

Specification of Automotive MLCC (Reference sheet)

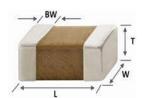


● Supplier : Samsung Electro-Mechanics ● Samsung P/N : CL21B473KBCWPNC

● AEC-Q200 Qualified

A. Dimension

Dimension



Size	0805 inch
L	2.00±0.10 mm
W	1.25±0.10 mm
Т	0.85±0.10 mm
BW	0.50+0.20/-0.30 mm

B. Samsung Part Number

<u>CL</u>	<u>21</u>	<u>B</u>	<u>473</u>	<u>K</u>	<u>B</u>	<u>C</u>	<u>w</u>	<u>P</u>	<u>N</u>	<u>C</u>
1	2	3	4	(5)	⑥	①	8	9	10	11

① Series	Samsung Multi-layer Ceramic Capacitor		
② Size	0805 (inch code)	L: 2.00±0.10 mm	W :1.25±0.10 mm
3 Dielectric	X7R	8 Inner electrode	Ni, Open Mode Design
Capacitance	47 nF	Termination	Metal-Epoxy
5 Capacitance	± 10%	Plating	Sn 100% (Pb Free)
tolerance		9 Product	Automotive
Rated Voltage	50 V	® Special code	Normal
7 Thickness	0.85±0.10 mm	① Packaging	Cardboard Type, 7" Reel

C. Reliability Test and Judgement condition

Test items	Performance	Test condition				
High Temperature	Appearance : No abnormal exterior appearance	Unpowered, 1,000hrs @ Max. temperature				
Exposure	Capacitance Change Within ±10 %	Measurement at 24±2hrs after test conclusion				
	Tan δ :0.03 max.					
	IR :More than 10,000 ^{MΩ} or 500 ^{MΩ} ×μF	Initial Measurement 2*				
	Whichever is smaller	Final Measurement 3*				
Temperature Cycling	Appearance : No abnormal exterior appearance	1,000Cycles				
	Capacitance Change Within ±10 %	Initial Measurement 2*				
	Tan δ :0.03 max.	Final Measurement 3*				
	IR : More than 10,000 № or 500 №×μF	Measurement at 24±2hrs after test conclusion				
	Whichever is smaller	1 cycle condition : -55+0/-3 °C(30±3min) → Room Temp. (1min)				
		→ 125+3/-0°C(30±3min) → Room Temp. (1min)				
Destructive Physical	No Defects or abnormalities	Per EIA 469				
Analysis						
Humidity Bias	Appearance : No abnormal exterior appearance	1,000hrs 85 ℃/85%RH, Rated Voltage and 1.3~1.5V,				
	Capacitance Change Within ±12.5 %	Add 100kohm resistor				
	Tan δ :0.035 max.	Initial Measurement 2*				
	IR :More than 500 MΩ or 25 MΩ×μF	Final Measurement 4*				
	Whichever is smaller	Measurement at 24±2hrs after test conclusion				
		The charge/discharge current is less than 50mA.				
High Temperature	Appearance : No abnormal exterior appearance	1,000hrs @ 125℃, 200% Rated Voltage,				
Operating Life	Capacitance Change Within ±12.5 %	Initial Measurement 2*				
	Tan δ :0.035 max.	Final Measurement 4*				
	IR :More than 1,000 ^M Ω or 50 ^M Ω×μF	Measurement at 24±2hrs after test conclusion				
	Whichever is smaller	The charge/discharge current is less than 50mA.				
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	Performance	Test condition					
External Visual	No abnormal exterior appearance	Microscope ('10)					
Physical Dimension	Within the specified dimensions	Using The calipers					
Mechanical Shock	Appearance : No abnormal exterior appearance	Three shocks in each direction should be applied along					
	Capacitance Change Within ±10 %	3 mutually perpendicular axes of the test specimen (18 shocks)					
	Tan δ, IR : Initial spec.	Peak value Duration Wave Velocity					
			1,500G	0.5ms	Half sine	4.7m/sec	
		Initial Measurement 2*					
		Final Measurement 5*					
Vibration	Appearance : No abnormal exterior appearance	5g's for 20min., 12cycles each of 3 orientations,					
	Capacitance Change Within ±10 %	Use 8	8"×5" PCB 0	.031" Thick	7 secure p	oints on one lo	ong side
	Tan δ, IR : Initial spec.	and 2	2 secure poir	nts at corne	rs of oppos	site sides. Part	s mounted
		withir	n 2" from any	secure po	int. Test fro	om 10~2,000Hz	
		Initial	I Measureme	ent 2*			
		Final Measurement 5*					
Resistance to	Appearance : No abnormal exterior appearance	prehe	eating : 150°	C for 60~12	20 sec.		
Solder Heat	Capacitance Change Within ±10 %	preheating : 150°C for 60~120 sec. Solder pot : 260±5°C, 10±1sec.					
	Tan δ, IR : Initial spec.	Initial Measurement 2*					
		Final Measurement 3*					
ESD	Appearance : No abnormal exterior appearance	AEC-Q200-002 or ISO/DIS10605					
	Capacitance Change Within ±10 %	Initial Measurement 2*					
	Tan δ, IR : Initial spec.	Final Measurement 4*					
Solderability	95% of the terminations is to be soldered	a) Preheat at 155 °C for 4 hours, Immerse in solder for 5s at 245±5 °C					
	evenly and continuously	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°C					
		solder : a solution ethanol and rosin					
Electrical	Capacitance : Within specified tolerance	*A capacitor prior to measuring the capacitance is heat treated at					it treated at
Characterization	Tan δ : 0.025 max.	150 +0/-10℃ for 1hour and maintained in ambient air for 24±2 ho					for 24±2 hours
	IR(25℃): More than 10,000 № or 500 №× <i>µ</i> F	The Capacitance / D.F. should be measured at 25 ℃,					
	Whichever is smaller	1 $^{\text{kHz}} \pm 10\%$, 1 $\pm 0.2 \text{ Vrms}$					
	IR(125℃) More than 1,000 № or 10 № × μF	I.R. should be measured with a DC voltage not exceeding					ding
	Whichever is smaller	Rate	d Voltage @	25℃, @ 12	5℃ for 60	~120 sec.	
	Dielectric Strength	Dielectric Strength : 250% of the rated voltage for 1~5 seconds					seconds
Board Flex	Appearance : No abnormal exterior appearance	Bend	ling to the lin	nit, 3 mm fo	r 60 secon	ds 1*	
	Capacitance Change Within ±10 %	Initial	l Measureme	ent 2*			
		Final	Measureme	ent 5*			
Terminal	Appearance : No abnormal exterior appearance	18 N,	, for 60 sec.				
Strength(SMD)	Capacitance Change Within ±10 %	Initial	l Measureme	ent 2*			
		Final Measurement 5*					
Beam Load	Destruction value should be exceed 20 N	on value should be exceed 20 N Beam speed : 0.5±0.05 mm/sec					
Temperature	X7R						
Characteristics	From -55 ℃ to 125 ℃, Capacitance change shou	d be v	within ±15%				

D. Recommended Soldering method :

Reflow (Reflow Peak Temperature : 260 +0/-5°C, 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 $^{\circ}\mathrm{C}$ for one hour after soldering process. and then let sit for 24±2 hours at room temperature. Perform the initial measurement.
- $^{\star}3$: Final measurement : Let sit for 24 \pm 2 hours at room temperature after test conclusion, then measure.
- *4 : Final measurement : Perform a heat treatment at 150 +0/-10 °C 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.



A 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.

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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
- ① Undersea equipment
- 8 Traffic signal equipment
- Data-processing equipment
- @ Electric heating apparatus, burning equipment
- 19 Safety equipment
- @ Any other applications with the same as or similar complexity or reliability to the applications