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

Low-power, mixed-signal MCUs

Target Applications

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

Kinetis K1x MCU Family

Core
- ARM® Cortex®-M4 50/72/100/120 MHz
- Debug Interfaces
- Interrupt Controller
- Floating-Point Unit (FPU)
- Security and Integrity
  - Cyclotronic Resonance Check (CRC)
  - Cryptographic Acceleration Unit (CAU)
  - HW Tamper Detection Unit
  - Random Number Generator

Analog
- 16-bit ADC
- PGA
- Comparator with 8-bit DAC
- 12-bit DAC
- Voltage Reference

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

Communication Interfaces
- FC
- SPI
- CAN
- UART (ISO 7816)

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

System
- Internal and External Watchdogs
- Memory Protection Unit (MPU)
- Low-Leakage Wake-Up Unit

Memories
- Program Flash (32 KB to 1 MB)
- NAND Flash Controller
- FlexFlash (32 to 512 KB)
- 2 to 16 KB EE
- Serial Programming Interface (EZPort)
- 8 to 128 KB SRAM
- Cache
- External Bus Interface (FlexBus)

HMI
- LCD
- QPI

Optional Feature

Standard 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 hardware development environment:
- Integrated development environments
  - Eclipse-based CodeWarrior V10.x IDE and Processor Expert
  - 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™
  - Cost-effective Nano™ SSL/Nano™ SSH for Freescale MQX RTOS
  - Micrium µ/OS-III
  - Express Logic ThreadX
  - SEGGER embOS
  - freeRTOS
  - Mocana (security)

- Full ARM ecosystem

Benefits
- Up to 120 MHz core supporting a broad range of processing bandwidth needs
- Peripheral and memory servicing with reduced CPU loading. Optimized bus bandwidth and flash execution performance. Concurrent multi-master bus accesses for increased bus bandwidth.
- High reliability, fast access program memory with 4-level security protection. Independent flash banks allow concurrent code execution and firmware updating.
- 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.
- 10 ultra-low-power modes with flash programming and analog operation down to 1.71 V
- Low-power timer, low-power RTC, low-leakage wake-up unit
- Peripheral activity and wake-up times can be optimized to suit application requirements, enabling extended battery life
- Continued device operation in reduced power states with flexible wake-up options
- High-speed 16-bit ADCs. Programmable gain amplifiers
- 12-bit DAC. High-speed comparators
- On-chip voltage reference
- Cryptographic acceleration unit (CAU)
- HW tamper detection unit
- Random number generator
- Fast, accurate signal conditioning capability with support for single or differential operation for improved noise rejection
- Support for small amplitude signal processing
- Analog signal generation for audio applications
- Fast, accurate motor overcurrent protection
- Eliminates need for external voltage reference reducing overall system cost
- Secure data transfer and storage. Faster than software implementations and with minimal CPU loading. Supports a wide variety of algorithms; DES, 3DES, AES, MD6, SHA-1, SHA-256.
- Secure key storage with internal/external tamper detect for unsecured flash, temperature/clock/supply voltage variations and physical attack
- 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.
- Variety of data size, format and transmission/reception settings supported for multiple industrial communication protocols
- Multiple communication interfaces for simple and efficient data exchange, industrial network bridging and audio system interfacing

Kinetic K1x MCU Family Options

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<thead>
<tr>
<th>Part Number</th>
<th>CPU (MHz)</th>
<th>Flash (KB)</th>
<th>Flex NVM (KB)</th>
<th>SRAM (KB)</th>
<th>Single-Precision Floating-Point Unit</th>
<th>Memory Protection</th>
<th>CAN</th>
<th>Secure Digital Host</th>
<th>NAND Flash Controller</th>
<th>External Bus</th>
<th>12-bit DAC</th>
<th>Programmable Gain Amplifiers</th>
<th>Tamper Detect</th>
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yy = package designator

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