VGLR · Screw-Terminal · 12000 h/105 °C

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

› Specifications · Spezifikationen

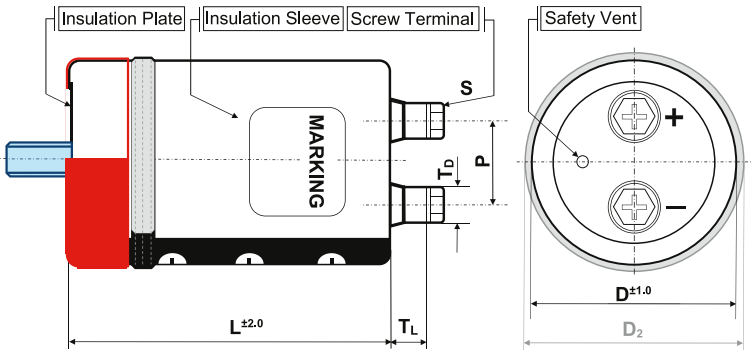
Items	Characteristics
Temperature range	-40°C ~ + 105°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10/+30% on request
Surge voltage / Ripple voltage	Repetitive max. 30 sec per 6 Minutes / ≤ 50V
Leakage current max. I_L (20°C, 5 min)	0.01 • C • V_r [µA] or 5 mA, which is smaller.
Useful life	12 000 hours at 105°C
Field failure rate	0.5 FIT = 0.5 • 10^{-9} Failures/hour
Reference standards	IEC 60384-4, JIS C 5101-4
Vibration	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*
Product Compliance	RoHS, REACH, Conflict Minerals a.o. – refer to p. 12–13

* Typical value

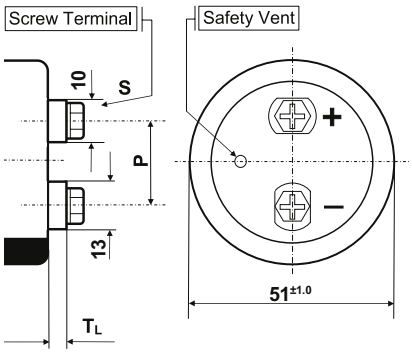
› Shape designation · Formbezeichnung

• additional information on p. 10–11 · Zusatzinformationen auf S. 10–11
• mounting accessories from p. 189 · Montagezubehör ab S. 189

Diameter 64 mm to 90 mm



Diameter 51 mm



Shape code Features	B Bolt	I / Y double sleeve for 2/3 points metal Bracket	N + suffix WC blank bottom + seating ring	N standard
outer insulation sleeve	•	•	•	•
insulation plate	•	•		•
stud bolt	•			
bottom double sleeve		•		
integrated seating ring			•	

diameter code	ØD	available shape	P	S	T_L	T_D	Cap material
C	51	B, N, I, Y	22.0	M5x10	4.5	13/10	PH
D	64	B, N, I, Y	28.6	M5x10	8.0	11	PH
E	77	B, N, I, Y, WC	31.5	M6x12	9.0	12	PH
F	90	B, N, I, Y, WC	31.5	M6x12	8.0	12	PH

Size in mm

› Product Code · Bestellbezeichnung

Example: Series VGLR · 12000 µF +/- 20 % · 400 V · D = 90 mm · L = 190 mm for bottom cooling

VGLR **2G** **123** **N** **F** **190** **WC**

- **VGLR** — Series name
- **2G** — Rated voltage code
- **123** — Capacitance code
- **N** — Shape code
- **F** — Diameter code
- **190** — Case length code – length in mm (3 digits)
- **WC** — Specific features

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

Rated voltage code			
Code	**Voltage**	**Code**	**Voltage**
2V	350	2W	450
2G	400	2H	500

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	**1 800**	9.1	21.0	30	31	17	0.20	51x96	VGLR2V182#C096
	2 200	10.2	23.5	25	26	17	0.20	51x109	VGLR2V222#C109
	2 700	11.4	26.3	20	21	17	0.20	51x125	VGLR2V272#C125
	3 300	15.1	34.7	16	19	18	0.20	64x107	VGLR2V332#D107
	3 900	16.8	38.6	14	16	18	0.20	64x123	VGLR2V392#D123
	4 700	18.2	41.9	11	13	18	0.20	64x147	VGLR2V472#D147
		20.6	47.4	11	13	20	0.20	77x108	VGLR2V472#E108
	5 600	20.3	46.7	10	11	18	0.20	64x164	VGLR2V562#D164
		23.1	53.1	10	11	20	0.20	77x124	VGLR2V562#E124
	6 800	22.6	52.0	8	10	18	0.20	64x187	VGLR2V682#D187
		24.9	57.3	8	10	20	0.20	77x148	VGLR2V682#E148
		28.6	65.8	8	10	20	0.20	90x110	VGLR2V682#F110
	8 200	27.9	64.2	7	8	20	0.20	77x165	VGLR2V822#E165
		31.0	71.3	7	8	20	0.20	90x150	VGLR2V822#F150
	10 000	31.0	71.3	5	7	20	0.20	77x188	VGLR2V103#E188
		34.2	78.7	5	7	20	0.20	90x150	VGLR2V103#F150
	12 000	35.1	80.7	5	5	20	0.20	77x228	VGLR2V123#E228
		36.8	84.6	5	5	20	0.20	90x167	VGLR2V123#F167
	15 000	41.5	95.5	4	5	20	0.20	90x190	VGLR2V153#F190
	18 000	44.3	101.9*	3	4	20	0.20	90x230	VGLR2V183#F230
	22 000	48.3	111.1*	3	3	20	0.20	90x268	VGLR2V223#F268
400 VDC Code: 2G Surge Voltage 450 VDC	**1 500**	8.4	19.4	35	38	17	0.20	51x96	VGLR2G152#C096
	1 800	9.4	21.7	30	32	17	0.20	51x109	VGLR2G182#C109
	2 200	10.6	24.4	24	26	17	0.20	51x125	VGLR2G222#C125
	2 700	13.6	31.3	20	22	18	0.20	64x107	VGLR2G272#D107
	3 300	15.5	35.7	16	18	18	0.20	64x123	VGLR2G332#D123
	3 900	16.5	38.0	14	16	18	0.20	64x147	VGLR2G392#D147
		18.8	43.2	14	16	20	0.20	77x108	VGLR2G392#E108
	4 700	18.6	42.8	11	13	18	0.20	64x164	VGLR2G472#D164
		21.2	48.8	11	13	20	0.20	77x124	VGLR2G472#E124
	5 600	20.5	47.2	10	11	18	0.20	64x187	VGLR2G562#D187
		23.1	53.1	10	11	20	0.20	77x124	VGLR2G562#E124

Additional designs on request · Weitere Designs auf Anfrage

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
400 VDC Code: 2G Surge Voltage 450 VDC	**5 600**	26.0	59.8	10	11	20	0.20	90x110	VGLR2G562#F110
	6 800	24.9	57.3	8	10	20	0.20	77x148	VGLR2G682#E148
		25.4	58.4	8	10	20	0.20	77x165	VGLR2G682#E165
		28.2	64.9	8	10	20	0.20	90x150	VGLR2G682#F150
	8 200	28.1	64.6	7	8	20	0.20	77x188	VGLR2G822#E188
		31.0	71.3	7	8	20	0.20	90x150	VGLR2G822#F150
	10 000	32.0	73.6	5	7	20	0.20	77x228	VGLR2G103#E228
		33.6	77.3	5	7	20	0.20	90x167	VGLR2G103#F167
	12 000	37.1	85.3	5	5	20	0.20	90x190	VGLR2G123#F190
	15 000	41.4	95.2	4	5	20	0.20	90x190	VGLR2G153#F190
		40.4	92.9	4	5	20	0.20	90x230	VGLR2G153#F230
	18 000	43.7	105.0*	3	4	20	0.20	90x268	VGLR2G183#F268
450 VDC Code: 2W Surge Voltage 500 VDC	**1 200**	7.9	18.2	44	47	17	0.20	51x96	VGLR2W122#C096
	1 500	9.0	20.7	36	39	17	0.20	51x109	VGLR2W152#C109
	1 800	10.1	23.3	30	33	17	0.20	51x125	VGLR2W182#C125
	2 200	12.6	29.0	24	27	18	0.20	64x107	VGLR2W222#D107
		14.9	34.3	24	27	18	0.20	77x77	VGLR2W222#E077
	2 700	14.4	33.1	20	22	18	0.20	64x123	VGLR2W272#D123
		16.1	37.0	20	22	20	0.20	77x108	VGLR2W272#E108
	3 300	15.6	35.9	16	18	18	0.20	64x147	VGLR2W332#D147
		18.5	42.6	16	18	20	0.20	77x108	VGLR2W332#E108
		18.2	41.9	16	18	20	0.20	77x124	VGLR2W332#E124
	3 900	17.5	40.3	14	16	18	0.20	64x164	VGLR2W392#D164
		19.4	44.6	14	16	20	0.20	77x148	VGLR2W392#E148
		22.3	51.3	14	16	20	0.20	90x110	VGLR2W392#F110
	4 700	19.3	44.4	11	13	18	0.20	64x187	VGLR2W472#D187
		21.3	49.0	11	13	20	0.20	77x148	VGLR2W472#E148
		24.2	55.7	11	13	20	0.20	90x126	VGLR2W472#F126
	5 600	23.2	53.4	10	11	20	0.20	77x148	VGLR2W562#E148
		23.7	54.5	10	11	20	0.20	77x165	VGLR2W562#E165
		26.3	60.5	10	11	20	0.20	90x150	VGLR2W562#F150
	6 800	26.3	60.5	8	10	20	0.20	77x188	VGLR2W682#E188
		28.9	66.5	8	10	20	0.20	90x150	VGLR2W682#F150
	8 200	29.8	68.5	7	8	20	0.20	77x228	VGLR2W822#E228
		31.5	72.5	7	8	20	0.20	90x190	VGLR2W822#F190
	10 000	33.9	78.0	5	6	20	0.20	90x230	VGLR2W103#F230
	15 000	41.0	94.3	4	5	20	0.20	90x268	VGLR2W153#F268
500 VDC Code: 2H Surge Voltage 550 VDC	**680**	4.6	10.6	85	90	17	0.20	51x96	VGLR2H681#C096
	820	5.2	12.0	70	74	17	0.20	51x109	VGLR2H821#C109
	1 000	5.9	13.6	58	62	17	0.20	51x125	VGLR2H102#C125
	1 500	8.4	19.3	38	41	18	0.20	64x107	VGLR2H152#D107
	1 800	9.5	21.9	32	36	18	0.20	64x123	VGLR2H182#D123
	2 200	10.3	23.7	26	30	18	0.20	64x147	VGLR2H222#D147
		11.7	26.9	26	30	20	0.20	77x108	VGLR2H222#E108

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
500 VDC Code: 2H Surge Voltage 550 VDC	**2 700**	11.8	27.1	22	26	18	0.20	64x187	VGLR2H272#D187
		13.3	30.6	22	26	20	0.20	77x124	VGLR2H272#E124
	3 300	14.4	33.1	18	21	18	0.20	77x148	VGLR2H332#E148
		16.5	38.0	18	21	20	0.20	90x110	VGLR2H332#F110
	3 900	15.9	36.6	15	16	20	0.20	77x165	VGLR2H392#E165
		17.8	40.9	15	16	20	0.20	90x126	VGLR2H392#F126
	4 700	17.6	40.5	13	13	20	0.20	77x188	VGLR2H472#E188
		19.4	44.6	13	13	20	0.20	90x150	VGLR2H472#F150
	5 600	19.8	45.5	11	11	20	0.20	77x228	VGLR2H562#E228
		21.1	48.5	11	11	20	0.20	90x150	VGLR2H562#F150
	6 800	23.1	53.1	9	11	20	0.20	90x190	VGLR2H682#F190
	7 500	24.2	55.7	9	10	20	0.20	90x190	VGLR2H752#F190
	8 200	24.7	56.8	8	9	20	0.20	90x230	VGLR2H822#F230
	10 000	27.0	62.1	7	7	20	0.20	90x268	VGLR2H103#F268

* Please contact us if load condition exceeds terminals related $I_{r\,max}$ referred on page 11

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

Ta (°C)	40	50	60	65	70	75	80	85	90	95	100	105
Multiplier	2.3	2.1	2.0	1.9	1.9	1.8	1.7	1.6	1.4	1.2	1.1	1.0

Forced cooling – Wind speed [m/sec]	v < 0.25	v ≥ 0.25	v ≥ 0.5	v ≥ 1.0	v ≥ 2.0	v ≥ 3.0
Multiplier	1.00	1.07	1.15	1.25	1.30	1.35

Water cooled heatsink – size ratio [L/D]	1.10	1.25	1.40	1.55	1.70	2.00	2.50	3.00
Multiplier	2.0	1.9	1.7	1.6	1.5	1.4	1.2	1.1

› Life Time Table · Brauchbarkeitsdauer – Tabelle

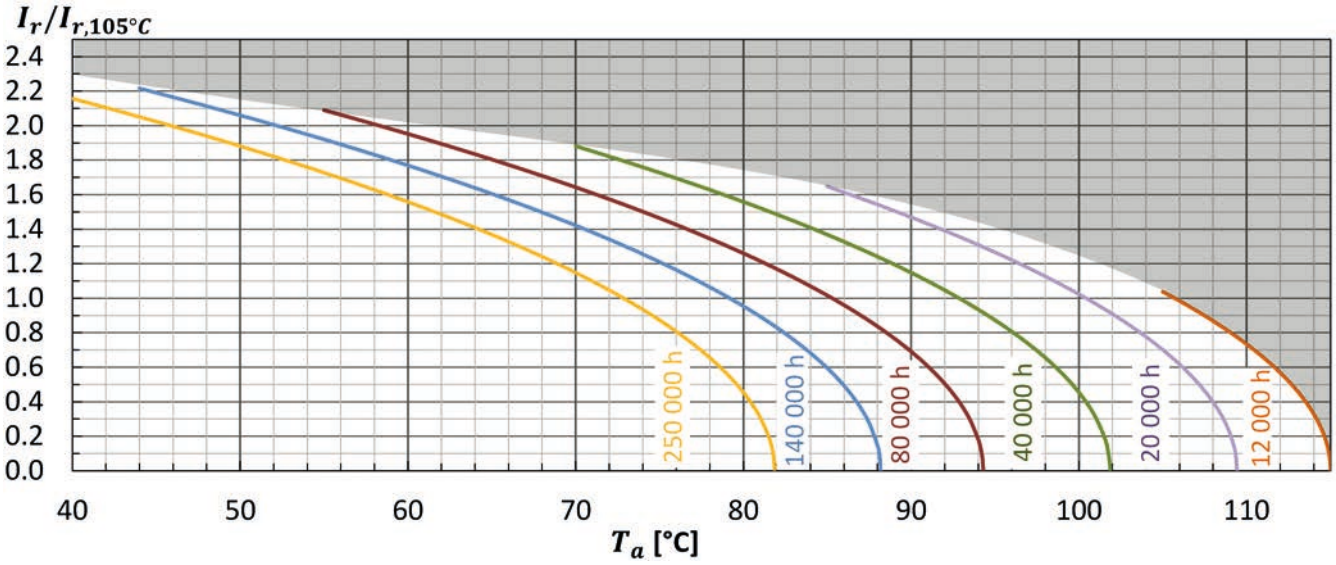
VGLR	Useful life as function of ambient temperature and ripple current											
I_r at 105°C	x 1.0	x 1.1	x 1.2	x 1.4	x 1.6	x 1.7	x 1.8	x 1.9	x 2.0	x 2.1	x 2.2	x 2.3
T_a = 40°C	250	250	250	250	250	250	250	250	250	250	213	147
T_a = 45°C	250	250	250	250	250	250	250	250	250	192	135	
T_a = 50°C	250	250	250	250	250	250	250	235	171	122		
T_a = 55°C	250	250	250	250	250	250	202	149	108	77		
T_a = 60°C	250	250	250	250	224	170	128	94	68			
T_a = 65°C	250	250	250	232	141	108	81	59				
T_a = 70°C	250	250	226	147	89	68	51	37				
T_a = 75°C	205	172	142	93	56	43	32					
T_a = 80°C	129	109	90	58	35	27						
T_a = 85°C	82	69	57	37	22							
T_a = 90°C	51	43	36	23								
T_a = 95°C	32	27	22									
T_a = 100°C	20	17										
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