

VFLR · Screw-Terminal · 12000 h/85 °C

Long Life · High Ripple · Bottom cooling design · Low ESR

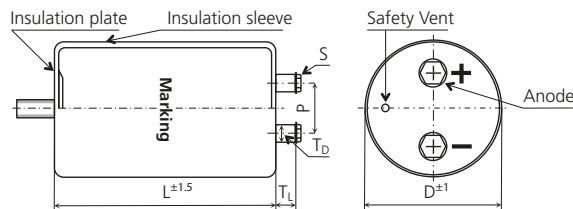
> Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 85°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10/+30% on request
Surge voltage / Ripple voltage	Repetitive max. 30 sec per 6 Minutes / ≤ 50V
Leakage current max. I _L (20°C, 5 min)	0.01 • C • V _r [μA] or 5 mA, which is smaller.
Useful life	12 000 hours at 85°C
Field failure rate	0.5 FIT = 0.5 • 10 ⁻⁹ Failures/hour
RoHS conform	Directive 2011/65/EU & (EU)2015/863
Specification / Vibration	JIS C 5101-4 / 0.75mm, 10...55Hz, 10g, 3x2h

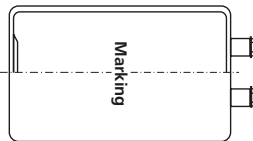


> Outline Drawings · Bauformen

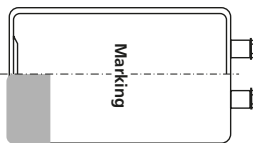
Shape: B (ØD = 51-101)
(for Bolt – Mounting, M12x16, stud bolt is not isolated)
Form: B (ØD = 51-101)
(für Bolzenbefestigung, M12x16, Bolzen nicht isoliert)



Shape: N (for PBT-Holder ØD = 77-101 and Press Ring ØD = 64-90)
Form: N (für PBT-Halter ØD = 77-101 und Einpressring ØD = 64-90)



Shape: Y (ØD = 51-101)
(double sleeve, Y-bracket free of charge)
Form: Y (ØD = 51-101)
(mit doppelter Isolierung, Y-Schelle wird kostenlos mitgeliefert)



ØD	P	S	T _L	T _D	Cap material
64	28.6	M5x10	8.0	11	PH
77	31.5	M6x12	9.0	12	PH
90	31.5	M6x12	8.0	12	PH

Size in mm. First listed terminal is standard.

> Product Code · Bestellbezeichnung

Example: Series VFLR · 12000 μF +/- 20 % · 400 V · D=90 mm · L= 167 mm with Y-Bracket

VFLR		2G		123		Y		F		167 ()																					
Type of series		Capacitance code		Rated voltage code		Fixing symbol code		Case code diameter		Customers' specification																					
		The first two digits are significant. The last digit indicates the number of following zeros in μF.		<table border="1"> <thead> <tr> <th>Code</th> <th>Voltage</th> <th>Code</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>2V</td> <td>350</td> <td>2W</td> <td>450</td> </tr> <tr> <td>2G</td> <td>400</td> <td>2H</td> <td>500</td> </tr> </tbody> </table>		Code	Voltage	Code	Voltage	2V	350	2W	450	2G	400	2H	500	B : Bolt ØD = 51 - 101 N : No double sleeve (PBT-Safety-holder or press ring) Y : 3 Stoppers Bracket ØD = 64 – 90 For bolt: Case length +1mm		<table border="1"> <thead> <tr> <th>ØD</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>64</td> <td>D</td> </tr> <tr> <td>77</td> <td>E</td> </tr> <tr> <td>90</td> <td>F</td> </tr> </tbody> </table>		ØD	Code	64	D	77	E	90	F	Case Code length Length in mm (3 digits)	
Code	Voltage	Code	Voltage																												
2V	350	2W	450																												
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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [μ F]	Ripple Current at 85°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [m Ω]	Zmax at 20°C/10kHz [m Ω]	ESL (typ) [nH]	Dissipation Factor at 20°C/120Hz Tan δ	DxL [mm]	Product Code # = variable value, see fixing code in the product code
350 VDC Code: 2V Surge Voltage 400 VDC	3 900	17.0	35.7	14	16	18	0.2	64x107	VFLR2V392#D107
	4 700	19.2	40.3	11	13	18	0.2	64x123	VFLR2V472#D123
	5 600	20.6	43.3	10	11	18	0.2	64x147	VFLR2V562#D147
		23.5	49.4	10	11	20	0.2	77x108	VFLR2V562#E108
	6 800	23.3	48.9	8	10	18	0.2	64x164	VFLR2V682#D164
		26.5	55.7	8	10	20	0.2	77x124	VFLR2V682#E124
	8 200	25.8	54.2	7	8	18	0.2	64x187	VFLR2V822#D187
		28.5	59.9	7	8	20	0.2	77x148	VFLR2V822#E148
		32.6	68.5	7	8	20	0.2	90x110	VFLR2V822#F110
	10 000	32.1	67.4	5	7	20	0.2	77x165	VFLR2V103#E165
		35.9	75.4	5	7	20	0.2	90x126	VFLR2V103#F126
	12 000	35.3	74.1	5	5	20	0.2	77x188	VFLR2V123#E188
		39.1	82.1	5	5	20	0.2	90x150	VFLR2V123#F150
	15 000	40.8	85.7	4	5	20	0.2	77x228	VFLR2V153#E228
		43.3	90.9	4	5	20	0.2	90x167	VFLR2V153#F167
	18 000	47.1	98.9	3	4	20	0.2	90x190	VFLR2V183#F190
22 000	51.2	107.5	3	4	20	0.2	90x230	VFLR2V223#F230	
400 VDC Code: 2G Surge Voltage 450 VDC	3 300	15.7	33.0	16	19	18	0.2	64x107	VFLR2G332#D107
	3 900	17.5	36.8	14	16	18	0.2	64x123	VFLR2G392#D123
	4 700	18.9	39.7	11	13	18	0.2	64x147	VFLR2G472#D147
		21.5	45.2	11	13	20	0.2	77x108	VFLR2G472#E108
	5 600	21.2	44.5	10	11	18	0.2	64x164	VFLR2G562#D164
		24.0	50.4	10	11	20	0.2	77x124	VFLR2G562#E124
	6 800	23.5	49.4	8	10	18	0.2	64x187	VFLR2G682#D187
		26.0	54.6	8	10	20	0.2	77x148	VFLR2G682#E148
		29.7	62.4	8	10	20	0.2	90x110	VFLR2G682#F110
	8 200	28.4	59.6	7	8	20	0.2	77x148	VFLR2G822#E148
		29.1	61.1	7	8	20	0.2	77x165	VFLR2G822#E165
		32.5	68.3	7	8	20	0.2	90x126	VFLR2G822#F126
	10 000	32.2	67.6	5	7	20	0.2	77x188	VFLR2G103#E188
		35.7	75.0	5	7	20	0.2	90x150	VFLR2G103#F150
	12 000	36.5	76.7	5	5	20	0.2	77x228	VFLR2G123#E228
		38.7	81.3	5	5	20	0.2	90x167	VFLR2G123#F167
15 000	43.0	90.3	4	5	20	0.2	90x190	VFLR2G153#F190	
18 000	46.3	97.2	3	4	20	0.2	90x230	VFLR2G183#F230	
450 VDC Code: 2W Surge Voltage 500 VDC	2 700	14.5	30.5	20	23	18	0.2	64x107	VFLR2W272#D107
	3 300	16.5	34.7	16	19	18	0.2	64x123	VFLR2W332#D123
	3 900	17.6	37.0	14	16	18	0.2	64x147	VFLR2W392#D147
		20.1	42.2	14	16	20	0.2	77x108	VFLR2W392#E108
	4 700	19.9	41.8	11	13	18	0.2	64x164	VFLR2W472#D164
		22.6	47.5	11	13	20	0.2	77x124	VFLR2W472#E124
	5 600	21.9	46.0	10	11	18	0.2	64x187	VFLR2W562#D187
		24.1	50.6	10	11	20	0.2	77x148	VFLR2W562#E148
	27.6	58.0	10	11	20	0.2	90x110	VFLR2W562#F110	

Additional designs on request · Weitere Designs auf Anfrage

VFLR · Screw-Terminal · 12000 h/85 °C

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [μ F]	Ripple Current at 85°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [m Ω]	Zmax at 20°C/10kHz [m Ω]	ESL (typ) [nH]	Dissipation Factor at 20°C/120Hz Tan δ	DxL [mm]	Product Code # = variable value, see fixing code in the product code	
450 VDC Code: 2W Surge Voltage 500 VDC	6 800	27.1	56.9	8	10	20	0.2	77x165	VFLR2W682#E165	
		30.3	63.6	8	10	20	0.2	90x126	VFLR2W682#F126	
	8 200	29.9	62.8	7	8	20	0.2	77x188	VFLR2W822#E188	
		33.1	69.5	7	8	20	0.2	90x150	VFLR2W822#F150	
	10 000	34.1	71.6	5	7	20	0.2	77x228	VFLR2W103#E228	
		36.5	76.7	5	7	20	0.2	90x150	VFLR2W103#F150	
	12 000	39.4	82.7	5	5	20	0.2	90x190	VFLR2W123#F190	
		43.3	90.9	4	5	20	0.2	90x230	VFLR2W153#F230	
	500 VDC Code: 2H Surge Voltage 550 VDC	1 800	11.3	23.7	32	38	18	0.2	64x107	VFLR2H182#D107
		2 200	12.8	26.9	26	31	18	0.2	64x123	VFLR2H222#D123
		2 700	13.9	29.2	22	26	18	0.2	64x147	VFLR2H272#D147
			15.9	33.4	22	26	20	0.2	77x108	VFLR2H272#E108
3 300		15.8	33.2	18	21	18	0.2	64x164	VFLR2H332#D164	
		18.0	37.8	18	21	20	0.2	77x124	VFLR2H332#E124	
3 900		17.3	36.3	15	18	18	0.2	64x187	VFLR2H392#D187	
		19.1	40.1	15	18	20	0.2	77x148	VFLR2H392#E148	
4 700		21.9	46.0	15	18	20	0.2	90x110	VFLR2H392#F110	
		21.4	44.9	13	15	20	0.2	77x165	VFLR2H472#E165	
5 600		24.0	50.4	13	15	20	0.2	90x126	VFLR2H472#F126	
		23.5	49.4	11	13	20	0.2	77x188	VFLR2H562#E188	
6 800		26.0	54.6	11	13	20	0.2	90x150	VFLR2H562#F150	
		26.7	56.1	9	10	20	0.2	77x228	VFLR2H682#E228	
8 200		28.4	59.6	9	10	20	0.2	90x167	VFLR2H682#F167	
		31.0	65.1	8	8	20	0.2	90x190	VFLR2H822#F190	
10 000		33.6	70.6	6	7	20	0.2	90x230	VFLR2H103#F230	

> Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	$\geq 10k$	Forced cooling [m/sec]	$v < 0.5$	$v \geq 0.5$	$v \geq 2.0$	$v \geq 3.0$
Multiplier	0.80	1.00	1.18	1.34	1.45	Multiplier	1.00	1.10	1.20	1.25

Ta (°C)	40	45	50	55	60	65	70	75	80	85
Multiplier	2.1	2.1	2.0	1.9	1.8	1.6	1.5	1.3	1.1	1.0

Additional designs on request · Weitere Designs auf Anfrage

> Life Time Table · Brauchbarkeitsdauer – Tabelle

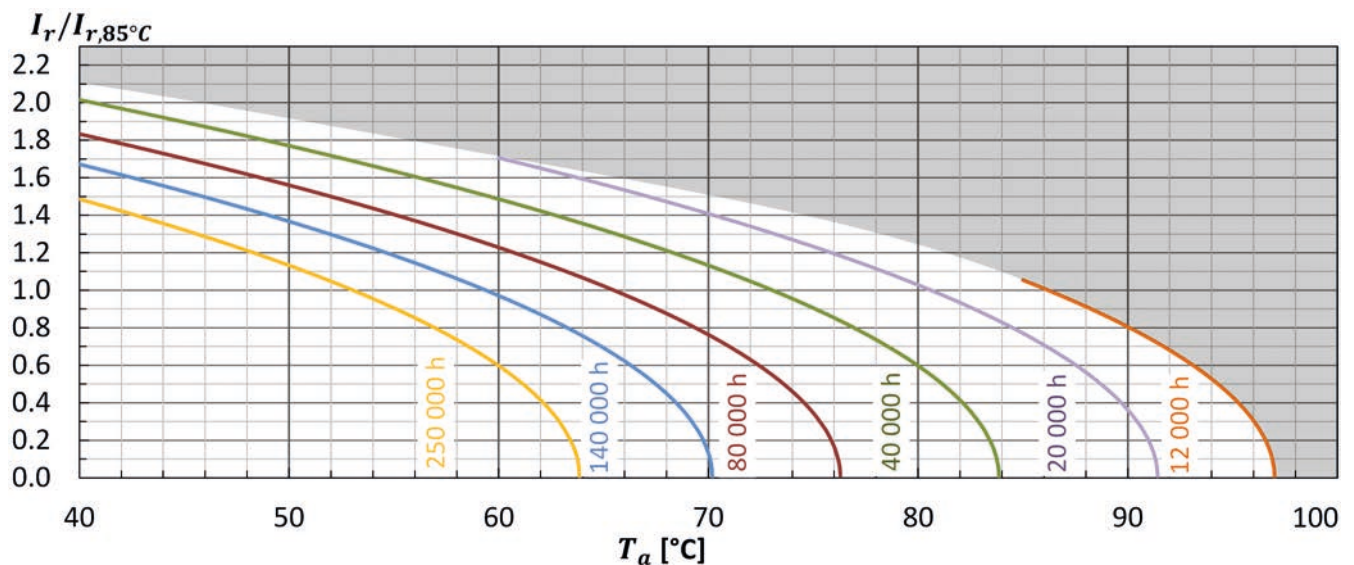
VFLR I_r at 85°C	Useful life as function of ambient temperature and ripple current											
	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1
$T_a = 40^\circ\text{C}$	250	250	250	250	250	240	176	127	90	62	42	28
$T_a = 45^\circ\text{C}$	250	250	250	250	202	151	111	80	57	39	26	17
$T_a = 50^\circ\text{C}$	250	250	214	167	127	96	70	50	36	25	16	
$T_a = 55^\circ\text{C}$	209	170	135	105	80	60	44	32	22	15		
$T_a = 60^\circ\text{C}$	132	107	85	66	51	38	28	20	14			
$T_a = 65^\circ\text{C}$	83	68	54	42	32	24	17					
$T_a = 70^\circ\text{C}$	52	43	34	26	20	15						
$T_a = 75^\circ\text{C}$	33	27	21	16								
$T_a = 80^\circ\text{C}$	21	17										
$T_a = 85^\circ\text{C}$	12											

khrs Max. value limited to 250 000 hours.

> Life Time Graph · Brauchbarkeitsdauer – Diagramm

Useful life depending on ambient temperature T_a and ripple current operating conditions I_r versus rated ripple current at the upper category temperature $I_r, 85^\circ\text{C}, 120\text{Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorie-temperatur $I_r, 85^\circ\text{C}, 120\text{Hz}$



> Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	$T_a = 85^\circ\text{C}$; V_r, I_r applied 8000 hours	$\Delta C/C \leq 15\%$ (of initial value) $Tan\delta \leq 175\%$ (of specified value) $I_l \leq$ specified value
Useful life	$T_a = 85^\circ\text{C}$; V_r, I_r applied 12000 hours	$\Delta C/C \leq 20\%$ (of initial value) $Tan\delta < 200\%$ (of specified value) $I_l \leq$ specified value

Reference Specification: JIS C 5101-4, JIS C 5102, IEC 60384-4