



# **SPECIFICATION** (Reference sheet)

- Supplier : Samsung electro-mechanics - Samsung P/N : CL32B475KBJSW6E

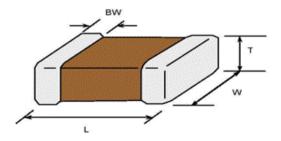
- Product : Multi-layer Ceramic Capacitor - Description : CAP, 4.7 ≠ , 50V, ±10%, X7R, 1210

### A. Samsung Part Number

<u>CL</u> <u>32</u> <u>B</u> <u>475</u> <u>K</u> <u>B</u> <u>J</u> <u>S</u> <u>W</u> <u>6</u> <u>E</u> ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪

① Series ② Size	Samsung Multi-layer Ceramic Capacitor 1210 (inch code) L: 3.20 ± 0.30 mm W: 2.50 ± 0.20 mm		
<ul> <li>③ Dielectric</li> <li>④ Capacitance</li> <li>⑤ Capacitance tolerance</li> <li>⑥ Rated Voltage</li> <li>⑦ Thickness</li> </ul>	X7R 4.7 \mu F ±10 % 50 V 2.50 ± 0.20 mm	<ul> <li>Inner electrode Termination Plating</li> <li>Product</li> <li>Special</li> <li>Packaging</li> </ul>	Ni Soft termination Sn 100% (Pb Free) Industrial (Network,Power,etc) Higher bending strength Embossed Type, 7" reel

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



Samauna D/N	Dimension(mm)			
Samsung P/N	L	W	Т	BW
CL32B475KBJSW6E	3.20 ± 0.30	2.50 ± 0.20	2.50 ± 0.20	0.60 ± 0.30

### C. Samsung Reliablility Test and Judgement Condition

		Judgement	Test condition		
Tan δ (DF)  0.1 max. treated at 150 °C+0/-10 °C for 1 hour and maintained i ambient air for 24±2 hours.  Insulation  Resistance  Whichever is smaller  Appearance  No abnormal exterior appearance  Microscope (×10)  Withstanding  No dielectric breakdown or  Withstanding breakdown  Temperature  Characteristics  (From -55 °C to 125 °C, Capacitance change should be within ±15%)  Adhesive Strength of Termination  Bending Strength  Capacitance change : within ±12.5%  Bending to the limit (3mm) with 1.0mm/sec.  Solderability  More than 75% of terminal surface is to be soldered newly  Resistance to  Capacitance change : within ±7.5%  Solder pot : 270±5 °C, 10±1 sec.  (preheating : 80~120 °C for 10~30 sec.)  Resistance to  Capacitance change : within ±7.5%  Solder pot : 270±5 °C, 10±1 sec.  Soldering Heat  Tan δ, IR : initial spec.  From 10Hz to 55Hz (return : 1min.)  2hours × 3 direction (x, y, z)  Moisture  Resistance change : within ±12.5%  With rated voltage  Resistance voltage  With rated voltage  With rated voltage  Vibration Test  Capacitance change : within ±12.5%  With rated voltage  Resistance  Tan δ : 0.125 max  Vibration ±12.5%  With rated voltage  Vibration +10 °C +0/-10 °C for 10 °C +0/-10 °	Capacitance	Within specified tolerance	1kHz ±10% / 1.0±0.2Vrms		
Resistance       Whichever is smaller       Microscope (x10)         Appearance       No abnormal exterior appearance       Microscope (x10)         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 of Termination       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 (3mm) 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 δ, IR: initial spec.       Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z)         Wibration       Capacitance change: within ±12.5%       With rated voltage         Resistance       Capacitance change: within ±12.5%       With rated voltage         Resistance       Tan δ: 0.125 max	Tan δ (DF)	0.1 max.	*A capacitor prior to measuring the capacitance is heat treated at 150 ℃+0/-10 ℃ for 1hour and maintained in ambient air for 24±2 hours.		
Appearance         No abnormal exterior appearance         Microscope (x10)           Withstanding         No dielectric breakdown or mechanical breakdown         250% of the rated voltage           Temperature         X7R           Characteristics         (From -55℃ to 125℃, Capacitance change should be within ±15%)           Adhesive Strength of Termination         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 (3mm) 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 δ, IR: initial spec.         Amplitude: 1.5mm           Vibration Test         Capacitance change: within ±5%         Amplitude: 1.5mm           From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z)           Moisture         Capacitance change: within ±12.5%         With rated voltage           Resistance         Tan δ: 0.125 max         Within ±12.5%         With rated voltage	Insulation	10,000Mohm or 100Mohm×μF	Rated Voltage 60~120 sec		
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 of Termination       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 (3mm) 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 Soldering Heat       Capacitance change : within ±7.5%       Solder pot : 270±5°C, 10±1sec.         Vibration Test       Capacitance change : within ±5%       Amplitude : 1.5mm         From 10Hz to 55Hz (return : 1min.) 2hours x 3 direction (x, y, z)         Moisture       Capacitance change : within ±12.5%       With rated voltage         Resistance       Tan δ : 0.125 max       Within ±12.5%       With rated voltage	Resistance	Whichever is smaller			
Voltage       mechanical breakdown         Temperature       X7R         Characteristics       (From -55 °C to 125 °C, Capacitance change should be within ±15%)         Adhesive Strength of Termination       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 (3mm) 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 δ, IR : initial spec.       Amplitude : 1.5mm         From 10Hz to 55Hz (return : 1min.)       From 10Hz to 55Hz (return : 1min.)         Zhours × 3 direction (x, y, z)         Moisture       Capacitance change : within ±12.5%       With rated voltage         Resistance       Tan δ : 0.125 max       Within ±12.5%       With rated voltage	Appearance	No abnormal exterior appearance	Microscope (x10)		
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Characteristics       (From -55℃ to 125℃, Capacitance change should be within ±15%)         Adhesive Strength of Termination       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 (3mm) 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 Soldering Heat       Capacitance change : within ±7.5%       Solder pot : 270±5°C, 10±1sec.         Vibration Test       Capacitance change : within ±5%       Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours x 3 direction (x, y, z)         Moisture       Capacitance change : within ±12.5%       With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs	Voltage	mechanical breakdown			
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of Terminationterminal electrodeBending StrengthCapacitance change : within ±12.5%Bending to the limit (3mm) 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 toCapacitance change : within ±7.5%Solder pot : 270±5°C, 10±1sec.Soldering HeatTan δ, IR : initial spec.Amplitude : 1.5mmVibration TestCapacitance change : within ±5%Amplitude : 1.5mmTan δ, IR : initial spec.From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)MoistureCapacitance change : within ±12.5%With rated voltageResistanceTan δ : 0.125 maxWithin ±12.5%With rated voltage	Characteristics	(From -55 ℃ to 125 ℃, Capacitance change	should be within ±15%)		
Bending Strength       Capacitance change : within ±12.5%       Bending to the limit (3mm) 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 δ, IR : initial spec.       Amplitude : 1.5mm         From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)         Moisture       Capacitance change : within ±12.5%       With rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs	Adhesive Strength	No peeling shall be occur on the			
Solderability  More than 75% of terminal surface is to be soldered newly  Resistance to Capacitance change: within $\pm 7.5\%$ Solder pot: $270\pm5^{\circ}\text{C}$ , $10\pm1\text{sec}$ .  Vibration Test  Capacitance change: within $\pm 5\%$ Amplitude: $1.5\text{mm}$ From $10\text{Hz}$ to $55\text{Hz}$ (return: $1\text{min.}$ ) 2hours $\times$ 3 direction (x, y, z)  Moisture  Resistance  Tan $\delta$ : 0.125 max  within $\pm 12.5\%$ With rated voltage $\pm 40\pm2^{\circ}\text{C}$ , $90\sim95\%\text{RH}$ , $500+12/-0\text{hrs}$	of Termination	terminal electrode			
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 δ, IR : initial spec.Within ±7.5% Solder pot : 270±5°C, 10±1sec.Vibration TestCapacitance change : Tan δ, IR : initial spec.Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : Tan δ : 0.125 maxWith rated voltage 40±2°C, 90~95%RH, 500+12/-0hrs	Bending Strength	Capacitance change: within ±12.5%	Bending to the limit (3mm)		
is to be soldered newly $ 245\pm5^{\circ}\mathbb{C}, \ 3\pm0.3\mathrm{sec}. $ $ (\mathrm{preheating}: 80\sim120^{\circ}\mathbb{C} \ \mathrm{for} \ 10\sim30\mathrm{sec}.) $ $ \mathbf{Resistance} \ \mathbf{to} $ $ \mathbf{Soldering} \ \mathbf{Heat} $ $ \mathbf{Tan} \ \delta, \ \mathbf{IR} : \mathrm{initial} \ \mathrm{spec}. $ $ \mathbf{Vibration} \ \mathbf{Test} $ $ \mathbf{Capacitance} \ \mathbf{change} : $ $ \mathbf{within} \ \pm5\% $ $ \mathbf{Amplitude} : 1.5\mathrm{mm} $ $ \mathbf{From} \ 10\mathrm{Hz} \ \mathbf{to} \ 55\mathrm{Hz} \ (\mathrm{return} : 1\mathrm{min}.) $ $ 2\mathrm{hours} \times 3 \ \mathrm{direction} \ (\mathbf{x}, \mathbf{y}, \mathbf{z}) $ $ \mathbf{Moisture} $ $ \mathbf{Resistance} $ $ \mathbf{Capacitance} \ \mathbf{change} : $ $ \mathbf{within} \ \pm12.5\% $ $ \mathbf{With} \ \mathrm{rated} \ \mathrm{voltage} $ $ \mathbf{With} \ \mathrm{rated} \ \mathrm{voltage} $ $ \mathbf{40\pm2^{\circ}\mathbb{C}}, \ 90\sim95\%\mathrm{RH}, \ 500+12/-0\mathrm{hrs} $			with 1.0mm/sec.		
is to be soldered newly $ 245\pm5^{\circ}\mathbb{C}, \ 3\pm0.3\mathrm{sec}. $ $ (\mathrm{preheating}: 80\sim120^{\circ}\mathbb{C} \ \mathrm{for} \ 10\sim30\mathrm{sec}.) $ $ \mathbf{Resistance} \ \mathbf{to} $ $ \mathbf{Soldering} \ \mathbf{Heat} $ $ \mathbf{Tan} \ \delta, \ \mathbf{IR} : \mathrm{initial} \ \mathrm{spec}. $ $ \mathbf{Vibration} \ \mathbf{Test} $ $ \mathbf{Capacitance} \ \mathbf{change} : $ $ \mathbf{within} \ \pm5\% $ $ \mathbf{Amplitude} : 1.5\mathrm{mm} $ $ \mathbf{From} \ 10\mathrm{Hz} \ \mathbf{to} \ 55\mathrm{Hz} \ (\mathrm{return} : 1\mathrm{min}.) $ $ 2\mathrm{hours} \times 3 \ \mathrm{direction} \ (\mathbf{x}, \mathbf{y}, \mathbf{z}) $ $ \mathbf{Moisture} $ $ \mathbf{Resistance} $ $ \mathbf{Capacitance} \ \mathbf{change} : $ $ \mathbf{within} \ \pm12.5\% $ $ \mathbf{With} \ \mathrm{rated} \ \mathrm{voltage} $ $ \mathbf{With} \ \mathrm{rated} \ \mathrm{voltage} $ $ \mathbf{40\pm2^{\circ}\mathbb{C}}, \ 90\sim95\%\mathrm{RH}, \ 500+12/-0\mathrm{hrs} $					
	Solderability	More than 75% of terminal surface	SnAg3.0Cu0.5 solder		
Resistance to Capacitance change : within $\pm 7.5\%$ Solder pot : $270\pm 5^{\circ}$ C, $10\pm 1$ sec.  Vibration Test Capacitance change : within $\pm 5\%$ Amplitude : $1.5$ mm  Tan $\delta$ , IR : initial spec. From $10$ Hz to $55$ Hz (return : $1$ min.) 2hours $\times 3$ direction (x, y, z)  Moisture Capacitance change : within $\pm 12.5\%$ With rated voltage Resistance Tan $\delta$ : $0.125$ max $0.125$ max		is to be soldered newly	245±5°C, 3±0.3sec.		
Soldering HeatTan $\delta$ , IR: initial spec.Amplitude: 1.5mmVibration TestCapacitance change: within $\pm 5\%$ Amplitude: 1.5mmTan $\delta$ , IR: initial spec.From 10Hz to 55Hz (return: 1min.) 2hours $\times$ 3 direction (x, y, z)MoistureCapacitance change: within $\pm 12.5\%$ With rated voltageResistanceTan $\delta$ : 0.125 max40 $\pm$ 2°C, 90~95%RH, 500+12/-0hrs			(preheating : 80~120°C for 10~30sec.)		
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Vibration TestCapacitance change : Tan $\delta$ , IR : initial spec.within $\pm$ 5%Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours $\times$ 3 direction (x, y, z)Moisture ResistanceCapacitance change : Tan $\delta$ : 0.125 maxwithin $\pm$ 12.5% 40 $\pm$ 2°C, 90~95%RH, 500+12/-0hrs	Resistance to	Capacitance change: within ±7.5%	Solder pot : 270±5°C, 10±1sec.		
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	Vibration Test	Capacitance change : within ± 5%	Amplitude: 1.5mm		
MoistureCapacitance change :within ±12.5%With rated voltageResistanceTan δ :0.125 max40±2°C, 90~95%RH, 500+12/-0hrs		Tan δ, IR : initial spec.	From 10Hz to 55Hz (return : 1min.)		
Resistance       Tan δ : 0.125 max       40±2°C, 90~95%RH, 500+12/-0hrs			2hours × 3 direction (x, y, z)		
	Moisture	Capacitance change: within ±12.5%	With rated voltage		
IR : 500Mohm or 12.5Mohm× <i>μ</i> F	Resistance	Tan δ: 0.125 max	40±2°C, 90~95%RH, 500+12/-0hrs		
		IR: 500Mohm or 12.5Mohm× <i>μ</i> F			
Whichever is smaller		Whichever is smaller			
High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage	High Temperature	Capacitance change: within ±12.5%	With 150% of the rated voltage		
Resistance       Tan δ : 0.125 max       Max. operating temperature	Resistance	Tan δ: 0.125 max	Max. operating temperature		
IR: 1,000Mohm or 25Mohm×# 1,000+48/-0hrs		IR : 1,000Mohm or 25Mohm× <i>μ</i> F	1,000+48/-0hrs		
Whichever is smaller		Whichever is smaller			
Temperature Capacitance change: within ±7.5% 1 cycle condition	Temperature	Capacitance change: within ±7.5%	1 cycle condition		
Cycling Tan δ, IR : initial spec. Min. operating temperature → 25°C	Cycling	Tan δ, IR : initial spec.	Min. operating temperature → 25°C		
→ Max. operating temperature → 25°C			→ Max. operating temperature → 25°C		
5 cycle test			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±5 °C, 30sec. )



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
- 4 Military equipment
- ⑤ Disaster prevention/crime prevention equipment
- 6 Power plant control equipment
- Atomic energy-related equipment
- Undersea equipment
- Traffic signal equipment
- Data-processing equipment
- ## Electric heating apparatus, burning equipment
- Safety equipment
- ® Any other applications with the same as or similar complexity or reliability to the applications