# Test Procedure for the NCS36510GEVK Evaluation Board

Assembly

In order to assemble the boards there are two main components that need to be added to the board.

1. *Assembly standoff:* The purpose behind adding the assembly standoffs is to provide elevation to the evaluation board (EVB) in order to make sure that the bottom of the board does not short with the table on which the board is placed. There are four holes where these standoffs need to be screwed into, as shown in the image below.
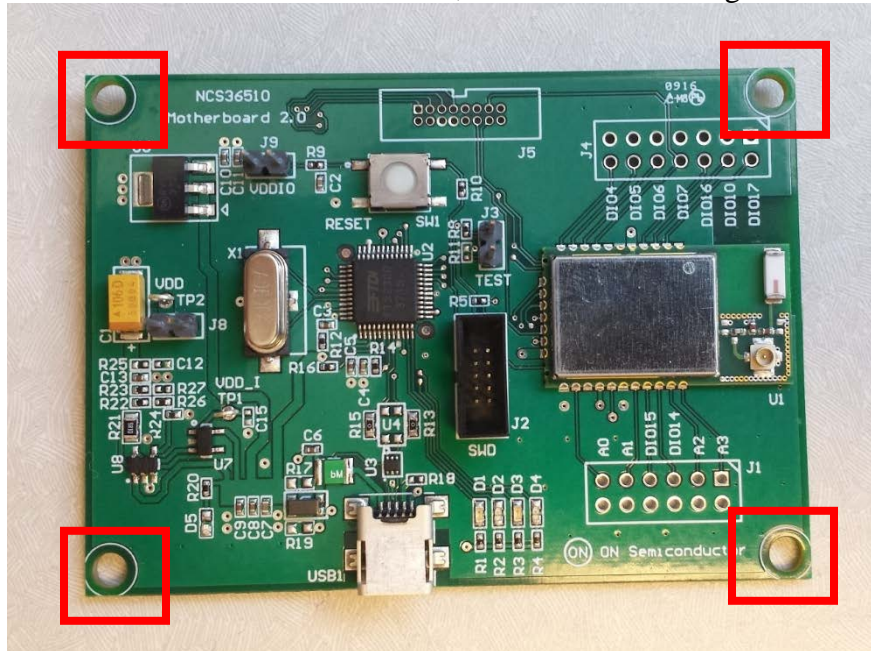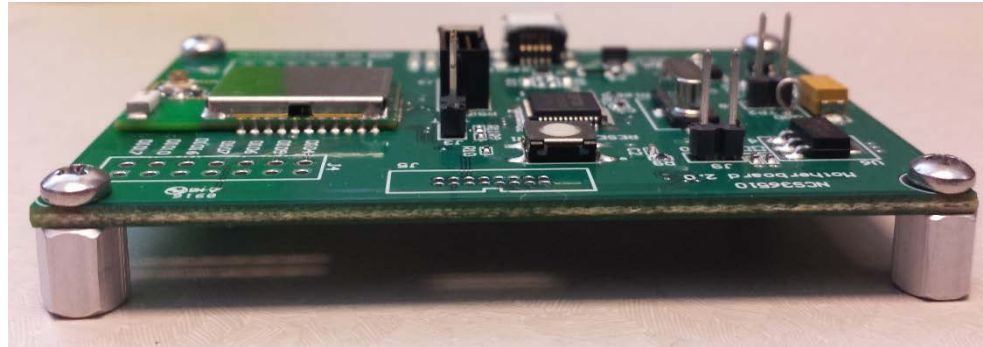

Figure 1: Standoff Assembly Holes.

After the holes have been populated with the screws, tighten the bases onto the screw until they become tight as seen in the images below.
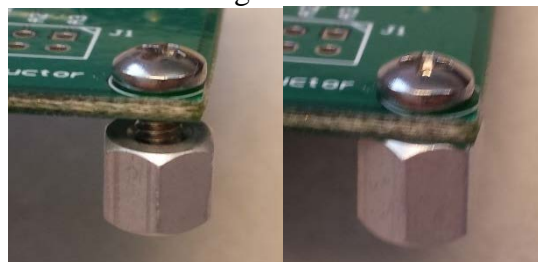

Figure 2: Base Tightened

Repeat this process for all four holes. Once all standoffs are populated, the board should look like the one in the figure shown below.

Figure 3: All four screws tightened.

2. *Adding jumper on headers:* As seen in the image below there are three headers that could potentially hold jumpers. In order to make sure that the board functions all three must be populated.
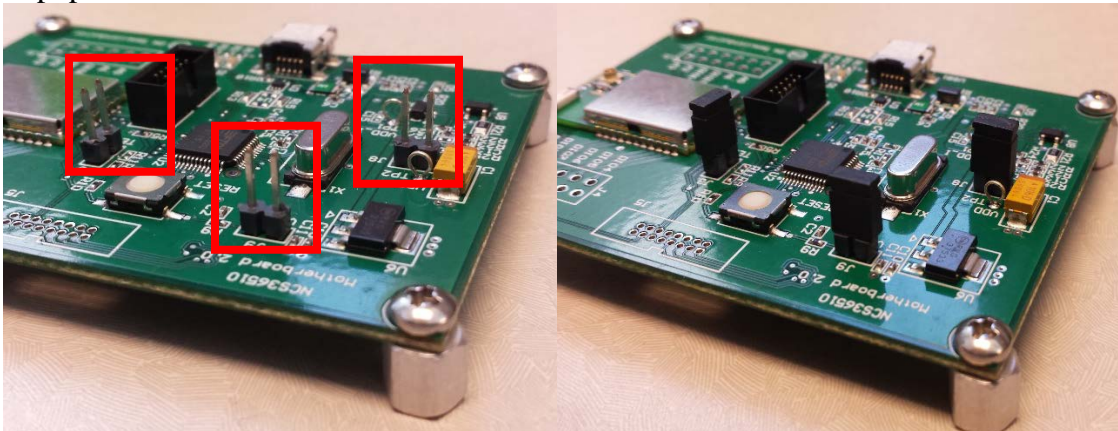
EVB Without Jumpers   **EVB With Jumpers**

Figure 4: Jumper Pins

After populating the jumpers your board should look like the one in the figure above.

Boot up

This involves installing the application required to communicate with the board onto the NCS36510. The following steps will walk you through the process of installing the appropriate application. It is highly encouraged that only one NCS36510 EVB is connected to the computer being used at a time to ensure proper programming.

I. Make sure that the NCS36510 GUI is installed on your computer

II. Go to the installation folder of the NCS36510 GUI, locate "defaultConfig.txt" and change "usertrimshow **false** endusertrimshow" to "usertrimshow **true** endusertrimshow"

III. Connect a NCS36510 board to your computer using the mini-USB port present on the board as shown in the image below.
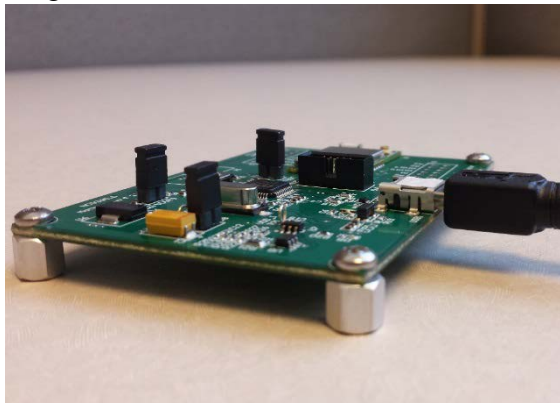

Figure 5: EVB with USB connected.

IV. Start the NCS36510 GUI application by clicking on the desktop icon as shown in the image below.

Figure 6: NCS36510 GUI Icon

V. Upon starting the GUI a "Flash required" error should occur, you should be prompted with the following dialog box.
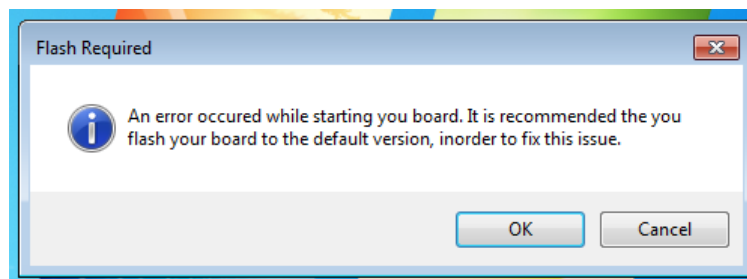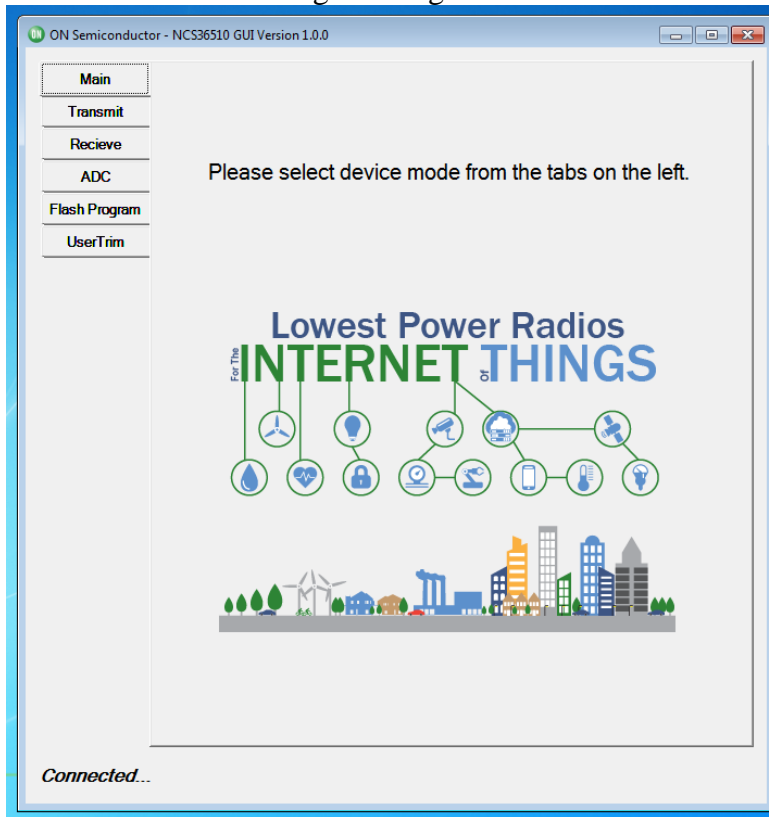

Figure 7: Flash Required Error Example

If this error does not show, the GUI application should start up instead, an example of this is shown in the following figure. At this point skip the following steps and continue onto the section labeled "Flash Programming".

Figure 8: Flash Program Exists

VI. Press the "OK" button in order to continue flashing the board. The following image will be shown the shows the flash is being installed onto the board.
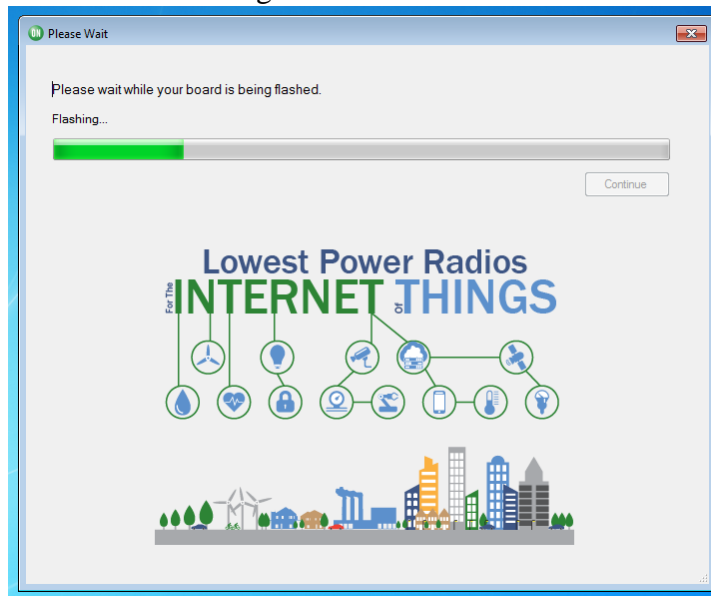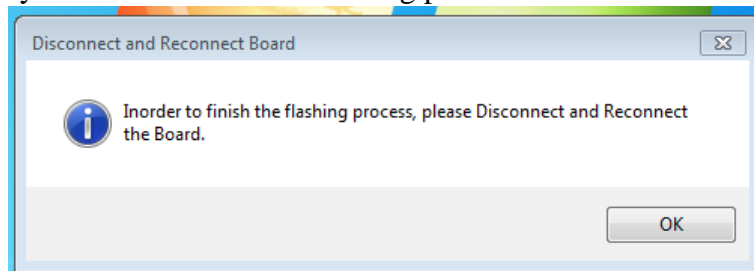

Figure 9: Flashing the board

VII. Once the flashing is finished the continue button should be enabled as shown in the image below.


Figure 10: Flashing Complete

VIII. Press the continue button and you will be prompted to Disconnect and Reconnect the board in order to finish the flashing process. Once you disconnect and reconnect the board, press okay in order to finish the flashing process.

Figure 11: Disconnect and Reconnect

IX. You will now be prompted and told that the flashing process has been successful and that the program will now restart. At this point you are ready to set the flash user trims and do a radio test on the board.
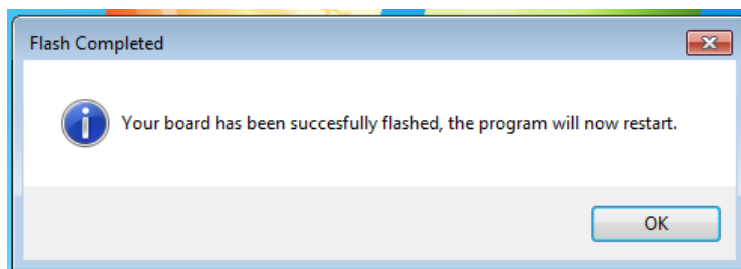
Figure 12: Flashing Successful

Flash Trim

Flash trims are used to set different properties of the oscillator present in the board. While explaining this document the flash trim values that I will be using are as follow:

32K: 00000039

32M: 00000017

RSSI: 0000003D

The following steps walk you through how to set the Flash User Trim.

I. After the boot up process has been finished and the application has been properly flashed. The NCS36510 GUI should open up automatically, refer to figure 8 to see how the Main interface that should pop up after the application has restarted. If it does not then follow step 2 in the "Boot Up" section in order to start the GUI.

Figure 13: NCS36510 Main Interface.

II. Now press the tab labelled "User Trim" on the GUI to get the User Trim page as shown in the image below.
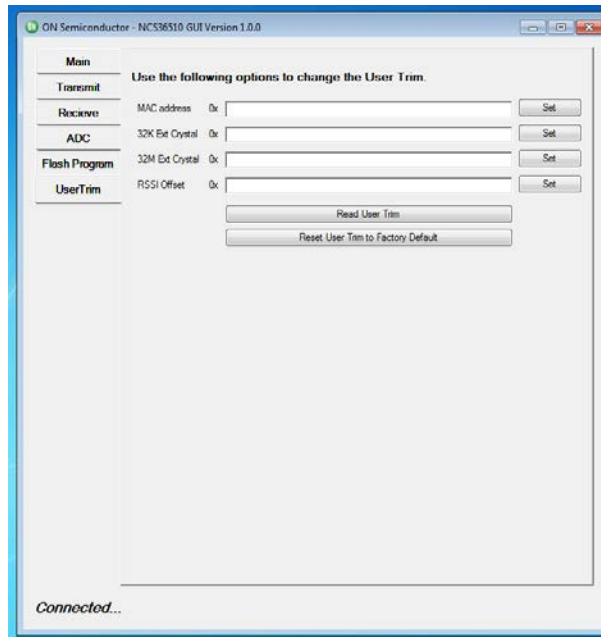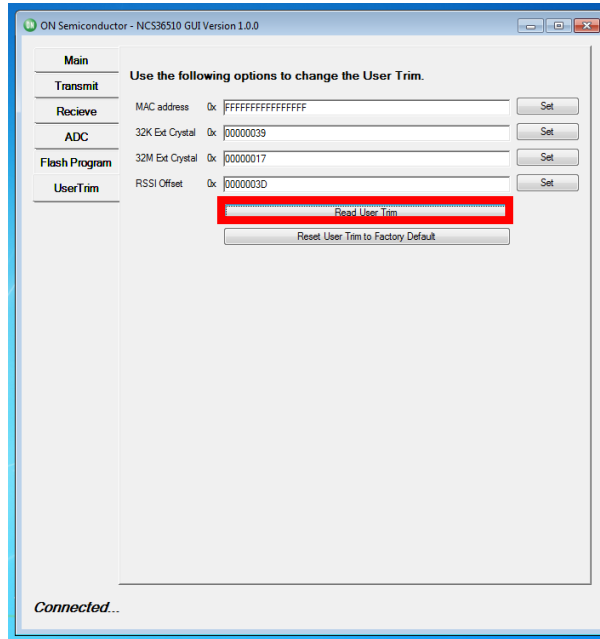

Figure 14: GUI User Trim Page

III. At this page insert the User Trim that you want to set. For the NCS36510 EVB's please use the values mentioned at the beginning of this section. Now your User Trim interface should look similar to the follow figure.

Figure 15: GUI User Trim Values

IV.   At this point press the set buttons corresponding to each value that you want to set and wait till you are prompted by the GUI that these values have been successfully set.

Figure 14: GUI User Trim Set Values

V.   Just to verify that the correct values have been set press the "Read User Trim" button to check what values are present on the NCS36510. The following image displays the expected results for the NCS36510 EVB's.

Figure 16: GUI User Trim read values

As seen in Figure 15 the values that have been read by the GUI are the same values that were set in the previous step. In this way one can confirm the values were set successfully.
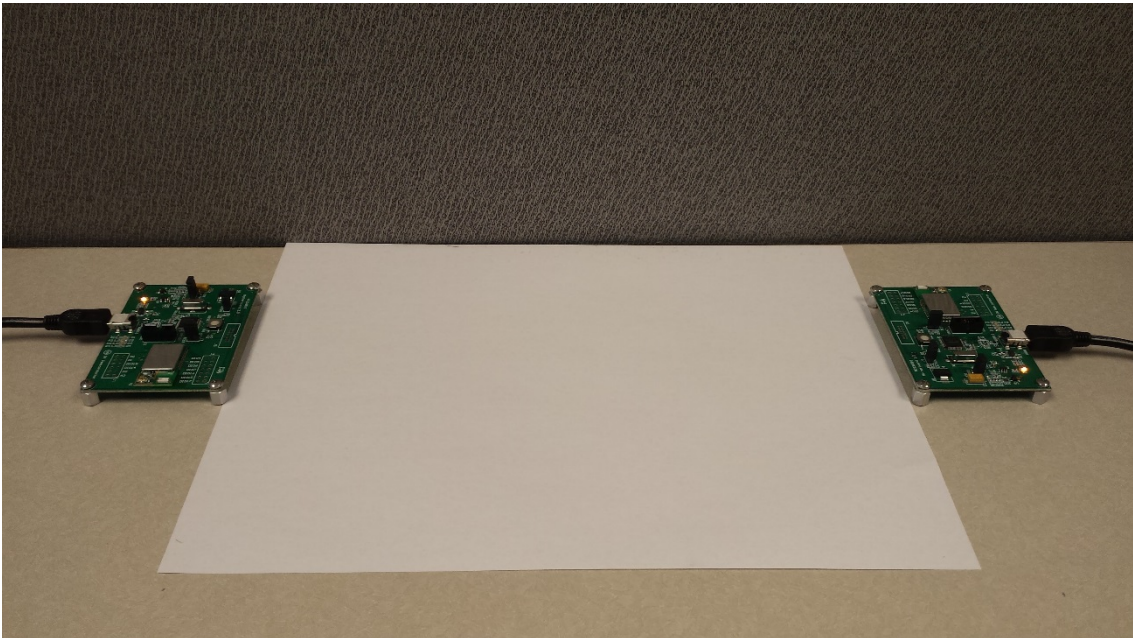
Radio Test

In this phase of the testing we will try to test the transmitting and the receiving capabilities of our board. We will require two boards connected to the system so we can test the transmission and the receiving on both these boards. The following steps highlight the necessary step required in order to carry out the Radio test.

I.   Place the two EVB's connected to a PC at a distance of 11 inches apart, this can be easily achieved by placing the boards on the opposite ends of an 8.5x11 piece of paper. The following image displays the required configuration.


Figure 17: Radio Test Board Configuration

II. After the boards are in the aforementioned configuration, make sure that all other instances of the NCS36510 GUI are closed on the PC that is being used. The next step is to open two independent instances of the GUI. To do this, double click on the icon located on the desktop of the PC being used, the icon is shown in Figure 6. It is important to allow the first instance of the GUI to fully load before initializing the second instance by double clicking on the same icon. At this point two instance of the GUI should be open and connected to one NCS36510 EVB each. The following image provides an example of what the two applications will look like when they are open.
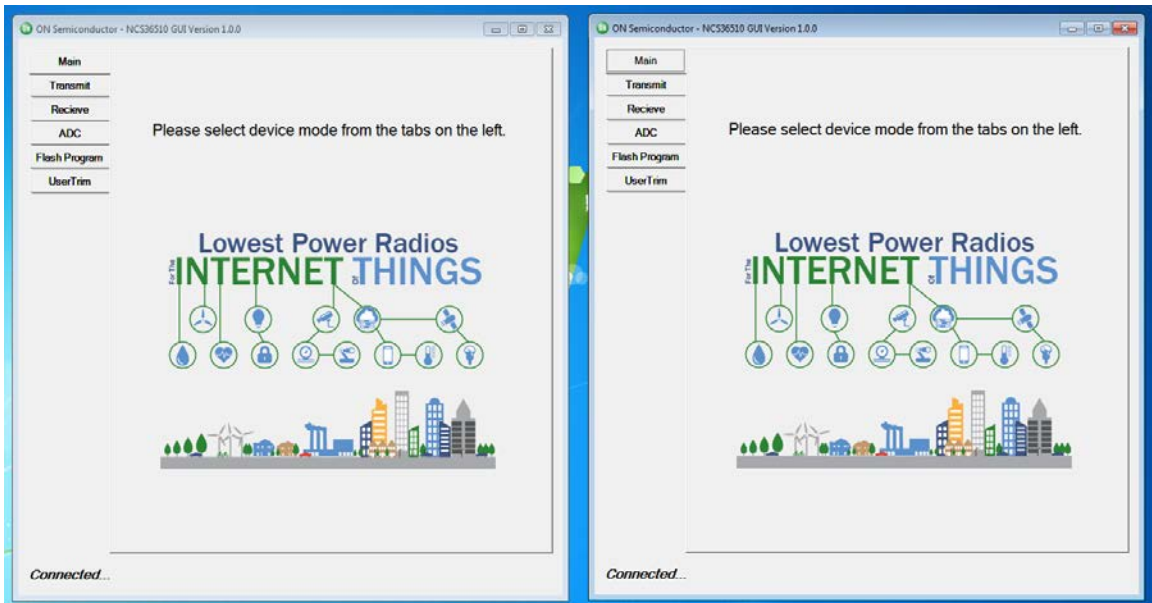
Figure 18: Two GUI Connected to two Boards

III.   Now that two boards are connected to their own respective instance of the NCS36510 GUI one can start testing the functionality of the radio on the NCS36510 EVB. On one instance of the GUI click the "Transmit" tab and on the other instance click the "Receive" tab. The following image displays the expected result of putting the GUI's into this configuration.
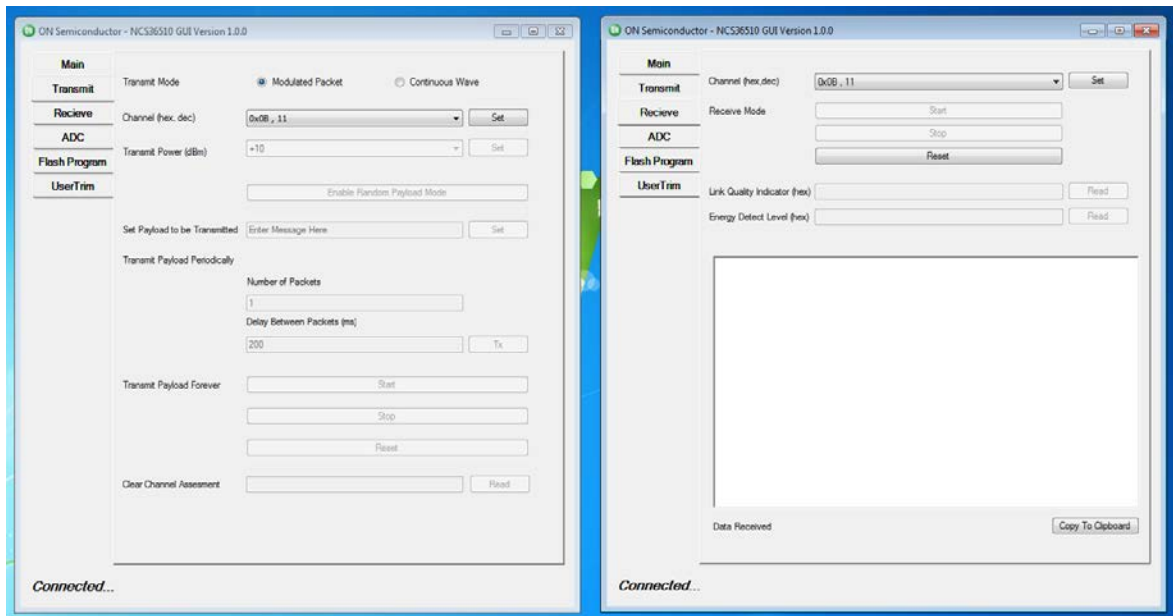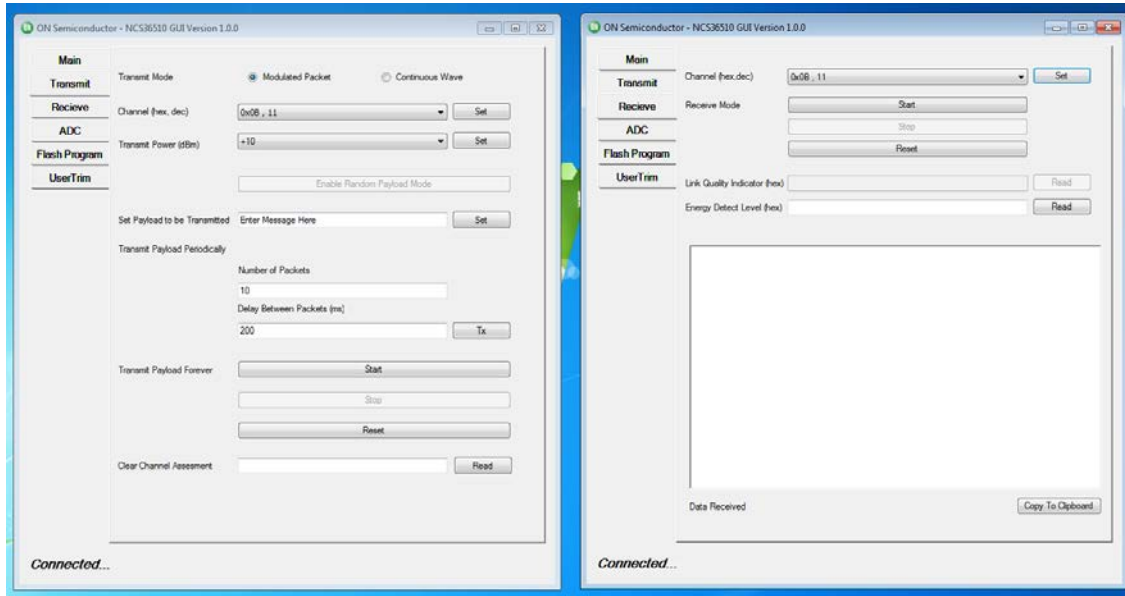

Figure 19: Transmit and Receive GUI Modes

IV.   Use the GUI on the "Transmit" tab to transmit 10 packets to the receiving GUI. Make sure that you do not transmit the packets just yet. Set up the receiving GUI to receive the

packets that are to be transmitted by the transmitting GUI. You can refer to the User manual for the board in order to get more information on how this can be achieved. The following image shows the GUI with the proper configurations to test the transmission from one GUI and to test the receiving on the other GUI.


Figure 20: Transmit and Receive Configuration

V. Once the GUI's have been configured, using the receiving GUI put the board connected to this GUI into receiving mode by pressing the "Start" button. Now transmit the 10 packets that we configured in the last step through the transmitting GUI by pressing the "Tx" button. Make sure that you press the "Start" button on the receive tab before pressing the "Tx" button on the transmit tab. The following image shows the buttons that need to be pressed in this step.
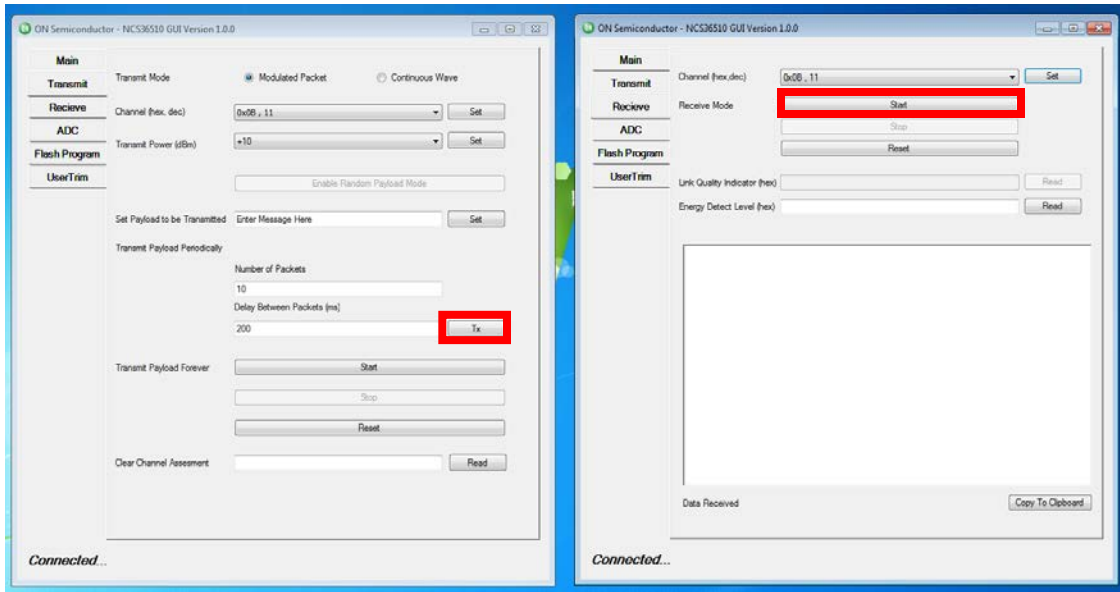
Figure 21: Transmit "Tx" button. Receive "Start" button

VI.   Now you should see that ten packets of data got transmitted from the transmit GUI to the receive GUI. The following image shows the result of this initial test.
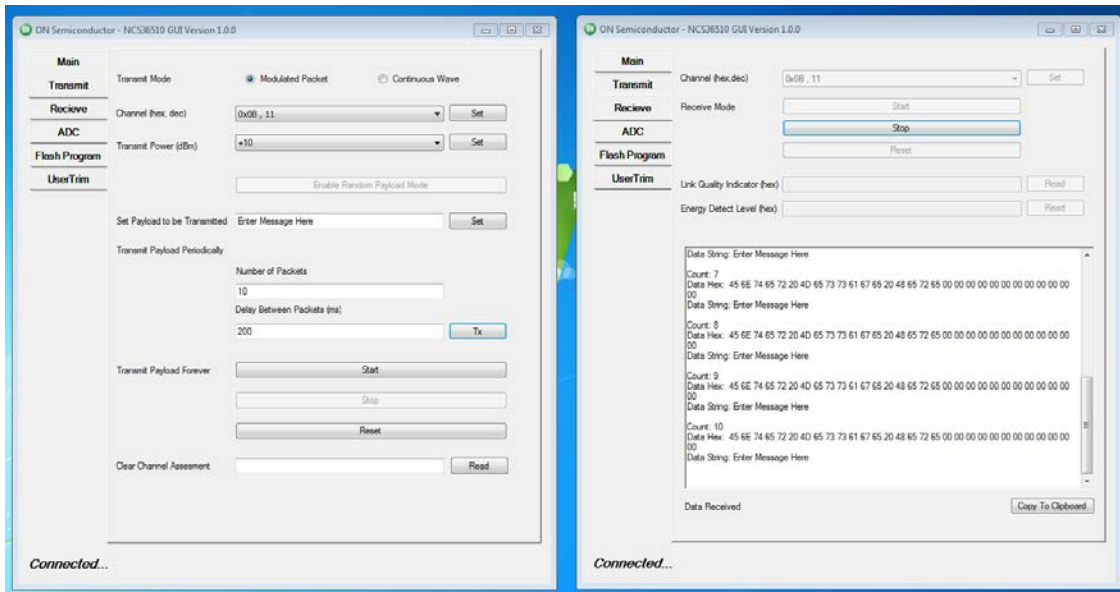
Figure 22: Ten Packets Received

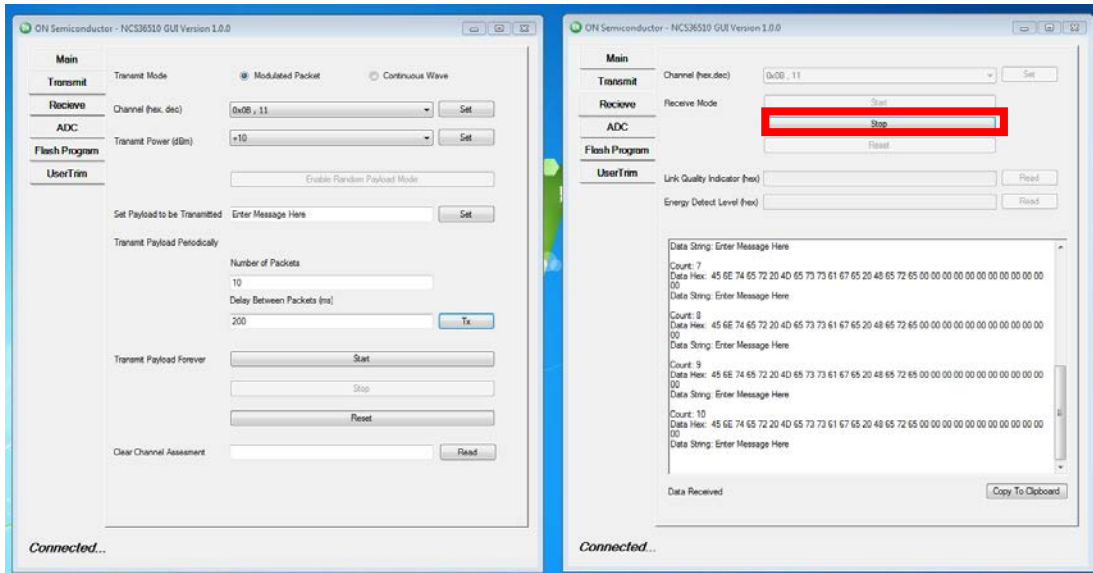VII.   To further test the receive functionality press the "Stop button" as shown by the image below.

Figure 23: Stop Receive Mode

VIII.   After pressing the "Stop button", press the Link Quality Indicator "Read" button in order to further test the quality of the connection between the transmitting and the receiving board. Make sure that the value is above 0x70 (hex) or 112 (decimal). (This needs to be more clearly defined. We will need to do this on a set of boards to enable us to provide more information on the expected range. This will be a range due to process variation so having one falue isn't sufficient.) The following image shows the "Read" button and the corresponding value that we get after pressing this button for the connections quality.
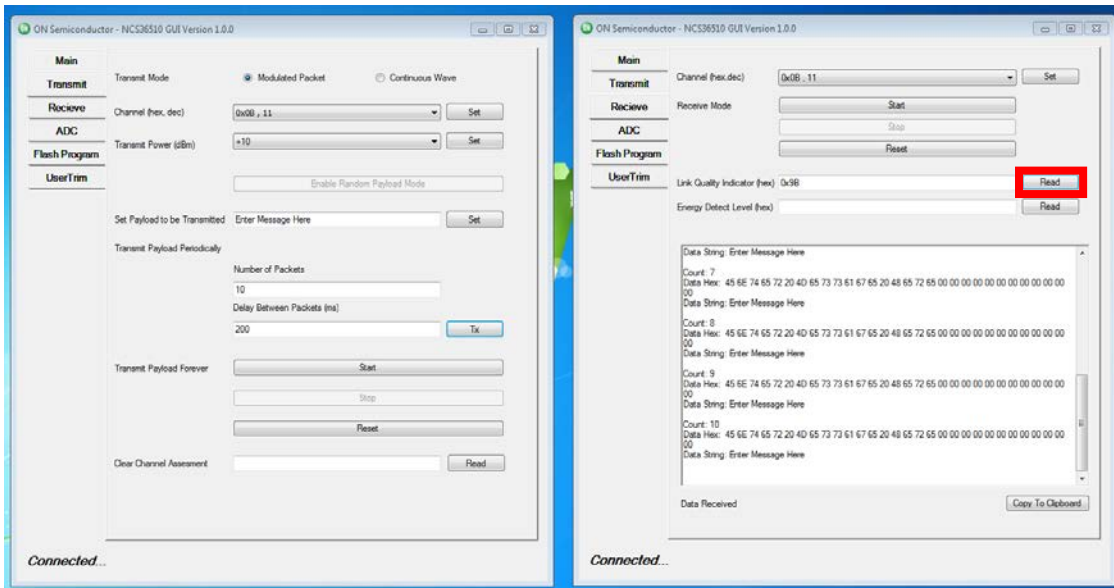

Figure 24: Link Quality Indicator.

At this point, the functional testing is complete. However at this point each board previously tested must be checked for its opposite functionality (i.e. the transmitting board must be tested for its receiving functionality and the receiving board must be tested for its transmitting functionality). To do this repeat step 1 in this section and ensure each board is being tested for the proper functionality.
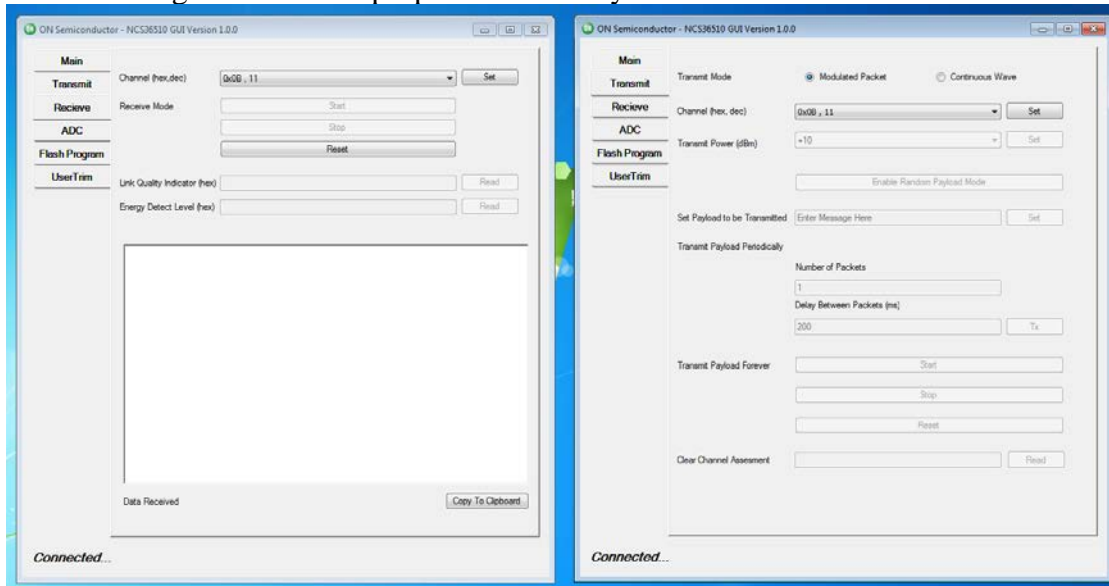
Figure 25: Receive and Transmit Testing

IX.   Make sure that you have tested both boards for their receiving and transmitting capabilities using the above mentioned steps. Once finished with the Radio Testing the board has been successfully tested.

Flash Programming

Note: It is recommended that you **only connect one board** while using the Flash functionality in order to avoid issues while flashing your board.

I. Select the "Flash Program" tab as shown in Figure 2, the "Flash Program" page will look as follows:
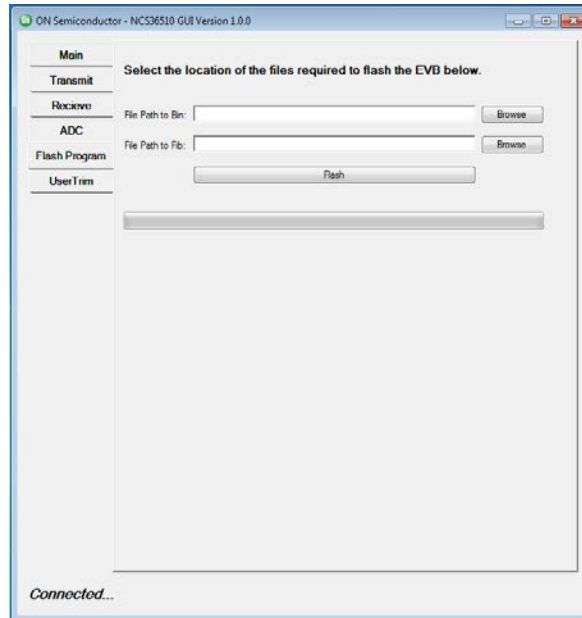

Figure 24: GUI-Flash Program-Interface

II. **On this page the GUI provides the user the capability to flash an application to the connected board. Press the "Browse" button next to the "File Path to Bin" and navigate to the desired binary file. This binary file should have an extension type of ".bin". If an invalid file is selected the user will be prompted with an error.**

III. **Press the "Browse" button next to the "File Path to Fib" and navigate to the fib file corresponding to the desired binary file. This fib file should have an extension type of ".txt". There is a specific pattern that the contents of the fib file need to follow in order to make ensure that the application is flashed properly.**

IV. **Press the "Flash" button and wait for the installation process to conclude. Once the process has concluded the following pop up should occur.**
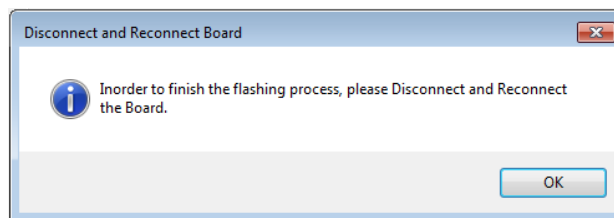

Figure 25: GUI-Flash Program-Power Cycle Board Popup

V. **Disconnect the USB cable used to connect the board with the computer and then reconnect the board. This is an important step to ensure proper functionality of**

both the hardware and software. Once this is complete press the "OK" button and wait for the following pop up to occur.
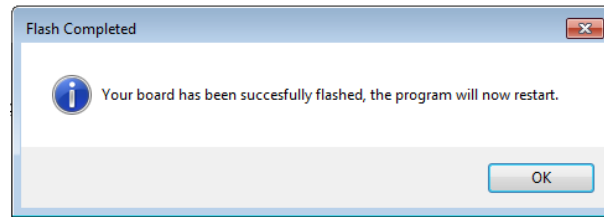

Figure 26: GUI-Flash Program-Successful

VI.   **Press the "OK' button and the GUI will restart automatically.**

Note: If after step V the program prompts you that the flash was unsuccessful, follow the instruction on the screen in order to re-flash the board to a default version which should allow you to continue using the system normally. The flashing of an application is usually unsuccessful if the fib file that is selected is either incorrect or has an incorrect argument value in it. Try to solve the problem by selecting a valid fib file or correcting the data in the selected fib file. If the problem persists contact the sales.

Kit Contents

The purpose of this section is to provide a checklist on what to provide in each NCS36510 EVK. A list is provided below.

1) NCS36510 evaluation boards assembled and tested (Quantity 2)
2) USB cables (Quantity 2)