

HCGF5 · Screw-Terminal · 6000 h/85 °C

Standard Performances · Small Diameter 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

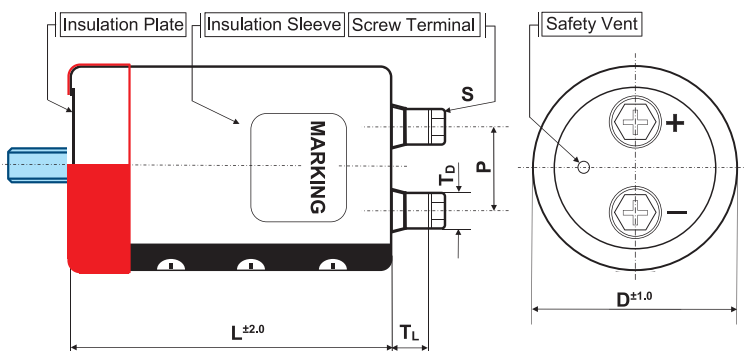
Items	Characteristics
Temperature range	-25°C ~ +85°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10/+30% on request
Surge voltage	Repetitive max. 30 sec per 6 Minutes
Leakage current max. I_L (20°C, 5 min)	$0.01 \cdot C \cdot V_r$ [μ A] or 3 mA, which is smaller.
Useful life	6 000 hours at 85°C
Field failure rate	0.5 FIT = $0.5 \cdot 10^{-9}$ 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
outer sleeve	•	•	•
insulation plate	•	•	•
stud bolt	•		
bottom double sleeve		•	

ØD	available shape	P	S	T _L	T _D	Cap material
36	B, N, I	12.7	M5x10	6.5	8	PH
51	B, N, I, Y	22.0	M5x10	5.5	10	PH
64	B, N, I, Y	28.6	M5x10	5.5	10	PH
77	B, N, I, Y	31.5	M5x10	5.0	10	PH
			M6x12	4.5	17.2	PH
90	B, N, I, Y	31.5	M5x10	5.0	10	PH
			M6x12	5.0	17.2	PH
101	B, N, Y	31.5	M6x12	3.0	14	PH

Size in mm. First listed terminal is standard.

> Product Code · Bestellbezeichnung

Example: Series HCGF5 · 4700 µF +/- 20 % · 200 V · D=51 mm · L=96 mm with Y-Bracket

HCGF5	2D	472	Y	C	096	PH
Type of series		Capacitance code	Fixing symbol code	Case code diameter		Specific features (e.g. M6 ...)
		The first two digits are significant. The last digit indicates the number of following zeros in µF.	B : Bolt N : single outer sleeve I : 2 Stoppers Bracket Y : 3 Stoppers Bracket			
Rated Voltage Code			Capacitance tolerance	Case Code length		
			Ø : ± 20 % Q : -10 % ~ + 30 %			
Code	Voltage			ØD	Code	
2C	160			36	A	
2D	200			51	C	
2E	250			64	D	
				77	E	
				90	F	
				101	G	

HCGF5 · Screw-Terminal · 6000 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
160 VDC Code: 2C Surge Voltage 200 VD	3 300	6.0	16.2	40	35	15	0.20	36x121	HCGF52C332#A121PH
	3 900	6.1	16.5	37	28	17	0.20	51x75	HCGF52C392#C075PH
	4 700	6.7	18.1	30	25	17	0.20	51x75	HCGF52C472#C075PH
	5 600	8.0	21.6	26	23	17	0.20	51x96	HCGF52C562#C096PH
	6 800	9.0	24.3	22	22	17	0.20	51x96	HCGF52C682#C096PH
	8 200	10.5	28.4	18	19	17	0.20	51x115	HCGF52C822#C115PH
	10 000	12.2	32.9	15	16	17	0.20	51x130	HCGF52C103#C130PH
		12.0	32.4	14	17	18	0.20	64x96	HCGF52C103#D096PH
	12 000	13.0	35.1	12	15	18	0.20	64x96	HCGF52C123#D096PH
	15 000	16.4	44.3	11	12	18	0.20	64x130	HCGF52C153#D130PH
	18 000	17.9	48.3	9	11	18	0.20	64x130	HCGF52C183#D130PH
	22 000	21.0	56.7	8	8	20	0.20	77x130	HCGF52C223#E130PH
	27 000	23.2	62.6	7	8	20	0.20	77x130	HCGF52C273#E130PH
	33 000	27.4	74.0	6	7	20	0.20	90x131	HCGF52C333#F131PH
	39 000	32.1	86.7	5	7	20	0.20	90x157	HCGF52C393#F157PH
	47 000	37.1	100.2**	5	7	20	0.20	77x195	HCGF52C473#E195PH
	50 000	39.2	105.8**	5	7	20	0.20	77x220	HCGF52C503#E220PH
	52 000	40.0	108.0**	5	6	20	0.20	77x220	HCGF52C523#E220PH
40.3		108.8**	5	6	20	0.20	90x196	HCGF52C523#F196PH	
68 000	42.6	115.0**	4	6	20	0.20	90x203	HCGF52C683#F203PH	
100 000	55.7	150.4**	4	6	29	0.20	101x250*	HCGF52C104#G250PH	
200 VDC Code: 2D Surge Voltage 250 VD	2 200	4.5	12.2	68	60	15	0.20	36x100	HCGF52D222#A100PH
	2 700	5.4	14.6	48	39	15	0.20	36x121	HCGF52D272#A121PH
	3 300	5.6	15.1	43	35	17	0.20	51x75	HCGF52D332#C075PH
	3 900	6.1	16.5	37	30	17	0.20	51x75	HCGF52D392#C075PH
	4 700	7.4	20.0	30	27	17	0.20	51x96	HCGF52D472#C096PH
	5 600	8.6	23.2	26	25	17	0.20	51x115	HCGF52D562#C115PH
	6 800	10.1	27.3	21	20	17	0.20	51x130	HCGF52D682#C130PH
	8 200	10.8	29.2	17	18	18	0.20	64x96	HCGF52D822#D096PH
	10 000	12.0	32.4	14	14	18	0.20	64x96	HCGF52D103#D096PH
	12 000	13.9	37.5	12	14	20	0.20	77x96	HCGF52D123#E096PH
	15 000	16.6	44.8	10	13	20	0.20	77x96	HCGF52D153#E096PH
	18 000	19.0	51.3	8	12	20	0.20	77x130	HCGF52D183#E130PH
	20 000	21.0	56.7	8	8	20	0.20	77x145	HCGF52D203#E145PH
	22 000	22.5	60.8	7	7	20	0.20	77x155	HCGF52D223#E155PH
	27 000	28.9	78.0	6	7	20	0.20	77x220	HCGF52D273#E220PH
		24.8	67.0	6	7	20	0.20	90x131	HCGF52D273#F131PH
	33 000	29.3	79.1	5	7	20	0.20	90x157	HCGF52D333#F157PH
	39 000	34.7	93.7	5	7	20	0.20	77x220	HCGF52D393#E220PH
40 000	32.3	87.2	5	7	20	0.20	90x157	HCGF52D403#F157PH	
52 000	40.3	108.8**	5	7	20	0.20	90x196	HCGF52D523#F196PH	
250 VDC Code: 2E Surge Voltage 300 VD	1 500	3.7	10.0	56	50	15	0.20	36x100	HCGF52E152#A100PH
	1 800	4.0	10.8	52	44	15	0.20	36x100	HCGF52E182#A100PH
	2 200	4.6	12.4	50	40	17	0.20	51x75	HCGF52E222#C075PH
	2 700	5.1	13.8	41	36	17	0.20	51x75	HCGF52E272#C075PH

Additional designs on request · Weitere Designs auf Anfrage

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
250 VDC Code: 2E Surge Voltage 300 VD	3 300	6.2	16.7	36	35	17	0.20	51x96	HCGF52E332#C096PH
	3 900	7.2	19.4	31	30	17	0.20	51x115	HCGF52E392#C115PH
	4 700	8.2	22.1	25	23	18	0.20	64x96	HCGF52E472#D096PH
	5 600	9.0	24.3	21	21	18	0.20	64x96	HCGF52E562#D096PH
	6 800	10.5	28.4	18	18	18	0.20	64x115	HCGF52E682#D115PH
	8 200	11.5	31.0	15	16	18	0.20	64x115	HCGF52E822#D115PH
	10 000	13.5	36.4	12	14	18	0.20	64x130	HCGF52E103#D130PH
		14.7	39.7	12	13	20	0.20	77x148	HCGF52E103#E148PH
	12 000	14.8	40.0	10	11	20	0.20	77x115	HCGF52E123#E115PH
	15 000	17.4	47.0	8	11	20	0.20	77x130	HCGF52E153#E130PH
	18 000	20.4	55.1	7	10	20	0.20	77x155	HCGF52E183#E155PH
	22 000	24.0	64.8	6	8	20	0.20	90x157	HCGF52E223#F157PH
26 000	26.8	72.4	6	7	20	0.20	77x220	HCGF52E263#E220PH	

* For Bolt mounting, length dimensions increase by +3 mm

** Please contact us if load condition exceeds terminals related I_{rmax} referred on page 9

Additional designs on request · Weitere Designs auf Anfrage

> Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	$\geq 10k$	Forced cooling [m/sec]	$v < 1.0$	$v \geq 1.0$
Multiplier	0.80	1.00	1.18	1.34	1.45	Multiplier	1.0	1.1

Temperature (°C)	40	45	50	55	60	65	70	75	80	85
Multiplier	2.7	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0

> Life Time Table · Brauchbarkeitsdauer – Tabelle

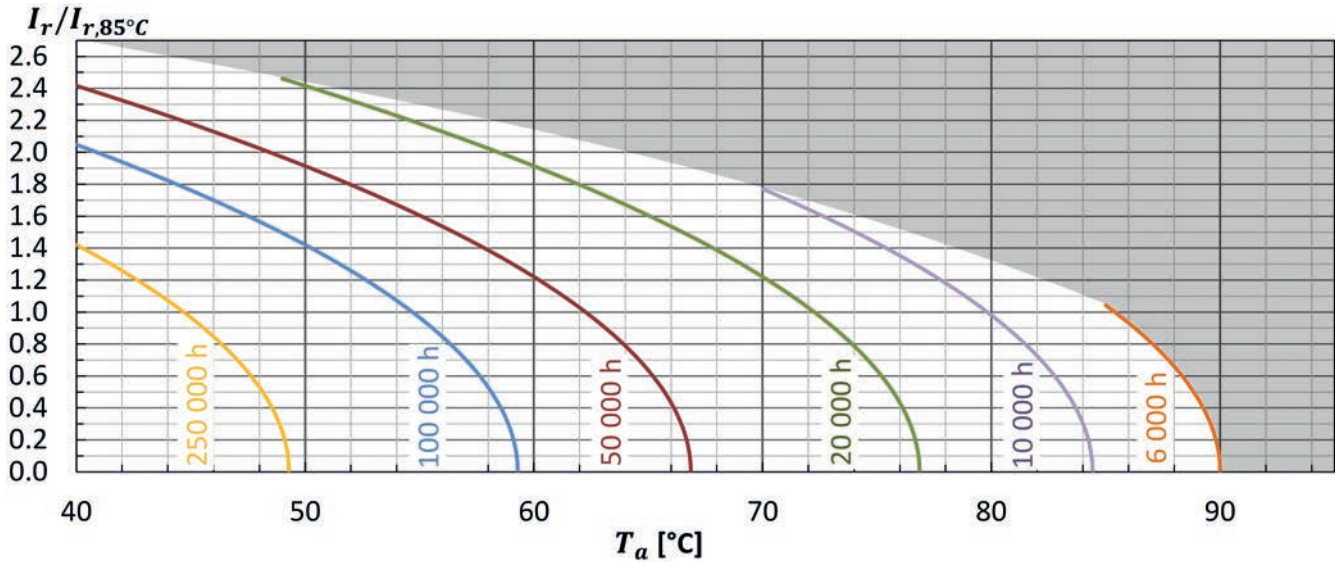
HCGF5 I_r at 85°C	Useful life as function of ambient temperature and ripple current												
	x 1.0	x 1.2	x 1.4	x 1.6	x 1.8	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7
$T_a = 40^\circ\text{C}$	250	250	250	199	149	108	91	76	63	51	42	33	27
$T_a = 45^\circ\text{C}$	243	201	162	125	94	68	57	48	39	32	26	21	
$T_a = 50^\circ\text{C}$	153	127	102	79	59	43	36	30	25	20			
$T_a = 55^\circ\text{C}$	97	80	64	50	37	27	23	19					
$T_a = 60^\circ\text{C}$	61	51	41	31	23	17							
$T_a = 65^\circ\text{C}$	38	32	25	20	15								
$T_a = 70^\circ\text{C}$	24	20	16	12									
$T_a = 75^\circ\text{C}$	15	12	10										
$T_a = 80^\circ\text{C}$	9	8											
$T_a = 85^\circ\text{C}$	6												

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 4000 hours	$\Delta C/C \leq 10\%$ (of initial value) $\text{Tan}\delta \leq 175\%$ (of specified value) $I_L \leq$ specified value
Useful life	$T_a = 85^\circ\text{C}$; V_r , I_r applied 6000 hours	$\Delta C/C \leq 15\%$ (of initial value) $\text{Tan}\delta < 200\%$ (of specified value) $I_L \leq$ specified value

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