AB161x LabTest Tool Users Guide

Version: 1.1
Release date: 25 January 2019

Document revision history

Revision	Date	Description
1.0	11 Dec 2018	Initial version
1.1	25 Jan 2019	Add NVKEY HW Selector

Table of contents

Lists of tables and figures

1. Overview

The Airoha AB161x series LabTest Tool provides a quick-to-download FW and test suite for easily tuning the frequency on Airoha AB161x devices. Two basic test functions (i.e. TX and RX) are included in this utility. You can use this tool to perform continuous TX, Burst TX, and RX BER tests on Airoha AB161x series products.
Note: You must first use the MPTOOL to download the FW so you can load the FT calibration data into the Flash.

Before using the AB161X series LabTest Tool, the hardware must be correctly set up as shown in the following image.

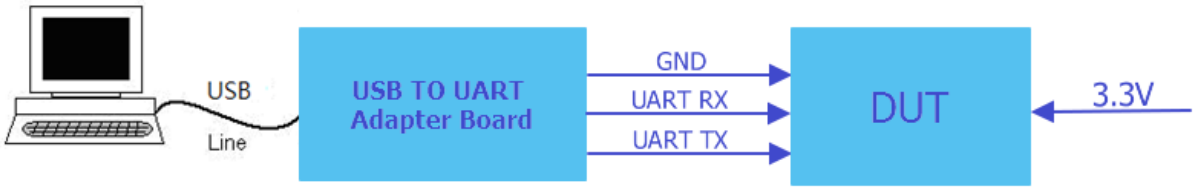

Figure 1. Connection Block Diagram

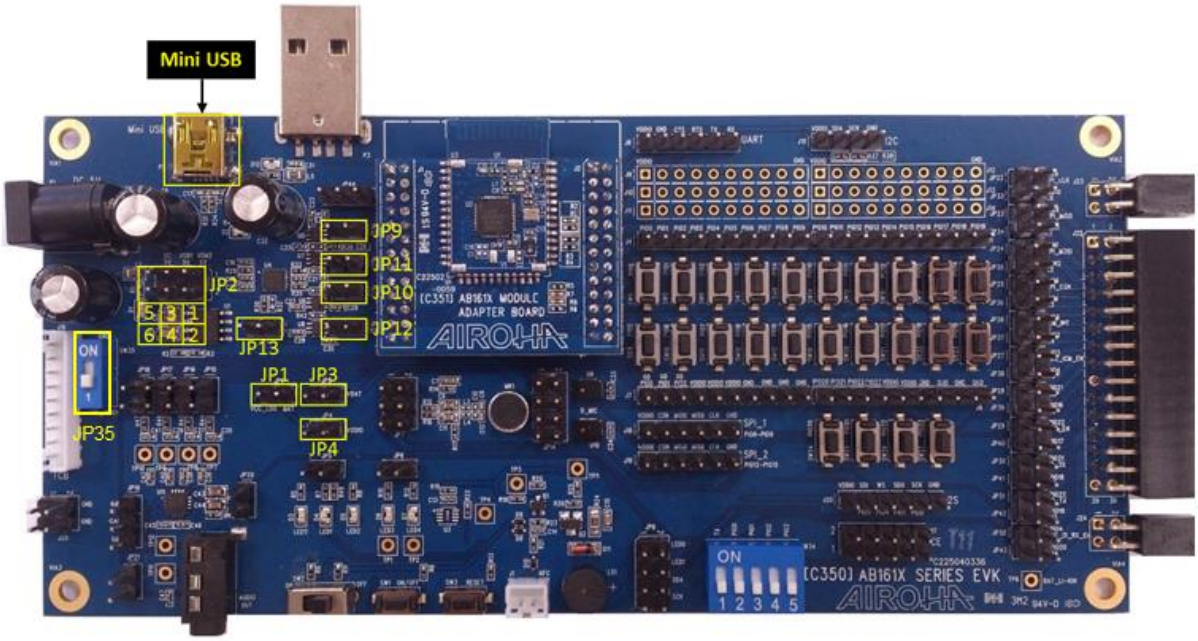

Figure 2. Top view of the AB161x Series Evaluation Board

Table 1. USB to UART jumper setting for download mode

Jumper / Mode	JP1	JP2	JP3	JP4	JP9	JP10	JP11	JP12	JP13	JP35
Mini-USB	O	3-4	O	O	X	X	O	O	O	ON

1.1. Supported chips

The Airoha AB161x Series LabTest Tool is compatible with the AB1611 and AB1613 chipsets.

2. Firmware Update

2.1. Quick start

You must install the LabTest Tool software if this is your first time using this tool on your PC.
You must prepare the following items to start the LabTest tool:

1) A *.bin file (provided)
2) An AB61x Series module
3) An AB161x Series EVK
4) Switch JP35 to on (OD_GPIO1 = Low) and power on. Put the DUT into Engineering mode, as in Figure 3.

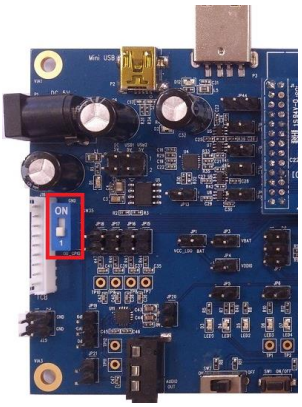

Figure 3. AB161x EVK Engineering mode setting

5) Double-click the Airoha.Tool.Kit.exe file to start the LabTest Tool, as shown in Figure 4.

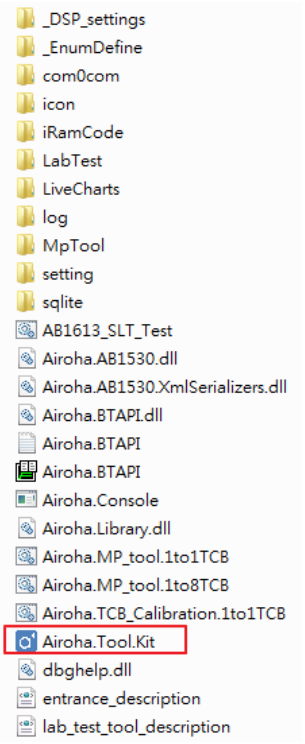

Figure 4. Software Path

A window opens so you can select the tool, as shown in Figure 5.

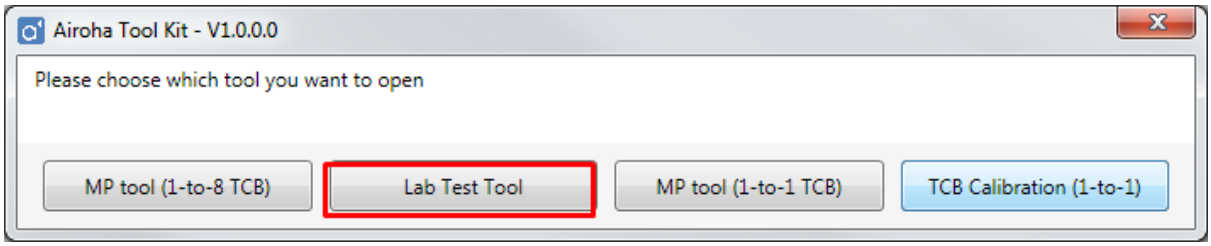

Figure 5. Tool selection window

6) Select a COM port for a specific device, as shown in Figure 6.

7) Click the  button to open the "Serial Port Settings" window, set the baud rate to 2000000, and then click "Apply" button, as shown in Figure 6.

8) Click the  button to enable the COM port and connect to the AB161x, as shown in Figure 6.

Note : If the  button changes to  , the AB161x LabTest Tool has communicated with AB161x chipset and can start updating the firmware. If the tool cannot communicate with the AB161x chipset, please check UART baud rate and whether OD_GPIO1 has been pulled low.

9) Click the "Browse…" button to select the location of the firmware, as shown in Figure 6.

10) Click the "Write Data" button to download the firmware, as shown in Figure 6.

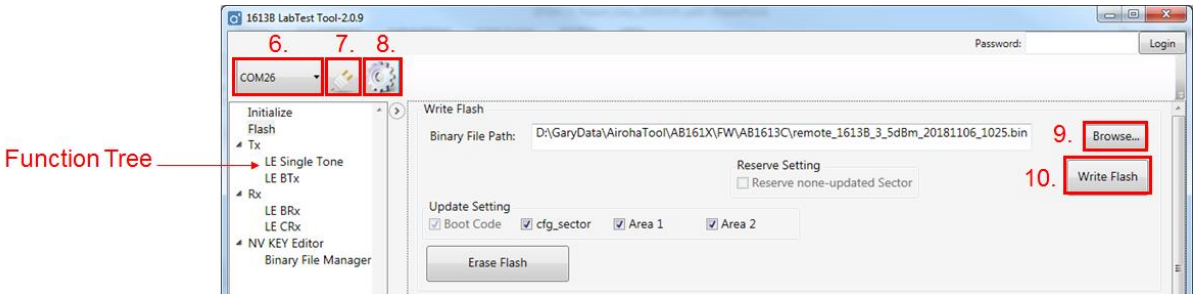

Figure 6. Tool Window

11) Click the “OK” button to finish writing, as shown in Figure 7.

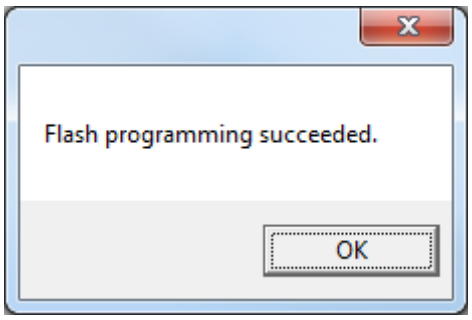

Figure 7. Flash write success Window

12) Click the button to release the COM port.

13) Switch JP35 to 1 (OD_GPIO1 = High) and press the Reset key (SW3).

The procedure is now complete.

2.2. NVKEY Editor

You can use the BT Tester to measure for frequency drift accuracy and whether the RF output power meets expectations. This function can be used to fine tune new parameters (e.g., Crystal Trim SPEC and GC Value) and apply new settings to FW.

When you complete setting up the fine tune the NV KEY Editor, the DUT must use the new FW version and rerun the MPTOOL until it meets the Mass production specification.

Please use the FW with the final parameter settings for the Mass production test.

1) Crystal 32M Config:

This item trims the crystal offset by measuring the frequency offset of the crystal signal using *TCB*.
The 'Spec' is the accuracy requirement for the crystal trim, as shown in Figure 8.

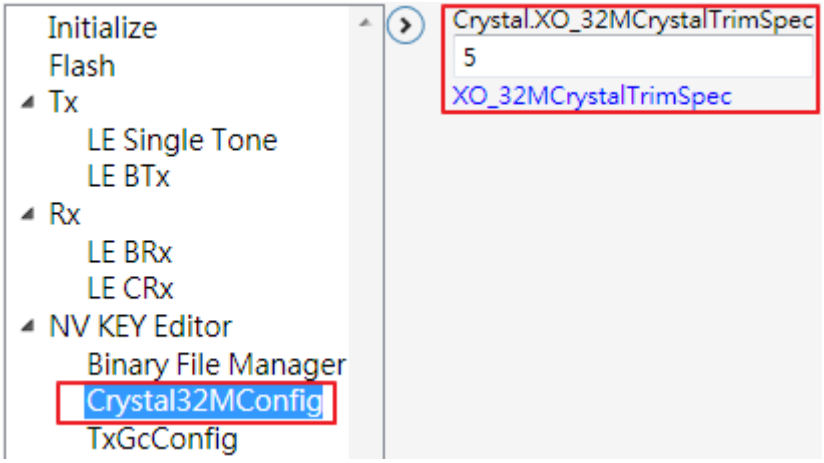

Figure 8. Crystal specification setting

2) TxGcConfig

If TX power does not meet the specification when you measure the RF, you can fine tune the GC Value setting as shown in Figure 9.

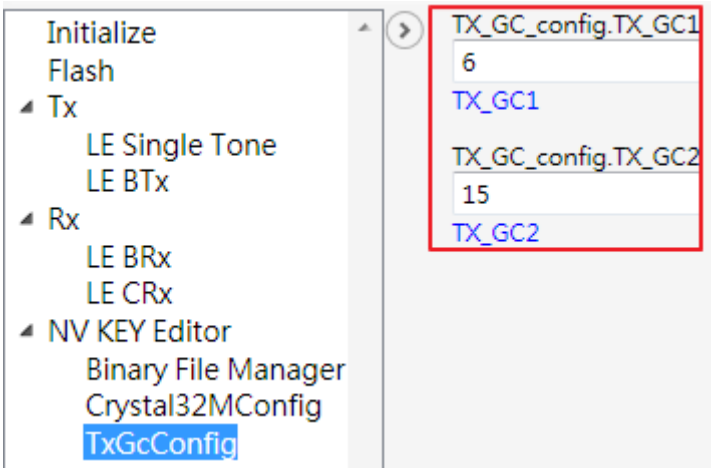

Figure 9. TX GC setting

3) HW Selector

In the HW Selector section, you can see the hardware settings; include Power, Buck、LDO and Crystal as shown in Figure 10.

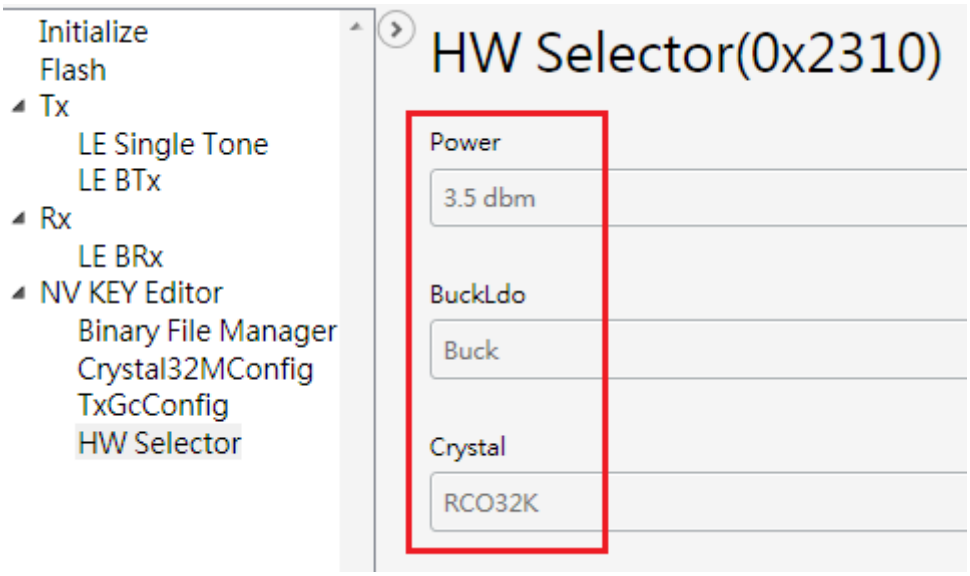

Figure 10. HW Selector

2.3. Creating new firmware parameters

1) Click the “Binary File Manager” button, as shown in Figure 11.

2) Click the “Browse…” button to select the location of FW, as shown in Figure 11Figure 11.

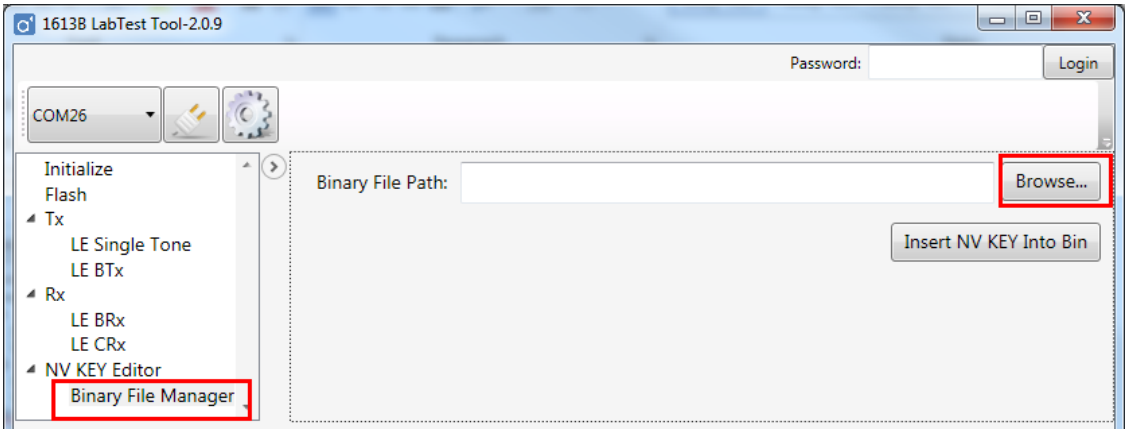

Figure 11. Loading Previous version of FW settings

3) Click the “Crystal32MConfig” button to set the crystal trim parameters, as shown in Figure 12Figure 12.

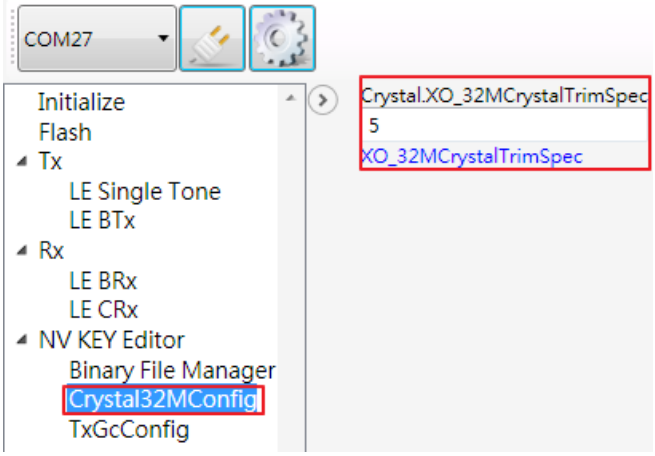

Figure 12. Fine tune crystal

4) Click the "TxGcConfig" button to set the GC value parameters, as shown in Figure 13.

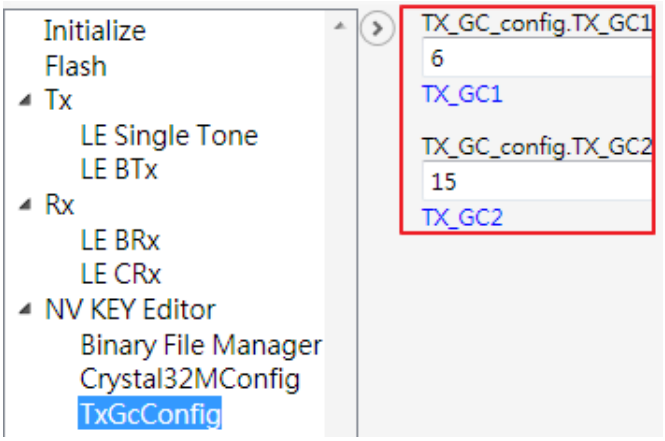

Figure 13. TX GC setting

5) Click the "Binary File Manager "button, as shown in Figure 14.

6) Click the "Insert NV Key into Bin" button to create the new FW, as shown in Figure 14.

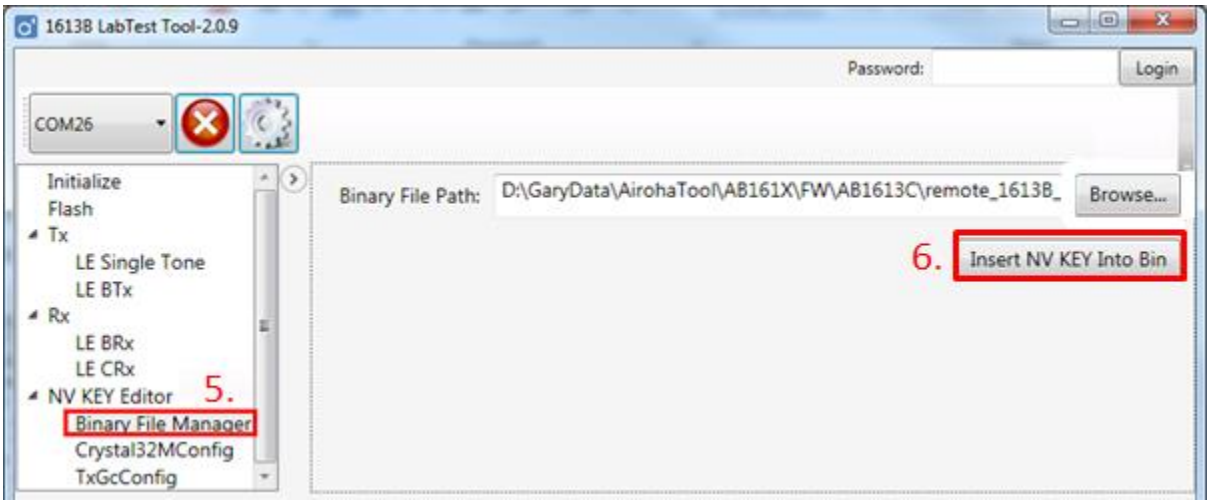

Figure 14. Tool setting

7) Create a new file name, as shown in Figure 15.

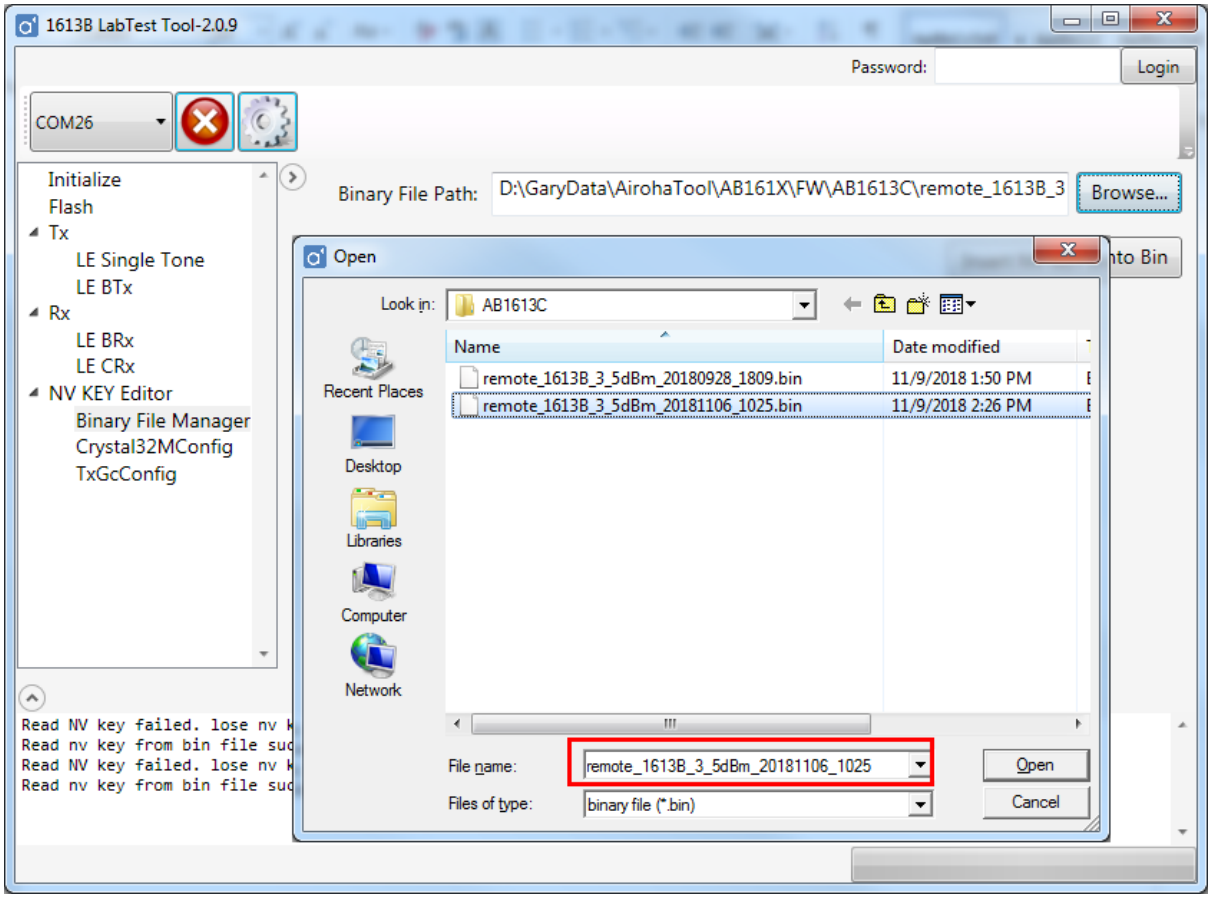

Figure 15. Create a new setting FW

8) Click the "OK" button to complete writing the new settings, as shown in Figure 16.

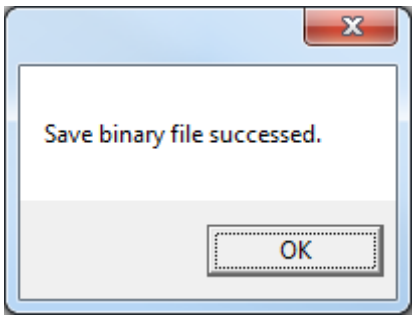

Figure 16. FW setting success

The procedure is now complete.

3. Fixed Frequency Test Environment Setup

3.1. Hardware setup

A UART interface is used for the PC-to-DUT connection. You can also use a USB-to-UART adaptor on the PC side to connect to the DUT side. A reference connection diagram is shown in Figure 17.

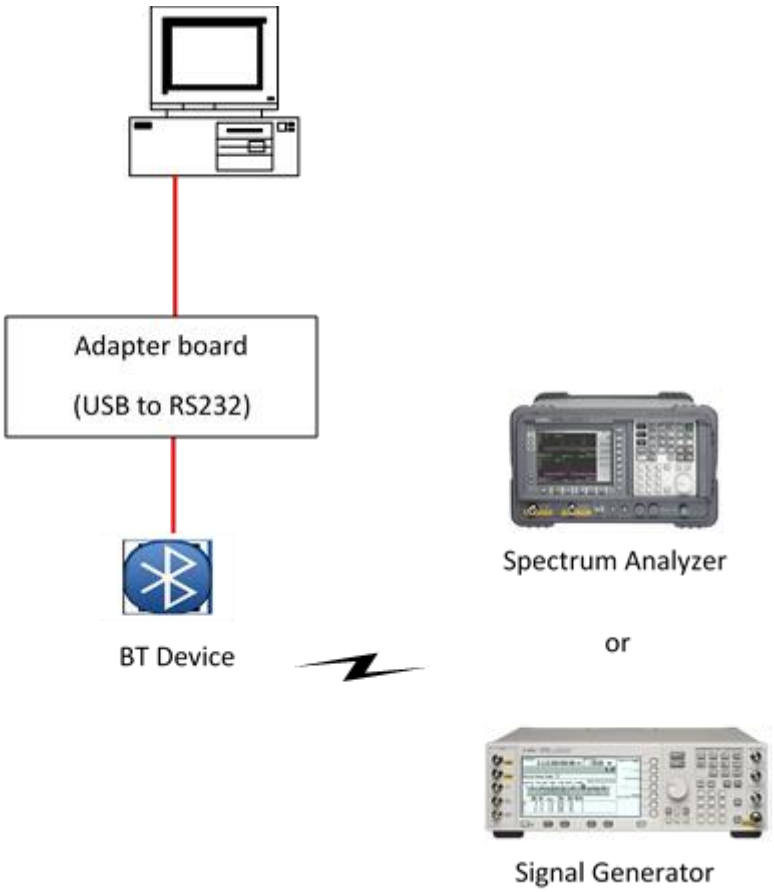

Figure 17. Hardware setup

3.2. Connection process

4) Select “Initialize” in the panel on the left, as shown in Figure 18.
5) Set SW35 to on (OD_GPIO1 = Low) and power on.
6) Set SW35 to 1 (OD_GPIO1 = High)
7) Set the baud rate to 115200 and click the button to enable the COM port and connect to AB161x, as shown in Figure 18.
8) Click the “start LabTest Tool “button, as shown in Figure 18.

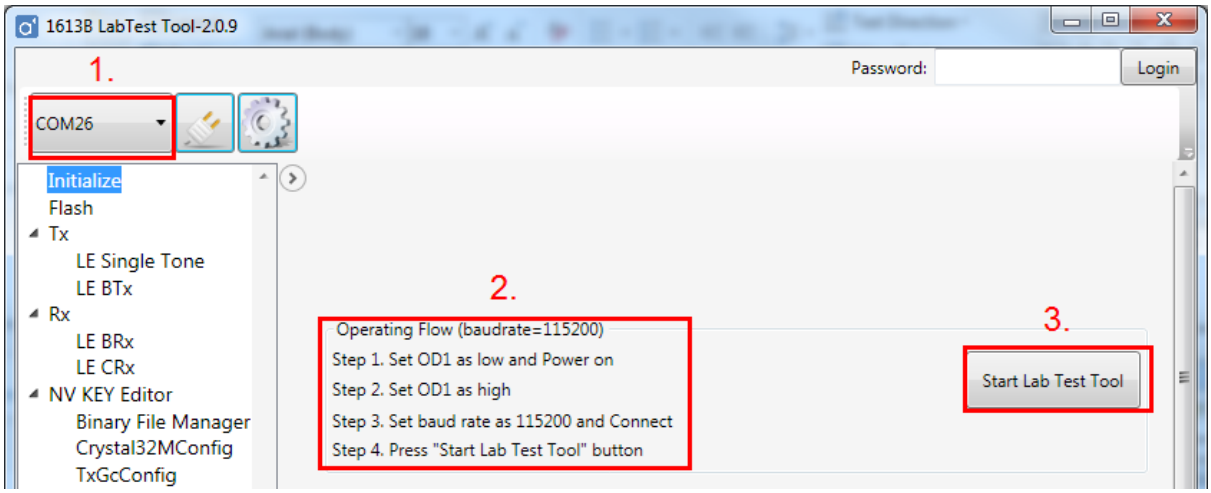

Figure 18. Into to Fixed frequency function setting

9) Click the “OK” button to complete making changes to the setting, as shown in Figure 19.

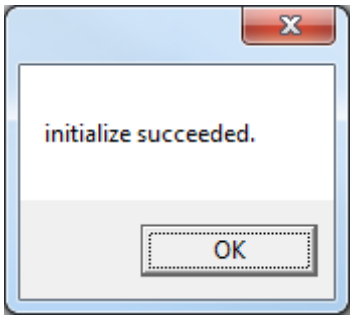

Figure 19. Setting success

10) You can now start the Fixed frequency test

4. Tx Test

There are two modes supported in the TX test functions: Single-tone TX and Burst TX.

4.1. Single Tone Transmission

When Single Tone is selected for Tx, a continuous single-tone signal without any modulation (i.e. Carrier Only) is sent from the RF port. You can set a different RF frequency and TX power setting on the parameter block and then click the 'Execute' button to start the single tone transmission. The RF frequency range is between 2402 and 2480MHz, and the Tx GC1 range is between 0 and 6. The other of TX GC2 range is between 0 and 15

Note: TX GC1 is used for RF power less than 0 dBm

TX GC2 is used for RF power more than 0~9dBm

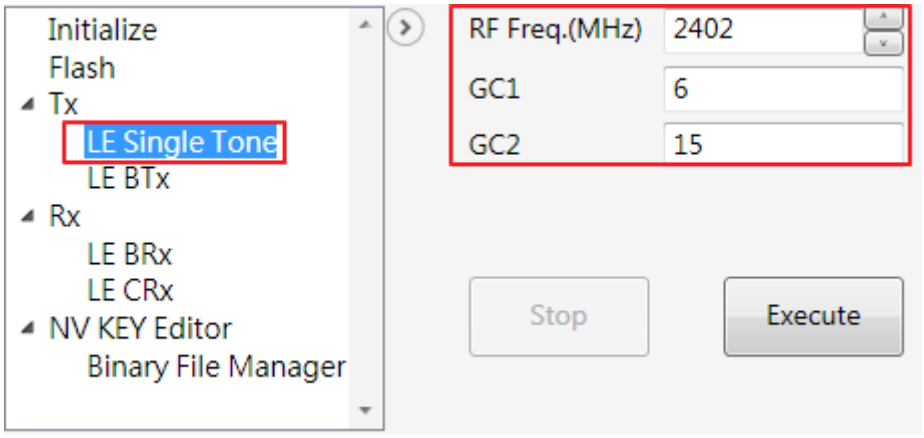

Figure 20. Single tone transmission settings on the Tx tab

4.2. LE Burst Data Transmission

When LE BTx is selected for Tx, a burst-type modulated signal with PDU header/PDU length is sent from the RF port. You can select a RF frequency to transmit, then set a TX GC value, modulation type (e.g., 1Mbps for BT4.0, and 2Mbps for BT5.0), and data type (e.g., all 0, all 1, 1010, 11110000, and PN). Then click the 'Execute' button to start transmitting the packet.

To hop within specific channels, select the 'Enable Hopping' checkbox and set the channel information in 'From Channel __ to __' fields. The tool automatically ignores the RF frequency value in the 'RF Freq.(MHz)' textbox. When the channels are set, click the 'Execute' button to start hopping through the selected channels.

You can click the 'Stop' button to stop this function when it is executed.

You can set the number of packets to be transmitted (1 to 65536) in the Package Count section. The LE burst data transmission stops when it reaches this specific number.

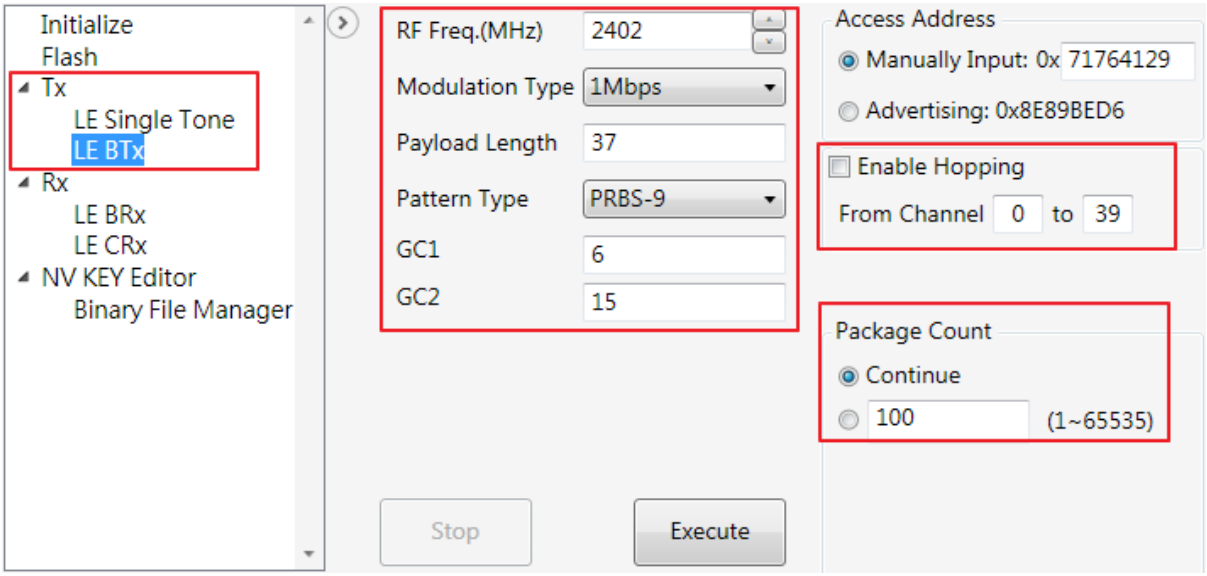

Figure 21. LE burst data transmission settings on the Tx tab

5. Rx Test

Burst Receiving is used for CE/FCC tests. Packet Receiving is used for bit error rate (BER) calculation.

5.1. LE Receiver Test

When Rx: LE BRx is selected, you can select a RF frequency for receiving LE packets, set a modulation type (i.e. 1Mbps for BT4.0, and 2Mbps for BT5.0), and then click the 'Execute' button to start receiving LE packet data.

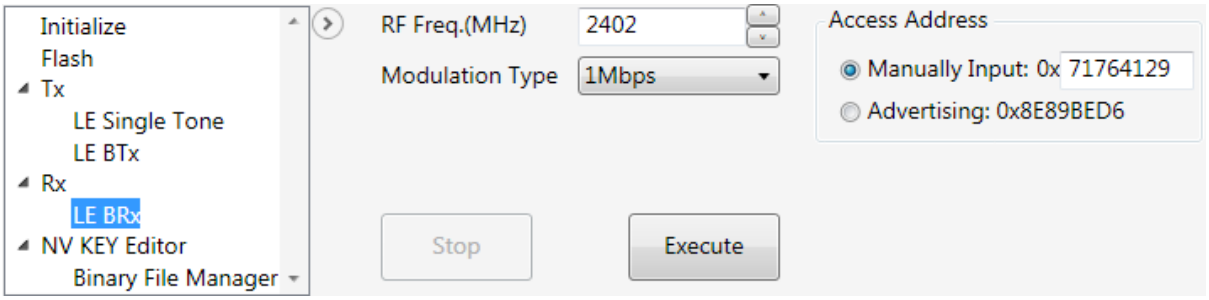

Figure 22. LE receiver test settings on the Rx tab