About Yageo

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 the Americas.

Yageo currently ranks as the world No.1 in chip-resistors, No. 3 in MLCCs and No. 4 in ferrite products, with a strong global presence: 23 sales offices in 15 countries, 9 production sites, 8 JIT logistic hubs, and 2 R&D centers worldwide. Ferroxcube and Vitrohm, who produce ferrites and leaded resistors, are also a part of the Yageo group.

We support our customers with extensive literature including datasheets, brochures and application notes, which are also available electronically on our website at: www.yageo.com
Automotive

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Introduction
The ever increasing presence of electronics in the automotive environment requires a wide diversity of passive components possessing advanced product characteristics and superior reliability.

Not only are established systems like engine control, power steering, transmission, climate control, lighting, and ABS undergoing monumental changes, but relatively new systems, such as car-to-car communications, driver assistance, self-steering, and self-parking are experiencing similar transformations which call for a greater number of resistors and capacitors. Deeper integration within the automotive environment necessitates pushing the performance of passive components to the limit.

Armed with this knowledge, Yageo has made a new series of automotive-qualified MLCC and R Chip components available to the market for use in current designs and as a precursor for future trends.

The new MLCC and R Chip are fully designed to meet the following criteria:
• AEC-Q200 qualified
• Full PPAP available
• Capable of performing under the most demanding of conditions
• Mass production under TS 16949 certification

Yageo has introduced the AC Automotive Series of MLCC capacitors in two temperature characteristics, NPO and X7R. The special product design, specifically selected raw materials, and dedicated mass production environment give the AC Automotive series excellent long term reliability and improved mechanical properties. As a discrete part or within an array, this new series covers the products required within infotainment and comfort and convenience applications.

For the majority of automotive applications, the workhorse solution has been the standard AC series of R Chip Thick Film technology, available in 0201 to 2512 case sizes.

Only a specially designed solution manufactured using selected materials can meet the needs of harsh environmental conditions in safety systems where sulfur may be a challenge. Yageo has the ultimate solution, the AA R Chip series.

High precision resistors working under humid conditions must meet unsurpassed reliability standards. R Chip Thin Film AT products from Yageo are the perfect choice for circuitry in power steering, instrument clusters, ECU, and ABS.

The third consideration in designing specialized solutions is derived from the automotive industry’s constant need to increase the availability of circuitry and functions without increasing size. Traditionally, power dissipation had to be sacrificed to achieve miniaturization; Yageo’s response is double and triple power resistors that enable small sizes without abandoning product performance.

Although SMD resistors dominate the PCB, leaded resistors are still essential components in various part of the electronic assembly due to the combination of reliability, power dissipation and stability. Flame proof (FMP Series) and precision metal film (MFP series) resistors are used in infotainment and comfort and convenience design. Yageo also introduces the AHA series for aluminum housed resistors which are applied in automotive signal lights.

In addition to the resistors and capacitors, Yageo ceramic patch/chip antennas and PCB antennas bring wireless connectivity to infotainment and telematic systems which enrich drivers’ experiences and enhance safety while driving.

The same knowledge and expertise which has helped Yageo develop its highly reliable components are also applied in assisting design engineers develop superior RoHS and REACH compliant solutions. By offering highly competitive and reliable solutions, Yageo realizes tomorrow’s passive components for the automotive application.
Automotive Electronics

- Lighting
- Infotainment
- Comfort & Convenience
### Automotive Chip Resistors

**AC Series**
- Automotive grade thick film chip resistor

**Feature**
- AEC-Q200 compliant
- Highly reliable electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications

**AT Series**
- Automotive grade sulfur resistance thin film high precision high stability chip resistor

**Feature**
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- High precision & stability
- Low TCR
- Low electrical noise
- Advanced sputtering technology

**PA Series**
- Automotive grade metal current sensor, low TCR chip resistor

**Feature**
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR

**PE Series**
- Automotive grade metal current sensor, low TCR chip resistor

**Feature**
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR

### MLCC

**AC Series**
- Automotive

**Feature**
- AEC-Q200 compliant and PPAP ready
- ISO/TS16949 certified
- Board Flex ≥2mm
- 100% AOI
- High reliability

**CS Series**
- Soft termination

**Feature**
- Good Resistance to Bending
- Good Resistance to Mechanical Vibration
- Good Resistance to Thermal Shock

**CC-HCV Series**
- High CV

**Feature**
- High capacitance and high voltage
- Higher energy density
- High reliability with no polarity
- RoHS-compliant & halogen-free

### Through Hole

**AH/AHP Series**
- Wirewound resistors, high power, aluminum housed, heatsink type

**Feature**
- High power rating (up to 50W)
- Wirewound (max. resistance up to 33Kohm)
- Heatsink mounted
- Reduced size
- Corrosion-resistant aluminum case for severe environments
- Excellent surge performance
- Fully lead-free compliance with no RoHS exemptions (7C-1)

**AHB Series**
- Wirewound resistors, high power, aluminum housed, heatsink type

**Feature**
- High power rating (up to 500W)
- Wirewound (max. resistance up to 82Kohm)
- Heatsink mounted
- Reduced size
- Corrosion-resistant aluminum case for severe environments
- Excellent surge performance
- Fully lead-free compliance with no RoHS exemptions (7C-1)

**SLR Series**
- Cement resistors, low ohmic, metal plate

**Feature**
- High power rating
- Low resistance (to 10mR)
- Double power available
- Flameproof cement case
- Excellent surge performance
- Vertical terminal
- Fully lead-free compliance with no RoHS exemptions (7C-1)

**JPW Series**
- Jumper, tinned-copper wire

**Feature**
- High quality tinned-copper
- High reliability
- Forming type available
- Fully lead-free compliance with no RoHS exemptions (7C-1)

### World's Leading Passive Component Service Provider

[Check Products Datasheets On Our Website](www.yageo.com)
### Automotive

#### Chip Resistors

**AC Series**
Automotive grade thin film chip resistor

**Feature**
- AEC-Q200 compliant
- Highly reliable electrode construction
- Compatible with all soldering processes
- High reliability

**AT Series**
Automotive grade sulfur resistance thin film high precision high stability chip resistor

**Feature**
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- High precision & stability
- Low TCR
- Low electrical noise
- Advanced sputtering technology

**PA Series**
Automotive grade metal current sensor, low TCR chip resistor

**Feature**
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR

### MLCC

#### AC Series
Automotive

**Feature**
- AEC-Q200 compliant and PPAP ready
- ISO/TS16949 certified
- Board Flex ≥2mm
- 100% AOI
- High reliability

#### CC-HC Series
High Capacitance

**Feature**
- High capacitance
- Very Low ESR and ESL
- Low self heating
- High reliability with no polarity
- RoHS-compliant & halogen-free

#### CC-HCV Series
High CV

**Feature**
- High capacitance and high voltage
- Higher energy density
- High reliability with no polarity
- RoHS-compliant & halogen-free

### Wireless

#### GNSS Antenna
Ceramic Patch Antenna

**Feature**
- High efficiency
- High accuracy
- Operating temperature: -40°C~105°C
- RoHS-compliant & halogen-free

#### WLAN/BT/ISM Antenna
Chip Antenna

**Feature**
- Compact size, small clearance
- SMD type antenna
- Operating temperature: -40°C~105°C
- RoHS-compliant & halogen-free

#### WWAN Antenna
Chip Antenna

**Feature**
- Compact size, small clearance
- SMD type antenna
- Operating temperature: -40°C~105°C
- RoHS-compliant & halogen-free

### Through Hole

#### MFP Series
Metal film resistors, precision

**Feature**
- High precision & stability
- Narrow tolerance
- Low TCR
- Low electrical noise
- AEC-Q200 compliant
- Fully lead-free compliance with no RoHS exemptions (7C-1)

#### MFR Series
Metal film resistors

**Feature**
- Wide resistance range
- High reliability
- High quality
- AEC-Q200 compliant
- Fully lead-free compliance with no RoHS exemptions (7C-1)
### Automotive

#### Chip Resistors

**AC Series**
Automotive grade thick film chip resistor

- **Feature**
  - AEC-Q200 compliant
  - Highly reliable electrode construction
  - Compatible with all soldering processes
  - Highly stable in auto-placement surface mounting applications

**AT Series**
Automotive grade sulfur resistance thin film high precision high stability chip resistor

- **Feature**
  - Superior resistance against sulfur-containing environments
  - AEC-Q200 compliant
  - High precision & stability
  - Low TCR
  - Low electrical noise
  - Advanced sputtering technology

**PA Series**
Automotive grade metal current sensor, low TCR chip resistor

- **Feature**
  - Excellent current sensing performance
  - High power rating for large current detection
  - Accurate power control
  - Reduce power consumption
  - Low thermal EMF
  - AEC-Q200 compliant
  - Low TCR

**PE Series**
Automotive grade metal current sensor, low TCR chip resistor

- **Feature**
  - Excellent current sensing performance
  - High power rating for large current detection
  - Accurate power control
  - Reduce power consumption
  - Low thermal EMF
  - AEC-Q200 compliant
  - Low TCR

**AC Series**
Automotive

- **Feature**
  - AEC-Q200 compliant and PPAP ready
  - ISO/TS16949 certified
  - Board Flex ≥2mm
  - 100% AOI
  - High reliability

**CC-Class I and Class II (>=0201) Series**
General purpose

- **Feature**
  - Suitable for all general purpose
  - Low ESR and self-heating
  - Stable capacitance and low impedance over wide frequency range
  - High reliability with no polarity
  - RoHS-compliant & halogen-free

**CC-HCV Series**
High CV

- **Feature**
  - High capacitance and high voltage
  - Higher energy density
  - High reliability with no polarity
  - RoHS-compliant & halogen-free

**X2Y Series**

- **Feature**
  - Excellent performance on EMI suppression or decoupling
  - Ultra-low equivalent series inductance (ESL)
  - Provides differential & common mode filtering with a single device

**CC-Class I and Class II (>=0201) Series**

- **Feature**
  - High precision & stability
  - Narrow tolerance
  - Low TCR
  - Low electrical noise
  - AEC-Q200 compliant
  - Fully lead-free compliance with no RoHS exemptions (7C-1)

**SLR Series**
Cement resistors, low ohmic, metal plate

- **Feature**
  - High power rating
  - Low resistance (to 10mR)
  - Double power available
  - Flameproof cement case
  - Excellent surge performance
  - Vertical terminal
  - Fully lead-free compliance with no RoHS exemptions (7C-1)

**KNP Series**
Wirewound resistors, flameproof

- **Feature**
  - High reliability
  - Flameproof silicone coated
  - Excellent surge performance
  - Fully lead-free compliance with no RoHS exemptions (7C-1)

### Automotive Electronics

#### Chip Resistors

**AC Series**
Automotive grade thick film chip resistor

- **Feature**
  - AEC-Q200 compliant
  - Highly reliable electrode construction
  - Compatible with all soldering processes
  - Highly stable in auto-placement surface mounting applications

**AT Series**
Automotive grade sulfur resistance thin film high precision high stability chip resistor

- **Feature**
  - Superior resistance against sulfur-containing environments
  - AEC-Q200 compliant
  - High precision & stability
  - Low TCR
  - Low electrical noise
  - Advanced sputtering technology

**PA Series**
Automotive grade metal current sensor, low TCR chip resistor

- **Feature**
  - Excellent current sensing performance
  - High power rating for large current detection
  - Accurate power control
  - Reduce power consumption
  - Low thermal EMF
  - AEC-Q200 compliant
  - Low TCR

**PE Series**
Automotive grade metal current sensor, low TCR chip resistor

- **Feature**
  - Excellent current sensing performance
  - High power rating for large current detection
  - Accurate power control
  - Reduce power consumption
  - Low thermal EMF
  - AEC-Q200 compliant
  - Low TCR

**AC Series**
Automotive

- **Feature**
  - AEC-Q200 compliant and PPAP ready
  - ISO/TS16949 certified
  - Board Flex ≥2mm
  - 100% AOI
  - High reliability

**CC-Class I and Class II (>=0201) Series**
General purpose

- **Feature**
  - Suitable for all general purpose
  - Low ESR and self-heating
  - Stable capacitance and low impedance over wide frequency range
  - High reliability with no polarity
  - RoHS-compliant & halogen-free

**CC-HCV Series**
High CV

- **Feature**
  - High capacitance and high voltage
  - Higher energy density
  - High reliability with no polarity
  - RoHS-compliant & halogen-free

**X2Y Series**

- **Feature**
  - Excellent performance on EMI suppression or decoupling
  - Ultra-low equivalent series inductance (ESL)
  - Provides differential & common mode filtering with a single device

**CC-Class I and Class II (>=0201) Series**

- **Feature**
  - High precision & stability
  - Narrow tolerance
  - Low TCR
  - Low electrical noise
  - AEC-Q200 compliant
  - Fully lead-free compliance with no RoHS exemptions (7C-1)

**SLR Series**
Cement resistors, low ohmic, metal plate

- **Feature**
  - High power rating
  - Low resistance (to 10mR)
  - Double power available
  - Flameproof cement case
  - Excellent surge performance
  - Vertical terminal
  - Fully lead-free compliance with no RoHS exemptions (7C-1)

**KNP Series**
Wirewound resistors, flameproof

- **Feature**
  - High reliability
  - Flameproof silicone coated
  - Excellent surge performance
  - Fully lead-free compliance with no RoHS exemptions (7C-1)
Powertrain & Safety

- Steering & Transmissions
- Engine Control Units
### Automotive

#### Chip Resistors

- **AC Series**
  - Automotive grade thick film chip resistor
  - Feature:
    - AEC-Q200 compliant
    - Highly reliable electrode construction
    - Compatible with all soldering processes
    - Highly stable in auto-placement surface mounting applications

- **AT Series**
  - Automotive grade sulfur resistance thin film high precision high stability chip resistor
  - Feature:
    - Superior resistance against sulfur-containing environments
    - AEC-Q200 compliant
    - High precision & stability
    - Low TCR
    - Low electrical noise
    - Advanced sputtering technology

- **PA Series**
  - Automotive grade metal current sensor, low TCR chip resistor
  - Feature:
    - Excellent current sensing performance
    - High power rating for large current detection
    - Accurate power control
    - Reduce power consumption
    - Low thermal EMF
    - AEC-Q200 compliant
    - Low TCR

- **PE Series**
  - Automotive grade metal current sensor, low TCR chip resistor
  - Feature:
    - Excellent current sensing performance
    - High power rating for large current detection
    - Accurate power control
    - Reduce power consumption
    - Low thermal EMF
    - AEC-Q200 compliant
    - Low TCR

### Powertrain & Safety

#### Wireless

- **X2Y Series**
  - X2Y
  - Feature:
    - Excellent performance on EMI suppression or decoupling
    - Ultra-low equivalent series inductance (ESL)
    - Provides differential & common mode filtering with a single device

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### Chip Resistors

#### AA Series
Automotive grade sulfur resistant thick film chip resistor

**Feature**
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- Highly reliable electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications

#### AT Series
Automotive grade sulfur resistance thin film high precision high stability chip resistor

**Feature**
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- High precision & stability
- Low TCR
- Low electrical noise
- Advanced sputtering technology

#### PA Series
Automotive grade metal current sensor, low TCR chip resistor

**Feature**
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR

#### PE Series
Automotive grade metal current sensor, low TCR chip resistor

**Feature**
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR

#### Wireless

#### X2Y Series
X2Y

**Feature**
- Excellent performance on EMI suppression or decoupling
- Ultra-low equivalent series inductance (ESL)
- Provides differential & common mode filtering with a single device

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Electric Vehicles

- Batteries & Chargers
<table>
<thead>
<tr>
<th>Automotive</th>
<th>Electric Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Batteries &amp; Chargers</td>
<td></td>
</tr>
</tbody>
</table>

- **Chip Resistors**
  - **AA Series**
    - Automotive grade sulfur resistant thick film chip resistor
  - **AT Series**
    - Automotive grade sulfur resistance thin film high precision high stability chip resistor
  - **PA Series**
    - Automotive grade metal current sensor, low TCR chip resistor
  - **PE Series**
    - Automotive grade metal current sensor, low TCR chip resistor
  - **SR Series**
    - Surge Chip resistor
  - **AC Series**
    - Automotive grade thick film chip resistor

**Feature**
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- Highly reliable electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications
- Superior resistance against sulfur-containing environments
- AEC-Q200 compliant
- High precision & stability
- Low TCR
- Low electrical noise
- Advanced sputtering technology
- Excellent current sensing performance
- High power rating for large current detection
- Accurate power control
- Reduce power consumption
- Low thermal EMF
- AEC-Q200 compliant
- Low TCR
- Excellent pulse loading performance
- High stability & reliability
- Narrow tolerance to 0.5%
- Excellent ESD withstand performance
- AEC-Q200 compliant
- AEC-Q200 compliant
- Highly reliable electrode construction
- Compatible with all soldering processes
- Highly stable in auto-placement surface mounting applications

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### Chip Resistors

#### Ordering information - Global part number

<table>
<thead>
<tr>
<th>Global part number - Single resistor (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering example: RC0402JR-0710RL</td>
</tr>
</tbody>
</table>

**Series name (code 1-2)**
- RC = Thick film general
- RE = Thick film precision
- AC = Thick film automotive grade
- AA = Thick film anti-FOS automotive grade
- AF = Thick film anti-FOS
- SR = Thick film anti-surge
- RV = Thick film high voltage
- TR = Thick film trimmable
- AR = Thick film NiAu termination
- RT = Thin film high precision
- AT = Thin film high precision automotive grade
- RL/PT = Thick film low ohmic
- PA/PE/PS/PU = Metal current sensor
- UE = ESD suppressor
- VRS = Multilayer chip varistor

**Resistance (code 12-16)**
- JR = Jumper
- OU5 = 0.0005Ω
- OR1 = 0.1Ω
- 1R = 1Ω
- 10R = 10Ω
- 100R = 100Ω
- 1K = 1000Ω
- 100M = 100 000 000Ω

**Taping reel (code 10-11)**
- 07 = 7 inch Dia. reel
- 13 = 13 inch Dia. reel
- 7N = 7 inch, ESD safe reel
- 7W = 7 in Dia. reel
- 2x = standard quantity
- 7T = 3 x standard power
- 47 = 4 x standard power
- 57 = 5 x standard power

**Size code (code 3-6)**

<table>
<thead>
<tr>
<th>Size code</th>
<th>(inch / metric)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0075</td>
<td>0.3 x 0.15</td>
</tr>
<tr>
<td>0100</td>
<td>0.4 x 0.2</td>
</tr>
<tr>
<td>0201</td>
<td>0.6 x 0.3</td>
</tr>
<tr>
<td>0402</td>
<td>1.0 x 0.5</td>
</tr>
<tr>
<td>0603</td>
<td>1.6 x 0.8</td>
</tr>
<tr>
<td>0612</td>
<td>1.6 x 3.2</td>
</tr>
<tr>
<td>0805</td>
<td>2.0 x 1.25</td>
</tr>
<tr>
<td>0815</td>
<td>2.15 x 3.75</td>
</tr>
<tr>
<td>0830</td>
<td>2.0 x 7.5</td>
</tr>
<tr>
<td>1206</td>
<td>3.2 x 1.6</td>
</tr>
<tr>
<td>1210</td>
<td>3.2 x 2.6</td>
</tr>
<tr>
<td>1218</td>
<td>3.2 x 4.5</td>
</tr>
<tr>
<td>2010</td>
<td>5.0 x 2.5</td>
</tr>
<tr>
<td>2512</td>
<td>6.35 x 3.2</td>
</tr>
</tbody>
</table>

**T. C. R. (code 9)**
- A = ±5 ppm/°C
- B = ±10 ppm/°C
- C = ±15 ppm/°C
- D = ±25 ppm/°C
- E = ±50 ppm/°C
- M = ±75 ppm/°C
- F = ±100 ppm/°C
- L = ±150 ppm/°C
- G = ±200 ppm/°C
- I = ±300 ppm/°C
- J = ±350 ppm/°C
- K = ±400 ppm/°C
- Q = ±700 ppm/°C

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

**Tolerance (code 7)**
- L = ±0.01%
- W = ±0.05%
- B = ±0.1%
- C = ±0.25%
- D = ±0.5%
- F = ±1%
- G = ±2%
- J = ±5% (for Thick Film Jumper ordering)
- K = ±10% (for TR = 0/-10%)
- M = ±20% (for TR = 0/-20%)
- N = ±30% (for TR = 0/-30%)
- “—“ = Based on spec (for thick film)

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**Note:**
1. System default code for ordering only. Please refer to series datasheets for different default codes.
2. Global Part Number is the preferred clear text code for ordering Yageo and Phycomp branded products.
3. Please refer to UE/VRS series datasheets for coding details.
### Chip Resistors

**Ordering information - Global part number - Arrays**

<table>
<thead>
<tr>
<th>Global part number - Arrays</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ordering example:</strong> YC122-JR-07100KL</td>
</tr>
</tbody>
</table>

| Series name (code 1-2) | YC = Array & Network (convex / flat) thick film  |
| TC = Array (concave) thick film  |
| AF = 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)  |
| 16 = 0603 x 2 (0606)  |
| 0603 x 4 (0612)  |
| 24 = 0602 x 8 (0616)  |
| 32 = 1206 x 4 (1224)  |
| 15 = 10Pin/8R (0612)  |
| 35 = 10Pin/8R (1225)  |
| AF is available with size 12&16 |
| Number of resistors (code 5) | 2 = 2 resistors |
| 4 = 4 resistors |
| 8 = 8 resistors |
| Schematic (code 6) | H = Reverse & Half type |
| M = Reverse type |
| “—” = Based on spec. |
| L = L-type (for YC358) |
| T = T-type (for YC158/358) |
| “H,M” for TC series |

| Resistance (code 12-16) | 0R = Jumper |
| 10R = 10Ω |
| 100R = 100Ω |
| 100K = 100KΩ |
| Taping reel (code 10-11) | 07 = 7 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 |
| Tolerance (code 7) | F = ±1% |
| J = ±5% (for Jumper ordering) |

**Note:** 1. System default code for ordering only. Please refer to series datasheets for different default codes.
# MLCC

## Ordering information - Global part number

| Global part number
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering example: CC0201KRX7R8BB102</td>
</tr>
</tbody>
</table>

### 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 value (code 15-17)
- Capacitance value = \( 102 \times 1 \times 100 \times 0.0001 \) pF
- (2 significant digits + number of zeros; the 3rd digit signifies the multiplying factor, and letter R is decimal point)
- 0 = \( 1 \times 1 \)
- 1 = \( 1 \times 10^1 \)
- 2 = \( 1 \times 10^2 \)
- 3 = \( 1 \times 10^3 \)
- 4 = \( 1 \times 10^4 \)
- 5 = \( 1 \times 10^5 \)
- 6 = \( 1 \times 10^6 \)
- 7 = \( 1 \times 10^7 \)
- X X R = Special capacitance
- (X X: capacitance before decimal point)
- Process code (code 14)
  - N = NP0
  - B = Class 2 product
- Termination (code 13)
  - B = Ni-Barrier
- 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)

### 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

---

**Application Selection Guide**

15
# Wireless

## Ordering information - Global part number

<table>
<thead>
<tr>
<th>Explanation of ordering code - New</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ordering example:</strong> ANT3216A063R2400A</td>
</tr>
</tbody>
</table>

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

### Frequency Band (MHz) (code 6)
- **2400:** 2.6 – 2.7 GHz
- **2455:** 2.485 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

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

### Serial No. (code 4)
- **B:** Bulk antenna
- **P:** PCB
- **X:** FPCB
- **S:** Metal
- **E:** External
- **J:** Integrated antenna

### Connector - Cable length (mm)
- **Ex:** X100 – IPEX connector, 100 mm cable length
- **X:** IPEX, **M:** MMCX, **S:** SMA, **Z:** Stripped
- **100:** 100 mm cable length

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

## Sample Ordering Example

**ANT3216A063R2400A**

- **ANT:** Antenna
- **3216:** Product Code
- **A:** Factory Control Code / Cable Type (code 7)
- **063:** Frequency Band (MHz)
- **R:** Frequency Band (MHz)
- **2400:** Frequency Band (MHz)
- **A:** Serial No.

## Chart breakdown:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANT</td>
<td>Antenna</td>
</tr>
<tr>
<td>BPF</td>
<td>Band-Pass Filter</td>
</tr>
<tr>
<td>LPF</td>
<td>Low-Pass Filter</td>
</tr>
<tr>
<td>BLN</td>
<td>Balun</td>
</tr>
<tr>
<td>BLF</td>
<td>Balun Filter</td>
</tr>
<tr>
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<td>Product Code</td>
</tr>
<tr>
<td>A</td>
<td>Factory Control Code / Cable Type</td>
</tr>
<tr>
<td>063</td>
<td>Frequency Band (MHz)</td>
</tr>
<tr>
<td>R</td>
<td>Frequency Band (MHz)</td>
</tr>
<tr>
<td>2400</td>
<td>Frequency Band (MHz)</td>
</tr>
<tr>
<td>A</td>
<td>Serial No.</td>
</tr>
</tbody>
</table>

---

**Note:** The above information is a schematic representation of the ordering code, which is used to specify the type and specifications of wireless components, such as antennas and filters, for various applications requiring specific frequencies and form factors.
Through Hole
Ordering information - Global part number

**MFR**

- Code 1 - 3
  Series Name
  See Index

**-12**

- Code 4 - 6
  Power Rating
  -05 = ød0.5mm
  -06 = ød0.6mm
  -07 = ød0.7mm
  -08 = ød0.8mm
  -10 = ød1.0mm
  -14 = ød1.4mm
  -12 = 1/6W
  -25 = 1/4W
  25S = 1/4WS
  -50 = 1/2W
  50S = 1/2WS
  100 = 1W
  1WS = 1WS
  200 = 2W
  2WS = 2WS
  204 = 0.4W
  207 = 0.6W
  300 = 3W
  3WS = 3WS
  3WM = 3WM
  400 = 4W
  500 = 5W
  5WS = 5WS
  5SS = 5WS
  700 = 7W
  7WS = 7WS
  10A = 10W
  20A = 20W
  30A = 30W
  40A = 40W
  50A = 50W
  10S = 10WS
  15A = 15W
  25A = 25W
  10B = 100W
  25B = 250W

**F**

- Code 7
  Tolerance
  P = ±0.02 %
  A = ±0.05 %
  B = ±0.1 %
  C = ±0.25 %
  D = ±0.5 %
  F = ±1 %
  G = ±2 %
  J = ±5 %
  K = ±10 %
  - = Base on Spec.

**T**

- Code 8
  Packing Style
  T = Tape/Box
  R = Tape/Reel
  B = Bulk

**F**

- Code 9
  Temperature Coefficient of Resistance
  - = Base on Spec.
  A = ±5 ppm/°C
  B = ±10 ppm/°C
  C = ±15 ppm/°C
  S = ±20 ppm/°C
  D = ±25 ppm/°C
  E = ±50 ppm/°C
  F = ±100 ppm/°C
  G = ±200 ppm/°C
  H = ±250 ppm/°C
  I = ±300 ppm/°C
  J = ±350 ppm/°C

**52-**

- Code 10 - 12
  Forming Type
  26- = 26mm
  52- = 52.4mm
  73- = 73mm
  81- = 81mm
  91- = 91mm
  F = F-Type
  FK = FkType
  FFK = F-form Kink
  M = M-Type Forming
  MT = MT Type Forming
  MR = MR Type
  AV = AVIsert
  PN = PANAsert

**100R**

- Code 13 - 17
  Resistance Value
  0R1 = 0.1
  100R = 100
  10K = 10,000
  10M = 10,000,000

**EXCEPTION:**

- **Cement series:**
  - Code 8: Special packing style code
    - B: Bulk with wirewound or metal oxide sub-assembly for resistance value
    - W: Bulk with ceramic based wirewound sub-assembly for resistance value
    - M: Bulk with metal oxide sub-assembly for resistance value
    - F: Bulk with Fiberglass based wirewound sub-assembly for resistance value

- **JPW series:**
  - Code 13-17: without resistance value code
    Example: JPW-06-T-52-

- **Code 10-12:** Without forming code
  Example: SQP500JB-10R

- **Code 4 - 6:** Power Rating
  - -05 = ød0.5mm
  - -06 = ød0.6mm
  - -07 = ød0.7mm
  - -08 = ød0.8mm
  - -10 = ød1.0mm
  - -14 = ød1.4mm
  - -12 = 1/6W
  - -25 = 1/4W
  - 25S = 1/4WS
  - -50 = 1/2W
  - 50S = 1/2WS
  - 100 = 1W
  - 1WS = 1WS
  - 200 = 2W
  - 2WS = 2WS
  - 204 = 0.4W
  - 207 = 0.6W
  - 300 = 3W
  - 3WS = 3WS
  - 3WM = 3WM
  - 400 = 4W
  - 500 = 5W
  - 5WS = 5WS
  - 5SS = 5WS
  - 700 = 7W
  - 7WS = 7WS
  - 10A = 10W
  - 20A = 20W
  - 30A = 30W
  - 40A = 40W
  - 50A = 50W
  - 10S = 10WS
  - 15A = 15W
  - 25A = 25W
  - 10B = 100W
  - 25B = 250W