

# SPECIFICATION

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

- Samsung P/N : **CL05A224KP5NNND**
- Description : **CAP, 220nF, 10V, ±10%, X5R, 0402**

## A. Samsung Part Number

CL 05 A 224 K P 5 N N N D  
①    ②    ③    ④    ⑤    ⑥    ⑦    ⑧    ⑨    ⑩    ⑪

|                         |                                       |                   |                          |
|-------------------------|---------------------------------------|-------------------|--------------------------|
| ① Series                | Samsung Multi-layer Ceramic Capacitor |                   |                          |
| ② Size                  | 0402 (inch code)                      | L: 1.0 ± 0.05 mm  | W: 0.5 ± 0.05 mm         |
| ③ Dielectric            | X5R                                   | ⑧ Inner electrode | Ni                       |
| ④ Capacitance           | 220 nF                                | Termination       | Cu                       |
| ⑤ Capacitance tolerance | ±10 %                                 | Plating           | Sn 100% (Pb Free)        |
| ⑥ Rated Voltage         | 10 V                                  | ⑨ Product         | Normal                   |
| ⑦ Thickness             | 0.5 ± 0.05 mm                         | ⑩ Special         | Reserved for future use  |
|                         |                                       | ⑪ Packaging       | Cardboard Type, 13" reel |

## B. Samsung Reliability Test and Judgement condition

|                                  | Performance   | Test condition   |
|----------------------------------|---|--|
| Capacitance                      | Within specified tolerance  | 1kHz±10%<br>1.0±0.2Vrms  |
| Tan δ (DF)                       | 0.05 max.   |  |
| Insulation Resistance            | 10,000Mohm or 100Mohm·μF<br>Whichever is Smaller                    | Rated Voltage 60~120 sec.  |
| Appearance                       | No abnormal exterior appearance                                     | Microscope (×10)   |
| Withstanding Voltage             | No dielectric breakdown or mechanical breakdown                     | 250% of the rated voltage  |
| Temperature Characterisitcs      | X5R<br>(From -55℃ to 85℃, Capacitance change should be within ±15%) |  |
| Adhesive Strength of Termination | No peeling shall be occur on the terminal electrode                 | 500g-F, for 10±1 sec.  |
| Bending Strength                 | Capacitance change : within ±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±5℃, 3±0.3sec.<br>(preheating : 80~120℃ for 10~30sec.) |
| Resistance to Soldering heat     | Capacitance change : within ±7.5%<br>Tan δ, IR : initial spec.      | Solder pot : 270±5℃, 10±1sec.  |

|                                    | <b>Performance</b>  | <b>Test condition</b>   |
|------------------------------------|---|---|
| <b>Vibration Test</b>              | 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)  |
| <b>Moisture Resistance</b>         | Capacitance change : within $\pm 12.5\%$<br>Tan $\delta$ : 0.075 max<br>IR : 500Mohm or 25Mohm $\cdot \mu\text{F}$<br>Whichever is Smaller  | With rated voltage<br>40 $\pm$ 2 $^{\circ}\text{C}$ , 90~95%RH, 500+12/-0hrs  |
| <b>High Temperature Resistance</b> | Capacitance change : within $\pm 12.5\%$<br>Tan $\delta$ : 0.075 max<br>IR : 1000Mohm or 50Mohm $\cdot \mu\text{F}$<br>Whichever is Smaller | With 200% of the rated voltage<br>Max. operating temperature<br>1000+48/-0hrs   |
| <b>Temperature Cycling</b>         | Capacitance change : within $\pm 7.5\%$<br>Tan $\delta$ , IR : initial spec.  | 1 cycle condition<br>Min. operating temperature $\rightarrow$ 25 $^{\circ}\text{C}$<br>$\rightarrow$ Max. operating temperature $\rightarrow$ 25 $^{\circ}\text{C}$<br>5 cycle test |

**C. Recommended Soldering method :**

Reflow ( Reflow Peak Temperature : 260+0/-5 $^{\circ}\text{C}$ , 10sec. Max )

\* For the more detail Specification, Please refer to the Samsung MLCC catalogue.