Melexis
INNOVATION WITH HEART

MLX91231

SMART IVT BATTERY SENSOR

SHUNT-BASED DC CURRENT SENSING WITH INTEGRATED SAFETY

MLX91231

The MLX91231 is a smart Shunt-based current sensor and is part of Melexis Gen 3 portfolio. With a measurement of three physical quantities (current, voltage and temperature) and a dedicated 32 KB Flash memory on a single IC, this ASIL compliant product is ideal for safety applications. With its diagnostics the MLX91231 is removing an important part of the burden from the integrator in developing all the safety mechanisms. That includes an on-chip overcurrent detection. The MLX91231 comes with ±0.25% accuracy over temperature (-40° to 125°C) and over lifetime all-in. It is boosting the accuracy of Shunt DC current sensing. The integrated MCU enables automatic gain control to cover higher dynamic ranges. The on-board flash memory supports custom software deployment and extensive compensation of system imperfections. Supplied with a regulated 5V or directly connected to the 12V battery, the MLX91231 outputs measurements and diagnostics either on a LIN bus or via UART.
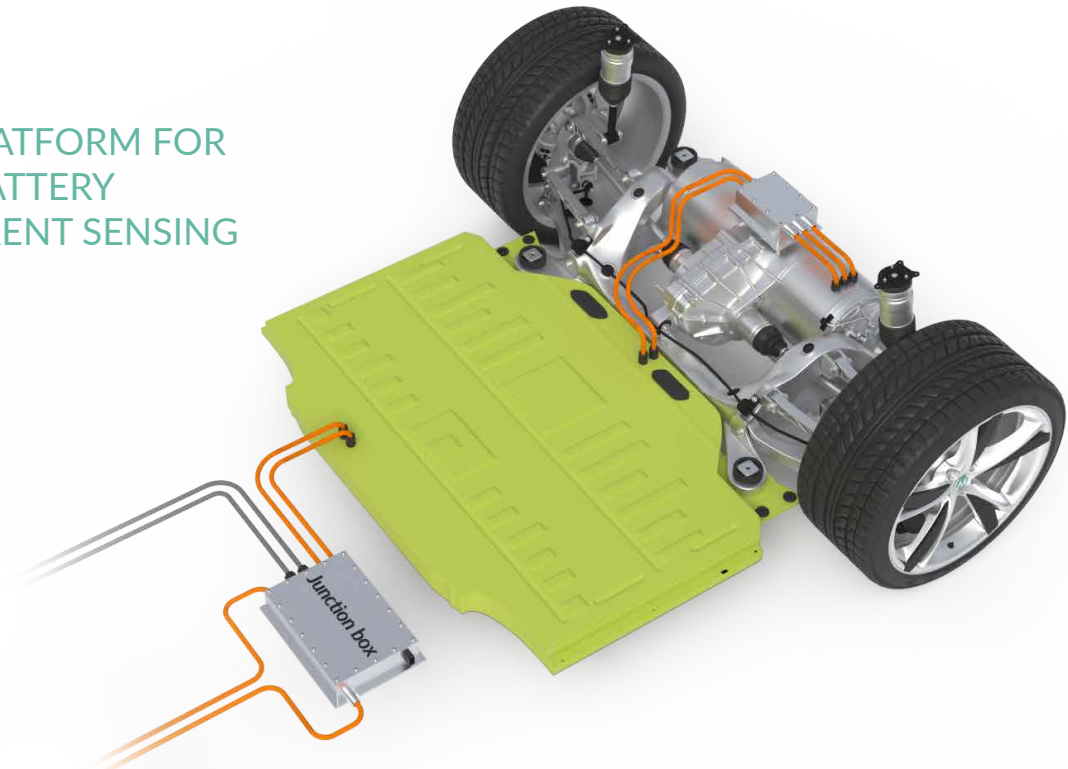
KEY FEATURES

- IVT battery measurements:
  - Shunt-based current sensor
  - Internal (PTAT) temperature sensor
  - Voltage measurement
- 16-bit MCU Memories:
  - 32 KB Flash
  - 128 B Flash Configuration Sector
  - 20 KB ROM
  - 2 KB RAM
  - 512 B EEPROM
- LIN/UART communication
  - LIN Physical Layer compliant to ISO17987-4 and SAE J2602
  - UART as CAN MCU bridge
  - Wake-up on LIN and UART or on internal timer
- Overcurrent detection functionality (<500µs)

- Ambient temperature from -40°C to 125°C
- Possible Automatic Gain Control (AGC) for higher dynamic range
- Supply voltage: 4.5 to 18V (12V battery)
- Low current consumption (<21mA), programmable duty cycled sleep mode (RAM content maintained at <100µA)
- Magnetic range from -100mV to 256mV
- ISO 26262 ASIL B(D) compliant SEooC (Safety Element out of Context)
- AEC-Q100 Grade 1 automotive qualified
- Low level SW libraries provided by Melexis
- User programmable transfer characteristic
- RoHS compliant package SOIC8 (DC)

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APPLICATIONS
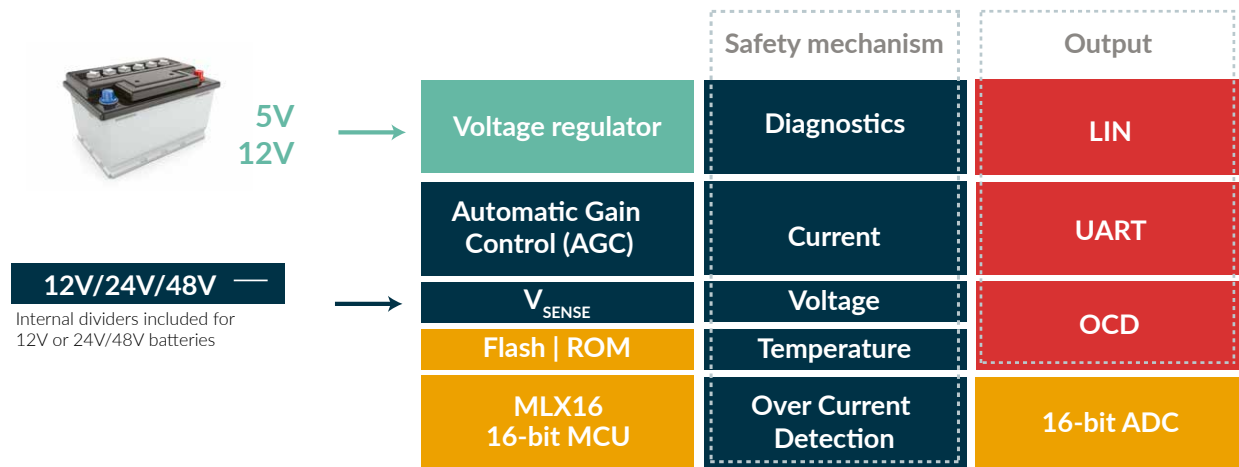
Hall based primary and redundant current measurement (homogenous or heterogenous sensing technology):

- Battery Terminal Sensor 12V/24V
- Battery Management System 48V/HV
- Enabling Battery State of Charge (SoC), State of Health (SoH) and State of Function (SoF)
- Smart Battery Disconnect Unit, Junction Box or Power Relay Assembly

- Smart Pyrofuses
- Smart HV relays or contactors
- HV DC FastCharge current sensing
- Zone controller
- Power distribution unit

IC PLATFORM FOR EV BATTERY CURRENT SENSING

Junction box

BLOCK DIAGRAM

	Safety mechanism	Output
5V 12V → **Voltage regulator**	Diagnostics	**LIN**
Automatic Gain Control (AGC)	Current	**UART**
V$_{SENSE}$	Voltage	**OCD**
**Flash	ROM**	Temperature	
MLX16 16-bit MCU	**Over Current Detection**	**16-bit ADC**

12V/24V/48V
Internal dividers included for 12V or 24V/48V batteries