



ZHONGNENG TECHNOLOGY

## Product Specification

**Product Name** : LBB051100A Residential ESS

**Product Model** : LBB051100A

**Date** : 12/07/2019

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## Revised Sheet

<b>ED</b>	<b>Amendment</b>	<b>Revision Date</b>
A/00	The new release	2019-05-08
A/01	Increase the curve of battery related parameters	2019-06-28
A/02	The exterior diagram of the battery box has been updated	2019-07-12



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## 1. Scope

This document is a specification, as an input file for the design and development of the pack, and as a standard for acceptance of battery system products.

## 2. Terminology and Basis for Writing

### 2.1 Definition of Terms

Battery Cell	The smallest energy storage unit, a basic electrochemical energy storage device, consisting of a positive electrode, a negative electrode, an electrolyte, a separator, and a casing, also called a cell.
Battery Module	Intermediate energy storage unit, a combination of several single-unit and circuit devices (monitoring and protection circuits, electrical and communication interfaces), also called modules, placed in a mechanical electrical unit.
Battery System	A power supply system consisting of a number of battery modules, circuit equipment (protection circuits, cell management systems, electrical and communication interfaces), and thermal management devices for powering electrical devices.
Nominal Voltage	Indicates or identifies an appropriate voltage approximation for the cell.
Capacity	The amount of electricity that can be supplied by a fully charged battery under specified conditions. Usually expressed in Ah.
Energy Capacity	The energy that can be supplied by a fully charged cell under specified conditions. Usually expressed in Wh or kWh.
Nominal Capacity	At the beginning of life (BOL), the minimum capacity that can be provided by a fully charged cell at a rate of 1 C (C-rate).
Unit	"V" (Volt) Volt (V), voltage unit "A" (Ampere) Ampere (A), current unit "Ah" (Ampere-Hour) Ampere-hour (Ah), charge unit "Wh" (Watt-Hour) Watt-hour (Wh), unit of electrical energy "Ω" (Ohm) ohm (Ω), resistance unit °C (degree Celsius) Celsius (°C), temperature unit "mm" (millimeter) mm (mm), length unit "s" (second) seconds (s), time unit "kg" (kilogram) kilograms (kg), weight unit "Hz" (Hertz) Hertz (Hz), frequency unit

### 2.2 Abbreviations

ZNTECH	ZHONGNENG TECHNOLOGY (HANGZHOU) CO., LTD.
BMS	Battery Management System
BMU	Battery Management Unit
BOL	Begin of Life



Bus-bar	Battery pole connecting rod
CAN	Controller Area Network
C-CAN	BMU and CMC communication CAN
CMC	Cell Manager Circuit
EOL	End of Life
HV	High Voltage
LV	Low Voltage
OCV	Open Circuit Voltage
SOC	State of Charge

### 3. Battery System Technical Parameters

The key parameters of the LBB051100A battery system are as follows:

Serial Number	Key Item	Specification	Remarks
3.1	Battery	CATL_LFP100Ah Cell	Lithium iron phosphate
3.2	Module Model	LBM025100A Module	2 modules in series
3.3	Nominal Capacity	100Ah	
3.4	Nominal Voltage	51.2V	Single cell voltage 3.2v
3.5	Operating Voltage Range	44.8V ~ 57.6V	
3.6	Rated Energy	5.12kWh	
3.7	Available SOC Range	10% ~ 100%	
3.8	SOC Transportation Range	40%	
3.9	Operating Temperature	Charging Temperature: 0 °C ~ 55 °C; Discharge Temperature: -20 °C ~ 55 °C	Detailed use conditions need to refer to the charge and discharge window
3.10	Storage Temperature	-20 °C ~ 55 °C	Longer than three months 25 °C storage
3.11	Working Humidity	20~80%RH	
3.12	Standard Charging Current	0.5C	
3.13	Maximum Charging Continuous Current	0.5C	
3.14	Standard Discharge Current	0.5C	

3.15	Maximum Discharge Continuous Current	0.7C	
3.16	Maximum Discharge Pulse Current	1C	Duration 3min, SOC $\geq$ 40%
3.17	Cell Voltage Difference	$\leq 20\text{mV}$	60 min after standing and stopped after charging and discharging
3.18	Weight	About 53Kg	Actual weight requires weighing confirmation
3.19	Dimensions	Length: 460 ( $\pm 5$ ) Width: 500 ( $\pm 5$ ) Height: 200 ( $\pm 5$ )	Air switch, MSD and other exteriors not included

## 4. Battery System Structure

### 4.1 Dimensions and External Surface Requirements

The appearance of the LBB051100A battery system is shown below. The battery system consists of 16pcs of 100Ah cells connected in serial.



Figure 1, Schematic Diagram of the LBB051100A Battery System

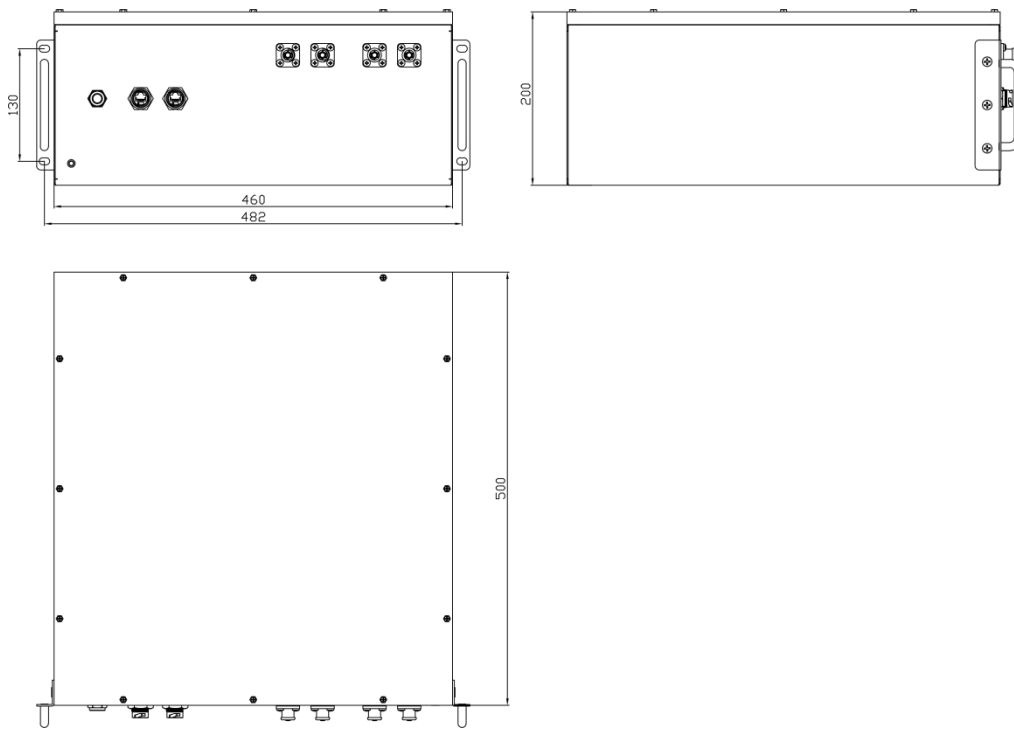


Figure 2, LBB051100A Battery System Size Chart

Appearance requirements: The appearance of the assembly has no obvious processing or bumping flaws, no crack on the surface, and no burrs on the weld.

Note: Side handles are optional accessories.

## 4.2 Electrical Schematic

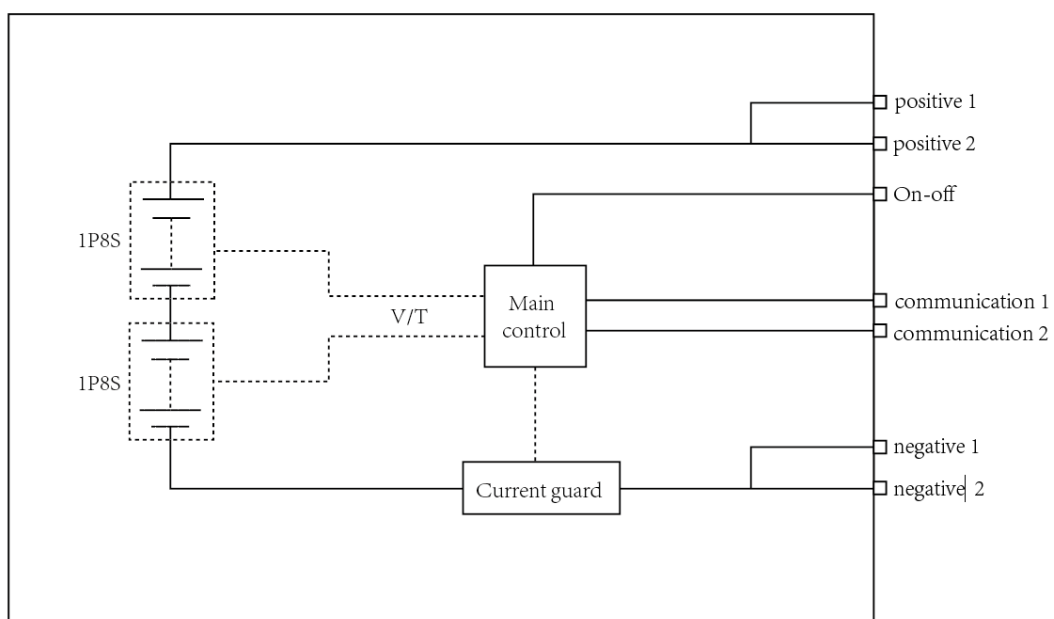




Figure 3, Electrical Schematic (LBB051100A Battery System)

### 4.3 Battery System Panel Connector

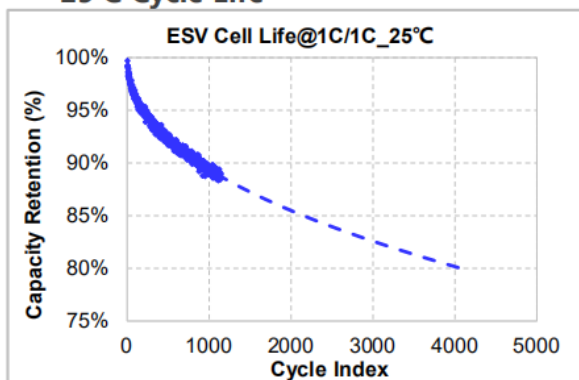
Interface	Connector Socket Model	Connector Plug Type	Definition	Remarks
Positive 1	C10-730187-2100	C10-730186-000	Orange 5.7	Amphenol, 25mm <sup>2</sup> , IP67, Busbar
Positive 2	C10-730187-2100	C10-730186-000	Orange 5.7	Amphenol, 25mm <sup>2</sup> , IP67, Busbar
Negative 1	C10-730187-1101	C10-730186-100	Black 5.7	Amphenol, 25mm <sup>2</sup> , IP67, Busbar
Negative 2	C10-730187-1101	C10-730186-100	Black 5.7	Amphenol, 25mm <sup>2</sup> , IP67, Busbar
Cascade Communication	RCP-5SPFFH-TC U7001	AFC1-CMS00AF 0042 (A)	RJ45	Amphenol, including wire harness 0.6m, which is subject to the actual product
External Communication	RCP-5SPFFH-TC U7001	AFC1-CMS00AF 0041 (A)	RJ45	Amphenol, including wire harness 1.35m, which is subject to the actual product

### 5. Battery Parameter Curve

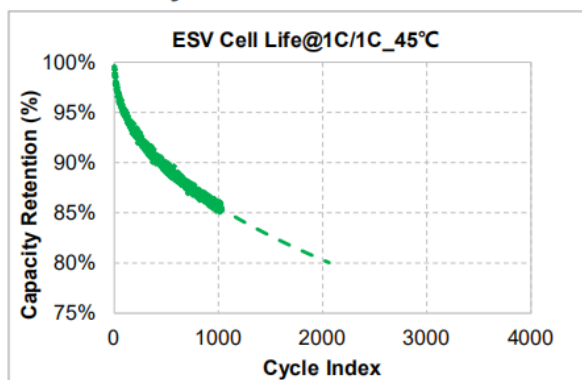
Some parameter curves are as follows:

**Test Condition :** 25°C , 2.5V~3.65V(100%DOD), 1C/1C Cycle

• **25°C Cycle Life**



• **45°C Cycle Life**



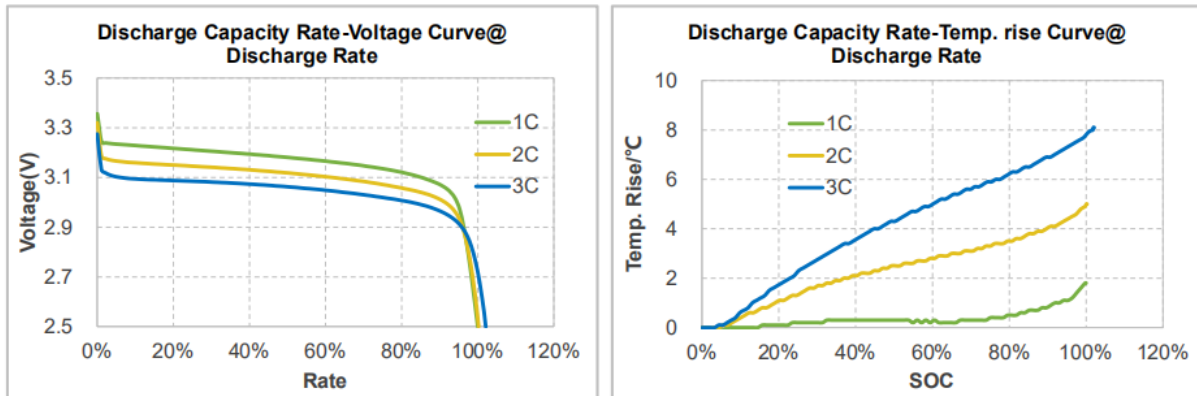
- ◆ 80% reversible capacity retention is still tested
- ◆ Prediction of cycle life @25°C is 4000cycle

Figure 4, Cycle Diagram





**Test Condition:** (1) Rest 30 min at 25°C; (2) 1C CC to 3.65V, 3.65V CV to 0.05C; (3) Rest 5min; (4) n\*C DC to 2.5V(n=1,2,3); (5) Repeat step 1 to step 4 until all the rates are tested; (6) Rest 5min.

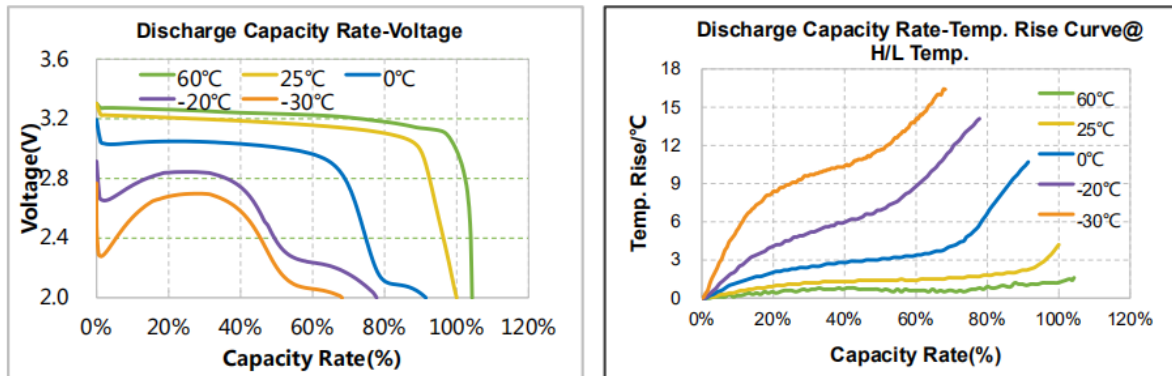


Rate Discharge Performance			
Discharge Rate	1C	2C	3C
Capacity Retention	100%	100%	102%
Temp. Rise ( °C )	1.8	5.0	8.1

Figure 5, Discharge Chart

**Charge Condition:** XX°C , 1C CC to 3.65V , 3.65V CV to 0.05C

**Discharge Condition:** 1C DC to 2.5V



High/Low Temp Discharge Performance					
Rate	25	60	0	-20	-30
Capacity	100%	103%	91%	78%	68%
Energy	4.2	1.6	10.7	14.1	16.4

Figure 6, Temperature and Capacity Curves



## **6. Transportation and Storage**

### **6.1 Transportation**

During transportation, it should be protected from severe vibration, shock, sun and rain, and should not be inverted to ensure that short circuits will not occur. During the loading and unloading process, it should be handled gently to prevent falling, rolling, heavy pressure and inverted.

### **6.2 Storage**

Product storage requirements are as follows:

- When the battery system is stored, it should be stored in a state of charge of 60%;
- Battery system products should be stored in a dry and ventilated environment, the temperature is not higher than 50 °C, the relative humidity is less than 80%, while away from flammable and explosive materials, avoid dust and metal powder, and avoid acid or other corrosion. Sexual gas contact;
- The storage location of the battery system products should be protected from rain, moisture and sun.

## **7. Main Issues and Statements**

### **7.1 Precautions**

This product must comply with the operating instructions, and any installation, maintenance and use of this product must strictly comply with the relevant safety regulations.

- Do not store or use at high temperatures, and must be kept away from heat. These environments above the safe temperature range can cause significant degradation in the performance and life of the product, and even cause serious consequences such as burning and explosion;
- Storage and use in environments with high static or high electromagnetic radiation is prohibited. Otherwise, the electronic components in this product may be damaged, which may cause safety hazards;
- Do not get wet or even soak in water. Otherwise, it may cause internal short circuit, loss of function or abnormal chemical reaction of the product, and cause fire, smoke, explosion and other accidents;
- If you find any abnormalities in smoking, fever, discoloration or deformation, or in use, storage, transportation and service, you should contact the professional department immediately to further observe and control the risks;
- Do not discard discarded products in fire or in hot furnaces. Waste batteries should be recycled and recycled by professional agencies or organizations;



- The installation and maintenance of the battery system must be performed by professional technicians.

The use must strictly comply with the relevant safety regulations. Non-professionals are strictly prohibited from installing, repairing, and over-discriminating battery systems.

## **7.2 Declaration**

The right to interpret this specification belongs to ZHONGNENG TECHNOLOGY (HANGZHOU) CO., LTD