P18262 - EVT Battery Management System

First Customer Interview - September 1, 2017

Attendees: Alex Young, Shane Snover, Greg Malanga, Ben Stewart, Steve Titus, Will McCaffrey, Jake Allison, Harold Paschal (guide).

What is the Timeline? Board Finished, Validation, Integration?

Must have a fully hardware validated system by 3/1/2018, but the earlier the better. Main device selection complete by 10/15/17 (i.e. uC, BMS chip, etc) to allow firmware and rest of EVT to begin development. Should have a detailed mechanical drawings by 2/1/2017 for integration considerations.

Intermediate milestones don't matter, just ultimate goal.

What Level of integration is expected? Wiring Harness, Firmware?

Deliver hardware only. Be sure that all hardware works appropriately (no duds).

Electrical design only, documentation, hardware tests (test plan). No extra integration required as part of MSD.

Constraints? Size of PCB, Max Current and Voltage, Microcontroller, Power?

Slave boards must fit within battery packs (60mm x 175mm x 25mm (WxLxH)).
150mm x 150mm x 25mm for boards outside of pack.
500V max (assuming configuration below).

LT for BMS chip preferred, not required.
Connectors should conform to EVT standards. Keyed connectors for idiot proofing are preferred.

Power inputs available, LVSS or pack voltage. BMS technically should always be on.

Main functions?

Monitor cell voltage actively and accurately. Temperature sensors on each slave (at least one per cell, extras ok). Coulumb counting/SOC – pack current sensing. Need stack to talk to each other.

Might want to use dual range current sensing.

Pack Configuration?

Nothing definite. Each board should monitor 12 in series (min). 120S, 25P. Subject to change. Should be defined within 4 weeks. (9/29/17)

What are the current user problems with the current design?

Biggest concern – not using latest BMS technology and microcontroller. Difficult to test and debug. Some hardware is over-complicated or unnecessarily derated.

Changes to budget?

$500 from MSD, $300 from EVT. $800 total. Should be enough to have two BMS systems (enough for two complete bikes).

Communications between customer and team?

Email is fine between customer, guide, and team.

Safety constraints?

Formula SAE rules for BMS, try to meet requirements. Each cell may need individual fuse. High voltage sources coming into board should be fused. Should be clearly marked on the boards.

Firmware desires?

Should have many debug test points and gpio indicators.

Floating point unit

No need for external watchdog timer.

What problems with other boards?

HID comms, debugging platforms and tool chains.

What has caused board failures, from HW perspective?

Inappropriate controller.

Spend a lot of time on hardware validation.

Targeting automotive grade components?

Not necessary, helps if cost is not too much of an issue. Temperature ratings should be primary consideration.

Electrical issues?

Over-speccing components, poor manufacturability, etc.

ADC read would cause reference voltage to drop.

Mechanical?

Mounting holes, floating (NC). 8/32 through-hole mounting screw.

Sensor Accuracy?

Temp +/- 2C; cell voltage within 30mV; pack within 500mV.