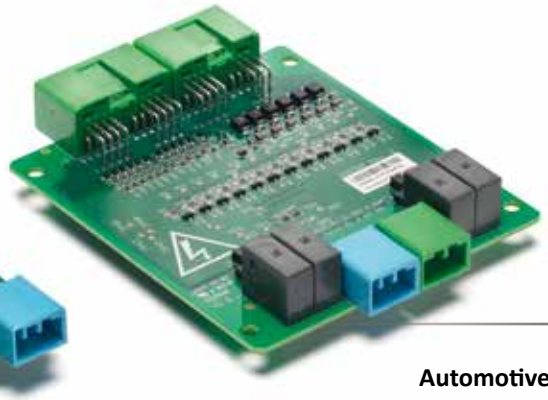
LiBAL n-BMS™
Networked Battery Management System

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 independent programmable processors on board the slaves in the BMS network. In any application, this is a huge advantage, because it does not require software on the slave processors, and therefore greatly simplifies in-field mainte-nance. In addition, the isoSPI communication network facilitate 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 compo-nents such as Processor, ASIC and PSU are carefully selected to meet the safety standard at ASIL C rate.

The system consists of a Master Control Unit (MCU) and up to 32 Cell Monitoring Units (CMU's), that each monitor up to 12 cells in series equal to total 384 cells in series.

The n-BMS can reach temperature accuracy up +/-1 °C and cell voltage measurement accuracy of +/- 1.5 mV, throughout the entire temperature range (-40 to +85 °C).

The BMS Creator™ software, enable the battery designer to create a unique BMS based on the n-BMS hardware. With the BMS Creator a customized application dedicated safety strategy, battery performance as well as battery life, can be achieved.

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 (down to 20 mS) allows optimal detection of pulses
Powerful and intelligent passive 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

USABILITY

RTC + logging of events, errors and warnings
BMS Creator PC tool for easy configuration
Open API to build unique BMS code
Optional current sensing (Hall effect or Shunt)
CAN UDS tool

Applications

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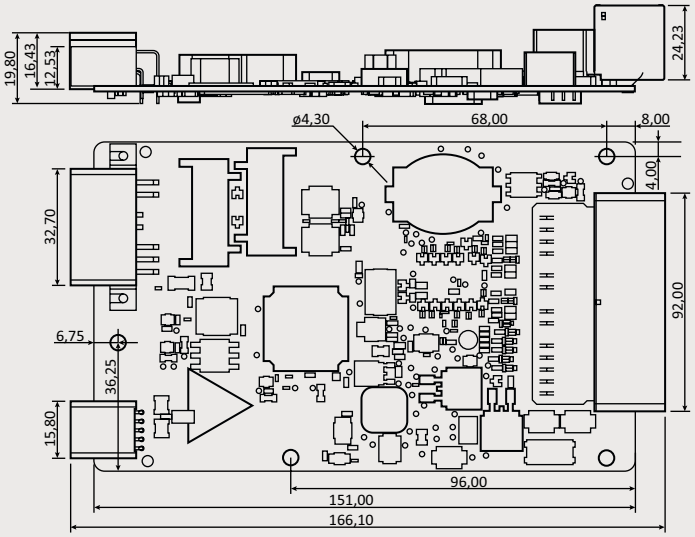
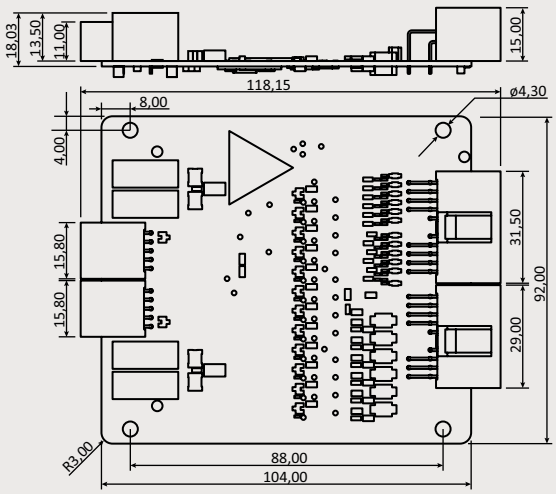


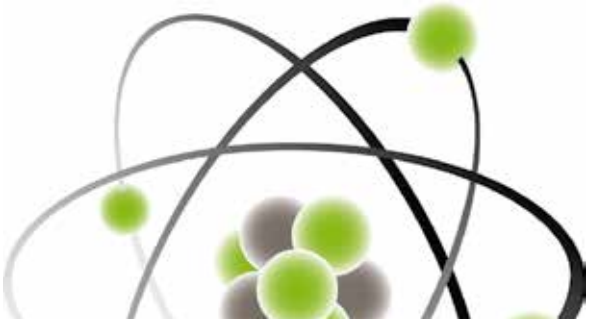
n-BMS MCU



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 (Down to 20 ms is possible)
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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