

## Surface-mount Ceramic Multilayer Capacitors

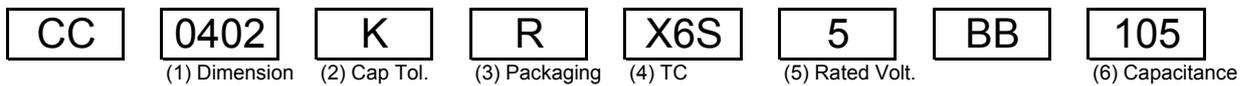
CC0402KRX6S5BB105 (0402 ,X6S, 1uF, 6.3V, ±10%)

Spec Sheet

### Scope

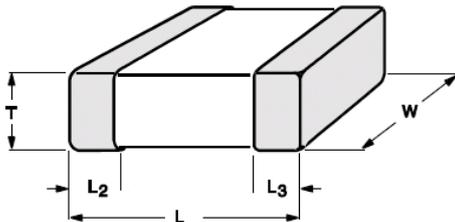
This product specification is applied to Multi-layer Ceramic Capacitor used for General Electronic equipments.

### Yageo Part Number



#### (1) External Dimensions

(Unit: mm)



L	1.0±0.05
W	0.5±0.05
T	0.5±0.05
L2/L3	0.15 to 0.30

(2) Capacitance Tolerance:	±10%
(4) Temperature Characteristics:	X6S
Temperature Range:	-55 to 105 °C
Cap Change:	±22%
(5) Rated Voltage:	6.3V
(6) Capacitance:	1uF
(3) Package:	Paper Tape Reel 7"
Packaging Unit:	10,000 pcs
Resistance:	R x C > 100Ω.F
Dielectric Loss Tangent:	10%
RoHS Compliance:	Yes
Halogen Free:	Yes
Soldering Method:	Reflow

IEC-60384 Standard Specification and Test methods

Test Item	Procedure	Requirements												
Mounting	The capacitors may be mounted on printed-circuit boards or ceramic substrates.	No visible damage												
Visual inspection and dimension check	Any applicable method using x10 magnification	In accordance with specification												
Capacitance Dielectric loss tangent	Class 2 (X5R, X6S, X7R, Y5V) : Precondition: 150 +0/-10 °C/1 hr , then keep for 24±1 hrs at room temp. f = 1KHz; measuring voltage 0.5V at 20°C	Within specified tolerance												
Temperature coefficient	<p>Capacitance shall be measured by the steps shown in the following table.</p> <p>The capacitance change should be measured after 5 min at each specified temperature stage.</p> <table border="1" data-bbox="443 974 756 1205"> <thead> <tr> <th>Step</th> <th>Temperature</th> </tr> </thead> <tbody> <tr> <td>a</td> <td>25±2</td> </tr> <tr> <td>b</td> <td>Lower Temperature ±3</td> </tr> <tr> <td>c</td> <td>25±2</td> </tr> <tr> <td>d</td> <td>Upper Temperature ±2</td> </tr> <tr> <td>e</td> <td>25±2</td> </tr> </tbody> </table> <p>(2) Class II Capacitance Change shall be calculated from the formula as below.</p> $\Delta C = \frac{C2 - C1}{C1} \times 100(\%)$ <p>C1: Capacitance at step c C2: Capacitance at step b or d</p>	Step	Temperature	a	25±2	b	Lower Temperature ±3	c	25±2	d	Upper Temperature ±2	e	25±2	<p>Class II:</p> <p>X7R/ X5R: <math>\Delta C/C</math>: ±15%</p> <p>Y5V: <math>\Delta C/C</math>: +22~-82%</p> <p>X6S: <math>\Delta C/C</math>: ±22%</p> <p>Measurement Voltage: 0.5±0.1V</p>
Step	Temperature													
a	25±2													
b	Lower Temperature ±3													
c	25±2													
d	Upper Temperature ±2													
e	25±2													
Adhesion	A force applied for 10 sec to the line joining the terminations and in a plane parallel to the substrate.	Force: size ≥ 0603: ≥ 5N, size=0402: ≥ 2.5N, size ≤ 0201: ≥ 1N												
Bending Strength	Mounting in accordance with IEC 60384-22 paragraph 4.3 Conditions: bending 1 mm at a rate of 1 mm/s, radius jig 5mm.	No visible damage $\Delta C/C$ : Class I, within ±1% or 0.5 pF, whichever is greater Class II: X7R, X5R, X6S: ±10%, Y5V: ±20%												
Resistance to soldering heat	Precondition: 150 +0/-10 °C/1 hr, then keep for 24±1 hrs at room temp Preheating: for size >1206:100 to 120 °C for 1 minute and 170 to 200°C for 1 minute. Solder bath temperature: 260 ± 5°C Dipping time 10±0.5 s Recovery time 24±2 Hours.	Dissolution of the end face plating shall not exceed 25% of the length of the edge concerned. $\Delta C/C$ : Class I, within ±0.5% or 0.5 pF, whichever is greater Class II: X7R, X5R, X6S : ±10%, Y5V: ±20% DF: within initial specified value IR: within initial specified value												

IEC-60384 Standard Specification and Test methods

Test Item	Procedure	Requirements
Solderability	The specimen shall be preheated to a temperature of 80 to 140 °C and maintained for 30s to 60s. 1. Temperature: 235±5°C / Dipping time: 2 ±0.5 s 2. Temperature: 245±5°C / Dipping time: 3 ±0.5 s (lead free) Depth of immersion: 10mm	The solder should cover over 95% of the critical area of each termination.
Rapid change of temperature	Precondition: 150 +0/-10 °C/1 hr, then keep for 24±1 hrs at room temp 5 cycles with following detail: 30 minutes at Lower Category Temperature; 30 minutes at Upper Category Temperature; Recovery time 24±2 Hours.	No visual damage Δ C/C: Class II: X7R, X5R, X6S:±15%, Y5V: ±20% DF: within initial specified value IR: within initial specified value
Damp heat with Ur load	1. Precondition (Class II only): 150 +0/-10 °C/1 hr, then keep for 24±1 hrs at room temp 2. Initial measure Spec: refer Initial spec (Cap, DF, IR) 3. Damp heat test: 500±12 hours at 40±2°C; 90 to 95% R.H.; 1.0Ur applied 4. Recovery: Class 1 : 6 to 24 hours, Class 2 : 24±2 hours 5. Final measure: Cap, DF, IR  P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to IEC 60384 4.1 and then the requirement shall be met.	No visual damage after recovery Δ C/C: Class II: X7R, X5R, X6S:±15%, Y5V: ±30% DF: Class II: X7R/X5R/X6S: 2 x specified value  Y5V : ≤15% IR: Class II: RxC ≥ 5Ω.F
Endurance	1. Precondition (Class II only): 150 +0/-10 °C/1 hr, then keep for 24±1 hrs at room temp 2. Initial measure Spec: refer Initial spec (Cap, DF, IR) 3. Endurance test: Temperature:X7R: 125°C , X5R/Y5V: 85°C 150% Specified voltage applied for 1000 hrs Recovery time: 24±2 hours 5. Final measure: Cap, DF, IR  P.S. If the capacitance value is less than the minimum value permitted, then after the other measurements have been made the capacitor shall be precondition according to IEC 60384 4.1 and then the requirement shall be met.	No visual damage after recovery Δ C/C: Class II: X7R, X5R, X6S:±15%, Y5V: ±30% DF: Class II: X7R/X5R/X6S: 2 x specified value  Y5V : ≤15% IR: Class II: RxC ≥ 10Ω.F

## Shelf Life & Storage Condition

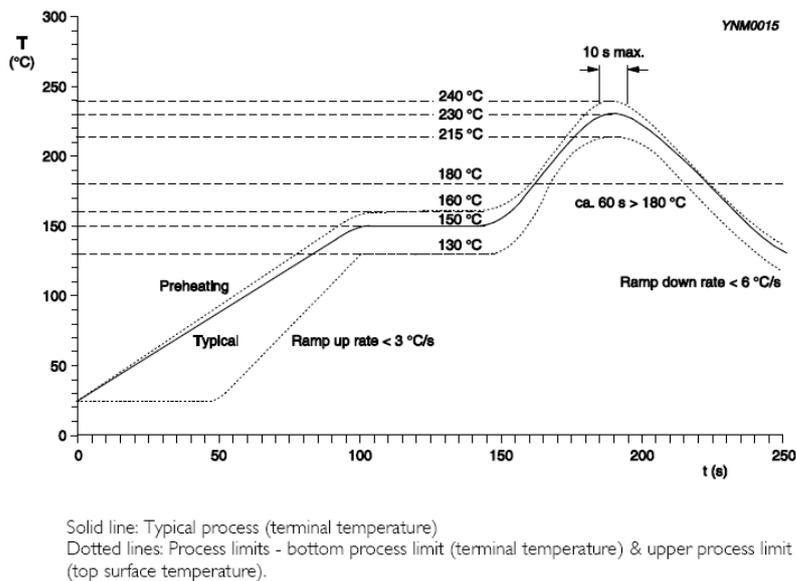
According with international specification JIS 1997.

- (1) Storage Conditions: Temperature -5 to 40°C  
Relative humidity 40~60%
- (2) Shelf Life: 2 years from date of manufacture

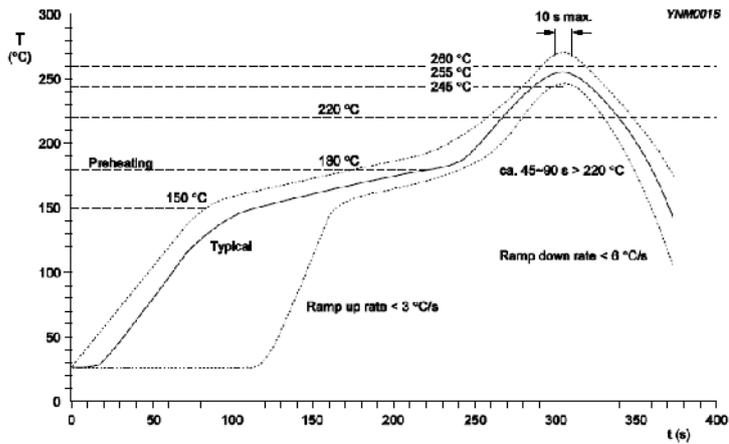
We recommend that the products are stored in their original packing (e.g. tape, reel). They should never be touched by hand.

## Soldering Condition

For normal use the capacitors may be mounted on printed-circuit boards or ceramic substrates by applying wave soldering, reflow soldering or conductive adhesive in accordance with "IEC 61760-1" (Standard method for the specification of surface mounting components).

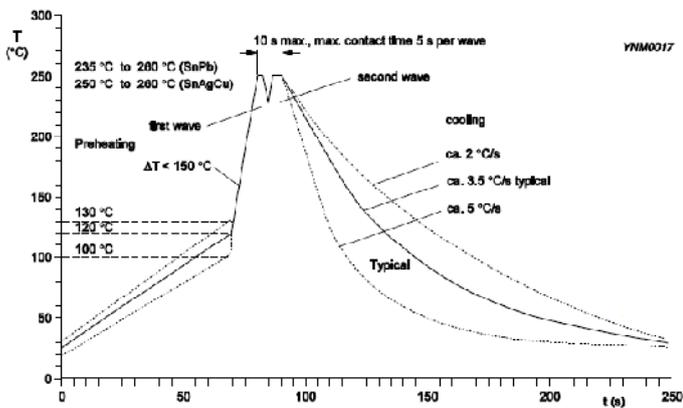


Infrared soldering, forced gas convection reflow soldering - Temperature/time profile for SnPb solders



Solid line: Typical process (terminal temperature)  
Dotted lines: Process limits - bottom process limit (terminal temperature) & upper process limit (top surface temperature).

Infrared soldering, forced gas convection reflow soldering - Temperature/time profile for lead-free SnAgCu solders



Solid line: Typical process  
Dotted lines: Process limits

Double wave soldering for SnPb and lead-free SnAgCu solder - Temperature/time profile (terminal temperature)