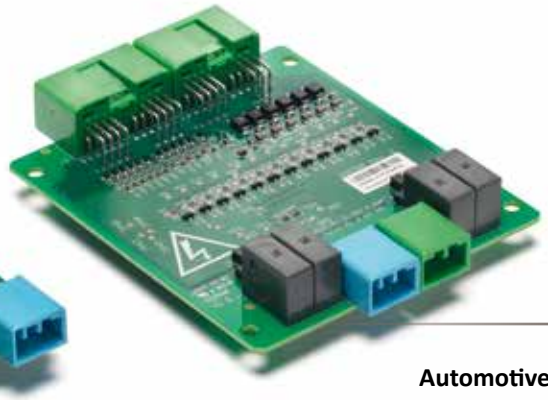
LiBAL n-BMS™
Networked Battery Management System

LiTHIUM BALANCE
BATTERY MANAGEMENT SYSTEMS



Automotive BMS for:
- **Pure Electric vehicle**
- **Hybrid Electric vehicle**
- **High Performance Electric vehicle**
- **Electric motorbikes**

INTRODUCTION

The networked LiBAL n-BMS has been developed around the new communication standard isoSPI, which essentially does not require programmable processors on CMU's (Slave PCB) in the BMS network. In any application, this is a huge advantage, because it does not require software on the CMU and therefore greatly simplifies in-field maintenance. In addition, the isoSPI communication network ensure the most cost efficient communication circuit in the market.

The n-BMS is developed to meet all relevant automotive requirements. ISO 26262 compliant design with key components such as Processor, ASIC and PSU carefully selected to meet the functional safety at ASIL C level.

The n-BMS can be configured with up to 32 CMU's. Each CMU can monitor up to 12 cells in series and thus the n-BMS can monitor in total up to 384 cells in series.

The n-BMS can measure temperature with an accuracy up to +/-1 C and meassure cell voltages with an accuracy of +/-1,5 mV, throughout the entire temperature range (-40 to +85 °C).

The n-BMS Creator™ software, enable the battery designer to create a unique Battery design based on the n-BMS hardware. The n-BMS Creator™ software facilitates a unique safety strategy, battery performance optimisation, charge time reduction as well as ensuring the best possible battery life.

SAFETY
- ISO 26262 rated components and design
- Self-test and redundancy in safety critical measurement circuits
- Open circuit detection

BATTERY LIFE
- High frequency sampling of current (100 mS) allows optimal detection of pulses
- Powerful and intelligent dissipative balancing at 200mA per cell
- -40° to +85°C operational range

PERFORMANCE
- ±1.5 mV accuracy in the complete temperature range (cell voltage)
- Optimized low power consumption mode
- ±1 °C accuracy in temperature measurement
- Advanced SOC algorithm with OCV compensation
- Advanced SOH algorithm
- Advanced SOP Algorithm

USABILITY
- RTC + logging of events, errors and warnings
- BMS Creator PC tool for easy configuration
- Optional current sensing (Hall effect or Shunt)
- CAN UDS tool

Applications

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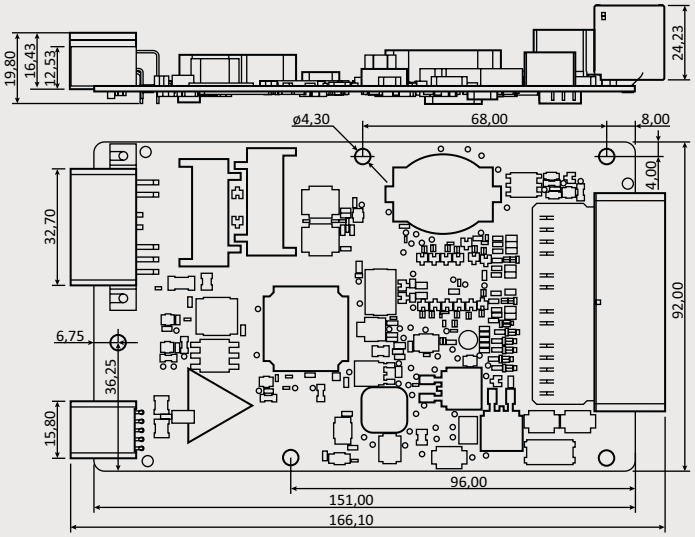
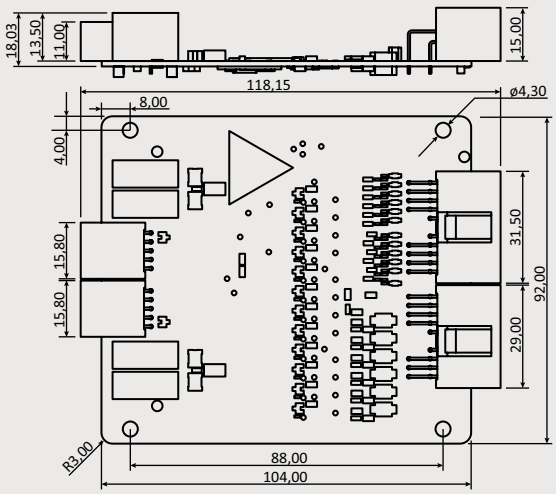


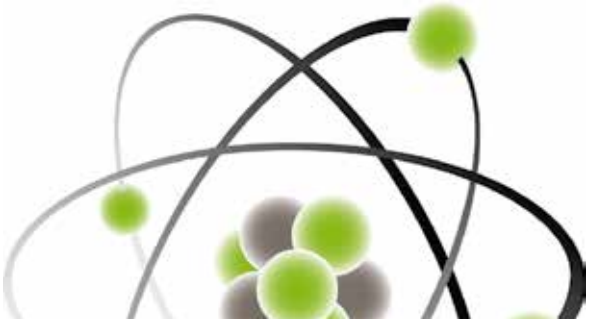
n-BMS MCU



n-BMS CMU

Dimensions in MM

PARAMETERS	SPECIFICATIONS
Master Control Unit (MCU)	
Power supply	6-35 V
Number of CMU's supported	1-32
Number of cells in series for total system	384
Range of high voltage measurement	0 - 1000 VDC
Accuracy of high voltage measurement	±1 VDC
Range of current measurement input Shunt	±150 mV
Accuracy of current measurement input Shunt	±1.0 mV -40 – 85 °C
Range of current measurement input (Hall effect sensor)	0.0 – 5.0 V, 0.0 -2.5 V current in, 2.5 V – 5.0 V current out
Accuracy of current measurement input (Hall effect sensor)	±1.5 mV -40 – 85 °C
Accuracy of temperature (NTC)	±1 °C -40 – 85 °C
Ground fault detection (leakage) levels	250/500/1000 Ω/V Between GND and HV+/-
Standby Consumption	<8,5 mW at 12V supply
Active Consumption	<3,5 W at 12 V supply
Communication interface, master-slave	isoSPI
Supported CAN communication type	CAN 2.0A/B 11 bit and 29 bit IDs
Supported CAN speeds	125, 250, 500, 1k kbit/sec
Number of CAN ports	2, one isolated CAN, one non-isolated CAN.
External GPIOs	16 (Active Low)
Charger control interfaces	CAN
Cell Monitoring Unit (CMU)	
Number of cells per unit	3-12 Cells (minimum 11 V, to power the CMU)
Detectable cell voltage	0 - 5 VDC
Cell balancing topology	Dissipative
Cell balancing current	200 mA, at cell voltage 4.2 V
Cell voltage typical sampling time	100 ms
Accuracy of single cell voltage	±1.5 mV from -40 to +85 °C
Range of Temperature measurements	-40 to +85 °C
Accuracy of cell temperature (NTC)	±1 °C -40 – 85 °C
Communication interface	isoSPI (Max. 5 m shielded cable between boards)
Standby Consumption	<269µW (with 12 cells @ 3,2 V)
Active Consumption	<326 mW (with 12 cells @ 3,2 V)
Patents	ZT 200780048774, EP 0781788.6, US 8.350.529



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