



SPECIFICATION

- · Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor
- · Samsung P/N :
- CL21A225KOFNFNE

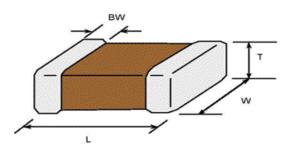
(Reference sheet)

- · Description :
- CAP, 2.2uF, 16V, ±10%, X5R, 0805

A. Samsung Part Number

		<u>CL</u> ①	<u>21</u> ②	<u>▲</u> ③	<u>225</u> ④	<u>K</u> 5	<mark>0</mark> 6	<u>Е</u> ⑦	<u>N</u> 8	<u>F</u> 9	<u>N</u> 10	<u></u> ⊑ ₪
1	Series	Samsung Multi-layer Ceramic Capacitor										
2	Size	0805 (inch	code)		L:	2.00	± 0.10	mm			W:	1.25 ± 0.10 mm
3	Dielectric	X5R				8	Inner	elect	rode			Ni
4	Capacitance	2.2 uF					Term	inatio	n			Cu
5	Capacitance	±10 %					Platir	ng				Sn 100% (Pb Free)
	tolerance					9	Prod	uct				Product for POWER application
6	Rated Voltage	16 V				10	Spec	ial				Reserved for future use
1	Thickness	1.25 ± 0.10 mm				1	Pack	aging				Embossed Type, 7" reel

B. Structure & Dimension



Samsung P/N	Dimension(mm)							
Samsung F/N	L	W	Т	BW				
CL21A225KOFNFNE	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

CapacitanceWithin specified tolerance14½ ±10% / 1.0±0.2VrmsTan 5 (DF)0.1 max.*A capacitor prior to measuring the capacitance is heat trated at 150 ° 40/-10° to 1 1 hour and maintained in ambient air for 24±2 hours.Insulation10,000 Mohm or 100 Mohm× μ FRated Voltage60-120 sec.ResistanceWhichever is smallerAppearanceMicroscope (×10)WithstandingNo dielectric breakdown or mechanical breakdown250% of the rated voltageTemperatureXSRCharacteristics(From-55 °C to 85°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 newlySnAg3.0Cu.0.5 solder 245±5°C, 10±1 sec.Soldering HeatTan 5, IR : initial spec.Solder pot : 270±5°C, 10±1 sec.Vibration TestCapacitance change : an 5, IR : initial spec.Amplitude : 1.5mm From 10½ to 55½ (return : 1min.) 2hours × 3 direction (x, y, z)MoistureCapacitance change : within ±12.5% Tan 5 : 0.125 max IR : 500Mohm or 12.5Mohm × μ F Whichever is smallerWith 150% of the rated voltage Max.operating temperature 1.000+48/ohrsHigh Temperature Capacitance change : Whichever is smaller1.50% Whichever is smaller1.50% Mohm or 25.Mohm × μ F Whichever is smallerHigh Temperature Capacitance change : Whichever is smaller1.000+48/ohrsMax.operating temperature		Judgement	Test condition				
Tan δ (DF)0.1 max.treated at 150°C+0/-10°C for 1 hour and maintained in ambient air for 24±2 hours.Insulation10,000Mohm or 100Mohm×μFRated Voltage60~120 sec.ResistanceWhichever is smallerMicroscope (×10)WithstandingNo dielectric breakdown or temperature250% of the rated voltageCharacteristics(From-55°C to 85°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the terminal electrodeof Terminationterminal electrodeBending StrengthCapacitance change : within ±12.5%Bending StrengthCapacitance change : within ±12.5%Bending StrengthCapacitance change : within ±12.5%Solder abilityMore than 75% of terminal surface is to be soldered newlyVibration TestCapacitance change : vithin ±7.5%Soldering Heat Vibration TestCapacitance change : vithin ±12.5%Moisture Resistance Tan δ : N : 0.125 max IR : Soldehmer is 300Mohm × μF Whichever is smallerHigh Temperature ResistanceCapacitance change : vithin ±12.5%Kith 150% Moisture ResistanceCapacitance change : vithin ±12.5%High Temperature ResistanceCapacitance change : vithin ±12.5%High Temperature ResistanceCapacitance change : vithin ±12.5%Kithin ±12.5% With red voltageWith rated voltage Max operating temperature 1,000+48/-0hrsHigh Temperature ResistanceCapacitance change : vithin ±12.5%Kithin ±12.5% With red voltageMith 150% of t	Capacitance	Within specified tolerance	1 ^{kHz} ±10% / 1.0±0.2Vrms				
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$\begin{tabular}{ c c c c c c c } \hline Tan \delta, IR: initial spec. & From 10Hz to 55Hz (return: 1min.) \\ 2hours \times 3 \ direction (x, y, z) \\ \hline \end{tabular} \e$	Soldering Heat						
$ \begin{array}{c} \mbox{Moisture} \\ \mbox{Resistance} \\ \mbox{Resistance} \\ \mbox{IR}: 500 \mbox{Mohm or } 12.5 \mbox{Mohm } \times \mbox{\sc h}^{F} \\ \mbox{Whichever is smaller} \\ \mbox{High Temperature} \\ \mbox{Resistance} \\ \mbox{Capacitance change : within } \pm 12.5 \mbox{\sc h} \\ \mbox{Tan } \delta: 0.125 \mbox{ max} \\ \mbox{IR}: 1,000 \mbox{Mohm or } 25 \mbox{Mohm } \times \mbox{\sc h}^{F} \\ \mbox{Whichever is smaller} \\ \mbox{Temperature} \\ \mbox{Temperature} \\ \mbox{Capacitance change : within } \pm 7.5 \mbox{\sc h} \\ \mbox{Temperature} \\ \mbox{Capacitance change : within } \pm 7.5 \mbox{\sc h} \\ \mbox{Tan } \delta, \mbox{ IR}: \mbox{ initial spec.} \\ \mbox{\sc h} \\ \mbox{Temperature} \\ \mbox{Capacitance change : within } \pm 7.5 \mbox{\sc h} \\ $	Vibration Test		From 10Hz to 55Hz (return : 1min.)				
$\begin{array}{c cccc} & IR: & 500 \text{Mohm or } 12.5 \text{Mohm} \times \mu^{\text{F}} & \\ & \text{Whichever is smaller} & \\ \hline \text{High Temperature} \\ \text{Resistance} & & \text{Capacitance change : within } \pm 12.5\% \\ & \text{Tan } \delta: & 0.125 \text{ max} & \\ & IR: & 1,000 \text{Mohm or } 25 \text{Mohm} \times \mu^{\text{F}} & \\ & \text{Whichever is smaller} & \\ \hline \text{Temperature} \\ \text{Cycling} & & \text{Capacitance change : within } \pm 7.5\% \\ & \text{Tan } \delta, \text{ IR : initial spec.} & & 1 \text{ cycle condition} \\ \hline \text{Min. operating temperature} & \rightarrow & 25^{\circ}\text{C} \\ \hline \end{array}$	Moisture	Capacitance change : within ±12.5%					
Whichever is smallerWith150%of the rated voltageHigh Temperature ResistanceCapacitance change :within $\pm 12.5\%$ Tan δ :With150%of the rated voltageResistanceTan δ :0.125 max 1,000Mohm or 25Mohm × μ^{F} Whichever is smallerWith150%of the rated voltageTemperature CyclingCapacitance change :within $\pm 7.5\%$ Tan δ , IR : initial spec.1 cycle condition Min. operating temperature Min. operating temperature \rightarrow	Resistance	Tan δ : 0.125 max	40±2℃, 90~95%RH, 500+12/-0hrs				
ResistanceTan δ :0.125 maxMax. operating temperatureIR:1,000Mohm or 25Mohm × μ^{F} 1,000+48/-0hrsWhichever is smaller1 cycle conditionTemperature CyclingCapacitance change :within $\pm 7.5\%$ 1 cycle conditionMax. operating temperature $\rightarrow 25^{\circ}C$							
ResistanceTan δ : 0.125 maxMax. operating temperatureIR: 1,000Mohm or 25Mohm × μ^{F} 1,000+48/-0hrsWhichever is smaller1Temperature CyclingCapacitance change : within ±7.5% Tan δ , IR : initial spec.1 cycle condition	High Temperature	Capacitance change : within ±12.5%	With ^{150%} of the rated voltage				
Whichever is smallerWhichever is smallerTemperature CyclingCapacitance change : within $\pm 7.5\%$ Tan δ , IR : initial spec.1 cycle condition Min. operating temperature $\rightarrow 25^{\circ}C$		-	Max. operating temperature				
CyclingTan δ , IR : initial spec.Min. operating temperature \rightarrow 25°C			1,000+48/-0hrs				
	Temperature	Capacitance change : within ±7.5%	1 cycle condition				
\rightarrow Max. operating temperature \rightarrow 25°C	Cycling	Tan δ, IR : initial spec.	Min. operating temperature \rightarrow 25°C				
			→ Max. operating temperature → 25° C				
5 cycle test			5 cycle test				

 $\,\%$ The reliability test condition can be replaced by the corresponding accelerated test condition.

D. Recommended Soldering method :

Reflow (Reflow Peak Temperature : 260±5°C, 30sec.)

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
- ④ Military equipment
- 5 Disaster prevention/crime prevention equipment
- Ø Power plant control equipment
- ⑦ Atomic energy-related equipment
- Indersea equipment
- Itraffic signal equipment
- Data-processing equipment
- ① Electric heating apparatus, burning equipment
- ② Safety equipment
- 13 Any other applications with the same as or similar complexity or reliability to the applications