Quick Start Manual For Linear Technology Demo Board DC384A

LTC1730 Pulse Charger

Demonstration board DC384A is complete pulse battery charger designed to charge one 4.1V or 4.2V Lithium-Ion cell (Float voltage can be selected using jumpers on the demo board). The charge current is determined by the current limit of the input power supply (AC wall adapter)

Please see the LTC1730 Data Sheet for additional information..

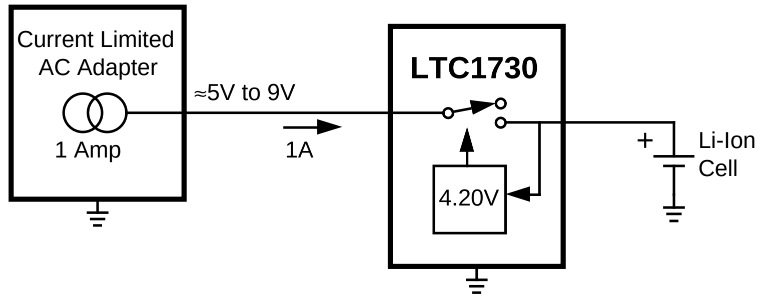


Figure 1. Basic LTC1730 Charger Concept

THE INPUT SUPPLY TO THIS DEMO BOARD MUST HAVE CURRENT LIMITING. THE CURRENT LIMIT DETERMINES THE CHARGE CURRENT.

The LTC1730 includes an overcurrent protection feature which will protect itself and the battery from excessive current in the event that an AC wall adapter is used that has the incorrect current limit, or no current limit. If the adapter current exceeds 1.5A, the charger's internal switch immediately turns off, and will turn on again after several hundred milliseconds. If the high current is still present, this condiion will continue. The average charge current in this condition is very low. See Figure 2.

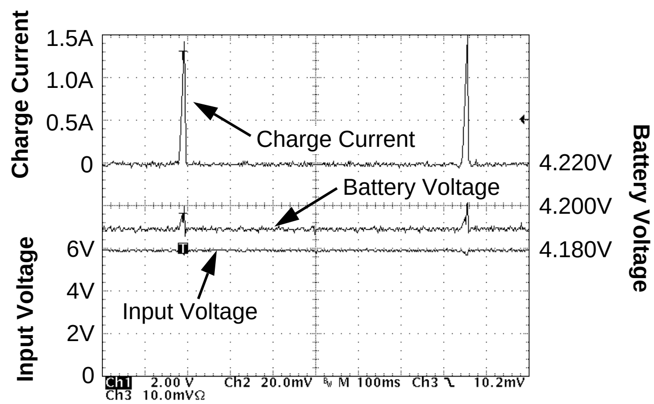


Figure 2. Waveforms showing overcurrent protection

At the begining of a typical charge cycle, if the battery voltage is less than 2.45V, a trickle current of 35mA will slowly bring the battery up to an acceptable voltage to start the full current portion of the charge cycle. Once the battery exceeds 2.45V the internal switch turns on and passes the full constant current of the wall adapter into the battery.

As the battery continues to charge, the battery voltage rises. When it is approximately 30mV below the programmed float voltage of 4.1V or 4.2V, the internal switch begins to cycle off and on. This cycling continues until the battery voltage (measured during the portion of the pulsing when no charge current is flowing) reaches 4.200V. As the battery voltage approaches the 4.2V threshold , the pulsing becomes less and less frequent, until it finially stops pulsing entirely. The battery is now fully charged. Typically, the pulsing will stop before the 3 hour safety timer ends the charge cycle. See Figure 3.

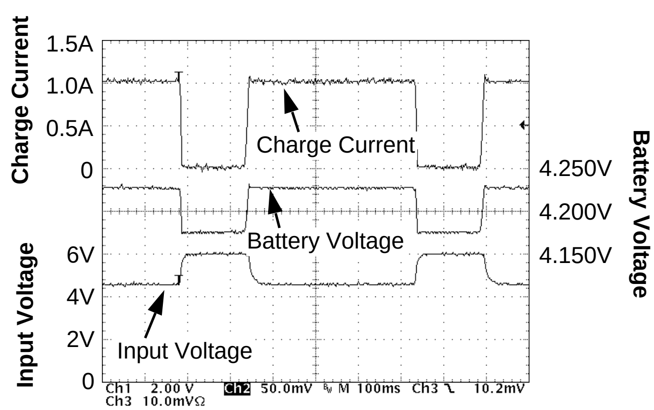


Figure 3. Waveforms showing pulsing for a near full charge battery condition

Note: Because of the ESR of the battery and associated wiring resistance, the battery voltage will rise when the internal switch is on and the current is flowing into the battery. The LTC1730 measures the battery voltage when the charge current is not flowing, and uses this voltage level to determine when to stop pulsing. Because of this resistance, the voltage at the charger output will be greater than the programmed float voltage when the charge current is flowing. Figure 3 shows a 50mV jump in battery voltage with 1A of charge current flowing, which matches exactly with the 50mΩ of DC resistance measured in the battery and associated wiring.

To evaluate this demoboard, connect a 5 to 8 Volt, 1A **current limited power source** to the +VIN and GND terminals of Demoboard DC384A. Connect a 4.1 or 4.2V discharged Li-Ion battery to the BAT and GND terminals. (Select the appropriate jumper location for JP1). Minimize the DC resistance between the charger output and the battery. The full output current of the power source will flow into the battery for approximately 30 to 60 minutes (depending on the capacity of the battery) and then will begin pulsing until the battery voltage reaches the programmed float voltage, or the 3 hour timer ends the charge.

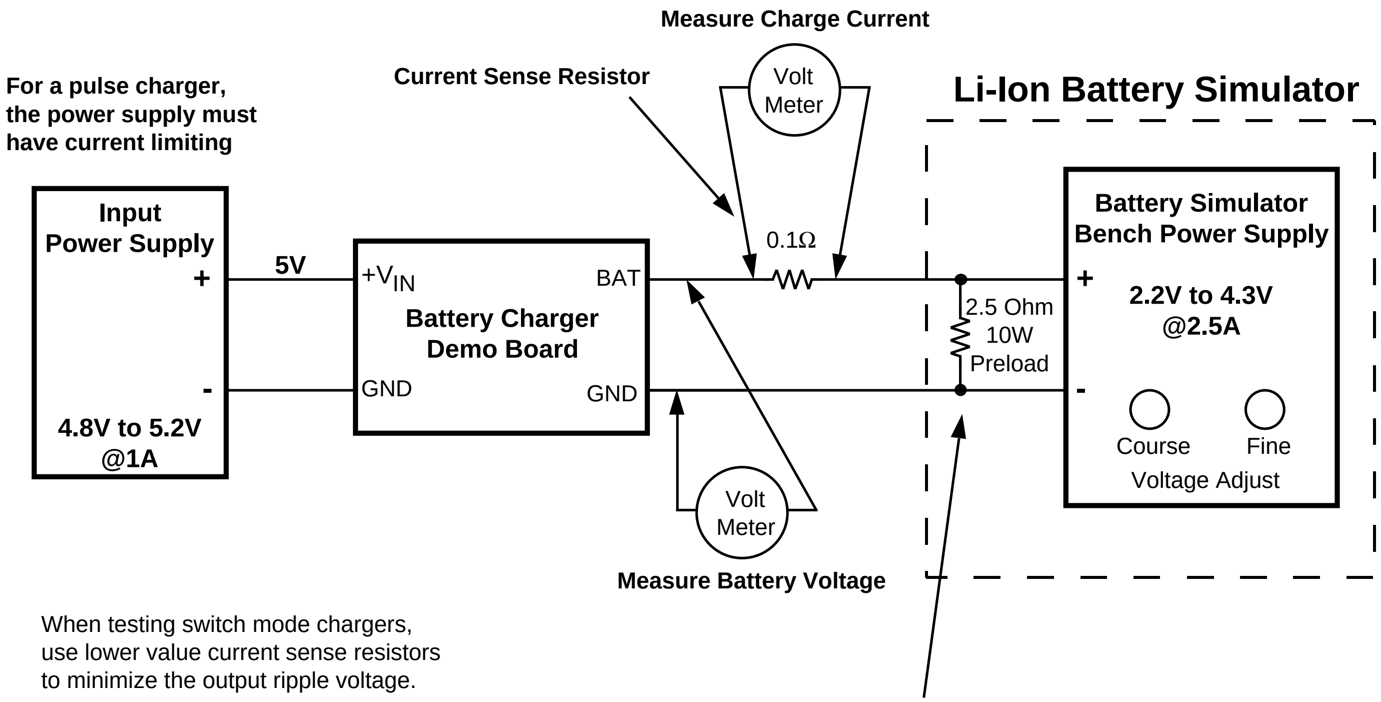
7/31/02

Battery Simulator

To Test Charger Operation Without Having to Charge and Discharge a Battery,

Use the following setup tor for testing the Battery Charger Demo Board. The battery simulator will will source and sink current, similar to an actual battery. Any level of charge from fully discharged to fully charged can be quickly simulated by simp;ly changing the battery simulator power supply voltage.

A fully discharged Li-Ion cell will be approx. 2.6V and a fully charged cell will be either 4.1V or 4.2V depending on the battery chemistry. When the cell is nearly fully charged, small changes in battery voltage will result in large changes in charge current .



When testing switch mode chargers, use lower value current sense resistors to minimize the output ripple voltage.

To determine the preload resistor value use Ohms law, R = E / I, with the following information; where E is the fully discharged battery voltage, and I is the maximum charge current + 10%.

To determine the maximum current required for the Battery Simulator Power Supply use Ohms law, I = E / R, where E = the maximum battery voltage, and R is the preload resistor value.