

# BTM44X – RF Testing

## Application Note

v1.1

### Introduction

The BTM44x Enhanced Data module consists of a frequency-hopping 2.4 Ghz radio module with FCC, IC, CE and Bluetooth SIG approvals.

If the product incorporating this module requires further approvals as a composite device, there may be a requirement to manipulate the BT radio in the module so it transmits continuously on any of the 80 channels.

Normally, the BTM44x module firmware ensures the radio frequency hops as per the approval requirements.

For radio testing, a Windows PC utility called BlueTest3, developed by CSR (Cambridge Silicon Radio) is required which can be made available under NDA.

The utility connects to the module via the module's SPI bus pins. The PC-to-module hardware interface is made by a USB adapter available from Digikey at: <http://parts.digikey.com/1/parts/1406287-converter-usb-spi-dev-sys-1808-1a.html>



Laird Technologies recommends for customers likely to require this testing capability that the following 5 pins on the BTM44x module should be tracked out to allow the PC to make a SPI connection to the module.

**Table 1: BTM44X pins for SPI connection**

Pin	Signal	Description
7	GND	
8	SPI_CSB	SPI bus chip select input
9	SPI_MISO	SPI bus serial output
10	SPI_MOSI	SPI bus serial input
11	SPI_CLK	SPI bus clock input

**Table 2: Module pins to RJ45 Connector Pins**

Signal	RJ45 Connector Pin
SPI_CSB	1
SPI_MOSI	5
SPI_CLK	7
SPI_MISO	3
GND	8

## RF Testing Software Installation

Once there is an NDA in place, obtain Bluesuite from Laird (radio testing tool chain). After installation, which makes many utilities available, invoke either BlueTest or BlueTest3, depending on your version of the installer. Also install the USB driver that was supplied with the USB to SPI adapter.

## RF Testing Procedure

No special preparation is required to preconfigure the module to be in test mode.

### Starting BlueTest

Run the BlueTest3 application. A dialog box appears titled "Choose a Protocol". In the Transport dropdown, select **SPI**. This reveals the Port dropdown. In the Port dropdown, select **USB SPI (241690)**.

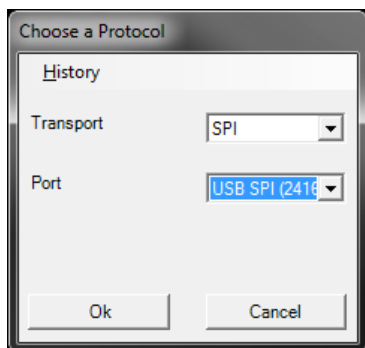


Figure 1: "Choose a Protocol" window

Click **OK**. The main BlueTest3 window opens and reports the connection status. When the link is established the firmware version is reported (Figure 2).

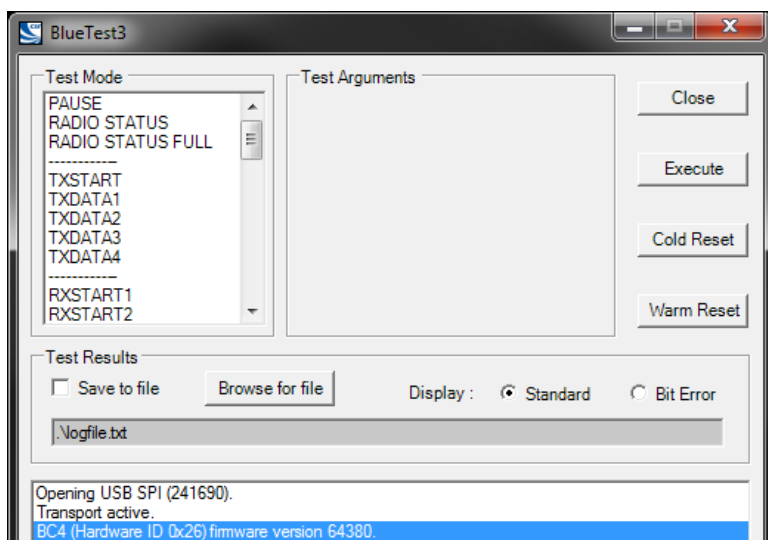


Figure 2: Firmware version reported in BlueTest

The test modes in the top left panel (Test Mode) can now be used.

## Power Settings

For RF tests using BlueTest3, the module power settings must be set correctly. These consist of two values entered into the 'Power (Ext, Int)' boxes. **The 'Power Setting' values provided by Laird must always be used.**

## To Generate a Carrier Signal

To generate a carrier signal without modulation select 'TXSTART' from the Test Mode list. Enter the required frequency and power settings in the 'Test Arguments' panel and leave 'Modulat'n Freq' set to 0. Click **Execute**. BlueTest should report 'Radio Test TXSTART successful' (Figure 3).

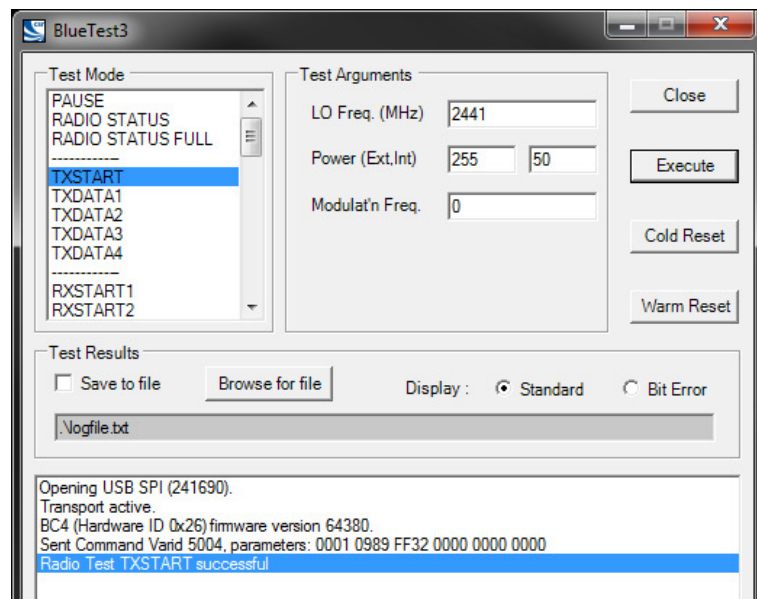


Figure 3: Radio Test TXSTART successful

To stop RF transmission select *PAUSE* from the RF Test Mode panel and click **Execute**.

## To Generate a Modulated Signal

To generate a modulated signal, select 'TXDATA1' from the 'Test Mode' list. Enter the required frequency and power settings in the 'Test Arguments' panel and click **Execute**. BlueTest reports "Radio Test TXDATA1 successful" (Figure 4).

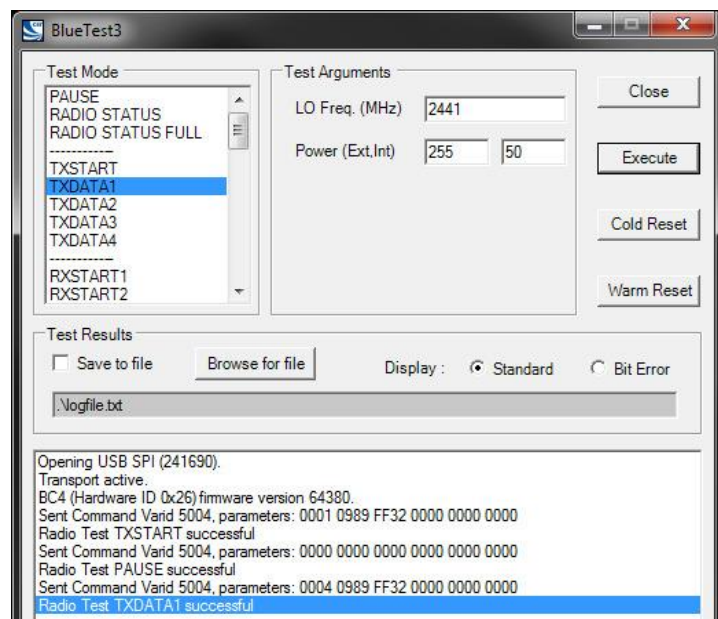


Figure 4: Radio Test TXDATA1 Successful

To stop RF transmission select PAUSE from the Test Mode panel and click **Execute**.

## Other Tests

Data packet type, size, frequency and duty cycle can be set using the CFG\_PKT and CFG\_FREQ options from the 'Test Mode' panel. Select CFG\_PKT or CFG\_FREQ, enter the required values for the arguments in the Test Arguments panel and click **Execute**. Figure 5 shows the typical settings required for a packet type of 4:

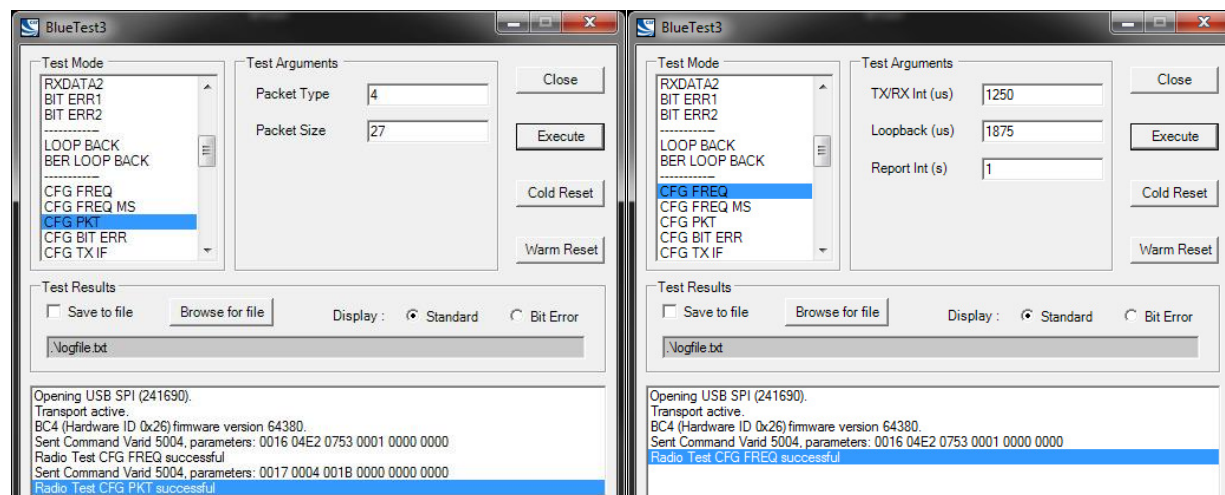


Figure 5: Settings for packet type of 4



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## REVISION HISTORY

Revision	Date	Description	Approved By
1.0	20 Oct 2011	Initial Release	Jonathan Kaye
1.1	20 Jun 2013	Updated images	Sue White