

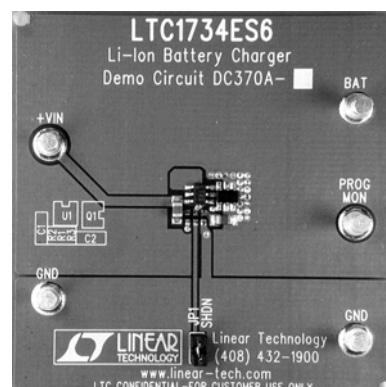
Quick Start Manual For Linear Technology

Demo board DC370A-A (4.1V) and DC370A-B (4.2V)

LTC1734 Linear Battery Charger for One Li-Ion Cell at 4.1V or 4.2V

Demonstration board DC370A is a constant-current/constant-voltage battery charger designed to charge one Lithium-Ion cell. This demoboard features a preset charge voltage ($\pm 1\%$) where the charge current can be easily programmed and monitored allowing for easy interface with a CPU or other circuitry providing charge termination.

The LTC1734 used on this demoboard drives an inexpensive PNP transistor in a linear regulator configuration that provides up to 700mA of charge current. The IC and the pass transistor are available in tiny 5 and 6-pin SOT 23 packages which reduces the total circuit area to less than 0.08 square inches, although additional pc-board copper area is needed for heat dissipation.



Other Features include;

- Preset float voltages of 4.1 & 4.2V $\pm 1\%$
- 700mA Constant Current (can be programmed for other charge currents ranging from 100mA to 700mA)
- Monitor charge current using the Program pin
- No isolation diode required
- No sense resistor required
- Manual Shutdown
- Low battery drain current when input supply is removed

Typical Demo Board Specifications

Input Voltage Range (V_{IN})	4.7V to 7V (upper range limited by pc board dissipation)
mode	Output Voltage (V_{BAT}) in constant voltage
DC370A-B	4.1 $\pm 1\%$ for DC370A-A and 4.2V $\pm 1\%$ for
current mode	Output Current (I_{BAT}) in constant
	700mA $\pm 10\%$
	Program pin voltage at full charge current
	Battery
1.5V $\pm 5\%$	
Drain Current with V_{IN} Removed	<1 μ A

Test Equipment Required for Demo Board Evaluation

Lab Power supply for input power	0 to 7V @ 1A
Digital voltmeter for measuring input voltage (V_{IN})	3-1/2 digits
Digital voltmeter for measuring battery voltage (V_{BAT})	4-1/2 digits, resolution to 1mV
Digital voltmeter for measuring program pin voltage	3-1/2 digits, resolution to 1mV
Digital voltmeter for measuring voltage across current sense resistor	3-1/2 digits
Li-Ion cell or *Battery Simulator	4.1 or 4.2V Rechargeable Li-Ion
Cell	
*Battery Simulator consists of;	
Power supply with coarse and fine output voltage adjust controls	0 to 5V @2A

Power resistor (preload for power supply)					2Ω	10W		
Current sense resistor for measuring charge current (I_{BAT})								
0.1Ω 1% 1W								
Current sense resistor for measuring battery drain current								
1kΩ 1% .5W								

Demoboard Evaluation

Begin by assuring that the SHDN jumper (JP1) near the bottom of the demo board is installed.

Referring to the setup diagram, connect the input power supply to the +V_{IN} and Ground pins of the demo board (power supply set for 0V). Connect the battery simulator (power supply also set to 0V) to the BATT and GND pins, with the 0.1Ω current sense resistor in the charge path as shown in the setup diagram. The battery simulator consists of an adjustable power supply and a 2 ohm 10 Watt resistor load in parallel with the power supply output. Connect the digital voltmeters to measure charger input voltage V_{IN}, charger voltage V_{BAT}, program pin voltage V_{PROG}, and charge current I_{BAT}.

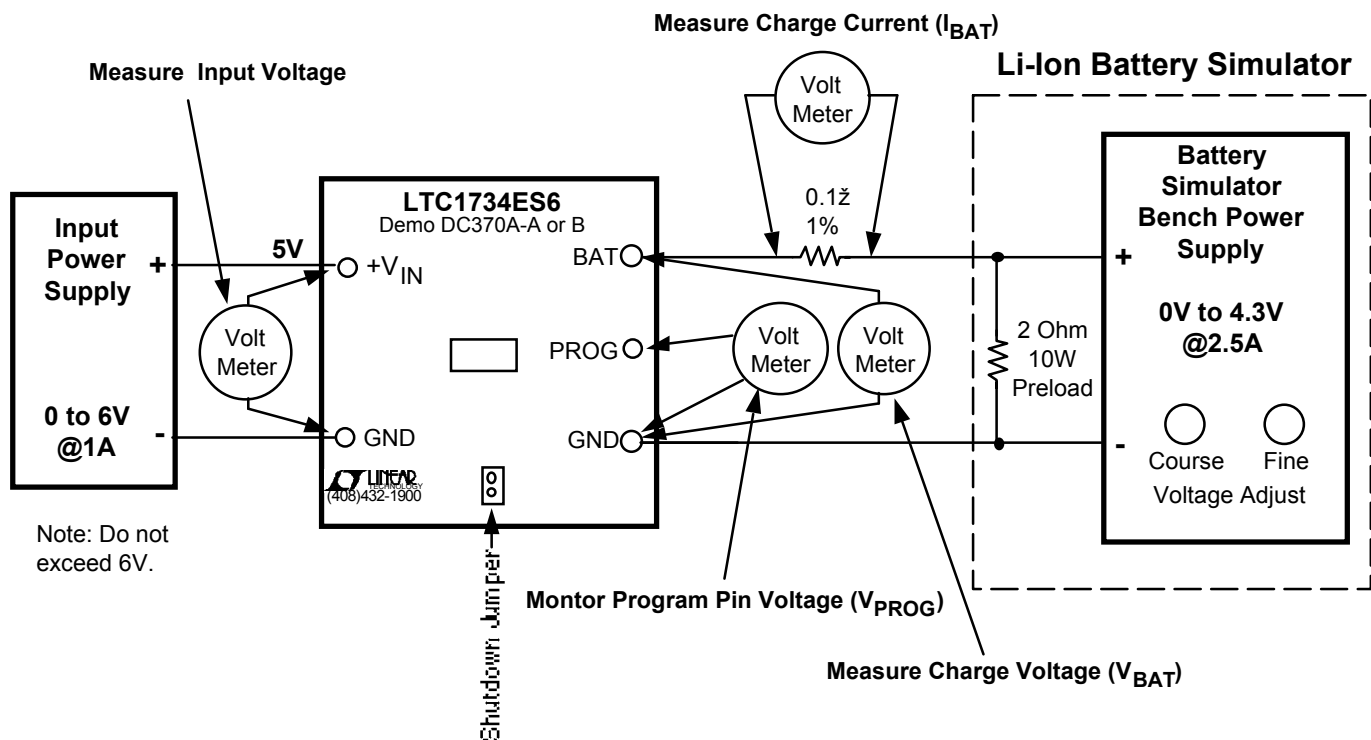
Undervoltage Lockout - Start the demoboard evaluation by increasing the input power supply to approximately 4.0V (battery simulator power supply set for 0V). The charger output voltage and charge current should be 0. The charger is off due to the undervoltage lockout feature.

Constant Current - Set the battery simulator power supply (V_{BAT}) to approximately 2.6V, and the input power supply to approximately 5.0V. The constant current portion of the charge cycle will immediately begin resulting in approximately 700mA of current flowing into the battery simulator, indicated by a reading of 70mV on the charge current DVM. This is the constant current portion of the charge cycle.

V_{PROG} Verification - With the 700mA charge current flowing into the battery simulator, measure the program pin voltage V_{PROG}. This voltage is proportional to charge current with 1.5V indicating full programmed current.

Constant Voltage - Begin increasing the battery simulator power supply, thus simulating a battery accepting charge. The charge current will remain at the programmed value of 700mA until the charger output voltage is within approximately 10mV of the of the preset charge voltage, at which time the charge current will begin to decrease. This is the beginning of the constant Voltage portion of the charge cycle.

Demoboard Test Setup Diagram



Continue slowly increasing the battery simulator power supply until the charge current drops to approximately 70mA (7mV on the charge current DVM), then read the charger output voltage on the DVM. This reading is the charger float voltage which will be either 4.1V or 4.2V $\pm$ 40mV depending on which version of the demoboard is being evaluated. The program pin voltage will indicate approximately 150mV, indicating 10% of the full programmed current.

Shutdown - Remove the SHDN jumper JP1. The charger will shut down dropping the charge current to 0mA. Quiescent current from the input supply will remain. Replace the jumper.

Sleep Mode - with input power removed, the LTC1734 enters a sleep mode dropping the battery drain current to near 0 μ A. To verify battery drain current, remove the input supply voltage or shut the supply off, replace the 0.1 Ω current sense resistor with a 1k Ω , and set the battery simulator power supply to approximately 4V. The charge current DVM will now read battery drain current with 1mV/ μ A.

Note; Although it would take more time, this charger can also be evaluated using a rechargeable Li-Ion battery instead of the battery simulator. If an actual battery is used, keep the DC resistance between the charger and the battery to a minimum, as this will affect the charge current in the constant voltage mode.