

AW-AM510-EVB

**IEEE 802.11 1X1 a/b/g/n Wireless LAN
+ Bluetooth 5.1 Combo**

12 x 12 LGA Module

User Guide

Rev. 02

(For Standard)

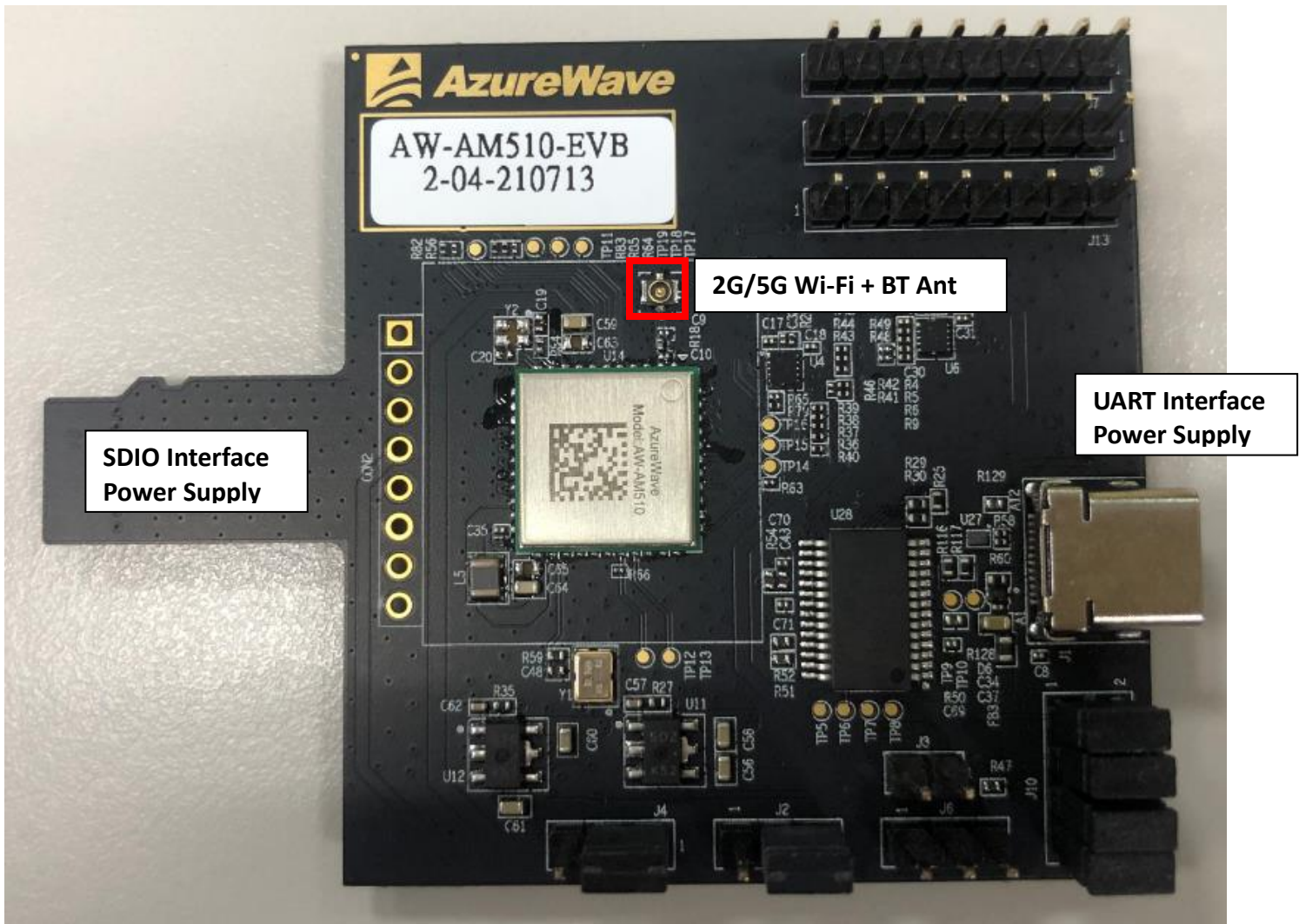
Revision History

Version	Revision Date	Description	Initials	Approved
01	2021/07/16	<ul style="list-style-type: none">● Initial Version● Change EVB PCB to 2H02 version	Roger Liu	N.C. Chen
02	2021/09/15	<ul style="list-style-type: none">● Modify schematic	Roger Liu	N.C. Chen

1. System Setup

1-1. Hardware Requirements

- AW-AM510-EVB (evaluation board of AW-AM510)
- Host system need running the Linux operating system (Ubunbu14.04 or later)
- SDIO/UART interface supported (USB port needed)
- Windows system(OS later than Windows XP) 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-AM510-EVB

1.1.1 For SDIO supply

For SDIO supply VBAT, please connect J2(1-2).

For SDIO supply VDDIO(1.8V), please connect J4(1-2).

For SDIO supply VDDIO(3.3V), please connect J4(2-3).

1.1.2 For USB supply

For USB supply VBAT, please connect J2(2-3).

For USB supply VDDIO(1.8V), please connect J4(1-2).

For USB supply VDDIO(3.3V), please connect J4(2-3).

1-2. Software package requirement

SDIO-UART

“SDIO-UART SW package_p132.zip”

1-2-1. Linux PC set up (SDIO-UART)

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

Open the folder and you can see below contents.

📁 Drivers

📁 MFG-W8978-MF-WIFI-BT-BRG-FC-VS2013-1.0.0.11-16.80.10.p132

Go into Driver folder and unzip the tar file you can see the files below.

📁 FwImage

🌐 SD-BT-8978-U16-MMC-16.26.10.p101-C4X14114_V0-GPL-src

🌐 SD-BT-CHAR-8978-U16-MMC-16.26.10.p101-C4X14114_V0-GPL-src

🌐 SD-UAPSTA-8978-U16-MMC-W16.68.10.p101-C4X16679_V0-app-src

🌐 SD-UAPSTA-8978-U16-MMC-W16.68.10.p101-C4X16679_V0-MGPL-src

🌐 SD-UAPSTA-8978-U16-MMC-W16.68.10.p101-C4X16679_V0-mlan-src

🌐 UART-BT-8978-U16-X86-16.26.10.p101-2.2-M4X14100-GPL-src

Unzip them all and go into the /**SD-UAPSTA-8978-U16-MMC-W16.68.10.p101-C4X16679_V0-mlan-src** folder and use the cmds as below.

Make clean

Make build

Then and go into the

/**SD-BT-8978-U16-MMC-16.26.10.p101-C4X14114_V0-GPL-src**

folder and use the cmds as below.

Make clean

Make build

1-2-2 Driver for UART-to-USB bridge IC(PL2303GC)

Update pl2303.ko driver to below direction and replace the original one.

*you can contact with Azurewave FAE for pl2303.ko file.

**notice: the kernel version may be different from the sample picture

```
root@azw-B85M-D3H: /lib/modules/3.19.0-25-generic/kernel/drivers/usb/serial# ls
aircable.ko          io_ti.ko            mxuport.ko         ssu100.ko
ark3116.ko          ipaq.ko             navman.ko          symbolserial.ko
belkin_sa.ko        ipw.ko              omninet.ko         ti_usb_3410_5052.ko
ch341.ko            ir-usb.ko           opticon.ko         usb_debug.ko
cp210x.ko           iuu_phoenix.ko     option.ko          usbserial.ko
cyberjack.ko        keyspan.ko          oti6858.ko        usb-serial-simple.ko
cypress_m8.ko       keyspan_pda.ko     pl2303.ko          usb_wwan.ko
digi_acceleport.ko kl5kusb105.ko       qcaux.ko           visor.ko
empeg.ko            kobil_sct.ko       qcserial.ko        whiteheat.ko
f81232.ko           mct_u232.ko        quatech2.ko        wishbone-serial.ko
ftdi_sio.ko         metro-usb.ko        safe_serial.ko     xsens_mt.ko
garmin_gps.ko       mos7720.ko          sierra.ko
io_edgeport.ko      mos7840.ko          spcp8x5.ko
```

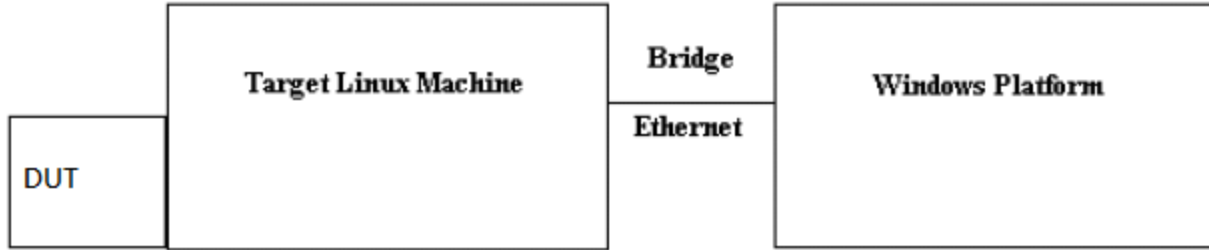
Input below cmds by terminal before connecting to AW-CM276NF-EVB's UART-to-USB port.

```
Insmod usbserial.ko
Insmod pl2303.ko
```

Connect USB-to-UART type C port to your PC and input "dmesg" to check if device ttyUSBx is generated successfully.

1-3. Environment set up and Bridge Mode Tool

The “Manufacturing Bridge” refers to the application that allows a user to send commands between Target platform and Windows platform. The environment enables the user to test performance of the AW-AM510



Manufacturing Bridge mode

1-4. Start driver installation and DUT testing

1-4-1. Linux PC side

After building the driver at Linux PC, you can run the following commands to install the driver and firmware and start the Manufacturing bridge application with the following commands.

Please copy firmware in the SW package

\\MFG-W8978-MF-WIFI-BT-BRG-FC-VS2013-1.0.0.11-16.80.10.p132\FwImage

- sdio8978_sdio_combo.bin
- sdio8978_uart_combo.bin
- usb8978_usb_combo.bin

To Linux system firmware direction

/lib/firmware/mrvl/

On the working direction, use the following commands to put the 88W8978 in MFG mode after power on DUT.

SDIO-UART:

a. For Wi-Fi

Go into bin_sd8978 folder and key in below cmds

```
modprobe cfg80211
Insmod mlan.ko
Insmod sd8978.ko mfg_mode=1 cal_data_cfg=none fw_name=mrvl/sdio8978_uart_combo.bin
```

b. For BT

Hciattach /dev/ttyUSB0 any 3000000 flow

*Please notice and key in the correct ttyUSB number in your Linux PC system.
Bring up the ethernet interface and specify an IP address to the Target platform. This address must match the IP for the DUT in which the Host PC is expecting.

Ex. ifconfig eth0 192.168.1.10 up

The next line will start the MFG Bridge application.

>./mfgbridge

At this point, the target is ready to receive Labtool commands.

1-4-2. Windows PC side

On the Windows laptop where the Labtool release was downloaded, go to the folder shown below:

AddCal.dll	2020/12/19 上午 01:51	應用程式擴充	1,131 KB
AddCalDLL.dll	2020/12/19 上午 01:51	應用程式擴充	1,131 KB
AddCalDLL.lib	2020/12/19 上午 01:51	LIB 檔案	2 KB
DutApi89XXDII.h	2020/12/19 上午 01:51	H 檔案	19 KB
DutApiMimoBtDII.dll	2020/12/19 上午 01:51	應用程式擴充	442 KB
DutApiMimoBtDII.lib	2020/12/19 上午 01:51	LIB 檔案	108 KB
DutApiMimoBtDIIDuallf.dll	2020/12/19 上午 01:52	應用程式擴充	463 KB
DutApiMimoBtDIIDuallf.lib	2020/12/19 上午 01:52	LIB 檔案	110 KB
DutApiMimoBtDIIUart.dll	2020/12/19 上午 01:52	應用程式擴充	605 KB
DutApiMimoBtDIIUart.lib	2020/12/19 上午 01:52	LIB 檔案	110 KB
DutApiSisoBt	2020/12/19 上午 01:52	應用程式	376 KB
DutBtApi.hc	2020/12/19 上午 01:51	HC 檔案	7 KB
DutBtApi89XXDII.h	2020/12/19 上午 01:51	H 檔案	21 KB
DutWlanApi.hc	2020/12/19 上午 01:51	HC 檔案	19 KB
DutWlanApi89XXDII.h	2020/12/19 上午 01:51	H 檔案	33 KB
Flash_SPI_header.bin	2020/12/19 上午 01:51	BIN 檔案	4 KB
Flash_SPI_header.sbin	2020/12/19 上午 01:51	SBIN 檔案	4 KB
GenHeader.bin	2020/12/19 上午 01:51	BIN 檔案	1 KB
SetUp	2020/12/19 上午 01:51	組態設定	3 KB
UsbHeader.bin	2020/12/19 上午 01:51	BIN 檔案	1 KB

Edit the “SetUp.ini” file as shown in the lines highlighted in **RED** below. The setup DutIpAddress will be the IP address of your target.

HostIPAddress will be the IP address of the Windows XP Laptop.

[DutIp]

DutIpAddress = 192.168.1.10

HostIpAddress = 192.168.1.100

Protocol = TCP

Then you can double click “DutApiSisoBt.exe” to enter labtool as below picture.

```

D:\Project\NXP_2457\FW\MFG-W8978-MF-WIFI-BT-BRG-FC-VS2013-1.0.0.11-16.80.10.p132\bin\release\labtool\DutApiSisoBt.exe
Name:      Dut labtool
Version:   1.0.0.11
Date:     Dec 18 2020 (09:52:40)

Note:

1. =====WiFi tool=====
2. =====BT  tool=====

Enter CMD 99 to Exit

Enter option:

```

2.RF Command

As the information showed on your screen, please enter these commands below to start your test. (Figure 9)

Command: 1 Wi-Fi testing

Command: 2 BT testing

```

D:\Project\NXP_2457\FW\MFG-W8978-MF-WIFI-BT-BRG-FC-VS2013-1.0.0.11-16.80.10.p132\bin\release\labtool\DutApiSisoBt.exe
Name:      Dut labtool
Version:   1.0.0.11
Date:     Dec 18 2020 (09:52:40)

Note:

1. =====WiFi tool=====
2. =====BT  tool=====

Enter CMD 99 to Exit

Enter option:

```

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

a. Tx on CH 6 at 10 dBm with a CCK-11Mbps data rate in 20 MHz BW mode

```

35 0          // Stop Tx
30 0          // Set 2.4G mode
112 0         // Set to 20 MHz BW
22 6 10 0    // Set to ch6 at 10 dBm with b mode
35 1 4        // Enable Output Power with CCK-11M Data Rate

```

b. Tx on CH 6 at 10 dBm with a OFDM-54Mbps data rate in 20 MHz BW mode

```

35 0          // Stop Tx
30 0          // Set 2.4G mode
112 0         // Set to 20 MHz BW
22 6 10 1    // Set to ch6 at 10 dBm with g mode
35 1 13       // Enable Output Power with OFDM-54Mbps Data Rate

```

c. Tx on CH 36 at 10 dBm with a OFDM-54M Data rate in 20 MHz BW mode


```

35 0           // Stop Tx
30 1           // Set 5G mode
112 0         // Set to 20 MHz BW
22 36 10 1    // Set to ch36 at 10 dBm with a mode
35 1 13       // Enable Output Power with OFDM-54Mbps Data Rate
  
```

d. Tx on CH 36-40 at 10 dBm with a MCS7 Data rate in 40 MHz BW Mode

```

35 0           // Stop Tx
30 1           // Set 5G mode
112 1         // Set to 40 MHz BW
22 36 10 2    // Set to ch38 at 10 dBm with a mode
35 1 22       // Enable Output Power with MCS7 Data Rate
  
```

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	

2-2. Test RX sensitivity Commands

a. Rx on CH 6 in 20 MHz BW Mode

```

35 0           // Stop Tx
30 0           // Set 2.4G mode
112 0         // Set to 20 MHz BW
12 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
  
```

b. Rx on CH 6 in 40 MHz BW Mode

```

35 0           // Stop Tx
30 0           // Set 2.4G mode
112 1         // Set to 40 MHz BW
  
```

```
12 4 // Set to CH 6
31 0 // Clear all the received packets
32 0 // Get Rx Packet Count and then clear the Rx packet counter
```

c. Rx on CH 36 in 20 MHz BW Mode

```
35 0 // Stop Tx
30 1 // Set 5G mode
112 0 // Set to 20 MHz BW
12 36 // Set to CH 36
31 0 // Clear all the received packets
32 0 // Get Rx Packet Count and then clear the Rx packet counter
```

d. Rx on CH 36-40 in 40 MHz BW Mode on Path A&B

```
35 0 // Stop Tx
30 1 // Set 5G mode
112 1 // Set to 40 MHz BW
12 36 // Set to CH 38
31 0 // Clear all the received packets
32 0 // Get Rx Packet Count and then clear the Rx packet counter
```

2-3 Others Commands

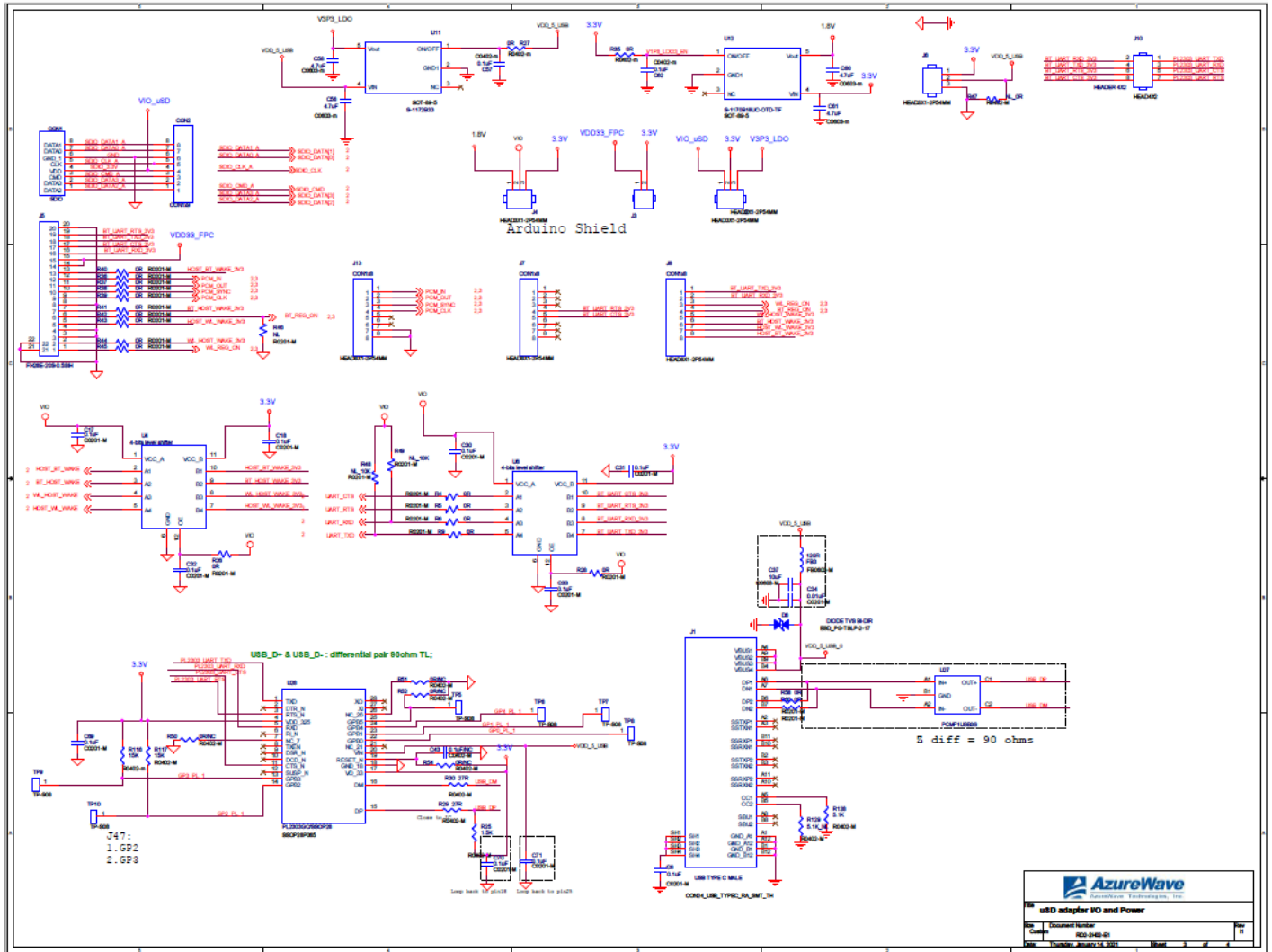
- (1) **Command 45**→ Check the MAC
- (2) **Command 99**→ Quit the test mode/ Quit the MFG tool

2-4 BT test mode Commands

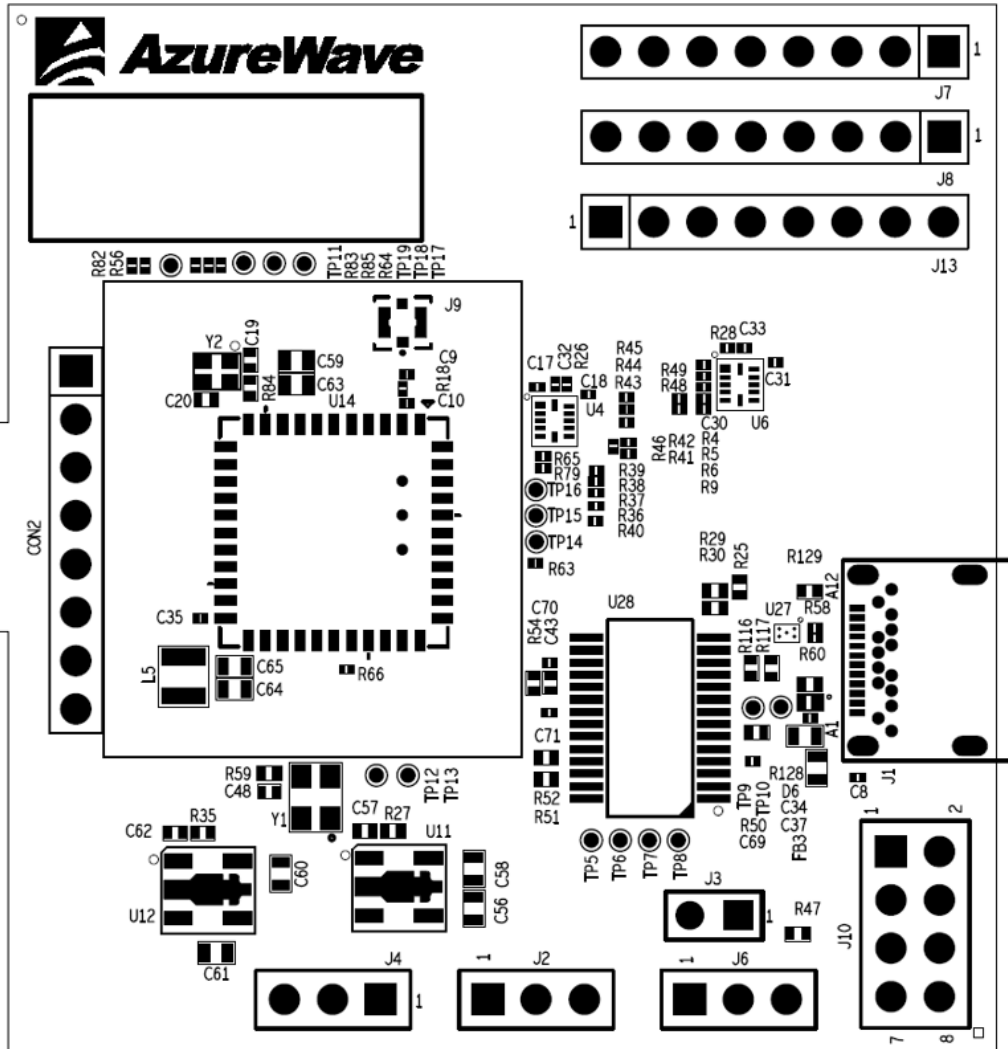
This is how we test our BT: let BT enter test mode, then connect to tester for testing.

- (1) **Command 45**→Check BT MAC.
- (2) **Command 78 1**→BT enter test mode.

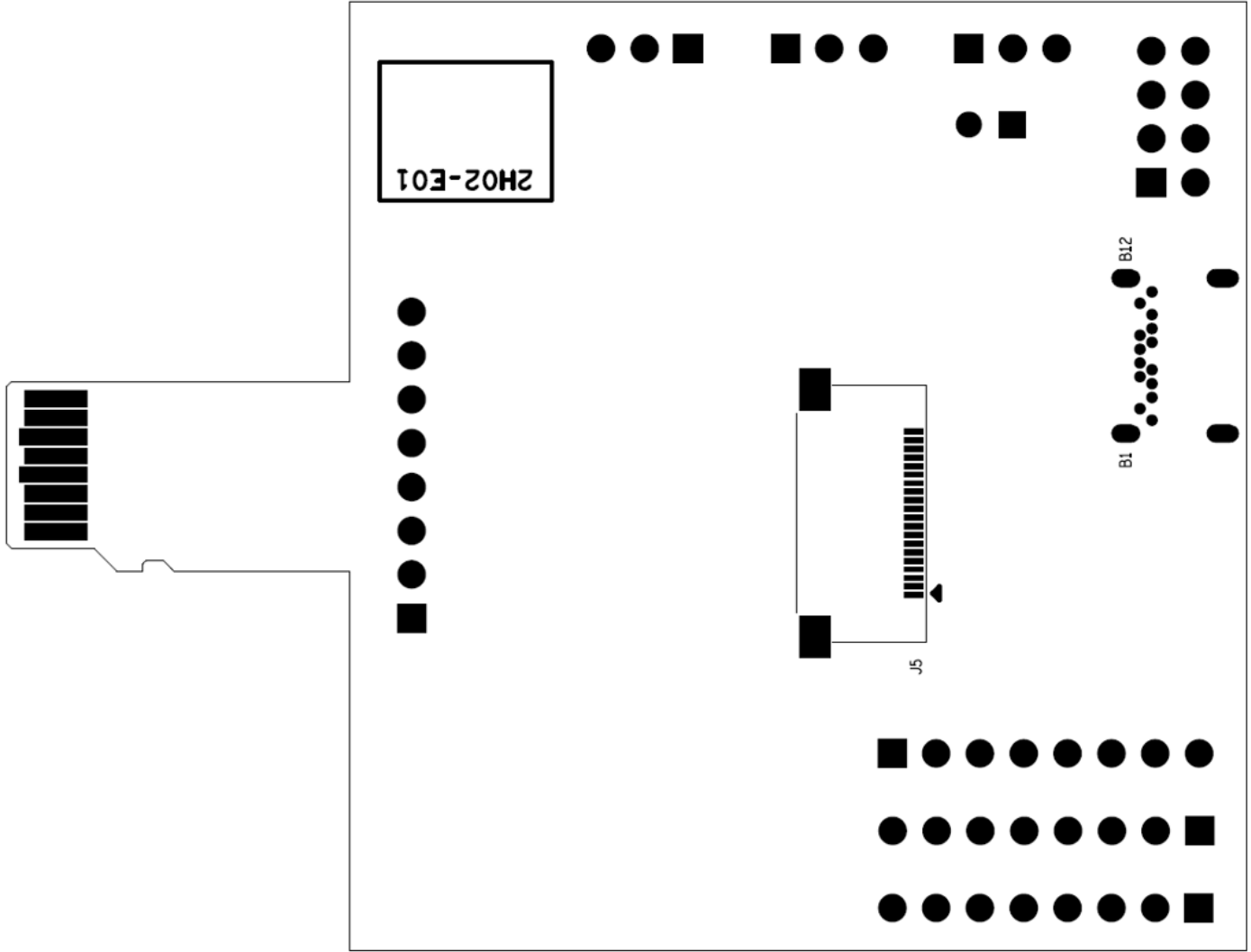
After you type above command, you can measure BT signal both TX/RX and the other BT test items by your BT instrument.



4. Placement



Top View



Bot View