



# **SPECIFICATION**

(Reference sheet)

- Supplier : Samsung electro-mechanics - Samsung P/N : CL10C120JC8NNNC

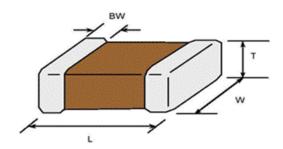
Product : Multi-layer Ceramic Capacitor
 Description : CAP, 12pF, 100V, ± 5%, C0G, 0603

### A. Samsung Part Number

<u>CL</u> <u>10</u> <u>C</u> <u>120</u> <u>J</u> <u>C</u> <u>8</u> <u>N</u> <u>N</u> <u>N</u> <u>C</u> ① ② ③ ④ ⑤ ⑥ ⑦ 8 ⑨ ⑩ ⑪

1	Series	Samsung Multi-layer Ceramic Capacitor		
2	Size	0603 (inch code)	L: 1.60 ± 0.10 mm	W: 0.80 ± 0.10 mm
3	Dielectric	C0G	8 Inner electrode	Ni
4	Capacitance	<b>12</b> pF	Termination	Cu
(5)	Capacitance	± 5%	Plating	Sn 100% (Pb Free)
	tolerance		Product	Normal
6	Rated Voltage	100 V	Special	Reserved for future use
7	Thickness	0.80 ± 0.10 mm	Packaging	Cardboard Type, 7" reel

#### B. Structure and dimension



Samsung P/N	Dimension(mm)				
(Lead Free)	L	W	Т	BW	
CL10C120JC8NNNC	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	

#### C. Samsung Reliability Test and Judgement condition

Rated Voltage   60~120 sec.		Performance	Test condition			
Rated Voltage   60~120 sec.	Capacitance	Within specified tolerance	1 <sup>Mlz</sup> ±10% / 0.5~5Vrms			
Appearance Whichever is smaller  Appearance No abnormal exterior appearance Microscop (X10)  Withstanding No dielectric breakdown or 200% of the rated voltage mechanical breakdown  Femperature COG  Characteristics (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Adhesive Strength No peeling shall be occur on the terminal electrode  Bending Strength Capacitance change: Bending to the limit (1mm) within ±5% or ±0.5pF whichever is larger within 1.0mm/sec.  Bolderability More than 75% of terminal surface is to be soldered newly 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.)  Resistance to Capacitance change: Solder in the properties of the pro	Q	640 min				
No abnormal exterior appearance  Mitroscop (X10)  No dielectric breakdown or mechanical breakdown  Cog  Characteristics  (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Adhesive Strength of Termination  Bending Strength  of Termination  Bending Strength  of Termination  Bending Strength  of Termination  Bending Strength  of Termination  Bending Strength  within ±5% or ±0.5p² whichever is larger  is to be soldered newly  More than 75% of terminal surface is to be soldered newly  Capacitance change : within ±2.5% or ±0.25pF whichever is larger  Tan δ, IR : initial spec.  Amplitude : 1.5mm  From 10Hz to 55Hz (return : 1min.)  Amplitude : 1.5mm  From 10Hz to 55Hz (return : 1min.)  Amplitude : 1.5mm  From 10Hz to 55Hz (return : 1min.)  Amplitude : 1.5mm  With rated voltage  With 20% of the rated voltage  Max. operating temperature  Q: 305 min IR: 1,000Mohm or 50Mohm ×   With 200% of the rated voltage  Max. operating temperature  1000+48/-0hrs	Insulation	10,000Mohm or 500Mohm×μF	Rated Voltage 60~120 sec.			
No dielectric breakdown or mechanical breakdown  COG  (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Adhesive Strength of Termination  Bending Strength  Capacitance change: within ±5% or ±0.55°F whichever is larger is to be soldered newly  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±7.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±7.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±7.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±7.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  Capacitance change: within ±7.5% or ±0.25pF whichever is larger in 5, IR: initial spec.  With rated voltage  40±2°C, 90~95%RH, 500+12/-0hrs  With 200% of the rated voltage  Max. operating temperature  Q: 305 min in 1000+48/-0hrs  Whichever is smaller	Resistance	Whichever is smaller				
Temperature	Appearance	No abnormal exterior appearance	Microscop (X10)			
Code   Characteristics   Code   Characteristics   Characteristic	Withstanding	No dielectric breakdown or	200% of the rated voltage			
Characteristics  (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Adhesive Strength of Termination  Bending Strength Capacitance change: within ±5% or ±0.5pF whichever is larger Bolderability  More than 75% of terminal surface is to be soldered newly  Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Moisture Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Moisture Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Moisture Capacitance change: within ±7.5% or ±0.75pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm ×   Whichever is smaller  With 200% of the rated voltage Max. operating temperature Resistance Within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm ×   Whichever is smaller	Voltage	mechanical breakdown				
No peeling shall be occur on the terminal electrode  Gapacitance change: within ±5% or ±0.5pf whichever is larger Tan ō, IR: initial spec.  Moisture Resistance Resistance  Resistance  Resistance  Resistance  Capacitance change: within ±2.5% or ±0.25pf whichever is larger Tan ō, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pf whichever is larger Tan ō, IR: initial spec.  Moisture Resistance  Resistance  Resistance  Resistance  Within ±2.5% or ±0.25pf whichever is larger Tan ō, IR: initial spec.  Moisture Resistance  Resistance  Resistance  Within ±2.5% or ±0.75pf whichever is larger Q: 140 min IR: 500Mohm or 25Mohm ×   Whichever is smaller  With 200% of the rated voltage Max. operating temperature Resistance  Within ±3% or ±0.3pf whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm ×   Whichever is smaller	Temperature	C0G	-			
of Termination         terminal electrode           Bending Strength         Capacitance change : within ±5% or ±0.5pF whichever is larger         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 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.)           Resistance to         Capacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.         Solder pot : 270±5°C, 10±1sec.           Amplitude : 1.5mm         From 10Hz to 55Hz (return : 1min.) 2hours '3 direction (x, y, z)           Moisture         Capacitance change : within ±7.5% or ±0.75pF whichever is larger Q : 140 min IR : 500Mohm or 25Mohm × μF Whichever is smaller         With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs           High Temperature         Capacitance change : within ±3% or ±0.3pF whichever is larger Q : 305 min IR : 1,000Mohm or 50Mohm × μF Whichever is smaller         With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs	Characteristics	(From -55℃ to 125℃, Capacitance change should be within ±30PPM/℃)				
Capacitance change : within ±5% or ±0.5 <sub>P</sub> F whichever is larger   Solderability   More than 75% of terminal surface is to be soldered newly   Solder pot : 270±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.)	Adhesive Strength	No peeling shall be occur on the	500g×F, for 10±1 sec.			
within ±5% or ±0.5pF whichever is larger  More than 75% of terminal surface is to be soldered newly  Capacitance change:  within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Capacitance change:  within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Wioisture  Capacitance change:  within ±7.5% or ±0.75pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × μF Whichever is smaller  within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller  within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller	of Termination	terminal electrode				
More than 75% of terminal surface is to be soldered newly   SnAg3.0Cu0.5 solder   245±5°C, 3±0.3sec.   (preheating : 80~120°C for 10~30sec.)     Resistance to   Capacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.   Amplitude : 1.5mm   From 10Hz to 55Hz (return : 1min.)     Tan δ, IR : initial spec.   With rated voltage   Within ±7.5% or ±0.75pF whichever is larger Q : 140 min   IR : 500Mohm or 25Mohm × μF   Whichever is smaller   With 200% of the rated voltage   Max. operating temperature   Resistance   within ±3% or ±0.3pF whichever is larger Q : 305 min   IR : 1,000Mohm or 50Mohm × μF   Whichever is smaller   Within ±8/4 - 0hrs   Whichever is smaller   Whichever is smaller   Within ±3% or ±0.3pF whichever is larger Q : 305 min   IR : 1,000Mohm or 50Mohm × μF   Whichever is smaller   Whichever is	Bending Strength	Capacitance change :	Bending to the limit (1mm)			
is to be soldered newly  245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.)  Resistance to Soldering heat  within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±7.5% or ±0.75pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × μF Whichever is smaller  Capacitance change: within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller		within ±5% or ±0.5pF whichever is larger				
(preheating: 80~120 °C for 10~30sec.)  Resistance to Capacitance change: within ±2.5% or ±0.25 pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25 pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±2.5% or ±0.25 pF whichever is larger Tan δ, IR: initial spec.  Capacitance change: within ±7.5% or ±0.75 pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × μF Whichever is smaller  Capacitance change: within ±3% or ±0.3 pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller  (preheating: 80~120 °C for 10~30sec.)  Solder pot: 270±5 °C, 10±1sec.  Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours '3 direction (x, y, z)  With rated voltage 40±2 °C, 90~95%RH, 500+12/-0hrs  With 200% of the rated voltage Max. operating temperature Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller	Solderability	More than 75% of terminal surface				
Resistance to Capacitance change : within $\pm 2.5\%$ or $\pm 0.25 p F$ whichever is larger Tan $\delta$ , IR : initial spec.  Capacitance change : within $\pm 2.5\%$ or $\pm 0.25 p F$ whichever is larger Within $\pm 2.5\%$ or $\pm 0.25 p F$ whichever is larger Tan $\delta$ , IR : initial spec.  Moisture Capacitance change : within $\pm 7.5\%$ or $\pm 0.75 p F$ whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × $\mu F$ Whichever is smaller  Gapacitance change : within $\pm 3\%$ or $\pm 0.3 p F$ whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × $\mu F$ Whichever is smaller  Nolder pot : 270 $\pm 5\%$ , $\pm 0.10\pm 15\%$ ,		is to be soldered newly	245±5℃, 3±0.3sec.			
Soldering heat       within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.       Amplitude: 1.5mm         /ibration Test       Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.       Amplitude: 1.5mm         // Moisture       Capacitance change: within ±7.5% or ±0.75pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × μF Whichever is smaller       With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs         // With 1200% of the rated voltage within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller       With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs		·				
Soldering heat       within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.       Amplitude: 1.5mm         /ibration Test       Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.       Amplitude: 1.5mm         // Moisture       Capacitance change: within ±7.5% or ±0.75pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × μF Whichever is smaller       With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs         // With 1200% of the rated voltage within ±3% or ±0.3pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × μF Whichever is smaller       With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs						
Tan δ, IR : initial spec.  Capacitance change : within ±2.5% or ±0.25 pF whichever is larger Tan δ, IR : initial spec.  Capacitance change : Tan δ, IR : initial spec.  Capacitance change : Within ±7.5% or ±0.75 pF whichever is larger Q: 140 min IR : 500Mohm or 25Mohm × μF Whichever is smaller  Capacitance change : With 200% of the rated voltage  Within ±3% or ±0.3 pF whichever is larger Q: 305 min IR : 1,000Mohm or 50Mohm × μF Whichever is smaller	Resistance to	Capacitance change :	Solder pot : 270±5℃, 10±1sec.			
Vibration Test       Capacitance change : within ±2.5% or ±0.25 pF whichever is larger Tan δ, IR : initial spec.       Amplitude : 1.5mm         Moisture       Capacitance change : within ±7.5% or ±0.75 pF whichever is larger Q : 140 min IR : 500Mohm or 25Mohm × μF Whichever is smaller       With rated voltage 40±2 °C, 90~95%RH, 500+12/-0hrs         High Temperature Resistance       Capacitance change : within ±3% or ±0.3 pF whichever is larger Q : 305 min IR : 1,000Mohm or 50Mohm × μF Whichever is smaller       With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs         Whichever is smaller       Within ±3% or ±0.3 pF whichever is larger Q : 305 min IR : 1,000Mohm or 50Mohm × μF Whichever is smaller       1000+48/-0hrs	Soldering heat	within ±2.5% or ±0.25pF whichever is larger				
within $\pm 2.5\%$ or $\pm 0.25 pF$ whichever is larger Tan $\delta$ , IR: initial spec. 2hours '3 direction (x, y, z)  Moisture Capacitance change: Within $\pm 7.5\%$ or $\pm 0.75 pF$ whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × $\mu F$ Whichever is smaller  Capacitance change: With rated voltage $\pm 40\pm 2^{\circ}\mathrm{C}$ , $\pm 90\sim 95^{\circ}\mathrm{RH}$ , $\pm 500+12/-0^{\circ}\mathrm{hrs}$ With rated voltage $\pm 40\pm 2^{\circ}\mathrm{C}$ , $\pm 90\sim 95^{\circ}\mathrm{RH}$ , $\pm 500+12/-0^{\circ}\mathrm{hrs}$ High Temperature Capacitance change: Within $\pm 3\%$ or $\pm 0.3^{\circ}\mathrm{F}$ whichever is larger Q: $\pm 305^{\circ}\mathrm{min}$ 1000+48/-0hrs  IR: 1,000Mohm or 50Mohm × $\pm 4000^{\circ}\mathrm{Hrs}$ 1000+48/-0hrs		Tan δ, IR : initial spec.				
Tan $\delta$ , IR: initial spec.  Capacitance change:  With rated voltage  Within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger  Q: 140 min  IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$ Whichever is smaller  Capacitance change:  With 200% of the rated voltage  Max. operating temperature  Q: 305 min  IR: 1,000Mohm or 50Mohm × $\mu\mathrm{F}$ Whichever is smaller	Vibration Test	Capacitance change :	Amplitude : 1.5mm			
MoistureCapacitance change : within $\pm 7.5\%$ or $\pm 0.75$ pF whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × $\mu$ F Whichever is smallerWith rated voltage $40\pm2^{\circ}$ C, $90\sim95\%$ RH, $500+12/-0$ hrsHigh TemperatureCapacitance change : within $\pm 3\%$ or $\pm 0.3$ pF whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × $\mu$ F Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrs		within ±2.5% or ±0.25pF whichever is larger	From 10Hz to 55Hz (return : 1min.)			
Resistance within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 140 min IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$ Whichever is smaller  High Temperature Resistance within $\pm 3\%$ or $\pm 0.3\mathrm{pF}$ whichever is larger Q: 305 min IR: 1,000Mohm or 50Mohm × $\mu\mathrm{F}$ Whichever is smaller		Tan δ, IR : initial spec.	2hours ´ 3 direction (x, y, z)			
Q: 140 min  IR: 500Mohm or 25Mohm × $\mu$ F  Whichever is smaller  Capacitance change:  With 200% of the rated voltage  Within ±3% or ±0.3 $\rho$ F whichever is larger  Q: 305 min  IR: 1,000Mohm or 50Mohm × $\mu$ F  Whichever is smaller	Moisture	Capacitance change :	· · · ·			
Q: 140 min  IR: 500Mohm or 25Mohm × $\mu$ F  Whichever is smaller  Capacitance change:  With 200% of the rated voltage  Within ±3% or ±0.3 $\rho$ F whichever is larger  Q: 305 min  IR: 1,000Mohm or 50Mohm × $\mu$ F  Whichever is smaller	Resistance	within ±7.5% or ±0.75pF whichever is larger	_			
Whichever is smaller  Capacitance change:  With 200% of the rated voltage  Within $\pm 3\%$ or $\pm 0.3\mathrm{pF}$ whichever is larger  Q: 305 min  IR: 1,000Mohm or 50Mohm × $\mu\mathrm{F}$ Whichever is smaller		Q: 140 min				
High TemperatureCapacitance change :With 200% of the rated voltageResistancewithin $\pm 3\%$ or $\pm 0.3 \mathrm{pF}$ whichever is largerMax. operating temperatureQ : 305 min $1,000\mathrm{Mohm}$ or $\pm 0.00\mathrm{Mohm}$ or		IR: 500Mohm or 25Mohm × $\mu$ F				
Resistance within $\pm 3\%$ or $\pm 0.3 \mathrm{pF}$ whichever is larger Q: 305 min   1,000Mohm or 50Mohm × $\mu\mathrm{F}$   Whichever is smaller   Max. operating temperature   1000+48/-0hrs		Whichever is smaller				
Q: 305 min 1000+48/-0hrs  IR: 1,000Mohm or 50Mohm × μF  Whichever is smaller	High Temperature	Capacitance change :	With 200% of the rated voltage			
IR : 1,000Mohm or 50Mohm × $\mu$ F Whichever is smaller	Resistance	within ±3% or ±0.3pF whichever is larger				
Whichever is smaller		Q: 305 min	1000+48/-0hrs			
		IR: 1,000Mohm or 50Mohm × $\mu$ F				
Canacitance change:		Whichever is smaller				
remperature poapacitance change . It tyche condition	Temperature	Capacitance change :	1 cycle condition			
	Cycling		<u> </u>			
Tan $\delta$ , IR : initial spec. $\rightarrow$ Max. operating temperature $\rightarrow$ 25 $^{\circ}$ C	· •	_	1			
5 cycle test			5 cycle test			

<sup>\*</sup> The reliability test condition can be replaced by the corresponding accelerated test condition.

#### D. Recommended Soldering method:

Reflow (Reflow Peak Temperature: 260+0/-5°C, 10sec. Max)



A 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.

## - 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
- Military equipment
- 5 Disaster prevention/crime prevention equipment
- Any other applications with the same as or similar complexity or reliability to the applications set forth above.