RoHS Compliant

SPECIFICATION FOR APPROVAL

File No.: Q/FRK 0.GS.E.C3D-E10

Product Name	DC-Link Capacitor for PCB
Product Type:	C3D
Product Code	C3D4M655KF1B382
Customer	
Customer Code	
Issue Date	2020-03

Xiamen Faratronic Co. Ltd.			Approved by Customer
Drafted	Checked	Approved	

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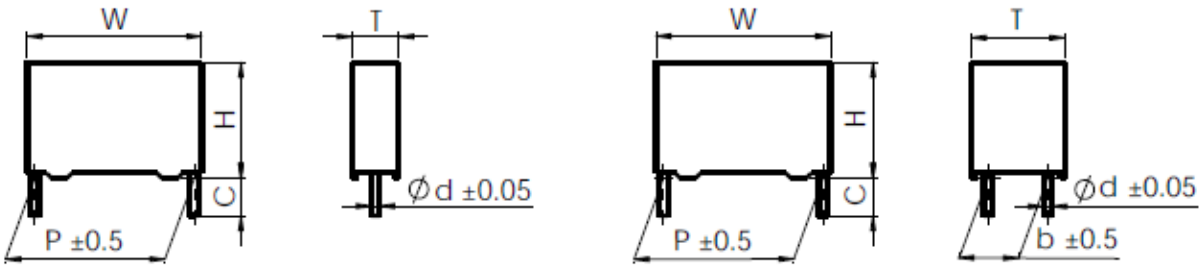
Version history

Current version	Date	Author	Change description

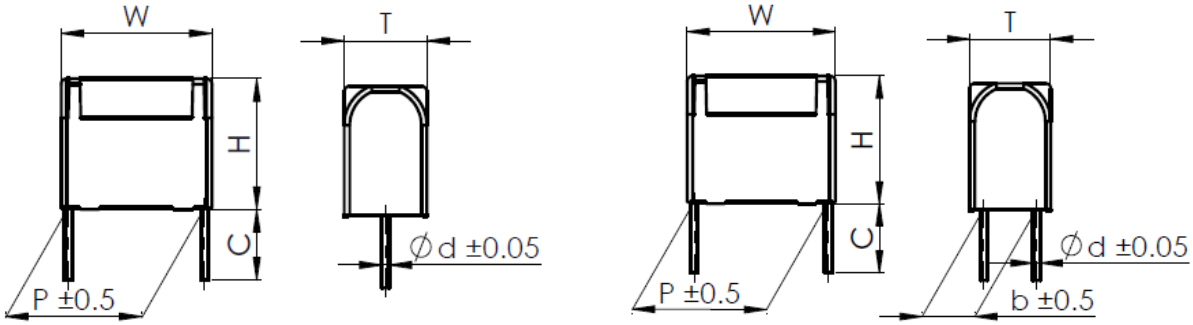
DC-Link Capacitor for PCB

■ Outline Drawing

2 Pins **4 Pins**



Square-bottom



Arc-bottom

■ Features

- Metallized polypropylene structure.
- Excellent electric property.
- Plastic case (UL94 V-0), Filled with resin.
- High performance DC filtering applications

(i.e. Frequency converters, Industrial and high-end power supplies and Solar inverters)

■ Safety Approvals

●		TUV Rheinland	EN 61071：2007，EN 61881-1：2011， 450Vdc ~ 3200Vdc，0.56μF~220μF，-40/85℃ Certificate No.：R 50266108
●		UL	UL 810 (construction only),Max. 5000Vdc,90℃ File No.: E256238, CCN: CZDS2

■ Specifications

Reference Standard	GB/T17702, IEC 61071
Climatic Category	40/105/56
Operating temperature (case)	-40℃~105℃ (+85℃ to +105℃: decreasing factor 1.5% per ℃ for $U_{N,\ 85℃}$)
$U_{N,\ 85℃}$	1500Vdc
Capacitance Tolerance	K (±10%)
Voltage Proof	$1.5U_{NDC}$ (10s)
Insulation Resistance($IR \times C_N$)	≥10 000s (20℃, 100V, 1min)
Self Inductance (Ls)	<1nH per mm of lead spacing
Maximum peak current Î(A)	$Î=C_N \times dV/dt$
Operation life time	100 000h at U_{NDC} , T_{amb}=70℃

■ Part number code system

The 18 digits part number is formed as follow:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
C	3	D															

Digit 1 to 3 Series code C3D

Digit 4 to 5 D.C. rated voltage 2J=630V 2K=800V 1X=900V

3A=1 000V 4M=1 500V

Digit 6 to 8 Rated capacitance value for example: 256=25×106pF=25.0μF

Digit 9 Capacitance tolerance J=±5% K=±10% M=±20%

Digit 10 Pitch B=27.5 mm C=30.0 mm F=37.5 mm M=52.5 mm

Digit 11 Internal use

Digit 12 to 15 Lead form and packaging code

Digit 16 to 18 Internal use

Table 1 lead form and packaging code

Digit 12		Digit 13 and Digit 14		Digit 15	
Code	Explanation	Code	Explanation	Code	Explanation
0	Two pins (bulk)	C0 38	Standard lead length 5.5mm lead length 3.8mm	0 2	Length tolerance ±1.0mm Length tolerance ±0.5mm
A	four pins(bulk) b=20.3mm				

■Technical data（mm）

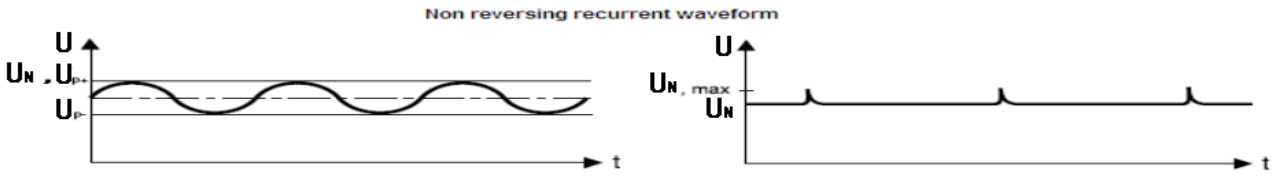
$U_{N,85℃}$: 1500Vdc												
C_N (μF)	W ±1.0	H ±1.0	T ±1.0	P ±0.5	b ±0.5	d ±0.05	dV/dt (V/μs)	tgδmax×(10^{-4})		ESR (mΩ)	I_{rms} (A)	Part number
								1kHz	10kHz			
6.5	42.0	42.0	28.0	37.5	10.2	1.0	39	11	85	8.7	10.3	C3D4M655KF1B382

Note: 1. Equivalent series resistance typical values at 10kHz;

2. Maximum rms current at 10kHz, T_{amb}=70℃, △T≤15.0℃.

■ Typical waveforms

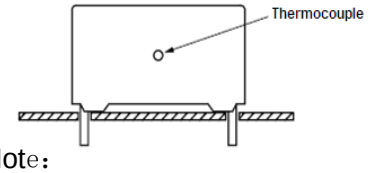
These capacitors are only suitable for DC applications. It means the voltage applied to the capacitors must be unidirectional ripple voltage.



Note：

- The peak voltage(U_{P+}) shall not be greater then the rated DC voltage(U_N).
- The peak-to-peak ripple voltage(U_{P-P}) shall not be greater then 0.1× (U_N).
- The maximum component surface temperature rise must be lower than 15℃.

■ Measuring the component temperature



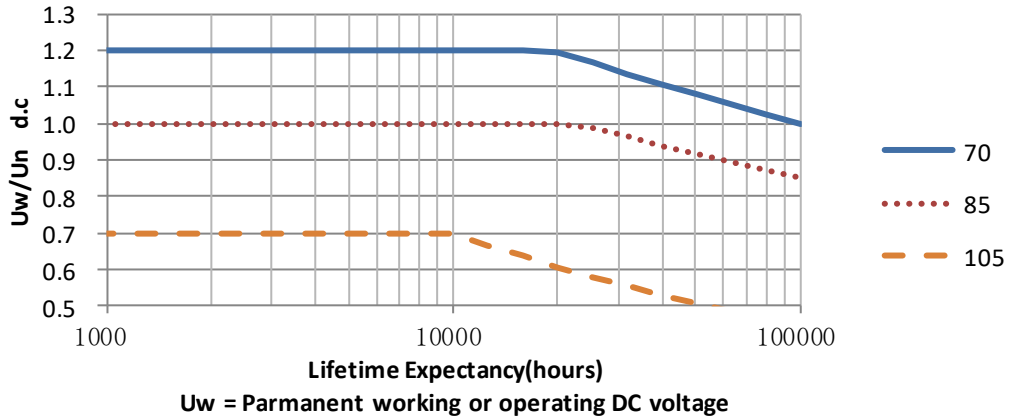
Note：

- The temperature is measured in unloaded (T_{amb}) and maximum loaded condition (T_c)
- The temperature rise is given by $\triangle T = T_c - T_{amb}$
- To avoid thermal radiation or convection, the capacitor must be tested in a closed area from air circulation

■ Over voltages according to IEC 61071:

1.1 U_N	30% of on-load-dur.
1 .15 U_N	30min/day
1.2 U_N	5min/day
1.3 U_N	1min/day
1.5 U_N	100ms every time, 1000 times during the whole life of the capacitor

■ Lifetime expectancy (typical curve)



Uw = Parmanent working or operating DC voltage

■ Test Method And Performance

No.	Item	Performance	Testing Method IEC 61071
1	5.14.2 External inspection	Legible marking and finish as specified Dimensions: see specific drawing	Check for finish, marking and overall dimensions
	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.14.1.1 Robustness of terminations	There shall be no visible damage	Tensile U_{a1} Wire diameter load d ≤0.8mm 10N 0.8 mm<d ≤1.2mm 20N Bending U_{b1} Wire diameter load d≤0.8 mm 5N 0.8 mm<d≤1.2 mm 10N 4×90°, duration 2s to 3s
	5.14.1.6 Resistance to soldering heat	There shall be no visible damage.	Solder temperature: 260˚C±5˚C Immersion time: 10s±1s
	Final measurements	|ΔC/C|≤0.5%(relative to the initial value) Increase of tgδ: ≤0.005	
2	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.14.3.1 Vibration	There shall be no evidence damage	f=10 Hz to 55Hz a=±0.35mm Test duration per axis = 10 frequency cycles (3 axes offset from each other by 90°C), 1 octave/min, the total times are 135min for 3 axes.
	5.14.3.1 Impacts	There shall be no evidence damage	1 000times, Acceleration: 390m/s^2 Pulse duration: 6ms
	Final measurements	|ΔC/C|≤0.5%(relative to the initial value) Increase of tgδ: ≤0.005	
3	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.9 Surge discharge test		Test voltage: 1.1U_{NDC} Number of discharges: 5 Time lapse every 2 min (10min total) Within 5 min after the surge discharge test, the capacitor shall be subjected to a voltage test between terminals: 1.5U_{NDC}, 60s
	Final measurements	|ΔC/C|≤1.0% (relative to the initial value) tgδ: ≤1.2×tgδ_0(the initial tgδ)+0.0001	

No.	Item	Performance	Testing Method IEC 61071
4	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.11 Self-healing		Voltage: $1.5U_{NDC}$ Duration: 10s If fewer than five clearing occur during this time, the voltage shall be increased slowly until five clearings have occurred since the start of the test or until the voltage has reached $2.5U_{NDC}$ If fewer than five clearings have occurred when the voltage has reached $2.5U_{NDC}$, for a time of 10s,the test shall be finished.
		|ΔC/C|≤0.5% (relative to the initial value) tgδ: ≤1.1×tgδ_0(the initial tgδ)+0.0001	
5	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.13.1Change of temperature	There shall be no evidence of deterioration	Test: Na θ_A=-40˚C,θ_B=+85˚C 5 cycles, Duration: t=30min
	Final measurements	|ΔC/C|≤2.0%(relative to the initial value) Increase of tgδ:≤0.015	
6	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.13.2Damp heat, steady state	There shall be no evidence of deterioration.	Temperature: 40˚C ±2˚C Humidity: 93±3 %RH Duration: 56 days
	5.5.1 Voltage test between terminals	There shall be no permanent puncturing or flashover.	$1.5U_{NDC}$, 60s
	5.6.1 Voltage test between terminals and case	There shall be no permanent puncturing or flashover.	2 000VAC, 10s
	Final measurements	|ΔC/C|≤2.0%(relative to the initial value) Increase of tgδ:≤0.015	
7	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.10.1Thermal stability test	Throughout the last 6h, the temperature of the case near of the top rise shall not increase by more than 1˚C	Temperature: ambient temperature Test current: 1.1Irms Test frequency: 10kHz Test time: 48h During the last 6h, the temperature of the case near of the top rise shall be measured per 1.5h.
	Final measurements	|ΔC/C|≤2.0%(relative to the initial value) tgδ:≤1.2×tgδ_0(the initial tgδ)+0.015	

No.	Item	Performance	Testing Method IEC 61071
8	Initial measurements	Capacitance at 1kHz tgδ at 10kHz	
	5.15 Endurance		Measuring procedure: (1) $1.3U_{NDC}$, 85℃, 500h (2) Charging and discharging: Times: 1 000 dv/dt: according to the technical data (3) $1.3U_{NDC}$, 85℃, 500h
	Final measurements	|ΔC/C|≤3.0%(relative to the initial value) Increase of tgδ:≤0.015	