



# **SPECIFICATION**

(Reference sheet)

· Supplier : Samsung electro-mechanics · Samsung P/N : CL10C6R8CB8NNWC

Product : Multi-layer Ceramic Capacitor

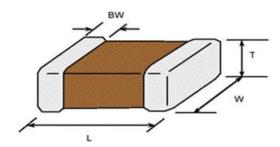
Description : CAP, 6.8pF, 50V, ± 0.25pF, C0G, 0603

### A. Samsung Part Number

<u>CL</u> <u>10</u> <u>C</u> <u>6R8</u> <u>C</u> <u>B</u> <u>8</u> <u>N</u> <u>N</u> <u>W</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	COG	8 Inner electrode	Ni
4	Capacitance	<b>6.8</b> pF	Termination	Cu
⑤	Capacitance	± 0.25pF	Plating	Sn 100% (Pb Free)
	tolerance		9 Product	Normal
6	Rated Voltage	50 V	<b>®</b> Special	Industrial (Network,etc)
7	Thickness	0.80 ± 0.10 mm	① Packaging	Cardboard Type, 7" reel

#### B. Structure and dimension



Samsung P/N	Dimension(mm)				
(Lead Free)	L	W	Т	BW	
CL10C6R8CB8NNWC	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.20	

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

Sa6 min   Insulation   10,000Mohm or 500Mohm×, pF   Rated Voltage   60~120 sec.   Whichever is smaller   Appearance   Whichever is smaller   No abnormal exterior appearance   Microscop (X10)   Withstanding   No dielectric breakdown or   300%   of the rated voltage   mechanical breakdown   300%   of the rated voltage		Performance	Test condition			
Insulation Resistance Whichever is smaller  Appearance No abnormal exterior appearance Microscop (X10)  Withstanding No dielectric breakdown or mechanical breakdown  Temperature COG Characteristics (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Adhesive Strength of Termination Bending Strength Within ±5% or ±0.5p°F whichever is larger is to be soldered newly  Resistance to Soldering heat  Vibration Test Capacitance change: within ±2.5% or ±0.25p°F whichever is larger Tan δ, IR: initial spec.  Moisture Rated Voltage Rated Voltage 60~120 sec. Riccondition Rated Voltage 60~120 sec. Riccondition Riccoscop (X10)  Microscop (X10)  300% of the rated voltage  500g×F, for 10±1 sec.  8ending to the limit (1mm) with 1.0mm/sec.  8nAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.)  Resistance to Solder pot: 270±5°C, 10±1sec.  Solder pot: 270±5°C, 10±1sec.  Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2	Capacitance	Within specified tolerance	1 <sup>Mlz</sup> ±10% / 0.5~5Vrms			
Resistance         Whichever is smaller           Appearance         No abnormal exterior appearance         Microscop (X10)           Withstanding         No dielectric breakdown or mechanical breakdown         300% of the rated voltage           Temperature         Cog         Characteristics         (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)           Adhesive Strength of Termination         No peeling shall be occur on the terminal electrode         500g×F, for 10±1 sec.           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           Solderability         More than 75% of terminal surface is to be soldered newly         SnAg3.0Cu0.5 solder           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.           Vibration Test         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.)           Moisture         Capacitance change: within ±7.5% or ±0.75pF whichever is larger Q: 122.67 min         With rated voltage         With rated voltage           Resistance         withir ±7.5% or ±0.75pF whichever is larger Q: 122.67 min         IR: 500Mohm	•		1			
No abnormal exterior appearance   Microscop (X10)	Insulation	10,000Mohm or 500Mohm× <i>µ</i> F	Rated Voltage 60~120 sec.			
Withstanding       No dielectric breakdown or mechanical breakdown       300% of the rated voltage         Temperature       C0G         Characteristics       (From -55 ℃ to 125 ℃, Capacitance change should be within ±30PPM/℃)         Adhesive Strength of Termination       No peeling shall be occur on the terminal electrode       500g×F, for 10±1 sec.         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         Solderability       SnAg3.0Cu0.5 solder         Resistance to       Capacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.       Solder pot : 270±5 ℃, 10±1sec.         Vibration Test       Capacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.       Amplitude : 1.5mm         Vibration 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 : 122.67 min       With rated voltage         Resistance       With rated voltage         With rated voltage       40±2 ℃, 90~95%RH, 500+12/-0hrs	Resistance	Whichever is smaller				
Voltage         mechanical breakdown           Temperature         COG           Characteristics         (From -55 ℃ to 125 ℃, Capacitance change should be within ±30PPM/℃)           Adhesive Strength of Termination         No peeling shall be occur on the terminal electrode         500g×F, for 10±1 sec.           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           Solderability         Soldered newly         SnAg3.0Cu0.5 solder           45±5 ℃, 3±0.3sec. (preheating : 80~120 ℃ for 10~30sec.)         Solder pot : 270±5 ℃, 10±1sec.           Resistance to within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.         Amplitude : 1.5mm         From 10Hz to 55Hz (return : 1min.)         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 : 122.67 min IR : 500Mohm or 25Mohm × μF         With rated voltage         40±2 ℃, 90~95%RH, 500+12/-0hrs	Appearance	No abnormal exterior appearance	Microscop (X10)			
Temperature CDG 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 is to be soldered newly  Capacitance change: strength 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.  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 ±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 ±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.  With rated voltage  40±2°C, 90~95%RH, 500+12/-0hrs  Q: 122.67 min IR: 500Mohm or 25Mohm × μF	Withstanding	No dielectric breakdown or	300% of the rated voltage			
Characteristics         (From -55 ℃ to 125 ℃, Capacitance change should be within ±30PPM/℃)           Adhesive Strength of Termination         No peeling shall be occur on the 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 ℃, 3±0.3sec. (preheating : 80~120 ℃ 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 ℃, 10±1sec.           Vibration Test         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.) 2hours ′ 3 direction (x, y, z)           Moisture         Capacitance change : within ±7.5% or ±0.75pF whichever is larger Q : 122.67 min IR : 500Mohm or 25Mohm × μF         With rated voltage 40±2 ℃, 90~95%RH, 500+12/-0hrs	Voltage	mechanical breakdown				
Adhesive Strength of Termination  Bending Strength  Capacitance change:     within ±5% or ±0.5pF whichever is larger  Solderability  More than 75% of terminal surface is to be soldered newly  Capacitance change:     within ±2.5% or ±0.25pF whichever is larger  Vibration Test  Capacitance change:     within ±2.5% or ±0.25pF whichever is larger     Tan δ, IR: initial spec.  Vibration Test  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 ±2.5% or ±0.75pF whichever is larger     Tan δ, IR: initial spec.  Moisture  Resistance  Within ±7.5% or ±0.75pF whichever is larger     Q: 122.67 min     IR: 500Mohm or 25Mohm × μF			-			
of Termination       terminal electrode         Bending Strength       Capacitance change: within ±5% or ±0.5pF whichever is larger       Bending to the limit (1mm) within ±10mm/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.         Vibration 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: 122.67 min IR: 500Mohm or 25Mohm × μF       With rated voltage	Characteristics	(From -55℃ to 125℃, Capacitance change should be within ±30PPM/℃)				
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.       SnAg3.0Cu0.5 solder         245±5°C, 3±0.3sec.       Solder pot : 270±5°C, 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.         Vibration Test       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.)         Moisture       Capacitance change : within ±7.5% or ±0.75pF whichever is larger Q : 122.67 min       With rated voltage       With rated voltage         Resistance       Within ±7.5% or ±0.75pF whichever is larger Q : 122.67 min       IR : 500Mohm or 25Mohm × μF	Adhesive Strength	No peeling shall be occur on the	500g×F, for 10±1 sec.			
Solderabilitywith $\pm 5\%$ or $\pm 0.5$ pF whichever is largerwith $\pm 0.0$ mm/sec.SolderabilityMore than 75% of terminal surface is to be soldered newlySnAg3.0Cu0.5 solder $\pm 0.3$ sec. (preheating : $\pm 0.3$ sec. (preheating : $\pm 0.3$ sec.)Resistance toCapacitance change : within $\pm 2.5\%$ or $\pm 0.25$ pF whichever is larger $\pm 0.3$ Tan $\pm 0.3$ IR : initial spec.Solder pot : $\pm 0.3$ to $\pm 0.3$ sec.)Vibration TestCapacitance change : within $\pm 0.3$ to $\pm 0$	of Termination	terminal electrode				
SolderabilityMore than 75% of terminal surface is to be soldered newlySnAg3.0Cu0.5 solder 245±5℃, 3±0.3sec. (preheating : 80~120℃ for 10~30sec.)Resistance toCapacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.Solder pot : 270±5℃, 10±1sec.Vibration TestCapacitance change : within ±2.5% or ±0.25pF whichever is larger Tan δ, IR : initial spec.Amplitude : 1.5mmVibration TestFrom 10Hz to 55Hz (return : 1min.) 2hours ´3 direction (x, y, z)MoistureCapacitance change : within ±7.5% or ±0.75pF whichever is larger Q : 122.67 min IR : 500Mohm or 25Mohm × μFWith rated voltage	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  Capacitance change: within ±2.5% or ±0.25pF whichever is larger Tan δ, IR: initial spec.  Vibration Test  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.) 2hours ´3 direction (x, y, z)  Moisture  Resistance  With rated voltage Within ±7.5% or ±0.75pF whichever is larger Q: 122.67 min IR: 500Mohm or 25Mohm × μF		within ±5% or ±0.5pF whichever is larger	1			
Resistance to Soldering heat Capacitance change: Solder pot: $270\pm5^{\circ}\mathrm{C}$ , $10\pm1\mathrm{sec}$ .  Vibration Test Capacitance change: Amplitude: $1.5\mathrm{mm}$ From $10\mathrm{Hz}$ to $55\mathrm{Hz}$ (return: $1\mathrm{min.}$ ) within $\pm2.5\%$ or $\pm0.25^{\circ}\mathrm{F}$ whichever is larger Tan $\delta$ , IR: initial spec. Amplitude: $1.5\mathrm{mm}$ From $10\mathrm{Hz}$ to $55\mathrm{Hz}$ (return: $1\mathrm{min.}$ ) $2\mathrm{hours}$ 3 direction (x, y, z)  Moisture Capacitance change: Within $\pm7.5\%$ or $\pm0.75^{\circ}\mathrm{F}$ whichever is larger Q: $122.67^{\circ}\mathrm{min}$ IR: $500\mathrm{Mohm}$ or $25\mathrm{Mohm} \times \mu\mathrm{F}$	Solderability	More than 75% of terminal surface				
Resistance to Capacitance change : Solder pot : $270\pm5^{\circ}$ C, $10\pm1$ sec.  Soldering heat Within $\pm2.5\%$ or $\pm0.25_{p}$ F whichever is larger Tan $\delta$ , IR : initial spec.  Vibration Test Capacitance change : Within $\pm2.5\%$ or $\pm0.25_{p}$ F whichever is larger Within $\pm2.5\%$ or $\pm0.25_{p}$ F whichever is larger Tan $\delta$ , IR : initial spec.  Moisture Capacitance change : With rated voltage  Resistance Within $\pm7.5\%$ or $\pm0.75_{p}$ F whichever is larger Q: $\pm0.75_{p}$ F whichever is larger $\pm0.25_{p}$ F whichever $\pm0.25_$	_	is to be soldered newly	245±5℃, 3±0.3sec.			
Soldering heat within $\pm 2.5\%$ or $\pm 0.25\mathrm{pF}$ whichever is larger Tan $\delta$ , IR: initial spec.  Vibration Test Capacitance change: within $\pm 2.5\%$ or $\pm 0.25\mathrm{pF}$ whichever is larger Tan $\delta$ , IR: initial spec.  Moisture Capacitance change: within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 122.67 min IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$						
Soldering heat within $\pm 2.5\%$ or $\pm 0.25\mathrm{pF}$ whichever is larger Tan $\delta$ , IR: initial spec.  Vibration Test Capacitance change: within $\pm 2.5\%$ or $\pm 0.25\mathrm{pF}$ whichever is larger Tan $\delta$ , IR: initial spec.  Moisture Capacitance change: within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 122.67 min IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$						
Tan $\delta$ , IR : initial spec.  Capacitance change :	Resistance to	Capacitance change :	Solder pot : 270±5℃, 10±1sec.			
Vibration TestCapacitance change : within $\pm 2.5\%$ or $\pm 0.25p\text{F}$ whichever is larger Tan $\delta$ , IR : initial spec.Amplitude : 1.5mmMoistureCapacitance change : within $\pm 7.5\%$ or $\pm 0.75p\text{F}$ whichever is larger Q : 122.67 min IR : 500Mohm or 25Mohm × $\mu\text{F}$ With rated voltage 40 $\pm 2^{\circ}\text{C}$ , 90~95%RH, 500+12/-0hrs	Soldering heat	within ±2.5% or ±0.25pF whichever is larger				
within $\pm 2.5\%$ or $\pm 0.25\mathrm{pF}$ whichever is larger Tan $\delta$ , IR: initial spec.  From 10Hz to 55Hz (return: 1min.) 2hours ´ 3 direction (x, y, z)  Moisture  Resistance  With rated voltage  within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 122.67 min  IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$	_	Tan δ, IR : initial spec.				
Tan $\delta$ , IR: initial spec. 2hours ´3 direction (x, y, z)  Moisture Capacitance change: Within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 122.67 min IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$	Vibration Test	Capacitance change :	Amplitude : 1.5mm			
MoistureCapacitance change :With rated voltageResistancewithin $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q : 122.67 min $40\pm2^\circ\mathrm{C}$ , $90\sim95\%\mathrm{RH}$ , $500+12/-0\mathrm{hrs}$ IR :500Mohm or 25Mohm × $\mu\mathrm{F}$		within ±2.5% or ±0.25pF whichever is larger	From 10Hz to 55Hz (return : 1min.)			
<b>Resistance</b> within $\pm 7.5\%$ or $\pm 0.75\mathrm{pF}$ whichever is larger Q: 122.67 min IR: 500Mohm or 25Mohm × $\mu\mathrm{F}$ $40\pm2^{\circ}\mathrm{C}$ , 90~95%RH, 500+12/-0hrs		Tan δ, IR : initial spec.	2hours ´ 3 direction (x, y, z)			
Q: 122.67 min IR: 500Mohm or 25Mohm × $\mu$ F	Moisture	Capacitance change :	· · · · ·			
IR : 500Mohm or 25Mohm × μF	Resistance	within ±7.5% or ±0.75pF whichever is larger	_			
' l		Q: 122.67 min				
		IR : 500Mohm or 25Mohm × $\mu$ F				
Whichever is smaller		Whichever is smaller				
High Temperature Capacitance change : With 200% of the rated voltage	High Temperature	Capacitance change :	With 200% of the rated voltage			
Resistance within ±3% or ±0.3pF whichever is larger Max. operating temperature	Resistance	within ±3% or ±0.3pF whichever is larger				
Q: 268 min 1000+48/-0hrs		Q: 268 min	1000+48/-0hrs			
IR: 1,000Mohm or 50Mohm × $\mu$ F		IR: 1,000Mohm or 50Mohm × $\mu$ F				
Whichever is smaller		Whichever is smaller				
Temperature Capacitance change : 1 cycle condition	Temperature	Capacitance change :	1 cycle condition			
	Cycling	_				
Tan $\delta$ , IR : initial spec. $\rightarrow$ Max. operating temperature $\rightarrow$ 25 $^{\circ}$ C	- <del>-</del>	_	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.