To: LFEV-ESCM Team

FROM: Drew Jeffrey

DATE: 24 February 2014

SUBJECT: LCD Display Choice

ABSTRACT:

The Pack Manager monitors and controls the charging process of an individual battery pack. This memo details the LCD character screen that was chosen for the pack manager.

TECHNICAL FINDINGS:

In order to display important details to the user, an LCD display was chosen over discrete LED lights and 7-segment displays due to the adaptability allowed by a software-controlled display. It can support multiple display configurations and is easily changed if necessary via software. LCD displays can come as graphic or character displays. Graphic displays allow each pixel to be turned on and off, similar to a computer monitor. Character displays have a grid of cells which can each support an alphanumeric character. The TS-8160-4200 supports character display LCD screens via its LCD pin header on the board.

Character LCD displays come in different sizes. Since our display needs to show overall pack voltage, current, temperature, and status of the pack (charging, discharge, any errors), we have determined that a 20 character x 4 line display will suit our display needs. This is typically the largest standard size LCD display available.

In searching for 20x4-character LCD displays, we found two main options: A 14-pin driven LCD screen which would be attached to the LCD header pins on the TS-8160-4200, or a USB-capable option which can be controlled by the serial stream from the USB port on the TS-8160-4200. Drivers and code examples for the LCD header pins on the TS-8160-4200 are difficult to find, whereas USB driver support for Linux is plentiful and the CFA634 TFH-KU's manual provides an excellent reference for the commands used to control the display. The CFA634 TFH-KU uses about 150mW of power whereas other LCD displays will use around 15mW of power for operation. The CFA634 TFH-KU will cost $65 including cabling and a standard 20x4 character

display will cost around $30 including all necessary pin headers and cabling to attach it to the TS-8160-4200.

RECOMMENDATIONS AND DECISIONS:

We recommend the purchase of both the CFA634 TFH-KU and a standard 20x4 character display which will be used by the LCD headers on the TS-8160-4200. The CFA634 TFH-KU will provide an easy to use platform to quickly add an aesthetically pleasing display to the battery pack without the need for additional software libraries. This will cut down on software development allowing more focus on the other aspects in software which are more critical to pack function (such as the charging algorithm). However, we would like to recommend the buying of a standard 20x4 character display as a backup in case cutbacks in power consumption are required and the standard 20x4 display is to be used.

ATTACHED DOCUMENTS AND USEFUL INFORMATION:

ADAFruit Serial Backpack: https://www.adafruit.com/products/784#Technical_Details
ADAFruit 20x4 LCD Character Display: http://www.adafruit.com/products/198
CrystalFonts CFA634 TFH-KU: https://www.crystalfontz.com/product/CFA634TFHKU