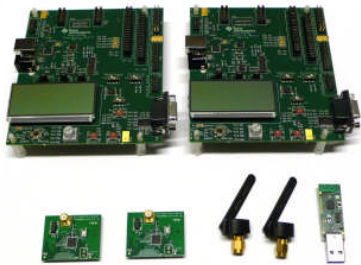


# CC2530DK Quick Start Guide

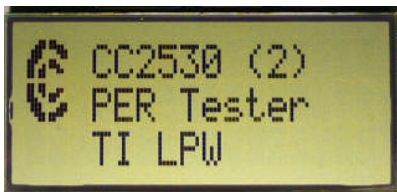
## 1. Kit Contents



2 x CC2530EM  
2 x 2.4 GHz Antennas  
2 x SmartRF05EB  
1 x CC2531 USB Dongle  
Batteries, cables and documentation

This guide will show how to run the packet error rate test application which is programmed on the CC2530 devices in this kit. It will also point to additional resources.

## 4. Packet Error Rate (PER)



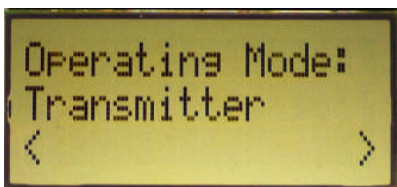
When power is applied to the SmartRF05EB, the preprogrammed PER test on the CC2530 will start running.

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.



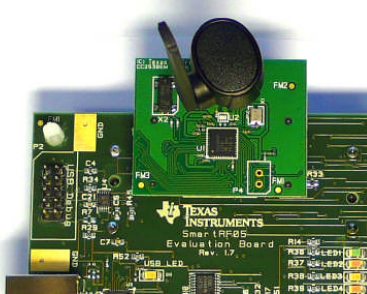
## 7. Set up the Transmitter



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.

## 2. Plug EM into SmartRF05EB



The CC2530EM, with the antenna mounted on the SMA connector, can be plugged into the SmartRF05EB.

Please refer to the SmartRF05 Evaluation Board User's Guide [4] for more information.

## 5. Select Channel

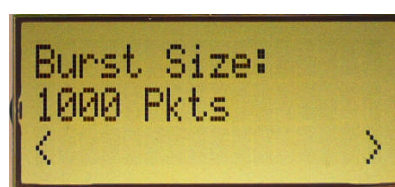


Select one of the 16 IEEE 802.15.4 channels, with channel number from 11 to 26 (2405-2480 MHz, 5 MHz channel spacing). Select the same channel for both boards.

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

Press Button 1 to confirm the selection.

## 8. TX: Select Number of Packets and Packet rate

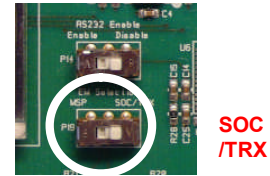


Next, select burst size (number of packets to send) by using the joystick, either 1000, 10K, 100K or 1M packets. Confirm the selection with Button 1.

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

## 3. Configure the SmartRF05EB

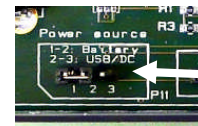
Set the EM Selection switch in position SOC/TRX.



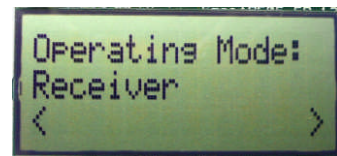
If you have a SmartRF05EB version 1.7.1 or older, it is recommended to turn off the RS232 interface for best performance.

Select power source with the jumper on header P11:

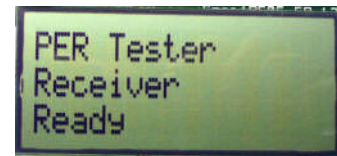
- Position 1-2: Batteries
- Position 2-3: USB or DC supply



## 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.

## 9. TX: Start PER Test

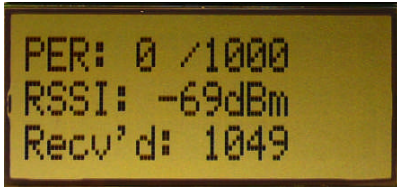


The transmitter is now configured for the PER test. The PER test is started and stopped by pushing the joystick (as a button). The transmitter will display the number of packets sent during the PER test.

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).

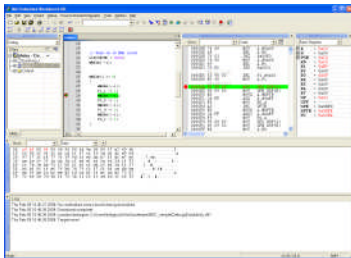


The receiver will also display the number of received packets and a moving average RSSI value based on the last 32 packets.

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

## 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](http://www.iar.com/ew8051).

### A. Available Software

#### CC2530 Software Examples

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

#### CC2531 USB Firmware Library

Basic USB stack for the CC2531, including HID and CDC examples [2].

#### RemoTI™ Network Protocol

TI's implementation of the ZigBee RF4CE standard: [www.ti.com/remoti](http://www.ti.com/remoti)

#### SimpliciTI™ Network Protocol

An RF protocol targeting simple, small RF networks: [www.ti.com/simpliciti](http://www.ti.com/simpliciti)

#### TIMAC Software

TI's IEEE 802.15.4 medium-access-control stack: [www.ti.com/timac](http://www.ti.com/timac)

#### Z-Stack™ Software

TI's ZigBee-compliant protocol stack: [www.ti.com/z-stack](http://www.ti.com/z-stack)

## 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.



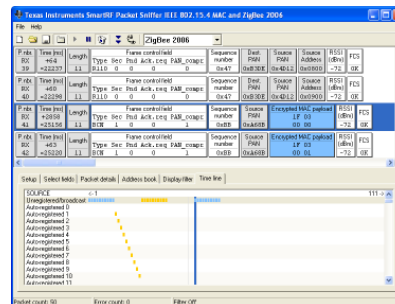
When installing SmartRF Studio, you will also install the USB drivers required for the SmartRF05EB board.

SmartRF Studio can be used for RF testing and evaluation of C2530 and CC2531.

SmartRF Studio can be downloaded from [www.ti.com/smartrfstudio](http://www.ti.com/smartrfstudio)

## 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.

### 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](http://www.ti.com/lprf)

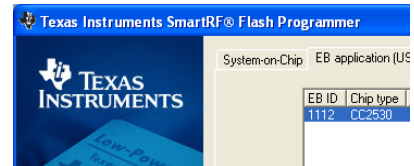
The Low Power RF Online Community has forums, blogs and videos. Use the forums to find information, discuss and get help with your design. Join us at [www.ti.com/lprf-forum](http://www.ti.com/lprf-forum)

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](http://www.ti.com/lprfnewsletter)

We hope you will enjoy working with the CC2530, CC2531 and associated Low-Power RF products from Texas Instruments.

## 12. Flash Programmer

Texas Instruments has a simple tool which can be used to program the flash on both the CC2530 and CC2531.



The Flash Programmer application, available on the kit web page [3], can be used to program Intel HEX files, read the contents of flash and several other operations.

Programming of a CC2530 or a CC2531 can be done through the SmartRF05EB.

Production programming tools are available from TI's developer network [5].

## 15. CC2531 USB Dongle

The CC2531 USB dongle, included in the development kit, can be used for packet sniffing or as a general development platform for USB firmware.



There is more information about the USB dongle in the CC2531 USB Dongle User's Guide and on the product web page [2].

### C. References

[1] **CC2530 product web page**  
<http://focus.ti.com/docs/prod/folders/print/cc2530.html>

[2] **CC2531 product web page**  
<http://focus.ti.com/docs/prod/folders/print/cc2531.html>

[3] **CC2530 Development Kit**  
<http://focus.ti.com/docs/toolsw/folders/print/cc2530dk.html>

[4] **SmartRF05EB User's Guide**  
[www.ti.com/lit/pdf/swru210](http://www.ti.com/lit/pdf/swru210)

[5] **LPRF Developer's Network**  
<http://focus.ti.com/general/docs/gencontent.tsp?contentId=29028>

## IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

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

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

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI 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 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. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

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

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

<b>Products</b>		<b>Applications</b>	
Amplifiers	<a href="http://amplifier.ti.com">amplifier.ti.com</a>	Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
Data Converters	<a href="http://dataconverter.ti.com">dataconverter.ti.com</a>	Automotive	<a href="http://www.ti.com/automotive">www.ti.com/automotive</a>
DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>	Communications and Telecom	<a href="http://www.ti.com/communications">www.ti.com/communications</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>	Computers and Peripherals	<a href="http://www.ti.com/computers">www.ti.com/computers</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>	Consumer Electronics	<a href="http://www.ti.com/consumer-apps">www.ti.com/consumer-apps</a>
Interface	<a href="http://interface.ti.com">interface.ti.com</a>	Energy	<a href="http://www.ti.com/energy">www.ti.com/energy</a>
Logic	<a href="http://logic.ti.com">logic.ti.com</a>	Industrial	<a href="http://www.ti.com/industrial">www.ti.com/industrial</a>
Power Mgmt	<a href="http://power.ti.com">power.ti.com</a>	Medical	<a href="http://www.ti.com/medical">www.ti.com/medical</a>
Microcontrollers	<a href="http://microcontroller.ti.com">microcontroller.ti.com</a>	Security	<a href="http://www.ti.com/security">www.ti.com/security</a>
RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>	Space, Avionics & Defense	<a href="http://www.ti.com/space-avionics-defense">www.ti.com/space-avionics-defense</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>	Video and Imaging	<a href="http://www.ti.com/video">www.ti.com/video</a>
		Wireless	<a href="http://www.ti.com/wireless-apps">www.ti.com/wireless-apps</a>

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2010, Texas Instruments Incorporated