



# SPECIFICATION

- · Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor
- · Samsung P/N :
- CL21B224KBFNNNF

(Reference sheet)

- Description :
- CAP, 220nF, 50V, ±10%, X7R, 0805

A. Samsung Part Number

		<u>CL</u> ①	<mark>21</mark> ②	<u>B</u> 3	<u>224</u> ④	<u>K</u> 5	<u>B</u> 6	<u>Е</u> 7	<u>N</u> 8	<u>N</u> 9	<u>N</u> 10	<u>Е</u> Ш	
1	Series	Samsung Multi-layer Ceramic Capacitor											
2	Size	0805 (inch	code)		L:	2.00	± 0.10	mm			W:	1.25 ± 0.10 m	nm
3	Dielectric	X7R				8	Inner	elect	rode			Ni	
4	Capacitance	220 nF					Term	inatio	n			Cu	
5	Capacitance	±10 %					Platir	g				Sn 100%	(Pb Free)
	tolerance					9	Prod	uct				Normal	
6	Rated Voltage	50 V				10	Spec	al				Reserved for	r future use
1	Thickness	1.25 ± 0.10 mm				1	Packa	aging				Embossed T	ype, 13" reel

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



Samsung P/N	Dimension(mm)							
Samsung F/N	L	W	Т	BW				
CL21B224KBFNNNF	2.00 ± 0.10	1.25 ± 0.10	1.25 ± 0.10	0.50 +0.20/-0.30				

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

Tan δ (DF)   0.025 max.   *A capacitor prior to measuring the capacitance is heat treated at 150 °C+0/-10 °C for 1 hour and maintained in ambient air for 24±2 hours.     Insulation   10,000Mohm or 500Mohm×//=   Rated Voltage   60~120 sec.     Resistance   Whichever is smaller   Appearance   Microscope (×10)     Withstanding   No abnormal exterior appearance   Microscope (×10)     Withstanding   No dielectric breakdown or mechanical breakdown   250% of the rated voltage     Yotage   mechanical breakdown   500g f, for 10±1 sec.     Characteristics   (From-55 °C to 125 °C, Capacitance change should be within ±15%)     Adhesive Strength   No peeling shall be occur on the terminal electrode   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 solder a newly   SnAg3.0Cu.0.5 solder 245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.))     Resistance to   Capacitance change : within ±7.5%   Solder pot : 270±5°C, 10±1 sec.     Soldering Heat   Tan 5, IR : initial spec.   Amplitude : 1.5mm     Yibration Test   Capacitance change : within ±12.5%   Amplitude : 1.5mm     Resistance   Tan 5, IR : initial spec.		Judgement	Test condition				
Tan $\delta$ (DF)0.025 max.treated at 150°C+04-10°C for 1 hour and maintained in ambient air for 24±2 hours.Insulation10,000Mohm or 500Mohm× $\mu^{\beta}$ Rated Voltage60~120 sec.ResistanceWhichever is smallerMotion or south or s	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 breakdown $250\%$ of the rated voltageVoltagemechanical breakdown or mechanical breakdown $250\%$ of the rated voltageTemperature CharacteristicsX7R (From-55°C to 125°C, Capacitance change should be within ±15%)Adhesive Strength of TerminationNo peeling shall be occur on the terminal electrode $500g$ f, for 10±1 sec.Bending Strength of TerminationCapacitance 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 Heat Tan $\delta$ , IR : initial spec.Solder pot : 270±5°C, 10±1sec.Wibration Test Wibration TestCapacitance change : within ±7.5% Tan $\delta$ : 0.05 max IR : 500Mohm or 25Mohm × $\mu^d$ Whichever is smallerWith 200% of the rated voltage 40±2°C, 90-95%RH, 500+12/-0hrsHigh Temperature ResistanceCapacitance change : within ±12.5% Tan $\delta$ : 0.05 max IR : 1,000Mohm or 50Mohm × $\mu^d$ Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsHigh Temperature Capacitance change : within ±12.5% Whichever is smallerMicrosechiton Max. operating temperature 1000+48/-0hrs25°C	Tan δ (DF)	0.025 max.	treated at 150 $^\circ\!\!\!\mathrm{C}$ +0/-10 $^\circ\!\!\!\mathrm{C}$ for 1 hour and maintained in				
AppearanceNo abnormal exterior appearanceMicroscope (×10)WithstandingNo dielectric breakdown or mechanical breakdown $250\%$ of the rated voltageYoltagemechanical breakdown $250\%$ of the rated voltageTemperatureX7R $250\%$ of the rated voltageCharacteristics(From-55° to 125°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the terminal electrode $500g \cdot f, \text{ for } 10 \pm 1 \sec$ .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 $245\pm5°C, 3\pm0.3sec.$ . (preheating : 80~120°C for 10~30sec.)Resistance to Soldering HeatCapacitance change : within ±7.5% Tan $\delta$ , IR : initial spec.Solder pot : 270±5°C, 10±1sec.Vibration Test ResistanceCapacitance change : within ±12.5% Tan $\delta$ : 0.05 max IR : 500Mohm or 25Mohm × $\mu^{f}$ Whichever is smallerWith rated voltage $40\pm2°C, 90~95\%RH, 500+12/-0hrs$ High Temperature ResistanceCapacitance change : within ±12.5% Tan $\delta$ : 0.05 max IR : 500Mohm or 50Mohm × $\mu^{f}$ Whichever is smallerWith 200% of the rated voltage Max. operating temperature $1000+48/-0hrs$ Temperature Capacitance change : within $\pm17.5\%$ 1 cycle condition Mox. operating temperature $1000+48/-0hrs$	Insulation	10,000Mohm or 500Mohm× <i>μ</i> F	Rated Voltage 60~120 sec.				
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Whichever is smallerWith200% of the rated voltageHigh Temperature ResistanceCapacitance change :within $\pm 12.5\%$ Tan $\delta$ :With200% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change :within $\pm 7.5\%$ Tan $\delta$ , IR : initial spec.1 cycle condition Min. operating temperature 1 cycle condition	Resistance	Tan δ : 0.05 max	40±2℃, 90~95%RH, 500+12/-0hrs				
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Whichever is smaller Whichever is smaller   Temperature Capacitance change : within ±7.5% 1 cycle condition   Cycling Tan δ, IR : initial spec. Min. operating temperature → 25°C	Resistance		-				
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 × <i>μ</i> F	1000+48/-0hrs				
CyclingTan $\delta$ , IR : initial spec.Min. operating temperature $\rightarrow$ 25°C		Whichever is smaller					
CyclingTan $\delta$ , IR : initial spec.Min. operating temperature $\rightarrow$ 25°C	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.