electrical test not required. Magnification 50X<br>Lead-free solder bath at 245 ±3°C<br>Dipping time: 3 ±0.5 seconds | Well tinned (≥95% covered) |
| | Resistance to soldering heat | MIL-STD-202G-method 210F | Lead-free solder, 260°C, 10 seconds immersion time | Max.: ±0.1 dB |
| Short time overload | | MIL-R-55342D-para 4.7.5 | 2.5 times RCWV or maximum overload voltage whichever is less for 5 seconds at room temperature | Max.: ±0.3 dB |

## AT - RF attenuator chip resistors, 0404

| Global part number - Preferred type for ordering Yageo / Phycomp branded products |
|---|
| Ordering example: ATV321CR-071DBL |




**Note:** 1. All of our RSMD products are RoHS compliant. "LFP" of the internal 2D reel label mentions "Lead Free Process"
2. Letter L is system default code for ordering only

| Phycomp worldwide - Traditional type | |
|---|---|
| Packing | paper tape |
| Quantity 10 000 | 2350 703 11…L |
| Remark | For last three digits, see following table "Attenuation codes" |

**Note:** L = Default code

| Phycomp CTC ordering code - Traditional type - North America | |
|---|---|
| Packing | paper tape |
| Quantity 10 000 | 9CV3218AXXXXX-PF3 |
| Remark | For last 9th to 13th digits, see following table "Attenuation codes" |

**Attenuation codes**

| Standard | | | |
|---|---|---|---|
| Value (dB) | Tolerance (dB) | Phycomp worldwide code (12NC) | Phycomp North America code (NA code) |
| 1 | ±0.3 | 012 | 01DBC |
| 2 | ±0.3 | 022 | 02DBC |
| 3 | ±0.3 | 032 | 03DBC |
| 4 | ±0.3 | 042 | 04DBC |
| 5 | ±0.3 | 052 | 05DBC |
| 6 | ±0.5 | 063 | 06DBD |
| 7 | ±0.5 | 073 | 07DBD |
| 8 | ±0.5 | 083 | 08DBD |
| 9 | ±0.5 | 093 | 09DBD |
| 10 | ±0.5 | 103 | 10DBD |
| 15 | ±1.0 | 154 | 15DBF |
| 20 | ±2.0 | 205 | 20DBG |

| Thick film chip resistors | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC (Preferred) | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| RC0100-R-SKE24L | RC0100, ±1% & ±5% , RoHS compliant, + Jumper | 01005 | F / J | 1/32W | 10 - 1M | 100 | 100 |
| RC0201-R-SKE24L | RC0201, ±1% & ±5% , RoHS compliant, + Jumper | 0201 | F / J | 1/20 W | 10 - 1M | 100 | 120 |
| RC0402JR-SKE24L | RC0402, ±5%, RoHS compliant, + Jumper | 0402 | J | 1/16 W | 10 - 1M | 100 | 110 |
| RC0402FR-SKE96L | RC0402, ±1%, RoHS compliant, + Jumper | 0402 | F | 1/16 W | 10 - 1M | 100 | 450 |
| RC0603JR-SKE24L | RC0603, ±5%, RoHS compliant, + Jumper | 0603 | J | 1/10 W | 10 - 1M | 50 | 110 |
| RC0603FR-SKE96L | RC0603, ±1%, RoHS compliant, + Jumper | 0603 | F | 1/10 W | 10 - 1M | 50 | 450 |
| RC0805JR-SKE24L | RC0805, ±5%, RoHS compliant, + Jumper | 0805 | J | 1/8 W | 10 - 1M | 50 | 110 |
| RC0805FR-SKE96L | RC0805, ±1%, RoHS compliant, + Jumper | 0805 | F | 1/8 W | 10 - 1M | 50 | 280 |
| RC1206JR-SKE24L | RC1206, ±5%, RoHS compliant, + Jumper | 1206 | J | 1/4 W | 10 - 1M | 50 | 110 |
| RC1206FR-SKE96L | RC1206, ±1%, RoHS compliant, + Jumper | 1206 | F | 1/4 W | 10 - 1M | 50 | 350 |

| Thick film array chip resistors (convex) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC (Preferred) | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| YC12X-JR-SK001L | YC124 / YC122, ±5%, +Jumper, RoHS compliant, | 0402 X 2<br>0402 X 4 | J | 1/16 W | 10 - 1M | 100 | 75 |

| Engineering design kit for current sensing application | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC (Preferred) | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| CS0402-R-SK001L | RL0402 - RL2512, ±1% & ±5%, RoHS compliant | 0402 - 2512 | F / J | --- | 100m - 910m | 30 | 160 |

| Engineering design kit for mobile application | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC (Preferred) | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| MD0402-R-SK001L | Chip resistors / MLCC / Attenuators | --- | --- | --- | --- | 50 - 100 | 44 |

**Note:** Before ordering, please contact our sales force for detail of resistance

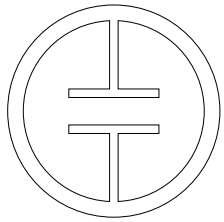
| Engineering design kit for automotive application | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC (Preferred) | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Min. items |
| AC0402-R-SK001L | AC0402 - AC1206, ±1% & ±5%, RoHS compliant, + Jumper | 0402 - 1206 | F/J | --- | 1 - 10M | 50-100 | 200 |

| Engineering design kit for general purpose | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Items |
| RC0402-R-SK001L | Chip resistors / MLCC | 0402 - 1206 | --- | --- | --- | 50-100 | 472 |

| Engineering design book for thin film chip resistor | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Items |
| RT0402-R-SB001L | RT0402 - RT1206, E96 series, ±0.1%, RoHS compliant | 0402 - 1206 | B | --- | 10 ~ 1M | 10 | 60 |

| Engineering design book for automotive application | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Items |
| AC0402-R-SB001L | AC0402 - AC1206, E96 series, ±1%, RoHS compliant | 0402 - 1206 | F | --- | 10 ~ 1M | 10 | 60 |

| Engineering design book for current sensing application | | | | | | | |
|---|---|---|---|---|---|---|---|
| Global CTC | Description | Size | Tolerance | Max. power | Resistance range | Resistor pieces | Items |
| PE0603-R-SB001L | PA/PE/PR, ±1%, RoHS compliant, low T.C.R. | 0603 - 2512 | F | --- | 0.5m ~ 50m | 10 | 60 |



# SMD CERAMIC MULTILAYER CAPACITORS

## Specification overview

| Specification overview | | | | | |
|---|---|---|---|---|---|
| Description | TC code | Series | Capacitance range | Voltage range | Size |
| Discrete | NPO | General purpose | 0.47 pF to 22 nF | 10V to 50 V | 01005, 0201, 0402, 0603, 0805, 1206, 1210,1812 |
| | | Medium and High voltage | 10 pF to 22 nF | 100 V to 3000 V | 0402, 0603, 0805, 1206, 1210, 1808, 1812 |
| | | High frequency | 0.2 pF to 100 pF | 16V to 250 V | 01005, 0201, 0402, 0603, 0805 |
| | X7R | General purpose & High capacitance | 100 pF to 47 µF | 6.3 V to 50 V | 01005, 0201, 0402, 0603, 0805, 1206, 1210,1812, 2220 |
| | | Medium and High voltage | 100 pF to 2.2 µF | 100 V to 3000 V | 0603, 0805, 1206, 1210, 1812 |
| | | Low inductance | 10 nF to 220 nF | 10 V to 50 V | 0306, 0508, 0612 |
| | | Soft termination | 100 pF to 1 µF | 16 V to 630 V | 0603, 0805,1206, 1210, 1808, 1812 |
| | X5R | General purpose & High capacitance | 100 pF to 100 µF | 6.3 V to 50 V | 01005, 0201, 0402, 0603, 0805, 1206, 1210,1812 |
| | Y5V | General purpose & High capacitance | 10 nF to 47 µF | 6.3 V to 50 V | 0201, 0402, 0603, 0805, 1206, 1210 |
| Automotive grade products | NP0 | Automotive grade | 10 pF to 10 nF | 50 V to 630 V | 0402, 0603, 0805,1206, 1210 |
| | X7R | Automotive grade | 100 pF to 2.2 µF | 16 V to 630 V | 0402, 0603, 0805,1206, 1210 |
| Safety certification products | NP0 | High voltage SC type | 2.0 pF to 470 pF | X1/Y2, X2/Y3 | 1808, 1812 |
| | X7R | High voltage SC type | 150 pF to 1.5 nF | X1/Y2, X2/Y3 | 1808, 1812 |
| C-Arrays | NP0 | 4C arrays | 10 pF to 470 pF | 50 V | 0508, 0612 |
| | X7R | 4C arrays | 180 pF to 100 nF | 16 V to 50 V | 0508, 0612 |
| | Y5V | 4C arrays | 10 nF to 100 nF | 25 V | 0612 |

Global part number

Ordering example: CC0201KRX7R8BB102

**CC 0201 K R X7R 8 B B 102**

Series name (code 1-2)
- CA = 4 x Capacitors array
- CC = Multilayer chip capacitors
- CL = Low inductance capacitors
- CQ = High frequency capacitors
- SC = Safety certification capacitors
- AC = Automotive grade capacitors
- CS = Soft termination capacitors

Size code (code 3-6)
- 0100
- 0201
- 0402
- 0603
- 0805
- 1206
- 1210
- 1808
- 1812
- 2220
- 0306
- 0508
- 0612

Capacitance tolerance (code 7)
- A = ±0.05 pF (CQ series only)
- B = ±0.1 pF
- C = ±0.25 pF
- D = ±0.5 pF
- F = ±1%
- G = ±2%
- J = ±5%
- K = ±10%
- M = ±20%
- Z = -20% to +80%

Packing style (code 8)
- R = Paper / PE tape reel Ø7 inch
- P = Paper / PE tape reel Ø13 inch
- K = Embossed plastic tape reel Ø7 inch
- F = Embossed plastic tape reel Ø13 inch
- C = Bulk case

TC material (code 9-11)
- NPO
- X5R
- X7R
- Y5V

Rated voltage (code 12)
- 5 = 6.3 V
- 6 = 10 V
- 7 = 16 V
- 8 = 25 V
- G = 35 V
- 9 = 50 V
- 0 = 100 V
- A = 200 V
- Y = 250 V
- B = 500 V
- Z = 630 V
- C = 1 kV
- D = 2 kV
- E = 3 kV
- T = X2 / Y3 for TUV / UL
- W = X1 / Y2 for TUV / UL
- U = X1 for UL (X7R, 1812)

Termination (code 13)
- B = Ni-Barrier

Process code (code 14)
- N = NP0
- B = Class 2 product

Capacitance value (code 15-17)
- 102 = 1 000 pF
- (2 significant digits+number of zeros; the 3rd digit signifies the multiplying factor, and letter R is decimal point)
- 0 = x 1
- 1 = x $10^1$
- 2 = x $10^2$
- 3 = x $10^3$
- 4 = x $10^4$
- 5 = x $10^5$
- 6 = x $10^6$
- 7 = x $10^7$
- X X R = Special capacitance
- (X X: capacitance before decimal point)

## Ordering information - Global part number

**Global part number**

Ordering example: CCxxxxKRX5RxBBxxx (for Low profile)

**C C 1 05 9 K R X 7 R 8 B B 1 0 2**

Series name (code 1-2)
- CC = Multilayer chip capacitors

Number of cap (code 3)
- 4 = 4 cap
- 2 = 2 cap
- 1 = Single

Size code (code 4-5)
- 01 = 0201
- 02 = 0402
- 03 = 0603
- 05 = 0805
- 06 = 1206, 0306
- 08 = 1808, 0508
- 10 = 1210
- 12 = 1812, 0612

Thickness (code 6)
- 3 = 0.3 mm
- 4 = 0.45 mm
- 5 = 0.5 mm
- 6 = 0.6 mm
- 8 = 0.8 mm
- 9 = 0.85 mm
- A = 1.0 mm
- B = 1.25 mm
- C = 1.6 mm
- D = 2.0 mm
- E = 2.5 mm
- F = 1.7 mm
- M = 1.15 mm
- N = 1.35 mm
- Q = 1.5 mm
- R = 1.8 mm

Capacitance tolerance (code 7)
- B = ±0.1 pF
- C = ±0.25 pF
- D = ±0.5 pF
- F = ±1%
- G = ±2%
- J = ±5%
- K = ±10%
- M = ±20%
- Z = -20% to +80%

Packing style (code 8)
- R = Paper / PE tape reel Ø7 inch
- P = Paper / PE tape reel Ø13 inch
- K = Embossed plastic tape reel Ø7 inch
- F = Embossed plastic tape reel Ø13 inch
- C = Bulk case

TC material (code 9-11)
- X5R
- X7R

Rated voltage (code 12)
- 5 = 6.3 V
- 6 = 10 V
- 7 = 16 V
- 8 = 25 V
- 9 = 50 V
- 0 = 100 V
- A = 200 V
- B = 500 V
- C = 1 kV
- D = 2 kV
- E = 3 kV
- G = 35 V
- Y = 250 V
- Z = 630 V

Termination (code 13)
- B = Ni-Barrier

Process code (code 14)
- N = NP0
- B = Class 2 product

Capacitance value (code 15-17)
102 = 1 000 pF
(2 significant digits+number of zeros; the 3rd digit signifies the multiplying factor, and letter R is decimal point)
- 0 = x 1
- 1 = x $10^1$
- 2 = x $10^2$
- 3 = x $10^3$
- 4 = x $10^4$
- 5 = x $10^5$
- 6 = x $10^6$
- 7 = x $10^7$
- X X R = Special capacitance (X X: capacitance before decimal point)

Thickness classes and packing quantities

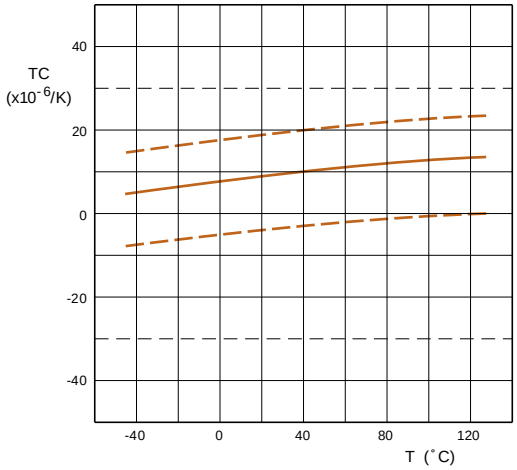
| Description | Size code | Thickness classification (mm) | Quantity per reel | | | | | Quantity per bulk case |
|---|---|---|---|---|---|---|---|---|
| | | | Tape width | 180 mm / 7” | | 330 mm / 13” | | |
| | | | | Paper | Blister | Paper | Blister | |
| Discrete capacitors | 01005 | 0.2±0.02 | 8 mm | 20 000 | --- | --- | --- | --- |
| | 0201 | 0.3 ±0.03 / ±0.05 | | 15 000 | --- | 50 000 | --- | --- |
| | 0402 | 0.5 ±0.05 / ±0.15 / ±0.20 | | 10 000 | --- | 50 000 | --- | 50 000 |
| | 0603 | 0.8 ±0.1 / ±0.2 | | 4 000 | --- | 15 000 | --- | 15 000 |
| | 0805 | 0.6 ±0.1 | | 4 000 | --- | 20 000 | --- | 10 000 |
| | | 0.85/1.0 ±0.1 | | 4 000 | --- | 15 000 | --- | 8 000 |
| | | 1.25 ±0.2 | | --- | 3 000 | --- | 10 000 | 5 000 |
| | 1206 | 0.6 ±0.1 | | 4 000 | --- | 20 000 | --- | --- |
| | | 0.85 ±0.1 | | 4 000 | --- | 15 000 | --- | --- |
| | | 1.00 / 1.15 ±0.1 | | --- | 3 000 | --- | 10 000 | --- |
| | | 1.25 ±0.2 | | --- | 3 000 | --- | 10 000 | --- |
| | | 1.6 ±0.15 | | --- | 2 500 | --- | 10 000 | --- |
| | | 1.6 ±0.2 / ±0.3 | | --- | 2 000 | --- | 10 000 | --- |
| | 1210 | 0.6 / 0.7 ±0.1 | | --- | 4 000 | --- | 15 000 | --- |
| | | 0.85 ±0.1 | | --- | 4 000 | --- | 10 000 | --- |
| | | 1.0 ±0.15 | | --- | 3 000 | --- | 10 000 | --- |
| | | 1.15 ±0.1 | | --- | 3 000 | --- | 10 000 | --- |
| | | 1.15 ±0.15 | | --- | 3 000 | --- | 10 000 | --- |
| | | 1.25 ±0.2 | | --- | 3 000 | --- | --- | --- |
| | | 1.5 ±0.1 | | --- | 2 000 | --- | --- | --- |
| | | 1.6 / 1.9 ±0.2 | | --- | 2 000 | --- | --- | --- |
| | | 2.0 ±0.2 | | --- | 2 000 / 1 000 | --- | --- | --- |
| | | 2.5 ±0.2 / ±0.3 | | --- | 1 000 / 500 | --- | --- | --- |
| | 1808 | 1.15 ±0.15 | 12 mm | --- | 3 000 | --- | --- | --- |
| | | 1.25 ±0.2 | | --- | 3 000 | --- | --- | --- |
| | | 1.35 ±0.15 | | --- | 2 000 | --- | --- | --- |
| | | 1.5 ±0.1 | | --- | 2 000 | --- | --- | --- |
| | | 1.6 ±0.2 | | --- | 2 000 | --- | 8 000 | --- |
| | | 2.0 ±0.2 | | --- | 2 000 | --- | --- | --- |
| | 1812 | 0.6 / 0.85 ±0.1 | | --- | 2 000 | --- | --- | --- |
| | | 1.15 ±0.1 | | --- | 1 000 | --- | --- | --- |
| | | 1.15 ±0.15 | | --- | 1 000 | --- | --- | --- |
| | | 1.25 ±0.2 | | --- | 1 000 | --- | --- | --- |
| | | 1.35 ±0.15 | | --- | 1 000 | --- | --- | --- |
| | | 1.5 ±0.1 | | --- | 1 000 | --- | --- | --- |
| | | 1.6 ±0.2 | | --- | 1 000 | --- | --- | --- |
| | | 2.0 ±0.2 | | --- | 1 000 | --- | --- | --- |
| | 2220 | 0.85 ±0.1 | | --- | 1 500 | --- | --- | --- |
| | | 1.15 ±0.1 | | --- | 1 500 | --- | --- | --- |
| Low inductance | 0306 | 0.5 ±0.1 | 8 mm | 4 000 | --- | 15 000 | --- | --- |
| | 0508 | 0.85 ±0.1 | | 4 000 | --- | 15 000 | --- | --- |
| | 0612 | 0.85 ±0.1 | | 4 000 | --- | 15 000 | --- | --- |
| Arrays | 0508 | 0.6 ±0.1 | | 4 000 | --- | --- | --- | --- |
| | 0612 | 0.8 ±0.1 | | 4 000 | --- | --- | --- | --- |

## NPO - General purpose 16 to 50V, 01005 to 1812

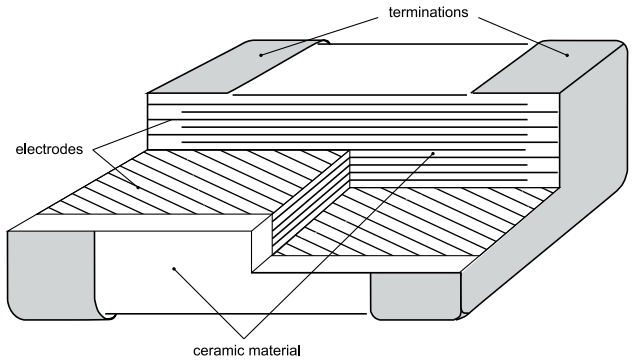
### Features

- Ultra-stable on capacitance
- Tight tolerance available
- High reliability
- Low ESR
- Good frequency performance
- No aging of capacitance

### Temperature characteristic

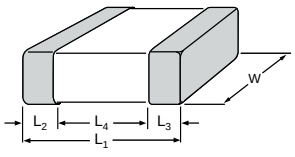



### Construction




### Case dimensions

Discrete capacitors - General purpose




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 01005 | 0402M | 0.4±0.02 | 0.2±0.02 | 0.07 | 0.14 | 0.14 |
| 0201 | 0603M | 0.6 ±0.03 | 0.3 ±0.03 | 0.10 | 0.20 | 0.20 |
| 0402 | 1005M | 1.0 ±0.05 | 0.5 ±0.05 | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.10 (1) | 1.25 ±0.10 (1) | 0.25 | 0.75 | 0.55 |
| | | 2.0 ±0.20 (2) | 1.25 ±0.20 (2) | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.15 (1) | 1.6 ±0.15 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.30 (2) | 1.6 ±0.20 (2) | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.20 (1) | 2.5 ±0.20 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.40 (2) | 2.5 ±0.30 (2) | 0.25 | 0.75 | 1.40 |
| 1812 | 4532M | 4.5 ±0.20 (1) | 3.2 ±0.20 (1) | 0.25 | 0.75 | 2.20 |
| | | 4.5 ±0.40 (2) | 3.2 ±0.40 (2) | 0.25 | 0.75 | 2.20 |

**Note:** 1. Dimension for size 0805 to 1812, C ≤ 1 nF
2. Dimension for size 0805 to 1812, C > 1 nF

| NP0 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | | |
| Capacitance | 01005 | 0201 | | | 0402 | | | 0603 | | |
| | 16 V | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V |
| 0.22 pF | | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | | | | | | |
| 0.47 pF | | | | | | | | | | |
| 0.56 pF | | | | | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |
| 0.68 pF | | | | | | | | | | |
| 0.82 pF | | | | | | | | | | |
| 1 pF | | | | | | | | | | |
| 1.2 pF | | | | | | | | | | |
| 1.5 pF | | | | | | | | | | |
| 1.8 pF | | | | | | | | | | |
| 2.2 pF | | | | | | | | | | |
| 2.7 pF | | | | | | | | | | |
| 3.3 pF | | | | | | | | | | |
| 3.9 pF | | | | | | | | | | |
| 4.7 pF | | | | | | | | | | |
| 5.6 pF | | | | | | | | | | |
| 6.8 pF | | | | | | | | | | |
| 8.2 pF | | | | | | | | | | |
| 10 pF | 0.2 ±0.02 | | | | | | | | | |
| 12 pF | | | | | | | | | | |
| 15 pF | | | | | | | | | | |
| 18 pF | | | | | | | | | | |
| 22 pF | | | | | | | | | | |
| 27 pF | | | | | | | | | | |
| 33 pF | | | | | | | | | | |
| 39 pF | | | | | | | | | | |
| 47 pF | | | | | | | | | | |
| 56 pF | | | | | | | | | | |
| 68 pF | | | | | | | | | | |
| 82 pF | | | | | | | | | | |
| 100 pF | | | | | | | | | | |
| 120 pF | | | | | | | | | | |
| 150 pF | | | | | | | | | | |
| 180 pF | | | | | | | | | | |
| 220 pF | | | | | | | | | | |
| 270 pF | | | | | | | | | | |
| 330 pF | | | | | | | | | | |
| 390 pF | | | | | | | | | | |
| 470 pF | | | | | | | | | | |
| 560 pF | | | | | | | | | | |
| 680 pF | | | | | | | | | | |
| 820 pF | | | | | | | | | | |
| 1000 pF | | | | | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | | | |
| Tape width | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## NP0 - General purpose 16 to 50V, 01005 to 0603

| NP0 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | | |
| Capacitance | 01005 | 0201 | | | 0402 | | | 0603 | | |
| | 16 V | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V |
| 1.2 nF | | | | | | | | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |
| 1.5 nF | | | | | | | | | | |
| 1.8 nF | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | |
| 2.7 nF | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | |
| 3.9 nF | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | |
| 5.6 nF | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | |
| 8.2 nF | | | | | | | | | | |
| 10 nF | | | | | | | | | | |
| 12 nF | | | | | | | | | | |
| 15 nF | | | | | | | | | | |
| 18 nF | | | | | | | | | | |
| 22 nF | | | | | | | | | | |
| 33 nF | | | | | | | | | | |
| 39 nF | | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| NP0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | |
| Capacitance | 0805 | | | 1206 | | | 1210 | 1210 | 1812 |
| | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V | 25 V | 50 V | 50 V |
| 0.22 pF | | | | | | | | | |
| 0.47 pF | | | | | | | | | |
| 0.56 pF | | | | | | | | | |
| 0.68 pF | | | | | | | | | |
| 0.82 pF | | | | | | | | | |
| 1 pF | | | | | | | | | |
| 1.2 pF | | | | | | | | | |
| 1.5 pF | | | | | | | | | |
| 1.8 pF | | | | | | | | | |
| 2.2 pF | | | | | | | | | |
| 2.7 pF | | | | | | | | | |
| 3.3 pF | | | | | | | | | |
| 3.9 pF | | | | | | | | | |
| 4.7 pF | | | | | | | | | |
| 5.6 pF | | | | | | | | | |
| 6.8 pF | | | | | | | | | |
| 8.2 pF | | | | | | | | | |
| 10 pF | | | | | | | | | |
| 12 pF | | | | | | | | | |
| 15 pF | | | | | | | | | |
| 18 pF | | | | | | | | | |
| 22 pF | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | | | |
| 27 pF | | | | | | | | | |
| 33 pF | | | | | | | | | |
| 39 pF | | | | | | | | | |
| 47 pF | | | | | | | | | |
| 56 pF | | | | | | | | | |
| 68 pF | | | | | | | | | |
| 82 pF | | | | | | | | | |
| 100 pF | | | | | | | | | |
| 120 pF | | | | | | | | | |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 270 pF | | | | | | | | | |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 560 pF | | | | | | | | | |
| 680 pF | | | | | | | | | |
| 820 pF | | | | | | | | | |
| 1000 pF | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## NPO - Gerneral purpose 16 to 50V, 0805 to 1812

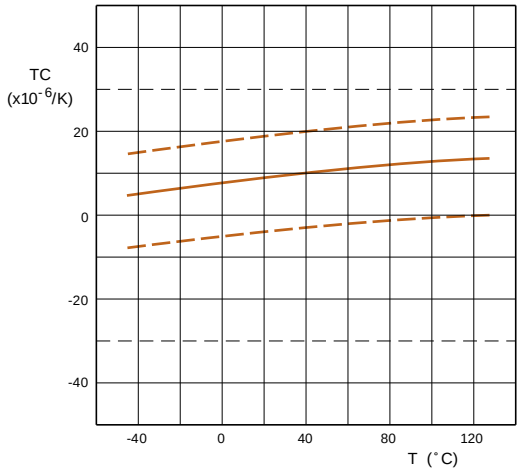
| NP0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | |
| Capacitance | 0805 | | | 1206 | | | 1210 | 1210 | 1812 |
| | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V | 25 V | 50 V | 50 V |
| 1.2 nF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 1.5 nF | | | | | | | | | |
| 1.8 nF | | | | | | | | | |
| 2.2 nF | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | | | | |
| 2.7 nF | | | | | | | | | |
| 3.3 nF | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | | | |
| 3.9 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 5.6 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 8.2 nF | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | |
| 10 nF | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | | | | |
| 12 nF | | | | | | | | | |
| 15 nF | | | | | | | | | |
| 18 nF | | | | | | | | | |
| 22 nF | | | | | | | 2.0 ±0.2 | 2.0 ±0.2 | |
| 33 nF | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | | | |
| 39 nF | | | | | | | | | |
| 47 nF | | | | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | | | |
| 56 nF | | | | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | | |
| 68 nF | | | | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | | |
| 82 nF | | | | | | | | | |
| 100 nF | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

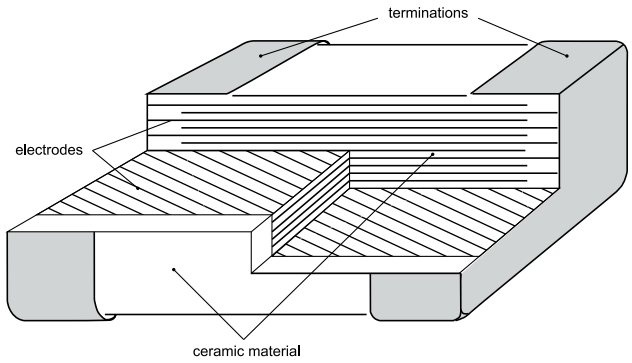
## Features

- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling / smoothing function

### Temperature characteristic

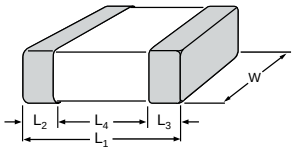



### Construction




### Dimensions

Discrete capacitors - Medium and High voltage




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 0402 | 1005M | 1.0 ±0.05 | 0.5 ±0.05 | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.20 | 1.25 ±0.20 | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.30 | 1.6 ±0.20 | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.40 | 2.5 ±0.30 | 0.25 | 0.75 | 1.40 |
| 1808 | 4520M | 4.5 ±0.40 | 2.0 ±0.30 | 0.25 | 0.75 | 2.20 |
| 1812 | 4532M | 4.5 ±0.40 | 3.2 ±0.30 | 0.25 | 0.75 | 2.20 |

| NP0 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Medium voltage | | | | | | | |
| Capacitance | 0402 | 0603 | | 0805 | | | |
| | 100 V | 100 V | 250 V | 100 V | 250 V | 500 V | 630 V |
| 1 pF | 0.5 ±0.05 | 0.8 ±0.1 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 1.2 pF | | | | | | | |
| 1.5 pF | | | | | | | |
| 1.8 pF | | | | | | | |
| 2.2 pF | | | | | | | |
| 2.7 pF | | | | | | | |
| 3.3 pF | | | | | | | |
| 3.9 pF | | | | | | | |
| 4.7 pF | | | | | | | |
| 5.6 pF | | | | | | | |
| 6.8 pF | | | | | | | |
| 8.2 pF | | | | | | | |
| 10 pF | | | | | | | |
| 12 pF | | | | | | | |
| 15 pF | | | | | | | |
| 18 pF | | | | | | | |
| 22 pF | | | | | | | |
| 27 pF | | | | | | | |
| 33 pF | | | | | | | |
| 39 pF | | | | | | | |
| 47 pF | | | | | | | |
| 56 pF | | | | | | | |
| 68 pF | | | | | | | |
| 82 pF | | | | | | | |
| 100 pF | | | | | | | |
| 120 pF | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 150 pF | | | | | | | |
| 180 pF | | | | | | | |
| 220 pF | | | | | | | |
| 270 pF | | | | | | | |
| 330 pF | | | | | | | |
| 390 pF | | | | | | | |
| 470 pF | | | | | | | |
| 560 pF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 |
| 680 pF | | | | | | | |
| 820 pF | | | | | | | |
| 1000 pF | | | | | | | |
| 1.2 nF | | | | 0.85 ±0.1 | 1.25 ±0.2 | | |
| 1.5 nF | | | | | | | |
| 1.8 nF | | | | | | | |
| 2.2 nF | | | | 1.25 ±0.2 | | | |
| 2.7 nF | | | | | | | |
| 3.3 nF | | | | | | | |
| 3.9 nF | | | | | | | |
| 4.7 nF | | | | | | | |
| Tape width | 8 mm | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| NP0 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Medium voltage | | | | | | | | |
| Capacitance | 1206 | | | | 1210 | | | |
| | 100 V | 250 V | 500 V | 630 V | 100 V | 250 V | 500 V | 630 V |
| 1 pF | | | | | | | | |
| 1.2 pF | | | | | | | | |
| 1.5 pF | | | | | | | | |
| 1.8 pF | | | | | | | | |
| 2.2 pF | | | 0.6 ±0.1 | | | | | |
| 2.7 pF | | | | | | | | |
| 3.3 pF | | | | | | | | |
| 3.9 pF | | | | | | | | |
| 4.7 pF | | | | | | | | |
| 5.6 pF | | | | | | | | |
| 6.8 pF | | | | | | | | |
| 8.2 pF | | | | | | | | |
| 10 pF | | | | 1.25 ±0.2 | | | | |
| 12 pF | | | | | | | | |
| 15 pF | | | | | | | | |
| 18 pF | | | | | | | | |
| 22 pF | | | | | | | | |
| 27 pF | | | | | | | | |
| 33 pF | | | | | | | | 1.25 ±0.2 |
| 39 pF | | | | | | | | |
| 47 pF | | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | |
| 56 pF | | | | | | | | |
| 68 pF | | | | | | | | |
| 82 pF | | | | | | | | |
| 100 pF | | | | | | | | |
| 120 pF | | | | | | | | |
| 150 pF | | | | | | | | |
| 180 pF | | | | | | | | |
| 220 pF | | | | | | | | |
| 270 pF | | | | | | | | |
| 330 pF | | | | | | | | |
| 390 pF | | | | | | | | |
| 470 pF | | | | | | | | |
| 560 pF | | | | | | | | |
| 680 pF | | | | | | | | |
| 820 pF | | 0.85 ±0.1 | 0.85 ±0.1 | | | | | |
| 1000 pF | | | | | | | | |
| 1.2 nF | 0.6 ±0.1 | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | |
| 1.5 nF | | | | | | | | |
| 1.8 nF | | 1.25 ±0.2 | 1.25 ±0.2 | | | | | |
| 2.2 nF | | | | | | | | |
| 2.7 nF | | | | | | | | |
| 3.3 nF | 0.85 ±0.1 | | | | | | | |
| 3.9 nF | | | | | | | | |
| 4.7 nF | | | | | | | | |
| 5.6 nF | | | | | | | | |
| 6.8 nF | | | | | | | | |
| 8.2 nF | 1.25 ±0.2 | | | | | | | |
| 10 nF | | | | | | | | |
| Tape width | 8 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## NP0 - High voltage, 0805 to 1210

| NP0 | | | | | |
|---|---|---|---|---|---|
| High voltage | | | | | |
| Capacitance | 0805 | 1206 | | 1210 | |
| | 1000 V | 1000 V | 2000 V | 1000 V | 2000 V |
| 10 pF | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 | | |
| 12 pF | | | | | |
| 15 pF | | | | | |
| 18 pF | | | | | |
| 22 pF | | | | | |
| 27 pF | | | | | |
| 33 pF | | | | 1.25 ±0.2 | 1.25 ±0.2 |
| 39 pF | | | | | |
| 47 pF | | | | | |
| 56 pF | | | | | |
| 68 pF | | | | | |
| 82 pF | | | | | |
| 100 pF | | | | | |
| 120 pF | | | | | |
| 150 pF | | | | | |
| 180 pF | | | | | |
| 220 pF | | | | | |
| 270 pF | | | | | |
| 330 pF | | | | | |
| 390 pF | | | | | |
| 470 pF | | | | | |
| 560 pF | | | | | |
| 680 pF | | | | | |
| 820 pF | | | | | |
| 1000 pF | | | | | |
| 1.2 nF | | | | | |
| 1.5 nF | | | | | |
| 1.8 nF | | | | | |
| 2.2 nF | | | | | |
| 2.7 nF | | | | | |
| 3.3 nF | | | | | |
| 3.9 nF | | | | | |
| 4.7 nF | | | | | |
| 5.6 nF | | | | | |
| 6.8 nF | | | | | |
| 8.2 nF | | | | | |
| 10 nF | | | | | |
| 12 nF | | | | | |
| 15 nF | | | | | |
| 18 nF | | | | | |
| 22 nF | | | | | |
| 33 nF | | | | | |
| Tape width | 8 mm | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

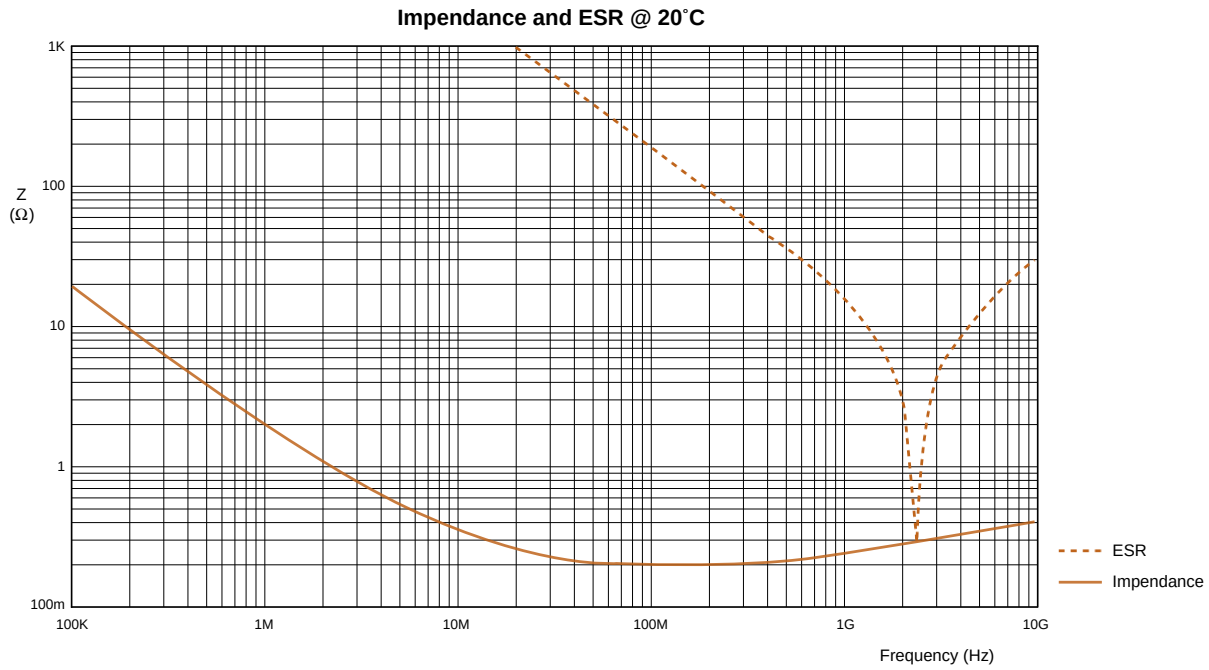
| NP0 | | | | | | |
|---|---|---|---|---|---|---|
| | High voltage | | | | | |
| Capacitance | 1808 | | | 1812 | | |
| | 1000 V | 2000 V | 3000 V | 1000 V | 2000 V | 3000 V |
| 10 pF | | | 1.6 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 12 pF | | | | | | |
| 15 pF | | | | | | |
| 18 pF | | | | | | |
| 22 pF | | | | | | |
| 27 pF | | | | | | |
| 33 pF | 1.25 ±0.2 | 1.25 ±0.2 | | | | |
| 39 pF | | | | | | |
| 47 pF | | | | | | |
| 56 pF | | | | | | |
| 68 pF | | | | | | |
| 82 pF | | | | | | |
| 100 pF | | | | | | |
| 120 pF | | | | | | |
| 150 pF | | | | | | |
| 180 pF | | | 2.0 ±0.2 | | | |
| 220 pF | | | | | | |
| 270 pF | | | | | | |
| 330 pF | | | | | | |
| 390 pF | | | | | | |
| 470 pF | | | | | | |
| 560 pF | | | | | | |
| 680 pF | | | | | | |
| 820 pF | | | | | | |
| 1000 pF | 1.25 ±0.2 | | | | | |
| 1.2 nF | | | | | | |
| 1.5 nF | | | | | | |
| 1.8 nF | | | | | | |
| 2.2 nF | | | | | | |
| 2.7 nF | | | | | | |
| 3.3 nF | | | | | | |
| 3.9 nF | | | | | | |
| 4.7 nF | | | | | | |
| 5.6 nF | | | | | | |
| 6.8 nF | | | | | | |
| 8.2 nF | | | | | | |
| 10 nF | | | | | | |
| 12 nF | | | | | | |
| 15 nF | | | | | | |
| 18 nF | | | | | | |
| 22 nF | | | | | | |
| 33 nF | | | | | | |
| Tape width | 12 mm | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

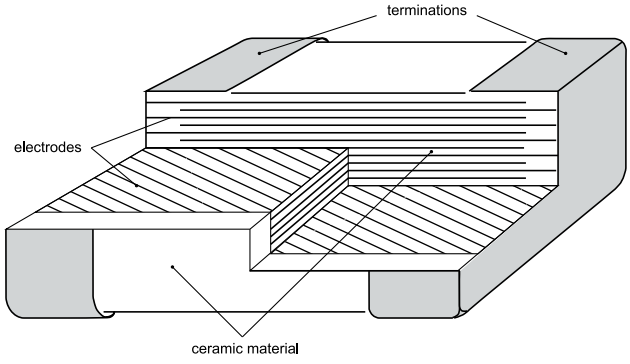
## Features

- Lowest ESR in high frequency
- Ultra small
- Noise filtering

### ESR characteristic

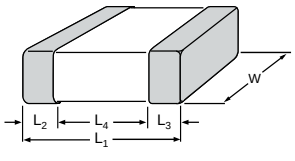



### Construction



## Case dimensions

### Discrete capacitors - High Frequency




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 01005 | 0402M | 0.4 ±0.02 | 0.2 ±0.02 | 0.07 | 0.14 | 0.13 |
| 0201 | 0603M | 0.6 ±0.03 | 0.3 ±0.03 | 0.10 | 0.20 | 0.20 |
| 0402 | 1005M | 1.0 ±0.05 | 0.5 ±0.05 | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.10 | 1.25 ±0.10 | 0.25 | 0.75 | 0.55 |

### NP0

High frequency

| Capaci-tance | 01005 | 0201 | | 0402 | | |
|---|---|---|---|---|---|---|
| | 16 V | 16 V | 25 V | 16 V | 25 V | 50 V |
| 0.2 pF | 0.2 ±0.02 | 0.3 ±0.03 | 0.3 ±0.03 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 0.3 pF | | | | | | |
| 0.4 pF | | | | | | |
| 0.5 pF | | | | | | |
| 0.6 pF | | | | | | |
| 0.7 pF | | | | | | |
| 0.8 pF | | | | | | |
| 0.9 pF | | | | | | |
| 1 pF | | | | | | |
| 1.2 pF | | | | | | |
| 1.5 pF | | | | | | |
| 1.8 pF | | | | | | |
| 2.2 pF | | | | | | |
| 2.7 pF | | | | | | |
| 3.3 pF | | | | | | |
| 3.9 pF | | | | | | |
| 4.7 pF | | | | | | |
| 5.6 pF | | | | | | |
| 6.8 pF | | | | | | |
| 8.2 pF | | | | | | |
| 10 pF | | | | | | |
| 12 pF | | | | | | |
| 15 pF | | | | | | |
| 18 pF | | | | | | |
| 22 pF | | | | | | |
| 27 pF | | | | | | |
| 33 pF | | | | | | |
| 39 pF | | | | | | |
| 47 pF | | | | | | |
| Tape width | 8 mm | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

### NP0

High frequency

| Capaci-tance | 0603 | | | 0805 | | |
|---|---|---|---|---|---|---|
| | 50 V | 100 V | 250 V | 50 V | 100 V | 250 V |
| 0.22 pF | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 0.47 pF | | | | | | |
| 0.56 pF | | | | | | |
| 0.68 pF | | | | | | |
| 0.82 pF | | | | | | |
| 1 pF | | | | | | |
| 1.2 pF | | | | | | |
| 1.5 pF | | | | | | |
| 1.8 pF | | | | | | |
| 2.2 pF | | | | | | |
| 2.7 pF | | | | | | |
| 3.3 pF | | | | | | |
| 3.9 pF | | | | | | |
| 4.7 pF | | | | | | |
| 5.6 pF | | | | | | |
| 6.8 pF | | | | | | |
| 8.2 pF | | | | | | |
| 10 pF | | | | | | |
| 12 pF | | | | | | |
| 15 pF | | | | | | |
| 18 pF | | | | | | |
| 22 pF | | | | | | |
| 27 pF | | | | | | |
| 33 pF | | | | | | |
| 39 pF | | | | | | |
| 47 pF | | | | | | |
| 56 pF | | | | | | |
| 68 pF | | | | | | |
| 82 pF | | | | | | |
| 100 pF | | | | | | |
| Tape width | 8 mm | | | | | |

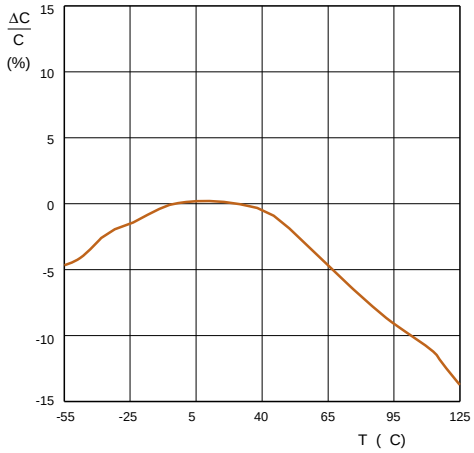
**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - General purpose & High capacitance, 01005 to 2220

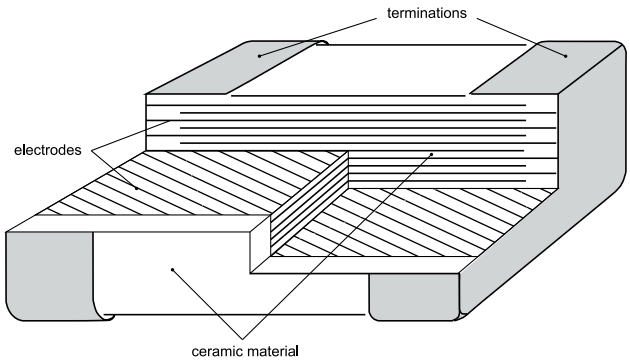
### Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance

### Temperature characteristic

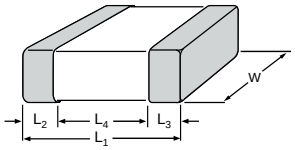



### Construction




### Case dimensions

Discrete capacitors - General purpose & High capacitance




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 01005 | 0402M | 0.4±0.02 | 0.2±0.02 | 0.07 | 0.14 | 0.14 |
| 0201 | 0603M | 0.6 ±0.03 | 0.3 ±0.03 | 0.10 | 0.20 | 0.20 |
| | | 0.6 ±0.05 | 0.3 ±0.05 | 0.10 | 0.20 | 0.20 |
| 0402 | 1005M | 1.0 ±0.05 (1) | 0.5 ±0.05 (1) | 0.15 | 0.30 | 0.40 |
| | | 1.0 ±0.20 (2) | 0.5 ±0.20 (2) | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 (1) | 0.8 ±0.10 (1) | 0.20 | 0.60 | 0.40 |
| | | 1.6 ±0.15 (2) | 0.8 ±0.15 (2) | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.10 (1) | 1.25 ±0.10 (1) | 0.25 | 0.75 | 0.55 |
| | | 2.0 ±0.20 (2) | 1.25 ±0.20 (2) | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.15 (1) | 1.6 ±0.15 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.30 (2) | 1.6 ±0.20 (2) | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.20 (1) | 2.5 ±0.20 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.40 (2) | 2.5 ±0.30 (2) | 0.25 | 0.75 | 1.40 |
| 1808 | 4520M | 4.5 ±0.40 | 2.0 ±0.30 | 0.25 | 0.75 | 2.20 |
| 1812 | 4532M | 4.5 ±0.20 (1) | 3.2 ±0.20 (1) | 0.25 | 0.75 | 2.20 |
| | | 4.5 ±0.40 (2) | 3.2 ±0.40 (2) | 0.25 | 0.75 | 2.20 |
| 2220 | 5750M | 5.7 ±0.40 | 5.0 ±0.30 | 0.25 | 0.75 | 3.40 |

**Note:** 1. Dimension for size 0402, C < 4.7 µF; 0603, C < 10 µF; 0805 to 1812, C ≤ 100 nF
2. Dimension for size 0402, C ≥ 4.7 µF; 0603, C ≥ 10 µF; 0805 to 1812, C > 100 nF

| X7R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | | | | |
| Capacitance | 01005 | | 0201 | | | | | 0402 | | | | |
| | 6.3 V | 10 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 10 pF | | | | | | | | | | | | |
| 15 pF | | | | | | | | | | | | |
| 22 pF | | | | | | | | | | | | |
| 33 pF | | | | | | | | | | | | |
| 47 pF | | | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | | | | | |
| 68 pF | | | | | | | | | | | | |
| 100 pF | 0.2 ±0.02 | 0.2 ±0.02 | | | | | | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 150 pF | | | | | | | | | | | | |
| 220 pF | | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | | |
| 22 nF | | | | | | | | | | | | |
| 33 nF | | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | | |
| 68 nF | | | | | | | | | | | | |
| 100 nF | | | | | | | | | | | | |
| 150 nF | | | | | | | | | | | | |
| 220 nF | | | | | | | | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | | |
| 330 nF | | | | | | | | | | | | |
| 470 nF | | | | | | | | 0.5 ±0.05 | 0.5 ±0.05 | | | |
| 680 nF | | | | | | | | | | | | |
| 1000 nF | | | | | | | | 0.5 ±0.05 | | | | |
| 2.2 µF | | | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | | | |
| 10 µF | | | | | | | | | | | | |
| 22 µF | | | | | | | | | | | | |
| 47 µF | | | | | | | | | | | | |
| 100 µF | | | | | | | | | | | | |
| Tape width | | | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - General purpose & High capacitance, 0603 / 0805

| X7R | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | | |
| Capacitance | 0603 | | | | | 0805 | | | | |
| | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 10 pF | | | | | | | | | | |
| 15 pF | | | | | | | | | | |
| 22 pF | | | | | | | | | | |
| 33 pF | | | | | | | | | | |
| 47 pF | | | | | | | | | | |
| 68 pF | | | | | | | | | | |
| 100 pF | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | | | | | |
| 150 pF | | | | | | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 220 pF | | | | | | | | | | |
| 330 pF | | | | | | | | | | |
| 470 pF | | | | | | | | | | |
| 680 pF | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | |
| 10 nF | | | | | | | | | | |
| 15 nF | | | | | | | | | | |
| 22 nF | | | | | | | | | | |
| 33 nF | | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 47 nF | | | | | | | | | | |
| 68 nF | | | | | | | | | | |
| 100 nF | | | | | | | | | | |
| 150 nF | | | | | | | | | | |
| 220 nF | | | | | | | | | | 1.25 ±0.2 |
| 330 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | |
| 470 nF | | | | 0.8 ±0.1 | | | | | | |
| 680 nF | | | | | | | | | | |
| 1000 nF | | | | 0.8 ±0.1 | 0.8 ±0.15 | | | | | |
| 2.2 µF | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | |
| 10 µF | | | | | | | | | | |
| 22 µF | | | | | | | | | | |
| 47 µF | | | | | | | | | | |
| 100 µF | | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

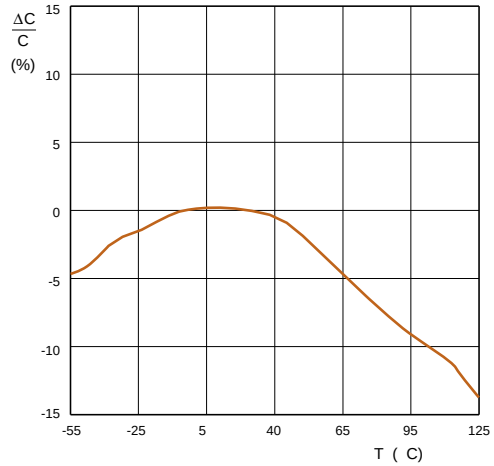
| X7R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | | | | |
| Capacitance | 1206 | | | | | 1210 | | | | | 1812 | 2220 |
| | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 50 V | 50 V |
| 10 pF | | | | | | | | | | | | |
| 15 pF | | | | | | | | | | | | |
| 22 pF | | | | | | | | | | | | |
| 33 pF | | | | | | | | | | | | |
| 47 pF | | | | | | | | | | | | |
| 68 pF | | | | | | | | | | | | |
| 100 pF | | | | | | | | | | | | |
| 150 pF | | | | | | | | | | | | |
| 220 pF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | | | | | | | |
| 330 pF | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | | |
| 2.2 nF | | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | | |
| 3.3 nF | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | 0.85 ±0.1 | |
| 6.8 nF | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | | |
| 22 nF | | | | | | | | | | | | |
| 33 nF | | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | | |
| 68 nF | | | | | | | | | | | | |
| 100 nF | | | | | | | | | | | 1.15 ±0.1 | |
| 150 nF | | | | | 1.15 ±0.1 | | | | | 1.15 ±0.1 | | |
| 220 nF | | | | | | | | | | | | 0.85 ±0.1 |
| 330 nF | | | | | 0.85 ±0.1 | | | | | | | |
| 470 nF | | | | | 1.0 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.25 ±0.2 | 1.6 ±0.2 | |
| 680 nF | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | | | | | | | | |
| 1000 nF | | | | | 1.6 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | 1.15 ±0.1 |
| 2.2 µF | | | | | | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | | |
| 4.7 µF | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | | | | | 2.5 ±0.2 | | |
| 10 µF | | | | | | | | | | | | |
| 22 µF | | | | | | 2.5 ±0.2 | 2.5 ±0.2 | 2.5 ±0.2 | 2.5 ±0.2 | | | |
| 47 µF | | | | | | | | | | | | |
| 100 µF | | | | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

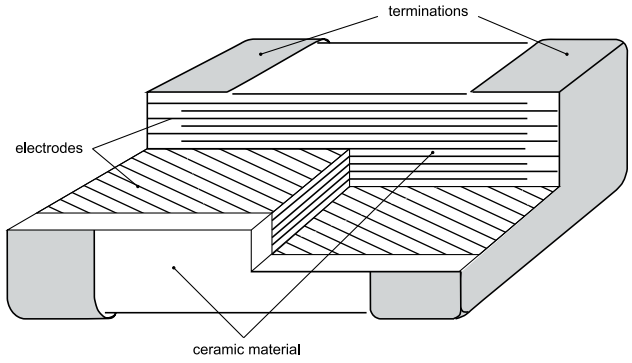
## Features

- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling / smoothing function

### Temperature characteristic

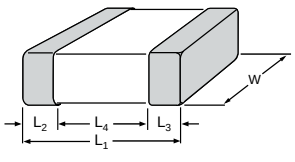



### Construction




### Dimensions

Discrete capacitors - Medium and High voltage




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 0402 | 1005M | 1.0 ±0.05 | 0.5 ±0.05 | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.20 | 1.25 ±0.20 | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.30 | 1.6 ±0.20 | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.40 | 2.5 ±0.30 | 0.25 | 0.75 | 1.40 |
| 1808 | 4520M | 4.5 ±0.40 | 2.0 ±0.30 | 0.25 | 0.75 | 2.20 |
| 1812 | 4532M | 4.5 ±0.40 | 3.2 ±0.30 | 0.25 | 0.75 | 2.20 |

| X7R | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Medium voltage & High voltage | | | | | | | | |
| Capacitance | 0402 | 0603 | | 0805 | | | | |
| | 100 V | 100 V | 250 V | 100 V | 250 V | 500 V | 630 V | 1000 V |
| 100 pF | 0.5 ±0.05 | 0.8 ±0.1 | | 0.6 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 150 pF | | | | | | | | |
| 220 pF | | | 0.8 ±0.1 | | | | | |
| 330 pF | | | | | | | | |
| 470 pF | | | | | | | | |
| 680 pF | | | | | | | | |
| 1.0 nF | | | | | | | | |
| 1.5 nF | | | | | | | | |
| 2.2 nF | | | | | | | | |
| 3.3 nF | | | | | | | | |
| 4.7 nF | | | | | | | | |
| 6.8 nF | | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | |
| 10 nF | | | | | | | | |
| 15 nF | | | | 0.85 ±0.1 | | | | |
| 22 nF | | | | | | | | |
| 33 nF | | | | 1.25 ±0.2 | | | | |
| 47 nF | | | | | | | | |
| 68 nF | | | | | | | | |
| 100 nF | | | | | | | | |
| 150 nF | | | | | | | | |
| 220 nF | | | | | | | | |
| 330 nF | | | | | | | | |
| 470 nF | | | | | | | | |
| 680 nF | | | | | | | | |
| 1000 nF | | | | | | | | |
| 2.2 µF | | | | | | | | |
| 4.7 µF | | | | | | | | |
| 10 µF | | | | | | | | |
| 22 µF | | | | | | | | |
| 47 µF | | | | | | | | |
| 100 µF | | | | | | | | |
| Tape width | 12 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - Medium and High voltage, 1206 / 1210

| X7R | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium voltage & High voltage | | | | | | | | | | | | |
| Capacitance | 1206 | | | | | | 1210 | | | | | |
| | 100 V | 250 V | 500 V | 630 V | 1000 V | 2000 V | 100 V | 250 V | 500 V | 630 V | 1000 V | 2000 V |
| 100 pF | | | | | | | | | | | | |
| 150 pF | | | | | | | | | | | | |
| 220 pF | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | | | | |
| 330 pF | | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | 1.25 ±0.2 | 1.25 ±0.2 |
| 1.5 nF | | | | | | | | | | | | |
| 2.2 nF | | | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 | | |
| 3.3 nF | | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | | |
| 22 nF | | 1.25 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | | | 1.25 ±0.2 | | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 |
| 33 nF | | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | | |
| 68 nF | 1.25 ±0.2 | | | | | | | | | | | |
| 100 nF | | 1.6 ±0.2 | | | | | | | | | | |
| 150 nF | | | | | | | 1.25 ±0.2 | | | | | |
| 220 nF | | | | | | | | | | | | |
| 330 nF | 1.6 ±0.2 | | | | | | 1.6 ±0.2 | | | | | |
| 470 nF | | | | | | | 1.25 ±0.2 | | | | | |
| 680 nF | | | | | | | | | | | | |
| 1000 nF | 1.6 ±0.2 | | | | | | 2.0 ±0.2 | | | | | |
| 2.2 µF | | | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | | | |
| 10 µF | | | | | | | | | | | | |
| 22 µF | | | | | | | | | | | | |
| 47 µF | | | | | | | | | | | | |
| 100 µF | | | | | | | | | | | | |
| Tape width | 12 mm | | | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

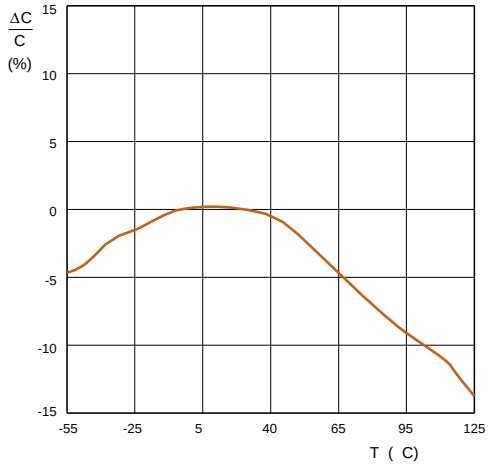
| X7R | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Medium voltage & High voltage | | | | | | | | | | |
| Capacitance | 1808 | | | 1812 | | | | | | |
| | 1000 V | 2000 V | 3000 V | 100 V | 250 V | 500 V | 630 V | 1000 V | 2000 V | 3000 V |
| 100 pF | | | | | | | | | | |
| 150 pF | | | 1.6 ±0.2 | | | | | | | |
| 220 pF | | | | | | | | | | |
| 330 pF | | 1.35 ±0.2 | | | | | | | | |
| 470 pF | 1.35 ±0.2 | | | | | | | | | |
| 680 pF | | | | | | | | | | |
| 1.0 nF | | | 2.0 ±0.2 | | | | | 1.35 ±0.2 | 1.35 ±0.2 | 1.6 ±0.2 |
| 1.5 nF | | | | | | | | | | |
| 2.2 nF | | 1.6 ±0.2 | | | | | | | | |
| 3.3 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | | | |
| 4.7 nF | | | | 0.85 ±0.1 | 0.85 ±0.1 | | | | | |
| 6.8 nF | 1.6 ±0.2 | | | | | | | | 1.6 ±0.2 | |
| 10 nF | | | | | | | | | 2.0 ±0.2 | |
| 15 nF | | | | | | | | | | |
| 22 nF | | | | | | | | | | |
| 33 nF | | | | | | | | 1.6 ±0.2 | | |
| 47 nF | | | | | 1.25 ±0.2 | | | | | |
| 68 nF | | | | | | | | | | |
| 100 nF | | | | 1.25 ±0.2 | | 1.6 ±0.2 | | | | |
| 150 nF | | | | | | | | | | |
| 220 nF | | | | | 1.6 ±0.2 | | | | | |
| 330 nF | | | | | | | | | | |
| 470 nF | | | | 1.6 ±0.2 | | | | | | |
| 680 nF | | | | | | | | | | |
| 1000 nF | | | | | | | | | | |
| 2.2 µF | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | |
| 10 µF | | | | | | | | | | |
| 22 µF | | | | | | | | | | |
| 47 µF | | | | | | | | | | |
| 100 µF | | | | | | | | | | |
| Tape width | 12 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

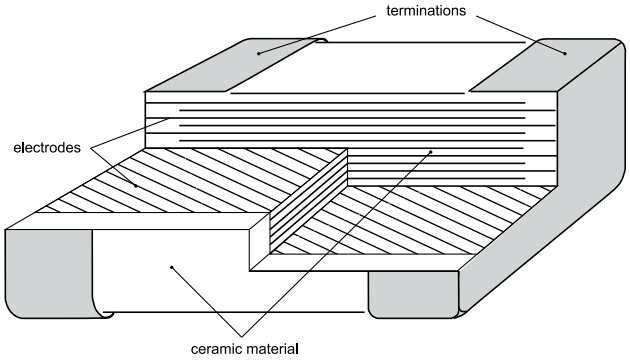
## Features

- Good solution for anti resonance reduction with controlled ESR
- Suitable for high speed IC decoupling due to low inductance type

### Temperature characteristic

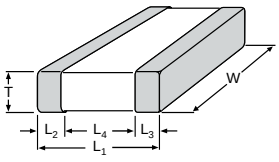



### Construction




### Dimensions

Discrete capacitors - Low inductance types only




| Case size designation | | Dimensions in mm | | | | | |
|---|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | T | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 0306 | 0816M | 0.8 ±0.15 | 1.6 ±0.20 | 0.50 ±0.10 | 0.10 | 0.30 | 0.20 |
| 0508 | 1220M | 1.25 ±0.20 | 2.0 ±0.20 | 0.85 ±0.10 | 0.13 | 0.46 | 0.38 |
| 0612 | 1632M | 1.6 ±0.20 | 3.2 ±0.20 | 0.85 ±0.10 | 0.13 | 0.46 | 0.50 |

| X7R | | | | | | | |
|---|---|---|---|---|---|---|---|
| Low Inductance series | | | | | | | |
| Capacitance | 0306 | 0508 | | | 0612 | | |
| | 10 V | 10 V | 16 V | 25 V | 16 V | 25 V | 50 V |
| 10 nF | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 22 nF | | | | | | | |
| 47 nF | | | | | | | |
| 100 nF | 0.5 ±0.1 | | 0.85 ±0.1 | | | | |
| 220 nF | | 0.85 ±0.1 | | | | 1.15 ±0.1 | 1.15 ±0.1 |
| 470 nF | | | | | | | |
| 1000 nF | | | | | 1.15 ±0.1 | | |
| Tape width | 8 mm | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X5R | | | |
|---|---|---|---|
| Low Inductance series | | | |
| Capacitance | 0306 | | |
| | 6.3 V | 10 V | 16 V |
| 100 nF | | | |
| 220 nF | | | |
| 470 nF | | | 0.5±0.1 |
| 1000 nF | 0.5±0.1 | 0.5±0.1 | |
| Tape width | 8 mm | | |

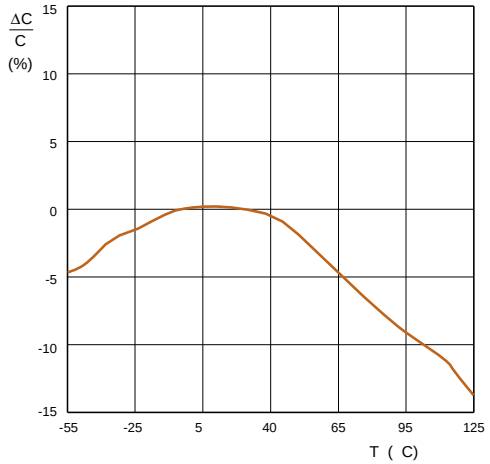
**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - Soft termination, 0603 to 1812

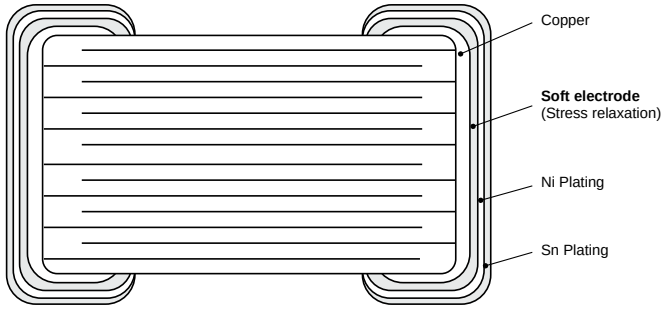
### Features

- Flexible termination system
- Improved resistance to thermal stresses
- Increased mechanical performance

### Temperature characteristic

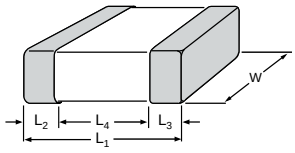



### Construction




### Dimensions

Discrete capacitors - Soft termination




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | L1 | W | L2 / L3 min | L2 / L3 max | L4 min |
| 0603 | 1608M | 1.6 ±0.20 | 0.8 ±0.15 | 0.20 | 0.50 | 0.40 |
| 0805 | 2012M | 2.0 ±0.30 | 1.25 ±0.20 | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.40 | 1.6 ±0.20 | 0.25 | 0.85 | 1.40 |
| 1210 | 3225M | 3.2 ±0.40 | 2.5 ±0.30 | 0.25 | 0.85 | 1.40 |
| 1812 | 4532M | 4.5 ±0.40 | 3.2 ±0.20 | 0.25 | 0.85 | 2.20 |

| X7R | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Soft termination | | | | | | | | | | | |
| Capacitance | 0603 | | | | | 0805 | | | | | |
| | 16 V | 25 V | 50 V | 100 V | 250 V | 50 V | 100 V | 250 V | 500 V | 630 V | 1000 V |
| 100 pF | 0.8 ±0.15 | 0.8 ±0.15 | 0.8 ±0.15 | 0.8 ±0.15 | | | | | | | |
| 150 pF | | | | | | 0.6 ±0.15 | 0.6 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 |
| 180 pF | | | | | 0.8 ±0.15 | | | | | | |
| 220 pF | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | |
| 390 pF | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | |
| 15 nF | | | | | | | | 1.25 ±0.2 | | | |
| 18 nF | | | | | | | | | | | |
| 22 nF | | | | | | 0.85 ±0.15 | 0.85 ±0.15 | | | | |
| 27 nF | | | | | | | | | | | |
| 33 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | | | | |
| 47 nF | | | | | | | | | | | |
| 68 nF | | | | | | | | | | | |
| 100 nF | | | | | | | | | | | |
| 150 nF | | | | | | | | | | | |
| 220 nF | | | | | | | | | | | |
| 330 nF | | | | | | | | | | | |
| 470 nF | | | | | | | | | | | |
| 680 nF | | | | | | | | | | | |
| 1000 nF | | | | | | | | | | | |
| 2.2 µF | | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | | |
| 10 µF | | | | | | | | | | | |
| 22 µF | | | | | | | | | | | |
| 47 µF | | | | | | | | | | | |
| 100 µF | | | | | | | | | | | |
| Tape width | 12 mm | | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - Soft termination, 1206

| X7R | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Soft termination | | | | | | | | | |
| Capaci-tance | 1206 | | | | | | | | |
| | 16 V | 25 V | 50 V | 100 V | 250 V | 500 V | 630 V | 1000 V | 2000 V |
| 100 pF | | | | | | | | | |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 680 pF | | | | | | | | | |
| 1.0 nF | | | | | | | | | |
| 1.5 nF | | | | | | | | | |
| 2.2 nF | | | | | | | | | |
| 3.3 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 10 nF | | | | | | | | | |
| 15 nF | | | | | | | | | |
| 18 nF | | | | | | | | | |
| 22 nF | | | | | 1.25 ±0.2 | | | | |
| 27 nF | | | | | | | | | |
| 33 nF | | | | | | | | | |
| 47 nF | | | | | | | | | |
| 68 nF | | | | 1.25 ±0.2 | | | | | |
| 100 nF | | | | | | | | | |
| 150 nF | | | 1.15 ±0.2 | | | | | | |
| 220 nF | | | | | | | | | |
| 330 nF | | 1.15 ±0.2 | | 1.6 ±0.2 | | | | | |
| 470 nF | 1.15 ±0.2 | | | | | | | | |
| 680 nF | | | | | | | | | |
| 1000 nF | | | | | | | | | |
| 2.2 µF | | | | | | | | | |
| 4.7 µF | | | | | | | | | |
| 10 µF | | | | | | | | | |
| 22 µF | | | | | | | | | |
| 47 µF | | | | | | | | | |
| 100 µF | | | | | | | | | |
| Tape width | 12 mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X7R | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Soft termination | | | | | | | | | | |
| Capaci-tance | 1210 | | | | | 1812 | | | | |
| | 16 V | 25 V | 50 V | 100 V | 250 V | 50 V | 100 V | 250 V | 500 V | 630 V |
| 100 pF | | | | | | | | | | |
| 150 pF | | | | | | | | | | |
| 180 pF | | | | | | | | | | |
| 220 pF | | | | | | | | | | |
| 330 pF | | | | | | | | | | |
| 390 pF | | | | | | | | | | |
| 470 pF | | | | | | | | | | |
| 680 pF | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | |
| 1.5 nF | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | 0.85 ±0.15 | | | | | |
| 2.2 nF | | | | | | | | | | |
| 3.3 nF | | | | | | 0.85 ±0.15 | 0.85 ±0.15 | 1.6 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 4.7 nF | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | |
| 10 nF | | | | | | | | | | |
| 15 nF | | | | | | | | | | |
| 18 nF | | | | | | | | | | |
| 22 nF | | | | | | | | 1.25 ±0.2 | | |
| 27 nF | | | | | | | | | | |
| 33 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | | 1.6 ±0.2 | |
| 47 nF | | | 1.15 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | | | |
| 68 nF | | | | | | | | 1.6 ±0.2 | | |
| 100 nF | | | | | | | | | | |
| 150 nF | 1.15 ±0.2 | 1.15 ±0.2 | | | | 1.6 ±0.2 | 1.6 ±0.2 | | | |
| 220 nF | | | | | | | | | | |
| 330 nF | | | | | | | | | | |
| 470 nF | | | | | | | | | | |
| 680 nF | | | | | | | | | | |
| 1000 nF | | | | | | | | | | |
| 2.2 µF | | | | | | | | | | |
| 4.7 µF | | | | | | | | | | |
| 10 µF | | | | | | | | | | |
| 22 µF | | | | | | | | | | |
| 47 µF | | | | | | | | | | |
| 100 µF | | | | | | | | | | |
| Tape width | 12mm | | | | | | | | | |

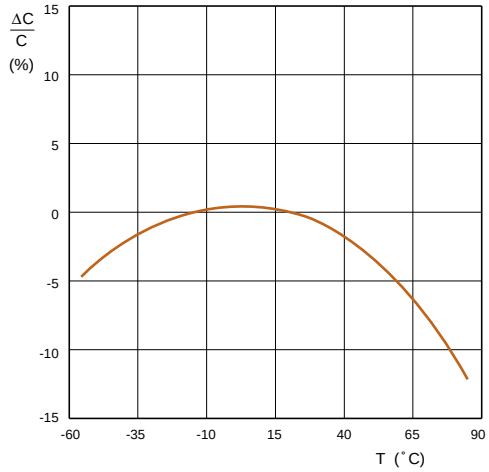
**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X5R - General purpose & High capacitance, 01005 to 1812

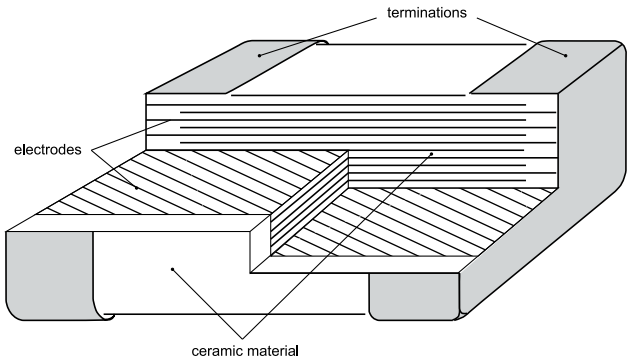
### Features

- Semi-stable on capacitance and high K
- High volumetric efficiency
- Highly reliable in high temperature application
- High insulation resistance

### Temperature characteristic

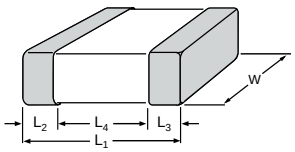



### Construction




### Case dimensions

Discrete capacitors - General purpose & High capacitance




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 01005 | 0402M | 0.4±0.02 | 0.2±0.02 | 0.07 | 0.14 | 0.14 |
| 0201 | 0603M | 0.6 ±0.03 (1) | 0.3 ±0.03 (1) | 0.10 | 0.20 | 0.20 |
| | | 0.6 ±0.05 (2) | 0.3 ±0.05 (2) | 0.10 | 0.20 | 0.20 |
| 0402 | 1005M | 1.0 ±0.05 (1) | 0.5 ±0.05 (1) | 0.15 | 0.30 | 0.40 |
| | | 1.0 ±0.20 (2) | 0.5 ±0.20 (2) | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 (1) | 0.8 ±0.10 (1) | 0.20 | 0.60 | 0.40 |
| | | 1.6 ±0.20 (2) | 0.8 ±0.20 (2) | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.10 (1) | 1.25 ±0.10 (1) | 0.25 | 0.75 | 0.55 |
| | | 2.0 ±0.20 (2) | 1.25 ±0.20 (2) | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.15 (1) | 1.6 ±0.15 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.30 (2) | 1.6 ±0.20 (2) | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.20 (1) | 2.5 ±0.20 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.40 (2) | 2.5 ±0.30 (2) | 0.25 | 0.75 | 1.40 |
| 1808 | 4520M | 4.5 ±0.40 | 2.0 ±0.30 | 0.25 | 0.75 | 2.20 |
| 1812 | 4532M | 4.5 ±0.20 (1) | 3.2 ±0.20 (1) | 0.25 | 0.75 | 2.20 |
| | | 4.5 ±0.40 (2) | 3.2 ±0.40 (2) | 0.25 | 0.75 | 2.20 |

**Note:** 1. Dimension for size 0201, C < 1 µF; 0402, C < 4.7 µF; 0603, C < 10 µF; 0805 to 1812, C ≤ 100 nF
2. Dimension for size 0201, C ≥ 1 µF; 0402, C ≥ 4.7 µF; 0603, C ≥ 10 µF; 0805 to 1812, C > 100 nF

| X5R | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | | | | | | | |
| Capacitance | 01005 | 0201 | | | | | 0402 | | | | |
| | 6.3 V | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 100 pF | 0.2 ±0.02 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 150 pF | | | | | | | | | | | |
| 220 pF | | | | | | | | | | | |
| 330 pF | | | | | | | | | | | |
| 470 pF | | | | | | | | | | | |
| 680 pF | | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | | |
| 10 nF | | | | | | | | | | | |
| 15 nF | | | | | | | | | | | |
| 22 nF | | | | | | | | | | | |
| 33 nF | | | | | | | | | | | |
| 47 nF | | | | | | | | | | | |
| 68 nF | | | | | | | | | | | |
| 100 nF | 0.2 ±0.02 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | | | | | | |
| 150 nF | | | | | | | | | | | |
| 220 nF | | 0.3 ±0.03 | 0.3 ±0.03 | | | | | | | 0.5 ±0.05 | 0.5 ±0.05 |
| 330 nF | | | | | | | | | | | |
| 470 nF | | 0.3 ±0.03 | | | | | | | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 680 nF | | | | | | | | | | | |
| 1 000 nF | | 0.3 ±0.05 | | | | | | | 0.5 ±0.05 | 0.5 ±0.05 | |
| 2.2 µF | | | | | | | | | 0.5 ±0.15 | | |
| 4.7 µF | | | | | | | 0.5 ±0.15 | 0.5 ±0.15 | | | |
| 10 µF | | | | | | | 0.5 ±0.2 | | | | |
| Tape width | | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X5R - General purpose & High capacitance, 0603 / 0805

| X5R | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | | | | | | |
| Capacitance | 0603 | | | | | 0805 | | | | |
| | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 100 pF | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | | | | | |
| 150 pF | | | | | | | | | | |
| 220 pF | | | | | | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 330 pF | | | | | | | | | | |
| 470 pF | | | | | | | | | | |
| 680 pF | | | | | | | | | | |
| 1.0 nF | | | | | | | | | | |
| 1.5 nF | | | | | | | | | | |
| 2.2 nF | | | | | | | | | | |
| 3.3 nF | | | | | | | | | | |
| 4.7 nF | | | | | | | | | | |
| 6.8 nF | | | | | | | | | | |
| 10 nF | | | | | | | | | | |
| 15 nF | | | | | | | | | | |
| 22 nF | | | | | | | | | | |
| 33 nF | | | | | | | | | | |
| 47 nF | | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 68 nF | | | | | | | | | | |
| 100 nF | | | | | | | | | | |
| 150 nF | | | | | | | | | | |
| 220 nF | | | | | | | | | | 1.25 ±0.2 |
| 330 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | |
| 470 nF | | | | | | | | | | |
| 680 nF | | | | | | | | | | |
| 1 000 nF | | | | | | | | | | |
| 2.2 µF | | | | | | | | | | |
| 4.7 µF | | | 0.8 ±0.15 | 0.8 ±0.15 | | | | | | |
| 10 µF | 0.8 ±0.15 | 0.8 ±0.2 | 0.8 ±0.2 | 0.8 ±0.2 | | | | | | |
| 22 µF | 0.8 ±0.2 | | | | | | | | | |
| 47 µF | | | | | | | | | | |
| 100 µF | | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X5R | | | | | |
|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | |
| Capacitance | 1206 | | | | |
| | 6.3 V | 10 V | 16 V | 25 V | 50 V |
| 100 pF | | | | | |
| 150 pF | | | | | |
| 220 pF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 330 pF | | | | | |
| 470 pF | | | | | |
| 680 pF | | | | | |
| 1.0 nF | | | | | |
| 1.5 nF | | | | | |
| 2.2 nF | | | | | |
| 3.3 nF | | | | | |
| 4.7 nF | | | | | |
| 6.8 nF | | | | | |
| 10 nF | | | | | |
| 15 nF | | | | | |
| 22 nF | | | | | |
| 33 nF | | | | | |
| 47 nF | | | | | |
| 68 nF | | | | | |
| 100 nF | | | | | |
| 150 nF | | | | | 1.15 ±0.1 |
| 220 nF | | | | | |
| 330 nF | | | | | 1.0 ±0.1 |
| 470 nF | | | | | |
| 680 nF | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.6 ±0.2 |
| 1 000 nF | | | | | |
| 2.2 µF | | | | | |
| 4.7 µF | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | |
| 10 µF | | | | | 1.6 ±0.3 |
| 22 µF | | | | 1.6 ±0.3 | |
| 47 µF | | | | | |
| 100 µF | 1.6 ±0.3 | | | | |
| Tape width | 8 mm | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X5R - High capacitance, 1210 / 1812

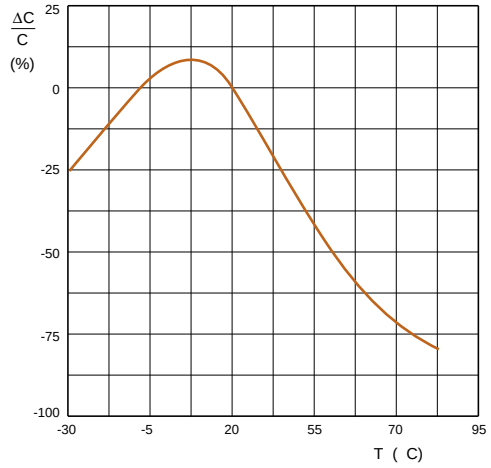
| X5R | | | | | | |
|---|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | | |
| Capacitance | 1210 | | | | | 1812 |
| | 6.3 V | 10 V | 16 V | 25 V | 50 V | 6.3 V |
| 100 pF | | | | | | |
| 150 pF | | | | | | |
| 220 pF | | | | | | |
| 330 pF | | | | | | |
| 470 pF | | | | | | |
| 680 pF | | | | | | |
| 1.0 nF | | | | | | |
| 1.5 nF | | | | | | |
| 2.2 nF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | |
| 3.3 nF | | | | | | |
| 4.7 nF | | | | | | |
| 6.8 nF | | | | | | |
| 10 nF | | | | | | |
| 15 nF | | | | | | |
| 22 nF | | | | | | |
| 33 nF | | | | | | |
| 47 nF | | | | | | |
| 68 nF | | | | | | |
| 100 nF | | | | | | |
| 150 nF | | | | | 1.15 ±0.1 | |
| 220 nF | | | | | | |
| 330 nF | | | | | | |
| 470 nF | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.15 ±0.1 | 1.25 ±0.2 | |
| 680 nF | | | | | | |
| 1 000 nF | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | |
| 2.2 µF | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | 1.9 ±0.2 | |
| 4.7 µF | | | | | | |
| 10 µF | | | | | 2.5 ±0.2 | |
| 22 µF | 2.5 ±0.2 | 2.5 ±0.2 | 2.5 ±0.2 | 2.5 ±0.3 | | |
| 47 µF | | | | | | 2.5 ±0.2 |
| 100 µF | 2.5 ±0.3 | 2.5 ±0.3 | 2.5 ±0.3 | | | 3.2 ±0.3 |
| Tape width | 8 mm | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

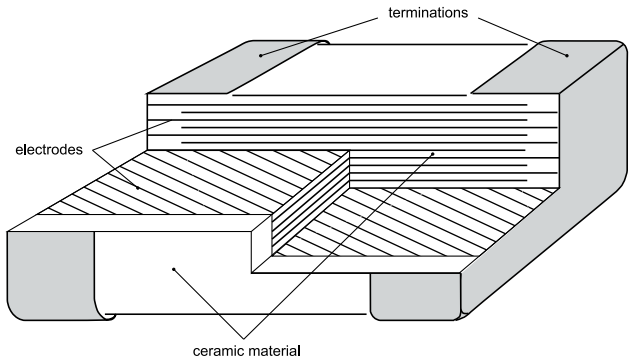
## Features

- High volumetric efficiency
- Non-polar construction

### Temperature characteristic

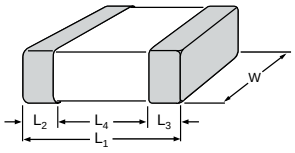



### Construction




### Case dimensions

Discrete capacitors - General purpose & High capacitance




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max | $L_4$ min |
| 0201 | 0603M | 0.6 ±0.03 | 0.3 ±0.03 | 0.10 | 0.20 | 0.20 |
| | | 0.6 ±0.05 | 0.3 ±0.05 | 0.10 | 0.20 | 0.20 |
| 0402 | 1005M | 1.0 ±0.05 (1) | 0.5 ±0.05 (1) | 0.15 | 0.30 | 0.40 |
| | | 1.0 ±0.20 (2) | 0.5 ±0.20 (2) | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.10 (1) | 0.8 ±0.10 (1) | 0.20 | 0.60 | 0.40 |
| | | 1.6 ±0.15 (2) | 0.8 ±0.15 (2) | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.10 (1) | 1.25 ±0.10 (1) | 0.25 | 0.75 | 0.55 |
| | | 2.0 ±0.20 (2) | 1.25 ±0.20 (2) | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.15 (1) | 1.6 ±0.15 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.30 (2) | 1.6 ±0.20 (2) | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.20 (1) | 2.5 ±0.20 (1) | 0.25 | 0.75 | 1.40 |
| | | 3.2 ±0.40 (2) | 2.5 ±0.30 (2) | 0.25 | 0.75 | 1.40 |

**Note:** 1. Dimension for size 0402, C < 4.7 µF; 0603, C < 10 µF; 0805 to 1210, C ≤ 100 nF
2. Dimension for size 0402, C ≥ 4.7 µF; 0603, C ≥ 10 µF; 0805 to 1210, C > 100 nF

## Y5V - General purpose & High capacitance 6.3 to 25V, 0201 / 0402

| Y5V | | | | | |
|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | |
| Capacitance | 0201 | 0402 | | | |
| | 6.3 V | 6.3 V | 10 V | 16 V | 25 V |
| 10 nF | 0.3 ±0.03 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 |
| 22 nF | | | | | |
| 47 nF | | | | | |
| 100 nF | | | | | |
| 220 nF | | | | | |
| 470 nF | | | | | |
| 1 000 nF | | | | | |
| Tape width | 8 mm | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Y5V - General purpose & High capacitance 6.3 to 25V, 0603 / 0805

| Y5V | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | | | | |
| Capacitance | 0603 | | | | 0805 | | | |
| | 6.3 V | 10 V | 16 V | 25 V | 6.3 V | 10 V | 16 V | 25 V |
| 10 nF | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 22 nF | | | | | | | | |
| 47 nF | | | | | | | | |
| 100 nF | | | | | | | | |
| 220 nF | | | | | | | | 0.85 ±0.1 |
| 470 nF | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | |
| 1 000 nF | | | | | | | | |
| 2.2 µF | | | | | | | | 1.25 ±0.2 |
| 4.7 µF | | | | | | | 1.25 ±0.2 | |
| 10 µF | | | | | 1.25 ±0.2 | 1.25 ±0.2 | | |
| 22 µF | | | | | | | | |
| Tape width | 8 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Y5V - General purpose & High capacitance 6.3 to 25V, 1206 / 1210

| Y5V | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| General purpose & High capacitance | | | | | | | | |
| Capacitance | 1206 | | | | 1210 | | | |
| | 6.3 V | 10 V | 16 V | 25 V | 6.3 V | 10 V | 16 V | 25 V |
| 10 nF | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | | | | |
| 22 nF | | | | | | | | |
| 47 nF | | | | | | | | |
| 100 nF | | | | | | | | |
| 220 nF | | | | | | | | |
| 470 nF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | | | | |
| 1 000 nF | | | | | | | | |
| 2.2 µF | | | | | | | | |
| 4.7 µF | | | | | | | | |
| 10 µF | | | 1.15 ±0.1 | 1.6 ±0.2 | 1.5 ±0.1 | 1.5 ±0.1 | 1.5 ±0.1 | 1.5 ±0.1 |
| 22 µF | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | 1.6 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | |
| 47 µF | | | | | | | | |
| Tape width | 8 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Y5V - General purpose & High capacitance 50V, 0402 to 1206

| Y5V | | | | |
|---|---|---|---|---|
| General purpose & High capacitance | | | | |
| Capacitance | 0402 | 0603 | 0805 | 1206 |
| | 50 V | 50 V | 50 V | 50 V |
| 10 nF | 0.5 ±0.05 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 22 nF | | | | |
| 47 nF | | | | |
| 100 nF | | | | |
| 220 nF | | | 0.85 ±0.1 | |
| 470 nF | | | | 0.85 ±0.1 |
| 1 000 nF | | | 1.25 ±0.2 | |
| 2.2 µF | | | | 1.15 ±0.1 |
| Tape width | 8 mm | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

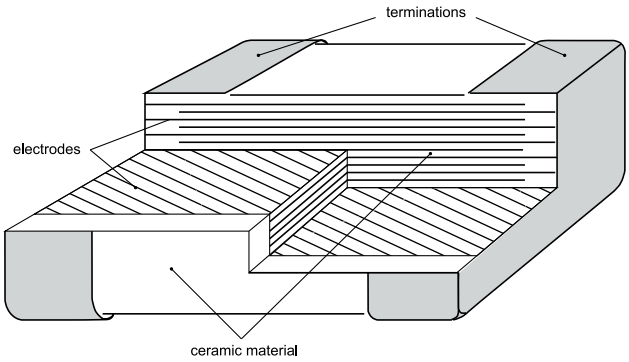
## Features

- Comply with AEC-Q200 standard
- MSL class: MSL 1
- J-STD-020D and TS-16949 compliant
- Halogen free epoxy
- RoHS compliant

## Applications

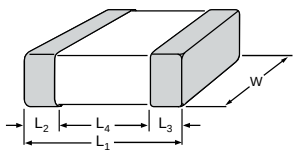
- All general purpose applications
- Entertainment applications
- Comfort / security applications
- Information applications

### Construction




### Dimensions

Discrete capacitors - Automotive grade




| Case size designation | | Dimensions in mm | | | | |
|---|---|---|---|---|---|---|
| Inch-based | Metric | L1 | W | L2 / L3 min | L2 / L3 max | L4 min |
| 0402 | 1005M | 1.0 ±0.05 | 0.5 ±0.05 | 0.15 | 0.30 | 0.40 |
| 0603 | 1608M | 1.6 ±0.20 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2012M | 2.0 ±0.20 | 1.25 ±0.20 | 0.25 | 0.75 | 0.55 |
| 1206 | 3216M | 3.2 ±0.30 | 1.6 ±0.20 | 0.25 | 0.75 | 1.40 |
| 1210 | 3225M | 3.2 ±0.30 | 2.5 ±0.20 | 0.25 | 0.75 | 1.40 |

| NP0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Automotive Grade | | | | | | | | | |
| Capacitance | 0402 | 0603 | | | 0805 | | | | |
| | 50 V | 50 V | 100V | 250V | 50 V | 100 V | 250 V | 500 V | 630 V |
| 10 pF | 0.5 ±0.05 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 |
| 12 pF | | | | | | | | | |
| 15 pF | | | | | | | | | |
| 18 pF | | | | | | | | | |
| 22 pF | | | | | | | | | |
| 27 pF | | | | | | | | | |
| 33 pF | | | | | | | | | |
| 39 pF | | | | | | | | | |
| 47 pF | | | | | | | | | |
| 56 pF | | | | | | | | | |
| 68 pF | | | | | | | | | |
| 82 pF | | | | | | | | | |
| 100 pF | | | | | | | | | |
| 120 pF | | | | | | | | | |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | | | | | | | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 270 pF | | | | | | | | | |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 560 pF | | | | | | | | 1.25 ±0.2 | |
| 680 pF | | | | | | | | | |
| 820 pF | | | | | | | | | |
| 1 000 pF | | | | | | | | | |
| 1.2 nF | | | | | | | | | |
| 1.5 nF | | | | | | | | | |
| 1.8 nF | | | | | | | | | |
| 2.2 nF | | | | | | | | | |
| 2.7 nF | | | | | | | | | |
| 3.3 nF | | | | | | | | | |
| 3.9 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 5.6 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 8.2 nF | | | | | | | | | |
| 10 nF | | | | | | | | | |
| Tape width | 8mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## NP0 - Automotive grade, 1206 / 1210

| NP0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Automotive Grade | | | | | | | | | |
| Capacitance | 1206 | | | | | 1210 | | | |
| | 50 V | 100 V | 250 V | 500 V | 630 V | 50 V | 100 V | 250 V | 500 V |
| 10 pF | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 |
| 12 pF | | | | | | | | | |
| 15 pF | | | | | | | | | |
| 18 pF | | | | | | | | | |
| 22 pF | | | | | | | | | |
| 27 pF | | | | | | | | | |
| 33 pF | | | | | | | | | |
| 39 pF | | | | | | | | | |
| 47 pF | | | | | | | | | |
| 56 pF | | | | | | | | | |
| 68 pF | | | | | | | | | |
| 82 pF | | | | | | | | | |
| 100 pF | | | | | | | | | |
| 120 pF | | | | | | | | | |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | | | | | | | | | |
| 270 pF | | | | | | | | | |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 560 pF | | | | | | | | | |
| 680 pF | | | | | | | | | |
| 820 pF | | | 0.85 ±0.1 | 0.85 ±0.1 | | | | | |
| 1 000 pF | | | | | | | | | |
| 1.2 nF | | | | | | | | | |
| 1.5 nF | | | | | | | | | |
| 1.8 nF | | | | | | | | | |
| 2.2 nF | | | | | | | | | |
| 2.7 nF | | | | | | | | | |
| 3.3 nF | | | | | | | | | |
| 3.9 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 5.6 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 8.2 nF | | | | | | | | | |
| 10 nF | | | | | | | | | |
| Tape width | 8mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X7R | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Automotive grade | | | | | | | | | |
| Capacitance | 0402 | | | | 0603 | | | | |
| | 10 V | 16 V | 25 V | 50 V | 10 V | 16 V | 25 V | 50 V | 100V |
| 100 pF | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | | | | | | | | | |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 680 pF | | | | | | | | | |
| 1 000 pF | | | | | | | | | |
| 1.5 nF | | | | | | | | | |
| 2.2 nF | | | | | | | | | |
| 3.3 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 10 nF | | | | | | | | | |
| 15 nF | | | | | | | | | |
| 18 nF | | | | | | | | | |
| 22 nF | | | | | | | | | |
| 27 nF | | | | | | | | | |
| 33 nF | | | | | | | | | |
| 47 nF | | | | | | | | | |
| 68 nF | | | | | | | | | |
| 100 nF | | | | | | | | | |
| 150 nF | | | | | | | | | |
| 220 nF | | | | | | | | | |
| 270 nF | | | | | | | | | |
| 330 nF | | | | | | | | | |
| 390 nF | | | | | | | | | |
| 470 nF | | | | | | | | | |
| 680 nF | | | | | | | | | |
| 1000 nF | | | | | | | | | |
| 2.2 µF | | | | | | | | | |
| 4.7 µF | | | | | | | | | |
| 10 µF | | | | | | | | | |
| Tape width | 8mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - Automotive grade, 0805

| X7R | | | | | | | |
|---|---|---|---|---|---|---|---|
| Automotive grade | | | | | | | |
| Capacitance | 0805 | | | | | | |
| | 10 V | 16 V | 25 V | 50 V | 100 V | 250 V | 500 V |
| 100 pF | | | | | | | |
| 150 pF | | | | | | | |
| 180 pF | | | | | | | |
| 220 pF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 |
| 330 pF | | | | | | | |
| 390 pF | | | | | | | |
| 470 pF | | | | | | | |
| 680 pF | | | | | | | |
| 1 000 pF | | | | | | | |
| 1.5 nF | | | | | | | |
| 2.2 nF | | | | | | | |
| 3.3 nF | | | | | | | |
| 4.7 nF | | | | | | | |
| 6.8 nF | | | | | | 1.25 ±0.2 | 1.25 ±0.2 |
| 10 nF | | | | | | | |
| 15 nF | | | | | | | |
| 18 nF | | | | | | | |
| 22 nF | | | | | | | |
| 27 nF | | | | | 1.25 ±0.2 | | |
| 33 nF | | | | | | | |
| 47 nF | | | | | | | |
| 68 nF | | | | | | | |
| 100 nF | | | | | | | |
| 150 nF | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | |
| 220 nF | | | | | | | |
| 270 nF | | | | | | | |
| 330 nF | | | | | | | |
| 390 nF | | | | | | | |
| 470 nF | | | | | | | |
| 680 nF | | | | | | | |
| 1000 nF | | | | | | | |
| 2.2 µF | | | | | | | |
| 4.7 µF | | | | | | | |
| 10 µF | | | | | | | |
| Tape width | 8mm | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X7R | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Automotive grade | | | | | | | | | |
| Capacitance | 1206 | | | | | | | | |
| | 6.3 V | 10 V | 16 V | 25V | 50V | 100V | 250 V | 500 V | 630 V |
| 100 pF | | | | | | | | | |
| 150 pF | | | | | | | | | |
| 180 pF | | | | | | | | | |
| 220 pF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 | 1.25 ±0.2 |
| 330 pF | | | | | | | | | |
| 390 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 680 pF | | | | | | | | | |
| 1 000 pF | | | | | | | | | |
| 1.5 nF | | | | | | | | | |
| 2.2 nF | | | | | | | | | |
| 3.3 nF | | | | | | | | | |
| 4.7 nF | | | | | | | | | |
| 6.8 nF | | | | | | | | | |
| 10 nF | | | | | | | | | |
| 15 nF | | | | | | | | | |
| 18 nF | | | | | | | 1.25 ±0.2 | | |
| 22 nF | | | | | | | | | |
| 27 nF | | | | | | | | | |
| 33 nF | | | | | | | | | |
| 47 nF | | | | | | | | | |
| 68 nF | | | | | | 1.25 ±0.2 | | | |
| 100 nF | | | | | | | | | |
| 150 nF | | | | | 1.15 ±0.2 | | | | |
| 220 nF | | | | | | | | | |
| 270 nF | | | | | 1.6 ±0.2 | 1.6 ±0.2 | | | |
| 330 nF | | | | | | | | | |
| 390 nF | | | | | | | | | |
| 470 nF | | | | | | | | | |
| 680 nF | 1.15 ±0.2 | 1.15 ±0.2 | 1.15 ±0.2 | 1.15 ±0.2 | | | | | |
| 1000 nF | | | | | | | | | |
| 2.2 µF | | | | | | | | | |
| 4.7 µF | | | | | | | | | |
| 10 µF | | | | | | | | | |
| Tape width | 8mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## X7R - Automotive grade, 1210

| X7R | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Automotive grade | | | | | | | | |
| Capacitance | 1210 | | | | | | | |
| | 6.3 V | 10 V | 16 V | 25V | 50V | 100V | 250 V | 500 V |
| 100 pF | | | | | | | | |
| 150 pF | | | | | | | | |
| 180 pF | | | | | | | | |
| 220 pF | | | | | | | | |
| 330 pF | | | | | | | | |
| 390 pF | | | | | | | | |
| 470 pF | | | | | | | | |
| 680 pF | | | | | | | | |
| 1 000 pF | | | | | | | | |
| 1.5 nF | | | | | | | | |
| 2.2 nF | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 0.85 ±0.1 | 1.25 ±0.2 |
| 3.3 nF | | | | | | | | |
| 4.7 nF | | | | | | | | |
| 6.8 nF | | | | | | | | |
| 10 nF | | | | | | | | |
| 15 nF | | | | | | | | |
| 18 nF | | | | | | | 1.25 ±0.2 | |
| 22 nF | | | | | | | | |
| 27 nF | | | | | | | | |
| 33 nF | | | | | | | | |
| 47 nF | | | | | | | | |
| 68 nF | | | | | | | | |
| 100 nF | | | | | | | | |
| 150 nF | | | | | 1.15 ±0.2 | 1.25 ±0.2 | | |
| 220 nF | | | | | | | | |
| 270 nF | | | | | | | | |
| 330 nF | | | | | | | | |
| 390 nF | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | | |
| 470 nF | | | | | | | | |
| 680 nF | | | | | | | | |
| 1000 nF | | | | | | | | |
| 2.2 µF | | | | | | | | |
| 4.7 µF | | | | | | | | |
| 10 µF | | | | | | | | |
| Tape width | 12mm | | | | | | | |

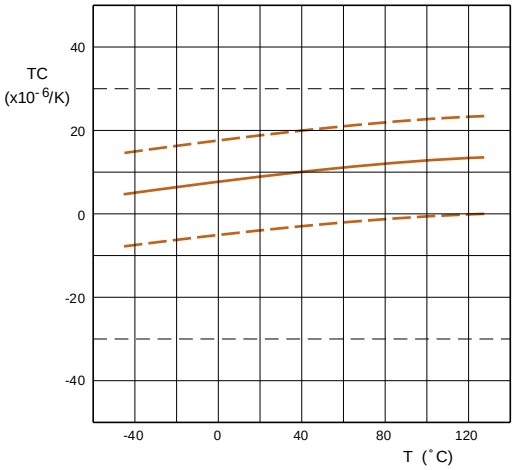
**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Features

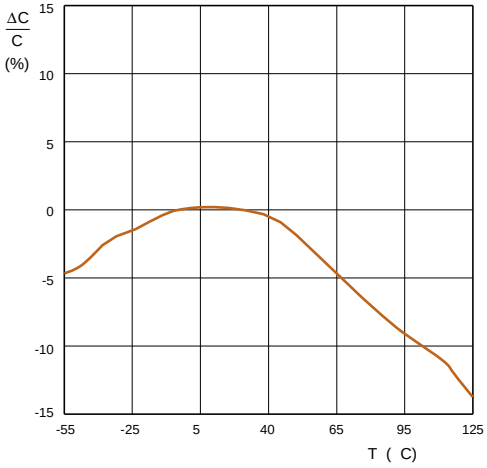
- Capable of operating at high voltage levels
- For high frequency snubber
- Decoupling/ Smoothing function
- TUV certificate No.: 50031668
- UL certificate No.: E238900

## Temperature characteristic

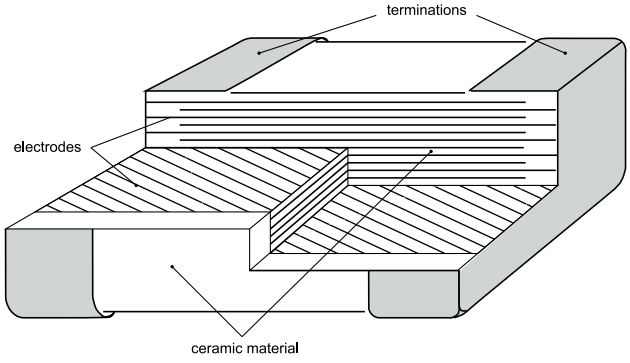
NP0




X7R

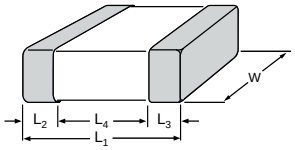



## Construction




## Dimensions

Discrete capacitors - High voltage SC type




| Case size designation | | Dimensions in mm | | | |
|---|---|---|---|---|---|
| Inch-based | Metric | $L_1$ | W | $L_2$ / $L_3$ min | $L_2$ / $L_3$ max |
| 1808 | 4520M | 4.8 ±0.30 | 2.0 ±0.30 | 0.25 | 0.75 |
| 1812 | 4532M | 4.8 ±0.30 | 3.2 ±0.30 | 0.25 | 0.75 |

## NP0 - High voltage SC type, 1808 / 1812

| NP0 | | | | |
|---|---|---|---|---|
| Capacitance | 1808 | | 1808 | 1812 |
| | X1/Y2 for TUV | X1/Y2 for UL | X2/Y3 for TUV/UL | X2/Y3 for TUV/UL |
| 2 pF | 1.6 ±0.2 | 1.6 ±0.2 | | |
| 3.3 pF | | | | |
| 4.7 pF | | | | 1.6 ±0.2 |
| 5 pF | | | 1.6 ±0.2 | |
| 10 pF | | | | |
| 12 pF | | | | |
| 15 pF | | | | |
| 18 pF | | | | |
| 22 pF | | | | |
| 27 pF | | | | |
| 33 pF | | | | |
| 39 pF | | | | |
| 47 pF | | | | |
| 56 pF | | | | |
| 68 pF | | | | |
| 82 pF | | | | |
| 100 pF | 2.0 ±0.2 | 2.0 ±0.2 | | |
| 120 pF | | | | 2.0 ±0.2 |
| 150 pF | | | | |
| 180 pF | | | | |
| 220 pF | | | | |
| 240 pF | | | | |
| 270 pF | | | 2.0 ±0.2 | |
| 330 pF | | | | |
| 390 pF | | | | |
| 430 pF | | | | |
| 470 pF | | | | |
| 560 pF | | | | |
| 680 pF | | | | |
| 820 pF | | | | |
| 1 000 pF | | | | |
| Tape width | 12 mm | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X7R | | | | |
|---|---|---|---|---|
| Capacitance | 1808 | | 1812 | |
| | X1/Y2 for TUV/UL | X2/Y3 for TUV/UL | X1/Y2 for TUV | X1 for UL |
| 150 pF | 1.6 ±0.2 | 1.6 ±0.2 | | |
| 180 pF | | | | |
| 220 pF | | | 1.6 ±0.2 | 1.6 ±0.2 |
| 240 pF | 2.0 ±0.2 | | | |
| 270 pF | | | | |
| 330 pF | | | | |
| 390 pF | | | 2.0 ±0.2 | 2.0 ±0.2 |
| 430 pF | | | | |
| 470 pF | | | | |
| 560 pF | | | | |
| 680 pF | | 2.0 ±0.2 | | |
| 820 pF | | | | |
| 1 000 pF | | | | |
| 1.2 nF | | | | |
| 1.5 nF | | | | |
| Tape width | 12 mm | | | |

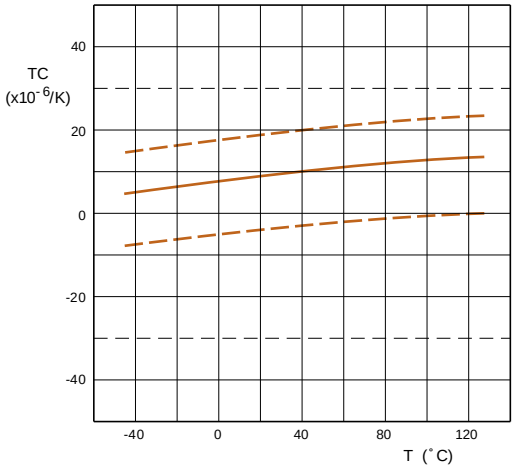
**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Features

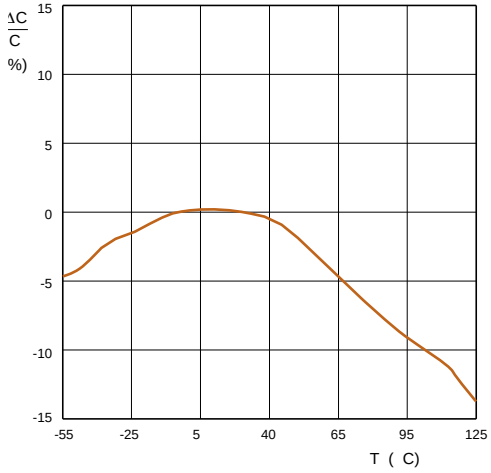
- Less than 50% board space of an equivalent discrete component
- High volumetric efficiency
- Increased throughput, by time saved in mounting

### Temperature characteristic

NP0

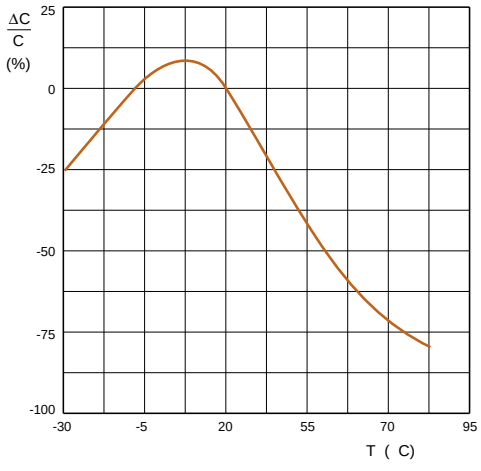



X7R

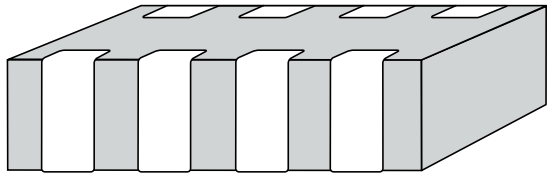



### Temperature characteristic

Y5V

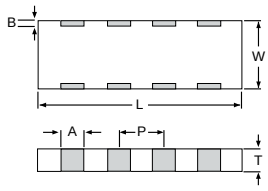



### Construction



## Dimensions

### 4C arrays




| Case size designation | | Dimensions in mm | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Inch-based | Metric | L | W | $T_{min}$ | $T_{max}$ | A | B | P |
| 0508 (4 x 0402) | 1220M (4 x 1005) | 2.0 ±0.15 | 1.25 ±0.15 | 0.50 | 0.70 | 0.28 ±0.10 | 0.2 ±0.10 | 0.5 ±0.10 |
| 0612 (4 x 0603) | 1632M (4 x 1608) | 3.2 ±0.15 | 1.60 ±0.15 | 0.70 (1)<br>0.50 (2) | 0.90 (1)<br>0.70 (2) | 0.4 ±0.10 | 0.3 ±0.20 | 0.8 ±0.10 |

**Note:** 1. Available for NP0 and X7R
2. Available for Y5V

| NP0 | | | | |
|---|---|---|---|---|
| 4C arrays | | | | |
| Capacitance | 0508 | | 0612 | |
| | 50 V | 100 V | 50 V | 100 V |
| 10 pF | 0.6 ±0.1 | 0.6 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 |
| 15 pF | | | | |
| 18 pF | | | | |
| 22 pF | | | | |
| 27 pF | | | | |
| 47 pF | | | | |
| 100 pF | | | | |
| 150 pF | | | | |
| 180 pF | | | | |
| 220 pF | | | | |
| 270 pF | | | | |
| 330 pF | | | | |
| 390 pF | | | | |
| 470 pF | | | | |
| 560 pF | | | | |
| 680 pF | | | | |
| 820 pF | | | | |
| 1 000 pF | | | | |
| Tape width | 8 mm | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| X7R | | | | | | |
|---|---|---|---|---|---|---|
| 4C arrays | | | | | | |
| Capacitance | 0508 | | | 0612 | | |
| | 16 V | 25 V | 50 V | 16 V | 25 V | 50 V |
| 180 pF | | | | | 0.8 ±0.1 | 0.8 ±0.1 |
| 220 pF | | | | | | |
| 270 pF | | | | | | |
| 330 pF | | | | | | |
| 390 pF | | | | | | |
| 470 pF | | | | | | |
| 560 pF | | | | | | |
| 680 pF | | | | | | |
| 820 pF | | | | | | |
| 1 000 pF | 0.6 ±0.1 | 0.6 ±0.1 | 0.6 ±0.1 | | | |
| 1.2 nF | | | | | | |
| 1.5 nF | | | | | | |
| 1.8 nF | | | | | | |
| 2.2 nF | | | | | | |
| 2.7 nF | | | | | | |
| 3.3 nF | | | | | | |
| 3.9 nF | | | | | | |
| 4.7 nF | | | | | | |
| 5.6 nF | | | | | | |
| 6.8 nF | | | | | | |
| 8.2 nF | | | | | | |
| 10 nF | | | | 0.8 ±0.1 | | |
| 12 nF | | | | | | |
| 15 nF | | | | | | |
| 18 nF | | | | | | |
| 22 nF | | | | | | |
| 27 nF | | | | | | |
| 33 nF | | | | | | |
| 47 nF | | | | | | |
| 56 nF | | | | | | |
| 68 nF | | | | | | |
| 82 nF | | | | | | |
| 100 nF | | | | | | |
| Tape width | 8 mm | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

| Y5V | |
|---|---|
| 4C arrays | |
| Capacitance | 0612 |
| | 25 V |
| 10 nF | 0.6 ±0.1 |
| 22 nF | |
| 47 nF | |
| 100 nF | |
| Tape width | 8 mm |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Sample kits for 0201 / 0402

### 0201 sample kits

| NP0 50 V | | NP0 25 V | | X7R 50 V | |
|---|---|---|---|---|---|
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1 | ±0.25 pF | 27 | ±5% | 47 | ±10% |
| 1.2 | ±0.25 pF | 33 | ±5% | 68 | ±10% |
| 1.5 | ±0.25 pF | 39 | ±5% | 100 | ±10% |
| 1.8 | ±0.25 pF | 47 | ±5% | 150 | ±10% |
| 2.2 | ±0.25 pF | 56 | ±5% | 220 | ±10% |
| 2.7 | ±0.25 pF | 68 | ±5% | 330 | ±10% |
| 3.3 | ±0.25 pF | 82 | ±5% | 470 | ±10% |
| 3.9 | ±0.25 pF | 100 | ±5% | X7R 25 V | |
| 4.7 | ±0.25 pF | Y5V 6.3V | | Capacitance (pF) | Tolerance |
| 5.6 | ±0.50 pF | Capacitance (pF) | Tolerance | 680 | ±10% |
| 6.8 | ±0.50 pF | 100 000 | -20% to +80% | 1 000 | ±10% |
| 8.2 | ±0.50 pF | X5R 6.3V | | X7R 16V | |
| 10 | ±5% | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 12 | ±5% | 100 000 | ±10% | 1 500 | ±10% |
| 15 | ±5% | | | 2 200 | ±10% |
| 18 | ±5% | | | 3 300 | ±10% |
| 22 | ±5% | | | X7R 10 V | |
| | | | | Capacitance (pF) | Tolerance |
| | | | | 10 000 | ±10% |

**Note:** 100 pieces per value. Ordering code CC020100000000000 for Yageo brand product

### 0402 sample kits

| NP0 50 V | | Y5V 16 V | | X7R 50 V | |
|---|---|---|---|---|---|
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1 | ±0.25 pF | 10 000 | ±20% | 100 | ±10% |
| 1.5 | ±0.25 pF | 22 000 | ±20% | 150 | ±10% |
| 2.2 | ±0.25 pF | 47 000 | ±20% | 220 | ±10% |
| 3.3 | ±0.25 pF | 100 000 | ±20% | 330 | ±10% |
| 4.7 | ±0.25 pF | X5R 25V | | 470 | ±10% |
| 6.8 | ±0.50 pF | Capacitance (pF) | Tolerance | 680 | ±10% |
| 10 | ±5% | 100 000 | ±10% | 1 000 | ±10% |
| 15 | ±5% | | | 1 500 | ±10% |
| 22 | ±5% | | | 2 200 | ±10% |
| 33 | ±5% | | | 3 300 | ±10% |
| 47 | ±5% | | | X7R 25 V | |
| 68 | ±5% | | | Capacitance (pF) | Tolerance |
| 100 | ±5% | | | 4 700 | ±10% |
| 150 | ±5% | | | 100 000 | ±10% |
| 220 | ±5% | | | X7R 16 V | |
| | | | | Capacitance (pF) | Tolerance |
| | | | | 6 800 | ±10% |
| | | | | 10 000 | ±10% |
| | | | | 15 000 | ±10% |
| | | | | 22 000 | ±10% |

**Note:** 95 pieces per value. Ordering code CC040200000000000 for Yageo brand product

| 0603 sample kits | | | | | |
|---|---|---|---|---|---|
| NP0 50 V | | NP0 25 V | | X7R 50 V | |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1 | ±0.25 pF | 1 000 | ±5% | 100 | ±10% |
| 1.5 | ±0.25 pF | 1 500 | ±5% | 150 | ±10% |
| 2.2 | ±0.25 pF | Y5V 50 V | | 220 | ±10% |
| 3.3 | ±0.25 pF | Capacitance (pF) | Tolerance | 330 | ±10% |
| 4.7 | ±0.25 pF | 10 000 | ±20% | 470 | ±10% |
| 6.8 | ±0.50 pF | 22 000 | ±20% | 680 | ±10% |
| 10 | ±5% | 47 000 | ±20% | 1 000 | ±10% |
| 15 | ±5% | 100 000 | ±20% | 1 500 | ±10% |
| 22 | ±5% | Y5V 16 V | | 2 200 | ±10% |
| 33 | ±5% | Capacitance (pF) | Tolerance | 3 300 | ±10% |
| 47 | ±5% | 220 000 | ±20% | 4 700 | ±10% |
| 68 | ±5% | 470 000 | ±20% | 6 800 | ±10% |
| 100 | ±5% | | | 10 000 | ±10% |
| 150 | ±5% | | | X7R 25 V | |
| 220 | ±5% | | | Capacitance (pF) | Tolerance |
| 330 | ±5% | | | 15 000 | ±10% |
| 470 | ±5% | | | 22 000 | ±10% |
| 680 | ±5% | | | X7R 16 V | |
| | | | | Capacitance (pF) | Tolerance |
| | | | | 33 000 | ±10% |
| | | | | 47 000 | ±10% |
| | | | | 68 000 | ±10% |
| | | | | 100 000 | ±10% |

**Note:** 48 pieces per value. Ordering code CC060300000000000 for Yageo brand product

| 0805 sample kits | | | | | |
|---|---|---|---|---|---|
| NP0 50 V | | NP0 25 V | | X7R 50 V | |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1 | ±0.25 pF | 3 300 | ±5% | 220 | ±10% |
| 1.5 | ±0.25 pF | 4 700 | ±5% | 330 | ±10% |
| 2.2 | ±0.25 pF | Y5V 50 V | | 470 | ±10% |
| 3.3 | ±0.25 pF | Capacitance (pF) | Tolerance | 680 | ±10% |
| 4.7 | ±0.25 pF | 10 000 | ±20% | 1 000 | ±10% |
| 6.8 | ±0.50 pF | 22 000 | ±20% | 1 500 | ±10% |
| 10 | ±5% | 47 000 | ±20% | 2 200 | ±10% |
| 15 | ±5% | 100 000 | ±20% | 3 300 | ±10% |
| 22 | ±5% | 220 000 | ±20% | 4 700 | ±10% |
| 33 | ±5% | Y5V 16 V | | 6 800 | ±10% |
| 47 | ±5% | Capacitance (pF) | Tolerance | 10 000 | ±10% |
| 68 | ±5% | 470 000 | ±20% | 15 000 | ±10% |
| 100 | ±5% | 1 000 000 | ±20% | 22 000 | ±10% |
| 150 | ±5% | | | 33 000 | ±10% |
| 220 | ±5% | | | 47 000 | ±10% |
| 330 | ±5% | | | 68 000 | ±10% |
| 470 | ±5% | | | 100 000 | ±10% |
| 680 | ±5% | | | X7R 16 V | |
| 1 000 | ±5% | | | Capacitance (pF) | Tolerance |
| 1 500 | ±5% | | | 150 000 | ±10% |
| 2 200 | ±5% | | | 220 000 | ±10% |
| | | | | 330 000 | ±10% |
| | | | | 470 000 | ±10% |

**Note:** 48 pieces per value. Ordering code CC080500000000000 for Yageo brand product

## Sample kits for 1206

| 1206 sample kits | | | | | |
|---|---|---|---|---|---|
| NP0 50 V | | NP0 25 V | | X7R 50 V | |
| Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance | Capacitance (pF) | Tolerance |
| 1 | ±0.25 pF | 10 000 | ±5% | 220 | ±10% |
| 1.5 | ±0.25 pF | Y5V 50 V | | 330 | ±10% |
| 2.2 | ±0.25 pF | Capacitance (pF) | Tolerance | 470 | ±10% |
| 3.3 | ±0.25 pF | 100 000 | ±20% | 680 | ±10% |
| 4.7 | ±0.25 pF | 220 000 | ±20% | 1 000 | ±10% |
| 6.8 | ±0.50 pF | 470 000 | ±20% | 1 500 | ±10% |
| 10 | ±5% | 1 000 000 | ±20% | 2 200 | ±10% |
| 15 | ±5% | | | 3 300 | ±10% |
| 22 | ±5% | | | 4 700 | ±10% |
| 33 | ±5% | | | 6 800 | ±10% |
| 47 | ±5% | | | 10 000 | ±10% |
| 68 | ±5% | | | 15 000 | ±10% |
| 100 | ±5% | | | 22 000 | ±10% |
| 150 | ±5% | | | 33 000 | ±10% |
| 220 | ±5% | | | 47 000 | ±10% |
| 330 | ±5% | | | 68 000 | ±10% |
| 470 | ±5% | | | 100 000 | ±10% |
| 680 | ±5% | | | 150 000 | ±10% |
| 1 000 | ±5% | | | 220 000 | ±10% |
| 1 500 | ±5% | | | X7R 16 V | |
| 2 200 | ±5% | | | Capacitance (pF) | Tolerance |
| 3 300 | ±5% | | | 330 000 | ±10% |
| 4 700 | ±5% | | | 470 000 | ±10% |
| 6 800 | ±5% | | | 680 000 | ±10% |
| | | | | 1 000 000 | ±10% |

**Note:** 48 pieces per value. Ordering code CC120600000000000 for Yageo brand product

| High capacitance sample kits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X5R 0402 | | | X7R 0603 | | | Y5V 0402 | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 1 µF | 6.3 V | ±10% | 1 µF | 16 V | ±10% | 1 µF | 6.3 V | -20% to +80% |
| 1 µF | 10 V | ±10% | X7R 0805 | | | 1 µF | 10 V | -20% to +80% |
| 2.2 µF | 6.3 V | ±20% | Capacitance | Rated voltage | Tolerance | Y5V 0603 | | |
| X5R 0603 | | | 1 µF | 25 V | ±10% | Capacitance | Rated voltage | Tolerance |
| Capacitance | Rated voltage | Tolerance | 2.2 µF | 16 V | ±10% | 1 µF | 10 V | -20% to +80% |
| 1 µF | 16 V | ±10% | 2.2 µF | 25 V | ±10% | 1 µF | 16 V | -20% to +80% |
| 1 µF | 25 V | ±10% | X7R 1206 | | | 2.2 µF | 10 V | -20% to +80% |
| 2.2 µF | 6.3 V | ±10% | Capacitance | Rated voltage | Tolerance | 2.2 µF | 16 V | -20% to +80% |
| 2.2 µF | 10 V | ±10% | 1 µF | 25 V | ±10% | 4.7 µF | 6.3 V | -20% to +80% |
| 2.2 µF | 16 V | ±10% | 2.2 µF | 25 V | ±10% | Y5V 0805 | | |
| 4.7 µF | 6.3 V | ±10% | 4.7 µF | 25 V | ±10% | Capacitance | Rated voltage | Tolerance |
| 4.7 µF | 10 V | ±10% | 10 µF | 16 V | ±10% | 1 µF | 16 V | -20% to +80% |
| 10 µF | 6.3 V | ±20% | | | | 1 µF | 25 V | -20% to +80% |
| X5R 0805 | | | | | | 1 µF | 50 V | -20% to +80% |
| Capacitance | Rated voltage | Tolerance | | | | 2.2 µF | 16 V | -20% to +80% |
| 2.2 µF | 25 V | ±10% | | | | 4.7 µF | 10 V | -20% to +80% |
| 4.7 µF | 6.3 V | ±10% | | | | 10 µF | 10 V | -20% to +80% |
| 4.7 µF | 10 V | ±10% | | | | Y5V 1206 | | |
| 4.7 µF | 16 V | ±10% | | | | Capacitance | Rated voltage | Tolerance |
| 10 µF | 6.3 V | ±10% | | | | 4.7 µF | 16 V | -20% to +80% |
| 10 µF | 10 V | ±10% | | | | 10 µF | 10 V | -20% to +80% |
| 10 µF | 16 V | ±10% | | | | 10 µF | 16 V | -20% to +80% |
| 22 µF | 6.3 V | ±20% | | | | 22 µF | 16 V | -20% to +80% |
| X5R 1206 | | | | | | | | |
| Capacitance | Rated voltage | Tolerance | | | | | | |
| 4.7 µF | 16 V | ±10% | | | | | | |
| 4.7 µF | 25 V | ±10% | | | | | | |
| 10 µF | 16 V | ±10% | | | | | | |
| 10 µF | 25 V | ±10% | | | | | | |
| 22 µF | 6.3 V | ±20% | | | | | | |

**Note:** 50 pieces per value. Ordering code CC888800000000000 for Yageo brand product

| High capacitance sample kits for smart phone | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| X5R 0201 | | | X5R 0603 | | | X5R 0805 | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 100 nF | 6.3 V | ±10% | 1 µF | 16 V | ±10% | 2.2 µF | 16 V | ±10% |
| 100 nF | 10 V | ±10% | 1 µF | 25 V | ±10% | 2.2 µF | 25 V | ±10% |
| 220 nF | 6.3 V | ±20% | 2.2 µF | 10 V | ±10% | 4.7 µF | 6.3 V | ±10% |
| 470 nF | 6.3 V | ±20% | 2.2 µF | 16 V | ±10% | 4.7 µF | 10 V | ±10% |
| 1 µF | 6.3 V | ±20% | 4.7 µF | 6.3 V | ±10% | 4.7 µF | 16 V | ±10% |
| X5R 0402 | | | 4.7 µF | 10 V | ±10% | 4.7 µF | 25 V | ±10% |
| Capacitance | Rated voltage | Tolerance | 10 µF | 6.3 V | ±20% | 10 µF | 6.3 V | ±10% |
| 1 µF | 6.3 V | ±10% | 22 µF | 6.3 V | ±20% | 10 µF | 10 V | ±10% |
| 1 µF | 10 V | ±10% | | | | 10 µF | 16 V | ±10% |
| 1 µF | 16 V | ±10% | | | | 22 µF | 6.3 V | ±20% |
| 2.2 µF | 6.3 V | ±20% | | | | 47 µF | 6.3 V | ±20% |
| 4.7 µF | 6.3 V | ±20% | | | | X5R 1206 | | |
| 10 µF | 6.3 V | ±20% | | | | Capacitance | Rated voltage | Tolerance |
| | | | | | | 10 µF | 16 V | ±10% |
| | | | | | | 10 µF | 25 V | ±10% |
| | | | | | | 22 µF | 6.3 V | ±10% |
| | | | | | | 47 µF | 6.3 V | ±20% |

**Note:** 50 pieces per value. Ordering code SP888800000000000 for Yageo brand product

## High voltage sample kits for general applications

| High voltage sample kits for general applications | | |
|---|---|---|
| NP0 1206 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 pF | 1 kV | ±5% |
| 100 pF | 1 kV | ±5% |
| 1 nF | 1 kV | ±5% |
| 10 pF | 2 kV | ±5% |
| 100 pF | 2 kV | ±5% |
| NP0 1210 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 pF | 1 kV | ±5% |
| 100 pF | 1 kV | ±5% |
| 1 nF | 1 kV | ±5% |
| 10 pF | 2 kV | ±5% |
| 100 pF | 2 kV | ±5% |
| NP0 1808 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 pF | 1 kV | ±5% |
| 100 pF | 1 kV | ±5% |
| 1 nF | 1 kV | ±5% |
| 10 pF | 3 kV | ±5% |
| 100 pF | 3 kV | ±5% |
| 10 pF | 2 kV | ±5% |
| 100 pF | 2 kV | ±5% |
| NP0 1812 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 pF | 2 kV | ±5% |
| 100 pF | 2 kV | ±5% |
| 1 nF | 2 kV | ±5% |
| 10 pF | 1 kV | ±5% |
| 100 pF | 1 kV | ±5% |
| 1 nF | 1 kV | ±5% |
| 10 pF | 3 kV | ±5% |
| 100 pF | 3 kV | ±5% |
| X7R 1206 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 nF | 1 kV | ±10% |
| 1 nF | 2 kV | ±10% |
| 1 nF | 1 kV | ±10% |
| X7R 1210 | | |
| Capacitance | Rated voltage | Tolerance |
| 1 nF | 1 kV | ±10% |
| 10 nF | 1 kV | ±10% |
| 1 nF | 2 kV | ±10% |
| X7R 1808 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 nF | 1 kV | ±10% |
| 1 nF | 3 kV | ±10% |
| 1 nF | 1 kV | ±10% |
| 1 nF | 2 kV | ±10% |
| X7R 1812 | | |
| Capacitance | Rated voltage | Tolerance |
| 10 nF | 2 kV | ±10% |
| 1 nF | 1 kV | ±10% |
| 10 nF | 1 kV | ±10% |

**Note:** 50 pieces per value. Ordering code HV777700000000000 for Yageo brand product

| High frequency sample kits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NP0 0201 | | | | | | | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 0.2pF | 25 V | ±0.1pF | 1.6pF | 25 V | ±0.1pF | 5.0pF | 25 V | ±0.25pF |
| 0.3pF | 25 V | ±0.1pF | 1.8pF | 25 V | ±0.1pF | 5.6pF | 25 V | ±0.25pF |
| 0.4pF | 25 V | ±0.1pF | 2.0pF | 25 V | ±0.1pF | 6.0pF | 25 V | ±0.25pF |
| 0.5pF | 25 V | ±0.1pF | 2.2pF | 25 V | ±0.1pF | 6.2pF | 25 V | ±0.25pF |
| 0.6pF | 25 V | ±0.1pF | 2.4pF | 25 V | ±0.1pF | 6.8pF | 25 V | ±0.25pF |
| 0.7pF | 25 V | ±0.1pF | 2.7pF | 25 V | ±0.1pF | 7.0pF | 25 V | ±0.25pF |
| 0.8pF | 25 V | ±0.1pF | 3.0pF | 25 V | ±0.1pF | 7.5pF | 25 V | ±0.25pF |
| 0.9pF | 25 V | ±0.1pF | 3.3pF | 25 V | ±0.1pF | 8.0pF | 25 V | ±0.25pF |
| 1.0pF | 25 V | ±0.1pF | 3.6pF | 25 V | ±0.1pF | 8.2pF | 25 V | ±0.25pF |
| 1.1pF | 25 V | ±0.1pF | 3.9pF | 25 V | ±0.1pF | 9.0pF | 25 V | ±0.25pF |
| 1.2pF | 25 V | ±0.1pF | 4.0pF | 25 V | ±0.1pF | 9.1pF | 25 V | ±0.25pF |
| 1.3pF | 25 V | ±0.1pF | 4.3pF | 25 V | ±0.1pF | 10pF | 25 V | ±5% |
| 1.5pF | 25 V | ±0.1pF | 4.7pF | 25 V | ±0.1pF | | | |

**Note:** 10 pieces per value. Ordering code CQ02010000000SB000 for Yageo brand product

| High frequency sample kits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NP0 0402 | | | | | | | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 0.2pF | 50V | ±0.1pF | 2.0pF | 50V | ±0.1pF | 6.8pF | 50V | ±0.25pF |
| 0.3pF | 50V | ±0.1pF | 2.2pF | 50V | ±0.1pF | 7.0pF | 50V | ±0.25pF |
| 0.4pF | 50V | ±0.1pF | 2.4pF | 50V | ±0.1pF | 7.5pF | 50V | ±0.25pF |
| 0.5pF | 50V | ±0.1pF | 2.7pF | 50V | ±0.1pF | 8.0pF | 50V | ±0.25pF |
| 0.6pF | 50V | ±0.1pF | 3.0pF | 50V | ±0.1pF | 8.2pF | 50V | ±0.25pF |
| 0.7pF | 50V | ±0.1pF | 3.3pF | 50V | ±0.1pF | 9.0pF | 50V | ±0.25pF |
| 0.8pF | 50V | ±0.1pF | 3.6pF | 50V | ±0.1pF | 9.1pF | 50V | ±0.25pF |
| 0.9pF | 50V | ±0.1pF | 3.9pF | 50V | ±0.1pF | 10pF | 50V | ±5% |
| 1.0pF | 50V | ±0.1pF | 4.0pF | 50V | ±0.1pF | 12pF | 50V | ±5% |
| 1.1pF | 50V | ±0.1pF | 4.3pF | 50V | ±0.1pF | 15pF | 50V | ±5% |
| 1.2pF | 50V | ±0.1pF | 4.7pF | 50V | ±0.1pF | 18pF | 50V | ±5% |
| 1.3pF | 50V | ±0.1pF | 5.0pF | 50V | ±0.25pF | 22pF | 50V | ±5% |
| 1.5pF | 50V | ±0.1pF | 5.6pF | 50V | ±0.25pF | 27pF | 50V | ±5% |
| 1.6pF | 50V | ±0.1pF | 6.0pF | 50V | ±0.25pF | 33pF | 50V | ±5% |
| 1.8pF | 50V | ±0.1pF | 6.2pF | 50V | ±0.25pF | | | |

**Note:** 10 pieces per value. Ordering code CQ04020000000SB000 for Yageo brand product

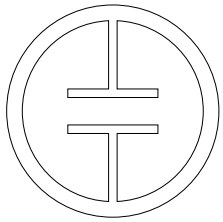
## Sample kits for high frequency series

| High frequency sample kits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NP0 0603 | | | | | | | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 0.2pF | 250 V | ±0.1pF | 2.0pF | 250 V | ±0.1pF | 6.8pF | 250 V | ±0.25pF |
| 0.3pF | 250 V | ±0.1pF | 2.2pF | 250 V | ±0.1pF | 7.0pF | 250 V | ±0.25pF |
| 0.4pF | 250 V | ±0.1pF | 2.4pF | 250 V | ±0.1pF | 7.5pF | 250 V | ±0.25pF |
| 0.5pF | 250 V | ±0.1pF | 2.7pF | 250 V | ±0.1pF | 8.0pF | 250 V | ±0.25pF |
| 0.6pF | 250 V | ±0.1pF | 3.0pF | 250 V | ±0.1pF | 8.2pF | 250 V | ±0.25pF |
| 0.7pF | 250 V | ±0.1pF | 3.3pF | 250 V | ±0.1pF | 9.0pF | 250 V | ±0.25pF |
| 0.8pF | 250 V | ±0.1pF | 3.6pF | 250 V | ±0.1pF | 9.1pF | 250 V | ±0.25pF |
| 0.9pF | 250 V | ±0.1pF | 3.9pF | 250 V | ±0.1pF | 10pF | 250 V | ±5% |
| 1.0pF | 250 V | ±0.1pF | 4.0pF | 250 V | ±0.1pF | 12pF | 250 V | ±5% |
| 1.1pF | 250 V | ±0.1pF | 4.3pF | 250 V | ±0.1pF | 15pF | 250 V | ±5% |
| 1.2pF | 250 V | ±0.1pF | 4.7pF | 250 V | ±0.1pF | 18pF | 250 V | ±5% |
| 1.3pF | 250 V | ±0.1pF | 5.0pF | 250 V | ±0.25pF | 22pF | 250 V | ±5% |
| 1.5pF | 250 V | ±0.1pF | 5.6pF | 250 V | ±0.25pF | 27pF | 250 V | ±5% |
| 1.6pF | 250 V | ±0.1pF | 6.0pF | 250 V | ±0.25pF | 33pF | 250 V | ±5% |
| 1.8pF | 250 V | ±0.1pF | 6.2pF | 250 V | ±0.25pF | 47pF | 250 V | ±5% |

**Note:** 10 pieces per value. Ordering code CQ06030000000SB000 for Yageo brand product

| High frequency sample kits | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| NP0 0805 | | | | | | | | |
| Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance | Capacitance | Rated voltage | Tolerance |
| 0.2pF | 250 V | ±0.1pF | 2.4pF | 250 V | ±0.1pF | 8.2pF | 250 V | ±0.25pF |
| 0.3pF | 250 V | ±0.1pF | 2.7pF | 250 V | ±0.1pF | 9.0pF | 250 V | ±0.25pF |
| 0.4pF | 250 V | ±0.1pF | 3.0pF | 250 V | ±0.1pF | 9.1pF | 250 V | ±0.25pF |
| 0.5pF | 250 V | ±0.1pF | 3.3pF | 250 V | ±0.1pF | 10pF | 250 V | ±5% |
| 0.6pF | 250 V | ±0.1pF | 3.6pF | 250 V | ±0.1pF | 12pF | 250 V | ±5% |
| 0.7pF | 250 V | ±0.1pF | 3.9pF | 250 V | ±0.1pF | 15pF | 250 V | ±5% |
| 0.8pF | 250 V | ±0.1pF | 4.0pF | 250 V | ±0.1pF | 18pF | 250 V | ±5% |
| 0.9pF | 250 V | ±0.1pF | 4.3pF | 250 V | ±0.1pF | 22pF | 250 V | ±5% |
| 1.0pF | 250 V | ±0.1pF | 4.7pF | 250 V | ±0.1pF | 27pF | 250 V | ±5% |
| 1.1pF | 250 V | ±0.1pF | 5.0pF | 250 V | ±0.25pF | 33pF | 250 V | ±5% |
| 1.2pF | 250 V | ±0.1pF | 5.6pF | 250 V | ±0.25pF | 47pF | 250 V | ±5% |
| 1.3pF | 250 V | ±0.1pF | 6.0pF | 250 V | ±0.25pF | 56pF | 250 V | ±5% |
| 1.5pF | 250 V | ±0.1pF | 6.2pF | 250 V | ±0.25pF | 68pF | 250 V | ±5% |
| 1.6pF | 250 V | ±0.1pF | 6.8pF | 250 V | ±0.25pF | 82pF | 250 V | ±5% |
| 1.8pF | 250 V | ±0.1pF | 7.0pF | 250 V | ±0.25pF | 100pF | 250 V | ±5% |
| 2.0pF | 250 V | ±0.1pF | 7.5pF | 250 V | ±0.25pF | | | |
| 2.2pF | 250 V | ±0.1pF | 8.0pF | 250 V | ±0.25pF | | | |

**Note:** 10 pieces per value. Ordering code CQ08050000000SB000 for Yageo brand product



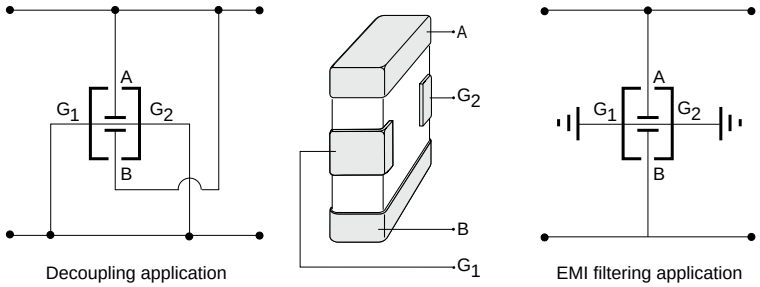
# SMD CERAMIC EMI FILTER CAPACITORS
# X2Y® PRODUCTS

### Features

- Broadband Filtering and Decoupling: X2Y® is effective up to 10 GHz and frequencies beyond
- Ultra Low ESL: Noise cancellation within X2Y® makes ESL reducing from nanohenry to picohenry levels
- Bypass: Unlike feedthrough capacitors, X2Y® is in bypass, so no DC current limitations
- Matched Y-caps: Two tightly matched line to ground capacitors in one device
- Superior Balance: Temperature and voltage variations balanced of two Y-caps
- Aging Reliability: Aging effects are equal on two Y-caps

**Circuit of typical applications**

SCM049_V




Decoupling application

EMI filtering application

| Benefits | Applications |
|---|---|
| • Fewer Components in Filtering: One X2Y® can replace multiple inductors and/or capacitors<br>• Superior Performance in Filtering: One X2Y® can eliminate both differential and common mode noises<br>• Fewer Components in Decoupling: Up to 1:7 replacement of MLCC in power delivering system bypass networks<br>• Superior Performance in Decoupling: Large or small, X2Y® components exhibit ultra low ESL<br>• Total Cost Savings: Assembly cost savings through reduced component count and placement costs<br>• Board Level Design Advantages: Dramatically reduces via drills, which blocks routing | • EMI filtering on DC motors<br>• Filtered connectors (airbag connectors, RJ-45 connectors)<br>• High speed data-line filtering<br>• Decoupling of supply-lines in high speed digital circuits<br>• Broadband filtering<br>• Amplifier decoupling and EMI suppression<br>• IC Decoupling, on-package, on-PCB<br>• DC power line filtering<br>• Data line filtering<br>• EMI suppression for DC motors<br>• Sensors<br>• Audio |

| X7R | | | | | |
|---|---|---|---|---|---|
| Size | Y-Capacitor | | Voltage rating (V) | Thickness (mm) | Global part number |
| | Capacitance (nF) | TOLERANCE ( %) | | | |
| 0603 | 1 | 20% | 100 | 0.65 | CX 0603 MR X7R 0BB 102 |
| | 1 | 20% | 16 | | CX 0603 MR X7R 7BB 102 |
| | 1.5 | 20% | 100 | | CX 0603 MR X7R 0BB 152 |
| | 1.5 | 20% | 50 | | CX 0603 MR X7R 9BB 152 |
| | 2.2 | 20% | 100 | | CX 0603 MR X7R 0BB 222 |
| | 4.7 | 20% | 100 | | CX 0603 MR X7R 0BB 472 |
| | 5.6 | 20% | 100 | | CX 0603 MR X7R 0BB 562 |
| | 5.6 | 20% | 50 / 63 | | CX 0603 MR X7R 9BB 562 |
| | 10 | 20% | 50 / 63 | | CX 0603 MR X7R 9BB 103 |
| | 22 | 20% | 25 | | CX 0603 MR X7R 8BB 223 |
| | 47 | 20% | 16 | | CX 0603 MR X7R 7BB 473 |
| | 56 | 20% | 16 | | CX 0603 MR X7R 7BB 563 |
| | 100 | 20% | 10 | | CX 0603 MR X7R 6BB 104 |
| | 220 | 20% | 10 | | CX 0603 MR X7R 6BB 224 |
| 0805 | 1 | 20% | 100 | 0.85 | CX 0805 MR X7R 0BB 102 |
| | 4.7 | 20% | 100 | | CX 0805 MR X7R 0BB 472 |
| | 10 | 20% | 100 | | CX 0805 MR X7R 0BB 103 |
| | 15 | 20% | 50 / 63 | | CX 0805 MR X7R 9BB 153 |
| | 18 | 20% | 50 / 63 | | CX 0805 MR X7R 9BB 183 |
| | 22 | 20% | 50 / 63 | | CX 0805 MR X7R 9BB 223 |
| | 22 | 20% | 25 | | CX 0805 MR X7R 8BB 223 |
| | 39 | 20% | 25 | | CX 0805 MR X7R 8BB 393 |
| | 47 | 20% | 16 | | CX 0805 MR X7R 7BB 473 |
| | 100 | 20% | 16 | | CX 0805 MR X7R 7BB 104 |
| | 180 | 20% | 10 | | CX 0805 MR X7R 6BB 184 |
| 1206 | 15 | 20% | 100 | 1.20 | CX 1206 MK X7R 0BB 153 |
| | 22 | 20% | 100 | | CX 1206 MK X7R 0BB 223 |
| | 47 | 20% | 50 / 63 | | CX 1206 MK X7R 9BB 473 |
| | 100 | 20% | 50 / 63 | | CX 1206 MK X7R 9BB 104 |
| | 220 | 20% | 16 | | CX 1206 MK X7R 7BB 224 |
| | 390 | 20% | 16 | | CX 1206 MK X7R 7BB 394 |
| | 470 | 20% | 10 | | CX 1206 MK X7R 6BB 474 |
| 1210 | 100 | 20% | 50 | 1.60 | CX 1210 MK X7R 9BB 104 |
| | 220 | 20% | 50 | | CX 1210 MK X7R 9BB 224 |
| | 390 | 20% | 50 | | CX 1210 MK X7R 9BB 394 |
| | 470 | 20% | 25 | | CX 1210 MK X7R 8BB 474 |
| | 560 | 20% | 25 | | CX 1210 MK X7R 8BB 564 |
| | 820 | 20% | 16 | | CX 1210 MK X7R 7BB 824 |
| | 1000 | 20% | 16 | | CX 1210 MK X7R 7BB 105 |
| 1410 | 390 | 20% | 50 | 1.30 | CX 1410 MK X7R 9BB 394 |

| X5R | | | | | |
|---|---|---|---|---|---|
| Size | Y-Capacitor | | Voltage rating (V) | Thickness (mm) | Global part number |
| | Capacitance (nF) | TOLERANCE ( %) | | | |
| 0603 | 220 | 20% | 10 | 0.65 | CX 0603 MR X5R 6BB 224 |
| | 330 | 20% | 10 | | CX 0603 MR X5R 6BB 334 |
| | 470 | 20% | 10 | | CX 0603 MR X5R 6BB 474 |
| | 470 | 20% | 6.3 | | CX 0603 MR X5R 5BB 474 |

**Note:** 1. Special values are available on request

## Ordering information

| NP0 | | | | | |
|---|---|---|---|---|---|
| Size | Y-Capacitor | | Voltage rating (V) | Thickness (mm) | Global part number |
| | Capacitance (nF) | TOLERANCE ( %) | | | |
| 0603 | 0.01 | 20% | 100 | 0.85 | CX 0603 MR NPO 0BB 100 |
| | 0.022 | | 100 | | CX 0603 MR NPO 0BB 220 |
| | 0.033 | | 100 | | CX 0603 MR NPO 0BB 330 |
| | 0.047 | | 100 | | CX 0603 MR NPO 0BB 470 |
| | 0.1 | | 50 | | CX 0603 MR NPO 9BB 101 |
| | 0.22 | | 50 | | CX 0603 MR NPO 9BB 221 |
| | 0.47 | | 50 | | CX 0603 MR NPO 9BB 471 |
| 0805 | 0.01 | | 50 | | CX 0805 MR NPO 9BB 100 |
| | 0.022 | | 50 | | CX 0805 MR NPO 9BB 220 |
| | 0.047 | | 50 | | CX 0805 MR NPO 9BB 470 |

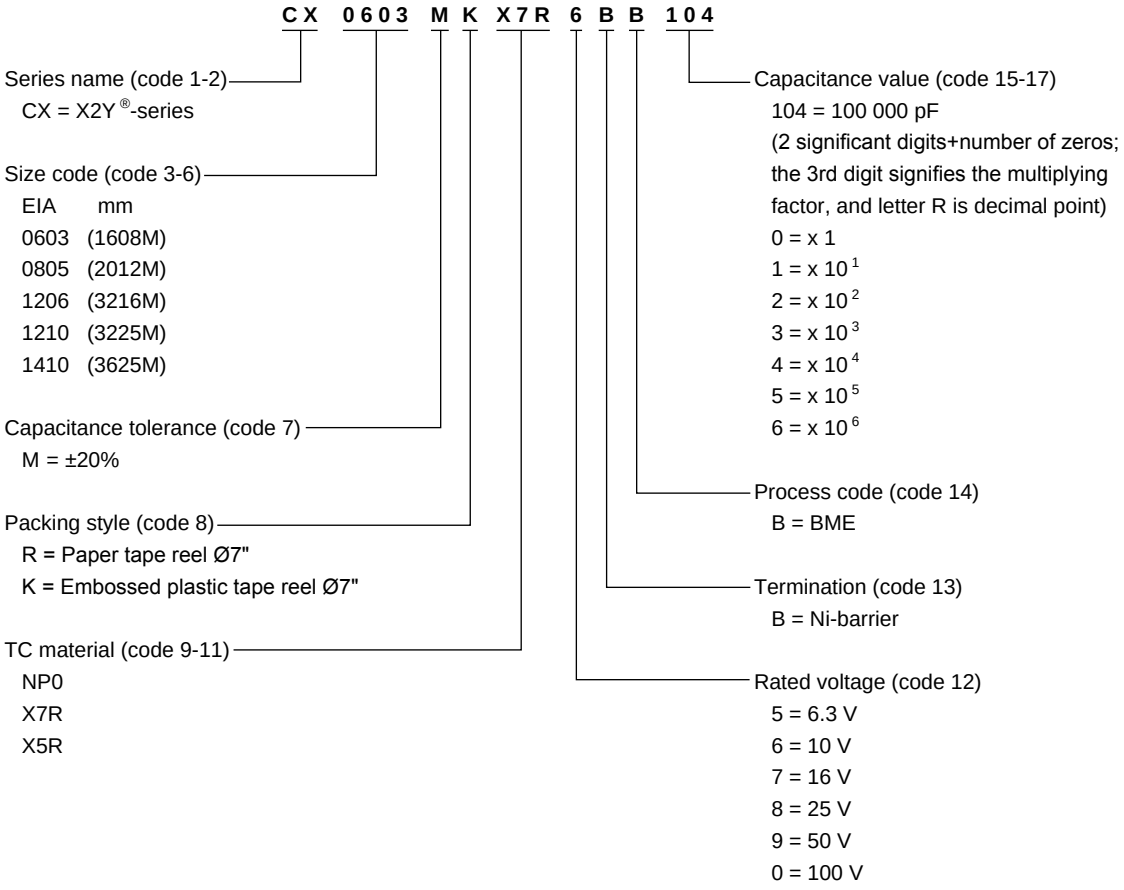
**Note:** 1. Special values are available on request

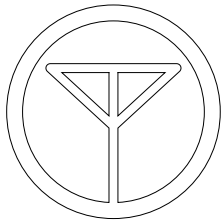
| Thickness classes and packing quantities | | |
|---|---|---|
| Thickness Classification (mm) | Quantity per reel | |
| | 8 mm tape width | |
| | Ø180mm / 7” | |
| | 0603 - 1410 | |
| | Paper | Blister |
| 0.60 ±0.10 | 4 000 | --- |
| 0.85 ±0.10 | 4 000 | --- |
| 1.20 ±0.15 | --- | 3 000 |
| 1.60 ±0.15 | --- | 2 000 |
| 1.90 ±0.20 | --- | 2 000 |

**Note:** 1. Special values are available on request

Global part number

Ordering example: CX0603MKX7R6BB104





WIRELESS COMPONENTS

## Introduction

Yageo produces a comprehensive range of wireless components, inclding metal/PCB/FPCB antenna, patch antenna (ceramic bulk), active antenna (LNA circuit), chip antenna, and RF components (filter/balancer).

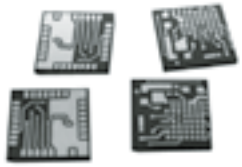
Our products cover a wide variety of wireless communication protocols, including Bluetooth & IEEE 802.11b/g, WPAN (Wireless Personal Area Network), WLAN (Wireless Local Area Network), WMAN (Wireless Metropolitan Area Network), WWAN (Wireless Wide Area Network) and LTE (Long Term Evolution).

## Wireless Components

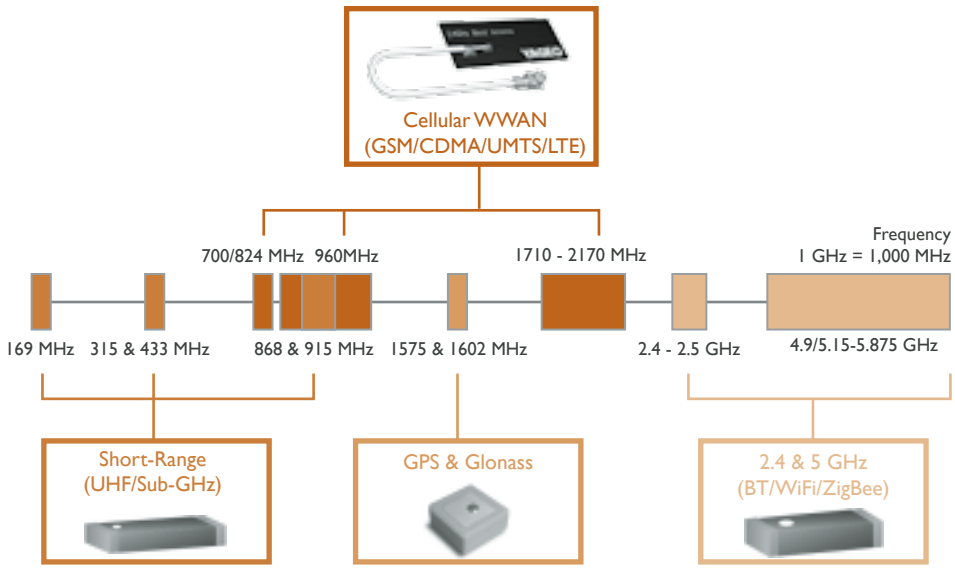
### Antenna

| | | | | |
|---|---|---|---|---|
| | | | | |
| Metal | PCB | FPCB | LTCC / Ceramic | Patch / Ceramic |

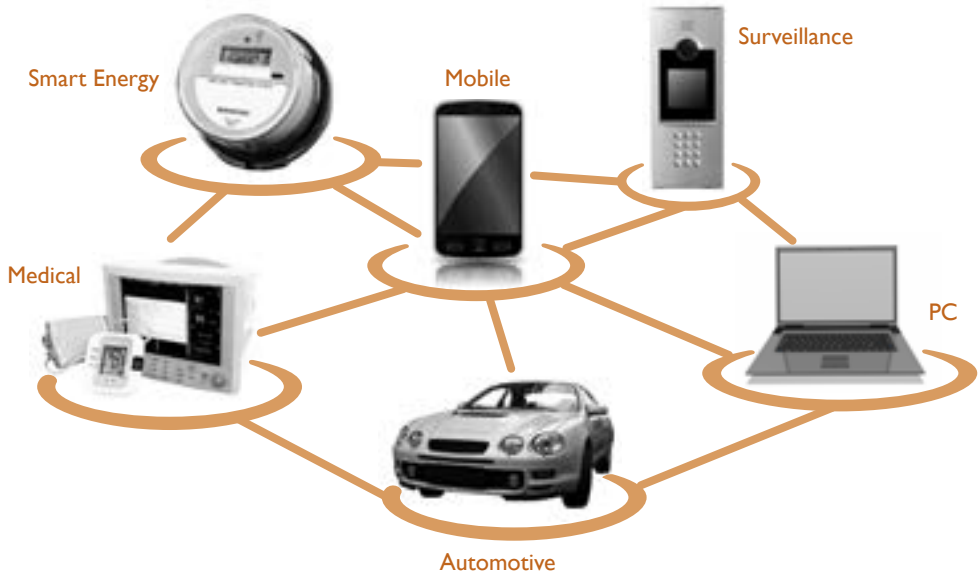
### LTCC Balun/ Filter/ Balun + Filter (Combo) / X2Y

| | | | | |
|---|---|---|---|---|
| | | | |  |
| Balun | Filter | Balun + Filter | X2Y Filter | FEM Substrate |

### Yageo Antenna Portfolio



Portable devices, home appliances, industrial/medical equipment will be equipped with wireless connectivity for Peer-to-Peer data exchange. More wireless components are needed.




## Key features of wireless components

**Compact**
- Maximize performance with the smallest size required
- The smallest 2.4/5 GHz antenna: PCB 18.4x7.5 mm / LTCC 2x1.25 mm

**Multi-Band & High Efficiency**
- WWAN: Quad-band (850/900/1800/1900 MHz) to Penta-band (850/900/1800/1900/2100 MHz)
- Support 4G cellular network LTE 700 MHz (Band 12,13,17), 2300/2600 MHz
- Multi-band 2.3/2.4/2.7 & 5 GHz supporting WLAN/WiMAX/LTE
- Operating in dual navigational systems GPS & Glonass: 1575 – 1602 MHz

**High Reliability**
- Operating temperature range: -40°C ~ 105°C
- Operating humidity 95% RH at 40°C
- Vibration verification

**Easy Installation**
- Reliable adhesive tape, surface mount, and flexible cable/connector selection

## 2.4 GHz

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1204F001R2400A / CAN43110590124 51K<br>1204 2.4GHz PIFA Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 6.66 dBi(Typ.) | **Size** (mm) : 12*4*2.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1004F002R2400A / CAN43110410224 51K<br>1004 2.4GHz PIFA Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 1.55 dBi(Typ.) | **Size** (mm) : 10*4*2.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT9520LL06R2400A / CAN43117950624 52K<br>9520 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.5 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.85 dBi(Typ.) | **Size** (mm) : 9.5*2.0*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT8010LL04R2400A / CAN43117810424 53K<br>8010 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 5.88 dBi(Typ.) | **Size** (mm) : 8.0*1.0*1.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT7836A003R2400A / CAN43112780324 51K<br>7836 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 3.93 dBi dBi(Typ.) | **Size** (mm) : 7.8*3.6*0.5<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT7020LL05R2400A / CAN43117720524 52K<br>7020 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.62 dBi dBi(Typ.) | **Size** (mm) : 7.0*2.0*0.8<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL45R2400A / CAN43117534524 51K<br>5320 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 5.5 dBi dBi(Typ.) | **Size** (mm) : 5.3*2.0*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL24R2400A / CAN43117532424 52K<br>5320 2.4GHz PIFA Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.78 dBi(Typ.) | **Size** (mm) : 5.3*2.0*1.25<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5010LL04R2400A / CAN43117510424 53K<br>5010 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.28 dBi(Typ.) | **Size** (mm) : 5.0*1.0*1.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT3216LL00R2400A / CAN43117120024 53K<br>3216 2.4Ghz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.5 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 5 dBi(Typ.) | **Size** (mm) : 3.2*1.6*1.3<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT3216A063R2400A / CAN43112126324 53K<br>3216 2.4GHz PIFA Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 1.69 dBi(Typ.) | **Size** (mm) : 3.2*1.6*0.5<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT3012LL04R2400A / CAN43117920424 53K<br>3012 2.4GHz Chip Antenna | **Freq. Range:** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 1.84 dBi(Typ.) | **Size** (mm) : 3.0*1.2*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## 2.4 GHz

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT2012LL13R2400A / CAN431171413245 4K<br>2012 2.4GHz PIFA Chip Antenna | **Freq. Range :** 2400~2500 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.72 dBi(Typ.) | **Size** (mm) : 2.0*1.2*1.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANTX200P001B24003<br>2.4GHz PCB Antenna - mini | **Freq. Range :** 2400 MHz<br>**VSWR*:** 2.5 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 4.8 dBi(Typ.) | **Size** (mm) : 18.4*7.5*0.55<br>**Operating Temp.:** -40 ~ 80°C<br>**RoHS Compliance** |

## 2.4 GHz / GPS

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1003LL15R1524A / CAN431175615152 1K<br>1003 2.4GHz+GPS PIFA Chip Antenna | **Freq. Range :** 1575 / 2400 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 1.15 dBi / 2.90 dBi(Typ.) | **Size** (mm) : 10*3*1.5<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL07R1524A / CAN431175307152 2K<br>5320 2.4GHz+GPS PIFA Chip Antenna | **Freq. Range :** 1575 / 2400 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.47 dBi / 2.04 dBi(Typ.) | **Size** (mm) : 5.3*2.0*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

## 2.4 / 5 GHz

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1003LL05R2455A / CAN431175605252 1K<br>1003 2.4+5GHz Chip Antenna | **Freq. Range :**<br>2400~2500/ 5150~5875 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.5 dBi / 2.48dBi(Typ.) | **Size** (mm) : 10*3*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL04R2455A / CAN431175304252 2K<br>5320 2.4+5GHz Chip Antenna | **Freq. Range :**<br>2400~2500/ 5150~5875 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.72 dBi / 3.85dBi(Typ.) | **Size** (mm) : 5.3*2.0*1.4<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL24R2455A / CAN431175324252 2K<br>5320 2.4+5GHz PIFA Chip Antenna | **Freq. Range :** 2400~2500/<br>5150~5875 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.17 dBi / 3.51dBi(Typ.) | **Size** (mm) : 5.3*2.0*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANTX100P001B24553<br>2.4+5GHz PCB Antenna | **Freq. Range :**<br>2400~2500/ 5150~5875 MHz<br>**VSWR*:** 2.5 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 5.1dBi(Typ.) | **Size** (mm) : 50*10*0.9<br>**Operating Temp.:** -40 ~ 80°C<br>**RoHS Compliance** |

## 5 GHz

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT3216LL05R5000A / CAN431171205500 3K<br>3216 5GHz Chip Antenna | **Freq. Range :** 5150~5875 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 5.71 dBi(Typ.) | **Size** (mm) : 3.2*1.6*1.3<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## Cellular WWAN

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT2112A010B0918A / CAN431328410918IB<br>2112 Cellular-Band Chip Antenna | **Freq. Range :** 824~960 / 1710~1990 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 0.5 ~ 1 dBi(Typ.) | **Size** (mm) : 21*12*0.5<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT3505B000TWPENA / CAN431344900918IB<br>3505 Penta-band Antenna | **Freq. Range :** 824~960 /1710~2170 MHz<br>**VSWR*:** 2.8 / 3.5 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 2.9 dBi(Typ.) | **Size** (mm) : 35*5*6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1204LL00R0918A / CAN431175900918IK<br>1204 Cellular-Band Chip Antenna | **Freq. Range :** 900/1800 MHz<br>**VSWR*:** 3.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** N/A | **Size** (mm) : 12*4*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANTX100P001BWPEN3<br>Penta-band PCB Antenna | **Freq. Range :** 824~960 / 1710~2170 MHz<br>**VSWR*:** 2.5 Max ( Low Band )<br>3.5 Max ( High Band )<br>**Polarization:** Linear<br>**Peak Gain :** 4.2 dBi(Typ.) | **Size** (mm) : 50*20*0.55<br>**Operating Temp.:** -40 ~ 80°C<br>**Cable*:** Φ1.13 / 100mm<br>**Connector:** I-PEX<br>**Mounting:** Adhesive Tape<br>**RoHS Compliance** |

## Short-Range

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1204LL05R0915A / CAN431175905091IK<br>1204 915MHz Chip Antenna | **Freq. Range :** 915 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 3.32 dBi(Typ.) | **Size** (mm) : 12*4*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1204LL08R0870A / CAN431175908087IK<br>1204 870MHz Chip Antenna | **Freq. Range :** 870 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 0.5 dBi(Typ.) | **Size** (mm) : 12*4*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1204LL17R0870A / CAN431175917087IK<br>1204 870MHz PIFA Chip Antenna | **Freq. Range :** 870 MHz<br>**VSWR*:** 2.8 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 1.05 dBi(Typ.) | **Size** (mm) : 12*4*1.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT7020LL05R0870A / CAN431177205087 2K<br>7020 870MHz Chip Antenna | **Freq. Range :** 870 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** N/A | **Size** (mm) : 7.0*2.0*0.7<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1204F002R0433A / CAN431105902043IK<br>1204 433MHz Chip Antenna | **Freq. Range :** 315/ 433 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 0.79 dBi(Typ.) | **Size** (mm) : 12*4*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1204LL20R0433A / CAN431175920043IK<br>1204 433MHz Chip Antenna | **Freq. Range :** 315/ 433 MHz<br>**VSWR*:** 3.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** 0.83 dBi(Typ.) | **Size** (mm) : 12*4*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT2405F001R0169A / CAN431105001016 2K<br>2405 169MHz Chip Antenna | **Freq. Range :** 169 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** N/A | **Size** (mm): 24*5*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

* VSWR depends on the environment
* Cable/Connector is customizable

## GPS

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT8010LL05R1575A / CAN43117810515 83K<br>8010 GPS Chip Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 0.67 dBi(Typ.) | **Size** (mm): 8.0*1.0*1.0<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT6230LL01R1575A / CAN43117630115 82K<br>6230 GPS Chip Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 2.52 dBi(Typ.) | **Size** (mm): 6.2*3.0*1.25<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT5320LL14R1575A / CAN43117531415 82K<br>5320 GPS PIFA Chip Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 3.16 dBi(Typ.) | **Size** (mm): 5.3*2.0*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT3216LL15R1575A / CAN43117121515 83K<br>3216 GPS PIFA Chip Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 7.32 dBi(Typ.) | **Size** (mm): 3.2*1.6*1.2<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1010B00FT1575A / CAN43134200F1581B<br>10104 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** -3 dBic(Typ.) | **Size** (mm): 10*10*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1212B00BT1575A / CAN43134220B1581B<br>12124 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** -1 dBic(Typ.) | **Size** (mm): 12*12*4<br>**Operating Temp.:** -40 ~ 105°C<br>Mounting : SMD<br>**RoHS Compliance** |
| | ANT1212B00DT1575A / CAN43134220D1581B<br>12124 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** -1 dBic(Typ.) | **Size** (mm): 12*12*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1515B00BT1575A / CAN43134230B1581B<br>15154 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 1.5 dBic(Typ.) | **Size** (mm): 15*15*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT1515B00DT1575A / CAN43134230D1581B<br>15154 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 1.5 dBic(Typ.) | **Size** (mm): 15*15*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1515B00FT1575A / CAN43134230F1581B<br>15154 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 1.5 dBic(Typ.) | **Size** (mm): 15*15*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1818B00AT1575A / CAN43134240A1581B<br>18182 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 2 dBic(Typ.) | **Size** (mm): 18*18*2<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT1818B00BT1575A / CAN43134240B1581B<br>18184 GPS Patch Antenna | **Freq. Range :** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 4 dBic(Typ.) | **Size** (mm): 18*18*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |

* VSWR depends on the environment

## GPS

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1818B00CT1575A / CAN43134240C1581B<br>18182 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 2 dBic(Typ.) | **Size** (mm)**:** 18*18*2<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1818B00DT1575A / CAN43134240D1581B<br>18184 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 4 dBic(Typ.) | **Size** (mm)**:** 18*18*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1818B00ET1575A / CAN43134240E1581B<br>18182 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 2 dBic(Typ.) | **Size** (mm)**:** 18*18*2<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT2525B00AT1575A / CAN43134250A1581B<br>25252 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5 dBic(Typ.) | **Size** (mm)**:** 25*25*2<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT2525B00BT1575A / CAN43134250B1581B<br>25254 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5.5 dBic(Typ.) | **Size** (mm)**:** 25*25*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT2525B00CT1575A / CAN43134250C1581B<br>25252 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5 dBic(Typ.) | **Size** (mm)**:** 25*25*2<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT2525B00DT1575A / CAN43134250D1581B<br>25254 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5.5 dBic(Typ.) | **Size** (mm)**:** 25*25*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT2525B00ET1575A / CAN43134250E1581B<br>25252 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5 dBic(Typ.) | **Size** (mm)**:** 25*25*2<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT2525B00FT1575A / CAN43134250F1581B<br>25254 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**Peak Gain:** 5.5 dBic(Typ.) | **Size** (mm)**:** 25*25*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1606B00DT1575A / CAN43134460D1581B<br>16064 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** -0.5 dBic(Typ.) | **Size** (mm)**:** 16*6*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT1004B000R1575A / CAN4311441001581K<br>10044 GPS Patch Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 1.61 dBic(Typ.) | **Size** (mm)**:** 10*4*4<br>**Operating Temp. :** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |

* VSWR depends on the environment

## GPS+Glonass

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT1818B00BT1516A / CAN43134240B1561B<br>18184 Gps+Glonass Patch Antenna | **Freq. Range:** 1575 / 1602 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 1.89 / 2.59 dBi(Typ.) | **Size** (mm): 18*18*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT1818B00DT1516A / CAN43134240D1561B<br>18184 Gps+Glonass Patch Antenna | **Freq. Range:** 1575 / 1602 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 2.65 / 2.79 dBi (Typ.) | **Size** (mm): 18*18*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |
| | ANT2525B00BT1516A / CAN43134250B1561B<br>25254 Gps+Glonass Patch Antenna | **Freq. Range:** 1575 / 1602 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 3.44 / 4.10 dBi (Typ.) | **Size** (mm): 25*25*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** SMD<br>**RoHS Compliance** |
| | ANT2525B00DT1516A / CAN43134250D1561B<br>25254 Gps+Glonass Patch Antenna | **Freq. Range:** 1575 / 1602 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 3.5 / 3.8 dBi (Typ.) | **Size** (mm): 25*25*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |

## Active GPS

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT2525JB08B1575A / CAN4313325081581B<br>25256.9 GPS Active Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**LNA Gain:** 16 dB (Typ.)<br>**Antenna Gain:** 5.5 dBic(Typ.) | **Size** (mm): 25*25*6.9<br>**Cable*** (mm): 1.13*75<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |
| | ANT1818JB30B1575A / CAN4313324301581B<br>18187.1 GPS Active Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**LNA Gain:** 25 dB (Typ.)<br>**Antenna Gain:** 1.54 dBic(Typ.) | **Size** (mm): 18*18*7.1<br>**Cable*** (mm): 1.37*100<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |
| | ANT1515JB27B1575A / CAN4313323271581B<br>15156.5 GPS Active Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** RHCP<br>**LNA Gain:** 20.5 dB (Typ.)<br>**Antenna Gain:** 1.0 dBic(Typ.) | **Size** (mm): 15*15*6.5<br>**Cable*** (mm): 1.13*100<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |
| | ANT1212JB27B1575A / CAN4313322271581B<br>12126.5 GPS Active Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 1.5 (Max)<br>**Polarization:** RHCP<br>**LNA Gain:** 25 dB (Typ.)<br>**Antenna Gain:** -0.16 dBic(Typ.) | **Size** (mm): 12*12*6.5<br>**Cable*** **(mm):** 1.13*60<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |
| | ANT1606JB12B1575A / CAN4313346121581B<br>20066.4 GPS Active Antenna | **Freq. Range:** 1575 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**LNA Gain:** 20 dB (Typ.)<br>**Antenna Gain:** 0.35 dBi (Typ.) | **Size** (mm): 20*6*6.4<br>**Cable*** **(mm):** 1.37*93<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |

## Active GPS+Glonass

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT8010JLC1B1516A / CAN4313981C11561B<br>22061.9 GPS+Glonass Active Antenna | **Freq. Range:** 1575/1602 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**LNA Gain:** 20 / 20 dB (Typ.)<br>**Antenna Gain:** 5.88 dBi(Typ.) | **Size** (mm): 22*6*1.9<br>**Cable*** **(mm):** 1.13*100<br>**Operating Temp.:** -30 ~ 85°C<br>**RoHS Compliance** |

* VSWR depends on the environment
* Cable/Connector is customizable

## FM

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT2405F001R0098A / CAN4311050010882K<br>2405 FM Chip Antenna | **Freq. Range :** 88 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** N/A | **Size** (mm)**:** 24*5*1.6<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |
| | ANT1105LF00R0098A / CAN4311858000882K<br>1105 FM (Ferrite) Chip Antenna | **Freq. Range :** 88 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain :** N/A | **Size** (mm)**:** 11*5*1.3<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

## SDARS

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT2525B00DT2300A / CAN43134250D2301B<br>25254 SDARS Patch Antenna | **Freq. Range :** 2320~2345 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** LHCP<br>**Peak Gain :** 6 dBic(Typ.) | **Size (mm):**25*25*4<br>**Operating Temp.:** -40 ~ 105°C<br>**Mounting:** PIN<br>**RoHS Compliance** |

## 1.88~2.1 GHz

| Model | Part No./ Description | Electrical Data | Mechanical Data |
|---|---|---|---|
| | ANT8868LL00R1880A / CAN43117880018 81K<br>8868 DECT Chip Antenna | **Freq. Range :** 1880~2000 MHz<br>**VSWR*:** 2.0 (Max)<br>**Polarization:** Linear<br>**Peak Gain:** 6.13 dBi(Typ.) | **Size** (mm)**:** 8.8*6.8*0.9<br>**Operating Temp.:** -40 ~ 105°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## Filter (BPF)

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | BPF2012LL05R2400A / CFL4111714052454K<br>2012 2.4G BPF Type05, H.R.3.2G | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 2.0dB (Max)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>24dB Min @ 3200MHz<br>30dB Min @ 4800~5000MHz<br>20dB Min @ 7200~7500MHz | **Size**(mm): 2.0*1.2*0.9<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF2012LL22R2400A / CFL4111714222454K<br>2012 2.4G BPF Type22, H.R.2.1G | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 2.5 dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>30dB Min @ 824~915 MHz<br>32dB Min @ 1920~1980 MHz<br>16dB Min @ 2110~2170 MHz<br>35dB Min @ 4800~5000 MHz<br>23dB Min @ 7200~7500 MHz | **Size**(mm): 2.0*1.2*0.5<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF2012LM17R2400A / CFL4111514172454K<br>2012 2.4G BPF Type17, H.R.2.1G | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 2.6dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>40dB Min @ 880~960 MHz<br>40dB Min @ 1710~1990 MHz<br>20dB Min @ 2110~2170 MHz<br>30dB Min @ 4800~5000 MHz<br>30dB Min @ 7200~7500 MHz | **Size**(mm): 2.0*1.2*0.9<br>**Operating Temp.:** -25~85°C<br>**RoHS Compliance** |
| | BPF2012LM47R2400A / CFL4111514472454K<br>2012 2.4G BPF Type47, H.R.2.1G | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 1.8dB (Max)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>30dB Min @ 824~915 MHz<br>30dB Min @ 1545~1605 MHz<br>35dB Min @1710~1990 MHz<br>30dB Min @2170 MHz<br>30dB Min @ 4800~5000 MHz<br>25dB Min @ 7200~7500 MHz | **Size**(mm): 2.0*1.2*0.8<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF2012LM09R2400A / CFL4111514092454K<br>2012 2.4G BPF Type09 | **Freq.Range:** 2400-2500MHz<br>**Insertion Loss:** 1.2dB (Max)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>15dB Min @1600MHz<br>25dB Min @3200MHz<br>20dB Min @4800~5000MHz | **Size**(mm): 2.0*1.2*0.9<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF2012LL01R5000A / CFL4111714015004K<br>2012 5G BPF Type01 | **Freq. Range:** 4900-5950 MHz<br>**Insertion Loss:** 1.5dB (Max)<br>**VSWR*:**2.0 (Max) | **Attenuation:**<br>30dB Min@1280~3000MHz<br>25dBMin@ 3300~4000MHz<br>25dBMin@ 9800~11900MHz | **Size**(mm): 2.0*1.2*1<br>**Operating Temp.:**<br>**RoHS Compliance** |
| | BPF2012LL05R5000A / CFL4111714055004K<br>2012 5G BPF Type05 | **Freq. Range:** 5150-5850 MHz<br>**Insertion Loss:** 1.8dB (Max)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>30dB Min @ 2400~2500MHz<br>20dB Min @ 4700MHz | **Size**(mm): 2.0*1.2*0.8<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF1608LM02R2400A / CFL4111515022454K<br>1608 2.4G BPF Type02 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 1.7 dB (Max)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>30dB Min @ 880~960 MHz<br>20dB Min @ 1710~1990 MHz<br>8.5dB Min@ 2170 MHz<br>20dB Min @ 4800~5000 MHz<br>25dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.6<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF1608LM07R2400A / CFL4111515072454K<br>1608 2.4G BPF Type07 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 3.2 dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>40dB Min @ 880~915 MHz<br>38dB Min @ 1710~1850 MHz<br>40dB Min @ 1850~1910 MHz<br>40dB Min @ 1920~1990 MHz<br>35dB Min @ 2110~2170 MHz<br>30dB Min @ 4800~5000 MHz<br>30dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.6<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## Filter (BPF)

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | BPF1608LM17R2400A / CFL4111515172454K<br>1608 2.4G BPF Type17 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 2.7 dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>38dB Min @ 880~915 MHz<br>35dB Min @ 1710~1850 MHz<br>35dB Min @ 1850~1910 MHz<br>35dB Min @ 1920~1990 MHz<br>25dB Min @ 2110~2170 MHz<br>30dB Min @ 4800~5000 MHz<br>30dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.6<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF1608LM11R2400A / CFL4111515112454K<br>1608 2.4G BPF Type11 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 1.8 dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>20dB Min @ 1710~1990 MHz<br>6.5dB Min @ 2110~2170 MHz<br>25dB Min @ 4800~5000 MHz<br>20dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.6<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BPF1608LM37R2400A / CFL4111515372454K<br>1608 2.4G BPF Type37 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 2.8 dB (Max.)<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>38dB Min @ 880~915 MHz<br>35dB Min @ 1710~1850 MHz<br>35dB Min @ 1850~1910 MHz<br>35dB Min @ 1920~1990 MHz<br>30dB Min @ 2110~2170 MHz<br>35dB Min @ 4800~5000 MHz<br>25dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.6<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

## Filter (LPF)

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | LPF1608LL53R2400A / CFL4111715532454K<br>1608 2.4G LPF Type53 | **Freq. Range:** 2400-2500 MHz<br>**Insertion Loss:** 0.48dB (Max)<br>**VSWR*:** 1.5 (Max) | **Attenuation:**<br>35dB Min @ 4800~5000 MHz<br>27dB Min @ 7200~7500 MHz | **Size**(mm): 1.6*0.8*0.65<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

## Filter (Diplexer)

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | DPX2012LL85R2455A / CFL4111714852524K<br>2012 2.4/5GHz Diplexer Type85 | **Freq. Range:** 2400-2500MHz/ 4900-5900MHz<br>**Insertion Loss:**<br>Low : 0.7dB/<br>High: 0.9dB<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>20dB Min @ 4900~5900 MHz<br>20dB Min @ 2400~2500 MHz | **Size**(mm): 2.0*1.2*0.85<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | DPX2012LL89R2455A / CFL4111714892524K<br>2012 2.4/5GHz Diplexer Type89 | **Freq. Range:** 2400-2500MHz/ 4900-5950MHz<br>**Insertion Loss:**<br>Low : 0.5dB/<br>High: 0.65dB<br>**VSWR*:** 2.0 (Max) | **Attenuation:**<br>20dB Min.,2f0@4800~5000 MHz<br>20dB Min.,3f0@7200~7500 MHz<br>20dB Min. @ 824~915 MHz<br>20dB Min. @1800~2500 MHz<br>10dB Ref.,2f0@9800~11900 MHz | **Size**(mm): 2.0*1.2*0.5<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## Balun

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | BLN1608LL01R5000A/ CBA471171501 5004K<br>1608 5G Balun Type01, 50100 | **Freq. Range:** 4900-5950MHz<br>**Insertion Loss:** 1.2 dB (Max)<br>**VSWR*:** 2.0 (Max) | **Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** 100Ω<br>**Phase Difference:** 180 ±10 degree<br>**Amplitude Difference:** 1.5 dB (Max) | **Size**(mm): 1.6*0.8*0.65<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BLN1608LL00R2400A/ CBA471171500 2454K<br>1608 2.4G Balun Type00, 5050 | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 1.2 dB (Max)<br>**VSWR*:** 2.0 (Max) | **Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** 50Ω<br>**Phase Difference:** 180 ±10 degree<br>**Amplitude Difference:** 1 dB (Max) | **Size**(mm): 1.6*0.8*0.65<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BLN1608LL01R2400A/ CBA471171501 2454K<br>1608 2.4G Balun Type01, 50100 | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 1.1 dB (Max)<br>**VSWR*:** 2.0 (Max) | **Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** 100Ω<br>**Phase Difference:** 180 ±10 degree<br>**Amplitude Difference:** 2 dB (Max) | **Size**(mm): 1.6*0.8*0.65<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

## Balance Filter (Combo)

| Model | Part No./ Description | Electrical Data | | Mechanical Data |
|---|---|---|---|---|
| | BLF2012LL98R2400A/ CBA471171498 2454K<br>2012 2.4G Combo Type98 | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 3.5dB (Max)<br>**VSWR*:** 2.0 (Max)<br>**Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** Conjugate match to CSR BC03/04 series<br>**Phase Difference:** 180 ±5 degree @25°C<br>**Amplitude Balance:** 1.0 dB (Max) | **Attenuation:**<br>40dB Min@880~960MHz<br>25dB Min@1300~1600MHz<br>35dB Min@4800~5000MHz<br>30dB Min@7200~7500MHz | **Size**(mm): 2.0*1.2*0.9<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BLF2012LM37R2400A/ CBA471151437 2454K<br>2012 2.4G Combo Type37 | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 2.8 dB (Max)<br>**VSWR*:** 2.0 (Max)<br>**Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** Conjugate match to CSR BC04/05/06 series<br>**Phase Difference:** 180 ±10 degree @25°C<br>**Amplitude Balance:** 1.5 dB (Max) | **Attenuation:**<br>35dB Min@880~960MHz<br>30dB Min@1710~1880MHz<br>20dB Min@1880~1990MHz<br>30dB Min@4800~5000MHz | **Size**(mm): 2.0*1.2*0.8<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |
| | BLF2012LM31R2400A/ CBA471151431 2454K<br>2012 2.4G Combo Type31 | **Freq. Range:** 2400-2500MHz<br>**Insertion Loss:** 3.1dB (Max)<br>**VSWR*:**<br>**Unbalanced Impedance:** 50Ω<br>**Balanced Impedance:** Conjugate match to MTK MT6616 series<br>**Phase Difference:** 180 ±10 degree @25°C<br>**Amplitude Balance:** 1.5 dB (Max) | **Attenuation:**<br>35dB Min@880~960MHz<br>30dB Min@1710~1880MHz<br>20dB Min@1880~1990MHz<br>30dB Min@4800~5000MHz | **Size**(mm): 2.0*1.2*0.8<br>**Operating Temp.:** -40~85°C<br>**RoHS Compliance** |

* VSWR depends on the environment

## Explanation of ordering code - New

**Ordering example : ANT3216A063R2400A**

**ANT 3216 A 063 R 2400 A**

**Product Type (code 1)**
- ANT: Antenna
- BPF: Band-Pass Filter
- LPF: Low-Pass Filter
- BLN: Balun
- BLF: Balun Filter
- DPX: Diplexer

**(1) Size (mm) - SMD (LTCC) (code 2)**
- 3216: 3.2 x 1.6 mm
- 2012: 2.0 x 1.2 mm
- 2520: 2.5 x 2.0 mm

**(2) Connector - Cable length (mm) Stand-alone (code 2)**

Ex: X100 – IPEX connector, 100 mm cable length
X: IPEX, M: MMCX, S: SMA, Z: Stripped
100: 100 mm cable length

**Type (code 3)**
- L, F, A: Chip antenna / Filter / Balun
- B: Bulk antenna
- P: PCB
- X: FPCB
- S: Metal
- E: External
- J: Integrated antenna

**Factory Control Code / Cable Type (code 7)**

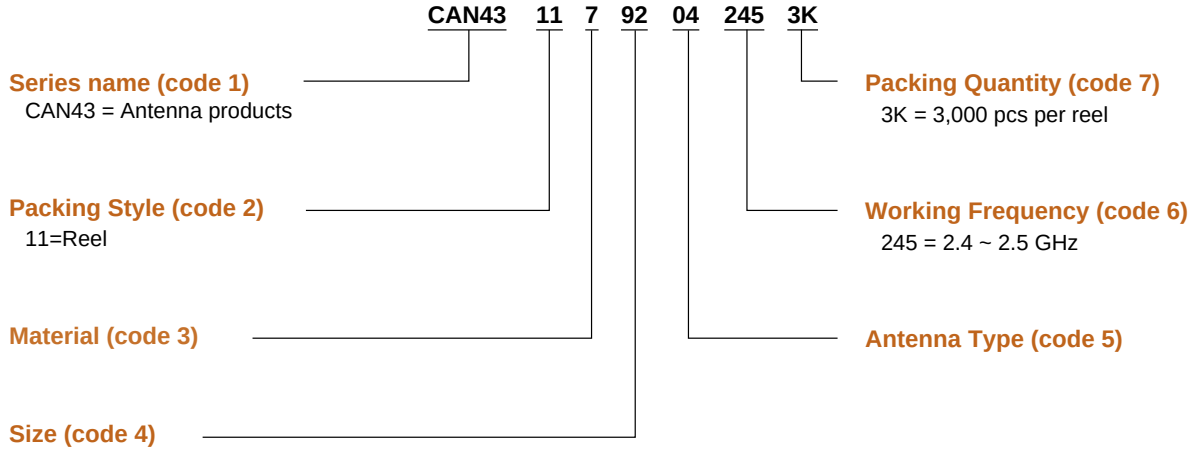
**Frequency Band (MHz)(code 6)**
- 2400: 2.4 – 2.5 GHz;
- 2455: 2.4&5 GHz
- 1575: GPS; 1516: GPS+Glonass
- 0433: 433 MHz
- 0870: 868 MHz
- 0918: 900/1800 MHz
- WQUD: 850/900/1800/1900 MHz
- WPEN: 850/900/1800/1900/2100 MHz

**Packing Style (code 5)**
- R: Tape & Reel
- T: Tray
- B: Bulk

**Serial No. (code 4)**

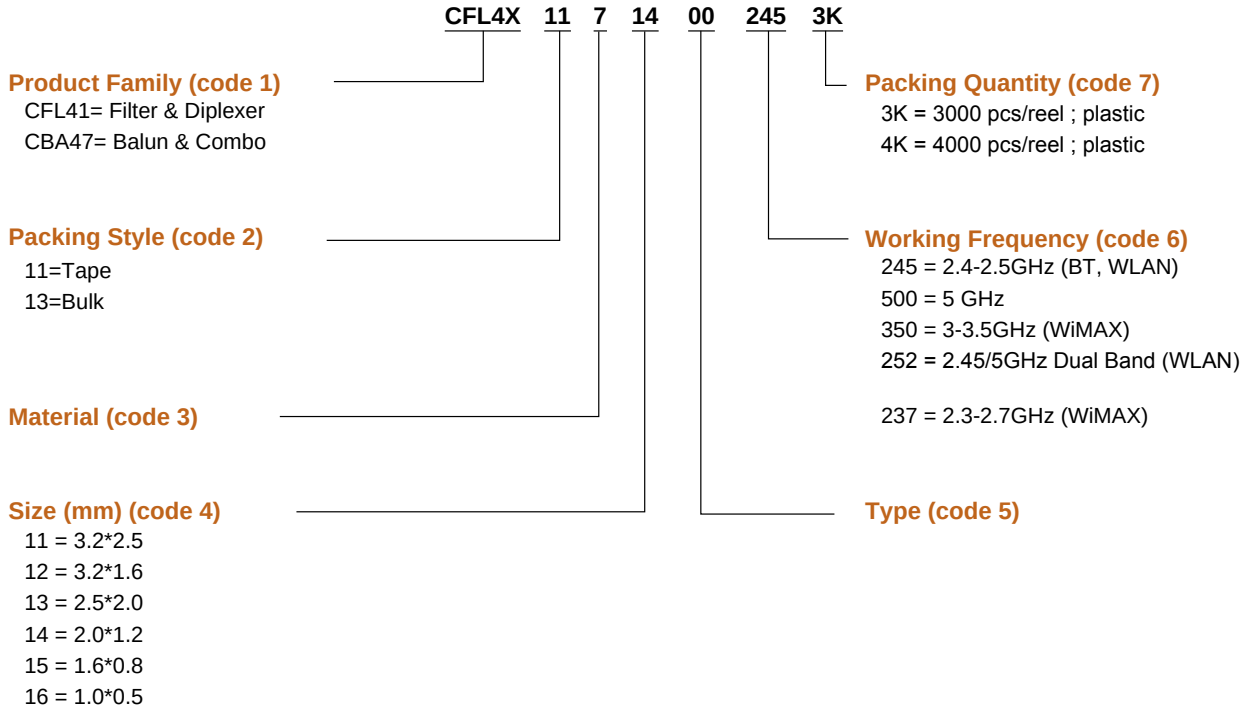
## Explanation of ordering code - Antenna (old)

**Ordering example : CAN4311792042453K**

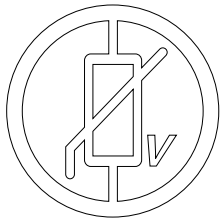



## Explanation of ordering code - Filter / Diplexer / Balun / Combo (old)

**Ordering example : CFL4X11714002453K**



| M2M Application : Antenna<br>Ordering code ANTSB000000020140 | | |
|---|---|---|
| Product Series | PART NUMBER | Frequency Range (MHz) |
| 2.4GHz | ANT1204F001R2400A | 2400 - 2500 |
| | ANT8010LL04R2400A | 2400 - 2500 |
| | ANT5320LL24R2400A | 2400 - 2500 |
| | ANT3216A063R2400A | 2400 - 2500 |
| | ANT3216LL00R2400A | 2400 - 2500 |
| | ANT2012LL13R2400A | 2400 - 2500 |
| | ANTX200P001B24003 | 2400 - 2500 |
| 2.4/5 GHz | ANT5320LL04R2455A | 2400 - 2500 |
| | | 5150 - 5875 |
| | ANT5320LL24R2455A | 2400 - 2500 |
| | | 5150 - 5875 |
| | ANTX100P001B24553 | 2400 - 2500 |
| | | 5150 - 5875 |
| | ANTX200P002B24553 | 2400 - 2500 |
| | | 5150 - 5875 |
| GPS | ANT6230LL01R1575A | 1575 |
| | ANT5320LL14R1575A | 1575 |
| | ANT3216LL15R1575A | 1575 |
| | ANT1212B00DT1575A | 1575 |
| | ANT1515B00FT1575A | 1575 |
| | ANT1818B00AT1575A | 1575 |
| | ANT2525B00BT1575A | 1575 |
| | ANT2525B00FT1575A | 1575 |
| GPS& GLONASS | ANT1818B00BT1516A | 1575 / 1602 |
| | ANT1818B00DT1516A | 1575 / 1602 |
| | ANT2525B00BT1516A | 1575 / 1602 |
| | ANT2525B00DT1516A | 1575 / 1602 |
| Active GPS | ANT1818JB30B1575A | 1575 |
| 2.4GHz + GPS | ANT5320LL17R1524A | 1575 / 2400 |
| Cellular WWAN | ANT2112A010B0918A | 824 - 960 |
| | | 1710 - 1990 |
| | ANT1204LL00R0918A | 900 / 1800 |
| | ANT3505B000TWPENA | 824 - 960 |
| | | 1710 - 2170 |
| | ANTX100P001BWPEN3 | 824 - 960 |
| | | 1710 - 2170 |
| Short-Range | ANT2405F001R0169A | 169 |
| | ANT1204F002R0433A | 315 / 433 |
| | ANT1204LL08R0870A | 870 |
| | ANT1204LL05R0915A | 915 |
| FM | ANT1105LF00R0098A | 88 |
| SDARS | ANT2525B00DT2300A | 2320 - 2345 |

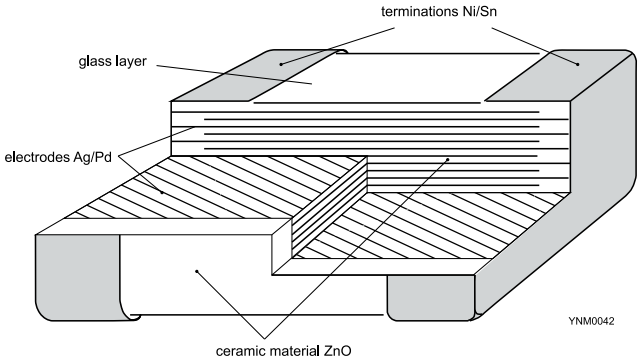


# MULTILAYER CHIP VARISTORS

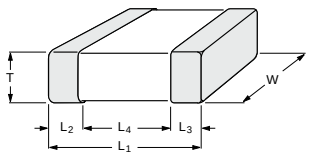
## Features

- Excellent clamping voltage
- Excellent energy dissipation capability
- Quick response time (<1n sec)
- Adjustable capacitance values
- High reliability
- High transient current capability
- Symmetrical voltage-current characteristics

### Construction




### Case dimensions




| Case size designation | Dimensions in mm | | | | | |
|---|---|---|---|---|---|---|
| Inch-based | $L_1$ | W | T | $L_2$ / $L_{2\ min}$ | $L_2$ / $L_{3\ max}$ | $L_{4\ min}$ |
| 0402 | 1.0 ±0.10 | 0.5 ±0.10 | 0.5 ±0.10 | 0.15 | 0.30 | 0.40 |
| 0603 | 1.6 ±0.15 | 0.8 ±0.10 | 0.8 ±0.10 | 0.20 | 0.60 | 0.40 |
| 0805 | 2.0 ±0.20 | 1.25 ±0.10 | 0.85 ±0.10 | 0.25 | 0.75 | 0.55 |
| 1206 | 3.2 ±0.15 | 1.6 ±0.15 | | 0.25 | 0.75 | 1.40 |

### Thickness classification and packing quantities

| Type | Thickness classification (mm) | 8 mm tape width per reel |
|---|---|---|
| | | 180 mm / 7” |
| | | Paper |
| 0402 | 0.50 ±0.10 | 10 000 |
| 0603 | 0.80 ±0.10 | 4 000 |
| 0805 | 0.85 ±0.10 | 4 000 |
| 1206 | 0.85 ±0.10 | 4 000 |

| MLV | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | | |
| 0402 | | | | | | | | | |
| Maximum working voltage | 5.5 V | 5.5 V | 9 V | 14 V | 14 V | 18 V | 18 V | 18 V | 30 V |
| Varistor voltage tolerance (code 8) | 10 ~ 14 V (S) | 7.2 ~ 10.8V (M) | 10.2~13.8V (L) | 18~24 V (S) | 16.2~19.8V (K) | 24~34 V (S) | 50~80 V (S) | 21.6~26.4 V (K) | 50~80 V (S) |
| 1 pF | | | | | | | | | |
| 3 pF | | | | | | | 0.5 ±0.10 | | 0.5 ±0.10 |
| 5 pF | | | | | | | | | |
| 10 pF | | | | | | 0.5 ±0.10 | | | |
| 15 pF | | | | | | | | | |
| 22 pF | 0.5 ±0.10 | | | 0.5 ±0.10 | | | | | |
| 27 pF | | | | | | | | | |
| 33 pF | | | | | | | | | |
| 40 pF | | | | | | | | | |
| 50 pF | | | 0.5 ±0.10 | | 0.5 ±0.10 | | | 0.5 ±0.10 | |
| 82 pF | | | | | | | | | |
| 100 pF | | 0.5 ±0.10 | | | | | | | |
| 120 pF | | | | | | | | | |
| 160 pF | | | | | | | | | |
| 200 pF | | | | | | | | | |
| 250 pF | | | | | | | | | |
| 300 pF | | | | | | | | | |
| 360 pF | | | | | | | | | |
| 470 pF | | | | | | | | | |
| 480 pF | | | | | | | | | |
| 650 pF | | | | | | | | | |
| 900 pF | | | | | | | | | |
| Tape width | 8 mm | | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Specification for 0603

| MLV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | |
| 0603 | | | | | | | | |
| Maximum working voltage | 5.5 V | 5.5 V | 9 V | 9 V | 14 V | 14 V | 18 V | 30 V |
| Varistor voltage tolerance (code 8) | 10 ~ 14 V (S) | 7.2 ~ 10.8 V (M) | 14~ 18 V (S) | 9.6 ~ 14.4 V (M) | 18 ~ 24 V (S) | 16.2 ~ 19.8 V (K) | 24 ~ 32 V (S) | 50 ~ 80 V (S) |
| 1 pF | | | | | | | | |
| 3 pF | | | | | | | | 0.80 ±0.10 |
| 5 pF | | | | | | | | |
| 9 pF | | | | | | | | |
| 10 pF | | | | | | | 0.80 ±0.10 | |
| 15 pF | | | | | | | | |
| 22 pF | 0.80 ±0.10 | | 0.80 ±0.10 | | 0.80 ±0.10 | | | |
| 33 pF | | | | | | | | |
| 50 pF | | | | | | | | |
| 82 pF | | | | | | | | |
| 100 pF | | 0.80 ±0.10 | | 0.80 ±0.10 | | 0.80 ±0.10 | | |
| 120 pF | | | | | | | | |
| 160 pF | | | | | | | | |
| 180 pF | | | | | | | | |
| 200 pF | | | | | | | | |
| 250 pF | | | | | | | | |
| 300 pF | | | | | | | | |
| 350 pF | | | | | | | | |
| 360 pF | | | | | | | | |
| 470 pF | | | | | | | | |
| 650 pF | | | | | | | | |
| 680 pF | | | | | | | | |
| 800 pF | | | | | | | | |
| 900 pF | | | | | | | | |
| Tape width | 8 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Specification for 0805

| MLV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| General purpose | | | | | | | | |
| 0805 | | | | | | | | |
| Maximum working voltage | 5.5 V | 9 V | 14 V | 16 V | 18 V | 26 V | 30 V | 38 V |
| Varistor voltage tolerance (code 8) | 7.2 ~ 10.8 V (M) | 10.8 ~ 14.6 V (L) | 16.3 ~ 20.7 V (K) | 20 ~ 27 V (S) | 19.27 ~ 28.8 V (M) | 29.7 ~ 36.3 V (K) | 36.9 ~ 45.1 V (K) | 45 ~ 58 V (S) |
| 100 pF | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 | 0.85 ±0.10 |
| 160 pF | | | | | | | | |
| 250 pF | | | | | | | | |
| 400 pF | | | | | | | | |
| 500 pF | | | | | | | | |
| 600 pF | | | | | | | | |
| 900 pF | | | | | | | | |
| 1.1 nF | | | | | | | | |
| 3.3 nF | | | | | | | | |
| Tape width | 8 mm | | | | | | | |

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Specification for 1206

<table>
<tr><td colspan="7">MLV</td></tr>
<tr><td colspan="7">General purpose</td></tr>
<tr><td colspan="7">1206</td></tr>
<tr><td>Maximum working voltage</td><td>5.5 V</td><td>14 V</td><td>18 V</td><td>26 V</td><td>30 V</td><td>38 V</td></tr>
<tr><td>working voltage</td><td>7.2 ~ 10.8 V (M)</td><td>16.3 ~ 20.7 V (K)</td><td>19.27 ~ 28.8 V (M)</td><td>29.7 ~ 36.3 V (K)</td><td>36.9 ~ 45.1 V (K)</td><td>45 ~ 58 V (S)</td></tr>
<tr><td>100 pF</td><td></td><td rowspan="6">0.85 ±0.10</td><td rowspan="5">0.85 ±0.10</td><td rowspan="3">0.85 ±0.10</td><td rowspan="2">0.85 ±0.10</td><td rowspan="2">0.85 ±0.10</td></tr>
<tr><td>160 pF</td><td></td></tr>
<tr><td>250 pF</td><td></td><td rowspan="3">0.85 ±0.10</td></tr>
<tr><td>400 pF</td><td></td></tr>
<tr><td>500 pF</td><td rowspan="5">0.85 ±0.10</td><td></td></tr>
<tr><td>600 pF</td><td></td><td></td></tr>
<tr><td>800 pF</td><td></td><td></td><td></td></tr>
<tr><td>900 pF</td><td></td><td></td><td></td><td></td></tr>
<tr><td>1.1 nF</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.3 nF</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tape width</td><td colspan="6">8 mm</td></tr>
</table>

**Note:** Values in shaded cells indicate thickness class (unit: mm)

## Ordering information for 0402 to 1206

Global part number

Ordering example: VRS0402KR55R680N

**VR S 0402 K R 55R 680 N**

Series name (code 1-2)
- VR = Varistor

Chip type (code 3)
- S = Single chip

Size code (code 4-7)
- 0402
- 0603
- 0805
- 1206

Varistor voltage tolerance (code 8)
- K = ±10 %
- L = ±15 %
- M = ±20 %
- S = Special range

Packing style (code 9)
- R = paper tape reel Ø7 inch

Capacitance tolerance (code 16)
- K = ± 10 %
- L = ± 15 %
- M = ± 20 %
- N = ± 30 %

Capacitance value (code 13-15)
- 680 = 68 pF
- (2 significant digits+number of zeros; the 3rd digit signifies the multiplying factor, and letter R is decimal point)
- 0 = x 1
- 1 = x $10^1$

Maximum working voltage (code 10-12)
- 33R = 3.3 V
- 55R = 5.5 V
- 090 = 9 V
- 110 = 11 V
- 120 = 12 V
- 140 = 14 V
- 150 = 15 V
- 160 = 16 V
- 180 = 18 V
- 190 = 19 V
- 220 = 22 V
- 260 = 26 V
- 300 = 30 V
- 310 = 31 V
- 380 = 38 V

## YAGEO - A GLOBAL COMPANY

### ASIA


**Dongguan, China**
Tel. +86 769 8772 0275
Fax. +86 769 8791 0053

**Hong Kong, China**
Tel. +852 2342 6833
Fax. +852 2342 6588

**Mudu, China**
Tel. +86 512 6651 8889
Fax. +86 512 6651 9889

**Qingdao, China**
Tel. +86 532 8797 0533
Fax. +86 532 8797 0533

**Suzhou, China**
Tel. +86 512 6825 5568
Fax. +86 512 6825 5386

**Tokyo, Japan**
Tel. +81 3 6809 3972
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Tel. +82 31 712 4797
Fax. +82 31 712 5866

**Kuala Lumpur, Malaysia**
Tel. +60 3 8063 8864
Fax. +60 3 8063 7376

**Singapore**
Tel. +65 6244 7800
Fax. +65 6244 4943

**Taipei, Taiwan**
Tel. +886 2 6629 9999
Fax. +886 2 6628 8886


### EUROPE


**Roermond, Benelux**
Tel. +31 475 385 555
Fax. +31 475 385 589

**Munich, Germany**
Tel. +49 8990 7784 380
Fax. +49 8990 7784 379

**Szombathely, Hungary**
Tel. +36 94 517 702
Fax. +36 94 517 701

**Milan, Italy**
Tel. +39 02 6129 1017
Fax. +39 02 6601 7490

**Moscow, Russian Federation**
Tel. +7 965 408 18 11
Fax. +7 498 610 07 07


### NORTH AMERICA


**San Jose, U.S.A.**
Tel. +1 408 240 6200
Fax. +1 408 240 6201


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