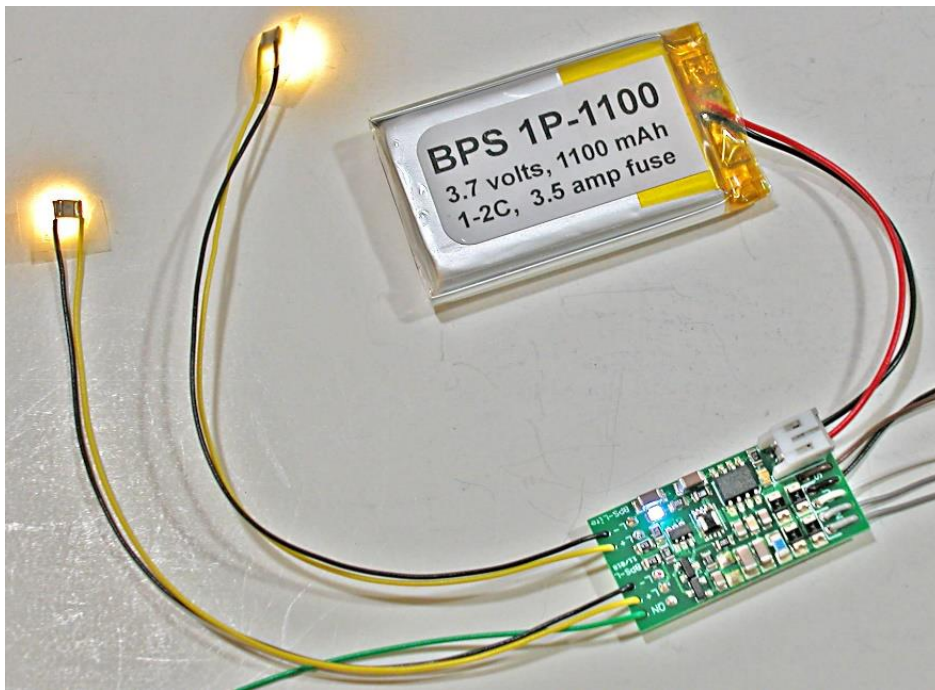


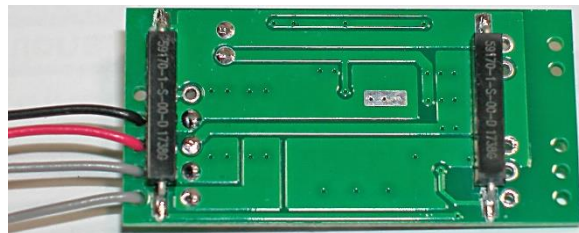
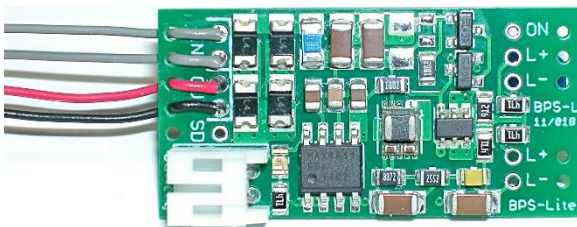
# BPS-Lite: Lighting Power Supply

1-amp battery power supply for coach and caboos lighting



## Description

BPS-Lite is intended for mobile lighting; specifically, coaches and cabooses. It includes a bridge rectifier, battery charger, 2 LED light outputs, an on/off switch and a connection for battery output. There are two indication lights on the circuit board; a green LED lights while charging; a white LED indicates lights are on. Two magnetic reed switches on back side of board are used to switch battery and light outputs on and off.



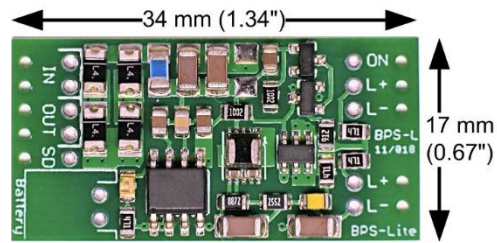
## Battery Selection

A single cell LiPo, (3.7 volts, either standard or high output rating) is required. Lighting load is well within the capability of a small battery. The photo above includes 3 LEDs, each with a 470 ohm series resistor. Assuming a LiPo cell at nominal 3.7 volts and LED forward voltage of 2.7 volts, LED current is approx. 2.1 mA when using 470 ohm resistor. For 3 LEDs, total battery current is 6.3 mA. A fully charged 1,000 mAh battery should operate lights approximately 158 hours before requiring recharge.<sup>1</sup> Obviously, a smaller battery would be adequate, but space for a battery will not be a constraint in most lighting applications.

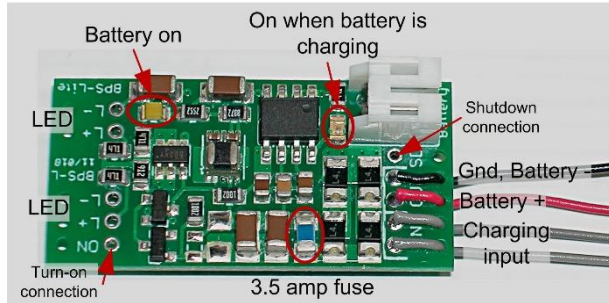
<sup>1</sup> Operating duration in hours is  $1000/6.3 = 158$  hours.

## Size

On and off reed switches are the only components on back of circuit board. The battery socket is highest component on front side. Maximum thickness is 8 mm (0.32").



## Connections



Two LED terminals are included with 470 ohm series resistors on the board. L+ is LED positive connection. Turn-on and shutdown connections are not necessary for most installations and will normally not be wired, since reed switches perform these tasks.

Gray leads are for battery charging and polarity is not important. Most convenient arrangement is connection to wheel wipers and charging from track voltage; either DC or DCC, but not exceeding 18 volts.

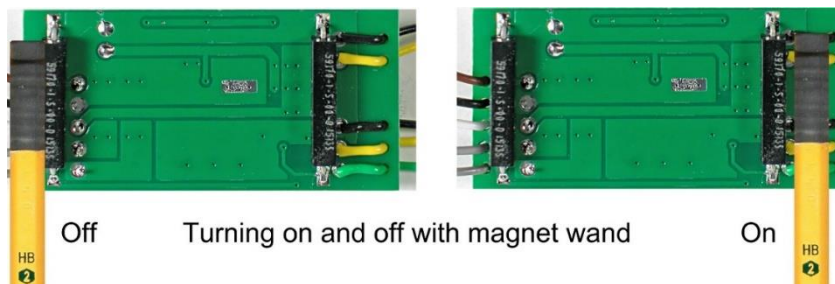
Battery power is accessible through the “out” terminal (red and black leads in figure) and should be used with caution since an accidental short will blow the battery fuse (or destroy the board if battery is not fused). **Always unplug battery before making connections.** The battery output can power a number of LEDs wired in parallel (use series resistors to protect LEDs) or other accessories. Red lead in figure is battery positive, black is battery negative, (which is also ground).

The battery connector is JST PH socket, which is standard for BPS batteries. If using a third-party battery, polarity is critical, since there is no protection for reversed polarity (except possibly within the battery package).



***BPS-Lite is delivered with battery positive lead insulated. Since a voltage transient associated with plugging in the battery may turn on battery output, be sure to keep battery + terminal insulated until connections have been completed.***

## On/Off Control



On/off control is performed with a magnet wand, which has an actuation range of approx. 1/2". Operation is not affected by plastic or non-ferrous metals and the board is intended to be mounted with reed switches close to model's exterior surface (roof or side, for example).

## Protection

### Overload

Depending on battery, BPS-Lite is designed for continuous output of 1 to 3 amps. If no battery, charging input will still flow to the output, but will be limited by component thermal shutdown (less than ½ amp).

### Short-Circuit

With no charging input:

- If using a BPS battery, the battery fuse will limit damage. Battery replacement may be necessary.
- If using a third-party battery, damage will depend on protection within the battery package. Avoid batteries with no internal protection.

With charging input:

A 3.5 amp fuse limits damage (with or without connected battery) from a short-circuit within the circuit board.

### Battery Reversed Polarity

Except for battery socket, which is polarized to prevent reversed polarity, there is no additional protection within BPS-Lite.

## Optional Features

### Automatic On

This feature, which is inherited from BPS design, turns on battery power when track voltage is detected. Since this is annoying when attempting to operate with coach lights off while running on powered track, it is disabled by default.

### Input Over-voltage

The circuit board includes provision for over-voltage protection, but the capability is omitted by default. Maximum voltage rating of input components is 35 volts, which exceeds DCC standards by a comfortable margin. If required, a Zener diode can be added to limit voltage.

