



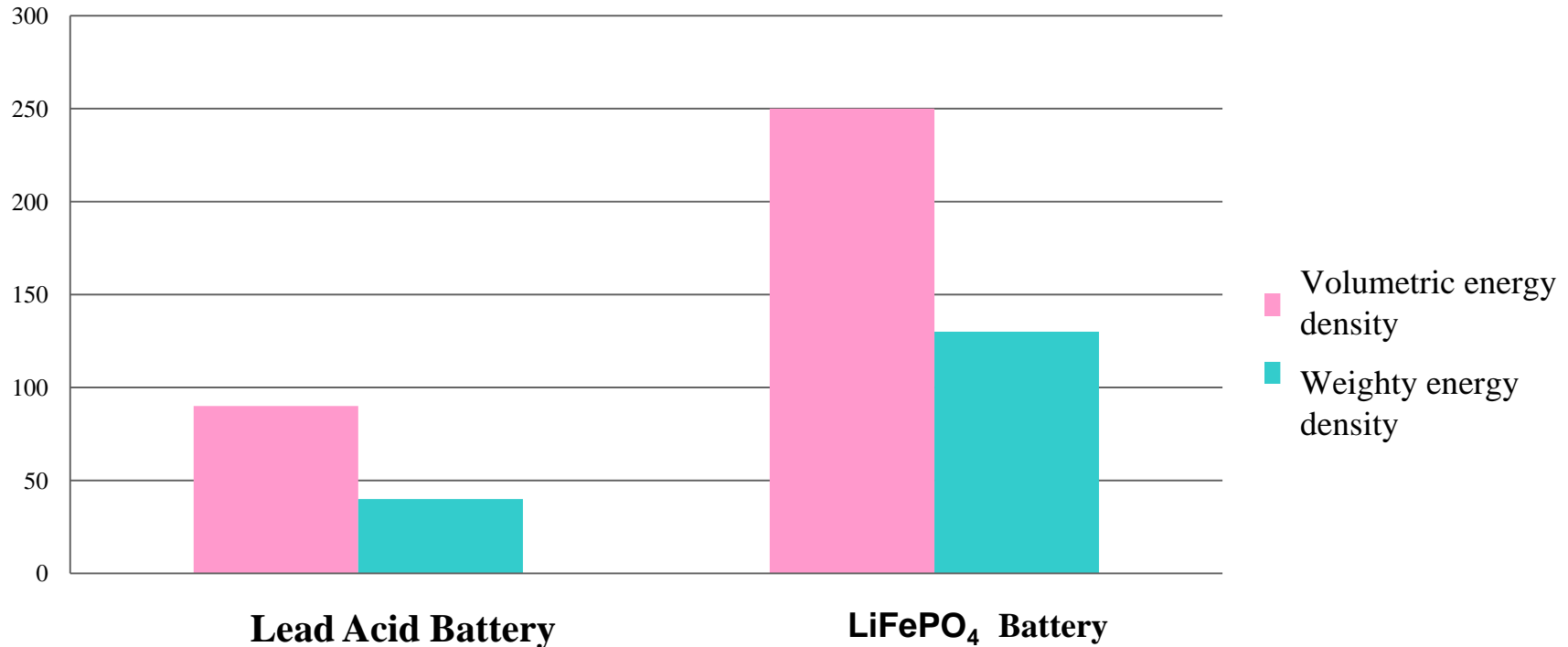
Introduction to the Energy Storage System (ESS) of Apower Electronics Co., Ltd



Contents

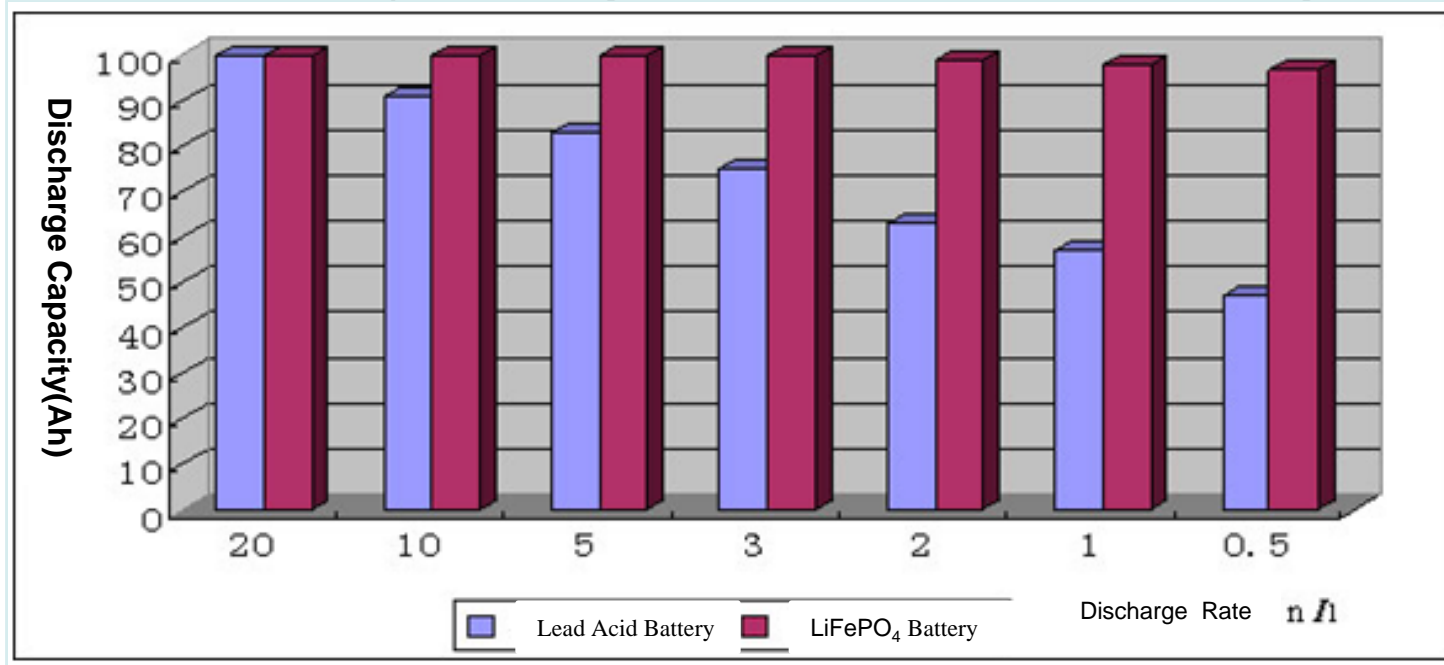
- Performance Comparison between LiFePO_4 Battery and Lead Acid Battery
- Performance of the Energy Storage System(ESS)
- Product Specification and Parameters
- Functional Diagram
- Product Advantages
- Test Cases & Reports

Comparison of Energy Density between LiFePO₄ Battery and Lead Acid Battery



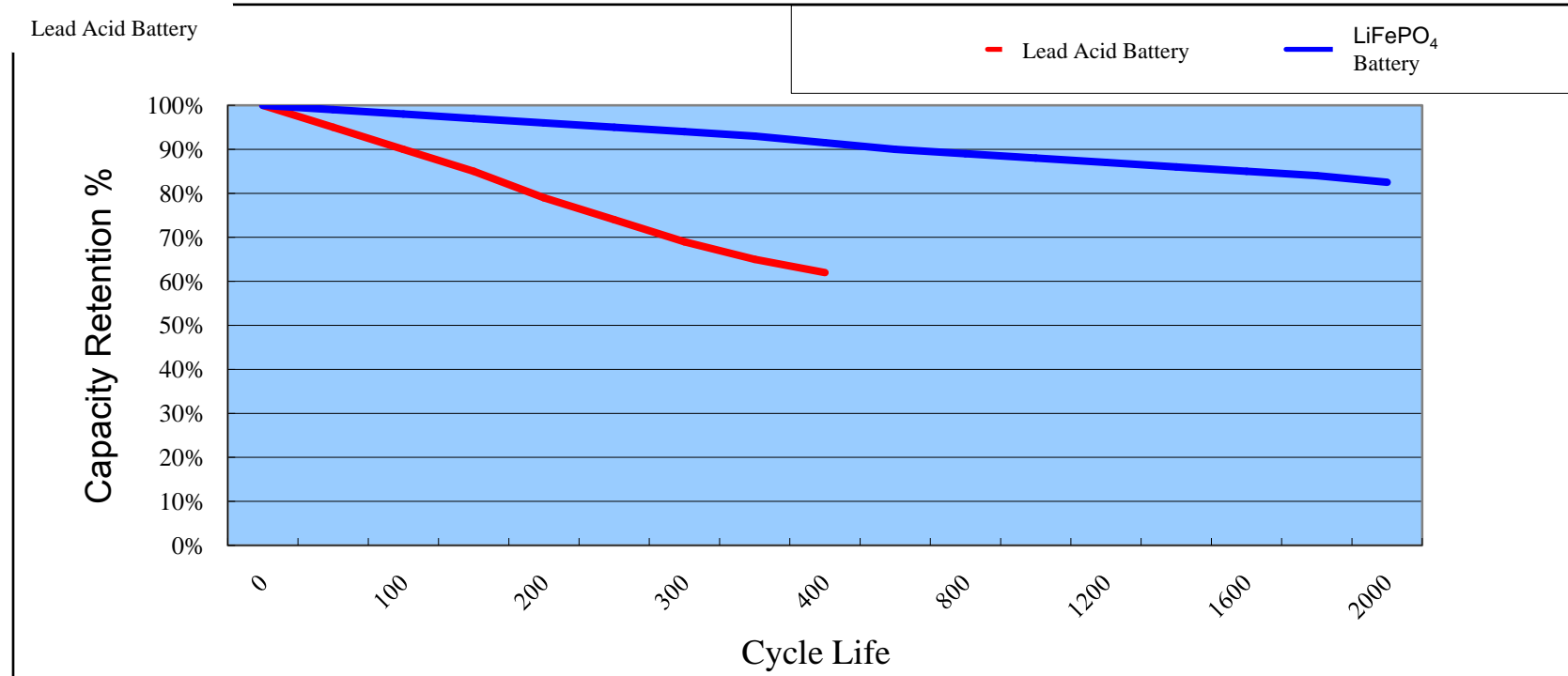
For a given capacity, the LiFePO₄ Battery boasts a volume and weight which will be 1/3 to 2/3 of that of the Lead Acid Battery.

Comparison of Discharge Rate between LiFePO₄ Battery and Lead Acid Battery



The LiFePO₄ Battery reaches a relatively high discharge capacity in a shorter period than the Lead Acid Battery does, which meets the need of high current discharge.

Comparison of Cycle Life between LiFePO₄ Battery and Lead Acid Battery



LiFePO₄ Battery can be recharged over **2000 times** with a cycle life as long as **10 years**.

While Lead Acid Battery will lose 40% of its capacity after being recharged 400 times at the RT.

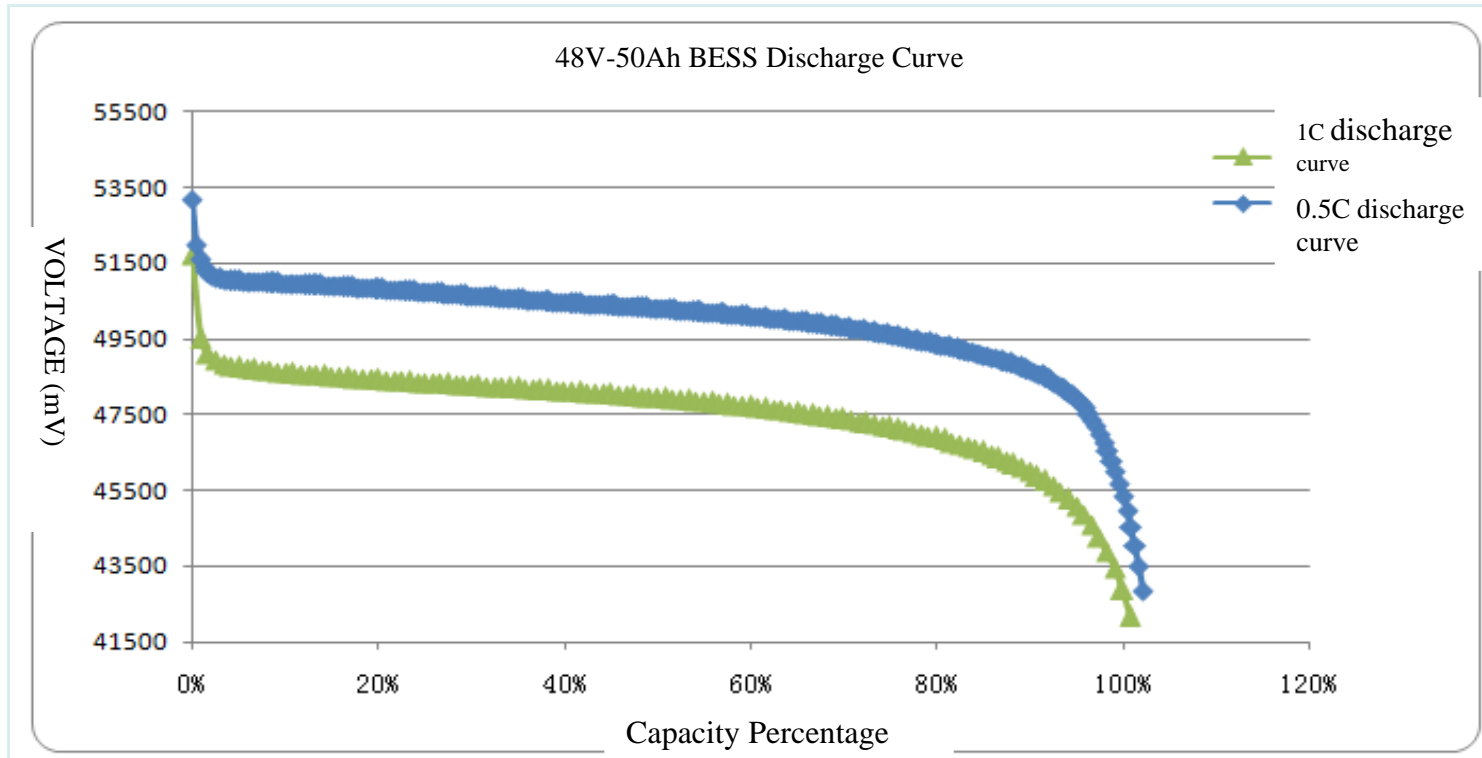
Comparison of Environmental Impact made by LiFePO_4 Battery and Lead Acid Battery

Without any heavy metal, LiFePO_4 battery makes no impact on human body and the environment during its manufacture, transportation and being used or wasted.

Lead Acid battery, containing lead and strong acid, will harm human body and pollute the environment during its manufacture and being used or discarded.



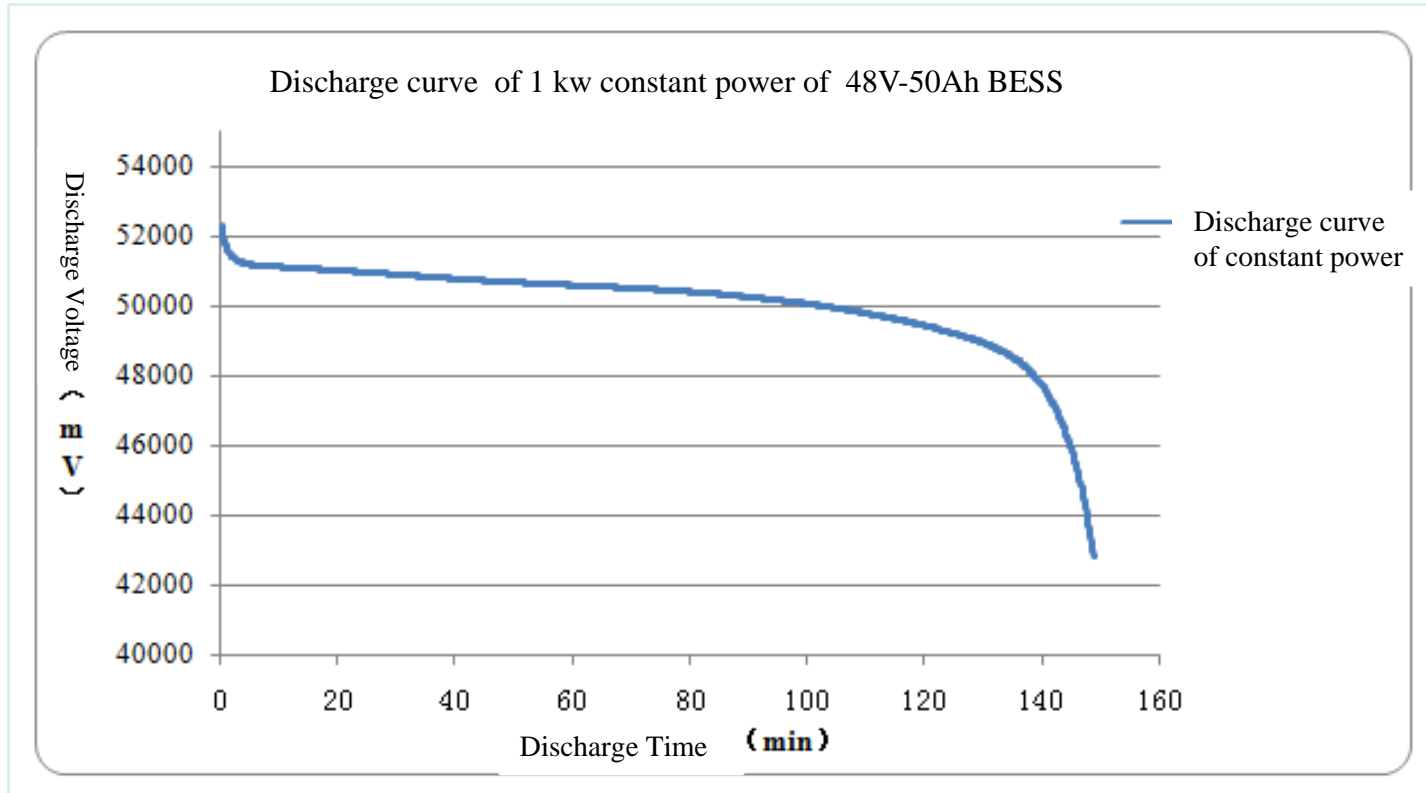
The Rate of ESS



The discharge capacity of 25A is 50.8Ah, and the discharge capacity of 50A is 49.6 Ah.

Therefore the ESS remains a relatively high capacity under a high-current discharge.

The Constant Power of ESS



1 kw constant power takes 148.9 minutes to discharge.

Safety of the ESS

Items	LiFePO ₄ Battery
Overcharge & Overdischarge Test	No Explosion, No Fire
Nail Test	No Explosion, No Fire
Short-circuit Test	No Explosion, No Fire
Thermal Abuse Test	No Explosion, No Fire
Impact Test	No Explosion, No Fire
Crush Test	No Explosion, No Fire
Drop Test	No Explosion, No Leakage and Smoking

Having been authenticated by YDB032-2009, the Test Standard for Back-up LiFePO₄ Battery Pack for Telecommunications, ESS is 100% safe.

Specification and Parameters

Specification of Low-capacity ESS



Integration, Intelligence
and light-weight

Parameters	AEC4840	AEC4850	AEC4860
Cathode Material	LiFePO ₄	LiFePO ₄	LiFePO ₄
Nominal Voltage (V)	48	48	48
Nominal Capacity (Ah)	40	50	60
Nominal Energy (Wh)	1920	2400	2880
Height (mm)	132 (3U)	132 (3U)	132 (3U)
Width (mm)	482	482	482
Working Voltage (V)	43.2~57.6	43.2~57.6	43.2~57.6
Average Charging Voltage(V)	56.0~57.6	56.0~57.6	56.0~57.6
Maximum Discharging Current(A)	40	50	50
Weight (kg)	<35	<40	<45

Specification and Parameters

Specification of High-capacity BESS



Parameters	AEC48200	AEC48300	AEC48500
Cathode Material	LiFePO4	LiFePO4	LiFePO4
Nominal Voltage (V)	48	48	48
Nominal Capacity (Ah)	200	300	500
Nominal Energy (kWh)	9.6	14.4	24.0
Height (mm)	12U	18U	30U
Width (mm)	482	482	482
Working Voltage (V)	43.2~57.6	43.2~57.6	43.2~57.6
Average Charging Voltage (V)	56.0~57.6	56.0~57.6	56.0~57.6
Maximum Discharging Current(A)	100	150	250
Weight (kg)	<200	<280	<440

Specification and Parameters

➤ Automatic Management

Automatically intermissive charge-discharge management, energy management, safety management, remote control management

➤ Electromagnetic Compatibility (EMC)

Resisting the radiated interference for the battery pack

➤ Integration

The integration of collecting and processing information, controlling the system and communication simplifies the installation and maintenance.

➤ Equalization Management

Achieving the equalization management automatically and ensuring the consistence of battery pack, so as to prolong its cycle life.

➤ Protection against Abnormalities

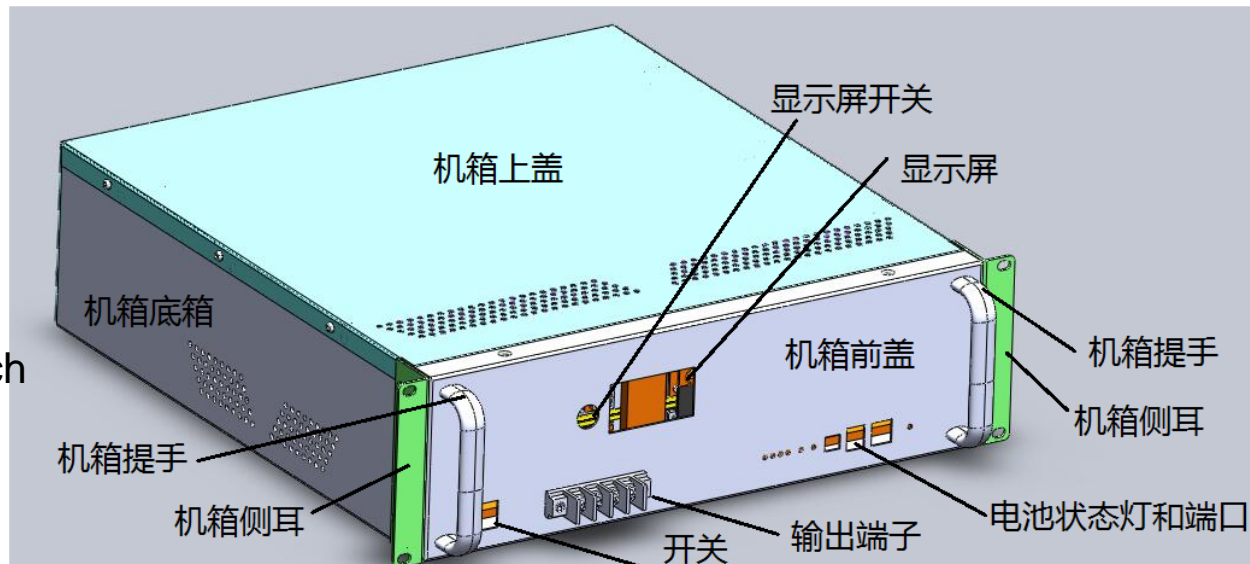
The whole-process management can avoid abnormalities like over-charge, over-temperature, over-current, short-circuit and the likes.

BESS Management functions	
Real-time collecting and updating information of battery	√
Warning and protection against high and low temperature	√
Warning and protection against over-voltage charge	√
Warning and protection against under-voltage discharge	√
Warning and protection against over-current charge	√
Warning and protection against over-current discharge	√
Warning and protection against reverse connection	√
Warning and protection against short-circuit	√
Protection of the automatic failure recovery	√
Automatic charge-discharge management	√
Equalization management	√
Remote monitor and control of the network management	√
Online update	√

Functional Diagram

Main Parts :

- 1) ON/OFF Button
- 2) Output terminal
- 3) Display Screen and the Switch
- 4) Indicating Light
- 5) RS 485 & 232 mouthpiece
- 6) Reset Key
- 7) Earthing Terminal



Product Advantages

- **Strong Adaptability** : BESS can be used in the high current and a wide temperature range
- **High Accurateness and Reliability**: the adaption of IC at vehicle level can increase the accurateness, stability and reliability of the BMS.
- **Strong Impact Resistance and EMC**
- **Human-machine Interface**: the display screen shows BESS's parameters directly.
- **Intelligent Design**: it enables the remote control and feedbacks all data to the remote monitor center.
- **Block-based Design**: Parallel structure can be added to the multi-blocks to prolong BESS life.
- **Energy-conservation and Environmental-Friendliness** : No cooling system.

Comparison of Product Advantages among Peer Companies

Manufacturer Functions	AEC	Company A	Company B
Current & Voltage Measuring Accuracy	5mV/200mA	10mV/800mA	20mV/1500mA
SOC estimation Accuracy	2%	4%	5%
Equalization	V	X	V
Inside Telfon Wire	V	X	X
Vehicle-level IC	V	X	X
Warning against Sensor Failure and Recovery	V	V	X
Second Disconnection	V	X	V
calibration	V	V	X
Intermittive charge-discharge management	V	V	X
YX/YC/YK/YT	V	Part of them	Part of them
Password	V	V	X

Test Cases & Reports

1) 48V-400Ah



48V-400Ah Blocks— the removable energy storage program in Xinjiang

Test Cases & Reports

2) 48V-1000Ah



48V1000Ah Blocks—the removable energy storage program in Xinjiang

Test Cases & Reports

3) 48V-50Ah



48V-50Ah Blocks—wall-mounted energy storage program of Unicom in Yangjiang City, Guangzhou

Test Cases & Reports


4) 48V-150Ah





48V-150Ah Block—outside energy storage program of Telcom in Meizhou City, Guangzhou

Test Cases & Reports

报告编号: 12-12-YDC195



2011000911H

CNAS L0511

检 验 报 告


产品名称 通信用后备式锂离子电池组

产品型号 HP4850-F1 (48V 50Ah)

委托单位 广东国光电子有限公司

生产单位 广东国光电子有限公司

检验类别 委托检验



信息产业邮电工业产品质量监督检验中心

信息产业邮电工业产品质量监督检验中心
检 验 报 告

报告编号: 12-12-YDC195
第 1 页共 5 页

产品型号及名称	HP4850-F1 (48V 50Ah) 通信用后备式锂离子电池组	委托单位	广州市花都区镜湖大道 8 号国光工业园 F2 栋
受检单位	广东国光电子有限公司	产 地	广东省
生产单位	广东国光电子有限公司	送样日期	2013 年 1 月 15 日
送样地点	派检中心 (清仙桥)	送 样 者	周显茂
样品数量	1 台	原编号或生产日期	——
检验类别	委 托 检 验	检验项目	应检 18 项
样品初始状态	样品初始状态完好, 符合检验要求		
检验依据	YD/T2344.1-2011《通信用磷酸铁锂电池组第 1 部分: 集成式电池组》		
检 验 结 论	<p>该公司生产的 HP4850-F1 (48V 50Ah) 通信用后备式磷酸铁锂电池组经检验, 各项性能技术指标结果如下</p> <p>所检性能及技术指标共 18 项, 均达到 YD/T2344.1—2011《通信用磷酸铁锂电池组第 1 部分: 集成式电池组》中的要求。</p> <div style="text-align: right; margin-top: 10px;">  (检验报告专用章) 签发日期: 2013 年 1 月 16 日 </div>		
备 注	本检验报告不作产品认证型式试验审批凭证。		

批准:  审核:  主检: 

TLL Test Report

Test Cases & Reports

报告编号: 13054567

检 验 报 告

产品名称: _____ 后备电源

型号规格: _____ 4850-T1


委托单位: _____ 广东国光电子有限公司

检验类别: _____ 委托检验

ITL — I-Test Laboratory
广州弘诺电子科技有限公司

报告编号: 13054567 第 2 页 共 20 页

检 验 报 告

产品名称	后备电源	型号规格	4850-T1
		检验类别	委托检验
委托方	广东国光电子有限公司	委托方地址	广东省广州市花都区新华镇镜湖大道8号国光工业园F2栋
生产企业	广东国光电子有限公司	生产企业地址	广东省广州市花都区新华镇镜湖大道8号国光工业园F2栋
样品数量	1个	样品状态	外观完好
收样日期	2013年5月18日	检测日期	2013年5月18日~5月21日
检验依据	1. YD/T 983-1998 通信电源设备电磁兼容性限值及测量方法 2. GB/T 17626.2-2008 电磁兼容 试验和测量技术 静电放电抗扰度试验 3. GB/T 17626.5-2008 电磁兼容 试验和测量技术 浪涌(冲击)抗扰度试验 4. 委托方要求: 静电放电和浪涌同时满足等级4		
检验结论	合格。		
主检: 邱俊铭			
签名: 邱俊铭 日期: 2013年5月22日			
审批: 李保权			
签名: 李保权 日期: 2013年5月22日			
职务: 经理		盖章	
备注	/		

EMC Test Report

THANK YOU