

# SPECIFICATION

(Reference sheet)

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

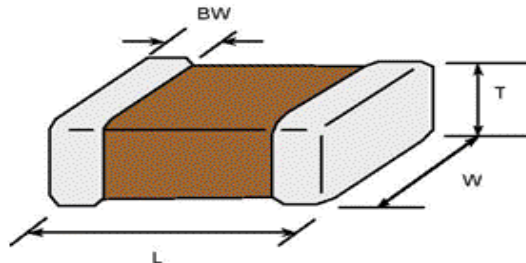
- Samsung P/N: **CL05B221JB5NNNC**
- Description : **CAP, 220pF, 50V, ±5%, X7R, 0402**

## A. Samsung Part Number

CL   05   B   221   J   B   5   N   N   N   C  
 ①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧   ⑨   ⑩   ⑪

|                         |                                       |                   |  |                         |  |  |  |  |  |  |
|-------------------------|---------------------------------------|-------------------|--|-------------------------|--|--|--|--|--|--|
| ① Series                | Samsung Multi-layer Ceramic Capacitor |                   |  |                         |  |  |  |  |  |  |
| ② Size                  | 0402 (inch code)                      | L: 1.00 ± 0.05 mm |  | W: 0.50 ± 0.05 mm       |  |  |  |  |  |  |
| ③ Dielectric            | X7R                                   | ⑧ Inner electrode |  | Ni                      |  |  |  |  |  |  |
| ④ Capacitance           | 220 pF                                | Termination       |  | Cu                      |  |  |  |  |  |  |
| ⑤ Capacitance tolerance | ±5 %                                  | Plating           |  | Sn 100% (Pb Free)       |  |  |  |  |  |  |
| ⑥ Rated Voltage         | 50 V                                  | ⑨ Product         |  | Normal                  |  |  |  |  |  |  |
| ⑦ Thickness             | 0.50 ± 0.05 mm                        | ⑩ Special         |  | Reserved for future use |  |  |  |  |  |  |
|                         |                                       | ⑪ Packaging       |  | Cardboard Type, 7" reel |  |  |  |  |  |  |

## B. Structure & Dimension



| Samsung P/N     | Dimension(mm) |             |             |             |
|-----------------|---------------|-------------|-------------|-------------|
|                 | L             | W           | T           | BW          |
| CL05B221JB5NNNC | 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 $\pm 10\%$ / 1.0 $\pm 0.2$ Vrms                                                                                                                   |
| Tan $\delta$ (DF)                | 0.025 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 500Mohm $\times \mu F$<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      | X7R<br>(From -55°C to 125°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)<br>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 $\pm 0.3$ sec.<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 $\pm 1$ sec.                                                                                                           |
| 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 $\delta$ : 0.05 max<br>IR : 500Mohm or 25Mohm $\times \mu F$<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 $\delta$ : 0.05 max<br>IR : 1,000Mohm or 50Mohm $\times \mu F$<br>Whichever is smaller | With 200% 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.

We may change, modify or discontinue the product specifications without notice at any time.

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

Should you have any question regarding the product specifications,

please contact our sales personnel or application engineers.

## **- Disclaimer & Limitation of Use and Application -**

The products listed in this Specification sheet are **NOT** designed and manufactured for any use and applications set forth below.

Please note that any misuse of the products deviating from products specifications or information provided in this Spec sheet may cause serious property damages or personal injury.

We will **NOT** be liable for any damages resulting from any misuse of the products, specifically including using the products for high reliability applications as listed below.

If you have any questions regarding this 'Limitation of Use and Application', you should first contact our sales personnel or application engineers.

- ① Aerospace/Aviation equipment
- ② Automotive or Transportation equipment (vehicles , trains , ships , etc)
- ③ Medical equipment
- ④ Military equipment
- ⑤ Disaster prevention/crime prevention equipment
- ⑥ Any other applications with the same as or similar complexity or reliability to the applications set forth above.