



## Battery Specification

**Product Name:** Rechargeable Li-ion Polymer Battery

**Product Model:** ÁÁGÜHÓÝ

**Product Number:** RH5G14010017/RH5G14010018

Prepared by : \_\_\_\_\_ Date: \_\_\_\_\_


Standard by : \_\_\_\_\_ Date: \_\_\_\_\_

Checked by : \_\_\_\_\_ Date: \_\_\_\_\_

Approved by : \_\_\_\_\_ Date: \_\_\_\_\_


<b>Project Manager</b>	
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<b>Customer Approval</b>	
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	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4


## 修订记录/Revision history

Version	Prepared by	Date	Check by	Remark
V1.0	Yawang Jie	2021/07/21	Qinglang Wu	Original release
V1.1	Yawang Jie	2021/09/01	Qinglang Wu	<ol style="list-style-type: none"> <li>1. Update cell information</li> <li>2. Update pack Typical capacity</li> <li>3. Update pre-charge current</li> <li>4. Update ship voltage</li> <li>5. Update mechanical drawing</li> </ol>
V1.2	Shaowei Chen	2022/07/15	Qinglang Wu	<ol style="list-style-type: none"> <li>1. Update label.</li> <li>2. Modify project name.</li> <li>3. Update PCB layout.</li> <li>4. Update mechanical diagram.</li> <li>5. Update 4.2.14 shipping OCV, 4.2.15 internal impedance.</li> </ol>
V1.3	Shaowei Chen	2023/04/06	Qinglang Wu	<ol style="list-style-type: none"> <li>4.2.2 Modify Nominal Capacity;</li> <li>7.2 Add PCM Board;</li> </ol>
V1.4	Shaowei Chen	2023/05/18	Qinglang Wu	<ol style="list-style-type: none"> <li>2. Update Standard compliance;</li> <li>4.1 Update Cell impedance to 65mΩ;</li> <li>4.2.9 Update Precharge time to 100 minutes;</li> <li>4.2.14 Update shipping voltage and SOC;</li> <li>4.2.15 Update internal impedance to 150mΩ;</li> <li>4.2.17 Update Storage temperature to -40degC;</li> <li>5.1 Update Storage characteristics and cycle life;</li> <li>5.4 Update ESD;</li> <li>6.3 Update Certification Item.</li> <li>5.3 Update 0V charging remark;</li> </ol>

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

## Contents /内容

1. Scope/范围 .....	4
2. Standard compliance/参考标准 .....	4
3. Product name and model/产品型号名称 .....	4
3.1 Product Name/产品名称: Rechargeable Li-ion Polymer Battery .....	4
3.2 Product Model/产品型号: GR3BX .....	4
4. Typical Characteristics/主要参数 .....	4
4.1 Cell Characteristics .....	4
4.2 Battery Characteristics .....	5
5. Performance/性能 .....	6
5.1 Electrical characteristics/电气性能 .....	6
5.2 Environmental Safety Test/环境安全试验 .....	9
5.3 PCM Specification/保护板规格 .....	12
5.3.1 Function of PCM/保护板参数(Topr= -20~60℃) .....	12
5.3.2 Circuit Diagram/电路原理图 .....	14
5.3.3 PCB layout/印制板板图 .....	14
5.3.4 BOM/物料清单 .....	15
5.4 Safety Requirement/安全性能 .....	16
6. Reliability Performance/可靠性能 .....	18
6.1 Waterproof grade/防水等级 .....	18
6.2 ESD .....	18
6.3 Certification .....	18
7. Mechanical characteristics/机械性能 .....	18
7.1 Appearance/外观 .....	18
7.2 Mechanical diagrams/机械图表 .....	20
8. Label/标签 .....	22
9. Others/其他 .....	24
9.1 Odor/气味 .....	24
9.2 Protection for Environment/环境保护 .....	24
10. Warning and notice .....	24

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

## 1. Scope/范围

The specification describes the requirements for GR3BX Rechargeable Li-ion Polymer battery pack.

Battery supplied by Fujian SCUD Power Technology Co., Ltd.

本规格书适用于 GR3BX 锂离子电池，由福建飞毛腿动力科技有限公司生产。

## 2. Standard compliance/参考标准

The battery should be complied with the standard of GB 31241-2014.

Country List/Other	Cell	Pack
US/Canada	UL 1642 including clause 14 Impact Test, UL/CSA 60950-1 2 <sup>nd</sup> Ed; UL/CSA 62368-1 2 <sup>nd</sup> Ed	UL2054 UL/CSA 60950-1 2 <sup>nd</sup> Ed LPS+CoA with Max Charging current and temp; UL/CSA 62368-1 2 <sup>nd</sup> Ed LPS+CoA with Max Charging current and temp+CoA with Max Abn Charging and Temp All reports with complete Country Deviations
	CTIA/IEEE 1725	CTIA/IEEE 1725
EU/UK	IEC 62133-2(CB) including clause 8.3.9 Forced Internal Short Circuit Test All reports with complete Country Deviations	IEC/EN 62133-2(CB)+IEC/EN 60950-1(CB) LPS output + IEC/EN 62368-1(CB) LPS All reports with complete Country Deviations
	IEC 62281(CB) including clause 6.4.9 Crush Test if above FISC Test is not conducted	EN 55032/CISPR 32/EN 55024/CISPR 24 Battery Directive 2006/66/EC CE sDoC UKCA sDoC
Mexico	N/A	N/A
Transportation	UN 38.3/UN3480/PI965/CSTCG	UN 38.3/UN3480/PI965/CSTCG
Recycled	UL2809	UL2809

## 3. Product name and model/产品型号名称


3.1 Product Name/产品名称: Rechargeable Li-ion Polymer Battery

3.2 Product Model/产品型号: GR3BX

## 4. Typical Characteristics/主要参数

### 4.1 Cell Characteristics


Supplier /电芯厂家	Cell Model /电芯型号	Nominal Voltage /额定电压	Rated capacity 额定容量 (mAh)	Cell Impedance /电芯内阻

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

ATL	Lithium-ion Polymer Rechargeable cell 354647B	3.7V	855 (Nominal) 835 (Rated)	$\leq 65\text{m}\Omega$
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## 4.2 Battery Characteristics


No.	Item	Specification	Remarks	
4.2.1	Rated Capacity /额定容量	820mAh	0.2C discharge, 3.0V cut off at 25°C±3°C	
4.2.2	Nominal Capacity /标称容量	840mAh	0.2C discharge, 3.0V cut off at 25°C±3°C	
4.2.3	Nominal voltage /标称电压	3.7V		
4.2.4	Charge method /充电模式	CC/CV	0.5C(410mA)/4.2V CC/CV charge to 0.05C(41mA) cut-off	
4.2.5	Charger limit voltage /充电限制电压	4.2V		
4.2.6	End of Discharge Voltage /放电截止电压	3.0V	Capacity test discharge Cut-off voltage is 3.0V/cell	
4.2.7	Standard Charge Current /标准充电电流	0.5C(410mA)	Standard Charge Current (Recommend charging current)	
4.2.8	Maximum charging current /最大充电电流	0.5C(410mA)		
4.2.9	Pre-charge current / 预充电流	$\leq 0.1\text{C}$	1.0~3.0V, within approximately 100 minutes	
4.2.10	Standard Discharge Current /标准放电电流	0.2C(164mA)	Discharge: 25±3°C, 65% RH max (Recommend discharging current)	
4.2.11	Max. Continuous Discharge Current /最大持续放电电流	1.0C(820mA)		
4.2.12	Max. Peak Discharge Current /最大尖峰放电电流	2.5C(2.05A) / <500ms		
4.2.13	Weight(g) /重量	390g		
4.2.14	Shipping OCV /出厂电池电压	3.82~3.95V	About 51%~72% SOC	
4.2.15	Internal impedance /电池内阻	$\leq 150\text{ m}\Omega$ (initial max.)	AC 1kHz	
4.2.16	Operating temperature (cell surface temperature) /工作环境温度 (电芯表面温度)	Charge	0°C~10°C	0.1C Max to 4.2V, then CV to 0.05C
			10°C~50°C	0.5C Max to 4.2V, then CV to 0.05C
		Discharge	-20°C~0°C	0.5C Max to 3.0V
			0°C~60°C	1.0C Max to 3.0V
4.2.17	Storage temperature /存储温度	Within 3 month	-40°C~+60°C	Humidity: $\leq 75\%RH$ The Cell voltage should be kept in the range of 3.6V to 3.95V by charging the Cells if the Cells are stored more than 3 months.
		over 3 months	25±3°C	

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4


## 5. Performance/性能

### 5.1 Electrical characteristics/电气性能


Items	Conditions and others	Performances
Environment /环境	Unless otherwise specified, all test stated in this specification are conducted at 1)temperature: $23 \pm 3^{\circ}\text{C}$ ; 2)humidity: $\leq 75\%$ ; 3)atmospheric pressure: 86kPa~106kPa	
Measure Equipment 测试设备	1) Ammeter and Voltmeter: The ammeter and voltmeter should have an accuracy of the grade 0.5 or higher. 2)Slide caliper: The slide caliper should have less than 0.05mm scale. 3)Impedance meter: The impedance meter with AC 1kHz should be used.	
Standard Charge /标准充电	Charging the battery with 0.5C of constant current and constant voltage 4.2V at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . Charge end of current 0.05C. /在环境温度 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 条件下, 以 0.5C 充电, 当电池端电压达到充电限制电压 4.2V 时, 改为恒压充电, 充电截止电流 0.05C。	
Standard Discharge Capacity/标准放电容量	Within 0.5~1hour after standard charge, discharge with 0.2C to 3.0V cut-off at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ . repeat charge and discharge for 5times. Until the discharge time meet the requirement, stop the test. /电池按规定充电后搁置 0.5~1 小时后, 在 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的温度下以 0.2C 电流放电到 3.0V。上述实验可以重复 5 次, 当有一次循环电池容量符合要求, 实验即可停止。	Discharge time $\geq 300$ mins / 放电时间 $\geq 300$ 分钟

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

High Temperature discharge /高温放电	After standard charged, battery should be stored in a temperature-controlled environment at $55 \pm 2^\circ\text{C}$ for 2 hours. after storage, battery should be discharged with 0.2C to 3.0V cut-off. /电池按规定充电结束后, 将电池放入 $55^\circ\text{C} \pm 2^\circ\text{C}$ 的高温箱中恒温 2h, 然后以 0.2C 电流放电至 3.0V.	Discharge time $\geq 300$ mins / 放电时间 $\geq 300$ 分钟。
Low Temperature discharge /低温放电	After standard charged, battery should be stored in a temperature-controlled environment at $-10 \pm 2^\circ\text{C}$ for 4 hours. after storage, battery should be discharged with 0.2 C to 3.0V cut-off. /电池按标准充电结束后, 将电池放入 $-10^\circ\text{C} \pm 2^\circ\text{C}$ 的低温箱中恒温 4h 后, 以 0.2 C 电流放电至终止电压	Discharge time $\geq 180$ mins /放电时间 $\geq 180$ 分钟。
Storage Characteristics (Retain capacity)/自放电容量	Stored at 100% SOC Retained capacity = after storage discharge 0.2C <sub>min</sub> 3.0 V at $25 \pm 3^\circ\text{C}$ divided by measured capacity before storage /100%容量的电池包存储后, 在 $25 \pm 3^\circ\text{C}$ 下用 0.2C <sub>min</sub> 放电至 3.0V 获得的容量除以存储前的容量。	$>83\% C_{\text{measured}}$ for 3 months at $25^\circ\text{C}$ $>83\% C_{\text{measured}}$ for 1 month at $45^\circ\text{C}$ $>83\% C_{\text{measured}}$ for 1 week at $60^\circ\text{C}$
Storage Characteristics (Recoverable capacity)/存储恢复容量	Recoverable capacity = Full charge after storage discharge: charge CC 0.5C <sub>min</sub> to 4.20V CV 0.05C <sub>min</sub> Then discharge: 0.2C <sub>min</sub> 3.0 V at $25 \pm 3^\circ\text{C}$ divided by measured capacity before storage /恢复容量=存储后充满电后放电容量 充电 CC 0.5C <sub>min</sub> 后 4.20V CV 充至 0.05C <sub>min</sub> 截止, 然后 $25 \pm 3^\circ\text{C}$ 下 0.2C <sub>min</sub> 放电至 3.0V 获得的容量除以存储前的容量	$>95\% C_{\text{measured}}$ for 3 months at $25^\circ\text{C}$ $>95\% C_{\text{measured}}$ for 1 month at $45^\circ\text{C}$ $>85\% C_{\text{measured}}$ for 1 week at $60^\circ\text{C}$


	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

<p>Cycle Life/循环寿命</p>	<p>A) 1000 cycles charging/discharging is repeated in the below condition:  Environment: <math>12 \pm 2^\circ\text{C}/25 \pm 3^\circ\text{C}/45^\circ\text{C} \pm 2^\circ\text{C}</math>  Charging: 0.5C CC to 4.2V then CV to 0.05C.  Discharging: 0.5C  Discharge end of voltage: 3.0V  Cell is to be rested for 5 minutes after charged and 5 minutes after discharge.  Measure each of one hundred cycle capacity with standard charge and discharge, and record it.</p> <p>B) 1000 cycles charging/discharging is repeated in the below condition:  Environment: <math>12 \pm 2^\circ\text{C}/25 \pm 3^\circ\text{C}/45^\circ\text{C} \pm 2^\circ\text{C}</math>  Charging: 0.5C CC to 3.95V then CV to 0.05C.  Discharging: 0.5C  Discharge end of voltage: 3.0V  Cell is to be rested for 5 minutes after charged and 5 minutes after discharge.  Measure each of one hundred cycle capacity with standard charge and discharge, and record it.</p> <p>A) 在环境温度 <math>12 \pm 2^\circ\text{C}/25 \pm 3^\circ\text{C}/45^\circ\text{C} \pm 2^\circ\text{C}</math> 的条件下, 0.5C 恒流充至 4.2V 后恒压至 0.05C, 搁置 5min, 然后以 0.5C 电流放电至 3.0V, 放电结束后, 搁置 5min, 再进行下一个充放电循环。每 100 次按标准充放电条件测量电池的恢复容量并记录。</p> <p>B) 在环境温度 <math>12 \pm 2^\circ\text{C}/25 \pm 3^\circ\text{C}/45^\circ\text{C} \pm 2^\circ\text{C}</math> 的条件下, 0.5C 恒流充至 3.95V 后恒压至 0.05C, 搁置 5min, 然后以 0.5C 电流放电至 3.0V, 放电结束后, 搁置 5min, 再进行下一个充放电循环。每 100 次按标准充放电条件测量电池的恢复容量并记录。</p>	<p>A) The battery capacity should be more than 80% of Initial capacity at every 100 cycles, total 1000 cycles.</p> <p>B) The battery capacity should be more than 85% of Initial capacity at every 100 cycles, total 1000 cycles.</p> <p>A) 每循环 100 次后电池容量为初始容量 80%以上, 循环 1000 次。</p> <p>B) 每循环 100 次后电池容量为初始容量 85%以上, 循环 1000 次。</p>
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	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

## 5.2 Environmental Safety Test/环境安全试验


Items	Conditions and others	Performances
Low Pressure 低气压	<p>The standard charged battery is to be stored in the vacuum chamber. After close the vacuum chamber, then reduce the pressure, until the internal pressure is no more than 11.6kPa, and keep for 6 hours.</p> <p>充饱电的电池，将其搁置在真空箱中。真空箱密闭后，逐渐减少其内部压力至不高于 11.6kPa(模拟海拔 15240m)并保持 6 小时。</p>	<p>The battery should be no leakage, no venting, no rupture, no fire or no explosion.</p> <p>电池应不泄露、不泄气、不破裂、不起火和不爆炸。</p>
Thermal Shock 温度循环	<p>Battery(standard charged) is repeatedly tested with 10 times heat cycling, which means maintaining the battery for 6hours at <math>-40^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> and <math>72^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> respectively.</p> <p>The interval of temperature change is kept in 30mins.</p> <p>电池充满电后，将电池放入温控箱中，</p> <ol style="list-style-type: none"> <li>1) 在温度 <math>72^{\circ}\text{C} \pm 2^{\circ}\text{C}</math> 的实验箱中保持 6 小时</li> <li>2) 将实验箱温度降为 <math>-40^{\circ}\text{C} \pm 2^{\circ}\text{C}</math>，保持 6 小时</li> <li>3) 温度转换时间不大于 30 分钟</li> <li>4) 重复步骤 1) ~2)，共循环 10 次。</li> </ol>	<p>The battery should be no leakage, no venting, no rupture, no fire or no explosion.</p> <p>电池应不泄露、不泄气、不破裂、不起火和不爆炸。</p>
Vibration /震动试验	<p>Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration should be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7Hz traversed in 15 minutes.</p> <p>This cycle should be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.</p> <p>The logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency</p>	<p><math>\text{OCV} \geq 90\%</math> initial OCV (open circuit voltage)</p> <p>The battery should be no leakage, no venting, no rupture, no fire or no explosion.</p> <p>开路电压不低于初始电压 90%,并能进行正常的充放电。电池应不泄露、不泄气、不破裂、不起火和不爆炸。</p>

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

	<p>increased until a peak acceleration of 8 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz.</p> <p>/电池按规定充电结束后，将电池固定在振动台上，不可使电池变形。采用正弦波进行振动，并以对数扫频方式在 15mins 内从 7Hz 扫频到 200Hz 并返回到 7Hz。振动沿样品互相垂直的三个方向（其中一个方向必须与样品正负极所在平面垂直）进行，每个方向按上述对数扫频方式重复 12 次，振动 3h。对数扫频方式如下：7Hz~18Hz 保持 9.8m/s<sup>2</sup> 的峰值加速度。将振幅保持在 0.8mm（位移为 1.6mm）直至峰值加速度达到 78.4m/s<sup>2</sup>（频率约为 50Hz）。保持 78.4m/s<sup>2</sup> 的峰值加速度直到频率增长到 200Hz。</p>	
<p>Acceleration Test /加速度冲击</p>	<p>电池按照 Spec 规定充电后，固定在冲击台上，最初 3ms 内，最小平均加速度为 75g.N,峰值加速度为 150+/-25g.N,持续脉冲时间为 6+/-1ms,电池每个方向进行三次加速度冲击。测试后，电池按标准充电方式进行一次放电充电循环。</p> <p>A standard charged battery is to be firmly secured to the platform of acceleration test equipment.</p> <p>Each shock is to be applied in a direction normal to the face of the battery. For each shock the cell is to be accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 75g.N. The peak acceleration should be between 125 and 175g. N.</p> <p>The acceleration shock test last for 6+/-1ms.</p> <p>After testing, charge and discharge the battery with standard method.</p>	<p>The battery should be no fire, no explosion, or no leakage.</p> <p>电池应不起火，不爆炸，不漏液。</p>

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

<p>Drop Test /跌落试验（软包电池须与整机配合测试）</p> <p>The test need device to support.</p>	<p>The battery is to be dropped down to concrete(or steel plate) from a height of 1m for 6 times (with direction X,Y,Z each 1 times).</p> <p>Discharge with 0.5 C to 3.0V cut-off within 1 hour after fully-charged.</p> <p>/电池按规定充电结束后，将电池样品由高度为 1m 的位置自由跌落到水泥地板或钢板上，从 X、Y、Z 正负方向（六个方向）每个方向自由跌落 1 次。自由跌落结束后，将电池以 0.5C 电流放电至 3.0V。然后进行充放电循环</p>	<p>OCV<math>\geq</math>90% initial OCV（open circuit voltage）</p> <p>The battery should be no leakage, no fire or no explosion.</p> <p>开路电压不低于初始电压 90%，并能进行正常的充放电。电池应不泄露、不起火和不爆炸。</p>
<p>High temperature stress relieving /高温应力消除 <b>（注塑成型的热塑性外壳电池适用）</b> <b>Applicable for the thermoplastic shell battery for injection molding.</b></p>	<p>The standard discharged battery is to be placed in a 70+/-2<math>^{\circ}</math>C circulating air oven for 7 hours. After finishing the test, remove it and restore to room temperature.</p> <p>将电池按照 4.5.1 规定的试验方法充满电后，在 70+/-2<math>^{\circ}</math>C 的鼓风恒温箱中搁置 7H，取出并恢复至室温。</p>	<p>The enclosure does not result in the physical deformation that causes the internal components to be exposed.</p> <p>外壳不能发生导致内部组成暴露的物理变形。</p>
<p>Using at high temperature /高温使用</p>	<p>The standard charged battery is to be placed in the high temperature experiment box, emperature is set as the battery charging upper-limit temperature, or battery discharging upper- limit temperature, or cell charge upper-limit temperature, or cell discharge upper-limit temperature, which specified in the specification, or 80 <math>^{\circ}</math>C,choose the highest one, and keep for 7 hours after waiting for the sample surface temperature stability.</p> <p>将满电样品置于高温实验箱内，将高温箱温度设为 SPEC 规定的电池组充电上限温度，电池组放电上限温度，电芯充电上限温度，电芯放电上限温度，以及 80<math>^{\circ}</math>C 中的最大值，待样品表面温度稳定后保持 7H。</p>	<p>The battery should meet one of the requirement:</p> <p>1)Not discharge, store in the high temperature experiment box , there should be no fire, no explosion, or no leakage.</p> <p>2)Connect with charge/discharge device, conducted with a standard discharge/charge cycle.</p> <p>样品应满足下列条件之一：</p> <p>1)切断放电电路，电池应不起火，不爆炸，不漏液</p> <p>2)未切断电路，在高温中按规格书进行一次标准放电充电循环。</p>


	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

High Humidity& High Temperature /恒定湿热	The standard charged battery should be stored in the oven with requirements of 90%-95% relative humidity at 40±2°C for 48 hours, after finishing, inspect appearance and measure the recovery capacity by standard charge/discharge cycling after discharging with 0.2C to 3.0V cut-off at 23°C±2°C.  /电池按规定充电结束后，将电池放入 40°C±2°C，相对湿度为 90%~95%的恒温恒湿箱中搁置 48h 后，将电池取出在环境温度 23°C±2°C 的条件下搁置，目测电池外观；再以 0.2C 电流放电至 3.0V,然后以标准充放电方式测量电池恢复容量。	Discharge time ≥180mins / 放电时间≥180 分钟  The battery should be no leakage. 电池应不漏液  The battery should be no distortion, no rustiness, no leakage, no venting, no fire or no explosion. 电池应不变形、不锈蚀、不泄露、不泄气、不破裂、不起火和不爆炸。
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### 5.3 PCM Specification/保护板规格

#### 5.3.1 Function of PCM/保护板参数(Topr= -20~60°C)

Items	Unit	Min.	Typ	Max.	Remark
Primary Protection					
1 <sup>st</sup> Over charge detection voltage /一段过充电保护电压	V	4.25	4.275	4.3	
1 <sup>st</sup> Over charge detection delay time /一段过充电保护延迟时间	s	0.717	1.024	1.331	
1 <sup>st</sup> Overcharge release voltage /一段过充保护恢复电压	V	4.215	4.275	4.3	
1 <sup>st</sup> Over discharge detection voltage /一段过放电保护电压	V	2.26	2.3	2.34	
1 <sup>st</sup> Over discharge detection delay time /一段过放电保护延迟时间	ms	67.2	96	124.8	
1 <sup>st</sup> Over discharge release voltage /一段过放电保护解除电压	V	2.26	2.3	2.37	
1 <sup>st</sup> Discharge over current detection current 1 /一段放电过电流保护值	A	2.0	4.13	8.12	Charger release /充电解除
1 <sup>st</sup> Discharge over current detection delay time1 /一段放电过电流保护延迟时间	ms	7	10	13	
1 <sup>st</sup> Charge over current detection current /一段充电过电流保护值	A	0.86	1.88	3.88	Load release /放电解除
1 <sup>st</sup> Charge over current detection delay time /一段充电过电流保护延迟时间	ms	7	10	13	

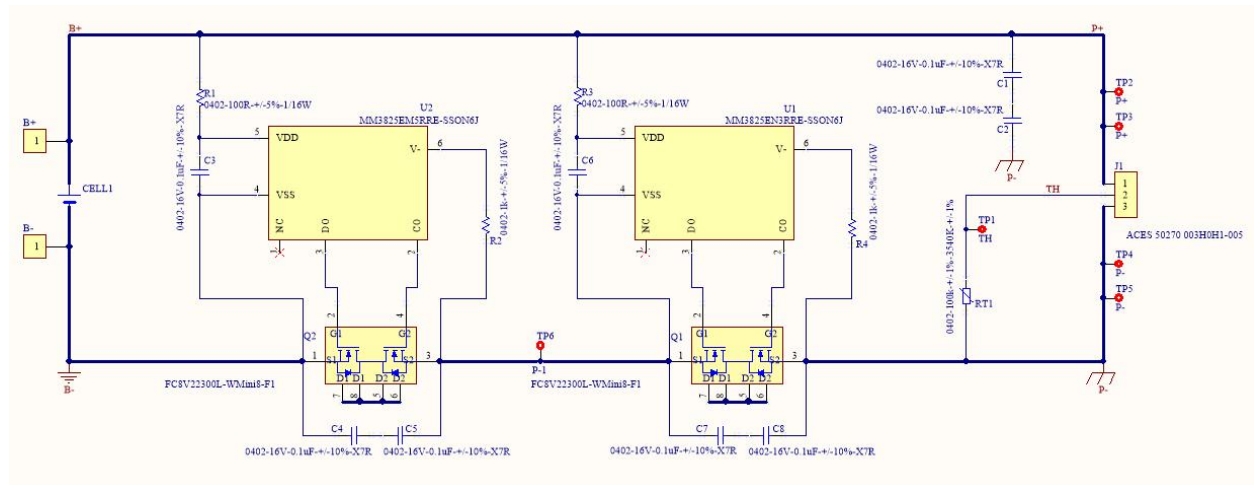
	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

1 <sup>st</sup> Short circuit protection current /一段短路保护值	A	7.68	16.25	32.71	
1 <sup>st</sup> Short circuit protection current delay time /一段短路保护延迟时间	us	188	300	450	
0V charging/0V 充电	Permission				By connecting the charger more than Minimum operating voltage for 0V charging (Vst).
	V	-	-	1.2	
Secondary Protection					
2 <sup>nd</sup> Over charge detection voltage /一段过充电保护电压	V	4.25	4.275	4.3	
2 <sup>nd</sup> Over charge detection delay time /一段过充电保护延迟时间	s	0.717	1.024	1.331	
2 <sup>nd</sup> Overcharge release voltage /一段过充保护恢复电压	V	4.215	4.275	4.3	
2 <sup>nd</sup> Over discharge detection voltage /一段过放电保护电压	V	2.16	2.2	2.27	
2 <sup>nd</sup> Over discharge detection delay time /一段过放电保护延迟时间	ms	179.2	256	332.8	
1 <sup>st</sup> Over discharge release voltage /一段过放电保护解除电压	V	2.16	2.2	2.27	
2 <sup>nd</sup> Discharge over current detection current I /一段放电过电流保护值	A	2.22	4.56	8.94	Charger release /充电解除
2 <sup>nd</sup> Discharge over current detection delay time I /一段放电过电流保护延迟时间	ms	22.4	32	41.6	
2 <sup>nd</sup> Charge over current detection current /一段充电过电流保护值	A	1.02	2.19	4.47	Load release /放电解除
2 <sup>nd</sup> Charge over current detection delay time /一段充电过电流保护延迟时间	ms	14	20	26	
2 <sup>nd</sup> Short circuit protection current /一段短路保护值	A	8.95	18.75	37.41	
2 <sup>nd</sup> Short circuit protection current delay time /一段短路保护延迟时间	us	219	350	525	
0V charging/0V 充电	Inhibition				Even if connected to charger, this IC inhibits charging battery discharged less than 0V battery charge inhibition battery voltage (Vst).
	V	0.6	0.9	1.2	

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

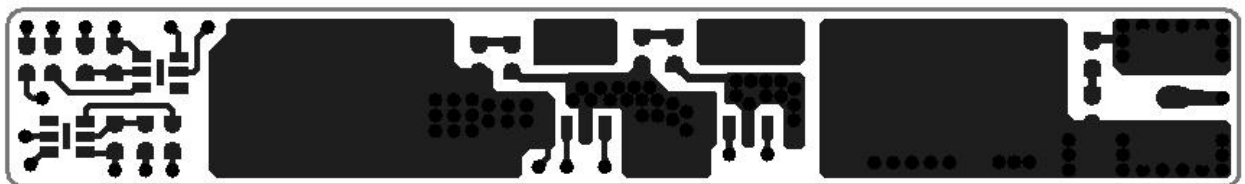
Other					
Current consumption /工作消耗电流	$\mu A$	-	5	8	
Standby Current /休眠电流	$\mu A$	-	-	0.2	
Internal Resistance of PCM /保护板内阻	$m\Omega$	-	-	88	Within wire harness /含线束

### 5.3.2 Circuit Diagram/电路原理图

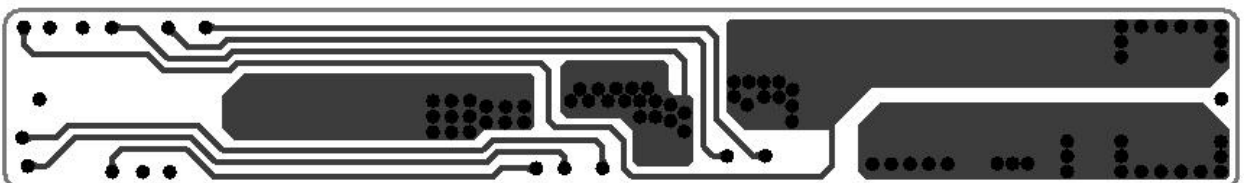


### 5.3.3 PCB layout/印制板板图

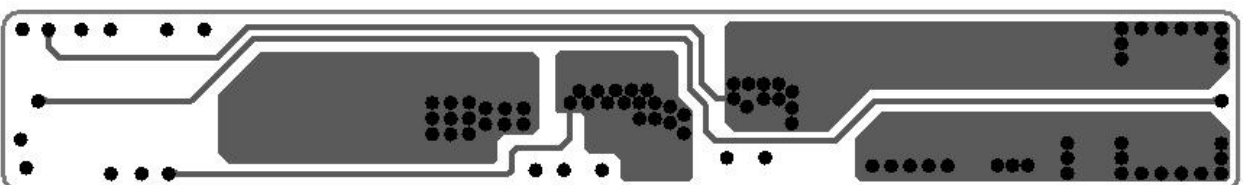
Top Layer:




Inner layer1:

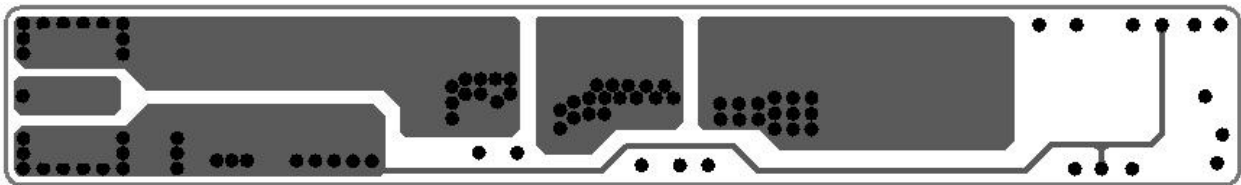


Inner layer2:

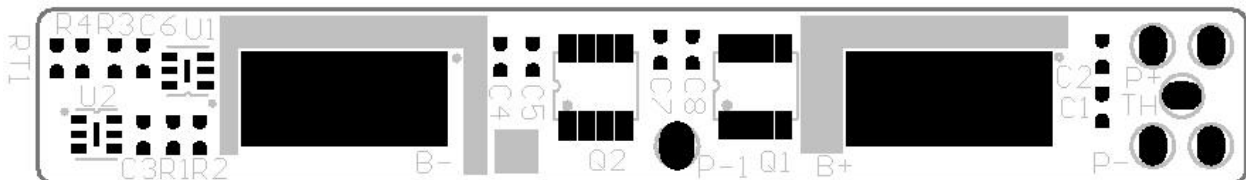


	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

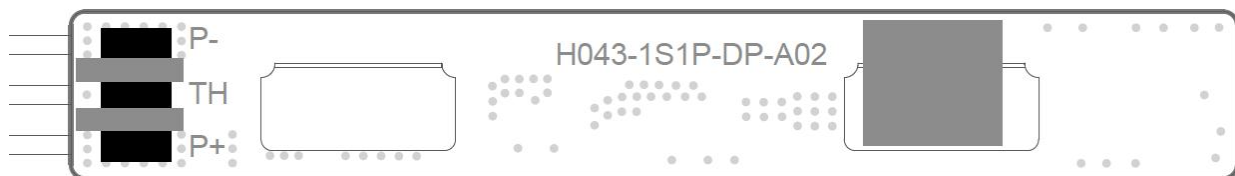
Bottom Layer(mirrored):



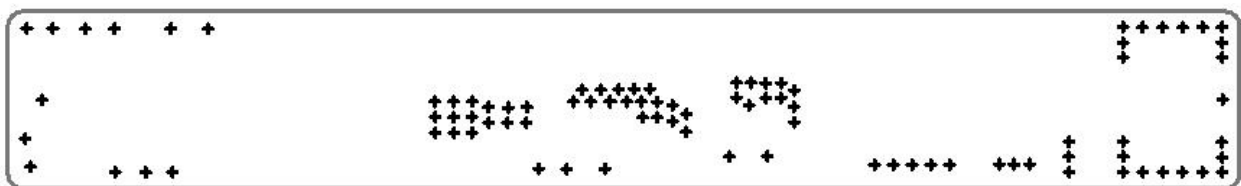
Top Overlay&Solder:



Bottom Overlay/Solder(mirrored):




Drill Guide:



### 5.3.4 BOM/物料清单


No.	Type	Description	Symbol	Qty.	Manufacturer	Package
1	Capacitor	0402-16V-0.1uF-±10%-X7R	C1, C2, C4, C5,C6,C7,C8	8	YAGEO /Samsung	0402
2	Resistor	0402-100R-±5%-1/16W	R1,R3	2	YAGEO /TA-I	0402
3	Resistor	0402-1k-±5%-1/16W	R2,R4	2	YAGEO /TA-I	0402
4	Primary PIC	MM3825EN3RRE	U1	1	Mitsumi	SSON6J
5	Secondary PIC	MM3825EM5RRE	U2	1	Mitsumi	SSON6J
6	MOSFET	FC8V22300L /SP8608(ALT.)	Q1,Q2	2	PANASONIC /Samhop(ALT.)	WMini8-F1 /S mini 8
7	NTC	0402-100K-F-3540K-F-TH05-3L104F	RT1	1	Mitsubishi	0402

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4


8	NI-PAD	7.0*3.1*0.1	B+/B-	2	DATONG /FUCI(ALT.)	7.0*3.1*0.1
9	PCB	H043-1S1P-DP-A02	/	1	Victory Giant /Redboard(ALT.)	/
10	Connector	50270-003H0H1-L18.3mm-AWG28 #-UL3302-ACES	J1	1	ACES	/
11	UV glue	326-loctit-1 升/桶	/	0.01ml	LOCTITE	/
12	Under fill glue	HS-601UF-B-底部	/	0.04ml	HANSTAR	/

#### 5.4 Safety Requirement/安全性能

Items	Conditions and others	Performances
Charge Over Voltage Protection /过压充电	<p>The standard charged battery is continue to be charged with maximum charging current to <math>n*6V</math> or the highest possible voltage(Choose the best one), and keep the voltage by CV charging, until the protection circuit starts.</p> <p>将电池按标准充电方式充满电后，继续以最大充电电流恒流充至 <math>n*6V</math> 或者可能承受的最高电压值（两者取较高者），并保持该电压进行恒压充电。充电至保护电路起动。</p>	<p>The battery should be no fire, no explosion or no leakage.</p> <p>电池组应不起火，不爆炸，不漏液。</p>
Charge Over Current Protection /过流充电	<p>The standard discharged battery is to be charged with 1.5 times charge protection current, until the protection circuit starts.</p> <p>电池组按标准放电方式放完电后，然后以 1.5 倍的过流充电保护电流进行恒流充电，直至保护电路起动。</p>	<p>The battery should be no fire, no explosion or no leakage.</p> <p>电池组应不起火，不爆炸，不漏液。</p>
Over Discharge Protection /欠压放电	<p>The standard charged battery is to be discharged with maximum continuous discharge current, until the protection circuit starts. then keep for 10 minutes, recharging the battery with standard charge method.</p> <p>将电池按标准充电方式充满电后，以其最大持续放电电流放电至保护电路起动，然后静置 10min,继续按 SPEC 规定方法充满电。</p>	<p>The battery should be no fire, no explosion or no leakage.</p> <p>电池组应不起火，不爆炸，不漏液。</p>

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

Over Load Protection /超载	<p>The standard charged battery is to be discharged with 1.5 times discharge protection current, until the protection circuit starts.</p> <p>将电池按标准充电方式充满电后，然后以 1.5 倍过流保护电流恒流放电至保护电路起动。</p>	<p>The battery should be no fire, no explosion or no leakage.</p> <p>电池组应不起火，不爆炸，不漏液。</p>
External Short Circuit /外部短路	<p>The test should be conducted under 25±5°C.</p> <p>The standard charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with copper wire having a resistance about 80mΩ±20 mΩ. until the protection circuit starts.</p> <p>将电池按照标准充电方式充满电后，短路电池组的正负极端子，外部短路总电阻为 80+/-20mΩ,直至保护电路起动。</p>	<p>The battery should be no fire, no explosion, no smoke or no leakage.</p> <p>电池应不起火，不爆炸，不冒烟或漏液。</p>
Reverse Charge /反向充电	<p>The standard charged battery should be reverse charged with recommending current for 90 minutes.</p> <p>将电池按标准充电方式充满电后，然后以推荐充电电流反向充电 90min。</p>	<p>The battery should be no fire, no explosion, no smoke or no leakage.</p> <p>电池应不起火，不爆炸，不冒烟或漏液。</p>
ESD /静电	<p>The standard charged battery should be test under ESD ±8kV contact discharge and ±15kV air discharge for each 5 times. The interval of discharge is 1min.</p> <p>对充饱电后的电池（金属端子）进行±8kV 接触放电与±15kV 空气放电各 5 次，每次放电间隔 1 分钟。</p>	<p>The function of battery should be work well.</p> <p>电池所有功能正常。</p>
Drop Impact test /重物冲击测试  (对于软包装电池，本条不适用 /This item is not applicabel for polymer battery)	<p>Battery is to be placed on a flat surface.</p> <p>To place 15.8mm±0.2mm diameter bar across the center of standard charged battery, and drop 9.1kg weight from 610±25mm height onto the battery. Then keep for 6hr,</p> <p>/充饱电的电池放置于平面冲击台上，并将一个直径 15.8mm 的钢柱放置于电池中心，钢柱的纵轴平行于平面，让品质 9.1kg 的重物从 610mm±25mm 高度自由落到电池中心上方的钢柱上，测试完毕，观察 6 小时。</p>	<p>The battery should be no fire, no explosion.</p> <p>/电池应不起火、不爆炸。</p>

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

Heating test /热滥用	<p>A battery is to be heated in a circulating air oven. The temperature of the oven is to be raised at a rate of <math>(5^{\circ}\text{C}\pm 2^{\circ}\text{C})/\text{min}</math> to a temperature of <math>130^{\circ}\text{C}</math>. The oven is to remain for 30 minutes.</p> <p>/电池放置于热箱中, 温度以 <math>(5^{\circ}\text{C}\pm 2^{\circ}\text{C})/\text{min}</math> 的速率升至 <math>130^{\circ}\text{C}\pm 2^{\circ}\text{C}</math> 并保温 30mins。</p>	<p>The battery should be no fire, no explosion.</p> <p>/电池应不起火、不爆炸。</p>
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## 6. Reliability Performance/可靠性能

### 6.1 Waterproof grade/防水等级

No needed.

### 6.2 ESD

Meet IEC61000-4-2 level 4 ( $\pm 8\text{ kV}$  contact and  $\pm 15\text{ kV}$  air). /满足 IEC61000-4-2 等级 4 接触  $\pm 8\text{ kV}$ 、空气  $\pm 15\text{ kV}$ 。

### 6.3 Certification


UN38.3  
IEC62133+62368  
UL2054+62368  
CTIA/IEEE1725  
CE-EMC/EN 55032/CISPR 32/EN 55024/CISPR 24  
UKCA  
电池指令  
UL2809

## 7. Mechanical characteristics/机械性能

### 7.1 Appearance/外观

Sheet 6 Appearance

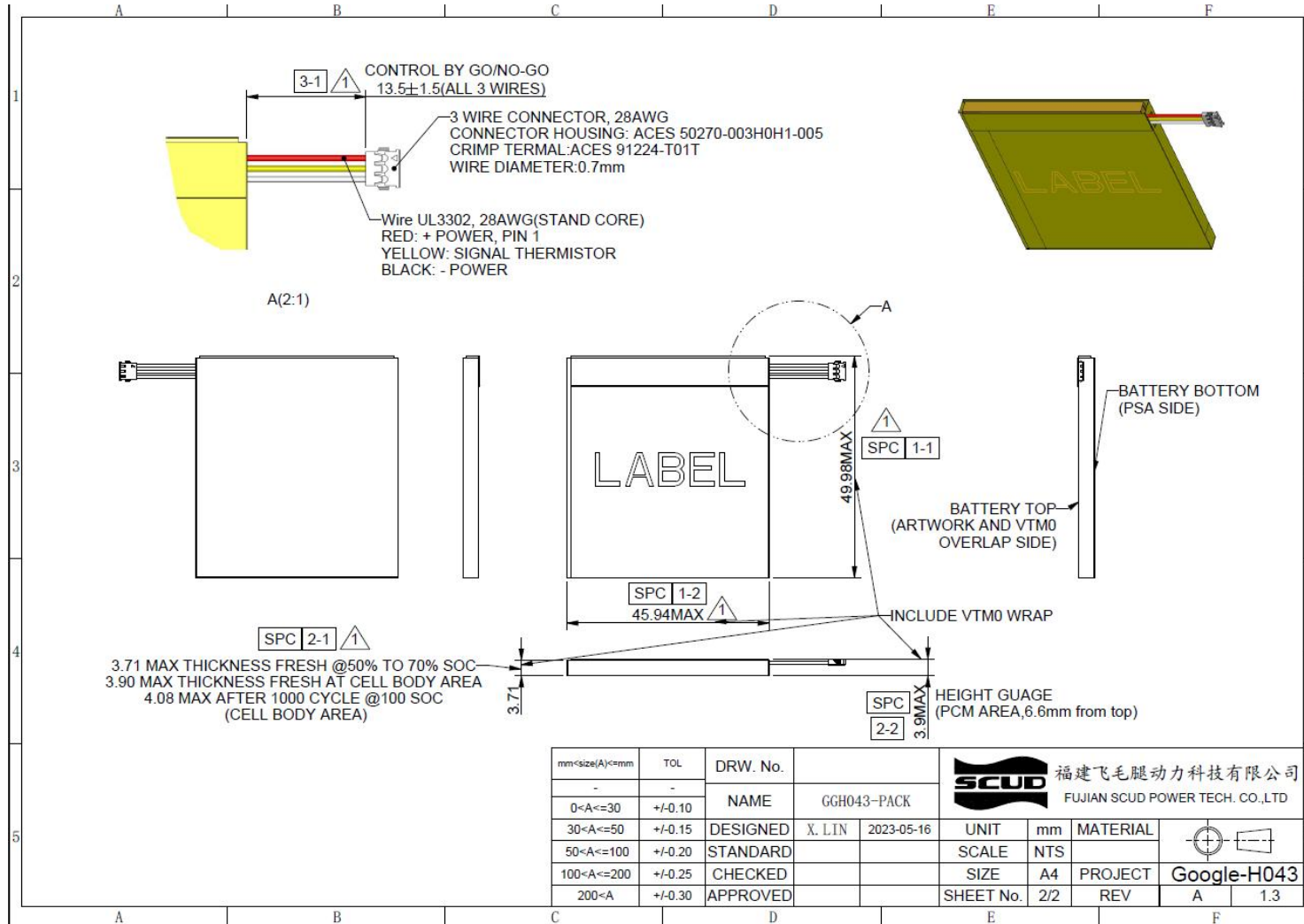
NO.	Item	Conditions and others	Remark
1	Dimension/外形尺寸	Refer to the structure diagram /参见机械结构图表	
2	Connection PIN/接触极片	Refer to the structure diagram /参见机械结构图表	
3	The material of housing/塑壳材料	Combustion proof grade:V-0 /阻燃等级: V-0	


	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

4	Mark and Label/标签	Refer to the attachment of battery label. /参见结构卷标部分	
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## 7.2 Mechanical diagrams/机械图表

Refer to the attachment of battery structure diagram./参考附件电池结构图表



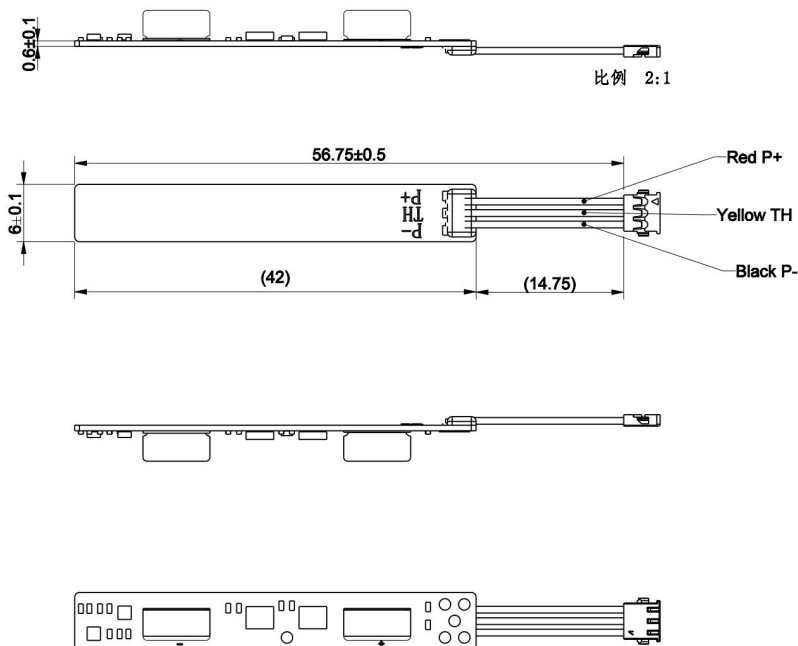
	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4


Refer to the attachment of PCM board./参考附件 PCM 板图

PCM width  
6.00+/-0.1 mm

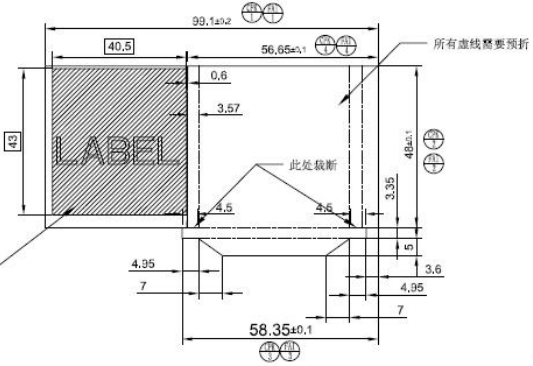
PCM Length(including wire, excluding connector)  
56.75+/-0.5 mm

PCM Thickness  
0.6+/-0.1mm



	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

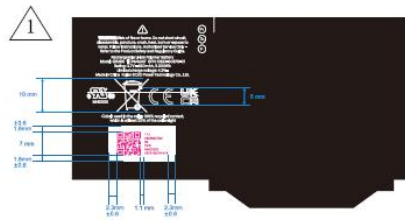
## 8. Label/标签



铭牌信息区域，此面为正面

所有虚线需要预折



此处裁断



白框尺寸19.7X10.6mm

QR code printing requirements:

- QR Code coding principles: (code size 7\*7mm)  
VVY G8230037001 RR Y M D MM SSSSS QQQQQQQQQQQ  
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩
- >>>  
①VVY---- battery supplier code (SCUD is 1PU)  
②G8230037001 = GOOGLE PART NUMBER  
③RR-----REVISION (2 characters, alphanumeric)  
④Y----- YEAR (Year where parts are produced at part vendor. 1 character, numeric. Last digit of the year). (For example: 2021, Y=1)  
⑤M----- MONTH (Month where parts are produced at part vendor. 1 character, alphanumeric. 1 - 9 for JAN - SEPT, A= OCT, B = NOV, C= DEC)  
⑥D----- DAY (Date where parts are produced at part vendor. 1 character alphanumeric. 1 - 9 for 1st - 9th, A = 10th, B = 11th, ... X = 31st. Skip letter "I" and letter "0", see Appendix IV for details)  
⑦MM -----TOOLING/CAVITY NUMBER (2 characters, alphanumeric). Replace MM with XX when the 2 characters are not in use.  
⑧SSSS---- 5-digit serial number (Hexadecimal, 0-9, capital letters A-F, from 00001 to FFFF in sequence, not to repeat, need to start coding from 0001 again daily)  
⑨QQQQQQQQQQQQ ---CM (INTEGRATOR) PART NUMBER, 12 characters.
- The font is Google Sans. Font size 2.6pt.

mm(size) A<mm	TOL	DRW. No.		 福建飞毛腿动力科技有限公司 FUJIAN SCUD POWER TECH. CO.,LTD			
-	-	NAME	OEM铭牌	UNIT	mm	MATERIAL	
0<A<=30	+/-0.10	DESIGNED		SCALE	NTS	UNASSIGNED	
30<A<=50	+/-0.15	STANDARD		SIZE	A4	PROJECT	
50<A<=100	+/-0.20	CHECKED		SHEET No.	2/3	REV	
100<A<=200	+/-0.25	APPROVED					H043
200<A	+/-0.30						V 1.1

## 9. Others/其他

### 9.1 Odor/气味

The battery do not product special smell or harmful odor./本电池不会产生特别或有害的气味

### 9.2 Protection for Environment/环境保护

The material used for packing should meet the criterion to protect environment./封装电池所用材料须全部符合环境保护标准

## 10. Warning and notice

### WARNING


- 1、 Do not put the battery into a fire, or heat the battery.
- 2、 Do not store the battery in high temperature environment.
- 3、 Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment.
- 4、 Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
- 5、 Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.
- 6、 Do not disassemble or alter the batteries' outside structure.
- 7、 Do not submerge the battery in water, do not wet the battery when store the battery.

### NOTICE

- 1、 Battery should be charged and discharged with proper charger, in compliance with correct operation contents
- 2、 Do not use the battery with other maker's batteries, different types and /or models of batteries such as dry batteries, nickel-metal hydride batteries, or nickel-cadmium batteries, or new and old lithium batteries together.
- 3、 Do not leave the battery in a charger or equipment if it generates an older and/or heat, changes color and/or shape, leaks electrolyte, or cause any other abnormality.
- 4、 Do not discharge the battery continuously when it is not charged.

### Caution

- 1、 Complete instructions as to how to replace the battery including the following or equivalent statement:  
Dispose of used battery promptly. Keep away from children.
- 2、 Caution – The battery used in this device may present a risk of fire or chemical burn if mistreated. Do no disassemble, heat above (manufacturer's maximum temperature limit), or incinerate. Replace battery

	Rechargeable Li-Ion Polymer Battery	Security level	Internal public
	H043(1S1P) RECYCLED COBALT Battery Specification	Ver.	V1.4

with (battery manufacturer's name or end product manufacturer's name and part number) only. Use of another battery may present a risk of fire or explosion.

- 3、 For long-term storage, please charge at 0.5C for about one hour in advance.
- 4、 Do not use the battery in other than the following conditions; otherwise, the battery might cause heat generation, damage, or deterioration of its performance.
  - 1) Do not put the battery into a fire, or heat the battery.
  - 2) Do not store the battery in high temperature environment.
  - 3) Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment.
  - 4) Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together, may cause short-circuit.
  - 5) Do not drive a nail in, hit with a hammer, or stamp on the battery, do not strike the battery in other ways.
  - 6) Do not disassemble or alter the batteries' outside structure.
  - 7) Do not submerge the battery in water, do not wet the battery when store the battery.