

Quick Start Guide

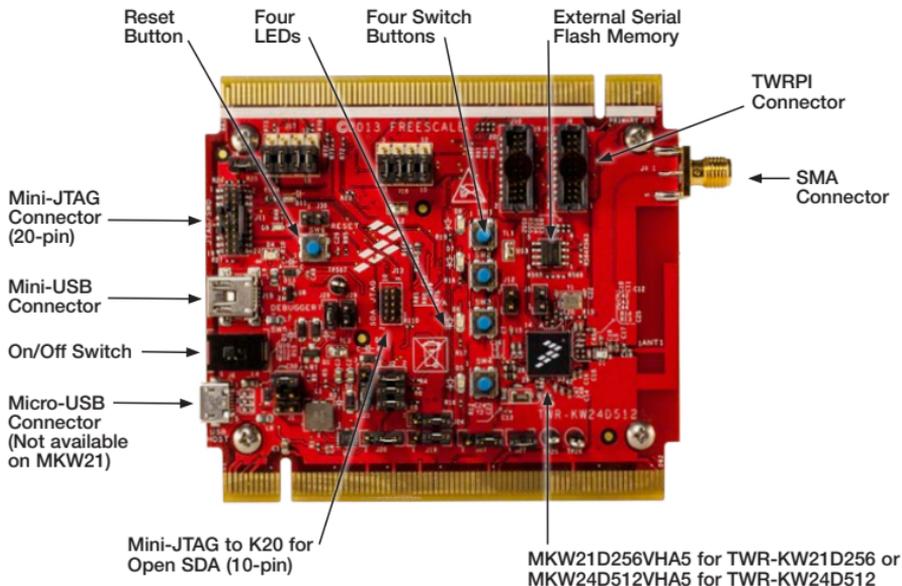
TWR-KW2x Development Platform Connectivity Test Application Demo

This Quick Start Guide is for use with TWR-KW21D256 and TWR-KW24D512 kits.



TOWER SYSTEM

Get to Know the TWR-KW2x



TWR-KW2x Freescale Tower System

The TWR-KW2x module is part of the Freescale Tower System portfolio, a modular development platform that enables rapid prototyping and tool re-use through reconfigurable hardware. Elevate your design to the next level with this industrial power house by building your Tower System today.

TWR-KW2x Features

| Device | Flash | RAM | USB | Flex Memory | Smart Energy 2.0 |
|---------------|--------|-------|-----|-------------|------------------|
| MKW21D256VHA5 | 256 KB | 32 KB | No | 64 KB | No |
| MKW21D512VHA5 | 512 KB | 64 KB | No | No | No |
| MKW22D512VHA5 | 512 KB | 64 KB | Yes | No | No |
| MKW24D512VHA5 | 512 KB | 64 KB | Yes | No | Yes |

- 50 MHz ARM® Cortex®-M4 CPU core
- Typical current consumption: 250 μ A/MHz run, 1.7 μ A RTC standby
- IEEE® 802.15.4 compliant
- -102 dBm Rx sensitivity and +8 dBm Tx output power
- Peak typical current consume: 17 mA Tx and 19 mA Rx
- Dual personal area network (PAN) support in hardware
- Run two RF networks simultaneously
- Active and passive tamper detection with RTC timestamp
- Crypto engine: DES, 3DES, AES 128-256, SHA-1, SHA-256, MD5, RNG
- UART, SPI, I²C, optional USB 2.0 FS/LS H/D/OTG
- 16-bit ADC
- Operating range: 1.8–3.6 V, -40 °C to +105 °C

Step-by-Step Installation Instructions

In this quick start guide, you will learn how to set up the TWR-KW2x device and run a couple of tests included in the demonstration software that is already preloaded. The TWR-KW2x development platform comes preprogrammed with the Connectivity Test Demo Application to provide a demonstration of the device's capabilities. This quick start guide will demonstrate how Packet Error Rate tests work.

1 Connect the Hardware

Connect one end of the USB cable to the PC and the other end to the TWR-KW2x's mini-USB connector. Allow the PC to automatically install the USB drivers if needed. Repeat for another board.

On the TWR-KW2x, ensure C17 component is populated to enable SMA connector.

Attach a coaxial cable to the SMA connector. The coaxial cable should be connected to a variable attenuator with 100 dB range and then to test equipment or another board.

Note: This hardware is certified for conducted measurements only. The user accepts responsibility for standards compliance for radiated measurements with an antenna.

2 Power on the Boards

Move the On/Off switch until the blue LEDs start flashing.

3 Start Serial Communication

Open a terminal window (such as HyperTerminal) and configure a COM port to start a Serial communication with a board. Each board requires its own connection.

COM port settings:

- Bits per second: 115200
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

4 Start Demo

Press the **Reset** button on both boards. You will see the Connectivity Test Demo's text in the terminal. Press **Enter** to start the demo.

5 Send and Receive Packets

On the Connectivity Test Menu, press **2** on both terminals to select "Packet Error Rate Test." The PER test sends a number of packets from a transmitter to a receiver all on a single channel.

```

MOW2x - HyperTerminal
File Edit View Call Transfer Help
[Icons]

-----
Connectivity Test Interface short cuts
-----
-Press [i] for Tx operation
-Press [r] for Rx operation
-Press [q] for channel up
-Press [w] for channel down
-Press [a] for Power up
-Press [s] for Power down
-Press [z] for Crystal Trim up
-Press [x] for Crystal Trim down
-Press [n] to increase the Payload
-Press [m] to decrease the Payload
These keys can be used all over the application to change
the test parameters

Select the Test to perform
-----
-Press [1] Continuous tests
-Press [2] Packet Error Rate test
-Press [3] Range test
-Press [4] Radio registers edit

Mode Tx, Channel 15, Power 23, Crystal Trim 115, Payload 020 >

Connected 8:00:55 Auto detect 115200 B-N-1 SCROLL CAPS NUM Exit: Print echo
  
```

Note: There are parameters that can be modified before running a test, i.e., changing the channel ('q' or 'w') or output power ('a' or 's').

Receiver

- Press **R** to set the board in Rx operation.
- Press the **space bar** to start listening to packets.
- “PER Test Rx Running” will be displayed in the terminal screen.

```

Packet 983
Packet 984
Packet 985
Packet 986
Packet 987
Packet 988
Packet 989
Packet 990
Packet 991
Packet 992
Packet 993
Packet 994
Packet 995
Packet 996
Packet 997
Packet 998
Packet 999
Packet 1000

PER Test Finished
Received 1000 of 1000 packets transmitted
Press [enter] to go back to the Per Rx test menu
  
```

Receiver

Transmitter

- Press **T** to ensure the board is in Tx operation.
- Start sending packets over the air by selecting the number of packets to be sent.

```

Running PER Tx. Sending 1000 Packets
PER Tx DONE

Press [enter] to go back to the PER Tx test menu
  
```

Transmitter

After you have started sending packets from the transmitter, the receiver's terminal will display the packets as they arrive. Once the PER test is done, a summary of received/sent packets will be displayed.

Press **Enter** to go back to the previous menu.

6 Download Freescale BeeKit® Wireless

Connectivity Toolkit

BeeKit is a standalone software application that provides a graphical user interface in which the user can create, modify, save and update wireless network solutions based on Freescale's protocol stacks. Download BeeKit under Software and Tools at freescale.com/wireless.

7 Recommended Reading

For downloadable demo applications and information on usage of the OpenSDA interface please visit freescale.com/TWR-KW2x.

Detailed instructions on how to run SMAC demos can be found in the MKW2x SMAC Demonstration Applications User's Guide ([MKW2xSMACDAUG.pdf](#)).

Refer to BeeKit Wireless Connectivity Toolkit Quick Start Guide ([BKWCTKQSG.pdf](#)) to load sample applications using BeeStack (ZigBee®) and IEEE 802.15.4 MAC protocol stacks.

Support

Visit freescale.com/support for a list of phone numbers within your region.

Warranty

Visit freescale.com/warranty for complete warranty information.

FCC NOTICE: This kit is designed to allow:

- (1) Product developers to evaluate electronic components, circuitry or software associated with the kit to determine whether to incorporate such items in a finished product and
- (2) Software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

CE NOTICE: This board is only compliant when directly connected and not connected to an antenna.

For more information, visit freescale.com/TWR-KW2x

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