

32-bit ARM® Cortex™-M0+ MCUs

Kinetis KL1 Family

Target Applications

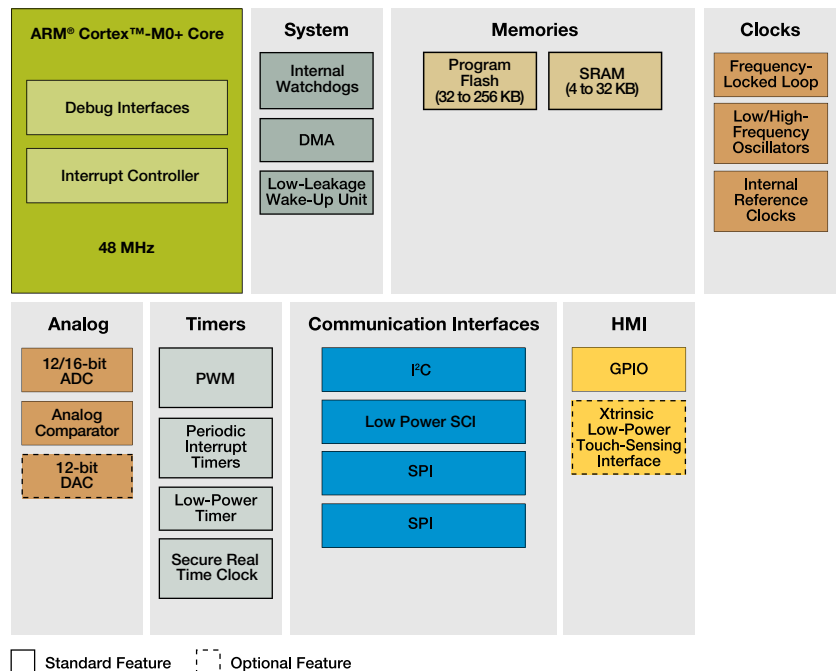
- Electronic shelf labels
- Radio-controlled toys
- Motor control
- Electronic toll collection

Ultra-low-power, entry-level MCUs

Overview

The Kinetis KL1 MCU family is pin, software and tool compatible with all other Kinetis L families and provides additional memory, communications and analog peripheral options beyond those offered on the KL0 family. The Kinetis KL1 MCU family is also compatible with the Kinetis K10 MCU (ARM® Cortex™-M4) family, providing a migration path to higher performance and feature integration. Devices start from 32 KB of flash in a small-footprint 5 x 5 mm 32 QFN package, extending up to 256 KB in a 80 LQFP package. Each family member combines ultra-low-power performance with a rich suite of analog, communication, timing and control peripherals.

Kinetis KL1 MCU Family: Block Diagram



Features

Ultra Low Power

- Next-generation 32-bit ARM Cortex™-M0+ core. 2x more CoreMark/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
- LPSCI, SPI, I²C, ADC, DAC, LP timer and DMA support low-power mode operation without waking up the core

Flash and SRAM

- Up to 256 KB flash with 64 byte flash cache, up to 32 KB RAM
- Security circuitry to prevent unauthorized access to RAM and flash contents

Performance

- ARM Cortex-M0+ core, 48 MHz core frequency 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
- Up to 4-ch. 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 output mode operation for improved noise rejection
- High-speed comparator with internal 6-bit DAC
- 12-bit DAC with DMA support

Timing and Control

- Two 6-ch. and one 2-ch., 16-bit low-power timer PWM modules with DMA support
- 2-ch., 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 with calendar

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

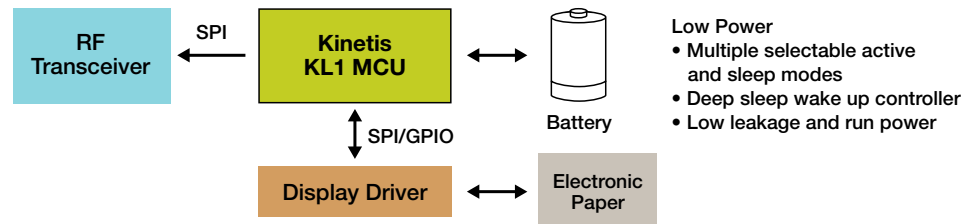
Connectivity and Communications

- I²C with DMA support, up to 100 Kb/s and compatible with SMBus V2 features
- One LPUART and two UARTs with DMA support
- Two SPIs with DMA support

Software and Tool

- Freescale Tower System hardware development environment and low-cost demo board
- Integrated development environments
- CodeWarrior for Microcontrollers V10.x (Eclipse) IDE with Processor Expert
- IAR Embedded Workbench, Keil MDK, Atollic, CodeRed
- Runtime software and RTOS
- MQX-Lite, FreeRTOS, CodeSourcery G++ (GNU)
- Full ARM ecosystem support

Kinetis KL1 MCU Family: Electronic Shelf Label



Kinetis KL1 MCU Family

Sub-Family	Part Number	Memory			Features								Other (Key Features)	√ Packages															
		CPU (MHz)	Flash (KB)	SRAM (KB)	DMA	UART	SPI	I ² C	TSI	12-bit DAC	16-bit ADC w/DP Ch.	12-bit ADC		Total I/Os	24 QFN (4 x 4, 0.5 mm)	25 WLQSP	32 LQFP (7 x 7, 0.8 mm)	32 QFN (5 x 5, 0.5 mm)	35 WLQSP	48 LQFP (7 x 7, 0.5 mm)	48 LQFN (7 x 7, 0.5 mm)	64 LQFP (10 x 10, 0.5 mm)	80 LQFP (14 x 14, 0.5 mm)	100 LQFP (14 x 14, 0.5 mm)	121 MAPBGA (8 x 8, 0.65 mm)				
KL14	MKL14Z32Vxx4	48	32	4	√	√	√	√				√	28-70				√			√	√	√							
	MKL14Z64Vxx4	48	64	8	√	√	√	√				√	28-70				√			√	√	√							
KL15	MKL15Z32Vxx4	48	32	4	√	√	√	√	√	√	√		28-70				√	*		√	√	√							
	MKL15Z64Vxx4	48	64	8	√	√	√	√	√	√	√		28-70				√	*		√	√	√							
	MKL15Z128Vxx4	48	128	16	√	√	√	√	√	√	√		28-70				√	*		√	√	√							
	MKL16Z256Vxx4	48	256	32	√	√	√	√	√	√	√		28-70				√			√	√	√							

Note: Additional KL1 family members are currently under development. Visit freescale.com for the latest information.

* Proposed

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

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