

# Test Sheet of Monolithic Ceramic Capacitor

## GRM21(0805/2012) series [High Dielectric Type]

| Typical Murata Global Part No | Size (inch/mm) | Temp. Chara. | Cap.Value | Cap.Tol. | Volt. |
|-------------------------------|----------------|--------------|-----------|----------|-------|
| GRM21BC81C226ME44             | 0805/2012      | X6S          | 22uF      | +/-20%   | 16V   |

Data No.:QMC-GR2-0109  
DATE: 2016.3.7

Murata Manufacturing Co., Ltd.

Operating Temperature Range / 使用温度範囲 : -55 ~ +105°C

| Tested Item/<br>試験項目                                        | Tested Condition/<br>試験条件                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Result/試験結果<br>(Rejection Number/Sample Number) |             |      |   |              |        |   |              |        |      |
|-------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------|------|---|--------------|--------|---|--------------|--------|------|
| 1.Adhesive Strength<br>of Termination/<br>固着性               | Substrate/基板 : Glass-epoxy<br>Pressurization Power / 加圧力 : 10N<br>(GRM03 : 2N / GRM15,18 : 5N)<br>Keeping Time / 保持時間 : 10±1s<br>Solder Type / はんだ種類 : Sn-3.0Ag-0.5Cu<br>Pressuring Speed/加圧速度 : 0.5 mm/sec (GRM03 : 0.1mm/sec)                                                                                                                                                                                                                                                                             | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 2.Vibration/<br>振動                                          | Oscillation Frequency/振動周波数 : 10Hz to 55Hz to 10Hz for 1min.<br>Total Amplitude/全振幅 : 1.5 mm<br>Time/時間 : A period of 2 hours in each of 3 mutually perpendicular directions.<br>(Total 6 hours)                                                                                                                                                                                                                                                                                                            | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 3.Substrate Bending<br>test/<br>耐ﾌﾟﾘﾝﾄ板曲げ性                  | Substrate/基板 : Glass-epoxy (100mm × 40mm × 1.6mm*)<br>* (t=GRM03/15 : 0.8mm)<br>Deflection/たわみ量 : 1mm<br>Keeping Time/保持時間 : 5±1s<br>Pressure jig/加圧治具 : R5mm                                                                                                                                                                                                                                                                                                                                               | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 4.Solderability/<br>はんだ付け性                                  | Flux/フラックス : Ethanol solution of rosin 25(wt)%<br>Solder/はんだ : Sn-3.0Ag-0.5Cu<br>Solder Temperature/はんだ温度 : 245±5°C<br>Immersion Time/浸せき時間 : 2s±0.5s<br>Immersion Position/浸せき位置 : Covering terminal electrode<br>/ 端子電極が隠れるところまで。<br>Preheat/試験前予熱 : 80 to 120°C for 10-30 sec                                                                                                                                                                                                                            | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 5.Resistance to<br>soldering Heat/<br>はんだ耐熱性                | Solder/はんだ : Sn-3.0Ag-0.5Cu<br>Solder Temperature/はんだ温度 : 270±5°C<br>Immersion Time/浸せき時間 : 10s±0.5s<br>Immersion Position/浸せき位置 : Covering terminal electrode<br>/ 端子電極が隠れるところまで。<br>Preheating/試験前予熱 : 120 to 150°C for 60 sec<br>*Preheating for GRM32/43/55<br><table border="1"> <thead> <tr> <th>Step</th><th>Temperature</th><th>Time</th></tr> </thead> <tbody> <tr> <td>1</td><td>100 to 120°C</td><td>1 min.</td></tr> <tr> <td>2</td><td>170 to 200°C</td><td>1 min.</td></tr> </tbody> </table> | Step                                            | Temperature | Time | 1 | 100 to 120°C | 1 min. | 2 | 170 to 200°C | 1 min. | 0/10 |
| Step                                                        | Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Time                                            |             |      |   |              |        |   |              |        |      |
| 1                                                           | 100 to 120°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1 min.                                          |             |      |   |              |        |   |              |        |      |
| 2                                                           | 170 to 200°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1 min.                                          |             |      |   |              |        |   |              |        |      |
| 6.Temperature<br>Sudden Change/<br>温度急変                     | 1 Cycle condition/1サイクル条件<br>step 1: Min. Operating Temp.(+0°C,-3°C) , 30min±3min<br>step 2: Ordinary Temp.,2min to 3 min<br>step 3: Max. Operating Temp.(+3°C,-0°C) , 30min±3min<br>step 4: Ordinary Temp.,2min to 3 min<br>Cycle/回数 : 5 cycles                                                                                                                                                                                                                                                            | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 7.High Temperature<br>High<br>Humidity(Steady)/<br>高温高湿(定常) | Temperature/温度 : 40°C±2°C<br>Humidity/湿度 : 90%(RH) to 95%(RH)<br>Voltage/電圧 : The Rated Voltage/定格電圧<br>Time/時間 : 500±12h                                                                                                                                                                                                                                                                                                                                                                                   | 0/10                                            |             |      |   |              |        |   |              |        |      |
| 8.Durability/<br>耐久性                                        | Temperature/温度 : Max. Operating Temp.±3°C<br>Voltage/電圧 : Apply 100% of the rated voltage / 定格電圧 x 100%<br>Time/時間 : 1000±12h                                                                                                                                                                                                                                                                                                                                                                               | 0/10                                            |             |      |   |              |        |   |              |        |      |

Note: These tested condition and specification are for the typical item.

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—○— AVE. ■ MAX. ■ MIN.

| Tested Item/<br>試験項目                                                | Confirmed Criteria/<br>評価項目       | Specification and Result / 規格値 および 試験結果                                                                         |    |  |  |  |
|---------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------|----|--|--|--|
| 1.Adhesive<br>Strength<br>of Termination/<br>固着性                    | Appearance/外観                     | No defects including no<br>peeling of the termination.<br>端子電極のはく離及びその他<br>異常はありません。                            | OK |  |  |  |
| 2.Vibration/<br>振動                                                  | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance/<br>静電容量              | 17.6 to 26.4uF                                                                                                  |    |  |  |  |
|                                                                     | D.F.                              | 0.1(max.)                                                                                                       |    |  |  |  |
| 3.Substrate<br>Bending test/<br>耐ﾌﾟﾘﾝﾄ板曲げ性                          | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance Change/<br>静電容量変化率(%) | ±10% (within)                                                                                                   | OK |  |  |  |
| 4.Solderability /<br>はんだ付け性                                         | Wetting area/<br>はんだ付き面積          | 95% of the termination is to<br>be soldered evenly and<br>continuously/<br>端子電極の95%以上に切れ<br>目なくはんだが付着してい<br>ます。 | OK |  |  |  |
| 5.Resistance to<br>Soldering Heat/<br>はんだ耐熱性                        | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance Change/<br>静電容量変化率(%) | ±15% (within)                                                                                                   |    |  |  |  |
|                                                                     | D.F.                              | 0.1(max.)                                                                                                       |    |  |  |  |
|                                                                     | IR/絶縁抵抗(MQ)                       | 2.3E+00(min.)                                                                                                   |    |  |  |  |
|                                                                     | Voltage Proof/<br>耐電圧             | No defects/異常ありません。                                                                                             | OK |  |  |  |
| 6.Temperature<br>Sudden Change/<br>温度急変                             | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance Change/<br>静電容量変化率(%) | ±7.5% (within)                                                                                                  |    |  |  |  |
|                                                                     | D.F.                              | 0.1(max.)                                                                                                       |    |  |  |  |
|                                                                     | IR/絶縁抵抗(MQ)                       | 2.3E+00(min.)                                                                                                   |    |  |  |  |
|                                                                     | Voltage Proof/<br>耐電圧             | No defects/異常ありません。                                                                                             | OK |  |  |  |
| 7.High<br>Temperature High<br>Humidity<br>(Steady)/<br>高温高湿<br>(定常) | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance Change/<br>静電容量変化率(%) | ±12.5% (within)                                                                                                 |    |  |  |  |
|                                                                     | D.F.                              | 0.2(max.)                                                                                                       |    |  |  |  |
|                                                                     | IR/絶縁抵抗(MQ)                       | 5.7E-01(min.)                                                                                                   |    |  |  |  |
| 8.Durability/<br>耐久性                                                | Appearance/外観                     | No defects<br>/著しい異常はありません。                                                                                     | OK |  |  |  |
|                                                                     | Capacitance Change/<br>静電容量変化率(%) | ±12.5% (within)                                                                                                 |    |  |  |  |
|                                                                     | D.F.                              | 0.2(max.)                                                                                                       |    |  |  |  |
|                                                                     | IR/絶縁抵抗(MQ)                       | 1.1E+00(min.)                                                                                                   |    |  |  |  |