SAMSUNG ELECTRO-MECHANICS

Specification of Automotive MLCC

- **Supplier : Samsung electro-mechanics**
- **Product : Multi-layer Ceramic Capacitor**
- **Samsung P/N : CL21B103KC65PNC**
- **Description : CAP, 10㎋, 100V, ±10%, X7R, 0805**
- **AEC-Q 200 Specified**

A. Samsung Part Number

CL	21	B	103	K	C	6	5	P	N	C
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪

①	**Series**	Samsung Multi-layer Ceramic Capacitor			
②	**Size**	0805 (inch code)	L: 2.0 ± 0.1 mm	W: 1.25 ± 0.1 mm	
③	**Dielectric**	X7R	⑧	**Inner electrode**	Ni , Open mode
④	**Capacitance**	10 ㎋		**Termination**	Cu , Ag-epoxy
⑤	**Capacitance tolerance**	±10 %		**Plating**	Sn 100% (Pb Free)
			⑨	**Product**	Automotive
⑥	**Rated Voltage**	100 V	⑩	**Grade code**	Standard
⑦	**Thickness**	0.6 ± 0.1 mm	⑪	**Packaging**	Cardboard Type, 7" reel

B. Reliablility Test and Judgement condition

	Performance	Test condition
High Temperature Exposure	Appearance : No abnormal exterior appearance Capacitance Change : Within ±10% Tan δ : 0.03 max IR : More than 10,000㏁ or 500㏁×㎌ Whichever is Smaller	Unpowered, 1000hrs@T=150℃ Measurement at 24±2hrs after test conclusion
Temperature Cycling	Appearance : No abnormal exterior appearance Capacitance Change : Within ±10% Tan δ : 0.03 max IR : More than 10,000㏁ or 500㏁×㎌ 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 ±12.5% Tan δ : 0.03 max IR : More than 10,000㏁ or 500㏁×㎌ 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 ±12.5% Tan δ : 0.035 max IR : More than 500㏁ or 25㏁×㎌ 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 ±12.5% Tan δ : 0.035 max IR : More than 1000㏁ or 50㏁×㎌ Whichever is Smaller	1000hrs @ TA=125℃, 200% Rated Voltage, Measurement at 24±2hrs after test conclusion The charge/discharge current is less than 50mA.

<table>
<tr><th></th><th>Performance</th><th>Test condition</th></tr>
<tr><td>External Visual</td><td>No abnormal exterior appearance</td><td>Microscope (´10)</td></tr>
<tr><td>Physical Dimensions</td><td>Within the specified dimensions</td><td>Using The calipers</td></tr>
<tr><td>Mechanical Shock</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%
Tan δ, IR : initial spec.</td><td>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></td></tr>
<tr><td>Vibration</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%
Tan δ, IR : initial spec.</td><td>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 10~2000㎐.</td></tr>
<tr><td>Resistance to Solder Heat</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%
Tan δ, IR : initial spec.</td><td>Solder pot : 260±5℃, 10±1sec.</td></tr>
<tr><td>Thermal Shock</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%
Tan δ, IR : initial spec.</td><td>-55℃/+125℃.
Note: Number of cycles required-300,
Maximum transfer time-20 sec, Dwell time-15min. Air-Air</td></tr>
<tr><td>ESD</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%
Tan δ, IR : initial spec.</td><td>AEC-Q200-002</td></tr>
<tr><td>Solderability</td><td>95% of the terminations is to be soldered evenly and continuously</td><td>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</td></tr>
<tr><td>Electrical Characterization</td><td>Capacitance : Within specified tolerance
Tan δ (DF) : 0.025 max.
IR(25℃) : More than 10,000㏁ or 500㏁×㎌
IR(125℃) : More than1,000㏁ or 10㏁×㎌
Whichever is Smaller
Dielectric Strength</td><td>The Capacitance /D.F. should be measured at 25℃,
1㎑±10%, 1.0±0.2Vrms
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</td></tr>
<tr><td>Board Flex</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%</td><td>Bending to the limit (2㎜) for 5 seconds</td></tr>
<tr><td>Terminal Strength(SMD)</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±10%</td><td>18N, for 60±1 sec.</td></tr>
<tr><td>Beam Load</td><td>Destruction value should not be exceed
Chip Length < 2.5㎜
a) Chip Thickness > 0.5㎜ : 20N
b) Chip Thickness ≤ 0.5㎜ : 8N</td><td>Beam speed
0.5±0.05㎜/sec</td></tr>
<tr><td>Temperature Characterisitcs</td><td colspan="2">X7R
(From -55℃ to 125℃, Capacitance change shoud be within ±15%)</td></tr>
</table>

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.