S32K5SDK

S32K5 software development kit (SDK)

Rev. 1.0 — 14 September 2026 **Product brief**

1 Software product overview

The S32K5 SDK is the software package offered by NXP that enables the programming of the SoCs from the S32K5 device family, for its intended use in the automotive domain: Central compute, body control, powertrain, gateway and connectivity on virtual ECUs.

SDK is the one-stop shop for S32K5 SoCs software, and contains NXP proprietary runtime software, tools, and reference integration examples as well as partner software.

Using the examples from the SDK one can quickly evaluate the S32K5 SoCs capabilities and reference use cases such as central compute and connected vehicle. The examples also act as a starting point for further application development.

The SDK can be downloaded from nxp.com portal.

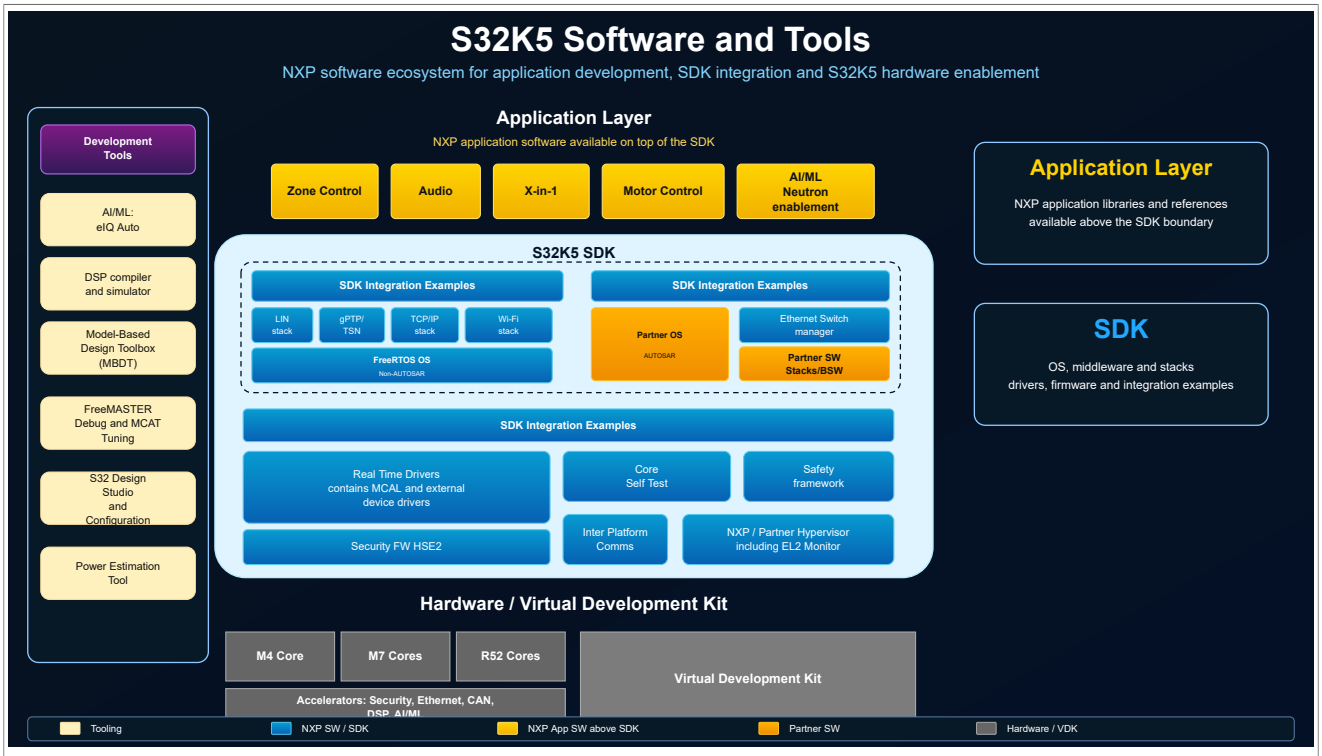


Figure 1. S32K5 SDK software overview

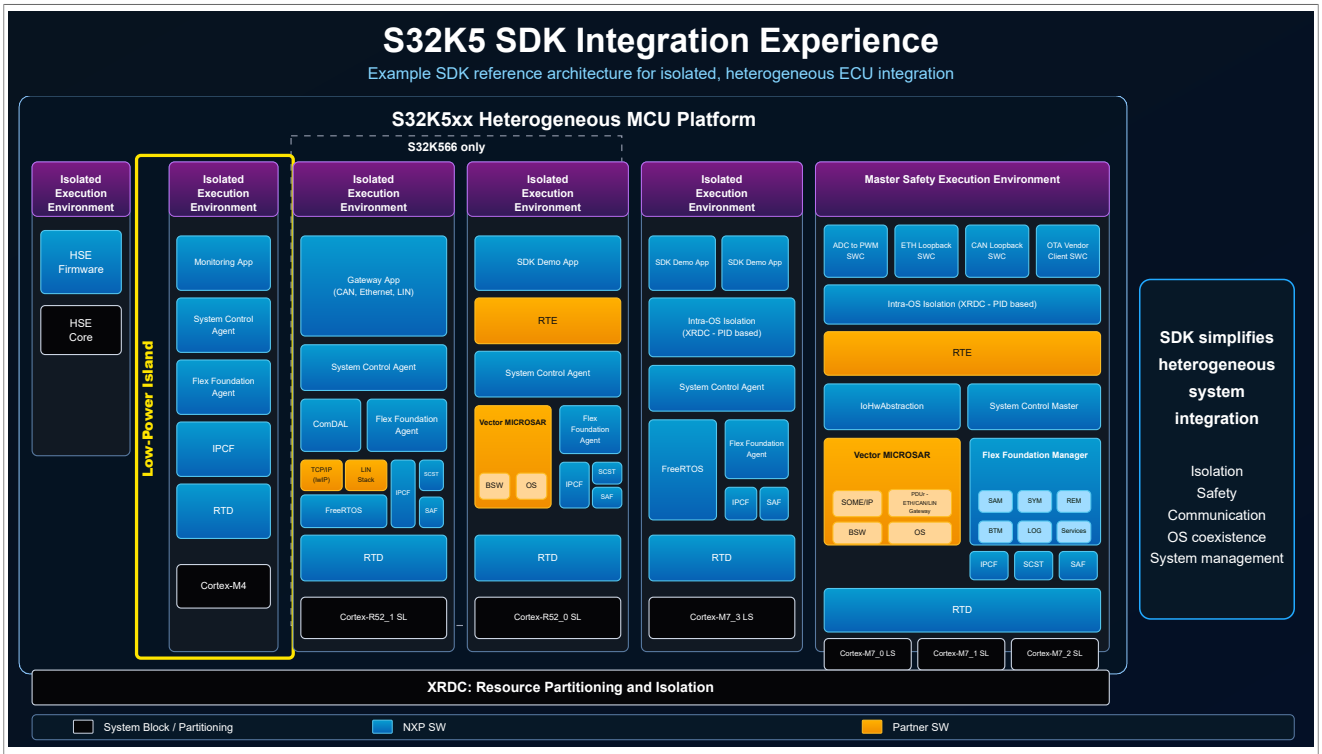


Figure 2. S32K5 SDK integration example

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

2 Software content

This section describes the content of the S32K5 SDK.

2.1 Runtime software

These are the building blocks to program the S32K5 SoC. The runtime software is organized in the following sections.

2.1.1 Firmware

Firmware software helps to program specialized subsystems. It is composed of:

- DSP-V Framework
  The DSP-V Framework provides a specialized signal-processing environment designed for vector processing, audio processing, sensor processing, and other computationally intensive workloads. It enables efficient use of the DSP-V accelerator through optimized software components and APIs.
- Flexible Low-Latency Communication Engine (FlexLLCE)
  FlexLLCE is a high-performance, hardware-accelerated firmware on S32K, delivering deterministic, low-latency network processing for automotive workloads.
- Hardware Security Engine (HSE)
  HSE is a software acceleration firmware running on top of NXP dedicated security core. HSE enables offloading of the most common security algorithms from the CPU to dedicated hardware. Provides key storage and secure boot, while serving as a secure enclave.
- Secure Boot Assist Firmware (SBAF)
  The SBAF is NXP firmware that initializes the device and establishes the secure boot chain before application software execution.

2.1.2 Drivers

The drivers provide software abstractions over the SoC capabilities. They are grouped in:

- External IC Drivers
  External IC drivers provide software support for external devices connected to the S32K5 SoC, including PMICs, Ethernet PHYs, and CAN/LIN transceivers. These drivers enable reliable communication and system integration while maintaining a common software architecture across the S32 platform.
- Inter-Platform Communication Framework (IPCF)
  IPCF enables communication between software instances running on the same SoC. It uses the MRU IP to communicate between software, while permissions over memory are granted via XRDC configuration.
- Real-Time Drivers (RTD)
  RTD is a set of AUTOSAR® compliant device drivers responsible for hardware abstraction and enablement of the NXP devices. The CDD provided on top of the required AUTOSAR drivers create a rich ecosystem for developers and applications.
- S32 Safety Software Framework (SAF)
  SAF is a premium software bundle designed to help developers build ISO 26262-compliant automotive and industrial safety applications. It provides comprehensive software coverage for hardware safety mechanisms, enabling latent fault detection, system recovery, and ASIL D integration.
- Structural Core Self-Test (SCST)
  SCST library consists of a set of atomic tests targeted for improving fault coverage on Arm® Cortex®-R52 cores.

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

2.1.3 Operating systems and hypervisors

Those are either NXP proprietary operating systems or ports from open source.

- Exception Level 2 (EL2) Monitor hypervisor
  EL2 Monitor is a lightweight partitioning hypervisor which supports isolation of applications on the Cortex-R52 Core processors by providing GIC virtualization and EL2 MPU protection.
- FreeRTOS®
  FreeRTOS is a market-leading, open-source RTOS designed specifically for microcontrollers and small microprocessors, running on the Cortex-R52 Cores.
- Vector MICROSAR
  MICROSAR is an AUTOSAR-compliant basic software platform from Vector that provides operating system, communication, and middleware components for automotive ECUs.

2.1.4 Software stacks and libraries

The software stacks are either NXP proprietary implementation of communication protocols or ports from open source. Libraries contain specialized, domain-specific software.

- Audio Video Bridging (AVB) stack
  The AVB stack provides deterministic delivery of audio and video streams over Ethernet networks. It supports IEEE 1722 protocols, gPTP-based synchronization, and TSN technologies to enable low-latency, high-availability multimedia transport.
- Automotive Math and Motor Control Library (AMMCLib)
  AMMCLib is a collection of easy to use production-ready software libraries tailored for motor control applications.
- eIQ® Auto
  eIQ Auto is NXP's AI/ML enablement suite that provides tools and runtime software for developing, optimizing, and deploying machine learning applications on S32 platforms.
- Generalized Precision Time Protocol (gPTP) stack
  gPTP stack implements the IEEE 802.1AS standard, providing nanosecond-level time synchronization across networked devices. It ensures that all distributed sensors, actuators, and controllers share a single, highly accurate clock, crucial for real-time applications in automotive, industrial, and AVB domains.
- MbedTLS stack
  MbedTLS (previously PolarSSL) is an implementation of the TLS and SSL protocols and the respective cryptographic algorithms and support code required, integrated with NXP security accelerators.
- Motion Wise Communication
  MotionWise Communication provides lightweight, deterministic, and service-oriented communication based on modern protocols such as DDS and Zenoh. It enables efficient data exchange across vehicle domains ranging from high-performance compute platforms to resource-constrained microcontrollers.
- Neutron Development and Extension package
  Neutron is the AI inference runtime and acceleration technology used within eIQ Auto to execute optimized neural-network models efficiently on NXP hardware.
- Secure Digital Host Controller (SDHC) stack
  SDHC wtack is an embedded software library that provides APIs to access the SD bus interface via the SDHC hardware driver and file system layers. It allows microcontrollers and processors to interface with SD, SDIO, and MMC cards from various vendors.
- Time-Sensitive Networking (TSN) stack
  TSN stack is a collection of software components that enable deterministic, time-synchronized communication over standard Ethernet networks. It uses the capabilities of the NETCv3 Ethernet switch.
- Transmission Control Protocol/Internet Protocol (TCP/IP) stack

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

TCP/IP stack provides an integration for the Lightweight IP (lwIP) stack running on top of S32N hardware. It is designed for resource-constrained microcontrollers, providing full UDP, TCP and IP capabilities with minimal RAM needs.

2.2 Tools

Tools helps the user to program the device, enabling ease of use for complex operations such as configuration, build, flash and debug.

- S32 Design Studio
  S32 Design Studio is a complimentary, Eclipse-based IDE by NXP Semiconductors, purpose-built for automotive and ultra-reliable Arm®-based microcontrollers and processors. It provides a seamless, code-size-unlimited environment for editing, compiling, and debugging C/C++ code, complete with rich graphical configuration tools to speed up development.
- FreeMASTER
  FreeMASTER is a real-time data visualization and debugging tool developed by NXP Semiconductors. It allows embedded engineers to non-intrusively monitor, graph, and modify internal variables and parameters on a running microcontroller without halting its execution.
- S32 Configuration Tools Suite
  The S32 Configuration Tools Suite provides graphical tools for pin multiplexing, clock setup, peripheral configuration, boot configuration, and code generation. These tools simplify hardware configuration and accelerate software development through guided workflows and automated validation.

2.3 Reference integration examples

The reference integration examples are bundled under the S32K5 SDK.

S32K5 SDK provides the following functionalities:

- A reference software integration platform for S32K5 SoC applications. It streamlines S32K5 hardware evaluation and accelerates software development.
- Out-of-the-box integration of NXP software and strategic partner software on top of the S32K software ecosystem while acting as a development platform for applications.
- Multiple execution environments running on the same SoC and provides examples for different deployment models. The platform is designed around isolated cohorts/partitions that can host different software stacks and operating systems.
- Emphasizes rapid evaluation and bring-up through automation. The available capabilities include: One-click build flows, automated image generation, flash image creation, board deployment scripts, support for pre-built demonstrations.
- S32K5 SDK accelerates customer ramp-up by providing a pre-integrated, pre-configured, and automated software environment for S32K5, showcasing key differentiators and flows.

The SDK reference integration examples demonstrate practical use cases including multicore bring-up, inter-core communication, CAN and Ethernet gateways, virtualization, resource isolation, power management, safety diagnostics, DSP-V enablement, and machine-learning deployment workflows. These examples provide pre-integrated software environments that accelerate customer evaluation and application development.

The targeted use cases include but are not limited to:

- Safe and Secure booting
- Isolation and Virtualization
- Power Management
- Secure Communication
- CAN-to-CAN and CAN-to-Ethernet gateway implementations
- Ethernet switching and port-forwarding demonstrations

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

- Secure onboard communication using SecOC and MACsec technologies
- Inter-core communication using IPCF, and CAN
- AI/ML deployment and inference examples
- Functional safety and fault-management demonstrations based on SAF, SCST, and FlexFoundation

2.4 Partner software

S32K5 SDK uses and/or distributes partner software under a redistribution license granted by the partners. Partner software is used to cover areas not addressed by NXP, but useful or required for programming the S32K5 SoCs.

The partner software used and/or distributed by S32K5 SDK are:

- Elektrobit EB tresos
- Vector MICROSAR
- Vector tools

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

3 Supported targets

S32K5 SDK is intended to be used with the S32K5 family of devices. It is usable out of the box on the NXP standard development boards. Examples provided will have limited derivative support and a guide will be provided to migrate them. Custom boards might need adaptations.

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

4 Quality, standards compliance and testing approach

The SDK is developed according to NXP Software Development Processes that are Automotive-SPICE (including also various tailoring such as for open-source), IATF16949 and ISO9001 compliant.

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

5 Abbreviations

Table 1. Abbreviations

Abbreviation	Description
AI	Artificial Intelligence
ASIL	Automotive Safety Integrity Level
API	Application Programming Interface
AVB	Audio-Video Bridging
CAN	Controller Area Network
CDD	Complex Device Drivers
CPU	Central Processing Unit
DDS	Data Distribution Service
DSP	Digital Signal Processor
ECU	Electronic Control Unit
GIC	Generic Interrupt Controller
gPTP	Generalized Precision Time Protocol
IC	Integrated Circuit
IDE	Integrated Development Environment
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
LIN	Local Interconnect Network
lwIP	Lightweight Internet Protocol
MACsec	Media Access Control Security
ML	Machine Learning
MMC	MultiMediaCard
MPU	Memory Protection Unit
MRU	Maximum Receive Unit
PHY	Physical Layer
PMIC	Power Management Integrated Circuit
RAM	Random-Access Memory
RTOS	Real-Time Operating System
SD	Secure Digital
SDIO	Secure Digital Input Output
SoC	System on a Chip
SecOC	Secure Onboard Communication
SSL	Secure Sockets Layer
TLS	Transport Layer Security
TSN	Time-Sensitive Networking

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Table 1. Abbreviations...*continued*

Abbreviation	Description
UDP	User Datagram Protocol
XRDC	Extended Resoruce Domain Controller

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

6 Revision history

Table 2. Revision history

Document ID	Release date	Description
S32K5SDK_PB v.1.0	14 September 2026	Initial release

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Legal information

Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at https://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Suitability for use in automotive applications — This NXP product has been qualified for use in automotive applications. If this product is used by customer in the development of, or for incorporation into, products or services (a) used in safety critical applications or (b) in which failure could lead to death, personal injury, or severe physical or environmental damage (such products and services hereinafter referred to as "Critical Applications"), then customer makes the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, safety, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP. As such, customer assumes all risk related to use of any products in Critical Applications and NXP and its suppliers shall not be liable for any such use by customer. Accordingly, customer will indemnify and hold NXP harmless from any claims, liabilities, damages and associated costs and expenses (including attorneys' fees) that NXP may incur related to customer's incorporation of any product in a Critical Application.

Quick reference data — The Quick reference data is an extract of the product data given in the Limiting values and Characteristics sections of this document, and as such is not complete, exhaustive or legally binding.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

HTML publications — An HTML version, if available, of this document is provided as a courtesy. Definitive information is contained in the applicable document in PDF format. If there is a discrepancy between the HTML document and the PDF document, the PDF document has priority.

Translations — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately.

Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at PSIRT@nxp.com) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

NXP B.V. — NXP B.V. is not an operating company and it does not distribute or sell products.

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

NXP — wordmark and logo are trademarks of NXP B.V.

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Tables

Tab. 1. Abbreviations 9
Tab. 2. Revision history 11

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Figures

Fig. 1. S32K5 SDK software overview 1
Fig. 2. S32K5 SDK integration example 2

All information provided in this document is subject to legal disclaimers.

© 2026 NXP B.V. All rights reserved.

Contents

1 Software product overview 1
2 Software content 3
2.1 Runtime software 3
2.1.1 Firmware 3
2.1.2 Drivers 3
2.1.3 Operating systems and hypervisors 4
2.1.4 Software stacks and libraries 4
2.2 Tools 5
2.3 Reference integration examples 5
2.4 Partner software 6
3 Supported targets 7
4 Quality, standards compliance and testing approach 8
5 Abbreviations 9
6 Revision history 11
Legal information 12

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© 2026 NXP B.V. **All rights reserved.**