

## Channel Validation

Date Completed: \_\_\_\_\_

Performed by: \_\_\_\_\_

### Tested Specifications:

Test #	Engineering Specification	Description	Requirement
T4	ES5	Number of Available Channels	>15

### Revision History:

Revision	Description	Date
1	Document Created	12/9/2010
2	Document Updated	1/6/2011

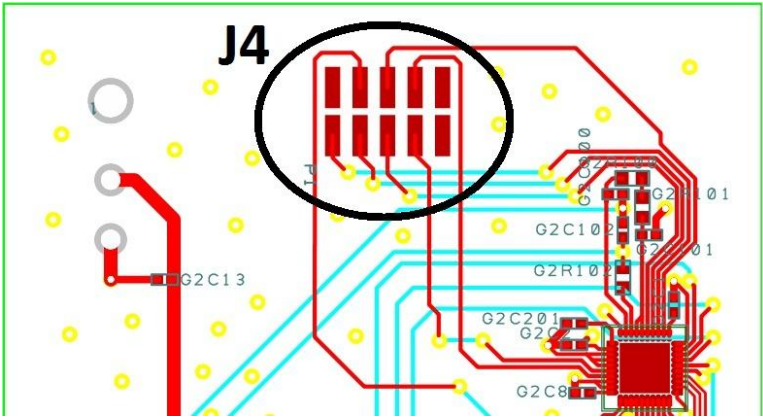

### Equipment Needed:




Name of Equipment	Accuracy
6 Communication Boards	-
6 PCs with SmartRF Studio Previously Installed	-
6 CC Debuggers	-

**Resources Needed:**

Resource	Comment
SmartRF Studio 7	-
Custom Script	The script compares the received data (Hex format exported from SmartRF Studio 7) with the original transmitted data, and calculates the Bit Error Rate and Data Rate of the connection.
Space for 6 PCs and communication boards.	All six antennas should be in Line of Sight of each other.

**Test Procedure:**

Step #	Check Off	Procedure
1		Place a communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 1 for the rest of the Test Procedure.
2		Place a PC by the communication board and turn it on.
3		Connect the CC Debugger to a USB port of the PC using a USB cable.
4		<p>Plug the programming connector from the CC Debugger to J4 on the communication board.</p> 
5		<p>Open SmartRF Studio 7 on the PC.</p> 

6		<p>Double click on the connected device to open the device control panel.</p> 
7		<p>Click on the Expert Mode on the top of the screen.</p> 
8		<p>Click on Packet Tx on the top of the screen.</p> 
9		<p>Fill in the Fields according to Figure 1.</p>

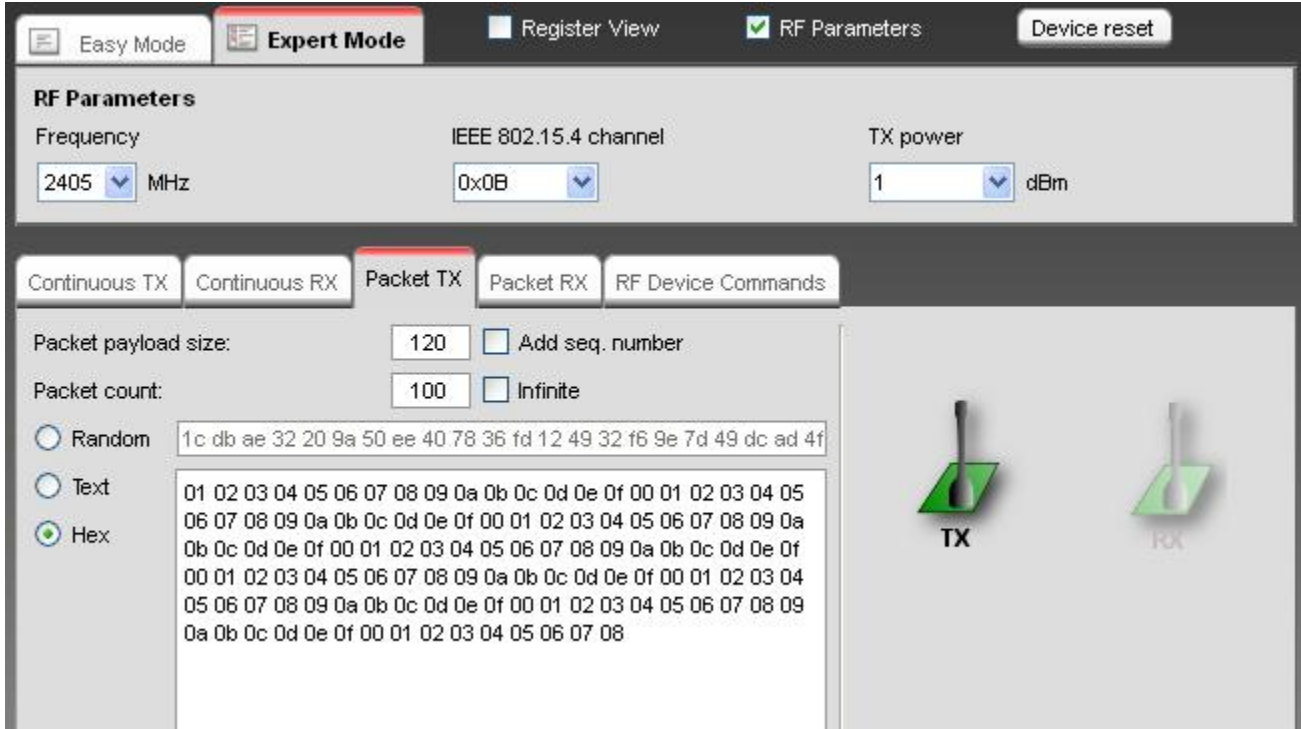
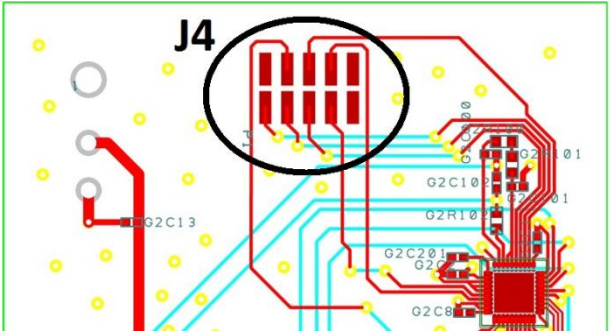


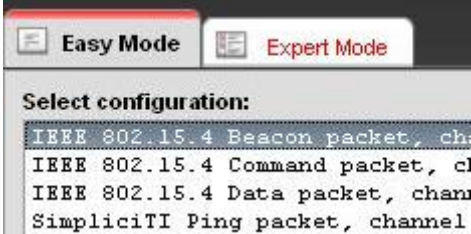
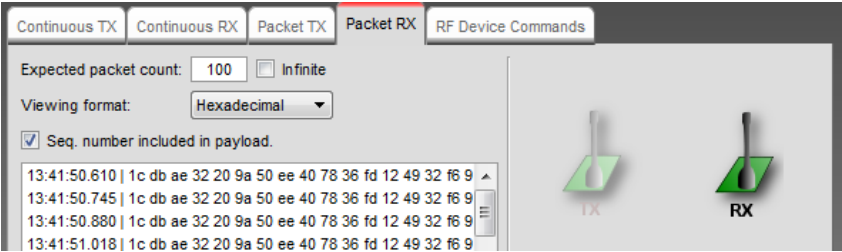




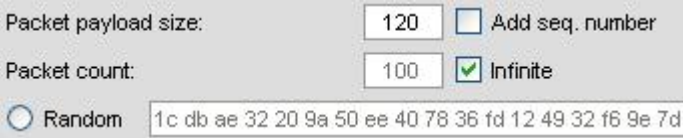



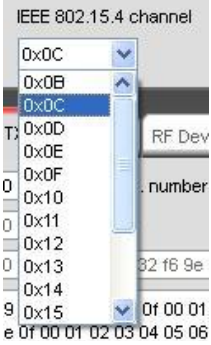

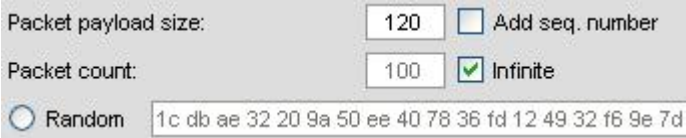





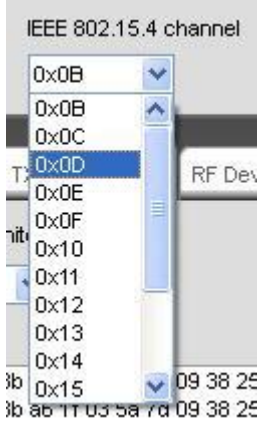
Figure 1 - Configuration Settings for Transmission on Channel 0x0B

10		Place a second communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 2 for the rest of the test procedure.
11		Place a PC by the communication board and turn it on.
12		Connect the CC Debugger to a USB port of the PC using a USB cable.
13		<p>Plug the programming connector from the CC Debugger to J4 on the communication board.</p> 
14		<p>Open SmartRF Studio 7 on the PC.</p> 
15		<p>Double click on the connected device to open the device control panel.</p> 
16		<p>Click on the Expert Mode on the top of the screen.</p> 

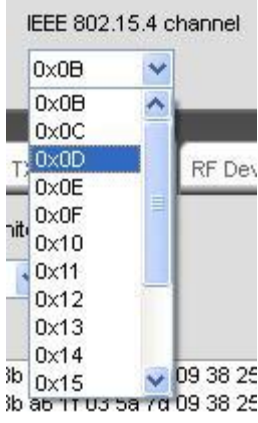
17		<p>Click on Packet Rx on the top of the screen.</p> 
18		<p>Fill in an appropriate name for the test in the field at the bottom of the screen. Record or copy this name.</p> 
19		<p>Click on the start button at the bottom right of the screen on the PC with Board 2 to start receiving data.</p> 
20		<p>Click the start button at the bottom right of the screen on the PC with Board 1 to start the transmission of data.</p> 
21		<p>Wait until the receive computer has received 100 packets successfully.</p> 
22		<p>Open up the custom script and input the path corresponding to the name of the text file for the executed test (as inputted in Step 18).</p>

23		Record the calculated BER and Data Rate from the script in the Measured Results table under Channel 0x0B.
24		<p>Change the packet count on Board 1 from from 100 to Infinite by checking the box.</p> 
25		<p>Click the start button at the bottom right of the screen on the PC with Board 1 to start the transmission of data.</p> 
26		<p>Change the Expected Packet Count on Board 2 to Infinite by checking the box.</p> 
27		<p>Click on the start button at the bottom right of the screen on the PC with Board 2 to start receiving data.</p> 
28		Place a third communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 3 for the rest of the Test Procedure.
29		Follow steps 2 through 8 with Board 3.
30		Fill in the Fields according to Figure 1 except change the IEEE 802.15.4 channel to 0x0C.

		
31		Place a fourth communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 4 for the rest of the test procedure.
32		Follow steps 11 through 18 with Board 4.
33		Change the IEEE 802.15.4 channel to 0x0C. 
34		Follow steps 19 through 24 with Board 3 and Board 4 except fill in the BER and Data Rate under Channel 0x0C in the Measured Results Table.
35		Change the packet count on Board 3 from from 100 to Infinite by checking the box. 
36		Click the start button at the bottom right of the screen on the PC with Board 3 to start the transmission of data. 

37		<p>Change the Expected Packet Count on Board 4 to Infinite by checking the box.</p> 
38		<p>Click on the start button at the bottom right of the screen on the PC with Board 2 to start receiving data.</p> 
39		<p>Place a fifth communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 5 for the rest of the test procedure.</p>
40		<p>Follow steps 2 through 8 with Board 3.</p>
41		<p>Fill in the Fields according to Figure 1 except change the IEEE 802.15.4 channel to 0x0D.</p> 
42		<p>Place a sixth communication board upon a static free surface at least two feet off the ground. Orientate the antenna vertically. This board will be considered Board 6 for the rest of the test procedure.</p>
43		<p>Follow steps 11 through 18 with Board 6.</p>
44		<p>Change the IEEE 802.15.4 channel to 0x0D.</p>



		 <p>The screenshot shows a software interface for selecting an IEEE 802.15.4 channel. A dropdown menu is open, displaying a list of hexadecimal channel identifiers from 0x0B to 0x15. The channel 0x0D is currently selected and highlighted in blue. The text 'IEEE 802.15.4 channel' is visible at the top of the menu. To the right of the menu, the text 'RF Dev' is partially visible.</p>
45		<p>Follow steps 19 through 24 with Board 3 and Board 4 except fill in the BER and Data Rate under Channel 0x0D in the Measured Results Table.</p>
46		<p>Repeat steps 41, 44, and 45 with Channels 0x0E through 0x1A and record the BER and Data Rate in the Measured Results Table.</p>

**Measured Results Table:**

<b>Channel Number</b>	<b>Recorded BER (%)</b>	<b>Passable BER (%)</b>	<b>Recorded Data Rate (kbps)</b>	<b>Passable Data Rate (kbps)</b>	<b>Pass/Fail</b>
0x0B		< 0.12		>40	
0x0C		< 0.12		>40	
0x0D		< 0.12		>40	
0x0E		< 0.12		>40	
0x0F		< 0.12		>40	
0x10		< 0.12		>40	
0x11		< 0.12		>40	
0x12		< 0.12		>40	
0x13		< 0.12		>40	
0x14		< 0.12		>40	
0x15		< 0.12		>40	
0x16		< 0.12		>40	
0x17		< 0.12		>40	
0x18		< 0.12		>40	
0x19		< 0.12		>40	
0x1A		< 0.12		>40	

**Comments and Calculations:**

**Sign off on section completion:** \_\_\_\_\_

**Date of Sign Off:** \_\_\_\_\_