



# Kinetis KL1 Family

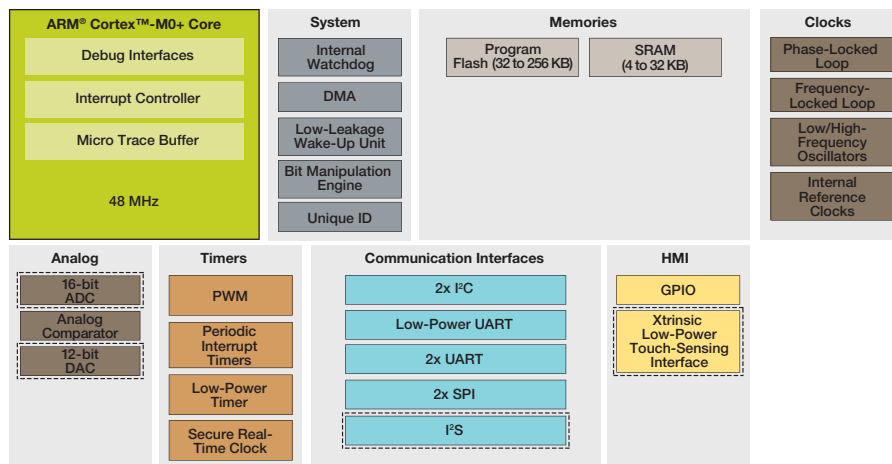
## Ultra-low-power, general-purpose MCUs

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 in the Kinetis KL0 family. The Kinetis KL1 family is also compatible with the Kinetis K10 (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 an 80 LQFP package. Each combines ultra-low-power performance with a rich suite of analog, communication, timing and control peripherals.

### Target Applications

- Roller blind control
- Radio controlled toys
- Motor control
- Electronic toll collection

### Kinetis KL1x Family



Standard     Optional

### 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, keeping an 8-bit “look and feel”
- Multiple, flexible low-power modes including new compute clocking option 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 to +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

## Kinetis KL1x Family Options

Part Number	CPU (MHz)	Memory		Features											Packages					
		Flash (KB)	SRAM (KB)	DMA	UART	SPI	I <sup>2</sup> C	TSI	I <sup>2</sup> S	RTC	12-bit DAC	16-bit ADC w/DP Ch.	12-bit ADC	Total I/Os	Ⓜ	FM	AD	FT	LH	LK
																32 QFN (5 x 5, 0.5 mm)	35 WL CSP	48 QFN (7 x 7, 0.5 mm)	64 LQFP (10 x 10, 0.5 mm)	80 LQFP (12 x 12, 0.5 mm)
MKL14Z32xxx4	48 MHz	32	4	✓	3	2	2			✓		✓	28~70		✓		✓	✓	✓	
	48 MHz	64	8	✓	3	2	2			✓		✓	28~70		✓		✓	✓	✓	
MKL15Z32xxx4	48 MHz	32	4	✓	3	2	2	✓		✓	✓	✓	28~70		✓		✓	✓	✓	
	48 MHz	64	8	✓	3	2	2	✓		✓	✓	✓	28~70		✓		✓	✓	✓	
	48 MHz	128	16	✓	3	2	2	✓		✓	✓	✓	28~70		✓	✓	✓	✓	✓	
MKL16Z32xxx4	48 MHz	32	4	✓	3	2	2	✓	✓	✓	✓	✓	28~70		✓		✓	✓	✓	
	48 MHz	64	8	✓	3	2	2	✓	✓	✓	✓	✓	28~70		✓		✓	✓	✓	
	48 MHz	128	16	✓	3	2	2	✓	✓	✓	✓	✓	28~70		✓		✓	✓	✓	
	48 MHz	256	32	✓	3	2	2	✓	✓	✓	✓	✓	54~70					✓	✓	

\* Proposed family member. Refer to family product brief on [freescale.com](http://freescale.com) for latest information.

### 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
- 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

- I<sup>2</sup>C with DMA support, up to 100 kbps and compatible with SMBus V2 features
- One LPUART and two UARTs with DMA support
- Two SPIs with DMA support

### Software and Tools

- Freescale Tower System hardware development environment and low-cost demo board
- Integrated development environments
  - Green Hills MULTI IDE
  - CodeWarrior for MCUs 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