TO: LFEV-ESCM Team
FROM: Amira Ahsan,
       Prarthana Ranjit
DATE: 19th April, 2013
SUBJECT: I^2C Protocol

ABSTRACT:
The memo describes the updates to the I^2C communication protocol established for communication between master and slave PICs.

Setting the Address of the Slave PIC:
- The LSB is 0.
- Bit[3-1] - Cell number
- Bit[7-4] - Pack number

Default Address of the slave PIC has been set to 0x04

*Note: Pack numbering should start from 1. The PIC16LF1827 doesn’t support SSPxADD (address) values of 0, 1, or 2 in I2C mode.

Command formats:
Please note that these commands are to be written to the PIC first (12C write commands). In case of any of the get commands mentioned in this protocol, the I2C write is to be followed by an I2C read command.

<table>
<thead>
<tr>
<th>Board Address</th>
<th>Command Number</th>
<th>Data Byte High</th>
<th>Data Byte Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x 04(default)</td>
<td>0x 1X</td>
<td>0x XX</td>
<td>0x XX</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Board Address</th>
<th>Command Number</th>
<th>Data Byte High</th>
<th>Data Byte Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x 04(default)</td>
<td>0x 0X</td>
<td>0x 00 - 0xFF</td>
<td>0x 00 - 0xFF</td>
</tr>
</tbody>
</table>

MSB of read/get commands = 1
MSB of write/set commands = 0
Command Set:

<table>
<thead>
<tr>
<th>Command #</th>
<th>Description</th>
<th>#Bytes Returned</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x 10</td>
<td>Gets the cell voltage</td>
<td>2</td>
</tr>
<tr>
<td>0x 11</td>
<td>Gets the cell temperature</td>
<td>2</td>
</tr>
<tr>
<td>0x 12</td>
<td>Gets the pack charging current</td>
<td>2</td>
</tr>
<tr>
<td>0x 13</td>
<td>Gets the pack discharging current</td>
<td>2</td>
</tr>
<tr>
<td>0x 14</td>
<td>Gets the bypass resistor switch state</td>
<td>2</td>
</tr>
<tr>
<td>0x 15</td>
<td>Gets the slave/board address</td>
<td>2</td>
</tr>
<tr>
<td>0x 16</td>
<td>Gets the software version</td>
<td>2</td>
</tr>
<tr>
<td>0x 17</td>
<td>Gets 0x0042(test command)</td>
<td>2</td>
</tr>
<tr>
<td>0x 18</td>
<td>Gets the bypass time in minutes</td>
<td>2</td>
</tr>
<tr>
<td>0x 19</td>
<td>Gets charging coulomb count as well as the number of times the charging current was summed</td>
<td>8*</td>
</tr>
<tr>
<td>0x 1A</td>
<td>Gets discharging coulomb count, as well as the number of times the discharging current was summed</td>
<td>8*</td>
</tr>
<tr>
<td>0x 1B</td>
<td>Gets cell voltage and temperature</td>
<td>4</td>
</tr>
<tr>
<td>0x 1C</td>
<td>Gets the voltage, temperature and charging current of the cell</td>
<td>6</td>
</tr>
<tr>
<td>0x 1D</td>
<td>Gets the voltage, temperature and discharging current of the cell</td>
<td>6</td>
</tr>
<tr>
<td>0x 1E</td>
<td>Gets the time elapsed since the bypass switch has been set</td>
<td>6**</td>
</tr>
<tr>
<td>0x 00</td>
<td>Sets the bypass switch state</td>
<td>n/a</td>
</tr>
<tr>
<td>0x 01</td>
<td>Sets the board address</td>
<td>n/a</td>
</tr>
<tr>
<td>0x 02</td>
<td>Sets the bypass time in minutes</td>
<td>n/a</td>
</tr>
<tr>
<td>0x 03</td>
<td>Calls the function to test the watchdog timer</td>
<td>n/a</td>
</tr>
</tbody>
</table>

* The first 4 bytes constitute the coulomb count. The following four bytes refers to the number of times the sampled current reading was summed to generate the coulomb count.

** The first two bytes represent minutes. The next two bytes refer to the seconds while the last two bytes refer to milliseconds.