Testing WILCS02/WINCS02 with MCHPRT3 Tool

WILCS02/WINCS02

Product Page Links

Introduction

This user guide provides detailed information on using the Microchip Radio Test 3 tool (MCHPRT3 tool) with the Microchip WILCS02_WINCS02. The MCHPRT3 tool enables users to evaluate and demonstrate the Radio Frequency (RF) performance and functionalities of the WILCS02_WINCS02.

Table of Contents

1. Quick References

1.1. Reference Documentation

- *WILCS02 Family Data Sheet* (DS70005557)
- *WINCS02 Family Data Sheet* (DS70005577)
- *WILCS02IC and WINCS02IC Programming and Calibration User's Guide* (DS50003815)

1.2. Hardware Prerequisites

- WILCS02_WINCS02 Device (WILCS02IC and WINCS02IC)
- Wi-Fi® Tester (for example, Litepoint IQxel)

1.3. Software Prerequisites

- Windows 10
- Microchip Radio Test 3 Tool Installer Package (MCHPRT3)

1.4. Acronyms and Abbreviations

Table 1-1. Acronyms and Abbreviations

Acronyms and Abbreviations	Description
CCA	Clear Channel Assessment
CLI	Command Line Interface
DLL	Dynamic Link Library
EVM	Error Vector Magnitude
GI	Guard Interval
GUI	Graphical User Interface
LNA	Low Noise Amplifier
MCHPRT3	Microchip Radio Tool Third Generation
PDREF	Peak Detector Reference Voltage/Bias Voltage
RSSI	Received Signal Strength Indicator
TSSI	Transmitted Signal Strength Indicator

2. MCHPRT3 Tool and WILCS02_WINCS02 Package Components

This section provides an overview of the MCHPRT3 tool and the WILCS02_WINCS02 package components.

Note: The recommendation is to use the Windows® 10 operating system for the MCHPRT3 tool setup.

The following table outlines the details of the MCHPRT3 tool package files:

Table 2-1. MCHPRT3 Tool Package Files

File Name	Description
`MCHPRT3.exe` file	MCHPRT3 executable file
`MCHPRT3_CLI.exe` file	MCHPRT3 CLI executable file
`uninstall.exe` file	Uninstall the MCHPRT3 tool
`vc_redist.x86.exe` file	Microsoft Visual C++ Redistributable (x86) executable file

The following table outlines the details of the WILCS02_WINCS02 package files:

Table 2-2. WILCS02_WINCS02 Package Files

File Name	Description
`release_note.txt`	Description the modify history log
Examples folder	Example file for customer reference
`WILCS02_WINCS02.chm`	WILCS02_WINCS02 complied HTML help file
`WILCS02_WINCS02.dll` file	WILCS02_WINCS02 dynamic link library file
`WILCS02_WINCS02_CDECL.dll` file	Default calling convention file for C and C++ programs

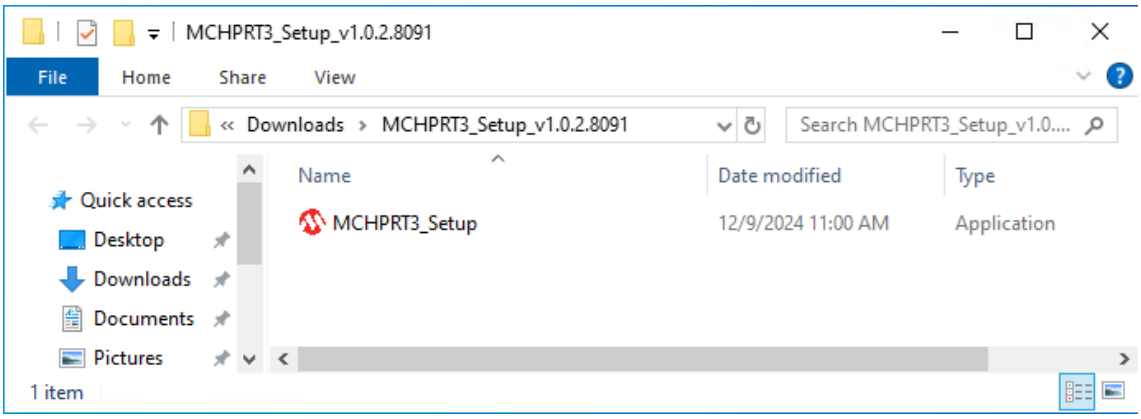
3. Installing MCHPRT3 Tool

This section provides step-by-step instructions for installing the MCHPRT3 tool on a Windows operating system. The following are the steps to complete the installation:

Note: To download the setup file, go to MCHPRT3—Microchip Radio Tool Third Generation.

1. Extract the `MCHPRT3_Setup_v1.0.2.8091.zip`.

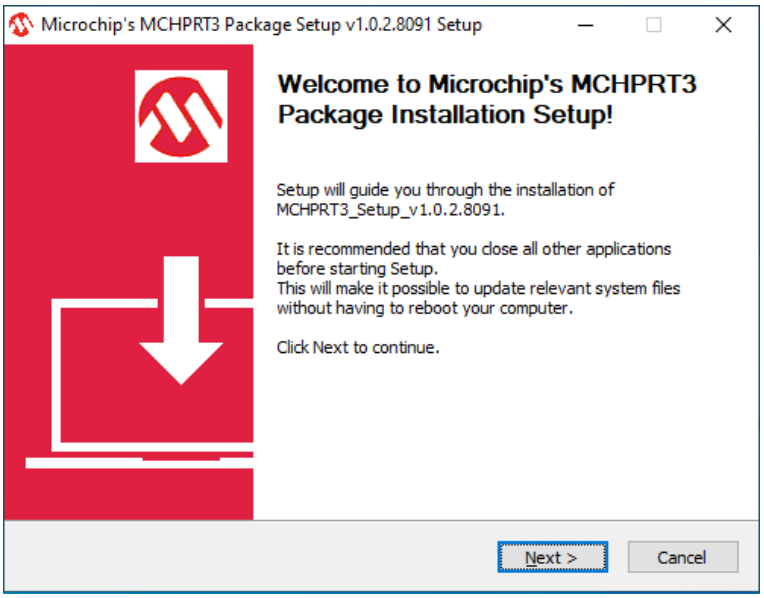
Figure 3-1. MCHPRT3 Setup File



Note: The version number provided here is for reference. For the most up-to-date version, refer to the MCHPRT3 page.

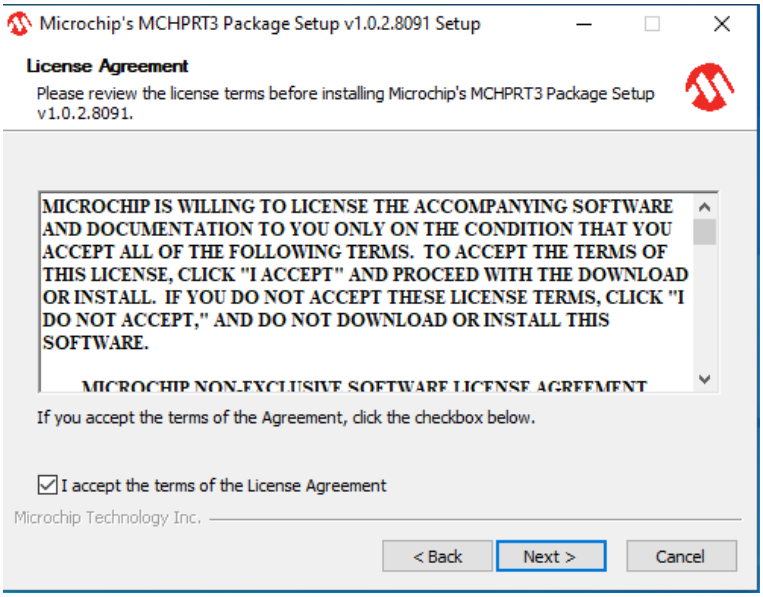
2. Execute the `MCHPRT3_Setup.exe`. The following screen appears:
   1. Click **Next** to continue the installation procedure.

Figure 3-2. MCHPRT3 Setup Welcome Screen



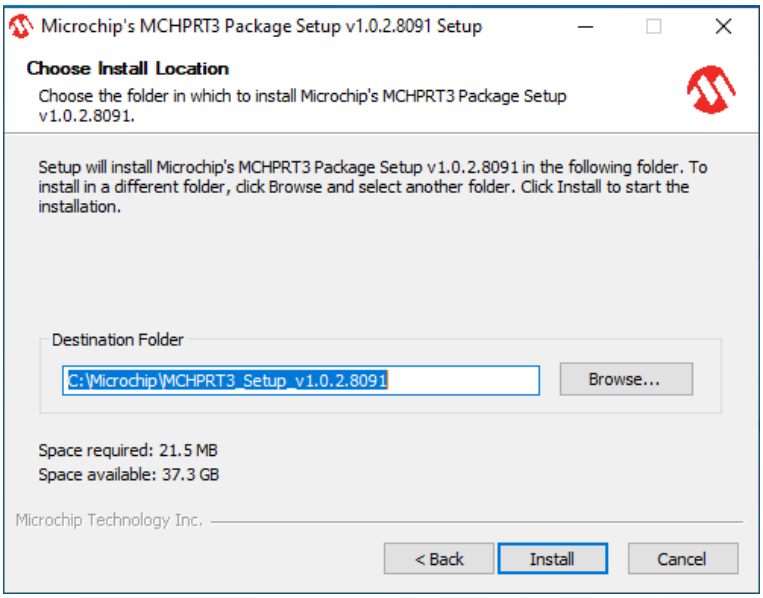
3. Check “I accept the terms of the License Agreement”.
   1. Click **Next** to continue.

Figure 3-3. License Agreement Screen



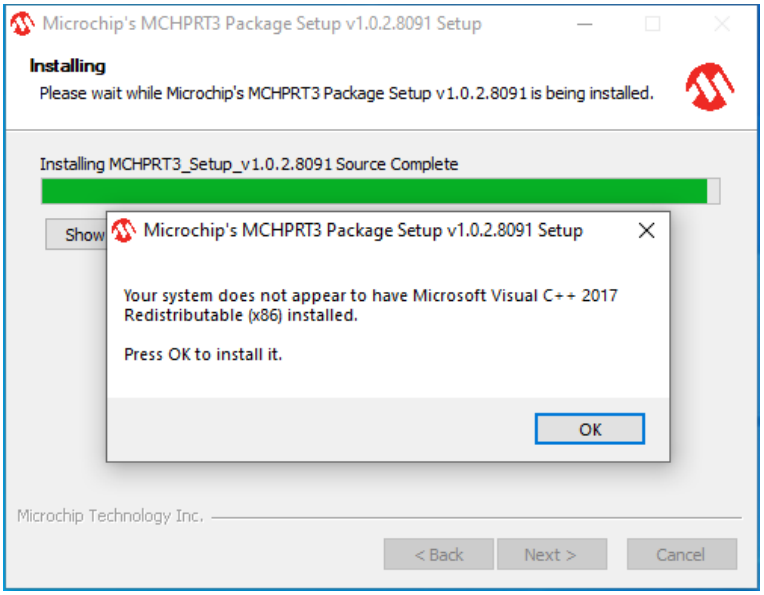
4. Click **Browse** to change the destination folder to the desired location, then click **Install** to continue the installation procedure.
   1. By default, the MCHPRT3 tool installs the package in the *C:\Microchip* folder.

Figure 3-4. Destination Folder Selection Screen



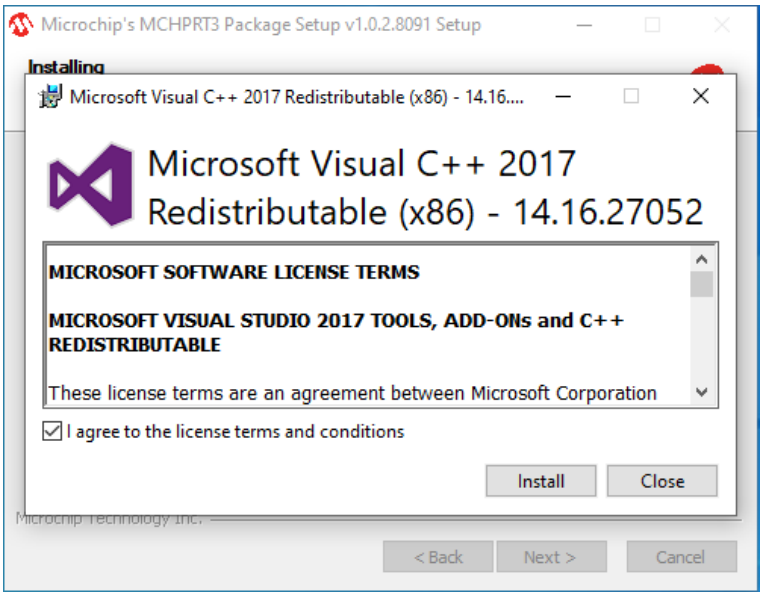
5. If the system does not have the “Microsoft Visual C++ Redistributable for Visual Studio 2015, 2017, and 2019” installed, the following screen appears.
   1. Click **OK** to install it.

Figure 3-5. Microsoft Visual C++ Redistributable Installation Prompt



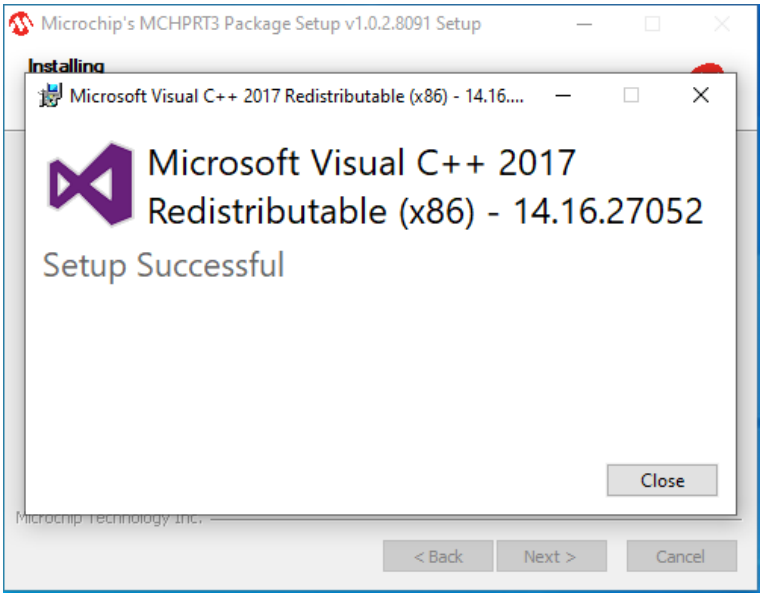
6. Check “I accept the license terms and conditions” and click **Install** to continue.

Figure 3-6. Microsoft Visual C++ Redistributable License Agreement Screen



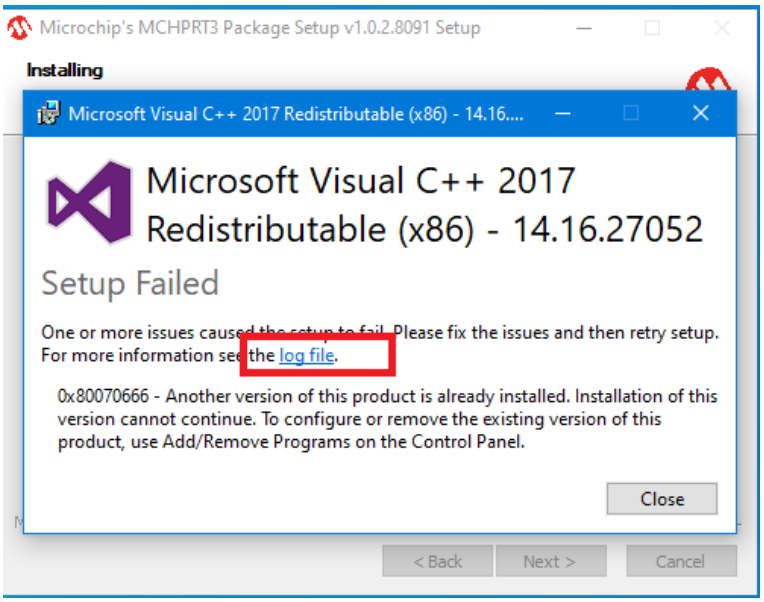
7. Click **Close** to continue.

Figure 3-7. Microsoft Visual C++ Redistributable Installation Complete Screen



Note:
If an error occurs when installing the Microsoft Visual C++ 2017 Redistributable (x86) – 14.16.27052, click the log file link as shown below.

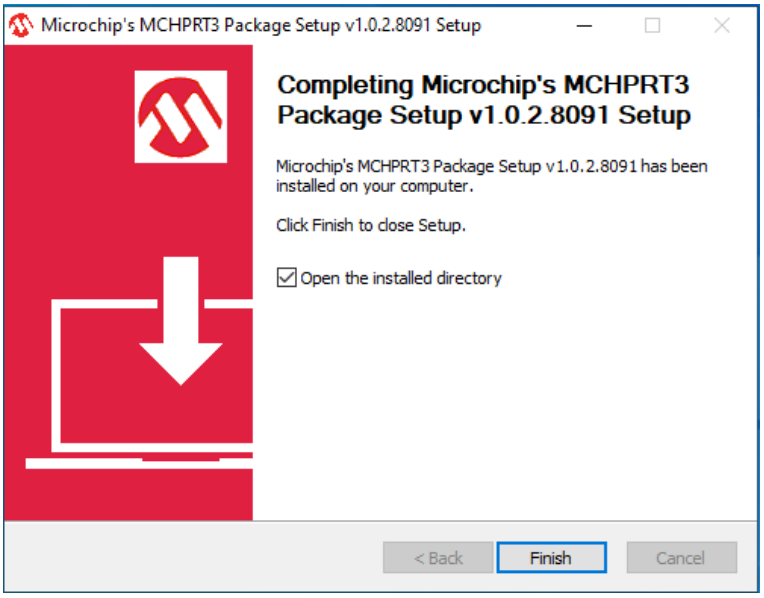
Figure 3-8. Microsoft Visual C++ Setup Failed



If the last line in the log file content is “Error 0x80070666: Cannot install a product when a newer version is installed,” it means that your system may already have a higher version installed. Therefore, it is fine to use the tool.

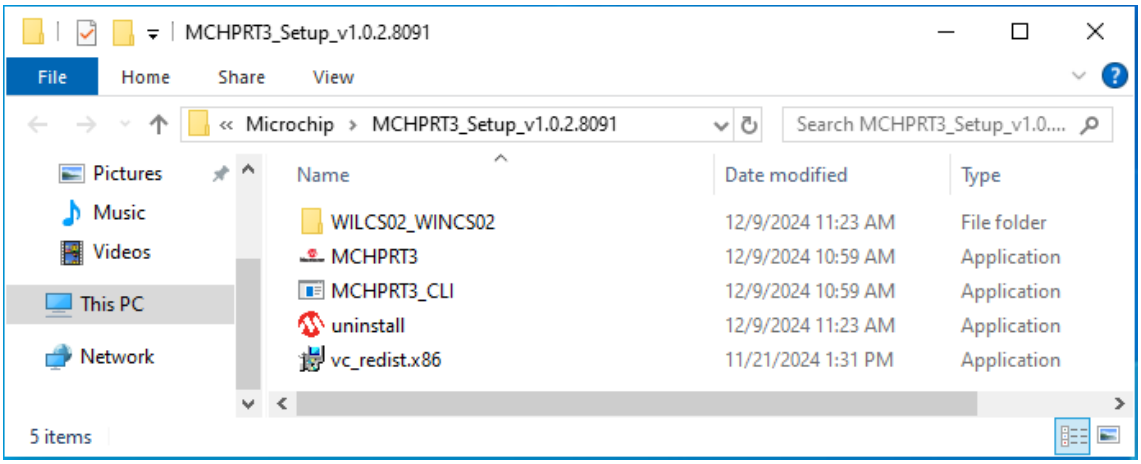
8. Check “Open the installed directory” and click **Finish** to continue.

Figure 3-9. Installation Complete Screen



9. The file browser opens with the install directory.

Figure 3-10. Installed Directory in File Browser

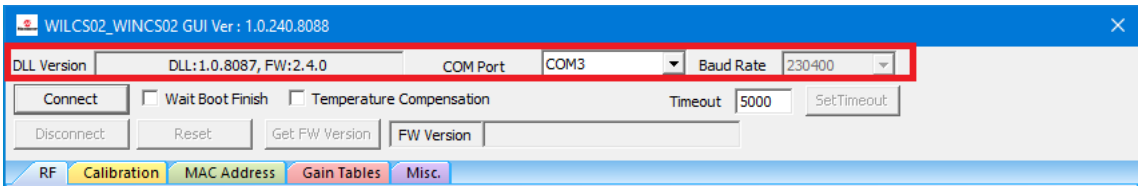


4. Testing and Calibrating WILCS02_WINCS02 with Wi-Fi® Tester Using MCHPRT3 Tool

This chapter provides details about using the MCHPRT3 tool to test or calibrate the WILCS02_WINCS02 with Wi-Fi® Tester. This chapter also demonstrates the process of updating the parameters using the MCHPRT3 tool.

Note: Ensure the DLL support firmware version matches the WILCS02_WINCS02, and the COM port connection supports the 230400 baud rate.

Figure 4-1. DLL Version and COM Port Information

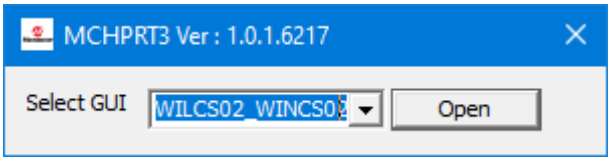


4.1. Getting Started with MCHPRT3 Tool GUI for the WILCS02_WINCS02

The following are the steps to launch the MCHPRT3 tool:

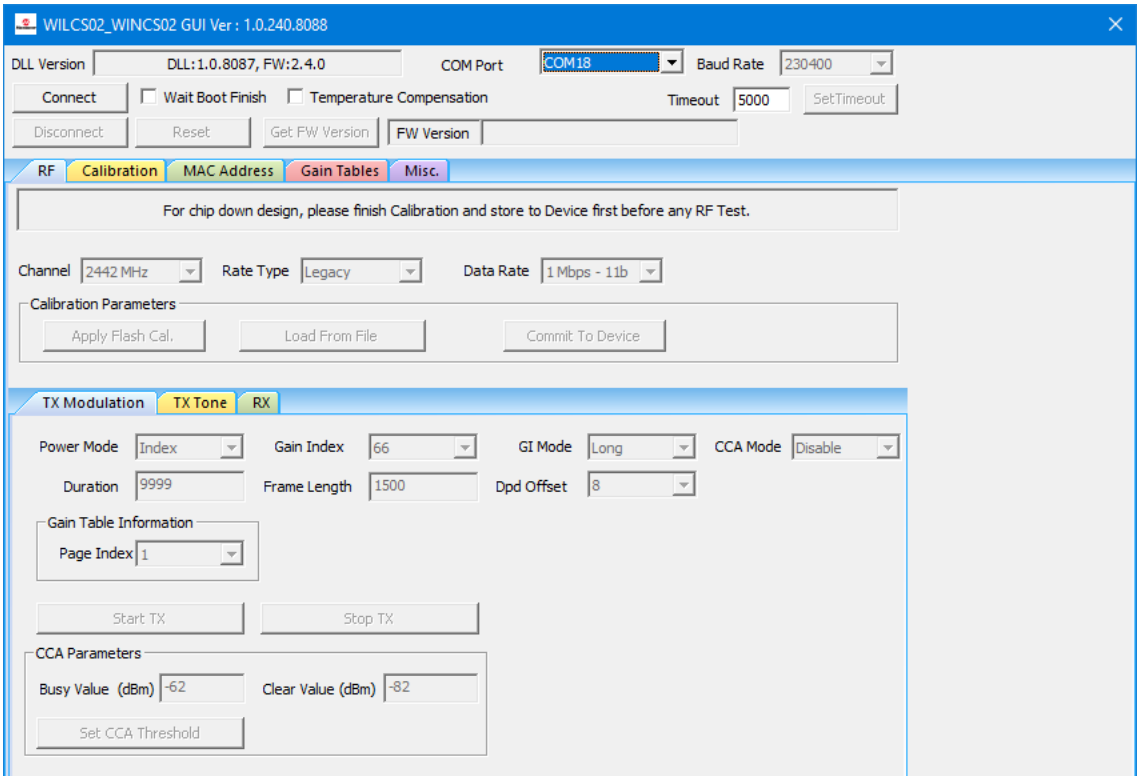
1. Double click the `MCHPRT3.exe` file to launch the MCHPRT3 tool.
2. From the "Select GUI" drop-down list, select WILCS02_WINCS02.
3. Click **Open** to launch the WILCS02_WINCS02 window (see the following figure).

Figure 4-2. Start-Up Window of the MCHPRT3 Tool



4. The WILCS02_WINCS02 window is divided into the following sections (see the following figure):
   - **RF tab:** Provides settings to perform the RF TX Modulation, TX Tone, RX Test
   - **Calibration tab:** Complete TX and RX Calibration flow
   - **MAC Address tab:** Read/Write Wi-Fi® Address
   - **Gain Tables tab:** Process Gain Table relate function
   - **Misc. tab:** Process others, example Post Cal

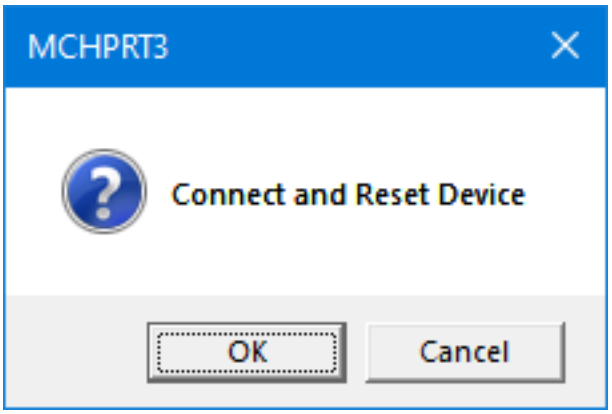
Figure 4-3. Start-up Window of the WILCS02_WINCS02 GUI Tool



4.2. Connect WILCS02_WINCS02 Device

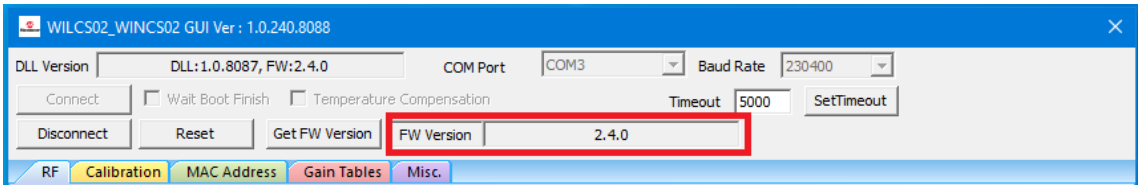
1. Select the respective “COM port”.
2. Enter the “Timeout” value as 5000 (default value) and click **SetTimeout**
   Note: This value must be greater than 5000 milliseconds.
3. Check the “Wai Boot Finish” when powering ON the WILCS02_WINCS02 before pressing the “Connect” button. By default, the “Wai Boot Finish” is disabled.
   Note: The time between powering ON and pressing the “Connect” button must be shorter than the WILCS02_WINCS02 boot sequence time.
4. Check the “Temperature Compensation” field if the test temperature is not at room temperature. By default, the Temperature Compensation is disabled.
5. Click **Connect** to connect the UART of the WILCS02_WINCS02 (see the following figure).

Figure 4-4. Connect Device



6. Click **OK** in the pop-up window to Reset the WILCS02_WINCS02 device. The firmware version appears instantly (see the following figure).

Figure 4-5. Firmware Version

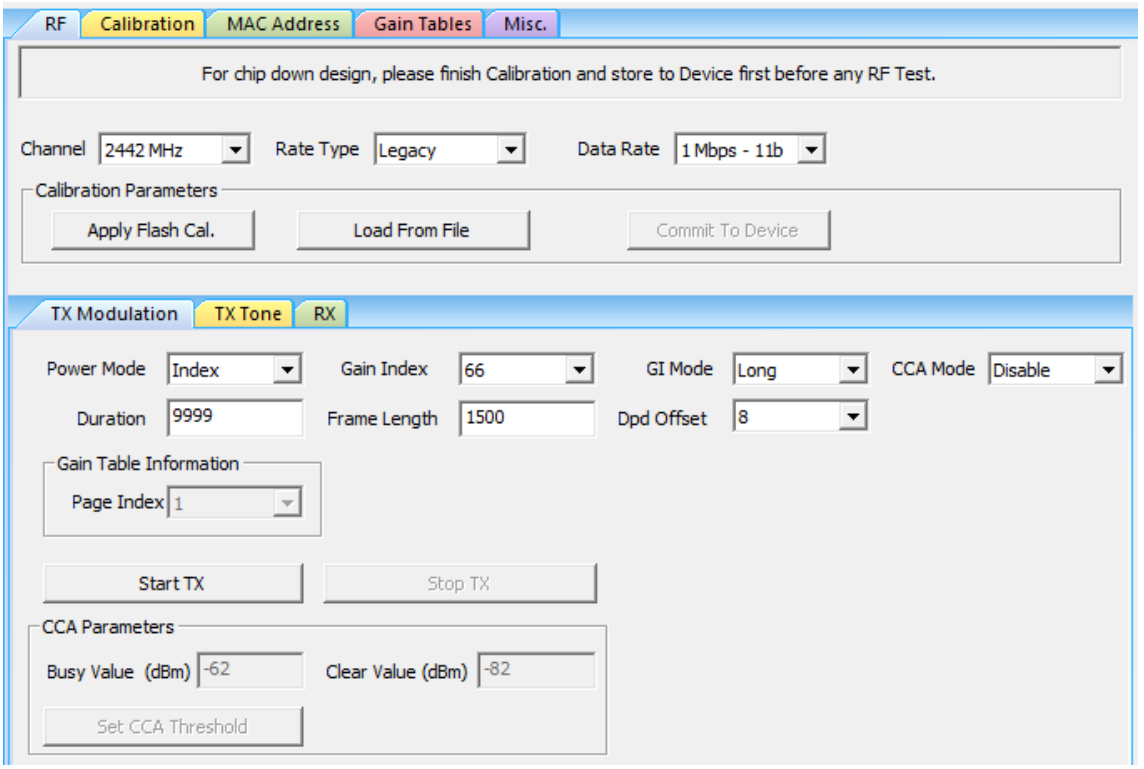


4.3. RF TX Modulation Test Demonstration

In this demonstration, the user can transmit Wi-Fi® standard packets with the WILCS02_WINCS02.

Perform the following steps for the demonstration of the RF TX modulation test:

Figure 4-6. RF TX Modulation Test



1. In the **RF** tab, perform the following steps:
   a. From the “Channel” drop-down list, select *2442 MHz* for channel 7.
   b. From the “Rate Type” drop-down list, select *Legacy* for 11b and 11g mode or *MCS* for 11n mode.
   c. From the “Data Rate” drop-down list, select *1 Mbps – 11b* for 11b mode and 1 Mbps.
   d. **Load From File:** Load the calibration file (`.cfg` file) and click **Commit To Device**, if necessary.
   e. **Apply Flash Cal. :** If the calibration file is loaded and committed to Flash, click **Apply Flash Cal.** to apply the calibration parameters in Flash.
2. In the **TX Modulation** tab, perform the following steps:

a. From the “Power Mode” drop-down list, select *Index* for manual input gain index, *TPC Once* for enabling TPC.
   - Select the “Gain Index” value from 0-115.
   - From the “Power Mode” drop-down list, select *TPC Once* to read values from gain table for the transmission.

b. Retain the “Duration” as *9999* (default value).

c. Retain the “Frame Length” as *1500* (default value).

d. From the “GI Mode” drop-down list, select *Long* for long GI and *Short* for short GI.

e. Retain the “CCA Mode” as *Disable* (default value).
   - Enter the “Busy Value (dBm)” when “CCA Mode” is *Enable* (-62 is default value).
   - Enter the “Clear Value (dBm)” when “CCA Mode” is *Enable* (-82 is default value).
   - Click **Set CCA Threshold** to change the CCA threshold value, if necessary.

f. Click **Start TX** to transmit Wi-Fi packets as configured parameter. Use the Wi-Fi tester to verify the transmitting packets.

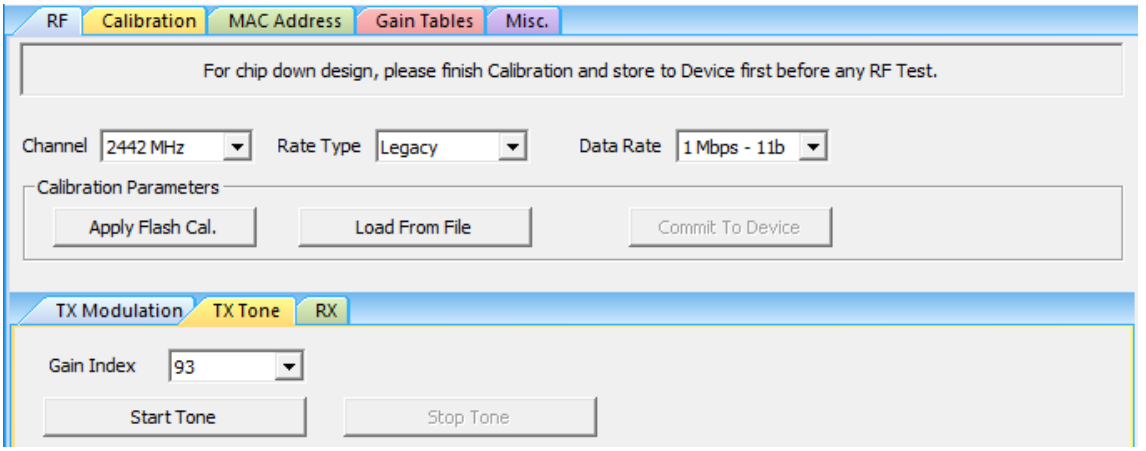
g. Click **Stop TX** to stop the transmission.

4.4. RF TX Tone Test Demonstration

In this demonstration, the user can transmit single tone on the WILCS02_WINCS02. Perform the following steps for the demonstration of the transmission:

1. In the **RF** tab, from the “Channel” drop-down list, select *2442 MHz* for channel 7.
2. In the **TX Tone** tab, select gain index from 0 to 255.
3. Click Start Tone to transmit single tone as configured in step 1 and 2. Use the Wi-Fi® tester to verify the transmitting single tone.
4. Click **Stop Tone** to stop the transmission.

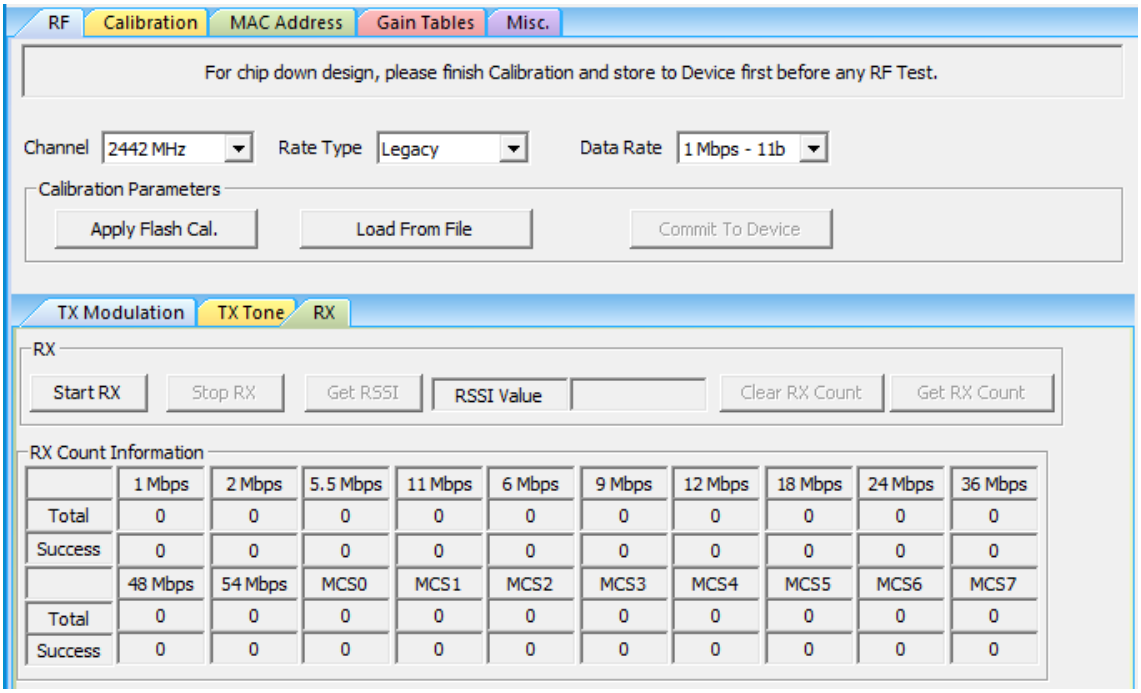
Figure 4-7. RF TX Tone Test Demonstration



4.5. RF RX Test Demonstration

In this demonstration, the user can receive Wi-Fi® packets on the WILCS02_WINCS02. perform the following step for receiving Wi-Fi Packets.

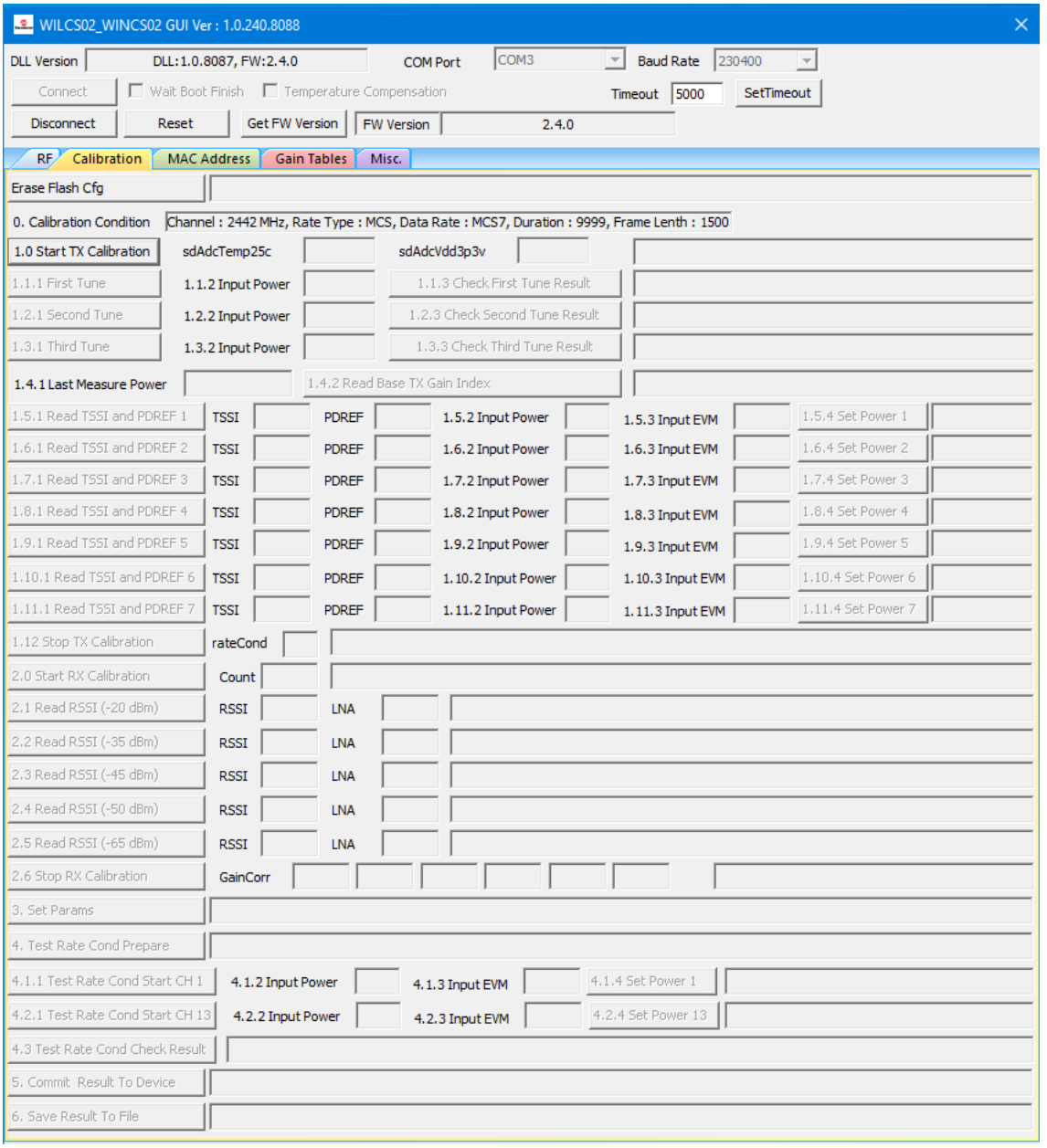
Figure 4-8. RF RX Test Demonstration



1. In the **RF** tab, perform the following steps:
   a. From the “Channel” drop-down list, select *2442 MHz* for channel 7.
   b. From the “Rate Type” drop-down list, select *Legacy* for 11b and 11g Mode, *MCS* for 11n mode or *ALL – RX Only* for all data rates.
   c. From the “Data Rate” drop-down list, select *1 Mbps – 11b* for 11b Mode and 1 Mbps.
2. In the **RX** tab, perform the following steps:
   a. Click **Start RX** to receive Wi-Fi packets as configured in step 1. Use IQxel Wi-Fi tester or other tools to send the Wi-Fi packets to the WILCS02_WINCS02 device.
   b. Click **Stop RX** to stop receiving the Wi-Fi packets.
   c. Click **Get RX Count**. The “RX Count Information” table shows the received Wi-Fi packets.
   d. Click **Clear RX Count** to Reset RX Count Information.
   e. Repeat the above steps for a new RX test.
   f. Click **Get RSSI** to read the RSSI value.

4.6. Calibration Flow Demonstration

Figure 4-9. Calibration Flow Demonstration



In this demonstration, the user can calibrate TX parameters and RX parameters of the WILCS02_WINCS02. Perform the following steps for the demonstration of the calibration flow:

1. Connect the RF connecter on the WILCS02_WINCS02 to the Wi-Fi® tester (IQxel or others) to measure the RF power from the WILCS02_WINCS02.
2. Check the cable loss between the WILCS02_WINCS02 connecter to the Wi-Fi tester. Enter the cable loss or RF power offset into the Wi-Fi tester.
3. Set the Wi-Fi tester to receive the Wi-Fi packets that are transmitted from the WILCS02_WINCS02.
4. In the **Calibration** tab, the button “Erase Flash Cfg” will erase the device calibration parameters and gain tables. Use it carefully. It will show the following message after pressing this button.

Figure 4-10. Calibration Tab

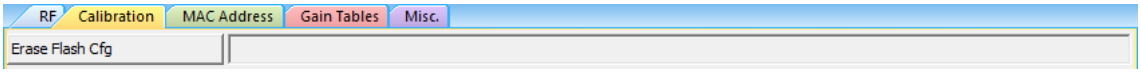
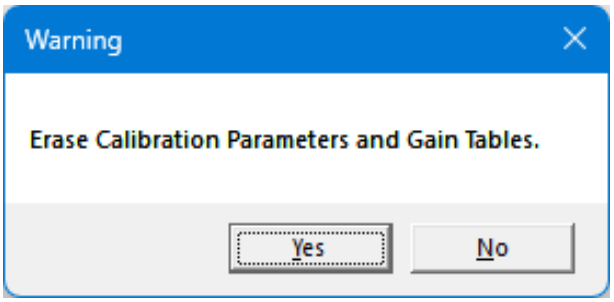


Figure 4-11. Warning



5. In the **Calibration** tab, perform the following steps to start a new calibration:
   a. To initiate the new TX calibration, click on the **1.0 Start TX Calibration** button and wait for the `sdAdcTemp25c` and `sdAdcVdd3p3v` values to appear on the GUI.

      Figure 4-12. Start TX Calibration

   b. Click on **1.1.1 First Tune** button.
      - Wait for the “1.1.2 Input Power” and “1.1.3 Check First Tune Result” buttons to enable.
      - Read the RF Power on the Wi-Fi tester.
      - Enter the measured RF power from the Wi-Fi tester in “1.1.2 Input Power”.
      - Click on **1.1.3 Check First Tune Result** button.
      - Wait for the result to appear on the GUI.

      Figure 4-13. First Tune

      - Go to step 5.c when result is “need tune”.
      - Go to step 5.e when result is “no need tune”.

   c. Click on **1.2.1 Second Tune** button.
      - Wait for the “1.2.2 Input Power” and “1.2.3 Check Second Tune Result” buttons to enable.
      - Read the RF power on the Wi-Fi tester.
      - Enter the measured RF power from the Wi-Fi tester in “1.2.2 Input Power”.
      - Click on **1.2.3 Check Second Tune Result** button.
      - Wait for the result to appear on the GUI.

      Figure 4-14. Second Tune

      - Go to step 5.d when result is “need tune”.
      - Go to step 5.e when result is “no need tune”.

   d. Click on **1.3.1 Third Tune** button.
      Note: This step is almost not necessary.

- Wait for the “1.3.2 Input Power” and “1.3.3 Check Third Tune Result” buttons to enable.
- Read the RF power on the Wi-Fi tester.
- Enter the measured RF power from the Wi-Fi tester in “1.3.2 Input Power”.
- Click on **1.3.3 Check Second Tune Result** button.
- Wait for the result to appear on the GUI.

Figure 4-15. Third Tune

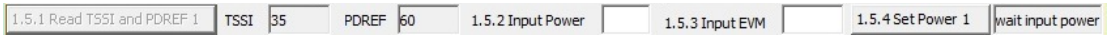
e. Click on **1.4.2 Read Base TX Gain Index** button.

Figure 4-16. Read Base TX Gain Index

- Wait for the `baseTxGainIndex` to appear on the GUI.

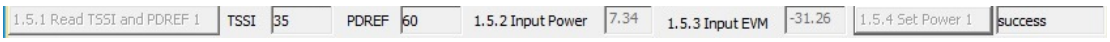
f. Click on **1.5.1 Read TSSI and PDREF 1** button.
- Wait for the “TSSI” and “PDREF” values to appear on the GUI.

Figure 4-17. Read TSSI and PDREF 1



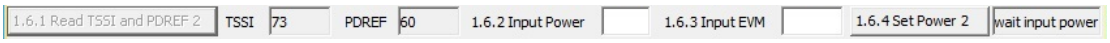
- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.5.2 Input Power”
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.5.3 Input EVM”
- Click on **1.5.4 Set Power 1** button.
- Wait for result to appear as success.

Figure 4-18. Set Power Success



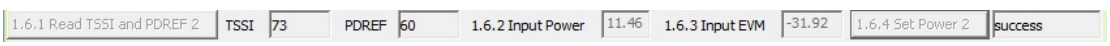
g. Click on **1.6.1 Read TSSI and PDREF 2** button.
- Wait for “TSSI” and “PDREF” values to appear on the GUI.

Figure 4-19. Read TSSI and PDREF 2



- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.6.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.6.3 Input EVM”.
- Click on **1.6.4 Set Power 2** button.
- Wait for result to appear as success.

Figure 4-20. Set Power 2 Success



h. Click on **1.7.1 Read TSSI and PDREF 3** button.

- Wait for “TSSI” and “PDREF” values to appear on the GUI.

Figure 4-21. Read TSSI and PDREF 3

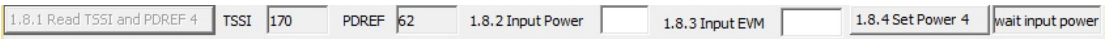
- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.7.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.7.3 Input EVM”.
- Click on **1.7.4 Set Power 3** button.
- Wait for result to appear as success.

Figure 4-22. Set Power 3 Success

i. Click on **1.8.1 Read TSSI and PDREF 4** button.

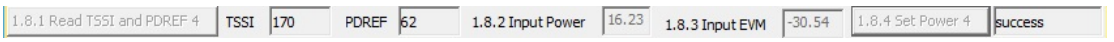
- Wait for “TSSI” and “PDREF” values to appear on the GUI.

Figure 4-23. Read TSSI and PDREF 4



- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.8.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.8.3 Input EVM”.
- Click on **1.8.4 Set Power 4** button.
- Wait for the result to appear as success.

Figure 4-24. Set Power 4 Success

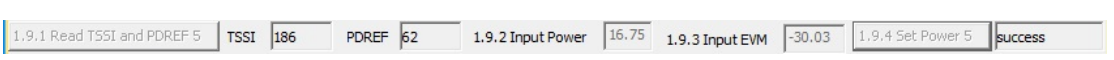


j. Click on **1.9.1 Read TSSI and PDREF 5** button.

Figure 4-25. Read TSSI and PDREF 5

- Wait for “TSSI” and “PDREF” values to appear on the GUI.
- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.9.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.9.3 Input EVM”.
- Click on **1.9.4 Set Power 5** button
- Wait for the result to appear as success.

Figure 4-26. Set Power 5 Success



k. Click on **1.10.1 Read TSSI and PDREF 6** button.

Figure 4-27. Read TSSI and PDREF 6

- Wait for “TSSI” and “PDREF” values to appear on the GUI.
- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.10.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.10.3 Input EVM”.
- Click on **1.10.4 Set Power 6** button.
- Wait for the result to appear as success.

Figure 4-28. Set Power 6 Success

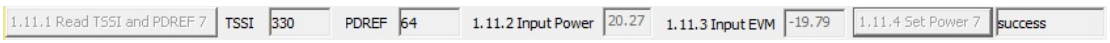
l. Click on **1.11.1 Read TSSI and PDREF 7**button.

- Wait for “TSSI” and “PDREF” values to appear on the GUI.

Figure 4-29. Read TSSI and PDREF 7

- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “1.11.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “1.11.3 Input EVM”.
- Click on **1.11.4 Set Power 7** button.
- Wait for the result to appear as success.

Figure 4-30. Set Power 7 Success



m. Click on **1.12 Stop TX Calibration** button.

- Wait for the “rateCond” to appear on the GUI.

Figure 4-31. Stop TX Calibration

n. Click on **2.0 Start RX Calibration** button to start the RX calibration.

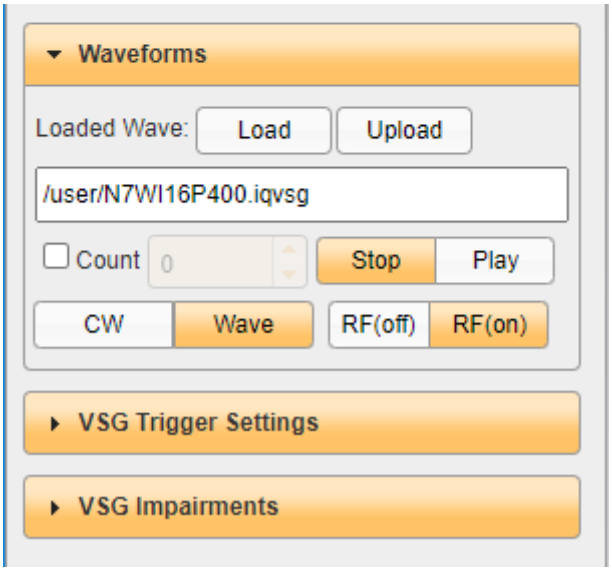
- Wait for the result to appear as success.

Figure 4-32. Start RX Calibration

Note:
The user can choose their own Wi-Fi tester tool. In this case, the IQxel Wi-Fi tester tool is shown only as an example. Change the “Power Level” setting for different scenarios in the following steps using the same IQxel Wi-Fi tester tool.

Set the Wi-Fi tester to transmit Wi-Fi MCS7 packets at 2442 MHz and -20 dBm power level that will be received by WILCS02_WINCS02.

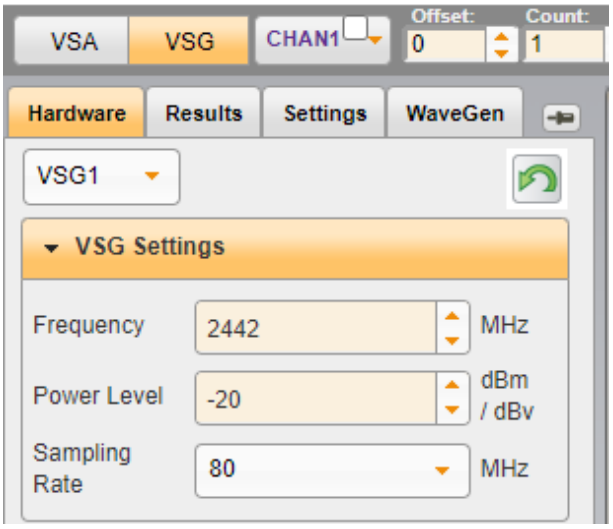
Figure 4-33. IQxel Wi-Fi tester



o. Read RSSI (-20 dBm)

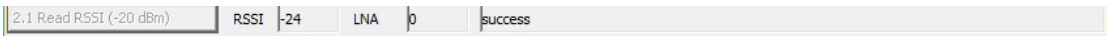
- Set -20 dBm power level in the Wi-Fi tester.

Figure 4-34. -20 dBm power level



- Click on **2.1 Read RSSI (-20 dBm)** button.
- Wait for “RSSI” and “LNA” values to appear on the GUI.

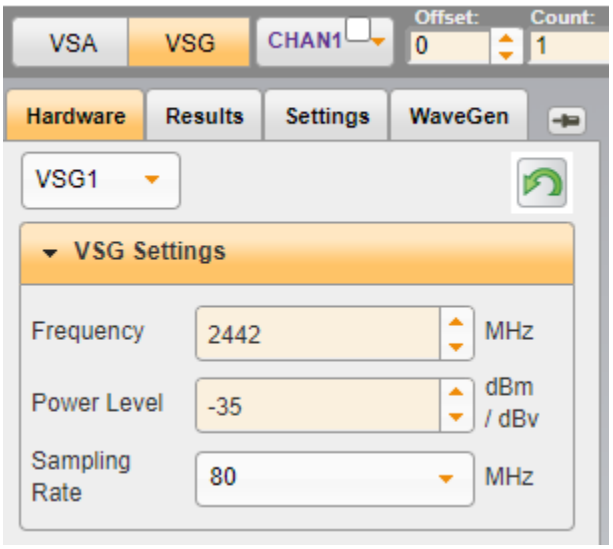
Figure 4-35. Read RSSI and LNA



p. Read RSSI (-35 dBm)

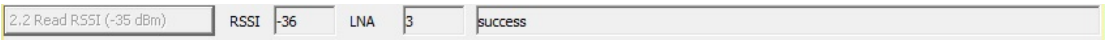
- Set -35 dBm power level in the Wi-Fi tester.

Figure 4-36. -35 dBm Power Level



- Click on **2.2 Read RSSI (-35 dBm)** button.
- Wait for “RSSI” and “LNA” values to appear on the GUI.

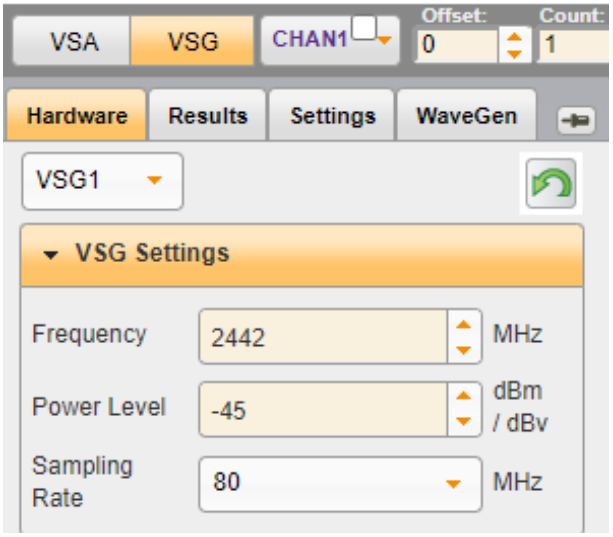
Figure 4-37. Read RSSI and LNA



q. Read RSSI (-45 dBm)

- Set -45 dBm power level in the Wi-Fi tester.

Figure 4-38. -45 dBm Power Level

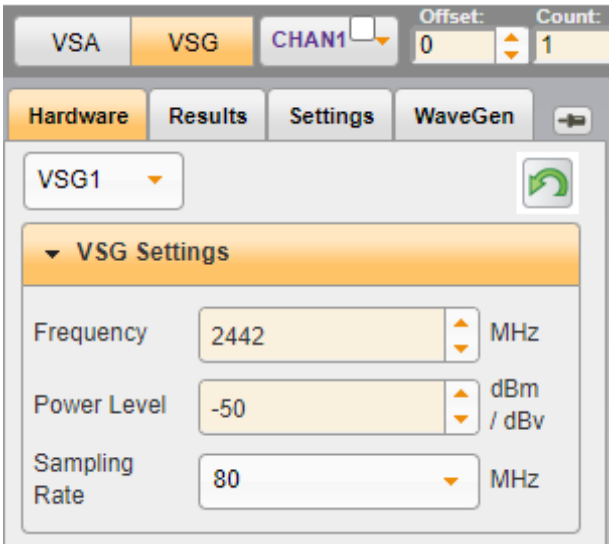


- Click on **2.3 Read RSSI (-45 dBm)** button.
- Wait for “RSSI” and “LNA” values to appear on the GUI.

Figure 4-39. Read RSSI and LNA

r. Read RSSI (-50 dBm)
   - Set -50 dBm power level in the Wi-Fi tester.

Figure 4-40. -50 dBm Power Level

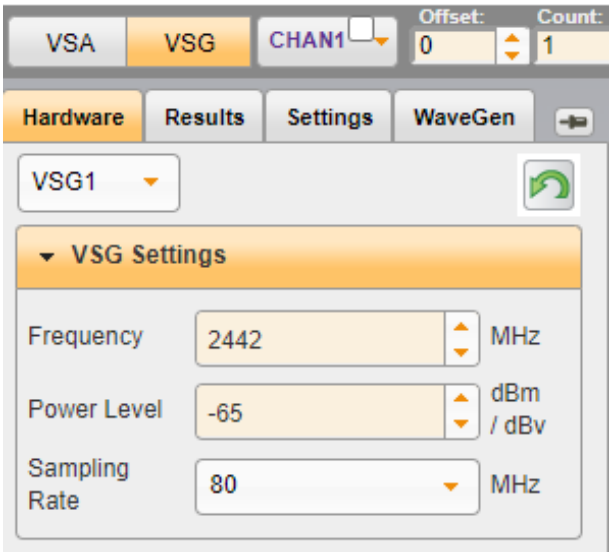


   - Click on **2.4 Read RSSI (-50 dBm)** button.
   - Wait for “RSSI” and “LNA” values to appear on the GUI.

Figure 4-41. Read RSSI and LNA

s. Read RSSI (-65 dBm)
   - Set -65 dBm power level in the Wi-Fi tester.

Figure 4-42. -65 dBm Power Level



- Click on **2.5 Read RSSI (-65 dBm)** button.
- Wait for “RSSI” and “LNA” values to appear on the GUI.

Figure 4-43. Read RSSI and LNA

t. Click on **2.6 Stop RX Calibration** button.
- If the LNA sequence does not match 0, 3, 4, 7 Go to step 5.o.
- If the RSSI sequence does not match -20 > -35 > -45 > -50 > -65 Go to step 5.o.

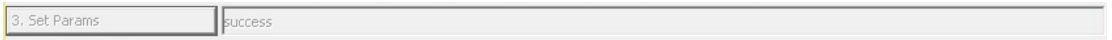
Figure 4-44. Stop RX Calibration

- Wait for “GainCorr” value to appear on the GUI.

Figure 4-45. Read GainCorr

u. Click on **3. Set Params** button.
- Wait for the result to appear as success.

Figure 4-46. Set Params



v. Click on **4. Test Rate Cond Prepare** button.
- Wait for the result to appear as success.

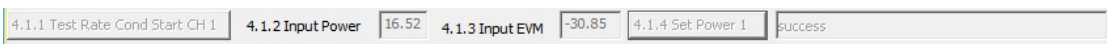
Figure 4-47. Test Rate Cond Prepare

w. Click on **4.1.1 Test Rate Cond Start CH 1** button.

Figure 4-48. Test Rate Cond Start CH 1

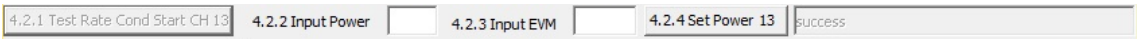
- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “4.1.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “4.1.3 Input EVM”.
- Click on **4.1.4 Set Power 1** button.
- Wait for the result to appear as success.

Figure 4-49. Set Power 1 Success



x. Click on **4.2.1 Test Rate Cond Start CH 13** button.

Figure 4-50. Test Rate Cond Start CH 13

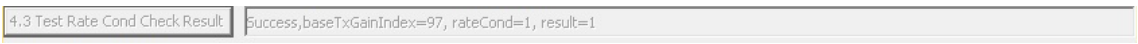


- Read the RF Power on the Wi-Fi tester.
- Enter the measured RF Power from the Wi-Fi tester in “4.2.2 Input Power”.
- Read the RF EVM on the Wi-Fi tester.
- Enter the measured RF EVM from the Wi-Fi tester in “4.2.3 Input EVM”.
- Click on **4.2.4 Set Power 13** button.
- Wait for the result to appear as success.

Figure 4-51. Set Power 13 Success

y. Click on **4.3 Test Rate Cond Check Result** button.

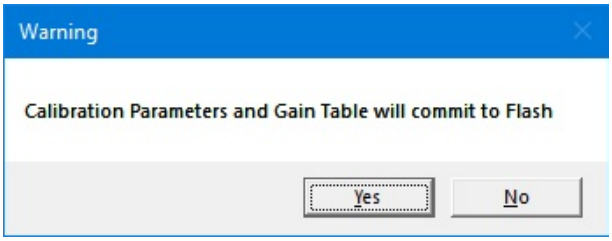
Figure 4-52. Test Rate Cond Check Result



- If the result is not 1, go to step 5.w

i. Click on **5. Commit Result To Device** button.

Figure 4-53. Commit Result To Device

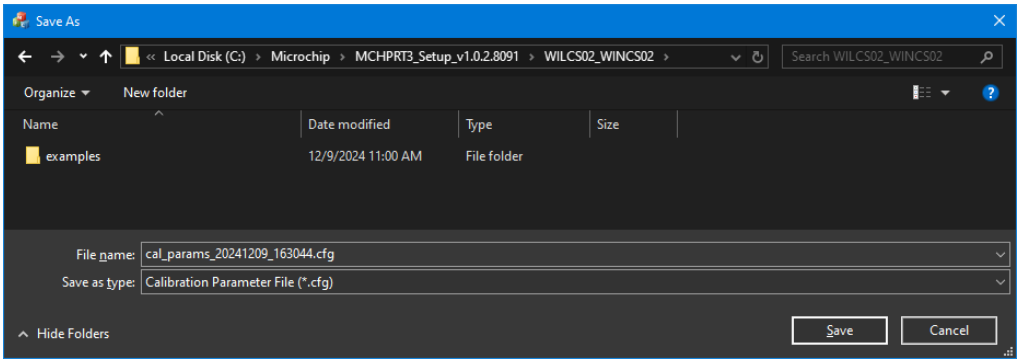


- Press **Yes** button.
- Wait for the calibration parameters to be written to the device.
- Wait for the gain table to be written to the device.

Figure 4-54. Commit Result To Device

ii. Click on **6. Save Result To File** button.
- To save calibration parameters to a file, follow these steps:
  a. Open the screen below.
  b. Input the file name.
  c. Click the **Save** button to save the calibration parameters to the file.

Figure 4-55. Save Result To File



– To save the gain table to a file, follow these steps:
  a. Open the screen.
  b. Input the file name.
  c. Click on the **Save** button to save the gain table to the file.

Figure 4-56. Save Gain Table to the File

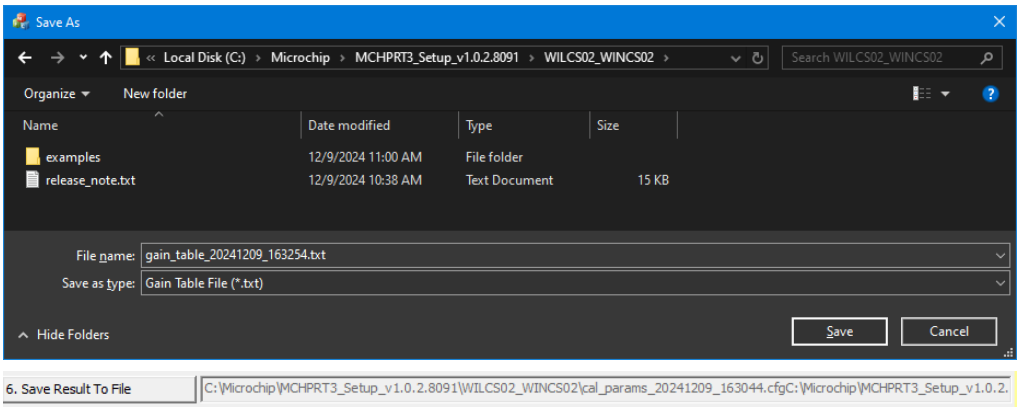
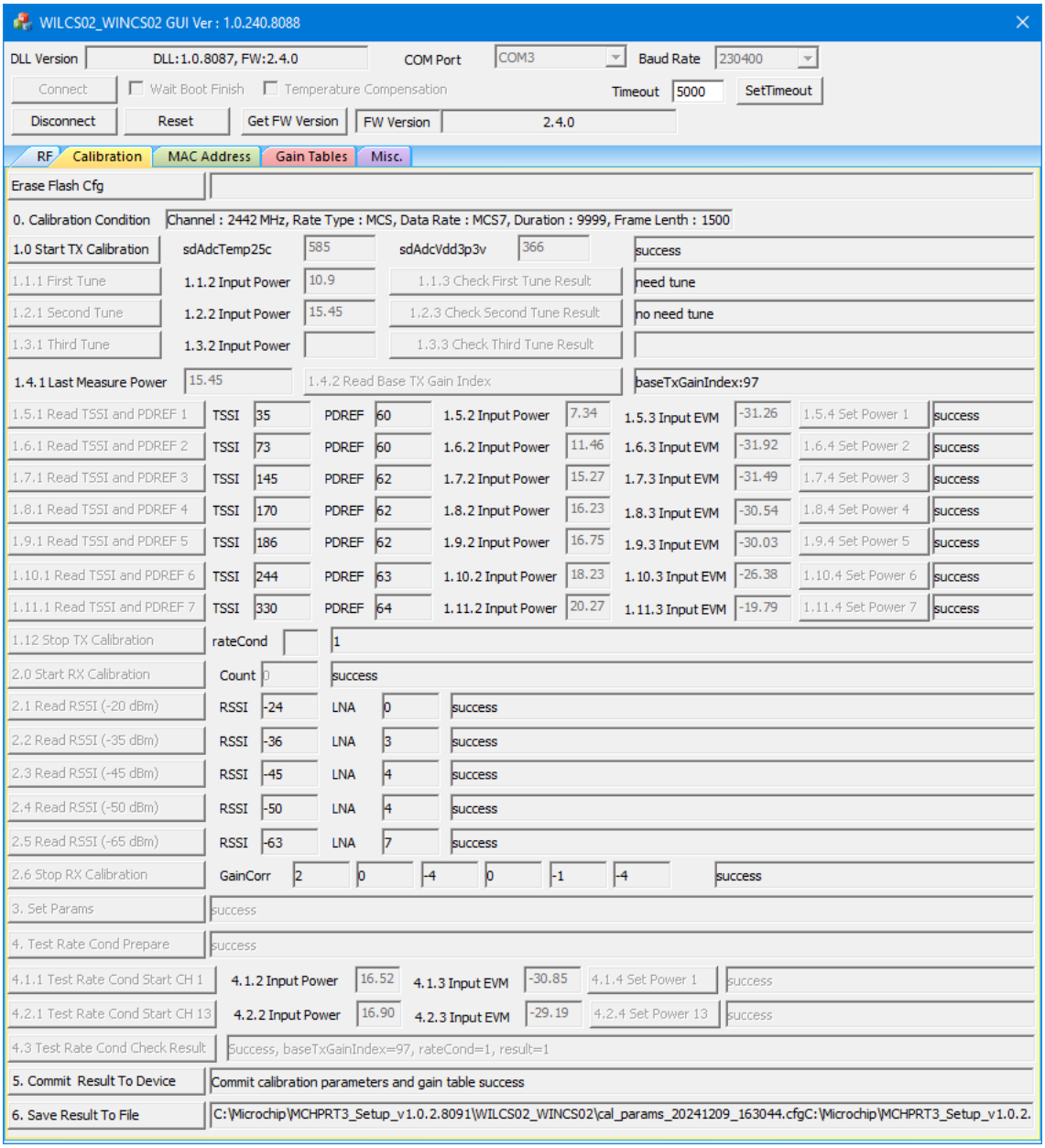


Figure 4-57. Calibration GUI

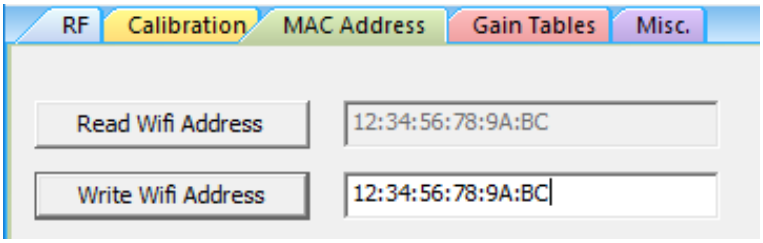


4.7. MAC Address Programming

In this demonstration, set the MAC address of the Wi-Fi® interfaces of the WILCS02_WINCS02. In the **MAC Address** tab, perform the following steps for MAC Address programming:

1. Click the **Read Wi-Fi Address** button to read the Wi-Fi address.
2. Enter the Wi-Fi address to write the Wi-Fi address, for example, `12:34:56:78:9A:BC`, then click the **Write Wi-Fi Address** button.

Figure 4-58. MAC Address Programming



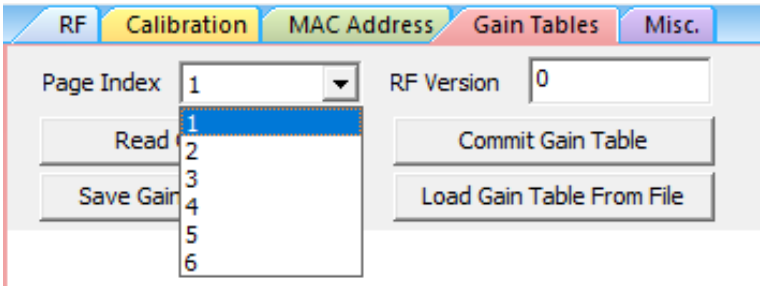
4.8. Gain Tables Demonstration

In this demonstration, users can edit the gain tables of the WILCS02_WINCS02. The gain tables are the power settings stored in Flash of the WILCS02_WINCS02 to control the TX power in application firmware. The “Page Index” value ranges from 1-6, and users can store the gain tables information in the “Page Index” for the respective Flash.

Steps for Gain Tables Demonstration

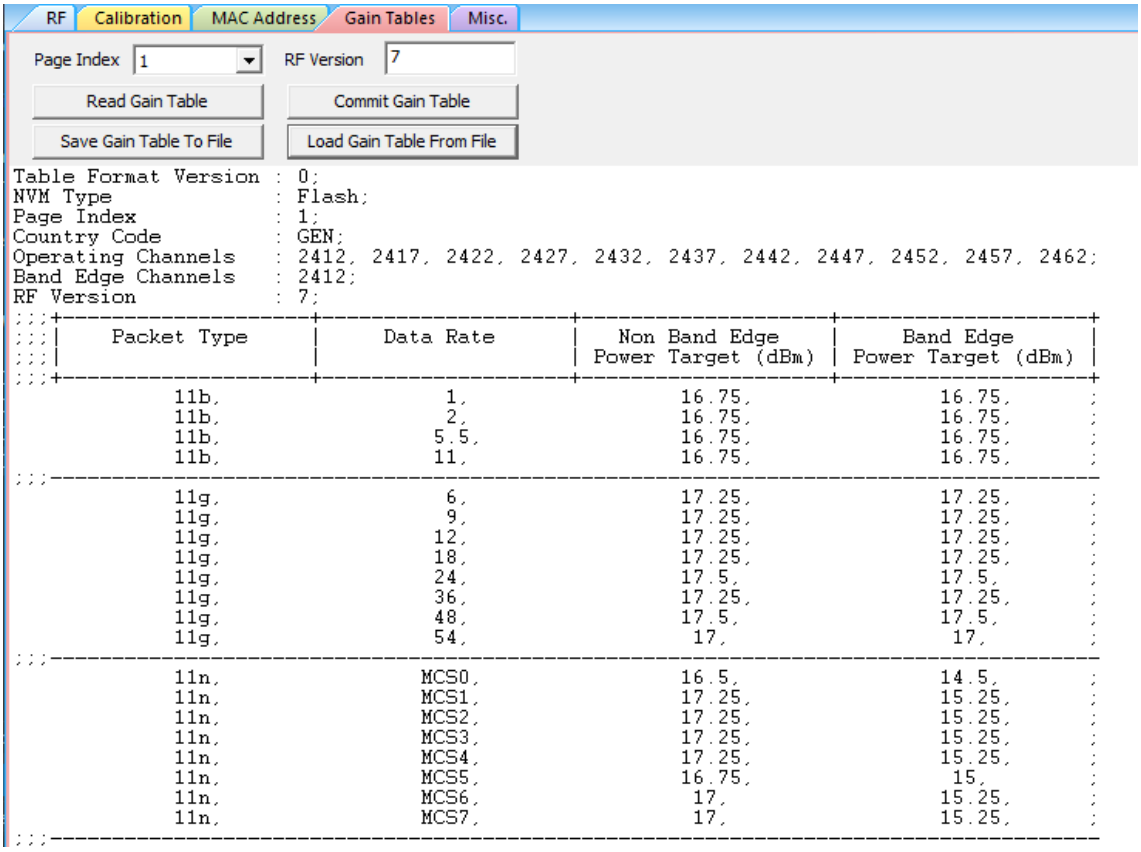
1. From the “Page Index” drop-down list, select a value ranging from 1-6 to read or write for the gain table.

Figure 4-59. Page Index



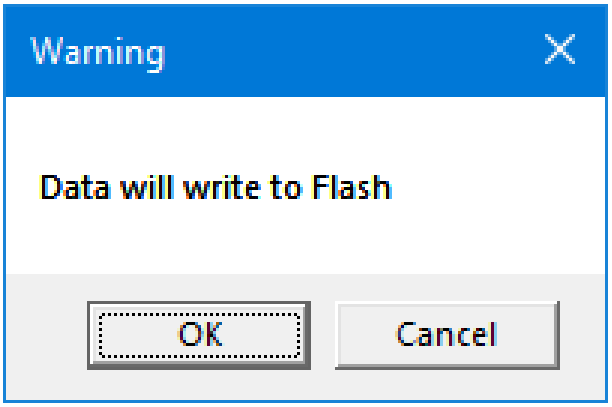
2. Click the **Read Gain Table** button to read the gain table. The gain table content will display on the GUI.

Figure 4-60. Read Gain Table



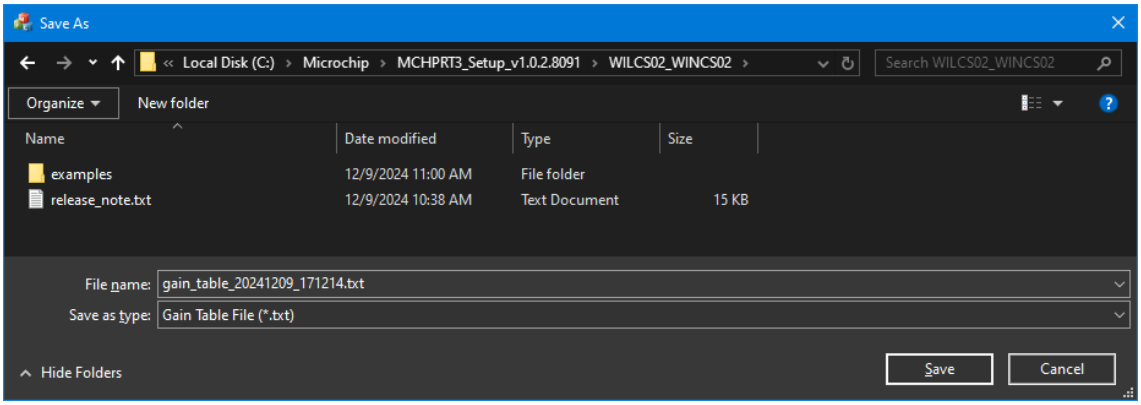
3. Enter a value for “RF Version” and click the **Commit Gain Table** button. Click the **OK** button to write the gain table to the device.

Figure 4-61. Writing to Gain Table



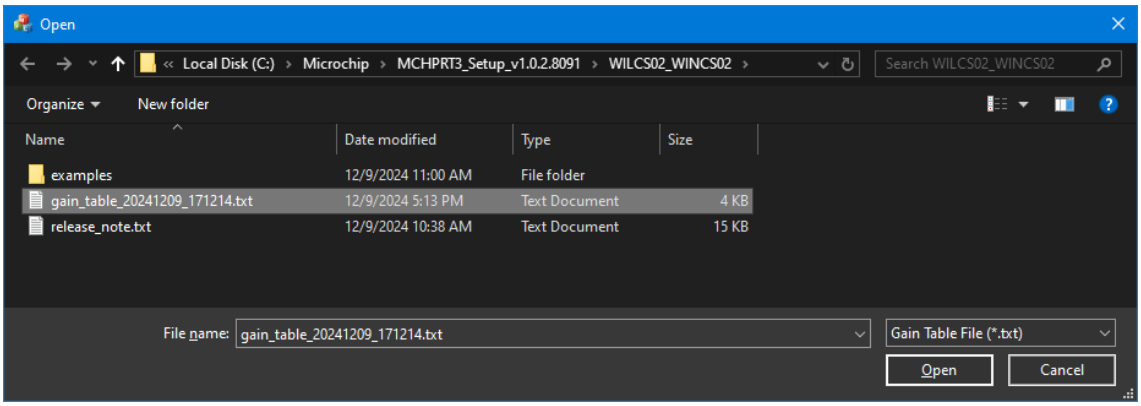
4. Click the **Save Gain Table To File** button to save the gain table for backup and editing. Users can edit the saved gain table text file if they need to modify the gain settings.

Figure 4-62. Saving the Gain Table



5. Click the **Load Gain Table From File** button to load the gain table.

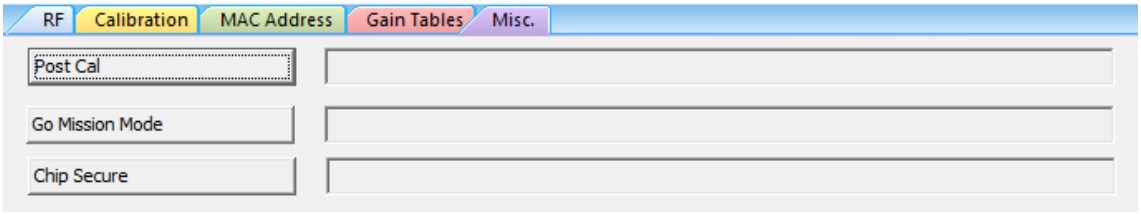
Figure 4-63. Loading the Gain Table



4.9. Post Cal

In this demonstration, run the “Post Cal” mode for different RF connectors of the WILCS02_WINCS02. Click the **Post Cal** button to execute it.

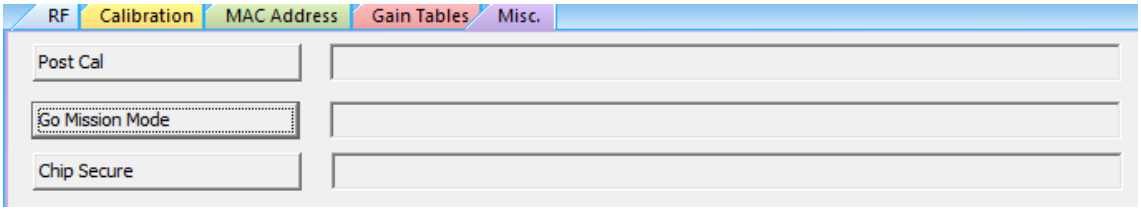
Figure 4-64. Post Cal



4.10. Go Mission Mode

In this demonstration, the user can run the “Go Mission Mode” to switch to Mission Mode from Hut Mode on the next Restart. Click **Go Mission Mode** button to execute it.

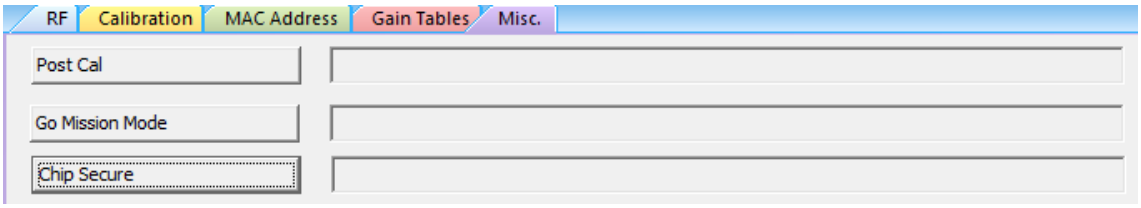
Figure 4-65. Go Mission Mode



4.11. Chip Secure

In this demonstration, run the “Chip Secure” to secure the chip. Click the **Chip Secure** button to execute it.

Figure 4-66. Chip Secure



5. WILCS02_WINCS02 Dynamic Link Library (DLL) Gain Table Information

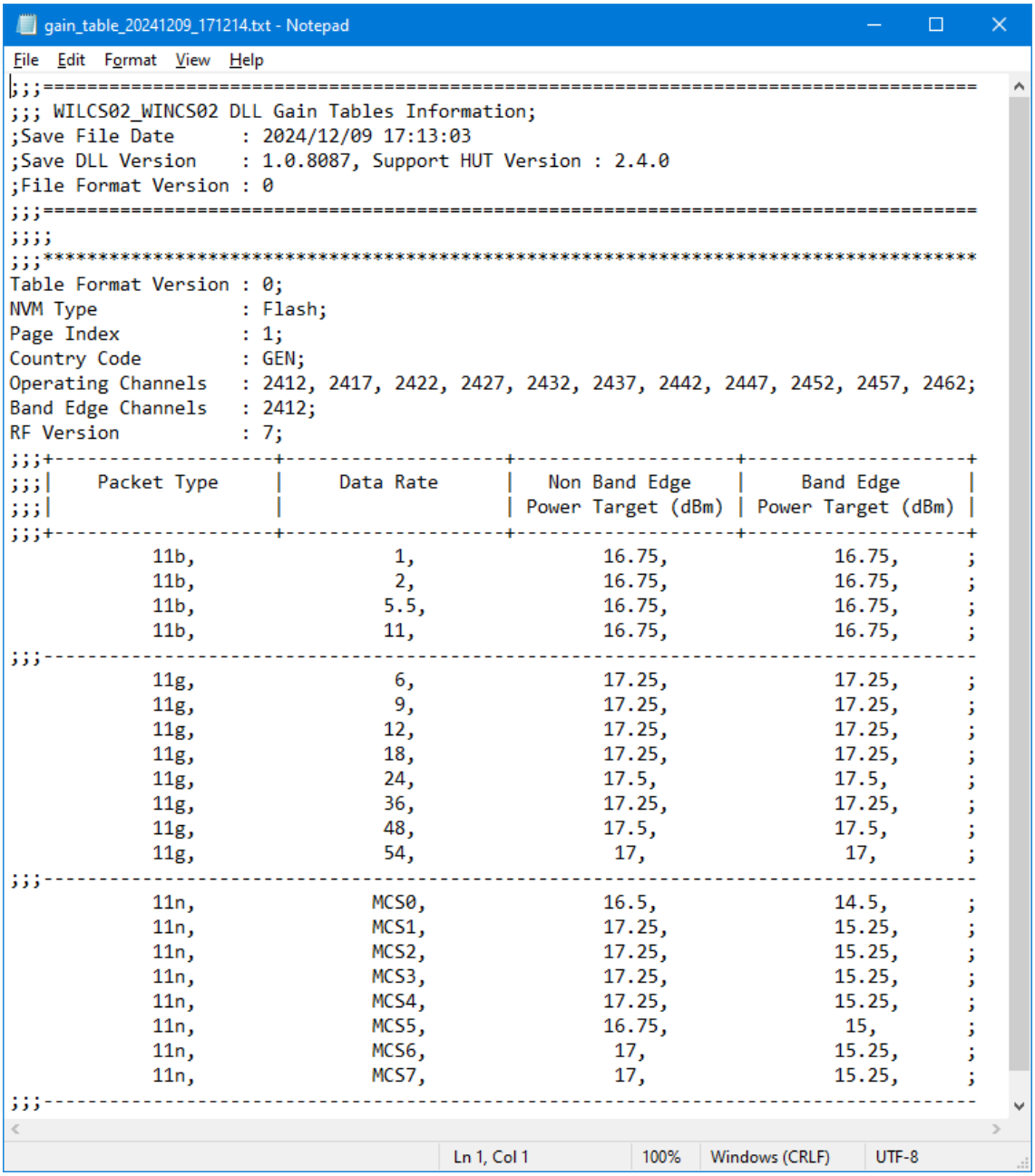
This chapter describes the WILCS02_WINCS02 gain table information and explains how to modify the gain table.

5.1. Gain Table Example

The WILCS02_WINCS02 gain table is a text-based file that can be opened or edited using any text editor. The following rules apply to a gain table file:

- ";;;" indicates a comment for the entire line.
- If the first character is ";", the row contains file information.
  Note: Do not modify this row.
- If the first character is blank, the row contains the Gain Table information. The power target values can be modified, but no other information or format must be altered.
  - Gain Table information power target values range from 0-25 dBm, with 0.25 dB per step.
    Note: If any information in the gain table is unavailable, the entire group of information is considered invalid.

Figure 5-1. Gain Table Example



6. WILCS02_WINCS02 Command Line Interface (CLI) Information

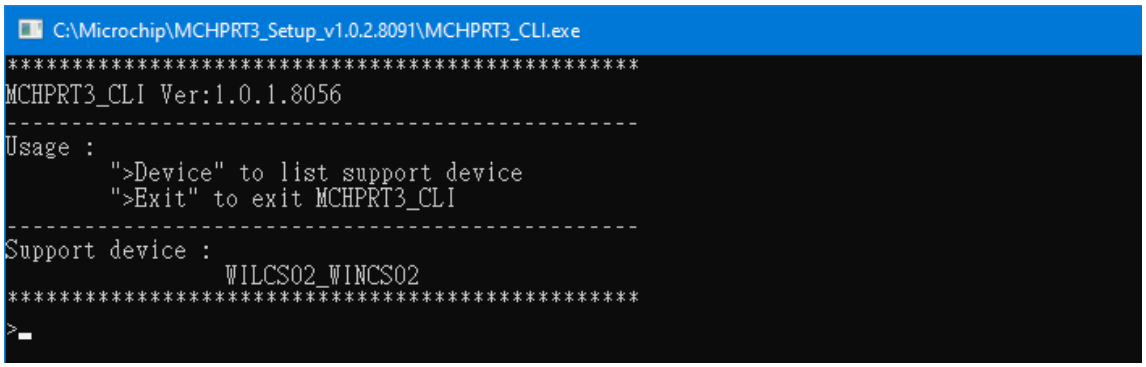
This chapter describes the Command Line Interface (CLI) information of the WILCS02_WINCS02.

6.1. WILCS02_WINCS02 CLI Example

The WILCS02_WINCS02 CLI is a part of the MCHPRT3 tool installer.

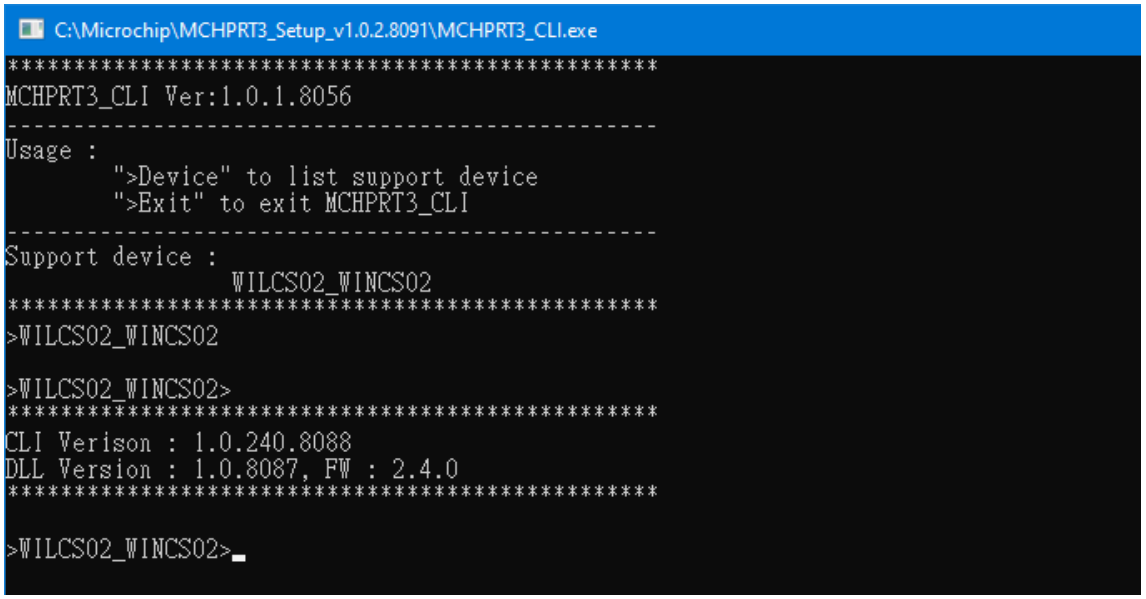
1. Double click `MCHPRT3_CLI.exe` to run the CLI.

Figure 6-1. Command Line Interface



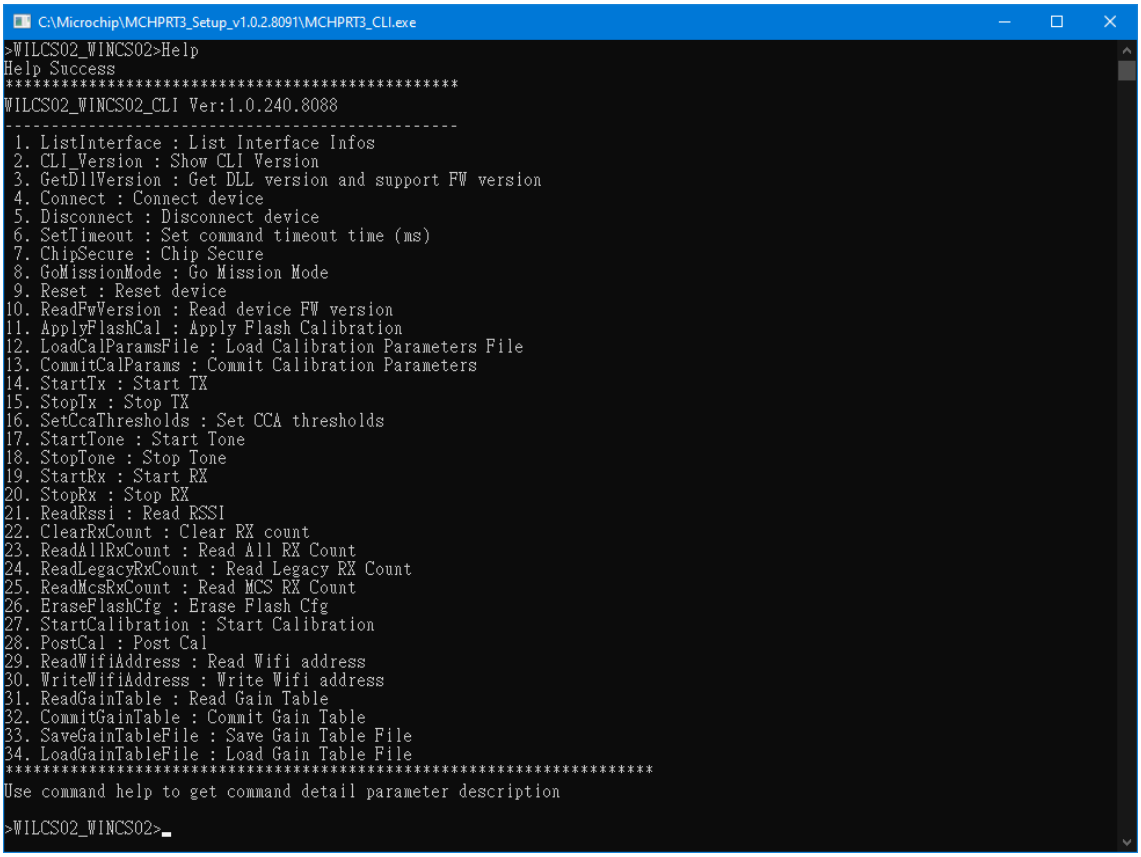
2. To test the WILCS02_WINCS02, enter the “WILCS02_WINCS02”.

Figure 6-2. Command Line Interface



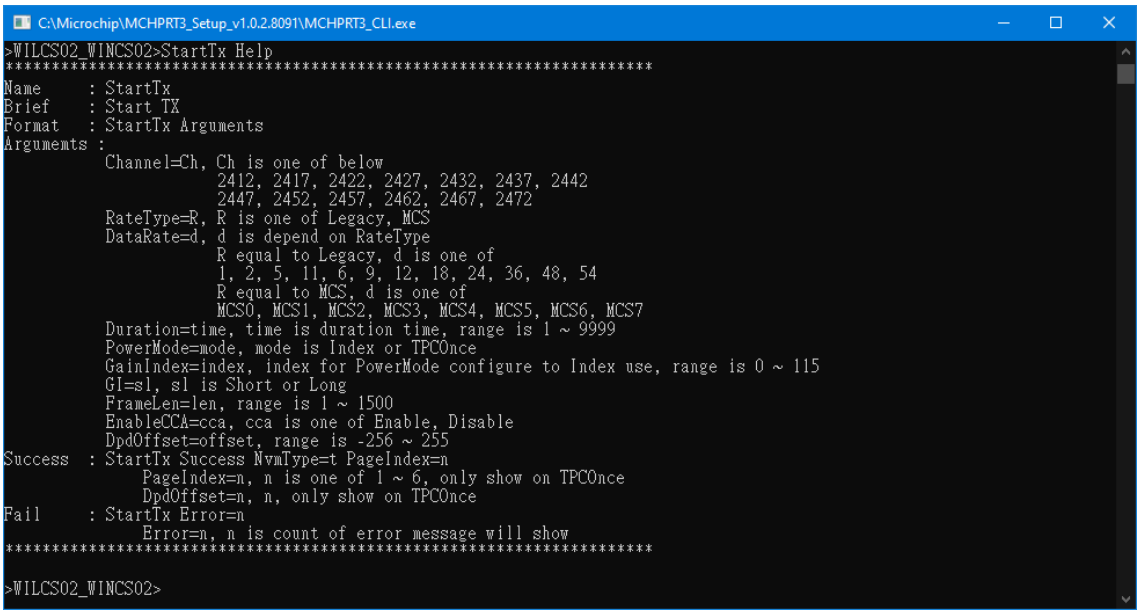
3. Enter “Help” to browse CLI help manual.

Figure 6-3. Command Line Interface



– For example, enter “StartTx Help” to browse the CLI StartTx Help manual.

Figure 6-4. Command Line Interface



7. WILCS02_WINCS02 Python 3 Information

This chapter describes the Python 3 example information of the WILCS02_WINCS02. For more details, refer to the `Python3_Example.chm`.

Refer to the example code in the WILCS02_WINCS02 package example folder, which provides details on how to use the `WILCS02_WINCS02.dll` file with the Python language to control the WILCS02_WINCS02.

7.1. Python 3.11.1 Environment

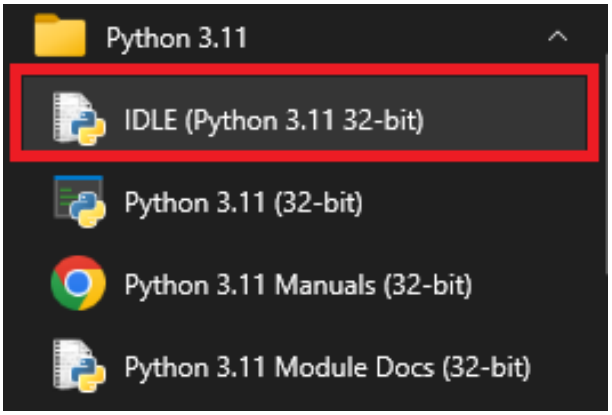
Python Environment : Python 3.11.1 (tags/v3.11.1:a7a450f, Dec 6 2022, 19:43:28) [MSC v.1934 32 bit (Intel)] on win32).

7.2. Steps to Run the Python 3.11 Environment

The following are the steps to run the Python 3.11 environment:

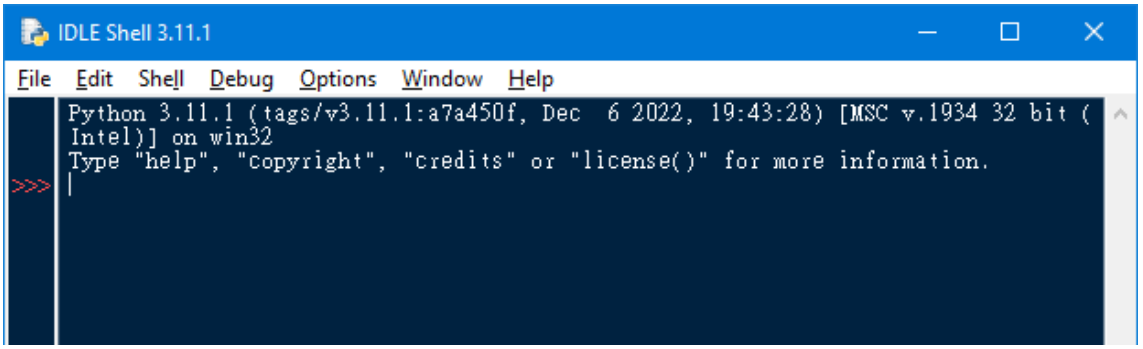
1. Open **IDLE (Python 3.11 32-bit)** in the **Python 3.11** folder from the PC **Start** menu.

Figure 7-1. Python IDLE



2. The following figure illustrates the “IDLE” window of “Python 3.11”.

Figure 7-2. IDLE



3. Go to *File > Open* and choose the `WILCS02_WINCS02_GUI.py` file.

Figure 7-3. Opening `WILCS02_WINCS02_GUI.py`

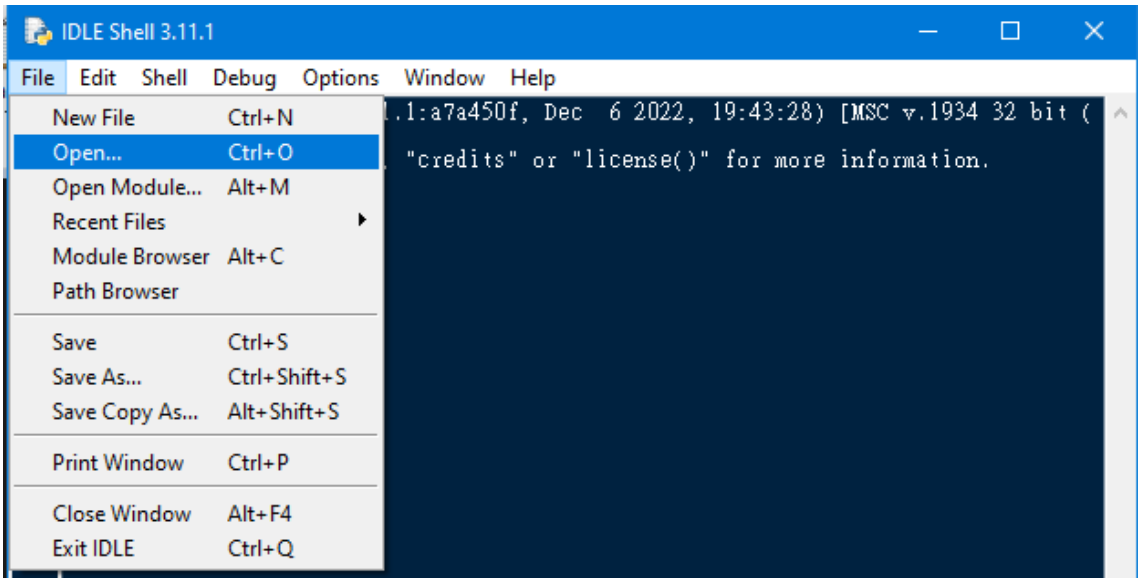
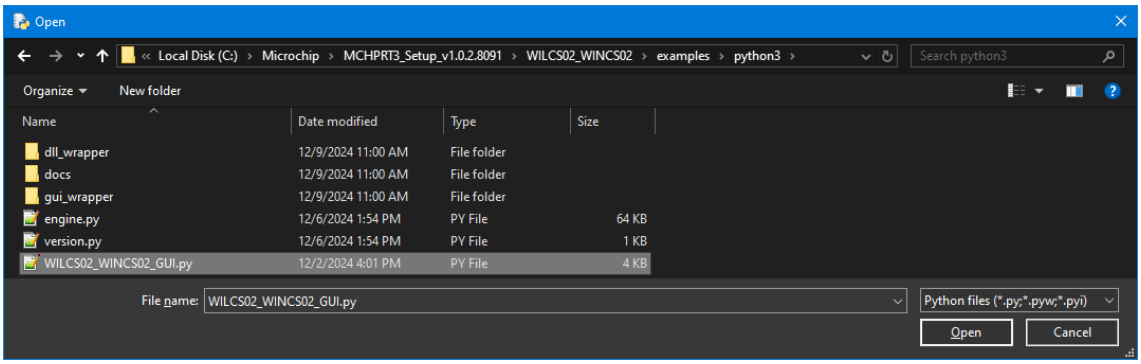
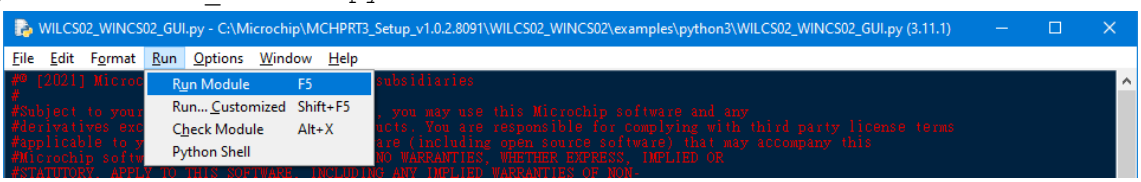


Figure 7-4. Opening `WILCS02_WINCS02_GUI.py`



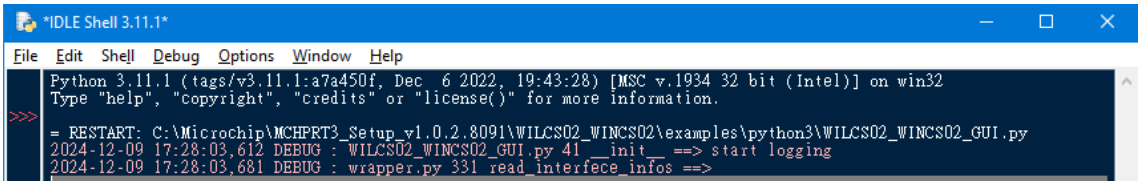
4. Go to *Run>Run Module* to execute the `WILCS02_WINCS02.py` file.

Figure 7-5. `WILCS02_WINCS02.py`



5. The “Python 3.11” shell window displays the following message:

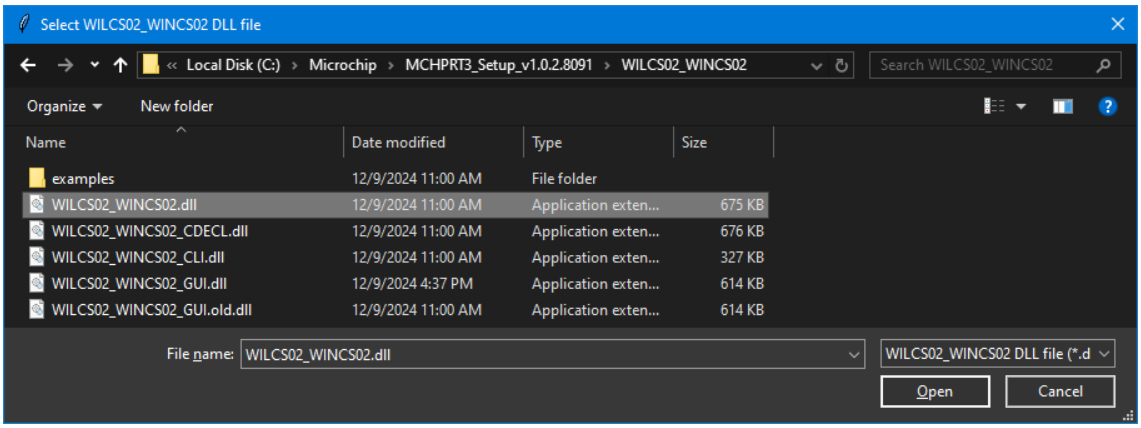
Figure 7-6. Check Run `WILCS02_WINCS02.py` Status



Note: If the shell window displays an error message, check if the source code is from the original `MCHPRT3_Setup.exe` installation folder.

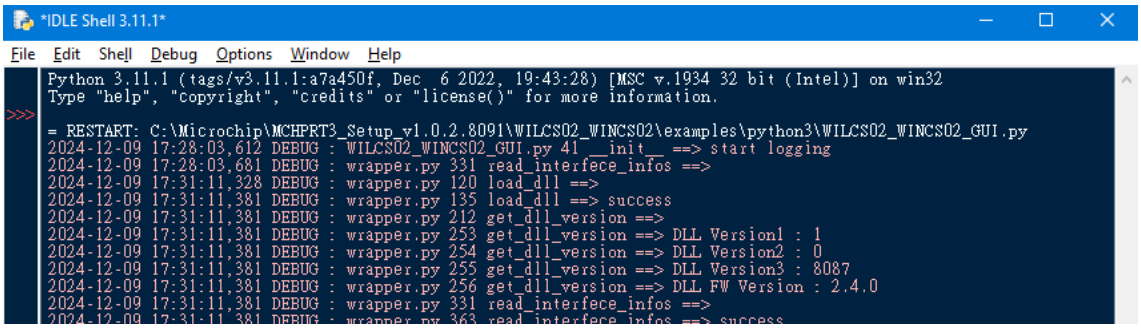
6. Select the `WILCS02_WINCS02.dll` file to load the library and run the example code.

Figure 7-7. `WILCS02_WINCS02.dll`



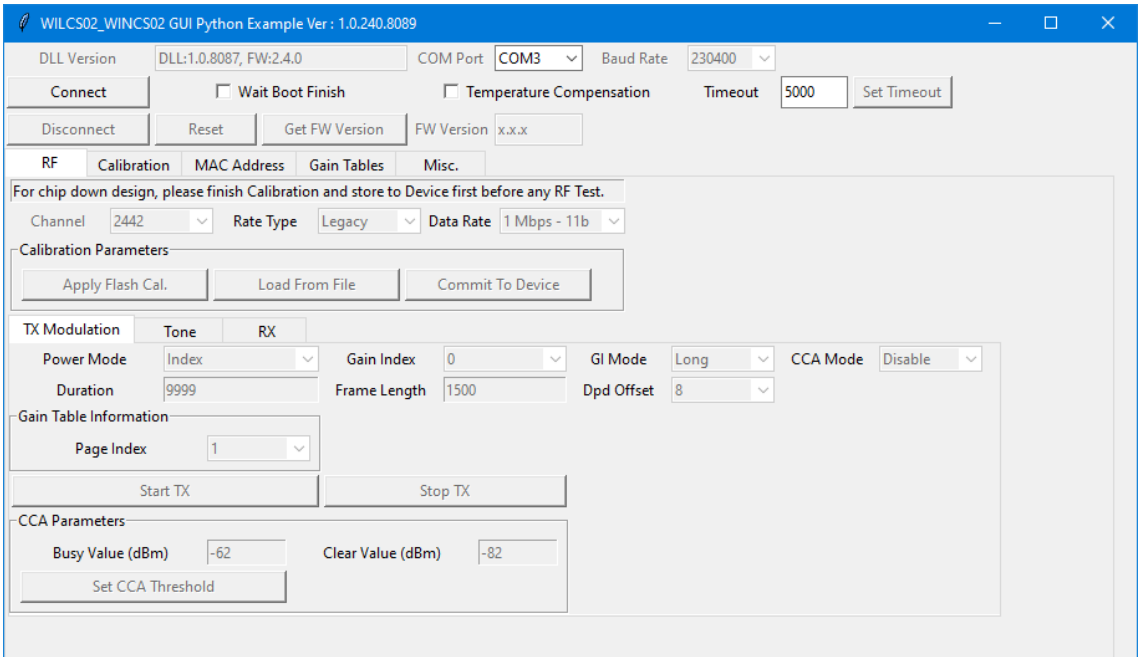
7. The following figure illustrates the Python shell window. After successfully loading the `WILCS02_WINCS02.dll` file, the Python shell window displays the `.dll` file version. In the Python shell window, users can reference the GUI run process to design a tool for themselves.

Figure 7-8. Successful Loading of `WILCS02_WINCS02.dll`



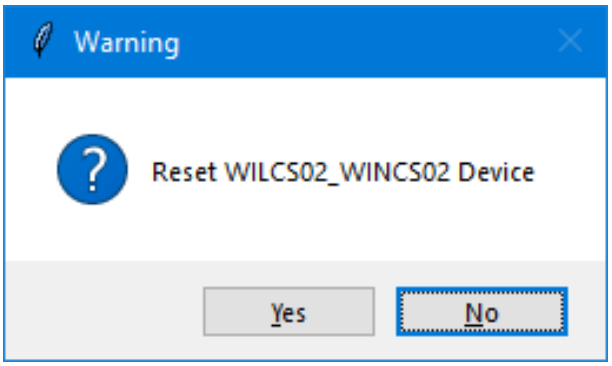
8. The following figure illustrates the `WILCS02_WINCS02` GUI Python example.
Note: Check if the version matches the device HUT code firmware version.
9. Select the device connect “COM Port” and click **Connect** to connect the `WILCS02_WINCS02` device.

Figure 7-9. Python Example GUI



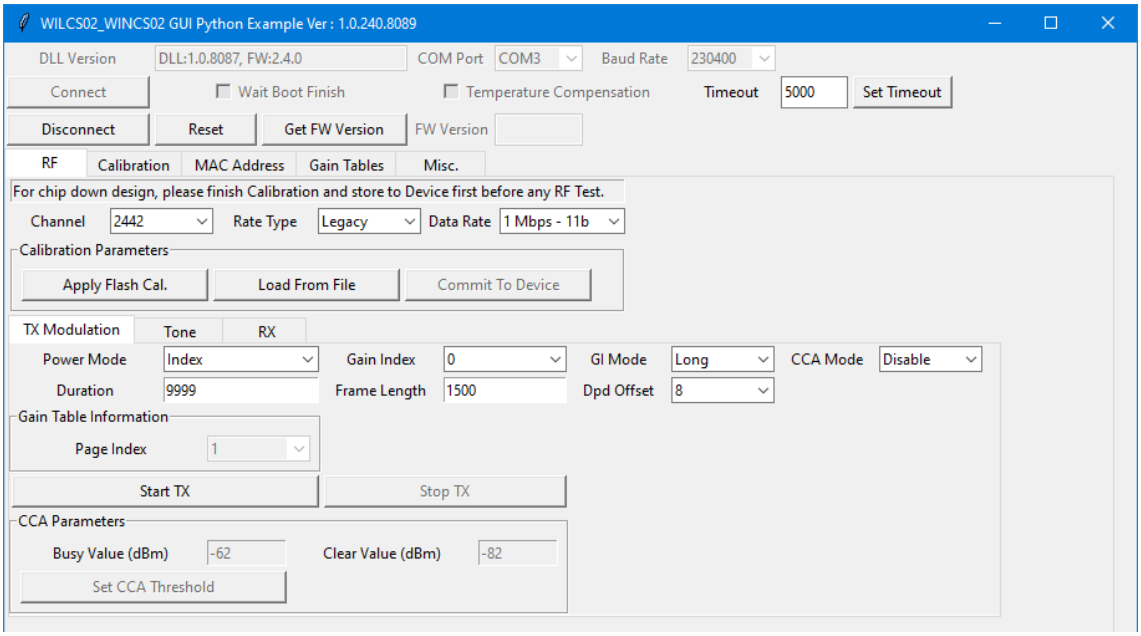
10. The following warning pop-up window appears after connecting the WILCS02_WINCS02 device. Click **Yes** to Reset the `WILCS02_WINCS02` device.

Figure 7-10. Warning



11. After a successful connection, the following WILCS02_WINCS02 GUI Python example window appears.

Figure 7-11. Python Example GUI



8. Document Revision History

The document revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Section	Description
A	06/2025	Document	Initial revision

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