Specification Approval Sheet

Name: Li-ion Polymer Battery

Model:

SPEC: LP-502235-3.7V 370mAh-PCM

File Number：

Project：/

Approved By	Checkup	Make
	Jerry	Chen bin
	2014-5-20	2014-5-20

Customer Confirmation	Signature	Date
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Amendment Records

Revision	Description	Issued Date	Approved By
A0	New release	2014-5-4	

1 Scope

This document describes the performance characteristics and testing methods for Li-ion polymer battery produced by RYDER Corporation.

2 Product type and model number

2.1 Product type

Li-ion polymer Battery

2.2 Model number

LP-502235-3.7V 370mAh-PCM

3 Rated performance

Form 1: Battery rated performance

No	Item	Rated performance	Remark
1	Rated capacity	Nominal 370mAh Min 370mAh -5%	Standard discharge after standard charge
2	Nominal voltage	3.7V	Mean operation voltage during standard discharge after standard charge
3	Voltage at end of discharge	3.0V	Discharge cut-off voltage
4	Charging voltage	4.2V	
5	Impedance	<260mΩ	
6	Standard charge	Constant current 0.2 C_5A Constant voltage 4.2V Cut-off current ≤0.02C_5A	
7	Standard discharge	Constant current 0.2 C_5A End voltage 3.0V	
8	Fast charge	Constant current 0.5C_5A Constant voltage 4.2V Cut-off current ≤0.02C_5A	
9	Fast discharge	Constant current 0.5 C_5A End voltage 3.0V	
10	Maximum continuous discharge current	1.0 C_5A	
11	Operation temperature range	Charge: 0~45℃ Discharge: -20~60℃	60±25%R.H
12	Cycle life	>300cycles	Charging/discharging in the below condition: Charge: standard charge Discharge: 0.2 C_5A to3.0V Rest time between charge/discharge:30min Until the discharge capacity <80% of NC
13	Storage temperature	≤1 month: -20 ~ 45℃ ≤3 months: -20 ~ 35℃ ≤1 year: 0 ~ 25℃	60±25%R.H, Best 10~25℃ for long-time storage
14	Weight	Approx: 20g	

15	Dimension(mm)	Thickness*width*Height(Max)	5.5*25.5*40

4 Electrical performances

Form 2: Battery electrical performances

No	Items	Test procedure	Requirements
1	Nominal voltage	The average value of the working voltage during the whole discharge process.	3.7V
2	Discharge performance	The discharge capacity of the battery, measured with 0.2 C_5A down to 3.0V within 1 hour after a standard charge at 25±5℃	Discharge ≥Minimum capacity
3	Capacity retention	After 28 days storage at 25±5℃, after having been standard charged and discharged at 0.2 C_5A to 3.0V (the residual capacity is above 85% of nominal capacity)	Discharge time≥4.25h
4	Cycle life	Charging/discharging in the below condition: Charge: standard charge at 25±5℃ Discharge: 0.2C_5A to 3.0V Rest time between charge/discharge:30min Until the discharge capacity <80% of NC	>300cycles
5	Storage	(Within 3 months after manufactured) The battery is charged with 0.2C_5A to 40-50% capacity and stored at ambient temperature 25±5℃, 65±20%RH for 12 months. After the 12 months storage period the cell is fully charged and discharged to 3.0V with 0.2 C_5A	Discharge time≥4h

5 Standard test conditions

Test should be conducted with new batteries within one week after shipment from our factory and the batteries shall not be cycled more than five times before the test. Unless otherwise defined, test and measurement shall be done under temperature of 20±5℃ and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 15~30℃ and humidity 25~85%RH.

6 Cautions in use

To ensure proper use of the battery please read the manual carefully before using it.

6.1 Handling

Do not expose to, dispose of the battery in fire.

Do not put the battery in a charger or equipment with wrong terminals connected.

Avoid shorting the battery.

Avoid excessive physical shock or vibration.

Do not disassemble or deform the battery.

Do not immerse in water.

Do not use the battery mixed with other different make, type, or model batteries.

Keep out of the reach of children.

6.2 Charge and discharge

Battery must be charged in appropriate charger only.

Never use a modified or damaged charger.

Do not leave battery in charge over 24 hours.

6.3 Storage

Store the battery in a cool, dry and well-ventilated area.

6.4 Disposal

Regulations vary for different countries, Dispose of in accordance with local regulations.

7 Battery operation instruction

7.1 Charging

Charging current：Cannot surpass the biggest charging current which in this specification book stipulated.

Charging voltage：Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

Charge temperature：The battery must charge in the ambient temperature scope which this specification book stipulated. Use the constant electric current and constant voltage to charge. Do not reverse charge. When the positive electrode and the negative meet together, damage can be made for the battery.

7.2 Discharging current

The discharging current shall not surpass the biggest discharging current stipulated in this specification book. The oversized electric current discharge can lower the battery storage capacity and cause battery to generate heat.

7.3 Electric discharge temperature

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

7.4 Over-discharge

Short time of excessively discharge will not affect the usage. But the long time excess discharge can damage the battery performance and cause the function losing. When the battery is not used for a long time, because of its automatic flashover characteristic, it may excessively discharges. To prevent excessively discharge occur, the battery should maintain certain electric quantity.

7.5 Storage of battery

The battery should be stored within the temperature range which stipulated in the specification book. If the storage time surpasses six months, you should carry on additional charge to the battery.

8 Period of warranty

The period of warranty is one year from the date of shipment. RYDER guarantees to give a replacement in case of batteries with defects proven due to manufacturing process instead of the customer’s abuse and misuse.

9 Other chemical reaction

Because batteries utilize chemical reactions, battery performance will deteriorate over time even only store there for a long period of time but without being used. In addition, if the using conditions, such as charge, discharge, ambient temperature etc. are not maintained within the specified ranges, the battery life expectancy

may be shortened or the device which the battery is applied for could be damaged because of electrolyte leakage. If the battery can not sustain for a relatively long period of time at one charge, even if it is charged correctly, this may indicate it is time to change the battery.

10 Note

Any other items which are not covered in this specification shall be agreed by both parties.

11 Application circuit

11.1 Electrical characteristics

Table 3: PCM electrical characteristics

Item	Content	Criterion
Over charge Protection	Over charge detection voltage	4.275±0.025V
	Over charge release voltage	/
Over discharge protection	Over discharge detection voltage	2.8±0.050V
	Over discharge release voltage	/
Over current protection	Over current detection current	0.5-2.5A
	Release condition	Cut load
Short protection	Detection condition	Exterior short circuit
	Protection	Have
	Release condition	Cut short circuit
Interior resistance	Main loop electrify resistance	R_{DS}≤65mΩ
Current consumption	Current consume in normal operation	8.0μA Max

11.2 Parts List

NO	Part No	Description	Material	Unit	
1		R-0603-330Ω±5%-1/10W -20℃ TO 70℃	R1	PCS	1
2		R-0603-1KΩ±5%-1/10W -20℃ TO 70℃	R2	PCS	1
3		C-0603-104-50V-X7R ±10%	C1	PCS	1
4	0402SM8205001	MOS-SME8205A N 20V5A TSSOP-8 0.025R -55℃ TO 150℃ SINO	U2	PCS	1
5	0401R5402N003	IC-R5402N128EC-TR-FF SOT-23-6 -40℃ TO 85℃ RICOH	U1	PCS	1
6		PCM：PCB-RYD-01S-030 V1.02 17.5*3.7*0.8		PCS	1
7	51010100A5004	PCM-F3.7V 0.5/1.2A-NS-17.5*3.7*2.5		PCS	1

11.3 Terminal explanations

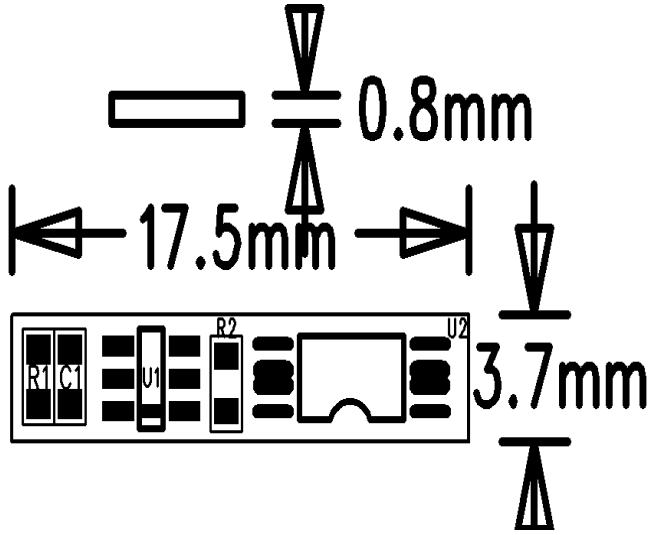
11.3.1 B+：Connected to the battery positive terminal

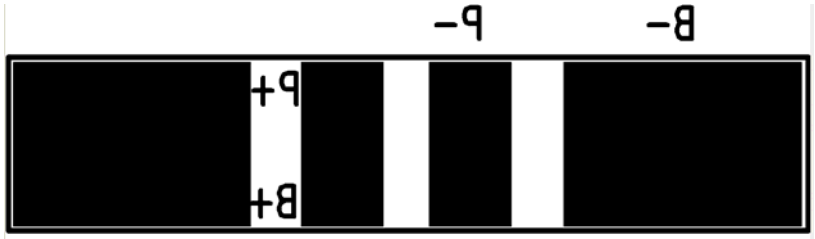
11.3.2 B-：Connected to the battery negative terminal

11.3.3 P-：Connected to the battery's negative output or the charger's negative terminal

11.3.4 P+：Connected to the battery's positive output or the charger's positive terminal

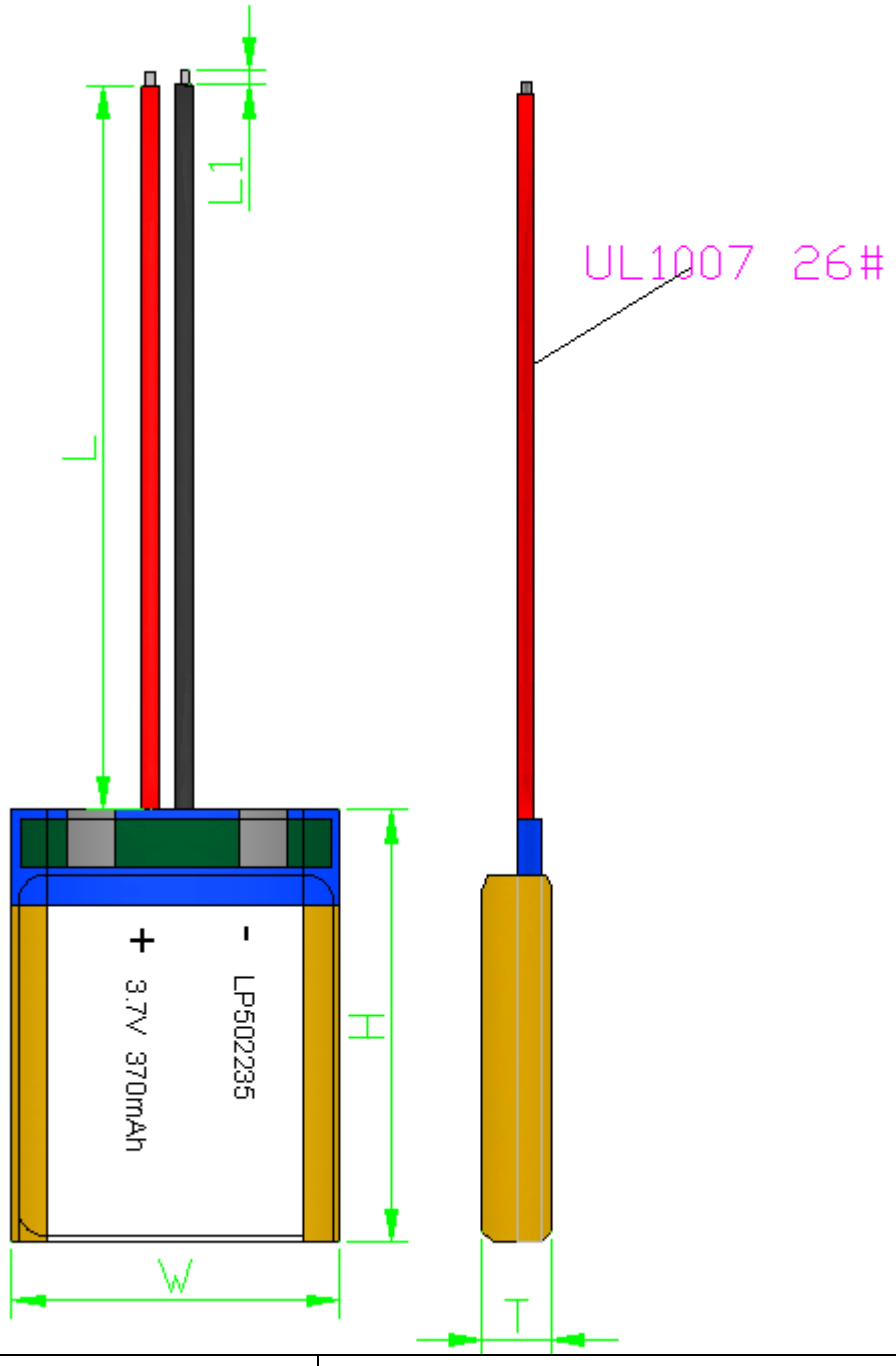
11.4 PCM layout





12 Battery pack drawing

Drawing 1: Battery pack drawing



1	Dimension(mm)	Thickness*width*Height(Max)	(T*W*H)5.5*25.5*40mm
2	Wire length(mm)	L+L1	60±2+1.5