

## SPECIFICATION

(Reference sheet)

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

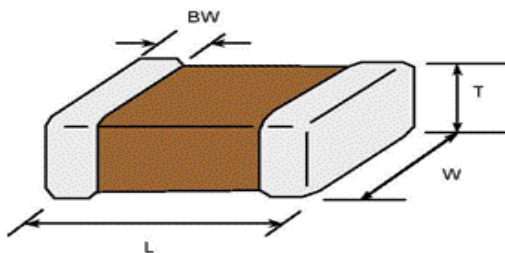
· Samsung P/N : **CL32B473KHINNWE**  
· Description : **CAP, 47nF, 630V, ±10%, X7R, 1210**

### A. Samsung Part Number

**CL 32 B 473 K H ! N N W E**  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

|                         |                                       |                        |                                   |
|-------------------------|---------------------------------------|------------------------|-----------------------------------|
| ① Series                | Samsung Multi-layer Ceramic Capacitor |                        |                                   |
| ② Size                  | 1210 (inch code)                      | L : $3.20 \pm 0.30$ mm | W : $2.50 \pm 0.20$ mm            |
| ③ Dielectric            | X7R                                   | ⑧ Inner electrode      | Ni                                |
| ④ Capacitance           | 47 nF                                 | Termination            | Cu                                |
| ⑤ Capacitance tolerance | ±10 %                                 | Plating                | Sn 100% (Pb Free)                 |
| ⑥ Rated Voltage         | 630 V                                 | ⑨ Product              | Normal                            |
| ⑦ Thickness             | $2.00 \pm 0.20$ mm                    | ⑩ Special              | Industrial (Network, Power, etc.) |
|                         |                                       | ⑪ Packaging            | Embossed Type, 7" reel            |

### B. Structure & Dimension



| Samsung P/N     | Dimension(mm)   |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|                 | L               | W               | T               | BW              |
| CL32B473KHINNWE | $3.20 \pm 0.30$ | $2.50 \pm 0.20$ | $2.00 \pm 0.20$ | $0.60 \pm 0.30$ |

### 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+0/-10 °C for 1hour and maintained in ambient air for 24 $\pm 2$ hours.        |
| Insulation Resistance            | 10,000Mohm or 500Mohm $\times \mu F$<br>Whichever is smaller                                                                           | 500 $\pm 50$ Vdc 60 $\pm 5$ sec.                                                                                                                        |
| Appearance                       | No abnormal exterior appearance                                                                                                        | Microscope ( $\times 10$ )                                                                                                                              |
| Withstanding Voltage             | No dielectric breakdown or mechanical breakdown                                                                                        | 150% 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) with 1.0mm/sec.                                                                                                              |
| Solderability                    | More than 95% 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 120% of the rated voltage<br>Max. operating temperature<br>1,000+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 : 250 °C, 6sec.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.

Should you have any question regarding the product specifications,

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