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# Lithium-ion Battery Specification

PROJECT NAME	□□□□ <b>CS-PMIIICSL</b>
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Environmental □ □: ■ROHS □RoHS NO Support

<b>AUTHORIZED SIGNATURE 8</b>
COMPANY CHOP

APPROVED	CHECKED	PREPARED

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1. PREFACE  SCOPE				
This product approval sheet has 9 pages (include the first page)  This product approval sheet includes technical features, testing method, external connection graph, packing and so on.  Amendment on this product approval sheet content must depend on below condition:  1. Customer's request or agreement.				
2. Safety guarantee and no influence to machine which the battery used in.  Use can give mass production after the agreement of "battery approval sheet" and				

We can give mass production after the agreement of "battery approval sheet" and sample with the customer. Designed by Roofer R&D team, this approval sheet will be the basis of test.

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## 2.Technical Features

Item		Rated performance	Note
2.1 Rated Voltage		3.7V	
2.2 Discharge C	cut-off Voltage	3V	
2.3 Rated Capac		1600mAh	0.2C Discharge 0.2C □□
2.4 Limited Char	ge Voltage	4.2VDC	
2.5 Charge Meth	od	CC-CV (Constant Current With Constant Voltage)	
2.6 Standard C	Charge Current	320mA	0.2C
2.7 Quick Char	rge Current	1600mA	1C
2.8 Max Discharg	ge Current	1600mA	1C
2.9 Initial Interna	Charge terminal		AC 1kHz (AC Impedance)
Resistance	Discharge terminal	≤220mΩ	AC 1kHz 🗆 🗆 🗆
2.10 Weight Pe	er Battery	≤37.3g	Electronic scale (W/O Packing Materials)
2.11 Battery Size		L=52.1mm MAX W=34mm MAX H=10.5mm MAX	Calipers
2.12.Operating Temperature	Charge □ □	0°C □ +45°C	Humidity 65±20% □ □ 65±20%
	Discharge	-20°C □ +60°C	Humidity 65±20% □ □ 65±20%
2.13 Storage Temperature	Standing Storage (less than one year	-20°C □ +35°C	Humidity 65±20% □□ 65±20%

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Notes(□□):  1. Period of storage is counted from shipping date  □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□				
3.Test ( )  3.1 Testing Environment ::  3.1.1 Test time should be no more than one month after receive the battery  3.1.2 Testing Environment ::  Humidity( : 15 : -25 : Relative Humidity( : 25 : 45% - 85%  Atmospheric Pressure( : 76kPa106kPa				
<ul> <li>3.2 Testing Instrument(□□□□):</li> <li>3.2.1 Voltage meter 0.5 grade or more regulated by IEC 51/IEC 485, more than 10KΩ/V internal resistance</li> <li>□□□ IEC 51/IEC 485 □□□□ 0.5 □□□□, □□□□ 10KΩ/V</li> <li>3.2.2 Current meter 0.5 grade or more regulated by IEC 51/IEC 485, include wire resistance less than 0.01Ω.</li> <li>□□□ IEC 51/IEC 485 □□□□ 0.5 □□□□, □□□□□□□□ 0.01Ω.</li> </ul>				
3.2.3 Calipers Definition 0.02mm  3.2.4 Internal Resistance Meter AC 1KHz 4 terminal measure setting.  1KHz 4   1KHz 4				
<ul><li>3.2.5 Load Resistance Include external circuitry, allowed resistance figure error is ±5%.</li><li>3.2.6 Finished Battery Product Testing Machine</li></ul>				

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3.3 Test method and request (□□□□□□□)							
	Item		Test Method	Request			
1	Appearance		By sight 30CM vertically	Case appearance should be smooth w/o nick, burr and other mechanical damage. Exposed metallic part should not be Oxidized. Case should not be distorted.			
2	2 Insulation Resistance		Test the external packing of battery and insulation between poles using insulation-meter	More than 10MΩ □□ 10MΩ			
3	Charging  Charging  Capacity		Environment temperature (15□25) □, CC/CV mode, 0.2C constant current charge to 4.2V, then constant voltage charge mode, cut off current 0.01C □□□□(15□25)□,CC/CV□□,0.2C□□□□□ 4.2V,□□□□□□□□,□□□□ 0.01C□	<ol> <li>Discharging time: ≥5 hours.</li> <li>□□□:≥5 □□□</li> <li>No distortion on appearance, no burst and no leak</li> </ol>			
		Discharging	Environment temperature (15 25), 0.2C constant current discharge, cut off current 3.0V (15 25),0.2C (15 25),0.2C				
4	4 Internal Resistance		AC testing method. In half capacity condition, using AC 1kHz testing method to measure the internal resistance figure between poles in battery connector.	Charge terminal/□□□□ Discharge terminal/□□□□ ≤220mΩ			
	High temperature Resistant Capability		1).Use nominal capacity charging method full charge the battery, then keep 0.5h□1h. □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	1).After test, 1C capacity should be ≥54 minutes.  □□□□1C□□□≥54□□□  2).Case appearance should not be distorted and crack.  □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□			
6	Low temperature Resistant Capability		1).Use nominal capacity charging method full charge the battery, then keep 0.5h 1h.  2).Put full-charged battery in -20 ± 2 chest freezer for 24h then use 0.2C discharge to 3.0V  0.2C 0 3.0V	1).After test, 0.2C capacity should be ≥3.5 hours □ □ □ □ 0.2C □ □ ≥3.5 □ □ □  2). Case appearance should not be distorted and crack. □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □			
7	Cycle Life		After 400 cycles of complete charge and discharge at 1C current, and record the capacity When the time between twice	Battery should not explode smoke, burn or burst. 1C charge and discharge cycle life should more than 300 times			

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		discharging less than 42 minutes, cycle life should be ending.	1C≥400
8	Vibration Proof Capability	After standard charged, keep for 0.5h~  1h,then installed onto the vibration test with clamps. Equipment parameters of frequency and amplitude are as follows(the frequency is to be varied at the rate of 1oct/min between 10Hz □55Hz, and repeat vibration for 30min. The battery is to be tested in three mutually perpendicular directions): frequency:10Hz □30Hz amplitude: 0.38mm frequency:30Hz □55Hz amplitude: 0.19mm □0.5 □1 □0.5 □1 □0.38mm □0.5 □1 □0.38mm □0.30Hz □55Hz □0.038mm □0.030Hz □55Hz □0.030Hz □0.19mm	1) Battery appearance should not be obvious nick, leak, smoke and burst.  2) After test, no defect in electrical performance, and voltage≥3.7V.  □≥3.7V□
9	Fall Proof Capability	After complete charge, the battery is to be drop to a armor plate(18mm 20mm thick) placed on a cement floor from a height of 1.2 meter for 14 times.(fall down by six sides and one corner).	1) Battery should not be leak, smoke and burst.  2) After test, no defect in electrical performance, and voltage≥3.7V.  □≥3.7V□
11	Capacity Retention	1).In environmental temperature 20 ± 5 condition, Use nominal capacity charging method full charge the battery.  20 ± 5 condition, Use nominal capacity charging method full charge the battery.  20 ± 5 condition conditions are conditions as a condition of the conditions are conditions.  2) Lay the battery opened circuit 28 days, then use 0.2C discharge it to cut off voltage.	0.2C discharging time should no less than 90%. 0.2C □ □ □ □ □ □ □ 90%.
1 2	Constant Temperature and Humidity Proof Capability	After standard charged, keep for 0.5h 1h,then Lay the battery in temperature 40±2 and humidity 90% 95% environmental chambers for 60 hours. Then lay the battery in environmental temperature 20±5 condition for 2 hours. Later discharge it in 0.2C and record the capacity.	1) Battery appearance should not be obvious nick, leak, smoke and burst.      □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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**3.4.** Shipping Voltage (Inspection before shipment): ≥3.7V

## 4. Protection Capability Test Method and Request

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	Item	Test Method	Request	
1	Overcharge Test	Apply a 5V voltage and a 1C charge current on the battery for 10 hours.	Battery could not be burst, burn, leak and smoke	
2	Over discharge Test	Discharge the battery at 1C to cut off voltage then discharge with loading 30Ω for 24hs. □ 1C □ □ □ □ □ □ □ 30Ω □ □ □ 24H□	Battery could not be burst, burn, leak and smoke	
3	Over-current protection	1) The battery is fully charged to rated capacity.  2) Load current at 0.2A/S to cut off the output of the battery.  0.2A/S 000000000000000000000000000000000000	Battery could not be burst, burn, leak and smoke	
4	Pack Short-circuit Protection	<ol> <li>The battery is charged to rated capacity.</li> <li>The battery is to be short-circuited by connecting the positive and negative terminals of the battery with thermocouple having a maximum resistance load of 0.1Ω for 1h.</li> <li>1h</li> </ol>	Battery could not be burst, burn, leak and smoke After charging.  After charging the battery can be used normally.	

#### 5. Cell

1) Chem:	Lithium-ion	Cell
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2) Spec: 103450AR/3.7V/1600mAh  $\square$ HY $\square$  $\square$ 

3) 000103450AR/3.7V/1600mAh 0HY000

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### **6. OUTLINE (**□□□□):

L=52.1mm MAX W=34mm MAX H=10.5mm MAX



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Over-charging	Over-discharging	Over-current	Short-circuit	Quiescent
voltage	voltage protection	protection	protection time	current
protection		figure		
4.3V±25mV	2.45V±60mV	4.5 A±0.5A	≤300us	≤8uA

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## 8. Packing / □□

Packing method, as the customer required.