



ATWINC/ATWILC

MCHPRT2 User Guide

Introduction

This document provides detailed information about the MCHPRT2 tool, which allows the user to easily configure, evaluate and test an RF system. This tool simplifies the effort during the early stage of development, regulatory certification and production testing. The MCHPRT2 tool with v1.0 is used for this demonstration. MCHPRT2 is a Windows® -based software program.

Notes: The ATWINC and ATWILC denote the following:

- ATWINC15x0
- ATWINC3400
- ATWILC1000
- ATWILC3000

Features

The MCHPRT2 tool includes the following functions for the ATWINC/ATWILC devices:

- Flexible Graphical User Interface (GUI) Configuration Options
- Inbuilt Command Line Interpreter (CLI)
- Wi-Fi® RF Performance Evaluation
- Bluetooth® Low Energy (BLE) RF Performance Evaluation
- Continuous Wave (CW) Transmitter
- RF Frequency Offset Calibration
- e-Fuse Programming
- Register Read/Write
- Register Range Dump
- Received Signal Strength Indicator (RSSI) Reading
- Firmware (FW) Upgrade
- Gain Table Update
- Webpage Upgrade

Table of Contents

| | |
|---|----|
| Introduction..... | 1 |
| Features..... | 1 |
| 1. Prerequisite..... | 4 |
| 1.1. Hardware Prerequisites..... | 4 |
| 1.2. Software Prerequisite..... | 5 |
| 1.3. UART/I ² C Pin Details | 6 |
| 1.4. Power-Up/Down Sequence..... | 6 |
| 1.5. Hardware Setup..... | 7 |
| 2. Graphical User Interface..... | 9 |
| 2.1. Wi-Fi..... | 9 |
| 2.2. Bluetooth Low Energy (ATWILC3000/ATWINC3400)..... | 18 |
| 2.3. Temperature Calibration Calculator..... | 22 |
| 2.4. Register..... | 23 |
| 2.5. eFuse..... | 26 |
| 2.6. Firmware Upgrade..... | 28 |
| 3. Command Line..... | 31 |
| 3.1. Wi-Fi..... | 31 |
| 3.2. Bluetooth (ATWILC3000/ATWINC3400)..... | 46 |
| 3.3. HCI Command..... | 57 |
| 3.4. Register..... | 60 |
| 3.5. eFuse (ATWINC/ATWILC)..... | 64 |
| 3.6. Firmware Upgrade..... | 69 |
| 4. Appendix A – Python [®] Example..... | 76 |
| 4.1. Example..... | 76 |
| 5. Appendix B – HCI Command Tools..... | 78 |
| 5.1. HCI Initialization..... | 78 |
| 5.2. HCI Command..... | 79 |
| 5.3. UART Initialization..... | 82 |
| 5.4. Serial Port..... | 82 |
| 6. Appendix C – Firmware Update..... | 88 |
| 6.1. Firmware Update..... | 88 |
| 7. Appendix D – MCHPRT2 Tool Inbuilt Configuration..... | 92 |
| 8. Document Revision History..... | 93 |
| Microchip Information..... | 94 |
| The Microchip Website..... | 94 |
| Product Change Notification Service..... | 94 |
| Customer Support..... | 94 |
| Microchip Devices Code Protection Feature..... | 94 |

| | |
|----------------------------------|----|
| Legal Notice..... | 94 |
| Trademarks..... | 95 |
| Quality Management System..... | 96 |
| Worldwide Sales and Service..... | 97 |

1. Prerequisite

This chapter provides the hardware and software prerequisites for using the MCHPRT2 tool with the ATWINC/ATWILC series.

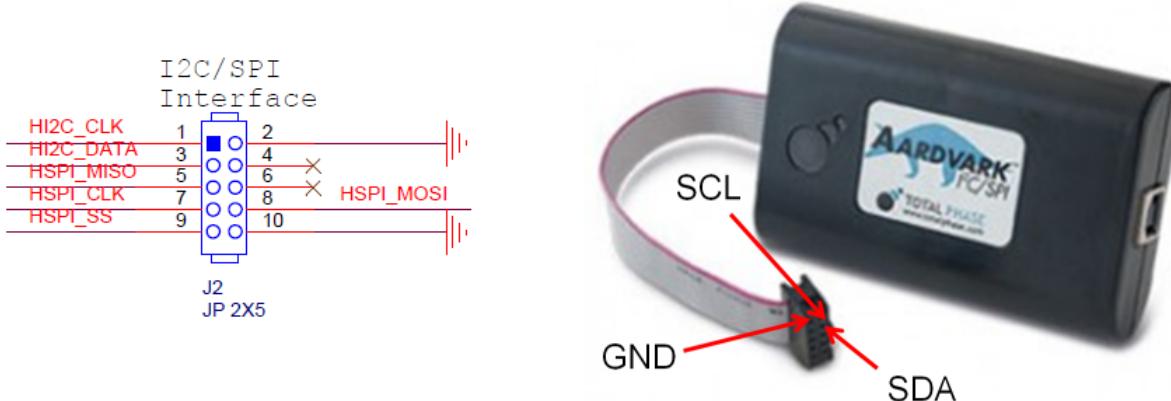
1.1 Hardware Prerequisites

This section provides the hardware tools that are required to test the RF system. ATWINC/ATWILC is connected to the GUI using Aardvark™ or serial bridge.

1.1.1 Aardvark I²C Host Adapter

Aardvark I²C/HCI Host adapter is used to interface PC via USB to I²C pins of ATWINC/ATWILC. The same is shown in the following figure. For more information, refer to <http://www.totalphase.com/products/aardvark-i2cspi/>.

Figure 1-1. Aardvark I²C/HCI Host Adapter



1.1.2 USB-UART Converter

This USB-UART converter ([MCP2200 Breakout Module](#)) will be used to interface the PC to the UART DTM interface of the ATWINC3XXX devices. Any generic USB-UART converter can also be used.

Figure 1-2. USB-UART Converter



1.2 Software Prerequisite

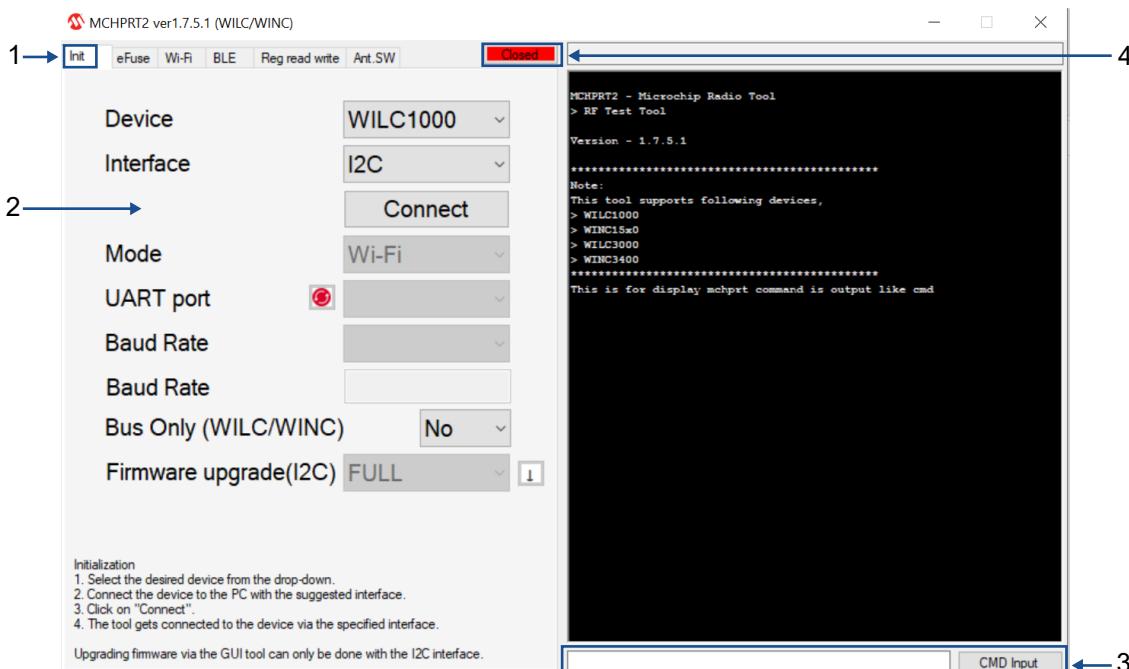
1.2.1 Serial Bridge Connection (ATWILC/ATWINC)

MCHPRT2 GUI can be operated without the Aadvark tool with the help of the serial bridge application from Microchip Studio. In the GUI, instead of I²C, select UART. Enter the valid Com port, baud rate and click **Init** to start evaluating the RF test system. For more information, see the [Serial Bridge Application Note](#).

1.2.2 MCHPRT2 GUI Tool

The MCHPRT2 tool allows the user to easily configure, evaluate and test an RF system. It simplifies the effort during the early stage of development. The later sections have a detailed explanation on how the tool is used to test the RF system.

Figure 1-3. MCHPRT2 GUI Tool



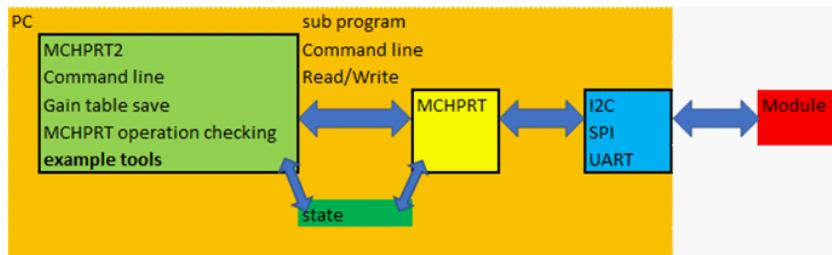
1. Click the tab for Initialization, eFuse, Wi-Fi, BLE or Register read and write option.
2. Function block for the selected tab.
3. CMD command line block.
4. Device connectivity status:
 - Closed – Sub process MCHPRT2 tool is closed
 - Ready – MCHPRT2 tool is waiting for the command
 - Processing – MCHPRT2 tool is running

1.2.2.1 MCHPRT2 Software Architecture

MCHPRT2 is a C# program using MCHPRT command line function for RF test or automation test example. The following link has an example of process function to open, send and receive the command.

<https://docs.microsoft.com/en-us/dotnet/api/system.diagnostics.process?redirectedfrom=MSDN&view=netframework-4.7.2>.

The following is the architecture of MCHPRT2.

Figure 1-4. MCHPRT2

For MCHPRT2 source code contact Microchip sales.

1.3 UART/I²C Pin Details

Connect the UART or I²C to the PC, and power on the ATWINC/ATWILC. Ensure that the ATWINC/ATWILC is in the right test mode with the correct pins.

The following table provides the I²C connection for ATWINC/ATWILC 1XXX and 3XXX series.

Table 1-1. I²C Connection

| Connections | 1XXX Module series | 1XXX Chip series | 3XXX Module series | 3XXX Chip series |
|------------------------------|--------------------|------------------|--------------------|------------------|
| I ² C Slave Data | Pin 3 | Pin 33 | Pin 10 | Pin 16 |
| I ² C Slave clock | Pin 2 | Pin 32 | Pin 11 | Pin 17 |
| BT_RXD | NA | NA | Pin 8 | Pin 14 |
| BT_RXD | NA | NA | Pin 9 | Pin 15 |

1.4 Power-Up/Down Sequence

This section provides the power-up/down sequence for the ATWINC/ATWILC devices.

1.4.1 Power-up/down Sequence (ATWINC/ATWILC)

The power-up/down sequence for ATWINC/ATWILC is shown in the following figure. The timing parameters are provided in following the table.

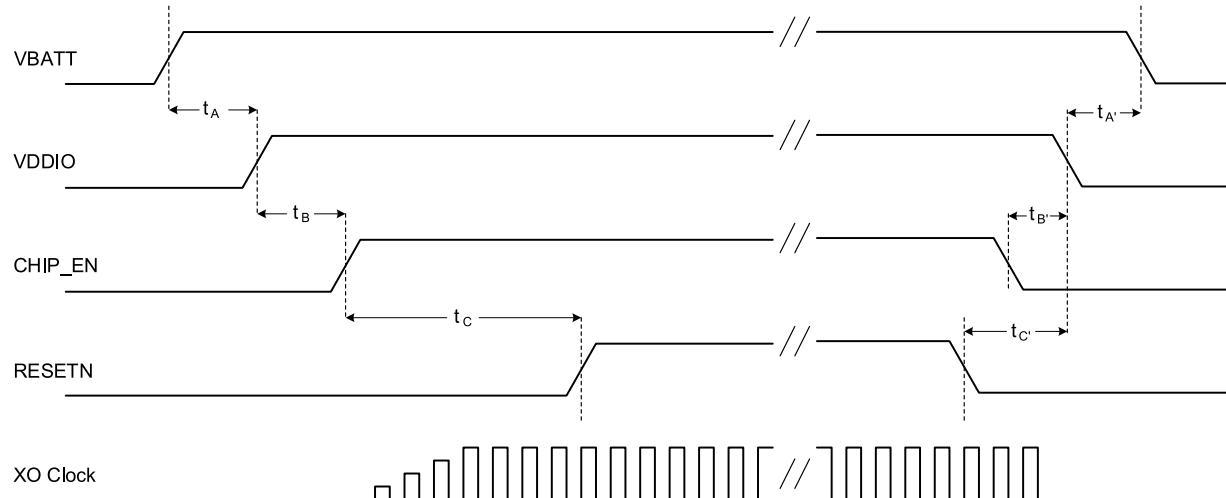
Figure 1-5. Power-up/down Sequence (ATWINC/ATWILC)

Table 1-2. Power-up/down Sequence Timing Parameters

| Parameter | Min. | Units | Description |
|-----------------|------|-------|--|
| t _A | 0 | ms | <ul style="list-style-type: none"> VBATT rise to VDDIO rise VBATT and VDDIO can rise simultaneously or can be tied together. VDDIO must not rise before VBATT. |
| t _B | 0 | ms | <ul style="list-style-type: none"> VDDIO rise to CHIP_EN rise CHIP_EN must not rise before VDDIO. CHIP_EN must be driven high or low, not left floating. |
| t _C | 5 | ms | <ul style="list-style-type: none"> CHIP_EN rise to RESETN rise This delay is needed because the XO clock must stabilize before RESETN removal. RESETN must be driven high or low, not left floating. |
| t _{A'} | 0 | ms | <ul style="list-style-type: none"> VDDIO fall to VBATT fall VBATT and VDDIO can fall simultaneously or can be tied together. VBATT must not fall before VDDIO. |
| t _{B'} | 0 | ms | <ul style="list-style-type: none"> CHIP_EN fall to VDDIO fall VDDIO must not fall before CHIP_EN. CHIP_EN and RESETN can fall simultaneously. |
| t _{C'} | 0 | ms | <ul style="list-style-type: none"> RESETN fall to VDDIO fall VDDIO must not fall before RESETN. RESETN and CHIP_EN can fall simultaneously. |

It is mandatory that the ATWINC/ATWILC chip is in the right bootloader state for establishing connection from GUI through I2C. To do that, the host MCU must power-up the ATWINC/ATWILC chip and then perform the reset sequence as defined in the figure Power-up/down Sequence (ATWINC/ATWILC). This is done very easily from the host MCU by calling the nm_bsp_init() and nm_bsp_reset() function. The code snippet for the same is as shown below,

```
int main(void)
{ /* Initialize the board. */
  system_init();
  /* Initialize the BSP. */
  nm_bsp_init();
  nm_bsp_reset();
  while(1) {
  }
}
```

1.5 Hardware Setup

The following figures illustrate the block diagram of the test setup using ATWINC.

Figure 1-6. ATWINC1500 Hardware Setup

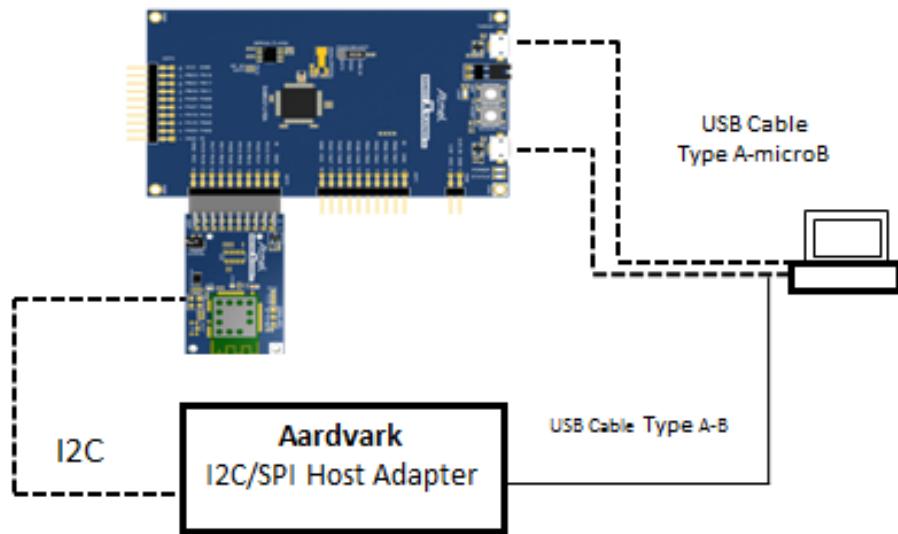
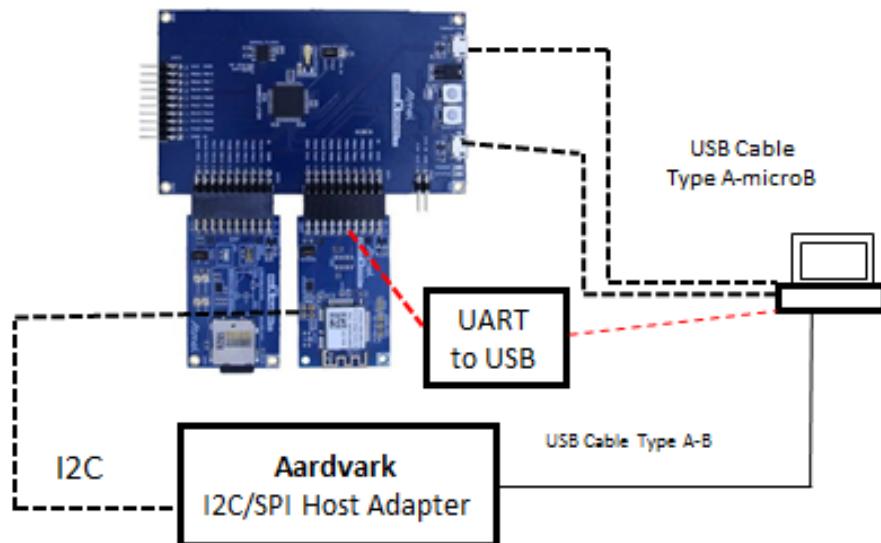


Figure 1-7. ATWINC3400 Hardware Setup



2. Graphical User Interface

This chapter provides the steps to follow to put the device in Wi-Fi and Bluetooth test mode, and set registers, eFuse bits and perform firmware upgrade using the MCHPRT2 tool.

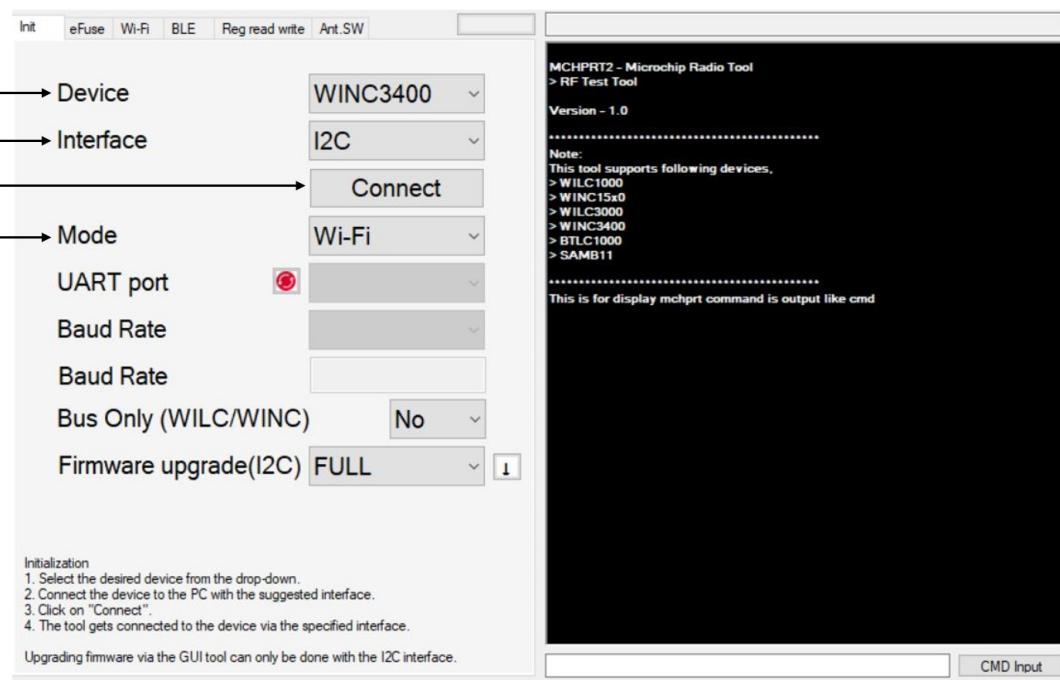
2.1 Wi-Fi

2.1.1 Initialization

Perform the following steps for Wi-Fi initialization.

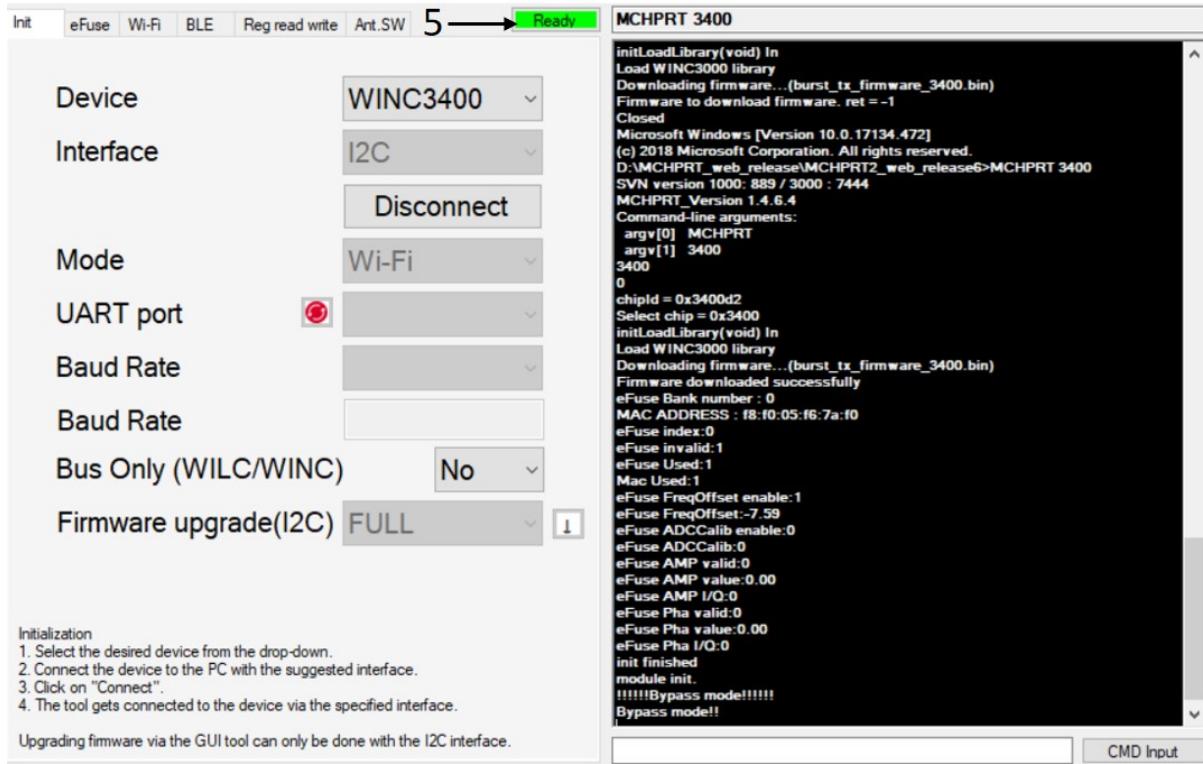
1. Double-click to open the `MCHPRT2.exe` executable file and, select the interface as "I2C" when using "I2C" connection. Select the interface as 'UART' when using serial bridge UART connection.
2. Select the device from the Device series drop down box.
3. Choose Wi-Fi as the mode from the drop down box.
4. Click **Connect** to initialize the device.
5. After initialization is complete, the status of the process bar displays Ready.

Figure 2-1. Wi-Fi Initialization



Note: The CLI information is displayed on the right hand side.

Figure 2-2. Wi-Fi Initialization



2.1.2 Transmission (TX)

2.1.2.1 Start TX – Gain, Channel, Data Rate

Set the following parameters to Start TX:

1. Navigate to the **Wi-Fi** tab.
 2. Select the desired channel **CH** for testing.
 3. Select the desired data rate from the drop-down box, and choose the Gain mode (Dynamic/Bypass/FLASH(WINC1500/WINC3400 only)).
- Note:** In Bypass mode, PPA, PA and Digital Gain are enabled. The value is set within the specified value besides PPA, PA and Digital Gain. In Dynamic and Flash gain mode, PPA, PA and Digital Gain are disabled.
4. Enter PPA.
 5. Enter PA.
 6. Enter Digital Gain (-7 ~ -15).

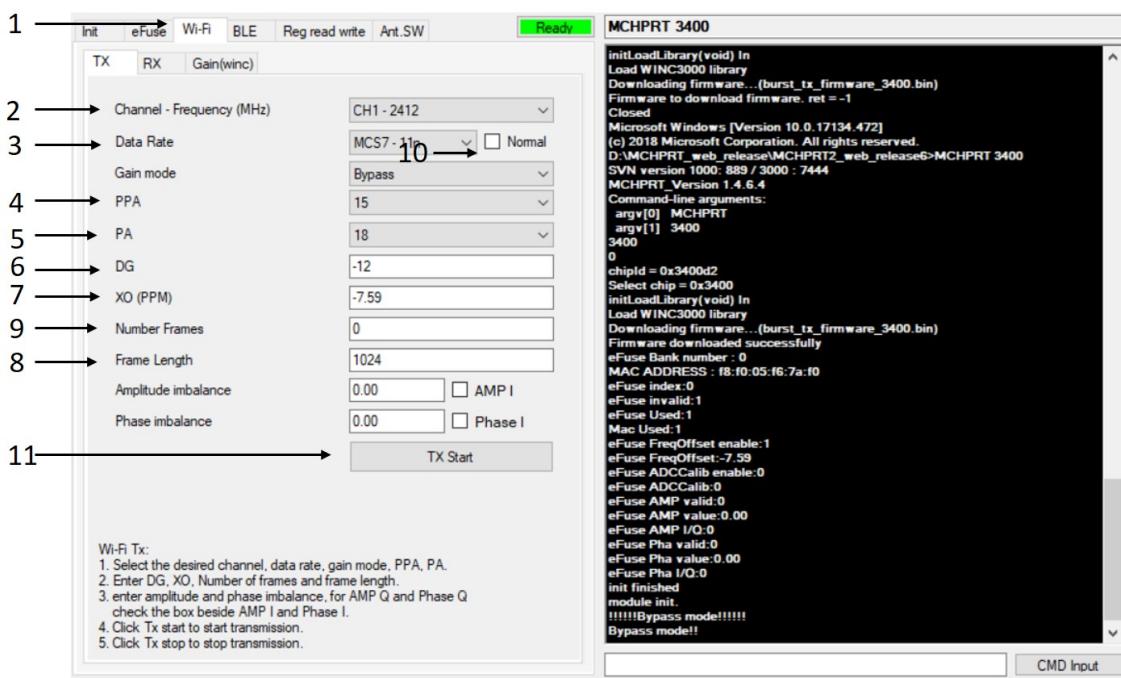
Note: The following table provides the details about the recommended values of the PA and PPA gain values. The user can only customize the DG gain values to meet the gain value requirements.

Table 2-1. Recommended PA and PPA Gain Values

| Device | PA | PPA | DG |
|----------|----------------------|----------------------|--|
| WILC1000 | 18 | 6 | Customizable within the provided range |
| WINC1500 | 18 | 6 | Customizable within the provided range |
| WILC3000 | Wi-Fi –18 BLE – 6 | Wi-Fi –15 BLE – 6 | Customizable within the provided range |
| WINC3400 | Wi-Fi –18 BLE – 6 | Wi-Fi –15 BLE – 6 | Customizable within the provided range |

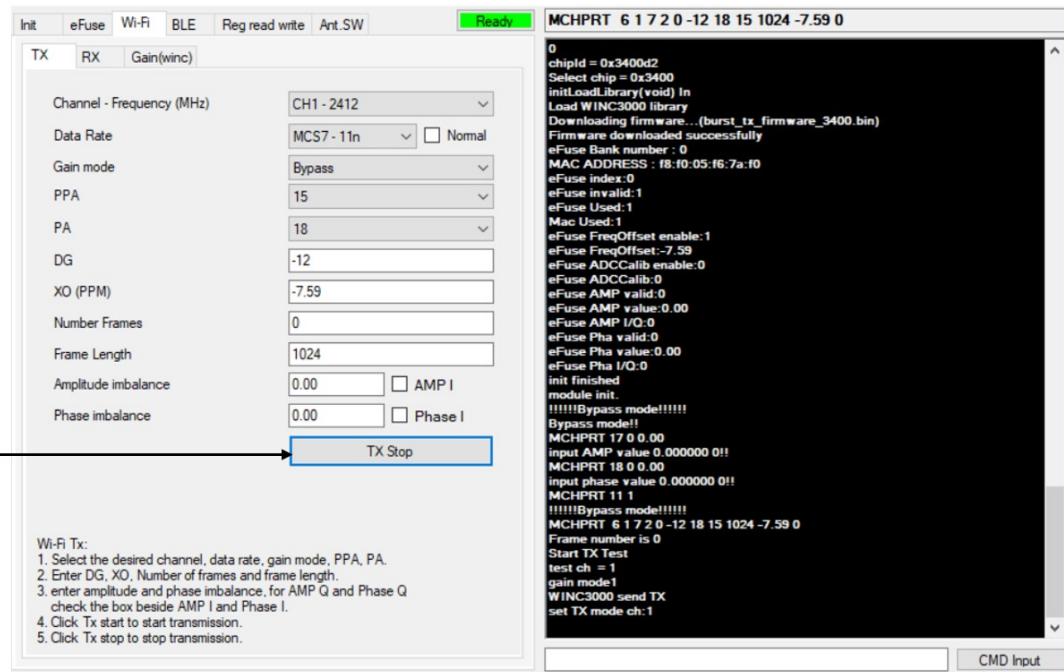
7. XO offset.
8. Length (0~1024).
9. Frames (0 for continuous TX mode).
10. For CW mode of transmission, select the check box before Normal to enter CW mode.
11. Click **TX start** to Start TX.

Figure 2-3. Start TX



12. Click **TX stop** to Stop TX.

Figure 2-4. Stop TX



Note: The value that is written to amplitude and phase imbalance in the Wi-Fi tab is used for testing. It is not written into the eFuse.

Notes:

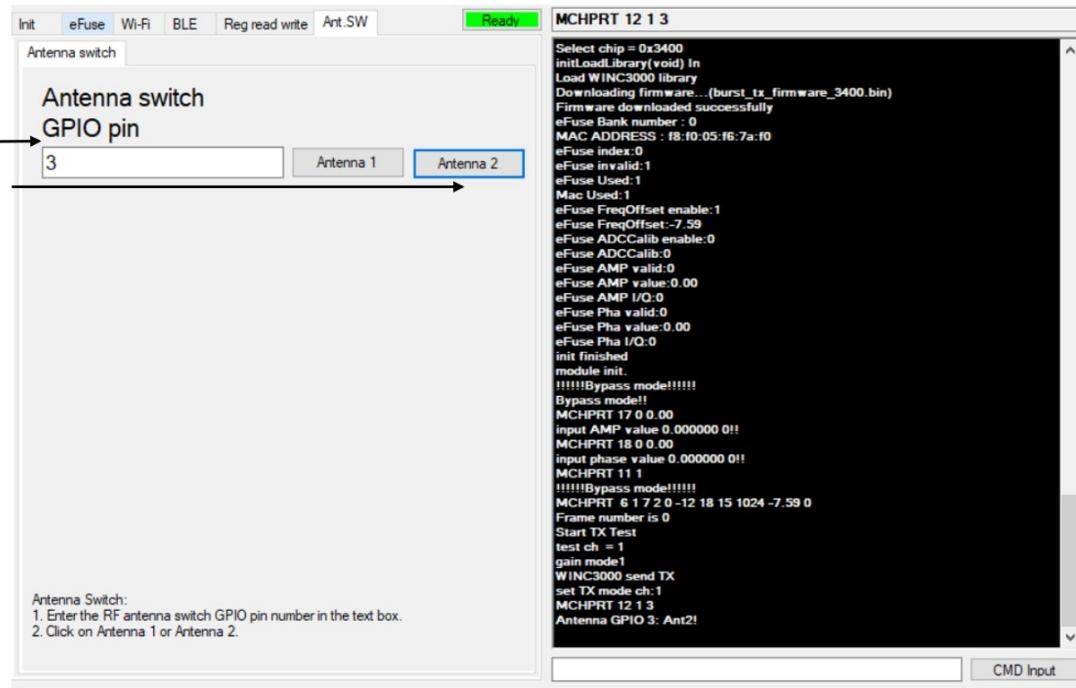
- Bypass mode: Gain values are used from the value entered in the GUI.
- Dynamic mode: Gain Values are used from the loaded test firmware (.bin gain table).
- Flash mode (For WINC devices): Gain values are used from Flash memory.

2.1.2.2 Antenna Switch

Set the following parameters for Antenna switch (ATWILC1000/ATWINC15x0).

1. Enter the GPIO number for switching the antenna.
2. Click on the Antenna 2 button for switching.

Figure 2-5. Enable Antenna Switch



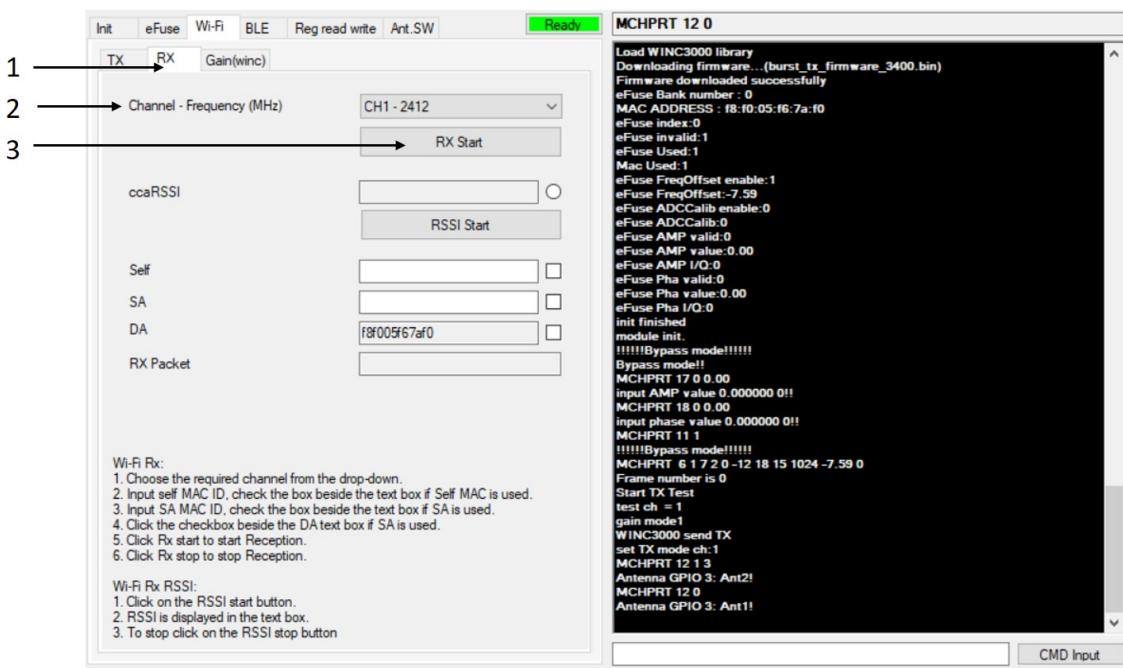
2.1.3 Receive (RX)

2.1.3.1 Start RX

Perform the following steps to Start RX:

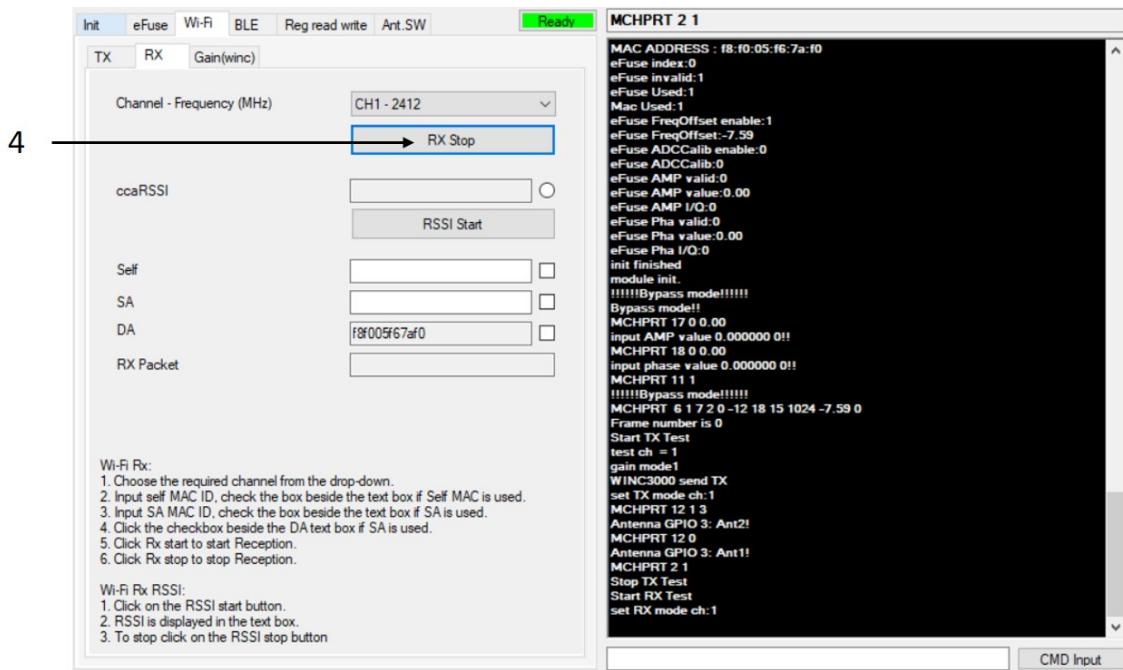
1. Navigate to the **RX** tab, under the **Wi-Fi** tab.
2. Select the required channel from the Channel - Frequency (MHz) drop down box.
3. Click **RX start** to start the receive test.

Figure 2-6. Start RX Test



- Click **RX stop** to stop receiving and the number of received packets is shown in RX packet text box.

Figure 2-7. Stop RX



2.1.3.2 RX MAC Filter Control

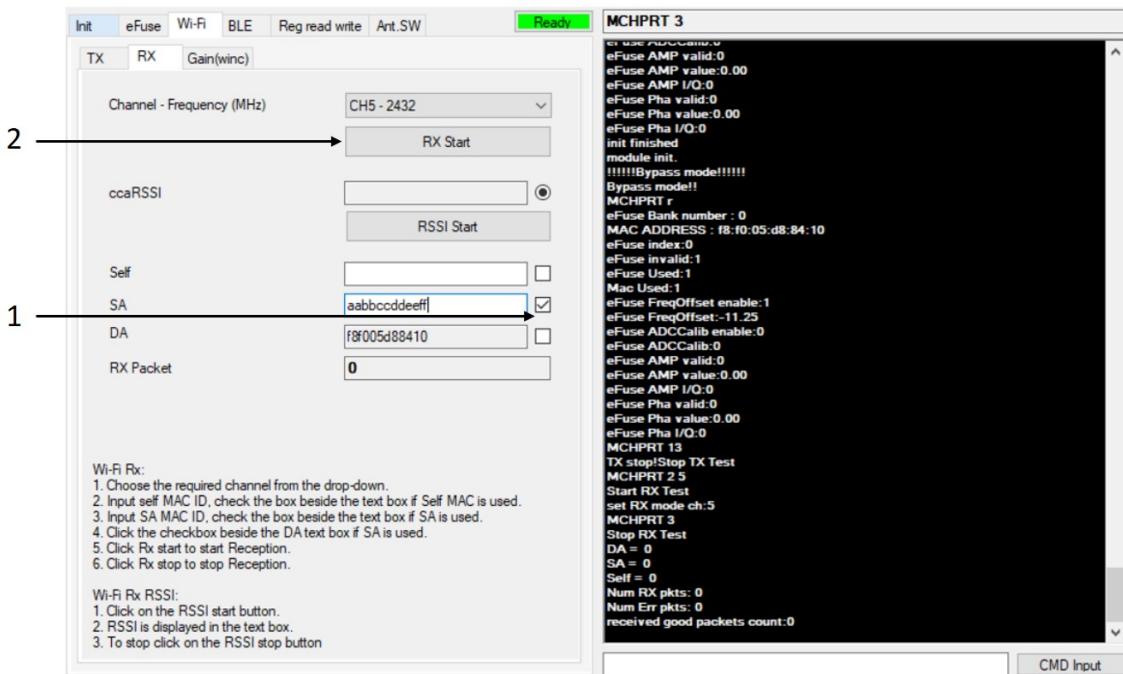
2.1.3.2.1 Enable RX MAC Filter SA (Source)

Perform the following steps to enable RX MAC filter for SA.

- Click on the **SA** check box and input Source MAC address in the text box.

- Click **RX start** to start the RX test.

Figure 2-8. Enable RX MAC Filter SA

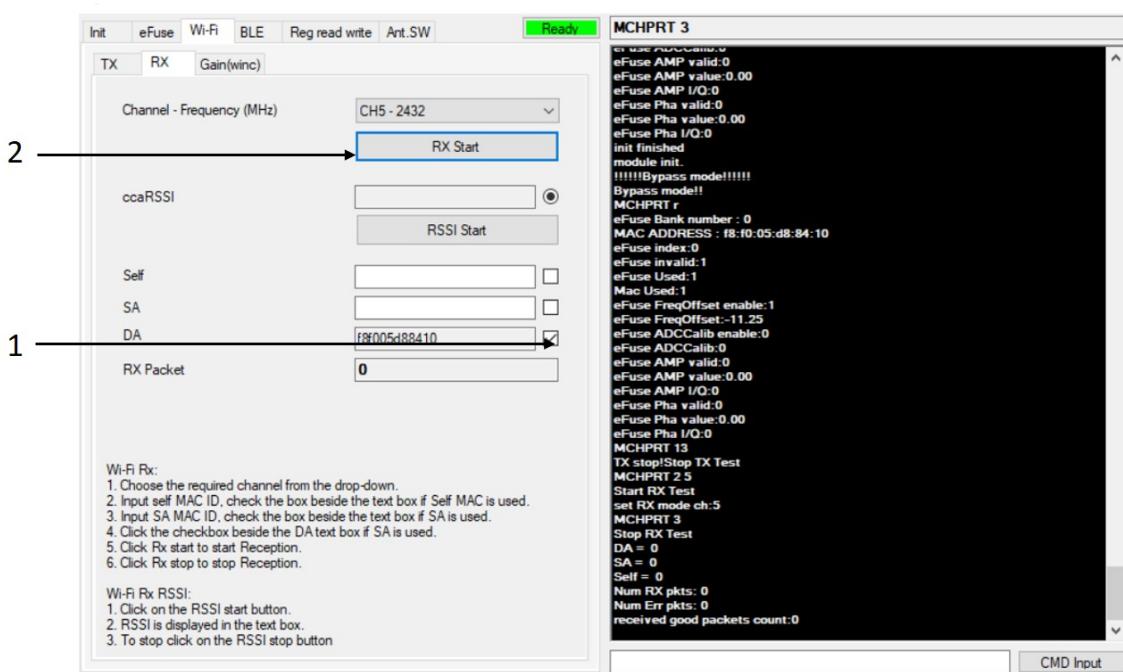


2.1.3.2.2 Enable RX MAC Filter DA (Destination)

Perform the following steps to enable RX MAC filter for DA.

- Click the **DA** check box to enable RX MAC filter for DA.
- Click on **RX start** to start the RX test.

Figure 2-9. Enable RX MAC Filter DA

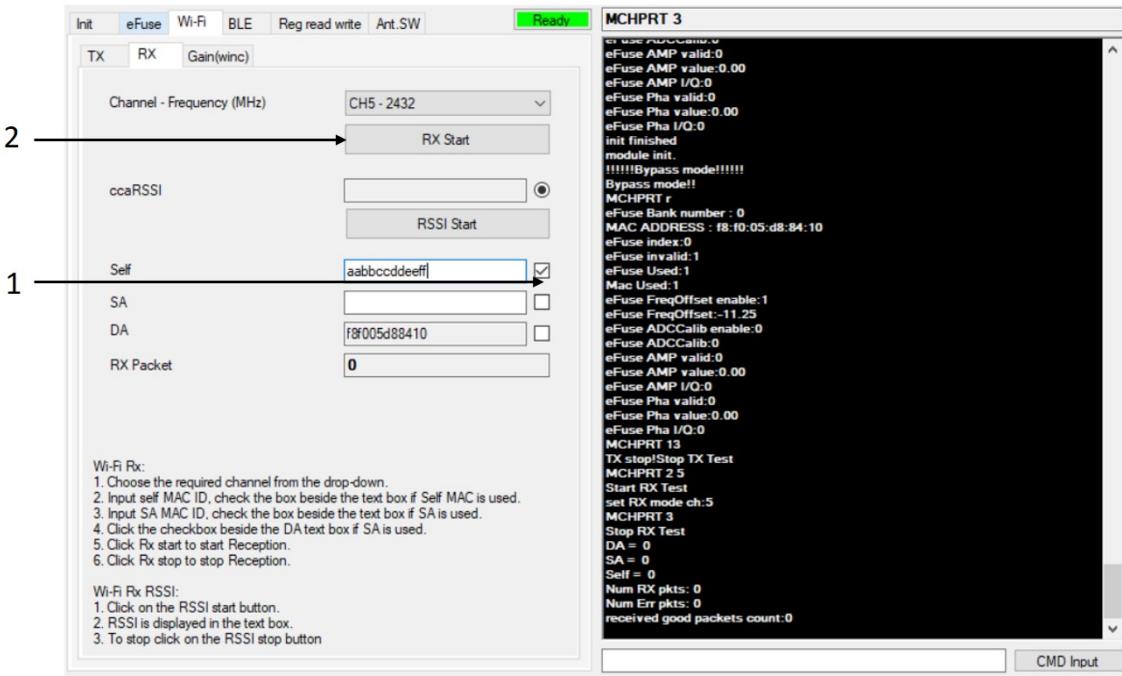


2.1.3.2.3 Enable Override Self MAC Address

Perform the following steps to enable override self MAC address.

1. Click on **Self** check box and input Self MAC address in the text box.
2. Click **RX start** to start the RX test.

Figure 2-10. Enable Override Self MAC Address



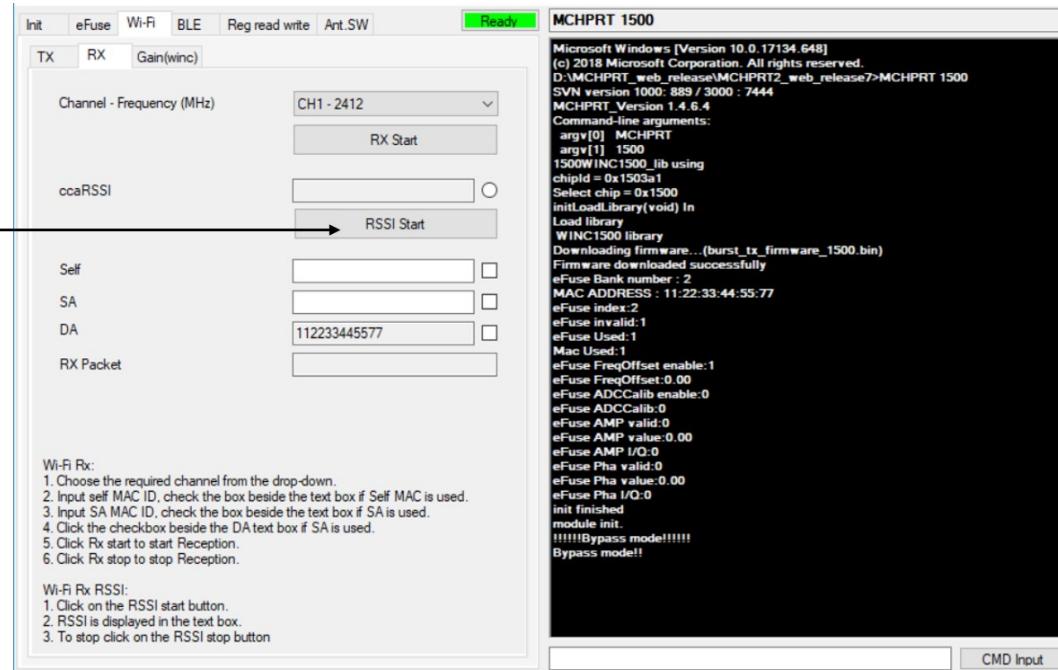
2.1.3.3 ccaRSSI

Perform the following steps to start RSSI test:

1. Click **RSSI start** to start receiving the signal strength displayed in the tab next to ccaRSSI.

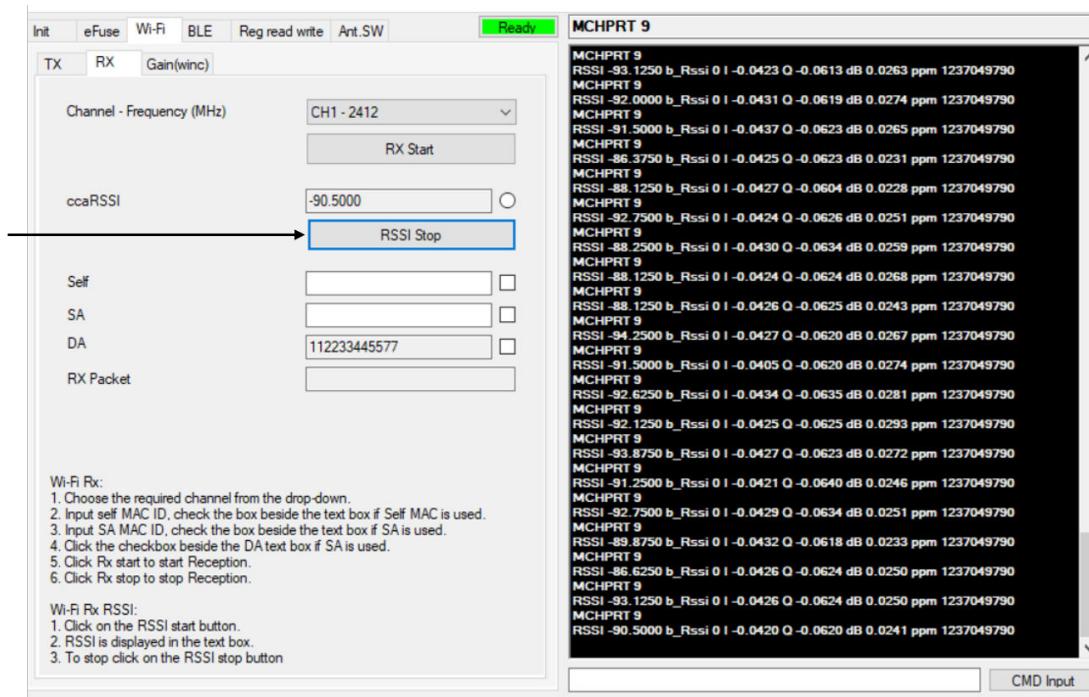
Note: If a valid Wi-Fi packet is received, the indicator next to the ccarSSI text box displays as selected.

Figure 2-11. Start RSSI



- Click **RSSI stop** to stop measuring RSSI.

Figure 2-12. Stop RSSI



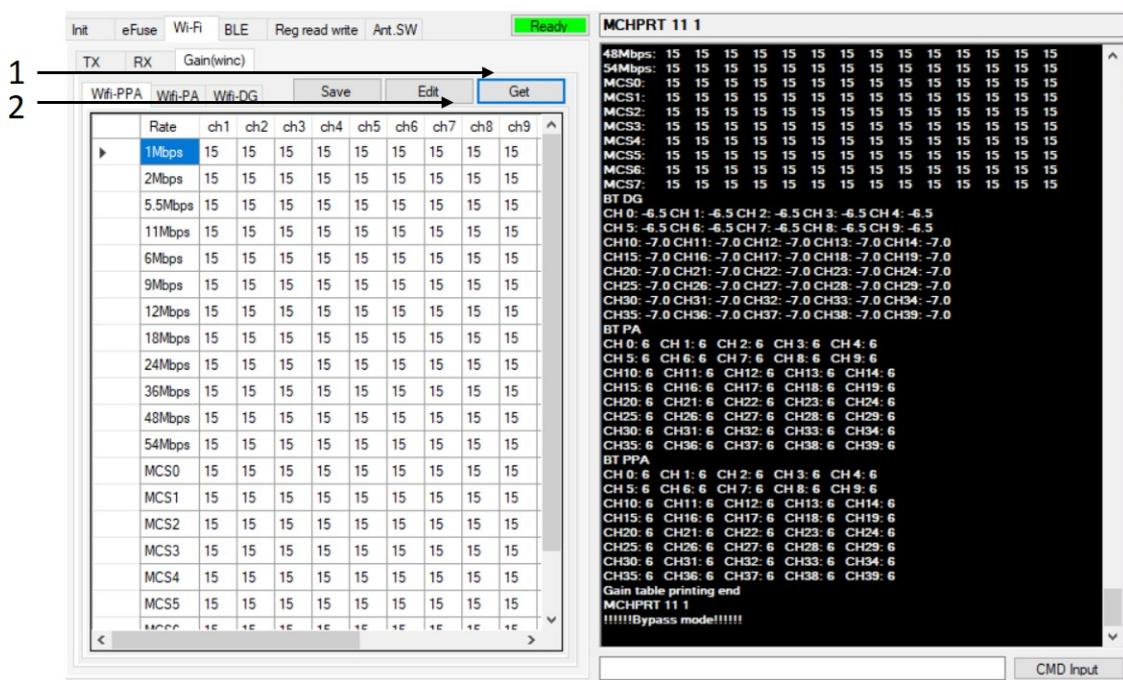
2.1.4 Gain Table

Perform the following steps for Gain table settings:

- Navigate to **Gain(winc)** under **Wi-Fi** tab and, click **Get** to get the Wifi-PPA, Wifi-PA and Wifi-DG.

2. Click **Edit** to change the values of PPA, PA and DG. Click **Save** to apply the changes.

Figure 2-13. Gain Table Update



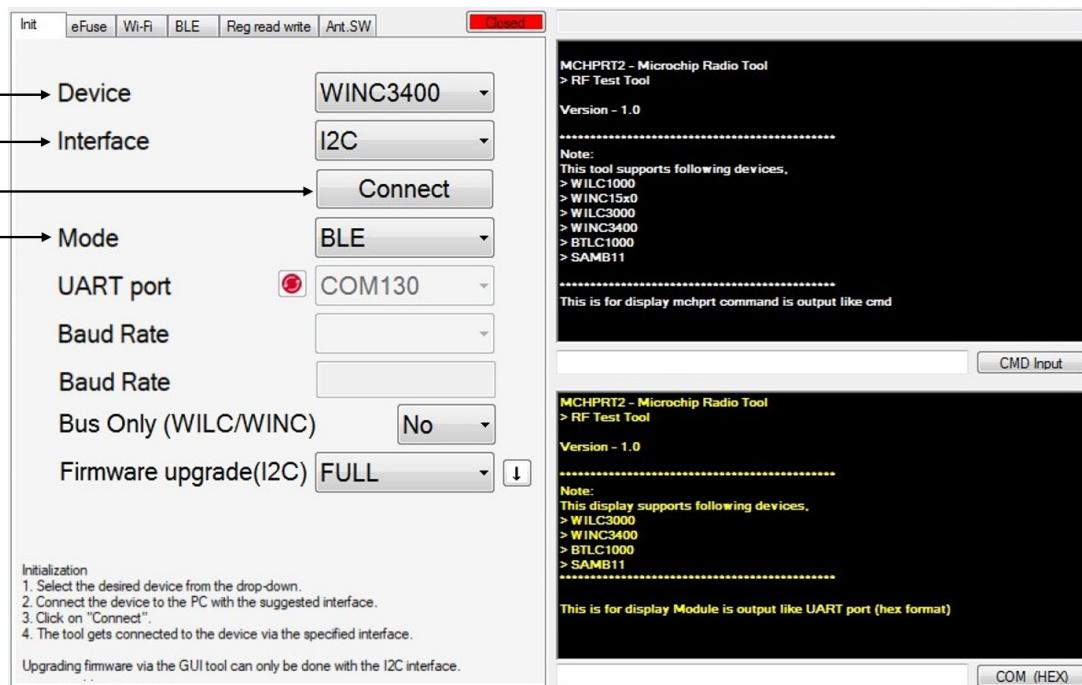
2.2 Bluetooth Low Energy (ATWILC3000/ATWINC3400)

2.2.1 Initialization

Perform the following steps for Bluetooth initialization.

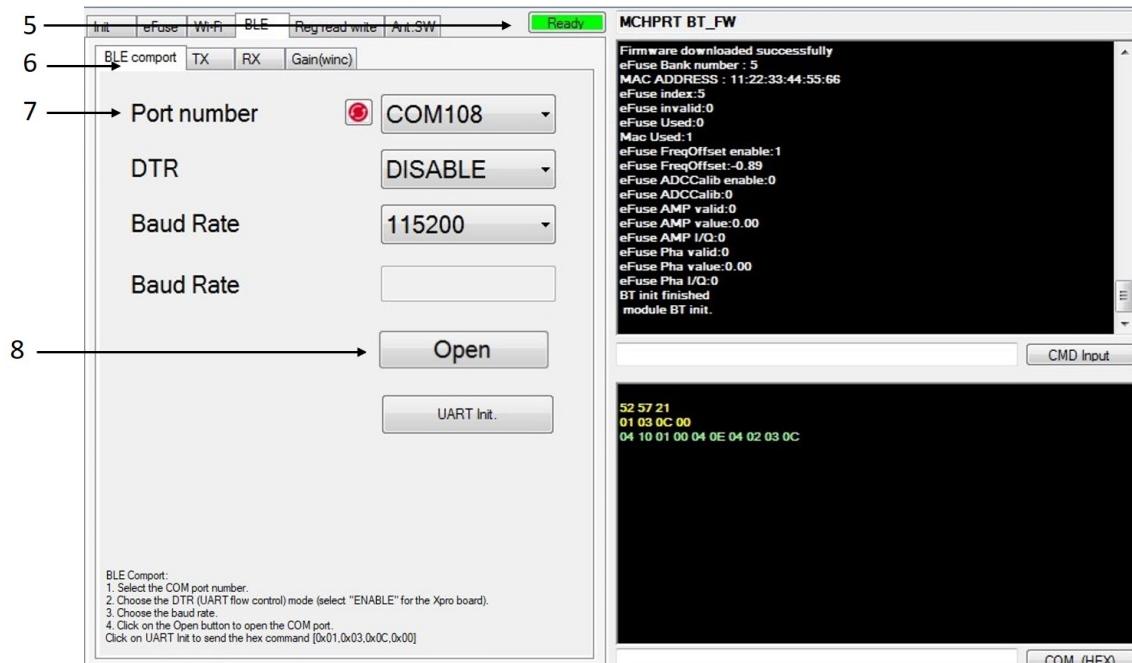
1. Double-click on MCHPRT2.exe to open the GUI tool and select the device from the drop down box.
2. Select the interface as "I2C" when using "I2C" connection, and as "UART" when using serial bridge UART connection.
3. Select the Mode as BLE from the drop down box, next to Mode.
4. Click **Connect**.

Figure 2-14. Bluetooth Initialization



5. The process bar status displays Ready, after the initialization completes.
6. Navigate to **BLE comport** tab under **BLE**.
7. Select the COM port number and, select Baud rate as 115200.
8. Click **Open** to connect to the selected COM port.

Figure 2-15. Selecting COM Port



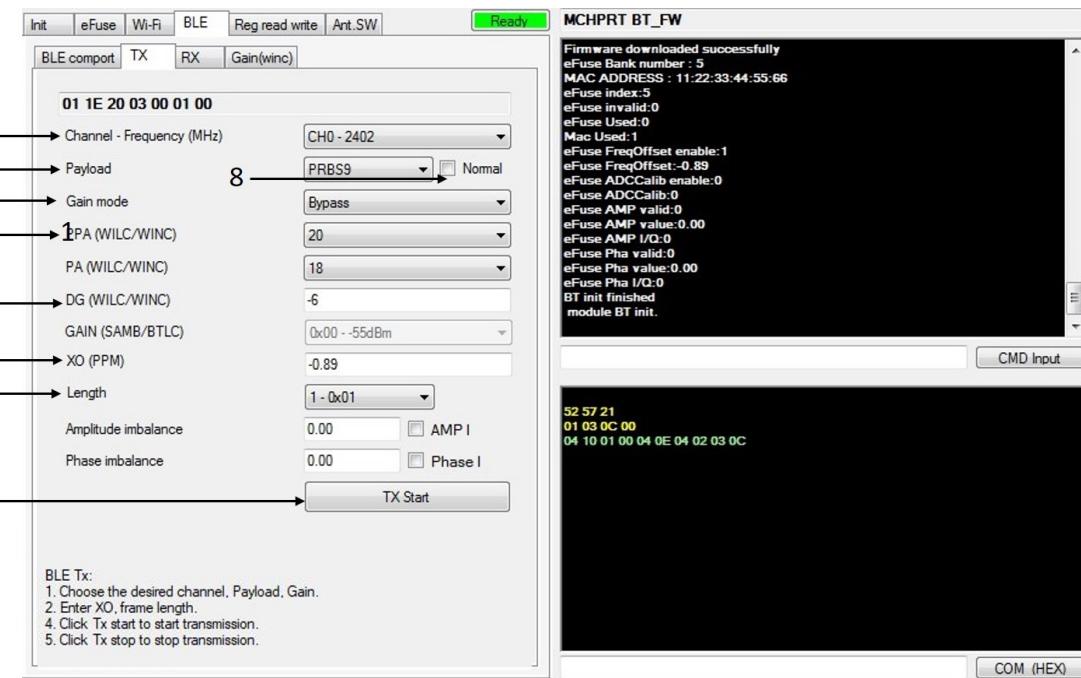
To check if DTR is enabled, see [1.3. UART/I2C Pin Details](#).

2.2.2 TX

Set the following parameters for Bluetooth TX.

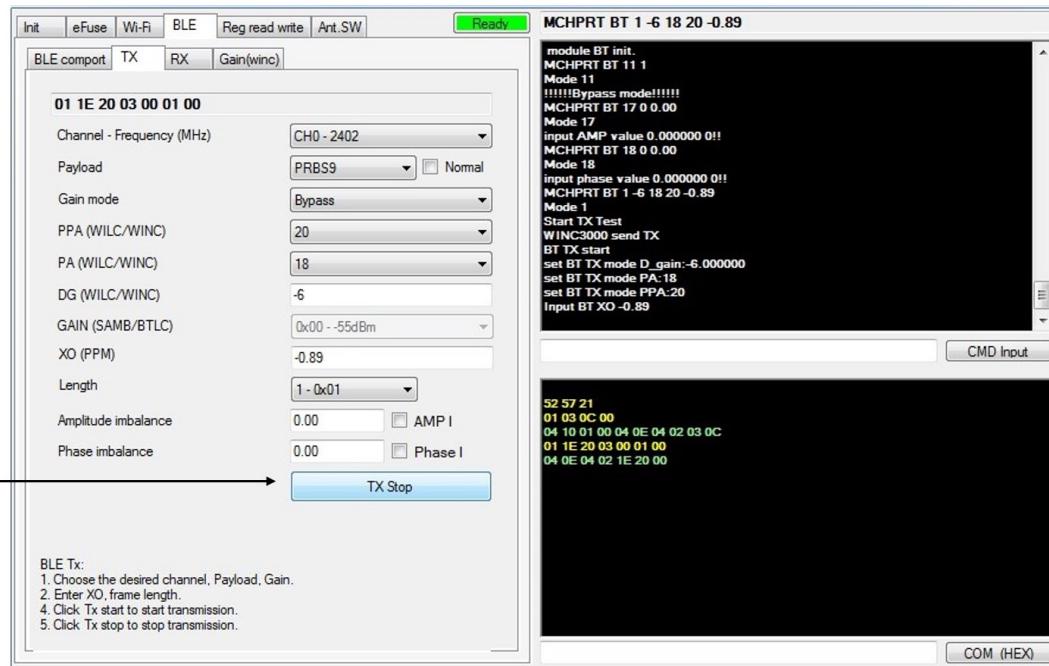
1. Navigate to TX tab under BLE and choose the desired channel from Channel-Frequency drop-down.
2. Select the payload.
3. Select gain mode.
4. Select PPA and PA values from the drop down box.
5. Enter Digital gain.
6. Enter XO offset.
7. Select Frame Length.
8. Select the check box next to payload drop down box, to enable CW mode.
9. Click **TX Start** to start transmission.

Figure 2-16. Start TX for Bluetooth



10. Click **TX Stop** to stop transmission.

Figure 2-17. Stop TX for Bluetooth

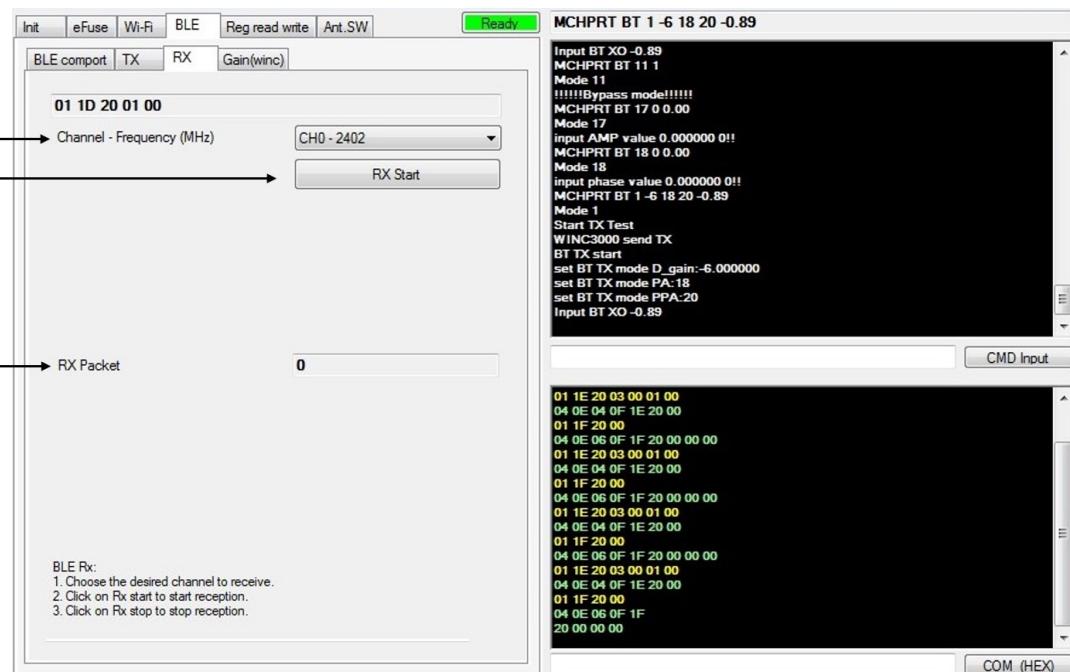


2.2.3 RX

Set the following parameters for RX test:

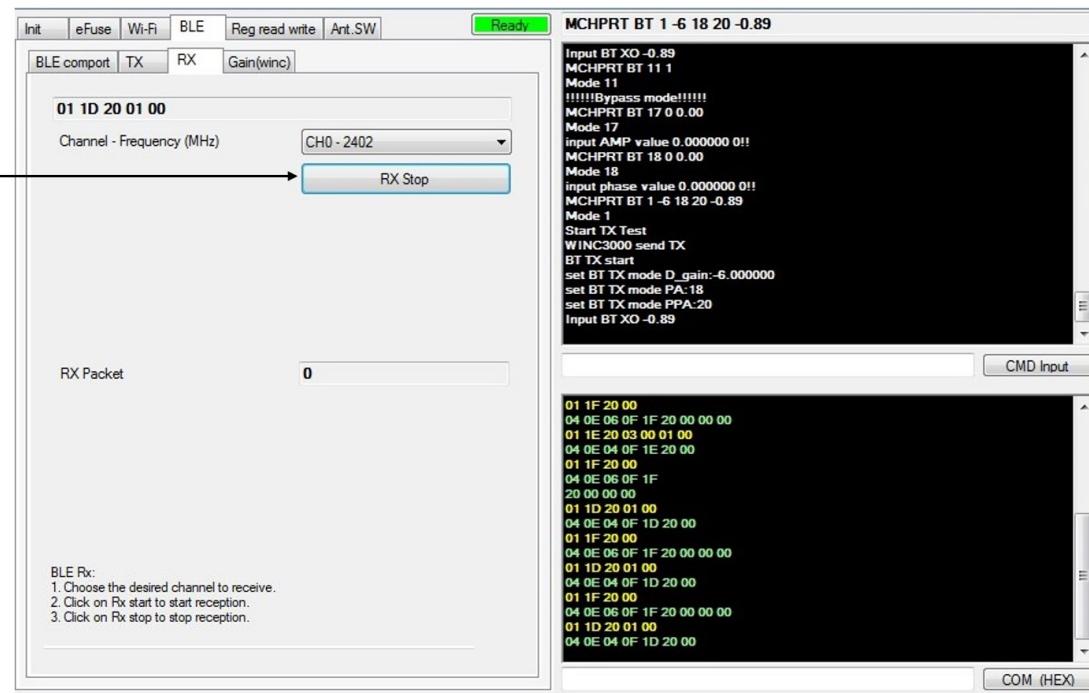
1. Navigate to RX tab under BLE and choose the required channel from the Channel-Frequency drop down box.
2. Click **RX start** to start the reception.
3. Rx packet shows the number of successful packets received.

Figure 2-18. Start Bluetooth RX Test



4. Click **RX stop** to stop the reception.

Figure 2-19. Stop Bluetooth RX Test



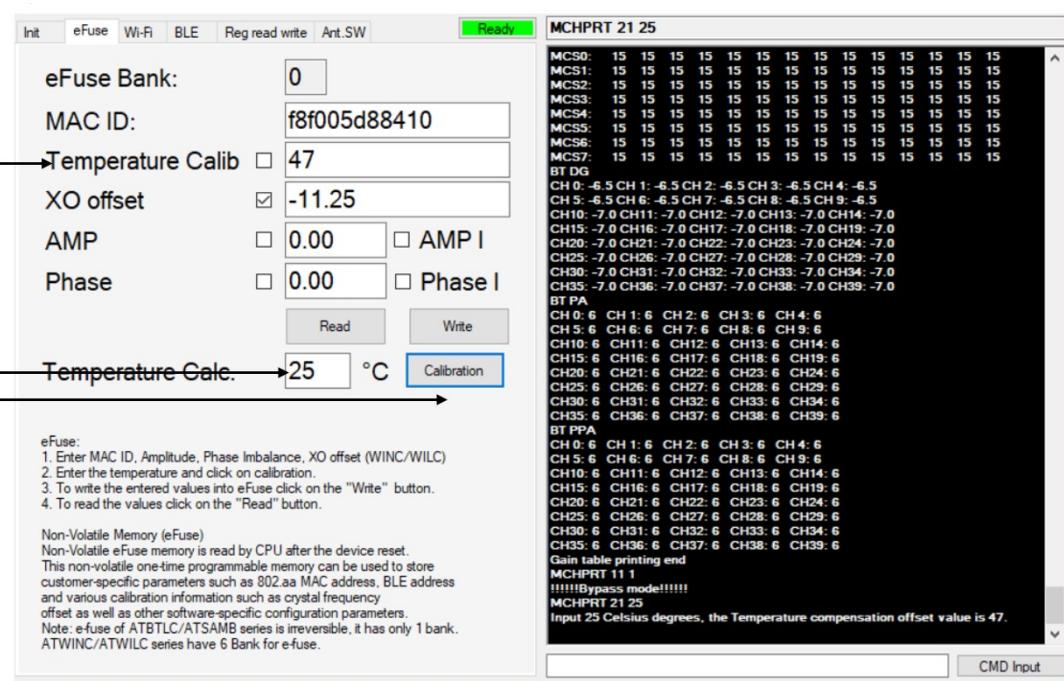
2.2.4 Direct Test Mode

1. Stop all the Tx or Rx tests before starting DTM mode.
2. After the BLE initialization, reconnect the COM port to the testing equipment.

2.3 Temperature Calibration Calculator

1. Navigate to eFuse and type the current temperature value in the text box.
2. Click **Calibration**.
3. The calibrated temperature value is displayed in the text box beside Temperature Calib.

Figure 2-20. Temperature calibration procedure



Note: Temperature calibration only works in Dynamic mode. The current WILC/WINC firmware doesn't support this feature. It is for future reference.

2.4 Register

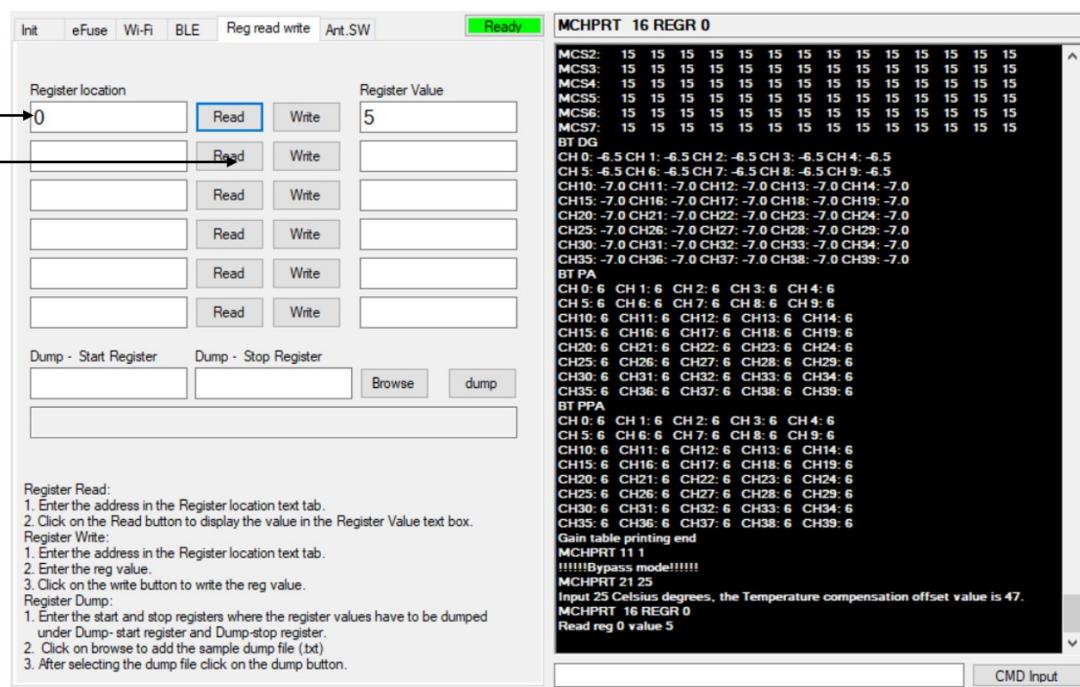
Navigate to **Reg read and write** tab.

2.4.1 Read

Perform the following steps to read the register values.

1. Enter the address in the Register location text tab, as shown in the following figure.
2. Click **Read** button to display value in the Register Value text box.

Figure 2-21. Read Reg Value

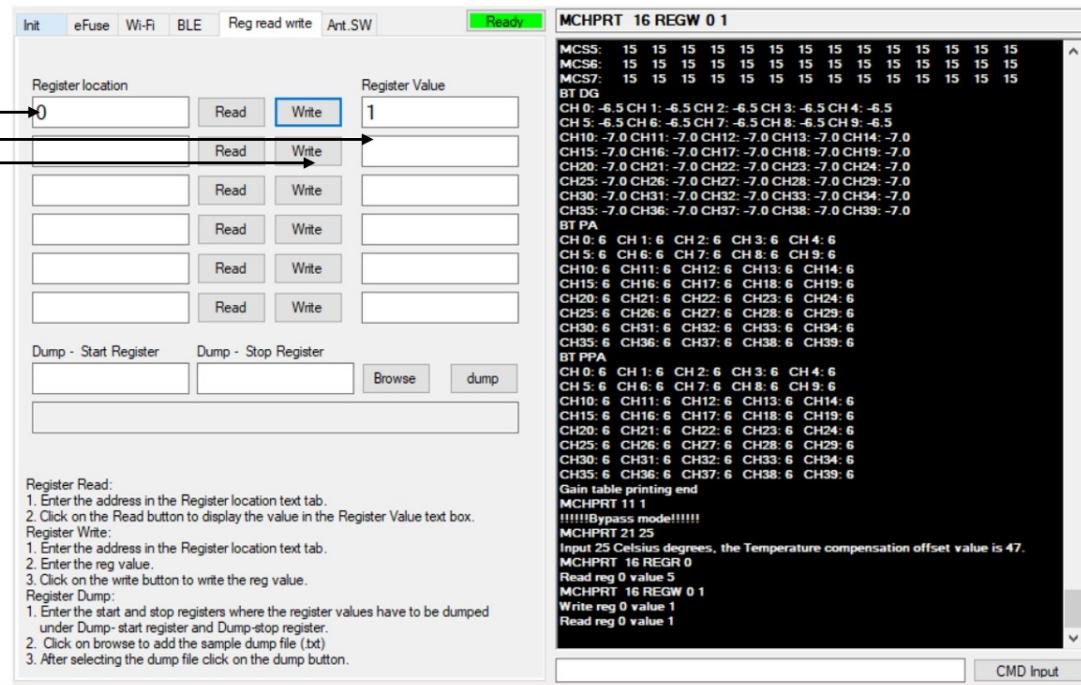


2.4.2 Write

Perform the following steps to write the register values.

1. Type the register location.
2. Type the register value in the Register value text box.
3. Click **Write** to write into the specified location.

Figure 2-22. Write Reg Value

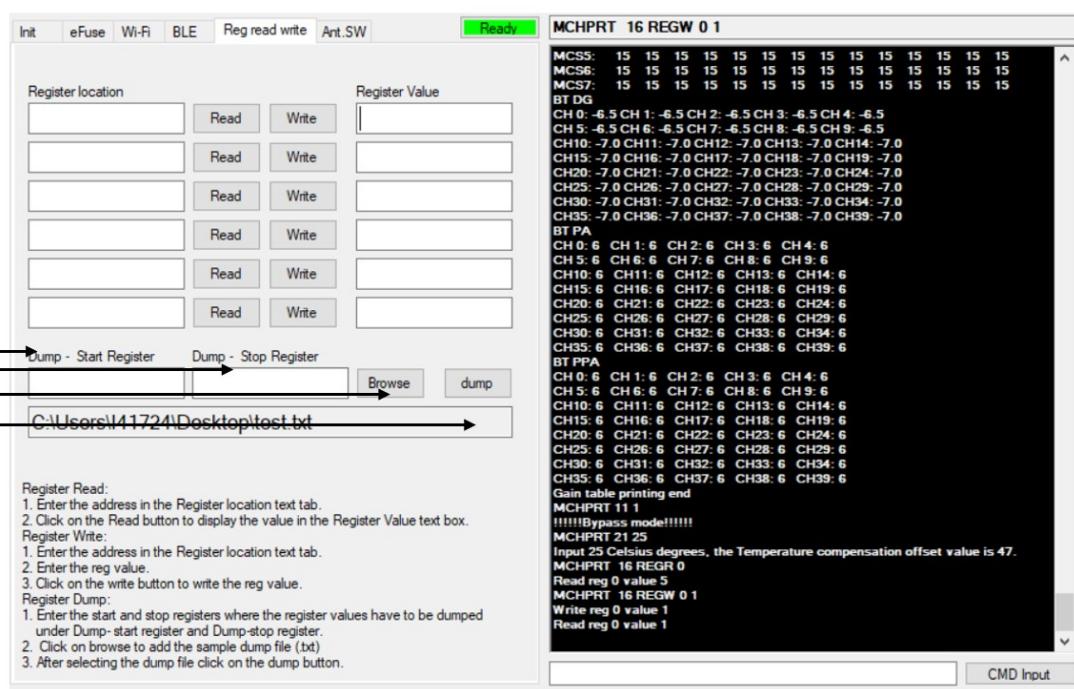


2.4.3 Register Dump

Perform the following steps to dump the registers.

1. Enter the start and stop registers where the register values has to be dumped under Dump- start register and Dump-stop register.
2. Click Browse to add the sample dump file (.txt).
3. After selecting the dump file click **Dump**.

Figure 2-23. Adding the Sample Dump File



Note: The format for dump file is .txt.

- After dumping the registers, the process bar indicates blue color.

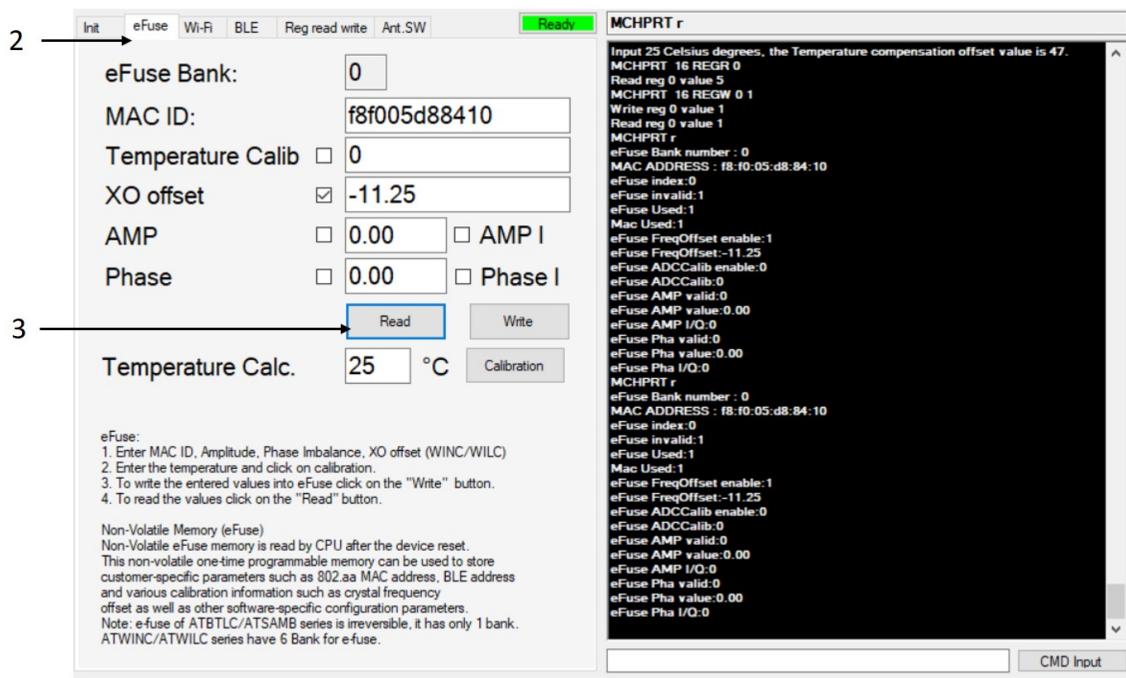
2.5 eFuse

2.5.1 Read

Perform the following steps to read eFuse.

- Open MCHPRT2 GUI tool.
- After initialization, navigate to eFuse tab.
- Click **Read** to see the written parameters.

Figure 2-24. Read eFuse



2.5.2 Write

Perform the following steps to write eFuse:

1. Navigate to eFuse tab. To update gain correction, XO offset , AMP and Phase imbalance enter the respective values.
2. Click **Write** to write efuse.
3. If only a few parameters are required to be written to eFuse, then the other parameter follows the previous eFuse information. To confirm this enter letter "Y" in the CMD Input text box and click on CMD Input. After the eFuse is written, "eFuse write finish" displays in the command window.
4. The eFuse bank number automatically updates by +1. If the module is new, the bank will be Null. On first write, the bank number gets incremented by +1 until it reaches 5. (0-5 banks).

Figure 2-25. Enable eFuse Write

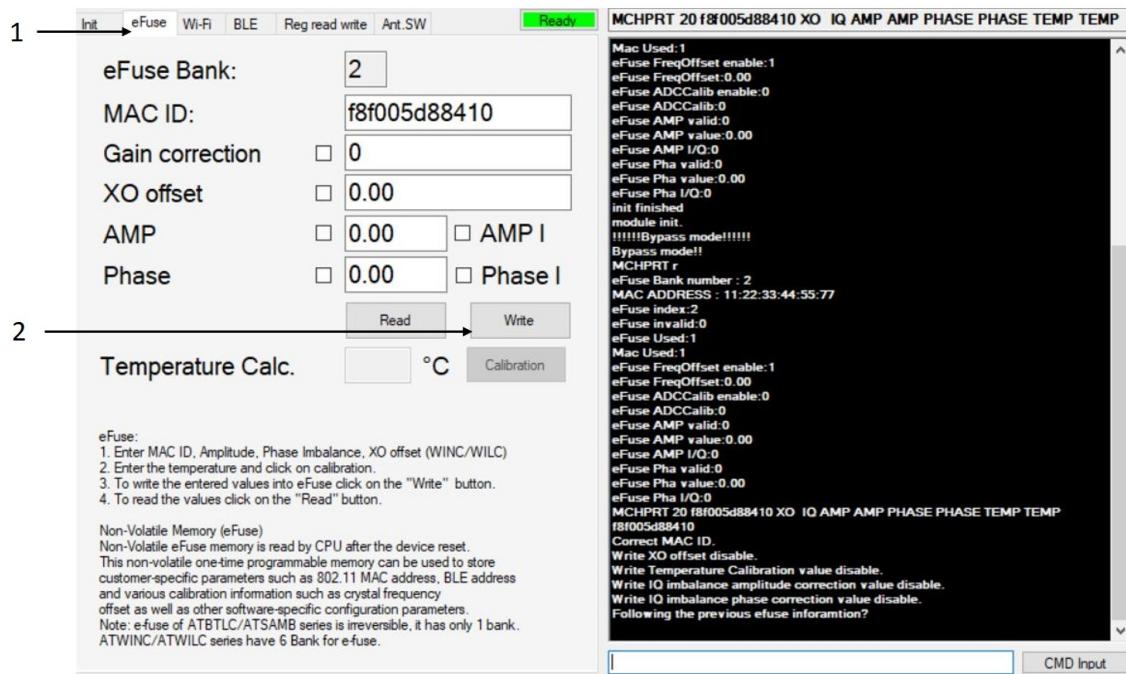
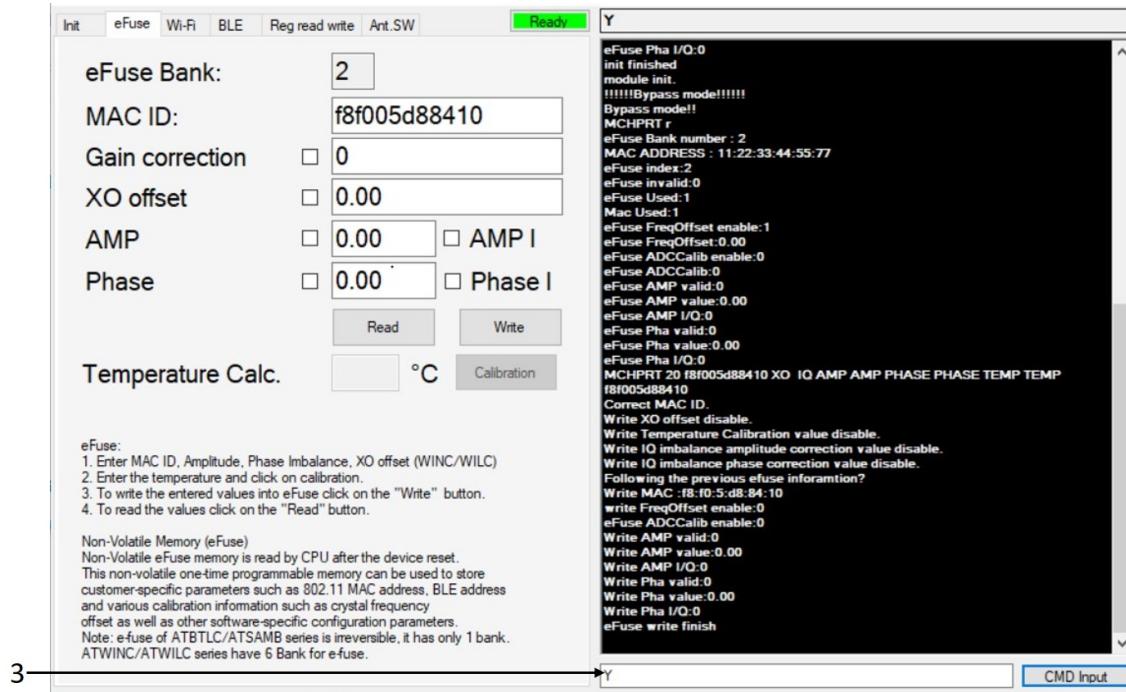


Figure 2-26. Enter Y



2.6 Firmware Upgrade

Perform the following steps to upgrade the firmware using the MCHPRT2 Tool. It is the same firmware upgrade example that is available in Microchip Studio. See [6. Appendix C – Firmware Update](#) for details.



Important: Before the FW upgrade, update the firmware files in following folder:

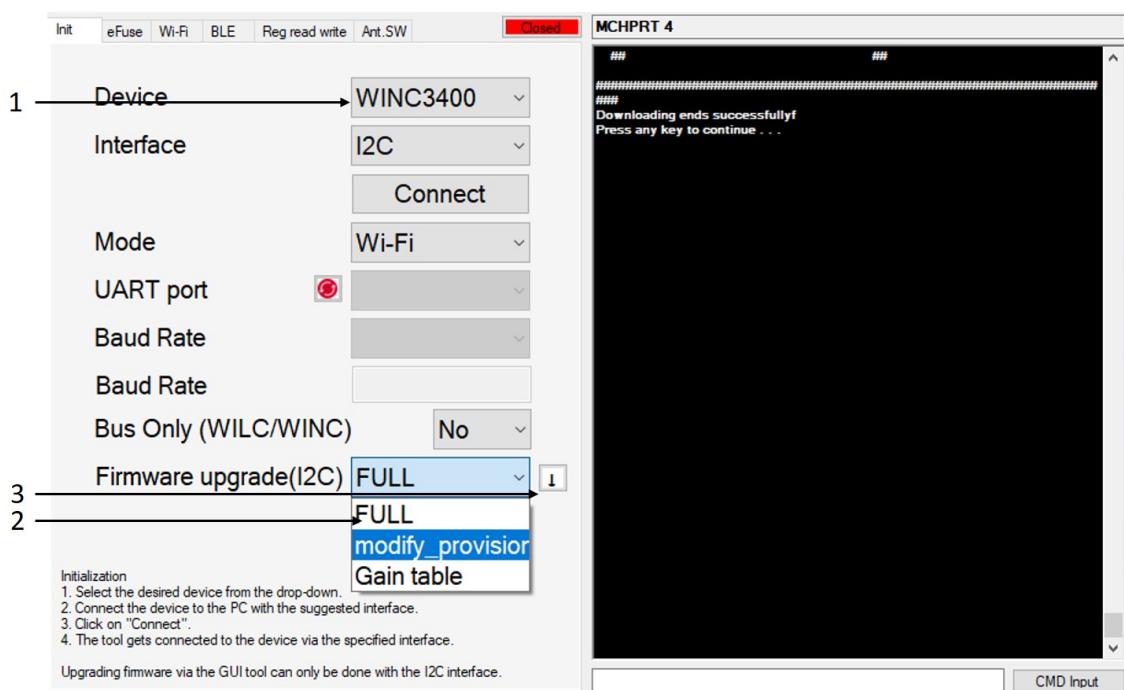
- ..\MCHPRT\upgrade_1500\firmware\firmware (for ATWINC1500)
 - ..\MCHPRT\upgrade_3400\firmware\firmware (for ATWINC3400)

1. Select the chip from the drop-down menu.
 2. Select the upgrade items from the list.



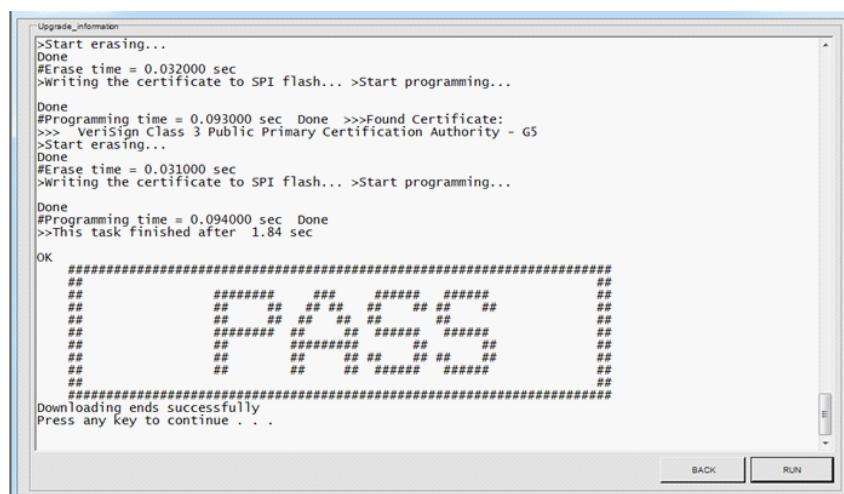
3. Click  to start the firmware upgrade.

Figure 2-27. FW Upgrade



4. After the upgrade is successful, the log displays as “PASS” (see the following figure).

Figure 2-28. Successful Upgrade



ATWINC/ATWILC

Graphical User Interface

Note: ASF has the latest firmware. For information on how to add the upgrade file into the MCHPRT2 tool folder, see the Firmware upgrade folder in MCHPRT2 package.

3. Command Line

The commands that are sent using command line can also be sent from the GUI by entering the command in the CMD Input text box.

3.1 Wi-Fi

3.1.1 Initialization

The following table provides the command syntax for Wi-Fi initialization.

Table 3-1. Wi-Fi Initialization

| Command Syntax | MCHPRT X |
|----------------|--|
| X | <p>X refers to Chip selection:</p> <p>Fast Connection</p> <ul style="list-style-type: none">• 1000 – ATWILC1000 series with I²C• 1000_UART – ATWILC1000 series with UART• 1500 – ATWINC15X0 series with I²C• 1500_UART – ATWINC15X0 series with UART• 3000 – ATWILC3000 series with I²C• 3000_UART – ATWILC3000 series with UART• 3400 – ATWINC3400 series with I²C• 3400_UART – ATWINC3400 series with UART |
| Example | <p>MCHPRT 0</p> <p>Auto-detect Chip with I²C connector</p> <p>MCHPRT 0_UART</p> <p>Auto-detect Chip with UART connector</p> |

The following figure illustrates the Wi-Fi initialization.

Figure 3-1. Console Log of Wi-Fi Initialization (MCHPRT 0)

```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT 0
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\>MCHPRT 0
SUMVersion: 889 / 3000 : 7433
MCHPRT_Version 1.4.5.4

Command-line arguments:
    argv[0]  MCHPRT
    argv[1]  0
    0WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7433>
chipId = 0x3400d2
flash id :1440ef
initLoadLibrary(void) In
Load WINC3000 library
WINC1500/WINC3400/WINC1500/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7433>
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7433>

chipId = 0x3400d2
flash id :1440ef
initLoadLibrary(void) In
Load WINC3000 library
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7433>

0
initLoadLibrary(void) In
Load WINC3000 library
Downloading Firmware...<burst_tx_firmware_3400.bin>
Firmware downloaded successfully

eFuse Bank number : 5
eFuse Index:5
eFuse Index<5
eFuse Invalid:1
eFuse Used:0
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:35.33
eFuse ADCCalib enable:0
eFuse ADCCalib:18
eFuse AMP valid:1
eFuse AMP value:5.65
eFuse AMP I/Q:1
eFuse Pha valid:0
eFuse Pha value:0.00
eFuse Pha I/Q:0

init finished
module init.

!!!!!!Bypass mode!!!!!!
Bypass mode!

```

3.1.2 IQ Amplitude and Phase Imbalance Calibration

Before running the TX test, read the IQ Amplitude and Phase imbalance calibration value from the eFuse memory, then set it using the following commands:

Set Amplitude Imbalance Calibration Value

Command – MCHPRT 17 IQ AMP

- IQ – Real (0) or Imaginary (1)
- AMP – Amplitude imbalance correction value. The range is -6 dB to 6 dB.

Set Phase Imbalance Calibration Value

Command – MCHPRT 18 IQ PHA

- IQ – Real (0) or Imaginary (1)
- PHA – Phase imbalance correction value. The range is -10 degrees to +10 degrees.

Notes:

- After running the MCHPRT 17 IQ AMP and the MCHPRT 18 IQ PHA commands, run the MCHPRT 11 1 command so the MCHPRT2 tool uses this value.
- By default, IQ calibration values are programmed into the eFuse bank in the factory. So, the user is not required to run the IQ calibration.

3.1.3 TX

3.1.3.1 Start TX – Gain, Channel, Data Rate

The following table provides the command syntax for gain, channel and data rate of the TX test.

Table 3-2. Start TX: After Initialization

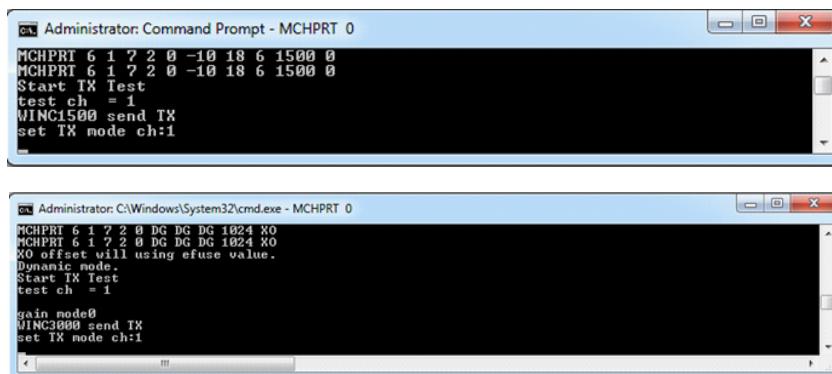
| Command Syntax | MCHPRT 6 X Y Z A B C D L F | | | | |
|----------------|--|--------------|-----|----------|------|
| X | X refers to TX channel: 1 to 14 <ul style="list-style-type: none"> • 1 – Channel 1 (2412 MHz) • 6 – Channel 6 (2437 MHz) • 14 – Channel 14 (2484 MHz) | | | | |
| Y Z | Y refer to Rate, Z refers to Preamble: | | | | |
| | Rate = 0 | Preamble = 0 | 11b | 1 Mbps | — |
| | Rate = 1 | Preamble = 0 | 11b | 2 Mbps | — |
| | Rate = 2 | Preamble = 0 | 11b | 5.5 Mbps | — |
| | Rate = 3 | Preamble = 0 | 11b | 11 Mbps | — |
| | Rate = 0 | Preamble = 1 | 11g | 6 Mbps | — |
| | Rate = 1 | Preamble = 1 | 11g | 9 Mbps | — |
| | Rate = 2 | Preamble = 1 | 11g | 12 Mbps | — |
| | Rate = 3 | Preamble = 1 | 11g | 18 Mbps | — |
| | Rate = 4 | Preamble = 1 | 11g | 24 Mbps | — |
| | Rate = 5 | Preamble = 1 | 11g | 36 Mbps | — |
| | Rate = 6 | Preamble = 1 | 11g | 48 Mbps | — |
| | Rate = 7 | Preamble = 1 | 11g | 54 Mbps | — |
| | Rate = 0 | Preamble = 2 | 11n | MCS - 0 | 0x80 |
| | Rate = 1 | Preamble = 2 | 11n | MCS - 1 | 0x81 |
| | Rate = 2 | Preamble = 2 | 11n | MCS - 2 | 0x82 |
| | Rate = 3 | Preamble = 2 | 11n | MCS - 3 | 0x83 |
| | Rate = 4 | Preamble = 2 | 11n | MCS - 4 | 0x84 |
| | Rate = 5 | Preamble = 2 | 11n | MCS - 5 | 0x85 |
| | Rate = 6 | Preamble = 2 | 11n | MCS - 6 | 0x86 |
| | Rate = 7 | Preamble = 2 | 11n | MCS - 7 | 0x87 |
| A | A refers to bandwidth: 0/1 – 20 MHz | | | | |
| B | B refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain | | | | |
| C | C refers to PA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 • ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 DG: Dynamic Gain | | | | |

.....continued

| Command Syntax | MCHPRT 6 X Y Z A B C D L F |
|----------------|---|
| D | D refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 • ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 DG: Dynamic Gain |
| L | L refers to length: 0 – 1500 Maximum limit is 1500 |
| F | F refers Frequency offset: -50 to +50 base on Crystal XO: eFuse XO value |
| Example | MCHPRT 6 1 7 2 0 -10 18 6 1500 0 Channel 1. MCS 7 – 20 MHz, length 1500, 0 ppm, offset DG – 10, PPA 6 , PA 18 |

The following figure shows the example start TX test.

Figure 3-2. Console Log of TX Test Mode



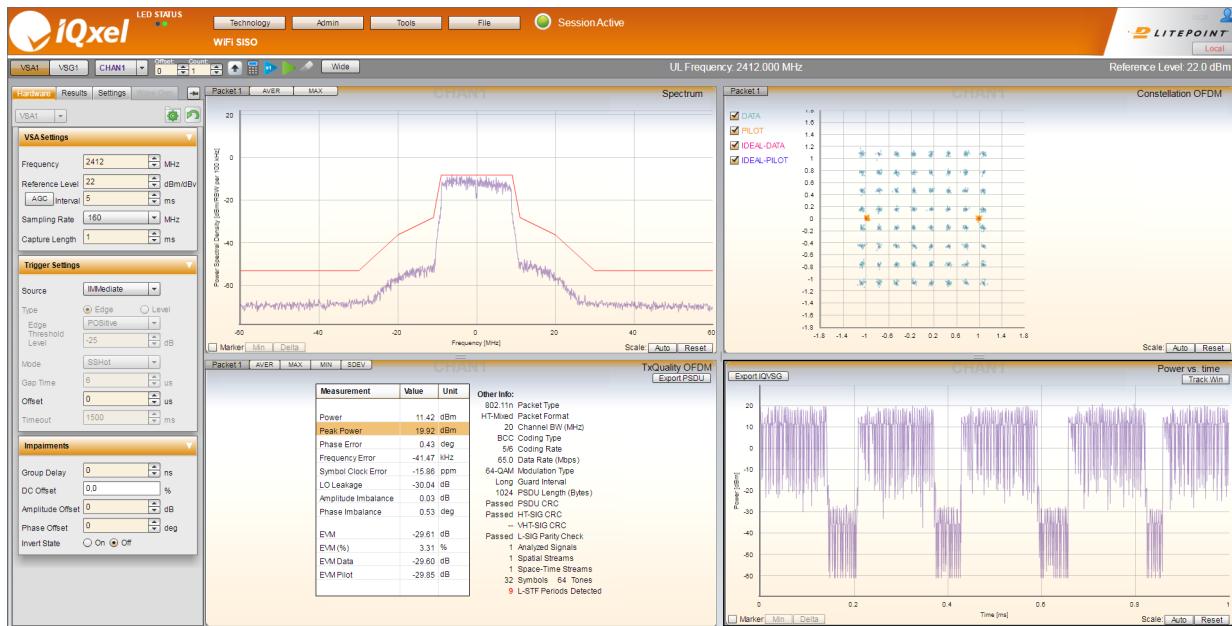
```

Administrator: Command Prompt - MCHPRT 0
MCHPRT 6 1 7 2 0 -10 18 6 1500 0
MCHPRT 6 1 7 2 0 -10 18 6 1500 0
Start TX Test
test ch = 1
WINC1500 send TX
set TX mode ch:1

Administrator: C:\Windows\System32\cmd.exe - MCHPRT 0
MCHPRT 6 1 7 2 0 DG DG DG 1024 XO
MCHPRT 6 1 7 2 0 DG DG DG 1024 XO
XO offset will using efuse value.
Dynamic mode.
Start TX Test
test ch = 1
gain mode0
WINC3000 send TX
set TX mode ch:1

```

The Wi-Fi TX mode starts as shown in the following figure.

Figure 3-3. TX Mode Start

3.1.3.2 CW

The following table provides the command syntax for CW TX mode.

Table 3-3. Start TX CW: After Initialization

| Command Syntax | MCHPRT 8 X Y Z A B C D L F |
|----------------|---|
| X | X refers to TX channel: 1 to 14 <ul style="list-style-type: none"> • 1 – Channel 1 (2412 MHz) • 6 – Channel 6 (2437 MHz) • 14 – Channel 14 (2484 MHz) |

.....continued

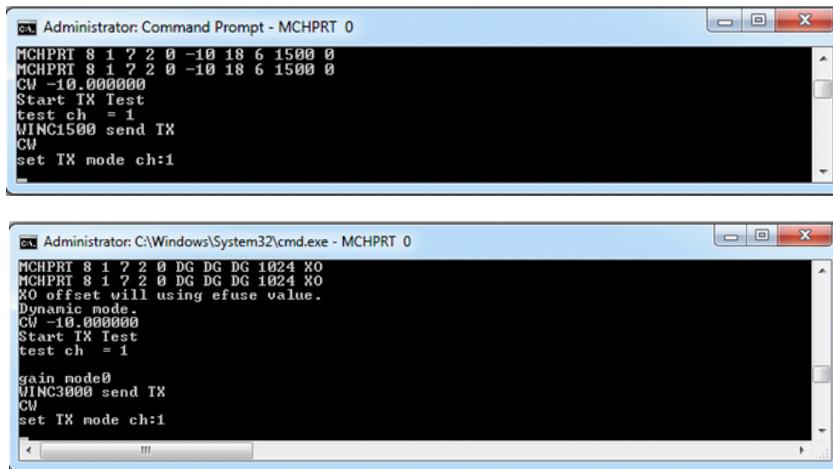
| Command Syntax | MCHPRT 8 X Y Z A B C D L F | | | | |
|----------------|--|--------------|-----|----------|------|
| Y Z | Y refer to Rate, Z refers to Preamble: | | | | |
| | Rate = 0 | Preamble = 0 | 11b | 1 Mbps | — |
| | Rate = 1 | Preamble = 0 | 11b | 2 Mbps | — |
| | Rate = 2 | Preamble = 0 | 11b | 5.5 Mbps | — |
| | Rate = 3 | Preamble = 0 | 11b | 11 Mbps | — |
| | Rate = 0 | Preamble = 1 | 11g | 6 Mbps | — |
| | Rate = 1 | Preamble = 1 | 11g | 9 Mbps | — |
| | Rate = 2 | Preamble = 1 | 11g | 12 Mbps | — |
| | Rate = 3 | Preamble = 1 | 11g | 18 Mbps | — |
| | Rate = 4 | Preamble = 1 | 11g | 24 Mbps | — |
| | Rate = 5 | Preamble = 1 | 11g | 36 Mbps | — |
| | Rate = 6 | Preamble = 1 | 11g | 48 Mbps | — |
| | Rate = 7 | Preamble = 1 | 11g | 54 Mbps | — |
| | Rate = 0 | Preamble = 2 | 11n | MCS - 0 | 0x80 |
| | Rate = 1 | Preamble = 2 | 11n | MCS - 1 | 0x81 |
| | Rate = 2 | Preamble = 2 | 11n | MCS - 2 | 0x82 |
| | Rate = 3 | Preamble = 2 | 11n | MCS - 3 | 0x83 |
| | Rate = 4 | Preamble = 2 | 11n | MCS - 4 | 0x84 |
| | Rate = 5 | Preamble = 2 | 11n | MCS - 5 | 0x85 |
| | Rate = 6 | Preamble = 2 | 11n | MCS - 6 | 0x86 |
| | Rate = 7 | Preamble = 2 | 11n | MCS - 7 | 0x87 |
| A | A refers to bandwidth: 0/1 – 20 MHz | | | | |
| B | B refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain | | | | |
| C | C refers to PA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 DG: Dynamic Gain | | | | |
| D | D refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 DG: Dynamic Gain | | | | |
| L | L refers to length: 0 – 1500 Maximum limit is 1500 | | | | |

.....continued

| | |
|-----------------------|--|
| Command Syntax | MCHPRT 8 X Y Z A B C D L F |
| F | F mean Frequency offset : -50 to +50 base on Crystal XO: eFuse XO value |
| Example | MCHPRT 8 1 7 2 0 -10 18 6 1500 0 Channel 1. MCS 7 – 20 MHz, length 1500, 0 ppm offset DG – 10, PPA 6, PA 18 CW mode |

The following figure shows the example of start CW TX mode.

Figure 3-4. Console Log of CW TX Mode



The figure consists of two side-by-side screenshots of a Windows Command Prompt window. Both windows have a title bar 'Administrator: Command Prompt - MCHPRT 0' and show the same sequence of commands being entered and executed.

```

MCHPRT 8 1 7 2 0 -10 18 6 1500 0
MCHPRT 8 1 7 2 0 -10 18 6 1500 0
CW -10.000000
Start TX Test
test ch = 1
WINC1500 send TX
CW
set TX mode ch:1

```

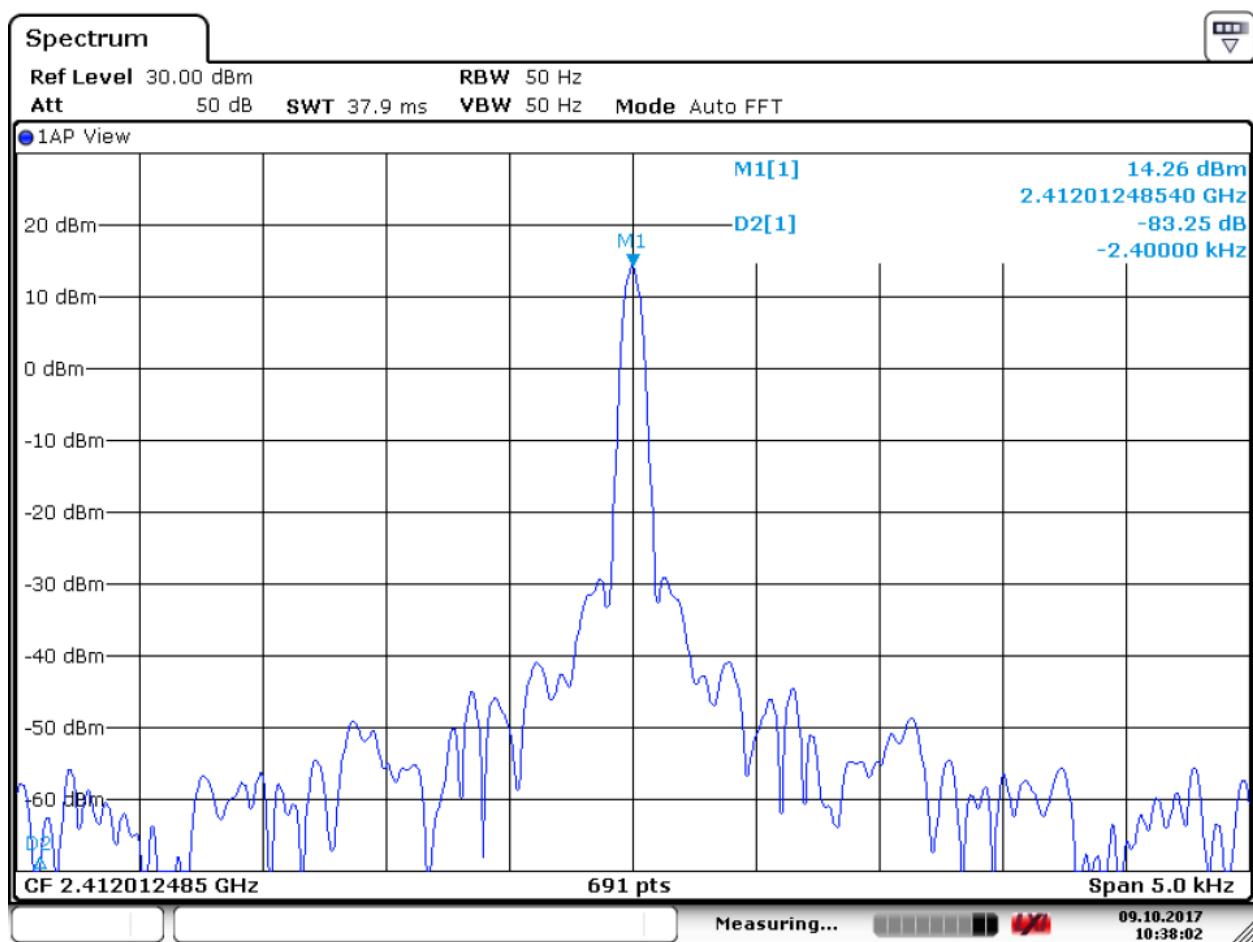
The second window shows the continuation of the command sequence:

```

MCHPRT 8 1 7 2 0 DG DG DG 1024 XO
MCHPRT 8 1 7 2 0 DG DG DG 1024 XO
XO offset will using efuse value.
Dynamic mode.
CW -10.000000
Start TX Test
test ch = 1
gain mode0
WINC3000 send TX
CW
set TX mode ch:1

```

The CW TX mode starts as shown in the following figure.

Figure 3-5. CW TX Mode Start

3.1.3.3 Gain Mode

The following table provides the command syntax for Gain mode settings.

Table 3-4. Gain Mode setting: After Initialization, Before TX Start

| Command Syntax | MCHPRT 11 X |
|----------------|---|
| X | X refers to Gain mode: <ul style="list-style-type: none">• 0 – Dynamic gain mode• 1 – Bypass gain mode (default)• 2 – Flash gain mode |
| Example | MCHPRT 11 1 Bypass mode |

The following figure shows the example of Gain mode.

Figure 3-6. Console Log of Gain Mode

```
MCHPRT 11 1
MCHPRT 11 1
11
!!!!!!Bypass mode!!!!!!
```

3.1.3.4 Antenna Switch

The following table provides the command syntax for Antenna switch (ATWILC1000/ATWINC15X0).

Table 3-5. Antenna Switching: After Initialization

| Command Syntax | MCHPRT 12 X Y |
|----------------|--|
| X | X refers to Antenna: • 0 – antenna 1 (default) • 1 – antenna 2 |
| Y | Y refers to GPIO pin: • 3 – GPIO3 |
| Example | MCHPRT 12 0 3 Antenna switching A |

The following figure shows the example of Antenna switch.

Figure 3-7. Console Log of Antenna Switch

```
MCHPRT 12 0 3
12
!!!!!!Antenna 1!!!!!!
```

3.1.3.5 Stop TX

The following table provides the command syntax for Stop TX test.

Table 3-6. Stop TX: After Initialization and TX Start

| Command Syntax | MCHPRT 13 |
|----------------|-----------------------------|
| Example | MCHPRT 13 Stop TX |

The following figure shows the example of Stop TX test.

Figure 3-8. Console Log of Stop TX Test Mode

```
MCHPRT 13
MCHPRT 13
13
TX stop!Stop TX Test
```

3.1.4 RX

3.1.4.1 Start RX

The following table provides the command syntax for RX test.

Table 3-7. Start RX: After Initialization

| Command Syntax | MCHPRT 2 X |
|----------------|--|
| X | X refers to TX channel: 1 to 14 <ul style="list-style-type: none"> • 1 – Channel 1 (2412 MHz) • 6 – Channel 6 (2437 MHz) • 14 – Channel 14 (2484 MHz) |
| Example | MCHPRT 2 1 RX mode in Channel 1 Start with reset the count |

The following figure shows the example of start RX test.

Figure 3-9. Console Log of RX Test Mode

```
Administrator: Command Prompt - MCHPRT 0
MCHPRT 2 1
MCHPRT 2 1
2
Start RX Test
set RX mode ch:1
```

3.1.4.2 Start RX with MAC Filter Selection

The following table provides the command syntax for RX test with MAC filter selection.

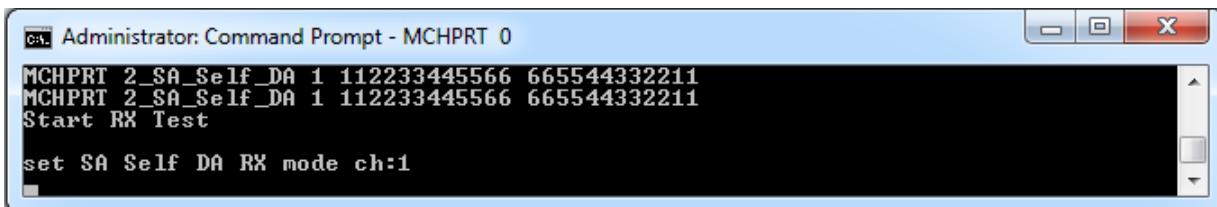
Table 3-8. Start RX with MAC Filter selection: After Initialization

| Command Syntax | MCHPRT X Y Z A |
|----------------|---|
| X | X refers to RX mode: <ul style="list-style-type: none"> • 2_DA – Destination Filter • 2_SA – Source Filter • 2_Self – Override self MAC address • 2_SA_DA – SA with DA • 2_Self_DA – Self with DA • 2_SA_Self – SA with Self • 2_SA_Self_DA – All MAC filter apply |
| Y | Y refers to TX channel: 1 to 14 <ul style="list-style-type: none"> • 1 – Channel 1 (2412 MHz) • 6 – Channel 6 (2437 MHz) • 14 – Channel 14 (2484 MHz) |
| Z | In “2_SA”, “2_SA_DA”, “2_SA_Self”, “2_SA_Self_DA” Source MAC address In “2_Self”, “2_Self_DA” Self MAC address |
| A | In “2_SA_Self_DA” Self MAC address |

|continued | |
|-----------------------|--|
| Command Syntax | MCHPRT X Y Z A |
| Example | <p>MCHPRT 2_SA_Self_DA 1 112233445566 665544332211 RX with Source MAC filter: 112233445566 and DA MAC filter and Self MAC address: 665544332211 in Channel 1 Start with reset the count</p> <p>MCHPRT 2_SA_DA 12 112233445566 RX with Source MAC filter: 112233445566 in Channel 12 Start with reset the count</p> <p>MCHPRT 2_Self_DA 13 665544332211 RX with DA MAC filter and Self MAC address: 665544332211 in Channel 13 Start with reset the count</p> |

The following figure shows the example of RX with Source MAC filter: 112233445566 and DA MAC filter and Self MAC address: 665544332211 in Channel 1 Start with reset the count.

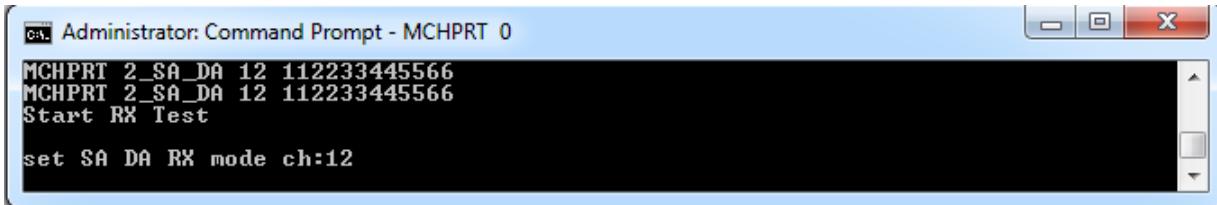
Figure 3-10. Console Log of RX with Source MAC Filter (Channel 1)



```
Administrator: Command Prompt - MCHPRT 0
MCHPRT 2_SA_Self_DA 1 112233445566 665544332211
MCHPRT 2_SA_Self_DA 1 112233445566 665544332211
Start RX Test
set SA Self DA RX mode ch:1
```

The following figure shows the example of RX with Source MAC filter: 112233445566 in Channel 12 Start with reset the count.

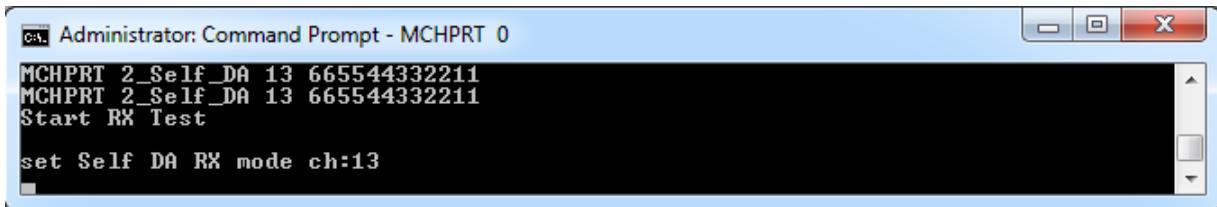
Figure 3-11. Console Log of RX with Source MAC Filter (Channel 12)



```
Administrator: Command Prompt - MCHPRT 0
MCHPRT 2_SA_DA 12 112233445566
MCHPRT 2_SA_DA 12 112233445566
Start RX Test
set SA DA RX mode ch:12
```

The following figure shows the example of RX with DA MAC filter and Self MAC address: 665544332211 in Channel 13 Start with reset the count.

Figure 3-12. Console Log of RX with Source MAC Filter (Channel 13)



```
Administrator: Command Prompt - MCHPRT 0
MCHPRT 2_Self_DA 13 665544332211
MCHPRT 2_Self_DA 13 665544332211
Start RX Test
set Self DA RX mode ch:13
```

3.1.4.3 RX Package Report

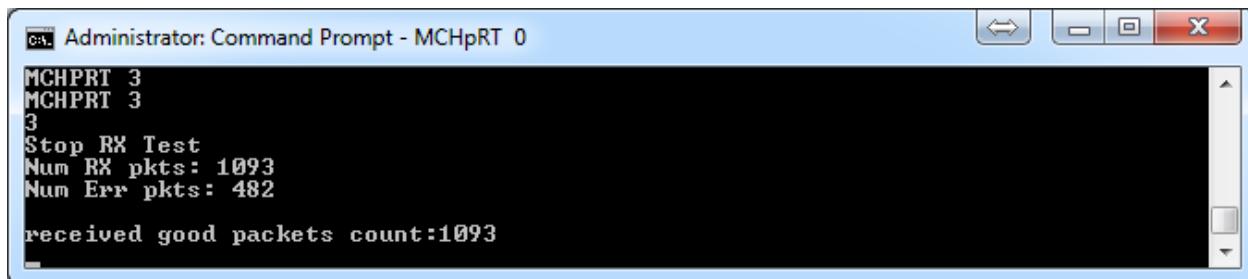
The following table provides the command syntax for RX package report.

Table 3-9. RX Package Report: After Initialization and Start RX

| Command Syntax | MCHPRT 3 |
|----------------|--|
| Example | <p>MCHPRT 3 Report the package number (package count will not reset)</p> |

The following figure shows the example of RX package report.

Figure 3-13. Console Log of RX Package Report



```
Administrator: Command Prompt - MCHpRT 0
MCHPRT 3
MCHPRT 3
3
Stop RX Test
Num RX pkts: 1093
Num Err pkts: 482
received good packets count:1093
```

3.1.4.4 RSSI Reading

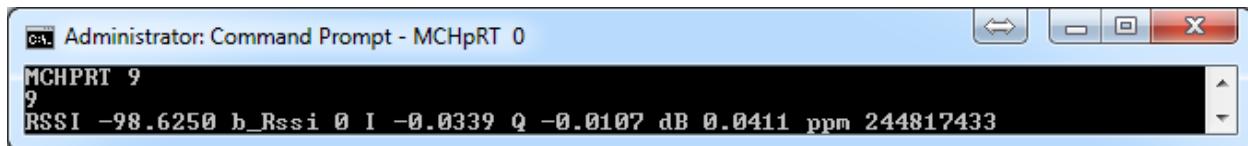
The following table provides the command syntax for RSSI reading once.

Table 3-10. RX Package Report Once: After Initialization and Start RX

| Command Syntax | MCHPRT 9 |
|----------------|---|
| Example | MCHPRT 9 Report the RSSI reading once |

The following figure shows the example of RSSI reading once.

Figure 3-14. Console Log of RSSI Reading Once



```
Administrator: Command Prompt - MCHpRT 0
MCHPRT 9
9
RSSI -98.6250 b_Rssi 0 I -0.0339 Q -0.0107 dB 0.0411 ppm 244817433
```

3.1.4.5 RSSI Reading in Seconds

The following table provides the command syntax for RSSI reading in seconds.

Table 3-11. RX Package Report: After Initialization and Start RX

| Command Syntax | MCHPRT 10 X |
|----------------|--|
| X | X refers to the number of sec report the RSSI reading |
| Example | MCHPRT 10 2 Report the RX RSSI reading in 10 sec |

The following figure shows the example of RSSI reading.

Figure 3-15. Console Log of RSSI Reading

```

Administrator: Command Prompt - MCHpRT_0

MCHPRT 10 2
MCHPRT 10 2
10
Sec 0.00s RSSI -100.8750 b_Rssi 0 I -0.0364 Q -0.0106 dB 0.0378 ppm 792486806
Sec 0.10s RSSI -75.1250 b_Rssi 0 I -0.0342 Q -0.0108 dB 0.0378 ppm 792486806
Sec 0.20s RSSI -99.0000 b_Rssi 0 I -0.0370 Q -0.0151 dB 0.0379 ppm 792486806
Sec 0.30s RSSI -99.3750 b_Rssi 0 I -0.0351 Q -0.0101 dB 0.0381 ppm 792486806
Sec 0.40s RSSI -101.3750 b_Rssi 0 I -0.0339 Q -0.0102 dB 0.0383 ppm 792486806
Sec 0.50s RSSI -100.3750 b_Rssi 0 I -0.0346 Q -0.0112 dB 0.0386 ppm 792486806
Sec 0.60s RSSI -99.3750 b_Rssi 0 I -0.0373 Q -0.0106 dB 0.0388 ppm 792486806
Sec 0.70s RSSI -100.8750 b_Rssi 0 I -0.0372 Q -0.0099 dB 0.0388 ppm 792486806
Sec 0.80s RSSI -99.3750 b_Rssi 0 I -0.0345 Q -0.0106 dB 0.0388 ppm 792486806
Sec 0.90s RSSI -76.1250 b_Rssi 1 I -0.0343 Q -0.0123 dB 0.0389 ppm 792486806
Sec 1.00s RSSI -99.8750 b_Rssi 0 I -0.0351 Q -0.0105 dB 0.0387 ppm 792486806
Sec 1.10s RSSI -98.2500 b_Rssi 0 I -0.0342 Q -0.0100 dB 0.0387 ppm 792486806
Sec 1.20s RSSI -99.0000 b_Rssi 0 I -0.0349 Q -0.0105 dB 0.0387 ppm 792486806
Sec 1.30s RSSI -97.5000 b_Rssi 0 I -0.0343 Q -0.0103 dB 0.0388 ppm 792486806
Sec 1.40s RSSI -100.8750 b_Rssi 0 I -0.0344 Q -0.0107 dB 0.0385 ppm 792486806
Sec 1.50s RSSI -100.3750 b_Rssi 0 I -0.0350 Q -0.0106 dB 0.0384 ppm 792486806
Sec 1.60s RSSI -99.8750 b_Rssi 0 I -0.0347 Q -0.0107 dB 0.0385 ppm 792486806
Sec 1.70s RSSI -97.8750 b_Rssi 0 I -0.0340 Q -0.0126 dB 0.0384 ppm 792486806
Sec 1.80s RSSI -98.6250 b_Rssi 0 I -0.0345 Q -0.0106 dB 0.0383 ppm 792486806
Sec 1.90s RSSI -94.2500 b_Rssi 0 I -0.0342 Q -0.0112 dB 0.0383 ppm 792486806
Sec 2.00s RSSI -97.8750 b_Rssi 0 I -0.0364 Q -0.0106 dB 0.0384 ppm 792486806

```

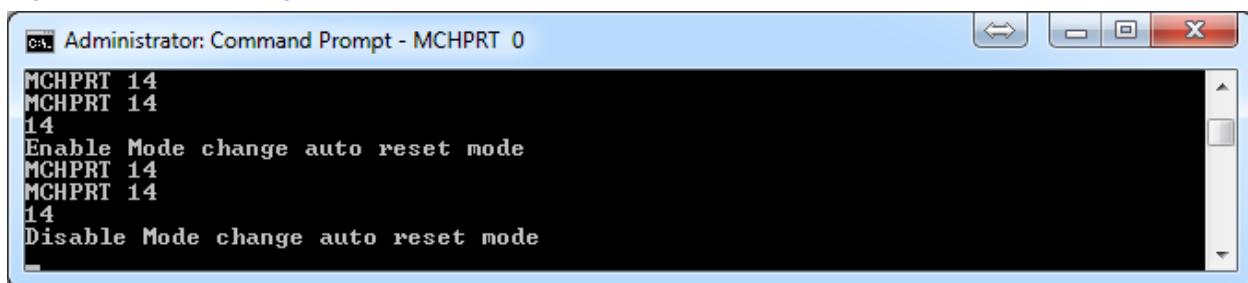
3.1.4.6 Auto Reset Mode

The following table provides the command syntax for Auto Reset mode.

Table 3-12. Auto Reset Mode

| Command Syntax | MCHPRT 14 |
|-------------------|--|
| Enable | <p>Enable refers to that the MCHPRT will auto reset with the mode change For example:</p> <p>MCHPRT 8 1 7 7 0 -10 18 6 1500 0 (Module auto reset)</p> <p>MCHPRT 6 1 7 7 0 -10 18 6 1500 0 (Module auto reset)</p> <p>MCHPRT 2 1</p> |
| Disable (default) | <p>Disable refers that the MCHPRT will not auto reset with the mode change. Command flow must follow the correct step.</p> <p>For example:</p> <p>MCHPRT 8 1 7 7 0 -10 18 6 1500 0</p> <p>MCHPRT 13</p> <p>MCHPRT 6 1 7 7 0 -10 18 6 1500 0</p> <p>MCHPRT 13</p> <p>MCHPRT 2 1</p> <p>Each TX information change or change to RX mode, requires to send stop TX command.</p> |
| Example | MCHPRT 14 |

The following figure shows the example of Auto Reset mode.

Figure 3-16. Console Log of Auto Reset Mode

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt - MCHPRT 0". The window contains the following text:

```
MCHPRT 14
MCHPRT 14
14
Enable Mode change auto reset mode
MCHPRT 14
MCHPRT 14
14
Disable Mode change auto reset mode
```

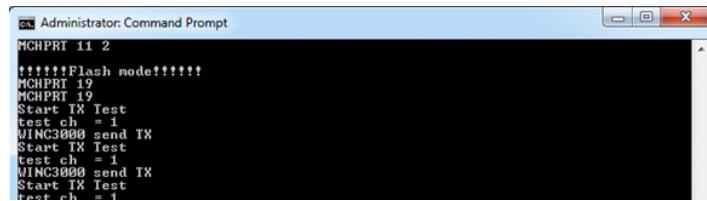
3.1.4.7 Digital Gain Table Printing

The following table provides the command syntax for Digital Gain Table Printing.

Table 3-13. Digital Gain Table Printing: After Initialization and Before TX and RX

| Command Syntax | MCHPRT 19 |
|----------------|--|
| Example | MCHPRT 19 Module will start TX from Channel 1 to Channel 14 for checking gain table and then printing the gain table in current Gain mode. This is not applicable for Bypass mode. |

The following figure shows the example of Digital Gain Table Printing.

Figure 3-17. Console Log of Digital Gain Table Printing

A screenshot of a Windows Command Prompt window titled "Administrator: Command Prompt". The window contains the following text:

```
MCHPRT 11 2
!!!!!!Flash mode!!!!!!
MCHPRT 19
MCHPRT 19
Start TX Test
test ch = 1
UINC3000 send TX
Start TX Test
test ch = 1
UINC3000 send TX
Start TX Test
test ch = 1
```

Figure 3-18. Console Log of Display Gain Table Printing WINC3400

```

BT DG
CH 0: -6.5 CH 1: -6.5 CH 2: -6.5 CH 3: -6.5 CH 4: -6.5
CH1: -7.0 CH11: -7.0 CH12: -7.0 CH13: -7.0 CH14: -7.0
CH15: -7.0 CH16: -7.0 CH17: -7.0 CH18: -7.0 CH19: -7.0
CH20: -7.0 CH21: -7.0 CH22: -7.0 CH23: -7.0 CH24: -7.0
CH25: -7.0 CH26: -7.0 CH27: -7.0 CH28: -7.0 CH29: -7.0
CH30: -7.0 CH31: -7.0 CH32: -7.0 CH33: -7.0 CH34: -7.0
CH35: -7.0 CH36: -7.0 CH37: -7.0 CH38: -7.0 CH39: -7.0

BT P0
CH 0: 6 CH 1: 6 CH 2: 6 CH 3: 6 CH 4: 6
CH 5: 6 CH 6: 6 CH 7: 6 CH 8: 6 CH 9: 6
CH10: 6 CH11: 6 CH12: 6 CH13: 6 CH14: 6
CH15: 6 CH16: 3 CH17: 0 CH18: 0 CH19: 0
CH20: 0 CH21: 0 CH22: 0 CH23: 0 CH24: 0
CH25: 0 CH26: 0 CH27: 0 CH28: 0 CH29: 0
CH30: 3 CH31: 0 CH32: 6 CH33: 0 CH34: 6
CH35: 6 CH36: 6 CH37: 6 CH38: 6 CH39: 6

BT PPA
CH 0: 6 CH 1: 6 CH 2: 6 CH 3: 6 CH 4: 6
CH 5: 6 CH 6: 6 CH 7: 6 CH 8: 6 CH 9: 6
CH10: 6 CH11: 6 CH12: 6 CH13: 6 CH14: 6
CH15: 6 CH16: 6 CH17: 6 CH18: 6 CH19: 6
CH20: 6 CH21: 6 CH22: 6 CH23: 6 CH24: 6
CH25: 6 CH26: 6 CH27: 6 CH28: 6 CH29: 6
CH30: 6 CH31: 6 CH32: 6 CH33: 6 CH34: 6
CH35: 6 CH36: 6 CH37: 6 CH38: 6 CH39: 6

```

3.1.4.8 Deinitialization

The following table provides the command syntax for deinitialization.

Table 3-14. Deinitialization: After Initialization

| Command Syntax | MCHPRT 4 |
|----------------|-------------------------------------|
| Example | MCHPRT 4 Deinitialization |

The following figure shows the example of deinitialization.

Figure 3-19. Console Log of Deinitialization

```

Administrator: Command Prompt
MCHPRT 4
MCHPRT 4
4
Closed
Closed
Closed
C:\MCHPRT>_

```

3.2 Bluetooth (ATWILC3000/ATWINC3400)

3.2.1 Bluetooth Initialization

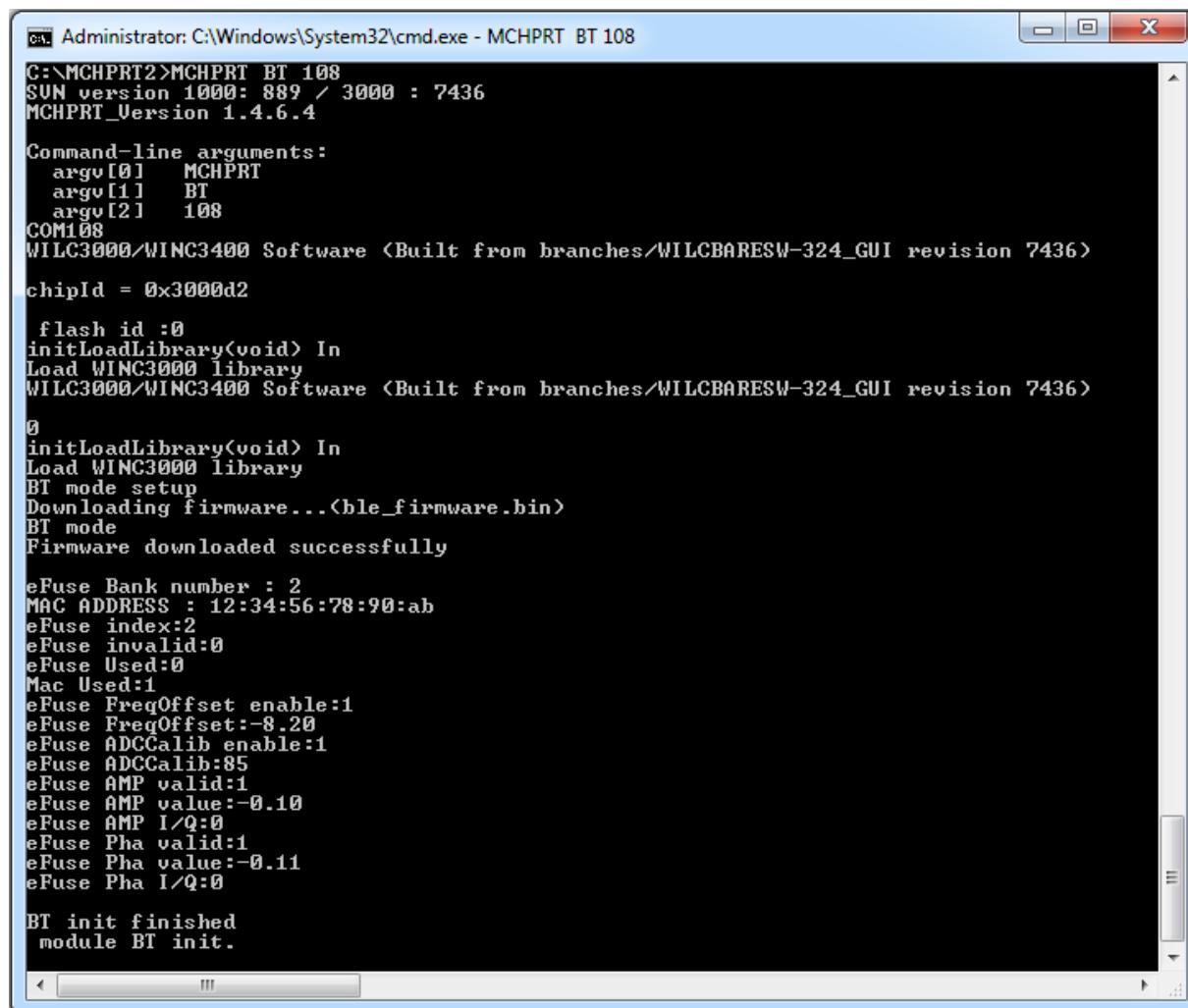
The following table provides the command syntax for Bluetooth initialization. Refer to [1.3. UART/I2C Pin Details](#) to check if DTR is enabled or not.

Table 3-15. Initialization

| Command Syntax | MCHPRT BT X |
|----------------|---|
| BT | <ul style="list-style-type: none"> • BT refers to I2C • BT_UART refers to UART connect • BT_DTR refers to I2C and DTR enable • BT_UART_DTR refers to UART connect and DTR enable • BT_FW refers to firmware upload |
| X | X refers to the port number for Bluetooth UART |
| Example | MCHPRT BT 90 |

The following figure shows the example of Bluetooth initialization.

Figure 3-20. Console Log of Bluetooth Initialization



```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT 108
C:>MCHPRT2>MCHPRT BT 108
SUN_version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4

Command-line arguments:
    argv[0]    MCHPRT
    argv[1]    BT
    argv[2]    108
COM108
WILC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

chipId = 0x3000d2

    flash id :0
initLoadLibrary<void> In
Load WINC3000 library
WILC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

0
initLoadLibrary<void> In
Load WINC3000 library
BT mode setup
Downloading firmware...<ble_firmware.bin>
BT mode
Firmware downloaded successfully

eFuse Bank number : 2
MAC ADDRESS : 12:34:56:78:90:ab
eFuse index:2
eFuse invalid:0
eFuse Used:0
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:-8.20
eFuse ADCCalib enable:1
eFuse ADCCalib:85
eFuse AMP valid:1
eFuse AMP value:-0.10
eFuse AMP I/Q:0
eFuse Pha valid:1
eFuse Pha value:-0.11
eFuse Pha I/Q:0

BT init finished
module BT init.

```

Table 3-16. Bluetooth initialization without serial port

| Command Syntax | MCHPRT BT |
|----------------|---|
| BT | <ul style="list-style-type: none"> • BT refers to I2C • BT_UART refers to UART connect • BT_DTR refers to I2C and DTR enable • BT_UART_DTR refers to UART connect and DTR enable • BT_FW refers to firmware upload |
| Example | MCHPRT BT |

Figure 3-21. Console Log of Bluetooth Initialization without Serial Port

```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT
C:\MCHPRT2>MCHPRT BT
SUN version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4

Command-line arguments:
    argv[0]    MCHPRT
    argv[1]    BT
BT
This mode is only using for setting the WILC/WINC 3xxx series BLE mode power
command: MCHPRT BT 1 DG PA PPA
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

chipId = 0x3000d2

flash id :0
initLoadLibrary<void> In
Load WINC3000 library
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

0
initLoadLibrary<void> In
Load WINC3000 library
BT mode setup
Downloading firmware...<ble_firmware.bin>
BT mode
Firmware downloaded successfully

eFuse Bank number : 2
MAC ADDRESS : 12:34:56:78:90:ab
eFuse index:2
eFuse invalid:0
eFuse Used:1
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:-8.20
eFuse ADCCalib enable:1
eFuse ADCCalib:85
eFuse AMP valid:1
eFuse AMP value:-0.10
eFuse AMP I/Q:0
eFuse Pha valid:1
eFuse Pha value:-0.11
eFuse Pha I/Q:0

BT init finished
module BT init.

```

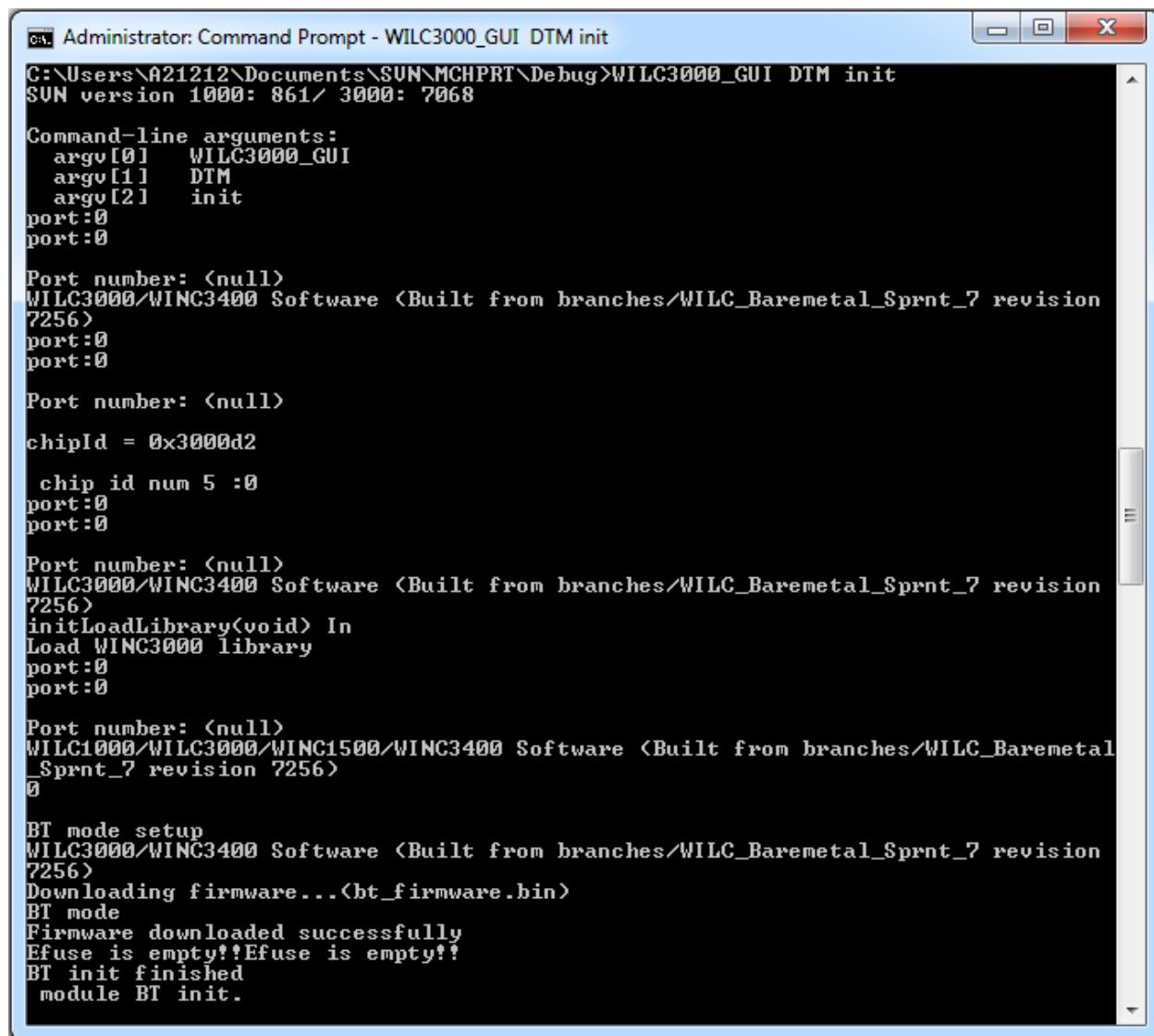
3.2.2 Bluetooth DTM

The following table provides the command syntax for Bluetooth DTM mode initialization.

Table 3-17. Initialization of DTM Mode

| Command Syntax | MCHPRT DTM init |
|----------------|------------------------|
| Example | MCHPRT DTM init |

The following figure shows the example of DTM initialization.

Figure 3-22. Console Log of DTM Initialization


The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt - WILC3000_GUI DTM init". The window displays a log of DTM initialization commands and their results. The log includes command-line arguments, port numbers, chip ID, library loading, and BT mode setup information.

```

Administrator: Command Prompt - WILC3000_GUI DTM init
C:\Users\A21212\Documents\SUN\MCHPRT\Debug>WILC3000_GUI DTM init
SUN version 1000: 861/ 3000: 7068

Command-line arguments:
    argv[0]    WILC3000_GUI
    argv[1]    DTM
    argv[2]    init
port:0
port:0

Port number: <null>
WILC3000/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7256>
port:0
port:0

Port number: <null>
chipId = 0x3000d2
    chip id num 5 :0
port:0
port:0

Port number: <null>
WILC3000/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7256>
initLoadLibrary(void) In
Load WINC3000 library
port:0
port:0

Port number: <null>
WILC1000/WILC3000/WINC1500/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7256>
0

BT mode setup
WILC3000/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7256>
Downloading firmware...<bt_firmware.bin>
BT mode
Firmware downloaded successfully
Efuse is empty!!Efuse is empty!!
BT init finished
module BT init.

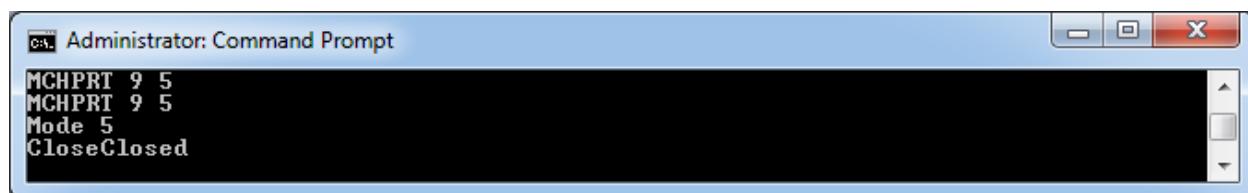
```

The following table provides the command syntax for DTM mode exit.

Table 3-18. Exit DTM Mode

| Command Syntax | MCHPRT 9.5 |
|----------------|------------|
| Example | MCHPRT 9.5 |

The following figure shows the example of DTM mode exit.

Figure 3-23. Console Log of DTM Mode Exit


The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The window displays a log of DTM mode exit commands and their results. The log includes MCHPRT version, mode selection, and a CloseClosed command.

```

Administrator: Command Prompt
MCHPRT 9.5
MCHPRT 9.5
Mode 5
CloseClosed

```

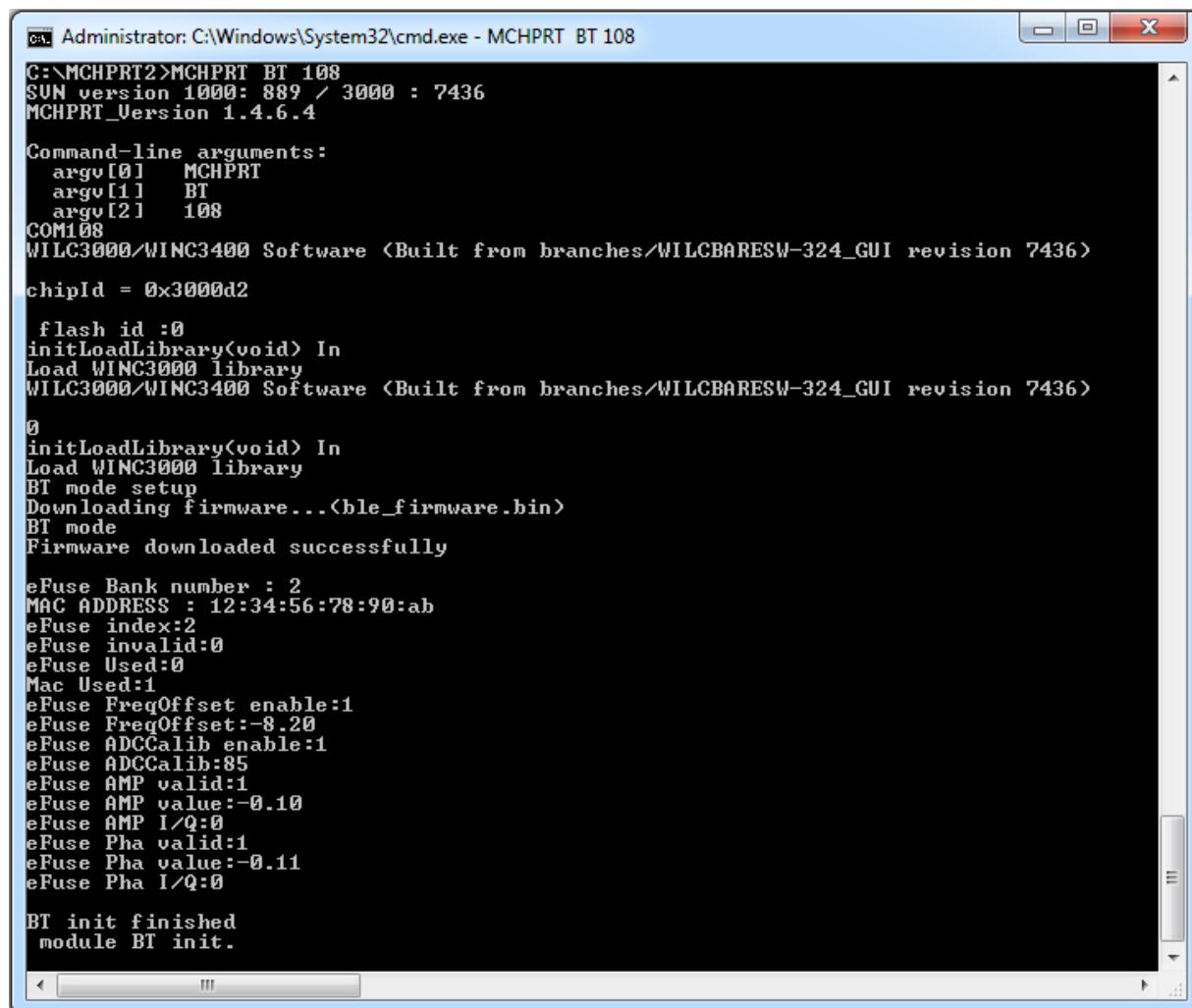
3.2.3 Bluetooth TX

The following table provides the command syntax for the Bluetooth TX test.

Table 3-19. Start Bluetooth TX: After Bluetooth Initialization

| Command Syntax | MCHPRT BT 1 X Y Z A B C F |
|----------------|--|
| X | X refer to TX channel: 0 to 39 <ul style="list-style-type: none"> • 0 – Channel 0 (2402 MHz) • 39 – Channel 39 (2480 MHz) |
| Y | Y refers to Length: 0 – 37 <ul style="list-style-type: none"> • 1 – 0x1 • 37 – 0x25 |
| Z | Z refers to Payload: 1 – 8 <ul style="list-style-type: none"> • 1 – PRBS9 • 2 – 11110000 • 3 – 10101010 • 4 – PRBS15 • 5 – 11111111 • 6 – 00000000 • 7 – 00001111 • 8 – 01010101 |
| A | A refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain |
| B | B refers PA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 • ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 DG: Dynamic Gain |
| C | C refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 • ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 Dynamic Gain |
| F | F refers to Frequency offset: -50 to +50 base on Crystal XO: eFuse XO value |
| Example | MCHPRT BT 1 0 37 0 -6 6 6 XO Channel 0. 0x25 length, PRBS9 DG – 10, PPA 6 , PA 6 |

The following figure shows the example of Bluetooth TX test mode.

Figure 3-24. Console Log of Bluetooth TX Test Mode

The screenshot shows a Windows Command Prompt window titled "Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT 108". The window displays a series of log messages from the MCHPRT application. The log includes the version information (SUN version 1000: 889 / 3000 : 7436, MCHPRT_Version 1.4.6.4), command-line arguments (MCHPRT, BT, 108), and software details (WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>). It also shows the chip ID (chipId = 0x3000d2), the loading of the WINC3000 library, and the successful download of the firmware (ble_firmware.bin) into eFuses. The log concludes with the message "BT init finished module BT init."

```
C:\>MCHPRT2>MCHPRT BT 108
SUN version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4

Command-line arguments:
    argv[0]    MCHPRT
    argv[1]    BT
    argv[2]    108
COM108
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

chipId = 0x3000d2

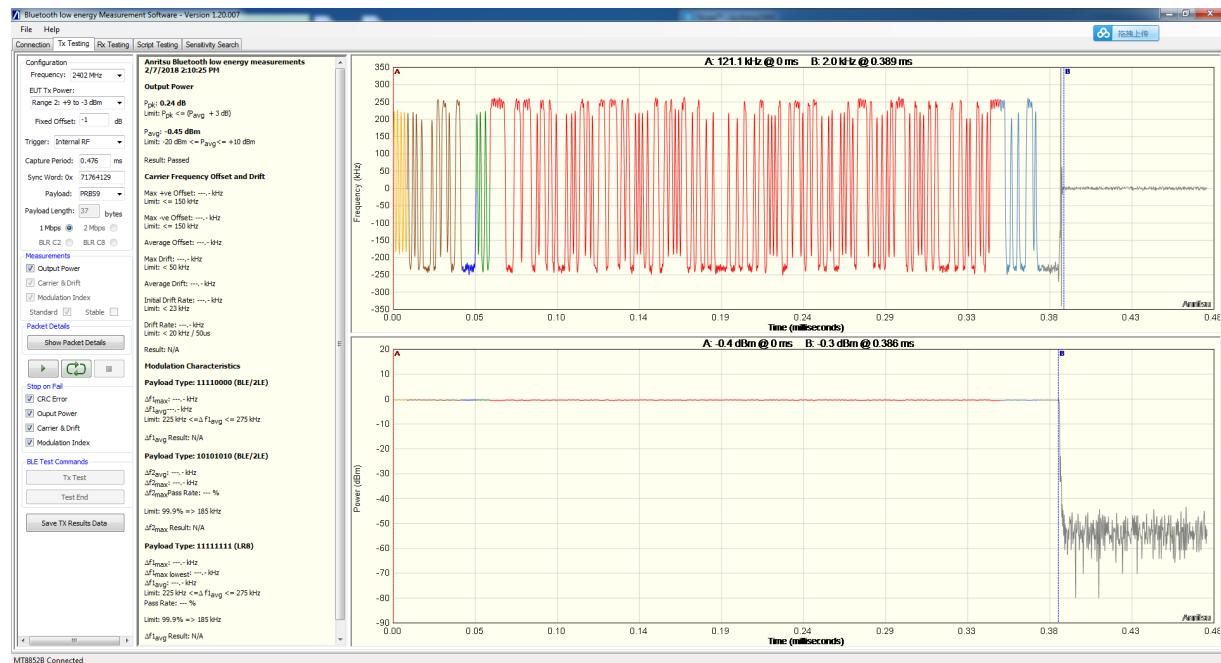
    flash id :0
initLoadLibrary<void> In
Load WINC3000 library
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

0
initLoadLibrary<void> In
Load WINC3000 library
BT mode setup
Downloading firmware...<ble_firmware.bin>
BT mode
Firmware downloaded successfully

eFuse Bank number : 2
MAC ADDRESS : 12:34:56:78:90:ab
eFuse index:2
eFuse invalid:0
eFuse Used:0
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:-8.20
eFuse ADCCalib enable:1
eFuse ADCCalib:85
eFuse AMP valid:1
eFuse AMP value:-0.10
eFuse AMP I/Q:0
eFuse Pha valid:1
eFuse Pha value:-0.11
eFuse Pha I/Q:0

BT init finished
module BT init.
```

The Bluetooth TX mode starts as shown in the following figure.

Figure 3-25. BT TX Mode Start**Table 3-20. Start Bluetooth TX: After Bluetooth Initialization without Serial Port Connection**

| Command Syntax | MCHPRT BT 1 X Y Z A B C F |
|----------------|---|
| A | A refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain |
| B | B refers PA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 Dynamic Gain |
| C | C refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 Dynamic Gain |
| F | F refers to Frequency offset: -50 to +50 base on Crystal XO: eFuse XO value |
| Example | MCHPRT BT 1 -6 6 6 XO DG – 10, PPA 6 , PA 6 |

Figure 3-26. Bluetooth TX Log without Serial Port Connection

```
C:\>MCHPRT2>MCHPRT BT
SUN version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4

Command-line arguments:
    argv[0]    MCHPRT
    argv[1]    BT
BT
This mode is only using for setting the WILC/WINC 3xxx series BLE mode power
command: MCHPRT BT 1 DG PA PPA
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

chipId = 0x3000d2

flash id :0
initLoadLibrary<void> In
Load WINC3000 library
WINC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7436>

0
initLoadLibrary<void> In
Load WINC3000 library
BT mode setup
Downloading firmware...<ble_firmware.bin>
BT mode
Firmware downloaded successfully

eFuse Bank number : 2
MAC ADDRESS : 12:34:56:78:90:ab
eFuse index:2
eFuse invalid:0
eFuse Used:1
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:-8.20
eFuse ADCCalib enable:1
eFuse ADCCalib:85
eFuse AMP valid:1
eFuse AMP value:-0.10
eFuse AMP I/Q:0
eFuse Pha valid:1
eFuse Pha value:-0.11
eFuse Pha I/Q:0

BT init finished
module BT init.
```

3.2.3.1 CW

The following table provides the command syntax for the Bluetooth TX CW mode.

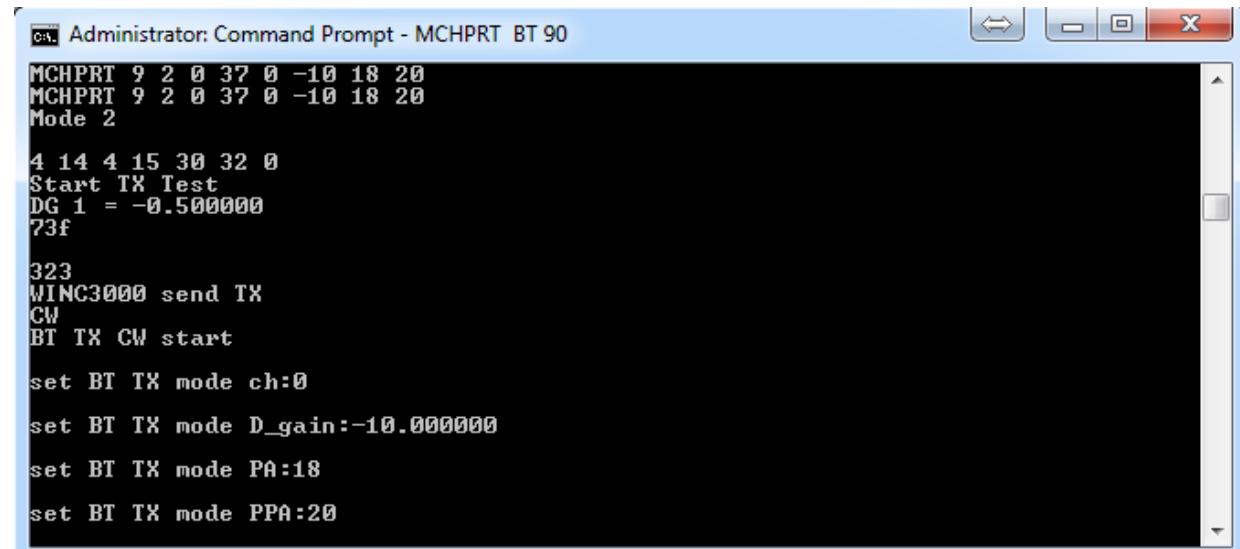
Table 3-21. Start Bluetooth TX CW: After Bluetooth Initialization with Serial Port

| Command Syntax | MCHPRT BT 2 X Y Z A B C F |
|----------------|---|
| X | X refer to TX channel: 0 to 39 <ul style="list-style-type: none"> • 0 – Channel 0 (2402 MHz) • 39 – Channel 39 (2480 MHz) |
| Y | Y refers to Length: 0 – 37 <ul style="list-style-type: none"> • 1 – 0x1 • 37 – 0x25 |

|continued | |
|----------------|---|
| Command Syntax | MCHPRT BT 2 X Y Z A B C F |
| Z | Z refers to Payload: 1 – 8 <ul style="list-style-type: none"> • 1 – PRBS9 • 2 – 11110000 • 3 – 10101010 • 4 – PRBS15 • 5 – 11111111 • 6 – 00000000 • 7 – 00001111 • 8 – 01010101 |
| A | A refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain |
| B | B refers PA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 • ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 DG: Dynamic Gain |
| C | C refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> • ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 • ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 DG: Dynamic Gain |
| Example | MCHPRT BT 2 0 37 0 -6 6 6 18 20 Channel 0. 0x25 length, PRBS9 DG – 6, PPA 6 , PA 6 CW mode |

The following figure shows the example of Bluetooth CW mode.

Figure 3-27. Console Log of Bluetooth CW Mode



```

Administrator: Command Prompt - MCHPRT BT 90
MCHPRT 9 2 0 37 0 -10 18 20
MCHPRT 9 2 0 37 0 -10 18 20
Mode 2

4 14 4 15 30 32 0
Start TX Test
DG 1 = -0.500000
73f

323
WINC3000 send TX
CW
BT TX CW start

set BT TX mode ch:0
set BT TX mode D_gain:-10.000000
set BT TX mode PA:18
set BT TX mode PPA:20

```

The Bluetooth CW mode starts as shown in the following figure.

Figure 3-28. BT CW Mode Start

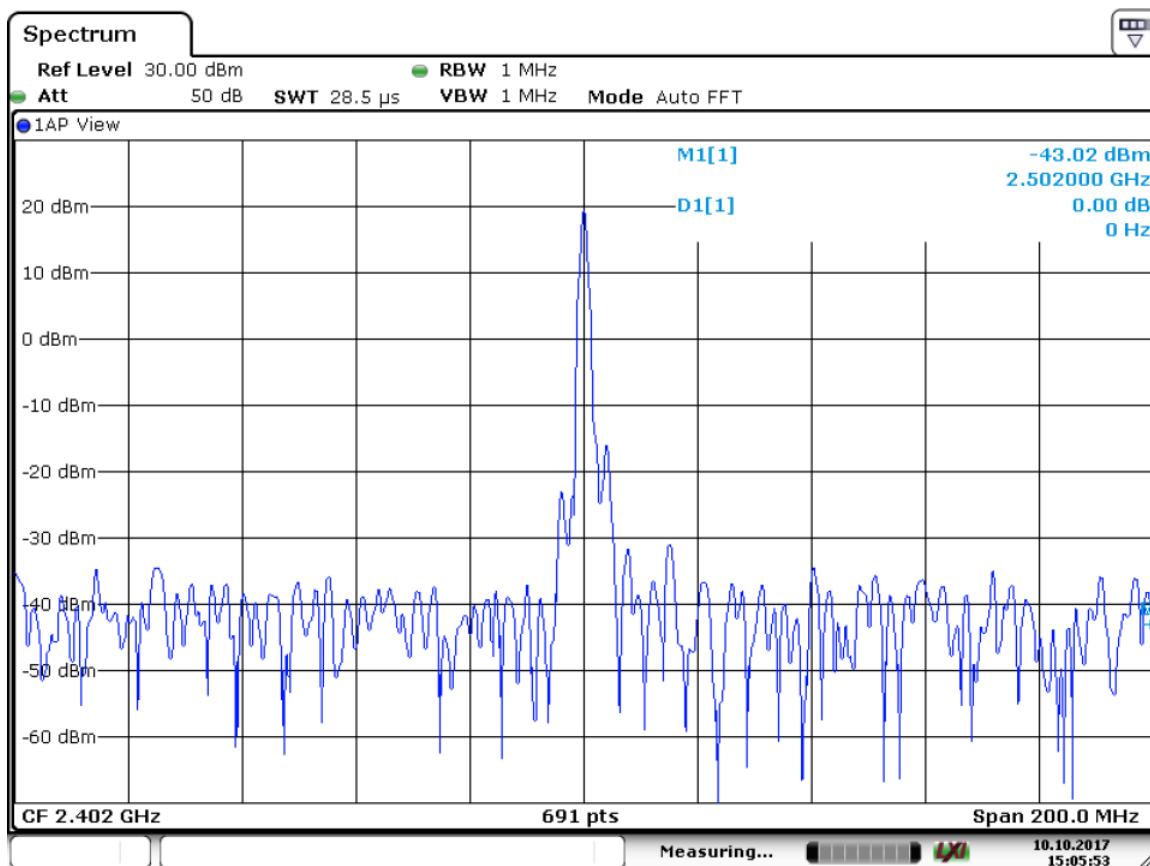


Table 3-22. Start Bluetooth TX CW: After Bluetooth Initialization without Serial Port

| Command Syntax | | MCHPRT BT 8 A B C F |
|----------------|--|--|
| A | | A refers to Digital Gain (Bypass mode): Range: -20 to 0 DG: Dynamic Gain |
| B | | B refers PA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 18, 15, 12, 9, 6, 3 ATWILC3000/ATWINC3400 – 18, 15, 12, 9, 6, 3 Dynamic Gain |
| C | | C refers to PPA gain (Bypass mode): <ul style="list-style-type: none"> ATWILC1000/ATWINC15X0 – 9, 6, 3, 0 ATWILC3000/ATWINC3400 – 20, 18, 15, 12, 6, 0 Dynamic Gain |
| F | | F refers to Frequency offset: -50 to +50 base on Crystal XO: eFuse XO value |
| Example | MCHPRT BT 8 -6 6 6 XO DG – 6, PPA 6 , PA 6 CW mode | |

Figure 3-29. Console Log of Bluetooth CW Mode without Serial Port

```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT
MCHPRT BT 8 -6 6 6 XO
Mode 8
Start TX Test
WINC3000 send TX
CW
BT TX start
set BT TX mode D_gain:-6.000000
set BT TX mode PA:6
set BT TX mode PPA:6
Using org XO value

```

3.2.4 Bluetooth Start RX

The following table provides the command syntax for Bluetooth RX test.

Table 3-23. Start Bluetooth RX: After Bluetooth Initialization with Serial Port

| Command Syntax | MCHPRT BT 3 X |
|----------------|--|
| X | X refers to TX channel: 0 to 39 <ul style="list-style-type: none"> • 0 – Channel 0 (2402 MHz) • 39 – Channel 39 (2480 MHz) |
| Example | MCHPRT BT 3 0 RX mode in Channel 1 Start with reset the count |

The following figure shows the example of start Bluetooth RX test.

Figure 3-30. Console Log of Bluetooth RX Mode

```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT 108
MCHPRT BT 3 0
MCHPRT BT 3 0
Mode 3
4 14 4 15 29 32 0
BT RX start
set BT TX mode ch:0

```

3.2.5 Bluetooth RX Package Count

The following table provides the command syntax for Bluetooth RX package count.

Table 3-24. Start Bluetooth RX Package Count: After Bluetooth Initialization with Serial Port

| Command Syntax | MCHPRT BT 4 |
|----------------|---|
| Example | MCHPRT BT 4 Print out good package number |

The following figure shows the example of Bluetooth RX package count.

Figure 3-31. Console Log of Bluetooth RX Package Count

```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT BT 108
MCHPRT BT 4
MCHPRT BT 4
Mode 4
4 14 6 15 31 32 0 0 0
received good packets count:0

```

3.2.6 BLE Deinitialization

The following table provides the command syntax for BLE deinitialization.

Table 3-25. BLE Deinitialization: After Initialization

| Command Syntax | MCHPRT BT 5 |
|----------------|---|
| Example | MCHPRT BT 5 BT Deinitialization |

The following figure shows the example of BLE deinitialization.

Figure 3-32. Console Log of BLE Deinitialization

```
MCHPRT BT 5
MCHPRT BT 5
Mode 5
CloseClosed
C:\MCHPRT2>
```

3.3 HCI Command

3.3.1 Initialization of COM Port

The following table provides the command syntax for initialization of COM port. Refer to [1.3. UART/I2C Pin Details](#) to check if DTR is enabled or not.

Table 3-26. Initialization

| Command Syntax | MCHPRT HCI X |
|----------------|--|
| HCI | HCI_DTR refers to DTR enable |
| X | X refers to the port number for Bluetooth UART |
| Example | MCHPRT HCI 94 |

The following figure shows the example of initialization of COM port.

Figure 3-33. Console Log of Initialization of COM Port

```
MCHPRT HCI 108
SUN version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4
Command-line arguments:
argv[0] MCHPRT
argv[1] HCI
argv[2] 108
COM108
module UART init. finished
-
```

3.3.2 HCI TX

The following table provides the command syntax for the HCI TX test.

Table 3-27. Start HCI TX: HCI command only

| Command Syntax | MCHPRT HCI 1 X Y Z |
|----------------|--|
| X | X refer to TX channel: 0 to 39 <ul style="list-style-type: none"> • 0 – Channel 0 (2402 MHz) • 39 – Channel 39 (2480 MHz) |
| Y | Y refers to Length: 0 – 37 <ul style="list-style-type: none"> • 1 – 0x1 • 37 – 0x25 |
| Z | Z refers to Payload: 0 – 7 <ul style="list-style-type: none"> • 0 – PRBS9 • 1 – 11110000 • 2 – 10101010 • 3 – PRBS15 • 4 – 11111111 • 5 – 00000000 • 6 – 00001111 • 7 – 01010101 |
| Example | MCHPRT HCI 1 0 37 1 Channel 0. 0x25 length, PRBS9 |

The following figure shows the example of HCI TX test mode.

Figure 3-34. Console Log of HCI TX Test Mode

```
MCHPRT HCI 1 0 37 1
MCHPRT HCI 1 0 37 1
Mode 1
4 14 4 15 30 32 0
```

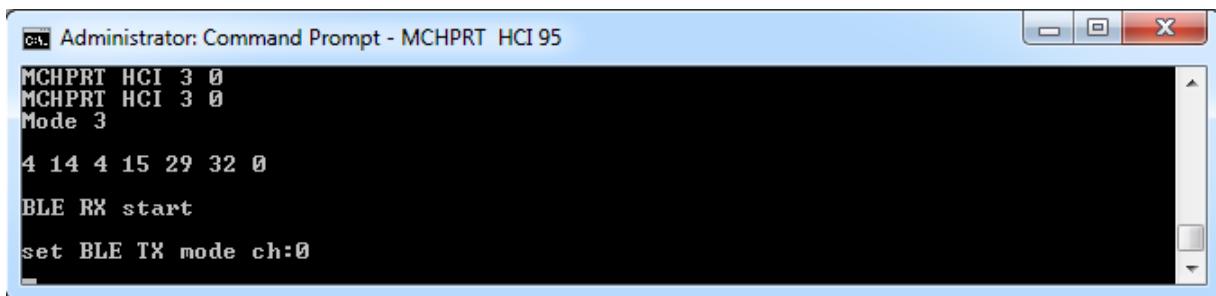
3.3.3 HCI RX

The following table provides the command syntax for HCI RX test.

Table 3-28. Start HCI RX: HCI command only

| Command Syntax | MCHPRT HCI 3 X |
|----------------|--|
| X | X refers to TX channel: 0 to 39 <ul style="list-style-type: none"> • 0 – Channel 0 (2402 MHz) • 39 – Channel 39 (2480 MHz) |
| Example | MCHPRT HCI 3 0 Channel 0. RX mode start |

The following figure shows the example of start HCI RX test.

Figure 3-35. Console Log of HCI RX Mode


```
MCHPRT HCI 3 0
MCHPRT HCI 3 0
Mode 3
4 14 4 15 29 32 0
BLE RX start
set BLE TX mode ch:0
```

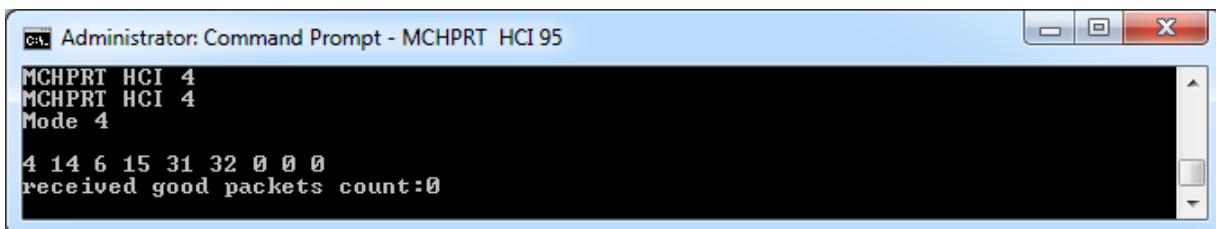
3.3.4 HCI RX Package Count

The following table provides the command syntax for HCI RX package count.

Table 3-29. Start HCI RX Package Count: HCI command only

| | |
|-----------------------|--|
| Command Syntax | MCHPRT HCI 4 |
| Example | MCHPRT HCI 4 Print out good package number |

The following figure shows the example of HCI RX package count.

Figure 3-36. Console Log of HCI RX Package Count


```
MCHPRT HCI 4
MCHPRT HCI 4
Mode 4
4 14 6 15 31 32 0 0 0
received good packets count:0
```

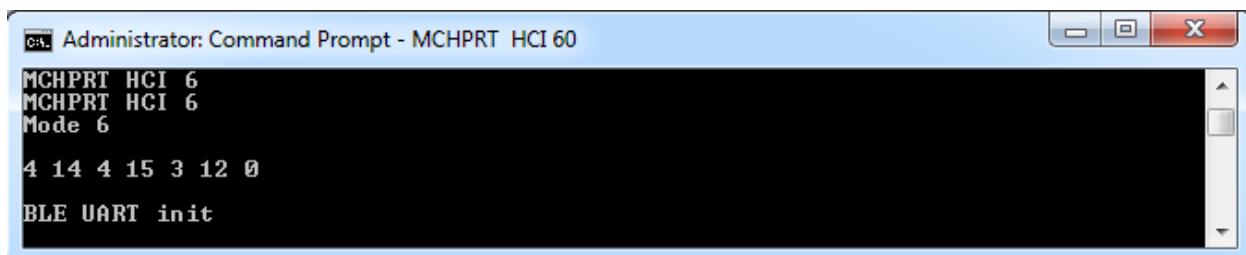
3.3.5 HCI UART Initialization Command

The following table provides the command syntax for HCI UART initialization command.

Table 3-30. Send UART Init Command and Print out Reply

| | |
|-----------------------|--|
| Command Syntax | MCHPRT HCI 6 |
| Example | MCHPRT HCI 6 Print out the reply |

The following figure shows the example of HCI UART initialization command.

Figure 3-37. Console Log of HCI UART Init Command


```
MCHPRT HCI 6
MCHPRT HCI 6
Mode 6
4 14 4 15 3 12 0
BLE UART init
```

3.3.6 HCI Deinitialization

The following table provides the command syntax for HCI deinitialization.

Table 3-31. HCI Deinitialization: HCI command only

| | |
|-----------------------|--|
| Command Syntax | MCHPRT HCI 5 |
| Example | MCHPRT HCI 5 COM port Deinitialization |

The following figure shows the example of HCI deinitialization.

Figure 3-38. Console Log of HCI Deinitialization

```
C:\ MCHPRT HCI 5
MCHPRT HCI 5
Mode 5
CloseClosed
C:\MCHPRT>
```

3.4 Register

3.4.1 Read

The following table provides the command syntax for Reg value read before initialization.

Table 3-32. Reg Value Read: Before Initialization ATWINC/ATWILC

| | |
|-----------------------|--|
| Command Syntax | MCHPRT REGR X |
| REGR | <ul style="list-style-type: none"> • REGR refers to using I2C • REGR_UART refers to using UART |
| X | X refers to the register number that reads and prints the value |
| Example | MCHPRT REGR 0 Reg 0 value will be printed |

The following figure shows the example of reg value read before initialization.

Figure 3-39. Console Log of Reg Value Read Before Initialization

```
C:\MCHPRT>MCHPRT REGR 0
SUN version 1000: 840/ 3000: 7068

Command-line arguments:
argc[0] MCHPRT
argc[1] REGR
argc[2] 0
WINC3400 Failed to initialize. Error code -7: Failed to initialize ASIC driver.
chipId = 0x1503a1

chip id num 5 :5
initLoadLibrary(void) In
Load WINC1500 library
WINC1000/WINC3000/WINC1500/WINC3400 Software <Built from branches/WILC_Baremetal_Sprint_7 revision 7068>

Read reg 0 value 5
Closed
C:\MCHPRT>
```

The following table provides the command syntax for Reg value read after initialization.

Table 3-33. Reg Value Read: After Initialization ATWINC/ATWILC

| Command Syntax | MCHPRT 16 REGR X |
|----------------|---|
| X | X refers to the register number that reads and prints the value |
| Example | MCHPRT 16 REGR 0 Reg 0 value will be printed |

The following figure shows the example of reg value read after initialization.

Figure 3-40. Console Log of Reg Value Read After Initialization

```
C:\>MCHPRT>MCHPRT 3000
SUN version 1000: 861/ 3000: 7068
MCHPRT_Version 1.3.2.2

Command-line arguments:
    argv[0]    MCHPRT
    argv[1]    3000
port:0
port:0

Port number: <null>

chipId = 0x3400d2

Select chip = 0x3000
initLoadLibrary<void> In
Load WINC3000 library
Downloading firmware... (burst_tx_firmware_3000.bin)
Firmware downloaded successfully
MAC ADDRESS:11:22:33:44:55:66
issue
read FreqOffset:0
0.000000
read FreqOffset_use:-44267397547453963934461014558483742737742270922175970558373
37884970961215686920759478435005404098190743844324717740629806625489835036725553
73798209683928985987814948852270997493487093158841942016.000000
read PATxGainCorr_use:0
read PATxGainCorr:0
eFuse index:0
MODULE Def. FreqOffset:0.00
GainCorr:0.00

init finished
module init.

Bypass mode!?
MCHPRT 16 REGR 0
MCHPRT 16 REGR 0

Read reg 0 value 5
```

3.4.2 Write

The following table provides the command syntax for Reg value write before initialization.

Table 3-34. Reg Value Write: Before Initialization ATWINC/ATWILC

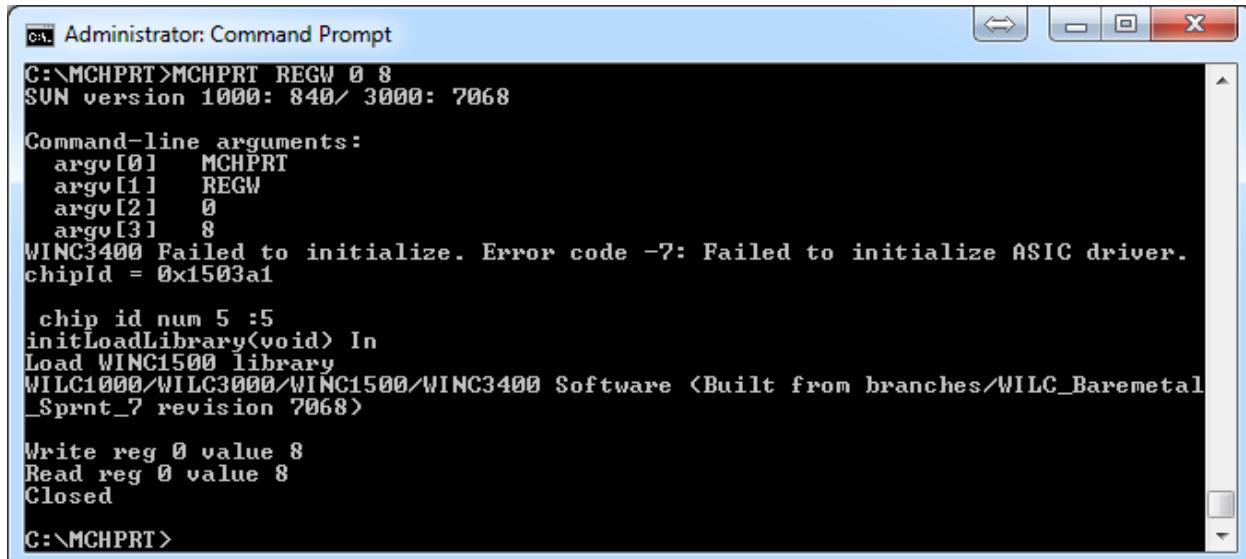
| Command Syntax | MCHPRT REGW X Y |
|----------------|--|
| REGW | <ul style="list-style-type: none"> REGW refers to using I2C REGW_UART refers to using UART |
| X | X refers to the register number that writes the register location |
| Y | Y refers to the write register value that writes the register value |

.....continued

| | |
|-----------------------|--|
| Command Syntax | MCHPRT REGW X Y |
| Example | MCHPRT REGW 0 8 Reg 0 value will change to 8 |

The following figure shows the example of Reg value write before initialization.

Figure 3-41. Console Log of Reg Value Write Before Initialization



```
C:\>MCHPRT>MCHPRT REGW 0 8
SUN version 1000: 840/ 3000: 7068

Command-line arguments:
 argv[0]  MCHPRT
 argv[1]  REGW
 argv[2]  0
 argv[3]  8
WINC3400 Failed to initialize. Error code -7: Failed to initialize ASIC driver.
chipId = 0x1503a1

 chip id num 5 :5
initLoadLibrary(void) In
Load WINC1500 library
WILC1000/WILC3000/WINCI500/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7068>

Write reg 0 value 8
Read reg 0 value 8
Closed

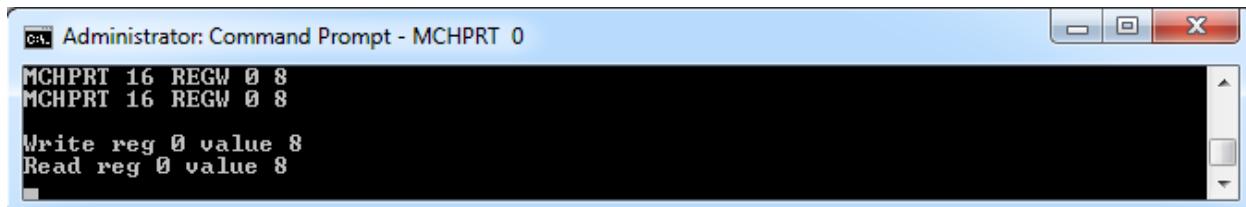
C:\>MCHPRT>
```

The following table provides the command syntax for Reg value write after initialization.

Table 3-35. Reg Value Write: After Initialization ATWINC/ATWILC

| | |
|-----------------------|---|
| Command Syntax | MCHPRT 16 REGW X Y |
| X | X refers to the register number that writes the register location |
| Y | Y refers to the write register value that writes the register value |
| Example | MCHPRT 16 REGW 0 8 Reg 0 value will change to 8 |

Figure 3-42. Console Log of Reg Value Write After Initialization



```
C:\>Administrator: Command Prompt - MCHPRT 0
MCHPRT 16 REGW 0 8
MCHPRT 16 REGW 0 8

Write reg 0 value 8
Read reg 0 value 8
```

3.4.3 Dump

The following table provides the command syntax for Reg value dump before initialization.

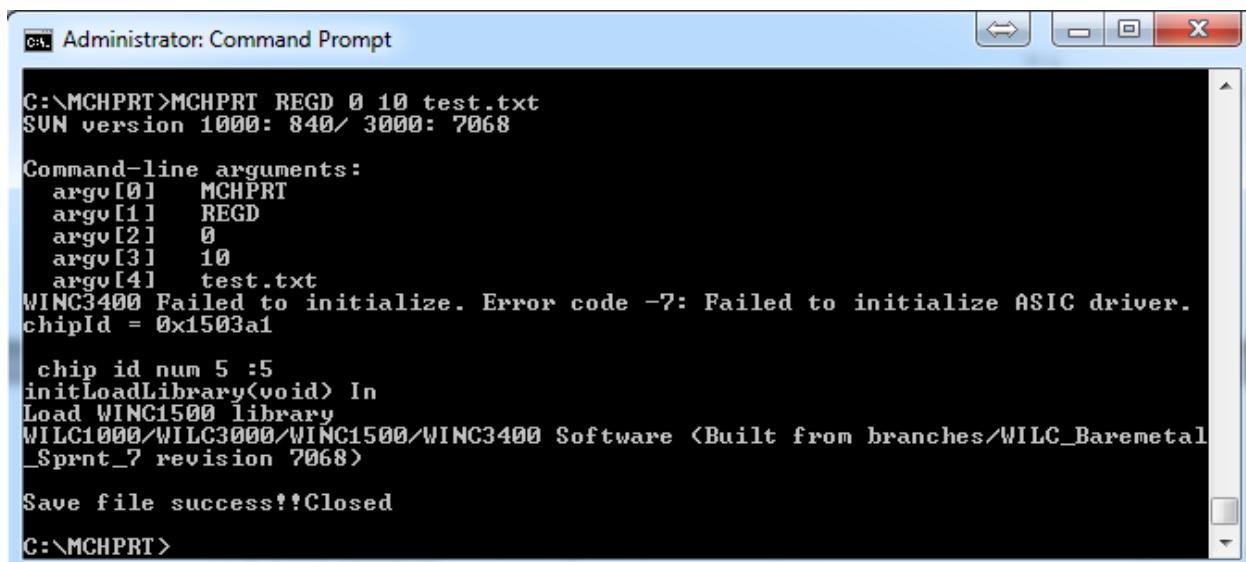
Table 3-36. Reg Value Dump: Before Initialization ATWINC/ATWILC

| | |
|-----------------------|--|
| Command Syntax | MCHPRT REGD X Y F |
| REGD | <ul style="list-style-type: none"> REGD refers to using I2C REGD_UART refers to using UART |

|continued | |
|-----------------------|--|
| Command Syntax | MCHPRT REGD X Y F |
| X | X refers to the register number that reads the register value |
| Y | Y refers to the stop register number that reads the register value |
| F | F refers to the register information file name Example: test.txt |
| Example | MCHPRT REGD 0 10 test.txt Report the RX RSSI reading in 10 sec |

The following figure shows the example of reg value dump before initialization.

Figure 3-43. Console Log of Reg Value Dump Before Initialization



```
C:\>MCHPRT>MCHPRT REGD 0 10 test.txt
SUN version 1000: 840/ 3000: 7068

Command-line arguments:
 argv[0]  MCHPRT
 argv[1]  REGD
 argv[2]  0
 argv[3]  10
 argv[4]  test.txt
WINC3400 Failed to initialize. Error code -7: Failed to initialize ASIC driver.
chipId = 0x1503a1

 chip id num 5 :5
initLoadLibrary(void) In
Load WINC1500 library
WILC1000/WILC3000/WINCI500/WINC3400 Software <Built from branches/WILC_Baremetal_Sprnt_7 revision 7068>

Save file success!!Closed
C:\>MCHPRT>
```

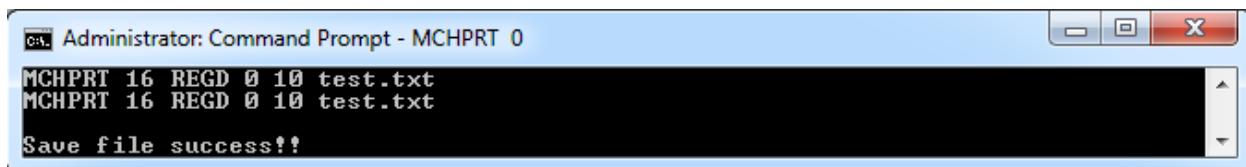
The following table provides the command syntax for Reg value dump after initialization.

Table 3-37. Reg Value Dump: After Initialization ATWINC/ATWILC

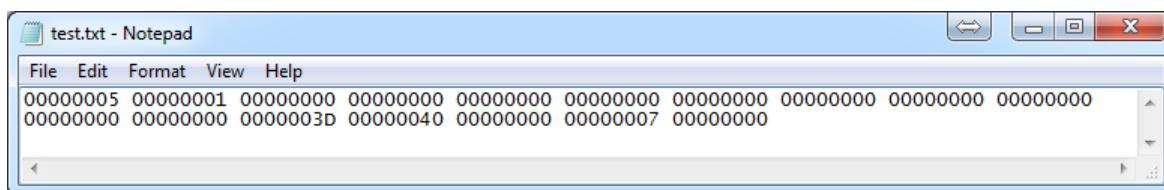
| Command Syntax | MCHPRT 16 REGD X Y F |
|----------------|---|
| X | X refers to the register number that reads the register value |
| Y | Y refers to the stop register number that reads the register value |
| F | F refers to the register information file name Example: test.txt |
| Example | MCHPRT 16 REGD 0 10 test.txt Report the RX RSSI reading in 10 sec |

The following figure shows the example of reg value dump after initialization.

Figure 3-44. Console Log of Reg Value Dump After Initialization



```
C:\>MCHPRT>MCHPRT 16 REGD 0 10 test.txt
MCHPRT 16 REGD 0 10 test.txt
Save file success!!
```

Figure 3-45. Sample test.txt

3.5 eFuse (ATWINC/ATWILC)

3.5.1 Read

The following table provides the command syntax for read eFuse before initialization.

Table 3-38. Read eFuse: Before Initialization

| Command Syntax | MCHPRT r |
|----------------|--|
| r | <ul style="list-style-type: none"> r refers to I2C r_UART refers to UART |
| Example | MCHPRT r eFuse information display |

The following figure shows the example of read eFuse before initialization.

Figure 3-46. Console Log of Read eFuse Before Initialization

```
C:\>MCHPRT>MCHPRT r
SUN version 1000: 840/ 3000: 7068

Command-line arguments:
    argv[0]  MCHPRT
    argv[1]  r
WINC3400 Failed to initialize. Error code -7: Failed to initialize ASIC driver.
chipId = 0x1503a1

    chip id num 5 :5
initLoadLibrary<void> In
Load WINC1500 library
WINC1000/WILC3000/WINC1500/WINC3400 Software <Built from branches/WILC_Baremetal
_Sprnt_7 revision 7068>
MAC ADDRESS:01:23:45:67:89:ab
issue
read FreqOffset:10fc
67.940002
read FreqOffset_use:0.000000
read PATxGainCorr_use:0
read PATxGainCorr:0
eFuse index:0
MODULE Def. FreqOffset:67.94
GainCorr:0.00
Closed

C:\>MCHPRT>
```

The following table provides the command syntax for read eFuse after initialization.

Table 3-39. Read eFuse: After Initialization

| Command Syntax | MCHPRT 16 r |
|----------------|---|
| Example | MCHPRT 16 r eFuse information display |

The following figure shows the example of read eFuse after initialization.

Figure 3-47. Console Log of Read eFuse After Initialization

```

Administrator: Command Prompt - MCHPRT 3000
C:\>MCHPRT 3000
SUN version 1000: 861/ 3000: 7068
MCHPRT_Version 1.3.2.2

Command-line arguments:
  argv[0]  MCHPRT
  argv[1]  3000
port:0
port:0

Port number: <null>
chipId = 0x3400d2

Select chip = 0x3000
initLoadLibrary(void) In
Load WINC3000 library
Downloading firmware...<burst_tx_firmware_3000.bin>
Firmware downloaded successfully
MAC ADDRESS:11:22:33:44:55:66
issue
read FreqOffset:0
0.000000
read FreqOffset_use:-0.000000
read PATxGainCorr_use:0
read PATxGainCorr:0
eFuse index:0
MODULE Def. FreqOffset:0.00
GainCorr:0.00

init finished
module init.

Bypass mode?!
MCHPRT 16 r
MCHPRT 16 r
MAC ADDRESS:11:22:33:44:55:66
issue
read FreqOffset:0
0.000000
read FreqOffset_use:-0.000000
read PATxGainCorr_use:0
read PATxGainCorr:0
eFuse index:0
MODULE Def. FreqOffset:0.00
GainCorr:0.00

```

3.5.2 Write

3.5.2.1 Write MAC ID Information

The following table provides the command syntax for write MAC ID and frequency offset only before initialization.

Table 3-40. Write MAC ID in eFuse: Before Initialization

| | |
|----------------|---|
| Command Syntax | MCHPRT XXXXXXXXXXXX Y IQ A AE P PE T TEor MCHPRT MAC_UART XXXXXXXXXXXX Y IQ A AE P PE T TE |
| MAC_UART | <ul style="list-style-type: none"> • MAC_UART refers to UART • Without MAC_UART refers to I2C XXXXXXXXXXXX refers to MAC ID |
| XXXXXXXXXXXXXX | XXXXXXXXXXXXXX refers to MAC ID |

.....continued

| | |
|-----------------------|---|
| Command Syntax | MCHPRT XXXXXXXXXXXX Y IQ A AE P PE T TEor MCHPRT MAC_UART XXXXXXXXXXXX Y IQ A AE P PE T TE |
| Y | Y refers to frequency offset value If "XO" is given as input then it disables the XO in eFuse. |
| A | A refers to IQ imbalance amplitude correction value. Give the value as "0". The current WILC/WINC firmware doesn't support this feature, it is for future reservation If "AMP" is given as input then it disable amplitude imbalance in efuse. |
| AE | AE refers to correction value real or imaginary 0: Real 1: Imaginary If "AMP" is given as input then it disable amplitude imbalance in efuse. |
| P | P refers to phase correction value in IQ imbalance. Give the value as "0". The current WILC/WINC firmware doesn't support this feature, it is for future reservation If "Phase" is given as input then it disable phase imbalance in efuse. |
| PE | PE refers to correction value real or imaginary 0: Real 1: Imaginary If "Phase" is given as input then it disable phase imbalance in efuse. |
| T | Temperature calibration value use temperature calibration calculator to find the temperature calibration value. If "TEMP" is given as input then it disables efuse temperature calibration |
| TE | Temperature calibration enable 0: disable 1: enable If "TEMP" is given as input then it disables efuse temperature calibration |
| Example | MCHPRT 1234567890AB -70 IQ 0 0 0 0 86 1 eFuse update the MAC ID: 1234567890AB Frequency offset: -70Amplitude correction value 0 Amplitude enableReal Phase correction value 0 Amplitude enableReal Temperature calibration value 86 Temperature calibration Enable |

The following figure shows the example of write MAC ID in eFuse before initialization.

Figure 3-48. Console Log of Write MAC ID for eFuse Before Initialization

```

Administrator: C:\Windows\System32\cmd.exe
C:\Users\A21212\Documents\SUN\MCHPRT\Release>MCHPRT F8F005D71F3D -7.91 IQ 1.1 1 1.2 1 83 1
SUN version 1000: 889/ 3000: 7416
MCHPRT_Version 1.4.6.1

Command-line arguments:
argv[0] MCHPRT
argv[1] F8F005D71F3D
argv[2] -7.91
argv[3] IQ
argv[4] 1.1
argv[5] 1
argv[6] 1.2
argv[7] 1
argv[8] 83
argv[9] 1

WILC3000/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7416>
chipId = 0x3000d2

Flash id :ffffffff
initLoadLibrary(void) In
Load WINC3000 library
WILC3000/WILC3000/WINC1500/WINC3400 Software <Built from branches/WILCBARESW-324_GUI revision 7416>
F8F005D71F3D

Correct MAC ID.

write FreqOffset:-7.91
write FreqOffset:7e05
write ADCCalib:53
Write AMP valid:1
Write AMP value:1.10
Write AMP I/Q:i
Write Pha valid:1
Write AMP value:1.20
Write AMP I/Q:i

Write MAC :F8:f0:5:d7:1f:3d

eFuse write finish
Closed
C:\Users\A21212\Documents\SUN\MCHPRT\Release>MCHPRT r...

```

The following table provides the command syntax for write MAC ID and frequency offset only after initialization.

Table 3-41. Write MAC ID and Frequency Offset in eFuse: After Initialization

| Command Syntax | MCHPRT 20 XXXXXXXXXXXX Y IQ A AE P PE T TE |
|----------------|---|
| XXXXXXXXXXXX | XXXXXXXXXXXX refers to MAC ID |
| Y | Y refers to frequency offset value |
| A | A refers to IQ imbalance amplitude correction value. Give the value as "0". The current WILC/WINC firmware doesn't support this feature, it is for future reservation. |
| AE | AE refers to correction value real or imaginary 0: Real 1: Imaginary |
| P | P refers to phase correction value in IQ imbalance. Give the value as "0". The current WILC/WINC firmware doesn't support this feature, it is for future reservation. |
| PE | PE refers to correction value real or imaginary 0: Real 1: Imaginary |
| T | Temperature calibration value Use temperature calibration calculator to find the temperature calibration value. |
| TE | Temperature calibration enable 0: disable 1: enable |

.....continued

| Command Syntax | MCHPRT 20 XXXXXXXXXXXX Y IQ A AE P PE T TE |
|----------------|---|
| Example | MCHPRT 20 1234567890AB -70 IQ 0 0 0 0 86 1 eFuse update the MAC ID: 1234567890AB Frequency offset: -70 Amplitude correction value 0 Amplitude enableReal Phase correction value 0 Amplitude enableReal Temperature calibration value 86 Temperature calibration Enable |

The following figure shows the example of write MAC ID and frequency offset in eFuse after initialization.

Figure 3-49. Console Log of Write MAC ID for eFuse After Initialization



```

Administrator: C:\Windows\System32\cmd.exe - MCHPRT_3000

C:\Users\021212\Documents\SUN\MCHPRT\Release>MCHPRT_3000
MCHPRT Version 1000: 889 / 3000: 7416
MCHPRT_Version 1.4.6.1

Command-line arguments:
  argv[0]  MCHPRT
  argv[1]  3000
  argv[2]

chipId = 0x3000d2
Select chip = 0x3000
initial library<0x0> In
Load VINC3000 library
downloading firmware...<burst_tx_firmware_3000.bin>
Firmware downloaded successfully

Fuse Bank number : 2
MAC ADDRESS : 01:23:45:67:89:ab
Fuse Bank:2
Fuse invalid:0
Fuse Used:0
Mac Used:1
Fuse FreqOffset:-7.92
Fuse ADCCalib:83
Fuse RMP valid:1
Fuse RMP value:0.10
Fuse RMP I/Q:1
Fuse Pha valid:1
Fuse RMP value:0.20
Fuse RMP I/Q:1
init finished
module init.

!!!!!!Bypass mode!!!!!!
Bypass mode!
MCHPRT 20 9876543210AB -12.1 IQ 2.2 1 0.1 1 46 1
MCHPRT 20 9876543210AB -12.1 IQ 2.2 1 0.1 1 46 1
9876543210AB

Correct MAC ID.
write FreqOffset:-12.10
write FreqOffset:7cf9
write ADCCalib:2e
write RMP valid:1
write RMP value:2.20
write RMP I/Q:1
write Pha valid:1
write RMP value:0.10
write RMP I/Q:1

write MAC :98:76:54:32:10:ab

Fuse write finish
MCHPRT r
MCHPRT r

Fuse Bank number : 3
MAC ADDRESS : 98:76:54:32:10:ab
Fuse Bank:3
Fuse invalid:0
Fuse Used:0
Mac Used:1
Fuse FreqOffset:-12.11
Fuse ADCCalib:46
Fuse RMP valid:1
Fuse RMP value:2.20
Fuse RMP I/Q:1
Fuse Pha valid:1
Fuse RMP value:0.11
Fuse RMP I/Q:1

```

3.5.2.2 Invalidate an eFuse Bank

In some cases, the user needs to invalidate a specific eFuse bank. In order to invalidate a specific eFuse bank, use the `MCHPRT efuse_invalid bank_number` command, and the bank number value ranges from 0-5.

The following are some example commands:

- To invalidate eFuse Bank 0, run the command `MCHPRT efuse_invalid 0`.
- To invalidate eFuse Bank 3, run the command `MCHPRT efuse_invalid 3`.

3.6 Firmware Upgrade

Note: For updating the .bat file please refer to the [Firmware update](#) section in the appendix.

3.6.1 ATWINC Series Upgrade

3.6.1.1 Full

The following table provides the command syntax for firmware upgrade.

Table 3-42. Firmware Upgrade: Before Initialization

| Command Syntax | Upgrade_1500/ Upgrade_3400 |
|----------------|---|
| X | X refers to Antenna <ul style="list-style-type: none">• Upgrade_1500 - ATWINC1500 FW upgrade• Upgrade_3400 - ATWINC3400 FW upgrade |
| Example | Upgarde_1500 ATWINC1500 FW upgrade starts and when completes it shows "PASS" |

The following figure shows the example of firmware upgrade.

Figure 3-50. Console Log of Firmware Upgrade

The figure consists of two vertically stacked screenshots of a Windows Command Prompt window. Both windows have the title bar 'Administrator: Command Prompt'.

Top Window:

```
C:\MCHPRT>Upgrade_1500
C:\MCHPRT>IF [] == [] <SET PORT_NUM=0 > ELSE <SET PORT_NUM= >
C:\MCHPRT>if "" == "I2C" Goto contine_I2C
C:\MCHPRT>if "" == "UART" Goto contine_UART
C:\MCHPRT>if "" == "" Goto contine_I2C
C:\MCHPRT>cd upgrade_1500\firmware
C:\MCHPRT\upgrade_1500\firmware>download_all.bat I2C 0<nul
Mode I2C
Downloading Image...
*****
* >Programmer for WINC1500 SPI Flash*
* Owner: Atmel Corporation *
*****
SUN REV 14275 SUN BR branches/WIFI10T-1660_19_5_2_RC7
Built at Jan 26 2017 22:09:25
Firmware Path (2B0) ../../firmware/m2m_aio_2b0.bin
Firmware Path (3A0) ../../firmware/m2m_aio_3A0.bin
```

Bottom Window:

```
>Writing the certificate to SPI flash...
Done
>>>Found Certificate:
>>> WINCRootCA
>Writing the certificate to SPI flash...
Done
All certificates have been downloaded
OK
#####
##      #####  ##  #####  #####
##      ##  ##  ##  ##  ##
##      ##  ##  ##  ##  ##
##      #####  ##  #####  #####
##      ##  ##  ##  ##  ##
##      ##  ##  ##  ##  ##
##      ##  ##  ##  ##  ##
##      ##  ##  ##  ##  ##
#####
Download ends successfully
Press any key to continue . .
C:\MCHPRT\upgrade_1500\firmware\Tools\root_certificate_downloader\debug_i2c>
```

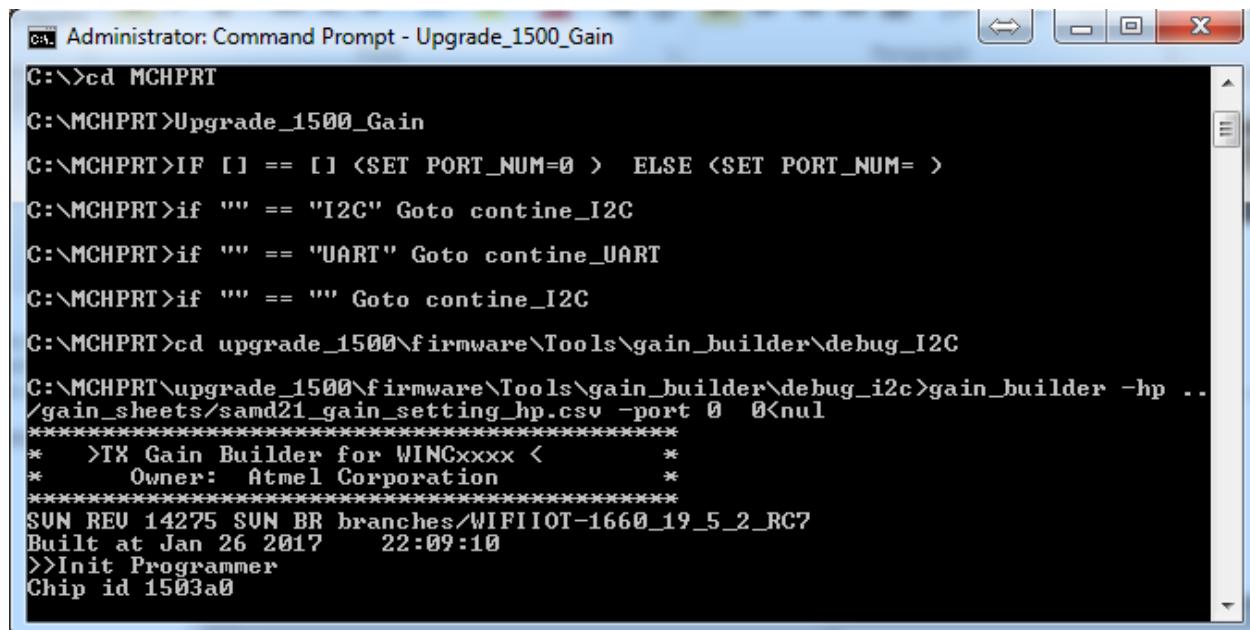
3.6.1.2 Gain Table

The following table provides the command syntax for firmware upgrade (gain table).

Table 3-43. Firmware Upgrade (gain table): Before Initialization

| Command Syntax | Upgrade_1500_Gain/ Upgrade_3400_Gain |
|----------------|--|
| X | X refers to Antenna <ul style="list-style-type: none"> • Upgrade_1500_Gain - ATWINC1500 FW upgrade • Upgrade_3400_Gain - ATWINC3400 FW upgrade |
| Example | Upgarde_1500_Gain ATWINC1500 FW upgrade starts and when completes it closes the command line |

The following figure shows the example of firmware upgrade (gain table).

Figure 3-51. Console Log of Firmware Upgrade (Gain table)


```

Administrator: Command Prompt - Upgrade_1500_Gain

C:\>cd MCHPRT
C:\MCHPRT>Upgrade_1500_Gain
C:\MCHPRT>IF [] == [] <SET PORT_NUM=0 > ELSE <SET PORT_NUM= >
C:\MCHPRT>if "" == "I2C" Goto contine_I2C
C:\MCHPRT>if "" == "UART" Goto contine_UART
C:\MCHPRT>if "" == "" Goto contine_I2C
C:\MCHPRT>cd upgrade_1500\firmware\Tools\gain_builder\debug_I2C
C:\MCHPRT\upgrade_1500\firmware\Tools\gain_builder\debug_i2c>gain_builder -hp ...
/gain_sheets/samd21_gain_setting_hp.csv -port 0 <nul
*****
*   >TX Gain Builder for WINCxxxx <      *
*   Owner: Atmel Corporation               *
*****
SUN REV 14275 SUN BR branches/WIFI2IOT-1660_19_5_2_RC7
Built at Jan 26 2017 22:09:10
>>Init Programmer
Chip id 1503a0

```

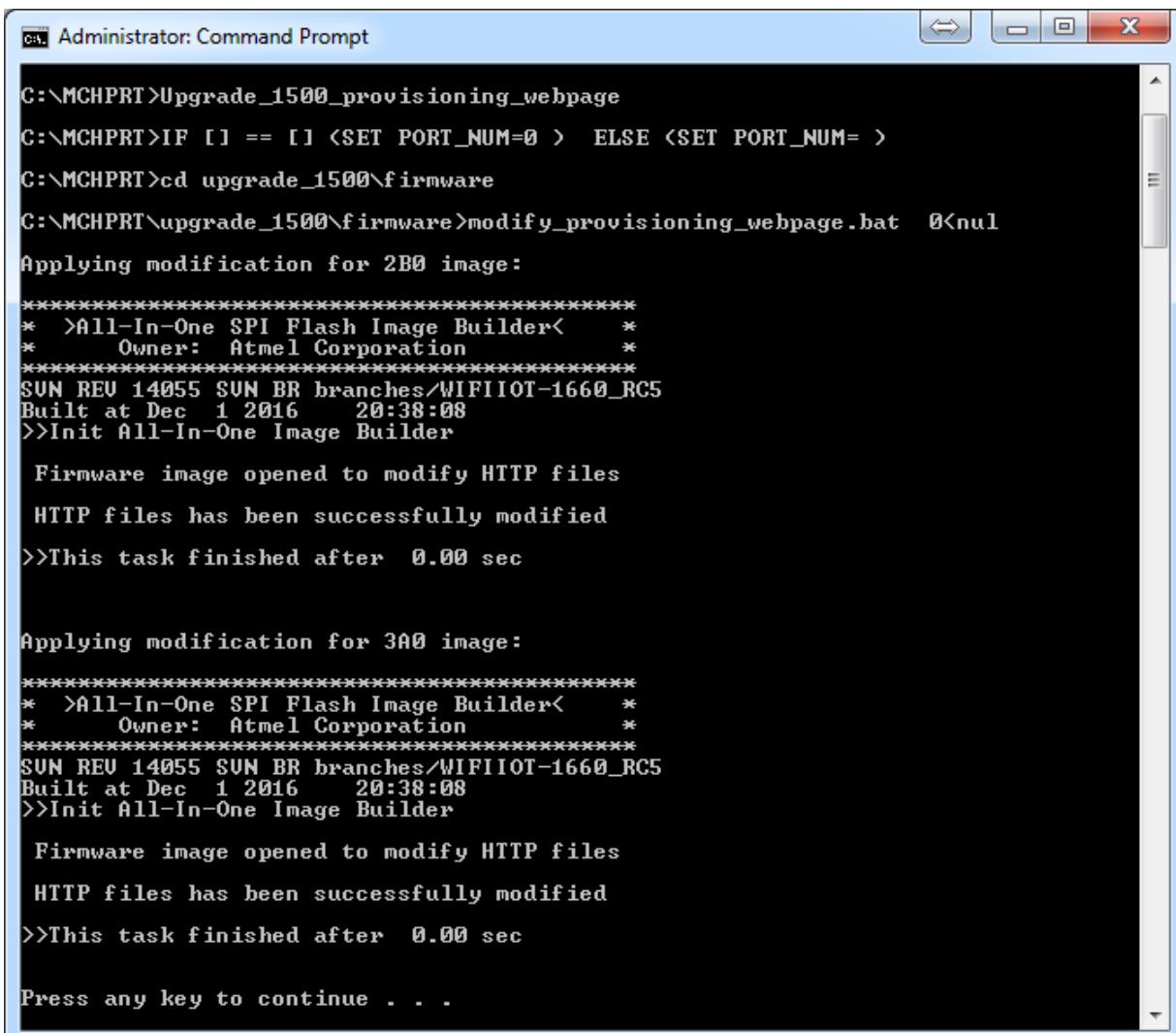
3.6.1.3 Provisioning Webpage

The following table provides the command syntax for firmware upgrade (provisioning webpage).

Table 3-44. Firmware Upgrade (Provisioning Webpage): Before Initialization

| Command Syntax | Upgrade_1500_provisioning_webpage/ Upgrade_3400_provisioning_webpage |
|----------------|--|
| X | X refers to Antenna <ul style="list-style-type: none"> Upgrade_1500_provisioning_webpage - ATWINC1500 Upgrade_3400_provisioning_webpage - ATWINC3400 |
| Example | Upgarde_1500_provisioning_webpage ATWINC1500 webpage update |

The following figure shows the example of firmware upgrade (provisioning webpage).

Figure 3-52. Console Log of Firmware Upgrade (Provisioning Webpage)

The screenshot shows a Windows Command Prompt window titled "Administrator: Command Prompt". The window displays the output of a command-line script used for provisioning a webpage. The log includes several "All-In-One SPI Flash Image Builder" initialization messages, each indicating it was built at December 1, 2016, at 20:38:08. It shows the script modifying HTTP files for two different images (2B0 and 3A0) and completing the task after 0.00 seconds. Finally, it prompts the user to press any key to continue.

```
C:\>MCHPRT>Upgrade_1500_provisioning_webpage
C:\>MCHPRT>IF [] == [] <SET PORT_NUM=0 > ELSE <SET PORT_NUM= >
C:\>MCHPRT>cd upgrade_1500\firmware
C:\>MCHPRT\upgrade_1500\firmware>modify_provisioning_webpage.bat 0<nul
Applying modification for 2B0 image:
*****
* >All-In-One SPI Flash Image Builder< *
* Owner: Atmel Corporation *
*****
SUN REU 14055 SUN BR branches/WIFI2OT-1660_RC5
Built at Dec 1 2016 20:38:08
>>Init All-In-One Image Builder

Firmware image opened to modify HTTP files
HTTP files has been successfully modified
>>This task finished after 0.00 sec

Applying modification for 3A0 image:
*****
* >All-In-One SPI Flash Image Builder< *
* Owner: Atmel Corporation *
*****
SUN REU 14055 SUN BR branches/WIFI2OT-1660_RC5
Built at Dec 1 2016 20:38:08
>>Init All-In-One Image Builder

Firmware image opened to modify HTTP files
HTTP files has been successfully modified
>>This task finished after 0.00 sec

Press any key to continue . . .
```

Note: ASF has the latest firmware. See Firmware upgrade folder in MCHPRT2 package, for information on how to add the upgrade file into MCHPRT2 tool folder.



Important: Before the Firmware upgrade, update the Firmware file in the following folder:

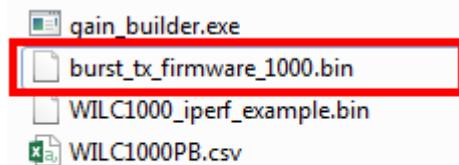
- ..\\MCHPRT\\upgrade_1500\\firmware\\firmware (for ATWINC1500)
- ..\\MCHPRT\\upgrade_3400\\firmware\\firmware (for ATWINC3400)

3.6.2 ATWILC Series Upgrade

3.6.2.1 Updating Target Firmware

Before the Firmware upgrade, update the target firmware file in the ATWILC1000 or ATWILC3000 folder:

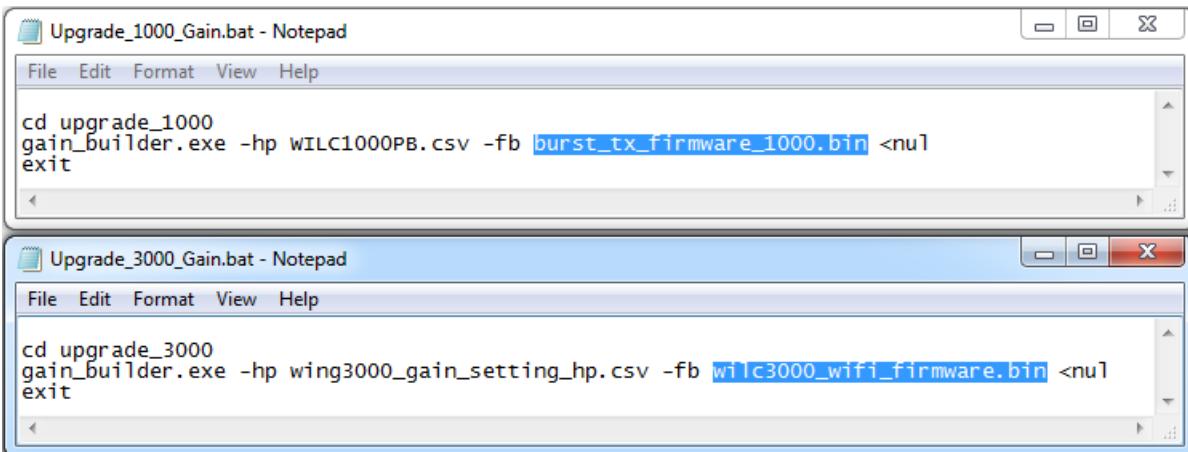
..\\MCHPRT\\upgrade_1000

Figure 3-53. Target Firmware File

Note: If required, edit the .csv file for gain table update. For additional details on the gain table update procedure, refer to the application notes.

3.6.2.2 Gain Table Update

Edit the Upgrade_1000_Gain.bat or Upgrade_3000_Gain.bat. Update the highlighted text (as shown in the following figure) to update target bin or hex file and then save the edited bat file.

Figure 3-54. Editing Firmware Files

3.6.2.3 Gain Table Update on Target Firmware

The following table provides the command syntax for gain table update on target firmware.

Table 3-45. Upgrade Gain Table on Target Firmware File

| Command Syntax | Upgrade_1000_gain/ Upgrade_3000_gain |
|----------------|--|
| Setting model | <ul style="list-style-type: none"> Upgrade_1000_gain - ATWILC1000 FW upgrade Upgrade_3000_gain - ATWILC3000 FW upgrade |
| Example | Upgarde_1000_gain Target file will upgrade with new gain table |

The following figures illustrate the example of firmware upgrade.

Figure 3-55. Console Log of Firmware Upgrade using ATWILC1000

```
Administrator: Command Prompt
*****
* >TX Gain Builder for WILC1000 <
*   Owner: Atmel Corporation
*****
>>Init Programmer
Setting file has been opened:
    "WILC1000PB.csv"
Initializing values ...
>Extracting data from file...
Done
>Building tables...
Done

|CH/REG|00001240|00001244|00001248|0000124C|00001250|00001254|00001258|
|-----|-----|-----|-----|-----|-----|-----|-----|
|01|01010143|0000000CC|00000000|00000000|11110000|22221111|00002222|
|02|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|03|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|04|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|05|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|06|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|07|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|08|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|09|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|10|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|11|012001C9|00000000|00000000|00000000|11110000|11111111|00001111|
|12|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|13|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|14|019701C9|00000016B|00000000|00000000|11110000|11111111|00002221|
|-----|-----|-----|-----|-----|-----|-----|-----|

TX Gain values have been downloaded successfully.

>>This task finished after 0.02 sec
Press any key to continue . . .
```

Figure 3-56. Console Log of Firmware Upgrade using ATWILC3000

```
Administrator: Command Prompt
*****
* >TX Gain Builder for WILC3000 <
* Owner: Atmel Corporation
*****
>>Init Programmer
Setting file has been opened:
  "wing3000_gain_setting_hp.csv"
Initializing values ...
>Extracting data from file...
Done
>Building tables...
Done

|CH/REG|00161140|00161144|00161148|0016114C|00161150|00161154|00161158|00
16115C|00161160|00161164||| | | | | | | |
| 01|00E500E5|00E500E5|01310131|01310131|01310131|01310131|01200120|01
200120|01200120|00E50101||| | | | | |
| 02|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 03|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 04|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 05|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 06|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 07|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 08|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 09|00E500E5|00E500E5|01430143|01430143|01430143|01430143|01430143|01
430143|01430143|00E50101||| | | | |
| 10|00E500E5|00E500E5|01310143|01310131|01310131|01310131|01430143|01
430143|01430143|00E50101||| | | | |
| 11|00E500E5|00E500E5|01310143|01310131|01310131|01310131|01010101|01
010101|01010101||| | | | |
| 12|00E500E5|00E500E5|01310143|01310131|01310131|01310131|01430143|01
430143|01430143|00E50101||| | | | |
| 13|00E500E5|00E500E5|01310143|01310131|01310131|01310131|01430143|01
430143|01430143|00E50101||| | | | |
| 14|00E500E5|00E500E5|01310143|01310131|01310131|01310131|01430143|01
430143|01430143|00E50101||| | | | |

TX Gain values have been downloaded successfully.

>>This task finished after 0.03 sec
Press any key to continue . . .
```

4. Appendix A – Python® Example

Overview

Python is an interpreted, high-level, general-purpose programming language. Refer to www.python.org/ for downloading Python software and documentation.

4.1 Example

3 TX with 1 RX test case:

```
import sys
# import Python standard function for sys
import subprocess
# import Python standard function for call CMD function
import time
# import Python standard function for time
start_time = time.time()
#Python standard function for time check the start time
child = subprocess.Popen(["MCHPRT", "3400"], stdout=subprocess.PIPE,stdin=subprocess.PIPE )
# Start Init in CMD type "MCHPRT 3400" using subprocess
time.sleep(1)
# Delay 1 sec for upload test FW to module

print "Start Test TX1 11b 11Mbps"
# Print the command state to screen
child.stdin.write("MCHPRT 6 6 3 0 0 -10 18 15 1500 0\n")
# Send command to start TX, command informaiton please help to check application note
# add the TX measurement in here

print "Start Test TX2 11g 54Mbps"
# Print the command state to screen
child.stdin.write("MCHPRT 6 6 7 1 0 -10 18 15 1500 0\n")
# Send command to start TX, command informaiton please help to check application note
# add the TX measurement in here

print "Start Test TX3 11n MCS7"
# Print the command state to screen
child.stdin.write("MCHPRT 6 6 7 2 0 -10 18 15 1500 0\n")
# Send command to start TX, command informaiton please help to check application note
# add the TX measurement in here

print "Stop TX"
# Print the command state to screen
child.stdin.write("MCHPRT 13\n")
# Send command to stop TX, command informaiton please help to check application note

print "Test RX1 channel 6"
# Print the command state to screen
child.stdin.write("MCHPRT 2 6\n")
# Send command to start channel 6, command informaiton please help to check application note

print "Test RX1 package count "
# Print the command state to screen
child.stdin.write("MCHPRT 3\n")
# Send command to stop RX and printing recevied package information, command informaiton
# please help to check application note

child.stdin.write("MCHPRT 4\n")
# Send command to close MCHPRT, command informaiton please help to check application note

print child.stdout.read()
child.stdin.close()
child.kill()
```

```
print("--- %s seconds ---" % (time.time() - start_time))
--- 7.08999991417 seconds ---
```

Figure 4-1. Log when the script is run:

```
C:\Users\r21212\Documents\SUN\MCHPRT2\WindowsFormsApplication2\bin\Release>WINC_example.py
Administrator: C:\Windows\System32\cmd.exe
C:\Users\r21212\Documents\SUN\MCHPRT2\WindowsFormsApplication2\bin\Release>WINC_example.py
Start Test TX1 11b 11Mbps
Start Test TX2 11g 54Mbps
Start Test TX3 11n MCS7
Stop TX
Test on channel 6
Load RX package count
SUM version 1000: 889 / 3000 : 7436
MCHPRT_Version 1.4.6.4
Command-line arguments:
    argv[0] MCHPRT
    argv[1] 3400
3400
0
chipId = 0x3400d2
Select chip = 0x3400
initLoadLibrary(void) In
Load WINC3000 library
Downloading firmware...burst_tx_firmware_3400.bin
Firmware downloaded successfully
eFuse Bank number : 5
MAC ADDRESS : f8:f0:05:d7:id:34
eFuse index:5
eFuse invalid:0
eFuse Used:1
Mac Used:1
eFuse FreqOffset enable:1
eFuse FreqOffset:35.33
eFuse ADCCalib enable:0
eFuse ADCCalib:18
eFuse AMP valid:1
eFuse AMP value:15.65
eFuse AMP I/Q:1
eFuse Pha valid:0
eFuse Pha value:0.00
eFuse Pha I/Q:0
init finished
module init.

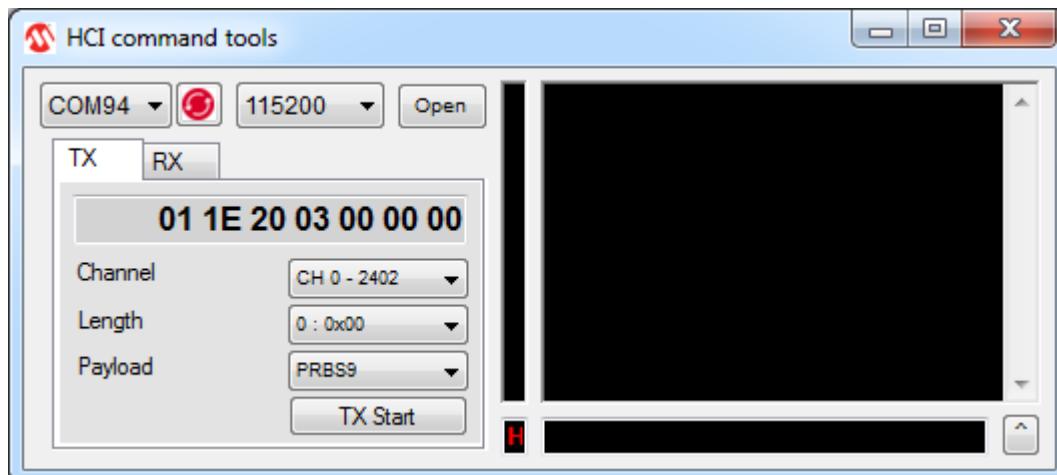
!!!!!!Bypass mode!!!!!!
Bypass mode!!
MCHPRT 6 6 3 0 0 -10 18 15 1500 0
Frame number is 0
Start TX Test
test ch = 6
gain mode1
WINC3000 send TX
set TX mode ch:6
MCHPRT 6 6 7 1 0 -10 18 15 1500 0
Frame number is 0
Start TX Test
test ch = 6
gain mode1
WINC3000 send TX
set TX mode ch:6
MCHPRT 13
TX stop!Stop TX Test
MCHPRT 2 6
Start RX test
set RX mode ch:6
MCHPRT 3
Stop RX Test
DA = 0
SA = 0
Self = 0
Num RX pkts: 0
Num Err pkts: 3
received good packets count:0
MCHPRT 4
Closed
--- 6.8789999485 seconds ---
```

5. Appendix B – HCI Command Tools

This appendix explains the HCI command tools included in the following function for serial port communication:

- HCI TX command
- HCI RX command
- Serial port communication
 - Hexadecimal communication
 - Decimal communication
 - String communication

Figure 5-1. HCI Command Tool

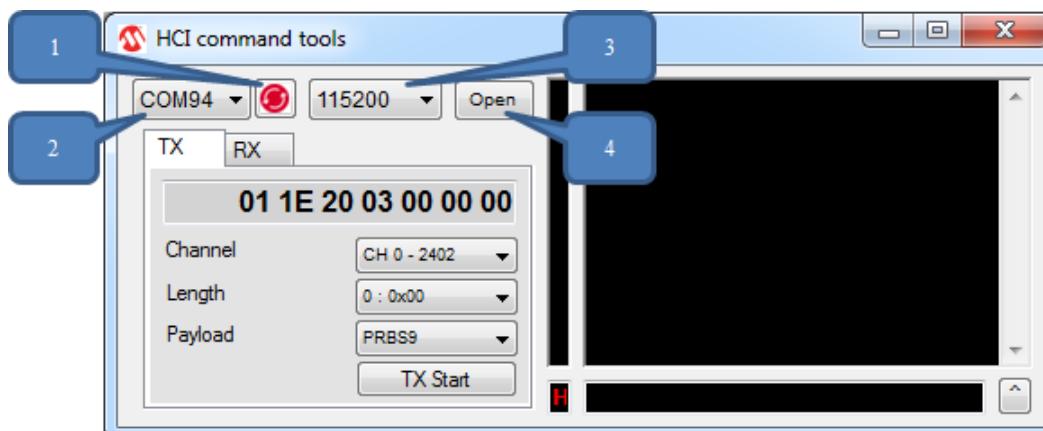


5.1 HCI Initialization

Perform the following steps for HCI initialization.

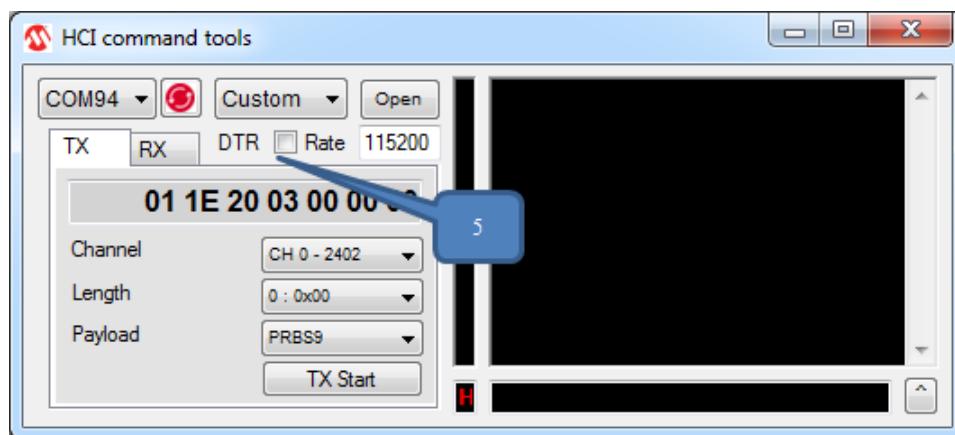
1. Click **rescan** button to scan the serial port in PC.
2. Select the COM Port.
3. Select the Baud Rate.
4. Click **Open** to open the Serial port for communication.

Figure 5-2. HCI Command Initialization



5. Select the baud rate as Custom and then DTR is enabled. Select DTR check box.

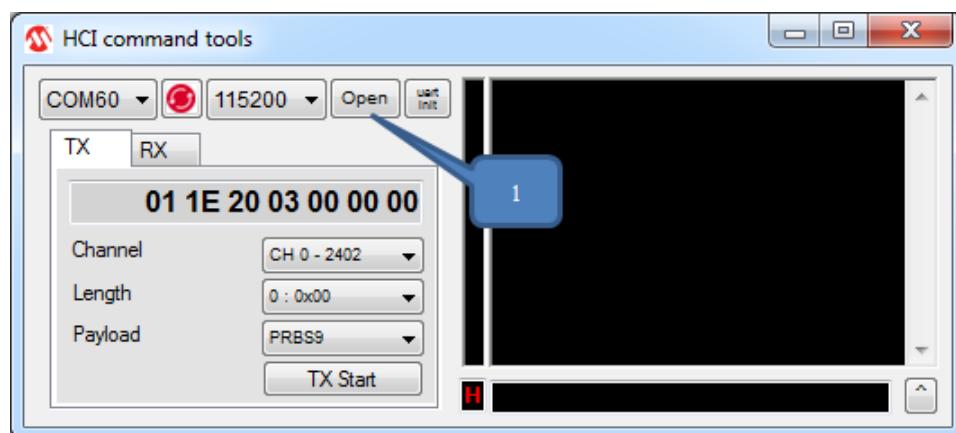
Figure 5-3. Enable DTR



5.2 HCI Command

After the initialization of the Serial port connection, the button will change to “Close”.

Figure 5-4. Serial Port Initialization

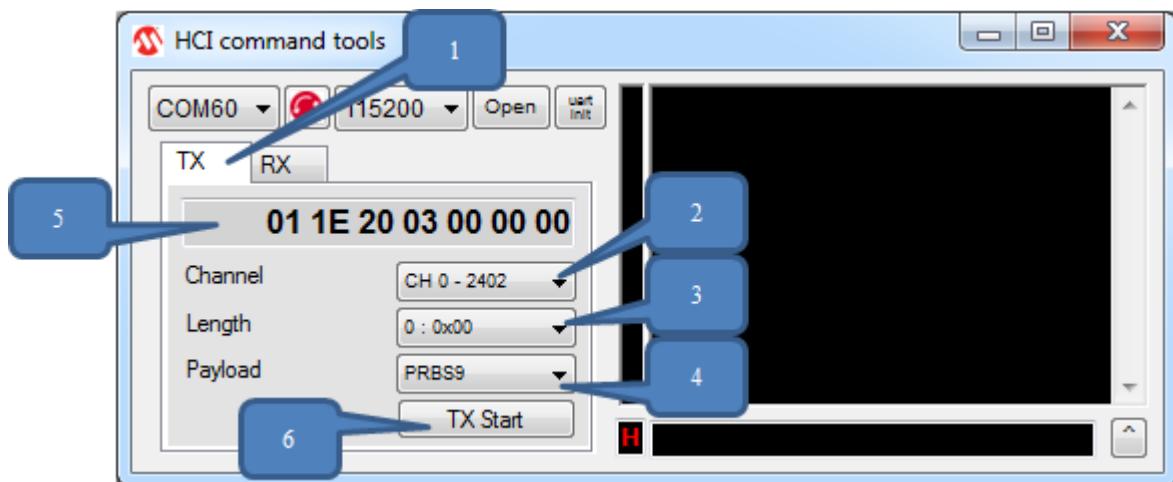


5.2.1 HCI TX

Perform the following steps for TX.

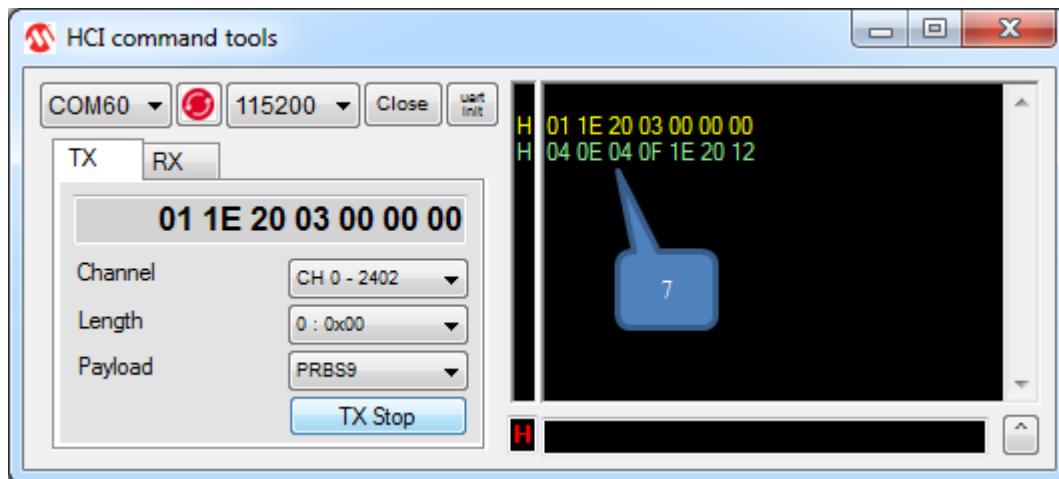
1. After successful initialization, select the **TX** tab to change to TX HCI command.
2. Select the Channel.
3. Select the Length.
4. Select the Payload.
5. Then the HCI command is shown in the TX command box.
6. Click **TX Start** to send the TX HCI command.

Figure 5-5. Start TX



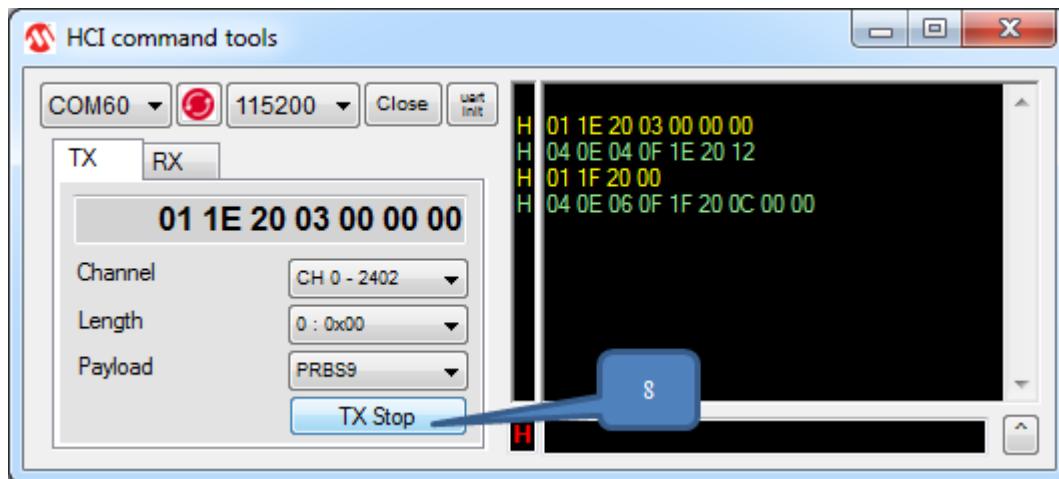
- The sent and received HCI command is shown in the log. Yellow represents the sent command [Hex] and Green represents the received command [Hex].

Figure 5-6. Sent/Received HCI Command



- Click **TX Stop** to send TX stop command.

Figure 5-7. Stop TX

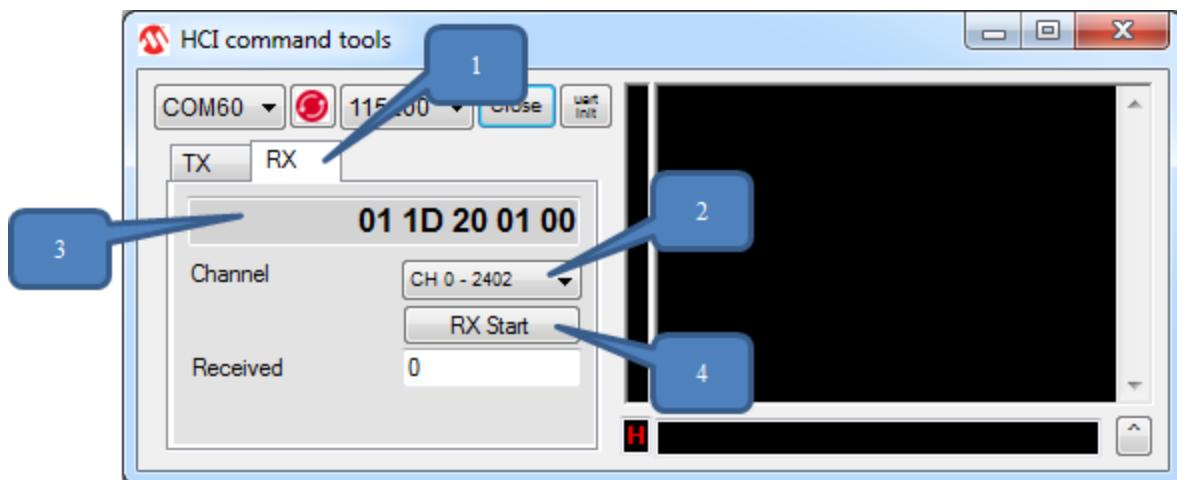


5.2.2 HCI RX

Perform the following steps for HCI RX.

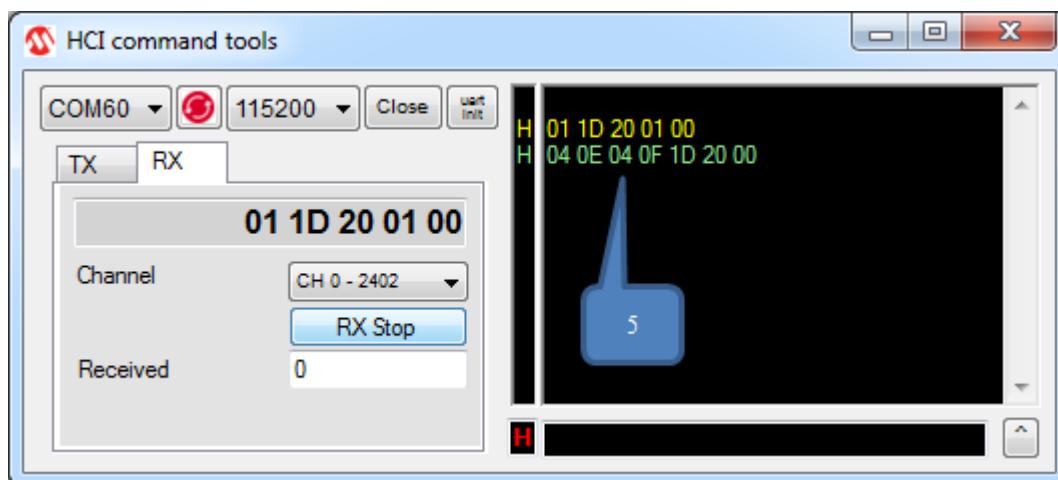
1. After successful initialization, select the **RX** tab to change to RX HCI command.
2. Select the Channel.
3. The HCI command is shown in the RX command box.
4. Click **RX Start** to send the RX HCI command.

Figure 5-8. Start RX



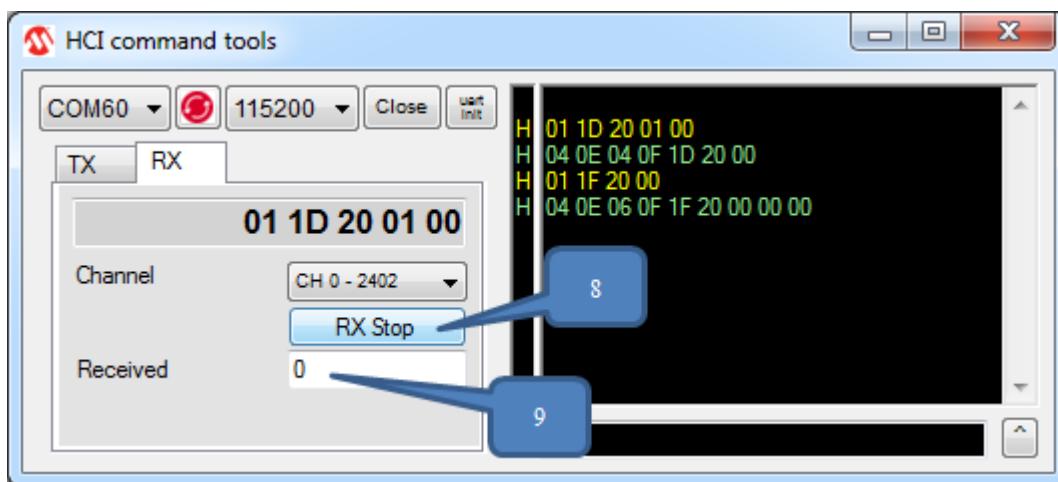
5. The sent and received HCI command is shown in the log. Yellow represents the sent command [Hex] and Green represents the received command [Hex].

Figure 5-9. Sent/Received HCI Command



6. Click **RX Stop** to send RX stop command and the received package number is shown in Received text box.

Figure 5-10. Stop RX



5.3 UART Initialization

To enable the UART command, click **UART init**. Then send the UART command (0x01, 0x03, 0x0c, 0x00).

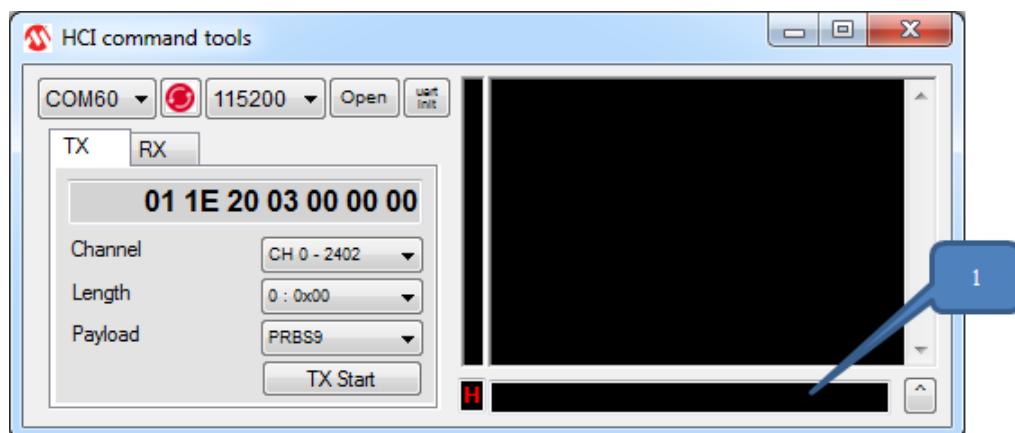
Figure 5-11. UART Init



5.4 Serial Port

After successful initialization, the Serial port communication starts and enter the commands to be sent using the text box, as shown in the following figure. The commands can be Hexadecimal or Decimal value for Hexadecimal command or String.

Figure 5-12. Serial Port Communication

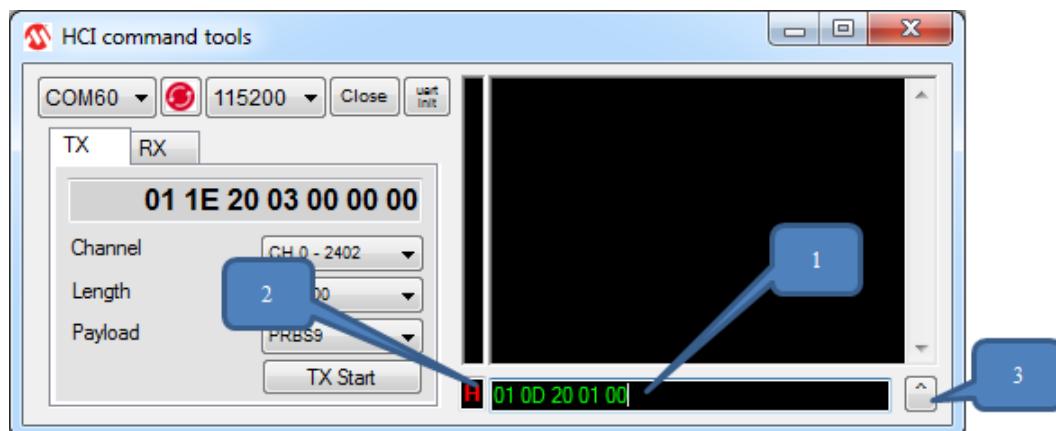


5.4.1 Hexadecimal Communication

Perform the following steps for Hexadecimal communication.

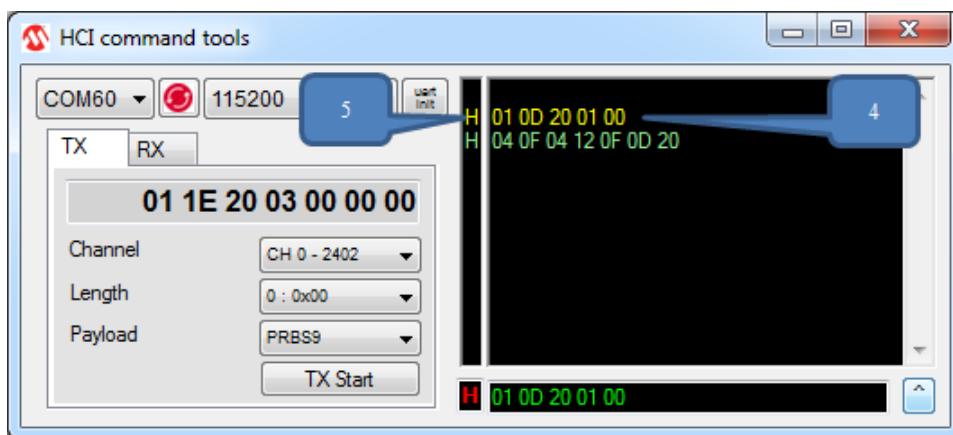
1. Enter the Hex command in the text box.
2. Then double-click the input type display until “H” is shown.
3. Click \wedge to send the Hex command input manually.

Figure 5-13. Start Hexadecimal Communication



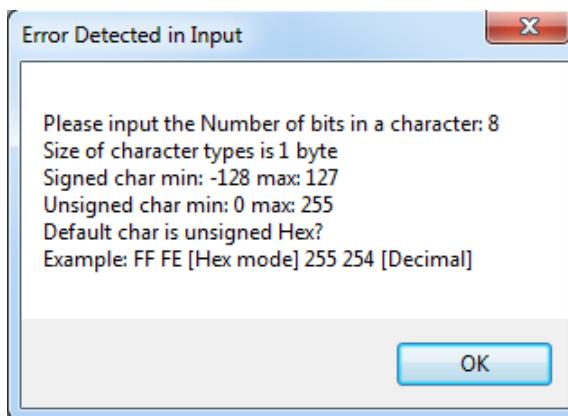
4. The sent manual input command is shown in the log.
5. The log displays the format as “H” (Hexadecimal) or “S” (String). Yellow represents the sent command [Hex] and Green represents the received command [Hex].

Figure 5-14. Sent/Received Command



Provide the Hexadecimal input with 1 byte (Min: 00, Max: FF). For example: 01 1E 20 03 00 00 00

Figure 5-15. Error Detected in Input

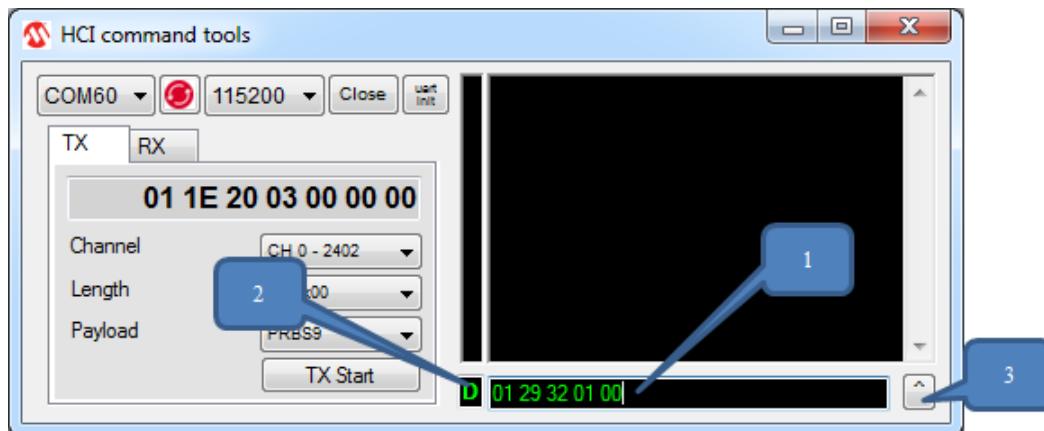


5.4.2 Decimal Input Hexadecimal Communication

Perform the following steps for Decimal input Hexadecimal communication.

1. Enter the Decimal command in the text box.
2. Then double-click the input type display until “D” is shown.
3. Click \wedge to send the Decimal command input manually and to auto-convert to Hex command.

Figure 5-16. Start Hexadecimal Communication with Decimal Input



4. The sent manual input command is shown in the log.

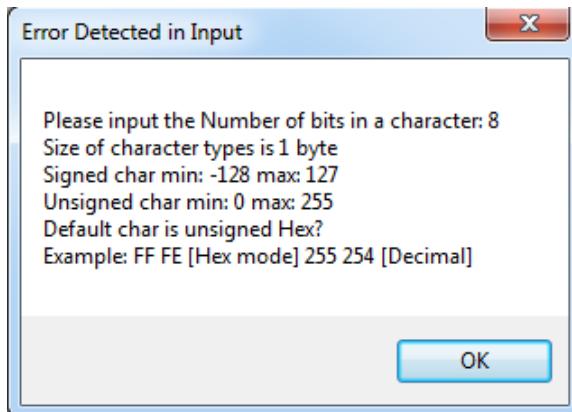
5. The log displays the format as “H” (Hexadecimal) or “S” (String). Yellow represents the sent command [Hex] and Green represents the received command [Hex].

Figure 5-17. Sent/Received Command



Provide the Hexadecimal input with 1 byte (Min: 00, Max: FF). For example: 01 1E 20 03 00 00 00

Figure 5-18. Error Detected in Input

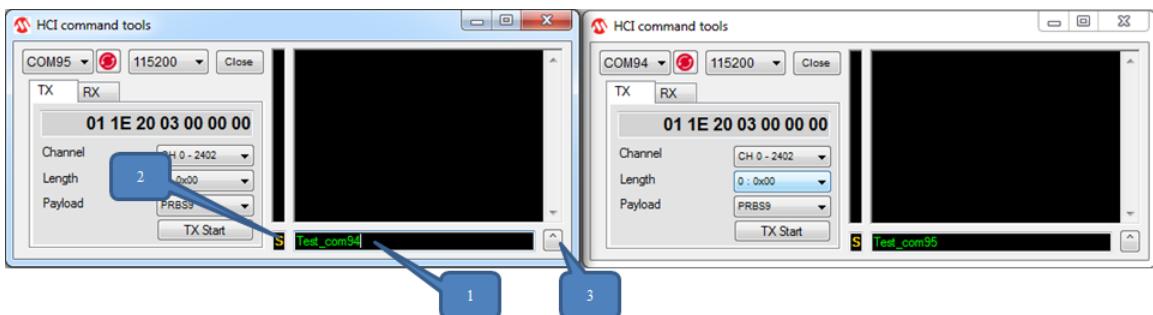


5.4.3 String Communication

Perform the following steps for String communication.

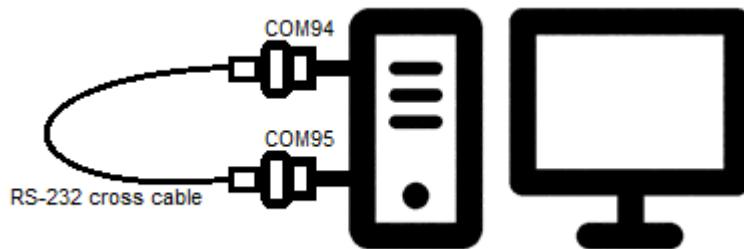
1. Enter the String command in the text box.
2. Then double-click the input type display until “S” is shown.
3. Click ▲ to send the String command input manually.

Figure 5-19. Start String Communication



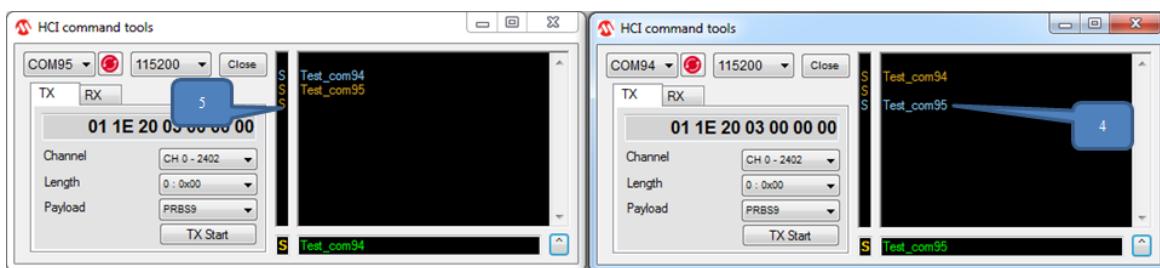
The following display is setup as the loopback for COM Port 94 and COM Port 95.

Figure 5-20. Example of Test Setup



4. The sent manual input command is shown in the log.
5. The log displays the format as “H” (Hexadecimal) or “S” (String). Blue represents the sent command [String] and Gold represents the received command [String].

Figure 5-21. Sent/Received String Command

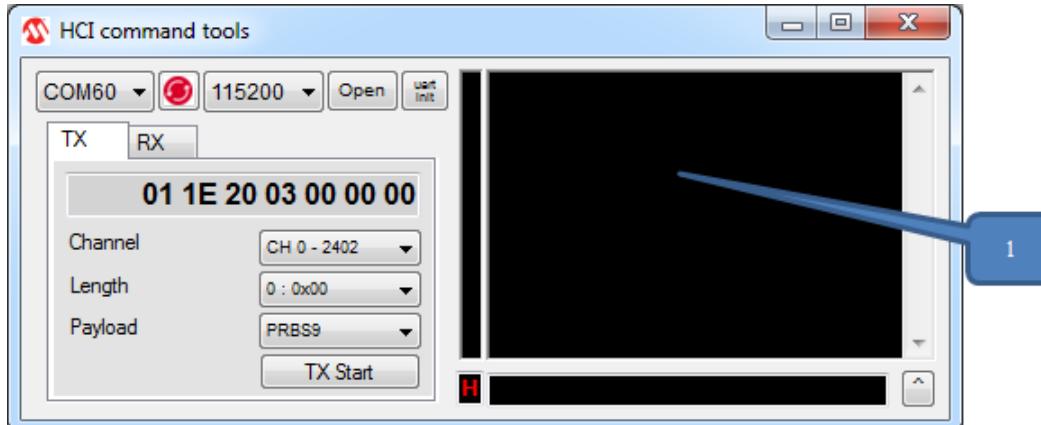


5.4.4 Log

Perform the following steps for String communication.

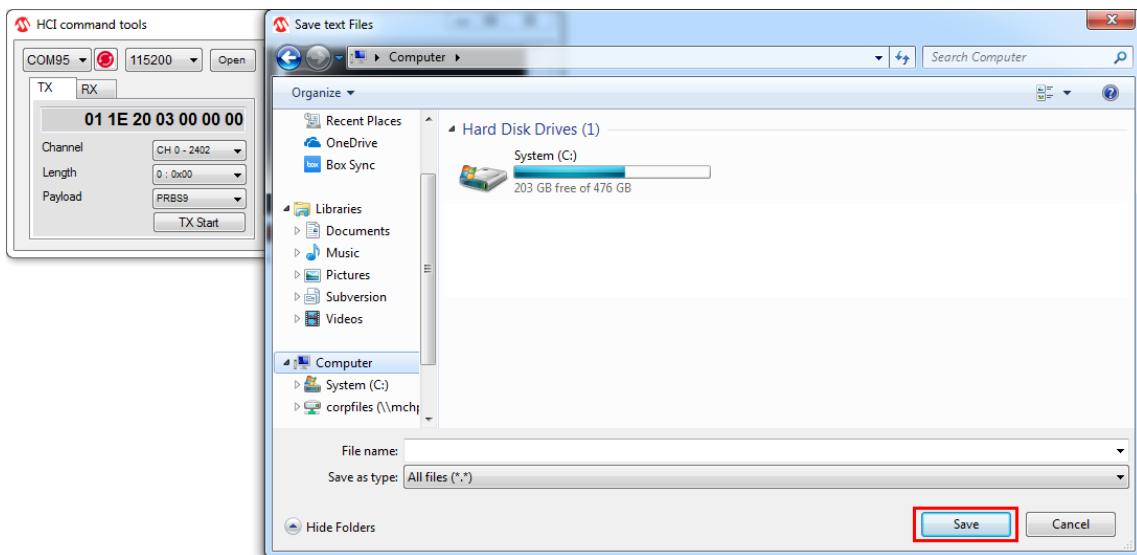
1. Double-click the log display, to select the location to save the file.

Figure 5-22. Saving the Log File



2. Select the log location and file name and then click **Save**.

Figure 5-23. Save Text Files

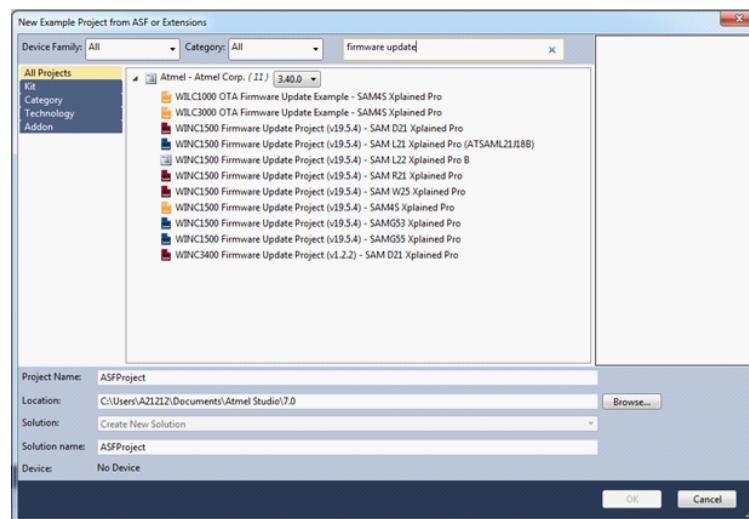


6. Appendix C – Firmware Update

6.1 Firmware Update

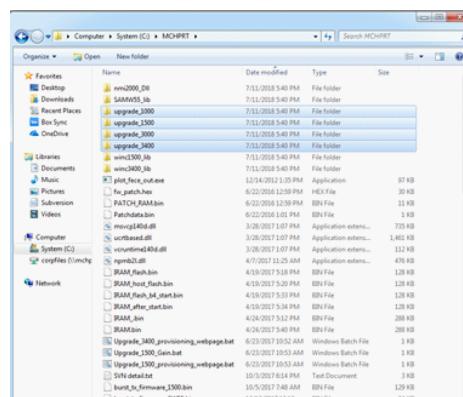
The Firmware update folder included in MCPRT2 package is from [Microchip Studio, Advanced Software Framework \(ASF\)](#). The following figure shows firmware update example application in Microchip Studio ASF.

Figure 6-1. Firmware Update Folder in ASF



The following figure shows the firmware update folder in MCHPRT2 tool

Figure 6-2. Firmware Update Folder in MCHPRT Tool



6.1.1

Firmware/Gain Table Example in MCHPRT2 Package

MCHPRT2 GUI Tool uses the batch file to use the ASF Firmware example project in MCHPRT2 Package.

Figure 6-3. Example for bat File



The following figure shows the details information of what is present in the bat file.

WILC1000 bin file gain table upgrade bat file (upgrade_1000_gain.bat):

```
cd upgrade_1000
gain_builder.exe -hp WILCPB.csv -fb burst_tx_firmware_1000.bin <nul
exit
```

cd upgrade_1000 //change the path to upgrade_1000 Folder in the Package.

gain_builder.exe -hp WILCPB.csv -fb burst_tx_firmware_1000.bin // run gain_builder.exe update the gain table in burst_tx_firmware_1000.bin with WILC1000PB.csv gain table value

exit // exit the command prompt

WINC1500 firmware upgrade and gain table example batch file (Upgrade_1500.bat) :

```
IF [%2]==[] (
SET PORT_NUM=0
) ELSE (
SET PORT_NUM=%1
)

if "%1" == "I2C" Goto continue_I2C
if "%1" == "UART" Goto continue_UART
if "%1" == "" Goto continue_I2C

:continue_I2C
cd upgrade_1500\firmware
download_all.bat I2C D21 3A0 0 <nul
exit

:continue_UART
cd upgrade_1500\firmware
download_all.bat UART PORT_NUM <nul
exit
```

If [%2] == [] (SET PORT_NUM = 0) //setting UART Port Number

ELSE (SET PORT_NUM = %1)

if "%1" == "I2C" Goto continue_I2C // Jump to I2C part based on the command entered in the command prompt

if "%1" == "UART" Goto continue_UART // Jump to UART part based on the command entered in the command prompt

```

if "%1" == I2C Goto continue_I2C
:continue_I2C // I2C Part
cd upgrade_1500\firmware // change the path to upgrade_1500\firmware
download_all.bat I2C D21 3A0 0 <nul // giving inputs to download_all.bat file if the firmware upgrade is via UART or
I2C, D21 part number, chip 3A0, Aardvark serial number, com port of edbg USB device.
exit
upgrade_1500_gain.bat

```



```

IF [%2]==[] ( // check the input value to
SET PORT_NUM=0
) ELSE (SET PORT_NUM=%1) //setting UART port number to upgrade
if "%1" == "I2C" Goto continue_I2C // jump to I2C part
if "%1" == "UART" Goto continue_UART // jump to UART part
if "%1" == "" Goto continue_I2C

:continue_I2C // update module gain table to samd21_gain_setting_hp.csv value by I2C
cd upgrade_1500\firmware\Tools\gain_builder\debug_I2C
gain_builder -hp ../gain_sheets/samd21_gain_setting_hp.csv -port 0 <nul
exit

:continue_UART // update module gain table to samd21_gain_setting_hp.csv value by UART
cd upgrade_1500\firmware\Tools\gain_builder\debug_UART
gain_builder -hp ../gain_sheets/samd21_gain_setting_hp.csv -port 0 <nul
exit

```

6.1.2 Firmware Upgrade Folder in MCHPRT2 Package

The folder that is present in MCHPRT2 package can be updated from the firmware update project that is available in Microchip Studio ASF.

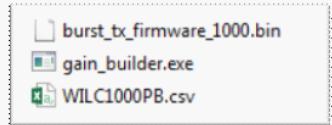
Folder information:

- upgrade_1000 WILC1000 – Gain table upgrade file example
- upgrade_1500 WINC1500 – Firmware example project for ASF

- upgrade_3000 WILC3000 – Gain table upgrade file example
- upgrade_3400 WINC3400 – Firmware example project for ASF

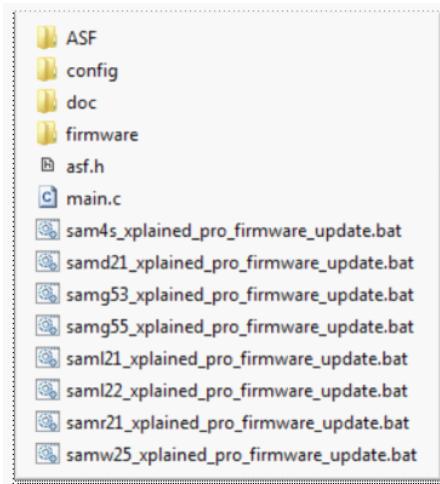
upgrade_1000 includes: upgrade_1000 folder includes burst_tx_firmware_1000.bin, gain_builder.exe and WILC1000PB.csv files as shown in the following figure.

Figure 6-4. Files in upgrade_1000 Folder



upgrade_1500 includes(same as ASF version 3.40.0): The following figure shows the files that are present in the upgrade_1500. The files are same as the firmware update example project that is available in the ASF.

Figure 6-5. Files in upgrade_1500 Folder



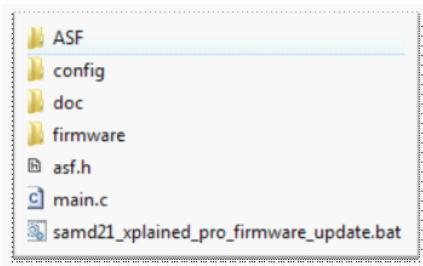
upgrade_3000 includes: upgrade_3000 folder includes wilc3000_wifi_firmware.bin, gain_builder.exe and wilc3000_gain_setting_hp.csv files as shown in the following figure.

Figure 6-6. Files in upgrade_3000 Folder



upgrade_3400 included (same as in ASF version 3.40.0): The following figure shows the files that are present in the upgrade_3400. The files are same as the firmware update example project that is available in the ASF.

Figure 6-7. Files in upgrade_3400 Folder



7. Appendix D – MCHPRT2 Tool Inbuilt Configuration

The MCHPRT2 tool comes with some of the following configuration parameters available in the `list.ini` file of the MCHPRT2 tool package, see the following figure:

- Retry function
- Module enable/disable

Figure 7-1. list.ini

```
DELAY 0
INIT_COUNTER 1
FW_COUNTER 1
MESSAGE_DISABLE 1
TX_duty_cycle 5
==Input the setting to enable the module==
WILC1000 ENABLE
WINC15x0 ENABLE
WILC3000 ENABLE
WINC3400 ENABLE
SAMB11/BTLC1000 DISABLE
```

- DELAY – Delay between retries in milliseconds (ms). The delay range is from 0 ms to 1s.
- INIT_COUNTER – Number of retries in the initial connection loop
- FW_COUNTER – Number of retries of firmware download
- MESSAGE_DISABLE:
 - MESSAGE DISABLE – 1
 - MESSAGE ENABLE – 0

Note: MESSAGE ENABLE – For some decision making, the MCHPRT2 tool requests the user to manually enter a few parameters, such as, Yes or No, while executing the MCHPRT2 tool commands. For the production environment, disable the message, which is the default configuration.

- Module Enable/Disable – By default, the WILC1000/WINC15x0 and the WILC3000/WINC3400 modules are enabled and SAMB11/BTLC1000 modules are disabled.

8. Document Revision History

| Revision | Date | Section | Description |
|----------|---------|--|---|
| C | 02/2023 | 1.2.1. Serial Bridge Connection (ATWILC/ ATWINC) | <ul style="list-style-type: none"> Added hyperlink Replaced Atmel by Microchip |
| | | 2.6. Firmware Upgrade | Replaced Atmel by Microchip |
| | | 3.1.1. Initialization | Removed Auto Chip Selection commands <ul style="list-style-type: none"> 0 – Autodetect Chip with I2C 0_UART – Autodetect Chip with UART |
| | | 3.1.2. IQ Amplitude and Phase Imbalance Calibration | Added Note |
| | | 3.5.2. Write | Removed eFuse "Write MAC ID Only" command section |
| | | 6.1. Firmware Update | Replaced Atmel by Microchip |
| | | 6.1.2. Firmware Upgrade Folder in MCHPRT2 Package | Replaced Atmel by Microchip |
| B | 03/2022 | Document | Minor edits and updates |
| | | 1.2.2. MCHPRT2 GUI Tool | <ul style="list-style-type: none"> Updated section Updated Figure 1-3 |
| | | 2.1.2.1. Start TX – Gain, Channel, Data Rate | Updated section |
| | | 3. Command Line | Updated section |
| | | 3.1.2. IQ Amplitude and Phase Imbalance Calibration | Added section |
| | | 3.5.2.2. Invalidate an eFuse Bank | Added section |
| | | 7. Appendix D – MCHPRT2 Tool Inbuilt Configuration | Added section |
| A | 07/2019 | All | Initial Revision |

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