

FCC Test Manual for 11n Mesh Card

Product Name:	11n Mesh Card for Delta Smart Grid Network
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1. Introduction

The Mesh Card is designed to interface with the Smart Electricity Meter as an Add-On Board Communication Module to enable the wireless data transfer capability for the Smart meter and also act as a wireless mesh network which is implemented under Wi-Fi 802.11a/b/g/n standard.

It has been designed to operate in the dual-band Wi-Fi connectivity which supports IEEE 802.11a/b/g/n standard. The whole solution is implemented with the Texas Instruments AM437x (SoC) Applications processor and WiFi Module WL1837 from TI is used which supports Dual band 2.4GHz/5GHz Wi-Fi.

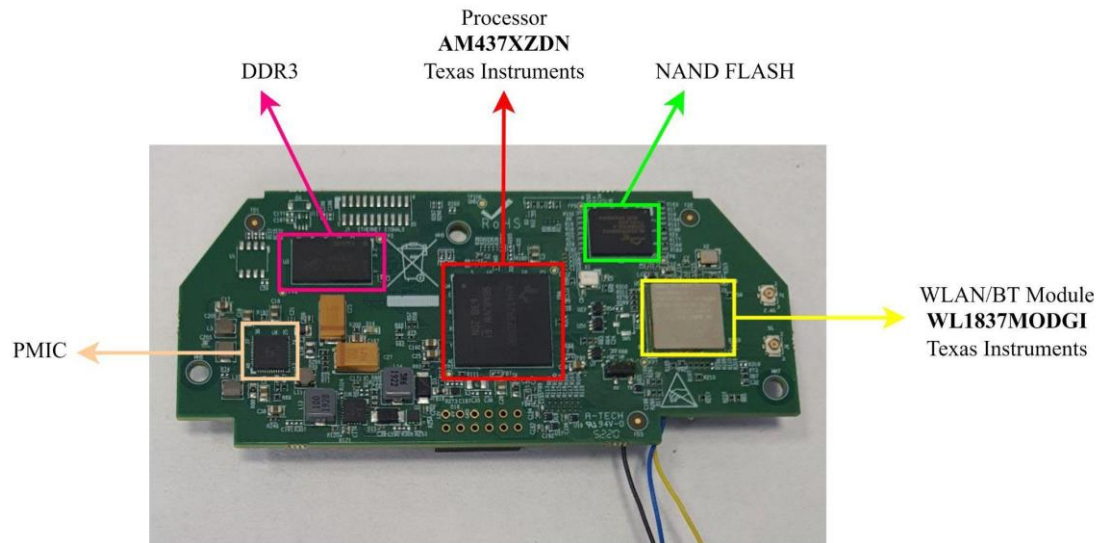
2. Hardware Specifications

Parameter	Description
Processor and Wi-Fi module	● Processor: AM4378BZDN80 from Texas Instruments ● Wi-Fi Module: WL1837MODGI from Texas Instruments
Memory	● DDR3 SDRAM - 128MBytes ● NAND Flash - 256MBytes
Wi-Fi	● Dual-band IEEE802.11a/b/g/n ● Wi-Fi Radio Either 2×2 on 2.4GHz (or) 1×1 on 2.4GHz (or) 1x1 on 5GHz ● Wi-Fi Mesh and Wi-Fi hotspot simultaneous operation
Power Supply	● In stand alone mode, Board can be powered by 12V DC(1A Current) or 4V DC(2A Current) Supply.
Operating Temperature	-40°C to 85°C



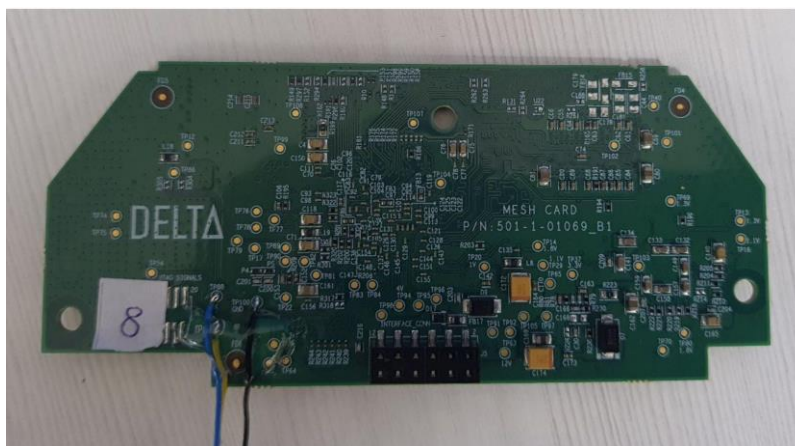
3. IC marking of Mesh card

3.1 Top view of the Mesh card



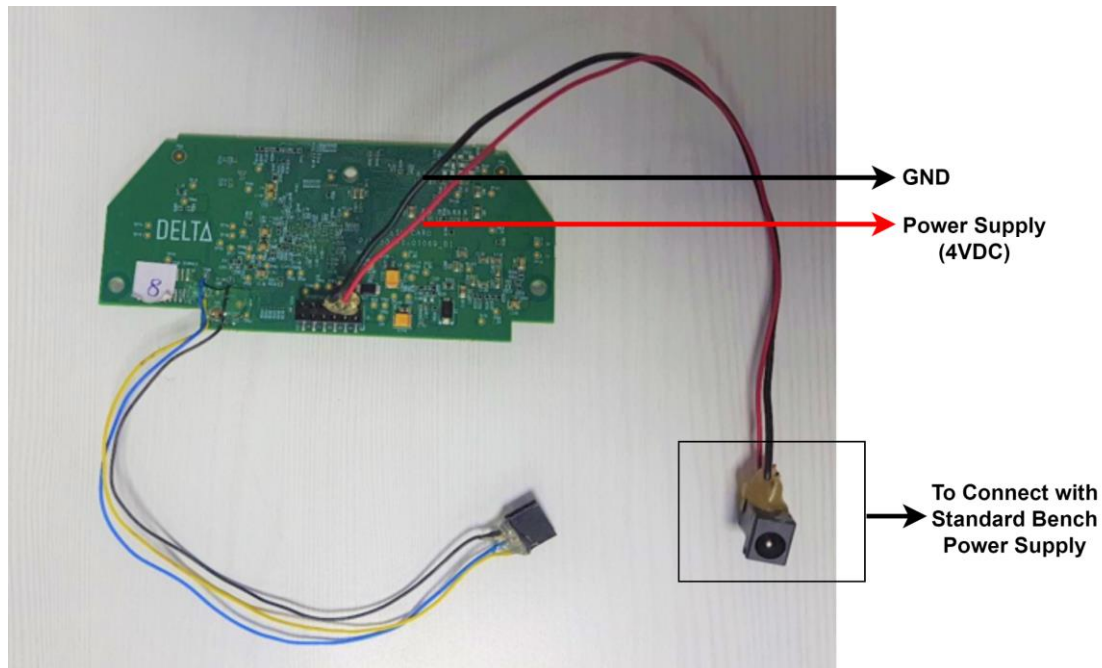
The top side of the Mesh Card contains the Main Processor **AM437XZDN**, **Wi-Fi Module** WLAN/BT Module **WL1837MODGI**, DDR3, and PMIC.

3.2 Bottom View of Mesh Card



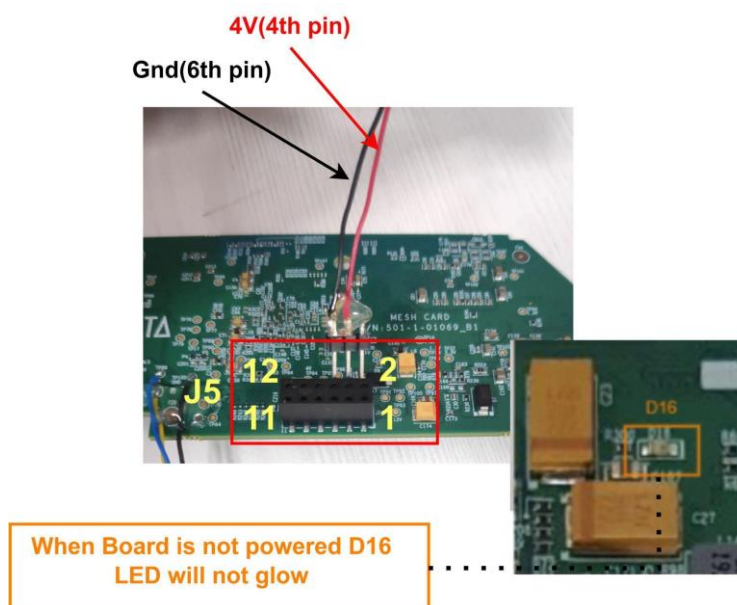
The Bottom Side of the Mesh Card contains the **IO connector (PCB Ref Des J5)** used to provide a **supply to the board and** communicate with the meter over UART serial interface.

4. Mesh Card Power Supply Connection



The Mesh card needs to be powered with the 4V supply from a **Standard bench power supply** using the cable assembly with DC Jack which should be connected to the IO Connector J5 on the board as shown in the above image.

Note: The Red wire is for 4V and Black wire is for GND.



Step:1 Connect the male header to the respective female header(J5) in the board.

CONFIDENTIAL

- **Red color wire (4V supply pin) - PIN: 4 of J5**
- **Black color wire (Ground pin) - PIN: 6 of J5**

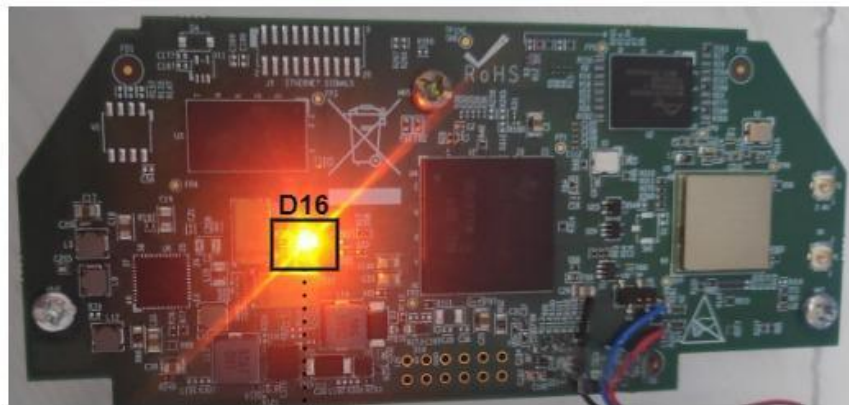
Note: J5 Header is present on the bottom side of the board.

Step:2 Connect the 2 wires Red and Black from the Mesh card's J5 connector using the male jumper to the Power supply.

Note: Mesh Card be powered on using either with **12V or 4V** supply. When 11n Mesh card is installed in the Vision Meter, the mesh card will be powered from 4V supply

S.No	Power Input to Mesh Card	Connection to J5 Header
1	12V Input	J5 Connector: Pin No 2 – 12V Pin No 6 – GND
2	4V Input	J5 Connector: Pin No 4 – 4V Pin No 6 – GND

LED Indication for Power ON/OFF status of Mesh Card:



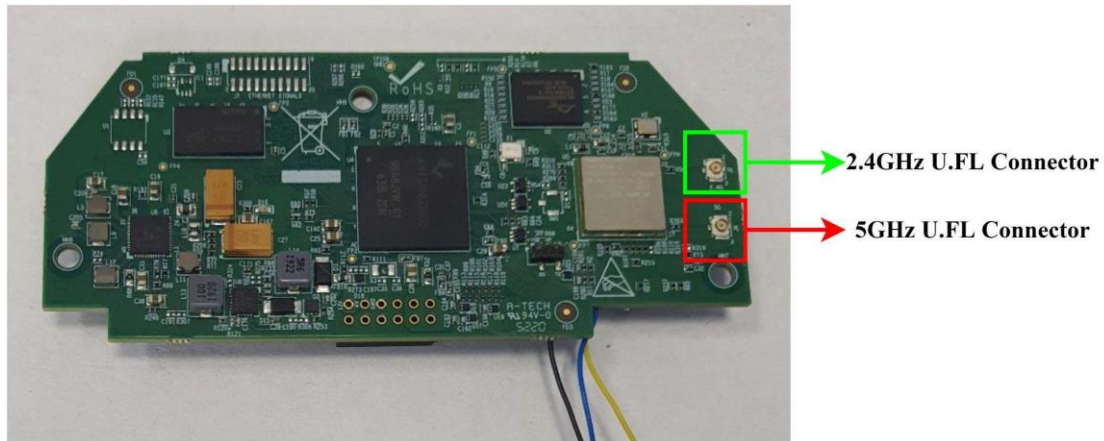
When board is powered ON D16 LED (in top of mesh card) will glow

Note: The **LED D16** will glow when Mesh Card is **Power ON**

include one photo with meter as a final configuration



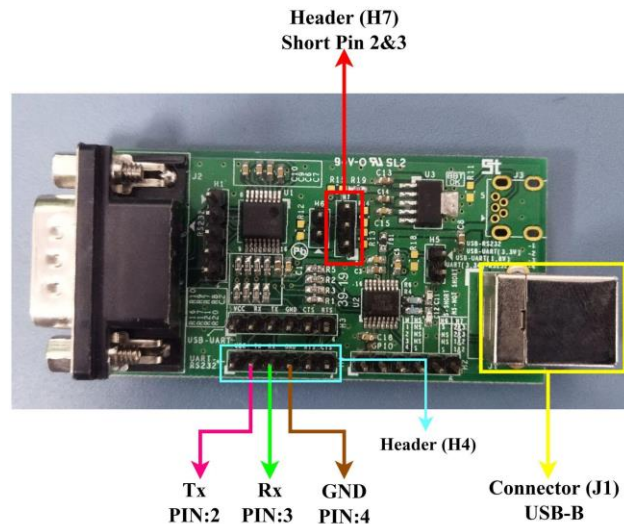
5. Antenna Port - U.FL Connector



The 11n Mesh card supports WiFi 2.4GHz and 5GHz Radios. The dual band patch antenna is used and needs to be connected with the on-board U.FL connectors highlighted in the above image.

S.No	PCB Ref Des	Frequency (GHz)	Patch Antenna Part Number
1	J2	2.4GHz	W3334B0150
2	J4	5GHz	W3334B0150

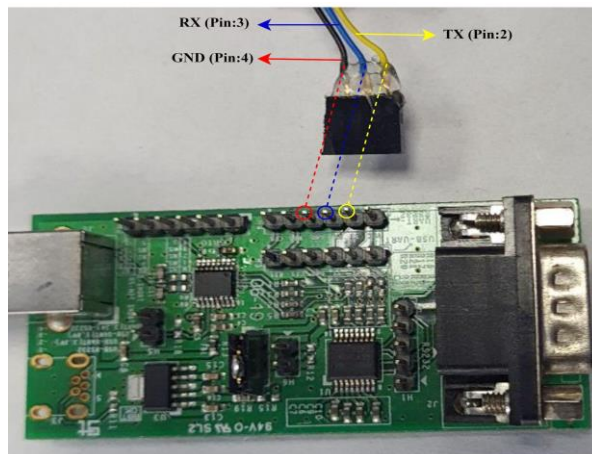
6. UART TO USB Connection for Console



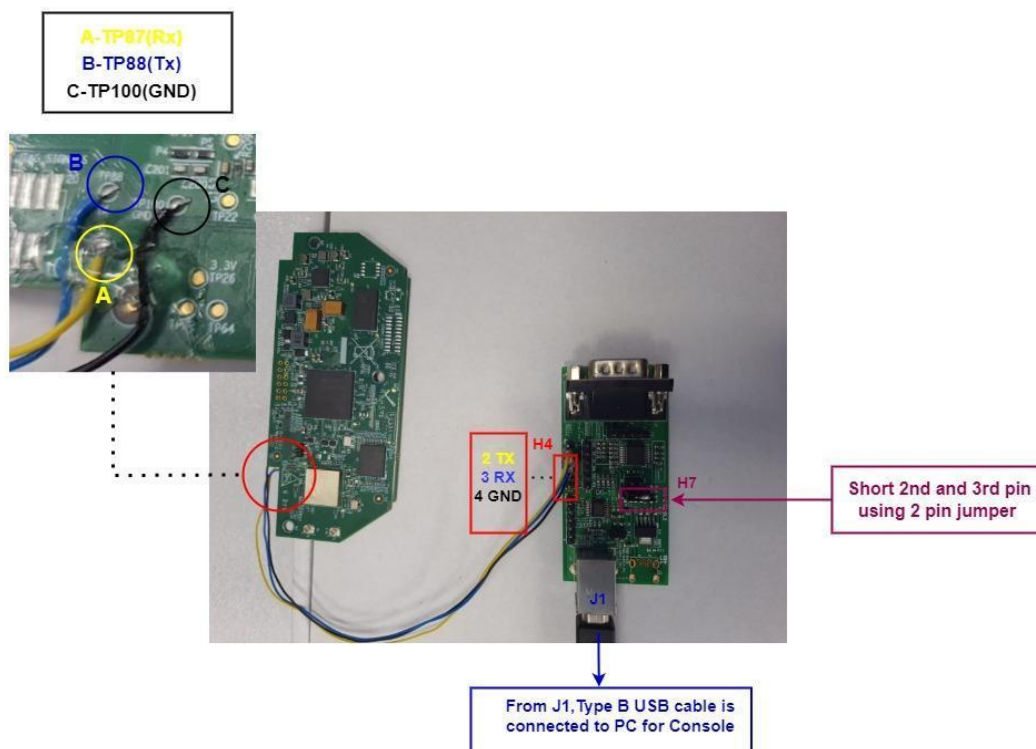
NOTE:

This U2UC console board is only for accessing console logs for testing purposes and this board will not be provided with the final product.

6.1 Connecting Mesh Card UART signals into U2UC Board



The above image shows the connection of UART to the USB conversion board for accessing console logs. The Tx, Rx and GND pin needs to be connected to the respected marked circles in the H7 connector of the U2UC board.



Step 1: The UART signals are taken from the Test points of the Mesh card as follow,

Signal	Test Point	Wire color
UART Tx	TP88	Blue
UART Rx	TP87	Yellow
Gnd	TP100	Black

Step 2: The wires from the Mesh cards are connected to the **UART to USB console board in header H4** as follows

Signal	Pin number in H4 Header	Wire color
Tx	2nd pin	Yellow
Rx	3rd pin	Blue
Gnd	4th pin	Black

Step 3: Short the 2nd and 3rd pin of **H7** in UART to USB Console board

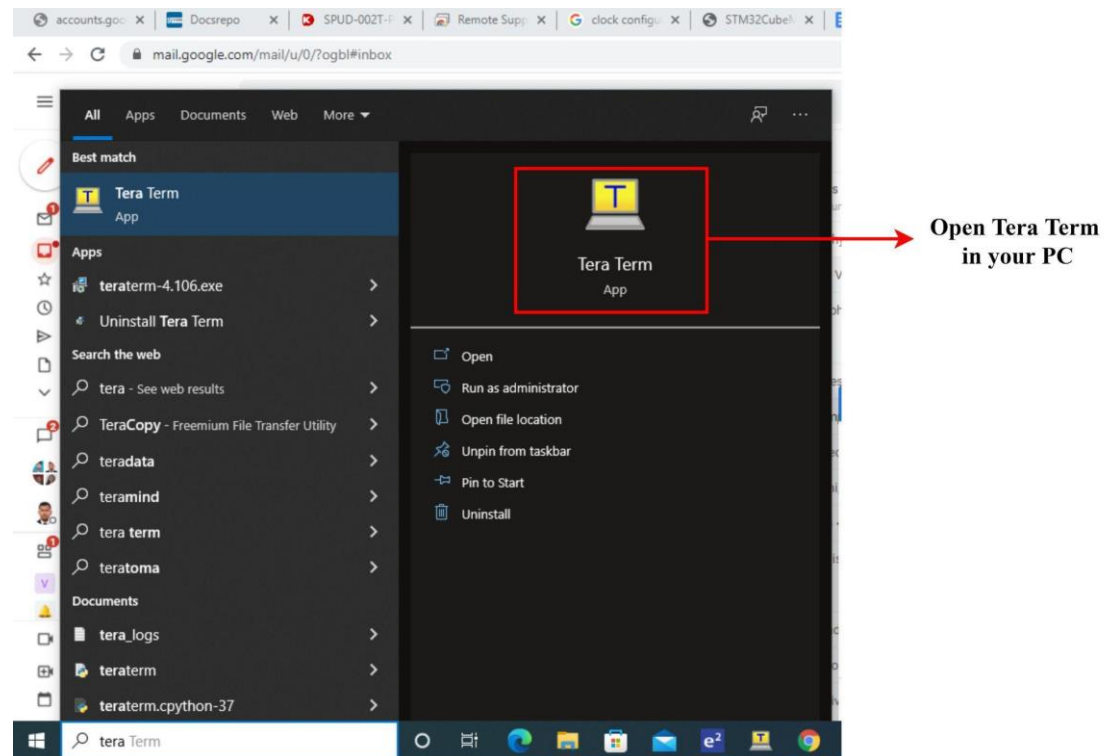
Step 4: From the J1 connector connect the USB type B cable and connect the other end of the cable to the PC for the console.

6.2 Console Using Tera Term Software

Steps to be followed after connecting the USB cable to your PC is given below,

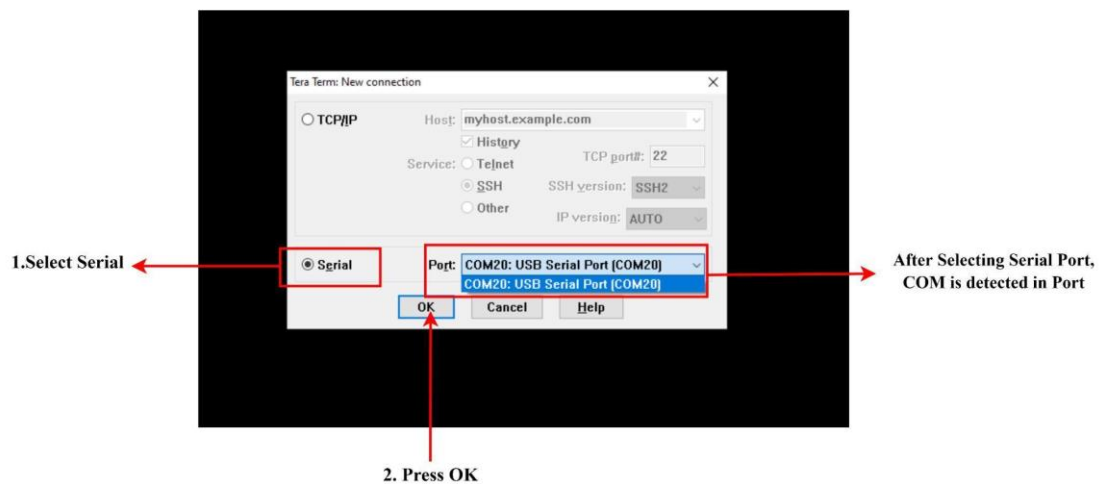


STEP 1:



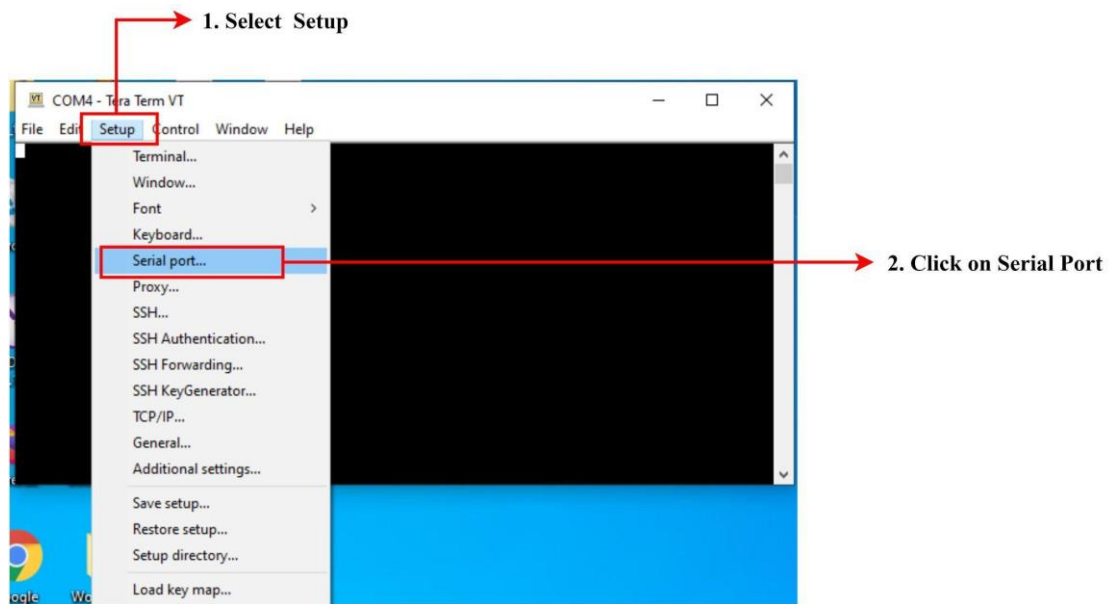
After connecting the U2UC windows board to PC as mentioned in the Section 6 above, in the windows PC goto Start and open Open Tera Term.

STEP 2:



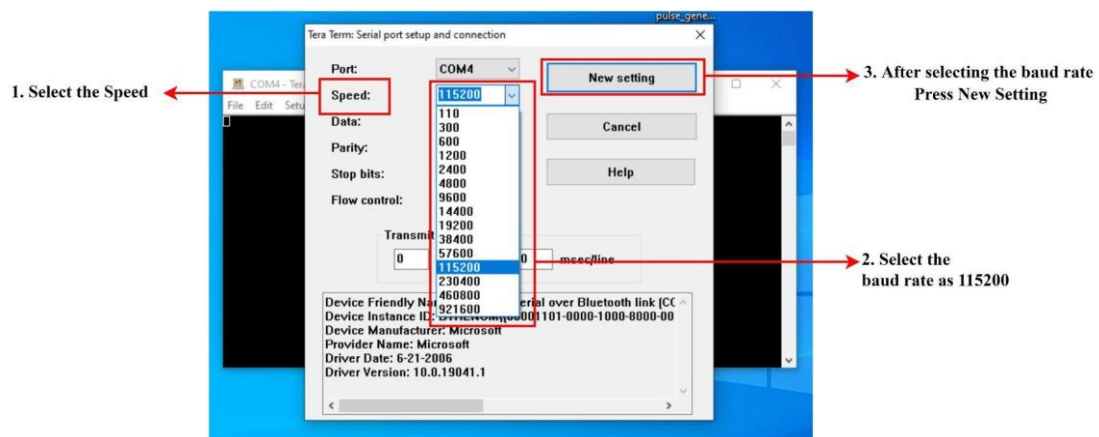
Please ensure that the **Serial** option is selected. Then Select the serial the COM Port: USB Serial Port is detected, then press OK.

STEP 3:



Open Setup and select Serial port

STEP 4:



After clicking the serial port, select the speed as **115200** and then Click the new setting.

STEP 5:

```

08 | Started Login Service.
08 | Started System Logger Daemon "default" instance.
DELTA_GET_BOARD_DATA: Finished:

MESHCARD

MeshCard login: [ 34.736338] bridge: filtering via arp/ip/ip6tables is no longer available by default. Update your scripts to load br_net
vlan0 Enable = 1
IP for br-lan is 192.168.1.1
[ 45.842671] vlcrc: down
[ 45.863054] br-lan: port 1(vlan0) entered blocking state
[ 45.868753] br-lan: port 1(vlan0) entered disabled state
[ 45.879788] device vlan0 entered promiscuous mode
[ 45.958362] netlink: 'hostapd': attribute type 213 has an invalid length.
[ 45.980004] IPv6: ADDRCONF(NETDEV_CHANGE): vlan0: link becomes ready
[ 45.990364] br-lan: port 1(vlan0) entered blocking state
[ 45.995810] br-lan: port 1(vlan0) entered forwarding state
[ 46.058889] cryptd: max_cpu_qlen set to 1000
[ 46.333201] IPv6: ADDRCONF(NETDEV_UP): mesh02: link is not ready
[ 47.956280] vlcrc: down
[ 47.986913] IPv6: ADDRCONF(NETDEV_UP): mesh02: link is not ready
[ 47.999251] netlink: 'upa_supplicant': attribute type 7 has an invalid length.
[ 48.022505] IPv6: ADDRCONF(NETDEV_CHANGE): mesh02: link becomes ready

MESHCARD

MeshCard login: root
Password: → Enter Login and Password here

MESHCARD

root@MeshCard:~#
root@MeshCard:~#

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Please check for the console logs. Once the Mesh Card has booted up, below login credentials need to be provided to proceed further.

Login: root

Password: delta123

Note:

Passwords will not be displayed in the console log screen, so please enter the correct password and **press enter** to proceed further.



The design of product complies with U.S. Federal Communications Commission (FCC) guidelines respecting safety levels of radio frequency (RF) exposure for Mobile devices.

RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.

FCC PART 15 STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been verified to comply with the limits for a class B computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. See 47 CFR Sec. 15.105(b). These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and the receiver.

- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

FCC ID: 2A3WGOA71110**FCC CAUTION STATEMENT FOR MODIFICATIONS**

CAUTION: Any changes or modifications not expressly approved by Delta Energy and Communication, Inc. could void the user's authority to operate the equipment

