



BlueCore ä 01

BlueTest Instruction Manual

AN047

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Bluetooth® Qualified

Contents

Contents	2
Introduction	3
Getting Started Simple Tests	4
Simple Tests	5
Quantitative Tests.....	10
Transmitter Only	10
Receiver Only.....	14
Loopback Test Mode	16
Configuration Commands	22
Built-in-Self Test (BIST) Routines.....	22
Miscellaneous Test Routines	42
Persistent Store Keys.....	49
Appendix 1.....	49
BIST Parameters	49
Appendix 2.....	51
Known Software Issue(s) in BlueTest Version 1.4	51
Appendix 3.....	52
Combining Tests Using a Second Unit	52
Appendix 4.....	52
Configuration Commands Available During Tests.....	53
Appendix 5.....	54
Bluetooth Packet Types	54

Introduction

BlueTest is a program that controls the on-chip built-in-self-test (BIST) software for RF testing. This document explains the facilities offered by the BIST. BlueTest does not execute any of these tests. It sends commands to **BlueCore01** and/or enables the on-chip BIST, then reports any results.

The tests fall into six categories:

- Simple RF tests; used for PCB de-bug and optimisation
- Quantitative tests for transmit and receive; used to establish the performance of the Bluetooth device.
- Loopback test modes; used for qualification and regulatory testing
- Configuration commands to set parameters for other tests
- Built-in self-test routines
- Miscellaneous test routines

Further details about commands, parameters and packet types are included in the appendices following the tests.

Running a Test

In a BlueTest dialog select the **Standard** button to display the entire test. This applies to all of the tests except for the BIT ERR1 and BIT ERR2 tests. Click on **Bit Error** to display these results in a column format.

When running the tests, the results display in a dialog box.

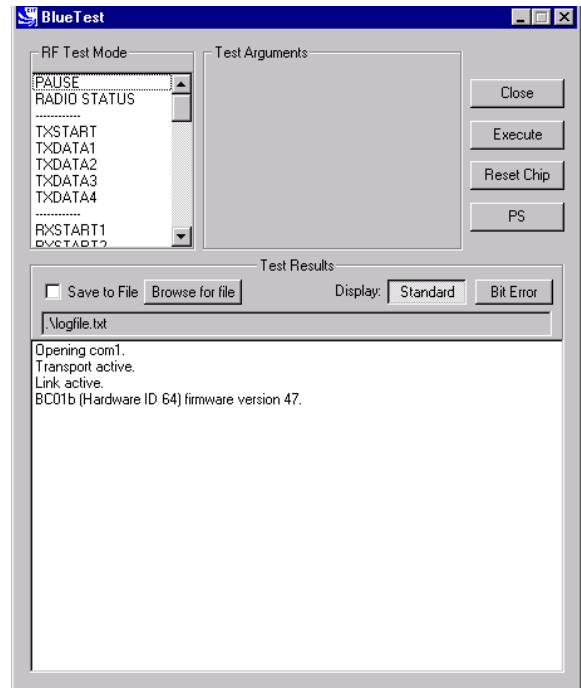
The default file name is `logfile.txt`. It is located in the current directory in which the program resides. Select **Browse for File** to create your own file name and path (using test examples provided).

To save test results to a file, tick **Save to File**.

Note: Some of these tests require two Bluetooth modules to function correctly. The PCM External Loopback test has notes specifically for use with CSR's Casira development kit.

All of the following tests are designed to run with CSR's firmware versions Beta 10.4 and above.

Several tests include entries for **Related Test Spec Name**. These refer to tests in the Bluetooth Special Interest Group (SIG) Test Specification for RF document, rev. 0.9r, dated 31 January 2000.



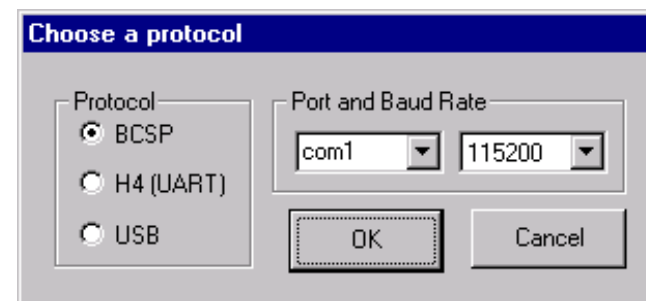
BlueTest Example Display

Getting Started

Run **Bluetest.exe**.

Select a Protocol (Default **BCSP**).

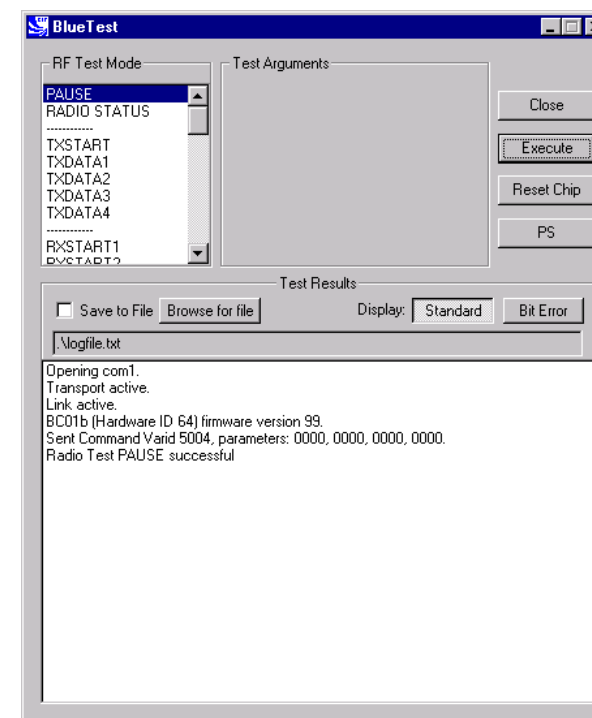
Select **Port and Baud Rate** (Default com1, 115200).



Simple Tests

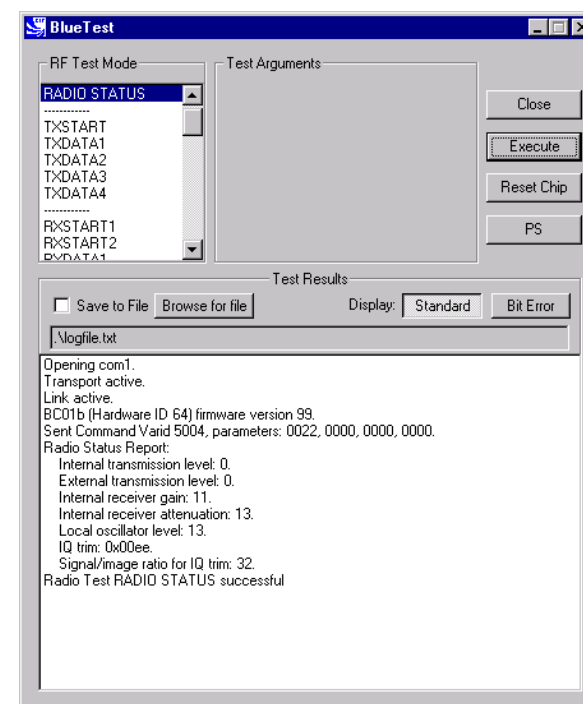
RF Test Mode

Title	PAUSE
Summary	Halts the current test and stops any radio activity.
Test Arguments	None
Return Data	None
Exit	Click on Reset Chip or enter a new command.

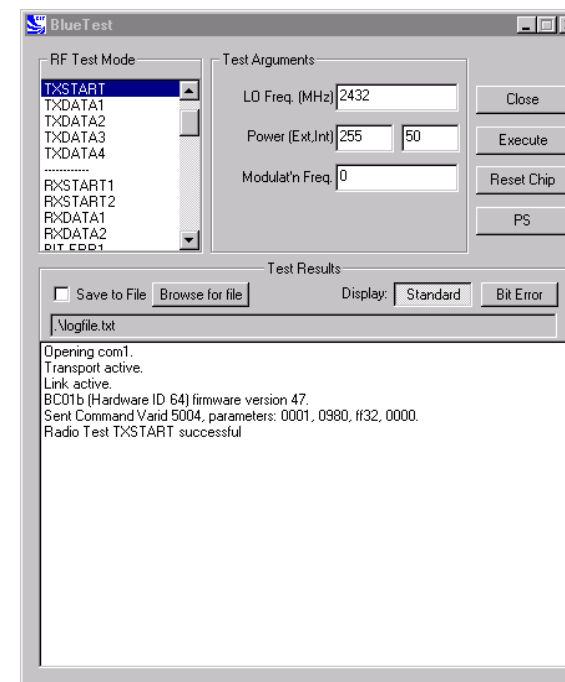


PAUSE Example Display

Title	RADIO STATUS
Summary	Returns the values from the radio control registers.
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
Exit	Click on Reset Chip .

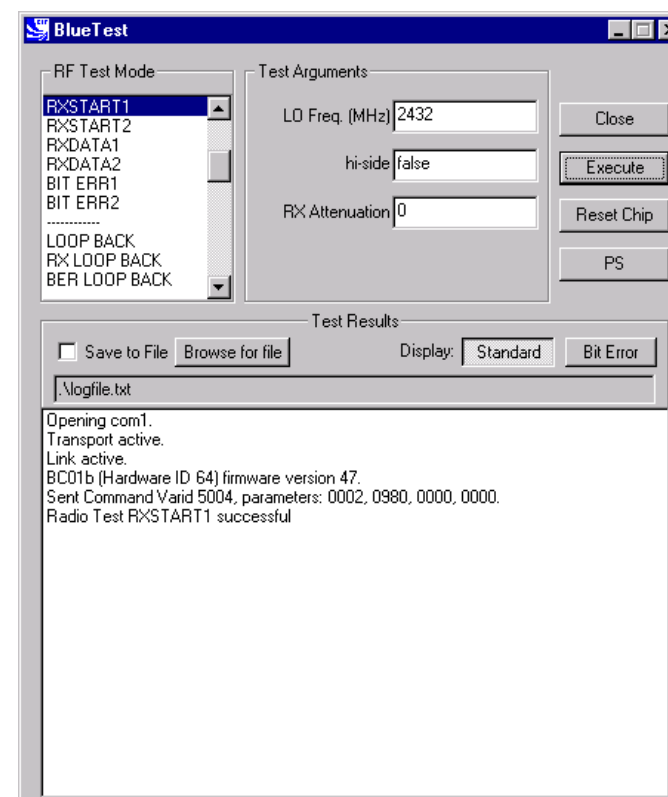

RADIO STATUS Example Display

Title	TXSTART
Summary	Enables the transmitter in continuous transmission at a designated frequency (LO Freq) with a designated output Power (Ext, Int) and designated tone modulation frequency (Modulat'n Freq).
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 (Default = 50) Modulat'n Freq = -32768 to 32767 in units of 1/4096MHz
Return Data	None Use RF Analyser to check carrier output.
Exit	Click on Reset Chip .



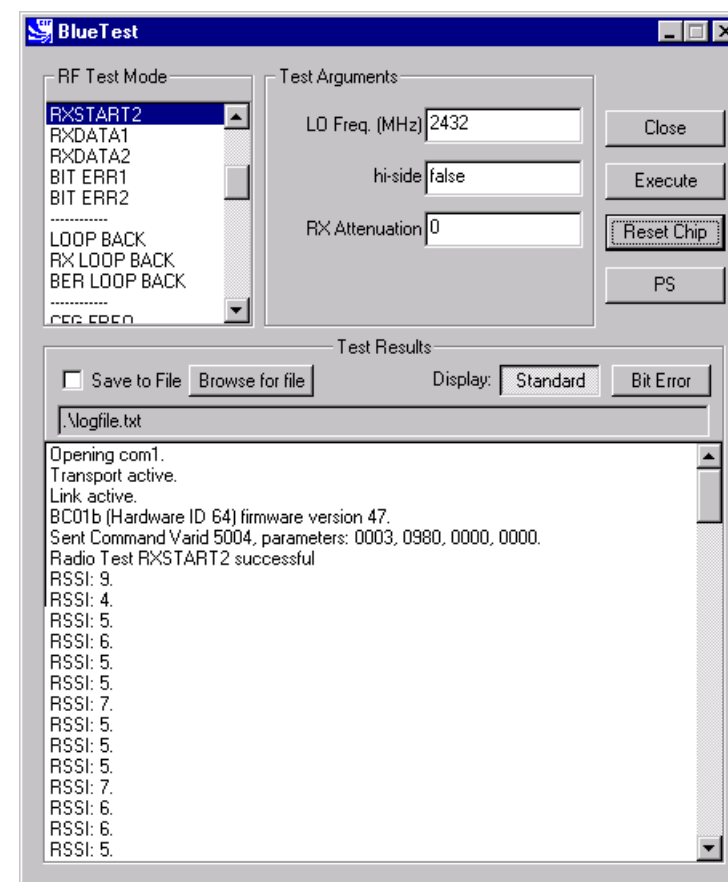
TXSTART Example Display

Title	RXSTART1
Summary	Enables the receiver in continuous reception 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). Requires a second unit to be running TXSTART. Routes final IF to TEST_A pin.
Test Arguments	LO Freq (Carrier Frequency MHz)= 2402 to 2480 hi-side (default = False) set 0 or 1 RX Attenuation = 0 to 15 (Default = 0)
Return Data	None
Exit	Click on Reset Chip .



RXSTART1 Example Display

Title	RXSTART2
Summary	Enables the receiver in continuous reception, 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). Digitises the RSSI and sends report regularly to host. Requires a second unit to be running TXSTART .
Test Arguments	LO Freq (Carrier Frequency MHz) = 2402 to 2480 hi-side (default = false) set 0 or 1 RX Attenuation = 0 to 15 (Default = 0)
Return Data	RSSI values, as a uint16, sent over BCSP channel 3 at a rate of about 10 per second. Can be saved to log file. H4 and USB use manufacturer's extensions.
Exit	Click on Reset Chip .



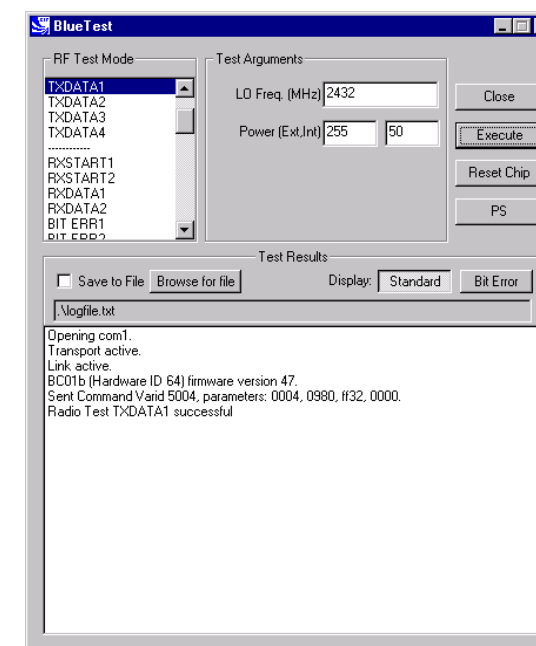
RXSTART2 Example Display

Quantitative Tests

Transmitter Only

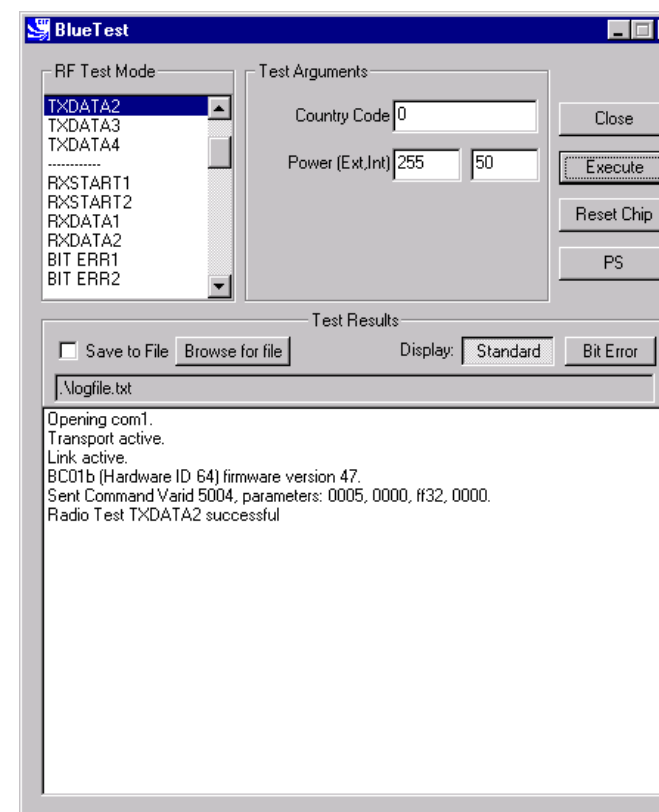
Title	TXDATA1
Summary	Enables the transmitter, with a designated frequency (LO Freq) and output Power (Ext, Int). Payload is PRBS9 data. Receiver is not operating. Packet type and duty cycle can be configured. Refer to Configuration Commands section.
Related Test Spec Name	TRM/CA/03/C (power control), 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), TRM/CA/08/C (Initial carrier frequency tolerance), TRC/CA/01/C (Out-of-band spurious emissions).
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 (Default = 50).
Return Data	None Use an RF Analyser to check carrier output.
Exit	Click on Reset Chip or select another TXDATA command.

Note: **TXDATA** and **RXDATA** require the same Bluetooth address in each module for **RXDATA** to receive data transmitted by **TXDATA**. Use **CFG_UAP_LAP** to set the address used by the BIST.



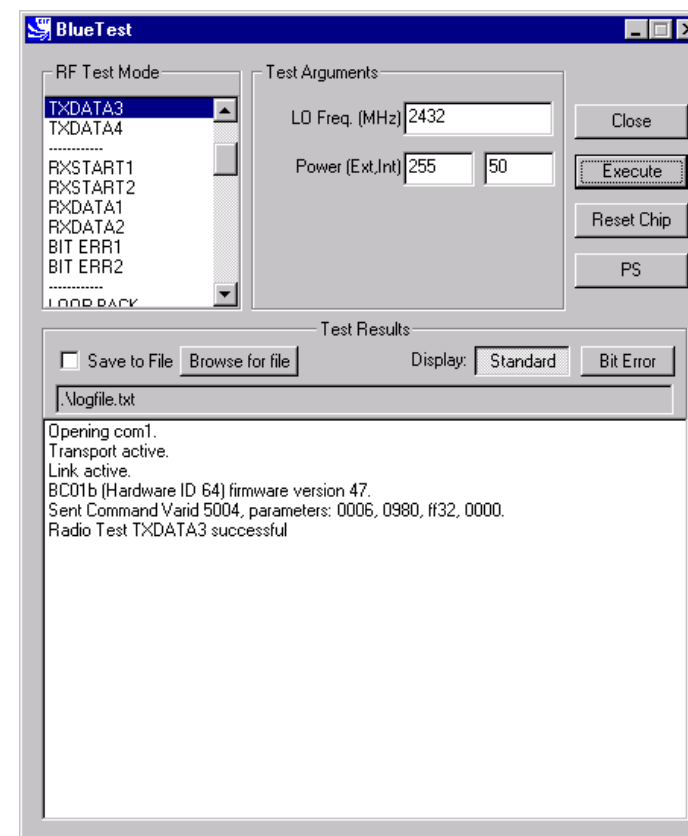
TXDATA1 Example Display

Title	TXDATA2
Summary	Enables the transmitter, with a simplified hop sequence designated by Country Code and sets output Power (Ext, Int). Payload is PRBS9 data (Default DH1). Receiver is not operating. Packet type and duty cycle can be configured. Refer to Configuration Commands section.
Related Test Spec Name	TRM/CA/01/C (output power), TRM/CA/02/C (power density)
Test Arguments	Country Code = 0 to 3 (Default = 0)
Return Data	None Use RF Analyser to check carrier output.
Exit	Click on Reset Chip or select another TXDATA command.



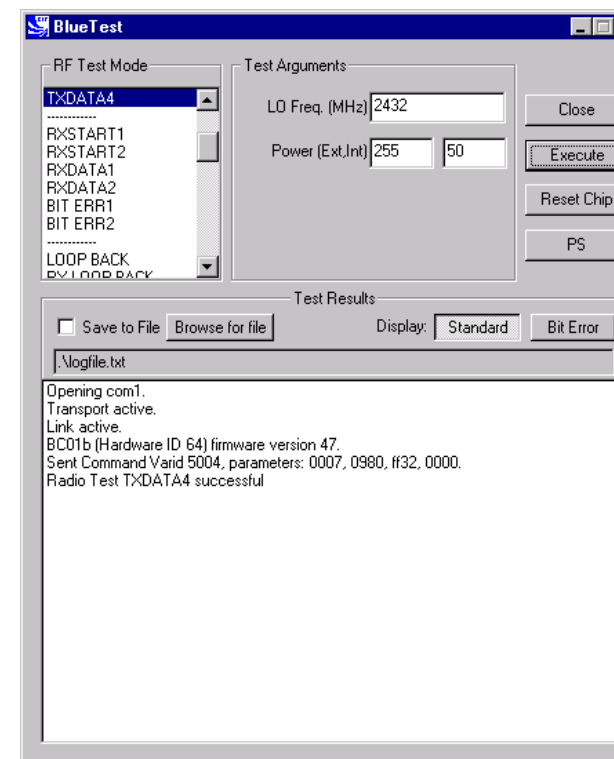
TXDATA2 Example Display

Title	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. Refer to Configuration Commands section.
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 (Default = 50).
Return Data	None Use RF Analyser to check out carrier
Exit	Click on Reset Chip or select another TXDATA command.



TXDATA3 Example Display

Title	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. Refer to Configuration Commands section.
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 (Default = 50).
Return Data	None Use an RF Analyser to check out carrier.
Exit	Click on Reset Chip or select another TXDATA command.

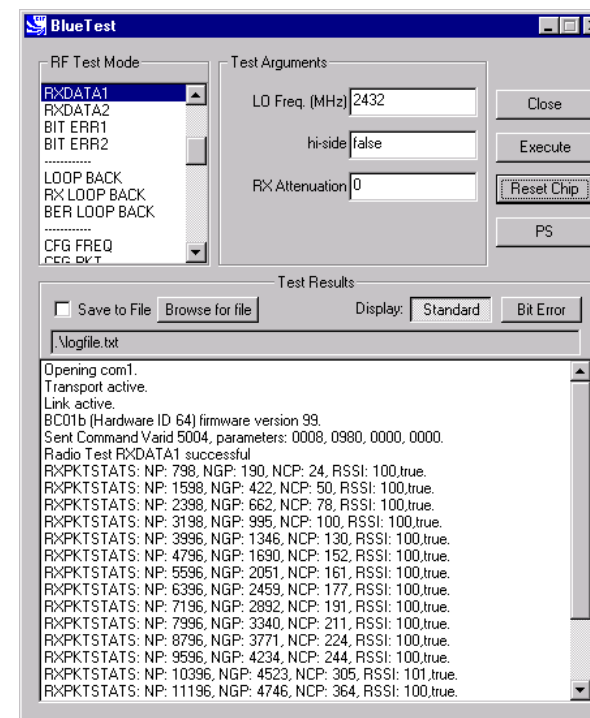


TXDATA4 Example Display

Receiver Only

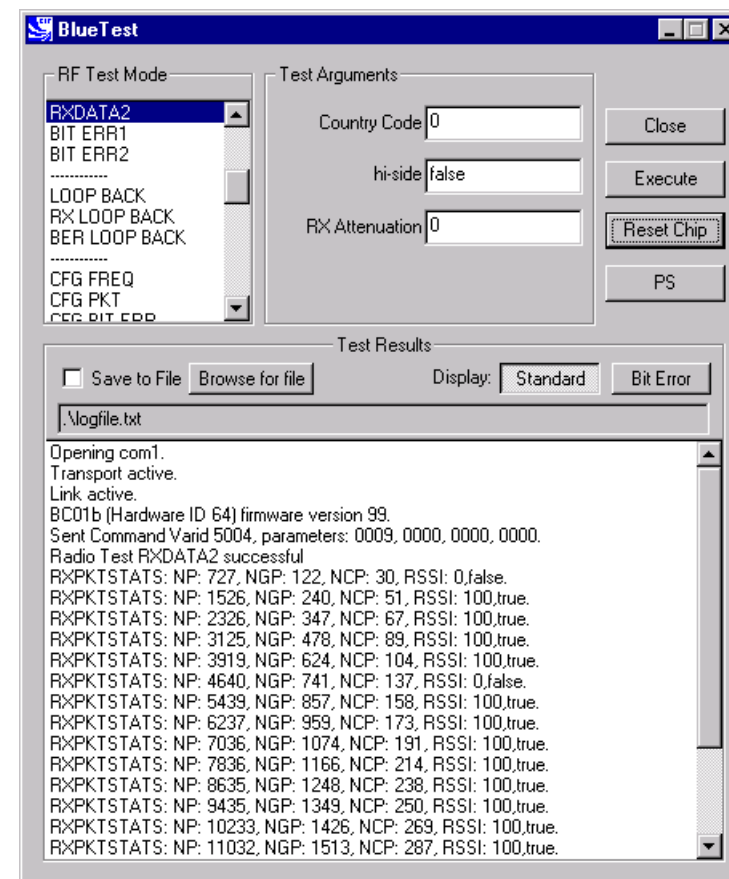
Title	RXDATA1
Summary	Enables the receiver, at a designated frequency (LO Freq) with a choice of low or high side modulation (hi-side), and with a designated attenuation setting (RX Attenuation). The software counts the number of received packet and the number of payloads with correctable errors. The payload itself is thrown away. The time between receive slots and report frequency can be set. Refer to Configuration Commands section.
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 NP = number of good packets, NCP = number of corrected packets RSSI = value as shown True = RSSI is reliable, otherwise false The numbers wrap, rather than being reset to 0.
Exit	Click on Reset Chip .

Note: TXDATA and RXDATA require the same Bluetooth address in each module for RXDATA to receive data transmitted by TXDATA. Use **CFG_UAP_LAP** to set the address used by the BIST.



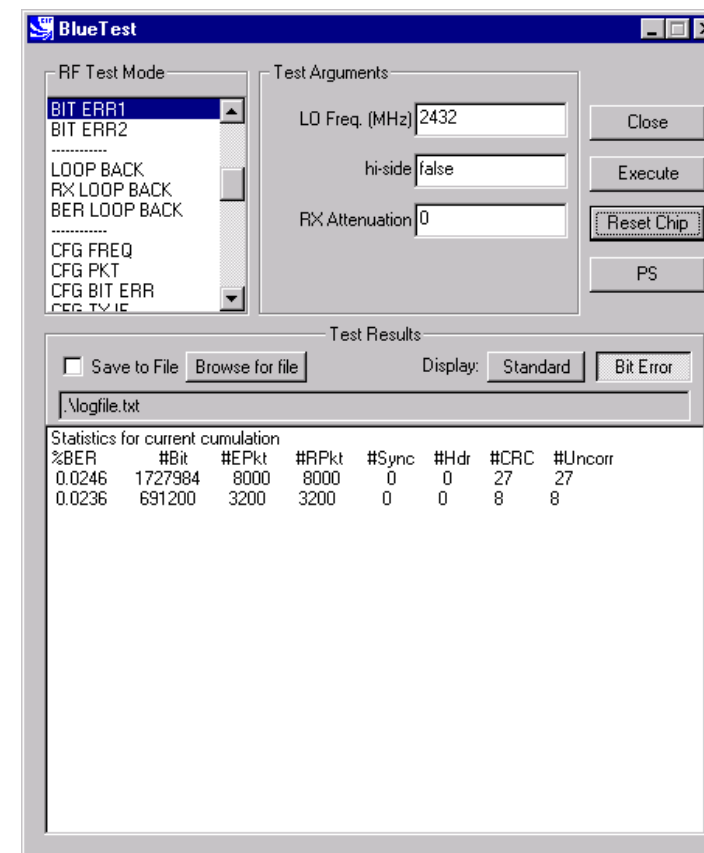
RXDATA1 example display

Title	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. Refer to Configuration Commands Section.
Related Test Spec Name	Standby mode spurious emissions (FCC test)
Test Arguments	Country Code = 0 to 3 (default = 0) hi-side = 0 or 1 (default = 0) RX Attenuation = 0 to 15 (default = 0)
Return Data	NP = number of packets NG = number of good packets NCP = number of corrected packets RSSI = value as shown True = RSSI is reliable, otherwise false The numbers wrap, rather than being reset to 0.
Exit	Click on Reset Chip .



RXDATA2 Example Display

Title	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: - 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 <code>txrx_freq</code> (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 <code>bits_count</code> (default = 1.6Mbits). Reports are sent according to <code>report_freq</code> set (default = 1 second). The times between receive slots and report frequency can be set, and the count reset. Refer to Configuration Commands section.

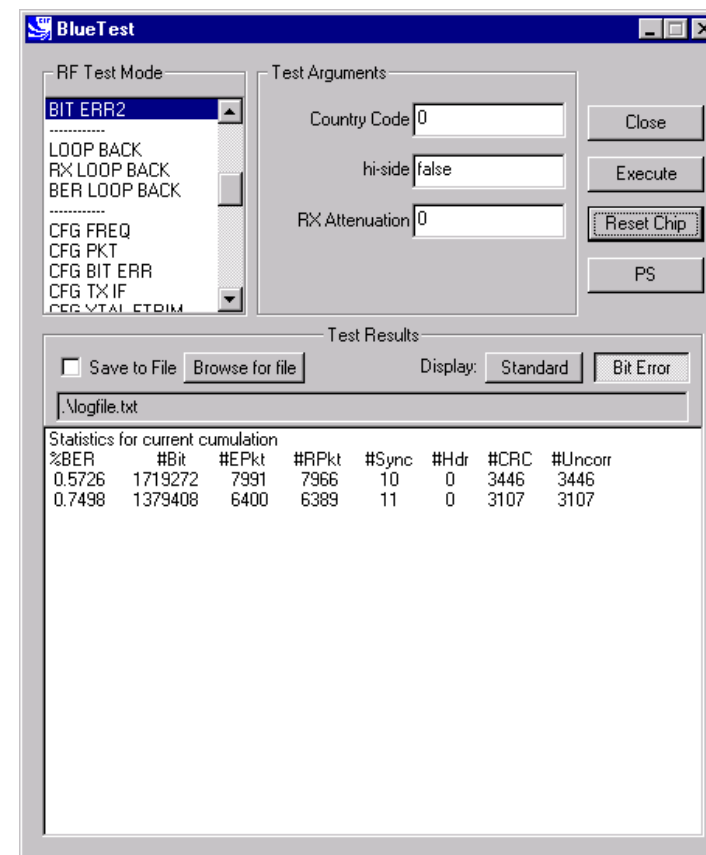


BIT ERR1 Example Display



Title	BIT ERR1 (Continued)
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)
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 (refer to BIT ERR1 Summary).
Exit	Click on Reset Chip .

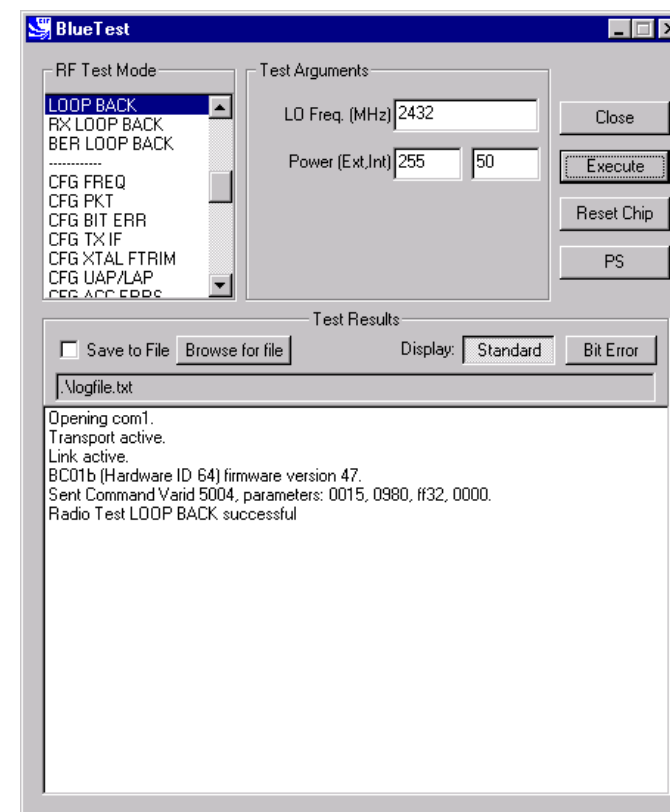
Title	BIT ERR2
Summary	Enables the receiver with simplified hopping defined by Country Code with a choice of low or high side modulation (hi-side), and with a designated attenuation setting (RX Attenuation) as for RXDATA2. Returns information on bit errors to the host as those given for BIT ERR1.
Related 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. This is a more thorough test than that possible with the 7 Layers equipment.
Test Arguments	Country Code = 0 to 3 (default 0) hi-side = 0 or 1 (default = 0) RX Attenuation = 0 to 15 (default = 0)
Note	With a second unit, execute CFG UAP/LAP to set BT address then execute TXDATA2 , then execute CFG UAP/LAP to set the same BT address on the Equipment under Test (EUT) before executing BIT ERR2 .
Return Data	Nine reports, each two uint32 values as for BIT ERR1 .
Exit	Click on Reset Chip .



BIT ERR2 Example Display

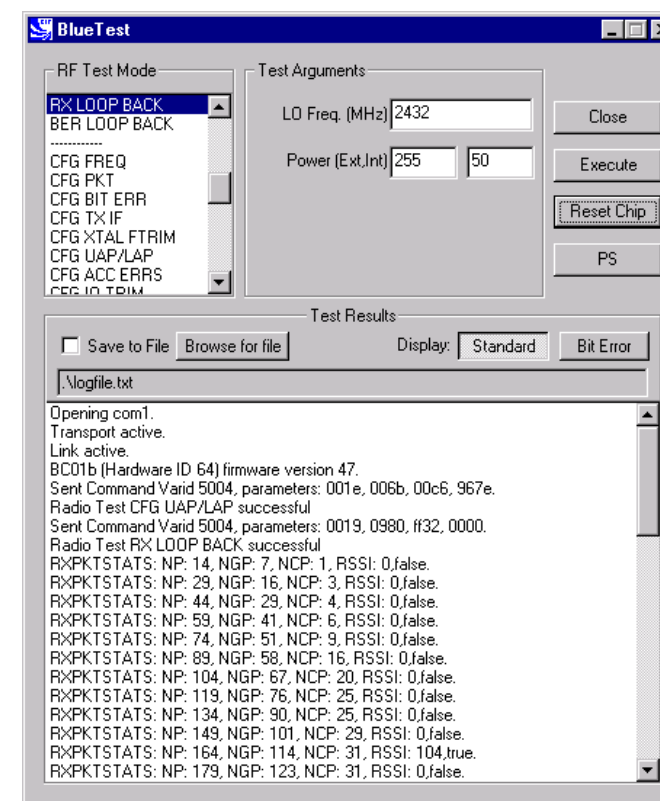
Loopback Test Mode

Title	LOOP BACK
Summary	Receives data on LO Frequency for data packets and then retransmits this data on the same channel at transmit level 'lv1'. Highside reception is off and attenuation is set to 0. Expected reception frequency, <code>txrx_freq</code> (default = 12500 microsecs) with single slot packets returned <code>lb_offs</code> after receipt (default = 1875 microsecs). Defaults can be changed. See Configuration Commands section.
Related Test Spec Name	None, but note that this test RCV/CA/01/C to RCV/CA/06/C to be performed in loopback without using the LMP commanded loopback test mode. RCV/CA/01/C to RCV/CA/06/C to be performed in loopback, but without using the LMP commanded loopback test mode.
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 (Default = 50).
Return Data	None
Exit	Click on Reset Chip .



LOOP BACK Example Display

Title	RX LOOP BACK
Summary	Transmit PRBS9 data on LO Frequency at transmit level and listen for transmissions in the next slot but one. Sends reports as RXDATA1 back to the host once per second (configurable). Highside reception is off and attenuation is set to 0. Default is single-slot packets (configurable with config_freq). This is designed to be used with a second unit in LOOP_BACK test mode.
Related Test Spec Name	None, but note that this test allows transmission to and reception from Implementation under Test (IUT) in LOOP_BACK test mode with RSSI and BER calculated from FEC.
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 (Default = 50).
Note	With a second unit execute CFG UAP/LAP to set the Bluetooth address. Execute LOOP BACK then execute CFG UAP/LAP to set the same BT address on the Equipment under Test (EUT) before executing RX LOOP BACK .
Return Data	NP = Number of packets NGP = Number of good packets NCP = Number of corrected packets RSSI = Received Signal Strength Indication True = RSSI is reliable, otherwise false
Exit	Click on Reset Chip .



RX LOOP BACK Example Display