

Enabling the CYW20704 for Transmit and Receive Testing

Associated Part Family: CYW20704

This document describes the procedures using BlueTool™ software to verify FCC compliance of the CYW20704 in the transmit and receive modes for Bluetooth and Bluetooth low energy (BLE).

1 About This Document

1.1 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

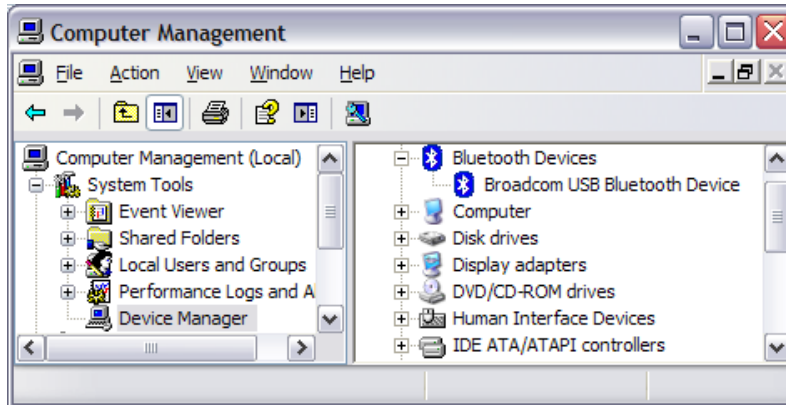
Broadcom Part Number	Cypress Part Number
BCM20704	CYW20704

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 Connect the Device and Verify Communication

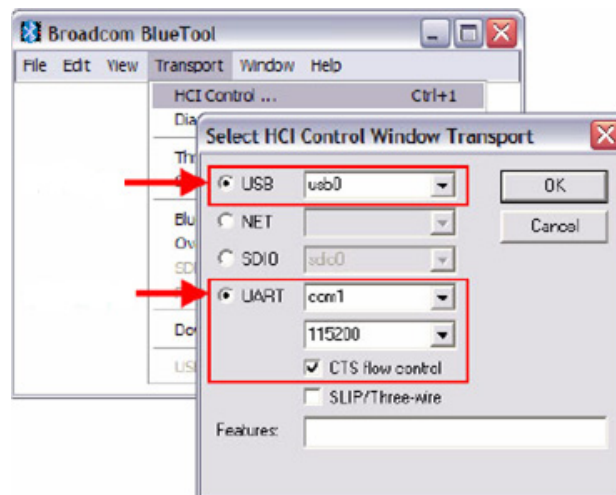
1. Connect the Bluetooth device to a USB port on the computer.
2. From the **Start** menu on the PC, right-click **My Computer**, then select **Manage** from the context menu.
3. On the left panel of the Computer Management window, select **Device Manager**.
4. On the right panel, verify that “Broadcom USB Bluetooth Device” is present under “Bluetooth Devices”. This indicates that the device is communicating with the computer.
5. Close the Computer Management window.



4 Set Up BlueTool For Bluetooth Testing

Note: BlueTool™ version 1.1.8 was used for the following procedures.

1. Start BlueTool (from the **Start** menu, select **Programs**, then **Broadcom BlueTool**, then **BlueTool**).
2. From the BlueTool **View** menu, select **Log Window**. The BlueTool log window is used to verify issued commands and display their results.
3. From the BlueTool **Transport** menu, select **HCI Control**.
4. In the Select HCI Control Window Transport window, select one of the following options:
 - **USB**—If the USB option is selected, then select **usb0** from the menu.
 - **UART**—If the UART option is selected, then select the appropriate COM port, set the baud rate to **115200**, and select **CTS flow control**.

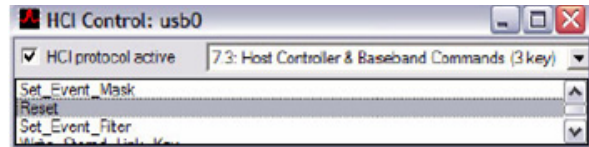


5. Click the **OK** button.
The HCI Control window appears.

5 Reset the Device Under Test

Note: The Device Under Test (DUT) should be reset before each procedure.

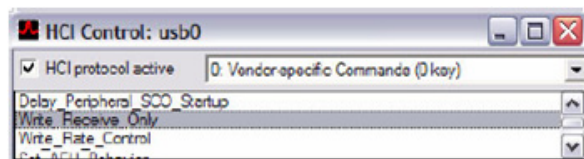
1. In the HCI Control window, clear the **HCI protocol active** option, then select it again.
2. Select **7.3: Host Controller & Baseband Commands (3 key)** from the menu.
3. Double-click **Reset** from the command list to reset the DUT.



6 Receive Test

The following procedure puts the DUT in receive mode. It is a nonhopping, write receive-only test.

1. In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
2. Double-click **Write_Receive_Only** from the command list.



3. In the HCI Command: Write_Receive_Only window, enter the desired frequency:
 - Low: 2402 MHz
 - Mid: 2441 MHz
 - High: 2480 MHz
4. Click the **OK** button.

If the test is successful, then in the BlueTool Log Window, the last line will read "Status = 0x0 (0, "Success")".

7 Transmit Tests

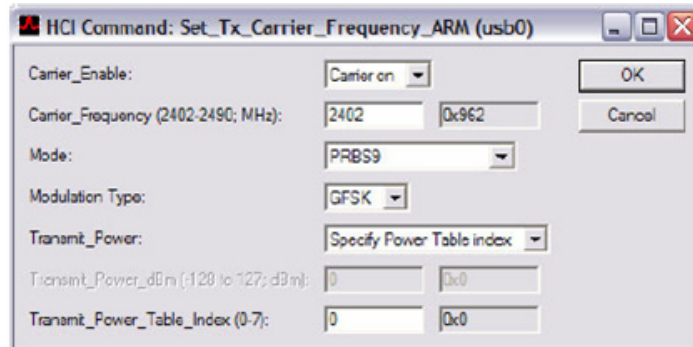
7.1 Single Frequency, Nonhopping

The following procedure sets the transmit carrier frequency ARM.

1. Reset the device (see [Reset the Device Under Test on page 3](#)).
2. In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
3. Double-click **Set_Tx_Carrier_Frequency_ARM** from the command list.
4. In the HCI Command: Set_Tx_Carrier_Frequency_ARM window, select the following options:
 - Carrier_Enable—Select **Carrier on**.
 - Carrier_Frequency—Enter the desired output frequency.
 - Mode—Select **PRBS9**.
 - Modulation Type—Select **GFSK, 8PSK, or QPSK**.

Note: Only one modulation type can be selected for a specific test instance, but all three types must be tested for FCC compliance.

- Transmit_Power—Select **Specify Power Table index**.
- Transmit_Power_Table_Index—Enter **0**.

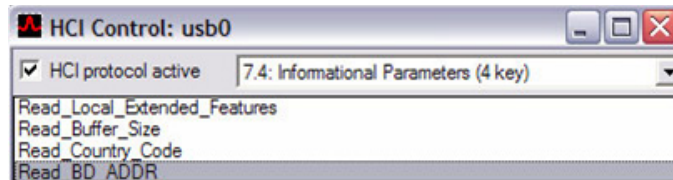


- Click the **OK** button.

7.2 Frequency Hopping

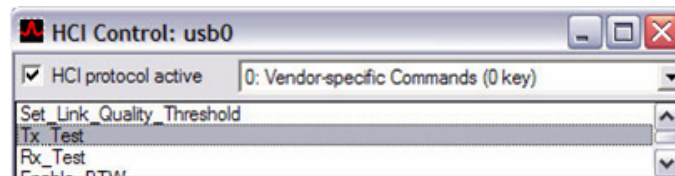
7.2.1 ACL Basic

- Reset the device (see [Reset the Device Under Test on page 3](#)).
- In the HCI Control window, select **7.4: Informational Parameters (4 key)** from the menu.
- Double-click **Read_BD_ADDR** from the command list.



In the BlueTool Log Window, the last line will show the Bluetooth device address of the DUT.

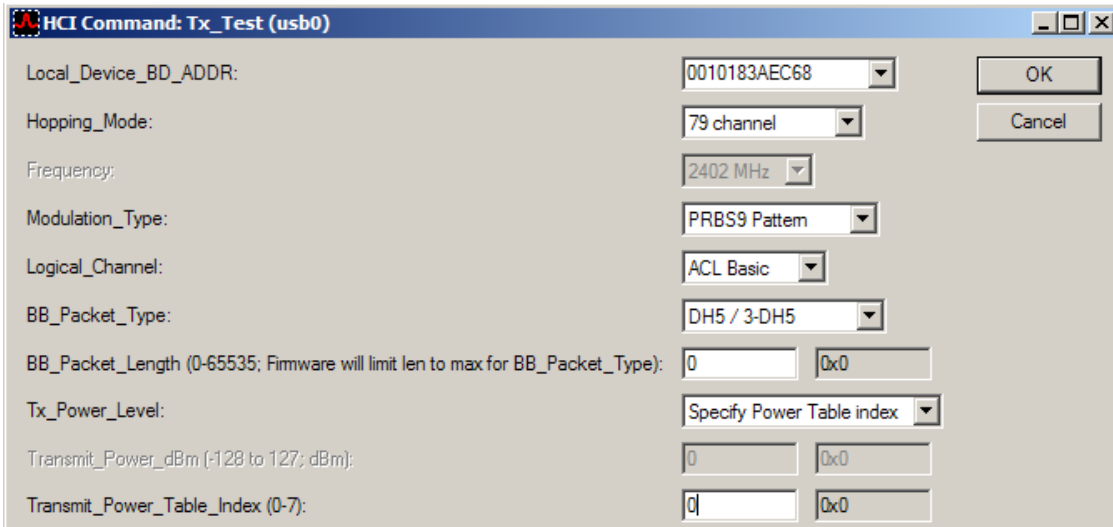
- In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
- Double-click **Tx_Test** from the command list.



- In the HCI Command: Tx_Test window, select the following options:
 - Local_Device_BD_ADDR—Select the Bluetooth device address of the DUT.
 - Hopping_Mode—Select **79 channel**.
 - Modulation_Type—Select **PRBS9 Pattern**.
 - Logical_Channel—Select **ACL Basic**.
 - BB_Packet_Type—Select **DH5/3-DH5**, **DH3/3-DH3**, or **DH1/2-DH1**.

Note: Only one packet type can be selected for a specific test instance, but all three types must be tested for FCC compliance.

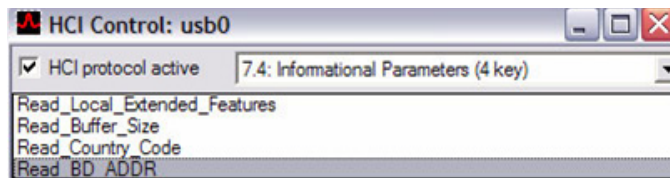
- BB_Packet_Length—Enter **65535**.
- Tx_Power_Level—Select **Specify Power Table index**.
- Transmit_Power_Table_Index—Enter **0**.



7. Click the **OK** button.

7.2.2 ACL EDR

1. Reset the device (see [Reset the Device Under Test on page 3](#)).
2. In the HCI Control window, select **7.4: Informational Parameters (4 key)** from the menu.
3. Double-click **Read_BD_ADDR** from the command list.



In the BlueTool Log Window, the last line will show the Bluetooth device address of the DUT.

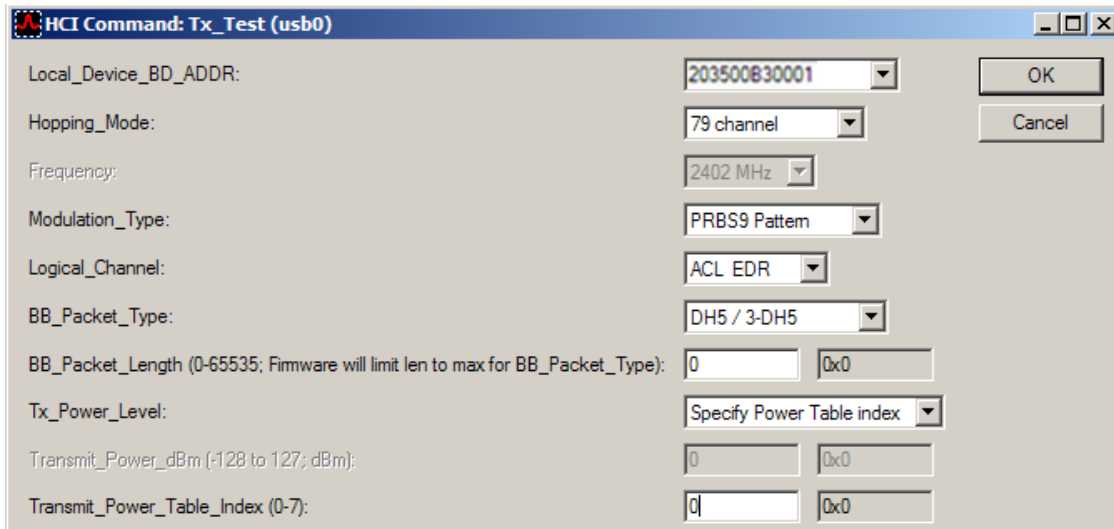
4. In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
5. Double-click **Tx_Test** from the command list.



6. In the HCI Command: Tx_Test window, select the following options:
 - Local_Device_BD_ADDR—Select the Bluetooth device address of the DUT.
 - Hopping_Mode—Select **79 channel**.
 - Modulation_Type—Select **PRBS9 Pattern**.
 - Logical_Channel—Select **ACL EDR**.
 - BB_Packet_Type—Select **DH5/3-DH5** or **DM5-2DH5**.

Note: Only one packet type can be selected for a specific test instance, but both types must be tested for FCC compliance.

- BB_Packet_Length—Enter **65535**.
- Tx_Power_Level—Select **Specify Power Table index**.
- Transmit_Power_Table_Index—Enter **0**.



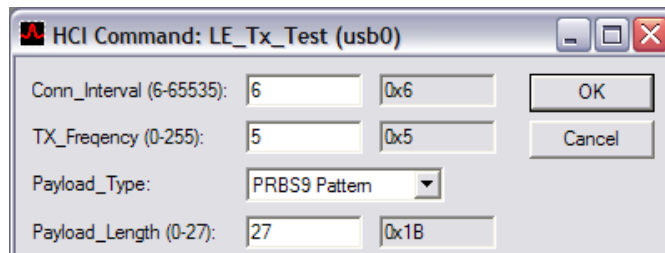
7. Click the **OK** button.

8 Set Up BlueTool for BLE Testing

8.1 Transmit Mode BLE

8.1.1 Single Frequency, Nonhopping

1. Reset the device (see [Reset the Device Under Test on page 3](#)).
2. In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
3. Double-click **LE_Tx_Test** from the command list.
4. In the HCI Command: LE_Tx_Test window, select the following options:
 - Conn_Interval—Enter **6**.
 - TX_Frequency—Enter a specific channel (0–36).
 - Payload_Type—Select a pattern.
 - Payload_Length—Enter **27**.

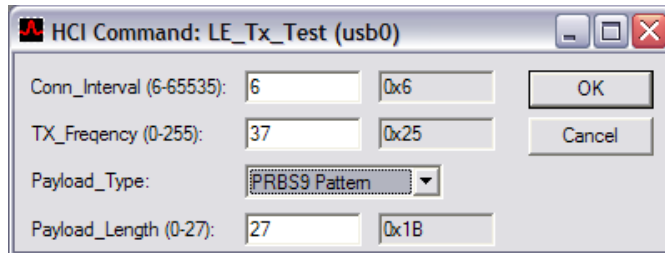


5. Click the **OK** button.

8.1.2 Hopping Across All 37 Channel Frequencies

1. Reset the device (see [Reset the Device Under Test on page 3](#)).
2. In the HCI Control window, select **0: Vendor-specific Commands (0 key)** from the menu.
3. Double-click **LE_Tx_Test** from the command list.
4. In the HCI Command: LE_Tx_Test window, select the following options:
 - Conn_Interval—Enter **6**.

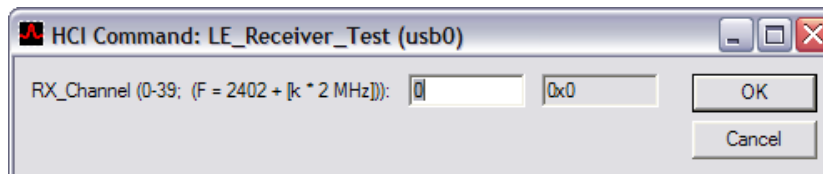
- TX_Frequency—Enter **37**.
- Payload_Type—Select a pattern.
- Payload_Length—Enter **27**.



5. Click the **OK** button.

8.2 Receive Test BLE

1. Reset the device (see [Reset the Device Under Test on page 3](#)).
2. In the HCI Control window, select **7.8: LE Controller Commands (8 key)** from the menu.
3. Double-click **LE_Receiver_Test** from the command list.
4. In the HCI Command: LE_Receiver_Test window, enter the RX channel number.



5. Click the **OK** button.
6. When finished running the receiver test, then in the HCI Control window, select **7.8: LE Controller Commands (8 key)** from the menu.
7. Double-click **LE_Test_End** from the command list.
In the BlueTool Log Window, the "Num_Of_Packets_Received" line will show the amount of packets received by the DUT.

```

41:49.193 usb0 <c LE_Test_End
                HCI Command Complete Event
[OE 06]: 01 1F 20 00 FF 03
event = 0xE (14, "Command Complete")
Num_HCI_Command_Packets = 0x1 (1)
Command_Opcode = 0x201F (8223, "LE_Test_E
Status = 0x0 (0, "Success")
Num_Of_Packets_Received = 0x3FF (1023)
    
```

Document History Page

Document Title: AN214775 - Enabling the CYW20704 for Transmit and Receive Testing

Document Number: 002-14775

Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	-	-	05/11/2015	Initial release
*A	5449057	UTSV	09/27/2016	Updated in Cypress template Added Cypress part numbering scheme
*B	5840403	AESATMP8	08/01/2017	Updated logo and Copyright.

Worldwide Sales and Design Support

Cypress maintains a worldwide network of offices, solution centers, manufacturer's representatives, and distributors. To find the office closest to you, visit us at [Cypress Locations](#).

Products

ARM® Cortex® Microcontrollers	cypress.com/arm
Automotive	cypress.com/automotive
Clocks & Buffers	cypress.com/clocks
Interface	cypress.com/interface
Internet of Things	cypress.com/iot
Memory	cypress.com/memory
Microcontrollers	cypress.com/mcu
PSoC	cypress.com/psoc
Power Management ICs	cypress.com/pmic
Touch Sensing	cypress.com/touch
USB Controllers	cypress.com/usb
Wireless Connectivity	cypress.com/wireless

PSoC® Solutions

[PSoC 1](#) | [PSoC 3](#) | [PSoC 4](#) | [PSoC 5LP](#) | [PSoC 6](#)

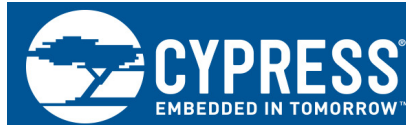
Cypress Developer Community

[Forums](#) | [WICED IOT Forums](#) | [Projects](#) | [Video](#) | [Blogs](#) | [Training](#) | [Components](#)

Technical Support

cypress.com/support

All other trademarks or registered trademarks referenced herein are the property of their respective owners.



Cypress Semiconductor
198 Champion Court
San Jose, CA 95134-1709

© Cypress Semiconductor Corporation, 2015-2017. This document is the property of Cypress Semiconductor Corporation and its subsidiaries, including Spansion LLC ("Cypress"). This document, including any software or firmware included or referenced in this document ("Software"), is owned by Cypress under the intellectual property laws and treaties of the United States and other countries worldwide. Cypress reserves all rights under such laws and treaties and does not, except as specifically stated in this paragraph, grant any license under its patents, copyrights, trademarks, or other intellectual property rights. If the Software is not accompanied by a license agreement and you do not otherwise have a written agreement with Cypress governing the use of the Software, then Cypress hereby grants you a personal, non-exclusive, nontransferable license (without the right to sublicense) (1s) under its copyright rights in the Software (a) for Software provided in source code form, to modify and reproduce the Software solely for use with Cypress hardware products, only internally within your organization, and (b) to distribute the Software in binary code form externally to end users (either directly or indirectly through resellers and distributors), solely for use on Cypress hardware product units, and (2) under those claims of Cypress's patents that are infringed by the Software (as provided by Cypress, unmodified) to make, use, distribute, and import the Software solely for use with Cypress hardware products. Any other use, reproduction, modification, translation, or compilation of the Software is prohibited.

TO THE EXTENT PERMITTED BY APPLICABLE LAW, CYPRESS MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARD TO THIS DOCUMENT OR ANY SOFTWARE OR ACCOMPANYING HARDWARE, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. To the extent permitted by applicable law, Cypress reserves the right to make changes to this document without further notice. Cypress does not assume any liability arising out of the application or use of any product or circuit described in this document. Any information provided in this document, including any sample design information or programming code, is provided only for reference purposes. It is the responsibility of the user of this document to properly design, program, and test the functionality and safety of any application made of this information and any resulting product. Cypress products are not designed, intended, or authorized for use as critical components in systems designed or intended for the operation of weapons, weapons systems, nuclear installations, life-support devices or systems, other medical devices or systems (including resuscitation equipment and surgical implants), pollution control or hazardous substances management, or other uses where the failure of the device or system could cause personal injury, death, or property damage ("Unintended Uses"). A critical component is any component of a device or system whose failure to perform can be reasonably expected to cause the failure of the device or system, or to affect its safety or effectiveness. Cypress is not liable, in whole or in part, and you shall and hereby do release Cypress from any claim, damage, or other liability arising from or related to all Unintended Uses of Cypress products. You shall indemnify and hold Cypress harmless from and against all claims, costs, damages, and other liabilities, including claims for personal injury or death, arising from or related to any Unintended Uses of Cypress products.

Cypress, the Cypress logo, Spansion, the Spansion logo, and combinations thereof, WICED, PSoC, CapSense, EZ-USB, F-RAM, and Traveo are trademarks or registered trademarks of Cypress in the United States and other countries. For a more complete list of Cypress trademarks, visit cypress.com. Other names and brands may be claimed as property of their respective owners.