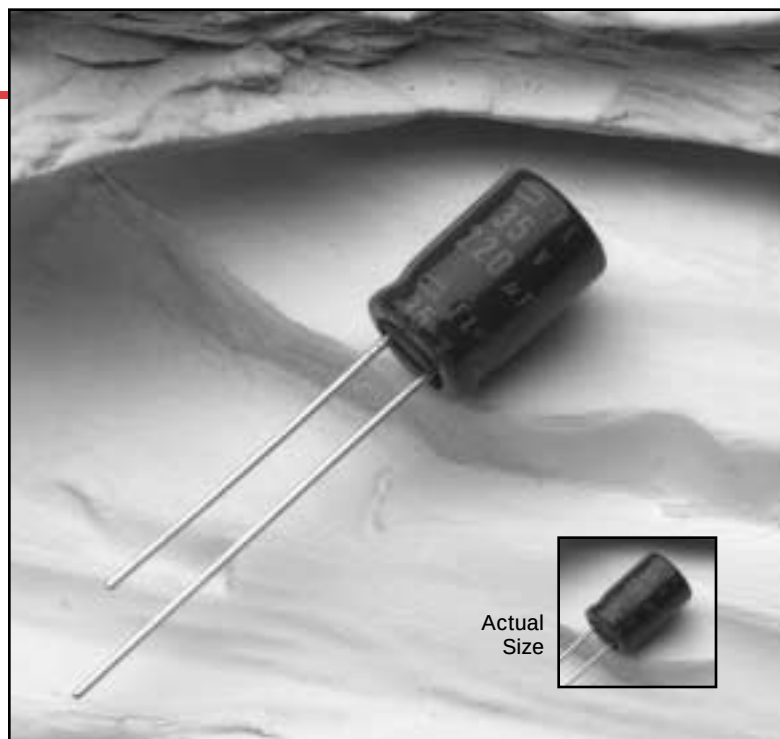


- **Miniature**
- **Long Life**
- **High Reliability**
- **Solvent Proof**
- **+105°C
Maximum
Temperature**



The new FL series capacitors are small size capacitors that are designed for a very long useful lifetime. These capacitors have a rated lifetime of 3,000 to 6,000 hours at +105°C with the full rated ripple current applied, depending on the case size. With the smaller case sizes and longer rated lifetime, these capacitors are ideal for switching power supplies, DC-DC converters or any other application requiring high reliability.

The FL series capacitors are solvent proof. Refer to the Mini-Glossary for cleaning guidelines and recommended cleaning agents that are compatible with United Chemi-Con products.

Summary of Specifications

- **Radial lead terminals.**
- **Capacitance range: 0.47 to 1,500 μ F.**
- **Voltage range: 6.3 to 50VDC.**
- **Category temperature range: -40°C to +105°C.**
- **Leakage current: 0.03CV or 3 μ A, whichever is greater, after 2 minutes at +20°C.**
- **Standard capacitance tolerance: $\pm 20\%$**
- **Nominal case size (D $\times$ L): 4 $\times$ 5mm to 8 $\times$ 20mm.**
- **Rated lifetime: 3,000 to 6,000 hours at +105°C with the rated ripple current applied, depending on case size.**

FL Series

FL Specifications

Item	Characteristics																																				
Category Temperature Range	− 40 to +105°C																																				
Rated Voltage Range	6.3 to 50VDC																																				
Capacitance Range	0.47 to 1,500μF																																				
Capacitance Tolerance	± 20% (M) at +20°C, 120Hz																																				
Leakage Current	I = 0.03CV or 3μA, whichever is greater, after 2 minutes at +20°C. Where I = Max. leakage current (μA), C = Nominal capacitance (μF) and V= Rated voltage (V)																																				
Dissipation Factor (Tan δ)	At +20°C, 120Hz <table><tr><td>Rated Voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td></tr><tr><td>Tan δ (DF)</td><td>0.50</td><td>0.40</td><td>0.35</td><td>0.30</td><td>0.25</td><td>0.25</td></tr></table>							Rated Voltage (V)	6.3	10	16	25	35	50	Tan δ (DF)	0.50	0.40	0.35	0.30	0.25	0.25																
Rated Voltage (V)	6.3	10	16	25	35	50																															
Tan δ (DF)	0.50	0.40	0.35	0.30	0.25	0.25																															
Impedance at 100kHz	At 100kHz, maximum impedance at +20°C is specified in the Ratings Tables.																																				
Rated Ripple Current Multipliers <i>Refer to Section 4 of the Mini-Glossary for explanation of Rated Ripple Current Multipliers.</i>	Frequency (Hz) <table><tr><td>Capacitance (μF)</td><td>120Hz</td><td>1kHz</td><td>10kHz</td><td>100kHz</td></tr><tr><td>≤ 3.3μF</td><td>0.20</td><td>0.66</td><td>0.90</td><td>1.00</td></tr><tr><td>4.7- 6.8μF</td><td>0.35</td><td>0.70</td><td>0.90</td><td>1.00</td></tr><tr><td>10 -180μF</td><td>0.40</td><td>0.75</td><td>0.90</td><td>1.00</td></tr><tr><td>220 -560μF</td><td>0.50</td><td>0.85</td><td>0.94</td><td>1.00</td></tr><tr><td>680 -1,500μF</td><td>0.60</td><td>0.87</td><td>0.95</td><td>1.00</td></tr></table>							Capacitance (μF)	120Hz	1kHz	10kHz	100kHz	≤ 3.3μF	0.20	0.66	0.90	1.00	4.7- 6.8μF	0.35	0.70	0.90	1.00	10 -180μF	0.40	0.75	0.90	1.00	220 -560μF	0.50	0.85	0.94	1.00	680 -1,500μF	0.60	0.87	0.95	1.00
Capacitance (μF)	120Hz	1kHz	10kHz	100kHz																																	
≤ 3.3μF	0.20	0.66	0.90	1.00																																	
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680 -1,500μF	0.60	0.87	0.95	1.00																																	
Endurance (Load Life)	The following specifications shall be satisfied when the capacitors are restored to +20°C after subjecting them to DC voltage at +105°C with the rated ripple current applied for the rated lifetime hours specified in the Ratings Tables. The sum of the DC voltage and peak AC voltage must not exceed the full rated voltage of the capacitors. Capacitance change: ≤ ± 30% of initial measured value Tan δ (DF) : ≤ 300% of initial specified value Leakage current : ≤ initial specified value																																				
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to +20°C after exposing them for 1,000 hours at +105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes, at least 24 hours and not more than 48 hours before the measurements. Capacitance change: ≤ ± 20% of initial measured value Tan δ (DF) : ≤ 200% of initial specified value Leakage current : ≤ initial specified value																																				

Part Numbering System for FL Series

When ordering, always specify complete catalog number for FL Series.

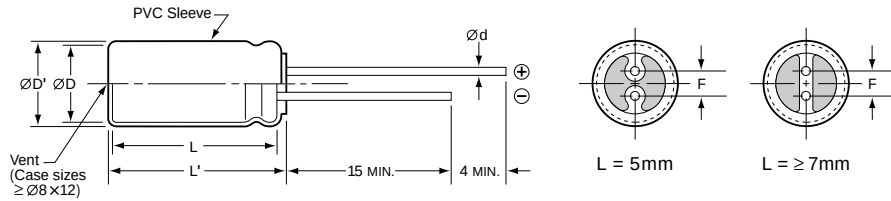
FL	35	VB	221	M	8X15	LL	
							Lead Length: LL is Standard.
							Case Code: See Case Sizes in Tables.
							Capacitance Tolerance: M = ± 20%
							Capacitance Value: Expressed in Microfarads. The first two digits are significant figures, and the third digit indicates the number of zeros for capacitance of 100μF or more. R indicates the decimal point for capacitance less than 100μF (e.g. R22 = .22μF; 2R2 = 2.2μF; 22R = 22μF; 221 = 220μF; 222 = 2,200μF; 223 = 22,000μF).
							Lead Configuration: VB = Radial Lead Terminals.
							DC Rated Voltage: Expressed in Volts (e.g. 35 = 35WVDC).
							Series Name: Indicates Basic Capacitor Design.

FL Series

Diagram of Dimensions

VB/Radial Lead

Unit: mm



For optional lead configurations and tape and ammo packaging, refer to the beginning of the Miniature section.

ØD	ØD' max.	L' max.	Ød	F
4	ØD+0.5	L+1.0	0.45	1.5±0.5
5	ØD+0.5	L+1.0 (≤7L)	0.45 (≤7L)	2.0±0.5
6.3	ØD+0.5	L+1.5 (≥11.5L)	0.5 (≥11.5L)	2.5±0.5
8	ØD+0.5	L+1.0 (≤7L)	0.45 (≤7L)	2.5±0.5 (5L)
		L+1.5 (≥12L)	0.6 (≥12L)	3.5±0.5 (≥7L)

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (µF)	Catalog Part Number	Nominal Case Size* D × L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Rated Ripple Current (mA rms) at +105°C, 100kHz	Rated Lifetime (Hours) at +105°C
6.3 Volts 8 Volts Surge	33	FL6.3VB33RM4X5LL	4 × 5	5.4	37	3,000
	47	FL6.3VB47RM4X7LL	4 × 7	3.0	55	3,000
	56	FL6.3VB56RM5X5LL	5 × 5	3.1	57	3,000
	82	FL6.3VB82RM5X7LL	5 × 7	1.6	88	3,000
	100	FL6.3VB101M6X5LL	6.3 × 5	1.7	82	3,000
	120	FL6.3VB121M4X11LL	4 × 11.5	2.2	83	5,000
	150	FL6.3VB151M6X7LL	6.3 × 7	0.86	142	3,000
	220	FL6.3VB221M5X11LL	5 × 11.5	1.5	115	5,000
	220	FL6.3VB221M8X5LL	8 × 5	1.5	110	3,000
	270	FL6.3VB271M5X15LL	5 × 15	1.2	149	6,000
	270	FL6.3VB271M8X7LL	8 × 7	0.56	205	3,000
	470	FL6.3VB471M6X11LL	6.3 × 11.5	0.72	190	5,000
	560	FL6.3VB561M6X15LL	6.3 × 15	0.53	245	6,000
	1,000	FL6.3VB102M8X12LL	8 × 12	0.41	287	6,000
	1,200	FL6.3VB122M8X15LL	8 × 15	0.30	365	6,000
	1,500	FL6.3VB152M8X20LL	8 × 20	0.23	417	6,000
10 Volts 13 Volts Surge	22	FL10VB22RM4X5LL	4 × 5	5.4	37	3,000
	33	FL10VB33RM4X7LL	4 × 7	3.0	55	3,000
	33	FL10VB33RM5X5LL	5 × 5	3.1	57	3,000
	47	FL10VB47RM5X7LL	5 × 7	1.6	88	3,000
	68	FL10VB68RM6X5LL	6.3 × 5	1.7	82	3,000
	100	FL10VB101M4X11LL	4 × 11.5	2.2	83	5,000
	100	FL10VB101M6X7LL	6.3 × 7	0.86	142	3,000
	150	FL10VB151M8X5LL	8 × 5	1.5	110	3,000
	180	FL10VB181M5X11LL	5 × 11.5	1.5	115	5,000

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.

FL Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number	Nominal Case Size* D × L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Rated Ripple Current (mA rms) at +105°C, 100kHz	Rated Lifetime (Hours) at +105°C
10 Volts 13 Volts Surge	220	FL10VB221M5X15LL	5 × 15	1.2	149	6,000
	220	FL10VB221M8X7LL	8 × 7	0.56	205	3,000
	390	FL10VB391M6X11LL	6.3 × 11.5	0.72	190	5,000
	470	FL10VB471M6X15LL	6.3 × 15	0.53	245	6,000
	680	FL10VB681M8X12LL	8 × 12	0.41	287	6,000
	1,000	FL10VB102M8X15LL	8 × 15	0.30	365	6,000
	1,200	FL10VB122M8X20LL	8 × 20	0.23	417	6,000
16 Volts 20 Volts Surge	15	FL16VB15RM4X5LL	4 × 5	5.4	37	3,000
	22	FL16VB22RM4X7LL	4 × 7	3.0	55	3,000
	22	FL16VB22RM5X5LL	5 × 5	3.1	57	3,000
	33	FL16VB33RM5X7LL	5 × 7	1.6	88	3,000
	47	FL16VB47RM6X5LL	6.3 × 5	1.7	82	3,000
	68	FL16VB68RM4X11LL	4 × 11.5	2.2	83	5,000
	68	FL16VB68RM6X7LL	6.3 × 7	0.86	142	3,000
	100	FL16VB101M8X5LL	8 × 5	1.5	110	3,000
	120	FL16VB121M5X11LL	5 × 11.5	1.5	115	5,000
	150	FL16VB151M8X7LL	8 × 7	0.56	205	3,000
	180	FL16VB181M5X15LL	5 × 15	1.2	149	6,000
	270	FL16VB271M6X11LL	6.3 × 11.5	0.72	190	5,000
	390	FL16VB391M6X15LL	6.3 × 15	0.53	245	6,000
	470	FL16VB471M8X12LL	8 × 12	0.41	287	6,000
	680	FL16VB681M8X15LL	8 × 15	0.30	365	6,000
	820	FL16VB821M8X20LL	8 × 20	0.23	417	6,000
25 Volts 32 Volts Surge	10	FL25VB10RM4X5LL	4 × 5	5.4	37	3,000
	15	FL25VB15RM4X7LL	4 × 7	3.0	55	3,000
	15	FL25VB15RM5X5LL	5 × 5	3.1	57	3,000
	22	FL25VB22RM5X7LL	5 × 7	1.6	88	3,000
	33	FL25VB33RM6X5LL	6.3 × 5	1.7	82	3,000
	39	FL25VB39RM4X11LL	4 × 11.5	2.2	83	5,000
	56	FL25VB56RM6X7LL	6.3 × 7	0.86	142	3,000
	68	FL25VB68RM5X11LL	5 × 11.5	1.5	115	5,000
	68	FL25VB68RM8X5LL	8 × 5	1.5	110	3,000
	100	FL25VB101M5X15LL	5 × 15	1.2	149	6,000
	100	FL25VB101M8X7LL	8 × 7	0.56	205	3,000
	120	FL25VB121M6X11LL	6.3 × 11.5	0.72	190	5,000
	180	FL25VB181M6X15LL	6.3 × 15	0.53	245	6,000
	270	FL25VB271M8X12LL	8 × 12	0.41	287	6,000
	390	FL25VB391M8X15LL	8 × 15	0.30	365	6,000
	470	FL25VB471M8X20LL	8 × 20	0.23	417	6,000
35 Volts 44 Volts Surge	4.7	FL35VB47RM4X5LL	4 × 5	5.4	37	3,000
	6.8	FL35VB68RM4X7LL	4 × 7	3.0	55	3,000
	10	FL35VB10RM5X5LL	5 × 5	3.1	57	3,000
	10	FL35VB10RM5X7LL	5 × 7	1.6	88	3,000
	22	FL35VB22RM4X11LL	4 × 11.5	2.2	83	5,000
	22	FL35VB22RM6X5LL	6.3 × 5	1.7	82	3,000
	22	FL35VB22RM6X7LL	6.3 × 7	0.86	142	3,000
	33	FL35VB33RM8X5LL	8 × 5	1.5	110	3,000
	47	FL35VB47RM5X11LL	5 × 11.5	1.5	115	5,000
	47	FL35VB47RM8X7LL	8 × 7	0.56	205	3,000
	56	FL35VB56RM5X15LL	5 × 15	1.2	149	6,000
	100	FL35VB101M6X11LL	6.3 × 11.5	0.72	190	5,000
	120	FL35VB121M6X15LL	6.3 × 15	0.53	245	6,000
	180	FL35VB181M8X12LL	8 × 12	0.41	287	6,000
	220	FL35VB221M8X15LL	8 × 15	0.30	365	6,000
	330	FL35VB331M8X20LL	8 × 20	0.23	417	6,000

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.

FL Series

Standard Voltage Ratings - VB/Radial Lead

Rated Voltage (WVDC)	Capacitance (μF)	Catalog Part Number	Nominal Case Size* D × L (mm)	Maximum Impedance (Ω) at +20°C, 100kHz	Rated Ripple Current (mA rms) at +105°C, 100kHz	Rated Lifetime (Hours) at +105°C
50 Volts 63 Volts Surge	0.47	FL50VBR47M4X5LL	4 × 5	34	14	3,000
	0.47	FL50VBR47M5X11LL	5 × 11.5	14	36	5,000
	1.0	FL50VB1R0M4X5LL	4 × 5	19	18	3,000
	1.0	FL50VB1R0M5X11LL	5 × 11.5	8	48	5,000
	2.2	FL50VB2R2M4X5LL	4 × 5	14	22	3,000
	2.2	FL50VB2R2M5X11LL	5 × 11.5	6	56	5,000
	3.3	FL50VB3R3M4X5LL	4 × 5	11	26	3,000
	3.3	FL50VB3R3M5X11LL	5 × 11.5	5	62	5,000
	4.7	FL50VB4R7M4X7LL	4 × 7	9	30	3,000
	4.7	FL50VB4R7M5X5LL	5 × 5	6	40	3,000
	4.7	FL50VB4R7M5X11LL	5 × 11.5	4	68	5,000
	6.8	FL50VB6R8M5X7LL	5 × 7	4.8	50	3,000
	10	FL50VB10RM5X11LL	5 × 11.5	2.5	90	5,000
	10	FL50VB10RM6X5LL	6.3 × 5	2.9	63	3,000
	12	FL50VB12RM4X11LL	4 × 11.5	3.7	67	5,000
	15	FL50VB15RM6X7LL	6.3 × 7	2.2	90	3,000
	22	FL50VB22RM8X5LL	8 × 5	2.6	84	3,000
	22	FL50VB22RM8X7LL	8 × 7	1.6	120	3,000
	27	FL50VB27RM5X11LL	5 × 11.5	2.6	87	5,000
	33	FL50VB33RM5X15LL	5 × 15	2.0	115	6,000
	47	FL50VB47RM6X11LL	6.3 × 11.5	1.2	147	5,000
	68	FL50VB68RM6X15LL	6.3 × 15	0.89	189	6,000
	100	FL50VB101M8X12LL	8 × 12	0.68	223	6,000
	120	FL50VB121M8X15LL	8 × 15	0.51	280	6,000
	180	FL50VB181M8X20LL	8 × 20	0.38	371	6,000

*The case sizes in table are with no sleeve, refer to diagram for case sizes with sleeve.