

# Specification of Automotive MLCC

- Supplier : Samsung electro-mechanics
- Product : Multi-layer Ceramic Capacitor

- Samsung P/N : **CL10C330JB81PNC**
- Description : **CAP, 33pF, 50V, ±5%, COG, 0603**
- AEC-Q 200 Specified

## A. Samsung Part Number

**CL**   **10**   **C**   **330**   **J**   **B**   **8**   **1**   **P**   **N**   **C**  
 ①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧   ⑨   ⑩   ⑪

① Series	Samsung Multi-layer Ceramic Capacitor									
② Size	0603 (inch code)		L: 1.6 ± 0.1 mm		W: 0.8 ± 0.1 mm					
③ Dielectric	C0G		⑧ Inner electrode		Ni					
④ Capacitance	33 pF		Termination		Cu					
⑤ Capacitance tolerance	±5 %		Plating		Sn 100% (Pb Free)					
⑥ Rated Voltage	50 V		⑨ Product		Automotive					
⑦ Thickness	0.8 ± 0.1 mm		⑩ Grade code		Standard					
			⑪ Packaging		Cardboard Type, 7" reel(4,000ea)					

## B. Reliability Test and Judgement condition

	Performance	Test condition
<b>High Temperature Exposure</b>	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q : 1000 min IR : More than 10,000MΩ or 500MΩ×μF Whichever is Smaller	Unpowered, 1000hrs@T=150℃ Measurement at 24±2hrs after test conclusion
<b>Temperature Cycling</b>	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q : 1000 min IR : More than 10,000MΩ or 500MΩ×μF Whichever is Smaller	1000Cycles Measurement at 24±2hrs after test conclusion 1 cycle condition : -55+0/-3℃ (15±3min) -> Room Temp(1min.) -> 125+3/-0℃ (15±3min) -> Room Temp(1min.)
<b>Destructive Physical Analysis</b>	No Defects or abnormalities	Per EIA 469
<b>Moisture Resistance</b>	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q : 350 min IR : More than 10,000MΩ or 500MΩ×μF Whichever is Smaller	10Cycles, t=24hrs/cycle Heat (25~65℃) and humidity (80~98%), Unpowered measurement at 24±2hrs after test conclusion
<b>Humidity Bias</b>	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q : 200 min IR : More than 500MΩ or 25MΩ×μF Whichever is Smaller	1000hrs 85℃/85%RH, Rated Voltate and 1.3~1.5V, Add 100kohm resistor Measurement at 24±2hrs after test conclusion The charge/discharge current is less than 50mA.
<b>High Temperature Operating Life</b>	Appearance : No abnormal exterior appearance Capacitance Change : within ±3.0% or ±0.3pF whichever is larger Q : 350 min IR : More than 10,000MΩ or 500MΩ×μF Whichever is Smaller	1000hrs @ TA=125℃, 200% Rated Voltage, Measurement at 24±2hrs after test conclusion The charge/discharge current is less than 50mA.

	Performance	Test condition								
External Visual	No abnormal exterior appearance	Microscope (´10)								
Physical Dimensions	Within the specified dimensions	Using The calipers								
Mechanical Shock	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q, IR : initial spec.	Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks) <table><tr><td>Peakvalue</td><td>Duration</td><td>Wave</td><td>Velocity</td></tr><tr><td>1,500G</td><td>0.5ms</td><td>Half sine</td><td>4.7m/sec.</td></tr></table>	Peakvalue	Duration	Wave	Velocity	1,500G	0.5ms	Half sine	4.7m/sec.
Peakvalue	Duration	Wave	Velocity							
1,500G	0.5ms	Half sine	4.7m/sec.							
Vibration	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q, IR : initial spec.	5g's for 20min., 12cycles each of 3 orientations, Use 8"x5" PCB 0.031" Thick 7 secure points on one long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10~2000Hz .								
Resistance to Solder Heat	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q, IR : initial spec.	Solder pot : 260±5℃, 10±1sec.								
Thermal Shock	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q, IR : initial spec.	-55℃/+125℃ . Note: Number of cycles required-300, Maximum transfer time-20 sec, Dwell time-15min. Air-Air								
ESD	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger Q, IR : initial spec.	AEC-Q200-002								
Solderability	95% of the terminations is to be soldered evenly and continuously	a) Preheat at 155℃ for 4 hours, Immerse in solder for 5s at 245±5℃ b) Steam aging for 8 hours, Immerse in solder for 5s at 245±5℃ c) Steam aging for 8 hours, Immerse in solder for 120s at 260±5℃ solder : a solution ethanol and rosin								
Electrical Characterization	Capacitance : Within specified tolerance Q :     1000     max. IR(25℃) : More than 100,000MΩ or 1,000MΩ×μF IR(125℃) : More than10,000MΩ or 100MΩ×μF Whichever is Smaller Dielectric Strength	The Capacitance /Q should be measured at 25℃ , 1MHz±10%, 0.5~5Vrms I.R. should be measured with a DC voltage not exceeding Rated Voltage @25℃ , @125℃ for 60~120 sec. Dielectric Strength : 250% of the rated voltage for 1~5 seconds								
Board Flex	Appearance : No abnormal exterior appearance Capacitance Change : within ±5.0% or ±0.5pF whichever is larger	Bending to the limit (3mm) for 5 seconds								
Terminal Strength(SMD)	Appearance : No abnormal exterior appearance Capacitance Change : within ±2.5% or ±0.25pF whichever is larger	10N, for 60±1 sec.								
Beam Load	Destruction value should not be exceed Chip Length < 2.5mm a) Chip Thickness > 0.5mm : 20N b) Chip Thickness ≤ 0.5mm : 8N	Beam speed 0.5±0.05mm/sec								
Temperature Characteristics	C0G (From -55℃ to 125℃ , Capacitance change should be within ±30PPM/℃)									

### C. Recommended Soldering method :

Reflow ( Reflow Peak Temperature : 260+0/-5℃, 10sec. Max )  
Meet IPC/JEDEC J-STD-020 D Standard

\* For the more detail Specification, Please refer to the Samsung MLCC catalogue.