



# **SPECIFICATION**

- · Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor
- · Samsung P/N :
- CL21B392KBANNNC

(Reference sheet)

- · Description :
- CAP, 3.9nF, 50V, ±10%, X7R, 0805

A. Samsung Part Number

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1	Series	Samsung Multi-layer Ceramic Capacitor													
2	Size	0805 (inc	ch co	de)		L:	2.00	± 0.10	mm			W:	1.25 ± 0.10 i	mm	
3	Dielectric	X7R					8	Inner	elect	rode			Ni		
4	Capacitance	3.9 nF						Term	inatio	n			Cu		
5	Capacitance	±10 %						Platir	ıg				Sn 100%	(Pb Free)	
	tolerance						9	Prod	uct				Normal		
6	Rated Voltage	50 V					10	Spec	ial				Reserved for	r future use	
$\bigcirc$	Thickness	0.65 ± 0.10	mm				1	Packa	aging				Cardboard T	ype, 7" reel	

### **B. Structure & Dimension**



Samsung P/N	Dimension(mm)							
Samsung F/N	L	W	Т	BW				
CL21B392KBANNNC	2.00 ± 0.10	1.25 ± 0.10	0.65 ± 0.10	0.50 +0.2/-0.3				

#### C. Samsung Reliablility Test and Judgement Condition

		Judgement	Test condition
Tan δ (DF) 0.025 max. treated at 150℃ +00-10℃ for 1 hour and maintained in ambient air for 24±2 hours.   Insulation 10.000Mohm or 500Mohm×/d <sup>c</sup> Rated Voltage 60~120 sec.   Resistance Whichever is smaller Microscope (×10)   Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or 250% of the rated voltage   Temperature X7R Characteristics (From-55℃ to 125℃, Capacitance change should be within ±15%)   Adhesive Strength No peeling shall be occur on the of Termination 500g-f, for 10±1 sec.   Bending Strength Capacitance change : within ±12.5% 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±°C, 3±0.3sec.   Vibration Test Capacitance change : within ±7.5% Solder pot : 270±5℃, 10±1sec.   Soldering Heat Tan δ, IR : initial spec. Yibration Test Capacitance change : within ±12.5%   With rate voltage Tan δ : 0.05 max With 200% of the rated voltage 40±2℃, 90-95%RH, 500+12/-0hrs   Resistance Tan δ : 0.05 max Main ±12.5% With 200% of the rated voltage   High Temperature Capacita	Capacitance	Within specified tolerance	1 <sup>kHz</sup> ±10% / 1.0±0.2Vrms
ResistanceWhichever is smallerAppearanceNo abnormal exterior appearanceMicroscope (×10)WithstandingNo dielectric breakdown or mechanical breakdown250% of the rated voltageYoltagemechanical breakdown250% of the rated voltageCharacteristics(From-55°C to 125°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the terminal electrode500g·f, for 10±1 sec.Bending StrengthCapacitance change : within ±12.5%Bending to the limit (1mm) with 1.0mm/sec.SolderabilityMore than 75% of terminal surface is to be soldered newlySnAg3.0Cu0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.)Resistance to Soldering HeatCapacitance change : within ±7.5% Tan δ, IR : initial spec.Solder pot : 270±5°C, 10±1sec.Vibration Test emistion TestCapacitance change : within ±12.5% Tan δ, IR : initial spec.Amplitude : 1.5mm From 10Hz to 55Hz (returm : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : within ±12.5% Tan δ : 0.05 max IR : 500Mohm or 25Mohm × μ <sup>F</sup> Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsHigh Temperature Capacitance change : within ±12.5% Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature Capacitance change : within ±12.5% Whichever is smallerVib200% of the rated voltage Max. operating temperature 1000+48/-0hrs	Tan δ (DF)	0.025 max.	*A capacitor prior to measuring the capacitance is heat treated at $150^{\circ}C+0/-10^{\circ}C$ for 1 hour and maintained in ambient air for 24±2 hours.
AppearanceNo abnormal exterior appearanceMicroscope (×10)WithstandingNo dielectric breakdown or mechanical breakdown250% of the rated voltageYottagemechanical breakdown250% of the rated voltageTemperatureX7R250% of the rated voltageCharacteristics(From-55°C to 125°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the terminal electrode500g·f, for 10±1 sec.Bending StrengthCapacitance change : within ±12.5% Bending StrengthBending to the limit (1mm) with 1.0mm/sec.SolderabilityMore than 75% of terminal surface is to be soldered newlySnAg3.0Cu0.5 solder 2445±5°C, 340.3sec. (preheating : 80~120°C for 10~30sec.)Resistance to Soldering HeatCapacitance change : within ±7.5% Tan 5, IR : initial spec.Solder pot : 270±5°C, 10±1sec.Vibration Test ResistanceCapacitance change : within ±12.5% Tan 5 : 0.05 max IR : 500Mohm or 25Mohm × μF Whichever is smallerWith rated voltage 40±2°C, 90~95%RH, 500+12/-0hrsHigh Temperature ResistanceCapacitance change : within ±12.5% Tan 5 : 0.05 max IR : 1,000Mohm or 50Mohm × μF Whichever is smallerWith 200% of the rated voltage Max. operating temperature 100+48/-0hrsHigh Temperature Capacitance change : within ±7.5%1 cycle condition Min. operating temperature 100+48/-0hrs1 cycle condition Min. operating temperature 1000+48/-0hrs	Insulation	10,000Mohm or 500Mohm× <i>μ</i> F	Rated Voltage 60~120 sec.
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is to be soldered newly $245\pm5^{\circ}C, 3\pm0.3sec.$ (preheating : $80-120^{\circ}C$ for $10-30sec.$ )Resistance to Soldering HeatCapacitance change : within $\pm 7.5\%$ Solder pot : $270\pm5^{\circ}C, 10\pm1sec.$ Vibration TestCapacitance change : within $\pm 5\%$ Tan $\delta, IR : initial spec.$ Amplitude : $1.5mm$ From $10Hz$ to $55Hz$ (return : $1min.$ ) $2hours × 3 direction (x, y, z)$ Moisture ResistanceCapacitance change : within $\pm 12.5\%$ Tan $\delta : 0.05 max$ IR : $500Mohm$ or $25Mohm × \mu^{F}$ Whichever is smallerWith rated voltage $40\pm2^{\circ}C, 90-95\%$ RH, $500+12/-0hrs$ High Temperature ResistanceCapacitance change : within $\pm 12.5\%$ Tan $\delta : 0.05 max$ IR : $500Mohm$ or $25Mohm × \mu^{F}$ Whichever is smallerWith $200\%$ of the rated voltage Max. operating temperature $1000+48/-0hrs$ Temperature CyclingCapacitance change : within $\pm 7.5\%$ Tan $\delta, IR : initial spec.I cycle conditionMin. operating temperature1 cycle conditionMin. operating temperature\rightarrow 25^{\circ}C$			with 1.0mm/sec.
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Solderability	More than 75% of terminal surface	SnAg3.0Cu0.5 solder
Resistance to Soldering HeatCapacitance change : Tan $\delta$ , IR : initial spec.within $\pm 7.5\%$ Solder pot : $270\pm5^{\circ}$ C, $10\pm1$ sec.Vibration TestCapacitance change : Tan $\delta$ , IR : initial spec.within $\pm 5\%$ From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : Tan $\delta$ : 0.05 maxwithin $\pm 12.5\%$ Whichever is smallerWith rated voltage 40 $\pm 2^{\circ}$ C, 90~95%RH, 500+12/-0hrsHigh Temperature ResistanceCapacitance change : within $\pm 12.5\%$ Whichever is smallerWith $\pm 12.5\%$ Mith $\pm 12.5\%$ Whichever is smallerWith $200\%$ of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature Capacitance change : Whichever is smallerUth $\pm 7.5\%$ Michever is smallerI cycle condition Min. operating temperature $- 25^{\circ}$ C		is to be soldered newly	245±5℃, 3±0.3sec.
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$ \begin{array}{c} \mbox{Moisture} \\ \mbox{Resistance} & \begin{tabular}{lllllllllllllllllllllllllllllllllll$	Vibration Test	5	From 10Hz to 55Hz (return : 1min.)
ResistanceTan $\delta$ :0.05 max $40\pm 2^{\circ}$ C, 90~95%RH, 500+12/-0hrsIR:500Mohm or 25Mohm × $\mu$ F $40\pm 2^{\circ}$ C, 90~95%RH, 500+12/-0hrsHigh TemperatureCapacitance change : within $\pm 12.5\%$ With 200% of the rated voltageResistanceTan $\delta$ :0.05 maxMax. operating temperatureIR:1,000Mohm or 50Mohm × $\mu$ F1000+48/-0hrsWhichever is smallerWhichever is smaller1 cycle conditionTemperatureCapacitance change : within $\pm 7.5\%$ 1 cycle conditionCyclingTan $\delta$ , IR: initial spec.1 cycle condition	Moisture	Capacitance change : within ±12.5%	
Whichever is smallerWith200% of the rated voltageHigh Temperature ResistanceCapacitance change :within $\pm 12.5\%$ Tan $\delta$ :With200% of the rated voltageResistanceTan $\delta$ :0.05 max 1,000Mohm or 50Mohm × $\mu$ F Whichever is smallerWith200% of the rated voltageTemperature CyclingCapacitance change :within $\pm 7.5\%$ 1 cycle conditionTim $\delta$ , IR : initial spec.1 cycle conditionMin. operating temperature	Resistance	Tan δ : 0.05 max	40±2℃, 90~95%RH, 500+12/-0hrs
High Temperature ResistanceCapacitance change : 0.05 max IR : 1,000Mohm or 50Mohm × $\mu^{F}$ Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : max Tan $\delta$ , IR : initial spec.With ±7.5% 1 cycle condition Min. operating temperature		IR : 500Mohm or 25Mohm × $\mu$ F	
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$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	High Temperature	Capacitance change : within ±12.5%	With 200% of the rated voltage
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Temperature CyclingCapacitance change : Tan $\delta$ , IR : initial spec.within $\pm 7.5\%$ Min. operating temperature1 cycle condition Min. operating temperature		IR : 1,000Mohm or 50Mohm × $\mu$ F	1000+48/-0hrs
CyclingTan $\delta$ , IR : initial spec.Min. operating temperature $\rightarrow$ 25°C		Whichever is smaller	
	Temperature	Capacitance change : within ±7.5%	1 cycle condition
$\rightarrow$ Max. operating temperature $\rightarrow$ 25°C	-	Tan δ, IR : initial spec.	-
	_		$\rightarrow$ Max. operating temperature $\rightarrow$ 25°C
5 cycle test			5 cycle test

X 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 )

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.

- Aerospace/Aviation equipment
- ② Automotive or Transportation equipment (vehicles, trains, ships, etc)
- 3 Medical equipment
- *④ 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.