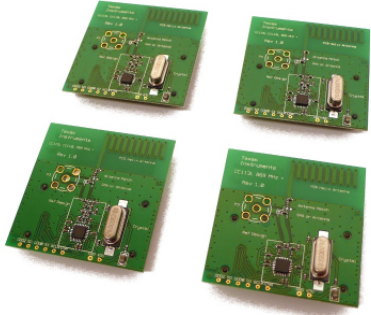# CC11xL Evaluation module Kit Quick Start Guide

Opening the Box and Running the Packet Error Rate Test

1. Kit Contents

2 x CC110LEM 433 MHz
1 x CC113LEM 433 MHz
1 x CC115LEM 433 MHz
Documentation

The EMK is an add-on kit to supplement the CC11XLDK with evaluation boards supporting the 433 MHz frequency band.

2. How to use the Modules

The CC11XLEM boards can be plugged into several development boards from Texas Instruments. Most notably, you can use the SmartRF Transceiver EB, which is included in the CC11XLDK-868-915. This board lets you run a packet error rate (PER) test, control the device from SmartRF™ Studio and it can be used as a development platform.

It is also possible to connect the EM to other TI development boards with the appropriate connectors or to the basic "SoC Battery Board". The latter can be used as a carrier board for the EM to simplify the connection to other boards with a microcontroller. See:

http://focus.ti.com/docs/toolsw/folders/print/socbb.html

This guide will show how to use the modules together with SmartRF Transceiver EB (TrxEB)

3. Plug the EM into the TrxEB
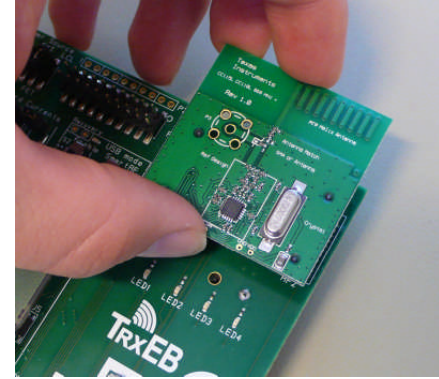
Insert a CC110LEM into the TrxEB. The connectors will only fit in one position so that the EM cannot be inserted the wrong way. Do not use excessive force on the EM.

The EM has a PCB antenna, so there is no need for an external antenna.

You can also use CC113L and CC115L for the Per test, but note that CC113L is a receiver only and CC115L is a transmitter only.

4. Select Board Mode

Use the switches S1 and S2 to select the operating mode of the board. For the sake of this quick start guide, please select "Enable" and "UART". This configuration will make it possible to communicate directly with the MSP430 over a virtual COM port on the PC.
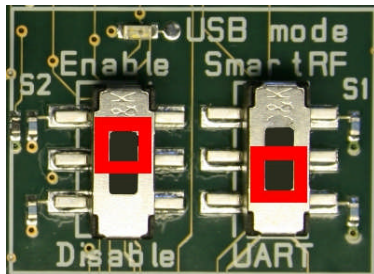

5. Power Options

There are several ways of applying power to the TrxEB.

- 2 x 1.5 V AA batteries
- USB
- External Power Supply
- MSP430 Debugger

For the batteries and USB, there are voltage regulators on the TrxEB that will set the on-board voltage to 3.3 V. The external power supply should set a voltage that does not exceed 3.3 V. By default, the MSP430 debugger supplies 3.0 V.

Note that there should only be one active power source at any one time.

6. Select Power Source
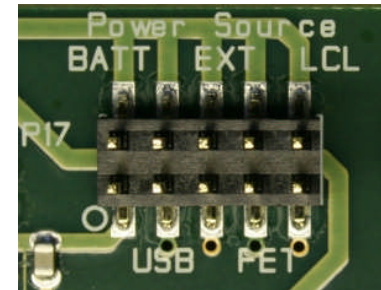
Depending on the power source, make sure you connect jumpers to the appropriate pins on the "Power Source" header. For instance, if you use batteries, use a jumper to short-circuit pin 1 and 2 on the header. The last jumper in the row (pin 9-10) should always be mounted, unless the MSP430 FET is used as the power source.

7. Welcome Screen
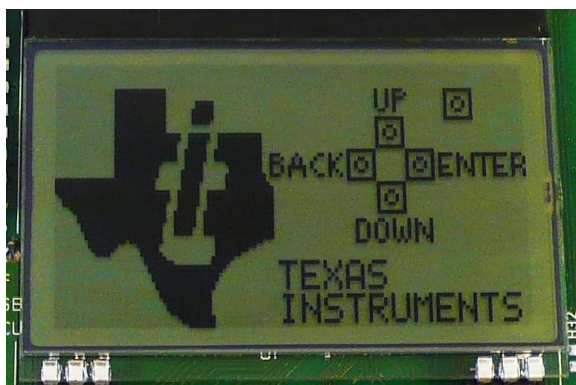
Turn on power with the Main Power switch. You should now see the Texas Instruments logo and a short description of the buttons on the LCD. Pushing any of the five buttons on the board will take you to the main menu.

NB! If you don't see anything on the screen – don't panic. First, make sure the mode switches are in the correct positions (see step 4 above). Secondly, the first build of TrxEB unfortunately uses a connector that doesn't fit exactly to the pins of the LCD. It should be sufficient to tilt the LCD slightly to get a snug fit with the connector.

8. Packet Error Rate Test
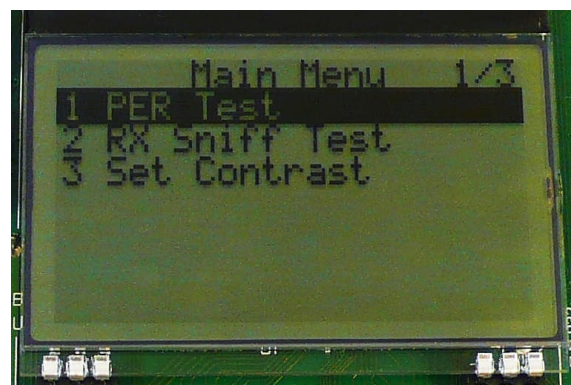
Select the PER (Packet Error Rate) test by highlighting the selection using the up/down buttons. Confirm your selection by pressing Enter (right button).
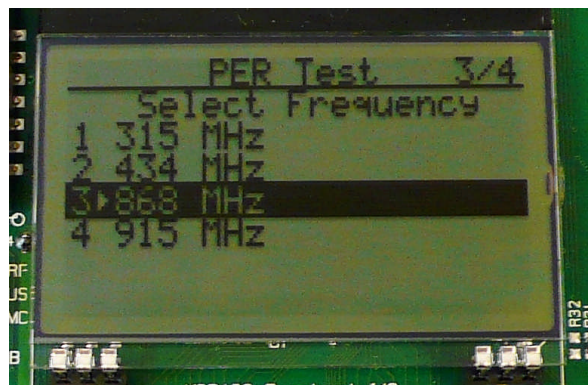
9. Select Test Mode
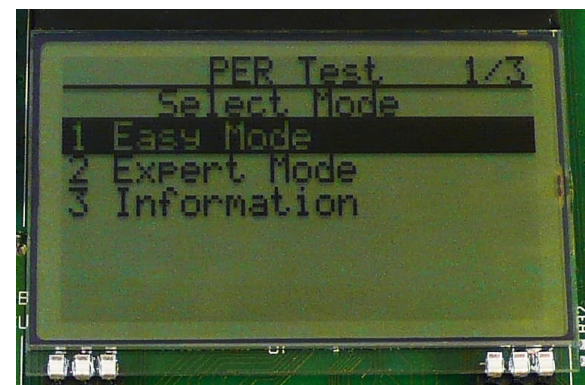
The PER test can be run is several modes. Easy Mode sets up a one-way test and uses default settings. This test is convenient for practical range testing.

The other test modes and details about how the PER test works are described in the "**TrxEB RF Software Examples User's Guide**".

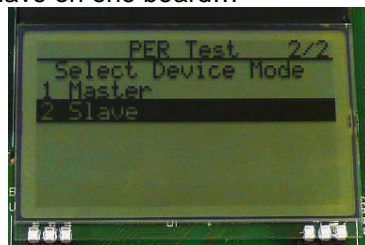Highlight "Easy Mode" and press Enter (right button).
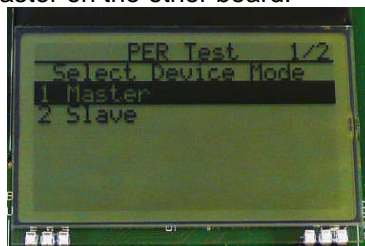
10. Select Frequency

Select which frequency to use for the test. Make sure that the evaluation modules you have match the selected frequency.

11. Select Mode

One of the boards must operate as the slave (transmitter) and the other as master (receiver). Select Slave on one board…
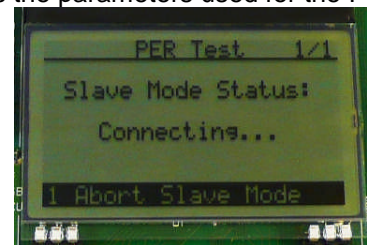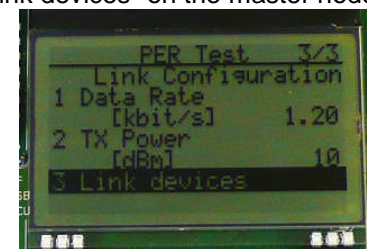

…and Master on the other board.

12. Establish Link

The slave node will now wait for a configuration package from the Master. The configuration contains the parameters used for the PER test.

The configuration package will be sent when you select "link devices" on the master node.

13. Link Established

When the initial linking has completed, the slave node will start the test by continuously transmitting packets to the master.
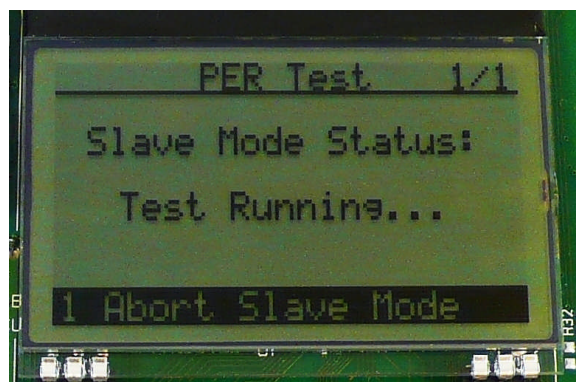
14. Start the Receiver (master)

On the master node, you can select the number of packets you want to receive in order to calculate the packet error.

When selecting "Start PER Test", the master (receiver) will begin to count the number of received packets and provide some statistics.

15. PER Test Results

The master will display a window that plots the received signal strength (RSSI) for each packet.

Press the "Up" button to go to the detailed statistical window.

16. PER Test Results

The statistics window will show the error rate based on the number of lost or erroneous packets divided by the total number of packets that should have been received.
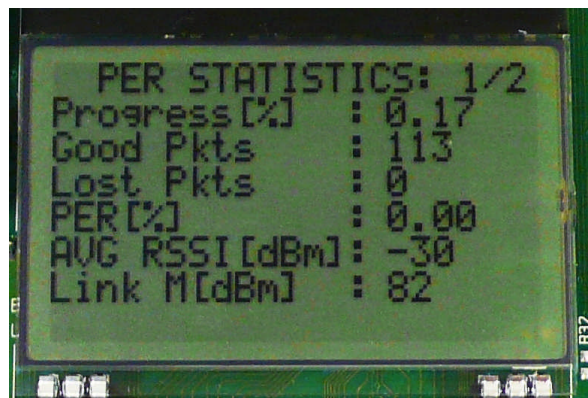
17. Troubleshooting

It you are experiencing problems with this test, please check the following:

- Nothing is shown in the display! Unfortunately, the first series of TrxEB uses a connector that doesn't fit exactly to the pins of the LCD. It should be sufficient to tilt the LCD slightly to get a snug fit with the connector.
- Please visit the kit web page and check for updated SW and documentation. Updated SW can be downloaded to the device using IAR EW430 or SmartRF Flash Programmer.
- If you get poor PER results at short distances, try to move the transmitter and receiver further apart. The CC11xL receiver may experience saturation if it is too close to the other CC11xL transmitting at full output power.

18. References

Please visit www.ti.com and

http://focus.ti.com/docs/toolsw/folders/print/cc11x lemk-433.html

On the kit product page, you will find additional documentation, links to updated software examples and software tools like SmartRF Studio.

You will also find a lot of information on the TI E2E forum at http://e2e.ti.com

We hope that you will enjoy working with the CC110L, CC113L and CC115L devices.

SmartRF™ Studio

1. Download and Install
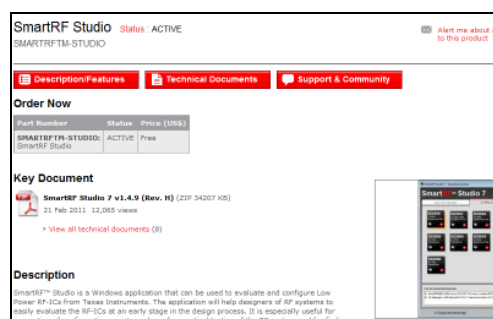
Before connecting SmartRF TrxEB to your PC, download and install SmartRF Studio from www.ti.com/smartrfstudio.

2. Launch SmartRF Studio

After installing the tool, connect the EB to the PC using the USB cable and start SmartRF Studio. Select the "Sub 1 GHz" tab and double click the highlighted device icon (CC110L, CC113L or CC115L).

3. Test the Radio
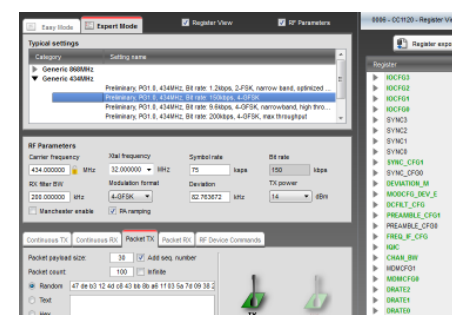
You can now configure the radio, export register settings and run performance tests of the radio.

IMPORTANT NOTICE