freescale Kinetis

Kinetis W Series

Kinetis KW0x Wireless MCUs

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

Overview

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.

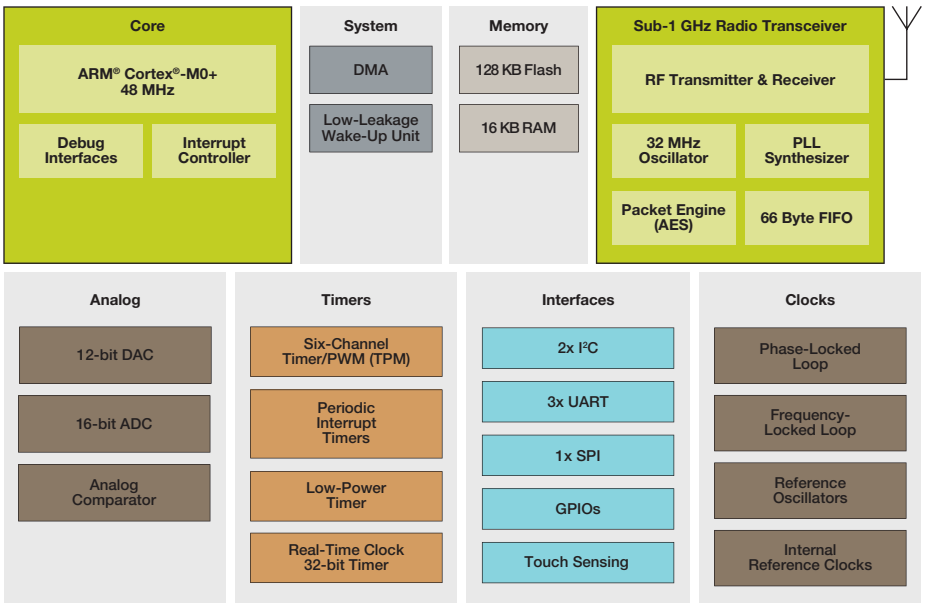
The KW0x smart radio supports OOK, FSK, GFSK and MSK signal modulation to transmit and receive information from 1.2 to 600 Kb/s for addressing the different types of communications required in the industrial market. An embedded front end radio integrates high-performance, low-noise amplifiers and power amplifiers to reach a sensitivity of -120 dBm at 1.2 Kb/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). The Freescale platform approach includes hardware, software, tools and reference designs to help simplify development.

Target Applications

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

Kinetis KW0x Wireless MCU



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

Orderable Part

Part Number	Description
MKW01Z128CHN	• 290–1020 MHz smart radio • 128 KB flash/16 KB RAM • Bulk tray

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

Kinetis KW0x Key Benefits

Ultra-low-power 32-bit Cortex-M0+ core offers a well-matched CPU to run target applications	Flexible radio (multiple frequency bands, multiple modulation) provides common platform development for compliance with multiple industry standards
Optimized flash and RAM memory size provide a single-chip device for operation of the communication stack and the application	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. 2x 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 • I²C, 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 Kb/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 Kb/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 I²C with DMA support, up to 100 Kb/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 • Temperature range of –40 °C to +85 °C

Development Tools

Part Number	Description	$USD
MRB-KW019032NA	KW01 915 MHz module with 32 MHz XTAL • Device programmed with code for North America • Antenna • USB cable • Quick Start Guide	$99
MRB-KW019032EU	KW01 868 MHz module with 32 MHz XTAL • Device programmed with code for Europe • Antenna • USB cable • Quick Start Guide	$99
MRB-KW019030JA	KW01 900 MHz module with 30 MHz XTAL • Device programmed with code for Japan • Antenna • USB cable • Quick Start Guide	$99
TWR-RF-MRB	• Adaptor for connecting the Modular Reference Board to the Kinetis Tower System portfolio	$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 freescale.com/MRB-KW0x for additional information.

For more information about Kinetis products and documentation, visit freescale.com/KW0x

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