

# Chip Multilayer Ceramic Capacitors for General Purpose

## GRM155R61A224JE19\_(0402,X5R(EIA),0.22uF,DC 10 V)

**muRata**

\_:Packaging Code

Reference Sheet

### ■ Scope

This product specification is applied to Chip Multilayer Ceramic Capacitors used for General Electronic equipment.

### ■ MURATA Part No. System

|       |                      |                    |                                   |                     |                           |                             |                             |                      |   |
|-------|----------------------|--------------------|-----------------------------------|---------------------|---------------------------|-----------------------------|-----------------------------|----------------------|---|
| (Ex.) | GRM                  | 15                 | 5                                 | R6                  | 1A                        | 224                         | J                           | E19                  | D |
|       | (1)L/W<br>Dimensions | (2)T<br>Dimensions | (3)Temperature<br>Characteristics | (4)Rated<br>Voltage | (5)Nominal<br>Capacitance | (6)Capacitance<br>Tolerance | (7)Murata's<br>Control Code | (8)Packaging<br>Code |   |

### ■ Type



### ■ Rated Value

(1)Size Code : 0402

(3)Temperature Characteristics : R6(Public STD Code :X5R(EIA))

| MURATA PART NO. | Dimensions(mm) |  |  |  |  |
|-----------------|----------------|--|--|--|--|
|-----------------|----------------|--|--|--|--|

■ Specifications and Test Methods

| No.  | Item                                    |                  | Specification                                                           | Test Method (Ref. Standard:JIS C 5101, IEC60384)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |      |                                   |                  |   |                         |         |   |                                |
|------|-----------------------------------------|------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-----------------------------------|------------------|---|-------------------------|---------|---|--------------------------------|
| 1    | Rated Voltage                           |                  | Shown in Rated value.                                                   | The rated voltage is defined as the maximum voltage which may be applied continuously to the capacitor.<br>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.                                                                                                                                                                                                                                                                                |      |                                   |                  |   |                         |         |   |                                |
| 2    | Appearance                              |                  | No defects or abnormalities.                                            | Visual inspection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |      |                                   |                  |   |                         |         |   |                                |
| 3    | Dimension                               |                  | Shown in Rated value.                                                   | Using Measuring instrument of dimension.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |                                   |                  |   |                         |         |   |                                |
| 4    | Voltage Proof                           |                  | No defects or abnormalities.                                            | Measurement Point : Between the terminations<br>Test Voltage : 250% of the rated voltage<br>Applied Time : 1s to 5s<br>Charge/Discharge Current : 50mA max.                                                                                                                                                                                                                                                                                                                                                                                 |      |                                   |                  |   |                         |         |   |                                |
| 5    | Insulation Resistance(I.R.)             |                  | More than $50\Omega \cdot F$                                            | Measurement Temperature: Room Temperature<br>Measurement Point : Between the terminations<br>Measurement Voltage : Rated Voltage<br>Charging Time : 1min<br>Charge/Discharge Current : 50mA max.                                                                                                                                                                                                                                                                                                                                            |      |                                   |                  |   |                         |         |   |                                |
| 6    | Capacitance                             |                  | Shown in Rated value.                                                   | Measurement Temperature: Room Temperature<br>Measurement Frequency : $1.0 \pm 0.1\text{kHz}$<br>Measurement Voltage : $0.5 \pm 0.1V_{rms}$                                                                                                                                                                                                                                                                                                                                                                                                  |      |                                   |                  |   |                         |         |   |                                |
| 7    | Q or Dissipation Factor (D.F.)          |                  | DF:0.1 max.                                                             | Measurement Temperature : Room Temperature<br>Measurement Frequency : $1.0 \pm 0.1\text{kHz}$<br>Measurement Voltage : $0.5 \pm 0.1V_{rms}$                                                                                                                                                                                                                                                                                                                                                                                                 |      |                                   |                  |   |                         |         |   |                                |
| 8    | Capacitance Temperature Characteristics | No bias          | Within $\pm 15\%$<br>( $-55^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ ) | The capacitance change should be measured after 5 minutes at each specified temperature stage.<br><br>Capacitance value as a reference is the value in "*" marked step.<br><br>Measurement Voltage : Less than $1.0V_{rms}$ (Refer to the individual data sheet)<br><table><tr><th>Step</th><th>Temperature(<math>^{\circ}\text{C}</math>)</th><th>Applying Voltage</th></tr><tr><td>1</td><td>Reference Temp. <math>\pm 2</math></td><td>No bias</td></tr><tr><td>2</td><td>Min. Operating Temp. <math>\pm 3&lt;/</math></td></tr></table> | Step | Temperature( $^{\circ}\text{C}$ ) | Applying Voltage | 1 | Reference Temp. $\pm 2$ | No bias | 2 | Min. Operating Temp. $\pm 3</$ |
| Step | Temperature( $^{\circ}\text{C}$ )       | Applying Voltage |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                   |                  |   |                         |         |   |                                |
| 1    | Reference Temp. $\pm 2$                 | No bias          |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                   |                  |   |                         |         |   |                                |
| 2    | Min. Operating Temp. $\pm 3</$          |                  |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |                                   |                  |   |                         |         |   |                                |



| No. | Item                                          |                    | Specification                                     | Test Method (Ref. Standard:JIS C 5101, IEC60384)                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----|-----------------------------------------------|--------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15  | High Temperature<br>High Humidity<br>(Steady) | Appearance         | No defects or abnormalities.                      | Solder the capacitor on the test substrate shown in Fig.3.<br>Test Temperature : 40+/-2°C<br>Test Humidity : 90%RH to 95%RH<br>Test Time : 500+/-12h<br>Test Voltage : Rated Voltage<br>Charge/Discharge Current : 50mA max.<br><br>Pre-treatment : Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.<br>Post-treatment : Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.       |
|     |                                               | Capacitance Change | Within +/-12.5%                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|     |                                               | Q or D.F.          | DF:0.2 max.                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|     |                                               | I.R.               | More than 500MΩ or 12.5Ω·F (Whichever is smaller) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 16  | Durability                                    | Appearance         | No defects or abnormalities.                      | Solder the capacitor on the test substrate shown in Fig.3.<br>Test Temperature : Maximum Operating Temperature+/-3°C<br>Test Time : 1000+/-12h<br>Test Voltage : 150% of the rated voltage<br>Charge/Discharge Current : 50mA max.<br><br>Pre-treatment : Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure.<br>Post-treatment : Perform a heat treatment at 150+0/-10°C for 1hour and then let sit for 24+/-2hours at room temperature, then measure. |
|     |                                               | Capacitance Change | Within +/-12.5%                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|     |                                               | Q or D.F.          | DF:0.2 max.                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|     |                                               | I.R.               | More than 1000MΩ or 25Ω·F (Whichever is smaller)  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Substrate Bending Test

• Test Substrate

Material : JIS C 6484 Copper-clad laminated sheets for PCBs (Glass fabric base, epoxy resin)

Thickness : 0.8mm

Copper Foil Thickness: 0.035mm

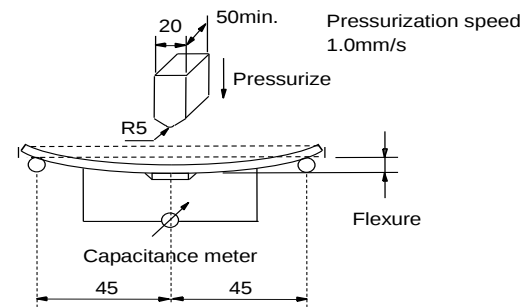
Kind of Solder : Sn-3.0Ag-0.5Cu



Fig.1 (in mm)

| Series | Dimension(mm) |     |     |
|--------|---------------|-----|-----|
|        | a             | b   | c   |
| GRM15  | 0.4           | 1.5 | 0.5 |

• Pressurization Method



■ Package

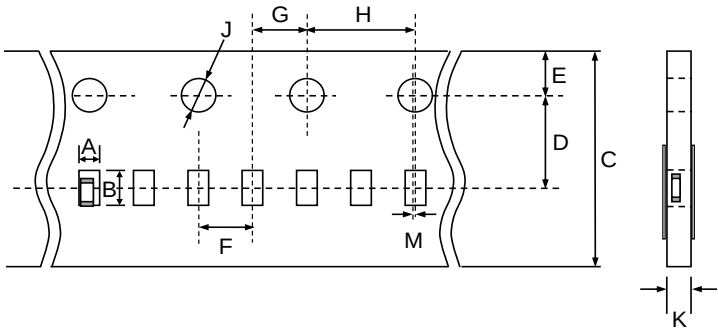
Tape Carrier Packaging

1. Minimum Quantity (pcs./reel)

| Series |   | φ180mm Reel | φ180mm Reel | φ330mm Reel |
|--------|---|-------------|-------------|-------------|
|        |   | PAPER Tape  | PAPER Tape  | PAPER Tape  |
|        |   | Code:D      | Code:W      | Code:J      |
| GRM15  | 5 | 10000(W8P2) | 20000(W8P1) | 50000(W8P2) |

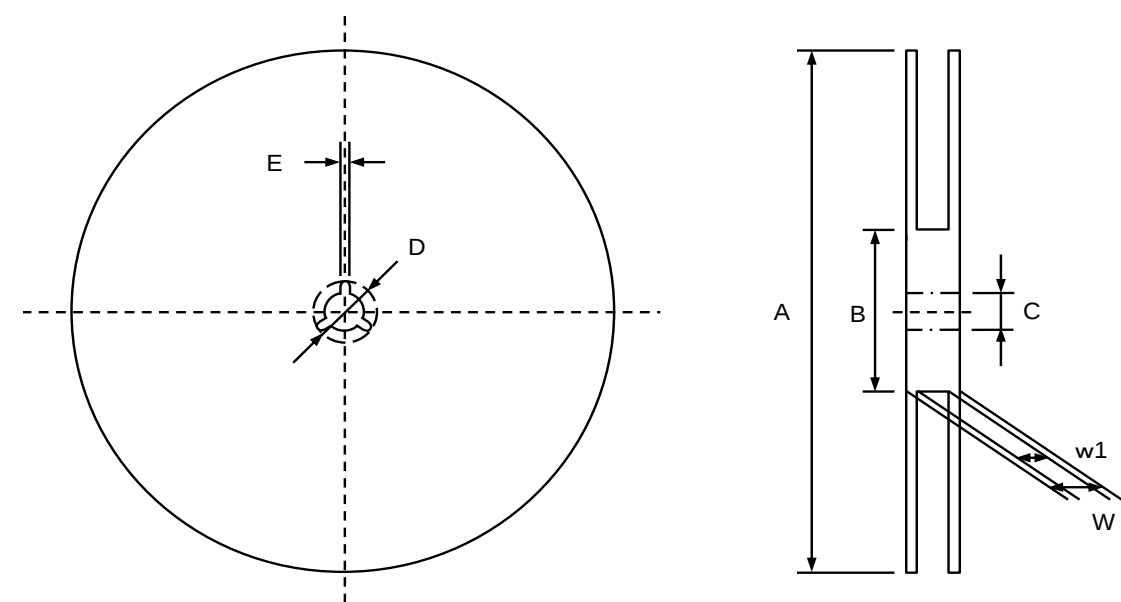
2. Dimensions of Tape (in mm)

(1)GRM155(W8P2 Code:D/J)



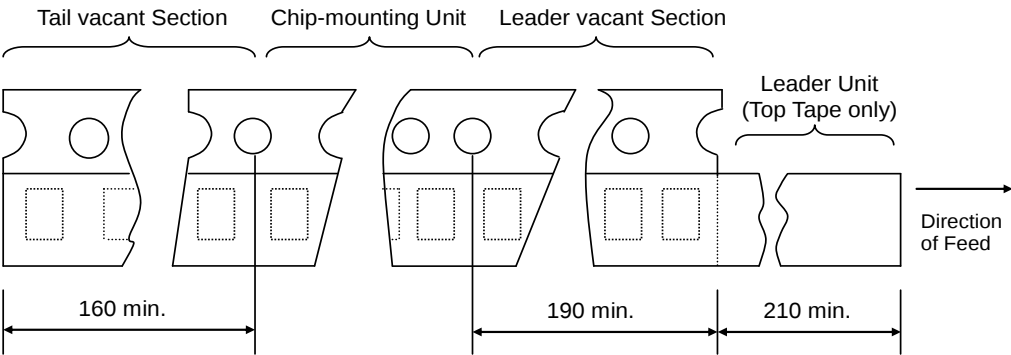
| Series |  | Dimensions(Chip) |   |   | A | B | C | D | E | F | G | H | J | K | L | M |
|--------|--|------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|        |  | L                | W | T |   |   |   |   |   |   |   |   |   |   |   |   |

3. Dimensions of Reel (in mm)

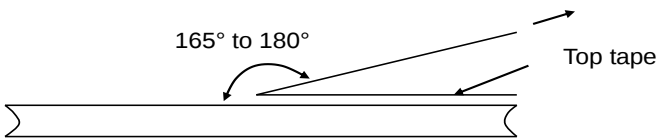


| Reel        | A           | B        | C         | D         | E         | W         | w1       |
|-------------|-------------|----------|-----------|-----------|-----------|-----------|----------|
| φ180mm Reel | φ180+0/-3.0 | φ50 min. | φ13+/-0.5 | φ21+/-0.8 | 2.0+/-0.5 | 16.5 max. | 10+/-1.5 |
| φ330mm Reel | φ330+/-2.0  | φ50 min. | φ13+/-0.5 | φ21+/-0.8 | 2.0+/-0.5 | 16.5 max. | 10+/-1.5 |

4. Part of the leader and part of the vacant section are attached as follows.  
The sprocket holes are to the right as the tape is pulled toward the user.



5. Accumulate tolerance of sprocket holes pitch = +/-0.3mm/10 pitch
6. Chip in the tape is enclosed as shown in 2.Dimensions of Tape.
7. The top tape and carrier tape are not attached at the end of the tape for a minimum of 5 pitches.
8. There are no jointing for top tape and bottom tape.
9. There are no fuzz in the cavity.
10. Break down force of top tape : 5N min.  
Break down force of bottom tape : 5N min. (Only a bottom tape existence )
11. Reel is made by resin and appeaser and dimension is shown in 3.Dimensions of Reel.  
There are possibly to change the material and dimension due to some impairment.
12. Peeling off force : 0.1N to 0.6N in the direction as shown below.



13. Label that show the customer parts number, our parts number, our company name, inspection number and quantity, will be put in outside of reel.











































