

# Technical Specification of Battery Backup Power System for Communication (**48V 50Ah**)

**File#:**

**Version: A**

**Effective Date: May 10th, 2016**

Model	4850A
Specification	48V 50Ah

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## 1. Scope

This document described Lithium Iron Phosphate Battery (48V 50Ah), including mechanical design, basic performance, test method and notes for use. The product applies to telecommunication back up power and storage system.

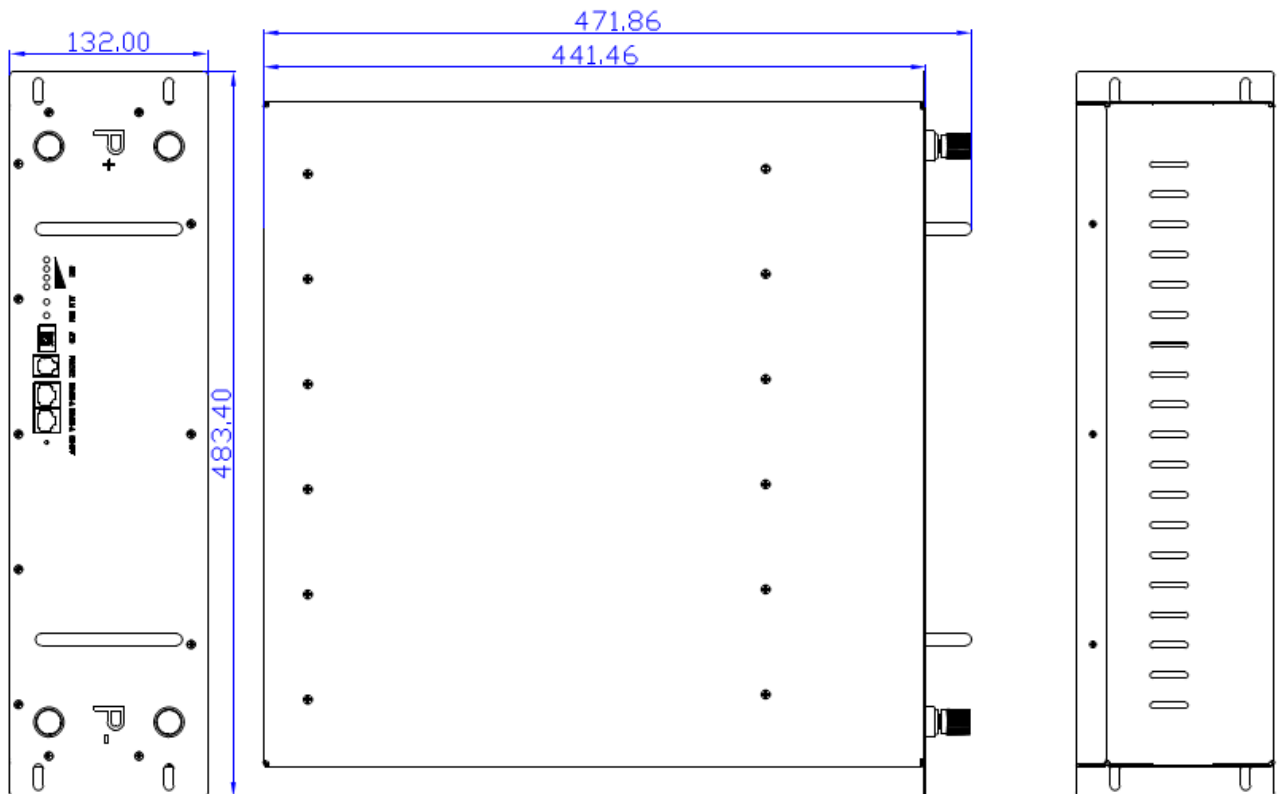
## 2. Mechanical Design

2.1 Battery specification: 48V, 50Ah

2.2 Battery dimension: L×W×H=483.4mm×441.5mm×132.0mm

2.3 Cell Model: LF50 (W135mm×T30mm×H185mm)

2.4 Combination Method: 15S1P



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### 3. Battery Pack Basic Performance

#	Item	Parameter	Remark
1	Rated Capacity	50Ah	25°C ± 3°C, 0.33C constant current discharging, 40.5V cut off
2	Rated Voltage	48V	
3	Standard Charge Current	10A (0.2C)	0°C~45°C, 0.2C CC (Constant current) charge to 54.0V, then CV (constant voltage) charge, cut off when charging current ≤ 0.05C.
4	Max Charge Current	50A (1C)	0°C~45°C, do not exceed 1C
5	Charge Cut Off Voltage	54.0V	
6	Standard Discharge Current	25A (0.5C)	-20°C~+60°C, 0.5C CC (Constant Current) discharge, cut off @40.5V.
7	Max Continuous Discharge Current	50A (1C)	25°C ± 3°C, continuous 1C discharge
8	Discharge Cut Off Voltage	40.5V	
9	Max Pulse Discharge Current	80A	25°C ± 3°C; ≤ 1S
10	Working Temperature (charge)	0°C~45°C	During charge, battery and ambient temperature should not exceed 45°C.
11	Working Temperature (discharge)	-20°C~55°C	Battery can work at specified temperature range with capacity loss in tolerance.
12	Battery Weight	About 32Kg	Including wire
13	Battery Impedence	≤ 250mΩ	AC impedence

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#### 4. Main Performance

##### 4.1 Battery pack main performance parameter

#	Item	Standard	Test Method	
1	Discharge Rate Character	0.33C	Test Temperature: $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ; Charge: 0.2C constant current charge to 54V, transfer to constant voltage, cut off when current $\leq 0.05\text{C}$ Discharge: 0.33C/0.5C constant current discharge cut off @40.5V.	
		0.5C		$\geq 95\%$
2	Capacity & Temperature Character	$55^{\circ}\text{C}$	Charge: 0.2C constant current charge to 54V, transfer to constant voltage, cut off when current $\leq 0.05\text{C}$ ; Discharge: 0.5C constant current discharge cut off at 40.5V; 2hours interval for The temperature.	
		$45^{\circ}\text{C}$		$\geq 95\%$
		$25^{\circ}\text{C}$		100%
		$0^{\circ}\text{C}$		$\geq 65\%$
		$-10^{\circ}\text{C}$		$\geq 50\%$
	Life Cycle Character	80%DOD, RT	$\geq 3500$ 次	After finish the standard charging, lay aside for 30 min, in $25 \pm 5^{\circ}\text{C}$ , 0.3C constant current discharge to 80%DOD, then go for next cycle.
4	Storage Character (Recoverable capacity)	$25^{\circ}\text{C}$ 6months	$\geq 95\%$	Charge battery with 60%~75% capacity for storage
		$45^{\circ}\text{C}$ 3 months	$\geq 90\%$	
		$60^{\circ}\text{C}$ 1 month	$\geq 90\%$	

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#### 4.2 Ambient Character

#	Item	Standard	Test Method
1	Steady damp heat test	No fire, No explosion, No leakage. Discharge capacity cannot be lower than 60% of initial capacity	After standard charge, test as below: Temp: $40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ; Relative Humidity: 90%~95%; Standing time: 48h; take out and place for 2h at room temperature. Then discharge with 1C till cut off voltage
2	Vibration	No fire, No explosion, No leakage.	After standard charge, fix to vibration machine and vibrate 30 minutes each at XYZ direction. Frequency Sweeping Rate: 1oct/min; Vibration Frequency: 10Hz~30Hz; Displacement amplitude (Single): 0.38mm; Vibration Frequency: 30Hz~55Hz; Displacement amplitude (Single): 0.19mm.
3	Low Pressure	No fire, No explosion, No leakage.	Under $25 \pm 3^{\circ}\text{C}$ ambient temperature, put cell into vacuum cabinet, and reduce internal pressure gradually to not high than 11.6kPa (Simulated altitude 15240m), keep 6Hours.
4	Drop Test	No fire, No explosion, No leakage.	Under the condition of shipment, the battery is free fall from a height of 1 m to a concrete floor of 5 cm thick, repeat 3 times from X, Y, Z axis direction.

#### 4.3 Safety Performance

#	Item	Standard	Test Method
1	Over Charge Test	No fire, No explosion	After standard charge, Under $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ambient temperature for 1h. Then under the same temperature, 0.5C constant current charge to 5V (the simple cell).
2	Over Discharge Test	No fire, No explosion	After standard charge, Under $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ambient temperature for 1h. Then under the same temperature, 0.3 C constant current discharge to 0V (the simple cell).
3	Heat shock	No fire, No explosion	Put battery in hot cabinet, temperature is up with $5^{\circ}\text{C}/\text{min} \pm 2^{\circ}\text{C}/\text{min}$ rate to $130^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and keep for 30mins
4	High Temperature Test	No fire, No explosion, Capacity recovery cannot less than 80%	After standard charge, place battery in $85^{\circ}\text{C}$ for 4h.
5	Short Circuit	No fire, No explosion	After standard charge, Under $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ambient temperature for 1h. Then put the battery by external short circuit for 10 min, the outside line resistance should be less than $100 \text{ m}\Omega$ .

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## 5. BMS (Battery Management System)

### 5.1 Protection Parameter

#	Item	Description	Value	Unit	
1	Over Charge Parameter	Unit Overcharge Warning Voltage	3650	mV	
		Unit Overcharge Protection Voltage	3700	mV	
		Battery pack over charge warning voltage	54.5	V	
		Battery Pack over charge protection voltage	55.5	V	
2	Over Discharge Parameter	Unit Overdischarge Warning Voltage	2800	mV	
		Unit Overcharge Protection Voltage	2700	mV	
		Battery pack over discharge warning voltage	45	V	
		Battery Pack over discharge protection voltage	40.5	V	
3	Charge Over Current Parameter	Charge Over Current Warning	45	A	
		Charge 1st over current	50	A	
		Charge 2nd over current	50	A	
		Short circuit at charging port	YES		
4	Discharge Over Current Parameter	Discharge over current warning	52	A	
		Discharge 1st over current	55	A	
		Discharge 2nd over current	80	A	
		Short circuit at discharging port	YES		
5	Temperature Protection	Charge	High temperature warning	50	°C
			Low temperature warning	0	°C
			High temperature protection	65	°C
			Low temperature protection	0	°C
		Discharge	High temperature warning	50	°C
			Low temperature warning	0	°C
			High temperature protection	70	°C
			Low temperature protection	-20	°C

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## 5.2 Electrical Parameter

#	Item	Min	Typical	Max	Unit
1	Manage cell qty	—	15	16	Qty
2	Normal Working Voltage	—	48	58	V
3	Working temperature range	-20	25	60	°C
4	Continuous charge current	—	25	50	A
5	5 Continuous discharge current	—	25	50	A
6	Impedence	—			
7	1~16 Static current	—	—	2	mA
8	Total Operate Power Consumption	—		200	m A
9	Total dormant power consumption	—		1000	u A

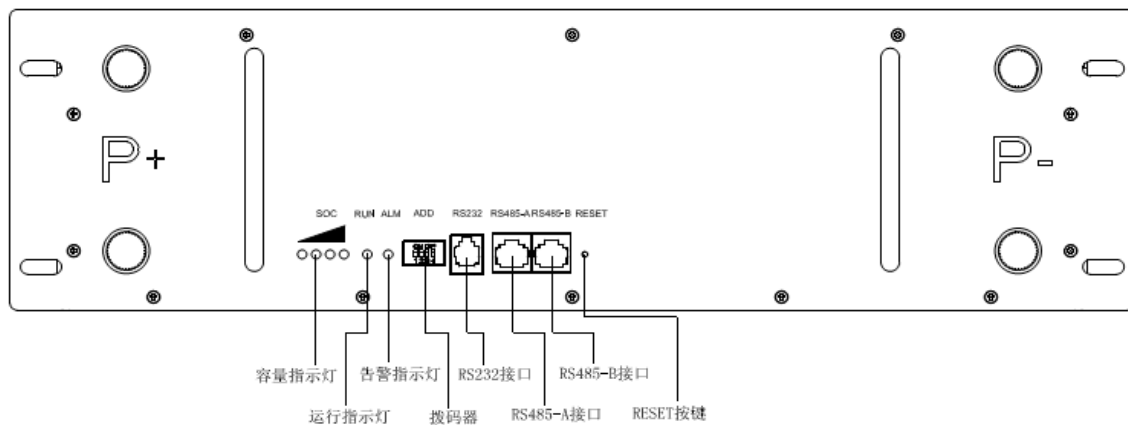
## 5.3 Function

#	Function	Description
1	Setup address	By dial switch, set up Main device or second devices
2	System Reset	By Reset button, reset system
3	Interface for Communicate	RS485 connector allows several devices connecting in parallel to enlarge battery capacity. RS232 interface communicates with upper computer.
4	SOC Evaluate and Display	Can dynamic evaluate SOC for each battery pack, and display the remaining power by 4 green LED.
5	Operation Status Display	Can display system operation status by 1 green LED
6	Failure Warning Display	Can display system failure by 1 red LED
7	Data Storage	Can record battery array's voltage, temperature, each charge and discharge power
8	Low Consumption	Very slight static consumption deviation, and low operation& standby consumption
9	SOH Evaluation	Per sampling information, can do SOH evaluation for whole battery



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10	Balance Management	300mAh balance current function during charging, improve cell voltage consistency.			
11	Unit Voltage Inspection	Test cell unit's voltage, 16S Max can be inspected.			
12	Temperature Inspection	Battery temperature protection function, battery high & low temperature protection and component high temperature protection.			
13	Charge & discharge control	Disconnect failed module when at abnormal charge, over discharge, over-hot, over current, short circuit, separate each defective module timely and reduce defective scope			
14	Short Circuit Protection	When battery has short circuit, system will be automatically protective within 100μS, disconnect load and recover.			
15	“4 Remote” Communication	Through connection between upper computer and BMS, can remote signaling, remote control, remote adjust, telemetry.			
16	Polarity Reverse Connection Protection	When polarity reverses connection, system will warn and protect.			
17	Battery in Parallel Connection Management	Support multiple-unit battery connection in parallel, and set up address			

## 6. Battery panel and connector interface



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## 7. Storage and Transportation Requirement

Item		Requirement
Storage Temperature	Less than 1month	-20℃~+45℃
	Less than 6 month	-10℃~+35℃
Humidity		<70%RH
Storage SOC		60~75% SOC

## 8. Notes for Battery Usage

### 8.1 Prohibition

For avoiding battery leakage, heat radiating, explosion, below prevent tips should be taken care of:

- a) Prohibition of disassembly or re-assembly;
- b) Prohibition of short circuited battery
- c) Prohibition to use near hot source;
- d) Prohibition of dumping of battery into water, ocean or getting battery wet
- e) Prohibition of charging near fire or under sunlight;
- f) Charge with specified charge according to charging requirement
- g) Prohibition of inserting nail into battery, hammering or stepping on by foot
- h) Prohibition of throwing;
- i) Prohibition to use with damaged or deformed battery;
- j) Prohibition of direct welding on battery pack;
- k) Prohibition of charging opposite or over discharging
- l) Prohibition of charge opposite or opposite connection
- m) Prohibition to use to unspecified equipment;
- n) Prohibition to direct touch with leaking battery

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### 8.2 Attentions

- a) Prohibit of using battery in sunlight, otherwise will cause over hot, firing, or function failure, life reducing;
- b) Prohibit use near static place which over 64V;
- c) Prohibit charge at temperature below 0°C or above 60°C;
- d) When use at first time, if has corrosion, or bad smell, or any other abnormal, please do not use.

### 8.3 Delivery requirements

#	Item	Parameter	Remark
1	Capacity	$\geq 47\text{Ah}$	0.5C discharg
2	Voltage Range	48.0V-52.0V	
3	Battery Impedence	$\leq 250\text{m}\Omega$	AC impedence
4	Battery Weight	About 32Kg	Including wire
5	Insulation impedance	$\geq 50\text{M}\Omega / 500\text{V}$	Between the output terminals and carton
6	Delivery capacity requirements	50% SOC $\pm 10\%$	Voltage range 48.0V-52.0V