

Chip Monolithic Ceramic Capacitors

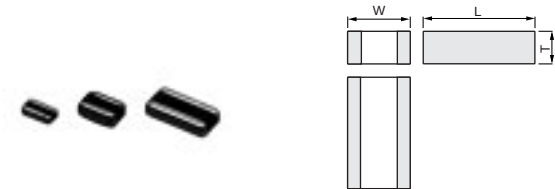
Low ESL LLL/LLA/LLM Series

■ Features (Reversed geometry Low ESL Type)

- 1. Low ESL, good for noise reduction for high frequency
- 2. Small, high cap

■ Applications

- 1. High speed micro processor
- 2. High frequency digital equipment



Part Number	Dimensions (mm)		
	L	W	T
LLL185	1.6 ±0.1	0.8 ±0.1	0.6 max.
LLL216	2.0 ±0.1	1.25 ±0.1	0.6 ±0.1
LLL219			0.85 ±0.1
LLL317	3.2 ±0.15	1.6 ±0.15	0.7 ±0.1
LLL31M			1.15 ±0.1

Reversed geometry Low ESL Type

Part Number	LLL18						LLL21						LLL31					
L x W	1.6x0.8						2.0x1.25						3.2x1.6					
TC	X7R (R7)			X7S (C7)			X7R (R7)			X7S (C7)			X7R (R7)			X5R (R6)		
Rated Volt.	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	50 (1H)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)																		
2200pF (222)	0.5 (5)																	
3300pF (332)	0.5 (5)																	
4700pF (472)	0.5 (5)						0.6 (6)											
6800pF (682)		0.5 (5)					0.6 (6)											
10000pF (103)		0.5 (5)	0.5 (5)				0.6 (6)						0.7 (7)					
15000pF (153)		0.5 (5)	0.5 (5)				0.6 (6)						0.7 (7)	0.7 (7)				
22000pF (223)		0.5 (5)	0.5 (5)				0.6 (6)	0.6 (6)					0.7 (7)	0.7 (7)				
33000pF (333)			0.5 (5)				0.85 (9)	0.6 (6)	0.6 (6)				0.7 (7)	0.7 (7)				
47000pF (473)			0.5 (5)					0.6 (6)	0.6 (6)				0.7 (7)	0.7 (7)				
68000pF (683)			0.5 (5)					0.6 (6)	0.6 (6)				0.7 (7)	0.7 (7)				
0.10μF (104)				0.5 (5)				0.6 (6)	0.6 (6)				1.15 (M)	0.7 (7)				
0.15μF (154)					0.5 (5)			0.85 (9)	0.6 (6)				1.15 (M)	0.7 (7)				
0.22μF (224)					0.5 (5)					0.6 (6)				1.15 (M)				
0.33μF (334)						0.5 (5)				0.6 (6)				1.15 (M)	0.7 (7)			
0.47μF (474)						0.5 (5)				0.85 (9)				1.15 (M)	0.7 (7)			

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The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

Reversed geometry Low ESL Type Low Profile

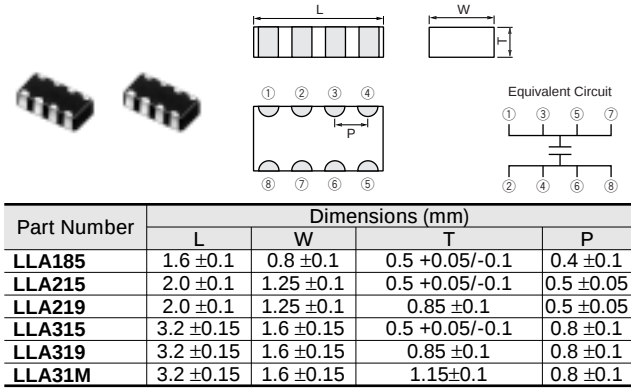
The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

■ Features (Eight Terminals Low ESL Type)

- 1. Low ESL (100pH) , suitable to decoupling capacitor for 1GHz clock speed IC.
- 2. Small, large cap

■ APPLICATIONS

- 1. High speed micro processor
- 2. High frequency digital equipment.



Part Number	Dimensions (mm)			
	L	W	T	P
LLA185	1.6 ±0.1	0.8 ±0.1	0.5 +0.05/-0.1	0.4 ±0.1
LLA215	2.0 ±0.1	1.25 ±0.1	0.5 +0.05/-0.1	0.5 ±0.05
LLA219	2.0 ±0.1	1.25 ±0.1	0.85 ±0.1	0.5 ±0.05
LLA315	3.2 ±0.15	1.6 ±0.15	0.5 +0.05/-0.1	0.8 ±0.1
LLA319	3.2 ±0.15	1.6 ±0.15	0.85 ±0.1	0.8 ±0.1
LLA31M	3.2 ±0.15	1.6 ±0.15	1.15±0.1	0.8 ±0.1

Eight Terminals Low ESL Type

Part Number	LLA18	LLA21					LLA31		
L x W	1.6x0.8	2.0x1.25					3.2x1.6		
TC	X7S (C7)	X7R (R7)				X7S (C7)	X7R (R7)		
Rated Volt.	4 (0G)	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	4 (0G)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)									
10000pF(103)		0.85(9)							
15000pF(153)		0.85(9)							
22000pF(223)		0.85(9)							
33000pF(333)		0.85(9)							
47000pF(473)		0.85(9)							
68000pF(683)			0.85(9)						
0.10μF(104)			0.85(9)				0.85(9)		
0.15μF(154)			0.85(9)				1.15(M)		
0.22μF(224)			0.85(9)				0.85(9)		
0.33μF(334)	0.5(5)			0.85(9)			0.85(9)		
0.47μF(474)	0.5(5)			0.85(9)			0.85(9)		
0.68μF(684)				0.85(9)			0.85(9)		
1.0μF(105)	0.5(5)				0.85(9)			0.85(9)	
1.5μF(155)					0.85(9)			0.85(9)	
2.2μF(225)						0.85(9)			0.85(9)
4.7μF(475)						0.85(9)			

The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

Eight Terminals Low ESL Type Low Profile

Part Number	LLA21					LLA31			
L x W	2.0x1.25					3.2x1.6			
TC	X7R (R7)				X7S (C7)	X7R (R7)			
Rated Volt.	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)	
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)									
10000pF(103)	0.5(5)								
15000pF(153)	0.5(5)								
22000pF(223)	0.5(5)								
33000pF(333)		0.5(5)							
47000pF(473)		0.5(5)							
68000pF(683)		0.5(5)							
0.10μF(104)		0.5(5)				0.5(5)			
0.15μF(154)			0.5(5)	0.5(5)		0.5(5)			
0.22μF(224)			0.5(5)	0.5(5)		0.5(5)			

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Part Number	LLA21					LLA31		
L x W	2.0x1.25					3.2x1.6		
TC	X7R (R7)				X7S (C7)	X7R (R7)		
Rated Volt.	25 (1E)	16 (1C)	10 (1A)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)								
0.33μF(334)			0.5(5)	0.5(5)			0.5(5)	
0.47μF(474)				0.5(5)			0.5(5)	
0.68μF(684)				0.5(5)			0.5(5)	
1.0μF(105)					0.5(5)			0.5(5)
1.5μF(155)					0.5(5)			0.5(5)
2.2μF(225)					0.5(5)			0.5(5)

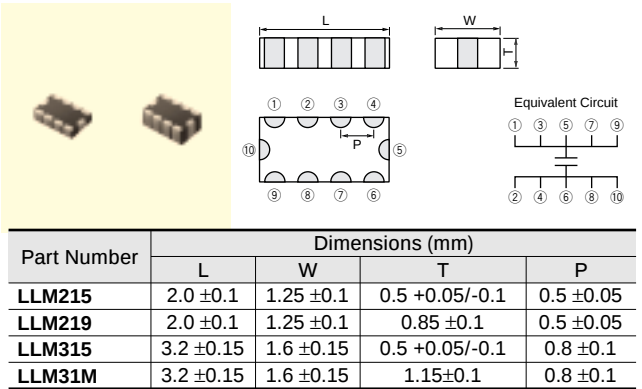
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- Features (Ten Terminals Low ESL Type)
1. Low ESL (45pH), suitable to decoupling capacitor for 2GHz clock speed IC.

2. Small, large cap

- APPLICATIONS
1. High speed micro processor

2. High frequency digital equipment



Ten Terminals Low ESL Type

Part Number	LLM21				LLM31		
L x W	2.0x1.25				3.2x1.6		
TC	X7R (R7)		X7S (C7)		X7R (R7)		
Rated Volt.	25 (1E)	16 (1C)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)							
10000pF(103)	0.85(9)						
15000pF(153)	0.85(9)						
22000pF(223)	0.85(9)						
33000pF(333)	0.85(9)						
47000pF(473)	0.85(9)						
68000pF(683)		0.85(9)					
0.10μF(104)		0.85(9)			1.15(M)		
0.15μF(154)		0.85(9)			1.15(M)		
0.22μF(224)		0.85(9)			1.15(M)		
0.33μF(334)			0.85(9)		1.15(M)		
0.47μF(474)			0.85(9)		1.15(M)		
0.68μF(684)			0.85(9)		1.15(M)		
1.0μF(105)			0.85(9)		1.15(M)		
1.5μF(155)			0.85(9)			1.15(M)	
2.2μF(225)				0.85(9)		1.15(M)	
3.3μF(335)							1.15(M)
4.7μF(475)							1.15(M)

The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

Ten Terminals Low ESL Type Low Profile

Part Number	LLM21				LLM31		
L x W	2.0x1.25				3.2x1.6		
TC	X7R (R7)		X7S (C7)		X7R (R7)		
Rated Volt.	25 (1E)	16 (1C)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)
Capacitance (Capacitance part numbering code) and T (mm) Dimension (T Dimension part numbering code)							
10000pF(103)	0.5(5)						
15000pF(153)	0.5(5)						
22000pF(223)	0.5(5)						
33000pF(333)		0.5(5)					
47000pF(473)		0.5(5)					
68000pF(683)		0.5(5)					
0.10μF(104)		0.5(5)			0.5(5)		
0.15μF(154)			0.5(5)		0.5(5)		

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Part Number	LLM21				LLM31		
L x W	2.0x1.25				3.2x1.6		
TC	X7R (R7)			X7S (C7)	X7R (R7)		
Rated Volt.	25 (1E)	16 (1C)	6.3 (0J)	4 (0G)	16 (1C)	10 (1A)	6.3 (0J)

The part numbering code is shown in ().
Dimensions are shown in mm and Rated Voltage in Vdc.

Specifications and Test Methods

Continued on the following page. 

Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specifications	Test Method															
14	Temperature Cycle	Appearance	No marking defects	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 48±4 hours at room temperature, then measure. <table><tr><th>Step</th><th>1</th><th>2</th><th>3</th><th>4</th></tr><tr><td>Temp. (°C)</td><td>Min. Operating Temp. ±3</td><td>Room Temp.</td><td>Max. Operating Temp. ±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></table> • Initial measurement. Perform a heat treatment at 150 ±10 °C for one hour and then let sit for 48±4 hours at room temperature. Perform the initial measurement.	Step	1	2	3	4	Temp. (°C)	Min. Operating Temp. ±3	Room Temp.	Max. Operating Temp. ±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. ±3		Room Temp.	Max. Operating Temp. ±3	Room Temp.												
		Time (min.)	30±3		2 to 3	30±3	2 to 3												
		Capacitance Change	Within ±7.5% *1																
D.F.	W.V.: 25V min.; 0.025 max. W.V.: 16V max.; 0.035 max. *1																		
I.R.	More than 10,000MΩ or 500Ω · F (Whichever is smaller)																		
Dielectric Strength	No failure																		
15	Humidity (Steady State)	Appearance	No marking defects	Sit the capacitor at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 48±4 hours at room temperature, then measure.															
		Capacitance Change	Within ±12.5% *1																
		D.F.	0.05 max. *1																
		I.R.	More than 1,000MΩ or 50Ω · F (Whichever is smaller)																
16	Humidity Load	Appearance	No marking defects	Apply the rated voltage at 40±2°C and 90 to 95% humidity for 500±12 hours. Remove and let sit for 48±4 hours at room temperature, then measure. The charge/discharge current is less than 50mA.															
		Capacitance Change	Within ±12.5% *1																
		D.F.	0.05 max. *1																
		I.R.	More than 500MΩ or 25Ω · F *1 (Whichever is smaller)																
		Dielectric Strength	No failure																
17	High Temperature Load	Appearance	No marking defects	Apply 200% of the rated voltage for 1000±12 hours at the maximum operating temperature ±3°C. Let sit for 48±4 hours at room temperature, then measure. The charge/discharge current is less than 50mA. •Initial measurement. Apply 200% (*2) of the rated DC voltage for one hour at the maximum operating temperature ±3°C. Remove and let sit for 48±4 hours at room temperature. Perform initial measurement. (*1)															
		Capacitance Change	Within ±12.5% *1																
		D.F.	W.V.: 25V min.; 0.04 max. W.V.: 16V max.; 0.05 max. *1																
		I.R.	More than 1,000MΩ or 50Ω · F *1 (Whichever is smaller)																
		Dielectric Strength	No failure																

*1 : The figure Indicates typical inspection.Please refer to individual specifications.

*2 : Some of the parts are applicable in rated voltage×150%. Please refer to individual specifications.