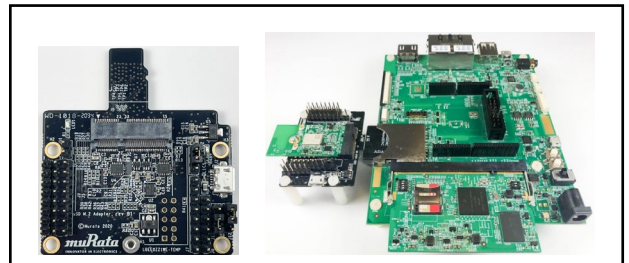


**Murata Wi-Fi/BT  
Solution for i.MX**

**Hardware User  
Manual**



**Revision History**

Revision	Date	Author	Change Description
1.0	08/31/2015	S. Kerr, R. Willett	Initial version
2.0	11/07/2015	S. Kerr	Modified Murata Wi-Fi/BT EVK definition. This simplifies bring-up on Freescale i.MX 6 Platforms.
3.0	01/02/2018	S. Kerr	Updated to add support for 1.8V VIO.
4.0	11/17/2020	TF	Updated to add new uSD-M.2 adapter option. Updated the supported i.MX platforms. Added 1YM, 1ZM, 1XA EVB's.

## Table of Contents

<b>1</b>	<b>WI-FI/BT HARDWARE SOLUTION FOR I.MX.....</b>	<b>6</b>
1.1	INTRODUCTION.....	6
1.2	ACRONYMS.....	7
1.3	REFERENCES.....	9
1.3.1	<i>Murata's uSD-M.2 Adapter Landing Page</i> .....	9
1.3.2	<i>Murata uSD-M.2 Adapter Rev B1 Datasheet</i> .....	9
1.3.3	<i>Murata uSD-M.2 Adapter Rev A Datasheet</i> .....	9
1.3.4	<i>Murata's Community Forum Support</i> .....	9
1.3.5	<i>Embedded Artists' M.2 Modules Landing Page</i> .....	9
1.3.6	<i>Embedded Artists' i.MX Developer Kits Landing Page</i> .....	9
1.3.7	<i>Murata's i.MX Wireless Solutions Landing Page</i> .....	9
1.4	MURATA KIT CONTENTS .....	9
1.5	EMBEDDED ARTISTS' WI-FI/BLUETOOTH EVB'S.....	11
<b>2</b>	<b>PLATFORM SUPPORT .....</b>	<b>12</b>
2.1	NXP I.MX 6 PLATFORM SUPPORT .....	14
2.2	NXP I.MX 8 PLATFORM SUPPORT .....	15
2.3	NXP I.MX RT PLATFORM SUPPORT.....	18
2.4	NXP I.MX VERSUS MURATA MODULE INTERCONNECT .....	19
2.5	EMBEDDED ARTISTS' I.MX PLATFORM SUPPORT .....	21
2.6	EMBEDDED ARTISTS' I.MX VERSUS MURATA MODULE INTERCONNECT.....	22
<b>3</b>	<b>MURATA USD-M.2 ADAPTER.....</b>	<b>23</b>
3.1	USD-M.2 ADAPTER HIGH-LEVEL DESCRIPTION .....	23
3.2	USD-M.2 ADAPTER: HEADERS/JUMPERS IN DETAIL.....	26
3.2.1	<i>J1: Power Supply Selector</i> .....	27
3.2.2	<i>J11: Optional Jumper to Disable Bluetooth for WLAN-Only Operation</i> .....	27
3.2.3	<i>J9: Bluetooth UART TX/RX and WLAN/Bluetooth Control Arduino Header</i> .....	27
3.2.4	<i>J5: Optional BT PCM and WLAN/BT Debug Signals</i> .....	27
3.2.5	<i>J12: M.2 IO Voltage: J12 in 1-2 pos for 1.8V VDDIO; J12 in 2-3 pos for 3.3V</i> .....	29
3.2.6	<i>J13: HOST IO Voltage: J13 in 1-2 pos for 3.3V VDDIO; J13 in 2-3 pos for 1.8V</i> .....	29
3.2.7	<i>J7: Optional Arduino Header Power Supply (can connect either 5V or 3.3V VBAT)</i> .....	29
3.2.8	<i>J8: BT UART RTS/CTS Arduino Header</i> .....	29
3.3	HOST/M.2 VDDIO VOLTAGE SETTINGS .....	31
3.4	USD-M.2 ADAPTER: PINOUT DEFINITION.....	32
3.5	USD-M.2 SCHEMATIC & LAYOUT .....	36
3.6	CONNECTING THE WI-FI/BT M.2 EVB TO USD-M.2 ADAPTER.....	41
3.7	SECURING USD-M.2 ADAPTER TO NXP I.MX EVK.....	41
<b>4</b>	<b>CONNECTING MURATA WI-FI/BT SOLUTION ON I.MX RT PLATFORMS .....</b>	<b>43</b>
4.1	USD-M.2 ADAPTER ON I.MX RT PLATFORMS.....	43

4.1.1	WLAN connections for i.MX RT.....	43
4.1.2	WLAN and Bluetooth connections for i.MX RT.....	44
4.1.2.1	WLAN and Bluetooth Close-Up #1.....	45
4.1.2.2	WLAN and Bluetooth Close-Up #2.....	46
4.1.3	WLAN, Bluetooth, and WLAN/Bluetooth Control connections for i.MX RT.....	47
4.1.3.1	WLAN, Bluetooth, and WLAN/BT Control Close-up.....	47
4.1.4	Power Options.....	49
4.1.4.1	Arduino 5V Power Option.....	49
4.1.4.2	USB 5V Power Option.....	50
4.1.4.3	3.3V VDDIO Override Option.....	51
4.1.5	Bluetooth Disable Option for WLAN-Only Mode.....	52
<b>5</b>	<b>CONNECTING MURATA WI-FI/BT SOLUTION ON I.MX 6 PLATFORMS.....</b>	<b>53</b>
5.1	USD-M.2 ADAPTER ON I.MX 6 PLATFORMS.....	53
5.2	NXP I.MX 6 PLATFORM INTERCONNECT DETAILS.....	55
5.2.1	Connecting to i.MX 6SX SDB (3.3V WLAN-SDIO VIO Override).....	55
5.2.1.1	i.MX 6SX SDB: WL_HOST_WAKE Detailed Rework Instructions.....	56
5.2.2	Connecting to i.MX 6Quad SDB (3.3V WLAN-SDIO VIO Override).....	58
5.2.2.1	i.MX 6Quad SDB: Detailed Rework Instructions.....	59
5.2.3	Connecting to iMX 6UL EVK or i.MX 6ULL EVK (1.8V WLAN-SDIO VIO).....	61
5.2.3.1	i.MX 6UL EVK: Detailed Rework Instructions.....	63
<b>6</b>	<b>CONNECTING MURATA WI-FI/BT SOLUTION ON I.MX 8 PLATFORMS.....</b>	<b>63</b>
6.1	DIRECT Wi-Fi/BT M.2 INTERFACE ON I.MX 8 PLATFORMS.....	63
6.1.1	Connecting Wi-Fi/BT on i.MX 8MQuad EVK.....	64
6.1.2	Connecting Wi-Fi/BT on i.MX 8M Mini/Nano EVK's.....	64
6.2	USD-M.2 ADAPTER ON I.MX 8M MINI/NANO EVK.....	65
<b>7</b>	<b>TYPE 1YM M.2 EVB WLAN/BLUETOOTH BUS INTERFACE CONFIGURATION.....</b>	<b>70</b>
<b>8</b>	<b>APPENDIX: HOST/M.2 VDDIO VOLTAGE SETTINGS (REV B1 VS. REV A).....</b>	<b>72</b>

## List of Figures

FIGURE 1:	I.MX 6 EVK WLAN/BT INTERCONNECT BLOCK DIAGRAM.....	15
FIGURE 2:	I.MX 8QXP MEK OR 8MQUAD EVK WLAN/BT INTERCONNECT BLOCK DIAGRAM.....	16
FIGURE 3:	I.MX 8M MINI EVK WLAN-PCIE INTERCONNECT BLOCK DIAGRAM.....	16
FIGURE 4:	I.MX 8M MINI/NANO EVK WLAN/BT INTERCONNECT BLOCK DIAGRAM.....	17
FIGURE 5:	NXP I.MX RT EVK WI-FI/BT INTERCONNECT BLOCK DIAGRAM.....	18
FIGURE 6:	COMBINE EMBEDDED ARTISTS' I.MX COM WITH THEIR WI-FI/BT M.2 MODULE.....	21
FIGURE 7:	MURATA USD-M.2 ADAPTER, TOP VIEW.....	25
FIGURE 8:	MURATA USD-M.2 ADAPTER, BOTTOM VIEW.....	26
FIGURE 9:	USD-M.2 ADAPTER: LEFT HEADERS/JUMPERS.....	28
FIGURE 10:	USD-M.2 ADAPTER: RIGHT HEADERS/JUMPERS.....	30
FIGURE 11:	COMMON HOST/M.2 IO VOLTAGE LEVEL SHIFT OPTIONS.....	32

FIGURE 12: MURATA USD-M.2 ADAPTER SCHEMATIC.....	36
FIGURE 13: USD-M.2 ADAPTER LAYOUT, TOP VIEW .....	39
FIGURE 14: USD-M.2 ADAPTER LAYOUT, BOTTOM VIEW.....	40
FIGURE 15: CONNECTING THE EMBEDDED ARTISTS' WI-FI/BT M.2 EVB TO MURATA'S USD-M.2 ADAPTER.....	41
FIGURE 16: SECURING USD/SD CONNECTION ON I.MX 6 EVK.....	42
FIGURE 17: SECURING USD CONNECTION ON I.MX 8 EVK.....	42
FIGURE 18: I.MX RT1060 EVK + USD-M.2 + 1 DX M.2 EVB (WLAN ONLY).....	44
FIGURE 19: I.MX RT1060 EVK + USD-M.2 + 1DX M.2 EVB (WLAN + BLUETOOTH) .....	44
FIGURE 20: I.MX RT1060 EVK + USD-M.2 + 1DX M.2 EVB (WLAN + BT): CLOSE-UP #1.....	45
FIGURE 21: I.MX RT1060 EVK + USD-M.2 + 1DX M.2 EVB (WLAN, BT): CLOSE-UP #2.....	46
FIGURE 22: I.MX RT1060 EVK + USD-M.2 + 1DX M.2 EVB (WLAN, BT, WLAN/BT CTRL) .....	47
FIGURE 23: I.MX RT1060 EVK + USD-M.2 + 1DX M.2 EVB (WLAN, BT, WLAN/BT CTRL): CLOSE-UP .....	48
FIGURE 24: USD-M.2 ADAPTER ARDUINO 5V POWER OPTION .....	49
FIGURE 25: USD-M.2 ADAPTER USB 5V POWER OPTION.....	50
FIGURE 26: USD-M.2 ADAPTER 3.3V VDDIO OVERRIDE OPTION.....	51
FIGURE 27: USD-M.2 ADAPTER BLUETOOTH DISABLE OPTION .....	52
FIGURE 28: I.MX 6SX SDB + USD-M.2 ADAPTER + 1MW M.2 EVB .....	55
FIGURE 29: R328 LOCATION ON I.MX 6SX SDB LAYOUT FILE (WL_HOST_WAKE CONNECTION).....	57
FIGURE 30: REWORK TO CONNECT WL_HOST_WAKE SIGNAL ON NXP I.MX 6SX SDB.....	57
FIGURE 31: I.MX 6QUAD SDB + USD-M.2 ADAPTER + 1MW M.2 EVB .....	58
FIGURE 32: I.MX 6QUAD SDB - REMOVE U14 (SPI NOR FLASH).....	60
FIGURE 33: I.MX 6QUAD SDB - BT_REG_ON/BT_UART_CTS/BT_UART_RTS.....	60
FIGURE 34: I.MX 6QUADSDB - WL_REG_ON/WL_HOST_WAKE/BT_UART_TX/BT_UART_RX.....	61
FIGURE 35: I.MX 6UL(L) EVK + USD-M.2 + 1LV M.2 EVB .....	62
FIGURE 36: REWORK FOR THE I.MX 6UL EVK.....	63
FIGURE 37: I.MX 8MQAD EVK WITH TYPE 1CX (BOTTOM VIEW).....	64
FIGURE 39: I.MX 8M MINI/NANO EVK WITH TYPE 1CX (BOTTOM VIEW) .....	64
FIGURE 39: I.MX 8M MINI/NANO EVK WITH USD-M.2 ADAPTER (WLAN ONLY).....	65
FIGURE 40: I.MX 8M MINI/NANO EVK WITH USD-M.2 ADAPTER (WLAN/BLUETOOTH).....	65
FIGURE 41: CABLE CONNECTIONS ON I.MX 8M MINI/NANO EVK (EVEN NUMBER CONNECTOR VIEW) .....	67
FIGURE 42: CABLE CONNECTIONS ON I.MX 8M MINI/NANO EVK (ODD NUMBER CONNECTOR VIEW).....	67
FIGURE 43: CABLE CONNECTIONS ON USD-M.2 ADAPTER (J9 HEADER) .....	68
FIGURE 44: CABLE CONNECTIONS ON USD-M.2 ADAPTER (J8 HEADER) .....	68
FIGURE 45: LOW-PROFILE JUMPER WIRES (DIGI-KEY PART NUMBER 1988-1178-ND).....	69
FIGURE 46: NXP I.MX EVK WITH LOW-PROFILE JUMPER WIRES.....	69
FIGURE 47: ADDITIONAL HEX STANDOFF (DIGI-KEY PART NUMBER RPC3570-ND) .....	70
FIGURE 48: TYPE 1YM M.2 EVB CONFIGURATION STRAPPING OPTIONS .....	71
FIGURE 49: TYPE 1YM M.2 CONFIGURED FOR WLAN-SDIO/BT-SDIO (1YM-SDIO*) .....	71
FIGURE 50: TYPE 1YM M.2 CONFIGURED FOR WLAN-SDIO/BT-UART (1YM-SDIO).....	72



FIGURE 51: REV A (LEFT) AND REV B1 (RIGHT) ADAPTER CONFIGURED FOR DEFAULT 1.8V VIO .....	73
FIGURE 52: REV A (LEFT) AND REV B1 (RIGHT) ADAPTER CONFIGURED FOR DEFAULT 3.3V VIO OVERRIDE.....	74
FIGURE 53: REV A USD-M.2 ADAPTER SCHEMATIC.....	75
FIGURE 54: REV A USD-M.2 ADAPTER LAYOUT (TOP).....	77
FIGURE 55: REV A USD-M.2 ADAPTER LAYOUT (BOTTOM).....	78

## List of Tables

TABLE 1: ACRONYMS USED IN HARDWARE USER MANUAL .....	7
TABLE 2: USD-M.2 ADAPTER KIT CONTENTS.....	10
TABLE 3: EMBEDDED ARTISTS' WI-FI/BT M.2 MODULES SUPPORTED .....	11
TABLE 4: MURATA MODULE HARDWARE SUPPORT ON NXP PLATFORMS.....	12
TABLE 5: MURATA MODULE SUPPORT ON EMBEDDED ARTISTS' PLATFORMS.....	13
TABLE 6: NXP I.MX/MURATA MODULE INTERCONNECT.....	20
TABLE 7: EMBEDDED ARTISTS' I.MX INTERCONNECT .....	22
TABLE 8: USD-M.2 ADAPTER FEATURES .....	24
TABLE 9: HOST/M.2 IO VOLTAGE LEVEL SETTING.....	31
TABLE 10: USD-M.2 ADAPTER PINOUT DEFINITION.....	32
TABLE 11: NXP I.MX RT EVK AND MURATA USD-M.2 ADAPTER INTERCONNECT .....	43
TABLE 12: BLUETOOTH UART TX/RX SIGNAL INTERCONNECT.....	45
TABLE 13: BLUETOOTH UART CTS/RTS SIGNAL INTERCONNECT .....	46
TABLE 14: OVERALL BT UART AND WLAN/BT CONTROL SIGNALS.....	48
TABLE 15: PIN DESCRIPTION FOR ARDUINO POWER OPTION .....	49
TABLE 16: NXP I.MX EVK AND MURATA USD-M.2 ADAPTER INTERCONNECT.....	53
TABLE 17: I.MX 6 INTERCONNECT VIA J6 (FLAT/FLEX CABLE - FFC).....	54
TABLE 18: CONNECTIONS FOR DYNAMICALLY CONTROLLED WL_REG_ON AND BT_REG_ON SIGNALS.....	56
TABLE 19: ADAPTER BOARD RIBBON CABLE CONNECTIONS ON I.MX 6QUAD SDB .....	59
TABLE 20: ADAPTER BOARD RIBBON CABLE CONNECTIONS ON I.MX 6UL EVK (REV C2).....	62
TABLE 21: ADAPTER BOARD CONNECTIONS ON I.MX 8M MINI/8M NANO EVK .....	66
TABLE 22: HOST/M.2 IO VOLTAGE LEVELS SETTINGS.....	73

# 1 Wi-Fi/BT Hardware Solution for i.MX

## 1.1 Introduction

Murata has partnered closely with [Embedded Artists AB](#) to provide a flexible Wi-Fi & Bluetooth solution for NXP Semiconductors' [i.MX RT](#), [i.MX 8](#), [i.MX 7](#) and [i.MX 6](#) Evaluation Kits. Murata's [uSD-M.2 Adapter](#) Kit with [Embedded Artists' Wi-Fi/BT M.2 Modules](#) enable users with a simple plug-in solution. The Embedded Artists' Wi-Fi/BT M.2 Modules are based on Murata modules using [Cypress Semiconductor](#)'s and [NXP Semiconductor](#)'s Wi-Fi/BT chipsets. Current Wi-Fi/BT EVB support includes:

- [Type 1DX](#) (CYW4343W)
- [Type 1MW](#) (CYW43455)
- [Type 1LV](#) (CYW43012)
- [Type 1CX](#) (CYW4356)
- [Type 1XA](#) (CYW54591)
- [Type 1ZM](#) (NXP 88W8987)
- [Type 1YM](#) (NXP 88W8997)

Note that when connecting any Embedded Artists' M.2 EVB's via Murata's uSD-M.2 Adapter, only WLAN-SDIO/BT-UART interfaces are supported. As such the WLAN-PCIe only M.2 EVB's (1CX, 1XA, and 1YM (configured for WLAN-PCIe mode)) **do not work**. For WLAN-PCIe interface, direct interconnect via onboard M.2 connector is required (i.e. NXP i.MX 8MQXP MEK, i.MX 8MQuad EVK, i.MX 8M Mini EVK). The uSD-M.2 Adapter provides the following interfaces to host MCU/MPU:

- microSD (uSD) interface for WLAN-SDIO (SD is an option with microSD-SD Adapter).
- Arduino Headers (i.MX RT) or Flat/Flex Connector (i.MX 6) for Bluetooth UART, Bluetooth PCM and WLAN/Bluetooth control signals.
- Optional power, debug, and clocking signals connect through Arduino Header or Micro-AB USB Connector.

Murata's uSD-M.2 Adapter uses a type **2230-xx-E** M.2 Connector: this interface is essentially M.2 Key-E compliant with some enhancements to support additional debug signals and optional 3.3V VDDIO override for some [Embedded Artists' Wi-Fi/BT M.2 Modules](#). Refer to **Section 1.5** for more details. Note that the 3.3V M.2 VDDIO operation is only recommended when 1.8V interface voltage cannot be supported by host.

Out of the current Wi-Fi/BT M.2 Modules supported, Type 1YM (NXP 88W8997) is unique in that it can be configured for different WLAN/BT bus interfaces. **Section 7** provides specific details on how 1YM M.2 EVB can have its default WLAN/Bluetooth interfaces configured for the SDIO bus (allowing the previously mentioned uSD-M.2 Adapter interconnect – **only at 1.8V VIO**). Note the default configuration on Type 1YM M.2 EVB is WLAN-PCIe/BT-UART (unlike WLAN-SDIO it supports both 1.8V and 3.3V VIO signaling).

It is important to note that Type 1LV, 1ZM, and 1YM (WLAN-SDIO mode) **can only operate in 1.8V VIO mode**. **Both the Wi-Fi/BT M.2 EVB's and the modules do not support 3.3V VIO** and, as such, cannot support interconnect to some legacy i.MX 6 EVK's which have fixed 3.3V VIO signaling over WLAN-SDIO interconnect.

## 1.2 Acronyms

**Table 1: Acronyms used in Hardware User Manual**

Acronym	Meaning
<b>1YM-SDIO</b>	1YM M.2 EVB configured for WLAN-SDIO (1.8V VIO Only) – see <b>Section 7</b>
<b>1YM</b>	1YM M.2 EVB (default) configured for WLAN-PCIe (1.8/3.3V VIO) – see <b>Section 7</b>
<b>BT</b>	Bluetooth
<b>CTRL</b>	Control
<b>CTS</b>	Clear to Send
<b>CYW</b>	Cypress
<b>DL</b>	DualLite
<b>EA</b>	Embedded Artists designs, manufactures and distributes current Wi-Fi/BT M.2 EVB's ( <a href="#">link here</a> ). EA also have enhanced i.MX developer kits which provide comprehensive support for Murata modules ( <a href="#">link here</a> ).
<b>EVB</b>	Evaluation Board
<b>EVK</b>	Evaluation Kit
<b>FFC</b>	Flat Flexible Cable
<b>GND</b>	Ground
<b>GPIO</b>	General Purpose Input Output
<b>JTAG</b>	Joint Test Action Group
<b>LED</b>	Light-emitting Diode
<b>M.2</b>	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 ( <a href="http://www.pcisig.com">www.pcisig.com</a> ).
<b>OOB IRQ</b>	Out of Band Interrupt Request Line
<b>PCIe</b>	Peripheral Component Interconnect Express
<b>PCM</b>	Pulse Code Modulation
<b>Q</b>	Quad
<b>QP</b>	QuadPlus
<b>RTOS</b>	Real-time Operating System
<b>RTS</b>	Request to Send

Acronym	Meaning
<b>RX</b>	Receive
<b>SD</b>	Secure Digital
<b>SDB</b>	Sabre Development Board
<b>SDIO</b>	Secure Digital Input Output
<b>SX</b>	SoloX
<b>TX</b>	Transmit
<b>UART</b>	Universal Asynchronous Receiver/Transmitter
<b>UL</b>	UltraLite
<b>USB</b>	Universal Serial Bus
<b>uSD</b>	microSD
<b>uSD-M.2</b>	microSD to M.2 Adapter
<b>VBAT</b>	Voltage of Battery
<b>VDDIO</b>	Voltage used by signals on memory bus
<b>VIO</b>	Input Offset Voltage
<b>Wi-Fi</b>	Wireless LAN: "Wi-Fi" is a registered trademark of Wi-Fi Alliance
<b>WLAN</b>	Wireless Local Area Network

## 1.3 References

### 1.3.1 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.

### 1.3.2 Murata uSD-M.2 Adapter Rev B1 Datasheet

This [datasheet](#) documents the current revision of the Murata uSD-M.2 adapter hardware and its interfacing options. Rev B1 provides additional interface capability with voltage level shifter for BT-UART and WLAN/BT control signals, as compared to the previous revision A.

### 1.3.3 Murata uSD-M.2 Adapter Rev A Datasheet

This [datasheet](#) documents previous version of the Adapter. The current revision (B1) is backwards compatible with Rev A. Customers are encouraged to transition to latest version (B1) of Adapter.

### 1.3.4 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 existing support threads.

### 1.3.5 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.

### 1.3.6 Embedded Artists' i.MX Developer Kits Landing Page

This [website landing page](#) lists Embedded Artists' i.MX Developer Kits (i.MX RT/6/7/8) which Murata strongly recommends. These developer kits deliver an enhanced, customer-friendly i.MX Wireless solution.

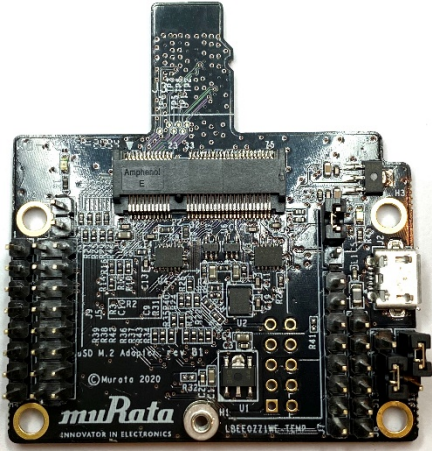


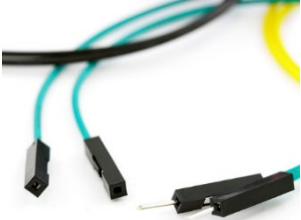
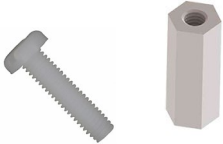
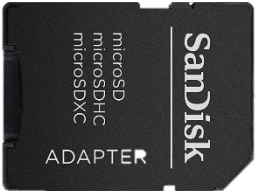
### 1.3.7 Murata's i.MX Wireless Solutions Landing Page

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.

## 1.4 Murata Kit Contents

The Murata [uSD-M.2 Adapter](#) Kit (Part No: **LBEE0ZZ1WE-TEMP**) contents are shown in **Table 2**. It is **strongly recommended** that customers use Murata's newly revised Revision B1 Adapter. Revision B1 incorporates needed VIO level shifting for BT-UART and other WLAN/BT control signals. The level shifting is necessary to adhere to the strict M.2 VIO signaling guidelines while still satisfying the required VIO signaling at the i.MX host interface. Although this adapter was designed specifically to interface with NXP i.MX reference platforms, it can be used on any processor platform with microSD/SD interconnect supporting 4-bit WLAN-SDIO interface.

**Table 2: uSD-M.2 Adapter Kit Contents**








Picture of Contents	Description of Contents
	<p>uSD-M.2 Adapter (Revision B1)</p>
	<p>M.2 screw for attaching Wi-Fi/Bluetooth M.2 Evaluation Board (EVB)</p>
	<p>75mm 20-pos, 0.5mm pitch flat/flex cable</p>
	<p>13 pieces 200mm long male-to-female jumper cables (compatible with Arduino header)</p>
	<p>4 x 19mm stand-offs in nylon and associated M3 screws</p>
	<p>microSD to SD Card Adapter</p>

## 1.5 Embedded Artists' Wi-Fi/Bluetooth EVB's

Embedded Artists designs, manufactures and distributes the Wi-Fi/Bluetooth M.2 EVB's based on Murata modules. These new M.2 EVB's are now Murata's **official** evaluation board for these modules in the Distribution Channel. Embedded Artists has excellent documentation support with a main landing page at: <https://www.embeddedartists.com/m2/>.

**Table 3** shows the details of Embedded Artists' Wi-Fi/Bluetooth M.2 modules. Note that Type 1DX, 1MW, 1LV, 1ZM, and 1YM (when resistor strapping configuration modified per **Section 7**) support a WLAN-SDIO interface whereas Type 1CX, 1XA, and 1YM (default configuration) have a WLAN-PCIe interface. Also note that Type 1LV's, 1ZM's, and 1YM-SDIO's interface voltage only supports 1.8V; whereas other EVB's interface voltage can be either 1.8V (default) or 3.3V. To learn specifics on any of the M.2 EVB's, click on Embedded Artists' M.2 Module Part Number (hyperlink included in table). To learn more specifics on the Murata module, click Murata module part number and you will be redirected to Murata's module landing page.

**Table 3: Embedded Artists' Wi-Fi/BT M.2 Modules Supported**

Murata Module	Chipset	Wi-Fi/BT Support	Murata Part Number	EA M.2 Module Part #	VIO	Interface	EVB Picture
1DX	CYW 4343W	802.11b/g/n Bluetooth 5.0	<a href="#">LBEE5KL1DX</a>	<a href="#">EAR00318</a>	1.8V / 3.3V	WLAN-SDIO BT-UART	
1MW	CYW 43455	802.11a/b/g/n/ac (1x1 SISO) Bluetooth 5.0	<a href="#">LBEE5HY1MW</a>	<a href="#">EAR00315</a>	1.8V / 3.3V	WLAN-SDIO BT-UART	
1LV	CYW 43012	802.11 a/b/g/n/ac- friendly™ Bluetooth 5.0	<a href="#">LBEE59B1LV</a>	<a href="#">EAR00323</a>	<b>1.8V Only</b>	WLAN-SDIO BT-UART	
1CX	CYW 4356	802.11a/b/g/n/ac (2x2 MIMO) Bluetooth 5.0	<a href="#">LBEH5UL1CX</a>	<a href="#">EAR00321</a>	1.8V / 3.3V	WLAN-PCIe BT-UART	
1XA	CYW 54591	802.11a/b/g/n/ac (2x2 MIMO) Bluetooth 5.1	<a href="#">LBEE5XV1XA</a>	<a href="#">EAR00373</a>	1.8V / 3.3V	WLAN-PCIe BT-UART	
1ZM	NXP 88W8987	802.11a/b/g/n/ac (1x1 SISO) Bluetooth 5.1	<a href="#">LBEE5QD1ZM</a>	<a href="#">EAR00364</a>	<b>1.8V Only</b>	WLAN-SDIO BT-UART	
1YM	NXP 88W8997	802.11a/b/g/n/ac (2x2 MIMO) Bluetooth 5.2	<a href="#">LBEE5XV1YM</a>	<a href="#">EAR00370</a>	1.8V (WLAN SDIO, PCIe)  3.3V (WLAN- PCIe Only)	WLAN-SDIO/ WLAN-PCIe  BT-UART/ BT-SDIO* (Eval Only)	



## 2 Platform Support

Table 4 lists Murata module interconnect with NXP i.MX EVK's.

**Table 4: Murata module hardware support on NXP platforms**

NXP i.MX EVK Part number	NXP i.MX EVK	Murata modules supported	Inter-Connect
<a href="#">MCIMX8QXP-CPU</a>	i.MX 8QXP MEK	1CX, 1XA, 1YM	M.2
<a href="#">MCIMX8M-EVKB</a>	i.MX 8MQuad EVK	1CX, 1XA, 1YM	1CX Soldered down; 1CX, 1XA, 1YM via M.2
<a href="#">8MMINILPD4-EVK</a>	i.MX 8M Mini EVK	1DX, 1MW, 1LV, 1CX, 1XA, 1ZM, 1YM, 1YM-SDIO	1CX, 1XA, 1YM via M.2 (WLAN Only); 1DX, 1MW, 1LV, 1ZM, 1YM-SDIO via uSD-M.2 Adapter
<a href="#">8MMINID4-EVK</a>	i.MX 8M Mini EVK	1MW, 1CX, 1XA, 1YM	1MW Soldered down; 1CX, 1XA, 1YM via M.2 (WLAN Only)
<a href="#">8MNANOD4-EVK</a>	i.MX 8M Nano EVK	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	1MW Soldered down; 1DX, 1MW, 1LV, 1ZM, 1YM-SDIO via uSD-M.2 Adapter
<a href="#">MCIMX7SABRE</a>	i.MX 7Dual SDB	ZP	ZP Soldered down
<a href="#">MCIMX7ULP-EVK</a>	i.MX 7ULP EVK	1DX	1DX Soldered down
<a href="#">MCIMX6QP-SDB</a>	i.MX 6QP SDB	1DX, 1MW	uSD-M.2 Adapter
<a href="#">MCIMX6Q-SDB</a>	i.MX 6Quad SDB	1DX, 1MW	uSD-M.2 Adapter
<a href="#">MCIMX6SX-SDB</a>	i.MX 6SX SDB	1DX, 1MW	uSD-M.2 Adapter
<a href="#">MCIMX6UL-EVKB</a>	i.MX 6UL EVK	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	uSD-M.2 Adapter
<a href="#">MCIMX6ULL-EVK</a>	i.MX 6ULL EVK	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	uSD-M.2 Adapter
<a href="#">MIMXRT1064-EVK</a>	i.MX RT1064 EVK	1DX, 1MW, 1LV, 1ZM	uSD-M.2 Adapter
<a href="#">MIMXRT1060-EVK</a>	i.MX RT1060 EVK	1DX, 1MW, 1LV, 1ZM	uSD-M.2 Adapter
<a href="#">IMXRT1050-EVKB</a>	i.MX RT1050 EVK	1DX, 1MW, 1LV, 1ZM	uSD-M.2 Adapter
<a href="#">MIMXRT1020-EVK</a>	i.MX RT1020 EVK	1DX, 1MW, 1LV, 1ZM	uSD-M.2 Adapter
<a href="#">SLN-ALEXA-IOT</a>	i.MX RT106A	1DX	1DX Soldered down

As shown by **Table 4**, **there are three different interconnects with NXP i.MX EVK's:**

- 1) **Module Down:** the Murata module is soldered down on the SOM board. Clearly this provides this easiest approach given that only the NXP i.MX EVK is required. NXP's website provides all necessary documentation on the hardware interconnect, providing both the schematic, layout, and BOM files.
- 2) **Direct M.2 Interconnect:** some of the NXP i.MX EVK's have M.2 connector onboard, allowing the user to directly plug in and secure the Wi-Fi/BT M.2 EVB. On the platforms listed, the M.2 connectors only support WLAN-PCIe/BT-UART interconnect. Note that the i.MX 8M Mini EVK's only support WLAN-PCIe – the BT-UART lines are not connected to M.2.
- 3) **uSD-M.2 Adapter Interconnect:** Embedded Artists' Wi-Fi/BT M.2 EVB connects to Murata's uSD-M.2 Adapter which, in turn, plugs into NXP i.MX EVK microSD or SD connector.

**Table 5** lists Murata module interconnect with [Embedded Artists' Developer Kits](#).

**Table 5: Murata module support on Embedded Artists' platforms**

EA i.MX Dev Kit	Part Number	Murata Modules Supported	Interconnect
<a href="#">iMX8M Quad COM</a>	EAK00330	1DX, 1MW, 1LV, 1CX, XA, 1ZM, 1YM, 1YM-SDIO	M.2
<a href="#">iMX8M Mini uCOM</a>	EAK00347	1DX, 1MW, 1LV, 1CX, XA, 1ZM, 1YM, 1YM-SDIO	Optional 1MW down; M.2
<a href="#">iMX8M Nano uCOM</a>	EAK00360	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	Optional 1MW down; M.2
<a href="#">iMX7 Dual COM</a>	EAK00329	1DX, 1MW, 1LV, 1CX, XA, 1ZM, 1YM, 1YM-SDIO	M.2
<a href="#">iMX7 Dual uCOM</a>	EAK00344	1DX, 1MW, 1LV, 1CX, XA, 1ZM, 1YM, 1YM-SDIO	M.2
<a href="#">iMX7ULP uCOM</a>	EAK00346	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	Optional 1LV down; M.2
<a href="#">iMX6 Quad COM</a>	EAK00332	1DX, 1MW, 1LV, 1CX, XA, 1YM	M.2
<a href="#">iMX6 DualLite COM</a>	EAK00342	1DX, 1MW, 1LV, 1CX, XA, 1YM	M.2
<a href="#">iMX6 SoloX COM</a>	EAK00331	1DX, 1MW, 1LV, 1CX, XA, 1YM	M.2
<a href="#">iMX6 UltraLite COM</a>	EAK00343	1DX, 1MW, 1LV, 1ZM, 1YM-SDIO	M.2
<a href="#">i.MX RT1062 COM</a>	EAK00310	1DX, 1MW, 1LV, 1ZM	M.2

As can be clearly seen in **Table 5**, the Murata module support on Embedded Artists' i.MX Dev Kits is **superior** to NXP's i.MX EVK's. Murata has collaborated closely with Embedded Artists to arrive at an enhanced Wi-Fi/BT connectivity solution for customers who need to more easily evaluate all of Murata module options on a given i.MX processor. The key to this interconnect is the direct M.2 connector on the Embedded Artists' COM Carrier baseboard **which provides key advantages:**

- Comprehensive module interconnect. Embedded Artists' platform provides full interconnect options with various Murata Wi-Fi/BT modules. The only limitations are primarily due to i.MX processors not supporting a given bus interconnect such as i.MX 8M Nano with no PCIe bus.
- Full-speed WLAN-SDIO interconnect. Some of the NXP i.MX EVK's have limited SDIO bus speed with Murata's uSD-M.2 Adapter due to additional connectors between the i.MX processor and the Wi-Fi/BT module. Embedded Artists' Developer Kits place the M.2 connector very close to the i.MX COM (AKA SOM) board to shorten the SDIO bus trace length and optimize signal integrity.
- Additional access WLAN/BT debug signals including JTAG. Embedded Artists' platform brings out additional debug signals to headers on the COM carrier board to allow customers easier drill-down on debugging wireless issues.
- Additional signal interconnect. Embedded Artists' platform provides comprehensive signal interconnect between the Wi-Fi/BT module and the i.MX processor. Although not always necessary, these signals permit users to test/evaluate all possible scenarios of data/control signal interconnect.

For additional information on the Embedded Artists' solution, refer to Sections **2.5** and **2.6**. Also there is excellent support documentation on their website [here](#).

## 2.1 NXP i.MX 6 Platform Support

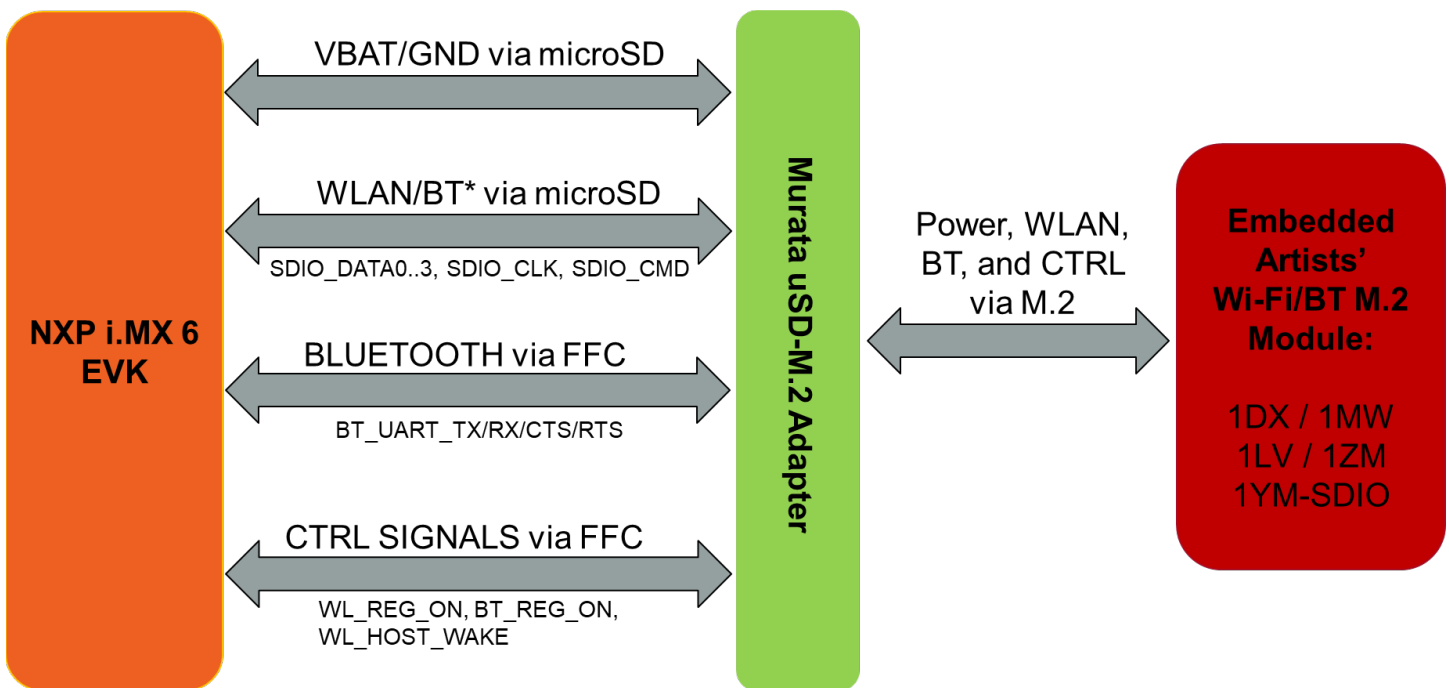
Refer to **Figure 1** for an interconnect block diagram between NXP's i.MX 6 EVK's and Embedded Artists' Wi-Fi/Bluetooth M.2 Module with Murata's uSD-M.2 Adapter. Currently Type 1DX, 1MW, 1LV, 1ZM, and 1YM (WLAN-SDIO) Wi-Fi/BT M.2 EVB's are supported via WLAN-SDIO/BT-UART interface. **Key considerations include:**

- **WLAN-SDIO Interface:** 4-bit SDIO interface. For adapter boards, the SDIO interface (SD\_CLK, SD\_CMD, SD\_DATA0..3) is supported via standard microSD card pinout. A microSD-to-SD adapter must be used to interface with the i.MX 6 EVK's. The uSD-M.2 Adapter provides both 1.8V and 3.3V VIO signaling options for WLAN-SDIO so SDIO 2.0/3.0 are supported. SDIO bus signal integrity issues can occur at frequencies above 50 MHz. However, the NXP i.MX 6UL(L) EVK's have been validated at SDIO clock speeds over 100 MHz. For reliable evaluation, we **recommend not exceeding 50 MHz SDIO clock frequency.**
- **Bluetooth UART Interface:** H4 (4-wire signaling) is supported. This requires flow control lines RTS/CTS in addition to TX/RX. Murata's uSD-M.2 uses 20 pin FFC cable interconnects for the UART lines. No signaling issues have been noticed for speed up to 4 Mbps over the UART connection. Although not supported on the NXP i.MX6 platforms, the uSD-M.2 Adapter brings out BT PCM (IN/OUT/SYNC/CLK) signals on the 20-pin FFC connector.

- **GPIO Control Lines:** The WLAN/Bluetooth control signals include WL\_REG\_ON, WL\_HOST\_WAKE, and BT\_REG\_ON. Murata's uSD-M.2 adapter provides control signal connections via FFC ribbon cable interconnect. Although NXP i.MX6 platforms have limited control signal interconnect, the uSD-M.2 Adapter brings out BT\_DEV\_WAKE, BT\_HOST\_WAKE, and WL\_DEV\_WAKE signals on the 20-pin FFC connector.
- **Optional Bluetooth via microSD:** Type 1YM M.2 can be configured to support Bluetooth interface over SDIO. However, this configuration is supported for evaluation purposes only.
- **1LV, 1ZM, 1YM-SDIO VIO Limitations:** These modules **only support 1.8V VIO over WLAN-SDIO interconnect**. As such, **only NXP i.MX 6UL/6ULL EVK's work with these M.2 EVB's**.

Refer to **Figure 11: Murata uSD-M.2 Adapter schematic** for further interconnect details.

**Figure 1: i.MX 6 EVK WLAN/BT Interconnect Block Diagram**



## 2.2 NXP i.MX 8 Platform Support

Two different i.MX 8 EVK interconnects are covered in this section: (i) direct M.2 for WLAN-PCIe based solutions; and (ii) uSD-M.2 Adapter interconnect for WLAN-SDIO based solutions.

**Figure 2** shows a simplified block diagram for the i.MX 8QXP MEK or 8MQuad EVK Wi-Fi/BT interconnect. Currently Type 1CX, 1XA, and 1YM Wi-Fi/BT M.2 EVB's are supported via WLAN-PCIe/BT-UART interface. Note that **no** Adapter is used for i.MX 8QXP MEK or i.MX 8MQuad EVK – just the Wi-Fi/BT M.2 EVB (Module).

**Figure 3** shows a simplified block diagram for the i.MX 8M Mini EVK Wi-Fi/BT interconnect (using M.2 connector). Currently Type 1CX, 1XA, and 1YM Wi-Fi/BT M.2 EVB's (WLAN Only – Bluetooth signals are not brought out) are supported via the WLAN-PCIe interface. As such, this hardware configuration **can only be** used for WLAN evaluation.

Figure 2: i.MX 8QXP MEK or 8MQuad EVK WLAN/BT Interconnect Block Diagram

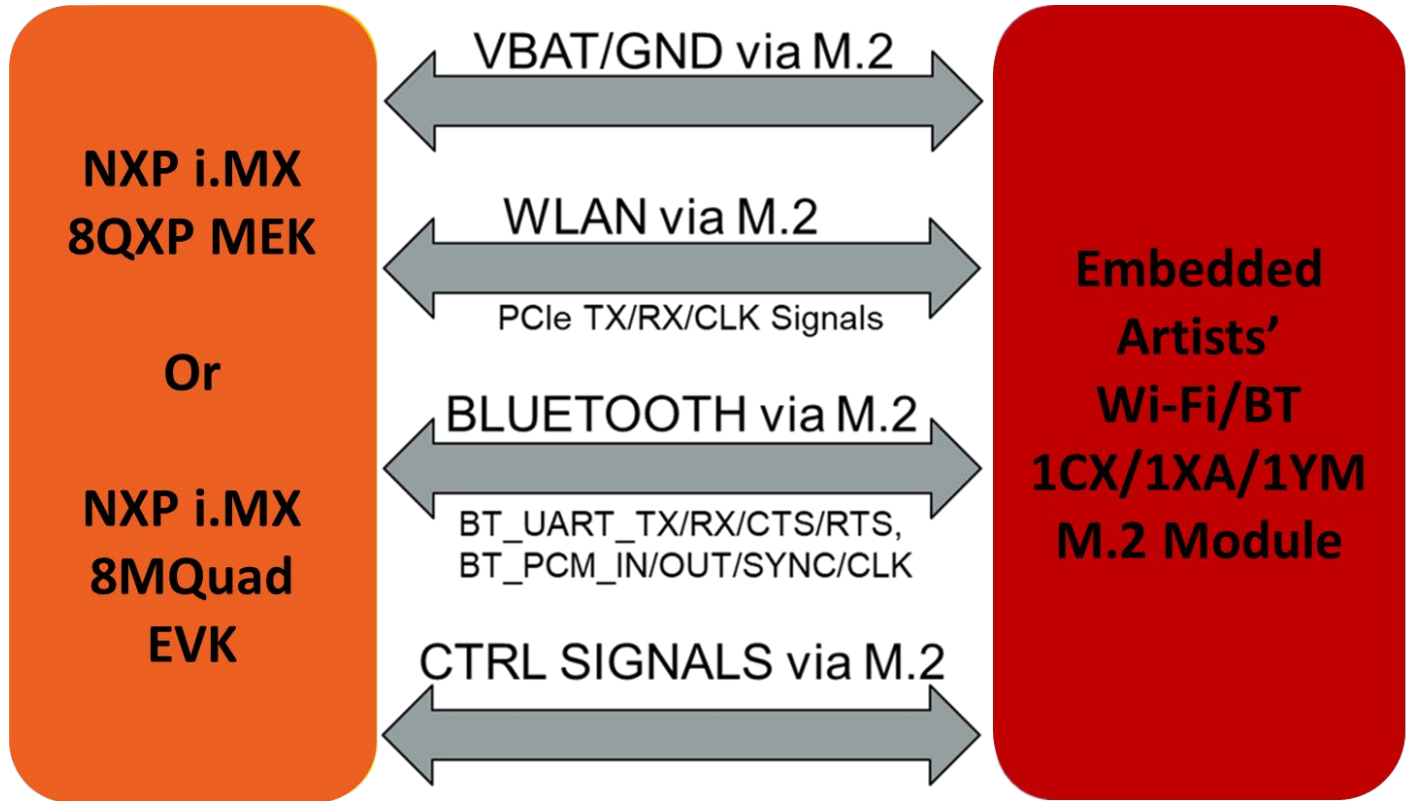
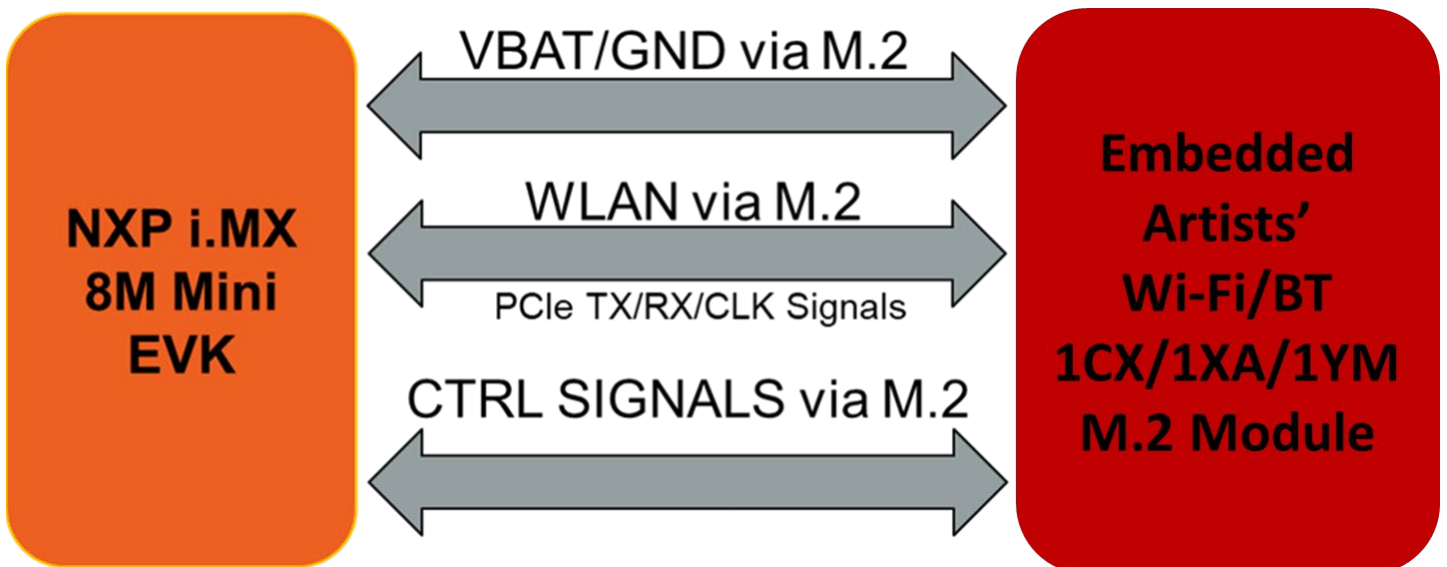


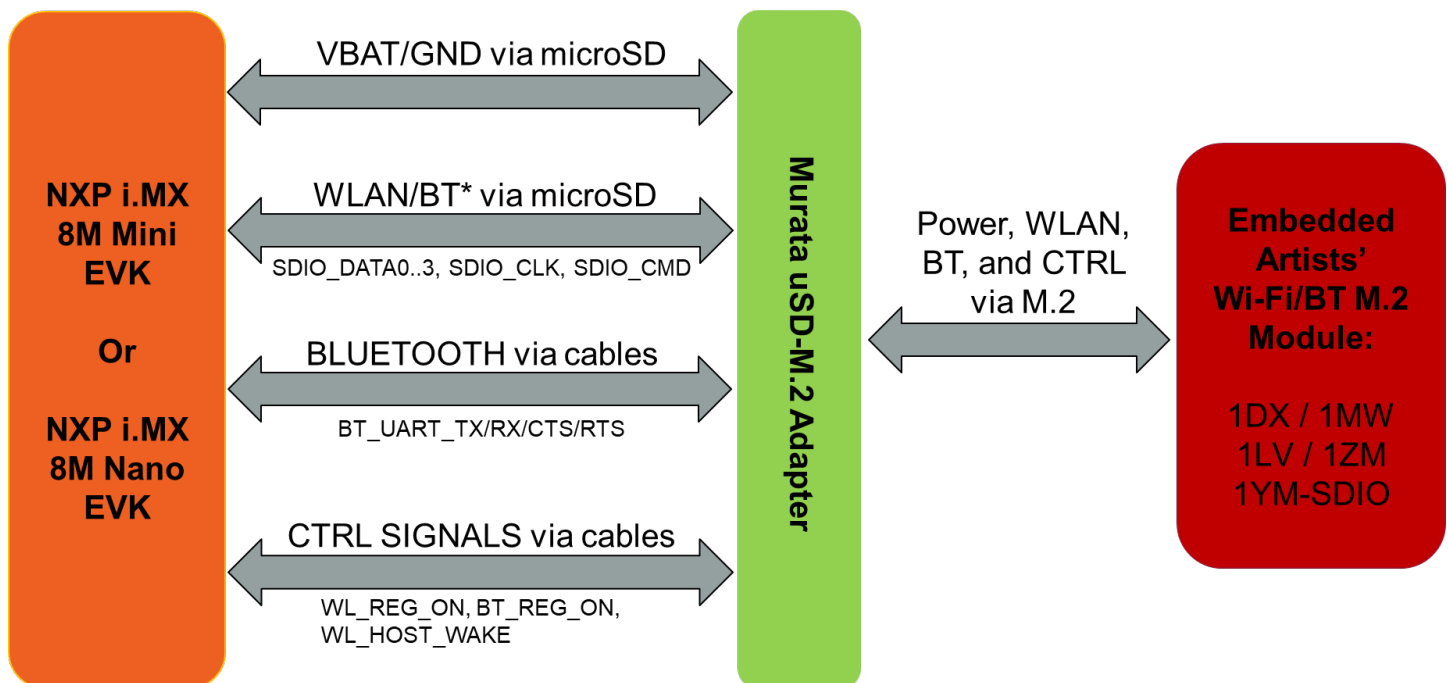
Figure 3: i.MX 8M Mini EVK WLAN-PCIe Interconnect Block Diagram



For WLAN-SDIO based module see **Figure 4**: Type 1DX, 1MW, 1LV, 1ZM, and 1YM (WLAN-SDIO) modules are supported via the uSD-M.2 adapter on both the i.MX 8M Mini and i.MX 8M Nano EVK's. Note that both variants of these EVK's use onboard eMMC flash. The eMMC flash is necessary as the default uSD card slot is no longer available for booting the Linux image. As pictured, the Type 1YM M.2 EVB strapping (**Section 7**) needs to be configured for WLAN-SDIO operation. Regarding this i.MX 8M Mini/Nano EVK interconnect, **key considerations include**:

- **WLAN-SDIO Interface**: 4-bit SDIO interface. For adapter boards, the SDIO interface (SD\_CLK, SD\_CMD, SD\_DATA0..3) is supported via standard microSD card pinout. There is direct connection between Murata's uSD-M.2 Adapter and the NXP i.MX 8M Mini/Nano EVK. The uSD-M.2 Adapter provides both 1.8V and 3.3V VIO signaling options for WLAN-SDIO so SDIO 2.0 and SDIO 3.0 can be supported. No signal integrity issues on the SDIO bus have been noted at SDIO clock frequencies up to the maximum 200 MHz.
- **Bluetooth UART Interface**: H4 (4-wire signaling) is supported. This requires flow control lines RTS/CTS in addition to TX/RX. Jumper wires connect the uSD-M.2 Adapter header connectors to the NXP i.MX EVK. No signaling issues have been noticed for speed up to 4 Mbps over the UART connection.
- **GPIO Control Lines**: The WLAN/Bluetooth control signals include WL\_REG\_ON, WL\_HOST\_WAKE, and BT\_REG\_ON. Murata's uSD-M.2 adapter provides control signal connections via header connectors. Jumper wires connect these signals to the NXP i.MX EVK.
- **Optional Bluetooth via microSD**: Type 1YM M.2 can be configured to support Bluetooth interface over SDIO. However, this configuration is supported for evaluation purposes only.
- **1LV, 1ZM, 1YM-SDIO VIO Limitations**: These modules **only support 1.8V VIO over WLAN-SDIO interconnect**. As such, both i.MX 8M Mini/Nano EVK's **require** 1.8V VIO Configuration.

**Figure 4: i.MX 8M Mini/Nano EVK WLAN/BT Interconnect Block Diagram**



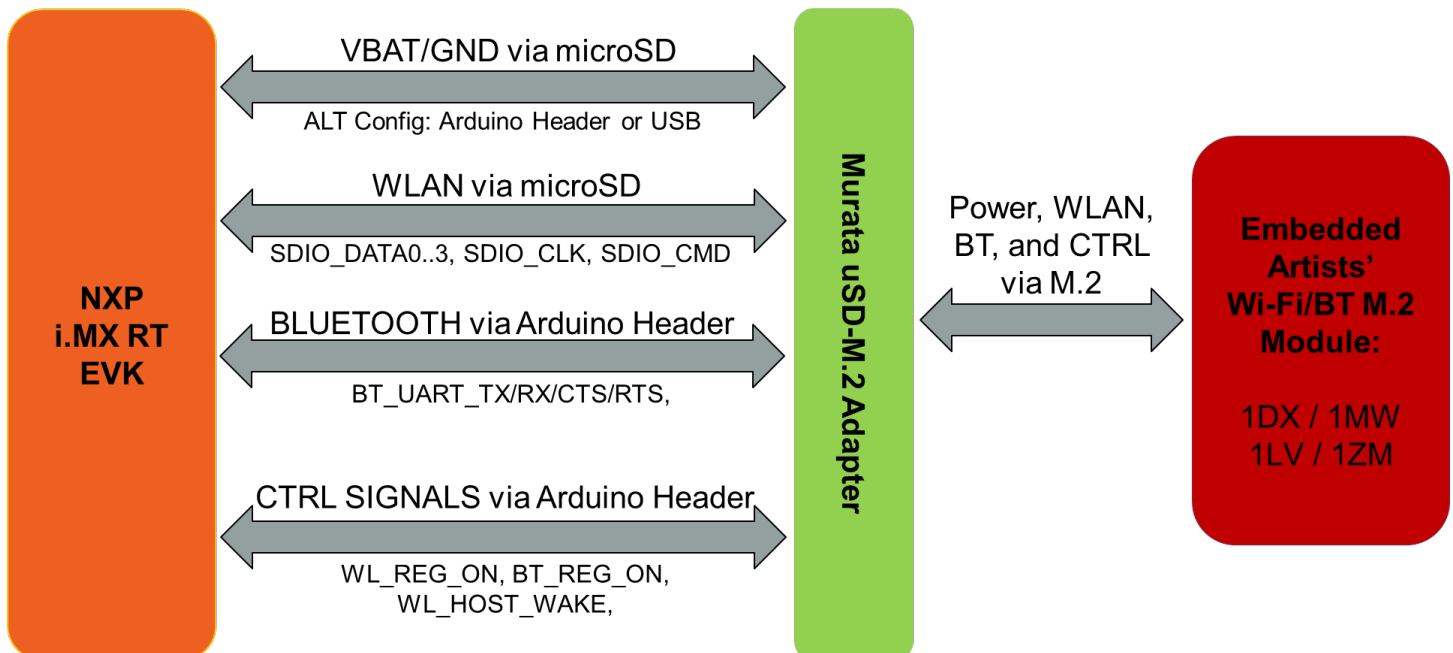


## 2.3 NXP i.MX RT Platform Support

**Figure 5** shows a simplified block diagram for the i.MX RT EVK Wi-Fi/BT interconnect: Type 1DX, 1MW, 1LV, and 1ZM M.2 modules are supported via the uSD-M.2 adapter. Note that there are the usual dependencies on software support. **Additional key considerations include:**

- **WLAN-SDIO Interface:** 4-bit SDIO interface. For adapter boards, the SDIO interface (SD\_CLK, SD\_CMD, SD\_DATA0..3) is supported via standard microSD card pinout. There is direct connection between Murata's uSD-M.2 Adapter and the NXP i.MX RT 10xx EVK's. The uSD-M.2 Adapter provides both 1.8V and 3.3V VIO signaling options for WLAN-SDIO so SDIO 2.0 and SDIO 3.0 can be supported. Validation has been done at speeds up to maximum of 200 MHz SDIO clock frequency.
- **Bluetooth UART Interface:** H4 (4-wire signaling) is supported. This requires flow control lines RTS/CTS in addition to TX/RX. Jumper wires connect the uSD-M.2 Adapter header connectors to the NXP i.MX RT10xx EVK. No signaling issues have been noticed for speed up to 4 Mbps over the UART connection.
- **GPIO Control Lines:** The WLAN/Bluetooth control signals include WL\_REG\_ON, WL\_HOST\_WAKE, and BT\_REG\_ON. Murata's uSD-M.2 adapter provides control signal connections via header connectors. Jumper wires connect these signals to the NXP i.MX RT10xx EVK's Arduino header. Additional signals can be accessed on uSD-M.2 Adapter - refer to **Section 3**.
- **1LV, 1ZM VIO Limitations:** These modules **only support 1.8V VIO over WLAN-SDIO interconnect**. As such, i.MX RT10xx EVK's **require** 1.8V VIO Configuration.

**Figure 5: NXP i.MX RT EVK Wi-Fi/BT Interconnect Block Diagram**





## 2.4 NXP i.MX versus Murata Module Interconnect

**Table 6** provides an overview of i.MX reference platform versus Murata module matrix. For a given i.MX platform and Murata module, you can quickly look up the compatibility. Details on the terminology **used in the table are provided below:**

- “**NC**” means “No Connect”. This is due to one or both of the following reasons:
  - VIO incompatible: Wi-Fi/BT M.2 Module requires VIO voltage level that the NXP i.MX Hardware cannot provide.
  - Physical bus (i.e. SDIO, PCIe, UART) and/or WLAN/Bluetooth control line interconnect is not available.
- “**uSD-M.2**”: Murata’s uSD-M.2 Adapter provides interconnect to the Embedded Artists’ Wi-Fi/BT M.2 Module. NXP i.MX Host WLAN SDIO is configured for 1.8V VIO default. The Bluetooth UART, and WLAN/BT control signals from i.MX Host are configured at 3.3V VIO (hardware limitation due to fixed voltage rails). Rev B1 Adapter level shifts the BT UART and some of the WLAN/BT control signals. Although Rev A Adapter does not level shift BT UART (and some WLAN/BT control signals), it can still be used where shown for the i.MX 6UL and i.MX 6ULL EVK’s.
- “**uSD-M.2\***”: Murata’s uSD-M.2 Adapter (Rev B1) provides interconnect to the Embedded Artists’ Wi-Fi/BT M.2 Module. However, additional cabling and/or standoffs are required to connect Bluetooth UART and WLAN/BT control signals to the NXP i.MX 8M Mini EVK and 8M Nano EVK. Please refer to **Section 6.2** for more details.
- “**uSD-M.2-3.3V**”: Murata’s uSD-M.2 Adapter provides interconnect to the Embedded Artists’ Wi-Fi/BT M.2 Module. NXP i.MX Host WLAN SDIO is configured for (fixed at) 3.3V VIO. The Bluetooth UART, and WLAN/BT control signals from i.MX Host are configured at 3.3V VIO. Either Rev B1 or Rev A uSD-M.2 Adapter can be used in this case – with correct jumper setting for 3.3V override mode.
- “**M.2**”: Only Embedded Artists’ Wi-Fi/BT M.2 EVB is required. The NXP i.MX EVK has a M.2 connector. Currently only WLAN-PCIe, BT-UART, and WLAN/BT CTRL signals are brought out on the M.2 connectors for these specific NXP i.MX EVK’s. As such, **only** Wi-Fi/BT M.2 EVB’s which support WLAN-PCIe (i.e. 1CX, 1XA, and 1YM) can be used.
- “**M.2<sup>w</sup>**”: Only Embedded Artists’ Wi-Fi/BT M.2 EVB is required. The NXP i.MX EVK has a M.2 connector. Currently only WLAN-PCIe, and WLAN CTRL signals are brought out on the M.2 connectors for these specific NXP i.MX EVK’s. As such, there is no Bluetooth support – only WLAN.
- Again, the default hardware strapping option for EA’s Type 1YM M.2 EVB (EAR00370) is WLAN-PCIe/BT-UART. In **Table 6**, we refer to this default configuration as “**1YM**”. It may also be referred to as “1YM-PCIe”. The non-default (WLAN-SDIO) strapping option is referred to as “**1YM-SDIO**”. Refer to **Section 7** for details on strapping configuration for Type 1YM M.2 EVB.

**Table 6: NXP i.MX/Murata Module Interconnect**

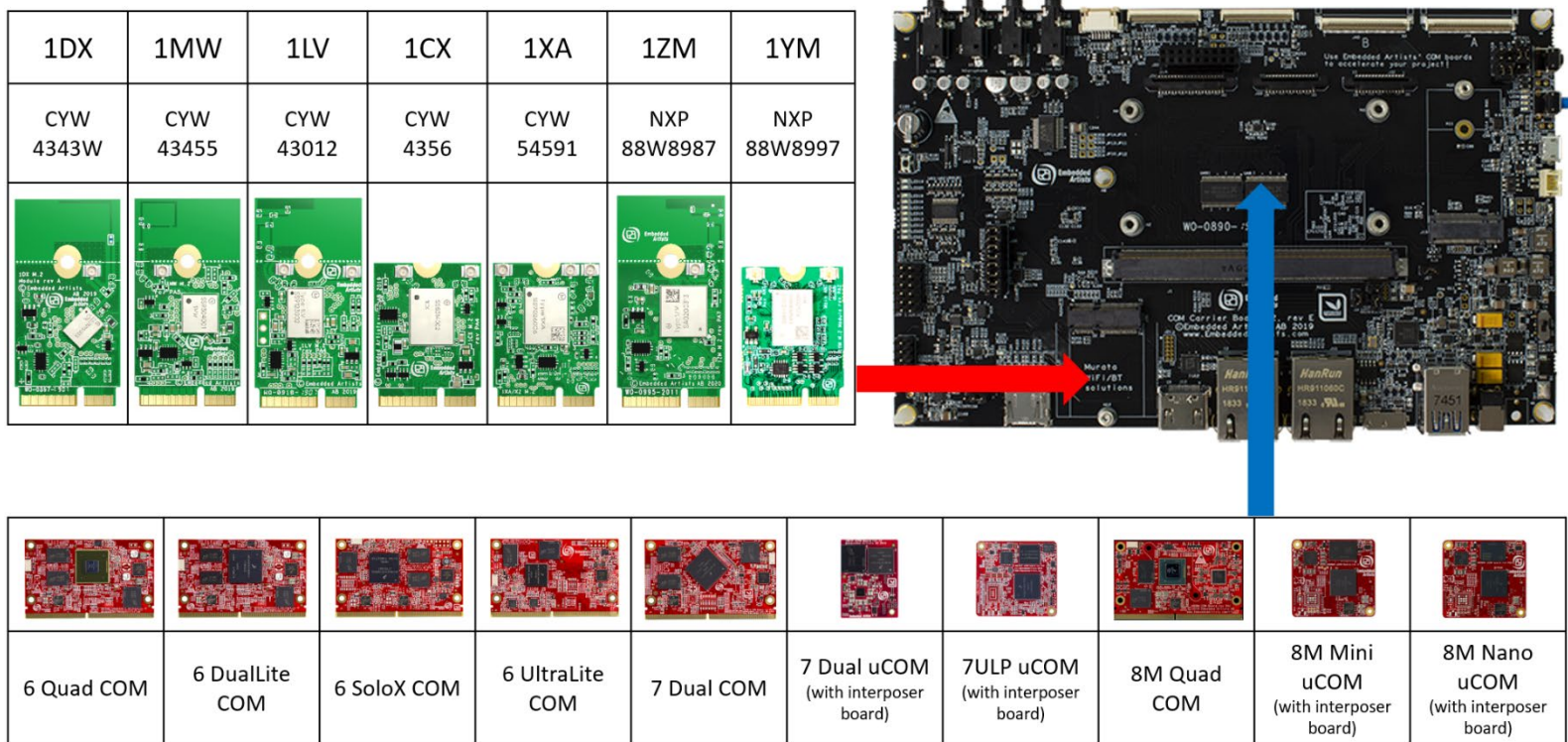
<b>NXP i.MX EVK Part Number</b>	<b><u>1DX</u></b>	<b><u>1MW</u></b>	<b><u>1LV</u></b>	<b><u>1CX</u></b>	<b><u>1XA</u></b>	<b><u>1ZM</u></b>	<b><u>1YM-SDIO</u></b>	<b><u>1YM</u></b>
<a href="#"><u>MCIMX8QXP-CPU</u></a>	NC	NC	NC	M.2	M.2	NC	NC	M.2
<a href="#"><u>MCIMX8M-EVKB</u></a>	NC	NC	NC	MD, M.2	M.2	NC	NC	M.2
<a href="#"><u>8MMINILPD4-EVK</u></a>	uSD-M.2 <sup>+</sup>	uSD-M.2 <sup>+</sup>	uSD-M.2 <sup>+</sup>	M.2 <sup>w</sup>	M.2 <sup>w</sup>	uSD-M.2 <sup>+</sup>	uSD-M.2 <sup>+</sup>	M.2 <sup>w</sup>
<a href="#"><u>8MMINID4-EVK</u></a>	NC	MD	NC	M.2 <sup>w</sup>	M.2 <sup>w</sup>	NC	NC	M.2 <sup>w</sup>
<a href="#"><u>8MNANOD4-EVK</u></a>	uSD-M.2 <sup>+</sup>	MD, uSD-M.2 <sup>+</sup>	uSD-M.2 <sup>+</sup>	NC	NC	uSD-M.2 <sup>+</sup>	uSD-M.2 <sup>+</sup>	NC
<a href="#"><u>MCIMX7ULP-EVK</u></a>	MD	NC	NC	NC	NC	NC	NC	NC
<a href="#"><u>MCIMX6QP-SDB</u></a>	uSD-M.2-3.3V	uSD-M.2-3.3V	NC	NC	NC	NC	NC	NC
<a href="#"><u>MCIMX6Q-SDB</u></a>	uSD-M.2-3.3V	uSD-M.2-3.3V	NC	NC	NC	NC	NC	NC
<a href="#"><u>MCIMX6SX-SDB</u></a>	uSD-M.2-3.3V	uSD-M.2-3.3V	NC	NC	NC	NC	NC	NC
<a href="#"><u>MCIMX6UL-EVKB</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	uSD-M.2	NC
<a href="#"><u>MCIMX6ULL-EVK</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	uSD-M.2	NC
<a href="#"><u>MIMXRT1064-EVK</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	NC	NC
<a href="#"><u>MIMXRT1060-EVK</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	NC	NC
<a href="#"><u>IMXRT1050-EVKB</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	NC	NC
<a href="#"><u>MIMXRT1020-EVK</u></a>	uSD-M.2	uSD-M.2	uSD-M.2	NC	NC	uSD-M.2	NC	NC
<a href="#"><u>SLN-ALEXA-IOT</u></a>	MD	NC	NC	NC	NC	NC	NC	NC
<a href="#"><u>i.MX 7Dual SDB</u></a>	ZP (legacy module) soldered down. No other modules supported.							

**uSD-M.2 = works with uSD-M.2 Adapter configured for 1.8V VIO default**  
**uSD-M.2<sup>+</sup> = works with uSD-M.2 Adapter (Rev B1) with additional cabling**  
**uSD-M.2-3.3V = works with uSD-M.2 Adapter configured for 3.3V VIO override mode**  
**M.2 = Wi-Fi/BT M.2 EVB plugs directly into M.2 connector**  
**M.2<sup>w</sup> = Wi-Fi/BT M.2 EVB plugs directly into M.2 connector; but only WLAN is functional**

## 2.5 Embedded Artists' i.MX platform support

Murata has partnered with Embedded Artists to provide an easier solution for evaluating Wi-Fi/BT IoT modules. This solution is composed of three parts: [Carrier board](#), [Computer on Module \(COM\) board](#), and [M.2 Evaluation boards \(EVB\)](#). **Figure 6** shows that the carrier board can work with a variety of Embedded Artists' i.MX 6/7/8 COM boards and different Murata based EVBs. With this platform, users can easily evaluate processors against Wi-Fi/BT M.2 EVBs to find the best combination for their product. Also, Embedded Artists brings out all the test points you need for trouble shooting. With this platform, no adapter/interconnection is needed, therefore you can see the real potential of Murata's module. **Figure 6** shows how this platform work with COM board and M.2 Wi-Fi/BT EVBs.

**Figure 6: Combine Embedded Artists' i.MX COM with their Wi-Fi/BT M.2 Module**



## 2.6 Embedded Artists' i.MX versus Murata Module Interconnect

**Table 7** provides an i.MX Reference Platform versus Murata module matrix. An additional row is included to provide a quick chipset lookup.

**Table 7: Embedded Artists' i.MX Interconnect**

Embedded Artists' i.MX Dev Kit	<u>1DX</u>	<u>1MW</u>	<u>1LV</u>	<u>1CX</u>	<u>1XA</u>	<u>1ZM</u>	<u>1YM-SDIO</u>	<u>1YM</u>
	CYW4343W	CYW43455	CYW43012	CYW4356	CYW54591	88W8987	88W8997	88W8997
<a href="#">iMX8M Quad COM</a>	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
<a href="#">iMX8M Mini uCOM</a>	M.2	M.2 / MD	M.2	M.2	M.2	M.2	M.2	M.2
<a href="#">iMX8M Nano uCOM</a>	M.2	M.2 / MD	M.2	NC	NC	M.2	M.2	NC
<a href="#">iMX7 Dual COM</a>	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
<a href="#">iMX7 Dual uCOM</a>	M.2	M.2	M.2	M.2	M.2	M.2	M.2	M.2
<a href="#">iMX7ULP uCOM</a>	M.2	M.2	M.2 / MD	NC	NC	M.2	M.2	NC
<a href="#">iMX6 Quad COM</a>	M.2	M.2	M.2 <sup>V</sup>	M.2	M.2	NC	NC	M.2
<a href="#">iMX6 DualLite COM</a>	M.2	M.2	M.2 <sup>V</sup>	M.2	M.2	NC	NC	M.2
<a href="#">iMX6 SoloX COM</a>	M.2	M.2	M.2 <sup>V</sup>	M.2	M.2	NC	NC	M.2
<a href="#">iMX6 UltraLite COM</a>	M.2	M.2	M.2	NC	NC	M.2	M.2	NC
<a href="#">iMX RT1062 COM</a>	M.2	M.2	M.2	NC	NC	M.2	NC	NC

**M.2 = Wi-Fi/BT M.2 EVB plugs in directly to Embedded Artists' COM Carrier M.2 connector.**

**M.2<sup>V</sup> = The i.MX COM boards have fixed 3.3 V SDIO VIO. Although there is a disparity in specified VIO signaling, reliability testing has shown no failures.**

**MD = Module Soldered Down.**

**NC = No Connect.**

As can be seen in **Table 7**, the Wi-Fi/BT interconnect options for i.MX processors on Embedded Artists' hardware **are excellent**. The only limitations on interconnect are due to fixed voltage rails on some legacy i.MX6 COM boards and no PCIe bus support on i.MX 6UL, 7ULP, 8M Nano. Murata partnered strategically with Embedded Artists for their superior technical solutions in hardware and software. **They provide the easiest path for customers to evaluate Murata's Wi-Fi/Bluetooth solutions.**

### 3 Murata uSD-M.2 Adapter

The Murata Wi-Fi/Bluetooth module connects easily to the NXP i.MX RT, 6, and 8 EVK's by employing Murata's custom uSD-M.2 Adapter. This section provides detailed information on this adapter. Although designed specifically for NXP's i.MX EVK's, the Adapter can be used for other processors which support microSD or SD connectors with 4-bit WLAN-SDIO interface.

#### 3.1 uSD-M.2 Adapter High-Level Description

Murata uSD-M.2 Adapter Kit allows customized Wi-Fi and Bluetooth for NXP's i.MX RT/6/8 EVK's. The primary connection for the Adapter is the microSD WLAN-SDIO which is also typically used to power the M.2 EVB. With the included microSD-to-SD adapter, the adapter is easily converted to support full-size SD connectors. The uSD-M.2 Adapter Kit features optional power, debug, and clocking signals that connect through the Arduino Header or Micro-AB USB connector. Murata uSD-M.2 Adapter Kit offers uSD interface for WLAN-SDIO and is specifically designed for compatibility with Embedded Artists' Wi-Fi/BT M.2 Evaluation Boards (EVB).

All WLAN/BT-necessary signals including WLAN-SDIO, WLAN-PCIe, BT-UART, BT-PCM, and GPIO's are included on M.2 connector pins (Key "E"). No additional wiring is required. Note that the **new** uSD-M.2 Adapter provides interconnect for NXP i.MX RT/6/8 EVK's and **replaces** previous Murata i.MX Inter-Connect Kits (both V1/V2) to provide Wi-Fi/BT solution. Murata no longer supports the legacy i.MX V1/V1 Adapter interconnect kits.

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). The 20 pin FFC connector is currently supported by NXP's i.MX 6 Platforms. The Arduino headers' layout matches NXP's i.MX RT1020/1050/1060/1064 EVK's. NXP's i.MX 8M Mini/Nano EVK's use the uSD-M.2 Adapter Arduino header for connecting BT-UART and WLAN/BT control signals. Refer to **Section 3.2** for more details on adapter interconnect.

**Figure 7** and **Figure 8** shows the top and bottom views of the Murata's uSD-M.2 adapter. **Table 8** provides details on all the Adapter features highlighted in both figures.

**Table 8: 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) – <b>not illuminated</b> 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 <b>Jumper must be installed to power Adapter</b> (unless J5 Arduino Header Pins #15/16 are connected to external GND/3.3V VBAT). <b>Position 1-2:</b> 5V/3.3V VBAT supply from micro-USB (J2); or Arduino (J7) <b>Position 2-3:</b> 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 7: Murata uSD-M.2 Adapter, Top View

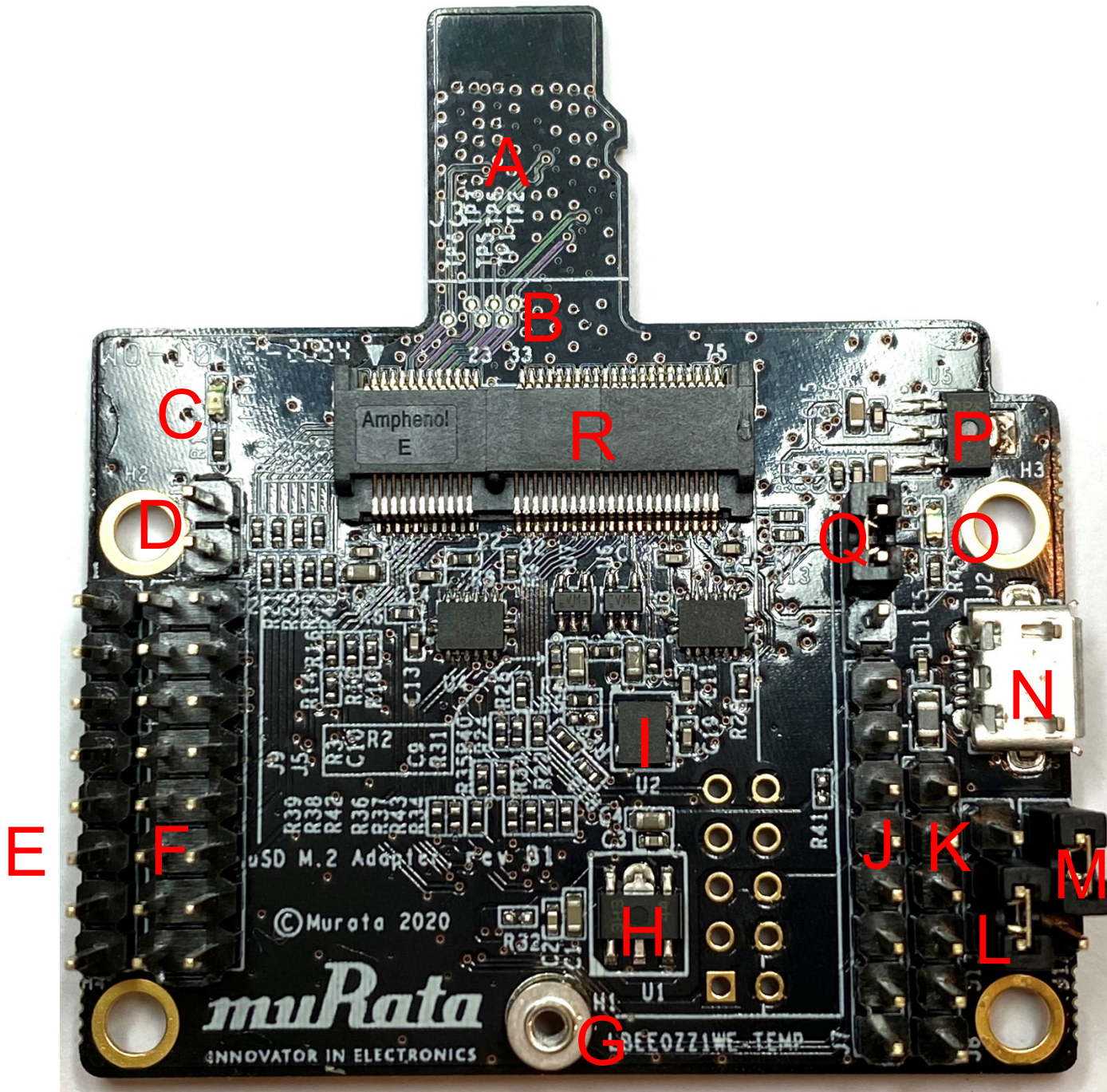
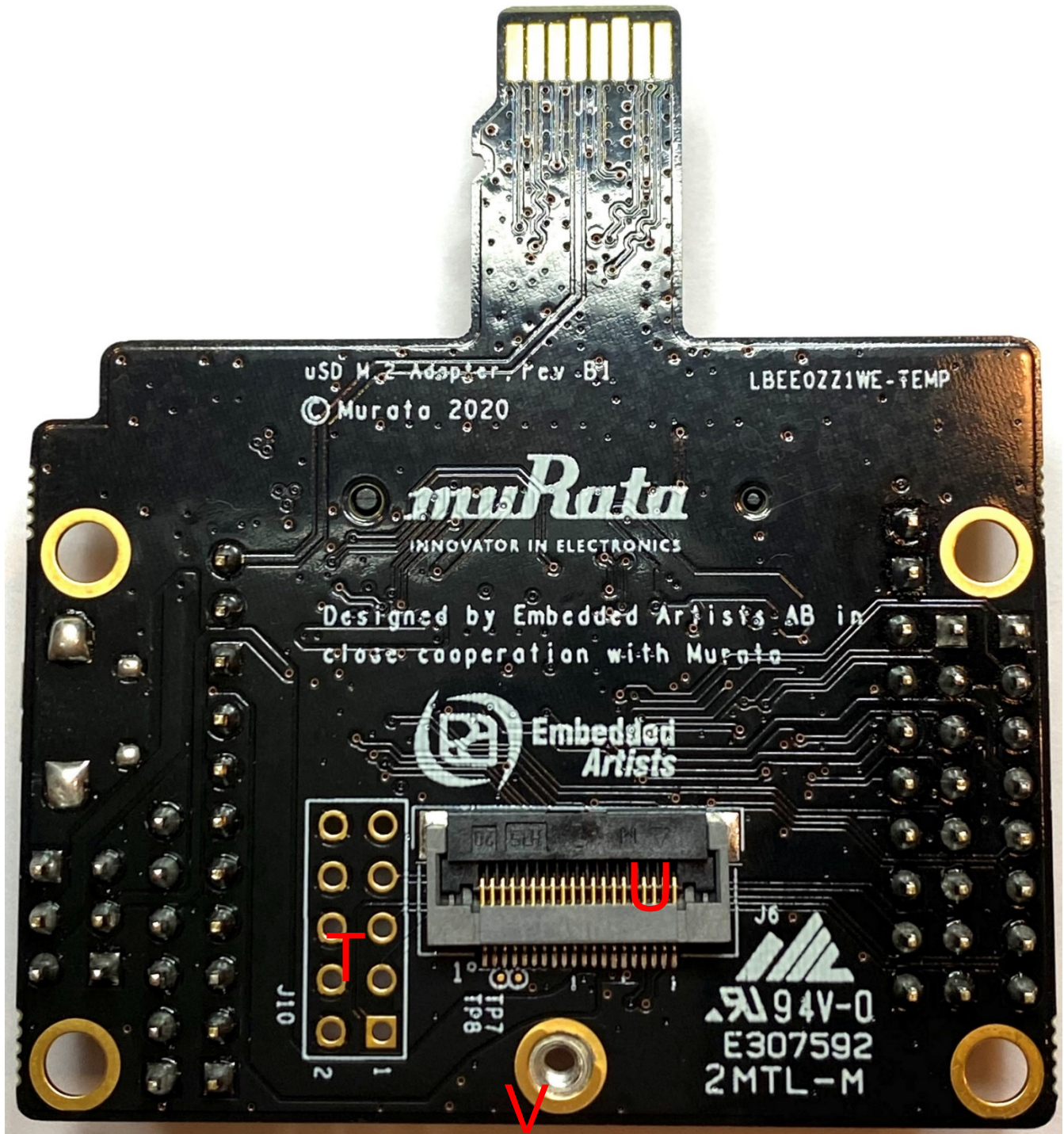




Figure 8: Murata uSD-M.2 Adapter, Bottom view



### 3.2 uSD-M.2 Adapter: Headers/Jumpers in Detail

For more details on the headers and jumpers, refer to **Figure 9: uSD-M.2 Adapter: Left Headers/Jumpers**, and **Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers**. Pin #1 location on J5 and J9 Arduino Headers are marked clearly in **Figure 9**. Regarding even/odd pins on J5, pin #2 is to the immediate right of pin #1: also seen in **Figure 12: uSD-M.2 Adapter Layout, Top View**.

### 3.2.1 J1: Power Supply Selector

Referring to **Figure 10** (jumper view) and **Figure 11** (schematic), the J1 Jumper is used to select the power source. **This jumper must be installed to power Adapter** (unless J5 Arduino Header Pins #15/16 are connected to external GND/3.3V VBAT). **There are only two options/positions:**

**Position 1-2:** 5V/3.3V VBAT supply from micro-USB (J2) or Arduino Header (J7);

**Position 2-3:** VBAT supply (typical 3.1~3.3V) from uSD connector (**default**).

**NOTE:** the kit is shipped with **default position of 2-3**; thereby configuring the uSD-M.2 Adapter to pull power from the uSD connector.

### 3.2.2 J11: Optional Jumper to Disable Bluetooth for WLAN-Only Operation

Referring to **Figure 9: uSD-M.2 Adapter: Left Headers/Jumpers**, J11 (**see blue rectangle**) is an optional jumper to disable Bluetooth core. This option is provided to minimize current consumption when running WLAN-only mode on specific modules. When J11 pins are not closed (i.e. jumper not installed), BT\_REG\_ON is driven active high (VDDIO = 1.8V default or 3.3V when J12 is in 2-3 position) when power is applied to the adapter. Referring to **Figure 12: Murata uSD-M.2 Adapter schematic**, R3 and C10 provide a simple resistor-capacitor power-on-reset signal for BT\_REG\_ON.

### 3.2.3 J9: Bluetooth UART TX/RX and WLAN/Bluetooth Control Arduino Header

Referring to **Figure 9: uSD-M.2 Adapter: Left Headers/Jumpers**, J9 (**see orange rectangle**) is a 8-pin Arduino Header that provides connectors to Bluetooth UART TX/RX and WLAN/Bluetooth control signals. All signals are 3.3V VIO. Referring to **Figure 11: Murata uSD-M.2 Adapter schematic**, level shifters U3 and U4 handle translation from 3.3V VIO signals to 1.8V VIO signals on Wi-Fi/BT M.2 Module (when J12/J13 jumpers are configured to default 1-2 setting). WL\_REG\_ON\_HOST and BT\_REG\_ON\_HOST signals are buffered via U6 and U7 respectively to 3.3V signals on Wi-Fi/BT M.2 Module.

Arduino Header signals connect with 200mm long male-to-female jumper cables (refer to **Table 2: uSD-M.2 Adapter Kit Contents**).

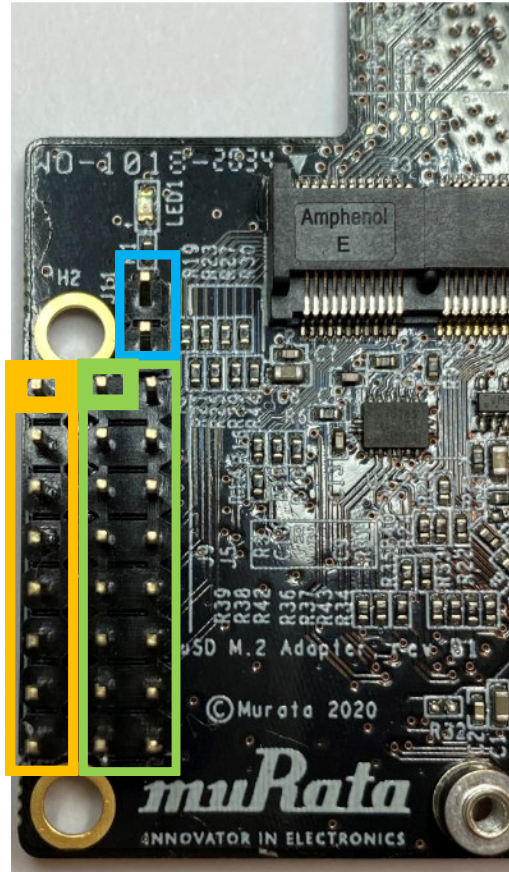
### 3.2.4 J5: Optional BT PCM and WLAN/BT Debug Signals

Referring to **Figure 9: uSD-M.2 Adapter: Left Headers/Jumpers** and **Figure 11: Murata uSD-M.2 Adapter schematic**, J5 (**see green rectangle**) is a 16-pin header that provides access to the following signals:

- Bluetooth PCM signals.
- WLAN and Bluetooth UART debug signals.
- Optional slow clock (LPO\_IN\_3V3) connection. If the user wants to bypass the onboard slow clock provided by U2 (i.e. remove R4), then this pin allows direct injection of the signal to M.2 Module.
- Optional 3.3V VBAT and GND power option: this is the only way to power the uSD-M.2 Adapter with J1 jumper removed.

Note that the signals listed in **Figure 9** do not describe the seldomly used debug signals. Only specially enabled WLAN firmware or Bluetooth patch files will enable these optional debug pins.

**Figure 9: uSD-M.2 Adapter: Left Headers/Jumpers**



J11 = Optional BT Disable; Jumper for WLAN-Only Mode  
 → Jumper Installed = BT\_REG\_ON is Low (BT Core disabled)  
 → Not Installed = BT\_REG\_ON is driven active high by Adapter on-board circuitry (default); or driven by Host if Arduino cable installed (J9; Pin #4).

J9 = BT UART TX/RX and WLAN/BT CTRL Arduino Header

Pin#	J9 Signal	Pin#	J9 Signal
1	BT_UART_TXD_HOST	5	WL_HOST_WAKE_HOST
2	BT_UART_RXD_HOST	6	BT_HOST_WAKE_OD_M2
3	WL_REG_ON_HOST	7	WL_DEV_WAKE_HOST
4	BT_REG_ON_HOST	8	BT_DEV_WAKE_HOST

J5 = Optional BT PCM and WLAN/BT Debug Signals

Pin#	J5 Signal	Pin#	J5 Signal
1	BT_PCM_IN_M2	14	LPO_IN_3V3
3	BT_PCM_OUT_M2	15	GND
5	BT_PCM_SYNC_M2	16	USD_3V3
7	BT_PCM_CLK_M2		



### 3.2.5 J12: M.2 IO Voltage: J12 in 1-2 pos for 1.8V VDDIO; J12 in 2-3 pos for 3.3V

Referring to **Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers** and **Figure 11: Murata uSD-M.2 Adapter schematic**, Jumper J12 (see yellow rectangle) default setting is 1-2 position for 1.8V VDDIO on M.2 interface. This setting works for all M.2 Modules (currently 1DX, 1MW, 1LV, 1ZM, and 1YM-SDIO). Per M.2 interface, WLAN-SDIO/BT-UART/BT-PCM interfaces operate at a default 1.8V. The M.2 EVB's level shift remaining WLAN/BT (3.3V) control signals.

With J12 Installed in 2-3 position, VDDIO changes to 3.3V using pin #64 on M.2 interface to drive this M.2 IO Voltage setting. LED2 (blue) illuminates when 3.3V VDDIO setting is selected. **NOTE:** this will only work on select M.2 Modules such as Type 1DX, and 1MW. Type 1LV, 1ZM, and 1YM-SDIO M.2 Modules **only support 1.8V VIO**.

### 3.2.6 J13: HOST IO Voltage: J13 in 1-2 pos for 3.3V VDDIO; J13 in 2-3 pos for 1.8V

Referring to **Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers** and **Figure 11: Murata uSD-M.2 Adapter schematic**, Jumper J13 (see purple rectangle) default setting is 1-2 position for 3.3V Host IO voltage. This VIO setting applies to all signals except WLAN-SDIO, BT PCM, and WLAN/BT debug.

If J13 setting is 2-3 position, then Host IO voltage is configured for 1.8V. This jumper setting **is only valid** when J12 is configured for 1-2 (1.8V VIO) as well. **NOTE:** this 1.8V Host IO voltage setting is not used on any existing NXP i.MX EVK's currently.

### 3.2.7 J7: Optional Arduino Header Power Supply (can connect either 5V or 3.3V VBAT)

Referring to **Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers** and **Figure 11: Murata uSD-M.2 Adapter schematic**, J7 Arduino Header (see orange rectangle) is used to provide optional power supply to uSD connector. Jumper J1 must be in 1-2 position (see **Section 3.2.1**) to disconnect uSD power and enable J7 header. Powering options include the following (J1 in 1-2 position):

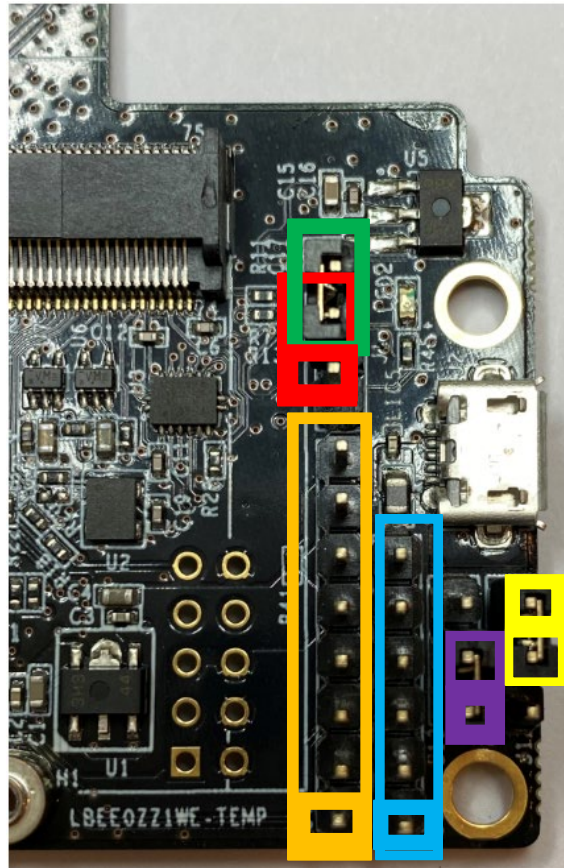
- Connect J7 Pins #2 and/or #3 to 3.3V VBAT; and Pin #6 and/or #7 to GND.
- Connect J7 Pins #5 to 5V VBAT; and Pin #6 and/or #7 to GND.

### 3.2.8 J8: BT UART RTS/CTS Arduino Header

Referring to **Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers** and **Figure 11: Murata uSD-M.2 Adapter schematic**, J8 Arduino Header (see blue rectangle) provides Bluetooth RTS and CTS connections. Default configuration for the Murata module (1DX/1MW/1LV/1ZM/1YM-SDIO) is to require flow control (i.e. not just TX/RX). As such, both RTS/CTS signals **need to be connected** to host MCU/MPU to provide correctly functioning BT UART connection using H4 UART transport.

**NOTE:** BT\_UART\_CTS\_HOST (UART CTS) is an input signal, and BT\_UART\_RTS\_HOST (UART RTS) is an output. For complete details on the pin/signal definitions, refer to **Murata uSD-M.2 Adapter Rev B1 Datasheet**.

**Figure 10: uSD-M.2 Adapter: Right Headers/Jumpers**



J1 = Power Supply Selector

**Jumper must be installed to power Adapter**

- ➔ 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 uSD connector

J12 = M.2 IO Voltage in 1-2 pos for 1.8V VDDIO; and 2-3 pos for 3.3V

- ➔ Jumper Installed in 1-2 pos = M.2 VIO set to 1.8V (default)
- ➔ Jumper Installed in 2-3 pos = M.2 VIO set to 3.3V; LED2 (Blue) illuminates

J13 = HOST VDD in 1-2 pos for 3.3V VDDIO and 2-3 pos for 1.8V

- ➔ Jumper Installed in 1-2 pos = HOST VDD set to 3.3V (default)
- ➔ Jumper Installed in 2-3 pos = VDDIO set to 1.8V

J7 = Optional Arduino Header Power Supply

Pin#	J7 Signal	Pin#	J7 Signal
2	USD_3V3	6	GND
4	USD_3V3	7	GND
5	5V		

J8 = BT UART RTS/CTS Arduino Header

Pin#	J8 Signal	Pin#	J8 Signal
3	BT_UART_RTS_HOST	4	BT_UART_CTS_HOST

### 3.3 Host/M.2 VDDIO Voltage Settings

**Table 9: Host/M.2 IO Voltage Level Setting** summarizes J13/J12 jumper settings, indicating what Host and M.2 VIO voltages are being configured. **Figure 11: Common Host/M.2 IO Voltage Level Shift Options** describes the two most common voltage settings in a block diagram.

The default configuration for J13/J12 (Host/M.2 VIO) is setting both jumpers in 1-2 position. This configures the M.2 VIO for WLAN-SDIO (and optional PCM) at 1.8 volts. The BT-UART and select WLAN-BT CTRL signals are level shifted from Host 3.3V to M.2 1.8V as necessary to adhere to the M.2 specification.

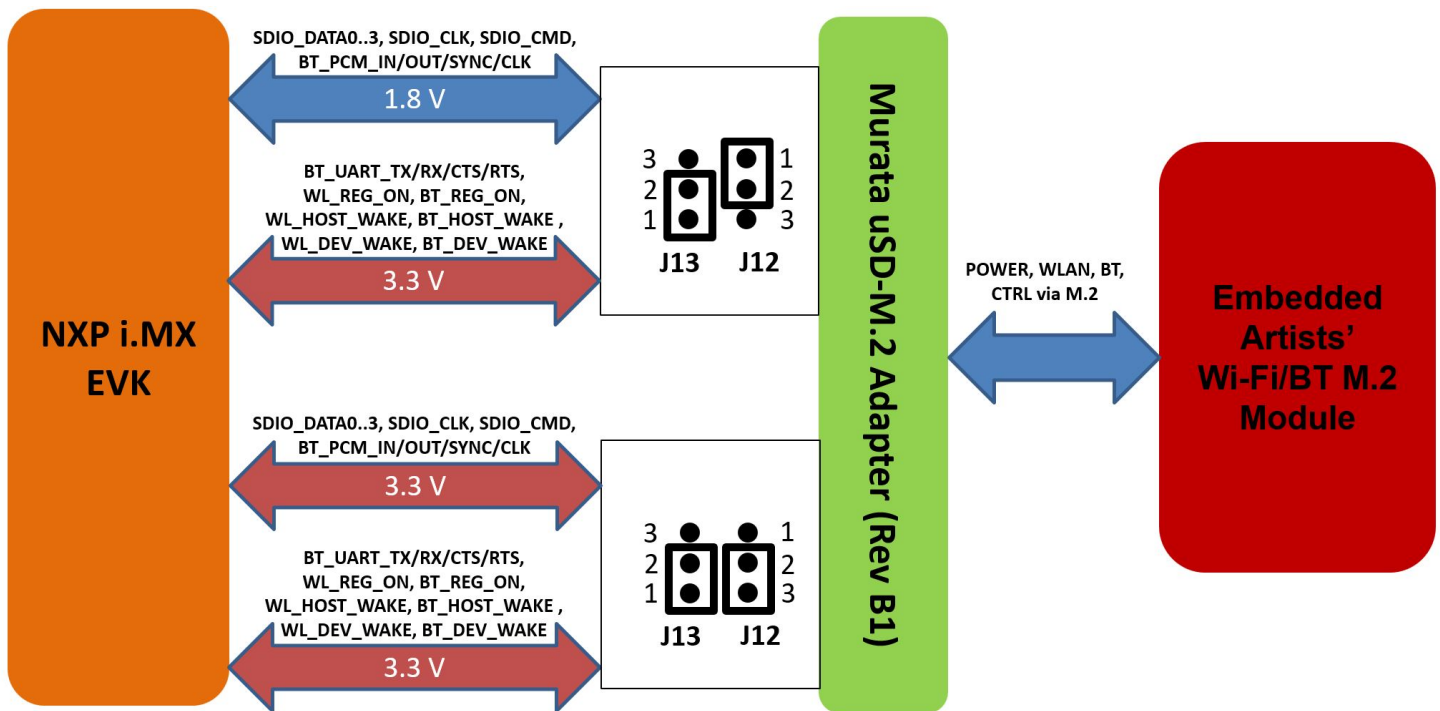
The “3.3V Override” configuration is used when the Host MPU/MCU platform **can only support 3.3V VIO signaling on WLAN-SDIO interface**. This override feature **only** works with select M.2 EVB’s as previously documented in this datasheet. The J13/J12 settings for this override mode are 1-2/2-3 respectively as shown in the block diagram.

Revision A of the uSD-M.2 Adapter **does not support level shifting** on BT-UART nor on select WLAN/BT CTRL signals. The limitation with the Rev A Adapter is that the Host and/or M.2 interface may over-drive certain pins at 3.3V VIO which are configured for 1.8V input. This limitation has been **corrected** with Revision B1. Note the Rev A of the uSD-M.2 Adapter “3.3V Override” configuration is configured by connecting Jumper J12.

**Table 9: Host/M.2 IO Voltage Level Setting**

Host IO Voltage	M.2 IO Voltage	SDIO Voltage	UART/Ctrl Signal Voltage	All Other Signals Voltage	Notes and Explanation
3.3V (J13 in 1-2 pos)	1.8V (J12 in 1-2 pos)	1.8V	3.3V	1.8V	Voltage levels to M.2 module according to standard. 3..3V on UART and main control signals, but some direct M.2 signals have 1.8V voltage level.
3.3V (J13 in 1-2 pos)	3.3V (J12 in 2-3 pos)	3.3V	3.3V	3.3V	"3.3V override mode". 3.3V on SDIO and all GPIOs. Note that all M.2 modules do not support 3.3V override mode.
1.8V (J13 in 2-3 pos)	1.8V (J12 in 1-2 pos)	1.8V	1.8V	1.8V	Voltage levels to M.2 module according to standard. Host processor has 1.8V IO voltage.
1.8V (J13 in 2-3 pos)	3.3V (J12 in 2-3 pos)				Do not select. Not a valid combination.

**Figure 11: Common Host/M.2 IO Voltage Level Shift Options**



### 3.4 uSD-M.2 Adapter: Pinout Definition

Table 10 provides Adapter pinout definition. Refer to **Figure 12: Murata uSD-M.2 Adapter schematic** for more details. Note that signal names ending in “HOST” connect to the i.MX Host, whereas those ending in “M2” connect directly to the M.2 EVB.

**Table 10: uSD-M.2 Adapter Pinout Definition**

J#	Pin #	Name	I/O	V	Description
J1	1-2	USD_3V3	N/A	3.3	5V/3.3V VBAT supply from micro-USB (J2) or Arduino Header (J7)
J1	2-3	USD_3V3	N/A	3.0~3.3	VBAT supply (typical 3.1~3.3V) from microSD connector (default)
J2	1-5	USB micro-B	N/A	5.0	Optional 5V USB Power Supply via Micro-AB USB Connector
J3	1,7,18,33,39,45, 51, 57,63,69, 75	GND	N/A	N/A	M.2 Ground connections
J3	2,4,72,74	VBAT	N/A	3.3~3.6	M.2 VBAT supply
J3	8	BT_PCM_CLK_M2	I/O	1.8	Bluetooth PCM Clock
J3	9	USD_CLK_M2	I	1.8	SDIO Clock
J3	10	BT_PCM_SYNC_M2	I/O	1.8	Bluetooth PCM Sync
J3	11	USD_CMD_M2	I/O	1.8	SDIO Command



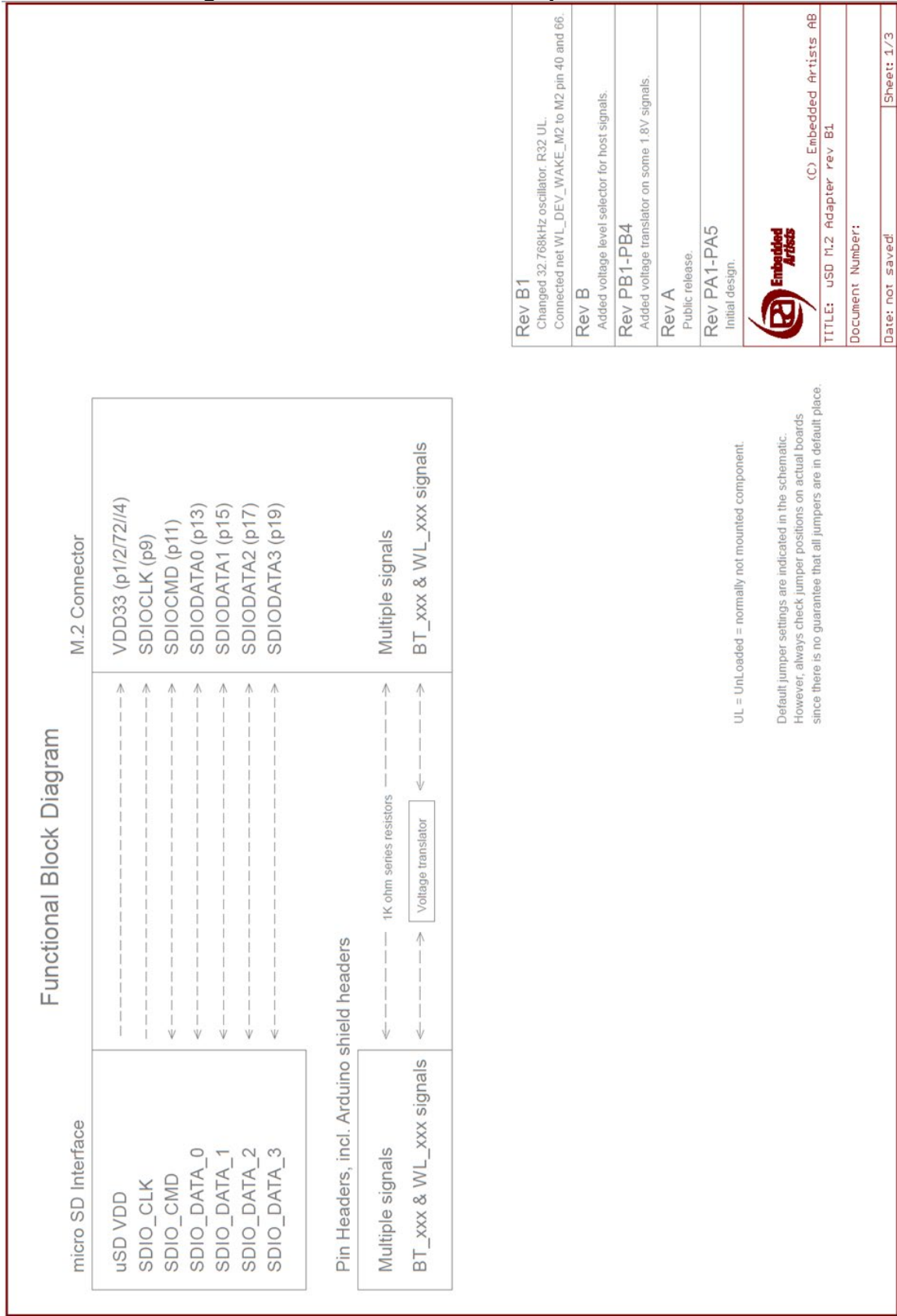
J3	12	BT_PCM_OUT_M2	O	1.8	Bluetooth PCM Output
J3	13	USD_DATA0_M2	I/O	1.8	SDIO DATA0
J3	14	BT_PCM_IN_M2	I	1.8	Bluetooth PCM Input
J3	15	USD_DATA1_M2	I/O	1.8	SDIO DATA1
J3	17	USD_DATA2_M2	I/O	1.8	SDIO DATA2
J3	19	USD_DATA3_M2	I/O	1.8	SDIO DATA3
J3	20	BT_HOST_WAKE_OD_M2	O	3.3	Bluetooth Host Wake: Active Low
J3	21	WL_HOST_WAKE_M2	O	1.8	WLAN Host Wake: Active Low
J3	22	BT_UART_TXD_M2	O	1.8	Bluetooth UART Transmit
J3	32	BT_UART_RXD_M2	I	1.8	Bluetooth UART Receive
J3	34	BT_UART_RTS_M2	O	1.8	Bluetooth UART Request-To-Send
J3	36	BT_UART_CTS_M2	I	1.8	Bluetooth Clear-To-Send
J3	38	M2_PIN38-JTAG_TDO	I/O	1.8	Optional JTAG Debug signal
J3	40	M2_PIN40	I/O	1.8	Optional M.2 signal
J3	42	BT_DEV_WAKE_M2	I	1.8	Bluetooth Device Wake
J3	44	M2_PIN44-JTAG_TDI_OR_TRST	I/O	1.8	Optional JTAG Debug signal
J3	46	M2_PIN46-JTAG_TCK	I/O	1.8	Optional JTAG Debug signal
J3	48	M2_PIN48-JTAG_TMS	I/O	1.8	Optional JTAG Debug signal
J3	50	LPO_IN_3V3	I	3.3	External Sleep Clock (32.768 kHz) – used in deep sleep mode
J3	54	BT_REG_ON_3V3	I	3.3	Enables/Disables Bluetooth core: Active High
J3	56	WL_REG_ON_3V3	I	3.3	Enables/Disables WLAN core: Active High
J3	59	M2_PIN59	I/O	1.8	Optional M.2 signal
J3	61	M2_PIN61	I/O	1.8	Optional M.2 signal
J3	62	M2_PIN62	I/O	1.8	Optional M.2 signal
J3	64	VDDIO override	I	1.8~3.3	Overrides default 1.8V VDDIO; forces 3.3V operation on some M.2 Modules
J3	65	M2_PIN65	I/O	1.8	Optional M.2 signal
J3	66	WL_DEV_WAKE_M2	I	1.8	WLAN Device Wake
J3	67	M2_PIN67	I/O	1.8	Optional M.2 signal
J3	68	M2_PIN68	I/O	1.8	Optional M.2 signal
J3	70	M2_PIN70	I/O	1.8	Optional M.2 signal
J3	71	M2_PIN71	I/O	1.8	Optional M.2 signal
J3	73	M2_PIN73	I/O	1.8	Optional M.2 signal
J4	1	USD_DATA2_M2	I/O	1.8	microSD SDIO DATA2
J4	2	USD_DATA3_M2	I/O	1.8	microSD SDIO DATA3
J4	3	USD_CMD_M2	I/O	1.8	microSD SDIO Command
J4	4	VCC	N/A	3.0~3.3	VBAT supply from microSD

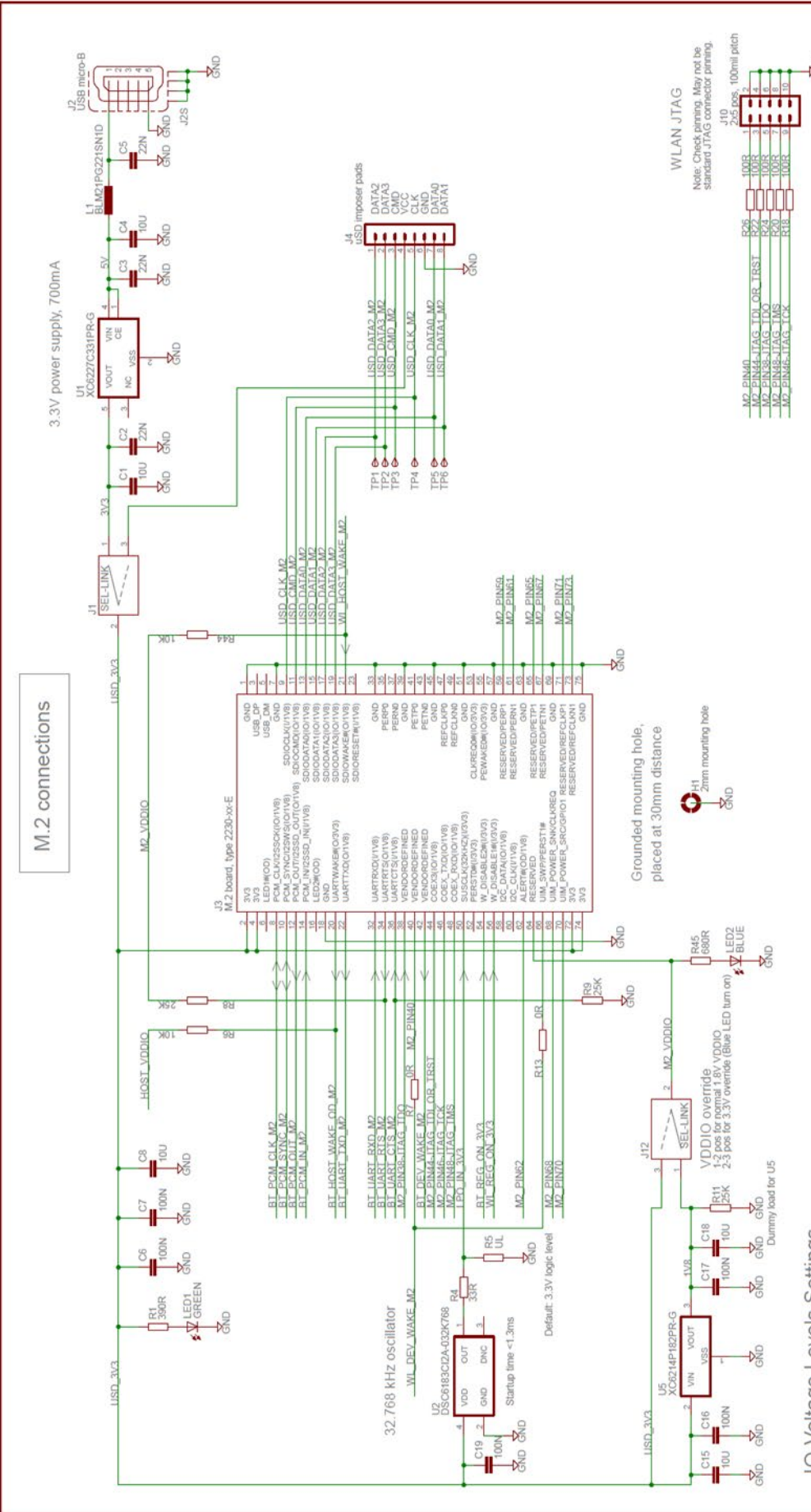
J4	5	USD_CLK_M2	O	1.8	microSD SDIO Clock
J4	6	GND	N/A	N/A	microSD Ground
J4	7	USD_DATA0_M2	I/O	1.8	microSD DATA0
J4	8	USD_DATA1_M2	I/O	1.8	microSD DATA1
J5	1	BT_PCM_IN_M2	I	1.8~3.3	Bluetooth PCM Input
J5	2	M2_PIN59	I/O	1.8~3.3	Optional M.2 signal
J5	3	BT_PCM_OUT_M2	O	1.8~3.3	Bluetooth PCM Output
J5	4	M2_PIN61	I/O	1.8~3.3	Optional M.2 signal
J5	5	BT_PCM_SYNC_M2	I/O	1.8~3.3	Bluetooth PCM Sync
J5	6	M2_PIN65	I/O	1.8~3.3	Optional M.2 signal
J5	7	BT_PCM_CLK_M2	I/O	1.8~3.3	Bluetooth PCM Clock
J5	8	M2_PIN67	I/O	1.8~3.3	Optional M.2 signal
J5	9	M2_PIN62	I/O	1.8~3.3	Optional M.2 signal
J5	10	M2_PIN71	I/O	1.8~3.3	Optional M.2 signal
J5	11	M2_PIN68	I/O	1.8~3.3	Optional M.2 signal
J5	12	M2_PIN73	I/O	1.8~3.3	Optional M.2 signal
J5	13	M2_PIN70	I/O	1.8~3.3	Optional M.2 signal
J5	14	LPO_IN_3V3	I	3.3	External Sleep Clock (32.768 kHz) – used in deep sleep mode. Optional input to drive signal directly on this pin – or can be used to measure/check clock signal. If driving this pin with external clock; remove R4. Another option is to ground the clock input signal (install R5 and remove R4).
J5	15	GND	N/A	N/A	Ground connection; used for external power (i.e. lab bench power supply).
J5	16	USD_3V3	N/A	3.3	3.3V VBAT external power supply (i.e. lab bench power supply). Need to disconnect/remove Jumper J1.
J6	1	WL_REG_ON_HOST	I	1.8~3.3	Enables/Disables WLAN core: Active High
J6	2	WL_HOST_WAKE_HOST	O	1.8~3.3	WLAN Host Wake: Active Low (OOB IRQ)
J6	5	WL_DEV_WAKE_HOST	I	1.8~3.3	WLAN Device Wake
J6	6	BT_REG_ON_HOST	I	1.8~3.3	Enables/Disables Bluetooth Core: Active High
J6	7	BT_HOST_WAKE_OD_M2	O	1.8~3.3	Bluetooth Host Wake: Active Low
J6	8,20	GND	N/A	N/A	Ground
J6	9	BT_PCM_CLK_M2	I/O	1.8~3.3	Bluetooth PCM Clock
J6	10	BT_PCM_SYNC_M2	I/O	1.8~3.3	Bluetooth PCM Sync
J6	11	BT_PCM_OUT_M2	O	1.8~3.3	Bluetooth PCM Output
J6	12	BT_PCM_IN_M2	I	1.8~3.3	Bluetooth PCM Input
J6	13	BT_DEV_WAKE_HOST	I	1.8~3.3	Bluetooth Device Wake

J6	14,15	3V3	N/A	3.3	Alternative VBAT supply for Adapter
J6	16	BT_UART_RXD_HOST	I	1.8~3.3	Bluetooth UART Receive
J6	17	BT_UART_CTS_HOST	I	1.8~3.3	Bluetooth UART Clear-To-Send
J6	18	BT_UART_TXD_HOST	O	1.8~3.3	Bluetooth UART Transmit
J6	19	BT_UART_RTS_HOST	O	1.8~3.3	Bluetooth UART Request-To-Send
J7	2,4	USD_3V3	N/A	3.3	Alternative VBAT supply for Adapter
J7	5,(8)	5V	N/A	5.0	Alternative VBAT supply for Adapter: to connect Pin #8, populate R41.
J7	6,7	GND	N/A	N/A	Ground
J8	3	BT_UART_RTS_HOST	O	1.8~3.3	Bluetooth UART Request-To-Send
J8	4	BT_UART_CTS_HOST	I	1.8~3.3	Bluetooth UART Clear-To-Send
J9	1	BT_UART_TXD_HOST	O	1.8~3.3	Bluetooth UART Transmit
J9	2	BT_UART_RXD_HOST	I	1.8~3.3	Bluetooth UART Receive
J9	3	WL_REG_ON_HOST	I		Enables/Disables WLAN core: Active High
J9	4	BT_REG_ON_HOST	I	1.8~3.3	Enables/Disables Bluetooth Core: Active High
J9	5	WL_HOST_WAKE_HOST	O	1.8~3.3	WLAN Host Wake: Active Low (OOB IRQ)
J9	6	BT_HOST_WAKE_OD_M2	O	1.8~3.3	Bluetooth Host Wake: Active Low
J9	7	WL_DEV_WAKE_HOST	I	1.8~3.3	WLAN Device Wake
J9	8	BT_DEV_WAKE_HOST	I	1.8~3.3	Bluetooth Device Wake
J10	2,4,6,8,10	GND	N/A	N/A	Ground
J10	1	M2_PIN40	I/O	1.8~3.3	Optional M.2 signal
J10	3	M2_PIN44-JTAG_TDI_OR_TRST	I/O	1.8~3.3	Optional JTAG Debug signal
J10	5	M2_PIN38-JTAG_TDO	I/O	1.8~3.3	Optional JTAG Debug signal
J10	7	M2_PIN48-JTAG_TMS	I/O	1.8~3.3	Optional JTAG Debug signal
J10	9	M2_PIN46-JTAG_TCK	I/O	1.8~3.3	Optional JTAG Debug signal
J11	1	BT_REG_ON_HOST	N/A	N/A	Enables/Disables Bluetooth Core: Active High; J11 provides option to disable Bluetooth core
J11	2	GND	N/A	N/A	Ground
J12	1-2	M2_VDDIO	N/A	1.8	J12: Jumper Pins 1-2 to configure M.2 IO Voltage to 1.8V (default)
J12	2-3	M2_VDDIO	N/A	3.3	J12: Jumper Pins 2-3 to configure M.2 IO Voltage to 3.3V
J13	1-2	HOST_VDDIO	N/A	3.3	J13: Jumper Pins 1-2 to configure HOST IO Voltage to 3.3V (default)
J13	2-3	HOST_VDDIO	N/A	1.8	J13: Jumper Pins 2-3 to configure HOST IO Voltage to 1.8V.

### 3.5 uSD-M.2 Schematic & Layout

Figure 12: Murata uSD-M.2 Adapter schematic





### IO Voltage Levels Settings

Host IO Voltage	M.2 IO Voltage	SDIO Voltage	UART/Ctrl signal voltage	All other signals voltage	Notes and Explanation
3.3V (J13 in 1-2 pos)	1.8V (J12 in 1-2 pos)	1.8V	3.3V	1.8V	Voltage levels to M.2 module according to standard. Host processor has 1.8V IO voltage.
3.3V (J13 in 1-2 pos)	3.3V (J12 in 2-3 pos) Blue LED is on.	3.3V	3.3V	3.3V	"3.3V override mode". 3.3V on SDIO and all GPIOs. Note that all M.2 modules do not support 3.3V override mode.
1.8V (J13 in 2-3 pos)	1.8V (J12 in 1-2 pos)	1.8V	1.8V	1.8V	Voltage levels to M.2 module according to standard. Host processor has 1.8V IO voltage.
1.8V (J13 in 2-3 pos)	3.3V (J12 in 2-3 pos) Blue LED is on.				Do not select. Not a valid combination.



TITLE: USD M.2 Adapter rev B1

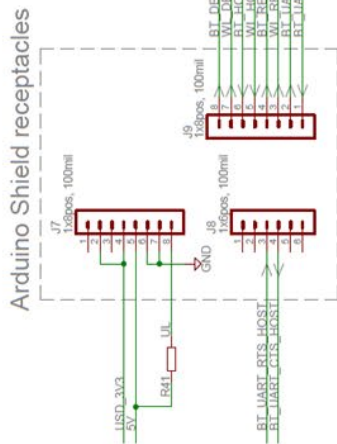
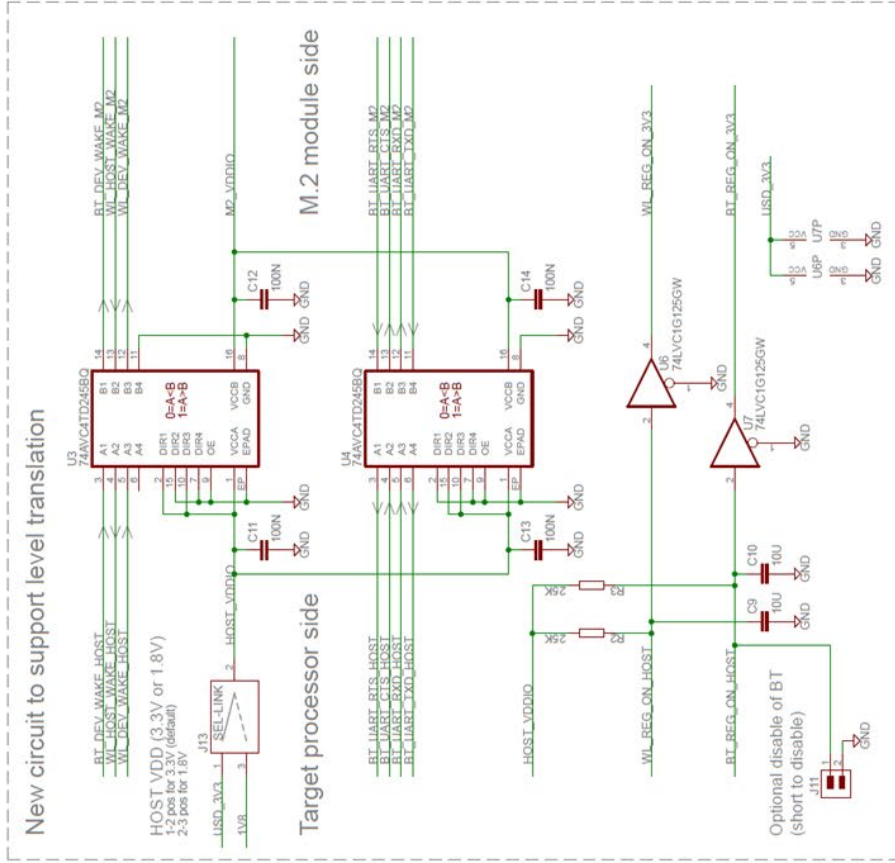
Document Number:

Date: not saved

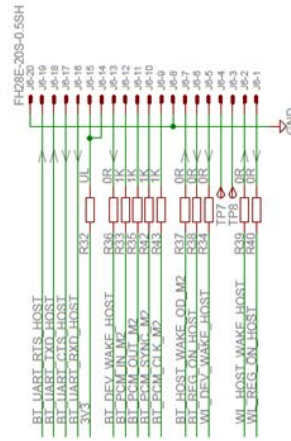
Sheet: 2/3



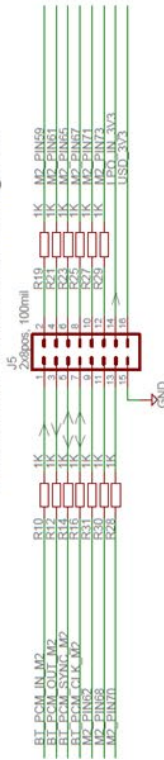
M.2 connections



FPC connector to Sabre boards



Pin header to access ctrl signals



TITLE: USD M.2 Adapter rev B1 (C) Embedded Artists AB

Document Number:

Date: not saved!

Sheet: 3/3

**Figure 12** provides full schematics for the Adapter. When viewing PDF, just rotate the page clockwise 90° to get a close-up. **Figure 13** shows the Adapter layout, allowing users to easily identify components.

**Figure 13: uSD-M.2 Adapter Layout, Top View**

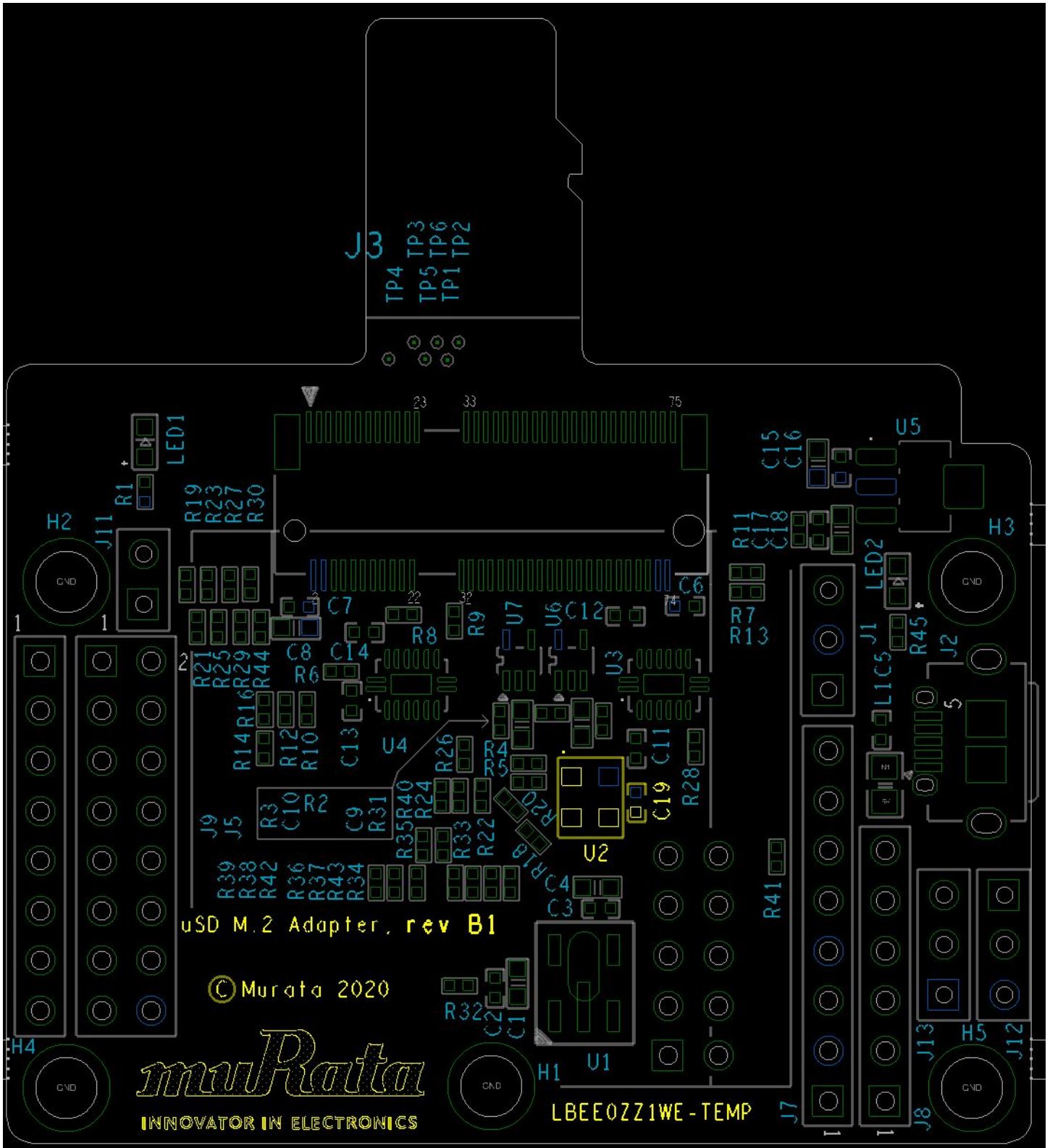
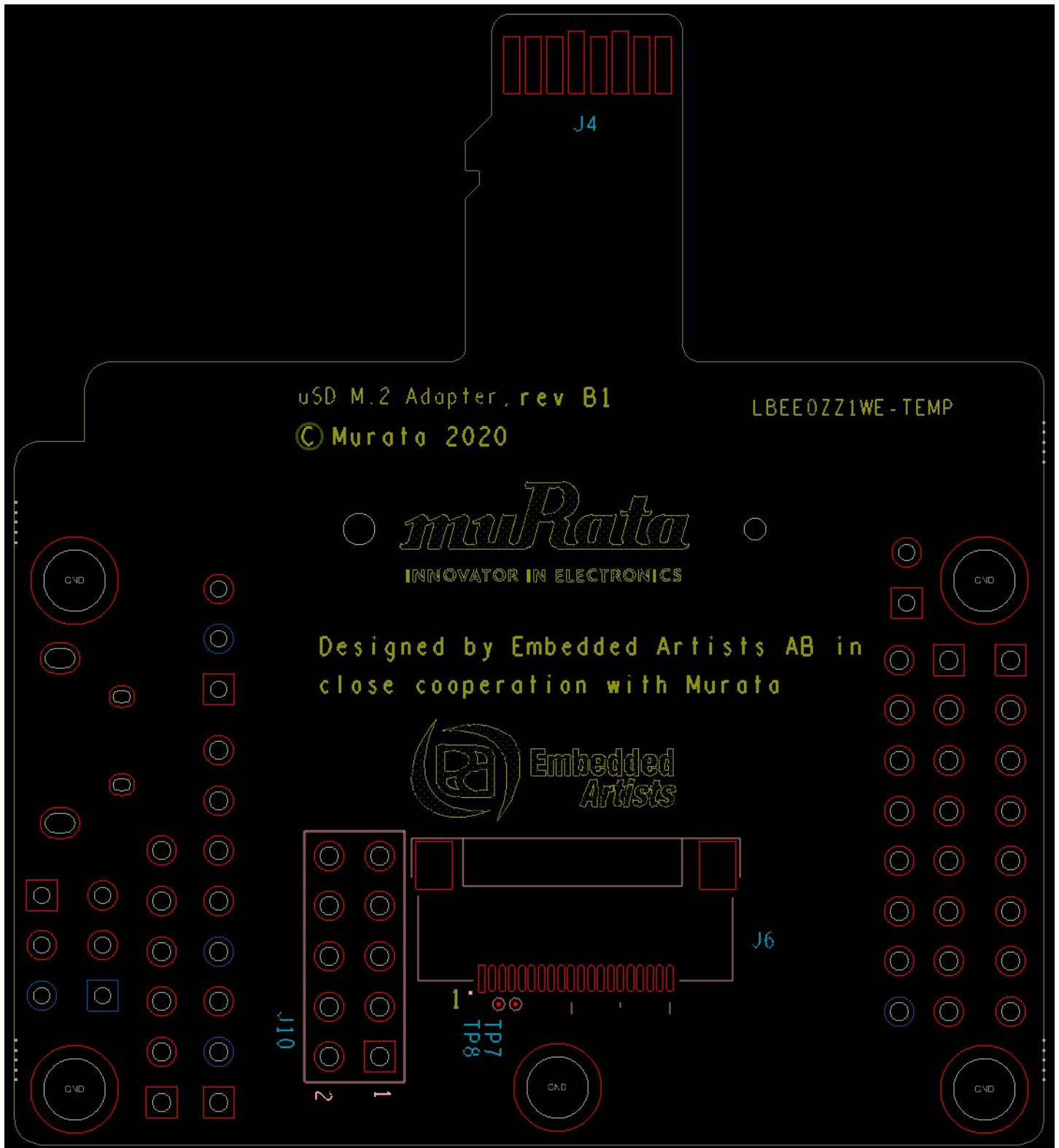


Figure 14: uSD-M.2 Adapter Layout, Bottom View

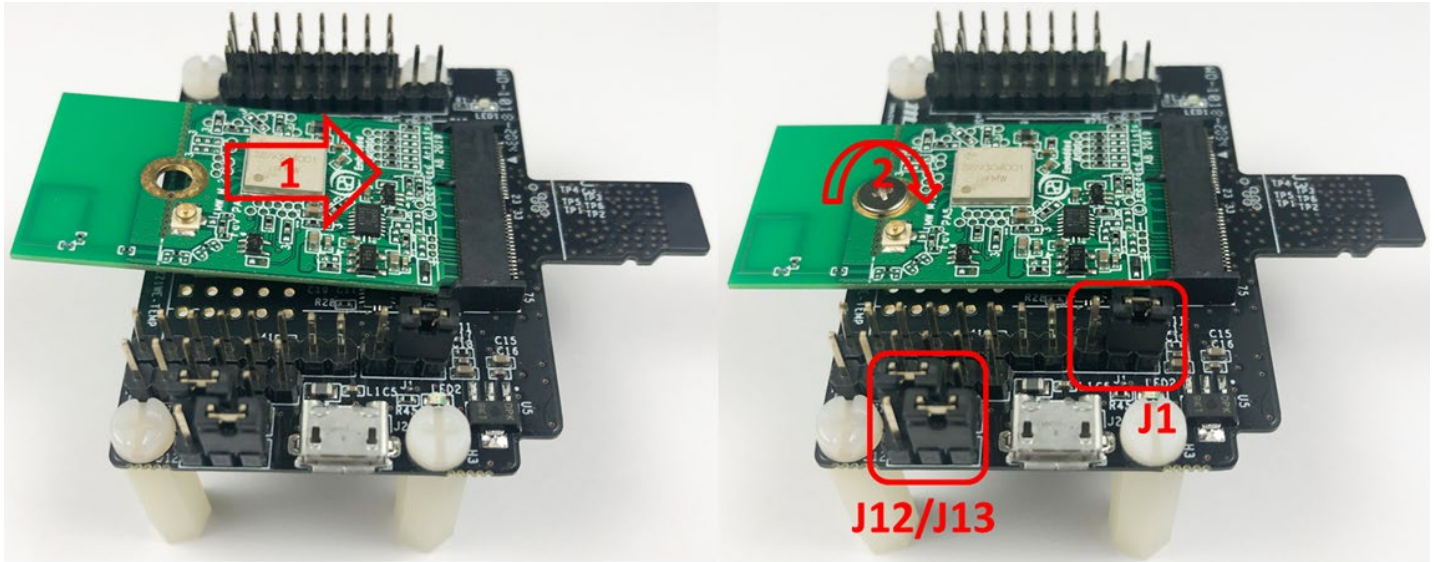




### 3.6 Connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter

When connecting the Wi-Fi/BT M.2 EVB to uSD-M.2 Adapter Rev B1 (**Figure 15**), 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 15: Connecting the Embedded Artists' Wi-Fi/BT M.2 EVB to Murata's uSD-M.2 Adapter**



### 3.7 Securing uSD-M.2 Adapter to NXP i.MX EVK

On NXP's i.MX RT/6/8 EVK's, an issue that customers can encounter is an unreliable uSD/SD electrical connection when using Murata's uSD-M.2 Adapter. The poor interconnect is caused by two issues: push-push (micro) SD card connectors on NXP i.MX EVK's; and low friction interface between the uSD-M.2 Adapter and uSD-SD Adapter Card.

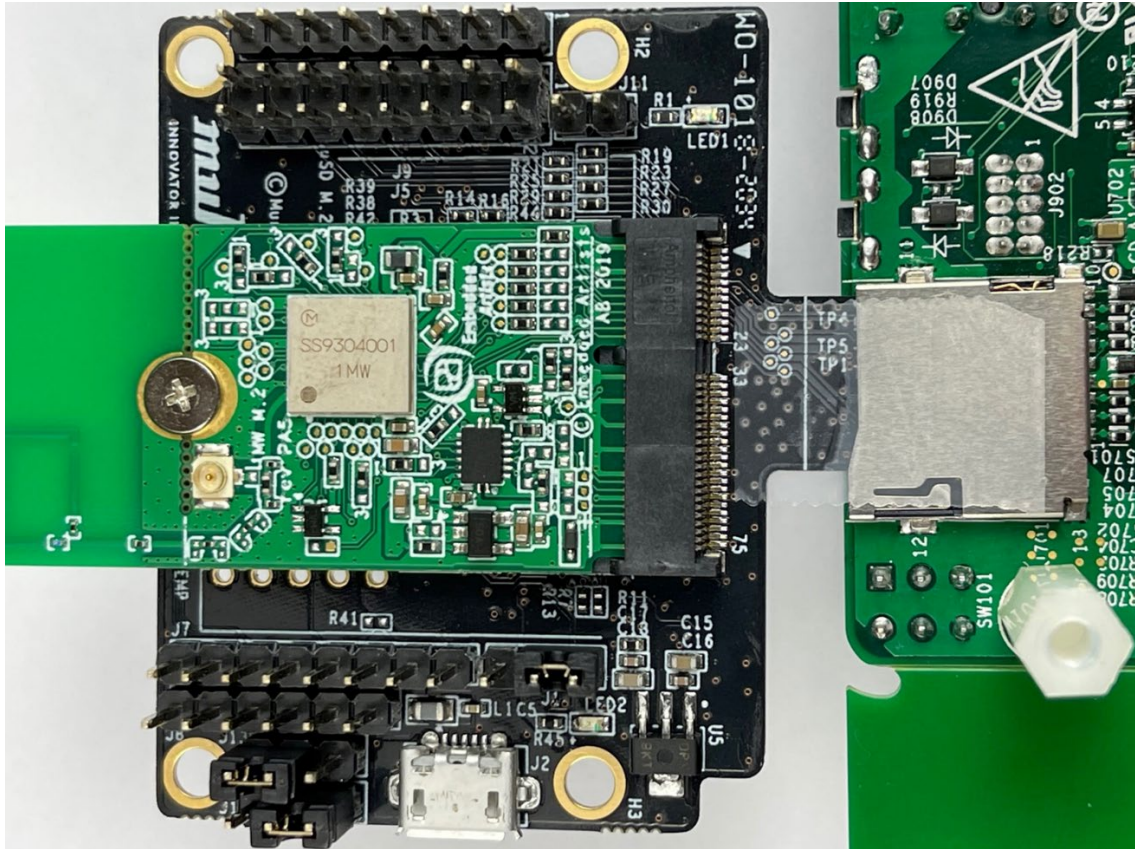
To properly secure the uSD-M.2 Adapter interconnect on the i.MX 6 EVK's, Murata **strongly recommends** to simply tape the uSD Adapter-SD Card connection and the SD Card-EVK connection as shown in **Figure 16**. Note that taping the SD Card-EVK connection makes the platform a little less flexible to work with. However, removing and re-applying clear tape is straightforward.

To properly secure the uSD-M.2 Adapter interconnect on the i.MX RT10xx and i.MX 8 EVK's, Murata **strongly recommends** to simply tape the uSD Adapter-EVK connection as shown in **Figure 17** (i.MX RT interconnect is equivalent to i.MX 8). 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.

Figure 16: Securing uSD/SD Connection on i.MX 6 EVK



Figure 17: Securing uSD Connection on i.MX 8 EVK





## 4 Connecting Murata Wi-Fi/BT Solution on i.MX RT Platforms

### 4.1 uSD-M.2 Adapter on i.MX RT Platforms

The Murata's Wi-Fi/BT Kit is specifically designed to interconnect easily with the NXP i.MX RT platforms. **Table 11: NXP i.MX RT EVK and Murata uSD-M.2 Adapter Interconnect** lists the NXP i.MX RT reference platforms with the supported Wi-Fi/Bluetooth modules.

**Table 11: NXP i.MX RT EVK and Murata uSD-M.2 Adapter Interconnect**

i.MX RT EVK	Part number	Murata modules supported	Interconnect
<a href="#">i.MX RT1064 EVK</a>	MIMXRT1064-EVK	<a href="#">1DX</a> , <a href="#">1MW</a> , <a href="#">1LV</a>	<a href="#">uSD-M.2 Adapter</a>
<a href="#">i.MX RT1060 EVK</a>	MIMXRT1060-EVK	<a href="#">1DX</a> , <a href="#">1MW</a> , <a href="#">1LV</a>	<a href="#">uSD-M.2 Adapter</a>
<a href="#">i.MX RT1050 EVK</a>	IMXRT1050-EVKB	<a href="#">1DX</a> , <a href="#">1MW</a> , <a href="#">1LV</a>	<a href="#">uSD-M.2 Adapter</a>
<a href="#">i.MX RT1020 EVK</a>	MIMXRT1020-EVK	<a href="#">1DX</a> , <a href="#">1MW</a> , <a href="#">1LV</a>	<a href="#">uSD-M.2 Adapter</a>
<a href="#">i.MX RT106A</a>	SLN-ALEXA-IOT	<a href="#">1DX</a>	Soldered down

#### 4.1.1 WLAN connections for i.MX RT

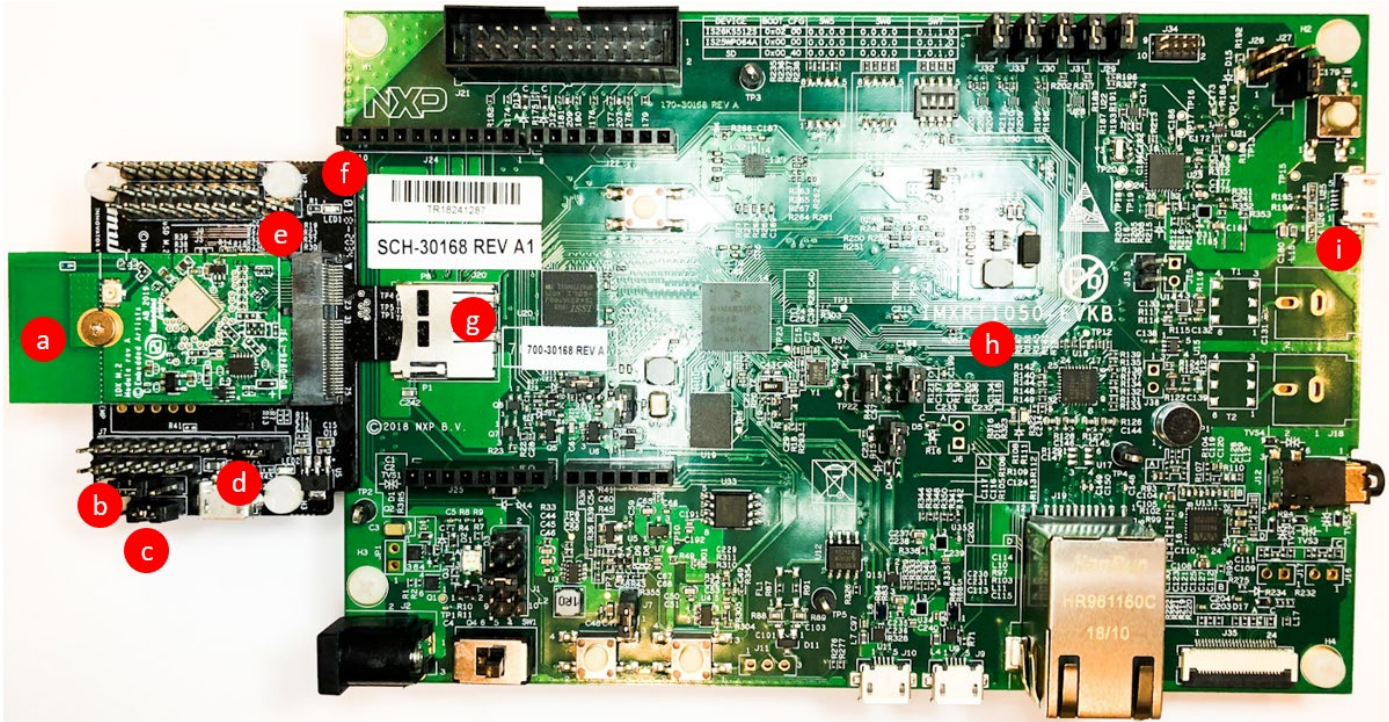
**Figure 18** shows the hardware configuration with the NXP i.MX RT1060 EVK connected with Type 1DX M.2 EVB via the uSD-M.2 Adapter. This is representative of all the other possible combinations of i.MX RT EVKs and Murata Wi-Fi/Bluetooth M.2 EVBs.

- Embedded Artists' Type 1DX M.2 EVB with PCB Trace Antenna
- HOST IO (J13) is in 1-2 pos for 3.3V VIO
- M.2 IO (J12)
  - For rev A adapter, J12 is open for 1.8V VIO
  - For rev B1 adapter, J12 is in 1-2 pos for 1.8V VIO
- Power Supply Jumper (J1) Position 2-3: VBAT supply (typical 3.1~3.3V) from uSD connector
- BT Disable Jumper (J11) Not Installed: Bluetooth Core enabled
- Power LED (LED1) is illuminated (**Green**)
- uSD Connector (Push-Push Ejection Style)
- NXP i.MX RT1060 EVK
- Power/Debug/Control Connection via micro-USB

Make sure the green LED1 is ON which confirms the correct connection. Also make sure blue LED2 is OFF (1.8V VIO mode). When blue LED2 is on then 3.3V VIO override mode is enabled. **NOTE:** The i.MX RT series can support the SDIO bus interface (i.e. 1DX, 1LV, 1MW, 1ZM) but not the PCIe interface (i.e. 1CX, 1XA and 1YM).

**NOTE:** Although not pictured here, Murata **strongly recommends** securing the **uSD-M.2 Adapter to NXP i.MX RT10xx platform with tape**. Refer to **Section 3.7** for more details.

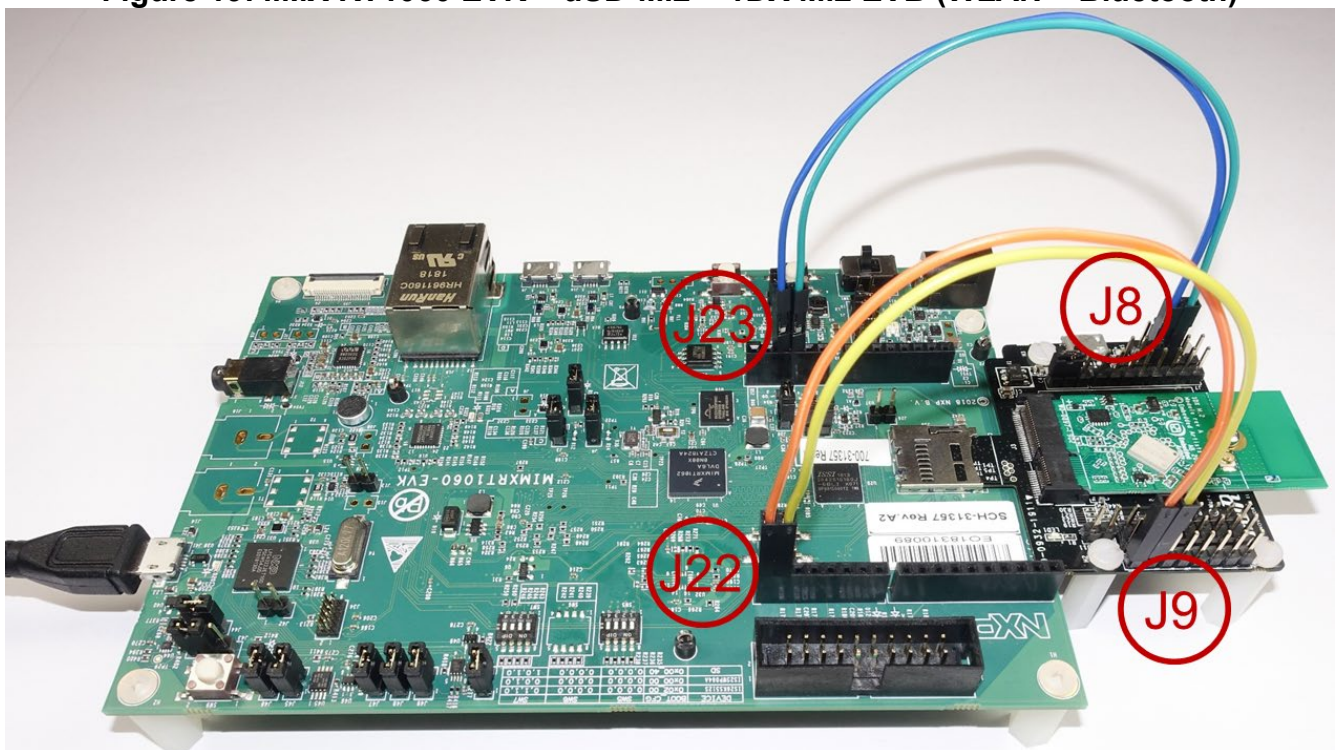
Figure 18: i.MX RT1060 EVK + uSD-M.2 + 1 DX M.2 EVB (WLAN Only)



#### 4.1.2 WLAN and Bluetooth connections for i.MX RT

Figure 19 shows the additional wiring required to bring up the WLAN and Bluetooth. These wires come with the uSD-M.2 Adapter kit as shown in the Table 2. In this configuration, the WLAN/BT control signals are not connected. For the control signal connections, please refer to Section 4.1.3.

Figure 19: i.MX RT1060 EVK + uSD-M.2 + 1DX M.2 EVB (WLAN + Bluetooth)





**NOTE:** BT-UART TX/RX/CTS/RTS are the required minimum to support BT-UART H4 signaling. **The TX/RX and CTS/RTS are “crossed”:** TX->RX; RX->TX; CTS->RTS; RTS->CTS. The CTS/RTS signal interconnect is **different from i.MX 6/7/8 which is straight-through and not crossed**.

The i.MX RT1060 EVK’s J22/J23 and uSD-M.2 Adapter’s J9/J8 headers have identical pinout to simplify the interconnect. Other i.MX RT10xx EVK’s have same header pinout – albeit the jumper header number may differ. In **Figure 19**, WL\_REG\_ON, BT\_REG\_ON, and WL\_HOST\_WAKE **are not connected** to i.MX RT. Refer to **Sections 4.1.2.1** and **4.1.2.2** for close-up views.

#### 4.1.2.1 WLAN and Bluetooth Close-Up #1

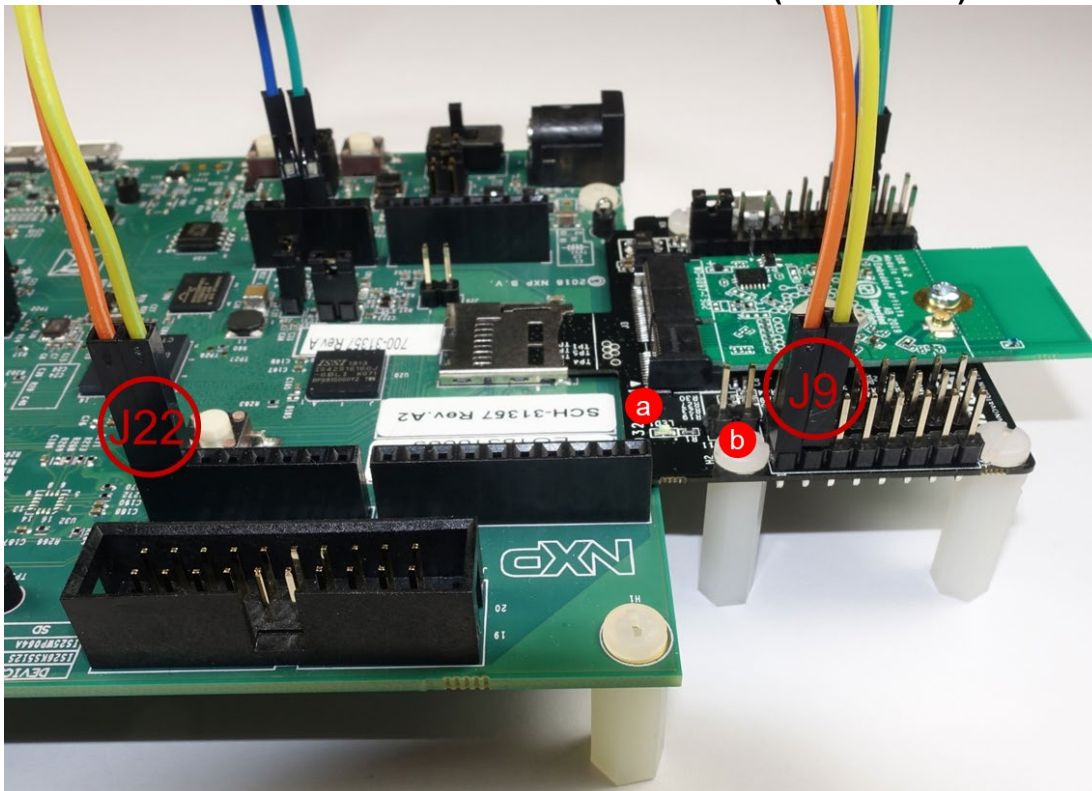
**Table 12** shows the UART TX/RX signal connections in between these jumpers used for the communication between the uSD-M.2 Adapter and the NXP i.MX RT1060 EVK. **Figure 20** shows a close-up picture of wired connection between J22 and J9. Note the following highlighted areas:

- a) Power LED (LED1) is illuminated (**Green**)
- b) BT Disable Jumper (J11): Not Installed (Bluetooth core enabled)

**Table 12: Bluetooth UART TX/RX Signal Interconnect**

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

**Figure 20: i.MX RT1060 EVK + uSD-M.2 + 1DX M.2 EVB (WLAN + BT): Close-Up #1**



#### 4.1.2.2 WLAN and Bluetooth Close-Up #2

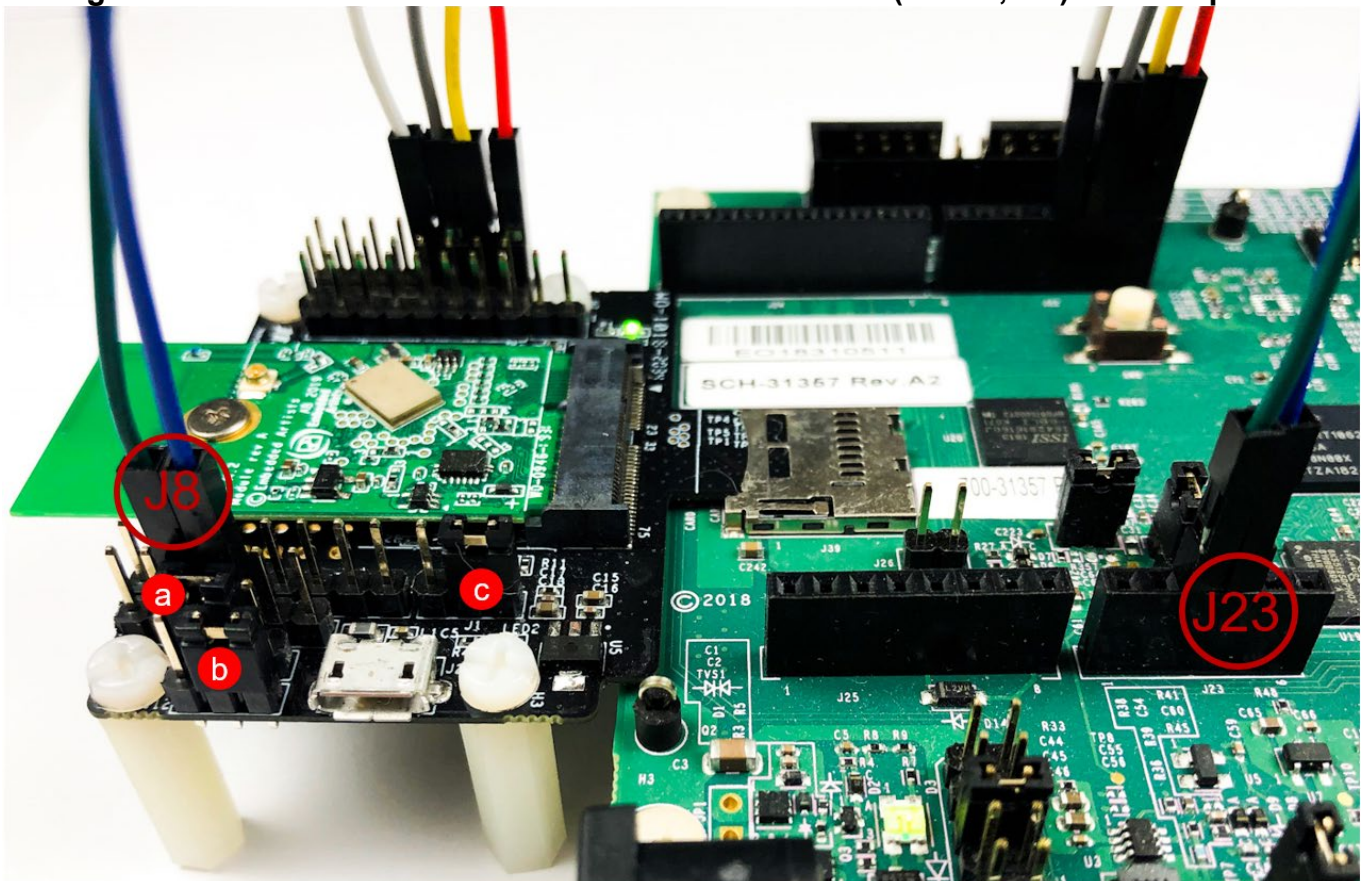
**Table 13** shows the UART CTS/RTS signal connections in between these jumpers used for the communication between the uSD-M.2 Adapter and the NXP i.MX RT1060 EVK. **Figure 21** shows a close-up picture of wired connection between J23 and J8. Note the following highlighted areas:

- a) J13 Jumper:  
**Position 1-2:** HOST VIO 3.3V for rev B1 adapter
- b) J12 Jumper:
  - For rev A adapter: J12 disconnected for 1.8V VIO
  - For rev B1 adapter: J12 in 1-2 pos for 1.8V, and J13 in 1-2 pos for 3.3V VIO
- c) Power Supply Jumper (J1)  
**Position 2-3:** VBAT supply (typical 3.1~3.3V) from uSD connector

**Table 13: Bluetooth UART CTS/RTS Signal Interconnect**

Signal Name	uSD-M.2 Adapter Header/Pin	i.MX RT EVK Pin	i.MX RT EVK Signal
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 21: i.MX RT1060 EVK + uSD-M.2 + 1DX M.2 EVB (WLAN, BT): Close-Up #2**

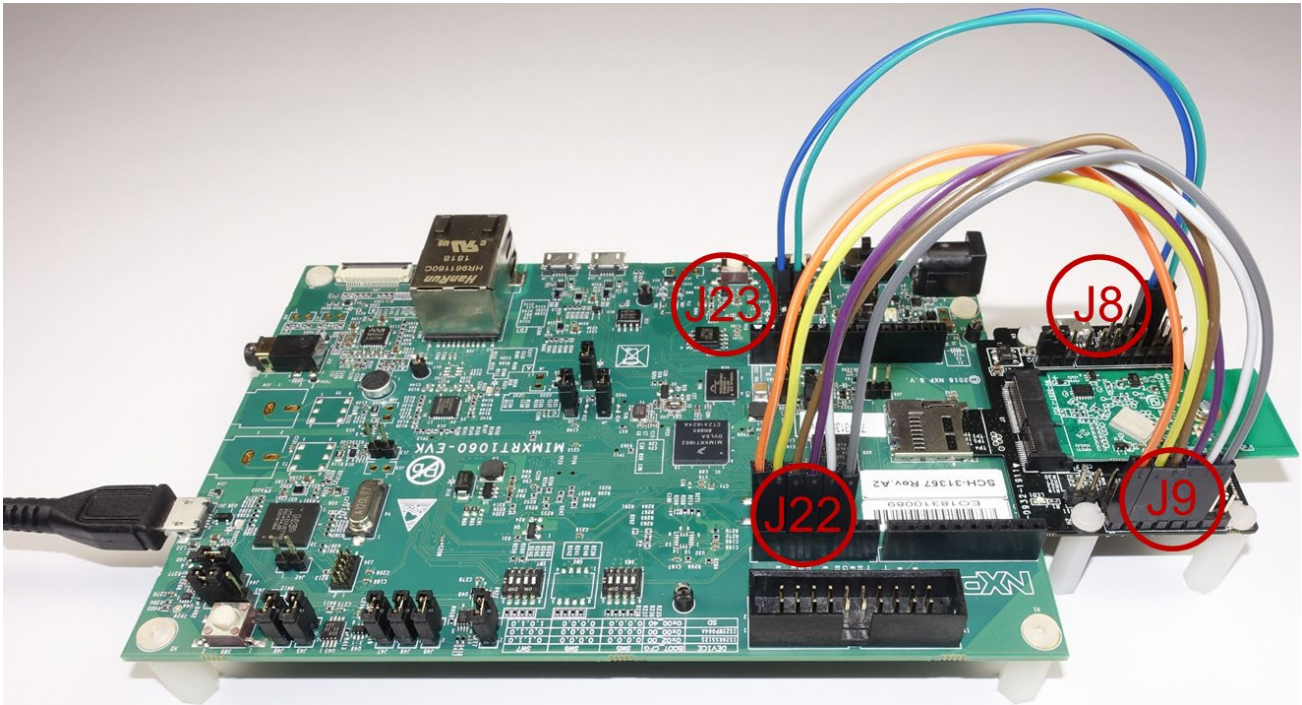




### 4.1.3 WLAN, Bluetooth, and WLAN/Bluetooth Control connections for i.MX RT

**Figure 22** illustrates the configuration for the WLAN, Bluetooth, and WLAN/Bluetooth control connections.

**Figure 22: i.MX RT1060 EVK + uSD-M.2 + 1DX M.2 EVB (WLAN, BT, WLAN/BT CTRL)**



**NOTE:** In the configuration pictured, WL\_REG\_ON, BT\_REG\_ON, and WL\_HOST\_WAKE signals **are connected** to i.MX RT via J22/J9 Arduino connection, while the rest of the connections are same as mentioned in **Section 4.1.2**. Refer to **Section 4.1.3.1** for close-up view.

#### 4.1.3.1 WLAN, Bluetooth, and WLAN/BT Control Close-up

**Table 14: Overall BT UART and WLAN/BT Control Signals** lists all signals (via Arduino header) on i.MX RT 1060 EVK with Murata uSD-M.2 Adapter interconnect.

Please refer to **Figure 23** for a close-up on jumper wires between J22 and J9 headers. This set up is useful for the WLAN, Bluetooth, and the WLAN/BT control signals communication. The connection between the jumpers J23 and J8 remain same as described in **Section 4.1.2.2**. Note the following highlighted areas:

- Power LED (LED1) is illuminated (**Green**)
- BT Disable Jumper (J11): Not Installed (Bluetooth core enabled)





## 4.1.4 Power Options

Apart from the default power option of microSD connection where the Wi-Fi/BT EVK (Murata uSD-M.2 Adapter + Embedded Artists' Wi-Fi/BT M.2 EVB) pulls power from the SDIO connection, there are other options described here.

### 4.1.4.1 Arduino 5V Power Option

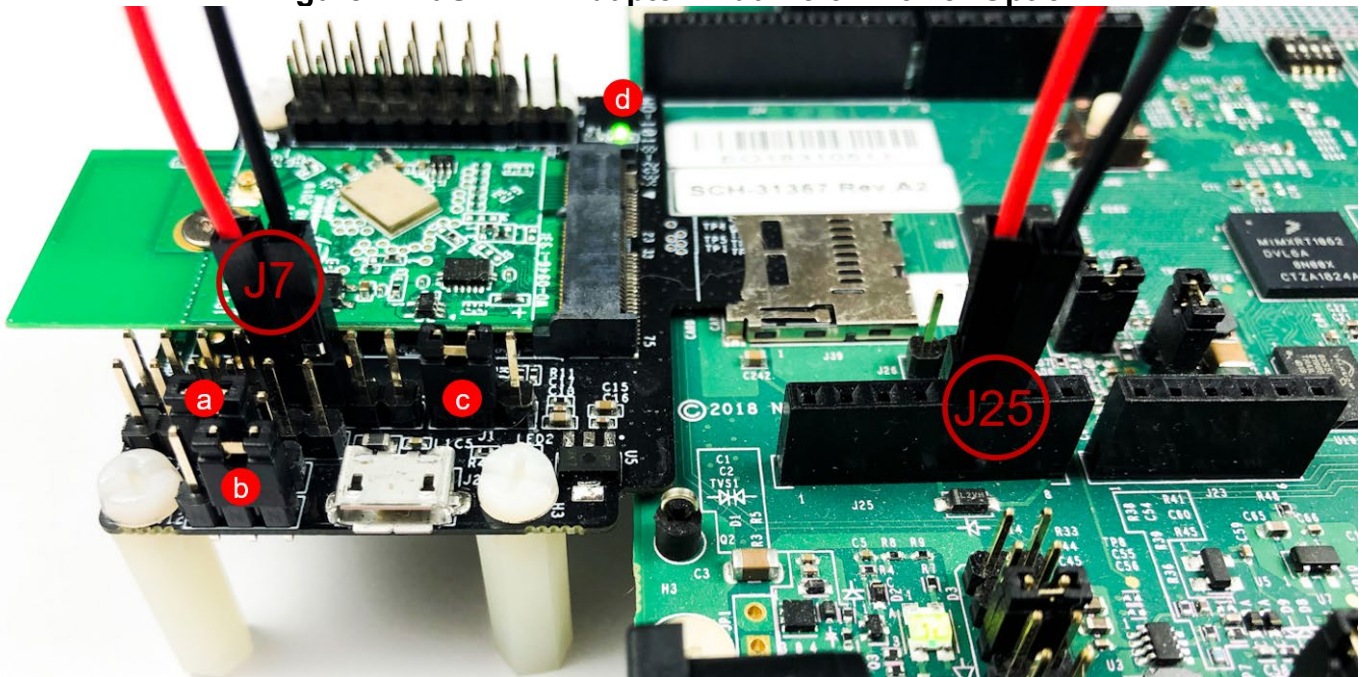
**Figure 24** illustrates the option of supplying 5V power to the uSD-M.2 Adapter using the Arduino header. Note that microSD power is disconnected (J1 is in 1-2 position). U1 regulator on Adapter steps down 5V supply to 3.3V VBAT. Refer to **Table 15** for the pin descriptions. Regarding the highlighted areas on **Figure 24**:

- a) J13 Jumper:  
**Position 1-2:** HOST VIO 3.3V for rev B1 adapter
- b) J12 Jumper:
  - For rev A adapter: J12 disconnected for 1.8V VIO
  - For rev B1 adapter: J12 in 1-2 pos for 1.8V, and J13 in 1-2 pos for 3.3V VIO
- c) J1 = Power Supply Selector  
**Position 1-2:** 5V or 3.3V VBAT supply from Arduino (J7)
- d) Power LED (LED1) is illuminated (**Green**)

**Table 15: Pin Description for Arduino Power Option**

Signal Name	uSD-M.2 Adapter Header/Pin	i.MX RT EVK Pin	i.MX RT EVK Signal
5V	J7 / Pin 5	J25 / 5	5V
GND	J7 / Pin 6	J25 / 6	GND

**Figure 24: uSD-M.2 Adapter Arduino 5V Power Option**



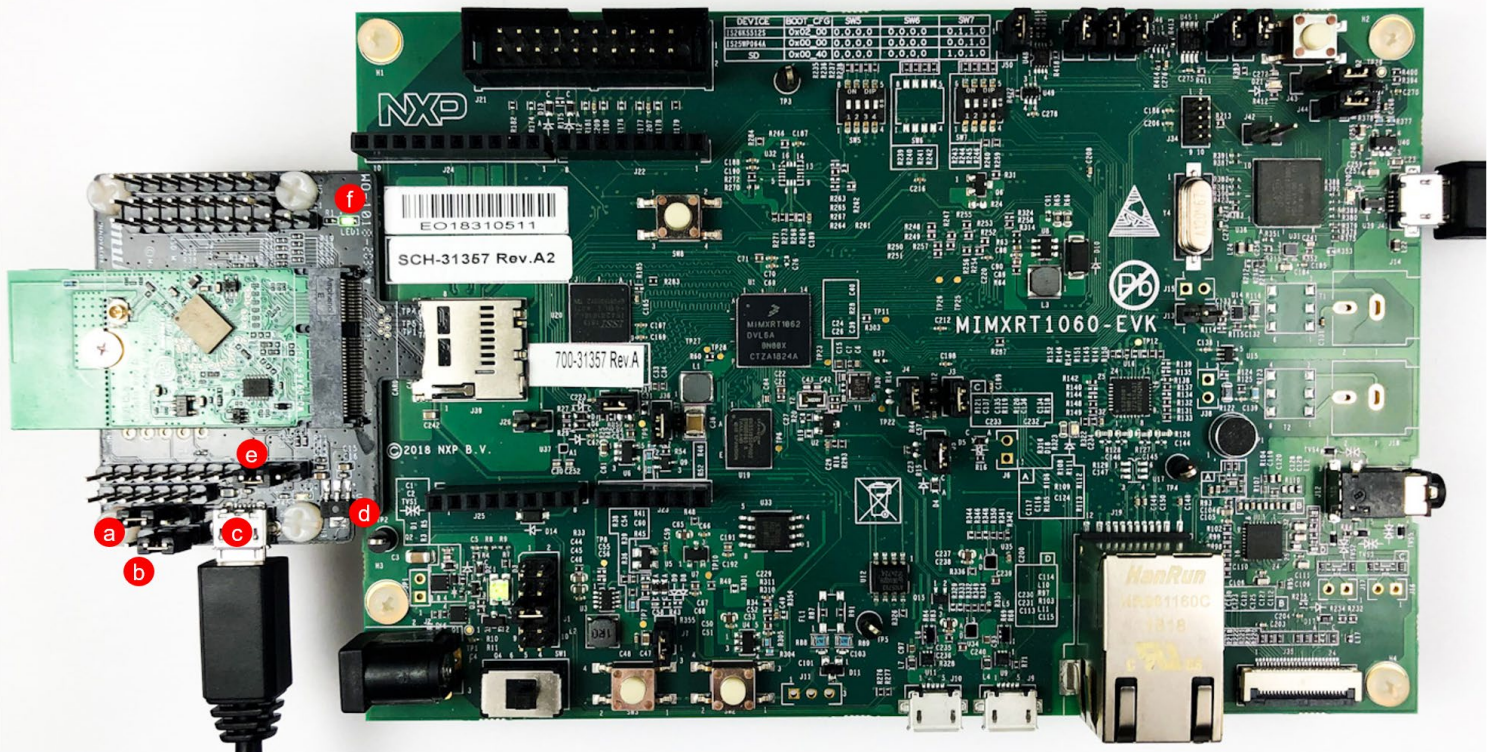


#### 4.1.4.2 USB 5V Power Option

**Figure 25** shows the option of powering up the uSD-M.2 Adapter board directly by connecting the 5V power supply to the USB port (J2) in the adapter board. Optional USB 5V power supply. microSD VBAT is disconnected. U1 regulator on Adapter steps down 5V supply to 3.3V VBAT. Note the following highlighted areas:

- a) J13 Jumper:  
**Position 1-2:** HOST VIO 3.3V for rev B1 adapter
- b) J12 Jumper:
  - For rev A adapter, J12 disconnected for 1.8V VIO
  - For rev B1 adapter, J12 in 1-2 pos for 1.8V and J13 in 1-2 pos for 3.3V VIO
- c) J2 = Optional 5V USB Power Supply via Micro-AB USB Connector
- d) U5 Regulator (on Adapter) to provide optional 1.8V VIO to M.2 Interface.
- e) J1 = Power Supply Selector  
**Position 1-2:** 5V/3.3V VBAT supply from USB
- f) Power LED (LED1) is illuminated (**Green**)

**Figure 25: uSD-M.2 Adapter USB 5V Power Option**

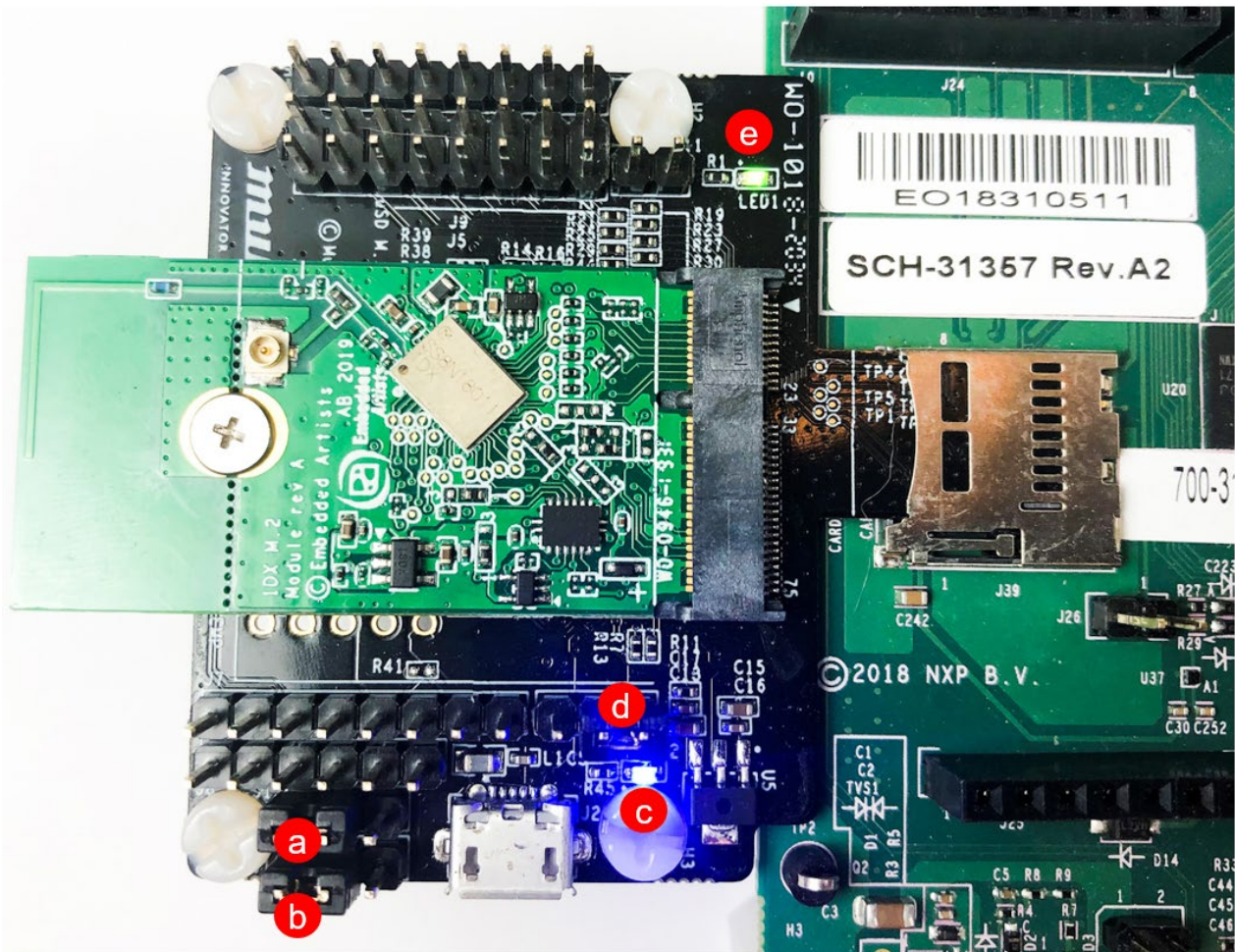


#### 4.1.4.3 3.3V VDDIO Override Option

**Figure 26** shows how to set up the adapter in 3.3V mode or 1.8V mode. For the rev A adapter to be in 3.3V override mode, insert jumper J12. For rev B1 adapter to be in 3.3V mode, install J12 in 2-3 position. For Type 1DX, and 1MW M.2 EVB's, the user can elect to configure VIO for 3.3V. However, the software needs to be modified on i.MX RT platform. **NOTE:** the default HW/SW configuration is 1.8V VIO (adheres to M.2 specification for WLAN-SDIO VIO). Note the following highlighted areas:

- a) J13 Jumper:  
**Position 1-2:** HOST VIO 3.3V for rev B1 adapter
- b) J12 = VDDIO Override:
  - For rev A adapter, Short J12 for 3.3V VDDIO
  - For rev B1 adapter, install J12 in 2-3 pos and J13 in 1-2 pos for 3.3V VDDIO
- c) LED2 = 3.3V VDDIO Override Indicator (**Blue**)
- d) Power Supply Jumper (J1)  
**Position 2-3:** VBAT supply (typical 3.1~3.3V) from uSD connector
- e) Power LED (LED1) is illuminated (**Green**)

**Figure 26: uSD-M.2 Adapter 3.3V VDDIO Override Option**



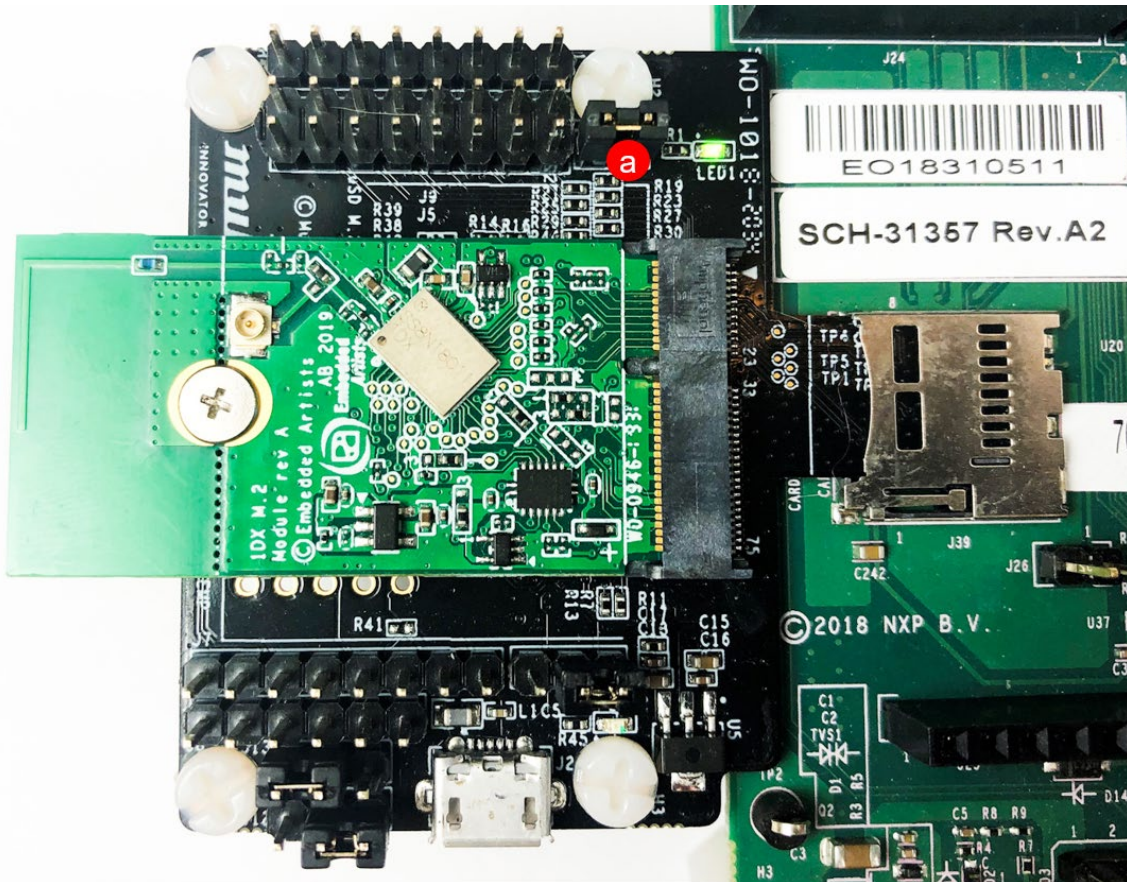


#### 4.1.5 Bluetooth Disable Option for WLAN-Only Mode

To optimize power consumption for WLAN-only operation, it is best for users to install J11 jumper or to drive BT\_REG\_ON signal low (using Arduino cable connection). If Bluetooth core is powered without proper initialization, then additional current is drawn needlessly. **Figure 27** shows the adapter with a jumper installed on J11. Note the following highlighted areas:

- a) J11 = Optional BT Disable Jumper for WLAN-Only Mode: installed which drives BT\_REG\_ON signal low, thereby disabling Bluetooth core.

**Figure 27: uSD-M.2 Adapter Bluetooth Disable Option**





## 5 Connecting Murata Wi-Fi/BT Solution on i.MX 6 Platforms

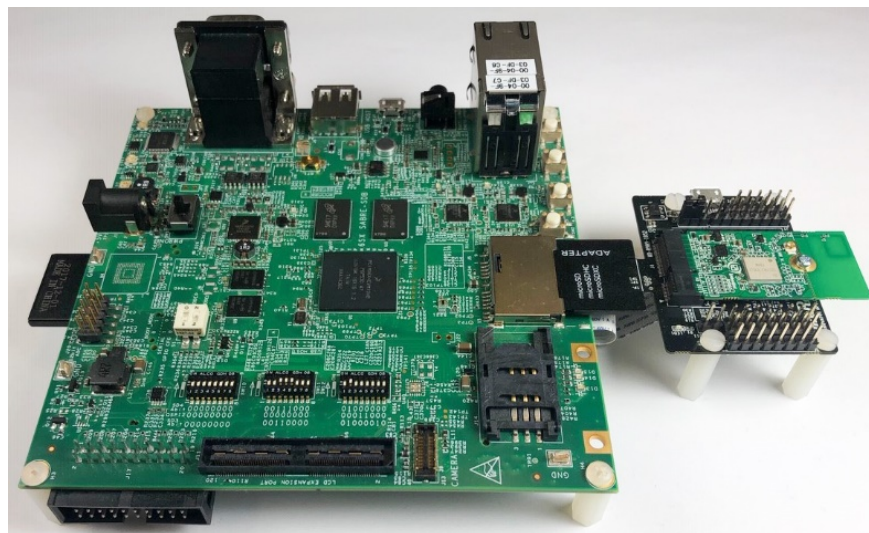
### 5.1 uSD-M.2 Adapter on i.MX 6 Platforms

The Murata's uSD-M.2 adapter is specifically designed to interconnect easily with the NXP i.MX 6 platforms. **Table 16** lists the supported NXP i.MX 6 reference platforms indicating VIO options, and links to interconnect details. Only i.MX 6UL/6ULL EVK's provide 1.8V VIO over WLAN-SDIO, thereby not limiting module interconnect due to VIO incompatibility. For more information on a given NXP i.MX 6 platforms click on the hyperlink and it will navigate you to the relevant landing page. Note that **without 1.8V VIO option, module support is limited** (i.e. 1ZM, 1YM-SDIO, 1LV are not supported).

**Table 16: NXP i.MX EVK and Murata uSD-M.2 Adapter Interconnect**

NXP i.MX 6 Platform	Interconnect	1.8V VIO	Notes
<a href="#">i.MX 6QP SDB</a>	<a href="#">uSD-M.2 Adapter</a>	No	Previous interconnect issues on i.MX 6Q/DL SDB were corrected on this i.MX EVK.
<a href="#">i.MX 6Q/DL SDB</a>	<a href="#">uSD-M.2 Adapter</a>	No	Please refer to <b>Section 5.2.2.1</b> for rework instructions.
<a href="#">i.MX 6SX SDB</a>	<a href="#">uSD-M.2 Adapter</a>	No	Rework recommended to connect optional WL_HOST_WAKE. Refer to <b>Section 5.2.1.1</b> for rework instructions.
<a href="#">i.MX 6UL EVK</a> <a href="#">i.MX 6ULL EVK</a>	<a href="#">uSD-M.2 Adapter</a>	Yes	Rework recommended to connect optional WL_HOST_WAKE. Please reference <b>Section 5.2.3.1</b> for rework instructions.

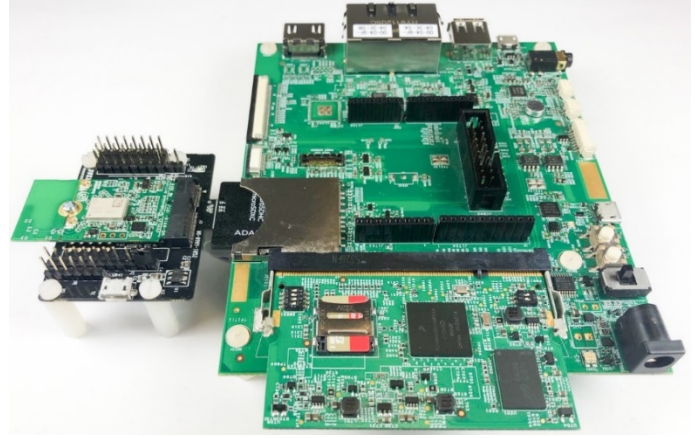
Below are the pictures of all the supported NXP i.MX 6 platforms. For details on interconnect, signals, and rework, refer to **Section 5.2**.



**i.MX 6SX SDB**



**i.MX 6Quad SDB**



**i.MX 6UL(L) EVK**

The i.MX6 EVK/Murata uSD-M.2 Adapter interconnect consists of the WLAN-SDIO connection via microSD connector, and all additional signals via the 20-pin FFC ribbon cable. **Table 17** lists all the Bluetooth UART, optional BT PCM, and WLAN/BT control signals used for the communication between the i.MX 6 platform and the M.2 module via the 20 pin FFC.

**Table 17: i.MX 6 Interconnect via J6 (Flat/Flex Cable - FFC)**

Pin #	Signal	I/O	VIO (V)	Function
1	WL_REG_ON_HOST	I	1.8~3.3	Enables/Disables WLAN core: Active High
2	WL_HOST_WAKE_HOST	O	1.8~3.3	WLAN Host Wake: Active Low (OOB IRQ)
5	WL_DEV_WAKE_HOST	I	1.8~3.3	WLAN Device Wake
6	BT_REG_ON_HOST	I	1.8~3.3	Enables/Disables Bluetooth Core: Active High
7	BT_HOST_WAKE_OD_M2	O	1.8~3.3	Bluetooth Host Wake: Active Low
8,20	GND	N/A	N/A	Ground
9	BT_PCM_CLK_M2	I/O	1.8~3.3	Bluetooth PCM Clock
10	BT_PCM_SYNC_M2	I/O	1.8~3.3	Bluetooth PCM Sync
11	BT_PCM_OUT_M2	O	1.8~3.3	Bluetooth PCM Output
12	BT_PCM_IN_M2	I	1.8~3.3	Bluetooth PCM Input
13	BT_DEV_WAKE_HOST	I	1.8~3.3	Bluetooth Device Wake
14,15	3V3	N/A	3.3	Alternative VBAT supply for Adapter
16	BT_UART_RXD_HOST	I	1.8~3.3	Bluetooth UART Receive
17	BT_UART_CTS_HOST	I	1.8~3.3	Bluetooth UART Clear-To-Send
18	BT_UART_TXD_HOST	O	1.8~3.3	Bluetooth UART Transmit
19	BT_UART_RTS_HOST	O	1.8~3.3	Bluetooth UART Request-To-Send



## 5.2 NXP i.MX 6 Platform Interconnect Details

### 5.2.1 Connecting to i.MX 6SX SDB (3.3V WLAN-SDIO VIO Override)

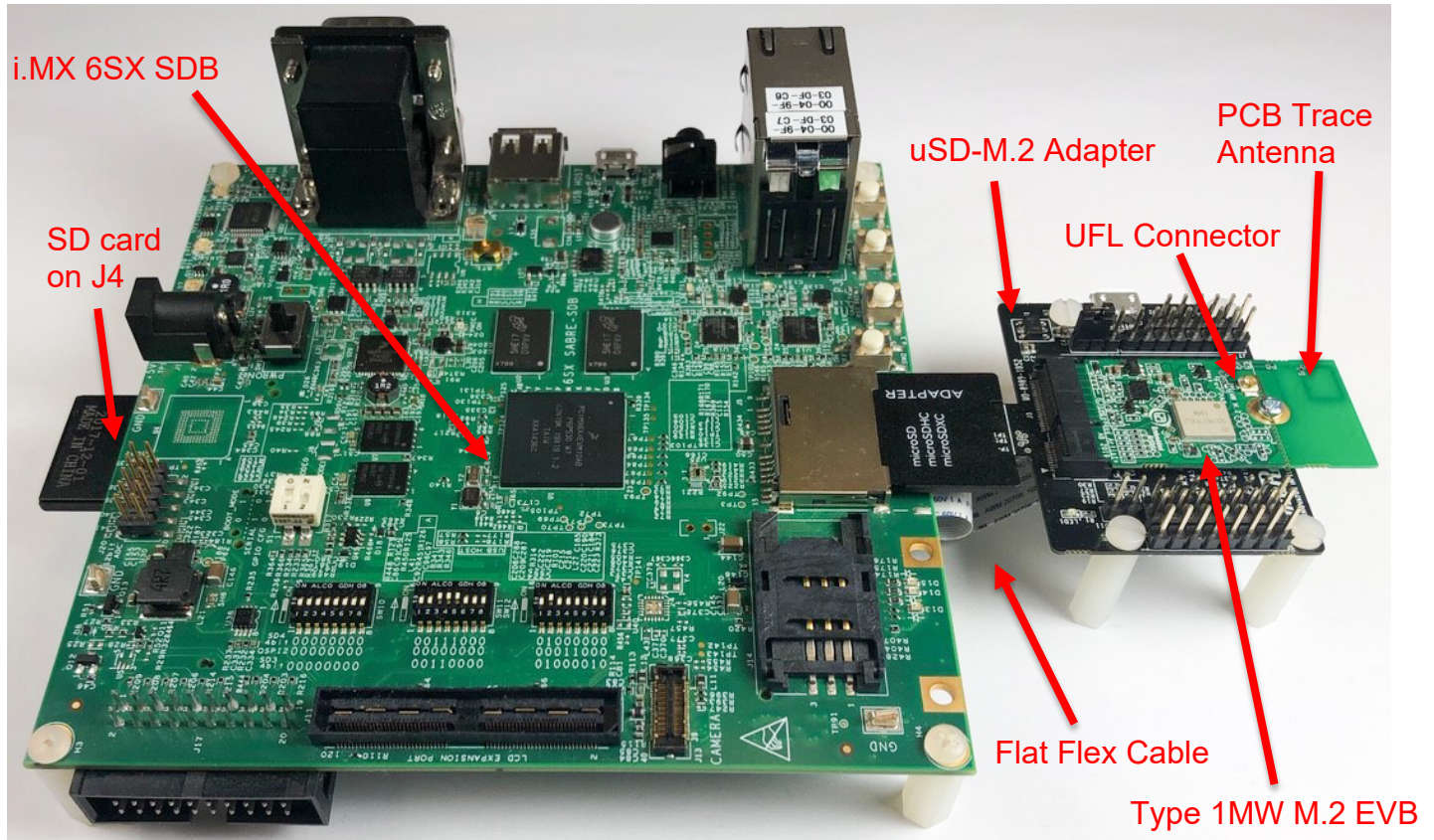
**Figure 28** illustrates how to connect Murata's uSD-M.2 Adapter with Embedded Artists' Wi-Fi/BT M.2 EVB to NXP's i.MX 6SX SDB. Note that the i.MX 6SX SDB WLAN-SDIO VIO is fixed at 3.3V. As such only modules/M.2 EVB's supporting 3.3V VIO will work (i.e. 1DX, 1MW). By referencing NXP's schematic (SPF-27962.pdf) and **Table 18**, **without any hardware modifications**:

- WL\_REG\_ON (enables WLAN core) is driven by uSD-M2 Adapter's power-on-reset circuitry.
- BT\_REG\_ON (enables BT core) is driven by i.MX 6SX NAND\_DATA06 signal.
- BT-UART signals are connected to i.MX 6SX UART5.
- WL\_HOST\_WAKE and BT\_HOST\_WAKE signals are not connected.

Regarding recommended rework to this platform, Murata recommends connecting the WL\_HOST\_WAKE signal by populating R328 with a zero Ohm resistor (or solder blob). This signal is required for OOB IRQ signaling when SDIO in-band interrupts are not desirable. Refer to **Section 5.2.1.1** for details.

**NOTE:** Although not pictured here, Murata ***strongly recommends*** securing the **uSD-M.2 Adapter to NXP i.MX 6SoloX SDB with tape**. Refer to **Section 3.7** for more details.

**Figure 28: i.MX 6SX SDB + uSD-M.2 Adapter + 1MW M.2 EVB**



**Table 18: i.MX 6SX SDB Interconnect with Murata uSD-M.2 Adapter**

Host Pin#	i.MX 6SX SDB (MCIMX6SX SDB) Signal	NXP i.MX 6SX MUX Selection	Wi-Fi/BT M.2 EVB Signal	NOTES
1	ENET1_RX_CLK	MX6SX_PAD_ENET1_RX_CLK__GPIO2_IO_4	WL_REG_ON	Takes WLAN core in and out of reset. Populate R327 on i.MX 6SX platform. Ensure R328 is removed.  <b>NOTE:</b> WL_HOST_WAKE connection is preferred option in this configuration. Adapter drives WL_REG_ON with power-on-reset circuitry. <b>Recommendation:</b> Do Not Connect.
2	ENET1_RX_CLK	MX6SX_PAD_ENET1_RX_CLK__GPIO2_IO_4	WL_HOST_WAKE	Optional signal used for OOB IRQ: out-of-band WLAN interrupt. Populate R328 on i.MX 6SX platform. Ensure R327 is removed. <b>Recommendation:</b> Connect.
6	NAND_DATA06	MX6SX_PAD_NAND_DATA06__GPIO4_IO_10	BT_REG_ON	Takes Bluetooth core in and out of reset. In default configuration, this signal is connected. The i.MX 6SX Signal overrides the Adapter's power-on-reset circuitry.
7	TP60	N/C	BT_HOST_WAKE	Optional signal used for Bluetooth power optimization. Module drives this signal to take host MPU out of sleep mode. This is not connected in default connection.
13	TP61	N/C	BT_DEV_WAKE	Optional signal used for Bluetooth power optimization. Host drives this signal to take Bluetooth core out of sleep mode. This is not connected in default configuration.
16	KEY_ROW3	MX6SX_PAD_KEY_ROW3__UART5_RX	BT_UART_TXD	
17	KEY_COL3	MX6SX_PAD_KEY_COL3__UART5_TX	BT_UART_RXD	
18	KEY_COL2	MX6SX_PAD_KEY_COL2__UART5_RTS_B	BT_UART_RTS	Straight-thru connection on RTS.
19	KEY_ROW2	MX6SX_PAD_KEY_ROW2__UART5_CTS_B	BT_UART_CTS	Straight-thru connection on CTS.

### 5.2.1.1 i.MX 6SX SDB: WL\_HOST\_WAKE Detailed Rework Instructions

To further clarify necessary rework, there are two layout images included. **Figure 29** shows zoomed-in section of NXP's layout file (LAY-27962\_C.brd) where J19 Ribbon Cable Connector is located on i.MX 6SX SDB. It is easier to solder directly onto resistor pads (R328). **Figure 30** shows rework done on the i.MX 6SX SDB platform. Ensure that R327 is not populated (connects to WL\_REG\_ON signal).





## 5.2.2 Connecting to i.MX 6Quad SDB (3.3V WLAN-SDIO VIO Override)

**Figure 31** illustrates how to connect Murata's uSD-M.2 Adapter with Embedded Artists' Wi-Fi/BT M.2 EVB to NXP's i.MX 6Quad SDB. Note that the i.MX 6Quad SDB WLAN-SDIO VIO is fixed at 3.3V. As such only modules/M.2 EVB's supporting 3.3V VIO will work (i.e. 1DX, 1MW). Without modification, the Wi-Fi/BT M.2 EVB (with Adapter) will be inverted. One workaround is using taller standoffs for the i.MX 6Quad SDB and flip main board upside down as pictured.

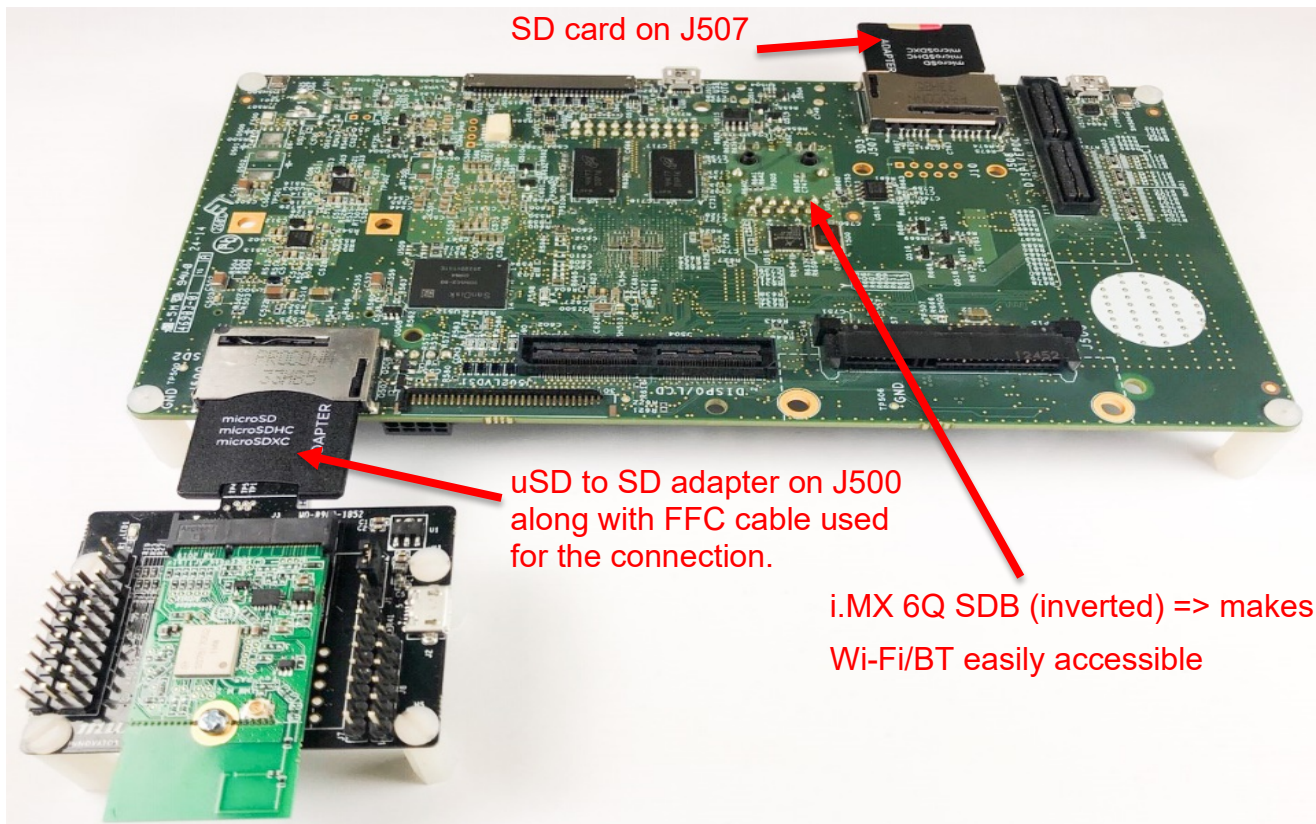
The NXP i.MX 6Quad SDB requires rework to connect the BT-UART and WLAN/BT control signals necessary for Murata module to operate correctly. Page 15 of the [NXP schematic](#) (SPF-27516\_C6.pdf) correctly captures the necessary rework to be done. **Repeated here:**

**NOTE:** To use J13, populate resistors R209 - R213 and depopulate the SPI NOR FLASH U14. Resistors R214 and R215 should not be populated because both UART outputs (TXDs) have been crossed together and both UART inputs (RXDs) have been crossed together. To make the UART work correctly, solder a jumper wire from R215 pad 1 to R214 pad 2 and from R215 pad 2 to R214 pad 1.

**Table 19** summarizes the ribbon cable connections, mapping the i.MX 6Quad SDB signals (Refer to the [NXP Schematic](#) / SPF-27516\_C6.pdf) to the Wi-Fi/BT M.2 EVB signals. It also includes the necessary MUX selection on the NXP i.MX 6Quad SDB Platform.

**NOTE:** Although not pictured here, Murata **strongly recommends** securing the **uSD-M.2 Adapter to NXP i.MX 6Quad SDB with tape**. Refer to **Section 3.7** for more details.

**Figure 31: i.MX 6Quad SDB + uSD-M.2 Adapter + 1MW M.2 EVB**



**Table 19: i.MX 6Quad SDB Interconnect with Murata uSD-M.2 Adapter**

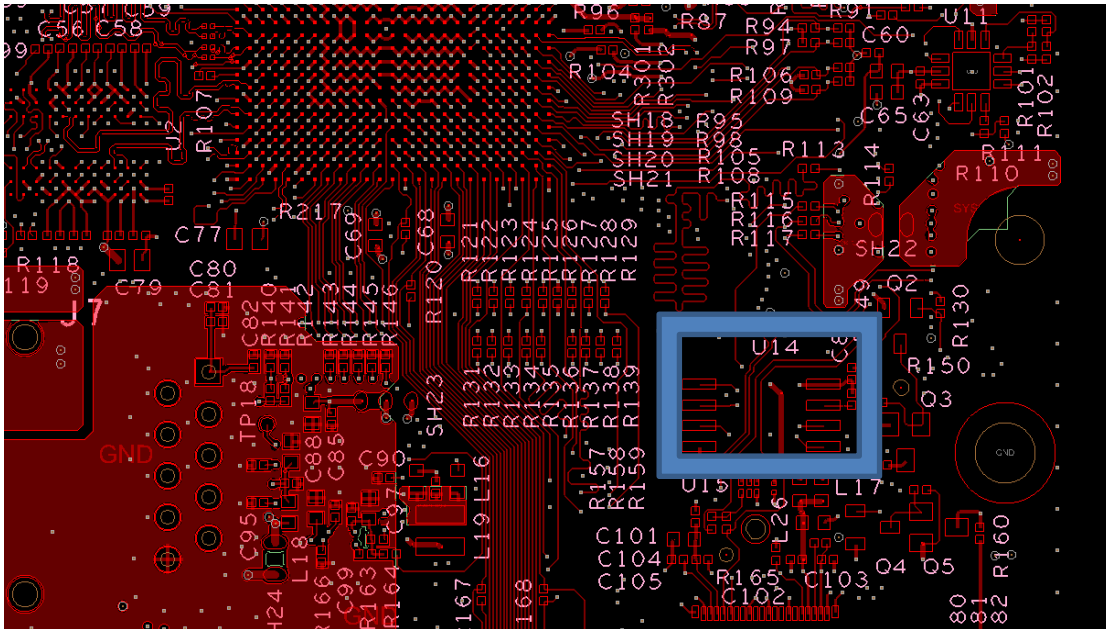
Host Pin#	i.MX 6Quad SDB (MCIMX6Q-SDB) Signal	NXP i.MX 6Quad MUX Selection	Wi-Fi/BT M.2 EVB Signal	NOTES
1	KEY_ROW0/ CSPI1_MOSI/ SPINOR_MOSI	MX6QDL_PAD_KEY_ROW0__GPIO4_IO07	WL_REG_ON	Takes WLAN core in and out of reset. R586 must be populated in default position. (Option A).
2	KEY_COL0/ CSPI1_CLK/ SPINOR_CLK	MX6QDL_PAD_KEY_COL0__GPIO4_IO06	WL_HOST_WAKE	Optional signal used for OOB IRQ: out-of-band interrupt. R590 must be populated in default position (Option A).
6	KEY_ROW6	MX6QDL_PAD_GPIO_2__KEY_ROW6	BT_REG_ON	Takes Bluetooth core in and out of reset. <b>NOTE:</b> GPIO (1,2).
7	TP29	N/C	BT_HOST_WAKE	Optional signal used for Bluetooth power optimization. Module drives this signal to take host MPU out of sleep mode.
13	TP30	N/C	BT_DEV_WAKE	Optional signal used for Bluetooth power optimization. Host drives this signal to take Bluetooth core out of sleep mode.
16	KEY_COL1/ CSPI1_MISO/ SPINOR_MISO	MX6QDL_PAD_KEY_COL1__UART5_TX_DATA	BT_UART_RXD	<b>NOTE:</b> special rework required to connect UART5 TX to Murata BT RX. Also, R583 must be populated in default position (Option A).
17	KEY_ROW4	MX6QDL_PAD_KEY_ROW4__UART5_CTS_B	BT_UART_CTS	Straight-thru connection on CTS.
18	KEY_ROW1/ CSPI1_CS0/ SPINOR_CS0	MX6QDL_PAD_KEY_ROW1__UART5_RX_DATA	BT_UART_TXD	<b>NOTE:</b> special rework required to connect UART5 RX to Murata BT TX. Also, R584 must be populated in default position (Option A).
19	KEY_COL4	MX6QDL_PAD_KEY_COL4__UART5_RTS_B	BT_UART_RTS	Straight-thru connection on RTS.

### 5.2.2.1 i.MX 6Quad SDB: Detailed Rework Instructions

- 1) Remove U14 (SPI NOR Flash) pictured in the layout **Figure 32**. U14 is framed by blue box. It is to the bottom right of i.MX 6 MPU.
- 2) Note orientation of J13 Connector (Pin #1 on bottom left) in **Figure 33**. Populate resistors R209 (Pin #6/KEY\_ROW6/BT\_REG\_ON: blue), R210 (Pin #17/KEY\_ROW4/BT\_UART\_CTS: orange) and R211 (Pin #19/KEY\_COL4/BT\_UART\_RTS: green).

- Referring to **Figure 34**, populate resistors R212 (Pin#1/KEY\_ROW0/WL\_REG\_ON: blue) and R213 (Pin#2/KEY\_COL0/WL\_HOST\_WAKE: orange). Now we must swap the TX/RX lines so “MPU TX <-> BT RX” and “MPU RX <-> BT TX”. R214/Pad#1 connects to R215/Pad#2; and R214/Pad#2 connects to R215/Pad#1. One connection can be crossed by placing resistor on 60-degree angle (approx.) and the other connection made with blue-wire (yellow) as shown.

**Figure 32: i.MX 6Quad SDB - remove U14 (SPI NOR Flash)**



**Figure 33: i.MX 6Quad SDB - BT\_REG\_ON/BT\_UART\_CTS/BT\_UART\_RTS**

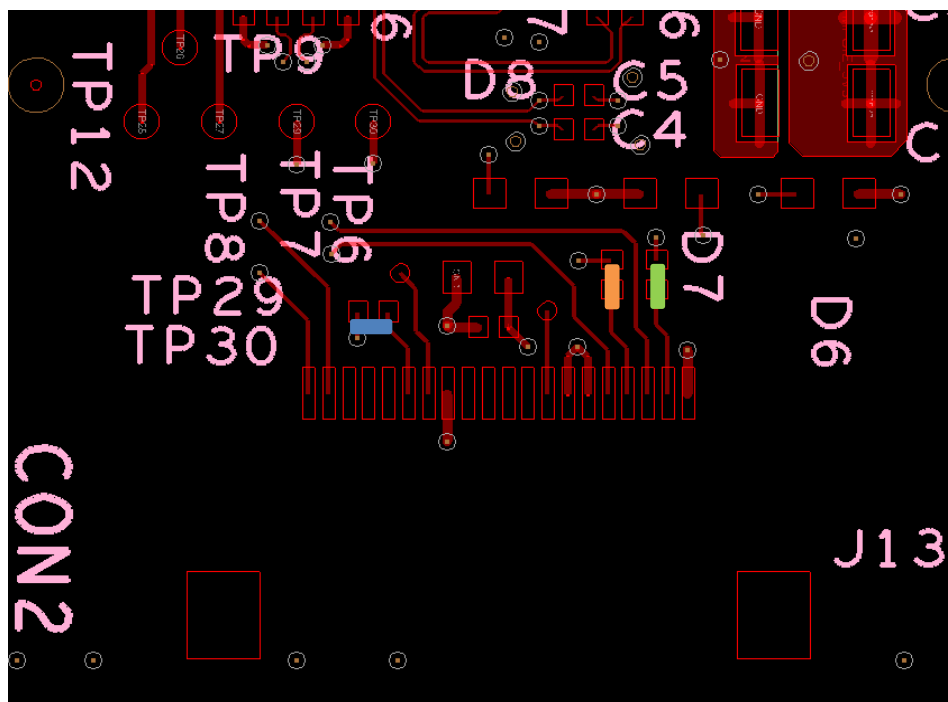
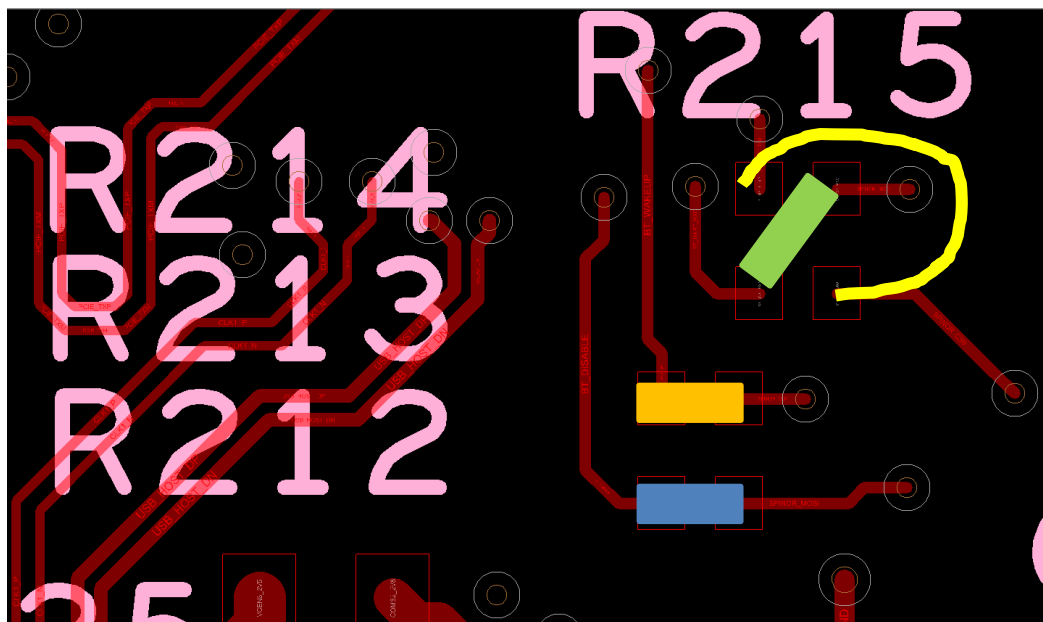


Figure 34: i.MX 6QuadSDB - WL\_REG\_ON/WL\_HOST\_WAKE/BT\_UART\_TX/BT\_UART\_RX



### 5.2.3 Connecting to iMX 6UL EVK or i.MX 6ULL EVK (1.8V WLAN-SDIO VIO)

**Figure 35** illustrates how to connect Murata's uSD-M.2 Adapter with Embedded Artists' Wi-Fi/BT M.2 EVB to NXP's i.MX 6UL(L) EVK. Note that the i.MX 6UL(L) EVK WLAN-SDIO VIO can be configured for either **1.8V (preferred)** or 3.3V. As such all WLAN-SDIO Wi-Fi/BT M.2 EVB's are supported. By referencing NXP's schematic (SPF-28616\_C2.pdf) and **Table 20**, **without any hardware modifications**:

- WL\_REG\_ON (enables WLAN core) is driven by i.MX 6UL(L) SNVS\_TAMPER1 signal.
- BT\_REG\_ON (enables BT core) is driven by i.MX 6UL(L) BT\_nPWD signal.
- BT-UART signals are connected to i.MX 6UL(L) UART2.
- WL\_HOST\_WAKE and BT\_HOST\_WAKE signals are not connected.

Regarding recommended rework to this platform, Murata recommends connecting the WL\_HOST\_WAKE signal by removing R1633 and populating R1704 with a zero Ohm resistor (or solder blob). This signal is required for OOB IRQ signaling when SDIO in-band interrupts are not desirable. Refer to **Section 5.2.3.1** for details.

**NOTE:** Although not pictured here, Murata ***strongly recommends*** securing the **uSD-M.2 Adapter to NXP i.MX 6UL(L) EVK with tape**. Refer to **Section 3.7** for more details.



**Figure 35: i.MX 6UL(L) EVK + uSD-M.2 + 1LV M.2 EVB**

uSD to SD adapter on J1802 along with FFC cable used for the connection.



**Table 20: Adapter Board Ribbon Cable Connections on i.MX 6UL EVK (Rev C2)**

Host Pin#	i.MX 6UL(L) EVK Signal	NXP i.MX 6UL(L) MUX Selection	Wi-Fi/BT M.2 EVB Signal	NOTES
1	SNVS_TAMPER1/ BT_DISABLE	MX6UL_PAD_SNVS_TAMPER 1__GPIO5_IO01	WL_REG_ON	Takes WLAN core in and out of reset.
2	ENET2_RXER/ ECSPI4_SS0	MX6UL_PAD_ENET2_RX_ER_ _GPIO2_IO15	WL_HOST_WAKE	Optional signal used for OOB IRQ: out-of-band interrupt. On i.MX 6UL, remove R1633 and populate R1704 (disconnects ENET2/U1601).
6	BT_nPWD	N/A	BT_REG_ON	Takes Bluetooth core in and out of reset. BT_nPWD is generated by U2101 using SHIFT_SDI/SHCP/STCP signals.
7	ENET2_TXEN/ ECSPI4_MOSI	MX6UL_PAD_ENET2_TX_EN_ _GPIO2_IO13	BT_HOST_WAKE	Optional signal used for Bluetooth power optimization. Module drives this signal to take host MPU out of sleep mode.
13	ENET2_TXD1/ ECSPI4_SCLK	MX6UL_PAD_ENET2_TX_DAT A1__GPIO2_IO13	BT_DEV_WAKE	Optional signal used for Bluetooth power optimization.
16	UART2_TXD	MX6UL_PAD_UART2_TX_DAT A__UART2_DCE_TX	BT_UART_RXD	
17	UART2_CTS_BB	MX6UL_PAD_UART2_CTS_B_ _UART2_DCE_CTS	BT_UART_CTS	Straight-thru connection on CTS.
18	UART2_RXD	MX6UL_PAD_UART2_RX_DA TA__UART2_DCE_RX	BT_UART_TXD	
19	UART2_RTS_BB	MX6UL_PAD_UART2_RTS_B_ _UART2_DCE_RTS	BT_UART_RTS	Straight-thru connection on RTS.



### 6.1.1 Connecting Wi-Fi/BT on i.MX 8MQuad EVK

The user can configure for either the onboard Type 1CX module or use the M.2 connector. As shown in **Figure 37**, the i.MX 8MQuad EVK provides a secondary Wi-Fi/BT solution on the underside via a M.2 connector. Currently the only supported M.2 EVB's are Type 1CX, 1XA, and 1YM. Refer to NXP MCIMX8M-EVKB schematic SPF-38820\_A1.pdf (page 17) for details on the interconnect. No rework is required to interface to the Embedded Artists' Wi-Fi/BT M.2 EVB's (WLAN-PCIe/BT-UART).

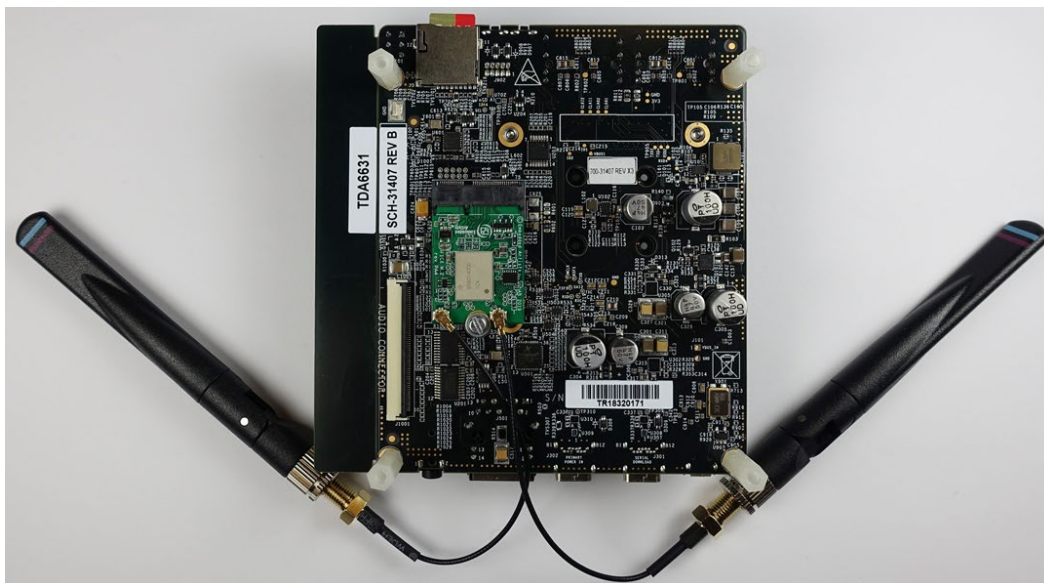
**Figure 37: i.MX 8MQuad EVK with Type 1CX (bottom view)**



### 6.1.2 Connecting Wi-Fi/BT on i.MX 8M Mini/Nano EVK's

Both 8M Mini EVK's (8MMINILPD4-EVK and 8MMINID4-EVK) have a WLAN-PCIe M.2 connector on the baseboard – **with no connection for Bluetooth-UART**. See **Figure 39** for upside-down EVK view showing M.2 connector (current supported M.2 EVB's are Type 1CX, 1XA, and 1YM). Refer to NXP EVK schematics (SPF-31407\_C2.pdf and SPF-31407\_C3.pdf) for more details on interconnect.

**Figure 38: i.MX 8M Mini/Nano EVK with Type 1CX (bottom view)**

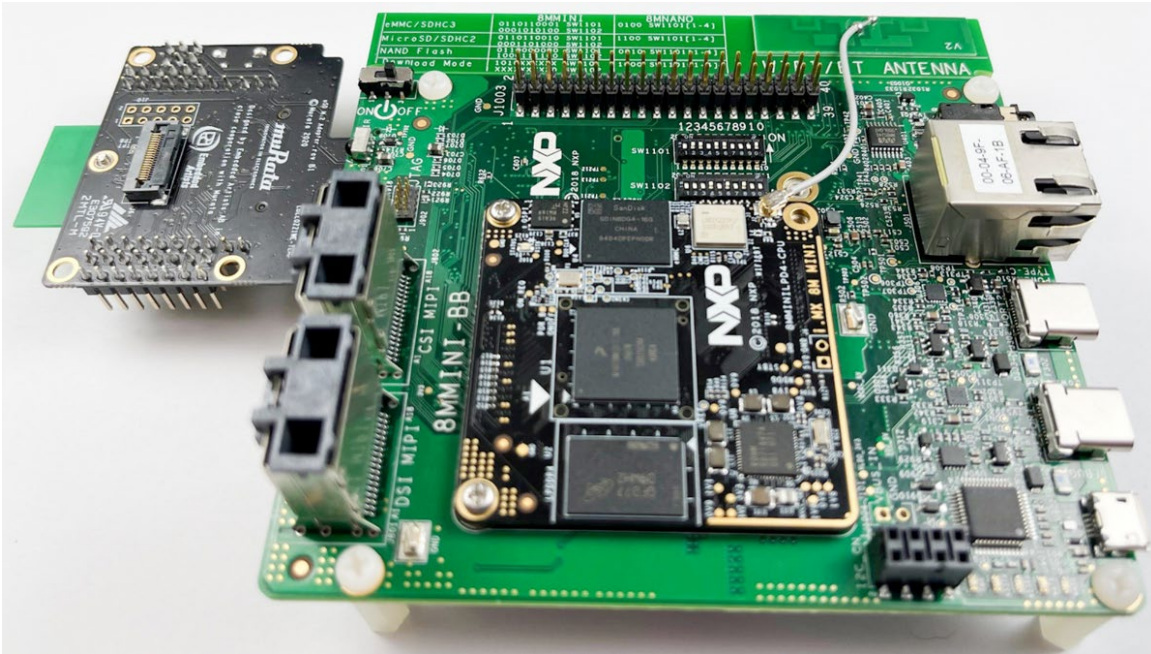




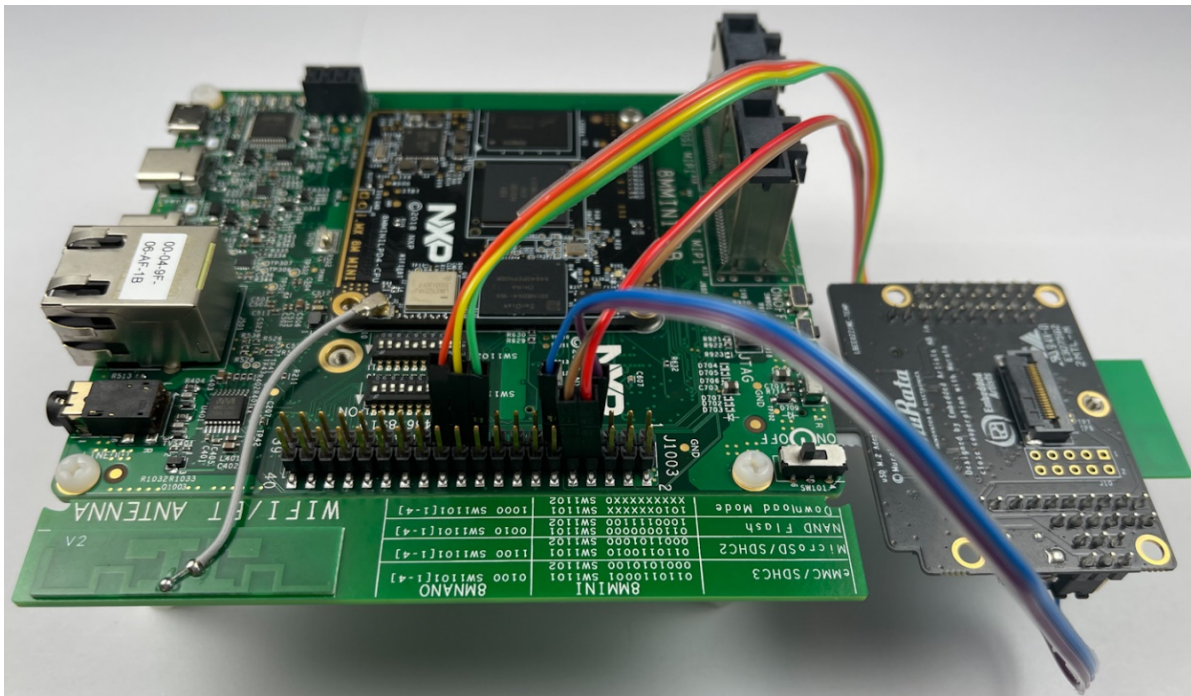
## 6.2 uSD-M.2 Adapter on i.MX 8M Mini/Nano EVK

There are two configurations for adding uSD-M.2 Adapter interconnect to i.MX 8M Mini/Nano EVK: WLAN/Bluetooth (**Figure 40**) and WLAN (**Figure 39**). **The WLAN configuration is quite simple:** just insert inverted uSD-M.2 Adapter with Wi-Fi/M.2 EVB attached into microSD slot. The WLAN/BT configuration requires additional jumper cables for Bluetooth-UART and WLAN/BT control signals.

**Figure 39: i.MX 8M Mini/Nano EVK with uSD-M.2 Adapter (WLAN Only)**



**Figure 40: i.MX 8M Mini/Nano EVK with uSD-M.2 Adapter (WLAN/Bluetooth)**





The only i.MX 8M Mini/Nano EVK's supported **have eMMC onboard**: 8MMINILPD4-EVK and 8MNANOD4-EVK. For Bluetooth-UART and additional WLAN/BT control (WL\_REG\_ON, BT\_REG\_ON, WL\_HOST\_WAKE) signals interconnect, there are additional 6~7" F/F Jumper cables (with optional offsets) that are needed as referenced below. However, customers only needing WLAN-SDIO connectivity can insert uSD-M.2 Adapter (with Wi-Fi/BT M.2). For full Wi-Fi/BT configuration (Bluetooth-UART and WLAN/BT control lines), connect seven (7) jumper wires from the uSD-M.2 adapter to the i.MX 8M Mini/Nano EVK per **Table 21**. Refer to **Figure 41**, **Figure 42**, **Figure 43**, and **Figure 44** for additional details: colored wires are shown in these figures so users may more easily follow along. **Note there is a clearance issue** when attaching "normal" jumper wires. **Murata recommends two different approaches**:

- a. Use low-profile jumper wires (like Digi-Key part number 1988-1178-ND) which can be bent at right-angles – see **Figure 45**, and **Figure 46**. The connectors on uSD-M.2 Adapter need to be bent at 45° angle so that there is no interference with default NXP i.MX standoffs.

**OR:**

- b. Use "normal" jumper wires (like Digi-Key part number 1568-1513-ND) with additional standoffs (like Digi-Key part number RPC3570-ND). Referring to **Figure 47**, the additional standoffs (which screw into existing NXP i.MX EVK standoffs) add necessary height to platform so there is no interference with jumper wire connectors.

**For WLAN-only, no jumper cables need to be connected.** For customers only needing to evaluate Wi-Fi (**Figure 40**), this provides a faster interconnect option. There is a Power-On-Reset (POR) circuit (on uSD-M.2 Adapter) for driving WL\_REG\_ON high – signal which enables WLAN core, thereby only requiring host interface to drive the WLAN-SDIO interface (SDIO in-band interrupts only).

**NOTE:** Although not pictured here, Murata **strongly recommends** securing the **uSD-M.2 Adapter to NXP i.MX 8M Mini/Nano EVK's with tape**. Refer to **Section 3.7** for more details.

**Table 21: Adapter Board Connections on i.MX 8M Mini/Nano EVK**

Signal Name	uSD-M.2 Adapter Header/Pin	i.MX 8M Mini/Nano EVK J1003 Pin	i.MX 8M Mini/Nano EVK Signal
BT_UART_TX	J9 / Pin 1	10	UART3_RXD
BT_UART_RX	J9 / Pin 2	8	UART3_TXD
WL_REG_ON	J9 / Pin 3	19	ECSPI2_MOSI
BT_REG_ON	J9 / Pin 4	21	ECSPI2_MISO
WL_HOST_WAKE	J9 / Pin 5	23	ECSPI2_SCLK
BT_UART_RTS	J8 / Pin 3	11	UART3_RTS
BT_UART_CTS	J8 / Pin 4	7	UART3_CTS

Figure 41: Cable connections on i.MX 8M Mini/Nano EVK (Even Number Connector View)

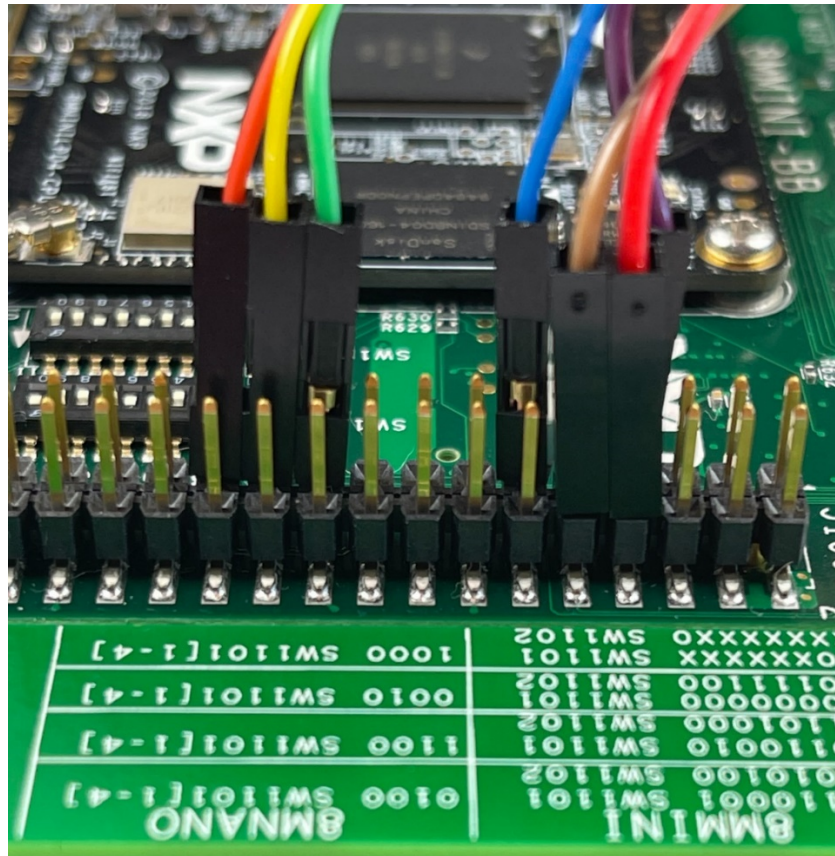
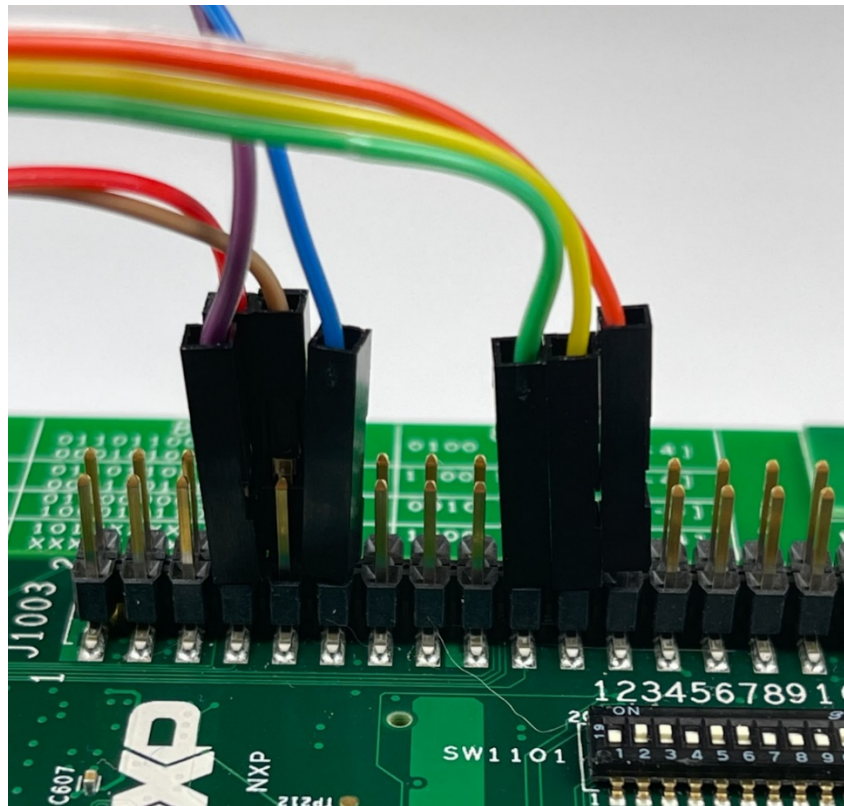
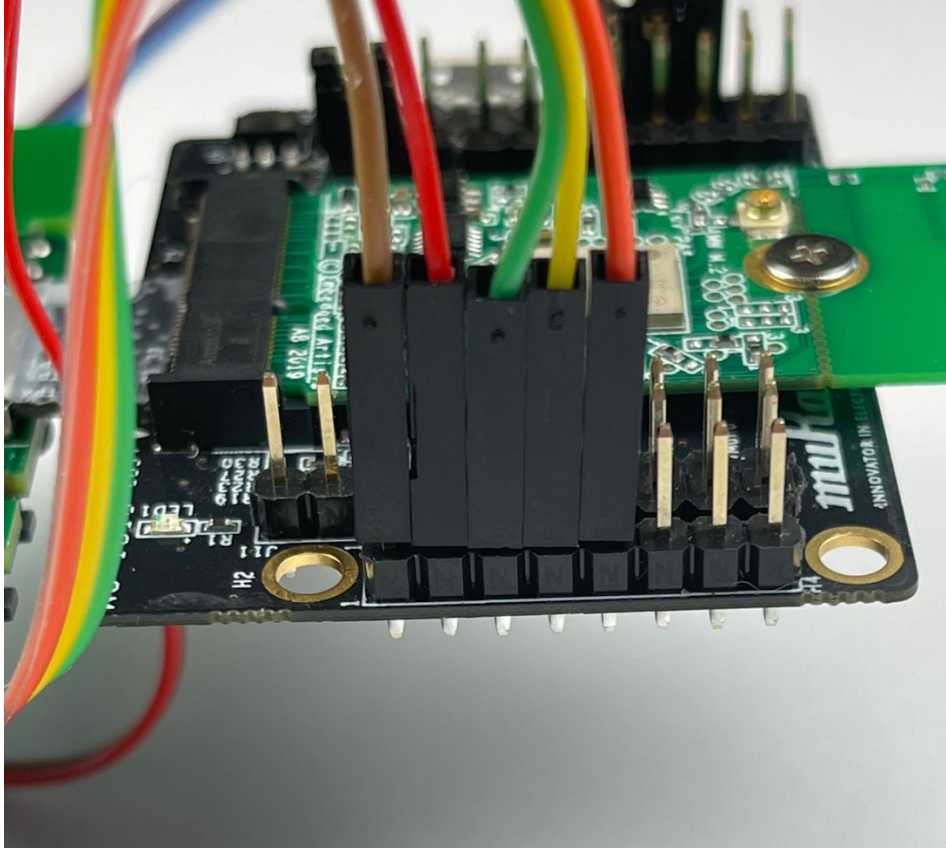


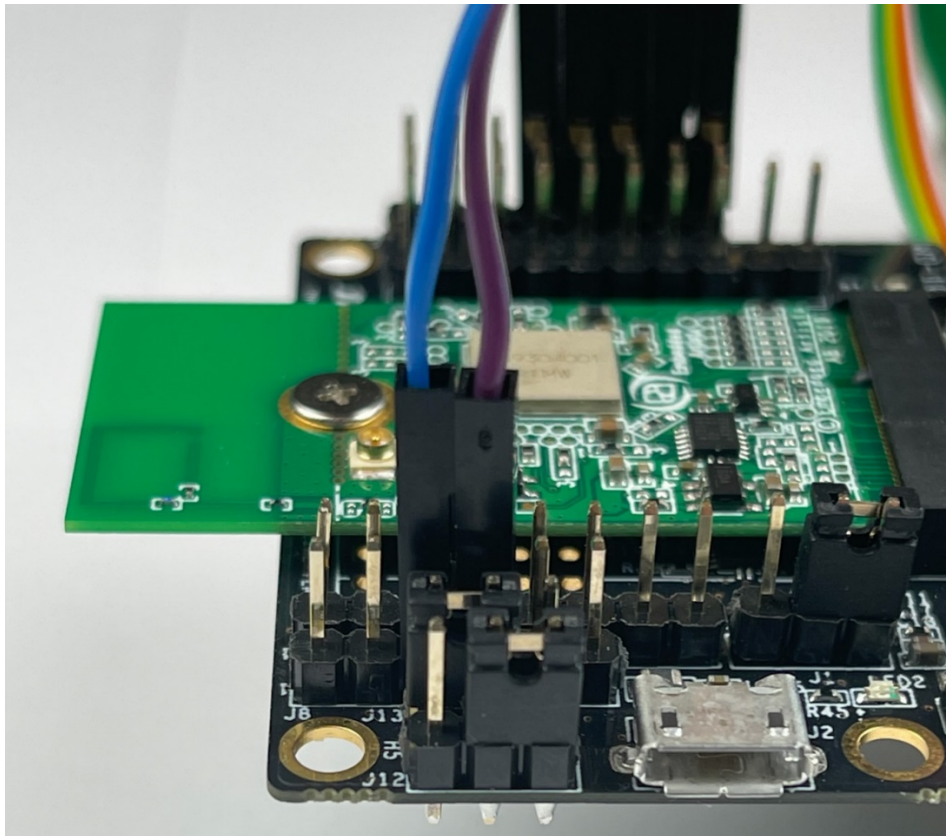
Figure 42: Cable connections on i.MX 8M Mini/Nano EVK (Odd Number Connector View)



**Figure 43: Cable connections on uSD-M.2 Adapter (J9 Header)**



**Figure 44: Cable connections on uSD-M.2 Adapter (J8 Header)**





**Figure 45: Low-Profile Jumper Wires (Digi-Key part number 1988-1178-ND)**



**Figure 46: NXP i.MX EVK with Low-Profile Jumper Wires**

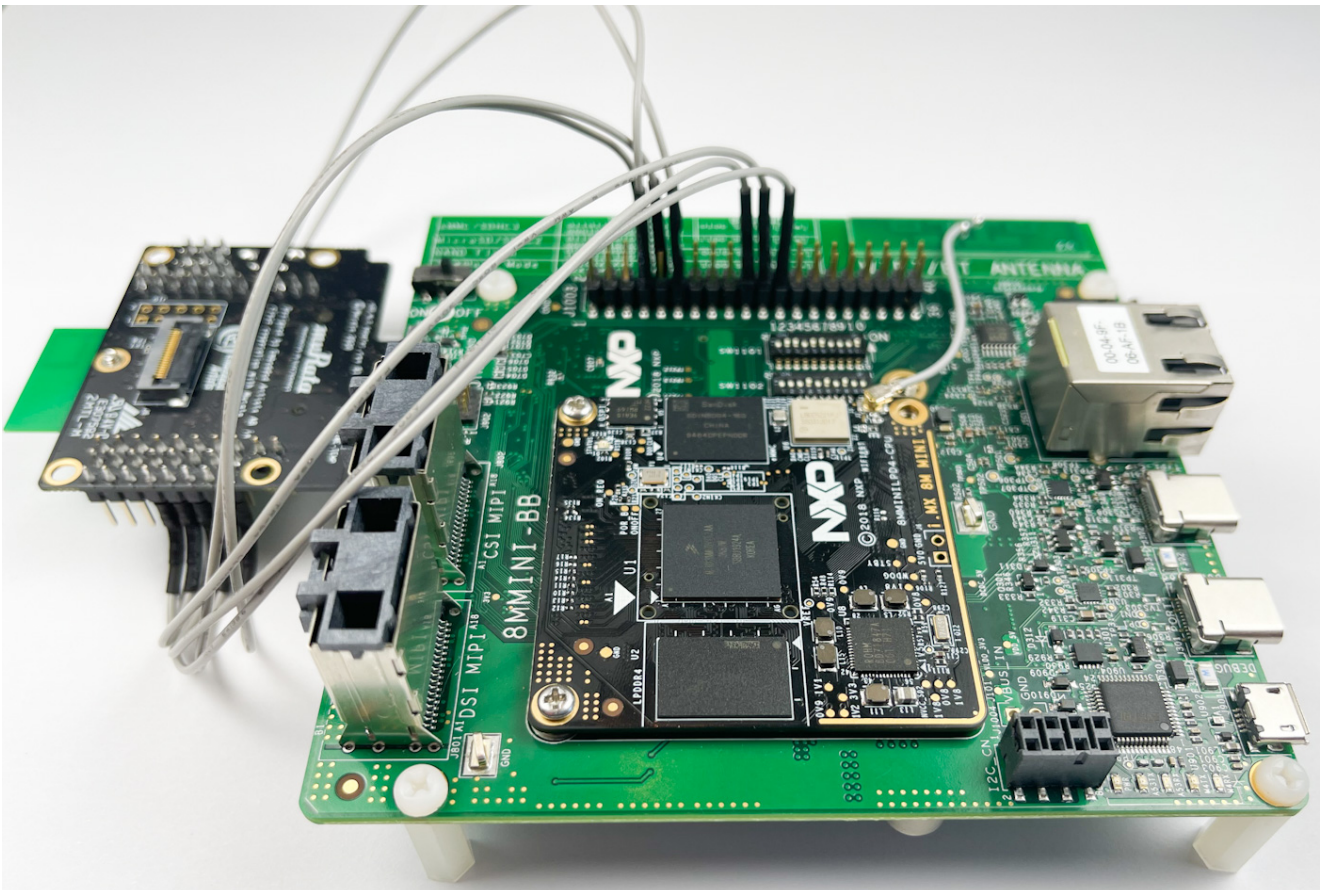
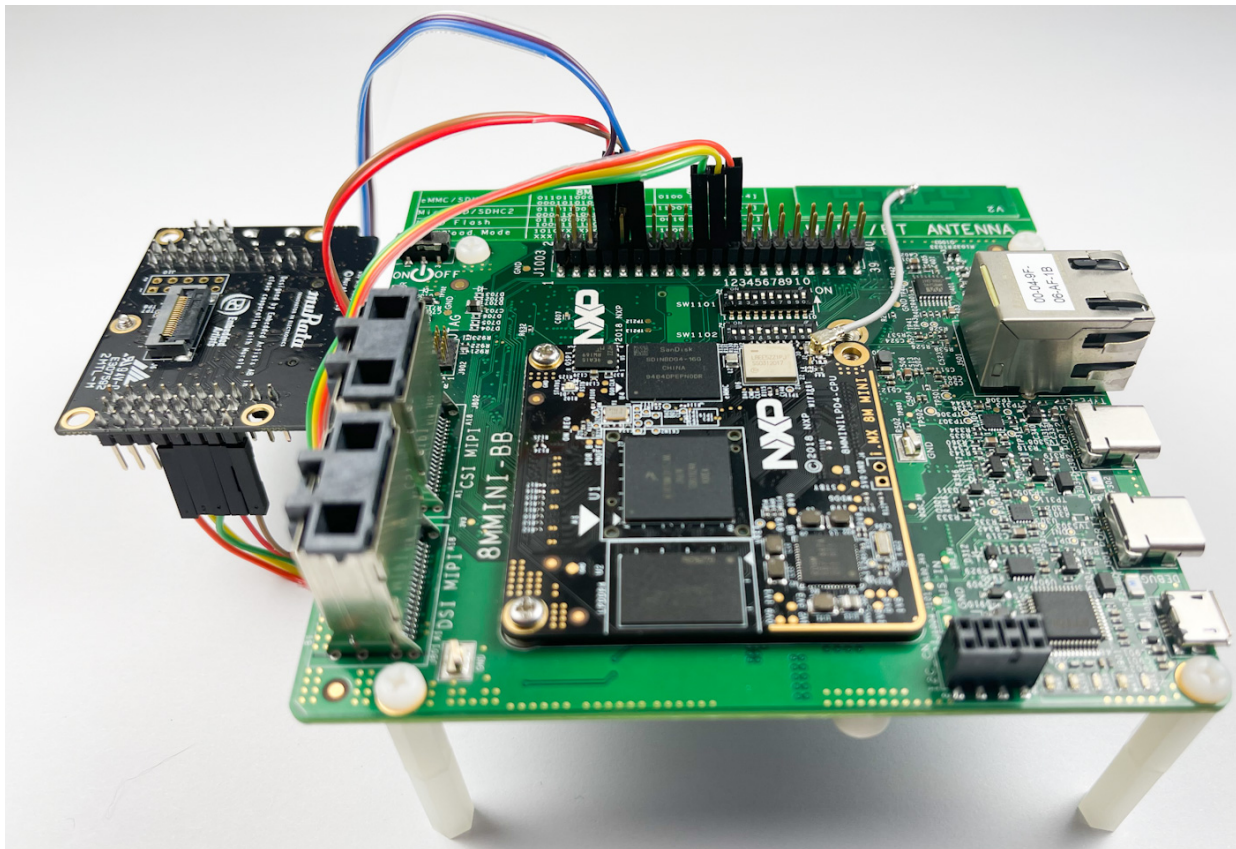




Figure 47: Additional Hex Standoff (Digi-Key part number RPC3570-ND)



## 7 Type 1YM M.2 EVB WLAN/Bluetooth Bus Interface Configuration

The Type 1YM module supports more than one interface configuration. The Embedded Artists' Wi-Fi/BT M.2 EVB (EAR00370) is default configured (via resistor strapping options) for WLAN-PCIe/BT-UART. However, the following **configuration options should be considered**:

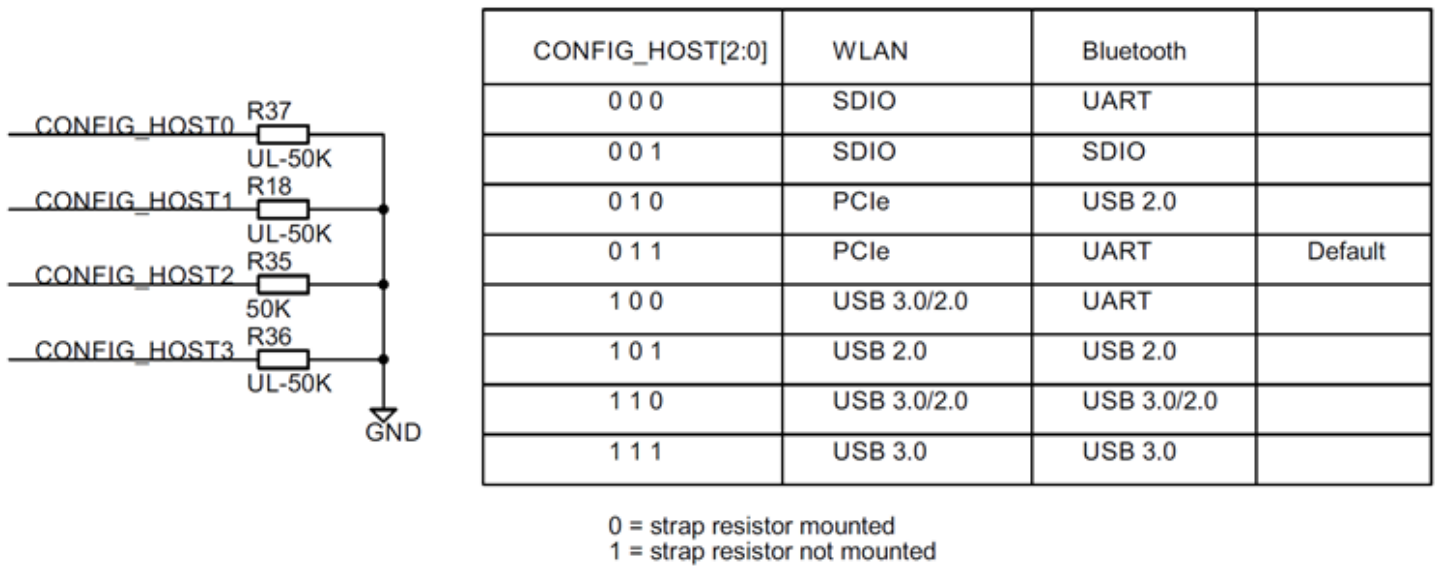
- **WLAN-PCIe/BT-UART (1YM)**: default configuration. This mode is used when plugging the M.2 EVB directly into NXP M.2 connector. Supports both 1.8V and 3.3V VIO.
- **WLAN-SDIO/BT-UART (1YM-SDIO)**: see **Figure 50** for resistor strapping option – two 50K Ohm resistors need to be added (to right of default one). **Supports only 1.8V VIO**.
- **WLAN-SDIO/BT-SDIO (1YM-SDIO\*)**: this configuration is intended for evaluation only. See **Figure 49** for resistor strapping option – one 50K Ohm resistor needs to be added (to right of default one). **Supports only 1.8V VIO**.

Regarding the actual configuration of the Embedded Artists Type 1YM M.2 Module (EVB), the customer needs to perform some minor rework to modify the resistor strapping options – if not going with WLAN-PCIe/BT-UART default. The necessary rework (addition of 50K Ohm 0201 resistors) is

easily illustrated in **Figure 48** which shows both relevant schematic capture and configuration-strapping table. The “CONFIG HOST” resistors are (in order left to right as pictured):

- CONFIG\_HOST3
- CONFIG\_HOST2 (default resistor already installed for WLAN-PCIe/BT-UART)
- CONFIG\_HOST1 (install this resistor only for WLAN-SDIO/BT-SDIO option)
- CONFIG\_HOST0 (install this resistor in addition to #1 for WLAN-SDIO/BT-UART option)

**Figure 48: Type 1YM M.2 EVB Configuration Strapping Options**



**Figure 49: Type 1YM M.2 Configured for WLAN-SDIO/BT-SDIO (1YM-SDIO\*)**

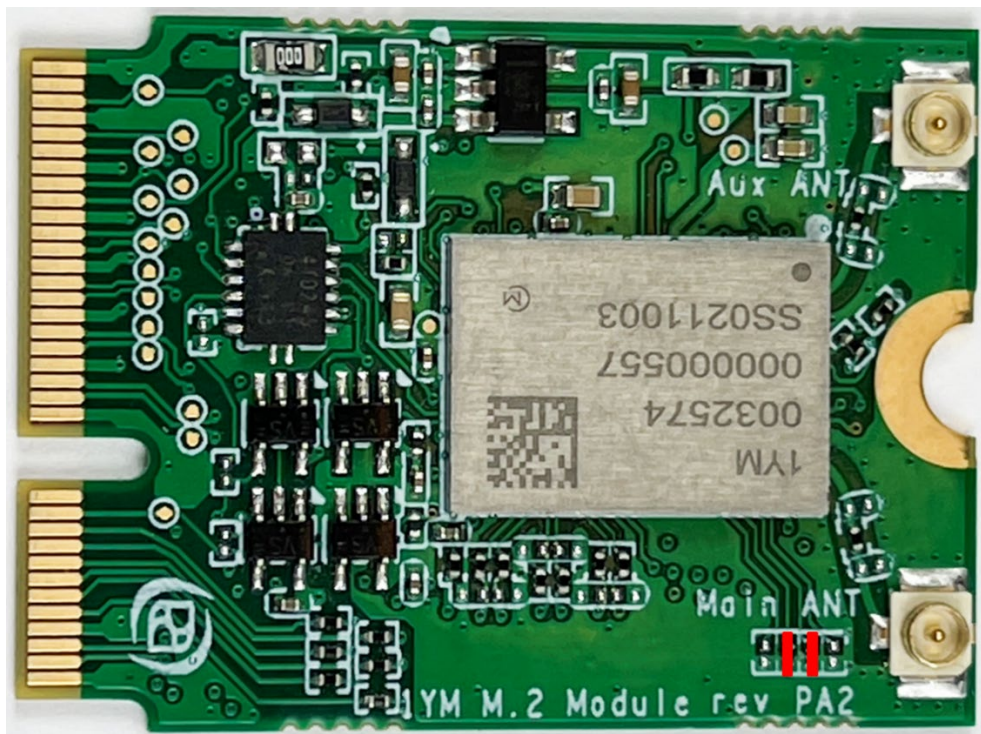
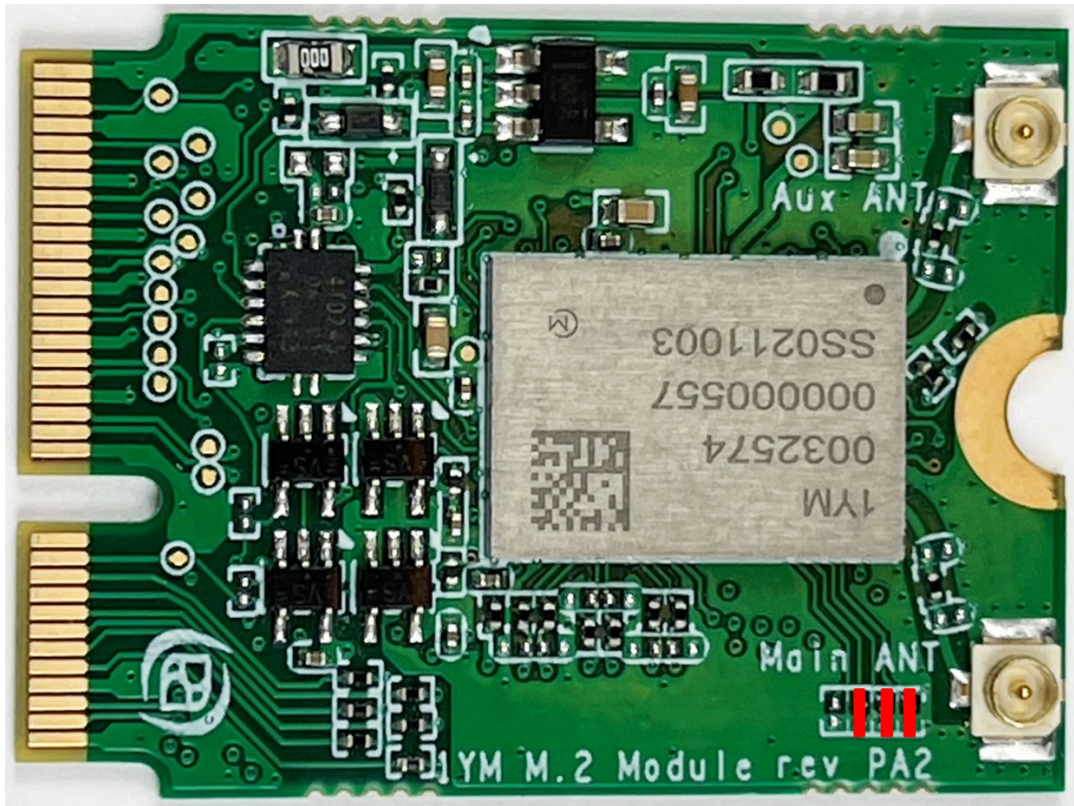




Figure 50: Type 1YM M.2 Configured for WLAN-SDIO/BT-UART (1YM-SDIO)



## 8 Appendix: HOST/M.2 VDDIO Voltage Settings (Rev B1 vs. Rev A)

**Table 22** summarizes J13/J12 jumper settings for **Rev B1 of the uSD-M.2 Adapter**, indicating what Host and M.2 VIO voltages are being configured. The default configuration for J13/J12 (Host/M.2 VIO) is setting both jumpers in 1-2 position. This configures the M.2 VIO for WLAN-SDIO (and optional PCM) at 1.8 volts. The BT-UART and select WLAN-BT CTRL signals are level shifted from Host 3.3V to M.2 1.8V as necessary to adhere to the M.2 specification.

The “**3.3V Override**” configuration is used when the Host MPU/MCU platform **can only support 3.3V VIO signaling on WLAN-SDIO interface**. This override feature **only** works with M.2 EVB’s that support 3.3V VIO signaling (currently 1DX and 1MW). The J13/J12 settings for this override mode are 1-2/2-3 respectively as shown in the block diagram.

Revision A of the uSD-M.2 Adapter **does not support level shifting** on BT-UART nor on select WLAN/BT CTRL signals. The limitation with the Rev A adapter is that the Host and/or M.2 interface may over-drive certain pins at 3.3V VIO which are configured for 1.8V input. This limitation has been **corrected** with Revision B1. Note the Rev A of the uSD-M.2 Adapter “3.3V Override” configuration is configured by connecting Jumper J12.

**Figure 51** and **Figure 52** shows comparison between jumper J12 setting in between rev A and rev B1 adapter.

**Table 22: HOST/M.2 IO Voltage Levels Settings**

Host IO Voltage	M.2 IO Voltage	SDIO VIO	UART/Ctrl signal voltage	All other signals voltage	Notes and Explanation
3.3V (J13 in 1-2 pos)	1.8V (J12 in 1-2 pos)	1.8V	3.3V	1.8V	Voltage levels to M.2 module according to standard. 3..3V on UART and main control signals, but some direct M.2 signals have 1.8V voltage level.
3.3V (J13 in 1-2 pos)	3.3V (J12 in 2-3 pos)	3.3V	3.3V	3.3V	"3.3V override mode". 3.3V on SDIO and all GPIOs. Note that all M.2 modules do not support 3.3V override mode.
1.8V (J13 in 2-3 pos)	1.8V (J12 in 1-2 pos)	1.8V	1.8V	1.8V	Voltage levels to M.2 module according to standard. Host processor has 1.8V IO voltage.
1.8V (J13 in 2-3 pos)	3.3V (J12 in 2-3 pos)				Do not select. Not a valid combination.

**Figure 51: Rev A (left) and Rev B1 (right) Adapter configured for default 1.8V VIO**

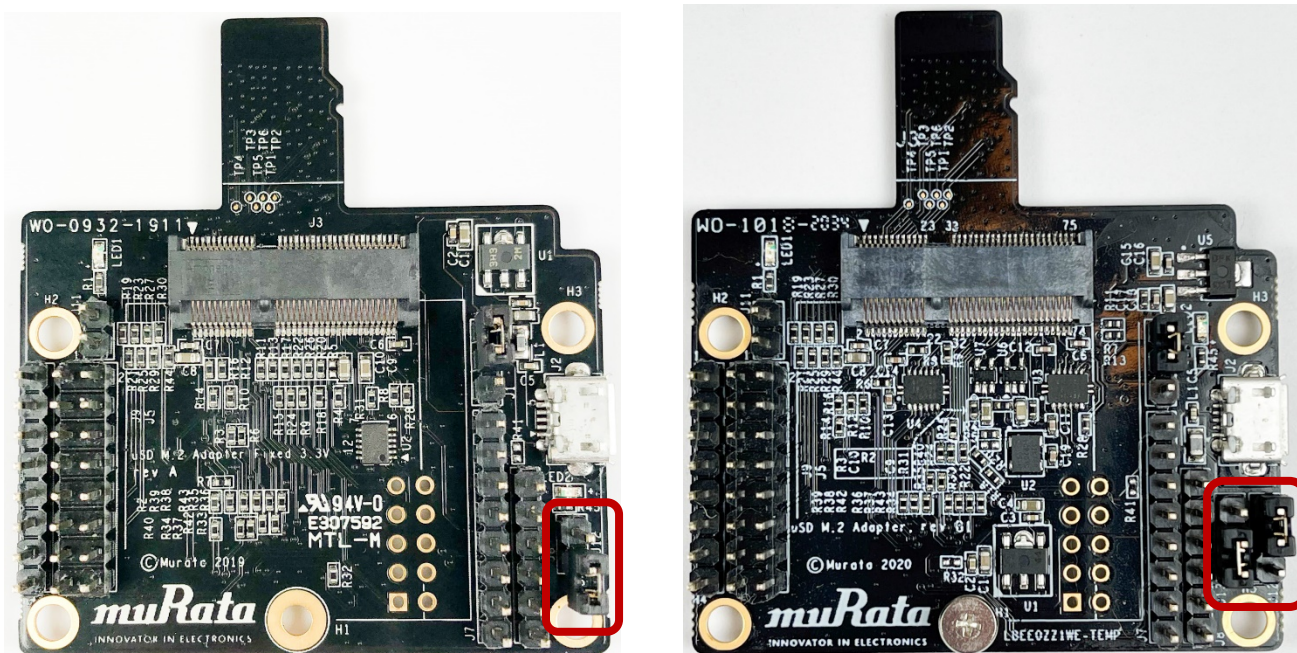
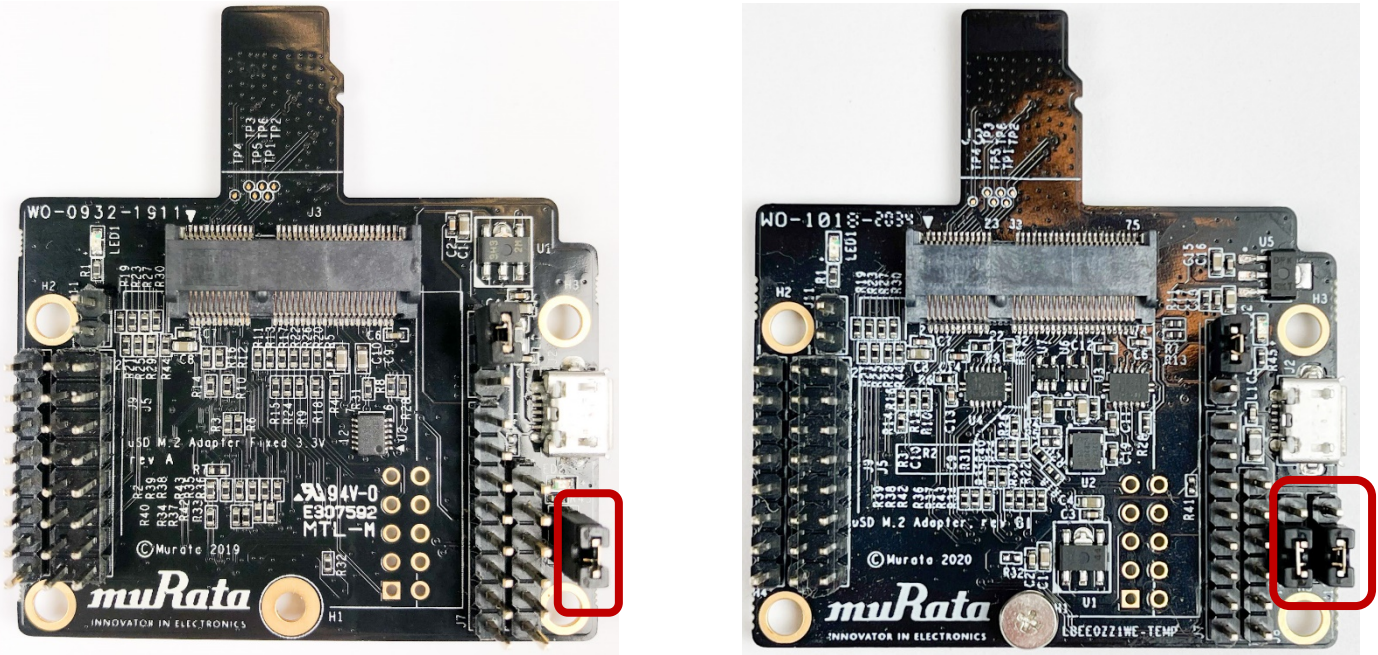




Figure 52: Rev A (left) and Rev B1 (right) Adapter configured for default 3.3V VIO Override



**To configure 1.8V VIO (default) mode (blue LED2 is not illuminated):**

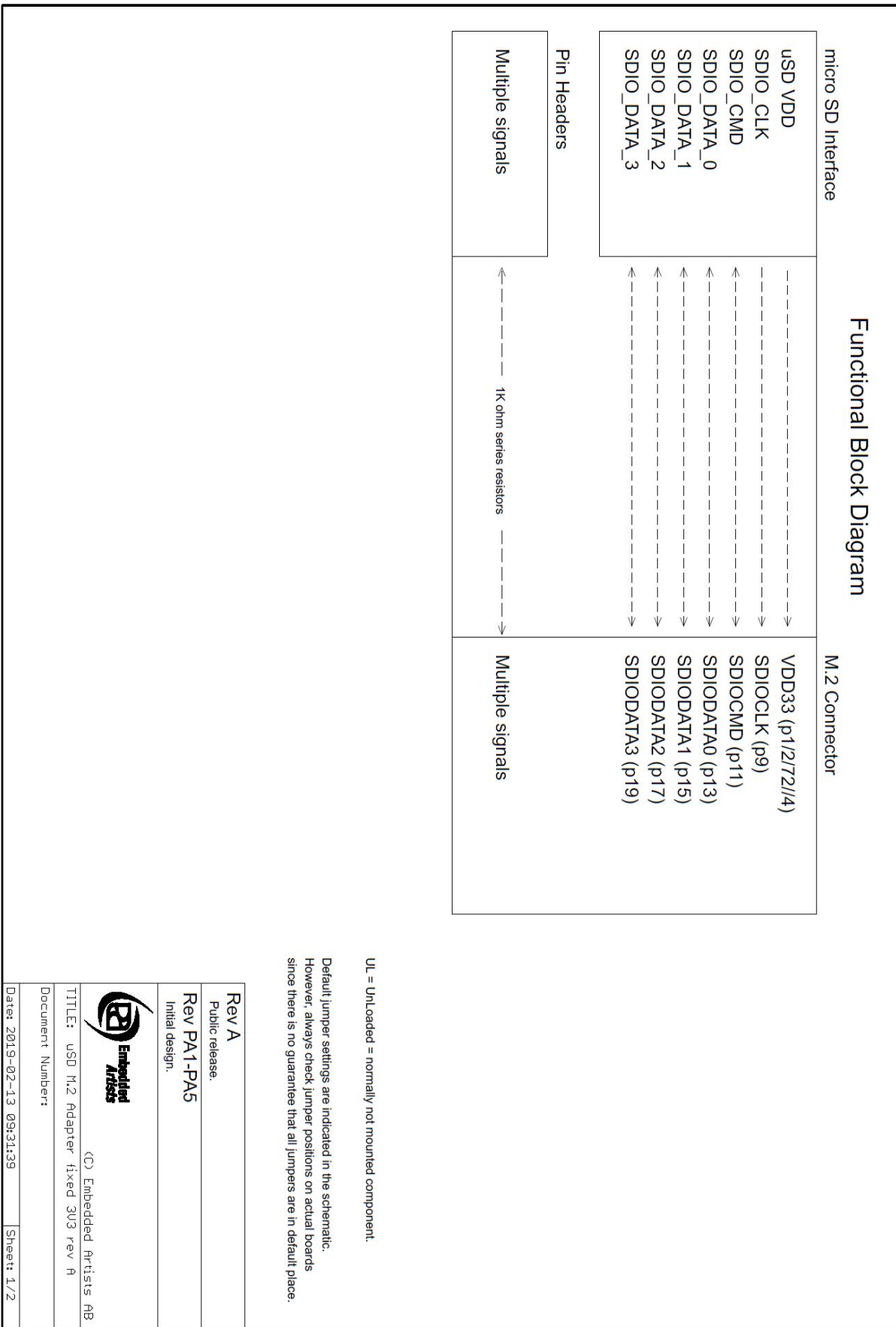
- For Rev A uSD-M.2 Adapter: Jumper J12 is removed/open.
- For Rev B1 uSD-M.2 Adapter:
  - Jumper J12 is installed in 1-2 position.
  - Jumper J13 is installed in 1-2 position.

**To configure 3.3V VIO Override mode (blue LED2 illuminated):**

- For Rev A uSD-M.2 Adapter: Jumper J12 is installed/shorted.
- For Rev B1 uSD-M.2 Adapter:
  - Jumper J12 is installed in 2-3 position.
  - Jumper J13 is installed in 1-2 position.

For more specifics on rev A adapter circuit and layout refer to **Figure 53: rev A uSD-M.2 Adapter Schematic**, **Figure 54: rev A uSD-M.2 Adapter Layout (top)**, and **Figure 55: rev A uSD-M.2 Adapter Layout (bottom)**.

**Figure 53: rev A uSD-M.2 Adapter Schematic**



UL = Unloaded = normally not mounted component.

Default jumper settings are indicated in the schematic.  
However, always check jumper positions on actual boards  
since there is no guarantee that all jumpers are in default place.


<b>Rev A</b>
Public release.
<b>Rev PA1-PA5</b>
Initial design.
 <b>Embedded Artists AB</b>
© Embedded Artists AB
TITLE: USD M.2 Adapter fixed 3V3 rev A
Document Number:
Date: 2019-02-13 09:31:39
Sheet: 1/2





Figure 54: rev A uSD-M.2 Adapter Layout (top)

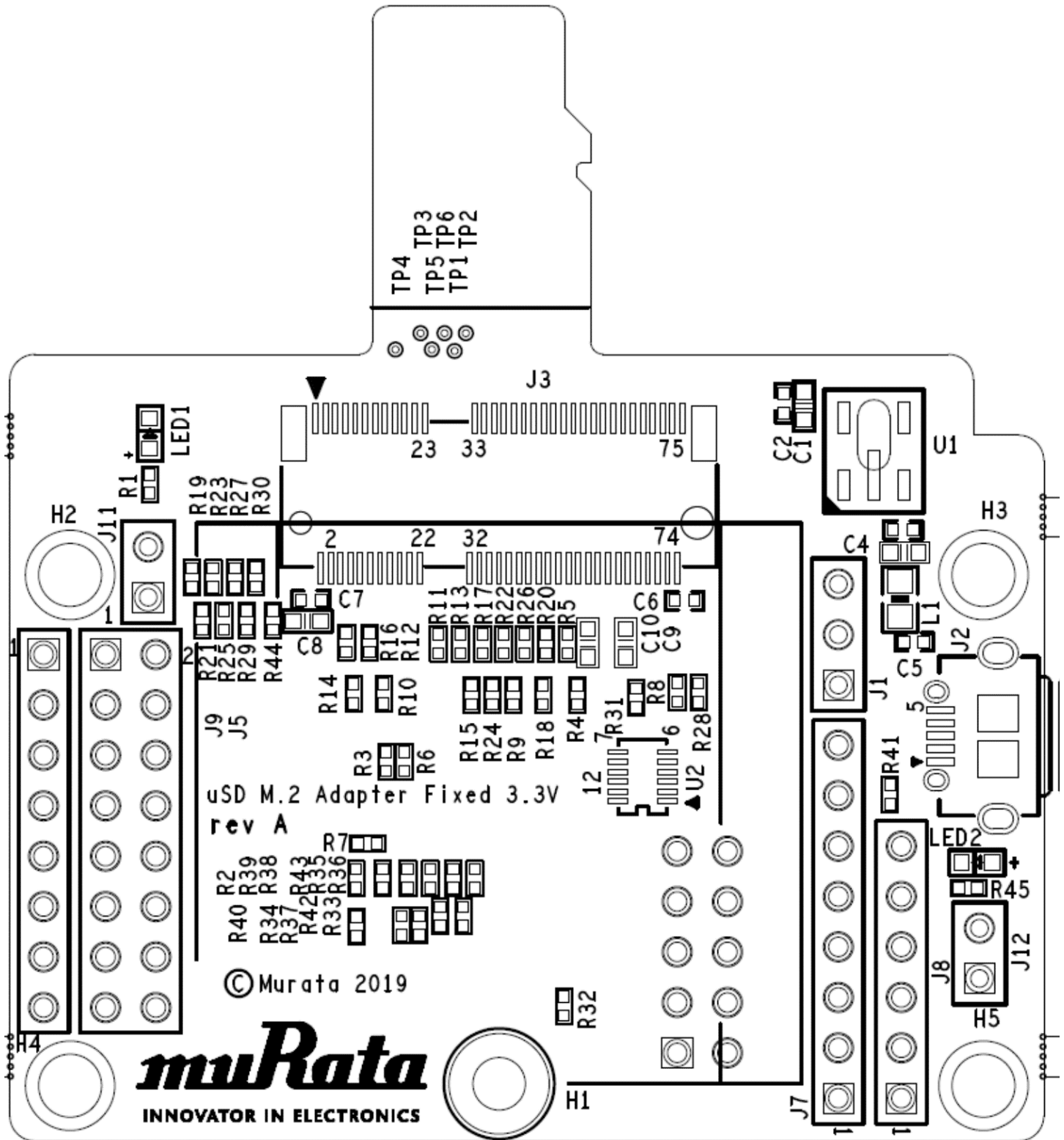


Figure 55: rev A uSD-M.2 Adapter Layout (bottom)

