AN214868

Transmit and Receive Testing Using the BlueTool Utility

Associated Part Family: CYW20734

This application note describes the basic hardware and software setup needed to conduct transmit and receive tests using a CYW20734-based reference board. It includes procedures to set the CYW20734 in Transmit and Receive modes as required when measuring emissions for FCC compliance.

1 About This Document

1.1 Audience

This document was created for hardware designers and test engineers who are designing and testing devices and systems that include the CYW20734. This document assumes the reader is familiar with Cypress BlueTool™ software and CYW20734-based reference boards.

1.2 Acronyms and Abbreviations

In most cases, acronyms and abbreviations are defined on first use.

Acronyms and abbreviations in this document are also defined in “Acronyms and Abbreviations” on page 13.

1.3 Document Conventions

The information in this document applies to both of the CYW20734 evaluation boards. For the sake of simplicity, we will refer to these boards generically as the CYW20734 reference board.

1.4 Cypress part numbering scheme

Cypress is converting the acquired IoT part numbers from Broadcom to the Cypress part numbering scheme. Due to this conversion, there is no change in form, fit, or function as a result of offering the device with Cypress part number marking. The table provides Cypress ordering part number that matches an existing IoT part number.

Table 1. Mapping Table for Part Number between Broadcom and Cypress

Broadcom Part Number	Cypress Part Number
BCM20734	CYW20734

1.5 About the CYW20734

The CYW20734 is a Bluetooth Core Specification version 4.0-compliant device designed for use in standard HCI UART applications. It features a complete, lower-layer Bluetooth protocol stack. The CYW20734 is intended for applications in wireless input devices, such as game controllers, keyboards, and joysticks. Built-in firmware adheres to the Bluetooth Human Interface Device (HID) profile and Bluetooth Device ID profile specifications.

2 IoT Resources

Cypress provides a wealth of data at http://www.cypress.com/internet-things-iot to help you to select the right IoT device for your design, and quickly and effectively integrate the device into your design. Cypress provides customer access to a wide range of information, including technical documentation, schematic diagrams, product bill of materials, PCB layout information, and software updates. Customers can acquire technical documentation and software from the Cypress Support Community website (http://community.cypress.com/).

3 Hardware and Software Requirements

The following equipment and software are required to successfully complete the tasks described in this document:

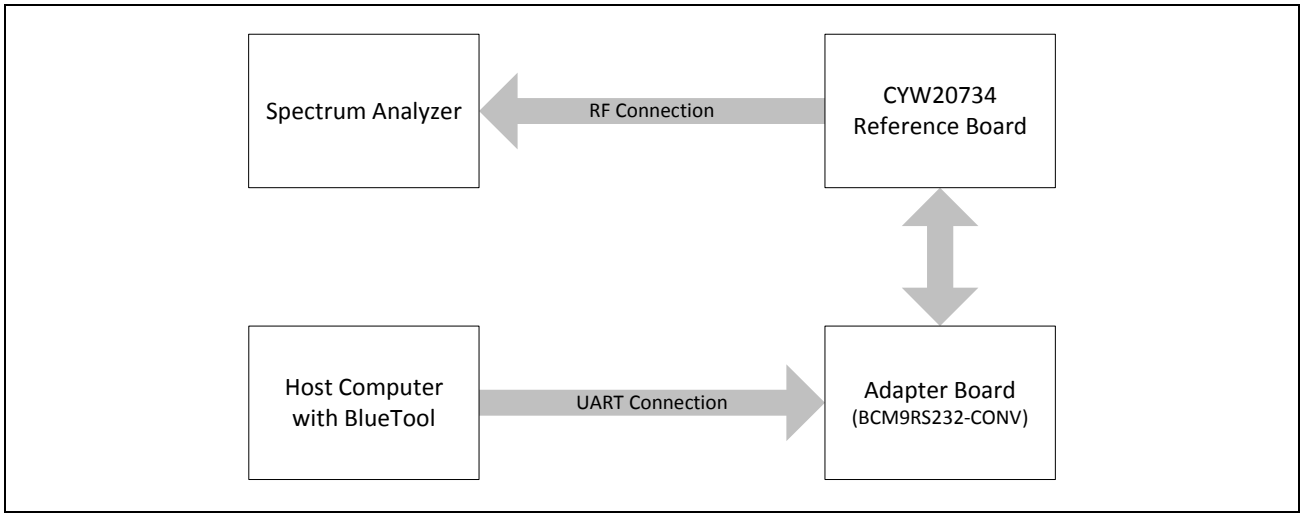
- CYW20734-based reference board
- BCM9RS232-CONV UART adapter board
- Personal computer
- Spectrum analyzer, such as the Agilent ESA-E Series
- Miscellaneous serial and coax cables for connecting the hardware
- BlueTool software

3.1 Hardware Setup

1. Connect the device under test (the CYW20734 reference board) to the serial adapter board (BCM9RS232-CONV) with a 6-wire cable (see Figure 1).
2. Connect the serial adapter board to the PC using a serial cable.
3. Power up the serial adapter board.
4. Connect the CYW20734 reference board to the spectrum analyzer using an SMA coaxial cable.

You are now ready to begin testing. See BlueTool Setup on page 2 for BlueTool configuration details.

Figure 1. Hardware Setup



3.2 BlueTool Setup

BlueTool has an integrated Perl module that provides an interface to automate the use of Perl scripts.

ActivePerl 5.8.4 (or newer) must be installed before the BlueTool application is installed. Click the link below to get a free download of ActivePerl:

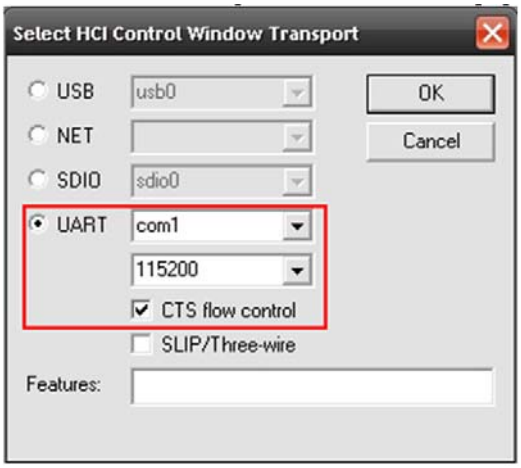
www.activestate.com/activeperl/

Follow the steps below to set up BlueTool for receive/transmit testing.

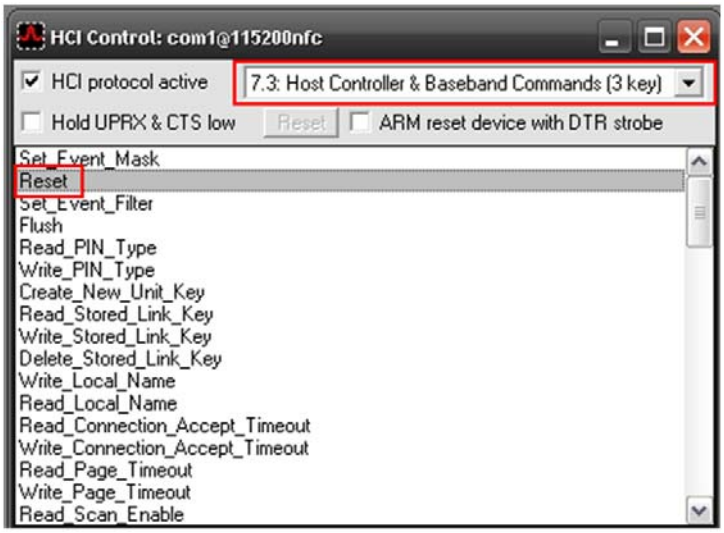
1. Start the BlueTool application. In the **View** menu, select **Log Window** to open the BlueTool Log Window.



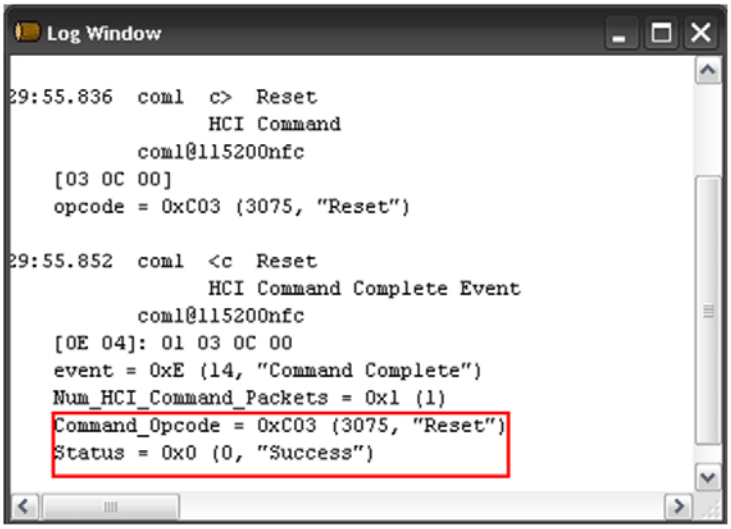
2. In the **Transport** menu, select **HCI Control** to open the Select HCI Control Window Transport window, then set the following options:
   a. Select the **UART** option.
   b. Select **com1** for the COM port.
   c. Set the baud rate to 115200.
   d. Select **CTS flow control**.
   e. Click **OK** to save the option settings.



3. After clicking OK to save the UART option, an HCI Control command window will open. Select **7.3: Host Controller & Baseband Commands (3 key)** from the command list, then double-click the **Reset** command.



4. After double-clicking the **Reset** command, the log window should indicate Success for the reset status.



BlueTool is now set for receive/transmit testing. Three tests are described in the following sections:

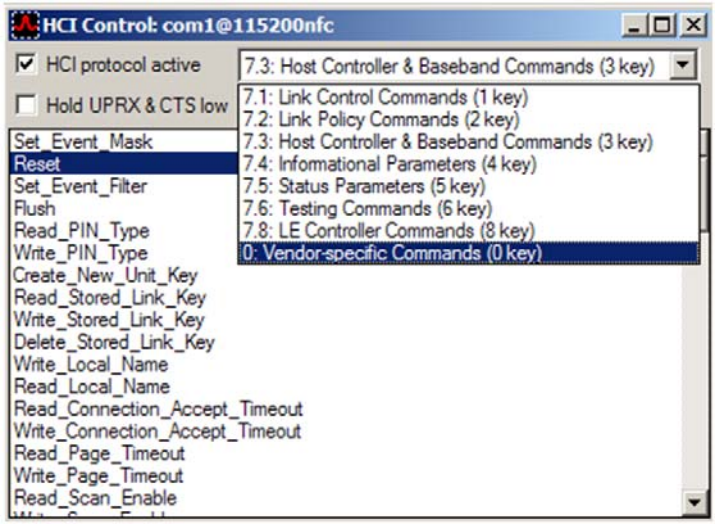
- Receive Testing
- Single-Frequency Transmit Testing
- Frequency-Hopping Transmit Testing

4 Receive Testing

Follow the steps below to set the CYW20734 reference board in Receive mode for receive testing.

Note: You must complete all the steps in Hardware Setup on page 2 and BlueTool Setup on page 2 before startBing this procedure.

1. In the HCI Control window, select **0: Vendor specific Command (0 Key)** from the command list.



2. In the HCI Control window, double-click the **Write_Receive_Only** command to open the HCI Command: Write_Receive_Only window (you may have to scroll down to find this command).
3. In the HCI Command: Write_Receive_Only window, enter the appropriate frequency in the **Receive_Frequency** field (2042 MHz for low channel, 2441 MHz for mid-channel, and 2480 MHz for high channel), then click **OK**.



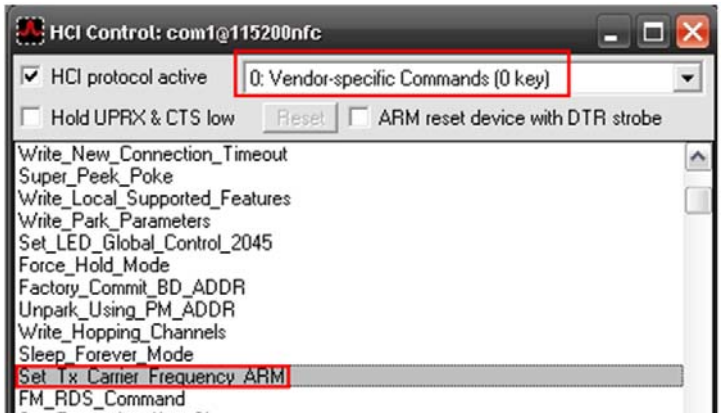
4. To verify the results, check the BlueTool Log Window to verify the parameters were set correctly and the response **Receive_Frequency** is the same as the frequency set in Step 3 above.

5 Single-Frequency Transmit Testing

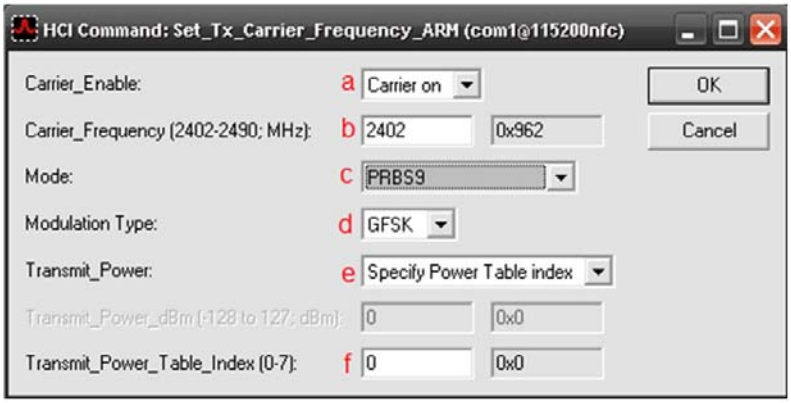
Follow the steps below to set the CYW20734 reference board in Transmit mode for single-frequency testing.

Note: You must complete all the steps in Hardware Setup on page 2 and BlueTool Setup on page 2 before starting this procedure.

1. In the HCI Control window, select **0: Vendor-specific Command (0 Key)** from the command list, then double-click the **Set_Tx_Carrier_Frequency_ARM** command to set the CYW20734 reference board in Transmit mode and open the HCI Control: Set_Tx_Carrier_Frequency_ARM window.



2. Select the following options in the HCI Control: Set_Tx_Carrier_Frequency_ARM window:
   a. **Carrier Enable**: Select **Carrier on**.
   b. **Carrier Frequency**: Enter the appropriate carrier frequency in this field (low channel = 2402 MHz, mid channel = 2441 MHz, high channel = 2480 MHz)
   c. **Mode**: select **PRBS9**.
   d. **Modulation Type**: Select **GFSK** to test a single-frequency channel in ACL basic mode or **8PSK** to test a single-frequency channel in ACL EDR modulation mode.
   e. **Transmit Power**: Select **Specify Power Table Index**.
   f. **Transmit Power Table Index**: Enter zero in this field.



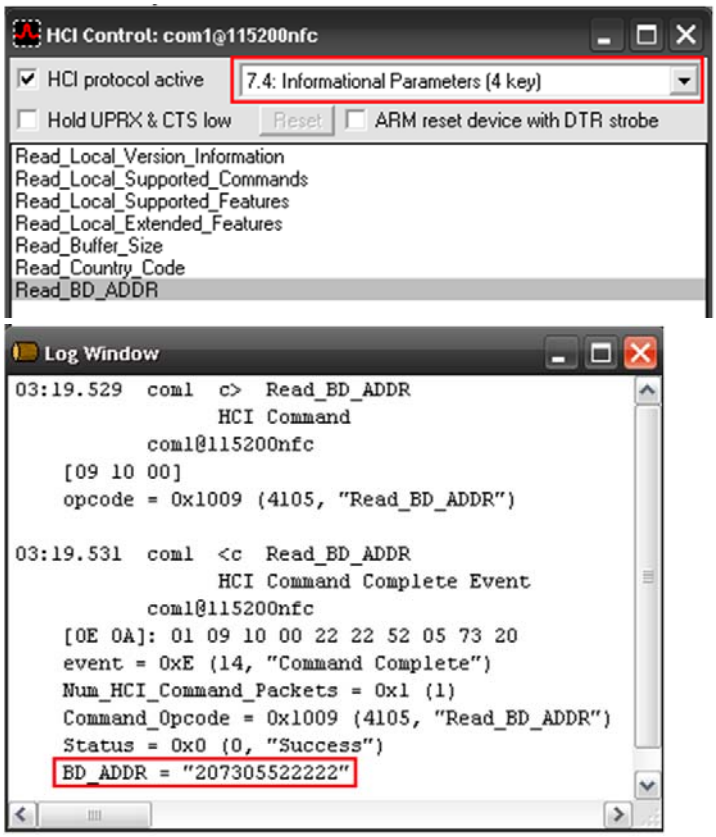
3. Click **OK**. BlueTool should now be set to measure transmit spurs. Check the BlueTool Log Window to verify the parameters were set correctly and the response transmit frequency is the same as the **Carrier_Frequency** set in Step 2 above.

6 Frequency-Hopping Transmit Testing

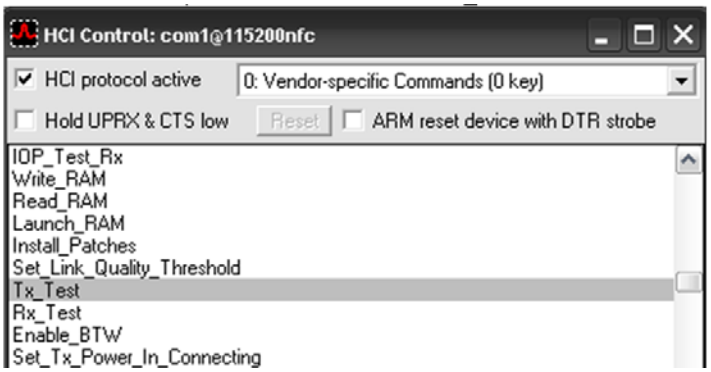
Follow the steps below to set the CYW20734 reference board in Transmit mode for frequency-hopping testing.

Note: You must complete all the steps in Hardware Setup on page 2 and BlueTool Setup on page 2 before starting this procedure.

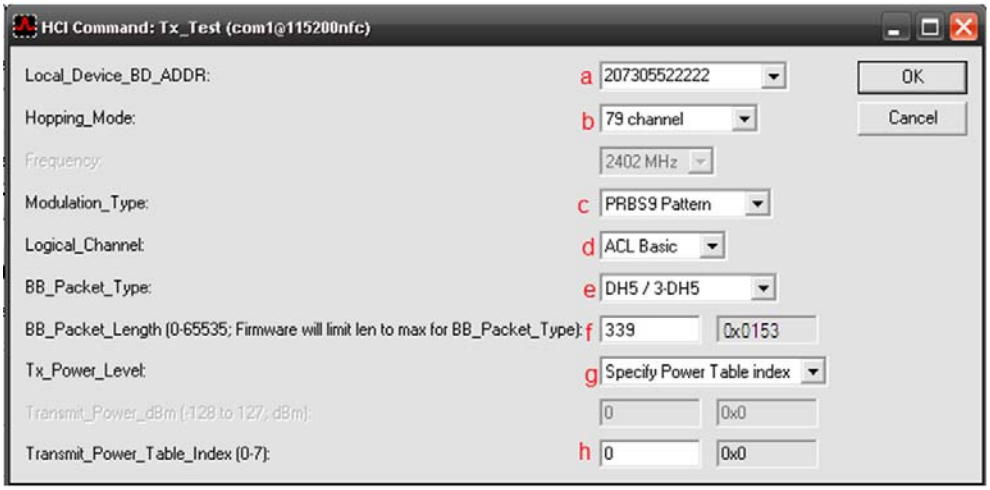
1. In the HCI Control window, select **74: Information Parameters (4 Key)** from the command list, then double-click the **Read_BD_ADDR** command. Record the board address shown in the Log Window.



2. In the HCI Control window, select **0: Vendor-specific Command (0 Key)** from the command list, then double-click the **TX_Test** command to open the HCI Command: Tx_Test window.



3. Set the following options in the HCI Command: Tx_Test window:
   a. **Local_Device_BD_ADDR**: Make sure this board address matches the board address recorded in Step 1 on page 7.
   b. **Hopping_Mode**: Select **79 channel**.
   c. **Modulation_Type**: Select **PRBS9 Pattern**.
   d. **Logical_channel**: Select **ACL Basic** to test hopping channels in GFSK mode or **ACL EDR** to test hopping channels in 8PSK modulation mode.
   e. **BB_Packet_type**: Select **DH5/3-DH5**.
   f. **BB_Packet_Length**: Enter **339** for ACL Basic or **1021** for ACL EDR.
   g. **Tx_Power_Level**: Select **Specify Power Table index**.
   h. **Transmit_Power_Table_Index**: Enter zero in this field.



4. Click **OK** to perform the frequency-hopping test.

Document History Page

Document Title: AN214868 - Transmit and Receive Testing Using the BlueTool Utility Document Number: 002-14868				
Rev.	**ECN No.**	**Orig. of Change**	**Submission Date**	**Description of Change**
**	-	-	09/18/2014	20734-AN200-R Initial release
*A	5449235	UTSV	09/29/2016	Updated in Cypress template Added Cypress part numbering scheme
*B	5834940	BENV	07/27/2017	Updated logo and copyright

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