正崴精密工業股份有限公司

CHENG UEI PRECISION INDUSTRY CO., LTD.

Product Approval Specifications

Customer : ABG

Customer Model name :

Customer P/N :

FOXLINK Model name :

FOXLINK P/N :

Approval Sheet # :

Issuing Date : 2010/11/17

Customer Approved
Date : / /

Issued By FOXLINK Green Energy Business Unit					
Approved	**PM Checked**	**QA Checked**	**RD-Section**	**RD Checked**	**Prepared**
			EE		
			ME		
			PK		

History of revisions

Version	Date	Description	ECN No.	Prepared by
01	2009/10/7	Initial Document Created		
		1.		

Contents

Attached Documents

One	Battery ID Drawing(TBD)
Two	Schematic

1. General

1.1 Scope

This product specification shall be applied to the Lithium Ion Battery Pack.
The battery pack is for the use of the E-Book.

1.2 Name and Model

1.2.1 Customer Model Name :
1.2.2 Fox Link Model Name :
1.2.3 Cell Configuration : Lithium Ion Polymer cell for 2S1P
1.2.4 Cell Chemistry Type : Lithium Ion Polymer LISHEN PP3658122AB 2800mAh

1.3 Safety Regulation

N/A.

2. Specification

2.1 Rating

	Item	Specification	Remarks
2.1.1	Nominal Capacity	2800mAh	0.2C discharge, 6.0V cut off @25℃
2.1.2	Minimum Capacity	2740mAh	0.2C discharge, 6.0V cut off @25℃
2.1.3	Nominal Voltage	7.4V	3.7V/cell, OCV
2.1.4	Charge Voltage	8.4V	
2.1.5	Discharge Cutoff Voltage	6.0V	
2.1.6	Charge Method	CC-CV	
2.1.7	Standard Charge	8.4V/1370mA(0.5C)	The battery is charged at 1370mA (0.5C) of constant current and 8.4V constant voltage for taper current reached to 137mA(0.05C).
2.1.8	Maximum Charge Voltage	8.4V	4.20V/Cell
	Maximum Charge Current	1400mA	
2.1.9	Maximum Discharge Current	2740mA(1C)	Max : 12W
2.1.10	Operating Ambient Temperature	0~45℃, 85%RH Max	Charging
	Range And Humidity Rang	0~60℃, 85%RH Max	Discharging
2.1.11	Storage Temperature Range	-20～45℃	Within 30 day
		-20～35℃	Within 180 day
2.1.12	Recommended Storage Temperature	25℃±5℃	At The Shipment State

2.2 Dimension and Appearance

2.2.1 Dimension : L :TBD±0.15 , W :TBD±0.15 , H :TBD±0.15 mm
Refer to attached drawing

2.2.2 Weight：192 g ± 5g

2.2.3 Terminal :

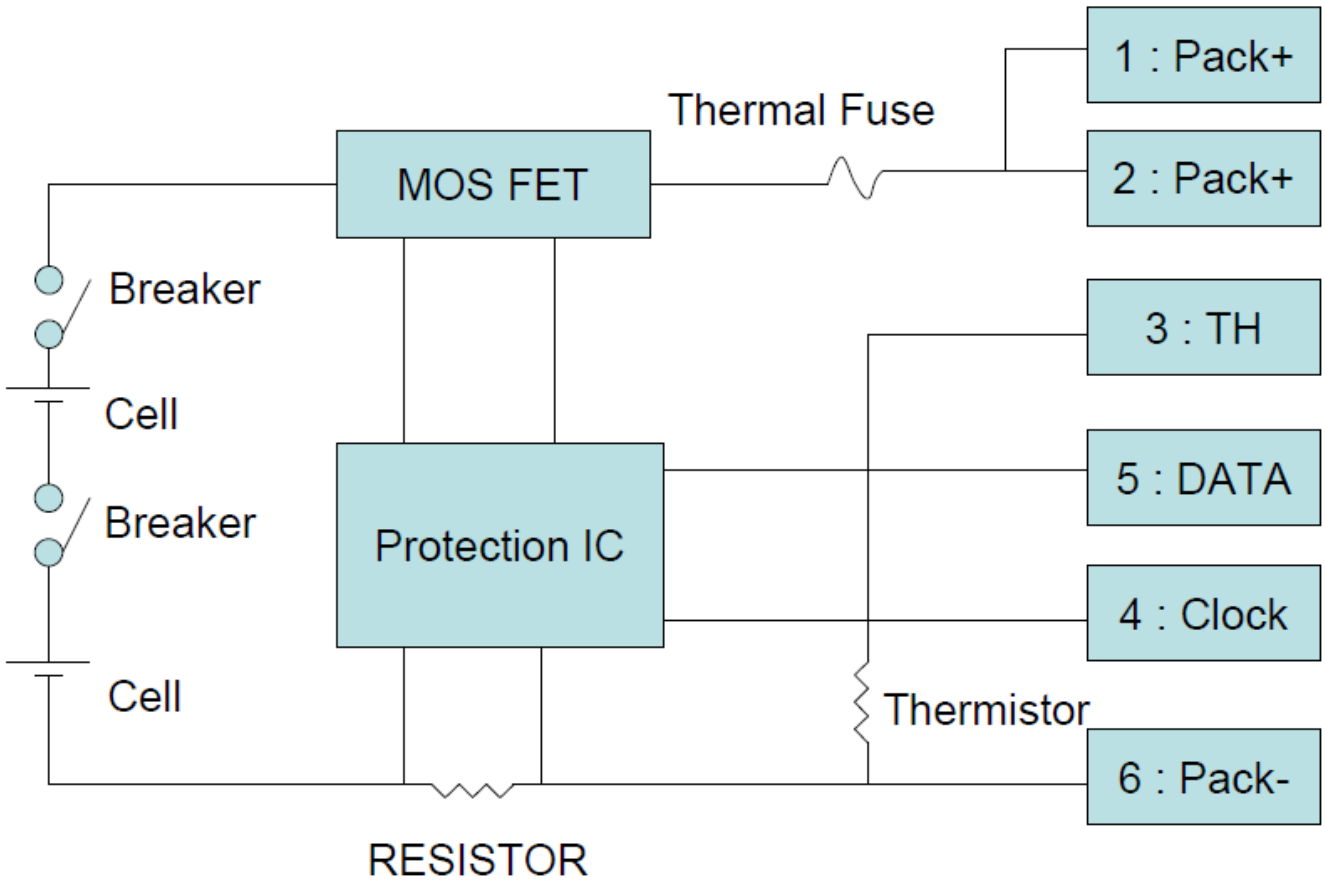
Pin No.	Name	Description	Remarks
1	P+	Pack Positive	
2	P+	Pack Positive	
3	TH	10KΩ±1%connected between the TH and P-	B Value：3435K
4	SCL	Communication Clock	
5	SDA	Communication Data	
6	P-	Pack Negative	

3. Battery Pack Operation

3.1 Control Circuit

The circuit controls charge/discharge process.

Refer attached schematic drawing.



3.2 Gas Gauge – EEPROM Data

Gas Gauge IC : MAXIM DS2777

Address (HEX)	Description	Data (HEX)	Comments
20h~2Fh	User EEPROM Registor	00	Customer don't define
60h	Control Register	48	
61h	Accumulation Bias Register (AB)	00	
62h	Aging Capacity Register MSB (AC)	23	
63h	Aging Capacity Register LSB (AC)	00	
64h	Charge Voltage Register (VCHG)	D6	
65h	Minimum Charge Current Register (IMIN)	38	
66h	Active-Empty Voltage Register (VAE)	A4	
67h	Active-Empty Current Register (IAE)	89	
68h	Active-Empty 40 Register	0A	
69h	Sense Resistor Prime Register (RSNSP)	32	
6Ah	Full 40 MSB Register	23	
6Bh	Full 40 LSB Register	2D	
6Ch	Full Segment 4 Slope Register	0D	
6Dh	Full Segment 3 Slope Register	17	
6Eh	Full Segment 2 Slope Register	32	
6Fh	Full Segment 1 Slope Register	22	
70h	AE Segment 4 Slope Register	01	
71h	AE Segment 3 Slope Register	0C	
72h	AE Segment 2 Slope Register	1E	
73h	AE Segment 1 Slope Register	4E	
74h	SE Segment 4 Slope Register	02	
75h	SE Segment 3 Slope Register	04	
76h	SE Segment 2 Slope Register	08	
77h	SE Segment 1 Slope Register	0B	
78h	Sense-Resistor Gain Register MSB (RSGAIN)	64	
79h	Sense-Resistor Gain Register LSB (RSGAIN)	1B	

Address (HEX)	Description	Data (HEX)	Comments
7Ah	Sense-Resistor Temperature Coefficient Register (RSTC)	00	
7Bh	Current Offset Bias Register (COB)	00	
7Ch	TBP34 Register	1E	
7Dh	TBP23 Register	14	
7Eh	TBP12 Register	0A	
7Fh	Protector Threshold Register	5F	
80h	2-Wire Slave Address Register	68	

4. Performance and Characteristic

4.1 Test Conditions and Apparatus

Each performance and characteristic shall be tested under the following condition and apparatus, if there is not any notice.

4.1.1 Standard Test Conditions

The test shall be implemented at 23±2℃ of temperature with 65±20% of relative humidity, as long as no doubts, it is allowed to test at ranges of 15～30℃ and 25～85%.

If there is difference between test environment temperature and battery pack temperature, measure them after leaving the above conditions for more than 3 hours but less than 24hours. As to humidity, if it has no possibility to affect results of test, it can be ignored.

4.1.2 Standard Charge

The rated charge means charging at 8.4V of constant voltage and 1370mA(0.5C) of constant current until the charging current tapered to 137mA(0.05C).

4.1.3 Standard Discharge

The standard discharge means discharging at 1370mA (0.5C) discharge down to output voltage 6V of the battery pack.

4.1.4 Apparatus

4.1.4.1 Dimension:

The dimension measurement shall be implemented by digital vernier caliper with 0.01 mm scale, or the measuring instrument that has the equal or more of accuracy.

4.1.4.2 Ammeter &Voltmeter:

The Ammeter and Voltmeter should have ±35mV or more of accuracy, or other apparatus should have equal or more accuracy.

4.1.4.3 Internal Resistance Gauge:

The internal resistance shall be measured by a sine wave alternate current process (AC 1KHz).

4.2 Electrical Performance

<table>
<tr><th></th><th>Item</th><th>Condition</th><th>Specification</th></tr>
<tr><td>4.2.1</td><td>Open Circuit Voltage</td><td>The open-circuit voltage shall be measured within 24 hours after standard charge.</td><td>8.2V or more</td></tr>
<tr><td>4.2.2</td><td>Internal Impedance</td><td>It must be measured at shipping condition.</td><td>280mΩ or less</td></tr>
<tr><td rowspan="3">4.2.3</td><td rowspan="3">Pack Capacity in Room temperature</td><td>The capacity on 0.2C discharge shall be measured after charge at 23±2℃</td><td>2740mAh or more</td></tr>
<tr><td>The capacity on 0.5C discharge shall be measured after charge at 23±2℃</td><td>2603mAh or more</td></tr>
<tr><td>The capacity on 1C discharge shall be measured after charge at 23±2℃</td><td>2466mAh or more</td></tr>
<tr><td>4.2.4</td><td>Pack Capacity in Discharging Temperature Characteristic</td><td>The capacity shall be measured after standard charge and 0.2C discharge at the temperature shown in the following table.
<table>
<tr><th rowspan="2">Charge Temperature</th><th colspan="4">Discharge temperature</th></tr>
<tr><th>-10℃</th><th>0℃</th><th>25℃</th><th>60℃</th></tr>
<tr><td>25℃</td><td>1370mAh</td><td>1918mAh</td><td>2740mAh</td><td>2603mAh</td></tr>
</table></td><td>More than the value in the left table</td></tr>
<tr><td>4.2.5</td><td>ESD Susceptibility</td><td>Examine according to IEC Pub 1000-4-2, only test connect.
Level #3: ±4kV (contact at battery terminals)
±8kV (air)</td><td>Level #3: Operational</td></tr>
<tr><td>4.2.6</td><td>Life cycle</td><td>The capacity on standard discharge shall be measured after 500cycle of standard charge and discharge at 23+2℃</td><td>2192mAh or more</td></tr>
</table>

4.3 Mechanical Performance

	Item	Condition	Specification
4.3.1	Durability of Vibration	1.A battery is to be subjected to simple harmonic motion with an amplitude of 0.8mm. 2.The frequency is to be varied at the rate of 1 hertz pre minute between 10 and 55 hertz and return in not less than 90 nor more than 100 minutes. The battery is to be tested in three mutually perpendicular directions. Q'ty:3pcs	Neither leakage nor prominent breakage. No interference for charge / discharge and normal functional.
4.3.2	Drop Test	The sample is to be dropped form a height of 1m on concrete surface. Each sample is to be dropped three times on painting surface. Q'ty:3pcs	The sample shall not explode or catch fire, No leakage.
4.3.3	Durability of Shock	The cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. Each cell shall be subjected to a total of three shocks of equal magnitude. The shocks are to be applied in each or three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested. Each shock is to be applied in a direction normal to the face of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3 milliseconds the minimum average acceleration is 75 g (where is the local acceleration due to gravity). The peak acceleration shall be between 125 and 175 g. Test temperature: 20 +/- 5 degree C. Q'ty:3pcs	The sample shall not explode or catch fire.
4.2.4	Crush test	A battery pack is to be crushed between two flat surfaces with crashing force of 13KN at right angle to its major axis. Q'ty:3pcs	The sample shall not explode or catch fire.
4.2.5	Impact test	A battery pack is to be placed on a flat surface at right angle to its major axis. 7.9mm diameter bar is to be placed on a right position of the battery pack. A 9.1Kg weight is to be dropped from a height of 61 cm onto the battery pack. Q'ty:3pcs	The sample shall not explode or catch fire.

4.4 Safety Performance

	Item	Condition	Standard
4.4.1	Short Circuit	After rated charge, it must be shorted between positive and negative terminals for 1 hour.	No leakage No flaming No explosion No smoke No spouting of gas
4.4.2	Over-charge performance	1. Charge sample after discharge till discharge end voltage at constant current and constant voltage (1C /12±0.05V) for 7 hours 2. Charge sample after discharge till discharge end voltage at constant current and constant voltage (2C /8.4±0.05V) for 7 hours	
4.4.3	Over-discharge Performance	1. Discharge at 0.2C to end of voltage 6V 2. The pack apply an external resistance of less than 30 ohm for 24 hours.	
4.4.4	Expose in Critical Temperature	After rated charging, it must be left for 8hours at 90℃.	No flaming No explosion No smoke No spouting of gas
4.4.5	Thermal Shock	-40℃ / +85℃ 24 Cycles 1 hour at each temperature / 10 second transition time	1.No any safety issue 2.Casing no cracks or break 3.Electronic function is normal

5. Current Consumption

	Item	Specification	Comments
1	Active Mode	200uA	Cell V @3.7V
2	Sleep Mode	10uA	Cell V < 2.45V

6. Safety Control

6.1 Primary Protection Function

Protection IC: DS2777
MOSFET: TPCP8001

Control charge/discharge FET.

Parameter	Minimum	Typical	Maximum	Unit
Over charge detection voltage	4.204	4.239	4.274	V
Over charge detection delay time	600		1400	mSec
Over charge release voltage	4.104	4.139	4.174	V
Over discharge detection voltage	2.415	2.45	2.485	V
Over discharge detection delay time	600		1400	mSec
Charge Over current detection	1.75	2.50	3.25	A
Charge Over current detection delay time	8	10	12	mSec
Discharge Over current detection	2.75	3.75	4.75	A
Discharge Over current detection delay time	8	10	12	mSec
Short-Circuit current detection	12	15	18	A
Load short-circuiting detection delay time	80	120	160	uSec

6.2 Secondary Protection Function

Thermal Fuse：FUSE,9A/50V,139℃,T6D,ANZEN DENGU,LF

7. Marking

7.1 Label

The customer is responsible for the overall indication of the label. But the description of the label should be mutually discussed in advance.

7.2 Serial Label

Please refer attached sheet.

8. Others

8.1 Warranty Period

12 months from the date of manufacture of products.

8.2 Shipping Conditions

Capacity is between 30% ~ 50%.

8.3 Disposal instructions

Dispose of used battery promptly. Keep away from children. Do not disassemble and do not dispose of in fire.

8.4 Information for safety

Manufacturer:

a) Do not dismantle, open or shred cells. Batteries should be dismantled only by trained personnel.

Multicell battery cases should be designed so that they can be opened only with the aid of a tool.

b) Do not short-circuit a cell or battery. Do not store cells or batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by conductive materials.

c) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.

d) Do not subject cells or batteries to mechanical shock.

e) A dedicated charger should be provided for each equipment. Complete charging instructions should be provided for all secondary cells and batteries offered for sale.

f) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.

End-user

a) Do not dismantle, open or shred secondary cells or batteries.

b) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.

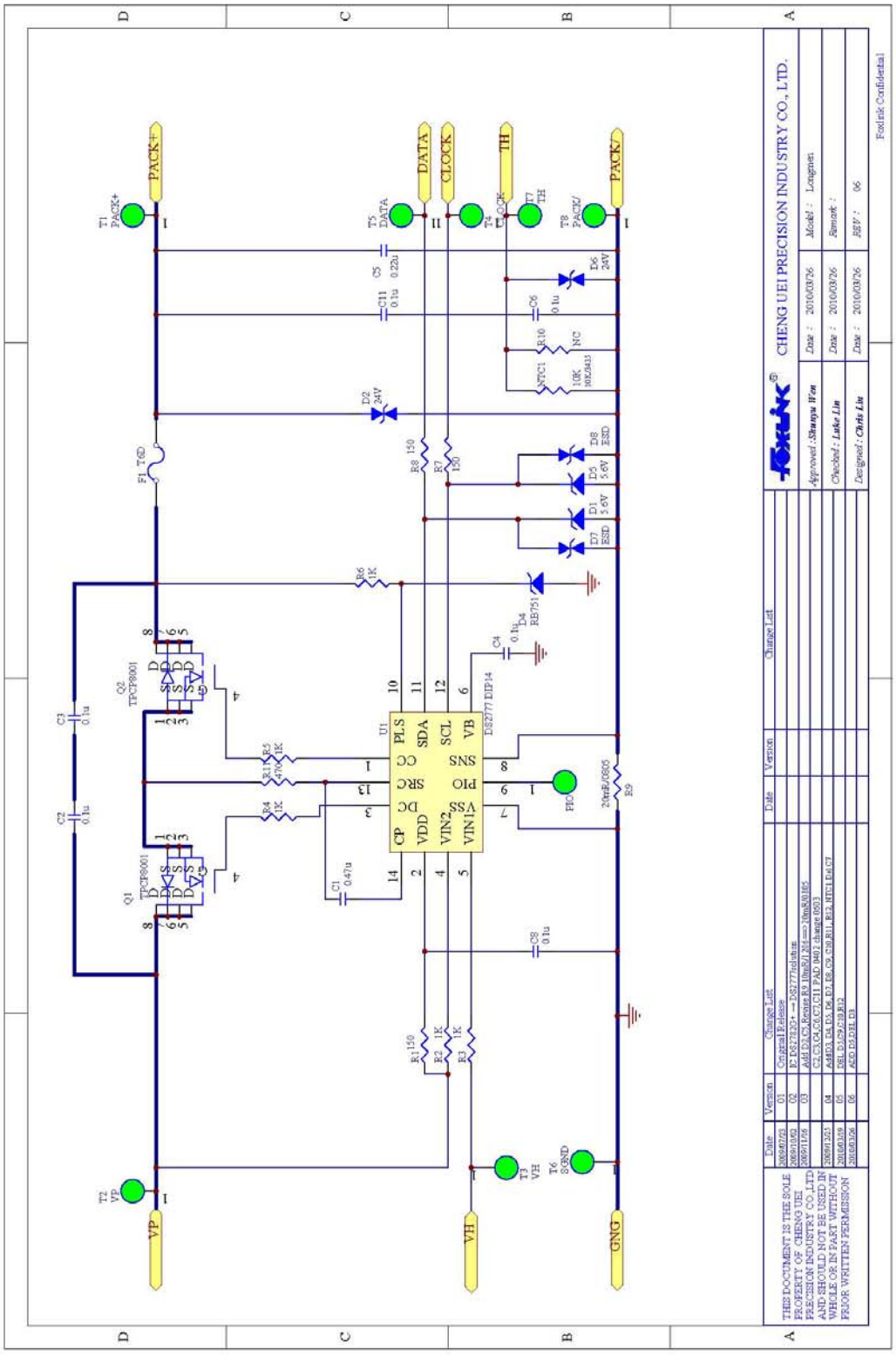
c) Do not short-circuit a cell or a battery. Do not store cells or batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by, other metal objects.
d) Do not use any charger other than that specifically provided for use with the equipment.
e) Do not use any cell or battery which is not designed for use with the equipment.
f) Do not mix cells of different manufacture, capacity, size or type within a device.
g) Seek medical advice immediately if a cell or a battery has been swallowed.
h) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.

8.5 Recommended charging instruction

Charging Marking/Instructions - Recommended charging information is also provided on the product, its smallest packaging unit, or the instructions provided with each battery. The charge limits as outlined in the Charge Limits Table above are provided as part of these instructions.

Attachment One

Attachment Two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