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 MCU portfolio is supported by the most comprehensive set of development tools and software.
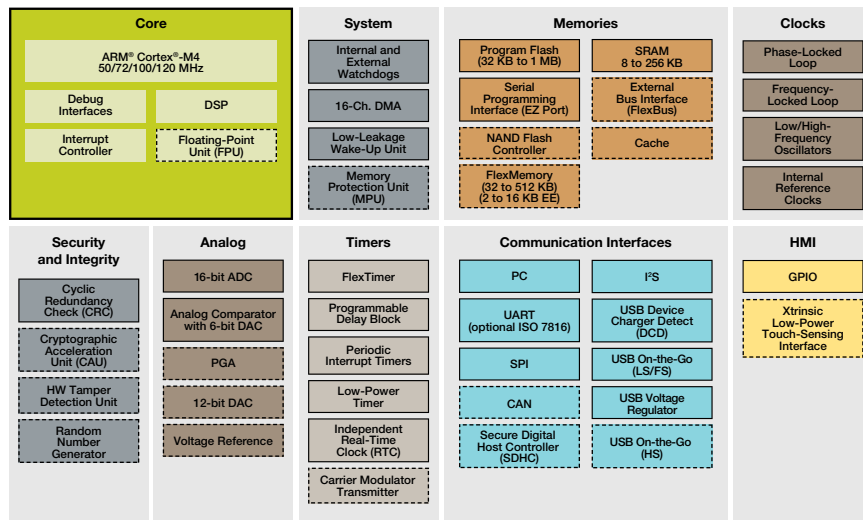
The Kinetis K2x MCU family is pin-peripheral and software compatible with many of the Kinetis K series MCU families, offering full and high-speed USB 2.0 On-The-Go options in addition to other features like device charge detect capability and USB crystal-less functionality present in the latest devices. This family starts from 32 KB of flash in 5 x 5 mm 32-pin QFN packages extending up to 1 MB in a 144-pin MAPBGA package with up to 256 KB of SRAM. These devices offer various levels of integration with a rich suite of analog, communication, timing and control peripherals. Next-generation Kinetis K2x MCUs are further optimized for performance with industry-leading power consumption and offer more streamlined integration for further BOM cost reductions.

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

Target Applications

- Barcode scanners
- Electronic point of sales (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

Core		System	Memories		Clocks
Core		**System**	**Memories**		**Clocks**
ARM® Cortex®-M4 50/72/100/120 MHz		Internal and External Watchdogs	Program Flash (32 KB to 1 MB)	SRAM 8 to 256 KB	Phase-Locked Loop
Debug Interfaces	DSP	16-Ch. DMA	Serial Programming Interface (EZ Port)	External Bus Interface (FlexBus)	Frequency-Locked Loop
Interrupt Controller	Floating-Point Unit (FPU)	Low-Leakage Wake-Up Unit	NAND Flash Controller	Cache	Low/High-Frequency Oscillators
		Memory Protection Unit (MPU)	FlexMemory (32 to 512 KB) (2 to 16 KB EE)		Internal Reference Clocks

Security and Integrity	Analog	Timers	Communication Interfaces		HMI
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	UART (optional ISO 7816)	USB Device Charger Detect (DCD)	Xtrinsic Low-Power Touch-Sensing Interface
HW Tamper Detection Unit	PGA	Periodic Interrupt Timers	SPI	USB On-the-Go (LS/FS)	
Random Number Generator	12-bit DAC	Low-Power Timer	CAN	USB Voltage Regulator	
	Voltage Reference	Independent Real-Time Clock (RTC)	Secure Digital Host Controller (SDHC)	USB On-the-Go (HS)	
		Carrier Modulator Transmitter			

☐ **Standard Feature**   ⬚ **Optional Feature**

CERTIFIED **USB**

Energy Efficient Solutions
optimized for low power

- 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

Kinetis K2x MCU Benefits

- Cortex-M4 core featuring digital signal processing capability with floating point unit offering outstanding computational power for control algorithms, sensor data processing, audio processing, among others, while increasing math accuracy and reducing code size
- Industry leading low-power consumption specifications to help extend battery life and reduce overall board power supply requirement with run currents down to 138 uA/MHz
- Low-leakage stop mode with full-state retention down to 2.6 uA while maintaining a fast wake-up time of 6 uS
- Ultra-low-power shelf mode, down to 150 nA, allowing multiple years of real-time clock retention without compromising battery power
- Smart integration supporting applications that require 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

Online enablement with ARM mbed™ development platform

mbed Enabled

- 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

Kinetis K2x MCU Sub-Family	Kinetis K24 MCUs High SRAM	Kinetis K22 MCUs Baseline				Kinetis K21 MCUs Security Rich		Kinetis K20 MCUs High Mixed Signal Integration			
CPU Performance	120MHz w/FPU	50MHz	100MHz w/FPU	120MHz w/FPU	120MHz w/FPU	50MHz	120MHz w/FPU	50MHz	72MHz	100MHz	120MHz w/FPU
Embedded Memory (Flash, SRAM)	256-1024KB, 256KB	192-512KB, 32-64KB	128KB, 24KB	640-1024KB, 128KB	256-512KB, 48-128KB	192-512KB, 32-64KB	640-1024KB, 128KB	32-160KB, 8-16KB	96-288KB, 16-64KB	256-512KB, 32-128KB	1024KB, 128KB
Analog	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 and Tamper		-			
Other Features	CAN, FlexBus	-	-	CAN, FlexBus	FlexBus	-	CAN, FlexBus	-	CAN, FlexBus	CAN, FlexBus	HS USB, CAN, NAND Flash Controller, FlexBus
Package Options	LQFP144, LQFP100, MAP121	LQFP48, LQFP80, LQFP100, 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 Hardware	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

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