

Specification of Automotive MLCC

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

- Samsung P/N : **CL10C471JB81PNC**
- Description : **CAP, 470pF, 50V, ±5%, COG, 0603**
- AEC-Q 200 Specified

A. Samsung Part Number

CL **10** **C** **471** **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	470 pF		Termination	Cu						
⑤	Capacitance tolerance	±5 %		Plating	Sn 100% (Pb Free)						
			⑨	Product	Automotive						
⑥	Rated Voltage	50 V	⑩	Grade code	Standard						
⑦	Thickness	0.8 ± 0.1 mm	⑪	Packaging	Cardboard Type, 7" reel						

B. Reliability Test and Judgement condition

	Performance	Test condition
High Temperature Exposure	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 °C Measurement at 24±2hrs after test conclusion
Temperature Cycling	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 °C (15±3min) -> Room Temp(1min.) -> 125+3/-0 °C (15±3min) -> Room Temp(1min.)
Destructive Physical Analysis	No Defects or abnormalities	Per EIA 469
Moisture Resistance	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 °C) and humidity (80~98%), Unpowered measurement at 24±2hrs after test conclusion
Humidity Bias	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 °C/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.
High Temperature Operating Life	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 °C, 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"×5" 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 °C, 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 °C/+125 °C . 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 °C for 4 hours, Immerse in solder for 5s at 245±5 °C b) Steam aging for 8 hours, Immerse in solder for 5s at 245±5 °C c) Steam aging for 8 hours, Immerse in solder for 120s at 260±5 °C solder : a solution ethanol and rosin											
Electrical Characterization	Capacitance : Within specified tolerance Q : 1000 max. IR(25 °C) : More than 100,000MΩ or 1,000MΩ×μF IR(125 °C) : More than10,000MΩ or 100MΩ×μF Whichver is Smaller Dielectric Strength	The Capacitance /Q should be measured at 25 °C , 1MHz±10%, 0.5~5Vrms I.R. should be measured with a DC voltage not exceeding Rated Voltage @25 °C, @125 °C 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 Characterisitcs	C0G (From -55 °C to 125 °C, Capacitance change should be within ±30PPM/°C)												

C. Recommended Soldering method :

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

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