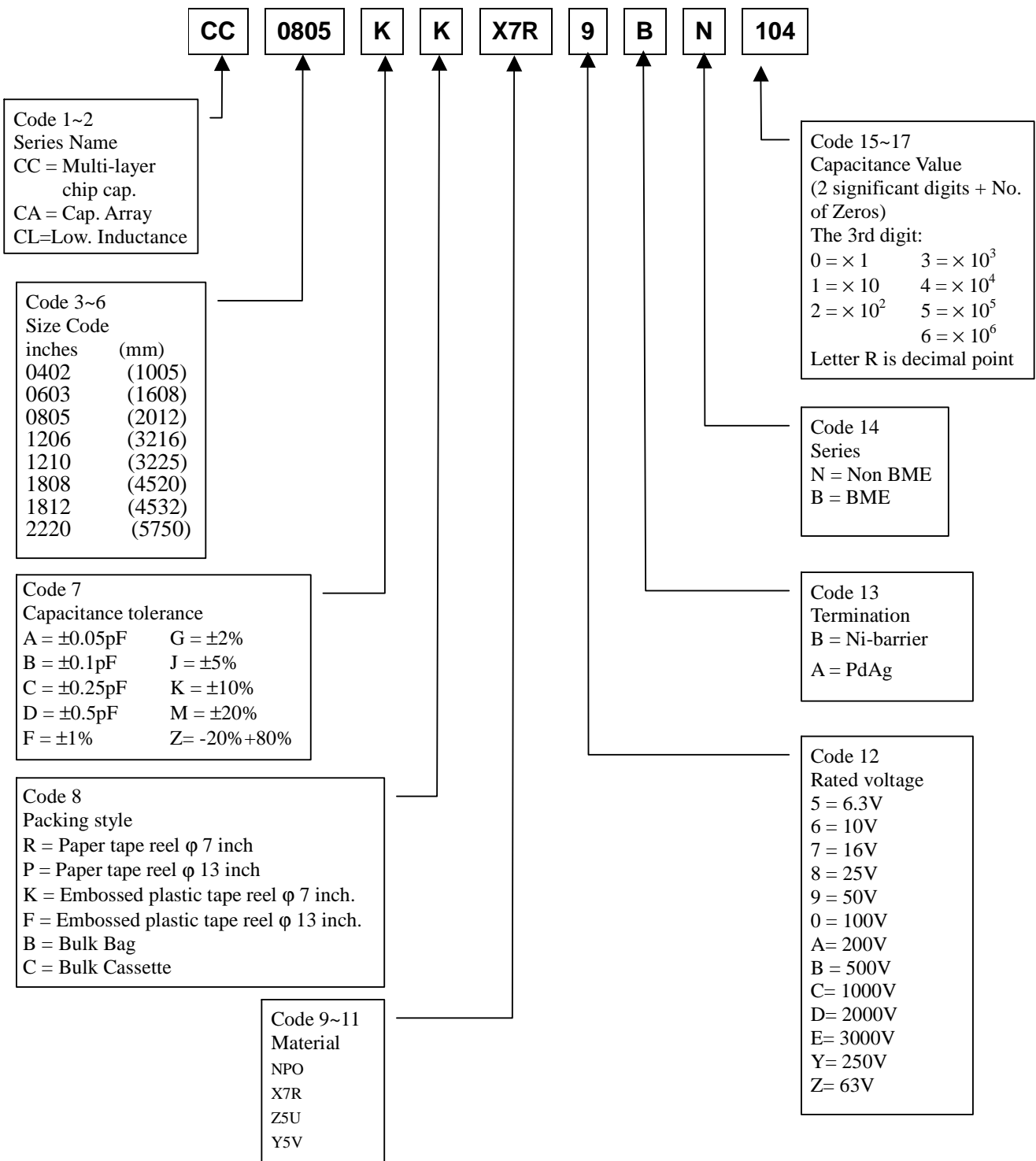


1. SUBJECT: This specification applies on the chip capacitor made by Yageo Corporation.

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

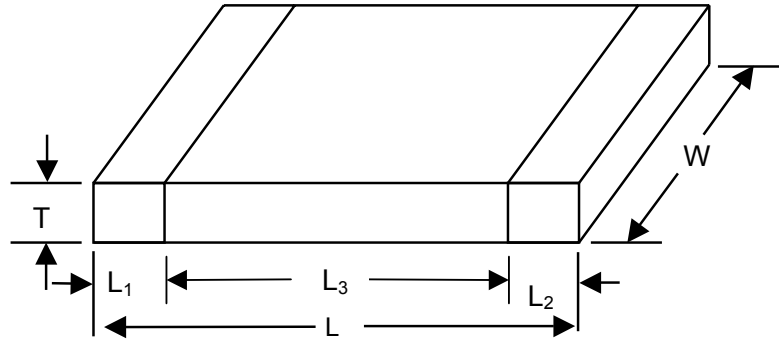
Example:



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			

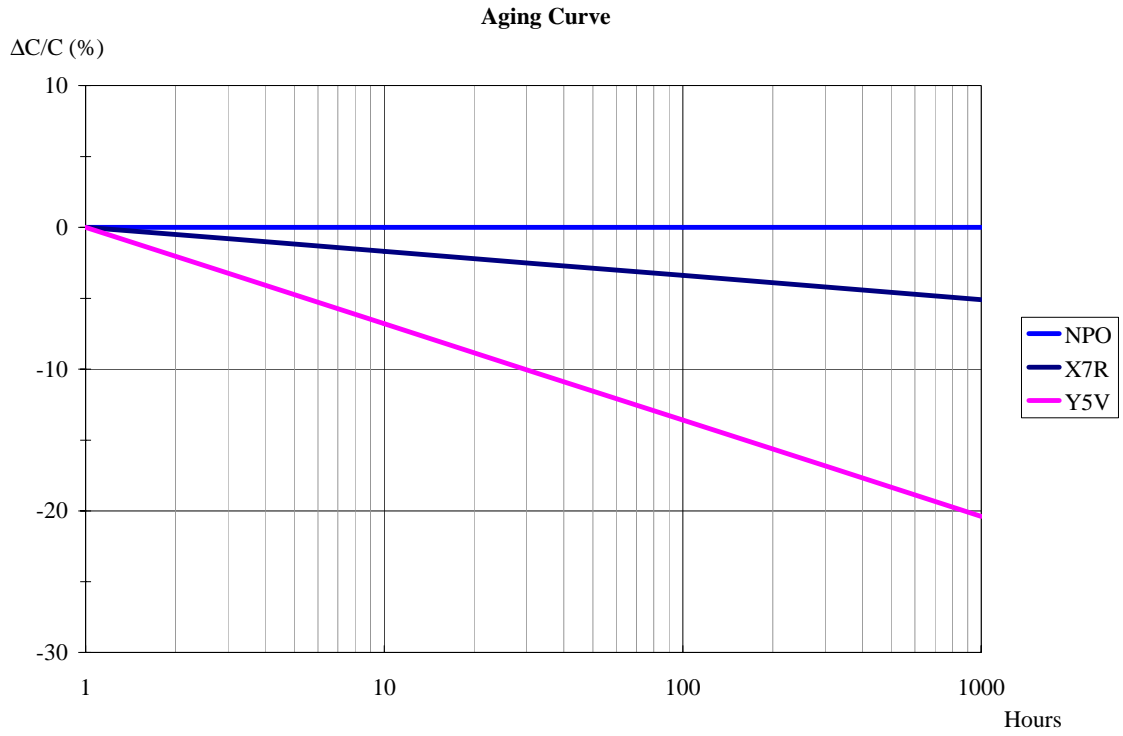
4. DIMENSION (mm)



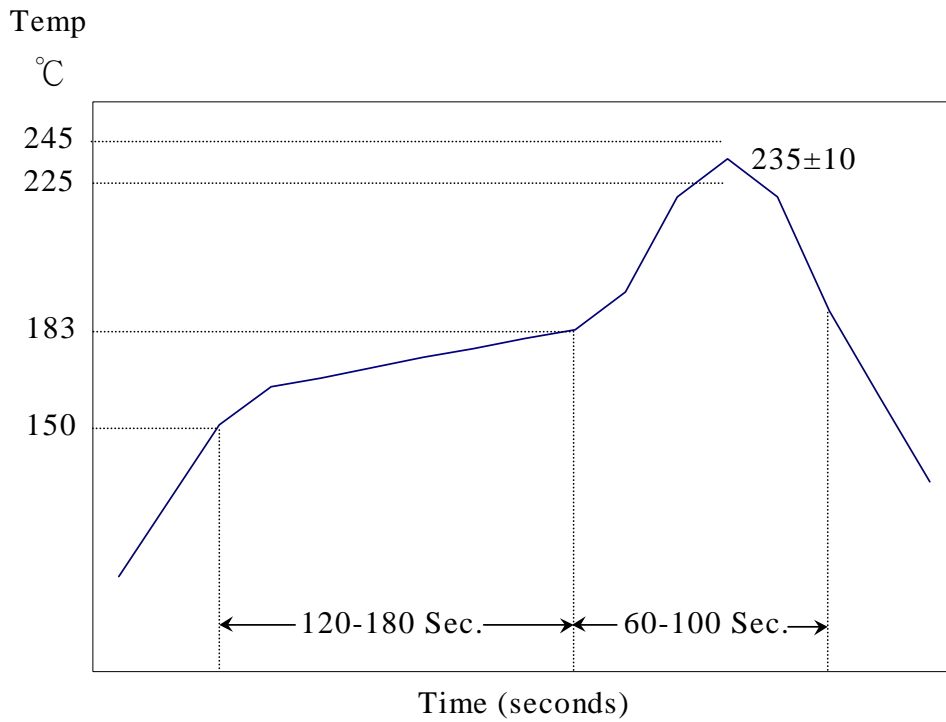
Style	L	W	T		L ₁ :L ₂		L ₃
			MIN.	MAX.	MIN.	MAX.	Min.
CC0402	1.0±0.05	0.5±0.05	0.45	0.55	0.15	0.30	0.40
CC0603	1.6±0.10	0.8±0.10	0.70	0.90	0.20	0.60	0.40
CC0805	2.0±0.10	1.25±0.10	0.50	1.35	0.25	0.75	0.55
CC1206	3.2±0.15	1.6±0.15	0.50	1.35	0.25	0.75	1.40
CC1210	3.2±0.20	2.5±0.20	0.50	1.80	0.25	0.75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

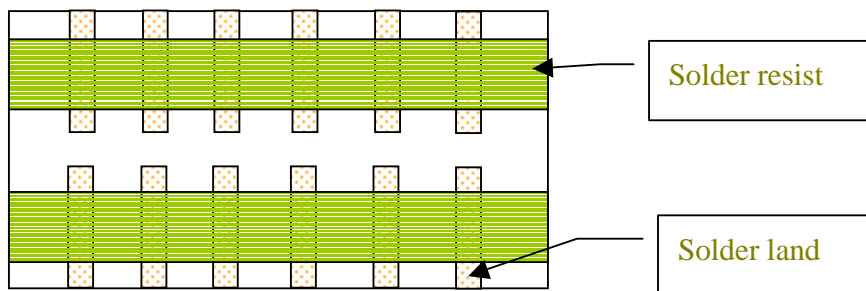
Peak Temperature : 230 ± 10 °C

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	$260 \pm 5^\circ\text{C}$ for $10 \pm 0.5\text{s}$ in static solder bath	$\Delta C/C \leq 0.5\%$ or 0.5pF , whichever is greater	$-5\% \leq \Delta C/C \leq 10\%$	$-10\% \leq \Delta C/C \leq 20\%$
4.11	Solderability	$235 \pm 5^\circ\text{C}$ for $2 \pm 0.5\text{s}$ in a static solder bath	75% minimum coverage of metallic area		
4.12	Rapid change of temperature	NPO/X7R: -55°C to $+125^\circ\text{C}$, 5 cycles Y5V: -25°C to $+85^\circ\text{C}$, 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 U_r 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 $U_r \geq 1\text{kV}$) Precondition for Class 2 $U_r \leq 16\text{V}$	$\Delta C/C: 2\%$ or 1pF whichever is greater $\text{Tan } \delta: \leq 2 \times \text{specified Value}$ IR: $2500\text{M}\Omega$ or $RxC \geq 25\text{s}$ whichever is less	$\Delta C/C: \leq 15\%$ $\text{Tan } \delta: \leq 7\%$ IR: $1000\text{M}\Omega$ or $RxC \geq 25\text{s}$ Whichever is less	$-40\% \leq \Delta C/C \leq 30\%$ $\text{Tan } \delta: \leq 7\%, 12.5\%, 15\%$ IR: $1000\text{M}\Omega$ or $RxC \geq 25\text{s}$ Whichever is less
4.15	Endurance	At upper category temperature, $2xU_r$ applied ($1.5U_r$ for $U_r > 50\text{V}$, $1.2U_r$ for $U_r \geq 1\text{kV}$) for 1000hours Class 2 only 1000 hours, At upper category temperature, No voltage (for $U_r \geq 1\text{kV}$) Precondition for Class 2 $U_r \leq 16\text{V}$	$\Delta C/C: 2\%$ or 1pF whichever is greater $\text{Tan } \delta: \leq 2 \times \text{specified Value}$ IR: $4000\text{M}\Omega$ or $RxC \geq 40\text{s}$ whichever is less	$\Delta C/C: \leq 20\%$ $\text{Tan } \delta: \leq 7\%$ IR: $2000\text{M}\Omega$ or $RxC \geq 50\text{s}$ Whichever is less	$-40\% \leq \Delta C/C \leq 30\%$ $\text{Tan } \delta: \leq 7\%, 12.5\%, 15\%$ IR: $2000\text{M}\Omega$ or $RxC \geq 50\text{s}$ 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																																		
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1.5																																		
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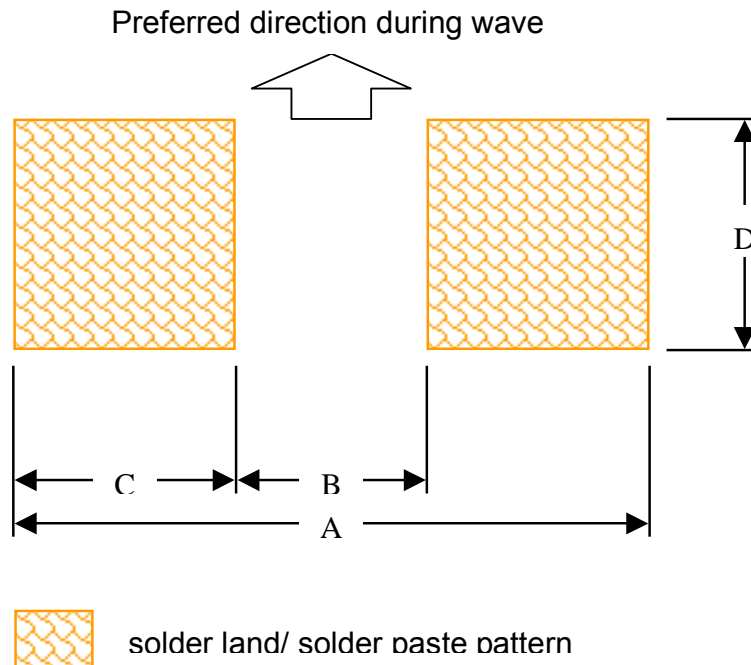
X7R

Capacitance (nF)	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	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
(uF) 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 (mm)
	A	B	C	D	
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 (mm)
	A	B	C	D	
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

Process Flow			Process Stage	Control Point
Mat'l Process	Prepare process	Due Stage		
Powder	Incoming Inspection			Analysis of powder
Binder			Ball Mill	Recipe Milling time Viscosity
inner paste	incoming inspection		Foil Casting	Foil Weight
			Screen Printing	Printing width laydown
			Pressing	Pressure Temperature
			Cutting	Free Margin
			Binder Burn Out	Weight loss%
outer paste	incoming inspection		Sintering	Thermo-ring temperature
			Tumbling	Rolling speed
			Dipping	Termination length
			Curing	Profile setting
			Inner defect check	Destructure Physical Analysis
			Plating	Solderability Tin concentration Ni concentration Tin thickness Nickel thickness
			Testing	C% 1st piece check Mechanical M/C setting
			Mechanical visual	Mechanical defect
		QA	Cap/TanD IR+HV Body fault item End term. fault item Dimension item Solderability	
Packing Material			Taping	Peel off force Product defect
			Taping Q/A	Taping defect
			Stock	