ACT Charger User Manual

A modular device for li-poly charging & capacity measurement

github.com/codebylytle/ACT_Charger

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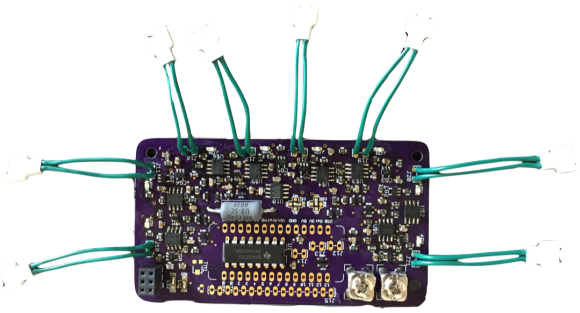

1 Specifications

VCC	5V
Max. Supply Current per Board	4.5A
Board Power Connectors	Phillips-head screw terminal
Programming/Debugging Interface	Micro USB
Battery Connectors	Molex 51006-0200
Charging Voltage	4.2V
Charging Current	500mA
Discharge load	8.2Ω
Number of Boards	1-16

2 Theory of Operation

This device is designed to charge and collect data concerning the performance of single-cell lithium polymer batteries. As such, it has three basic functions: charging batteries, discharging batteries while measuring power output, and serving a basic user-interface that allows for switching between modes and presents collected data after batteries have discharged. The system is controlled by an AVR micro-controller, which drives an LCD, takes user input from buttons, communicates with current measurement devices on each board over I2C, and switches each battery between charging and discharging states via serial-in/parallel-out shift registers. I2C and shift register data is transmitted between one master and up to 15 slave boards by a 5-pin bus.

3 Use

1. Charge Mode
    - 1. Cycle power. All batteries will begin charging on start-up.
    - 2. Plug in batteries in any arrangement.
    - 3. When a "Discharge?" prompt appears on the LCD, use the right button followed by the center "select" button to choose "N." The device will now charge all batteries until it is powered down.
    - Indicator LED's: Check the red LED next to the left of each battery connector for the status of that battery. If the light is lit, the battery is charging. If the light is not lit, the battery has finished charging. Known bug: when no battery is connected, the LED's switch on and off at a very high frequency, appearing only dimly lit. This does not impact charger functions.
2. Discharge Mode
    - 1. Cycle power. All batteries will begin charging on start-up.
    - 2. Plug in batteries in any arrangement.
    - 3. When a "Discharge?" prompt appears on the LCD, use the left button followed by the center "select" button to choose "Y." The device will now begin discharging the first battery (located next to the screw terminals) on each board, and all other batteries will continue charging. Once a battery reaches the minimum allowed voltage, it will begin charging and the next battery will begin discharging.
    - 4. When all batteries have finished discharging, the device will charge all batteries and display data recorded during discharge (see "Data Mode")
3. Data Mode
    - When a battery discharge cycle completes, a paginated display of each battery's capacity and a list of batteries which should be considered for disposal will appear on the LCD. Use the right and left buttons to scroll to a new page.
    - All batteries will continue charging while the device is in data mode.To exit data mode, cycle power to the device.
    - NOTE: All data is stored in volatile memory. If the device loses power, any collected data will be lost.
4. Serial Mode
    - Advanced users can access a similar UI with a live voltage and current readout on a serial console at 9600 baud by setting the "displayMode" variable in the charger firmware to 1.