



# **SPECIFICATION**

- · Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor
- · Samsung P/N :
- CL31B475KAHNNNE

(Reference sheet)

- · Description :
- CAP, 4.7uF, 25V, ±10%, X7R, 1206

A. Samsung Part Number

			<u>CL</u> ①	<u>31</u> ②	<u>B</u> 3	<u>475</u> ④	<u>K</u> 5	<mark>4</mark> 6	<u>н</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	1206	(inch c	ode)		L:	3.20	± 0.20	mm			W:	1.60 ± 0.20	mm	
3	Dielectric	X7R					8	Inner	elect	rode			Ni		
4	Capacitance	4.7	uF					Term	inatio	n			Cu		
5	Capacitance	±10 °	%					Platir	ıg				Sn 100%	(Pb Free)	
	tolerance						9	Prod	uct				Normal		
6	Rated Voltage	25 \	V				10	Spec	ial				Reserved fo	r future use	
1	Thickness	1.60 ± 0.2	20 mm				1	Pack	aging				Embossed 1	ype, 7" reel	

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



Samsung P/N	Dimension(mm)							
Samsung F/N	L	W	Т	BW				
CL31B475KAHNNNE	3.20 ± 0.20	1.60 ± 0.20	1.60 ± 0.20	0.50 ± 0.30				

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

Resistance Whichever is smaller Microscope (×10)   Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage   Temperature X7R   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 soldered newly SnAg3.0Cu0.5 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±1sec.   Soldering Heat Tan ō, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (returm : 1min.) 2hours × 3 direction (x, y, z)   Moisture Capacitance change : within ±12.5% Resistance Amplitude : 1.5mm From 10Hz to 55Hz (returm : 1min.) 2hours × 3 direction (x, y, z)   High Temperature Capacitance change : within ±12.5% Tan ō : 0.125 max With rated voltage   Whichever is smaller Max. operating temperature 100+48/-0hrs   High Temperature Capacitance change : within ±12.5% Tan ō : 0.125 max		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×/f°Rated Voltage60-120 sec.ResistanceWhichever is smallerAppearanceMicroscope (×10)WithstandingNo dielectric breakdown or mechanical breakdown250% of the rated voltageVoltagemechanical breakdown250% of the rated voltageTemperatureX7R (From-55°C to 125°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the of Terminal electrodeBending StrengthCapacitance change : vithin ±12.5%SolderabilityMore than 75% of terminal surface is to be soldered newlySolderabilityMore than 75% of terminal surface is to be soldered newlyVibration TestCapacitance change : capacitance change : within ±7.5%Soldering HeatTan δ, IR : initial spec.Vibration TestCapacitance change : solder capacitance change : within ±12.5%Moisture ResistanceCapacitance change : minitial spec.With rated voltage Whichever is smallerAmplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : minitial spec.Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : minitial spec.Mith 150% of the rated voltage Max. operating temperature 1000+48/-OhrsHigh Temperature ResistanceCapacitance change : minitial spec. </td <td>Capacitance</td> <td>Within specified tolerance</td> <td>1<sup>kHz</sup> ±10% / 1.0±0.2Vrms</td>	Capacitance	Within specified tolerance	1 <sup>kHz</sup> ±10% / 1.0±0.2Vrms
Resistance Whichever is smaller Microscope (×10)   Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage   Temperature X7R   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 soldered newly SnAg3.0Cu0.5 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±1sec.   Soldering Heat Tan 5, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)   Moisture Capacitance change : within ±12.5% Resistance With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs   IR : 500Mohm or 12.5Mohm × µ <sup>E</sup> Whichever is smaller With 150% of the rated voltage Max. operating temperature   High Temperature Capacitance change : within ±12.5% Tan 5 : 0.125 max With 150% of the rated voltage Max. operating temperature → 25°C	Tan δ (DF)	0.1 max.	treated at 150 $^\circ\!\!\!\mathrm{C}$ +0/-10 $^\circ\!\!\!\mathrm{C}$ for 1 hour and maintained in
Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage   Temperature X7R   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.   of Termination 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±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±1sec.   Soldering Heat Tan õ, IR : initial spec. Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)   Moisture Capacitance change : within ±12.5% Tan õ : 0.125 max IR : 500Mohm or 12.5Mohm × /r <sup>j</sup> Whichever is smaller With 150% of the rated voltage   High Temperature Capacitance change : within ±12.5% Whichever is smaller With 150% of the rated voltage   Tan õ : 0.125 max IR : 1,000Mohm or 25Mohm × /r <sup>j</sup> Whichever is smaller With 150% of the rated voltage   Tan õ : 0.125 max IR : 1,000Mohm or 25Mohm × /r <sup>j</sup> Whichever is smaller 1 cycle condition   Min. operating tem	Insulation	10,000Mohm or 100Mohm× <i>µ</i> F	Rated Voltage 60~120 sec.
Withstanding VoltageNo dielectric breakdown or mechanical breakdown $250\%$ of the rated voltageTemperature CharacteristicsX7R (From-55°C to 125°C, Capacitance change should be within ±15%)Adhesive StrengthAdhesive Strength of TerminationNo peeling shall be occur on the terminal electrode $500g$ ·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 : tan $\delta_1$ IR : initial spec.Solder pot : 270±5°C, 10±1sec.Vibration TestCapacitance change : within ±12.5%More than 75.% tan $\delta_1$ IR : initial spec.Solder pot : 270±5°C, 10±1sec.Moisture ResistanceCapacitance change : tan $\delta_1$ IR : initial spec.Amplitude : 1.5mm From 10Hz to 55Hz (returm : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : tan $\delta_1$ IR : initial spec.With n±12.5% With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrsHigh Temperature ResistanceCapacitance change : tan $\delta_1$ IR : initial spec.With 150% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : whichever is smaller1 cycle condition Min. operating temperature $\rightarrow 25^{\circ}C$ High Temperature CyclingCapacitance change : motion of the smaller1 cycle condition Min. operating temperature $\rightarrow 25^{\circ}C$	Resistance	Whichever is smaller	
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Whichever is smallerWith150% of the rated voltageHigh Temperature ResistanceCapacitance change :within $\pm 12.5\%$ Tan $\delta$ :With150% of the rated voltageResistanceTan $\delta$ :0.125 max IR :Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change :within $\pm 7.5\%$ Tan $\delta$ , IR : initial spec.1 cycle condition Min. operating temperature Max. operating temperature Min. operating temperature Max. operating temperature	Resistance		-
High Temperature ResistanceCapacitance change : 0.125 max IR : 1,000Mohm or 25Mohm × $\mu$ F Whichever is smallerWith 150% of the rated voltage Max. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : max Tan δ, IR : initial spec.within ±7.5% Tan δ, IR : initial spec.I cycle condition Min. operating temperature Max. operating temperature Max. operating temperature Min. operating temperature Min. operating temperature Min. operating temperature Max. operating temperature		IR : 500Mohm or 12.5Mohm × $\mu$ F	
ResistanceTan $\delta$ : 0.125 maxMax. operating temperatureIR: 1,000Mohm or 25Mohm × $\mu$ FMax. operating temperatureVhichever is smaller1000+48/-0hrsTemperatureCapacitance change : within ±7.5%1 cycle conditionCyclingTan $\delta$ , IR : initial spec.1 cycle conditionMax. operating temperature $\rightarrow$ 25°C $\rightarrow$ Max. operating temperature $\rightarrow$ 25°C		Whichever is smaller	
ResistanceTan $\delta$ : 0.125 max IR: 1,000Mohm or 25Mohm × $\mu$ F Whichever is smallerMax. operating temperature 1000+48/-0hrsTemperature CyclingCapacitance change : within ±7.5% Tan $\delta$ , IR : initial spec.1 cycle condition Min. operating temperature Min. operating temperature Max. operating temperature Min. operating temperature Max. operating temperature Min. operating temperature Max. operating temperature Min. operating temperature	High Temperature	Capacitance change : within ±12.5%	With 150% of the rated voltage
IR :1,000Mohm or 25Mohm × $\mu$ F1000+48/-0hrsTemperature CyclingCapacitance change :within ±7.5%1 cycle conditionTan $\delta$ , IR : initial spec.1 cycle conditionMin. operating temperature $\rightarrow$ 25°C $\rightarrow$ Max. operating temperature $\rightarrow$ 25°C	Resistance		-
Whichever is smallerWhichever is smallerTemperature CyclingCapacitance change : within $\pm 7.5\%$ Tan $\delta$ , IR : initial spec.1 cycle condition Min. operating temperature $\rightarrow 25^{\circ}$ C $\rightarrow$ Max. operating temperature $\rightarrow 25^{\circ}$ C		IR : 1,000Mohm or 25Mohm × <i>μ</i> F	
CyclingTan $\delta$ , IR : initial spec.Min. operating temperature $\rightarrow$ $25^{\circ}C$ $\rightarrow$ Max. operating temperature $\rightarrow$ $25^{\circ}C$			
CyclingTan $\delta$ , IR : initial spec.Min. operating temperature $\rightarrow$ $25^{\circ}C$ $\rightarrow$ Max. operating temperature $\rightarrow$ $25^{\circ}C$	Temperature	Capacitance change : within ±7.5%	1 cycle condition
	-		Min. operating temperature $\rightarrow$ 25°C
			$\rightarrow$ 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±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.

- 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.