



# **SPECIFICATION**

(Reference sheet)

- Supplier : Samsung electro-mechanics - Samsung P/N : CL10C1R5BB8NNNC

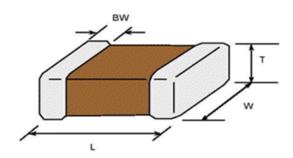
Product : Multi-layer Ceramic Capacitor
 Description : CAP, 1.5pF, 50V, ± 0.1pF, C0G, 0603

## A. Samsung Part Number

<u>CL</u> <u>10</u> <u>C</u> <u>1R5</u> <u>B</u> <u>B</u> <u>8</u> <u>N</u> <u>N</u> <u>N</u> <u>C</u> ① ② ③ ④ ⑤ ⑥ ⑦ ® 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		
Capacitance	<b>1.5</b> pF	Termination	Cu		
⑤ Capacitance	± 0.1 pF	Plating	Sn 100% (Pb Free)		
tolerance		Product	Normal		
6 Rated Voltage	50 V	<b>®</b> Special	Reserved for future use		
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
CL10C1R5BB8NNNC	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.30 ± 0.20

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

Capacitance       Within specified tolerance       1Mt±10%       0.5~5Vrms         Q       430 min       Insulation       10,000Mohm or 500Mohm×μF       Rated Voltage       60~120 sec.         Resistance       Whichever is smaller       Rated Voltage       60~120 sec.         Appearance       No abnormal exterior appearance       Microscope (*10)         Withstanding       No dielectric breakdown or mechanical breakdown       300% of the rated voltage         Voltage       mechanical breakdown       *** 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 : with 1.0mm/sec.       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       Solderability       SnAg3.0Cu0.5 solder         Voltage       Voltage       SnAg3.0Cu0.5 solder         Solderability       With 1.0mm/sec.       SnAg3.0Cu0.5 solder         Restored Notation of the properties of		Performance	Test condition		
Insulation	Capacitance	Within specified tolerance	1Mt±10% 0.5~5Vrms		
Resistance       Whichever is smaller         Appearance       No abnormal exterior appearance       Microscope (*10)         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 ±0.5 pF 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.)	Q	430 min	1		
Appearance       No abnormal exterior appearance       Microscope (*10)         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 245±5 ℃, 3±0.3sec. (preheating : 80~120 ℃ for 10~30sec.)	Insulation	10,000Mohm or 500Mohm×μF	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         Bending Strength       Capacitance change : with 1.0mm/sec.         Bending Strength       Within ±5% or ±0.5pF whichever is larger         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	Whichever is smaller			
Voltage       mechanical breakdown         Temperature       C0G         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 : with 1.0mm/sec.       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.)	Appearance	No abnormal exterior appearance	Microscope ('10)		
Temperature 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  More than 75% of terminal surface is to be soldered newly  COG (From -55°C to 125°C, Capacitance change should be within ±30PPM/°C)  Solog×F, for 10±1 sec.  Bending to the limit (1mm) with 1.0mm/sec.  SnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating: 80~120°C for 10~30sec.)	Withstanding	No dielectric breakdown or	300% of the rated voltage		
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 245±5 °C, 3±0.3sec.         Very company to the limit (1mm) with 1.0mm/sec.       Company to the limit (1mm) with 1.0mm/sec.         Solderability       SnAg3.0Cu0.5 solder 245±5 °C, 3±0.3sec.         Very company to the limit (1mm) with 1.0mm/sec.       Company to the limit (1mm) with 1.0mm/sec.	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  More than 75% of terminal surface  is to be soldered newly  Solderability  No peeling shall be occur on the terminal sec.  Section 10±1 sec.  Bending to the limit (1mm) with 1.0mm/sec.  SnAg3.0Cu0.5 solder  245±5°C, 3±0.3sec.  (preheating: 80~120°C for 10~30sec.)	Temperature	COG			
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℃, 3±0.3sec.         (preheating : 80~120℃ for 10~30sec.)	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℃, 3±0.3sec. (preheating : 80~120℃ 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 with 1.0mm/sec.  Solderability More than 75% of terminal surface is to be soldered newly 245±5℃, 3±0.3sec. (preheating : 80~120℃ for 10~30sec.)	of Termination	terminal electrode			
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.)	Bending Strength	Capacitance change :	Bending to the limit (1mm)		
is to be soldered newly 245±5 ℃, 3±0.3sec. (preheating : 80~120 ℃ for 10~30sec.)		within ±5% or ±0.5pF whichever is larger	with 1.0mm/sec.		
(preheating : 80~120 ℃ for 10~30sec.)	Solderability	More than 75% of terminal surface	SnAg3.0Cu0.5 solder		
, , , , , , , , , , , , , , , , , , ,		is to be soldered newly	245±5℃, 3±0.3sec.		
			(preheating : 80~120 ℃ for 10~30sec.)		
Resistance to Capacitance change : Solder pot : 270±5℃, 10±1sec.	Resistance to	Capacitance change :	Solder pot : 270±5℃, 10±1sec.		
Soldering heat within ±2.5% or ±0.25pF whichever is larger	Soldering heat	within ±2.5% or ±0.25pF whichever is larger			
Tan δ, IR : initial spec.		Tan δ, IR : initial spec.			
Vibration Test         Capacitance change :         Amplitude : 1.5mm	Vibration Test	Capacitance change :	Amplitude : 1.5mm		
within ±2.5% or ±0.25pF whichever is larger From 10Hz to 55Hz (return : 1min.)		within ±2.5% or ±0.25pF whichever is larger	From 10Hz to 55Hz (return : 1min.)		
Tan δ, IR : initial spec. 2hours ´ 3 direction (x, y, z)		Tan δ, IR : initial spec.	2hours ´3 direction (x, y, z)		
Moisture Capacitance change : With rated voltage	Moisture	Capacitance change :			
Resistance within ±7.5% or ±0.75pF whichever is larger 40±2℃, 90~95%RH, 500+12/-0hrs	Resistance	within ±7.5% or ±0.75pF whichever is larger	40±2℃, 90~95%RH, 500+12/-0hrs		
Q: 105 min		Q: 105 min			
IR: 500Mohm or 25Mohm × $\mu$ F		IR: 500Mohm or 25Mohm × μF			
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	Max. operating temperature		
Q: 215 min 1000+48/-0hrs		Q: 215 min			
IR: 1,000Mohm or 50Mohm × $\mu$ F		IR : 1,000Mohm or 50Mohm × μF			
Whichever is smaller		Whichever is smaller			
Temperature Capacitance change : 1 cycle condition	Temperature	Capacitance change :	1 cycle condition		
Cycling within ±2.5% or ±0.25pF whichever is larger Min. operating temperature → 25°C	I	within ±2.5% or ±0.25pF whichever is larger	Min. operating temperature → 25°C		
Tan δ, IR : initial spec. $\rightarrow$ Max. operating temperature $\rightarrow$ 25°C					
		·			
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℃, 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.