

32-bit L Series MCUs

Kinetis KL1 Family

Ultra-low-power, entry-level MCUs

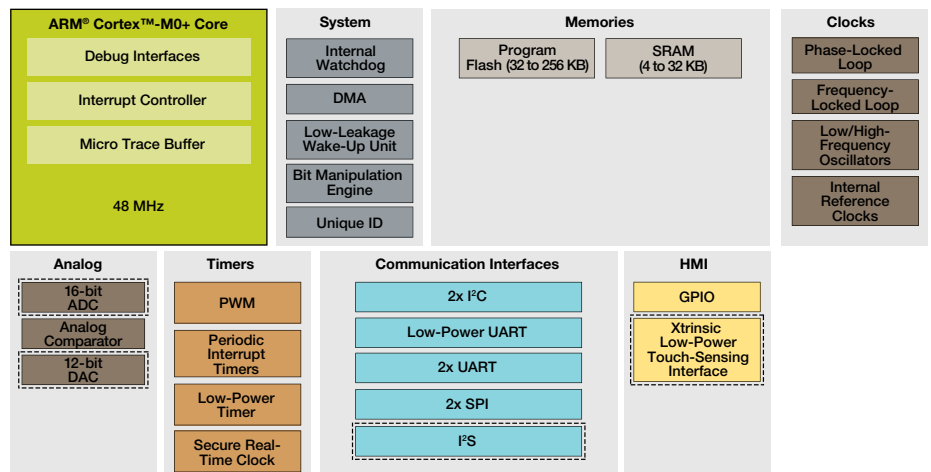
Target Applications

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

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 family of MCUs built on the ARM® Cortex™-M4 core, 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



Standard Optional



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

- One 6-ch. and two 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

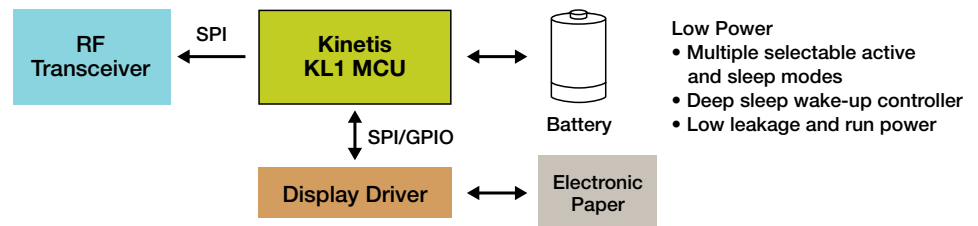
Connectivity and Communications

- I²C with DMA support, up to 400 Kb/s and compatible with SMBus V2 features
- One LPUART and two UARTs with DMA support
- Two SPIs with DMA support
- I²S module for audio applications

Software and Tools

- 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
- I²S module for audio applications

Kinetis KL1 MCU Family: Electronic Shelf Label



Kinetis KL1x Family Options

Sub-Family	Part Number	CPU (MHz)	Memory		Features										Package							
			Flash (KB)	SRAM (KB)	DMA	UART	SPI	I ² C	TSI	I ² S	RTC	12-bit DAC	16-bit ADC w/ DP Ch.	12-bit ADC	Total I/Os	Other	FM	AD	FT	LH	LK	
																	32 QFN (5 x 5, 0.5 mm)	35 WLCSP	48 QFN (7 x 7, 0.5 mm)	64 LQFP (10 x 10, 0.5 mm)	80 LQFP (12 x 12, 0.5 mm)	64 MAPBGA (5 x 5, 0.5 mm)
KL14	MKL14Z32xxx4	48 MHz	32	4	✓	3	2	2			✓			✓	28-70		✓		✓	✓	✓	
	MKL14Z64xxx4	48 MHz	64	8	✓	3	2	2			✓			✓	28-70		✓		✓	✓	✓	
KL15	MKL15Z32xxx4	48 MHz	32	4	✓	3	2	2	✓		✓	✓	✓	✓	28-70		✓		✓	✓	✓	
	MKL15Z64xxx4	48 MHz	64	8	✓	3	2	2	✓		✓	✓	✓	✓	28-70		✓		✓	✓	✓	
	MKL15Z128xxx4	48 MHz	128	16	✓	3	2	2	✓		✓	✓	✓	✓	28-70		✓	✓	✓	✓	✓	
KL16	MKL16Z128xxx4	48 MHz	128	16	✓	3	2	2	✓	✓	✓	✓	✓	✓	28-70		✓		✓	✓	✓	✓
	MKL16Z256xxx4	48 MHz	256	32	✓	3	2	2	✓	✓	✓	✓	✓	✓	54-70		✓		✓	✓	✓	✓

* Proposed family member. Refer to family product brief on freescale.com for latest information.

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

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