

LLL/LLR/LLA/LLM Series Specifications and Test Methods (2)

No.	Item	Specifications	Test Method																	
1	Operating Temperature Range	R6: -55 to +85°C R7, C7: -55 to +125°C C8: -55 to +105°C																		
2	Rated Voltage	See the previous pages.	The rated voltage is defined as the maximum voltage that may be applied continuously to the capacitor. When AC voltage is superimposed on DC voltage, V^{P-P} or V^{O-P} , whichever is larger, should be maintained within the rated voltage range.																	
3	Appearance	No defects or abnormalities	Visual inspection																	
4	Dimensions	Within the specified dimension	Using calipers																	
5	Dielectric Strength	No defects or abnormalities	No failure should be observed when 250% of the rated voltage is applied between the terminations for 1 to 5 seconds, provided the charge/discharge current is less than 50mA.																	
6	Insulation Resistance	50Ω · F min.	The insulation resistance should be measured with a DC voltage not exceeding the rated voltage at 25°C and 75%RH max. and within 1 minute of charging.																	
7	Capacitance	Within the specified tolerance	The capacitance/D.F. should be measured at 25°C at the frequency and voltage shown in the table.																	
8	Dissipation Factor (D.F.)	R6, R7, C7, C8: 0.120 max.	<table border="1"> <thead> <tr> <th>Capacitance</th> <th>Frequency</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>C ≤ 10μF (10V min.)</td> <td>1±0.1kHz</td> <td>1.0±0.2Vrms</td> </tr> <tr> <td>C ≤ 10μF (6.3V max.)</td> <td>1±0.1kHz</td> <td>0.5±0.1Vrms</td> </tr> <tr> <td>C > 10μF</td> <td>120±24Hz</td> <td>0.5±0.1Vrms</td> </tr> </tbody> </table>	Capacitance	Frequency	Voltage	C ≤ 10μF (10V min.)	1±0.1kHz	1.0±0.2Vrms	C ≤ 10μF (6.3V max.)	1±0.1kHz	0.5±0.1Vrms	C > 10μF	120±24Hz	0.5±0.1Vrms					
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C > 10μF	120±24Hz	0.5±0.1Vrms																		
9	Capacitance Temperature Characteristics	<table border="1"> <thead> <tr> <th>Char.</th> <th>Temp. Range (°C)</th> <th>Reference Temp.</th> <th>Cap. Change</th> </tr> </thead> <tbody> <tr> <td>R6</td> <td>-55 to +85</td> <td rowspan="4">25°C</td> <td>Within ±15%</td> </tr> <tr> <td>R7</td> <td>-55 to +125</td> <td>Within ±15%</td> </tr> <tr> <td>C7</td> <td>-55 to +125</td> <td>Within ±22%</td> </tr> <tr> <td>C8</td> <td>-55 to +105</td> <td>Within ±22%</td> </tr> </tbody> </table>	Char.	Temp. Range (°C)	Reference Temp.	Cap. Change	R6	-55 to +85	25°C	Within ±15%	R7	-55 to +125	Within ±15%	C7	-55 to +125	Within ±22%	C8	-55 to +105	Within ±22%	<p>The capacitance change should be measured after 5 min. at each specified temperature stage. The ranges of capacitance change compared with the 25°C value over the temperature ranges shown in the table should be within the specified ranges.</p> <p>Measuring voltage: LLL153C70E105; 0.2±0.05Vrms</p> <ul style="list-style-type: none"> Initial measurement. <p>Perform a heat treatment at 150+0/-10°C for one hour and then set for 24±2 hours at room temperature. Perform the initial measurement.</p>
Char.	Temp. Range (°C)	Reference Temp.	Cap. Change																	
R6	-55 to +85	25°C	Within ±15%																	
R7	-55 to +125		Within ±15%																	
C7	-55 to +125		Within ±22%																	
C8	-55 to +105		Within ±22%																	
10	Adhesive Strength of Termination	No removal of the terminations or other defect should occur.	Solder the capacitor to the test jig (glass epoxy board) using a eutectic solder. Then apply 10N* force in parallel with the test jig for 10±1 sec. The soldering should be done either with an iron or using the reflow method and should be conducted with care so that the soldering is uniform and free of defects such as heat shock. *5N (LLL15, LLL18, LLR18, LLA, LLM Series)																	
11	Vibration	Appearance	No defects or abnormalities																	
		Capacitance	Within the specified tolerance																	
		D.F.	R6, R7, C7, C8: 0.120 max.																	
12	Solderability of Termination	75% of the terminations are to be soldered evenly and continuously.	Immerse the capacitor in a solution of ethanol (JIS-K-8101) and rosin (JIS-K-5902) (25% rosin in weight proportion). Preheat at 80 to 120°C for 10 to 30 seconds. After preheating, immerse in eutectic solder solution for 2±0.5 seconds at 230±5°C, or Sn-3.0Ag-0.5Cu solder solution for 2±0.5 seconds at 245±5°C.																	
13	Resistance to Soldering Heat	Appearance	No marking defects																	
		Capacitance Change	R6, R7, C7, C8: Within ±7.5%																	
		D.F.	R6, R7, C7, C8: 0.120 max.																	
		I.R.	50Ω · F min.																	
		Dielectric Strength	No failure																	
			<p>Preheat the capacitor at 120 to 150°C for 1 minute. Immerse the capacitor in a eutectic solder or Sn-3.0Ag-0.5Cu solder solution at 270±5°C for 10±0.5 seconds. Let sit at room temperature for 24±2 hours, then measure.</p> <ul style="list-style-type: none"> Initial measurement. <p>Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement.</p>																	

Continued on the following page. 

△Note 1. This Specifications and Test Methods is downloaded from the website of Murata Manufacturing co.,Ltd. Therefore, it's specifications are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering.
 2. This Specifications and Test Methods has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

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Continued from the preceding page.

No.	Item	Specifications	Test Method															
14	Temperature Sudden Change	Appearance	Fix the capacitor to the supporting jig in the same manner and under the same conditions as (10). Perform the five cycles according to the four heat treatments listed in the following table. Let sit for 24±2 hours at room temperature, then measure. <table border="1" style="margin-top: 10px;"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>Min. Operating Temp. +0/-3</td> <td>Room Temp.</td> <td>Min. Operating Temp. +0/-3</td> <td>Room Temp.</td> </tr> <tr> <td>Time (min.)</td> <td>30±3</td> <td>2 to 3</td> <td>30±3</td> <td>2 to 3</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. 	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp. +0/-3	Room Temp.	Min. Operating Temp. +0/-3	Room Temp.	Time (min.)	30±3	2 to 3	30±3	2 to 3
		Step		1	2	3	4											
		Temp. (°C)		Min. Operating Temp. +0/-3	Room Temp.	Min. Operating Temp. +0/-3	Room Temp.											
		Time (min.)		30±3	2 to 3	30±3	2 to 3											
		Capacitance Change		R6, R7, C7, C8: Within ±12.5%														
D.F.	R6, R7, C7, C8: 0.120 max.																	
I.R.	50Ω · F min.																	
Dielectric Strength	No failure																	
15	High Temperature High Humidity (Steady State)	Appearance	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. The charge/discharge current is less than 50mA. Apply the rated DC voltage. <ul style="list-style-type: none"> • Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. • Measurement after test Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. 															
		Capacitance Change		R6, R7, C7, C8: Within ±12.5%														
		D.F.		R6, R7, C7, C8: 0.2 max.														
		I.R.		12.5Ω · F min.														
16	Durability	Appearance	Apply 150% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. The charge/discharge current is less than 50mA. <ul style="list-style-type: none"> • Initial measurement Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature. Perform the initial measurement. • Measurement after test Perform a heat treatment at 150+0/-10°C for one hour and then let sit for 24±2 hours at room temperature, then measure. 															
		Capacitance Change		R6, R7, C7, C8: Within ±12.5% * LLL153C70G474, LLL153C70E105: Within ±20%														
		D.F.		R6, R7, C7, C8: 0.2 max.														
		I.R.		25Ω · F min.														
* 17	ESR	Within below ESR value at Frequency: 10±0.1MHz 100mΩ: Within 70 to 130mΩ 220mΩ: Within 154 to 286mΩ 470mΩ: Within 329 to 611mΩ 1000mΩ: Within 700 to 1300mΩ	The ESR should be measured at room temperature with the Equivalent of HP4294A.															

* LLR: This specification is only for LLR Type