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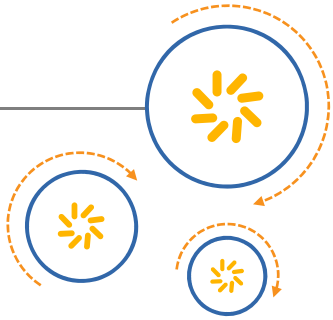

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CSR

Push every boundary.™

BlueCore®

BlueTest3

User Guide

Issue 7

Document History

Revision	Date	Change Reason
a	13 SEP 00	Original publication of this document (CSR reference BC01b-AN-047a)
b	16 JUL 01	Revision and addition of tests and appendices.
3	03 SEP 10	New document numbering system, CSR reference CS-102736-UGP3. Revised to update the BlueTest3 test commands.
4	27 SEP 10	Updates to RXSTART1, RXSTART2, RXDATA1, RXDATA2, BIT ERR1 and BIT ERR2.
5	14 FEB 11	Descriptions added for new routines BLE TEST TX, BLE TEST RX and BLE TEST END. Updates to Section 4, BIT ERR1, BIT ERR2, PCM EXT LB, PCM LB, PCM TIMING IN, PCM TONE, Read PIO, RXDATA1, RXDATA2 and Set PIO.
6	02 MAR 11	Updates to Read PIO and Set PIO. Editorial updates.
7	28 APR 15	Updated for BlueSuite 2.6 and to new CSR style. If you have any comments about this document, send an email to Comments@csr.com, giving the document number, title and section with your feedback.

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1 Introduction

BlueTest3 is a graphical Windows application that is part of BlueSuite, and can be downloaded from www.csrsupport.com.

BlueTest3 controls the running of BlueCore BIST routines (mainly *radiotest* commands). Tests are run on-chip so BlueTest3 does not execute the tests directly. BlueTest3 sends commands to BlueCore and reports the results it receives.

This guide documents BlueTest3 and the test commands it supports. Full documentation for the commands can be found in *HQ and BCCMD Protocols and Commands*.

The tests are split into:

- Simple RF tests; used for debugging and optimising PCBs.
- Quantitative tests that do transmission, reception and loopback modes, used to establish the performance of the Bluetooth device.
- Configuration commands to set parameters for other tests
- Miscellaneous test routines

See the appendices for further details about configuration commands, packet types and tests that involve using two Bluetooth modules that communicate.

Note:

- Several tests refer to requirements tests in the Bluetooth SIG *Radio Frequency* specification document, which is available from the Bluetooth SIG membership website. These references are marked as the **Related Test Spec Name**.
- The PCM External Loopback test has notes specifically for use with CSR's Casira development kit.

2 BlueTest3 and BlueTest

BlueTest3 is the replacement for the original BlueTest application. This user guide is for BlueTest3, although much of it applies to parts of the BlueTest application. (BlueTest is only available in BlueSuite versions prior to v2.3).

Table 2.1 lists the main differences between BlueTest3 and BlueTest.

Feature	BlueTest	BlueTest3
Can connect over the SPI debug interface		✓
Can connect over the USB interface	✓	✓
Can connect over all UART interface protocols	✓	✓
Supports all currently relevent tests	✓	✓
Supports additional older tests for early BlueCore chips	✓	
Uses the TestEngine library as the underlying engine		✓

Table 2.1: Comparing Features of BlueTest3 and BlueTest

BlueTest3 uses Microsoft .NET technology. The security requirements of the Microsoft .NET model mean BlueTest3 cannot be run from a network drive unless it is marked as a trusted path for .NET. See http://msdn.microsoft.com/en-us/library/zdc263t0(VS.80).aspx for more information.

To run some tests over the SPI debug interface, BlueTest3 needs firmware version 23 or higher. In earlier firmware versions the SPI debug transport did not support HQ commands, and so some tests are greyed out.

Important Note:

CSR recommends using BlueTest3 unless you need features available only in BlueTest.

3 Making a New Connection

Before running any tests, you must set up a connection between BlueTest3 and your BlueCore device, as shown in Figure 3.1, before passing any commands and results between the host computer and your BlueCore device.

To create a new connection:

1. Physically connect your BlueCore device to the host computer.

   Note:

   BlueCore devices are normally initially configured for BCSP host interface connections over the UART.

   See the *PSTool User Guide* to reconfigure your BlueCore device for a different host interface. No configuration changes are required to enable SPI debug interface connections.

2. Run BlueTest3. The **Transport Dialog** window opens.
3. Select the required **Transport** type. CSR recommends using the BCSP transport when using serial port connections.
4. Select the port the device is connected to.
5. If making a serial connection, select the data rate. From firmware version 18, BlueCore uses a data rate of PSKEY_UART_BAUDRATE. BlueCore7 and later chips use PSKEY_UART_BITRATE instead. The key values can be changed using PSTool. The keys are documented in `pskeys.txt` in firmware releases from www.csrsupport.com.
6. Click **OK**.

If BlueTest3 is successfully connected to the device, the application displays `Transport Active` and identifies the BlueCore chip and firmware version.

If BlueTest3 is not connected to the device, close the program and follow these steps:

1. Reset the device.
2. Check if the value of PSKEY_HOST_INTERFACE matches the interface you are using. If using UART, check that the value of PSKEY_UART_BAUDRATE / PSKEY_UART_BITRATE matches the data rate you used. Use PSTool to read and write the PS Keys. Warm reset the device after changing PS Keys.
3. Make sure the BlueCore firmware is running. Use BlueFlash to start the processor if firmware is not running.

BlueTest3 maintains a history of up to five different connections.

Figure 3.1: Making a USB Connection with BlueTest3

4 Running a Test

After BlueTest3 successfully makes a connection, you can run tests on your BlueCore device. Figure 4.1 shows BlueTest3 running a test.

To run a test:

1. Be sure BlueCore is running the firmware. If the firmware is stopped, use BlueFlash to start it again.
2. Select **Save to File** to save the results of tests to the logfile. To change the log file name or location, select **Browse for file** to open the file selection dialogue.
3. Select the required test command to display any relevant test arguments.

   Note:

   To run some tests over the SPI debug interface, BlueTest3 needs firmware version 23 or higher. In earlier firmware versions the SPI debug transport did not support HQ commands, and so some tests are greyed out.

4. Set the test arguments as desired.
5. Click **Execute** to run the selected test.

The lower half of the interface displays the test results.

Executing the tests put the BlueCore chip into test mode. The firmware does not respond to standard Bluetooth commands when in test mode. You can run more tests while in test mode, or restart the firmware by resetting the device.

To reset the BlueCore device:

1. Click **Cold Reset** to perform a normal reset, losing all state information.
2. Click **Warm Reset** to reset while preserving any PS Key values stored in BlueCore RAM.

For the BIT ERR1, BIT ERR2 and BER LOOPBACK tests, setting the **Display** option to **BER** instead of **Standard** switches to a reporting mode more suited to BER measurements, where the reports include the calculated BER.

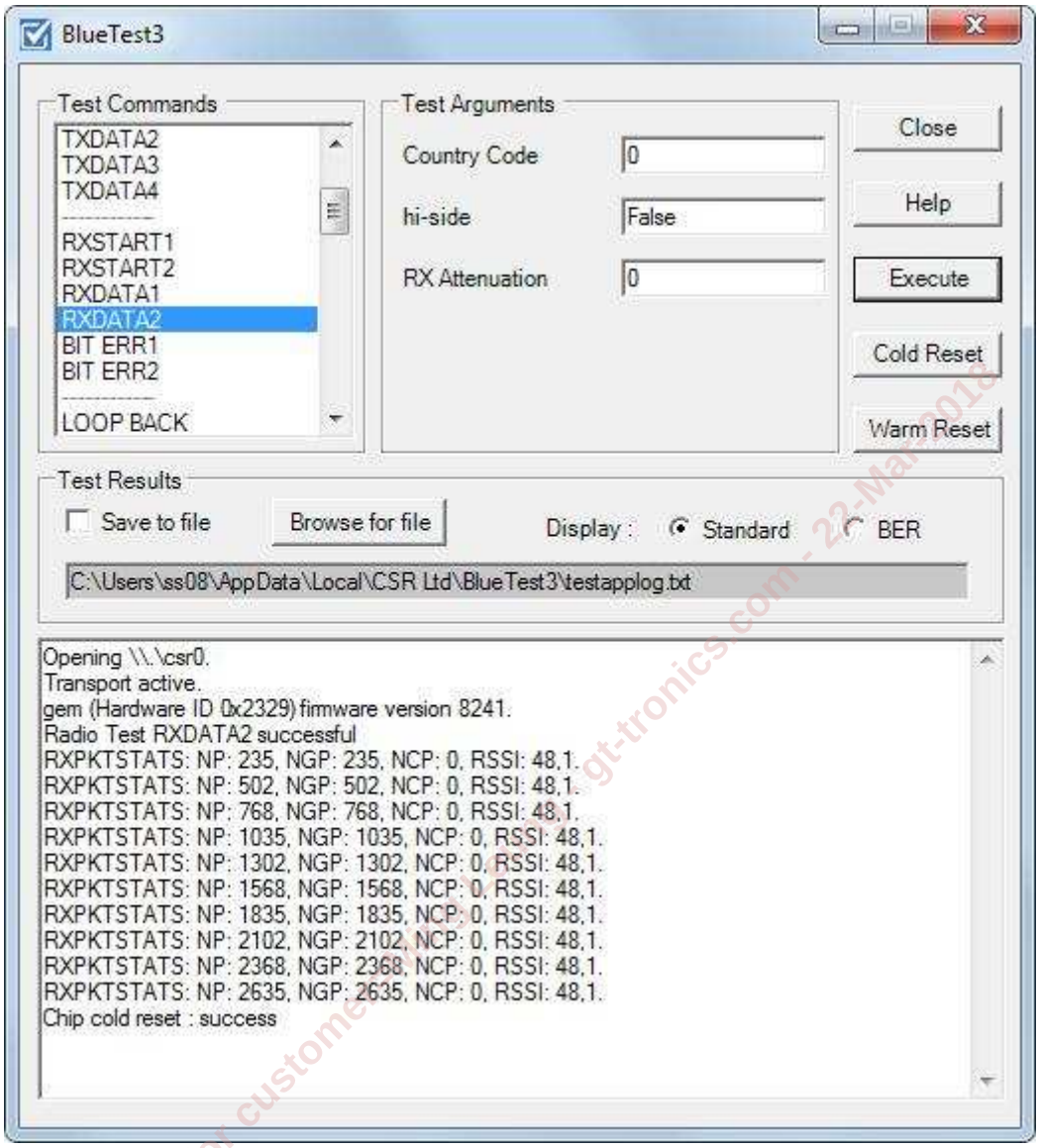

Figure 4.1: BlueTest3 Running RXDATA2

5 Chip and Firmware Support for Tests

Some tests are not possible on certain BlueCore devices:

- Tests that have been added and removed between BlueCore generations.
- Tests that require the chip to have specific features, such as a codec.
- Firmware builds that do not contain all the radio tests.

  4Mb RFCOMM firmware builds have a limited set of tests and older firmware versions may not contain all the tests.

  Use BlueFlash (documented in the *BlueSuite User Guide*) to determine your firmware version. You can download the latest firmware from www.csrsupport.com.

6 Simple Tests

These tests return status information and run at a continuous radio frequency (not frequency hopping).

6.1 PAUSE

Summary	Halts the current test and stops any radio activity.
Test Arguments	None
Return Data	None
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

6.2 RADIO STATUS

Summary	Returns the values of the radio control registers. **Note:** This command is now obsolete. Use the RADIO STATUS FULL command instead.
Test Arguments	None
Return Data	Internal transmission level External transmission level Internal receiver gain Internal receiver attenuation Local oscillator level IQ trim Signal/image ratio for IQ trim (only relevant on chips before BlueCore5)
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

6.3 RADIO STATUS FULL

Summary	Returns an extended list of values of the radio control registers.
Test Arguments	None
Return Data	Internal transmission level External transmission level Internal receiver gain Local oscillator level IQ trim Signal/image ratio for IQ trim (only relevant on chips before BlueCore5) Internal receiver attenuation Local oscillator amplitude Frequency error Receive frequency error
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

6.4 TXSTART

Summary	Enables the transmitter in continuous transmission at a designated frequency (**LO Freq**) with a designated output **Power (Ext, Int)**. Setting **Modulat'n Freq** offsets the resulting transmitted signal in frequency by smaller values.
Test Arguments	**LO Freq** (Carrier Frequency in MHz) = 2402 to 2480 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63. Defaults: ▪ Ext = 255 ▪ Int = 50 **Modulat'n Freq** = -32768 to 32767, in units of 1/4096MHz. 4096 is equivalent to 1MHz.
Return Data	None Use a spectrum analyser to check carrier output.
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Optional external amplifier
Configuration Commands	**CFG TX IF**, **CFG XTAL FTRIM**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX PA ATTEN**, **CFG TX POWER**

6.5 RXSTART1

Summary	Enables continuous reception at a fixed frequency. Receives at designated frequency (**LO Freq**) with a choice of low or high side modulation (**hi-side**) and with a designated attenuation setting (**RX Attenuation**).
Test Arguments	**LO Freq** (Carrier Frequency in MHz) = 2402 to 2480 **hi-side** (default = False) set 0 or 1 **RX Attenuation** = 0 to 15 (1023 max for BlueCore5 only, default = 0) On BlueCore5 chips, the **RX Attenuation** value also controls the RX mixer attenuation and I2I level, where the bits are used as follows: ▪ 0 to 3: Attenuation setting ▪ 4 to 5: Mixer attenuation ▪ 6 to 7: Unused ▪ 8 to 9: I2I level
Return Data	None
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Requires a signal generator or a second unit running **TXSTART**.
Configuration Commands	**CFG XTAL FTRIM**

6.6 RXSTART2

Summary	Enables continuous reception at a fixed frequency. Digitises the RSSI and sends report regularly to host. Receives at designated frequency (**LO Freq**) with a choice of low or high side modulation (**hi-side**) and with a designated attenuation setting (**RX Attenuation**).
Test Arguments	**LO Freq** (Carrier Frequency in MHz) = 2402 to 2480 **hi-side** (default = False) set 0 or 1 **RX Attenuation** = 0 to 15 (1023 max for BlueCore5 only, default = 0) On BlueCore5 chips, the **RX Attenuation** value also controls the RX mixer attenuation and I2I level, where the bits are used as follows: ▪ 0 to 3: Attenuation setting ▪ 4 to 5: Mixer attenuation ▪ 6 to 7: Unused ▪ 8 to 9: I2I level
Return Data	RSSI values, as uint16s, are sent by the chip at a rate of about 10 per second. The values displayed by BlueTest3 are refreshed every second (approximately).
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Requires a signal generator or a second unit to be running **TXSTART**
Configuration Commands	**CFG XTAL FTRIM**

7 Quantitative Tests

These tests transmit and/or receive (and print statistics of) Bluetooth packets. You may need both a transmitting device and a receiving device when using them.

Configuration commands like CFG PKT (sets the packet type) are particularly relevant for these tests. See Appendix B for a table showing which configuration commands apply to each of the quantitative tests.

7.1 Transmission Tests

7.1.1 TXDATA1

Summary	Enables the transmitter with a fixed frequency (**LO Freq**) and output **Power (Ext, Int)**. Payload is PRBS9 data. Receiver is not operating. Packet type and duty cycle can be configured. See Section 8.
Related Test Spec Name	TRM/CA/03/C (power control), TRM/CA/04/C (Tx output spectrum – frequency range), TRM/CA/05/C (Tx output spectrum – 20dB bandwidth), TRM/CA/06/C (Adjacent channel power), and TRM/CA/08/C (Initial carrier frequency tolerance).
Test Arguments	**LO Freq** (Carrier Frequency in MHz) = 2402 to 2480 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for basic rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50
Return Data	None Use a spectrum analyser to check output
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Optional external amplifier
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX IF**, **CFG UAP/LAP**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG TX PA ATTEN**, **CFG TX POWER**

7.1.2 TXDATA2

Summary	Enables the transmitter with a simplified hop sequence designated by **Country Code** and sets output **Power (Ext, Int)**. Payload is PRBS9 data. Receiver is not operating. Packet type and duty cycle can be configured. See Section 8. Version 2.1 of the *Specification of the Bluetooth System* deprecated **Country Code** as all countries now use 0.
Related Test Spec Name	TRM/CA/02/C (power density)
Test Arguments	**Country Code** = 0 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for basic rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50
Return Data	None Use a Bluetooth receiver to check output
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	You must use **CFG UAP/LAP** to set the same Bluetooth address for both the receiving unit and the transmitting unit. Optional external amplifier.
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX IF**, **CFG UAP/LAP**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG TX PA ATTEN**, **CFG TX POWER**, **CFG HOPPING SEQ**

7.1.3 TXDATA3

Summary	Enables the transmitter with a designated frequency (**LO Freq**) and output **Power (Ext, Int)**. Payload is sequence 101010…. Receiver is not operating. Packet type and duty cycle can be configured. See Section 8.
Related Test Spec Name	TRM/CA/07/C (modulation characteristic), TRM/CA/09/C (carrier frequency drift)
Test Arguments	**LO Freq** (Carrier Frequency MHz)= 2402 to 2480 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for basic rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50
Return Data	None Use a Bluetooth receiver to check output
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Optional external amplifier
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX IF**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG UAP/LAP**, **CFG TX PA ATTEN**, **CFG TX POWER**

7.1.4 TXDATA4

Summary	Enables the transmitter with a designated frequency (**LO Freq**) and output **Power (Ext, Int)**. Payload is sequence 1111000011110000…. Receiver is not operating. Packet type and duty cycle can be configured. See Section 8.
Related Test Spec Name	TRM/CA/07/C (modulation characteristic), TRM/CA/09/C (carrier frequency drift)
Test Arguments	**LO Freq** (Carrier Frequency MHz)= 2402 to 2480 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for Basic Rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50
Return Data	None Use a Bluetooth receiver to check output
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Optional external amplifier
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX IF**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG UAP/LAP**, **CFG TX PA ATTEN**, **CFG TX POWER**

7.2 Receiver Tests

7.2.1 RXDATA1

Summary	Enables the receiver at a designated frequency (**LO Freq**) with a choice of low or high side modulation (**hi-side**) and a designated attenuation setting (**RX Attenuation**). The software counts the number of received packets and the number of payloads with correctable errors. The payload itself is thrown away. The time between receive slots and report frequency can be set. See Section 8.
Test Arguments	**LO Freq** (Carrier Frequency MHz)= 2402 to 2480 **hi-side** = 0 or 1 (default = 0) **RX Attenuation** = 0 to 15 (default = 0)
Return Data	`NP` = number of packets `NGP` = number of good packets `NCP` = number of corrected packets `RSSI` = Received Signal Strength Indicator value in dBm The numbers wrap, rather than being reset to 0.
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	You must use **CFG UAP/LAP** to set the same Bluetooth address for both the receiving unit and the transmitting unit.
Configuration Commands	**CFG XTAL FTRIM**, **CFG FREQ**, **CFG FREQ MS**, **CFG UAP/LAP**

7.2.2 RXDATA2

Summary	Enables the receiver with a simplified hop sequence designated by **Country Code**, with a choice of low or high side modulation (**hi-side**) and with a designated attenuation setting (**RX Attenuation**). The software counts the number of received packets and the number of payloads with correctable errors. The payload itself is thrown away. The time between receive slots and report frequency can be set. See Section 8. Version 2.1 of the *Specification of the Bluetooth System* deprecated **Country Code** as all countries now use 0.
Related Test Spec Name	Standby mode spurious emissions (FCC test)
Test Arguments	**Country Code** = 0 **hi-side** = 0 or 1 (default = 0) **RX Attenuation** = 0 to 15 (default = 0)
Return Data	`NP` = number of packets `NGP` = number of good packets `NCP` = number of corrected packets `RSSI` = Received Signal Strength Indicator value in dBm The numbers wrap, rather than being reset to 0.
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	You must use **CFG UAP/LAP** to set the same Bluetooth address for both the receiving unit and the transmitting unit.
Configuration Commands	**CFG XTAL FTRIM**, **CFG FREQ**, **CFG FREQ MS**, **CFG UAP/LAP**, **CFG HOPPING SEQ**

7.2.3 BIT ERR1

Summary	Enables the receiver at a designated frequency (**LO Freq**) with a choice of low or high side modulation (**hi-side**) and with a designated attenuation setting (**RX Attenuation**). Returns a set of reports to the host including: ▪ Number of data bits received (payload excluding FEC and CRC) ▪ Number of data bits that were in error. Assumes PRBS9 data starting with 1FF in each packet ▪ Number of packets received ▪ Number of packets expected, based on txrx_freq (default 12500) ▪ Number of packets with header errors as reported by hardware ▪ Number of packets with CRC errors ▪ Number of packets with uncorrected errors (currently same as CRC errors) ▪ Number of sync timeouts. Note that until a transmission is received a long timeout is used, so this does not reflect the number of packets expected Each report has two uint32 values. First is value since last report, second is summed over the last **Sample Size** (default = 1.6Mbits). Reports are sent by the chip according to reporting interval set (default = 1 second, can be set with **CFG FREQ** / **CFG FREQ MS**). The times between receive slots and report frequency can be set, and the count reset (See Section 8). The display is updated when at least **Sample Size** bits have been received, i.e. if no bits are received, no reports are displayed.
Related Test Spec Name	RCV/CA/01/C and RCV/CA/02/C (sensitivity), RCV/CA/03/C (C/I performance), RCV/CA/04/C (blocking performance), RCV/CA/05/C (intermodulation performance), RCV/CA/06/C (maximum input level)
Test Arguments	**LO Freq** (Carrier Frequency MHz) = 2402 to 2480 **hi-side** = 0 or 1 (default = 0) **RX Attenuation** = 0 to 15 (default = 0) **Sample Size** = 1 to 4.2 x 10^9 (overrides sample size set by **CFG BIT ERR**, default = 1600000 Bit)
Note	With a second unit, execute **CFG UAP/LAP** to set the Bluetooth address. Execute **TXDATA1** then execute **CFG UAP/LAP** to set the same Bluetooth address on the Equipment Under Test (EUT) before executing **BIT ERR1**.
Return Data	Eight reports, each two uint32 values (see **BIT ERR1** Summary).
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	**CFG BIT ERR**, **CFG FREQ**, **CFG FREQ MS**, **CFG UAP/LAP**, **CFG XTAL FTRIM**

7.2.4 BIT ERR2

Summary	Enables the receiver with simplified hopping defined by **Country Code** with a choice of low or high side modulation (**hi-side**), and with a designated attenuation setting (**RX Attenuation**) as for **RXDATA2**. Returns information on bit errors to the host as those given for **BIT ERR1**. Version 2.1 of the *Specification of the Bluetooth System* deprecated **Country Code** as all countries now use 0.
Related Test Spec Name	None, but note that this test allows (as in **BIT ERR1**) the tests RCV/CA/01/C and RCV/CA/02/C (sensitivity), RCV/CA/04/C (blocking performance) to be performed with hopping on.
Test Arguments	**Country Code** = 0 **hi-side** = 0 or 1 (default = 0) **RX Attenuation** = 0 to 15 (default = 0) **Sample Size** = 1 to 4.2 x 10^9 (overrides sample size set by **CFG BIT ERR**, default = 1600000 Bit).
Return Data	Nine reports, each two uint32 values as for **BIT ERR1**.
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	**CFG BIT ERR**, **CFG FREQ**, **CFG FREQ MS**, **CFG UAP/LAP**, **CFG XTAL FTRIM**, **CFG HOPPING SEQ**

7.3 Loopback Test Modes

7.3.1 LOOPBACK

Summary	Echoes data received on **LO Frequency** onto the same channel at transmit level `lvl`. Highside reception is off and attenuation is set to 0. Expected reception frequency, **TX/RX Int (µs)** (default = 12500µs) with single slot packets returned **Loopback (µs)** after receipt (default = 1875µs). Defaults can be changed using the **CFG FREQ / CFG FREQ MS** configuration commands.
Related Test Spec Name	RCV/CA/01/C to RCV/CA/06/C
Test Arguments	**LO Freq** (Carrier Frequency MHz)= 2402 to 2480 (default = 2432) **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for basic rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50
Return Data	None
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Second unit transmitting data. See **BER LOOPBACK**. Optional external amplifier
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG FREQ MS**, **CFG TX IF**, **CFG UAP/LAP**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG TX PA ATTEN**, **CFG TX POWER**

7.3.2 BER LOOPBACK

Summary	Sends out data to a unit running in **LOOPBACK** test mode, and listens for the echoed replies. Transmits PRBS9 data on **LO Frequency** at transmit level and listens for transmissions in the next slot but one. Displays **BIT ERR1**-style reports once per second (configurable). Highside reception is off and attenuation is set to zero. Default is single slot packets (configurable with **CFG FREQ**).
Related Test Spec Name	None, but note that this test allows transmission to and reception from IUT in loopback test mode, with calculation of bit error to the Bluetooth specification.
Test Arguments	**LO Freq** (Carrier Frequency MHz)= 2402 to 2480 **Power (Ext, Int)** = gain of external amplifier (if present) and internal amplifier. Ext value is specific to the design and Int value is 0 to 63 for basic rate packets, but up to 127 for EDR packets (105 maximum for BlueCore4). Defaults: ▪ Ext = 255 ▪ Int = 50 **Sample Size** = 1 to 4.2 x 10^9 (overrides sample size set by CFG BIT ERR, default = 1600000 Bit)
Note	With a second unit execute **CFG UAP/LAP** to set BT address then execute **LOOPBACK**, then execute **CFG UAP/LAP** to set the same BT address on the EUT before executing **BER LOOPBACK**.
Return Data	Nine reports as for **BIT ERR1**.
Test Ends	When you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	Second unit running **LOOPBACK**. Optional external amplifier
Configuration Commands	**CFG PKT**, **CFG FREQ**, **CFG FREQ MS**, **CFG IQ TRIM**, **CFG LO LVL**, **CFG TX IF**, **CFG TX TRIM**, **CFG XTAL FTRIM**, **CFG TX PA ATTEN**, **CFG TX POWER**, **CFG UAP/LAP**

8 Configuration Commands

These commands configure how your BlueCore device runs the tests. Once running click **Reset Chip** to return to normal behaviour, or enter a new test command.

Appendix B shows which quantitative tests can be configured by each configuration command.

8.1 CFG FREQ

Summary	Configures the timing variables that determine the frequency of transmission, reception and results report events. **TX/RX Int** sets the period in microseconds between TX and RX events in **RXDATA**, **TXDATA**, **BIT ERR** and **LOOPBACK** test modes. Default is 1250 (2 slots), maximum 65536. If passed as 0, the current value is unchanged. **Loopback** sets the offset in microseconds between a reception event and retransmission of the data in loopback. Default is 1875 (two slots later), must be less than **TX/RX Int**. If 0, the current value is unchanged. **Report Int** sets the time in seconds between reports to host sent by **RXDATA** and **BIT ERR** functions. Default is 1, if passed as 0 the current value is unchanged.
Test Arguments	**TX/RX Int** (µs) = 1 to 65535 (default = 1250) **Loopback** (µs) = 1 to 65535 (default = 1875) **Report Int** (s) = 1 to 65 (default = 1)
Return Data	None

8.2 CFG FREQ MS

Summary	Configures the timing variables that determine the frequency of transmission, reception and results report events. **TX/RX Int** sets the period in microseconds between TX and RX events in **RXDATA**, **TXDATA**, **BIT ERR** and **LOOPBACK** test modes. Default is 1250 (2 slots), maximum 65536. If passed as 0, the current value is unchanged. **Loopback** sets the offset in microseconds between a reception event and retransmission of the data in loopback. Default is 1875 (two slots later), must be less than **TX/RX Int**. If 0, the current value is unchanged. **Report Int** sets the time in milliseconds between reports to host sent by **RXDATA** and **BIT ERR** functions. Default is 1, if passed as 0 the current value is unchanged.
Test Arguments	**TX/RX Int** (µs) = 1 to 65535 (default = 1250) **Loopback** (µs) = 1 to 65535 (default = 1875) **Report Int** (ms) = 100 to 65535 (default = 1000)
Return Data	None

8.3 CFG PKT

Note:

If you change the packet size and want to run repeated transmission tests, you may also have to use **CFG FREQ** to set the gap between retransmissions of the data, as larger packets require more time to receive.

Summary	Sets packet type and size for loopback tests. **Packet Type** is the standard Bluetooth packet type with 16 added for EDR packets. Entering an invalid number selects the default packet type: DM5 for **TXDATA1/2**, DH5 for **TXDATA3/4**. **Packet Size** is the size of data in packet, from 1 to the maximum for the type. Zero sets default: 20 bytes for **TXDATA1/2**, 192 bytes for **TXDATA3/4**. Since the 2 values are connected, both values must be set at once. No default is inferred from the other.
Test Arguments	**Packet Type** = 3 to 31 (default = 4) (see Appendix C) **Packet Size** = 0 to 1021 (default = 27)
Return Data	None

8.4 CFG BIT ERR

Summary	Sets 2 values used in bit error measurements. If **Bits Count** is non-zero, the target for total counters is set to this and total count resets at this value. If passed as 0, the current value is unchanged. If **Reset** is true and **BIT ERR1/2** is active, immediately resets the counters for the total statistics, but not over the last report period.
Test Arguments	**Bits Count** = 1 to 4.2 x 10^9 (default = 1600000 Bit) **Reset** = false (0) or true (1) (default = false)
Return Data	None

8.5 CFG TX IF

Summary	Sets the IF (intermediate frequency) used in transmit test modes. See the PS Key documentation in your firmware release for PSKEY_TX_OFFSET_HALF_MHZ. Offset is a signed integer with a range from +5 to –5, in units of 0.5MHz.
Test Arguments	**IF Offset** = -5 to +5 (default = 0). IF offsets outside the range -2 to +2 are not recommended for normal operation.
Return Data	None

8.6 CFG XTAL FTRIM

Summary	Trims the crystal that controls **BlueCore** timing. This only needs to be done on new hardware. This command can be used to set a new trim value either before a test is started or while a test is already in operation. The change takes effect immediately. **Crystal Trim** is a number between 0 and 63 inclusive. This is not a permanent change.
Test Arguments	**Crystal Trim** = 0 to 63 (typical = 27)
Return Data	None

8.7 CFG UAP/LAP

Summary	Sets the Bluetooth address (UAP and LAP) to be used for tests. **BlueCore** usually uses its own Bluetooth Device address to determine the access sync code, as if it is master of a piconet. The UAP and LAP are the only parts used. This command allows a special UAP and LAP to be used only in the test modes.
Test Arguments	Bluetooth Address: **UAP** = `0` to `ff` (Default = `6b`) **LAP** = `0` to `ffffff` (Default = `c6967e`)
Return Data	None

8.8 CFG IQ TRIM

Summary	Sets the **IQ Trim** value, overriding the value calculated by the internal calibration algorithm. This command is not executed in normal use.
Test Arguments	**IQ Trim** = `0` to `511` (default `149` (hex))
Return Data	None

8.9 CFG TX TRIM

Summary	Sets the Active Member Address **Trim** for the device to be used in the header of all test transmissions to Active Member Address. If the transmitter and receiver are used for the same test, both devices will normally have to be set to the same Active Member Address.
Test Arguments	**Trim** = 0 to 7, Default = 7
Return Data	None

8.10 CFG LO LVL

Summary	Adjusts the output level of the analogue LO that locks onto the transmitting carrier frequency. Sets the output level to **LO level**, overriding the value calculated by the internal calibration algorithm. This command is not executed in normal use. BlueCore5 and later chips do not support this command.
Test Arguments	**LO level** = 0 to 15 (default = 13)
Return Data	None

8.11 CFG TX PA ATTEN

Summary	Only for BlueCore5 and BlueCore6 chips. Use this control to create an enhanced power table. Set to 0 for maximum power, and increase by 1 for each power step, using TXDATA1 to transmit with different power values to achieve the desired ouput power. See *Enhanced Power Table Construction*.
Test Arguments	**TX PA Atten** = 0 to 5
Return Data	None

8.12 CFG TX POWER

Summary	Sets the power target in dBm. The firmware selects the power table entry giving the closest output power to the target. This power table entry is then used for subsequent TX tests. Once this command has been executed, the **Power (Ext, Int)** parameter for TX tests is ignored. Setting the power target value to 0xDEAF disables this setting, which means that the **Power (Ext, Int)** parameter for TX tests is used.
Test Arguments	**Power target (dBm)**. Default = 0
Return Data	None

8.13 CFG HOPPING SEQ

Summary	Configures the set of hop frequencies to be used with **RXDATA2**, **TXDATA2** and **BIT ERR2**. The functionality is analogous to the HCI Set_AFH_Host_Channel_Classification command. The command is needed because Japanese regulatory approval sometimes requires a power density test, and AFH can alter the density. The adjusted hopping sequence allows the **RXDATA2**, **TXDATA2** and **BIT ERR2** commands to be used while simulating a reduced hop set. This can be performed using 20 channels, the minimum number of active channels permitted by the AFH specification. The command payload is a set of five uint16s whose bits represent 79 channels: ▪ Channel 0 is the lowest bit of the first word. ▪ Channel 78 is bit 14 of the final word. The channel is used only if the bit is 1. The hopping algorithm is the same as that used when all frequencies are in use, but only on the selected frequencies. This guarantees that the radio spends equal amounts of time on each selected frequency.
Test Arguments	**Channels** 15 to 0 = `0x0000` to `0xffff`. Channel 0 is bit `0x0001`. **Channels** 31 to 16 = `0x0000` to `0xffff` **Channels** 47 to 32 = `0x0000` to `0xffff` **Channels** 63 to 48 = `0x0000` to `0xffff` **Channels** 78 to 64 = `0x0000` to `0xffff`. Channel 78 is bit `0x4000`. Example parameters, use the lowest 20 channels only: `0xffff`, `0x000f`, `0x0000`, `0x0000`, `0x0000`
Return Data	None

9 Built-in Self-Test (BIST) Routines

These commands run the built-in self-tests on your BlueCore device. These tests do not require extra hardware.

9.1 DEEP SLEEP

Summary	Puts the chip into deep-sleep after a delay of half a second until woken by reset or activity on the USB, UART or SPI interfaces.
Related Test Spec Name	None
Test Arguments	None
Return Data	None
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.2 PCM LB

Summary	Sets the PCM into loop back mode, so that the data read from the PCM input is output continuously on the PCM-out pin. The loop back is via software and the buffers so there is a pipeline delay. The PCM port mode is selectable. ▪ If **PCM Mode** = 0, BlueCore is slave in normal 4-wire configuration ▪ If **PCM Mode** = 1, BlueCore is master in normal 4-wire configuration ▪ If **PCM Mode** = 2, BlueCore is master in Manchester encoded, 2-wire configuration. If PSKEY_HOSTIO_MAP_SCO_CODEC is set to TRUE, data is sent to the codec for analogue output instead of being output at the PCM port.
Related Test Spec Name	None
Test Arguments	**PCM Mode** = 0 to 2 (default = 1) **Interface** = 0 to n (default = 0). Selects the zero-indexed PCM interface to use. This parameter is only visible and supported for ICs supporting multiple PCM port tests.
Return Data	None
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.3 PCM EXT LB

Summary	Runs the PCM external loop back test. 512 bytes of random data is written to the PCM output and is read again on the input pin. A check is made that the data read back is the same (up to usual codec transformations) as that written. The PCM port mode is selectable as **PCM Mode**, which is the same as for **PCM LB**. The external LOOP BACK may be a simple wire.
Related Test Spec Name	None
Test Arguments	**PCM Mode** = 0 to 2 (default = 1) **Interface** = 0 to n (default = 0). Selects the zero-indexed PCM interface to use. This parameter is only visible and supported for ICs supporting multiple PCM port tests.
Return Data	None
Test Ends	Automatically
Special Requirements	The PCM input and output must be linked for this test to succeed. The link may be a simple wire, or if Casira hardware is being used, set CN8 jumper to Codec BYP and on header CN12 link pins 10 and 11.
Configuration Commands	None

9.4 STEREO CODEC LB

Summary	Enable loopback mode in the stereo codec hardware. This outputs data read from the stereo input onto the codec out pin at the specified sample rate. The stereo codec port mode is selectable. The loopback remains on until another test is called, or the chip is reset. The loopback is via the buffers, with the read/write hardware in lockstep but with a small offset, so there is a pipeline delay.
Related Test Spec Name	None
Test Arguments	**Sample Rate** (Hz) = 0 to 65535 (default 8000) **Route** (0 to 3) selects the stereo codec port mode: ▪ 0 for Mic_L -> Spk_L, Mic_R -> Spk_R ▪ 1 for Mic_R -> Spk_L and Spk_R ▪ 2 for Mic_L -> Spk_L and Spk_R ▪ 3 for Mic_L -> Spk_R, Mic_R -> Spk_L
Return Data	None
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.5 SETTLE

Summary	Builds the trim lookup table as normal, then does a step from **Start Channel** to **Finish Channel**, while the synthesiser is running. It digitises the synthesiser error voltage at intervals of 10µs to 20µs over the next 200µs and writes the results to an array.
Related Test Spec Name	None
Test Arguments	**Start Channel** = 0 to 78 (default 0) **Finish Channel** = 0 to 78 (default 78)
Return Data	A sequence of 10 reports of the synthesiser error voltage over the next 200µs.
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.6 PCM TONE

Summary	This command outputs a sine wave to the PCM port. If PSKEY_HOSTIO_MAP_SCO_CODEC is set to TRUE, data is sent to the codec for analogue output instead of being output at the PCM port.
Related Test Spec Name	None
Test Arguments	**Frequency** (0 to 5) controls the frequency of the sine wave. The value 0 corresponds to 250Hz; each increment of 1 doubles the frequency. Hence, 1 corresponds to 500Hz, 2 to 1kHz and so on. No bounds checking is performed on the parameter, but large values are not useful due to hardware limitations. **Amplitude** (0 to 8) controls the amplitude of the sine wave. 8 is the full volume; each decrement of 1 reduces the amplitude by a factor of 2. 0 is valid and causes the hardware to be activated with constant audio data. **DC offset** is a constant offset to be added to the audio data. **Interface** = 0 to n (default = 0). Selects the zero-indexed PCM interface to use. This parameter is only visible and supported for ICs supporting multiple PCM port tests.
Return Data	None
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.7 PCM TONE STEREO

Summary	This command outputs a sine wave to the stereo codec. For this command to succeed, PSKEY_HOSTIO_MAP_SCO_CODEC must be set to TRUE.
Related Test Spec Name	None
Test Arguments	**Frequency** (0 to 5) controls the frequency of the sine wave. The value 0 corresponds to 250Hz; each increment of 1 doubles the frequency. Hence, 1 corresponds to 500Hz, 2 to 1kHz and so on. No bounds checking is performed on the parameter, but large values are not useful due to hardware limitations. **Amplitude** (0 to 8) controls the amplitude of the sine wave. 8 is the full volume; each decrement of 1 reduces the amplitude by a factor of 2. 0 is valid and causes the hardware to be activated with constant audio data. **DC offset** is a constant offset to be added to the audio data. **Channel (0 to 2)**. Channel 0 = Left and Right, Channel 1 = Left, Channel 2 = Right.
Return Data	None
Test Ends	If you click **Reset Chip**, **PAUSE**, or enter a new command.
Special Requirements	None
Configuration Commands	None

9.8 PCM TIMING IN

Summary	Writes data to a PIO pin, and tests that the same data (up to usual codec transformations) is readable on one of the PCM pins used for timing in slave mode. External wiring must be provided between the corresponding pins. Similar to the **PCM EXT LB** command.
Related Test Spec Name	None
Test Arguments	**PIO line out** (0 to 7) selects the PIO pin to be used for output. The second parameter (0 to 1) selects the pin to test input on. 0 for PCM_SYNC, 1 for PCM_CLK. **Interface** = 0 to n (default = 0). Selects the zero-indexed PCM interface to use. This parameter is only visible and supported for ICs supporting multiple PCM port tests.
Return Data	None
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

9.9 CTS RTS LB

Summary	This command performs a series of writes to the UART CTS line and attempts to read back the value written on the UART RTS line. External wiring must be provided between the corresponding pins.
Related Test Spec Name	None
Test Arguments	None
Return Data	None
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

9.10 ENABLE DUT MODE

Summary	Puts the device into DUT mode. A device can be made discoverable and connectable if its firmware supports the required BCCMD (firmware from 23g onwards). Once a device is discoverable, connectable and in DUT mode, BT loopback testing can be performed.
Related Test Spec Name	None
Test Arguments	None
Return Data	None
Test Ends	If you click **Reset Chip**
Special Requirements	None
Configuration Commands	None

10 Bluetooth Low Energy Test Modes

10.1 BLE TEST TX

Summary	Starts Bluetooth low energy transmit test mode (equivalent to the HCI_LE_Transmitter_Test command). Starts packet transmission on a fixed **Channel**, packet payload **Length** and payload **Bit pattern**.
Related Test Spec Name	All TRM-LE/CA/* tests as listed in Bluetooth test specification *RF-PHY.TS/4.0.0*.
Test Arguments	**Channel** = 0 to 39 (BLE channel = (freqMHz - 2402) / 2). **Length** = 0 to 37 (bytes). The length of the payload data in each packet. **Bit pattern** = 0 to 7. The packet payload bit pattern, where: ▪ 0 = Pseudo-random bit sequence 9 ▪ 1 = Pattern of alternating bits "11110000" ▪ 2 = Pattern of alternating bits "10101010" ▪ 3 = Pseudo-random bit sequence 15 ▪ 4 = Pattern of all "1" bits ▪ 5 = Pattern of all "0" bits ▪ 6 = Pattern of alternating bits "00001111" ▪ 7 = Pattern of alternating bits "01010101"
Return Data	None
Test Ends	When you click **Reset Chip** or run **BLE TEST END**.
Special Requirements	This function is only supported by BlueCore ICs supporting Bluetooth low energy and standard Bluetooth.
Configuration Commands	None

10.2 BLE TEST RX

Summary	Starts Bluetooth low energy receive test mode (equivalent to the HCI_LE_Receiver_Test command). Starts packet reception on a fixed **Channel**. Setting **Report Int (s)** to a non-zero value causes regular received packet count reports to be posted.
Related Test Spec Name	All RCV-LE/CA/* tests as listed in Bluetooth test specification *RF-PHY.TS/4.0.0* (in conjunction with **BLE TEST END**).
Test Arguments	**Channel** = 0 to 39 (BLE channel = (freqMHz – 2402) / 2). **Report Int (s)** = 0 to 42. The time, in seconds, between packet count reports. If set to 0, no reports are generated until **BLE TEST END** is executed. Otherwise, the receive test automatically stops and restarts at the specified interval, with a packet count report being posted (because the test is stopped and restarted, the packet count resets after each report). If the specified interval is greater than 42 (or if zero, and **Reset Chip** or **BLE TEST END** is not executed within 42 seconds), the reported packet count values will be invalid (because they have wrapped past their type limit of 65535).
Return Data	If **Report Int (s)** is non-zero, the number of received packets is reported at the specified interval.
Test Ends	When you click **Reset Chip**, or run **BLE TEST END**.
Special Requirements	This function is only supported by BlueCore ICs supporting Bluetooth low energy and standard Bluetooth.
Configuration Commands	None

10.3 BLE TEST END

Summary	Stops **BLE TEST TX** and **BLE TEST RX** test modes (equivalent to the HCI_LE_Test_End command). If **BLE TEST RX** is running when this function executes, a received packet count report is posted.
Related Test Spec Name	All RCV-LE/CA/* tests as listed in Bluetooth test specification *RF-PHY.TS/4.0.0* (in conjunction with **BLE TEST RX**).
Test Arguments	None
Return Data	If **BLE TEST RX** is running when this function executes, the number of received packets is reported.
Test Ends	Automatically
Special Requirements	This function is only supported by BlueCore ICs supporting Bluetooth low energy and standard Bluetooth.
Configuration Commands	None

11 Miscellaneous Test Routines

These commands perform miscellaneous functions including configuring PIO lines and providing BlueCore device information.

11.1 Set PIO

Note:

Use with caution as this overrides previous settings.

Summary	Sets the direction and value of designated PIO lines. For ICs supporting up to 32 PIOs, additional parameters are used to allow designated I/O lines to be mapped as PIOs.
Related Test Spec Name	None
Test Arguments	For ICs supporting up to 16 PIOs: **Mask (hex)** The direction mask, where a bit being set designates the line as an output. **Values (hex)** The values to set for the output lines. For ICs supporting up to 32 PIOs: **Map Mask (hex)** Specifies the lines to map as PIOs. The mask should not include any lines which are dedicated PIOs, or lines which are reserved for other uses, and therefore cannot be mapped as PIOs. **PIO Mask (hex)** Specifies the PIOs to set. This can include lines mapped as PIOs, as well as dedicated PIOs. **Direction (hex)** Specifies the direction of the lines specified in the **PIO Mask** argument, where a bit being set designates the line as an output. **Values (hex)** The values to set for the output lines.
Return Data	Reports hex values for the direction mask and state of the lines. The values are 32-bit if the IC supports up to 32 PIOs. Otherwise, it reports 16-bit values.
Test Ends	Automatically
Special Requirements	For ICs supporting up to 32 PIOs, those lines which can be mapped as PIOs, and those lines which are reserved (cannot be mapped or driven) are IC dependant.
Configuration Commands	None

11.2 Read PIO

Summary	Reads the logic state of the PIO pins. Valid whether they are inputs or outputs.
Related Test Spec Name	None
Test Arguments	For ICs supporting up to 32-bit PIOs: **Map Mask (hex)** Specifies the lines to map as PIOs. Do not include any lines which are dedicated PIOs, or lines which are reserved for other uses, and therefore cannot be mapped as PIOs.
Return Data	Reports hex values for the direction mask and state of the lines. The values are 32-bit if the IC supports up to 32 PIOs. Otherwise, it reports 16-bit values.
Test Ends	Automatically
Special Requirements	For ICs supporting up to 32 PIOs, those lines which can be mapped as PIOs are IC dependant.
Configuration Commands	None

11.3 Provoke Fault

Note:

See the *HQ and BCCMD Protocols and Commands* document for more information about using fault modes.

Summary	Provokes a fault mode in the on-chip processor.
Related Test Spec Name	None
Test Arguments	**Fault (hex)** selects the fault mode (currently from 0 to `0xfe`, default = 0).
Return Data	None for the command, but BlueTest3 displays resulting fault reports generated by the chip as they are received.
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

11.4 Read Chip Version

Summary	Reads the hardware ID and firmware version of device.
Related Test Spec Name	None
Test Arguments	None
Return Data	Hardware ID and firmware version.
Test Ends	Automatically
Special Requirements	None
Configuration Commands	None

11.5 Set Xtal Offset

Summary	Calculates the crystal frequency offset value from the given **Nominal Freq (MHz)** and **Actual Freq (MHz)** (measured) values, sets the value as the PS Key for the crystal offset value, then performs a warm reset so the offset value takes effect for subsequent tests. Because this function performs a reset, any running test function stops. This function can be used for crystal calibration with ICs supporting the frequency offset value method (the test is disabled for ICs that support the previous crystal "trim" value method of crystal calibration). The **TXSTART** function can be used prior to this function to generate at the nominal frequency (external test equipment is required to measure the actual frequency). If the current offset value is non-zero, an error message shows and there is no change to the device. This is because a zero offset value (the default) needs to be in use when calibration is performed, otherwise the calculated offset value will be incorrect. The offset value can be reset to 0 using the **PSTool** or **PSCli** applications.
Related Test Spec Name	None
Test Arguments	**Nominal Freq. (MHz)** = 2402.0 to 2480.0 (the frequency used with **TXSTART** to measure the actual frequency. **Actual Freq. (MHz)** = 2402.0 to 2480.0 (the measured frequency).
Return Data	The function reports the calculated offset value and the status of the operation.
Test Ends	Automatically.
Special Requirements	This function is only enabled and supported for ICs supporting the frequency offset value method of crystal calibration.
Configuration Commands	None.

12 Document References

Document	Reference
HQ and BCCMD Protocols and Commands	CS-227432-SP
BC7820 Bluetooth Power Measurement Using BlueTest3	CS-202163-AN
BlueSuite User Guide	CS-118613-UG
Bluetooth Low Energy RF PHY Test Specification	https://www.bluetooth.org
Bluetooth SIG Radio Frequency TSS and TP System Specification	https://www.bluetooth.org
Casira User Guide	CS-102077-UG
Enhanced Power Table Construction	CS-101532-AN
PSTool User Guide	CS-101505-UG
Specification of the Bluetooth System	www.bluetooth.com

Appendix A Combining Tests Using a Second Unit

Table A.1 lists tests that can be combined by using a second unit.

Equipment Under Test	Second Unit
TXSTART	RXSTART
	RXSTART2
TXDATA1/TXDATA3/TXDATA4	RXDATA1
	BIT ERR1
TXDATA2	RXDATA2
	BIT ERR2
LOOPBACK	BER LOOPBACK
BLE TEST TX	BLE TEST RX

Table A.1: Testing With a Second Unit

Appendix B Configuration Commands for Quantitative Tests

Important Note:

Make sure your chip and firmware version supports any configuration commands and tests you need. See Section 5.

Configuration Commands for Quantitative Tests													
Test Running on the Equipment Under Test	CFG FREQ	CFG FREQ MS	CFG PKT	CFG BIT ERR	CFG TX IF	CFG XTAL FTRIM	CFG UAP/ LAP	CFG IQ TRIM	CFG TX TRIM	CFG LO LVL	CFG TX POWER	CFG TX PA ATTEN	CFG HOPPING SEQ
TXSTART					✓	✓		✓		✓	✓	✓	
RXSTART1						✓							
RXSTART2						✓							
TXDATA1	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TXDATA2	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
TXDATA3	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
TXDATA4	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
RXDATA1	✓	✓				✓	✓						
RXDATA2	✓	✓				✓	✓						✓
BIT ERR1	✓	✓		✓		✓	✓						
BIT ERR2	✓	✓		✓		✓	✓						✓
LOOPBACK	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	
BER LOOPBACK	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	

Table B.1: Configuration Commands for Quantitative Tests

Appendix C Bluetooth Packet Types

Table C.1 lists the Bluetooth packet types along with the **CFG PKT** types to use with BlueTest. The table does not list common control packets (ID, NULL, POLL, FHS) because BlueTest cannot send them.

Link Type	Data Rate	Packet Type	Slot Occupancy	Bluetooth Spec Type Code	CFG PKT	
					Type	Maximum User Payload (Size)
ACL	Basic	DM1	1	3	3	0-17
		DM3	3	10	10	0-121
		DH3	3	11	11	0-183
		DM5	5	14	14	0-224
		DH5	5	15	15	0-339
	EDR	DM1	1	3	19	0-17
		2-DH3	3	10	26	0-367
		3-DH3	3	11	27	0-552
		2-DH5	5	14	30	0-679
		3-DH5	5	15	31	0-1021
SCO	Basic	HV1	1	5	5	10
		HV2	1	6	6	20
		HV3	1	7	7	30
		DV	1	8	8	10+(0-9) D
eSCO	Basic	EV3	1	7	7	1-30
		EV4	3	12	12	1-120
		EV5	3	13	13	1-180
	EDR	2-EV3	1	6	22	1-60
		3-EV3	1	7	23	1-90
		2-EV5	3	12	28	1-360
		3-EV5	3	13	29	1-540

Table C.1: Bluetooth Packet Types for BlueTest

Terms and Definitions

Term	Definition
ACL	Asynchronous Connection-oriented
AFH	Adaptive Frequency Hopping
BCSP	BlueCore Serial Protocol
BIST	Built-In Self-Test
BlueCore®	Group term for CSR's range of Bluetooth wireless technology ICs
BlueSuite®	BlueCore family of software utilities for Bluetooth evaluation and development
Bluetooth®	Set of technologies providing audio and data transfer over short-range radio connections
Casira™	Bluetooth development hardware from CSR
codec	Coder decoder
CTS	Clear to Send
DUT	Device Under Test
EDR	Enhanced Data Rate
eSCO	Extended SCO
H4DS	H4 Deep Sleep
HQ	Host Query
i.e.	*Id est*, that is
I/O	Input/Output
IC	Integrated Circuit
IF	Intermediate Frequency
IQ	In-Phase and Quadrature
LAP	Lower Address Part
LO	Local Oscillator
PCB	Printed Circuit Board
PCM	Pulse Code Modulation
PIO	Parallel Input/Output
RF	Radio Frequency
RSSI	Received Signal Strength Indication
RTS	Request To Send

Term	Definition
SCO	Synchronous Connection-Oriented
SIG	(Bluetooth) Special Interest Group
SPI	Serial Peripheral Interface
UAP	Upper Address Part
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus