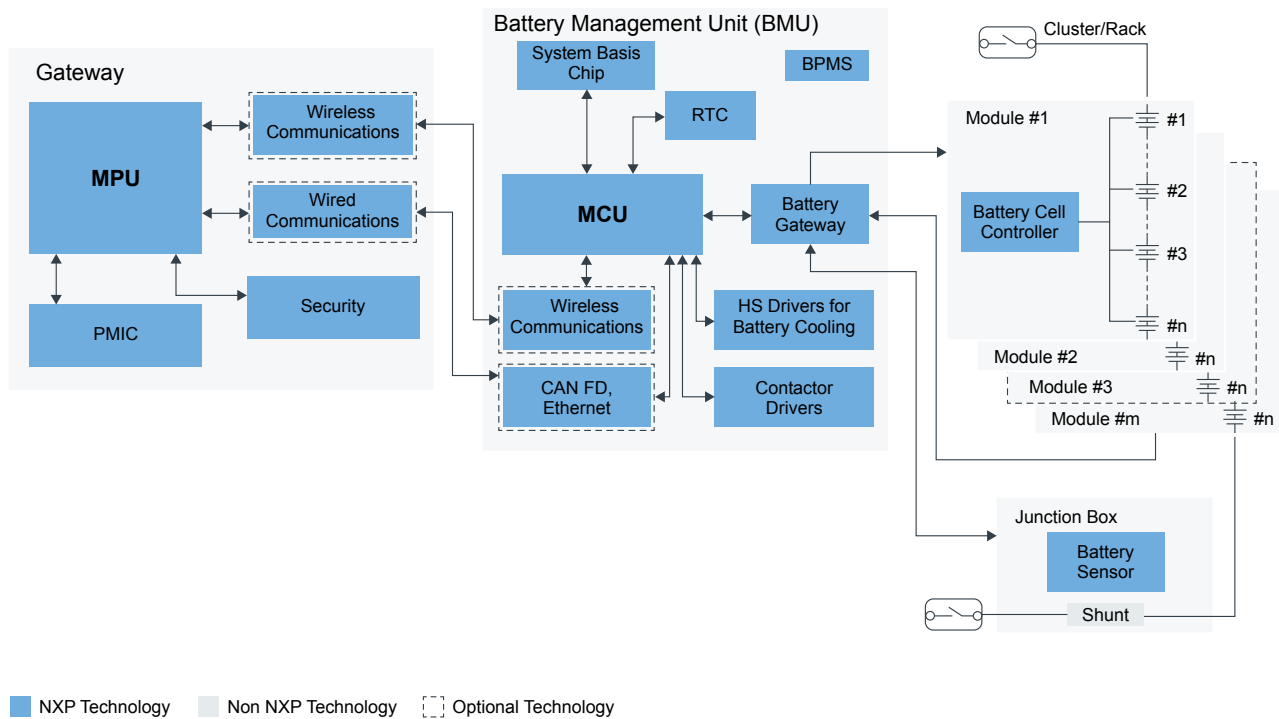# Energy Storage System (ESS)

Last Updated: Feb 26, 2025

The transition to renewable energy sources, electrification of vehicles and the need for resilience in power supplies have been driving a very positive trend for Li-Ion based battery storage systems.

NXP provides complete system solutions for battery management, for which leadership technologies are used for security, functional safety, detection of thermal runaway, cell monitoring, wireless and wired connectivity and microcontrollers in a broad range of performance and feature sets.

NXP's own Transport Protocol Link technology enables modular storage at scalability with practically no limits. MCU free and SW free storage modules can be communicated through SPI, CAN FD or UART to easily scale from a few kWh capacity in residential to MWh for utility scale.

High-accuracy data can be accessed for advanced algorithms for SOC and SOH algorithms as well as optimal power management.

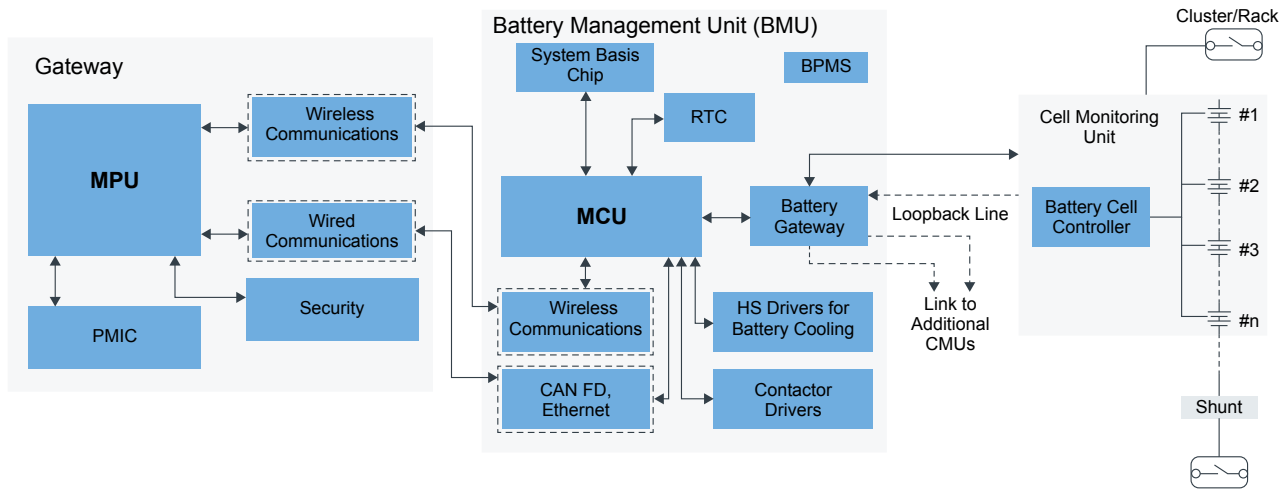**ESS Including BMS for HV Block Diagram**

Gateway

MPU

Wireless Communications

Wired Communications

Security

PMIC

Battery Management Unit (BMU)

System Basis Chip

RTC

BPMS

MCU

Wireless Communications

CAN FD, Ethernet

HS Drivers for Battery Cooling

Contactor Drivers

Battery Gateway

Cluster/Rack

Module #1

Battery Cell Controller

#1
#2
#3
#n

Module #2 #n
Module #3 #n
Module #m #n

Junction Box

Battery Sensor

Shunt

■ NXP Technology   ■ Non NXP Technology   ⌐ ¬ Optional Technology

Recommended Products for ESS Including BMS for HV	
Battery Cell Controller	• MC33771C: 14-Channel Li-Ion Battery Cell Controller IC • MC33775: 14 Channel Li-Ion Battery Cell Controller IC ASIL D
BPMS	• NBP8-9x: Highly Integrated Battery Pressure Monitor Sensor
Battery Sensor	• MC33772C: 6-Channel Li-Ion Battery Cell Controller IC • MM9Z1_638: Battery Sensor with CAN and LIN
Battery Gateway	• MC33664: Isolated Network High-Speed Transceiver • MC33665A: General Purpose BMS Communication TPL Transceiver and CAN FD Gateway

MCU	• MCX-A13X-A14X-A15X: MCX A13x, 14x, 15x MCUs with Arm® Cortex® M33, Scalable Device Options, Low Power and Intelligent Peripherals • MCX-N94X-N54X: MCX N94x/54x Highly Integrated Multicore MCUs with On-Chip Accelerators, Intelligent Peripherals and Advanced Security • i.MX-RT1170: i.MX RT1170: 1 GHz Crossover MCU with Arm® Cortex® Cores • LPC553x: LPC553x/S3x: Advanced Analog Arm®Cortex®-M33-Based MCU Family • S32K1: S32K1 Microcontrollers for Automotive General Purpose • S32K3: S32K3 Microcontrollers for Automotive General Purpose
Contactor Drivers	• HB2000: SPI Programmable 10 A H-Bridge Brushed DC Motor Driver • MC33996: 16-Output Switch with SPI Control
RTC	• PCF2131: Nano-Power Highly Accurate RTC with Integrated Quartz Crystal
HS drivers for battery cooling	• MC12XS6: External Automotive Lighting Multi-Channel eXtreme Switch • XS2410: Quad 100 mΩ / Dual 50 mΩ, 3.0 V to 60 V High-Side Switch
MPU	• i.MX8MNANO: i.MX 8M Nano Family - Arm® Cortex®-A53, Cortex-M7 • i.MX6ULL: i.MX 6ULL Single-Core Processor with Arm® Cortex®-A7 Core
PMIC	• PCA9450: Power Management IC (PMIC) for i.MX 8M Mini/Nano/Plus • PF1510: Power Management Integrated Circuit (PMIC) for Low Power Application Processors
Security	• SE050: EdgeLock® SE050: Plug and Trust Secure Element Family – Enhanced IoT Security with High Flexibility
System Basis Chip	• FS26: Safety System Basis Chip with Low Power, for ASIL D Systems
Wireless Communication	• 88W8987: 2.4/5 GHz Dual-Band 1x1 Wi-Fi® 5 (802.11ac) + Bluetooth® 5.2 Solution • IW416: 2.4/5 GHz Dual-Band 1x1 Wi-Fi® 4 (802.11n) + Bluetooth® 5.2 Solution
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Wired Communications	• TJA1042: High-Speed CAN Transceiver with Standby Mode • TJA1057: High-Speed CAN Transceiver - Mantis Family • Automotive Ethernet PHYs: Automotive Ethernet PHY Transceivers
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ESS Including BMS for 48V Block Diagram

Gateway

MPU

Wireless Communications

Wired Communications

Security

PMIC

Battery Management Unit (BMU)

System Basis Chip

RTC

BPMS

MCU

Wireless Communications

CAN FD, Ethernet

Battery Gateway

HS Drivers for Battery Cooling

Contactor Drivers

Loopback Line

Link to Additional CMUs

Cluster/Rack

Cell Monitoring Unit

Battery Cell Controller

#1
#2
#3
#n

Shunt

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View our complete solution for Energy Storage System (ESS).

Note: The information on this document is subject to change without notice.