

Kinetis KL1x MCU Family

Ultra-low-power, entry-level MCUs



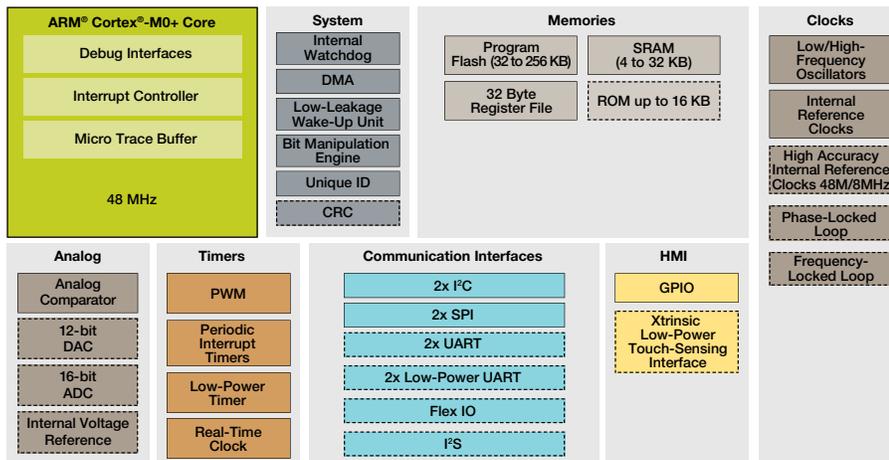
Overview

The Kinetis KL1x family of ARM® Cortex®-M0+ MCUs combine ultra-low-power performance with a rich suite of analog, communication, timing and control peripherals. Family members start from 32 KB of flash in a small 3.5 x 3.5 mm² 36XFBGA package, extending up to 256 KB in an 80 LQFP package. The KL1x MCU family is compatible with the ARM Cortex-M4 based Kinetis K10 MCU family, offering a migration path to higher performance and feature integration.

Target Applications

- Battery-operated applications
- Consumer applications
- Low-power applications

Kinetis KL1x MCU Family Block Diagram



 Optional

Features

Ultra-Low-Power

- Next-generation 32-bit ARM Cortex-M0+ core. Two times 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 that reduces dynamic power by placing peripherals in an asynchronous stop mode

- LPUART, SPI, I²C, FlexIO, ADC, DAC, LP timer and DMA support low-power mode operation without waking up the core

Memory

- Up to 256 KB flash with 64 byte flash cache, up to 32 KB RAM
- Up to 16 KB ROM with integrated bootloader
- Security circuitry to prevent unauthorized access to RAM and flash contents

Features cont.

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-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 for 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 6-channel and two 2-channel, 16-bit low-power timer PWM modules with DMA support
- 2-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

- I²C with DMA support, up to 1Mb/s and compatible with SMBus V2 features
- Three UART with up to two LPUART, and DMA support
- Two SPIs with DMA support
- I²S module for audio applications

- Flex IO with capability of emulating multiple serial interface, such as IrDA, UART, SPI, I²C, etc.

Software and Tools

- Freescale Freedom Development Platforms and Tower System modules
- 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, Keil MDK, Atollic
- Runtime software and RTOS
 - MQX™ Lite, FreeRTOS, CodeSourcery G++ (GNU)
- Full ARM ecosystem support

Kinetis KL1x MCU Family Options

| Sub-Family | Part Number | CPU (MHz) | Memory | | | Features | | | | | | | | | | | Package | | | | | | | | |
|------------|---------------|-----------|------------|-----------|-----|----------------|------|-----------------|-----|------------------|-----|------------------|---------|-----|------------|----------------------|------------|------------|------------------------|------------------------------|------------------------------|------------------------|---------------------------|---------------------------|---------------------------|
| | | | Flash (KB) | SRAM (KB) | DMA | Low-Power UART | UART | UART w/ ISO7816 | SPI | I ² C | TSI | I ² S | Flex IO | RTC | 12-bit DAC | 16-bit ADC w/ DP Ch. | 12-bit ADC | Total I/Os | FM | DA | AD | FT | LH | LK | MP |
| | | | | | | | | | | | | | | | | | | | 32 QFN (5 x 5, 0.5 mm) | 36X FEQA (3.5 x 3.5, 0.5 mm) | 35 WLCSP (2.5 x 3.0, 0.4 mm) | 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) |
| KL13 | MKL13Z32xxx4 | 48 MHz | 32 | 4 | ✓ | 2 | 1 | 1 | 2 | 2 | | | ✓ | ✓ | ✓ | ✓ | 28~70 | * | | | * | ✓ | ✓ | | |
| | MKL13Z64xxx4 | 48 MHz | 64 | 8 | ✓ | 2 | 1 | 1 | 2 | 2 | | | ✓ | ✓ | ✓ | ✓ | 28~70 | * | | | * | ✓ | ✓ | | |
| KL14 | MKL14Z32xxx4 | 48 MHz | 32 | 4 | ✓ | 1 | 2 | | 2 | 2 | | | | | | ✓ | 28~70 | ✓ | | | ✓ | ✓ | ✓ | | |
| | MKL14Z64xxx4 | 48 MHz | 64 | 8 | ✓ | 1 | 2 | | 2 | 2 | | | | | | ✓ | 28~70 | ✓ | | | ✓ | ✓ | ✓ | | |
| KL15 | MKL15Z32xxx4 | 48 MHz | 32 | 4 | ✓ | 1 | 2 | | 2 | 2 | ✓ | | | | ✓ | ✓ | ✓ | 28~70 | ✓ | | | ✓ | ✓ | ✓ | |
| | MKL15Z64xxx4 | 48 MHz | 64 | 8 | ✓ | 1 | 2 | | 2 | 2 | ✓ | | | | ✓ | ✓ | ✓ | 28~70 | ✓ | | | ✓ | ✓ | ✓ | |
| | MKL15Z128xxx4 | 48 MHz | 128 | 16 | ✓ | 1 | 2 | | 2 | 2 | ✓ | | | | ✓ | ✓ | ✓ | 28~70 | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| KL16 | MKL16Z32xxx4 | 48 MHz | 32 | 4 | ✓ | 1 | 2 | | 2 | 2 | ✓ | ✓ | | | ✓ | ✓ | ✓ | 28~54 | ✓ | | | ✓ | ✓ | | |
| | MKL16Z64xxx4 | 48 MHz | 64 | 8 | ✓ | 1 | 2 | | 2 | 2 | ✓ | ✓ | | | ✓ | ✓ | ✓ | 28~54 | ✓ | | | ✓ | ✓ | | |
| | MKL16Z128xxx4 | 48 MHz | 128 | 16 | ✓ | 1 | 2 | | 2 | 2 | ✓ | ✓ | | | ✓ | ✓ | ✓ | 28~54 | ✓ | | | ✓ | ✓ | | |
| | MKL16Z256xxx4 | 48 MHz | 256 | 32 | ✓ | 1 | 2 | | 2 | 2 | ✓ | ✓ | | | ✓ | ✓ | ✓ | 54 | | | | ✓ | ✓ | | ✓ |
| KL17 | MKL17Z128xxx4 | 48 MHz | 128 | 32 | ✓ | 2 | 1 | 1 | 2 | 2 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 28~54 | ✓ | | | ✓ | ✓ | | ✓ |
| | MKL17Z256xxx4 | 48 MHz | 256 | 32 | ✓ | 2 | 1 | 1 | 2 | 2 | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 28~54 | ✓ | | | ✓ | ✓ | | ✓ |
| | MKL17Z32xxx4 | 48MHz | 32 | 8 | ✓ | 2 | 1 | 1 | 2 | 2 | | | ✓ | ✓ | | ✓ | ✓ | 28~54 | * | ✓ | | * | ✓ | | * |
| | MKL17Z64xxx4 | 48MHz | 64 | 16 | ✓ | 2 | 1 | 1 | 2 | 2 | | | ✓ | ✓ | | ✓ | ✓ | 28~54 | * | ✓ | | * | ✓ | | * |

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

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

Freescale, the Freescale logo, CodeWarrior, the Energy Efficient Solutions logo, Xtrinsic, Kinetis and Processor Expert are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Trm. Off. Tower is a trademark of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners. ARM and Cortex are the registered trademarks of ARM Limited (or its subsidiaries) in the EU and/or elsewhere. All rights reserved. © 2012–2015 Freescale Semiconductor, Inc.



AMEYA360

Components Supply Platform

Authorized Distribution Brand :



Website :

Welcome to visit www.ameya360.com

Contact Us :

➤ Address :

401 Building No.5, JiuGe Business Center, Lane 2301, Yishan Rd
Minhang District, Shanghai , China

➤ Sales :

Direct +86 (21) 6401-6692

Email amall@ameya360.com

QQ 800077892

Skype [ameyasales1](#) [ameyasales2](#)

➤ Customer Service :

Email service@ameya360.com

➤ Partnership :

Tel +86 (21) 64016692-8333

Email mkt@ameya360.com