

Super Li-ion Battery

Specification

超级锂离子电池

产品规格书

MODEL/型号: HTC4016

(2.4V/5mAh)

Prepared By/Date 编制/日期	Checked By/Date 审核/日期	Approved By/Date 批准/日期
		6th of June 2024

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	Company Name(公司名称)
	虎一
	Company Stamp(公司印章)

1 Scope (适用范围)

This specification is applied to the reference battery in this Specification and manufactured by NEW ENERGYCO,LTD.This specification shall not be reproduced in part or in whole for other purposes without the permission of the Company.

本规格书适用于本书中所提及的、新能源股份有限公司制造的电池。本规格书未经本公司许可，不得部份或全部复制用作他途。

2 Product Specification (产品技术规格)

2.1 Characteristic (参数性能)

Table 1 (表 1)

Table 1 (表 1)				
No. (序号)	Item (项目)	General Parameter (常规参数)		Remark (备注)
1	Rated Capacity (额定容量)	Typical (标称容量)	5mAh	Standard discharge (0.5C) after Standard charge (标准充电后 0.5C 标准放电)
		Minimum (最小容量)	4.5mAh	
2	Nominal Voltage (标称电压)	2.4V		Mean Operation Voltage (即工作电压)
3	Internal Impedance (内阻)	≤1.2 Ω		Charged to about 70% of capacity (带电量 70%的情况下)
4	Standard charge (标准充电)	Constant Current 5 mA (1.0C) end Voltage 2.80V 0mA cut-off (恒流: 5mA (1.0C) 截止电压: 2.80V 截止电流: 0mA)		Charge time : Approx 1.5h (充电时间: 大约 1.5 个小时)
5	Standard discharge (标准放电)	Constant current 5mA (1.0C) end voltage 1.6V (恒流: 5mA (1.0C) 截止电压: 1.6V)		
6	Fast charge (快速充电)	Constant Current 50mA (10C) end Voltage 2.80V 0mA cut-off (恒流: 50mA (10C) 截止电压: 2.80V 截止电流: 0mA))		Charge time : Approx 0.2h (充电时间: 大约 0.2 个小时)
7	Maximum Continuous Discharge Current (最大放电持续电流)	25mA (5C)		
8	Operation Temperature Range (工作温度范围)	Charge (充电) : 0~45℃		60±25%R.H. Bare Cell (单体电池工作湿度范围)
		Discharge (放电) : -30~75℃		
9	Storage Temperature Range (储存温度范围)	Less than 1 year: -10~20℃ (小于一年: -10~20℃)		60±25%R.H. at the shipment state (出货状态时的湿度范围)
		less than 3 months: -10~45℃ (小于 3 个月: -10~45℃)		

2.2 Cycle Life (循环寿命)

Table 2 (表 2)

No. (序号)	Item (项目)	Criteria (标准)	Test Conditions (测试条件)
1	Cycle Life (循环寿命) (0.5C)	Higher than 70% of the Initial Capacities of the Cells (初始容量的 70%)	Carry out >3000cycle Charge: 0.5C to 2.80V Discharge: 1.0 C to 1.6V Temperature: 25±3°C 循环>3000 次 充电: 0.5C to 2.80V 放电: 1.0C 放至 1.6V 温度: 25±3°C

2.3 Temperature dependence of discharge (放电温度特性)

Cells (fully charged) discharged @0.5C5A to 1.6V at temperatures per Table 3

Cells shall be stored for 2 hours during this test. The capacity of each cell shall meet or exceed the requirements of Table 3.

电池(充满电后)按表 3 的温度中放电.

电池必须先在试验温度中放置 2 个小时,在每一个温度中的放电容量应不小于表 3 的要求.

Table 3.(表 3)

Discharge Temperature (放电温度)	-20	-0°C	25°C	60°C
Discharge Capacity (0.5C) (放电容量/0.5C)	60%	80%	100%	95%

3. Protection circuit(保护电路)

HTC Li-ion battery is very safe, it can be over-charged and over-discharged without any risk, so it can be used safely without PCM;

Although it can be used safely without PCM, charging and discharging of the battery must be under normal conditions, otherwise the battery performance will be influenced or the battery will be failure.

钛酸锂电池是非常安全的电池,它可在过充和过放时不发生危险,故可以不用保护电路;

虽然可以不用保护板,但电池应确保在正常条件下充电和放电,否则电池性能会受到影响或电池失效.

4.Note For Use Of Battery(电池组使用说明)

N/A

5. Cell Mechanical characteristics and Safety Test (电芯安全测试及机械特性)

(Safety Test)

Table 5 (表 5)

Item (项目)	Battery Condition (电池要求)	Test Method (测试方法)	Requirements (要求)
Vibration Test 振动测试		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 an 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. 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。	No leakage 无泄漏 No fire 不起火
Crush (挤压试验)	Fresh, Fully charged (充满电的新电 池)	Crush between two flat plates. Applied force is about 13kN(1.72Mpa) for 30min. (电池放置在两块平面金属板间, 施加 13KN (1.72Mpa) 的作用力, 且持续保持 30 分钟)	No explosion, No fire (无起火无爆炸)
Short Circuit (短路试验 20°C)	Fresh, Fully charged (充满电的新电 池)	Each test sample battery, in turn, is to be short circuited by connecting the (+) and (-) terminals of the battery with a Cu wire having a maximum resistance load of 0.05 Ω . Tests are to be conducted at room temperature($20 \pm 2^\circ\text{C}$). (在常温下约 $20 \pm 2^\circ\text{C}$ 依次把每个样品电池的正负极用铜线连接起来使电池外部短路--线路总电阻不超过 0.05 Ω)	No explosion No fire The temperature of the surface of the Cells are lower than 150°C (无起火无爆炸 电池表面温度应 低于 150°C)
Impact (冲击试验)	Fresh, Fully charged (充满电的新电 池)	A 56mm diameter bar is inlayed into the bottom of a 10kg weight. And the weight is to be dropped from a height of 1m onto a sample battery and then the bar will be across the center of the sample. (用一条直径为 56mm 的圆棒放置在电池中央, 将一 10Kg 的重锤从 1m 的高度垂直落下在电池的中心位置)	No explosion, No fire (无起火无爆炸)
Forced Discharge (过放试验)	Fresh, Fully charged (充满电的新电 池)	Discharge at a current of 1 C ₅ A for 2.5h. (以 1C ₅ A 的电流放电 2.5 小时)	No explosion, No fire (无起火无爆炸)

6. Handling of Cells (电池操作注意事项)

6.1 Cell fixing (电池的固定)

The cell should be fixed to the battery pack by its large surface area.

No cell movement in the battery pack should be allowed. (Forbidden to shake the +/- pins of battery)!

电池最大面积的一面应该固定在外壳上, 安装后电池不能有松动(严禁摇晃电“+/-”极性导针)!

6.2 Inside design (电池外壳内部设计)

No sharp edge components should be inside the pack containing the LIP cell.

外壳内安装电池的部位不应有锋锐边。

6.3 Battery soldering(电芯加工焊接)

Electric soldering iron bit temp.: 320~350℃

Soldering time <3S

电池应用时极性导针焊接铬铁嘴温度设定:320~350℃ 焊接时间<3 秒!

6.4 Special Instruction(特别说明):

The “+” or “-” pin of Super Li-ion Battery shall never be touched with battery shell to form circuit; otherwise the battery will be damaged.

新能源所提供的超级锂圆柱形锂离子电池在应用时绝对不允许电池的“+”极性或者“-”极性与电池壳体形成回路，否则将永久性损坏电池!

7. Others (其它)

7.1 Prohibition of disassembly (禁止拆卸)

- 1) Never disassemble the cells 不要拆卸电池

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, explosion, or other problems.

拆卸电池会发生电池内部短路,会引起起火/爆炸/有害气体或者其它问题。

- 2) Electrolyte is harmful 电解液是有害的

LIP battery 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.

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。

7.2 Prohibition of dumping of cells into fire (不要把电池倾倒在火中)

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

不要焚毁电池，否则会致电池爆炸，这个很危险，必须禁止。

7.3 Battery cells replacement (更换电池)

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user. 更换电池应由电池生产商或设备供应商完成，用户不要自行更换。

7.4 Please do not exceed the specification range using the battery. Any product quality problems caused by incorrect use beyond the scope of specifications, hereby The Division assumes no responsibility

请不要超出本规格书范围使用电池，任何超出规格书范围内的不正确使用导致的产品品质问题，本公司概不承担任何责任。

7.5 This specification shall be valid for one year from the date of issuance.

本规格书自签发之日起一年内有效。

7.6 The right of final interpretation of this specification rests with the Engineering Department of New Energy Co., Ltd.

本规格书最终解释权归新能源股份有限公司工程部所有。

8. Period of Warranty (保质期)

The period of warranty is 1 year from the date of shipment. new energy guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customer abuse and misuse.

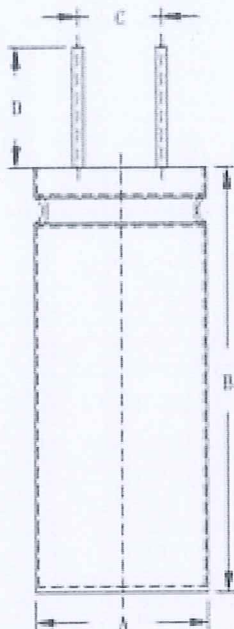
电池的保质期从出货之日算起为 1 年。如果证明电池的缺陷是在制造过程中形成的而不是由于用户滥用及错误使用造成，本公司负责退换电池。

9. Storing the Batteries (电池的存放)

The batteries should be stored at room temperature, charged to about 40% to 70% of capacity. We recommend that batteries be charged about once every 3~6 months to prevent over discharge.

电池应当在室温下存放，应充到 40%至 70%的电量。如长时间储存，须 3~6 个月充一次电以防止电池过放电。

10. Initial Dimension: (初始尺寸)



单位: mm 公差: ± 0.2

项 目	参 数
A(直径)	4.0
B(长度)	16.2
C(引脚间距)	1.5
D(引脚规格)	$\varnothing 0.4 \times 3$ (2.8mm)

注意: 1. 电池顶部胶水高度控制在 0.8~1.3mm (含) 以内, 胶外引脚长度 1.5~1.9mm;

2. 胶水完全覆盖电池底部, 无缝隙。

Caution: 1. Control the height of the adhesive on the top of the battery to be no more than 1.3mm, Pin length outside of glue is 1.5-1.9mm;

2. The glue should completely cover the bottom of the battery without any gaps.

备注: 请注意电池极 +/- 有标注++++对应的脚位是电池正极)

(Note: Please note that the battery pole is marked with + + + + (the corresponding pin is the positive pole of the battery)

positive pole of the battery)

Units (单位)	mm		Weight(重量)		0.4±0.05g	
Connector/插头	无					
Wire(引线)	无		L(线长)		/	
D (直径)	Max.	W (宽度)	Max.	H (高度)	Max.	
Drawer (绘图)		Checked (审核)		Approved (批准)		Date (日期)
NEW ENERGY				HTC4016 DRAWING		
				Drawing ID (图号)		

Specification of Product

产品规格书

客户/Customer: 虎一科技

型号/Model Name: 104050

料号/ Part No:

描述/Description: 984051PPV-3200mAh

TMB Model Name: BP2322

天贸料号/TMB Part No:

制造商 Manufacturer	结构 Structure	电子 Electron	包装 Packaging	QE	项目 Project
客户 Customer	结构 Structure	硬件 Hardware	包装 Packaging	SQE	项目 Project

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[illegible]

2. Application Scope/适用范围

本规格书适用于中山天贸电池有限公司设计的锂离子电池。

The specification describes the requirements for lithium-ion polymer battery supplied by TMB Battery Co. Ltd..

3. Applicable Standards/引用标准

GB/T18287-2013 移动电话用锂离子电池总规范、IEC62133-2012、GB 31241-2022 便携式电子产品用锂离子电池和电池组安全要求。

General specification of lithium-ion battery for GB/T18287-2013 mobile phone; safety requirements of lithium-ion battery and battery pack for IEC62133-2012、GB 31241-2022 portable electronics.

4. Typical Parameters/主要参数

4.1 Battery Main Characteristics/电池特性

Nominal Voltage /额定电压	Battery Maker /电池制造商	Battery Model /电池型号	Battery Nominal Capacity /电池额定容量
3.8V	TMB/天贸	984051PPV	3200mAh

充电方式

标准(推荐)充电 Standard Charge	步骤 1: 恒流充电: 0.2 C ₅ A (最大) 充电至 4.35V; Step1: Constant Current: Maximum 0.2 C ₅ A to 4.35V 步骤 2: 恒压充电: 4.35V; 截止电流: 0.02C ₅ A Step 2: Constant Voltage:4.35V Charge Cut-off Current: 0.02C ₅ A	0~15℃
	步骤 1: 恒流充电: 0.5C ₅ A (最大) 充电至 4.35V; Step1:Constant Current: Maximum 0.5C ₅ A to 4.35V 步骤 2: 恒压充电: 4.35V; 截止电流: 0.02C ₅ A Step 2: Constant Voltage:4.35V Charge Cut-off Current: 0.02C ₅ A	15~45℃
	步骤 1: 恒流充电: 0.5C ₅ A (最大) 充电至 4.1V; Step1: Constant Current: Maximum 0.5C ₅ A to 4.1 V	45℃~55℃

4.2 Battery Pack Electrical Characteristics/电池组特性

NO./序号	Items/项目	Specification/参数规格	Remarks/备注
1	Charge voltage/充电电压	4.35V	
2	Nominal Voltage/额定电压	3.8V	
3	ex-factory voltage/出厂电压	3.85-3.95V	

4	标称容量 Nominal Capacity	3200mAh	23±2℃ 下 0.2 C ₅ A 放电容量 0.2C ₅ A Discharge Capacity at 23±2℃
5	Internal resistance of battery /电池内阻	≤170mΩ	AC 1 kHz LCR meter
6	Battery weight/电池重量	~g	Approx.
7	Cycle life/循环寿命	≥500Cycles (Retention: ≥80%)	常温 23±2℃ 环境下, 0.5C ₅ A 充放电/Normal temperature 23±2℃, charge/discharge at 0.5C ₅ A .
9	Maximum charge current /最大充电电流	0.5C ₅ A	15~45℃
10	Standard discharge current /标准放电电流	0.2C ₅ A	-20~60℃
11	Maximum discharge current /最大放电电流	0.5C ₅ A	10~45℃
12	Under voltage discharge protection voltage/欠压放电 保护电压	3.0±0.075V	
13	End of discharging voltage/ 放电终止电压	3.0V	容量测试
14	ESD static test 静电测试	air discharge	±8KV
		contact discharge	±4KV
15	贮存温度 Storage Temperature Range	-5~35℃	恢复容量≥80% (0.2 C ₅ A 常温检 测) 电芯应在带电 50%或电压在 3.70~ 3.8V 的状态下储存; 长 期贮存温度: 20±5℃ Recoverable capacity / Initial Capacity≥80% by discharge current 0.2 C ₅ A. Storage in 50% charged state or 3.7V~3.8V at 20±5℃.
	贮存湿度 Storage Humidity Range	≤75%RH	

5.PCM Specification/保护板规格

5.1PCM Electrical Characteristics (at 25℃) /保护板电气特性 (at 25℃)

项目 Item	详细内容 Detailed contents	标准 Standard
过充保护 Overcharge protection	*保护电压 Protection voltage	4.425±0.02V
	保护延迟时间 Protection delay time	0.7-1.0-1.3s
	保护解除电压 Protection removal voltage	4.225±0.05V
过放保护 Over-discharge protection	*保护电压 Protection voltage	3.0±0.075V
	保护延迟时间 Protection delay time	14-20-26ms
	保护解除电压 Protection removal voltage	3.2±0.08V
放电过流保护 Discharge overcurrent protection	*保护电流 Protection current	4.0-8.0A
	保护延迟时间 Protection delay time	8-12-16ms
	保护解除条件 Protection removal condition	断开负载 Disconnect load/充电 Charge
充电过流保护 Charge overcurrent protection	保护电流 Protection current	1.8-5.0A
	保护延迟时间 Protection delay time	5-8-11ms
	保护解除条件 Protection removal condition	断开充电 Disconnect Charge
短路保护 Short-circuit protection	保护条件 Protection condition	外部电路短路 External short-circuit
	保护延迟时间 Protection delay time	230-300-500us
	保护解除条件 Protection removal condition	断开短路电路 Disconnect short-circuit/充电 Charge
静态电流 Quiescent current	*电路内部消耗 Circuit internal consumption	≤8.0uA
内阻 Internal resistance	*成品内部阻值 Internal resistance of Finished PCM	≤100mΩ
0V 充电 0V Charge	IC 是否支持 If IC supports it or not	是 YES

5.2 Parts List/零件清单

序号 No.	编号 Symbol	名称 Name	规格 Spec./型号 Model	封装 Packaging	数量 Qty.	厂商 Manufacturer/备注 Remark
1	U1	保护 IC	R5492N352KL	SOT-23-6	1	理光
2	U2	MOSFET	CJS2016	TSSOP-8	1	长晶
3	R1	贴片电阻	330Ω±5%	0402	1	厚声/风华
4	R2	贴片电阻	1KΩ±5%	0402	1	厚声/风华
5	C1C2C3	贴片电容	0.1uF ±10%/25V, X5R	0402	3	风华/华科
6	R3R4	NTC	10KΩ±1%	0402	2	卓英社, B=3950
7	B+B-	L 型纯镍片	6.0*3.0*3.0*0.1mm		2	隆鑫发/劲林通
8	P+/P-/T/T	4pin 端子线	端子型号: PH2.0-4PIN 正向 (要求灼热丝过 750 和 850 度) 线长: 142.5±1.5mm	单头浸锡 红/黑/黄/黄	1	UL3302 24# 利通/晶品/鈰源
9	BP2322-1	保护板	36.0±0.15*4.2±0.1*0.8±0.1mm	FR4 双面	1	喷锡, 绿油 吉瑞达/东阳/国昌荣

备注 Notes:

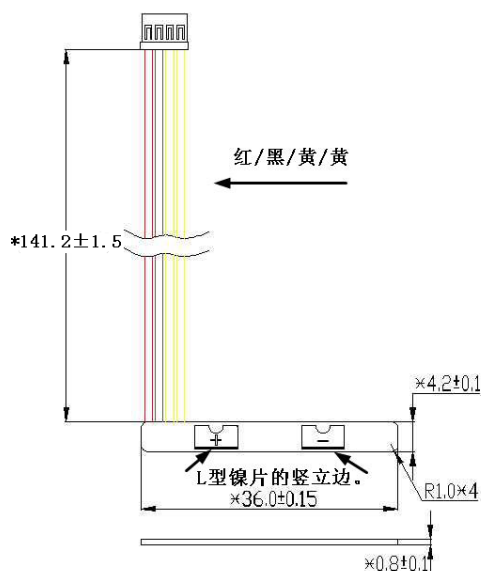
1、所有物料满足 RoHS; All materials must be RoHS complaint;

2、*为重点管控项， $CP \geq 1.67$ ， $CPK \geq 1.33$ ；The items marked with the symbol “*” are the critical controlled points. Must achieve $CP \geq 1.67$ ， $CPK \geq 1.33$ ；

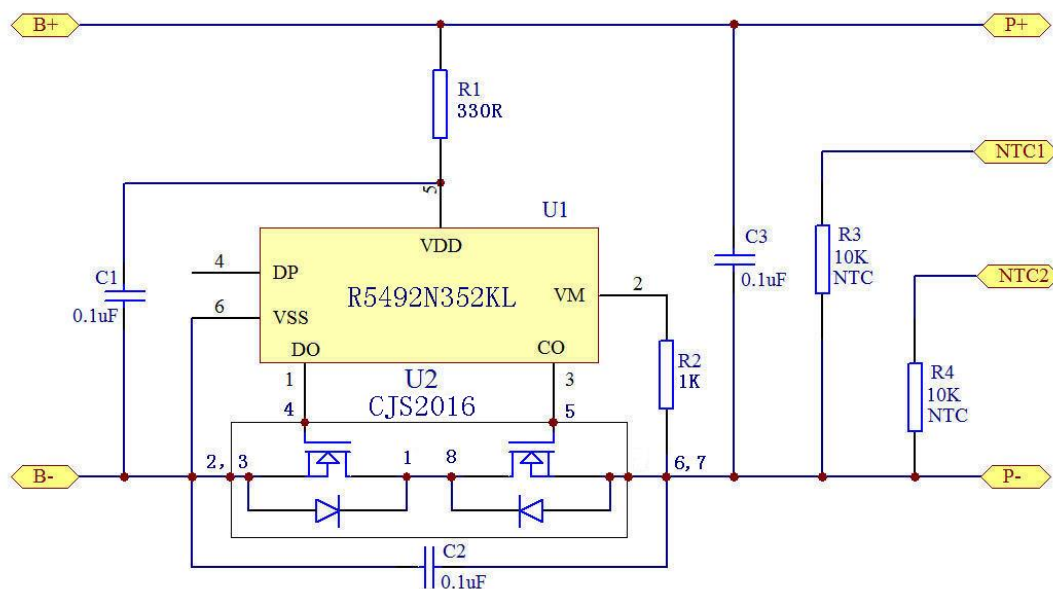
3、送样时请按照“BP-QM-004PCM 检验标准”文件要求，提供保护板可靠性测试报告；

4、板做绿油；更换 IC，2023. 5. 29；改端子线，2023. 9. 20；改 MOS 管和 R3，2024. 1. 4。

外形尺寸图 Overall dimensions: 单位: mm



5.3 Circuit Diagram/电路图



5.4 PCB layout/PCB 层面图

BP2322-1V0

B+

B-

TOP OVERLAYER

TOP SOLDER

TOP LAYER



BOTTOM OVERLAYER



BOTTOM SOLDER



BOTTOM LAYER

6. Test Protocol/测试协议

Test Condition/测试条件:

The test should be at $(23 \pm 2) ^\circ\text{C}$ with $60 \pm 25\%$ relative humidity if there are no special requirements.
标准测试条件，如下测试如未特别规定，均应在 $(23 \pm 2) ^\circ\text{C}$ ，相对湿度 $60 \pm 25\%$ 条件下进行。

Test illustration/测试说明:

Battery means one block with PCM, Battery and parts of structure; Battery means a monomer Battery.
在本规格书中，电池及电池组指带保护板、电池与结构的整体，电池则指电池单体。

Test Meter and Equipment Requirement/测量仪表与设备要求:

The minimum precision of meter to measure size is 0.01mm, measuring range 0-200mm.
用 0.01mm 或更精确的工具来测量尺寸,其量程为 0-200mm。

The precision of meter to measure voltage is $\pm 5\text{mv}$, scope 0-20V, and the precision of meter to measure current is $\pm 0.3\%$

电压表的精确度为 $\pm 5\text{mv}$, 其量程为 0-20V; 电流表的精确度为当前电流 $\pm 0.3\%$ 。

Impedance shall be measured by sinusoidal alternating current method(AC 1 kHz LCR meter).

国产的内阻仪使用一个(1KHz)的正弦交变电流来规范。

Standard Charge/标准充电方式:

a) 在 $23 \pm 2^\circ\text{C}$ 的环境温度下，以 0.2C 充电，当电池或电池组端电压达到充电限制电压时，改为恒压充电，直到充电电流小于或等于 $0.02C_5A$ ，最长充电时间不大于 8 小时，停止充电。

At the temperature of $23 \pm 2^\circ\text{C}$, charge at 0.2C and change to CV (constant-voltage) mode until the voltage of battery and battery pack reaches the limited charge voltage, and stop charging until the charge current is $\leq 0.02C_5A$, and the Max. charge time must ≤ 8 hours.

6.1 General Test/常规测试

序号 No.	项目 Items	测试方法 Test Conditions	指标 Criteria
6.1.1	0.2 C ₅ A 容量 0.2C ₅ A Capacity	电芯标准充满电后，搁置 10min，记录 0.2 C ₅ A 恒流放电至 3.0V 所需的时间。 The time which is measured with discharge current of 0.2 C ₅ A CC(constant current) and 3.0V cut-off voltage after the fully charged cells being rest for 10min.	放电时间 $\geq 300\text{min}$ Discharge Time $\geq 300\text{min}$

6.1.2	0.5 CsA 容量 0.5CsA Capacity	电芯标准充满电后,静置 10min,记录 0.5 CsA 恒流放电至 3.0V 所需的时间。 The time which is measured with discharge current of 0.5 CsA CC(constant current) and 3.0V cut-off voltage after the fully charged cells being rest for 10min.	放电时间≥114min Discharge Time≥114min
6.1.3	1 CsA 容量 1CsA Capacity	电芯标准充满电后,静置 10min,记录 1 CsA 恒流放电至 3.0V 所需的时间。 The time which is measured with discharge current of 1 CsA CC(constant current) and 3.0V cut-off voltage after the fully charged cells being rest for 10min.	放电时间≥51min Discharge Time≥51min
6.1.4	循环寿命 Cycle Life	在环境温度 23±2℃的条件下,电芯以 0.5CsA 恒流恒压充满电;静置 10min;0.5 CsA 恒流放电至 3.0V;静置 10min;重复 500 次;第三周放电容量定义为初始容量。 Carry out 500 cycles (0.5 CsA fully charged and rest 10min/ 0.5 CsA discharge with 3.0V cut-off voltage) at 23± 2℃. Initial capacity means the third discharged capacity.	500 周循环容量/初始容量≥80% 500 Cycles Retention Capacity ≥ 80% Initial Capacity
6.1.5	荷电保持能力 Storage Characteristics	电芯标准充满电后,在 20±5℃条件下搁置 28 天,再以 0.2 CsA 电流放电至截止电压 3.0V 所需的时间。 The time which is measured with discharge current of 0.2 CsA CC(constant current) and 3.0V cut-off voltage after stored at 20±5℃ for 28 days at a full charged state.	放电时间≥255min Discharge Time≥255min

6.2、环境适应性能 Environment Characteristics

6.2.1	高温性能 High Temperature Performance	电芯标准充满电后,贮存在 55±2℃的高温箱内恒温 2h,记录在此条件下以 0.2CsA 恒流放电至 3.0V 的时间。 The time which is measured with discharge current of 0.2CsA CC(constant current) and 3.0V cut-off voltage after stored at 55±2℃ for 2 hours at a full charged state.	放电时间≥255min Discharge time≥255min
6.2.2	低温性能 Low Temperature Performance	电芯标准充满电后,贮存在-10℃±2℃的高低温箱中搁置 4h,记录在此条件下 0.2CsA 放电至 3.0V 的时间。	放电时间≥180min; Discharge Time≥180min

		The time which is measured with discharge current of 0.2C ₅ A CC(constant current) and 3.0V cut-off voltage after stored at -10±2℃ for 4 hours at a full charged state.	
6.2.3	恒温恒湿 Constant Temperature and Humidity	电芯充满电后, 放入高低温箱中, 在 40±2℃相对湿度 90-95%的环境下搁置 48 小时后.将电芯取出在环境温度 20±5℃的条件下搁置 2 小时。目测电芯外观, 记录以 0.2C ₅ A 电流放电至 3.0V 的时间。The charged cells are stored in the following condition: 40± 2℃ and 90%-95%RH for 48 hours, then placed in 20± 5℃ temperature for 2 hours. Checked appearance prior and discharged to 3.0V cut-off voltage at a constant current of 0.2 C ₅ A, the discharge time is measured.	放电时间≥180min 电芯无变形、漏液、破裂 Discharge Time≥180min No distortion, no leakage, no crack
6.2.4	跌落测试 Drop Test	电芯充满电后, 将电芯从 1m 的跌落高度自由落体跌落到混凝土板上。每个面跌落一次, 共六次。Each fully charged cell is dropped from a height of 1m onto a concrete floor for six panels (each panel once) .The cells are dropped so as to obtain impacts in random orientations.	不起火, 不爆炸; No fire, No explosion
6.2.5	低气压 Low pressure	电芯充满电后, 将电芯置于 20±5℃的真空箱中, 抽真空将箱内压降低至 11.6kPa,并保持 6h。After rapid charged, the cells are to be stored for 6 hours under the condition of 20±5℃at an absolute pressure of 11.6 kPa.	不漏液, 不起火, 不爆炸 No leakage, No fire, No explosion
6.2.6	温度循环 Temperature Cycle	电芯充满电后, 按以下流程测试: a) 将电芯放入 75℃±2℃的环境中, 保持 6h; b) 将温度降为-40℃±2℃的环境中, 保持 6h; 重复 a) -b) 两个步骤 10 个循环, 其中每次转换 30min 内。 After fully Charged, the cells are test according to following steps: a) Raise the temperature to 75±2℃ and maintain the temperature for 6 h; b) Reduce the temperature to -40±2℃ and maintain the temperature for 6 h; Repeat the steps a) -b) for 10 cycles, change the temperature within 30min at a time.	不漏液, 不起火, 不爆炸 No leakage , No fire, No explosion

6.2.7	高温存贮 1 High temperature storage 1	在 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 环境温度下将电池按标准充电方式充满电后，测量电池厚度，放入 $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的温度箱中恒温存储 48h，恢复到室温放置 2h 后，测量电池厚度，观察电池外观，用 0.2C 放电至终止电压，记录剩余容量，再用标准方式充满电后用 0.2C 放电记录可恢复容量 In $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient temperature to the battery charging ways, according to the standard to measure the thickness of the battery, in the $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ temperature box for 48 h, constant temperature storage place 2 h after return to room temperature, measuring the thickness of the battery, then watch battery appearance, with 0.2 C to discharge voltage, the residual capacity of record, with a standard way after a full charge with 0.2 C discharge records can restore the capacity	剩余容量/初始容量 $\geq 80\%$ 恢复容量/初始容量 $\geq 90\%$ 电芯厚度变化 $\leq 10\%$ Residual Capacity $\geq 80\%$ Initial Capacity Recoverable Capacity $\geq 90\%$ Initial Capacity The rate of variation in thickness $\leq 10\%$
6.2.8	高温存贮 2 High temperature storage 2	在 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 环境温度下将电池按标准充电方式充满电后，测量电池厚度，放入 $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 的温度箱中恒温存储 168h，恢复到室温放置 2h 后，测量电池厚度，观察电池外观，用 0.2C 放电至终止电压，记录剩余容量，再用标准方式充满电后用 0.2C 放电记录可恢复容量 In $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient temperature to the battery charging ways, according to the standard to measure the thickness of the battery, in the $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$ temperature box for 168 h, constant temperature storage place 2 h after return to room temperature, measuring the thickness of the battery, the watch battery appearance, with 0.2 C to discharge voltage, the residual capacity of record, with a standard way after a full charge with 0.2 C discharge records can restore the capacity	剩余容量/初始容量 $\geq 80\%$ 恢复容量/初始容量 $\geq 90\%$ 电芯厚度变化 $\leq 10\%$ Residual Capacity $\geq 80\%$ Initial Capacity Recoverable Capacity $\geq 90\%$ Initial Capacity The rate of variation in thickness $\leq 10\%$
6.2.9	14 天浮充 (23°C) 14 day float	在 $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 环境温度下将电池以标准充电方式充满电后，测量电池厚度，随后连续保持充电	无破裂，漏液，冒烟，爆裂

	charging (23 °C)	14 天。恢复到室温放置 2h 后，测量电池厚度，观察电池外观，用 0.2C 放电至终止电压，记录剩余容量，再用标准方式充满电后用 0.2C 放电记录可恢复容量 In 23°C ±2°C ambient temperature to the battery charging ways, according to the standard to measure the thickness of the battery, then keep charging to 14 day。constant temperature storage place 2 h after return to room temperature, measuring the thickness of the battery, the watch battery appearance, with 0.2 C to discharge voltage, the residual capacity of record, with a standard way after a full charge with 0.2 C discharge records can restore the capacity	电芯厚度变化 ≤10% No cracking, leakage, smoke, or bursting The rate of variation in thickness ≤10%
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6.3、安全性能 Safety Characteristics

序号 No.	项目 Items	测试方法 Test Conditions	指标 Criteria
6.3.1	过充电 Overcharge Characteristics	在环境温度 20±5°C 的条件下，以 0.2 C₅A 恒流放电至 3.0V，以指定 3 C₅A 恒流充电到指定电压 4.6V，转为恒压充电，当出现以下情况时终止测试，①电芯失效（如起火、爆炸）；②电芯温度下降到比峰值低 20%；③总的测试时间达到 7h。 The cells firstly 0.2 C₅A discharged to 3.0V at 20±5°C, then charged at a 3 C₅A current with a voltage limit of 4.6V, then turn to charge at constant voltage. The test can be terminated after 7 hours or perform fire and explosion, alternatively when the cells temperature is reduced to top 20%.	不着火 不爆炸 No fire No explosion
6.3.2	热滥用 Hot Oven Characteristics	将满电电芯用绝缘线悬挂在温度冲击箱（远红外鼓风烘箱或真空烤箱）中，冲击箱温度以 5°C±2°C /min 的速率上升到 130°C±2°C，保持 30min，观察电芯状态。 The standard fully charged cell is to be heated in a circulating air oven, the temperature of the oven is to be raised at a rate of 5±2°C/min to 130±2°C and remain for 30 minutes at that temperature. Then check the cells' appearance.	不着火 不爆炸 No fire No explosion

6.3.3	常温外部短路 (Room temperature) Short-circuit Characteristics	电芯充满电后，放置在环境温度 $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 的条件下，在电芯表面温度达到要求温度后，再放置 30min,在防爆箱内用电阻 $80\pm 20\text{m}\Omega$ 的导线将电芯正负极短接。 A fully charged cell is to be short circuited by connecting the positive and negative terminals with a electric resistance ($80\pm 20\text{m}\Omega$) at room temperature $20^{\circ}\text{C}\pm 5^{\circ}\text{C}$ will cells kept in the temperature for 30min.	不着火； 不爆炸； 电芯的外部表面温度不超过 150°C No fire; No explosion; Temperature on the cells' surface should no more than 150°C
6.3.4	高温外部短路 55°C Short-circuit Characteristics	电芯充满电后，放置在环境温度 $55^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 的条件下，在电芯表面温度达到设定温度后，再放置 30min,在防爆箱内用电阻 $80\pm 20\text{m}\Omega$ 的导线将电芯正负极短接。 A fully charged cell is to be short circuited by connecting the positive and negative terminals with a electric resistance ($80\pm 20\text{m}\Omega$) at temperature $55^{\circ}\text{C}\pm 5^{\circ}\text{C}$ will cells kept in the temperature for 30min.	不着火、不爆炸；电芯外表面温度不超过 150°C 。 No fire; No explosion; Temperature on the cells' surface should no more than 150°C
6.3.5	强制放电 Forced Discharge	将电芯放完电后，以 1C5A 电流反向充电 90min。 A fully discharged cell is to be forced discharged at a 1C5A current for 90min reversed.	不着火、不爆炸 No fire No explosion
6.3.6	振动 Vibration	将充满电的电芯固定在振动台上，采用正弦波振动试验，并以对数扫频方式从 7~200Hz（15min 内循环增减）；X、Y、Z 三个方向每个方向循环扫频振动 12 个循环，每个方向震动 3h。Fully charged cells fixed on the vibration table, using the sine vibration, and within 15 min in logarithmic sweep from 7hz frequency sweep to 200hz and return to the 7hz. Vibration along three mutually perpendicular direction of sample must match the sample, according to the logarithmic sweep in each direction way to 12 repetitions, vibration 3 hours	不漏液 不起火 不爆炸 No leakage No fire No explosion
6.3.7	加速度冲击 Mechanical Shock	将充满电的电芯固定在试验设备上。在 3 个相互垂直的方向上各承受一次等值的冲击。至少一个方向垂直于电芯的宽面。每次冲击按下述方法进行：在最初的 3ms 内，最小平均加速度为 735m/s	不漏液 不起火 不爆炸 No leakage

		² ,峰值加速应该在 1225m/s ² 和 1715m/s ² 之间, 脉冲持续时间为 6ms±1ms. The standard fully charged cells are fixed on the test equipment, each in three perpendicular directions under the impact of an equivalent force. Impact method: The minimum acceleration is 735m/s ² in first 3ms, the peak acceleration should be 1225-1715 m/s ² ,the duration of impulse is 6ms±1ms.	No fire No explosion
6.3.8	挤压 Crush	将满电的电芯放在两平板间使用挤压机进行挤压, 使挤压作用力逐步达到 13kN±0.78kN, 一旦达到压力即可卸压。试验过程中不能发生外部短路。 After fully charged, the cells are to be crushed between two flat surfaces, the crushing is to be continue until the pressure reach of 13kN±0.78KN.Once the maximum pressure obtained it is to be released. Outside short circuit is not allowed while test.	不起火 不爆炸 No fire No explosion
6.3.9	燃烧喷射 Projectile Test	将电芯充满电后, 放置在试验工装的钢丝网上, 用火焰加热电芯, 出现以下情况时停止加热: a) 电芯爆炸; b) 电芯完全燃烧; c)持续加热 30min, 电芯未起火、未爆炸。 Fully charged cell is to be heated and shall remain on the screen until it: a) explode; b) burned out ; c) the cell remain well until heated 30min.	电芯部件或电芯整体 (粉尘状物除外) 不得穿透铝网。 Component of the cell or entire cell (except the dust) should remain in the screen until it explodes or the cell burned out.

7、技术和安全要求 Technology and Security Requirement

7.1 充电 Charge

7.1.1 充电电流 Charge Current

充电电流应小于产品说明书中所规定的最大充电电流; 过高电流将有损于电池性能, 严重影响电池的安全性, 并可能使电芯发热、泄漏。

Charging current should be less than maximum charge current specified in the product specification, over-current will cause generating heat and leakage and weaken its performance.

7.1.2 充电电压 Charging Voltage

单体电池充电电压应小于产品说明书中所规定的充电电压。

Charging should be done by voltage less than that specified in the product specification.

7.1.3 充电温度 Charging Temperature

电池充电应在产品说明书所规定的温度范围内充电。

The Battery should be charged within a range of specified temperatures in the product specification.

7.1.4 反充电 Reverse charging

认准电极连接正确后再充电；如果反接电池，不但不能充进电，反而会使电芯性能严重损坏，降低电池安全性，使电芯发热，泄漏。

The Battery should be connected, confirming that its poles are correctly aligned. Inverse charging should be strictly prohibited. If the Battery is connected improperly, it may be damaged.

7.2 放电 Discharge

电芯放电电流应下于产品说明书中所规定的最大放电电流；高电流放电会使放电容量显著降低，且可能产生发热等现象。放电避免低于 2.5V。

The cell should be discharged at less than maximum discharge current specified in the product specification. High rate current may cause loss of capacity and generating heat. Discharge cut-off voltage should avoid less than 2.5V.

7.2.2 放电温度 Discharge Temperature

电池应在产品说明书所规定的温度范围内放电使用。

The Battery should be discharged within a range of temperatures specified in the product specification.

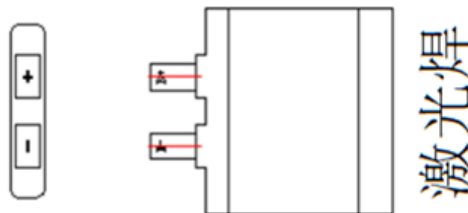
7.2.3 过放电 Overdischarge

长时间放电搁置的电池，需每隔六个月充一次电，将其电压维持在 3.0~3.8V 左右，以减少电池过放电的可能性。

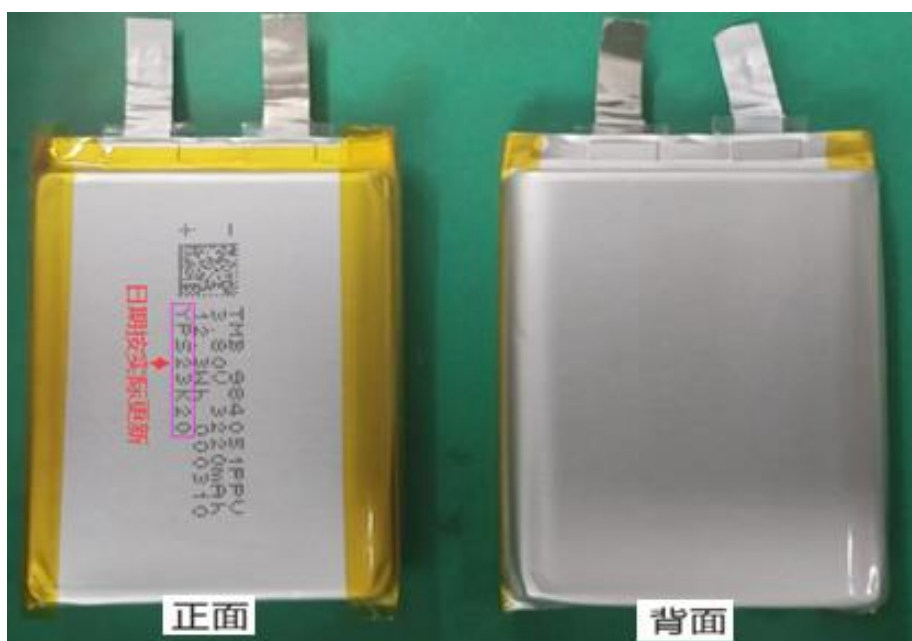
In order to avoid over-discharging, the Battery should be charged every 6 months and remain in a 3.0V~3.8V charged state while keeping for a very long time without any use.

8 Description Of Mechanical Characteristics/机械特性描述

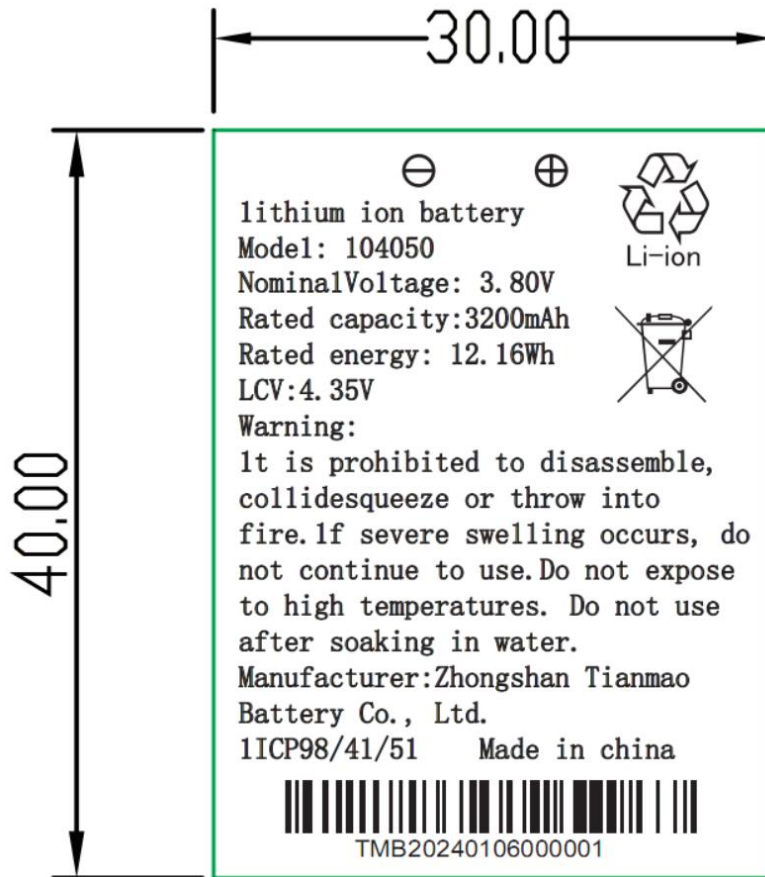
8.1 Battery Assembly Diagram/电池装配图



8.2 Appearance Requirements And Dimension Figure(Unit: mm)外观要求和尺寸描绘（单位：毫米）



Battery label diagram / 电池标签图



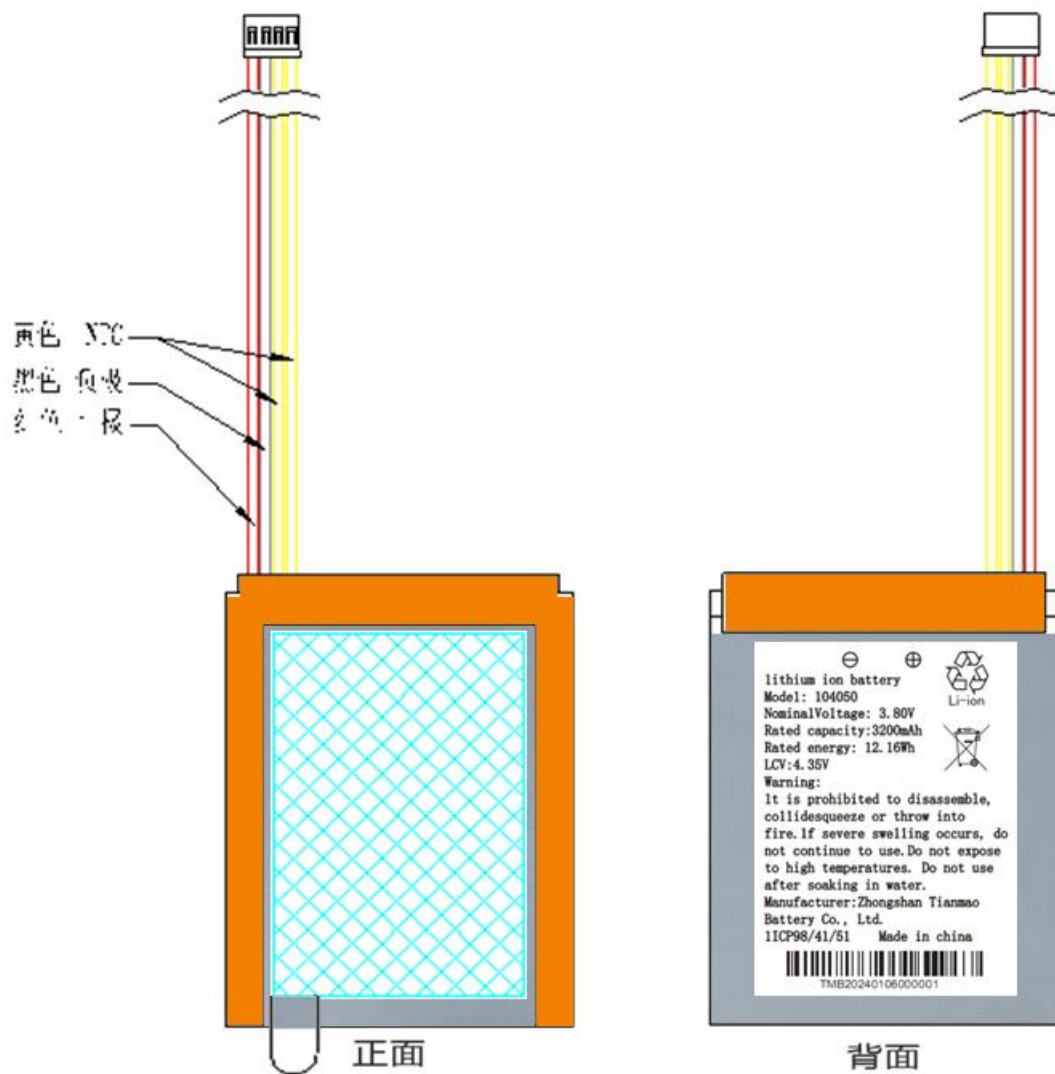
1. 颜色: 白底黑字
2. 图中红色虚线仅代表折叠边缘, 不印刷, 不压线.
3. 商标打印条形码、序列号要求通过耐磨测试, 测试标准国标GB4943-2001。
4. 商标要求粘性良好, 具体要求指标与检验方法参见以下:
(以下仅针对包裹式电池商标) 初粘力: 6#球; 保持力: $\geq 24H$; 剥离力: $\geq 9N$; 试包10PC成品电池, 24H后查看外观, 如有外观不良, 视为标贴来料NG, 必须满足四个条件才能判定OK
5. 刀模边缘需平整, 无毛刺. 外观不可以有油污、露线、斑点、色差等印刷缺陷。

SN编码规则: TMB20240106000001

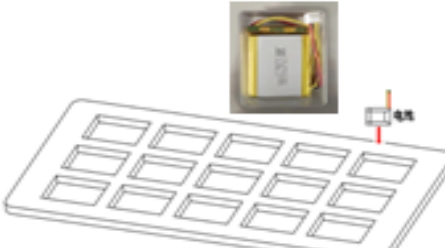
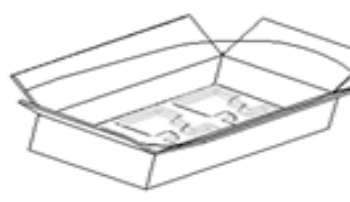
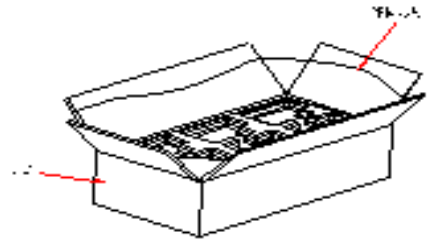
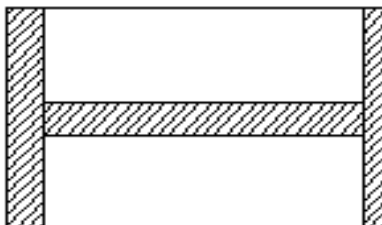
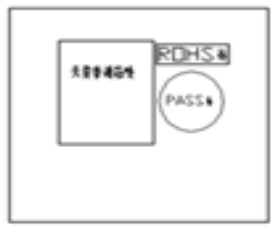
TMB: 固定不变

20240106 不固定, 按照实际生产年月日更新, 2024表示年份, 01表示月份, 06表示日
000001: 6位流水码, 过日清零

Finished product renderings/成品效果图



8.4 Packaging Diagram And Plastic Tray Dimension./包装图和尺寸

1.电池正面朝上放入吸塑盘，每个吸塑盘放15PCS电池	2.箱内单层装示意图：外箱内套风琴袋，每层装15PCS	版本号	A0																																				
		生效日期	2023-9-20																																				
3.箱内所有层堆放后示意图：每箱装10个吸塑（包含顶层空吸塑），共135PCS成品电池。	4.封箱示意图：封箱方式为“工”字型。	文件编号	TM-WIP-BP/PF-XXXX																																				
		项目名称	BP2322																																				
5.整箱示意图：外箱侧面贴天翼普通箱唛，ROHS标，PASS标	6.箱唛示意图：天翼普通箱唛，内容根据实际填写	物料编码	/																																				
	<table><tr><td>品名</td><td>规格</td><td>单位</td><td>数量</td></tr><tr><td>1.电池</td><td>3.85-3.95V</td><td>PCS</td><td>135PCS/箱</td></tr><tr><td>2.吸塑</td><td>15PCS/盘</td><td>盘</td><td>10PCS</td></tr><tr><td>3.风琴袋</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr><tr><td>4.箱唛</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr><tr><td>5.ROHS标</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr><tr><td>6.天翼普通箱唛</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr><tr><td>7.合格证</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr><tr><td>8.装箱单</td><td>1个/箱</td><td>个</td><td>1PCS/箱</td></tr></table>	品名	规格	单位	数量	1.电池	3.85-3.95V	PCS	135PCS/箱	2.吸塑	15PCS/盘	盘	10PCS	3.风琴袋	1个/箱	个	1PCS/箱	4.箱唛	1个/箱	个	1PCS/箱	5.ROHS标	1个/箱	个	1PCS/箱	6.天翼普通箱唛	1个/箱	个	1PCS/箱	7.合格证	1个/箱	个	1PCS/箱	8.装箱单	1个/箱	个	1PCS/箱	包装方式	普通包装
品名	规格	单位	数量																																				
1.电池	3.85-3.95V	PCS	135PCS/箱																																				
2.吸塑	15PCS/盘	盘	10PCS																																				
3.风琴袋	1个/箱	个	1PCS/箱																																				
4.箱唛	1个/箱	个	1PCS/箱																																				
5.ROHS标	1个/箱	个	1PCS/箱																																				
6.天翼普通箱唛	1个/箱	个	1PCS/箱																																				
7.合格证	1个/箱	个	1PCS/箱																																				
8.装箱单	1个/箱	个	1PCS/箱																																				
		出厂电压	3.85-3.95V																																				
		成品内阻	≤180mΩ																																				
		1. 每箱内部包装清单： 1PCS风琴袋 10PCS吸塑 2. 15PCS电池/吸塑， 135PCS电池/箱																																					
		备注：																																					
	/																																						
/	/																																						

制作：卢明友

审核：

批准：

9. Cautions And Warnings/注意事项与警告

9.1Cautions/注意事项

- 9.1.1 Before using the batteries, please carefully read the service manual and the identification on the surface of the batteries.
使用电池前，请仔细阅读电池服务手册。
- 9.1.2 Children should be allowed to play with them.
避免儿童玩弄电池。
- 9.1.3 The batteries should only be charged with a matching charger.
本电池只能使用配套充电器充电。
- 9.1.4 When the batteries are not be used for a long time, please store them safely so that they will stay in a half-charged state. Please wrap the batteries with non-conductive materials in order that metallic materials will not contact the batteries directly, which may result in damage to the batteries. Keep the batteries in a cool and dry place.
长期不用时，请将电池储存完好，让电池处于半荷电状态。请用不导电材料包裹电池，以避免金属直接接触电池，造成电池损坏，将电池保持在阴凉干燥处。
- 9.1.5 The warranty period is 12 months from the date of ex-factory. However, TBM will not replace the battery free of charge even in the warranty period if the problem with the battery results from misusing rather than bad quality.
质保期是自出厂之日起 12 个月内，属于使用不当而非质量问题的，即使在质保期内，我司也不会无偿更换新电池。

9.2Warnings/警告

- 9.2.1 During their use, the batteries should be kept away from heat sources and high voltages.
在使用过程中，电池应远离热源，高压源。
- 9.2.2 Don not disassemble or assemble the batteries by yourself.
切勿私自拆装电池。
- 9.2.3 Do not short circuit the positive and negative poles of the battery with metal and do not store or move the batteries together with metal sheets either.
不要将电池的正负极用金属连接，也不要将电与金属片放在一起存储和移动。
- 9.2.4 Do not heat and burn of the batteries, and throw them in fire.
严禁将电池投入火中，加热和焚烧电池。
- 9.2.5 Damping of the battery is prohibited.
禁止浸泡电池和弄湿电池。
- 9.2.6 Avoid to charge battery near a fire source or in direct sunlight.
避免在火源附近或阳光直射下充电。
- 9.2.7 The battery should not be damaged by means of methods like knocking metallic things into the battery, hammering the battery, knocking it violent or etc.
禁止用金属凿入电池、捶打或摔打电池或其他方法破坏电池。

9.2.8 Welding is not allowed to be conducted on the battery.

禁止在电池上直接焊。

9.2.9 Do not directly contact with the leaking battery.

不要直接触及漏液电池。

10 Remarks/备注

10.1 If the product demand unit does not use the product according to the provisions of this specification, causing social impact and affecting the reputation of TMB, TMB will investigate the responsibility of the product demand unit. According to the degree of impact on TMB, the product demander should provide compensation to TMB.

如果由于产品需求单位不按本说明书中的规定进行使用，造成社会性影响，并对 TMB 的声誉造成影响的，TMB 将会追究产品需求单位的责任。根据对 TMB 造成的影响程度，产品需求单位需向 TMB 提供赔偿。

10.2 TMB reserves the right to modify the specifications and performance parameters of the product. Before ordering TMB products, the buyer needs to confirm the latest status of the products in advance with TMB.

TMB 保留对产品的规格及性能参数修改的权利。买方在订购 TMB 产品前，需要与 TMB 提前确认产品的最新状态。

10.3 This above No. 6.2.7, 6.2.8, 6.2.9 are the warning clause. When the battery reaches any of the terms described in the above, means that the battery has been used beyond the specifications, the customer shall take protective measures on the battery. At the same time, the TMB shall not take any responsibility for the damage in connection therewith.

以上 No. 6.2.7, 6.2.8, 6.2.9 为警示条款。当电芯达到其中任何项条款描述的指标和状态时，意味着电芯已经超出设计使用条件。客户需及时采取保护措施。同时，TMB 对上述使用状态的电池质量不承担任何保证责任，并对因此而导致的客户及第三方的任何损失不予赔偿。

10.4 Avoid long-term storage and use of batteries above 55°C (inclusive), otherwise there is a risk that the battery will bulge.

避免电池在 55°C 以上（含）长期存储与使用，否则有电池会起鼓等风险。

如因误操作或者不正当使用等造成的相关后果，我司不负任何责任。

10.5 English specifications are for reference only. Please refer to the technical specifications of the Chinese version.

英文规格释义仅供参考，请以中文版技术规格要求为准。

NTC 附件

Chip NTC Thermistor

www.joinset.com

ISO/TS16949
ISO14001

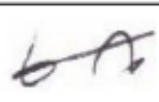
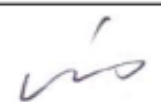
Customer : QINGDAO JOINSET

Document No. : AP16-TH-0512-01

**Approval Sheet
[for Product Specification]**

Product	Chip NTC Thermistor
Part No	ECTH100505 103F 3950FST

Approved by Customer : [Signing or Stamping here]

Joinset Co., Ltd.			
QA	Production	R&D	Sales Part
			



www.joinset.com

Joinset Co., Ltd.

9B-51L, Panwol Industrial Complex,
329, Haean-ro, Danwon-gu, Ansan-si,
Gyeonggi-do, 425-866, Korea.

Tel : +82-31-495-2601(Ref.)

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[illegible]

Chip NTC Thermistor

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Chip NTC Thermistor

■ Features

1. Small Size, Low Capacitance at 40MHz [Below 3pF]
2. Corresponding to the high B value
3. Strong against electrostatic discharge
4. Excellent in cost- performance
5. High accuracy and High Environmental Resistance are provided due to our original Manufacturing Method
6. All Pb-free product [Pb and Cd are not contained in product]

■ Applications

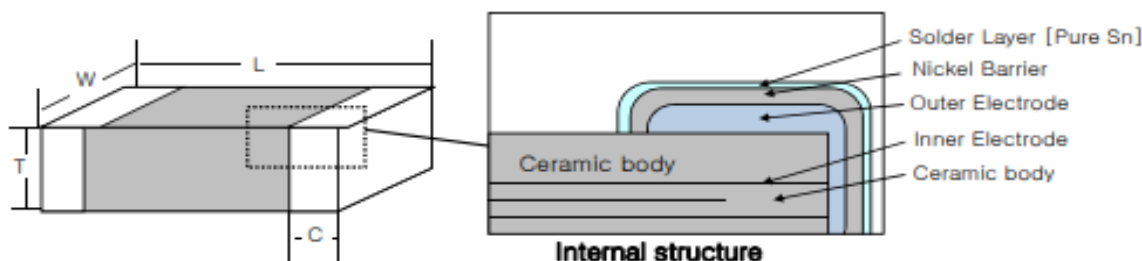
1. Mobile communication related Equipment [TCXO, RF Circuit, LCD Panel, Battery Pack]
2. Computer related Equipment
3. Video Camcorder, Car Audio related Equipment
4. Optical communication related Equipment

■ Part Number

ECH	100505	103	F	3950	F	S	T
①	②	③	④	⑤	⑥	⑦	⑧

①	Series	Chip Thermistor
②	Dimension	Refer to Shape & Dimension
③	Resistance	103 = 10K Ω [= 10 x 10 ³ Ω] @ 25℃ ± 0.2℃
④	R Tolerance	F : ±1% of Nominal Resistance
⑤	B Value	B25℃/85℃ = 3950K
⑥	B Tolerance	F : ±1% of Nominal B Value
⑦	Type	S : Pb free product
⑧	Packing	T : Paper carrier Tape & Plastic Reel

■ Shape & Dimension



Size	L[mm]	W[mm]	T[mm]	C[mm]
0603	0.60 ± 0.03	0.30 ± 0.03	0.30 ± 0.03	0.15 ± 0.05
1005	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.05	0.25 ± 0.10
1608	1.60 ± 0.10	0.80 ± 0.10	0.80 ± 0.10	0.40 ± 0.20
2012	2.00 ± 0.20	1.25 ± 0.20	0.85 ± 0.20	0.50 ± 0.20

Chip NTC Thermistor

■ Specifications

TYPE	B value [K]	Nominal Resistance (Ω) [at 25℃]										
		22	50	100	500	1k	5k	10k	50k	100k	500k	1M
SMD CHIP	2800			100Ω								
	3150	22Ω	68Ω									
	3250			100Ω	220Ω							
	3435							10kΩ				
	3520					1kΩ	6.8kΩ					
	3800							10kΩ	150kΩ			
	3970						5kΩ	68kΩ				
	4050					1kΩ		470kΩ				
	4200							68kΩ	680kΩ			
	4550							10kΩ	220kΩ			
	4750								220kΩ			

※ B value is calculated from the resistance at 25℃ and 85℃.

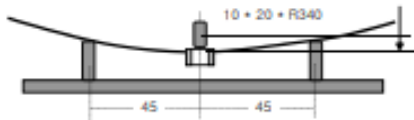
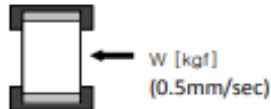
※ Variations are available on request.

1005 Type

No	Part No	R25℃[pΩ]	B[25℃/85℃]	B tolerance	Operating Temperature
1	ECTH100505 103F 3950FST	10kΩ	3950K	±1%	-40℃ ~ 125℃

Chip NTC Thermistor

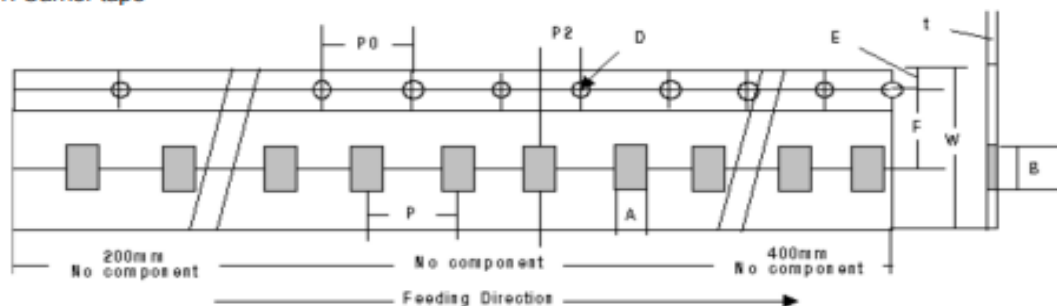
■ Performance Specification

No	ITEM	Requirements	Test condition
1	Operating Temp. Range	-40℃ ~ +125℃	
2	Resistance	Within Tolerance of Resistance	Measured at 25℃ in Silicon Oil Bath
3	B Value	Within Tolerance of B Value	$B_{25℃/85℃}[K] = \frac{1}{\ln(R_{25℃}/R_{85℃})} \cdot (1/T_{25℃} - 1/T_{85℃})$
4	Max Rated Wattage[mW]	100 mW	Measured in the still air with the sample which is soldered on a glass epoxy board t = 1.6mm
5	Heat Dissipation Constant [mW/℃]	1 mW/℃	Measured in the still air with the sample which is soldered on a solder coated copper wire $\Phi = 0.25$
6	Solderability	More than 90% of the terminal electrode shall be covered with new solder.	1. Type of solder : Sn-3.0Ag-0.5Cu 2. Soldering Temp & Time : 230±5℃, 5±1 sec
7	Resistance to Solder Heat	1. No Serious mechanical damage 2. More than 50% of the terminal electrode shall be covered with new solder 3. $\Delta R \leq \pm 3\%$ (Ref. To initial value)	1. Type of solder : Sn-3.0Ag-0.5Cu 2. Soldering Temp & Time : * Solder Heat Test : 260±5℃, 5±1sec 3. Preheat the Part at 120~150℃, 1min. Let sit at R.T, for 24Hrs then Measure
8	Humidity Test	1. No Serious mechanical damage 2. $\Delta R \leq \pm 3\%$ (Ref. To initial value) 3. $\Delta B \leq \pm 3\%$ (Ref. To initial value)	1. Test Temp. & Relative Humidity & Time : 85±5℃, 85±5% RH, 500± 24Hrs 2. Let sit at R.T, for 24Hrs then Measure
9	Thermal Shock	1. No Serious mechanical damage 2. $\Delta R \leq \pm 3\%$ (Ref. To initial value) 3. $\Delta B \leq \pm 3\%$ (Ref. To initial value)	1. Temp. : -40±5℃, +85±5℃ 2. Soak Time : 30min ± 3min The cycles is repeated 100 times
10	High Temp. Resistance	1. No Serious mechanical damage 2. $\Delta R \leq \pm 3\%$ (Ref. To initial value) 3. $\Delta B \leq \pm 3\%$ (Ref. To initial value)	1. Temp. : +85±5℃ 2. Time : 1000Hrs ± 12Hrs Let sit at R.T, for 24Hrs then Measure
11	Low Temp. Resistance	1. No Serious mechanical damage 2. $\Delta R \leq \pm 3\%$ (Ref. To initial value) 3. $\Delta B \leq \pm 3\%$ (Ref. To initial value)	1. Temp. : -40±5℃ 2. Time : 1000Hrs ± 12Hrs Let sit at R.T, for 24Hrs then Measure
12	Bending Strength	1. No Serious mechanical damage	Add load at 0.5mm/sec until glass epoxy board bends up to 1mm [= Bending Depth] 
13	Adhesive Strength of Termination	1. Adhesion above the standard Size: 1005, 1608, 2012 W[kgf]: 0.5, 1.0, 1.2↑	

Chip NTC Thermistor

Packing specifications

1. Carrier tape



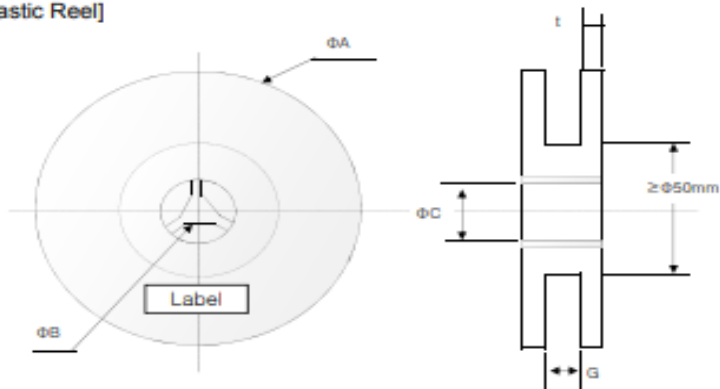
unit : mm

Size	A0	B0	W	D1	E	F	P	P0	P2	t
0603	0.38±0.05	0.68±0.05	8.00±0.20	1.50±0.25	1.75±0.10	3.50±0.50	2.0±0.05			0.5 max.
1005	0.65±0.10	1.15±0.10					2.0±0.05		0.7 max.	
1608	1.10±0.10	1.90±0.10					4.0±0.10	4.0±0.10	2.0±0.10	1.1 max.
2012	1.50±0.10	2.35±0.10								

* paper type

2. Reel & Label

[Plastic Reel]



unit : mm

code	dimension
ΦA	178±2.0
ΦB	13.0±0.5
ΦC	22.0±2.0
G	10.0±1.5
t	2.5±0.5

* 1005 ~ 2012 size

[Label]

PROD CD : ① ECTH100505 103F 3950FST



LOT NO : ② TC121102-20Y 10,000 *



QTY ③ 10,000 SEQ NO ④ 001/009 INSPECTOR ⑤ SJ PARK

① ECTH100505 103F 3950FST ⑦ JOINSET



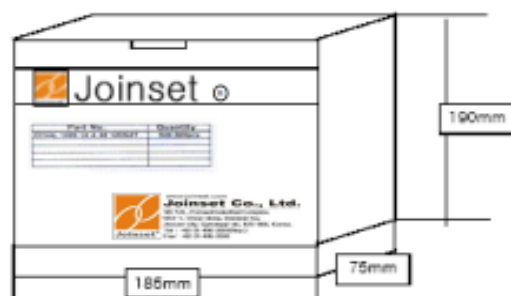
code	description
①	Part no.
②	Lot no.
③	Quantity
④	Sequence no.
⑤	Inspector
⑥	Packing date
⑦	Manufacturer

Chip NTC Thermistor

■ Packing specifications

3. Box

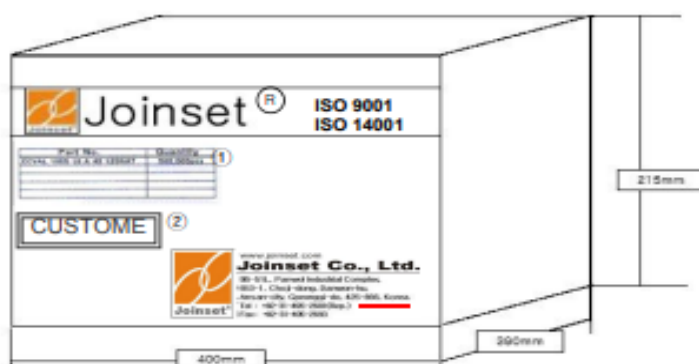
1) Inner box



* 5 Reels in each Inner Box

* Label : Part no. & Quantity

2) Outer box



* Outer Box contains 10 Inner Box (50 Reels)

* Label : ① Part no. & Quantity ② Customer

3) Packing Quantity

unit : pcs

Chip size	060303	100505	160808	201208	Carrier Tape
pcs/reel	15,000	10,000	4,000	4,000	Paper
Inner Box	75,000	50,000	20,000	20,000	-
Outer	750,000	500,000	200,000	200,000	-

■ Following conditions

Should be kept in order to avoid deterioration of solderability of external electrodes and the characteristics of this products.

(1) Storage Condition: Temperature: -10°C to +40°C. Humidity: less than 75 %RH, without dewing.

(2) Storage Term: Use this product within 6 months after delivery.

If 6 months or more elapsed, please check the solderability before use.

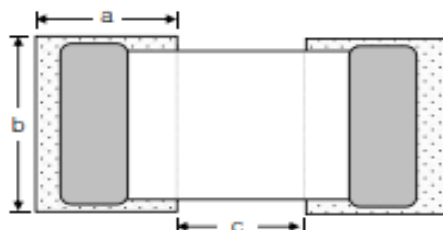
(3) Storage Place: Store this product in no corrosive gas (SOX, Cl, etc.), nor directly under sunshine.

* This product doesn't do the damp-proof packing. (Be proper for 'Moisture Sensitivity Level 1'.)

Chip NTC Thermistor

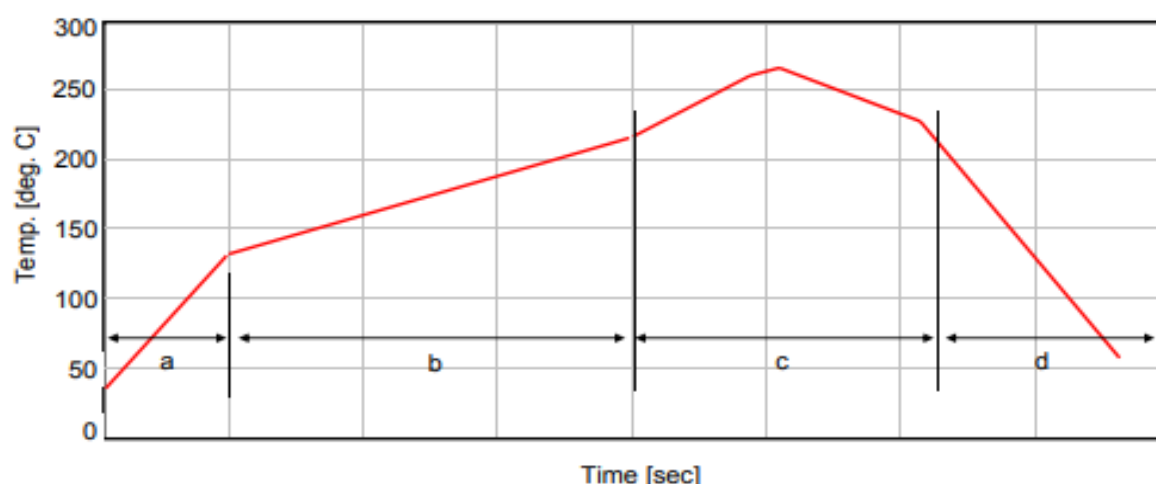
Recommended Soldering condition

1) Land Pattern Design



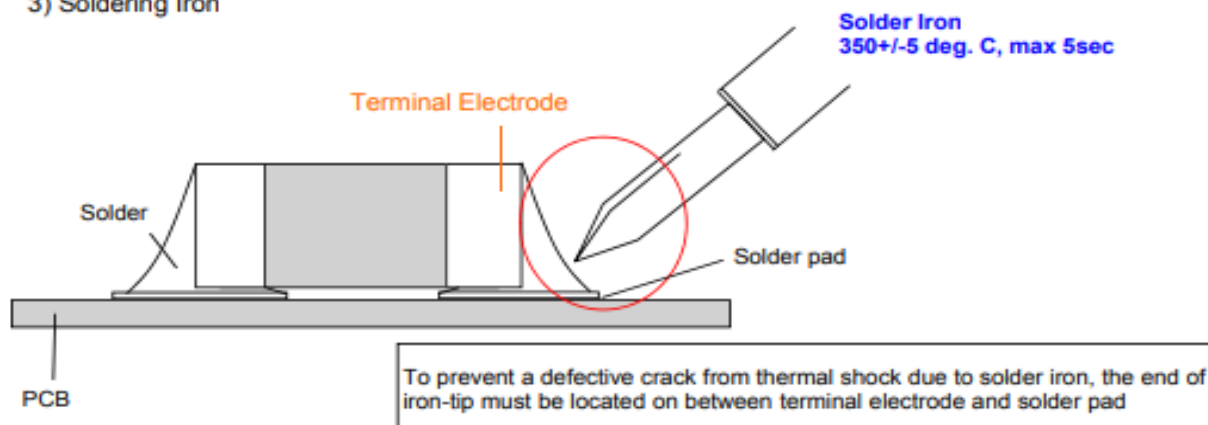
Code	Land Dimension with Chip Size [mm]			
	0603	1005	1608	2012
a	0.20~0.35	0.30~0.50	0.60~0.70	0.60~0.70
b	0.25~0.40	0.40~0.60	0.60~0.80	0.80~1.10
c	0.25~0.40	0.30~0.50	0.60~0.80	1.00~1.20

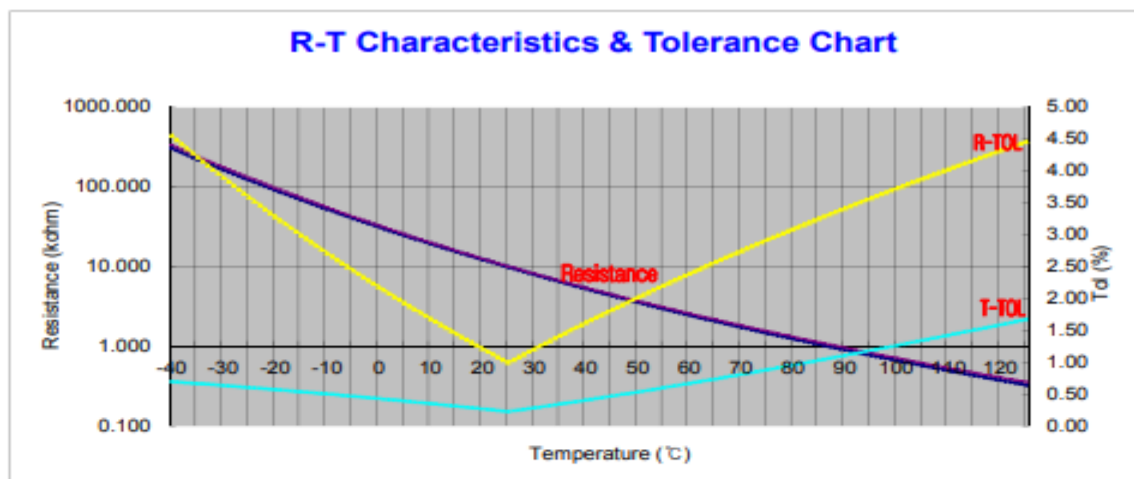
2) Reflow Soldering



Zone		temp. range [deg. C]	time [sec]	Remark
a	Curing	RT ~ 130	60	* Solder : Sn-Ag-Cu * 260deg. C, within 10sec
b	Preheat	max 220	90 ~ 150	
c	Soldering	220 ~ 260	90 ~ 150	
d	Cooling	220 ~ RT	min 60	

3) Soldering Iron





Part no . ECTH100505103F3950FST

(Unit : kohm)

TEMP(C)	MIN	MEAN	MAX	R-TOL(MIN)	R-TOL(MAX)	T-TOL(MIN)	T-TOL(MAX)
-40	302.700	316.505	330.907	4.36	4.55	0.67	0.70
-39	283.910	296.667	309.965	4.30	4.48	0.67	0.69
-38	266.398	278.189	290.472	4.24	4.42	0.66	0.69
-37	250.069	260.970	272.319	4.18	4.35	0.66	0.68
-36	234.837	244.918	255.407	4.12	4.28	0.65	0.68
-35	220.622	229.948	239.644	4.06	4.22	0.64	0.67
-34	207.351	215.981	224.947	4.00	4.15	0.64	0.66
-33	194.957	202.945	211.238	3.94	4.09	0.63	0.66
-32	183.377	190.772	198.445	3.88	4.02	0.63	0.65
-31	172.553	179.401	186.502	3.82	3.96	0.62	0.65
-30	162.431	168.775	175.348	3.76	3.89	0.62	0.64
-29	152.963	158.841	164.927	3.70	3.83	0.61	0.63
-28	144.103	149.550	155.187	3.64	3.77	0.61	0.63
-27	135.808	140.857	146.079	3.58	3.71	0.60	0.62
-26	128.040	132.721	137.559	3.53	3.65	0.59	0.61
-25	120.762	125.103	129.587	3.47	3.58	0.59	0.61
-24	113.940	117.966	122.123	3.41	3.52	0.58	0.60
-23	107.544	111.279	115.133	3.36	3.46	0.58	0.59
-22	101.545	105.011	108.584	3.30	3.40	0.57	0.59
-21	95.915	99.132	102.447	3.25	3.34	0.56	0.58
-20	90.631	93.617	96.692	3.19	3.28	0.56	0.58
-19	85.669	88.442	91.294	3.13	3.23	0.55	0.57
-18	81.008	83.582	86.230	3.08	3.17	0.55	0.56
-17	76.628	79.019	81.476	3.03	3.11	0.54	0.56
-16	72.511	74.731	77.012	2.97	3.05	0.53	0.55
-15	68.639	70.701	72.819	2.92	2.99	0.53	0.54
-14	64.996	66.912	68.878	2.86	2.94	0.52	0.53
-13	61.568	63.349	65.174	2.81	2.88	0.51	0.53
-12	58.341	59.996	61.691	2.76	2.83	0.51	0.52
-11	55.302	56.840	58.414	2.71	2.77	0.50	0.51
-10	52.439	53.868	55.331	2.65	2.72	0.50	0.51
-9	49.741	51.069	52.428	2.60	2.66	0.49	0.50
-8	47.197	48.432	49.694	2.55	2.61	0.48	0.49
-7	44.799	45.947	47.119	2.50	2.55	0.48	0.49
-6	42.536	43.603	44.692	2.45	2.50	0.47	0.48
-5	40.401	41.392	42.405	2.40	2.44	0.46	0.47
-4	38.385	39.307	40.247	2.35	2.39	0.45	0.46
-3	36.481	37.339	38.212	2.30	2.34	0.45	0.46
-2	34.683	35.480	36.292	2.25	2.29	0.44	0.45
-1	32.984	33.725	34.479	2.20	2.24	0.43	0.44
0	31.378	32.067	32.767	2.15	2.18	0.43	0.43
1	29.860	30.499	31.150	2.10	2.13	0.42	0.43
2	28.423	29.018	29.622	2.05	2.08	0.41	0.42
3	27.064	27.617	28.178	2.00	2.03	0.41	0.41
4	25.778	26.291	26.812	1.95	1.98	0.40	0.40
5	24.560	25.037	25.521	1.90	1.93	0.39	0.40

TEMP(C)	MIN	MEAN	MAX	R-TOL(MIN)	R-TOL(MAX)	T-TOL(MIN)	T-TOL(MAX)
6	23.407	23.850	24.299	1.86	1.88	0.38	0.39
7	22.314	22.726	23.142	1.81	1.83	0.38	0.38
8	21.279	21.661	22.047	1.76	1.78	0.37	0.37
9	20.298	20.652	21.010	1.72	1.74	0.36	0.36
10	19.367	19.696	20.028	1.67	1.69	0.35	0.36
11	18.485	18.789	19.097	1.62	1.64	0.35	0.35
12	17.647	17.930	18.215	1.58	1.59	0.34	0.34
13	16.852	17.114	17.379	1.53	1.54	0.33	0.33
14	16.098	16.341	16.585	1.48	1.50	0.32	0.32
15	15.382	15.606	15.833	1.44	1.45	0.31	0.32
16	14.701	14.909	15.118	1.39	1.40	0.31	0.31
17	14.054	14.247	14.440	1.35	1.36	0.30	0.30
18	13.440	13.617	13.796	1.31	1.31	0.29	0.29
19	12.855	13.020	13.184	1.26	1.27	0.28	0.28
20	12.300	12.451	12.603	1.22	1.22	0.27	0.27
21	11.771	11.911	12.051	1.17	1.18	0.27	0.27
22	11.268	11.397	11.526	1.13	1.13	0.26	0.26
23	10.790	10.908	11.027	1.09	1.09	0.25	0.25
24	10.334	10.443	10.552	1.04	1.04	0.24	0.24
25	9.900	10.000	10.100	1.00	1.00	0.23	0.23
26	9.478	9.578	9.678	1.04	1.04	0.24	0.24
27	9.077	9.177	9.277	1.09	1.09	0.25	0.25
28	8.695	8.794	8.894	1.13	1.13	0.27	0.27
29	8.331	8.430	8.529	1.17	1.17	0.28	0.28
30	7.984	8.082	8.181	1.21	1.22	0.29	0.29
31	7.654	7.751	7.849	1.25	1.26	0.30	0.30
32	7.339	7.435	7.532	1.29	1.30	0.31	0.31
33	7.039	7.134	7.230	1.33	1.34	0.32	0.33
34	6.752	6.846	6.941	1.37	1.38	0.33	0.34
35	6.479	6.572	6.666	1.41	1.42	0.35	0.35
36	6.218	6.310	6.403	1.45	1.47	0.36	0.36
37	5.969	6.060	6.151	1.49	1.51	0.37	0.37
38	5.732	5.821	5.911	1.53	1.55	0.38	0.39
39	5.505	5.593	5.682	1.57	1.59	0.39	0.40
40	5.288	5.375	5.463	1.61	1.63	0.41	0.41
41	5.081	5.167	5.253	1.65	1.67	0.42	0.42
42	4.883	4.967	5.052	1.69	1.71	0.43	0.44
43	4.694	4.777	4.860	1.73	1.75	0.44	0.45
44	4.514	4.595	4.677	1.77	1.79	0.46	0.46
45	4.341	4.420	4.501	1.80	1.83	0.47	0.47
46	4.175	4.254	4.333	1.84	1.87	0.48	0.49
47	4.017	4.094	4.172	1.88	1.91	0.49	0.50
48	3.866	3.941	4.018	1.92	1.94	0.51	0.51
49	3.721	3.795	3.870	1.95	1.98	0.52	0.53
50	3.582	3.655	3.729	1.99	2.02	0.53	0.54
51	3.449	3.520	3.593	2.03	2.06	0.54	0.55
52	3.322	3.392	3.463	2.06	2.10	0.56	0.56
53	3.200	3.268	3.338	2.10	2.14	0.57	0.58
54	3.083	3.150	3.219	2.14	2.17	0.58	0.59
55	2.971	3.037	3.104	2.17	2.21	0.59	0.60
56	2.864	2.928	2.994	2.21	2.25	0.61	0.62
57	2.761	2.824	2.888	2.24	2.29	0.62	0.63
58	2.662	2.724	2.787	2.28	2.32	0.63	0.65
59	2.567	2.628	2.690	2.31	2.36	0.65	0.66
60	2.476	2.536	2.596	2.35	2.40	0.66	0.67
61	2.389	2.447	2.507	2.38	2.43	0.67	0.69
62	2.305	2.362	2.421	2.42	2.47	0.69	0.70
63	2.225	2.281	2.338	2.45	2.50	0.70	0.71
64	2.148	2.202	2.258	2.49	2.54	0.71	0.73
65	2.073	2.127	2.182	2.52	2.58	0.73	0.74
66	2.002	2.055	2.108	2.55	2.61	0.74	0.76
67	1.934	1.985	2.038	2.59	2.65	0.75	0.77
68	1.868	1.918	1.970	2.62	2.68	0.77	0.78
69	1.805	1.854	1.904	2.65	2.72	0.78	0.80
70	1.744	1.792	1.842	2.69	2.75	0.79	0.81
71	1.686	1.733	1.781	2.72	2.79	0.81	0.83
72	1.629	1.675	1.723	2.75	2.82	0.82	0.84
73	1.575	1.620	1.667	2.79	2.85	0.84	0.86
74	1.523	1.567	1.613	2.82	2.89	0.85	0.87
75	1.473	1.516	1.561	2.85	2.92	0.86	0.89

TEMP(C)	MIN	MEAN	MAX	R-TOL(MIN)	R-TOL(MAX)	T-TOL(MIN)	T-TOL(MAX)
76	1.425	1.467	1.511	2.88	2.96	0.88	0.90
77	1.379	1.420	1.462	2.91	2.99	0.89	0.91
78	1.334	1.374	1.416	2.95	3.02	0.90	0.93
79	1.291	1.330	1.371	2.98	3.06	0.92	0.94
80	1.249	1.288	1.328	3.01	3.09	0.93	0.96
81	1.210	1.247	1.286	3.04	3.12	0.95	0.97
82	1.171	1.208	1.246	3.07	3.16	0.96	0.99
83	1.134	1.170	1.208	3.10	3.19	0.98	1.00
84	1.098	1.134	1.170	3.13	3.22	0.99	1.02
85	1.064	1.099	1.134	3.16	3.26	1.00	1.03
86	1.031	1.065	1.100	3.19	3.29	1.02	1.05
87	0.999	1.032	1.066	3.22	3.32	1.03	1.06
88	0.968	1.000	1.034	3.25	3.35	1.05	1.08
89	0.938	0.970	1.002	3.28	3.38	1.06	1.09
90	0.909	0.940	0.972	3.31	3.42	1.08	1.11
91	0.881	0.912	0.943	3.34	3.45	1.09	1.13
92	0.855	0.884	0.915	3.37	3.48	1.11	1.14
93	0.829	0.858	0.888	3.40	3.51	1.12	1.16
94	0.804	0.832	0.862	3.43	3.54	1.13	1.17
95	0.780	0.808	0.836	3.46	3.57	1.15	1.19
96	0.756	0.784	0.812	3.49	3.60	1.16	1.20
97	0.734	0.761	0.788	3.52	3.64	1.18	1.22
98	0.712	0.738	0.765	3.55	3.67	1.19	1.23
99	0.691	0.717	0.743	3.58	3.70	1.21	1.25
100	0.671	0.696	0.722	3.60	3.73	1.22	1.27
101	0.651	0.676	0.701	3.63	3.76	1.24	1.28
102	0.632	0.656	0.681	3.66	3.79	1.25	1.30
103	0.614	0.637	0.662	3.69	3.82	1.27	1.31
104	0.596	0.619	0.643	3.72	3.85	1.28	1.33
105	0.579	0.602	0.625	3.74	3.88	1.30	1.35
106	0.562	0.585	0.607	3.77	3.91	1.31	1.36
107	0.546	0.568	0.590	3.80	3.94	1.33	1.38
108	0.531	0.552	0.574	3.83	3.97	1.34	1.39
109	0.516	0.537	0.558	3.85	4.00	1.36	1.41
110	0.501	0.522	0.543	3.88	4.03	1.37	1.43
111	0.487	0.507	0.528	3.91	4.06	1.39	1.44
112	0.474	0.493	0.513	3.94	4.09	1.40	1.46
113	0.460	0.479	0.499	3.96	4.12	1.42	1.47
114	0.448	0.466	0.486	3.99	4.14	1.43	1.49
115	0.435	0.454	0.472	4.02	4.17	1.45	1.51
116	0.423	0.441	0.460	4.04	4.20	1.47	1.52
117	0.412	0.429	0.447	4.07	4.23	1.48	1.54
118	0.401	0.418	0.435	4.09	4.26	1.50	1.56
119	0.390	0.406	0.424	4.12	4.29	1.51	1.57
120	0.379	0.395	0.413	4.15	4.32	1.53	1.59
121	0.369	0.385	0.402	4.17	4.34	1.54	1.61
122	0.359	0.375	0.391	4.20	4.37	1.56	1.62
123	0.349	0.365	0.381	4.22	4.40	1.57	1.64
124	0.340	0.355	0.371	4.25	4.43	1.59	1.66
125	0.331	0.346	0.361	4.28	4.46	1.60	1.67