VGL · Screw-Terminal · 12000 h/105°C

Long Life · Bottom cooling design

Optional design for permanent and deep charge-discharge application with high voltage hub and pulsed operation mode upon request.

Spezielles Design für häufige und tiefe Lade-, Entladeanwendungen mit hohem Spannungshub und Impulsbetrieb auf Anfrage erhältlich.

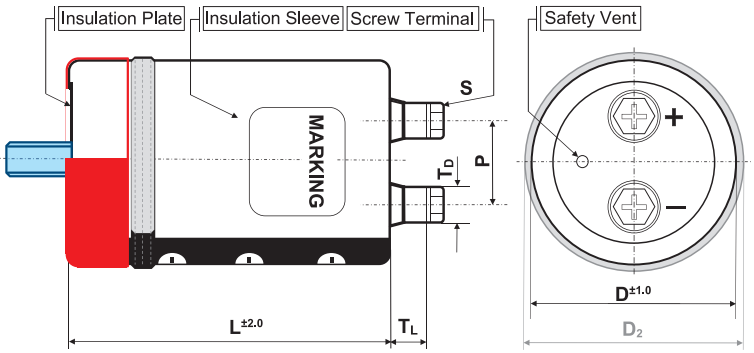
› Specifications · Spezifikationen

Items	Characteristics
Temperature range	-40°C ~ + 105°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 105°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	M5x10	8.0	11	PH
			M6x12	9.0	12	PH
90	B, N, I, Y, WC	31.5	M5x10	7.0	11	PH
			M6x12	8.0	12	PH

Size in mm. First listed terminal is standard.

› Product Code · Bestellbezeichnung

Example: Series VGL · 15000 µF +/- 20 % · 400 V · D = 90 mm · L = 190 mm with Y-Bracket

VGL **2G** **153** **Y** **F** **190**

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

Capacitance tolerance
- Ø : ± 20 %
- Q : -10 % ~ + 30 %

Case code diameter

ØD	Code
64	D
77	E
90	F

Specific features (e.g. M6 …)

Case Code length
Length in mm (3 digits)

Rated VoltageCode (Surge Voltage) V_r [V DC]	Capacitance C_r [µF]	Ripple Current at 105°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**	10.5	28.4	27	32	18	0.20	64x94	VGL2V392#D094
	4 700	11.9	32.1	22	23	18	0.20	64x107	VGL2V472#D107
	5 600	13.0	35.1	20	21	18	0.20	64x123	VGL2V562#D123
		14.6	39.4	20	21	20	0.20	77x95	VGL2V562#E095
	6 800	14.1	38.1	18	18	18	0.20	64x147	VGL2V682#D147
		16.0	43.2	18	18	20	0.20	77x108	VGL2V682#E108
		18.5	50.0	18	18	20	0.20	90x97	VGL2V682#F097
	8 200	15.9	42.9	15	17	18	0.20	64x187	VGL2V822#D187
		18.0	48.6	15	17	20	0.20	77x124	VGL2V822#E124
		20.2	54.5	15	17	20	0.20	90x110	VGL2V822#F110
	10 000	19.5	52.7	12	15	20	0.20	77x148	VGL2V103#E148
		22.1	59.7	12	15	20	0.20	90x126	VGL2V103#F126
	12 000	21.8	58.9	10	13	20	0.20	77x188	VGL2V123#E188
		24.1	65.1	10	13	20	0.20	90x150	VGL2V123#F150
	15 000	25.2	68.0	8	11	20	0.20	77x228	VGL2V153#E228
		26.5	71.6	8	11	20	0.20	90x167	VGL2V153#F167
	18 000	29.3	79.1	6	9	20	0.20	90x190	VGL2V183#F190
	22 000	31.5	85.1	5	7	20	0.20	90x230	VGL2V223#F230
400 VDC Code: 2G Surge Voltage 450 VDC	**3 300**	9.7	26.2	30	35	18	0.20	64x94	VGL2G332#D094
	3 900	10.8	29.2	27	32	18	0.20	64x107	VGL2G392#D107
	4 700	11.9	32.1	22	23	18	0.20	64x123	VGL2G472#D123
		13.3	35.9	22	23	20	0.20	77x95	VGL2G472#E095
	5 600	12.8	34.6	20	21	18	0.20	64x147	VGL2G562#D147
		14.5	39.2	20	21	20	0.20	77x108	VGL2G562#E108
		16.8	45.4	20	21	20	0.20	90x97	VGL2G562#F097
	6 800	14.5	39.2	18	18	18	0.20	64x187	VGL2G682#D187
		16.4	44.3	18	18	20	0.20	77x124	VGL2G682#E124
		18.4	49.7	18	18	20	0.20	90x110	VGL2G682#F110
	8 200	18.0	48.6	15	17	20	0.20	77x165	VGL2G822#E165
		20.0	54.0	15	17	20	0.20	90x126	VGL2G822#F126
	10 000	19.9	53.7	12	15	20	0.20	77x188	VGL2G103#E188
		22.0	59.4	12	15	20	0.20	90x150	VGL2G103#F150
	12 000	23.7	64.0	10	13	20	0.20	90x167	VGL2G123#F167
	15 000	26.7	72.1	8	11	20	0.20	90x190	VGL2G153#F190
	18 000	28.5	77.0	7	9	20	0.20	90x230	VGL2G183#F230
450 VDC Code: 2W Surge Voltage 500 VDC	**2 200**	8.1	21.9	42	42	18	0.20	64x94	VGL2W222#D094
	2 700	9.2	24.8	42	42	18	0.20	64x107	VGL2W272#D107
	3 300	10.2	27.5	35	40	18	0.20	64x123	VGL2W332#D123
		11.4	30.8	35	40	20	0.20	77x95	VGL2W332#E095
	3 900	10.9	29.4	27	32	18	0.20	64x147	VGL2W392#D147
		12.4	33.5	27	32	20	0.20	77x108	VGL2W392#E108
	4 700	12.2	32.9	24	27	18	0.20	64x164	VGL2W472#D164
		13.9	37.5	24	27	20	0.20	77x124	VGL2W472#E124
		15.8	42.7	24	27	20	0.20	90x97	VGL2W472#F097

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 105°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	**5 600**	13.5	36.5	24	23	18	0.20	64x187	VGL2W562#D187
		14.9	40.2	22	23	20	0.20	77x148	VGL2W562#E148
		17.1	46.2	22	23	20	0.20	90x110	VGL2W562#F110
	6 800	16.8	45.4	20	20	20	0.20	77x165	VGL2W682#E165
		18.7	50.5	20	20	20	0.20	90x126	VGL2W682#F126
	8 200	18.5	50.0	18	18	20	0.20	77x188	VGL2W822#E188
		20.4	55.1	18	18	20	0.20	90x150	VGL2W822#F150
	10 000	20.4	55.1	15	15	20	0.20	77x188	VGL2W103#E188
		22.2	59.9	15	15	20	0.20	90x167	VGL2W103#F167
	12 000	24.5	66.2	13	12	20	0.20	90x190	VGL2W123#F190
	15 000	26.6	71.8	11	10	20	0.20	90x230	VGL2W153#F230
500 VDC Code: 2H Surge Voltage 550 VDC	**1 500**	6.5	17.6	74	80	18	0.20	64x107	VGL2H152#D107
	1 800	7.2	19.4	62	50	18	0.20	64x123	VGL2H182#D123
		8.0	21.6	62	50	20	0.20	77x95	VGL2H182#E095
	2 200	7.8	21.1	53	50	18	0.20	64x147	VGL2H222#D147
		8.9	24.0	53	50	20	0.20	77x108	VGL2H222#E108
	2 700	8.8	23.8	40	35	18	0.20	64x164	VGL2H272#D164
		11.4	30.8	40	35	20	0.20	90x97	VGL2H272#F097
	3 300	9.8	26.5	38	32	18	0.20	64x187	VGL2H332#D187
		11.1	30.0	38	32	20	0.20	77x124	VGL2H332#E124
		12.5	33.8	38	32	20	0.20	90x110	VGL2H332#F110
	3 900	11.9	32.1	30	27	20	0.20	77x148	VGL2H392#E148
		13.5	36.5	30	27	20	0.20	90x126	VGL2H392#F126
	4 700	13.3	35.9	25	20	20	0.20	77x165	VGL2H472#E165
		14.7	39.7	25	20	20	0.20	90x150	VGL2H472#F150
	5 600	14.6	39.4	20	17	20	0.20	77x188	VGL2H562#E188
		15.8	42.7	20	17	20	0.20	90x167	VGL2H562#F167
	6 800	17.5	47.3	17	17	20	0.20	90x190	VGL2H682#F190
	8 200	18.8	50.8	14	14	20	0.20	90x230	VGL2H822#F230

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	50	60	65	70	75	80	85	90	95	100	105
Multiplier	2.7	2.6	2.5	2.4	2.3	2.2	2.1	2.0	1.8	1.4	1.2	1.0

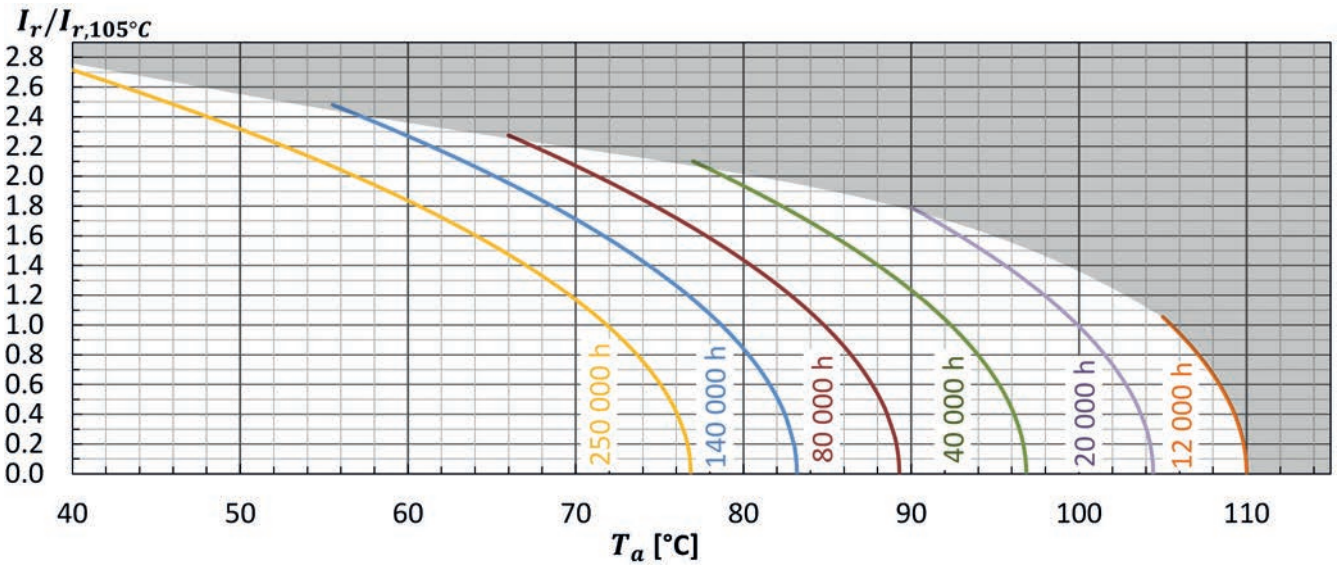
› Life Time Table · Brauchbarkeitsdauer – Tabelle

VGL	Useful life as function of ambient temperature and ripple current											
I_r at 105°C	x 1.0	x 1.2	x 1.4	x 1.7	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	250	250
T_a = 45°C	250	250	250	250	250	250	250	250	250	250	250	
T_a = 50°C	250	250	250	250	250	250	250	250	250	222		
T_a = 55°C	250	250	250	250	250	250	250	209	172			
T_a = 60°C	250	250	250	250	225	190	159	132				
T_a = 65°C	250	250	250	225	142	120	100					
T_a = 70°C	250	250	208	142	90	76	63					
T_a = 75°C	196	163	132	90	56	48						
T_a = 80°C	124	103	83	56	36							
T_a = 85°C	78	65	52	36	22							
T_a = 90°C	49	41	33	22								
T_a = 95°C	31	26	21									
T_a = 100°C	19	16										
T_a = 105°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 $I_{r,\,105°C,120Hz}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T_a und Wechselstrombelastung I_r im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorietemperatur $I_{r,\,105°C,120Hz}$



› Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	T_a = 105°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 = 105°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