32-bit Microcontrollers

Kinetis K60 Family

Low-power MCUs with Ethernet and security

Target Applications

- Building automation controllers
- Elevator control panels
- Instrumentation clusters
- Surveillance cameras

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 K60 MCU family includes IEEE® 1588 Ethernet, Full- and High-Speed USB 2.0 On-The-Go with device charger detect capability, hardware encryption and tamper detection capabilities. Devices start from 256 KB of flash in 100 LQFP packages extending up to 1 MB in a 256 MAPBGA package with a rich suite of analog, communication, timing and control peripherals. High memory density K60 family devices include an optional single precision floating point unit, NAND flash controller and DRAM controller.

Kinetis K60 Family

Core	System	Memories	Clocks
ARM® Cortex™-M4 100/120/150 MHz	Internal and External Watchdogs	Program Flash (256 KB to 1 MB) / SRAM (64 to 128 KB)	Phase-Locked Loop
Debug Interfaces / DSP	Memory Protection Unit (MPU)	FlexMemory (256 to 512 KB) (4 to 16 KB EE) / External Bus Interface (FlexBus)	Frequency-Locked Loop
Interrupt Controller / Floating Point Unit (FPU)	DMA	Serial Programming Interface (EzPort) / Cache	Low/High-Frequency Oscillators
	Low-Leakage Wake-Up Unit	NAND Flash Controller / DDR Controller	Internal Reference Clocks

Security and Integrity	Analog	Timers	Communication Interfaces	HMI
Cyclic Redundancy Check (CRC)	16-bit ADC	FlexTimer	I²C / I²S	GPIO
Random Number Generator	PGA	Carrier Modulator Transmitter	UART (ISO 7816) / Secure Digital Host Controller (SDHC)	Xtrinsic Low-Power Touch-Sensing Interface
Cryptographic Acceleration Unit (CAU)	Analog Comparator	Programmable Delay Block	SPI / USB On-the-Go (LS/FS)	
H/W Tamper Detection Unit	6-bit DAC	Periodic Interrupt Timers	CAN / USB On-the-Go (HS)	
	12-bit DAC	Low-Power Timer	IEEE 1588 Ethernet MAC / USB Device Charger Detect (DCD)	
	Voltage Reference	Independent Real-Time Clock (RTC)	USB Voltage Regulator	
		IEEE® 1588 Timer		

☐ Standard Feature   ⸬ Optional Feature

freescale™
Kinetis

Energy Efficient Solutions
optimized for low power

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
  - Keil MDK
  - CodeSourcery Sourcery G++ (GNU)
- Runtime software and RTOS
  - Math, DSP and encryption libraries
  - Motor control libraries
  - Complimentary bootloaders (USB, Ethernet, RF, serial)
  - Complimentary Freescale embedded GUI
  - Complimentary Freescale MQX™
  - Cost-effective Nano™ SSL/Nano™ SSH for Freescale MQX RTOS
  - Micrium uC/OS-III
  - Express Logic ThreadX
  - SEGGER embOS
  - freeRTOS
  - Mocana (security)
- Full ARM ecosystem

Features	Benefits
• ARM® Cortex™-M4 core with DSP instruction support and optional single precision floating point unit • Up to 32-channel DMA. Up to 16 KB of cache. Cross bar switch	• Up to 150 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
• IEEE® 1588 Ethernet MAC with hardware time stamping • USB On-The-Go (Full- and High-Speed) with device charger detect	• Precision clock synchronization for real-time, networked industrial automation and control • Optimized charging current/time for portable USB devices, enabling longer battery life. Integrated USB low-voltage regulator supplies up to 120 mA off chip at 3.3V to power external components from 5V input
• Hardware encryption coprocessor • System security with hardware tamper detect	• Secure data transfer and storage. Faster than software implementations and with minimal CPU loading. Supports a wide variety of algorithms, including DES, 3DES, AES, MD5, SHA-1 and SHA-256 • Secure real-time clock with independent battery supply. Secure key storage with internal/external tamper detect for unsecure flash, temperature/clock/supply voltage variations and physical attack
• FlexBus external bus interface • Secure digital host controller • NAND flash controller • DRAM controller	• Enables the connection of external memories and peripherals (e.g. graphics displays) • Connection to SD, SDIO, MMC or CE-ATA cards for in-application software upgrades, file systems or adding Wi-Fi® or Bluetooth® support • Supports up to 32-bit ECC current and future NAND types with minimal software overhead • Supports connection of DDR, DDR2 and low-power DDR memories
• 256 KB–1 MB flash. Up to 128 KB of SRAM • 32 KB–512 KB FlexMemory	• High reliability, fast access program memory with 4-level security protection. Independent flash banks allow concurrent code execution and firmware updating • FlexMemory provides 32B–16 KB of user-segmentable byte write/erase EEPROM. In addition, Flex NVM 256—512 KB for extra program code, data or EEPROM backup

K60 Family Options

Part Number	CPU (MHz)	Flash (KB)	Flex Memory (KB)	SRAM (KB)	Cache (KB)	Single Precision Floating Point Unit	CAN	Memory Protection Unit	Secure Digital Host Controller	NAND Flash Controller	External Bus Interface	12-bit DAC	Prog. Gain Amplifier	5V Tolerant I/O	Other	LL 100 LQFP (14 x 14 mm)	MC 121 BGA (8 x 8 mm)	LQ 144 LQFP (20 x 20 mm)	MD 144 BGA (13 x 13 mm)	MJ 256 BGA (17 x 17 mm)
MK60DN256Vyy10	100	256	–	64	–		√	√	√		√	√	√	√	USB OTG (FS), IEEE® 1588 Ethernet, Encryption	√	√	√	√	
MK60DN512Vyy10	100	512	–	128	–		√	√	√		√	√	√	√	USB OTG (FS), IEEE 1588 Ethernet, Encryption	√	√	√	√	
MK60FN1M0Vyy12	120	1 MB	–	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption				√	√
MK60FN1M0Vyy15	150	1 MB	–	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption				√	√
MK60DX256Vyy10	100	256	256	64	–		√	√	√		√	√	√	√	USB OTG (FS), IEEE 1588 Ethernet, Encryption	√	√	√	√	
MK60FX512Vyy12	120	512	512	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption				√	√
MK60FX512Vyy15	150	512	512	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption				√	√
MK61FN1M0Vyy12	120	1 MB	–	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption, HW Tamper Detect, *DDR Controller				√	√
MK61FN1M0Vyy15	150	1 MB	–	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption, HW Tamper Detect, *DDR Controller				√	√
MK61FX512Vyy12	120	512	512	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption, HW Tamper Detect, *DDR Controller				√	√
MK61FX512Vyy15	150	512	512	128	16	√	√	√	√	√	√	√	√	√	USB OTG (FS/HS), IEEE 1588 Ethernet, Encryption, HW Tamper Detect, *DDR Controller				√	√

yy = Package designator
*256 pin only

For current information about Kinetis products and documentation, please visit freescale.com/Kinetis

freescale™