AUTOSAR-compliant software for automotive MCUs

# AUTOSAR Classic NXP Software Solutions

AUTOSAR (AUTomotive Open System ARchitecture) addresses the challenge of rising code complexity by providing an open automotive software architecture.

## OVERVIEW

This architecture supports the development of standardized electronic systems that improve quality, performance, safety and environmental friendliness. It also helps to simplify the process of updating software over the lifetime of a vehicle.

## NXP, AUTOSAR PREMIUM PARTNER

Our company has been a Premium Partner since the conception of the partnership, and our engineers have contributed to several concepts and module specifications. Major releases of the Classic Platform are v3.0, v4.0, v4.2, v4.3, and most recently v4.4.

To support this industry standard, we offer production-intent AUTOSAR Microcontroller Abstraction Layer (MCAL) and Operating System (OS) software for use on our automotive microcontrollers and processors.

Our software contributions to the architecture are developed according to:

▸ MISRA

▸ Automotive SPICE®

▸ For SafeAssure MCUs, the development process for MCAL software has been further enhanced to comply with ISO26262

## PRODUCT INTEGRATION AND AVAILABILITY

MCAL and OS packages are designed to be configured with Elektrobit's EB tresos Studio tool which is included in our software packages. Through standardized APIs and configuration interface formats based on XML, our software can be integrated with other software from the ecosystem architecture and configuration tools offered by third parties.

Most of our software products are available on our main website located on the Software & Tools section of the corresponding page of the product you are using. For production license models, support agreements, and pricing, please contact your local NXP sales representative or any of our authorized distributors.

## AUTOMOTIVE APPLICATIONS

▸ Body electronics

▸ Chassis and safety

▸ Driver assistance systems
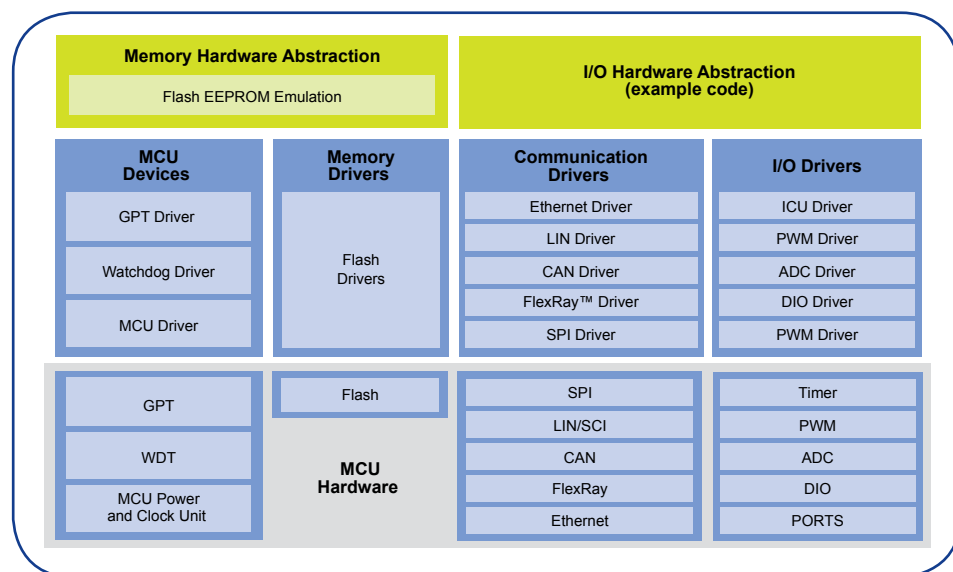
▸ Powertrain and vechicle dynamics

AUTOSAR (Classic) enables cost-effective software development by removing the need for customer drivers. This makes the MCU easier to use, saves development and integration time, increases quality and reduces overall cost.

For a select number of S12, MPC56xx and MPC57xx families, we offer an optimized implementation of the AUTOSAR OS. Depending on the MCU type, OS scalability classes 1–4 are supported.

## AUTOSAR-COMPLIANT MCAL SOFTWARE FEATURES

▸ High-quality, efficient, reliable and scalable AUTOSAR-compliant set of MCU abstraction layer (MCAL) drivers

▸ Supports pre-compile and post-build loadable configuration

▸ Developed in an automotive SPICE level 3 (HIS scope) process framework

▸ Supports:
  – AUTOSAR 3.0: S12/S12X, MPC5668G, MPC563xM
  – AUTOSAR 4.0: S12ZVMC256, MPC56xx (selected families), MPC57xx
  – AUTOSAR 4.2: S32, MPC56xx (selected families), MPC57xx (selected families)
  – AUTOSAR 4.3: S32 (selected families), MPC57xx (selected families)

▸ Integrated with EB tresos® Studio AUTOSAR configuration tool from Elektrobit

▸ Supports industry standard compilers:
  – Green Hills
  – Wind River
  – CodeWarrior

## AUTOSAR (CLASSIC) MCAL PACKAGE

| Memory Hardware Abstraction | | I/O Hardware Abstraction (example code) | |
| --- | --- | --- | --- |
| Flash EEPROM Emulation | | | |

| MCU Devices | Memory Drivers | Communication Drivers | I/O Drivers |
| --- | --- | --- | --- |
| GPT Driver | Flash Drivers | Ethernet Driver | ICU Driver |
| Watchdog Driver | | LIN Driver | PWM Driver |
| MCU Driver | | CAN Driver | ADC Driver |
| | | FlexRay™ Driver | DIO Driver |
| | | SPI Driver | PWM Driver |

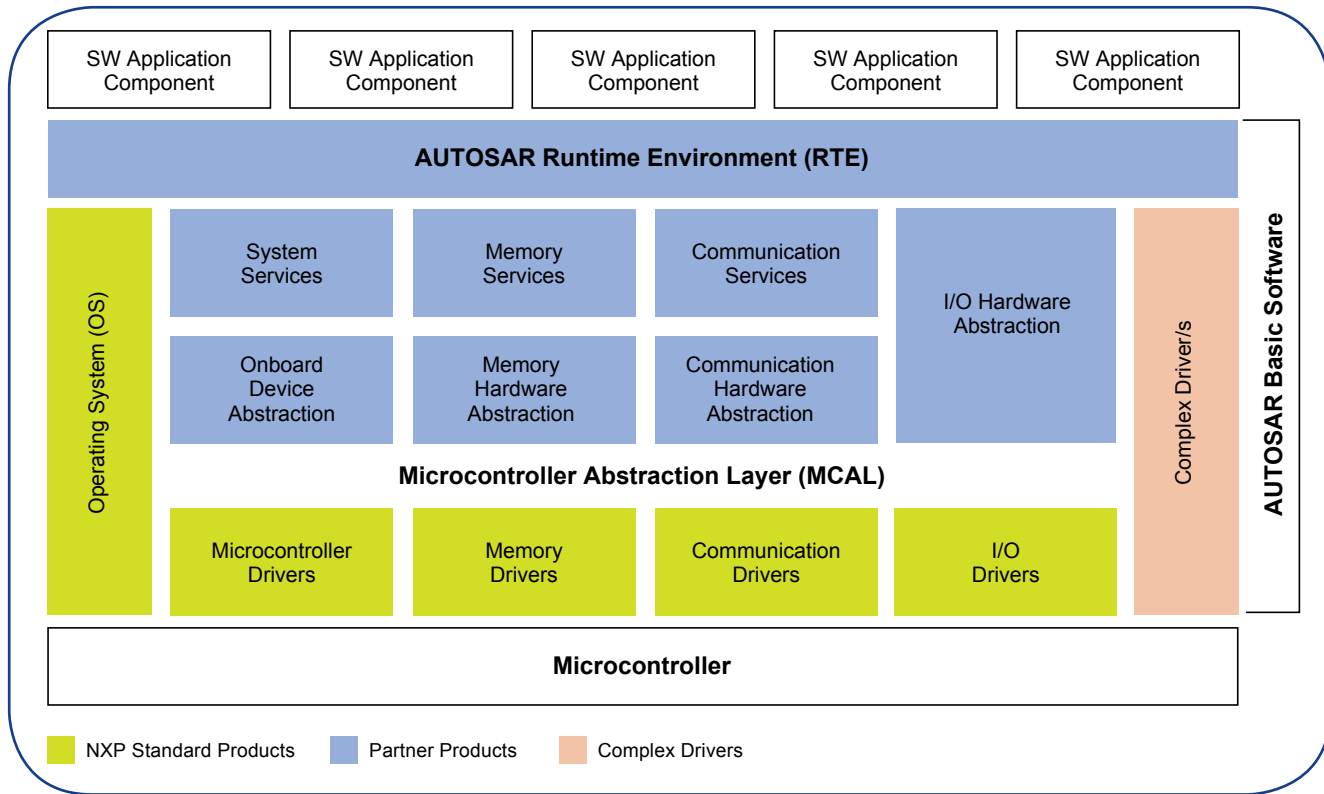| | | | |
| --- | --- | --- | --- |
| GPT | Flash | SPI | Timer |
| WDT | | LIN/SCI | PWM |
| MCU Power and Clock Unit | MCU Hardware | CAN | ADC |
| | | FlexRay | DIO |
| | | Ethernet | PORTS |

## AUTOSAR-COMPLIANT OPERATING SYSTEM FEATURES

▸ High-quality, efficient, reliable and scalable AUTOSAR-compliant operating system

▸ Developed in an automotive SPICE level 3 (HIS scope) process framework

▸ Supports AUTOSAR scalability classes 1, 2, 3 and 4, in line with available hardware resources

▸ Supports:
  – AUTOSAR 3.0: S12/S12X, MPC56xx (selected families)
  – AUTOSAR 4.0: S12ZVMC256, MPC56xx (selected families), MPC57xx (selected families)

▸ Takes full advantage of processor capabilities

▸ Integrated with EB tresos Studio AUTOSAR configuration tool from Elektrobit

▸ Supports industry standard compilers:
  – Green Hills
  – Wind River
  – CodeWarrior

## PRODUCTION SOFTWARE

All AUTOSAR (Classic) software products are intended for production use. To support individual customer schedules, frozen branch support as well as dedicated customer compiler tests are offered. The software can be licensed in various forms and with various support options to fit the full variety of automotive ECU programs.

## AUTOSAR (CLASSIC) BASIC SOFTWARE ARCHITECTURE

| SW Application Component | SW Application Component | SW Application Component | SW Application Component | SW Application Component |
|---|---|---|---|---|

**AUTOSAR Runtime Environment (RTE)**

**Operating System (OS)**

| System Services | Memory Services | Communication Services | I/O Hardware Abstraction |
|---|---|---|---|
| Onboard Device Abstraction | Memory Hardware Abstraction | Communication Hardware Abstraction | |

**Microcontroller Abstraction Layer (MCAL)**

| Microcontroller Drivers | Memory Drivers | Communication Drivers | I/O Drivers |
|---|---|---|---|

**Complex Driver/s**

**AUTOSAR Basic Software**

**Microcontroller**

- 🟩 NXP Standard Products
- 🟦 Partner Products
- 🟧 Complex Drivers

## AUTOSAR (CLASSIC) MCAL AVAILABILITY MATRIX

| | QM | | ISO26262 ASIL | |
|---|---|---|---|---|
| **V 4.3** | MPC574xB-C-G | S32K118 / K14x | MPC574xB-C-G | S32K118 / K14x |
| **V 4.2** | MPC574xB-C-G | S32K118 / K14x | MPC574xB-C-G<br>MPC5674F | S32V23 (M4)<br>S32Rx7 (Z4, Z7)   S32K118 / K14x |
| **V 4.0** | MPC5643L   MPC574xB-C-G<br>MPC564xB-C   MPC567xK   MAC57D5x (M4)<br>MPC560xBC-D   MPC5676R<br>MPC560xP   MPC564xA   S12ZVMC256 S12ZVC   S32K118 / K14x | | MPC574xB-C-G<br>MPC5746R<br>MPC5744P   MPC5777M<br>MPC5775K   MPC5777C   S32K118 / K14x | |
| **V 3.0** | MPC5668   MPC563xM | | | |

- 🟩 Available free of charge from www.nxp.com
- ⬚ Available, commercial license required (3 mths eval license from www.nxp.com)

**AUTOSAR**