

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

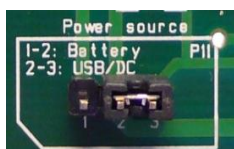
Voltage regulators on the SmartRF05EB will set the on-board voltage to 3.3V.

External Power Supply¹ 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.

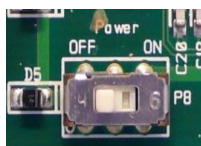
4. Select Power Source

Locate the power source header P11 just above the LCD on the SmartRF05EB

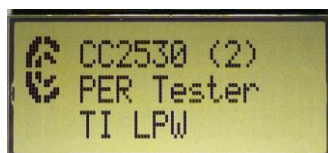


Connect pins 1 and 2 if you are using batteries to power the board. Connect pins 2 and 3 if you are using USB or external power supply.

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".



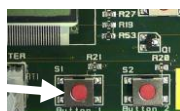
5. Packet Error Rate (PER)



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

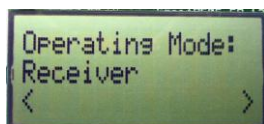


Select one of the 16 IEEE 802.15.4 channels, with channel number from 11 to 26 (2405-2480 MHz, 5 MHz channel spacing). Select the same channel for both boards.

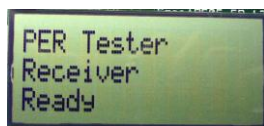
The channel is selected by moving the joystick to the right or left.

Press Button 1 to confirm the selection.

7. Set up the Receiver

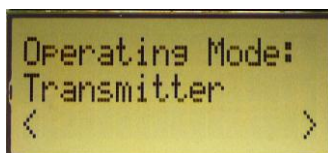


Set one of the boards to operate as receiver. Use the joystick to select mode. Confirm by pressing Button 1.



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.

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).

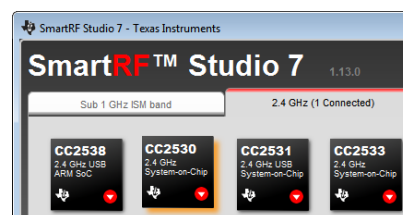


The receiver will also display the number of received packets and a moving average RSSI value based on the last 32 packets.

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.



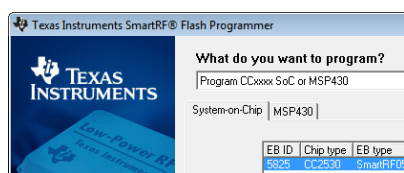
When installing SmartRF Studio, you will also install the USB drivers required for the SmartRF05EB board.

SmartRF Studio can be used for RF testing and evaluation of CC2530.

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

13. Flash Programmer

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



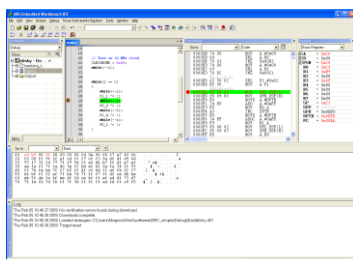
The Flash Programmer application, available on the kit web page [2], can be used to program Intel HEX files, read the contents of flash and several other operations.

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

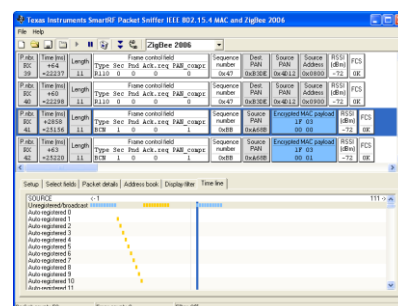
To develop software, program and debug the CC2530, you should use IAR Embedded Workbench for 8051.



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

TI's 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>

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products (also referred to herein as "components") are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI's terms and conditions of sale of semiconductor products. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers' products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers' products and applications, Buyers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of significant portions of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI components or services with statements different from or beyond the parameters stated by TI for that component or service voids all express and any implied warranties for the associated TI component or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards which anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI's goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed a special agreement specifically governing such use.

Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Products

Audio	www.ti.com/audio
Amplifiers	amplifier.ti.com
Data Converters	dataconverter.ti.com
DLP® Products	www.dlp.com
DSP	dsp.ti.com
Clocks and Timers	www.ti.com/clocks
Interface	interface.ti.com
Logic	logic.ti.com
Power Mgmt	power.ti.com
Microcontrollers	microcontroller.ti.com
RFID	www.ti-rfid.com
OMAP Applications Processors	www.ti.com/omap
Wireless Connectivity	www.ti.com/wirelessconnectivity

Applications

Automotive and Transportation	www.ti.com/automotive
Communications and Telecom	www.ti.com/communications
Computers and Peripherals	www.ti.com/computers
Consumer Electronics	www.ti.com/consumer-apps
Energy and Lighting	www.ti.com/energy
Industrial	www.ti.com/industrial
Medical	www.ti.com/medical
Security	www.ti.com/security
Space, Avionics and Defense	www.ti.com/space-avionics-defense
Video and Imaging	www.ti.com/video

TI E2E Community

e2e.ti.com