Quick Start Guide for the Freescale Freedom Development Platform

FRDM-KW24D512

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Kinetis

External Use

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Quick Start Package Overview

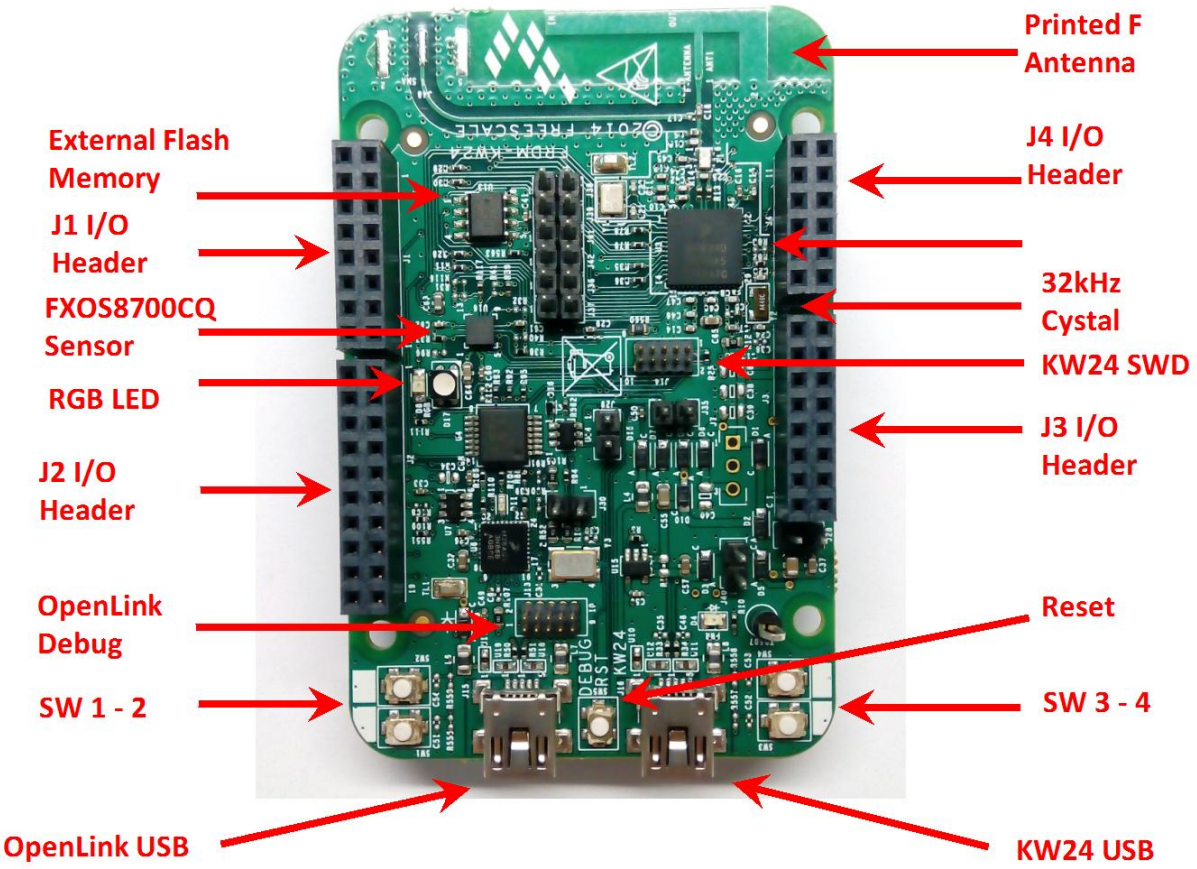
These documents are available as part of the Quick Start Package:

Name	Type	Description
Quick Start Guide	PDF	This document
Precompiled Examples	Folder	S-record images of example projects for use with the MSD Flash Programmer

Additional reference documents are available on freescale.com/FRDM-KW24D512

Name	Description
FRDM-KW24D512 Quick Start Package	Quick Start Guide and supporting files for getting started with the FRDM-KW24D512
FRDM-KW24D512 User's Manual	Overview and detailed information for the FRDM-KW24D512 hardware
FRDM-KW24D512 Pin-outs	Spreadsheet of pin connections for all MCU pins. Includes pin out for the I/O headers, Arduino R3 compatibility chart, and OpenSDA MCU pin out.
FRDM-KW24D512 Schematics	PDF schematics for the FRDM-KW24D512 hardware
FRDM-KW24D512 Design Package	Zip file containing all design source files for the FRDM-KW24D512 hardware
OpenSDA User's Guide	Overview and instructions for use of the OpenSDA embedded debug circuit

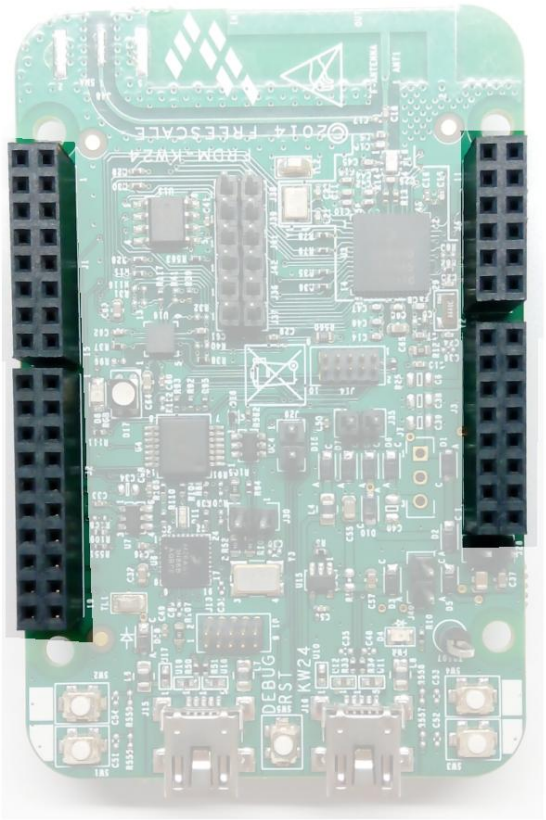
Get to Know the FRDM-KW24D512



Get to Know the FRDM-KW24D512

2 - PTD7_TX	1 - PTE0_TX
4 - PTD6_RX	3 - PTE1_RX
6 - PTD5_CTS	5 - PTE2_CTS
8 - PTD4_RTS	7 - PTE3_RTS
10 - GPIO2	9 - NC
12 - GPIO1	11 - NC
14 - PTD4	13 - NC
16 - PTD1	15 - NC

2 - PTA19	1 - NC
4 - PTA18/CLK_OUT	3 - NC
6 - PTC5_SPI_SS	5 - NC
8 - PTC6_SPI_SOUT	7 - NC
10 - PTC7_SPI_SIN	9 - NC
12 - PTC5_SPI_CLK	11 - NC
14 - GND	13 - NC
16 - VREF	15 - NC
18 - PTD3_I2C_SDA	17 - NC
20 - PTD2_I2C_SCL	19 - NC



11 - PTA0	12 - NC
9 - PTA1	10 - NC
7 - PTA2	8 - TX_SWITCH
5 - PTA3	6 - RX_SWITCH
3 - PTA4	4 - ANT_B
1 - NC	2 - ANT_A

15 - NC	16 - V_IN
13 - NC	14 - GND
11 - NC	12 - GND
9 - NC	10 - VCC_5V
7 - NC	8 - VCC_3V3
5 - NC	6 - RESET_b
3 - NC	4 - IO_REF
1 - NC	2 - NC

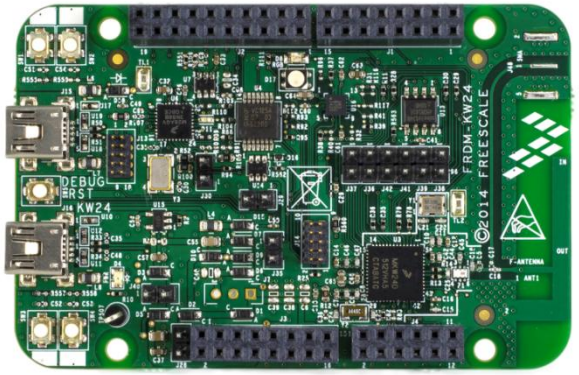
Get to Know the FRDM-KW24D512

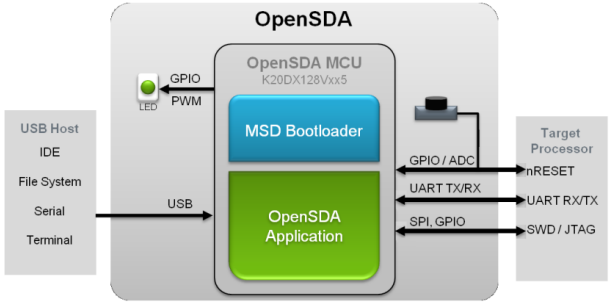
The Freescale Freedom development platform is a set of software and hardware tools for evaluation and development. It is ideal for rapid prototyping of microcontroller-based applications. The Freescale Freedom KW24 hardware, FRDM-KW24D512, is a simple, yet sophisticated design featuring a Kinetis W series MCU, the industry's first MCU built on the ARM® Cortex® M4 core.

Features:

- MKW24D512VHA5 MCU – 50MHz, 512KB Flash, 64KB SRAM, 63LGA
- Small RF reference design area marked in silkscreen, combo sensor FXOS8700CQ, Tri-color LED, Flexible power supply options – USB, external source
- Two (4) user push-button switches (SW1-SW4)
- Easy access to MCU I/O
- Power-measurement access points
- UART, SPI, I2C, optional USB 2.0 FS/LS H/D/OTG
- Form factor compatible with Arduino ™ R3 pin layout
- New, OpenSDA debug interface
  - Mass storage device flash programming interface (default) – no tool installation required to evaluate demo apps
  - CMSIS-DAP interface: new ARM standard for embedded debug interface

Refer to the *FRDM-KW24D512 User's Manual* and *OpenSDA User's Guide* for more information.





FRDM-KW24D512 Operation Description

- The KW24 operating frequency range is 2405 MHz to 2480 MHz, the data rate is 250 Kbps, and the modulation type is OQPSK – all of these parameters are defined by the 802.15.4 standard.

- The antenna is a fixed printed inverted “F”, or PIFA antenna on the PCB. The operating voltage for the KW24 is 3.3V and the current for TX/RX is < 20 mA. The KW24 crystal oscillator is 32 MHz and the radio uses an internal PLL to generate the RF frequency.

Getting Started Out of the Box

Installing Drivers and Running the Out of Box Demo

0 Optional: Download and Install the mbed serial configuration drivers from https://developer.mbed.org/handbook/Windows-serial-configuration

1 FRDM-KW24D512 comes with the mass-storage device (MSD) Flash Programmer OpenSDA Application pre-installed. It will appear as a removable storage drive with a volume label of FRDM-KW24D512.

The FRDM-KW24D512 will appear as a removable storage drive (MSD Flash Programmer) with a volume label of 'DAPLink'. The board also includes an USB serial port interface that will be enumerated as "mbed Serial Port".

If the USB Serial Port fails to automatically install in Windows, follow the instructions in Step 0 to get and install the driver required.

2 The pre-installed demo running on the KW24 MCU provides an easy way to test the RF performance of the transceiver for basic transmitter and receiver tests. It includes test mode (continuous tx, modulated, unmodulated, etc.), Packet Error Rate and Range tests (LQI measurements) as well as radio's registers communication through the serial port communication with the OpenSDA interface.

Introduction to OpenSDA

OpenSDA is an open-standard serial and debug adapter. It bridges serial and debug communications between a USB host and an embedded target processor. OpenSDA software includes a flash-resident USB mass-storage device (MSD) bootloader and a collection of OpenSDA Applications. FRDM-KW24D512 comes with the following applications preloaded:

- MSD Flash Programmer
- Debug Application
- Virtual mbed serial port

Follow these instructions to run the OpenSDA Bootloader and change the installed OpenSDA application:

Enter OpenSDA Bootloader Mode

1. Unplug the USB cable if attached.
2. Press and hold the Reset button (SW5).
3. Plug in a USB cable (not included) between a USB host and the OpenSDA USB connector (labeled “OpenSDA”).
4. Release the Reset button.

A removable drive should now be visible in the host file system with a volume label of `BOOTLOADER`. You are now in OpenSDA Bootloader mode.

Update the OpenSDA application

1. While in OpenSDA Bootloader mode, copy & paste or drag & drop the OpenSDA firmware into the `BOOTLOADER` drive.
2. Unplug the USB cable and plug it in again. The new OpenSDA Application should now be running and a `FRDM-KW24D512` drive should be visible in the host file system.

Introduction to OpenSDA

The MSD Flash Programmer is a composite USB application that provides a virtual serial port and an easy and convenient way to program applications into the KW24 MCU. It emulates a FAT16 file system, appearing as a removable drive in the host file system with a volume label of 'DAPLink'. Raw binary files that are copied to the drive are programmed directly into the flash of the KW24 and executed automatically. The virtual serial port can be opened with standard serial terminal applications.

Using the MSD Flash Programmer

1. Locate the `Precompiled Examples` folder in the FRDM-KW24D512 Quick Start Package.
2. Copy & paste or drag & drop one of the `.bin` files to the `FRDM-KW24D512` drive.

The new application should now be running on the FRDM-KW24D512. And you can program repeatedly without the need to unplug and reattach the USB cable before reprogramming.

Using the Virtual Serial Port

1. Determine the symbolic name assigned to the FRDM-KW24D512 virtual serial port. In Windows open Device Manager and look for the COM port named "mbed Serial Port (COMxx)".
2. Open the serial terminal emulation program of your choice. Examples for Windows include Tera Term, PuTTY and HyperTerminal.
3. Program one of the applications from the `Precompiled Examples` folder using the MSD Flash Programmer.
4. Configure the terminal program. Most embedded examples use 115200 baud rate, 8 data bits, no parity bits, one stop bit (8-N-1) and no flow control.
5. Press and release the Reset button (SW5) at anytime to restart the example application. Resetting the embedded application will not affect the connection of the virtual serial port to the terminal program.

NOTE: Flash programming with the MSD Flash Programmer is currently only supported on Windows operating systems. However, the virtual serial port has been successfully tested on Windows, Linux and Mac operating systems.

Explore Further

Now that you are familiar with the FRDM-KW24D15 and OpenSDA, it's time to explore the additional software and lab guides available on www.freescale.com/FRDM-KW24D512. Select your next path from the links in the **Jump Start Your Design section.**

Get in Touch

How to Reach Us:

Home Page:
freescale.com

Web Support:
freescale.com/support

FCC compliance information

- This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID RUN-FRDM-KW24D512" any similar wording that expresses the same meaning may be used.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- The board is a reference/evaluation platform that can be programmed in different ways by developers to implement and evaluate wireless functionality. The test firmware is pre-loaded in the board during production, and the "connectivity test" firmware allows the radio to be put into different TX and RX modes and to run PER tests. The RF section is a 2.4 GHz 802.15.4 compliant radio with a fixed printed "F" antenna. The board only requires +5V power to operate without any need for special installation.

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