Low-power MCUs with USB On-The-Go

Kinetis® K2x 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

▸ Barcode scanners

▸ Electronic point of sale (EPOS)

▸ Gaming accessories

▸ Health and wellness monitors

▸ Home and building automation

▸ Industrial/commercial sensor nodes

▸ IoT data concentrators

▸ Multi-functional printers

▸ Smart grid data concentrators

▸ Sports and activity wearables

These families are performance efficient and offer industry-leading low power consumption 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 K2x MCU family offers full and optional high-speed USB 2.0 On-The-Go (OTG), including options for crystal-less device functionality. Devices range from 32 KB to 2 MB of flash with 256 KB of SRAM; packages include BGA, LQFP, QFN and WLCSP spanning from 32- to 169- pin options.

The Kinetis K2x 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 proprietary MQX™ RTOS, FreeRTOS™, and Micrium® μC/OS kernels and Baremetal (no RTOS) applications

Integrated Development Environments (IDE)

▸ Atollic® TrueSTUDIO®
atollic.com/products/target-support/nxp-freescale/

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

▸ IAR Embedded Workbench®
iar.com/kinetis

▸ ARM Keil® microcontroller development kit
keil.com/nxp

▸ SOMNIUM® DRT Cortex-M IDE
www.**somniumtech.com/nxp**

- ▸ 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

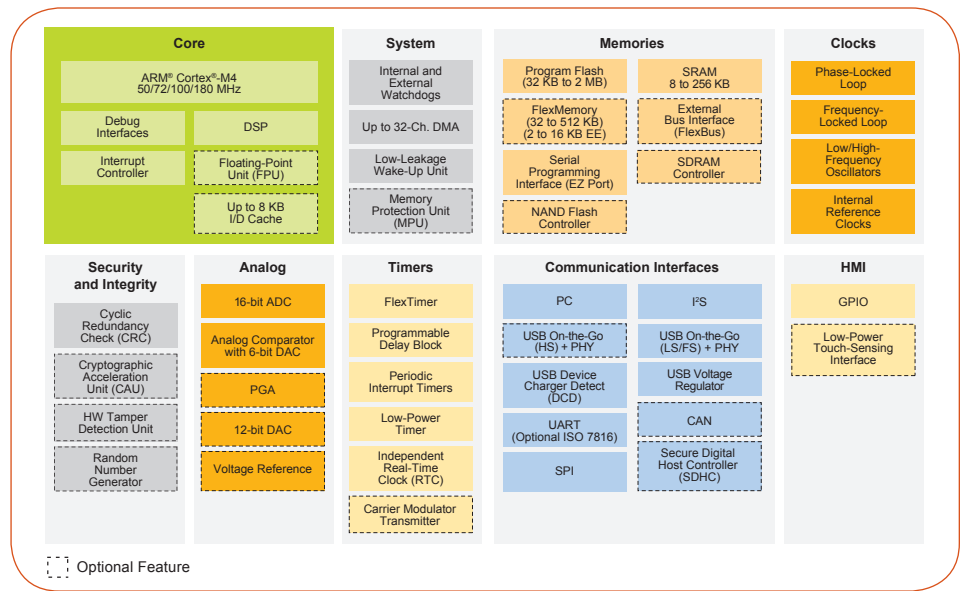## Online Enablement with ARM mbed™ Development Platform

mbed Enabled

- ▸ Rapid and easy Kinetis MCU prototyping and development
- ▸ Online mbed SDK, developer community
- ▸ **https://developer.mbed.org**
- ▸ Free software libraries

Proprietary MQX RTOS

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

KINETIS K2x MCU FAMILY BLOCK DIAGRAM

Core
ARM® Cortex®-M4 50/72/100/180 MHz
- Debug Interfaces
- DSP
- Interrupt Controller
- Floating-Point Unit (FPU)
- Up to 8 KB I/D Cache

System
- Internal and External Watchdogs
- Up to 32-Ch. DMA
- Low-Leakage Wake-Up Unit
- Memory Protection Unit (MPU)

Memories
- Program Flash (32 KB to 2 MB)
- SRAM 8 to 256 KB
- FlexMemory (32 to 512 KB) (2 to 16 KB EE)
- External Bus Interface (FlexBus)
- Serial Programming Interface (EZ Port)
- SDRAM Controller
- NAND Flash Controller

Clocks
- Phase-Locked Loop
- Frequency-Locked Loop
- Low/High-Frequency Oscillators
- Internal Reference Clocks

Security and Integrity
- Cyclic Redundancy Check (CRC)
- Cryptographic Acceleration Unit (CAU)
- HW Tamper Detection Unit
- Random Number Generator

Analog
- 16-bit ADC
- Analog Comparator with 6-bit DAC
- PGA
- 12-bit DAC
- Voltage Reference

Timers
- FlexTimer
- Programmable Delay Block
- Periodic Interrupt Timers
- Low-Power Timer
- Independent Real-Time Clock (RTC)
- Carrier Modulator Transmitter

Communication Interfaces
- I²C
- I²S
- USB On-the-Go (HS) + PHY
- USB On-the-Go (LS/FS) + PHY
- USB Device Charger Detect (DCD)
- USB Voltage Regulator
- UART (Optional ISO 7816)
- CAN
- SPI
- Secure Digital Host Controller (SDHC)

HMI
- GPIO
- Low-Power Touch-Sensing Interface

⬚ Optional Feature

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 modular development platform
  - – Rapid prototyping and evaluation
  - – Low-cost, interchangeable modules
- ▸ Freedom development platforms
  - – Low cost (<$30 USD)
  - – Arduino® R3 compatible
  - – mbed-enabled on select boards

KINETIS K2x MCUs: FULL-SPEED USB

Kinetis K2x MCU Sub-Family	Kinetis K26 MCUs High Performance	Kinetis K24 MCUs High SRAM	Kinetis K22 MCUs Baseline				Kinetis K21 MCUs Security Rich		Kinetis K20 MCUs High Mixed-Signal Integration			
CPU performance	180 MHz w/FPU	120 MHz w/FPU	50 MHz	100 MHz w/FPU	120 MHz w/FPU	120 MHz w/FPU	50 MHz	120 MHz w/FPU	50 MHz	72 MHz	100 MHz	120 MHz w/FPU
Embedded memory (flash, SRAM)	Up to 2048 KB, 256 KB	256-1024 KB, 256 KB	192–512 KB, 32–64 KB	128 KB, 24 KB	640–1024 KB, 128 KB	256–512 KB, 48–128 KB	192–512 KB, 32–64 KB	640–1024 KB, 128 KB	32–160 KB, 8–16 KB	96–288 KB, 16–64 KB	256–512 KB, 32–128 KB	1024 KB, 128 KB
Analog	2 x 16-bit ADC, 2 x 12-bit DAC	PGA 2 x 16-bit ADC, 2 x 12-bit DAC	1 x 16-bit ADC, 1 x 12-bit DAC	2 x 16-bit ADC, 1 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	1 x 16-bit ADC, 1 x 12-bit DAC	2 x 16-bit ADC, 2 x 12-bit DAC	1 x 16-bit ADC	PGA 2 x 16-bit ADC, 1 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
Security	Hardware Encryption	Hardware Encryption	-				Hardware Encryption and Tamper Detection		-			
Other features	HS USB w/ PHY, CAN, FlexBus, SDRAM Controller	CAN, FlexBus	-	-	CAN, FlexBus	FlexBus	-	CAN, FlexBus	-	CAN, FlexBus	CAN, FlexBus	HS USB, CAN, NAND flash controller, FlexBus
Package options	WLCSP169, MAP169, MAP144, LQFP144	LQFP144, LQFP100, MAP121	LQFP48, LQFP80, MAP121, LQFP64	XFBGA121, LQFP100, MAP64, LQFP64	MAP144, MAP121, LQFP144, LQFP64, LQFP100, LQFP80	XFBGA121, LQFP100, MAP64, LQFP64	MAP121, LQFP80	MAP144, MAP121, LQFP144	LQFP48, MAP64, QFN48, LQFP64, QFN32	LQFP80, LQFP64, MAP121, LQFP100	LQFP100, LQFP144, LQFP80, MAP144, MAP121	MAP144, LQFP144
Development board	TWR-K65F180M, FRDM-K66F	TWR-K64F120M, TWR-K24F120M, FRDM-K64F	TWR-K21D50M	TWR-K22F120M, FRDM-K22F	TWR-K21F120M	TWR-K22F120M, FRDM-K22F	TWR-K21D50M	TWR-K21F120M	TWR-K20D50M, FRDM-K20D50M	TWR-K20D72M	TWR-K60D100M	TWR-K60F120M, FRDM-K22F

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

www.nxp.com/Kinetis

Document Number: KINK2XFS REV 10

CERTIFIED USB

Energy Efficient Solutions by Freescale