

# S32K1 Arm® Cortex®-based MCUs for Automotive and Industrial Applications

The S32K1 family of 32-bit AEC-Q100 qualified MCUs combines a breakthrough suite of production-grade tools and software with a scalable family of Arm Cortex-M based MCUs built on future-proof 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

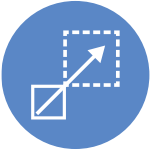
## S32K1 Family Overview

S32K116	S32K118	Common Features	S32K142	S32K144	S32K146	S32K148
Cortex-M0+ @ 48MHz		AEC-Q100	Cortex-M4F @ up to 112MHz			
up to 42 I/Os	up to 58 I/Os	Security Module (CSEc)	up to 89 I/Os	up to 128 I/Os	up to 156 I/Os	
4 channel eDMA		ASIL-B compliant	16 channel eDMA			
1x FlexCAN with 1x FD		Low Power	2x FlexCAN with 1x FD	3x FlexCAN with 1x FD	3x FlexCAN with 2x FD	3x FlexCAN with 3x FD
1x 13-ch 12-bit ADC	1x 16-ch 12-bit ADC	FlexIO	2x 16-ch 12-bit ADC		2x 24-ch 12-bit ADC	2x 32-ch 12-bit ADC
		MPU				
		FlexTimer				
			ENET			
			Quad SPI			
			ETM Trace			
			SAI			

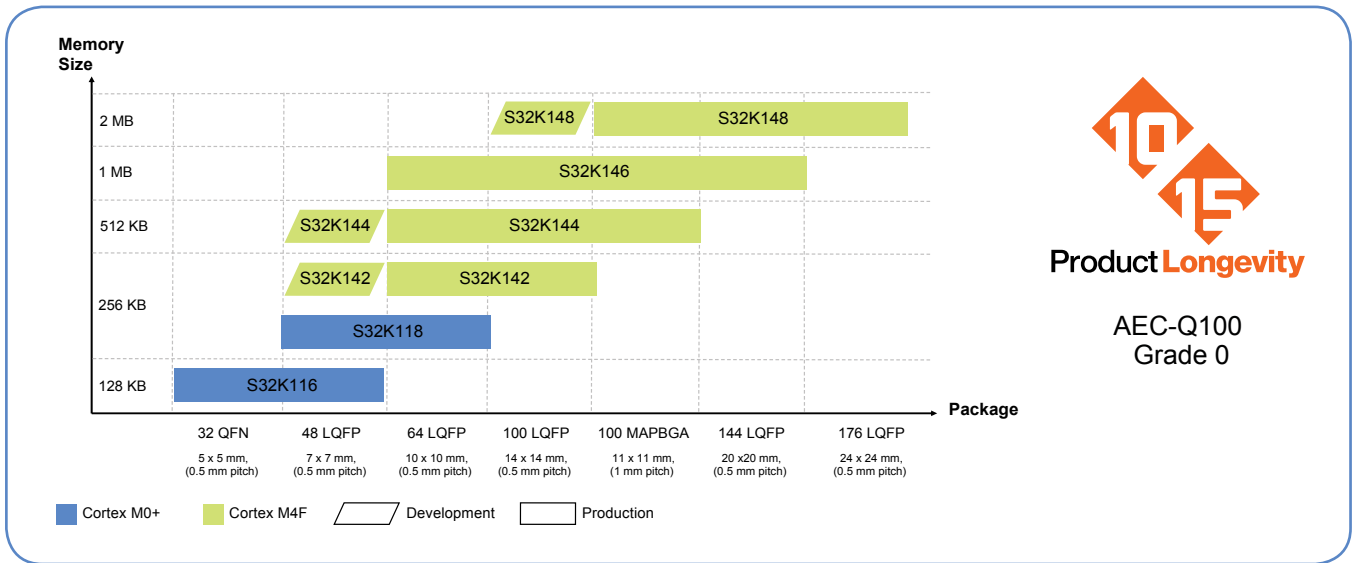


## Key Features

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

	<h3>Scalability</h3> <ul style="list-style-type: none"> <li>• Memory range from 128 KB to 2 MB</li> <li>• Pin count from 32 to 176 pins</li> <li>• QFN, LQFP, MAPBGA packages</li> <li>• IP compatibility across family</li> </ul>		<h3>Security</h3> <ul style="list-style-type: none"> <li>• Cryptographic Services Engine (CSEc) Module</li> <li>• SHE Compliant</li> <li>• AES128 Encryption and Decryption</li> <li>• Up to 20 Key Firmware</li> <li>• Unique ID</li> <li>• Secure Boot</li> <li>• Flash content protection in normal test mode</li> </ul>
	<h3>Safety</h3> <ul style="list-style-type: none"> <li>• ISO26262 ASIL-B</li> <li>• ECC on flash and SRAM MPU; CRC Watchdog</li> <li>• Core Self Test Library</li> <li>• FMEDA</li> <li>• Safety Manual</li> <li>• Technical Support</li> </ul>		<h3>Connectivity</h3> <p><b>FlexCAN</b></p> <ul style="list-style-type: none"> <li>• Support CAN-FD and standard CAN</li> <li>• 64 byte CAN-FD at 8 Mbps</li> </ul> <p><b>FlexIO</b></p> <ul style="list-style-type: none"> <li>• Emulation of UART, SPI, I<sup>2</sup>C, I<sup>2</sup>S, LCD RGB, PWM, LIN, etc.</li> </ul> <p><b>QUADSPI</b></p> <ul style="list-style-type: none"> <li>• Interface to external flash device</li> <li>• Support SDR and HyperRAM modes</li> </ul> <p><b>Ethernet &amp; Audio Interface</b></p> <ul style="list-style-type: none"> <li>• 10/100 Mbps MAC</li> <li>• IEEE802.3-2002</li> <li>• AVB</li> <li>• IEEE-1588 timestamping</li> </ul>

## S32K1 Memory & Package Scalability



## Ultra-Low Power

### Typical consumption values across S32K1xx power modes

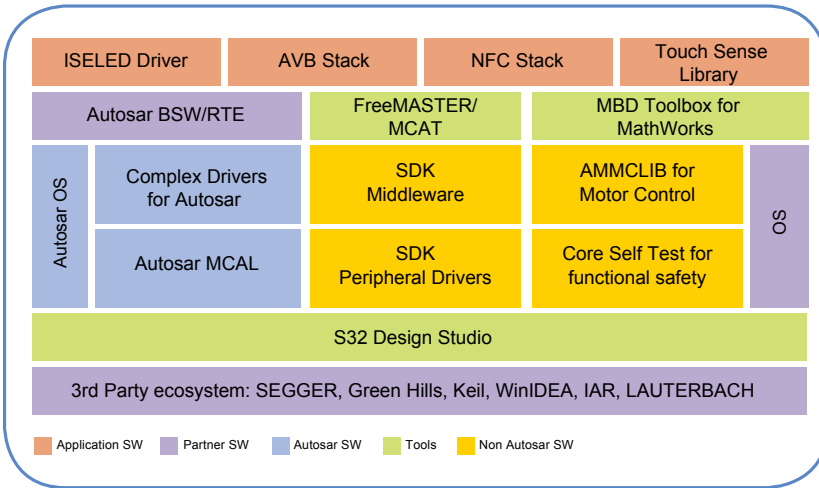
VLPS	40 µA	at 5V with LPTMR enabled
VLPR	1.07 mA	at 5V @ 8 MHz
STOP1	6.3 mA	at 5V @ 48 MHz
STOP2	7.2 mA	at 5V @ 48 MHz
RUN	20.3 mA	at 5V @ 48 MHz
HRUN	52.2 mA	at 5V @ 112 MHz

S32K1 MCUs combine multiple low power operating modes with autonomous, low power peripherals providing complete control over the dynamic and static power profiles.

- ▶ Seven active and standby modes (RUN/WAIT/STOP) with all memory & 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 & peripherals

## 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

## S32K Evaluation Boards

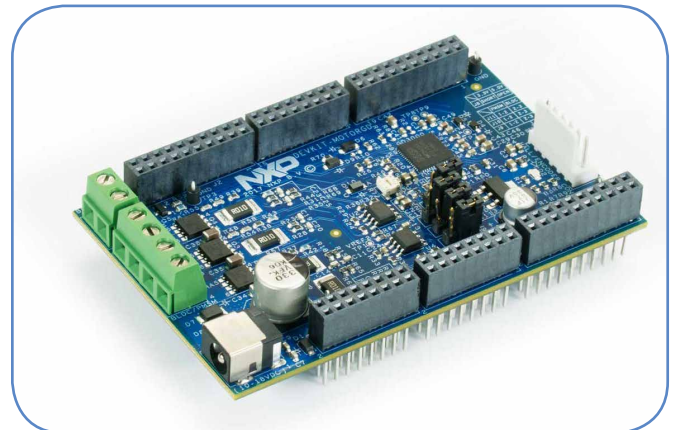
Arduino™ UNO compliant, touch sense pads, OpenSDA serial and debug adaptor, microUSB or 12 V supply



<b>S32K116EV-B-Q048</b>	UJA1169 CAN/LIN PHY SBC	\$49 SRP
<b>S32K118EV-B-Q064</b>	UJA1169 CAN/LIN PHY SBC	\$49 SRP
<b>S32K142EV-B-Q100</b>	UJA1169 CAN/LIN PHY SBC	\$49 SRP
<b>S32K144EV-B-Q0100</b>	UJA1169 CAN/LIN PHY SBC	\$49 SRP
<b>S32K146EV-B-Q144</b>	UJA1169 CAN/LIN PHY SBC	\$149 SRP
<b>S32K148EV-B-Q176</b>	UJA1132 CAN/LIN PHY SBC	\$149 SRP
	ADTJA1101-RMII Ethernet daughter card	\$75 SRP

**MTRDEVKSBNK144 / MTRDEVKSPNK144** \$299 SRP  
3-phase BLDC/PMSM Development Kit with S32K144 MCU

**DEVKIT-MOTORGD** \$299 SRP  
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

- |                     |                      |
|---------------------|----------------------|
| <b>Automotive</b>   | <b>Industrial</b>    |
| ▶ Seat Control      | ▶ Factory Automation |
| ▶ Window            | ▶ Inverters          |
| ▶ Interior Lighting | ▶ Home Audio         |
| ▶ Door              | ▶ Sensing            |
| ▶ Sunroof           | ▶ Avionics           |
| ▶ Pump & Fans, HVAC | ▶ Medical            |

## S32K1 Ordering Information

Part numbers below are available for sampling on [www.nxp.com/S32K](http://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)	Cortex M0+ core; 48 MHz	32 QFN	-40 to 125C		
FS32K116LAT0MLFT				48 LQFP			
FS32K118LAT0MLFT	48 LQFP						
FS32K118LAT0MLHT	64 LQFP						
FS32K142HAT0MLHT	256 KB/32 KB	CAN FD; FlexIO; Crypto Security Engine; eDMA (16 ch)	Cortex M4F core; 80 MHz	64 LQFP			
FS32K142HAT0MLLT				100 LQFP			
FS32K144HAT0MLHT	64 LQFP						
FS32K144HAT0MLLT	100 LQFP						
FS32K144HAT0MMHT	512 KB/64 KB			100 MAPBGA			
FS32K146HAT0MLHT				64 LQFP			
FS32K146HAT0MLLT	1 MB/128 KB			100 LQFP			
FS32K146HAT0MLQT				144 LQFP			
FS32K146HAT0MMHT				100 MAPBGA			
FS32K148UJT0VLQT				144 LQFP			
FS32K148UJT0VLUT	2 MB/256 KB			CAN FD; FlexIO; Crypto Security Engine; eDMA (16 ch); Ethernet; Serial Audio Interface; QSPI	Cortex M4F core; 112 MHz	176 LQFP	-40 to 105C
FS32K148UJT0VMHT						100 MAPBGA	

# S32K1 Resources

### For more information visit:

S32K1 Product Information  
[nxp.com/S32K](http://nxp.com/S32K)

S32K community  
[nxp.com/S32K1Community](http://nxp.com/S32K1Community)

SafeAssure community  
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