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Attention to : _____
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Date : **2021-06-10**
日期 : _____

Product Specification 产品规格书

Product Name : **LCC MODULE**
产品名称 : _____

Part Number : **MVAP0100103851206MD**
产品型号 : _____

Version : **A0**
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Revision History
规格书修订记录

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一、Scope 适用范围

This specification applies to the 3.8V 120F LCC module.

本规格书适用于 3.8V 120F LCC 模组产品。

二、Specification 主要技术参数

NO. 序号	Items 项目	Specification 规格	Remark 备注
1	Working voltage 工作电压	2.5V~4.2V	Charge cutoff voltage 4.2V, Discharge cutoff voltage 2.5V. 充电截止电压 4.2V, 放电截止电压 2.5V.
2	Nominal capacity (F) 标称容量	120F/56mAh (-10%~50%)	5C,4.2V Constant Current discharge to 2.5V 5C,4.2V 恒流放电到 2.5V
3	Internal Resistance(AC) 交流内阻	≤180m Ω	Measuring frequency 测试频率: 1kHz Measuring temperature 测试温度: 20±2℃
4	Internal Resistance(DC) 直流内阻	≤90m Ω	
5	Standard Charging Current 标准充电电流	0.28A	5C
6	Max Charging Current 最大充电电流	0.56A	10C
7	Standard Discharging Current 标准放电电流	0.28A	5C
8	Max Discharging Current 最大放电电流	0.56A	10C
9	Energy capacity(Fully Charged)最大存储能量	0.187Wh	
10	Self Discharge 自放电	≤5%	3 months later at 25℃. 25℃,3 个月后.
11	Operating Temperature Range 工作温度范围	-30~65℃	
12	Storage Temperature Range 储存温度范围	-30~65℃	
13	Storage voltage Range 储存电压范围	3.35V (±2%)	Storage voltage when the module is not in use. 模组不使用时的存储电压。
14	Nominal Weight 重量	约 5g	
15	Protection Class 防护等级	-	

Note 说明

Constant current discharge method 恒流放电测试方法:

Measuring circuit 测试线路示意:

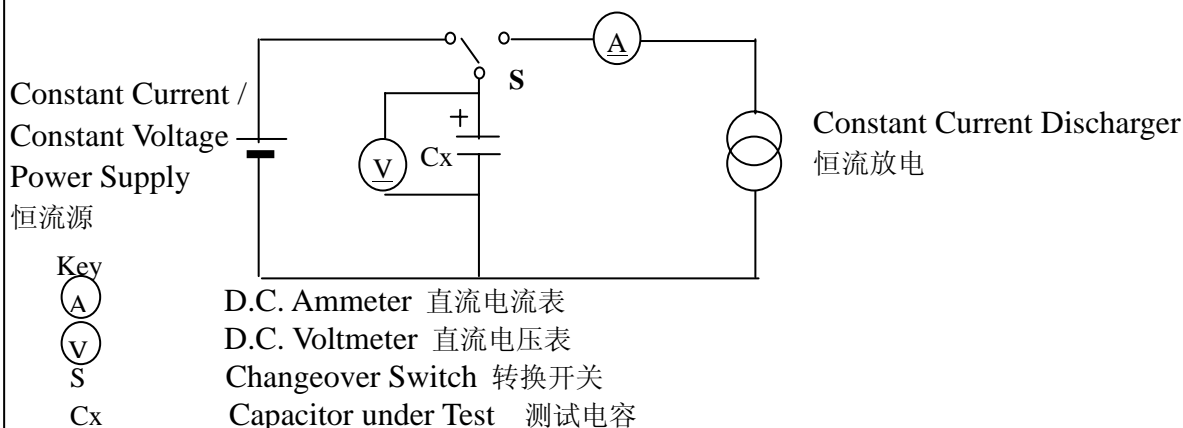


Figure 1: Circuit for Constant Current Discharge Method 图 1: 恒流放电方法线路

Measuring method 测试方法

- 1) Set the D.C. voltage at the Charge cutoff voltage (U_R). 设定恒流源的电压在充电截止电压。
- 2) Set the constant current value of the constant current discharger to the discharge current specified in Table 1. 按照表1的要求设定负载仪的放电电流。
- 3) Turn the switch S to the D.C. power supply, apply voltage and charge for 30 min after the constant current/constant voltage power supply has achieved the Charge cutoff voltage. 将转换开关拨到恒流源充电端，恒流充电达到充电截止电压值后，再恒压充电30分。
- 4) After charging for 30 min, change over the switch S to the constant current discharger, and discharge with a constant current. 30分充电结束后，转换开关拨到负载仪端，进行恒流放电。
- 5) Measure the time t_1 and t_2 when the voltage between capacitor terminals at the time of discharge reduces from U_1 to U_2 as shown in Figure 2, and calculate the capacitance value by the following formula:

如图 2 所示，记录放电时电压在 U_1, U_2 的时刻， t_1, t_2 的值，并用以下公式计算容量。

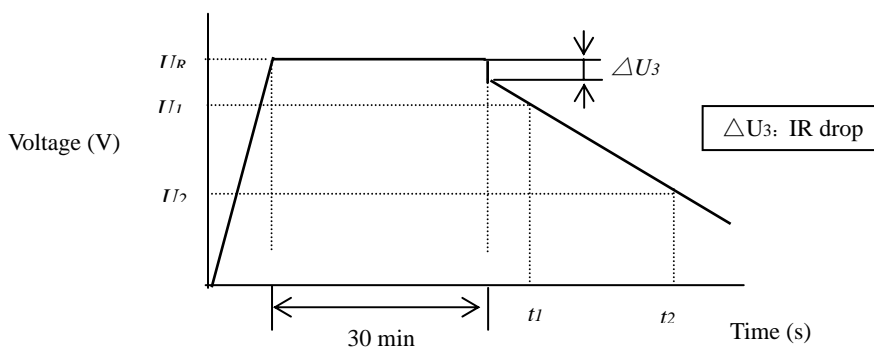


Figure 2: Voltage Characteristics between Capacitor Terminals 图 2: 电容器端电压特征

$$C = \frac{I \times (t_2 - t_1)}{U_1 - U_2}$$

- C the capacitance (F); 容量 (F)。
- I the discharge current (A); 放电电流 (A)。
- U_1 the measurement starting voltage (V); 测量开始时电压 (V)。

- U_2 the measurement ending voltage (V); 测量结束时电压 (V)。
- t_1 the time from discharge start to reach U_1 (s); 放电开始到电压达到 U_1 的时间 (s)。
- t_2 the time from discharge start to reach U_2 (s); 放电开始到电压达到 U_2 的时间 (s)。
- U_R the Charge cutoff voltage for the LCC module (V); LCC 模组的充电截止电压 (V)。

- 6) The discharge current I and the voltages U_R and U_2 at the time of discharge voltage drop shall be as per Table 1. The method classification shall be in accordance with the individual standards.
 放电电流和 U_R , U_2 的压降按照表 1 制定。

Table 1: Discharge Conditions 表 1: 放电条件

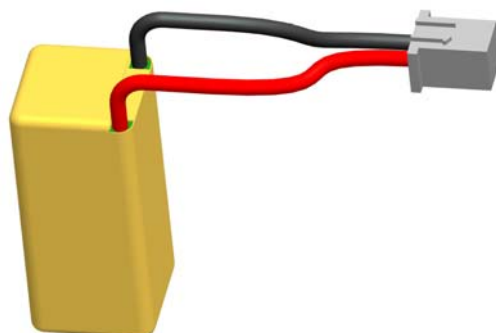
Charge time of constant voltage 恒压充电时间	30 min
I (A)	$5 * C_R * (V_{max} - V_{min}) / 3600$
U_R	Charge cutoff voltage 充电截止电压
U_2	Discharge cutoff voltage 放电截止电压
NOTE: C_R is the rated capacitance in F (Farad), and U_R is the rated voltage in V (Volt). 注: C_R 是额定容量, 单位法拉 (F); U_R 是充电截止电压, 单位伏特 (V)。	

三、LCC Module LCC 模组

3.1 Main Component 主要部件

NO. 序号	Items 项目	Specification 规格	Quantity 数量	Remark 备注
1	Cell 单体电容	LCC 3.8V/120F	1pcs	12.5*25 RR
2	Control Board 控制板	3.8V_120F_PCB_FW_VMS_1S1P_01_A0	1pc	
3	PET 套管		1 pc	
4	Connector 连接器	Connector-XH2.54-2P+24# AWG Red and Black,Length 30mm.	1pcs	

3.2 Appearance & Structure 外观和结构



四、Product General Performance 产品常规性能

No. 序号	Items 项目	Criteria 标准	Test Method 测试方法
1	Load Life Test 寿命测试	$\Delta C/C$:初始电容的 $\pm 30\%$ 范围内 ESR: 初始电容的 ESR*2.0.	The capacitor is stored at temperature 60 ± 2 °C with rated voltage for 1000 +48/-0 hours. The result should meet the specifications without visible damage and no leakage of electrolyte. 在额定电压下, 在 60 ± 2 °条件下储存 1000 +48/-0 小时, 满足容量和 ESR 标准, 同时无可见损伤, 无电解液泄漏。
2	Cycle Life (25°C)	$\geq 50,000$ Cycles	Capacitors cycles between specified voltage 3.8V and rated voltage 2.5V underconstant current at +25 °C (50,000 cycles) +25°C下在额定电压 3.8V 和下限电压 2.5V 之间恒流充放电循环次数 (50,000 次)
3	Temperature Characteristics 温度特性	-30°C	$\Delta C/C$:初始电容的 $\pm 50\%$ 范围内 ESR: 初始电容的 ESR*2.0. $\Delta C/C$:初始电容的 $\pm 20\%$ 范围内 ESR: 初始电容的 ESR*2.0.
		65°C	

五、Product Reliability 产品可靠性

No. 序号	Items 项目	Criteria 标准	Test Method 测试方法
1	Temperature and Humidity Test 温湿度测试	$\Delta C/C$:初始电容的 $\pm 30\%$ 范围内 小于等于初始电容的 ESR*4.0.	The capacitor shall be exposed for 240 \pm 48 hours in an atmosphere of 90~95%RH at 40 \pm 2°C, the characteristic change shall meet the following requirement. The result should meet the specifications without visible damage and no leakage of electrolyte. 将电容在湿度 90~95%RH, 温度 40 \pm 2°C 的条件下放置 240 \pm 48 小时, 满足容量和 ESR 标准, 同时无可见损伤, 无电解液泄漏。

六、Product Circuit 产品电路

6.1 Circuit Diagram 电路原理图

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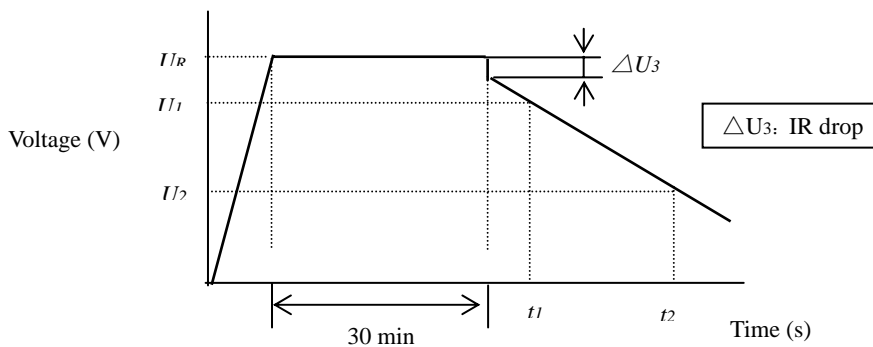
6.2 CMS Parameters 电容管理系统参数

No. 序号	Items 项目	Conditions 条件	Parameters 参数	Tolerance 精度	Units 单位
1	Over Charge Protection 过充保护	Cell Voltage 单体电压	4.275	±0.025	V
2	Over Discharge Protection 过放保护	Cell Voltage 单体电压	2.425	±0.080	V
	Over discharge protection recovery 过放保护恢复	Remove discharge load, Connect power supply. 移除负载, 连接电源.	NO	NO	NO
3	PCM Power Consumption 保护板功耗	Module 模组	3	N/A	uA
4	Discharge Overcurrent Protection 放电过电流保护	Module 模组	9.37	±2	A
5	Short Circuit Protection 短路保护	Module 模组	85	±25	A

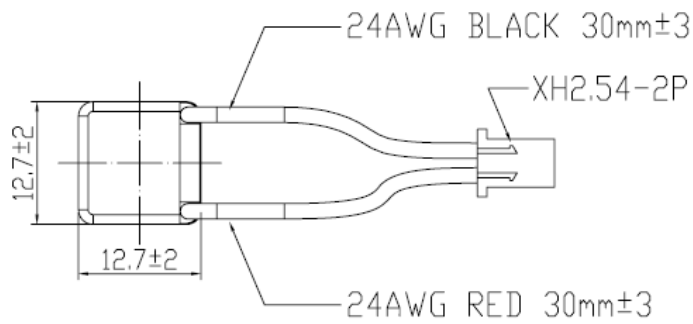
七、Charge/Discharge Characteristics 充放电特性

Charge: 5C(0.28A) CC (Constant Current) charge to 4.2V.
 充电: 0.28A 恒流充电到 4.2V 截止。

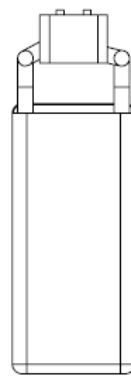
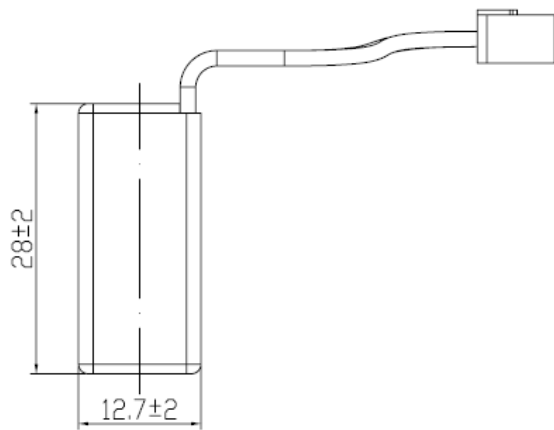
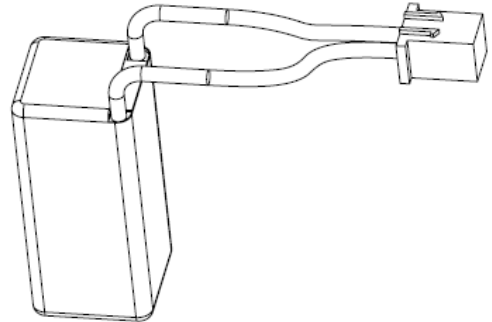
Discharge: 5C (0.28A) CC (Constant Current) discharge to 2.5V.
 放电: 0.28A 恒流放电到 2.5V。



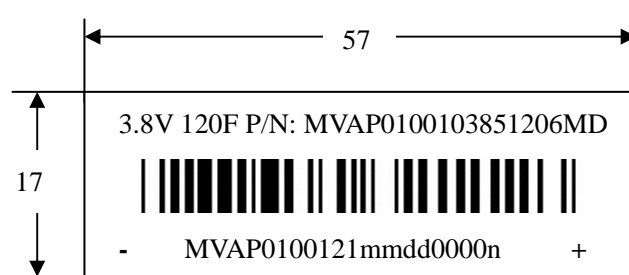
八、Product Dimensions 产品尺寸



单位: mm



九、Product Label 产品标签



十、Notice 注意事项

10.1 Charging 充电

10.1.1 Charging Current 充电电流

Charging current should be less than maximum charge current specified in the product specification. Charging with higher current than recommended value may cause damage to cell performance in electrical and mechanical characteristics as well as safety, and could lead to head generation or leakage.

充电电流不得超过本规格书最大的充电电流，使用高于充电值充电将可能引起电容的充放电性能，机械性能和安全性能的问题，可能导致发热或泄漏。

10.1.2 Charging Voltage 充电电压

Charging shall be done at voltage less than what specified (4.2V) in the product specification. Charging beyond 4.2V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

充电电压应小于产品规格书规定的电压(4.2V)，4.2V 为充电最高极限，充电器的设计应满足此条件。

Charging with higher voltage than recommended value may cause damage to cell performance in electrical and mechanical characteristics as well as safety, and could lead to head generation or leakage.

充电电压高于推荐值，可能引起电容的充放电性能，机械性能，和安全性能的问题，可能会导致发热或泄露。

10.1.3 Charging Temperature 充电温度

The module shall be charged within -30~65°C.

产品必须在-30~65°C温度范围内进行充电。

10.1.4 Prohibition of Reverse Charging 禁止反向充电

Positive and negative poles of the module should be connected correctly, and reverse charging is prohibited. The reverse charging may cause damage to the module, leading to degradation of module performance.

正确的连接模组的正负极，严禁反向充电，反向充电会降低模组的充放电性能。

10.2 Discharging 放电

10.2.1 Discharging Current 放电电流

The module shall be discharged at less than the maximum discharge current specified in the product specification. High discharging current may reduce the discharging capacity rapidly and cause over-heat.

放电电流不得超过规格书规定的最大放电电流，大电流放电会导致容量快速下降和过热。

10.2.2 Discharging Temperature 放电温度

The module shall be discharged within -30~65°C.

产品必须在-30~65°C温度范围内进行放电。

10.3 Storage 储存

10.3.1 The capacitor cannot be stored in place with humidity over 85%RH or place with toxic gas.

产品不能储存在湿度超过 85%，或有毒气体的地方。

10.3.2 The capacitor should be best stored in the environment within -20~50°C temperature with relative humidity less than 60%.

最好储存在温度-20~50°C，湿度 60%的环境中。