

# Kinetis K1x MCU Family

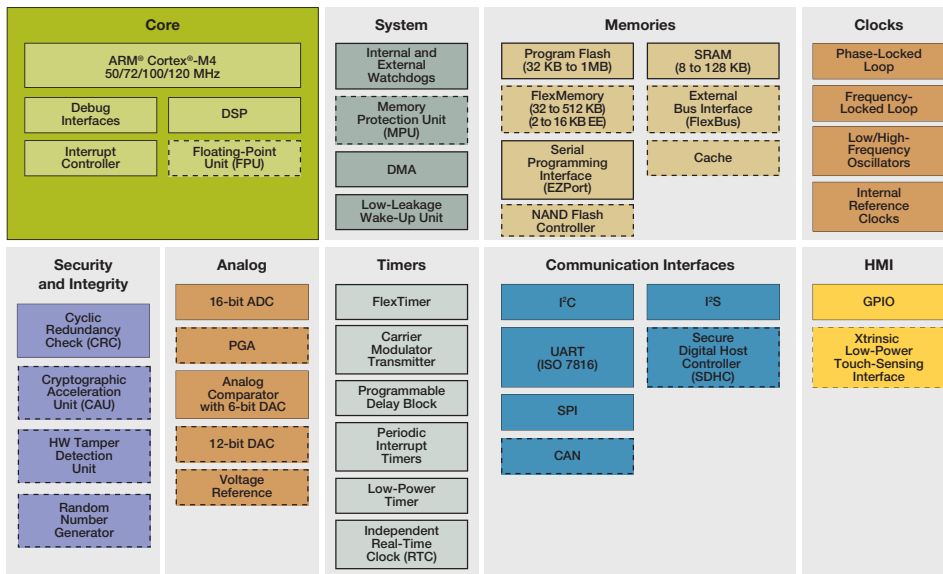
## Low-power, mixed-signal MCUs

### Overview

The Kinetis MCU portfolio consists of multiple pin-, peripheral- and software-compatible MCU families based on the ARM® Cortex®-M4 core. Families are built from innovative 90 nm thin-film storage (TFS) flash technology with unique FlexMemory (EEPROM) capability, and offer industry-leading low power and mixed signal analog integration.

The K1x MCU family is the entry point into the Kinetis MCU portfolio. Devices start from 32 KB of flash in a small-footprint 5x5 mm 32 QFN package, extending up to 1 MB in a 144 MAPBGA package with a rich suite of analog, communication, timing and control peripherals. Additionally, pin compatibility, flexible low-power capabilities and innovative FlexMemory help to solve many of the major pain points for system implementation.

### Kinetis K1x MCU Family



☐ Standard Feature ☐ Optional Feature



### Target Applications

- Electronic point of sales (EPOS)
- Flow meters
- Gaming controllers
- HVAC systems
- Remote sensors

## One-Stop Enablement Offering—MCU + IDE + RTOS

Freescale Tower System development board platform:

- Integrated development environments
  - Eclipse-based CodeWarrior V10.x IDE and Processor Expert software configuration tool
  - IAR Embedded Workbench®
  - MDK®
  - Mentor Graphics Sourcery™ CodeBench
- Runtime software and RTOS
  - Math, DSP and encryption libraries
  - Motor control libraries
  - Complimentary bootloaders (e.g., USB, Ethernet, RF, serial)
  - Complimentary Freescale embedded GUI
  - Complimentary Freescale MQX™ RTOS
  - Cost-effective Nano™ SSL/Nano™ SSH for Freescale MQX RTOS
  - Micrium µC/OS-III
  - Express Logic ThreadX®
  - SEGGER embOS®
  - freeRTOS
  - Mocana (security)
- Full ARM ecosystem

Features	Benefits
<ul style="list-style-type: none"> <li>Cortex-M4 core with DSP instruction support and optional single-precision floating-point unit</li> <li>Up to 32-channel DMA. Up to 16 KB of cache. Crossbar switch.</li> </ul>	<ul style="list-style-type: none"> <li>Up to 120 MHz core supporting a broad range of processing bandwidth needs</li> <li>Peripheral and memory servicing with reduced CPU loading. Optimized bus bandwidth and flash execution performance. Concurrent multi-master bus accesses for increased bus bandwidth.</li> </ul>
<ul style="list-style-type: none"> <li>32 KB–1 MB flash. Up to 128 KB of SRAM.</li> <li>32–512 KB FlexMemory</li> </ul>	<ul style="list-style-type: none"> <li>High reliability, fast access program memory with 4-level security protection. Independent flash banks allow concurrent code execution and firmware updating.</li> <li>FlexMemory provides 32 byte–16 KB of user-segmentable byte write/erase EEPROM. In addition, FlexNVM from 32–512 KB for extra program code, data or EEPROM backup.</li> </ul>
<ul style="list-style-type: none"> <li>10 ultra-low-power modes with flash programming and analog operation down to 1.71 V</li> <li>Low-power timer, low-power RTC, low-leakage wake-up unit</li> </ul>	<ul style="list-style-type: none"> <li>Peripheral activity and wake-up times can be optimized to suit application requirements, enabling extended battery life (Stop currents of &lt;500 nA, run currents of &lt;200 µA/MHz, 4 µs wake-up from Stop)</li> <li>Continual device operation in reduced power states with flexible wake-up options</li> </ul>
<ul style="list-style-type: none"> <li>High-speed 16-bit ADCs. Programmable gain amplifiers</li> <li>12-bit DAC. High-speed comparators</li> <li>On-chip voltage reference</li> <li>Cryptographic acceleration unit (CAU)</li> <li>HW tamper detection unit</li> <li>Random number generator</li> </ul>	<ul style="list-style-type: none"> <li>Fast, accurate signal conditioning capability with support for single or differential operation for improved noise rejection</li> <li>Support for small amplitude signal processing</li> <li>Analog signal generation for audio applications</li> <li>Fast, accurate motor overcurrent protection</li> <li>Eliminates need for external voltage reference reducing overall system cost</li> <li>Secure data transfer and storage. Faster than software implementations and with minimal CPU loading. Supports a wide variety of algorithms: DES, 3DES, AES, MD5, SHA-1, SHA-256.</li> <li>Secure key storage with internal/external tamper detect for unsecured flash, temperature/clock/supply voltage variations and physical attack</li> </ul>
<ul style="list-style-type: none"> <li>Low-power capacitive touch-sensing interface</li> </ul>	<ul style="list-style-type: none"> <li>Provides a modern upgrade from mechanical to touch keypad, rotary and slider user interfaces and operates in all low-power modes with minimal current added. Supports up to 16 inputs.</li> </ul>
<ul style="list-style-type: none"> <li>Up to six UARTs with IrDA support. One UART with ISO 7816 support.</li> <li>I²S interface, up to two CAN modules, up to three DSPI interfaces, up to two I2C interfaces</li> </ul>	<ul style="list-style-type: none"> <li>Variety of data size, format and transmission/reception settings supported for multiple industrial communication protocols</li> <li>Multiple communication interfaces for simple and efficient data exchange, industrial network bridging and audio system interfacing</li> </ul>

## Kinetis K1x MCU Family Options

Part Number	Memory				Features										Other	Packages									
	CPU (MHz)	Flash (KB)	Flex NVM (KB)	SRAM (KB)	Cache (KB)	Single-Precision Floating-Point Unit	Memory Protection	CAN	Secure Digital Host	NAND Flash Controller	External Bus Interface	12-bit DAC	Prog. Gain Amplifier	5 V Tolerant I/O		FM (5x5)	FT (7x7)	LF (7x7)	MP (5x5)	LH (10x10)	LK (12x12)	LL (10x14)	MC (8x8)	LQ (20x20)	MD (13x13)
MK10DN32Vyy5	50	32		8												✓	✓	✓	✓	✓					
MK10DN64Vyy5	50	64		16												✓	✓	✓	✓	✓					
MK10DN128Vyy5	50	128		16												✓	✓	✓	✓	✓					
MK10DN512Vyy10	100	512		128			✓	✓	✓		✓	✓	✓	✓						✓	✓	✓	✓	✓	✓
MK10FN1M0Vyy12	120	1 MB		128	16	✓	✓	✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓
MK10DX32Vyy5	50	32v	32	8												✓	✓	✓	✓	✓					
MK10DX64Vyy5	50	64	32	16												✓	✓	✓	✓	✓					
MK10DX128Vyy5	50	128	32	16												✓	✓	✓	✓	✓					
MK10DX64Vyy7	72	64	32	16				✓			✓	✓	✓	✓		✓	✓	✓	✓	✓		✓			
MK10DX128Vyy7	72	128	32	32				✓			✓	✓	✓	✓					✓	✓		✓			
MK10DX256Vyy7	72	256	32	64				✓			✓	✓	✓	✓					✓	✓	✓	✓			
MK10DX128Vyy10	100	128	128	32		✓	✓	✓	✓		✓	✓	✓	✓						✓			✓	✓	✓
MK10DX256Vyy10	100	256	256	64			✓	✓	✓		✓	✓	✓	✓						✓				✓	✓
MK10FX512Vyy12	120	512	512	128	16	✓	✓	✓	✓	✓	✓	✓	✓	✓									✓	✓	✓
MK11DX128AVyy5(R)	50	128	64	32								✓			Encryption and Tamper Detect						✓				
MK11DX256AVyy5(R)	50	256	64	32								✓			Encryption and Tamper Detect						✓				
MK11DN512AVyy5(R)	50	512		64								✓			Encryption and Tamper Detect					✓					
MK12DX128Vyy5(R)	50	128	64	32								✓						✓	✓	✓		✓			
MK12DX256Vyy5(R)	50	256	64	32								✓						✓	✓	✓		✓			
MK12DN512Vyy5	50	512		64								✓						✓	✓	✓		✓			

yy = package designator

For current information about Kinetis products and documentation, please visit [freescale.com/Kinetis/Kseries](http://freescale.com/Kinetis/Kseries)

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