Kinetis M Series

Kinetis M Series MCUs

Ultra-low-power, smart-metering MCUs with precision analog, security and HMI peripherals

Target Applications

- Electricity meters
- Flow meters
  (e.g., heat, water, gas)
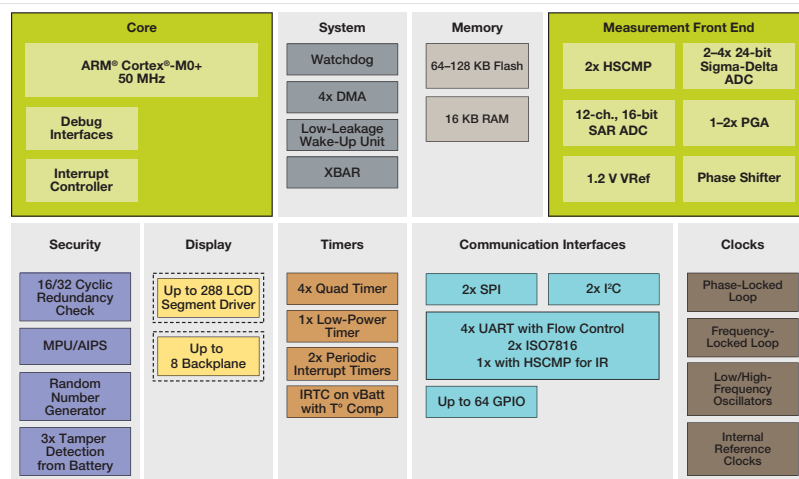- Industrial measurement
  and sensing

Overview

Kinetis M Series MCUs are based on the 32-bit ARM® Cortex®-M0+ core and provide a low-cost, highly integrated solution for one-, two- and three-phase electricity meters that require powerful 32-bit processing capability, precision analog, security, and HMI functionality.

Each MCU includes a powerful analog front end that is configurable for different regions and which enables power calculations with 0.1 percent accuracy. A high-accuracy real-time clock delivers less than five ppm drift over temperature. Metrology firmware for calculating active, reactive and apparent power using a variety of algorithms is provided free of charge by Freescale. Pre-certified reference designs for Europe, China, India, the U.S. and Japan are available for customer evaluation.

The Kinetis M Series is supported by the Tower System hardware development platform.

Kinetis M Series Metering MCUs

Core	System	Memory	Measurement Front End		
ARM® Cortex®-M0+ 50 MHz	Watchdog	64–128 KB Flash	2x HSCMP	2–4x 24-bit Sigma-Delta ADC	
	4x DMA				
Debug Interfaces	Low-Leakage Wake-Up Unit	16 KB RAM	12-ch., 16-bit SAR ADC	1–2x PGA	
Interrupt Controller	XBAR		1.2 V VRef	Phase Shifter	

Security	Display	Timers	Communication Interfaces		Clocks
16/32 Cyclic Redundancy Check	Up to 288 LCD Segment Driver	4x Quad Timer	2x SPI	2x I²C	Phase-Locked Loop
MPU/AIPS	Up to 8 Backplane	1x Low-Power Timer	4x UART with Flow Control 2x ISO7816 1x with HSCMP for IR		Frequency-Locked Loop
Random Number Generator		2x Periodic Interrupt Timers			Low/High-Frequency Oscillators
3x Tamper Detection from Battery		IRTC on vBatt with T° Comp	Up to 64 GPIO		Internal Reference Clocks

☐ Optional

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Specifications

Kinetis M Series

- High-performance ARM Cortex-M0+ core, up to 50 MHz of core clock frequency
- 128/64 KB single array flash
- Supports v6-M instruction set architecture including all 16-bit v7-M instructions plus a number of 32-bit Thumb®-2 instructions
- Phase-locked loop to generate clocks for analog front end
  - Input range: 31.25–39.0625 kHz
  - Output range: 11.72–14.65 MHz
- Frequency-locked loop to generate core, system and flash clocks
  - Input range: 31.25–39.0625 kHz
  - Output range: 20–50 MHz
- Flexible modes of operation
- Two internal trimmable clock references
  - 32 kHz
  - 4 MHz

Analog Front End

- 24-bit sigma-delta ADC with 94 dB SNR
- Programmable gain amplifier with gains from 1 to 32 with low temperature drift
- High precision internal voltage reference with low temperature drift
- 12-channel 16-bit SAR ADC

Security

- Active and passive tamper detection with time stamping
- Memory protection unit, AIPS (peripheral protection), random number generator, CRC

Interface

- LCD segment driver up to 288
- High accuracy RTC +-5 PPM over temperature range
- Four UART, two SPI, two I2C

Other Specifications

- Voltage range: 1.71–3.6 V (without AFE)
- Voltage range: 2.7–3.6 V (with AFE)
- Temperature range: –40 °C to +85 °C

Kinetis M Series Selector Guide

Part Number	Purpose	Package	No. SD	LCD	Memory Flash	RAM
MKM14Z64CHH5	Single Phase	LGA 44	4	no	64 KB	16 KB
MKM14Z128CHH5	Two Phase	LGA 44	4	no	128 KB	16 KB
MKM33Z64CLH5	Single Phase	LQFP 64	3	8 x 17	64 KB	16 KB
MKM33Z128CLH5	Single Phase	LQFP 64	3	8 x 17	128 KB	16 KB
MKM33Z64CLL5	Single Phase	LQFP 100	3	8 x 38	64 KB	16 KB
MKM33Z128CLL5	Single Phase	LQFP 100	3	8 x 38	128 KB	16 KB
MKM34Z128CLL5	Two Phase	LQFP 100	4	8 x 38	128 KB	16 KB

Key Features

- High-performance ultra-low-power ARM Cortex-M0+ core
- 24-bit sigma-delta ADC and PGA achieving 94 dB SNR
- High accuracy RTC with +5 PPM over temperature
- Rich set of security: MPU, active tamper, RNG for Welmec compliant meters
- Pre-certified metrology software

Enablement

- TWR-KM34Z50M Tower System development module
- Reference designs (available for loan)
  - Low-cost single-phase power meter for markets in Asia
  - Single-phase power meter for markets in EMEA
  - Two-phase power meter for markets in AMR/JPN
- CodeWarrior for Microcontrollers v10.x IDE with Processor Expert
- IAR Embedded Workbench, Keil MDK IDEs and others from the ARM ecosystem
- Freescale MQX™ Lite RTOS
- Application notes
- Tower System development platform

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

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