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
**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 I^2C

---

**KM MCU Series Block Diagram**

**KM Series Selector Guide**

<table>
<thead>
<tr>
<th>Sub-Family</th>
<th>Part Number</th>
<th>CPU Frequency (MHz)</th>
<th>Flash (KB)</th>
<th>SRAM (KB)</th>
<th>UART (ISO 7816/LPUART)</th>
<th>PC</th>
<th>SPI</th>
<th>ADC (24-bit (∑Δ))</th>
<th>Total I/Os</th>
<th>Package</th>
<th>Development Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM14</td>
<td>MKM14Z128(A)xxx5</td>
<td>50</td>
<td>128</td>
<td>16</td>
<td>2 (2/-)</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>20</td>
<td>Y</td>
<td>HH LGA (5 x 5, 0.65 mm)</td>
</tr>
<tr>
<td>KM14</td>
<td>MKM14Z64(A)xxx5</td>
<td>50</td>
<td>64</td>
<td>16</td>
<td>2 (2/-)</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>20</td>
<td>Y</td>
<td>HH LQFP (10 x 10, 0.5 mm)</td>
</tr>
<tr>
<td>KM33</td>
<td>MKM33Z128(A)xxx5</td>
<td>50</td>
<td>128</td>
<td>16</td>
<td>4 (2/-)</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>38–68</td>
<td>Y</td>
<td>LL LQFP (10 x 10, 0.5 mm)</td>
</tr>
<tr>
<td>KM33</td>
<td>MKM33Z64(A)xxx5</td>
<td>50</td>
<td>64</td>
<td>16</td>
<td>4 (2/-)</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>38–68</td>
<td>Y</td>
<td>LL LQFP (10 x 10, 0.5 mm)</td>
</tr>
<tr>
<td>KM34</td>
<td>MKM34Z128(A)xxx5</td>
<td>50</td>
<td>128</td>
<td>16</td>
<td>4 (2/-)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>68</td>
<td>Y</td>
<td>LL LQFP (14 x 14, 0.5 mm)</td>
</tr>
<tr>
<td>KM34</td>
<td>MKM34Z256xxx7</td>
<td>75</td>
<td>256</td>
<td>32</td>
<td>5 (2/1)</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>72–99</td>
<td>Y</td>
<td>LL LQFP (14 x 14, 0.5 mm)</td>
</tr>
<tr>
<td>KM35</td>
<td>MKM35Z256xxx7</td>
<td>75</td>
<td>256</td>
<td>64</td>
<td>5 (2/1)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>72–99</td>
<td>Y</td>
<td>LL LQFP (20 x 20, 0.5 mm)</td>
</tr>
<tr>
<td>KM35</td>
<td>MKM35Z512xxx7</td>
<td>75</td>
<td>512</td>
<td>64</td>
<td>5 (2/1)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>72–99</td>
<td>Y</td>
<td>LL LQFP (20 x 20, 0.5 mm)</td>
</tr>
</tbody>
</table>
COMPREHENSIVE ENABLEMENT

Tower System Development Modules

- TWR-KM3SZ75M
- 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

SUPPORTED SOFTWARE BY FAMILY

<table>
<thead>
<tr>
<th>Product Family</th>
<th>MCUXpresso Software and Tools</th>
<th>Supported IDEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM34 75 MHz</td>
<td>Available, Available (Pins, Clocks)</td>
<td>MCUXpresso IDE, Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION</td>
</tr>
<tr>
<td>KM35 75 MHz</td>
<td>Available, Available (Pins, Clocks, Peripherals)</td>
<td>MCUXpresso IDE, IAR EWARM, Keil uVISION</td>
</tr>
<tr>
<td>KM14 50 MHz</td>
<td>In Plan, In Plan</td>
<td>Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)</td>
</tr>
<tr>
<td>KM33 50 MHz</td>
<td>In Plan, In Plan</td>
<td>Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)</td>
</tr>
<tr>
<td>KM34 50 MHz</td>
<td>In Plan, In Plan</td>
<td>Kinetis Design Studio (KDS), IAR EWARM, Keil uVISION, Codewarrior(MCU10.6.5)</td>
</tr>
</tbody>
</table>

Single-Phase Power Meter

Three-Phase Power Meter