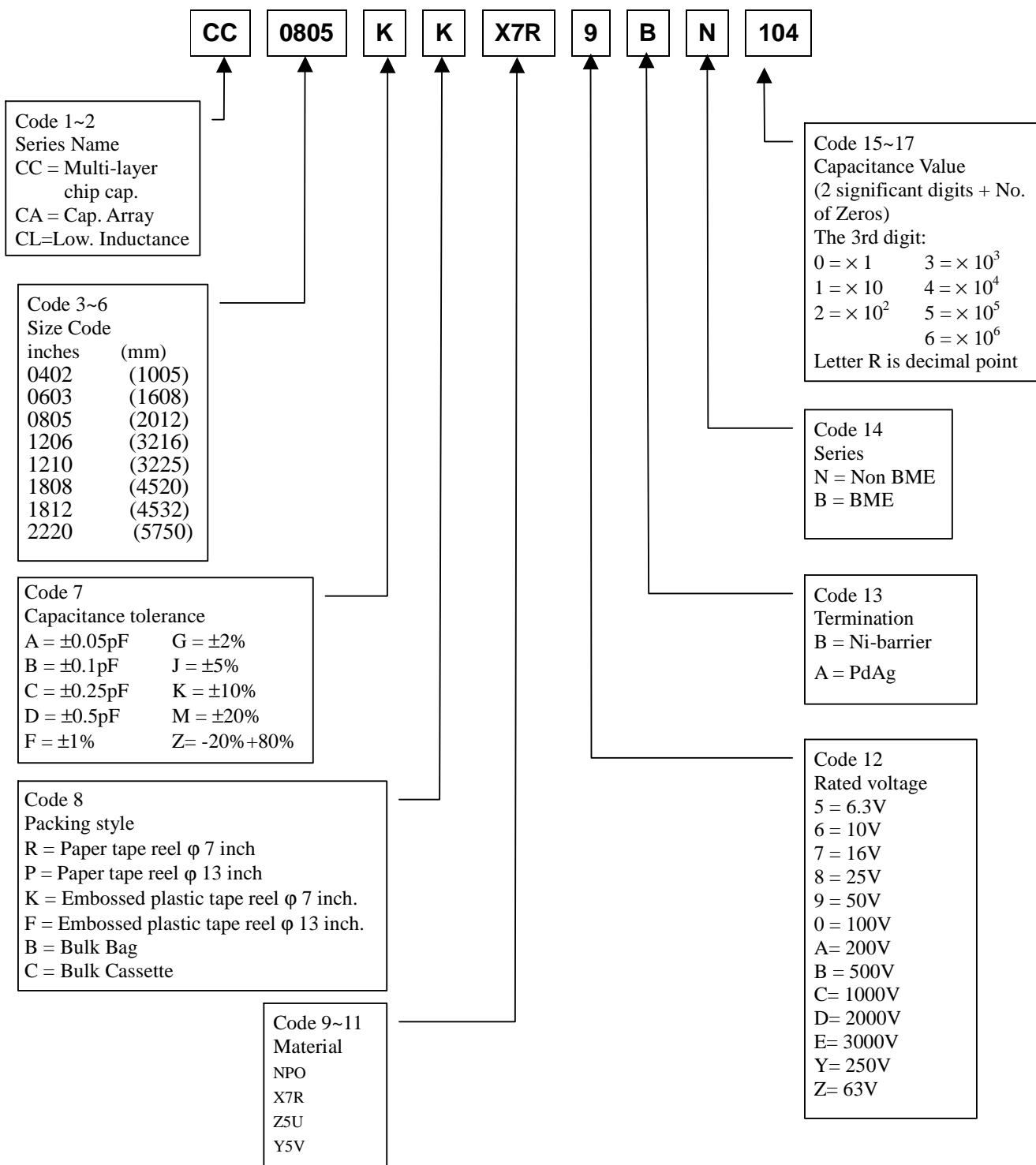


1. SUBJECT: This specification applies on the chip capacitor made by Yageo Corporation.

2. PART NUMBER: Part number of the chip capacitor is identified by the size, tolerance, packing, material and capacitor value.

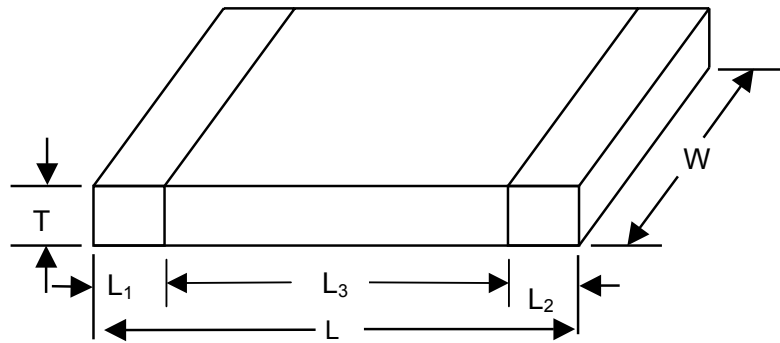
Example:



3. ELECTRICAL CHARACTERISTICS

Characteristics	Test conditions	Requirement			
		Class I	Class II		
		NPO	X7R	Y5V	Z5U
Operation temperature range		-55°C to 125°C	-55°C to 125°C	-25°C to 85°C	+10°C to +85°C
Temperature characteristic/coefficient (TC)	With respect to 20°C (25°C, for Y5V、Z5U) within operation temperature range	NPO 16V, 0±60ppm/K NPO >16V, 0±30ppm/K	±15%	+30% to -80%	+22% to -56%
Capacitance tolerance	With respect to 20°C (25°C, for Y5V、Z5U) NPO:	C < 5pF; ±0.25pF C ≥ 5pF; ±0.5pF C ≥ 10pF; ±5%, ±10%	±10%, ±20%	±20%, -20%~+80%	±20%, -20%~+80%
Dissipation factor (Tan δ)	C ≤ 1000pF 1Vrms/1MHz C > 1000pF 1Vrms/1KHz X7R/Y5V: 1Vrms/1KHz Z5U: 0.5Vrms/1KHz	C < 10pF: Tan δ ≤ 10(3/C+0.7)×10 ⁻⁴ or 30 ×10 ⁻⁴ whichever is less. C ≥ 10pF Tan δ ≤ 10 × 10 ⁻⁴	Tan δ ≤ 2.5%, 50V Tan δ ≤ 2.5%, 25V Tan δ ≤ 3.5%, 16V Tan δ ≤ 5%, 10V	Tan δ ≤ 5% or ≤ 7%, 25V/50V depending on capacitance value Tan δ ≤ 9% or ≤ 12.5%, 16V depending on capacitance value Tan δ ≤ 12.5%, 10V	Tan δ ≤ 4%, 50V Tan δ ≤ 6%, 25V Tan δ ≤ 9%, 16V
Insulation resistance(IR)	At Ur(rated voltage) for 1 minute Ur>500V,at 500V(DC) for 1minute	R _{ins} > 10GΩ or R _{ins} ×C≥500s, whichever is less.	R _{ins} > 10GΩ or R _{ins} ×C≥500s, Whichever is less.	R _{ins} > 10GΩ or R _{ins} ×C≥100s, whichever is less.	
Dielectric withstanding Voltage	At 2.5Ur (for Ur ≤ 100V) 1.5Ur + 100V (for Ur > 100V) 1.5Ur,Ur=1000V 1.2Ur,Ur>1000V for 5Second	No breakdown			

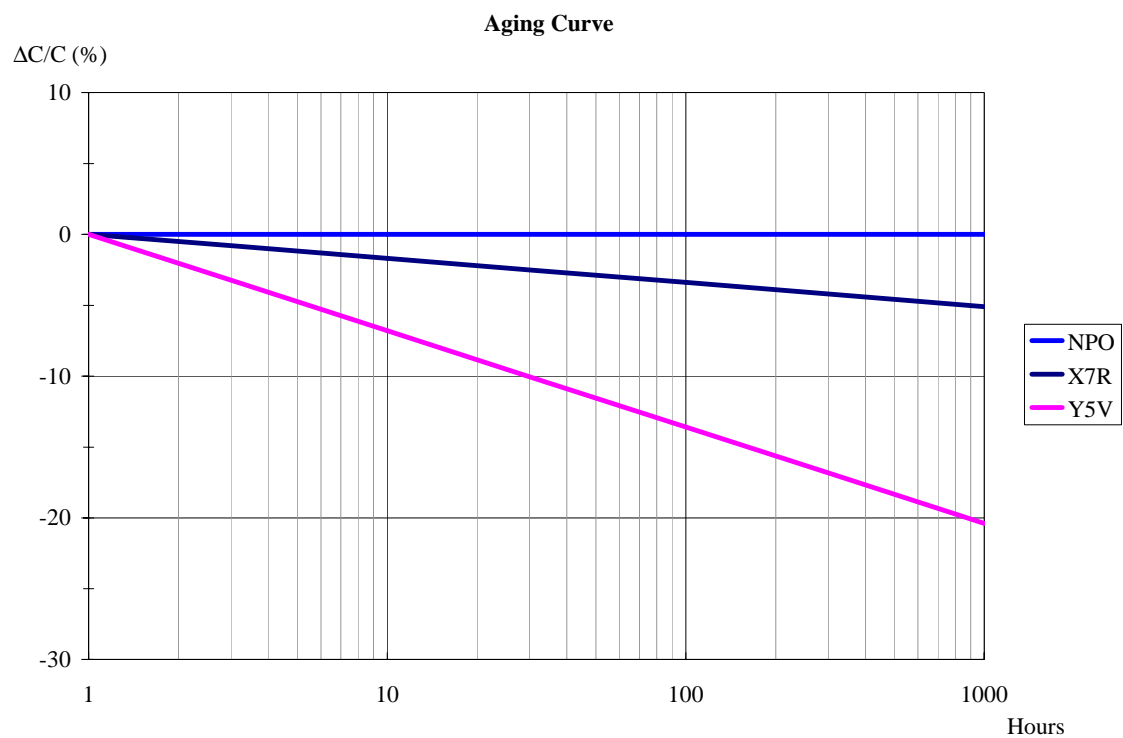
4. DIMENSION (mm)



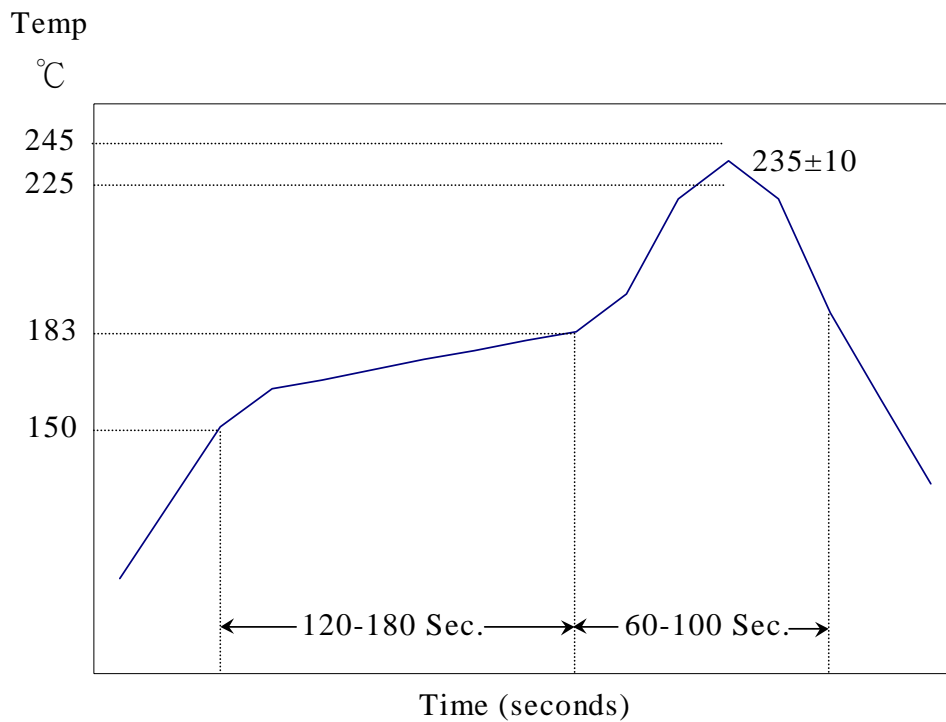
Style	L	W	T		L ₁ :L ₂		L ₃
			MIN.	MAX.	MIN.	MAX.	Min.
CC0402	1.0±0.05	0.5±0.05	0.45	0.55	0.15	0.30	0.40
CC0603	1.6±0.10	0.8±0.10	0.70	0.90	0.20	0.60	0.40
CC0805	2.0±0.10	1.25±0.10	0.50	1.35	0.25	0.75	0.55
CC1206	3.2±0.15	1.6±0.15	0.50	1.35	0.25	0.75	1.40
CC1210	3.2±0.20	2.5±0.20	0.50	1.80	0.25	0.75	1.40
CC1812	4.5±0.20	3.2±0.20	0.50	1.80	0.25	0.75	2.20
CC2220	5.7±0.20	5.0±0.20	0.50	1.80	0.25	0.75	2.20

Unit: mm

Aging Rate



Reflow Profile



Profile Parameters 參數

1-2°C/Sec ramp 溫昇

Preheat 150-183°C : 2-3 minutes

Time above 183°C : 60-100 seconds

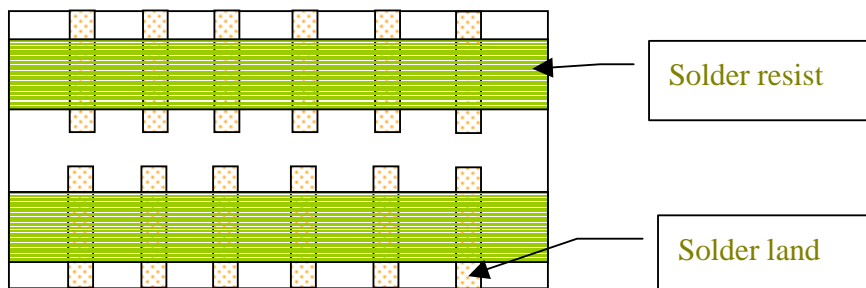
Peak Temperature : 230 ± 10 °C

Module should only be in oven for 5.5-6 minute

5. TESTS AND REQUIREMENTS

IEC 384-10	Test items	Conditions	Requirements		
			NPO	X7R	Y5V
4.9	Bending	Bending rate 1mm/s, jig. Radius 340mm	$\Delta C/C \leq 1\%$	$\Delta C/C \leq 10\%$	$\Delta C/C \leq 20\%$
4.10	Resistance to soldering heat	260±5°C for 10±0.5s in static solder bath	$\Delta C/C \leq 0.5\%$ or 0.5pF, whichever is greater	-5% ≤ $\Delta C/C \leq 10\%$	-10% ≤ $\Delta C/C \leq 20\%$
4.11	Solderability	235±5°C for 2±0.5 s in a static solder bath	75% minimum coverage of metallic area		
4.12	Rapid change of temperature	NPO/X7R: -55°C to +125°C, 5 cycles Y5V: -25°C to +85°C, 5 cycles	$\Delta C/C \leq 1\%$ or 1pF, whichever is greater	$\Delta C/C \leq 15\%$	$\Delta C/C \leq 20\%$
4.14	Damp heat, steady state	At 40°C, 90 to 95% RH and Ur applied (max. 500V, for 56 days (500 hours for Y5V) Class 2 only 56 days at 40°C, 90 to 95% RH, No voltage (for Ur ≥ 1kV) Precondition for Class 2 Ur ≤ 16V	$\Delta C/C: 2\%$ or 1pF whichever is greater Tan δ : ≤ 2xspecified Value IR: 2500MΩ or RxC ≥ 25s whichever is less	$\Delta C/C \leq 15\%$ Tan δ : ≤ 7% IR: 1000MΩ or RxC ≥ 25s Whichever is less	-40% ≤ $\Delta C/C \leq 30\%$ Tan δ : ≤ 7%, 12.5%, 15% IR: 1000MΩ or RxC ≥ 25s Whichever is less
4.15	Endurance	At upper category temperature, 2xUr applied (1.5Ur for Ur > 50V, 1.2Ur for Ur ≥ 1KV) for 1000hours Class 2 only 1000 hours, At upper category temperature, No voltage (for Ur ≥ 1KV) Precondition for Class 2 Ur ≤ 16V	$\Delta C/C: 2\%$ or 1pF whichever is greater Tan δ : ≤ 2xspecified Value IR: 4000MΩ or RxC ≥ 40s whichever is less	$\Delta C/C \leq 20\%$ Tan δ : ≤ 7% IR: 2000MΩ or RxC ≥ 50s Whichever is less	-40% ≤ $\Delta C/C \leq 30\%$ Tan δ : ≤ 7%, 12.5%, 15% IR: 2000MΩ or RxC ≥ 50s Whichever is less

PCB Layout for Reliability test:



NPO

Capacitance	16V		25V					50V					100V					200V				500V			1kV		2kV	3kV		4kV		
	0402	0603	0402	0603	0805	1206	1210	0402	0603	0805	1206	1210	1812	0603	0805	1206	1210	1812	0805	1206	1210	1812	1206	1210	1812	1206	1812	1206	1808	1812	1808	1812
(pF) 0.47																																
0.56																																
0.68																																
0.82																																
1.0																																
1.2																																
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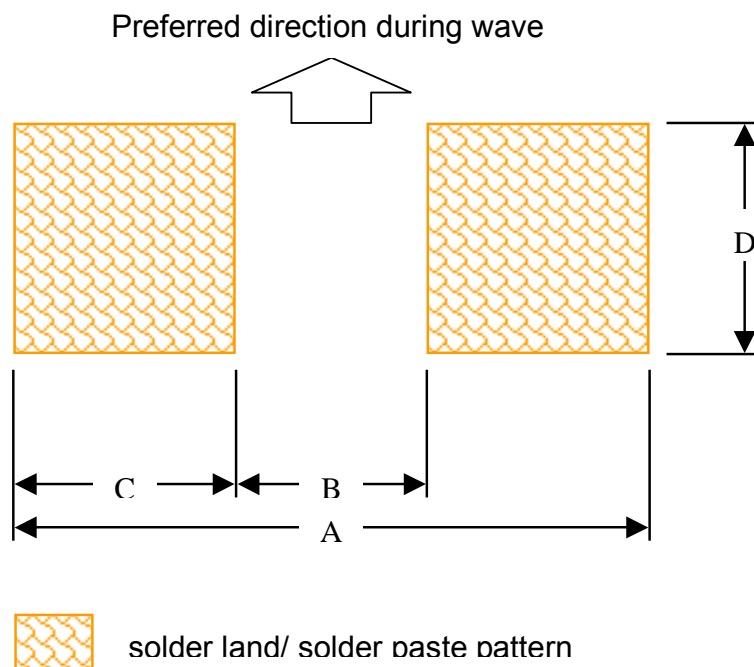
X7R

Capacitance	10V			16V				25V					50V							100V				200V				500V			1kV			2kV	
	0603	0805	1206	0402	0603	0805	1206	0402	0603	0805	1206	1210	0402	0603	0805	1206	1210	1812	2220	0805	1206	1210	1812	0805	1206	1210	1812	1206	1210	1812	1206	1808	1812	1808	1812
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Y5V

Capacitance (uF)	Y5V 10V				Y5V 16V					Y5V 25V				Y5V 50V			Z5U 25V		Z5U 50V		
	0603	0805	1206	1210	0402	0603	0805	1206	1210	0603	0805	1206	1210	0603	0805	1206	0603	1206	0805	1206	1210
0.010																					
0.022																					
0.047																					
0.10																					
0.22																					
0.47																					
1.0																					
2.2																					
3.3																					
4.7																					
10																					
22																					

commended dimension of solder lands



Reflow soldering

Style	FOOTPRINT DIMENSIONS (mm)				Placement Accuracy
	A	B	C	D	(mm)
CC0402	1.5	0.5	0.5	0.5	± 0.15
CC0603	2.3	0.5	0.9	0.9	± 0.25
CC0805	2.8	0.9	0.95	1.4	± 0.25
CC1206	4.0	2.0	1.0	1.8	± 0.25
CC1210	4.0	2.0	1.0	2.7	± 0.25
CC1808	5.4	3.3	1.05	3.3	± 0.25
CC1812	5.4	3.3	1.05	3.3	± 0.25
CC2220	6.6	4.5	1.05	3.3	± 0.25

Wave soldering

Style	FOOTPRINT DIMENSIONS (mm)				Placement Accuracy
	A	B	C	D	(mm)
CC0603	2.7	0.9	0.9	0.8	± 0.25
CC0805	3.4	1.3	1.05	1.3	± 0.25
CC1206	4.8	2.3	1.25	1.7	± 0.25
CC1210	5.3	2.3	1.50	2.6	± 0.25

MLCC QC Flow Chart

