# AW-CU598-EVB

## Wireless MCU with Integrated Wi-Fi 6 and Bluetooth Low Energy 5.3

## 15mm x 28mm LGA Module

## User Guide

**Rev. 03**

(For Standard)

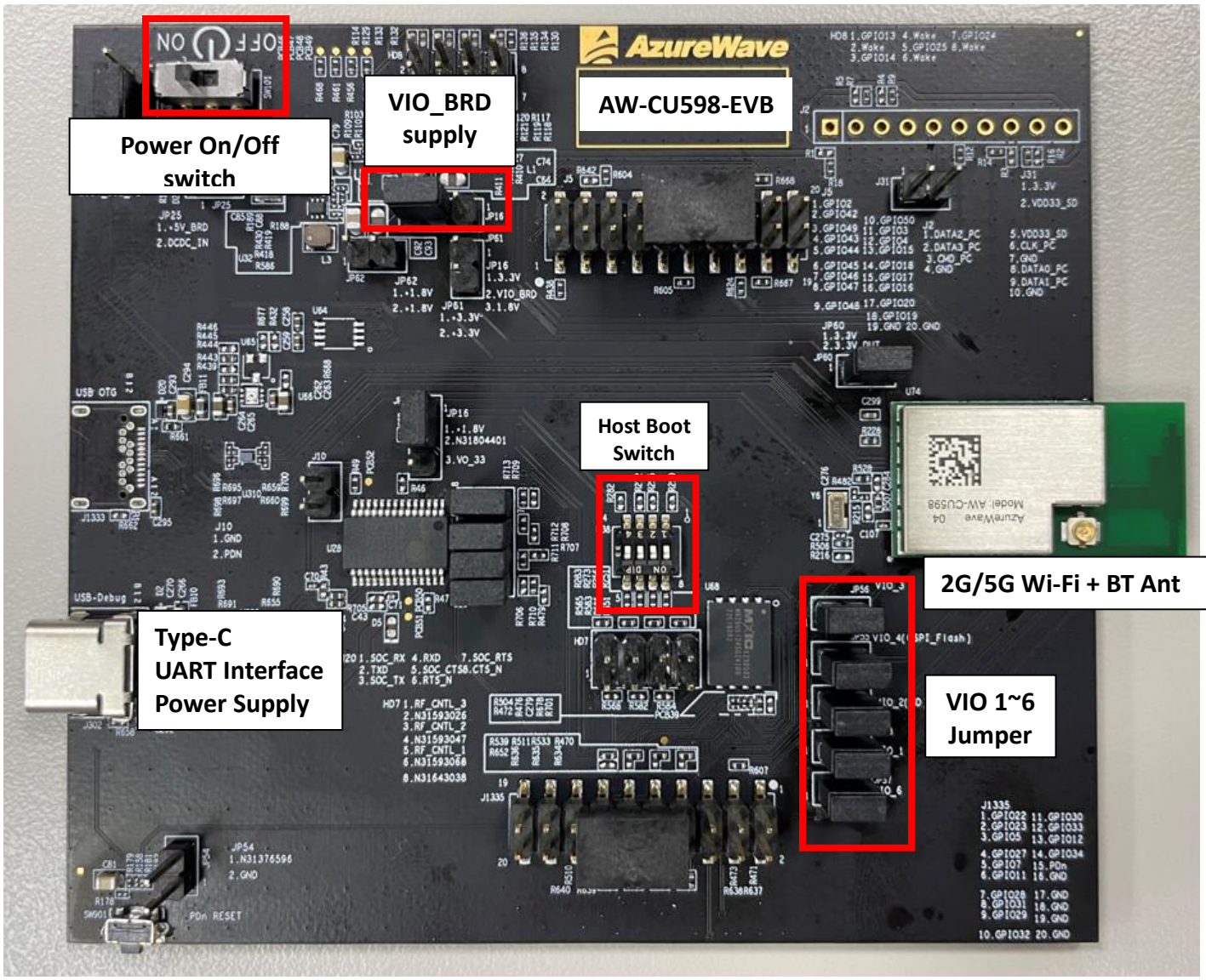
# Revision History

| Version | Revision Date | Description | Initials | Approved |
|---|---|---|---|---|
| 01 | 2023/02/03 | ● Initial Version | Roger Liu | N.C. Chen |
| 02 | 2023/08/08 | ● Update normal mode operation SOP | Roger Liu | N.C. Chen |
| 03 | 2024/01/18 | ● Change EVB type | Roger Liu | N.C. Chen |
| | | | | |

# 1.System Setup

## 1-1. Hardware Requirements

- AW-CU598-EVB (evaluation board of AW-CU598)
- SDIO/UART interface supported (USB port needed)
- Windows system(OS later than Windows) for Labtool.
- Vector Signal Analyzer/WLAN analyzer for transmit measurements.
- WLAN signal generator for receiver measurements.
- RF isolation chamber for receive measurements.
- RF attenuators
- RF cable




AW-CU598-EVB

1.1.1 For VIO_BRD supply
For VIO_BRD supply VDDIO(1.8V), please connect JP16(2-3).
For VIO_BRD supply VDDIO(3.3V), please connect JP16(1-2).

1.1.2 For Config Host Boot (ON DIP side is 0)
For ISP boot, please connect U38(1110).
For Boot from QSPI Flash, please connect U38(1111).

## 1-2. Software package requirement

***a. USB-UART driver***

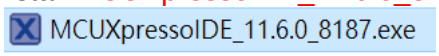
***b. MCUXpressoIDE_11.6.0_8187.exe***

***c. MFG or Normal FW image***

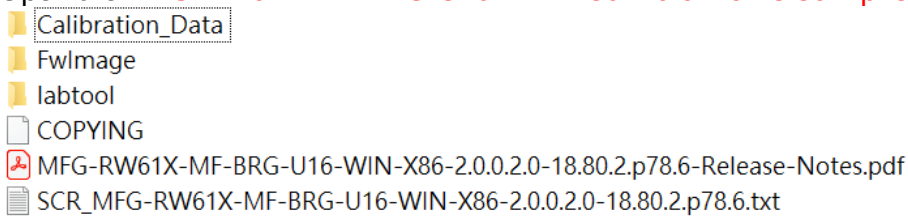
### 1-2-1.Windows PC set up (USB-UART)

After download the SW package from AzureWave contact window, please build the driver first.

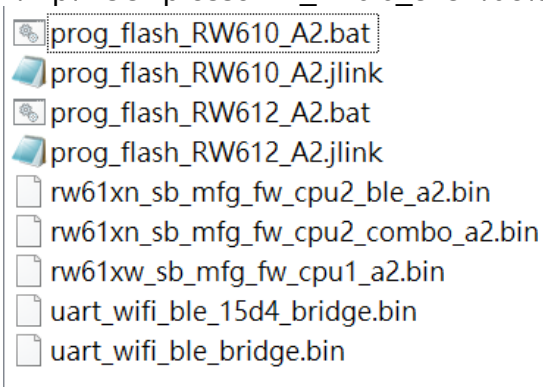
Install MCUXpressoIDE_11.6.0_8187.exe




Open the MFG-RW61X-MF-BRG-U16-WIN-X86-2.0.0.2.0-18.80.2.p78.6 and you can see below contents.



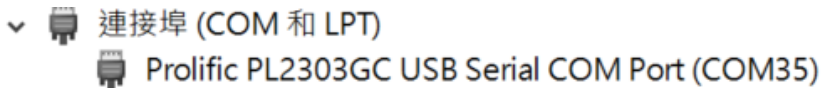

Go into A2 folder under the Fwlmage folder you can see the files below, copy all files to C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries



Connect USB-to-UART type C port to your PC, if the com port is not recognized Number, must install the Driver “PL23XX_Prolific_DriverInstaller_v408”

Install the driver manually. You can get the driver from ProfilicI’s web site.
https://www.prolific.com.tw/US/ShowProduct.aspx?p_id=225&pcid=41

The installation is successful, find the com port number.




## 1-3. Start Write firmware image and DUT testing

### 1-3-1 Windows PC side (Normal Mode operation)

Switch U38 to ISP boot mode and then connect USB-to-UART type C port to your PC.
Execute the command in C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries
and edit your com port number.

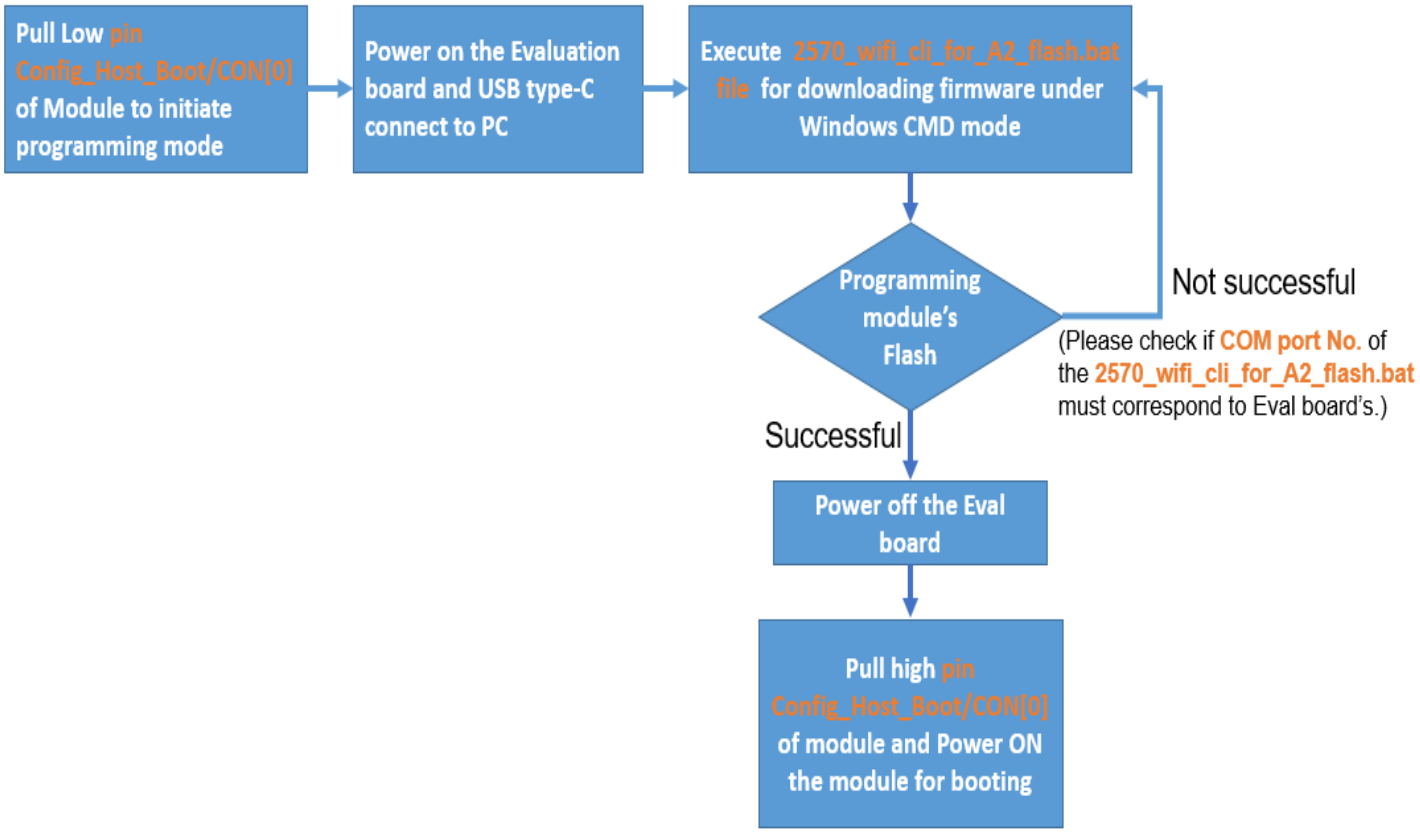
```
blhost.exe -p COM5 -t 3 get-property 1
blhost.exe -p COM5 -t 60000 fill-memory 0x20001000 0x4 0xC0000008
blhost.exe -p COM5 -t 60000 configure-memory 0x9 0x20001000
blhost.exe -p COM5 -t 60000 flash-erase-region 0x8000000 0x800000
blhost.exe -p COM5 -t 60000 write-memory 0x8400000 images\rw610_sb_wifi_v1.bin
blhost.exe -p COM5 -t 60000 write-memory 0x8540000 images\rw610_sb_ble_v1.bin
blhost.exe -p COM5 -t 60000 write-memory 0x8000000 images\rdrw612qfn_wifi_cli.bin
```

Execution command
And automatically close the window after writing.

```
C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 3 get-property 1
Ping responded in 1 attempt(s)
Inject command 'get-property'
Response status = 0 (0x0) Success.
Response word 1 = 1258488064 (0x4b030100)
Current Version = K3.1.0

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 fill-memory 0x20001000 0x4 0xC0000008
Ping responded in 1 attempt(s)
Inject command 'fill-memory'
Successful generic response to command 'fill-memory'
Response status = 0 (0x0) Success.

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 configure-memory 0x9 0x20001000
Ping responded in 1 attempt(s)
Inject command 'configure-memory'
Successful generic response to command 'configure-memory'
Response status = 0 (0x0) Success.

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 flash-erase-region 0x8000000 0x800000
Ping responded in 1 attempt(s)
Inject command 'flash-erase-region'
Successful generic response to command 'flash-erase-region'
Response status = 0 (0x0) Success.

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>REM blhost.exe -p COM -t 60000 write-memory 0x8400000 payload_cpu1_wifi.bin

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>REM blhost.exe -p COM -t 60000 write-memory 0x8540000 payload_cpu2_ble.bin

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>REM blhost.exe -p COM -t 60000 write-memory 0x8000000 uart_MFG_bridge_wlan_ble_cpu3withfcb.bin
```

```
C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 write-memory 0x8400000 rw610_sb_wifi_v1.bin
Ping responded in 1 attempt(s)
Inject command 'write-memory'
Preparing to send 517660 (0x7e61c) bytes to the target.
Successful generic response to command 'write-memory'
(1/1)100% Completed!
Successful generic response to command 'write-memory'
Response status = 0 (0x0) Success.
Wrote 517660 of 517660 bytes.

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 write-memory 0x8540000 rw610_sb_ble_v1.bin
Ping responded in 1 attempt(s)
Inject command 'write-memory'
Preparing to send 136016 (0x21350) bytes to the target.
Successful generic response to command 'write-memory'
(1/1)100% Completed!
Successful generic response to command 'write-memory'
Response status = 0 (0x0) Success.
Wrote 136016 of 136016 bytes.

C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries>blhost.exe -p COM16 -t 60000 write-memory 0x8000000 rdrw612qfn_wifi_cli.bin
Ping responded in 1 attempt(s)
Inject command 'write-memory'
Preparing to send 747184 (0xb66b0) bytes to the target.
Successful generic response to command 'write-memory'
(1/1)100% Completed!
Successful generic response to command 'write-memory'
Response status = 0 (0x0) Success.
Wrote 747184 of 747184 bytes.
```

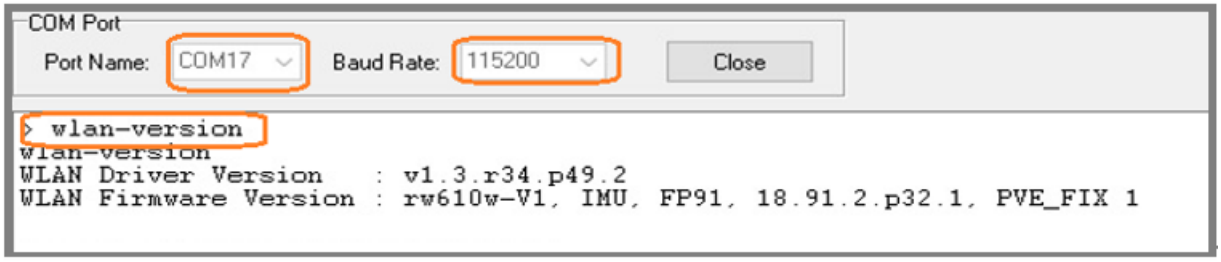
## Programming mode/Write firmware image sequence



Here is a Normal Mode operation example;
Please **switch U38 to Boot from QSPI Flash and restart DUT** after programming flash

Open the Terminal window and set com port 17 and baud-rate as 115200

Execute the command: wlan-version



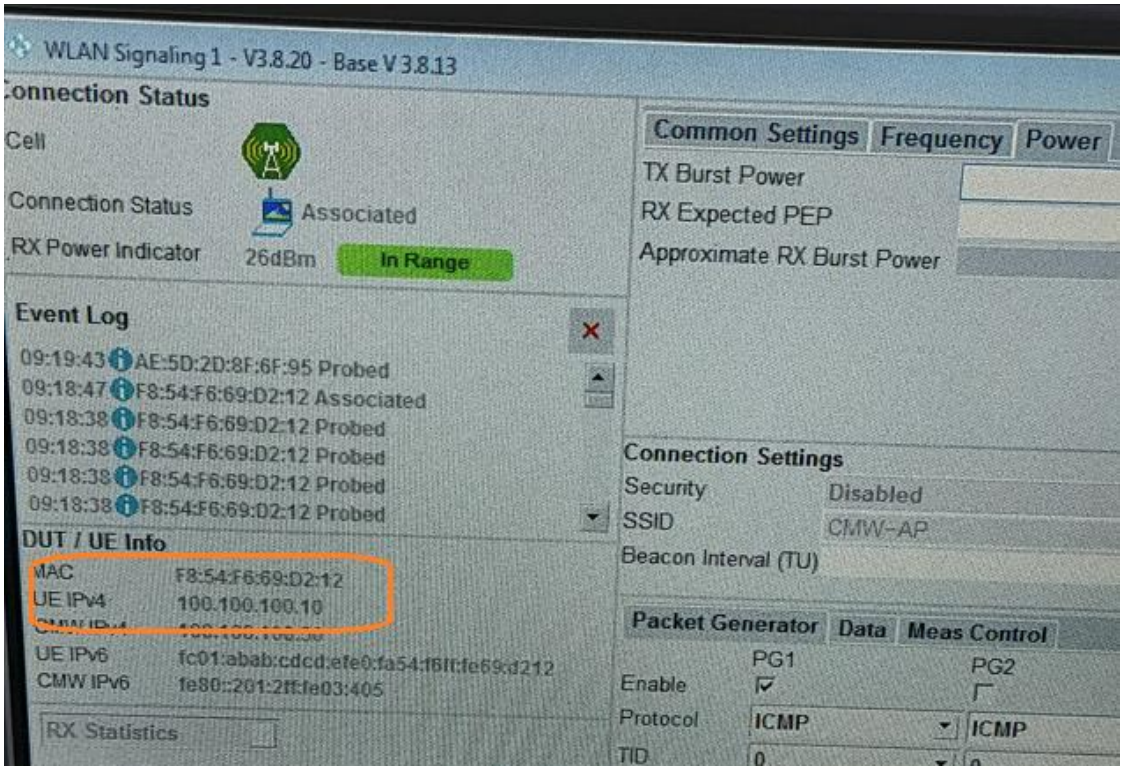

Execute the command: wlan-scan

```
> wlan-scan
# wlan-scan
Scan scheduled...

# 6 networks found:
00:01:02:03:04:05  "CMW-AP" Infra
         channel: 1
         rssi: -71 dBm
         security: OPEN
         WMM: YES
24:DE:C6:1D:12:C0  "SWSDFPLDEV" Infra
         channel: 6
         rssi: -98 dBm
         security: WPA2 Enterprise
         WMM: YES
24:DE:C6:1D:12:C3  "SWSDFPLNET" Infra
         channel: 6
         rssi: -97 dBm
         security: WPA2 Enterprise
         WMM: YES
10:0C:6B:9A:E6:E8  "DQA_2.4G" Infra
         channel: 7
         rssi: -79 dBm
         security: OPEN
         WMM: YES
```

Execute the command: wlan-add 1 ssid CMW-AP
Execute the command: waln-connect 1

```
> wlan-add 1 ssid CMW-AP
wlan-add 1 ssid CMW-AP
Added "1"

> wlan-connect 1
# wlan-connect 1
Connecting to network...
Use 'wlan-stat' for current connection status.

# ========================================
app_cb: WLAN: received event 1
========================================
app_cb: WLAN: authenticated to network
========================================
app_cb: WLAN: received event 0
========================================
app_cb: WLAN: connected to network
Connected to following BSS:
SSID = [CMW-AP]
IPv4 Address: [100.100.100.10]
IPv6 Address: Link-Local    :    FE80::FA54:F6FF:FE69:D212 (Preferred)
```

Connect to tester CMW-AP and show DUT information.

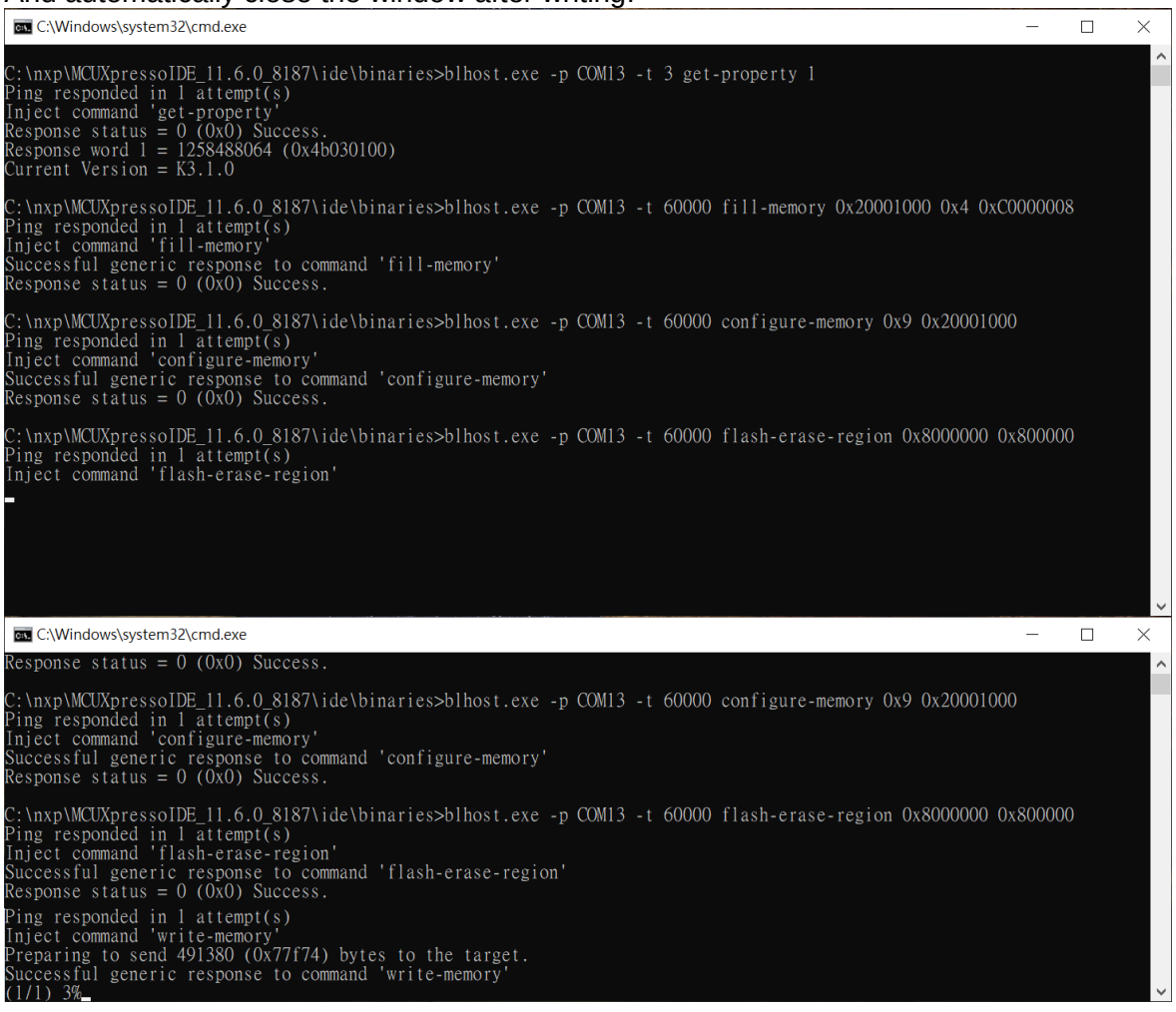


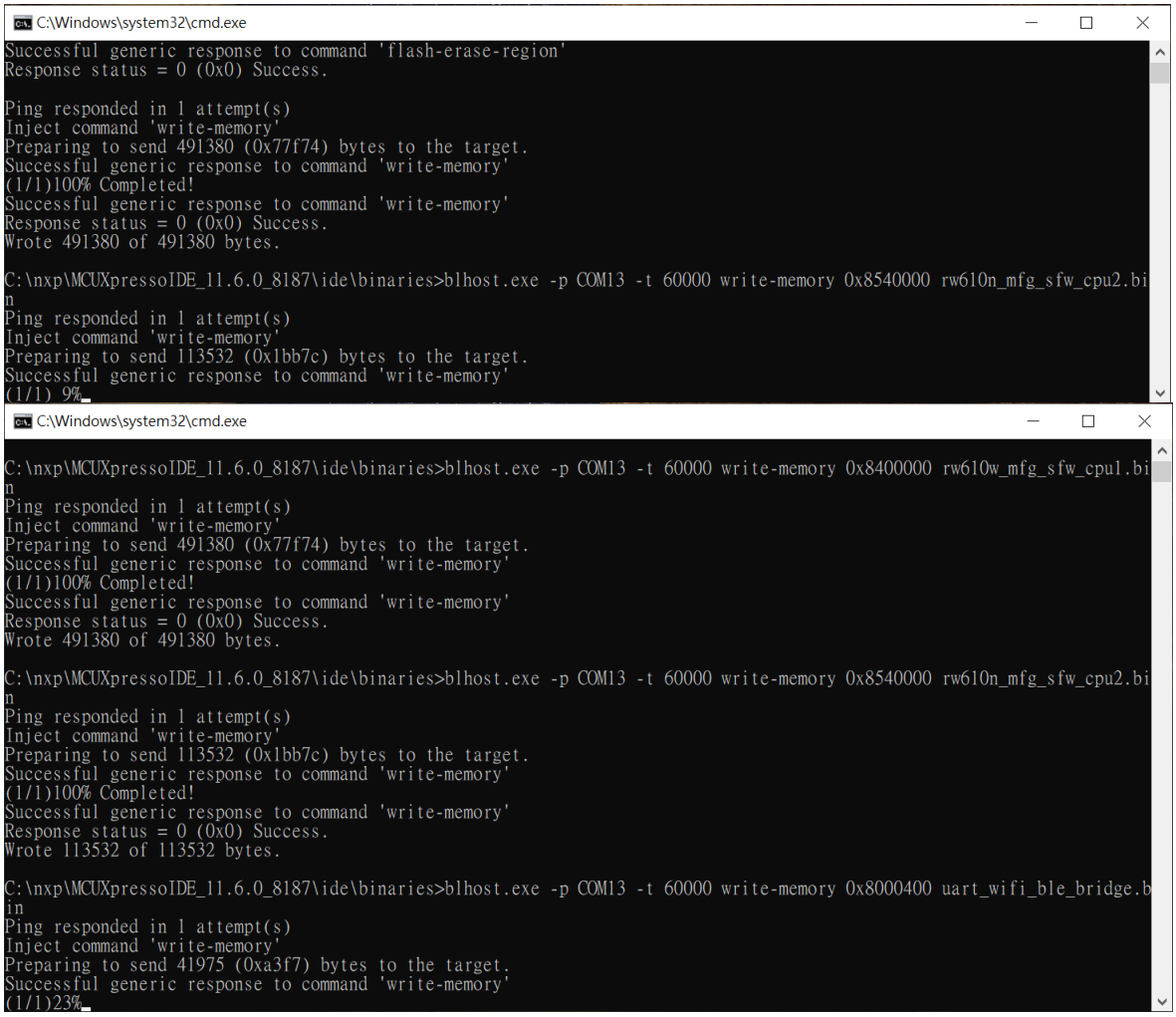
### 1-3-2. Windows PC side (MFG Mode operation)

Switch U38 to ISP boot mode and then connect USB-to-UART type C port to your PC.
Execute the command in C:\nxp\MCUXpressoIDE_11.6.0_8187\ide\binaries
and edit your com port number.

```
blhost.exe -p COM11 -t 3 get-property 1
blhost.exe -p COM11 -t 60000 fill-memory 0x20001000 0x4 0xC0000008
blhost.exe -p COM11 -t 60000 configure-memory 0x9 0x20001000
blhost.exe -p COM11 -t 60000 flash-erase-region 0x8000000 0x800000
blhost.exe -p COM11 -t 60000 write-memory 0x8400000 rw610w_mfg_sfw_cpu1.bin
blhost.exe -p COM11 -t 60000 write-memory 0x8540000 rw610n_mfg_sfw_cpu2.bin
blhost.exe -p COM11 -t 60000 write-memory 0x8000400 uart_wifi_ble_bridge.bin
```

Execution command
And automatically close the window after writing.






### 1-3-3. Windows PC side

Open the labtool under MFG-RW61X-MF-BRG-U16-WIN-X86-2.0.0.2.0-18.80.2.p78.6 can to see the following content.

| | | | |
|---|---|---|---|
| AddCalDLL.dll | 2023/12/1 下午 09:10 | 應用程式擴充 | 1,140 KB |
| DutApiSisoApApp_RW610.exe | 2023/12/1 下午 09:10 | 應用程式 | 390 KB |
| DutApiSisoApAppUartDll.dll | 2023/12/1 下午 09:10 | 應用程式擴充 | 543 KB |
| DutApiSisoApAppUartDll.lib | 2023/12/1 下午 09:10 | LIB 檔案 | 157 KB |
| SetUp.ini | 2023/12/19 上午 11:57 | 組態設定 | 6 KB |
| Test.txt | 2023/12/19 下午 12:00 | 文字文件 | 2 KB |
| TF_Config_20MHz.txt | 2023/12/1 下午 09:10 | 文字文件 | 3 KB |

Edit the “SetUp.ini” file as shown in the lines highlighted in RED below.

a. The setup DutIpAddress will be the COM PORT address of your target.

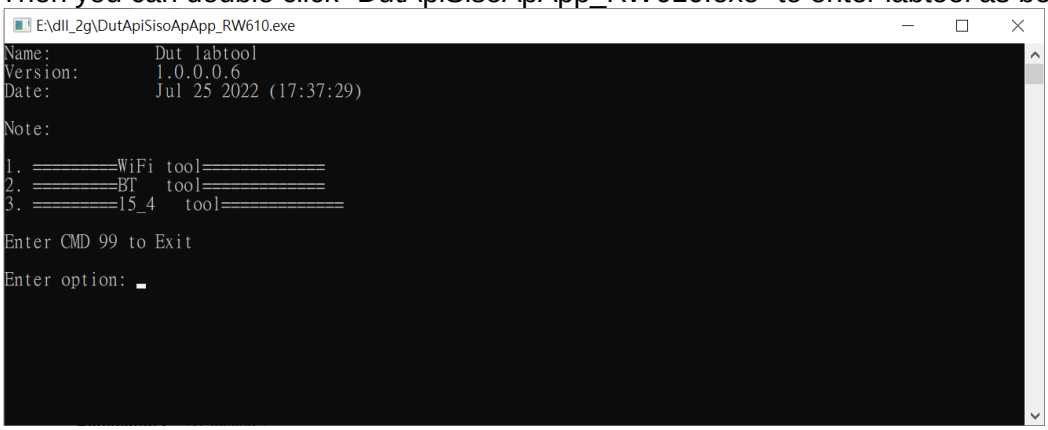
```
[COMSET]
ComNo = 9
BaudRate = 115200
byParity = 0
byStopBits = 1
byByteSize = 8
```

b. The setup **NO_EEPROM** is the storage type to get/set function.

```
[DutInitSet]
;0 - EEPROM support
;1 - NO_EEPROM support
;2 - OTP support
NO_EEPROM=2
```

- 1 - NO_EEPROM support ➔ Set storage type to .conf calibration file in labtool folder.
- 2 - OTP support ➔ Set storage type to OTP in DUT

First make sure the switch is in read mode.
Then you can double click “DutApiSisoApApp_RW610.exe” to enter labtool as below picture.

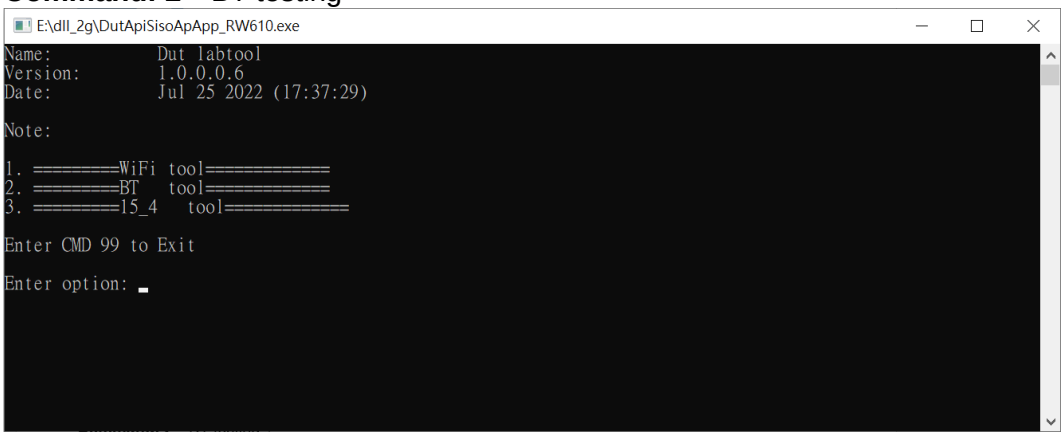


# 2. RF Command

As the information showed on your screen, please enter these commands below to start your test.

**Command: 1** Wi-Fi testing

**Command: 2** BT testing




## 2-1. Generate 802.11a/b/g/n Packet commands

a. Tx on CH 6 at 15 dBm with a CCK-11Mbps data rate in 20 MHz BW mode

```
44 2                    //Set storage type to OTP
35 0 0                  // Stop Tx
6 11 0                  // Set 2.4G mode
112 0 0                 // Set to 20 MHz BW
12 0 6                  // Set to ch6
35 0 1 4 15             // Enable Output Power at 15 dBm with CCK-11M Data Rate with b mode
```

---

b. Tx on CH 6 at 12 dBm with an OFDM-54Mbps data rate in 20 MHz BW mode

```
44 2                    //Set storage type to OTP
35 0 0                  // Stop Tx
6 11 0                  // Set 2.4G mode
112 0 0                 // Set to 20 MHz BW
12 0 6                  // Set to ch6
35 0 1 13 12            // Enable Output Power with at 12 dBm OFDM-54M Data Rate with g mode
```

---

c. Tx on CH 6 at 10 dBm with a MCS0 Data rate in 20 MHz BW mode

```
44 2                    //Set storage type to OTP
35 0                    // Stop Tx
6 11 0                  // Set 2.4G mode
112 0 0                 // Set to 20 MHz BW
12 0 6                  // Set to ch6
35 0 1 15 10            // Enable Output Power at 10 dBm with MCS0 Data Rate with n mode
```

---

d. Tx on CH 36 at 16 dBm with a OFDM-54Mbps rate in 20 MHz BW Mode

```
44 2              //Set storage type to OTP
35 0 0            // Stop Tx
6 3 0             // Set 5G mode
112 0 0           // Set to 20 MHz BW
12 0 36           // Set to ch36
35 0 1 13 16      // Enable Output Power at 16 dBm with OFDM-54M Data Rate with a mode
```

---

## Data rate set up table

### B mode & G mode:

| 1Mbps | 2Mbps | 5.5Mbps | 11Mbps | 6Mbps | 9Mbps | 12Mbps | 18Mbps | 24Mbps |
|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 6 | 7 | 8 | 9 | 10 |
| 36Mbps | 48Mbps | 54Mbps | | | | | | |
| 11 | 12 | 13 | | | | | | |

### N mode:

| MCS0 | MCS1 | MCS2 | MCS3 | MCS4 | MCS5 | MCS6 | MCS7 | |
|---|---|---|---|---|---|---|---|---|
| 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |

### AC mode:

### VHT Data Rates:

1100 for VHT_SS1_MCS0 1101 for VHT_SS1_MCS1 1102 for VHT_SS1_MCS2
1103 for VHT_SS1_MCS3 1104 for VHT_SS1_MCS4 1105 for VHT_SS1_MCS5
1106 for VHT_SS1_MCS6 1107 for VHT_SS1_MCS7 1108 for VHT_SS1_MCS8
1109 for VHT_SS1_MCS9

### AX mode:

### HE Data Rates:

2100 for HE_SS1_MCS0 2101 for HE_SS1_MCS1 2102 for HE_SS1_MCS2
2103 for HE_SS1_MCS3 2104 for HE_SS1_MCS4 2105 for HE_SS1_MCS5
2107 for HE_SS1_MCS7 2108 for HE_SS1_MCS8 2109 for HE_SS1_MCS9
2110 for HE_SS1_MCS10 2111 for HE_SS1_MCS11

## 2-2. Test RX sensitivity Commands

a. Rx on CH 6 in 20 MHz BW Mode

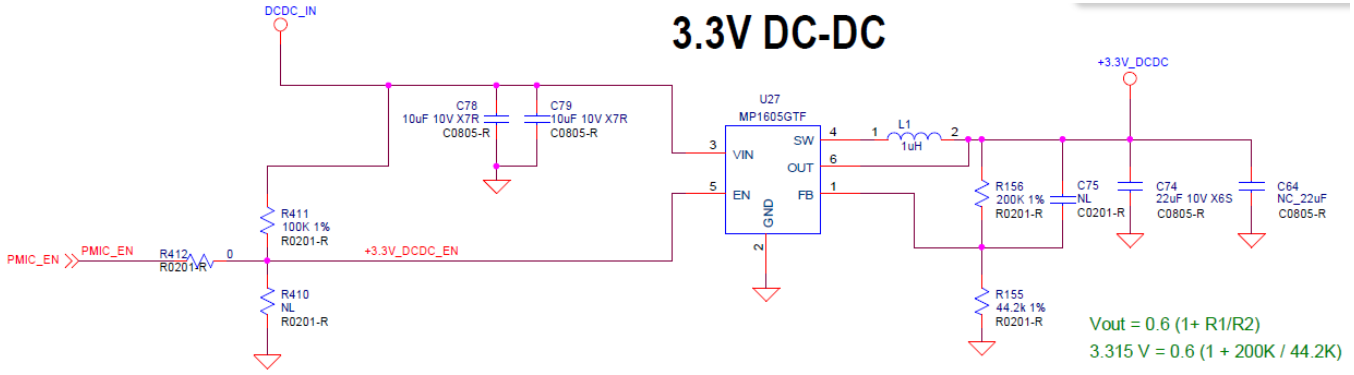
```
44 2              //Set storage type to OTP
35 0 0            // Stop Tx
6 11 0            // Set 2.4G
112 0 0           // Set to 20 MHz BW
12 0 6            // Set to CH 6
31 0              // Clear all the received packets
32 0              // Get Rx Packet Count and then clear the Rx packet counter
```

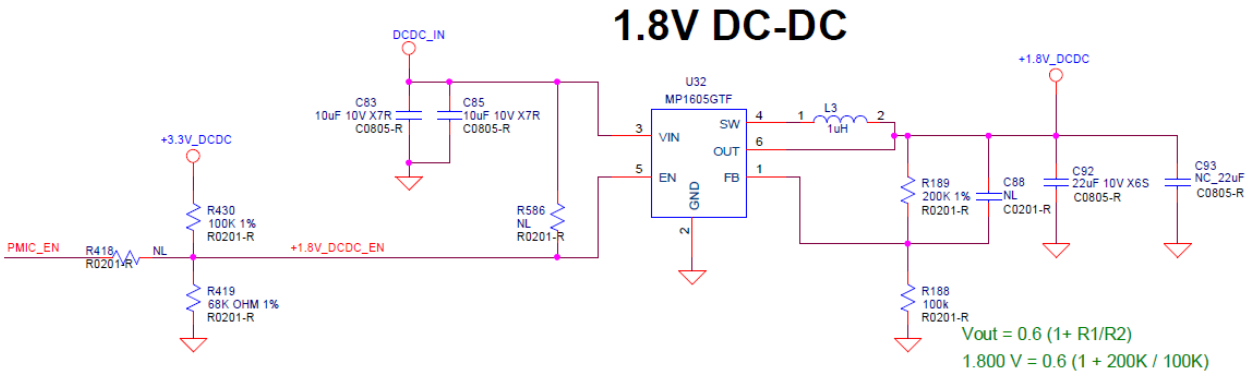
---

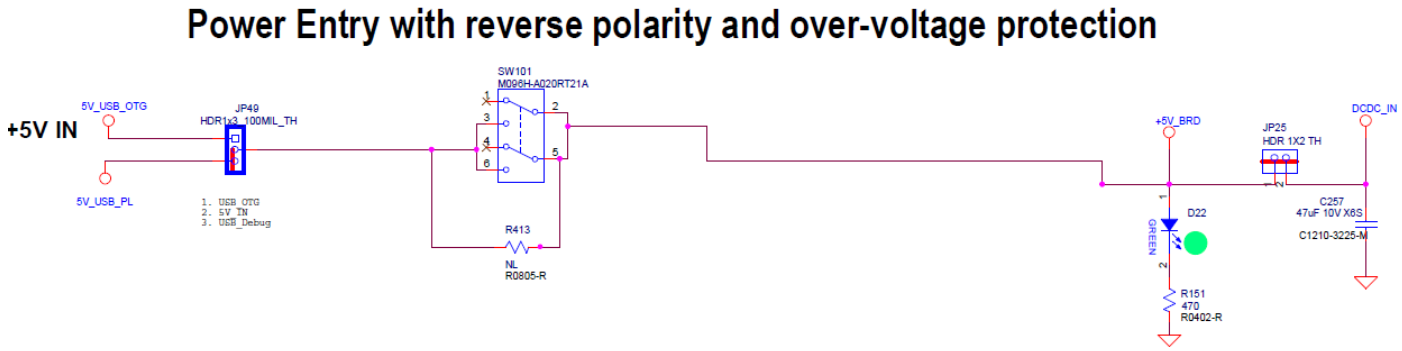
## 2-3 Others Commands

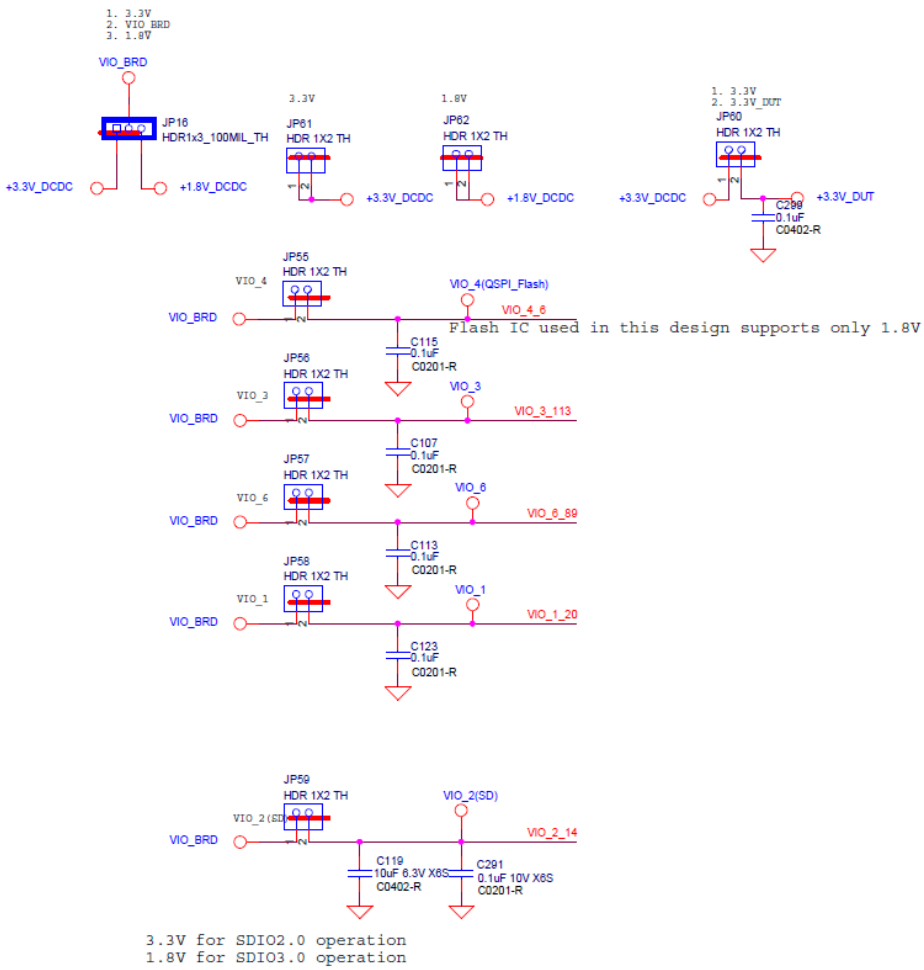
(1) **Command 45**→ Check the MAC
(2) **Command 99**→ Quit the test mode/ Quit the MFG tool

# 3. EVB schematic

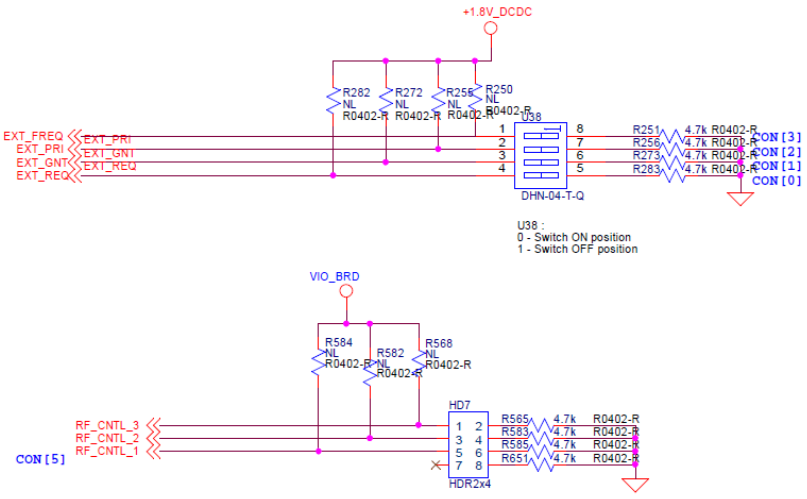




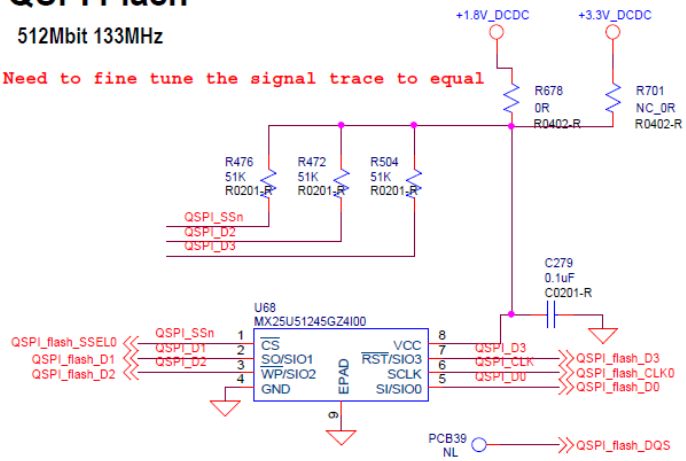

## STRAP CONFIG



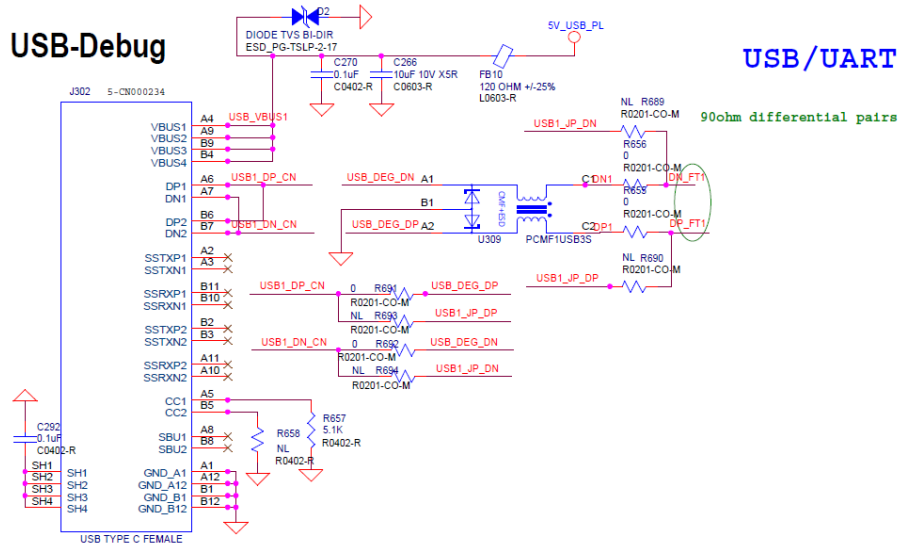
## QSPI Flash

512Mbit 133MHz

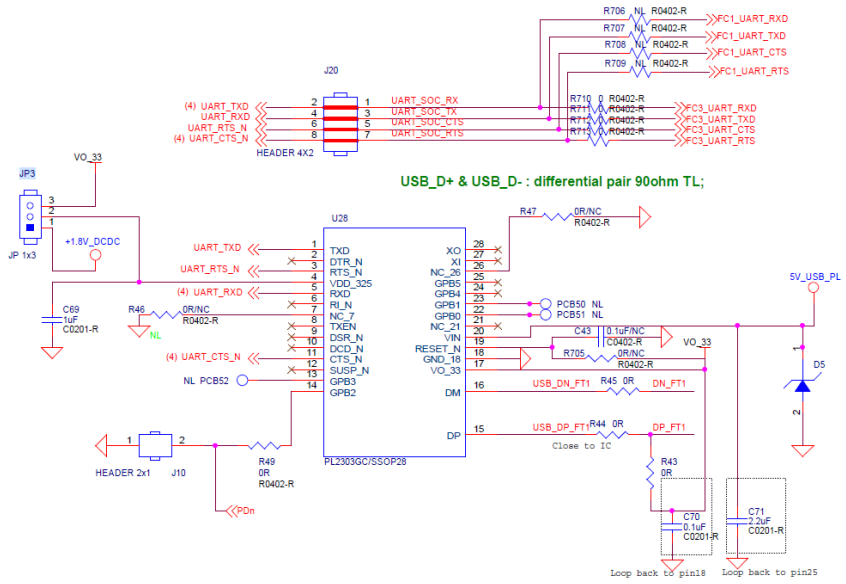
Need to fine tune the signal trace to equal

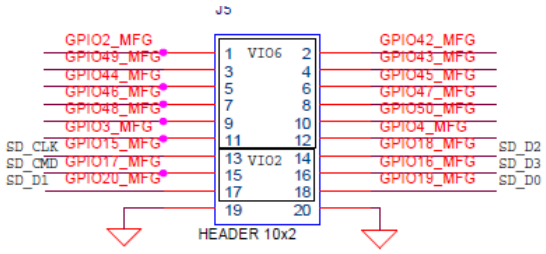


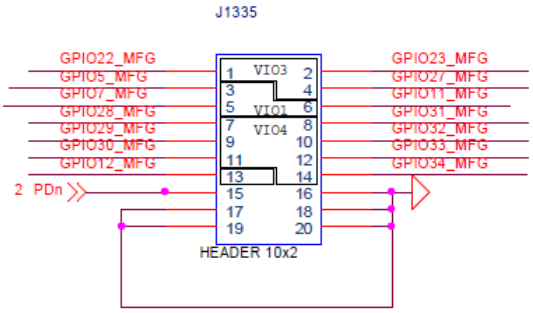

## USB-Debug



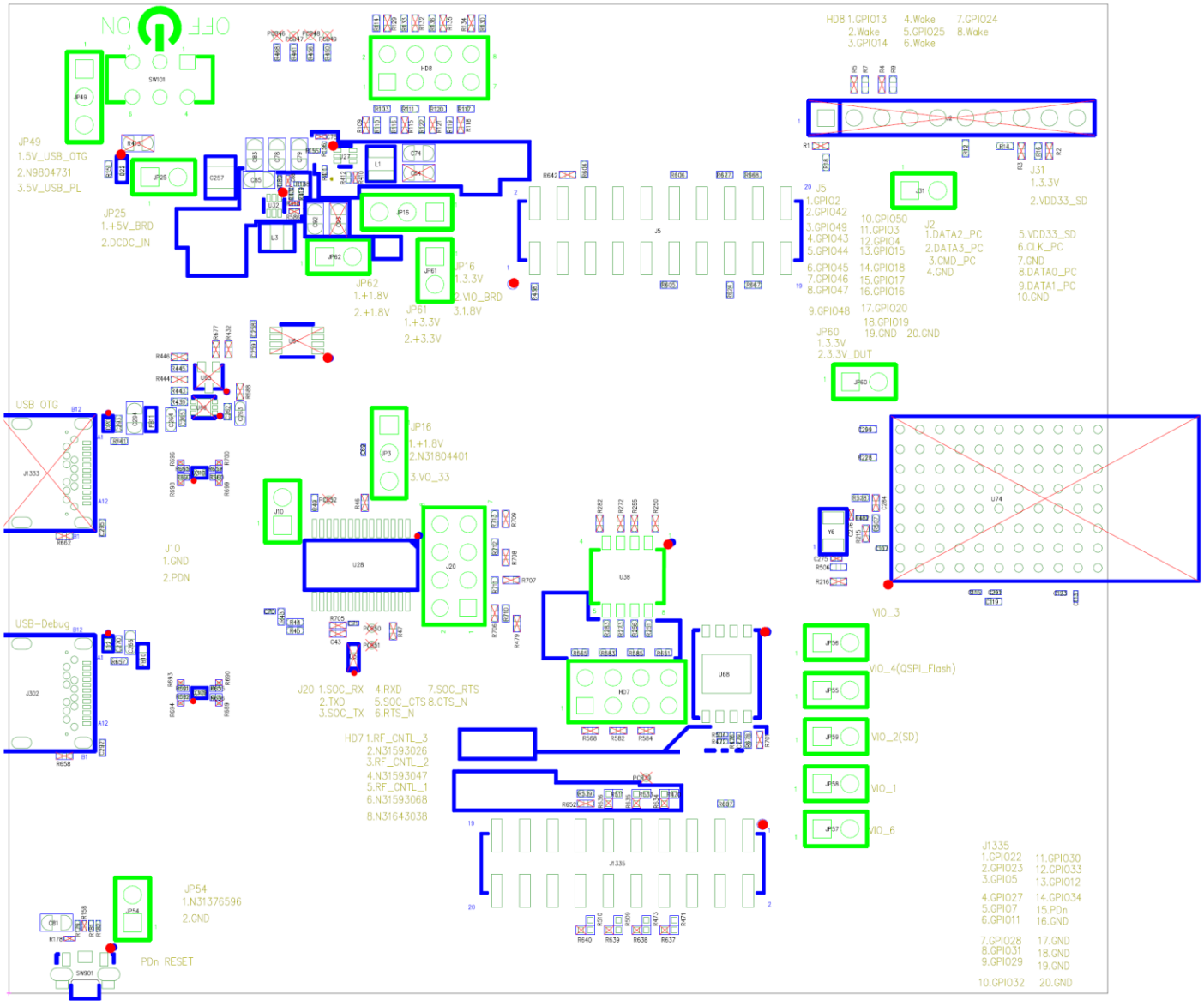

## PL2303





# 4. Placement




Top View