SAMSUNG ELECTRO-MECHANICS

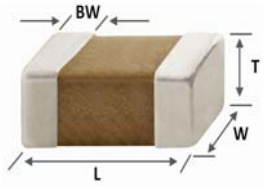
Specification of Automotive MLCC (Reference sheet)

RoHS+Halogen Compliant ecoparts

- **Supplier : Samsung electro-mechanics**
- **Product : Multi-layer Ceramic Capacitor**
- **Samsung P/N : CL05C390JB51PNC**
- **Description : CAP, 39pF, 50V, ± 5%, C0G, 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	C	390	J	B	5	1	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**	C0G	⑧ **Inner electrode**	Ni
④ **Capacitance**	39 pF	**Termination**	Cu
⑤ **Capacitance tolerance**	± 5%	**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

	Performance	Test condition
High Temperature Exposure	Appearance : No abnormal exterior appearance Capacitance Change : Within ±2.5% or ±0.25pF whichever is larger Q : 1,000 min. IR : More than 10,000 MΩ or 500 MΩ×μF Whichever is smaller	Unpowered, 1,000hrs @ Max. temperature 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 : 1,000 min. IR : More than 10,000 MΩ or 500 MΩ×μF Whichever is smaller	1,000Cycles 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 ±2.5% or ±0.25pF whichever is larger Q : 200 min. IR : More than 500 MΩ or 25 MΩ×μF Whichever is smaller	1,000hrs 85℃/85%RH, Rated Voltage and 1.3~1.5V, Add 100kohm resistor The charge/discharge current is less than 50mA.
High Temperature Operating Life	Appearance : No abnormal exterior appearance Capacitance Change : Within ±3% or ±0.3pF whichever is larger Q : 350 min. IR : More than 1,000 MΩ or 50 MΩ×μF Whichever is smaller	1,000hrs @ 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 ±2.5% or ±0.25pF whichever is larger
Q, 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><th>Peak value</th><th>Duration</th><th>Wave</th><th>Velocity</th></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 ±2.5% or ±0.25pF whichever is larger
Q, 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 10~2,000Hz.</td></tr>
<tr><td>Resistance to Solder Heat</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±2.5% or ±0.25pF whichever is larger
Q, IR : Initial spec.</td><td>Preheating : 150℃ for 60~120 sec.
Solder pot : 260±5℃, 10±1sec.</td></tr>
<tr><td>ESD</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±2.5% or ±0.25pF whichever is larger
Q, IR : Initial spec.</td><td>AEC-Q200-002 or ISO/DIS10605</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
Q : 1,000 min.
IR(25℃) : More than 100,000 MΩ or 1,000 MΩ×μF Whichever is smaller.
IR(125℃) : More than 10,000 MΩ or 100 MΩ×μF Whichever is smaller.
Dielectric Strength</td><td>The Capacitance / D.F. should be measured at 25℃,
1 MHz ± 10%, 0.5~5 Vrms
I.R. should be measured with a DC voltage not exceeding
Rated Voltage @25℃, @125℃ for 60~120 sec.
Dielectric Strength : 300% of the rated voltage for 1~5 seconds</td></tr>
<tr><td>Board Flex</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±5% or ±0.5pF whichever is larger</td><td>Bending to the limit, 3 mm for 60 seconds</td></tr>
<tr><td>Terminal Strength(SMD)</td><td>Appearance : No abnormal exterior appearance
Capacitance Change : Within ±2.5% or ±0.25pF whichever is larger</td><td>2 N, for 60 sec.</td></tr>
<tr><td>Beam Load</td><td>Destruction value should be exceed 8 N</td><td>Beam speed : 0.5±0.05 mm/sec</td></tr>
<tr><td>Temperature Characteristics</td><td colspan="2">C0G
From -55 ℃ to 125 ℃, Capacitance change should be within 0±30ppm/℃</td></tr>
</table>

D. Recommended Soldering method :

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

⚠ 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