



32-bit ARM® Cortex®-M0+ Core Processor

Kinetis KL02 Family 20-pin Chip-Scale Package MCU

World's smallest ARM Powered® MCU



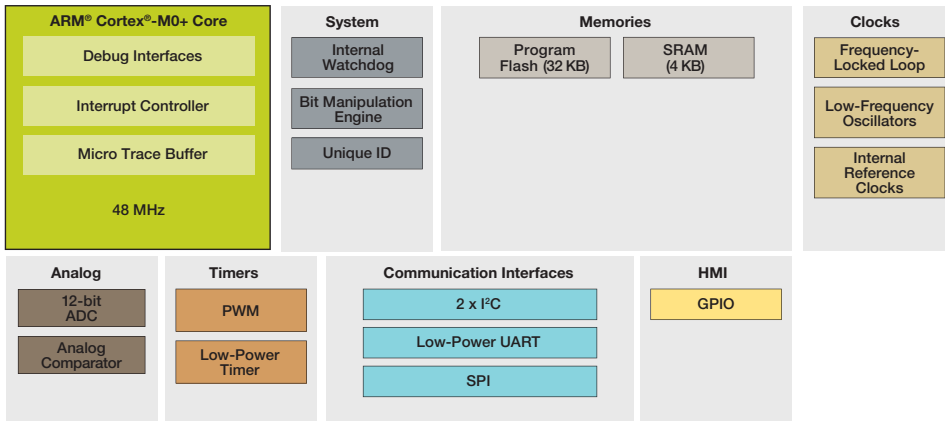
Overview

The Kinetis 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% less PCB area, yet delivers 60% 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.

Target Applications

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

Kinetis KL02 CSP MCU Family Block Diagram



Features

Ultra Low Power

- Next-generation 32-bit Cortex-M0+ core. 2x more CoreMark/mA than the closest 8/16-bit architecture
- Multiple, flexible, low-power modes, including new compute mode that reduces dynamic power by placing peripherals in an asynchronous stop mode
- LPUART, SPI, I²C, ADC, DAC, LP timer and DMA 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

- Cortex-M0+ core, 48 MHz core frequency over full voltage and temperature range (-40 °C to +105 °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

- Two 2-ch., 16-bit low-power timer PWM modules
- Low-power timer allows operation in all power modes except VLLS0

HMI

- Up to 28 controllable GPIO with pin interrupt support

Connectivity and Communications

- I²C, up to 400 Kb/s and compatible with SMBus V2 features
- LPUART and SPI

Software and Tools

- CodeWarrior for MCUs V10.x (Eclipse) IDE with Processor Expert software configuration tool
- IAR Embedded Workbench®, ARM Keil® MDK, Atollic, GCC
- MQX™ Lite, FreeRTOS
- Full ARM ecosystem support

Freescale Freedom Development Platform

The Freescale Freedom development platform is a small, low-power, cost-effective evaluation and development tool perfect for quick application prototyping and demonstration of Kinetis MCU families. The platform offers an easy-to-use mass-storage device mode flash programmer, a virtual serial port and classic programming and run control capabilities.

- Low cost (<\$20 USD MSRP)
- Designed in an industry-standard compact form factor
- Easy access to the MCU I/O pins
- Integrated open standard serial and debug interface (OpenSDA)
- Compatible with a rich set of third-party expansion boards

Learn more at freescale.com/Freedom.

Kinetis KL02 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	FG	AF	FK	FM
																	16 QFN (3 x 3, 0.5 mm)	20 WLCSP (1.9 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		√	√	√	√

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

Freescale, the Freescale logo, CodeWarrior, the Energy Efficient Solutions logo, Kinetis and Processor Expert are trademarks of Freescale Semiconductor, Inc., Reg. U.S. Pat. & Tm. Off. All other product or service names are the property of their respective owners. ARM, ARM Powered, Cortex and Keil are registered trademarks of ARM Limited (or its subsidiaries) in the EU and/or elsewhere. All rights reserved. © 2012–2014 Freescale Semiconductor, Inc.