

# SPECIFICATION

(Reference sheet)

· Supplier : Samsung electro-mechanics  
· Product : Multi-layer Ceramic Capacitor

· Samsung P/N: **CL05A225MQ5NNNC**  
· Description : **CAP, 2.2uF, 6.3V, ±20%, X5R, 0402**

## A. Samsung Part Number

**CL** **05** **A** **225** **M** **Q** **5** **N** **N** **N** **C**  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

|                                |                                       |                          |  |                         |  |  |  |  |  |  |
|--------------------------------|---------------------------------------|--------------------------|--|-------------------------|--|--|--|--|--|--|
| ① <b>Series</b>                | Samsung Multi-layer Ceramic Capacitor |                          |  |                         |  |  |  |  |  |  |
| ② <b>Size</b>                  | 0402 (inch code)                      | L: 1.00 ± 0.05 mm        |  | W: 0.50 ± 0.05 mm       |  |  |  |  |  |  |
| ③ <b>Dielectric</b>            | X5R                                   | ⑧ <b>Inner electrode</b> |  | Ni                      |  |  |  |  |  |  |
| ④ <b>Capacitance</b>           | 2.2 uF                                | ⑨ <b>Termination</b>     |  | Cu                      |  |  |  |  |  |  |
| ⑤ <b>Capacitance tolerance</b> | ±20 %                                 | ⑩ <b>Plating</b>         |  | Sn 100% (Pb Free)       |  |  |  |  |  |  |
| ⑥ <b>Rated Voltage</b>         | 6.3 V                                 | ⑪ <b>Product</b>         |  | Normal                  |  |  |  |  |  |  |
| ⑦ <b>Thickness</b>             | 0.50 ± 0.05 mm                        | ⑫ <b>Special</b>         |  | Reserved for future use |  |  |  |  |  |  |
|                                |                                       | ⑬ <b>Packaging</b>       |  | Cardboard Type, 7" reel |  |  |  |  |  |  |

## B. Structure & Dimension



| Samsung P/N     | Dimension(mm) |             |             |             |
|-----------------|---------------|-------------|-------------|-------------|
|                 | L             | W           | T           | BW          |
| CL05A225MQ5NNNC | 1.00 ± 0.05   | 0.50 ± 0.05 | 0.50 ± 0.05 | 0.25 ± 0.10 |

### C. Samsung Reliability Test and Judgement Condition

|                                  | Judgement                                                                                                                               | Test condition                                                                                                                                        |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Capacitance                      | Within specified tolerance                                                                                                              | 1kHz $\pm 10\%$ / 0.5 $\pm$ 0.1Vrms                                                                                                                   |
| Tan $\delta$ (DF)                | 0.1 max.                                                                                                                                | *A capacitor prior to measuring the capacitance is heat treated at 150°C $\pm$ 0/-10°C for 1 hour and maintained in ambient air for 24 $\pm$ 2 hours. |
| Insulation Resistance            | 10,000Mohm or 100Mohm $\times \mu F$<br>Whichever is smaller                                                                            | Rated Voltage 60~120 sec.                                                                                                                             |
| Appearance                       | No abnormal exterior appearance                                                                                                         | Microscope ( $\times 10$ )                                                                                                                            |
| Withstanding Voltage             | No dielectric breakdown or mechanical breakdown                                                                                         | 250% of the rated voltage                                                                                                                             |
| Temperature Characteristics      | X5R<br>(From -55°C to 85°C, Capacitance change should be within $\pm 15\%$ )                                                            |                                                                                                                                                       |
| Adhesive Strength of Termination | No peeling shall be occur on the terminal electrode                                                                                     | 500g·f, for 10 $\pm$ 1 sec.                                                                                                                           |
| Bending Strength                 | Capacitance change : within $\pm 12.5\%$                                                                                                | Bending to the limit (1mm) with 1.0mm/sec.                                                                                                            |
| Solderability                    | More than 75% of terminal surface is to be soldered newly                                                                               | SnAg3.0Cu0.5 solder<br>245 $\pm$ 5°C, 3 $\pm$ 0.3sec.<br>(preheating : 80~120°C for 10~30sec.)                                                        |
| Resistance to Soldering Heat     | Capacitance change : within $\pm 7.5\%$<br>Tan $\delta$ , IR : initial spec.                                                            | Solder pot : 270 $\pm$ 5°C, 10 $\pm$ 1sec.                                                                                                            |
| Vibration Test                   | Capacitance change : within $\pm 5\%$<br>Tan $\delta$ , IR : initial spec.                                                              | Amplitude : 1.5mm<br>From 10Hz to 55Hz (return : 1min.)<br>2hours $\times$ 3 direction (x, y, z)                                                      |
| Moisture Resistance              | Capacitance change : within $\pm 12.5\%$<br>Tan $\delta$ : 0.125 max<br>IR : 500Mohm or 12.5Mohm $\times \mu F$<br>Whichever is smaller | With rated voltage<br>40 $\pm$ 2°C, 90~95%RH, 500+12/-0hrs                                                                                            |
| High Temperature Resistance      | Capacitance change : within $\pm 12.5\%$<br>Tan $\delta$ : 0.125 max<br>IR : 1,000Mohm or 25Mohm $\times \mu F$<br>Whichever is smaller | With 150% of the rated voltage<br>Max. operating temperature<br>1000+48/-0hrs                                                                         |
| Temperature Cycling              | Capacitance change : within $\pm 7.5\%$<br>Tan $\delta$ , IR : initial spec.                                                            | 1 cycle condition<br>Min. operating temperature $\rightarrow$ 25°C<br>$\rightarrow$ Max. operating temperature $\rightarrow$ 25°C<br><br>5 cycle test |

※ The reliability test condition can be replaced by the corresponding accelerated test condition.

### D. Recommended Soldering method :

Reflow ( Reflow Peak Temperature : 260 $\pm$ 0/-5°C, 10sec. Max )



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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So, you need to approve the product specifications before placing an order.

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