

### LL SERIES ▀ LOW LEAKAGE CURRENT 105°C TYPE

#### KEY FEATURES

- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C • 2000 hours
- Low leakage current,  $I_{LEAK} \leq 0.002 \cdot C_R \cdot V_R$  or 0.4 (μA)
- Extremely stable leakage current characteristic
- Capacitance tolerance  $\pm 10\%$  on request



#### SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	$V_R$	6.3 ~ 63V DC							
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$							
Capacitance Range	$C_R$	1 ~ 2200μF							
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)							
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	$\leq 0.002 \cdot C_R \cdot V_R$ or 0.4μA, whichever is greater • After 3 minutes [ $I_{LEAK}$ (μA) ; $C_R$ (μF) ; $V_R$ (V) ]							
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	$V_R$ (V DC)	6.3	10	16	25	35	50	63
		$\tan \delta$ (%)	20	17	13	10	9	8	8
		For $C_R > 1000\mu F$ , add 2% per every multiple 1000μF of rated capacitance value							
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	4	3	3	2	2	2	2
		For capacitance > 1000μF							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value						
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value								

Lifetime Test			
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	<b>2000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 150\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 150\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4		

#### MULTIPLIER $K_f$ for RIPPLE CURRENT vs. FREQUENCY

$C_R$ (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 2200$	0.8	1	1.16	1.25	1.35	1.38

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
6.3	22	5	11	36	LL220M6R3C110A
	33	5	11	44	LL330M6R3C110A
	47	5	11	53	LL470M6R3C110A
	100	5	11	74	LL101M6R3C110A
	220	6.3	11	131	LL221M6R3E110A
	330	6.3	11	161	LL331M6R3E110A
	470	8	11.5	242	LL471M6R3F115A
	1000	10	12.5	390	LL102M6R3G125A
10	2200	13	20	665	LL222M6R3I200A
	22	5	11	50	LL220M010C110A
	33	5	11	66	LL330M010C110A
	47	5	11	75	LL470M010C110A
	100	5	11	104	LL101M010C110A
	220	8	11.5	193	LL221M010F115A
	330	8	11.5	256	LL331M010F115A
	470	8	11.5	319	LL471M010F115A
16	1000	10	16	605	LL102M010G160A
	2200	13	20	860	LL222M010I200A
	10	5	11	39	LL100M016C110A
	22	5	11	62	LL220M016C110A
	33	5	11	68	LL330M016C110A
	47	5	11	105	LL470M016C110A
	100	6.3	11	138	LL101M016E110A
	220	8	11.5	220	LL221M016F115A
25	330	8	11.5	268	LL331M016F115A
	470	10	12.5	407	LL471M016G125A
	1000	10	20	704	LL102M016G200A
	2200	13	25	890	LL222M016I250A
	4.7	5	11	32	LL4R7M025C110A
	10	5	11	43	LL100M025C110A
	22	5	11	65	LL220M025C110A
	33	5	11	76	LL330M025C110A
35	47	6.3	11	116	LL470M025E110A
	100	8	11.5	149	LL101M025F115A
	220	10	12.5	246	LL221M025G125A
	330	10	12.5	352	LL331M025G125A
	470	10	16	484	LL471M025G160A
	1000	13	20	847	LL102M025I200A
	4.7	5	11	33	LL4R7M035C110A
	10	5	11	48	LL100M035C110A
35	22	6.3	11	71	LL220M035E110A
	33	6.3	11	83	LL330M035E110A
	47	6.3	11	125	LL470M035E110A
	100	8	11.5	187	LL101M035F115A

See "PACKAGING INFORMATION" to taped or formed products.

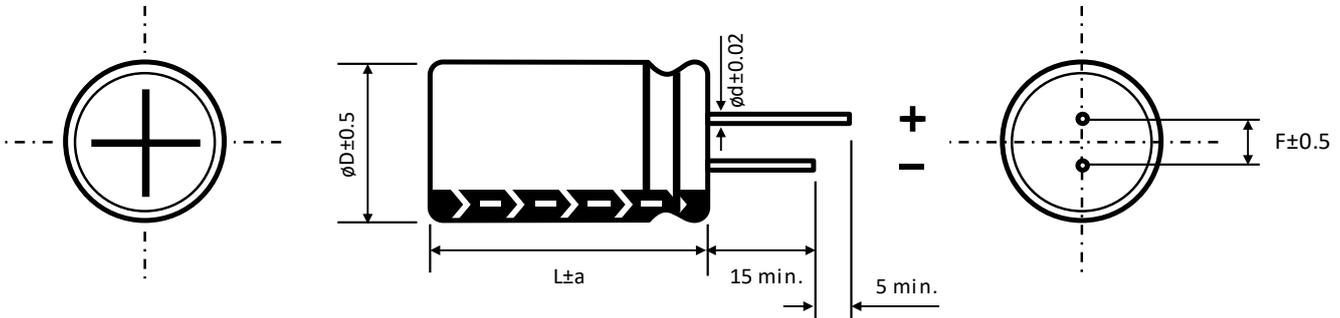
**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
35	220	10	12.5	330	LL221M035G125A
	330	10	16	440	LL331M035G160A
	470	13	20	590	LL471M035I200A
	1000	13	25	1012	LL102M035I250A
50	1	5	11	17	LL010M050C110A
	2.2	5	11	24	LL2R2M050C110A
	3.3	5	11	29	LL3R3M050C110A
	4.7	5	11	36	LL4R7M050C110A
	10	5	11	52	LL100M050C110A
	22	6.3	11	77	LL220M050E110A
	33	6.3	11	99	LL330M050E110A
	47	8	11.5	138	LL470M050F115A
	100	10	12.5	217	LL101M050G125A
	220	10	20	380	LL221M050G200A
	330	13	20	506	LL331M050I200A
	470	13	25	705	LL471M050I250A
63	1	5	11	17	LL010M063C110A
	2.2	5	11	24	LL2R2M063C110A
	3.3	5	11	32	LL3R3M063C110A
	4.7	5	11	39	LL4R7M063C110A
	10	6.3	11	58	LL100M063E110A
	22	6.3	11	94	LL220M063E110A
	33	8	11.5	110	LL330M063F115A
	47	8	11.5	152	LL470M063F115A
	100	10	16	260	LL101M063G160A
	220	13	20	440	LL221M063I200A
	330	13	25	594	LL331M063I250A

See "PACKAGING INFORMATION" to taped or formed products.

## DIMENSIONS ▪ All dimensions in mm



$\varnothing D$	5	6.3	8	10	13
F	2	2.5	3.5	5	5
$\varnothing d$	0.5			0.6	
a	1.5			1.5	

## PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

<a href="#">General Precautions &amp; Guidelines</a>	<a href="#">Packaging Information</a>	<a href="#">3D Models</a>	<a href="#">Reliability Tests</a>

### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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