

# 锂离子电容器产品规格书

*Lithium-ion CAPACITOR PRODUCT SPECIFICATION*

产品类型 (Product Type) : 锂离子电容器 LIC Series

产品型号 (Product Model) : FH3R8M406T-N0820

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## FH3R8M406T-N0820

### 产品规格书 Product specification

#### ➤ 产品特点 Features

锂离子电容器是一种融合了双电层电容器高功率密度和锂离子电池高能量密度的新型储能元件，应用前景广阔。

Lithium ion capacitor is a new type of energy storage element which combines the high power density of double layer capacitor and the high energy density of lithium ion battery, the application prospect is broad.

工作温度范围宽，-40℃可充电，高温 85℃可放电；

Wide operating temperature range, -40℃ rechargeable, 85℃ available for discharge.

绿色环保，满足 RoHs 要求；

Green, meet RoHs requirements;

#### ➤ 应用 Applications

智能仪表，行车记录仪，照明灯具；

Intelligent instrument, Automobile data recorder, Illumination lamp;

ETC、税控收款机、数码相机、电动工具；

ETC, Fiscal cash register, Digital camera, Power tools;

无线节能鼠标、无线手写板、SSD 固态硬盘。

Wireless energy saving mouse, Wireless handwriting board, SSD solid state drive.

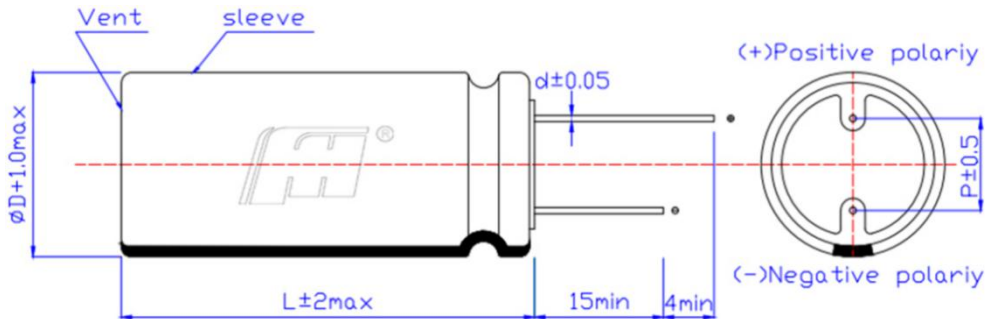
#### ➤ 型号命名规则 Part Number System

品牌代码 Brand FH		额定电压 The rated voltage		结构 Structure		额定容量 Rated Capacitance		容量偏差 Permitting capacitance error		特性 Series		单体尺寸 φD*L/mm Dimensions			
F	H	2R7	2.7V	L	引针式 Radial Type	104	0.1F	X	-10%~+30%	N	常规 Normal	0612	6.3*12.5		
		2R8	2.8V			224	0.22F					V	-10%~+10%	0813	8*13
		3R0	3.0V			334	0.33F	M	±20%		1020			10*20	
		5R5	5.5V	474	0.47F	T	-20%~+80%				1225	12.5*25			
		7R5	7.5V	504	0.5F			H	高温 High Temperature	1313	13*13				
		13R5	13.5V	105	1.0F	L	低内阻 Low ESR			1625	16*25				
		25R0	25V	155	1.5F			V	高电压 High Voltage	1840	18*40				
		48R0	48V	205	2.0F	W	螺柱式 Stud type			305	3.0F	C	组合式 Combined type	308	3000F
		S	盖板式 Cover plate type	106	10F			K	螺纹式 Screw type	705	7.0F			V	高电压 High Voltage
				206	20F	106	10F			206	20F	256	25F		
C	纽扣式 Coin type	256	25F	V	螺柱式 Stud type	356	35F	H	高电压 High Voltage	L	低内阻 Low ESR	组合式 Combined type	M	锂离子电 容LIC	
		506	50F			506	50F								506
Z	组合式 Combined type	308	3000F	M	锂离子电 容LIC	308	3000F	V	高电压 High Voltage	L	低内阻 Low ESR	组合式 Combined type	M	锂离子电 容LIC	
		308	3000F			308	3000F								308

➤ 产品性能 Specifications

项目 project		FH3R8M406T-N0820		备注 Notes
工作温度范围 Category temperature range		-20℃~+65℃		
工作电压范围 Operating voltage range		2.5V~3.8V		DC
最低电压 Mix Voltage		2.5V		
容量 Capacitance		40F		15mA 25℃
容量偏差 Capacitance Tolerance		-20%~+80%		
最大内阻 MAX ESR		200mΩ		AC, 1KHz, 3.8V
充电 Charge	标准充电 Standard	150mA@4.0V		
	快速充电 Rapid	300mA@4.0V		
放电 Discharge	最大放电持续电流 Maximum Continuous Discharge Current	200mA		
	脉冲 Pulse (1sec).	1.0A		
最佳存储环境 Optimum storage condition		-10℃~50℃, ≤65%RH		
温度特性 Characteristics in different temperature	容量ΔC	Step 2	小于等于初始值的 30% Less than or equal to 30% of the initial value	Step 1: +25℃±2℃ Step 2: -20℃±2℃ Step 3: +65℃±2℃ Step 4: +25℃±2℃
	ESR		小于等于规定值的 1000% Less than or equal to 1000% of the specified value	
	容量ΔC	Step 3	小于等于初始值的 30% Less than or equal to 30% of the initial value	
	ESR		小于等于规定值的 200% Less than or equal to 200% of the specified value	
	容量ΔC	Step 4	满足初始规定值 20%范围内 Satisfies the range of 20% of the initial rating	
	ESR		满足初始规定值 Satisfies the initial value	
耐久性 Endurance	容量ΔC	满足初始规定值 30%范围内 Satisfies the range of 30% of the initial rating		温度 Temperature: +55℃±2℃ 时间 Time: 1000h
	ESR	小于等于规定值 400% Less than or equal to 400% of the specified value		
	外观	无漏液或机械损伤 No leakage or mechanical damage		
循环寿命 Cycle life	容量ΔC	满足初始规定值 30%范围内 Satisfies the range of 30% of the initial rating		3.1V~3.7V 150mA 温度 Temperature: +25℃±2℃ 次数 Cycles: 100000 次
	ESR	小于等于初始值 400% Less than or equal to 400% of the specified value		

➤ **标准产品外形尺寸图 shape of standard product**



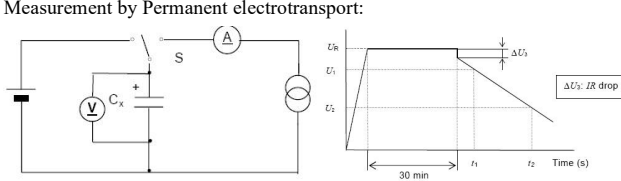
实际尺寸及公差以参数表为准。

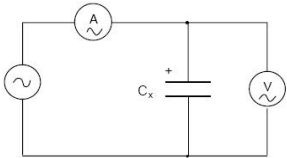
The actual size and tolerance shall be subject to the parameter table.

➤ **产品尺寸 Dimensions**

型号 Part Number	$D \pm 0.5 \text{ mm}$	$L \pm 1.5 \text{ mm}$	$P \pm 3.5 \text{ mm}$	$d \pm 0.1 \text{ mm}$
FH3R8M406T-N0820	8.0	20	5.0	0.6

➤ **测试方法 Measuring Method**

容量 Capacitance	<p>恒流放电法测量 Measurement by Permanent electrotransport:</p> <ol style="list-style-type: none"> <li>恒流/恒压源的直流电压设定为额定电压 (<math>U_R</math>)。 DC voltage of constant current/constant voltage source is set as rated voltage (<math>U_R</math>).</li> <li>设定规定的恒电流放电装置的恒定电流值。 Set the constant current value of the constant current discharge device.</li> <li>将开关S切换到直流电源，在恒流/恒压源达到额定电压后恒压充电30min。 Switch the switch S to dc power supply, and charge at constant voltage for 30min after the constant current/constant voltage source reaches the rated voltage.</li> <li>在充电30min结束后，将开关S变换到恒流放电装置，以恒定电流进行放电。 After charging for 30min, switch S is changed to the constant exile device to discharge with constant current.</li> </ol> <p>3、测量电容器两端电压从 <math>U_1</math> 到 <math>U_2</math> 的时间 <math>t_1</math> 和 <math>t_2</math>，如图所示，根据下列等式计算容量值： Measure the time <math>t_1</math> and <math>t_2</math> of the voltage from <math>U_1</math> to <math>U_2</math> at both ends of the capacitor, as shown in the figure, and calculate the capacitance value according to the following equation</p> <p>Measurement by Permanent electrotransport:</p>  $C = \frac{I \times (t_2 - t_1)}{U_1 - U_2}$
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内阻 Resistance	<p>交流阻抗方法测量AC impedance measurements: 采用如下图所示的电路进行测量: The circuit as shown in the figure below is used for measurement:</p>  <p>电容器的内阻Ra应通过下式计算 Capacitor resistance Ra shall be computed by the type: <math>R_a = U/I</math> 其中where: Ra 交流内阻 AC impedance (Ω); U 交流电压有效值 Effective value of U ac voltage (V r.m.s); I 交流电流有效值 Effective value of I ac current (V r.m.s)。</p>
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➤ 安全测试及机械特性 Cell Mechanical characteristics and Safety Test

序号	项目	测试方法	技术标准
1	过放测试 Forced Discharge	按标准充电将超容充满电，以200mA 的电流放电2.5小时。 Recharge the Asymmetry SuperCapacitor by standard charge, discharge at a current of 200mA for 2.5h.	不起火 No fire 不爆炸 No explosion
2	振动测试 Vibration Test	将标准充电后的电芯固定在振动台上，沿 X、Y、Z 三个方向各振动 30 分钟，振幅 1.6mm，振动频率 为 10Hz~55Hz，每分钟变化 1Hz。 After standard charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz~55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes.	无泄漏 No leakage 不起火 No fire
3	跌落 Drop	在标准充电状态下，将产品由 1.0m 高度的位置跌落到 20mm 厚的硬木板上，沿 X、Y、Z 三个方向分别自由跌落 1 次。 After standard charging, Drop the product from the height of 1.0m to a hardwood of 20mm thick, and fall down the X、Y、Z respectively for one time.	无泄漏 No leakage 不起火 No fire 无破裂或爆炸 No burst or explosion
4	重物冲击 Impact	将产品放置于冲击台上，将直径 15.8mm，10 公斤 重锤自 1m 高度自由落下，冲击已固定在夹具中的 产品。 Place the product on the impact table, with a diameter of 15.8 mm, the 10-kilogram weight of the weight is freely falling from 1m, and the impact has been fixed in the fixture.	不起火 No fire 不爆炸 No explosion 外观允许发生变形 Allows for deformation
5	低温性能 Low Temperature	按标准充电将超容充满电，将超容放置于低温-20℃ 环境中 4h，然后以200mA 放电至 3.0 V。Recharge the Asymmetry SuperCapacitor by standard charge, Place the cell in low temperature, 4 h - 20℃ environment, Then 200mA is then discharged to 3.0 V.	不起火、不爆炸 No fire、No explosion 放电容量大于初始容量的 70% The discharge capacity is more than 70% of the initial capacity

## ➤ 技术要求 Technical requirement

(1) 标准环境条件（除非特别要求，各项试验应在标准大气条件下进行）

Standard environmental conditions (unless specifically requested, trials should be conducted under standard atmospheric conditions)

(2) 标准温度 Standard temperature :  $25\pm 3^{\circ}\text{C}$ ;

大气压力 Atmospheric pressure : 86kPa~106 kPa; 标准湿度 Standard humidity :  $65\pm 20\%$

(3) 标准充电: 在标准环境条件下, 对产品以 150mA 恒流充电至上限电压后再恒压充电, 直至充电电流小于或等于 0.02A, 停止充电。

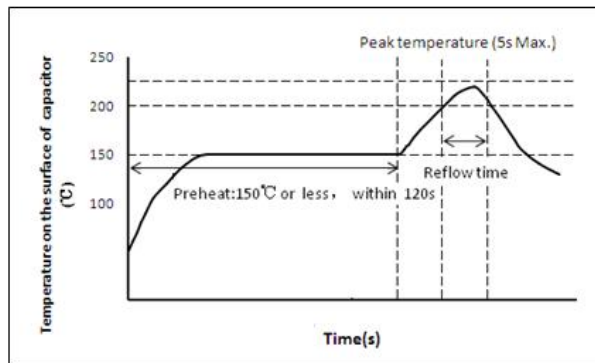
Standard Charge: Under standard environmental conditions, the product is charged to the upper limit voltage with 150mA constant current, until the charging current is less than or equal to 0.02A, stopping the charging.

(4) 标准放电: 将产品以 200mA 电流恒流放电至终止电压。

Standard Discharge: The product is discharge to the termination voltage by 200mA current.

## ➤ 焊接条件 Soldering Condition

建议产品的焊接条件为流动焊接, 如下图 The welding condition of the proposed product is flow welding, as shown below:



焊接时需注意 Care should be taken when welding:

(1) 短时间内按照上述焊接条件, 开展低温焊接工作。

Carry out low-temperature welding in accordance with the above welding conditions within a short time.

(2) 当电压达到 0.3V 以上时, 不要回流焊接。

When the voltage is above 0.3v, do not backflow welding.

(3) 有关更多回流焊接的条件请咨询我们。

Please consult us for more conditions of reflow soldering.

## ➤ 使用注意事项 Cautions For Use

(1) 在测试或使用产品之前, 请仔细阅读本规格书, 请不要超出本规格书范围使用电芯; 以防止不当操作引起 产品功能失效、发热、漏液、起火甚至爆炸。

Please read the specification carefully before testing or using the product, Please do not exceed the specification range using the cell; Prevent improper operation to cause product function failure, heat, leakage, fire and even explosion.

### (2) 禁止拆卸 Prohibition of disassembly

1) 不要拆卸电芯 Never disassemble the cells

拆卸电芯会发生电芯内部短路, 会引起发热、引燃周边物质、有害气体或者其它问题。

The disassembling may generate internal short circuit in the cell, which may cause heating, ignite Peripheral material explosion or other problems.

2) 电解液是有害的 Electrolyte is harmful

万一电解液沾到皮肤、进入眼睛，应立即用清水冲洗以及求助医生。

Cells should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

**(3) 严禁将电芯倾倒在火中 Prohibition of dumping of cells into fire**

不要焚毁电芯，否则会致电芯燃烧，这个很危险，必须禁止。

Never incinerate nor dispose the cells in fire, These may cause burning of the cells, which is very dangerous and is prohibited.

**(4) 超容电芯更换 SuperCapacitor cells replacement**

更换电芯应由电芯生产商或设备供应商完成，用户严禁私自更换。

The SuperCapacitor replacement shall be done only by either cells supplier or device supplier and never be done by the User.

**(5) 严禁将产品进行反向充电或者正负极直接短路。**

It is strictly prohibited to direct the product in reverse charge or direct short circuit.

**(6) 新产品使用或长时间贮存后，使用前请按要求将其充满电。**

After the new product is used or stored for a long time, please fully charged before use.

**(7) 对产品进行测试时，请使用专用测试设备。**

Use a special test device when testing the product.

**(8) 禁止敲击、抛掷或踩踏产品；严禁将产品放入洗衣机或高压容器内。**

It is forbidden to knock, toss or stamp products; Do not put the product in the washing machine or high pressure vessel.

**(9) 使用、测试或存放产品时，如发现其有变热、散发气味、变色、变形或其它异常时，请立即停止使用或测试，立即隔离并远离。**

Use, test, or store products, If it is found to have heat, odor, discoloration, deformation or other abnormalities, Please stop using or testing immediately, Immediately isolate and stay away.

**(10) 运输及储存 Transport and storage**

1) 锂超容应当在室温下存放，应充到 50%至 80%的电量；如长时间储存，建议每半年充一次电。

The SuperCapacitor should be stored at room temperature, charged to about 50% to 80% of capacity; We recommend that Asymmetry SuperCapacitor be charged about once per half a year to prevent over discharge.

产品存放应避免与腐蚀性物质接触、并远离火源和热源。

Product storage should avoid contact with corrosive substances and keep away from fire and heat source.

2) 产品运输过程应防止产品受潮，储存温度应为-20℃~50℃、相对湿度小于 65%，最大湿度不可超过 65%，否则会导致电容受潮性能劣化或生锈。

Should prevent products be affected with damp in product transportation, storage temperature should be -20 ℃ to 50 ℃, relative humidity less than 65%, the maximum humidity no more than 65%, otherwise it will cause capacitance performance degradation of be affected with damp or rust.

产品应包装成箱进行运输，在运输过程中应防止剧烈振动、冲击或挤压、防止日晒雨淋；可使用汽车、火车、轮船、飞机等交通工具运输。

The products should be packed in boxes for transportation, During transportation, it should prevent vibration, impact or extrusion, prevent sun and rain; Transport of vehicles, trains, ships, aircraft etc.

### (11) 安装与焊接 Installation and welding

1) 超级电容器用于双面电路板上时, 要注意连接处不可经过电容器可触及的地方, 否则会导致产品短路过压及电容器损坏。安装过程及安装后, 不可强行扭动或倾斜电容器, 不得用力拉拽引线, 应先断针及折弯后焊接。在焊接过程中要避免使电容器过热 (1.6mm 的印刷线路板, 焊接时应为 260℃, 时间不超过 5s), 焊接后, 线路板和电容器要清洗于净。

When the supercapacitor is used on the double-sided circuit board, it should be noted that the connection cannot pass through the reach of the capacitor, otherwise the product will be short circuit overvoltage and the capacitor will be damaged. During installation and after installation, do not twist or tilt the capacitor by force. Do not pull the lead by force. Break the needle and weld after bending. In the welding process to avoid overheating of the capacitor (1.6 mm of printed circuit board, the welding should be 260 °C, when time is not more than 5 s), after welding, circuit board and the capacitor to clean in the net.

#### 2) 引脚焊接要求 Pin welding requirements

产品在使用焊接过程时应避免正、负电极短路; 焊台温度设定在 300~320℃, 焊接时间≤3 秒; 尽量减少对引脚 的循环焊接, 请勿反复摇摆输出引脚。

The product should avoid the positive and negative electrode short circuit when using welding process; Welding temperature is set in 300 ~ 320℃, the welding time for 3 seconds or less; Minimize cyclic welding of pins; Do not sway the output pins repeatedly.

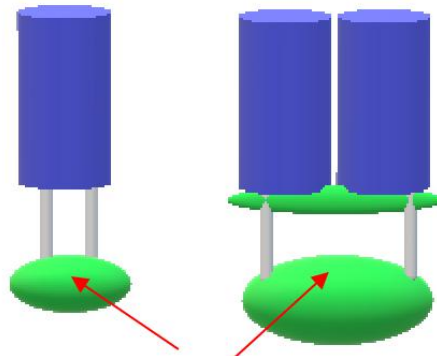
#### 3) 电芯的固定 Cell fixing

电芯最大面积的一面应该固定在外壳上; 安装后超容不能有松动。 The cell should be fixed to the Asymmetry SuperCapacitor pack by its large surface area; No cell movement in the Asymmetry SuperCapacitor pack should be allowed.

#### 4) 外壳内部设计 Inside design

外壳内安装电芯的部位不应有锋锐边。

No sharp edge components should be insides the pack containing the cell.



此处尽量不要布线

### (12) 超级电容器短路判断 Short circuit judgment of supercapacitor

短路电容应不能进行充放电, 在电容正负极间施加直流电压, 电容电压不升高, 可判定短路, 用万用表判定时, 新电容在为充电时, 以欧姆档测量 (短路档) 指示为短路状态, 是正常现象, 不能确定电容即为短路, 应观察阻值是否增加, 如增加即为非短路。

The short circuit capacitance shall not be charged or discharged. The dc voltage shall be applied between the positive and negative terminals of the capacitance. The capacitance voltage shall not be increased

When charging, it is normal to use ohm gauge (short circuit block) indicator as short circuit state. Capacitance is short circuit and cannot be determined. It should be observed whether the resistance value increases or not.

### (13) 串联及并联使用问题 Series and parallel operation problem

相同超级电容器串联使用时, 总电压=串联个数×单体耐压; 总容量=单体容量÷串联个数; 总能量=串联个数×单体容量,



总内阻=串联个数×单体内阻。

三个及以上串联存在单体间的电压均衡问题，需要考虑采用均衡电路，用于保证长期使用过程中电容不能过电压使用，从而引起电容器寿命衰减及损坏。不同规格超级电容器不可进行串联使用。

超级电容器进行并联使用时，可以不同容值的并联，采用相同电压充电，但要注意各个电容之间的电流平衡问题以及相互隔离，避免由于放电后电势差产生的相互反向充电。

When the same super capacitor is used in series, the total voltage = series number \* monomer withstand voltage; Total capacity = unit capacity Total energy = series number x monomer capacity, total internal resistance = series number x monomer resistance.

There is a problem of voltage balancing between three or more monomers in series, so it is necessary to consider adopting equalizing circuit to ensure that the capacitance cannot be used over voltage during long-term use, thus causing capacitor life attenuation and damage. Supercapacitors of different specifications cannot be used in series.

When the super capacitors are used in parallel, they can be connected in parallel with different capacitance values and charged by the same voltage. However, it is necessary to pay attention to the current balance between the capacitors and to isolate each other, so as to avoid reverse charging due to the potential difference after discharge.

**(14) 其它使用上的问题，请向生产厂家咨询或参照超级电容器使用说明的相关技术资料执行。**

For other problems in use, please consult the manufacturer or refer to the relevant technical data of the instructions for the use of supercapacitors.

**(15) 漏液情况处理 Handling of leakage situation**

皮肤接触：用肥皂水和清水彻底冲洗皮肤；

Skin contact: rinse skin thoroughly with soap and water;

眼睛接触：用流动清水或生理盐水冲洗，就医；

Eye contact: flush with flowing water or normal saline and seek medical advice;

吸取：立即用水漱口，就医；

Absorb: immediately rinse with water and seek medical advice;

如果发现超级电容器过热或是闻到气味，应立即断开与超级电容器连接的电源和负载，让其降温，然后进行正确处理，不可让脸或手接触过热的超级电容器。

If the supercapacitor is found to be overheating or smelling, the power supply and load connected to the supercapacitor should be disconnected immediately to cool it, and the supercapacitor should be treated properly so that no face or hand contact with the supercapacitor is allowed.