



# **SPECIFICATION**

- · Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor
- · Samsung P/N :
- CL03A103KP3NNNC

(Reference sheet)

- · Description :
- CAP, 10nF, 10V, ±10%, X5R, 0201

A. Samsung Part Number

		<u>CL</u> ①	<u>03</u> ②	<mark>4</mark> 3	<u>103</u> ④	<u>K</u> 5	<u>Р</u> 6	<u>3</u> 7	<u>N</u> 8	<u>N</u> 9	<u>N</u> 10	<mark>C</mark> 11
1	Series	Samsung Multi-layer Ceramic Capacitor										
2	Size	0201 (inch c	ode)		L: (	0.60	± 0.03	mm			W:	$0.30\pm0.03~\text{mm}$
3	Dielectric	X5R				8	Inner	elect	rode			Ni
4	Capacitance	10 nF					Term	inatio	n			Cu
5	Capacitance	±10 %					Platir	ıg				Sn 100% (Pb Free)
	tolerance					9	Prod	uct				Normal
6	Rated Voltage	10 V				10	Spec	ial				Reserved for future use
1	Thickness	$0.30 \pm 0.03$ mm				1	Packa	aging				Cardboard Type, 7" reel

## **B. Structure & Dimension**



Samsung P/N	Dimension(mm)							
Samsung F/N	L	W	Т	BW				
CL03A103KP3NNNC	0.60 ± 0.03	0.30 ± 0.03	0.30 ± 0.03	0.15 ± 0.05				

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

		Judgement	Test condition				
Tan δ (DF) 0.05 max. treated at 150°C+0/-10°C for 1 hour and maintained ambient air for 24±2 hours.   Insulation 10.000Mohm or 100Mohm×μ <sup>E</sup> Rated Voltage 60~120 sec.   Resistance Whichever is smaller Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or 250% of the rated voltage Characteristics   Characteristics (From-55°C to 85°C, Capacitance change should be within ±15%) Adhesive Strength   Adhesive Strength No peeling shall be occur on the terminal electrode 200g·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 SnAg3.0Cu0.5 solder   Solderability More than 75% of terminal surface is to be solder a newly Solder pot : 270±5°C, 10±1sec.   Vibration Test Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec.   Vibration Test Capacitance change : within ±12.5% Amplitude : 1.5mm   From 10Hz to 55Hz (return : 1min.) 2hours × 105 ± 0.075 max Prove 10Hz voltage   Moisture Capacitance change : within ±12.5% Amplitude : 1.5mm   Resistance	Capacitance	Within specified tolerance	1 <sup>kHz</sup> ±10% / 1.0±0.2Vrms				
Resistance Whichever is smaller   Appearance No abnormal exterior appearance Microscope (×10)   Withstanding No dielectric breakdown or 250% of the rated voltage   Voltage mechanical breakdown 250% of the rated voltage   Temperature X5R 250% of the rated voltage   Characteristics (From-55°C to 85°C, Capacitance change should be within ±15%)   Adhesive Strength No peeling shall be occur on the terminal electrode 200g-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 SnAg3.0Cu.05 solder   245±5°C, 3±0.3sec. (preheating : 80~120°C for 10~30sec.) Anglitude : 1.5mm   Resistance to Capacitance change : within ±7.5% Solder pot : 270±5°C, 10±1sec.   Soldering Heat Tan 5, IR : initial spec. Amplitude : 1.5mm   Vibration Test Capacitance change : within ±12.5% Michever is smaller   Moisture Capacitance change : within ±12.5% With rated voltage   Resistance Tan 5 : 0.075 max Whichever is smaller With 200% of the rated voltage   High Temperature Capacitance ch	Tan δ (DF)	0.05 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 voltageYoltagemechanical breakdown250% of the rated voltageTemperatureX5R Characteristics(From-55°C to 85°C, Capacitance change should be within ±15%)Adhesive StrengthNo peeling shall be occur on the terminal electrode200g·f, for 10±1 sec.Bending StrengthCapacitance change : 	Insulation	10,000Mohm or 100Mohm× <i>μ</i> F	Rated Voltage 60~120 sec.				
Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage   Temperature X5R   Characteristics (From-55 °C to 85 °C, Capacitance change should be within ±15%)   Adhesive Strength of Termination No peeling shall be occur on the terminal electrode 200g 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 (return : 1min.) 2hours × 3 direction (x, y, z)   Moisture Capacitance change : within ±12.5% Tan ō : 0.075 max IR : 500Mohm or 25Mohm × μ <sup>c</sup> Whichever is smaller With rated voltage   High Temperature Capacitance change : within ±12.5% Whichever is smaller With 200% of the rated voltage   High Temperature Capacitance change : within ±12.5% Whichever is smaller With 200% of the rated voltage	Resistance	Whichever is smaller					
Voltagemechanical breakdownTemperature CharacteristicsX5R (From-55 °C to 85 °C, Capacitance change should be within ±15%)Adhesive Strength of TerminationNo peeling shall be occur on the terminal electrode200g f, for 10±1 sec.Bending Strength of TerminationCapacitance change : terminal electrodewithin ±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 Vibration TestCapacitance change : capacitance change : within ±7.5%Solder pot : 270±5°C, 10±1sec.Vibration TestCapacitance change : capacitance change : within ±12.5%Amplitude : 1.5mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : tan 5 : 0.075 max IR : SolMohm or 25Mohm × $\mu^{F}$ Whichever is smallerWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrsHigh Temperature ResistanceCapacitance change : to : to : there within ±12.5%With 200% of the rated voltage Max. operating temperature 1000+48/-0hrs	Appearance	No abnormal exterior appearance	Microscope (×10)				
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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 $\pm 5\%$ Tan $\delta$ , IR : initial spec.Amplitude : $1.5$ mm From 10Hz to 55Hz (return : 1min.) 2hours × 3 direction (x, y, z)Moisture ResistanceCapacitance change : Tan $\delta$ : $0.075$ max IR : $1 \equiv 500$ Mohm or 25Mohm × $\mu$ F Whichever is smallerWith rated voltage $40\pm2^{\circ}$ C, $90\sim95\%$ RH, $500+12/-0$ hrsHigh Temperature ResistanceCapacitance change : $1 \equiv 0.075$ max IR : $1,000$ Mohm or 50Mohm × $\mu$ F Whichever is smallerWith $200\%$ of the rated voltage Max. operating temperature $1000+48/-0$ hrs		is to be soldered newly	245±5℃, 3±0.3sec.				
			(preheating : 80~120℃ for 10~30sec.)				
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High Temperature Capacitance change : within ±12.5% With 200% of the rated voltage   Resistance Tan δ : 0.075 max Max. operating temperature   IR : 1,000Mohm or 50Mohm × μF 1000+48/-0hrs   Whichever is smaller Whichever is smaller	Resistance	Tan δ : 0.075 max	40±2℃, 90~95%RH, 500+12/-0hrs				
High Temperature ResistanceCapacitance change : 0.075 max IR : Whichever is smallerwithin $\pm 12.5\%$ Max. operating temperature 1000+48/-0hrsWith 200% of the rated voltage Max. operating temperature 1000+48/-0hrs		IR : 500Mohm or 25Mohm × $\mu$ F					
Resistance Tan δ : 0.075 max Max. operating temperature   IR : 1,000Mohm or 50Mohm × μF 1000+48/-0hrs   Whichever is smaller 0.000 + 48/-0hrs 1000 + 48/-0hrs		Whichever is smaller					
Resistance Tan δ : 0.075 max Max. operating temperature   IR : 1,000Mohm or 50Mohm × μF 1000+48/-0hrs   Whichever is smaller 1000+48/-0hrs	High Temperature	Capacitance change : within ±12.5%	With 200% of the rated voltage				
Whichever is smaller		Tan δ : 0.075 max	-				
		IR : 1,000Mohm or 50Mohm × μF	1000+48/-0hrs				
Temperature   Capacitance change :   within ±7.5%   1 cycle condition		Whichever is smaller					
	Temperature	Capacitance change : within ±7.5%	1 cycle condition				
<b>Cycling</b> Tan $\delta$ , IR : initial spec. Min. operating temperature $\rightarrow 25^{\circ}$ C	-	Tan δ, IR : initial spec.	-				
$\rightarrow$ Max. 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+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.