

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

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

S32K116	S32K118	Common Features	S32K142	S32K144	S32K146	S32K148
Arm® Cortex®-M0+ @ 48 MHz		AEC-Q100	Cortex-M4F @ up to 112 MHz			
up to 43 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	2 x FlexCAN with 1 x FD	3 x FlexCAN with 1 x FD	3 x FlexCAN with 2 x FD	3 x FlexCAN with 3 x FD
1x 13-ch. 12-bit ADC	1x 16-ch. 12-bit ADC	FlexIO	2 x 16-ch. 12-bit ADC		2 x 24-ch. 12-bit ADC	2 x 32-ch. 12-bit ADC
		MPU				
		FlexTimer				
			ENET			
			Quad SPI			
			ETM Trace			
			SAI			

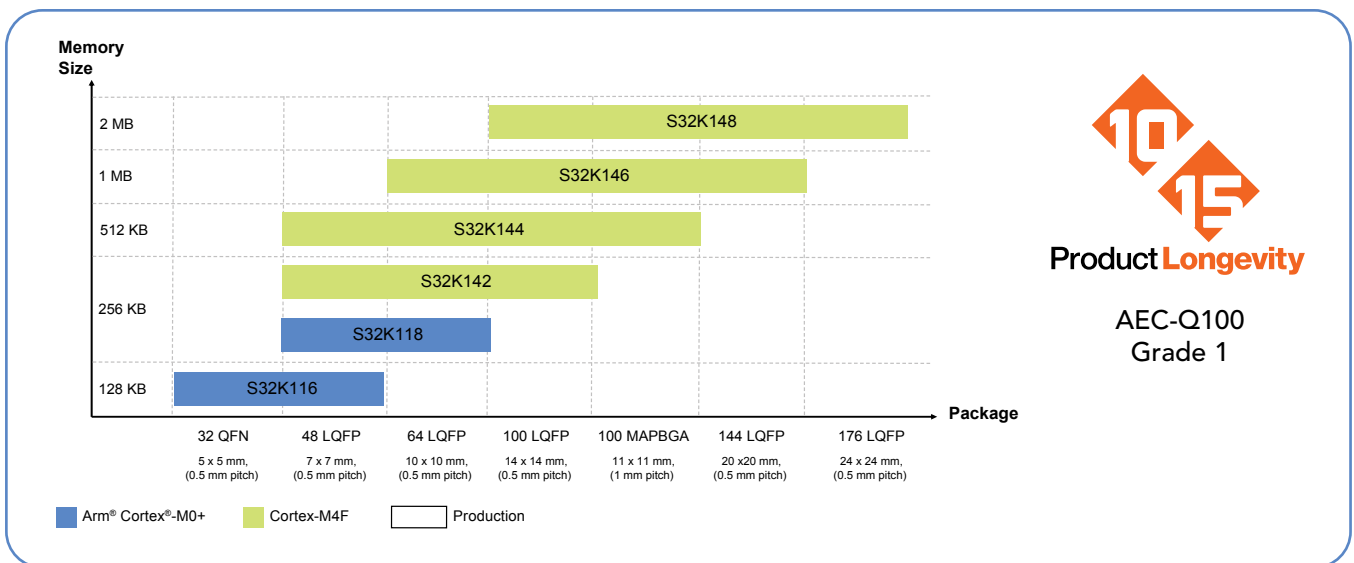


Key Features

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"> • Memory range from 128 KB to 2 MB • Pin count from 32 to 176 pins • QFN, LQFP, MAPBGA packages • IP compatibility across family 		<h3>Security</h3> <ul style="list-style-type: none"> • 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
	<h3>Safety</h3> <ul style="list-style-type: none"> • ISO26262 ASIL B • ECC on flash and SRAM MPU; CRC watchdog • Core self-test library • FMEDA • Safety manual • Technical support 		<h3>Connectivity</h3> <p>FlexCAN</p> <ul style="list-style-type: none"> • Support CAN FD and standard CAN • 64-byte CAN FD at 8 Mbit/s <p>FlexIO</p> <ul style="list-style-type: none"> • Emulation of UART, SPI, I²C, I²S, LCD RGB, PWM, LIN, etc. <p>QUADSPI</p> <ul style="list-style-type: none"> • Interface to external flash device • Support SDR and HyperRAM modes <p>Ethernet & Audio Interface</p> <ul style="list-style-type: none"> • 10/100 Mbit/s MAC • IEEE[®] 802.3-2002 • AVB • IEEE-1588 timestamping

S32K1 Memory and Package Scalability



Ultra-Low Power

Typical consumption values across S32K1xx power modes

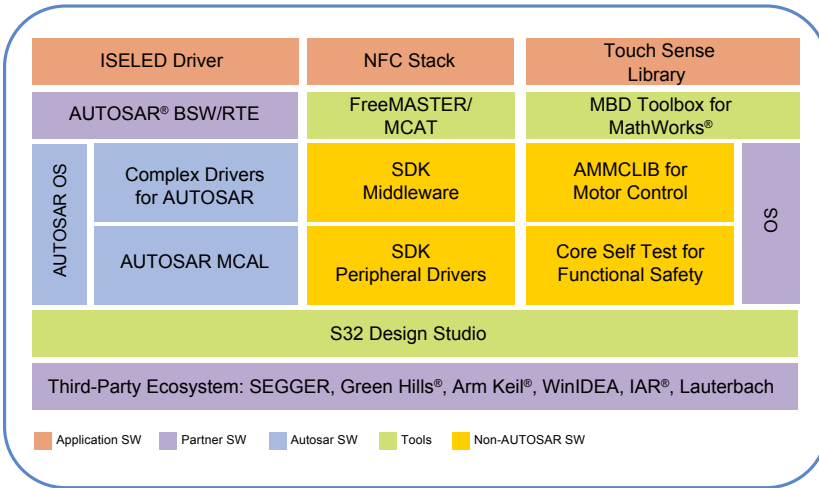
VLPS	40 μ A	at 5 V with LPTMR enabled
VLPR	1.07 mA	at 5 V @ 8 MHz
STOP1	6.3 mA	at 5 V @ 48 MHz
STOP2	7.2 mA	at 5 V @ 48 MHz
RUN	20.3 mA	at 5 V @ 48 MHz
HRUN	52.2 mA	at 5 V @ 112 MHz

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

Enablement

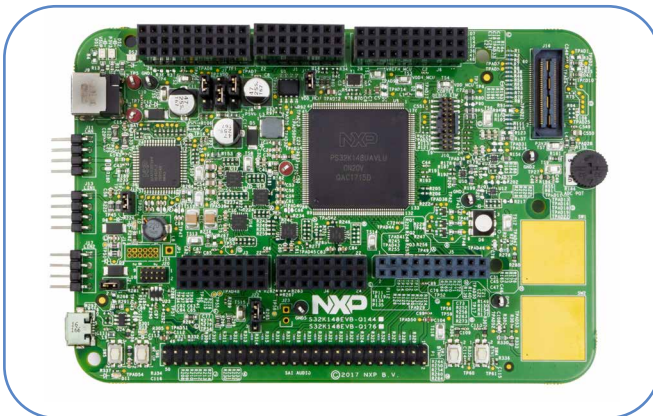
The S32K1 MCUs are supported by a complete ecosystem to minimize development effort and reduce time-to-market.



- ▶ 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



S32K116EVB-Q048

UJA1169 CAN/LIN PHY SBC

S32K118EVB-Q064

UJA1169 CAN/LIN PHY SBC

S32K142EVB-Q100

UJA1169 CAN/LIN PHY SBC

S32K144EVB-Q100

UJA1169 CAN/LIN PHY SBC

S32K146EVB-Q144

UJA1169 CAN/LIN PHY SBC

S32K148EVB-Q176

UJA1132 CAN/LIN PHY SBC
ADTJA1101-RMII Ethernet daughter card

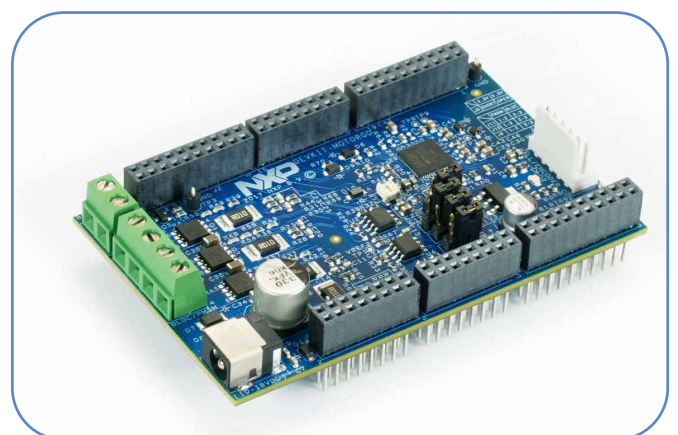
MTRDEVKSBNK144 / MTRDEVKSPNK144

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				48 LQFP			
FS32K118LAT0MLFT	256 KB/25 KB			48 LQFP			
FS32K118LAT0MLHT				64 LQFP			
FS32K142HAT0MLFT	256 KB/32 KB	CAN FD; FlexIO; crypto security engine; eDMA (16 ch.)	Cortex-M4F core; 80 MHz	48 LQFP			
FS32K142HAT0MLHT				64 LQFP			
FS32K142HAT0MLLT				100 LQFP			
FS32K144HAT0MLFT	512 KB/64 KB			48 LQFP			
FS32K144HAT0MLHT				64 LQFP			
FS32K144HAT0MLLT				100 LQFP			
FS32K144HAT0MMHT				100 MAPBGA			
FS32K146HAT0MLHT	1 MB/128 KB			64 LQFP			
FS32K146HAT0MLLT				100 LQFP			
FS32K146HAT0MLQT				144 LQFP			
FS32K146HAT0MMHT				100 MAPBGA			
FS32K148UJT0VLLT	2 MB/256 KB			CAN FD; FlexIO; crypto security engine; eDMA (16 ch.); Ethernet; Serial audio interface; QSPI		Cortex-M4F core; 112 MHz	100 LQFP*
FS32K148UJT0VLQT					144 LQFP		
FS32K148UJT0VLUT					176 LQFP		
FS32K148UJT0VMHT					100 MAPBGA		

*QSPI not supported by S32K148-100 LQFP derivatives



S32K1 Resources

For more information visit:

S32K1 product information
nxp.com/S32K

S32K community
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SafeAssure® community
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Document Number: S32K1AUTOMCUBRA4 REV 6