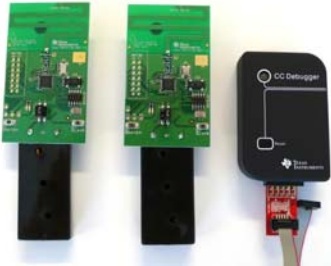


# CC1110 Mini Development Kit 868-915 MHz

## Quick Start Guide

### 1 Kit Contents



- 2 x SmartRFCC1110-868 target boards
- 1 x CC Debugger
- 1 x 10- pin flat cable with 2x5 2.54 mm connector
- 1 x 10-pin flat cable with 2x5 1.27 mm connector
- 1 x Converter board 2.54 mm – 1.27 mm connector
- 1 x Mini USB cable
- Batteries
- CD with Evaluation Version of the IAR EW8051 Documentation

### 2 Running the Preprogrammed Link Test

#### 2.1 Introduction

The CC1110 on the SmartRFCC1110 target board is preprogrammed with a link test which operates at 868.3 MHz, and uses GFSK modulation and a bit rate of 2.4 kbps.

The link test runs a point-to-point communication between a Slave and a Master node based on the SimpliciTI 1.1.0 protocol.

First the Master and Slave nodes must be configured as described in the following sections. The two nodes will then establish a link. When this link is established, the Master starts to periodically send packets to the Slave. Between each transmission, the Master goes to receive mode and waits 250 ms for an acknowledgement packet from the Slave. The Slave node is in receive mode waiting for packets from the Master. For each received packet, the Slave automatically responds with an acknowledgement packet.

#### 2.2 Powering the boards

Place 2 AAA batteries in the battery holders placed on the bottom side of each of the SmartRFCC1110-868 boards. Place the jumper on the power selection connector P1 between pin 1 and pin 2 on each board.



Applying power to the SmartRFCC1110-868 starts the preprogrammed link test on the CC1110 and the two LEDs on the board are on for 1 s.

#### 2.3 Configure the Master Node

Press the S1/MASTER button that is placed on the left hand side of the board. When this button is pushed, the two LEDs on this board will blink rapidly. The Master now waits for a Slave node to establish a link.



Note that the boards only respond to the first button push. To reconfigure the board, the board must be reset, see point 2.9 in this manual.

#### 2.4 Configure the Slave Node

On the other board, press the S2/SLAVE button that is placed on the right side of the board. When the button has been pushed, the two LEDs on this board will blink very slowly until a link with a Master node is established. Note that establishing the link may finish in less than 1 s depending on the environment.



It is important to keep distance (more than 1 meter) between the two nodes when they are trying to establish the link to avoid saturation. This is because full output power (12 dBm) is used for this communication between the nodes.

#### 2.5 The LEDs on the Master Node

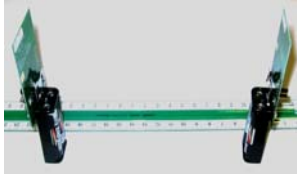
LEDs	State
Both LEDs blink rapidly	The Master is trying to establish a link with a Slave
Green LED on for 0.5 s	The Master has received an ACK to a packet sent, link ok
Red LED on for 0.5 s	The Master has not received an ACK to the last 3 packets sent
Red LED on for 3 s	If the Master does not receive ACKs from the SLAVE in ~70 s, the Master will stop to send packets to save power. Press S1/MASTER to resume the link test
Red LED on for 5 s	For test only: When the link is established, pressing the S2/SLAVE button turns the red LED on for 5 s

#### 2.6 The LEDs on the Slave node

LEDs	State
Both LEDs blink slowly	The Slave is trying to establish a link with a Master
Red LED on continuously	The link between the Slave and Master is established and the Slave is in RX waiting for packets from the Master
Green LED on for 0.5 s while red LED on continuously	The Slave has received a packet from the Master and sent an ACK, link ok

## 2.7 Antenna Performance

The PCB antenna length on the SmartRFCC1110-868 is tuned for optimal performance with two AAA batteries present in the battery holder. As this antenna is directive, see DN024 [www.ti.com/lit/swra227](http://www.ti.com/lit/swra227), it is important to place the two nodes so that the arrow in the silk print next to the antenna on both boards points upwards towards the sky for optimal performance.



## 2.8 Range testing

The preprogrammed link test is well suited for range testing. Place the Slave in an open field and bring the Master a known distance away. Use the LED signaling to decide the link quality.

Note that the environment, antenna, etc greatly affect the range, see DN018 [www.ti.com/lit/swra169](http://www.ti.com/lit/swra169).

## 2.9 Resetting the board

The recommended reset sequence is:

- Remove jumper on P1 completely
- Push one of the buttons to discharge the large capacitor on the power line. If this capacitor is not discharged, the SmartRFCC1110-868 boards may continue to run the current application until the capacitor is discharged. This may take several seconds.
- Replace the jumper on P1 to power the board again

# 3 Using the CC Debugger with the Development Kit

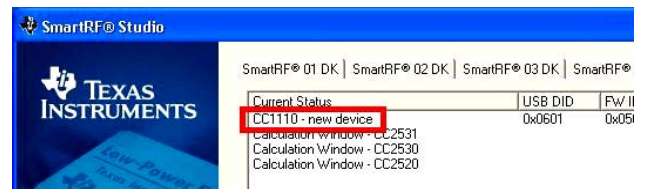
## 3.1 The CC Debugger

The CC Debugger connects to the PC via a mini USB and uses the DEBUG interface to communicate with the radio. The tool can be used for:

- Programming the flash and debugging an application running on the CC1110. The PC tools available for these purposes are the SmartRF Flash Programmer from Texas Instruments and IAR Embedded Workbench for 8051 from IAR Systems.
- Testing the radio performance of CC1110 using SmartRF Studio.

For more details, please refer to the CC Debugger User's Guide [www.ti.com/lit/swru197](http://www.ti.com/lit/swru197) and the CC1110 & CC2510 Mini Development Kit User's Guide [www.ti.com/lit/swru236](http://www.ti.com/lit/swru236).

## 3.2 SmartRF Studio



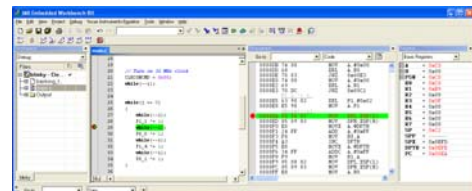
SmartRF Studio can be used for RF testing, evaluation of CC1110 and to find optimal register settings. It is available on [www.ti.com/smartrfstudio](http://www.ti.com/smartrfstudio).

## 3.3 Flash Programmer



The Flash Programmer application, available on the kit web page <http://focus.ti.com/docs/toolsw/folders/print/flash-programmer.html> can be used to program Intel HEX files, read the contents of CC1110 flash, and several other operations.

## 3.4 IAR Embedded Workbench



To develop software, program and debug the CC1110, the IAR Embedded Workbench for 8051 is recommended. An evaluation version of IAR EW8051 is included in the kit. This free evaluation version and 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 and User's Guides

### CC1110 & CC2510 Mini DK Software Example User's Guide and Source Code

Source and documentation for the link test for the SmartRFCC1110 target board [www.ti.com/lit/zip/swrc133](http://www.ti.com/lit/zip/swrc133) and [www.ti.com/lit/swru237](http://www.ti.com/lit/swru237)

### CC1110 & CC2510 Mini Development Kit User's Guide

More documentation and details on the use of the SmartRFCC1110 target board [www.ti.com/lit/swru236](http://www.ti.com/lit/swru236)

### CC1110, CC2510 Basic Software Examples

Source code for other, simple examples for the CC1110 [www.ti.com/lit/zip/swrc117](http://www.ti.com/lit/zip/swrc117)

### SimpliciTI™ Network Protocol

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

## B. More information

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

On the Texas Instruments' Low-Power RF web site [www.ti.com/lprf](http://www.ti.com/lprf), you will find all our latest products, news and events updates, and much more.

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 CC1110 Mini Development Kit and associated Low-Power RF products from Texas Instruments.

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### Products

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DLP® Products	<a href="http://www.dlp.com">www.dlp.com</a>
DSP	<a href="http://dsp.ti.com">dsp.ti.com</a>
Clocks and Timers	<a href="http://www.ti.com/clocks">www.ti.com/clocks</a>
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RFID	<a href="http://www.ti-rfid.com">www.ti-rfid.com</a>
RF/IF and ZigBee® Solutions	<a href="http://www.ti.com/lprf">www.ti.com/lprf</a>

### Applications

Audio	<a href="http://www.ti.com/audio">www.ti.com/audio</a>
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Digital Control	<a href="http://www.ti.com/digitalcontrol">www.ti.com/digitalcontrol</a>
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Military	<a href="http://www.ti.com/military">www.ti.com/military</a>
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