VFLR · Screw-Terminal · 12000 h/85 °C

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

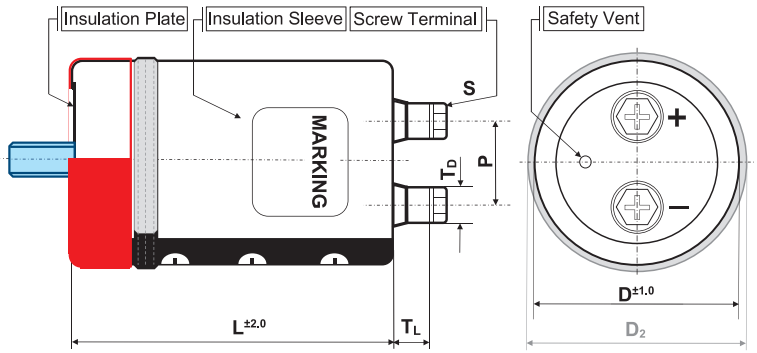
› Specifications · Spezifikationen

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 / ≤ 70V
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
Outer materials	UL94-V0 / UL224-VW1 certified (cap / sleeve)
Sleeve withstanding voltage	4000 Vac / 1min between terminals bundled and plate*

* Typical value

› Shape designation · Formbezeichnung

- for details refer to p. 8–9 · technische Details siehe S. 8–9
- for mounting options refer to p. 149 ff · Montageoptionen siehe S. 149 ff



	B	I / Y	N	N + WC
outer sleeve	•	•	•	•
insulation plate	•	•	•	
stud bolt	•			
bottom double sleeve		•		
integrated seating ring				•

ØD	available shape	P	S	T_L	T_D	Cap material
64	B, N, I, Y	28.6	M5x10	8.0	11	PH
77	B, N, I, Y, WC	31.5	M6x12	9.0	12	PH
90	B, N, I, Y, WC	31.5	M6x12	8.0	12	PH

Size in mm

› 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

The first two digits are significant. The last digit indicates the number of following zeros in µF.

Rated voltage code

Code	Voltage	Code	Voltage
2V	350	2W	450
2G	400	2H	500

Fixing symbol code

- B : Bolt
- N : single outer sleeve
- I : 2 Stoppers Bracket
- Y : 3 Stoppers Bracket
- N + suffix WC: blank bottom + seating ring

Case code diameter

ØD	Code
64	D
77	E
90	F

Capacitance tolerance

- Ø : ± 20 %
- Q : -10 % ~ + 30 %

Specific features

Case Code length

Length in mm (3 digits)

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	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	0.20	64x107	VFLR2V392#D107
	4 700	19.2	40.3	11	13	18	0.20	64x123	VFLR2V472#D123
	5 600	20.6	43.3	10	11	18	0.20	64x147	VFLR2V562#D147
		23.5	49.4	10	11	20	0.20	77x108	VFLR2V562#E108
	6 800	23.3	48.9	8	10	18	0.20	64x164	VFLR2V682#D164
		26.5	55.7	8	10	20	0.20	77x124	VFLR2V682#E124
	8 200	25.8	54.2	7	8	18	0.20	64x187	VFLR2V822#D187
		28.5	59.9	7	8	20	0.20	77x148	VFLR2V822#E148
		32.6	68.5	7	8	20	0.20	90x110	VFLR2V822#F110
	10 000	32.1	67.4	5	7	20	0.20	77x165	VFLR2V103#E165
		35.9	75.4	5	7	20	0.20	90x126	VFLR2V103#F126
	12 000	35.3	74.1	5	5	20	0.20	77x188	VFLR2V123#E188
		39.1	82.1	5	5	20	0.20	90x150	VFLR2V123#F150
	15 000	40.8	85.7	4	5	20	0.20	77x228	VFLR2V153#E228
		43.3	90.9	4	5	20	0.20	90x167	VFLR2V153#F167
	18 000	47.1	98.9	3	4	20	0.20	90x190	VFLR2V183#F190
	22 000	52.0	109.2*	3	4	20	0.20	90x190	VFLR2V223#F190
		51.2	107.5*	3	4	20	0.20	90x230	VFLR2V223#F230
400 VDC Code: 2G Surge Voltage 450 VDC	**3 300**	15.7	33.0	16	19	18	0.20	64x107	VFLR2G332#D107
	3 900	17.5	36.8	14	16	18	0.20	64x123	VFLR2G392#D123
	4 700	18.9	39.7	11	13	18	0.20	64x147	VFLR2G472#D147
		21.5	45.2	11	13	20	0.20	77x108	VFLR2G472#E108
	5 600	21.2	44.5	10	11	18	0.20	64x164	VFLR2G562#D164
		24.0	50.4	10	11	20	0.20	77x124	VFLR2G562#E124
	6 800	23.5	49.4	8	10	18	0.20	64x187	VFLR2G682#D187
		26.0	54.6	8	10	20	0.20	77x148	VFLR2G682#E148
		29.7	62.4	8	10	20	0.20	90x110	VFLR2G682#F110
	8 200	28.4	59.6	7	8	20	0.20	77x148	VFLR2G822#E148
		29.1	61.1	7	8	20	0.20	77x165	VFLR2G822#E165
		32.5	68.3	7	8	20	0.20	90x126	VFLR2G822#F126
	10 000	32.2	67.6	5	7	20	0.20	77x188	VFLR2G103#E188
		35.7	75.0	5	7	20	0.20	90x150	VFLR2G103#F150
	12 000	36.5	76.7	5	5	20	0.20	77x228	VFLR2G123#E228
		38.7	81.3	5	5	20	0.20	90x167	VFLR2G123#F167
	15 000	43.0	90.3	4	5	20	0.20	90x190	VFLR2G153#F190
	18 000	46.3	97.2	3	4	20	0.20	90x230	VFLR2G183#F230
450 VDC Code: 2W Surge Voltage 500 VDC	**2 700**	14.5	30.5	20	23	18	0.20	64x107	VFLR2W272#D107
	3 300	16.5	34.7	16	19	18	0.20	64x123	VFLR2W332#D123
	3 900	17.6	37.0	14	16	18	0.20	64x147	VFLR2W392#D147
		20.1	42.2	14	16	20	0.20	77x108	VFLR2W392#E108
	4 700	19.9	41.8	11	13	18	0.20	64x164	VFLR2W472#D164
		22.6	47.5	11	13	20	0.20	77x124	VFLR2W472#E124
	5 600	21.9	46.0	10	11	18	0.20	64x187	VFLR2W562#D187
		24.1	50.6	10	11	20	0.20	77x148	VFLR2W562#E148
		27.6	58.0	10	11	20	0.20	90x110	VFLR2W562#F110

Additional designs on request · Weitere Designs auf Anfrage

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Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 85°C/120Hz I_r [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	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**	22.9	48.1	8	10	20	0.20	64x187	VFLR2W682#D187
		27.1	56.9	8	10	20	0.20	77x165	VFLR2W682#E165
		30.3	63.6	8	10	20	0.20	90x126	VFLR2W682#F126
	8 200	29.9	62.8	7	8	20	0.20	77x188	VFLR2W822#E188
		33.1	69.5	7	8	20	0.20	90x150	VFLR2W822#F150
	10 000	34.1	71.6	5	7	20	0.20	77x228	VFLR2W103#E228
		36.5	76.7	5	7	20	0.20	90x150	VFLR2W103#F150
	12 000	39.4	82.7	5	5	20	0.20	90x190	VFLR2W123#F190
	15 000	43.3	90.9	4	5	20	0.20	90x230	VFLR2W153#F230
500 VDC Code: 2H Surge Voltage 550 VDC	**1 800**	11.3	23.7	32	38	18	0.20	64x107	VFLR2H182#D107
	2 200	12.8	26.9	26	31	18	0.20	64x123	VFLR2H222#D123
	2 700	13.9	29.2	22	26	18	0.20	64x147	VFLR2H272#D147
		15.9	33.4	22	26	20	0.20	77x108	VFLR2H272#E108
	3 300	15.8	33.2	18	21	18	0.20	64x164	VFLR2H332#D164
		18.0	37.8	18	21	20	0.20	77x124	VFLR2H332#E124
	3 900	17.3	36.3	15	18	18	0.20	64x187	VFLR2H392#D187
		19.1	40.1	15	18	20	0.20	77x148	VFLR2H392#E148
		21.9	46.0	15	18	20	0.20	90x110	VFLR2H392#F110
	4 700	21.4	44.9	13	15	20	0.20	77x165	VFLR2H472#E165
		24.0	50.4	13	15	20	0.20	90x126	VFLR2H472#F126
	5 600	23.5	49.4	11	13	20	0.20	77x188	VFLR2H562#E188
		26.0	54.6	11	13	20	0.20	90x150	VFLR2H562#F150
	6 800	26.7	56.1	9	10	20	0.20	77x228	VFLR2H682#E228
		28.4	59.6	9	10	20	0.20	90x167	VFLR2H682#F167
	8 200	31.0	65.1	8	8	20	0.20	90x190	VFLR2H822#F190
	10 000	34.2	71.8	6	7	20	0.20	90x190	VFLR2H103#F190
		33.6	70.6	6	7	20	0.20	90x230	VFLR2H103#F230

* Please contact us if load condition exceeds terminals related $I_{r\,max}$ referred on page 9

Additional designs on request · Weitere Designs auf Anfrage

› Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k
Multiplier	0.80	1.00	1.18	1.34	1.45

Forced cooling [m/sec]	v < 0.5	v ≥ 0.5	v ≥ 2.0	v ≥ 3.0
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

› Life Time Table · Brauchbarkeitsdauer – Tabelle

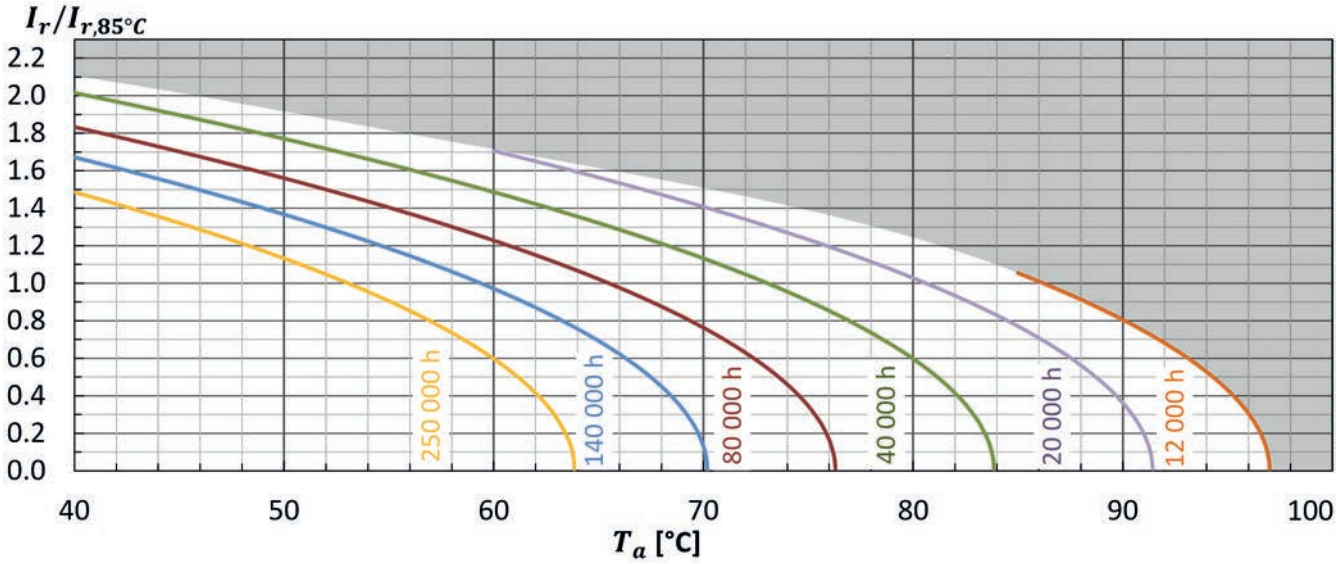
VFLR	Useful life as function of ambient temperature and ripple current											
I_r at 85°C	x 1.0	x 1.1	x 1.2	x 1.3	x 1.4	x 1.5	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1
T_a = 40°C	250	250	250	250	250	240	176	127	90	62	42	28
T_a = 45°C	250	250	250	250	202	151	111	80	57	39	26	17
T_a = 50°C	250	250	214	167	127	96	70	50	36	25	16	
T_a = 55°C	209	170	135	105	80	60	44	32	22	15		
T_a = 60°C	132	107	85	66	51	38	28	20	14			
T_a = 65°C	83	68	54	42	32	24	17					
T_a = 70°C	52	43	34	26	20	15						
T_a = 75°C	33	27	21	16								
T_a = 80°C	21	17										
T_a = 85°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 $I_{r,\ 85°C,120Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorietemperatur $I_{r,\ 85°C,120Hz}$



› Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	T_a = 85°C; V_r, I_r applied 8000 hours	ΔC/C ≤ 10% (of initial value) Tanδ ≤ 175% (of specified value) I_L ≤ specified value
Useful life	T_a = 85°C; V_r, I_r applied 12000 hours	ΔC/C ≤ 15% (of initial value) Tanδ < 200% (of specified value) I_L ≤ specified value

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