SAMSUNG ELECTRO-MECHANICS

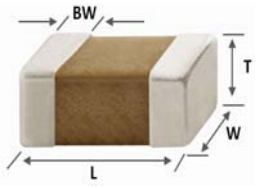
# Specification of Automotive MLCC *(Reference sheet)*

RoHS+Halogen Compliant Ecoparts

- **Supplier : Samsung Electro-Mechanics**
- **Product : Multi-layer Ceramic Capacitor**
- **Samsung P/N : CL21B102KC6WPNC**
- **Description : CAP, 1㎋, 100V, ± 10%, X7R, 0805**
- **AEC-Q200 Qualified**

## A. Dimension

● **Dimension**




| Size | 0805 inch |
|---|---|
| L | 2.00±0.10 mm |
| W | 1.25±0.10 mm |
| T | 0.60±0.10 mm |
| BW | 0.50+0.20/-0.30 mm |

## B. Samsung Part Number

| CL | 21 | B | 102 | K | C | 6 | W | P | N | C |
|---|---|---|---|---|---|---|---|---|---|---|
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ | ⑩ | ⑪ |

| | | | |
|---|---|---|---|
| ① **Series** | Samsung Multi-layer Ceramic Capacitor | | |
| ② **Size** | 0805 (inch code) | L : 2.00±0.10 mm | W :1.25±0.10 mm |
| ③ **Dielectric** | X7R | ⑧ **Inner electrode** | Ni, Open Mode Design |
| ④ **Capacitance** | 1 ㎋ | **Termination** | Metal-Epoxy |
| ⑤ **Capacitance tolerance** | ± 10% | **Plating** | Sn 100% (Pb Free) |
| | | ⑨ **Product** | Automotive |
| ⑥ **Rated Voltage** | 100 V | ⑩ **Special code** | Normal |
| ⑦ **Thickness** | 0.60±0.10 mm | ⑪ **Packaging** | Cardboard Type, 7" Reel |

## C. Reliability Test and Judgement condition

| Test items | Performance | Test condition |
|---|---|---|
| **High Temperature Exposure** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ : 0.03 max.<br>IR : More than 10,000 ㏁ or 500 ㏁×㎌<br>Whichever is smaller | Unpowered, 1,000hrs @ Max. temperature<br>Measurement at 24±2hrs after test conclusion<br><br>Initial Measurement 2*<br>Final Measurement 3* |
| **Temperature Cycling** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ : 0.03 max.<br>IR : More than 10,000 ㏁ or 500 ㏁×㎌<br>Whichever is smaller | 1,000Cycles<br>Initial Measurement 2*<br>Final Measurement 3*<br>Measurement at 24±2hrs after test conclusion<br>1 cycle condition : -55+0/-3℃(30±3min) → Room Temp. (1min) → 125+3/-0℃(30±3min) → Room Temp. (1min) |
| **Destructive Physical Analysis** | No Defects or abnormalities | Per EIA 469 |
| **Humidity Bias** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±12.5 %<br>Tan δ : 0.035 max.<br>IR : More than 500 ㏁ or 25 ㏁×㎌<br>Whichever is smaller | 1,000hrs 85℃/85%RH, Rated Voltage and 1.3~1.5V,<br>Add 100kohm resistor<br>Initial Measurement 2*<br>Final Measurement 4*<br>Measurement at 24±2hrs after test conclusion<br>The charge/discharge current is less than 50mA. |
| **High Temperature Operating Life** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±12.5 %<br>Tan δ : 0.035 max.<br>IR : More than 1,000 ㏁ or 50 ㏁×㎌<br>Whichever is smaller | 1,000hrs @ 125℃, 200% Rated Voltage,<br>Initial Measurement 2*<br>Final Measurement 4*<br>Measurement at 24±2hrs after test conclusion<br>The charge/discharge current is less than 50mA. |

| | Performance | Test condition |
|---|---|---|
| **External Visual** | No abnormal exterior appearance | Microscope (´10) |
| **Physical Dimension** | Within the specified dimensions | Using The calipers |
| **Mechanical Shock** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ, IR : Initial spec. | Three shocks in each direction should be applied along<br>3 mutually perpendicular axes of the test specimen (18 shocks)<br>Peak value \| Duration \| Wave \| Velocity<br>1,500G \| 0.5ms \| Half sine \| 4.7m/sec<br>Initial Measurement 2*<br>Final Measurement 5* |
| **Vibration** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ, IR : Initial spec. | 5g's for 20min., 12cycles each of 3 orientations,<br>Use 8"×5" PCB 0.031" Thick 7 secure points on one long side<br>and 2 secure points at corners of opposite sides. Parts mounted<br>within 2" from any secure point. Test from 10~2,000㎐.<br>Initial Measurement 2*<br>Final Measurement 5* |
| **Resistance to Solder Heat** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ, IR : Initial spec. | preheating : 150℃ for 60~120 sec.<br>Solder pot : 260±5℃, 10±1sec.<br>Initial Measurement 2*<br>Final Measurement 3* |
| **ESD** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 %<br>Tan δ, IR : Initial spec. | AEC-Q200-002 or ISO/DIS10605<br>Initial Measurement 2*<br>Final Measurement 4* |
| **Solderability** | 95% of the terminations is to be soldered<br>evenly and continuously | a) Preheat at 155℃ for 4 hours, Immerse in solder for 5s at 245±5℃<br>b) Steam aging for 8 hours, Immerse in solder for 5s at 245±5℃<br>c) Steam aging for 8 hours, Immerse in solder for 120s at 260±5℃<br>solder : a solution ethanol and rosin |
| **Electrical Characterization** | Capacitance : Within specified tolerance<br>Tan δ : 0.025 max.<br>IR(25℃) : More than 10,000 ㏁ or 500 ㏁×㎌<br>Whichever is smaller<br>IR(125℃) More than 1,000 ㏁ or 10 ㏁×㎌<br>Whichever is smaller<br><br>Dielectric Strength | *A capacitor prior to measuring the capacitance is heat treated at<br>150 +0/-10℃ for 1hour and maintained in ambient air for 24±2 hours<br>The Capacitance / D.F. should be measured at 25℃,<br>1 ㎑ ± 10%, 1 ± 0.2 Vrms<br>I.R. should be measured with a DC voltage not exceeding<br>Rated Voltage @25℃, @125℃ for 60~120 sec.<br><br>Dielectric Strength : 200% of the rated voltage for 1~5 seconds |
| **Board Flex** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 % | Bending to the limit, 3 ㎜ for 60 seconds 1*<br>Initial Measurement 2*<br>Final Measurement 5* |
| **Terminal Strength(SMD)** | Appearance : No abnormal exterior appearance<br>Capacitance Change Within ±10 % | 18 N, for 60 sec.<br>Initial Measurement 2*<br>Final Measurement 5* |
| **Beam Load** | Destruction value should be exceed 20 N | Beam speed : 0.5±0.05 ㎜/sec |
| **Temperature Characteristics** | X7R<br>From -55 ℃ to 125 ℃, Capacitance change should be within ±15% | |

## D. Recommended Soldering method :

Reflow ( Reflow Peak Temperature : 260 +0/-5℃, 30sec. ), Meet IPC/JEDEC J-STD-020 D Standard

*1 : The figure indicates typical specification. Please refer to individual specifications.

*2 : Initial measurement : Perform a heat treatment at 150 +0/-10℃ for one hour after soldering process.
and then let sit for 24±2 hours at room temperature. Perform the initial measurement.

*3 : Final measurement : Let sit for 24±2 hours at room temperature after test conclusion, then measure.

*4 : Final measurement : Perform a heat treatment at 150 +0/-10℃ for one hour after soldering process.
and then let sit for 24±2 hours at room temperature. Perform the initial measurement.

*5 : Final measurement : Let measure within 24 hours at room temperature after test conclusion.

⚠ Product specifications included in the specifications are effective as of March 1, 2013.

Please be advised that they are standard product specifications for reference only.

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