

RF Tool User Guide

Revision History

Date	Version	Description
June 15, 2020	0.50	Initial version created.
December 2, 2020	0.51	Corrected typos.
April 14, 2021	0.52	Updated format, no content change.
August 23, 2021	0.53	Updated baud rate in Figure 5 - RF Tool Interface Setting

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Overview

The document provides instructions on how to install and use Atmosic RF Tool to test Tx and Rx RF performance. Customers can use it to perform Tx output power test and Rx sensitivity test. It is also a tool for FCC/CE pretest and certification

Environment Setup

A complete set of the test suite includes:

- PC x1 (Windows 10, Windows 8.1, Windows 7 SP1*, Windows 8*)
- ATM2/3 EVK x1
- Interface Board x1
- Type A to Micro USB cable x 1

[Figure 1](#) shows the connection setup between PC, Interface board and EVK

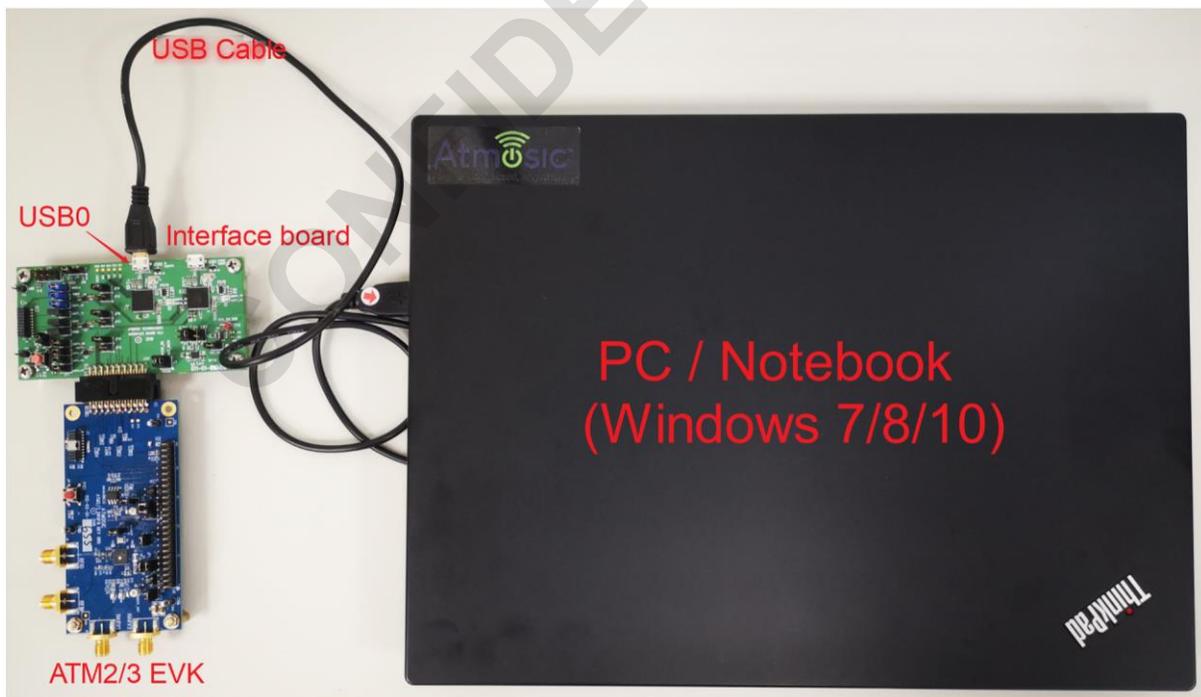


Figure 1 - RF Tool Hardware Environment

Download Software

- The tool is typically located at Customer Gateway under

- ATM3_2X/HW/HW_Tools/rftool_v1.x_click_runui.bat_for_GUI_mode.zip
- Extract the .zip file
- There is a “runui.bat” file inside the folder. Double click to execute after the DUT is powered on properly as [Figure 2](#).

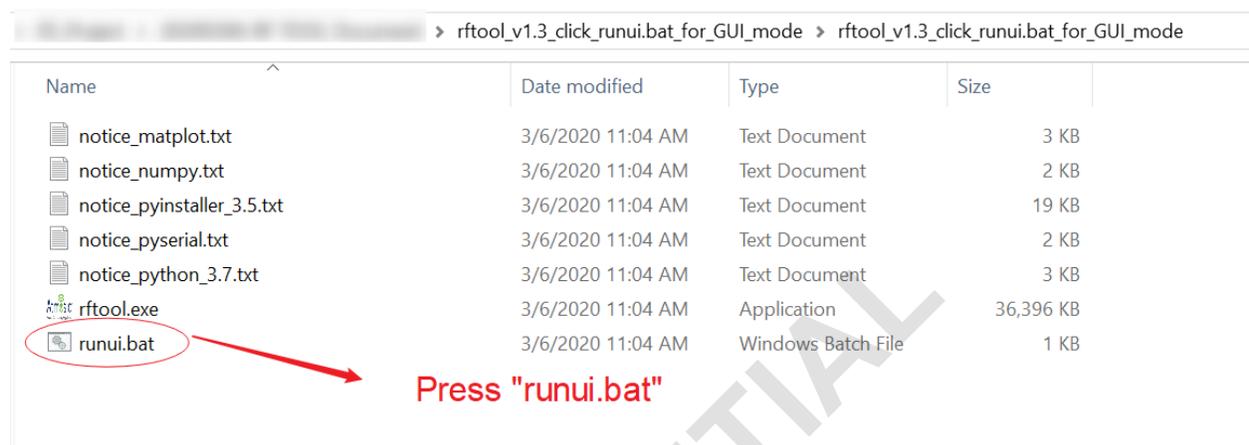


Figure 2 - “runui.bat” File in RF Tool Folder

Power on DUT

(Refer to EVK User’s Guide for more details on power on the DUT)

- Connect the DUT to interface board

- Plug USB cable to USB0 (port J6) of the interface board (green color board) as shown below. Do not plug a second USB cable into USB1 (port J5) of the interface board.
- Plug the other end of the USB cable into the Windows computer, Windows will install FTDI usb-to-serial driver automatically. After the driver is installed, the device shows as a COM port in the Windows Device Manager as [Figure 3](#).

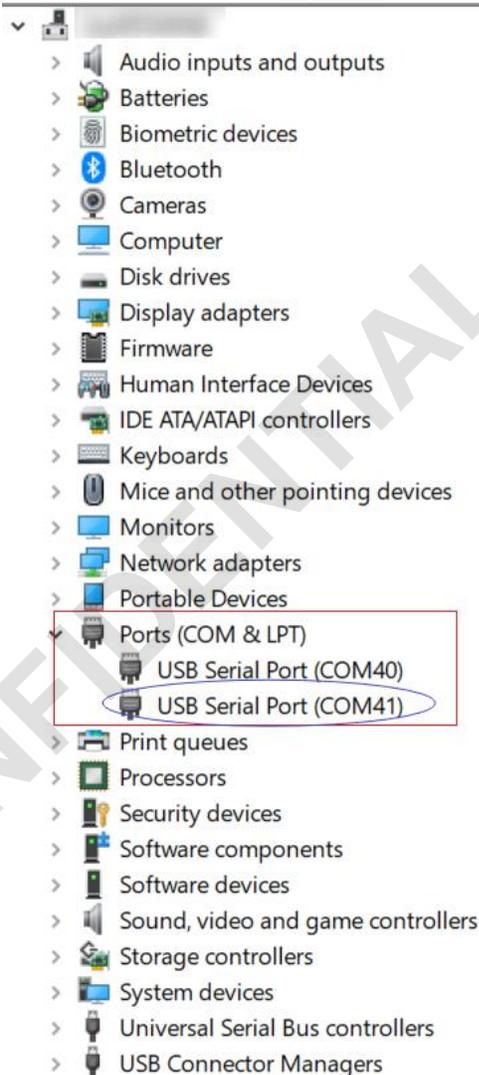


Figure 3 - New COM Ports from the Interface Board

Running the RF Tool

After power on the DUT properly and see the COM port, execute “runui.bat” , and you should be able to see the command window shown below pop-up as [Figure 4](#).

```
D:\05_Project\20200306-RF TOOL Document\rfctool_v1.3_click_runui.bat_for_GUI_mode\rfctool_v1.3_click_runui.bat_for_GUI_mode>rfctool --gui
1[Warn ]not find .ini(AtmosicRFTool.ini) file or section name(uartsave)
2[Trace ]call enum_comport
3[Trace ]Device-COM40, description-USB Serial Port (COM40)
4[Trace ]Device-COM41, description-USB Serial Port (COM41)
```

USB0, the second com port.

Figure 4 - RF Tool Command Window

Select the correct baud rate for the COM port and kit. The default baud rate is 460800 bps. Click "Open COM" to connect to the DUT. Then click the "Radio Test" item to enter the parameter setting windows as [Figure 5](#).

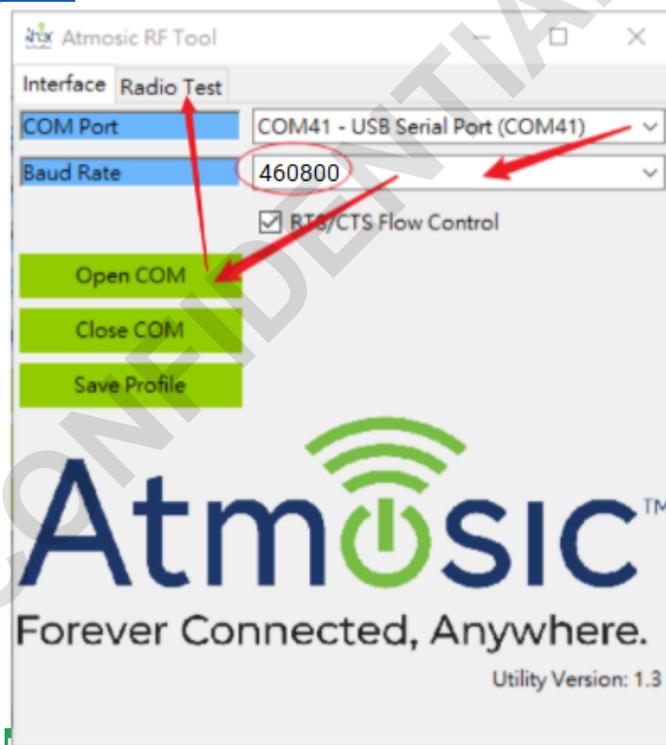


Figure 5 - RF Tool Interface Setting

Press the reset button. If the command window shows that the "Reset" command was successful, you can control the ATM 2/3 EVK via the Atmosic RF tool as [Figure 6](#).

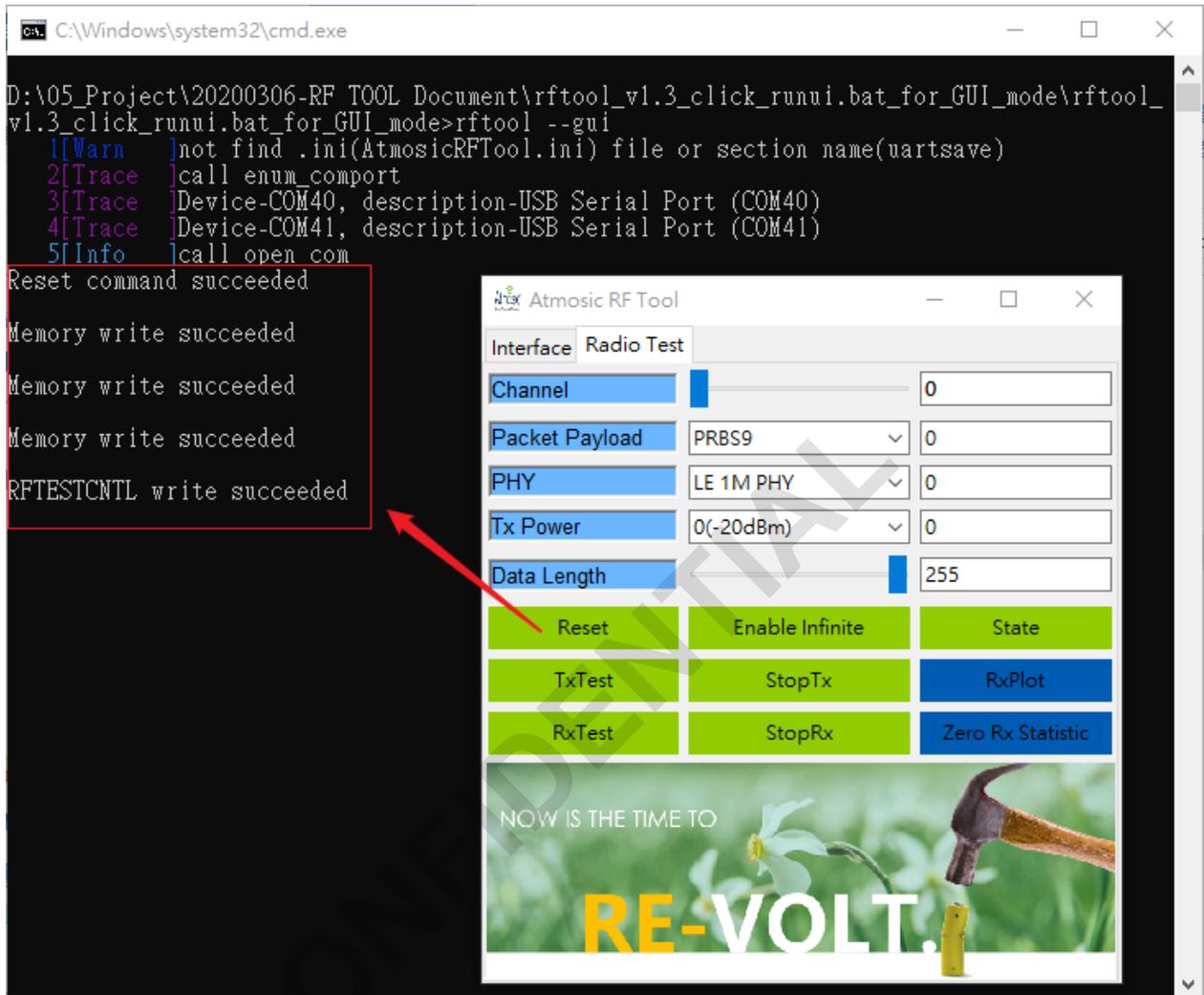


Figure 6 - Reset the ATM2/3 EVK

RF Test Functions

The RF Tool can control the ATM2/3 chipset to enter the transmit mode or receive mode. Transmit includes three modes: Burst Tx mode, Infinite Tx mode and single tone mode. Receive includes Rx mode and it can counter the receive package in a suitable setting.

The RF tool can control the ATM 2/3 chipset to enter transmit mode or receive mode. Transmit mode includes three modes: burst Tx mode, infinite Tx mode and single tone mode. Receive moden includes the Rx mode which can use appropriate settings to count the number of packets received.

[Figure 7](#) shows the RF Tool user interface and test items. According to [Figure 7](#), detailed descriptions of the test items are in [Table 1](#).



Figure 7 - RF Tool User Interface and Test Items

Table 1 - Radio Test Items Description

Items	Name	Description	Notes
1	Channel	Bluetooth LE RF channel	There are 40 channels from CH0 (2402 MHz) to CH39 (2480 MH). It can be adjusted by typing or by using the slider.
2	Packet Payload	Bluetooth LE standard packet payload format	Packet Payload include: PRBS9/ 11110000 /10101010/ PRBS15/ 11111111/00000000/00001111/01010101
3	PHY	RF PHY	RF PHY include: LE 1M PHY/ LE 2M PHY/ LE Coded PHY(S=2)/ LE Coded PHY(S=8) / Single Tone
4	Tx Power	Tx output power setting	Tx output power level include: 4 dBm/ 2 dBm/ 0 dBm/ -2 dBm/ -4 dBm/ -6 dBm / -10 dBm/ -20 dBm
5	Data Length	Payload length	The payload length rengen is from 1 to 255. It can be adjusted by typing or by using the slider
6	Reset	HCI reset command	HCI reset command: 0x01030C00
7	Enable Infinite (Disable Infinite)	Enable/Disable Infinite Tx mode	Enable or disable Infinite Tx mode. With this button, all the PHY settings can be defined as the "Infinite Tx mode" or "Burst Tx mode".
8	State	Burst Tx mode or Infinite Tx mode	Display the infinite state in the command window. Infinite Tx mode, show " infinite is 1" Burst Tx mode, show " infinite is 0"
9	TxTest	Turn on Tx function	Start transmitting the RF signal
10	StopTx	Turn off Tx function	Stop transmitting the RF signal
11	RxTest	Turn on Rx function	Start receiving the RF signal
12	StopRx	Turn off Rx function	Stop receiving the RF signal
13	Rxplot	Plot the receive package numbers	Rx communication test. This function can simply verify that the EVK Tx / Rx function can work normally without an instrument.
14	Zero Rx Statistic	Received package numbers reset to 0.	Reset the received package number.

Tx Test

There are three modes supported in the Tx Test: Burst Tx mode, Infinite Tx mode and Single tone mode. [Figure 8](#) shows the ATM2/3 EVK Tx test environment.

Spectrum Analyzer

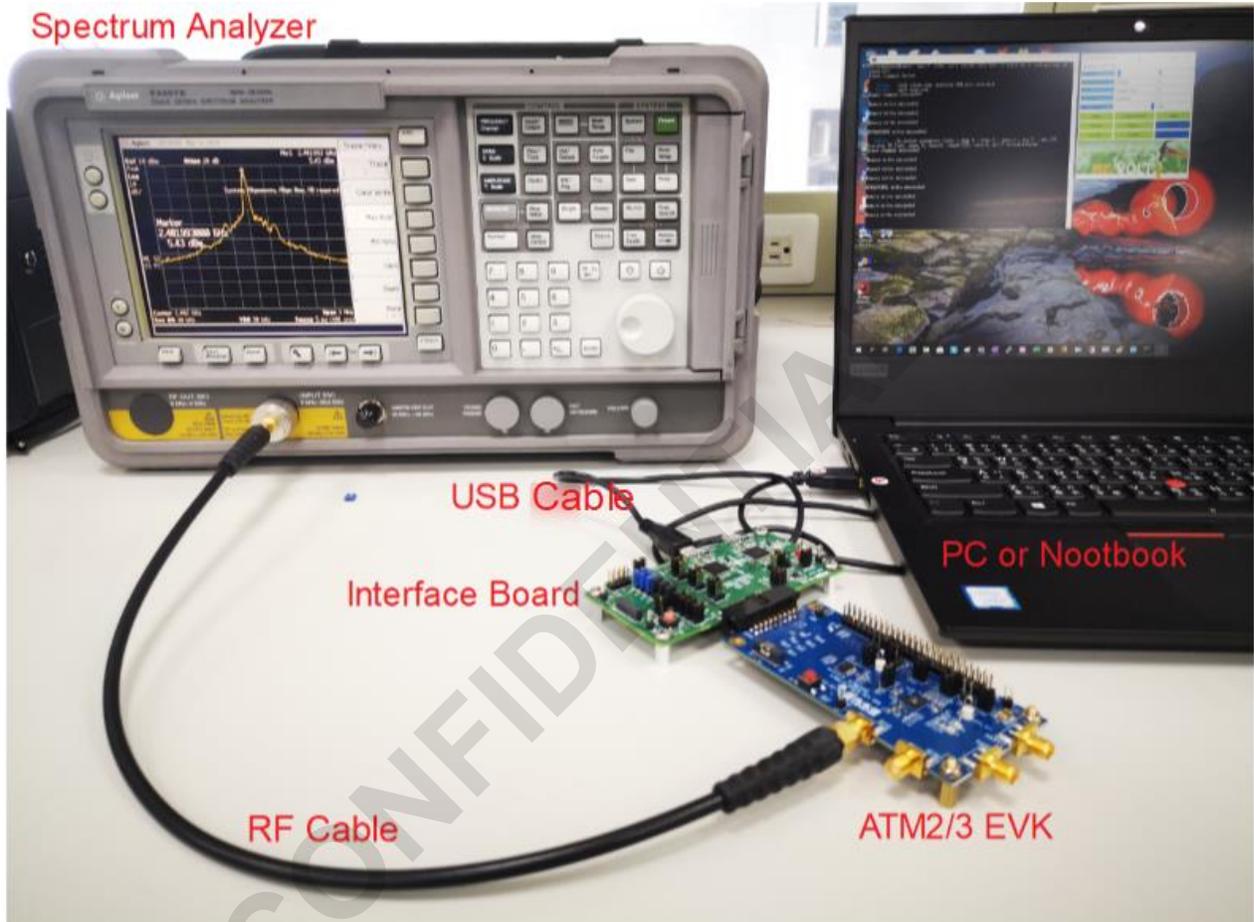


Figure 8 - ATM2/3 EVK Tx Test Environment Setting

Burst Tx mode

In the default setting, when TxTest is selected, the burst type modulation signal will be sent on the RF port. The user can select an RF channel, RF PHY, Tx power level and data length before pressing the TxTest button.

If users need to change the transmission settings, you must first press StopTx to stop the RF signal transmission, and then select a new transmission setting.

Infinite Tx mode

Select "Enable Infinite", the infinite Tx will be enabled. When TxTest is selected, the continue modulation signal will be sent on the RF port. The user can select an RF channel, RF PHY, Tx power level and data length before pressing the TxTest button.

If users need to change the transmission settings, you must first press StopTx to stop the RF signal transmission, and then select a new transmission setting.

Single Tone Transmission

Select the PHY setting and choose "Single Tone". When TxTest is selected, the continuous single tone without modulation signal will be sent on the RF port. The user can select an RF channel, Tx power level before pressing the TxTest button.

If users need to change the transmission settings, you must first press StopTx to stop the RF signal transmission, and then select a new transmission setting.

Rx Test

Rx mode

When RxTest is selected, the Rx mode will be enabled. The users can select an RF channel, RF PHY before pressing the RxTest button.

If users need to change the Rx settings, you must first press StopRx to disable the Rx mode, and then select new Rx settings.

Rx mode also provides the function of receiving packet counter. The user first needs to press the Rx plot button. A new "BLE Direct Test Rx Statistics" window will pop up. Then press the RxTest button, the received packets start counting, and stop counting until pressing the "StopRx" button. Finally, the received packets are shown in the "BLE Direct Test Rx Statistics" window. Press the "Zero Rx Statistic" button, the receive package can be reset to zero. The simple test process is shown in [Figure 9](#).

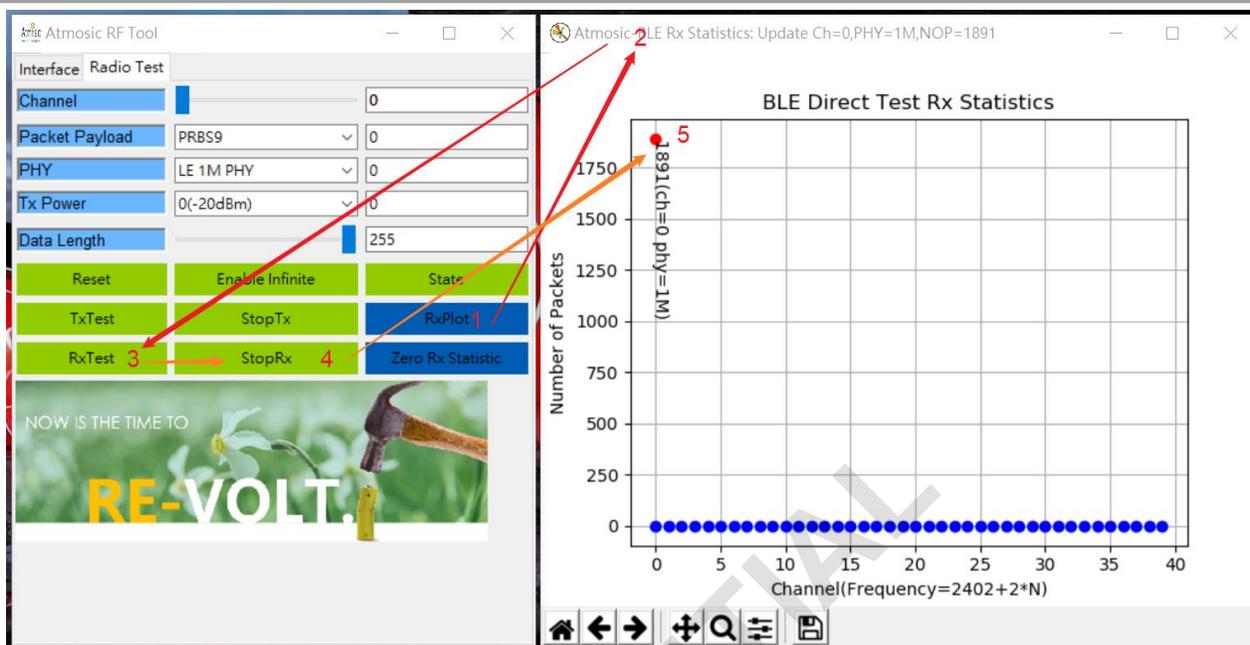


Figure 9 - The Receive Package Counter Operation Procedure

How to Check DUT RF Function Using RF tool

If the user wants to check the DUT RF function without a Bluetooth LE tester, you can prepare a golden unit such as ATMx/3 EVK and DUT. Open RF Tool twice on the same PC, then control the golden unit and DUT separately. [Figure 10](#) illustrates the testing process.

You can set the golden unit into Burst Tx mode to verify the DUT in Rx mode. Then you can swap the test to set the golden unit into Rx mode to verify the DUT in Burst Tx mode.

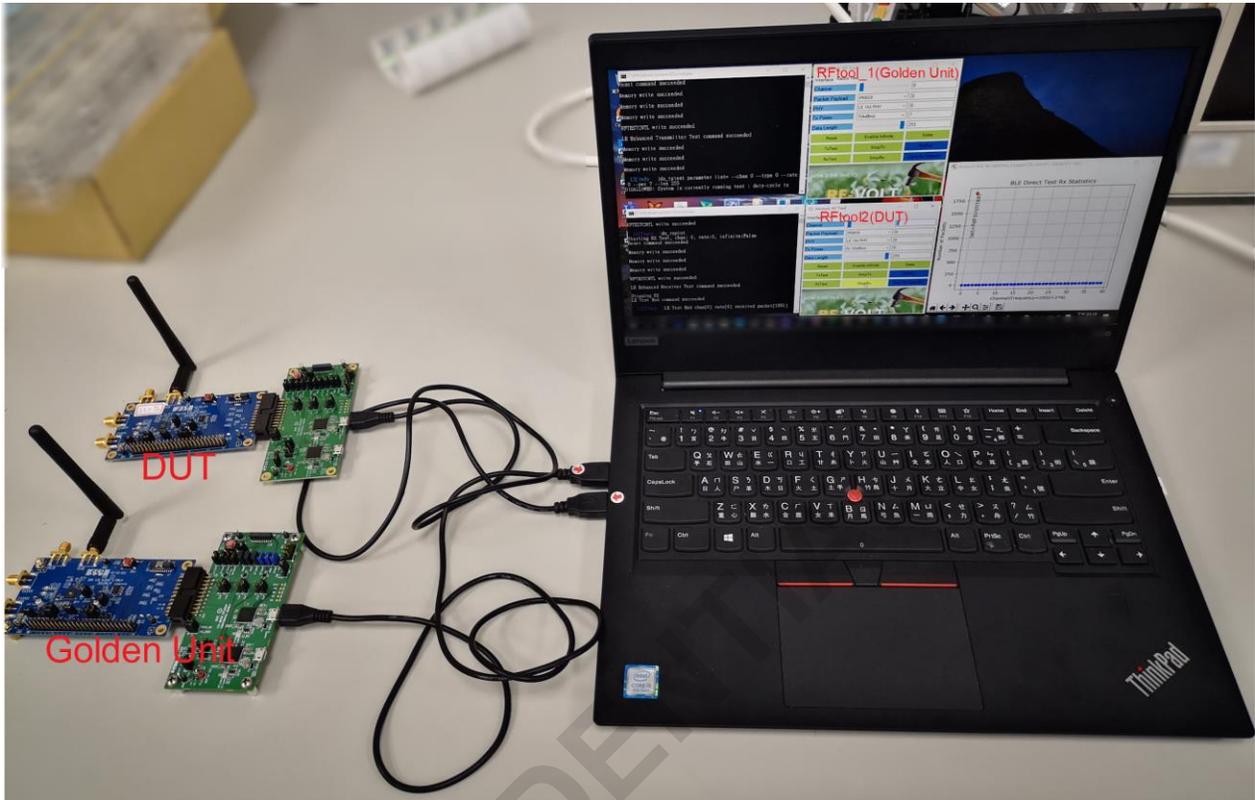


Figure 10 - Test Environment to Check DUT RF Function Using RF tool

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