CC2530EMK Quick Start Guide

1. Kit Contents

2 x CC2530EM
2 x Pulse W1010 Antennas
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

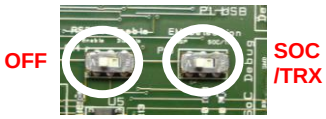
2. Plug EM into SmartRF05EB

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. Configure the SmartRF05EB

Set the EM Selection switch in position SOC/TRX. For best performance, it is recommended to turn off the RS232 interface.



Select power source with the jumper on header P11:

- Position 1-2: Batteries
- Position 2-3: USB or DC supply

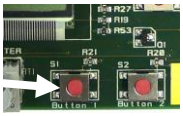
Warning! To minimize risk of injury or property damage, never use rechargeable batteries to power the board. Always select a power source that is suitably rated for use with this EVM, **not exceeding 20 VDC, with a current output rating between 0 and 1500 mA. Note that there should only be one active power source at any one time. Do not leave the EVM powered when unattended.**

4. 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.



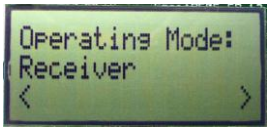
5. Select Channel

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.

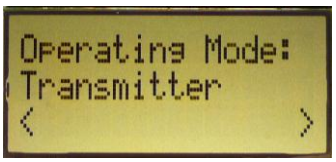
6 Set up the Receiver



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.

7. 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.

8. 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.

9. 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.

10. RX: Observe PER

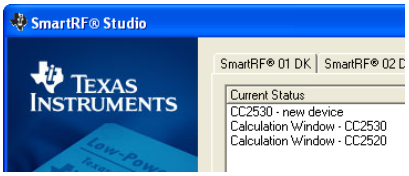
The PER test receiver will display the PER value (number of lost and erroneous packets divided by the number of packets sent, displayed as a fraction of 1000).

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.

11. 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

12. Flash Programmer

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

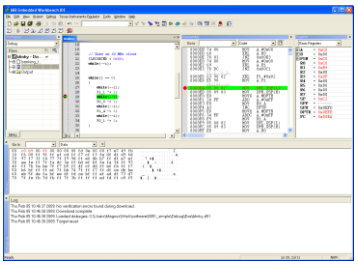
The Flash Programmer application, available on the kit web page [2], can be used to program Intel HEX files, read the contents of flash and several other operations.

Programming of a CC2530 can be done through the SmartRF05EB.

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

13. IAR Embedded Workbench

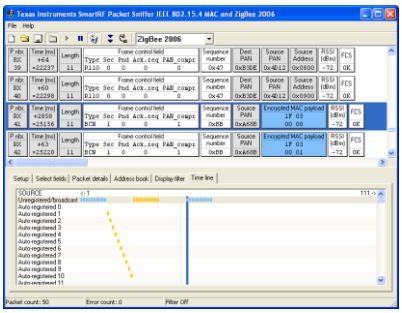
To develop software, program and debug the CC2530, you should use IAR Embedded Workbench for 8051.



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.

14. 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.

15. Thank You!

We hope you will enjoy working with the CC2530 and associated Low-Power RF products from Texas Instruments.

A. Available Software

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

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

SimpliciTI™ Network Protocol
An RF protocol targeting simple, small RF networks: www.ti.com/simpliciti

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

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

B. More information

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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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During normal operation, some circuit components may have case temperatures greater than 40°C. The EVM is designed to operate properly with certain components above 40°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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General Statement for EVMs including a radio

User Power/Frequency Use Obligations: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this is strictly prohibited and unauthorized by Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant

Caution

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.

FCC Interference Statement for Class A EVM devices

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For EVMs annotated as IC – INDUSTRY CANADA Compliant

This Class A or B digital apparatus complies with Canadian ICES-003.

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This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs including detachable antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

~

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada.

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

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Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan!

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(2) Use this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or

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Also, please do not transfer this product, unless you give the same notice above to the transferee.

Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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