The S32K1 family of 32-bit AEC-Q100 qualified MCUs combines an innovative suite of production-grade tools and software with a scalable family of Arm Cortex-M based MCUs built on durable features. S32K1 MCUs are included in NXP's Product Longevity Program which guarantees a minimum of 15 years assured supply.

**Value Proposition**

**Scalable Single Platform**
- Hardware and software compatible families
- 48 MHz Arm Cortex-M0+ core; or up to 112 MHz Arm Cortex-M4F core
- Memory range from 128 KB to 2 MB
- Pin count from 32 to 176 pins
- QFN, LQFP, MAPBGA packages

**Superior Features and Performance**
- ISO CAN FD
- CSEc hardware security
- Ultra-low-power performance
- ASIL B ISO26262 functional safety

**Complete Software Solution**
- Production-grade software development kit (SDK)
- S32 Design Studio IDE
- Third-party ecosystem support to reduce time-to-market

**S32K1 Family Overview**
Key Features
The S32K1 MCU family provides a scalable platform with next-generation safety, security, connectivity and low-power features.

Scalability
- Memory range from 128 KB to 2 MB
- Pin count from 32 to 176 pins
- QFN, LQFP, MAPBGA packages
- IP compatibility across family

Safety
- ISO26262 ASIL B
- ECC on flash and SRAM MPU; CRC watchdog
- Core self-test library
- FMEDA
- Safety manual
- Technical support

Security
- Cryptographic services engine (CSEc) module
- SHE compliant
- AES128 encryption and decryption
- Up to 20 key firmware
- Unique ID
- Secure boot
- Flash content protection in normal test mode

Connectivity
FlexCAN
- Support CAN FD and standard CAN
- 64-byte CAN FD at 8 Mbit/s

FlexIO
- Emulation of UART, SPI, I2C, I2S, LCD RGB, PWM, LIN, etc.

QUADSPI
- Interface to external flash device
- Support SDR and HyperRAM modes

Ethernet & Audio Interface
- 10/100 Mbit/s MAC
- IEEE® 802.3-2002
- AVB
- IEEE-1588 timestamping

Ultra-Low Power
The S32K1 MCUs combine multiple low-power operating modes with autonomous, low-power peripherals allowing control over dynamic and static power profiles.

- Seven active and standby modes (RUN/WAIT/STOP) with all memory and register contents and IO pin states maintained in all modes
- All I/O pins and several peripherals function as fast wake-up sources
- Analog, communication and timing peripherals operate autonomously via DMA with no CPU intervention
- Extensive clock gating for core and peripherals

S32K1 Memory and Package Scalability

<table>
<thead>
<tr>
<th>Memory Size</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 MB</td>
<td>S32K148</td>
</tr>
<tr>
<td>1 MB</td>
<td>S32K146</td>
</tr>
<tr>
<td>512 KB</td>
<td>S32K144</td>
</tr>
<tr>
<td>256 KB</td>
<td>S32K142</td>
</tr>
<tr>
<td>128 KB</td>
<td>S32K118</td>
</tr>
<tr>
<td>64 QFN</td>
<td>S32K116</td>
</tr>
</tbody>
</table>

Typical consumption values across S32K1xx power modes

- VLPS: 40 µA at 5 V with LPTMR enabled
- VLPR: 1.07 mA at 5 V @ 8 MHz
- STOP1: 6.3 mA at 5 V @ 48 MHz
- STOP2: 7.2 mA at 5 V @ 48 MHz
- RUN: 20.3 mA at 5 V @ 48 MHz
- HRUN: 52.2 mA at 5 V @ 112 MHz
Enablement

The S32K1 MCUs are supported by a complete ecosystem to minimize development effort and reduce time-to-market.

- S32 Design Studio IDE
  - Free of charge, zero code limit, Eclipse based, supports GCC and third-party compilers
  - Compatible with NXP’s Advanced Math and Motor Control Library (AMMCLIB)
- Software Development Kit (SDK)
  - Free of charge, production-grade
  - MISRA and SPICE Level 3 compliant low-level drivers for all MCU peripherals
  - Free RTOS operating system
- AUTOSAR MCAL and Core Self-Test Library

S32K1 Evaluation Boards

Arduino™ UNO compliant, touch sense pads, OpenSDA serial and debug adaptor, microUSB or 12 V supply

- MTRDEVK5BNK144 / MTRDEVKSPNK144
  3-phase BLDC/PMSM Development Kit with S32K144 MCU

- DEVKIT-MOTORGD
  Low-Cost Motor Control Solution for DEVKIT Platform

Partners

- Arm
- AUTOSAR
- Keil®
- Cosmic Software
- IAR Systems
- Vector
- Green Hills®
- Elektrobit
- Wind River
- MathWorks®
- ARCCORE
- FreeRTOS

Target Applications

Automotive

- Seat control
- Window
- Interior lighting
- Door
- Sunroof
- Pump and fans, HVAC

Industrial

- Factory automation
- Inverters
- Home audio
- Sensing
- Avionics
- Medical
## S32K1 Ordering Information

Part numbers below are available for sampling on www.nxp.com/S32K. For a full list of all orderable part numbers see the attachment included with S32K1xx MCU Family data sheet.

### Part Number | Flash Size/RAM | Features | Cores | Package | Ambient Temperature
--- | --- | --- | --- | --- | ---
FS32K116LAT0MFMT | 128 KB/17 KB | CAN FD; FlexIO; crypto security engine; eDMA (4 ch.) | Arm® Cortex®-M0+ core; 48 MHz | 32 QFN | -40 °C to 125 °C
FS32K116LAT0MLFT | 256 KB/25 KB | CAN FD; FlexIO; crypto security engine; eDMA (4 ch.) | Arm® Cortex®-M0+ core; 48 MHz | 48 LQFP
FS32K118LAT0MLFT | 256 KB/32 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.) | Cortex-M4F core, 80 MHz | 48 LQFP
FS32K142HAT0MLFT | 512 KB/64 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.) | Cortex-M4F core, 80 MHz | 64 LQFP
FS32K142HAT0MLLT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K144HAT0MLHT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K144HAT0MLLT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K146HAT0MLHT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K146HAT0MLLT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K148UJT0VLTT | 1 MB/128 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K148UJT0VLQT | 2 MB/256 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K148UJT0VLUT | 2 MB/256 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA
FS32K148UJT0VMMHT | 2 MB/256 KB | CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI | Cortex-M4F core, 112 MHz | 100 MAPBGA

*QSPI not supported by S32K148-100 LQFP derivatives

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## S32K1 Resources

For more information visit:

- S32K1 product information [nxp.com/S32K](https://nxp.com/S32K)
- S32K community [nxp.com/S32K1Community](https://nxp.com/S32K1Community)
- SafeAssure® community [nxp.com/SafeAssureCommunity](https://nxp.com/SafeAssureCommunity)
- Product Longevity information [nxp.com/ProductLongevity](https://nxp.com/ProductLongevity)

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nxp.com/S32K

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