

# UE Series UE-12Li6

MULTI-APPLICATION - LiFePO<sub>4</sub> POWER



## 1. Scope

This specification only applies to the reference battery pack **UE-12Li6** manufactured by Master Battery, S.L.

## 2. Ratings

	Item	Rating	Note
Cell	Battery Type	Li-ion Battery	
	Cell Model	32700 - 6 Ah	
	Nominal Capacity	6 Ah	Discharge: 0.2 C Cut-off Voltage: 2.5 V
	Minimum Capacity	5.9 Ah	Discharge: 0.2 C Cut-off Voltage: 2.5 V
	Nominal Voltage	3.2 V	
	Internal Impedance	≤ 15.0 mΩ	
	Dimensions (L x D)	Max. 70.5 x 32.5 mm	
	Weight	Approx. 141 g	

	Item	Rating	Note
<b>Battery Pack</b>	Pack Method	4S1P	
	Nominal Capacity	6 Ah	Discharge: 0.1 C Cut-off Voltage: 10 V
	Minimum Capacity	5.7 Ah	Discharge: 0.1 C Cut-off Voltage: 10 V
	Nominal Voltage	12.8 V	
	Energy	76.8 Wh	
	Charge Voltage	14.6 V	
	Discharge Cut-off Voltage	10 V	
	Charge Method	CC/CV	
	Standard Charge Current	1 A	
	Max. Charge Current	5 A	
	Standard Discharge Current	1 A	
	Max. Continues Discharge Current	5 A	
	Cycle Life	2500 times	100% DOD
	Internal Impedance	≤ 70 mΩ	
	Dimensions (L x W x H)	151 x 65 x 94 mm	
	Output Wire		
	Output Connector		
	Weight	Approx. 0.8 kg	
	Working Temperature Range	Charge: -0°C~45°C Discharge: -20°C~60°C	
Storage Temperature	-10°C~35°C		

### 3. BMS Parameters

Features	Test Items	Specification			Unit
		Minimum	Typical Value	Maximum Value	
Operating Voltage	Voltage Range	8.4		15	V
Working Current	Charge Current (Continuous)	-		10	A
	Discharge Current (Continuous)	-		10	A
Charging Protection	Charger Voltage (CC/CV)	15			V
	Overcharge Protection Voltage	3.700	3.750	3.800	V
	Overcharge Protection Delay Time	500	1.000	1.500	mS
	Overcharge Protection Recovery Voltage	3.550	3.600	3.650	V
Discharge Protection	Overdischarge Protection Voltage	2.000	2.100	2.200	V
	Overdischarge Protection Delay Time	150	300	450	mS
	Overdischarge Protection Recovery Voltage	2.200	2.300	2.400	V
	Overdischarge Protection Recovery Conditions	Charge recovery			
Overcurrent Protection	Charge Overcurrent Protection Value		/		A
	Charge Overcurrent Delay		/		mS
	Charge Release Adjustment	/			
	Discharge Overcurrent 1 Protection Current Value	50		100	A
	Discharge Overcurrent 1 Protection Delay	50		200	mS
	Discharge Overcurrent Protection Recovery Condition	Disconnect the load			
Short Circuit Protection	Short Circuit Protection Delay Time	80	100	200	uS
	Short Circuit Protection Recovery	Disconnect the load			
Equalization Function	Equalization Turn-on Voltage	3.570	3.600	3.630	V
	Balance Current	20		35	mA
Temperature Protection	Temperature Protection Value		/		°C
	Temperature Protection Release Value		/		°C
Internal Resistance	Discharge Circuit Internal Resistance	/	10	20	mR
Self-consumption	Operating Mode	/	20	40	uA
Operating Temperature	Normal Working Range	-20		70	°C
Storage Temperature	Humidity below 90%	-40		85	°C
Protective Plate Size	Length*Width*Height	66±1*34±1*8±1			mm

## 4. Performance

### 4.1 Standard Test Condition

The battery shall be evaluated within 1 month from the arrival date.

Unless otherwise stated in these specifications, the following test shall be carried out in an ambient temperature of  $20\pm 5^{\circ}\text{C}$ , relative humidity of  $65\pm 20\%$ .

Discharge capacity when the battery is discharged at 2 A to 10 V after being standard charged. Five cycles are permitted for this test. The test shall be terminated at the end of the first cycle which meets the requirement.

### 4.2 Testing Instrument or Apparatus

#### 4.2.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by instruments with equal or more precision scale of 0.01 mm specified.

#### 4.2.2 Voltmeter and Ammeter

Voltmeters and ammeters shall be equal or more precision instruments of  $10\text{ K}\Omega/\text{V}$  and  $0.01\ \Omega$ .

#### 4.2.3 Impedance Meter

Impedance shall be measured by a sinusoidal alternating current method (1 kHz LCR meter).

### 4.3 Standard Charge

Standard charge means charging for 6 hours using 14.6 V/1 A charger.

### 4.4 Standard Discharge

Standard discharge means discharging at 2 A down to 10 V.

### 4.5 Electrical Performance

Item	Condition	Specification
Open-Circuit Voltage	The open-circuit voltage shall be measured within 24 hours after standard charge.	$\geq 12\text{ V}$
Battery Capacity	The discharge time at 1 A shall be measured after standard charge at $20\pm 5^{\circ}\text{C}$ and rest 30 mins.	$\geq 95\%$
Cycle Life	The discharge time on standard discharge shall be measured after 2500 cycles of standard charge and discharge at $20\pm 5^{\circ}\text{C}$ .	100% DOD
Charge (Capacity) Retention	The discharge time at 1 A shall be measured after standard charge and then storage at $20\pm 5^{\circ}\text{C}$ for 28 days.	$\geq 80\%$
Temperature Characteristic 1	After standard charging at $20\pm 5^{\circ}\text{C}$ , laying the battery at $55^{\circ}\text{C}$ for 5 hour, then discharge at 1 A to 10 V, record the discharge time.	$\geq 90\%$
Temperature Characteristic 2	After standard charging at $20\pm 5^{\circ}\text{C}$ , laying the battery at $-10^{\circ}\text{C}$ for 24 hour, then discharge at 1 A to 10 V, record the discharge time.	$\geq 60\%$

## 5. Mechanical Performance

Item	Condition	Specification
Crush Test	A battery is to be crushed between two flat surfaces. The force for the crushing is to be applied by a hydraulic ram with a 32 mm diameter piston. The crushing is to be continued until a pressure reading of 17.2 mm Pa is reached on the hydraulic ram, applied force of 13 kN. Once the maximum pressure has been obtained it is to be released.	No fire, No explosion
Drop Test	The battery has only two axes of symmetry in which case only two directions shall be tested. The battery is to be dropped from a height of 1 meter twice onto concrete ground.	No explosion, No fire, No smoke
Vibration	A full-charged battery is to be subjected to simple harmonic motion with an amplitude of 1.6 mm total maximum excursion. The frequency is to be varied at the rate of 1 hertz per minute between 10 and 55 hertz. The cell shall be vibrated for 30 minutes per axis o XYZ axes.	No leakage, No Fire, No explosion

## 6. Delivery Condition

Approx. 40% charged; Shipment voltage: 13 V

## 7. Warnings

To prevent the possibility of the battery from leaking, heating, fire, Please READ this specification carefully before usage and observe the following precautions:

- When recharging, use the Li-ion battery charger specifically for that purpose.
- Do not strike battery with any sharp edge parts, such as Ni-tabs, pins and needles.
- Do not immerse the battery in water and seawater.
- Do not use and leave the battery near a heat source as fire or heater.
- Do not reverse the position and negative terminals.
- Do not connect the battery to an electrical outlet.
- Do not discard the battery in fire or heat it.
- The battery tabs are not so stubborn especially for aluminum tab. Do not bend tab.
- Do not short-circuit the battery by directly connecting the positive and negative terminal with metal object.
- Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.
- Do not directly solder the battery and pierce the battery with a nail or other sharp object.

## 8. Battery Operation Instruction

### 8.1 Charge

**Charging current:** Do not surpass the biggest charging current which in this specification.

**Charging voltage:** Do not surpass the highest voltage which in this specification.

**Charge temperature:** The charge temperature is in according to this specification.

### 8.2 Discharge Current

**Discharge current:** Do not surpass the biggest discharge current which in this specification.

**Discharge voltage:** Do not be less than the lowest voltage which is in this specification.

**Discharge temperature:** The discharge temperature is in according to this specification.

### 8.3 Over-discharge

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.

### 8.4 Storing the Batteries

*The battery should store in the product specification book stipulation temperature range. If has surpasses above for 3 months the long time storage, suggested you should carry on additional charge to the battery.*

### 8.5 Please do not continuously charge the battery over 8 hours

## 9. Others

- The customer is requested to contact Master Battery in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.
- Master Battery will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.
- Master Battery will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the battery, if it is deemed necessary.