freescale™
Kinetis

32-bit Microcontrollers

Kinetis K2x MCU Family

Low-Power MCUs with USB On-The-Go

Overview

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. 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 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 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.

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

Kinetis K2x MCU Family Block Diagram

Core			System	Memories		Clocks
ARM® Cortex®-M4 50/72/100/180 MHz			Internal and External Watchdogs	Program Flash (32 KB to 2 MB)	SRAM 8 to 256 KB	Phase-Locked Loop
Debug Interfaces	DSP		Up to 32-Ch. DMA	FlexMemory (32 to 512 KB) (2 to 16 KB EE)	External Bus Interface (FlexBus)	Frequency-Locked Loop
Interrupt Controller	Floating-Point Unit (FPU)		Low-Leakage Wake-Up Unit	Serial Programming Interface (EZ Port)	SDRAM Controller	Low/High-Frequency Oscillators
	Up to 8 KB I/D Cache		Memory Protection Unit (MPU)	NAND Flash Controller		Internal Reference Clocks

Security and Integrity	Analog	Timers	Communication Interfaces		HMI
Cyclic Redundancy Check (CRC)	16-bit ADC	FlexTimer	I²C	I²S	GPIO
Cryptographic Acceleration Unit (CAU)	Analog Comparator with 6-bit DAC	Programmable Delay Block	USB On-the-Go (HS) + PHY	USB On-the-Go (LS/FS) + PHY	Xtrinsic Low-Power Touch-Sensing Interface
HW Tamper Detection Unit	PGA	Periodic Interrupt Timers	USB Device Charger Detect (DCD)	USB Voltage Regulator	
Random Number Generator	12-bit DAC	Low-Power Timer	UART (optional ISO 7816)	CAN	
	Voltage Reference	Independent Real-Time Clock (RTC)	SPI	Secure Digital Host Controller (SDHC)	
		Carrier Modulator Transmitter			

☐ Standard Feature   ⬚ Optional Feature

CERTIFIED USB

Energy Efficient Solutions
optimized for low power

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 Freescale MQX™ RTOS, FreeRTOS, and Micrium uC/OS kernels and baremetal (no RTOS) applications

Processor Expert Software Configuration Tool

- Complimentary software configuration tool providing IO allocation and pin initialization and configuration of hardware abstraction and peripheral drivers

Integrated Development Environments (IDE)

- Atollic® TrueSTUDIO®
  atollic.com/index.php/partnerfreescale

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

- IAR Embedded Workbench®
  iar.com/kinetis

- ARM Keil® Microcontroller Development Kit
  keil.com/freescale

- 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 Freescale Connect partners

Online enablement with ARM mbed™ development platform

- Rapid and easy Kinetis MCU prototyping and development

- Online mbed SDK, Developer Community

- Free software libraries

Freescale MQX RTOS

- Commercial-grade MCU software platform at no cost with optional add-on software and support packages

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

- Freescale 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	2x 16-bit ADC, 2x 12-bit DAC	PGA 2x 16-bit ADC, 2x 12-bit DAC	1x 16-bit ADC, 1x 12-bit DAC	2x 16-bit ADC, 1x 12-bit DAC	2x 16-bit ADC, 2x 12-bit DAC	2x 16-bit ADC, 2x 12-bit DAC	1x 16-bit ADC, 1x 12-bit DAC	2x 16-bit ADC, 2x 12-bit DAC	1x 16-bit ADC	PGA 2x 16-bit ADC, 1x 12-bit DAC	PGA 2x 16-bit ADC, 2x 12-bit DAC	PGA 4x 16-bit ADC, 2x 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.

For more information about Kinetis MCUs, software, tools and documentation visit freescale.com/Kinetis

freescale™