TEXAS INSTRUMENTS

CC2530EMK Quick Start Guide

1. Kit Contents

2 x Pulse W1010 Antennas

2 x CC2530EM

Documentation

The RF boards in this kit are FCC and IC certified and tested to comply with ETSI/R&TTE standards over temperature from 0 to +35°C. The antenna, W1010 from Pulse, is a ¼ wave dipole antenna with 2 dBi gain.

FCC/IC Regulatory Compliance
FCC Part 15 Class A Compliant
IC ICES-003 Class A Compliant

2. Plug EM into SmartRF05EB

The CC2530EM, with the antenna mounted on the SMA connector, can be plugged into a SmartRF05EB. The SmartRF05EB is included in the CC2530 Development Kit [2].

Caution! The kit contains ESD sensitive components. Handle with care to prevent permanent damage.

3. Power Options

There are several ways of applying power to the SmartRF05EB;

- USB (5V through USB plug)
- External Power Supply (requirements below)
- 2 x 1.5V AA Non-Rechargeable Alkaline Batteries

Voltage regulators on the SmartRF05EB will set the on-board voltage to 3.3V.

External Power Supply[1] Requirements:
Nom Voltage: 4 to 20 VDC
Max Current: 1500 mA
Efficiency Level V

Warning! To minimize risk of personal injury or property damage, never use rechargeable batteries to power the board.
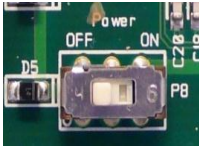
4. Select Power Source

Locate the power source header P11 just above the LCD on the SmartRF05EB
Connect pins 1 and 2 if you are using batteries to power the board. Connect pins 2 and 3 if you are using USB or external power supply.

Once you have set P11, find switch P8 just next to the DC jack on the SmartRF05EB.
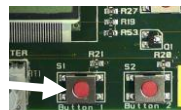To power on the board, flip the switch from "OFF" to "ON".
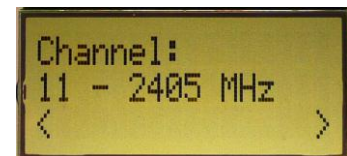
5. Packet Error Rate (PER)

When power is applied to the SmartRF05EB, the preprogrammed PER test on the CC2530 will start running.

The LCD will display the screen as shown in the picture above. The number in the parentheses is the revision of the CC2530.

Press Button 1 to continue.
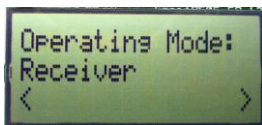
6. Select Channel

Select one of the 16 IEEE 802.15.4 channels, with channel number from 11 to 26 (2405-2480 MHz, 5 MHz channel spacing). Select the same channel for both boards.
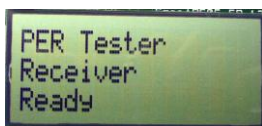
The channel is selected by moving the joystick to the right or left.

Press Button 1 to confirm the selection.
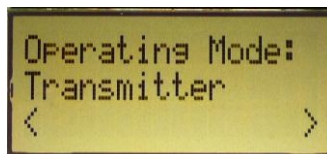
7. Set up the Receiver

Set one of the boards to operate as receiver. Use the joystick to select mode. Confirm by pressing Button 1.

The receiver will now wait for packets from the transmitter.

8. Set up the Transmitter

Set the other board to operate as transmitter. Use the joystick to select mode. Confirm the selection by pressing Button 1.

On the transmitter node, additional parameters have to be set. On the next screen, select the TX output power (signal strength). Use the joystick to select between -3 dBm, 0 dBm or 4 dBm. Confirm the selection with Button 1.

9. TX: Packets and Rate

Next, select burst size (number of packets to send) by using the joystick, either 1000, 10K, 100K or 1M packets. Confirm the selection with Button 1.

After selecting burst size, select packet rate; 100, 50, 20 or 10 packet per second. Confirm the selection with Button 1.

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[1] When using an external power supply, make sure it meets the listed requirements in addition to complying with applicable regional product regulatory and safety certification requirements such as UL, CSA, VDE, CCC, and PSE.

10. TX: Start PER Test

The transmitter is now configured for the PER test. The PER test is started and stopped by pushing the joystick (as a button). The transmitter will display the number of packets sent during the PER test.

After stopping the test, it will start from the beginning if the test is restarted.

11. RX: Observe PER

The PER test receiver will display the PER value (number of lost and erroneous packets divided by the number of packets sent, displayed as a fraction of 1000).

The receiver will also display the number of received packets and a moving average RSSI value based on the last 32 packets.

By pressing button 1, all counters on the receiver will be reset and the receiver will restart the PER calculations.

12. SmartRF Studio

After running the PER test, the next recommended step is to install SmartRF Studio and to connect the evaluation board to the PC.
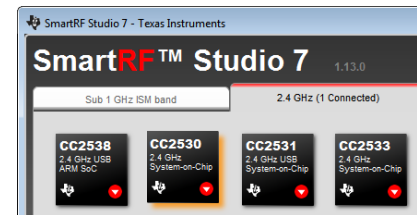
When installing SmartRF Studio, you will also install the USB drivers required for the SmartRF05EB board.

SmartRF Studio can be used for RF testing and evaluation of C2530.

SmartRF Studio can be downloaded from www.ti.com/smartrfstudio

13. Flash Programmer

Texas Instruments has a simple tool which can be used to program the flash on the CC2530.

The Flash Programmer application, available on the kit web page [2], can be used to program Intel HEX files, read the contents of flash and several other operations.

Programming of a CC2530 can be done through the SmartRF05EB.

Production programming tools are available from TI's developer network [4].

14. IAR Embedded Workbench

To develop software, program and debug the CC2530, you should use IAR Embedded Workbench for 8051.
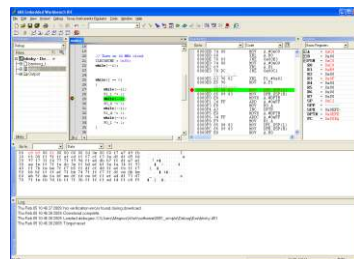
A free evaluation version of IAR EW8051 is included in the kit. A free, code size limited version can be downloaded from the web. See www.iar.com/ew8051.

15. Packet Sniffer

In order to debug RF protocols, it is possible to use TI's SmartRF Packet Sniffer.
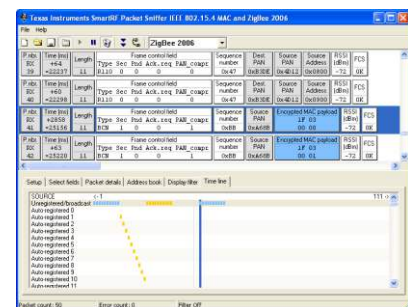
You can use the CC2531 USB dongle or the SmartRF05EB with a CC2530EM to capture the packets.

A. Available Software

CC2530 Software Examples
Source code for the PER test and other simple examples for the CC2530 [1]

Z-Stack™ Software
TI's ZigBee-compliant protocol stack www.ti.com/z-stack

RemoTI™ Network Protocol
TIs' implementation of the ZigBee RF4CE standard: www.ti.com/remoti

TIMAC Software
TI's IEEE 802.15.4 medium-access-control stack: www.ti.com/timac

B. More information

On Texas Instruments' Low-Power RF web site you will find all our latest products, application and design notes, FAQ section, news and events updates, and much more. Just go to www.ti.com/lprf

The Low Power RF Online Community has forums, blogs and videos. Use the forums to find information, discuss and get help with your design. Join us at www.ti.com/lprf-forum

The TI LPRF eNewsletter keeps you up to date on e.g. new products, application notes, software and events. Sign up at www.ti.com/lprfnewsletter

C. References

[1] CC2530 product web page
www.ti.com/product/cc2530

[2] CC2530 Development Kit
www.ti.com/tool/cc2530dk

[3] SmartRF05EB User's Guide
www.ti.com/lit/pdf/swru210

[4] LPRF Developer's Network
http://focus.ti.com/general/docs/gencontent.tsp?contentId=98994

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