



Battery Specification Approval Sheet



Cell Model

LiFeP04-1078178

PACK Capacity (Ah)

20

Model nubber

4S2P 12. 8V20Ah-PCM

Total Page

8

Registered	Checked	Approved

Customer Approve		
Dept.	Signature	Date
QA Dept.		
R&D Dept.		
Approved		



Content

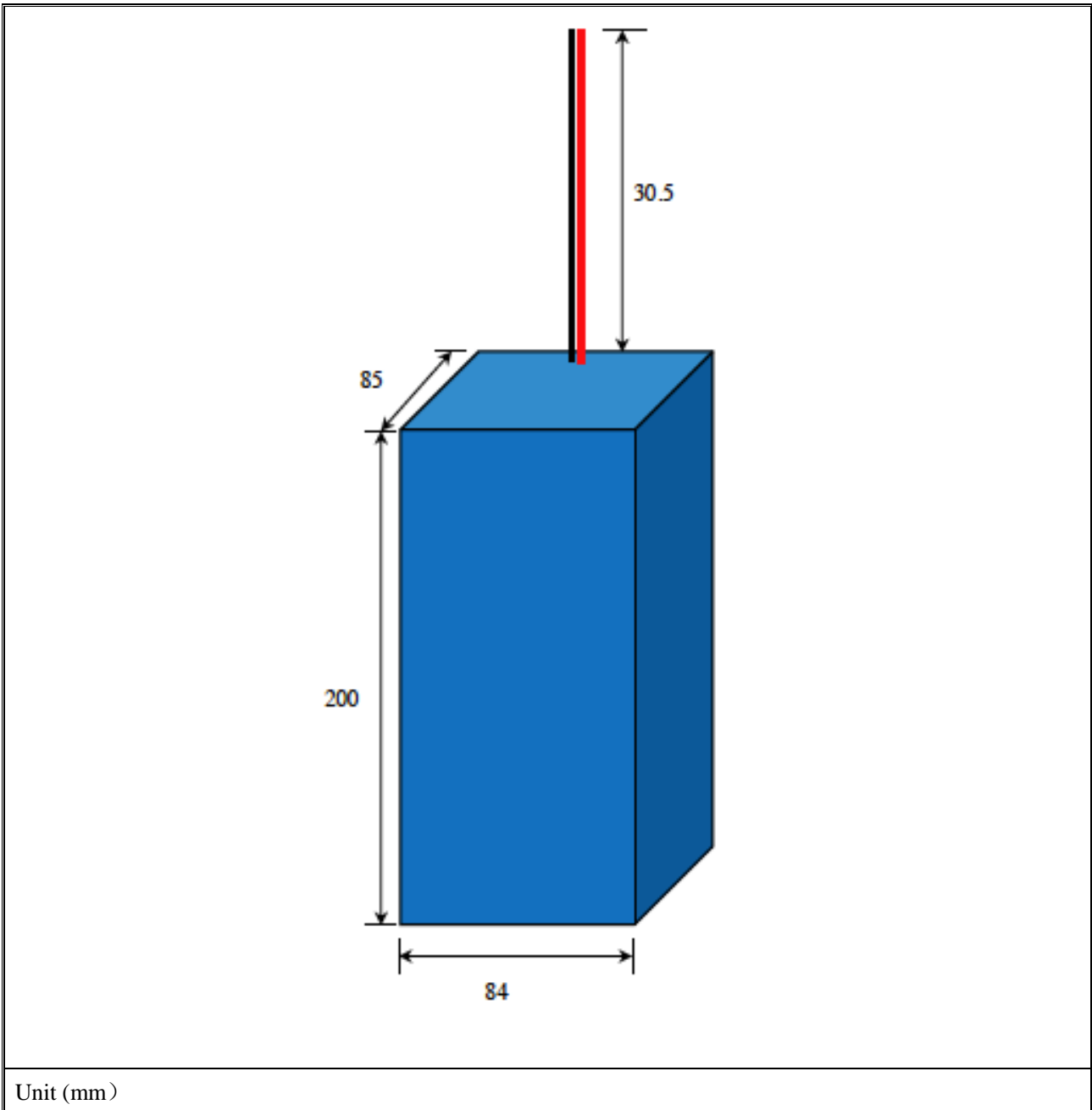
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2. Scope

This specification describes the basic performance, technical requirement, testing method, warning and caution of the Li-Ion Polymer rechargeable battery. The specification only applies to the UTAG Battery pack.

3. Initial Dimension



Unit (mm)

**4. Specification**

NO.	Item		Specifications	
4.1	Min. Capacity		20Ah 0.2C Discharge	
4.2	Initial Impedance		$\leq 80 \text{ m}\Omega$	
4.3	Weight		Approx. 3KG	
4.4	Nominal Voltage Fully Charge Voltage (FC) Fully Discharge Voltage (FD)		12.8V 14.6V Defined in this DOC: FC = 14.6V 8.0 V Defined in this DOC: FD = 8.0 V	
4.5	Standard Charge Current		0.2 C	
4.6	Standard Charging Method		0.2C CC (constant current) charge to 14.6V, then CV (constant voltage FC) charge till charge current decline to $\leq 0.02C$.	
4.7	Charging Time		Standard Charging: Approx. 7 hours	
4.8	Standard Discharge Current		Constant Current 0.2C, End Voltage FD	
4.9	Max. Charge Current	0°C ~ 15°C	6A	
		15°C ~ 45°C	10A	
4.10	Max. Discharge Current	0°C ~ 45°C	20A	
4.11	Discharge Lower Limit Voltage		8V	
4.12	Charge Upper Limit Voltage		14.6V	
4.13	Discharge Temperature		-20°C ~ 60°C	
4.14	Storage Temperature	-20°C ~ 45°C	≤ 3 month	Percentage of recoverable capacity no less than 80% of the initial capacities.
		-20°C ~ 28°C	≤ 1 year	
4.15	Recoverable Capacity		Constant current 0.2C charge to FC, then constant voltage FC charge to current declines to 0.02C, rest for 10min, constant current 0.2C discharge to FD, rest for 10min. Repeat above steps 3 times, recording the maximum capacity.	
4.16	Storage humidity		$\leq 75\% \text{ RH}$	
4.17	Appearance		Without distortion and leakage	
4.18	Standard testing condition		Temperature: $23 \pm 5^\circ\text{C}$ Humidity: $\leq 75\% \text{ RH}$ Atmospheric Pressure: 86 ~ 106 KPa	

Remark:

- From 4.1 to 4.12 and 4.14, the testing condition is following 4.17 (standard testing condition).
- If the working condition is out of 4.17, the performance will change.



5. General Performance

No.	Item	Test Methods And Condition	Criteria
5.1	0.2C Capacity	At standard testing condition, after standard charging, rest for 30 min, then discharging at 0.2C to voltage FD.	$\geq 20\text{Ah}$
5.2	High-Low Temperature Discharge Performance	At standard testing condition, Then store it at the constant temperature of $55 \pm 2^\circ\text{C}$ of 5h (of $-20 \pm 2^\circ\text{C}$ for 16h), and discharge at 0.2C to 80V.	Discharge Capacity/ Nominal capacity $\times 100\%$ A) $55^\circ\text{C} \geq 95.0\%$ B) $-20^\circ\text{C} \geq 55.0\%$
5.3	Capability of Keeping Electricity	At standard testing condition, after standard charging, no outer loading circuit, rest the cell 28days, discharging at 0.3C to voltage FD.	Residual Capacity $\geq 90\%$; Recoverable capacity $\geq 90\%$;
5.4	Cycle Life	At standard testing condition, constant current 0.2C charge to 14.6, then constant voltage 14.6 charge to current declines to 0.02C, rest for 30min, constant current 0.2C discharge to 8V, rest for 30min. Repeat above steps till continuously discharging capacity higher than 80% of the initial capacity of the cell.	≥ 1000 times(次)

6. Battery Protection

The battery shall be with the over-charging protection, over-discharging protection, and over-current protection during use. Protective circuit shall have protective functions as follows:

- 1) Over-Charging Protection: Overcharging protection stops charging if any cell of the battery pack reaches 15.2V.
- 2) Over-Discharging Protection: The Over-discharging protection monitors the voltage of any cell in the pack and works to avoid a drop in the cell voltage to 8.0V or less.
- 3) Over-Current Protection

The cell shall be discharged at less than the maximum discharge current specified in the Specification Approval Sheet. A high discharging current may reduce the discharge capacity significantly or cause overheating.

6.1 Charge Protection

Name	Item	Value	Range	Unit
Over-Voltage for Single Cell	Over-voltage	3900	± 25	mV
	Over-voltage Recovery	3800	± 5	mV
Balance Function	Balance Voltage	3600	± 25	mV



	Balance Current	65	± 10	mA
Charge Over-Current	Charge Over-Current	33	±5	A
	Over-Current Delay Time	-	Dependence on the Charger	mS
	Delay-Time Recovery	-		mS

6.2 Discharge Protection

Name	Item	Value	Range	Unit
Discharge Current	Continued Current	8	≤15	A
	Max Current Test	30A 5S		
Under-Voltage for Single Cell	Over-Discharge Voltage	2000	±5	mV
	Discharge Recovery	2300	±10	mV
	Delay Time	1.2	±0.2	S
Discharge Over-Current	Discharge Over-Current	33	±5	A
	Over-current Delay Time	45	±5	mS
Normal Work Current	Normal Work current	10		A
Internal Resistance	Internal Resistance	≤20		mΩ
Short Circuit	Short Circuit	Yes, Equipped with the function		
	Recovery Condition	Removing the short circuit to automatically recover.		

7. Warnings

To prevent the possibility of the battery from leaking, overheating or causing a fire, please observe the following precautions:

- Do not immerse the battery in liquids.
- Do not use or leave the battery near a heat source such as a fire or heater.
- when recharging, use the battery charger specifically for that purpose.
- Do not reverse the positive and negative terminals.
- Do not connect the battery directly to an electrical outlet.
- Do not discard the battery in fire or heat.
- Do not bend the battery tabs.
- Do not transport and store the battery with metal objects.
- Do not hit or throw the battery.
- Do not directly solder the battery or pierce the battery with a sharp object.

8. Cautions

- Do not use or leave the battery near high temperatures (i.e direct sunlight or hot vehicle). Leaving the battery near high temperatures can cause it to overheat or cause a fire. It will also decrease the battery life.
- Do not use the battery in locations where static electricity is great, otherwise, the safety devices may be damaged.



- If the battery leaks and gets into the eyes, do not rub. Rinse the eyes immediately with clean running water, and seek medical attention. Eye injury may result.
- If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appears abnormal during use, recharging or storage, then immediately remove it from the device or battery charger and stop using it.
- In case the battery terminals are dirty, clean the terminals with a dry cloth before it is used. Power failure or charge failure may occur due to poor connection with the instrument.
- Discharged battery may cause fire. Immediately tape the battery terminals to insulate them.
- The battery should be stored at room temperature and charged between 40% to 60% of capacity. In the event the battery is discharged, battery should be charged with standard charging device once every 3 months while in storage. The battery should be charged with standard charging device one time after being stored more than a year in order to activate it and restore energy.

9. Handling of Battery Packs

- Battery must be charged with its appropriate charger only.
- Never use a modified or damaged charger.

10. Period of Warranty

The period of warranty is two year from the shipment date. UTAG guarantees a replacement due to proven manufacturing error, but will not be replaced due to customer error.