Ultra-low-power MCUs with USB OTG

Kinetis® KL2x MCU Family

The Kinetis KL2x family of MCUs based on ARM® Cortex®-M0+ cores combines ultra-low-power performance with a rich suite of analog, communication, timing and control peripherals, including a USB 2.0 On-The-Go controller.

TARGET APPLICATIONS

- Battery-operated applications
- Consumer applications
- Low-power applications
- USB peripherals

Family members start from 32 KB of flash in a small 3.5 x 3.5 mm² XFBGA package, extending up to 512 KB in a 121 MAPBGA package. The KL2x MCU family is compatible with the Cortex-M4-core-based Kinetis K20 MCU family, offering a migration path to higher performance and feature integration.

FEATURES

Ultra-Low-Power

- Next-generation 32-bit Cortex-M0+ core with two times more CoreMarks®/mA than the closest 8-/16-bit architecture
- Single-cycle fast I/O access port facilitates bit banging and software protocol emulation, maintaining an 8-bit 'look and feel'
- Multiple flexible low-power modes, including new compute mode which reduces dynamic power by placing peripherals in an asynchronous stop mode
- LPUART, SPI, I²C, Flex™ I/O, ADC, DAC, LP timer and DMA support low-power mode operation without waking up the core

Memory

- Up to 512 KB flash with 64-byte flash cache, up to 128 KB RAM
- 16 to 32 KB ROM with integrated bootloader
- Security circuitry to prevent unauthorized access to RAM and flash contents

Performance

- Cortex-M0+ core running at up to 72 MHz (up to 96 MHz for high-speed run) over full voltage and temperature range (–40 °C +105 °C)
- Bit manipulation engine for improved bit handling of peripheral modules
- Thumb® instruction set combines high code density with 32-bit performance
- 4–8 channel DMA for peripheral and memory servicing with reduced CPU loading and faster system throughput
- Independent-clocked COP guards against clock skew or code runaway for fail-safe applications

Mixed signal

- Up to 16-bit ADC with configurable resolution, sample time and conversion speed/power. Integrated temperature sensor. Single or differential input mode operation in order to achieve improved noise rejection
- High-speed comparator with internal 6-bit DAC
- 12-bit DAC with DMA support
- 1.2 V high-accuracy internal voltage reference

Timing and control

- One six-channel and two 2-channel,16-bit low-power timer PWM modules with DMA support
- Two-channel 32-bit periodic interrupt timer provides time base for RTOS task schedule or trigger source for ADC conversion
- Low-power timer allows operation in all power modes except for VLLS0
- Real-time clock

HMI

- Capacitive touch sense interface supports up to 16 external electrodes and DMA data transfer
- GPIO with pin interrupt support, DMA request capability and other pin control options

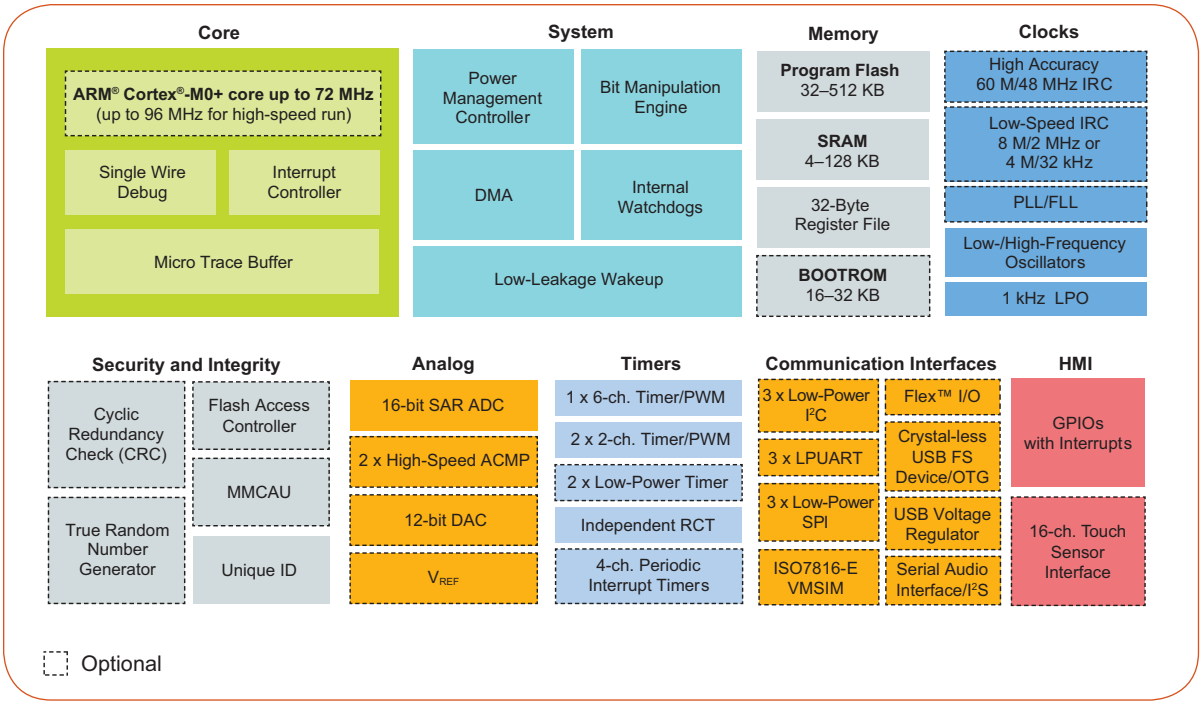
Connectivity and communications

- USB 2.0 On-The-Go (full-speed) integrated USB low-voltage regulator supplies up to 120 mA off chip at 3.3 volts to power external components from five-volt input
- Three I^2C with DMA support, up to 1 Mbit/s and compatible with SMBus V2 features
- Three UART with up to three LPUART, and DMA support
- Three SPI with DMA support
- I^2S module for audio applications
- Flex-IO with capability of emulating multiple serial interface, such as IrDA, UART, SPI, I^2C, etc.

Software and Tools

- Freedom Development Platforms and Tower® System board
- Kinetis software development kit (SDK)
- Integrated development environment (IDE)
  - Kinetis design studio IDE
  - CodeWarrior® for microcontrollers V10.x (Eclipse) IDE with Processor Expert® software modeling tool
  - IAR® Embedded Workbench, ARM® Keil® MDK, Atollic
- Runtime software and RTOS
  - FreeRTOS™
- Full ARM ecosystem support
- Online enablement with ARM mbed™ development platform

KINETIS KL2x MCU FAMILY BLOCK DIAGRAM



KINETIS KL2x MCU FAMILY OPTIONS

Sub-Family	Part Number	CPU (MHz)	Memory		Features															√ Package								
																				FM	FT	DA	AL	LH	LK	LL	MP	MC
			Flash (KB)	SRAM (KB)	DMA	Low-Power UART	UART	ISO7816-3	SPI	I2C	TSI	I2S	Flex IO	RTC	12-bit DAC	16-bit ADC w/DP Ch.	12-bit ADC	Total I/Os	Other	32 QFN (5 x 5, 0.5 mm)	48 QFN (7 x 7, 0.5 mm)	36X FBGA (3.5 x 3.5, 0.5 mm)	36WLCSP (2.4 x 2.5, 0.35 mm)	64 LQFP (10 x 10, 0.5 mm)	80 LQFP (12 x 12, 0.5 mm)	100 LQFP (14 x 14, 0.5 mm)	64 MAPBGA (5 x 5, 0.5 mm)	121 MAPBGA (8 x 8, 0.65 mm)
KL24	MKL24Z32xxx4	48 MHz	32	4	√	1	2	-	2	2	-	-	-	√	-	-	√	23~66	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	√	-	-	-
	MKL24Z64xxx4	48 MHz	64	8	√	1	2	-	2	2	-	-	-	√	-	-	√	23~66	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	√	-	-	-
KL25	MKL25Z32xxx4	48 MHz	32	4	√	1	2	-	2	2	√	-	-	√	√	√	-	23~66	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	√	-	-	-
	MKL25Z64xxx4	48 MHz	64	8	√	1	2	-	2	2	√	-	-	√	√	√	-	23~66	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	√	-	-	-
	MKL25Z128xxx4	48 MHz	128	16	√	1	2	-	2	2	√	-	-	√	√	√	-	23~66	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	√	-	-	-
KL26	MKL26Z32xxx4	48 MHz	32	4	√	1	2	-	2	2	√	√	-	√	√	√	-	23~50	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	-	-	-	-
	MKL26Z64xxx4	48 MHz	64	8	√	1	2	-	2	2	√	√	-	√	√	√	-	23~50	USB 2.0 FS OTG/ Host/Device	√	√	-	-	√	-	-	-	-
	MKL26Z128xxx4	48 MHz	128	16	√	1	2	-	2	2	√	√	-	√	√	√	-	23~80	USB 2.0 FS OTG/ Host/Device	√	√	-	√	√	-	√	-	√
	MKL26Z256xxx4	48 MHz	256	32	√	1	2	-	2	2	√	√	-	√	√	√	-	50~80	USB 2.0 FS OTG/ Host/Device	-	-	-	-	√	-	√	√	√
KL27	MKL27Z32xxx4	48 MHz	32	8	√	2	1	1	2 x 16 bit	2	-	-	√	√		√	-	23~50	USB 2.0 FS Device, with crystal-less USB	*	*	√	-	√	-	-	*	-
	MKL27Z64xxx4	48 MHz	64	16	√	2	1	1	2 x 16 bit	2	-	-	√	√		√	-	23~50	USB 2.0 FS Device, with crystal-less USB	√	*	√	-	√	-	-	*	-
	MKL27Z128xxx4	48 MHz	128	32	√	2	1	1	2 x 16 bit	2	-	√	√	√	√	√	-	23~50	USB 2.0 FS Device, with crystal-less USB	√	√	-	-	√	-	-	√	-
	MKL27Z256xxx4	48 MHz	256	32	√	2	1	1	2 x 16 bit	2	-	√	√	√	√	√	-	23~50	USB 2.0 FS Device, with crystal-less USB	√	√	-	-	√	-	-	√	-
KL28	MKL28Z512xxx7	72 MHz (up to 96 MHz)	512	128	8	3	3	1	3	3	√	1	√	√	√	√	√	82	Crystal-less USB, Device Only	-	-	-	-	-	-	√	-	-

* This package is included in a Package Your Way program for Kinetis MCUs. Please visit **www.nxp.com/KPYW** for more detail.

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