KM SERIES MCUs FOR PRECISION METROLOGY

Enabling high accuracy, secure 1-, 2- and 3-phase electricity metering solutions, as well as flow meter and other precision measurement applications, through powerful analog front end (AFE), rich security protection and HMI functionality.

TARGET APPLICATIONS

- Electricity meters

- Flow meters (e.g., heat, water, gas)

- Industrial measurement and sensing

- EV charger

OVERVIEW

KM series MCUs are based on the 32-bit Arm® Cortex®-M0+ core and provide a powerful analog front end that is configurable for different regions, enabling power calculations with 0.1 percent accuracy. A high accuracy auto-compensated iRTC with hardware tamper detection delivers less than 5 PPM drift over temperature. In addition of security, communication interfaces and multiple low-power features, KM3x supports segment LCD for applications requiring HMI functionality. Metrology firmware for calculating active, reactive and apparent power using a variety of algorithms is provided free of charge. Pre-certified reference designs for Europe, China, India, the U.S. and Japan are available for customer evaluation.
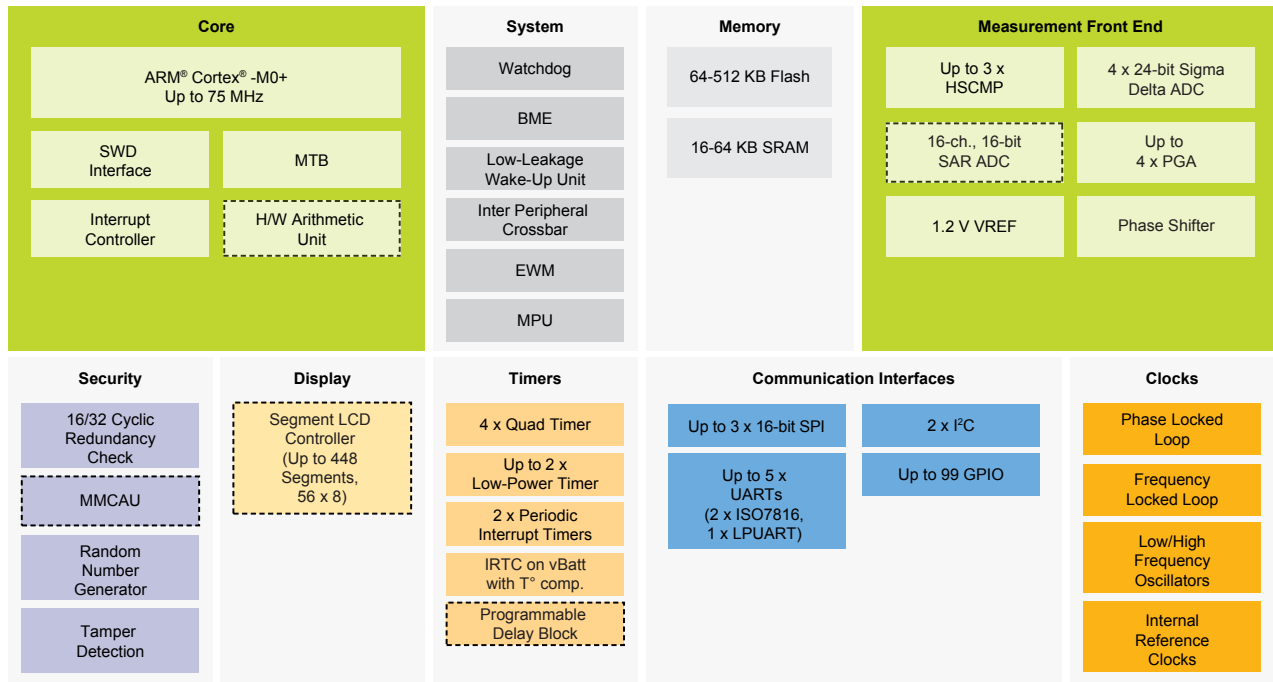
SPECIFICATIONS

- High-performance Cortex-M0+ core, up to 75 MHz of core clock frequency

- Up to 512 KB program flash, up to 64 KB SRAM

- 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: 20–75 MHz

- Flexible low-power modes to provide power optimization based on application requirements

- 32 kHz and 4 MHz internal reference clock

- Operating Characteristics
  – Voltage range: 1.71–3.6 V (without AFE)
  – Voltage range: 2.7–3.6 V (with AFE)
  – Temperature range: –40 °C to +105 °C

KM MCU SERIES BLOCK DIAGRAM

Core
- ARM® Cortex® -M0+ Up to 75 MHz
- SWD Interface
- MTB
- Interrupt Controller
- H/W Arithmetic Unit

System
- Watchdog
- BME
- Low-Leakage Wake-Up Unit
- Inter Peripheral Crossbar
- EWM
- MPU

Memory
- 64-512 KB Flash
- 16-64 KB SRAM

Measurement Front End
- Up to 3 x HSCMP
- 4 x 24-bit Sigma Delta ADC
- 16-ch., 16-bit SAR ADC
- Up to 4 x PGA
- 1.2 V VREF
- Phase Shifter

Security
- 16/32 Cyclic Redundancy Check
- MMCAU
- Random Number Generator
- Tamper Detection

Display
- Segment LCD Controller (Up to 448 Segments, 56 x 8)

Timers
- 4 x Quad Timer
- Up to 2 x Low-Power Timer
- 2 x Periodic Interrupt Timers
- IRTC on vBatt with T° comp.
- Programmable Delay Block

Communication Interfaces
- Up to 3 x 16-bit SPI
- 2 x I²C
- Up to 5 x UARTs (2 x ISO7816, 1 x LPUART)
- Up to 99 GPIO

Clocks
- Phase Locked Loop
- Frequency Locked Loop
- Low/High Frequency Oscillators
- Internal Reference Clocks

┆ ┆ Optional

KM SERIES SELECTOR GUIDE

Sub-Family	Part Number	CPU Frequency (MHz)	Flash (KB)	SRAM (KB)	UART (ISO 7816/LPUART)	I²C	SPI	ADC (24-bit (ΣΔ))	Total I/Os	HH 44 LGA (5 x 5, 0.65 mm)	LH 64 LQFP (10 x 10, 0.5 mm)	LL 100 LQFP (14 x 14, 0.5 mm)	LQ 144 LQFP (20 x 20, 0.5 mm)	Development Hardware
KM14	MKM14Z128(A)xxx5	50	128	16	2 (2/-)	1	2	4	20	Y				TWR-KM34Z50M(V3)
	MKM14Z64(A)xxx5	50	64	16	2 (2/-)	1	2	4	20	Y				TWR-KM34Z50M(V3)
KM33	MKM33Z128(A)xxx5	50	128	16	4 (2/-)	2	2	3	38–68		Y	Y		TWR-KM34Z50M(V3)
	MKM33Z64(A)xxx5	50	64	16	4 (2/-)	2	2	3	38–68		Y	Y		TWR-KM34Z50M(V3)
KM34	MKM34Z128(A)xxx5	50	128	16	4 (2/-)	2	2	4	68			Y		TWR-KM34Z50M(V3)
	MKM34Z256xxx7	75	256	32	5 (2/1)	2	2	4	72–99			Y	Y	TWR-KM34Z75M
KM35	MKM35Z256xxx7	75	256	64	5 (2/1)	2	3	4	72–99			Y	Y	TWR-KM35Z75M
	MKM35Z512xxx7	75	512	64	5 (2/1)	2	3	4	72–99			Y	Y	TWR-KM35Z75M

KEY FEATURES

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
- Up to 16-channel, 16-bit SAR ADC

Security

- Memory mapped cryptographic acceleration unit (MMCAU) for AES encryption
- Memory protection unit, AIPS (peripheral protection), random number generator, CRC

Interface

- LCD segment driver up to 448 (56 x 8) segments
- High accuracy RTC +-5 PPM over temperature range
- Up to five UART, three SPI, two I²C

COMPREHENSIVE ENABLEMENT

Tower System Development Modules

- [TWR-KM35Z75M](#)
- [TWR-KM34Z75M](#)
- [TWR-KM34Z50M](#)

Reference Designs (available for customer evaluation)

- Low-cost three-phase/single-phase power meters for markets in Asia
- Three-phase/single-phase power meters for markets in Europe, Middle East and Africa

Software and Tools

- MCUXpresso Software and Tools - a cohesive set of software development tools for Kinetis, LPC microcontrollers, and i.MX RT crossover MCUs
- IAR Embedded Workbench®, Arm Keil® MDK IDEs and others from the Arm technology ecosystem
- Proprietary MQX™ Lite RTOS
- Pre-certified metrology software

Single-Phase Power Meter

Three-Phase Power Meter

SUPPORTED SOFTWARE BY FAMILY

Product Family	MCUXpresso Software and Tools		Supported IDEs
	MCUXpresso SDK	MCUXpresso Config Tool	
KM34 75 MHz	Available	Available (Pins, Clocks)	MCUXpresso IDE, Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION
KM35 75 MHz	Available	Available (Pins, Clocks, Peripherals)	MCUXpresso IDE, IAR EWARM, Keil uVISION
KM14 50 MHz	In Plan	In Plan	Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)
KM33 50 MHz	In Plan	In Plan	Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)
KM34 50 MHz	In Plan	In Plan	Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)

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