



SPECIFICATION

(Reference sheet)

· Supplier : Samsung electro-mechanics · Samsung P/N : CL10A226MQ8NRNE

· Product : Multi-layer Ceramic Capacitor · Description : CAP, 22uF, 6.3V, ±20%, X5R, 0603

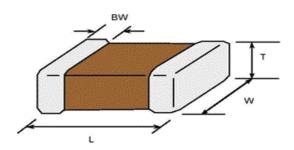
A. Samsung Part Number

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1	Series	Samsung Multi-layer Ceramic Capacitor					
2	Size	0603 (inch code)	L: 1.60	± 0.20 mm	W:	$0.80 \pm 0.20 \text{ mm}$	
3	Dielectric	X5R	8	Inner electrode		Ni	
4	Capacitance	22 uF		Termination		Cu	
(5)	Capacitance	±20 %		Plating		Sn 100% (Pb Free)	
	tolerance		9	Product		Size control code	
6	Rated Voltage	6.3 V	10	Special		Reserved for future use	
7	Thickness	$0.80 \pm 0.20 \text{ mm}$	11	Packaging		Embossed Type, 7" reel	

B. Structure & Dimension



Samsung P/N	Dimension(mm)					
Samsung F/N	L	W	Т	BW		
CL10A226MQ8NRNE	1.60 ± 0.20	0.80 ± 0.20	0.80 ± 0.20	0.30 ± 0.20		

C. Samsung Reliablility Test and Judgement Condition

Tan δ (DF) 0.1 max. treated at 150 ℃ +0/-10 ℃ for 1 hour and maintained ambient air for 24±2 hours. Insulation Resistance Whichever is smaller Appearance No abnormal exterior appearance Withstanding Voltage Temperature Characteristics (From-55 ℃ to 85 ℃, Capacitance change should be within ±15%) Adhesive Strength of Termination Bending Strength of Termination Bending Strength Oapacitance 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 Appearance to Capacitance change: within ±7.5% Soldering Heat Vibration Test Capacitance change: within ±5% Tan δ, IR: initial spec. Vibration Test Capacitance change: within ±12.5% Moisture Capacitance change: within ±12.5% Tan δ: 0.25 max IR: 500Mohm or 8.8Mohm × μF 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		Judgement	Test condition		
Tan δ (DF) 0.1 max. treated at 150 ℃ +0/-10 ℃ for 1 hour and maintained ambient air for 24±2 hours. Insulation 10,000Mohm or 50Mohm×μF Resistance Whichever is smaller Appearance No abnormal exterior appearance Withstanding Voltage No dielectric breakdown or mechanical breakdown Temperature Characteristics (From-55 ℃ to 85 ℃, Capacitance change should be within ±15%) Adhesive Strength of Termination 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 Capacitance change: within ±7.5% Solder pot: 270±5 ℃, 10±1sec. From 10Hz to 55Hz (return: 1min.) Zhours × 3 direction (x, y, z) With nated voltage High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage ### Voltage 60~120 sec. Rated Voltage 60~120 sec. ### Rated Voltage 60~120 sec. ### Poor Voltage 60~1	Capacitance	Within specified tolerance	120Hz ±20% / 0.5±0.1Vrms		
Resistance Whichever is smaller Appearance No abnormal exterior appearance Microscope (×10) Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage Temperature X5R Characteristics (From-55℃ to 85℃, 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 (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) Wibration Test Capacitance change : within ±12.5% With rated voltage Resistance Tan ō : 0.25 max IR : 500Mohm or 8.8Mohm × μF Whichever is smaller With 150% of the rated voltage High Temperature Capacitance change : within ±12.5% With 150% of the rated voltage	Tan δ (DF)	0.1 max.	*A capacitor prior to measuring the capacitance is heat treated at $150^{\circ}\text{C}+0/-10^{\circ}\text{C}$ for 1 hour and maintained in ambient air for 24±2 hours.		
Appearance No abnormal exterior appearance Microscope (×10) Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage Temperature X5R Characteristics (From-55℃ to 85℃, 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 (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 δ, IR: initial spec. 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: 0.25 max IR: 500Mohm or 8.8Mohm × μF Whichever is smaller High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage	Insulation	10,000Mohm or 50Mohm×μF	Rated Voltage 60~120 sec.		
Withstanding No dielectric breakdown or mechanical breakdown 250% of the rated voltage Temperature Characteristics X5R Characteristics (From-55℃ to 85℃, 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 (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 δ, IR: initial spec. Amplitude: 1.5mm From 10Hz to 55Hz (return: 1min.) 2hours × 3 direction (x, y, z) Wibration Test Capacitance change: within ±12.5% With rated voltage Resistance Tan δ: 0.25 max IR: 500Mohm or 8.8Mohm × μF Whichever is smaller With 150% of the rated voltage High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage	Resistance	Whichever is smaller			
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	Solderability	More than 75% of terminal surface	SnAg3.0Cu0.5 solder		
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IR: 500Mohm or 8.8Mohm × μ F Whichever is smaller High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage	Moisture	Capacitance change : within ±12.5%	With rated voltage		
Whichever is smaller High Temperature Capacitance change: within ±12.5% With 150% of the rated voltage	Resistance	Tan δ : 0.25 max	40±2°C, 90~95%RH, 500+12/-0hrs		
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Resistance Tan δ : 0.25 max Max operating temperature	High Temperature	Capacitance change : within ±12.5%	With 150% of the rated voltage		
1 Tan 6 . 6.26 max max operating temperature	Resistance	Tan δ : 0.25 max	Max. operating temperature		
IR: 1,000Mohm or 17.7Mohm × μ F 1,000+48/-0hrs Whichever is smaller			1,000+48/-0hrs		
Temperature Capacitance change: within ±10% 1 cycle condition	Temperature	Capacitance change : within ±10%	1 cycle condition		
Cycling Tan δ, IR : initial spec. Min. operating temperature \rightarrow 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		

^{**} 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.

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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