SAMSUNG ELECTRO-MECHANICS

Specification of Automotive MLCC (Reference sheet)

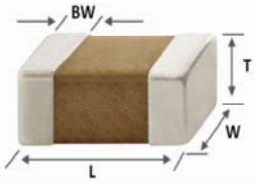
RoHS+Halogen Compliant ecoparts

● **Supplier : Samsung Electro-Mechanics**
● **Product : Multi-layer Ceramic Capacitor**

● **Samsung P/N : CL05B104KB54PNC**
● **Description : CAP, 100㎋, 50V, ± 10%, X7R, 0402**
● **AEC-Q200 Qualified**

A. Dimension

● **Dimension**



Size	0402 inch
L	1.00±0.05 mm
W	0.50±0.05 mm
T	0.50±0.05 mm
BW	0.25±0.10 mm

B. Samsung Part Number

CL	05	B	104	K	B	5	4	P	N	C
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪

① **Series**	Samsung Multi-layer Ceramic Capacitor		
② **Size**	0402 (inch code)	L : 1.00±0.05 mm	W : 0.50±0.05 mm
③ **Dielectric**	X7R	⑧ **Inner electrode**	Ni
④ **Capacitance**	100 ㎋	**Termination**	Metal-Epoxy
⑤ **Capacitance tolerance**	± 10%	**Plating**	Sn 100% (Pb Free)
		⑨ **Product**	Automotive
⑥ **Rated Voltage**	50 V	⑩ **Special code**	Normal
⑦ **Thickness**	0.50±0.05 mm	⑪ **Packaging**	Cardboard Type, 7" Reel

C. Reliability Test and Judgement condition

Test items	Performance	Test condition
High Temperature Exposure	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ : 0.2 max. IR More than 10,000 ㏁ or 50 ㏁×㎌ Whichever is smaller	Unpowered, 1,000hrs @ Max. temperature Measurement at 24±2hrs after test conclusion Initial Measurement 2* Final Measurement 3*
Temperature Cycling	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ : 0.2 max. IR More than 10,000 ㏁ or 50 ㏁×㎌ Whichever is smaller	1,000Cycles Initial Measurement 2* Final Measurement 3* Measurement at 24±2hrs after test conclusion 1 cycle condition : -55+0/-3℃(30±3min) → Room Temp. (1min) → 125+3/-0℃(30±3min) → Room Temp. (1min)
Destructive Physical Analysis	No Defects or abnormalities	Per EIA 469
Humidity Bias	Appearance : No abnormal exterior appearance Capacitance Change Within ±12.5 % Tan δ : 0.2 max. IR More than 500 ㏁ or 5 ㏁×㎌ Whichever is smaller	1,000hrs 85℃/85%RH, Rated Voltage and 1.3~1.5V, Add 100kohm resistor Initial Measurement 2* Final Measurement 4* 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 : 0.2 max. IR More than 1,000 ㏁ or 5 ㏁×㎌ Whichever is smaller	1,000hrs @ 125℃, 150% Rated Voltage, Initial Measurement 2* Final Measurement 4* 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 (X10)
Physical Dimension	Within the specified dimensions	Using The calipers
Mechanical Shock	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ, IR : Initial spec.	Three shocks in each direction should be applied along 3 mutually perpendicular axes of the test specimen (18 shocks) Peak value: 1,500G; Duration: 0.5ms; Wave: Half sine; Velocity: 4.7m/sec Initial Measurement 2* Final Measurement 5*
Vibration	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ, 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 10~2,000㎐. Initial Measurement 2* Final Measurement 5*
Resistance to Solder Heat	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ, IR : Initial spec.	preheating : 150℃ for 60~120 sec. Solder pot : 260±5℃, 10±1sec. Initial Measurement 2* Final Measurement 3*
ESD	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 % Tan δ, IR : Initial spec.	AEC-Q200-002 or ISO/DIS10605 Initial Measurement 2* Final Measurement 4*
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 Tan δ : 0.1 max. IR(25℃) : More than 1,0000 ㏁ or 50 ㏁×㎌ Whichever is smaller IR(125℃) More than 1,000 ㏁ or 5 ㏁×㎌ Whichever is smaller Dielectric Strength	*A capacitor prior to measuring the capacitance is heat treated at 150 +0/-10℃ for 1hour and maintained in ambient air for 24±2 hours The Capacitance / D.F. should be measured at 25℃, 1 ㎑ ± 10%, 1 ± 0.2 Vrms 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 ±10 %	Bending to the limit, 2 ㎜ for 60 seconds 1* Initial Measurement 2* Final Measurement 5*
Terminal Strength(SMD)	Appearance : No abnormal exterior appearance Capacitance Change Within ±10 %	2 N, for 60 sec. Initial Measurement 2* Final Measurement 5*
Beam Load	Destruction value should be exceed 8 N	Beam speed : 0.5±0.05 ㎜/sec
Temperature Characteristics	X7R From -55 ℃ to 125 ℃, Capacitance change should be within ±15%	

D. Recommended Soldering method :

Reflow (Reflow Peak Temperature : 260 +0/-5℃, 30sec.), Meet IPC/JEDEC J-STD-020 D Standard

*1 : The figure indicates typical specification. Please refer to individual specifications.

*2 : Initial measurement : Perform a heat treatment at 150 +0/-10℃ for one hour after soldering process.
and then let sit for 24±2 hours at room temperature. Perform the initial measurement.

*3 : Final measurement : Let sit for 24±2 hours at room temperature after test conclusion, then measure.

*4 : Final measurement : Perform a heat treatment at 150 +0/-10℃ for one hour after soldering process.
and then let sit for 24±2 hours at room temperature. Perform the initial measurement.

*5 : Final measurement : Let measure within 24 hours at room temperature after test conclusion.

⚠ 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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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.*

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② *Medical equipment*
③ *Military equipment*
④ *Disaster prevention/crime prevention equipment*
⑤ *Power plant control equipment*
⑥ *Atomic energy-related equipment*
⑦ *Undersea equipment*
⑧ *Traffic signal equipment*
⑨ *Data-processing equipment*
⑩ *Electric heating apparatus, burning equipment*
⑪ *Safety equipment*
⑫ *Any other applications with the same as or similar complexity or reliability to the applications*