Lithium BMS AT Instruction Set

Version 1.0 (15.4.2018)

TeamBMS 2018

Contents

1. Overview

This document provides AT commands used by LithiumBMS board and shows examples on how to use them.

1.1 Communication parameters

The LithiumBMS board communicates via two wire serial interface – UART. Pins are labeled on the board (RX, TX). Default speed of communication is 115200bps, with eight data bits, one stop bits and no parity.

2. Commands

2.1 Basic configuration commands

2.1.1 AT+VCUTOFF – Set cutoff voltages per cell

	Set command	**Query command**
Command	AT+VCUTOFF=<min>,<max>	AT+VCUTOFF?
Response	OK	+VCUTOFF:<min>,<max>
Parameters	• <min> Lower threshold of voltage per cell • <max> Higher threshold of voltage per cell	
Notes	• If voltage of any cell is outside of these boundaries, accupack is disconnected (SW fuse triggered) • All values are in volts, floats are accepted	
Examples	AT+VCUTOFF=3.5,4.25	AT+VCUTOFF?

2.1.2 AT+ICUTOFF – Set cutoff current for software fuse

	Set command	**Query command**
Command	AT+ICUTOFF=<current>	AT+ICUTOFF?
Response	OK	+ICUTOFF:<current>
Parameters	• <current> Current threshold	
Notes	• If current exceeds set value, accupack is disconnected (SW fuse triggered) • All values are in amperes, floats are accepted	
Examples	AT+ICUTOFF=16	AT+ICUTOFF?

2.1.3 AT+TCUTOFF – Set cutoff temperature of accupack

	Set command	**Query command**
Command	AT+TCUTOFF=<current>	AT+TCUTOFF?
Response	OK	+TCUTOFF:<temp>
Parameters	• <temp> Temperature threshold	
Notes	• If accupack temperature exceeds set value, accupack is disconnected (SW fuse triggered) • All values are in degrees Celsius, floats are accepted	
Examples	AT+TCUTOFF=45	AT+TCUTOFF?

2.1.4 AT+VBAL – Set min/max delta voltage between cells to turn on/off balancer

	Set command	**Query command**
Command	AT+VBAL=<onValue>,<offValue>	AT+VBAL?
Response	OK	+VBAL:<onValue>,<offValue>
Parameters	• <onValue> Turn on delta voltage between cells • <offValue> Turn off delta voltage between cells	
Notes	• If a cell voltage is different from others more than <onValue>, balancer is turned on • If a cell voltage is different from others less than <offValue>, balancer is turned off • All values are in volts, floats are accepted	
Examples	AT+VBAL=0.3,0.2	AT+VBAL?

2.1.5 AT+RSENSE – Set current sensing resistor value

	Set command	**Query command**
Command	AT+RSENSE=<resistance>	AT+RSENSE?
Response	OK	+RSENSE:<resistance>
Parameters	• <resistance> Current sense resistor value	
Notes	• All values are in ohms, floats are accepted	
Examples	AT+RSENSE =0.3,0.2	AT+RSENSE?

2.2 Advanced configuration commands

2.2.1 AT+LED – Enable/disable LED indication

	Set command	**Query command**
Command	AT+LED=<enable>	AT+LED?
Response	OK	+LED:<enable>
Parameters	• <enable> Led indication status	
Notes	• Value of 1 means enabled, value of 0 means disabled	
Examples	AT+LED=1	AT+LED?

2.2.2 AT+BTN – Enable/disable reset of software fuse using button

	Set command	**Query command**
Command	AT+BTN=<enable>	AT+BTN?
Response	OK	+BTN:<enable>
Parameters	• <enable> SW fuse can/cannot be reset with button	
Notes	• Value of 1 means enabled, value of 0 means disabled	
Examples	AT+BTN =1	AT+BTN?

2.2.3 AT+EBAL – Enable/disable automatic balancer

	Set command	Query command
Command	AT+EBAL=<enable>	AT+EBAL?
Response	OK	+BTN:<enable>
Parameters	• <enable> Balancing enabled/disabled	
Notes	• Value of 1 means enabled, value of 0 means disabled	
Examples	AT+EBAL=1	AT+EBAL?

2.2.4 AT+VSTIME – Set cell voltage measurement period

	Set command	Query command
Command	AT+VSTIME=<period>	AT+VSTIME?
Response	OK	+VSTIME:<period>
Parameters	• <period> Period of voltage measurement	
Notes	• All values are in seconds, floats are accepted	
Examples	AT+VSTIME=5.0	AT+VSTIME?

2.2.5 AT+ISTIME – Set current measurement period

	Set command	Query command
Command	AT+ISTIME=<period>	AT+ISTIME?
Response	OK	+ISTIME:<period>
Parameters	• <period> Period of current measurement	
Notes	• All values are in seconds, floats are accepted	
Examples	AT+ISTIME=0.25	AT+ISTIME?

2.3 Software use control commands

2.3.1 AT+SWFRES – Reset software fuse

	Set command	Query command
Command	AT+SWFRES	-
Response	OK	-
Parameters	-	
Notes	• Reset SW fuse, if triggered	
Examples	AT+SWFRES	-

2.3.2 AT+SWFAUTORES – Enable/disable automatic software fuse reset

	Set command	Query command
Command	AT+SWFAUTORES=<enable>	AT+SWFAUTORES?
Response	OK	+SWFAUTORES:<enable>
Parameters	• Enable/Disable SW fuse reset with button	
Notes	• Value of 1 means enabled, value of 0 means disabled	
Examples	AT+SWFAUTORES=1	AT+SWFAUTORES?

2.4 Basic status commands

2.4.1 AT – Check communication

	Set command	Query command
Command	-	AT?
Response	-	OK
Parameters	-	
Notes	• Check for communication	
Examples	-	AT?

2.4.2 AT+VPACK – Read accupack voltage

	Set command	Query command
Command	-	AT+VPACK?
Response	-	+VPACK=<voltage>
Parameters	• <voltage> Accupack voltage	
Notes	• All values are in volts, floats accepted	
Examples	-	AT+VPACK?

2.4.3 AT+I – Read output current value

	Set command	Query command
Command	-	AT+I?
Response	-	+I=<current>
Parameters	• <current> Current to/from accupack	
Notes	• Positive if charging, negative otherwise • All values are in amperes, floats accepted	
Examples	-	AT+I?

2.4.4 AT+T – Read accupack temperature

	Set command	Query command
Command	-	AT+T?
Response	-	+T=<temp>
Parameters	• <temp> Temperature of accupack	
Notes	• All values are in degrees Celsius, floats accepted	
Examples	-	AT+T?

2.5 Advanced status commands

2.5.1 AT+NCELLS – Read number of cells connected

	Set command	Query command
Command	-	AT+NCELLS?
Response	-	+NCELLS=<num>
Parameters	• <num> Number of detected cells	
Notes	-	
Examples	-	AT+NCELLS?

2.5.2 AT+VCELLS – Read voltages of all cells

	Set command	Query command
Command	-	AT+VCELLS?
Response	-	+VCELLS=<v1>,<v2>,…,<v6>
Parameters	• <vX> Voltage of Xth cell	
Notes	• All values are in volts, floats accepted	
Examples	-	AT+VCELLS?

2.5.3 AT+BAL – Read balancer status

	Set command	Query command
Command	-	AT+BAL?
Response	-	+BAL=<b1>,<b2>,…,<b6>
Parameters	• <bX> Status of balancer for Xth cell	
Notes	• Value of 1 means on, value of 0 means off • All values are in volts, floats accepted	
Examples	-	AT+VCELLS?

2.5.4 AT+HWFUSE – Read hardware fuse status

	Set command	Query command
Command	-	AT+HWFUSE?
Response	-	+HWFUSE=<state>
Parameters	• <state> Status of HW fuse	
Notes	• Value of 1 means OK, value of 0 means triggered	
Examples	-	AT+HWFUSE?

2.5.5 AT+SWFUSE – Read software fuse status

	Set command	Query command
Command	-	AT+SWFUSE?
Response	-	+SWFUSE=<state>
Parameters	• <state> Status of SW fuse	
Notes	• Value of 1 means OK, value of 0 means triggered	
Examples	-	AT+SWFUSE?