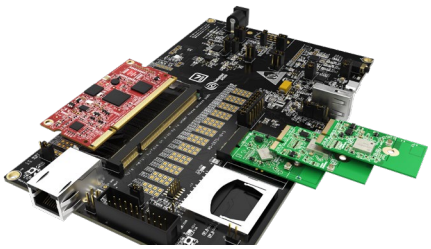
Murata Wi-Fi/BT (CYW) Solution for i.MX

FreeRTOS User Guide



Revision History

Revision	Date	Author	Change Description
1.0	Nov 17, 2020	TF	Initial Release. **NOTE:** Material moved from previous Quick Start Guide. Added alternative option to download SDK in **Section 6**. Added more sample application example in **Section 7**. Removed i.MX RT1052 references.
1.1	Jan 28, 2021	TF	Added sample application example in **Section 7**.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

1 Introduction

This document provides detailed instructions on adding wireless functionality with Embedded Artists' Wireless M.2 Modules on NXP Semiconductor's i.MX RT 1020/1050/1060/1064 Evaluation Kit and Embedded Artists AB's i.MX RT 1062 Developer's kit. NXP's latest SDK supports 1DX and 1LV M.2 modules. The SDK supports both Wi-Fi and Bluetooth for all the i.MX RT boards (except i.MX RT 1064 EVK where BLE is not functional). Murata provides a patch release for supporting Type 1MW – please go to Murata's Forum. This chapter explains how to set up the hardware and the steps required for software installation.

1.1 Acronyms

Table 1: Acronyms used in Quick Start Guide

Acronym	Meaning
BT	Bluetooth
CYW	Cypress
EA	Embedded Artists designs, manufactures and distributes current Wi-Fi/BT M.2 EVB's (link here). EA also have enhanced i.MX developer kits which provide comprehensive support for Murata modules (link here).
EULA	End User License Agreement
EVB	Evaluation Board (Embedded Artists' Wi-Fi/BT module)
EVK	Evaluation Kit
FTDI	Future Technology Devices International
IDE	Integrated Development Environment
JTAG	Joint Test Action Group
M.2	Formerly known as the Next Generation Form Factor (NGFF), is a specification for internally mounted computer expansion cards and associated connectors. The M.2 specification is defined by PCI-SIG (www.pcisig.com).
PC	Personal Computer
RF	Radio Frequency
RTOS	Real-time Operating System
RX	Receive
SD	Secure Digital
SDIO	Secure Digital Input Output
SDK	Software Development Kit
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
uSD	Micro SD
uSD-M.2	Micro SD to M.2 Adapter
Wi-Fi	Wireless LAN: "Wi-Fi" is a registered trademark of Wi-Fi Alliance
WLAN	Wireless Local Area Network

1.1 References

1.1.1 Murata Wi-Fi/BT (CYW) Solution for i.MX FreeRTOS Quick Start Guide

This Quick Start Guide provides quick steps to get started with Murata Wi-Fi/BT Cypress chipset-based solution with the help of an example.

1.1.2 Murata Wi-Fi/BT Solution for i.MX Hardware User Manual

This manual describes the Murata uSD-M.2 Adapter hardware. All interface signals to the NXP i.MX RT, 6, 7, and 8 EVK's are described. Specifics on interfacing each i.MX EVK to Murata uSD-M.2 Adapter are provided.

1.1.3 Murata's Community Forum Support

Murata's Community provides online support for the Murata Wi-Fi/Bluetooth modules on various i.MX platforms. Refer to this link for main Forum Wi-Fi and Bluetooth landing page.

1.1.4 Murata uSD-M.2 Adapter Datasheet (Rev B1)

This datasheet documents the current version of the Murata' latest uSD-M.2 adapter hardware and its interfacing options.

1.1.5 Murata uSD-M.2 Adapter Datasheet (legacy Rev A)

This datasheet documents the current version of the Murata's legacy uSD-M.2 adapter hardware and its interfacing options. This adapter version is no longer manufactured.

1.1.6 Murata's uSD-M.2 Adapter Landing Page

This website landing page provides latest/comprehensive information on Murata's adapter including links to where it can be purchased.

1.1.7 Embedded Artists' Reference Documentation

Embedded Artists designed the 1DX/1MW/1LV M.2 EVB's in close collaboration with Murata. It is ***important to note*** that Embedded Artists manufactures and distributes the Wi-Fi/BT M.2 EVB's. Refer to this main landing page for more information: www.embeddedartists.com/m2. **Table 2** lists some relevant documents published by Embedded Artists.

1.1.8 Murata's i.MX Wireless Solutions Landing Page

This website landing page provides latest/comprehensive information on Murata's i.MX Wireless solutions which use the uSD-M.2 Adapter as a key enabler so customers can easily evaluate Murata's modules on i.MX processors.

1.1.9 Murata's i.MX Wireless Solutions Landing Page

This website landing page provides latest/comprehensive information on Murata's i.MX Wireless solutions which use the uSD-M.2 Adapter as a key enabler so customers can easily evaluate Murata's modules on i.MX processors.

Table 2: Embedded Artists Documentation Listing

Documentation Filename	Note
Wi-Fi/BT M.2 EVB Primer	Introduction and drill-down on M.2 interface
M.2 SDIO Interface Schematic	Reference schematic for customers designing in WLAN-SDIO M.2 EVB.
M.2 PCIe Interface Schematic	Reference schematic for customers designing in WLAN-PCIe M.2 EVB.
1DX M.2 Module Datasheet	Comprehensive details on 1DX Wi-Fi/BT M.2 Module.
1MW M.2 Module Datasheet	Comprehensive details on 1MW Wi-Fi/BT M.2 Module.
1LV M.2 Module Datasheet	Comprehensive details on 1LV Wi-Fi/BT M.2 Module.

1.2 Hardware Options

This section describes how to configure the hardware correctly, for both NXP and Embedded Artists i.MX RT series platforms. The following table lists the different platforms supported by Murata modules.

Table 3: Murata module support on NXP and Embedded Artists' platforms

i.MX EVK / Dev kit	Manufacturer	Part number	Murata modules supported	Interconnect
i.MX RT1064 EVK	NXP	MIMXRT1064-EVK	1DX, 1MW[1], 1LV[2]	uSD-M.2 Adapter
i.MX RT1060 EVK	NXP	MIMXRT1060-EVK	1DX, 1MW[1], 1LV[2]	uSD-M.2 Adapter
i.MX RT1050 EVK	NXP	IMXRT1050-EVKB	1DX, 1MW[1], 1LV[2]	uSD-M.2 Adapter
i.MX RT1020 EVK	NXP	MIMXRT1020-EVK	1DX, 1MW[1], 1LV[2]	uSD-M.2 Adapter
i.MX RT106A	NXP	SLN-ALEXA-IOT	1DX	Soldered down
iMX RT1062 Dev Kit	Embedded Artists	EAK00310	1DX, 1MW, 1LV	M.2

NOTE: The Embedded Artists' iMX RT1062 Developer's Kit can be used instead of previous (now discontinued) iMX RT1052 Dev Kit for development/evaluation purposes. The main difference between the iMX RT1052 and the iMX RT1062 is that the iMX RT1062 has 1 MB of SRAM while the iMX RT1052 has 0.5 MB SRAM. The iMX RT1052 OEM COM is available for order here.

[1] Driver support is present, example code to be added. Post on Murata Community Forum for assistance.
[2] Currently 1LV only supports Wi-Fi examples. Bluetooth example is not included yet. Go to Forum for assistance.

Several toolchains are supported by NXP as below, but MCUXpresso IDE is the primary focus in this document:

- NXP supports MCUXpresso IDE
- GNU toolchain for Arm® Cortex® -M with Cmake build system
- IAR Embedded Workbench
- Keil™ MDK-Arm

2 Hardware Setup for NXP EVKs with uSD-M.2 Adapter

To enable Murata's wireless solution on NXP's i.MX RT 1020/1050/1060/1064 Evaluation Kits, Embedded Artists' Wi-Fi/BT M.2 EVB's (Murata module onboard) connected to Murata's uSD-M.2 Adapter. The on-board debug adapter is supported. Refer to **Figure 1**, **Figure 2** and **Figure 3** for example of i.MX RT1050 EVK. Murata's uSD-M.2 Adapter plugs in directly to the EVK's microSD connector. The micro-USB connector (J28) is used for USB-UART/JTAG.

Refer to **Section 8** on how to correctly connect Embedded Artists' Wi-Fi/BT M.2 EVB to the Murata Adapter and how to properly jumper the Adapter for default 1.8V VIO operation (not 3.3V override mode). Now insert the Murata Adapter into the microSD slot (J20) until you hear the click sound (push-push connector). Per **Section 8.3**, it is best to tape the uSD Adapter-microSD connection. Make sure the green LED (LED1) on the adapter board is illuminated when powered. Also, the blue LED (LED2) should **not be** illuminated. Repeating the Murata uSD-M.2 Adapter jumper settings:

- For rev B1 adapter, J12 is in 1-2 pos & J13 is in 1-2 pos.
- For (legacy) rev A adapter, J12 is open.

Figure 1: Connecting the EVB to the EVK

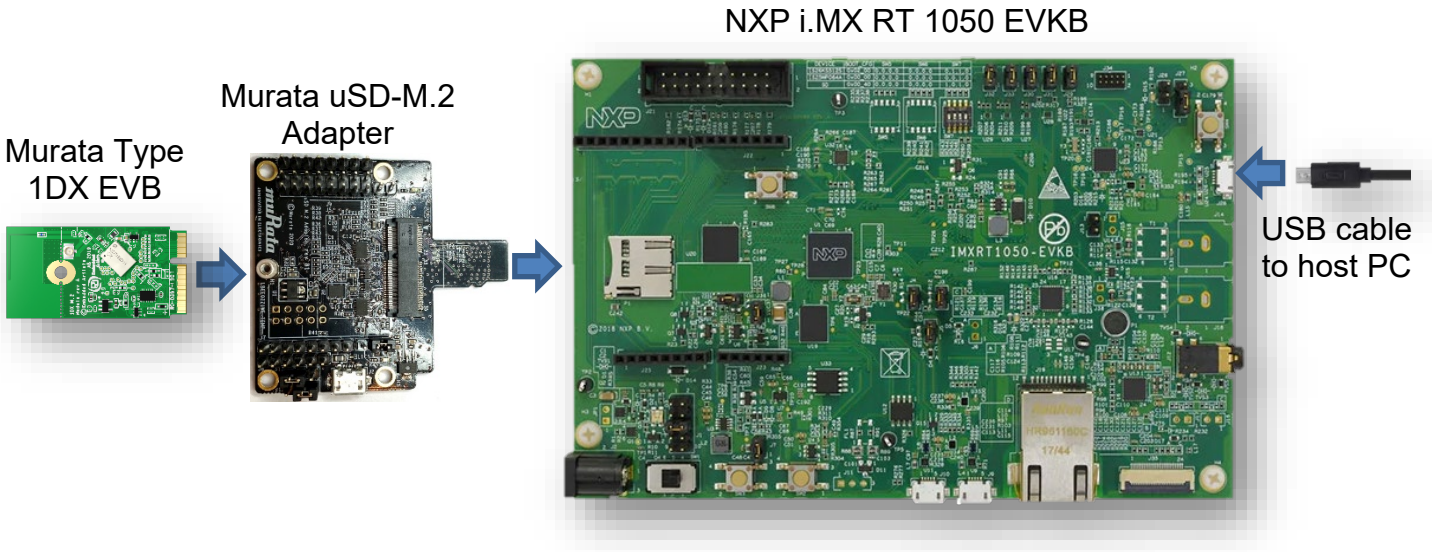


Figure 2: Connected setup close up

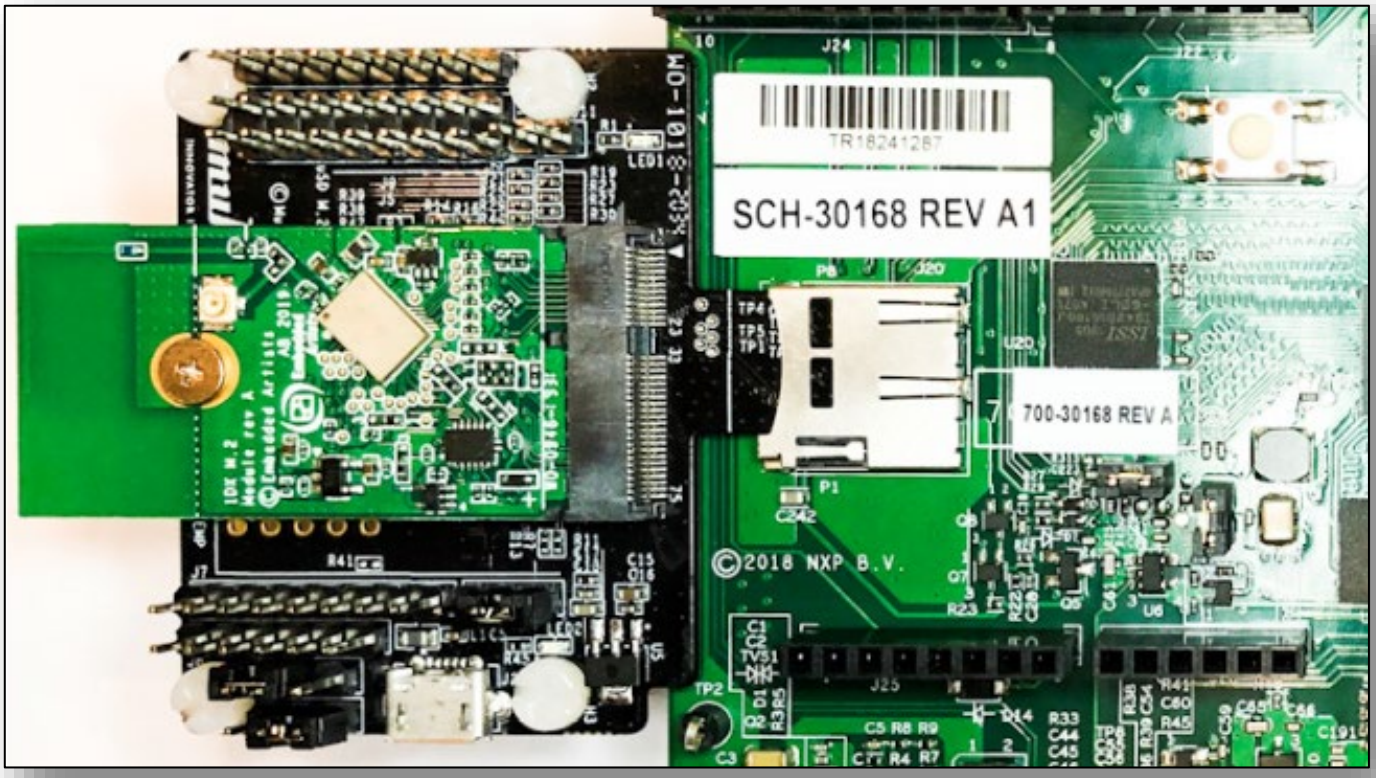
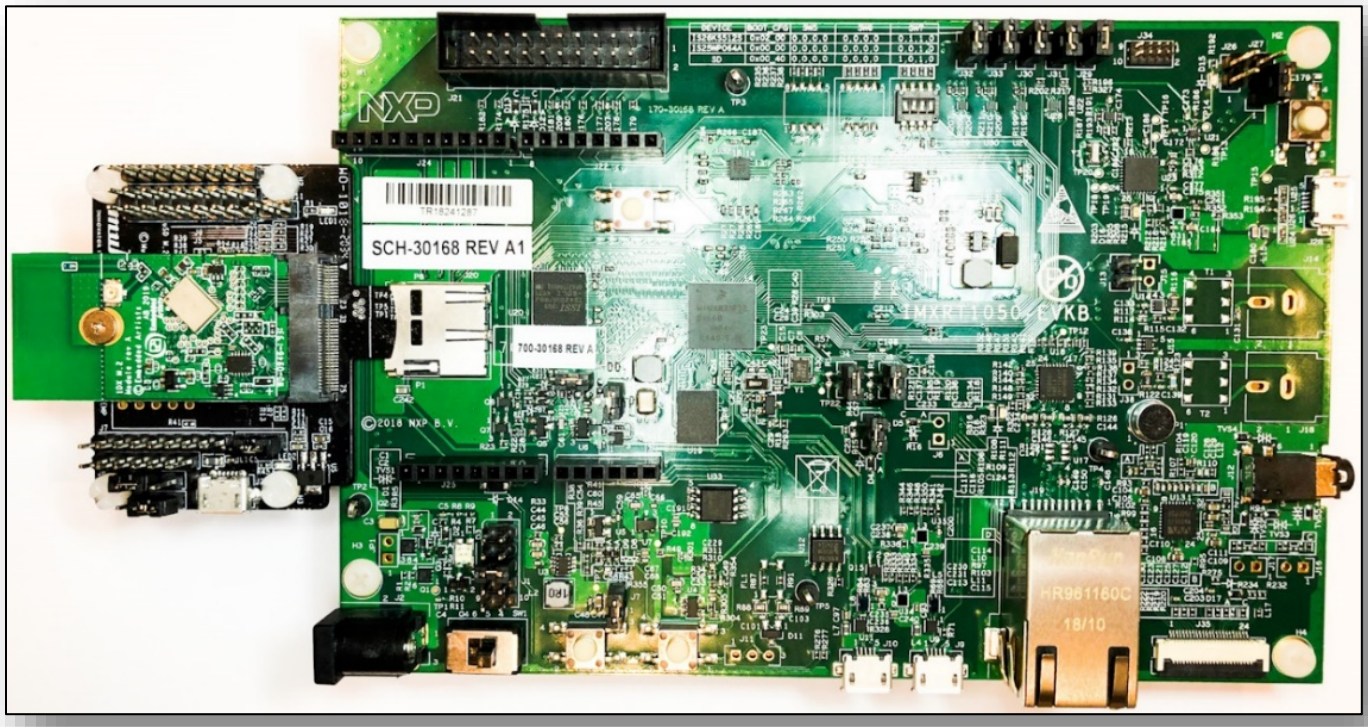


Figure 3: NXP i.MX RT 1050-EVKB with Type 1DX M.2 & uSD-M.2 Adapter

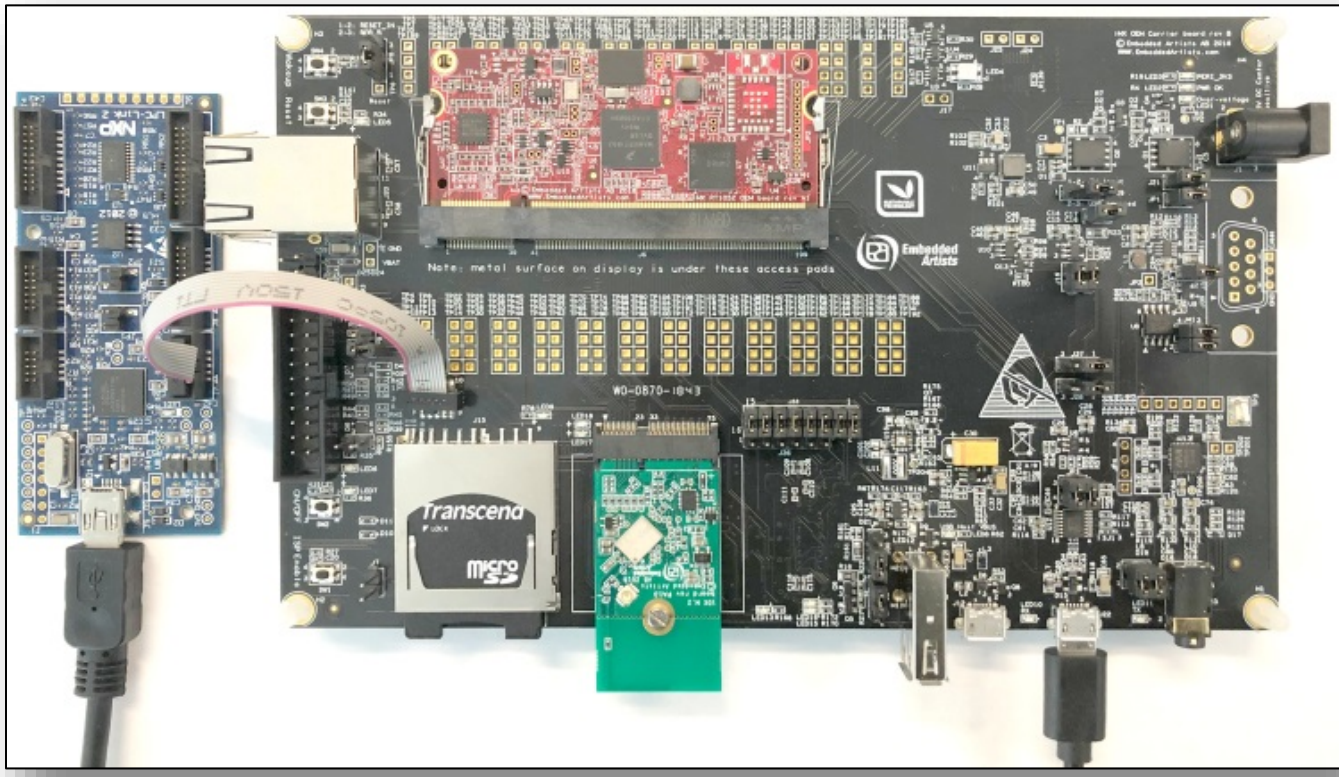


3 Hardware Setup for Embedded Artists Dev Kits via M.2 interface

Embedded Artists' i.MX RT 1062 Developer Kit has a M.2 connector onboard for direct connection to the M.2 EVB (no adapter required). LPC-Link2 is recommended for the debug adapter. Embedded Artists' website provides support package. **Figure 4** shows the full connection of developer's kit with M.2 and debug probe. Micro-USB connector (J22) is used for USB-UART. J10 is used for LPC-Link2 connection.

NOTE: The red line in the flex cable used to connect the debug probe to the developer's kit should align with the arrow at J10 (i.e., pin 1 of J10).

Figure 4: Embedded Artists i.MX RT 1062 Developer's Kit



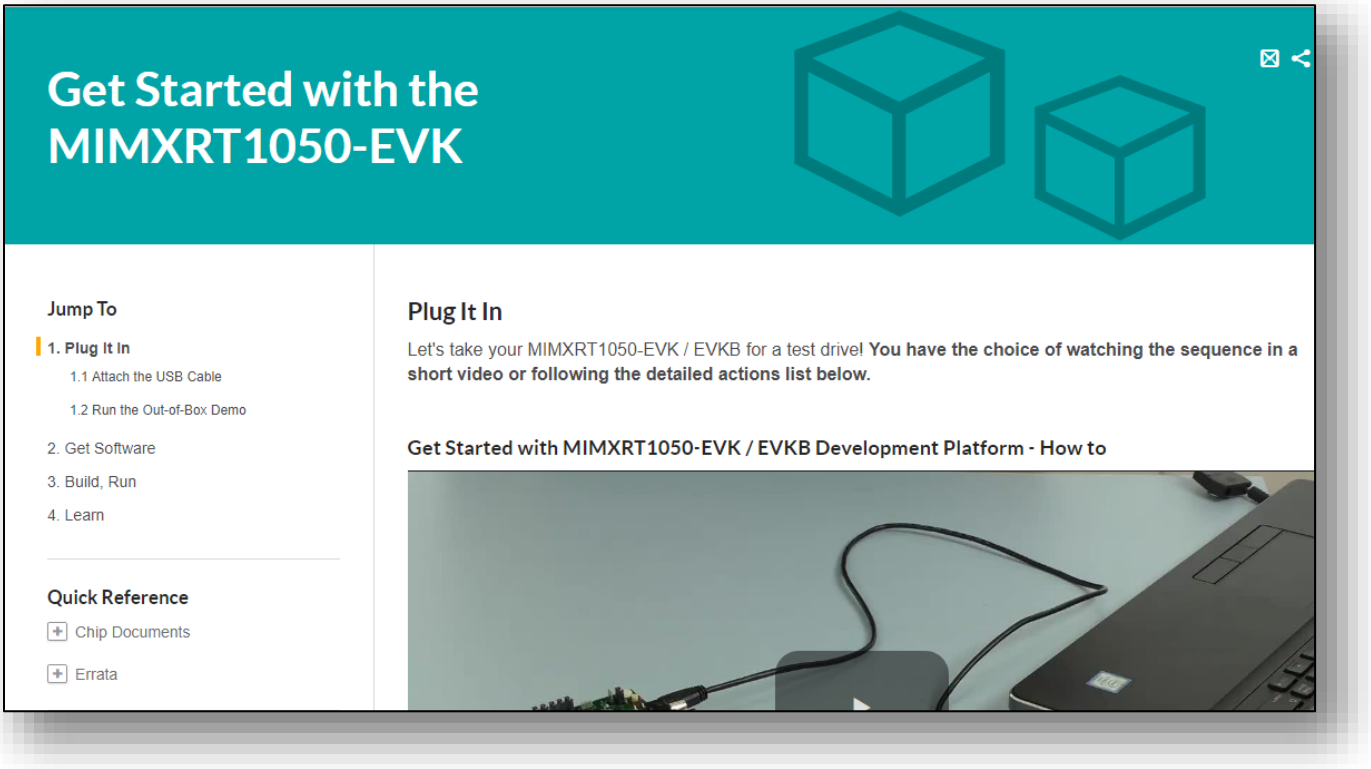
4 Software Setup for NXP EVKs

If you are using Embedded Artists Board, please skip this section and go to **Section 5** of this document.

Click here to go the NXP landing page as shown in **Figure 5**. Follow the steps described in NXP web to install these tools:

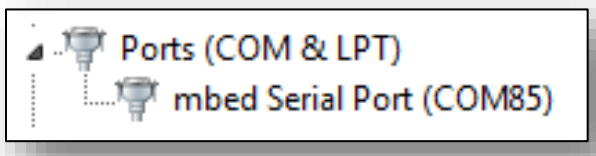
- MCUXPresso IDE
- mbed Virtual COM Port Driver
- Terminal application (TeraTerm, Putty, etc.)

Figure 5: NXP Getting Started Web Page



You should now be able to see mbed Serial Port on the Device Manager as shown in **Figure 6** if you completed software installation successfully.

Figure 6: COM Port of NXP IMXRT1050-EVKB



For installing the required SDK(s) for MCUXpresso IDE, please refer to **Section 6**.

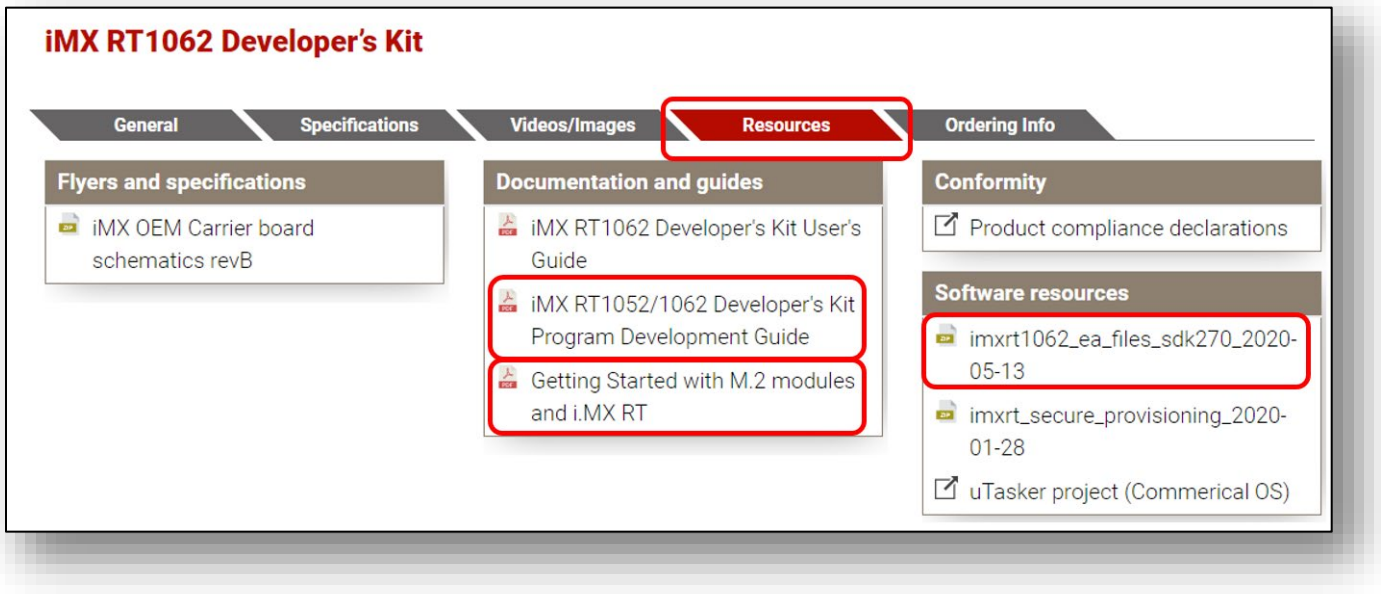
5 Software Setup for Embedded Artists Dev Kits

If you are using NXP Board, please skip this section and go back to **Section 4** of this document.

Click here to go the EA landing page as shown in **Figure 7**. Download the document iMX RT1052/1062 Developer's Kit Program Development Guide from the resource tab for detailed instructions about downloading and setting up the SDK. Download “imxrt10xx_ea_files_sdk270_yyyy-mm-dd.zip” for the SDK setup. Go to **Section 6** for more detail. You can also download “Getting Started with M.2 modules and i.MX RT” to run the sample example for the wiced_iperf. Also install all the tools mentioned below:

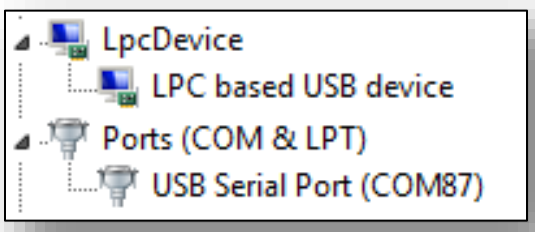
- MCUXpresso IDE
- FTDI Virtual COM Port Driver
- Terminal application (TeraTerm, Putty, etc.)

Figure 7: Embedded Artists Resource Web



You should see LPC based USB device and USB Serial Port on the Device Manager as below if you completed software installation successfully. The driver for LPC-Link2 is included in the MCUXpresso.

Figure 8: COM Port and JTAG of Embedded Artists Kit



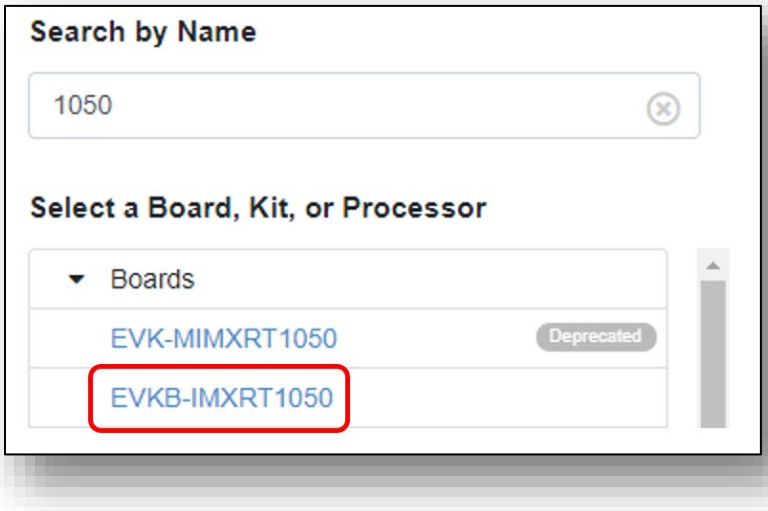
6 SDK Setup for MCUXpresso

MCUXpresso supports various processors, so it requires appropriate SDK for i.MX RT. To support Embedded Artists' Wireless M.2 Modules, additional components (wifi_wiced and other related components) are required. There are two ways to install SDK in the new MCUXpresso IDE. Follow the steps below carefully to install right components.

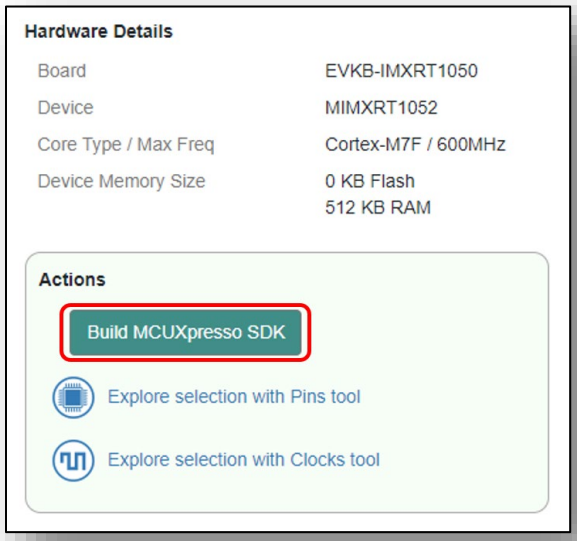
6.1 Drag and drop SDK in the IDE

1. First download the MCUXpresso SDK by following this URL: https://mcuxpresso.nxp.com. You will need to login to your NXP account and then click "Select Development Board".

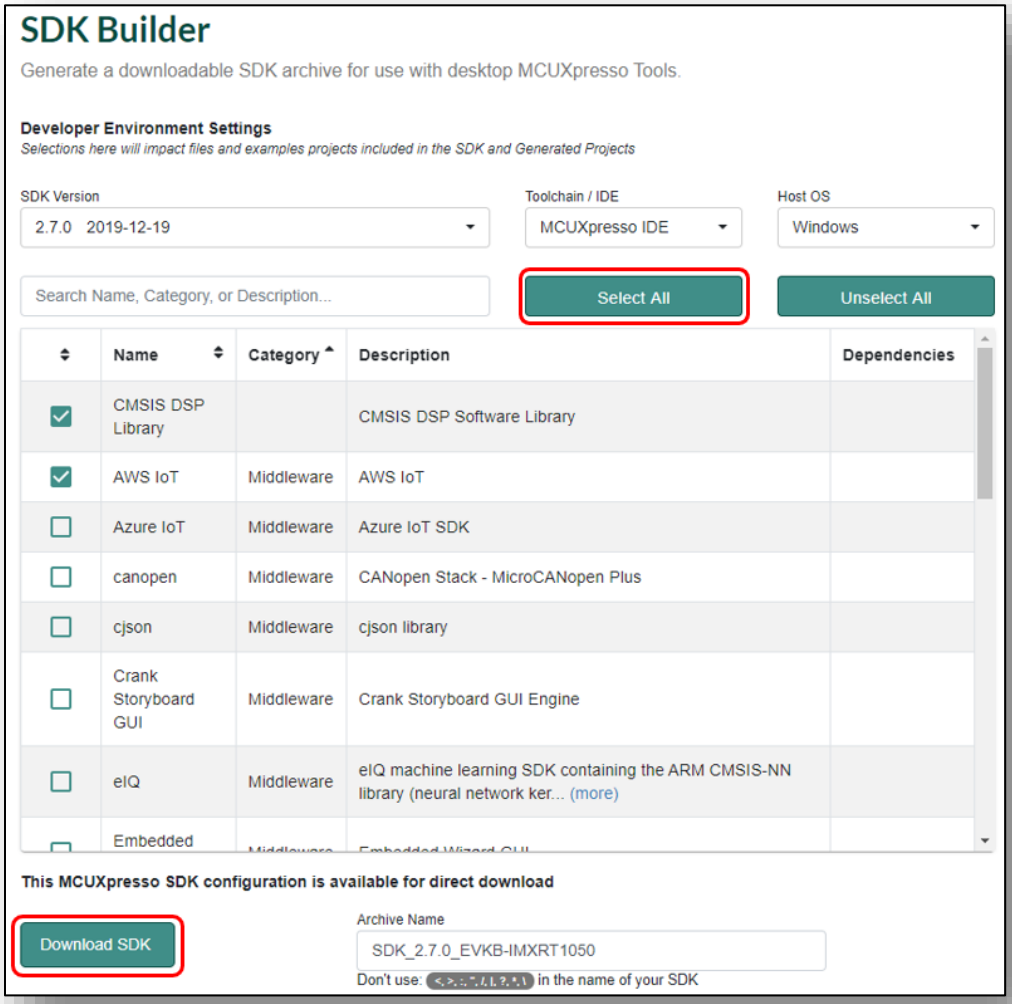
2. Type "1050", then select "EVKB-IMXRT1050" for i.MX RT 1050 EVKB.



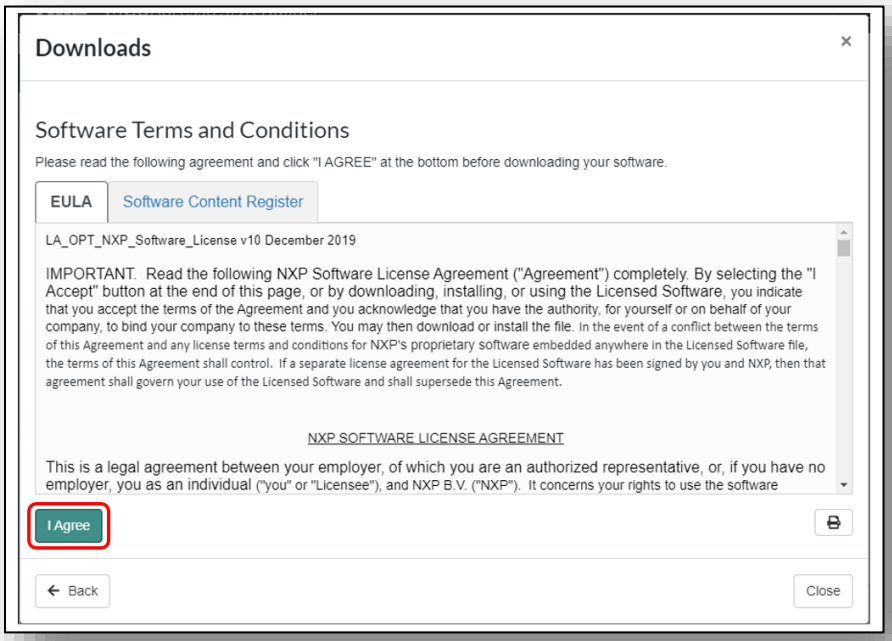
3. Scroll down, then click “Build MCUXpresso SDK”



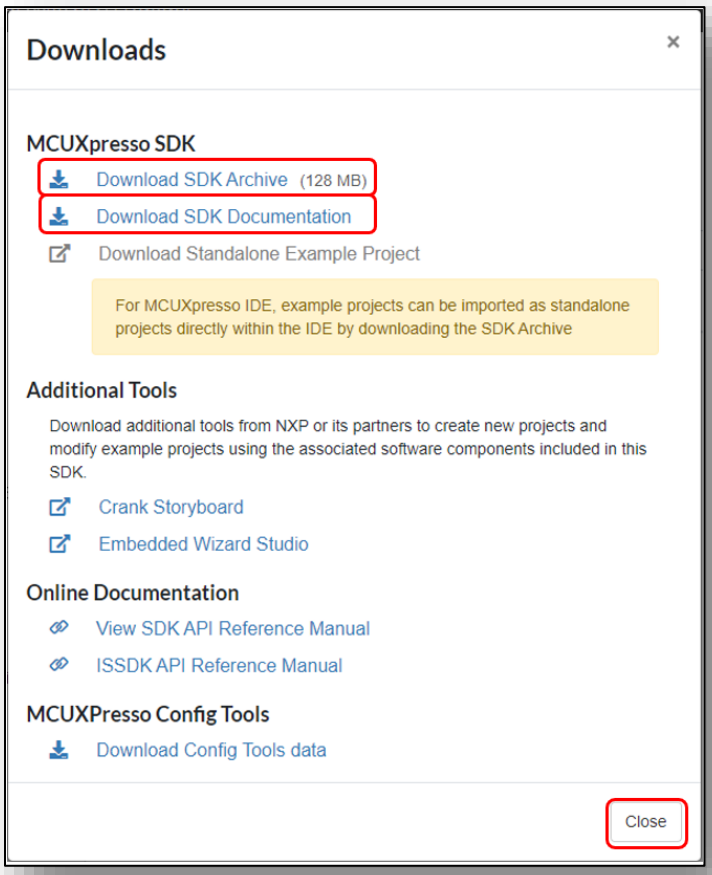
4. Click “Select All” and then select “Download SDK” to download the SDK.



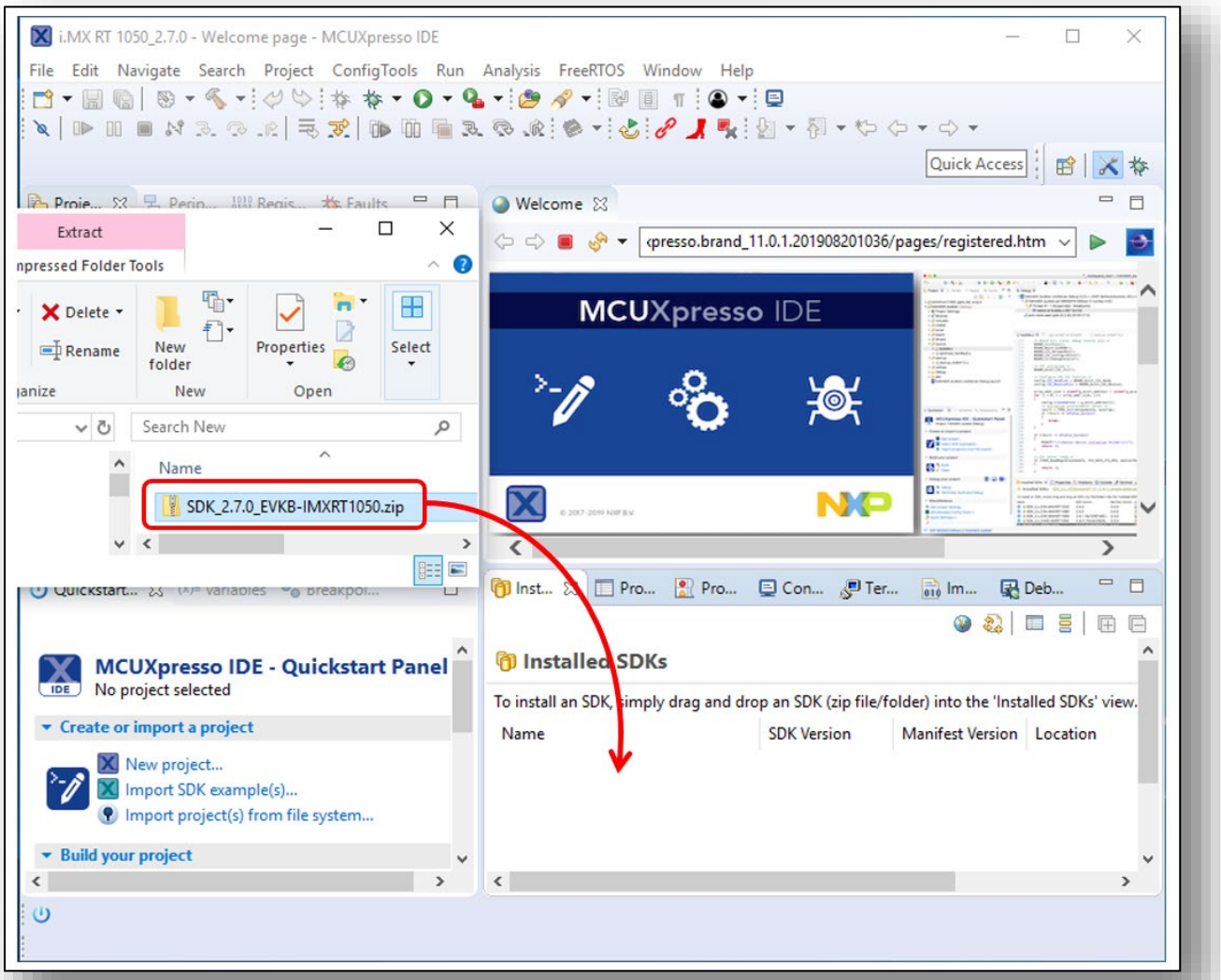
5. Agree to the EULA to start the SDK download.



6. Click “Download SDK Archive” if download does not start automatically. You can also download SDK Documentation, then click “Close”.

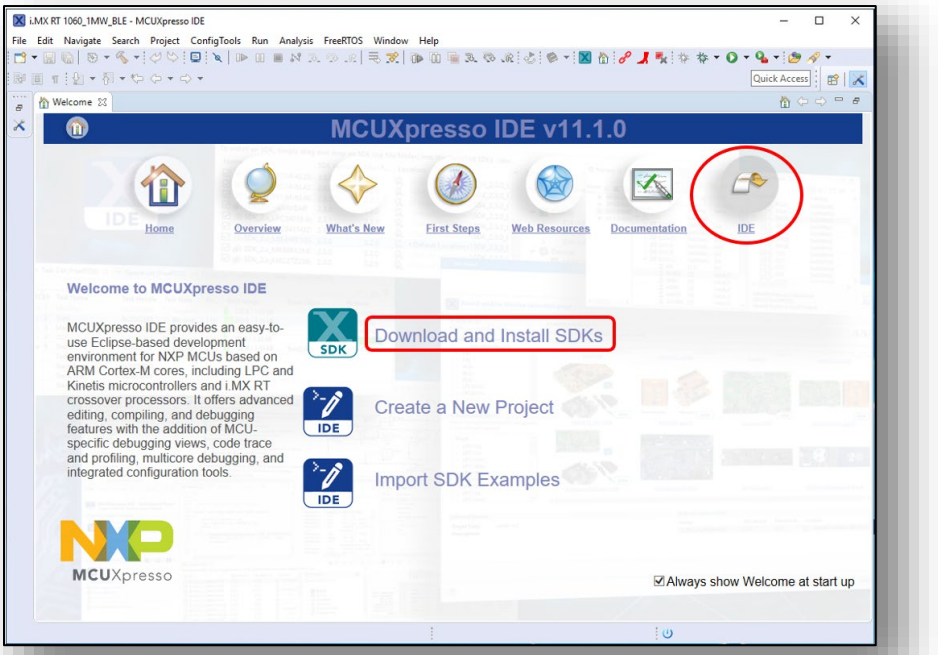


7. To install the SDK in the MCUXpresso, drag and drop the SDK Archive file on “Installed SDKs window”.

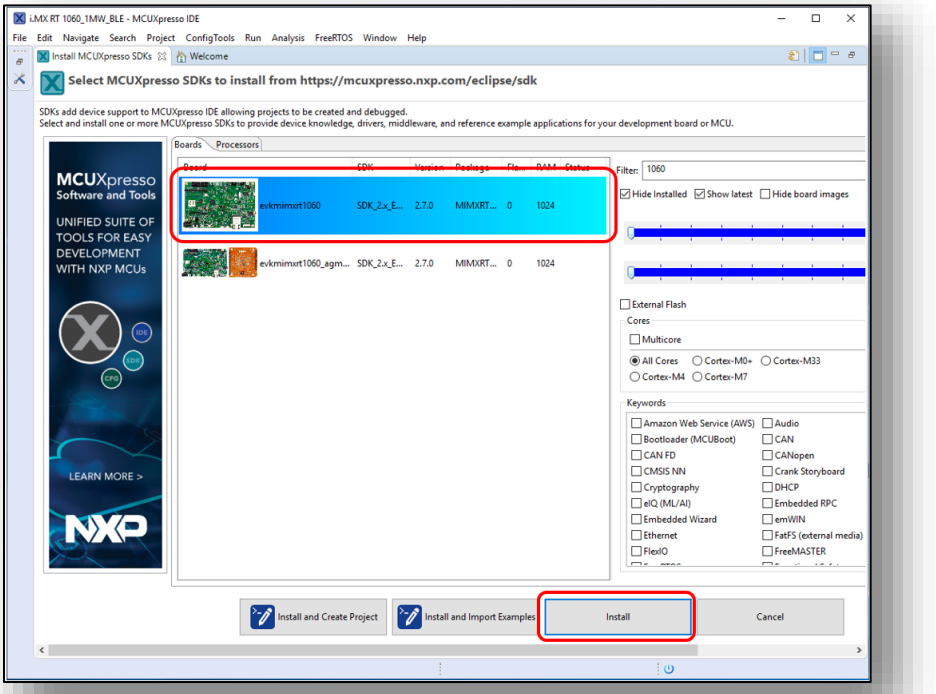


6.2 Install SDK directly from MCUXpresso IDE

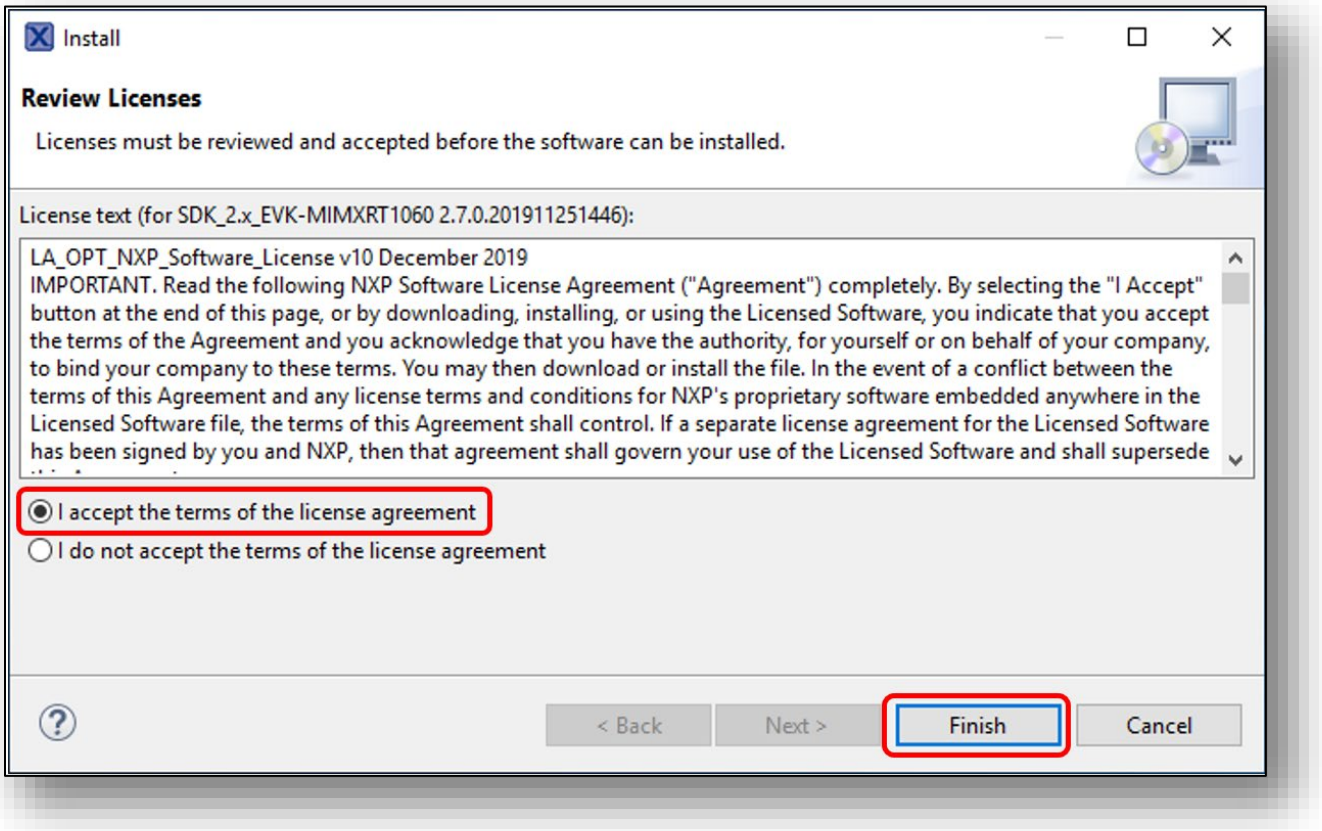
1. To install the SDK in the MCUXpresso IDE, click on “Download and Install SDKs”. To switch to normal IDE, click on IDE.



2. Type “1060” in the filter box. Click on “evkmimxrt1060” and click on “install” to download and install the SDK for i.MX RT 1060 EVK.



3. Accept the license agreement and click on finish to start the download.



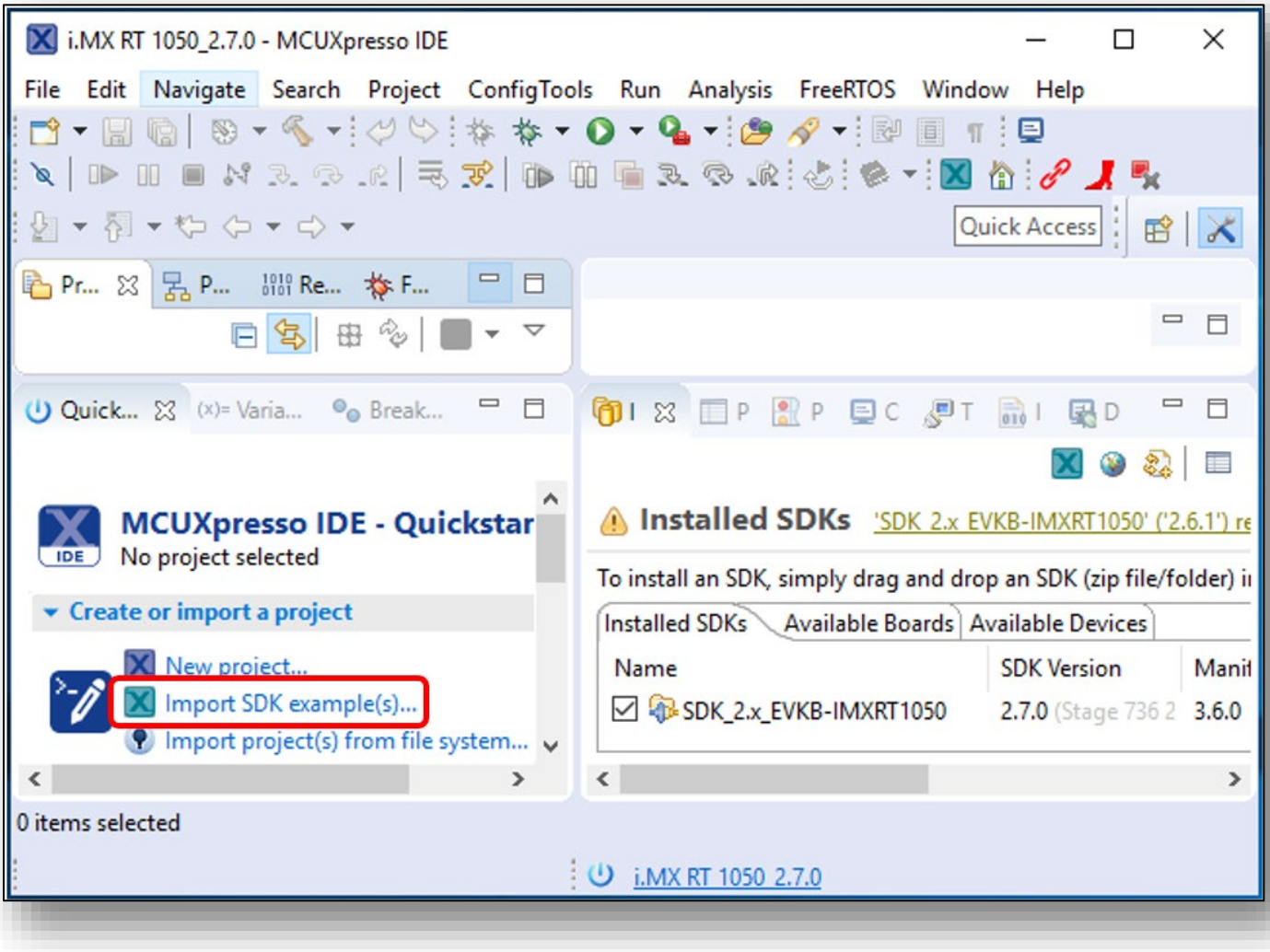
7 Running Sample Application

Various sample applications are provided by the SDK. There are four Wi-Fi examples included in the latest SDK:

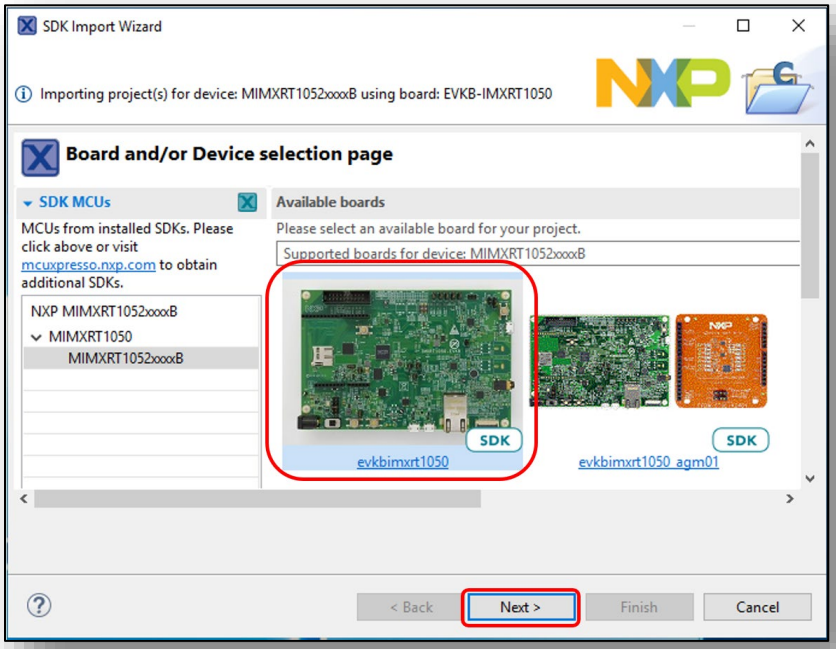
- wiced_iperf_4343W: this is for performance test for 1DX (CYW4343W).
- wiced_iperf_43012: this is for performance test for 1LV (CYW43012).
- wiced_mfg_test_4343W: this is for RF measurements and Regulatory testing for 1DX.
- wiced_mfg_test_43012: this is for RF measurements and Regulatory testing for 1LV.
- wiced_bt_passthrough_4343W: this is for Bluetooth testing for 1DX.
- wiced_ble_4343W: this is for BLE testing for 1DX.
- wiced_webconfig_4343W: this is for STA + SoftAP with a web server testing for 1DX.

7.1 Example wiced_iperf_4343W

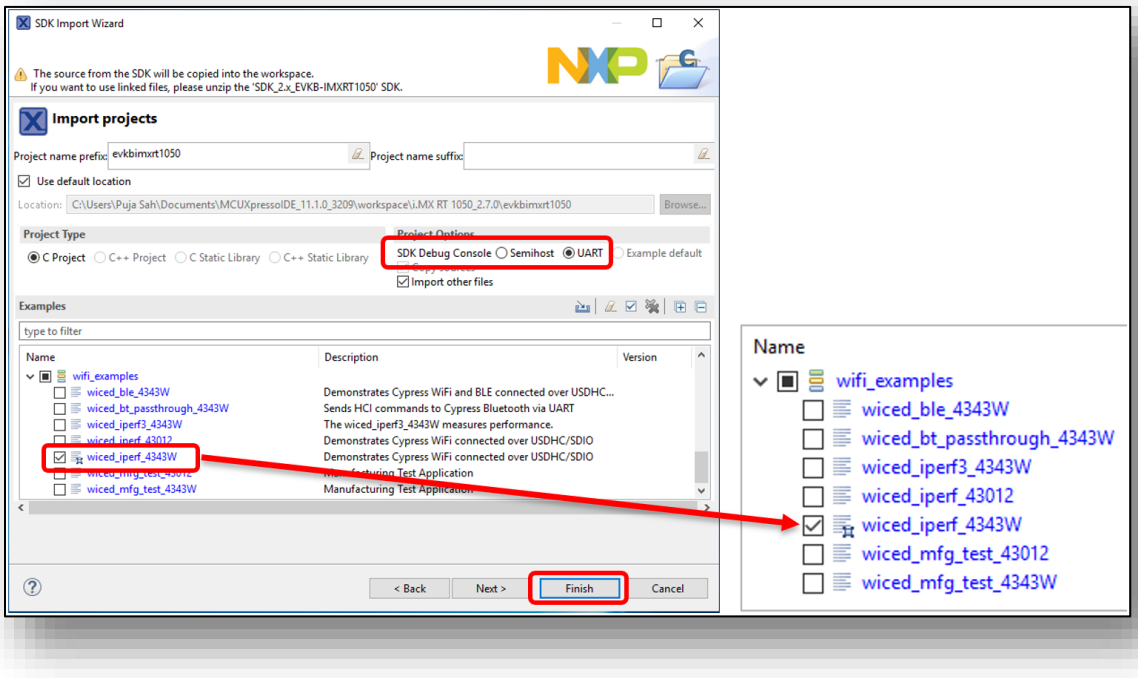
1. Click on “Import SDK example(s)…” in the Quickstart Panel.



2. Select “evkbimxrt1050” board and click Next button.

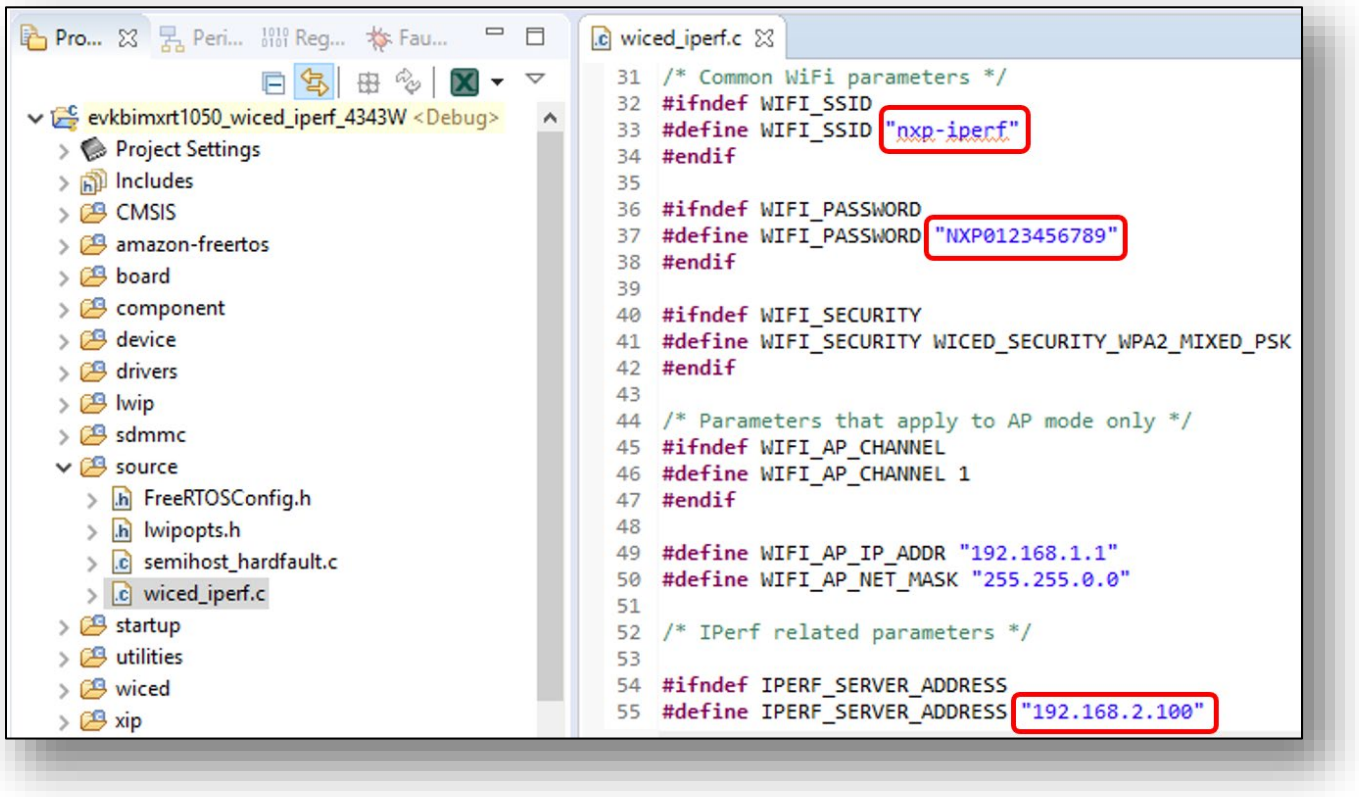


3. Expand wifi_examples and select wiced_iperf_4343W. Select UART for SDK Debug Console, then click Finish button.



NOTE: If you are using Embedded Artists board, modify flash memory size from 0x800000 to 0x400000 and select “MIMXRT1050-EcoXiP_ATXP032.cfx” as the driver. For details and to run the wiced_iperf_4343W example in the EA’s i.MX RT 1062 Developer’s Kit, please refer to the Getting Started with M.2 modules and i.MX RT.

4. Open evkbimxrt1050_wiced_iperf_4343W/source/wiced_iperf.c to modify WIFI_SSID, WIFI_PASSWORD and IPERF_SERVER_ADDRESS.

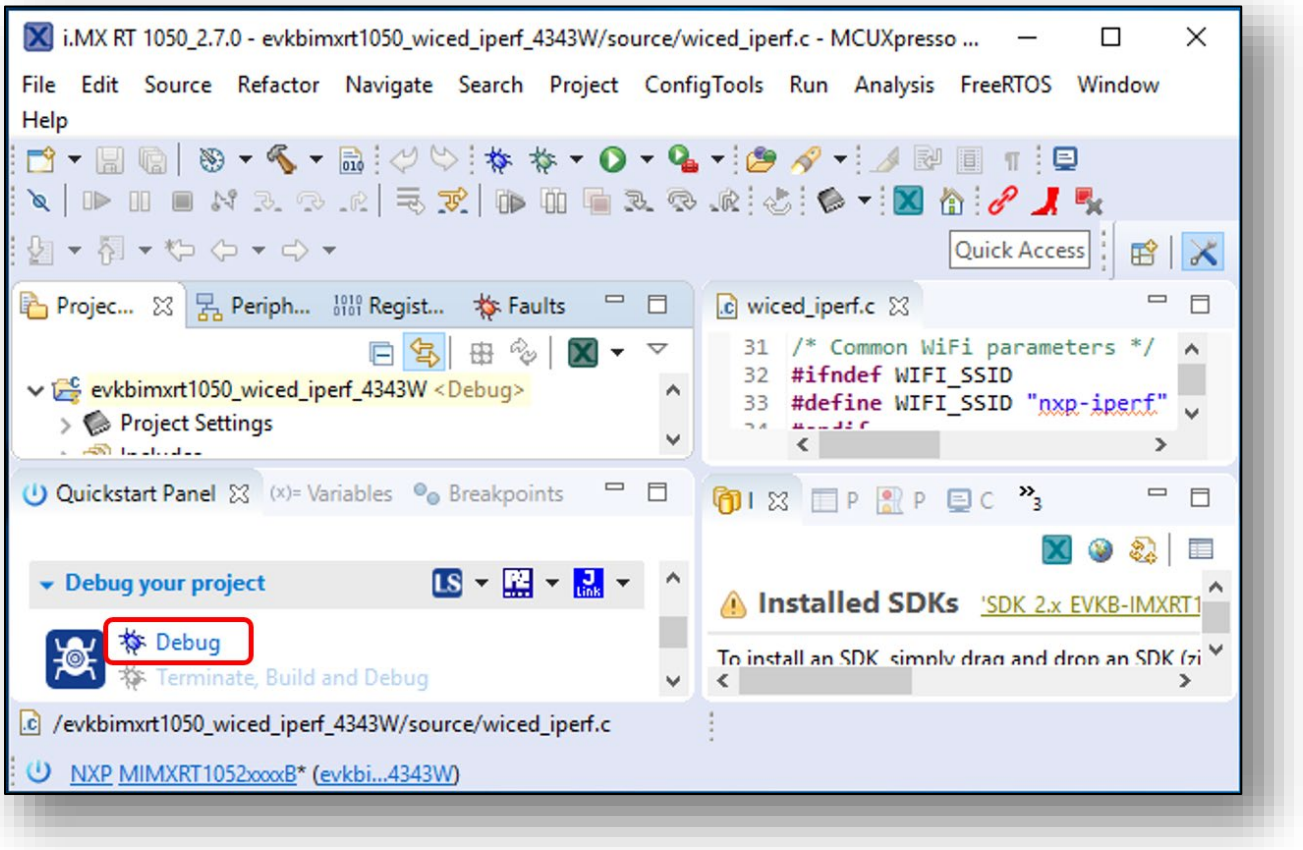


In case of Embedded Artists' board, you need to add or modify some files in the example before starting debug. You can get these files from "imxrt10xx_ea_files_sdk270_yyyy-mm-dd.zip" downloaded in **Section 5.**

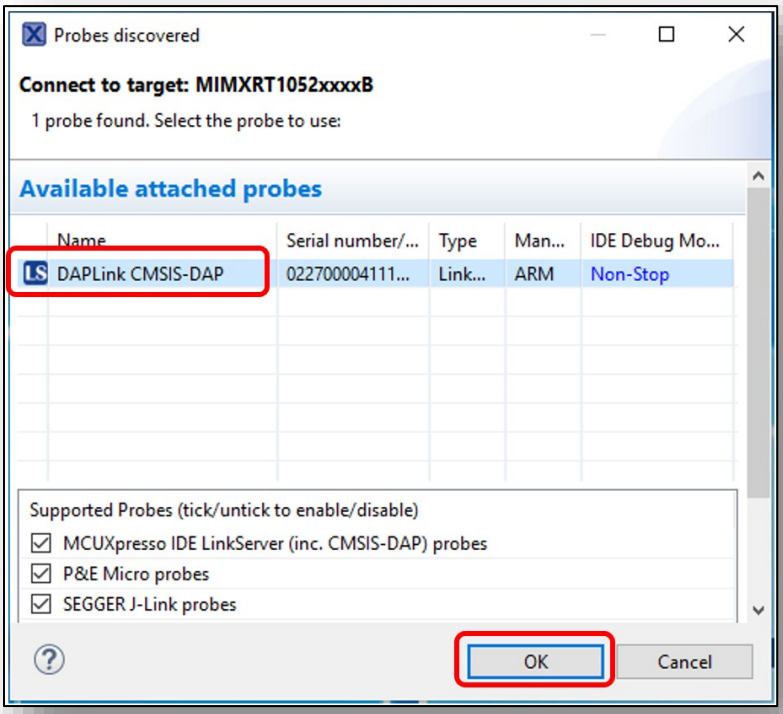
Table 4: Files to be modified on Embedded Artists' Dev Kit

File to copy	Destination	Comment
pin_mux.c	board/	Replace existing file
fsl_lpi2c.c	drivers/	New file
fsl_lpi2c.h	drivers/	New file
pca6416.c	source/	New file
pca6416.h	source/	New file
wwd_platform.c	43xxx_wifi/WICED/platform/MCU/LPC/WWD	Replace existing file
wwd_SDIO.c	43xxx_wifi/WICED/platform/MCU/LPC/WWD	Replace existing file
evkmimxrt10xx_flexspi_nor_config.c	xip/	Replace existing file

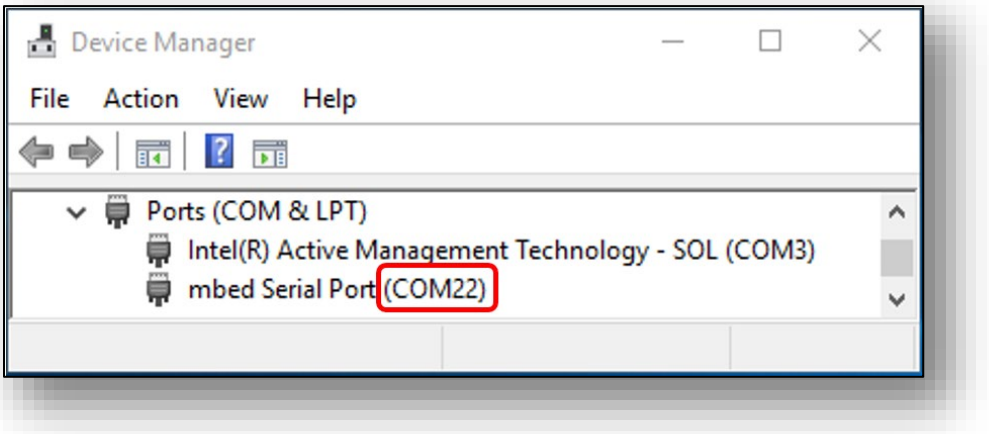
5. Click Debug in the QuickStart Panel.



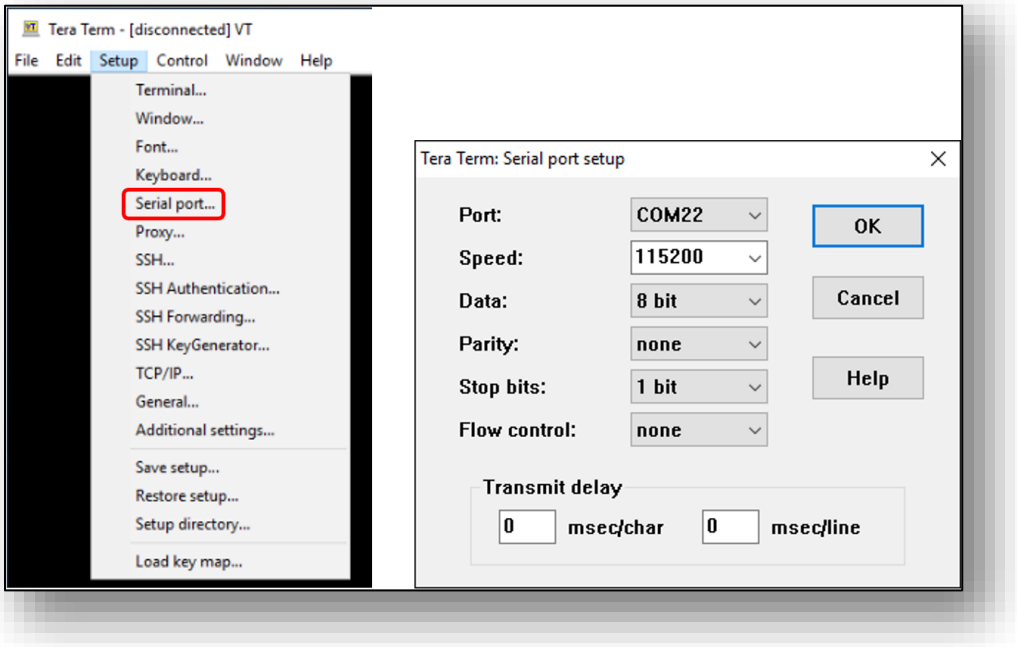
6. For the very first attempt, you need to select the appropriate JTAG adapter. Select the adapter and click OK, and then wait for a while for the build. You can see the log on console window.



7. After the Debug process is complete, open the “Device Manager” in windows and go to “Ports (COM & LPT)” to check the mbed COM port number. In this case, COM 22 is our COM port number.



8. Now the iperf example is ready to run. Open Tera Term on the appropriate COM port (i.e. COM 22 in this case). Configure port for 115200 bps, 8 bits data, no parity, and 1 stop bit (115200/8/N/1).



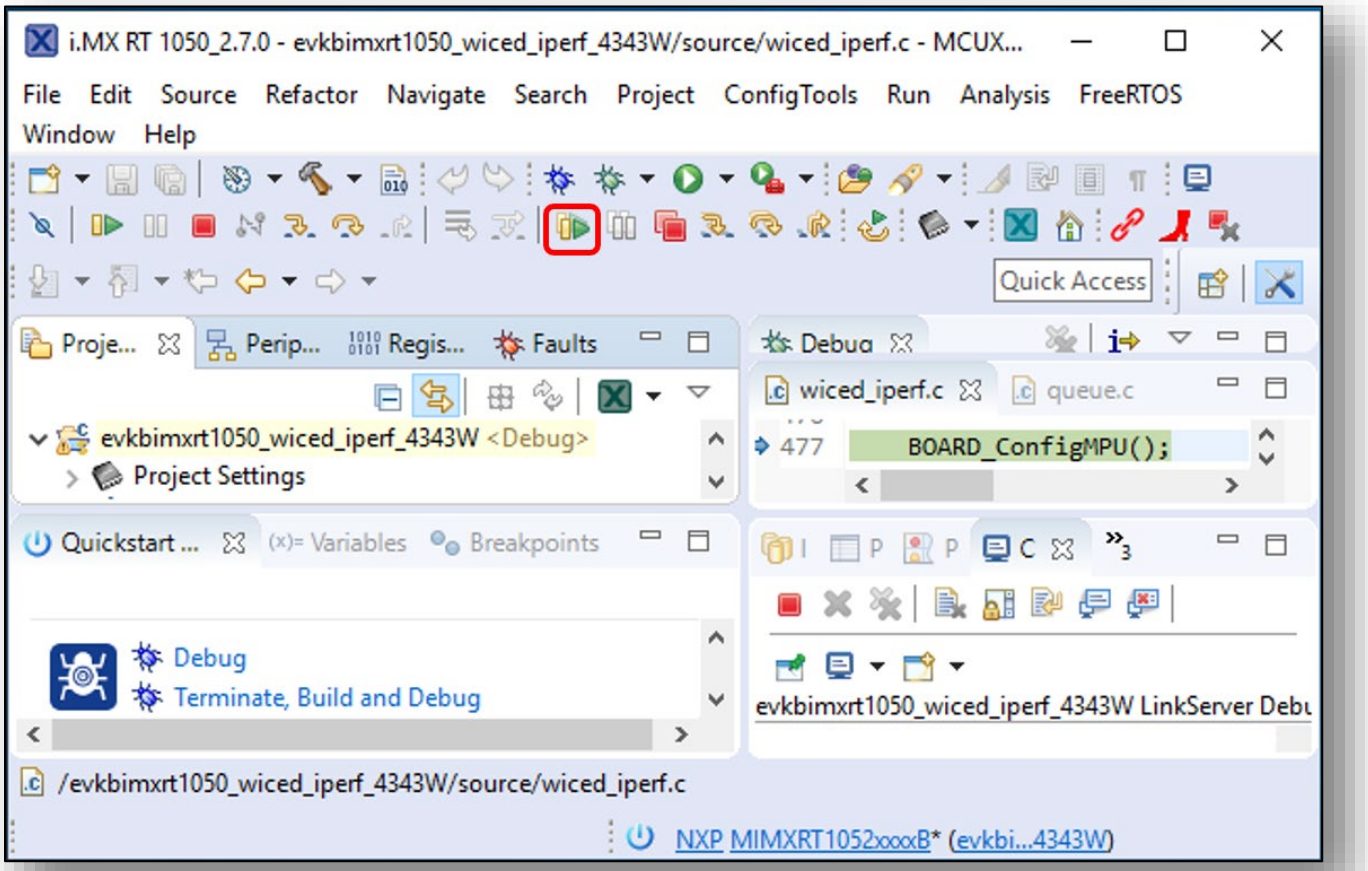
9. To download the iperf, follow the following link:

For Windows: https://iperf.fr/download/windows/iperf-2.0.5-win32.zip
For Linux: Follow the steps to install iperf.

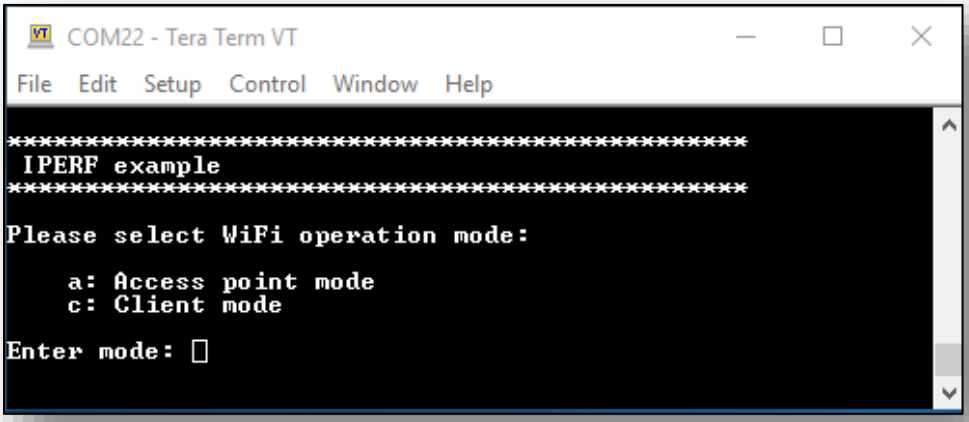
1. Download the .deb file for iperf 2.05 via https://iperf.fr/download/ubuntu/iperf_2.0.5+dfsg1-2_amd64.deb
2. Change directory to where the .deb file is.
3. Run the following commands to install it.

```
$ dpkg -I iperf_2.0.5+dfsg1-2_amd64.deb
$ sudo dpkg -i iperf_2.0.5+dfsg1-2_amd64.deb
$ sudo apt install iperf
```

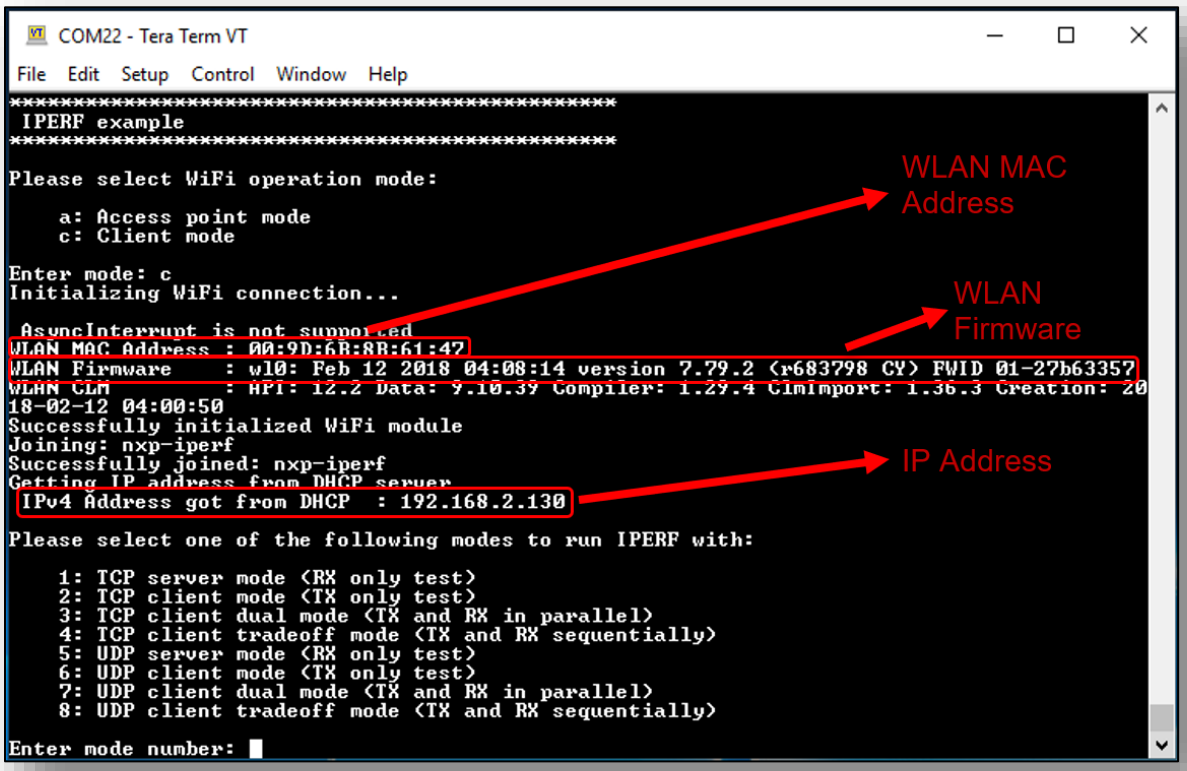
10. Click resume button in MCUXpresso.



11. You should see this output from i.MX RT.

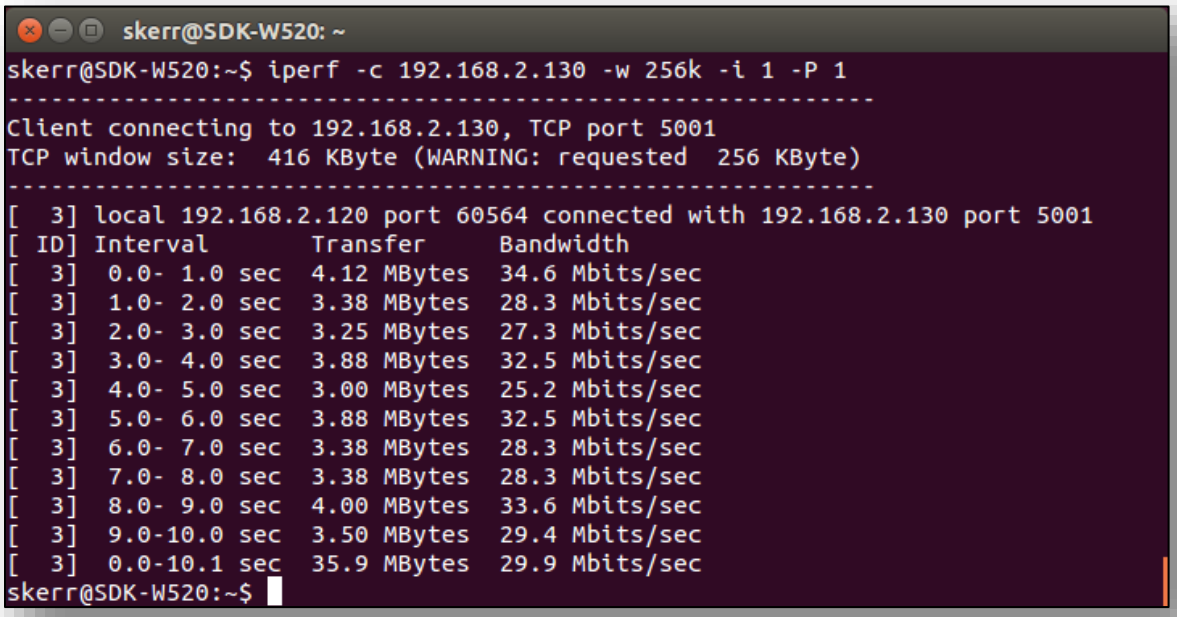


12. Type “c” to run as client mode. The sample wiced_iperf support several options. Let’s try iperf server. Type ‘1’ in Tera Term.

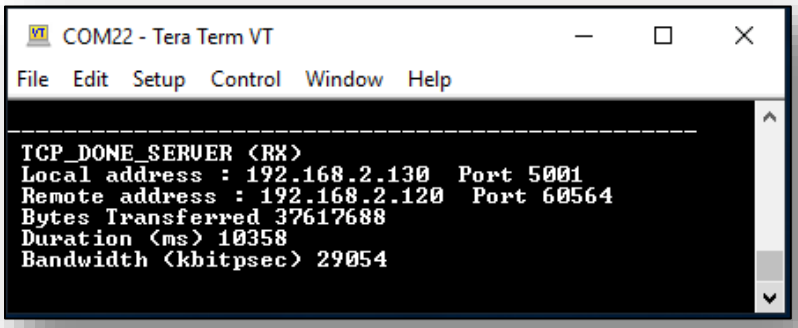


13. To see the throughput numbers, type iperf command in another laptop with iperf2 installed in it: “iperf -c <ip address> -w 256k -i 1 -P 1”. You will see below throughput.

Laptop iPerf Results:

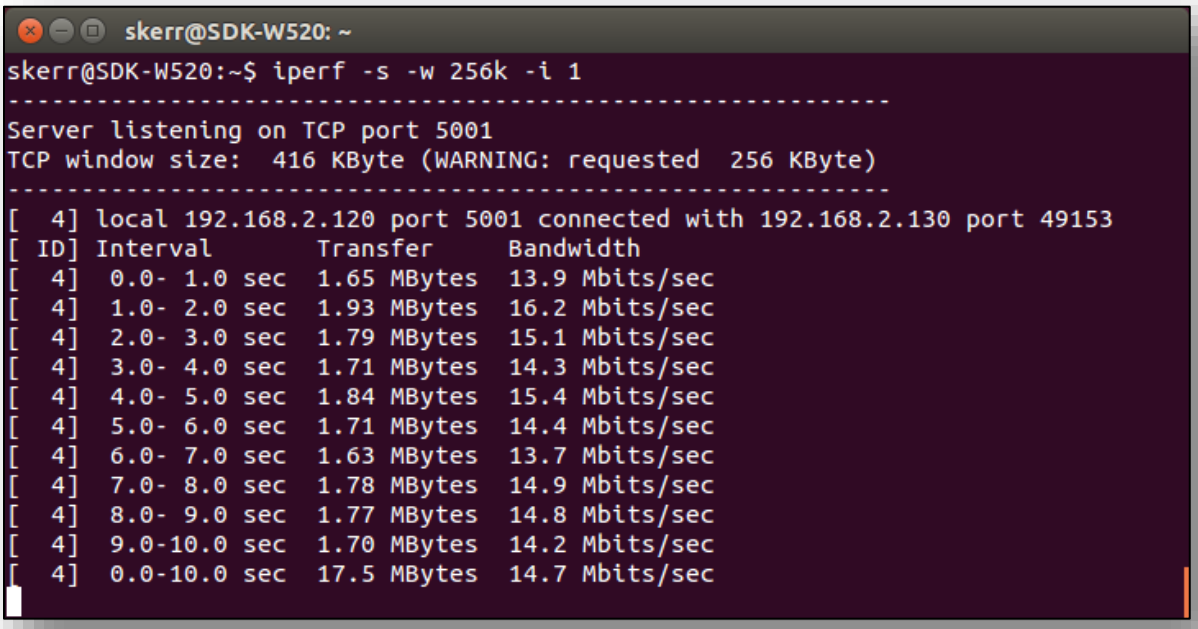


Console Output – Tera Term:

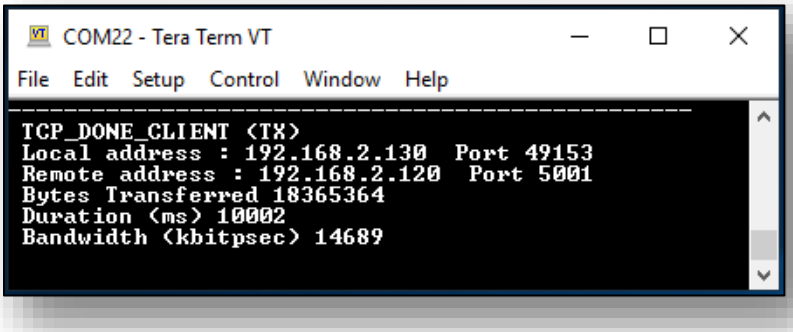


14. Type 2 in Tera Term to run TCP client mode (TX only). Before typing 2, make sure to run server on another Laptop ("iperf -s -w 256k -i 1"). You will see below outputs:

Laptop iPerf Results:

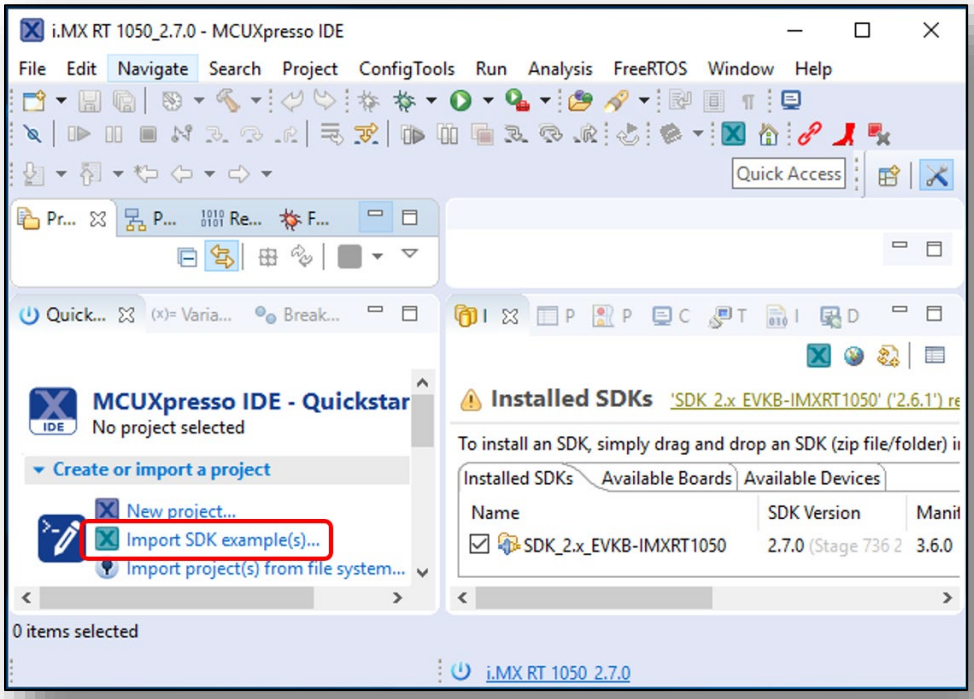


Console Output – Tera Term:

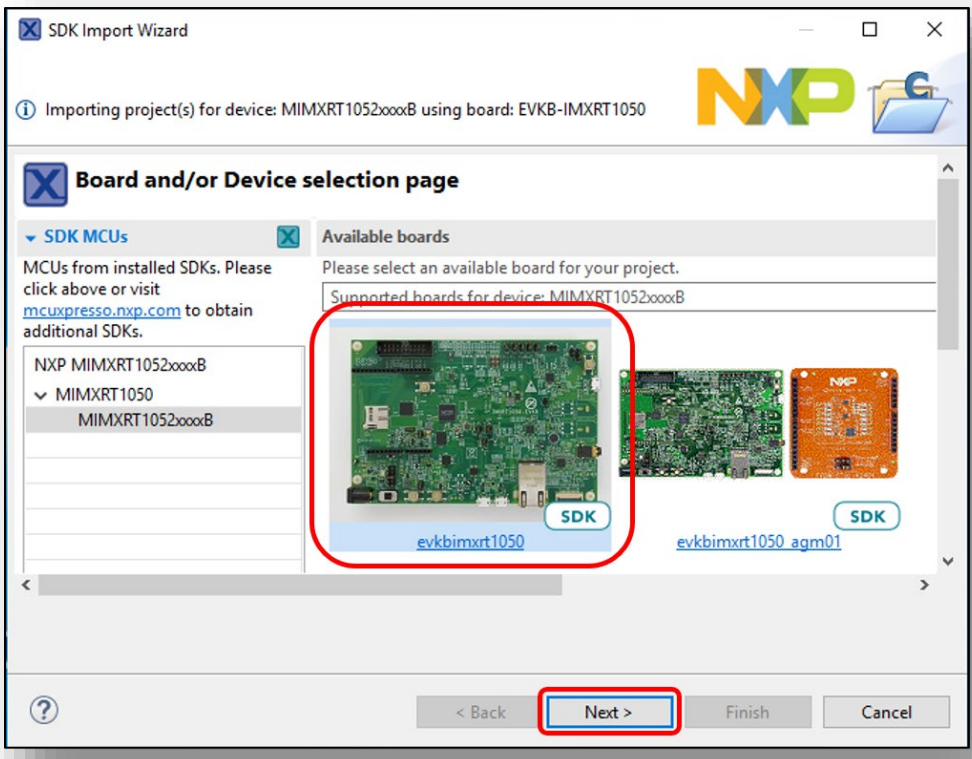


7.2 Example wiced_iperf_43012

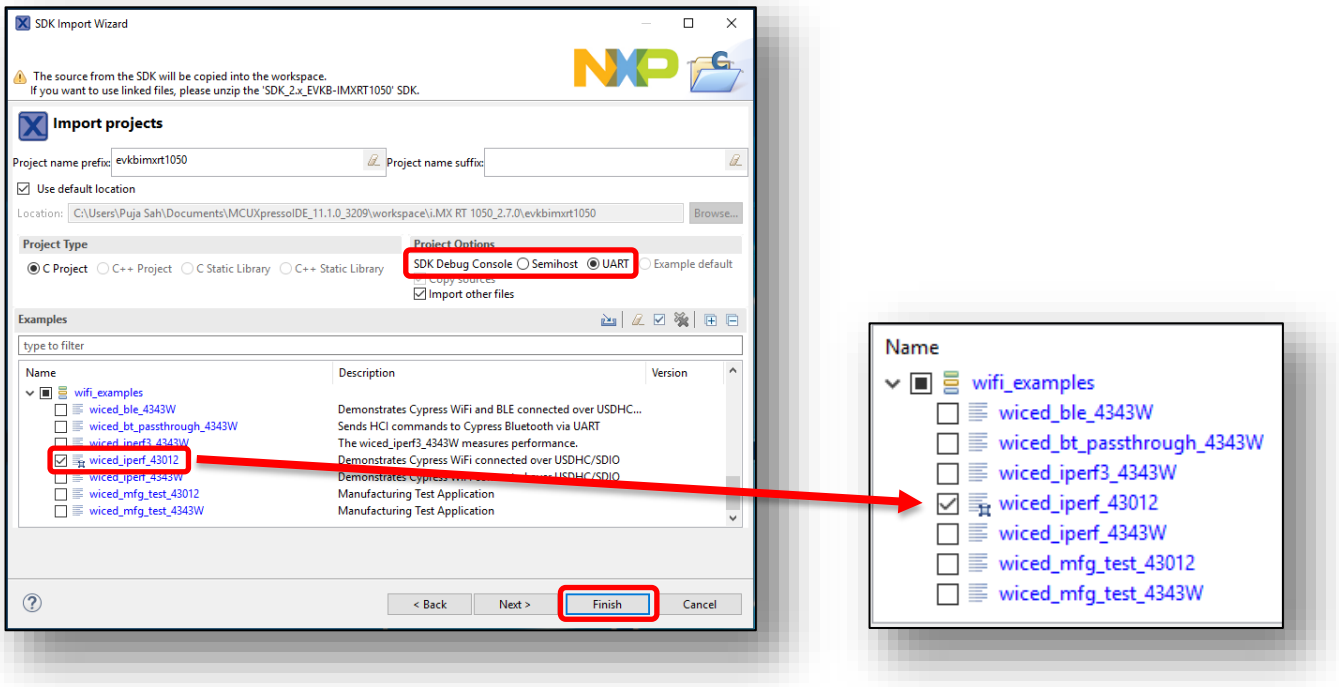
1. Click on “Import SDK example(s)…” in the Quickstart Panel.



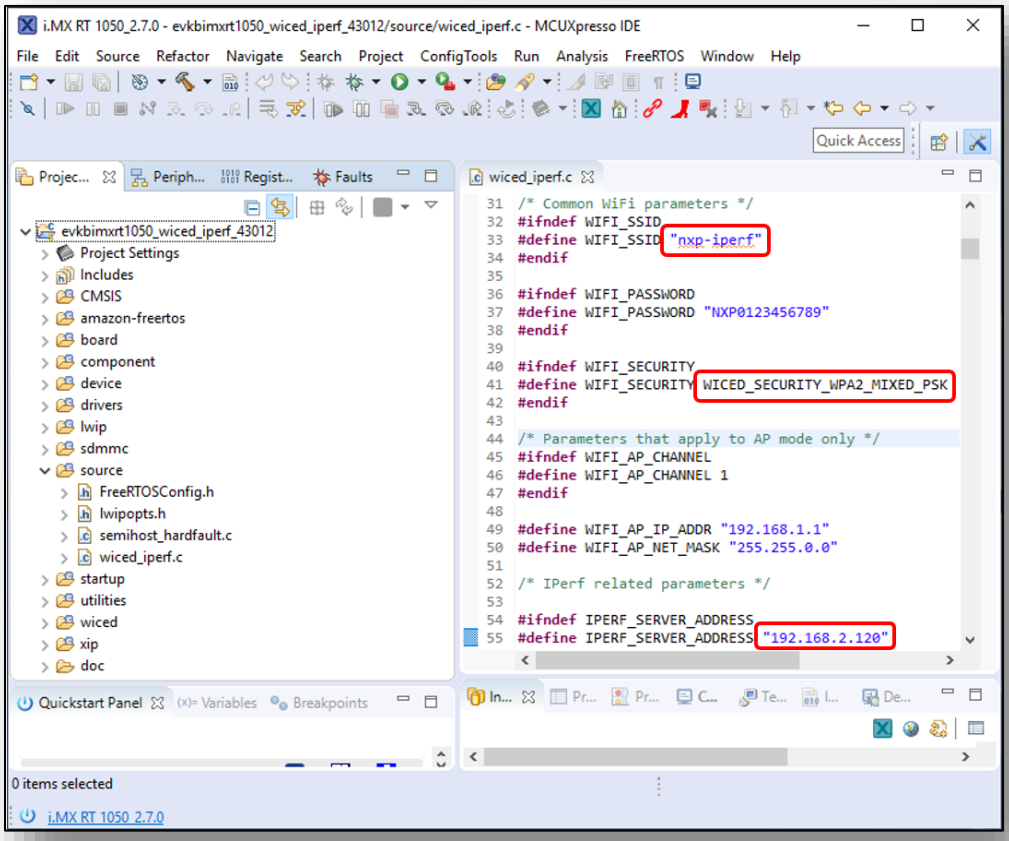
2. Select “evkbimxrt1050” board and click Next button.



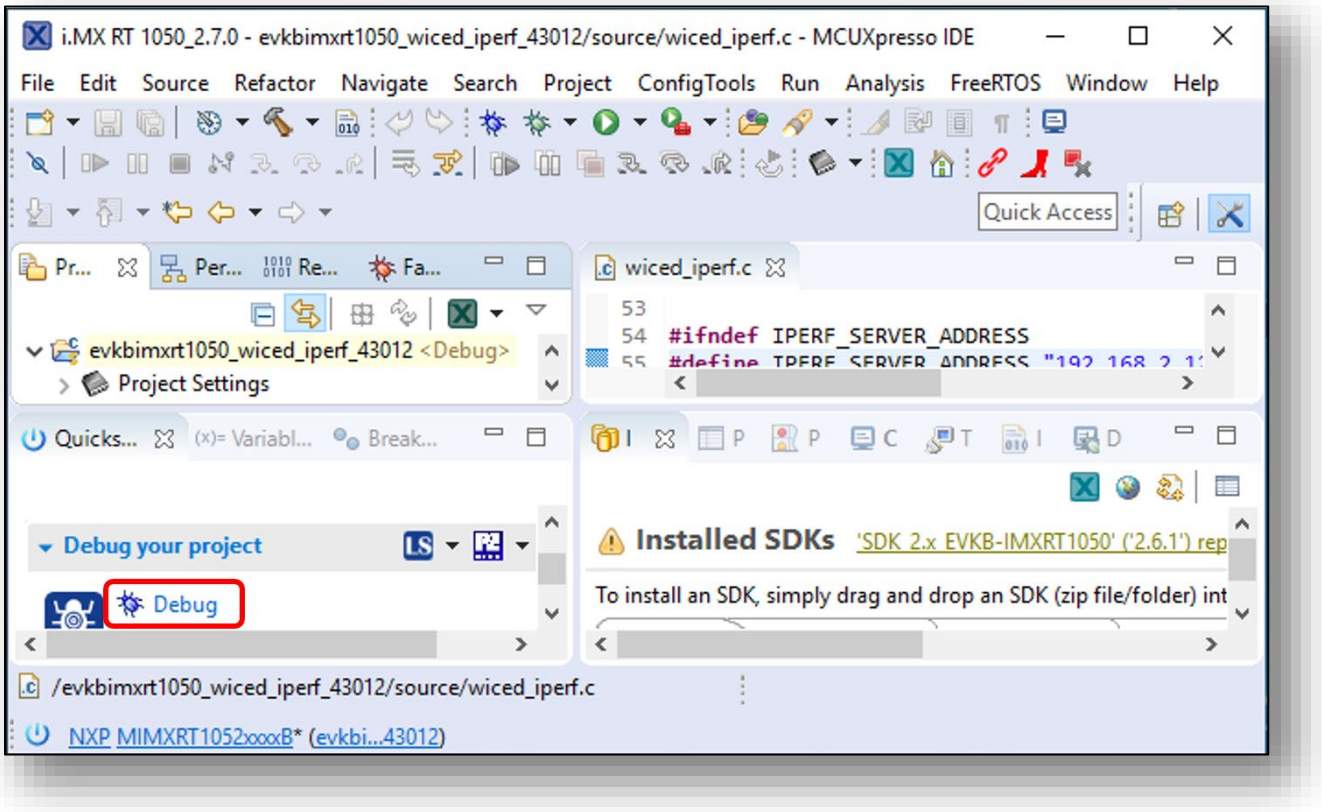
3. Expand wifi_examples and select wiced_iperf_43012. Select UART for SDK Debug Console, then click Finish button.



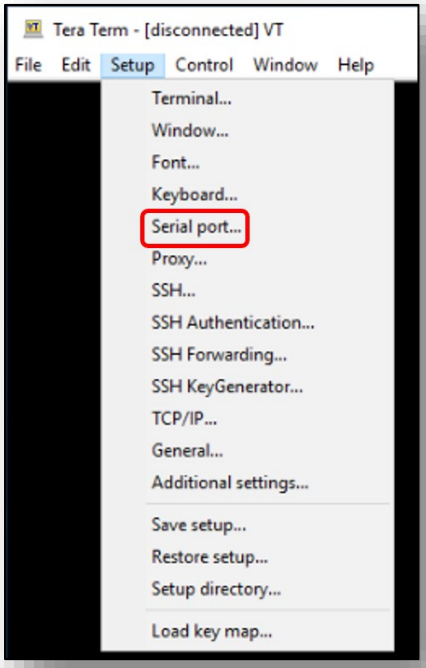
4. Open source/wiced_iperf.c to modify WIFI_SSID, WIFI_PASSWORD and IPERF_SERVER_ADDRESS.

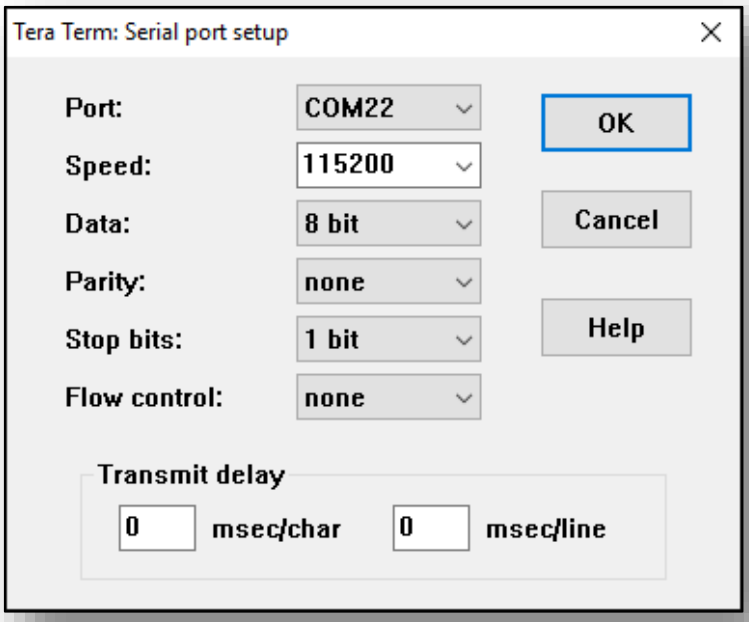


5. Click on “Debug” button in the Quickstart Panel.

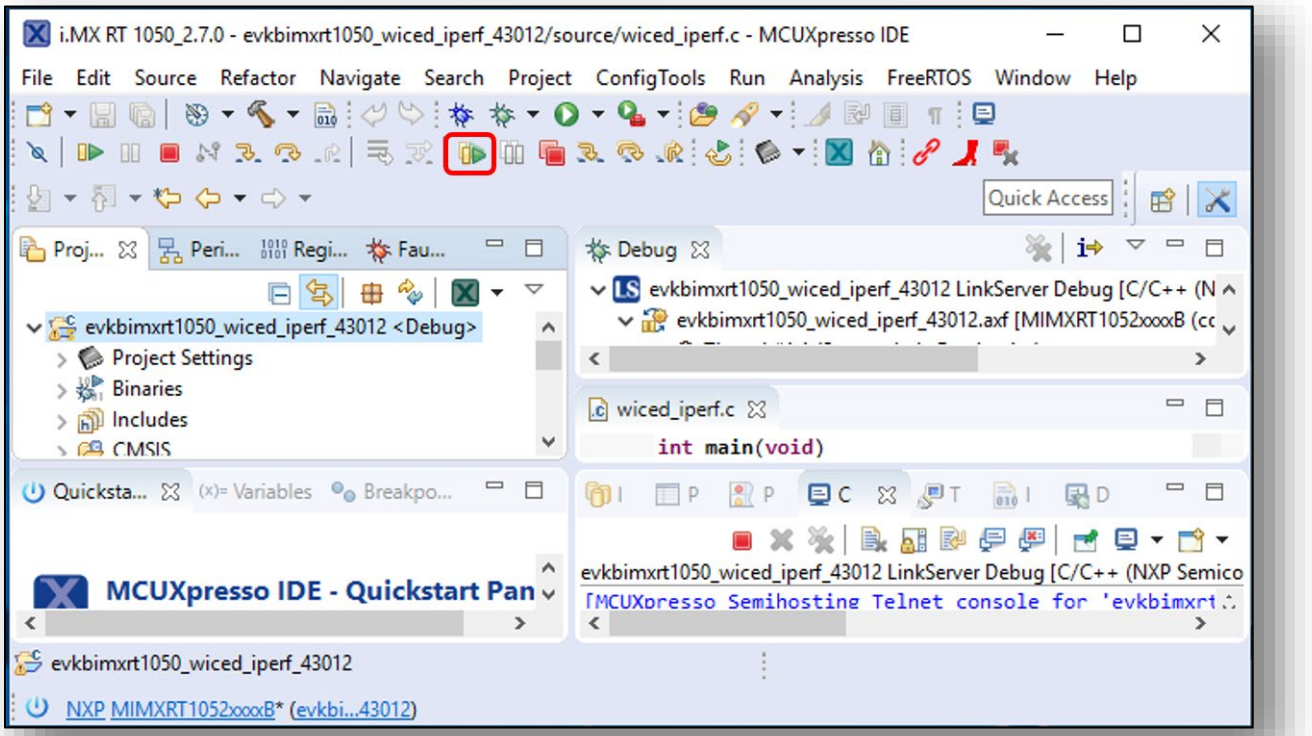


6. After the debug process is complete, the iperf example is ready to run. Open Tera Term on the appropriate COM port (i.e., COM 22 in this case). Configure port for 115200 bps, 8 bits data, no parity, and 1 stop bit (115200/8/N/1).

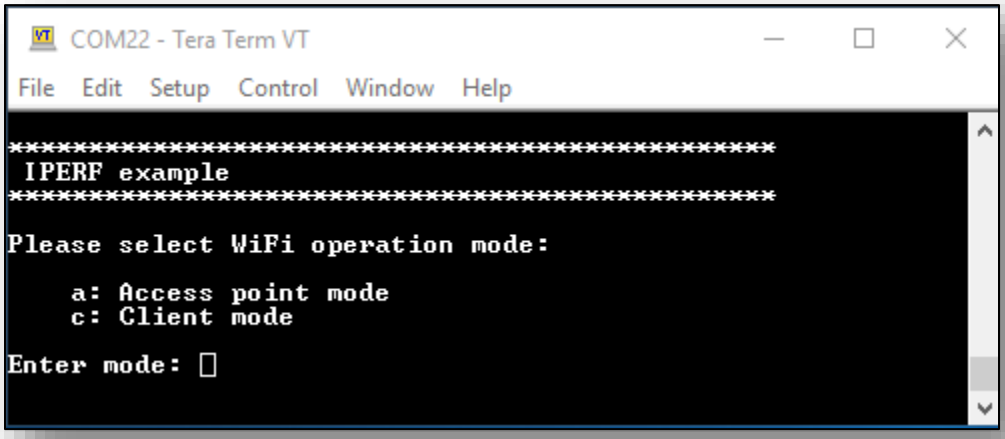




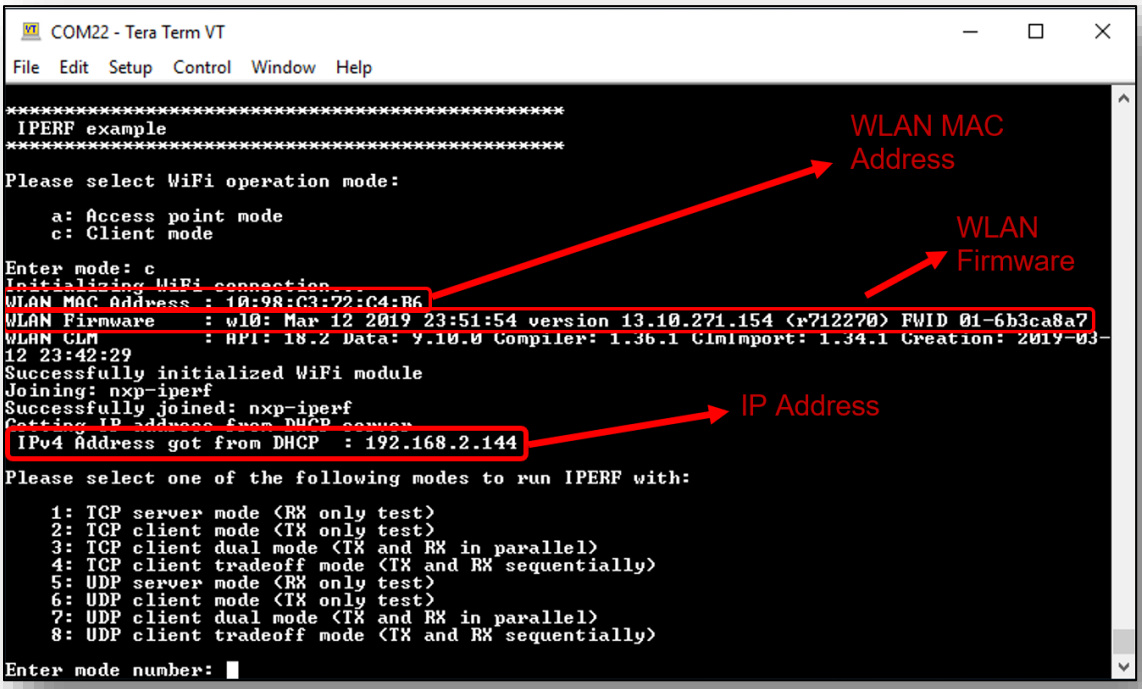
7. Click resume button in MCUXpresso.



8. You should see following output in Tera Term.

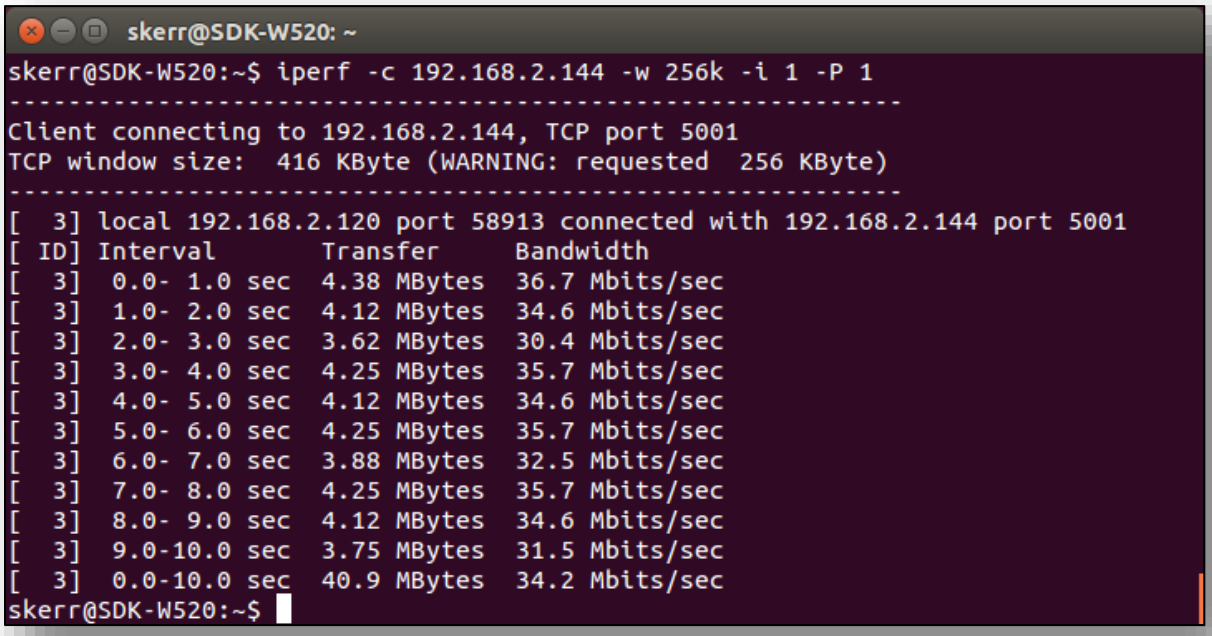


9. Type “c” to run as client mode. The sample wiced_iperf support several options. Let’s try iperf server. Type ‘1’ in Tera Term.

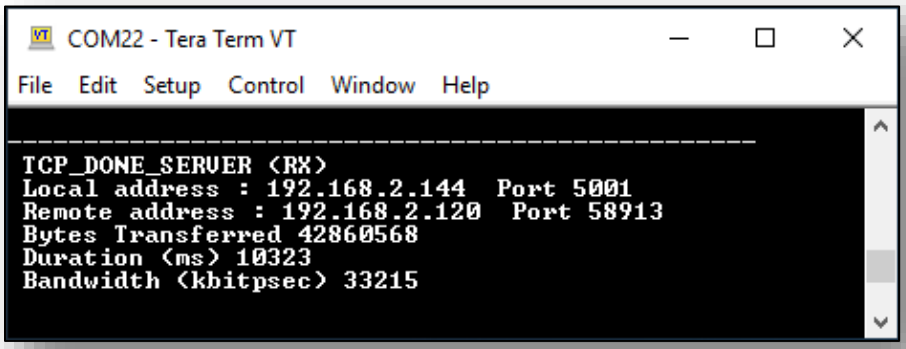


10. To see the throughput numbers, type iperf command in another laptop with iperf2 installed in it: “iperf -c <ip address> -w 256k -i 1 -P 1”. Throughput performance numbers are shown for both 2.4GHz and 5GHz below.

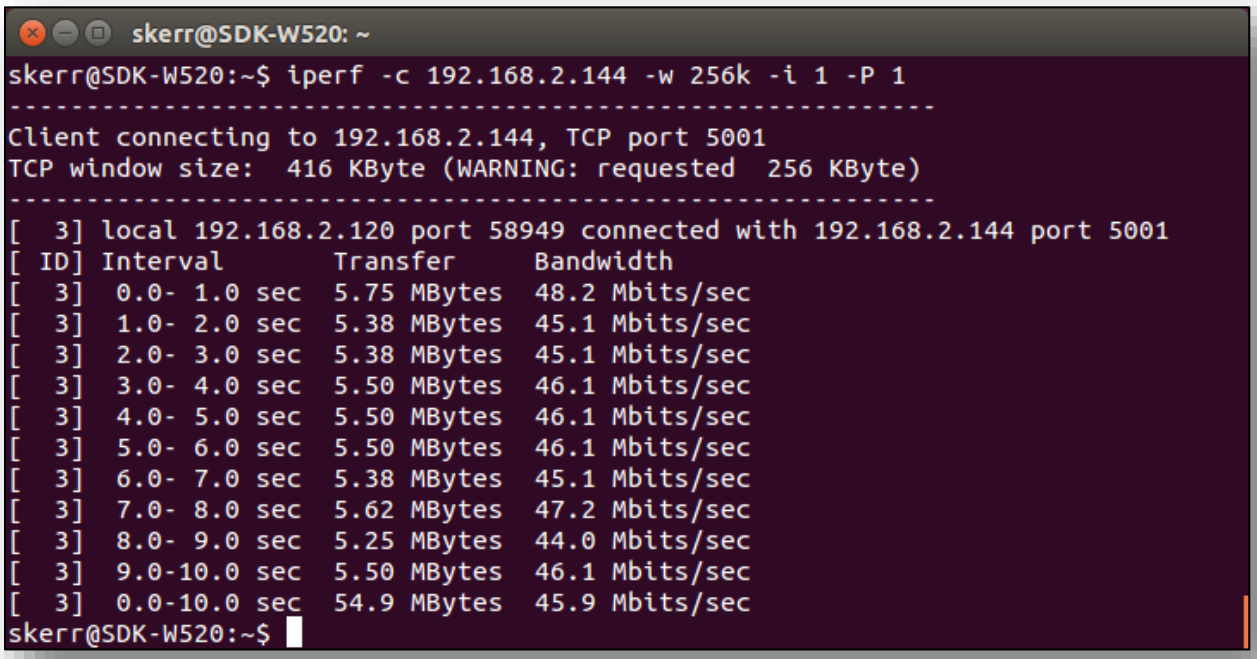
Laptop iPerf Results (2.4GHz):



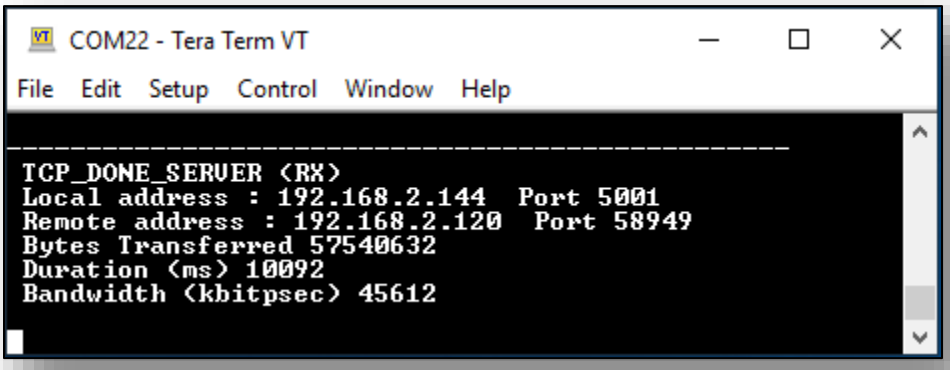
Console Output – Tera Term (2.4GHz):



Laptop iPerf Results (5GHz):

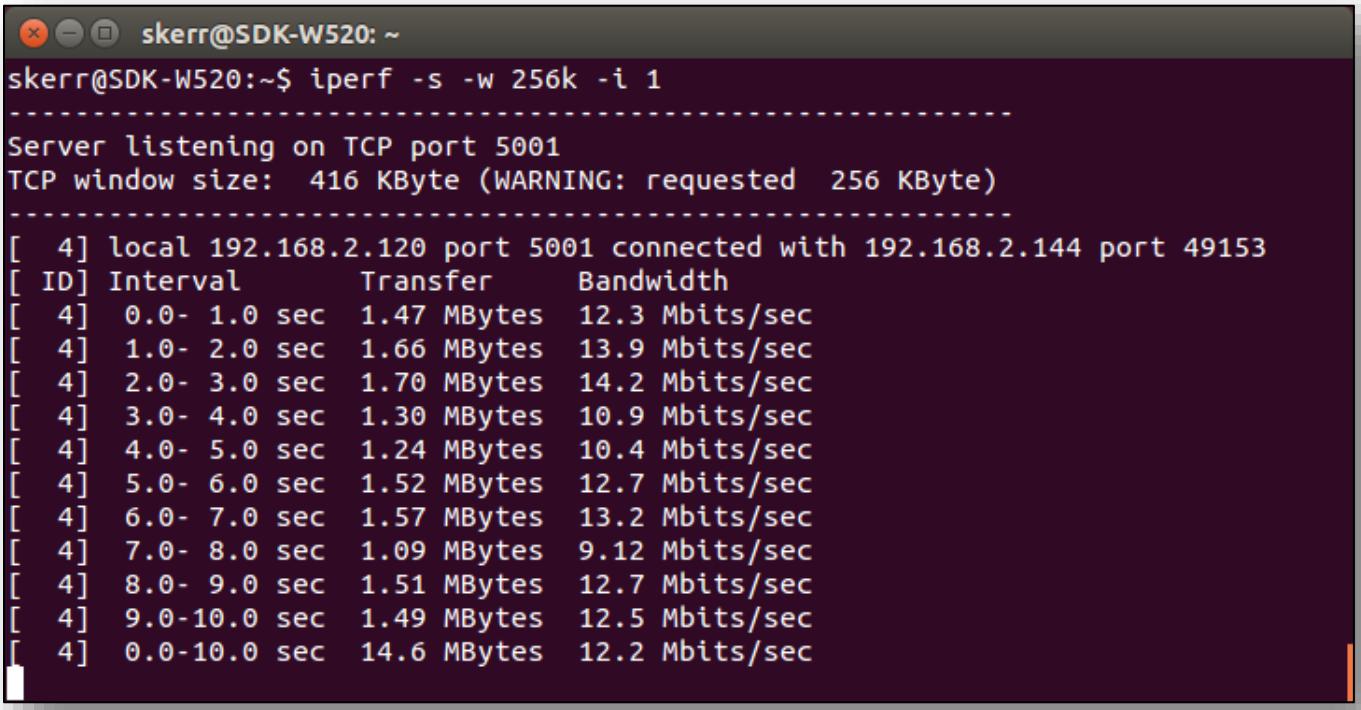


Console output – Tera Term (5GHz):

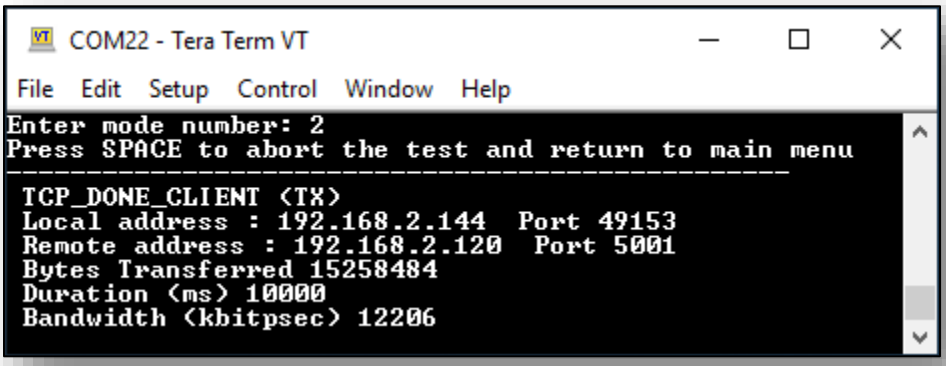


11. Type 2 in Tera Term to run TCP client mode (TX only). Before typing 2, make sure to run server on another Laptop (“iperf -s -w 256k -i 1”). You will see below outputs:

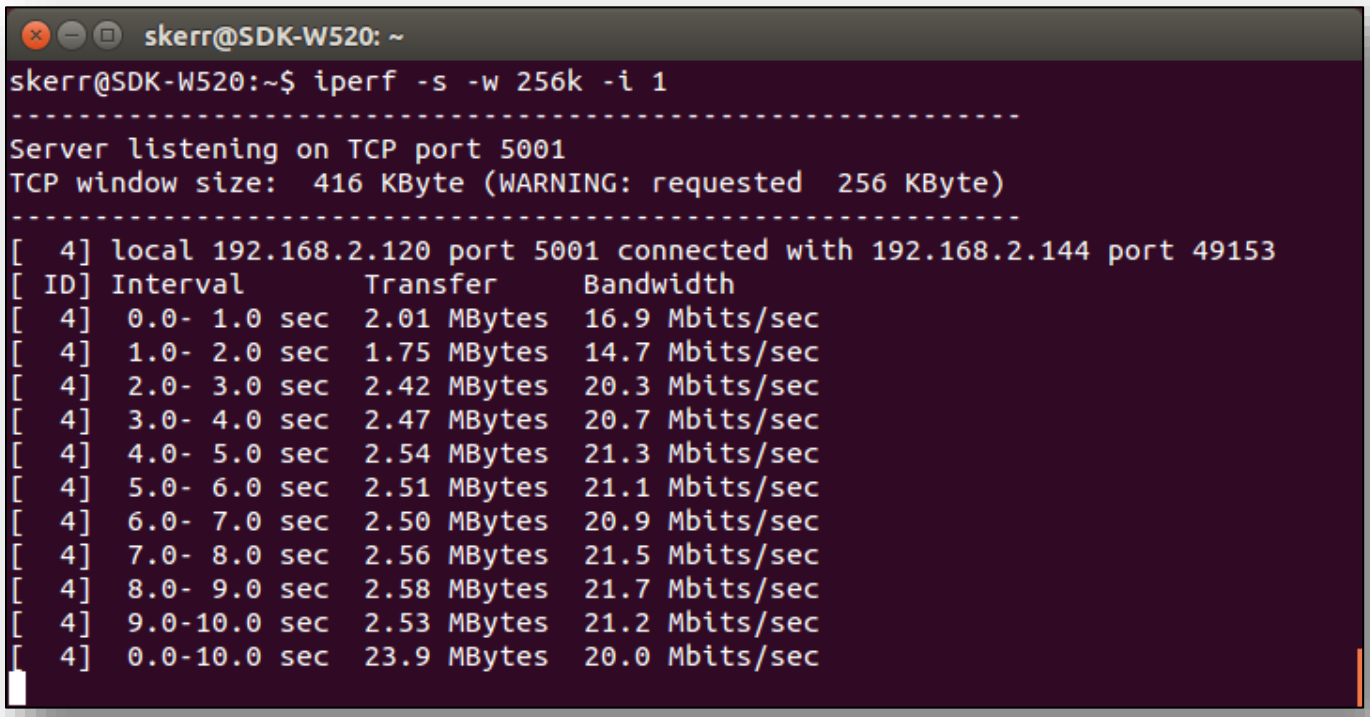
Laptop iPerf Results (2.4GHz):



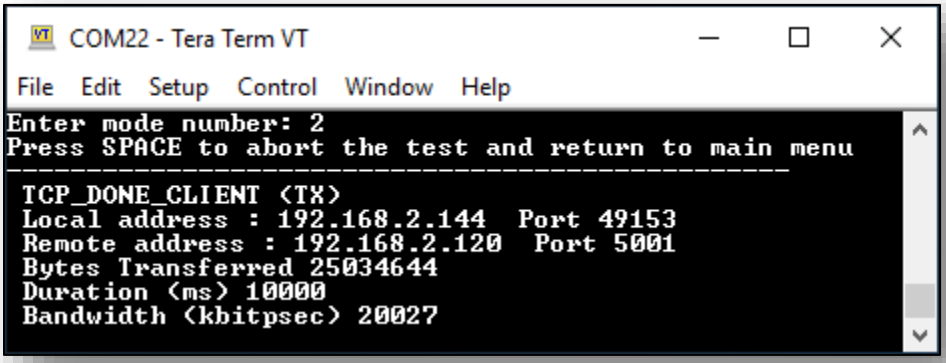
Console output – Tera Term (2.4GHz):



Laptop iPerf Results (5GHz):



Console output – Tera Term (5GHz):



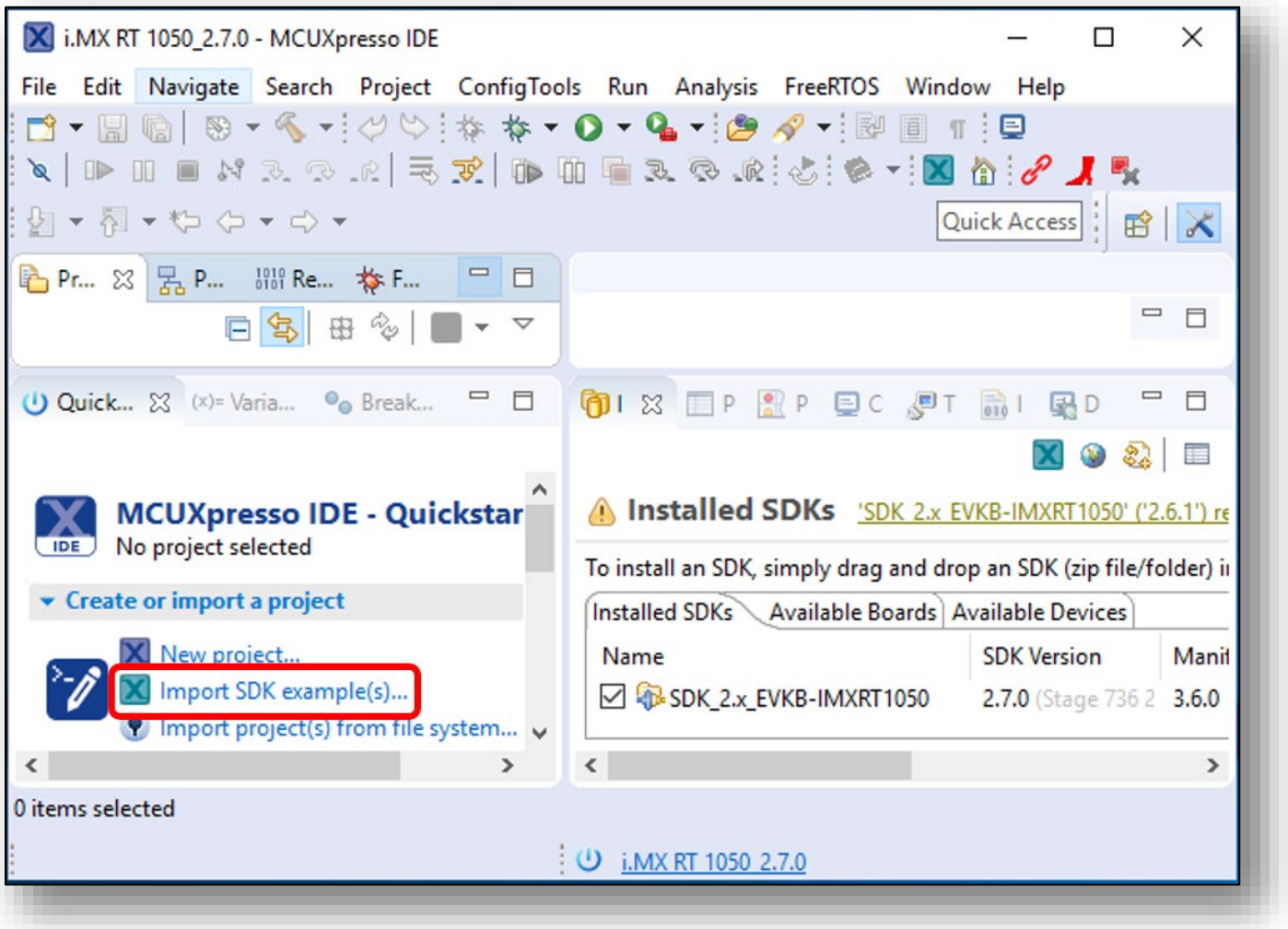
7.3 Example wiced_mfg_test_4343W

1. Hardware Requirement (Optional):

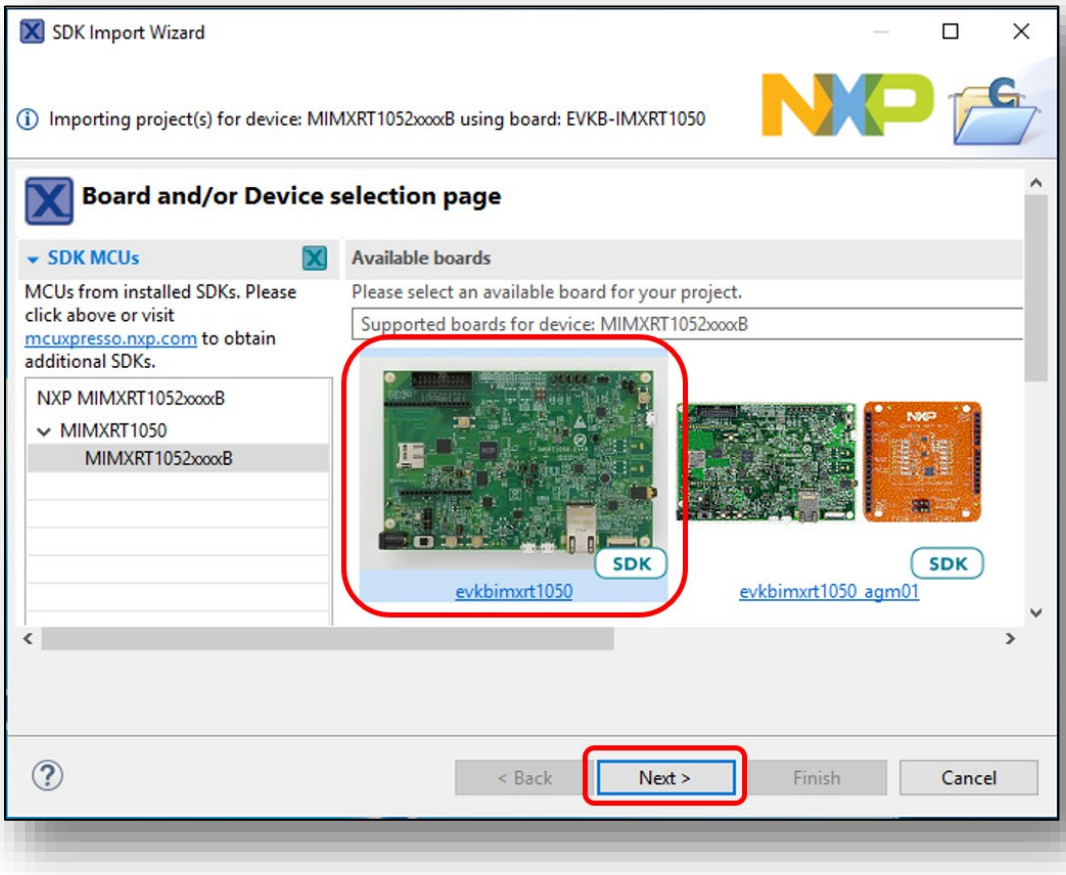
    a. evkbimxrt1050 board's connector J22, pin 3 to Murarta_uSD M.2 Adapter's connector J9, pin 3
    b. Connect the board with PC by using USB/UART converter:
        - board uart RX (pin 1 on J22) - connect it to TX pin on converter
        - board uart TX (pin 2 on J22) - connect it to RX pin on converter
        - board GND (pin 7 on J24)

2. Step 1 is only required if you want to see throughput in the terminal window. Otherwise just skip step 1 and go to step 3.

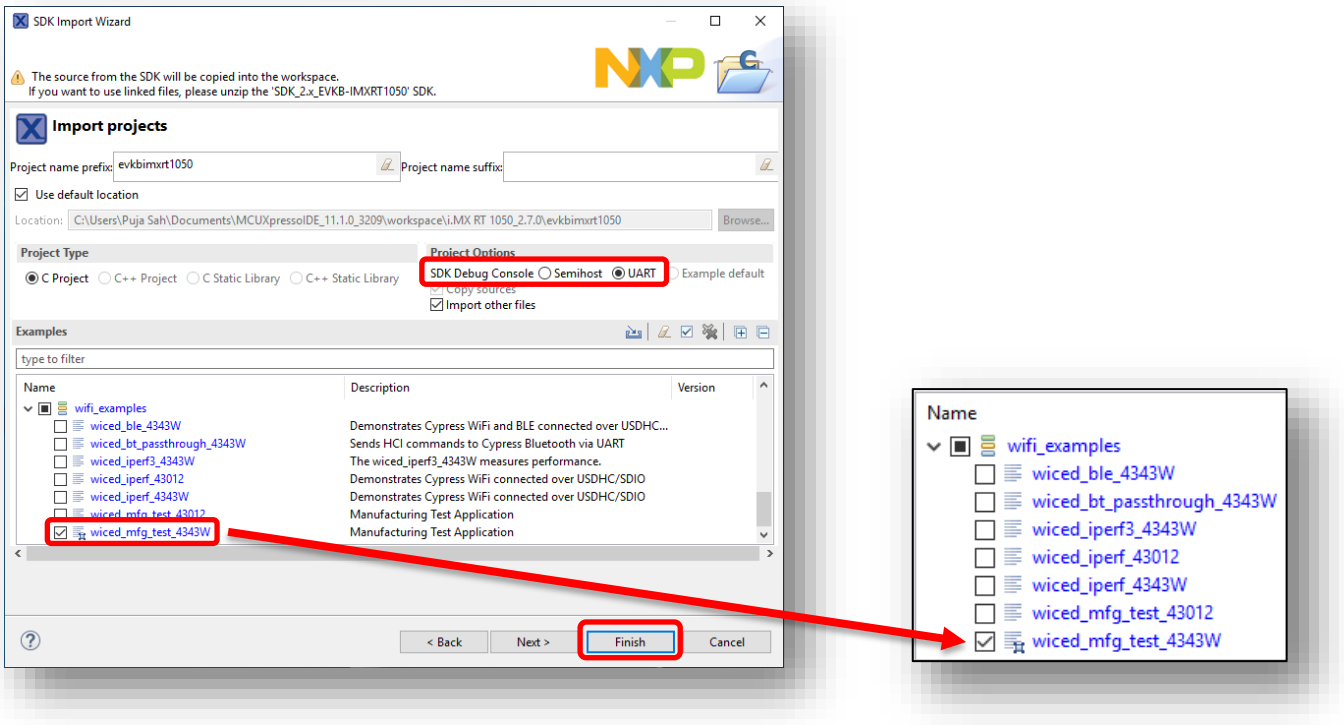
3. Click on “Import SDK example(s)…” in the Quickstart Panel.



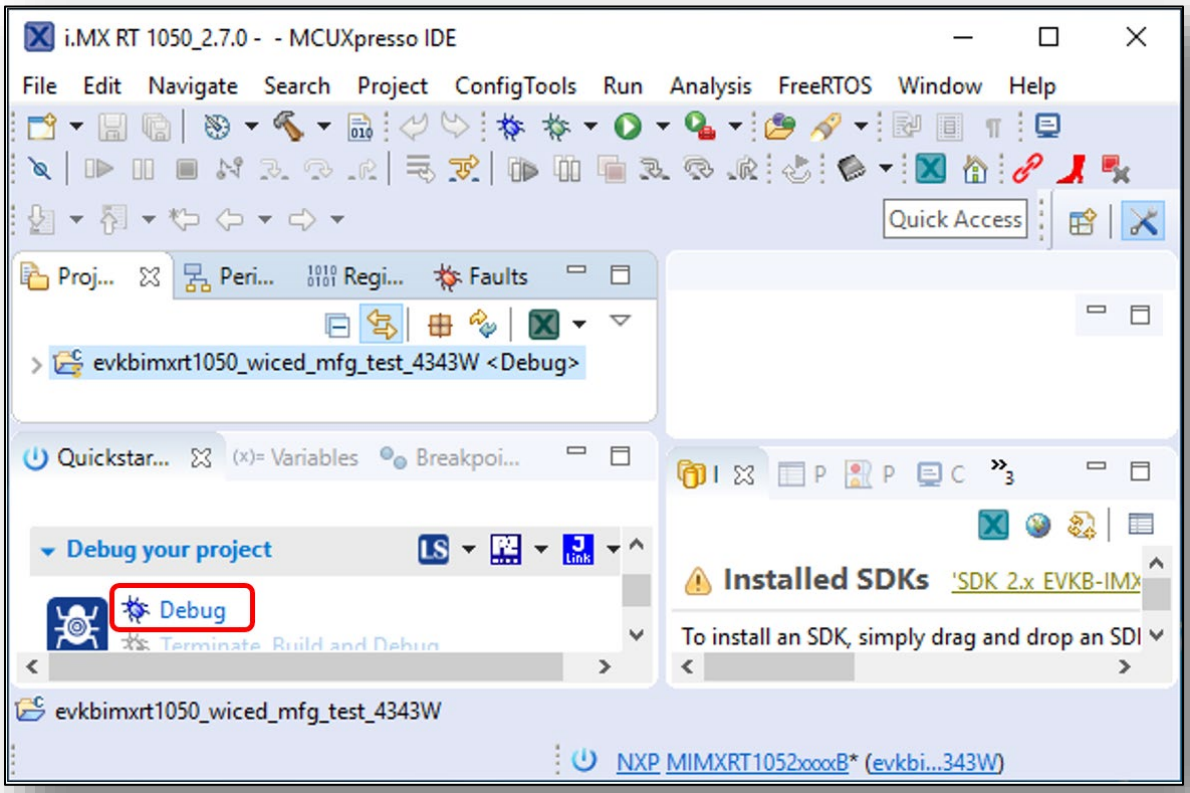
4. Select “evkbimxrt1050” board and click Next button.



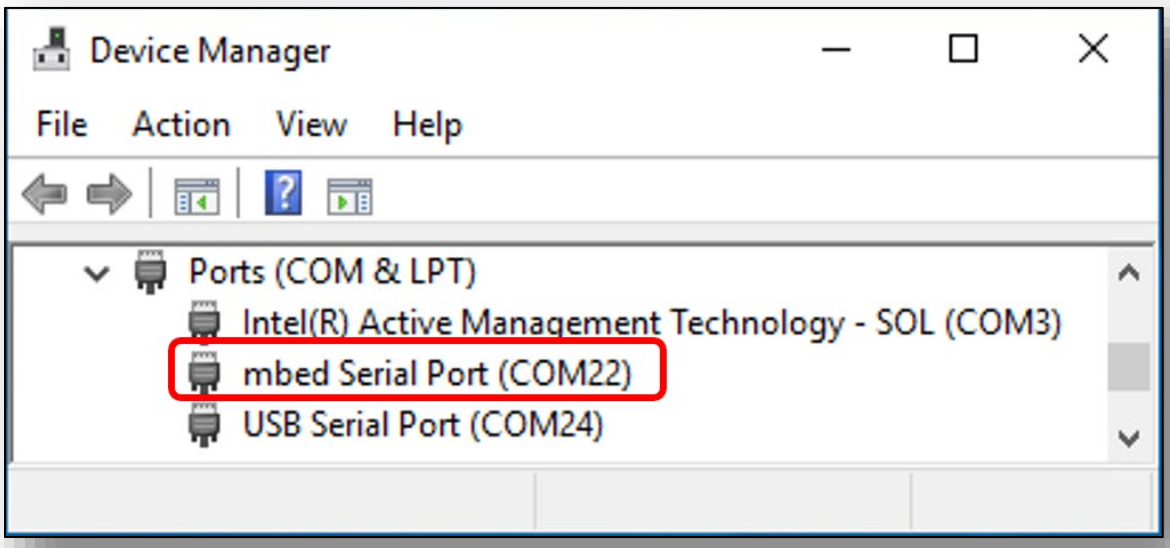
5. Expand wifi_examples and select wiced_mfg_test_4343W. Select UART for SDK Debug Console, then click Finish button.



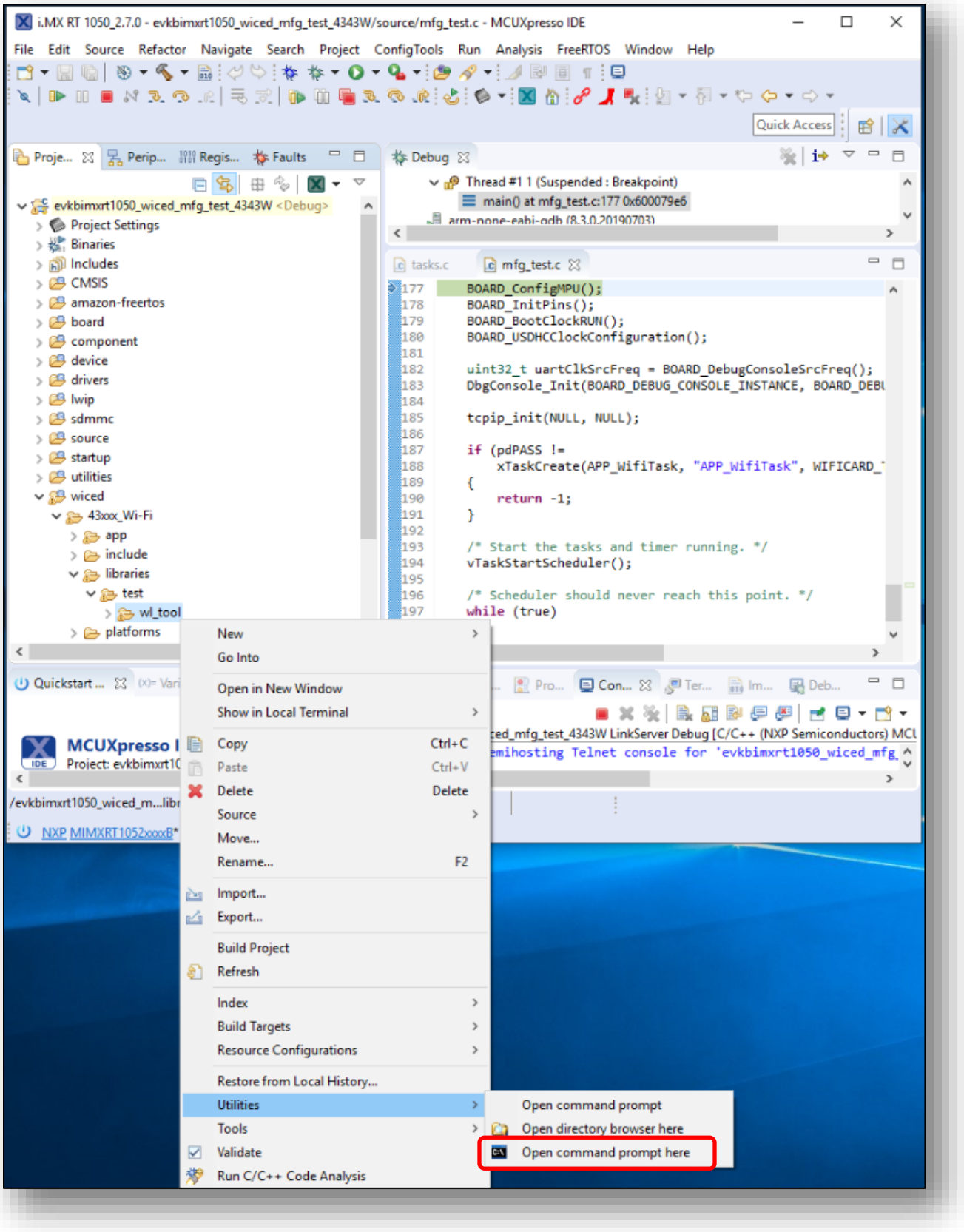
6. Click on “Debug” button in the Quickstart Panel.



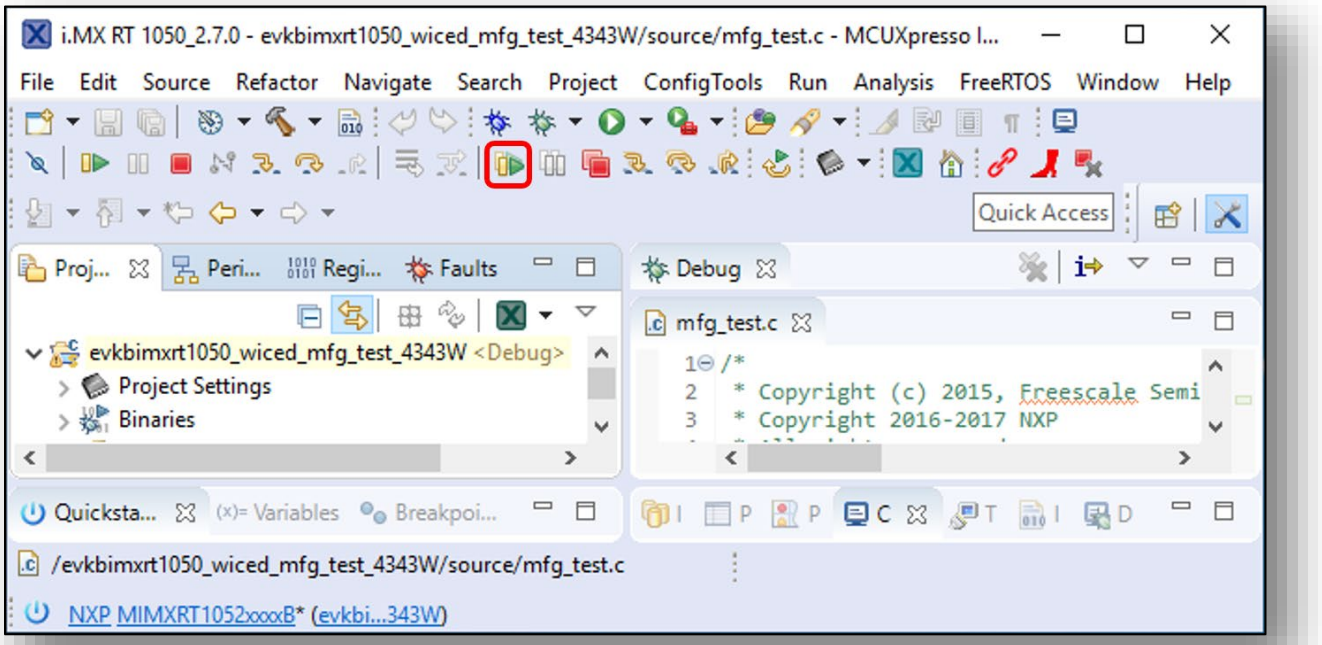
7. After the Debug process is complete, open the “Device Manager” in windows and go to “Ports (COM & LPT)” to check the mbed COM port number. In this case, COM 22 is our COM port number.



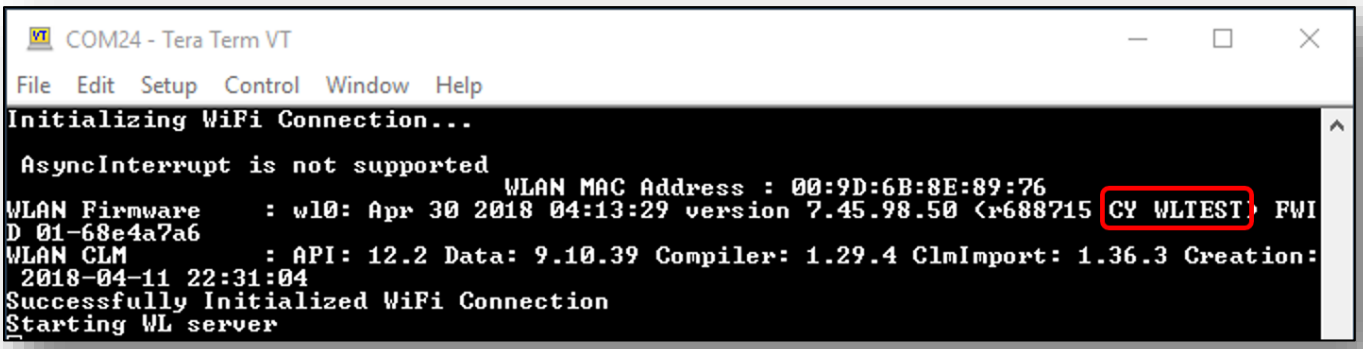
8. Open evkbimxrt1050_wiced_mfg_test_4343W/wiced/43xxx_Wi-Fi/libraries/test/wl_tool and right click on wl_tool. Select Utilities/Open command prompt here and a command prompt window will come up.



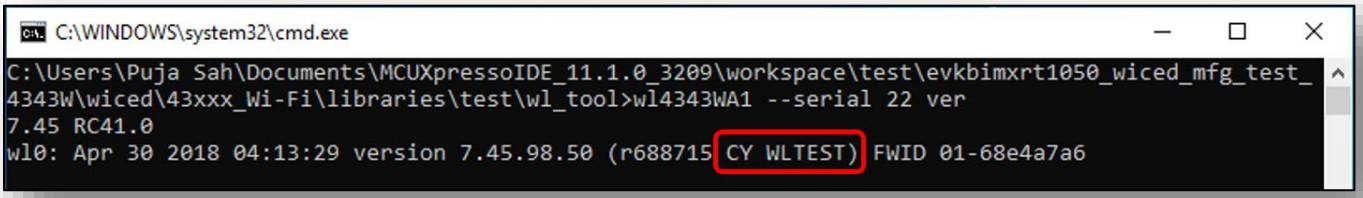
9. After the command prompt window shows up, click on “resume debug” in the MCUXpresso IDE.



10. To see logs from debug console, open the Tera Term with USB/UART converter port number (i.e., COM 24). You should see the output as below in the terminal window:

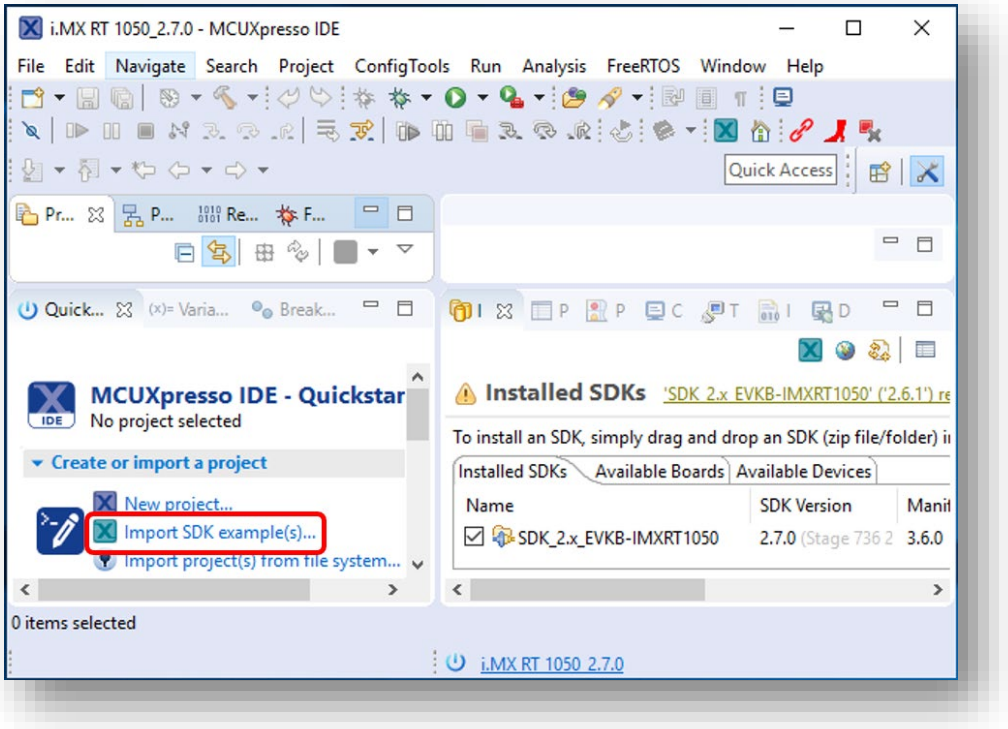


11. Type “wl4343WA1 --serial <COM port number> ver” and hit return. If you can see CY WLTEST in the output that means the manufacturing example is working fine.

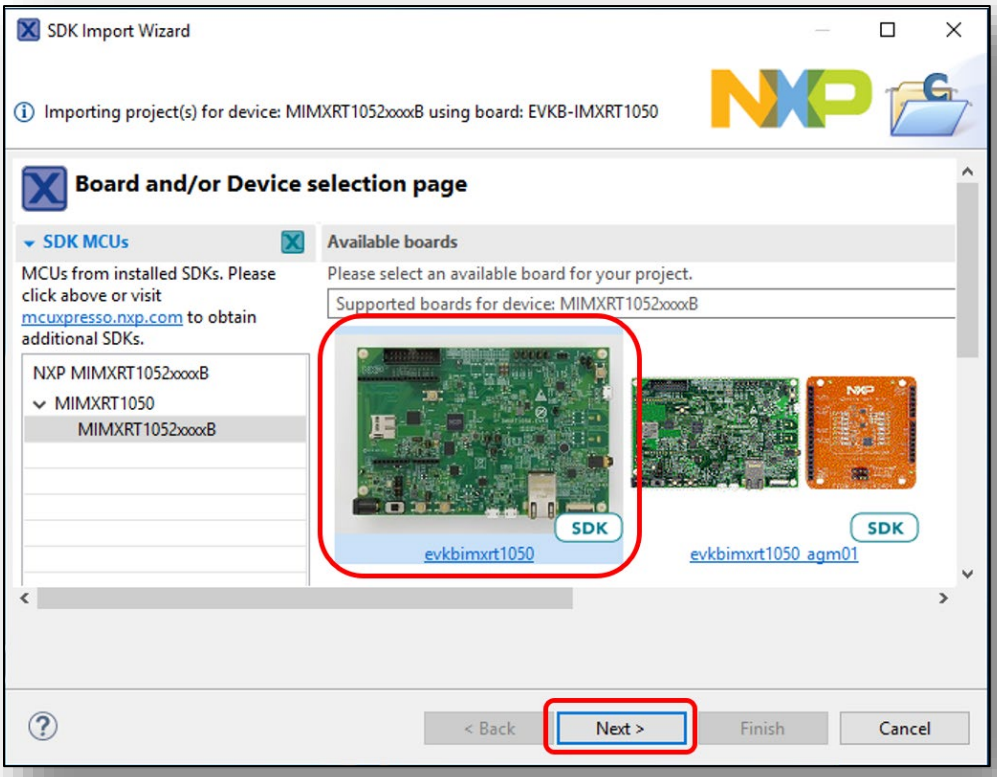


7.4 Example wiced_mfg_test_43012

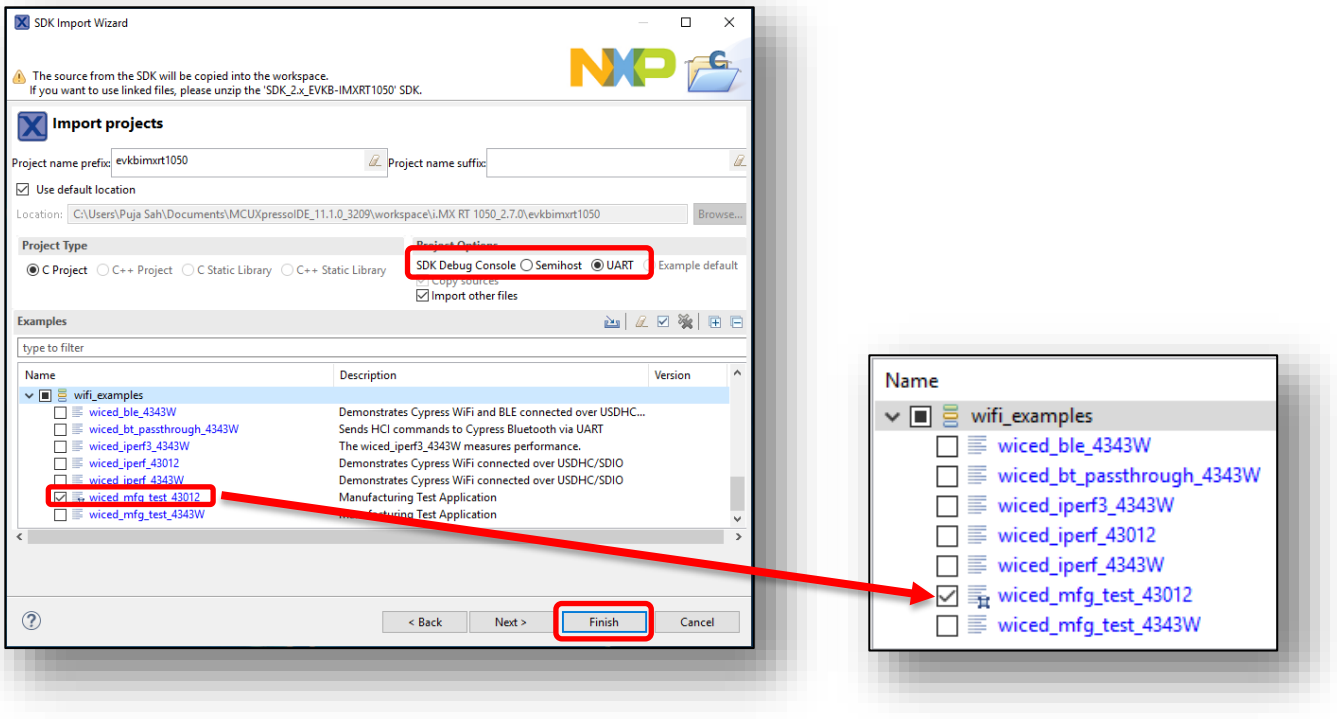
1. Click on “Import SDK example(s)…” in the Quickstart Panel.



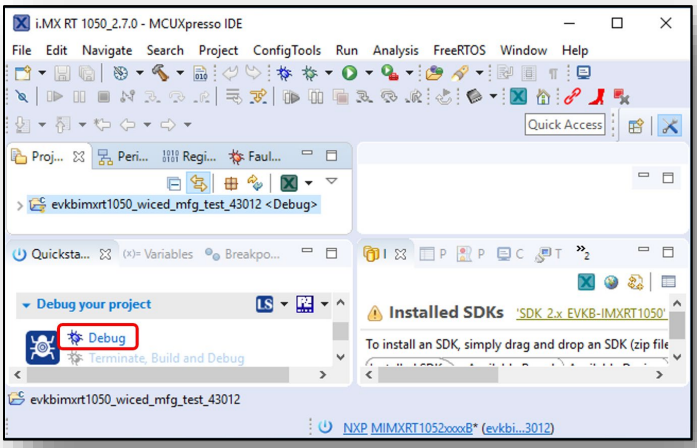
2. Select “evkbimxrt1050” board and click Next button.



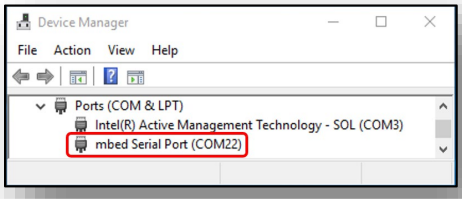
3. Expand wifi_examples and select wiced_mfg_test_43012. Select UART for SDK Debug Console, then click Finish button.



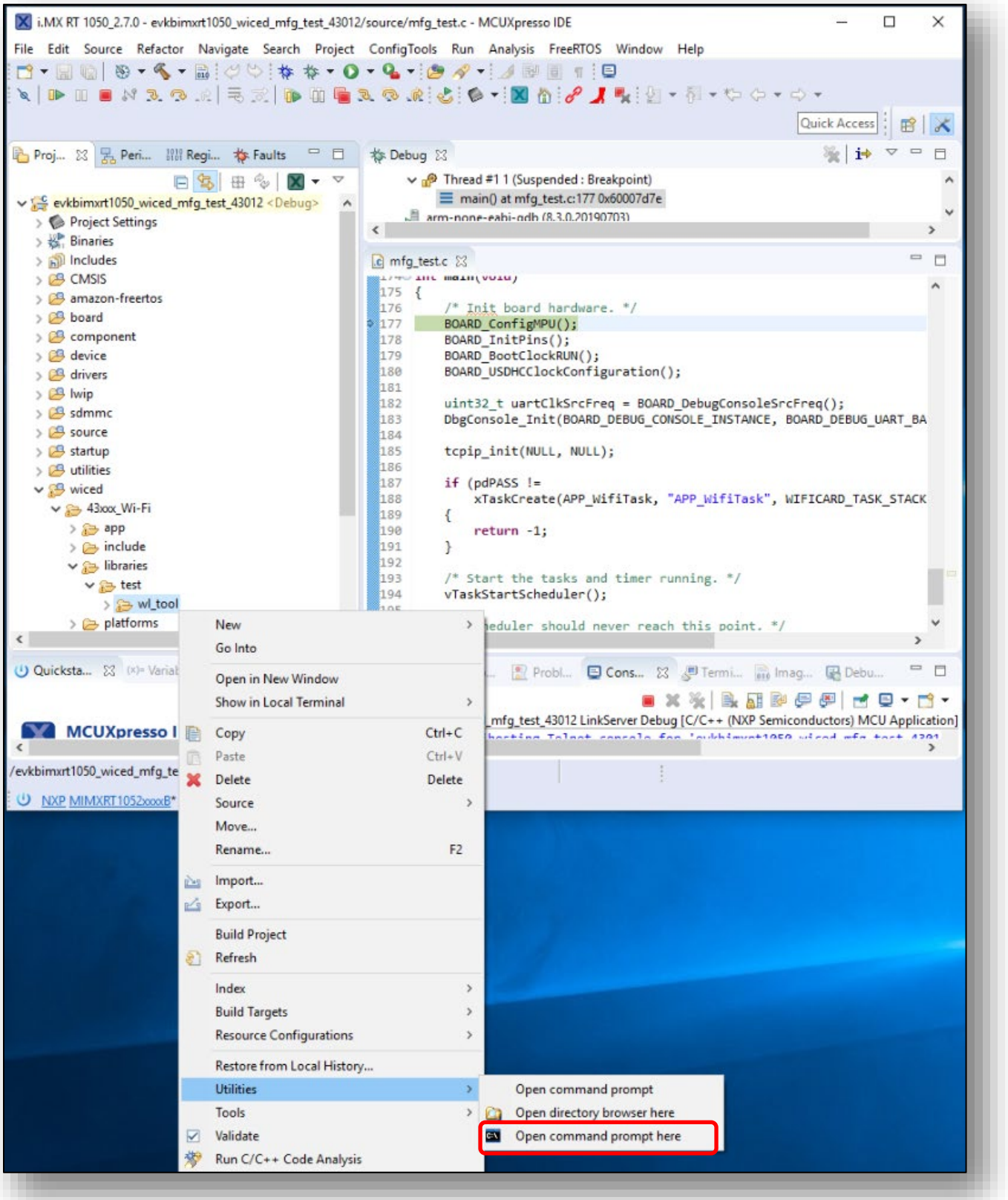
4. Click on “Debug” button in the Quickstart Panel.



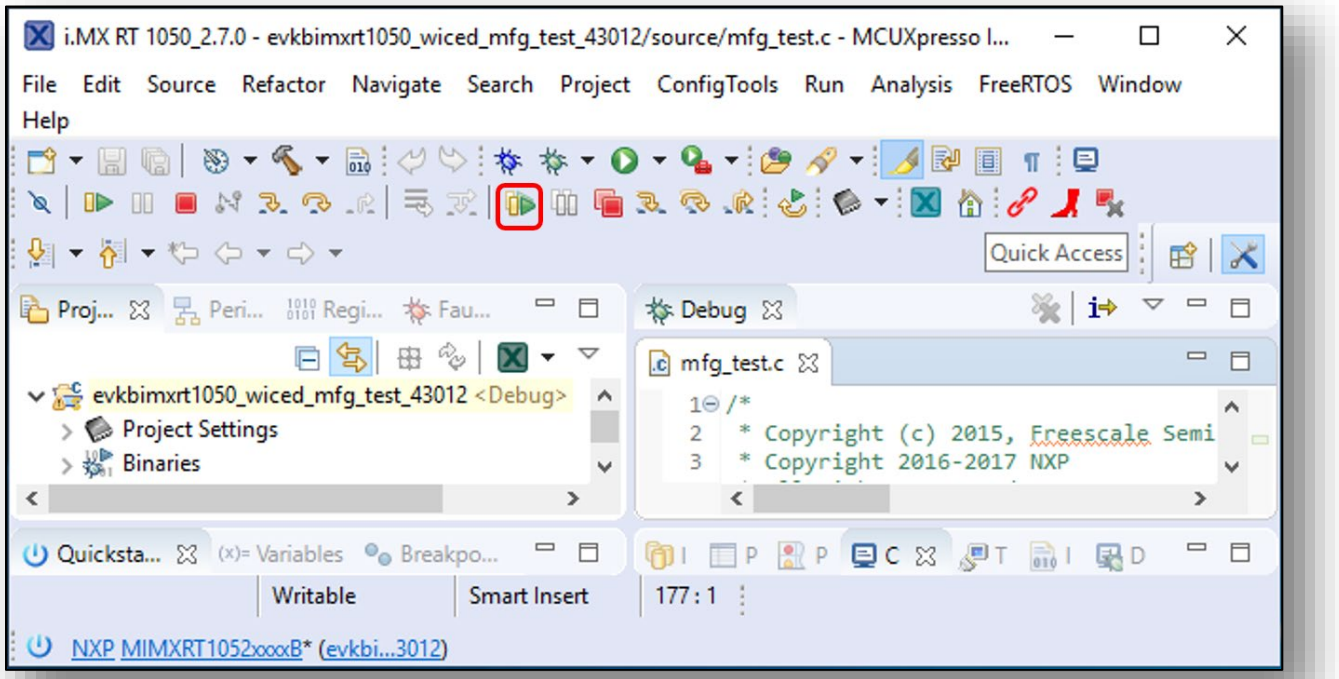
5. After the Debug process is complete, open the “Device Manager” in windows and go to “Ports (COM & LPT)” to check the mbed COM port number. In this case, COM 22 is our COM port number.



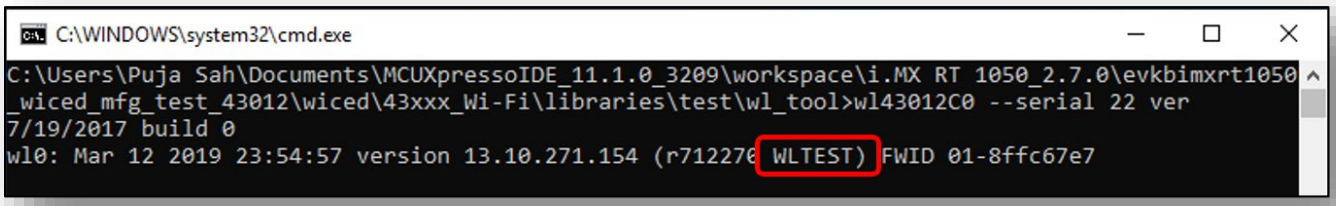
6. Open evkbimxrt1050_wiced_mfg_test_43012/43xxx_Wi-Fi/libraries/test/wl_tool and right click on wl_tool. Select Utilities/Open command prompt here and a command prompt window will come up.



7. After the command prompt window shows up, click on “resume debug” in the MCUXpresso IDE.



8. Type “wl43012C0 --serial <COM port number> ver” and hit return. If you can see WLTEST in the output that means the manufacturing example is working fine.



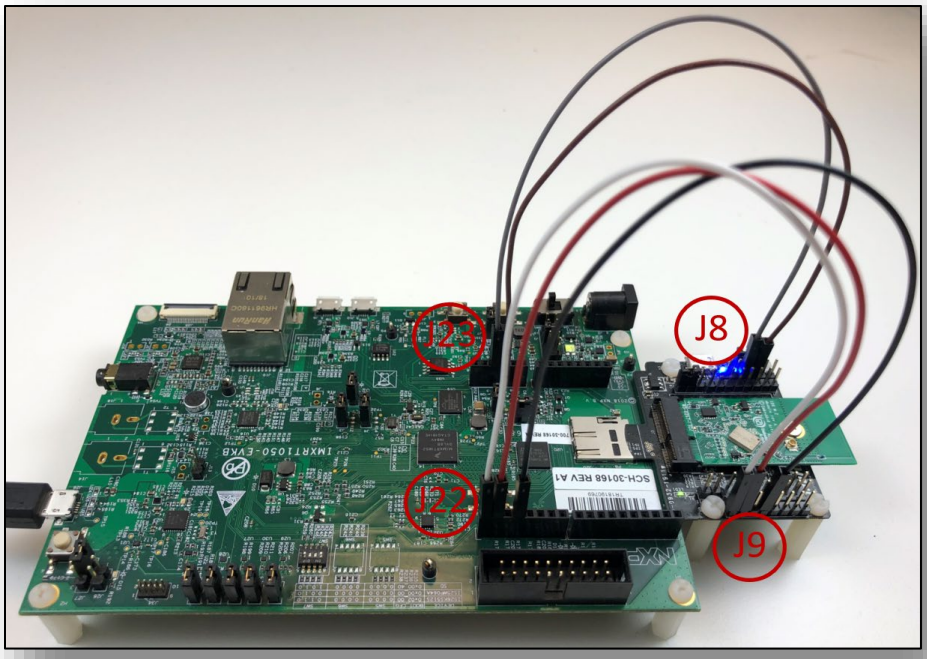
7.5 Example wiced_bt_passthrough_4343W

1. Hardware requirements:
    a. Connect the uSD-M.2 adapter with the NXP i.MX RT EVK as per **Table 5** and **Figure 9**.
    b. Set the uSD-M.2 adapter to run in 3.3V override mode:
        i. For rev A adapter, J12 is closed for 3.3V VIO
        ii. For rev B1 adapter, J12 is in 2-3 pos for 3.3V & J13 is in 1-2 pos for 3.3V VIO
    c. Connect the board with PC by using USB/UART converter (Optional):
    - board UART RX (pin 8 on J22) - connect it to TX pin on converter
    - board UART TX (pin 7 on J22) - connect it to RX pin on converter
    - board GND (pin 7 on J24)

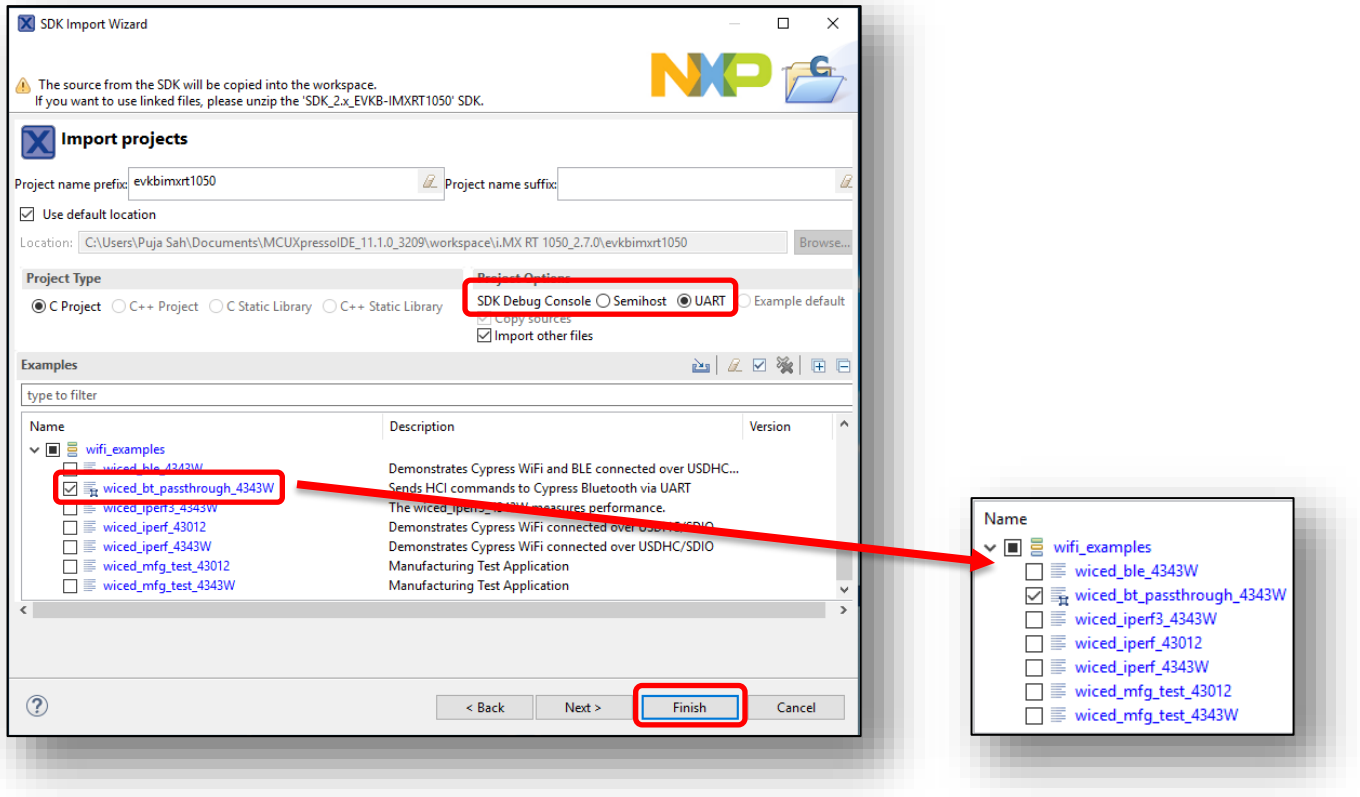
Table 5: Additional connections to run BT passthrough

Signal Name	uSD-M.2 Adapter Header/Pin	i.MX RT EVK Pin	i.MX RT EVK Signal
BT_UART_TXD_HOST	J9 / Pin 1	J22 / 1	LPUART3_RX
BT_UART_RXD_HOST	J9 / Pin 2	J22 / 2	LPUART3_TX
BT_REG_ON_HOST	J9 / Pin 4	J22 / 4	GPIO1_IO24
BT_UART_RTS_HOST	J8 / Pin 3	J23 / 3	LPUART3_CTS_B
BT_UART_CTS_HOST	J8 / Pin 4	J23 / 4	LPUART3_RTS_B

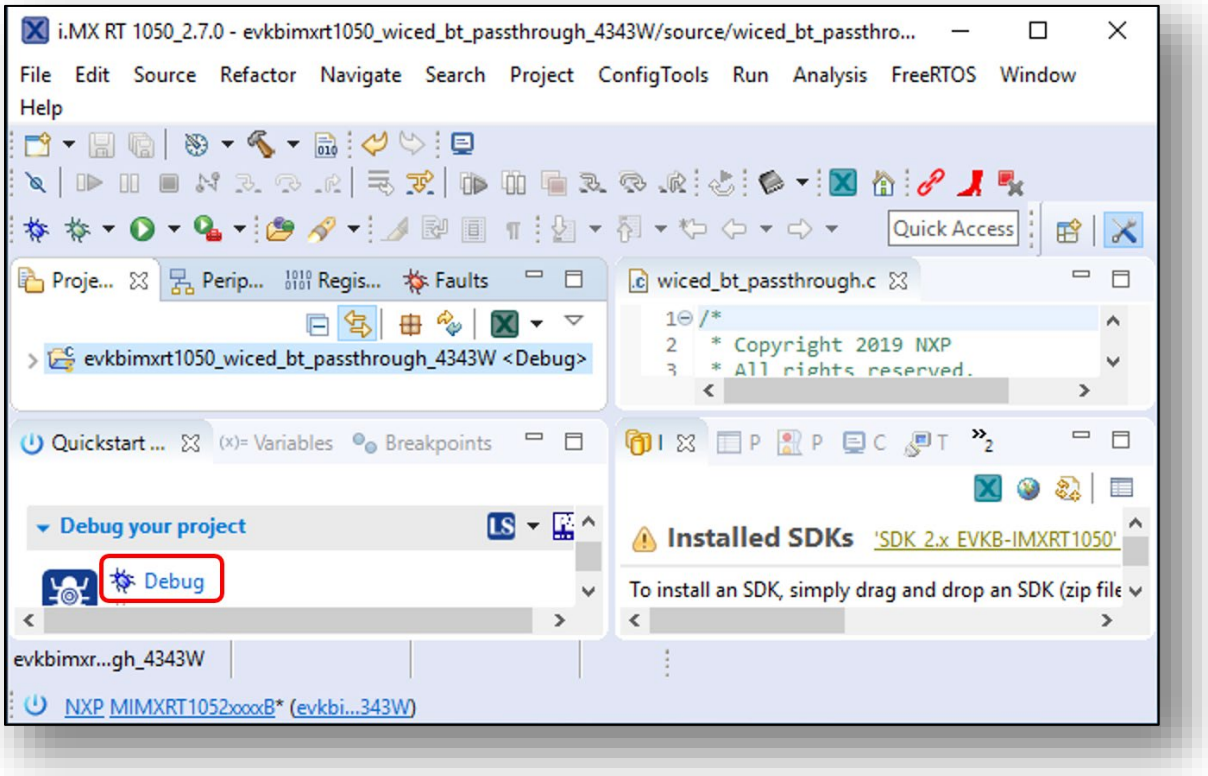
Figure 9: NXP i.MX RT 1050 EVK hardware settings to run BT passthrough



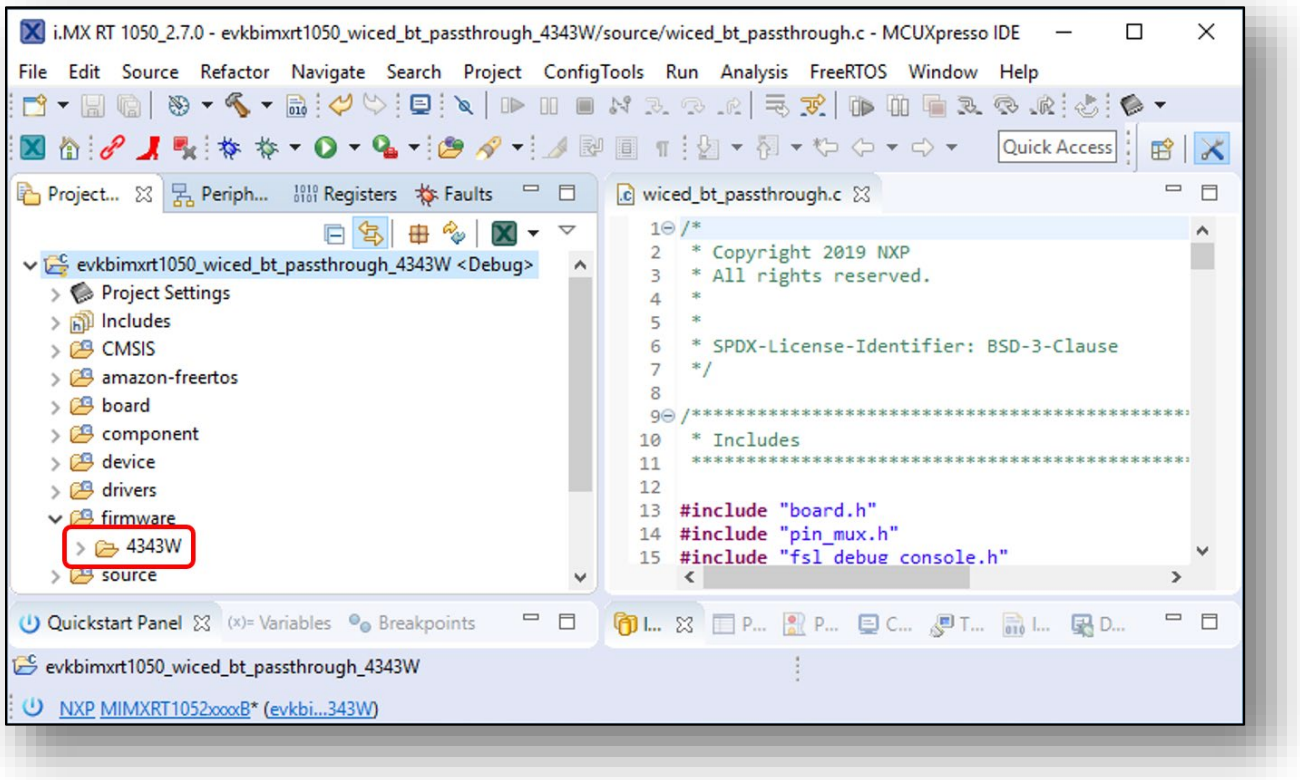
2. Click on “Import SDK example(s)…” in the Quickstart Panel. Select “evkbimxrt1050” board and click Next button. Expand wifi_examples and select wiced_bt_passthrough_4343W. Select UART for SDK Debug Console, then click Finish button.



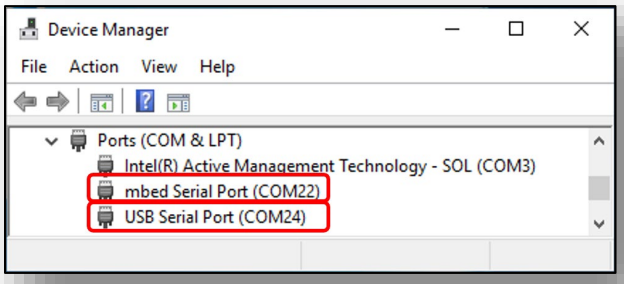
3. Click on “Debug” button.



4. Copy and paste the folder 4343W (evkbimxrt1050_wiced_bt_passthrough_4343W/firmware/4343W) in your desktop.

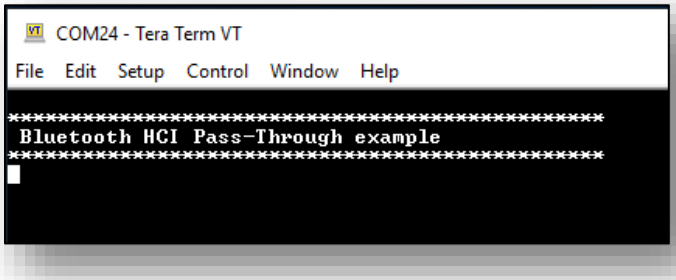


5. Open the device manager and check for the port numbers.

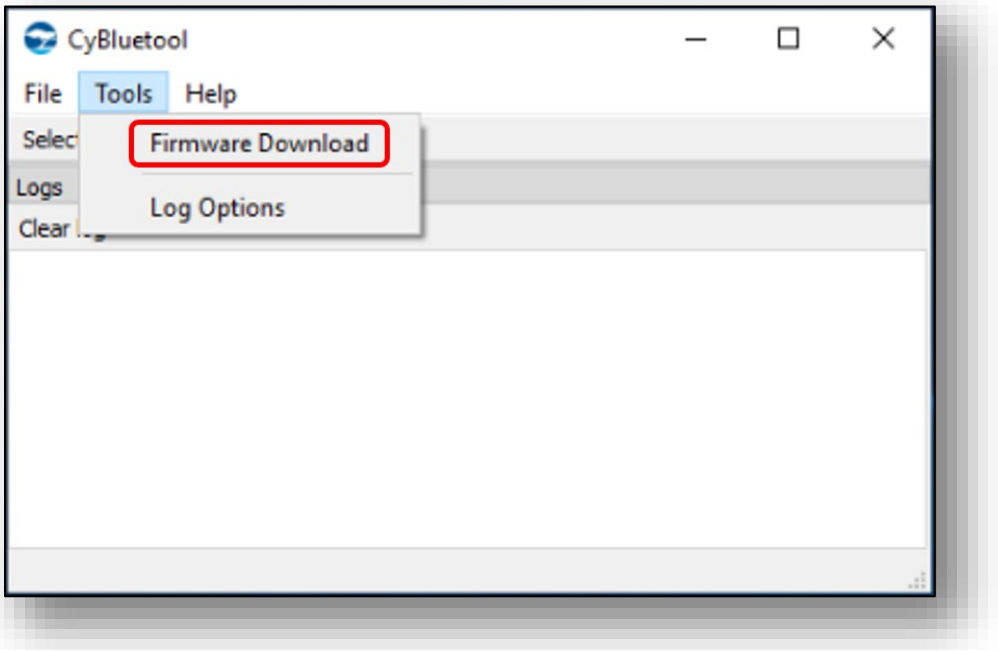


6. Open Tera Term at the USB serial port number (i.e., COM 24). Run debug in the IDE and then do resume debug. You will see below output in the terminal window.

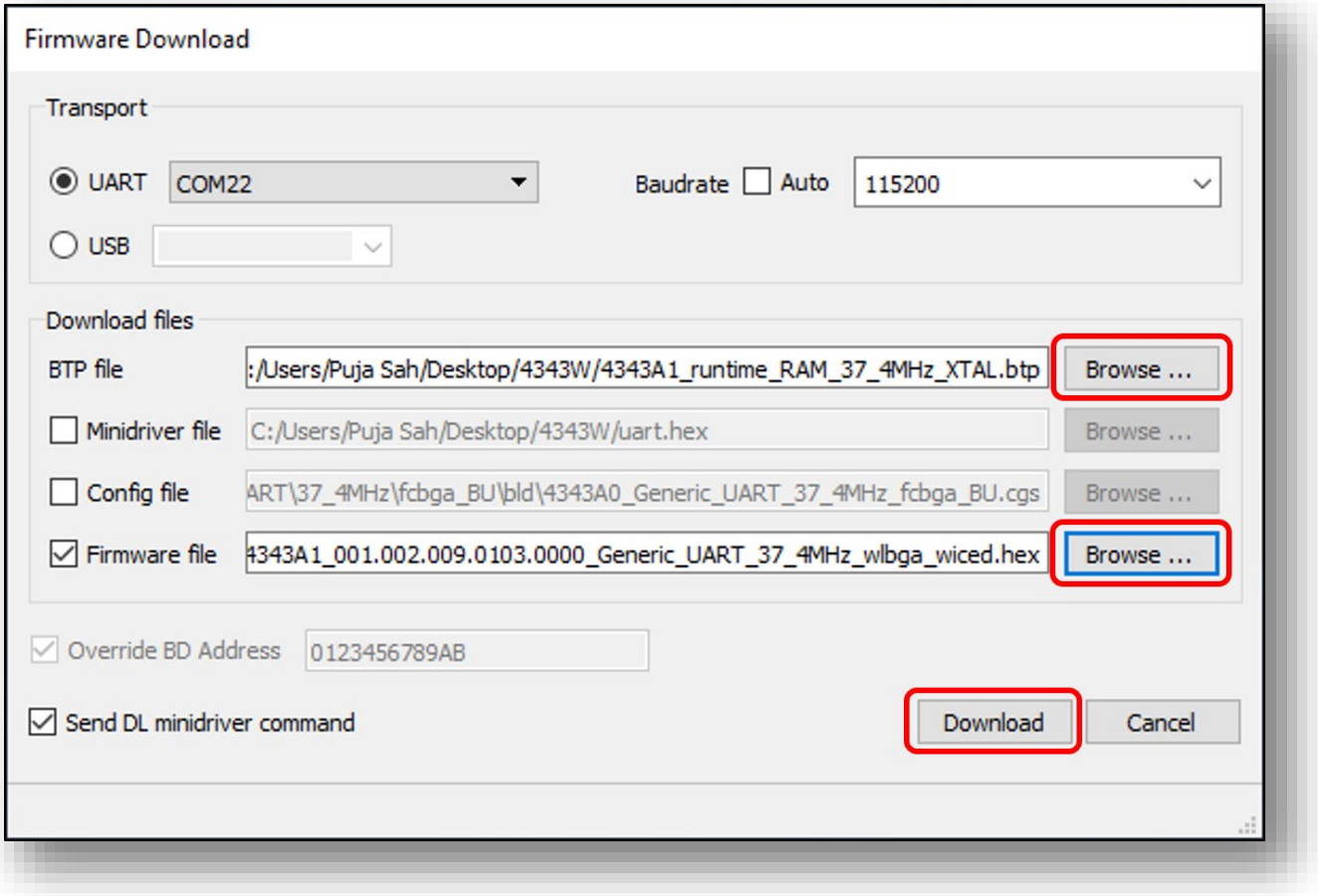
NOTE: This step is optional. This step is required only when USB/UART converter is used.



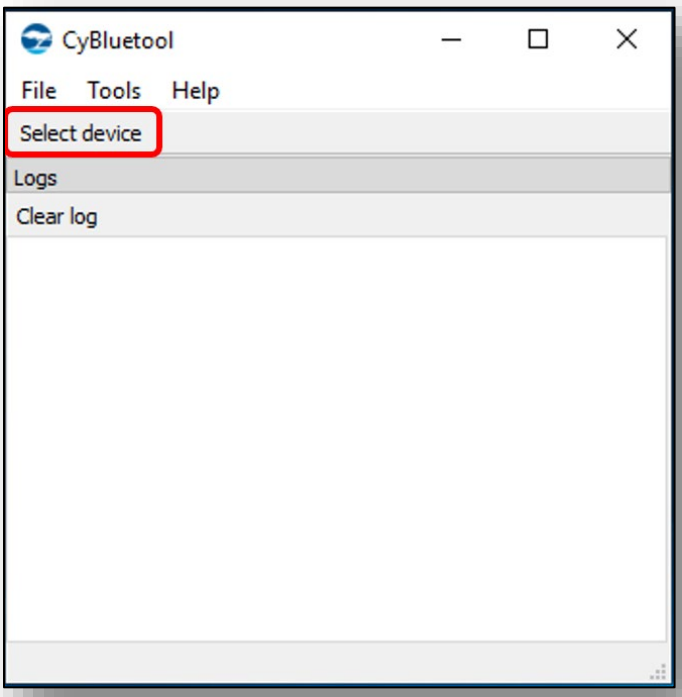
7. Open the CyBluetool and select Firmware Download.

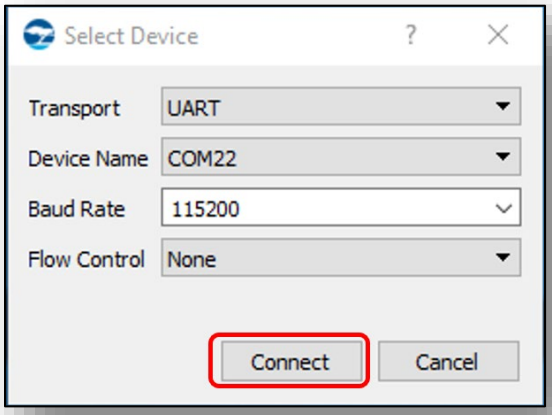


8. The below window will come up. Select the UART as mbed serial port number (i.e., COM 22). Browse for the BTP file and go to the 4343W folder location in Desktop. Also browse for the Firmware file and then Click on “Download”.

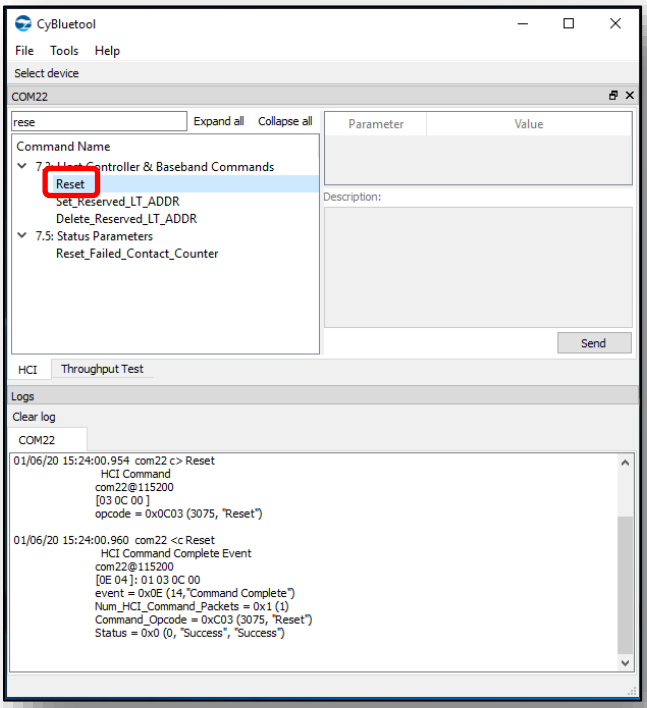


9. Click on “Select device” in CyBluetool. Use the following settings in the dialog window:
    - Transport: UART
    - Device Name: the name of the mbed serial port
    - Baud Rate: 115200
    - Flow Control: None

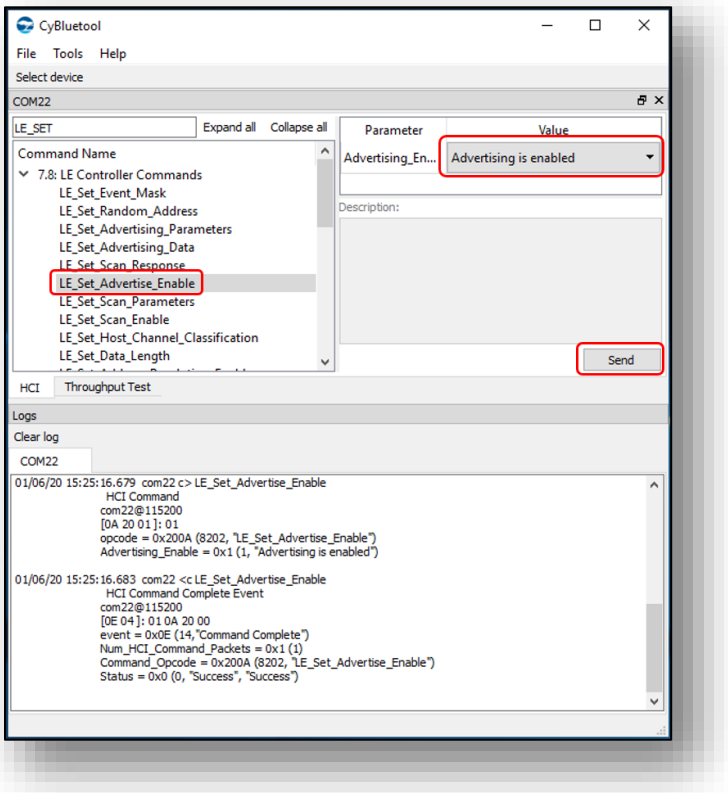




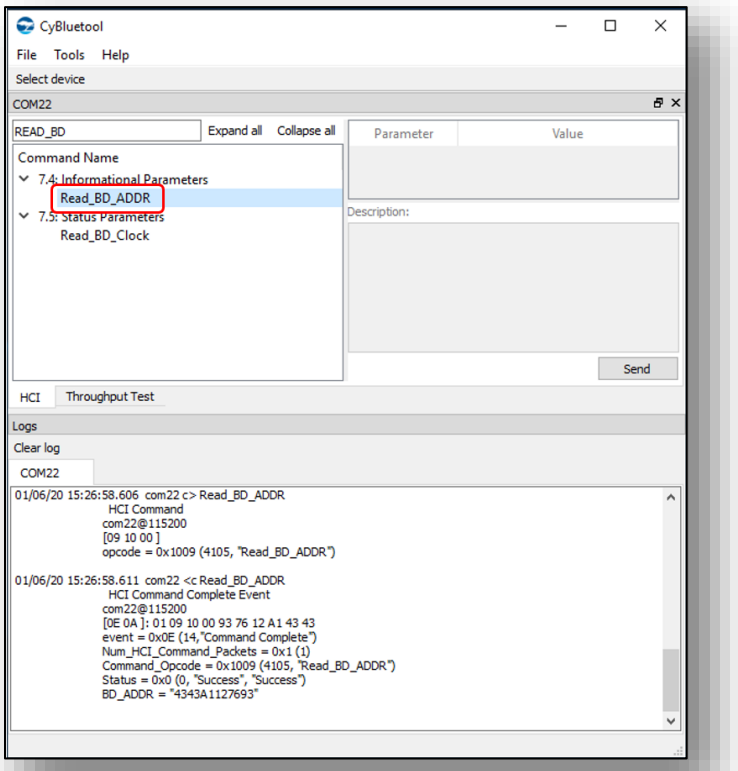
10. Using CyBluetool, send command Reset to verify its successful working.



11. Send command LE_Set_Advertise_Enable with parameter Advertising_Enable set to "Advertising is enabled".



12. Send command Read_BD_ADDR by double clicking on “Read_BD_ADDR”.



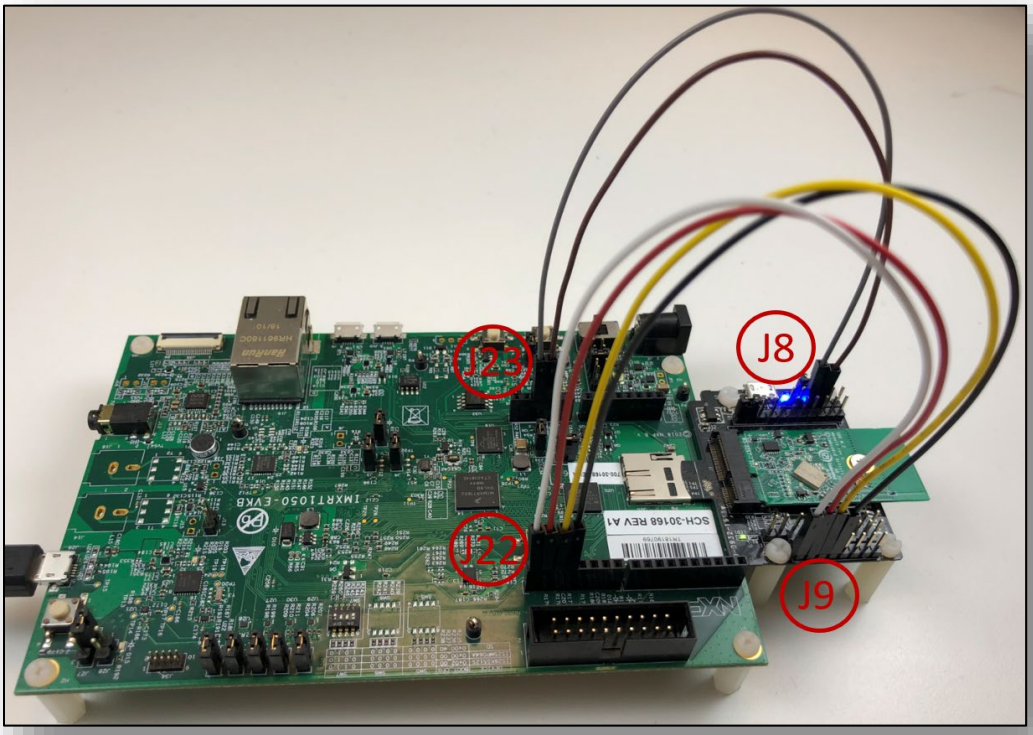
7.6 Example wiced_ble_4343W

1. Hardware Requirements:
    a. Connect the uSD-M.2 adapter with the NXP i.MX RT EVK as per **Table 5** and **Figure 10**.
    b. Run at 3.3V:
        i. For rev A adapter, J12 is closed for 3.3V VIO
        ii. For rev B1 adapter, J12 is in 2-3 pos for 3.3V & J13 is in 1-2 pos for 3.3V VIO

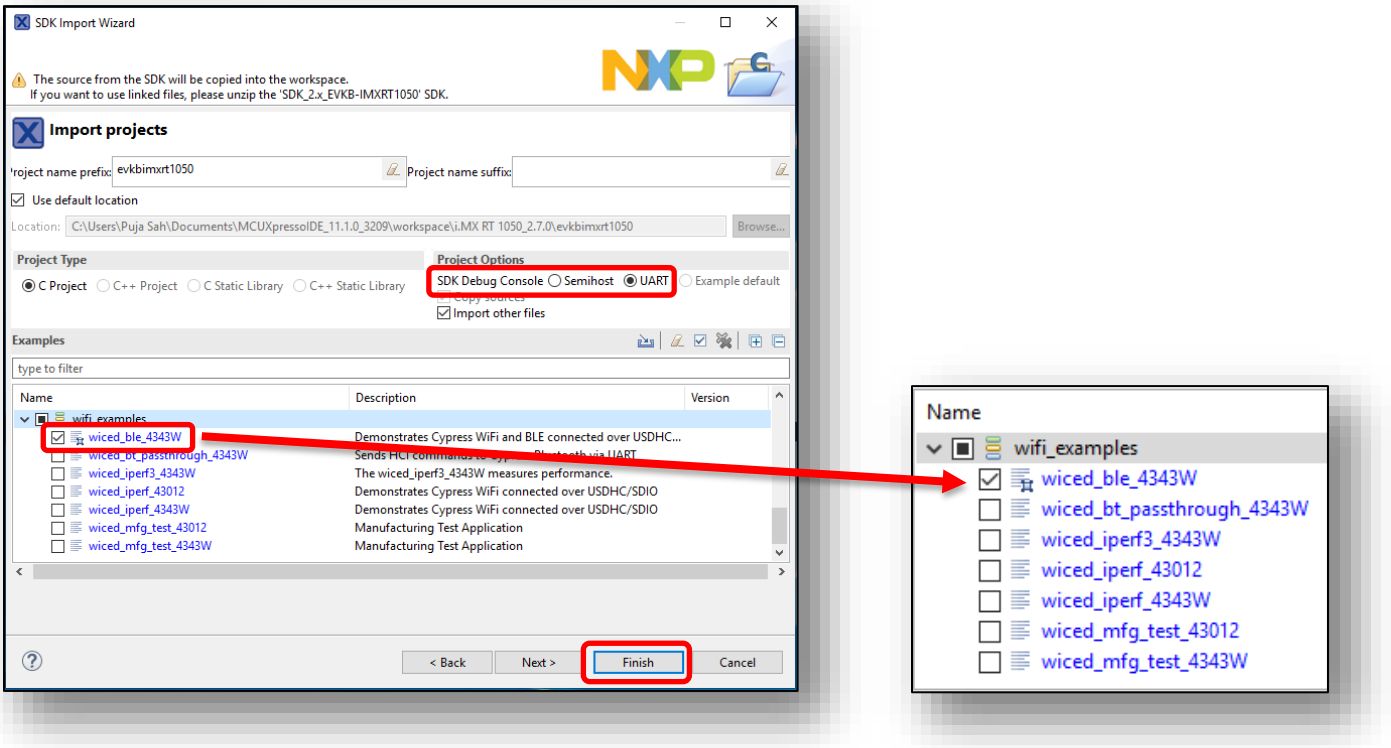
Table 6: Additional connections to run BLE

Signal Name	uSD-M.2 Adapter Header/Pin	i.MX RT EVK Pin	i.MX RT EVK Signal
BT_UART_TXD_HOST	J9 / Pin 1	J22 / 1	LPUART3_RX
BT_UART_RXD_HOST	J9 / Pin 2	J22 / 2	LPUART3_TX
WL_REG_ON_HOST	J9 / Pin 3	J22 / 3	GPIO1_IO11
BT_REG_ON_HOST	J9 / Pin 4	J22 / 4	GPIO1_IO24
BT_UART_RTS_HOST	J8 / Pin 3	J23 / 3	LPUART3_CTS_B
BT_UART_CTS_HOST	J8 / Pin 4	J23 / 4	LPUART3_RTS_B

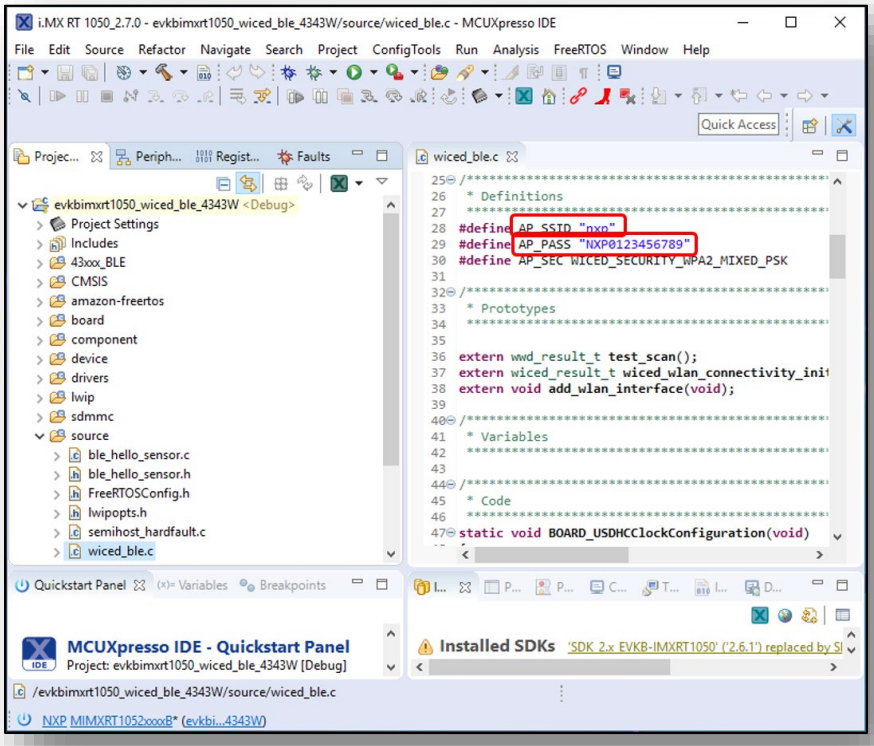
Figure 10: NXP i.MX RT 1050 EVK hardware settings to run BLE



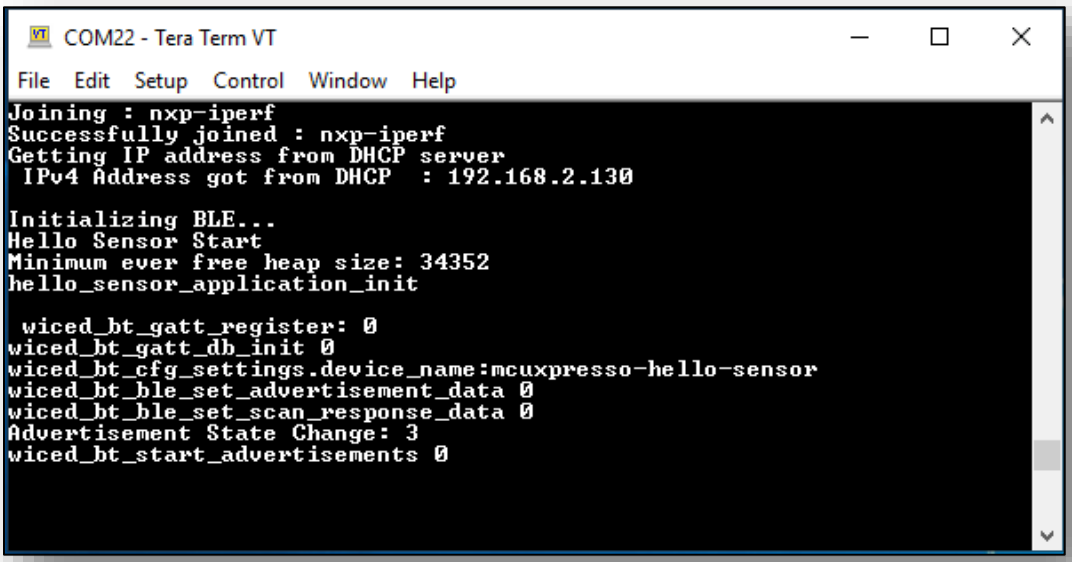
2. Click on “Import SDK example(s)…” in the Quickstart Panel. Select “evkbimxrt1050” board and click Next button. Expand wifi_examples and select “wiced_ble_4343W”. Select UART for SDK Debug Console, then click Finish button.



3. Open evkbimxrt1050_wiced_ble_4343W/source/wiced_ble.c to modify AP_SSID, AP_PASS if necessary.

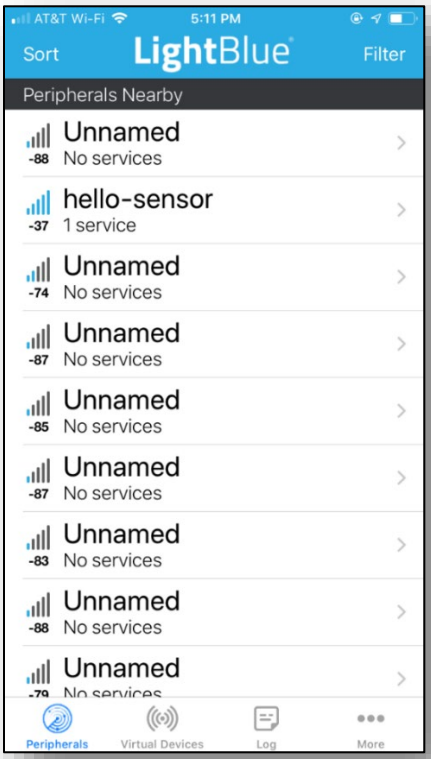


4. Run debug in the IDE. Once the app is booted, BLE advertising starts with the device name “mcuxpresso-hello-sensor”.



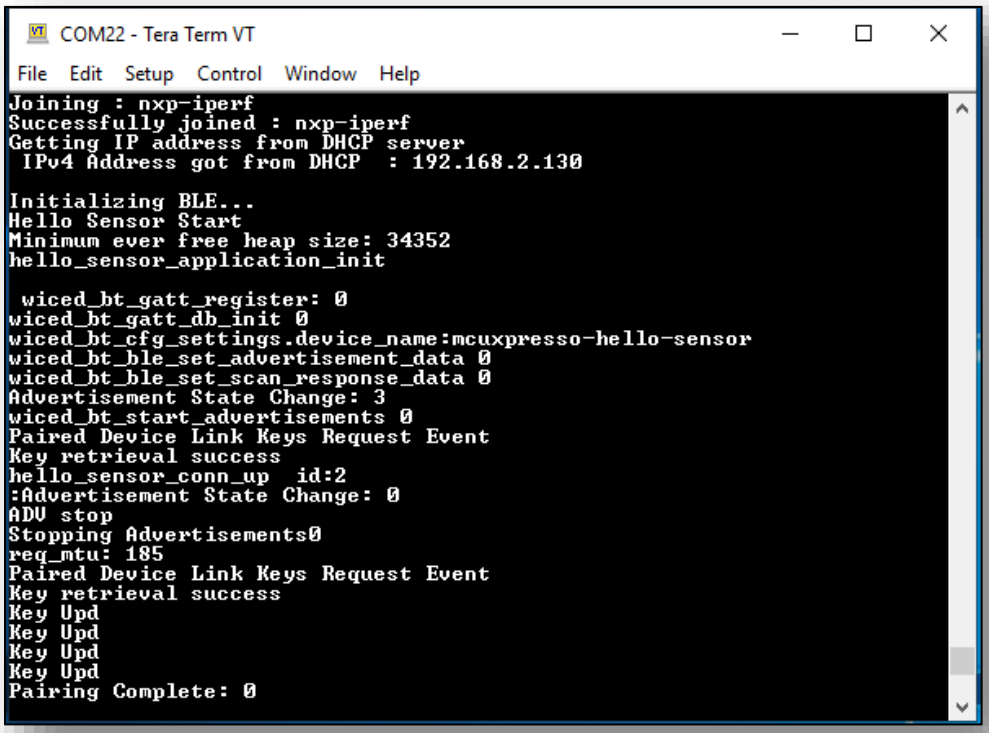
5. Download and install any of the BLE scanner apps such as LightBlue / BLE Scanner / nRF Connect to the BLE enabled device.

6. Open the app and scan for devices. Scan results shows “mcuxpresso-hello-sensor”. You will see below output in your phone.

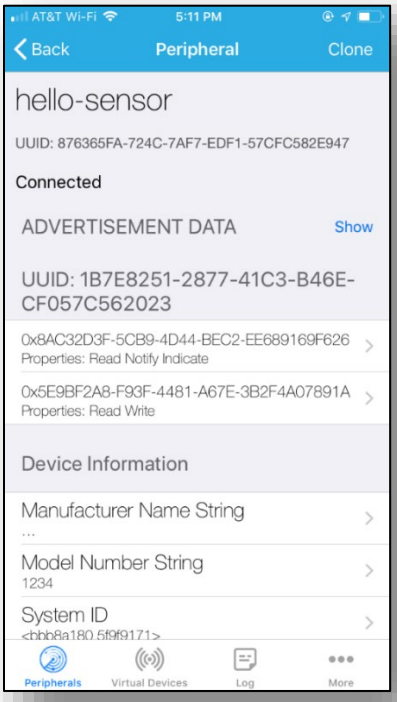


7. Connect to mcuxpresso-hello-sensor to view its services. When paired to the device, you will see below outputs:

In Tera Term:



In Phone:

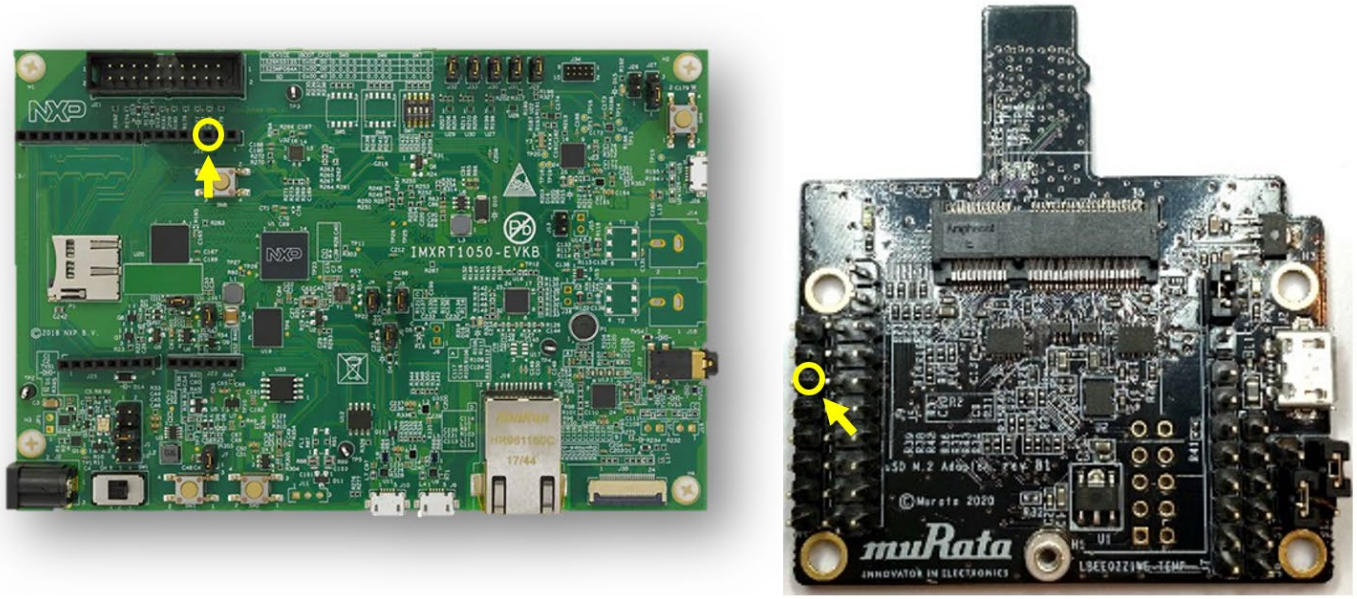


7.7 Example wiced_webconfig_4343W

1. Hardware Requirement:

    a) Connect pin3 of evkbimxrt1050 board's connector J22 to pin 3 of Murata uSD M.2 Adapter's connector J9, using plug-to-receptable cables:

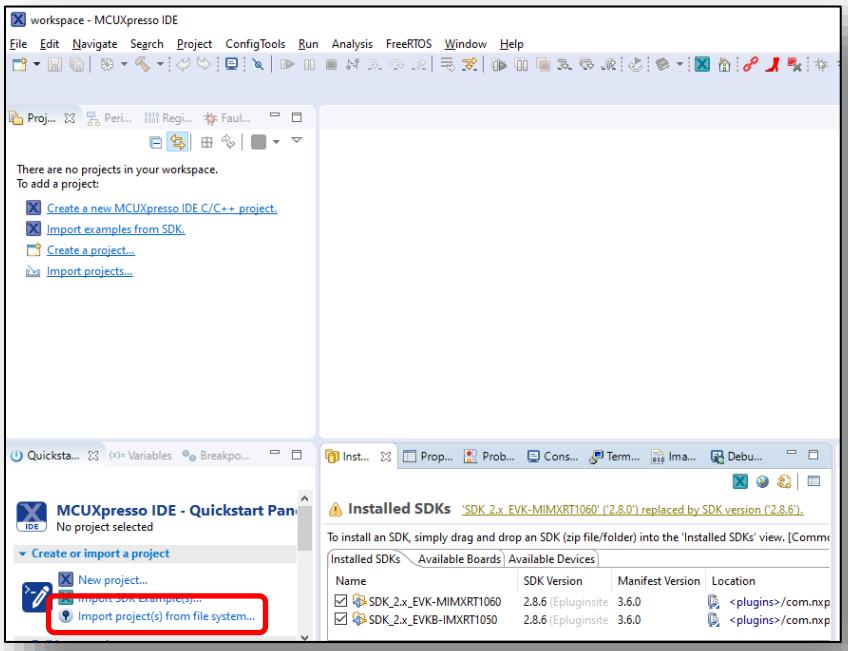
Figure 11: Additional cabling pins



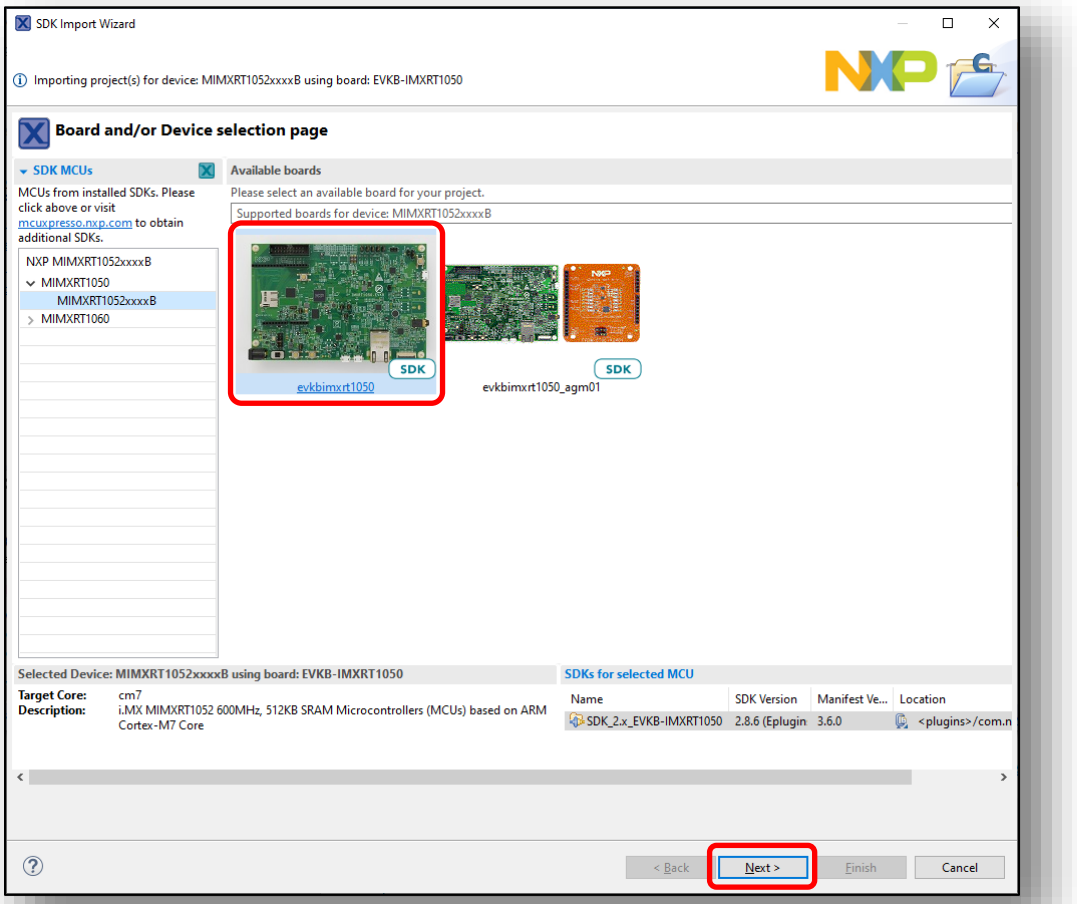
See the figure below for this additional cabling.

Figure 12: Additional cabling

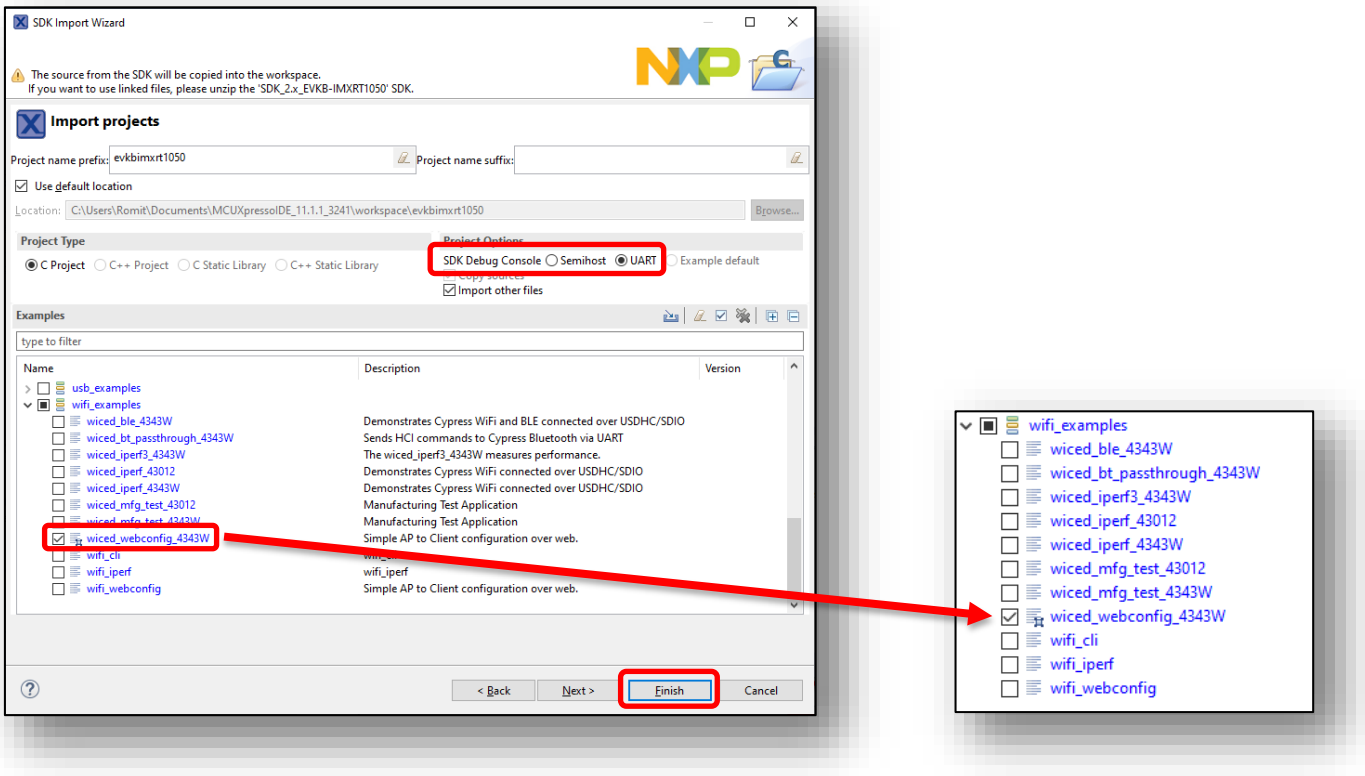
2. Click on “Import SDK example(s)…” in the Quickstart Panel.



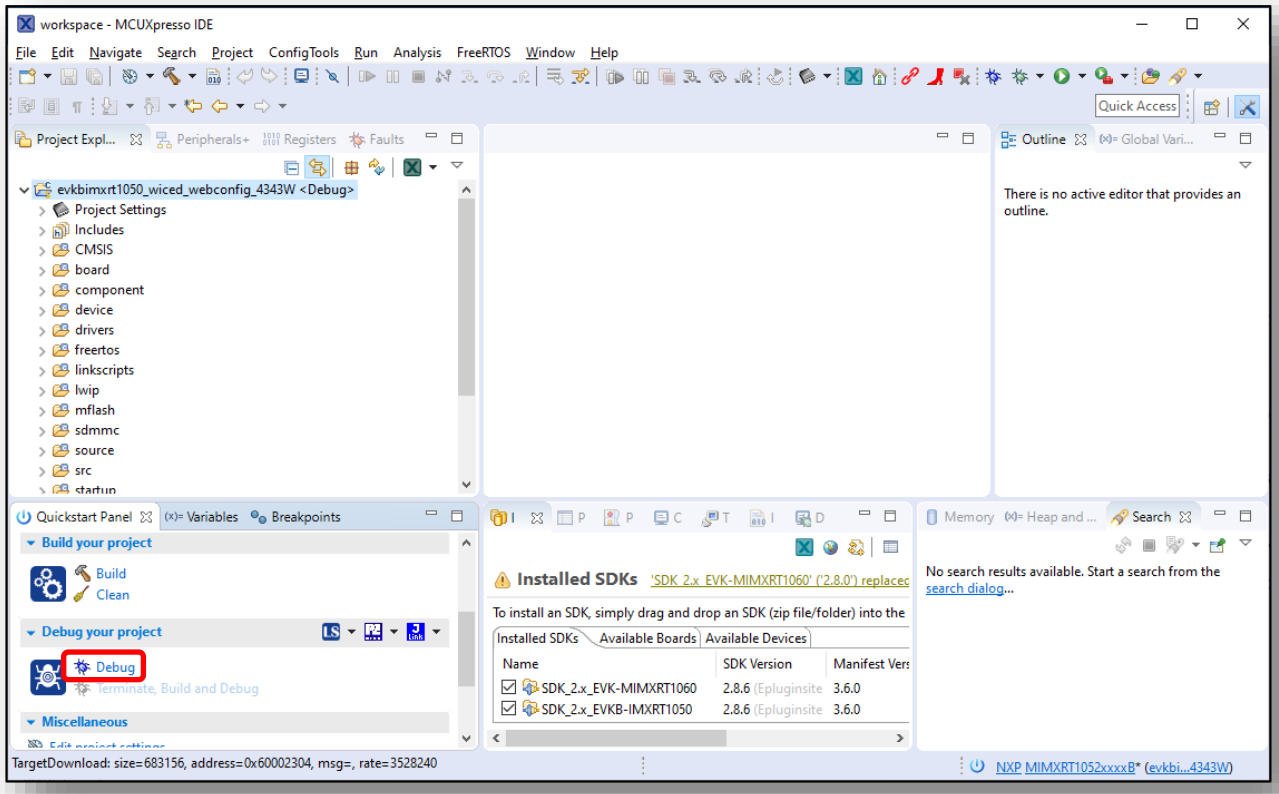
3. Select “evkbimxrt1050” board and click Next button.



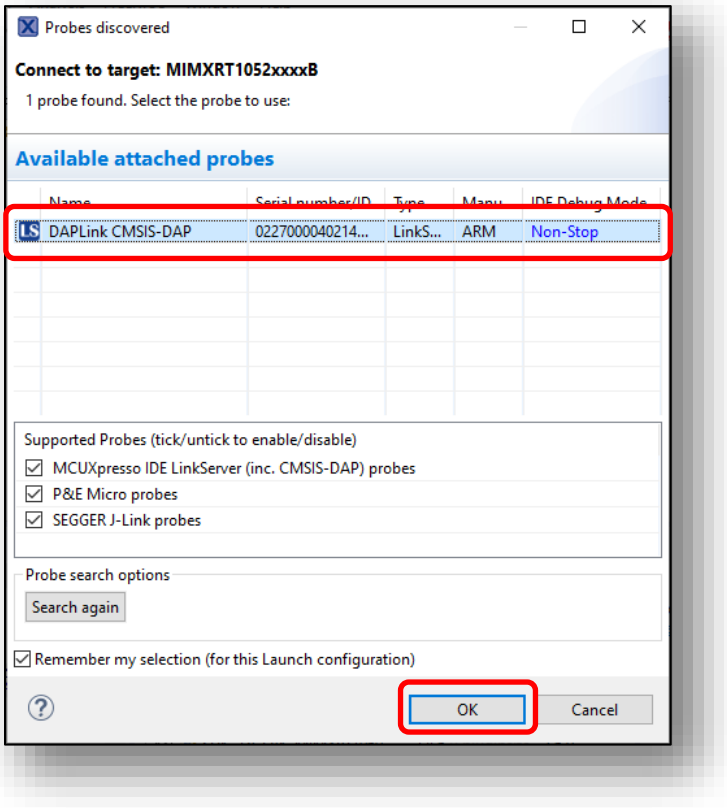
4. Expand wifi_examples and select “wiced_webconfig_4343W”. Select “UART” for SDK Debug Console, then click “Finish” button.



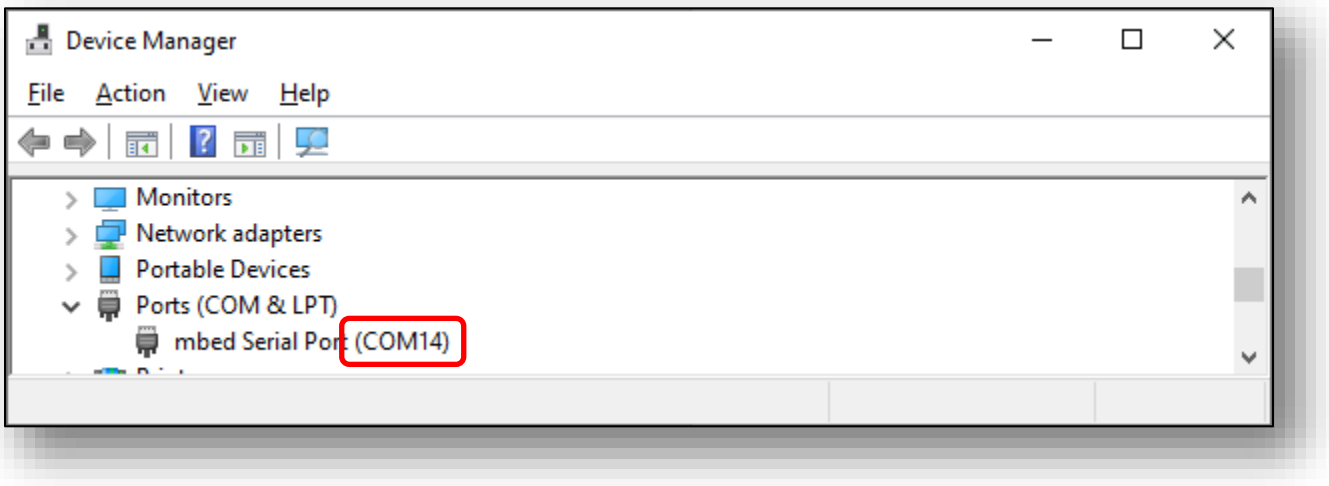
5. Click “Debug” in the Quickstart Panel.



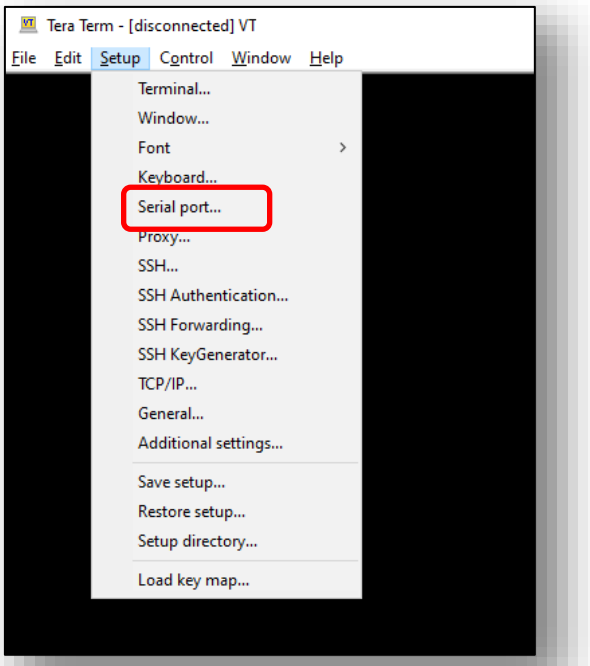
6. For the very first attempt, you need to select the appropriate JTAG adapter. Select the adapter and click OK, and then wait for a while for the build. You can see the log on console window.

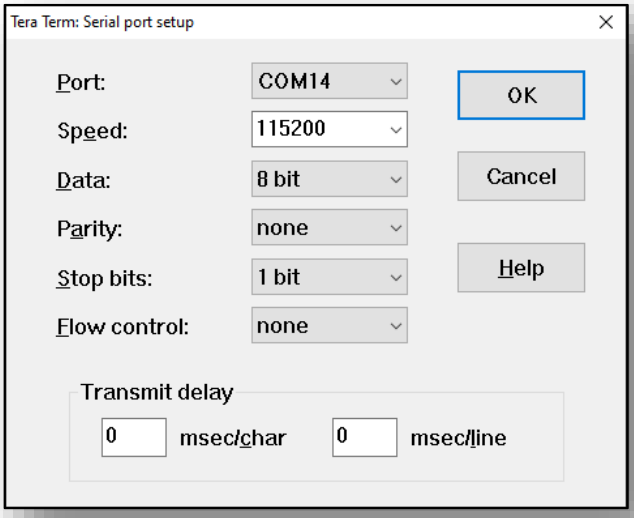


7. After the Debug process is complete, open the “Device Manager” in windows and go to “Ports (COM & LPT)” to check the mbed COM port number. In this case, COM 14 is our COM port number.

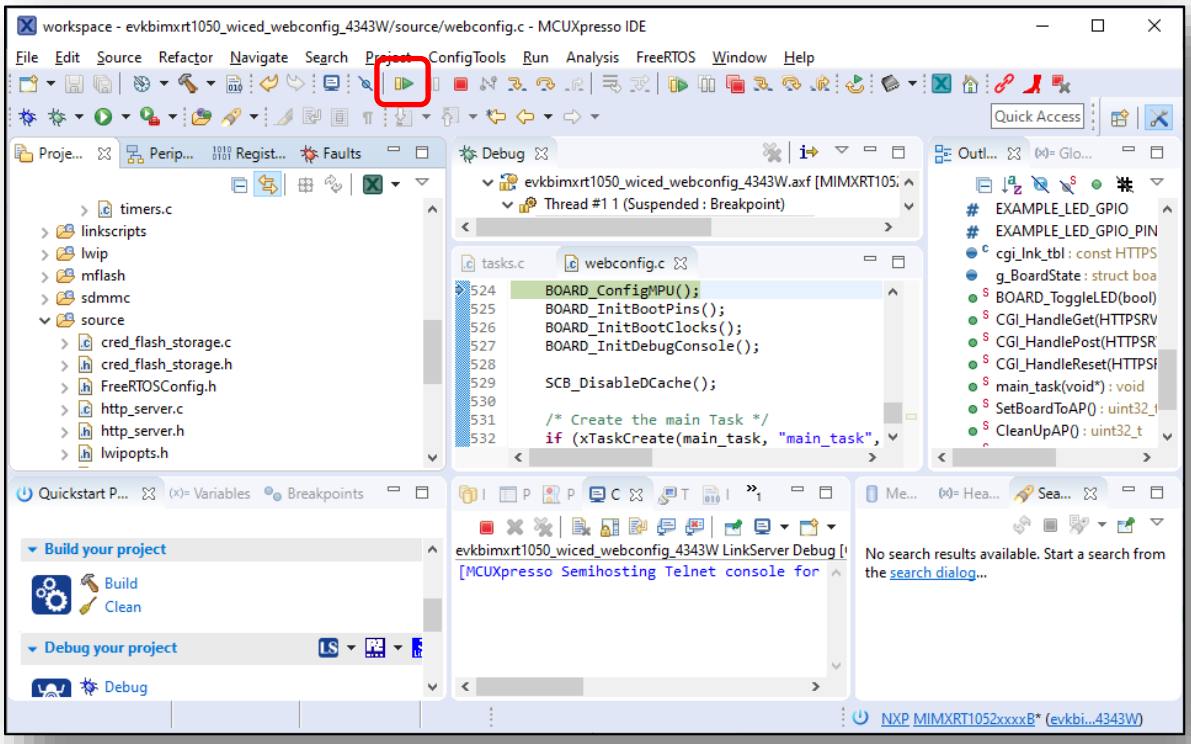


8. Now the webconfig example is ready to run. Open Tera Term on the appropriate COM port (i.e. COM 14 in this case). Configure port for 115200 bps, 8 bits data, no parity, and 1 stop bit (115200/8/N/1).

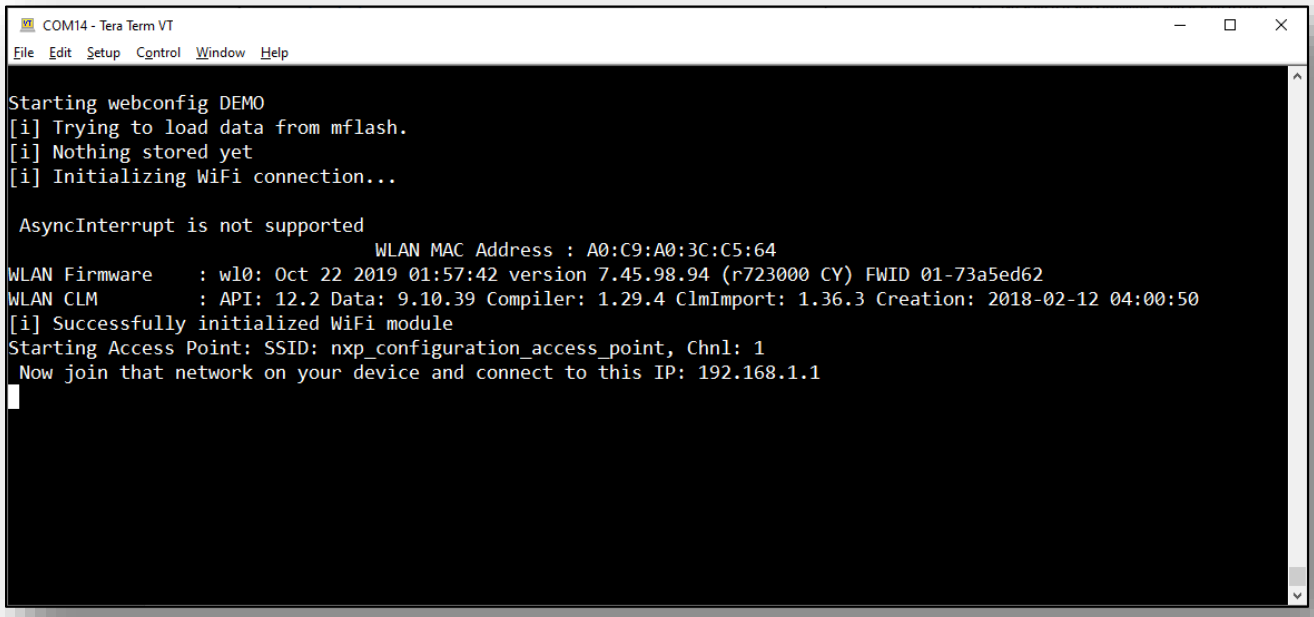




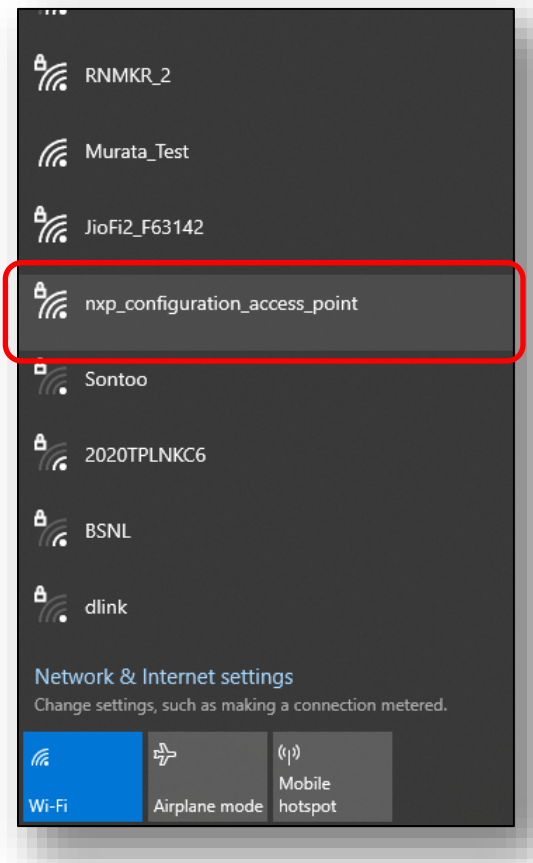
9. Click Resume button in MCUXpresso.



10. You should see this output from i.MX RT on Tera Term.

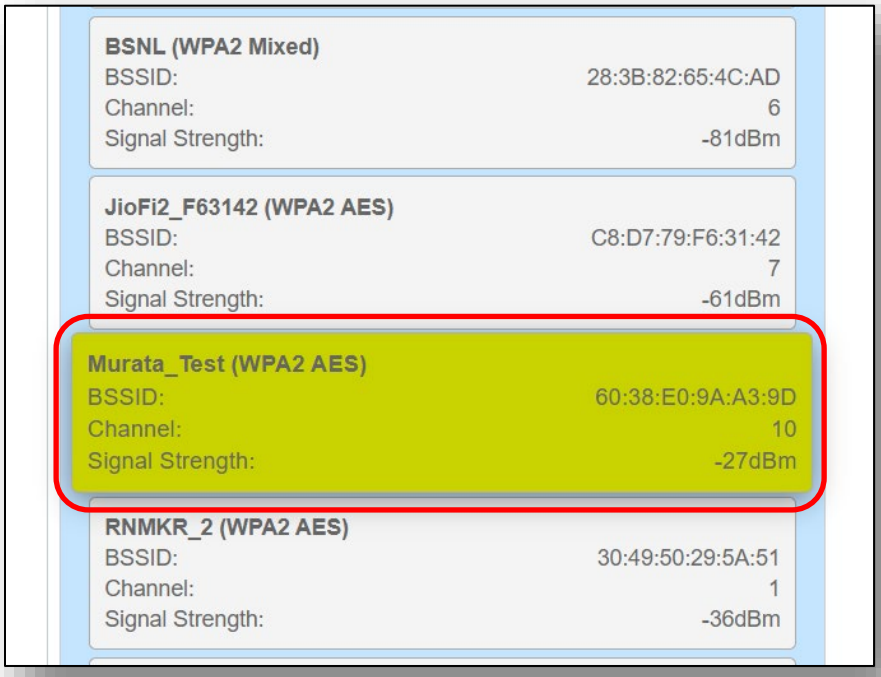


11. From a wireless client device (can be a laptop, or a phone), search for available wireless networks and connect to “nxp_configuration_access_point” SSID. The password is “NXP0123456789”.

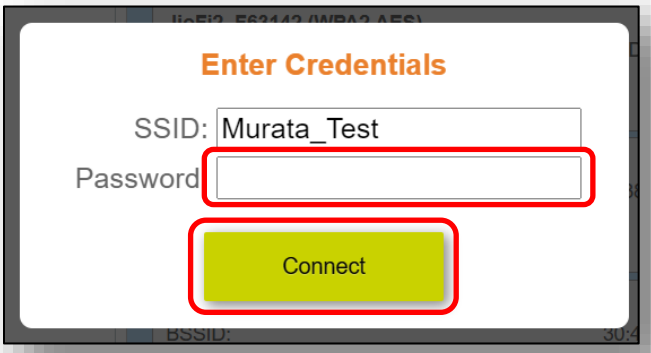


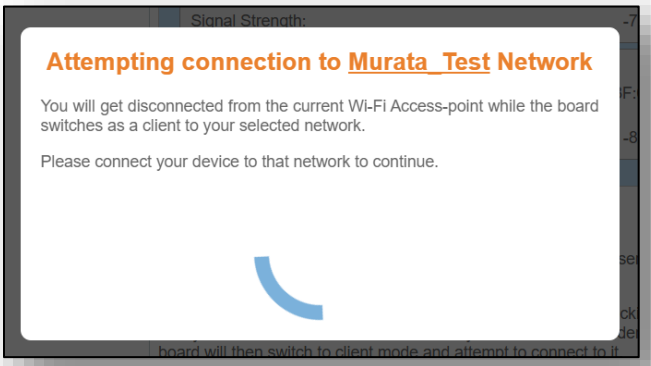
12. Open the web browser on the client device (Microsoft Internet Explorer is not supported) and go to “192.168.1.1” IP address. The wiced_webconfig_4343W example creates a web-based configuration interface to set up the Wi-Fi client configurations here. The EVK is currently set up as an AP, as can be seen in the UI. You can scan for available networks here.

13. Click on a network of your selection to connect to it.

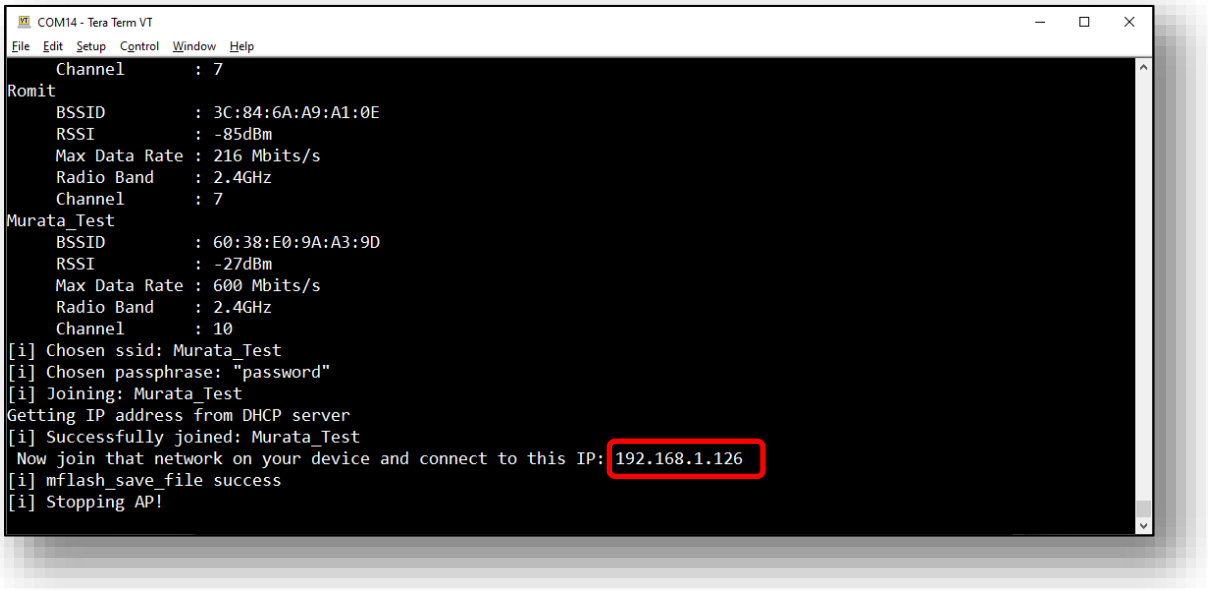


14. Enter the network password and click on connect.





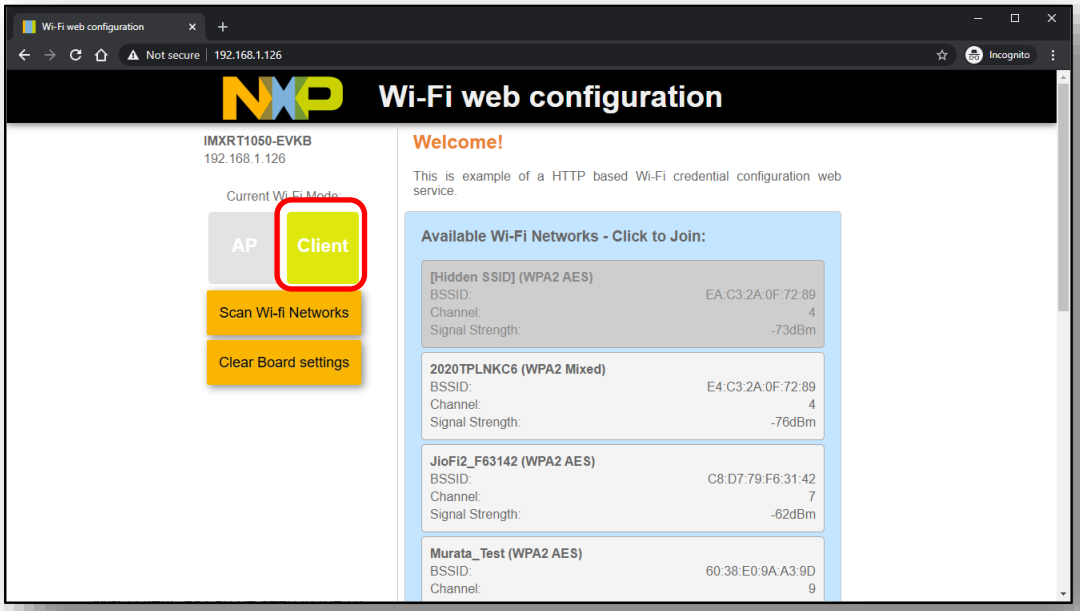
15. If connection is successful, the credential will be saved on the EVK mflash and will be used automatically after the EVK reboots. The AP will be turned off. You should see this output on Tera Term. Note the IP address shown.



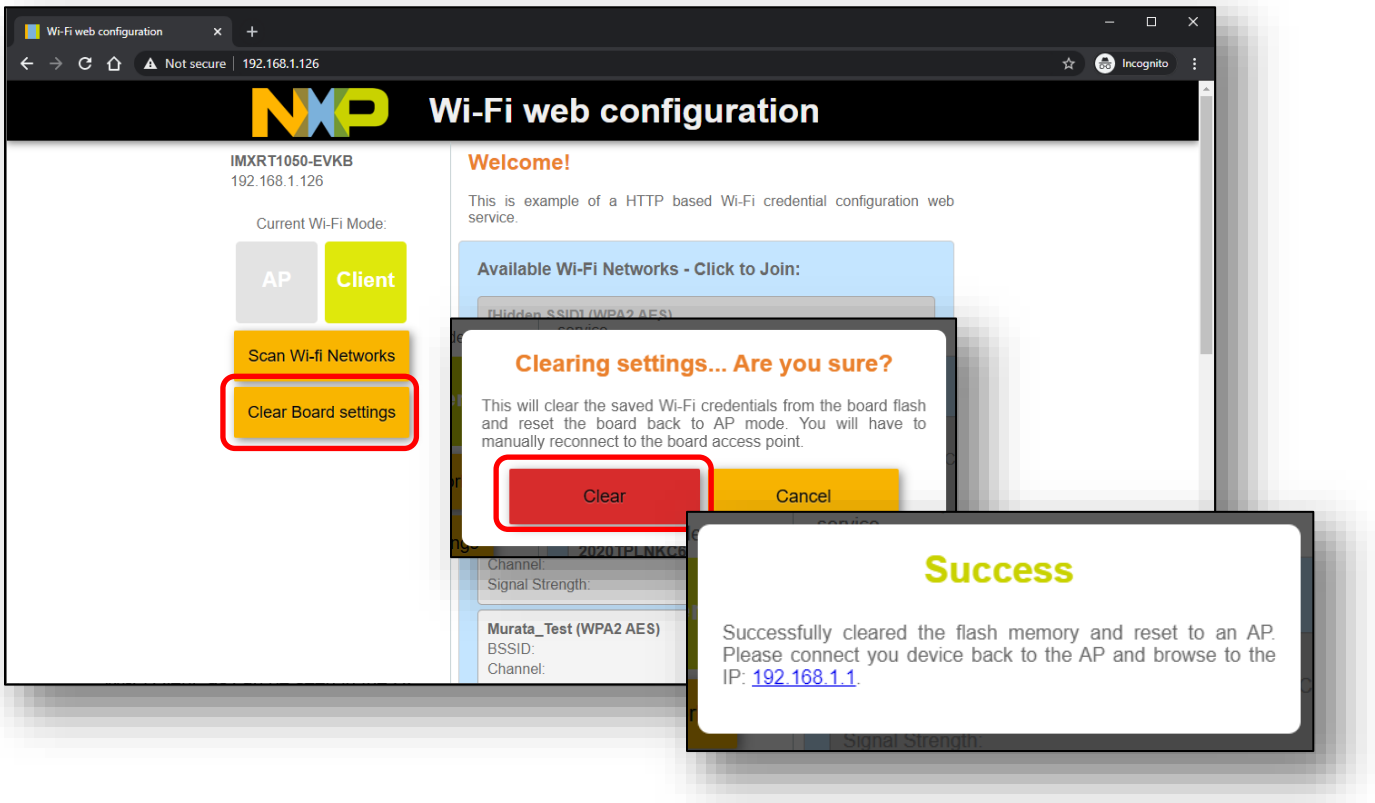
Upon reboot, the EVK will henceforth automatically connect to the saved network.

16. Connect the wireless client device to the same network as the EVK, open the web browser and go to the IP address shown on the Tera Term window (192.168.1.126 in this example).

17. The web-based configuration interface will be accessible here. The EVK is currently set up as a Wi-Fi client, as can be seen in the UI.



18. You can use the “Clear Board settings” button on the interface to remove the saved network settings.

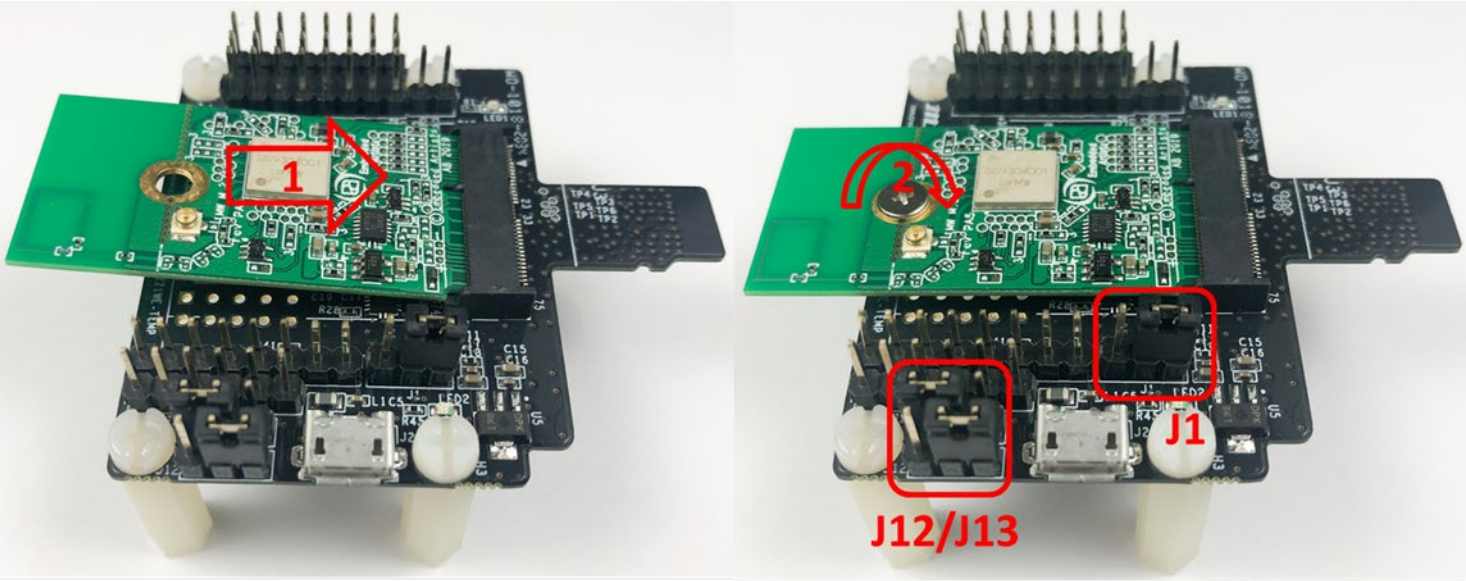


8 Murata's uSD-M.2 Adapter

8.1 Connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter

When connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter Rev B1 (**Figure 13**), make sure to (#1) firmly insert it before using M.2 screw to (#2) secure it in place. Important Jumpers (J12, J13, and J1) are highlighted.

Figure 13: Connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter



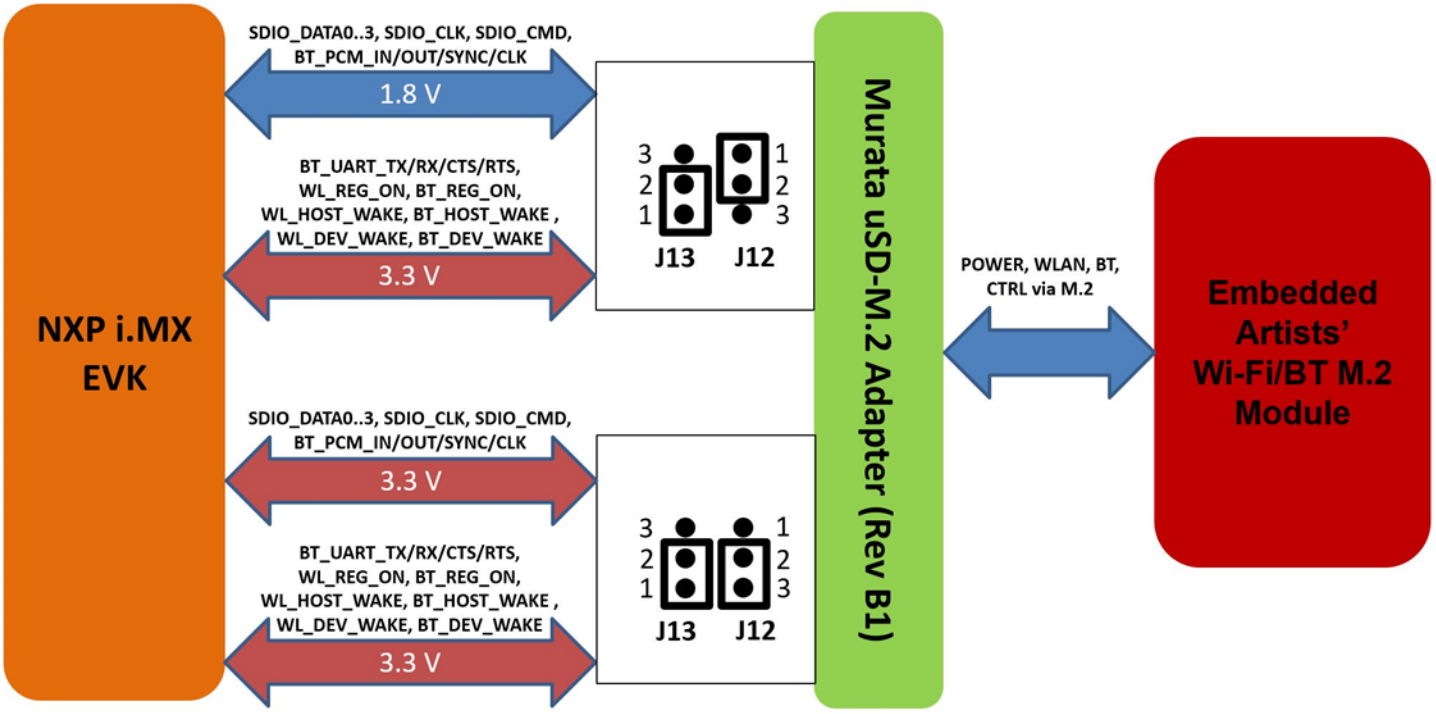
8.2 Configuring uSD-M.2 Adapter Jumpers for Correct VIO Signaling

Figure 14 shows a block diagram highlighting the Host (i.MX RT10xx EVK) and Wi-Fi/BT M.2 EVB VIO signaling voltages.

Default configuration is to have J13/J12 set to 1-2/1-2 positions respectively for the 1.8V VIO default configuration (WLAN-SDIO VIO at 1.8V VIO; BT-UART and WLAN/BT control signals at 3.3V VIO). Rev B1 Adapter level shifts the BT-UART signals and all WLAN/BT control signals except WL_REG_ON/BT_REG_ON which get level shifted on Wi-Fi/BT M.2 EVB.

In certain configurations where Host WLAN-SDIO VIO is 3.3V, we J13/J12 set to 1-2/2-3 positions respectively for the 3.3V VIO override mode setting (WLAN-SDIO, BT-UART, and WLAN/BT control signals all at 3.3V VIO). There is no level shifting on the Adapter of Wi-Fi/BT M.2 EVB in this case.

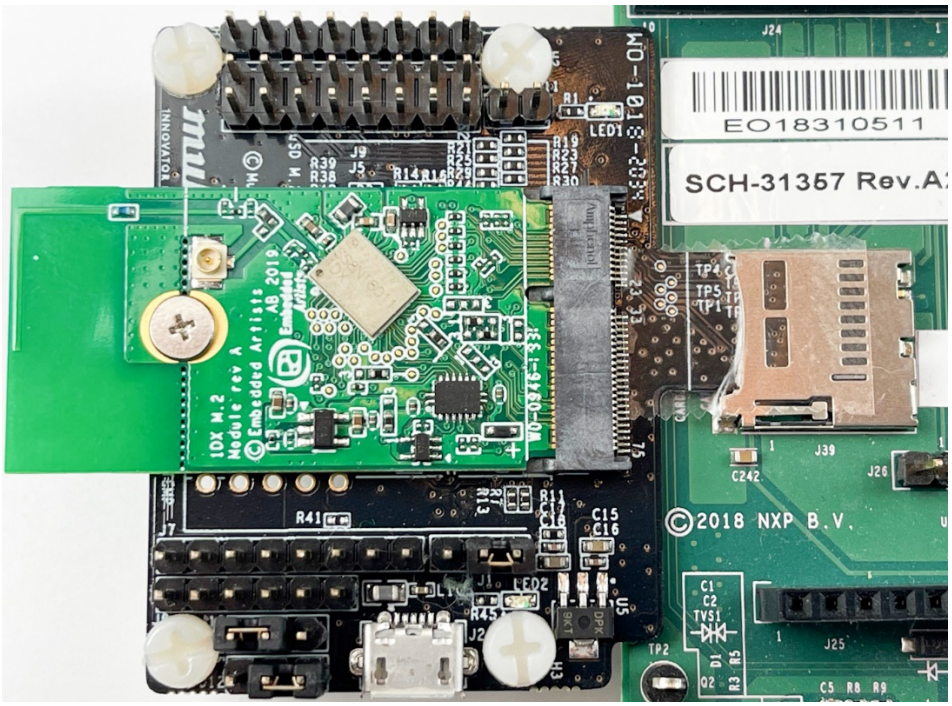
Figure 14: Host/M.2 IO Voltage Level Shift Options on Rev B1 Adapter



8.3 Securing uSD-M.2 Adapter to NXP i.MX RT10xx EVK

On NXP's i.MX RT10xx EVK's, one potential problem is an unreliable uSD/SD electrical connection when using Murata's uSD-M.2 Adapter. This is due to the "push push" uSD connector and lack of friction in the interface between Adapter and microSD connector.

Figure 15: Securing uSD-M.2 Adapter to i.MX RT10xx EVK



To properly secure the uSD-M.2 Adapter interconnect on the i.MX RT10xx EVK's, Murata ***strongly recommends*** to simply tape the uSD Adapter-EVK connection as shown in **Figure 15**. Note that taping the uSD Adapter-EVK connection makes the platform a little less flexible to work with. However, removing and re-applying clear tape is straightforward.

8.4 uSD-M.2 Adapter High-Level Description

Figure 16 and **Figure 17** show the features on the uSD-M.2 Adapter; with details in **Table 7.** The uSD-M.2 Adapter supports additional signals to WLAN-SDIO using either Arduino headers (J5, J8, and J9) or 20 pin FFC connector (J6). For more details on Murata's uSD-M.2 Adapter, refer to the Hardware User Manual.

Table 7: uSD-M.2 Adapter Features

Char	Description
A	microSD connector provides Power (VBAT, GND) and WLAN-SDIO
B	SDIO bus test points (CLK, CMD, DAT0, DAT1, DAT2, DAT3)
C	Power LED Indicator (green): if not illuminated then no power applied to M.2 EVB
D	J11 = Optional BT Disable Jumper for WLAN-Only Mode (close this jumper to drive BT_REG_ON low and disable Bluetooth Core; thereby optimizing power consumption)
E	J9 = BT UART TX/RX and WLAN/BT Control Signals (8 pin header)
F	J5 = Optional BT PCM and WLAN/BT Debug Signals (2x8 pin header)
G	Threaded mount for M.2 screw: 30mm distance from M.2 connector
H	Regulator to step down optional 5V VBAT from USB or Arduino header to 3.3V
I	External sleep clock input (32.768kHz)
J	J7 = Optional Arduino Header Power Supply (8 pin header; 5V or 3.3V VBAT)
K	J8 = BT UART RTS/CTS Signals (6 pin header)
L	J13 = Host IO Voltage: J13 in 1-2 pos for 3.3V VDDIO (default); J13 in 2-3 pos for 1.8V
M	J12 = M.2 IO Voltage: J12 in 1-2 pos for 1.8V VDDIO (default); J12 in 2-3 pos for 3.3V
N	J2 = Optional 5V USB Power Supply via Micro-AB USB Connector
O	LED2 = 3.3V M.2 IO Voltage Indicator (Blue) – not illuminated in default configuration
P	Regulator to provide optional 1.8V VIO to M.2 interface (M.2 EVB's have own 1.8V onboard)
Q	J1 = Power Supply Selector Jumper must be installed to power Adapter (unless J5 Arduino Header Pins #15/16 are connected to external GND/3.3V VBAT). **Position 1-2:** 5V/3.3V VBAT supply from micro-USB (J2); or Arduino (J7) **Position 2-3:** VBAT supply (typical 3.1~3.3V) from microSD connector
R	M.2 Connector: type 2230-xx-E
S	microSD connector pins: provides Power (VBAT, GND) and WLAN-SDIO
T	WLAN JTAG header (header pins not populated)
U	20 pin FFC connector (BT UART, BT PCM, WLAN/BT Control signals)
V	Additional test points from 20pin flat/flex connector

Figure 16: uSD-M.2 Adapter Features (Top View)

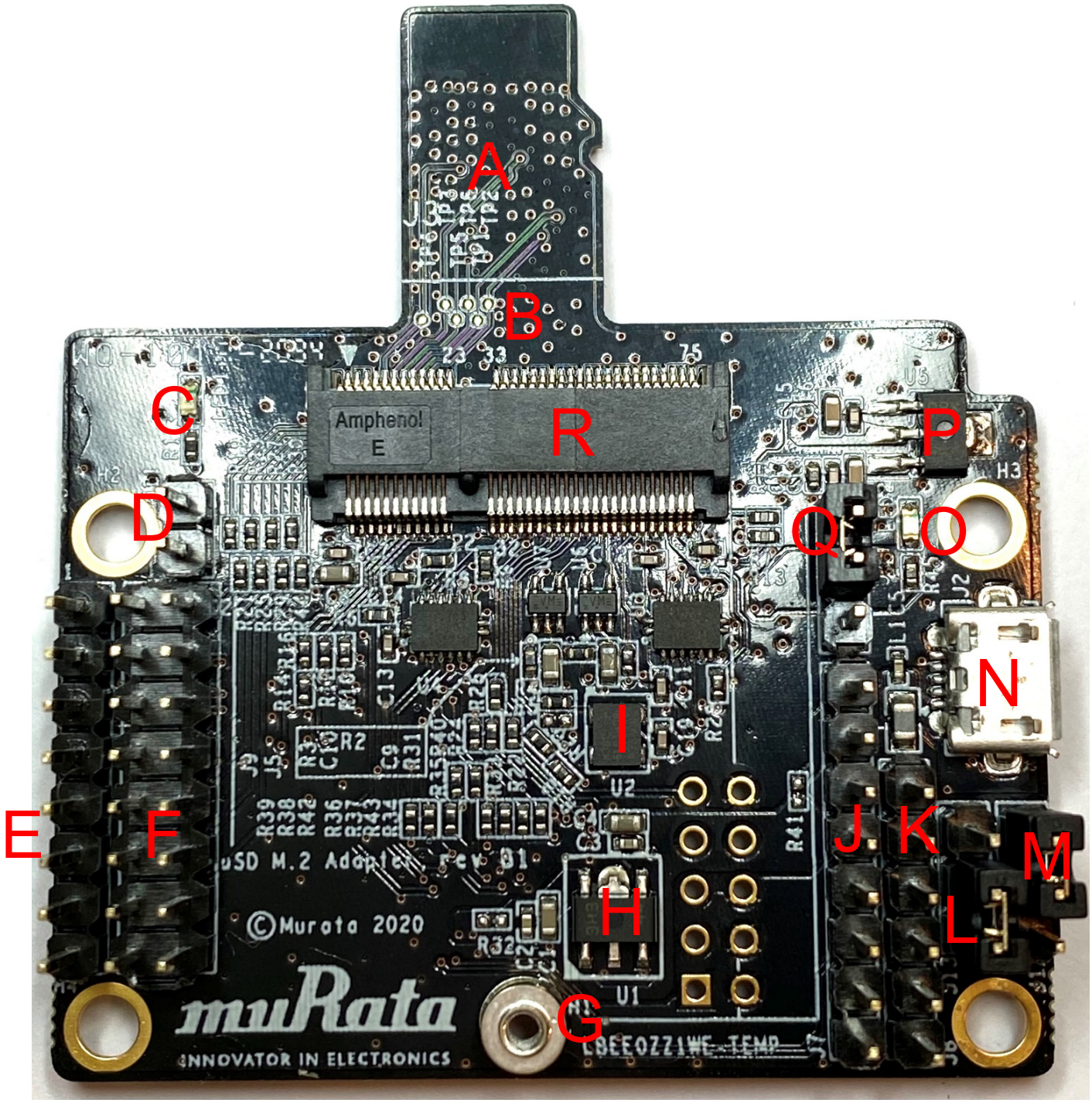
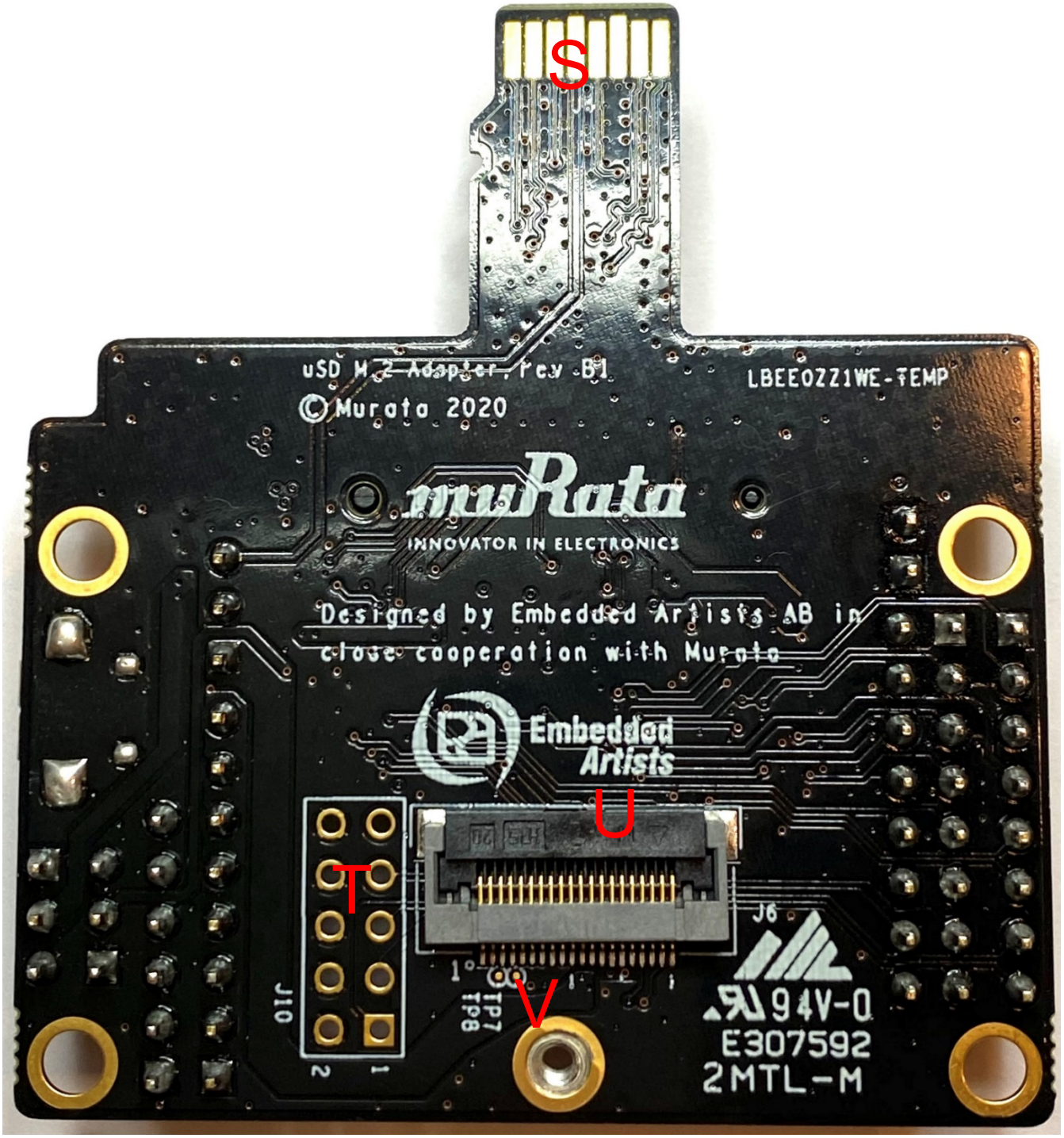


Figure 17: uSD-M.2 Adapter Features (Bottom View)



9 Technical Support Contact

Table 8 lists all the support resources available for the Murata Wi-Fi/Bluetooth solution.

Table 8: List of Support Resources

Support Site	Notes
Murata Community Forum	**Primary support point for technical queries.** This is an open forum for all customers. Registration is required.
Murata i.MX Landing Page	No login credentials required. Murata documentation covering hardware, software, testing, etc. is provided here.
Murata uSD-M.2 Adapter Landing Page	Landing page for uSD-M.2 Adapter. In conjunction with Murata i.MX Landing Page, this should provide the user with comprehensive getting started documentation.
Murata Module Landing Page	No login credentials required. Murata documentation covering all Cypress-based Wi-Fi/BT modules is provided here.

10 Additional Useful Links

In addition to **Table 8** listings of support resources, **Table 9**, **Table 10**, **Table 11** and **Table 12** provides some useful links.

Table 9: NXP links

Link	Notes
MCUXpresso IDE	Landing page to download MCUXpresso IDE
MCUXpresso SDK	Comprehensive information of MCUXpresso SDK
MCUXpresso SDK Builder	Customize and build MCUXpresso SDKs
LPC-Link 2	Landing page of the debug probe for i.MX RT EVKs
i.MX RT 1050 EVK	Landing page of the i.MX RT 1050 EVK
i.MX RT 1060 EVK	Landing page of the i.MX RT 1060 EVK
i.MX RT 1050 Getting Started	Getting started guide for the i.MX RT 1050 EVK
i.MX RT 1056 Getting Started	Getting started guide for the i.MX RT 1056 EVK

Table 10: Embedded Artists' Landing Pages

Landing Pages	Notes
Embedded Artists' Website	The Art of Embedded Systems Development – made EASY™
i.MX RT COM Boards	Listing of Computer-on-Module boards.
i.MX RT COM Carrier Board V2	Main baseboard which all the COM boards plug into.
M.2 Module Family	Top level listing of 1DX, 1LV, 1MW M.2 EVBs.

Table 11: Embedded Artists' Datasheets and Schematics

Datasheets and Schematics	Notes
i.MX RT COM Carrier Board V2 Datasheet	Comprehensive definition of COM Carrier (baseboard).
i.MX RT COM Carrier Board V2 Schematics	Complete schematics including clear definition of uSD-M.2 Adapter.
M.2 SDIO Interface Schematic	Reference schematic for customers designing in WLAN-SDIO M.2 EVB.
M.2 PCIe Interface Schematic	Reference schematic for customers designing in WLAN-PCIe M.2 EVB.
EACOM Board Specification Guide	Comprehensive definition of Embedded Artists' Computer-On-Module's.
1DX M.2 Module Datasheet	Comprehensive details on 1DX Wi-Fi/BT M.2 Module.
1LV M.2 Module Datasheet	Comprehensive details on 1LV Wi-Fi/BT M.2 Module.
1MW M.2 Module Datasheet	Comprehensive details on 1MW Wi-Fi/BT M.2 Module.

Table 12: Embedded Artists' User Manuals and Software

User Manuals and Software	Notes
Getting Started with M.2 modules and i.MX RT	How to bring up Embedded Artists i.MX RT Dev Kits.
Wi-Fi/BT M.2 EVB Primer	Introduction and drill-down on M.2 interface.