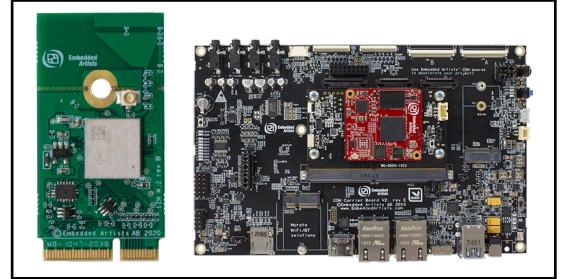**Murata Wi-Fi/BT (NXP)**
Solution for
Embedded Artists' i.MX

Linux Quick Start Guide

Revision History

Revision	Date	Author	Change Description
1.0	Nov 17, 2020	TF	Initial Release

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LIST OF FIGURES

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1 Introduction

This document details enabling [Murata's Wi-Fi/Bluetooth modules](#) on [Embedded Artists' i.MX Developer's Kits](#) / [COM boards](#) (running Linux), using [Embedded Artists' Wi-Fi/BT EVB's](#). Murata supports Wi-Fi/Bluetooth on several combinations of Embedded Artists' i.MX Developer's Kits / COM boards and M.2 Wi-Fi/Bluetooth EVB's (running different Linux kernel versions). This Quick Start documents a couple of hardware/software configuration to introduce users to the Murata solution and demonstrate the ease of getting started with Embedded Artists' hardware. For more details on different configurations supported, please refer to the [Murata Wi-Fi/BT (NXP) Solution for i.MX Linux User Guide](#).

The Embedded Artists' Developer's Kits / COM boards currently supported are based on i.MX 8, i.MX 7 and i.MX 6. All platforms have direct M.2 interconnect with following signals supported:

- WLAN-SDIO, WLAN-PCIe
- BT-UART, BT-PCM
- WLAN/BT control signals
- WLAN JTAG and WLAN/BT debug signals

Figure 1: Embedded Artists' i.MX 8M Mini uCOM Developer's Kit with Type 1ZM M.2 Module
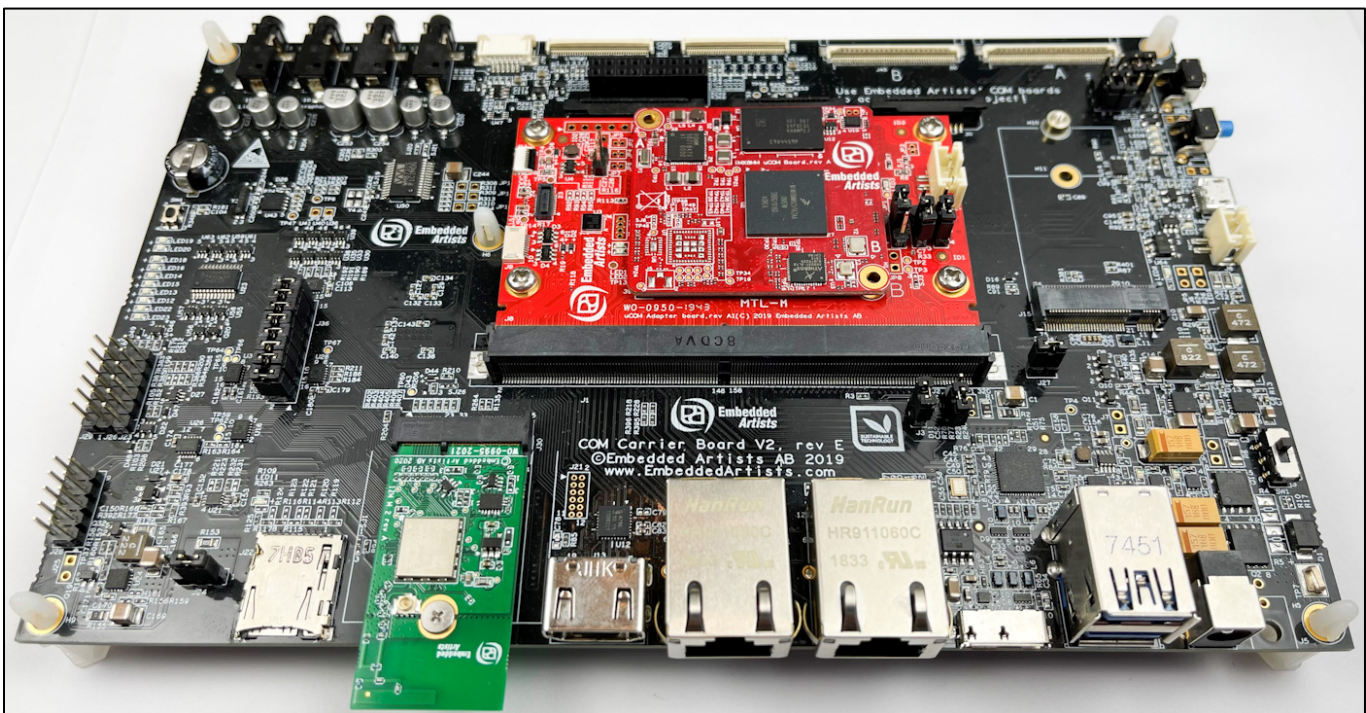
The following sections describe the process of getting Wi-Fi and Bluetooth up and running on Embedded Artists' [i.MX 8MMini uCOM Developer's Kit](#) with Murata [Type 1ZM](#) module, running [5.4.47](#) kernel release. The document also describes the process of easily switching to Murata [Type 1YM](#) module without any need for complicated hardware changes or software builds.

2   References

2.1   Embedded Artists' M.2 Modules Landing Page

This [website landing page](#) provides latest/comprehensive information on Embedded Artists' M.2 Evaluation Boards which enable Murata Wi-Fi/BT modules for easy evaluation.

2.2   Embedded Artists' Developer's Kits Landing Page

This [website landing page](#) provides latest/comprehensive information on Embedded Artists' i.MX application processor-based Developer's Kits, which enables easy and modular solution for evaluating various processors and Murata Wi-Fi/BT modules.

2.3   Murata's i.MX Wireless Solutions Landing Page

The "Supported Hardware by Embedded Artists" section of this [website landing page](#) provides latest/comprehensive information on Murata's i.MX Wireless solutions so customers can easily evaluate Murata's modules on Embedded Artists i.MX processors.

2.4   Murata's Community Forum Support

Murata's Community provides online support for all of Murata's i.MX Wireless solutions, including separate sections for Embedded Artists solutions. Refer to [this link](#) for the Forum's main Wi-Fi/Bluetooth landing page.

2.5   Murata Wi-Fi/BT (NXP) Solution for i.MX Linux User Guide

This [User Guide](#) details steps to get Murata Wi-Fi/BT (NXP-based) modules up and running quickly.

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3 Interfacing the Wi-Fi/Bluetooth M.2 Module (EVB)

Figure 3 and **Figure 3** illustrate how Embedded Artists' 1ZM M.2 EVB is connected to the i.MX 8M Mini uCOM Developer's Kit in the M.2 slot. No additional cabling is required.

Figure 2: Plug in Type 1ZM M.2 EVB on shallow angle, inserting it fully into M.2 Connector
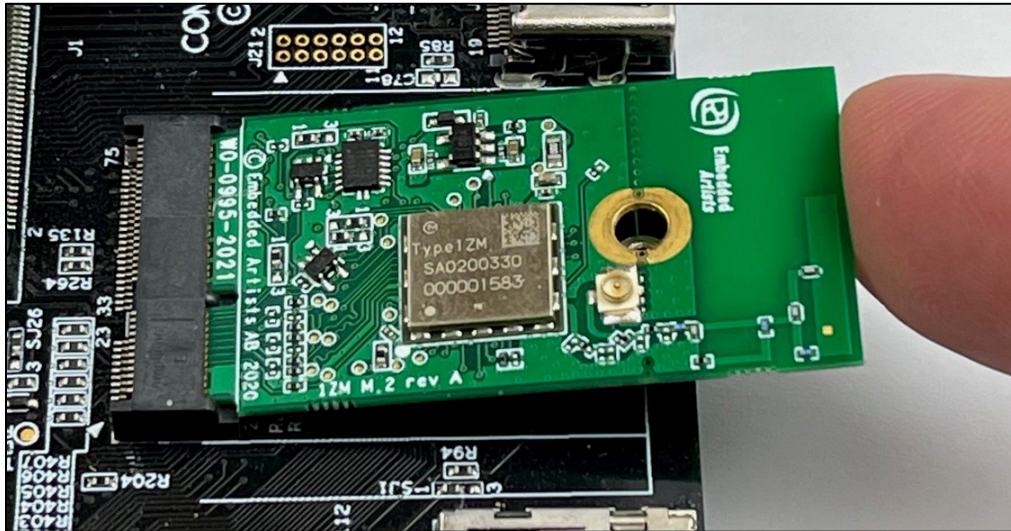

Figure 3: Continue pushing with finger (for snug fit) while securing M.2 EVB with screw
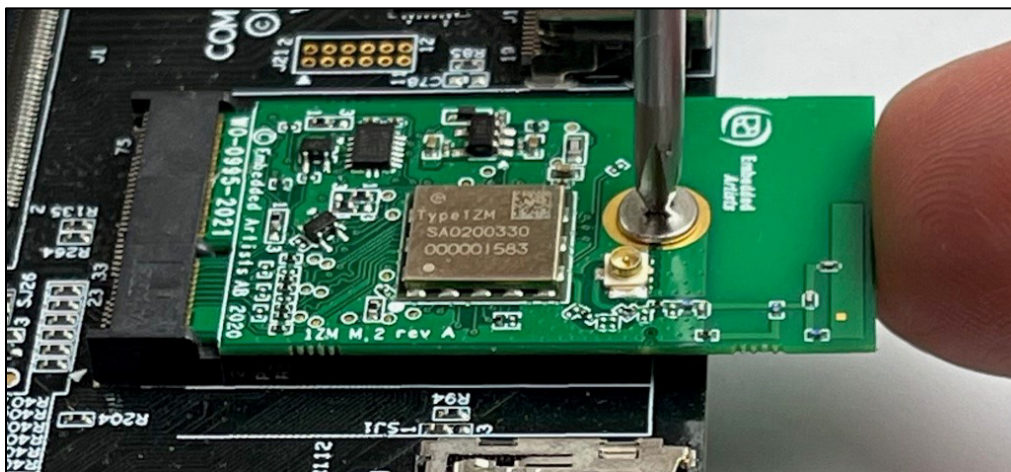
4 Download Prebuilt Linux Image and Flash Platform

Embedded Artists provide prebuilt Linux images for users to quickly download and start evaluating. These are available at Embedded Artists i.MX Related Resources page. The following steps showcase the process of downloading and flashing the image for the Linux kernel 5.4.47. The host system being used is running Windows® 10.

1. Download 5.4.47 Linux image for Embedded Artists' i.MX 8MMini uCOM Board / Kit, from Embedded Artists i.MX Related Resources page as shown in **Figure 4**.

Figure 4: Embedded Artists i.MX Related Resources page

i.MX8M Mini uCOM Board / Kit			
Resource	**Description**	**Updated**	**Size (MB)**
uuu_imx8mm_ucom_5.4.47.zip	UUU tool including bootloader, kernel (**5.4.47**) and file system images	2021-01-22	159.0
uuu_imx8mm_ucom_5.4.24.zip	UUU tool including bootloader, kernel (**5.4.24**) and file system images	2021-01-25	160.5

2. Extract the downloaded archive. This will extract both the image as well as the UUU application that can be used to flash the board.

3. Set up the Developer's Kit and the console by following the online Getting Started.

4. Put the Developer's Kit into OTG mode to download the image, by closing the J2 jumper as shown in **Figure 5**.

Figure 5: J2 jumper (closed for flashing mode) on Developer's Kit

5. Power on the Developer's Kit.

6. Open a command prompt, navigate to the folder where the downloaded zip file was extracted and run the UUU tool.

```
C:\> cd c:\temp\uuu_imx8mq_com_5.4.24
C:\temp\uuu_imx8mq_com_5.4.24> uuu.exe full_tar.uuu
```

7. The terminal will show the download progress.

```
D:\temp\uuu_imx8mm_ucom_5.4.47>uuu.exe full_tar.uuu
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.3.191-0-g4fe24b9

Success 0    Failure 0


1:12    26/29 [=======>           23%                 ] FBK: ucp  files/ea-image-base-imx8mmea-ucom.tar.bz2 t:-
```

8. Wait till the download is complete.

```
D:\temp\uuu_imx8mm_ucom_5.4.47>uuu.exe full_tar.uuu
uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.3.191-0-g4fe24b9

Success 1     Failure 0

1:12    29/29 [Done                                   ] FBK: DONE
```

9. Power off the Developer's Kit.

10. Put the Developer's Kit into eMMC boot mode, by opening the J2 jumper.

11. Power on and boot the Developer's Kit.
    - Username: "root"
    - Password: "pass"

12. Set up the Developer's Kit for working with the Type 1ZM EVB, by invoking the switch_module.sh script as shown below. Once that is done reboot the Dev Kit.

```
$ switch_module.sh 1zm
$ switch_module.sh off
$ reboot
```

13. The Developer's Kit should boot with the Wi-Fi driver loaded automatically. To verify, you can issue "dmesg" command and search on "wlan" string. Expected log results are included.

```
$ dmesg | grep wlan

wlan: Loading MWLAN driver
wlan: Enable TX SG mode
wlan: Enable RX SG mode
wlan: version = SD8987---16.92.10.p207-MXM4X16186.p6-GPL-(FP92)
wlan: Driver loaded successfully
```

5 Enable Wi-Fi

1. Ensure the interface is up by issuing "ifconfig mlan0".

```
$ ifconfig mlan0
mlan0     Link encap:Ethernet  HWaddr 00:9D:6B:A6:EE:76    ← WLAN MAC Address
          UP BROADCAST MULTICAST  MTU:1500  Metric:1       ← "wlan0" interface is UP
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
```

2. Scan for available Wi-Fi networks.

```
$iw dev mlan0 scan
```

3. Connect to an unsecured Access Point (AP) "Murata_5G".

```
$ iw dev mlan0 connect Murata_5G
$ iw dev mlan0 link
Connected to 84:1b:5e:f6:a7:60 (on wlan0)
      SSID: Murata_5G
      freq: 5180
      RX: 1944 bytes (8 packets)
      TX: 0 bytes (0 packets)
      signal: -44 dBm
      tx bitrate: 24.0 MBit/s
      bss flags:
      dtim period:     1
      beacon int:      100
```

4. Run DHCP client to get IP address.

```
$ udhcpc -i mlan0
```

5. Ping AP (IP address 192.168.10.1) to check connectivity.

```
$ ping 192.168.10.1
```

6 Enable Bluetooth

1. Load the Bluetooth driver by issuing the following command ("bluetooth_up.sh" script invokes *hciattach, hciconfig up, hcitool scan*). The Linux BlueZ stack is used for Bluetooth operations.

```
$ /opt/ea/bluetooth_up.sh
```

Note: There might be couple of error/warning messages, but these can be safely ignored.

2. To repeat scanning Bluetooth devices.

```
$ hcitool scan
```

7 Switch Wi-Fi/BT M.2 Module to Type 1YM

The modular design of Embedded Artists' Developer's Kits and the industry standard M.2 interface of the Embedded Artists' Wi-Fi/BT Modules allow users to quickly switch wireless solutions. The steps below describe the process of switching out the Type 1ZM module used in the previous steps with the Type 1YM module. Note that Type 1YM (default configuration) is a WLAN-PCIe/BT-UART whereas Type 1ZM is WLAN-SDIO/BT-UART. The Embedded Artists' M.2 interface provides these interconnect options, making it very customer friendly.

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The Embedded Artists' solution makes switching wireless solutions quite simple by merely running the "switch_module.sh" script. This feature is consistent with Embedded Artists' overall approach to their hardware/software solutions: lowering the bar for customers so they can quickly get their desired software applications up and running. To quickly switch from Type 1ZM to Type 1YM solutions:

1. Issue "halt" command and power off the Developer's Kit.

```
$ halt
```

2. Unscrew and Disconnect the Type 1ZM EVB from the Developer's Kit and connect the Type 1YM M.2 EVB.

3. Power on and boot the Developer's Kit.

4. Set up the Developer's Kit for working with the Type 1YM EVB (WLAN-PCIe configured), by invoking the switch_module.sh script and rebooting the platform as shown below.

```
switch_module.sh 1ym-pcie
switch_module.sh off
reboot
```

5. The Developer's Kit should boot with and bring up Type 1YM's WLAN interface automatically. The same steps to enable/test Wi-Fi/Bluetooth can be repeated.

8   Murata Community Forum

Murata supports our Wi-Fi/BT modules on all Embedded Artists' Developer Kits using our Community Forum. Go to Murata's Wireless Community Forum at https://community.murata.com/.

Figure 6: Links to Adapter and more Wi-Fi/BT M.2 EVB's