



Ultra-low-power wireless MCU for sub-1 GHz wireless connectivity applications

## Kinetis KW0x Wireless MCUs

Powered by the ultra-low-power 48 MHz ARM® Cortex®-M0+ 32-bit core, the KW0x family of MCUs embeds a rich set of peripherals such as a high-performance, bi-directional sub-1 GHz radio capable of operating over a wide frequency range of 315, 433, 470, 868, 915, 928 and 960 MHz in the license-free industrial, scientific and medical (ISM) frequency bands.

### TYPICAL APPLICATIONS

- ▶ Smart metering
- ▶ Building control
- ▶ Home automation
- ▶ Wireless sensor networks
- ▶ Medical/healthcare

The KW0x smart radio supports OOK, FSK, GFSK and MSK signal modulation to transmit and receive information from 1.2 to 600 kbit/s for addressing the different types of communications required in the industrial market. An embedded front end radio integrates high-performance, low noise amplifiers and power amplifiers to reach a sensitivity of -120 dBm at 1.2 kbit/s and an output power adjustable from -18 to +17 dBm.

The KW0x smart radio has 128 KB of on-chip, non-volatile flash memory and 16 KB of RAM for running various types of communication protocols, from proprietary protocols (simple media access controller (SMAC)) to globally standardized protocols (IEEE® 802.15.4). This platform approach includes hardware, software, tools and reference designs to help simplify development.

### KINETIS KW0X KEY BENEFITS

- ▶ Ultra-low-power 32-bit ARM Cortex -M0+ core offers a well-matched CPU to run target applications
- ▶ Optimized flash and RAM memory size provide a single-chip device for operation of the communication stack and the application
- ▶ Flexible radio (multiple frequency bands, multiple modulation) provides common platform development for compliance with multiple industry standards
- ▶ High performance and low power consumption are ideal for coin cell battery-operated equipment

### FEATURES SUMMARY

#### MCU

- ▶ Ultra-low-power 32-bit ARM Cortex-M0+ core. 2 x more CoreMark®/mA than the closest 8/16-bit architecture.
- ▶ Single-cycle fast I/O access port facilitates bit banging and software protocol emulation, maintaining an 8-bit "look and feel"



- ▶ Multiple, flexible low-power modes including new compute operation which reduces dynamic power by placing peripherals in an asynchronous stop mode
- ▶ I<sup>2</sup>C, ADC, DAC, LP timer and DMA support low-power mode operation without waking up the core

#### RF Transceiver

- ▶ Supports 290–340 MHz, 424–510 MHz, and 862–1020 MHz frequency bands
- ▶ High sensitivity: As low as -120 dBm at 1.2 kbit/s
- ▶ High selectivity: 80 dB blocking immunity
- ▶ Low current: RX = 16 mA, 100nA register retention
- ▶ Programmable output: -18 to +17 dBm in 1 dB steps
- ▶ FSK bit rates up to 600 kbit/s
- ▶ FSK, GFSK, MSK, GMSK and OOK modulations
- ▶ Packet engine with CRC, AES-128 encryption and 66 byte FIFO
- ▶ Built-in temperature sensor and low battery indicator

#### Memory

- ▶ 128 KB flash with 64 byte flash cache
- ▶ 16 KB RAM

#### Peripherals

- ▶ 16-bit ADC with configurable resolution, sample time and conversion speed/power
- ▶ High-speed comparator with internal 6-bit DAC
- ▶ 12-bit DAC with DMA support

#### Interfaces

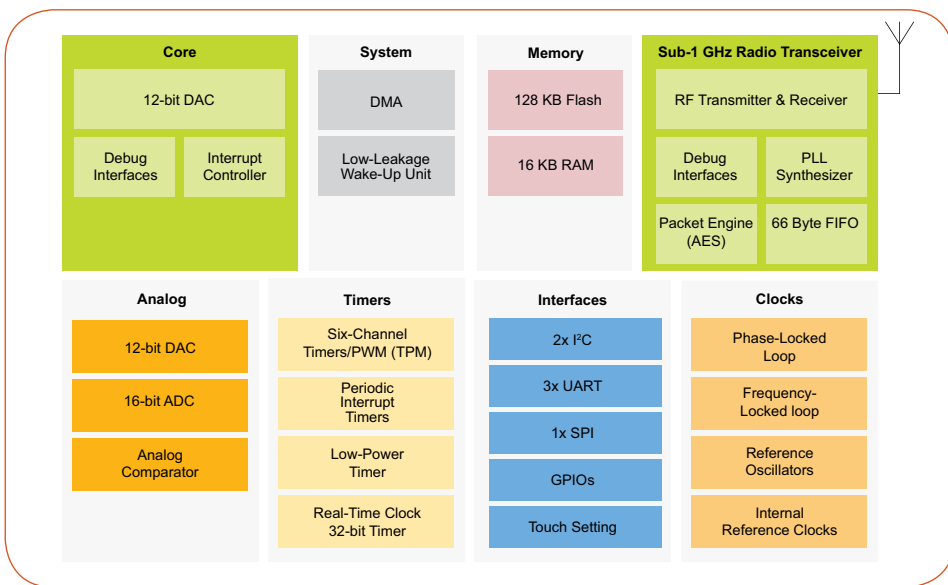
- ▶ Capacitive touch-sense interface supports external electrodes
- ▶ GPIO with pin interrupt support, DMA request capability and other pin control options
- ▶ One I<sup>2</sup>C with DMA support, up to 100 kbit/s and compatible with SMBus V2 features
- ▶ One LPUART and two UART with DMA support

#### Operating Voltage and

#### Temperature Range

- ▶ 1.8 to 3.6 V operating voltage with on-chip voltage regulators

## KINETIS KW0x WIRELESS MCU



- ▶ Temperature range of -40 °C to +85 °C

### SOFTWARE AND TOOLS

#### Radio Test Utility

- ▶ Run on PC connected through USB
- ▶ Allows fast evaluation of radio performance in a lab environment without the need for writing software:
  - Common control allows setting of frequency, modulation and operation mode.
  - Transmit control allows setting of TX power, ramp and shaping for analysis.

- Receive control allows setting of bandwidths, AFC, OOK thresholds, LNA Sensitivity, RSSI thresholds and readings.

- Packet Handler control allows setting of packet preamble, sync and payload for board-to-board testing.

#### SMAC

- ▶ Simple communication and test applications based on drivers/PHY utilities available as source code
- ▶ Small footprint (<10 KB)
- ▶ Supports point-to-point communication (bi-directional RF communication link), broadcast communication

### DEVELOPMENT TOOLS

Part Number	Description	\$USD
MRB-KW019032NA	KW01 915 MHz module with 32 MHz XTAL <ul style="list-style-type: none"> <li>• Device programmed with code for North America</li> <li>• Antenna</li> <li>• USB cable</li> <li>• Quick start guide</li> </ul>	\$99
MRB-KW019032EU	KW01 868 MHz module with 32 MHz XTAL <ul style="list-style-type: none"> <li>• Device programmed with code for Europe</li> <li>• Antenna</li> <li>• USB cable</li> <li>• Quick start guide</li> </ul>	\$99
MRB-KW019030JA	KW01 900 MHz module with 30 MHz XTAL <ul style="list-style-type: none"> <li>• Device programmed with code for Japan</li> <li>• Antenna</li> <li>• USB cable</li> <li>• Quick start guide</li> </ul>	\$99
TWR-RF-MRB	<ul style="list-style-type: none"> <li>• Adaptor for connecting the modular reference board to the Kinetis Tower system</li> </ul>	\$99

\*Please note: A minimum of two MRB-KW01 boards of the same style are typically required to demonstrate full functionality of the system. Refer to [www.nxp.com/MRB-KW0x](http://www.nxp.com/MRB-KW0x) for additional information.



**NOTE:** MRB-KW0x, TWR-RF-MRB and TWR-ELEV boards, as well as other boards for the TWR system each are ordered separately.



MRB-KW0x on TWR-RF-MRB

## ORDERABLE PART

Part Number	Description
MKW01Z128CHN	<ul style="list-style-type: none"> <li>• 290–1020 MHz smart radio</li> <li>• 128 KB flash/16 KB RAM</li> <li>• Bulk tray</li> </ul>