



Introduction

LiFePO₄wered/USB™ is a convenient power module that makes it easy for makers and engineers to integrate LiFePO₄ battery technology into their 3.3 V powered circuits.

What are LiFePO₄ batteries?

LiFePO₄ or “Lithium iron phosphate”, is a Lithium-ion chemistry that offers some distinct advantages:

- 3.2 V nominal voltage.
- 3.6 V maximum voltage during the charge cycle.
- Stable and safe chemistry, significantly reducing risk of fire and explosion compared to other Lithium-ion batteries.
- Long shelf-life and calendar life.
- No memory effect.
- High charge/discharge cycle count (>1000).
- Wide temperature range (-20 °C - 60 °C discharge).
- High power density.
- Low internal resistance.
- Environmentally friendly and RoHS compliant.

What is LiFePO₄wered/USB™?

Short answer: a convenient module to get you started with LiFePO₄ battery technology.

Long answer: a complete USB chargeable LiFePO₄ battery system with these great features:

- Convenient “battery holder with USB connector” form factor for easy PCB integration.
- Single sided design enables mounting flush with a carrier PCB.
- Connections are on a 0.1” grid for easy use with solderless breadboard or prototype PCBs.
- Uses Micro-USB charge connector (before revision 3) or USB Type C connector (revision 3), for compatibility with ubiquitous cell phone chargers.
- Ultra low leakage of only 0.5 μ A typical when the charger is disconnected.
- Smart charger IC keeps battery topped up as long as USB power is present while preventing overcharge, and provides features such as preconditioning and battery short protection.
- 3.3 V circuits can connect directly to the battery without the need for a voltage regulator.
- Extra 0.1” connector provides access to USB signals as well as alternative access to the battery power.
- Status LED (red) indicates when the battery is charging.
- The battery can be charged while it is powering a circuit.
- Bridging solder jumper SJ1 turns on fast charge mode, requiring only half the normal charge time.

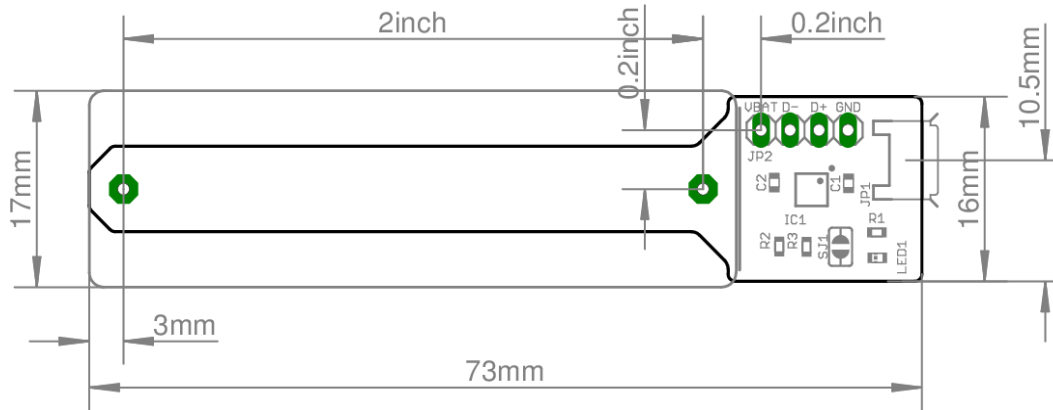
Revisions

Revisions below 3 use the Microchip MCP73123J LiFePO₄ charge controller and have a USB Micro-B connector for charging.

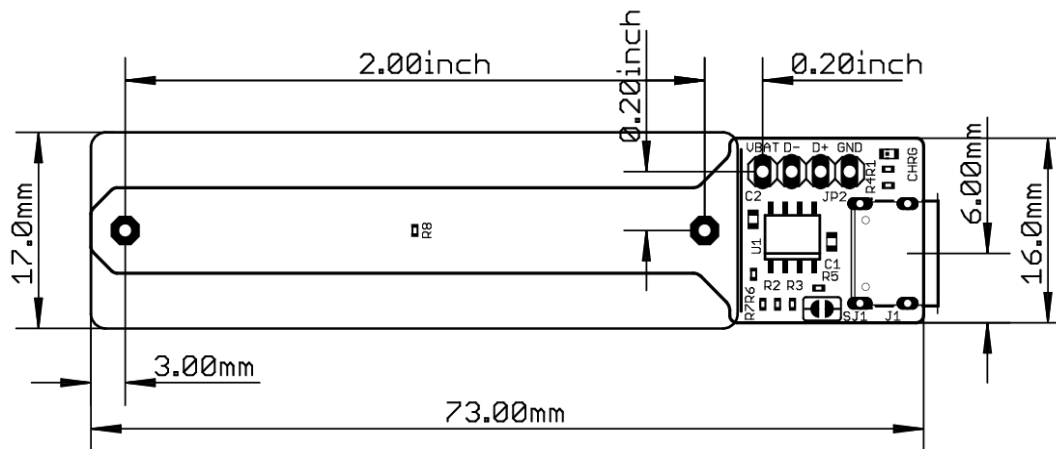
Microchip stopped selling the J variant that disables the elapse timer on the general market, so revision 3 is based on the CN3058E LiFePO₄ charge controller and it uses a USB Type C connector for charging. This revision adds under and over temperature charge protection.

Mechanical characteristics

Before revision 3:



Revision 3:



The overall height of the device from the bottom of the PCB to the top of the battery is less than 20 mm. The battery terminals are typically 7.5 or 11.5 mm long and 0.6 or 0.8 mm in diameter, depending on the particular battery holder installed.

Revision 3 was created with the goal to have as little physical difference as possible compared to older revisions, but the change to a Type C USB connector made it necessary to swap the location of the USB connector and the charge LED, because of the larger size of the Type C connector.

Electrical characteristics

Unless otherwise indicated, all characteristics apply for $V_{USB} = 4.2\text{ V to }6.0\text{V}$ and $T_A = -20\text{ °C to }60\text{ °C}$. Typical values are at 25 °C and $V_{USB} = 5\text{ V}$.

Parameter	Sym	Min	Typ	Max	Unit	Conditions
USB charge voltage	V_{USB}	4.2	5.0	6.0	V	
Battery leakage current	$I_{DISCHARGE}$		0.5	4	μA	USB voltage absent
			6	17	μA	USB voltage present
Battery charge current before revision 3	I_{CHARGE}		245		mA	SJ1 open
			480		mA	SJ1 bridged
Battery charge current revision 3	$I_{CHARGE3}$		259		mA	SJ1 open
			498		mA	SJ1 bridged
Maximum output voltage	V_{REG}	3.55	3.6	3.65	V	
Precondition voltage threshold before revision 3	V_{PTH}	1.9	2.0	2.1	V	
Precondition voltage threshold revision 3	V_{PTH}	2.45	2.5	2.55	V	
Precondition current ratio	I_{PRE} / I_{CHARGE}		10		%	
Recharge voltage threshold before revision 3	V_{RECH}	3.35	3.42	3.49	V	
Recharge voltage threshold revision 3	V_{RECH}		3.3		V	
Charge temperature range revision 3	T_{CHARGE}	-5		45	°C	

Sales and support

To buy the LiFePO₄wered/USB™, please visit <http://lifepo4wered.com>. To order in quantity and for volume discounts, please contact sales@lifepo4wered.com. For technical support, please contact support@lifepo4wered.com.

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