Murata
Manufacturing Co., Ltd.

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for EU RoHS Compliant

- · All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).



Chip Monolithic Ceramic Capacitors (Medium Voltage)

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Please check the MURATA home page (http://www.murata.com/) if you cannot find the part number in the catalog.



Part Numbering

Chip Monolithic Ceramic Capacitors

GR M 18 8 B1 1H 102 K A01 D (Part Number)

Product ID

2Series

| Product ID | Code | Series |
|------------|------|---|
| | J | Soft Termination Type |
| CD. | М | Tin Plated Layer |
| GR | 4 | Only for Information Devices / Tip & Ring |
| | 7 | Only for Camera Flash Circuit |
| GQ | М | High Frequency for Flow/Reflow Soldering |
| GM | Α | Monolithic Microchip |
| GIVI | D | For Bonding |
| GN | М | Capacitor Array |
| | L | Low ESL Type |
| LL | R | Controlled ESR Low ESL Type |
| LL | Α | 8-termination Low ESL Type |
| | М | 10-termination Low ESL Type |
| GJ | М | High Frequency Low Loss Type |
| GA | 2 | For AC250V (r.m.s.) |
| GA | 3 | Safety Standard Certified Type |

3Dimensions (LXW)

| Code | Dimensions (LXW) | EIA |
|------|------------------|--------|
| 02 | 0.4×0.2mm | 01005 |
| 03 | 0.6×0.3mm | 0201 |
| 05 | 0.5×0.5mm | 0202 |
| 08 | 0.8×0.8mm | 0303 |
| 0D | 0.38×0.38mm | 015015 |
| ОМ | 0.9×0.6mm | 0302 |
| 15 | 1.0×0.5mm | 0402 |
| 18 | 1.6×0.8mm | 0603 |
| 1M | 1.37×1.0mm | 0504 |
| 21 | 2.0×1.25mm | 0805 |
| 22 | 2.8×2.8mm | 1111 |
| 31 | 3.2×1.6mm | 1206 |
| 32 | 3.2×2.5mm | 1210 |
| 42 | 4.5×2.0mm | 1808 |
| 43 | 4.5×3.2mm 1812 | |
| 52 | 5.7×2.8mm 2211 | |
| 55 | 5.7×5.0mm | 2220 |

Dimension (T) (Except GNM)

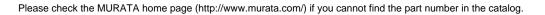
| - ,,, | • • |
|-------|---------------------------------------|
| Code | Dimension (T) |
| 2 | 0.2mm |
| 3 | 0.3mm |
| 5 | 0.5mm |
| 6 | 0.6mm |
| 7 | 0.7mm |
| 8 | 0.8mm |
| 9 | 0.85mm |
| Α | 1.0mm |
| В | 1.25mm |
| С | 1.6mm |
| D | 2.0mm |
| E | 2.5mm |
| F | 3.2mm |
| M | 1.15mm |
| N | 1.35mm |
| Q | 1.5mm |
| R | 1.8mm |
| s | 2.8mm |
| Х | Depends on individual standards. |
| | · · · · · · · · · · · · · · · · · · · |

4 Elements (**GNM** Only)

| Code | Elements |
|------|------------|
| 2 | 2-elements |
| 4 | 4-elements |

Continued on the following page.







Continued from the preceding page.

5Temperature Characteristics

| Temperature Characteristic Codes | | | Operating | | | | |
|----------------------------------|----------------------|-----|--------------------------------|----------------------|--|-------------------|--|
| Code | Code Public STD Code | | Reference Temperature | Temperature Range | Capacitance Change or Temperature Coefficient | Temperature Range | |
| 1X | SL *1 | JIS | 20°C | 20 to 85°C | +350 to -1000ppm/°C | -55 to 125°C | |
| 2C | CH *1 | JIS | 20°C | 20 to 125°C | 0±60ppm/°C | -55 to 125°C | |
| 2P | PH *1 | JIS | 20°C | 20 to 85°C | -150±60ppm/°C | -25 to 85°C | |
| 2R | RH *1 | JIS | 20°C | 20 to 85°C | -220±60ppm/°C | -25 to 85°C | |
| 2S | SH *1 | JIS | 20°C | 20 to 85°C | -330±60ppm/°C | -25 to 85°C | |
| 2T | TH *1 | JIS | 20°C | 20 to 85°C | -470±60ppm/°C | -25 to 85°C | |
| 3C | CJ *1 | JIS | 20°C | 20 to 125°C | 0±120ppm/°C | -55 to 125°C | |
| 3P | PJ *1 | JIS | 20°C | 20 to 85°C | -150±120ppm/°C | -25 to 85°C | |
| 3R | RJ *1 | JIS | 20°C | 20 to 85°C | -220±120ppm/°C | -25 to 85°C | |
| 3S | SJ *1 | JIS | 20°C | 20 to 85°C | -330±120ppm/°C | -25 to 85°C | |
| 3T | TJ *1 | JIS | 20°C | 20 to 85°C | -470±120ppm/°C | -25 to 85°C | |
| 3U | UJ *1 | JIS | 20°C | 20 to 85°C | -750±120ppm/°C | -25 to 85°C | |
| 4C | CK *1 | JIS | 20°C | 20 to 125°C | 0±250ppm/°C | -55 to 125°C | |
| 5C | C0G *1 | EIA | 25°C | 25 to 125°C | 0±30ppm/°C | -55 to 125°C | |
| 5G | X8G *1 | EIA | 25°C | 25 to 150°C | 0±30ppm/°C | -55 to 150°C | |
| 6C | C0H *1 | EIA | 25°C | 25 to 125°C | 0±60ppm/°C | -55 to 125°C | |
| 6P | P2H *1 | EIA | 25°C | 25 to 85°C | -150±60ppm/°C | -55 to 125°C | |
| 6R | R2H *1 | EIA | 25°C | 25 to 85°C | -220±60ppm/°C | -55 to 125°C | |
| 6S | S2H *1 | EIA | 25°C | 25 to 85°C | -330±60ppm/°C | -55 to 125°C | |
| 6T | T2H *1 | EIA | 25°C | 25 to 85°C | -470±60ppm/°C | -55 to 125°C | |
| 7U | U2J *1 | EIA | 25°C | 25 to 125°C *6 | -750±120ppm/°C | -55 to 125°C | |
| B1 | B *2 | JIS | 20°C | -25 to 85°C | ±10% | -25 to 85°C | |
| В3 | В | JIS | 20°C | -25 to 85°C | ±10% | -25 to 85°C | |
| C7 | X7S | EIA | 25°C | -55 to 125°C | ±22% | -55 to 125°C | |
| C8 | X6S | EIA | 25°C | -55 to 105°C | ±22% | -55 to 105°C | |
| D7 | X7T | EIA | 25°C | -55 to 125°C | +22, -33% | -55 to 125°C | |
| D8 | X6T | EIA | 25°C | -55 to 105°C | +22, -33% | -55 to 105°C | |
| E7 | X7U | EIA | 25°C | -55 to 125°C | +22, -56% | -55 to 125°C | |
| F1 | F *2 | JIS | 20°C | -25 to 85°C | +30, -80% | -25 to 85°C | |
| F5 | Y5V | EIA | 25°C | -30 to 85°C | +22, -82% | -30 to 85°C | |
| L8 | X8L | *3 | 25°C | -55 to 150°C | +15, -40% | -55 to 150°C | |
| R1 | R *2 | JIS | 20°C | -55 to 125°C | ±15% | -55 to 125°C | |
| R3 | R | JIS | 20°C | -55 to 125°C | ±15% | -55 to 125°C | |
| R6 | X5R | EIA | 25°C | -55 to 85°C | ±15% | -55 to 85°C | |
| R7 | X7R | EIA | 25°C | -55 to 125°C | ±15% | -55 to 125°C | |
| R9 | X8R | EIA | 25°C | -55 to 150°C | ±15% | -55 to 150°C | |
| 1440 | | | 0500 | FF 1 40500 | ±10% *4 | FF / 1050C | |
| W0 | - | - | 25°C -55 to 125°C +22, -33% *5 | | -55 to 125°C | | |

^{*1} Please refer to table for Capacitance Change under reference temperature.

Continued on the following page.





Please check the MURATA home page (http://www.murata.com/) if you cannot find the part number in the catalog.

^{*2} Capacitance change is specified with 50% rated voltage applied.

^{*3} Murata Temperature Characteristic Code.

^{*4} Apply DC350V bias.

^{*5} No DC bias.

^{*6} Rated Voltage 100Vdc max : 25 to 85°C

Continued from the preceding page.

●Capacitance Change from each temperature

JIS Code

| | | | Capacitance Char | nge from 20°C (%) | | |
|-------------|-------|-------|------------------|-------------------|-------|-------|
| Murata Code | −55°C | | −25°C | | −10°C | |
| | Max. | Min. | Max. | Min. | Max. | Min. |
| 1X | - | - | - | - | _ | - |
| 2C | 0.82 | -0.45 | 0.49 | -0.27 | 0.33 | -0.18 |
| 2P | - | - | 1.32 | 0.41 | 0.88 | 0.27 |
| 2R | - | - | 1.70 | 0.72 | 1.13 | 0.48 |
| 2\$ | - | - | 2.30 | 1.22 | 1.54 | 0.81 |
| 2T | - | - | 3.07 | 1.85 | 2.05 | 1.23 |
| 3C | 1.37 | -0.90 | 0.82 | -0.54 | 0.55 | -0.36 |
| 3P | - | - | 1.65 | 0.14 | 1.10 | 0.09 |
| 3R | - | - | 2.03 | 0.45 | 1.35 | 0.30 |
| 38 | - | - | 2.63 | 0.95 | 1.76 | 0.63 |
| 3T | - | - | 3.40 | 1.58 | 2.27 | 1.05 |
| 3U | - | - | 4.94 | 2.84 | 3.29 | 1.89 |
| 4C | 2.56 | -1.88 | 1.54 | -1.13 | 1.02 | -0.75 |

EIA Code

| | | | Capacitance Char | nge from 25°C (%) | | |
|-------------|-------|-------|------------------|-------------------|-------|-------|
| Murata Code | −55°C | | −30°C | | -10°C | |
| | Max. | Min. | Max. | Min. | Max. | Min. |
| 5C/5G | 0.58 | -0.24 | 0.40 | -0.17 | 0.25 | -0.11 |
| 6C | 0.87 | -0.48 | 0.59 | -0.33 | 0.38 | -0.21 |
| 6P | 2.33 | 0.72 | 1.61 | 0.50 | 1.02 | 0.32 |
| 6R | 3.02 | 1.28 | 2.08 | 0.88 | 1.32 | 0.56 |
| 6S | 4.09 | 2.16 | 2.81 | 1.49 | 1.79 | 0.95 |
| 6T | 5.46 | 3.28 | 3.75 | 2.26 | 2.39 | 1.44 |
| 7U | 8.78 | 5.04 | 6.04 | 3.47 | 3.84 | 2.21 |

6 Rated Voltage

| Code | Rated Voltage | | | |
|------|---|--|--|--|
| 0E | DC2.5V | | | |
| 0G | DC4V | | | |
| 0J | DC6.3V | | | |
| 1A | DC10V | | | |
| 1C | DC16V | | | |
| 1E | DC25V | | | |
| YA | DC35V | | | |
| 1H | DC50V | | | |
| 2A | DC100V | | | |
| 2D | DC200V | | | |
| 2E | DC250V | | | |
| YD | DC300V | | | |
| 2H | DC500V | | | |
| 2J | DC630V | | | |
| 3A | DC1kV | | | |
| 3D | DC2kV | | | |
| 3F | DC3.15kV | | | |
| ВВ | DC350V (for Camera Flash Circuit) | | | |
| E2 | AC250V | | | |
| GC | X1/Y2; AC250V (Safety Standard Certified Type GC) | | | |
| GF | Y2, X1/Y2; AC250V (Safety Standard Certified Type GF) | | | |
| GD | Y3; AC250V (Safety Standard Certified Type GD) | | | |
| GB | X2; AC250V (Safety Standard Certified Type GB) | | | |

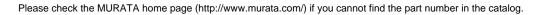
Capacitance

Expressed by three-digit alphanumerics. The unit is picofarad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros which follow the two numbers.If there is a decimal point, it is expressed by the capital letter "R." In this case, all figures are significant digits.

| Ex.) | Code | Capacitance |
|------|------|-------------|
| | R50 | 0.5pF |
| | 1R0 | 1.0pF |
| | 100 | 10pF |
| | 103 | 10000pF |

Continued on the following page.





Continued from the preceding page.

Capacitance Tolerance

| Code | Capacitance Tolerance | TC | Series | Ca | pacitance Step |
|------|-----------------------|---------------------|-----------------------------|--------------|-------------------------|
| w | ±0.05pF | СΔ | GRM/GJM | ≦9.9pF | 0.1pF |
| | | | GRM/GJM | ≦9.9pF | 0.1pF |
| В | ±0.1pF | СΔ | GQM | ≦1pF | 0.1pF |
| | | | GQW | 1.1 to 9.9pF | 1pF Step and E24 Series |
| | | СΔ | GRM/GJM | ≦9.9pF | 0.1pF |
| С | ±0.25pF | except C∆ | GRM | ≦5pF | * 1pF |
| C | ±0.25βF | СД | GQM | ≦1pF | 0.1pF |
| | | $C\Delta$ | GQW | 1.1 to 9.9pF | 1pF Step and E24 Series |
| | | СΔ | GRM/GJM | 5.1 to 9.9pF | 0.1pF |
| D | ±0.5pF | except C∆ | GRM | 5.1 to 9.9pF | * 1pF |
| | | СΔ | GQM | 5.1 to 9.9pF | 1pF Step and E24 Series |
| G | ±2% | СΔ | GJM | ≥10pF | E12 Series |
| | 1270 | СΔ | GQM | ≧10pF | E24 Series |
| J | ±5% | CΔ, SL, U2J | GRM/GA3 | ≧10pF | E12 Series |
| J | T2 /0 | СΔ | GQM/GJM | ≥10pF | E24 Series |
| | | B, R, X7R, X5R, ZLM | GRJ/GRM/GR7/GA3 | | E6 Series |
| K | ±10% | COG | GNM | | E6 Series |
| | | B, R, X7R, X5R, ZLM | GR4, GMD | | E12 Series |
| | | B, R, X7R, X7S | GRM/GMA | | E6 Series |
| М | ±20% | X5R, X7R, X7S | GNM | | E3 Series |
| IVI | 12076 | X7R | GA2 | | E3 Series |
| | | X5R, X7R, X7S, X6S | LLL/LLR/LLA/LLM | | E3 Series |
| Z | +80%, -20% | F, Y5V | GRM | | E3 Series |
| R | | Depend | ls on individual standards. | | |

^{*} E24 series is also available.

Individual Specification Code (Except LLR)

Expressed by three figures.

9ESR (**LLR** Only)

| Code | ESR |
|------|--------|
| E01 | 100mΩ |
| E03 | 220mΩ |
| E05 | 470mΩ |
| E07 | 1000mΩ |

Packaging

| Code | Packaging |
|------|-----------------------------|
| L | ø180mm Embossed Taping |
| D | ø180mm Paper Taping |
| E | ø180mm Paper Taping (LLL15) |
| K | ø330mm Embossed Taping |
| J | ø330mm Paper Taping |
| F | ø330mm Paper Taping (LLL15) |
| В | Bulk |
| С | Bulk Case |
| Т | Bulk Tray |
| | |

Please check the MURATA home page (http://www.murata.com/) if you cannot find the part number in the catalog.



| Function | Туре | Series |
|---|---|--|
| Decoupling Constitution | High Capacitance | GRM (X5R, X7R, Y5V etc.) 68pF-100μF |
| Decoupling, Smoothing | Array (2 or 4 Elements) | GNM 10pF–2.2μF |
| Frequency Control/Tuning, Impedance Matching | Class 1 TC's | GRM (C0G) 0.1pF-0.1μF |
| | | GRM (U2J etc.) |
| | Low Inductance (Reverse Geometry) | LLL 2200pF–10μF |
| High Speed Decoupling | Low Inductance (Controlled ESR) | LLR 1.0μF |
| | Low Inductance (Multi-Termination) | LLA/LLM (From 1GHz) 0.01μF–4.7μF |
| High Farmers | Low ESR, Ultra Small | GJM (500MHz to 10GHz) 0.1pF-33pF |
| High Frequency | Lowest ESR | GQM (500MHz to 10GHz) 0.1pF-100pF |
| Optical Communications | Wire-Die-Bonding | GMA 100pF–0.47μF GMD 100pF–1μF |
| Medium Voltage High Frequency Snubber | 250V/630V/1kV/2kV/3.15kV Low Dissipation | GRM (C0G, U2J) 10pF-10000pF |
| Medium Voltage LCD Backlight Inverter | 3.15kV Low Dissipation | GRM (C0G) 5pF-47pF |
| Medium Voltage | 250V/630V/1kV High Capacitance | GRM (X7R) 220pF-1μF |
| Decoupling, Smoothing | 250V/630V/1kV Soft Termination Type | GRJ (X7R) 470pF-1μF |
| Medium Voltage Only for Camera Flash Circuit | 350V High Capacitance | GR7 10000pF–47000pF |
| Medium Voltage | 2kV High Capacitance | GR4 100pF–10000pF |
| Only for Information Devices | Safety Standard Certified | Type GD 10pF-4700pF Type GF 10pF-4700pF |
| | Safety Standard Certified | Type GC 100pF-330pF Type GF 470pF-4700pF Type GB 10000pF-56000pF |
| AC Lines Noise Removal | AC250V which meets Japanese Law | GA2 470pF-0.1μF |
| Automotive | High Capacitance | GCM (X7R etc.) 100pF-47μF |
| (Powertrain, Safety Equipment) | Class 1 TC's | GCM (C0G etc.) 1.0pF-56000pF |
| Medium Voltage for Automotive | 250V/630V Low Dissipation | GCM (U2J) 10pF-10000pF |
| (Powertrain, Safety Equipment) | 250V/630V Soft Termination Type | GCJ (X7R) 1000pF-0.47µF |
| | | |



Applications?

Chip Monolithic Ceramic Capacitors

| 1 | For General Purpose GRM Series Specifications and Test Methods Reference Data | 51 |
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| 2 | Capacitor Array GNM Series Specifications and Test Methods | |
| 3 | Low ESL LLL/LLR/LLA/LLM Series Specifications and Test Methods | |
| 4 | High-Q Type GJM Series Specifications and Test Methods | |
| 5 | High Frequency GQM Series Specifications and Test Methods Reference Data | 108 |
| 6 | Monolithic Microchip GMA Series Specifications and Test Methods | |
| 7 | For Bonding GMD Series Specifications and Test Methods | |
| Ca Notic | age — ution — ee — ence Data — ee — | 128 132 144 151 |

Chip Monolithic Ceramic Capacitors



For General Purpose GRM Series

■ Features

- 1. Higher resistance of solder-leaching due to the Ni-barriered termination, applicable for reflow-soldering, and flow-soldering (GRM18/21/31 type only).
- 2. The GRM series is a lead free product.
- 3. Smaller size and higher capacitance value.
- 4. High reliability and no polarity.
- 5. Excellent pulse response and noise reduction due to the low impedance at high frequency.
- 6. The GRM series is available in paper or embossed tape and reel packaging for automatic placement. Bulk case packaging is also available for GRM15/ 18/21(T=0.6,1.25).
- 7. TA replacement.

■ Applications

General electronic equipment

| | | Din | nensions | (mm) | | |
|-------------|-----------|-----------|------------------|--------------|--------|---------|
| Part Number | L | W | T | e | g min. | |
| GRM022 | 0.4 ±0.02 | 0.2 ±0.02 | 0.2 ±0.02 | 0.07 to 0.14 | 0.13 | |
| GRM033 | 0.6 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.1 to 0.2 | 0.2 | |
| GRM15X | | | 0.25 ±0.05 | 0.1 to 0.3 | 0.4 | - |
| GRM153 | 1.0 ±0.05 | 0.5 ±0.05 | 0.3 ±0.03 | 0.1 10 0.3 | 0.4 | (E) (m) |
| GRM155 | | | 0.5 ±0.05 | 0.15 to 0.35 | 0.3 | - 4 |
| GRM185 | 1.6 ±0.1 | 0.8 ±0.1 | 0.5 +0/-0.1 | 0.2 to 0.5 | 0.5 | - |
| GRM188* | 1.0 ±0.1 | 0.6 ±0.1 | 0.8 ±0.1 | 0.2 10 0.5 | 0.5 | 0 - 0 |
| GRM216 | | | 0.6 ±0.1 | | | |
| GRM219 | 2.0 ±0.1 | 1.25 ±0.1 | 0.85 ±0.1 | 0.2 to 0.7 | 0.7 | |
| GRM21A | 2.0 ±0.1 | 1.23 ±0.1 | 1.0 +0/-0.2 | .2 | 0.7 | |
| GRM21B | | | 1.25 ±0.1 | | | |
| GRM316 | | | 0.6 ±0.1 | | | |
| GRM319 | 3.2 ±0.15 | 1.6 ±0.15 | 0.85 ±0.1 | 0.3 to 0.8 | 1.5 | |
| GRM31M | | | 1.15 ±0.1 | 0.3 10 0.0 | 1.5 | e g e |
| GRM31C | 3.2 ±0.2 | 1.6 ±0.2 | 1.6 ±0.2 | | | |
| GRM329 | | | 0.85 +0.15/-0.05 | | | |
| GRM32A | | | 1.0 +0/-0.2 | | | |
| GRM32M | | | 1.15 ±0.1 | | | |
| GRM32N | 3.2 ±0.3 | 2.5 ±0.2 | 1.35 ±0.15 | 0.3 min. | 1.0 | |
| GRM32C | 3.2 ±0.3 | 2.3 ±0.2 | 1.6 ±0.2 | 0.3 11111. | 1.0 | |
| GRM32R | | | 1.8 ±0.2 | | | L H W |
| GRM32D | | | 2.0 ±0.2 | | | |
| GRM32E | | | 2.5 ±0.2 | | | |

^{*} Bulk Case: 1.6 ±0.07(L) × 0.8 ±0.07(W) × 0.8 ±0.07(T) The figures indicate typical specification



Temperature Compensating Type C0G(5C),U2J(7U) Characteristics

| | ex.6: T Dimension [mm] | | | | | | | | | | | | | | | | | | | |
|--|------------------------|------------------------|---------------|-------------------------|-------------------------|-------------------|-------------------|-------------------|-------------------|--------------|-------------------|------------------|-----------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|
| TC | | | | | C | 0G(5 (| C) | | | | | U2J(7U) | | | | | | | | |
| LxW | (| 0.4x0.: | 2 | 0.6x0.3 | 1.0x0.5 | 1.6 | k0.8 | 2.0x | 1.25 | 3.2x | 1.6 | 0.6 | (0.3 | 1.0 | (0.5 | 1.6> | (0.8 | 2.0x | 1.25 | 3.2x1.6 |
| [mm] | < | (02) 01005 | ō> | (03) <0201> | (15) <0402> | (1 <06 | 8) 03> | (2 <08 | 1) 05> | (3) | 1) 06> | (0 <02 | 3) 01> | (1 <04 | 5) 02> | (1 <06 | 8) 03> | (2 <08 | 1) 05> | (31) <1206> |
| Rated Voltage | 16 | 10 | 6.3 | 50 | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 50 | 25 | 50 | 10 | 50 | 10 | 50 | 10 | 50 |
| Capacitance [Vdc] | (1C) | (1A) | (0 J) | (1H) | (1H) | (1E) | (1H) | (1E) | (1H) | (1E) | (1H) | (1H) | (1E) | (1H) | (1A) | (1H) | (1A) | (1H) | (1A) | (1H) |
| 0.1pF(R10) | | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 0.2pF(R20) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! ! ! | | | | |
| 0.3pF(R30) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | | | | | ! ! ! | | | | |
| 0.4pF(R40) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 0.5pF(R50) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 0.6pF(R60) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 0.7pF(R70) | 2 | | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 0.8pF(R80) | 2 | | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 0.9pF(R90) | 2 | | | 3 | 3, 5 | | | | | <u> </u> | | | | | | <u> </u> | | | | |
| 1.0pF(1R0) | 2 | ł | | 3 | 3, 5 | | | | | | | 3 | | 5 | | ! ! ! | | | | |
| 1.1pF(1R1) | 2 | - | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 1.2pF(1R2) | 2 | ŀ | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 1.3pF(1R3) | 2 | ŀ | | 3 | 3, 5 | | | ! ! | | | | | | - | | 1 1 1 | | | | |
| 1.4pF(1R4) | 2 | ŀ | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 1.5pF(1R5) 1.6pF(1R6) | 2 | ł | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 1.7pF(1R7) | 2 | ł | | 3 | 3, 5 3, 5 | | | | | - - | | | | | | - | | | | |
| 1.8pF(1R8) | 2 | ł | | 3 | 3, 5 | | | ! ! | | - - | | | | | | - - | | | | |
| 1.9pF(1R9) | 2 | l | | 3 | 3, 5 | | | | | ! ! ! | | | | | | ! ! ! | | | | |
| 2.0pF(2R0) | 2 | | | 3 | 3, 5 | | | | | <u>.</u> | | 3 | ri | 5 | | | | | | |
| 2.1pF(2R1) | 2 | ı | | 3 | 3, 5 | | | | | | | | l | | | | | | | |
| 2.2pF(2R2) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 2.3pF(2R3) | 2 | 1 | | 3 | 3, 5 | | | | | | | | | | | ! ! ! | | | | |
| 2.4pF(2R4) | 2 | i | | 3 | 3, 5 | | | | | I I | | | | | | ! ! | | | | |
| 2.5pF(2R5) | 2 | ı | | 3 | 3, 5 | | | ! ! | | | | | | | | 1 1 1 | | | | |
| 2.6pF(2R6) | 2 | 1 | | 3 | 3, 5 | | | | | | | | | | | ! ! ! | | | | |
| 2.7pF(2R7) | 2 | 1 | | 3 | 3, 5 | | | | | ! ! ! | | | | | | ! ! ! | | | | |
| 2.8pF(2R8) | 2 | i | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 2.9pF(2R9) | 2 | 1 | | 3 | 3, 5 | | | ! ! | | | | | | | | ! ! ! | | | | |
| 3.0pF(3R0) | 2 | | | 3 | 3, 5 | | | | | <u></u> | | 3 | · | 5 | | <u></u> | | | | |
| 3.1pF(3R1) | 2 | | | 3 | 3, 5 | | | | | | | | ' | | | ! ! | | | | |
| 3.2pF(3R2) | 2 | | | 3 | 3, 5 | | | | | - - | | | | | | - - | | | | |
| 3.3pF(3R3) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | | | | | ! ! ! | | | | |
| 3.4pF(3R4) | 2 | | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 3.5pF(3R5) | 2 | | | 3 | 3, 5 | | | ! ! | | | | | | | | 1 1 1 | | | | |
| 3.6pF(3R6) | 2 | | | 3 | 3, 5 | | | | | 1 | | | | | | | | | | |
| 3.7pF(3R7) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! ! | | | | |
| 3.8pF(3R8) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 3.9pF(3R9) | 2 | ļ | | 3 | 3, 5 | | | | | - | | | ; | | | | | | | |
| 4.0pF(4R0) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | 3 | | 5 | | ! ! ! | | | | |
| 4.1pF(4R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! | | | | |
| 4.2pF(4R2) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | - - | | | | |
| 4.3pF(4R3) | 2 | | | 3 | 3, 5 | | | | | - - | | | | | | - - | | | | |
| 4.4pF(4R4) | 2 | - | | 3 | 3, 5 | | | | | ! ! | | | | | | | | | | |
| 4.5pF(4R5) | 2 | - | | 3 | 3, 5 | | | | | | | ! ! | | | | | | | | |
| 4.6pF(4R6) | 2 | - | | 3 | 3, 5 | | | | | | | | | | | | | | | |
| 4.7pF(4R7) | 2 | - | | 3 | 3, 5 | | | | | ! ! ! | | | | | | ! ! ! | | | | |
| 4.8pF(4R8) | 2 | - | | 3 | 3, 5 | | | | | ! ! | | | | | | ! ! | | | | |
| 4.9pF(4R9) | 2 | | | 3 | 3, 5 | | | | | ! | | | | | | ! | | | | |

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|--|--------|------------------------|------|---------|-------------------------|------|-------------------|----------|-------------|--------------|------|-------------|------------------|------|--------------------|------------------|---------------|-------------|---------------|----------------------|
| TC | J1.GIT | C0G(5C) | | | | | | | | | | | U2J(7U) | | | | | | | |
| LxW | C |).4x0.: | 2 | 0.6x0.3 | 1.0x0.5 | | (0.8 | 2.0x | 1.25 | 3.2x | 1.6 | 0.6x | (0.3 | 1.0 | x0.5 | | رر x0.8 | 2.0x | 1.25 | 3.2x1.6 |
| [mm] | | (02) 01005 | | (03) | (15) <0402> | (1 | 8) 03> | (2 | (1) (05) | (3) | 1) | <02 | 3) | (1 | 5) ·02> | | 8) | (2 | 1) | (31) <1206> |
| Rated Voltage | | 10 | 6.3 | 50 | 50 | 100 | 50 | 100 | 50 | 100 | 50 | 50 | 25 | 50 | 10 | 50 | 10 | 50 | 10 | 50 |
| Capacitance [Vdc] | (1C) | (1 A) | (0J) | (1H) | (1H) | (1E) | (1H) | (1E) | (1H) | (1E) | (1H) | (1H) | (1E) | (1H) | (1 A) | (1H) | (1 A) | (1H) | (1 A) | (1H) |
| 5.0pF(5R0) | 2 | | | 3 | 3, 5 | | | | | | | 3 | | 5 | | ! ! ! | | ! ! | | ! ! |
| 5.1pF(5R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | ! | | ! ! |
| 5.2pF(5R2) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | ! ! | | | | ! ! ! | | ! ! ! | | |
| 5.3pF(5R3) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | | | | | ! ! ! |
| 5.4pF(5R4) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | ! ! | | | | ! ! ! | | 1 | | |
| 5.5pF(5R5) 5.6pF(5R6) | 2 | | | 3 | 3, 5 3, 5 | | | | | | | i i | | | | | | 1 | | 1 |
| 5.7pF(5R7) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | ! ! ! |
| 5.8pF(5R8) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | ! ! | | ! ! | | |
| 5.9pF(5R9) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | ! ! ! |
| 6.0pF(6R0) | 2 | | | 3 | 3, 5 | | | | | : | | 3 | | 5 | | ! | | ; ! | | ; |
| 6.1pF(6R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | ! ! |
| 6.2pF(6R2) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! ! ! | | ! ! ! | | |
| 6.3pF(6R3) | 2 | | | 3 | 3, 5 | | | | | | | i i | | | | | | 1 | | 1 |
| 6.4pF(6R4) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | ! ! | | | | ! ! ! | | ! ! | | |
| 6.5pF(6R5) | 2 | | | 3 | 3, 5 | | | | | | | 1 | | | | | | | | i i |
| 6.6pF(6R6) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | | | ! ! ! | | ! ! ! |
| 6.7pF(6R7) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | |
| 6.8pF(6R8) 6.9pF(6R9) | 2 | | | 3 | 3, 5 3, 5 | | | | | ! ! | | | | | | | | ! ! | | ! ! |
| 7.0pF(7R0) | 2 | | | 3 | 3, 5 | | | | | - - - | | 3 | | 5 | 1 | | | | | |
| 7.1pF(7R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | | | | | ! ! |
| 7.2pF(7R2) | 2 | 1 | | 3 | 3, 5 | | | | | | | | | | | , | | | | |
| 7.3pF(7R3) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! | | | | | | | | ! ! |
| 7.4pF(7R4) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | | | | | ! ! ! |
| 7.5pF(7R5) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | |
| 7.6pF(7R6) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | ! ! ! |
| 7.7pF(7R7) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | - | | ! ! | | |
| 7.8pF(7R8) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | [] [| | ! ! | | |
| 7.9pF(7R9) | 2 | | | 3 | 3, 5 | | | | | : | | : | | | 1 | ¦ ¦ | | ¦ | | ; ; |
| 8.0pF(8R0) | 2 | | | 3 | 3, 5 | | | | | | | 3 | | 5 | | | | | | ! ! |
| 8.1pF(8R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! ! ! | | 1 | | |
| 8.2pF(8R2) | 2 | | | 3 | 3, 5 3, 5 | | | | | | | | | | | | | | | ! ! |
| 8.3pF(8R3) 8.4pF(8R4) | 2 | | | 3 | 3, 5 | | | | | : ! ! | | : ! ! | | | | 1 | | : ! ! | | : ! ! |
| 8.5pF(8R5) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | ! ! | | | | | | ! ! | | ! ! |
| 8.6pF(8R6) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | 1 | | ! ! ! | | ! ! |
| 8.7pF(8R7) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | ! ! |
| 8.8pF(8R8) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | 1 1 1 1 | | ! ! | | ! ! |
| 8.9pF(8R9) | 2 | | | 3 | 3, 5 | | | | | | | | | | , | i ! L | | i ! ! | | |
| 9.0pF(9R0) | 2 | | | 3 | 3, 5 | | | | | ! ! | | 3 | | 5 | | | | ! ! | | ! ! ! |
| 9.1pF(9R1) | 2 | | | 3 | 3, 5 | | | | | | | | | | | ! ! | | ! ! | | ! ! |
| 9.2pF(9R2) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | | | ! ! | | ! ! |
| 9.3pF(9R3) | 2 | | | 3 | 3, 5 | | | | | - - | | ! ! | | | | - - | | ! ! | | ! ! |
| 9.4pF(9R4) | 2 | | | 3 | 3, 5 | | | | | | | ! ! | | | | | | | | ! ! |
| 9.5pF(9R5) 9.6pF(9R6) | 2 | | | 3 | 3, 5 3, 5 | | | | | | | ! ! | | | | ! ! ! | | ! ! | | ! ! |
| 9.7pF(9R7) | 2 | | | 3 | 3, 5 | | | | | ! ! | | ! ! | | | | | | ! ! | | ! ! |
| 9.8pF(9R8) | 2 | | | 3 | 3, 5 | | | | | ! ! ! | | ! ! ! | | | | 1 | | 1 | | ! ! ! |
| 9.9pF(9R9) | 2 | | | 3 | 3, 5 | | | | | - - | | ! ! | | | | | | | | ! ! |
| | | in () s | | | | | | I A Fine | hl Cod | | | | | | | 1 | | Conti | | n the f |

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| 6 ex.6: T | T Dimension [mm] | | | | | | | | | | | | | | | | | | | | |
|--|------------------|---------------------|-----|---------|--------------|------------|----|-------------|------|-------------|------------|-----|------------------|-----|------|-------------|------|-------------|------|--------------|--|
| | | | | | | | | | | | | | U2J(7U) | | | | | | | | |
| TC | (|).4x0. | 2 | 0 6x0 3 | 1.0x0.5 | | | 2 Ox | 1.25 | 3.2 | x1.6 | 0.6 | к0.3 | 1.0 | x0.5 | | x0.8 | 2 Ox | 1.25 | 3 2x1 6 | |
| LxW [mm] | | (02) | | (03) | (15) | (1 | 8) | (2 | 21) | (3 | (1) | (0 | 3) | (1 | 5) | (1 | 8) | (21) | | (31) | |
| Rated Voltage | | 0100 <u>8</u> 10 | 6.3 | 50 | <0402> 50 | <06 100 | 50 | 100 | 50 | 100 | 206> 50 | 50 | 01> 25 | 50 | 10 | 50 | 10 | 50 | 10 | <1206> 50 | |
| Capacitance [Vdc] | | | | | | | | | (1H) | | (1H) | 1 | (1E) | | (1A) | | (1A) | | (1A) | | |
| 10pF(100) | 2 | , , | , , | 3 | 3, 5 | 8 | 8 | | , , | | , , | 3 | | 5 | | | , , | | , , | | |
| 12pF(120) | 2 | 1 | | 3 | 3, 5 | 8 | 8 | | | i i | | 3 | | 5 | | | | i ! | | | |
| 15pF(150) | 2 | ı | | 3 | 3, 5 | 8 | 8 | | | 1 | | 3 | | 5 | | | | ! ! | | | |
| 18pF(180) | 2 | ı | | 3 | 3, 5 | 8 | 8 | | | | | | 3 | 5 | | | | 1 | | | |
| 22pF(220) | 2 | 1 | | 3 | 3, 5 | 8 | 8 | | | i ! | | į | 3 | 5 | | i ! ! | | i ! | | | |
| 27pF(270) | 2 | | | 3 | 3, 5 | 8 | 8 | | | | | ! | 3 | 5 | | | | | | | |
| 33pF(330) | 2 | | | 3 | 3, 5 | 8 | 8 | | | | | | 3 | 5 | | ! ! | | | | | |
| 39pF(390) | 2 | | | 3 | 3, 5 | 8 | 8 | | | i ! | | į | 3 | 5 | | | | ; ! ! | | | |
| 47pF(470) | 2 | | | 3 | 3, 5 | 8 | 8 | | | | | - | 3 | 5 | | | | | | | |
| 56pF(560) | | 2 | 2 | 3 | 3, 5 | 8 | 8 | | | | | ! | 3 | 5 | | | | | | | |
| 68pF(680) | | 2 | 2 | 3 | 3, 5 | 8 | 8 | | | | | į | 3 | 5 | | ! | | | | | |
| 82pF(820) | ļ | 2 | 2 | 3 | 3, 5 | 8 | 8 | | | <u> </u> | | | 3 | 5 | | | | <u> </u> | | | |
| 100pF(101) | | 2 | 2 | 3 | 3, 5 | 8 | 8 | 6 | | ! | | ! | 3 | 5 | | | | ! | | | |
| 120pF(121) | | | | | 3, 5 | 8 | 8 | 6 | | | | | | 5 | | ! ! ! | | 1 | | | |
| 150pF(151) | | | | | 3, 5 | 8 | 8 | 6 | | | | | | 5 | | i i i | | 1 | | | |
| 180pF(181) | | | | ! ! | 3, 5 | 8 | 8 | 6 | | ! | | | | 5 | | | | ! | | | |
| 220pF(221) | | | | | 3, 5 | 8 | 8 | 6 | - | | | | | | | | | 1 | | | |
| 270pF(271) | | | | | 3, 5 | 8 | 8 | 6 | ł | i ! | | | | | | i I I | | i ! | | | |
| 330pF(331) | | | | ! ! | 3, 5 | 8 | 8 | 6 | ł | | | - | | | | | | | | | |
| 390pF(391) | | | | | 3, 5 | 8 | 8 | 6 | ł | | | ! | | | | | | ! | | | |
| 470pF(471) | | | | | 3, 5 | 8 | 8 | 6 | ł | | | į | | | | | | | | | |
| 560pF(561) 680pF(681) | | | | | 3, 5 | 8 | 8 | 6 | ł | | | 1 | | | | | | | | | |
| 820pF(821) | | | | | 5 | 8 | 8 | 6 | 1 | ! | | ! | | | | | | ! | | | |
| 1000pF(102) | | | | | 5 | 8 | 8 | 6 | ł | | | | | | | 8 | 1 | | | | |
| 1200pF(122) | | | | 1 | | 8 | 8 | 6 | 6 | i | | | | | 5 | 8 | | 1 | | | |
| 1500pF(152) | | | | | | 8 | 8 | 6 | 6 | | | | | | 5 | 8 | | ! ! | | | |
| 1800pF(182) | | | | | | | 8 | 6 | 6 | 9 |] | | | | 5 | 8 | | 1 | | | |
| 2200pF(222) | | | | | | ! ! | 8 | 6 | 6 | 9 | | į | | | 5 | 5, 8 | | i ! | | | |
| 2700pF(272) | | | | | 1 | ! ! | 8 | 6 | 6 | 9 | Ī | - | | | 5 | 5, 8 | | | | | |
| 3300pF(332) | | | | | | ! ! | 8 | 6 | 6 | 9 | | ! | | | 5 | 5, 8 | | | | | |
| 3900pF(392) | | | | | | | 8 | | 6 | 9 | | į | | | 5 | 5, 8 | | | | | |
| 4700pF(472) | | | | | - | ! ! | | 1 | 6 | 9 | 9 | 1 | | | 5 | 5, 8 | | | | ! ! | |
| 5600pF(562) | | | | | ! | ! ! | | | 9 | 9 | 9 | | | | | 8 | 5 | | | | |
| 6800pF(682) | | | | | į | | | : ! | 9 | 9 | 9 | | | | | 8 | 5 | | | | |
| 8200pF(822) | | | | | <u> </u> | | | | 9 | 9 | 9 | l | | | | 8 | 5 | | | | |
| 10000pF(103) | | | | | | ! ! | | | 9 | 9 | 9 | | | | | 8 | 5 | 6 | | | |
| 12000pF(123) | | | | | | | | , | 9 | 9 | 9 | | | | | , | 8 | 6 | | | |
| 15000pF(153) | | | | ! ! | - | ! ! | | 1 1 1 | 9 | 9 | 9 | 1 | | | | | 8 | 6 | | ! ! | |
| 18000pF(183) | | | | | | | | ! ! | В | 9 | 9 | | | | | ! ! ! | 8 | 6 | | | |
| 22000pF(223) | | | | | ! | ! ! | | ! ! | В | 9 | 9 | | | | | ! ! | 8 | 9 | | | |
| 27000pF(273) | - | | | | : | | | | | : | 9 | | | | | | | 9 | | | |
| 33000pF(333) | | | | | 1 | | | | | ! | 9 | | | | | (((| | Α | | | |
| 39000pF(393) | - | | | | 1 | ! ! | | | | ! | 9 | | | | | | | В | | | |
| 47000pF(473) | - | | | | ! ! | ! ! | | | | : ! ! | M | | | | | | | В | | | |
| 56000pF(563) | | | | ! ! | | | | | | [[| M | | | | | | | | 9 | 9 | |
| 68000pF(683) | | | | | ! | ! ! | | 1 1 1 | | ! | С | | | | | 1 1 1 | | ! | В | M | |
| 82000pF(823) | - | | | | ! ! | ! ! | | ! ! ! | | | С | - | | | | 1 1 1 | | | В | M | |
| 0.1μF(104) | | | | | <u> </u> | ! | | | | | С | | | | | ! | | | В | М | |



Temperature Compensating Type P2H(6P),R2H(6R),S2H(6S),T2H(6T) Characteristics

| 6 | ex.6: T l | - | | _ | JPO | | .(0. | ,,,,, |
|----------|-----------------|----------------------|---------------------|------------------------------------|---------------------|---------------------|---------------------|---------------------|
| | тс | P2H (6P) | R2 (6 | 2H R) | S2 (6 | | T2 (6 | |
| | LxW [mm] | (15) | (03) | 1.0x0.5 (15) <0402> | (03) | (15) | (03) | (15) |
| Rated Vo | oltage [Vdc] | 50 (1H) | 25 (1E) | 50 (1H) | 25 (1E) | 50 (1H) | 25 (1E) | 50 (1H) |
| 1.0pF(| (1R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 2.0pF(| 2R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 3.0pF(| (3R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 4.0pF(| (4R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 5.0pF(| 5R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 6.0pF(| (6R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 7.0pF(| 7R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 8.0pF(| (8R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 9.0pF(| (9R0) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 10pF | (100) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 12pF | (120) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 15pF | (150) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 18pF | (180) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 22pF | (220) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 27pF | (270) | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 33pF | (330) | | 3 | 5 | 3 | 5 | 3 | 5 |
| 39pF | (390) | | 3 | | 3 | 5 | 3 | 5 |
| 47pF | (470) | | 3 | | 3 | | 3 | 5 |
| 56pF | (560) | | 3 | | 3 | | 3 | 5 |
| 68pF | (680) | | 3 | | 3 | | 3 | 5 |
| 82pF | (820) | | 3 | | 3 | <u></u> . | 3 | 5 |
| 100pF | (101) | | 3 | ,,,,,, | 3 | | 3 | 5 |

Ontinued from the preceding page.

High Dielectric Constant Type X7R(R7)/X7S(C7)/X7T(D7)/X7U(E7) Characteristics

| 5 ex.5: T | ex.5: T Dimension [mm] | | | | | | | | | | | | | | | | | |
|-------------------------|--------------------------|---------|-------|----------------------|---------------|--------|-------------------------|---------|--------|------|--------------------------|--------|------|------|---------------|------|---------------|--|
| LxW | 0.4x0.2 (02) | | | x0.3 (3) | | | 1 | .0x0. | 5 | | 1.6x0.8 (18) | | | | | | | |
| [mm] | (02) <01005> | | <02 | 01> | | | (15) <0402> | | | | | <0603> | | | | | | |
| Rated Voltage | 10 | 25 | 16 | 10 | 6.3 | 100 | 50 | 25 | 16 | 10 | 100 | 50 | 25 | 16 | 10 | 6.3 | 4 | |
| Capacitance [Vdc] | ` / | (1E) | (1C) | (1A) | (0 J) | (2A) | (1H) | (1E) | (1C) | (1A) | (2A) | (1H) | (1E) | (1C) | (1 A) | (0J) | (0G) | |
| 68pF(680) | 2 | | | | | i | | | | | | | | | | | | |
| 100pF(101) | 2 | 3 | 3 | | | 1 | | | | | | | | | | | | |
| 150pF(151) | 2 | 3 | 3 | | | | | | | | | | | | | | | |
| 220pF(221) | 2 | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 330pF(331) | 2 | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 470pF(471) | 2 | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 680pF(681) | | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 1000pF(102) | | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 1500pF(152) | | 3 | 3 | | | 5 | X, 5 | | | | 8 | 8 | | | | | | |
| 2200pF(222) | | | 3 | 3 | | 5 | 5 | Х | | | 8 | 8 | 8 | | | | | |
| 3300pF(332) | | | 3 | 3 | | 5 | 5 | | Х | | 8 | 8 | 8 | | | | | |
| 4700pF(472) | | | | 3 | 3 | 5 | 5 | 5 | Х | | 8 | 8 | 8 | | | | | |
| 6800pF(682) | | | | 3 | 3 | l | 5 | 5 | Х | l | 8 | 8 | 8 | L | | | | |
| 10000pF(103) | | | | 3 | 3 | | 5 | 5 | Х | | 8 | 8 | 8 | | | | | |
| 15000pF(153) | | | | | | 1 | 5 | 5 | 5 | | | 8 | 8 | | | | | |
| 22000pF(223) | | | | | | | 5 | 5 | 5 | | | 8 | 8 | | | | | |
| 33000pF(333) | | | | | | | | 5 | 5 | | | 8 | 8 | | | | | |
| 47000pF(473) | | | | | | | | 5 | 5 | | | 8 | 8 | | | | | |
| 68000pF(683) | | | | | | | | | 5 | 5 | | 8 | 8 | | | | | |
| 0.10μF(104) | | | | | | | | | 5 | 5 | 8 | 8 | 8 | | | | | |
| 0.15μF(154) | | | | | | 1 | | | 5 | | | | 8 | 8 | | | | |
| 0.22μF(224) | | | | | | ! | | | 5 | | | | 8 | 8 | | | | |
| 0.33μF(334) | | | | | | | | | | | | | | 8 | 8 | | | |
| 0.47μF(474) | | | | | | | | | | | | | 8 | 8 | 8 | | | |
| 0.68μF(684) | | | | | | ! ! | | | | | | | | 8 | 8 | | | |
| 1.0μF(105) | | | | | | | | | | | | | 8 | 8 | 5, 8 | | | |
| 2.2μF(225) | | | | | | ! ! | | | | | | | | | 8 | 8 | 8 | |
| The part number code is | hour | in () c | nd Ha | it io ob | own in | . [] | · E | IA linc | ol Cod | ^ | | | | | | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Continued on the following page.



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|------------------------------------|

| Continued from the pre | eceding | g page | | | | | | | | | | | | | | | | | | | | |
|------------------------|---------|--------|------|-------------------------|------|------|------|-------------|------|------|-------------------------|------|------|------|-------------|------|------|------|--------------------|------|---------------|---------------|
| LxW | | | 2 | .0x1.2 (21) | 25 | | | | | 3 | 3.2x1. (31) | 6 | | | | | | | (2.5 2) | | | |
| [mm] | | | < | 0805 | > | | | | | < | 1206 | > | | | | | | <12 | 2) 10> | | | |
| Rated Voltage | | 50 | 25 | 16 | 10 | 6.3 | 4 | 100 | | 25 | 16 | 10 | 6.3 | 4 | 100 | 50 | 35 | 25 | 16 | 10 | 6.3 | 4 |
| Capacitance [Vdc] | (2A) | (1H) | (1E) | (1C) | (1A) | (0J) | (0G) | (2A) | (1H) | (1E) | (1C) | (1A) | (0J) | (0G) | (2A) | (1H) | (YA) | (1E) | (1C) | (1A) | (0 J) | (0G) |
| 6800pF(682) | 9 | | | | | | | | | | | | | | | | | | | | | |
| 10000pF(103) | В | | | | | | | | | | | | | | ! ! | | | | | | | |
| 15000pF(153) | В | | | | | | | 9 | | | | | | | | | | | | | | |
| 22000pF(223) | В | | | | | | | M | | | | | | | | | | | | | | |
| 33000pF(333) | В | 9 | | | | | | М | | | | | | | ! ! ! | | | | | | | |
| 47000pF(473) | В | В | | | | | | М | | | | | | | | | | | | | | |
| 68000pF(683) | | В | 9 | <u>.</u> | | | | M | | | | | | | ! + | | | | | | | |
| 0.10μF(104) | | В | В | | | | | 9 | | _ | | | | | | | | | | | | |
| 0.15μF(154) | | В | В | | | | | М | М | | | | | | | | | | | | | |
| 0.22μF(224) | Α | В | В | | | | | М | М | | | | | | | | | | | | | |
| 0.33μF(334) | Α | 9 | В | | | | | ! ! | 9 | 9 | | | | | ! ! ! | | | | | | | |
| 0.47μF(474) | В | В | 9 | | | | | M | M | 9 | | | | | | | | | | | | |
| 0.68μF(684) | | | 9 | 9 | l | | | M | M | 9 | l | | | | С | | | | | | | |
| 1.0μF(105) | | В | 9, B | В | | _ | | С | М | | | | | | С | | | | | | | |
| 2.2μF(225) | | | В | В | В | | | | С | M | М | | | | E | | _ | | | | | |
| 4.7μF(475) | | | | В | В | | | <u> </u> | С | С | 9#, C | | | | | Е | | | | | | |
| 10μF(106) | | | | | В | В | | - ! | | С | С | С | | | | | Е | D | | | | |
| 22μF(226) | | | | | | | В | | | | | С | С | | ! ! | | | Е | Е | Е | | |
| 47μF(476) | | | | | | | | ! ! ! | | | | | | С | l | | | | | Е | Е | |
| 100μF(107) | | | | | | | | | | | | | | | | | | | | | | E |
| | | | | | | | | | | | | | | | | | | | | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

| - | 1 | | | | | - (|
|-------------------|------------------|----------------------|---------------------------|---------------------|--------------------------------|--------------------|
| 5 | ex.5: T [| Jimen | sion [m | m] | | |
| | LxW [mm] | (0 | (0.3 3) 01> | | .0x0. (15) 0402 | |
| Rated Capacitance | Voltage [Vdc] | 6.3 (0J) | 4 (0G) | 25 (1E) | 6.3 (0J) | 4 (0G) |
| 15000p | F(153) | 3 | 3 | | | |
| 22000p | F(223) | 3 | 3 | | | |
| 33000p | F(333) | 3 | 3 | | | |
| 47000p | F(473) | 3 | 3 | | | |
| 68000p | F(683) | | | 5 | | |
| 0.10μ | F(104) | | | 5 | | |
| 0.15μ | F(154) | | | | 5 | 5 |
| 0.22μ | F(224) | | | | 5 | 5 |
| 0.33μ | F(334) | | | | 5 | 5 |
| 0.47μ | F(474) | | | | 5 | 5 |
| 0.68μ | F(684) | | | | 5# | 5 |
| | | | | | | |

| LxW [mm] | | 1.6x0.8 (18) <0603> | | | 2.0x1.25 (21) <0805> | | | | | | 3.2x1. (31) 1206 | | | 3.2x2.5 (32) <1210> | | | | | |
|---------------------------------|---|------------------------------------|----------------------|--------------------|-------------------------------------|---------------------|---------------------|---------------------|----------------------|--------------------|---------------------------------|---------------------|---------------------|------------------------------------|--------------------|---------------------|---------------------|----------------------|---|
| Rated Voltage Capacitance [Vdc] | | 10 (1A) | 6.3 (0J) | 4 (0G) | 2.5 (0E) | 25 (1E) | 16 (1C) | 10 (1A) | 6.3 (0J) | 4 (0G) | 25 (1E) | 16 (1C) | 10 (1A) | 6.3 (0J) | 4 (0G) | 25 (1E) | 10 (1A) | 6.3 (0J) | |
| 1.0μF(105) | 8 | 5 | 5 | | | 1 | 6 | | | | | | | | | 1 | | | |
| 2.2μF(225) | | 8 | 8 | | | | 9 | | | | | 6 | | | | ! ! | | | |
| 4.7μF(475) | | | | 8 | | В | В | 9 | 9 | | | 9 | | | | | | | |
| 10μF(106) | | | | 8# | 8 | | | В | 9, B | | С | М | 9 | 9 | | D | | | |
| 22μF(226) | | | | | | i i | | | B# | В | | | С | С | | Е | N | | |
| 47μF(476) | | | | | | | | | | | | | | С | С | | Е | Е | |
| 100μF(107) | | | | | | ! ! | | | | | | | | | С | | | Е | E |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

^{*} These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

^{*} These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

Low ESL LL□ Series

High-Q GJM Series

High Frequency GOM Series

Capacitance Table

Ontinued from the preceding page.

High Dielectric Constant Type X5R(R6) Characteristics

| 5 ex.5: T [| Dimen | sion [m | nm] | | · | | : P | lease r | efer to | X7R(F | R7) etc | . Char | acteris | tics. | | | | | |
|-----------------------|-------|--------------------|---------------|------|-------------------|------|-------------|---------|---------|-------------------|---------|--------|-------------|-------|------|------------------------|------|------|------|
| LxW | | x0.2 | | 0.6 | (0.3 | | | | 1.0x | x0.5 | | | | | 1 | .6x0. | 8 | | |
| [mm] | <010 | 2) 005> | | <02 | 3) 01> | | | | <04 | 5) 02> | | | | | < | (18) :0603 | > | | |
| Rated Voltage | 10 | 6.3 | 25 | 16 | 10 | 6.3 | 100 | | 25 | 16 | 10 | 6.3 | 100 | 50 | 25 | 16 | 10 | 6.3 | 4 |
| | (1A) | (0J) | (1E) | (1C) | (1A) | (0J) | (2A) | (1H) | (1E) | (1C) | (1A) | (0J) | (2A) | (1H) | (1E) | (1C) | (1A) | (0J) | (0G) |
| 68pF(680) | 2 | | | | , | | | | | | | | i | | | | | | |
| 100pF(101) | 2 | | | | | | ! ! | | | | | | ! ! | | | | | | |
| 150pF(151) | 2 | | | | | | | | 1 | | | | | | 1 | | | | |
| 220pF(221) | 2 | | | | | | | | | | | | | | | | | | |
| 330pF(331) | 2 | | | | | | | | | | | | | | | | | | |
| 470pF(471) | 2 | | | | | | | | | | | | | | | | | | |
| 680pF(681) | 2 | 2 | | | | | | | | | | | | | | | | | |
| 1000pF(102) | 2 | 2 | | | | | | 5 | | | | | | 8 | | | | | |
| 1500pF(152) | 2 | 2 | | | 3 | | | | | | | | | | | | | | |
| 2200pF(222) | 2 | 2 | | | 3 | | | 5 | | | | | | 8 | | | | | |
| 3300pF(332) | 2 | 2 | | | 3 | | | | | | | | | | | | | | |
| 4700pF(472) | 2 | 2 | | | 3 | | | 5 | | | | | | 8 | | | | | |
| 6800pF(682) | 2 | 2 | L | | 3 | | | | | | | | | | | | | | |
| 10000pF(103) | 2 | 2 | | | 3 | 3 | | | | | | | | 8 | | | | | |
| 15000pF(153) | | | | | | 3 | | | | | | | 1 | | | | | | |
| 22000pF(223) | | | | | | 3 | | | | 5 | | | | 8 | | | | | |
| 33000pF(333) | | | | | | 3 | | | | 5 | 5 | | ! ! | | | | | | |
| 47000pF(473) | | | | | | 3 | | | | 5 | 5 | | | | | | | | |
| 68000pF(683) | | | | | | | | | 5 | 5 | 5 | | ! | | | | | | |
| 0.10μF(104) | | | | | | | | | 5 | 5 | 5 | | | | 8 | | | | |
| 0.15μF(154) | | | | | | | 1 1 1 | | | • | 5 | 5 | | | | | | | |
| 0.22μF(224) | | | ! ! | | | | 1 1 1 | | | | 5 | 5 | | | 8 | 8 | | | |
| 0.33μF(334) | | | | | | | ! | | | | 5 | 5 | | | | | | | |
| 0.47μF(474) | | | | | | | ! | | | | 5 | 5 | | | 8 | 8 | | | |
| 0.68μF(684) | | | | | | | | | | | 5 | 5 | | | | | 8 | | |
| 1.0μF(105) | | | ! | | | | ; ! | | | | 5 | | ! ! | | 8 | 5, 8 | 5 | | |
| 2.2μF(225) | | | | | | | | | | | | | ! ! | | | 8 | 8 | | |
| 4.7μF(475) | | | ! ! ! | | | | | | | | | | ! ! ! | | | | | 8 | |
| 10μF(106) | | | | | | | | | | | | | | | | | | 8 | 8 |
| 22μF(226) | | | - - - | | | | ! ! ! | | | | | | ! ! | | | | | | 8 |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Continued on the following page.



Continued from the preceding page.

| Z Continued from the bre | ccani | y page. | | | | | | ı | | | | _ | | | | | | | | | | |
|--------------------------|-------|---------|------|------------------------|------|------|---|--------------|----|-----|-----------------------|----|-----|---|-----|----|------|--------------|-------------------|----|-----|---|
| LxW | | | | .0x1.2 | | | | | | | 3.2x1. | | | | | | | 3.2 | | | | |
| [mm] | | | < | (21) :0805 | > | | | | | < | (31) 1206 | > | | | | | | (3 : | 2) 10> | | | |
| Rated Voltage | 100 | 50 | 25 | 16 | 10 | 6.3 | 4 | 100 | 50 | 25 | 16 | 10 | 6.3 | 4 | 100 | 50 | 35 | 25 | 16 | 10 | 6.3 | 4 |
| | | | | | | | | | | | | | | | | | (YA) | | | | | |
| 6800pF(682) | | | | | | | | 1 | | | | | | | | | | | | | | |
| 10000pF(103) | | | | | | | | | | | | | | | | | | | | | | |
| 15000pF(153) | | | | | | | | | | | | | | | | | | | | | | |
| 22000pF(223) | | | | | | | | | | | | | | | | | | | | | | |
| 33000pF(333) | | | | | | | | | | | | | | | | | | | | | | |
| 47000pF(473) | | | | | | | | | | | | | | | | | | | | | | |
| 68000pF(683) | | | | | | | | | | | | | | | | | | | | | | |
| 0.10μF(104) | | | | | | | | | | | | | | | | | | | | | | |
| 0.15μF(154) | | | | | | | | | | | | | | | | | | | | | | |
| 0.22μF(224) | | | | | | | | | | | | | | | | | | | | | | |
| 0.33μF(334) | | | | | | | | 1 | | | | | | | | | | | | | | |
| 0.47μF(474) | | | | | | | | | | | | | | | | | | | | | | |
| 0.68μF(684) | | | | | | | | | | | | | | | | | | | | | | |
| 1.0μF(105) | | | 6 | 6, B | | | | | | | | | | | | | | | | | | |
| 2.2μF(225) | | | 9, B | 9, B | В | | _ | | С | 6 | | | | | | | _ | | | | | |
| 4.7μF(475) | | | В | 9, B | 9, B | В | | - - | | 9,C | 9,C | | | | | | | | | | | |
| 10μF(106) | | | | В | 9, B | 9, B | | | | С | 9, C | 9 | | | | | Е | D | | | | |
| 22μF(226) | | | | | | В | 9 | | | | С | С | С | | | | | Е | | | | |
| 47μF(476) | | | | | | | | ! ! | | | | С | С | | | | | | Е | Е | | |
| 100μF(107) | | | | | | | | | | | | | С | С | | | | | | | Е | |

| LxW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|---------------------|---------------------|-----------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc |] | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 0.1pF(R10) | ±0.05pF(W) | | GRM0335C1HR10WD01D | GRM1555C1HR10WA01D |
| | ±0.1pF(B) | | GRM0335C1HR10BD01D | GRM1555C1HR10BA01D |
| 0.2pF(R20) | ±0.05pF(W) | GRM0225C1CR20WD05L | GRM0335C1HR20WD01D | GRM1555C1HR20WA01D |
| | ±0.1pF(B) | GRM0225C1CR20BD05L | GRM0335C1HR20BD01D | GRM1555C1HR20BA01D |
| 0.3pF(R30) | ±0.05pF(W) | GRM0225C1CR30WD05L | GRM0335C1HR30WD01D | GRM1555C1HR30WA01D |
| | ±0.1pF(B) | GRM0225C1CR30BD05L | GRM0335C1HR30BD01D | GRM1555C1HR30BA01D |
| 0.4pF(R40) | ±0.05pF(W) | GRM0225C1CR40WD05L | GRM0335C1HR40WD01D | GRM1555C1HR40WA01D |
| | ±0.1pF(B) | GRM0225C1CR40BD05L | GRM0335C1HR40BD01D | GRM1555C1HR40BA01D |
| 0.5pF(R50) | ±0.05pF(W) | GRM0225C1CR50WD05L | GRM0335C1HR50WD01D | GRM1555C1HR50WA01D |
| | ±0.1pF(B) | GRM0225C1CR50BD05L | GRM0335C1HR50BD01D | GRM1555C1HR50BA01D |
| 0.6pF(R60) | ±0.05pF(W) | GRM0225C1CR60WD05L | GRM0335C1HR60WD01D | GRM1555C1HR60WA01D |
| | ±0.1pF(B) | GRM0225C1CR60BD05L | GRM0335C1HR60BD01D | GRM1555C1HR60BA01D |
| 0.7pF(R70) | ±0.05pF(W) | GRM0225C1CR70WD05L | GRM0335C1HR70WD01D | GRM1555C1HR70WA01D |
| | ±0.1pF(B) | GRM0225C1CR70BD05L | GRM0335C1HR70BD01D | GRM1555C1HR70BA01D |
| 0.8pF(R80) | ±0.05pF(W) | GRM0225C1CR80WD05L | GRM0335C1HR80WD01D | GRM1555C1HR80WA01D |
| | ±0.1pF(B) | GRM0225C1CR80BD05L | GRM0335C1HR80BD01D | GRM1555C1HR80BA01D |
| 0.9pF(R90) | ±0.05pF(W) | GRM0225C1CR90WD05L | GRM0335C1HR90WD01D | GRM1555C1HR90WA01D |
| | ±0.1pF(B) | GRM0225C1CR90BD05L | GRM0335C1HR90BD01D | GRM1555C1HR90BA01D |
| 1.0pF(1R0) | ±0.05pF(W) | GRM0225C1C1R0WD05L | GRM0335C1H1R0WD01D | GRM1555C1H1R0WA01D |
| | ±0.1pF(B) | GRM0225C1C1R0BD05L | GRM0335C1H1R0BD01D | GRM1555C1H1R0BA01D |
| | ±0.25pF(C) | GRM0225C1C1R0CD05L | GRM0335C1H1R0CD01D | GRM1555C1H1R0CA01D |
| 1.1pF(1R1) | ±0.05pF(W) | GRM0225C1C1R1WD05L | GRM0335C1H1R1WD01D | GRM1555C1H1R1WA01D |
| | ±0.1pF(B) | GRM0225C1C1R1BD05L | GRM0335C1H1R1BD01D | GRM1555C1H1R1BA01D |
| | ±0.25pF(C) | GRM0225C1C1R1CD05L | GRM0335C1H1R1CD01D | GRM1555C1H1R1CA01D |
| 1.2pF(1R2) | ±0.05pF(W) | GRM0225C1C1R2WD05L | GRM0335C1H1R2WD01D | GRM1555C1H1R2WA01D |
| | ±0.1pF(B) | GRM0225C1C1R2BD05L | GRM0335C1H1R2BD01D | GRM1555C1H1R2BA01D |
| | ±0.25pF(C) | GRM0225C1C1R2CD05L | GRM0335C1H1R2CD01D | GRM1555C1H1R2CA01D |
| 1.3pF(1R3) | ±0.05pF(W) | GRM0225C1C1R3WD05L | GRM0335C1H1R3WD01D | GRM1555C1H1R3WA01D |
| | ±0.1pF(B) | GRM0225C1C1R3BD05L | GRM0335C1H1R3BD01D | GRM1555C1H1R3BA01D |
| | ±0.25pF(C) | GRM0225C1C1R3CD05L | GRM0335C1H1R3CD01D | GRM1555C1H1R3CA01D |
| 1.4pF(1R4) | ±0.05pF(W) | GRM0225C1C1R4WD05L | GRM0335C1H1R4WD01D | GRM1555C1H1R4WA01D |
| | ±0.1pF(B) | GRM0225C1C1R4BD05L | GRM0335C1H1R4BD01D | GRM1555C1H1R4BA01D |
| | ±0.25pF(C) | GRM0225C1C1R4CD05L | GRM0335C1H1R4CD01D | GRM1555C1H1R4CA01D |
| 1.5pF(1R5) | ±0.05pF(W) | GRM0225C1C1R5WD05L | GRM0335C1H1R5WD01D | GRM1555C1H1R5WA01D |
| | ±0.1pF(B) | GRM0225C1C1R5BD05L | GRM0335C1H1R5BD01D | GRM1555C1H1R5BA01D |
| | ±0.25pF(C) | GRM0225C1C1R5CD05L | GRM0335C1H1R5CD01D | GRM1555C1H1R5CA01D |
| 1.6pF(1R6) | ±0.05pF(W) | GRM0225C1C1R6WD05L | GRM0335C1H1R6WD01D | GRM1555C1H1R6WA01D |
| | ±0.1pF(B) | GRM0225C1C1R6BD05L | GRM0335C1H1R6BD01D | GRM1555C1H1R6BA01D |
| | ±0.25pF(C) | GRM0225C1C1R6CD05L | GRM0335C1H1R6CD01D | GRM1555C1H1R6CA01D |
| 1.7pF(1R7) | ±0.05pF(W) | GRM0225C1C1R7WD05L | GRM0335C1H1R7WD01D | GRM1555C1H1R7WA01D |
| | ±0.1pF(B) | GRM0225C1C1R7BD05L | GRM0335C1H1R7BD01D | GRM1555C1H1R7BA01D |
| | ±0.25pF(C) | GRM0225C1C1R7CD05L | GRM0335C1H1R7CD01D | GRM1555C1H1R7CA01D |
| 1.8pF(1R8) | ±0.05pF(W) | GRM0225C1C1R8WD05L | GRM0335C1H1R8WD01D | GRM1555C1H1R8WA01D |
| , , -, | ±0.1pF(B) | GRM0225C1C1R8BD05L | GRM0335C1H1R8BD01D | GRM1555C1H1R8BA01D |
| | ±0.25pF(C) | GRM0225C1C1R8CD05L | GRM0335C1H1R8CD01D | GRM1555C1H1R8CA01D |
| 1.9pF(1R9) | ±0.05pF(W) | GRM0225C1C1R9WD05L | GRM0335C1H1R9WD01D | GRM1555C1H1R9WA01D |
| į (- | ±0.1pF(B) | GRM0225C1C1R9BD05L | GRM0335C1H1R9BD01D | GRM1555C1H1R9BA01D |
| | ±0.25pF(C) | GRM0225C1C1R9CD05L | GRM0335C1H1R9CD01D | GRM1555C1H1R9CA01D |
| | | | IA [inch] Code | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



1 Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) 6 Rated Voltage

4Dimension (T) Capacitance
Packaging*

9Individual Specification Code

*GRM022: D is applicable.



| LxW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|-----------------------|---|-----------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc |] | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 2.0pF(2R0) | ±0.05pF(W) | GRM0225C1C2R0WD05L | GRM0335C1H2R0WD01D | GRM1555C1H2R0WA01D |
| | ±0.1pF(B) | GRM0225C1C2R0BD05L | GRM0335C1H2R0BD01D | GRM1555C1H2R0BA01D |
| | ±0.25pF(C) | GRM0225C1C2R0CD05L | GRM0335C1H2R0CD01D | GRM1555C1H2R0CA01D |
| 2.1pF(2R1) | ±0.05pF(W) | GRM0225C1C2R1WD05L | GRM0335C1H2R1WD01D | GRM1555C1H2R1WA01D |
| | ±0.1pF(B) | GRM0225C1C2R1BD05L | GRM0335C1H2R1BD01D | GRM1555C1H2R1BA01D |
| | ±0.25pF(C) | GRM0225C1C2R1CD05L | GRM0335C1H2R1CD01D | GRM1555C1H2R1CA01D |
| 2.2pF(2R2) | ±0.05pF(W) | GRM0225C1C2R2WD05L | GRM0335C1H2R2WD01D | GRM1555C1H2R2WA01D |
| | ±0.1pF(B) | GRM0225C1C2R2BD05L | GRM0335C1H2R2BD01D | GRM1555C1H2R2BA01D |
| | ±0.25pF(C) | GRM0225C1C2R2CD05L | GRM0335C1H2R2CD01D | GRM1555C1H2R2CA01D |
| 2.3pF(2R3) | ±0.05pF(W) | GRM0225C1C2R3WD05L | GRM0335C1H2R3WD01D | GRM1555C1H2R3WA01D |
| | ±0.1pF(B) | GRM0225C1C2R3BD05L | GRM0335C1H2R3BD01D | GRM1555C1H2R3BA01D |
| | ±0.25pF(C) | GRM0225C1C2R3CD05L | GRM0335C1H2R3CD01D | GRM1555C1H2R3CA01D |
| 2.4pF(2R4) | ±0.05pF(W) | GRM0225C1C2R4WD05L | GRM0335C1H2R4WD01D | GRM1555C1H2R4WA01D |
| 1 (-7 | ±0.1pF(B) | GRM0225C1C2R4BD05L | GRM0335C1H2R4BD01D | GRM1555C1H2R4BA01D |
| | ±0.25pF(C) | GRM0225C1C2R4CD05L | GRM0335C1H2R4CD01D | GRM1555C1H2R4CA01D |
| 2.5pF(2R5) | ±0.05pF(W) | GRM0225C1C2R5WD05L | GRM0335C1H2R5WD01D | GRM1555C1H2R5WA01D |
| 2.001 (2110) | ±0.1pF(B) | GRM0225C1C2R5BD05L | GRM0335C1H2R5BD01D | GRM1555C1H2R5BA01D |
| | ±0.25pF(C) | GRM0225C1C2R5CD05L | GRM0335C1H2R5CD01D | GRM1555C1H2R5CA01D |
| 2.6pF(2R6) | ' ' ' | GRM0225C1C2R6WD05L | GRM0335C1H2R6WD01D | GRM1555C1H2R6WA01D |
| 2.6pr(2R6) | ±0.05pF(W) | | | |
| | ±0.1pF(B) | GRM0225C1C2R6BD05L | GRM0335C1H2R6BD01D | GRM1555C1H2R6BA01D |
| 0.7.5(4.5.5) | ±0.25pF(C) | GRM0225C1C2R6CD05L | GRM0335C1H2R6CD01D | GRM1555C1H2R6CA01D |
| 2.7pF(2R7) | ±0.05pF(W) | GRM0225C1C2R7WD05L | GRM0335C1H2R7WD01D | GRM1555C1H2R7WA01D |
| | ±0.1pF(B) | GRM0225C1C2R7BD05L | GRM0335C1H2R7BD01D | GRM1555C1H2R7BA01D |
| | ±0.25pF(C) | GRM0225C1C2R7CD05L | GRM0335C1H2R7CD01D | GRM1555C1H2R7CA01D |
| 2.8pF(2R8) | ±0.05pF(W) | GRM0225C1C2R8WD05L | GRM0335C1H2R8WD01D | GRM1555C1H2R8WA01D |
| | ±0.1pF(B) | GRM0225C1C2R8BD05L | GRM0335C1H2R8BD01D | GRM1555C1H2R8BA01D |
| | ±0.25pF(C) | GRM0225C1C2R8CD05L | GRM0335C1H2R8CD01D | GRM1555C1H2R8CA01D |
| 2.9pF(2R9) | ±0.05pF(W) | GRM0225C1C2R9WD05L | GRM0335C1H2R9WD01D | GRM1555C1H2R9WA01D |
| | ±0.1pF(B) | GRM0225C1C2R9BD05L | GRM0335C1H2R9BD01D | GRM1555C1H2R9BA01D |
| | ±0.25pF(C) | GRM0225C1C2R9CD05L | GRM0335C1H2R9CD01D | GRM1555C1H2R9CA01D |
| 3.0pF(3R0) | ±0.05pF(W) | GRM0225C1C3R0WD05L | GRM0335C1H3R0WD01D | GRM1555C1H3R0WA01E |
| | ±0.1pF(B) | GRM0225C1C3R0BD05L | GRM0335C1H3R0BD01D | GRM1555C1H3R0BA01D |
| | ±0.25pF(C) | GRM0225C1C3R0CD05L | GRM0335C1H3R0CD01D | GRM1555C1H3R0CA01D |
| 3.1pF(3R1) | ±0.05pF(W) | GRM0225C1C3R1WD05L | GRM0335C1H3R1WD01D | GRM1555C1H3R1WA01D |
| | ±0.1pF(B) | GRM0225C1C3R1BD05L | GRM0335C1H3R1BD01D | GRM1555C1H3R1BA01D |
| | ±0.25pF(C) | GRM0225C1C3R1CD05L | GRM0335C1H3R1CD01D | GRM1555C1H3R1CA01D |
| 3.2pF(3R2) | ±0.05pF(W) | GRM0225C1C3R2WD05L | GRM0335C1H3R2WD01D | GRM1555C1H3R2WA01E |
| , | ±0.1pF(B) | GRM0225C1C3R2BD05L | GRM0335C1H3R2BD01D | GRM1555C1H3R2BA01D |
| | ±0.25pF(C) | GRM0225C1C3R2CD05L | GRM0335C1H3R2CD01D | GRM1555C1H3R2CA01D |
| 3.3pF(3R3) | ±0.05pF(W) | GRM0225C1C3R3WD05L | GRM0335C1H3R3WD01D | GRM1555C1H3R3WA01D |
| 3.3pi (3113) | ±0.1pF(B) | GRM0225C1C3R3BD05L | GRM0335C1H3R3BD01D | GRM1555C1H3R3BA01D |
| | ±0.1pr(b) ±0.25pF(C) | GRM0225C1C3R3DD05L | GRM0335C1H3R3CD01D | GRM1555C1H3R3CA01D |
| 3.4pF(3R4) | • • • • | | | |
| 3.4pr(3R4) | ±0.05pF(W) | GRM0225C1C3R4WD05L | GRM0335C1H3R4WD01D | GRM1555C1H3R4WA01D |
| | ±0.1pF(B) | GRM0225C1C3R4BD05L | GRM0335C1H3R4BD01D | GRM1555C1H3R4BA01D |
| 25 5/255 | ±0.25pF(C) | GRM0225C1C3R4CD05L | GRM0335C1H3R4CD01D | GRM1555C1H3R4CA01D |
| 3.5pF(3R5) | ±0.05pF(W) | GRM0225C1C3R5WD05L | GRM0335C1H3R5WD01D | GRM1555C1H3R5WA01D |
| | ±0.1pF(B) | GRM0225C1C3R5BD05L | GRM0335C1H3R5BD01D | GRM1555C1H3R5BA01D |
| | ±0.25pF(C) | GRM0225C1C3R5CD05L | GRM0335C1H3R5CD01D | GRM1555C1H3R5CA01D |

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 2R0 | W | D05 | L 2 3 4 5 6 7 8

1 Product ID 2 Series 5 Temperature Characteristics Capacitance Tolerance

3Dimensions (LxW)

4Dimension (T)

*GRM022: D is applicable.



| _xW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|-----------------------|---|-----------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc |] | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 3.6pF(3R6) | ±0.05pF(W) | GRM0225C1C3R6WD05L | GRM0335C1H3R6WD01D | GRM1555C1H3R6WA01D |
| | ±0.1pF(B) | GRM0225C1C3R6BD05L | GRM0335C1H3R6BD01D | GRM1555C1H3R6BA01D |
| | ±0.25pF(C) | GRM0225C1C3R6CD05L | GRM0335C1H3R6CD01D | GRM1555C1H3R6CA01D |
| 3.7pF(3R7) | ±0.05pF(W) | GRM0225C1C3R7WD05L | GRM0335C1H3R7WD01D | GRM1555C1H3R7WA01D |
| | ±0.1pF(B) | GRM0225C1C3R7BD05L | GRM0335C1H3R7BD01D | GRM1555C1H3R7BA01D |
| | ±0.25pF(C) | GRM0225C1C3R7CD05L | GRM0335C1H3R7CD01D | GRM1555C1H3R7CA01D |
| 3.8pF(3R8) | ±0.05pF(W) | GRM0225C1C3R8WD05L | GRM0335C1H3R8WD01D | GRM1555C1H3R8WA01D |
| | ±0.1pF(B) | GRM0225C1C3R8BD05L | GRM0335C1H3R8BD01D | GRM1555C1H3R8BA01D |
| | ±0.25pF(C) | GRM0225C1C3R8CD05L | GRM0335C1H3R8CD01D | GRM1555C1H3R8CA01D |
| 3.9pF(3R9) | ±0.05pF(W) | GRM0225C1C3R9WD05L | GRM0335C1H3R9WD01D | GRM1555C1H3R9WA01D |
| | ±0.1pF(B) | GRM0225C1C3R9BD05L | GRM0335C1H3R9BD01D | GRM1555C1H3R9BA01D |
| | ±0.25pF(C) | GRM0225C1C3R9CD05L | GRM0335C1H3R9CD01D | GRM1555C1H3R9CA01D |
| 4.0pF(4R0) | ±0.05pF(W) | GRM0225C1C4R0WD05L | GRM0335C1H4R0WD01D | GRM1555C1H4R0WA01E |
| | ±0.1pF(B) | GRM0225C1C4R0BD05L | GRM0335C1H4R0BD01D | GRM1555C1H4R0BA01D |
| | ±0.25pF(C) | GRM0225C1C4R0CD05L | GRM0335C1H4R0CD01D | GRM1555C1H4R0CA01D |
| 4.1pF(4R1) | ±0.05pF(W) | GRM0225C1C4R1WD05L | GRM0335C1H4R1WD01D | GRM1555C1H4R1WA01E |
| | ±0.1pF(B) | GRM0225C1C4R1BD05L | GRM0335C1H4R1BD01D | GRM1555C1H4R1BA01D |
| | ±0.25pF(C) | GRM0225C1C4R1CD05L | GRM0335C1H4R1CD01D | GRM1555C1H4R1CA01D |
| 4.2pF(4R2) | ±0.05pF(W) | GRM0225C1C4R2WD05L | GRM0335C1H4R2WD01D | GRM1555C1H4R2WA01E |
| , | ±0.1pF(B) | GRM0225C1C4R2BD05L | GRM0335C1H4R2BD01D | GRM1555C1H4R2BA01D |
| | ±0.25pF(C) | GRM0225C1C4R2CD05L | GRM0335C1H4R2CD01D | GRM1555C1H4R2CA01D |
| 4.3pF(4R3) | ±0.05pF(W) | GRM0225C1C4R3WD05L | GRM0335C1H4R3WD01D | GRM1555C1H4R3WA01E |
| , | ±0.1pF(B) | GRM0225C1C4R3BD05L | GRM0335C1H4R3BD01D | GRM1555C1H4R3BA01D |
| | ±0.25pF(C) | GRM0225C1C4R3CD05L | GRM0335C1H4R3CD01D | GRM1555C1H4R3CA01D |
| 4.4pF(4R4) | ±0.05pF(W) | GRM0225C1C4R4WD05L | GRM0335C1H4R4WD01D | GRM1555C1H4R4WA01E |
| . , , | ±0.1pF(B) | GRM0225C1C4R4BD05L | GRM0335C1H4R4BD01D | GRM1555C1H4R4BA01D |
| | ±0.25pF(C) | GRM0225C1C4R4CD05L | GRM0335C1H4R4CD01D | GRM1555C1H4R4CA01D |
| 4.5pF(4R5) | ±0.05pF(W) | GRM0225C1C4R5WD05L | GRM0335C1H4R5WD01D | GRM1555C1H4R5WA01E |
| | ±0.1pF(B) | GRM0225C1C4R5BD05L | GRM0335C1H4R5BD01D | GRM1555C1H4R5BA01D |
| | ±0.25pF(C) | GRM0225C1C4R5CD05L | GRM0335C1H4R5CD01D | GRM1555C1H4R5CA01D |
| 4.6pF(4R6) | ±0.05pF(W) | GRM0225C1C4R6WD05L | GRM0335C1H4R6WD01D | GRM1555C1H4R6WA01E |
| | ±0.1pF(B) | GRM0225C1C4R6BD05L | GRM0335C1H4R6BD01D | GRM1555C1H4R6BA01D |
| | ±0.25pF(C) | GRM0225C1C4R6CD05L | GRM0335C1H4R6CD01D | GRM1555C1H4R6CA01D |
| 4.7pF(4R7) | ±0.05pF(W) | GRM0225C1C4R7WD05L | GRM0335C1H4R7WD01D | GRM1555C1H4R7WA01E |
| pi (4111) | ±0.1pF(B) | GRM0225C1C4R7BD05L | GRM0335C1H4R7BD01D | GRM1555C1H4R7BA01D |
| | ±0.25pF(C) | GRM0225C1C4R7CD05L | GRM0335C1H4R7CD01D | GRM1555C1H4R7CA01D |
| 4.8pF(4R8) | ±0.05pF(W) | GRM0225C1C4R8WD05L | GRM0335C1H4R8WD01D | GRM1555C1H4R8WA01E |
| 4.0pi (41 10) | ±0.1pF(B) | GRM0225C1C4R8BD05L | GRM0335C1H4R8BD01D | GRM1555C1H4R8BA01D |
| | ±0.1pf (B) | GRM0225C1C4R8CD05L | GRM0335C1H4R8CD01D | GRM1555C1H4R8CA01D |
| 4.9pF(4R9) | ±0.25pf (V) | GRM0225C1C4R9WD05L | GRM0335C1H4R9WD01D | GRM1555C1H4R9WA01E |
| 4.7pi (41(3) | ±0.1pF(B) | GRM0225C1C4R9BD05L | GRM0335C1H4R9BD01D | GRM1555C1H4R9BA01D |
| | | GRM0225C1C4R9DD05L | GRM0335C1H4R9CD01D | GRM1555C1H4R9CA01D |
| 5.0pF(5R0) | ±0.25pF(C) | GRM0225C1C5R0WD05L | GRM0335C1H5R0WD01D | GRM1555C1H5R0WA01E |
| 5.0pr (3NU) | ±0.05pF(W) +0.1pF(B) | | GRM0335C1H5R0WD01D | GRM1555C1H5R0WA01E |
| | ±0.1pF(B) | GRM0225C1C5R0BD05L | | |
| 5.1pF(5R1) | ±0.25pF(C) | GRM0225C1C5R0CD05L | GRM0335C1H5R0CD01D | GRM1555C1H5R0CA01D |
| 5. τρε(3κ ι) | ±0.05pF(W) | GRM0225C1C5R1WD05L | GRM0335C1H5R1WD01D | GRM1555C1H5R1WA01D |
| | ±0.1pF(B) | GRM0225C1C5R1BD05L | GRM0335C1H5R1BD01D | GRM1555C1H5R1BA01D |
| | ±0.25pF(C) | GRM0225C1C5R1CD05L | GRM0335C1H5R1CD01D | GRM1555C1H5R1CA01D |
| | ±0.5pF(D) | GRM0225C1C5R1DD05L | GRM0335C1H5R1DD01D | GRM1555C1H5R1DA01D |



| LxW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|-----------------------|--|-----------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc |] | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 5.2pF(5R2) | ±0.05pF(W) | GRM0225C1C5R2WD05L | GRM0335C1H5R2WD01D | GRM1555C1H5R2WA01D |
| | ±0.1pF(B) | GRM0225C1C5R2BD05L | GRM0335C1H5R2BD01D | GRM1555C1H5R2BA01D |
| | ±0.25pF(C) | GRM0225C1C5R2CD05L | GRM0335C1H5R2CD01D | GRM1555C1H5R2CA01D |
| | ±0.5pF(D) | GRM0225C1C5R2DD05L | GRM0335C1H5R2DD01D | GRM1555C1H5R2DA01D |
| 5.3pF(5R3) | ±0.05pF(W) | GRM0225C1C5R3WD05L | GRM0335C1H5R3WD01D | GRM1555C1H5R3WA01E |
| | ±0.1pF(B) | GRM0225C1C5R3BD05L | GRM0335C1H5R3BD01D | GRM1555C1H5R3BA01D |
| | ±0.25pF(C) | GRM0225C1C5R3CD05L | GRM0335C1H5R3CD01D | GRM1555C1H5R3CA01E |
| | ±0.5pF(D) | GRM0225C1C5R3DD05L | GRM0335C1H5R3DD01D | GRM1555C1H5R3DA01E |
| 5.4pF(5R4) | ±0.05pF(W) | GRM0225C1C5R4WD05L | GRM0335C1H5R4WD01D | GRM1555C1H5R4WA01I |
| | ±0.1pF(B) | GRM0225C1C5R4BD05L | GRM0335C1H5R4BD01D | GRM1555C1H5R4BA01E |
| | ±0.25pF(C) | GRM0225C1C5R4CD05L | GRM0335C1H5R4CD01D | GRM1555C1H5R4CA01E |
| | ±0.5pF(D) | GRM0225C1C5R4DD05L | GRM0335C1H5R4DD01D | GRM1555C1H5R4DA01I |
| 5.5pF(5R5) | ±0.05pF(W) | GRM0225C1C5R5WD05L | GRM0335C1H5R5WD01D | GRM1555C1H5R5WA01I |
| , | ±0.1pF(B) | GRM0225C1C5R5BD05L | GRM0335C1H5R5BD01D | GRM1555C1H5R5BA01I |
| | ±0.25pF(C) | GRM0225C1C5R5CD05L | GRM0335C1H5R5CD01D | GRM1555C1H5R5CA01I |
| | ±0.5pF(D) | GRM0225C1C5R5DD05L | GRM0335C1H5R5DD01D | GRM1555C1H5R5DA01I |
| 5.6pF(5R6) | ±0.05pF(W) | GRM0225C1C5R6WD05L | GRM0335C1H5R6WD01D | GRM1555C1H5R6WA01 |
| 0.0pr (0110) | ±0.1pF(B) | GRM0225C1C5R6BD05L | GRM0335C1H5R6BD01D | GRM1555C1H5R6BA01I |
| | ±0.25pF(C) | GRM0225C1C5R6CD05L | GRM0335C1H5R6CD01D | GRM1555C1H5R6CA01I |
| | <u>-</u> <u>:</u> | GRM0225C1C5R6DD05L | GRM0335C1H5R6DD01D | |
| F 7nF/ FD7 \ | ±0.5pF(D) | | | GRM1555C1H5R6DA01 |
| 5.7pF(5R7) | ±0.05pF(W) | GRM0225C1C5R7WD05L | GRM0335C1H5R7WD01D | GRM1555C1H5R7WA01 |
| | ±0.1pF(B) | GRM0225C1C5R7BD05L | GRM0335C1H5R7BD01D | GRM1555C1H5R7BA01I |
| | ±0.25pF(C) | GRM0225C1C5R7CD05L | GRM0335C1H5R7CD01D | GRM1555C1H5R7CA01I |
| 5 0 5/ 55 | ±0.5pF(D) | GRM0225C1C5R7DD05L | GRM0335C1H5R7DD01D | GRM1555C1H5R7DA01I |
| 5.8pF(5R8) | ±0.05pF(W) | GRM0225C1C5R8WD05L | GRM0335C1H5R8WD01D | GRM1555C1H5R8WA01 |
| | ±0.1pF(B) | GRM0225C1C5R8BD05L | GRM0335C1H5R8BD01D | GRM1555C1H5R8BA01 |
| | ±0.25pF(C) | GRM0225C1C5R8CD05L | GRM0335C1H5R8CD01D | GRM1555C1H5R8CA01 |
| | ±0.5pF(D) | GRM0225C1C5R8DD05L | GRM0335C1H5R8DD01D | GRM1555C1H5R8DA01 |
| 5.9pF(5R9) | ±0.05pF(W) | GRM0225C1C5R9WD05L | GRM0335C1H5R9WD01D | GRM1555C1H5R9WA01 |
| | ±0.1pF(B) | GRM0225C1C5R9BD05L | GRM0335C1H5R9BD01D | GRM1555C1H5R9BA01 |
| | ±0.25pF(C) | GRM0225C1C5R9CD05L | GRM0335C1H5R9CD01D | GRM1555C1H5R9CA01 |
| | ±0.5pF(D) | GRM0225C1C5R9DD05L | GRM0335C1H5R9DD01D | GRM1555C1H5R9DA01 |
| 6.0pF(6R0) | ±0.05pF(W) | GRM0225C1C6R0WD05L | GRM0335C1H6R0WD01D | GRM1555C1H6R0WA01 |
| | ±0.1pF(B) | GRM0225C1C6R0BD05L | GRM0335C1H6R0BD01D | GRM1555C1H6R0BA01 |
| | ±0.25pF(C) | GRM0225C1C6R0CD05L | GRM0335C1H6R0CD01D | GRM1555C1H6R0CA01 |
| | ±0.5pF(D) | GRM0225C1C6R0DD05L | GRM0335C1H6R0DD01D | GRM1555C1H6R0DA01 |
| 6.1pF(6R1) | ±0.05pF(W) | GRM0225C1C6R1WD05L | GRM0335C1H6R1WD01D | GRM1555C1H6R1WA01 |
| | ±0.1pF(B) | GRM0225C1C6R1BD05L | GRM0335C1H6R1BD01D | GRM1555C1H6R1BA01I |
| | ±0.25pF(C) | GRM0225C1C6R1CD05L | GRM0335C1H6R1CD01D | GRM1555C1H6R1CA01I |
| | ±0.5pF(D) | GRM0225C1C6R1DD05L | GRM0335C1H6R1DD01D | GRM1555C1H6R1DA01 |
| 6.2pF(6R2) | ±0.05pF(W) | GRM0225C1C6R2WD05L | GRM0335C1H6R2WD01D | GRM1555C1H6R2WA01 |
| , | ±0.1pF(B) | GRM0225C1C6R2BD05L | GRM0335C1H6R2BD01D | GRM1555C1H6R2BA01I |
| | ±0.25pF(C) | GRM0225C1C6R2CD05L | GRM0335C1H6R2CD01D | GRM1555C1H6R2CA01 |
| | ±0.5pF(D) | GRM0225C1C6R2DD05L | GRM0335C1H6R2DD01D | GRM1555C1H6R2DA01I |
| 6.3pF(6R3) | ±0.05pF(W) | GRM0225C1C6R3WD05L | GRM0335C1H6R3WD01D | GRM1555C1H6R3WA01 |
| op. (0.10) | ±0.1pF(B) | GRM0225C1C6R3BD05L | GRM0335C1H6R3BD01D | GRM1555C1H6R3BA01I |
| | ±0.1pf (b) ±0.25pF(C) | GRM0225C1C6R3DD05L | GRM0335C1H6R3CD01D | GRM1555C1H6R3CA01 |
| | <u></u> | | | |
| | ±0.5pF(D) | GRM0225C1C6R3DD05L | GRM0335C1H6R3DD01D | GRM1555C1H6R3DA01I |

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 5R2 | W | D05 | L 2 3 4 5 6 7 8

1 Product ID 2 Series 5 Temperature Characteristics Capacitance Tolerance

3Dimensions (LxW)

4Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.

*GRM022: D is applicable.



| LxW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|---------------------|---------------------|----------------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc | | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | . , | Part Number | |
| 6.4pF(6R4) | ±0.05pF(W) | GRM0225C1C6R4WD05L | GRM0335C1H6R4WD01D | GRM1555C1H6R4WA01D |
| | ±0.1pF(B) | GRM0225C1C6R4BD05L | GRM0335C1H6R4BD01D | GRM1555C1H6R4BA01D |
| | ±0.25pF(C) | GRM0225C1C6R4CD05L | GRM0335C1H6R4CD01D | GRM1555C1H6R4CA01D |
| | ±0.5pF(D) | GRM0225C1C6R4DD05L | GRM0335C1H6R4DD01D | GRM1555C1H6R4DA01D |
| 6.5pF(6R5) | ±0.05pF(W) | GRM0225C1C6R5WD05L | GRM0335C1H6R5WD01D | GRM1555C1H6R5WA01D |
| | ±0.1pF(B) | GRM0225C1C6R5BD05L | GRM0335C1H6R5BD01D | GRM1555C1H6R5BA01D |
| | ±0.25pF(C) | GRM0225C1C6R5CD05L | GRM0335C1H6R5CD01D | GRM1555C1H6R5CA01D |
| | ±0.5pF(D) | GRM0225C1C6R5DD05L | GRM0335C1H6R5DD01D | GRM1555C1H6R5DA01D |
| 6.6pF(6R6) | ±0.05pF(W) | GRM0225C1C6R6WD05L | GRM0335C1H6R6WD01D | GRM1555C1H6R6WA01D |
| | ±0.1pF(B) | GRM0225C1C6R6BD05L | GRM0335C1H6R6BD01D | GRM1555C1H6R6BA01D |
| | ±0.25pF(C) | GRM0225C1C6R6CD05L | GRM0335C1H6R6CD01D | GRM1555C1H6R6CA01D |
| | ±0.5pF(D) | GRM0225C1C6R6DD05L | GRM0335C1H6R6DD01D | GRM1555C1H6R6DA01D |
| 6.7pF(6R7) | ±0.05pF(W) | GRM0225C1C6R7WD05L | GRM0335C1H6R7WD01D | GRM1555C1H6R7WA01D |
| | ±0.1pF(B) | GRM0225C1C6R7BD05L | GRM0335C1H6R7BD01D | GRM1555C1H6R7BA01D |
| | ±0.25pF(C) | GRM0225C1C6R7CD05L | GRM0335C1H6R7CD01D | GRM1555C1H6R7CA01D |
| | ±0.5pF(D) | GRM0225C1C6R7DD05L | GRM0335C1H6R7DD01D | GRM1555C1H6R7DA01D |
| 6.8pF(6R8) | ±0.05pF(W) | GRM0225C1C6R8WD05L | GRM0335C1H6R8WD01D | GRM1555C1H6R8WA01D |
| | ±0.1pF(B) | GRM0225C1C6R8BD05L | GRM0335C1H6R8BD01D | GRM1555C1H6R8BA01D |
| | ±0.25pF(C) | GRM0225C1C6R8CD05L | GRM0335C1H6R8CD01D | GRM1555C1H6R8CA01D |
| | ±0.5pF(D) | GRM0225C1C6R8DD05L | GRM0335C1H6R8DD01D | GRM1555C1H6R8DA01D |
| 6.9pF(6R9) | ±0.05pF(W) | GRM0225C1C6R9WD05L | GRM0335C1H6R9WD01D | GRM1555C1H6R9WA01D |
| | ±0.1pF(B) | GRM0225C1C6R9BD05L | GRM0335C1H6R9BD01D | GRM1555C1H6R9BA01D |
| | ±0.25pF(C) | GRM0225C1C6R9CD05L | GRM0335C1H6R9CD01D | GRM1555C1H6R9CA01D |
| | ±0.5pF(D) | GRM0225C1C6R9DD05L | GRM0335C1H6R9DD01D | GRM1555C1H6R9DA01D |
| 7.0pF(7R0) | ±0.05pF(W) | GRM0225C1C7R0WD05L | GRM0335C1H7R0WD01D | GRM1555C1H7R0WA01D |
| | ±0.1pF(B) | GRM0225C1C7R0BD05L | GRM0335C1H7R0BD01D | GRM1555C1H7R0BA01D |
| | ±0.25pF(C) | GRM0225C1C7R0CD05L | GRM0335C1H7R0CD01D | GRM1555C1H7R0CA01D |
| | ±0.5pF(D) | GRM0225C1C7R0DD05L | GRM0335C1H7R0DD01D | GRM1555C1H7R0DA01D |
| 7.1pF(7R1) | ±0.05pF(W) | GRM0225C1C7R1WD05L | GRM0335C1H7R1WD01D | GRM1555C1H7R1WA01D |
| | ±0.1pF(B) | GRM0225C1C7R1BD05L | GRM0335C1H7R1BD01D | GRM1555C1H7R1BA01D |
| | ±0.25pF(C) | GRM0225C1C7R1CD05L | GRM0335C1H7R1CD01D | GRM1555C1H7R1CA01D |
| | ±0.5pF(D) | GRM0225C1C7R1DD05L | GRM0335C1H7R1DD01D | GRM1555C1H7R1DA01D |
| 7.2pF(7R2) | ±0.05pF(W) | GRM0225C1C7R2WD05L | GRM0335C1H7R2WD01D | GRM1555C1H7R2WA01D |
| | ±0.1pF(B) | GRM0225C1C7R2BD05L | GRM0335C1H7R2BD01D | GRM1555C1H7R2BA01D |
| | ±0.25pF(C) | GRM0225C1C7R2CD05L | GRM0335C1H7R2CD01D | GRM1555C1H7R2CA01D |
| | ±0.5pF(D) | GRM0225C1C7R2DD05L | GRM0335C1H7R2DD01D | GRM1555C1H7R2DA01D |
| 7.3pF(7R3) | ±0.05pF(W) | GRM0225C1C7R3WD05L | GRM0335C1H7R3WD01D | GRM1555C1H7R3WA01D |
| | ±0.1pF(B) | GRM0225C1C7R3BD05L | GRM0335C1H7R3BD01D | GRM1555C1H7R3BA01D |
| | ±0.25pF(C) | GRM0225C1C7R3CD05L | GRM0335C1H7R3CD01D | GRM1555C1H7R3CA01D |
| | ±0.5pF(D) | GRM0225C1C7R3DD05L | GRM0335C1H7R3DD01D | GRM1555C1H7R3DA01D |
| 7.4pF(7R4) | ±0.05pF(W) | GRM0225C1C7R4WD05L | GRM0335C1H7R4WD01D | GRM1555C1H7R4WA01D |
| | ±0.1pF(B) | GRM0225C1C7R4BD05L | GRM0335C1H7R4BD01D | GRM1555C1H7R4BA01D |
| | ±0.25pF(C) | GRM0225C1C7R4CD05L | GRM0335C1H7R4CD01D | GRM1555C1H7R4CA01D |
| | ±0.5pF(D) | GRM0225C1C7R4DD05L | GRM0335C1H7R4DD01D | GRM1555C1H7R4DA01D |
| 7.5pF(7R5) | ±0.05pF(W) | GRM0225C1C7R5WD05L | GRM0335C1H7R5WD01D | GRM1555C1H7R5WA01D |
| | ±0.1pF(B) | GRM0225C1C7R5BD05L | GRM0335C1H7R5BD01D | GRM1555C1H7R5BA01D |
| | ±0.25pF(C) | GRM0225C1C7R5CD05L | GRM0335C1H7R5CD01D | GRM1555C1H7R5CA01D |
| | ±0.5pF(D) | GRM0225C1C7R5DD05L | GRM0335C1H7R5DD01D | GRM1555C1H7R5DA01D |
| The part number or | ode is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code | |



| _xW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|-----------------------|---------------------|-----------------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc] | | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 7.6pF(7R6) | ±0.05pF(W) | GRM0225C1C7R6WD05L | GRM0335C1H7R6WD01D | GRM1555C1H7R6WA01 |
| | ±0.1pF(B) | GRM0225C1C7R6BD05L | GRM0335C1H7R6BD01D | GRM1555C1H7R6BA01 |
| | ±0.25pF(C) | GRM0225C1C7R6CD05L | GRM0335C1H7R6CD01D | GRM1555C1H7R6CA01 |
| | ±0.5pF(D) | GRM0225C1C7R6DD05L | GRM0335C1H7R6DD01D | GRM1555C1H7R6DA01 |
| 7.7pF(7R7) | ±0.05pF(W) | GRM0225C1C7R7WD05L | GRM0335C1H7R7WD01D | GRM1555C1H7R7WA01 |
| | ±0.1pF(B) | GRM0225C1C7R7BD05L | GRM0335C1H7R7BD01D | GRM1555C1H7R7BA01 |
| | ±0.25pF(C) | GRM0225C1C7R7CD05L | GRM0335C1H7R7CD01D | GRM1555C1H7R7CA01 |
| | ±0.5pF(D) | GRM0225C1C7R7DD05L | GRM0335C1H7R7DD01D | GRM1555C1H7R7DA01 |
| 7.8pF(7R8) | ±0.05pF(W) | GRM0225C1C7R8WD05L | GRM0335C1H7R8WD01D | GRM1555C1H7R8WA0 |
| | ±0.1pF(B) | GRM0225C1C7R8BD05L | GRM0335C1H7R8BD01D | GRM1555C1H7R8BA0 |
| | ±0.25pF(C) | GRM0225C1C7R8CD05L | GRM0335C1H7R8CD01D | GRM1555C1H7R8CA0 |
| | ±0.5pF(D) | GRM0225C1C7R8DD05L | GRM0335C1H7R8DD01D | GRM1555C1H7R8DA0 |
| 7.9pF(7R9) | ±0.05pF(W) | GRM0225C1C7R9WD05L | GRM0335C1H7R9WD01D | GRM1555C1H7R9WA0 |
| 1. (-, | ±0.1pF(B) | GRM0225C1C7R9BD05L | GRM0335C1H7R9BD01D | GRM1555C1H7R9BA0 |
| | ±0.25pF(C) | GRM0225C1C7R9CD05L | GRM0335C1H7R9CD01D | GRM1555C1H7R9CA0 |
| | ±0.5pF(D) | GRM0225C1C7R9DD05L | GRM0335C1H7R9DD01D | GRM1555C1H7R9DA0 |
| 8.0pF(8R0) | ±0.05pF(W) | GRM0225C1C8R0WD05L | GRM0335C1H8R0WD01D | GRM1555C1H8R0WA0 |
| 0.0pr (0110) | ±0.1pF(B) | GRM0225C1C8R0BD05L | GRM0335C1H8R0BD01D | GRM1555C1H8R0BA0 |
| | ±0.25pF(C) | GRM0225C1C8R0CD05L | GRM0335C1H8R0CD01D | GRM1555C1H8R0CA0 |
| | ±0.5pF(D) | GRM0225C1C8R0DD05L | GRM0335C1H8R0DD01D | GRM1555C1H8R0DA0 |
| 8.1pF(8R1) | ±0.05pF(W) | GRM0225C1C8R1WD05L | GRM0335C1H8R1WD01D | GRM1555C1H8R1WA0 |
| 6. Tpl (6K1) | | GRM0225C1C8R1WD05L | GRM0335C1H8R1BD01D | GRM1555C1H8R1BA0 |
| | ±0.1pF(B) | GRM0225C1C8R1BD05L | GRM0335C1H8R1CD01D | GRM1555C1H8R1CA0 |
| | ±0.25pF(C) | | | |
| 0.25F(9D2) | ±0.5pF(D) | GRM0225C1C8R1DD05L | GRM0335C1H8R1DD01D | GRM1555C1H8R1DA0 |
| 8.2pF(8R2) | ±0.05pF(W) | GRM0225C1C8R2WD05L | GRM0335C1H8R2WD01D | GRM1555C1H8R2WA0 |
| | ±0.1pF(B) | GRM0225C1C8R2BD05L | GRM0335C1H8R2BD01D | GRM1555C1H8R2BA0 |
| | ±0.25pF(C) | GRM0225C1C8R2CD05L | GRM0335C1H8R2CD01D | GRM1555C1H8R2CA0 |
| | ±0.5pF(D) | GRM0225C1C8R2DD05L | GRM0335C1H8R2DD01D | GRM1555C1H8R2DA0 |
| 8.3pF(8R3) | ±0.05pF(W) | GRM0225C1C8R3WD05L | GRM0335C1H8R3WD01D | GRM1555C1H8R3WA0 |
| | ±0.1pF(B) | GRM0225C1C8R3BD05L | GRM0335C1H8R3BD01D | GRM1555C1H8R3BA0 |
| | ±0.25pF(C) | GRM0225C1C8R3CD05L | GRM0335C1H8R3CD01D | GRM1555C1H8R3CA0 |
| | ±0.5pF(D) | GRM0225C1C8R3DD05L | GRM0335C1H8R3DD01D | GRM1555C1H8R3DA0 |
| 8.4pF(8R4) | ±0.05pF(W) | GRM0225C1C8R4WD05L | GRM0335C1H8R4WD01D | GRM1555C1H8R4WA0 |
| | ±0.1pF(B) | GRM0225C1C8R4BD05L | GRM0335C1H8R4BD01D | GRM1555C1H8R4BA0 |
| | ±0.25pF(C) | GRM0225C1C8R4CD05L | GRM0335C1H8R4CD01D | GRM1555C1H8R4CA0 |
| | ±0.5pF(D) | GRM0225C1C8R4DD05L | GRM0335C1H8R4DD01D | GRM1555C1H8R4DA0 |
| 8.5pF(8R5) | ±0.05pF(W) | GRM0225C1C8R5WD05L | GRM0335C1H8R5WD01D | GRM1555C1H8R5WA0 |
| | ±0.1pF(B) | GRM0225C1C8R5BD05L | GRM0335C1H8R5BD01D | GRM1555C1H8R5BA0 |
| | ±0.25pF(C) | GRM0225C1C8R5CD05L | GRM0335C1H8R5CD01D | GRM1555C1H8R5CA0 |
| | ±0.5pF(D) | GRM0225C1C8R5DD05L | GRM0335C1H8R5DD01D | GRM1555C1H8R5DA0 |
| 8.6pF(8R6) | ±0.05pF(W) | GRM0225C1C8R6WD05L | GRM0335C1H8R6WD01D | GRM1555C1H8R6WA0 |
| | ±0.1pF(B) | GRM0225C1C8R6BD05L | GRM0335C1H8R6BD01D | GRM1555C1H8R6BA01 |
| | ±0.25pF(C) | GRM0225C1C8R6CD05L | GRM0335C1H8R6CD01D | GRM1555C1H8R6CA0 |
| | ±0.5pF(D) | GRM0225C1C8R6DD05L | GRM0335C1H8R6DD01D | GRM1555C1H8R6DA0 |
| 8.7pF(8R7) | ±0.05pF(W) | GRM0225C1C8R7WD05L | GRM0335C1H8R7WD01D | GRM1555C1H8R7WA0 |
| | ±0.1pF(B) | GRM0225C1C8R7BD05L | GRM0335C1H8R7BD01D | GRM1555C1H8R7BA0 |
| | | GRM0225C1C8R7CD05L | GRM0335C1H8R7CD01D | GRM1555C1H8R7CA0 |
| | ±0.25pF(C) | GINNUZZOCI CON / CDUSE | Oltimodoco Illolti obolb | |

(Part Number) | GR | M | 02 | 2 | 5C | 1C | 7R6 | W | D05 | L **9 9 9 9 6**

Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW)

4 Dimension (T)

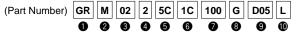


| LxW [mm] | | 0.4x0.2(02)<01005> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|------------------------|--|--|--|--|
| Rated Volt. [Vdc |] | 16(1C) | 50(1H) | 50(1H) |
| Capacitance | Tolerance | 1.5(1.5) | Part Number | 33() |
| 8.8pF(8R8) | ±0.05pF(W) | GRM0225C1C8R8WD05L | GRM0335C1H8R8WD01D | GRM1555C1H8R8WA01D |
| 5.5p. (5.1.5) | ±0.1pF(B) | GRM0225C1C8R8BD05L | GRM0335C1H8R8BD01D | GRM1555C1H8R8BA01D |
| | ±0.25pF(C) | GRM0225C1C8R8CD05L | GRM0335C1H8R8CD01D | GRM1555C1H8R8CA01D |
| | ±0.5pF(D) | GRM0225C1C8R8DD05L | GRM0335C1H8R8DD01D | GRM1555C1H8R8DA01D |
| 8.9pF(8R9) | ±0.05pF(W) | GRM0225C1C8R9WD05L | GRM0335C1H8R9WD01D | GRM1555C1H8R9WA01D |
| 517 p. (5115) | ±0.1pF(B) | GRM0225C1C8R9BD05L | GRM0335C1H8R9BD01D | GRM1555C1H8R9BA01D |
| | ±0.25pF(C) | GRM0225C1C8R9CD05L | GRM0335C1H8R9CD01D | GRM1555C1H8R9CA01D |
| | ±0.5pF(D) | GRM0225C1C8R9DD05L | GRM0335C1H8R9DD01D | GRM1555C1H8R9DA01D |
| 9.0pF(9R0) | ±0.05pF(W) | GRM0225C1C9R0WD05L | GRM0335C1H9R0WD01D | GRM1555C1H9R0WA01D |
| 7.0pr (0110) | ±0.1pF(B) | GRM0225C1C9R0BD05L | GRM0335C1H9R0BD01D | GRM1555C1H9R0BA01D |
| | ±0.25pF(C) | GRM0225C1C9R0CD05L | GRM0335C1H9R0CD01D | GRM1555C1H9R0CA01D |
| | ±0.5pF(D) | GRM0225C1C9R0DD05L | GRM0335C1H9R0DD01D | GRM1555C1H9R0DA01D |
| 9.1pF(9R1) | ±0.05pF(W) | GRM0225C1C9R1WD05L | GRM0335C1H9R1WD01D | GRM1555C1H9R1WA01D |
| 7. (pr (3R1) | ±0.1pF(B) | GRM0225C1C9R1BD05L | GRM0335C1H9R1BD01D | GRM1555C1H9R1BA01D |
| | ±0.1pf (b) ±0.25pF(C) | GRM0225C1C9R1BD05L | GRM0335C1H9R1CD01D | GRM1555C1H9R1CA01D |
| | | GRM0225C1C9R1CD05L | GRM0335C1H9R1CD01D | GRM1555C1H9R1DA01D |
| 9.2pF(9R2) | ±0.5pF(D) ±0.05pF(W) | GRM0225C1C9R1DD05L | GRM0335C1H9R2WD01D | GRM1555C1H9R2WA01D |
| 4.2βI (31(2) | | GRM0225C1C9R2WD05L | GRM0335C1H9R2BD01D | GRM1555C1H9R2WA01D |
| | ±0.1pF(B) | GRM0225C1C9R2BD05L | | |
| | ±0.25pF(C) | | GRM0335C1H9R2CD01D | GRM1555C1H9R2CA01D |
| 9.3pF(9R3) | ±0.5pF(D) | GRM0225C1C9R2DD05L GRM0225C1C9R3WD05L | GRM0335C1H9R2DD01D GRM0335C1H9R3WD01D | GRM1555C1H9R2DA01D GRM1555C1H9R3WA01D |
| 9.3pF(9N3) | ±0.05pF(W) | GRM0225C1C9R3WD05L | | |
| | ±0.1pF(B) | GRM0225C1C9R3DD05L | GRM0335C1H9R3BD01D GRM0335C1H9R3CD01D | GRM1555C1H9R3BA01D GRM1555C1H9R3CA01D |
| | ±0.25pF(C) | GRM0225C1C9R3CD05L | GRM0335C1H9R3CD01D | GRM1555C1H9R3CA01D |
| 9.4pF(9R4) | ±0.5pF(D) | GRM0225C1C9R4WD05L | GRM0335C1H9R4WD01D | GRM1555C1H9R4WA01D |
| 9.4pr(3K4) | ±0.05pF(W) | GRM0225C1C9R4WD05L | GRM0335C1H9R4WD01D | GRM1555C1H9R4WA01D |
| | ±0.1pF(B) | GRM0225C1C9R4CD05L | GRM0335C1H9R4CD01D | GRM1555C1H9R4CA01D |
| | ±0.25pF(C) | GRM0225C1C9R4CD05L | GRM0335C1H9R4CD01D | GRM1555C1H9R4CA01D |
| 9.5pF(9R5) | ±0.5pF(D) ±0.05pF(W) | GRM0225C1C9R5WD05L | GRM0335C1H9R5WD01D | GRM1555C1H9R5WA01D |
| 7.5pr (31(3) | ±0.1pF(B) | GRM0225C1C9R5WD05L | GRM0335C1H9R5BD01D | GRM1555C1H9R5BA01D |
| | ±0.1pr(b) ±0.25pF(C) | GRM0225C1C9R5DD05L | GRM0335C1H9R5DD01D | GRM1555C1H9R5CA01D |
| | ±0.5pF(D) | GRM0225C1C9R5CD05L | GRM0335C1H9R5CD01D | GRM1555C1H9R5DA01D |
| 9.6pF(9R6) | ±0.05pF(W) | GRM0225C1C9R6WD05L | GRM0335C1H9R6WD01D | GRM1555C1H9R6WA01D |
| 7.0pr (31(0) | | GRM0225C1C9R6BD05L | GRM0335C1H9R6BD01D | GRM1555C1H9R6BA01D |
| | ±0.1pF(B) | GRM0225C1C9R6D05L | GRM0335C1H9R6DD01D | GRM1555C1H9R6CA01D |
| | ±0.25pF(C) | GRM0225C1C9R6DD05L | GRM0335C1H9R6DD01D | GRM1555C1H9R6DA01D |
| 9.7pF(9R7) | ±0.5pF(D) | GRM0225C1C9R0DD05L | GRM0335C1H9R7WD01D | GRM1555C1H9R7WA01D |
| 9.7pF(3K7) | ±0.05pF(W) ±0.1pF(B) | GRM0225C1C9R7WD05L | GRM0335C1H9R7WD01D | GRM1555C1H9R7WA01D |
| | | | | GRM1555C1H9R7CA01D |
| | ±0.25pF(C) | GRM0225C1C9R7CD05L GRM0225C1C9R7DD05L | GRM0335C1H9R7CD01D GRM0335C1H9R7DD01D | GRM1555C1H9R7CA01D |
| 9.8pF(9R8) | ±0.5pF(D) | GRM0225C1C9R8WD05L | GRM0335C1H9R8WD01D | GRM1555C1H9R8WA01D |
| 7.0pr (31(0) | ±0.05pF(W) +0.1pF(B) | | | GRM1555C1H9R8BA01D |
| | ±0.1pF(B) | GRM0225C1C9R8BD05L | GRM0335C1H9R8BD01D | |
| | ±0.25pF(C) | GRM0225C1C9R8CD05L | GRM0335C1H9R8CD01D | GRM1555C1H9R8CA01D |
| 9.9pF(9R9) | ±0.5pF(D) | GRM0225C1C9R8DD05L GRM0225C1C9R9WD05L | GRM0335C1H9R8DD01D GRM0335C1H9R9WD01D | GRM1555C1H9R8DA01D GRM1555C1H9R9WA01D |
| 9.9pr(3N9) | ±0.05pF(W) +0.1pF(B) | | GRM0335C1H9R9WD01D | GRM1555C1H9R9WA01D |
| | ±0.1pF(B) | GRM0225C1C9R9BD05L | | |
| | ±0.25pF(C) | GRM0225C1C9R9CD05L | GRM0335C1H9R9CD01D | GRM1555C1H9R9CA01D |
| The most seed | ±0.5pF(D) |) and Unit is shown in []. <>: E | GRM0335C1H9R9DD01D | GRM1555C1H9R9DA01D |



| LxW [mm] Rated Volt. [Vdc] | | | 0.4x0.2(02)<01005> | | 0.6x0.3(03)<0201> | |
|----------------------------|-----------------|--------------------|-----------------------------|--------------------|----------------------------|--|
| | | 16(1C) | 10(1A) | 6.3(0J) | 50(1H) | |
| Capacitance | Tolerance | | Part N | lumber | | |
| 10pF(100) | ±2%(G) | GRM0225C1C100GD05L | | | GRM0335C1H100GD01D | |
| | ±5%(J) | GRM0225C1C100JD05L | | | GRM0335C1H100JD01D | |
| 12pF(120) | ±2%(G) | GRM0225C1C120GD05L | | | GRM0335C1H120GD01E | |
| | ±5%(J) | GRM0225C1C120JD05L | | | GRM0335C1H120JD01E | |
| 15pF(150) | ±2%(G) | GRM0225C1C150GD05L | | | GRM0335C1H150GD01E | |
| | ±5%(J) | GRM0225C1C150JD05L | | | GRM0335C1H150JD01E | |
| 18pF(180) | ±2%(G) | GRM0225C1C180GD05L | | | GRM0335C1H180GD01I | |
| | ±5%(J) | GRM0225C1C180JD05L | | | GRM0335C1H180JD01E | |
| 22pF(220) | ±2%(G) | GRM0225C1C220GD05L | | | GRM0335C1H220GD01I | |
| | ±5%(J) | GRM0225C1C220JD05L | | | GRM0335C1H220JD01I | |
| 27pF(270) | ±2%(G) | GRM0225C1C270GD05L | | | GRM0335C1H270GD01I | |
| | ±5%(J) | GRM0225C1C270JD05L | | | GRM0335C1H270JD01I | |
| 33pF(330) | ±2%(G) | GRM0225C1C330GD05L | | | GRM0335C1H330GD01I | |
| | ±5%(J) | GRM0225C1C330JD05L | | | GRM0335C1H330JD01I | |
| 39pF(390) | ±2%(G) | GRM0225C1C390GD05L | | | GRM0335C1H390GD01 | |
| | ±5%(J) | GRM0225C1C390JD05L | | | GRM0335C1H390JD01I | |
| 47pF(470) | ±2%(G) | GRM0225C1C470GD05L | | | GRM0335C1H470GD01 | |
| | ±5%(J) | GRM0225C1C470JD05L | | | GRM0335C1H470JD01I | |
| 56pF(560) | ±2%(G) | | GRM0225C1A560GD05L | GRM0225C0J560GD05L | GRM0335C1H560GD01 | |
| | ±5%(J) | | GRM0225C1A560JD05L | GRM0225C0J560JD05L | GRM0335C1H560JD01I | |
| 68pF(680) | ±2%(G) | | GRM0225C1A680GD05L | GRM0225C0J680GD05L | GRM0335C1H680GD01 | |
| | ±5%(J) | | GRM0225C1A680JD05L | GRM0225C0J680JD05L | GRM0335C1H680JD01I | |
| 82pF(820) | ±2%(G) | | GRM0225C1A820GD05L | GRM0225C0J820GD05L | GRM0335C1H820GD01 | |
| | ±5%(J) | | GRM0225C1A820JD05L | GRM0225C0J820JD05L | GRM0335C1H820JD01I | |
| 100pF(101) | ±2%(G) | | GRM0225C1A101GD05L | GRM0225C0J101GD05L | GRM0335C1H101GD01 | |
| | ±5%(J) | | GRM0225C1A101JD05L | GRM0225C0J101JD05L | GRM0335C1H101JD01I | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



1 Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) ⑥Rated Voltage
 ⑤Individual Specification Code
 ⑥Packaging*

4 Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.

*GRM022: D is applicable.

| LxW [mm] | | 1.0x0.5(15)<0402> |
|-----------------------|------------------------------------|--|
| Rated Volt. [Vdc] | | 50(1H) |
| TC | | C0G(5C) |
| Capacitance | Tolerance | Part Number |
| 10pF(100) | ±2%(G) | GRM1555C1H100GA01D |
| -1- (7 | ±5%(J) | GRM1555C1H100JA01D |
| 12pF(120) | ±2%(G) | GRM1555C1H120GA01D |
| p. (e) | ±5%(J) | GRM1555C1H120JA01D |
| 15pF(150) | ±2%(G) | GRM1555C1H150GA01D |
| 1001 (100) | ±5%(J) | GRM1555C1H150JA01D |
| 18pF(180) | ±2%(G) | GRM1555C1H180GA01D |
| 10p. (100) | ±5%(J) | GRM1555C1H180JA01D |
| 22pF(220) | ±2%(G) | GRM1555C1H220GA01D |
| 22p: (220) | ±5%(J) | GRM1555C1H220JA01D |
| 27pF(270) | ±3%(G) | GRM1555C1H270GA01D |
| 27pi (270) | ±5%(J) | GRM1555C1H270JA01D |
| 33pF(330) | | GRM1555C1H330GA01D |
| 33pi (330) | ±2%(G) | |
| 39pF(390) | ±5%(J) ±2%(G) | GRM1555C1H330JA01D GRM1555C1H390GA01D |
| 39pr(390) | | |
| 47pF/ 470) | ±5%(J) | GRM1555C1H390JA01D |
| 47pF(470) | ±2%(G) | GRM1555C1H470GA01D |
| F (= F(F00) | ±5%(J) | GRM1555C1H470JA01D |
| 56pF(560) | ±2%(G) | GRM1555C1H560GA01D |
| (0.5(000) | ±5%(J) | GRM1555C1H560JA01D |
| 68pF(680) | ±2%(G) | GRM1555C1H680GA01D |
| | ±5%(J) | GRM1555C1H680JA01D |
| 82pF(820) | ±2%(G) | GRM1555C1H820GA01D |
| 100 5(101) | ±5%(J) | GRM1555C1H820JA01D |
| 100pF(101) | ±2%(G) | GRM1555C1H101GA01D |
| 120 5(404) | ±5%(J) | GRM1555C1H101JA01D GRM1555C1H121GA01D |
| 120pF(121) | ±2%(G) | |
| 1E0pF(1E1) | ±5%(J) | GRM1555C1H121JA01D |
| 150pF(151) | ±2%(G) | GRM1555C1H151GA01D |
| 100 5(404) | ±5%(J) | GRM1555C1H151JA01D |
| 180pF(181) | ±2%(G) | GRM1555C1H181GA01D |
| 000 5(004) | ±5%(J) | GRM1555C1H181JA01D |
| 220pF(221) | ±2%(G) | GRM1555C1H221GA01D |
| 070 5(074) | ±5%(J) | GRM1555C1H221JA01D |
| 270pF(271) | ±2%(G) | GRM1555C1H271GA01D |
| 222 5/224) | ±5%(J) | GRM1555C1H271JA01D |
| 330pF(331) | ±2%(G) | GRM1555C1H331GA01D |
| 222 5/224) | ±5%(J) | GRM1555C1H331JA01D |
| 390pF(391) | ±2%(G) | GRM1555C1H391GA01D |
| 470 5/474) | ±5%(J) | GRM1555C1H391JA01D |
| 470pF(471) | ±2%(G) | GRM1555C1H471GA01D |
| | ±5%(J) | GRM1555C1H471JA01D |
| 560pF(561) | ±2%(G) | GRM1555C1H561GA01D |
| | ±5%(J) | GRM1555C1H561JA01D |
| 680pF(681) | ±2%(G) | GRM1555C1H681GA01D |
| | ±5%(J) | GRM1555C1H681JA01D |
| 820pF(821) | ±2%(G) | GRM1555C1H821GA01D |
| | ±5%(J) | GRM1555C1H821JA01D |
| 1000pF(102) | ±2%(G) | GRM1555C1H102GA01D |
| | ±5%(J) | GRM1555C1H102JA01D |



| LxW [mm] | | 1.6x0.8(1 | 8)<0603> |
|----------------------|-----------------|--------------------|--------------------|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) |
| Capacitance | Tolerance | Part N | umber |
| 10pF(100) | ±5%(J) | GRM1885C2A100JA01D | GRM1885C1H100JA01D |
| 12pF(120) | ±5%(J) | GRM1885C2A120JA01D | GRM1885C1H120JA01D |
| 15pF(150) | ±5%(J) | GRM1885C2A150JA01D | GRM1885C1H150JA01D |
| 18pF(180) | ±5%(J) | GRM1885C2A180JA01D | GRM1885C1H180JA01D |
| 22pF(220) | ±5%(J) | GRM1885C2A220JA01D | GRM1885C1H220JA01D |
| 27pF(270) | ±5%(J) | GRM1885C2A270JA01D | GRM1885C1H270JA01D |
| 33pF(330) | ±5%(J) | GRM1885C2A330JA01D | GRM1885C1H330JA01D |
| 39pF(390) | ±5%(J) | GRM1885C2A390JA01D | GRM1885C1H390JA01D |
| 47pF(470) | ±5%(J) | GRM1885C2A470JA01D | GRM1885C1H470JA01D |
| 56pF(560) | ±5%(J) | GRM1885C2A560JA01D | GRM1885C1H560JA01D |
| 68pF(680) | ±5%(J) | GRM1885C2A680JA01D | GRM1885C1H680JA01D |
| 82pF(820) | ±5%(J) | GRM1885C2A820JA01D | GRM1885C1H820JA01D |
| 100pF(101) | ±5%(J) | GRM1885C2A101JA01D | GRM1885C1H101JA01D |
| 120pF(121) | ±5%(J) | GRM1885C2A121JA01D | GRM1885C1H121JA01D |
| 150pF(151) | ±5%(J) | GRM1885C2A151JA01D | GRM1885C1H151JA01D |
| 180pF(181) | ±5%(J) | GRM1885C2A181JA01D | GRM1885C1H181JA01D |
| 220pF(221) | ±5%(J) | GRM1885C2A221JA01D | GRM1885C1H221JA01D |
| 270pF(271) | ±5%(J) | GRM1885C2A271JA01D | GRM1885C1H271JA01D |
| 330pF(331) | ±5%(J) | GRM1885C2A331JA01D | GRM1885C1H331JA01D |
| 390pF(391) | ±5%(J) | GRM1885C2A391JA01D | GRM1885C1H391JA01D |
| 470pF(471) | ±5%(J) | GRM1885C2A471JA01D | GRM1885C1H471JA01D |
| 560pF(561) | ±5%(J) | GRM1885C2A561JA01D | GRM1885C1H561JA01D |
| 680pF(681) | ±5%(J) | GRM1885C2A681JA01D | GRM1885C1H681JA01D |
| 820pF(821) | ±5%(J) | GRM1885C2A821JA01D | GRM1885C1H821JA01D |
| 1000pF(102) | ±5%(J) | GRM1885C2A102JA01D | GRM1885C1H102JA01D |
| 1200pF(122) | ±5%(J) | GRM1885C2A122JA01D | GRM1885C1H122JA01D |
| 1500pF(152) | ±5%(J) | GRM1885C2A152JA01D | GRM1885C1H152JA01D |
| 1800pF(182) | ±5%(J) | | GRM1885C1H182JA01D |
| 2200pF(222) | ±5%(J) | | GRM1885C1H222JA01D |
| 2700pF(272) | ±5%(J) | | GRM1885C1H272JA01D |
| 3300pF(332) | ±5%(J) | | GRM1885C1H332JA01D |
| 3900pF(392) | ±5%(J) | | GRM1885C1H392JA01D |









| LxW [mm] | | 2.0x1.25(2 | 21)<0805> | 3.2x1.6(3 | 1)<1206> |
|------------------------|-----------------|--------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc | :] | 100(2A) | 50(1H) | 100(2A) | 50(1H) |
| Capacitance | Tolerance | | Part N | lumber | |
| 100pF(101) | ±5%(J) | GRM2165C2A101JA01D | | | |
| 120pF(121) | ±5%(J) | GRM2165C2A121JA01D | | | |
| 150pF(151) | ±5%(J) | GRM2165C2A151JA01D | | | |
| 180pF(181) | ±5%(J) | GRM2165C2A181JA01D | | | |
| 220pF(221) | ±5%(J) | GRM2165C2A221JA01D | | | |
| 270pF(271) | ±5%(J) | GRM2165C2A271JA01D | | | |
| 330pF(331) | ±5%(J) | GRM2165C2A331JA01D | | | |
| 390pF(391) | ±5%(J) | GRM2165C2A391JA01D | | | |
| 470pF(471) | ±5%(J) | GRM2165C2A471JA01D | | | |
| 560pF(561) | ±5%(J) | GRM2165C2A561JA01D | | | |
| 680pF(681) | ±5%(J) | GRM2165C2A681JA01D | | | |
| 820pF(821) | ±5%(J) | GRM2165C2A821JA01D | | | |
| 1000pF(102) | ±5%(J) | GRM2165C2A102JA01D | | | |
| 1200pF(122) | ±5%(J) | GRM2165C2A122JA01D | GRM2165C1H122JA01D | | |
| 1500pF(152) | ±5%(J) | GRM2165C2A152JA01D | GRM2165C1H152JA01D | | |
| 1800pF(182) | ±5%(J) | GRM2165C2A182JA01D | GRM2165C1H182JA01D | GRM3195C2A182JA01D | |
| 2200pF(222) | ±5%(J) | GRM2165C2A222JA01D | GRM2165C1H222JA01D | GRM3195C2A222JA01D | |
| 2700pF(272) | ±5%(J) | GRM2165C2A272JA01D | GRM2165C1H272JA01D | GRM3195C2A272JA01D | |
| 3300pF(332) | ±5%(J) | GRM2165C2A332JA01D | GRM2165C1H332JA01D | GRM3195C2A332JA01D | |
| 3900pF(392) | ±5%(J) | | GRM2165C1H392JA01D | GRM3195C2A392JA01D | |
| 4700pF(472) | ±5%(J) | | GRM2165C1H472JA01D | GRM3195C2A472JA01D | GRM3195C1H472JA01D |
| 5600pF(562) | ±5%(J) | | GRM2195C1H562JA01D | GRM3195C2A562JA01D | GRM3195C1H562JA01D |
| 6800pF(682) | ±5%(J) | | GRM2195C1H682JA01D | GRM3195C2A682JA01D | GRM3195C1H682JA01D |
| 8200pF(822) | ±5%(J) | | GRM2195C1H822JA01D | GRM3195C2A822JA01D | GRM3195C1H822JA01D |
| 10000pF(103) | ±5%(J) | | GRM2195C1H103JA01D | GRM3195C2A103JA01D | GRM3195C1H103JA01D |
| 12000pF(123) | ±5%(J) | | GRM2195C1H123JA01D | GRM3195C2A123JA01D | GRM3195C1H123JA01D |
| 15000pF(153) | ±5%(J) | | GRM2195C1H153JA01D | GRM3195C2A153JA01D | GRM3195C1H153JA01D |
| 18000pF(183) | ±5%(J) | | GRM21B5C1H183JA01L | GRM3195C2A183JA01D | GRM3195C1H183JA01D |
| 22000pF(223) | ±5%(J) | | GRM21B5C1H223JA01L | GRM3195C2A223JA01D | GRM3195C1H223JA01D |
| 27000pF(273) | ±5%(J) | | | | GRM3195C1H273JA01D |
| 33000pF(333) | ±5%(J) | | | | GRM3195C1H333JA01D |
| 39000pF(393) | ±5%(J) | | | | GRM3195C1H393JA01D |
| 47000pF(473) | ±5%(J) | | | | GRM31M5C1H473JA01L |
| 56000pF(563) | ±5%(J) | | | | GRM31M5C1H563JA01L |
| 68000pF(683) | ±5%(J) | | | | GRM31C5C1H683JA01L |
| 82000pF(823) | ±5%(J) | | | | GRM31C5C1H823JA01L |
| 100000pF(104) | ±5%(J) | | | | GRM31C5C1H104JA01L |



Temperature Compensating Type C0G(5C) Characteristics-Low Profile

| LxW [mm] | | 1.0x0.5(15)<0402> | |
|--|--|----------------------------|--|
| Rated Volt. [Vdc] | 1 | 50(1H) | |
| Capacitance | Tolerance | Part Number | |
| 0.1pF(R10) | ±0.1pF(B) | GRM1535C1HR10BDD5D | |
| 0.2pF(R20) | ±0.1pF(B) | GRM1535C1HR20BDD5D | |
| 0.3pF(R30) | ±0.1pF(B) | GRM1535C1HR30BDD5D | |
| 0.4pF(R40) | ±0.1pF(B) | GRM1535C1HR40BDD5D | |
| 0.5pF(R50) | ±0.1pF(B) | GRM1535C1HR50BDD5D | |
| 0.6pF(R60) | ±0.1pF(B) | GRM1535C1HR60BDD5D | |
| 0.7pF(R70) | ±0.1pF(B) | GRM1535C1HR70BDD5D | |
| 0.8pF(R80) | ±0.1pF(B) | GRM1535C1HR80BDD5D | |
| 0.9pF(R90) | ±0.1pF(B) | GRM1535C1HR90BDD5D | |
| 1.0pF(1R0) | ±0.25pF(C) | GRM1535C1H1R0CDD5D | |
| 1.1pF(1R1) | ±0.25pF(C) | GRM1535C1H1R1CDD5D | |
| 1.1pr (1R1) | ±0.25pF(C) | GRM1535C1H1R2CDD5D | |
| 1.2pr(1R2) | ±0.25pF(C) | GRM1535C1H1R2CDD5D | |
| 1.3pr(1R3) | ±0.25pF(C) | GRM1535C1H1R4CDD5D | |
| • • • • | | GRM1535C1H1R5CDD5D | |
| 1.5pF(1R5) 1.6pF(1R6) | ±0.25pF(C) ±0.25pF(C) | GRM1535C1H1R6CDD5D | |
| • • • • • | • • • • | | |
| 1.7pF(1R7) | ±0.25pF(C) | GRM1535C1H1R7CDD5D | |
| 1.8pF(1R8) | ±0.25pF(C) | GRM1535C1H1R8CDD5D | |
| 1.9pF(1R9) | ±0.25pF(C) | GRM1535C1H1R9CDD5D | |
| 2.0pF(2R0) | ±0.25pF(C) | GRM1535C1H2R0CDD5D | |
| 2.1pF(2R1) | ±0.25pF(C) | GRM1535C1H2R1CDD5D | |
| 2.2pF(2R2) | ±0.25pF(C) | GRM1535C1H2R2CDD5D | |
| 2.3pF(2R3) | ±0.25pF(C) | GRM1535C1H2R3CDD5D | |
| 2.4pF(2R4) | ±0.25pF(C) | GRM1535C1H2R4CDD5D | |
| 2.5pF(2R5) | ±0.25pF(C) | GRM1535C1H2R5CDD5D | |
| 2.6pF(2R6) | ±0.25pF(C) | GRM1535C1H2R6CDD5D | |
| 2.7pF(2R7) | ±0.25pF(C) | GRM1535C1H2R7CDD5D | |
| 2.8pF(2R8) | ±0.25pF(C) | GRM1535C1H2R8CDD5D | |
| 2.9pF(2R9) | ±0.25pF(C) | GRM1535C1H2R9CDD5D | |
| 3.0pF(3R0) | ±0.25pF(C) | GRM1535C1H3R0CDD5D | |
| 3.1pF(3R1) | ±0.25pF(C) | GRM1535C1H3R1CDD5D | |
| 3.2pF(3R2) | ±0.25pF(C) | GRM1535C1H3R2CDD5D | |
| 3.3pF(3R3) | ±0.25pF(C) | GRM1535C1H3R3CDD5D | |
| 3.4pF(3R4) | ±0.25pF(C) | GRM1535C1H3R4CDD5D | |
| 3.5pF(3R5) | ±0.25pF(C) | GRM1535C1H3R5CDD5D | |
| 3.6pF(3R6) | ±0.25pF(C) | GRM1535C1H3R6CDD5D | |
| 3.7pF(3R7) | ±0.25pF(C) | GRM1535C1H3R7CDD5D | |
| 3.8pF(3R8) | ±0.25pF(C) | GRM1535C1H3R8CDD5D | |
| 3.9pF(3R9) | ±0.25pF(C) | GRM1535C1H3R9CDD5D | |
| 4.0pF(4R0) | ±0.25pF(C) | GRM1535C1H4R0CDD5D | |
| 4.1pF(4R1) | ±0.25pF(C) | GRM1535C1H4R1CDD5D | |
| 4.2pF(4R2) | ±0.25pF(C) | GRM1535C1H4R2CDD5D | |
| 4.3pF(4R3) | ±0.25pF(C) | GRM1535C1H4R3CDD5D | |
| 4.4pF(4R4) | ±0.25pF(C) | GRM1535C1H4R4CDD5D | |
| 4.5pF(4R5) | ±0.25pF(C) | GRM1535C1H4R5CDD5D | |
| 4.6pF(4R6) | ±0.25pF(C) | GRM1535C1H4R6CDD5D | |
| 4.7pF(4R7) | ±0.25pF(C) | GRM1535C1H4R7CDD5D | |
| 4.7pi (41 .7) | | | |

| LxW [mm] | | 1.0x0.5(15)<0402> |
|---------------------|---------------------|----------------------------|
| Rated Volt. [Vdc | | 50(1H) |
| Capacitance | Tolerance | Part Number |
| 4.9pF(4R9) | ±0.25pF(C) | GRM1535C1H4R9CDD5E |
| 5.0pF(5R0) | ±0.25pF(C) | GRM1535C1H5R0CDD5E |
| 5.1pF(5R1) | ±0.5pF(D) | GRM1535C1H5R1DDD50 |
| 5.2pF(5R2) | ±0.5pF(D) | GRM1535C1H5R2DDD50 |
| 5.3pF(5R3) | ±0.5pF(D) | GRM1535C1H5R3DDD5E |
| 5.4pF(5R4) | ±0.5pF(D) | GRM1535C1H5R4DDD5E |
| 5.5pF(5R5) | ±0.5pF(D) | GRM1535C1H5R5DDD50 |
| 5.6pF(5R6) | ±0.5pF(D) | GRM1535C1H5R6DDD50 |
| 5.7pF(5R7) | ±0.5pF(D) | GRM1535C1H5R7DDD50 |
| 5.8pF(5R8) | ±0.5pF(D) | GRM1535C1H5R8DDD5E |
| 5.9pF(5R9) | ±0.5pF(D) | GRM1535C1H5R9DDD5E |
| 6.0pF(6R0) | ±0.5pF(D) | GRM1535C1H6R0DDD5E |
| 6.1pF(6R1) | ±0.5pF(D) | GRM1535C1H6R1DDD5E |
| 6.2pF(6R2) | ±0.5pF(D) | GRM1535C1H6R2DDD5E |
| 6.3pF(6R3) | ±0.5pF(D) | GRM1535C1H6R3DDD5I |
| 6.4pF(6R4) | ±0.5pF(D) | GRM1535C1H6R4DDD5I |
| 6.5pF(6R5) | ±0.5pF(D) | GRM1535C1H6R5DDD5E |
| 6.6pF(6R6) | ±0.5pF(D) | GRM1535C1H6R6DDD5I |
| 6.7pF(6R7) | ±0.5pF(D) | GRM1535C1H6R7DDD5E |
| 6.8pF(6R8) | ±0.5pF(D) | GRM1535C1H6R8DDD5E |
| 6.9pF(6R9) | ±0.5pF(D) | GRM1535C1H6R9DDD5I |
| 7.0pF(7R0) | ±0.5pF(D) | GRM1535C1H7R0DDD5E |
| 7.1pF(7R1) | ±0.5pF(D) | GRM1535C1H7R1DDD5I |
| 7.2pF(7R2) | ±0.5pF(D) | GRM1535C1H7R2DDD5I |
| 7.3pF(7R3) | ±0.5pF(D) | GRM1535C1H7R3DDD5E |
| 7.4pF(7R4) | ±0.5pF(D) | GRM1535C1H7R4DDD5E |
| 7.5pF(7R5) | ±0.5pF(D) | GRM1535C1H7R5DDD5E |
| 7.6pF(7R6) | ±0.5pF(D) | GRM1535C1H7R6DDD5E |
| 7.7pF(7R7) | ±0.5pF(D) | GRM1535C1H7R7DDD5I |
| 7.8pF(7R8) | ±0.5pF(D) | GRM1535C1H7R8DDD5I |
| 7.9pF(7R9) | ±0.5pF(D) | GRM1535C1H7R9DDD5E |
| 8.0pF(8R0) | ±0.5pF(D) | GRM1535C1H8R0DDD5I |
| 8.1pF(8R1) | ±0.5pF(D) | GRM1535C1H8R1DDD5I |
| 8.2pF(8R2) | ±0.5pF(D) | GRM1535C1H8R2DDD5E |
| 8.3pF(8R3) | ±0.5pF(D) | GRM1535C1H8R3DDD5E |
| 8.4pF(8R4) | ±0.5pF(D) | GRM1535C1H8R4DDD5E |
| 8.5pF(8R5) | ±0.5pF(D) | GRM1535C1H8R5DDD5E |
| 8.6pF(8R6) | ±0.5pF(D) | GRM1535C1H8R6DDD5E |
| 8.7pF(8R7) | ±0.5pF(D) | GRM1535C1H8R7DDD5E |
| 8.8pF(8R8) | ±0.5pF(D) | GRM1535C1H8R8DDD5E |
| 8.9pF(8R9) | ±0.5pF(D) | GRM1535C1H8R9DDD5E |
| 9.0pF(9R0) | ±0.5pF(D) | GRM1535C1H9R0DDD5I |
| 9.1pF(9R1) | ±0.5pF(D) | GRM1535C1H9R1DDD5I |
| 9.2pF(9R2) | ±0.5pF(D) | GRM1535C1H9R2DDD5I |
| 9.3pF(9R3) | ±0.5pF(D) | GRM1535C1H9R3DDD5I |
| 9.4pF(9R4) | ±0.5pF(D) | GRM1535C1H9R4DDD5 |
| 9.5pF(9R5) | ±0.5pF(D) | GRM1535C1H9R5DDD5I |
| 9.6pF(9R6) | ±0.5pF(D) | GRM1535C1H9R6DDD5E |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

(Part Number) | GR | M | 15 | 3 | 5C | 1H | R10 | B | DD5 | D **9 9 4 5** 6 0

Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD 180mm Reel Taping.



Temperature Compensating Type C0G(5C) Characteristics-Low Profile

| LxW [mm] | | 1.0x0.5(15)<0402> |
|---------------------|--------------------|----------------------------|
| Rated Volt. [Vdc |] | 50(1H) |
| Capacitance | Tolerance | Part Number |
| 9.7pF(9R7) | ±0.5pF(D) | GRM1535C1H9R7DDD5D |
| 9.8pF(9R8) | ±0.5pF(D) | GRM1535C1H9R8DDD5D |
| 9.9pF(9R9) | ±0.5pF(D) | GRM1535C1H9R9DDD5D |
| 10pF(100) | ±5%(J) | GRM1535C1H100JDD5D |
| 12pF(120) | ±5%(J) | GRM1535C1H120JDD5D |
| 15pF(150) | ±5%(J) | GRM1535C1H150JDD5D |
| 18pF(180) | ±5%(J) | GRM1535C1H180JDD5D |
| 22pF(220) | ±5%(J) | GRM1535C1H220JDD5D |
| 27pF(270) | ±5%(J) | GRM1535C1H270JDD5D |
| 33pF(330) | ±5%(J) | GRM1535C1H330JDD5D |
| 39pF(390) | ±5%(J) | GRM1535C1H390JDD5D |
| 47pF(470) | ±5%(J) | GRM1535C1H470JDD5D |
| 56pF(560) | ±5%(J) | GRM1535C1H560JDD5D |
| 68pF(680) | ±5%(J) | GRM1535C1H680JDD5D |
| 82pF(820) | ±5%(J) | GRM1535C1H820JDD5D |
| 100pF(101) | ±5%(J) | GRM1535C1H101JDD5D |
| 120pF(121) | ±5%(J) | GRM1535C1H121JDD5D |
| 150pF(151) | ±5%(J) | GRM1535C1H151JDD5D |
| 180pF(181) | ±5%(J) | GRM1535C1H181JDD5D |
| 220pF(221) | ±5%(J) | GRM1535C1H221JDD5D |
| 270pF(271) | ±5%(J) | GRM1535C1H271JDD5D |
| 330pF(331) | ±5%(J) | GRM1535C1H331JDD5D |
| 390pF(391) | ±5%(J) | GRM1535C1H391JDD5D |
| 470pF(471) | ±5%(J) | GRM1535C1H471JDD5D |
| 560pF(561) | ±5%(J) | GRM1535C1H561JDD5D |
| 680pF(681) | ±5%(J) | GRM1535C1H681JDD5D |

Temperature Compensating Type C0G(5C) Characteristics-Low Profile

| LxW [mm] | | 2.0x1.25(2 | 21)<0805> | 3.2x1.6(3 | 1)<1206> |
|-----------------------|-----------------|--------------------|--------------------|------------------------------------|--------------------|
| Rated Volt. [Vdc |] | 100(2A) | 50(1H) |) 100(2A) 50(1H) | |
| Capacitance | Tolerance | | Part N | lumber | |
| 100pF(101) | ±5%(J) | GRM2165C2A101JA01D | | | |
| 120pF(121) | ±5%(J) | GRM2165C2A121JA01D | | | |
| 150pF(151) | ±5%(J) | GRM2165C2A151JA01D | | | |
| 180pF(181) | ±5%(J) | GRM2165C2A181JA01D | | | |
| 220pF(221) | ±5%(J) | GRM2165C2A221JA01D | | | |
| 270pF(271) | ±5%(J) | GRM2165C2A271JA01D | | | |
| 330pF(331) | ±5%(J) | GRM2165C2A331JA01D | | | |
| 390pF(391) | ±5%(J) | GRM2165C2A391JA01D | | | |
| 470pF(471) | ±5%(J) | GRM2165C2A471JA01D | | | |
| 560pF(561) | ±5%(J) | GRM2165C2A561JA01D | | | |
| 680pF(681) | ±5%(J) | GRM2165C2A681JA01D | | | |
| 820pF(821) | ±5%(J) | GRM2165C2A821JA01D | | | |
| 1000pF(102) | ±5%(J) | GRM2165C2A102JA01D | | | |
| 1200pF(122) | ±5%(J) | GRM2165C2A122JA01D | GRM2165C1H122JA01D | | |
| 1500pF(152) | ±5%(J) | GRM2165C2A152JA01D | GRM2165C1H152JA01D | | |
| 1800pF(182) | ±5%(J) | GRM2165C2A182JA01D | GRM2165C1H182JA01D | GRM3195C2A182JA01D | |
| 2200pF(222) | ±5%(J) | GRM2165C2A222JA01D | GRM2165C1H222JA01D | GRM3195C2A222JA01D | |
| 2700pF(272) | ±5%(J) | GRM2165C2A272JA01D | GRM2165C1H272JA01D | GRM3195C2A272JA01D | |
| 3300pF(332) | ±5%(J) | GRM2165C2A332JA01D | GRM2165C1H332JA01D | GRM3195C2A332JA01D | |
| 3900pF(392) | ±5%(J) | | GRM2165C1H392JA01D | GRM3195C2A392JA01D | |
| 4700pF(472) | ±5%(J) | | GRM2165C1H472JA01D | GRM3195C2A472JA01D | GRM3195C1H472JA01D |
| 5600pF(562) | ±5%(J) | | GRM2195C1H562JA01D | GRM3195C2A562JA01D | GRM3195C1H562JA01D |
| 6800pF(682) | ±5%(J) | | GRM2195C1H682JA01D | GRM3195C2A682JA01D | GRM3195C1H682JA01D |
| 8200pF(822) | ±5%(J) | | GRM2195C1H822JA01D | GRM3195C2A822JA01D | GRM3195C1H822JA01D |
| 10000pF(103) | ±5%(J) | | GRM2195C1H103JA01D | GRM3195C2A103JA01D | GRM3195C1H103JA01D |
| 12000pF(123) | ±5%(J) | | GRM2195C1H123JA01D | | GRM3195C1H123JA01D |
| 15000pF(153) | ±5%(J) | | GRM2195C1H153JA01D | | GRM3195C1H153JA01D |
| 18000pF(183) | ±5%(J) | | | | GRM3195C1H183JA01D |
| 22000pF(223) | ±5%(J) | | | | GRM3195C1H223JA01D |
| 27000pF(273) | ±5%(J) | | | | GRM3195C1H273JA01D |
| 33000pF(333) | ±5%(J) | | | | GRM3195C1H333JA01D |
| 39000pF(393) | ±5%(J) | | | | GRM3195C1H393JA01D |
| 47000pF(473) | ±5%(J) | | | | GRM31M5C1H473JA01L |
| 56000pF(563) | ±5%(J) | | | | GRM31M5C1H563JA01L |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging

| LxW [mm] | | 0.6x0.3(0 : | 3)<0201> | 1.0x0.5(1 | 5)<0402> |
|----------------------|---------------------|---------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc] | | 50(1H) | 25(1E) | 50(1H) | 10(1A) |
| Capacitance | Tolerance | | Part Number | | |
| 1.0pF(1R0) | ±0.25pF(C) | GRM0337U1H1R0CD01D | | GRM1557U1H1R0CZ01D | |
| 2.0pF(2R0) | ±0.25pF(C) | GRM0337U1H2R0CD01D | | GRM1557U1H2R0CZ01D | |
| 3.0pF(3R0) | ±0.25pF(C) | GRM0337U1H3R0CD01D | | GRM1557U1H3R0CZ01D | |
| 4.0pF(4R0) | ±0.25pF(C) | GRM0337U1H4R0CD01D | | GRM1557U1H4R0CZ01D | |
| 5.0pF(5R0) | ±0.25pF(C) | GRM0337U1H5R0CD01D | | GRM1557U1H5R0CZ01D | |
| 6.0pF(6R0) | ±0.5pF(D) | GRM0337U1H6R0DD01D | | GRM1557U1H6R0DZ01D | |
| 7.0pF(7R0) | ±0.5pF(D) | GRM0337U1H7R0DD01D | | GRM1557U1H7R0DZ01D | |
| 8.0pF(8R0) | ±0.5pF(D) | GRM0337U1H8R0DD01D | | GRM1557U1H8R0DZ01D | |
| 9.0pF(9R0) | ±0.5pF(D) | GRM0337U1H9R0DD01D | | GRM1557U1H9R0DZ01D | |
| 10pF(100) | ±5%(J) | GRM0337U1H100JD01D | | GRM1557U1H100JZ01D | |
| 12pF(120) | ±5%(J) | GRM0337U1H120JD01D | | GRM1557U1H120JZ01D | |
| 15pF(150) | ±5%(J) | GRM0337U1H150JD01D | | GRM1557U1H150JZ01D | |
| 18pF(180) | ±5%(J) | | GRM0337U1E180JD01D | GRM1557U1H180JZ01D | |
| 22pF(220) | ±5%(J) | | GRM0337U1E220JD01D | GRM1557U1H220JZ01D | |
| 27pF(270) | ±5%(J) | | GRM0337U1E270JD01D | GRM1557U1H270JZ01D | |
| 33pF(330) | ±5%(J) | | GRM0337U1E330JD01D | GRM1557U1H330JZ01D | |
| 39pF(390) | ±5%(J) | | GRM0337U1E390JD01D | GRM1557U1H390JZ01D | |
| 47pF(470) | ±5%(J) | | GRM0337U1E470JD01D | GRM1557U1H470JZ01D | |
| 56pF(560) | ±5%(J) | | GRM0337U1E560JD01D | GRM1557U1H560JZ01D | |
| 68pF(680) | ±5%(J) | | GRM0337U1E680JD01D | GRM1557U1H680JZ01D | |
| 82pF(820) | ±5%(J) | | GRM0337U1E820JD01D | GRM1557U1H820JZ01D | |
| 100pF(101) | ±5%(J) | | GRM0337U1E101JD01D | GRM1557U1H101JZ01D | |
| 120pF(121) | ±5%(J) | | | GRM1557U1H121JZ01D | |
| 150pF(151) | ±5%(J) | | | GRM1557U1H151JZ01D | |
| 180pF(181) | ±5%(J) | | | GRM1557U1H181JZ01D | |
| 1200pF(122) | ±5%(J) | | | | GRM1557U1A122JA01D |
| 1500pF(152) | ±5%(J) | | | | GRM1557U1A152JA01D |
| 1800pF(182) | ±5%(J) | | | | GRM1557U1A182JA01D |
| 2200pF(222) | ±5%(J) | | | | GRM1557U1A222JA01D |
| 2700pF(272) | ±5%(J) | | | | GRM1557U1A272JA01D |
| 3300pF(332) | ±5%(J) | | | | GRM1557U1A332JA01D |
| 3900pF(392) | ±5%(J) | | | | GRM1557U1A392JA01D |
| 4700pF(472) | ±5%(J) | | | | GRM1557U1A472JA01D |



| LxW [mm] | | 1.6x0.8(1 | 8)<0603> |
|-----------------------|-----------------|--------------------|--------------------|
| Rated Volt. [Vdc] | | 50(1H) | 10(1A) |
| Capacitance | Tolerance | Part N | umber |
| 1000pF(102) | ±5%(J) | GRM1887U1H102JA01D | |
| 1200pF(122) | ±5%(J) | GRM1887U1H122JA01D | |
| 1500pF(152) | ±5%(J) | GRM1887U1H152JA01D | |
| 1800pF(182) | ±5%(J) | GRM1887U1H182JA01D | |
| 2200pF(222) | ±5%(J) | GRM1887U1H222JA01D | |
| 2700pF(272) | ±5%(J) | GRM1887U1H272JA01D | |
| 3300pF(332) | ±5%(J) | GRM1887U1H332JA01D | |
| 3900pF(392) | ±5%(J) | GRM1887U1H392JA01D | |
| 4700pF(472) | ±5%(J) | GRM1887U1H472JA01D | |
| 5600pF(562) | ±5%(J) | GRM1887U1H562JA01D | |
| 6800pF(682) | ±5%(J) | GRM1887U1H682JA01D | |
| 8200pF(822) | ±5%(J) | GRM1887U1H822JA01D | |
| 10000pF(103) | ±5%(J) | GRM1887U1H103JA01D | |
| 12000pF(123) | ±5%(J) | | GRM1887U1A123JA01D |
| 15000pF(153) | ±5%(J) | | GRM1887U1A153JA01D |
| 18000pF(183) | ±5%(J) | | GRM1887U1A183JA01D |
| 22000pF(223) | ±5%(J) | | GRM1887U1A223JA01D |

| LxW [mm] | | 2.0x1.25(2 | 2.0x1.25(21)<0805> | |
|------------------------|-----------------|---|-----------------------------|--------------------|
| Rated Volt. [Vdc |] | 50(1H) 10(1A) 50(1H) | | |
| Capacitance | Tolerance | | Part Number | |
| 10000pF(103) | ±5%(J) | GRM2167U1H103JA01D | | |
| 12000pF(123) | ±5%(J) | GRM2167U1H123JA01D | | |
| 15000pF(153) | ±5%(J) | GRM2167U1H153JA01D | | |
| 18000pF(183) | ±5%(J) | GRM2167U1H183JA01D | | |
| 22000pF(223) | ±5%(J) | GRM2197U1H223JA01D | | |
| 27000pF(273) | ±5%(J) | GRM2197U1H273JA01D | | |
| 33000pF(333) | ±5%(J) | GRM21A7U1H333JA39L | | |
| 39000pF(393) | ±5%(J) | GRM21B7U1H393JA01L | | |
| 47000pF(473) | ±5%(J) | GRM21B7U1H473JA01L | | |
| 56000pF(563) | ±5%(J) | | GRM2197U1A563JA01D | GRM3197U1H563JA01D |
| 68000pF(683) | ±5%(J) | | GRM21B7U1A683JA01L | GRM31M7U1H683JA01L |
| 82000pF(823) | ±5%(J) | | GRM21B7U1A823JA01L | GRM31M7U1H823JA01L |
| 100000pF(104) | ±5%(J) | | GRM21B7U1A104JA01L | GRM31M7U1H104JA01L |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



4 Dimension (T) **7**Capacitance Packaging



Temperature Compensating Type U2J(7U) Characteristics-Low Profile

| LxW [mm] | | 1.6x0.8(18)<0603> | | |
|-----------------------|-----------------|----------------------------|--------------------|--|
| Rated Volt. [Vdc] | | 50(1H) | 10(1A) | |
| Capacitance | Tolerance | Part Number | | |
| 2200pF(222) | ±5%(J) | GRM1857U1H222JA44D | | |
| 2700pF(272) | ±5%(J) | GRM1857U1H272JA44D | | |
| 3300pF(332) | ±5%(J) | GRM1857U1H332JA44D | | |
| 3900pF(392) | ±5%(J) | GRM1857U1H392JA44D | | |
| 4700pF(472) | ±5%(J) | GRM1857U1H472JA44D | | |
| 5600pF(562) | ±5%(J) | | GRM1857U1A562JA44D | |
| 6800pF(682) | ±5%(J) | | GRM1857U1A682JA44D | |
| 8200pF(822) | ±5%(J) | | GRM1857U1A822JA44D | |
| 10000pF(103) | ±5%(J) | | GRM1857U1A103JA44D | |

| LxW [mm] | | 2.0x1.25 (21) <0805> | | 3.2x1.6(31)<1206> |
|------------------------|-----------------|-----------------------------|--------------------|----------------------------|
| Rated Volt. [Vdc] | | 50(1H) | 10(1A) | 50(1H) |
| Capacitance | Tolerance | Part Number | | |
| 10000pF(103) | ±5%(J) | GRM2167U1H103JA01D | | |
| 12000pF(123) | ±5%(J) | GRM2167U1H123JA01D | | |
| 15000pF(153) | ±5%(J) | GRM2167U1H153JA01D | | |
| 18000pF(183) | ±5%(J) | GRM2167U1H183JA01D | | |
| 22000pF(223) | ±5%(J) | GRM2197U1H223JA01D | | |
| 27000pF(273) | ±5%(J) | GRM2197U1H273JA01D | | |
| 33000pF(333) | ±5%(J) | GRM21A7U1H333JA39L | | |
| 56000pF(563) | ±5%(J) | | GRM2197U1A563JA01D | GRM3197U1H563JA01D |
| 68000pF(683) | ±5%(J) | | | GRM31M7U1H683JA01L |
| 82000pF(823) | ±5%(J) | | | GRM31M7U1H823JA01L |
| 100000pF(104) | ±5%(J) | | | GRM31M7U1H104JA01L |



Temperature Compensating Type P2H(6P), R2H(6R) Characteristics

| TC | | P2H | R2 | ΣH | |
|-----------------------|---------------------|----------------------------|----------------------------|----------------------------|--|
| LxW [mm] | | 1.0x0.5(15)<0402> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> | |
| Rated Volt. [Vdc] | | 50(1H) | 25(1E) | 50(1H) | |
| Capacitance Tolerance | | Part Number | | | |
| 1.0pF(1R0) | ±0.25pF(C) | GRM1556P1H1R0CZ01D | GRM0336R1E1R0CD01D | GRM1556R1H1R0CD01E | |
| 2.0pF(2R0) | ±0.25pF(C) | GRM1556P1H2R0CZ01D | GRM0336R1E2R0CD01D | GRM1556R1H2R0CZ01D | |
| 3.0pF(3R0) | ±0.25pF(C) | GRM1556P1H3R0CZ01D | GRM0336R1E3R0CD01D | GRM1556R1H3R0CZ01E | |
| 4.0pF(4R0) | ±0.25pF(C) | GRM1556P1H4R0CZ01D | GRM0336R1E4R0CD01D | GRM1556R1H4R0CZ01D | |
| 5.0pF(5R0) | ±0.25pF(C) | GRM1556P1H5R0CZ01D | GRM0336R1E5R0CD01D | GRM1556R1H5R0CZ01D | |
| 6.0pF(6R0) | ±0.5pF(D) | GRM1556P1H6R0DZ01D | GRM0336R1E6R0DD01D | GRM1556R1H6R0DZ01D | |
| 7.0pF(7R0) | ±0.5pF(D) | GRM1556P1H7R0DZ01D | GRM0336R1E7R0DD01D | GRM1556R1H7R0DZ01D | |
| 8.0pF(8R0) | ±0.5pF(D) | GRM1556P1H8R0DZ01D | GRM0336R1E8R0DD01D | GRM1556R1H8R0DZ01E | |
| 9.0pF(9R0) | ±0.5pF(D) | GRM1556P1H9R0DZ01D | GRM0336R1E9R0DD01D | GRM1556R1H9R0DZ01D | |
| 10pF(100) | ±5%(J) | GRM1556P1H100JZ01D | GRM0336R1E100JD01D | GRM1556R1H100JZ01D | |
| 12pF(120) | ±5%(J) | GRM1556P1H120JZ01D | GRM0336R1E120JD01D | GRM1556R1H120JZ01D | |
| 15pF(150) | ±5%(J) | GRM1556P1H150JZ01D | GRM0336R1E150JD01D | GRM1556R1H150JZ01D | |
| 18pF(180) | ±5%(J) | GRM1556P1H180JZ01D | GRM0336R1E180JD01D | GRM1556R1H180JZ01D | |
| 22pF(220) | ±5%(J) | GRM1556P1H220JZ01D | GRM0336R1E220JD01D | GRM1556R1H220JZ01D | |
| 27pF(270) | ±5%(J) | GRM1556P1H270JZ01D | GRM0336R1E270JD01D | GRM1556R1H270JZ01D | |
| 33pF(330) | ±5%(J) | | GRM0336R1E330JD01D | GRM1556R1H330JZ01D | |
| 39pF(390) | ±5%(J) | | GRM0336R1E390JD01D | | |
| 47pF(470) | ±5%(J) | | GRM0336R1E470JD01D | | |
| 56pF(560) | ±5%(J) | | GRM0336R1E560JD01D | | |
| 68pF(680) | ±5%(J) | | GRM0336R1E680JD01D | | |
| 82pF(820) | ±5%(J) | | GRM0336R1E820JD01D | | |
| 100pF(101) | ±5%(J) | | GRM0336R1E101JD01D | | |









Temperature Compensating Type S2H(6S), T2H(6T) Characteristics

| TC | | S2H | | T2H | |
|---------------------|---|----------------------------|----------------------------|----------------------------|----------------------------|
| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
| Rated Volt. [Vdc | Rated Volt. [Vdc] 25(1E) 50(1H) | | 50(1H) | 25(1E) | 50(1H) |
| Capacitance | Tolerance | | Part N | umber | |
| 1.0pF(1R0) | ±0.25pF(C) | GRM0336S1E1R0CD01D | GRM1556S1H1R0CD01D | GRM0336T1E1R0CD01D | GRM1556T1H1R0CD01D |
| 2.0pF(2R0) | ±0.25pF(C) | GRM0336S1E2R0CD01D | GRM1556S1H2R0CZ01D | GRM0336T1E2R0CD01D | GRM1556T1H2R0CD01D |
| 3.0pF(3R0) | ±0.25pF(C) | GRM0336S1E3R0CD01D | GRM1556S1H3R0CZ01D | GRM0336T1E3R0CD01D | GRM1556T1H3R0CD01D |
| 4.0pF(4R0) | ±0.25pF(C) | GRM0336S1E4R0CD01D | GRM1556S1H4R0CZ01D | GRM0336T1E4R0CD01D | GRM1556T1H4R0CD01D |
| 5.0pF(5R0) | ±0.25pF(C) | GRM0336S1E5R0CD01D | GRM1556S1H5R0CZ01D | GRM0336T1E5R0CD01D | GRM1556T1H5R0CD01D |
| 6.0pF(6R0) | ±0.5pF(D) | GRM0336S1E6R0DD01D | GRM1556S1H6R0DZ01D | GRM0336T1E6R0DD01D | GRM1556T1H6R0DD01D |
| 7.0pF(7R0) | ±0.5pF(D) | GRM0336S1E7R0DD01D | GRM1556S1H7R0DZ01D | GRM0336T1E7R0DD01D | GRM1556T1H7R0DD01D |
| 8.0pF(8R0) | ±0.5pF(D) | GRM0336S1E8R0DD01D | GRM1556S1H8R0DZ01D | GRM0336T1E8R0DD01D | GRM1556T1H8R0DD01D |
| 9.0pF(9R0) | ±0.5pF(D) | GRM0336S1E9R0DD01D | GRM1556S1H9R0DZ01D | GRM0336T1E9R0DD01D | GRM1556T1H9R0DD01D |
| 10pF(100) | ±5%(J) | GRM0336S1E100JD01D | GRM1556S1H100JZ01D | GRM0336T1E100JD01D | GRM1556T1H100JD01D |
| 12pF(120) | ±5%(J) | GRM0336S1E120JD01D | GRM1556S1H120JZ01D | GRM0336T1E120JD01D | GRM1556T1H120JD01D |
| 15pF(150) | ±5%(J) | GRM0336S1E150JD01D | GRM1556S1H150JZ01D | GRM0336T1E150JD01D | GRM1556T1H150JD01D |
| 18pF(180) | ±5%(J) | GRM0336S1E180JD01D | GRM1556S1H180JZ01D | GRM0336T1E180JD01D | GRM1556T1H180JD01D |
| 22pF(220) | ±5%(J) | GRM0336S1E220JD01D | GRM1556S1H220JZ01D | GRM0336T1E220JD01D | GRM1556T1H220JD01D |
| 27pF(270) | ±5%(J) | GRM0336S1E270JD01D | GRM1556S1H270JZ01D | GRM0336T1E270JD01D | GRM1556T1H270JD01D |
| 33pF(330) | ±5%(J) | GRM0336S1E330JD01D | GRM1556S1H330JZ01D | GRM0336T1E330JD01D | GRM1556T1H330JD01D |
| 39pF(390) | ±5%(J) | GRM0336S1E390JD01D | GRM1556S1H390JZ01D | GRM0336T1E390JD01D | GRM1556T1H390JD01D |
| 47pF(470) | ±5%(J) | GRM0336S1E470JD01D | | GRM0336T1E470JD01D | GRM1556T1H470JD01D |
| 56pF(560) | ±5%(J) | GRM0336S1E560JD01D | | GRM0336T1E560JD01D | GRM1556T1H560JD01D |
| 68pF(680) | ±5%(J) | GRM0336S1E680JD01D | | GRM0336T1E680JD01D | GRM1556T1H680JD01D |
| 82pF(820) | ±5%(J) | GRM0336S1E820JD01D | | GRM0336T1E820JD01D | GRM1556T1H820JD01D |
| 100pF(101) | ±5%(J) | GRM0336S1E101JD01D | | GRM0336T1E101JD01D | GRM1556T1H101JD01D |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



| L v/M/ [mama] | | 0.4.0.2(00) .01005 |
|-----------------------|------------------|-----------------------------|
| LxW [mm] | | 0.4x0.2(02)<01005> |
| Rated Volt. [Vdc |] | 10(1A) |
| Capacitance Tolerance | | Part Number |
| 68pF(680) | ±10%(K) | GRM022R71A680KA01L |
| 100pF(101) | ±10%(K) | GRM022R71A101KA01L |
| 150pF(151) | ±10%(K) | GRM022R71A151KA01L |
| 220pF(221) | ±10%(K) | GRM022R71A221KA01L |
| 330pF(331) | ±10%(K) | GRM022R71A331KA01L |
| 470pF(471) | ±10%(K) | GRM022R71A471KA01L |

| LxW [mm] | | 0.6x0.3(03)<0201> | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc] | | 25(1E) | 16(1C) | 10(1A) | 6.3 (0J) |
| Capacitance | Tolerance | | Part N | lumber | |
| 100pF(101) | ±10%(K) | GRM033R71E101KA01D | GRM033R71C101KA01D | | |
| 150pF(151) | ±10%(K) | GRM033R71E151KA01D | GRM033R71C151KA01D | | |
| 220pF(221) | ±10%(K) | GRM033R71E221KA01D | GRM033R71C221KA01D | | |
| 330pF(331) | ±10%(K) | GRM033R71E331KA01D | GRM033R71C331KA01D | | |
| 470pF(471) | ±10%(K) | GRM033R71E471KA01D | GRM033R71C471KA01D | | |
| 680pF(681) | ±10%(K) | GRM033R71E681KA01D | GRM033R71C681KA01D | | |
| 1000pF(102) | ±10%(K) | GRM033R71E102KA01D | GRM033R71C102KA01D | | |
| 1500pF(152) | ±10%(K) | GRM033R71E152KA01D | GRM033R71C152KA01D | | |
| 2200pF(222) | ±10%(K) | | GRM033R71C222KA88D | GRM033R71A222KA01D | |
| 3300pF(332) | ±10%(K) | | GRM033R71C332KA88D | GRM033R71A332KA01D | |
| 4700pF(472) | ±10%(K) | | | GRM033R71A472KA01D | GRM033R70J472KA01D |
| 6800pF(682) | ±10%(K) | | | GRM033R71A682KA01D | GRM033R70J682KA01D |
| 10000pF(103) | ±10%(K) | | | GRM033R71A103KA01D | GRM033R70J103KA01D |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

1 Product ID 2 Series 5 Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging



| LxW [mm] 1.0x0.5(15)<0402> | | | | | | | |
|-------------------------------------|------------------|--------------------|--------------------|--------------------|---------------------|--|--|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) | 25(1E) | 16(1C) | | |
| Capacitance | Tolerance | | Part Number | | | | |
| 220pF(221) | ±10%(K) | GRM155R72A221KA01D | GRM155R71H221KA01D | | | | |
| 330pF(331) | ±10%(K) | GRM155R72A331KA01D | GRM155R71H331KA01D | | | | |
| 470pF(471) | ±10%(K) | GRM155R72A471KA01D | GRM155R71H471KA01D | | | | |
| 680pF(681) | ±10%(K) | GRM155R72A681KA01D | GRM155R71H681KA01D | | | | |
| 1000pF(102) | ±10%(K) | GRM155R72A102KA01D | GRM155R71H102KA01D | | | | |
| 1500pF(152) | ±10%(K) | GRM155R72A152KA01D | GRM155R71H152KA01D | | | | |
| 2200pF(222) | ±10%(K) | GRM155R72A222KA01D | GRM155R71H222KA01D | | | | |
| 3300pF(332) | ±10%(K) | GRM155R72A332KA01D | GRM155R71H332KA01D | | | | |
| 4700pF(472) | ±10%(K) | GRM155R72A472KA01D | GRM155R71H472KA01D | GRM155R71E472KA01D | | | |
| 6800pF(682) | ±10%(K) | | GRM155R71H682KA88D | GRM155R71E682KA01D | | | |
| 10000pF(103) | ±10%(K) | | GRM155R71H103KA88D | GRM155R71E103KA01D | | | |
| 15000pF(153) | ±10%(K) | | GRM155R71H153KA12D | GRM155R71E153KA61D | GRM155R71C153KA01D | | |
| 22000pF(223) | ±10%(K) | | GRM155R71H223KA12D | GRM155R71E223KA61D | GRM155R71C223KA01D | | |
| 33000pF(333) | ±10%(K) | | | GRM155R71E333KA88D | GRM155R71C333KA01D | | |
| 47000pF(473) | ±10%(K) | | | GRM155R71E473KA88D | GRM155R71C473KA01D | | |
| 68000pF(683) | ±10%(K) | | | | GRM155R71C683KA88D | | |
| 0.10μF(104) | ±10%(K) | | | | GRM155R71C104KA88D | | |
| 0.15μF(154) | ±10%(K) | | | | GRM155R71C154KA12D* | | |
| 0.22μF(224) | ±10%(K) | | | | GRM155R71C224KA12D* | | |

| LxW [mm] | | 1.0x0.5(15)<0402> |
|-----------------------|------------------|----------------------------|
| Rated Volt. [Vdc |] | 10(1A) |
| Capacitance Tolerance | | Part Number |
| 68000pF(683) | ±10%(K) | GRM155R71A683KA01D |
| 0.10μF(104) | ±10%(K) | GRM155R71A104KA01D |

The part number code is shown in () and Unit is shown in [].

^{*} Please refer to GRM Series Specifications and Test Method (2).

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

| LxW [mm] | | | 1.6x0.8(1 | 8)<0603> | |
|-----------------------|------------------|--------------------|--------------------|---------------------|---------------------|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) | 25(1E) | 16(1C) |
| Capacitance | Tolerance | | Part N | lumber | |
| 220pF(221) | ±10%(K) | GRM188R72A221KA01D | GRM188R71H221KA01D | | |
| 330pF(331) | ±10%(K) | GRM188R72A331KA01D | GRM188R71H331KA01D | | |
| 470pF(471) | ±10%(K) | GRM188R72A471KA01D | GRM188R71H471KA01D | | |
| 680pF(681) | ±10%(K) | GRM188R72A681KA01D | GRM188R71H681KA01D | | |
| 1000pF(102) | ±10%(K) | GRM188R72A102KA01D | GRM188R71H102KA01D | | |
| 1500pF(152) | ±10%(K) | GRM188R72A152KA01D | GRM188R71H152KA01D | | |
| 2200pF(222) | ±10%(K) | GRM188R72A222KA01D | GRM188R71H222KA01D | GRM188R71E222KA01D | |
| 3300pF(332) | ±10%(K) | GRM188R72A332KA01D | GRM188R71H332KA01D | GRM188R71E332KA01D | |
| 4700pF(472) | ±10%(K) | GRM188R72A472KA01D | GRM188R71H472KA01D | GRM188R71E472KA01D | |
| 6800pF(682) | ±10%(K) | GRM188R72A682KA01D | GRM188R71H682KA01D | GRM188R71E682KA01D | |
| 10000pF(103) | ±10%(K) | GRM188R72A103KA01D | GRM188R71H103KA01D | GRM188R71E103KA01D | |
| 15000pF(153) | ±10%(K) | | GRM188R71H153KA01D | GRM188R71E153KA01D | |
| 22000pF(223) | ±10%(K) | | GRM188R71H223KA01D | GRM188R71E223KA01D | |
| 33000pF(333) | ±10%(K) | | GRM188R71H333KA61D | GRM188R71E333KA01D | |
| 47000pF(473) | ±10%(K) | | GRM188R71H473KA61D | GRM188R71E473KA01D | |
| 68000pF(683) | ±10%(K) | | GRM188R71H683KA93D | GRM188R71E683KA01D | |
| 0.10μF(104) | ±10%(K) | GRM188R72A104KA35D | GRM188R71H104KA93D | GRM188R71E104KA01D | |
| 0.15μF(154) | ±10%(K) | | | GRM188R71E154KA01D | GRM188R71C154KA01D |
| 0.22μF(224) | ±10%(K) | | | GRM188R71E224KA88D | GRM188R71C224KA01D |
| 0.33μF(334) | ±10%(K) | | | | GRM188R71C334KA01D |
| 0.47μF(474) | ±10%(K) | | | GRM188R71E474KA12D* | GRM188R71C474KA88D |
| 0.68μF(684) | ±10%(K) | | | | GRM188C71C684KA12D* |
| 1.0μF(105) | ±10%(K) | | | GRM188R71E105KA12D* | GRM188R71C105KA12D* |

| LxW [mm] | | 1.6x0.8(18)<0603> | | | |
|----------------------|------------------|----------------------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc] | | 10(1A) 6.3(0J) | | 4(0G) | |
| Capacitance | Tolerance | Part Number | | | |
| 0.33μF(334) | ±10%(K) | GRM188R71A334KA61D | | | |
| 0.47μF(474) | ±10%(K) | GRM188R71A474KA61D | | | |
| 0.68μF(684) | ±10%(K) | GRM188R71A684KA61D | | | |
| 1.0μF(105) | ±10%(K) | GRM188R71A105KA61D* | | | |
| 2.2μF(225) | ±10%(K) | GRM188R71A225KE15D* | GRM188C70J225KE20D* | GRM188C70G225KE20D* | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

3 Dimensions (LxW)6 Rated Voltage9 Individual Specification Code

Dimension (T)CapacitancePackaging



^{*} Please refer to GRM Series Specifications and Test Method (2).

High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

| LxW [mm] 2.0x1.25(21)<0805> | | | 21)<0805> | | |
|--------------------------------------|------------------|--------------------|--------------------|---------------------|---------------------|
| Rated Volt. [Vdc |] | 100(2A) | 50(1H) | 25(1E) | 16(1C) |
| Capacitance | Tolerance | | Part N | umber | |
| 6800pF(682) | ±10%(K) | GRM219R72A682KA01D | | | |
| 10000pF(103) | ±10%(K) | GRM21BR72A103KA01L | | | |
| 15000pF(153) | ±10%(K) | GRM21BR72A153KA01L | | | |
| 22000pF(223) | ±10%(K) | GRM21BR72A223KA01L | | | |
| 33000pF(333) | ±10%(K) | GRM21BR72A333KA01L | GRM219R71H333KA01D | | |
| 47000pF(473) | ±10%(K) | GRM21BR72A473KA01L | GRM21BR71H473KA01L | | |
| 68000pF(683) | ±10%(K) | | GRM21BR71H683KA01L | GRM219R71E683KA01D | |
| 0.10μF(104) | ±10%(K) | | GRM21BR71H104KA01L | GRM21BR71E104KA01L | |
| 0.15μF(154) | ±10%(K) | | GRM21BR71H154KA01L | GRM21BR71E154KA01L | |
| 0.22μF(224) | ±10%(K) | GRM21AR72A224KAC5L | GRM21BR71H224KA01L | GRM21BR71E224KA01L | |
| 0.33μF(334) | ±10%(K) | GRM21AR72A334KAC5L | GRM219R71H334KA88D | GRM21BR71E334KA01L | |
| 0.47μF(474) | ±10%(K) | GRM21BR72A474KA73L | GRM21BR71H474KA88L | GRM219R71E474KA88D | |
| 0.68μF(684) | ±10%(K) | | | GRM219R71E684KA88D | GRM219R71C684KA01D |
| 1.0μF(105) | ±10%(K) | | GRM21BR71H105KA12L | GRM21BR71E105KA99L | GRM21BR71C105KA01L |
| | | | | GRM219R71E105KA88D | |
| 2.2μF(225) | ±10%(K) | | | GRM21BR71E225KA73L* | GRM21BR71C225KA12L |
| 4.7μF(475) | ±10%(K) | | | | GRM21BR71C475KA73L* |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | |
|---------------------|------------------|----------------------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 10(1A) 6.3(0J) | | 4(0G) | |
| Capacitance | Tolerance | | | | |
| 2.2μF(225) | ±10%(K) | GRM21BR71A225KA01L | | | |
| 4.7μF(475) | ±10%(K) | GRM21BR71A475KA73L* | | | |
| 10μF(106) | ±10%(K) | GRM21BR71A106KE51L* | GRM21BR70J106KE76L* | | |
| 22μF(226) | ±20%(M) | | | GRM21BE70G226ME51L* | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

^{*} Please refer to GRM Series Specifications and Test Method (2).

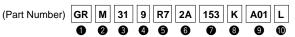
High Dielectric Constant Type X7R(R7)/X7U(E7) Characteristics

| LxW [mm] | | 3.2x1.6 (31) <1206> | | | | |
|-----------------------|------------------|----------------------------|--------------------|---------------------|--------------------|--|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) | 25(1E) | 16(1C) | |
| Capacitance | Tolerance | | Part N | umber | | |
| 15000pF(153) | ±10%(K) | GRM319R72A153KA01L | | | | |
| 22000pF(223) | ±10%(K) | GRM31MR72A223KA01L | | | | |
| 33000pF(333) | ±10%(K) | GRM31MR72A333KA01L | | | | |
| 47000pF(473) | ±10%(K) | GRM31MR72A473KA01L | | | | |
| 68000pF(683) | ±10%(K) | GRM31MR72A683KA01L | | | | |
| 0.10μF(104) | ±10%(K) | GRM319R72A104KA01D | | | | |
| 0.15μF(154) | ±10%(K) | GRM31MR72A154KA01L | GRM31MR71H154KA01L | | | |
| 0.22μF(224) | ±10%(K) | GRM31MR72A224KA01L | GRM31MR71H224KA01L | | | |
| 0.33μF(334) | ±10%(K) | | GRM319R71H334KA01D | GRM319R71E334KA01D | | |
| 0.47μF(474) | ±10%(K) | GRM31MR72A474KA35L | GRM31MR71H474KA01L | GRM319R71E474KA01D | | |
| 0.68μF(684) | ±10%(K) | GRM31MR72A684KA35L | GRM31MR71H684KA88L | GRM319R71E684KA01D | | |
| 1.0μF(105) | ±10%(K) | GRM31CR72A105KA01L | GRM31MR71H105KA88L | | | |
| 2.2μF(225) | ±10%(K) | | GRM31CR71H225KA88L | GRM31MR71E225KA93L | GRM31MR71C225KA35L | |
| 4.7μF(475) | ±10%(K) | | GRM31CR71H475KA12L | GRM31CR71E475KA88L | GRM31CR71C475KA01L | |
| 10μF(106) | ±10%(K) | | | GRM31CR71E106KA12L* | GRM31CR71C106KAC7L | |

| LxW [mm] | | 3.2x1.6(31)<1206> | | | |
|--------------------|------------------|----------------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 10(1A) | 4(0G) | | |
| Capacitance | Tolerance | | | | |
| 10μF(106) | ±10%(K) | GRM31CR71A106KA01L | | | |
| 22μF(226) | ±20%(M) | GRM31CR71A226ME15L* | GRM31CR70J226ME19L* | | |
| 47μF(476) | ±20%(M) | | | GRM31CE70G476ME15L* | |

| LxW [mm] | | 3.2x2.5 (32) <1210> | | | |
|----------------------|------------------|----------------------------|--------------------|--------------------|---------------------|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) | 35(YA) | 25(1E) |
| Capacitance | Tolerance | Part Number | | | |
| 0.68μF(684) | ±10%(K) | GRM32CR72A684KA01L | | | |
| 1.0μF(105) | ±10%(K) | GRM32CR72A105KA35L | | | |
| 2.2μF(225) | ±10%(K) | GRM32ER72A225KA35L | | | |
| 4.7μF(475) | ±10%(K) | | GRM32ER71H475KA88L | | |
| 10μF(106) | ±10%(K) | | | GRM32ER7YA106KA12L | GRM32DR71E106KA12L |
| 22μF(226) | ±20%(M) | | | | GRM32ER71E226ME15L* |

| LxW [mm] | | 3.2x2.5(32)<1210> | | | | |
|---------------------|------------------|---|---------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 16(1C) 10(1A) 6.3(0J) 4(0G) | | | 4(0G) | |
| Capacitance | Tolerance | Part Number | | | | |
| 22μF(226) | ±20%(M) | GRM32ER71C226MEA8L* | GRM32ER71A226ME20L* | | | |
| 47μF(476) | ±20%(M) | | GRM32ER71A476ME15L* | GRM32ER70J476ME20L* | | |
| 100μF(107) | ±20%(M) | | | | GRM32EE70G107ME19L* | |



Product IDSeriesTemperature CharacteristicsCapacitance Tolerance





^{*} Please refer to GRM Series Specifications and Test Method (2).

High Dielectric Constant Type X7R(R7)/X7T(D7) Characteristics-Low Profile

| LxW [mm] | | | 1.0x0.5(15)<0402> | | 1.6x0.8(18)<0603> |
|-----------------------|------------------|--------------------|----------------------------|--------------------|----------------------------|
| Rated Volt. [Vdc] | | 50(1H) | 25(1E) | 16(1C) | 10(1A) |
| Capacitance | Tolerance | | Part N | umber | |
| 220pF(221) | ±10%(K) | GRM15XR71H221KA86D | | | |
| 330pF(331) | ±10%(K) | GRM15XR71H331KA86D | | | |
| 470pF(471) | ±10%(K) | GRM15XR71H471KA86D | | | |
| 680pF(681) | ±10%(K) | GRM15XR71H681KA86D | | | |
| 1000pF(102) | ±10%(K) | GRM15XR71H102KA86D | | | |
| 1500pF(152) | ±10%(K) | GRM15XR71H152KA86D | | | |
| 2200pF(222) | ±10%(K) | | GRM15XR71E222KA86D | | |
| 3300pF(332) | ±10%(K) | | | GRM15XR71C332KA86D | |
| 4700pF(472) | ±10%(K) | | | GRM15XR71C472KA86D | |
| 6800pF(682) | ±10%(K) | | | GRM15XR71C682KA86D | |
| 10000pF(103) | ±10%(K) | | | GRM15XR71C103KA86D | |
| 1.0μF(105) | ±10%(K) | | | | GRM185D71A105KE36D |

| LxW [mm] | | 2.0x1.25 (21) <0805> | | | | |
|-----------------------|------------------|--|--------------------|--------------------|--------------------|--|
| Rated Volt. [Vdc | :] | 100(2A) 50(1H) 25(1E) 16(1C | | | | |
| Capacitance | Tolerance | | Part N | umber | | |
| 6800pF(682) | ±10%(K) | GRM219R72A682KA01D | | | | |
| 33000pF(333) | ±10%(K) | | GRM219R71H333KA01D | | | |
| 68000pF(683) | ±10%(K) | | | GRM219R71E683KA01D | | |
| 0.22μF(224) | ±10%(K) | GRM21AR72A224KAC5L | | | | |
| 0.33μF(334) | ±10%(K) | GRM21AR72A334KAC5L | GRM219R71H334KA88D | | | |
| 0.47μF(474) | ±10%(K) | | | GRM219R71E474KA88D | | |
| 0.68μF(684) | ±10%(K) | | | GRM219R71E684KA88D | GRM219R71C684KA01D | |
| 1.0μF(105) | ±10%(K) | | | GRM219R71E105KA88D | | |

| LxW [mm] Rated Volt. [Vdc] | | 3.2x1.6 (31)<1206> | | | | |
|-----------------------------|------------------|----------------------------|--------------------|--------------------|----------------------|--|
| | | 100(2A) | 50(1H) | 25(1E) | 16(1C) | |
| Capacitance | Tolerance | | Part N | umber | | |
| 15000pF(153) | ±10%(K) | GRM319R72A153KA01L | | | | |
| 22000pF(223) | ±10%(K) | GRM31MR72A223KA01L | | | | |
| 33000pF(333) | ±10%(K) | GRM31MR72A333KA01L | | | | |
| 47000pF(473) | ±10%(K) | GRM31MR72A473KA01L | | | | |
| 68000pF(683) | ±10%(K) | GRM31MR72A683KA01L | | | | |
| 0.10μF(104) | ±10%(K) | GRM319R72A104KA01D | | | | |
| 0.15μF(154) | ±10%(K) | GRM31MR72A154KA01L | GRM31MR71H154KA01L | | | |
| 0.22μF(224) | ±10%(K) | GRM31MR72A224KA01L | GRM31MR71H224KA01L | | | |
| 0.33μF(334) | ±10%(K) | | GRM319R71H334KA01D | | | |
| 0.47μF(474) | ±10%(K) | GRM31MR72A474KA35L | GRM31MR71H474KA01L | | | |
| 0.68μF(684) | ±10%(K) | GRM31MR72A684KA35L | GRM31MR71H684KA88L | | | |
| 1.0μF(105) | ±10%(K) | | GRM31MR71H105KA88L | | | |
| 2.2μF(225) | ±10%(K) | | | GRM31MR71E225KA93L | GRM31MR71C225KA35L | |
| 4.7μF(475) | ±10%(K) | | | | GRM319D71C475KA12D*# | |

| LxW [mm] | | 3.2x2.5(32)<1210> | | |
|----------------------|------------------|----------------------------|--------------------|--|
| Rated Volt. [Vdc |] | 100 (2A) | 50(1H) | |
| Capacitance | Tolerance | Part Number | | |
| 0.68μF(684) | ±10%(K) | GRM32CR72A684KA01L | GRM32NR71H684KA01L | |
| 1.0μF(105) | ±10%(K) | GRM32CR72A105KA35L | | |

The part number code is shown in () and Unit is shown in [].



^{*} Please refer to GRM Series Specifications and Test Method (2).

^{*} These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

| LxW [mm] | | 0.6x0.3(03)<0201> | | |
|-----------------------|------------------|----------------------------|---------------------|--|
| Rated Volt. [Vdc |] | 6.3 (0J) | 4(0G) | |
| Capacitance | Tolerance | Part Number | | |
| 15000pF(153) | ±10%(K) | GRM033C80J153KE01D* | GRM033C80G153KE01D* | |
| 22000pF(223) | ±10%(K) | GRM033C80J223KE01D* | GRM033C80G223KE01D* | |
| 33000pF(333) | ±10%(K) | GRM033C80J333KE01D* | GRM033C80G333KE01D* | |
| 47000pF(473) | ±10%(K) | GRM033C80J473KE19D* | GRM033C80G473KE01D* | |

| LxW [mm] 1.0x0.5(15)<0402> | | | | | | |
|-------------------------------------|--|--------------------|----------------------|---------------------|--|--|
| Rated Volt. [Vdc | d Volt. [Vdc] 25(1E) 6.3(0J) | | | | | |
| Capacitance | Tolerance | | Part Number | | | |
| 68000pF(683) | ±10%(K) | GRM155C81E683KA12D | | | | |
| 0.10μF(104) | ±10%(K) | GRM155C81E104KA12D | | | | |
| 0.15μF(154) | ±10%(K) | | GRM155C80J154KE01D* | GRM155C80G154KE01D* | | |
| 0.22μF(224) | ±10%(K) | | GRM155C80J224KE01D* | GRM155C80G224KE01D* | | |
| 0.33μF(334) | ±10%(K) | | GRM155C80J334KE01D* | GRM155C80G334KE01D* | | |
| 0.47μF(474) | ±10%(K) | | GRM155C80J474KE19D* | GRM155C80G474KE01D* | | |
| 0.68μF(684) | ±10%(K) | | GRM155C80J684KE15D*# | GRM155C80G684KE19D* | | |

| LxW [mm] | | 1.6x0.8(18)<0603> | | | | |
|---------------------|------------------|----------------------------|---------------------|---------------------|----------------------|--|
| Rated Volt. [Vdc] | | 25(1E) | 10(1A) | 6.3(0J) | 4(0G) | |
| Capacitance | Tolerance | | Part Number | | | |
| 1.0μF(105) | ±10%(K) | GRM188C81E105KAADD | | | | |
| 2.2μF(225) | ±10%(K) | | GRM188C81A225KE34D* | GRM188C80J225KE19D* | | |
| 4.7μF(475) | ±10%(K) | | | | GRM188C80G475KE19D* | |
| 10μF(106) | ±20%(M) | | | | GRM188C80G106ME47D*# | |

| LxW [mm] | | 1.6x0.8(18)<0603> | |
|-----------------------|------------------|----------------------------|--|
| Rated Volt. [Vdc |] | 2.5(0E) | |
| Capacitance Tolerance | | Part Number | |
| 10μF(106) | ±20%(M) | GRM188C80E106ME47D* | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | |
|---|------------------|-----------------------------|---------------------|---------------------|----------------------|--|
| Rated Volt. [Vdc] 25(1E) 16(1C) | | | 16(1C) | 10(1A) | 6.3(0J) | |
| Capacitance | Tolerance | | Part Number | | | |
| 1.0μF(105) | ±10%(K) | | GRM216C81C105KA12D* | | | |
| 2.2μF(225) | ±10%(K) | | GRM219C81C225KA12D* | | | |
| 4.7μF(475) | ±10%(K) | GRM21BC81E475KA12L* | GRM21BC81C475KA88L* | GRM219C81A475KE34D* | GRM219C80J475KE19D* | |
| 10μF(106) | ±10%(K) | | | GRM21BC81A106KE18L* | GRM21BC80J106KE19L* | |
| | | | | | GRM219C80J106KE39D* | |
| 22μF(226) | ±20%(M) | | | | GRM21BC80J226ME51L*# | |

| LxW [mm] | | 2.0x1.25(21)<0805> | |
|-----------------------|------------------|-----------------------------|--|
| Rated Volt. [Vdc | | 4(0G) | |
| Capacitance Tolerance | | Part Number | |
| 22μF(226) | ±20%(M) | GRM21BC80G226ME39L* | |

(Part Number) GR M 03 3 C8 0J 153 K E01 D

1 2 3 4 5 6 7 8 9 10

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3Dimensions (LxW)6Rated Voltage9Individual Specification Code

4 Dimension (T)7 Capacitance10 Packaging



^{*} Please refer to GRM Series Specifications and Test Method (2).

^{*}These Part Numbers have individual testing conditions on Durability of GRM Series Specifications and Test Methods (2). Please refer to P60.

High Dielectric Constant Type X6S(C8)/X6T(D8) Characteristics

| LxW [mm] | | 3.2x1.6(31)<1206> | | | | |
|---------------------|------------------|----------------------------|---------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc] | | 25(1E) | 16(1C) | 10(1A) | 6.3(0J) | |
| Capacitance | Tolerance | Part Number | | | | |
| 2.2μF(225) | ±10%(K) | | GRM316C81C225KA12D* | | | |
| 4.7μF(475) | ±10%(K) | | GRM319C81C475KA12D* | | | |
| 10μF(106) | ±10%(K) | GRM31CC81E106KE15L* | GRM31MC81C106KA12L | GRM319C81A106KA12D | GRM319C80J106KE19D* | |
| 22μF(226) | ±20%(M) | | | GRM31CC81A226ME19L* | GRM31CC80J226ME19L* | |
| 47μF(476) | ±20%(M) | | | | GRM31CC80J476ME18L* | |

| LxW [mm] | | 3.2x1.6(31)<1206> |
|---------------------|------------------|----------------------------|
| Rated Volt. [Vdc |] | 4(0G) |
| Capacitance | Tolerance | Part Number |
| 47μF(476) | ±20%(M) | GRM31CC80G476ME19L* |
| 100μF(107) | ±20%(M) | GRM31CD80G107ME39L* |

| LxW [mm] | | 3.2x2.5 (32)<1210> | | | |
|---------------------|------------------|---|---------------------|---------------------|---------------------|
| Rated Volt. [Vdc] | | 25(1E) 10(1A) 6.3(0J) 4(0G) | | | |
| Capacitance | Tolerance | Part Number | | | |
| 10μF(106) | ±10%(K) | GRM32DC81E106KA12L | | | |
| 22μF(226) | ±20%(M) | GRM32EC81E226ME15L* | GRM32NC81A226ME19L* | | |
| 47μF(476) | ±20%(M) | | GRM32EC81A476ME19L* | GRM32EC80J476ME64L* | |
| 100μF(107) | ±20%(M) | | | GRM32EC80J107ME20L* | GRM32EC80G107ME20L* |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

High Dielectric Constant Type X6S(C8) Characteristics-Low Profile

| LxW [mm] | | 1.6x0.8(18)<0603> | | |
|---------------------|------------------|---------------------------------------|--|--|
| Rated Volt. [Vdc] | | 10(1A) 6.3(0J) | | |
| Capacitance | Tolerance | Part Number | | |
| 1.0μF(105) | ±10%(K) | GRM185C81A105KE36D* GRM185C80J105KE26 | | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | |
|---------------------|------------------|--|---------------------|---------------------|
| Rated Volt. [Vdc |] | 16(1C) 10(1A) 6.3(0J) | | |
| Capacitance | Tolerance | | Part Number | |
| 1.0μF(105) | ±10%(K) | GRM216C81C105KA12D* | | |
| 2.2μF(225) | ±10%(K) | GRM219C81C225KA12D* | | |
| 4.7μF(475) | ±10%(K) | | GRM219C81A475KE34D* | GRM219C80J475KE19D* |
| 10μF(106) | ±10%(K) | | | GRM219C80J106KE39D* |

| LxW [mm] | | 3.2x1.6(31)<1206> | |
|-----------------------|------------------|----------------------------|--|
| Rated Volt. [Vdc] | l | 16(1C) | |
| Capacitance Tolerance | | Part Number | |
| 2.2μF(225) | ±10%(K) | GRM316C81C225KA12D* | |
| 4.7μF(475) | ±10%(K) | GRM319C81C475KA12D* | |

| LxW [mm] | | 3.2x2.5(32)<1210> |
|-----------------------|------------------|----------------------------|
| Rated Volt. [Vdc] | | 25(1E) |
| Capacitance Tolerance | | Part Number |
| 10μF(106) | ±10%(K) | GRM32DC81E106KA12L |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



^{*:} Please refer to GRM Series Specifications and Test Method(2).

^{*} Please refer to GRM Series Specifications and Test Method (2).

| LxW [mm] | | 0.4x0.2(02)<01005> | | |
|-----------------------|------------------|----------------------------------|---------------------|--|
| Rated Volt. [Vdc] | | 10(1A) 6.3(0J) | | |
| Capacitance | Tolerance | Part N | umber | |
| 68pF(680) | ±10%(K) | GRM022R61A680KA01L | | |
| 100pF(101) | ±10%(K) | GRM022R61A101KA01L | | |
| 150pF(151) | ±10%(K) | GRM022R61A151KA01L | | |
| 220pF(221) | ±10%(K) | GRM022R61A221KA01L | | |
| 330pF(331) | ±10%(K) | GRM022R61A331KA01L | | |
| 470pF(471) | ±10%(K) | GRM022R61A471KA01L | | |
| 680pF(681) | ±10%(K) | GRM022R61A681KE19L* | GRM022R60J681KE19L* | |
| 1000pF(102) | ±10%(K) | GRM022R61A102KE19L* | GRM022R60J102KE19L* | |
| 1500pF(152) | ±10%(K) | GRM022R61A152KE19L* | GRM022R60J152KE19L* | |
| 2200pF(222) | ±10%(K) | GRM022R61A222KE19L* | GRM022R60J222KE19L* | |
| 3300pF(332) | ±10%(K) | GRM022R61A332KE19L* | GRM022R60J332KE19L* | |
| 4700pF(472) | ±10%(K) | GRM022R61A472KE19L* | GRM022R60J472KE19L* | |
| 6800pF(682) | ±10%(K) | GRM022R61A682KE19L* | GRM022R60J682KE19L* | |
| 10000pF(103) | ±10%(K) | GRM022R61A103KE19L* | GRM022R60J103KE19L* | |

| LxW [mm] | | 0.6x0.3(03)<0201> | | | |
|-----------------------|------------------|---|-----|--------------------|---------------------|
| Rated Volt. [Vdc |] | 25(1E) 16(1C) 10(1A) 6.3(0 J | | | 6.3(0J) |
| Capacitance | Tolerance | | Par | t Number | |
| 100pF(101) | ±10%(K) | | | | |
| 150pF(151) | ±10%(K) | | | | |
| 220pF(221) | ±10%(K) | | | | |
| 330pF(331) | ±10%(K) | | | | |
| 470pF(471) | ±10%(K) | | | | |
| 680pF(681) | ±10%(K) | | | | |
| 1000pF(102) | ±10%(K) | | | | |
| 1500pF(152) | ±10%(K) | | | GRM033R61A152KA01D | |
| 2200pF(222) | ±10%(K) | | | GRM033R61A222KA01D | |
| 3300pF(332) | ±10%(K) | | | GRM033R61A332KA01D | |
| 4700pF(472) | ±10%(K) | | | GRM033R61A472KA01D | |
| 6800pF(682) | ±10%(K) | | | GRM033R61A682KA01D | |
| 10000pF(103) | ±10%(K) | | | GRM033R61A103KA01D | GRM033R60J103KA01D |
| 15000pF(153) | ±10%(K) | | | | GRM033R60J153KE01D* |
| 22000pF(223) | ±10%(K) | | | | GRM033R60J223KE01D* |
| 33000pF(333) | ±10%(K) | | | | GRM033R60J333KE01D* |
| 47000pF(473) | ±10%(K) | | | | GRM033R60J473KE19D* |

The part number code is shown in () and Unit is shown in []. : Please refer to X7R(R7) etc. Characteristics.

●Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) ⑥Rated Voltage
 ⑤Individual Specification Code
 ⑥Packaging*

4 Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.

*GRM022: D is applicable.



^{*} Please refer to GRM Series Specifications and Test Method (2).

| LxW [mm] | | 1.0x0.5(15)<0402> | | | |
|-----------------------|------------------|---|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc |] | 100(2A) 50(1H) 25(1E) 16([*] | | | 16(1C) |
| Capacitance | Tolerance | | Part N | umber | |
| 220pF(221) | ±10%(K) | | | | |
| 330pF(331) | ±10%(K) | | | | |
| 470pF(471) | ±10%(K) | | | | |
| 680pF(681) | ±10%(K) | | | | |
| 1000pF(102) | ±10%(K) | | GRM155R61H102KA01D | | |
| 1500pF(152) | ±10%(K) | | | | |
| 2200pF(222) | ±10%(K) | | GRM155R61H222KA01D | | |
| 3300pF(332) | ±10%(K) | | | | |
| 4700pF(472) | ±10%(K) | | GRM155R61H472KA01D | | |
| 6800pF(682) | ±10%(K) | | | | |
| 10000pF(103) | ±10%(K) | | | | |
| 15000pF(153) | ±10%(K) | | | | |
| 22000pF(223) | ±10%(K) | | | | GRM155R61C223KA01D |
| 33000pF(333) | ±10%(K) | | | | GRM155R61C333KA01D |
| 47000pF(473) | ±10%(K) | | | | GRM155R61C473KA01D |
| 68000pF(683) | ±10%(K) | | | GRM155R61E683KA87D | GRM155R61C683KA88D |
| 0.10μF(104) | ±10%(K) | | | GRM155R61E104KA87D | GRM155R61C104KA88D |

| LxW [mm] | | 1.0x0.5(15)<0402> | | |
|-----------------------|------------------|----------------------------------|---------------------|--|
| Rated Volt. [Vdc |] | 10(1A) 6.3(0J) | | |
| Capacitance | Tolerance | Part N | umber | |
| 33000pF(333) | ±10%(K) | GRM155R61A333KA01D | | |
| 47000pF(473) | ±10%(K) | GRM155R61A473KA01D | | |
| 68000pF(683) | ±10%(K) | GRM155R61A683KA01D | | |
| 0.10μF(104) | ±10%(K) | GRM155R61A104KA01D | | |
| 0.15μF(154) | ±10%(K) | GRM155R61A154KE19D* | GRM155R60J154KE01D* | |
| 0.22μF(224) | ±10%(K) | GRM155R61A224KE19D* | GRM155R60J224KE01D* | |
| 0.33μF(334) | ±10%(K) | GRM155R61A334KE15D* | GRM155R60J334KE01D* | |
| 0.47μF(474) | ±10%(K) | GRM155R61A474KE15D* | GRM155R60J474KE19D* | |
| 0.68μF(684) | ±10%(K) | GRM155R61A684KE15D* | GRM155R60J684KE19D* | |
| 1.0μF(105) | ±10%(K) | GRM155R61A105KE15D* | | |

The part number code is shown in () and Unit is shown in []. : Please refer to X7R(R7) etc. Characteristics.

< >: EIA [inch] Code

^{*} Please refer to GRM Series Specifications and Test Method (2).

| LxW [mm] | | 1.6x0.8(18)<0603> | | | |
|-----------------------|------------------|----------------------------|--------------------|---------------------|---------------------|
| Rated Volt. [Vdc |] | 100(2A) | 50(1H) | 25(1E) | 16(1C) |
| Capacitance | Tolerance | | Part N | umber | |
| 220pF(221) | ±10%(K) | | | | |
| 330pF(331) | ±10%(K) | | | | |
| 470pF(471) | ±10%(K) | | | | |
| 680pF(681) | ±10%(K) | | | | |
| 1000pF(102) | ±10%(K) | | GRM188R61H102KA01D | | |
| 1500pF(152) | ±10%(K) | | | | |
| 2200pF(222) | ±10%(K) | | GRM188R61H222KA01D | | |
| 3300pF(332) | ±10%(K) | | | | |
| 4700pF(472) | ±10%(K) | | GRM188R61H472KA01D | | |
| 6800pF(682) | ±10%(K) | | | | |
| 10000pF(103) | ±10%(K) | | GRM188R61H103KA01D | | |
| 15000pF(153) | ±10%(K) | | | | |
| 22000pF(223) | ±10%(K) | | GRM188R61H223KA01D | | |
| 33000pF(333) | ±10%(K) | | | | |
| 47000pF(473) | ±10%(K) | | | | |
| 68000pF(683) | ±10%(K) | | | | |
| 0.10μF(104) | ±10%(K) | | | GRM188R61E104KA01D | |
| 0.15μF(154) | ±10%(K) | | | | |
| 0.22μF(224) | ±10%(K) | | | GRM188R61E224KA88D | GRM188R61C224KA88D |
| 0.33μF(334) | ±10%(K) | | | | |
| 0.47μF(474) | ±10%(K) | | | GRM188R61E474KA12D* | GRM188R61C474KA93D* |
| 1.0μF(105) | ±10%(K) | | | GRM188R61E105KA12D* | GRM188R61C105KA93D* |
| 2.2μF(225) | ±10%(K) | | | | GRM188R61C225KE15D* |

| LxW [mm] | | 1.6x0.8(18)<0603> | | | |
|----------------------|------------------|---|---------------------|---------------------|--|
| Rated Volt. [Vdc] | | 10(1A) 6.3(0J) 4(0G) | | | |
| Capacitance | Tolerance | Part Number | | | |
| 0.68μF(684) | ±10%(K) | GRM188R61A684KA61D | | | |
| 2.2μF(225) | ±10%(K) | GRM188R61A225KE34D* | | | |
| 4.7μF(475) | ±10%(K) | | GRM188R60J475KE19D* | | |
| 10μF(106) | ±20%(M) | | GRM188R60J106ME47D* | GRM188R60G106ME47D* | |
| 22μF(226) | ±20%(M) | | | GRM188R60G226MEA0L* | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

3Dimensions (LxW)
6 Rated Voltage
9 Individual Specification Code

Dimension (T)CapacitancePackaging



[:] Please refer to X7R(R7) etc. Characteristics.

^{*} Please refer to GRM Series Specifications and Test Method (2).

| LxW [mm] | | | 2.0x1.25 | (21)<0805> | | |
|-----------------------|------------------|------------------|--|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 100(2A) | 100(2A) 50(1H) 25(1E) | | | |
| Capacitance | Tolerance | | Part I | Number | | |
| 6800pF(682) | ±10%(K) | | | | | |
| 10000pF(103) | ±10%(K) | | | | | |
| 15000pF(153) | ±10%(K) | | | | | |
| 22000pF(223) | ±10%(K) | | | | | |
| 33000pF(333) | ±10%(K) | | | | | |
| 47000pF(473) | ±10%(K) | | | | | |
| 68000pF(683) | ±10%(K) | | | | | |
| 0.10μF(104) | ±10%(K) | | | | | |
| 0.15μF(154) | ±10%(K) | | | | | |
| 0.22μF(224) | ±10%(K) | | | | | |
| 0.33μF(334) | ±10%(K) | | | | | |
| 0.47μF(474) | ±10%(K) | | | | | |
| 0.68μF(684) | ±10%(K) | | | | | |
| 1.0μF(105) | ±10%(K) | | | GRM216R61E105KA12D | GRM21BR61C105KA01L | |
| | | | | | GRM216R61C105KA88D* | |
| 2.2μF(225) | ±10%(K) | | | GRM21BR61E225KA12L | GRM21BR61C225KA88L* | |
| | | | | GRM219R61E225KA12D* | GRM219R61C225KA88D* | |
| 4.7μF(475) | ±10%(K) | | | GRM21BR61E475KA12L* | GRM21BR61C475KA88L* | |
| | | | | | GRM219R61C475KE15D* | |
| 10μF(106) | ±10%(K) | | | | GRM21BR61C106KE15L* | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | |
|---------------------|------------------|----------------------------------|---------------------|---------------------|--|--|
| Rated Volt. [Vdc |] | 10(1A) 6.3(0J) | | 4(0G) | | |
| Capacitance | Tolerance | Part Number | | | | |
| 2.2μF(225) | ±10%(K) | GRM21BR61A225KA01L | | | | |
| 4.7μF(475) | ±10%(K) | GRM21BR61A475KA73L* | GRM21BR60J475KA11L* | | | |
| | | GRM219R61A475KE34D* | | | | |
| 10μF(106) | ±10%(K) | GRM21BR61A106KE19L* | GRM21BR60J106KE19L* | | | |
| | | GRM219R61A106KE44D* | GRM219R60J106KE19D* | | | |
| 22μF(226) | ±20%(M) | | GRM21BR60J226ME39L* | GRM219R60G226ME66D* | | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

[:] Please refer to X7R(R7) etc. Characteristics.

^{*} Please refer to GRM Series Specifications and Test Method (2).

| LxW [mm] | | | 3.2x1.6(3 | 31)<1206> | | |
|-----------------------|------------------|------------------|---|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 100(2A) | 50(1H) 25(1E) 16(1C) | | | |
| Capacitance | Tolerance | | Part N | lumber | | |
| 15000pF(153) | ±10%(K) | | | | | |
| 22000pF(223) | ±10%(K) | | | | | |
| 33000pF(333) | ±10%(K) | | | | | |
| 47000pF(473) | ±10%(K) | | | | | |
| 68000pF(683) | ±10%(K) | | | | | |
| 0.10μF(104) | ±10%(K) | | | | | |
| 0.15μF(154) | ±10%(K) | | | | | |
| 0.22μF(224) | ±10%(K) | | | | | |
| 0.33μF(334) | ±10%(K) | | | | | |
| 0.47μF(474) | ±10%(K) | | | | | |
| 0.68μF(684) | ±10%(K) | | | | | |
| 1.0μF(105) | ±10%(K) | | | | | |
| 2.2μF(225) | ±10%(K) | | GRM31CR61H225KA88L | GRM316R61E225KA12D* | | |
| 4.7μF(475) | ±10%(K) | | | GRM31CR61E475KA88L | GRM31CR61C475KA01L | |
| | | | | GRM319R61E475KA12D* | GRM319R61C475KA88D* | |
| 10μF(106) | ±10%(K) | | | GRM31CR61E106KA12L* | GRM31CR61C106KA88L | |
| | | | | | GRM319R61C106KE15D* | |
| 22μF(226) | ±20%(M) | | | | GRM31CR61C226ME15L* | |

| LxW [mm] | | 3.2x1.6(31)<1206> | | | | |
|---------------------|------------------|---|---------------------|---------------------|--|--|
| Rated Volt. [Vdc |] | 10(1A) 6.3(0J) 4(0G) | | | | |
| Capacitance | Tolerance | Part Number | | | | |
| 10μF(106) | ±10%(K) | GRM319R61A106KE19L* | | | | |
| 22μF(226) | ±20%(M) | GRM31CR61A226ME19L* | GRM31CR60J226ME19L* | | | |
| 47μF(476) | ±20%(M) | GRM31CR61A476ME15L* | GRM31CR60J476ME19L* | | | |
| 100μF(107) | ±20%(M) | | GRM31CR60J107ME39L* | GRM31CR60G107ME39L* | | |

| LxW [mm] | | 3.2x2.5(32)<1210> | | | |
|----------------------|------------------|----------------------------|-----------------|--------------------|---------------------|
| Rated Volt. [Vdc] | | 100(2A) | 50(1H) | 35(YA) | 25(1E) |
| Capacitance | Tolerance | | Part Number | | |
| 0.68μF(684) | ±10%(K) | | | | |
| 1.0μF(105) | ±10%(K) | | | | |
| 2.2μF(225) | ±10%(K) | | | | |
| 4.7μF(475) | ±10%(K) | | | | |
| 10μF(106) | ±10%(K) | | | GRM32ER6YA106KA12L | GRM32DR61E106KA12L |
| 22μF(226) | ±20%(M) | | | | GRM32ER61E226ME15L* |

| LxW [mm] | | | 3.2x2.5(32)<1210> | | | | |
|---|------------------|---------------------|----------------------------|---------------------|--|--|--|
| Rated Volt. [Vdc] 16(1C) 10(1A) | | | 6.3(0J) | | | | |
| Capacitance | Tolerance | | Part Number | | | | |
| 22μF(226) | ±20%(M) | | | | | | |
| 47μF(476) | ±20%(M) | GRM32ER61C476ME15L* | GRM32ER61A476ME20L* | | | | |
| 100μF(107) | ±20%(M) | | | GRM32ER60J107ME20L* | | | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

: Please refer to X7R(R7) etc. Characteristics.

| (Part Number) | GR | M | 31 | С | R6 | 1H | 225 | K | A88 | L | |
|---------------|----|---|----|---|----|----|-----|---|-----|---|--|
| | 0 | 2 | 8 | 4 | 6 | 6 | 0 | 8 | 9 | 1 | |

[●]Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging



^{*} Please refer to GRM Series Specifications and Test Method (2).

High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

| LxW [mm] | | 1.0x0.5(15)<0402> | | | |
|-----------------------|------------------|---|-------------|--|--|
| Rated Volt. [Vdc |] | 16(1C) 25(1E) 16(1C) | | | |
| Capacitance | Tolerance | | Part Number | | |
| 220pF(221) | ±10%(K) | | | | |
| 330pF(331) | ±10%(K) | | | | |
| 470pF(471) | ±10%(K) | | | | |
| 680pF(681) | ±10%(K) | | | | |
| 1000pF(102) | ±10%(K) | | | | |
| 1500pF(152) | ±10%(K) | | | | |
| 2200pF(222) | ±10%(K) | | | | |
| 3300pF(332) | ±10%(K) | | | | |
| 4700pF(472) | ±10%(K) | | | | |
| 6800pF(682) | ±10%(K) | _ | | | |
| 10000pF(103) | ±10%(K) | | | | |

| LxW [mm] | | 1.6x0.8(18)<0603> | | |
|---------------------|------------------|---------------------------------|---------------------|--|
| Rated Volt. [Vdc |] | 16(1C) 10(1A) | | |
| Capacitance | Tolerance | Part Number | | |
| 1.0μF(105) | ±10%(K) | GRM185R61C105KE44D* | GRM185R61A105KE36D* | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | |
|-----------------------|------------------|-----------------------------|--|---------------------|---------------------|
| Rated Volt. [Vdc |] | 100(2A) | 0(2A) 50(1H) 25(1E) 16(1C) | | |
| Capacitance | Tolerance | | Part N | umber | |
| 6800pF(682) | ±10%(K) | | | | |
| 33000pF(333) | ±10%(K) | | | | |
| 68000pF(683) | ±10%(K) | | | | |
| 0.22μF(224) | ±10%(K) | | | | |
| 0.33μF(334) | ±10%(K) | | | | |
| 0.47μF(474) | ±10%(K) | | | | |
| 0.68μF(684) | ±10%(K) | | | | |
| 1.0μF(105) | ±10%(K) | | | GRM216R61E105KA12D | GRM216R61C105KA88D |
| 2.2μF(225) | ±10%(K) | | | GRM219R61E225KA12D* | GRM219R61C225KA88D* |
| 4.7μF(475) | ±10%(K) | | | | GRM219R61C475KE15D* |

| LxW [mm] | | | | | | |
|---------------------|------------------|---------------------|---------------------|---------------------|--|--|
| Rated Volt. [Vdc |] | 10(1A) | 4(0G) | | | |
| Capacitance | Tolerance | Part Number | | | | |
| 4.7μF(475) | ±10%(K) | GRM219R61A475KE34D* | | | | |
| 10μF(106) | ±10%(K) | GRM219R61A106KE44D* | GRM219R60J106KE19D* | | | |
| 22μF(226) | ±20%(M) | | | GRM219R60G226ME66D* | | |

The part number code is shown in () and Unit is shown in [].

: Please refer to X7R(R7) etc. Characteristics.



^{*} Please refer to GRM Series Specifications and Test Method (2).

High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

| LxW [mm] | | 3.2x1.6(31)<1206> | | | | |
|-----------------------|------------------|----------------------------|--|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 100(2A) | 100(2A) 50(1H) 25(1E) 16(1C) | | | |
| Capacitance | Tolerance | | Part N | lumber | | |
| 15000pF(153) | ±10%(K) | | | | | |
| 22000pF(223) | ±10%(K) | | | | | |
| 33000pF(333) | ±10%(K) | | | | | |
| 47000pF(473) | ±10%(K) | | | | | |
| 68000pF(683) | ±10%(K) | | | | | |
| 0.10μF(104) | ±10%(K) | | | | | |
| 0.15μF(154) | ±10%(K) | | | | | |
| 0.22μF(224) | ±10%(K) | | | | | |
| 0.33μF(334) | ±10%(K) | | | | | |
| 0.47μF(474) | ±10%(K) | | | | | |
| 0.68μF(684) | ±10%(K) | | | | | |
| 1.0μF(105) | ±10%(K) | | | | | |
| 2.2μF(225) | ±10%(K) | | | GRM316R61E225KA12D* | | |
| 4.7μF(475) | ±10%(K) | | | GRM319R61E475KA12D* | GRM319R61C475KA88D* | |
| 10μF(106) | ±10%(K) | | | | GRM319R61C106KE15D* | |

| LxW [mm] | | 3.2x1.6(31)<1206> |
|--------------------|------------------|----------------------------|
| Rated Volt. [Vdc] | | 10(1A) |
| Capacitance | Tolerance | Part Number |
| 10μF(106) | ±10%(K) | GRM319R61A106KE19D* |

| LxW [mm] | | 3.2x2.5(32)<1210> | | |
|----------------------|------------------|---|-------------|--------------------|
| Rated Volt. [Vdc] | | 100(2A) 50(1H) 25(1 | | 25(1E) |
| Capacitance | Tolerance | | Part Number | |
| 0.68μF(684) | ±10%(K) | | | |
| 1.0μF(105) | ±10%(K) | | | |
| 10μF(106) | ±10%(K) | | | GRM32DR61E106KA12L |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

: Please refer to X7R(R7) etc. Characteristics.

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3 Dimensions (LxW)
6 Rated Voltage
9 Individual Specification Code

Dimension (T)CapacitancePackaging



^{*} Please refer to GRM Series Specifications and Test Method (2).

GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet).

When no "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

| | | | cations | ease refer to GRM Series Specifications and Test Methods (2). | | |
|-----|------------------------------------|--|--|---|--|--|
| No. | Item | Temperature Compensating Type | High Dielectric Type | Test Method | | |
| 1 | Operating Temperature Range | -55 to +125°C (2P/R/S/T, 3P/R/S/T/U, 4P/R/S/T/U: -25 to +85°C) | B1, B3, F1: -25 to +85°C R1, R7: -55 to +125°C R6: -55 to +85°C C8: -55 to +105°C E4: +10 to +85°C F5: -30 to +85°C | Reference temperature: 25°C (2Δ, 3Δ, 4Δ, B1, B3, F1, R1: 20°C) | | |
| 2 | Rated Voltage | See the previous pages. | | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, VP-P or VO-P, whichever is larger, should be maintained within the rated voltage range. | | |
| 3 | Appearance | No defects or abnormalities | | Visual inspection | | |
| 4 | Dimensions | Within the specified dimensions | 1 | Using calipers (GRM02 size is based on Microscope) | | |
| 5 | Dielectric Strength | No defects or abnormalities | | No failure should be observed when 300%* of the rated voltage (temperature compensating type) or 250% of the rated voltage (high dielectric constant type) is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. *200% for 500V | | |
| 6 | Insulation Resistance | C≦0.047μF: More than 10,000MΩ C>0.047μF: More than 500Ω · F | | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 20/25°C and 75%RH max. and within 2 minutes of charging, provided the charge/ discharge current is less than 50mA. | | |
| 7 | Capacitance | Within the specified tolerance | | | | |
| 8 | Q/ Dissipation Factor (D.F.) | 30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF) | [R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max. | The capacitance/Q/D.F. should be measured at 20/25°C at the frequency and voltage shown in the table. Char. ΔC to 7U, 1X (more than 1000pF) R6,R7,C8,F5,B1,B3,F1 Frequency 1±0.1MHz 1±0.1kHz 120±24Hz 1±0.1kHz 0.5± 0.5± 0.1Vrms 0.05Vrms 0.05 | | |





Capacitance

Temperature

Characteristics

Capacitance

Drift

GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

| | | | cations | | | |
|-----|-----------|--|--|---|---|--|
| No. | Item | Temperature High Dielectric Type | | Test Method | | |
| | | Compensating Type | Compensating Type | | | |
| | No bias | Within the specified tolerance (Table A-1) | B1, B3: Within ±10% (-25 to +85°C) R1, R7: Within ±15% (-55 to +125°C) R6: Within ±15% (-55 to +85°C) E4: Within +22/-56% (+10 to +85°C) F1: Within +30/-80% (-25 to +85°C) F5: Within +22/-82% (-30 to +85°C) C8: Within ±22% | each specified temp (1)Temperature Co The temperature co capacitance measu When cycling the te through 5 (5C: +25 coeffs.: +25 to +85° within the specified and capacitance ch The capacitance dr between the maxim | • | |
| | | | , | Step | Temperature (°C) | |
| | 50% of | | B1: Within +10/-30% | 1 | Reference Temperature ±2 | |
| | the Rated | | R1: Within +15/–40% | | -55 ± 3 (for Δ C to 7U/R6/R7/C8) | |
| | Voltage | | F1: Within +30/–95% | 2 | -30±3 (for F5), 10±3 (for E4) | |

*Initial measurement for high

Perform a heat treatment at

150+0/-10°C for one hour

and then set for 24±2 hours

dielectric constant type

at room temperature. Perform the initial measurement.

(2) High Dielectric Constant Type

3

4

5

The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges." When applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp, stage

-25±3 (for other TC) Reference Temperature ±2

125±3 (for ΔC/R7), 105±3 (for C8)

85±3 (for other TC)

Reference Temperature ±2

| Step | Temperature (°C) | Applying Voltage (V) | |
|------|--|----------------------|--|
| 1 | Reference Temperature ±2 | | |
| 2 | -55±3 (for C8, R1, R7, R6) -25±3 (for B1, B3, F1) -30±3 (for F5)/10±3 (for E4) | No bias | |
| 3 | Reference Temperature ±2 | No bias | |
| 4 | 125±3 (for R1, R7)/ 85±3 (for B1, B3, R6 F1, F5, E4)/105±3 (for C8) | | |
| 5 | Reference Temperature ±2 | | |
| 6 | -55±3 (for R1)/ -25±3 (for B1, F1) 50% of the ra | | |
| 7 | Reference Temperature ±2 | voltage | |
| 8 | 125±3 (for R1)/ 85±3 (for B1, F1) | | |

No removal of the terminations or other defect should occur.

Adhesive Strength of Termination Baked electrode or copper foil Fig. 1a

Within ±0.2% or ±0.05pF

*Do not apply to 1X/25V

(whichever is larger.)

Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1a using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec.

The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *1N (GRM02), 2N (GRM03), 5N (GRM15, GRM18)

| (in ı | mm) |
|-------|-----|
|-------|-----|

| | | | (111 111111) |
|-------|-----|------|--------------|
| Type | а | b | С |
| GRM02 | 0.2 | 0.56 | 0.23 |
| GRM03 | 0.3 | 0.9 | 0.3 |
| GRM15 | 0.4 | 1.5 | 0.5 |
| GRM18 | 1.0 | 3.0 | 1.2 |
| GRM21 | 1.2 | 4.0 | 1.65 |
| GRM31 | 2.2 | 5.0 | 2.0 |
| GRM32 | 2.2 | 5.0 | 2.9 |
| GRM43 | 3.5 | 7.0 | 3.7 |
| GRM55 | 4.5 | 8.0 | 5.6 |





GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

12

Deflection

| | | | Specif | ications | |
|-----|-------------------------|-----------------------|--|--|--|
| No | . Ite | em | Temperature Compensating Type | High Dielectric Type | Test Method |
| | | Appearance | No defects or abnormalities | | |
| | | Capacitance | Within the specified tolerance | | |
| 111 | Vibration Resistance | Q/D.F. | 30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF) | [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.025 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max. | Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours). |
| | | Appearance | No marking defects | | Solder the capacitor on the test jig (glass epoxy board) shown |
| | | Capacitance Change | Within ±5% or ±0.5pF (whichever is larger) | Within ±10% | in Fig. 2a using a eutectic solder. Then apply a force in the direction shown in Fig. 3a for 5±1 sec. The soldering should be done by the reflow method and should be conducted with care |
| | | | | | so that the soldering is uniform and free of defects such as heat shock. |
| | | | | | <mark>→ </mark> |

50 Pressurizing speed: 1.0mm/sec.

Flexure : ≤1

Pressurize

R230

Capacitance meter

Fig. 3a

Fig. 2a

| | | t: 1.6mm (GRM02 | /03/15: t: 0.8mm) |
|-------|-----|-----------------|-------------------|
| Type | a | b | С |
| GRM02 | 0.2 | 0.56 | 0.23 |
| GRM03 | 0.3 | 0.9 | 0.3 |
| GRM15 | 0.4 | 1.5 | 0.5 |
| GRM18 | 1.0 | 3.0 | 1.2 |
| GRM21 | 1.2 | 4.0 | 1.65 |
| GRM31 | 2.2 | 5.0 | 2.0 |
| GRM32 | 2.2 | 5.0 | 2.9 |
| GRM43 | 3.5 | 7.0 | 3.7 |
| GRM55 | 4.5 | 8.0 | 5.6 |
| | | · | · |

(in mm)

| 13 | Solderability of Termination | 75% of the terminations are to be soldered evenly and continuously. |
|----|------------------------------|---|
| | | |

Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds.

After preheating, immerse in a eutectic solder solution for 2 ± 0.5 seconds at $230\pm5^{\circ}C$ or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.





Specifications

GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

| N | o. | Item | Temperature | High Dielectric Type | | Test | Method | İ | |
|---|-----------------------------------|------------------------|---|---|---|--|---|--|---------------|
| | | | Compensating Type The measured and observed cl | naracteristics should satisfy the | | | | | |
| | | | specifications in the following to | able. | | | | | |
| | | Appearance | No defects or abnormalities | T | | | | | |
| | | Capacitance Change | Within ±2.5% or ±0.25pF (whichever is larger) | B1, B3, R1, R6, R7, C8: Within ±7.5% F1, F5, E4: Within ±20% | | | | | |
| 1 | Resista to Solderii Heat | | 30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF) | [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. W.V.: 6.3/4V : 0.05 max. (C<3.3μF) : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.025 max. | Preheat the ca Immerse the ca solder solution temperature fo •Initial measure Perform a heat then set at room Perform the ini •Preheating for Step | apacitor in a eu at 270±5°C for r 24±2 hours, the ement for high the treatment at 1 m temperature tial measureme | tectic so 10±0.5 then mea dielectric 50+0/–10 for 24±2 ent. | lder or Sn-3.0A seconds. Set a sure. constant type 0°C for one hou | t room ur and |
| | | | | [F1, F5] | 2 | 170 to 2 | | 1 mi | |
| | | | W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max. | | | | | | |
| | | I.R. | More than 10,000M Ω or 500 Ω | F (whichever is smaller) | | | | | |
| | | Dielectric Strength | No defects | | | | | | |
| | | | The measured and observed of specifications in the following to | • | | | | | |
| | | Appearance | No defects or abnormalities | | | | | | |
| | | Capacitance Change | Within ±2.5% or ±0.25pF (whichever is larger) | B1, B3, R1, R6, R7, C8: Within ±7.5% F1, F5, E4: Within ±20% | | | | | |
| | | | | [B1, B3, R6, R7, C8] W.V.: 100V : 0.025 max. (C<0.068μF) : 0.05 max. (C≥0.068μF) W.V.: 50/35/25V: : 0.025 max.* | Fix the capacit manner and ur Perform the fiv shown in the fc Set for 24±2 hc | nder the same of e cycles accordal to the cycles accordal to the cycles accordal to the cycles accordance to the cycles a | condition ding to th | s as (10). | |
| 1 | 5 Temperati | ire | 30pF and over: Q≧1000 | *GRM32D R7/R6/C8 1E106: 0.035 max. W.V.: 16/10V: 0.035 max. | | Min. | Room | Max. | Room |
| • | Cycle | Q/D.F. | 30pF and below: Q≥400+20C | W.V.: 6.3/4V : 0.05 max. (C<3.3μF) | Temp. (°C) | Temp. +0/-3 | Temp. | Operating Temp. +3/–0 | Temp. |
| | | | C: Nominal Capacitance (pF) | : 0.1 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.05 max. (C<0.1μF) : 0.09 max. (C≥0.1μF) W.V.: 16/10V: 0.125 max. W.V.: 6.3V: 0.15 max. | Time (min.) Initial measure Perform a heat then set at roo Perform the ini | t treatment at 1 m temperature | 50+0/–10 for 24±2 | 0°C for one hou | 2 to 3 |
| | | I.R. | More than 10,000M Ω or 500 Ω | F (whichever is smaller) | | | | | |
| | | Dielectric Strength | No defects | | | | | | |





GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

> (Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). When no "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1).
>
> When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

| | | | | ications | |
|-----|--|-----------------------|---|--|---|
| lo. | Ite | em | Temperature Compensating Type | High Dielectric Type | Test Method |
| | | | The measured and observed chapecifications in the following ta | • | |
| | | Appearance | No defects or abnormalities | | |
| | | Capacitance Change | Within ±5% or ±0.5pF (whichever is larger) | B1, B3, R1, R6, R7, C8: Within ±12.5% F1, F5, E4: Within ±30% | |
| 16 | Humidity (Steady State) | Q/D.F. | 30pF and over: Q≥350 10pF and over 30pF and below: Q≥275+2.5C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF) | [R6, R7, C8] W.V.: 100V $: 0.05 \text{ max. } (C<0.068 \mu F) \\ : 0.075 \text{ max. } (C≥0.068 \mu F) \\ : 0.075 \text{ max. } (C≥0.068 \mu F) \\ W.V.: 50/35/25/16/10V \\ : 0.05 \text{ max.} \\ W.V.: 6.3/4V \\ : 0.075 \text{ max. } (C<3.3 \mu F) \\ : 0.125 \text{ max. } (C≥3.3 \mu F) \\ [E4] W.V.: 25V \text{min. } 0.05 \text{ max.} \\ [F1, F5] W.V.: 25V \text{ min. } 0.075 \text{ max. } (C<0.1 \mu F) \\ : 0.125 \text{ max. } (C≥0.1 \mu F) \\ W.V.: 16/10V: 0.15 \text{ max.} \\ W.V.: 6.3V: 0.2 \text{ max.} \\ W.V.: 6.3V: 0.2 \text{ max.} \\ \end{cases}$ | Set the capacitor at 40±2°C and in 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure. |
| | I.R. More than $1,000M\Omega$ or $50\Omega \cdot F$ (whichever is smaller) | | | | |
| | | | The measured and observed ch specifications in the following ta | • | |
| | | Appearance | No defects or abnormalities | | |
| | | Capacitance Change | Within ±7.5% or ±0.75pF (whichever is larger) | B1, B3, R1, R6, R7, C8: Within ±12.5% F1, F5, E4: Within ±30% [W.V.: 10V max.] F1, F5: Within +30/-40% | |
| 17 | Humidity Load | Q/D.F. | 30pF and over: Q≥200 30pF and below: Q≥100+10C/3 C: Nominal Capacitance (pF) | [B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C<3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max. (C<0.1μF) : 0.125 max. (C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max. | Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. Initial measurement for F1, F5/10V max. Apply the rated DC voltage for 1 hour at 40±2°C. Remove and set for 24±2 hours at room temperature. Perform initial measurement. |
| | | | | | |





GRM Series Specifications and Test Methods (1) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). When no "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

| | | | | ications | |
|-----|-----------------------------|-----------------------|---|---|--|
| No. | lt∈ | em | Temperature Compensating Type | High Dielectric Type | Test Method |
| | | | The measured and observed che specifications in the following ta | - | |
| | | Appearance | No defects or abnormalities | | |
| | | Capacitance Change | Within ±3% or ±0.3pF (whichever is larger) | B1, B3, R1, R6, R7, C8: Within ±12.5% F1, F5, E4: Within ±30% [Except 10V max. and. | Apply 200%* of the rated voltage at the maximum operating temperature ±3°C for 1000±12 hours. Set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. |
| 18 | High Temperature Load | Q/D.F. | 30pF and over: Q≥350 10pF and over 30pF and below: Q≥275+2.5C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF) | [B1, B3, R6, R7, C8] W.V.: 100V : 0.05 max. (C<0.068μF) : 0.075 max. (C≥0.068μF) W.V.: 50/35/25/16/10V : 0.05 max. W.V.: 6.3/4V : 0.075 max. (C≥3.3μF) : 0.125 max. (C≥3.3μF) [E4] W.V.: 25Vmin: 0.05 max. [F1, F5] W.V.: 25V min. : 0.075 max.(C≥0.1μF) : 0.125 max.(C≥0.1μF) : 0.125 max.(C≥0.1μF) W.V.: 16/10V: 0.15 max. W.V.: 6.3V: 0.2 max. | •Initial measurement for high dielectric constant type. Apply 200% of the rated voltage* at the maximum operating temperature ±3°C for one hour. Remove and set for 24±2 hours at room temperature. Perform initial measurement. *GRM155C81E 683/104, GRM188C81E105, GRM188C81E105, GRM21BR71H105, GRM21BR72A474, GRM21BR71C225, GRM31CR71H475, GRM32E R6/R7 YA106, GRM32D R7/R6/C8 1E106 : 150% of the rated voltage. |
| | | I.R. | More than 1,000M Ω or 50 Ω · F | (whichever is smaller) | |

Table A-1

| (1) | | | | | | | |
|-------|---------------------------------|----------------------------------|-------|------|-------|------|-------|
| | | Capacitance Change from 25°C (%) | | | | | |
| Char. | Char. Nominal Values (ppm/°C)*1 | | -55 | | -30 | | 10 |
| | | Max. | Min. | Max. | Min. | Max. | Min. |
| 5C | 0±30 | 0.58 | -0.24 | 0.40 | -0.17 | 0.25 | -0.11 |
| 6C | 0±60 | 0.87 | -0.48 | 0.59 | -0.33 | 0.38 | -0.21 |
| 6P | -150±60 | 2.33 | 0.72 | 1.61 | 0.50 | 1.02 | 0.32 |
| 6R | -220±60 | 3.02 | 1.28 | 2.08 | 0.88 | 1.32 | 0.56 |
| 6S | -330±60 | 4.09 | 2.16 | 2.81 | 1.49 | 1.79 | 0.95 |
| 6T | -470±60 | 5.46 | 3.28 | 3.75 | 2.26 | 2.39 | 1.44 |
| 7U | -750±120 | 8.78 | 5.04 | 6.04 | 3.47 | 3.84 | 2.21 |
| 1X | +350 to -1000 | _ | _ | _ | _ | - | _ |

^{*1:} Nominal values denote the temperature coefficient within a range of 25°C to 125°C (for Δ C)/85°C (for other TC).

(2)

| | | Capacitance Change from 20°C (%) | | | | | |
|-------|---------------------------|----------------------------------|-------|------|-------|------|-------|
| Char. | Nominal Values (ppm/°C)*2 | -55 | | -25 | | -10 | |
| 2C | | Max. | Min. | Max. | Min. | Max. | Min. |
| 2C | 0±60 | 0.82 | -0.45 | 0.49 | -0.27 | 0.33 | -0.18 |
| 3C | 0±120 | 1.37 | -0.90 | 0.82 | -0.54 | 0.55 | -0.36 |
| 4C | 0±250 | 2.56 | -1.88 | 1.54 | -1.13 | 1.02 | -0.75 |
| 2P | -150±60 | _ | _ | 1.32 | 0.41 | 0.88 | 0.27 |
| 3P | -150±120 | _ | _ | 1.65 | 0.14 | 1.10 | 0.09 |
| 4P | -150±250 | _ | _ | 2.36 | -0.45 | 1.57 | -0.30 |
| 2R | -220±60 | _ | _ | 1.70 | 0.72 | 1.13 | 0.48 |
| 3R | -220±120 | _ | _ | 2.03 | 0.45 | 1.35 | 0.30 |
| 4R | -220±250 | _ | _ | 2.74 | -0.14 | 1.83 | -0.09 |
| 2S | -330±60 | _ | _ | 2.30 | 1.22 | 1.54 | 0.81 |
| 3S | -330±120 | _ | _ | 2.63 | 0.95 | 1.76 | 0.63 |
| 4S | -330±250 | _ | _ | 3.35 | 0.36 | 2.23 | 0.24 |
| 2T | -470±60 | _ | _ | 3.07 | 1.85 | 2.05 | 1.23 |
| 3T | -470±120 | _ | _ | 3.40 | 1.58 | 2.27 | 1.05 |
| 4T | -470±250 | _ | _ | 4.12 | 0.99 | 2.74 | 0.66 |
| 3U | -750±120 | _ | _ | 4.94 | 2.84 | 3.29 | 1.89 |
| 4U | -750±250 | _ | _ | 5.65 | 2.25 | 3.77 | 1.50 |

^{*2:} Nominal values denote the temperature coefficient within a range of 20°C to 125°C (for Δ C)/85°C (for other TC).



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GRM Series Specifications and Test Methods (2) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When no When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

| No. | Item | Specifications | Test Method | | |
|-----|-----------------------------------|---|---|--|--|
| 1 | Operating Temperature Range | B1, B3, F1: -25 to +85°C R1, R7, C7, D7, E7: -55 to +125°C C6, R6: -55 to +85°C F5: -30 to +85°C C8, D8: -55 to +105°C, | Reference temperature: 25°C (B1, B3, R1, F1: 20°C) | | |
| 2 | Rated Voltage | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, VP-P or VO-F whichever is larger, should be maintained within the rated voltage range. | | |
| 3 | Appearance | No defects or abnormalities | Visual inspection | | |
| 4 | Dimensions | Within the specified dimensions | Using calipers (GRM02 size is based on Microscope) | | |
| 5 | Dielectric Strength | No defects or abnormalities | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | |
| 6 | Insulation Resistance | More than $50\Omega \cdot F$ | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at reference temperature and 75%RH max. and within 1 minutes of charging, provided the charge/discharge current is less than 50mA. | | |
| 7 | Capacitance | #Table 1 GRM022 B3/R6 1A 681 to 103 GRM155 B3/R6 1A 124 to 105 GRM185 B3/R6 1C/1A 105 GRM185 C8/D7 1A 105 GRM188 B3/R6 1C/1A 225 GRM188 R7/C8 1A 225 GRM188 B3/R6 1A 335 GRM219 B3/R6 1C/1A 475 GRM219 C8 1A 475 GRM219 B3/R6 1A 106 GRM21B B3/R6 1C/1A 106 GRM21B R7/C8 1A 106 GRM21B R7/C8 1A 106 GRM21B R7/C8 1A 106 | The capacitance/D.F. should be measured at reference temperature at the measuring frequency and voltage shown in the table. Nominal Capacitance Measuring Frequency Measuring Voltage C≤10μF (10V min.)* 1±0.1kHz 1.0±0.2Vrms C≤10μF (6.3V max.) 1±0.1kHz 0.5±0.1Vrms C>10μF 120±24Hz 0.5±0.1Vrms *For items in Table1 1±0.1kHz 0.5±0.1Vrms GRM188C80E106: | | |
| 8 | Dissipation Factor (D.F.) | B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max. | Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. | | |







GRM Series Specifications and Test Methods (2) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection.

☐ Continued from

| n the prec | When no "*" is added in PNs table, | pecifications (our product specifications or the approval sheet). Please refer to GRM Series Specifications and Test Methods (1). Please refer to GRM Series Specifications and Test Methods (2). |
|------------|------------------------------------|---|
| 1 | Specifications | Test Method |

| No. | Ite | em | Specifications | Test Method | | | |
|-----|---|--------------------------------|--|---|-----------------------|--|--|
| | | No bias | B1, B3: Within ±10% (-25 to +85°C) F1: Within +30/-80% (-25 to +85°C) R6: Within ±15% (-55 to +85°C) R1, R7: Within ±15% (-55 to +125°C) F5: Within ±22/-82% (-30 to +85°C) C6: Within ±22% (-55 to +85°C) C7: Within ±22% (-55 to +125°C) C8: Within ±22% (-55 to +125°C) D7: Within ±22% (-55 to +125°C) E7: Within +22/-33% (-55 to +125°C) E7: Within +22/-56% (-55 to +125°C) D8: Within +22/-33% (-55 to +105°C) | The capacitance change should be measured after 5 min. at each specified temp. stage. The ranges of capacitance change compared with the reference temperature value over the temperature ranges shown in the table should be within the specified ranges.* In case of applying voltage, the capacitance change should be measured after 1 more min. with applying voltage in equilibration of each temp. stage. *GRM32DR60J226, GRM43 B1/B3/R6 0J/1A 336/476: 1.0±0.2Vrms GRM155B30G475, GRM155B30J 225, GRM21BB30J476, | | | |
| | | | | GRM155R60E106, GRM188 B3/R6 0E/0G/0J 226: 0.2±0.05VI | | | |
| 9 | Capacitance Temperature Characteristics | 50% of the Rated Voltage | B1: Within +10/–30% R1: Within +15/–40% F1: Within +30/–95% | Step | ue e | | |
| 10 | Adhesive of Termin | 9 | No removal of the terminations or other defects should occur. | Solder the capacitor on the test jig (glass epoxy board) show in Fig. 1a using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *1N: GRM02, 2N: GRM03, 5N: GRM15/GRM18 Type a b c GRM02 GRM03 0.2 0.2 0.56 0.23 GRM03 0.3 0.9 0.3 GRM15 0.4 1.5 0.5 GRM18 1.0 3.0 1.2 GRM21 1.2 4.0 1.65 GRM31 2.2 5.0 2.0 GRM32 2.2 5.0 2.9 GRM33 3.5 7.0 3.7 GRM43 3.5 7.0 3.7 GRM55 4.5 8.0 5.6 | e e | | |
| | | Annogranas | No defects or obnormalities | Colder the conneiter on the test iis /gloss anow he and iis the | | | |
| 11 | Vibration | Appearance Capacitance D.F. | No defects or abnormalities Within the specified tolerance B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. | Solder the capacitor on the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic mot having a total amplitude of 1.5mm, the frequency being varie uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should applied for a period of 2 hours in each of 3 mutually | tion ed he d | | |

Continued on the following page. $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$

perpendicular directions (total of 6 hours).





GRM31CR6 0J/0G 107: 0.15 max.

GRM Series Specifications and Test Methods (2) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection. Please refer to individual specifications (our product specifications or the approval sheet). is added in PNs table, please refer to GRM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

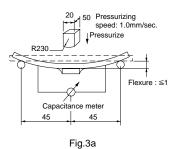
Continued from the preceding page

Item

Deflection

12

Solder the capacitor on the test jig (glass epoxy board) shown Appearance No marking defects in Fig. 2a using a eutectic solder. Then apply a force in the Capacitance Within ±10% direction shown in Fig. 3a for 5±1 sec. The soldering should be Change done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat Pressurizing speed: 1.0mm/sec Pressurize 100 t: 1.6mm



Specifications

| | (814116276676.476161111 | | | | |
|-------|-------------------------|------|------|--|--|
| Type | а | b | С | | |
| GRM02 | 0.2 | 0.56 | 0.23 | | |
| GRM03 | 0.3 | 0.9 | 0.3 | | |
| GRM15 | 0.4 | 1.5 | 0.5 | | |
| GRM18 | 1.0 | 3.0 | 1.2 | | |
| GRM21 | 1.2 | 4.0 | 1.65 | | |
| GRM31 | 2.2 | 5.0 | 2.0 | | |
| GRM32 | 2.2 | 5.0 | 2.9 | | |
| GRM43 | 3.5 | 7.0 | 3.7 | | |
| GRM55 | 4.5 | 8.0 | 5.6 | | |
| | | | | | |

Fig. 2a

Test Method

(in mm)

Time

(GRM02/03/15: t: 0.8mm)

Solderability of 75% of the terminations is to be soldered evenly and Termination continuously.

No defects on absorbed lities

Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in a eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.

| | | Appearance | No defects or abnormalities |
|---|------------|-------------|--|
| | | Capacitance | B1, B3, R1, *R6, R7, C6, C7, *C8, E7, D7, D8: Within ±7.5% F1, F5: Within ±20% *GRM188R6 0J/0G 106, GRM188C8 0E/0G 106, GRM219R60G226: |
| | Resistance | Change | Within ±12.5% GRM155R60G475, GRM155R60E106, GRM188R60G226: Within ±15% |
| 1 | to | DE | B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. C6: 0.125 max. D8: 0.15 max. |

*GRM31CR71F106: 0.125 max

Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder* or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Set at room temperature for 24±2 hours, then measure. *Do not apply to GRM02.

 Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then set at room temperature for 24±2 hours. Perform the initial measurement.

Temperature

GRM31CR6 0J/0G 107: 0.15 max. More than $50\Omega \cdot F$

No defects

F1, F5: 0.2 max.

*Preheating for GRM32/43/55

Step

| | Appearance | No defects or abnormalities |
|--|-----------------------|--|
| | Capacitance Change | B1, B3, R1, R6, R7, C6, C7, C8, D7, D8: Within $\pm 7.5\%$ E7: Within $\pm 30\%$ |

| 1 | 100 to 120°C | 1 min. |
|---|--------------|--------|
| 2 | 170 to 200°C | 1 min. |
| | | |

F1, F5: Within ±20% B1, B3, R1, *R6, *R7, C7, C8, E7, D7: 0.1 max. Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments

C6: 0.125 max.

shown in the following table.

D8: 0.15 max. Temperature 15 Suc Cha

DΕ

I.R.

Dielectric

Strength

Dielectric

Strength

Set for 24±2 hours at room temperature, then measure

| dden ange | D.I . | F1, F5: 0.2 max. *GRM31CR71E106: 0.125 max. GRM31CR6 0J/0G 107: 0.15 max. |
|--------------|-------|---|
| | | |

| Step | | | ა | 4 |
|-------------|----------------------------------|---------------|----------------------------------|---------------|
| Temp. (°C) | Min. Operating Temp. +0/–3 | Room Temp. | Max. Operating Temp. +3/–0 | Room Temp. |
| Time (min.) | 30±3 | 2 to 3 | 30±3 | 2 to 3 |

I.R. More than $50\Omega \cdot F$

No defects

•Initial measurement for high dielectric constant type Perform a heat treatment at 150+0/-10°C for one hour and then set at room temperature for 24±2 hours.

Perform the initial measurement.

GRM188R60J106 only Measurement after test Perform a heat treatment and then let sit for 24±2 hours at room temperature, then measure.





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GRM Series Specifications and Test Methods (2) (Note 1)-Typical Inspection

(Note 1) These Specifications and Test Methods indicate typical inspection.

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When no "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (1).

When "*" is added in PNs table, please refer to GRM Series Specifications and Test Methods (2).

Continued from the preceding page.

| _ | | | 3,13 | , | | | | |
|----|------------------------------------|--------------------------|---|--|--|--|--|--|
| No | . Ite | em | Specifications | Test Method | | | | |
| | | Appearance | No defects or abnormalities | Apply the rated voltage at 40±2°C and 90 to 95% humidity for | | | | |
| | High | Capacitance Change | B1, B3, R1, R6, R7, C6, C7, C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30% | 500±12 hours. The charge/discharge current is less than 50mA. •Initial measurement | | | | |
| 16 | Temperature High Humidity (Steady) | D.F. | B1, B3, R1, R6, R7, C6, C7, *C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max. *GRM319C81A106, GRM31MC81A106: 0.125 max. | Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | | |
| | (Steauy) | I.R. More than 12.5Ω · F | | •Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure | | | | |
| | | Appearance | No defects or abnormalities | Apply 150%* of the rated voltage for 1000±12 hours at the | | | | |
| | | Capacitance Change | B1, B3, R1, *R6, R7, C6, C7, *C8, E7, D7, D8: Within ±12.5% F1, F5: Within ±30% *GRM188C8 0E/0G 106, GRM219R60G226: within ±15% | maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. * Part Numbers with # have individual specification. | | | | |
| 17 | Durability | D.F. | B1, B3, R1, R6, R7, C6, C7, *C8, E7, D7, D8: 0.2 max. F1, F5: 0.4 max. *GRM319C81A106, GRM31MC81A106: 0.125 max. | As for these Part Numbers, please refer to table A. •Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and | | | | |
| | | 5 | More than 25Ω · F | then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | | |
| | | I.R. | MOLE MIGHT 5725 - 1 | •Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. | | | | |

Table A

| Part Number | Dimension LXW (mm) | Temp. Char. | Rated Volt. (Vdc) | Capacitance (F) | Cap. Tol (%) | Spec. Test Methods | Applied Testing Voltage at Durability |
|--------------------|-----------------------|-------------|----------------------|--------------------|-----------------|-----------------------|--|
| GRM155C80J684KE15D | 1.0×0.5 | X6S | 6.3 | 0.68μ | ±10% | (2) | Rated Volt. X100% |
| GRM155C80J684ME15D | 1.0×0.5 | X6S | 6.3 | 0.68μ | ±20% | (2) | Rated Volt. X100% |
| GRM188C80G106ME47D | 1.6×0.8 | X6S | 4 | 10μ | ±20% | (2) | Rated Volt. X100% |
| GRM21BC80J226ME51L | 2.0×1.25 | X6S | 6.3 | 22μ | ±20% | (2) | Rated Volt. X100% |
| GRM319D71C475KA12D | 3.2×1.6 | X7T | 16 | 4.7μ | ±10% | (2) | Rated Volt. X100% |
| GRM319D71C475MA12D | 3.2×1.6 | X7T | 16 | 4.7μ | ±20% | (2) | Rated Volt. ×100% |

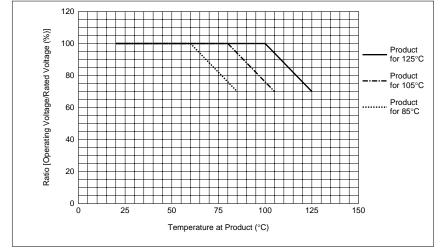
muRata

Part Numbers of table A are designed for use in the circuits where continuous applied voltage to the capacitor is derated than rated voltage.

These Part Numbers guarantee Durability Test with 100% x rated voltage as testing voltage at the maximum operating temperature.

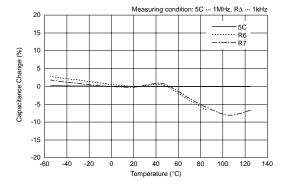
The following voltage and temperature derating conditions are recommended for use to ensure the same reliability level as normal specification.

• Recommended Derating Conditions on Voltage and Temperature

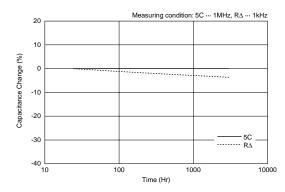


GRM Series Data

■ Capacitance - Temperature Characteristics

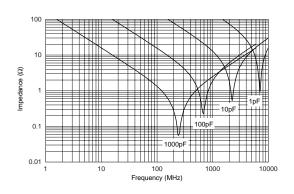


■ Capacitance Change - Aging

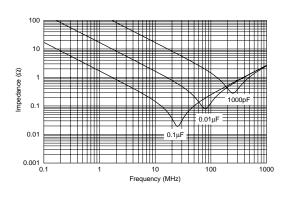


■ Impedance - Frequency Characteristics

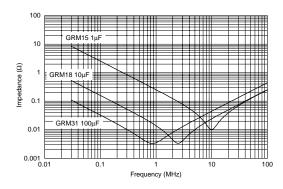
5C: GRM15



R∆: GRM15



 $R\Delta$



The data herein are given in typical values, not guaranteed ratings. Please refer to our Web site or contact our sales representatives for individual Part Number's data. Our Web Site: http://www.murata.com/products/capacitor/tech_data/



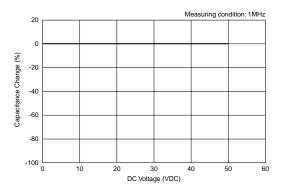


GRM Series Data

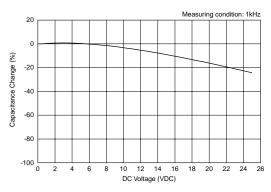
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■ Capacitance - DC Voltage Characteristics

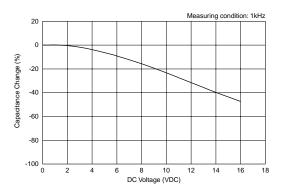
Temperature Compensating Type: GRM1555C1H102JA01



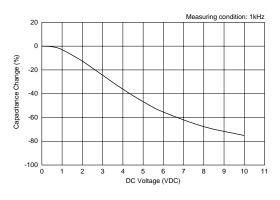
High Dielectric Constant Type: GRM155R71E103KA01



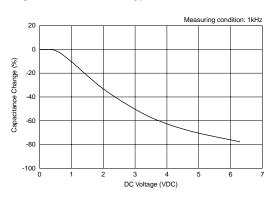
High Dielectric Constant Type: GRM155R71C104KA88



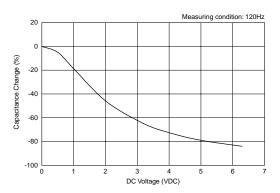
High Dielectric Constant Type: GRM155R61A105KE15



High Dielectric Constant Type: GRM188R60J106ME47



High Dielectric Constant Type: GRM31CR60J107ME39



The data herein are given in typical values, not guaranteed ratings. Please refer to our Web site or contact our sales representatives for individual Part Number's data. Our Web Site: http://www.murata.com/products/capacitor/tech_data/



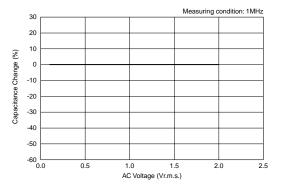


GRM Series Data

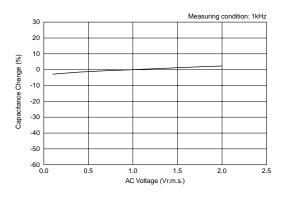
 $\begin{tabular}{|c|c|c|c|}\hline \searrow \\\hline \end{tabular}$ Continued from the preceding page.

■ Capacitance - AC Voltage Characteristics

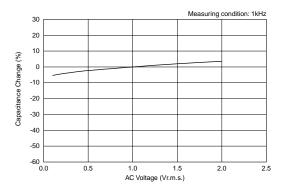
Temperature Compensating Type: GRM1555C1H102JA01



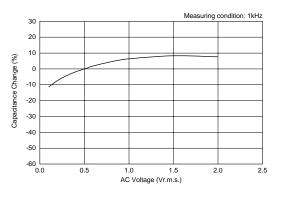
High Dielectric Constant Type: GRM155R71E103KA01



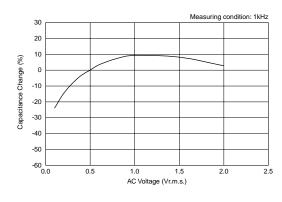
High Dielectric Constant Type: GRM155R71C104KA88



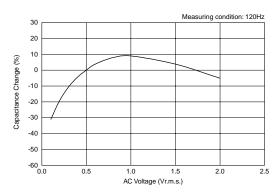
High Dielectric Constant Type: GRM155R61A105KE15



High Dielectric Constant Type: GRM188R60J106ME47



High Dielectric Constant Type: GRM31CR60J107ME39



The data herein are given in typical values, not guaranteed ratings.

Please refer to our Web site or contact our sales representatives for individual Part Number's data.

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Chip Monolithic Ceramic Capacitors



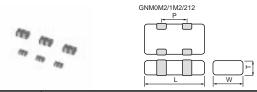
Capacitor Array GNM Series

■ Features

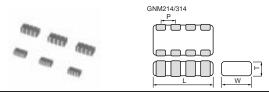
- 1. High density mounting due to mounting space saving
- 2. Mounting cost saving

■ Applications

General electronic equipment



| Part Number | Dimensions (mm) | | | | | | | |
|-------------|-----------------|------------|-----------------|------------|--|--|--|--|
| Part Number | L | W | Т | Р | | | | |
| GNM0M2 | 0.9 ±0.05 | 0.6 ±0.05 | 0.45 ±0.05 | 0.45 ±0.05 | | | | |
| | | | 0.5 +0.05/-0.10 | | | | | |
| GNM1M2 | 1.37 ±0.15 | 1.0 ±0.15 | 0.6 ±0.1 | 0.64 ±0.05 | | | | |
| | | | 0.8 +0/-0.15 | | | | | |
| CNIMO10 | 20+015 | 1 25 +0 15 | 0.6 ±0.1 | 10101 | | | | |
| GINIVIZIZ | 2.0 ±0.15 | 1.25 ±0.15 | 0.85 ±0.1 | 1.0 ±0.1 | | | | |
| GNM212 | 2.0 ±0.15 | 1.25 ±0.15 | | 1.0 ±0 | | | | |



| Part Number | Dimensions (mm) | | | | | | | |
|-------------|-----------------|------------|----------------|-----------|--|--|--|--|
| rait Number | L | W | Т | Р | | | | |
| | | | 0.5 +0.05/-0.1 | | | | | |
| GNM214 | 2.0 ±0.15 | 1.25 ±0.15 | 0.6 ±0.1 | 0.5 ±0.05 | | | | |
| | | | 0.85 ±0.1 | | | | | |
| | | | 0.8 ±0.1 | | | | | |
| GNM314 | 3.2 ±0.15 | 1.6 ±0.15 | 0.85 ±0.1 | 0.8 ±0.1 | | | | |
| GIVIVIS 14 | 3.2 ±0.13 | 1.0 ±0.15 | 1.0 ±0.1 | 0.6 ±0.1 | | | | |
| | | | 1.15 ±0.1 | | | | | |



Capacitance Table

Temperature Compensating Type C0G(5C) Characteristics

| 0.6 | ex.0.6: 7 | Γ Dimensi | ion [mm] | | |
|-------------|-----------------|-------------------------------------|-------------------------------------|---------------------------|---------------------|
| | LxW [mm] | 1.37x1.0 (1M) <0504> | 2.0x1.25 (21) <0805> | 3.23 (3 <12 | 1) |
| Number of E | Elements | 2(2) | | 4(4) | |
| Rated Vo | oltage [Vdc] | 50 (1H) | 50 (1H) | 100 (2A) | 50 (1H) |
| 10pF | (100) | 0.6 | 0.6 | 0.8 | 0.8 |
| 15pF | (150) | 0.6 | 0.6 | 0.8 | 0.8 |
| 22pF | (220) | 0.6 | 0.6 | 0.8 | 0.8 |
| 33pF | (330) | 0.6 | 0.6 | 0.8 | 0.8 |
| 47pF | (470) | 0.6 | 0.6 | 0.8 | 0.8 |
| 68pF | (680) | 0.6 | 0.6 | 0.8 | 0.8 |
| 100pF | (101) | 0.6 | 0.6 | 0.8 | 0.8 |
| 150pF | (151) | 0.6 | 0.6 | 0.8 | 0.8 |
| 220pF | (221) | 0.6 | 0.6 | | 0.8 |
| 330pF | (331) | | i I | | 0.8 |

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

| ex.0.6: T Dimension [mm] | | | | | | | | | | | | |
|--------------------------|-------------------------------|---------------------|---------------------|---------------------|-----------------------|---------------------|---------------------|---------------------------|---------------------|---------------------|---------------------|----------------------|
| Number o | LxW 1.37) [mm] (1N) [mm] <050 | | | M) | M) (21) 04> <0805> | | | 3.2x1.6 (31) <1206> | | | | |
| Rated | Voltage [Vdc] | 50 (1H) | 25 (1E) | 16 (1C) | 10 (1A) | 50 (1H) | 25 (1E) | 16 (1C) | 50 (1H) | 25 (1E) | 16 (1C) | 6.3 (0J) |
| 470p | F(471) | | | | | 0.6 | | | | | | |
| 1000p | F(102) | 0.6 | | | | 0.6 | | | | | | |
| 2200p | F(222) | | 0.6 | | | 1 | 0.6 | | | | | |
| 4700p | F(472) | | 0.6 | | | | 0.6 | | | | | |
| 10000p | F(103) | | 0.6 | | | ! ! | 0.6 | | | | | |
| 22000p | F(223) | | | 0.6 | 0.6 | | | 0.85 | | | | |
| 47000p | F(473) | | | 0.6 | 0.6 | | | 0.85 | 0.85 | | 1.0 | |
| 0.10μ | F(104) | | | 0.6 | 0.6 | | | 0.85 | 0.85 | 0.85 | 1.0 | |
| 1.0µ | F(105) | | | | | | | | | | | 1.15 |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

| 0.5 ex.0.5: | Γ Dimens | |
|----------------------|-------------------------------------|-------------------------------------|
| LxW [mm] | 1.37x1.0 (1M) <0504> | 2.0x1.25 (21) <0805> |
| Number of Elements | 2(2) | 4(4) |
| Rated Voltage [Vdc] | 16 (1C) | 16 (1C) |
| 0.10μF(104) | 0.5 | 0.5 |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Capacitance Table

High Dielectric Constant Type X5R(R6) Characteristics

| 0. | 0.6 ex.0.6: T Dimension [mm] | | | | | | | | | | | | | | | | |
|------------|---------------------------------------|---------------------|---------------------|----------------------|--------------------|-------------------------------------|---------------------|---------------------|---------------------|-------------------------------------|---------------------|-------------------------------------|----------------------|------------------------------------|----------------------|---------------------|---------------------|
| | LxW 0.9x0.6 (0M) (om) (0302> | | | | , | 1.37x1.((1M) <0504> | | | | 2.0x1.25 (21) <0805> | | 2.0x1.25 (21) <0805> | | 3.2x1.6 (31) <1206> | | | |
| | Number of Elements | | | | | | 2(| (2) | | | | | | 4(4) | | | |
| Capacitano | Rated Voltage [Vdc] | 16 (1C) | 10 (1A) | 6.3 (0J) | 4 (0G) | 50 (1H) | 25 (1E) | 16 (1C) | 10 (1A) | 6.3 (0J) | 16 (1C) | 10 (1A) | 6.3 (0J) | 10 (1A) | 6.3 (0J) | 16 (1C) | 10 (1A) |
| | 1000pF(102) | | | | | 0.6 | | | | | ! | | | | | | |
| | 2200pF(222) | | | | | 1 | 0.6 | | | | ! ! ! | | | | | | |
| | 4700pF(472) | | | | | i L | 0.6 | l | | | ! ! | | | ; ! ! | | ! ! | |
| • | 10000pF(103) | 0.45 | 0.45 | 0.45 | | | 0.6 | | | | | | | | | | |
| 2 | 22000pF(223) | 0.45 | 0.45 | 0.45 | | [[[| | 0.6 | 0.6 | | | | | | | - - | |
| 4 | 47000pF(473) | 0.45 | 0.45 | 0.45 | | ! ! | | 0.6 | 0.6 | | | | | - - | | | |
| | 0.10μF(104) | 0.45 | 0.45 | 0.45 | | | | | 0.6 | | | | | | | | |
| | 0.22μF(224) | | | | | ; ; | | 0.8 | | - | ! ! | | | ! ! | | | |
| | $0.47 \mu F(474)$ | | | | | | | | | | 0.85 | | | | | | |
| | 1.0μF(105) | | | | 0.45 | [| | 0.8 | 0.8 | 0.8 | 0.85 | 0.85 | | 0.85 | 0.85 | 0.85 | 0.85 |
| | 2.2μF(225) | | | | | | | | 8.0 | 0.8 | | 0.85 | 0.85 | | 0.85 | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

| 0.5 | ex.0.5: T Dimension [mm] | | | | | | |
|-----------|--------------------------|-----------------------------|-------------------------------------|---------------------|--|--|--|
| | LxW [mm] | 1.37 (1) <05 | 2.0x1.25 (21) <0805> | | | | |
| Number of | Elements | 2(| 4(4) | | | | |
| Rated V | Voltage [Vdc] | 16 (1C) | 10 (1A) | 10 (1A) | | | |
| 1.0μ | F(105) | 0.5 | 0.5 | 0.5 | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Temperature Compensating Type C0G(5C) Characteristics

| LxW [mm] | | 1.37x1.0(1M)<0504> | 2.0x1.25(21)<0805> | 3.2x1.6(31)<1206> | | | |
|---------------------|------------------|-----------------------------|-----------------------------|----------------------------|--------------------|--|--|
| Number of Elem | ents | 2(2) | | 4(4) | | | |
| Rated Volt. [Vdc |] | 50(1H) | 50(1H) | 100(2A) | 50(1H) | | |
| Capacitance | Tolerance | | Part N | umber | | | |
| 10pF(100) | ±10%(K) | GNM1M25C1H100KD01D | GNM2145C1H100KD01D | GNM3145C2A100KD01D | GNM3145C1H100KD01D | | |
| 15pF(150) | ±10%(K) | GNM1M25C1H150KD01D | GNM2145C1H150KD01D | GNM3145C2A150KD01D | GNM3145C1H150KD01D | | |
| 22pF(220) | ±10%(K) | GNM1M25C1H220KD01D | GNM2145C1H220KD01D | GNM3145C2A220KD01D | GNM3145C1H220KD01D | | |
| 33pF(330) | ±10%(K) | GNM1M25C1H330KD01D | GNM2145C1H330KD01D | GNM3145C2A330KD01D | GNM3145C1H330KD01D | | |
| 47pF(470) | ±10%(K) | GNM1M25C1H470KD01D | GNM2145C1H470KD01D | GNM3145C2A470KD01D | GNM3145C1H470KD01D | | |
| 68pF(680) | ±10%(K) | GNM1M25C1H680KD01D | GNM2145C1H680KD01D | GNM3145C2A680KD01D | GNM3145C1H680KD01D | | |
| 100pF(101) | ±10%(K) | GNM1M25C1H101KD01D | GNM2145C1H101KD01D | GNM3145C2A101KD01D | GNM3145C1H101KD01D | | |
| 150pF(151) | ±10%(K) | GNM1M25C1H151KD01D | GNM2145C1H151KD01D | GNM3145C2A151KD01D | GNM3145C1H151KD01D | | |
| 220pF(221) | ±10%(K) | GNM1M25C1H221KD01D | GNM2145C1H221KD01D | | GNM3145C1H221KD01D | | |
| 330pF(331) | ±10%(K) | | | | GNM3145C1H331KD01D | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7)/X7S(C7) Characteristics

| LxW [mm] | | 1.37x1.0(1M)<0504> | | | | | | | | |
|-----------------------|------------------|-----------------------------|--------------------|--------------------|--------------------|--|--|--|--|--|
| Number of Elem | ents | 2(2) | | | | | | | | |
| Rated Volt. [Vdc |] | 50(1H) | 25(1E) | 16(1C) | 10(1A) | | | | | |
| Capacitance | Tolerance | Part Number | | | | | | | | |
| 1000pF(102) | ±20%(M) | GNM1M2R71H102MA01D | | | | | | | | |
| 2200pF(222) | ±20%(M) | | GNM1M2R71E222MA01D | | | | | | | |
| 4700pF(472) | ±20%(M) | | GNM1M2R71E472MA01D | | | | | | | |
| 10000pF(103) | ±20%(M) | | GNM1M2R71E103MA01D | | | | | | | |
| 22000pF(223) | ±20%(M) | | | GNM1M2R71C223MA01D | GNM1M2R71A223MA01D | | | | | |
| 47000pF(473) | ±20%(M) | | | GNM1M2R71C473MA01D | GNM1M2R71A473MA01D | | | | | |
| 0.10μF(104) | ±20%(M) | | | GNM1M2R71C104MA01D | GNM1M2C71A104MA01D | | | | | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | | | |
|-----------------------|------------------|-----------------------------|--------------------|--------------------|--|--|--|--|
| Number of Elem | ents | 4(4) | | | | | | |
| Rated Volt. [Vdc |] | 50(1H) | 25(1E) | 16(1C) | | | | |
| Capacitance | Tolerance | | Part Number | | | | | |
| 470pF(471) | ±20%(M) | GNM214R71H471MA01D | | | | | | |
| 1000pF(102) | ±20%(M) | GNM214R71H102MA01D | | | | | | |
| 2200pF(222) | ±20%(M) | | GNM214R71E222MA01D | | | | | |
| 4700pF(472) | ±20%(M) | | GNM214R71E472MA01D | | | | | |
| 10000pF(103) | ±20%(M) | | GNM214R71E103MA01D | | | | | |
| 22000pF(223) | ±20%(M) | | | GNM214R71C223MA01D | | | | |
| 47000pF(473) | ±20%(M) | | | GNM214R71C473MA01D | | | | |
| 0.10μF(104) | ±20%(M) | | | GNM214R71C104MA01D | | | | |

| LxW [mm] | | 3.2x1.6(31)<1206> | | | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|--------------------|--|--|
| Number of Elem | ents | | 4(4) | | | | |
| Rated Volt. [Vdc] | | 50(1H) | 6.3(0J) | | | | |
| Capacitance | Tolerance | | Part Number | | | | |
| 47000pF(473) | ±20%(M) | GNM314R71H473MA11D | | GNM314R71C473MA01L | | | |
| 0.10μF(104) | ±20%(M) | GNM314R71H104MA11D | GNM314R71E104MA11D | GNM314R71C104MA01L | | | |
| 1.0μF(105) | ±20%(M) | | | | GNM314R70J105MA01L | | |

The part number code is shown in () and Unit is shown in [].

(Part Number) | GN | M | 1M | 2 | 5C | 1H | 100 | K | D01 | D **9 9 9 9** 6

1 Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

3 Dimensions (LxW) 6 Rated Voltage

4 Number of Elements Capacitance

9Individual Specification Code

Packaging



^{*} Please refer to GNM series Specifications and Test Method (2).

High Dielectric Constant Type X7R(R7) Characteristics-Low Profile

| LxW [mm] | | 1.37x1.0(1M)<0504> | 2.0x1.25(21)<0805> | | |
|---------------------------------------|-----------|-----------------------------|-----------------------------|--|--|
| Number of Elem | ents | 2(2) | 4(4) | | |
| Rated Volt. [Vdc |] | 16(1C) | 16(1C) | | |
| Capacitance | Tolerance | Part Number | | | |
| 0.10μF(104) ±20%(M) | | GNM1M2R71C104MAA1D | GNM214R71C104MAA1D | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X5R(R6) Characteristics

| LxW [mm] | | 0.9x0.6(0M)<0302> | | | | | |
|-----------------------|------------------|----------------------------|---------------------|---------------------|---------------------|--|--|
| Number of Elements | | 2(2) | | | | | |
| Rated Volt. [Vdc] | | 16(1C) | 10(1A) | 6.3(0J) | 4(0G) | | |
| Capacitance | Tolerance | Part Number | | | | | |
| 10000pF(103) | ±20%(M) | GNM0M2R61C103ME18D* | GNM0M2R61A103ME17D* | GNM0M2R60J103ME17D* | | | |
| 22000pF(223) | ±20%(M) | GNM0M2R61C223ME18D* | GNM0M2R61A223ME17D* | GNM0M2R60J223ME17D* | | | |
| 47000pF(473) | ±20%(M) | GNM0M2R61C473ME18D* | GNM0M2R61A473ME17D* | GNM0M2R60J473ME17D* | | | |
| 0.10μF(104) | ±20%(M) | GNM0M2R61C104ME18D* | GNM0M2R61A104ME17D* | GNM0M2R60J104ME17D* | | | |
| 1.0μF(105) | ±20%(M) | | | | GNM0M2R60G105ME17D* | | |

| LxW [mm] | | 1.37x1.0(1M)<0504> | | | | | |
|-----------------------|------------------|-----------------------------|--------------------|---------------------|--|--|--|
| Number of Elements | | 2(2) | | | | | |
| Rated Volt. [Vdc] | | 50(1H) | 25(1E) | 16(1C) | | | |
| Capacitance | Tolerance | Part Number | | | | | |
| 1000pF(102) | ±20%(M) | GNM1M2R61H102MA01D | | | | | |
| 2200pF(222) | ±20%(M) | | GNM1M2R61E222MA01D | | | | |
| 4700pF(472) | ±20%(M) | | GNM1M2R61E472MA01D | | | | |
| 10000pF(103) | ±20%(M) | | GNM1M2R61E103MA01D | | | | |
| 22000pF(223) | ±20%(M) | | | GNM1M2R61C223MA01D | | | |
| 47000pF(473) | ±20%(M) | | | GNM1M2R61C473MA01D | | | |
| 0.22μF(224) | ±20%(M) | | | GNM1M2R61C224ME18D* | | | |
| 1.0μF(105) | ±20%(M) | | | GNM1M2R61C105ME18D* | | | |

| LxW [mm] | | 1.37x1.0(1M)<0504> | | | |
|-----------------------|------------------|-----------------------------|---------------------|--|--|
| Number of Elem | ents | 2(| (2) | | |
| Rated Volt. [Vdc |] | 10(1A) | 6.3(0J) | | |
| Capacitance | Tolerance | Part Number | | | |
| 22000pF(223) | ±20%(M) | GNM1M2R61A223MA01D | | | |
| 47000pF(473) | ±20%(M) | GNM1M2R61A473MA01D | | | |
| 0.10μF(104) | ±20%(M) | GNM1M2R61A104MA01D | | | |
| 1.0μF(105) | ±20%(M) | GNM1M2R61A105ME17D* | GNM1M2R60J105ME12D* | | |
| 2.2μF(225) | ±20%(M) | GNM1M2R61A225ME18D* | GNM1M2R60J225ME18D* | | |

| LxW [mm] | | 2.0x1.25 (21)<0805> | | | | |
|----------------------|------------------|-----------------------------|---------------------|---------------------|--|--|
| Number of Elements | | 2(2) | | | | |
| Rated Volt. [Vdc] | | 16(1C) | 6.3(0J) | | | |
| Capacitance | Tolerance | | Part Number | | | |
| 0.47μF(474) | ±20%(M) | GNM212R61C474MA16D | | | | |
| 1.0μF(105) | ±20%(M) | GNM212R61C105MA16D | GNM212R61A105MA13D | | | |
| 2.2μF(225) | ±20%(M) | | GNM212R61A225ME16D* | GNM212R60J225ME16D* | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

^{*} Please refer to GNM series Specifications and Test Method (2).



Product IDSeriesTemperature CharacteristicsCapacitance Tolerance



 ³ Dimensions (LxW)
 4 Number of Elements
 6 Rated Voltage
 9 Capacitance
 9 Individual Specification Code
 10 Packaging

GNM314R61A105MA13D

High Dielectric Constant Type X5R(R6) Characteristics

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | |
|--------------------------------------|------------------|---------------------------------|---------------------|--|--|--|
| Number of Elem | ents | 4(4) | | | | |
| Rated Volt. [Vdc |] | 10(1A) | 6.3(0J) | | | |
| Capacitance | Tolerance | Part N | umber | | | |
| 1.0μF(105) | ±20%(M) | GNM214R61A105ME17D* | GNM214R60J105ME17D* | | | |
| 2.2μF(225) ±20%(M) | | GNM214R60J225ME | | | | |
| | | | | | | |
| LxW [mm] | | 3.2x1.6(31)<1206> | | | | |
| Number of Elem | ents | 4(4) | | | | |
| Rated Volt. [Vdc |] | 16(1C) 10(1A) | | | | |
| Capacitance Tolerance | | Part Number | | | | |
| | | | | | | |

GNM314R61C105MA15D

±20%(M)

1.0μF(**105**)

High Dielectric Constant Type X5R(R6) Characteristics-Low Profile

| LxW [mm] | | 1.37x1.0(1 | 2.0x1.25 (21) <0805> | | |
|-----------------------|------------------|---------------------|-----------------------------|--|--|
| Number of Elem | ents | 20 | 4(4) | | |
| Rated Volt. [Vdc] | | 16(1C) | 10(1A) | | |
| Capacitance Tolerance | | | | | |
| 1.0μF(105) | ±20%(M) | GNM1M2R61C105MEA2D* | GNM214R61A105MEA2D* | | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



< >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].

^{*} Please refer to GNM series Specifications and Test Method (2).

^{*} Please refer to GNM series Specifications and Test Method (2).

GNM Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).

When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

| | | | | Specifications | | , | · | | | | | | |
|-----|---|--|--|---|-------------------------|---|---|--|---|--|-------------------------------------|---|---|
| No. | Ite | m | Temperature Compensating Type | High Dielectric | с Туре | | | Tes | t Method | | | | |
| 1 | Operating Temperat Range | | 5C: -55 to +125°C | R7, C7: –55 to +125°C R6: –55 to +85°C | | | | | | | | | |
| 2 | Rated Vol | tage | See the previous page | ges. | | | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, VP-P or VO-P, whichever is larger, should be maintained within the rated voltage range. | | | | | | |
| 3 | Appearan | ce | No defects or abnorr | nalities | | | Visual inspectio | n | | | | | |
| 4 | Dimensio | ns | Within the specified | dimensions | | | Using calipers | | | | | | |
| 5 | Dielectric | Strength | No defects or abnorr | nalities | | | No failure should (5C) or 250% of terminations for current is less th | the rated vol 1 to 5 second | tage (R7) i | s applied b | etween the | | |
| 6 | Insulation Resistance | | More than 10,000Ms (whichever is smalle | | | | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging. | | | | | | |
| 7 | Capacitar | nce | Within the specified | olerance | | | The capacitance | e/Q/D.F. shou | Ild be meas | sured at 25 | °C at the | | |
| | | | 30pF min.: Q≧1000 | | | | frequency and v | | | | | | |
| 0 | Q/ Dissipation Facto (D.F.) | | | Faatan | 30pF max.: Q≥400+20C | Char. 25V min. 16V | 10V | 6.3V | Char. | 5C | | R | 7 |
| 8 | | n Factor | C: Nominal Capacitance (pF) | R7, R6, 0.025 0.035 C7 max. max. | 0.035 max. | 0.05 max. | Frequency Voltage | 1±0.1M 0.5 to 5V | | 1±0.1 1.0±0.2 | | | |
| 9 | Capacitance Temperature Characteristics | Capacitance Change Temperature Coefficient Capacitance Drift | Within the specified tolerance (Table A) Within the specified tolerance (Table A) Within ±0.2% or ±0.05pF (whichever is larger.) | Range Tell | Mp. Ch | Cap. hange Vithin ±15% Vithin ±22% | The capacitance change should be measured after \$\frac{9}{2}\$ each specified temperature stage. (1) Temperature Compensating Type The temperature coefficient is determined using the tance measured in step 3 as a reference. When cycl temperature sequentially from steps 1 through 5, the capacitance should be within the specified tolerance temperature coefficient and capacitance change as in the capacitance drift is calculated by dividing the diff between the maximum and minimum measured values steps 1, 3 and 5 by the cap. value in step 3. Step | | e capacicing the see to for the sin Table A. differences lues in the F5) F5) the above the table pe. hour and | | | | |
| 10 | Adhesive Strength of Termination | | GNM a | | er resist | cui. | Solder the capa Fig.1 using a eu the test jig for 10 The soldering sl reflow method a soldering is unif Type GNM1M2 GNM212 GNM214 GNM314 | tectic solder. D±1 sec. nould be done ind should be form and free a 0.5 0.6 0.6 0.8 | Then apply e either with conducted | 5N force in h an iron or l with care : | parallel with using the so that the | | |



GNM Series Specifications and Test Methods (1

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). Continued from the preceding page. When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Specifications Test Method No Temperature High Dielectric Type Compensating Type Appearance No defects or abnormalities Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The Within the specified tolerance Capacitance capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied 30pF min : Q≥1000 Vibration 30pF max.: uniformly between the approximate limits of 10 and 55Hz. The Char. 25V min. 10V 6.3V Resistance 16V Q≥400+20C frequency range, from 10 to 55Hz and return to 10Hz, should Q/D.F. R7, R6, 0.025 0.035 0.035 0.05 be traversed in approximately 1 minute. This motion should be C7 max. max max applied for a period of 2 hours in each of 3 mutually perpendic-C: Nominal Capacitance (pF) ular directions (total of 6 hours). Appearance No marking defects Solder the capacitor on the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Capacitance Within ±5% or ±0.5pF Then apply a force in the direction shown in Fig. 3 for 5±1 sec. Within ±10% Change (whichever is larger) The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free •GNM□□4 •GNM□□2 of defects such as heat shock. 100 100 5.0 5.0 12 Deflection 50 Pressurizing speed: 1.0mm/sec Pressurize R230 t=0.8mm Type а b Flexure : ≤1 GNM1M2 2.0±0.05 GNM212 2.0±0.05 0.6±0.05 0.5±0.05 0.5±0.05 citance meter GNM214 2.0±0.05 0.7±0.05 | 0.3±0.05 | 0.2±0.05 **GNM314** 2.5±0.05 | 0.8±0.05 | 0.4±0.05 | 0.4±0.05 Fig. 3 Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly and 13 80 to 120°C for 10 to 30 seconds. After preheating, immerse in Termination continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C Resistance to The measured and observed characteristics should satisfy the Soldering Heat specifications in the following table No marking defects Appearance Within ±2.5% Preheat the capacitor at 120 to 150°C for 1 minute. Immerse Capacitance or ±0.25pF R7, R6, C7: Within ±7.5% the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder Change (whichever is solution at 270±5°C for 10±0.5 seconds. Let sit at room larger) temperature for 24±2 hours, then measure. 30pF min.: Q≥1000 14 30pF max.: Initial measurement for high dielectric constant type Char. 25V min. 10V 6.3V 16V Q≥400+20C Perform a heat treatment at 150+0/-10°C for one hour and Q/D.F. R7. R6. 0.025 0.035 0.035 0.05 then let sit for 24±2 hours at room temperature. C7 max max max. max C: Nominal Perform the initial measurement Capacitance (pF) I.R. More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller)

Continued on the following page.





Dielectric

Strength

No failure

GNM Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1).
When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Continued from the preceding page.

| | | | | Specifications | | | | | | |
|-----|-------------------|------------------------|---|---|---|--|--|--|--|--|
| No. | Ite | em | Temperature Compensating Type | High Dielectric Type | Test Method | | | | | |
| | Temperat Cycle | ture | , , , | bbserved characteristics should satisfy the following table. | Fix the capacitor to the supporting jig in the same manner an | | | | | |
| | | Appearance | No marking defects | | under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following | | | | | |
| | | Capacitance Change | Within ±2.5% or ±0.25pF (whichever is larger) | R7, R6, C7: Within ±7.5% | table. Let sit for 24±2 hours (temperature compensating type or 48±4 hours (high dielectric constant type) at room temperature, then measure. | | | | | |
| 15 | | Q/D.F. | 30pF min.: Q≥1000 30pF max.: Q≥400+20C C:Nominal Capacitance (pF) | Char. 25V min. 16V 10V 6.3V R7, R6, 0.025 C7 0.035 max. 0.035 max. 0.035 max. 0.05 max. | Step | | | | | |
| | | I.R. | | Ω or 500 Ω · F (whichever is smaller) | Perform a heat treatment at 150+0/-10°C for one hour and | | | | | |
| | | Dielectric Strength | No failure | 2 01 30022 · 1 (WILICHEVEL IS SHIMHEI) | then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | | | |
| | Humidity State | | The measured and o | bserved characteristics should satisfy the following table. | | | | | | |
| | | Appearance | No marking defects | | | | | | | |
| | | Capacitance Change | Within ±5% or ±0.5pF (whichever is larger) | R7, R6, C7: Within ±12.5% | Sat the connector at 4042°C and 00 to 059/ humidity for 500441 | | | | | |
| 16 | | Q/D.F. | 30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF) | Char. 25V min. 16V 10V/6.3V R7, R6, 0.05 0.05 0.05 C7 max. max. max. | Set the capacitor at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temperature, then measure. | | | | | |
| | | I.R. | More than 1,000MΩ | or 50Ω · F (whichever is smaller) | | | | | | |
| | Humidity | Load | The measured and o | bserved characteristics should satisfy the following table. | | | | | | |
| | | Appearance | No marking defects | | | | | | | |
| | | Capacitance Change | Within ±7.5% or ±0.75pF (whichever is larger) | R7, R6, C7: Within ±12.5% | Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. | | | | | |
| 17 | | Q/D.F. | 30pF and over: Q≥200 30pF and below: Q≥100+10C/3 C: Nominal Capacitance (pF) | Char. 25V min. 16V 10V/6.3V R7, R6, 0.05 0.05 0.05 C7 max. max. max. | Remove and let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. | | | | | |
| | | I.R. | More than 500MΩ or | · 25Ω · F (whichever is smaller) | | | | | | |

Continued on the following page. $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$





GNM Series Specifications and Test Methods (1)

| | Continued fr | om the prec | eding page. | | lease refer to GNM Series Specifications and Test Methods (1). lease refer to GNM Series Specifications and Test Methods (2). |
|-----|------------------|-----------------------|---|--|---|
| | No. Item | | | Specifications | |
| No. | Ite | em | Temperature Compensating Type | High Dielectric Type | Test Method |
| | High Tem Load | perature | The measured and of specifications in the | bserved characteristics should satisfy the following table. | |
| | | Appearance | No marking defects | | 1 |
| | | Capacitance Change | Within ±3% or ±0.3pF (whichever is larger) | R7, R6, C7: Within ±12.5% | Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. |
| 18 | | Q/D.F. | 30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C C: Nominal Capacitance (pF) | Char. 25V min. 16V 10V/6.3V R7, R6, 0.04 0.05 0.05 C7 max. max. max. | Initial measurement for high dielectric constant type. Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 24±2 hours at room temperature. Perform initial measurement. |
| | | I.R. | More than 1.000MΩ | or 50Ω · F (whichever is smaller) | |

Table A

| | Nominal Values | Capacitance Change from 25°C (%) | | | | | | | | | |
|-------|----------------|----------------------------------|-------|------|-------|-------|-------|--|--|--|--|
| Char. | | -5! | 5°C | -30 |)°C | −10°C | | | | | |
| | (ppm/°C) *1 | Max. | Min. | Max. | Min. | Max. | Min. | | | | |
| 5C | 0±30 | 0.58 | -0.24 | 0.40 | -0.17 | 0.25 | -0.11 | | | | |

^{*1:} Nominal values denote the temperature coefficient within a range of 25 to 125°C.

GNM Series Specifications and Test Methods (2)

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2).

| No. | Item | Specifications | Test Method |
|-----|---|--|---|
| 1 | Operating Temperature Range | R6: -55°C to +85°C | |
| 2 | Rated Voltage | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{C-P} , whichever is larger, should be maintained within the rated voltage range. |
| 3 | Appearance | No defects or abnormalities | Visual inspection |
| 4 | Dimensions | Within the specified dimension | Using calipers |
| 5 | Dielectric Strength | No defects or abnormalities | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. |
| 6 | Insulation Resistance | 50Ω · F min. | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging. |
| 7 | Capacitance | Within the specified tolerance | The capacitance/D.F. should be measured at 25°C at the |
| 8 | Dissipation Factor (D.F.) | 0.1 max.*3 Table 3 GNM0M2 R6 103/223/473/104 GNM1M2 R6 0J 105/225 GNM1M2 R6 1A 105MEA4 GNM1M2 R6 1A 225 GNM212 R6 0J 225 GNM212 R6 1A 225 GNM214 R6 0J 225 *3 However 0.125 max. for Table 3 items. | Nominal Capacitance |
| 9 | Capacitance Temperature Characteristics | Char. Temp. Range Reference Temp. Cap. Change R6 -55 to +85°C 25°C Within ±15% | The capacitance change should be measured after 5 min.at each specified temperature stage. Step |
| 10 | Adhesive Strength of Termination | No removal of the terminations or other defects should occur. GNM 4 GNM 2 Solder resist Copper foil Fig. 1 | Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply 5N (GNM0M2: 2N) force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. Type a b c d GNM0M2 0.2 0.96 0.25 0.2 GNM1M2 0.5 1.6 0.32 0.32 GNM1M2 0.5 1.6 0.32 0.32 GNM212 0.6 1.8 0.5 0.5 GNM214 0.6 2.0 0.25 0.25 GNM314 0.8 2.5 0.4 0.4 (in mm) |

Appearance No defects or abnormalities Within the specified tolerance Capacitance Vibration 11 D.F. *3 However 0.125 max. for Table 3 items.

Solder the capacitor to the test jig (glass epoxy board) in the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours).



GNM Series Specifications and Test Methods (2

When no "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (1). Continued from the preceding page When "*" is added in PNs table, please refer to GNM Series Specifications and Test Methods (2). Nο Specifications Test Method Item Appearance No marking defects Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 2 using a eutectic solder. Then apply a force in the Capacitance Within ±10% direction shown in Fig. 3. The soldering should be done by the Change reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. •GNM□□4 GNM□□2 50 Pressurizing speed: 1 0mm/sec Pressurize 12 Deflection Thickness: 0.8mm d Type а b C GNM0M2 2.0±0.05 | 0.2±0.05 | 0.2±0.05 | 0.25±0.05 GNM1M2 45 GNM212 2.0±0.05 GNM214 2.0±0.05 | 0.7±0.05 | 0.3±0.05 | 0.2±0.05 Fig. 3 GNM314 2.5±0.05 | 0.8±0.05 | 0.4±0.05 | 0.4±0.05 Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly 80 to 120°C for 10 to 30 seconds. After preheating, immerse in Termination and continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. Appearance No marking defects Preheat the capacitor at 120 to 150°C for 1 minute. Immerse Capacitance R6*4: Within ±7.5% the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder 4GNM0M2R60G105: Within +15/-7.5% Change solution at 270±5°C for 10±0.5 seconds. Resistance 0.1 max. *3 Let sit at room temperature for 24±2 hours, then measure. to Soldering D.F. *3 However 0.125 max. for Table 3 items. Initial measurement Heat Perform a heat treatment at 150 +0/-10°C for one hour and I.R. $50\Omega \cdot F \min$ then let sit for 24±2 hours at room temperature. Perform Dielectric the initial measurement. No failure Strength Appearance No marking defects Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). R6*5: Within +12.5% Perform the five cycles according to the four heat treatments *5GNM0M2R60G105, GNM0M2R60J103/223/473/104, Capacitance listed in the following table. GNM0M2R61A103/223/473/104, Change Let sit for 24±2 hours at room temperature, then measure. GNM0M2R61C103/223/473/104, GNM1M2R61A105: Step Within ±15% Temperature 15 Min. Operating Min. Operating Room Room Temp. (°C) Cycle 0.1 max. *3 Temp Temp. Temp. Temp. D.F. *3 However 0.125 max. for Table 3 items Time (min.) 30±3 2 to 3 30±3 2 to 3 I.R. $50\Omega \cdot F$ min. Initial measurement Perform a heat treatment at 150 +0/-10 °C for one hour and Dielectric then let sit for 24±2 hours at room temperature. No failure Strength Perform the initial measurement Apply the rated voltage at 40±2°C and 90 to 95% humidity for Appearance No marking defects 500±12 hours. The charge/discharge current is less than 50mA. Capacitance R6: Within ±12.5% Initial measurement High Change Perform a heat treatment at 150 +0/-10°C for one hour Temperature D.F. 0.2 max. and then let sit for 24±2 hours at room temperature. 16 High Perform the initial measurement. Humidity Measurement after test (Steady) Perform a heat treatment at 150 +0/-10°C for one hour I.R. 12.5 Ω · F min. and then let sit for 24±2 hours at room temperature, then Appearance No marking defects Apply 150% (GNM1M2R61A225/1C105: 125% of the rated voltage) of the rated voltage for 1000±12 hours at the Capacitance R6: Within ±12.5% maximum operating temperature ±3°C. Let sit for 24±2 hours Change at room temperature, then measure. D.F. 0.2 max. The charge/discharge current is less than 50mA. Initial measurement Durability Perform a heat treatment at 150 +0/-10°C for one hour



I.R.

 $25\Omega \cdot F min.$

and then let sit for 24±2 hours at room temperature.

Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.

Perform the initial measurement.

Measurement after test

Chip Monolithic Ceramic Capacitors



Low ESL LLL/LLR/LLA/LLM Series

Reversed Geometry Low ESL Type

■ Features

- Low ESL, good for noise reduction for high frequency
- 2. Small, high cap

Applications

Decoupling solution for "chip sets", such as Mobile/FPD TV

Controlled ESR Low ESL Type

■ Features

- Good solution for anti resonance reduction with Controlled ESR.
- 2. Suitable for high speed IC decoupling due to low inductance type.
- 3. 4 types of ESR are available.

Applications

- All kind of IC package (network processor, media processor, etc)
- 2. Circuit that has anti-resonance

Eight Terminals Low ESL Type

■ Features

- 1. Low ESL (100pH), suitable to decoupling capacitor for 1GHz clock speed IC.
- 2. Small, high cap

■ Applications

High speed IC package (FPGA, network processor, etc)

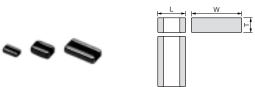
Ten Terminals Low ESL Type

■ Features

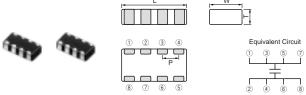
- 1. Low ESL (45pH), suitable to decoupling capacitor for 2GHz clock speed IC.
- 2. Small, high cap

Applications

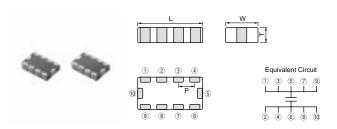
High speed IC package (FPGA, network processor, etc)



| Part Number | Dimensions (mm) | | | | | | | | |
|---------------|-----------------|-----------|----------------|--|--|--|--|--|--|
| r art ivumber | L | W | Т | | | | | | |
| LLL153 | 0.5 ±0.05 | 1.0 ±0.05 | 0.3 ±0.05 | | | | | | |
| LLL185 | 0.8 ±0.1 | 1.6 ±0.1 | 0.6 max. | | | | | | |
| LLL215 | | | 0.5 +0/-0.15 | | | | | | |
| LLL216 | 1.25 ±0.1 | 2.0 ±0.1 | 0.6 ±0.1 | | | | | | |
| LLL219 | | | 0.85 ±0.1 | | | | | | |
| LLL315 | | | 0.5 +0/-0.15 | | | | | | |
| LLL317 | 1.6 ±0.15 | 3.2 ±0.15 | 0.7 ±0.1 | | | | | | |
| LLL31M | | | 1.15 ±0.1 | | | | | | |
| LLR185 | 0.8 ±0.15 | 1.6 ±0.15 | 0.5 +0.05/-0.1 | | | | | | |



| Part Number | | Dime | nsions (mm) | |
|-------------|-----------|-----------|----------------|-----------|
| Part Number | L | W | T | Р |
| LLA185 | 1.6 ±0.1 | 0.8 ±0.1 | 0.5 +0.05/-0.1 | 0.4 ±0.1 |
| LLA215 | 2.0 ±0.1 | 1.25 ±0.1 | 0.5 +0.05/-0.1 | 0.5 ±0.05 |
| LLA219 | 2.0 ±0.1 | 1.25 ±0.1 | 0.85 ±0.1 | 0.5 ±0.05 |
| LLA315 | 3.2 ±0.15 | 1.6 ±0.15 | 0.5 +0.05/-0.1 | 0.8 ±0.1 |
| LLA319 | 3.2 ±0.15 | 1.6 ±0.15 | 0.85 ±0.1 | 0.8 ±0.1 |
| LLA31M | 3.2 ±0.15 | 1.6 ±0.15 | 1.15 ±0.1 | 0.8 ±0.1 |



| Part Number | Dimensions (mm) | | | | | | | | | |
|-------------|-----------------|-----------|----------------|-----------|--|--|--|--|--|--|
| Part Number | L | W | T | Р | | | | | | |
| LLM215 | 2.0 ±0.1 | 1.25 ±0.1 | 0.5 +0.05/-0.1 | 0.5 ±0.05 | | | | | | |
| LLM315 | 3.2 ±0.15 | 1.6 ±0.15 | 0.5 +0.05/-0.1 | 0.8 ±0.1 | | | | | | |



Capacitance Table

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8)/X5R(R6) Characteristics

| 5 | ex.5: T [| Dimensio | on [mm] | | | | | | | | | | | | | | | |
|-------------|-----------------|---------------|---------------------------|-------------|------|------------------------------------|------|---------------|-------------|------|-----------------------------------|------|---------------|--------|------|------------------------------------|------|------|
| | LxW [mm] | (1 | x1.0 5) 04> | | | 0.8x1.6 (18) <0306> | | | | | .25x2. (21) <0508> | | | | | 1.6x3.2 (31) <0612> | | |
| Rated | Voltage | 6.3 | 4 | 50 | 25 | 16 | 10 | 4 | 50 | 25 | 16 | 10 | 4 | 50 | 25 | 16 | 10 | 6.3 |
| Capacitance | [Vdc] | (0J) | (0G) | (1H) | (1E) | (1C) | (1A) | (0G) | (1H) | (1E) | (1C) | (1A) | (0G) | (1H) | (1E) | (1C) | (1A) | (0J) |
| 2200p | F(222) | | | 5 | | | | | | | | | | : ! | | | | |
| 4700p | F(472) | | | 5 | | | | | | | | | | | | | | |
| 10000p | F(103) | | | | 5 | | | | 6 | | | | | 7 | | | | |
| 22000p | F(223) | | | | 5 | | | | 6 | | | | | 7 | | | | |
| 47000p | F(473) | | | ! ! ! | | 5 | | | i I I | 6 | | | | 7 | | | | |
| 0.10µ | F(104) | 3 | | | | | 5 | | | 6 | | | | М | 7 | | | |
| 0.22µ | F(224) | 3 | | | | | 5 | | ! | | 9 | 6 | | | М | 7 | | |
| 0.47µ | F(474) | | 3 | | | | | 5 | | | | 9 | | | М | 7 | | |
| 1.0µ | F(105) | | | ! ! | | | | 5 | | | | 9 | | ! ! | | M | 7 | |
| 2.2μ | F(225) | | | ! ! ! | | | | 5 | | | | | 9 | | | | М | 7 |
| 4.7μ | F(475) | | | ! ! | | | | | ! ! ! | | | | | | | | | M |
| 10μ | F(106) | | | | | | | | 1 | | | | | | | | | M |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| 5 ex.5: T l | Dimensio | on [mm] | | | | | | | | | | | | |
|-----------------------|----------|---------|---------------------------|------|--------|------|------|---------------------|------|------|-------------|------|------------------------------|------|
| LxW [mm] | | (1 | <1.6 8) 06> | | | | (2 | x2.0 (1) (08> | | | | (3 | x3.2 (1) (12> | |
| Rated Voltage | 25 | 16 | 10 | 4 | 50 | 25 | 16 | 10 | 6.3 | 4 | 50 | 25 | 16 | 10 |
| Capacitance [Vdc] | (1E) | (1C) | (1A) | (0G) | (1H) | (1E) | (1C) | (1A) | (0J) | (0G) | (1H) | (1E) | (1C) | (1A) |
| 10000pF(103) | 5 | | | | 5 | | | | | | 5 | | | |
| 22000pF(223) | | 5 | | | ! ! | 5 | | | | | 5 | | | |
| 47000pF(473) | | 5 | | | ! ! | | 5 | | | | | 5 | l | |
| 0.10μF(104) | | | 5 | | ! ! | | 5 | | | | | 5 | | |
| 0.22μF(224) | | | | 5 | | | | 5 | | | | | 5 | |
| 0.47μF(474) | | | | | | | | | 5 | | ' ' ' | | | 5 |
| 1.0μF(105) | | | | | | | | | | 5 | | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Controlled ESR Low ESL Type X7S(C7) Characteristics

| | | | | • | • | | | | | | |
|-------------|------------------------|-----------------------|---------------------------|-----------------------|------------------------|--|--|--|--|--|--|
| 5 | ex.5: T Dimension [mm] | | | | | | | | | | |
| | LxW [mm] | | 0.8x (1 <03 | | | | | | | | |
| Rated \ | /oltage [Vdc] | 4 (0G) | | | | | | | | | |
| Capacitance | ESR [mΩ] | 100 (E01) | 220 (E03) | 470 (E05) | 1000 (E07) | | | | | | |
| 1.0μ | F(1 05) | 5 | 5 | 5 | 5 | | | | | | |

The part number code is shown in () and Unit is shown in [].

Capacitance Table

Eight Terminals Low ESL Type X7S(C7)/X7R(R7) Characteristics

| 5 | ex.5: T | Dimensio | on [mm] | | | | | | | |
|---------|------------------|------------------------------------|---------------------|---------------------|------------------------------------|------------------------------------|--------------------|---------------------|---------------------|--------------------|
| | LxW [mm] | 1.6x0.8 (18) <0603> | | | 2.0x1.2 (21) <0805> | 3.2x1.6 (31) <1206> | | | | |
| Rated V | /oltage [Vdc] | 4 (0G) | 25 (1E) | 16 (1C) | 10 (1A) | 6.3 (0J) | 4 (0G) | 16 (1C) | 10 (1A) | 4 (0G) |
| 10000pF | (103) | | 9 | | | | | ! | | |
| 22000pF | (223) | | 9 | | | | | ! ! | | |
| 47000pF | (473) | | 9 | | | | | i ! | | |
| 0.10μF | (104) | 5 | | 9 | | | | 9 | | |
| 0.22μF | (224) | 5 | | 9 | | | | 9 | | |
| 0.47μF | F(474) | 5 | | | 9 | | | 9 | | |
| 1.0μF | (105) | 5 | | | | 9 | | M | 9 | |
| 2.2µF | (225) | 5 | | | | | 9 | | М | 9 |
| 4.7μF | (475) | | | | | | 9 | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| 5 ex.5: T | Dimensio | on [mm] | | | | | | |
|---------------------------------|---------------------|---------------------|------------------------------------|----------------------|--------------------|---------------------|------------------------------------|----------------------|
| LxW [mm] | | | 2.0x1.2 (21) <0805> | | | | 3.2x1.6 (31) <1206> | |
| Rated Voltage Capacitance [Vdc] | 25 (1E) | 16 (1C) | 10 (1A) | 6.3 (0J) | 4 (0G) | 16 (1C) | 10 (1A) | 6.3 (0J) |
| 10000pF(103) | 5 | | | | | | | |
| 22000pF(223) | 5 | | _ | | | | | |
| 47000pF(473) | | 5 | | | | | | |
| 0.10μF(104) | | 5 | | | | | | |
| 0.22μF(224) | | | 5 | | | 5 | | |
| 0.47μF(474) | | | | 5 | | | 5 | |
| 1.0μF(105) | | | | | 5 | | | 5 |
| 2.2μF(225) | | | | | 5 | | | 5 |
| 4.7μF(475) | | | | | 5 | | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| Tell Tellinais Low Lot Type X7K(17)/X75(67) enarad | | | | | | | | |
|--|--------------------------|-------------------------------------|------|------------------------------------|------|------|---------------|--|
| 5 ex.5: T | 5 ex.5: T Dimension [mm] | | | | | | | |
| LxW [mm] | | 2.0x1.25 (21) <0805> | | 3.2x1.6 (31) <1206> | | | | |
| Rated Voltage | | 16 | 6.3 | 4 | 16 | 10 | 6.3 | |
| Capacitance [Vdc] | (1E) | (1C) | (0J) | (0G) | (1C) | (1A) | (0J) | |
| 10000pF(103) | 5 | | | | | | | |
| 22000pF(223) | 5 | | | | | | | |
| 47000pF(473) | | 5 | | | | | | |
| 0.10μF(104) | | 5 | | | 5 | | | |
| 0.22μF(224) | | | 5 | | 5 | | | |
| 0.47μF(474) | | | 5 | | | 5 | | |
| 1.0μF(105) | | | | 5 | | | | |
| 2.2μF(225) | | | | 5 | | | 5 | |
| | | | | | | | | |

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7)/X6S(C8) Characteristics

| LxW [mm] 0.5x1.0(1 | | | 5)<0204> | |
|----------------------------|------------------|---------------------|---------------------|--|
| Rated Volt. [Vdc |] | 6.3(0J) | 4(0G) | |
| Capacitance | Tolerance | Part Number | | |
| 0.10μF(104) | ±20%(M) | LLL153C80J104ME01E* | | |
| 0.22μF(224) | ±20%(M) | LLL153C80J224ME14E* | | |
| 0.47μF(474) | ±20%(M) | | LLL153C70G474ME17E* | |

LLL153 Series $4V/0.47\mu F(L: 0.5+0.07/-0.03mm)$

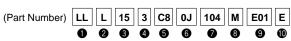
| LxW [mm] | | 0.8x1.6(18)<0306> | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc |] | 50(1H) | 25(1E) | 16(1C) | 10(1A) |
| Capacitance | Tolerance | | Part N | umber | |
| 2200pF(222) | ±20%(M) | LLL185R71H222MA01L | | | |
| 4700pF(472) | ±20%(M) | LLL185R71H472MA01L | | | |
| 10000pF(103) | ±20%(M) | | LLL185R71E103MA01L | | |
| 22000pF(223) | ±20%(M) | | LLL185R71E223MA01L | | |
| 47000pF(473) | ±20%(M) | | | LLL185R71C473MA01L | |
| 0.10μF(104) | ±20%(M) | | | | LLL185R71A104MA01L |
| 0.22μF(224) | ±20%(M) | | | | LLL185R71A224MA01L |

| LxW [mm] | | 0.8x1.6(18)<0306> | |
|----------------------|------------------|----------------------------|--|
| Rated Volt. [Vdc |] | 4(0G) | |
| Capacitance | Tolerance | Part Number | |
| 0.47μF(474) | ±20%(M) | LLL185C70G474MA01L | |
| 1.0μF(105) | ±20%(M) | LLL185C70G105ME02L* | |
| 2.2μF(225) | ±20%(M) | LLL185C70G225ME01L* | |

| LxW [mm] | | 1.25x2.0(21)<0508> | | | |
|-----------------------|------------------|-----------------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc |] | 50(1H) | 25(1E) | 16(1C) | 10(1A) |
| Capacitance | Tolerance | | Part N | lumber | |
| 10000pF(103) | ±20%(M) | LLL216R71H103MA01L | | | |
| 22000pF(223) | ±20%(M) | LLL216R71H223MA01L | | | |
| 47000pF(473) | ±20%(M) | | LLL216R71E473MA01L | | |
| 0.10μF(104) | ±20%(M) | | LLL216R71E104MA01L | | |
| 0.22μF(224) | ±20%(M) | | | LLL219R71C224MA01L | LLL216R71A224MA01L |
| 0.47μF(474) | ±20%(M) | | | | LLL219R71A474MA01L |
| 1.0μF(105) | ±20%(M) | | | | LLL219R71A105MA01L |

| LxW [mm] | | 1.25x2.0(21)<0508> |
|---------------------|------------------|-----------------------------|
| Rated Volt. [Vdc | | 4(0G) |
| Capacitance | Tolerance | Part Number |
| 2.2μF(225) | ±20%(M) | LLL219C70G225MA01L |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code



●Product ID 2 Series **5**Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage 9Individual Specification Code

4 Dimension (T) Capacitance Packaging



^{*} Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

Reversed Geometry Low ESL Type X7R(R7)/X5R(R6) Characteristics

| LxW [mm] | | 1.6x3.2 (31) <0612> | | | |
|-----------------------|---|----------------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc | d Volt. [Vdc] 50(1H) 25(1E) | | | 16(1C) | 10(1A) |
| Capacitance | Tolerance | | Part Number | | |
| 10000pF(103) | ±20%(M) | LLL317R71H103MA01L | | | |
| 22000pF(223) | ±20%(M) | LLL317R71H223MA01L | | | |
| 47000pF(473) | ±20%(M) | LLL317R71H473MA01L | | | |
| 0.10μF(104) | ±20%(M) | LLL31MR71H104MA01L | LLL317R71E104MA01L | | |
| 0.22μF(224) | ±20%(M) | | LLL31MR71E224MA01L | LLL317R71C224MA01L | |
| 0.47μF(474) | ±20%(M) | | LLL31MR71E474MA01L | LLL317R71C474MA01L | |
| 1.0μF(105) | ±20%(M) | | | LLL31MR71C105MA01L | LLL317R71A105MA01L |
| 2.2μF(225) | ±20%(M) | | | | LLL31MR71A225MA01L |

| LxW [mm] | | 1.6x3.2(31)<0612> |
|---------------------|------------------|----------------------------|
| Rated Volt. [Vdc | | 6.3 (0J) |
| Capacitance | Tolerance | Part Number |
| 2.2μF(225) | ±20%(M) | LLL317R70J225MA01L |
| 4.7μF(475) | ±20%(M) | LLL31MR70J475MA01L |
| 10μF(106) | ±20%(M) | LLL31MR60J106ME01L* |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Reversed Geometry Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| LxW [mm] | | 0.8x1.6(18)<0306> | | | |
|-----------------------|---|----------------------------|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc | Volt. [Vdc] 25(1E) 16(1C) 10(1A) | | 4(0G) | | |
| Capacitance | Tolerance | Part Number | | | |
| 10000pF(103) | ±20%(M) | LLL185R71E103MA11L | | | |
| 22000pF(223) | ±20%(M) | | LLL185R71C223MA11L | | |
| 47000pF(473) | ±20%(M) | | LLL185R71C473MA11L | | |
| 0.10μF(104) | ±20%(M) | | | LLL185R71A104MA11L | |
| 0.22μF(224) | ±20%(M) | | | | LLL185C70G224MA11L |

| LxW [mm] | | 1.25x2.0(21)<0508> | | | |
|-----------------------|------------------|---|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc |] | 50(1H) 25(1E) 16(1C) | | | 10(1A) |
| Capacitance | Tolerance | Part Number | | | |
| 10000pF(103) | ±20%(M) | LLL215R71H103MA11L | | | |
| 22000pF(223) | ±20%(M) | | LLL215R71E223MA11L | | |
| 47000pF(473) | ±20%(M) | | | LLL215R71C473MA11L | |
| 0.10μF(104) | ±20%(M) | | | LLL215R71C104MA11L | |
| 0.22μF(224) | ±20%(M) | | | | LLL215R71A224MA11L |

| LxW [mm] | | 1.25x2.0(21)<0508> | | |
|----------------------|------------------|-----------------------------|----------------|--|
| Rated Volt. [Vdc] | | 6.3 (0J) | 4(0G) | |
| Capacitance | Tolerance | Part Number | | |
| 0.47μF(474) | ±20%(M) | LLL215R70J474MA11L | | |
| 1.0μF(105) | ±20%(M) | LLL215C70G105MA | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

③Dimensions (LxW)⑥Rated Voltage④Individual Specification Code

Dimension (T)CapacitancePackaging



^{*} Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

Reversed Geometry Low ESL Type X7R(R7) Characteristics-Low Profile

| LxW [mm] | | 1.6x3.2(31)<0612> | | | |
|-----------------------|------------------|---|--------------------|--------------------|--------------------|
| Rated Volt. [Vdc |] | 50(1H) 25(1E) 16(1C) | | | 10(1A) |
| Capacitance | Tolerance | Part Number | | | |
| 10000pF(103) | ±20%(M) | LLL315R71H103MA11L | | | |
| 22000pF(223) | ±20%(M) | LLL315R71H223MA11L | | | |
| 47000pF(473) | ±20%(M) | | LLL315R71E473MA11L | | |
| 0.10μF(104) | ±20%(M) | | LLL315R71E104MA11L | | |
| 0.22μF(224) | ±20%(M) | | | LLL315R71C224MA11L | |
| 0.47μF(474) | ±20%(M) | | | | LLL315R71A474MA11L |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Controlled ESR Low ESL Type X7S(C7) Characteristics

| LxW [mm] | | 0.8x1.6(18)<0306> | | | | |
|---------------------|------------------|--|---|---------------------|---------------------|--|
| Rated Volt. [Vdc] | | 4(0G) | | | | |
| ESR [mΩ] | | 100(E01) | 100(E01) 220(E03) 470(E05) | | 1000(E07) | |
| Capacitance | Tolerance | Part Number | | | | |
| 1.0μF(105) | ±20%(M) | 20%(M) LLR185C70G105ME01L* LLR185C70G105ME03L* | | LLR185C70G105ME05L* | LLR185C70G105ME07L* | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics

| LxW [mm] | | 1.6x0.8(18)<0603> |
|----------------------|------------------|----------------------------|
| Rated Volt. [Vdc |] | 4(0G) |
| Capacitance | Tolerance | Part Number |
| 0.10μF(104) | ±20%(M) | LLA185C70G104MA01L |
| 0.22μF(224) | ±20%(M) | LLA185C70G224MA01L |
| 0.47μF(474) | ±20%(M) | LLA185C70G474MA01L |
| 1.0μF(105) | ±20%(M) | LLA185C70G105ME01L* |
| 2.2μF(225) | ±20%(M) | LLA185C70G225ME16L* |

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | |
|---------------------------------------|------------------|-----------------------------|---|--|--------------------|--|
| Rated Volt. [Vdc] | | 25(1E) | 25(1E) 16(1C) 10(1A) | | 6.3(0J) | |
| Capacitance | Tolerance | Part Number | | | | |
| 10000pF(103) | ±20%(M) | LLA219R71E103MA01L | | | | |
| 22000pF(223) | ±20%(M) | LLA219R71E223MA01L | | | | |
| 47000pF(473) | ±20%(M) | LLA219R71E473MA01L | | | | |
| 0.10μF(104) | ±20%(M) | | LLA219R71C104MA01L | | | |
| 0.22μF(224) | ±20%(M) | | LLA219R71C224MA01L | | | |
| 0.47μF(474) ±20%(M) | | LLA219R71A474MA01L | | | | |
| 1.0μF(105) ±20%(M) | | | | | LLA219R70J105MA01L | |

| LxW [mm] | | 2.0x1.25(21)<0805> | | |
|---------------------|------------------|-----------------------------|--|--|
| Rated Volt. [Vdc |] | 4(0G) | | |
| Capacitance | Tolerance | Part Number | | |
| 2.2μF(225) | ±20%(M) | LLA219C70G225MA01L | | |
| 4.7μF(475) | ±20%(M) | LLA219C70G475ME01L* | | |



^{*} Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

^{*} Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

Eight Terminals Low ESL Type X7R(R7) Characteristics

| LxW [mm] | | 3.2x1.6(31)<1206> | | | | |
|----------------------|------------------|----------------------------|--------------------|--------------------|--|--|
| Rated Volt. [Vdc] | | 16(1C) | 4(0G) | | | |
| Capacitance | Tolerance | Part Number | | | | |
| 0.10μF(104) | ±20%(M) | LLA319R71C104MA01L | | | | |
| 0.22μF(224) | ±20%(M) | LLA319R71C224MA01L | | | | |
| 0.47μF(474) | ±20%(M) | LLA319R71C474MA01L | | | | |
| 1.0μF(105) | ±20%(M) | LLA31MR71C105MA01L | LLA319R71A105MA01L | | | |
| 2.2μF(225) | ±20%(M) | | LLA31MR71A225MA01L | LLA319R70G225MA01L | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

Eight Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| LxW [mm] | | 2.0x1.25(21)<0805> | | | | | |
|--|------------------|-----------------------------|--------------------|----------------------------|--------------------|--|--|
| Rated Volt. [Vdc |] | 25(1E) | 16(1C) | 10(1A) | 6.3(0J) | | |
| Capacitance | Tolerance | | Part N | lumber | | | |
| 10000pF(103) ±20%(M) | | LLA215R71E103MA14L | | | | | |
| 22000pF(223) | ±20%(M) | LLA215R71E223MA14L | | | | | |
| 47000pF(473) | ±20%(M) | | LLA215R71C473MA14L | | | | |
| 0.10μF(104) ±20%(M) | | | LLA215R71C104MA14L | | | | |
| 0.22μF(224) | ±20%(M) | | | LLA215R71A224MA14L | | | |
| 0.47μF(474) ±20%(N | | | | | LLA215R70J474MA14L | | |
| | | | | | | | |
| LxW [mm] | | 2.0x1.25(21)<0805> | | 3.2x1.6(31)<1206> | | | |
| Rated Volt. [Vdc |] | 4(0G) | 16(1C) | 10(1A) | 6.3(0J) | | |
| Capacitance | Tolerance | Part Nu | | umber | | | |
| 0.22μF(224) | ±20%(M) | | LLA315R71C224MA14L | | | | |
| 0.47μF(474) | ±20%(M) | | | LLA315R71A474MA14L | | | |
| 1.0μF(105) | ±20%(M) | LLA215C70G105MA14L | | | LLA315R70J105MA14L | | |
| 2.2μF(225) | ±20%(M) | LLA215C70G225ME11L* | | | LLA315R70J225MA14L | | |
| 4.7μF(475) | ±20%(M) | LLA215C70G475ME19L* | | | | | |

Ten Terminals Low ESL Type X7R(R7)/X7S(C7) Characteristics-Low Profile

| LxW [mm] | | | 2.0x1.25(21)<0805> | | | | | |
|-----------------------|------------------|--------------------|-----------------------------|--------------------|---------------------|--|--|--|
| Rated Volt. [Vdc |] | 25(1E) | 16(1C) | 6.3(0J) | 4(0G) | | | |
| Capacitance | Tolerance | | Part Number | | | | | |
| 10000pF(103) | ±20%(M) | LLM215R71E103MA11L | | | | | | |
| 22000pF(223) | ±20%(M) | LLM215R71E223MA11L | | | | | | |
| 47000pF(473) | ±20%(M) | | LLM215R71C473MA11L | | | | | |
| 0.10μF(104) | ±20%(M) | | LLM215R71C104MA11L | | | | | |
| 0.22μF(224) | ±20%(M) | | | LLM215R70J224MA11L | | | | |
| 0.47μF(474) | ±20%(M) | | | LLM215R70J474MA11L | | | | |
| 1.0μF(105) | ±20%(M) | | | | LLM215C70G105MA11L | | | |
| 2.2μF(225) | ±20%(M) | | | | LLM215C70G225ME11L* | | | |
| I xW [mm] | | | 3 2x1 6(31)<1206> | | - | | | |

| LxW [mm] | | 3.2x1.6 (31)<1206> | | | | |
|---------------------------------------|------------------|----------------------------|--------------------|--------------------|--|--|
| Rated Volt. [Vdc] | | 16(1C) | 6.3(0J) | | | |
| Capacitance Tolerance | | Part Number | | | | |
| 0.10μF(104) ±20%(M) | | LLM315R71C104MA11L | | | | |
| 0.22μF(224) | ±20%(M) | LLM315R71C224MA11L | | | | |
| 0.47μF(474) | ±20%(M) | | LLM315R71A474MA11L | | | |
| 2.2μF(225) | ±20%(M) | | | LLM315R70J225MA11L | | |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

* Please refer to LLL/LLR/LLA/LLM Series Specifications and Test Method (2).

Product IDSeriesTemperature CharacteristicsCapacitance Tolerance

3Dimensions (LxW)6Rated Voltage9Individual Specification Code

4 Dimension (T)7 Capacitance10 Packaging

LLL/LLR/LLA/LLM Series Specifications and Test Methods

When no "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (1).

| | When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2). | | | | | |
|-----|---|------------------------|---|---|--|--|
| No. | Ite | em | Specifications | Test Method | | |
| 1 | Operating Temperat Range | <i>*</i> | R7, C7: –55 to +125°C | | | |
| 2 | 2 Rated Voltage | | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{p.p} or V ^{0.p} , whichever is larger, should be maintained within the rated voltage range. | | |
| 3 | Appearan | ice | No defects or abnormalities | Visual inspection | | |
| 4 | Dimensio | ns | Within the specified dimension | Using calipers | | |
| 5 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | |
| 6 | Insulation Resistance | | C≦0.047μF: More than 10,000MΩ C>0.047μF: More than 500Ω · F C: Normal Capacitance | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 2 minutes of charging. | | |
| 7 | Capacitar | nce | Within the specified tolerance | The capacitance/D.F. should be measured at 25°C at the | | |
| 8 | Dissipatio (D.F.) | on Factor | W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max. | frequency and voltage shown in the table. Frequency: 1±0.1kHz Voltage: 1±0.2Vrms *For LLA185C70G474, the capacitance should be measured unsing a voltage of 0.5±0.1Vrms. | | |
| 9 | Capacitance 7 Temperature Characteristics | | Char. Temp. Range (°C) Reference Temp. Cap.Change R7 -55 to +125 25°C Within ±15% C7 -55 to +125 25°C Within ±22% | The capacitance change should be measured after 5 min. at each specified temperature stage. Step | | |
| 10 | Adhesive of Termin | _ | No removal of the terminations or other defect should occur. | Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *5N (LLL18 and LLA/LLM Series) | | |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board) in | | |
| 11 | Vibration Resistance | | | the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually | | |
| 12 | Solderability of Termination | | 75% of the terminations are to be soldered evenly and continuously. | perpendicular directions (total of 6 hours). Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C, or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. | | |
| | | Appearance | No marking defects | | | |
| | Decision | Capacitance Change | Within ±7.5% | Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room | | |
| 13 | Resistance to Soldering Heat | D.F. | W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max. | temperature for 24±2 hours, then measure. Initial measurement. Perform a heat treatment at 150+0/–10°C for one hour and | | |
| | | I.R. | More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller) | then let sit for 24±2 hours at room temperature. Perform the | | |
| | | Dielectric Strength | No failure | initial measurement. | | |

muRata

Continued on the following page.





LLL/LLR/LLA/LLM Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (1).

When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2).

| Vo. | Ite | em | Specifications | Test Method | | | | |
|-----|--|-------------------------------|--|--|--|--|--|--|
| | | Appearance Capacitance Change | No marking defects Within ±7.5% | Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room | | | | |
| 14 | Temperature | D.F. | W.V.: 25V min.; 0.025 max. W.V.: 16V/10V max.; 0.035 max. W.V.: 6.3V max.; 0.05 max. | temperature, then measure. Step 1 2 3 4 Min Operating Room May Operating Room | | | | |
| | Cycle | I.R. | More than 10,000M Ω or 500 Ω · F (whichever is smaller) | Temp. (°C) Temp. +0/–3 Temp. Temp. +3/–0 Temp. | | | | |
| | | Dielectric Strength | No failure | Time (min.) 30±3 2 to 3 30±3 2 to 3 • Initial measurement. Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | | |
| | | Appearance | No marking defects | | | | | |
| 15 | Humidity | Capacitance Change | Within ±12.5% | Set the capacitor at 40±2°C and 90 to 95% humidity for 500± hours. Remove and let sit for 24±2 hours at room temperature | | | | |
| 13 | (Steady State) | D.F. | W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max. | then measure. | | | | |
| | | I.R. | More than 1,000M Ω or $50\Omega \cdot F$ (whichever is smaller) | | | | | |
| | | Appearance | No marking defects | | | | | |
| | Humidity | Capacitance Change | Within ±12.5% | Apply the rated voltage at 40±2°C and 90 to 95% humidity fo 500±12 hours. Remove and let sit for 24±2 hours at room | | | | |
| 16 | Load | D.F. | W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max. | temperature, then measure. The charge/discharge current is less than 50mA. | | | | |
| | | I.R. | More than $500 \text{M}\Omega$ or $25 \Omega \cdot \text{F}$ (whichever is smaller) | | | | | |
| | | Appearance | No marking defects | Apply 200% of the rated voltage for 1000±12 hours at the | | | | |
| | | Capacitance Change | Within ±12.5% | maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. | | | | |
| 17 | High Temperature Load | D.F. | W.V.: 10V min.; 0.05 max. W.V.: 6.3V max.; 0.075 max. | •Initial measurement. | | | | |
| | Load W.V.: 6.3V max.; 0.075 max. More than $1,000M\Omega$ or $50\Omega \cdot F$ (whichever is smaller) | | | Apply 200% of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit f 24±2 hours at room temperature. Perform initial measurement. | | | | |



LLL/LLR/LLA/LLM Series Specifications and Test Methods

When no "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (1).

When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2).

| | | | 71 | LLL/LLR/LLA/LLM Series Specifications and Test Methods (2). | | | |
|-----|---|------------------------|---|--|--|--|--|
| No. | | em | Specifications | Test Method | | | |
| 1 | Operating Temperat Range | • | R6: -55 to +85°C R7, C7: -55 to +125°C C8: -55 to +105°C | | | | |
| 2 | | | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range. | | | |
| 3 | Appearar | nce | No defects or abnormalities | Visual inspection | | | |
| 4 | Dimensio | ns | Within the specified dimension | Using calipers | | | |
| 5 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | | |
| 6 | Insulation Resistant | | 50Ω · F min. | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging. | | | |
| 7 | Capacita | nce | Within the specified tolerance | The capacitance/D.F. should be measured at 25°C at the | | | |
| 8 | Dissipation (D.F.) | on Factor | R6, R7, C7, C8: 0.120 max. | | | | |
| 9 | Capacitance 9 Temperature Characteristics | | Char. Temp. Range (°C) Reference Temp. Cap. Change R6 -55 to +85 Within ±15% R7 -55 to +125 Within ±15% C7 -55 to +125 Within ±22% C8 -55 to +105 Within ±22% | The capacitance change should be measured after 5 min. at each specified temperature stage. The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges. • Initial measurement. Perform a heat treatment at 150+0/-10°C for one hour and ther set for 24±2 hours at room temperature. Perform the initial measurement. | | | |
| 10 | Adhesive of Termin | | No removal of the terminations or other defect should occur. | Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *5N (LLL15, LLL18, LLR18, LLA, LLM Series) | | | |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board) in | | | |
| | | Capacitance | Within the specified tolerance | the same manner and under the same conditions as (10). The capacitor should be subjected to a simple harmonic motion | | | |
| 11 | Vibration | D.F. | R6, R7, C7, C8: 0.120 max. | having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours). | | | |
| 12 | Solderabi Terminati | • | 75% of the terminations are to be soldered evenly and continuously. | Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C, or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. | | | |
| | | Appearance | No marking defects | Preheat the capacitor at 120 to 150°C for 1 minute. Immerse | | | |
| | Resistance | Capacitance Change | R6, R7, C7, C8: Within ±7.5% | the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure. | | | |
| 13 | to Soldering | D.F. | R6, R7, C7, C8: 0.120 max. | | | | |
| | Heat | I.R. | $50Ω \cdot F$ min. | • Initial measurement. Perform a heat treatment at 150+0/–10°C for one hour and | | | |
| | | Dielectric Strength | No failure | then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | |

Continued on the following page.





LLL/LLR/LLA/LLM Series Specifications and Test Methods (2)

When no "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (1).
When "*" is added in PNs table, please refer to LLL/LLR/LLA/LLM Series Specifications and Test Methods (2). Continued from the preceding page.

| Vo. | Ite | m | Specifications | | | Tes | st Metho | d | | |
|-----|--|-------------------------------|--|-------------------------|---|-----------------------------------|------------|-----------------------------------|------------|--|
| | | Appearance Capacitance Change | No marking defects R6, R7, C7, C8: Within ±12.5% | und acc tabl | Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10).Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room temperature, | | | | | |
| | | D.F. | R6, R7, C7, C8: 0.120 max. | ther | n measure. | | | | | |
| 14 | Temperature Sudden | I.R. | $50\Omega \cdot F$ min. | | Step | 1 Min. Operating | 2 Room | Min. Operating | 4 Room | |
| | Change | | | _ | Temp. (°C) | Temp. +0/–3 | Temp. | Temp. +0/–3 | Temp. | |
| | | Dielectric Strength | No failure | • Ini Pe | itial measu erform a he | eat treatment a r 24±2 hours a | t 150+0/- | -10°C for one h mperature. Per | our and | |
| | | Appearance | No marking defects | App | oly the rate | d voltage at 40 | ±2°C and | d 90 to 95% hu | midity for | |
| | | Capacitance Change | R6, R7, C7, C8: Within ±12.5% | The | 500±12 hours. The charge/discharge current is less than 50mA. Apply the rated DC voltage. | | | | | |
| | High Temperature | D.F. | R6, R7, C7, C8: 0.2 max. | ' ' | l | | | | | |
| 15 | High Humidity (Steady State) | I.R. | $\begin{tabular}{lll} then let sit for 24 ± 2 hours a initial measurement. \\ & & \\ 12.5\Omega \cdot F min. \\ & & \\ \hline \end{tabular}$ | | at 150+0/–10°C for one hour and at room temperature. Perform the at 150+0/–10°C for one hour and at room temperature, then measure | | | | | |
| | | Appearance | No marking defects | App | oly 150% of | f the rated volt | age for 1 | 000±12 hours a | at the | |
| | | Capacitance Change | R6, R7, C7, C8: Within ±12.5% * LLL153C70G474: Within ±20% | | • | rating tempera scharge currer | | | | |
| | | D.F. | R6, R7, C7, C8: 0.2 max. | •Init | tial measur | rement | | | | |
| 16 | Durability | I.R. | $25\Omega\cdotF$ min. | the ini •Me Pe | Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. •Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measurement. | | | | form the | |
| 17 | Within below ESR value at Frequency: 10 ± 0.1 MHz 100 m Ω : Within 70 to 130 m Ω 7 ESR 220 m Ω : Within 154 to 286 m Ω 470m Ω : Within 329 to 611 m Ω 1000m Ω : Within 700 to 1300 m Ω | | | I | e ESR shou uivalent of I | | ed at roor | n temperature | with the | |

^{*} LLR: This specification is only for LLR Type



Chip Monolithic Ceramic Capacitors



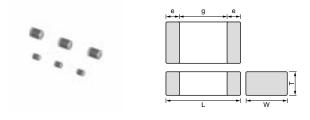
High-Q Type GJM Series

■ Features

- 1. Mobile Telecommunication and RF module, mainly
- Improvement of telephone call quality, Low power Consumption, yield ratio improvement.

■ Applications

VCO, PA, Mobile Telecommunication



| Part Number | | Dir | nensions (r | mm) | |
|-------------|-----------|-----------|-------------|--------------|--------|
| Part Number | L | W | T | е | g min. |
| GJM03 | 0.6 ±0.03 | 0.3 ±0.03 | 0.3 ±0.03 | 0.1 to 0.2 | 0.2 |
| GJM15 | 1.0 ±0.05 | 0.5 ±0.05 | 0.5 ±0.05 | 0.15 to 0.35 | 0.3 |

Capacitance Table

Temperature Compensating Type C0G(5C)/C0H(6C) Characteristics

| Temperature Con | | | Type (| CC |
|---------------------|----------|----------------------|-------------------------|----|
| 3 ex.3: T I | Dimensio | | | |
| LxW | | κ0.3 | 1.0x0.5 | |
| [mm] | <02 | (3) (01> | (15) <0402> | |
| Rated Voltage | 25 | 6.3 | 50 | |
| Capacitance [Vdc] | (1E) | (OJ) | (1H) | |
| 0.1pF(R10) | | | 5 | |
| 0.2pF(R20) | 3 | | 5 | |
| 0.3pF(R30) | 3 | | 5 | |
| 0.4pF(R40) | 3 | | 5 | |
| 0.5pF(R50) | 3 | | 5 | |
| 0.6pF(R60) | 3 | | 5 | |
| 0.7pF(R70) | 3 | | 5 | |
| 0.8pF(R80) | 3 | | 5 | |
| 0.9pF(R90) | 3 | | 5 | |
| 1.0pF(1R0) | 3 | | 5 | |
| 1.1pF(1R1) | 3 | | 5 | |
| 1.2pF(1R2) | 3 | | 5 | |
| 1.3pF(1R3) | 3 | | 5 | |
| 1.4pF(1R4) | 3 | | 5 | |
| 1.5pF(1R5) | 3 | | 5 | |
| 1.6pF(1R6) | 3 | | 5 | |
| 1.7pF(1R7) | 3 | | 5 | |
| 1.8pF(1R8) | 3 | | 5 | |
| 1.9pF(1R9) | 3 | | 5 | |
| 2.0pF(2R0) | 3 | | 5 | |
| 2.1pF(2R1) | 3 | | 5 | |
| 2.2pF(2R2) | 3 | | 5 | |
| 2.3pF(2R3) | 3 | | 5 | |
| 2.4pF(2R4) | 3 | | 5 | |
| 2.5pF(2R5) | 3 | | 5 | |
| 2.6pF(2R6) | 3 | | 5 | |
| 2.7pF(2R7) | 3 | | 5 | |
| 2.8pF(2R8) | 3 | | 5 | |
| 2.9pF(2R9) | 3 | | 5 | |
| 3.0pF(3R0) | 3 | | 5 | |
| 3.1pF(3R1) | 3 | | 5 | |
| 3.2pF(3R2) | 3 | | 5 | |
| 3.3pF(3R3) | 3 | | 5 | |
| 3.4pF(3R4) | 3 | | 5 | |
| 3.5pF(3R5) | 3 | | 5 | |
| 3.6pF(3R6) | 3 | | 5 | |
| 3.7pF(3R7) | 3 | | 5 | |
| 3.8pF(3R8) | 3 | | 5 | |
| 3.9pF(3R9) | 3 | | 5 | |
| 4.0pF(4R0) | 3 | | 5 | |
| 4.1pF(4R1) | 3 | | 5 | |
| 4.2pF(4R2) | 3 | | 5 | |
| 4.3pF(4R3) | 3 | | 5 | |
| 4.4pF(4R4) | 3 | | 5 | |
| 4.5pF(4R5) | 3 | | 5 | |
| 4.6pF(4R6) | 3 | | 5 | |
| 4.7pF(4R7) | 3 | | 5 | |
| 4.8pF(4R8) | 3 | | 5 | |
| 4.9pF(4R9) | 3 | | 5 | |
| | | | | |

| | LxW | 0.6x | | 1.0x0.5 |
|-------------|---------|-------------------|---------------|-------------------------|
| | [mm] | (0 : <02: | 3) 01> | (15) <0402> |
| Rated | /oltage | 25 | 6.3 | 50 |
| Capacitance | [Vdc] | (1E) | (0J) | (1H) |
| 5.0pF | F(5R0) | 3 | | 5 |
| 5.1pF | (5R1) | 3 | | 5 |
| 5.2pF | (5R2) | 3 | | 5 |
| 5.3pF | F(5R3) | 3 | | 5 |
| 5.4pF | (5R4) | 3 | | 5 |
| 5.5pF | F(5R5) | 3 | | 5 |
| 5.6pF | F(5R6) | 3 | | 5 |
| 5.7pF | (5R7) | 3 | | 5 |
| 5.8pF | F(5R8) | 3 | | 5 |
| 5.9pF | F(5R9) | 3 | | 5 |
| 6.0pF | F(6R0) | 3 | | 5 |
| 6.1pF | F(6R1) | 3 | | 5 |
| 6.2pF | (6R2) | 3 | | 5 |
| 6.3pF | F(6R3) | 3 | | 5 |
| 6.4pF | F(6R4) | 3 | | 5 |
| 6.5pF | F(6R5) | 3 | | 5 |
| 6.6pF | (6R6) | 3 | | 5 |
| 6.7pF | (6R7) | 3 | | 5 |
| 6.8pF | F(6R8) | 3 | | 5 |
| 6.9pF | (6R9) | 3 | | 5 |
| 7.0pF | (7R0) | 3 | | 5 |
| | (7R1) | 3 | | 5 |
| - | (7R2) | 3 | | 5 |
| | (7R3) | 3 | | 5 |
| | (7R4) | 3 | | 5 |
| | (7R5) | 3 | | 5 |
| 7.6pF | (7R6) | 3 | | 5 |
| 7.7pF | (7R7) | 3 | | 5 |
| | (7R8) | 3 | | 5 |
| | (7R9) | 3 | | 5 |
| | (8R0) | 3 | | 5 |
| - | (8R1) | 3 | | 5 |
| - | (8R2) | 3 | | 5 |
| 8.3pF | F(8R3) | 3 | | 5 |
| · | (8R4) | 3 | | 5 |
| <u>.</u> | (8R5) | 3 | | 5 |
| | (8R6) | 3 | | 5 |
| <u>.</u> | (8R7) | 3 | | 5 |
| | (8R8) | 3 | | 5 |
| - | (8R9) | 3 | | 5 |
| <u>.</u> | (9R0) | 3 | | 5 |
| · | (9R1) | 3 | | 5 |
| · | (9R2) | 3 | | 5 |
| | (9R3) | 3 | | 5 |
| | (9R4) | 3 | | 5 |
| | (9R5) | 3 | | 5 |
| | (9R6) | 3 | | 5 |
| | (9R7) | 3 | | 5 |
| | (9R8) | 3 | | 5 |

| LxW [mm] | 0.6x0.3 (03) <0201> | | 1.0x0.5 (15) <0402> |
|---------------------------------|------------------------------------|----------------------|------------------------------------|
| Rated Voltage Capacitance [Vdc] | 25 (1E) | 6.3 (0J) | 50 (1H) |
| 9.9pF(9R9) | 3 | | 5 |
| 10pF(100) | 3 | | 5 |
| 11pF(110) | 3 | | 5 |
| 12pF(120) | 3 | | 5 |
| 13pF(130) | 3 | | 5 |
| 15pF(150) | 3 | | 5 |
| 16pF(160) | 3 | | 5 |
| 18pF(180) | 3 | | 5 |
| 20pF(200) | 3 | | 5 |
| 22pF(220) | | 3 | |
| 24pF(240) | | 3 | |
| 27pF(270) | | 3 | |
| 30pF(300) | | 3 | |
| 33pF(330) | | 3 | |
| | | | |

| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|------------------------|---------------------|----------------------------------|----------------------------|
| Rated Volt. [Vdc] | | 25(1E) | 50(1H) |
| Capacitance | Tolerance | | umber |
| 0.1pF(R10) | ±0.05pF(W) | raitiv | GJM1555C1HR10WB01D |
| 0.1pr (1110) | ±0.1pF(B) | | GJM1555C1HR10BB01D |
| 0.2pF(R20) | ±0.05pF(W) | GJM0335C1ER20WB01D | GJM1555C1HR20WB01D |
| 0.2pi (1120) | ±0.1pF(B) | GJM0335C1ER20BB01D | GJM1555C1HR20BB01D |
| 0.3pF(R30) | ±0.05pF(W) | GJM0335C1ER30WB01D | GJM1555C1HR30WB01D |
| 5.5p. (11 23) | ±0.1pF(B) | GJM0335C1ER30BB01D | GJM1555C1HR30BB01D |
| 0.4pF(R40) | ±0.05pF(W) | GJM0335C1ER40WB01D | GJM1555C1HR40WB01D |
| 5p. (111 5) | ±0.1pF(B) | GJM0335C1ER40BB01D | GJM1555C1HR40BB01D |
| 0.5pF(R50) | ±0.05pF(W) | GJM0335C1ER50WB01D | GJM1555C1HR50WB01D |
| 5.5p. (11 55) | ±0.1pF(B) | GJM0335C1ER50BB01D | GJM1555C1HR50BB01D |
| 0.6pF(R60) | ±0.05pF(W) | GJM0335C1ER60WB01D | GJM1555C1HR60WB01D |
| 5.5p. (11 55) | ±0.1pF(B) | GJM0335C1ER60BB01D | GJM1555C1HR60BB01D |
| 0.7pF(R70) | ±0.05pF(W) | GJM0335C1ER70WB01D | GJM1555C1HR70WB01D |
| σ., μ. (ττ. υ) | ±0.1pF(B) | GJM0335C1ER70BB01D | GJM1555C1HR70BB01D |
| 0.8pF(R80) | ±0.05pF(W) | GJM0335C1ER80WB01D | GJM1555C1HR80WB01D |
| 5.5p. (11 22) | ±0.1pF(B) | GJM0335C1ER80BB01D | GJM1555C1HR80BB01D |
| 0.9pF(R90) | ±0.05pF(W) | GJM0335C1ER90WB01D | GJM1555C1HR90WB01D |
| 511 pr (415 5) | ±0.1pF(B) | GJM0335C1ER90BB01D | GJM1555C1HR90BB01D |
| 1.0pF(1R0) | ±0.05pF(W) | GJM0335C1E1R0WB01D | GJM1555C1H1R0WB01D |
| | ±0.1pF(B) | GJM0335C1E1R0BB01D | GJM1555C1H1R0BB01D |
| | ±0.25pF(C) | GJM0335C1E1R0CB01D | GJM1555C1H1R0CB01D |
| 1.1pF(1R1) | ±0.05pF(W) | GJM0335C1E1R1WB01D | GJM1555C1H1R1WB01D |
| | ±0.1pF(B) | GJM0335C1E1R1BB01D | GJM1555C1H1R1BB01D |
| | ±0.25pF(C) | GJM0335C1E1R1CB01D | GJM1555C1H1R1CB01D |
| 1.2pF(1R2) | ±0.05pF(W) | GJM0335C1E1R2WB01D | GJM1555C1H1R2WB01D |
| , , | ±0.1pF(B) | GJM0335C1E1R2BB01D | GJM1555C1H1R2BB01D |
| | ±0.25pF(C) | GJM0335C1E1R2CB01D | GJM1555C1H1R2CB01D |
| 1.3pF(1R3) | ±0.05pF(W) | GJM0335C1E1R3WB01D | GJM1555C1H1R3WB01D |
| | ±0.1pF(B) | GJM0335C1E1R3BB01D | GJM1555C1H1R3BB01D |
| | ±0.25pF(C) | GJM0335C1E1R3CB01D | GJM1555C1H1R3CB01D |
| 1.4pF(1R4) | ±0.05pF(W) | GJM0335C1E1R4WB01D | GJM1555C1H1R4WB01D |
| | ±0.1pF(B) | GJM0335C1E1R4BB01D | GJM1555C1H1R4BB01D |
| | ±0.25pF(C) | GJM0335C1E1R4CB01D | GJM1555C1H1R4CB01D |
| 1.5pF(1R5) | ±0.05pF(W) | GJM0335C1E1R5WB01D | GJM1555C1H1R5WB01D |
| | ±0.1pF(B) | GJM0335C1E1R5BB01D | GJM1555C1H1R5BB01D |
| | ±0.25pF(C) | GJM0335C1E1R5CB01D | GJM1555C1H1R5CB01D |
| 1.6pF(1R6) | ±0.05pF(W) | GJM0335C1E1R6WB01D | GJM1555C1H1R6WB01D |
| | ±0.1pF(B) | GJM0335C1E1R6BB01D | GJM1555C1H1R6BB01D |
| | ±0.25pF(C) | GJM0335C1E1R6CB01D | GJM1555C1H1R6CB01D |
| 1.7pF(1R7) | ±0.05pF(W) | GJM0335C1E1R7WB01D | GJM1555C1H1R7WB01D |
| | ±0.1pF(B) | GJM0335C1E1R7BB01D | GJM1555C1H1R7BB01D |
| | ±0.25pF(C) | GJM0335C1E1R7CB01D | GJM1555C1H1R7CB01D |
| 1.8pF(1R8) | ±0.05pF(W) | GJM0335C1E1R8WB01D | GJM1555C1H1R8WB01D |
| | ±0.1pF(B) | GJM0335C1E1R8BB01D | GJM1555C1H1R8BB01D |
| | ±0.25pF(C) | GJM0335C1E1R8CB01D | GJM1555C1H1R8CB01D |
| 1.9pF(1R9) | ±0.05pF(W) | GJM0335C1E1R9WB01D | GJM1555C1H1R9WB01D |
| | ±0.1pF(B) | GJM0335C1E1R9BB01D | GJM1555C1H1R9BB01D |
| | ±0.25pF(C) | GJM0335C1E1R9CB01D | GJM1555C1H1R9CB01D |
| The part number or | nde is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

03 | 3 | 5C | 1E | R20 | W (Part Number) | GJ | M | B01 D 8 **4 5** 6 0

●Product ID 2 Series 5 Temperature Characteristics

3 Capacitance Tolerance

3Dimensions (LxW) 6 Rated Voltage 9Individual Specification Code

4Dimension (T) **7**Capacitance Packaging



| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|---------------------------|--|--|--|
| Rated Volt. [Vdc] | 1 | 25(1E) | 50(1H) |
| Capacitance | Tolerance | , | umber |
| 2.0pF(2R0) | ±0.05pF(W) | GJM0335C1E2R0WB01D | GJM1555C1H2R0WB01D |
| 2.0pr (21(0) | ±0.1pF(B) | GJM0335C1E2R0BB01D | GJM1555C1H2R0BB01D |
| | ±0.25pF(C) | GJM0335C1E2R0CB01D | GJM1555C1H2R0CB01D |
| 2.1pF(2R1) | ±0.05pF(W) | GJM0335C1E2R1WB01D | GJM1555C1H2R1WB01D |
| 2. (pr (21(1) | ±0.1pF(B) | GJM0335C1E2R1BB01D | GJM1555C1H2R1BB01D |
| | ±0.25pF(C) | GJM0335C1E2R1CB01D | GJM1555C1H2R1CB01D |
| 2.2pF(2R2) | ±0.05pF(W) | GJM0335C1E2R2WB01D | GJM1555C1H2R2WB01D |
| 2.2pr (21(2) | ±0.1pF(B) | GJM0335C1E2R2BB01D | GJM1555C1H2R2BB01D |
| | ±0.1pf (b) ±0.25pF(C) | GJM0335C1E2R2CB01D | GJM1555C1H2R2CB01D |
| 2.3pF(2R3) | ±0.05pF(W) | GJM0335C1E2R3WB01D | GJM1555C1H2R3WB01D |
| 2.5pr (21(3) | | GJM0335C1E2R3BB01D | GJM1555C1H2R3BB01D |
| | ±0.1pF(B) ±0.25pF(C) | | |
| 2 4pE/ 2D4) | | GJM0335C1E2R3CB01D GJM0335C1E2R4WB01D | GJM1555C1H2R3CB01D |
| 2.4pF(2R4) | ±0.05pF(W) | | GJM1555C1H2R4WB01D |
| | ±0.1pF(B) | GJM0335C1E2R4BB01D | GJM1555C1H2R4BB01D |
| 2 FmF/2DF) | ±0.25pF(C) | GJM0335C1E2R4CB01D | GJM1555C1H2R4CB01D |
| 2.5pF(2R5) | ±0.05pF(W) | GJM0335C1E2R5WB01D | GJM1555C1H2R5WB01D |
| | ±0.1pF(B) | GJM0335C1E2R5BB01D | GJM1555C1H2R5BB01D |
| 2 (= 5(000) | ±0.25pF(C) | GJM0335C1E2R5CB01D | GJM1555C1H2R5CB01D |
| 2.6pF(2R6) | ±0.05pF(W) | GJM0335C1E2R6WB01D | GJM1555C1H2R6WB01D |
| | ±0.1pF(B) | GJM0335C1E2R6BB01D | GJM1555C1H2R6BB01D |
| 2.7:: F(0.0.7) | ±0.25pF(C) | GJM0335C1E2R6CB01D | GJM1555C1H2R6CB01D |
| 2.7pF(2R7) | ±0.05pF(W) | GJM0335C1E2R7WB01D | GJM1555C1H2R7WB01D |
| | ±0.1pF(B) | GJM0335C1E2R7BB01D | GJM1555C1H2R7BB01D |
| 2.0 (0.00) | ±0.25pF(C) | GJM0335C1E2R7CB01D | GJM1555C1H2R7CB01D |
| 2.8pF(2R8) | ±0.05pF(W) | GJM0335C1E2R8WB01D | GJM1555C1H2R8WB01D |
| | ±0.1pF(B) | GJM0335C1E2R8BB01D | GJM1555C1H2R8BB01D |
| 2.0%[(200) | ±0.25pF(C) | GJM0335C1E2R8CB01D | GJM1555C1H2R8CB01D |
| 2.9pF(2R9) | ±0.05pF(W) | GJM0335C1E2R9WB01D | GJM1555C1H2R9WB01D GJM1555C1H2R9BB01D |
| | ±0.1pF(B) | GJM0335C1E2R9BB01D | |
| 2.0×F(2 D0) | ±0.25pF(C) | GJM0335C1E2R9CB01D | GJM1555C1H2R9CB01D |
| 3.0pF(3R0) | ±0.05pF(W) | GJM0335C1E3R0WB01D | GJM1555C1H3R0WB01D |
| | ±0.1pF(B) | GJM0335C1E3R0BB01D | GJM1555C1H3R0BB01D |
| 2.1 mF/2D4\ | ±0.25pF(C) | GJM0335C1E3R0CB01D | GJM1555C1H3R0CB01D GJM1555C1H3R1WB01D |
| 3.1pF(3R1) | ±0.05pF(W) | GJM0335C1E3R1WB01D | GJM1555C1H3R1BB01D |
| | ±0.1pF(B) | GJM0335C1E3R1BB01D GJM0335C1E3R1CB01D | GJM1555C1H3R1CB01D |
| 3.2pF(3R2) | ±0.25pF(C) | GJM0335C1E3R2WB01D | GJM1555C1H3R2WB01D |
| 3.2 ρΓ(3R2) | ±0.05pF(W) | | |
| | ±0.1pF(B) | GJM0335C1E3R2BB01D | GJM1555C1H3R2BB01D |
| 2.2mF/2D2\ | ±0.25pF(C) | GJM0335C1E3R2CB01D | GJM1555C1H3R2CB01D |
| 3.3pF(3R3) | ±0.05pF(W) | GJM0335C1E3R3WB01D | GJM1555C1H3R3WB01D |
| | ±0.1pF(B) | GJM0335C1E3R3BB01D | GJM1555C1H3R3BB01D |
| 2.455(00.4) | ±0.25pF(C) | GJM0335C1E3R3CB01D | GJM1555C1H3R3CB01D |
| 3.4pF(3R4) | ±0.05pF(W) | GJM0335C1E3R4WB01D | GJM1555C1H3R4WB01D |
| | ±0.1pF(B) | GJM0335C1E3R4BB01D | GJM1555C1H3R4BB01D |
| 2 EnF/2DF\ | ±0.25pF(C) | GJM0335C1E3R4CB01D | GJM1555C1H3R4CB01D |
| 3.5pF(3R5) | ±0.05pF(W) | GJM0335C1E3R5WB01D | GJM1555C1H3R5WB01D |
| | ±0.1pF(B) | GJM0335C1E3R5BB01D | GJM1555C1H3R5BB01D |
| | ±0.25pF(C) | GJM0335C1E3R5CB01D | GJM1555C1H3R5CB01D |
| The part number co | ode is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |

(Part Number) | GJ | M | 03 | 3 | 5C | 1E | 2R0 | W | B01 | D **9 9 4 5** 6

Product ID 2Series 5 Temperature Characteristics 3 Capacitance Tolerance

6Rated Voltage **9**Individual Specification Code

3Dimensions (LxW)

4 Dimension (T) **7**Capacitance **®**Packaging



| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|---------------------|---------------------|----------------------------------|----------------------------|
| Rated Volt. [Vdc] | | 25(1E) | 50(1H) |
| Capacitance | Tolerance | Part N | |
| 3.6pF(3R6) | ±0.05pF(W) | GJM0335C1E3R6WB01D | GJM1555C1H3R6WB01D |
| | ±0.1pF(B) | GJM0335C1E3R6BB01D | GJM1555C1H3R6BB01D |
| | ±0.25pF(C) | GJM0335C1E3R6CB01D | GJM1555C1H3R6CB01D |
| 3.7pF(3R7) | ±0.05pF(W) | GJM0335C1E3R7WB01D | GJM1555C1H3R7WB01D |
| | ±0.1pF(B) | GJM0335C1E3R7BB01D | GJM1555C1H3R7BB01D |
| | ±0.25pF(C) | GJM0335C1E3R7CB01D | GJM1555C1H3R7CB01D |
| 3.8pF(3R8) | ±0.05pF(W) | GJM0335C1E3R8WB01D | GJM1555C1H3R8WB01D |
| | ±0.1pF(B) | GJM0335C1E3R8BB01D | GJM1555C1H3R8BB01D |
| | ±0.25pF(C) | GJM0335C1E3R8CB01D | GJM1555C1H3R8CB01D |
| 3.9pF(3R9) | ±0.05pF(W) | GJM0335C1E3R9WB01D | GJM1555C1H3R9WB01D |
| | ±0.1pF(B) | GJM0335C1E3R9BB01D | GJM1555C1H3R9BB01D |
| | ±0.25pF(C) | GJM0335C1E3R9CB01D | GJM1555C1H3R9CB01D |
| 4.0pF(4R0) | ±0.05pF(W) | GJM0335C1E4R0WB01D | GJM1555C1H4R0WB01D |
| | ±0.1pF(B) | GJM0335C1E4R0BB01D | GJM1555C1H4R0BB01D |
| | ±0.25pF(C) | GJM0335C1E4R0CB01D | GJM1555C1H4R0CB01D |
| 4.1pF(4R1) | ±0.05pF(W) | GJM0335C1E4R1WB01D | GJM1555C1H4R1WB01D |
| | ±0.1pF(B) | GJM0335C1E4R1BB01D | GJM1555C1H4R1BB01D |
| | ±0.25pF(C) | GJM0335C1E4R1CB01D | GJM1555C1H4R1CB01D |
| 4.2pF(4R2) | ±0.05pF(W) | GJM0335C1E4R2WB01D | GJM1555C1H4R2WB01D |
| | ±0.1pF(B) | GJM0335C1E4R2BB01D | GJM1555C1H4R2BB01D |
| | ±0.25pF(C) | GJM0335C1E4R2CB01D | GJM1555C1H4R2CB01D |
| 4.3pF(4R3) | ±0.05pF(W) | GJM0335C1E4R3WB01D | GJM1555C1H4R3WB01D |
| | ±0.1pF(B) | GJM0335C1E4R3BB01D | GJM1555C1H4R3BB01D |
| | ±0.25pF(C) | GJM0335C1E4R3CB01D | GJM1555C1H4R3CB01D |
| 4.4pF(4R4) | ±0.05pF(W) | GJM0335C1E4R4WB01D | GJM1555C1H4R4WB01D |
| | ±0.1pF(B) | GJM0335C1E4R4BB01D | GJM1555C1H4R4BB01D |
| | ±0.25pF(C) | GJM0335C1E4R4CB01D | GJM1555C1H4R4CB01D |
| 4.5pF(4R5) | ±0.05pF(W) | GJM0335C1E4R5WB01D | GJM1555C1H4R5WB01D |
| | ±0.1pF(B) | GJM0335C1E4R5BB01D | GJM1555C1H4R5BB01D |
| | ±0.25pF(C) | GJM0335C1E4R5CB01D | GJM1555C1H4R5CB01D |
| 4.6pF(4R6) | ±0.05pF(W) | GJM0335C1E4R6WB01D | GJM1555C1H4R6WB01D |
| | ±0.1pF(B) | GJM0335C1E4R6BB01D | GJM1555C1H4R6BB01D |
| | ±0.25pF(C) | GJM0335C1E4R6CB01D | GJM1555C1H4R6CB01D |
| 4.7pF(4R7) | ±0.05pF(W) | GJM0335C1E4R7WB01D | GJM1555C1H4R7WB01D |
| | ±0.1pF(B) | GJM0335C1E4R7BB01D | GJM1555C1H4R7BB01D |
| | ±0.25pF(C) | GJM0335C1E4R7CB01D | GJM1555C1H4R7CB01D |
| 4.8pF(4R8) | ±0.05pF(W) | GJM0335C1E4R8WB01D | GJM1555C1H4R8WB01D |
| | ±0.1pF(B) | GJM0335C1E4R8BB01D | GJM1555C1H4R8BB01D |
| | ±0.25pF(C) | GJM0335C1E4R8CB01D | GJM1555C1H4R8CB01D |
| 4.9pF(4R9) | ±0.05pF(W) | GJM0335C1E4R9WB01D | GJM1555C1H4R9WB01D |
| | ±0.1pF(B) | GJM0335C1E4R9BB01D | GJM1555C1H4R9BB01D |
| | ±0.25pF(C) | GJM0335C1E4R9CB01D | GJM1555C1H4R9CB01D |
| 5.0pF(5R0) | ±0.05pF(W) | GJM0335C1E5R0WB01D | GJM1555C1H5R0WB01D |
| | ±0.1pF(B) | GJM0335C1E5R0BB01D | GJM1555C1H5R0BB01D |
| | ±0.25pF(C) | GJM0335C1E5R0CB01D | GJM1555C1H5R0CB01D |
| 5.1pF(5R1) | ±0.05pF(W) | GJM0335C1E5R1WB01D | GJM1555C1H5R1WB01D |
| | ±0.1pF(B) | GJM0335C1E5R1BB01D | GJM1555C1H5R1BB01D |
| | ±0.25pF(C) | GJM0335C1E5R1CB01D | GJM1555C1H5R1CB01D |
| | ±0.5pF(D) | GJM0335C1E5R1DB01D | GJM1555C1H5R1DB01D |
| The part number co | ode is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |



| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|------------------------|---|--|------------------------------------|
| Rated Volt. [Vdc |] | 25(1E) | 50(1H) |
| Capacitance | Tolerance | Part N | umber |
| 5.2pF(5R2) | ±0.05pF(W) | GJM0335C1E5R2WB01D | GJM1555C1H5R2WB01D |
| | ±0.1pF(B) | GJM0335C1E5R2BB01D | GJM1555C1H5R2BB01D |
| | ±0.25pF(C) | GJM0335C1E5R2CB01D | GJM1555C1H5R2CB01D |
| | ±0.5pF(D) | GJM0335C1E5R2DB01D | GJM1555C1H5R2DB01D |
| 5.3pF(5R3) | ±0.05pF(W) | GJM0335C1E5R3WB01D | GJM1555C1H5R3WB01D |
| | ±0.1pF(B) | GJM0335C1E5R3BB01D | GJM1555C1H5R3BB01D |
| | ±0.25pF(C) | GJM0335C1E5R3CB01D | GJM1555C1H5R3CB01D |
| | ±0.5pF(D) | GJM0335C1E5R3DB01D | GJM1555C1H5R3DB01D |
| 5.4pF(5R4) | ±0.05pF(W) | GJM0335C1E5R4WB01D | GJM1555C1H5R4WB01D |
| | ±0.1pF(B) | GJM0335C1E5R4BB01D | GJM1555C1H5R4BB01D |
| | ±0.25pF(C) | GJM0335C1E5R4CB01D | GJM1555C1H5R4CB01D |
| | ±0.5pF(D) | GJM0335C1E5R4DB01D | GJM1555C1H5R4DB01D |
| 5.5pF(5R5) | ±0.05pF(W) | GJM0335C1E5R5WB01D | GJM1555C1H5R5WB01D |
| | ±0.1pF(B) | GJM0335C1E5R5BB01D | GJM1555C1H5R5BB01D |
| | ±0.25pF(C) | GJM0335C1E5R5CB01D | GJM1555C1H5R5CB01D |
| | ±0.5pF(D) | GJM0335C1E5R5DB01D | GJM1555C1H5R5DB01D |
| 5.6pF(5R6) | ±0.05pF(W) | GJM0335C1E5R6WB01D | GJM1555C1H5R6WB01D |
| 2.26. (2.22) | ±0.1pF(B) | GJM0335C1E5R6BB01D | GJM1555C1H5R6BB01D |
| | ±0.25pF(C) | GJM0335C1E5R6CB01D | GJM1555C1H5R6CB01D |
| | ±0.5pF(D) | GJM0335C1E5R6DB01D | GJM1555C1H5R6DB01D |
| 5.7pF(5R7) | ±0.05pF(W) | GJM0335C1E5R7WB01D | GJM1555C1H5R7WB01D |
| op. (e) | ±0.1pF(B) | GJM0335C1E5R7BB01D | GJM1555C1H5R7BB01D |
| | ±0.25pF(C) | GJM0335C1E5R7CB01D | GJM1555C1H5R7CB01D |
| | ±0.5pF(D) | GJM0335C1E5R7DB01D | GJM1555C1H5R7DB01D |
| 5.8pF(5R8) | ±0.05pF(W) | GJM0335C1E5R8WB01D | GJM1555C1H5R8WB01D |
| 5.5p. (5.1.5) | ±0.1pF(B) | GJM0335C1E5R8BB01D | GJM1555C1H5R8BB01D |
| | ±0.25pF(C) | GJM0335C1E5R8CB01D | GJM1555C1H5R8CB01D |
| | ±0.5pF(D) | GJM0335C1E5R8DB01D | GJM1555C1H5R8DB01D |
| 5.9pF(5R9) | ±0.05pF(W) | GJM0335C1E5R9WB01D | GJM1555C1H5R9WB01D |
| 0.7pi (0110) | ±0.1pF(B) | GJM0335C1E5R9BB01D | GJM1555C1H5R9BB01D |
| | ±0.25pF(C) | GJM0335C1E5R9CB01D | GJM1555C1H5R9CB01D |
| | ±0.5pF(D) | GJM0335C1E5R9DB01D | GJM1555C1H5R9DB01D |
| 6.0pF(6R0) | ±0.05pF(W) | GJM0335C1E6R0WB01D | GJM1555C1H6R0WB01D |
| 0.0pi (0110) | ±0.1pF(B) | GJM0335C1E6R0BB01D | GJM1555C1H6R0BB01D |
| | ±0.25pF(C) | GJM0335C1E6R0CB01D | GJM1555C1H6R0CB01D |
| | ±0.5pF(D) | GJM0335C1E6R0DB01D | GJM1555C1H6R0DB01D |
| 6.1pF(6R1) | ±0.05pF(W) | GJM0335C1E6R1WB01D | GJM1555C1H6R1WB01D |
| 0.1pi (01(1) | ±0.1pF(B) | GJM0335C1E6R1BB01D | GJM1555C1H6R1BB01D |
| | ±0.25pF(C) | GJM0335C1E6R1CB01D | GJM1555C1H6R1CB01D |
| | ±0.5pF(D) | GJM0335C1E6R1DB01D | GJM1555C1H6R1DB01D |
| 6.2pF(6R2) | ±0.05pF(W) | GJM0335C1E6R2WB01D | GJM1555C1H6R2WB01D |
| υ.Ζρι (υιτ2) | | GJM0335C1E6R2WB01D | GJM1555C1H6R2WB01D |
| | ±0.1pF(B) +0.25pF(C) | | GJM1555C1H6R2CB01D |
| | ±0.25pF(C) | GJM0335C1E6R2CB01D | |
| 6 2nF(0D0) | ±0.5pF(D) | GJM0335C1E6R2DB01D | GJM1555C1H6R2DB01D |
| 6.3pF(6R3) | ±0.05pF(W) +0.1pF(B) | GJM0335C1E6R3WB01D | GJM1555C1H6R3WB01D |
| | ±0.1pF(B) | GJM0335C1E6R3BB01D | GJM1555C1H6R3BB01D |
| | ±0.25pF(C) | GJM0335C1E6R3CB01D | GJM1555C1H6R3CB01D |
| | ±0.5pF(D) | GJM0335C1E6R3DB01D) and Unit is shown in []. <>: E | GJM1555C1H6R3DB01D IA [inch] Code |

(Part Number) | GJ | M | 03 | 3 | 5C | 1E | 5R2 | W | B01 D 2 8 4 5 6 0

1 Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4Dimension (T) **7**Capacitance **®**Packaging



| LxW [mm] | | 0.6v0.2(02) <0201 > | 1.0x0.5(15)<0402> |
|-----------------------|---|---|----------------------------|
| Rated Volt. [Vdc] | 1 | 0.6x0.3(03)<0201> 25(1E) | 50(1H) |
| Capacitance | Tolerance | Part N | , , |
| 6.4pF(6R4) | ±0.05pF(W) | GJM0335C1E6R4WB01D | GJM1555C1H6R4WB01D |
| 0.4pi (0114) | ±0.1pF(B) | GJM0335C1E6R4BB01D | GJM1555C1H6R4BB01D |
| | ±0.25pF(C) | GJM0335C1E6R4CB01D | GJM1555C1H6R4CB01D |
| | ±0.5pF(D) | GJM0335C1E6R4DB01D | GJM1555C1H6R4DB01D |
| 6.5pF(6R5) | ±0.05pF(W) | GJM0335C1E6R5WB01D | GJM1555C1H6R5WB01D |
| | ±0.1pF(B) | GJM0335C1E6R5BB01D | GJM1555C1H6R5BB01D |
| | ±0.25pF(C) | GJM0335C1E6R5CB01D | GJM1555C1H6R5CB01D |
| | ±0.5pF(D) | GJM0335C1E6R5DB01D | GJM1555C1H6R5DB01D |
| 6.6pF(6R6) | ±0.05pF(W) | GJM0335C1E6R6WB01D | GJM1555C1H6R6WB01D |
| • | ±0.1pF(B) | GJM0335C1E6R6BB01D | GJM1555C1H6R6BB01D |
| | ±0.25pF(C) | GJM0335C1E6R6CB01D | GJM1555C1H6R6CB01D |
| | ±0.5pF(D) | GJM0335C1E6R6DB01D | GJM1555C1H6R6DB01D |
| 6.7pF(6R7) | ±0.05pF(W) | GJM0335C1E6R7WB01D | GJM1555C1H6R7WB01D |
| | ±0.1pF(B) | GJM0335C1E6R7BB01D | GJM1555C1H6R7BB01D |
| | ±0.25pF(C) | GJM0335C1E6R7CB01D | GJM1555C1H6R7CB01D |
| | ±0.5pF(D) | GJM0335C1E6R7DB01D | GJM1555C1H6R7DB01D |
| 6.8pF(6R8) | ±0.05pF(W) | GJM0335C1E6R8WB01D | GJM1555C1H6R8WB01D |
| | ±0.1pF(B) | GJM0335C1E6R8BB01D | GJM1555C1H6R8BB01D |
| | ±0.25pF(C) | GJM0335C1E6R8CB01D | GJM1555C1H6R8CB01D |
| | ±0.5pF(D) | GJM0335C1E6R8DB01D | GJM1555C1H6R8DB01D |
| 6.9pF(6R9) | ±0.05pF(W) | GJM0336C1E6R9WB01D | GJM1555C1H6R9WB01D |
| | ±0.1pF(B) | GJM0336C1E6R9BB01D | GJM1555C1H6R9BB01D |
| | ±0.25pF(C) | GJM0336C1E6R9CB01D | GJM1555C1H6R9CB01D |
| | ±0.5pF(D) | GJM0336C1E6R9DB01D | GJM1555C1H6R9DB01D |
| 7.0pF(7R0) | ±0.05pF(W) | GJM0336C1E7R0WB01D | GJM1555C1H7R0WB01D |
| | ±0.1pF(B) | GJM0336C1E7R0BB01D | GJM1555C1H7R0BB01D |
| | ±0.25pF(C) | GJM0336C1E7R0CB01D | GJM1555C1H7R0CB01D |
| | ±0.5pF(D) | GJM0336C1E7R0DB01D | GJM1555C1H7R0DB01D |
| 7.1pF(7R1) | ±0.05pF(W) | GJM0336C1E7R1WB01D | GJM1555C1H7R1WB01D |
| | ±0.1pF(B) | GJM0336C1E7R1BB01D | GJM1555C1H7R1BB01D |
| | ±0.25pF(C) | GJM0336C1E7R1CB01D | GJM1555C1H7R1CB01D |
| | ±0.5pF(D) | GJM0336C1E7R1DB01D | GJM1555C1H7R1DB01D |
| 7.2pF(7R2) | ±0.05pF(W) | GJM0336C1E7R2WB01D | GJM1555C1H7R2WB01D |
| | ±0.1pF(B) | GJM0336C1E7R2BB01D | GJM1555C1H7R2BB01D |
| | ±0.25pF(C) | GJM0336C1E7R2CB01D | GJM1555C1H7R2CB01D |
| | ±0.5pF(D) | GJM0336C1E7R2DB01D | GJM1555C1H7R2DB01D |
| 7.3pF(7R3) | ±0.05pF(W) | GJM0336C1E7R3WB01D | GJM1555C1H7R3WB01D |
| | ±0.1pF(B) | GJM0336C1E7R3BB01D | GJM1555C1H7R3BB01D |
| | ±0.25pF(C) | GJM0336C1E7R3CB01D | GJM1555C1H7R3CB01D |
| 7.4.5/75.4 | ±0.5pF(D) | GJM0336C1E7R3DB01D | GJM1555C1H7R3DB01D |
| 7.4pF(7R4) | ±0.05pF(W) | GJM0336C1E7R4WB01D | GJM1555C1H7R4WB01D |
| | ±0.1pF(B) | GJM0336C1E7R4BB01D | GJM1555C1H7R4BB01D |
| | ±0.25pF(C) | GJM0336C1E7R4CB01D | GJM1555C1H7R4CB01D |
| 755/205 | ±0.5pF(D) | GJM0336C1E7R4DB01D | GJM1555C1H7R4DB01D |
| 7.5pF(7R5) | ±0.05pF(W) | GJM0336C1E7R5WB01D | GJM1555C1H7R5WB01D |
| | ±0.1pF(B) | GJM0336C1E7R5BB01D | GJM1555C1H7R5BB01D |
| | ±0.25pF(C) | GJM0336C1E7R5CB01D | GJM1555C1H7R5CB01D |
| 7.4×F/ 7D 0\ | ±0.5pF(D) | GJM0336C1E7R5DB01D | GJM1555C1H7R5DB01D |
| 7.6pF(7R6) | ±0.05pF(W) | GJM0336C1E7R6WB01D | GJM1555C1H7R6WB01D |
| | ±0.1pF(B) | GJM0336C1E7R6BB01D | GJM1555C1H7R6BB01D |
| | ±0.25pF(C) +0.5pF(D) | GJM0336C1E7R6CB01D | GJM1555C1H7R6CB01D |
| | ±0.5pF(D) | GJM0336C1E7R6DB01D | GJM1555C1H7R6DB01D |



| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|---------------------|---------------------|----------------------------------|----------------------------|
| Rated Volt. [Vdc |] | 25(1E) | 50(1H) |
| Capacitance | Tolerance | Part N | umber |
| 7.7pF(7R7) | ±0.05pF(W) | GJM0336C1E7R7WB01D | GJM1555C1H7R7WB01D |
| | ±0.1pF(B) | GJM0336C1E7R7BB01D | GJM1555C1H7R7BB01D |
| | ±0.25pF(C) | GJM0336C1E7R7CB01D | GJM1555C1H7R7CB01D |
| | ±0.5pF(D) | GJM0336C1E7R7DB01D | GJM1555C1H7R7DB01D |
| 7.8pF(7R8) | ±0.05pF(W) | GJM0336C1E7R8WB01D | GJM1555C1H7R8WB01D |
| | ±0.1pF(B) | GJM0336C1E7R8BB01D | GJM1555C1H7R8BB01D |
| | ±0.25pF(C) | GJM0336C1E7R8CB01D | GJM1555C1H7R8CB01D |
| | ±0.5pF(D) | GJM0336C1E7R8DB01D | GJM1555C1H7R8DB01D |
| 7.9pF(7R9) | ±0.05pF(W) | GJM0336C1E7R9WB01D | GJM1555C1H7R9WB01D |
| | ±0.1pF(B) | GJM0336C1E7R9BB01D | GJM1555C1H7R9BB01D |
| | ±0.25pF(C) | GJM0336C1E7R9CB01D | GJM1555C1H7R9CB01D |
| | ±0.5pF(D) | GJM0336C1E7R9DB01D | GJM1555C1H7R9DB01D |
| 8.0pF(8R0) | ±0.05pF(W) | GJM0336C1E8R0WB01D | GJM1555C1H8R0WB01D |
| | ±0.1pF(B) | GJM0336C1E8R0BB01D | GJM1555C1H8R0BB01D |
| | ±0.25pF(C) | GJM0336C1E8R0CB01D | GJM1555C1H8R0CB01D |
| | ±0.5pF(D) | GJM0336C1E8R0DB01D | GJM1555C1H8R0DB01D |
| 8.1pF(8R1) | ±0.05pF(W) | GJM0336C1E8R1WB01D | GJM1555C1H8R1WB01D |
| | ±0.1pF(B) | GJM0336C1E8R1BB01D | GJM1555C1H8R1BB01D |
| | ±0.25pF(C) | GJM0336C1E8R1CB01D | GJM1555C1H8R1CB01D |
| | ±0.5pF(D) | GJM0336C1E8R1DB01D | GJM1555C1H8R1DB01D |
| 8.2pF(8R2) | ±0.05pF(W) | GJM0336C1E8R2WB01D | GJM1555C1H8R2WB01D |
| | ±0.1pF(B) | GJM0336C1E8R2BB01D | GJM1555C1H8R2BB01D |
| | ±0.25pF(C) | GJM0336C1E8R2CB01D | GJM1555C1H8R2CB01D |
| | ±0.5pF(D) | GJM0336C1E8R2DB01D | GJM1555C1H8R2DB01D |
| 8.3pF(8R3) | ±0.05pF(W) | GJM0336C1E8R3WB01D | GJM1555C1H8R3WB01D |
| | ±0.1pF(B) | GJM0336C1E8R3BB01D | GJM1555C1H8R3BB01D |
| | ±0.25pF(C) | GJM0336C1E8R3CB01D | GJM1555C1H8R3CB01D |
| | ±0.5pF(D) | GJM0336C1E8R3DB01D | GJM1555C1H8R3DB01D |
| 8.4pF(8R4) | ±0.05pF(W) | GJM0336C1E8R4WB01D | GJM1555C1H8R4WB01D |
| | ±0.1pF(B) | GJM0336C1E8R4BB01D | GJM1555C1H8R4BB01D |
| | ±0.25pF(C) | GJM0336C1E8R4CB01D | GJM1555C1H8R4CB01D |
| | ±0.5pF(D) | GJM0336C1E8R4DB01D | GJM1555C1H8R4DB01D |
| 8.5pF(8R5) | ±0.05pF(W) | GJM0336C1E8R5WB01D | GJM1555C1H8R5WB01D |
| | ±0.1pF(B) | GJM0336C1E8R5BB01D | GJM1555C1H8R5BB01D |
| | ±0.25pF(C) | GJM0336C1E8R5CB01D | GJM1555C1H8R5CB01D |
| | ±0.5pF(D) | GJM0336C1E8R5DB01D | GJM1555C1H8R5DB01D |
| 8.6pF(8R6) | ±0.05pF(W) | GJM0336C1E8R6WB01D | GJM1555C1H8R6WB01D |
| | ±0.1pF(B) | GJM0336C1E8R6BB01D | GJM1555C1H8R6BB01D |
| | ±0.25pF(C) | GJM0336C1E8R6CB01D | GJM1555C1H8R6CB01D |
| | ±0.5pF(D) | GJM0336C1E8R6DB01D | GJM1555C1H8R6DB01D |
| 8.7pF(8R7) | ±0.05pF(W) | GJM0336C1E8R7WB01D | GJM1555C1H8R7WB01D |
| | ±0.1pF(B) | GJM0336C1E8R7BB01D | GJM1555C1H8R7BB01D |
| | ±0.25pF(C) | GJM0336C1E8R7CB01D | GJM1555C1H8R7CB01D |
| | ±0.5pF(D) | GJM0336C1E8R7DB01D | GJM1555C1H8R7DB01D |
| 8.8pF(8R8) | ±0.05pF(W) | GJM0336C1E8R8WB01D | GJM1555C1H8R8WB01D |
| | ±0.1pF(B) | GJM0336C1E8R8BB01D | GJM1555C1H8R8BB01D |
| | ±0.25pF(C) | GJM0336C1E8R8CB01D | GJM1555C1H8R8CB01D |
| | ±0.5pF(D) | GJM0336C1E8R8DB01D | GJM1555C1H8R8DB01D |
| The part number of | ode is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |

(Part Number) | GJ | M | 03 | 3 | 6C | 1E | 7R7 | W | B01 | D **9 9 4 5** 6

Product ID 2Series 5 Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

7Capacitance **®**Packaging

4 Dimension (T)



| 1 - 20/ [] | | 0.4.0.2(00), 0201 | 1.0×0.5(4.5), 0.400 |
|------------------------------------|---|--|---|
| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> 50(1H) |
| Rated Volt. [Vdc] | | 25(1E) 50(1H) Part Number | |
| Capacitance 8.9pF(8R9) | Tolerance | GJM0336C1E8R9WB01D | GJM1555C1H8R9WB01D |
| 6.9pi (6K9) | ±0.05pF(W) ±0.1pF(B) | GJM0336C1E8R9BB01D | GJM1555C1H8R9BB01D |
| | ±0.1pr(b) ±0.25pF(C) | GJM0336C1E8R9CB01D | GJM1555C1H8R9CB01D |
| | ±0.5pF(D) | GJM0336C1E8R9DB01D | GJM1555C1H8R9DB01D |
| 9.0pF(9R0) | ±0.05pF(W) | GJM0336C1E9R0WB01D | GJM1555C1H9R0WB01D |
| 9.0pF(9K0) | ±0.1pF(B) | GJM0336C1E9R0BB01D | GJM1555C1H9R0BB01D |
| | ±0.1pr(b) ±0.25pF(C) | GJM0336C1E9R0BB01D | GJM1555C1H9R0BB01D |
| | ±0.5pF(D) | GJM0336C1E9R0DB01D | GJM1555C1H9R0DB01D |
| 9.1pF(9R1) | ±0.05pF(W) | GJM0336C1E9R1WB01D | GJM1555C1H9R1WB01D |
| 7. Tpl (3K I) | ±0.1pF(B) | GJM0336C1E9R1BB01D | GJM1555C1H9R1BB01D |
| | ±0.1pr(B) ±0.25pF(C) | GJM0336C1E9R1CB01D | GJM1555C1H9R1CB01D |
| | ±0.5pF(D) | GJM0336C1E9R1DB01D | GJM1555C1H9R1DB01D |
| 9.2pF(9R2) | ±0.05pF(W) | GJM0336C1E9R2WB01D | GJM1555C1H9R2WB01D |
| 7.2pi (31(2) | ±0.1pF(B) | GJM0336C1E9R2BB01D | GJM1555C1H9R2BB01D |
| | ±0.25pF(C) | GJM0336C1E9R2CB01D | GJM1555C1H9R2CB01D |
| | ±0.5pF(D) | GJM0336C1E9R2DB01D | GJM1555C1H9R2DB01D |
| 9.3pF(9R3) | ±0.05pF(W) | GJM0336C1E9R3WB01D | GJM1555C1H9R3WB01D |
| 7.0pi (0110) | ±0.1pF(B) | GJM0336C1E9R3BB01D | GJM1555C1H9R3BB01D |
| | ±0.25pF(C) | GJM0336C1E9R3CB01D | GJM1555C1H9R3CB01D |
| | ±0.5pF(D) | GJM0336C1E9R3DB01D | GJM1555C1H9R3DB01D |
| 9.4pF(9R4) | ±0.05pF(W) | GJM0336C1E9R4WB01D | GJM1555C1H9R4WB01D |
| 71 p. (611 l) | ±0.1pF(B) | GJM0336C1E9R4BB01D | GJM1555C1H9R4BB01D |
| | ±0.25pF(C) | GJM0336C1E9R4CB01D | GJM1555C1H9R4CB01D |
| | ±0.5pF(D) | GJM0336C1E9R4DB01D | GJM1555C1H9R4DB01D |
| 9.5pF(9R5) | ±0.05pF(W) | GJM0336C1E9R5WB01D | GJM1555C1H9R5WB01D |
| , , , | ±0.1pF(B) | GJM0336C1E9R5BB01D | GJM1555C1H9R5BB01D |
| | ±0.25pF(C) | GJM0336C1E9R5CB01D | GJM1555C1H9R5CB01D |
| | ±0.5pF(D) | GJM0336C1E9R5DB01D | GJM1555C1H9R5DB01D |
| 9.6pF(9R6) | ±0.05pF(W) | GJM0336C1E9R6WB01D | GJM1555C1H9R6WB01D |
| • | ±0.1pF(B) | GJM0336C1E9R6BB01D | GJM1555C1H9R6BB01D |
| | ±0.25pF(C) | GJM0336C1E9R6CB01D | GJM1555C1H9R6CB01D |
| | ±0.5pF(D) | GJM0336C1E9R6DB01D | GJM1555C1H9R6DB01D |
| 9.7pF(9R7) | ±0.05pF(W) | GJM0336C1E9R7WB01D | GJM1555C1H9R7WB01D |
| | ±0.1pF(B) | GJM0336C1E9R7BB01D | GJM1555C1H9R7BB01D |
| | ±0.25pF(C) | GJM0336C1E9R7CB01D | GJM1555C1H9R7CB01D |
| | ±0.5pF(D) | GJM0336C1E9R7DB01D | GJM1555C1H9R7DB01D |
| 9.8pF(9R8) | ±0.05pF(W) | GJM0336C1E9R8WB01D | GJM1555C1H9R8WB01D |
| | ±0.1pF(B) | GJM0336C1E9R8BB01D | GJM1555C1H9R8BB01D |
| | ±0.25pF(C) | GJM0336C1E9R8CB01D | GJM1555C1H9R8CB01D |
| | ±0.5pF(D) | GJM0336C1E9R8DB01D | GJM1555C1H9R8DB01D |
| 9.9pF(9R9) | ±0.05pF(W) | GJM0336C1E9R9WB01D | GJM1555C1H9R9WB01D |
| | ±0.1pF(B) | GJM0336C1E9R9BB01D | GJM1555C1H9R9BB01D |
| | ±0.25pF(C) | GJM0336C1E9R9CB01D | GJM1555C1H9R9CB01D |
| | ±0.5pF(D) | GJM0336C1E9R9DB01D | GJM1555C1H9R9DB01D |
| The part number of | ode is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |



| LxW [mm] | | 0.6x0.3(0 | 3)<0201> | 1.0x0.5(15)<0402> |
|--------------------|-----------------|--------------------|--------------------|----------------------------|
| Rated Volt. [Vdc] | | 25(1E) | 6.3(0J) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 10pF(100) | ±2%(G) | GJM0336C1E100GB01D | | GJM1555C1H100GB01E |
| | ±5%(J) | GJM0336C1E100JB01D | | GJM1555C1H100JB01D |
| 11pF(110) | ±2%(G) | GJM0336C1E110GB01D | | GJM1555C1H110GB01E |
| | ±5%(J) | GJM0336C1E110JB01D | | GJM1555C1H110JB01E |
| 12pF(120) | ±2%(G) | GJM0336C1E120GB01D | | GJM1555C1H120GB01E |
| | ±5%(J) | GJM0336C1E120JB01D | | GJM1555C1H120JB01D |
| 13pF(130) | ±2%(G) | GJM0336C1E130GB01D | | GJM1555C1H130GB01E |
| | ±5%(J) | GJM0336C1E130JB01D | | GJM1555C1H130JB01E |
| 15pF(150) | ±2%(G) | GJM0336C1E150GB01D | | GJM1555C1H150GB01E |
| | ±5%(J) | GJM0336C1E150JB01D | | GJM1555C1H150JB01E |
| 16pF(160) | ±2%(G) | GJM0336C1E160GB01D | | GJM1555C1H160GB01 |
| | ±5%(J) | GJM0336C1E160JB01D | | GJM1555C1H160JB01D |
| 18pF(180) | ±2%(G) | GJM0336C1E180GB01D | | GJM1555C1H180GB01E |
| | ±5%(J) | GJM0336C1E180JB01D | | GJM1555C1H180JB01E |
| 20pF(200) | ±2%(G) | GJM0336C1E200GB01D | | GJM1555C1H200GB01I |
| | ±5%(J) | GJM0336C1E200JB01D | | GJM1555C1H200JB01E |
| 22pF(220) | ±2%(G) | | GJM0335C0J220GB01D | |
| | ±5%(J) | | GJM0335C0J220JB01D | |
| 24pF(240) | ±2%(G) | | GJM0335C0J240GB01D | |
| | ±5%(J) | | GJM0335C0J240JB01D | |
| 27pF(270) | ±2%(G) | | GJM0335C0J270GB01D | |
| | ±5%(J) | | GJM0335C0J270JB01D | |
| 30pF(300) | ±2%(G) | | GJM0335C0J300GB01D | |
| | ±5%(J) | | GJM0335C0J300JB01D | |
| 33pF(330) | ±2%(G) | | GJM0335C0J330GB01D | |
| | ±5%(J) | | GJM0335C0J330JB01D | |

The part number code is shown in () and Unit is shown in [].





GJM Series Specifications and Test Methods

| | | | Specifications | | | | | | | | |
|-----|---|----------------------------|---|---|---|--|---------------------------------|-----------------------|--|--|---------|
| No. | Ite | em | Temperature Compensating Type | Test Method | | | | | | | |
| 1 | Operating Temperati | ure Range | -55 to +125℃ | Reference Temperature: 25℃ (2C, 3C, 4C: 20℃) | | | | | | | |
| 2 | 2 Rated Voltage | | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, VPP or VOP, whichever is larger, should be maintained within the rated voltage range. | | | | | | | |
| 3 | Appearar | nce | No defects or abnormalities | Visual inspection | | | | | | | |
| 4 | Dimensio | ns | Within the specified dimensions | Using calipers | | | | | | | |
| 5 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when 300% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | | | | | | |
| 6 | Insulation (I.R.) | Resistance | 10,000M Ω min. or 500 Ω · F min. (whichever is smaller) | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25℃ and 75%RH max. and within 2 minutes of charging. | | | | | | | |
| 7 | Capacita | nce | Within the specified tolerance | The capacitance/Q should be measured at 25°C at the frequency and voltage shown in the table. | | | | | | | |
| | | | 30pF and over: Q≧1000 | | | | | | | | |
| 8 | Q | | | 30pF and below: Q≥400+20C | Frequency 1±0.1MHz Voltage 0.5 to 5Vrms | | | | | | |
| | | | C: Nominal Capacitance (pF) | voltage 0.3 to 3viiis | | | | | | | |
| | | Temperature Coefficient | Within the specified tolerance (Table A) | The capacitance change should be measured after 5 min. at each specified temperature stage. Temperature Compensating Type | | | | | | | |
| 9 | Capacitance Temperature Characteristics | e Conseitance | Within ±0.2% or ±0.05pF (whichever is larger.) | The temperature coefficient is determined using the capacitance measured in step 3 as a reference. When cycling the temperature sequentially from step 1 through 5, (5C: +25 to 125°C) other temp. coeffs.: +20 to 125°C) the capacitance should be within the specified tolerance for the temperature coefficient and capacitance change as in Table A. The capacitance drift is calculated by dividing the differences between the maximum and minimum measured values in steps 1, 3 and 5 by the capacitance value in step 3. | | | | | | | |
| | | | | | | | (managery) | Step Temperature (°C) | | | |
| | | | | 1 Reference Temp. ±2 | | | | | | | |
| | | | | | | | | | | | 2 —55±3 |
| | | | | | | | 3 Reference Temp. ±2 4 125±3 | | | | |
| | | | | | | | 4 125±3 5 Reference Temp. ±2 | | | | |
| 10 | Adhesive Strength of Termination | | No removal of the terminations or other defect should occur. | Solder the capacitor to the test jig (glass epoxy board) shown in Fig. 1 using a eutectic solder. Then apply a 5N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *2N (GJM03) Solder resist Baked electrode or copper foil | | | | | | | |
| | | | | GJM03 0.3 0.9 0.3 GJM15 0.4 1.5 0.5 | | | | | | | |
| | | | | (in mm) | | | | | | | |
| | | | | Fig. 1 | | | | | | | |

Continued on the following page.





GJM Series Specifications and Test Methods

Continued from the preceding page.

| | o. Item | | Specifications | Total Marking I | | | |
|-----------|-------------------------|--|---|--|--|--|--|
| No. | Ite | em | Temperature Compensating Type | Test Method | | | |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board) in the | | | |
| | | Capacitance | Within the specified tolerance | same manner and under the same conditions as (10). | | | |
| 11 | Vibration Resistance | tion | | The capacitor should be subjected to a simple harmonic motio having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 minute. This motion should be applied for a period of 2 hours in each of 3 mutually perpendicular directions (total of 6 hours). | | | |
| | | Appearance | No marking defects | Solder the capacitor to the test jig (glass epoxy boards) show | | | |
| | | Capacitance Change | Within ±5% or ±0.5pF (whichever is larger) | in Fig. 2 using a eutectic solder. Then apply a force in the direction shown in Fig. 3. The soldering should be done by the reflow method and shou be conducted with care so that the soldering is uniform and from the soldering is uniform. | | | |
| 12 | Deflection | Type a b c GJM03 0.3 0.9 0.3 GJM15 0.4 1.5 0.5 Fig. 2 | | 20 50 Pressurizing speed: 1.0mm/sec. Pressurize R230 Flexure : ≤1 Capacitance meter 45 (in mm) Fig. 3 | | | |
| 3 | Solderab Terminati | • | 75% of the terminations are to be soldered evenly and continuously. | Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5 or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5° | | | |
| | | | The measured and observed characteristics should satisfy the specifications in the following table. | _ | | | |
| | | Appearance | No marking defects | _ | | | |
| | Resistance | Capacitance Change | Within ±2.5% or ±0.25pF (whichever is larger) | Preheat the capacitor at 120 to 150°C for 1 minute. | | | |
| - 1 | to Soldering Heat | Q | 30pF and over: Q≥1000 30pF and below: Q≥400+20C C: Nominal Capacitance (pF) | Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5CL solder solution at 270±5°c for 10±0.5 seconds. Let sit at room temperature for 24±2 hours. | | | |
| | | I.R. | More than $10,000M\Omega$ or $500\Omega \cdot F$ (whichever is smaller) | | | | |
| | | Dielectric Strength | No failure | | | | |
| | | | The measured and observed characteristics should satisfy the specifications in the following table. | | | | |
| | | Appearance | No marking defects | Fix the capacitor to the supporting jig in the same manner and | | | |
| | | Capacitance Change | Within ±2.5% or ±0.25pF (whichever is larger) | under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table | | | |
| 5 | Temperature | onungo | 30pF and over: Q≥1000 | Let sit for 24±2 hours at room temperature, then measure. Step 1 2 3 4 | | | |
| | Cycle | Q | 30pF and below: Q≥400+20C | Temp (%) Min. Operating Room Max. Operating Room | | | |
| | | LD | C: Nominal Capacitance (pF) More than 10 000MO or 5000. F (which over in smaller) | Temp. 10/ 3 Temp. 13/ 0 Temp. | | | |
| | | I.R. Dielectric Strength | More than $10,000\text{M}\Omega$ or $500\Omega \cdot \text{F}$ (whichever is smaller) No failure | Time (min.) 30±3 2 to 3 30±3 2 to 3 | | | |
| | | Suengui | The measured and observed characteristics should satisfy the specifications in the following table. | | | | |
| | | Appearance | No marking defects | | | | |
| Humidity, | | Capacitance | Within ±5% or ±0.5pF | Let the capacitor sit at 40±2°C and 90 to 95% humidity for | | | |

Q≥350

Q≥200+10C

10pF and over, 30pF and below: Q≧275+ ½ C

More than 10,000M Ω or $500\Omega \cdot F$ (whichever is smaller)

Remove and let sit for 24 ± 2 hours (temperature compensating

type) at room temperature, then measure.

16

Steady

State

30pF and below:

10pF and below:

C: Nominal Capacitance (pF)

Q

I.R.

GJM Series Specifications and Test Methods

 $\begin{tabular}{|c|c|c|c|}\hline \searrow \\\hline \end{tabular}$ Continued from the preceding page.

| No. | Specifications Item Temperature Compensating Type | | Specifications | Test Method | |
|-----|---|---|---|---|--|
| NO. | | | Temperature Compensating Type | rest Method | |
| | | The measured and observed characteristics should satisfy the specifications in the following table. | | | |
| | | Appearance | No marking defects | | |
| 17 | Humidity Load | Capacitance Change | Within $\pm 7.5\%$ or ± 0.75 pF (whichever is larger) | Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room temperature, then | |
| | Lodd | Q | 30pF and over: Q≥200 30pF and below: Q≥100+ ½ C C: Nominal Capacitance (pF) | measure. The charge/discharge current is less than 50mA. | |
| | | I.R. | More than $500M\Omega$ or $25\Omega \cdot F$ (whichever is smaller) | | |
| | | The measured and observed characteristics should satisfy the specifications in the following table. | | | |
| | | Appearance | No marking defects | | |
| 18 | High Temperature | Capacitance Change | Within ±3% or ±0.3pF (whichever is larger) | Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 24±2 hours (temperature compensating type) at room temperature, then | |
| | Load | Q | 30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+ ½ C 10pF and below: Q≥200+10C C: Nominal Capacitance (pF) | measure. The charge/discharge current is less than 50mA. | |
| | | I.R. | More than 1,000M Ω or 50 Ω · F (whichever is smaller) | | |
| 19 | ESR | | 0.1pF≦C≦1pF: 350mΩ · pF below 1pF <c≦5pf: 300mω="" below<br="">5pF<c≦10pf: 250mω="" below<="" td=""><td>The ESR should be measured at room temperature, and frequency 1±0.2GHz with the equivalent of BOONTON Model 34A.</td></c≦10pf:></c≦5pf:> | The ESR should be measured at room temperature, and frequency 1±0.2GHz with the equivalent of BOONTON Model 34A. | |
| | LON | | 10pF <c≦33pf: 400mω="" below<="" td=""><td>The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B.</td></c≦33pf:> | The ESR should be measured at room temperature, and frequency 500±50MHz with the equivalent of HP8753B. | |

Table A

| | Temp. Coeff. (ppm/℃) *1 | Capacitance Change from 25°C Value (%) | | | | | | |
|------------|----------------------------|--|-------|-------|-------|------|-------|--|
| Char. Code | | -55°C | | −30°C | | -10℃ | | |
| | | Max. | Min. | Max. | Min. | Max. | Min. | |
| 5C | 0±30 | 0.58 | -0.24 | 0.40 | -0.17 | 0.25 | -0.11 | |
| 6C | 0±60 | 0.87 | -0.48 | 0.60 | -0.33 | 0.38 | -0.21 | |

^{*1:} Nominal values denote the temperature coefficient within a range of 25 to 125°C.

(2)

| | | Capacitance Change from 20℃ Value (%) | | | | | | | |
|-------|-------------------------------|---------------------------------------|-------|-------------|-------|------|-------|--|--|
| Char. | Nominal Values (ppm/°C) *2 | −55°C | | −55°C −25°C | | -1 | 0℃ | | |
| | (ppin/ c) · 2 | Max. | Min. | Max. | Min. | Max. | Min. | | |
| 2C | 0±60 | 0.82 | -0.45 | 0.49 | -0.27 | 0.33 | -0.18 | | |
| 3C | 0±120 | 1.37 | -0.90 | 0.82 | -0.54 | 0.55 | -0.36 | | |
| 4C | 0±250 | 2.56 | -1.88 | 1.54 | -1.13 | 1.02 | -0.75 | | |

^{*2:} Nominal values denote the temperature coefficient within a range of 20 to 125°C.



Chip Monolithic Ceramic Capacitors



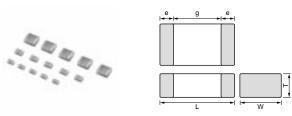
High Frequency GQM Series

■ Features

- 1. HiQ and low ESR at VHF, UHF, Microwave
- Feature improvement, low power consumption for mobile telecommunication. (Base station, terminal, etc.)

■ Applications

High frequency circuit (Mobile telecommunication, etc.)



| Part Number | Dimensions (mm) | | | | | | |
|-------------------------|-----------------|------------|------------|------------|--------|--|--|
| Part Number | L | W | Т | е | g min. | | |
| GQM187 | 1.6 ±0.15 | 0.8 ±0.15 | 0.7 ±0.1 | 0.2 to 0.5 | 0.5 | | |
| GQM188 | 1.6 ±0.1 | 0.8 ±0.1 | 0.8 ±0.1 | 0.2 to 0.5 | 0.5 | | |
| GQM219 (50,100V) | 2.0 ±0.1 | 1.25 ±0.1 | 0.85 ±0.1 | 0.2 to 0.7 | 0.7 | | |
| GQM219 (250V) | 2.0 ±0.15 | 1.25 ±0.15 | 0.85 ±0.15 | 0.2 to 0.7 | 0.7 | | |
| GQM22M | 2.8 ±0.5 | 2.8 ±0.4 | 1.15 ±0.2 | 0.3 min. | 1.0 | | |



Capacitance Table

perature Compensating Type C0G(5C) Characteristics

| Temperature Compensating Type C0G(5C) Character 7 ex.7: T Dimension [mm] | | | | | | | |
|--|----------|----------|----------|---------|---------------|-------|---------------|
| | | on [mm] | | | .0x1.2 | E | 2.8x2.8 |
| LxW | | 1.6x0.8 | 5 | 4 | (21) | 5 | (22) |
| [mm] | • | <0603> | | | <0805> | | <11111> |
| Rated Voltage | 250 | 100 | 50 | 250 | 100 | 50 | 500 |
| Capacitance [Vdc] | ` , | (2A) | (1H) | (2E) | (2A) | (1H) | (2H) |
| 0.10pF(R10) | 7 | | | | | | |
| 0.20pF(R20) | 7 | | | 1 | | | |
| 0.30pF(R30) | 7 | | | ! ! | | | - |
| 0.40pF(R40) | 7 | | 1 | | | | NA. |
| 0.50pF(R50) | 7 | 8 | | 9 | 9 | | M |
| 0.75pF(R75) 1.0pF(1R0) | 7 | 8 | | 9 | 9 | | M |
| 1.1pF(1R1) | 7 | 8 | | 9 | 9 | | M |
| 1.2pF(1R2) | 7 | 8 | | 9 | 9 | | M |
| 1.3pF(1R3) | 7 | 8 | | 9 | 9 | | M |
| 1.5pF(1R5) | 7 | 8 | | 9 | 9 | | M |
| 1.6pF(1R6) | 7 | 8 | | 9 | 9 | | M |
| 1.8pF(1R8) | 7 | 8 | | 9 | 9 | | M |
| 2.0pF(2R0) | 7 | 8 | | 9 | 9 | | M |
| 2.2pF(2R2) | 7 | 8 | | 9 | 9 | | М |
| 2.4pF(2R4) | 7 | 8 | | 9 | 9 | | М |
| 2.7pF(2R7) | 7 | 8 | | 9 | 9 | | М |
| 3.0pF(3R0) | 7 | 8 | | 9 | 9 | | М |
| 3.3pF(3R3) | 7 | 8 | | 9 | 9 | | М |
| 3.6pF(3R6) | 7 | 8 | | 9 | 9 | | М |
| 3.9pF(3R9) | 7 | 8 | | 9 | 9 | | М |
| 4.0pF(4R0) | 7 | 8 | | 9 | 9 | | М |
| 4.3pF(4R3) | 7 | 8 | | 9 | 9 | | М |
| 4.7pF(4R7) | 7 | 8 | | 9 | 9 | | M |
| 5.0pF(5R0) | 7 | 8 | | 9 | 9 | | M |
| 5.1pF(5R1) | 7 | 8 | | 9 | 9 | | M |
| 5.6pF(5R6) | 7 | 8 | | 9 | 9 | | M |
| 6.0pF(6R0) | 7 | 8 | | 9 | 9 | | M |
| 6.2pF(6R2) | 7 | 8 | | 9 | 9 | | M |
| 6.8pF(6R8) | 7 | 8 | | 9 | 9 | | M |
| 7.0pF(7R0) | 7 | | 8 | 9 | 9 | | M |
| 7.5pF(7R5) | 7 | | 8 | 9 | 9 | | M |
| 8.0pF(8R0) | 7 | | 8 | 9 | 9 | | M |
| 8.2pF(8R2) | 7 | | 8 | 9 | 9 | | M |
| 9.0pF(9R0) | 7 | | 8 | 9 | 9 | | M |
| 9.1pF(9R1) | 7 | | 8 | 9 | 9 | | M |
| 10pF(100) | 7 | | 8 | 9 | 9 | | M |
| 11pF(110) | 7 | | 8 | 9 | 9 | | M |
| 12pF(120) | 7 | | 8 | 9 | 9 | | M |
| 13pF(130) | 7 | | 8 | 9 | 9 | | M |
| 15pF(150) | 7 | | 8 | 9 | 9 | | M |
| 16pF(160) 18pF(180) | 7 | | 8 | 9 | 9 | | M |
| 20pF(200) | 7 | | 8 | 9 | 3 | 9 | M |
| 22pF(220) | 7 | | 8 | 9 | | 9 | M |
| 24pF(240) | 7 | | 8 | 9 | | 9 | M |
| 27pF(270) | 7 | | 8 | 9 | | 9 | M |
| 30pF(300) | 7 | | 8 | 9 | | 9 | M |
| 33pF(330) | 7 | | 8 | 9 | | 9 | М |
| The part number code is s | shown in | · () and | Linit in | chown i | . [] | · EIA | linch] Co |

| LxW [mm] | 1.6x0.8 (18) <0603> | | 2.0x1.25 (21) <0805> | | | 2.8x2.8 (22) <1111> | |
|---------------------------------|------------------------------------|----------------------|-------------------------------------|----------------------|----------------------|------------------------------------|----------------------|
| Rated Voltage Capacitance [Vdc] | 250 (2E) | 100 (2A) | 50 (1H) | 250 (2E) | 100 (2A) | 50 (1H) | 500 (2H) |
| 36pF(360) | 7 | | 8 | 9 | | 9 | М |
| 39pF(390) | 7 | | 8 | 9 | | 9 | М |
| 43pF(430) | 7 | | 8 | 9 | | 9 | М |
| 47pF(470) | 7 | | 8 | 9 | | 9 | М |
| 51pF(510) | | | 8 | 9 | | 9 | М |
| 56pF(560) | | | 8 | 9 | | 9 | М |
| 62pF(620) | | | 8 | 9 | | 9 | M |
| 68pF(680) | | | 8 | 9 | | 9 | М |
| 75pF(750) | | | 8 | 9 | | 9 | М |
| 82pF(820) | | | 8 | 9 | | 9 | М |
| 91pF(910) | | | 8 | 9 | | 9 | М |
| 100pF(101) | | | 8 | 9 | | 9 | М |

| LxW [mm] | | 1.6x0.8(1 | 8)<0603> |
|---------------------------|---|----------------------------------|--------------------|
| Rated Volt. [Vdc |] | 250 (2E) | 100(2A) |
| Capacitance | Tolerance | Part N | umber |
| 0.10pF(R10) | ±0.1pF(B) | GQM1875C2ER10BB12D | |
| 0.20pF(R20) | ±0.1pF(B) | GQM1875C2ER20BB12D | |
| 0.30pF(R30) | ±0.1pF(B) | GQM1875C2ER30BB12D | |
| | ±0.25pF(C) | GQM1875C2ER30CB12D | |
| 0.40pF(R40) | ±0.1pF(B) | GQM1875C2ER40BB12D | |
| | ±0.25pF(C) | GQM1875C2ER40CB12D | |
| 0.50pF(R50) | ±0.1pF(B) | GQM1875C2ER50BB12D | GQM1885C2AR50BB01D |
| | ±0.25pF(C) | GQM1875C2ER50CB12D | GQM1885C2AR50CB01D |
| 0.75pF(R75) | ±0.1pF(B) | GQM1875C2ER75BB12D | GQM1885C2AR75BB01D |
| | ±0.25pF(C) | GQM1875C2ER75CB12D | GQM1885C2AR75CB01D |
| 1.0pF(1R0) | ±0.1pF(B) | GQM1875C2E1R0BB12D | GQM1885C2A1R0BB01D |
| . , , | ±0.25pF(C) | GQM1875C2E1R0CB12D | GQM1885C2A1R0CB01D |
| 1.1pF(1R1) | ±0.1pF(B) | GQM1875C2E1R1BB12D | GQM1885C2A1R1BB01D |
| Γ () | ±0.25pF(C) | GQM1875C2E1R1CB12D | GQM1885C2A1R1CB01D |
| 1.2pF(1R2) | ±0.1pF(B) | GQM1875C2E1R2BB12D | GQM1885C2A1R2BB01D |
| p. (<u>-</u>) | ±0.25pF(C) | GQM1875C2E1R2CB12D | GQM1885C2A1R2CB01D |
| 1.3pF(1R3) | ±0.1pF(B) | GQM1875C2E1R3BB12D | GQM1885C2A1R3BB01D |
| p. (1110) | ±0.25pF(C) | GQM1875C2E1R3CB12D | GQM1885C2A1R3CB01D |
| 1.5pF(1R5) | ±0.1pF(B) | GQM1875C2E1R5BB12D | GQM1885C2A1R5BB01D |
| 1.5pr (11.6) | ±0.25pF(C) | GQM1875C2E1R5CB12D | GQM1885C2A1R5CB01D |
| 1.6pF(1R6) | ±0.25pr (b) | GQM1875C2E1R6BB12D | GQM1885C2A1R6BB01D |
| 1.0pr (110) | ±0.1pr(B) ±0.25pF(C) | GQM1875C2E1R6CB12D | GQM1885C2A1R6CB01D |
| 1.8pF(1R8) | ±0.25pr (b) | GQM1875C2E1R8BB12D | GQM1885C2A1R8BB01D |
| 1.0pr (110) | ±0.1pr(B) ±0.25pF(C) | GQM1875C2E1R8CB12D | GQM1885C2A1R8CB01D |
| 2.0pF(2R0) | ±0.25pr (b) | GQM1875C2E2R0BB12D | GQM1885C2A2R0BB01D |
| 2.0pr (21(0) | ±0.1pr(B) ±0.25pF(C) | GQM1875C2E2R0CB12D | GQM1885C2A2R0CB01D |
| 2.2pF(2R2) | ±0.25pr (b) | GQM1875C2E2R2BB12D | GQM1885C2A2R2BB01D |
| 2.2β1 (21(2) | ±0.1pr(b) ±0.25pF(C) | GQM1875C2E2R2CB12D | GQM1885C2A2R2CB01D |
| 2.4pF(2R4) | ±0.25pr (C) | GQM1875C2E2R4BB12D | GQM1885C2A2R4BB01D |
| 2.4μ Γ(2Κ4) | | GQM1875C2E2R4CB12D | GQM1885C2A2R4CB01D |
| 2.7pF/ 2D7) | ±0.25pF(C) | GQM1875C2E2R7BB12D | GQM1885C2A2R7BB01D |
| 2.7pF(2R7) | ±0.1pF(B) | | |
| 2.0~5(202) | ±0.25pF(C) | GQM1875C2E2R7CB12D | GQM1885C2A2R7CB01D |
| 3.0pF(3R0) | ±0.1pF(B) | GQM1875C2E3R0BB12D | GQM1885C2A3R0BB01D |
| 2 2 ~ F/2 D 2\ | ±0.25pF(C) | GQM1875C2E3R0CB12D | GQM1885C2A3R0CB01D |
| 3.3pF(3R3) | ±0.1pF(B) | GQM1875C2E3R3BB12D | GQM1885C2A3R3BB01D |
| 2 / = [(0.00) | ±0.25pF(C) | GQM1875C2E3R3CB12D | GQM1885C2A3R3CB01D |
| 3.6pF(3R6) | ±0.1pF(B) | GQM1875C2E3R6BB12D | GQM1885C2A3R6BB01D |
| 2.0~5/202 | ±0.25pF(C) | GQM1875C2E3R6CB12D | GQM1885C2A3R6CB01D |
| 3.9pF(3R9) | ±0.1pF(B) | GQM1875C2E3R9BB12D | GQM1885C2A3R9BB01D |
| 40 5(450) | ±0.25pF(C) | GQM1875C2E3R9CB12D | GQM1885C2A3R9CB01D |
| 4.0pF(4R0) | ±0.1pF(B) | GQM1875C2E4R0BB12D | GQM1885C2A4R0BB01D |
| | ±0.25pF(C) | GQM1875C2E4R0CB12D | GQM1885C2A4R0CB01D |
| 4.3pF(4R3) | ±0.1pF(B) | GQM1875C2E4R3BB12D | GQM1885C2A4R3BB01D |
| | ±0.25pF(C) | GQM1875C2E4R3CB12D | GQM1885C2A4R3CB01D |
| 4.7pF(4R7) | ±0.1pF(B) | GQM1875C2E4R7BB12D | GQM1885C2A4R7BB01D |
| | ±0.25pF(C) | GQM1875C2E4R7CB12D | GQM1885C2A4R7CB01D |
| 5.0pF(5R0) | ±0.1pF(B) | GQM1875C2E5R0BB12D | GQM1885C2A5R0BB01D |
| | ±0.25pF(C) | GQM1875C2E5R0CB12D | GQM1885C2A5R0CB01D |
| The part number of | nde is shown in (|) and Unit is shown in []. <>: E | IA [inch] Code |

(Part Number) | GQ | M | 18 | 7 | 5C | 2E | R10 | B | B12 D 6 0

●Product ID 2 Series 5 Temperature Characteristics 8 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4Dimension (T) **7**Capacitance Packaging



| LxW [mm] | | | 1.6x0.8(18)<0603> | |
|------------------------|---------------------|--------------------|----------------------------|--------------------|
| Rated Volt. [Vdc] | | 250(2E) | 100(2A) | 50(1H) |
| Capacitance | Tolerance | | Part Number | |
| 5.1pF(5R1) | ±0.25pF(C) | GQM1875C2E5R1CB12D | GQM1885C2A5R1CB01D | |
| | ±0.5pF(D) | GQM1875C2E5R1DB12D | GQM1885C2A5R1DB01D | |
| 5.6pF(5R6) | ±0.25pF(C) | GQM1875C2E5R6CB12D | GQM1885C2A5R6CB01D | |
| | ±0.5pF(D) | GQM1875C2E5R6DB12D | GQM1885C2A5R6DB01D | |
| 6.0pF(6R0) | ±0.25pF(C) | GQM1875C2E6R0CB12D | GQM1885C2A6R0CB01D | |
| | ±0.5pF(D) | GQM1875C2E6R0DB12D | GQM1885C2A6R0DB01D | |
| 6.2pF(6R2) | ±0.25pF(C) | GQM1875C2E6R2CB12D | GQM1885C2A6R2CB01D | |
| | ±0.5pF(D) | GQM1875C2E6R2DB12D | GQM1885C2A6R2DB01D | |
| 6.8pF(6R8) | ±0.25pF(C) | GQM1875C2E6R8CB12D | GQM1885C2A6R8CB01D | |
| | ±0.5pF(D) | GQM1875C2E6R8DB12D | GQM1885C2A6R8DB01D | |
| 7.0pF(7R0) | ±0.25pF(C) | GQM1875C2E7R0CB12D | | GQM1885C1H7R0CB01D |
| | ±0.5pF(D) | GQM1875C2E7R0DB12D | | GQM1885C1H7R0DB01D |
| 7.5pF(7R5) | ±0.25pF(C) | GQM1875C2E7R5CB12D | | GQM1885C1H7R5CB01D |
| | ±0.5pF(D) | GQM1875C2E7R5DB12D | | GQM1885C1H7R5DB01D |
| 8.0pF(8R0) | ±0.25pF(C) | GQM1875C2E8R0CB12D | | GQM1885C1H8R0CB01D |
| , , , | ±0.5pF(D) | GQM1875C2E8R0DB12D | | GQM1885C1H8R0DB01D |
| 8.2pF(8R2) | ±0.25pF(C) | GQM1875C2E8R2CB12D | | GQM1885C1H8R2CB01D |
| | ±0.5pF(D) | GQM1875C2E8R2DB12D | | GQM1885C1H8R2DB01D |
| 9.0pF(9R0) | ±0.25pF(C) | GQM1875C2E9R0CB12D | | GQM1885C1H9R0CB01D |
| 7.5p. (6116) | ±0.5pF(D) | GQM1875C2E9R0DB12D | | GQM1885C1H9R0DB01D |
| 9.1pF(9R1) | ±0.25pF(C) | GQM1875C2E9R1CB12D | | GQM1885C1H9R1CB01D |
| 7. 1pl (31(1) | ±0.5pF(D) | GQM1875C2E9R1DB12D | | GQM1885C1H9R1DB01D |
| 10pF(100) | ±2%(G) | GQM1875C2E100GB12D | | GQM1885C1H100GB01D |
| 10pi (1 00) | ±5%(J) | GQM1875C2E100JB12D | | GQM1885C1H100JB01D |
| 11pF(110) | ±2%(G) | GQM1875C2E110GB12D | | GQM1885C1H110GB01D |
| 11pi (11 0) | | GQM1875C2E110JB12D | | GQM1885C1H110JB01D |
| 12pF(120) | ±5%(J) | | | GQM1885C1H120GB01D |
| 12pr(120) | ±2%(G) | GQM1875C2E120GB12D | | |
| 1255(420) | ±5%(J) | GQM1875C2E120JB12D | | GQM1885C1H120JB01D |
| 13pF(130) | ±2%(G) | GQM1875C2E130GB12D | | GQM1885C1H130GB01D |
| 45 5(450) | ±5%(J) | GQM1875C2E130JB12D | | GQM1885C1H130JB01D |
| 15pF(150) | ±2%(G) | GQM1875C2E150GB12D | | GQM1885C1H150GB01D |
| | ±5%(J) | GQM1875C2E150JB12D | | GQM1885C1H150JB01D |
| 16pF(160) | ±2%(G) | GQM1875C2E160GB12D | | GQM1885C1H160GB01D |
| | ±5%(J) | GQM1875C2E160JB12D | | GQM1885C1H160JB01D |
| 18pF(180) | ±2%(G) | GQM1875C2E180GB12D | | GQM1885C1H180GB01D |
| | ±5%(J) | GQM1875C2E180JB12D | | GQM1885C1H180JB01D |
| 20pF(200) | ±2%(G) | GQM1875C2E200GB12D | | GQM1885C1H200GB01D |
| | ±5%(J) | GQM1875C2E200JB12D | | GQM1885C1H200JB01D |
| 22pF(220) | ±2%(G) | GQM1875C2E220GB12D | | GQM1885C1H220GB01D |
| | ±5%(J) | GQM1875C2E220JB12D | | GQM1885C1H220JB01D |
| 24pF(240) | ±2%(G) | GQM1875C2E240GB12D | | GQM1885C1H240GB01D |
| | ±5%(J) | GQM1875C2E240JB12D | | GQM1885C1H240JB01D |
| 27pF(270) | ±2%(G) | GQM1875C2E270GB12D | | GQM1885C1H270GB01D |
| | ±5%(J) | GQM1875C2E270JB12D | | GQM1885C1H270JB01D |
| 30pF(300) | ±2%(G) | GQM1875C2E300GB12D | | GQM1885C1H300GB01D |
| | ±5%(J) | GQM1875C2E300JB12D | | GQM1885C1H300JB01D |



| LxW [mm] | | 1.6x0.8(1 | 8)<0603> |
|---------------------|-----------------|--------------------|--------------------|
| Rated Volt. [Vdc] | | 250(2E) | 50(1H) |
| Capacitance | Tolerance | Part N | umber |
| 33pF(330) | ±2%(G) | GQM1875C2E330GB12D | GQM1885C1H330GB01D |
| | ±5%(J) | GQM1875C2E330JB12D | GQM1885C1H330JB01D |
| 36pF(360) | ±2%(G) | GQM1875C2E360GB12D | GQM1885C1H360GB01D |
| | ±5%(J) | GQM1875C2E360JB12D | GQM1885C1H360JB01D |
| 39pF(390) | ±2%(G) | GQM1875C2E390GB12D | GQM1885C1H390GB01D |
| | ±5%(J) | GQM1875C2E390JB12D | GQM1885C1H390JB01D |
| 43pF(430) | ±2%(G) | GQM1875C2E430GB12D | GQM1885C1H430GB01D |
| | ±5%(J) | GQM1875C2E430JB12D | GQM1885C1H430JB01D |
| 47pF(470) | ±2%(G) | GQM1875C2E470GB12D | GQM1885C1H470GB01D |
| | ±5%(J) | GQM1875C2E470JB12D | GQM1885C1H470JB01D |
| 51pF(510) | ±2%(G) | | GQM1885C1H510GB01D |
| | ±5%(J) | | GQM1885C1H510JB01D |
| 56pF(560) | ±2%(G) | | GQM1885C1H560GB01D |
| | ±5%(J) | | GQM1885C1H560JB01D |
| 62pF(620) | ±2%(G) | | GQM1885C1H620GB01D |
| | ±5%(J) | | GQM1885C1H620JB01D |
| 68pF(680) | ±2%(G) | | GQM1885C1H680GB01D |
| | ±5%(J) | | GQM1885C1H680JB01D |
| 75pF(750) | ±2%(G) | | GQM1885C1H750GB01D |
| | ±5%(J) | | GQM1885C1H750JB01D |
| 82pF(820) | ±2%(G) | | GQM1885C1H820GB01D |
| | ±5%(J) | | GQM1885C1H820JB01D |
| 91pF(910) | ±2%(G) | | GQM1885C1H910GB01D |
| | ±5%(J) | | GQM1885C1H910JB01D |
| 100pF(101) | ±2%(G) | | GQM1885C1H101GB01D |
| | ±5%(J) | | GQM1885C1H101JB01D |





| LxW [mm] | | 2.0x1.25(2 | 21)<0805> | 2.8x2.8(22)<1111> |
|----------------------|---------------------|--------------------|--------------------|----------------------------|
| Rated Volt. [Vdc] | | 250(2E) | 100(2A) | 500(2H) |
| Capacitance | Tolerance | , , | Part Number | |
| 0.50pF(R50) | ±0.1pF(B) | GQM2195C2ER50BB12D | GQM2195C2AR50BB01D | GQM22M5C2HR50BB01L |
| . , , | ±0.25pF(C) | GQM2195C2ER50CB12D | GQM2195C2AR50CB01D | GQM22M5C2HR50CB01L |
| 0.75pF(R75) | ±0.1pF(B) | GQM2195C2ER75BB12D | GQM2195C2AR75BB01D | GQM22M5C2HR75BB01L |
| . , , | ±0.25pF(C) | GQM2195C2ER75CB12D | GQM2195C2AR75CB01D | GQM22M5C2HR75CB01L |
| 1.0pF(1R0) | ±0.1pF(B) | GQM2195C2E1R0BB12D | GQM2195C2A1R0BB01D | GQM22M5C2H1R0BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R0CB12D | GQM2195C2A1R0CB01D | GQM22M5C2H1R0CB01L |
| 1.1pF(1R1) | ±0.1pF(B) | GQM2195C2E1R1BB12D | GQM2195C2A1R1BB01D | GQM22M5C2H1R1BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R1CB12D | GQM2195C2A1R1CB01D | GQM22M5C2H1R1CB01L |
| 1.2pF(1R2) | ±0.1pF(B) | GQM2195C2E1R2BB12D | GQM2195C2A1R2BB01D | GQM22M5C2H1R2BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R2CB12D | GQM2195C2A1R2CB01D | GQM22M5C2H1R2CB01L |
| 1.3pF(1R3) | ±0.1pF(B) | GQM2195C2E1R3BB12D | GQM2195C2A1R3BB01D | GQM22M5C2H1R3BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R3CB12D | GQM2195C2A1R3CB01D | GQM22M5C2H1R3CB01L |
| 1.5pF(1R5) | ±0.1pF(B) | GQM2195C2E1R5BB12D | GQM2195C2A1R5BB01D | GQM22M5C2H1R5BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R5CB12D | GQM2195C2A1R5CB01D | GQM22M5C2H1R5CB01L |
| 1.6pF(1R6) | ±0.1pF(B) | GQM2195C2E1R6BB12D | GQM2195C2A1R6BB01D | GQM22M5C2H1R6BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R6CB12D | GQM2195C2A1R6CB01D | GQM22M5C2H1R6CB01L |
| 1.8pF(1R8) | ±0.1pF(B) | GQM2195C2E1R8BB12D | GQM2195C2A1R8BB01D | GQM22M5C2H1R8BB01L |
| • | ±0.25pF(C) | GQM2195C2E1R8CB12D | GQM2195C2A1R8CB01D | GQM22M5C2H1R8CB01L |
| 2.0pF(2R0) | ±0.1pF(B) | GQM2195C2E2R0BB12D | GQM2195C2A2R0BB01D | GQM22M5C2H2R0BB01L |
| | ±0.25pF(C) | GQM2195C2E2R0CB12D | GQM2195C2A2R0CB01D | GQM22M5C2H2R0CB01L |
| 2.2pF(2R2) | ±0.1pF(B) | GQM2195C2E2R2BB12D | GQM2195C2A2R2BB01D | GQM22M5C2H2R2BB01L |
| | ±0.25pF(C) | GQM2195C2E2R2CB12D | GQM2195C2A2R2CB01D | GQM22M5C2H2R2CB01L |
| 2.4pF(2R4) | ±0.1pF(B) | GQM2195C2E2R4BB12D | GQM2195C2A2R4BB01D | GQM22M5C2H2R4BB01L |
| | ±0.25pF(C) | GQM2195C2E2R4CB12D | GQM2195C2A2R4CB01D | GQM22M5C2H2R4CB01L |
| 2.7pF(2R7) | ±0.1pF(B) | GQM2195C2E2R7BB12D | GQM2195C2A2R7BB01D | GQM22M5C2H2R7BB01L |
| | ±0.25pF(C) | GQM2195C2E2R7CB12D | GQM2195C2A2R7CB01D | GQM22M5C2H2R7CB01L |
| 3.0pF(3R0) | ±0.1pF(B) | GQM2195C2E3R0BB12D | GQM2195C2A3R0BB01D | GQM22M5C2H3R0BB01L |
| | ±0.25pF(C) | GQM2195C2E3R0CB12D | GQM2195C2A3R0CB01D | GQM22M5C2H3R0CB01L |
| 3.3pF(3R3) | ±0.1pF(B) | GQM2195C2E3R3BB12D | GQM2195C2A3R3BB01D | GQM22M5C2H3R3BB01L |
| | ±0.25pF(C) | GQM2195C2E3R3CB12D | GQM2195C2A3R3CB01D | GQM22M5C2H3R3CB01L |
| 3.6pF(3R6) | ±0.1pF(B) | GQM2195C2E3R6BB12D | GQM2195C2A3R6BB01D | GQM22M5C2H3R6BB01L |
| | ±0.25pF(C) | GQM2195C2E3R6CB12D | GQM2195C2A3R6CB01D | GQM22M5C2H3R6CB01L |
| 3.9pF(3R9) | ±0.1pF(B) | GQM2195C2E3R9BB12D | GQM2195C2A3R9BB01D | GQM22M5C2H3R9BB01L |
| | ±0.25pF(C) | GQM2195C2E3R9CB12D | GQM2195C2A3R9CB01D | GQM22M5C2H3R9CB01L |
| 4.0pF(4R0) | ±0.1pF(B) | GQM2195C2E4R0BB12D | GQM2195C2A4R0BB01D | GQM22M5C2H4R0BB01L |
| | ±0.25pF(C) | GQM2195C2E4R0CB12D | GQM2195C2A4R0CB01D | GQM22M5C2H4R0CB01L |
| 4.3pF(4R3) | ±0.1pF(B) | GQM2195C2E4R3BB12D | GQM2195C2A4R3BB01D | GQM22M5C2H4R3BB01L |
| | ±0.25pF(C) | GQM2195C2E4R3CB12D | GQM2195C2A4R3CB01D | GQM22M5C2H4R3CB01L |
| 4.7pF(4R7) | ±0.1pF(B) | GQM2195C2E4R7BB12D | GQM2195C2A4R7BB01D | GQM22M5C2H4R7BB01L |
| | ±0.25pF(C) | GQM2195C2E4R7CB12D | GQM2195C2A4R7CB01D | GQM22M5C2H4R7CB01L |
| 5.0pF(5R0) | ±0.1pF(B) | GQM2195C2E5R0BB12D | GQM2195C2A5R0BB01D | GQM22M5C2H5R0BB01L |
| | ±0.25pF(C) | GQM2195C2E5R0CB12D | GQM2195C2A5R0CB01D | GQM22M5C2H5R0CB01L |
| 5.1pF(5R1) | ±0.25pF(C) | GQM2195C2E5R1CB12D | GQM2195C2A5R1CB01D | GQM22M5C2H5R1CB01L |
| | ±0.5pF(D) | GQM2195C2E5R1DB12D | GQM2195C2A5R1DB01D | GQM22M5C2H5R1DB01L |
| 5.6pF(5R6) | ±0.25pF(C) | GQM2195C2E5R6CB12D | GQM2195C2A5R6CB01D | GQM22M5C2H5R6CB01L |
| | ±0.5pF(D) | GQM2195C2E5R6DB12D | GQM2195C2A5R6DB01D | GQM22M5C2H5R6DB01L |
| 6.0pF(6R0) | ±0.25pF(C) | GQM2195C2E6R0CB12D | GQM2195C2A6R0CB01D | GQM22M5C2H6R0CB01L |
| | ±0.5pF(D) | GQM2195C2E6R0DB12D | GQM2195C2A6R0DB01D | GQM22M5C2H6R0DB01L |



| | | 2.0x1.25(21)<0805> | | 2.8x2.8(22)<1111> |
|---|---|---|---|--|
| | 250(2E) | 100(2A) | 50(1H) | 500(2H) |
| Tolerance | | Part N | umber | |
| 6.2pF(6R2) ±0.25pF(C) | GQM2195C2E6R2CB12D | GQM2195C2A6R2CB01D | | GQM22M5C2H6R2CB01 |
| ±0.5pF(D) | GQM2195C2E6R2DB12D | GQM2195C2A6R2DB01D | | GQM22M5C2H6R2DB01 |
| ±0.25pF(C) | GQM2195C2E6R8CB12D | GQM2195C2A6R8CB01D | | GQM22M5C2H6R8CB01 |
| ±0.5pF(D) | GQM2195C2E6R8DB12D | GQM2195C2A6R8DB01D | | GQM22M5C2H6R8DB01 |
| ±0.25pF(C) | GQM2195C2E7R0CB12D | GQM2195C2A7R0CB01D | | GQM22M5C2H7R0CB01 |
| ±0.5pF(D) | GQM2195C2E7R0DB12D | GQM2195C2A7R0DB01D | | GQM22M5C2H7R0DB01 |
| ±0.25pF(C) | GQM2195C2E7R5CB12D | GQM2195C2A7R5CB01D | | GQM22M5C2H7R5CB01 |
| ±0.5pF(D) | GQM2195C2E7R5DB12D | GQM2195C2A7R5DB01D | | GQM22M5C2H7R5DB01 |
| ±0.25pF(C) | GQM2195C2E8R0CB12D | GQM2195C2A8R0CB01D | | GQM22M5C2H8R0CB01 |
| ±0.5pF(D) | GQM2195C2E8R0DB12D | GQM2195C2A8R0DB01D | | GQM22M5C2H8R0DB01 |
| ±0.25pF(C) | GQM2195C2E8R2CB12D | GQM2195C2A8R2CB01D | | GQM22M5C2H8R2CB01 |
| ±0.5pF(D) | GQM2195C2E8R2DB12D | GQM2195C2A8R2DB01D | | GQM22M5C2H8R2DB01 |
| ±0.25pF(C) | GQM2195C2E9R0CB12D | GQM2195C2A9R0CB01D | | GQM22M5C2H9R0CB01 |
| ±0.5pF(D) | GQM2195C2E9R0DB12D | GQM2195C2A9R0DB01D | | GQM22M5C2H9R0DB01 |
| 9.1pF(9R1) ±0.25pF(C) | GQM2195C2E9R1CB12D | GQM2195C2A9R1CB01D | | GQM22M5C2H9R1CB01 |
| | GQM2195C2E9R1DB12D | GQM2195C2A9R1DB01D | | GQM22M5C2H9R1DB01 |
| | GQM2195C2E100GB12D | GQM2195C2A100GB01D | | GQM22M5C2H100GB01 |
| | GQM2195C2E100JB12D | GQM2195C2A100JB01D | | GQM22M5C2H100JB01 |
| ±2%(G) | GQM2195C2E110GB12D | GQM2195C2A110GB01D | | GQM22M5C2H110GB01 |
| ±5%(J) | GQM2195C2E110JB12D | GQM2195C2A110JB01D | | GQM22M5C2H110JB01 |
| | GQM2195C2E120GB12D | GQM2195C2A120GB01D | | GQM22M5C2H120GB01 |
| + | GQM2195C2E120JB12D | | | GQM22M5C2H120JB01 |
| | GQM2195C2E130GB12D | GQM2195C2A130GB01D | | GQM22M5C2H130GB01 |
| | GQM2195C2E130JB12D | GQM2195C2A130JB01D | | GQM22M5C2H130JB01 |
| . , | GQM2195C2E150GB12D | GQM2195C2A150GB01D | | GQM22M5C2H150GB01 |
| | GQM2195C2E150JB12D | GQM2195C2A150JB01D | | GQM22M5C2H150JB01 |
| | GQM2195C2E160GB12D | GQM2195C2A160GB01D | | GQM22M5C2H160GB01 |
| | GQM2195C2E160JB12D | GQM2195C2A160JB01D | | GQM22M5C2H160JB01 |
| | GQM2195C2E180GB12D | GQM2195C2A180GB01D | | GQM22M5C2H180GB01 |
| | GQM2195C2E180JB12D | GQM2195C2A180JB01D | | GQM22M5C2H180JB01 |
| | | | GQM2195C1H200GB01D | GQM22M5C2H200GB01 |
| | | | | GQM22M5C2H200JB01 |
| | | | | GQM22M5C2H220GB01 |
| ' ` ' | | | | GQM22M5C2H220JB01 |
| | | | | GQM22M5C2H240GB01 |
| | | | | GQM22M5C2H240JB01 |
| | | | | GQM22M5C2H270GB01 |
| | | | | GQM22M5C2H270JB01 |
| | | | | GQM22M5C2H300GB01 |
| | | | | GQM22M5C2H300JB01 |
| | | | | GQM22M5C2H330GB01 |
| | | | | GQM22M5C2H330JB01 |
| | | | | |
| | | | | GQM22M5C2H360GB01 |
| | | | | GQM22M5C2H360JB01 |
| | | | | GQM22M5C2H390GB01 GQM22M5C2H390JB01 |
| | ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.25pF(C) ±0.5pF(D) ±0.5pF(D) ±0.5pF(D) | Tolerance ±0.25pF(C) GQM2195C2E6R2CB12D ±0.5pF(D) GQM2195C2E6R2CB12D ±0.5pF(D) GQM2195C2E6R8CB12D ±0.5pF(D) GQM2195C2E6R8CB12D ±0.5pF(D) GQM2195C2E6R8DB12D ±0.25pF(C) GQM2195C2E7R0CB12D ±0.5pF(D) GQM2195C2E7R0CB12D ±0.5pF(D) GQM2195C2E7R5CB12D ±0.5pF(D) GQM2195C2E8R0CB12D ±0.5pF(D) GQM2195C2E8R0CB12D ±0.5pF(D) GQM2195C2E8R0CB12D ±0.5pF(D) GQM2195C2E8R0CB12D ±0.5pF(D) GQM2195C2E8R2CB12D ±0.5pF(D) GQM2195C2E8R2CB12D ±0.5pF(D) GQM2195C2E8R2CB12D ±0.5pF(D) GQM2195C2E9R0CB12D ±0.5pF(D) GQM2195C2E9R0CB12D ±0.5pF(D) GQM2195C2E9R0CB12D ±0.5pF(D) GQM2195C2E9R1DB12D ±2%(G) GQM2195C2E100GB12D ±5%(J) GQM2195C2E100GB12D ±5%(J) GQM2195C2E110JB12D ±2%(G) GQM2195C2E100B12D ±2%(G) GQM2195C2E100B12D ±5%(J) GQM2195C2E130JB12D ±2%(G) GQM2195C2E130JB12D ±2%(G) GQM2195C2E130JB12D ±2%(G) GQM2195C2E150GB12D ±5%(J) GQM2195C2E150GB12D ±5%(J) GQM2195C2E150JB12D ±2%(G) GQM2195C2E160JB12D ±5%(J) GQM2195C2E160JB12D ±2%(G) GQM2195C2E10JB12D ±5%(J) GQM2195C2E20JB12D ±5%(J) GQM2195C2E330JB12D ±2%(G) GQM2195C2E330JB12D ±2%(G) GQM2195C2E330JB12D ±5%(J) GQM2195C2E330JB12D ±5%(J) GQM2195C2E330JB12D ±5%(J) GQM2195C2E330JB12D ±5%(J) GQM2195C2E330JB12D | Tolerance #0.25pF(C) GQM2195C2E6R2CB12D GQM2195C2A6R2CB01D #0.5pF(D) GQM2195C2E6R2CB12D GQM2195C2A6R2CB01D #0.25pF(C) GQM2195C2E6R2CB12D GQM2195C2A6R2CB01D #0.25pF(D) GQM2195C2E6R8CB12D GQM2195C2A6R8CB01D #0.25pF(D) GQM2195C2E6R8DB12D GQM2195C2A7R0CB01D #0.25pF(C) GQM2195C2E7R0CB12D GQM2195C2A7R0CB01D #0.25pF(D) GQM2195C2E7R0DB12D GQM2195C2A7R0CB01D #0.25pF(D) GQM2195C2E7R5CB12D GQM2195C2A7R5CB01D #0.25pF(D) GQM2195C2E7R5DB12D GQM2195C2A7R5CB01D #0.25pF(D) GQM2195C2E8R0CB12D GQM2195C2A7R5DB01D #0.25pF(D) GQM2195C2E8R0CB12D GQM2195C2A8R0CB01D #0.5pF(D) GQM2195C2E8R0CB12D GQM2195C2A8R0CB01D #0.5pF(D) GQM2195C2E8R2CB12D GQM2195C2A8R2CB01D #0.5pF(D) GQM2195C2E8R2CB12D GQM2195C2A8R2CB01D #0.5pF(D) GQM2195C2E9R0CB12D GQM2195C2A9R0CB01D #0.5pF(D) GQM2195C2E9R0CB12D GQM2195C2A9R0CB01D #0.5pF(D) GQM2195C2E9R0CB12D GQM2195C2A9R1CB01D #0.5pF(D) GQM2195C2E9R1CB12D GQM2195C2A9R1CB01D #0.5pF(D) GQM2195C2E9R1CB12D GQM2195C2A9R1CB01D #0.5pF(D) GQM2195C2E100GB12D GQM2195C2A100JB01D #2%(G) GQM2195C2E100JB12D GQM2195C2A100JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A100JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A100JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A10JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A10JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A130JB01D #2%(G) GQM2195C2E130JB12D GQM2195C2A130JB01D #2%(G) GQM2195C2E130JB12D GQM2195C2A130JB01D #2%(G) GQM2195C2E130JB12D GQM2195C2A150JB01D #2%(G) GQM2195C2E130JB12D GQM2195C2A150JB01D #2%(G) GQM2195C2E160JB12D GQM2195C2A150JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A180JB01D #2%(G) GQM2195C2E10JB12D GQM2195C2A180JB01D #2%(G) GQM2195C2E20JB12D #2%(G) GQM2195C2E30JB12D #2%(G) GQM2195C2E30JB12D #2%(G) GQM2195C2E30JB12D #2%(G) GQM2195C2E30JB12D #2%(G) GQM2195C2E30JB12D #2%(G) GQM2195C2E30JB12D #2% | Tolerance |

B12 D (Part Number) | GQ | M | 21 | 9 | 5C | 2E | 6R2 | C **3 4 5** 6 0

1 Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging



Temperature Compensating Type C0G(5C) Characteristics

| LxW [mm] | | 2.0x1.25(2 | 21)<0805> | 2.8x2.8(22)<1111> |
|---------------------|-----------------|--------------------|--------------------|----------------------------|
| Rated Volt. [Vdc] | l | 250(2E) | 50(1H) | 500(2H) |
| Capacitance | Tolerance | | Part Number | |
| 43pF(430) | ±2%(G) | GQM2195C2E430GB12D | GQM2195C1H430GB01D | GQM22M5C2H430GB01L |
| | ±5%(J) | GQM2195C2E430JB12D | GQM2195C1H430JB01D | GQM22M5C2H430JB01L |
| 47pF(470) | ±2%(G) | GQM2195C2E470GB12D | GQM2195C1H470GB01D | GQM22M5C2H470GB01L |
| | ±5%(J) | GQM2195C2E470JB12D | GQM2195C1H470JB01D | GQM22M5C2H470JB01L |
| 51pF(510) | ±2%(G) | GQM2195C2E510GB12D | GQM2195C1H510GB01D | GQM22M5C2H510GB01L |
| | ±5%(J) | GQM2195C2E510JB12D | GQM2195C1H510JB01D | GQM22M5C2H510JB01L |
| 56pF(560) | ±2%(G) | GQM2195C2E560GB12D | GQM2195C1H560GB01D | GQM22M5C2H560GB01L |
| | ±5%(J) | GQM2195C2E560JB12D | GQM2195C1H560JB01D | GQM22M5C2H560JB01L |
| 62pF(620) | ±2%(G) | GQM2195C2E620GB12D | GQM2195C1H620GB01D | GQM22M5C2H620GB01L |
| | ±5%(J) | GQM2195C2E620JB12D | GQM2195C1H620JB01D | GQM22M5C2H620JB01L |
| 68pF(680) | ±2%(G) | GQM2195C2E680GB12D | GQM2195C1H680GB01D | GQM22M5C2H680GB01L |
| | ±5%(J) | GQM2195C2E680JB12D | GQM2195C1H680JB01D | GQM22M5C2H680JB01L |
| 75pF(750) | ±2%(G) | GQM2195C2E750GB12D | GQM2195C1H750GB01D | GQM22M5C2H750GB01L |
| | ±5%(J) | GQM2195C2E750JB12D | GQM2195C1H750JB01D | GQM22M5C2H750JB01L |
| 82pF(820) | ±2%(G) | GQM2195C2E820GB12D | GQM2195C1H820GB01D | GQM22M5C2H820GB01L |
| | ±5%(J) | GQM2195C2E820JB12D | GQM2195C1H820JB01D | GQM22M5C2H820JB01L |
| 91pF(910) | ±2%(G) | GQM2195C2E910GB12D | GQM2195C1H910GB01D | GQM22M5C2H910GB01L |
| | ±5%(J) | GQM2195C2E910JB12D | GQM2195C1H910JB01D | GQM22M5C2H910JB01L |
| 100pF(101) | ±2%(G) | GQM2195C2E101GB12D | GQM2195C1H101GB01D | GQM22M5C2H101GB01L |
| | ±5%(J) | GQM2195C2E101JB12D | GQM2195C1H101JB01D | GQM22M5C2H101JB01L |

< >: EIA [inch] Code The part number code is shown in () and Unit is shown in [].



GQM Series Specifications and Test Methods

| No. | Ite | em | Specifications | | Test Me | ethod | |
|-----|---|----------------------|--|--|---|---|---|
| 1 | Operating Temperatu | ıre | −55 to 125°C | Reference Tempera | ature: 25℃ | | |
| 2 | 2 Rated Voltage | | See the previous page. | The rated voltage is defined as the maximum voltage be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V' whichever is larger, should be maintained within the voltage range. | | ge, V ^{p.p} or V ^{o.p} , | |
| 3 | Appearan | nce | No defects or abnormalities | Visual inspection | | | |
| 4 | Dimensio | n | Within the specified dimensions | Using calipers | | | |
| 5 | Dielectric | Strength | No defects or abnormalities | No failure should be is applied between t provided the charge *GQM187, GQM2 | the terminatio discharge cu | ns for 1 to 5 se irrent is less th | econds, an 50mA. |
| 6 | Insulation | Resistance | More than 10,000MΩ | The insulation resist voltage not exceeding max. and within 2 m charge/discharge cu | ng the rated v ninutes of cha | oltage at 25℃ rging, provided | and 75%RH |
| 7 | Capacita | nce | Within the specified tolerance | The capacitance/Q | | | at the |
| | | | 30pF and over: Q≧1400 | frequency and volta | ge shown in t | he table. | |
| 8 | Q | | 30pF and below: Q≧800+20C | Frequency | | 1±0.1MHz | |
| | | | C: Nominal Capacitance (pF) | Voltage | | 0.5 to 5Vrm | s |
| | | Temperature | Within the specified tolerance (Table A) | The capacitance cha | ange should b | e measured a | ter 5 min. at |
| 9 | O I I I I I I I I I I I I I I I I I I I | Capacitance Drift | Within $\pm 0.2\%$ or ± 0.05 pF (whichever is larger) | The temperature comeasured in step 3 When cycling the ten the capacitance sho temperature coefficie The capacitance dri between the maxims steps 1, 3 and 5 by | as a referenc nperature seq uld be within t ent and capac ft is calculated um and minim the capacitan | e. uentially from s the specified to citance change d by dividing th num measured ce value in ste | teps 1 through 5 lerance for the as in Table A. the differences values in the p 3. |
| | | | | Step | | emperature (° | , |
| | | | | 1 | Kei | ference Temp. -55±3 | ±2 |
| | | | | 3 | Ref | -35±3 ference Temp. | +2 |
| | | | | 4 | 110 | 125±3 | <u></u> |
| | | | | 5 | Ref | ference Temp. | ±2 |
| | | | No removal of the terminations or other defect should occur. | Solder the capacitor Fig. 1 using a eutecti with the test jig for 10 The soldering should reflow method and si | ic solder. Ther 0±1 sec. d be done eith | apply 10N* for | rce in parallel or using the |
| 10 | Adhesive | | + C+- | soldering is uniform a | | | |
| | of Termin | ation | | Туре | а | b | С |
| | | | | GQM18 | 1.0 | 3.0 | 1.2 |
| | | | Solder resist | GQM21 GQM22 | 1.2 2.2 | 4.0 5.0 | <u>1.65</u> 2.9 |
| | | | Baked electrode or copper foil | | | | (in mm) |
| | | Annogranco | No defects or abnormalities | Solder the consoiter | Fig. | | hoard) in the |
| | | Appearance | | Solder the capacitor same manner and u | | | • |
| 11 | Vibration Resistance | Capacitance | Within the specified tolerance 30pF and over: Q≥1400 30pF and below: Q≥800+20C C: Nominal Capacitance (pF) | The capacitor should having a total amplituding a total amplituding minimum to the frequency range, frow traversed in apportant motion should lead to the control of the co | d be subjecte tude of 1.5mn he approxima om 10 to 55Hz roximately 1 n | d to a simple he, the frequence te limits of 10 and return to ninute. | narmonic motion by being varied and 55Hz. The 10Hz, should |
| | | | | 3 mutually perpendi | cular direction | ns (total of 6 h | ours). |





GQM Series Specifications and Test Methods

Continued from the preceding page Specifications No Item Test Method Solder the capacitor on the test jig (glass epoxy board) shown Appearance No defects or abnormalities. in Fig. 2 using a eutectic solder. Capacitance Within ±5% or ±0.5pF Then apply a force in the direction shown in Fig. 3. Change (whichever is larger) The soldering should be done by the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 50 Pressurizing speed: 1.0mm/sec. Pressurize Deflection 100 t: 1.6mm Type b С a GQM18 3.0 1.0 1.2 Capacitance meter GQM21 1.2 4.0 1.65 45 GQM22 2.2 5.0 2.9 (in mm) Fig. 3 Fig. 2 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at Solderability of 75% of the terminations are to be soldered evenly 13 80 to 120℃ for 10 to 30 seconds. After preheating, immerse in Termination and continuously. eutectic solder solution for 2±0.5 seconds at 230±5°C or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C. The measured and observed characteristics should satisfy the specifications in the following table. Appearance No defects or abnormalities. Capacitance Within ±2.5% or ±0.25 pF (whichever is larger) Change Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the Resistance capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution 30pF and over: Q≥1400 14 to Soldering at 270±5℃ for 10±0.5 seconds. Let sit at room temperature for 30pF and below: Q≥800+20C Heat 0 24±2 hours, then measure. C: Nominal Capacitance (pF) I.R. More than $10,000M\Omega$ Dielectric No defects. Strength The measured and observed characteristics should satisfy the specifications in the following table Fix the capacitor to the supporting jig in the same manner and No defects or abnormalities. Appearance under the same conditions as (10). Capacitance Within ±2.5% or ±0.25pF Perform the five cycles according to the four heat treatments Change (whichever is larger) listed in the following table. Temperature Let sit for 24±2 hours at room temperature, then measure. 30pF and over: Q≥1400 15 Cycle 30pF and below: Q≥800+20C Step 4 Q Min. Operating Max. Operating Room Room Temp. (℃) C: Nominal Capacitance (pF) Temp. +3/-0 Temp. +0/-3 Temp. Temp. 30±3 30±3 Time (min.) 2 to 3 2 to 3 I.R. More than $10,000M\Omega$ Dielectric No defects. Strength The measured and observed characteristics should satisfy the specifications in the following table. Appearance No defects or abnormalities. Within ±5% or ±0.5pF Canacitance Set the capacitor at 40±2℃ and in 90 to 95% humidity for Humidity Change (whichever is larger) 500±12 hours. 16 Steady 30pF and over: Q≥350 Remove and set for 24±2 hours at room temperature, then State 10pF and over, 30pF and below: Q≥275+5C/2 measure.

Continued on the following page.





0

I.R

10pF and below: Q≥200+10C C: Nominal Capacitance (pF)

More than $1,000M\Omega$

GQM Series Specifications and Test Methods

Continued from the preceding page.

| No. | Ite | em | Specifications | Test Method |
|-----|---------------------|-----------------------|---|---|
| | | | The measured and observed characteristics should satisfy the specifications in the following table. | |
| | | Appearance | No defects or abnormalities. | |
| 17 | Humidity | Capacitance Change | Within ±7.5% or ±0.75pF (whichever is larger) | Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 24±2 hours at room |
| ., | Load | Q | 30pF and over: Q≥200 30pF and below: Q≥100+10C/3 | temperature then measure. The charge/discharge current is less than 50mA. |
| | | | C: Nominal Capacitance (pF) | |
| | | I.R. | More than $500M\Omega$ | |
| | | | The measured and observed characteristics should satisfy the specifications in the following table. | |
| | | Appearance | No defects or abnormalities. | |
| | High | Capacitance Change | Within ±3% or ±0.3pF (whichever is larger) | Apply 200%* of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. |
| 18 | Temperature Load | Q | 30pF and over: Q≥350 10pF and over, 30pF and below: Q≥275+5C/2 10pF and below: Q≥200+10C | Set for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. *GQM22: 150% of the rated voltage |
| | | | C: Nominal Capacitance (pF) | |
| | | I.R. | More than 1,000MΩ | |

Table A

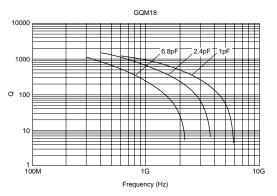
| | Nominal Values (ppm/℃) *1 | Capacitance Change from 25℃ (%) | | | | | | |
|-------|------------------------------|---------------------------------|-------|-------|-------|-------|-------|--|
| Char. | | −55℃ | | −30°C | | −10°C | | |
| | (ρρπ, σ, - τ | Max. | Min. | Max. | Min. | Max. | Min. | |
| 5C | 0±30 | 0.58 | -0.24 | 0.40 | -0.17 | 0.25 | -0.11 | |

^{*1:} Nominal values denote the temperature coefficient within a range of 25 to 125°C.

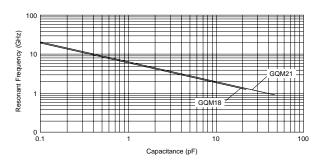


GQM Series Data

■ Q - Frequency Characteristics



■ Resonant Frequency - Capacitance



Chip Monolithic Ceramic Capacitors



Monolithic Microchip GMA Series

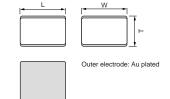
■ Features

- 1. Better microwave characteristics
- 2. Suitable for by passing
- 3. High density mounting

■ Applications

- 1. Optical device for telecommunication
- 2. IC, built-in IC packaging
- 3. Measuring equipment





| Part Number | Dimensions (mm) | | | | |
|-------------|-----------------|------------|------------|--|--|
| Part Number | L | W | T | | |
| GMA0D3 | 0.38 ±0.05 | 0.38 ±0.05 | 0.3 ±0.05 | | |
| GMA05X | 0.5 ±0.05 | 0.5 ±0.05 | 0.35 ±0.05 | | |
| GMA085 | 0.8 ±0.05 | 0.8 ±0.05 | 0.5 ±0.1 | | |

Capacitance Table

High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

| X ex.X: T | Dimension [mn | n] | | | | | | | |
|--------------------------------|---------------|----------------------|---------------------------|---------------------------|----------------------|----------------------|---------------------|-----------------------------|----------------------|
| LxW [mm] | (0D) | | 0.5) (0 <02 | (0.5 5) 02> | | | (0 | x0.8)8) 303> | |
| Rated Voltage Capacitance [Vdc | | 100 (2A) | 25 (1E) | 10 (1A) | 6.3 (0J) | 100 (2A) | 25 (1E) | 10 (1A) | 6.3 (0J) |
| 100pF(101) | | Х | | | | ! | | | |
| 150pF(151) | | Х | | | | - | | | |
| 220pF(221) | | Х | | | | | | | |
| 330pF(331) | | Х | | | | 1 | | | |
| 470pF(471) | | Х | | | | | | | |
| 680pF(681) | | Х | | | | ! ! ! | | | |
| 1000pF(102) | | Х | | | | | | | |
| 1500pF(152) | | | Х | | | 5 | | | |
| 2200pF(222) | | | Х | | | 5 | | | |
| 3300pF(332) | | | Х | | | 5 | | | |
| 4700pF(472) | | ! ! | Х | | _ | 5 | | | |
| 6800pF(682) | | <u>.</u> | | Х | | 5 | | | |
| 10000pF(103) | 3 | | | Х | | ! ! | 5 | | |
| 15000pF(153) | | 1 1 1 | | X | | 1 1 1 | 5 | | |
| 22000pF(223) | | 1 1 1 | | X | | 1 1 1 | 5 | | |
| 33000pF(333) | | | | | | | | 5 | |
| 47000pF(473) | | ! ! | | | | ! | | 5 | |
| 68000pF(683) | | ! ! | | | | | | 5 | |
| 0.10μF(104) | | 1 | | | X | | | 5 | |
| 0.47μF(474) | | 1 1 1 | | | | | | | 5 |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

| LxW [mm] | | 0.38x0.38(0D)<015015> |
|-----------------------|------------------|--------------------------------|
| Rated Volt. [Vdc |] | 10(1A) |
| Capacitance | Tolerance | Part Number |
| 10000pF(103) | ±20%(M) | GMA0D3R71A103MA01T |

| LxW [mm] | | | 0.5x0.5(0 | 5)<0202> | |
|-----------------------|------------------|--------------------|--------------------|--------------------|---------------------|
| Rated Volt. [Vdc] | | 100(2A) | 25(1E) | 10(1A) | 6.3 (0J) |
| Capacitance | Tolerance | | Part N | umber | |
| 100pF(101) | ±20%(M) | GMA05XR72A101MA01T | | | |
| 150pF(151) | ±20%(M) | GMA05XR72A151MA01T | | | |
| 220pF(221) | ±20%(M) | GMA05XR72A221MA01T | | | |
| 330pF(331) | ±20%(M) | GMA05XR72A331MA01T | | | |
| 470pF(471) | ±20%(M) | GMA05XR72A471MA01T | | | |
| 680pF(681) | ±20%(M) | GMA05XR72A681MA01T | | | |
| 1000pF(102) | ±20%(M) | GMA05XR72A102MA01T | | | |
| 1500pF(152) | ±20%(M) | | GMA05XR71E152MA11T | | |
| 2200pF(222) | ±20%(M) | | GMA05XR71E222MA11T | | |
| 3300pF(332) | ±20%(M) | | GMA05XR71E332MA11T | | |
| 4700pF(472) | ±20%(M) | | GMA05XR71E472MA11T | | |
| 6800pF(682) | ±20%(M) | | | GMA05XR71A682MA01T | |
| 10000pF(103) | ±20%(M) | | | GMA05XR71A103MA01T | |
| 15000pF(153) | ±20%(M) | | | GMA05XR71A153MA01T | |
| 22000pF(223) | ±20%(M) | | | GMA05XR71A223MA01T | |
| 33000pF(333) | ±20%(M) | | | | |
| 47000pF(473) | ±20%(M) | | | | |
| 68000pF(683) | ±20%(M) | | | | |
| 0.10μF(104) | ±20%(M) | | | | GMA05XR60J104ME12T* |

| LxW [mm] | | 0.8x0.8 (08)<0303> | | | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|---------------------|--|--|
| Rated Volt. [Vdc |] | 100(2A) | 25(1E) | 10(1A) | 6.3 (0J) | | |
| Capacitance | Tolerance | | Part N | lumber | | | |
| 1500pF(152) | ±20%(M) | GMA085R72A152MA01T | | | | | |
| 2200pF(222) | ±20%(M) | GMA085R72A222MA01T | | | | | |
| 3300pF(332) | ±20%(M) | GMA085R72A332MA01T | | | | | |
| 4700pF(472) | ±20%(M) | GMA085R72A472MA01T | | | | | |
| 6800pF(682) | ±20%(M) | GMA085R72A682MA01T | | | | | |
| 10000pF(103) | ±20%(M) | | GMA085R71E103MA11T | | | | |
| 15000pF(153) | ±20%(M) | | GMA085R71E153MA11T | | | | |
| 22000pF(223) | ±20%(M) | | GMA085R71E223MA11T | | | | |
| 33000pF(333) | ±20%(M) | | | GMA085R71A333MA01T | | | |
| 47000pF(473) | ±20%(M) | | | GMA085R71A473MA01T | | | |
| 68000pF(683) | ±20%(M) | | | GMA085R71A683MA01T | | | |
| 0.10μF(104) | ±20%(M) | | | GMA085R71A104MA01T | | | |
| 0.47μF(474) | ±20%(M) | | | | GMA085R60J474ME12T* | | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code

Product ID 2 Series **5**Temperature Characteristics 3 Capacitance Tolerance

3Dimensions (LxW) **6**Rated Voltage **9**Individual Specification Code

4 Dimension (T) **7**Capacitance Packaging

Packaging Code in Part Number shows STD Tray.



^{*} Please refer to GMA series Specifications and Test Method (2).

GMA Series Specifications and Test Methods

When no "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

| No. | Ite | m | Specifications | Test Method |
|-----|---|------------------------|---|---|
| 1 | Operating Temperat Range | | R7: –55 to +125°C | Reference Temperature: 25°C |
| 2 | Rated Vol | ltage | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range. |
| 3 | Appearan | ice | No defects or abnormalities | Visual inspection |
| 4 | Dimensio | ns | Within the specified dimensions | Using calipers |
| 5 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when a voltage of 250% of the rated voltage is applied between the both terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. |
| 6 | Insulation F | Resistance | More than $10,000M\Omega$ or 500Ω F (whichever is smaller) | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging. |
| 7 | Capacitar | nce | Within the specified tolerance | The capacitance/D.F. should be measured at reference temperature at the frequency and voltage shown in the table. |
| 8 | Dissipation (D.F.) | n Factor | R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max. | Frequency 1±0.1kHz Voltage 1±0.2Vrms |
| 9 | Capacitance Temperature Characteristics | No bias | R7: Within +/–15% (–55 to +125°C) | The capacitance change should be measured after 5 min. at each specified temp. stage. •The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* Step |
| 10 | Mechanical | Bond Strength | Pull force: 0.03N min. | MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25µm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire. |
| | Strength | Die Shear Strength | Die Shear force: 2N min. | MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate. |
| | | Appearance | No defects or abnormalities | Ramp frequency from 10 to 55Hz then return to 10Hz all within |
| 11 | Vibration | Capacitance | Within the specified tolerance | 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion. |
| | Resistance | D.F. | R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max. | Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours). |
| | | Appearance | No defects or abnormalities | The capacitor should be set for 24±2 hours at room |
| | | Capacitance Change | R7: Within ±7.5% | then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same |
| 12 | Temperature Cycle | D.F. | R7: W.V.: 25V min.; 0.025 max. W.V.: 16V/10V; 0.035 max. | conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for |
| | Cycle | I.R. | More than 10,000M Ω or 500 Ω F (whichever is smaller) | 24±2 hours at room temperature, then measure. Step 1 2 3 4 |
| | | Dielectric Strength | No defects | Temp. (°C) Min. Operating Temp. +0/-3 Room Temp. +3/-0 Max. Operating Temp. +3/-0 Room Temp. +3/-0 Time (min.) 30±3 2 to 3 30±3 2 to 3 |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 15 are performed.





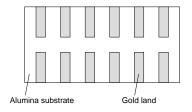
116

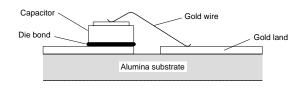
GMA Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). Continued from the preceding page When "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

| No. | Ite | m | Specifications | Test Method |
|-----|----------------|-----------------------|---|--|
| | | Appearance | No defects or abnormalities | |
| 13 | Humidity | Capacitance Change | R7: Within ±12.5% | Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% humidity. |
| 13 | (Steady State) | D.F. | R7: W.V.: 10V min.; 0.05 max. | Take it out and set it for 24±2 hours at room temperature, then |
| | | I.R. | More than 1,000M Ω or 50 Ω F (whichever is smaller) | - measure. |
| | | Appearance | No defects or abnormalities | |
| 14 | Humidity | Capacitance Change | R7: Within ±12.5% | Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to |
| 14 | Load | D.F. | R7: W.V.: 10V min.; 0.05 max. | 95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. |
| | | I.R. | More than $500 M\Omega$ or $25 \Omega F$ (whichever is smaller) | |
| | | Appearance | No defects or abnormalities | A voltage treatment should be given to the capacitor, in which a |
| | High | Capacitance Change | R7: Within ±12.5% | DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature; ±3°C then it should be set for 24±2 hours at room temperature and the initial measurement |
| 15 | Temperature | D.F. | R7: W.V.: 10V min.; 0.05 max. | should be conducted. |
| | Load | I.R. | More than 1,000M Ω or $50\Omega F$ (whichever is smaller) | Then apply the above mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the bath, and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 15 are performed.





GMA Series Specifications and Test Methods

When no "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2).

| No. | Ite | em | Specifications | Test Method |
|-----|---|-------------------------------------|-----------------------------------|---|
| 1 | Operating Temperat Range | | R6 : -55°C to 85°C | Reference Temperature : 25°C |
| 2 | Rated Vol | ltage | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range. |
| 3 | Appearan | ice | No defects or abnormalities. | Visual inspection. |
| 4 | Dimensio | ns | Within the specified dimensions. | Using calipers. |
| 5 | Dielectric | Strength | No defects or abnormalities. | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. |
| 6 | Insulation Resistance | | More than $50\Omega \cdot F$ | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging. |
| 7 | Capacitar | nce | Within the specified tolerance. | The capacitance/D.F. should be measured at reference |
| 8 | Dissipation Factor (D | | R6: 0.1 max. | temperature at the frequency and voltage shown in the table. Capacitance Frequency Voltage C≤10μF (6.3Vmax.) 1±0.1kHz 0.5±0.1Vrms |
| 9 | Capacitance Temperature Characteristics | No bias | R6 : Within ±15% (–55°C to +85°C) | The capacitance change should be measured after 5 min. at each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* Step Temperature (°C) 1 25±2 2 -55±3 3 25±2 4 85±3 *Initial measurement for high dielectric constant type Perform a heat treatment at 150 +0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. MIL-STD-883 Method 2011 Condition D |
| 10 | Mechanical Strength | Bond Strength | Pull force : 0.03N min. | Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25µm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire. |
| | Suengui | Die Shear Strength | Die Shear force : 2N min. | MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate. |
| | | Appearance | No defects or abnormalities. | Pamp frequency from 10 to 55Hz then return to 10Hz all within |
| 11 | Vibration | Capacitance | Within the specified tolerance. | Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion. |
| 11 | Resistance | D.F. | R6: 0.1 max. | Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours). |
| | | Appearance | No defects or abnormalities. | The capacitor should be set for 24±2 hours at room |
| | | Capacitance Change R6: Within ±7.5% | | temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same |
| | Tomporaturo | D.F. | R6: 0.1 max. | conditions as (11) and conduct the five cycles according to the |
| 12 | Temperature Sudden | I.R. | More than $50\Omega \cdot F$ | temperatures and time shown in the following table. Set it for 48±4 hours at room temperature, then measure. |
| | Change | | | Step 1 2 3 4 |
| | | Dielectric Strength | No defects | Temp. (°C) Min. Operating Temp.+0/-3 Room Temp. Operating Temp. +3/-0 Max. Operating Temp. +3/-0 Room Temp. Temp. Temp. Temp. 2 to 3 |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 14 are performed.



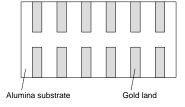


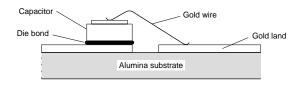
GMA Series Specifications and Test Methods (2)

When no "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (1). Continued from the preceding page

| | Continuea fro | om mo proo | when is added in Fi | When "*" is added in PNs table, please refer to GMA Series Specifications and Test Methods (2). | | | | |
|-----|--|-----------------------|------------------------------|--|--|--|--|--|
| No. | o. Item | | Specifications | Test Method | | | | |
| | | Appearance | No defects or abnormalities. | Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to | | | | |
| | | Capacitance Change | R6: Within ±12.5% | 95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. | | | | |
| | High | D.F. | R6: 0.2 max. | | | | | |
| 13 | Temperature High Humidity (Steady) | I.R. | More than 12.5 Ω · F | Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. Measurement after test Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. | | | | |
| | | Appearance | No defects or abnormalities. | Apply 150% of the rated voltage for 1000±12 hours at the | | | | |
| | | Capacitance Change | R6 : Within ±12.5% | maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/ discharge current is less than 50mA. | | | | |
| | | D.F. | R6: 0.2 max. | | | | | |
| 14 | Durability | I.R. | More than $25\Omega \cdot F$ | Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. Measurement after test Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. | | | | |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding and wire bonding when tests No. 11 to 14 are performed.





Chip Monolithic Ceramic Capacitors



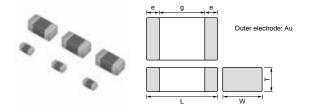
for Bonding GMD Series

■ Features

- 1. Small chip size (LxWxT: 0.6x0.3x0.3, 1.0x0.5x0.5mm)
- Available for Wire/Die bonding due to Gold termination.
- 3. Suitable for Optical device for telecommunication, built-in IC packaging.

■ Applications

- 1. Optical device for telecommunication
- 2. IC, built-in IC packaging



| Part Number | Dimensions (mm) | | | | | | | | |
|-------------|-----------------|----------|----------|--------------|--------|--|--|--|--|
| Part Number | L | W | T | е | g min. | | | | |
| GMD033 | 0.6±0.03 | 0.3±0.03 | 0.3±0.03 | 0.12 to 0.22 | 0.16 | | | | |
| GMD155 | 1.0±0.05 | 0.5±0.05 | 0.5±0.05 | 0.15 to 0.35 | 0.3 | | | | |

Capacitance Table

High Dielectric Constant Type X7R(R7)/X5R(R6) Characteristics

| 3 ex.3: T D | imension [mm | • | , , | , | ciensucs | | | |
|-----------------------|--------------|-------------------------|------|-------------|-------------------------|------|-------------------------|-------------------------|
| LxW | | 0.6x0.3 | | | 1.0x0.5 | | 0.6x0.3 | 1.0x0.5 |
| [mm] | | (03) <0201> | | | (15) <0402> | | (03) <0201> | (15) <0402> |
| Rated Voltage | 25 | 16 | 10 | 50 | 25 | 16 | 6.3 | 10 |
| Capacitance [Vdc] | (1E) | (1C) | (1A) | (1H) | (1E) | (1C) | (0J) | (1A) |
| 100pF(101) | 3 | | | 1 | | | 1 | |
| 120pF(121) | 3 | | | ! ! ! | | | ! ! ! | |
| 150pF(151) | 3 | | | | | | | |
| 180pF(181) | 3 | | | I I I | _ | | I I I | |
| 220pF(221) | 3 | | | 5 | | | | |
| 270pF(271) | 3 | | | 5 | | | ! ! ! | |
| 330pF(331) | 3 | | | 5 | | | ! ! | |
| 390pF(391) | 3 | | | 5 | | | | |
| 470pF(471) | 3 | | | 5 | | | | |
| 560pF(561) | 3 | | | 5 | | | | |
| 680pF(681) | 3 | | | 5 | | | | |
| 820pF(821) | 3 | | | 5 | | | ! ! ! | |
| 1000pF(102) | 3 | | | 5 | | | | |
| 1200pF(122) | 3 | | | 5 | | | | |
| 1500pF(152) | 3 | | | 5 | | | | |
| 1800pF(182) | | 3 | | 5 | | | 1 1 1 | |
| 2200pF(222) | | 3 | | 5 | | | | |
| 2700pF(272) | | 3 | | 5 | | | , | |
| 3300pF(332) | | 3 | | 5 | | | | |
| 3900pF(392) | | | 3 | 5 | | | | |
| 4700pF(472) | | | 3 | 5 | | | | |
| 5600pF(562) | | | 3 | | 5 | | ! ! ! | |
| 6800pF(682) | | | 3 | | 5 | | ! ! | |
| 8200pF(822) | | | 3 | | 5 | | , , L | |
| 10000pF(103) | | | 3 | | 5 | | | |
| 12000pF(123) | | | | 1 1 1 | 5 | | | |
| 15000pF(153) | | | | ! ! ! | 5 | | ! ! ! | |
| 18000pF(183) | | | | - | 5 | | | |
| 22000pF(223) | | | | 1 1 1 | 5 | | | |
| 27000pF(273) | | | | | 5 | | | |
| 33000pF(333) | | | | 1 1 1 | 5 | | | |
| 39000pF(393) | | | | ! ! ! | 5 | | ' | |
| 47000pF(473) | | | | | 5 | | | 1 |
| 56000pF(563) | | | | 1 1 1 | | 5 | 3 | |
| 68000pF(683) | | | | 1 1 1 | | 5 | 3 | |
| 82000pF(823) | | | | | | 5 | 3 | |
| 0.10μF(104) | | | | ! ! | | 5 | 3 | |
| 0.12μF(124) | | | | | | | | 5 |
| 0.15μF(154) | | | | 1 1 1 | | | | 5 |
| 0.18μF(184) | | | | 1 1 1 | | | 1 1 1 | 5 |
| 0.22μF(224) | | | | 1 1 1 | | | | 5 |
| 0.27μF(274) | | | | ! ! | | | | 5 |
| 0.33μF(334) | | | | | | | | 5 |
| 0.39μF(394) | | | | 1 1 1 | | | | 5 |
| 0.47μF(474) | | | | | | | I I | 5 |

The part number code is shown in () and Unit is shown in []. <>: EIA [inch] Code

High Dielectric Constant Type X7R(R7) Characteristics

| LxW [mm] | | 0.6x0.3(03)<0201> | | | | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|--|--|--|--|
| Rated Volt. [Vdc |] | 25(1E) | 16(1C) | 10(1A) | | | | |
| Capacitance | Tolerance | | Part Number | | | | | |
| 100pF(101) | ±10%(K) | GMD033R71E101KA01D | | | | | | |
| 120pF(121) | ±10%(K) | GMD033R71E121KA01D | | | | | | |
| 150pF(151) | ±10%(K) | GMD033R71E151KA01D | | | | | | |
| 180pF(181) | ±10%(K) | GMD033R71E181KA01D | | | | | | |
| 220pF(221) | ±10%(K) | GMD033R71E221KA01D | | | | | | |
| 270pF(271) | ±10%(K) | GMD033R71E271KA01D | | | | | | |
| 330pF(331) | ±10%(K) | GMD033R71E331KA01D | | | | | | |
| 390pF(391) | ±10%(K) | GMD033R71E391KA01D | | | | | | |
| 470pF(471) | ±10%(K) | GMD033R71E471KA01D | | | | | | |
| 560pF(561) | ±10%(K) | GMD033R71E561KA01D | | | | | | |
| 680pF(681) | ±10%(K) | GMD033R71E681KA01D | | | | | | |
| 820pF(821) | ±10%(K) | GMD033R71E821KA01D | | | | | | |
| 1000pF(102) | ±10%(K) | GMD033R71E102KA01D | | | | | | |
| 1200pF(122) | ±10%(K) | GMD033R71E122KA01D | | | | | | |
| 1500pF(152) | ±10%(K) | GMD033R71E152KA01D | | | | | | |
| 1800pF(182) | ±10%(K) | | GMD033R71C182KA11D | | | | | |
| 2200pF(222) | ±10%(K) | | GMD033R71C222KA11D | | | | | |
| 2700pF(272) | ±10%(K) | | GMD033R71C272KA11D | | | | | |
| 3300pF(332) | ±10%(K) | | GMD033R71C332KA11D | | | | | |
| 3900pF(392) | ±10%(K) | | | GMD033R71A392KA01D | | | | |
| 4700pF(472) | ±10%(K) | | | GMD033R71A472KA01D | | | | |
| 5600pF(562) | ±10%(K) | | | GMD033R71A562KA01D | | | | |
| 6800pF(682) | ±10%(K) | | | GMD033R71A682KA01D | | | | |
| 8200pF(822) | ±10%(K) | | | GMD033R71A822KA01D | | | | |
| 10000pF(103) | ±10%(K) | | | GMD033R71A103KA01D | | | | |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code







4Dimension (T)

Packaging Code in Part Number shows STD 180mm Reel Taping.



High Dielectric Constant Type X7R(R7) Characteristics

| LxW [mm] | | 1.0x0.5(15)<0402> | | | | | | |
|-----------------------|------------------|----------------------------|--------------------|--------------------|--|--|--|--|
| Rated Volt. [Vdc |] | 50(1H) | 25(1E) | 16(1C) | | | | |
| Capacitance | Tolerance | Part Number | | | | | | |
| 220pF(221) | ±10%(K) | GMD155R71H221KA01D | | | | | | |
| 270pF(271) | ±10%(K) | GMD155R71H271KA01D | | | | | | |
| 330pF(331) | ±10%(K) | GMD155R71H331KA01D | | | | | | |
| 390pF(391) | ±10%(K) | GMD155R71H391KA01D | | | | | | |
| 470pF(471) | ±10%(K) | GMD155R71H471KA01D | | | | | | |
| 560pF(561) | ±10%(K) | GMD155R71H561KA01D | | | | | | |
| 680pF(681) | ±10%(K) | GMD155R71H681KA01D | | | | | | |
| 820pF(821) | ±10%(K) | GMD155R71H821KA01D | | | | | | |
| 1000pF(102) | ±10%(K) | GMD155R71H102KA01D | | | | | | |
| 1200pF(122) | ±10%(K) | GMD155R71H122KA01D | | | | | | |
| 1500pF(152) | ±10%(K) | GMD155R71H152KA01D | | | | | | |
| 1800pF(182) | ±10%(K) | GMD155R71H182KA01D | | | | | | |
| 2200pF(222) | ±10%(K) | GMD155R71H222KA01D | | | | | | |
| 2700pF(272) | ±10%(K) | GMD155R71H272KA01D | | | | | | |
| 3300pF(332) | ±10%(K) | GMD155R71H332KA01D | | | | | | |
| 3900pF(392) | ±10%(K) | GMD155R71H392KA01D | | | | | | |
| 4700pF(472) | ±10%(K) | GMD155R71H472KA01D | | | | | | |
| 5600pF(562) | ±10%(K) | | GMD155R71E562KA01D | | | | | |
| 6800pF(682) | ±10%(K) | | GMD155R71E682KA01D | | | | | |
| 8200pF(822) | ±10%(K) | | GMD155R71E822KA01D | | | | | |
| 10000pF(103) | ±10%(K) | | GMD155R71E103KA01D | | | | | |
| 12000pF(123) | ±10%(K) | | GMD155R71E123KA01D | | | | | |
| 15000pF(153) | ±10%(K) | | GMD155R71E153KA01D | | | | | |
| 18000pF(183) | ±10%(K) | | GMD155R71E183KA01D | | | | | |
| 22000pF(223) | ±10%(K) | | GMD155R71E223KA01D | | | | | |
| 27000pF(273) | ±10%(K) | | GMD155R71E273KA11D | | | | | |
| 33000pF(333) | ±10%(K) | | GMD155R71E333KA11D | | | | | |
| 39000pF(393) | ±10%(K) | | GMD155R71E393KA11D | | | | | |
| 47000pF(473) | ±10%(K) | | GMD155R71E473KA11D | | | | | |
| 56000pF(563) | ±10%(K) | | | GMD155R71C563KA11D | | | | |
| 68000pF(683) | ±10%(K) | | | GMD155R71C683KA11D | | | | |
| 82000pF(823) | ±10%(K) | | | GMD155R71C823KA11D | | | | |
| 0.10μF(104) | ±10%(K) | | | GMD155R71C104KA11D | | | | |

The part number code is shown in () and Unit is shown in [].





High Dielectric Constant Type X5R(R6) Characteristics

| LxW [mm] | | 0.6x0.3(03)<0201> | 1.0x0.5(15)<0402> |
|-----------------------|------------------|----------------------------|----------------------------|
| Rated Volt. [Vdc |] | 6.3 (0J) | 10(1A) |
| Capacitance | Tolerance | Part N | umber |
| 56000pF(563) | ±10%(K) | GMD033R60J563KE11D* | |
| 68000pF(683) | ±10%(K) | GMD033R60J683KE11D* | |
| 82000pF(823) | ±10%(K) | GMD033R60J823KE11D* | |
| 0.10μF(104) | ±10%(K) | GMD033R60J104KE11D* | |
| 0.12μF(124) | ±10%(K) | | GMD155R61A124KE12D* |
| 0.15μF(154) | ±10%(K) | | GMD155R61A154KE12D* |
| 0.18μF(184) | ±10%(K) | | GMD155R61A184KE12D* |
| 0.22μF(224) | ±10%(K) | | GMD155R61A224KE12D* |
| 0.27μF(274) | ±10%(K) | | GMD155R61A274KE11D* |
| 0.33μF(334) | ±10%(K) | | GMD155R61A334KE11D* |
| 0.39μF(394) | ±10%(K) | _ | GMD155R61A394KE11D* |
| 0.47μF(474) | ±10%(K) | | GMD155R61A474KE11D* |

The part number code is shown in () and Unit is shown in []. < >: EIA [inch] Code



^{*} Please refer to GMD series Specifications and Test Method (2).

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GMD Series Specifications and Test Methods (1)

When no "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1).
When "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

| Vo. | Ite | m | Specifications | Test Method |
|-----|---|------------------------|---|---|
| 1 | Operating Temperat Range | | R7 : -55°C to 125°C | Reference Temperature : 25°C |
| 2 | Rated Vol | tage | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range. |
| 3 | Appearan | ce | No defects or abnormalities. | Visual inspection. |
| 4 | Dimensio | ns | Within the specified dimensions. | Using calipers. |
| 5 | Dielectric | Strength | No defects or abnormality. | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. |
| 6 | Insulation Resistance | | More than 10,000M Ω or 500 Ω · F (whichever is smaller) | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 2 minutes of charging. |
| 7 | Capacitar | nce | Within the specified tolerance. | The capacitance/D.F. should be measured at reference |
| 8 | Dissipation Factor (D. | | R7: W.V. 25Vmin.: 0.025 max. W.V. 16/10V: 0.035 max. | temperature at the frequency and voltage shown in the table. Frequency 1±0.1kHz Voltage 1±0.2Vrms |
| 9 | Capacitance Temperature Characteristics | No bias | R7 : Within ±15% (–55°C to +125°C) | each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* Step |
| 10 | Mechanical Strength | Bond Strength | Pull force : 0.03N min. | MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate wit Au-Sn (80/20) and bond a 25mm (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire |
| | Suengui | Die Shear Strength | Die Shear force : 2N min. | MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate. |
| | | Appearance | No defects or abnormalities. | B |
| | Vibration | Capacitance | Within the specified tolerance. | Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion. |
| 11 | Resistance | D.F. | R7: W.V. 25Vmin.: 0.025 max. W.V. 16/10V: 0.035 max. | Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours). |
| | | Appearance | No defects or abnormalities. | The capacitor should be set for 24±2 hours at room |
| | | Capacitance Change | R7 : Within ±7.5% | temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same |
| 12 | Temperature Cycle | D.F. | R7 : W.V. 25Vmin. : 0.025 max. W.V. 16/10V : 0.035 max. | conditions as (11) and conduct the five cycles according to the temperatures and time shown in the following table. Set it for 24±2 hours at room temperature, then measure. |
| | , . <u>.</u> | I.R. | More than 10,000M Ω or 500 Ω · F (whichever is smaller) | Step 1 2 3 4 Min. Room Max. Room Room |
| | | Dielectric Strength | No defects | Temp. (°C) Operating Temp. Operating Temp. +3/-0 Time (min.) 30+/-3 2 to 3 30+/-3 2 to 3 |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 15 are performed.

Continued on the following page. $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$

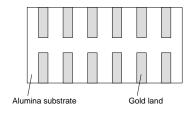




GMD Series Specifications and Test Methods (1)

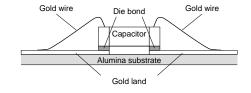
| \square | Continued fr | om the prec | | ease refer to GMD Series Specifications and Test Methods (1). ease refer to GMD Series Specifications and Test Methods (2). | | |
|-----------|-----------------------------|-----------------------|--|--|--|--|
| No. | o. Item | | Specifications | Test Method | | |
| | | Appearance | No defects or abnormalities. | | | |
| | | Capacitance Change | R7 : Within ±12.5% | Set the capacitor for 500±12 hours at 40±2°C, in 90 to 95% | | |
| 13 | Humidity (Steady State) | D.F. | R7: W.V. 25Vmin.: 0.05 max. W.V. 16/10V: 0.05 max. | humidity. Take it out and set it for 24±2 hours at room temperature, then measure. | | |
| | | I.R. | More than 1,000M Ω or $50\Omega \cdot F$ (whichever is smaller) | | | |
| | | Appearance | No defects or abnormalities. | | | |
| | | Capacitance Change | R7 : Within ±12.5% | Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to | | |
| 14 | Humidity Load | D.F. | R7 : W.V. 25Vmin. : 0.05 max. W.V. 16/10V : 0.05 max. | 95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. | | |
| | | I.R. | More than 500M Ω or 25 Ω · F (whichever is smaller) | | | |
| | | Appearance | No defects or abnormalities. | A voltage treatment should be given to the capacitor, in which a | | |
| | Lliah | Capacitance Change | R7 : Within ±12.5% | DC voltage of 200% the rated voltage is applied for one hour at the maximum operating temperature; ±3°C then it should be set for 24±2 hours at room temperature and the initial measurement | | |
| 15 | High Temperature Load | D.F. | R7: W.V. 25Vmin.: 0.05 max. W.V. 16/10V: 0.05 max. | should be conducted. Then apply the above-mentioned voltage continuously for 1000±12 hours at the same temperature, remove it from the | | |
| | | LR. | More than 1,000M Ω or 50 Ω · F | bath, and set it for 24±2 hours at room temperature, then | | |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 15 are performed.



(whichever is smaller)

I.R.



measure. The charge/discharge current is less than 50mA.

GMD Series Specifications and Test Methods (2)

When no "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). When "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2).

| No. | Ite | m | Specifications | Test Method | | |
|-----|---|---|-----------------------------------|--|--|--|
| 1 | Operating Temperat Range | | R6 : –55°C to 85°C | Reference Temperature : 25°C | | |
| 2 | Rated Voltage | | See the previous pages. | The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V ^{P-P} or V ^{O-P} , whichever is larger, should be maintained within the rated voltage range. | | |
| 3 | Appearan | се | No defects or abnormalities. | Visual inspection. | | |
| 4 | Dimension | ns | Within the specified dimensions. | Using calipers. | | |
| 5 | Dielectric | Strength | No defects or abnormalities. | No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA. | | |
| 6 | Insulation Resistance | | More than $50\Omega \cdot F$ | The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at normal temperature and humidity and within 1 minutes of charging. | | |
| 7 | Capacitar | nce | Within the specified tolerance. | The capacitance/D.F. should be measured at reference | | |
| 8 | Dissipation Factor (D. | | R6 : 0.1 max. | temperature at the frequency and voltage shown in the table. | | |
| 9 | Capacitance Temperature Characteristics | | R6 : Within ±15% (–55°C to +85°C) | each specified temp. stage. The ranges of capacitance change compared with the Reference Temperature value over the temperature ranges shown in the table should be within the specified ranges.* Step | | |
| 10 | Mechanical | echanical rength Bond Strength Pull force : 0.03N min. Mount the cap Au-Sn (80/20) capacitor term Die Shear Strength Die Shear force : 2N min. MilL-STD-883 Mount the cap | | MIL-STD-883 Method 2011 Condition D Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20) and bond a 25 μ m (0.001 inch) gold wire to the capacitor terminal using an ultrasonic ball bond. Then, pull wire. | | |
| | Strength | | | MIL-STD-883 Method 2019 Mount the capacitor on a gold metallized alumina substrate with Au-Sn (80/20). Apply the force parallel to the substrate. | | |
| | | Appearance | No defects or abnormalities. | | | |
| | Vibration | Capacitance | Within the specified tolerance. | Ramp frequency from 10 to 55Hz then return to 10Hz all within 1 minute. Amplitude: 1.5 mm (0.06 inch) max. total excursion. | | |
| 11 | Resistance | D.F. | R6 : 0.1 max. | Apply this motion for a period of 2 hours in each of 3 mutually perpendicular directions (total 6 hours). | | |
| | | Appearance | No defects or abnormalities. | The capacitor should be set for 24±2 hours at room | | |
| | | Capacitance Change | R6 : Within ±7.5% | temperature after one hour of heat treatment at 150+0/–10°C, then measure for the initial measurement. Fix the capacitor to the supporting jig in the same manner and under the same | | |
| | | D.F. | R6: 0.1 max. | conditions as (11) and conduct the five cycles according to the | | |
| 12 | Temperature | I.R. | More than $50\Omega \cdot F$ | temperatures and time shown in the following table. Set it for | | |
| 12 | Sudden . Change | | | 24±2 hours at room temperature, then measure. | | |
| | J | Dielectric Strength | No defects | Step 1 2 3 4 Temp. (°C) Min. Operating Temp. +0/-3 Room Temp. Operating Temp. +3/-0 Room Temp. Tem | | |

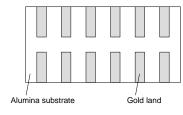
Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 14 are performed.

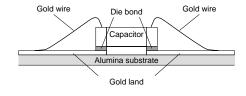




| \Box | When no "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (1). Continued from the preceding page. When "*" is added in PNs table, please refer to GMD Series Specifications and Test Methods (2). | | | | | | | | | |
|--------|---|-----------------------|--------------------------------|---|--|--|--|--|--|--|
| No. | Ite | m | Specifications | Test Method | | | | | | |
| | | Appearance | No defects or abnormalities. | Apply the rated voltage for 500±12 hours at 40±2°C, in 90 to | | | | | | |
| | | Capacitance Change | R6 : Within ±12.5% | 1 95% humidity and set it for 24±2 hours at room temperature, then measure. The charge/discharge current is less than 50mA. | | | | | | |
| | High | D.F. | R6: 0.2 max. | | | | | | | |
| 13 | Temperature High Humidity (Steady) | I.R. | More than $12.5\Omega \cdot F$ | • Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. | | | | | | |
| | | | | Measurement after test Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. | | | | | | |
| | | Appearance | No defects or abnormalities. | Apply 150%*2 of the rated voltage for 1000±12 hours at the | | | | | | |
| | | Capacitance Change | R6 : Within ±12.5% | maximum operating temperature ±3°C. Let sit for 24±2 hours at room temperature, then measure. The charge/ discharge current is less than 50mA. | | | | | | |
| | | D.F. | R6: 0.2 max. | The charge, discharge current is less than comm. | | | | | | |
| 14 | Durability | I.R. | More than $25\Omega \cdot F$ | *2 GMD155 R6 1A 274 to 474 are applied to 120%. • Initial measurement Perform a heat treatment at 150+0/–10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. • Measurement after test | | | | | | |

Mounting for testing: The capacitors should be mounted on the substrate as shown below using die bonding. when tests No. 11 to 14 are performed.





Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure.

■ Minimum Quantity Guide

| ■ Minimum C | | | | | | | Quanti | ty (pcs.) | | |
|----------------------------|----------------|------------|---------|-----------------------------|-------------------------|----------------|------------------|------------------|----------------------|----------------------|
| Part Number Packaging Code | | Dime | ensions | (mm) | ø180mm Reel ø330mm Reel | | | | | |
| | | L | W | Т | Paper Tape | Embossed Tape | Paper Tape | Embossed Tape | Bulk Case | Bulk Bag |
| | | | | | D | L | J | К | С | Bulk : B Tray : T |
| | GRM02 | 0.4 | 0.2 | 0.2 | - | 40,000 1) | - | - | - | 1,000 |
| | GRM03 | 0.6 | 0.3 | 0.3 | 15,000 | - | 50,000 | - | - | 1,000 |
| | GRM15 | 1.0 | 0.5 | 0.25/0.3 | 10,000 | - | 50,000 | - | - | 1,000 |
| | | 1.0 | 0.5 | 0.5 | 10,000 | - | 50,000 | - | 50,000 2) | 1,000 |
| | GRM18 | 1.6 | 0.8 | 0.5 | 4,000 | - | 10,000 | - | - | 1,000 |
| | | | | 0.8 | 4,000 | - | 10,000 | - | 15,000 ²⁾ | 1,000 |
| | GRM21 | 2.0 | 1.25 | 0.6 0.85 | 4,000 | - | 10,000 | - | 10,000 | 1,000 |
| | GRIVIZI | 2.0 | 1.23 | 1.0/1.25 | 4,000 | 3,000 | 10,000 | 10,000 | 5,000 2) | 1,000 1,000 |
| - | | | | 0.6/0.85 | 4,000 | - | 10,000 | - | - | 1,000 |
| | GRM31 | 3.2 | 1.6 | 1.15 | -,000 | 3,000 | - | 10,000 | - | 1,000 |
| For General | | | | 1.6 | - | 2,000 | - | 6,000 | - | 1,000 |
| Purpose | | | | 0.85 | 4,000 | - | 10,000 | - | - | 1,000 |
| | | | | 1.15 | - | 3,000 | - | 10,000 | - | 1,000 |
| | GRM32 | 3.2 | 2.5 | 1.35 | - | 2,000 | - | 8,000 | - | 1,000 |
| | | | | 1.6 | - | 2,000 | - | 6,000 | - | 1,000 |
| | | | | 1.8/2.0 2.5 | - | 1,000 | - | 4,000 | - | 1,000 |
| | | | | 1.15 | - | 1,000 | - | 5,000 | - | 1,000 |
| | GRM43 | 5.7 | 3.2 | 1.35/1.6 1.8/2.0 | - | 1,000 | - | 4,000 | - | 1,000 |
| | | | | 2.5 | - | 500 | - | 2,000 | - | 1,000 |
| - | | | | 2.8 1.15 | - | 500 1,000 | - | 1,500 5,000 | - | 500 1,000 |
| | | | | 1.13 1.35/1.6 1.8/2.0 | <u> </u> | 1,000 | | 4,000 | | 1,000 |
| | GRM55 | | 5.0 | 2.5 | <u> </u> | 500 | <u> </u> | 2,000 | | 500 |
| | | | | 3.2 | - | 300 | - | 1,500 | - | 500 |
| | GJM03 | 0.6 | 0.3 | 0.3 | 15,000 | - | 50,000 | - | - | 1,000 |
| High Power Type | GJM15 | 1.0 | 0.5 | 0.5 | 10,000 | - | 50,000 | - | 50,000 | 1,000 |
| | GQM18 | 1.6 | 0.8 | 0.7/0.8 | 4,000 | - | 10,000 | - | - | 1,000 |
| ligh Frequency | GQM21 | 2.0 | 1.25 | 0.85 | 4,000 | - | 10,000 | - | - | 1,000 |
| | GQM22 | 2.8 | 2.8 | 1.15 | - | 1,000 | - | 4,000 | - | 1,000 |
| | GMA0D | 0.38 | 0.38 | 0.3 | - | - | - | - | - | 400 3) |
| | GMA05 | 0.5 | 0.5 | 0.35 | - | - | - | - | - | 400 3) |
| Microchip | GMA08 | 0.8 | 0.8 | 0.5 | - | - | - | - | - | 400 3) |
| | GMD03 GMD15 | 0.6 1.0 | 0.3 | 0.3 | 15,000 10,000 | - | 50,000 50,000 | - | - | 1,000 1,000 |
| | GNM0M | 0.9 | 0.6 | 0.5 | 10,000 | - | 50,000 | - | - | 1,000 |
| | GNM1M | 1.37 | 1.0 | 0.5/0.6/0.8 | 4,000 | - | 10,000 | - | | 1,000 |
| Array | GNM21 | 2.0 | 1.25 | 0.5/0.6/0.85 | 4,000 | - | 10,000 | - | - | 1,000 |
| , | | | | 0.8/0.85 | 4,000 | - | 10,000 | - | - | 1,000 |
| | GNM31 | 3.2 | 1.6 | 1.0/1.15 | - | 3,000 | - | 10,000 | - | 1,000 |
| | LLL15 | 0.5 | 1.0 | 0.3 | 10,000 4) | - | 50,000 4) | - | - | 1,000 |
| | LLL18/LLR18 | 0.8 | 1.6 | 0.5 | - | 4,000 | - | 10,000 | - | 1,000 |
| | LLL21 | 1.25 | 2.0 | 0.5/0.6 | - | 4,000 | - | 10,000 | - | 1,000 |
| | | 1.20 | 2.0 | 0.85 | - | 3,000 | - | 10,000 | - | 1,000 |
| | LLL31 | 1.6 | 3.2 | 0.5/0.7 | - | 4,000 | - | 10,000 | - | 1,000 |
| | | | | 1.15 | - | 3,000 | - | 10,000 | - | 1,000 |
| Low ESL | LLA18 | 1.6 | 0.8 | 0.5 | - | 4,000 | - | 10,000 | - | 1,000 |
| | LLA21 | 2.0 | 1.25 | 0.5 | - | 4,000 | - | 10,000 | - | 1,000 |
| | | | | 0.85 0.5 | - | 3,000 | - | 10,000 10,000 | - | 1,000 |
| | LLA31 | 3.2 | 1.6 | 0.5 | <u>-</u> | 4,000 3,000 | <u>-</u> | 10,000 | - | 1,000 |
| | LLAJI | 5.2 | 1.0 | 1.15 | <u> </u> | 3,000 | <u> </u> | 10,000 | - | 1,000 |
| | LLM21 | 2.0 | 1.25 | 0.5 | <u> </u> | 4,000 | <u> </u> | 10,000 | - | 1,000 |
| | LLM31 | 3.2 | 1.6 | 0.5 | - | 4,000 | - | 10,000 | - | 1,000 |

^{1) 4}mm width, 1mm pitch Embossed Taping.





²⁾ There are parts without bulk case package.

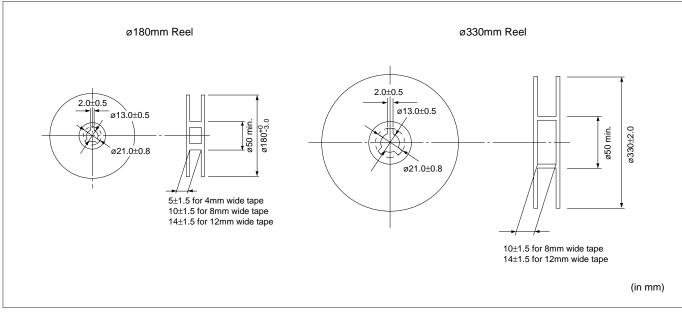
³⁾ Tray

⁴⁾ LLL15: ø180mm Reel Paper Taping Packaging Code: E, ø330mm Reel Paper Taping Packaging Code: F

Continued from the preceding page.

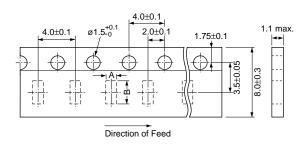
■ Tape Carrier Packaging

(1) Dimensions of Reel



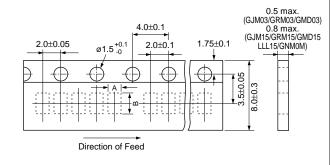
(2) Dimensions of Paper Tape

8mm width, 4mm pitch Tape



| Part Number | Α | В | |
|---|-----------|-----------|--|
| GRM18 GQM18 | 1.05±0.1 | 1.85±0.1 | |
| GNM1M | 1.17±0.05 | 1.55±0.05 | |
| GRM21 (T≦0.85mm) GQM21 GNM21 | 1.55±0.15 | 2.3±0.15 | |
| GRM31 (T≦0.85mm) GNM31 (T≦0.8mm) | 2.0±0.2 | 3.6±0.2 | |
| GRM32 (T≦0.85mm) | 2.8±0.2 | 3.6±0.2 | |

8mm width, 2mm pitch Tape



| Part Number | A* | B* |
|----------------------------------|------|------|
| GJM03 GRM03 GMD03 | 0.37 | 0.67 |
| GJM15 GRM15 GMD15 LLL15 | 0.65 | 1.15 |
| GNM0M | 0.72 | 1.02 |

*Nominal Value

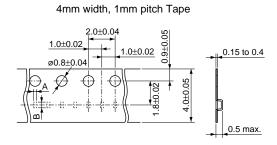


(in mm)



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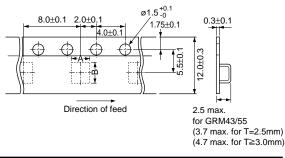
(3) Dimensions of Embossed Tape



| Part Number | A* | B* |
|-------------|------|------|
| GRM02 | 0.23 | 0.43 |

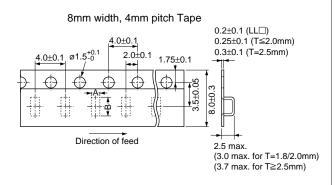
*Nominal Value

12mm width, 8mm pitch Tape



| Part Number | A* | B* |
|-------------|-----|-----|
| GRM43 | 3.6 | 4.9 |
| GRM55 | 5.2 | 6.1 |

*Nominal Value



| Part Number | А | В |
|--|----------|----------|
| LLL18, LLR18 LLA18 | 1.05±0.1 | 1.85±0.1 |
| GRM21 (T≥1.0mm) LLL21 LLA21, LLM21 | 1.45±0.2 | 2.25±0.2 |
| GRM31 (T≥1.15mm) LLL31 LLA31, LLM31 GNM31 (T≥1.0mm) | 1.9±0.2 | 3.5±0.2 |
| GRM32 (T≧1.0mm) | 2.8±0.2 | 3.5±0.2 |
| GQM22 | 2.8* | 3.5* |

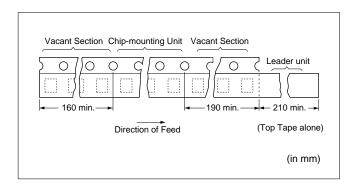
*Nominal Value

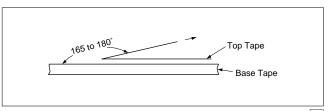
(in mm)

(4) Taping Method

- ① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- ② Part of the leader and part of the empty tape should be attached to the end of the tape as follows.
- ③ The top tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- 4 Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
- (5) The top tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
- ⑥ Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
- The peeling off force: 0.1 to 0.6N* in the direction shown at right.
 *GRM02 GRM03 CIMO3
 : 0.05 to 0.5N

GJM03 GMD03

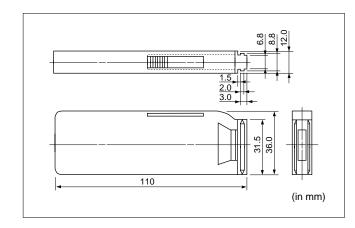






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■ Dimensions of Bulk Case Packaging The bulk case uses antistatic materials. Please contact Murata for details.



■ Storage and Operation conditions

- 1. The performance of chip monolithic ceramic capacitors may be affected by the storage conditions.
 - 1-1. Store capacitors in the following conditions: Temperature of +5°C to +40°C and a Relative Humidity of 20% to 70%.
 - (1) Sunlight, dust, rapid temperature changes, corrosive gas atmosphere or high temperature and humidity conditions during storage may affect the solderability and the packaging performance. Please use product within six months of receipt.
 - (2) Please confirm solderability before using after six months. Store the capacitors without opening the original bag. Even if the storage period is short, do not exceed the specified atmospheric conditions.
- 1-2. Corrosive gas can react with the termination (external) electrodes or lead wires of capacitors, and result in poor solderability. Do not store the capacitors in an atmosphere consisting of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.).
- 1-3. Due to moisture condensation caused by rapid humidity changes, or the photochemical change caused by direct sunlight on the terminal electrodes and/or the resin/epoxy coatings, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or in high humidity conditions.



■ Rating

- 1. Temperature Dependent Characteristics
- 1. The electrical characteristics of the capacitor can change with temperature.
 - 1-1. For capacitors having larger temperature dependency, the capacitance may change with temperature changes.

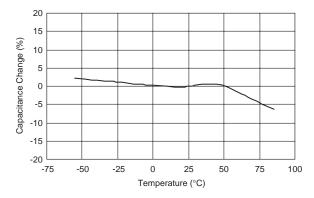
The following actions are recommended in order to ensure suitable capacitance values.

(1) Select a suitable capacitance for the operating temperature range.

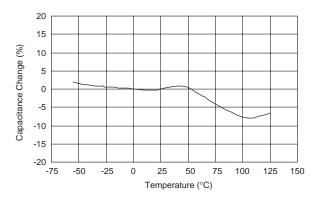
(2) The capacitance may change within the rated temperature.

When you use a high dielectric constant type capacitor in a circuit that needs a tight (narrow) capacitance tolerance. (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. And check capacitors using your actual appliances at the intended environment and operating conditions.

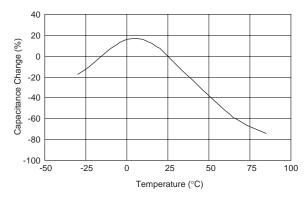
Typical Temperature Characteristics R6(X5R)



Typical Temperature Characteristics R7(X7R)



Typical Temperature Characteristics F5(Y5V)



- 2. Measurement of Capacitance
- 1. Measure capacitance with the voltage and the frequency specified in the product specifications.
 - 1-1. The output voltage of the measuring equipment may decrease occasionally when capacitance is high. Please confirm whether a prescribed measured voltage is impressed to the capacitor.
 - 1-2. The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied. Please consider the AC voltage characteristics when selecting a capacitor to be used in an AC circuit.





- Continued from the preceding page.
- 3. Applied Voltage
- 1. Do not apply a voltage to the capacitor that exceeds the rated voltage as called out in the specifications.
 - 1-1. Applied voltage between the terminals of a capacitor shall be less than or equal to the rated voltage.
 - (1) When AC voltage is superimposed on DC voltage, the zero-to-peak voltage shall not exceed the rated DC voltage.

When AC voltage or pulse voltage is applied, the peak-to-peak voltage shall not exceed the rated

(2) Abnormal voltages (surge voltage, static electricity, pulse voltage, etc.) shall not exceed the rated DC voltage.

Typical Voltage Applied to the DC Capacitor

| DC Voltage | DC Voltage+AC | AC Voltage | Pulse Voltage |
|------------|---------------|------------|---------------|
| E | E O | 0 | E |

(E: Maximum possible applied voltage.)

1-2. Influence of overvoltage

Overvoltage that is applied to the capacitor may result in an electrical short circuit caused by the breakdown of the internal dielectric layers. The time duration until breakdown depends on the applied voltage and the ambient temperature.

- 4. Applied Voltage and Self-heating Temperature
- 1. When the capacitor is used in a high-frequency voltage, pulse voltage, application, be sure to take into account self-heating may be caused by resistant factors of the capacitor.
 - 1-1. The load should be contained to the level such that when measuring at atmospheric temperature of 25°C, the product's self-heating remains below 20°C and surface temperature of the capacitor in the actual circuit remains within the maximum operating temperature.



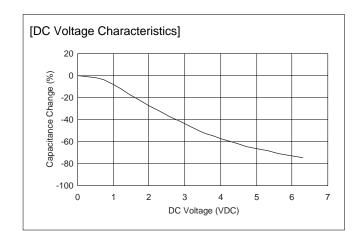


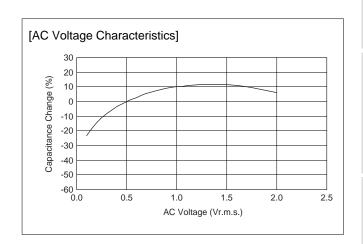
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- 5. DC Voltage and AC Voltage Characteristics
- The capacitance value of a high dielectric constant type capacitor changes depending on the DC voltage applied.
 Please consider the DC voltage characteristics when a capacitor is selected for use in a DC circuit.
 - 1-1. The capacitance of ceramic capacitors may change sharply depending on the applied voltage (see figure).

Please confirm the following in order to secure the capacitance.

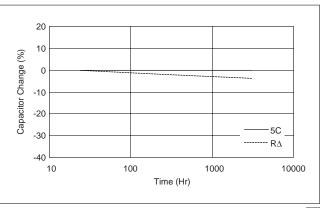
- (1) Whether the capacitance change caused by the applied voltage is within the range allowed or not.
- (2) In the DC voltage characteristics, the rate of capacitance change becomes larger as voltage increases, even if the applied voltage is below the rated voltage. When a high dielectric constant type capacitor is in a circuit that needs a tight (narrow) capacitance tolerance (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. In addition, check capacitors using your actual appliances at the intended environment and operating conditions.
- The capacitance values of high dielectric constant type capacitors change depending on the AC voltage applied.
 Please consider the AC voltage characteristics when selecting a capacitor to be used in an AC circuit.





- 6. Capacitance Aging
- The high dielectric constant type capacitors have the characteristic in which the capacitance value decreases with passage of time.

When you use a high dielectric constant type capacitors in a circuit that needs a tight (narrow) capacitance tolerance (e. g., a time constant circuit), please carefully consider the characteristics of these capacitors, such as their aging, voltage, and temperature characteristics. In addition, check capacitors using your actual appliances at the intended environment and operating conditions.

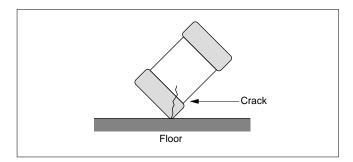


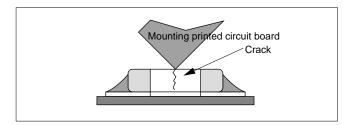


Continued from the preceding page.

7. Vibration and Shock

- 1. The capacitor's mechanical stress (vibration and shock) shall be specified for the use environment. Please confirm the kind of vibration and/or shock, its condition, and any generation of resonance. Please mount the capacitor so as not to generate resonance, and do not allow any impact on the terminals.
- 2. Mechanical shock due to being dropped may cause damage or a crack in the dielectric material of the capacitor.
 - Do not use a dropped capacitor because the quality and reliability may be deteriorated.
- 3. When printed circuit boards are piled up or handled, the corners of another printed circuit board should not be allowed to hit the capacitor, in order to avoid a crack or other damage to the capacitor.



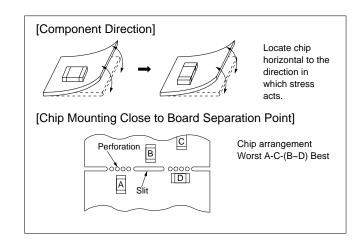




■ Soldering and Mounting

1. Mounting Position

- 1. Confirm the best mounting position and direction that minimizes the stress imposed on the capacitor during flexing or bending the printed circuit board.
 - 1-1. Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

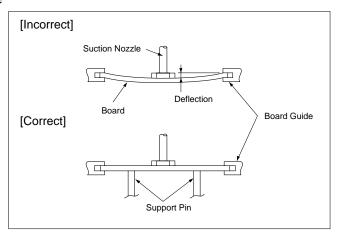


2. Information before Mounting

- 1. Do not reuse capacitors that were removed from the equipment.
- 2. Confirm capacitance characteristics under actual applied
- 3. Confirm the mechanical stress under actual process and equipment use.
- 4. Confirm the rated capacitance, rated voltage and other electrical characteristics before assembly.
- 5. Prior to use, confirm the solderability of capacitors that were in long-term storage.
- 6. Prior to measuring capacitance, carry out a heat treatment for capacitors that were in long-term storage.
- 7. The use of Sn-Zn based solder will deteriorate the reliability of the MLCC.
 - Please contact our sales representative or product engineers on the use of Sn-Zn based solder in advance.

3. Maintenance of the Mounting (pick and place) Machine

- 1. Make sure that the following excessive forces are not applied to the capacitors.
 - 1-1. In mounting the capacitors on the printed circuit board, any bending force against them shall be kept to a minimum to prevent them from any bending damage or cracking. Please take into account the following precautions and recommendations for use in your process.
 - (1) Adjust the lowest position of the pickup nozzle so as not to bend the printed circuit board.
 - (2) Adjust the nozzle pressure within a static load of 1N to 3N during mounting.
- 2. Dirt particles and dust accumulated between the suction nozzle and the cylinder inner wall prevent the nozzle from moving smoothly. This imposes greater force upon the chip during mounting, causing cracked chips. Also the locating claw, when worn out, imposes uneven forces on the chip when positioning, causing cracked chips. The suction nozzle and the locating claw must be maintained, checked and replaced periodically.







∆Caution

Continued from the preceding page.

4-1. Reflow Soldering

- 1. When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions are shown in table 1. It is required to keep the temperature differential between the solder and the component's surface (ΔT) as small as possible.
- 2. Solderability of Tin plating termination chips might be deteriorated when a low temperature soldering profile where the peak solder temperature is below the melting point of Tin is used. Please confirm the Solderability of Tin plated termination chips before use.
- 3. When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and the solvent within the range shown in the table 1.

Table 1

| Part Number | Temperature Differential |
|----------------------|--------------------------|
| GRM02/03/15/18/21/31 | |
| GJM03/15 | |
| LLL15/18/21/31 | ΔT≦190°C |
| LLR18 | |
| GQM18/21 | |
| GRM32/43/55 | |
| LLA18/21/31 | |
| LLM21/31 | ΔT≦130°C |
| GNM | |
| GQM22 | |

Recommended Conditions

| | Pb-Sn S | Lead Free Solder | | |
|------------------|-----------------|------------------|------------------|--|
| | Infrared Reflow | Vapor Reflow | Leau Free Solder | |
| Peak Temperature | 230 to 250°C | 230 to 240°C | 240 to 260°C | |
| Atmosphere | Air | Air | Air or N2 | |

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

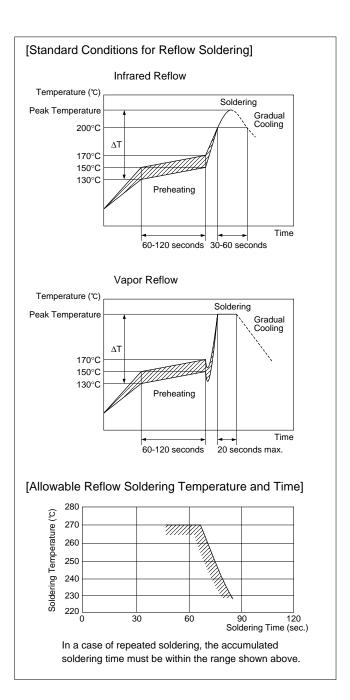
- 4. Optimum Solder Amount for Reflow Soldering
 - 4-1. Overly thick application of solder paste results in a excessive solder fillet height.

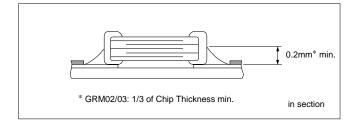
This makes the chip more susceptible to mechanical and thermal stress on the board and may cause the chips to crack.

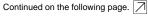
- 4-2. Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- 4-3. Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm* min.

Inverting the PCB

Make sure not to impose any abnormal mechanical shocks to the PCB.









Continued from the preceding page.

4-2. Flow Soldering

- When sudden heat is applied to the components, the mechanical strength of the components will decrease because a sudden temperature change causes deformation inside the components. In order to prevent mechanical damage in the components, preheating should be required for both of the components and the PCB board.
 - Preheating conditions are shown in table 2. It is required to keep the temperature differential between the solder and the component's surface (ΔT) as small as possible.
- Excessively long soldering time or high soldering temperature can result in leaching of the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and solvent within the range shown in the table 2.
- 4. Do not apply flow soldering to chips not listed in table 2.

Table 2

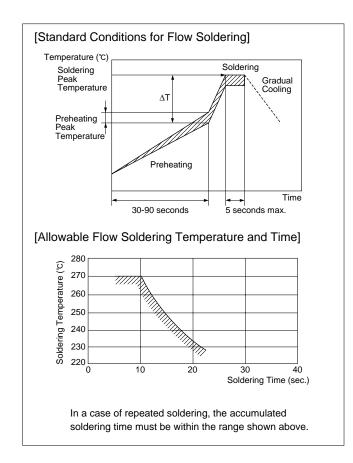
| Part Number | Temperature Differential |
|-------------|--------------------------|
| GRM18/21/31 | |
| LLL21/31 | ΔT≦150°C |
| GQM18/21 | |

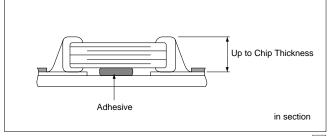
Recommended Conditions

| | Pb-Sn Solder | Lead Free Solder |
|-----------------------------|--------------|------------------|
| Preheating Peak Temperature | 90 to 110°C | 100 to 120°C |
| Soldering Peak Temperature | 240 to 250°C | 250 to 260°C |
| Atmosphere | Air | N2 |

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

- 5. Optimum Solder Amount for Flow Soldering
 - 5-1. The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessive, the risk of cracking is higher during board bending or any other stressful condition.







∆Caution

Continued from the preceding page.

4-3. Correction with a Soldering Iron

- 1. When sudden heat is applied to the components when using a soldering iron, the mechanical strength of the components will decrease because the extreme temperature change can cause deformations inside the components. In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board. Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature," "Temperature Differential" between the iron tip and the components and the PCB), should be within the conditions of table 3. It is required to keep the temperature differential between the soldering iron and the component surfaces (ΔT) as small as possible.
- 2. After soldering, do not allow the component/PCB to rapidly cool down.
- 3. The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, in turn causing a reduction in the adhesive strength of the terminations.
- 4. Optimum Solder amount when re-working with a Soldering Iron
 - 4-1. For sizes smaller than 0603, (GRM03/15/18, GJM03/15, GQM18), the top of the solder fillet should be lower than 2/3's of the thickness of the component or 0.5mm whichever is smaller. For 0805 and larger sizes, (GRM21/31/32/43/55, GQM21/22), the top of the solder fillet should be lower than 2/3's of the thickness of the component. If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful condition.
 - 4-2. A soldering iron with a tip of ø3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the
 - 4-3. Solder wire with Ø0.5mm or smaller is required for soldering.

4-4. Leaded Component Insertion

1. If the PCB is flexed when leaded components (such as transformers and ICs) are being mounted, chips may crack and solder joints may break. Before mounting leaded components, support the PCB using backup pins or special jigs to prevent warping.

5. Washing

Excessive ultrasonic oscillation during cleaning can cause the PCBs to resonate, resulting in cracked chips or broken solder joints. Take note not to vibrate PCBs.

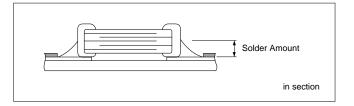
Table 3

| Part Number | Temperature of Soldering Iron Tip | Preheating Temperature | Temperature Differential (∆T) | Atmosphere |
|-------------------|-----------------------------------|---------------------------|-------------------------------------|------------|
| GRM03/15/18/21/31 | | | | |
| GJM03/15 | 350°C max. | 150°C min. | ΔT≦190°C | Air |
| GQM18/21 | | | | |
| GRM32/43/55 | 280°C max. | 150°C min | AT<120°C | Air |
| GQM22 | ZOU C Max. | 150 C IIIII. | Δ1≥130°C | All |

*Applicable for both Pb-Sn and Lead Free Solder.

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu









△Caution

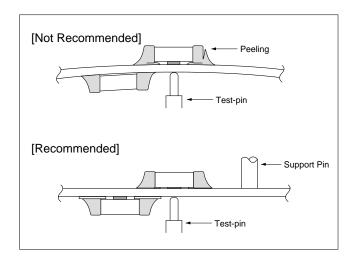
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6. Electrical Test on Printed Circuit Board

- Confirm position of the support pin or specific jig, when inspecting the electrical performance of a capacitor after mounting on the printed circuit board.
 - 1-1. Avoid bending printed circuit board by the pressure of a test pin, etc.

The thrusting force of the test probe can flex the PCB, resulting in cracked chips or open solder joints. Provide support pins on the back side of the PCB to prevent warping or flexing.

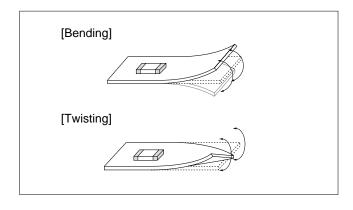
1-2. Avoid vibration of the board by shock when a test pin contacts a printed circuit board.



7. Printed Circuit Board Cropping

- After mounting a capacitor on a printed circuit board, do not apply any stress to the capacitor that is caused by bending or twisting the board.
 - 1-1. In cropping the board, the stress as shown right may cause the capacitor to crack.

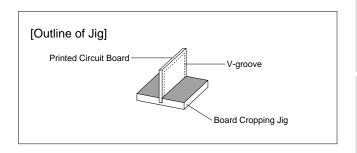
Try not to apply this type of stress to a capacitor.

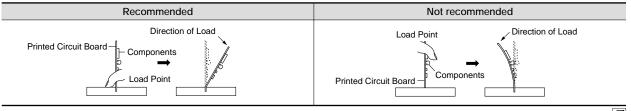


- 2. Ascertain of the cropping method for the printed circuit board in advance.
 - 2-1. Printed circuit board cropping shall be carried out by using a jig or an apparatus to prevent the mechanical stress that can occur to the board.
 - (1) Example of a suitable jig

Recommended example: the board should be pushed as close to the cropping jig as possible and from the back side of board in order to minimize the compressive stress applied to capacitor.

Not recommended example: when the board is pushed at a point far from the cropping jig and from the front side of board as below, the capacitor may form a crack caused by the tensile stress applied to capacitor.





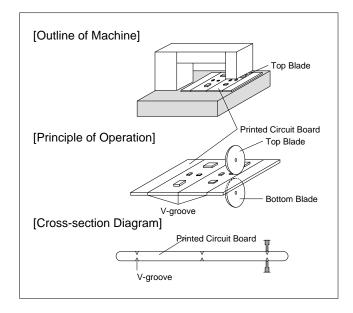


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(2) Example of a suitable machine

An outline of a printed circuit board cropping machine is shown as follows. Along the lines with the V-grooves on the printed circuit board, the top and bottom blades are aligned to one another when cropping the board.

The misalignment of the position between top and bottom blades may cause the capacitor to crack.



| Recommended | Not Recommended | | | |
|--------------|---|--------------|-------------------------|--|
| Recommended | Top-bottom Misalignment Left-right Misalignment | | Front-rear Misalignment | |
| Top Blade | Top Blade | Top Blade | Top Blade | |
| Bottom Blade | Bottom Blade | Bottom Blade | Bottom Blade | |

⚠Caution

■ Others

- 1. Under Operation of Equipment
 - 1-1. Do not touch a capacitor directly with bare hands during operation in order to avoid the danger of an electric shock.
 - 1-2. Do not allow the terminals of a capacitor to come in contact with any conductive objects (short-circuit). Do not expose a capacitor to a conductive liquid, including any acid or alkali solutions.
 - 1-3. Confirm the environment in which the equipment will operate is under the specified conditions. Do not use the equipment under the following environments.
 - (1) Being spattered with water or oil.
 - (2) Being exposed to direct sunlight.
 - (3) Being exposed to Ozone, ultraviolet rays or radiation.
 - (4) Being exposed to toxic gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas, etc.)
 - (5) Any vibrations or mechanical shocks exceeding the specified limits.
 - (6) Moisture condensing environments.
 - 1-4. Use damp proof countermeasures if using under any conditions that can cause condensation.

2. Others

- 2-1. In an Emergency
 - (1) If the equipment should generate smoke, fire or smell, immediately turn off or unplug the equipment.

- If the equipment is not turned off or unplugged, the hazards may be worsened by supplying continuous power.
- (2) In this type of situation, do not allow face and hands to come in contact with the capacitor or burns may be caused by the capacitor's high temperature.
- 2-2. Disposal of Waste

When capacitors are disposed, they must be burned or buried by an industrial waste vendor with the appropriate licenses.

2-3. Circuit Design GRM, GCM, GMA/D, LLL/A/M, GQM, GJM, GNM Series capacitors in this catalog are not safety certified products.

2-4. Remarks

Failure to follow the cautions may result, worst case, in a short circuit and smoking when the product is used.

The above notices are for standard applications and conditions. Contact us when the products are used in special mounting conditions.

Select optimum conditions for operation as they determine the reliability of the product after assembly. The data herein are given in typical values, not guaranteed ratings.



Rating

- 1. Operating Temperature
 - 1. The operating temperature limit depends on the
 - 1-1. Do not apply temperatures exceeding the upper operating temperature.
 - It is necessary to select a capacitor with a suitable rated temperature that will cover the operating temperature range.
 - Also it is necessary to consider the temperature distribution in equipment and the seasonal temperature variable factor.
 - 1-2. Consider the self-heating of the capacitor. The surface temperature of the capacitor shall be the upper operating temperature or less when including the self-heating factors.
- 2. Atmosphere Surroundings (gaseous and liquid)
 - 1. Restriction on the operating environment of capacitors.
 - 1-1. Capacitors, when used in the above, unsuitable, operating environments may deteriorate due to the corrosion of the terminations and the penetration of moisture into the capacitor.

- 1-2. The same phenomenon as the above may occur when the electrodes or terminals of the capacitor are subject to moisture condensation.
- 1-3. The deterioration of characteristics and insulation resistance due to the oxidization or corrosion of terminal electrodes may result in breakdown when the capacitor is exposed to corrosive or volatile gases or solvents for long periods of time.
- 3. Piezo-electric Phenomenon
- 1. When using high dielectric constant type capacitors in AC or pulse circuits, the capacitor itself vibrates at specific frequencies and noise may be generated. Moreover, when the mechanical vibration or shock is added to the capacitor, noise may occur.



■ Soldering and Mounting

1. PCB Design

- 1. Notice for Pattern Forms
 - 1-1. Unlike leaded components, chip components are susceptible to flexing stresses since they are mounted directly on the substrate. They are also more sensitive to mechanical and thermal stresses than leaded components. Excess solder fillet height can multiply these stresses and cause chip cracking. When designing substrates, take land patterns and dimensions into consideration to eliminate the possibility of excess solder fillet
 - 1-2. It is possible for the chip to crack by the expansion and shrinkage of a metal board. Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

Dattern Forme

| Pattern Forms | | | | | | | |
|---|---|---------------|--|--|--|--|--|
| | Prohibited | Correct | | | | | |
| Placing Close to Chassis | Chassis Solder (ground) Electrode Pattern | Solder Resist | | | | | |
| Placing of Chip Components and Leaded Components | Lead Wire | Solder Resist | | | | | |
| Placing of Leaded Components after Chip Component | Soldering Iron Lead Wire | Solder Resist | | | | | |
| Lateral Mounting | | Solder Resist | | | | | |



Continued from the preceding page.

2. Land Dimensions

2-1. A chip capacitor can be cracked due to the stress of PCB bending / etc if the land area is larger than needed and has an excess amount of solder. Please refer to the land dimensions in table 1 for flow soldering, table 2 for reflow soldering, table 3 for GNM & LLA, and table 4 for LLM. Please confirm the suitable land dimension by evaluating the actual SET / PCB.

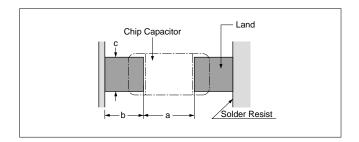


Table 1 Flow Soldering Method

| Dimensions Part Number | Chip (L×W) | a | b | С |
|---------------------------|------------|------------|------------|------------|
| GRM18 GQM18 | 1.6×0.8 | 0.6 to 1.0 | 0.8 to 0.9 | 0.6 to 0.8 |
| GRM21 GQM21 | 2.0×1.25 | 1.0 to 1.2 | 0.9 to 1.0 | 0.8 to 1.1 |
| GRM31 | 3.2×1.6 | 2.2 to 2.6 | 1.0 to 1.1 | 1.0 to 1.4 |
| LLL21 | 1.25×2.0 | 0.4 to 0.7 | 0.5 to 0.7 | 1.4 to 1.8 |
| LLL31 | 1.6×3.2 | 0.6 to 1.0 | 0.8 to 0.9 | 2.6 to 2.8 |

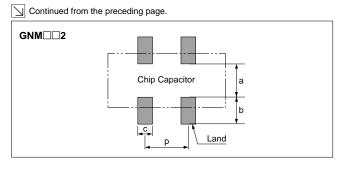
(in mm)

Table 2 Reflow Soldering Method

| Table 2 Reliow Soldering | Table 2 Reflow Soldering Method | | | | | | | |
|---------------------------|---------------------------------|-------------|--------------|-------------|--|--|--|--|
| Dimensions Part Number | Chip (L×W) | a | b | С | | | | |
| GRM02 | 0.4×0.2 | 0.16 to 0.2 | 0.12 to 0.18 | 0.2 to 0.23 | | | | |
| GRM03 GJM03 | 0.6×0.3 | 0.2 to 0.3 | 0.2 to 0.35 | 0.2 to 0.4 | | | | |
| GRM15 GJM15 | 1.0×0.5 | 0.3 to 0.5 | 0.35 to 0.45 | 0.4 to 0.6 | | | | |
| GRM18 GQM18 | 1.6×0.8 | 0.6 to 0.8 | 0.6 to 0.7 | 0.6 to 0.8 | | | | |
| GRM21 GQM21 | 2.0×1.25 | 1.0 to 1.2 | 0.6 to 0.7 | 0.8 to 1.1 | | | | |
| GRM31 | 3.2×1.6 | 2.2 to 2.4 | 0.8 to 0.9 | 1.0 to 1.4 | | | | |
| GRM32 | 3.2×2.5 | 2.0 to 2.4 | 1.0 to 1.2 | 1.8 to 2.3 | | | | |
| GRM43 | 4.5×3.2 | 3.0 to 3.5 | 1.2 to 1.4 | 2.3 to 3.0 | | | | |
| GRM55 | 5.7×5.0 | 4.0 to 4.6 | 1.4 to 1.6 | 3.5 to 4.8 | | | | |
| LLL15 | 0.5×1.0 | 0.15 to 0.2 | 0.2 to 0.25 | 0.7 to 1.0 | | | | |
| LLL18 LLR18 | 0.8×1.6 | 0.2 to 0.3 | 0.3 to 0.4 | 1.4 to 1.6 | | | | |
| LLL21 | 1.25×2.0 | 0.4 to 0.6 | 0.4 to 0.5 | 1.4 to 1.8 | | | | |
| LLL31 | 1.6×3.2 | 0.6 to 0.8 | 0.6 to 0.7 | 2.6 to 2.8 | | | | |
| GQM22 | 3.2×2.5 | 2.2 to 2.5 | 0.8 to 1.0 | 1.9 to 2.3 | | | | |

(in mm)





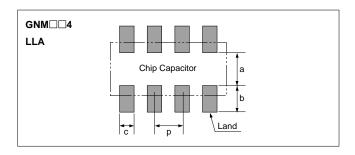


Table 3 GNM, LLA Series for Reflow Soldering Land Dimensions

| Part Number | Dimensions (mm) | | | | | | |
|-------------|-----------------|------|---------------|---------------|--------------|------|--|
| Part Number | L | W | а | b | С | р | |
| GNM0M2 | 0.9 | 0.6 | 0.12 to 0.20* | 0.35 to 0.40* | 0.3 | 0.45 | |
| GNM1M2 | 1.37 | 1.0 | 0.4 to 0.5 | 0.35 to 0.45 | 0.3 to 0.35 | 0.64 | |
| GNM212 | 2.0 | 1.25 | 0.6 to 0.7 | 0.5 to 0.7 | 0.4 to 0.5 | 1.0 | |
| GNM214 | 2.0 | 1.25 | 0.6 to 0.7 | 0.5 to 0.7 | 0.25 to 0.35 | 0.5 | |
| GNM314 | 3.2 | 1.6 | 0.8 to 1.0 | 0.7 to 0.9 | 0.3 to 0.4 | 0.8 | |
| LLA18 | 1.6 | 0.8 | 0.3 to 0.4 | 0.25 to 0.35 | 0.15 to 0.25 | 0.4 | |
| LLA21 | 2.0 | 1.25 | 0.5 to 0.7 | 0.35 to 0.6 | 0.2 to 0.3 | 0.5 | |
| LLA31 | 3.2 | 1.6 | 0.7 to 0.9 | 0.4 to 0.7 | 0.3 to 0.4 | 0.8 | |

* 0.82≦a+2b≦1.00

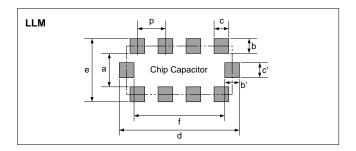


Table 4 LLM Series for Reflow Soldering Land Dimensions

| Part Number | Dimensions (mm) | | | | | | | |
|-------------|-----------------|--------------|-------|------------|------------|------------|-----|--|
| | а | b, b' | c, c' | d | е | f | р | |
| LLM21 | 0.6 to 0.8 | (0.3 to 0.5) | 0.3 | 2.0 to 2.6 | 1.3 to 1.8 | 1.4 to 1.6 | 0.5 | |
| LLM31 | 1.0 | (0.3 to 0.5) | 0.4 | 3.2 to 3.6 | 1.6 to 2.0 | 2.6 | 0.8 | |

b=(c-e)/2, b'=(d-f)/2

2. Adhesive Application

 Thin or insufficient adhesive can cause the chips to loosen or become disconnected during flow soldering.
 The amount of adhesive must be more than dimension c, shown in the drawing at right, to obtain the correct bonding strength.

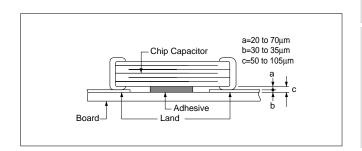
The chip's electrode thickness and land thickness must also be taken into consideration.

 Low viscosity adhesive can cause chips to slip after mounting. The adhesive must have a viscosity of 5000Pa • s (500ps) min. (at 25°C).

3. Adhesive Coverage

| Part Number | Adhesive Coverage* | | | | |
|---------------------|--------------------|--|--|--|--|
| GRM18, GQM18 | 0.05mg min. | | | | |
| GRM21, LLL21, GQM21 | 0.1mg min. | | | | |
| GRM31, LLL31 | 0.15mg min. | | | | |

*Nominal Value



Continued from the preceding page.

3. Adhesive Curing

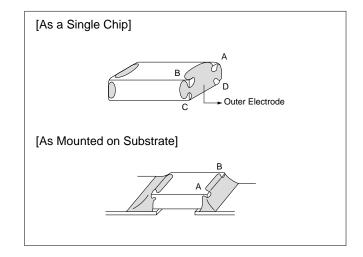
- 1. Insufficient curing of the adhesive can cause chips to disconnect during flow soldering and deterioration in the insulation resistance between the outer electrodes due to moisture absorption.
 - Control curing temperature and time in order to prevent insufficient hardening.

4. Flux Application

- 1. An excessive amount of flux generates a large quantity of flux gas, which can cause a deterioration of Solderability. Therefore apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- 2. Flux containing too high a percentage of halide may cause corrosion of the outer electrodes unless there is sufficient cleaning. Use flux with a halide content of 0.2% max.
- 3. Do not use strong acidic flux.
- 4. Do not use water-soluble *flux. (*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)

5. Flow Soldering

 Set temperature and time to ensure that leaching of the outer electrode does not exceed 25% of the chip end area as a single chip (full length of the edge A-B-C-D shown right) and 25% of the length A-B shown below as mounted on substrate.



Washing

- 1. Please evaluate a capacitor by actual cleaning equipment and conditions to confirm the quality and select the applicable solvent.
- 2. Unsuitable cleaning solvent may leave residual flux or other foreign substances, causing deterioration of electrical characteristics and the reliability of the

capacitors.

- 3. Select the proper cleaning conditions.
 - 3-1. Improper cleaning conditions (excessive or insufficient) may result in the deterioration of the performance of the capacitors.



Continued from the preceding page.

7. Coating

1. A crack may be caused in the capacitor due to the stress of the thermal contraction of the resin during curing

The stress is affected by the amount of resin and curing contraction.

Select a resin with small curing contraction.

The difference in the thermal expansion coefficient between a coating resin or a molding resin and the capacitor may cause the destruction and deterioration of the capacitor such as a crack or peeling, and lead to the deterioration of insulation resistance or dielectric breakdown.

Select a resin for which the thermal expansion coefficient is as close to that of capacitor as possible.

A silicone resin can be used as an under-coating to buffer against the stress.

2. Select a resin that is less hygroscopic.

Using hygroscopic resins under high humidity conditions may cause the deterioration of the insulation resistance of a capacitor.

An epoxy resin can be used as a less hygroscopic resin.

8. Die Bonding/Wire Bonding (GMA or GMD Series)

- 1. Die Bonding of Capacitors
 - Use the following materials for the Brazing alloys: Au-Sn (80/20) 300 to 320 °C in N2 atmosphere

 - (1) Control the temperature of the substrate so it matches the temperature of the brazing alloy.
 - (2) Place the brazing alloy on the substrate and place the capacitor on the alloy. Hold the capacitor and gently apply the load. Be sure to complete the operation within 1 minute.
- 2. Wire Bonding
 - Wire

Gold wire: 25 micro m (0.001 inch) diameter

- Bonding
- (1) Thermo compression, ultrasonic ball bonding.
- (2) Required stage temperature: 150 to 200 °C
- (3) Required wedge or capillary weight: 0.2N to 0.5N
- (4) Bond the capacitor and base substrate or other devices with gold wire.



Others

- 1. Transportation
 - 1. The performance of a capacitor may be affected by the conditions during transportation.
 - 1-1. The capacitors shall be protected against excessive temperature, humidity and mechanical force during transportation.
 - (1) Climatic condition
 - low air temperature: -40°C
 - change of temperature air/air: -25°C/+25°C
 - low air pressure: 30 kPa
 - change of air pressure: 6 kPa/min.
 - (2) Mechanical condition

Transportation shall be done in such a way that the boxes are not deformed and forces are not directly passed on to the inner packaging.

- 1-2. Do not apply excessive vibration, shock, and pressure to the capacitor.
 - (1) When excessive mechanical shock or pressure is applied to a capacitor, chipping or cracking may occur in the ceramic body of the capacitor.
 - (2) When the sharp edge of an air driver, a soldering iron, tweezers, a chassis, etc. impacts strongly on the surface of capacitor, the capacitor may crack and short-circuit.
- 1-3. Do not use a capacitor to which excessive shock was applied by dropping, etc. The capacitor dropped accidentally during processing may be damaged.



1. Solderability

(1) Test Method

Subject the chip capacitor to the following conditions. Then apply flux (an ethanol solution of 25% rosin) to the chip and dip it in 230℃ eutectic solder for 2 seconds. Conditions:

Expose prepared at room temperature (for 6 months and 12 months, respectively)

Prepared at high temperature (for 100 hours at 85℃) Prepared left at high humidity (for 100 hours under 90%RH to 95%RH at 40℃)

(2) Test Samples

GRM21: Products for flow/reflow soldering.

(3) Acceptance Criteria

With a 60-power optical microscope, measure the surface area of the outer electrode that is covered with solder.

(4) Results

Refer to Table 1.

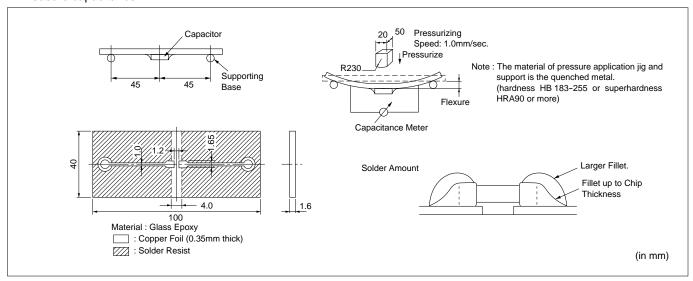
Table 1

| Sample | Initial State | Prepared at Room Temperature | | Prepared at High | Prepared at High Humidity for 100 Hours at 90 to | |
|---------------------------------|----------------|------------------------------|-----------|-------------------------------------|--|--|
| Sample | Illitiai State | 6 months | 12 months | Temperature for 100 Hours at 85℃ | 95% RH and 40°C | |
| GRM21 for flow/reflow soldering | 95 to 100% | 95 to 100% | 95% | 90 to 95% | 95% | |

2. Board Bending Strength for Solder Fillet Height

(1) Test Method

Solder the chip capacitor to the test PCB with the amount of solder paste necessary to achieve the fillet heights. Then bend the PCB using the method illustrated and measure capacitance.



(2) Test Samples

GRM21: 5C/R7/F5 Characteristics T=0.6mm

(3) Acceptance Criteria

Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 2.

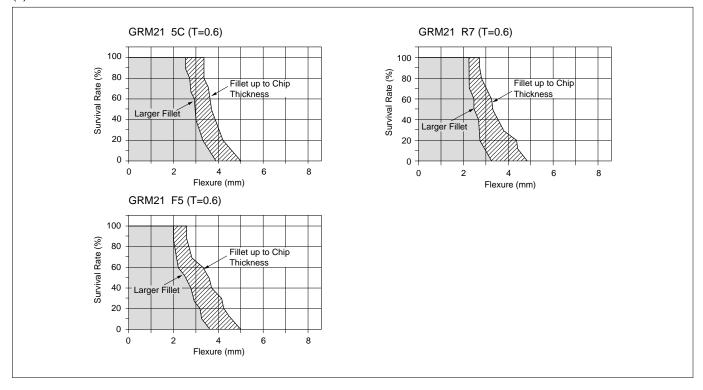
Table 2

| Tubic 2 | |
|-----------------|--|
| Characteristics | Change in Capacitance |
| 5C | Within ±5% or ±0.5pF, whichever is greater |
| R7 | Within ±12.5% |
| F5 | Within ±20% |



Continued from the preceding page.

(4) Results



3. Temperature Cycling for Solder Fillet Height

(1) Test Method

Solder the chips to the substrate of various test fixtures using sufficient amounts of solder to achieve the required fillet height. Then subject the fixtures to the cycle illustrated at right 200 times.

① Solder Amount

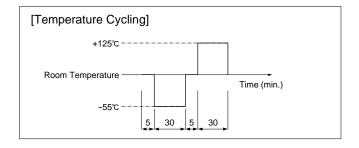
Alumina substrates are typically designed for reflow

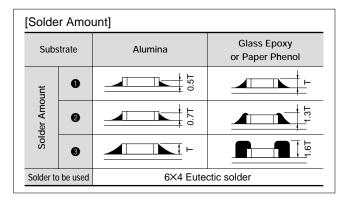
Glass epoxy or paper phenol substrates are typically used for flow soldering.

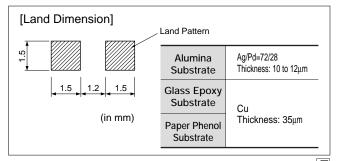
② Material

Alumina (Thickness: 0.64mm) Glass epoxy (Thickness: 1.64mm) Paper phenol (Thickness: 1.64mm)

(3) Land Dimension







Continued from the preceding page.

(2) Test Samples

GRM21 5C/R7/F5 Characteristics T=0.6mm

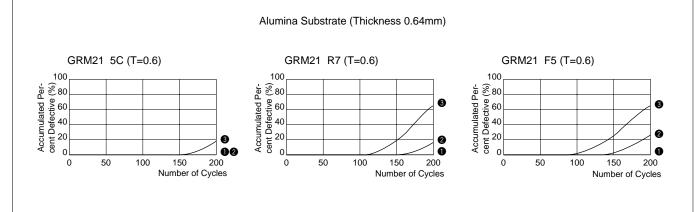
(3) Acceptance Criteria

Products are determined to be defective if the change in capacitance has exceeded the values specified in Table 3.

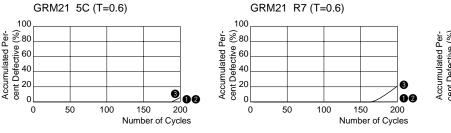
Table 3

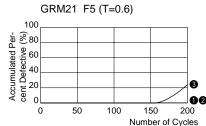
| Characteristics | Change in Capacitance |
|-----------------|---|
| 5C | Within ±2.5% or ±0.25pF, whichever is greater |
| R7 | Within ±7.5% |
| F5 | Within ±20% |

(4) Results

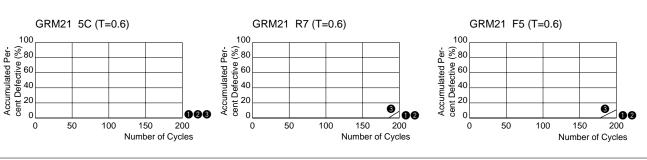


Glass Epoxy Substrate (Thickness 1.6mm)





Paper Phenol Substrate (Thickness 1.6mm)





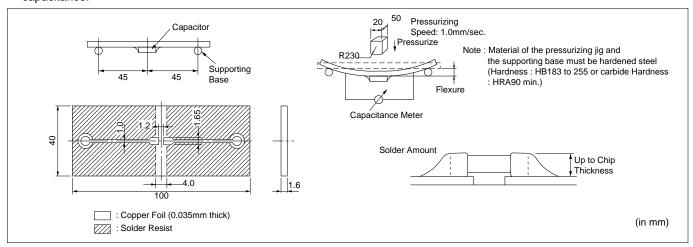


Continued from the preceding page.

4. Board Bending Strength for Board Material

(1) Test Method

Solder the chip to the test board. Then bend the board using the method illustrated below, to measure capacitance.



(2) Test Samples GRM21 5C/R7/F5 Characteristics T=0.6mm typical

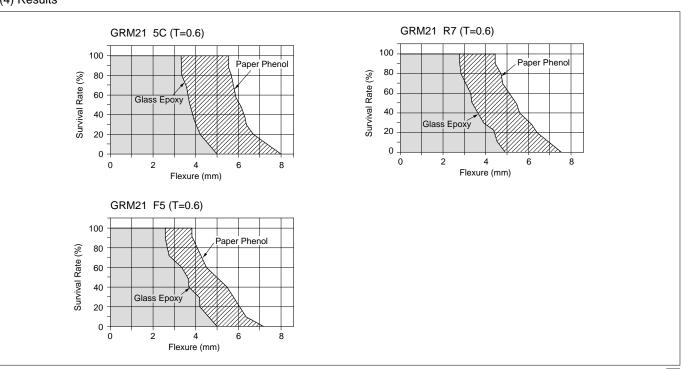
(3) Acceptance Criteria

Products should be determined to be defective if the change in capacitance has exceeded the values specified in Table 4.

Table 4

| Characteristics | Change in Capacitance |
|-----------------|--|
| 5C | Within ±5% or ±0.5pF, whichever is greater |
| R7 | Within ±12.5% |
| F5 | Within ±20% |

(4) Results



Continued from the preceding page.

5. Break Strength

(1) Test Method

Place the chip on a steel plate as illustrated on the right. Increase load applied to a point near the center of the test sample.

(2) Test Samples

GRM21 5C/R7/F5 Characteristics GRM31 5C/R7/F5 Characteristics

(3) Acceptance Criteria

Define the load that has caused the chip to break or crack, as the bending force.

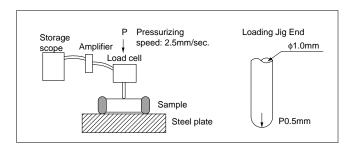
(4) Explanation

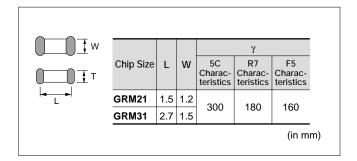
Break strength, P, is proportionate to the square of the thickness of the ceramic element and is expressed as a curve of secondary degree.

The formula is:

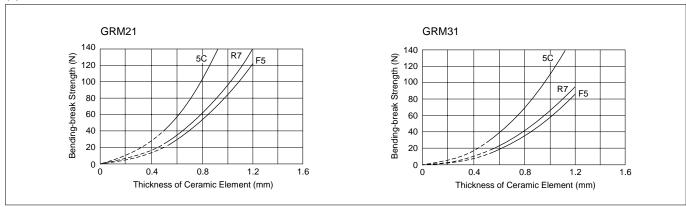
$$P = \frac{2\gamma WT^2}{3L} \quad (N)$$

W: Width of ceramic element (mm) T: Thickness of element (mm) L: Distance between fulcrums (mm) γ: Bending stress (N/mm²)





(5) Results



6. Thermal Shock

(1) Test method

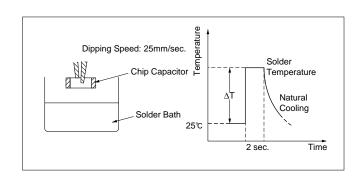
After applying flux (an ethanol solution of 25% rosin), dip the chip in a solder bath (6X4 eutectic solder) in accordance with the following conditions:

(2) Test samples

GRM21 5C/R7/F5 Characteristics T=0.6mm typical

(3) Acceptance criteria

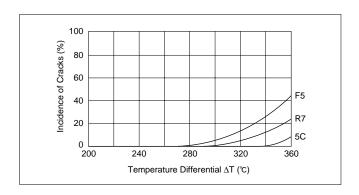
Visually inspect the test sample with a 60-power optical microscope. Chips exhibiting breaks or cracks should be determined to be defective.





Continued from the preceding page.

(4) Results



7. Solder Heat Resistance

(1) Test Method

① Reflow soldering:

Apply about 300 μm of solder paste over the alumina substrate. After reflow soldering, remove the chip and check for leaching that may have occurred on the outer electrode.

2 Flow soldering:

After dipping the test sample with a pair of tweezers in wave solder (eutectic solder), check for leaching that may have occurred on the outer electrode.

(2) Test samples

GRM21: For flow/reflow soldering T=0.6mm

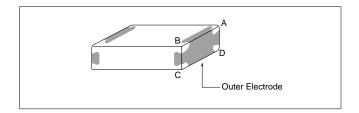
(3) Acceptance criteria

The starting time of leaching should be defined as the time when the outer electrode has lost 25% of the total edge length of A-B-C-D as illustrated:

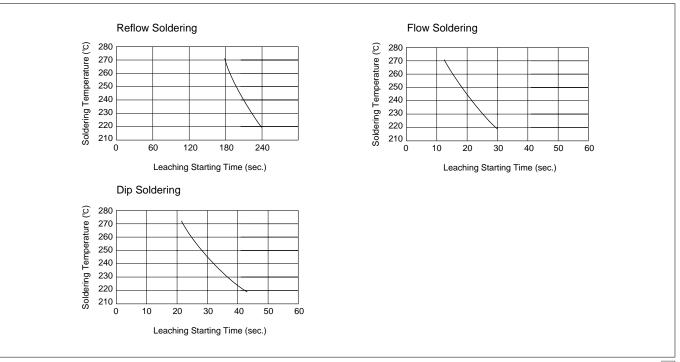
3 Dip soldering:

After dipping the test sample with a pair of tweezers in static solder (eutectic solder), check for leaching that may have occurred on the outer electrode.

4 Flux to be used: An ethanol solution of 25% rosin.



(4) Results



Continued from the preceding page.

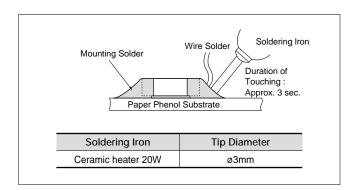
8. Thermal Shock when Making Corrections with a Soldering Iron

(1) Test Method

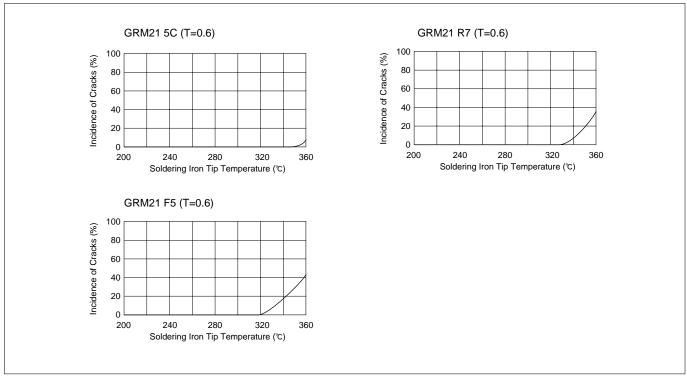
Apply a soldering iron meeting the conditions below to the soldered joint of a chip that has been soldered to a paper phenol board, while supplying wire solder. (Note: the soldering iron tip should not directly touch the ceramic element of the chip.)

(2) Test Samples
GRM21 5C/R7/F5 Characteristics T=0.6mm

(3) Acceptance Criteria for Defects Observe the appearance of the test sample with a 60-power optical microscope. Those units displaying any breaks or cracks are determined to be defective.



(4) Results



Chip Monolithic Ceramic Capacitors (Medium Voltage)

| 1 | For (| General Purpose GRM/GRJ Series | | | | | | | | |
|-----|-------|--|--|--|--|--|--|--|--|--|
| • | 1-1 | Low Dissipation Factor GRM Series ———— | — 160 | | | | | | | |
| | | Specifications and Test Methods ——— | | | | | | | | |
| | 1-2 | High Capacitance for General Use GRM Series - | | | | | | | | |
| | | Specifications and Test Methods | | | | | | | | |
| | 1-3 | Soft Termination Type GRJ Series | | | | | | | | |
| | | Specifications and Test Methods | | | | | | | | |
| 2 | Only | for Applications | | | | | | | | |
| | 2-1 | For LCD Backlight Inverter Circuit GRM/DC3.15kV Series — | — 176 | | | | | | | |
| | | Specifications and Test Methods ——— | — 177 | | | | | | | |
| | 2-2 | For Information Devices GR4 Series | — 179 | | | | | | | |
| | | Specifications and Test Methods — | | | | | | | | |
| | 2-3 | For Camera Flash Circuit GR7 Series ——— | | | | | | | | |
| | | Specifications and Test Methods ——— | | | | | | | | |
| 3 | AC25 | 50V Type (Which Meet Japanese Law) GA2 Series – | —————————————————————————————————————— | | | | | | | |
| | | cifications and Test Methods | | | | | | | | |
| 4 | Safe | ty Standard Certified GA3 Series | | | | | | | | |
| | 4-1 | UL, IEC60384-14 Class X1/Y2 Type GC — | <u> </u> | | | | | | | |
| | 4-2 | IEC60384-14 Class Y2, X1/Y2 Type GF | — 192 | | | | | | | |
| | 4-3 | IEC60384-14 Class Y3 Type GD | <u> </u> | | | | | | | |
| | 4-4 | IEC60384-14 Class X2 Type GB | — 195 | | | | | | | |
| | Spec | cifications and Test Methods ————— | — 196 | | | | | | | |
| Ref | erenc | e Data (Typical Example) | — 200 | | | | | | | |
| | kage | | | | | | | | | |
| | _ | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Chip Monolithic Ceramic Capacitors (Medium Voltage)



Low Dissipation Factor GRM Series

■ Features

- 1. Low-loss and suitable for high frequency circuits
- 2. Murata's original internal electrode structure provides high flash-over voltage.
- 3. A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels
- 4. Sn-plated external electrodes provides good solderability.
- 5. Use the GRM21/31 type with flow or reflow soldering, and other types with reflow soldering only.

■ Applications

Ideal for use on high frequency pulse circuits such as snubber circuits for switching power supplies, DC-DC converters, ballasts (inverter fluorescent lamps), etc.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.

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| Part Number | Dimensions (mm) | | | | | | |
|-------------|-----------------|-----------|--------------|--------|--------|--|--|
| Part Number | L | W | Т | e min. | g min. | | |
| GRM21A | 20+02 | 1.25 ±0.2 | 1.0 +0,-0.3 | | 0.7 | | |
| GRM21B | 2.0 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | 0.7 | | |
| GRM31A | 3.2 ±0.2 | 1.6 ±0.2 | 1.0 +0,-0.3 | | | | |
| GRM31B | 3.2 ±0.2 | 2.5 ±0.2 | 1.25 +0,-0.3 | | 1.5* | | |
| GRM32A | 3.2 ±0.2 | | 1.0 +0,-0.3 | | | | |
| GRM32B | 3.2 ±0.2 | | 1.25 +0,-0.3 | | | | |
| GRM42A | 4.5 ±0.3 | 2.0 ±0.2 | 1.0 +0,-0.3 | | 2.9 | | |

^{*} GRM31A7U3D, GRM32A7U3D, GRM32B7U3D: 1.8mm min.

C0G Characteristics

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| GRM21A5C2E100JW01D | DC250 | COG (EIA) | 10 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E120JW01D | DC250 | COG (EIA) | 12 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E150JW01D | DC250 | COG (EIA) | 15 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E180JW01D | DC250 | COG (EIA) | 18 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E220JW01D | DC250 | COG (EIA) | 22 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E270JW01D | DC250 | COG (EIA) | 27 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E330JW01D | DC250 | COG (EIA) | 33 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E390JW01D | DC250 | COG (EIA) | 39 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E470JW01D | DC250 | COG (EIA) | 47 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E560JW01D | DC250 | COG (EIA) | 56 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E680JW01D | DC250 | COG (EIA) | 68 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E820JW01D | DC250 | COG (EIA) | 82 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A5C2E101JW01D | DC250 | COG (EIA) | 100 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM31A5C2J100JW01D | DC630 | COG (EIA) | 10 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J120JW01D | DC630 | COG (EIA) | 12 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J150JW01D | DC630 | COG (EIA) | 15 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J180JW01D | DC630 | COG (EIA) | 18 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J220JW01D | DC630 | COG (EIA) | 22 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J270JW01D | DC630 | COG (EIA) | 27 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J330JW01D | DC630 | COG (EIA) | 33 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J390JW01D | DC630 | COG (EIA) | 39 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J470JW01D | DC630 | COG (EIA) | 47 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J560JW01D | DC630 | COG (EIA) | 56 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |

 $\begin{tabular}{|c|c|c|c|} \hline \end{tabular}$ Continued from the preceding page.

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|---|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GRM31A5C2J680JW01D | DC630 | , | | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J820JW01D | DC630 | COG (EIA) | 82 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J101JW01D | DC630 | COG (EIA) | 100 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J121JW01D | DC630 | COG (EIA) | 120 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J151JW01D | DC630 | COG (EIA) | 150 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J181JW01D | DC630 | COG (EIA) | 180 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J221JW01D | DC630 | COG (EIA) | 220 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J271JW01D | DC630 | COG (EIA) | 270 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J331JW01D | DC630 | COG (EIA) | 330 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J391JW01D | DC630 | COG (EIA) | 390 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J471JW01D | DC630 | COG (EIA) | 470 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C2J561JW01D | DC630 | COG (EIA) | 560 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31B5C2J681JW01L | DC630 | COG (EIA) | 680 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| GRM31B5C2J821JW01L | DC630 | COG (EIA) | 820 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| GRM31B5C2J102JW01L | DC630 | COG (EIA) | 1000 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| GRM31A5C3A100JW01D | DC1000 | COG (EIA) | 10 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A120JW01D | DC1000 | COG (EIA) | 12 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A150JW01D | DC1000 | COG (EIA) | 15 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A180JW01D | DC1000 | COG (EIA) | 18 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A220JW01D | DC1000 | COG (EIA) | 22 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A270JW01D | DC1000 | COG (EIA) | 27 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A330JW01D | DC1000 | COG (EIA) | 33 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A390JW01D | DC1000 | COG (EIA) | 39 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A470JW01D | DC1000 | COG (EIA) | 47 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A560JW01D | DC1000 | COG (EIA) | 56 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A680JW01D | DC1000 | COG (EIA) | 68 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A820JW01D | DC1000 | COG (EIA) | 82 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM31A5C3A101JW01D | DC1000 | COG (EIA) | 100 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |

U2J Characteristics

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| GRM21A7U2E101JW31D | DC250 | U2J (EIA) | 100 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E121JW31D | DC250 | U2J (EIA) | 120 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E151JW31D | DC250 | U2J (EIA) | 150 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E181JW31D | DC250 | U2J (EIA) | 180 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E221JW31D | DC250 | U2J (EIA) | 220 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E271JW31D | DC250 | U2J (EIA) | 270 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E331JW31D | DC250 | U2J (EIA) | 330 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E391JW31D | DC250 | U2J (EIA) | 390 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E471JW31D | DC250 | U2J (EIA) | 470 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E561JW31D | DC250 | U2J (EIA) | 560 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E681JW31D | DC250 | U2J (EIA) | 680 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E821JW31D | DC250 | U2J (EIA) | 820 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E102JW31D | DC250 | U2J (EIA) | 1000 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E122JW31D | DC250 | U2J (EIA) | 1200 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E152JW31D | DC250 | U2J (EIA) | 1500 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E182JW31D | DC250 | U2J (EIA) | 1800 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21A7U2E222JW31D | DC250 | U2J (EIA) | 2200 ±5% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21B7U2E272JW32L | DC250 | U2J (EIA) | 2700 ±5% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GRM31A7U2E272JW31D | DC250 | U2J (EIA) | 2700 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM21B7U2E332JW32L | DC250 | U2J (EIA) | 3300 ±5% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GRM31A7U2E332JW31D | DC250 | U2J (EIA) | 3300 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| GRM21B7U2E392JW32L | DC250 | U2J (EIA) | 3900 ±5% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GRM31A7U2E392JW31D | DC250 | U2J (EIA) | 3900 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|-------------------|
| GRM21B7U2E472JW32L | DC250 | U2J (EIA) | 4700 ±5% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| RM31A7U2E472JW31D | DC250 | U2J (EIA) | 4700 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| RM21B7U2E562JW32L | DC250 | U2J (EIA) | 5600 ±5% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| RM31A7U2E562JW31D | DC250 | U2J (EIA) | 5600 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min. |
| RM31B7U2E682JW31L | DC250 | U2J (EIA) | 6800 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| RM31B7U2E822JW31L | DC250 | U2J (EIA) | 8200 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| RM31B7U2E103JW31L | DC250 | U2J (EIA) | 10000 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min. |
| RM31A7U2J100JW31D | DC630 | U2J (EIA) | 10 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J120JW31D | DC630 | U2J (EIA) | 12 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J150JW31D | DC630 | U2J (EIA) | 15 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J180JW31D | DC630 | U2J (EIA) | 18 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J220JW31D | DC630 | U2J (EIA) | 22 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J270JW31D | DC630 | U2J (EIA) | 27 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J330JW31D | DC630 | U2J (EIA) | 33 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J390JW31D | DC630 | U2J (EIA) | 39 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J470JW31D | DC630 | U2J (EIA) | 47 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J560JW31D | DC630 | U2J (EIA) | 56 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J680JW31D | DC630 | U2J (EIA) | 68 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U2J820JW31D | DC630 | U2J (EIA) | 82 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J101JW31D | DC630 | U2J (EIA) | 100 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J121JW31D | DC630 | U2J (EIA) | 120 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J151JW31D | DC630 | U2J (EIA) | 150 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J181JW31D | DC630 | U2J (EIA) | 180 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J221JW31D | DC630 | U2J (EIA) | 220 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J271JW31D | DC630 | U2J (EIA) | 270 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J331JW31D | DC630 | U2J (EIA) | 330 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J391JW31D | DC630 | U2J (EIA) | 390 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J471JW31D | DC630 | U2J (EIA) | 470 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J561JW31D | DC630 | U2J (EIA) | 560 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J681JW31D | DC630 | U2J (EIA) | 680 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J821JW31D | DC630 | U2J (EIA) | 820 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U2J102JW31D | DC630 | U2J (EIA) | 1000 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM32A7U2J122JW31D | DC630 | U2J (EIA) | 1200 ±5% | 3.2 | 2.5 | 1.0 | 1.5 | 0.3 min |
| GRM32A7U2J152JW31D | DC630 | U2J (EIA) | 1500 ±5% | 3.2 | 2.5 | 1.0 | 1.5 | 0.3 min |
| GRM32A7U2J182JW31D | DC630 | U2J (EIA) | 1800 ±5% | 3.2 | 2.5 | 1.0 | 1.5 | 0.3 min |
| GRM32A7U2J222JW31D | DC630 | U2J (EIA) | 2200 ±5% | 3.2 | 2.5 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A100JW31D | DC1000 | U2J (EIA) | 10 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A120JW31D | DC1000 | U2J (EIA) | 12 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A150JW31D | DC1000 | U2J (EIA) | 15 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A180JW31D | DC1000 | U2J (EIA) | 18 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A220JW31D | DC1000 | U2J (EIA) | 22 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A270JW31D | DC1000 | U2J (EIA) | 27 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A330JW31D | DC1000 | U2J (EIA) | 33 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A390JW31D | DC1000 | U2J (EIA) | 39 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31A7U3A470JW31D | DC1000 | U2J (EIA) | 47 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A560JW31D | DC1000 | U2J (EIA) | 56 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A680JW31D | DC1000 | U2J (EIA) | 68 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A820JW31D | DC1000 | U2J (EIA) | 82 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A101JW31D | DC1000 | U2J (EIA) | 100 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 mir |
| RM31A7U3A121JW31D | DC1000 | U2J (EIA) | 120 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A151JW31D | DC1000 | U2J (EIA) | 150 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 mir |
| RM31A7U3A181JW31D | DC1000 | U2J (EIA) | 180 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 mir |
| RM31A7U3A221JW31D | DC1000 | U2J (EIA) | 220 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 mir |
| RM31A7U3A271JW31D | DC1000 | U2J (EIA) | 270 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| RM31A7U3A331JW31D | DC1000 DC1000 | U2J (EIA) | 330 ±5% | 3.2 | 1.6 | 1.0 | 1.5 | 0.3 min |
| GRM31B7U3A331JW31D | DC1000 DC1000 | U2J (EIA) | 330 ±5% 390 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min |
| GRM31B7U3A391JW31L | DC1000 DC1000 | U2J (EIA) | 390 ±5% 470 ±5% | 3.2 | 1.6 | 1.25 | 1.5 | 0.3 min |



Continued from the preceding page.

GRM42A7U3F101JW31L

DC3150

U2J (EIA)

0.3 min.

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--|---|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| GRM31A7U3D100JW31D | DC2000 | U2J (EIA) | 10 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D120JW31D | DC2000 | U2J (EIA) | 12 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D150JW31D | RM31A7U3D150JW31D DC2000 U2J (EIA) 15 ±5% | | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. | |
| GRM31A7U3D180JW31D DC2000 U2J (EIA) 18 ±5% | | 18 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. | |
| GRM31A7U3D220JW31D | DC2000 | U2J (EIA) | 22 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D270JW31D | DC2000 | U2J (EIA) | 27 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D330JW31D | DC2000 | U2J (EIA) | 33 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D390JW31D | DC2000 | U2J (EIA) | 39 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D470JW31D | DC2000 | U2J (EIA) | 47 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D560JW31D | DC2000 | U2J (EIA) | 56 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM31A7U3D680JW31D | DC2000 | U2J (EIA) | 68 ±5% | 3.2 | 1.6 | 1.0 | 1.8 | 0.3 min. |
| GRM32A7U3D820JW31D | DC2000 | U2J (EIA) | 82 ±5% | 3.2 | 2.5 | 1.0 | 1.8 | 0.3 min. |
| GRM32A7U3D101JW31D | DC2000 | U2J (EIA) | 100 ±5% | 3.2 | 2.5 | 1.0 | 1.8 | 0.3 min. |
| GRM32A7U3D121JW31D | DC2000 | U2J (EIA) | 120 ±5% | 3.2 | 2.5 | 1.0 | 1.8 | 0.3 min. |
| GRM32A7U3D151JW31D | DC2000 | U2J (EIA) | 150 ±5% | 3.2 | 2.5 | 1.0 | 1.8 | 0.3 min. |
| GRM32B7U3D181JW31L | DC2000 | U2J (EIA) | 180 ±5% | 3.2 | 2.5 | 1.25 | 1.8 | 0.3 min. |
| GRM32B7U3D221JW31L | DC2000 | U2J (EIA) | 220 ±5% | 3.2 | 2.5 | 1.25 | 1.8 | 0.3 min. |
| GRM42A7U3F270JW31L | DC3150 | U2J (EIA) | 27 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F330JW31L | DC3150 | U2J (EIA) | 33 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F390JW31L | DC3150 | U2J (EIA) | 39 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F470JW31L | DC3150 | U2J (EIA) | 47 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F560JW31L | DC3150 | U2J (EIA) | 56 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F680JW31L | DC3150 | U2J (EIA) | 68 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A7U3F820JW31L | DC3150 | U2J (EIA) | 82 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| | | | | | | | | |

100 ±5%

4.5

2.0

1.0

2.9



GRM Series Specifications and Test Methods

| No. | Ite | em | Specifications | Test Method | | | | |
|-----|---|-------------|--|--|--|--|--|--|
| 1 | Operating Temperatu | ure Range | -55 to +125℃ | - | | | | |
| 2 | Appearan | nce | No defects or abnormalities | Visual inspection | | | | |
| 3 | Dimensio | ns | Within the specified dimension | Using calipers and micrometers | | | | |
| 4 | Dielectric | : Strength | No defects or abnormalities | No failure should be observed when voltage in the Table is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA. Rated Voltage Test Voltage DC250V 200% of the rated voltage DC630V 150% of the rated voltage DC1kV, DC2kV, DC3.15kV 130% of the rated voltage | | | | |
| 5 | Insulation F (I.R.) | Resistance | More than 10,000MΩ | The insulation resistance should be measured with DC500±50V (DC250±25V in case of rated voltage: DC250V) and within 60±5 sec. of charging. | | | | |
| 6 | Capacita | nce | Within the specified tolerance | The capacitance/Q should be measured at the frequency and | | | | |
| 7 | Q | | 1,000 min. | voltage shown as follows. Capacitance Frequency Voltage C<1,000pF | | | | |
| 8 | Capacitance Temperature Characteristics | | Temp. Coefficient C0G char.: 0±30ppm/℃ (Temp. Range: +25 to +125℃) 0+30, -72ppm/℃ (Temp. Range: -55 to +25℃) U2J char.: -750±120ppm/℃ (Temp. Range: +25 to +125℃) -750+120, -347ppm/℃ (Temp. Range: -55 to +25℃) | The capacitance measurement should be made at each step specified in the Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2 | | | | |
| 9 | Adhesive of Termin | | No removal of the terminations or other defect should occur. | Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. INN, 10±1s Glass Epoxy Board Fig. 1 | | | | |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board). | | | | |
| | | Capacitance | Within the specified tolerance | The capacitor should be subjected to a simple harmonic motion | | | | |
| 10 | Vibration Resistance | | 1,000 min. | having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). Solder resist Glass Epoxy Board | | | | |
| | | | | Continued on the following page. | | | | |





GRM Series Specifications and Test Methods

Continued from the preceding page.

| No. | Ite | em | | S | pecification | ıs | | | | Test Method | |
|-----|--------------------------------------|------------------------|---|--|-------------------------------|-----------------------------|-------|--|---|--|--|
| 11 | Deflection Solderabi Terminati | llity of | LXW (mm) 2.0×1.25 3.2×1.6 3.2×2.5 4.5×2.0 75% of the term and continuous | a 1.2 2.2 2.2 3.5 | b 4.0 5.0 5.0 7.0 | on (mm) c 1.65 2.0 2.9 2.4 | d 1.0 | in Fig. 2. Then apply a The soldering should be cor and free of de | rapacitor in 1902) (25% of for 2±0.5 eed: 25±2.er: 245±5° | e direction shown in done using the ref h care so that the as heat shock. 20 50 Pressurizing speed: 1.0mr Pressurize Flexure: 45 Fig. 3 a solution of ethan rosin in weight project. 5mm/s C Lead Free Solde | flow method and soldering is uniform n/s =1 (in mm) nol (JIS-K-8101) and portion). Immerse in er (Sn-3.0Ag-0.5Cu) |
| | | Appearance | No marking def | octe | | | | Propost the c | | C H60A or H63A 120 to 150℃* for | |
| | Resistance | Capacitance Change | Within ±2.5% | 6013 | | | | Immerse the o | apacitor in condition | solder solution at 2 for 24±2 hrs., the | 260±5℃ for 10±1 sec. |
| 13 | to Soldering | Q | 1,000 min. | ,000 min. More than 10,000M Ω accordance with item No.4 | | | | | or more tha | an 3.2×2.5mm | |
| | Heat | I.R. | More than 10,0 | | | | | | | nperature | Time |
| | | Dielectric Strength | In accordance v | | | | | | 100 | 0 to 120°C 0 to 200°C | 1 min. |
| | | Appearance | No marking def | lo marking defects | | | | | tor to the su | upporting jig (glass | epoxy board) shown |
| | | Capacitance Change | Within ±2.5% | | | | | in Fig. 4. Perform the 5 cycles according to the 4 heat treatmen the following table. Let sit for 24±2 hrs. at room condition,* then measure | | | treatments listed in |
| | | Q | 500 min. | | | | | | | | |
| | | I.R. | More than 10,0 | 00ΜΩ | | | | Step 1 | | perature (℃) rating Temp.±3 | Time (min.) 30±3 |
| 14 | Temperature Cycle | | | | | | | 3 4 | Max. Ope | om Temp. erating Temp.±2 om Temp. | 2 to 3 30±3 2 to 3 |
| | | Dielectric Strength | In accordance v | In accordance with item No.4 | | | | | FZZ FZ FZZ FZ Glass E | Solde Cu spoxy Board | ar resist |
| | | Appearance | No marking def | ects | | | | | | | |
| | Humidity | Capacitance Change | Within ±5.0% | | | | | | | ±2℃ and relative h | numidity of 90 to 95% |
| 15 | (Steady | Q | 350 min. | | | | | for 500 ^{±2} 5hr Remove and | | 1±2 hrs. at room c | ondition,* then |
| | State) | I.R. | More than 1,00 | ΩΜΩ | | | | measure. | | | |
| | | Dielectric Strength | In accordance v | with item N | 0.4 | | | | | | |
| | | Appearance | No marking def | ects | | | | | | e for 1,000 ^{±4} 8hrs. | . at maximum |
| | | Capacitance Change | Within ±3.0% | | | | | operating tem Remove and measure. | • | 3℃. 4±2 hrs. at room c | ondition,* then |
| 16 | Life | Q | 350 min. | | | | | Rated \ | /oltage | | Voltage |
| | | I.R. Dielectric | More than 1,00 | | - 4 | | | DC2 DC630V, DC2kV, D | 50V DC1kV, | | rated voltage |
| | | Strength | In accordance v | vitn item N | 0.4 | | | | | rrent is less than 5 | 50mA. |

 $^{^*}$ "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Only for Applications

Chip Monolithic Ceramic Capacitors (Medium Voltage)



High Capacitance for General Use GRM Series

■ Features

- 1. A new monolithic structure for small, high capacitance capable of operating at high voltage
- 2. Sn-plated external electrodes provide good solderability.
- 3. Use the GRM18/21/31 types with flow or reflow soldering, and other types with reflow soldering only.

Applications

- 1. Ideal for use on diode-snubber circuits for switching power supplies.
- 2. Ideal for use as primary-secondary coupling for DC-DC converters.
- 3. Ideal for use on line filters and ringer detectors for telephones, facsimiles and modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.





| Part Number | | Din | nensions (mm | 1) | |
|-------------|----------|-----------|---------------|------------|--------|
| | L | W | T | е | g min. |
| GRM188 | 1.6 ±0.1 | 0.8 ±0.1 | 0.8 ± 0.1 | 0.2 to 0.5 | 0.4 |
| GRM21A | 2.0 ±0.2 | 1.25 ±0.2 | 1.0 +0,-0.3 | | 0.7 |
| GRM21B | 2.0 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | 0.7 |
| GRM31B | 3.2 ±0.2 | 1.6 ±0.2 | 1.25 +0,-0.3 | | |
| GRM31C | 3.2 ±0.2 | 1.0 ±0.2 | 1.6 ±0.2 | | 12 |
| GRM32Q | 3.2 ±0.3 | 2.5 ±0.2 | 1.5 +0,-0.3 | 0.3 min. | 1.2 |
| GRM32D | 3.2 ±0.3 | 2.5 ±0.2 | 2.0 +0,-0.3 | | |
| GRM43Q | 4.5 ±0.4 | 3.2 ±0.3 | 1.5 + 0, -0.3 | | 22 |
| GRM43D | 4.5 ±0.4 | 3.2 ±0.3 | 2.0 + 0, -0.3 | | 2.2 |
| GRM55D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0,-0.3 | | 3.2 |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Canacitance | | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------------|-----------------------|--------------|-----|-----------------|------------------|-----------------------------|------------------|
| GRM188R72E221KW07D | DC250 | X7R (EIA) | 220pF ±10% | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 |
| GRM188R72E331KW07D | DC250 X7R (EIA) 330pF ±10% | | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 | |
| GRM188R72E471KW07D | | | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 | |
| GRM188R72E681KW07D | DC250 | X7R (EIA) | 680pF ±10% | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 |
| GRM188R72E102KW07D | DC250 | X7R (EIA) | 1000pF ±10% | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 |
| GRM21AR72E102KW01D | DC250 | X7R (EIA) | 1000pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM188R72E152KW07D | DC250 | X7R (EIA) | 1500pF ±10% | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 |
| GRM21AR72E152KW01D | DC250 | X7R (EIA) | 1500pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM188R72E222KW07D | DC250 | X7R (EIA) | 2200pF ±10% | 1.6 | 0.8 | 0.8 | 0.4 | 0.2 to 0.5 |
| GRM21AR72E222KW01D | DC250 | X7R (EIA) | 2200pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21AR72E332KW01D | DC250 | X7R (EIA) | 3300pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21AR72E472KW01D | DC250 | X7R (EIA) | 4700pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21AR72E682KW01D | DC250 | X7R (EIA) | 6800pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRM21BR72E103KW03L | DC250 | X7R (EIA) | 10000pF ±10% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GRM31BR72E153KW01L | DC250 | X7R (EIA) | 15000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRM31BR72E223KW01L | DC250 | X7R (EIA) | 22000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRM31CR72E333KW03L | DC250 | X7R (EIA) | 33000pF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRM31CR72E473KW03L | DC250 | X7R (EIA) | 47000pF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRM31BR72E683KW01L | DC250 | X7R (EIA) | 68000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRM32QR72E683KW01L | DC250 | X7R (EIA) | 68000pF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRM31CR72E104KW03L | DC250 | X7R (EIA) | 0.10μF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRM32DR72E104KW01L | DC250 | X7R (EIA) | 0.10μF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRM32QR72E154KW01L | DC250 | X7R (EIA) | 0.15μF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRM43QR72E154KW01L | DC250 | X7R (EIA) | 0.15μF ±10% | 4.5 | 3.2 | 1.5 | 2.2 | 0.3 min. |
| GRM32DR72E224KW01L | DC250 | X7R (EIA) | 0.22μF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |





Continued from the preceding page.

GRM55DR73A104KW01L

DC1000

X7R (EIA)

C02E.pdf 10.12.20

For General Purpose GRM/GRJ Series

Only for Applications

AC250V Type GA2 Series

Safety Standard Certified GA3 Series

Product Information

0.3 min.

2.0

3.2

Electrode g Rated Voltage TC Code Length L Width W Thickness T Electrode e Part Number Capacitance min (Standard) (mm) (V) (mm) (mm) (mm) (mm) GRM43DR72E224KW01L DC250 X7R (EIA) $0.22 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. DC250 GRM43DR72E334KW01L X7R (EIA) $0.33 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. GRM55DR72E334KW01L DC250 X7R (EIA) $0.33 \mu F \pm 10\%$ 5.7 5.0 2.0 3.2 0.3 min. GRM43DR72E474KW01L 4.5 DC250 X7R (EIA) $0.47\mu F \pm 10\%$ 3.2 2.0 2.2 0.3 min. GRM55DR72E474KW01L DC250 X7R (EIA) 0.47µF ±10% 5.7 5.0 2.0 3.2 0.3 min. 5.7 DC250 5.0 2.0 GRM55DR72E105KW01L X7R (EIA) 1.0µF ±10% 3.2 0.3 min. GRM31BR72J102KW01L DC630 X7R (EIA) 1000pF ±10% 3.2 1.25 1.2 1.6 0.3 min. GRM31BR72J152KW01L DC630 X7R (EIA) 1500pF ±10% 3.2 1.25 1.2 0.3 min. 1.6 3.2 GRM31BR72J222KW01L 1.25 1.2 DC630 X7R (EIA) 2200pF ±10% 1.6 0.3 min. GRM31BR72J332KW01L DC630 X7R (EIA) 3300pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR72J472KW01L DC630 X7R (EIA) 3.2 1.2 0.3 min. 4700pF ±10% 1.6 GRM31BR72J682KW01L DC630 X7R (EIA) 3.2 1.25 1.2 6800pF ±10% 1.6 0.3 min. 1.25 1.2 GRM31BR72J103KW01L DC630 X7R (EIA) 10000pF ±10% 3.2 1.6 0.3 min. GRM31CR72J153KW03L DC630 X7R (EIA) 15000pF ±10% 3.2 1.6 1.6 1.2 0.3 min. GRM32QR72J223KW01L DC630 X7R (EIA) 22000pF ±10% 3.2 2.5 1.5 1.2 0.3 min. GRM32DR72J333KW01L DC630 X7R (EIA) 33000pF ±10% 3.2 2.5 2.0 1.2 0.3 min. 2.5 2.0 1.2 GRM32DR72J473KW01L DC630 X7R (EIA) 47000pF ±10% 3.2 0.3 min. GRM43QR72J683KW01L DC630 X7R (EIA) 68000pF ±10% 4.5 3.2 1.5 2.2 0.3 min. GRM43DR72J104KW01L DC630 X7R (EIA) $0.10 \mu F \pm 10\%$ 4.5 3.2 2.0 2.2 0.3 min. GRM55DR72J154KW01L 5.7 2.0 DC630 X7R (EIA) $0.15 \mu F \pm 10\%$ 5.0 3.2 0.3 min. 2.0 GRM55DR72J224KW01L DC630 X7R (EIA) $0.22 \mu F \pm 10\%$ 5.7 5.0 3.2 0.3 min. GRM31BR73A471KW01L DC1000 X7R (EIA) 470pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR73A102KW01L DC1000 X7R (EIA) 1000pF ±10% 3.2 1.6 1.2 0.3 min. 1.25 GRM31BR73A152KW01L 3.2 1.2 DC1000 X7R (EIA) 1500pF ±10% 1.6 0.3 min. GRM31BR73A222KW01L DC1000 X7R (EIA) 2200pF ±10% 3.2 1.6 1.25 1.2 0.3 min. 1.25 GRM31BR73A332KW01L DC1000 X7R (EIA) 3300pF ±10% 3.2 1.6 1.2 0.3 min. GRM31BR73A472KW01L DC1000 X7R (EIA) 4700pF ±10% 3.2 1.6 1.25 1.2 0.3 min. GRM32QR73A682KW01L DC1000 X7R (EIA) 6800pF ±10% 3.2 2.5 1.5 1.2 0.3 min. GRM32QR73A103KW01L 1.5 DC1000 X7R (EIA) 10000pF ±10% 3.2 2.5 1.2 0.3 min. GRM32DR73A153KW01L DC1000 X7R (EIA) 15000pF ±10% 3.2 2.5 2.0 1.2 0.3 min. 2.0 GRM32DR73A223KW01L DC1000 22000pF ±10% 3.2 2.5 1 2 X7R (EIA) $0.3 \, \text{min}$ GRM43DR73A333KW01L DC1000 X7R (EIA) 33000pF ±10% 4.5 3.2 2.0 2.2 0.3 min. GRM43DR73A473KW01L DC1000 X7R (EIA) 47000pF ±10% 4.5 3.2 2.0 2.2 0.3 min.

 $0.10 \mu F \pm 10\%$

5.7

5.0



AC250V Type GA2 Series

GRM Series Specifications and Test Methods

| No. | Item | ı | Specifications | Test Method | | |
|-----|------------------------------------|-------------|--|--|--|--|
| 1 | Operating Temperature | e Range | −55 to +125°C | - | | |
| 2 | Appearance | е | No defects or abnormalities | Visual inspection | | |
| 3 | Dimensions | 5 | Within the specified dimensions | Using calipers and micrometers | | |
| 4 | Dielectric S | itrength | No defects or abnormalities | No failure should be observed when 150% of the rated voltage (200% of the rated voltage in case of rated voltage: DC250V, 120% of the rated voltage in case of rated voltage: DC1kV) is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA. | | |
| 5 | Insulation Res (I.R.) | sistance | C≥0.01μF: More than $100M\Omega \bullet \mu F$ C<0.01μF: More than $10,000M\Omega$ | The insulation resistance should be measured with DC500±50V (DC250±25V in case of rated voltage: DC250V) and within 60±5 sec. of charging. | | |
| 6 | Capacitanc | е | Within the specified tolerance | The conscitoned /D C should be macoured at a fraguency of | | |
| 7 | Dissipation Factor (D.F. | | 0.025 max. | The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.) | | |
| 9 | Characteristics Adhesive Strength | | Cap. Change Within ±15% (Temp. Range: –55 to +125°C) No removal of the terminations or other defect should occur. | The capacitance measurement should be made at each step specified in the Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2 • Pretreatment Perform a heat treatment at 150±9°°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. Glass Epoxy Board Fig. 1 | | |
| | Appearance No defects or abnorma | | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board). | | |
| | С | Capacitance | Within the specified tolerance | The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied | | |
| 10 | Vibration Resistance D.F. | | 0.025 max. | uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). Solder resist Glass Epoxy Board | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





GRM Series Specifications and Test Methods

Continued from the preceding page.

| | Continued fr | om the prec | eding page. | | | | | | | | | |
|-----|---|---|------------------------------|---------------------------|---|---|---|--|--|--------------------------|--|--|
| No. | Ite | em | | Sr | oecification | ıs | | | Test Method | | | |
| 11 | Deflection Fig. 2 LXW Dimension (mm) (mm) a b c d 1.6x0.8 1.0 3.0 1.2 2.0x1.25 1.2 4.0 1.65 3.2x1.6 2.2 5.0 2.0 3.2x2.5 2.2 5.0 2.9 4.5x3.2 3.5 7.0 3.7 5.7x5.0 4.5 8.0 5.6 | | | | | | in Fig. 2. Then apply a The soldering should be cor | force in the direction shown is should be done using the reducted with care so that the effects such as heat shock. 20 50 Pressurizing Speed: 1.07 Pressurize Pressurize Flexur Capacitance meter 45 Fig. 3 | in Fig. 3. flow method and soldering is uniform g mm/s | | | |
| 12 | Solderab Terminati | | 75% of the term | inations are ^s | to be soldere | ed evenly and | d continuously. | Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0A(235±5°C H60A or H63A Eutectic Sol | | | | |
| 13 | Resistance to Soldering | Appearance Capacitance Change D.F. | Within ±10% 0.025 max. | | | | | | Preheat the capacitor at 120 to 150°C* for 1 min. Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s •Pretreatment Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* | | | |
| | Heat | " I.R. | | | _ | or more than 3.2×2.5mm Temperature 100 to 120°C 170 to 200°C | Time 1 min. 1 min. | | | | | |
| | | Appearance | No marking de | ects | | | | | tor to the supporting jig (glass | s epoxy board) shown | | |
| | | Capacitance Change | Within ±7.5% | | | | | in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed the following table. | | | | |
| | | D.F. | 0.025 max. | | | | | Let sit for 24±2 hrs. at room condition,* then measure. | | | | |
| | | I.R. | C≧0.01μF: Mo C<0.01μF: Mo | | • | | | Step 1 | Temperature (°C) Min. Operating Temp.±3 | Time (min.) 30±3 | | |
| 14 | Temperature Cycle | | σ τοιο τρι τ πιο | | | | | 2 3 4 •Pretreatme | Room Temp. Max. Operating Temp.±2 Room Temp. | 2 to 3 30±3 2 to 3 | | |
| | | Dielectric Strength In accordance with item No.4 | | | eat treatment at 150±1% C fo £2 hrs. at room condition.* | r 60±5 min. and then | | | | | | |
| | | Appearance | No marking de | ects | | | | | | | | |
| | | Capacitance Change | pacitance Within +15% | | | | for 500±24hrs | | | | | |
| 15 | Humidity (Steady | D.F. | 0.05 max. | | | | | Remove and measure. | let sit for 24±2 hrs. at room c | ondition,* then | | |
| 13 | State) | I.R. | C≧0.01μF: Mo C<0.01μF: Mo | | • | | | Pretreatme Perform a he | eat treatment at 150 ⁺ ₁ 8°C fo | r 60±5 min. and then | | |
| | | Dielectric Strength | In accordance | with item No | o.4 | | | let sit for 24 | ±2 hrs. at room condition.* | | | |

 $^{^{\}star}$ "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

GRM Series Specifications and Test Methods

Continued from the preceding page.

| No. | Ite | m | Specifications | Test Method | | | | |
|-----|----------------------------|---|---|---|--|--|--|--|
| | | Appearance | No marking defects | Apply 120% of the rated voltage (150% of the rated voltage in | | | | |
| | | Capacitance Change | Within ±15% (rated voltage: DC250V, DC630V) Within ±20% (rated voltage: DC1kV) | case of rated voltage: DC250V, 110% of the rated voltage in case of rated voltage: DC1kV) for 1,000±48hrs. at maximum | | | | |
| 16 | Life | D.F. 0.05 max. | 0.05 max. | operating temperature ±3°C. Remove and let sit for 24±2hrs. at room condition,* then measure. | | | | |
| | | I.R. $C \ge 0.01 \mu F$: More than $10 M \Omega \bullet \mu F$ $C < 0.01 \mu F$: More than $1,000 M \Omega$ | | The charge/discharge current is less than 50mA. •Pretreatment | | | | |
| | | Dielectric Strength | In accordance with item No.4 | Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.* | | | | |
| | | Appearance | No marking defects | | | | | |
| | Humidity Loading | Capacitance Change | Within ±15% | Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500±25hrs. | | | | |
| 17 | (Application: | D.F. | 0.05 max. | Remove and let sit for 24±2 hrs. at room condition,* then measure. | | | | |
| | DC250V, DC630V item) | I.R. | C≥0.01μF: More than $10M\Omega \cdot \mu F$ C<0.01μF: More than $1,000M\Omega$ | Pretreatment Apply test voltage for 60±5 min. at test temperature. | | | | |
| | , | Dielectric Strength | In accordance with item No.4 | Remove and let sit for 24±2 hrs. at room condition.* | | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors (Medium Voltage)



Soft Termination Type GRJ series

■ Features

- 1. Improves endurance against Board Bending Stress.
- Reduces the board bending stress by the conductive polymer termination.
- Use the GRJ21/31 types with flow or reflow soldering, and other types with reflow soldering only.

■ Applications

- 1. Ideal for use on diode-snubber circuits for switching power supplies.
- Ideal for use as primary-secondary coupling for DC-DC converters.
- 3. Ideal for use on line filters and ringer detectors for telephones, facsimiles and modems.

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Part Number | | Din | nensions (mm | 1) | |
|-------------|----------|-----------|--------------|----------|--------|
| Part Number | L | W | T | е | g min. |
| GRJ21A | 2.0 ±0.2 | 1.25 ±0.2 | 1.0 +0,-0.3 | | 0.7 |
| GRJ21B | 2.0 ±0.2 | 1.25 ±0.2 | 1.25 ±0.2 | | 0.7 |
| GRJ31B | 3.2 ±0.2 | 1.6 ±0.2 | 1.25 +0,-0.3 | | |
| GRJ31C | 3.2 ±0.2 | 1.0 ±0.2 | 1.6 ±0.2 | | 1.2 |
| GRJ32Q | 3.2 ±0.3 | 2.5 +0.2 | 1.5 +0,-0.3 | 0.3 min. | |
| GRJ32D | | 2.5 ±0.2 | 2.0 +0,-0.3 | | |
| GRJ43Q | 4.5 ±0.4 | 3.2 ±0.3 | 1.5 +0,-0.3 | | 22 |
| GRJ43D | 4.5 ±0.4 | 3.2 ±0.3 | 2.0 +0,-0.3 | | 2.2 |
| GRJ55D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0,-0.3 | | 3.2 |
| | | | | | |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|--------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GRJ21AR72E102KWJ1D | DC250 | X7R (EIA) | 1000pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21AR72E152KWJ1D | DC250 | X7R (EIA) | 1500pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21AR72E222KWJ1D | DC250 | X7R (EIA) | 2200pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21AR72E332KWJ1D | DC250 | X7R (EIA) | 3300pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21AR72E472KWJ1D | DC250 | X7R (EIA) | 4700pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21AR72E682KWJ1D | DC250 | X7R (EIA) | 6800pF ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GRJ21BR72E103KWJ3L | DC250 | X7R (EIA) | 10000pF ±10% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GRJ31BR72E153KWJ1L | DC250 | X7R (EIA) | 15000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72E223KWJ1L | DC250 | X7R (EIA) | 22000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31CR72E333KWJ3L | DC250 | X7R (EIA) | 33000pF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRJ31CR72E473KWJ3L | DC250 | X7R (EIA) | 47000pF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRJ31BR72E683KWJ1L | DC250 | X7R (EIA) | 68000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ32QR72E683KWJ1L | DC250 | X7R (EIA) | 68000pF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRJ31CR72E104KWJ3L | DC250 | X7R (EIA) | 0.10μF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRJ32DR72E104KWJ1L | DC250 | X7R (EIA) | 0.10μF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ32QR72E154KWJ1L | DC250 | X7R (EIA) | 0.15μF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRJ43QR72E154KWJ1L | DC250 | X7R (EIA) | 0.15μF ±10% | 4.5 | 3.2 | 1.5 | 2.2 | 0.3 min. |
| GRJ32DR72E224KWJ1L | DC250 | X7R (EIA) | 0.22μF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ43DR72E224KWJ1L | DC250 | X7R (EIA) | 0.22μF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ43DR72E334KWJ1L | DC250 | X7R (EIA) | 0.33μF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ55DR72E334KWJ1L | DC250 | X7R (EIA) | 0.33μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |
| GRJ43DR72E474KWJ1L | DC250 | X7R (EIA) | 0.47μF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ55DR72E474KWJ1L | DC250 | X7R (EIA) | 0.47μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |
| GRJ55DR72E105KWJ1L | DC250 | X7R (EIA) | 1.0μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |
| GRJ31BR72J102KWJ1L | DC630 | X7R (EIA) | 1000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72J152KWJ1L | DC630 | X7R (EIA) | 1500pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72J222KWJ1L | DC630 | X7R (EIA) | 2200pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |



| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|--------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| GRJ31BR72J332KWJ1L | DC630 | X7R (EIA) | 3300pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72J472KWJ1L | DC630 | X7R (EIA) | 4700pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72J682KWJ1L | DC630 | X7R (EIA) | 6800pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR72J103KWJ1L | DC630 | X7R (EIA) | 10000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31CR72J153KWJ3L | DC630 | X7R (EIA) | 15000pF ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |
| GRJ32QR72J223KWJ1L | DC630 | X7R (EIA) | 22000pF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRJ32DR72J333KWJ1L | DC630 | X7R (EIA) | 33000pF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ32DR72J473KWJ1L | DC630 | X7R (EIA) | 47000pF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ43QR72J683KWJ1L | DC630 | X7R (EIA) | 68000pF ±10% | 4.5 | 3.2 | 1.5 | 2.2 | 0.3 min. |
| GRJ43DR72J104KWJ1L | DC630 | X7R (EIA) | 0.10μF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ55DR72J154KWJ1L | DC630 | X7R (EIA) | 0.15μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |
| GRJ55DR72J224KWJ1L | DC630 | X7R (EIA) | 0.22μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |
| GRJ31BR73A471KWJ1L | DC1000 | X7R (EIA) | 470pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR73A102KWJ1L | DC1000 | X7R (EIA) | 1000pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR73A152KWJ1L | DC1000 | X7R (EIA) | 1500pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR73A222KWJ1L | DC1000 | X7R (EIA) | 2200pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR73A332KWJ1L | DC1000 | X7R (EIA) | 3300pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ31BR73A472KWJ1L | DC1000 | X7R (EIA) | 4700pF ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GRJ32QR73A682KWJ1L | DC1000 | X7R (EIA) | 6800pF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRJ32QR73A103KWJ1L | DC1000 | X7R (EIA) | 10000pF ±10% | 3.2 | 2.5 | 1.5 | 1.2 | 0.3 min. |
| GRJ32DR73A153KWJ1L | DC1000 | X7R (EIA) | 15000pF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ32DR73A223KWJ1L | DC1000 | X7R (EIA) | 22000pF ±10% | 3.2 | 2.5 | 2.0 | 1.2 | 0.3 min. |
| GRJ43DR73A333KWJ1L | DC1000 | X7R (EIA) | 33000pF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ43DR73A473KWJ1L | DC1000 | X7R (EIA) | 47000pF ±10% | 4.5 | 3.2 | 2.0 | 2.2 | 0.3 min. |
| GRJ55DR73A104KWJ1L | DC1000 | X7R (EIA) | 0.10μF ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |



GRJ Series Specifications and Test Methods

| No. | Ite | em | Specifications | | Test Method | | |
|-----|---|-------------|--|--|--|--|--|
| 1 | Operating Temperatu | ıre Range | -55 to +125°C | | - | | |
| 2 | Appearan | ice | No defects or abnormalities | Visual inspection | | | |
| 3 | Dimensio | ns | Within the specified dimensions | Using calipers and | micrometers | | |
| 4 | Dielectric | Strength | No defects or abnormalities | applied between the | e observed when voltage in the Table is e terminations for 1 to 5 sec., provided the urrent is less than 50mA. Test Voltage 200% of the rated voltage 150% of the rated voltage 120% of the rated voltage | | |
| 5 | Insulation F (I.R.) | Resistance | C≥0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ | The insulation resistance should be measured with DC500± (DC250±25V in case of rated voltage: DC250V) and within 6 sec. of charging. | | | |
| 6 | Capacitar | nce | Within the specified tolerance | The canacitance/D | .F. should be measured at a frequency of | | |
| 7 | Dissipation Factor (D. | | 0.025 max. | | tage of AC1±0.2V(r.m.s.) | | |
| 8 | Capacitance Temperature Characteristics | | Cap. Change Within ±15% (Temp. Range: –55 to +125°C) | Step 1 2 3 4 5 •Pretreatment Perform a heat tre | easurement should be made at each step ble. Temperature (°C) 25±2 Min. Operating Temp.±3 25±2 Max. Operating Temp.±2 25±2 eatment at 150±0/10°C for 60±5 min. and then at room condition.* | | |
| 9 | Adhesive Strength of Termination | | No removal of the terminations or other defect should occur. | in Fig. 1. Then apply 10N for The soldering shoul should be conducted. | r to the testing jig (glass epoxy board) shown rece in the direction of the arrow. Id be done using the reflow method and ad with care so that the soldering is uniform such as heat shock. 10N, 10±1s Glass Epoxy Board Fig. 1 | | |
| | | Appearance | No defects or abnormalities | Solder the capacito | or to the test jig (glass epoxy board). | | |
| | | Capacitance | Within the specified tolerance | The capacitor shou | ld be subjected to a simple harmonic motion | | |
| 10 | Vibration Resistance | D.F. | 0.025 max. | having a total amplitude of 1.5mm, the frequency be uniformly between the approximate limits of 10 and frequency range, from 10 to 55Hz and return to 10H traversed in approximately 1 min. This motion shoul for a period of 2 hrs. in each of 3 mutually perpendidirections (total of 6 hrs.). Solder resist Glass Epoxy Board | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

GRJ Series Specifications and Test Methods

| 7 | Continued fr | om the prec | eding page. | | | | | | | | |
|-----|------------------------------------|-------------------------------|---|--------------------------------------|---|--------------|-----------------|---|---|------------------------------|--|
| No. | Ite | em | | S | pecification | ns | | | Test Method | | |
| | | Appearance Capacitance Change | No marking def | ects | b | φ4.5 | | in Fig. 2. Then apply a The soldering | pacitor to the testing jig (glass force in the direction shown i should be done using the re aducted with care so that the | n Fig. 3. flow method and | |
| 11 | 1 Deflection | | LXW (mm) 2.0×1.25 3.2×1.6 3.2×2.5 4.5×3.2 5.7×5.0 | a 1.2 2.2 2.2 3.5 4.5 | 100 Fig. 2 Dimens b 4.0 5.0 5.0 7.0 8.0 | t:1.6 C | d 1.0 | 20 50 Pressurizing speed: 1.0mm/s Pressurize R230 Flexure=3 Capacitance meter 45 (in mm) Fig. 3 | | | |
| 12 | Solderabi Terminati | • | 75% of the termi | nations are | to be soldere | ed evenly an | d continuously. | Immerse the capacitor in a solution of ethanol (JIS-K-8101) a rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5C 235±5°C H60A or H63A Eutectic Solder | | | |
| | | Appearance | No marking def | ects | | | | | apacitor at 120 to 150°C* for | | |
| | | Capacitance Change | Within ±10% | | | | | sec. Let sit at •Immersing | capacitor in solder solution at room condition* for 24±2 hrs speed: 25±2.5mm/s | | |
| 13 | Resistance to Soldering Heat | D.F. | 0.025 max. C≧0.01μF: Mor C<0.01μF: Mor | | • | | | | nt eat treatment at 150 ⁺ ₁ %°C fo ±2 hrs. at room condition.* | r 60±5 min. and then | |
| | | Dielectric Strength | In accordance v | with item N | 0.4 | | | *Preheating to Step 1 2 | for more than 3.2×2.5mm Temperature 100 to 120°C 170 to 200°C | Time 1 min. 1 min. | |
| | | Appearance | No marking def | ects | | | | Fix the capac | itor to the supporting jig (glass | epoxy board) shown | |
| | | Capacitance Change | Within ±7.5% | | | | | in Fig. 4. Perform the 5 the following | cycles according to the 4 heatable. | at treatments listed in | |
| | | D.F. | 0.025 max. | | | | | | 2 hrs. at room condition,* the | n measure. | |
| | | I.R. | C≧0.01μF: Mor C<0.01μF: Mor | | • | | | Step 1 | Temperature (°C) Min. Operating Temp.±3 | Time (min.) | |
| | Temperature | | | | | | | $\begin{array}{c} 2 \\ \hline 3 \\ 4 \end{array}$ | Room Temp. Max. Operating Temp.±2 Room Temp. | 2 to 3 30±3 2 to 3 | |
| 14 | Cycle | Dielectric Strength | In accordance v | with item N | 0.4 | | | | eat treatment at 150±18°C fo ±2 hrs. at room condition.* | r 60±5 min. and then | |
| | | Appearance | No marking def | ects | | | | | | | |
| | | Capacitance Change | Within ±15% | | | | | for 500±26hrs | | • | |
| 15 | Humidity (Steady | D.F. | 0.05 max. | | | | | Remove and measure. | let sit for 24±2 hrs. at room o | ondition,* then | |
| | State) | I.R. | C≥0.01μF: Mor C<0.01μF: Mor | | | | | | nt eat treatment at 150 ⁺ 1 ⁰ °C fo ±2 hrs. at room condition.* | r 60±5 min. and then | |
| | | Dielectric Strength | In accordance v | with item N | 0.4 | | | 101 211 101 24 | LE 1113. AL TOUTH COMUNION." | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





GRJ Series Specifications and Test Methods

Continued from the preceding page.

| No. | Ite | em | Specifications | | Test Method | | | | |
|-----|---------------------|------------------------|--|---|--|--|--|--|--|
| | | Appearance | No marking defects | , | ble for 1,000±48hrs. at maximum | | | | |
| | | Capacitance Change | Within ±15% (rated voltage: DC250V, DC630V) Within ±20% (rated voltage: DC1kV) | room condition,* then | | | | | |
| | | D.F. | 0.05 max. | Rated Voltage DC250V | Applied Voltage 150% of the rated voltage | | | | |
| 16 | Life | I.R. | C≧0.01μF: More than 10MΩ • μF C<0.01μF: More than 1,000MΩ | DC630V DC1kV | 120% of the rated voltage 110% of the rated voltage | | | | |
| | | Dielectric Strength | In accordance with item No.4 | The charge/discharge current is less than 50mA. •Pretreatment Apply test voltage for 60±5 min. at test temperature. Remove and let sit for 24±2 hrs. at room condition.* | | | | | |
| | | Appearance | No marking defects | | | | | | |
| | Humidity Loading | Capacitance Change | Within ±15% | 95% for 500 ^{±2} 6hrs. | Apply the rated voltage at 40±2°C and relative humidity of 90 95% for 500±26hrs. | | | | |
| 17 | (Application: | D.F. | 0.05 max. | Remove and let sit for measure. | 24±2 hrs. at room condition,* then | | | | |
| ., | item) | I.R. | C≥0.01μF: More than 10M Ω • μF C<0.01μF: More than 1,000M Ω | Pretreatment Apply test voltage for | | | | | |
| | | Dielectric Strength | In accordance with item No.4 | Remove and let sit fo | | | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors (Medium Voltage)



For LCD Backlight Inverter Circuit GRM/DC3.15kV Series

■ Features

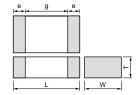
- 1. Low-loss and suitable for high frequency circuits
- Murata's original internal electrode structure realizes high flash-over voltage.
- A new monolithic structure for small, surfacemountable devices capable of operating at high voltage levels.
- 4. Sn-plated external electrodes realize good solderability.
- 5. Only for reflow soldering
- Capacitance values less than 22pF can be used in LCD backlight inverter circuits as long as the applied voltage, peak to peak, is less than 4.0kV at 100kHz or less.



Ideal for use as the ballast in LCD backlight inverter.

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Dort Number | | Dimensions (mm) | | | | | | | |
|-------------|----------|-----------------|--------------|--------|--------|--|--|--|--|
| Part Number | L | W | Т | e min. | g min. | | | | |
| GRM42A | 4.5 ±0.3 | 2.0 ±0.2 | 1.0 +0, -0.3 | 0.3 | 2.9 | | | | |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GRM42A5C3F050DW01L | DC3150 | C0G (EIA) | 5.0 ±0.5pF | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F100JW01L | DC3150 | C0G (EIA) | 10 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F120JW01L | DC3150 | C0G (EIA) | 12 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F150JW01L | DC3150 | C0G (EIA) | 15 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F180JW01L | DC3150 | C0G (EIA) | 18 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F220JW01L | DC3150 | C0G (EIA) | 22 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F270JW01L | DC3150 | C0G (EIA) | 27 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F330JW01L | DC3150 | C0G (EIA) | 33 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F390JW01L | DC3150 | COG (EIA) | 39 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |
| GRM42A5C3F470JW01L | DC3150 | COG (EIA) | 47 ±5% | 4.5 | 2.0 | 1.0 | 2.9 | 0.3 min. |



AC250V Type GA2 Series

GRM/DC3.15kV Series Specifications and Test Methods

| No. | Ite | m | Specifications | Test Method | | |
|-----|------------------------------------|------------|---|--|--|--|
| 1 | Operating Temperatu | re Range | −55 to +125°C | _ | | |
| 2 | Appearan | ce | No defects or abnormalities | Visual inspection | | |
| 3 | Dimensio | ns | Within the specified dimension | Using calipers and micrometers | | |
| 4 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when DC4095V is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA. | | |
| 5 | Insulation F (I.R.) | Resistance | More than $10,000M\Omega$ | The insulation resistance should be measured with DC500±50V and within 60±5 sec. of charging. | | |
| 6 | Capacitar | nce | Within the specified tolerance | The capacitance/Q should be measured at a frequency of | | |
| 7 | Q | | 1,000 min. | 1±0.2MHz and a voltage of AC0.5 to 5V(r.m.s.) | | |
| | | | | The capacitance measurement should be made at each step specified in the Table. | | |
| 8 | Capacitar Temperat Character | ure | Temp. Coefficient 0±30ppm/℃ (Temp. Range: +25 to +125℃) 0+30, -72ppm/℃ (Temp. Range: -55 to +25℃) | Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2 | | |
| 9 | Adhesive Strength of Termination | | No removal of the terminations or other defect should occur. | Solder the capacitor to the testing jig (glass epoxy board) show in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 10N, 10±1s Glass Epoxy Board Fig. 1 | | |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig (glass epoxy board). | | |
| 10 | Capacitance | | Within the specified tolerance 1,000 min. | The capacitor should be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). Solder resist Glass Epoxy Board | | |
| | | | No marking defects | Solder the capacitor to the testing jig (glass epoxy board) shown | | |
| 11 | 1 Deflection | | Dimension (mm) C C C C C C C C C | in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. | | |
| | | | | Fig. 3 | | |





AC250V Type GA2 Series

GRM/DC3.15kV Series Specifications and Test Methods

Continued from the preceding page.

| lo. | Ite | m | Specifications | Test Method | | | | | |
|-----|-------------------------|------------------------|---|--|--|--|--|--|--|
| 12 | Solderabi Terminati | | 75% of the terminations are to be soldered evenly and continuously. | Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s Temp. of solder: 245±5°C Lead Free Solder (Sn-3.0Ag-0.5Cu) 235±5°C H60A or H63A Eutectic Solder | | | | | |
| | | Appearance | No marking defects | Preheat the capacitor as in table. | | | | | |
| | | Capacitance Change | Within ±2.5% | Immerse the capacitor in solder solution at 260±5°C for 10±1 sec Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s | | | | | |
| 13 | Resistance to Soldering | Q | 1,000 min. | | | | | | |
| | Heat | I.R. | More than $10,000 M\Omega$ | *Preheating | | | | | |
| | | Dielectric | | Step Temperature Time | | | | | |
| | | Strength | In accordance with item No.4 | 1 100 to 120℃ 1 min. 2 170 to 200℃ 1 min. | | | | | |
| | | | | | | | | | |
| | | Appearance | No marking defects | Fix the capacitor to the supporting jig (glass epoxy board) showr in Fig. 4. | | | | | |
| | | Capacitance Change | Within ±2.5% | Perform the 5 cycles according to the 4 heat treatments listed the following table. | | | | | |
| | | Q | 1,000 min. | Let sit for 24±2 hrs. at room condition,* then measure. | | | | | |
| | | I.R. | More than 10,000MΩ | Step Temperature (°C) Time (min.) 1 Min. Operating Temp.±3 30±3 | | | | | |
| 14 | Temperature Cycle | Dielectric Strength | In accordance with item No.4 | 1 Min. Operating Temp.±3 30±3 2 Room Temp. 2 to 3 3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3 4 Room Temp. 2 to 3 Solder resist Cu Glass Epoxy Board Fig. 4 | | | | | |
| | | Appearance | No marking defects | | | | | | |
| | Humidity | Capacitance Change | Within ±5.0% | Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% | | | | | |
| 15 | (Steady | Q | 350 min. | for 500 ⁺² dhrs. Remove and let sit for 24±2 hrs. at room condition,* then | | | | | |
| | State) | I.R. | More than 1,000M Ω | measure. | | | | | |
| | | Dielectric Strength | In accordance with item No.4 | | | | | | |
| | | Appearance | No marking defects | | | | | | |
| | | Capacitance Change | Within ±3.0% | Apply 120% of the rated voltage for 1,000 ^{±48} hrs. at maximum operating temperature ±3°C. | | | | | |
| 16 | Life | Q | 350 min. | Remove and let sit for 24±2 hrs. at room condition,* then | | | | | |
| | | I.R. | More than 1,000M Ω | measure. | | | | | |
| | | Dielectric Strength | In accordance with item No.4 | The charge/discharge current is less than 50mA. | | | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors (Medium Voltage)



For Information Devices GR4 Series

■ Features

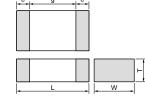
- These items are designed specifically for telecommunications devices (IEEE802.3) in Ethernet LAN and primary-secondary coupling for DC-DC converters.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- Sn-plated external electrodes realize good solderability.
- 4. Only for reflow soldering

■ Applications

- Ideal for use on telecommunications devices in Ethernet LAN
- Ideal for use as primary-secondary coupling for DC-DC converters

Do not use these products in any Automotive
Power train or Safety equipment including Battery
charger for Electric Vehicles and Plug-in Hybrid.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Part Number | Dimensions (mm) | | | | | | | |
|-------------|-----------------|----------|--------------|--------|--------|--|--|--|
| Part Number | L | W | T | e min. | g min. | | | |
| GR442Q | 4.5 ±0.3 | 2.0 ±0.2 | 1.5 +0, -0.3 | | | | | |
| GR443D | 4.5 ±0.4 | 3.2 ±0.3 | 2.0 +0, -0.3 | 0.3 | 2.5 | | | |
| GR443Q | 4.5 ±0.4 | 3.2 ±0.3 | 1.5 +0, -0.3 | 0.3 | | | | |
| GR455D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0, -0.3 | | 3.2 | | | |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| GR442QR73D101KW01L | DC2000 | X7R (EIA) | 100 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D121KW01L | DC2000 | X7R (EIA) | 120 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D151KW01L | DC2000 | X7R (EIA) | 150 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D181KW01L | DC2000 | X7R (EIA) | 180 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D221KW01L | DC2000 | X7R (EIA) | 220 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D271KW01L | DC2000 | X7R (EIA) | 270 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D331KW01L | DC2000 | X7R (EIA) | 330 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D391KW01L | DC2000 | X7R (EIA) | 390 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D471KW01L | DC2000 | X7R (EIA) | 470 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D561KW01L | DC2000 | X7R (EIA) | 560 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D681KW01L | DC2000 | X7R (EIA) | 680 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D821KW01L | DC2000 | X7R (EIA) | 820 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D102KW01L | DC2000 | X7R (EIA) | 1000 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D122KW01L | DC2000 | X7R (EIA) | 1200 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR442QR73D152KW01L | DC2000 | X7R (EIA) | 1500 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GR443QR73D182KW01L | DC2000 | X7R (EIA) | 1800 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GR443QR73D222KW01L | DC2000 | X7R (EIA) | 2200 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GR443QR73D272KW01L | DC2000 | X7R (EIA) | 2700 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GR443QR73D332KW01L | DC2000 | X7R (EIA) | 3300 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GR443QR73D392KW01L | DC2000 | X7R (EIA) | 3900 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GR443DR73D472KW01L | DC2000 | X7R (EIA) | 4700 ±10% | 4.5 | 3.2 | 2.0 | 2.5 | 0.3 min. |
| GR455DR73D103KW01L | DC2000 | X7R (EIA) | 10000 ±10% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |

| No. | Ite | m | Specifications | | Test Method | | |
|-----|---|-------------|--|--|--|---------------|--|
| 1 | Operating Temperatu | re Range | −55 to +125°C | | - | | |
| 2 | Appearan | ce | No defects or abnormalities | Visual inspection | | | |
| 3 | Dimension | ns | Within the specified dimensions | Using calipers and | micrometers | | |
| 4 | 4 Dielectric Strength | | No defects or abnormalities | | e observed when voltage in the terminations, provided the cloom. Test Voltage | | |
| | | | | DC2kV | 120% of the rated voltage | 60±1 sec. | |
| | | | | | AC1500V(r.m.s.) | 60±1 sec. | |
| 5 | Pulse Volt | tage | No self healing breakdowns or flash-overs have taken place in the capacitor. | Applied Pulse: 1.2/50µs Applied Voltage: 2.5kVo-p | | | |
| 6 | Insulation R (I.R.) | Resistance | More than $6{,}000M\Omega$ | The insulation resis and within 60±5 se | tance should be measured w c. of charging. | ith DC500±50V | |
| 7 | Capacitar | nce | Within the specified tolerance | The conscitones/D | C should be messured at a | fraguana, of | |
| 8 | Dissipatio Factor (D. | | 0.025 max. | The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.) | | | |
| 9 | Capacitance 9 Temperature Characteristics | | Cap. Change within ±15% (Temp. Range: −55 to +125°C) | The capacitance measurement should be made at each step specified in the Table. Step Temperature (°C) 1 25±2 2 Min. Operating Temp.±3 3 25±2 4 Max. Operating Temp.±2 5 25±2 • Pretreatment Perform a heat treatment at 150 ⁺⁰ / ₋₁₀ °C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* | | | |
| 10 | Adhesive of Termina | | in Fig. 1. Then apply 10N fo The soldering sho should be conduct | | tor to the testing jig (glass epoxy board) shown orce in the direction of the arrow. Duld be done using the reflow method and extend with care so that the soldering is uniform as such as heat shock. 10N, 10±1s Glass Epoxy Board | | |
| | | Appearance | No defects or abnormalities | | r to the test jig (glass epoxy l | , | |
| | | Capacitance | Within the specified tolerance | · · | ld be subjected to a simple h itude of 1.5mm, the frequenc | | |
| 11 | Vibration Resistance | on | | uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). Solder resist Glass Epoxy Board | | | |

^{* &}quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





Continued from the preceding page.

| \overline{A} | Continued from the preceding page. | | | | | | | | | | | |
|----------------|------------------------------------|-------------------------------|--------------------------------|--------------|--------------|---|--|--|--|-------------------------------|--|--|
| No. | Ite | em | | Sį | pecification | s | | | Test Method | | | |
| 12 | Solderability of | | Fig. 2 LXW Dimension (mm) | | | | | Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 20 50 Pressurizing speed: 1.0mm/s Pressurize Pressurize Flexure=1 Capacitance meter 45 (in mm) Fig. 3 Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5 sec. Immersing speed: 25±2.5mm/s | | | | |
| | | | No modern defeate | | | | | | ler: 245±5°C Lead Free Solde 235±5°C H60A or H63A E | | | |
| | | Appearance | No marking defe | ects | | | | | apacitor as in table. capacitor in solder solution at | 260±5℃ for 10±1 | | |
| | | Capacitance Change D.F. | Within ±10% 0.025 max. | | | | | sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s •Pretreatment | | | | |
| 14 | Resistance to Soldering | I.R. | More than 1,000 | ΟΜΩ | | | | | eat treatment at 150 [±] ₁°°C for 2 hrs. at room condition.* | 60±5 min. and then | | |
| | Heat | Dielectric Strength | In accordance w | vith item No | o.4 | | | *Preheating Step 1 2 | Temperature 100 to 120°C 170 to 200°C | Time 1 min. 1 min. | | |
| | | Appearance | No marking defe | ects | | | | 1 | itor to the supporting jig (glass | epoxy board) shown | | |
| | | Capacitance Change | Within ±15% | | | | | in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. | | | | |
| | | D.F. | 0.05 max. | | | | | Let sit for 24±2 hrs. at room condition,* then measure. | | | | |
| | | I.R. | More than 3,000 | ΩΜΩ | | | | Step 1 2 | Temperature (°C) Min. Operating Temp.±3 Room Temp. | Time (min.) 30±3 2 to 3 | | |
| 15 | Temperature Cycle | | | | | | | 3 4 | Max. Operating Temp.±2 Room Temp. | 30±3 2 to 3 | | |
| | 7- | Dielectric Strength | In accordance with item No.4 | | | | | •Pretreatment Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* | | | | |
| | | Appearance | No marking defe | ects | | | | | | | | |
| | Humidity | Capacitance Change | Within ±15% | | | | | for 500 ⁺² 6hr | itor sit at 40±2°C and relative h s. let sit for 24±2 hrs. at room c | • | | |
| 16 | (Steady | D.F. | 0.05 max. | | | | | measure. | | - | | |
| | State) | I.R. | More than 1,000 | ΟΜΩ | | | | Pretreatmer Perform a he | | 60±5 min. and then | | |
| | | Dielectric Strength | In accordance w | vith item No | D.4 | | | Perform a heat treatment at 150 [±] ₁8°c for 60±5 min. and then let sit for 24±2 hrs. at room condition.* | | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





Continued from the preceding page.

| No. | Item | | Specifications | Test Method | | | | |
|-----|------|------------------------|------------------------------|---|--|--|--|--|
| | | Appearance | No marking defects | | | | | |
| | | Capacitance Change | Within ±20% | Apply 110% of the rated voltage for 1,000 ^{±48} hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure. | | | | |
| 17 | Life | D.F. | 0.05 max. | The charge/discharge current is less than 50mA. | | | | |
| | | I.R. | More than $2,000M\Omega$ | Pretreatment Apply test voltage for 60±5 min. at test temperature. | | | | |
| | | Dielectric Strength | In accordance with item No.4 | Remove and let sit for 24±2 hrs. at room condition.* | | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors (Medium Voltage)



For Camera Flash Circuit GR7 Series

■ Features

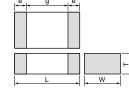
- Suitable for the trigger of the flash circuit, because real capacitance is stable during operating voltage.
- 2. The thin type fits thinner cameras.
- Sn-plated external electrodes realize good solderability.
- 4. For flow and reflow soldering

■ Applications

For strobe circuit

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Part Number | Dimensions (mm) | | | | | | | | |
|-------------|-----------------|-----------|---------------|--------|-----|--|--|--|--|
| Part Number | L W T | | e min. | g min. | | | | | |
| GR721A | 2.0 ±0.2 | 1.25 ±0.2 | 1.0 +0, -0.3 | | 0.7 | | | | |
| GR721B | 2.0 ±0.2 | 1.23 ±0.2 | 1.25 ±0.2 | | 0.7 | | | | |
| GR731A | | | 1.0 +0, -0.3 | 0.3 | 1.2 | | | | |
| GR731B | 3.2 ±0.2 | 1.6 ±0.2 | 1.25 +0, -0.3 | | | | | | |
| GR731C | | | 1.6 ±0.2 | | | | | | |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GR721AW0BB103KW01D | DC350 | - | 10000 ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GR731AW0BB103KW01D | DC350 | - | 10000 ±10% | 3.2 | 1.6 | 1.0 | 1.2 | 0.3 min. |
| GR721AW0BB153KW01D | DC350 | - | 15000 ±10% | 2.0 | 1.25 | 1.0 | 0.7 | 0.3 min. |
| GR731AW0BB153KW01D | DC350 | - | 15000 ±10% | 3.2 | 1.6 | 1.0 | 1.2 | 0.3 min. |
| GR721BW0BB223KW03L | DC350 | - | 22000 ±10% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GR731AW0BB223KW01D | DC350 | - | 22000 ±10% | 3.2 | 1.6 | 1.0 | 1.2 | 0.3 min. |
| GR731BW0BB223KW01L | DC350 | - | 22000 ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GR721BW0BB273KW03L | DC350 | - | 27000 ±10% | 2.0 | 1.25 | 1.25 | 0.7 | 0.3 min. |
| GR731AW0BB273KW01D | DC350 | - | 27000 ±10% | 3.2 | 1.6 | 1.0 | 1.2 | 0.3 min. |
| GR731AW0BB333KW01D | DC350 | - | 33000 ±10% | 3.2 | 1.6 | 1.0 | 1.2 | 0.3 min. |
| GR731BW0BB333KW01L | DC350 | - | 33000 ±10% | 3.2 | 1.6 | 1.25 | 1.2 | 0.3 min. |
| GR731CW0BB473KW03L | DC350 | - | 47000 ±10% | 3.2 | 1.6 | 1.6 | 1.2 | 0.3 min. |



| No. | Ite | m | Specifications | Test Method | | | |
|-----|---|---------------|---|--|--|--|--|
| 1 | Operating Temperatur | e Range | −55 to +125°C | - | | | |
| 2 | Appearan | ce | No defects or abnormalities | Visual inspection | | | |
| 3 | Dimension | ıs | Within the specified dimensions | Using calipers and micrometers | | | |
| 4 | Dielectric | Strength | No defects or abnormalities | No failure should be observed when DC500V is applied between the terminations for 1 to 5 sec., provided the charge/discharge current is less than 50mA. | | | |
| 5 | Insulation R (I.R.) | esistance | C≥0.01μF: More than 100MΩ • μF C<0.01μF: More than 10,000MΩ | The insulation resistance should be measured with DC250±50V and within 60±5 sec. of charging. | | | |
| 6 | Capacitan | се | Within the specified tolerance | The considered /D C should be recovered at a function of | | | |
| 7 | Dissipation Factor (D. | | 0.025 max. | The capacitance/D.F. should be measured at a frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.) | | | |
| 9 | Capacitan Temperati Characteri Adhesive of Termina | are estics | Cap. Change Within ±10% (Apply DC350V bias) Within ±33% (No DC bias) (Temp. Range: -55 to +125°C) No removal of the terminations or other defect should occur. | The capacitance measurement should be made at each step specified in the Table. Step | | | |
| | | Appearance | No defects or abnormalities | Fig. 1 Solder the capacitor to the test jig (glass epoxy board). | | | |
| | | Capacitance | Within the specified tolerance | The capacitor should be subjected to a simple harmonic motion | | | |
| | | oapacitatice | Within the specified tolerance | having a total amplitude of 1.5mm, the frequency being varied | | | |
| 10 | Vibration Resistance | D.F. | 0.025 max. | uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, should be traversed in approximately 1 min. This motion should be applied for a period of 2 hrs. in each of 3 mutually perpendicular directions (total of 6 hrs.). | | | |
| | | | | FZA FZA FZA FZA FZA Solder resist Cu Glass Epoxy Board | | | |

 $^{^{\}star}$ "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





Continued from the preceding page.

| No. | Ite | em | | Sį | pecification | s | | | Test Method | | |
|-----|------------------------------------|------------------------|--|--------------|--------------|-------------|-----------------|---|--|-----------------------------------|--|
| | | | No marking def | ects | | | | Solder the cap | pacitor to the testing jig (glass | epoxy board) shown | |
| 11 | Deflection | ı | ## ## ## ## ## ## ## ## ## ## ## ## ## | | | | | | in Fig. 2. Then apply a force in the direction shown in Fig. 3. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 20 50 Pressurizing speed: 1.0mm/s Pressurize Pressurize | | |
| | | | (mm) | а | Dimensi | ion (mm) | d | | Capacitance meter | | |
| | | | 2.0×1.25 3.2×1.6 | 1.2 2.2 | 4.0 5.0 | 1.65 2.0 | 1.0 | | 45 × 45 | (in mm) | |
| 12 | Termination | | 75% of the termi | | | | d continuously. | rosin (JIS-K-5 Immerse in so Immersing sp | Fig. 3 capacitor in a solution of etha 902) (25% rosin in weight probler solution for 2±0.5 sec. eed: 25±2.5mm/s er: 245±5°C Lead Free Solde 235±5°C H60A or H63A B | oportion). er (Sn-3.0Ag-0.5Cu) | |
| | | Appearance | No marking def | ects | | | | | | | |
| | Declateres | Capacitance Change | Within ±10% | | | | | Preheat the capacitor at 120 to 150°C for 1 min. Immerse the capacitor in solder solders at 260±5°C for 10±1 | | | |
| 13 | Resistance to Soldering Heat | D.F. | 0.025 max. | | | | | | room condition* for 24±2 hrs peed: 25±2.5mm/s | ., then measure. | |
| | | I.R. | C≧0.01μF: Mor C<0.01μF: Mor | | | | | Pretreatment Perform a he | It eat treatment at 150 [±] ₁8 ℃ for | 60±5 min. and then | |
| | | Dielectric Strength | In accordance v | with item No | 0.4 | | | let sit for 243 | -2 hrs. at room condition.* | | |
| | - | Appearance | No marking def | ects | | | | Fix the capaci in Fig. 4. | tor to the supporting jig (glass | epoxy board) shown | |
| | | Capacitance Change | Within ±7.5% | | | | | Perform the 5 the following | Perform the 5 cycles according to the 4 heat treatments listed in the following table. | | |
| | | D.F. | 0.025 max. | | мо г | | | Let sit for 24±2 hrs. at room condition,* then measure. | | | |
| | | I.R. | C≧0.01μF: Mor C<0.01μF: Mor | | • | | | Step 1 | Temperature (℃) Min. Operating Temp.±3 | Time (min.) 30±3 | |
| 14 | Temperature | | | · · · · | | | | 2 3 4 | Room Temp. Max. Operating Temp.±2 Room Temp. | 2 to 3 30±3 2 to 3 | |
| 17 | Cycle | Dielectric Strength | In accordance v | vith item No | ɔ.4 | | | Perform a he | Pretreatment Perform a heat treatment at 150 [±] 18 °C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* Solder resist Glass Epoxy Board Fig. 4 | | |
| | | Appearance | No marking def | ects | | | | | - | | |
| | | Capacitance Change | Within ±15% | | | | | for 500 ⁺² 6 hr | | • | |
| 15 | Humidity (Steady | D.F. | 0.05 max. | | | | | Remove and measure. | let sit for 24±2 hrs. at room c | ondition,* then | |
| | State) | I.R. | C≧0.01μF: Mor C<0.01μF: Mor | | • | | | Pretreatmen Perform a he | at treatment at 150±₁8 ℃ for | 60±5 min. and then | |
| | | Dielectric Strength | In accordance v | with item No | o.4 | | | let sit for 24±2 hrs. at room condition.* | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





AC250V Type GA2 Series

GR7 Series Specifications and Test Methods

Continued from the preceding page.

| No. | Ite | em . | Specifications | Test Method | | | |
|-----|----------|------------------------|---|--|--|--|--|
| | | Appearance | No marking defects | | | | |
| | | Capacitance Change | Within ±15% | Apply DC350V for 1,000 ^{±48} hrs. at maximum operating temperature ±3°C. Remove and let sit for 24±2 hrs. at room | | | |
| 16 | Life | D.F. | 0.05 max. | condition,* then measure. The charge/discharge current is less than 50mA. | | | |
| | Life | I.R. | C≥0.01μF: More than 10M Ω • μF C<0.01μF: More than 1,000M Ω | Pretreatment Apply test voltage for 60±5 min. at test temperature. | | | |
| | | Dielectric Strength | In accordance with item No.4 | Remove and let sit for 24±2 hrs. at room condition.* | | | |
| | | Appearance | No marking defects | | | | |
| | | Capacitance Change | Within ±15% | Apply the rated voltage at $40\pm2^{\circ}$ and relative humidity of 90 to 95% for 500^{+24}_{\circ} hrs. | | | |
| 17 | Humidity | D.F. | 0.05 max. | Remove and let sit for 24±2 hrs. at room condition,* then measure. | | | |
| ., | Loading | I.R. | C≥0.01μF: More than 10M Ω • μF C<0.01μF: More than 1,000M Ω | Pretreatment Apply test voltage for 60±5 min. at test temperature. | | | |
| | | Dielectric Strength | In accordance with item No.4 | Remove and let sit for 24±2 hrs. at room condition.* | | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors



AC250V Type (Which Meet Japanese Law) GA2 Series

■ Features

- 1. Chip monolithic ceramic capacitor for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels
- Sn-plated external electrodes realize good solderability.
- 4. Only for reflow soldering
- 5. Capacitance 0.01 to 0.1uF for connecting lines and 470 to 4700pF for connecting lines to earth.

■ Applications

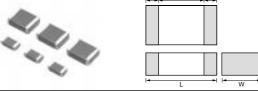
Noise suppression filters for switching power supplies, telephones, facsimiles, modems.

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.

■ Reference Standard

GA2 series obtains no safety approval. This series is based on the standards of the electrical appliance and material safety law of Japan (separated table 4).

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|--------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GA242QR7E2471MW01L | AC250 (r.m.s.) | X7R (EIA) | 470pF ±20% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA242QR7E2102MW01L | AC250 (r.m.s.) | X7R (EIA) | 1000pF ±20% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA243QR7E2222MW01L | AC250 (r.m.s.) | X7R (EIA) | 2200pF ±20% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA243QR7E2332MW01L | AC250 (r.m.s.) | X7R (EIA) | 3300pF ±20% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA243DR7E2472MW01L | AC250 (r.m.s.) | X7R (EIA) | 4700pF ±20% | 4.5 | 3.2 | 2.0 | 2.5 | 0.3 min. |
| GA243QR7E2103MW01L | AC250 (r.m.s.) | X7R (EIA) | 10000pF ±20% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA243QR7E2223MW01L | AC250 (r.m.s.) | X7R (EIA) | 22000pF ±20% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA243DR7E2473MW01L | AC250 (r.m.s.) | X7R (EIA) | 47000pF ±20% | 4.5 | 3.2 | 2.0 | 2.5 | 0.3 min. |
| GA255DR7E2104MW01L | AC250 (r.m.s.) | X7R (EIA) | 0.10μF ±20% | 5.7 | 5.0 | 2.0 | 3.2 | 0.3 min. |



| Part Number | Dimensions (mm) | | | | | | | |
|-------------|-----------------|----------|--------------|--------|--------|--|--|--|
| Part Number | L | W | Т | e min. | g min. | | | |
| GA242Q | 4.5 ±0.3 | 2.0 ±0.2 | 1.5 +0, -0.3 | | | | | |
| GA243D | 4.5 ±0.4 | 3.2 ±0.3 | 2.0 +0, -0.3 | 0.3 | 2.5 | | | |
| GA243Q | | 3.2 ±0.3 | 1.5 +0, -0.3 | 0.3 | 1 | | | |
| GA255D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0, -0.3 | | 3.2 | | | |

| No. | Ite | m | Specifications | Test M | ethod |
|-----|--|-------------|---|--|--|
| 1 | Operating Temperatu | re Range | −55 to +125°C | _ | |
| 2 | Appearan | ce | No defects or abnormalities | Visual inspection | |
| 3 | Dimension | ns | Within the specified dimensions | Using calipers and micrometers | |
| 4 | Dielectric | Strength | No defects or abnormalities | No failure should be observed w applied between the terminations charge/discharge current is less Nominal Capacitance C≥10,000pF C<10,000pF | s for 60±1 sec., provided the |
| 5 | Insulation F | Resistance | More than $2,000M\Omega$ | The insulation resistance should be and within 60±5 sec. of charging. | pe measured with DC500±50V |
| 6 | Capacitar | nce | Within the specified tolerance | | |
| 7 | Dissipation Factor (D. | | 0.025 max. | The capacitance/D.F. should be 1±0.2kHz and a voltage of AC1= | |
| 8 | Capacitar Temperat Character | ure | Cap. Change Within ±15% (Temp. Range: −55 to +125°C) | 1 Min. 3 | Pemperature (°C) 25±2 Operating Temp.±3 25±2 Operating Temp.±2 25±2 |
| 9 | Discharge Test (Application: Nominal Capacitance C<10,000pF) | Appearance | No defects or abnormalities | As in Fig., discharge is made 50 the capacitor (Cd) charged at DC R3 | C voltage of specified. R1 Ct R2 test Cd: 0.001μF |
| 10 | Adhesive of Termin | | No removal of the terminations or other defects should occur. | Solder the capacitor to the testing in Fig. 1. Then apply 10N force in the direct should be done using the reflow n conducted with care so that the so defects such as heat shock. | tion of the arrow. The soldering nethod and should be oldering is uniform and free of 10N, 10±1s |
| | | Appearance | No defects or abnormalities | Solder the capacitor to the test jig | |
| | | Capacitance | Within the specified tolerance | The capacitor should be subjecte having a total amplitude of 1.5mn | • |
| 11 | Vibration Resistance | D.F. | 0.025 max. | uniformly between the approxima frequency range, from 10 to 55Hz traversed in approximately 1 min. for a period of 2 hrs. in each of 3 directions (total of 6 hrs.). | te limits of 10 and 55Hz. The and return to 10Hz, should be This motion should be applied mutually perpendicular |

 $^{^*}$ "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





Continued from the preceding page.

| No. | Ite | em | | S | pecification | าร | | | Test Method | | |
|-----|--|---------------------------|---|-----------------|---------------------------------------|---|-----|--|--|------------------------|--|
| | | | No marking def | ects | | | | Solder the cap | pacitor to the testing jig (glass | epoxy board) shown | |
| | | | | | b c c c c c c c c c | φ4.5 | | Then apply a force in the direction shown in Fig. 3. The solderin should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. | | | |
| 12 | Deflection | n | | √ ////// | 4 ////// | t: 1.6 | | | 20 ⁵⁰ Pressurizing speed: 1.0m | m/s | |
| 12 | Dellection | '' | | ı | 100 Fig. 2 | 1 | | | ☐ ↓ Pressurize | | |
| | | | | | - | | | R230 | | | |
| | | | L×W | | Dimens | sion (mm) | d | | Flexure | e=1 | |
| | | | (mm) 4.5×2.0 | 3.5 | 7.0 | 2.4 | u | | Capacitance meter | | |
| | | | 4.5×3.2 | 3.5 | 7.0 | 3.7 | 1.0 | | 45 45 | (in mm) | |
| | | | 5.7×5.0 | 4.5 | 8.0 | 5.6 | | | Fig. 3 | | |
| 13 | Solderability of Termination 75% of the terminations are to be soldered evenly and conti | | | | d continuously. | Immerse the capacitor in a solution of ethanol (JIS-K-8101) an rosin (JIS-K-5902) (25% rosin in weight proportion). | | | | | |
| | | Appearance | No marking def | ects | | | | | | | |
| | | Capacitance Change | Within ±15% | | | | | The capacitor | should be subjected to 40±2° | C relative humidity of | |
| 14 | Humidity | D.F. | 0.05 max. | | | | | | 8 hrs., and then removed in re | | |
| | Insulation | I.R. | More than 1,00 | 0ΜΩ | | | | hrs. until 5 cyc | cles. | | |
| | | Dielectric Strength | In accordance with item No.4 | | | | | | | | |
| | | Appearance | No marking def | ects | | | | Preheat the c | apacitor as in table. | | |
| | | Capacitance Change | Within $\pm 10\%$ 0.025 max. More than $2,000M\Omega$ | | | | | Immerse the capacitor in solder solution at 260±5°C for 10±1 sec. Let sit at room condition* for 24±2 hrs., then measure. •Immersing speed: 25±2.5mm/s •Pretreatment Perform a heat treatment at 150±1°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.* | | | |
| | Decistores | D.F. | | | | | | | | | |
| 15 | Resistance to Soldering | I.R. | | | | | | | | | |
| | Heat | | | | | | | *Preheating | =2 nrs. at room condition." | | |
| | | Dielectric | In accordance v | with item N | 0.4 | | | Step | Temperature | Time | |
| | | Strength | | | | | | | 100 to 120℃ 170 to 200℃ | 1 min. 1 min. | |
| | | | | | | | | | | | |
| | | Appearance Capacitance | No marking def Within ±15% | ects | | | | in Fig. 4. | tor to the supporting jig (glass cycles according to the 4 hea | | |
| | | Change | | | | | | the following t | able. | | |
| | | D.F. | 0.05 max. | | | | | Let sit for 24± | 2 hrs. at room condition,* ther | n measure. | |
| | | I.R. | More than 2,00 | 0ΜΩ | | | | Step | Temperature (℃) Min. Operating Temp.±3 | Time (min.) | |
| | | | | | | | | 1 | Room Temp. | 30±3 2 to 3 | |
| | | | | | | | | 3 | Max. Operating Temp.±2 | 30±3 | |
| 16 | Temperature | | | | | | | 4 | Room Temp. | 2 to 3 | |
| 10 | Cycle | Dielectric Strength | In accordance v | with item N | o.4 | | | | t eat treatment at 150 [±] 18°C for -2 hrs. at room condition.* | 60±5 min. and then | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Continued on the following page.

Cu Glass Epoxy Board

Fig. 4





 $^{^{\}star}$ "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued from the preceding page.

| No. | Ite | m | Specifications | Test Method | | |
|-----|------------------------|--------------------------------|------------------------------|---|--|--|
| | | Appearance Capacitance | No marking defects | Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500±25hrs. | | |
| 4- | Humidity | Change | Within ±15% | Remove and let sit for 24±2 hrs. at room condition,* then | | |
| 17 | (Steady State) | D.F. | 0.05 max. | measure. •Pretreatment | | |
| | | I.R. | More than 1,000M Ω | Perform a heat treatment at 150 [±] ₁8°C for 60±5 min. and then | | |
| | | Dielectric Strength | In accordance with item No.4 | let sit for 24±2 hrs. at room condition.* | | |
| | | Appearance | No marking defects | Apply voltage and time as in Table at maximum operating | | |
| | | Capacitance Change | Within ±20% | temperature ±3°C. Remove and let sit for 24±2 hrs. at room condition,* then measure. The charge / discharge current is less than 50mA. | | |
| | | D.F. | 0.05 max. | Nominal Capacitance Test Time Test Voltage | | |
| | | I.R. | More than $1,000M\Omega$ | C≥10,000pF 1,000 ⁺⁴⁸ / _o hrs. AC300V (r.m.s.) | | |
| 18 | Life | Dielectric Strength | In accordance with item No.4 | C<10,000pF | | |
| | | Appearance | No marking defects | | | |
| | | Capacitance Change Within ±15% | | Apply the rated voltage at 40±2°C and relative humidity of 90 to 95% for 500 ^{±2} 6hrs. Remove and let sit for 24±2 hrs. at room condition,* then | | |
| 19 | Humidity Loading | D.F. | 0.05 max. | measure. | | |
| | Localing | I.R. | More than 1,000M Ω | Pretreatment Apply test voltage for 60±5 min. at test temperature. | | |
| | Dielectric Strength | | In accordance with item No.4 | Remove and let sit for 24±2 hrs. at room condition.* | | |

^{* &}quot;Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



Chip Monolithic Ceramic Capacitors



Safety Standard Certified GA3 Series UL, IEC60384-14 Class X1/Y2 Type GC

■ Features

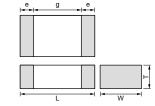
- 1. Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 3. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 4. Type GC can be used as an X1-class and Y2-class capacitor, line-by-pass capacitor of UL1414.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

■ Applications

- Ideal for use as Y capacitor or X capacitor for various switching power supplies
- 2. Ideal for modem applications

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Part Number | Dimensions (mm) | | | | | |
|-------------|-----------------|----------|----------|--------|--------|--|
| Part Number | L | W | T | e min. | g min. | |
| GA355D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 ±0.3 | 0.3 | 4.0 | |

■ Standard Certification

| | Standard No. | Class | Rated Voltage | |
|-------|--|--------------|--------------------|--|
| UL | UL1414 | Line By-pass | | |
| VDE | IEC 60384-14 EN 60384-14 | | | |
| BSI | EN 60065 (14.2) IEC 60384-14 EN 60384-14 | X1, Y2 | AC250V (r.m.s.) | |
| SEMKO | IEC 60384-14 EN 60384-14 | | | |
| ESTI | EN 60065 IEC 60384-14 | | | |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GA355DR7GC101KY02L | AC250 (r.m.s.) | X7R (EIA) | 100 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC151KY02L | AC250 (r.m.s.) | X7R (EIA) | 150 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC221KY02L | AC250 (r.m.s.) | X7R (EIA) | 220 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |
| GA355DR7GC331KY02L | AC250 (r.m.s.) | X7R (EIA) | 330 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |



Chip Monolithic Ceramic Capacitors



Safety Standard Certified GA3 Series IEC60384-14 Class Y2, X1/Y2 Type GF

■ Features

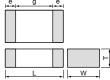
- 1. Available for equipment based on IEC/EN60950 and UL1950. Besides, the GA352/355 types are available for equipment based on IEC/EN60065, UL1492, and UL6500.
- 2. Type GF can be used as a Y2-class capacitor.
- 3. A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering

■ Applications

- 1. Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment
- 3. Ideal for use as Y capacitor or X capacitor for various switching power supplies (GA352/355 types only)

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.





| Part Number | Dimensions (mm) | | | | | | |
|-------------|-----------------|----------|--------------|--------|--------|--|--|
| Part Number | L | W | Т | e min. | g min. | | |
| GA342A | | | 1.0 +0, -0.3 | | | | |
| GA342D | 4.5 ±0.3 | 2.0 ±0.2 | 2.0 ±0.2 | | 2.5 | | |
| GA342Q | | | 1.5 +0, -0.3 | 0.3 | | | |
| GA352Q | | 2.8 ±0.3 | 1.5 +0, -0.3 | 0.3 | | | |
| GA355D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0, -0.3 | | 4.0 | | |
| GA355Q | | 3.0 ±0.4 | 1.5 +0, -0.3 | | | | |

■ Standard Certification

| | Standard | | Status of C | Rated | |
|-------|--------------|--------|------------------|-----------------------------|----------|
| | No. | Class | Size : 4.5×2.0mm | Size: 5.7×2.8mm and over | Voltage |
| UL | UL1414 | X1, Y2 | _ | 0 | |
| UL | UL 60950-1 | _ | 0 | _ | AC250V |
| VDE | IEC 60384-14 | X1, Y2 | _ | 0 | (r.m.s.) |
| SEMKO | EN 60384-14 | Y2 | 0 | 0 | |

Applications

| Size | Switching power supplies | Communication network devices such as a modem |
|--------------------|--------------------------|---|
| 4.5×2.0mm | _ | 0 |
| 5.7×2.8mm and over | 0 | 0 |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GA342D1XGF100JY02L | AC250 (r.m.s.) | SL (JIS) | 10 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGF120JY02L | AC250 (r.m.s.) | SL (JIS) | 12 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGF150JY02L | AC250 (r.m.s.) | SL (JIS) | 15 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGF180JY02L | AC250 (r.m.s.) | SL (JIS) | 18 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGF220JY02L | AC250 (r.m.s.) | SL (JIS) | 22 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342A1XGF270JW31L | AC250 (r.m.s.) | SL (JIS) | 27 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF330JW31L | AC250 (r.m.s.) | SL (JIS) | 33 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF390JW31L | AC250 (r.m.s.) | SL (JIS) | 39 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF470JW31L | AC250 (r.m.s.) | SL (JIS) | 47 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF560JW31L | AC250 (r.m.s.) | SL (JIS) | 56 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF680JW31L | AC250 (r.m.s.) | SL (JIS) | 68 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGF820JW31L | AC250 (r.m.s.) | SL (JIS) | 82 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342QR7GF101KW01L | AC250 (r.m.s.) | X7R (EIA) | 100 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GF151KW01L | AC250 (r.m.s.) | X7R (EIA) | 150 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342DR7GF221KW02L | AC250 (r.m.s.) | X7R (EIA) | 220 ±10% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342DR7GF331KW02L | AC250 (r.m.s.) | X7R (EIA) | 330 ±10% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342QR7GF471KW01L | AC250 (r.m.s.) | X7R (EIA) | 470 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA352QR7GF471KW01L | AC250 (r.m.s.) | X7R (EIA) | 470 ±10% | 5.7 | 2.8 | 1.5 | 4.0 | 0.3 min. |
| GA342QR7GF681KW01L | AC250 (r.m.s.) | X7R (EIA) | 680 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA352QR7GF681KW01L | AC250 (r.m.s.) | X7R (EIA) | 680 ±10% | 5.7 | 2.8 | 1.5 | 4.0 | 0.3 min. |
| GA342DR7GF102KW02L | AC250 (r.m.s.) | X7R (EIA) | 1000 ±10% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA352QR7GF102KW01L | AC250 (r.m.s.) | X7R (EIA) | 1000 ±10% | 5.7 | 2.8 | 1.5 | 4.0 | 0.3 min. |



| Continued from the preceding | g page. | | | | | | | - 10 |
|------------------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|---------------------|
| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
| GA352QR7GF152KW01L | AC250 (r.m.s.) | X7R (EIA) | 1500 ±10% | 5.7 | 2.8 | 1.5 | 4.0 | 0.3 min. |
| GA355QR7GF182KW01L | AC250 (r.m.s.) | X7R (EIA) | 1800 ±10% | 5.7 | 5.0 | 1.5 | 4.0 | 0.3 min. |
| GA355QR7GF222KW01L | AC250 (r.m.s.) | X7R (EIA) | 2200 ±10% | 5.7 | 5.0 | 1.5 | 4.0 | 0.3 min. |
| GA355QR7GF332KW01L | AC250 (r.m.s.) | X7R (EIA) | 3300 ±10% | 5.7 | 5.0 | 1.5 | 4.0 | 0.3 min. |
| GA355DR7GF472KW01L | AC250 (r.m.s.) | X7R (EIA) | 4700 ±10% | 5.7 | 5.0 | 2.0 | 4.0 | 0.3 min. |



Only for Applications

Chip Monolithic Ceramic Capacitors



Safety Standard Certified GA3 Series IEC60384-14 Class Y3 Type GD

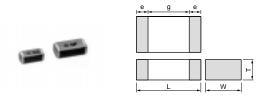
■ Features

- Available for equipment based on IEC/EN60950 and UL1950.
- 2. Type GD can be used as a Y3-class capacitor.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. +125 degree C guaranteed
- 5. Only for reflow soldering

■ Applications

- Ideal for use on line filters and couplings for DAA modems without transformers
- 2. Ideal for use on line filters for information equipment

Do not use these products in any Automotive Power train or Safety equipment including Battery chargers for Electric Vehicles and Plug-in Hybrids. Only Murata products clearly stipulated as "for Automotive use" can be used for automobile applications such as Power train and Safety equipment.



| Part Number | Dimensions (mm) | | | | | | |
|-------------|-----------------|----------|--------------|--------|--------|--|--|
| Part Number | L | W | T | e min. | g min. | | |
| GA342A | | | 1.0 +0, -0.3 | | | | |
| GA342D | 4.5 ±0.3 | 2.0 ±0.2 | 2.0 ±0.2 | | | | |
| GA342Q | | | 1.5 +0, -0.3 | 0.3 | 2.5 | | |
| GA343D | 4.5 ±0.4 | 3.2 ±0.3 | 2.0 +0, -0.3 | | | | |
| GA343Q | 4.5 ±0.4 | | 1.5 +0, -0.3 | | | | |

■ Standard Certification

| | Standard No. | Class | Rated Voltage |
|-------|-----------------------------|-------|----------------|
| UL | UL 60950-1 | | |
| SEMKO | IEC 60384-14 EN 60384-14 | Y3 | AC250V(r.m.s.) |

Applications

| Size | Switching power supplies | Communication network devices such as a modem |
|---------------------|--------------------------|---|
| 4.5×3.2mm and under | _ | 0 |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GA342D1XGD100JY02L | AC250 (r.m.s.) | SL (JIS) | 10 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD120JY02L | AC250 (r.m.s.) | SL (JIS) | 12 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD150JY02L | AC250 (r.m.s.) | SL (JIS) | 15 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD180JY02L | AC250 (r.m.s.) | SL (JIS) | 18 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342D1XGD220JY02L | AC250 (r.m.s.) | SL (JIS) | 22 ±5% | 4.5 | 2.0 | 2.0 | 2.5 | 0.3 min. |
| GA342A1XGD270JW31L | AC250 (r.m.s.) | SL (JIS) | 27 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD330JW31L | AC250 (r.m.s.) | SL (JIS) | 33 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD390JW31L | AC250 (r.m.s.) | SL (JIS) | 39 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD470JW31L | AC250 (r.m.s.) | SL (JIS) | 47 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD560JW31L | AC250 (r.m.s.) | SL (JIS) | 56 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD680JW31L | AC250 (r.m.s.) | SL (JIS) | 68 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342A1XGD820JW31L | AC250 (r.m.s.) | SL (JIS) | 82 ±5% | 4.5 | 2.0 | 1.0 | 2.5 | 0.3 min. |
| GA342QR7GD101KW01L | AC250 (r.m.s.) | X7R (EIA) | 100 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD151KW01L | AC250 (r.m.s.) | X7R (EIA) | 150 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD221KW01L | AC250 (r.m.s.) | X7R (EIA) | 220 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD331KW01L | AC250 (r.m.s.) | X7R (EIA) | 330 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD471KW01L | AC250 (r.m.s.) | X7R (EIA) | 470 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD681KW01L | AC250 (r.m.s.) | X7R (EIA) | 680 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD102KW01L | AC250 (r.m.s.) | X7R (EIA) | 1000 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA342QR7GD152KW01L | AC250 (r.m.s.) | X7R (EIA) | 1500 ±10% | 4.5 | 2.0 | 1.5 | 2.5 | 0.3 min. |
| GA343QR7GD182KW01L | AC250 (r.m.s.) | X7R (EIA) | 1800 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA343QR7GD222KW01L | AC250 (r.m.s.) | X7R (EIA) | 2200 ±10% | 4.5 | 3.2 | 1.5 | 2.5 | 0.3 min. |
| GA343DR7GD472KW01L | AC250 (r.m.s.) | X7R (EIA) | 4700 ±10% | 4.5 | 3.2 | 2.0 | 2.5 | 0.3 min. |



Chip Monolithic Ceramic Capacitors



Safety Standard Certified GA3 Series IEC60384-14 Class X2 Type GB

■ Features

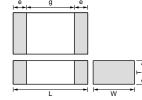
- 1. Type GB can be used as an X2-class capacitor.
- Chip monolithic ceramic capacitor (certified as conforming to safety standards) for AC lines.
- A new monolithic structure for small, high capacitance capable of operating at high voltage levels.
- 4. Compared to lead type capacitors, this new capacitor is greatly downsized and low-profiled to 1/10 or less in volume, and 1/4 or less in height.
- 5. +125 degree C guaranteed
- 6. Only for reflow soldering

■ Applications

Ideal for use as X capacitor for various switching power supplies

Do not use these products in any Automotive
Power train or Safety equipment including Battery
chargers for Electric Vehicles and Plug-in Hybrids.
Only Murata products clearly stipulated as
"for Automotive use" can be used for automobile
applications such as Power train and Safety equipment.





| Part Number | Dimensions (mm) | | | | | | |
|-------------|------------------|----------|-------------|--------|--------|--|--|
| Part Number | L | W | Т | e min. | g min. | | |
| GA355Q | | | 1.5 +0,-0.3 | | 3.0 | | |
| GA355D | 5.7 ±0.4 | 5.0 ±0.4 | 2.0 +0,-0.3 | 0.3 | | | |
| GA355E | 3.7 <u>1</u> 0.4 | | 2.5 +0,-0.3 | | | | |
| GA355X | | | 2.9 +0,-0.4 | | | | |

■ Standard Certification

| | Standard No. | Class | Rated Voltage |
|-------|-----------------------------|-------|--------------------|
| VDE | | | |
| SEMKO | IEC 60384-14 EN 60384-14 | X2 | AC250V (r.m.s.) |
| ESTI | | | , , |

| Part Number | Rated Voltage (V) | TC Code (Standard) | Capacitance (pF) | Length L (mm) | Width W (mm) | Thickness T (mm) | Electrode g min. (mm) | Electrode e (mm) |
|--------------------|----------------------|-----------------------|---------------------|------------------|-----------------|------------------|-----------------------------|------------------|
| GA355QR7GB103KW01L | AC250 (r.m.s.) | X7R (EIA) | 10000 ±10% | 5.7 | 5.0 | 1.5 | 3.0 | 0.3 min. |
| GA355QR7GB153KW01L | AC250 (r.m.s.) | X7R (EIA) | 15000 ±10% | 5.7 | 5.0 | 1.5 | 3.0 | 0.3 min. |
| GA355DR7GB223KW01L | AC250 (r.m.s.) | X7R (EIA) | 22000 ±10% | 5.7 | 5.0 | 2.0 | 3.0 | 0.3 min. |
| GA355ER7GB333KW01L | AC250 (r.m.s.) | X7R (EIA) | 33000 ±10% | 5.7 | 5.0 | 2.5 | 3.0 | 0.3 min. |
| GA355ER7GB473KW01L | AC250 (r.m.s.) | X7R (EIA) | 47000 ±10% | 5.7 | 5.0 | 2.5 | 3.0 | 0.3 min. |
| GA355XR7GB563KW06L | AC250 (r.m.s.) | X7R (EIA) | 56000 ±10% | 5.7 | 5.0 | 2.9 | 3.0 | 0.3 min. |



| Ne | 10 - | m | Cacifications | Tool Mothod | | |
|-----|--|------------------------|--|---|--|--|
| No. | Operating | em | Specifications | Test Method | | |
| 1 | Temperatu | ıre Range | -55 to +125℃ | - | | |
| 2 | Appearan | ice | No defects or abnormalities | Visual inspection | | |
| 3 | Dimensio | ns | Within the specified dimensions | Using calipers and micrometers | | |
| 4 | 4 Dielectric Strength | | No defects or abnormalities | No failure should be observed when voltage in the table is applied between the terminations for 60±1 sec., provided the charge/discharge current is less than 50mA. Test Voltage Type GB DC1075V Type GC/GD AC1500V (r.m.s.) Type GF AC2000V (r.m.s.) | | |
| 5 | Pulse Vol (Applicati GD/GF) | on: Type | No self healing breakdowns or flash-overs have taken place in the capacitor. | 10 impulses of alternating polarity are subjected. (5 impulses for each polarity) The interval between impulses is 60 sec. Applied Pulse: 1.2/50µs Applied Voltage: 2.5kVo-p The insulation resistance should be measured with DC500±50V | | |
| 6 | (I.R.) | Colorado | More than $6,000M\Omega$ | and within 60±5 sec. of charging. | | |
| 7 | Capacitar | nce | Within the specified tolerance | | | |
| 8 | Dissipation Factor (D.F.) | | Char. Specification X7R D.F.≤0.025 SL Q≥400+20C*² (C<30pF) | The capacitance/Q/D.F. should be measured at a frequency of 1±0.2kHz (SL char.: 1±0.2MHz) and a voltage of AC1±0.2V (r.m.s.) | | |
| 9 | Capacitance 9 Temperature Characteristics | | Char. Capacitance Change X7R Within ±15% Temperature characteristic guarantee is −55 to +125°C Char. Temperature Coefficient SL +350 to −1000ppm/°C Temperature characteristic guarantee is +20 to +85°C | The capacitance measurement should be made at each step specified in the Table. Step Temperature (°C) 1 25±2 (20±2 for SL char.) 2 Min. Operating Temp.±3 3 25±2 (20±2 for SL char.) 4 Max. Operating Temp.±2 5 25±2 (20±2 for SL char.) SL char.: The capacitance should be measured at even 85°C between step 3 and step 4. • Pretreatment for X7R char. Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1 | | |
| | | Appearance | No defects or abnormalities | As in Fig., discharge is made 50 times at 5 sec. intervals from | | |
| | | I.R. | More than 1,000M Ω | the capacitor (Cd) charged at DC voltage of specified. | | |
| 10 | Discharge Test (Application: Type GC) | Dielectric Strength | In accordance with item No.4 | R3 R1 Ct: Capacitor under test Cd: 0.001μF R1: 1,000Ω R2: 100ΜΩ R3: Surge resistance | | |
| 11 | Adhesive Strength of Termination | | No removal of the terminations or other defect should occur. | Solder the capacitor to the testing jig (glass epoxy board) shown in Fig. 1. Then apply 10N force in the direction of the arrow. The soldering should be done using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. 10N, 10±1s Glass Epoxy Board Glass Epoxy Board | | |

^{*1 &}quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





^{*2 &}quot;C" expresses nominal capacitance value (pF).

Continued from the preceding page.

| | | | 9 9 | | | | | | | |
|-----|--|------------|--|-----------------------------|------------|--------------|-----|---|--|---|
| No. | Ite | m | | Specifications | | | | | Test Method | |
| | | Appearance | No defects or a | abnormalitie | s | | | Solder the capacitor to the test jig (glass epoxy board). The capacitor should be subjected to a simple harmonic motic | | |
| | Capacitance | | Within the spec | cified tolerar | nce | | | having a total uniformly bety frequency ran | should be subjected to a si amplitude of 1.5mm, the freween the approximate limits uge, from 10 to 55Hz and retropproximately 1 min. This mo | equency being varied of 10 and 55Hz. The urn to 10Hz, should be |
| | Vilenetien | | | | | | | | f 2 hrs. in each of 3 mutually | |
| 12 | Vibration Resistance | | Char. | Specific | | | | directions (tot | al of 6 hrs.). | |
| | Resistance | D.F. | X7R | D.F.≦(| | _ | | | | |
| | Q SL Q≥400+20C*2 (C<30pF) Q≥1000 (C≥30pF) | | | | | | | | | |
| | | | No marking de | fects | | | | Solder the cap | pacitor to the testing jig (glas | ss epoxy board) shown |
| | | | | | | φ4.5 Φ4.5 | | should be dor conducted wit | force in the direction shown ne using the reflow method a th care so that the soldering as heat shock. | and should be |
| | | | | 100 t: 1.6 | | | | 20 ⁵⁰ Pressurizing ⊢-1 speed: 1.0mm/s | | |
| 13 | Deflection | า | | | Fig. 2 | | | | R230 Pressurize | IIIIVS |
| | | | LXW | | Dimensi | on (mm) | | | | |
| | | | (mm) | а | b | С | d | | Flexu | re=1 |
| | | | 4.5×2.0 | 3.5 | 7.0 | 2.4 | | | Capacitance meter | (in mm) |
| | | | 4.5×3.2 5.7×2.8 | 3.5 4.5 | 7.0 8.0 | 3.7 | 1.0 | | 45 45 | |
| | | | 5.7×5.0 | 4.5 | 8.0 | 5.6 | | | Fig. 3 | |
| 14 | Solderabi Terminati | • | 75% of the terminations are to be soldered evenly and continuously | | | | | rosin (JIS-K-5 Immerse in so Immersing sp | capacitor in a solution of eth 1902) (25% rosin in weight p older solution for 2±0.5 sec. eed: 25±2.5mm/s ler: 245±5°C Lead Free Sol 235±5°C H60A or H63A | der (Sn-3.0Ag-0.5Cu) |
| | | Appearance | No marking de | fects | | | | | capacitor as in table. Immer | |
| | | | Char. | Capacitanc | e Change | | | | on at 260±5°C for 10±1 sec. | Let sit at room |
| | Capacitance | | X7R | Within : | | _ | | | r 24±2 hrs., then measure. speed: 25±2.5mm/s | |
| | Resistance | Change | | ithin ±2.5% Vhichever is | • | _ | | •Pretreatmen | nt for X7R char. eat treatment at 150±₁8℃ fo | or 60±5 min. and then |
| 15 | to Soldering Heat | I.R. | More than 1,00 | 00ΜΩ | | | | let sit for 24± | ±2 hrs. at room condition.*1 | |
| | | Dielectric | | | | | | *Preheating | | |
| | | Strength | In accordance | with item No | 0.4 | | | Step | Temperature | Time |
| | | | | | | | | 1 | 100 to 120℃ | 1 min. |

^{*1 &}quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

1 min.





2

170 to 200℃

^{*2 &}quot;C" expresses nominal capacitance value (pF).

Continued from the preceding page.

| No. | Ite | m | Specifications | Test Method | | | | |
|-------|--|-------------------------------|---|--|--|--|--|--|
| | $\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$ | | Char. Capacitance Change X7R Within ±15% SI Within ±2.5% or ±0.25pF | Fix the capacitor to the supporting jig (glass epoxy board) shown in Fig. 4. Perform the 5 cycles according to the 4 heat treatments listed in the following table. Let sit for 24±2 hrs. at room condition,*¹ then measure. Step Temperature (°C) Time (min.) | | | | |
| 16 | | | Char. Specification X7R D.F.≤0.05 SL Q≥400+20C*2 (C<30pF) | 1 Min. Operating Temp.±3 30±3 2 Room Temp. 2 to 3 3 Max. Operating Temp.±2 30±3 4 Room Temp. 2 to 3 • Pretreatment for X7R char. Perform a heat treatment at 150 [±] -18°C for 60±5 min. and the let sit for 24±2 hrs. at room condition.*1 Glass Epoxy Board | | | | |
| | | Appearance | No marking defects | Fig. 4 | | | | |
| | _ | Capacitance Change | Char. Capacitance Change X7R Within ±15% SL Within ±5.0% or ±0.5pF (Whichever is larger) | Before this test, the test shown in the following is performed. Item 11 Adhesive Strength of Termination (applied force is 5N Item 13 Deflection | | | | |
| 17 (S | umidity Steady State) | D.F. Q | Char. Specification X7R D.F.≤0.05 SL Q≥275+5/2C*² (C<30pF) | Let the capacitor sit at 40±2°C and relative humidity of 90 to 95% for 500±26 hrs. Remove and let sit for 24±2 hrs. at room condition,*1 then measure. •Pretreatment for X7R char. | | | | |
| | | I.R. Dielectric | More than 3,000M Ω In accordance with item No.4 | Perform a heat treatment at 150 [±] 10 [∞] € for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1 | | | | |
| | | Strength Appearance | No marking defects | Before this test, the test shown in the following is performed. | | | | |
| | | Capacitance Change D.F. | $ \begin{array}{c cccc} \hline \textbf{Char.} & \textbf{Capacitance Change} \\ \hline \textbf{X7R} & \textbf{Within} \pm 20\% \\ \hline \textbf{SL} & \textbf{Within} \pm 3.0\% \text{ or} \pm 0.3 \text{pF} \\ \hline \textbf{(Whichever is larger)} \\ \hline \hline \textbf{Char.} & \textbf{Specification} \\ \hline \textbf{X7R} & \textbf{D.F.} \leq 0.05 \\ \hline \textbf{SL} & \textbf{Q} \geq 275 + 5/2 \textbf{C*}^2 \text{ (C} < 30 \text{pF)} \\ \hline \textbf{Q} \geq 350 & \textbf{(C} \geq 30 \text{pF)} \\ \hline \end{array} $ | -Item 11 Adhesive Strength of Termination (apply force is 5N) -Item 13 Deflection Impulse Voltage Each individual capacitor should be subjected to a 2.5kV (Type GC/GF: 5kV) Impulse (the voltage value means zero to peak) for three times. Then the capacitors are applied to life test. | | | | |
| 18 Li | ife | I.R. | More than $3{,}000M\Omega$ | Apply voltage as in Table for 1,000 hrs. at 125±6℃, relative humidity 50% max. | | | | |
| | | Dielectric Strength | In accordance with item No.4 | Type Applied Voltage GB AC312.5V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. GC GF GD AC425V (r.m.s.), except that once each hour the voltage is increased to AC1,000V (r.m.s.) for 0.1 sec. Let sit for 24±2 hrs. at room condition,*1 then measure. • Pretreatment for X7R char. Perform a heat treatment at 150±18°C for 60±5 min. and then let sit for 24±2 hrs. at room condition.*1 | | | | |

^{*1 &}quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





^{*2 &}quot;C" expresses nominal capacitance value (pF).

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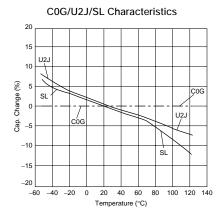
| No. | Ite | em | Specifications | Test Method | | | |
|-----|-------------------------------|-------------------------------|--|--|--|--|--|
| | | Appearance Capacitance Change | No marking defects Char. Capacitance Change X7R Within ±15% SL Within ±5.0% or ±0.5pF (Whichever is larger) | Before this test, the test shown in the following is performedItem 11 Adhesive Strength of Termination (apply force is 5N) -Item 13 Deflection | | | |
| 19 | Humidity Loading D.F. Q | | Char. Specification X7R D.F.≤0.05 SL Q≥275+5/2C*² (C<30pF) | Apply the rated voltage at 40±2°C and relative humidity of 90°95% for 500±26 hrs. Remove and let sit for 24±2 hrs. at room condition,*1 then measure. •Pretreatment for X7R char. Perform a heat treatment at 150±18°C for 60±5 min. and the let sit for 24±2 hrs. at room condition.*1 | | | |
| | | Dielectric Strength | In accordance with item No.4 | | | | |
| 20 | Strength | | The cheesecloth should not be on fire. | The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The UAC should be maintained for 2 min. after the last discharge. C1,2: 1μF±10% C3: 0.033μF±5% 10kV L1 to 4: 1.5mH±20% 16A Rod core choke Ct: 3μF±5% 10kV R: 100Ω±2% Cx: Capacitor under test UAC: UR±5% F: Fuse, Rated 16A UR: Rated Voltage Ut: Voltage applied to Ct Type Ui GD, GB 2.5kV GC, GF 5kV | | | |
| 21 | 1 Passive Flammability | | The burning time should not exceed 30 sec. The tissue paper should not ignite. | The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should be exposed to the flame only once. Time of exposure to flame: 30 sec. Length of flame: 12±1mm Gas burner: Length 35mm min. Inside Dia. 0.5±0.1mm Outside Dia. 0.9mm max. Gas: Butane gas Purity 95% min. Test Specimen Tissue About 10mm Thick Board | | | |

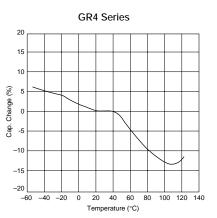
^{*1 &}quot;Room condition" Temperature: 15 to 35℃, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

^{*2 &}quot;C" expresses nominal capacitance value (pF).

GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

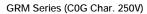
■ Capacitance - Temperature Characteristics

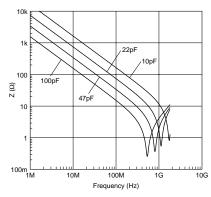


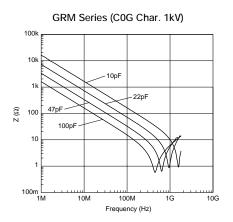


X7R Characteristics 30 20 Change (Cap. X7R Char. Spec.(lo -20 80 100 120 140 -40 -20 20 40 60 -60 0 Temperature (°C)

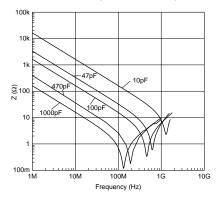
■ Impedance - Frequency Characteristics

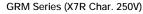


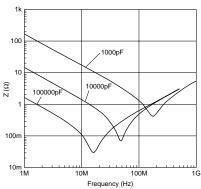




GRM Series (C0G Char. 630V)











GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

100

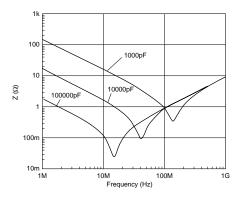
Z (Ω)

0.01 L 1M

Continued from the preceding page.

■ Impedance - Frequency Characteristics

GRM Series (X7R Char. 630V)



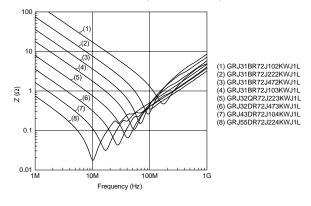


1G

GRJ Series (X7R Char. 250V)





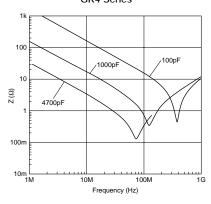




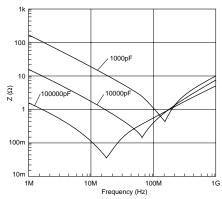
100M

Frequency (Hz)

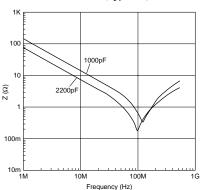
10M



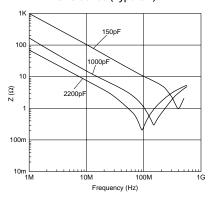
GA2 Series



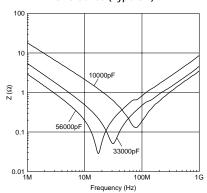
GA3 Series (Type GF)



GA3 Series (Type GD)



GA3 Series (Type GB)



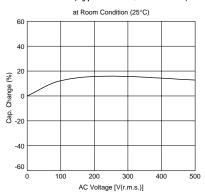
AC250V Type GA2 Series

GRM/GRJ/GR4/GR7/GA2/GA3 Series Reference Data (Typical Example)

Continued from the preceding page.

■ Capacitance - AC Voltage Characteristics

GA3 Series (Type GF/GD, X7R Char.)



GA3 Series (Type GB) at Room Condition (25°C) 60 40 Change (%) 10000pF 33000pF Сар. -60 L

400

600

AC Voltage [V(r.m.s.)]

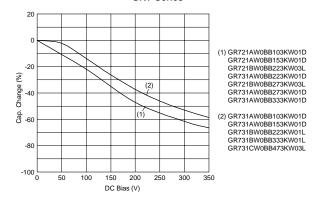
800

1000

200

■ Capacitance - DC Bias Characteristics

GR7 Series





Package

Taping is the standard packaging method.

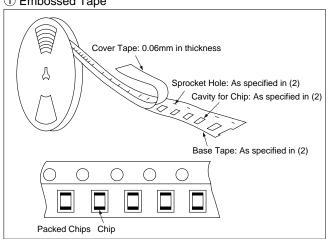
■ Minimum Quantity Guide

| | | | Dimensions (mn | n) | Quantity (pcs.) | | | |
|------------------------------|--------------------|-----|---|------|-----------------|---------------|--|--|
| | Part Number | | , | ., | ø180m | ø180mm Reel | | |
| | GPM18 | | W | Т | Paper Tape | Embossed Tape | | |
| | GRM18 | 1.6 | 0.8 | 0.8 | 4,000 | - | | |
| | GRJ21/GRM21/GR721 | 2.0 | 1.25 | 1.0 | 4,000 | - | | |
| | GRJ21/GRWI21/GR721 | 2.0 | 1.25 | 1.25 | - | 3,000 | | |
| | | | | 1.0 | 4,000 | - | | |
| | GRJ31/GRM31/GR731 | 3.2 | 1.6 | 1.25 | - | 3,000 | | |
| | | | | 1.6 | - | 2,000 | | |
| | | | | 1.0 | 4,000 | - | | |
| Medium | OD 100/0DM00 | | 0.5 | 1.25 | - | 3,000 | | |
| Voltage | GRJ32/GRM32 | 3.2 | 2.5 | 1.5 | - | 2,000 | | |
| | | | | 2.0 | - | 1,000 | | |
| | GRM42/GR442 | 4.5 | 2.0 | 1.0 | - | 3,000 | | |
| | | | | 1.5 | - | 2,000 | | |
| | GRJ43/GRM43/GR443 | 4.5 | 3.2 | 1.5 | - | 1,000 | | |
| | | | | 2.0 | - | 1,000 | | |
| | | | | 2.5 | - | 500 | | |
| | GRJ55/GRM55/GR455 | 5.7 | 5.0 | 2.0 | - | 1,000 | | |
| | GA242 | 4.5 | 2.0 | 1.5 | - | 2,000 | | |
| 4.00501/ | 04040 | 4.5 | 3.2 | 1.5 | - | 1,000 | | |
| AC250V | GA243 | | | 2.0 | - | 1,000 | | |
| | GA255 | 5.7 | 5.0 | 2.0 | - | 1,000 | | |
| | | | | 1.0 | - | 3,000 | | |
| | GA342 | 4.5 | 2.0 | 1.5 | - | 2,000 | | |
| | | | | 2.0 | - | 2,000 | | |
| | 04040 | 4.5 | | 1.5 | - | 1,000 | | |
| | GA343 | 4.5 | 3.2 | 2.0 | - | 1,000 | | |
| Safety Std. Certification | GA352 | 5.7 | 2.8 | 1.5 | - | 1,000 | | |
| Certinication | | | | 1.5 | - | 1,000 | | |
| | | | | 2.0 | - | 1,000 | | |
| | GA355 | 5.7 | 5.0 | 2.5 | - | 500 | | |
| | | | | 2.7 | - | 500 | | |
| | | | | 2.9 | - | 500 | | |

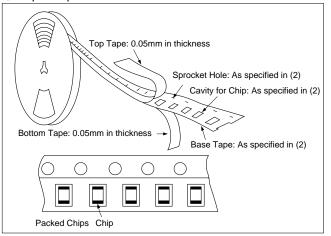
■ Tape Carrier Packaging

(1) Appearance of Taping

① Embossed Tape







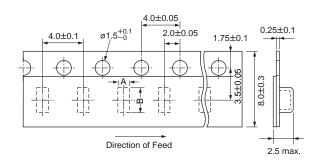




Package

- Continued from the preceding page.
- (2) Dimensions of Tape
- ① Embossed Tape

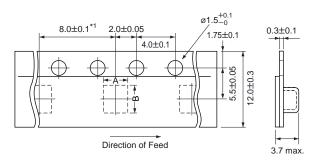
8mm width, 4mm pitch Tape



| Part Number | A* | B* |
|---------------------------------|------|------|
| GRJ21/GRM21/GR721 (T≧1.25mm) | 1.45 | 2.25 |
| GRJ31/GRM31/GR731 (T≧1.25mm) | 2.0 | 3.6 |
| GRJ32/GRM32 (T≥1.25mm) | 2.9 | 3.6 |

*Nominal Value

12mm width, 8mm/4mm pitch Tape



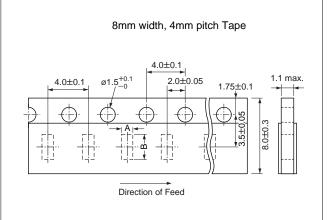
| Part Number | A* | B* |
|-------------------------------|-----|-----|
| GRM42/GR442/GA242/GA342 | 2.5 | 5.1 |
| GRJ43/GRM43/GR443/GA243/GA343 | 3.6 | 4.9 |
| GA352 | 3.2 | 6.1 |
| GRJ55/GRM55/GR455/GA255/GA355 | 5.4 | 6.1 |

^{*1 4.0±0.1}mm in case of GRM42/GR442/GA242/GA342

*Nominal Value

(in mm)

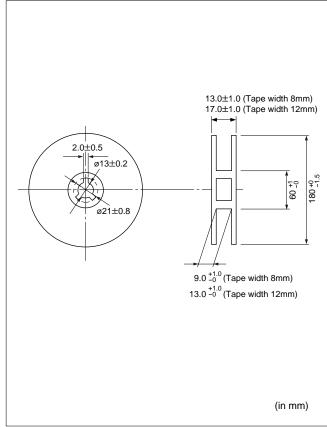
2 Paper Tape



| Part Number | A* | B* |
|------------------------------------|------|------|
| GRM18 | 1.05 | 1.85 |
| GRJ21/GRM21/GR721 (T=1.0mm) | 1.45 | 2.25 |
| GRM31/GR731 (T=1.0mm) | 2.0 | 3.6 |
| GRM32 (T=1.0mm) | 2.9 | 3.6 |

*Nominal Value (in mm)

(3) Dimensions of Reel



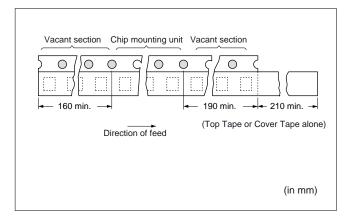


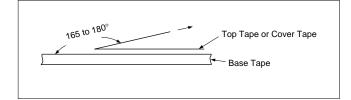
Package

Continued from the preceding page.

(4) Taping Method

- ① Tapes for capacitors are wound clockwise. The sprocket holes are to the right as the tape is pulled toward the user.
- ② Part of the leader and part of the empty tape should be attached to the end of the tape as shown at right.
- ③ The top tape or cover tape and base tape are not attached at the end of the tape for a minimum of 5 pitches.
- 4 Missing capacitors number within 0.1% of the number per reel or 1 pc, whichever is greater, and are not continuous.
- (5) The top tape or cover tape and bottom tape should not protrude beyond the edges of the tape and should not cover sprocket holes.
- ⑥ Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
- Peeling off force: 0.1 to 0.6N in the direction shown at right.







1 Caution

■ Storage and Operating Conditions

Operating and storage environment Do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In addition, avoid exposure to moisture. Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed 5 to 40 degrees centigrade and 20 to 70%.

Use capacitors within 6 months of delivery. Check the solderability after 6 months or more.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

■ Handling

- 1. Vibration and impact Do not expose a capacitor to excessive shock or vibration during use.
- 2. Do not directly touch the chip capacitor, especially the ceramic body. Residue from hands/fingers may create a short circuit environment.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.



⚠Caution

■ Caution (Rating)

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

When DC-rated capacitors are to be used in input circuits from a commercial power source (AC filter), be sure to use Safety Certified Capacitors because various regulations for withstanding voltage or impulses, established for all equipment, should be taken into consideration.

| Voltage | DC Voltage | DC+AC Voltage | AC Voltage | Pulse Voltage (1) | Pulse Voltage (2) |
|---------------------------|------------|---------------|------------|-------------------|-------------------|
| Positional Measurement | Vo-p | Vo-p | Vp-p | Vp-p | Vp-p |

- 2. Operating Temperature, Self-generated Heat, and Load Reduction at High-frequency Voltage Condition Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a highfrequency voltage, pulse voltage, it may self-generate heat due to dielectric loss.
- (1) In the case of X7R char. Applied voltage should be the load such as selfgenerated heat is within 20°C on the condition of atmosphere temperature 25°C. When measuring, use a thermocouple of small thermal capacity -K of Ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)





Caution

Continued from the preceding page.

(2) In case of COG, U2J char.

Due to the low self-heating characteristics of lowdissipation capacitors, the allowable electric power of these capacitors is generally much higher than that of X7R characteristic capacitors.

When a high frequency voltage that causes 20°C selfheating to the capacitor is applied, it will exceed the capacitor's allowable electric power.

The frequency of the applied sine wave voltage should be less than 500kHz (less than 100kHz in the case of rated voltage: DC3.15kV). The applied voltage should be less than the value shown in figure below.

In the case of non-sine wave that includes a harmonic frequency, please contact our sales representatives or product engineers. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

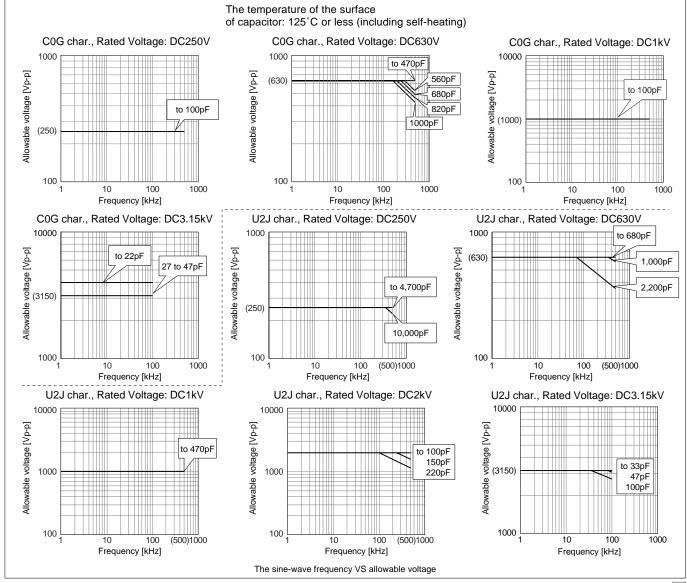
<C0G char., Rated Voltage: DC3.15kV>

The capacitors less than 22pF can be applied maximum 4.0kV peak to peak at 100kHz or less only for the ballast or the resonance usage in the LCD backlight inverter circuit.

<Capacitor Selection Tool>

We are also offering free software/the capacitor selection tool: "Murata Medium Voltage Capacitors Selection Tool by Voltage Form," which will assist you in selecting a suitable capacitor.

The software can be downloaded from Murata's Website. (http://www.murata.com/designlib/mmcsv/index.html). By inputting capacitance values and the applied voltage waveform of the specific capacitor series, this software will calculate the capacitor's power consumption and list suitable capacitors (non-sine wave is also available).







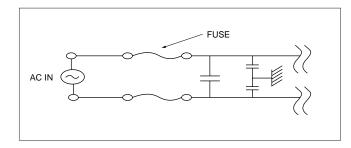
⚠Caution

Ontinued from the preceding page.

3. Fail-safe

Failure of a capacitor may result in a short circuit. Be sure to provide an appropriate fail-safe function such as a fuse on your product to help eliminate possible electric shock, fire, or fumes.

Please consider using fuses on each AC line if the capacitors are used between the AC input lines and earth (line bypass capacitors), to prepare for the worst case, such as a short circuit.



4. Test Condition for AC Withstanding Voltage

(1) Test Equipment

Tests for AC withstanding voltage should be made with equipment capable of creating a wave similar to a 50/60 Hz sine wave.

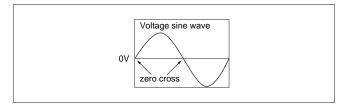
If the distorted sine wave or overload exceeding the specified voltage value is applied, a defect may be caused.

(2) Voltage Applied Method

The capacitor's leads or terminals should be firmly connected to the output of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage. If the test voltage is applied directly to the capacitor without raising it from near zero, it should be applied with the zero cross.* At the end of the test time, the test voltage should be reduced to near zero, and then the capacitor's leads or terminals should be taken off the output of the withstanding voltage test equipment. If the test voltage is applied directly to the capacitor without raising it from near zero, surge voltage may occur and cause a defect.

- *ZERO CROSS is the point where voltage sine wave passes 0V.
- See the figure at right -

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.





AC250V Type GA2 Series

⚠Caution

■ Caution (Soldering and Mounting)

Vibration and Impact
 Do not expose a capacitor to excessive shock or vibration during use.

2. Circuit Board Material

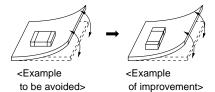
It is possible for the chip to crack by the expansion and shrinkage of a metal board.

Please contact us if you want to use our ceramic capacitors on a metal board such as Aluminum.

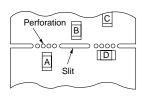
3. Land Layout for Cropping PC Board

Choose a mounting position that minimizes the stress imposed on the chip during flexing or bending of the board.

[Component Direction]



Locate chip horizontal to the direction in which stress acts. [Chip Mounting Close to Board Separation Point]



Chip arrangement Worst A>C>B~D Best





Continued from the preceding page.

4. Reflow Soldering

- When components are exposed to sudden heat, their mechanical strength can be decreased due to the extreme temperature changes which can cause flexing and result in internal mechanical damage, which will cause the parts to fail. In order to prevent mechanical damage, preheating is required for both the components and the PCB board. Preheating conditions are shown in Table 1. It is required to keep the temperature differential between the soldering and the components surface (ΔT) as small as possible.
- Solderability of Tin plating termination chips might be deteriorated when low temperature soldering profile where peak solder temperature is below the Tin melting point is used. Please confirm the solderability of Tin plating termination chips before use.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference (ΔT) between the component and solvent within the range shown in the Table 1.

Table 1

| Part Number | Temperature Differential | |
|-------------------|--------------------------|--|
| G□□18/21/31 | ΔΤ≦190℃ | |
| G□□32/42/43/52/55 | ΔΤ≦130℃ | |

Recommended Conditions

| | Pb-Sn S | Lead Free Solder | | |
|------------------|------------------------------|------------------|------------------|--|
| | Infrared Reflow Vapor Reflow | | Lead Free Solder | |
| Peak Temperature | 230-250°C | 230-240°C | 240-260°C | |
| Atmosphere | Air | Air | Air or N2 | |

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

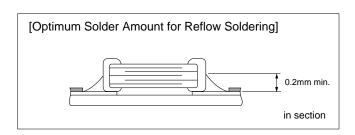
[Standard Conditions for Reflow Soldering] Infrared Reflow Temperature (°C) Soldering Peak Temperature 200°C ΛТ 170°C 150°C 130°C Preheating 60-120 seconds 30-60 seconds Vapor Reflow Temperature (°C) Soldering Peak Temperature Gradual 170°C 150°C 130°C Preheating Time 60-120 seconds [Allowable Soldering Temperature and Time] Soldering Temperature (°C) 270 260 250 240 230 90 Soldering Time (sec.)

Optimum Solder Amount for Reflow Soldering

- Overly thick application of solder paste results in excessive solder fillet height.
 - This makes the chip more susceptible to mechanical and thermal stress on the board and may cause cracked
- Too little solder paste results in a lack of adhesive strength on the outer electrode, which may result in chips breaking loose from the PCB.
- Make sure the solder has been applied smoothly to the end surface to a height of 0.2mm min.

Inverting the PCB

Make sure not to impose an abnormal mechanical shock on the PCB.



In the case of repeated soldering, the accumulated soldering time must be within the range shown above. Safety Standard

⚠Caution

Continued from the preceding page.

5. Flow Soldering

- When components are exposed to sudden heat, their mechanical strength can be decreased due to the extreme temperature changes which can cause flexing and result in internal mechanical damage, which will cause the parts to fail. Additionally, an excessively long soldering time or high soldering temperature results in leaching by the outer electrodes, causing poor adhesion or a reduction in capacitance value due to loss of contact between electrodes and end termination.
- In order to prevent mechanical damage, preheating is required for both the components and the PCB board. Preheating conditions are shown in Table 2. It is required to keep temperature differential between the soldering and the components surface (ΔT) as small as possible.
- When components are immersed in solvent after mounting, be sure to maintain the temperature difference between the component and solvent within the range shown in Table 2.

Do not apply flow soldering to chips not listed in Table 2.

Table 2

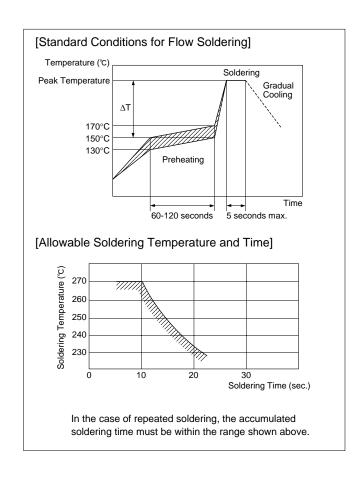
| Part Number | Temperature Differential | |
|-------------|--------------------------|--|
| G□□18/21/31 | ΔT≦150℃ | |

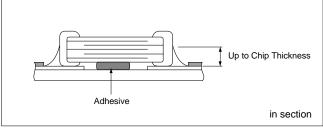
Recommended Conditions

| | Pb-Sn Solder | Lead Free Solder |
|------------------|--------------|------------------|
| Peak Temperature | 240-250°C | 250-260°C |
| Atmosphere | Air | N ₂ |

Pb-Sn Solder: Sn-37Pb Lead Free Solder: Sn-3.0Ag-0.5Cu

Optimum Solder Amount for Flow Soldering The top of the solder fillet should be lower than the thickness of components. If the solder amount is excessively large, the risk of cracking is higher during board bending or under any other stressful conditions.







⚠Caution

Continued from the preceding page.

6. Correction with a Soldering Iron

 When sudden heat is applied to the components by use of a soldering iron, the mechanical strength of the components will decrease because the extreme temperature change causes deformations inside the components.

In order to prevent mechanical damage to the components, preheating is required for both the components and the PCB board.

Preheating conditions, (The "Temperature of the Soldering Iron Tip", "Preheating Temperature,"

"Temperature Differential" between iron tip and the

Table 3

| Part Number | Temperature of Soldering Iron tip | Preheating Temperature | Temperature Differential (∆T) | Atmosphere |
|-----------------------|-----------------------------------|---------------------------|-------------------------------------|------------|
| G□□18/21/31 | 350°C max. | 150°C min. | ΔΤ≦190℃ | air |
| G□□32/42/43/ 52/55 | 280°C max. | 150°C min. | ΔΤ≦130℃ | air |

*Applicable for both Pb-Sn and Lead Free Solder.

Pb-Sn Solder: Sn-37Pb

Lead Free Solder: Sn-3.0Ag-0.5Cu

 Optimum Solder Amount when re-working Using a Soldering Iron

For sizes smaller than G = 18, the top of the solder fillet should be lower than 2/3 of the thickness of the component or 0.5mm whichever is smaller.

For sizes larger than $G \square \square 21$, the top of the solder fillet should be lower than 2/3 of the thickness of the component.

If the solder amount is excessive, the risk of cracking is higher during board bending or under any other stressful conditions.

A Soldering iron ø3mm or smaller should be used. It is also necessary to keep the soldering iron from touching the components during the re-work. Solder wire with ø0.5mm or smaller is required for soldering.

7. Washing

Excessive output of ultrasonic oscillation during cleaning causes PCBs to resonate, resulting in cracked chips or broken solder. Take note not to vibrate PCBs.

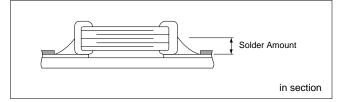
FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND FUMING WHEN THE PRODUCT IS USED.

components and the PCB), should be within the conditions of table 3.

It is required to keep the temperature differential between the soldering Iron and the component's surface (ΔT) as small as possible.

After soldering, do not allow the component/PCB to cool down rapidly.

The operating time for the re-working should be as short as possible. When re-working time is too long, it may cause solder leaching, in turn causing a reduction of the adhesive strength of the terminations.



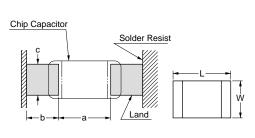


Notice

■ Notice (Soldering and Mounting)

1. Construction of Board Pattern After installing chips, if solder is excessively applied to the circuit board, mechanical stress will cause destruction resistance characteristics to lower. To prevent this, be extremely careful in determining shape and dimension before designing the circuit board diagram.

Construction and Dimensions of Pattern (Example)



Flow Soldering

| L×W | a | b | С |
|----------|---------|---------|---------|
| 1.6×0.8 | 0.6-1.0 | 0.8-0.9 | 0.6-0.8 |
| 2.0×1.25 | 1.0-1.2 | 0.9-1.0 | 0.8-1.1 |
| 3.2×1.6 | 2.2-2.6 | 1.0-1.1 | 1.0-1.4 |

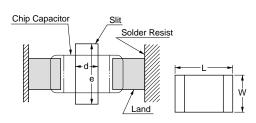
Flow soldering: 3.2×1.6 or less available.

Reflow Soldering

| tonen coldening | | | | |
|-----------------|---------|---------|---------|--|
| L×W | а | b | С | |
| 1.6×0.8 | 0.6-0.8 | 0.6-0.7 | 0.6-0.8 | |
| 2.0×1.25 | 1.0-1.2 | 0.6-0.7 | 0.8-1.1 | |
| 3.2×1.6 | 2.2-2.4 | 0.8-0.9 | 1.0-1.4 | |
| 3.2×2.5 | 2.0-2.4 | 1.0-1.2 | 1.8-2.3 | |
| 4.5×2.0 | 2.8-3.4 | 1.2-1.4 | 1.4-1.8 | |
| 4.5×3.2 | 2.8-3.4 | 1.2-1.4 | 2.3-3.0 | |
| 5.7×2.8 | 4.0-4.6 | 1.4-1.6 | 2.1-2.6 | |
| 5.7×5.0 | 4.0-4.6 | 1.4-1.6 | 3.5-4.8 | |
| | • | • | | |

(in mm)

Dimensions of Slit (Example)



Preparing the slit helps flux cleaning and resin coating on the back of the capacitor. However, the length of the slit design should be as short as possible to prevent mechanical damage in the capacitor. A longer slit design might receive more severe mechanical stress from the PCB. Recommended slit design is shown in the Table.

| L×W | d | е |
|----------|----------|---------|
| 1.6×0.8 | - | - |
| 2.0×1.25 | 2.0×1.25 | |
| 3.2×1.6 | 1.0-2.0 | 3.2-3.7 |
| 3.2×2.5 | 1.0-2.0 | 4.1-4.6 |
| 4.5×2.0 | 1.0-2.8 | 3.6-4.1 |
| 4.5×3.2 | 1.0-2.8 | 4.8-5.3 |
| 5.7×2.8 | 1.0-4.0 | 4.4-4.9 |
| 5.7×5.0 | 1.0-4.0 | 6.6-7.1 |

(in mm)





Notice

Continued from the preceding page.

Land Layout to Prevent Excessive Solder

| | Mounting Close to a Chassis | Mounting with Leaded Components | Mounting Leaded Components Later |
|--|---|---|--|
| Examples to Be Avoided | Chassis Solder (Ground solder) Adhesive Base board Land Pattern in section | Lead Wire Connected to a Part Provided with Lead Wires. | Soldering Iron Lead Wire of Component to be Connected Later. in section |
| Examples of Improvements by the Land Division | d2 d1 <d2 in="" resist="" section<="" solder="" td=""><td>Solder Resist in section</td><td>Solder Resist in section</td></d2> | Solder Resist in section | Solder Resist in section |

2. Mounting of Chips

- Thickness of adhesives applied Keep thickness of adhesives applied (50-105μm or more) to reinforce the adhesive contact considering the thickness of the termination or capacitor (20-70µm) and the land pattern (30-35µm).
- Mechanical shock of the chip placer When the positioning claws and pick-up nozzle are worn, the load is applied to the chip while positioning is concentrated in one position, thus causing cracks, breakage, faulty positioning accuracy, etc. Careful checking and maintenance are necessary to prevent unexpected trouble. An excessively low bottom dead point of the suction nozzle imposes great force on the chip during mounting, causing cracked chips. Please set the suction nozzle's

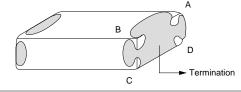
bottom dead point on the upper surface of the board.

3. Soldering

(1) Limit of losing effective area of the terminations and conditions needed for soldering.

Depending on the conditions of the soldering temperature and/or immersion (melting time), effective areas may be lost in some parts of the terminations.

To prevent this, be careful in soldering so that any possible loss of the effective area on the terminations will securely remain at a maximum of 25% on all edge length A-B-C-D-A of part with A, B, C, D, shown in the Figure below.



(2) Flux Application

- An excessive amount of flux generates a large quantity of flux gas, causing deteriorated solderability. So apply flux thinly and evenly throughout. (A foaming system is generally used for flow soldering.)
- Flux containing too high a percentage of halide may cause corrosion of the outer electrodes without sufficient cleaning. Use flux with a halide content of 0.2% max.
- Do not use strong acidic flux.
- Do not use water-soluble flux.* (*Water-soluble flux can be defined as non rosin type flux including wash-type flux and non-wash-type flux.)
- (3) Solder

The use of Sn-Zn based solder will deteriorate the reliability of the MLCC.

Please contact our sales representative or product engineers on the use of Sn-Zn based solder in advance.





Notice

Continued from the preceding page.

4. Cleaning

Please confirm there is no problem in the reliability of the product beforehand when cleaning it with the intended

The residue after cleaning it might cause a decrease in the surface resistance of the chip and the corrosion of the electrode part, etc. As a result it might cause reliability to deteriorate. Please confirm beforehand that there is no problem with the intended equipment in ultrasonic cleansing.

5. Resin Coating

Please use it after confirming there is no influence on the product with the intended equipment before the resin coating and molding.

A cracked chip might be caused at the cooling/heating cycle by the amount of resin spreading and/or bias

The resin for coating and molding must be selected as the stress is small when stiffening and the hygroscopic is low as possible.

Rating

- 1. Capacitance change of capacitor
- (1) In the case of X7R char.

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. Therefore, it is not likely to be suitable for use in a time constant circuit.

Please contact us if you need detailed information.

(2) In the case of any char. except X7R Capacitance might change a little depending on the surrounding temperature or an applied voltage. Please contact us if you intend to use this product in a strict time constant circuit.

2. Performance check by equipment

Before using a capacitor, check that there is no problem in the equipment's performance and the specifications.

Generally speaking, CLASS 2 (X7R char.) ceramic capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance. Therefore, the capacitance value may change depending on the operating condition in the equipment.

Accordingly, be sure to confirm the apparatus performance of receiving influence in a capacitance value change of a capacitor, such as leakage current and noise suppression characteristics.

Moreover, check the surge-proof ability of a capacitor in the equipment, if needed, because the surge voltage may exceed the specific value by the inductance of the circuit.



ISO 9001 Certifications

■ Qualified Standards

The products listed here have been produced by ISO 9001 certified factory.

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Design assistant tool SimSurfing SimSurfing



MLCC is now available!

Design assistant tool "SimSurfing" has been updated and you can now find and view any kind of characteristics of MLCCs.

Available function for MLCCs.

- 1 Products search
- ② View frequency characteristics (S parameters, Z, R, X, Q, DF, L, C)
- ③ DC voltage bias characteristics (Absolute capacitance/change rate)
- 4 Temperature characteristics (Absolute capacitance/change rate)
- (5) AC voltage bias characteristics (Absolute capacitance/change rate)
- 6 Download SPICE netlist/ S parameter

Select the Products

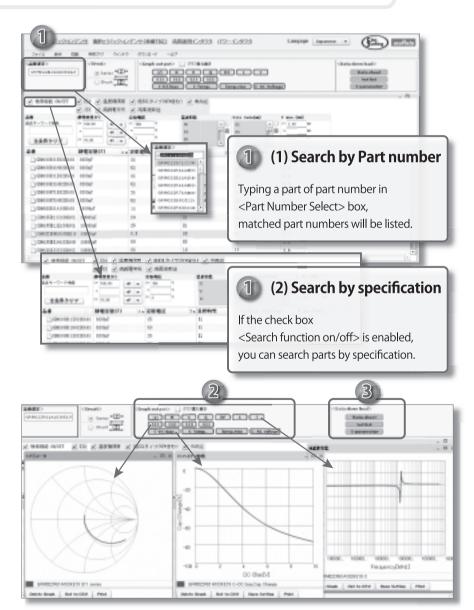
- (1) By part number
- (2) By performance

2 View characteristics

Clicking buttons in this area with partnumber selected, you can view any electrical characteristics chart.

Data download

You can download SPICE netlist and S parameter files (S2P)



These images are captured at August/2010. Be sure that this software will be updated frequently.

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 - 1 Aircraft equipment
- 2 Aerospace equipment
- ③ Undersea equipment (5) Medical equipment
- 4 Power plant equipment (in the interest of the intere
- (7) Traffic signal equipment
- ® Disaster prevention / crime prevention equipment
- Data-processing equipment
- Application of similar complexity and/or reliability requirements to the applications listed above
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