

# LION Li-BMS

Datasheet

## Modular Battery Management System

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# LION Li-BMS

## Overview

### System Description and Structure

The battery management system Li-BMS of LION Smart is a universal measuring, monitoring and control system for energy storage devices, based on lithium-ions. As a result of its modular hardware and software structure, the system can be easily configured to various kinds and sizes of battery packs and different scopes of application. A web-based graphical user interface allows comfortable configuration and commissioning of the battery pack.

The Li-BMS consists of the control module LION Control Module (LCM) with a central processor unit which can be flexibly connected to up to 16 measurement modules LION Measurement Module (LMM) via a bus system. The system features a fast and precise measurement of cell voltages and cell temperatures.

Due to the large number of available measurement channels and interfaces for communication with external devices, the Li-BMS is an ideal platform for experimental and development projects. Sophisticated security concepts and high-quality electronic components guarantee highest reliability, precision, performance and efficiency.

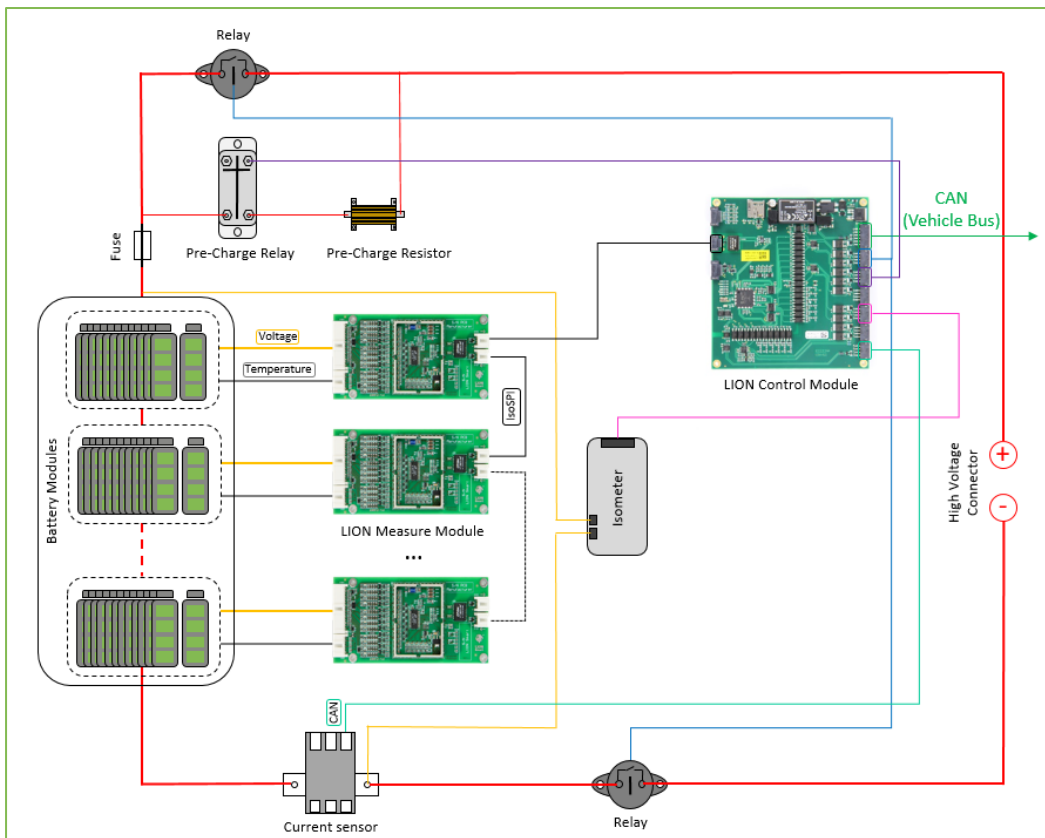


Figure 1: Block diagram BMS (simplified representation)

# LION Li-BMS

## Functions

### Cell Data Measurement

- Cell voltages: up to 18 channels per measurement module with a measuring range from 0 V to 5.0 V
- Cell temperatures: up to 12 channels per measurement module with a temperature measuring range from -40°C to +85°C

### Cell Monitoring and Balancing

- Compliance with defined voltage and temperature limits
- Battery power forecast for other control devices
- Passive balancing with equalization up to 50 mA (optionally expandable to 4 A)

### Utilization of Additional Analog Sensors

- Insulation resistance: e.g. Bender ISOMETER® 3204
- Current flow: e.g. Isabellenhütte ISAscale® IVT

### Circuit Breaker Control

- Control of the contactors with a 12 V coil voltage (high-side, low-side and pre-charge contactors)
- Additional outputs for controlling the cooling fan or pump

### Communication

- CAN external/internal (e.g. Isabellenhütte ISAscale® IVT)
- UART for development (WebGUI)
- isoSPI for module's internal communication
- Status and diagnostic output

### Data Logging

- Storage on internal MicroSD card
- External Database Connection

### Open and Scalable Software Architecture

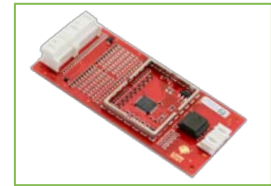
- Up to 16 Measure Modules per Control Module
- System size up to 800 V
- Flexible expansion of functions and adaptation to your own requirements
- Seamless integration into own algorithms, e.g. for SoC and SoH calculation
- Open code base (standard ANSI-C99), API for commercial development path

# LION Li-BMS

## System Module

### LION Measure Module (LMM)

- Precise voltage and temperature measurements
- Passive balancing method
- For up to 18 cells (based on Linear Technology)



### Technical Specifications

	LMM12-0.2	LMM12	LMM18
<b>General</b>			
Max. number of cells (per LMM)	12	12	18
Total Voltage (per LMM)	11...55 V	11...55 V	16...90 V
LxWxH	117 x 56 x 15 mm	120 x 60 x 11 mm	120 x 60 x 15 mm
Weight	43 g	36g	45 g
<b>Environment</b>			
Operating temperature	-40°C...+85°C	-40°C...+85°C	-40°C...+85°C
Storage temperature	-50°C...+105°C	-50°C...+105°C	-50°C...+105°C
<b>Power supply</b>			
Supply voltage	9...18 V	9...18 V	9...18 V
Current consumption	typically 10 mA	typically 10 mA	typically 25 mA
Standby current consumption	< 0,01 mA	< 0,01 mA	< 0,02 mA
<b>Voltage measurement</b>			
Measuring range	0 V...5,0 V	0 V...5,0 V	0 V...5,0 V
Accuracy (absolute)	± 1,5 mV	± 1,5 mV	± 2,5 mV
<b>Temperature measurement</b>			
Cell measurement channels	up to 12	up to 3	up to 8
Measuring range	-40°C...+85°C	-40°C...+85°C	-40°C...+85°C
Accuracy (absolute)	±1,5°C*	±1,5°C*	±1,5°C*
Operating temp. channels	1	2	1
<b>Cell balancing</b>			
Balancing method	Passive balancing	Passive balancing	Passive balancing
Balancing current	typ. 50 mA @ 4,2 V (optional up to 4 A)	typ. 50 mA @ 4,2 V	typ. 78 mA @ 4,2 V
<b>Interfaces</b>			
isoSPI	available	available	available
SPI	optional	optional	
<b>Battery Monitor</b>			
	LTC6804	LTC6811	LTC6813

\*with recommended NTC temperature sensor: NTC 10 kΩ @ 25°C, β Value: 3977

# LION Li-BMS

## System Module

### LION Control Module

- Powerful and secure computing unit
- Open and flexible software architecture
- Additional inputs and outputs



### Technical Specifications

#### LCM

#### Dimensions

LxWxH	142 x 130 x 17 mm
Weight	120 g

#### Environment

Operating temperature	-40°C...+85°C
Storage temperature	-50°C...+105°C

#### Power supply

Operating voltage	9...18 V, 12 V nominal
LCM Current consumption	100 mA, typically 150 mA
LCM + peripheral current consumption	Max. 15 A

#### Breaker outputs

Number of switching channels	7
Switching current single	≤ 5 A
Switching current total	≤ 15 A

#### Digital inputs

Number of input channels	7
Input voltage	12 V

#### Analog inputs

Number of input channels	4
Input voltage	0...12 V

#### Operating temperature monitoring

Number of sensors	1
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#### Memory

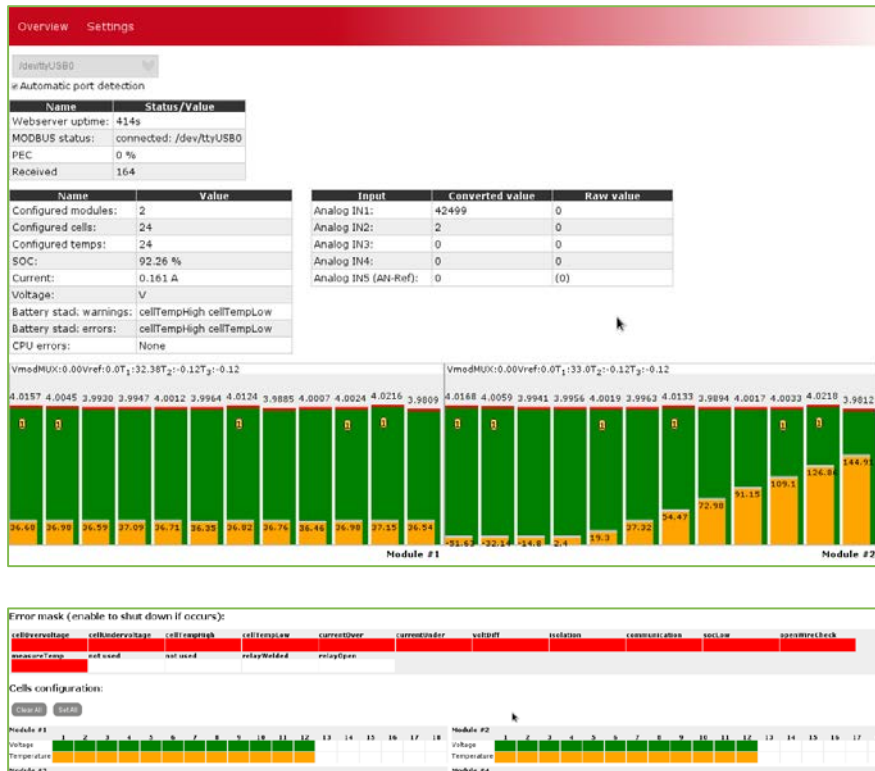
EEPROM	128 KB
MicroSD	4 GB

#### Communication interfaces

isoSPI	1x
CAN, HS, up to 1 Mbits/s	2x (public/private)
UART, TTL	1x 57.6 kBaud

### Web-based User Interface

- Platform-independent and re-brandable
- Configuration of control module parameters
- Graphical representation of the values measured by battery
- Logging of measured values into data base



# LION Li-BMS

## Contact

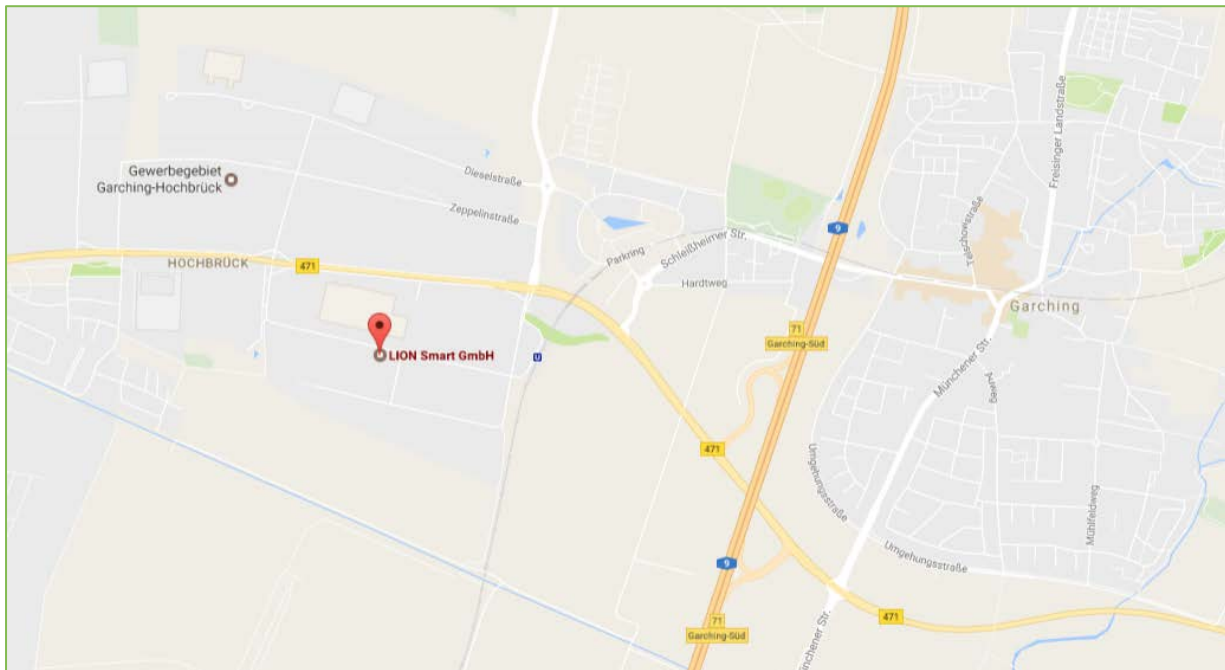
### Contact

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