Low-power MCUs with Ethernet and USB On-The-Go

Kinetis® K6x MCU Family

The Kinetis K series MCU portfolio offers the broadest selection of pin-, peripheral- and software-compatible MCU families based on the ARM® Cortex®-M4 core.

TARGET APPLICATIONS

‣ Building control

‣ Factory automation

‣ Home automation

‣ Industrial drivers

‣ IoT data concentrators

‣ Medical monitoring

These families are performance efficient and offer industry-leading low power while providing significant BOM savings through smart on-chip integration. The Kinetis K series is supported by a comprehensive set of development tools, software and enablement.

The Kinetis K6x MCU family offers IEEE® 1588 Ethernet, full and optional high-speed USB 2.0 On-The-Go (OTG), including options for crystal-less device functionality. Devices range from 256 KB to 2 MB of flash, with 256 KB of SRAM; packages include BGA, LQFP and WLCSP which span from 100 to 256 pins.

The Kinetis K6x MCU family is a scalable portfolio with various levels of integration, offering a rich suite of analog, communication, timing and control peripherals to accommodate a wide range of requirements.

COMPREHENSIVE ENABLEMENT SOLUTIONS

Kinetis software development kit (SDK)

‣ Extensive suite of robust peripheral drivers, stacks and middleware

‣ Includes software examples demonstrating the usage of the HAL, peripheral drivers, middleware and RTOSes

‣ Operating system abstraction (OSA) for our proprietary MQX™ RTOS, FreeRTOS™, and Micrium® µC/OS kernels and BareMetal (no RTOS) applications

Processor Expert® software configuration tool

‣ Complimentary software configuration tool providing I/O allocation and pin initialization and configuration of hardware abstraction and peripheral drivers

Integrated Development Environments (IDE)

▸ Atollic® TrueSTUDIO®
www.atollic.com/index.php/partnerfreescale

▸ Green Hills® Software MULTI
www.ghs.com/products/freescale_kinetis.html

▸ IAR Embedded Workbench®
www.iar.com/kinetis

▸ ARM Keil® microcontroller development kit **www.keil.com/freescale**

▸ Kinetis Design Studio IDE
  – No-cost integrated development environment (IDE) for Kinetis MCUs
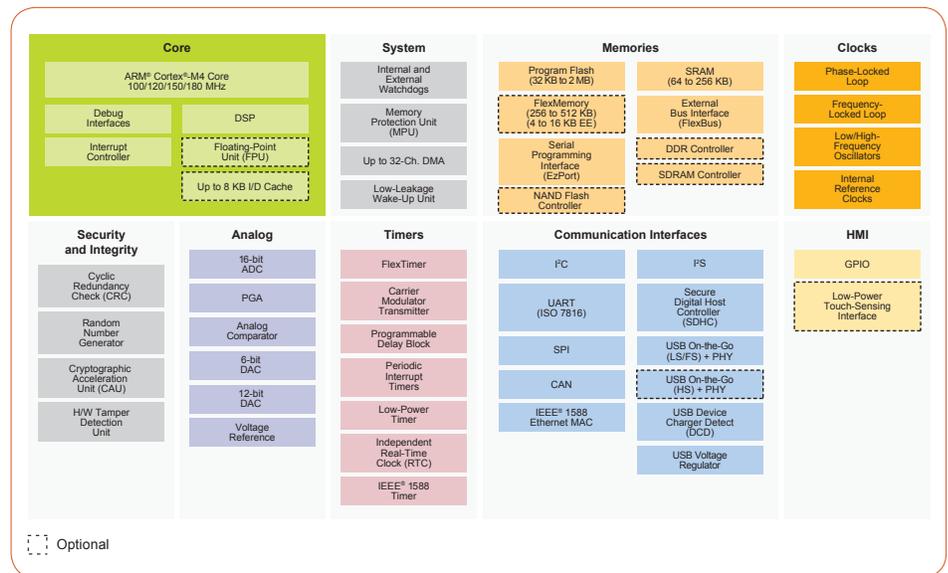 – Eclipse and GCC-based IDE for C/C++ editing, compiling and debugging

▸ Broad ARM ecosystem support through NXP Partner Program

Online enablement with ARM mbed™ development platform

▸ Rapid and easy Kinetis MCU prototyping and development

▸ Online mbed SDK, developer community

▸ Free software libraries

KINETIS K6x MCU FAMILY BLOCK DIAGRAM

Proprietary MQX RTOS

▸ Full-feature RTOS kernel, TCP/IP and USB stacks, file system, shell utility, peripheral drivers, board support packages and more at **www.nxp.com/mqx**

Bootloader

▸ Common bootloader for all Kinetis MCUs

▸ In-system flash programming over a serial connection: erase, program, verify

▸ ROM- or flash-based bootloader with open-source software and host-side programming utilities

Development hardware

▸ Tower® System development board platform
  – Rapid prototyping and evaluation
  – Low cost, interchangeable boards

▸ Freedom development platforms
  – Low cost (<$30 USD)
  – Arduino® R3 compatible
  – mbed-enabled on select boards

KINETIS K6x MCU BENEFITS

- IEEE® 1588 Ethernet MAC with hardware time stamping provides for precision clock synchronization for real-time industrial control

- Hardware acceleration block helps to optimize the performance of network controllers providing TCP/IP, UDP and ICMP protocol services

- Up to 180 MHz ARM® Cortex®-M4 core supporting a broad range of processing bandwidth requirements while maintaining excellent cost-effectiveness, easy-to-use packages and a wide range of memory densities

- Featuring digital signal processing capabilities with floating-point unit, offering outstanding computational power for control algorithms, sensor data processing and audio processing, among others, while increasing math accuracy and reducing code size

- Hardware encryption coprocessor for secure data transfer and storage with faster (than software) implementations and minimal CPU loading

- Secure digital host controller supports SD, SDIO, MMC or CE-ATA cards for in-application software upgrades, media files or adding Wi-Fi® support

- Outstanding low-power operation with dynamic currents down to 250 µA/MHz, state retention stop mode down to 5.8 µA with 4.5 µS wake-up time and lowest power mode down to 340 nA

- Smart integration supporting applications requiring higher performance, low power and reduction of BOM cost

- Highly reliable, fast access flash memory with four levels of protection for code security/protection

- Faster time-to-market with comprehensive enablement solutions, including SDK (drivers, libraries, stacks), IDE, bootloader, RTOS, online community and more

KINETIS K6x MCUs: 10/100 ETHERNET MAC WITH FULL-SPEED USB

Kinetis K6x MCU Sub-Family	Kinetis K66 MCUs High Performance	Kinetis K65 MCUs High Performance w/ Security	Kinetis K64 MCUs High SRAM	Kinetis K63 MCUs High SRAM w/ Security	Kinetis K61 MCUs High Mixed-Signal Integration w/ Security		Kinetis K60 MCUs High Mixed-Signal Integration		
CPU Performance	180 MHz w/ FPU	180 MHz w/ FPU	120 MHz w/ FPU	120 MHz w/ FPU	120 MHz w/ FPU	150 MHz w/ FPU	100 MHz	120 MHz w/ FPU	150 MHz w/ FPU
Embedded Memory (Flash, SRAM)	Up to 2048 KB, 256 KB	Up to 2048 KB, 256 KB	640–1024 KB, 192–256 KB	1024 KB, 256 KB	1024 KB, 128 KB	1024 KB, 128 KB	256–512 KB, 64–128 KB	1024 KB, 128 KB	1024 KB, 128 KB
Analog	2 x 16-bit ADC, 2 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	PGA, 4 x 16-bit ADC, 2 x 12-bit DAC	PGA, 4 x 16-bit ADC, 2 x 12-bit DAC	PGA, 2 x 16-bit ADC, 2 x 12-bit DAC	PGA, 4 x 16-bit ADC, 2 x 12-bit DAC	PGA, 4 x 16-bit ADC, 2 x 12-bit DAC
Security	Hardware encryption	Hardware encryption and tamper detection	Hardware encryption	Hardware encryption and tamper detection	Hardware encryption and tamper detection		Hardware encryption		
Other Features	HS USB w/ PHY, CAN, FlexBus, SDRAM controller	HS USB w/ PHY, CAN, FlexBus, SDRAM controller	CAN, FlexBus	CAN, FlexBus	CAN, FlexBus, NAND flash controller, HS USB, DDR controller		CAN, FlexBus	CAN, FlexBus, NAND Flash controller, HS USB	
Package Options	MAP144, LQFP144	WLCSP169, MAP169	LQFP100, LQFP144, MAP144, XFBGA121	MAP144, LQFP144	MAP144, MAP256	MAP144, MAP256	MAP121, MAP144, LQFP100, LQFP144	MAP144, LQFP144	MAP144, LQFP144
Development Board	TWR-K65F180M, FRDM-K66F	TWR-K65F180M	FRDM-K64F TWR-K64F120M	FRDM-K64F TWR-K64F120M	TWR-K60F120M	TWR-K60F120M	TWR-K60D100M	TWR-K60F120M	TWR-K60F120M

*Note: Not all features present on each device or development board. Check technical documentation to confirm feature availability per package.

HI-SPEED CERTIFIED USB

Energy Efficient Solutions by Freescale