SECURE CONNECTIONS
FOR A SMARTER WORLD



# ELECTRIFICATION SOLUTIONS BASED ON AUTOMOTIVE PROCESSORS AND MICROCONTROLLERS

*The automotive industry is speeding up towards some level of the electric vehicle (EV) —adapting itself to the new vehicle electrification trends by using renewable sources of energy. Both customer preferences for an eco-friendly lifestyle and government regulations around the globe are driving the growth in electrification systems and away from internal combustion engine vehicles.*

Carmakers understand the need to provide a range of EV alternatives to ease the transition from internal combustion vehicles to fully electric. Most carmaker fleets offer progressively electrified vehicle options that cover both customer and government requirements. However, the automotive industry at large is working hard to overcome the hurdle of providing this range of different EV types, with varying architectures within small delivery windows.

The automotive industry divided the architectures of new electric and hybrid vehicles (HEVs/EVs) types into five different categories: from the basic mild hybrid (M-HEV), full hybrid (F-HEV), and plugin-hybrid (P-HEV), up to the range-extended EV (RE-BEV), and fully electric vehicles (BEV). Each of these architectures has specific power needs. They also need dedicated hardware and software development for the specific systems; reusing hardware and software development across different architectures is helping automakers with the challenges that the market is demanding around costs and time.

NXP delivers electrified system solutions, incorporating optimal performance, robust functional safety, and power management features that automakers and developers require for their next generation of vehicles. We offer a robust, scalable portfolio of functional safety MCUs with associated power management ICs and SBCs, together with in-vehicle networking components for CAN, LIN, FlexRay™, and Ethernet.

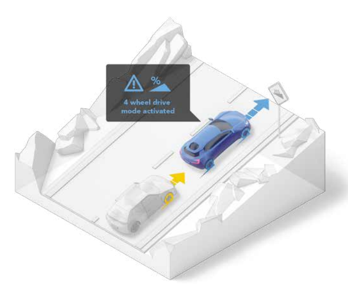
Our development platforms (featuring the quad Arm® Cortex®-R52 **S32S processor** or the Power Architecture® based **MPC5775B/E MCU**, together with our **FS6500** safety power SBC and **MC33771C** Li-ion Battery Cell Controller IC) and comprehensive software offerings (partnered with MathWorks) plus worldwide automotive presence and support for engineers can help you develop the next HEV generation. Our broad range of fully qualified solutions helps improve fuel economy and enhance performance.


### BATTERY MANAGEMENT SYSTEM (BMS)

Offering high measurement accuracy and ISO 26262 support up to ASIL D functional safety capability.

### HYBRID ELECTRIC VEHICLE (HEV)

Provides building blocks for the different electric vehicle types, addressing the need for cleaner cars and lower emissions.



### ELECTRIC VEHICLE (EV) POWER INVERTER

Targeting traction motor and onboard charging (OBC) applications.

## BATTERY MANAGEMENT SYSTEM (BMS)

RDVCU5775EVM high-voltage BMS and Vehicle Control Unit (VCU) reference design

MPC5775B/E-EVB development board for BMS and inverter

MPC5775B-BatterySystem HV evaluation system

NEWTEC-NTBMS e-mobility BMS solution targeting ASIL C functional safety

RDDRONE-BMS772 3 to 6 cell BMS on mobile robotics (drones and rovers) reference design

RD-K344BMU high-voltage Battery Management Unit (BMU) reference design

RD33771-48VEVM 48 V BMS reference design

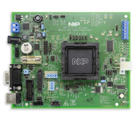
## HYBRID ELECTRIC VEHICLE (HEV)

**GreenBox**
To begin development on NXP's next generation of HEV and internal combustion engine MCUs

MPC5777C-DEVB development board

MPC5777MEVB Evaluation system

MPC5775BE-EVB evaluation system



MPC5777CEVB Evaluation System

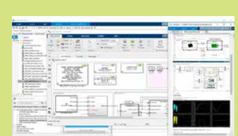
MPC5746REVB Evaluation System

## POWER INVERTER

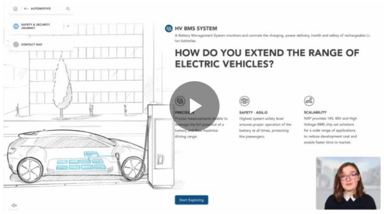
EV-INVERTERHDBT power inverter control (ICP 2.0) reference design for electric vehicle high-voltage traction inverters, using IGBT power modules

EV-INVERTER power inverter control reference design for electric vehicle traction motors and DC to DC converters

**Model-Based Design Toolbox (MBDT) software**
Estimating battery state of charge (SoC) is difficult and complex because of the non-linear character of the batteries and the internal environment assessments.
Neural Networks and NXP's MBDT help simplify the development of a battery SoC estimation algorithm.



### ELECTRIFICATION DEMOS




NXPLive Demo: High-Voltage BMS


NXP GreenBox Development Platform demo


NXPLive Demo: EV Inverter Control

## ON-DEMAND TRAINING:

**Electrification Training Academy**

Enabling a Connected EV Management System with NXP GoldBox and GreenBox Platforms plus AWS Cloud Services

High-Voltage Battery Management System Reference Design Based on S32K3

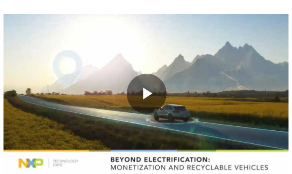
Deploying Battery Management System Algorithms on NXP S32K from Simulink

MathWorks' Deploying a Deep Learning-Based State-of-Charge (SoC) Estimation Algorithm to NXP S32K3 Microcontrollers

## LEARN MORE:

**nxp.com/electrification**

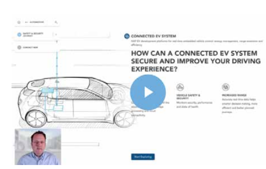
- NXP Vehicle Electrification solutions – brochure
- Electrification and the Future of EVs – podcast
- Innovative Design Drives Electric Vehicle Growth – blog post
- Eliminating Lead From Our Daily Lives – blog post
- Addressing Design Challenges for EV Charging Systems – blog post
- Better Batteries Will Help Speed Up EV Adoption – blog post
- How to Maximize the Full Potential of EV Batteries – blog post




Beyond Electrification: Monetization and Recyclable Vehicles


Sustainability in the Automotive Industry: Empowering Vision Zero

Electric Vehicles Edge Closer with NXP's Jens Hinrichsen




NXPLive Demo: Connected EV System Solutions





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