

Multi-application - LiFePO4 Power

CE **UE-24Li42**

Battery

Module

Specifications

## LITHIUM IRON PHOSPHATE BATTERY



Rev.	Date	Comments
A1	2017/11/06	Initial release
A2	2017/12/26	Revise model name, charging level and printing mark
A3	2018/01/08	Battery cell P/N and MSDS included
A4	2018/01/15	Revise spec to comply with certification conditions
A5	2018/01/24	Revise temperature range at 0 to 40°C while charging/discharging condition



## Table of Contents

1. Scope .....	3
2. Specification .....	3
2.1 Battery Module .....	3
2.2 Electrical Specifications .....	4
3. Battery Module Performance .....	5
3.1 Standard Test Conditions .....	5
3.2 Charging Characteristics .....	5
3.3 Discharging Characteristics .....	5
3.4 Cycle Life Performance .....	6
4. Safety Performance .....	7
4.1 Battery Module Safety Performance .....	7
4.2 Battery Module Mechanical Tests .....	8
4.3 Battery Module Final Tests .....	8
5. Operating Instructions .....	9
5.1 Charging .....	9
5.2 Discharging .....	9
5.3 Storage .....	9
5.4 Notices .....	9
6. Note .....	9



## 1. Scope

This specification sheet describes the UE-24Li42 battery module suitable for use in energy storage systems.

## 2. Specification

### 2.1 Battery Module

#### Battery Module (UE-24Li42)

Standard voltage	26.4V
Guaranteed initial battery capacity	42Ah @0.2C, 25°C
Cell Model	IFP45120146
MSDS of Cell	IFP45120146 MSDS.pdf
Storage temperature	0 ~ 45°C (in 6 months)
Storage humidity	15 ~ 90% R.H
Internal resistance	< 20mΩ
Battery management	Automatic, dynamic cell-balancing system

#### A) Charging

Charging methods	CC/CV
Charging ambient temperature	0 ~ 40°C
Humidity during charging	0 ~ 85% R.H
External max. charging voltage	27.5V
Max. continuous charging current	40A (1C)

#### B) Discharging

Discharging ambient temperature	0 ~ 40°C
Humidity during charging	0 ~ 85% R.H
Max. continuous discharging current	70A
Max. discharging current (instantaneous)	120A (< 5 seconds)
Discharge cut off voltage	22.0V (Recommend set at 23.0V)



### C) Dimensions

Dimensions [mm]	W260 × L170 × H263 (Max.) See Figure 2.1
Weight	14.5 ± 0.2 kg
Housing material	Body: SECC; Top cover: Bakelite
Terminal material	Aluminum See Chapter 3.1

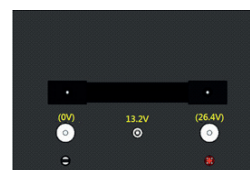
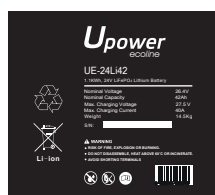


Figure 2.1 Battery Module 26.4V40Ah

## 2.2 Electrical Specifications

### 2.2.1 Terminals

Type	Circular aluminum terminal
Max. current (continuous)	100 Amp
Dimensions	See Figure 2.2.1
Terminal Material	Aluminum



(Unit: mm)

Figure 2.2.1 Circular Aluminum Terminal



### 3. Battery Module Performance

#### 3.1 Standard Test Conditions

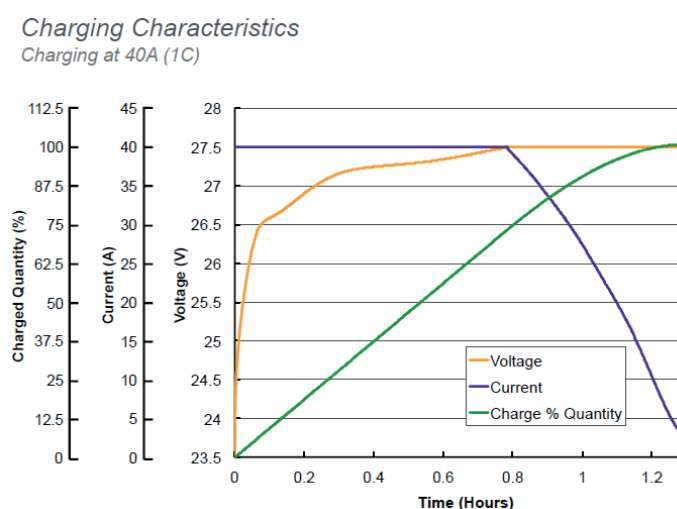
Unless stated otherwise, all tests described in this product specification sheet are conducted under the following environmental conditions:

Temperature:  $25 \pm 5^\circ\text{C}$

Humidity: 0~85% R.H.

#### 3.2 Charging Characteristics

The figure below presents the charging characteristics of the 26.4V40Ah battery module



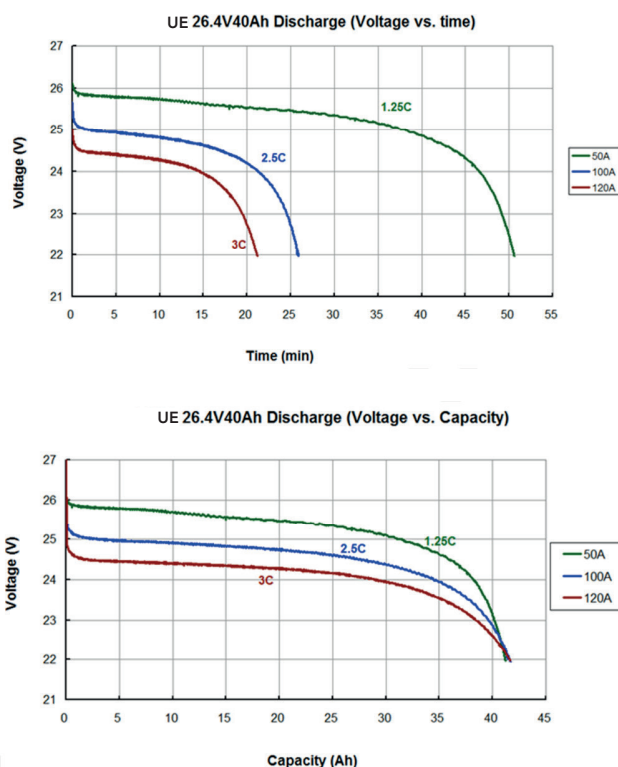
#### 3.3 Discharging Characteristics

The table below describes the module's constant current discharge and constant power discharge output, listed in Rows 2 and 3, respectively.

Terminal voltage is 22V/module and 2.75V/cell.

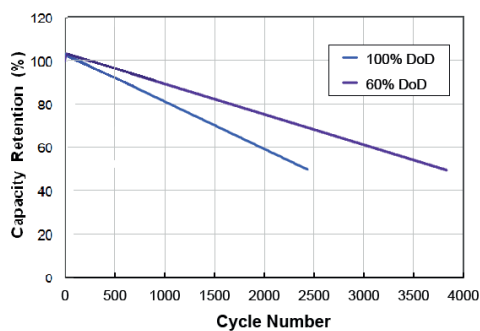
Time	27min	45min	1h	2h	5h	10h
Current (A)	70	53	40	20	8	4
Power (W)	1690	1280	1000	500	200	100





### 3.4 Cycle Life Performance

The chart below is representative cycle life of the 26.4V42Ah battery at 1C (40A)/1C(40A) charging/discharging rates.



## 4. Safety Performance

### 4.1 Battery Module Safety Performance

The table below shows the safety tests performed for UE battery module. In addition, the battery cells comprising this module have all passed the following safety tests: overcharging test, over-discharging test, short-circuit test, needle puncture test, crush test, and drop test.

No.	Items	Test Methods and Conditions	Criteria
1	Short-Circuit Test	<ol style="list-style-type: none"> <li>1. Ambient and battery temperatures are recorded prior to testing.</li> <li>2. The battery module is short-circuited by connecting the positive terminal and the negative terminal with a circuit load with resistance less than <math>0.1\Omega</math>.</li> <li>3. The battery is discharged until it reaches a fully discharge state, and the battery case returns to ambient temperature <math>\pm 10^\circ\text{C}</math>.</li> </ol>	Battery module does not catch fire or explode
2	Forced Discharge Test	<ol style="list-style-type: none"> <li>1. Ambient and battery temperatures are recorded prior to testing.</li> <li>2. The battery module contains one completely discharged parallel string (3.3V 40Ah) while the remaining cells within the same module are fully charged.</li> <li>3. The battery is short-circuited by a connecting the positive and negative terminals with a copper wire <math>R = 50\text{ m}\Omega</math>.</li> <li>4. The battery is discharged until it reaches a fully discharged state and the external temperature has returned to ambient temperature <math>\pm 10^\circ\text{C}</math>.</li> </ol>	Battery module does not catch fire or explode
3	Abnormal Overcharging Test	<ol style="list-style-type: none"> <li>1. Ambient and battery temperatures are recorded prior to testing.</li> <li>2. The battery module is first discharged at 8 A (0.2C/hour) to 21V.</li> <li>3. The battery is then charged at a constant voltage of 28V and a current limit of 100A.</li> <li>4. Test ends when one of the two scenarios occurs: <ol style="list-style-type: none"> <li>a. Battery voltage reaches 110% of the maximum allowed voltage and temperature reaches room temperature.</li> <li>or</li> <li>b. Battery reaches steady-state after 2 hours of charging.</li> </ol> </li> </ol>	Battery module does not catch fire or explode



## 4.2 Battery Module Mechanical Tests

Mechanical tests performed for UE battery module are described below.

### 4.2.1 Altitude Simulation

This is low pressure testing that simulates unpressurized airplane space (cargo area) at 15.000 meter altitude. After storing batteries at 11.6k Pa for >6 hours, these criteria shall be met: no mass loss, leaking, venting, disassembly, rupture or fire, and voltage within 10% of pre-test voltage.

### 4.2.2 Thermal Cycling Test (Thermal Shock)

This test covers changes in temperature extremes from - 40°C to +75°C. Batteries are stored for 6 hours at - 40°C (12 hours for large cells/batteries), then 6 hours at +75°C (12 hours for large cells/batteries), for a total of 10 cycles. Testing may be performed in a single chamber or thermal shock chamber, but less than 30 minute transitions shall be used.

### 4.2.3 Vibration Test

This test simulates vibration during transportation. Test is a Sine Sweep: 7Hz – 200Hz – 7Hz in 15 Minutes; 12 Sweeps (3 hours); 3 mutually perpendicular axes.

### 4.2.4 Shock Test

This test also simulates vibration during transportation. Test is a Half-Sine pulse: 150G/6ms for small cells/batteries; 50G/11ms for large cells/batteries; 3 pulses per direction; 6 directions (+/-z, +/-x, +/-y).

## 4.3 Battery Module Final Tests

The table below lists the test criteria for the outgoing quality control inspection:

ACIR (mΩ)	Terminal Voltage (V)	AC Pressure Test (Vac/1 min)	Casing Insulation (MΩ)	Capacity (Ah)
< 20	> 26.4	1000	> 10	≥ 42





## 5. Operating Instructions

Please follow the instructions below for safe battery operations.

### 5.1 Charging

This battery module may be charged at any time under normal operations when no error signal is displayed. The charger may be removed at any point during the charging process. There is no need to wait for the battery to become fully charged since UE batteries don't have memory effect.

**Overcharging:** If the battery is overcharged, please immediately **STOP** charging and remove the charger. Contact service personnel for battery inspection and/or replacement.

### 5.2 Discharging

Under normal operating conditions, this battery module may be discharged at any time when connected to a load.

**Over-discharging:** If the battery is over-discharged, disconnect the battery from the load **IMMEDIATELY** and avoid charging the battery. Contact service personnel for battery inspection and/or replacement.

### 5.3 Storage

Please store the battery module according to section 2.1. Keep the storage temperature between 0 - 45°C and humidity between 15 - 90% R.H. When stored, the battery module should be disconnected from the charger, and fully charge the battery module at least once every 3 months. Failing to do so will result in damaging the battery's performance. After a period of storage, please be sure to charge the batteries fully prior to installation and use.

### 5.4 Notices

Recommended parameters setting on the UPOWER's UPS/Inverter products:

- Battery type: User Defined (if applicant)
- Buck Charging Voltage: 27.5V (or 55.0V, or 82.5V)
- Floating Charging Voltage: 27.2V (or 55.0V, or 82.5V...)
- Low DC cut-off (or Stop discharge) Voltage: 23.0V (or 46.0V, or 69.0V)
- Max Charging Current: 40A
- Battery Equalization Voltage: 27.5V (if applicant)

## 6. Note

Copyright © 2017 UPOWER reserves the right to modify the design of this battery module.

