

Specification of Automotive MLCC

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

- Samsung P/N : **CL10C391JB81PNC**
- Description : **CAP, 390pF, 50V, ±5%, C0G, 0603**
- AEC-Q 200 Specified

A. Samsung Part Number

CL **10** **C** **391** **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	390 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(4,000ea)			

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℃ 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℃(15±3min) -> Room Temp(1min.) -> 125+3/-0℃(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℃) 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℃/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℃, 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	Visual inspection								
Physical Dimensions	Within the specified dimensions	Using The calipers								
Mechanical Shock	Appearance : No abnormal exterior appearance Capacitance Change : within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ 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 $\pm 2.5\%$ or $\pm 0.25\text{pF}$ 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 $\pm 2.5\%$ or $\pm 0.25\text{pF}$ whichever is larger Q, IR : initial spec.	Solder pot : $260\pm 5^\circ\text{C}$, 10 ± 1 sec.								
Thermal Shock	Appearance : No abnormal exterior appearance Capacitance Change : within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ whichever is larger Q, IR : initial spec.	$-55^\circ\text{C}/+125^\circ\text{C}$. 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 $\pm 2.5\%$ or $\pm 0.25\text{pF}$ 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 $245\pm 5^\circ\text{C}$ b) Steam aging for 8 hours, Immerse in solder for 5s at $245\pm 5^\circ\text{C}$ c) Steam aging for 8 hours, Immerse in solder for 120s at $260\pm 5^\circ\text{C}$ solder : a solution ethanol and rosin								
Electrical Characterization	Capacitance : Within specified tolerance Q : 1000 max. IR(25°C) : More than 100,000M Ω or 1,000M $\Omega \times \mu\text{F}$ IR(125°C) : More than 10,000M Ω or 100M $\Omega \times \mu\text{F}$ Whichever is Smaller Dielectric Strength	The Capacitance /Q should be measured at 25°C , 1MHz $\pm 10\%$, 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 $\pm 5.0\%$ or $\pm 0.5\text{pF}$ whichever is larger	Bending to the limit (3mm) for 5 seconds								
Terminal Strength(SMD)	Appearance : No abnormal exterior appearance Capacitance Change : within $\pm 2.5\%$ or $\pm 0.25\text{pF}$ 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 \leq 0.5mm : 8N	Beam speed 0.5 \pm 0.05mm/sec								
Temperature Characteristics	C0G (From -55°C to 125°C , Capacitance change should be within $\pm 30\text{PPM}/^\circ\text{C}$)									

C. Recommended Soldering method :

Reflow (Reflow Peak Temperature : $260+0/-5^\circ\text{C}$, 10sec. Max)

Meet IPC/JEDEC J-STD-020 D Standard

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