APPLICATION BRIEF

# Light Electric Vehicles (LEV)

## Driving urban e-mobility

As the world is migrating to low-emission transportation options and therefore electric vehicles, urban mobility and micromobility solutions have been one of the key electrification targets. Due to the impacts of rapid urbanization on air quality, traffic congestion and reliable transportation, light electric vehicles (LEVs) have gained a substantial demand over the years. This demand and regulations for custom and public LEVs require innovation in motor control, battery management, charging as well as connectivity & HMI systems.

Infineon's LEV portfolio covers multiple functional blocks found in e-bikes, e-scooters, pedal electric cycles (i.e. pedelecs), low speed electric cars and microEVs, e-forklifts and electrical three-wheelers and such small electric vehicles. From connectivity and security families to power management and sensor systems, Infineon meets each vehicle type's needs, while reducing overall development cost and time to market.

Infineon microcontroller families offer variety of memory options, power modes, analog/digital peripherals, temperature qualifications and communication protocols, whether for implementing Battery Management System (BMS) algorithms or motor control / vehicle control functions. XMC™ family's POSIF interface, single- or dual-core architecture options along with multiple ADC channel and high PWM/TCPWM timer count address motor control system requirements. Rich analog and digital peripheral options of PSoC™ family could be easily programmed with ModusToolbox™ and open-source Github libraries for battery protection, monitoring, and cell balancing.

Infineon's fully certified and qualified AIROC™ Bluetooth® module portfolio features various antennae, single/dual mode and form factor options as well as extended range and temperature support for keyless access, vehicle tracking, on-board diagnostics and overall seamless vehicle-user connectivity experience. AIROC™ Wi-Fi Bluetooth Combo solutions address connectivity needs for e-forklift and industrial fleet management tasks.

The OPTIGA™ Trust M and Authenticate S products present a tamper-resistant solution to match growing security requirements for battery authentication and vehicle security. The EAL6+ certified OPTIGA™ Authenticate NBT NFC-I2C tags enable a secure contactless pairing between the vehicles and the users.

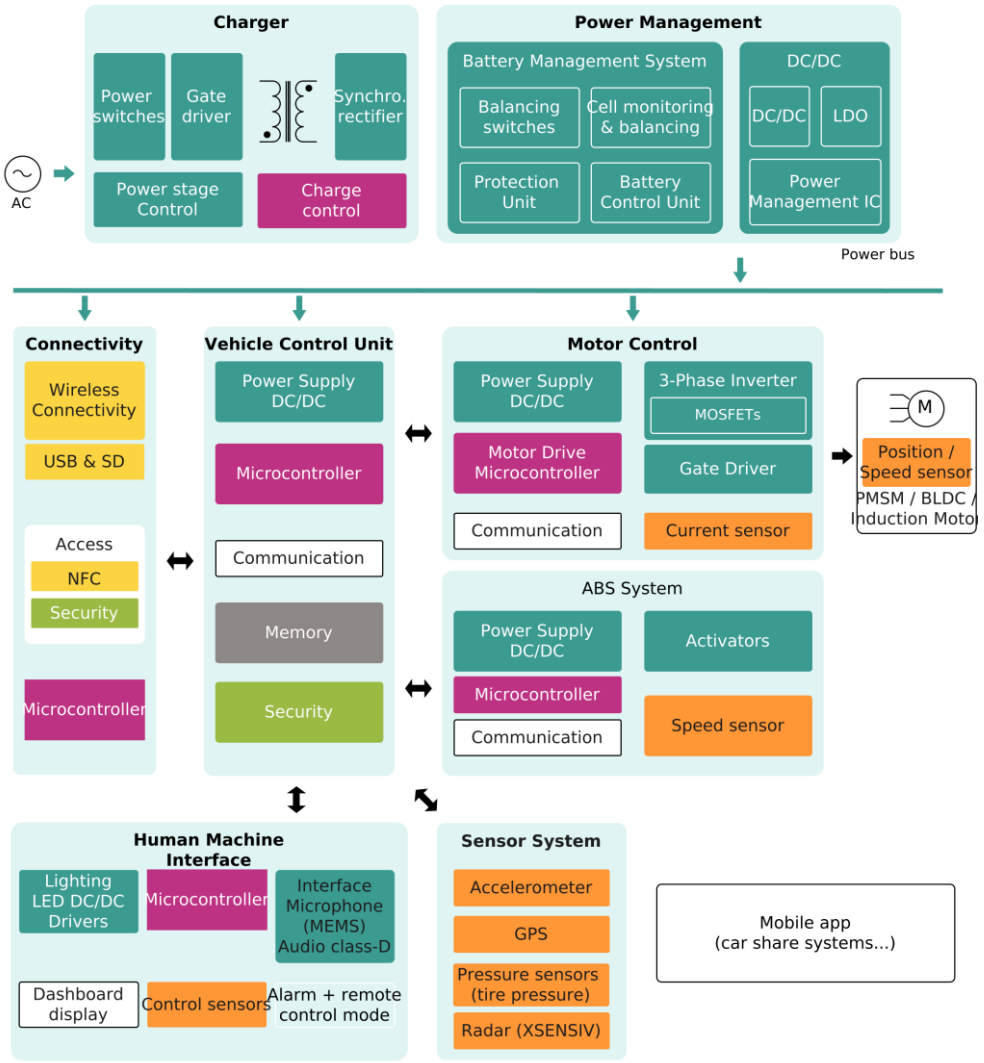
Highly reliable OptiMOS™ and StrongIRFET™ portfolios support a variety of power topologies for highly efficient and small form factor vehicle designs while CoolMOS™ and EiceDRIVER™ families support robust and reliable battery charging system designs. World-leading XENSIV™ sensor family enables smart and safe vehicle electrification.

Our wide portfolio ensures a perfect match for a wide range of LEV applications and bolsters our vision of driving decarbonization and digitalization, Together. Here at Infineon, we make life easier, safer, and greener.
https://www.infineon.com/cms/en/applications/light-electric-vehicles/

### Key features

- PSoC™ & XMC™ Industrial MCU's feature
  - **Multiple power profiles** for energy-efficient electric vehicles
  - **Rich analog and digital peripherals** for Motor Control & BMS implementation
  - Access to ModusToolbox™ & Infineon Developer Community resources for design support
- Infineon's AIROC™ Wi-Fi Combos and Standalone Bluetooth provide **robust and reliable connection for vehicle access, mobile app integration, performance tracking and OTA updates**
- **Vehicle security, identification and battery authenticity** ensured by OPTIGA™ family
- **Highly efficient and reliable power semiconductors** featuring OptiMOS™, StrongIRFET™, EiceDRIVER™ and CoolMOS™ families that offer small form factor design for various motor types and power architectures
- **High precision** current , tire pressure and position measurements with XENSIV™ sensors

## LEV Block Diagram




**Microcontroller**

- XMC™
- PSoC™
- PSoC™ 4 HV PA

**Memory**

- EXCELON™ F-RAM
- NOR Flash

**Security**

- OPTIGA™ Trust
- OPTIGA™ TPM
- OPTIGA™ Authenticate S
- OPTIGA™ NFC

**Wi-Fi and Bluetooth Connectivity**

- AIROC™ Wi-Fi/Bluetooth Combo
- AIROC™ Bluetooth & Multiprotocol

**Sensor**

- XENSIV™ Magnetic Sensors
- XENSIV™ Current Sensors
- XENSIV™ Tire Pressure Sensors

**Power**

- OptiMOS™ - LV FET
- StrongIRFET™
- EiceDRIVER™
- CoolMOS™

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