

FL Series

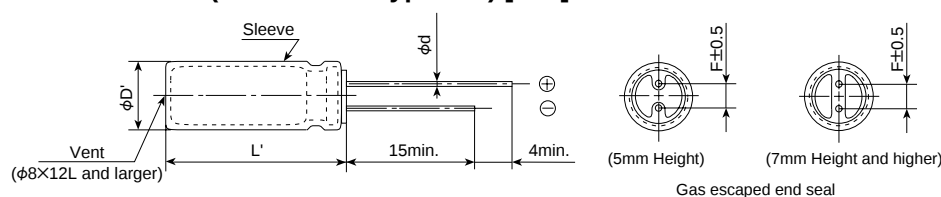
- Long life and high reliability for $\phi 4 \times 5$ to $\phi 8 \times 20$ mm range
- Endurance with ripple current : 105°C 3000 to 6000hours
- Suitable for long life and high reliability required products
- Solvent-proof type (see PRECAUTIONS AND GUIDELINES)



SPECIFICATIONS

Items	Characteristics	
Category	-40 to +105°C	
Temperature Range		
Rated Voltage Range	6.3 to 50V _{dc}	
Capacitance Tolerance	$\pm 20\%$ (M) (at 20°C, 120Hz)	
Leakage Current	I = 0.03CV or 3 μ A, whichever is greater. Where, I : Max. leakage current (μ A), C : Nominal capacitance (μ F), V : Rated voltage (V) (at 20°C after 2 minutes)	
Dissipation Factor (tan δ)	Rated voltage (V _{dc})	6.3V 10V 16V 25V 35V 50V
	tan δ (Max.)	0.50 0.40 0.35 0.30 0.25 0.25 (at 20°C, 120Hz)
Endurance	The following specifications shall be satisfied when the capacitors are restored to 20°C after subjected to DC voltage with the rated ripple current is applied for the specified period of time at 105°C.	
	Time	See STANDARD RATINGS
	Capacitance change	$\leq \pm 30\%$ of the initial value
	D.F. (tan δ)	$\leq 300\%$ of the initial specified value
	Leakage current	$\leq$ The initial specified value
Shelf Life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1000 hours at 105°C without voltage applied.	
	Capacitance change	$\leq \pm 20\%$ of the initial value
	D.F. (tan δ)	$\leq 200\%$ of the initial specified value
	Leakage current	$\leq$ The initial specified value

DIMENSIONS (Radial Lead Type=VB) [mm]



5mm Height

φD	4	5	6.3	8
φd	0.45	0.45	0.45	0.45
F	1.5	2.0	2.5	2.5
φD'	φD+0.5max.			
L'	L+1.0max.			

7mm Height

φD	4	5	6.3	8
φd	0.45	0.45	0.45	0.45
F	1.5	2.0	2.5	3.5
φD'	φD+0.5max.			
L'	L+1.0max.			

11.5mm and larger

φD	4	5	6.3	8
φd	0.45	0.5	0.5	0.6
F	1.5	2.0	2.5	3.5
φD'	φD+0.5max.			
L'	L+1.5max.			

PART NUMBERING SYSTEM

FL	10	VB	33	M	E05	
						Case code
						Cap tolerance ($\pm 20\%$)
						Nominal cap code
						Radial lead type
						Rated voltage in volts
						Series name

Capacitance	Code
4.7 μ F	4R7
10 μ F	10
100 μ F	100
2200 μ F	2200

◆ STANDARD RATINGS

V_{dc} Items Case code ϕDXL(mm)		6.3				10				16				25			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	33	5.4	37	3,000	22	5.4	37	3,000	15	5.4	37	3,000	10	5.4	37	3,000
4×7	D07	47	4.5	44	3,000	33	4.5	44	3,000	22	4.5	44	3,000	15	4.5	44	3,000
4×11.5	D11	120	2.2	83	5,000	100	2.2	83	5,000	68	2.2	83	5,000	39	2.2	83	5,000
5×5	E05	56	3.1	57	3,000	33	3.1	57	3,000	22	3.1	57	3,000	15	3.1	57	3,000
5×7	E07	82	2.5	70	3,000	47	2.5	70	3,000	33	2.5	70	3,000	22	2.5	70	3,000
5×11.5	E11	220	1.5	115	5,000	180	1.5	115	5,000	120	1.5	115	5,000	68	1.5	115	5,000
5×15	E15	270	1.2	149	6,000	220	1.2	149	6,000	180	1.2	149	6,000	100	1.2	149	6,000
6.3×5	F05	100	1.7	82	3,000	68	1.7	82	3,000	47	1.7	82	3,000	33	1.7	82	3,000
6.3×7	F07	150	1.3	116	3,000	100	1.3	116	3,000	68	1.3	116	3,000	56	1.3	116	3,000
6.3×11.5	F11	470	0.72	190	5,000	390	0.72	190	5,000	270	0.72	190	5,000	120	0.72	190	5,000
6.3×15	F15	560	0.53	245	6,000	470	0.53	245	6,000	390	0.53	245	6,000	180	0.53	245	6,000
8×5	H05	220	1.5	110	3,000	150	1.5	110	3,000	100	1.5	110	3,000	68	1.5	110	3,000
8×7	H07	270	0.90	162	3,000	220	0.90	162	3,000	150	0.90	162	3,000	100	0.90	162	3,000
8×12	H12	1,000	0.41	287	6,000	680	0.41	287	6,000	470	0.41	287	6,000	270	0.41	287	6,000
8×15	H15	1,200	0.30	365	6,000	1,000	0.30	365	6,000	680	0.30	365	6,000	390	0.30	365	6,000
8×20	H20	1,500	0.23	417	6,000	1,200	0.23	417	6,000	820	0.23	417	6,000	470	0.23	417	6,000

V_{dc} Items Case code ϕDXL(mm)		35				50			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)	Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	4.7	5.4	37	3,000	3.3	11	26	3,000
4×7	D07	6.8	4.5	44	3,000	4.7	9.0	30	3,000
4×11.5	D11	22	2.2	83	5,000	12	3.7	67	5,000
5×5	E05	10	3.1	57	3,000	4.7	6.0	40	3,000
5×7	E07	10	2.5	70	3,000	6.8	4.8	50	3,000
5×11.5	E11	47	1.5	115	5,000	27	2.6	87	5,000
5×15	E15	56	1.2	149	6,000	33	2.0	115	6,000
6.3×5	F05	22	1.7	82	3,000	10	2.9	63	3,000
6.3×7	F07	22	1.3	116	3,000	15	2.2	90	3,000
6.3×11.5	F11	100	0.72	190	5,000	47	1.2	147	5,000
6.3×15	F15	120	0.53	245	6,000	68	0.89	189	6,000
8×5	H05	33	1.5	110	3,000	22	2.6	84	3,000
8×7	H07	47	0.90	162	3,000	22	1.6	120	3,000
8×12	H12	180	0.41	287	6,000	100	0.68	223	6,000
8×15	H15	220	0.30	365	6,000	120	0.51	280	6,000
8×20	H20	330	0.23	417	6,000	180	0.38	371	6,000

V_{dc} Items Case code ϕDXL(mm)		50 (Small capacitance)			
		Capacitance (μ F)	Impedance 20°C, 100kHz (Ω max.)	Rated ripple current (mA _{rms} /105°C, 100kHz)	Endurance 105°C (hours)
4×5	D05	0.47	34	14	3,000
		1.0	19	18	3,000
		2.2	14	22	3,000
5×11.5	E11	0.47	14	36	5,000
		1.0	8.0	48	5,000
		2.2	6.0	56	5,000
		3.3	5.0	62	5,000
		4.7	4.0	68	5,000
		10	2.5	90	5,000

◆ RATED RIPPLE CURRENT MULTIPLIERS

● Frequency Multipliers

Capacitance(μ F)	Frequency(Hz)			
	120	1k	10k	100k
to 3.3 (and 50V (Small capacitance) items)	0.20	0.66	0.90	1.00
4.7 to 6.8	0.35	0.70	0.90	1.00
10 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1500	0.60	0.87	0.95	1.00