

# SPECIFICATION

(Reference sheet)

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

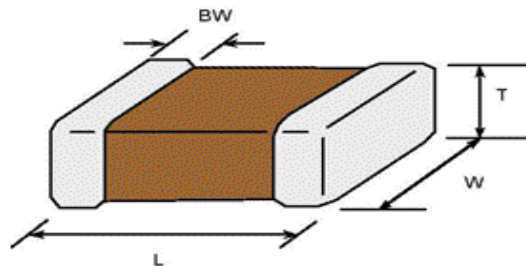
- Samsung P/N : **CL05A475MQ3LUNC**
- Description : **CAP, 4.7uF, 6.3V, ±20%, X5R, 0402**

## A. Samsung Part Number

**CL** **05** **A** **475** **M** **Q** **3** **L** **U** **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 ± 0.20 mm          | W : 0.50 ± 0.20 mm      |
| ③ <b>Dielectric</b>            | X5R                                   | ⑧ <b>Thickness division</b> | Low profile             |
| ④ <b>Capacitance</b>           | 4.7 uF                                | <b>Inner electrode</b>      | Ni                      |
| ⑤ <b>Capacitance tolerance</b> | ±20 %                                 | <b>Termination</b>          | Cu                      |
| ⑥ <b>Rated Voltage</b>         | 6.3 V                                 | <b>Plating</b>              | Sn 100% (Pb Free)       |
| ⑦ <b>Thickness</b>             | 0.30 ± 0.05 mm                        | ⑨ <b>Product</b>            | Size control code       |
|                                |                                       | ⑩ <b>Special</b>            | Reserved for future use |
|                                |                                       | ⑪ <b>Packaging</b>          | Cardboard Type, 7" reel |

## B. Structure & Dimension



| Samsung P/N     | Dimension(mm) |             |             |             |
|-----------------|---------------|-------------|-------------|-------------|
|                 | L             | W           | T           | BW          |
| CL05A475MQ3LUNC | 1.00 ± 0.20   | 0.50 ± 0.20 | 0.30 ± 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)                | 0.125 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 50Mohm $\times \mu F$<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 $\delta$ : 0.25 max<br>IR : 500Mohm or 3.5Mohm $\times \mu F$<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 $\delta$ : 0.25 max<br>IR : 1,000Mohm or 7Mohm $\times \mu F$<br>Whichever is smaller | With 100% 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 |

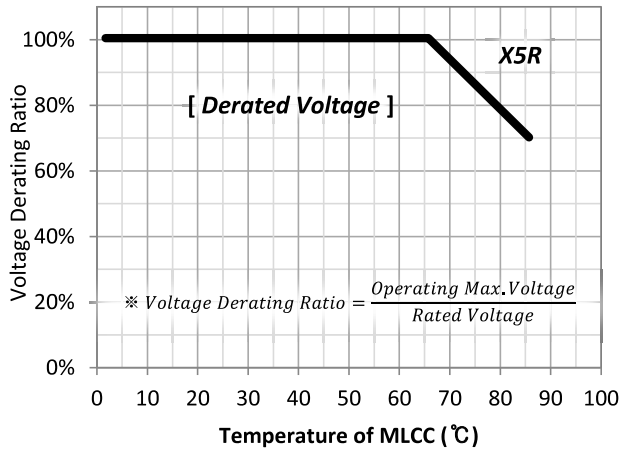
※ The reliability test condition can be replaced by the corresponding accelerated test condition.

### D. Recommended Soldering method :

Reflow ( Reflow Peak Temperature : 260 $\pm$ 5°C, 30sec. )

 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.

## ● Derating



This product, which guarantees High Temperature Reliability Test with 100% of rated voltage at the maximum temperature, is recommended to be used in the circuit with derated voltage compared to the rated voltage of the capacitor for long lifetime.

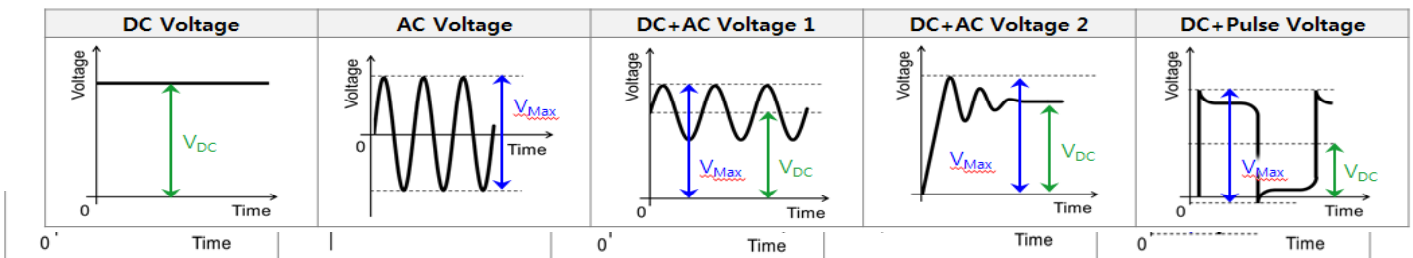
Max. voltage ( $V_{Max}$ ) and DC voltage ( $V_{DC}$ ) applied to this product shown in the table below are recommended to be used under the following conditions for long lifetime, respectively.

[Recommendations for long lifetime]

- $V_{Max} \leq$  (Derated Voltage on the left graph)
- $V_{DC} \leq 70\% \times$  (Derated Voltage on the left graph)

\* Temperature of MLCC : Surface temperature of MLCC in the circuit.

[Types of voltage applied to the capacitor]



## ● 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 Power plant control equipment
- ⑦ Atomic energy-related equipment
- ⑧ Undersea equipment
- ⑨ Traffic signal equipment
- ⑩ Data-processing equipment
- ⑪ Electric heating apparatus, burning equipment
- ⑫ Safety equipment
- ⑬ Any other applications with the same as or similar complexity or reliability to the applications