

32-bit ARM® Cortex™-M0+ Core

Kinetis KL02 Family 20-pin Chip-Scale Package MCU



Target Applications

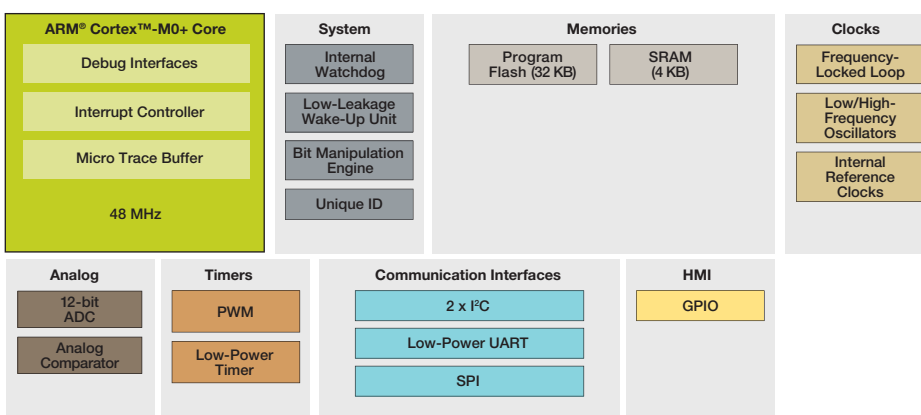
- Low-power devices
- Remote sensing nodes
- Portable consumer devices
- Ingestible healthcare sensing

World's smallest ARM Powered® MCU

Overview

The KL02 chip-scale package MCU is the world's smallest ARM Powered MCU. Available in the ultra-small 1.9 x 2.0 mm wafer-level chip-scale package, the KL02 CSP (MKL02Z32CAF4R) drastically reduces board space while retaining rich MCU feature integration. The KL02 CSP MCU consumes 25 percent less PCB area, yet delivers 60 percent more GPIO than the nearest competing MCU. The KL02 family allows designers to dramatically reduce their board size without compromising the performance, feature integration and power consumption of their end products.

Kinetis KL02 CSP MCU Family Block Diagram



Kinetis KL02 Family Options

Sub-Family	Part Number	CPU (MHz)	Memory		Features											√ Package				
			Flash (KB)	SRAM (KB)	DMA	UART	SPI	I²C	TSI	FS	RTC	12-bit DAC	16-bit ADC w/ DP ch.	12-bit ADC	Total I/Os	Other	FG	AF	FK	FM
																	16 QFN (3 x 3, 0.5 mm)	20 WLCSP (2 x 2, 0.4 mm)	24 QFN (4 x 4, 0.5 mm)	32 QFN (5 x 5, 0.5 mm)
KL02	MKL02Z8xxx4	48 MHz	8	1		1	1	2					√	14~28		√				
	MKL02Z16xxx4	48 MHz	16	2		1	1	2					√	14~28		√		√	√	
	MKL02Z32xxx4	48 MHz	32	4		1	1	2					√	14~28		√	√	√	√	

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

Features

Ultra Low Power

- Next-generation 32-bit ARM Cortex-M0+ core. 2x more CoreMark/mA than the closest 8/16-bit architecture
- Multiple flexible low power modes including new compute mode which reduces dynamic power by placing peripherals in an asynchronous stop mode
- LPUART, SPI, I²C, ADC, and LP timer support low power mode operation without waking up the core

Flash and SRAM

- 32 KB flash, 4 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 +85 °C). Single-cycle fast I/O access port facilitates bit banging and software protocol emulation, maintaining an 8-bit “look and feel”
- Bit manipulation engine for improved bit handling of peripheral modules
- Thumb instruction set combines high code density with 32-bit performance
- Independently-clocked COP guards against clock skew or code runaway for fail-safe applications

Mixed Signal

- 12-bit ADC with configurable resolution, sample time and conversion speed/power. Integrated temperature sensor
- High-speed comparator with internal 6-bit DAC

Timing and Control

- One 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 VLLS0

HMI

- Up to 28 controllable GPIO with pin interrupt support and DMA request capability

Connectivity and Communications

- I²C, up to 400 Kb/s and compatible with SMBus V2 features
- Low-power UART (LPUART) and SPI

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 and CodeRed IDEs
 - Runtime software and RTOS
 - MQX-Lite, FreeRTOS, CodeSourcery G++ (GNU)
- Full ARM ecosystem support

For more information about Kinetis products and documentation, please visit freescale.com/Kinetis/KL02CSP

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