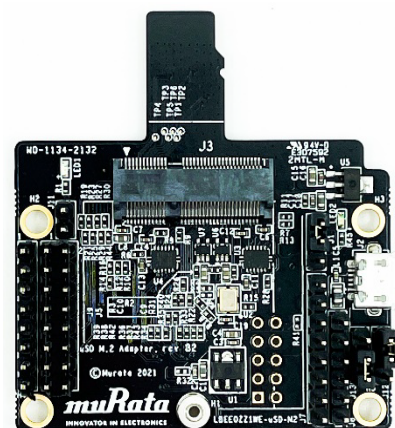
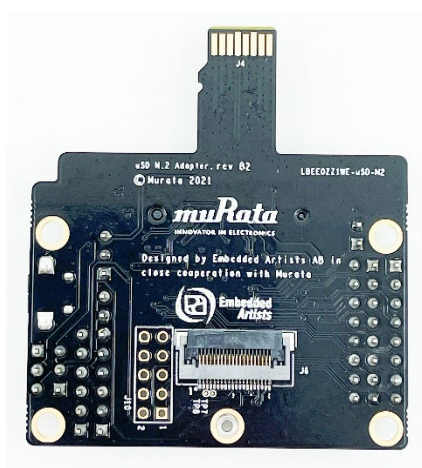


# uSD-M.2 Adapter

Datasheet - Rev. 4.0



## Table of Contents

1 Introduction to Murata uSD-M.2 Adapter Kit.....	4
2 Murata Kit Contents .....	5
3 uSD-M.2 Adapter High-Level Description.....	6
3.1 uSD-M.2 Adapter Features (Top View) .....	7
3.2 uSD-M.2 Adapter Features (Bottom View) .....	8
4 uSD-M.2 Adapter: Headers/Jumpers in Detail.....	9
4.1 J1: Power Supply Selector .....	9
4.2 J11: Optional Jumper to Disable Bluetooth for WLAN-Only Operation .....	9
4.3 J9: Bluetooth UART TX/RX and WLAN/Bluetooth Control Arduino Header .....	9
4.4 J5: Optional BT PCM and WLAN/BT Debug Signals .....	9
4.5 J12: M.2 IO Voltage: J12 in 1-2 pos for 1.8V VDDIO; J12 in 2-3 pos for 3.3V .....	11
4.6 J13: HOST IO Voltage: J13 in 1-2 pos for 3.3V VDDIO; J13 in 2-3 pos for 1.8V .....	11
4.7 J7: Optional Arduino Header Power Supply (can connect either 5V or 3.3V VBAT) .....	11
4.8 J8: BT UART RTS/CTS Arduino Header .....	11
5 HOST/M.2 VDDIO Voltage Settings.....	13
6 uSD-M.2 Adapter Schematic and Layout .....	17
7 Appendix A: Acronyms.....	22
8 Appendix B: References .....	23
8.1 Murata's uSD-M.2 Adapter Landing Page .....	23
8.2 Embedded Artists' M.2 Modules Landing Page .....	23
8.3 Murata's i.MX Wireless Solutions Landing Page .....	23
8.4 Murata's Community Forum Support.....	23
8.5 uSD-M.2 Adapter Rev B1 Datasheet.....	23
8.6 Murata uSD-M.2 Adapter Datasheet (legacy Rev A) .....	23
8.7 Murata Wi-Fi/BT Solution for i.MX Hardware User Manual.....	23
Revision History.....	24

## Figures

Figure 1: uSD-M.2 Adapter Features (Top View) .....	7
Figure 2: uSD-M.2 Adapter Features (Bottom View) .....	8
Figure 3: uSD-M.2 Adapter - Left Headers/Jumpers .....	10
Figure 4: uSD-M.2 Adapter - Right Headers/Jumpers .....	12
Figure 5: Common Host/M.2 IO Voltage Level Shift Options .....	14
Figure 6: uSD-M.2 Adapter Schematic .....	17
Figure 7: uSD-M.2 Adapter Layout (top) .....	20
Figure 8: uSD-M.2 Adapter Layout (bottom) .....	21

## Tables

Table 1: Document Conventions .....	3
Table 2: uSD Adapter Kit Contents .....	5
Table 3: uSD-M.2 Adapter Features .....	6
Table 4: uSD-M.2 Adapter - Left Headers/Jumpers Detail .....	10
Table 5: uSD-M.2 Adapter - Right Headers/Jumpers Detail .....	12
Table 6: Host/M.2 IO Voltage Level Setting .....	13
Table 7: uSD-M.2 Adapter Pinout Definition .....	14
Table 8: Acronyms .....	22

## About This Document

This datasheet describes Rev B2 of Murata's uSD-M.2 Adapter.









## Audience & Purpose

This datasheet is intended for engineers interfacing the uSD-M.2 Adapter to their hardware.

## Document Conventions

**Table 1** describes the document conventions.

**Table 1: Document Conventions**

Conventions	Description
	<b>Warning Note</b> Indicates very important note. Users are strongly recommended to review.
	<b>Info Note</b> Intended for informational purposes. Users should review.
	<b>Menu Reference</b> Indicates menu navigation instructions. <b>Example:</b> Insert → Tables → Quick Tables → Save Selection to Gallery 
	<b>External Hyperlink</b> This symbol indicates a hyperlink to an external document or website. <b>Example:</b> <a href="#">Embedded Artists AB</a>  Click on the text to open the external link.
	<b>Internal Hyperlink</b> This symbol indicates a hyperlink within the document. <b>Example:</b> <a href="#">Introduction</a>  Click on the text to open the link.
<code>Console input/output or code snippet</code>	<b>Console I/O or Code Snippet</b> This text <b>Style</b> denotes console input/output or a code snippet.
<code># Console I/O comment // Code snippet comment</code>	<b>Console I/O or Code Snippet Comment</b> This text <b>Style</b> denotes a console input/output or code snippet comment. <ul style="list-style-type: none"> <li>• Console I/O comment (preceded by "#") is for informational purposes only and does not denote actual console input/output.</li> <li>• Code Snippet comment (preceded by "//") may exist in the original code.</li> </ul>

# 1 Introduction to Murata uSD-M.2 Adapter Kit

Murata has partnered closely with [Embedded Artists AB](#) to provide a flexible Wi-Fi & Bluetooth solution for NXP Semiconductors' [i.MX RT/6/7/8 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 [NXP Semiconductors'](#) and [Infineon Semiconductor's](#) Wi-Fi/BT chipsets. Current Wi-Fi/BT M.2 EVB support includes Murata [Type 2DS](#) (NXP 88W8801), [Type 1XK](#) (NXP IW416), [Type 1ZM](#) (NXP 88W8987), [Type 1YM](#)<sup>1</sup> (NXP 88W8997 – WLAN-SDIO), [Type 1XL](#)<sup>2</sup> (NXP 88W8997 – WLAN-SDIO), [Type 2XS](#)<sup>3</sup> (NXP 88W8997 – WLAN-SDIO), [Type 1YN](#) (CYW43439), [Type 1DX](#) (CYW4343W), [Type 1LV](#) (CYW43012), [Type 2AE](#) (CYW4373E), and [Type 1MW](#) (CYW43455).



All these M.2 EVBs use the WLAN-SDIO interface; this adapter does not support interfacing WLAN-PCIe configured modules such as Embedded Artists' [Type 1XA](#) (CYW54591) and [Type 1YM](#) (NXP 88W8997 – WLAN-PCIe).

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/8) or Flat/Flex Connector (i.MX 6/7) 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 3.3V VDDIO override<sup>4</sup> for [Embedded Artists' Wi-Fi/BT M.2 Modules](#).



The 3.3V M.2 VDDIO operation is only recommended when 1.8V interface voltage cannot be supported by host. Refer to **Table 6** for more details.

The Rev B2 of the uSD-M.2 Adapter is equivalent to Rev B1, with the only component change being the sleep clock (32 KHz). Rev B1 datasheet is hosted on Murata website [here](#). Both Rev B2 and Rev B1 of the uSD-M.2 Adapter are backwards compatible with Rev A; and includes enhancements for BT UART and WLAN/BT control signal level shifting. Rev A datasheet is hosted on Murata website [here](#). Customers are encouraged to transition to either Rev B2 or B1.

To learn more details on configuring any of the Embedded Artists' Wi-Fi/BT M.2 modules for WLAN-SDIO configuration (i.e. 1YM, 1XL, 2XS) by modifying resistor strapping, please refer to the "Resources" tab for the corresponding datasheet at [Embedded Artists' Wi-Fi/BT M.2 Modules](#). WLAN-SDIO configuration is also covered in Murata documents (User Guide, Hardware Manual).



Given the limitations on Revision A of the uSD-M.2 Adapter, it is strongly recommended that customers switch to either Revision B1 or B2.

<sup>1</sup> Note that default strapping configuration on Type 1YM M.2 EVB (EAR00370) is for WLAN-PCIe and BT-UART.

<sup>2</sup> Note that default strapping configuration on Type 1XL M.2 EVB (EAR00387) is for WLAN-PCIe and BT-UART.

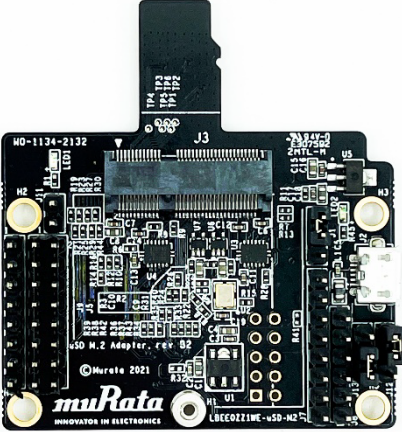




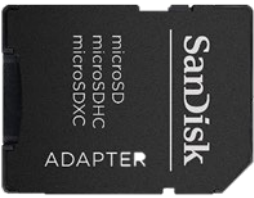
<sup>3</sup> Note that default strapping configuration on Type 2XS M.2 EVB (EAR00411) is for WLAN-PCIe and BT-UART.

<sup>4</sup> Note that 3.3V VDDIO override feature is currently only supported on Embedded Artists' 2DS, 1XK, 1YM, 1XL, 2XS, 1YN, 1DX, 2AE, and 1MW M.2 modules. The 1ZM, and 1LV M.2 modules only operate at 1.8V VIO only (chipset limitation).


## 2 Murata Kit Contents

The Murata [uSD-M.2 Adapter Kit](#) (Part No: LBEE0ZZ1WE-uSD-M2) contents are shown in **Table 2**.

**Table 2: uSD Adapter Kit Contents**

Picture of Contents	Description of Contents
	uSD-M.2 Adapter (Revision B2)
	M.2 screw for attaching Wi-Fi/Bluetooth M.2 Evaluation Board (EVB)
	75 mm 20-pos, 0.5 mm pitch flat/flex cable.
	13 pieces 200 mm long male-to-female jumper cables (compatible with Arduino header).
	4 x 19 mm stand-offs in nylon and associated M3 screws.
	microSD to SD Card Adapter

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

**Figure 1** and **Figure 2** highlight the Adapter features; with text explanation in **Table 3**. 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 6/7 Platforms. The Arduino headers provides interconnect options to i.MX RT/8 Platforms. For more details on interconnecting with NXP's evaluation platforms, refer to [Murata Wi-Fi/BT Solution for i.MX Hardware User Manual](#) .

**Table 3: uSD-M.2 Adapter Features**

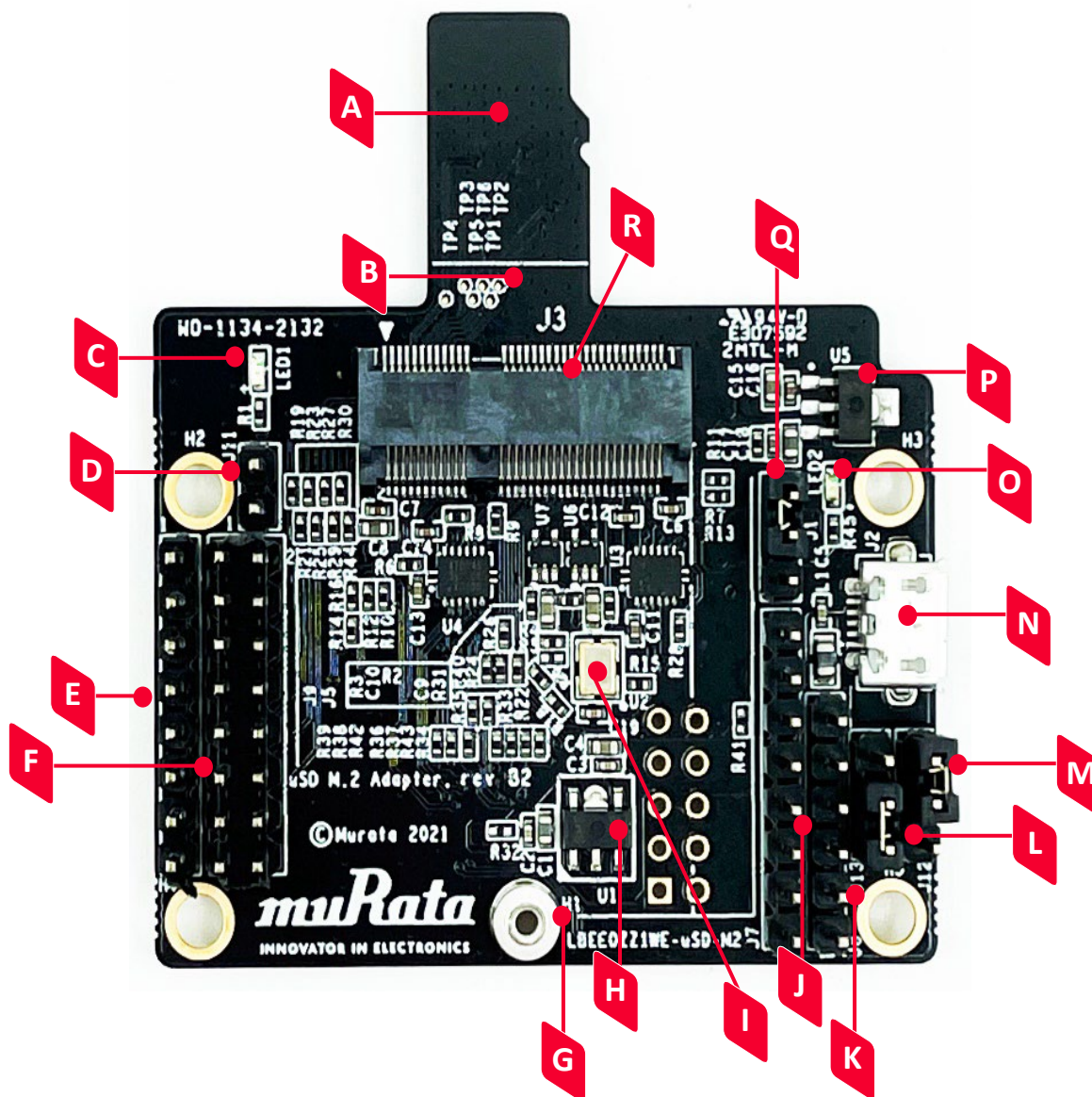
Clear	Description
A	microSD connector provides Power (VBAT, GND) and WLAN-SDIO
B	SDIO bus test points (CLK, CMD, DAT0, DAT1, DAT2, DAT3)
C	Power LED Indicator (green): if not illuminated then no power applied to M.2 EVB
D	<b>J11</b> = Optional BT Disable Jumper for WLAN-Only Mode (close this jumper to drive BT_REG_ON low and disable Bluetooth Core; thereby optimizing power consumption for WLAN-only operation)
E	<b>J9</b> = BT UART TX/RX and WLAN/BT Control Signals (8 pin header)
F	<b>J5</b> = Optional BT PCM and WLAN/BT Debug Signals (2x8 pin header)
G	Threaded mount for M.2 screw: 30 mm 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 (32.768 kHz)
J	<b>J7</b> = Optional Arduino Header Power Supply (8 pin header; 5V or 3.3V VBAT)
K	<b>J8</b> = BT UART RTS/CTS Signals (6 pin header)
L	<b>J13</b> = Host IO Voltage: J13 in 1-2 pos for 3.3V VDDIO (default); J13 in 2-3 pos for 1.8V
M	<b>J12</b> = M.2 IO Voltage: J12 in 1-2 pos for 1.8V VDDIO (default); J12 in 2-3 pos for 3.3V
N	<b>J2</b> = Optional 5V USB Power Supply via Micro-AB USB Connector
O	<b>LED2</b> = 3.3V M.2 IO Voltage Indicator (Blue) – not illuminated in default configuration
P	Regulator to provide optional 1.8V VIO to M.2 interface (M.2 EVBs have own 1.8V onboard)
Q	<b>J1</b> = Power Supply Selector Jumper must be installed to power Adapter (unless J5 Arduino Header Pins #15/16 are connected to external GND/3.3V VBAT). <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 provide 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 20-pin flat/flex connector



### 3.1 uSD-M.2 Adapter Features (Top View)

**Figure 1** describes the parts (Top View) of the uSD-M.2 Adapter Features. Refer to **Table 3** for feature descripts denoted by alphabets.

**Figure 1: uSD-M.2 Adapter Features (Top View)**

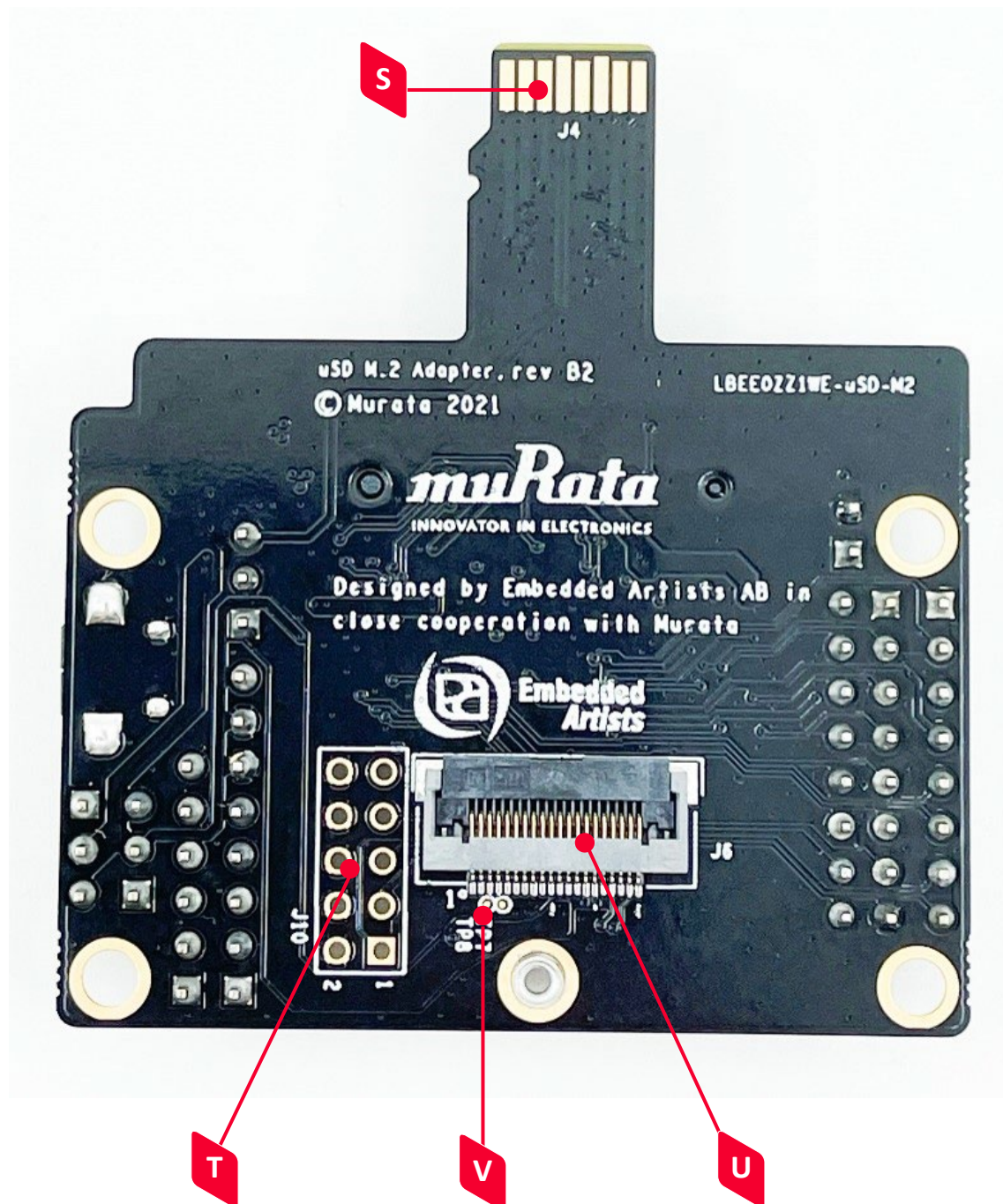




## 3.2 uSD-M.2 Adapter Features (Bottom View)

**Figure 2** describes the parts (Bottom View) of the uSD-M.2 Adapter Features. Refer to **Table 3** for feature descripts denoted by alphabets.

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



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

For more details on the headers and jumpers, refer to **Figure 3**, and **Figure 4**. Pin #1 location on J5 and J9 Arduino Headers are marked clearly on **Figure 3**. Regarding even/odd pins on J5, pin #2 is to the immediate right of pin #1: also seen referring to **Figure 7** (adapter layout).

### 4.1 J1: Power Supply Selector

Referring to **Figure 4** and **Figure 6**, the J1 Jumper is used to select the power source for the adapter. 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 microSD connector (default).



The kit ships with J1 in default position of 2-3; configuring VBAT supply from microSD connector.

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

Referring to **Figure 3**, and 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. 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 installed in 2-3 position) when power is applied to the adapter. Referring to **Figure 6**, R3 and C10 provide a simple resistor-capacitor power-on-reset signal for BT\_REG\_ON.

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

Referring to **Figure 3**, J9 (see **orange rectangle**) is an 8-pin Arduino Header that provides connectors to Bluetooth UART TX/RX and WLAN/Bluetooth control signals. Referring to **Figure 6**, 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.

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

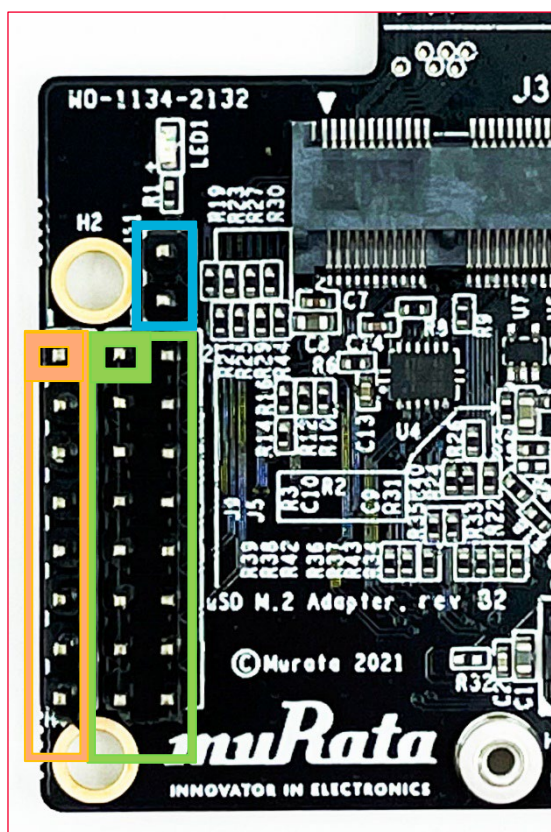
Referring to **Figure 3** and **Figure 6**, J5 (see **green rectangle**) is a 16-pin header that provides access to the following signals:

- 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.



The signals listed in **Figure 3** do not describe the seldomly used debug signals. Only specially enabled WLAN firmware or Bluetooth binaries will enable these optional debug pins.

**Figure 3: uSD-M.2 Adapter - Left Headers/Jumpers**



**Table 4: uSD-M.2 Adapter - Left Headers/Jumpers Detail**


uSD Adapter Header Jumper Detail			
J11 = Optional BT Disable; Jumper for WLAN-Only Mode			
<ul style="list-style-type: none"> <li>Jumper Installed = BT_REG_ON is Low (BT Core disabled)</li> <li>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).</li> </ul>			
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		

## 4.5 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 4** (jumper setting) and **Figure 6** (schematic), Jumper J12 (**see yellow rectangle**) default setting is 1-2 position for 1.8V VDDIO on M.2 interface. Per M.2 interface, WLAN SDIO/BT UART/BT PCM interfaces operate at a default 1.8V. The M.2 EVBs 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.



The 3.3V VDDIO (J12 in 2-3 position) will only work on select M.2 Modules such as 1XK or 2AE. Please consult Embedded Artists' Wi-Fi/BT M.2 module datasheet at [Embedded Artists' Wi-Fi/BT M.2 Modules](#)  for specifics on supported VIO signaling.

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

Referring to **Figure 4** (jumper setting) and **Figure 6** (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.

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

Referring to **Figure 4** (jumper setting) and **Figure 6** (schematic), J7 Arduino Header (**see orange rectangle**) is used to provide optional power supply to microSD connector. Jumper J1 must be in 1-2 position (see J1: Power Supply Selector) to disconnect microSD power and enable J7 header. Powering options include the following (J1 in position 1-2):

- Connect J7 Pins #2 and/or #4 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.

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

Referring to **Figure 4** and **Figure 6**, J8 Arduino Header (**see blue rectangle**) provides Bluetooth RTS and CTS connections. Default configuration for the Murata modules is to require flow control (i.e. not just TX/RX/GND). 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.



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 **Table 7**.



Figure 4: uSD-M.2 Adapter - Right Headers/Jumpers

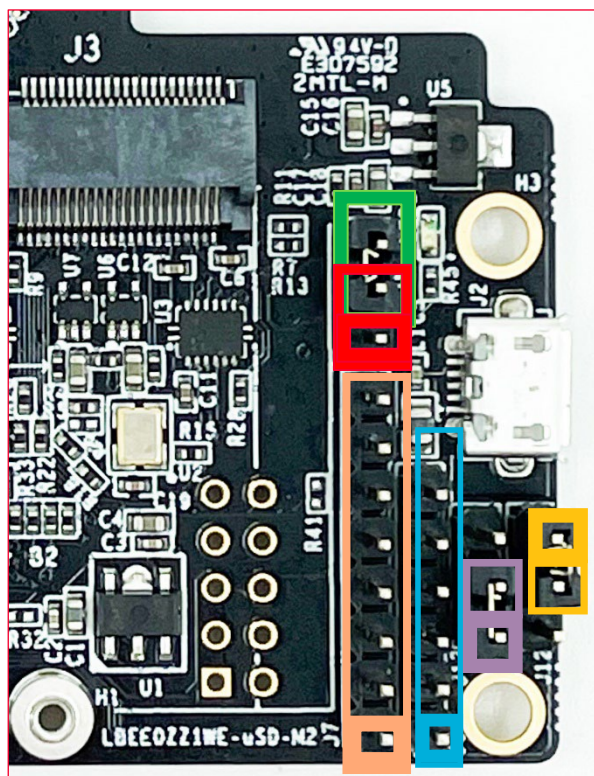


Table 5: uSD-M.2 Adapter - Right Headers/Jumpers Detail

uSD Adapter Header Jumper Detail			
J1 = Power Supply Selector			
Jumper must be installed to power Adapter			
<ul style="list-style-type: none"> <li>Position 1-2: 5V/3.3V VBAT supply from micro-USB (J2) or Arduino (J7)</li> <li>Position 2-3: VBAT supply (typical 3.1 ~ 3.3V) from microSD connector</li> </ul>			
J12 = M.2 IO Voltage in 1-2 pos for 1.8V VDDIO; and 2-3 pos for 3.3V			
<ul style="list-style-type: none"> <li>Jumper Installed in 1-2 pos = M.2 VIO set to 1.8V (default)</li> <li>Jumper Installed in 2-3 pos = M.2 VIO set to 3.3V; LED2 (Blue) illuminates</li> </ul>			
J13 = HOST IO Voltage in 1-2 pos for 3.3V VDDIO; and 2-3 pos for 1.8V			
<ul style="list-style-type: none"> <li>Jumper Installed in 1-2 pos = HOST VIO set to 3.3V (default)</li> <li>Jumper Installed in 2-3 pos = HOST VIO set to 1.8V</li> </ul>			
J7 = Optional Arduino Header Power Supply			
Pin#	J7 Signal	Pin#	J7 Signal
2	USD_3V3		GND
4	USD_3V3		GND
5	5V		
J8 = BT UART RTS/CTS Arduino Header			
Pin#	J8 Signal	Pin#	J8 Signal
3	BT_PCM_SYNC_M2	4	BT_UART_CTS_HOST

## 5 HOST/M.2 VDDIO Voltage Settings

**Table 6** summarizes J13/J12 jumper settings, indicating what Host and M.2 VIO voltages are being configured. **Figure 5** 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 EVBs 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. The Rev B2 of the uSD-M.2 Adapter is backwards compatible with Rev B1; and includes slightly modified sleep clock.



Given the limitations on Revision A of the uSD-M.2 Adapter, it is strongly recommended that customers switch to either Revision B1 or B2.

**Table 6: 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 5: Common Host/M.2 IO Voltage Level Shift Options

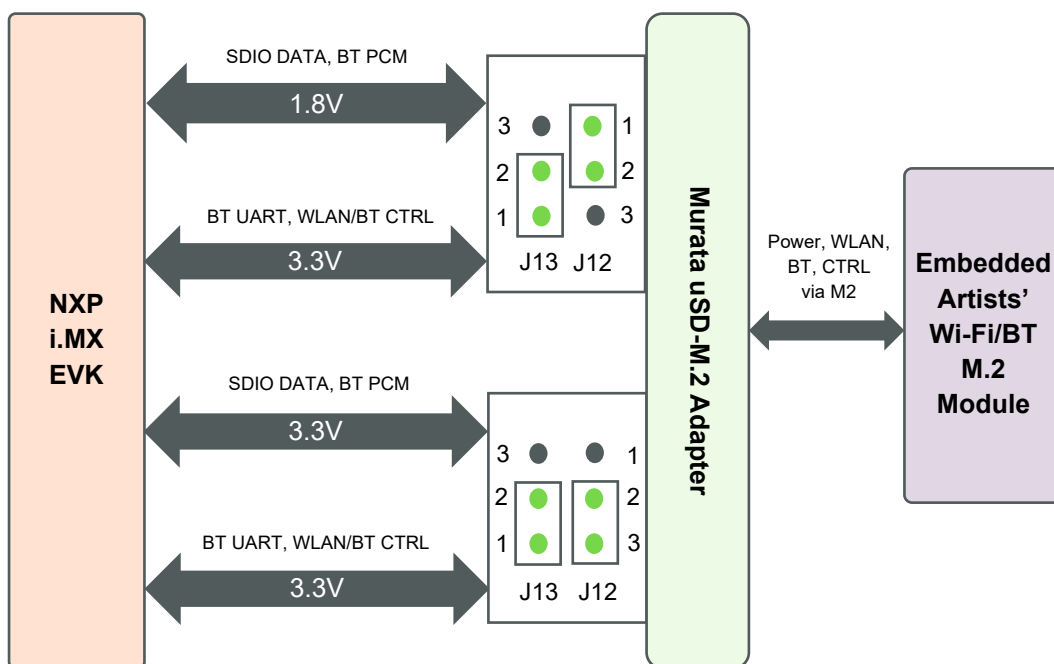


Table 7: uSD-M.2 Adapter Pinout Definition

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

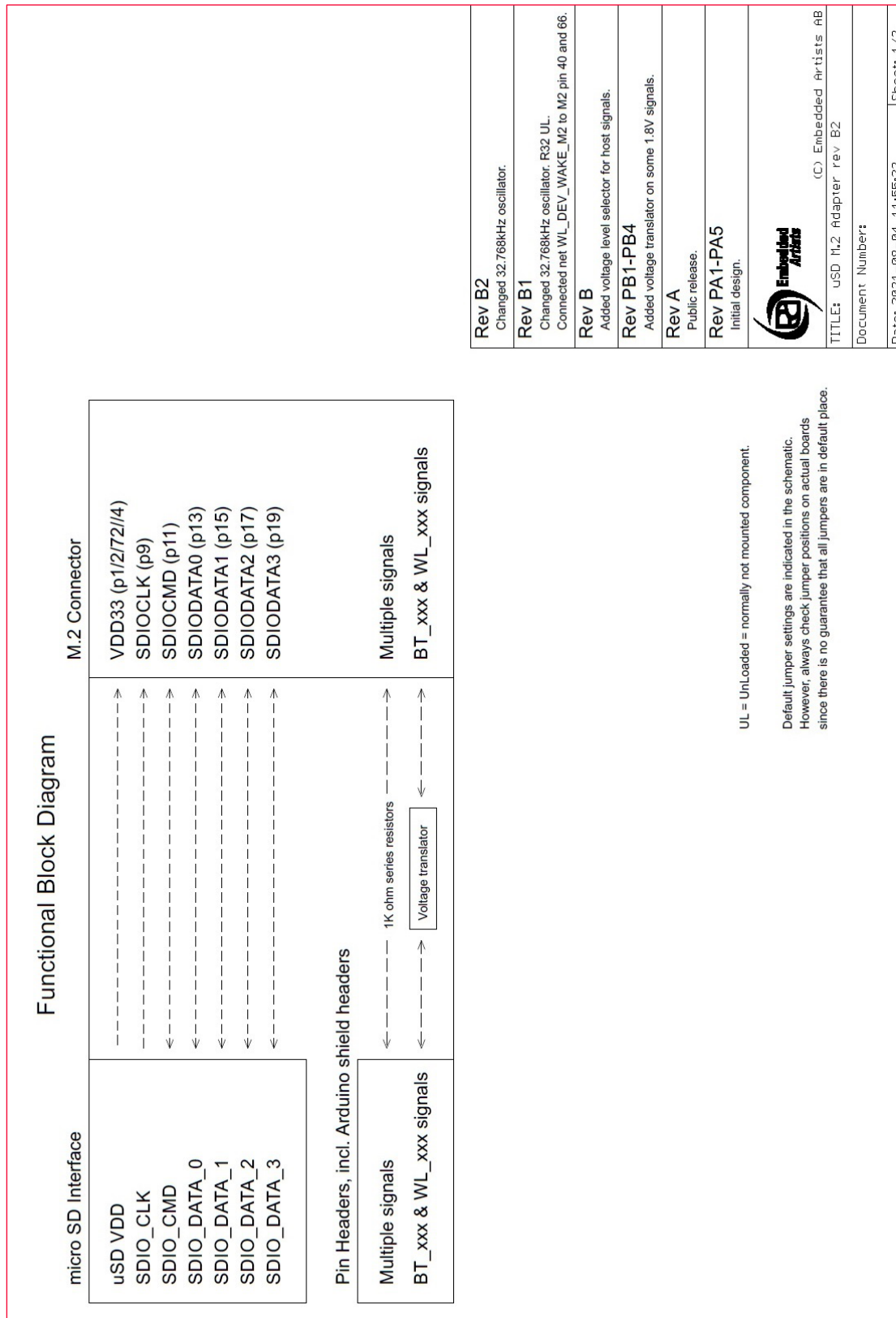
J#	Pin #	Name	I/O	V	Description
J3	50	LPO_IN_3V3	I	3.3	External Sleep Clock (32.768 kHz) – used in deep sleep mode
J3	54	BT_REG_ON_3V3	I	3.3	Enables/Disables Bluetooth core: Active High
J3	56	WL_REG_ON_3V3	I	3.3	Enables/Disables WLAN core: Active High
J3	59	M2_PIN59	I/O	1.8	Optional M.2 signal
J3	61	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

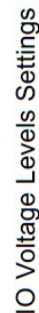
J#	Pin #	Name	I/O	V	Description
J6	14,15	3V3	N/A	3.3	Alternative VBAT supply for Adapter
J6	16	BT_UART_RXD_HOST	I	1.8~3.3	Bluetooth UART Receive
J6	17	BT_UART_CTS_HOST	I	1.8~3.3	Bluetooth UART Clear-To-Send
J6	18	BT_UART_TXD_HOST	O	1.8~3.3	Bluetooth UART Transmit
J6	19	BT_UART_RTS_HOST	O	1.8~3.3	Bluetooth 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.

## 6 uSD-M.2 Adapter Schematic and Layout

For more specifics on adapter circuit and layout refer to **Figure 6**, **Figure 7**, and **Figure 8**.

**Figure 6: uSD-M.2 Adapter Schematic**





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) 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.

**Stand-offs**

H2 3.2mm mounting hole  
H3 3.2mm mounting hole  
H4 3.2mm mounting hole  
H5 3.2mm mounting hole



Embedded Artists

✓ (C) Embedded Artists AB

---

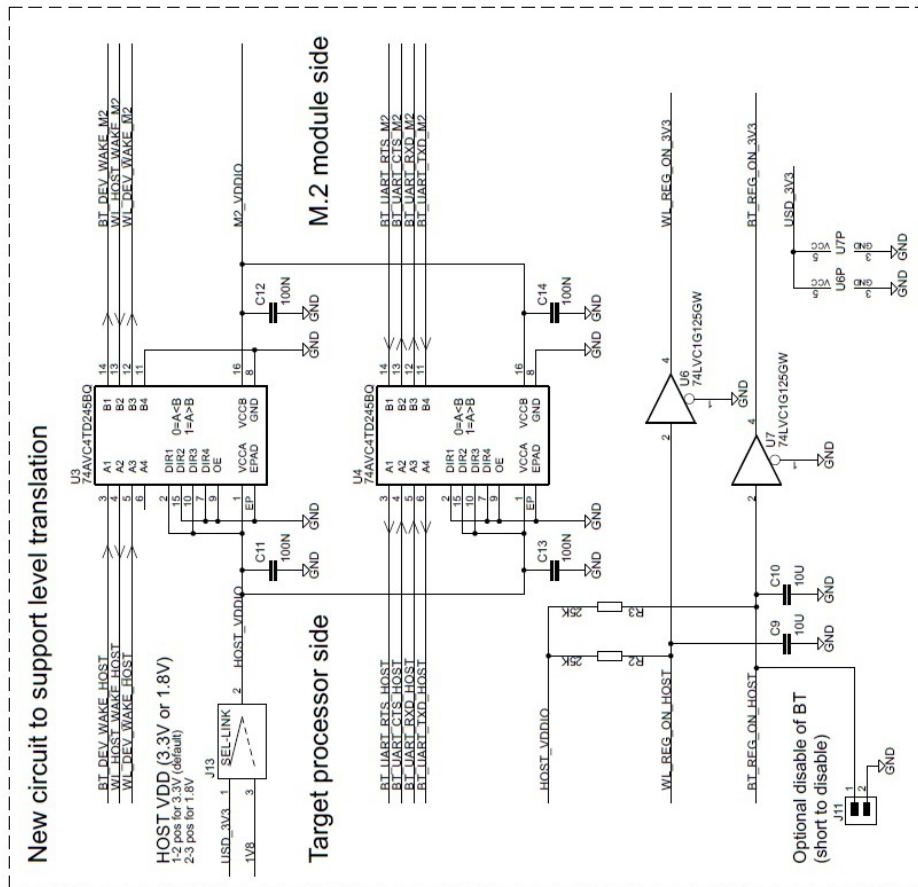
ITILE: USD M.2 Adapter rev B2

Document Number:

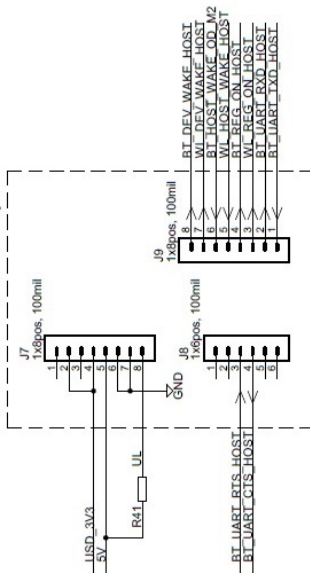
Date: 2021-08-04 11:55:33	Sheet: 2/3
---------------------------	------------



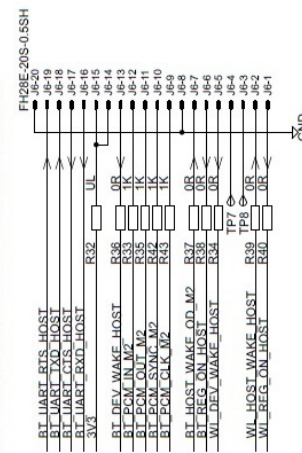
## M.2 connections



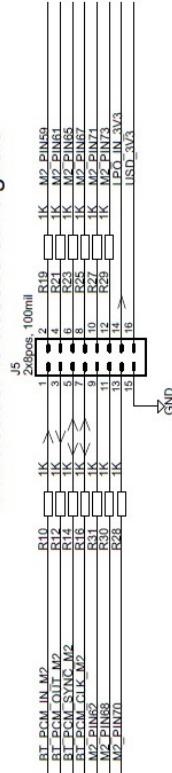
## Arduino Shield receptacles



## FPC connector to Sabre boards



## Pin header to access ctrl signals


 (C) Embedded Artists AB  
 TITLE: uSD M.2 Adapter rev B2

Document Number:

Date: 2021-08-04 11:55:33 Sheet: 3/3



Figure 7: uSD-M.2 Adapter Layout (top)

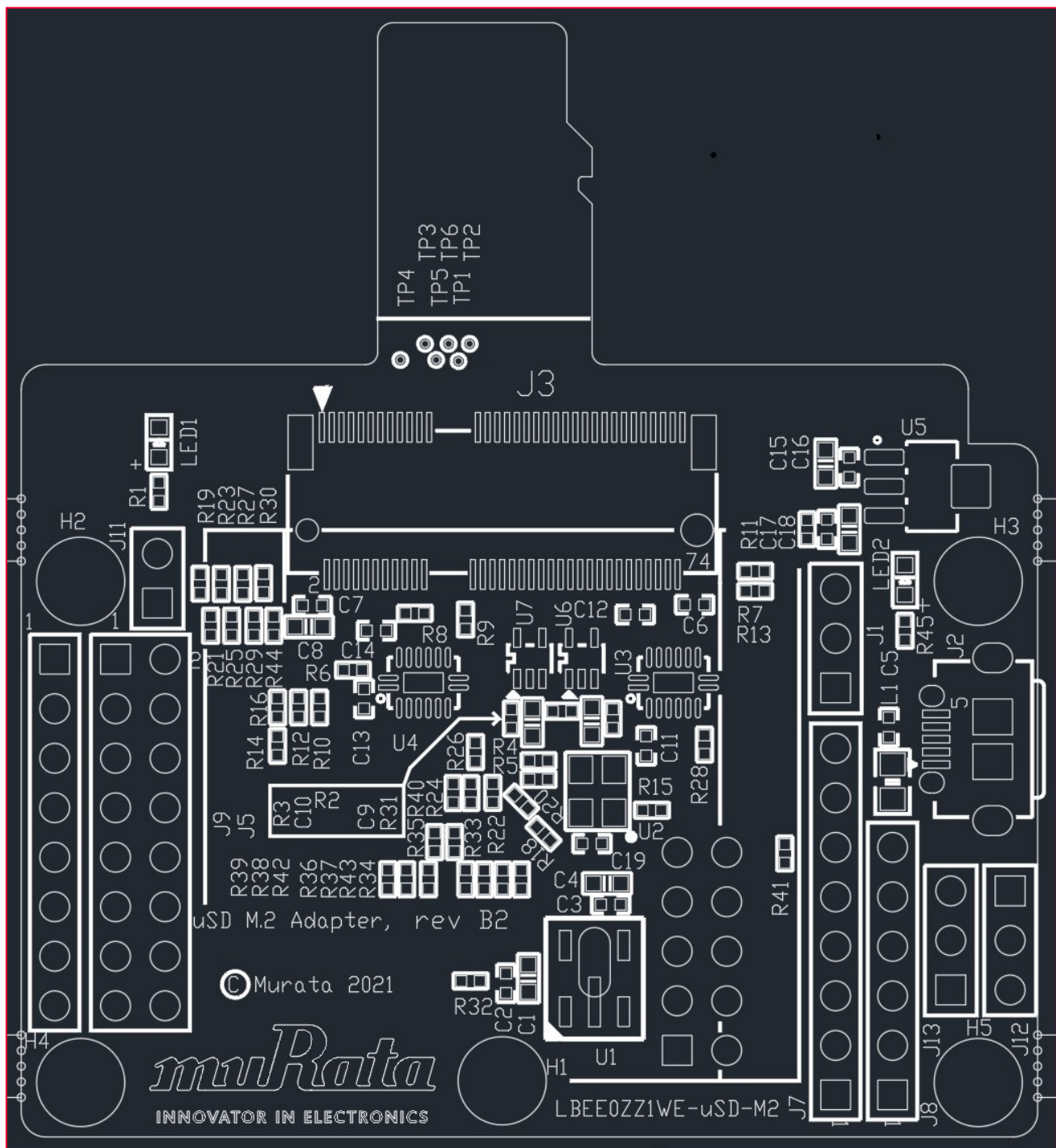
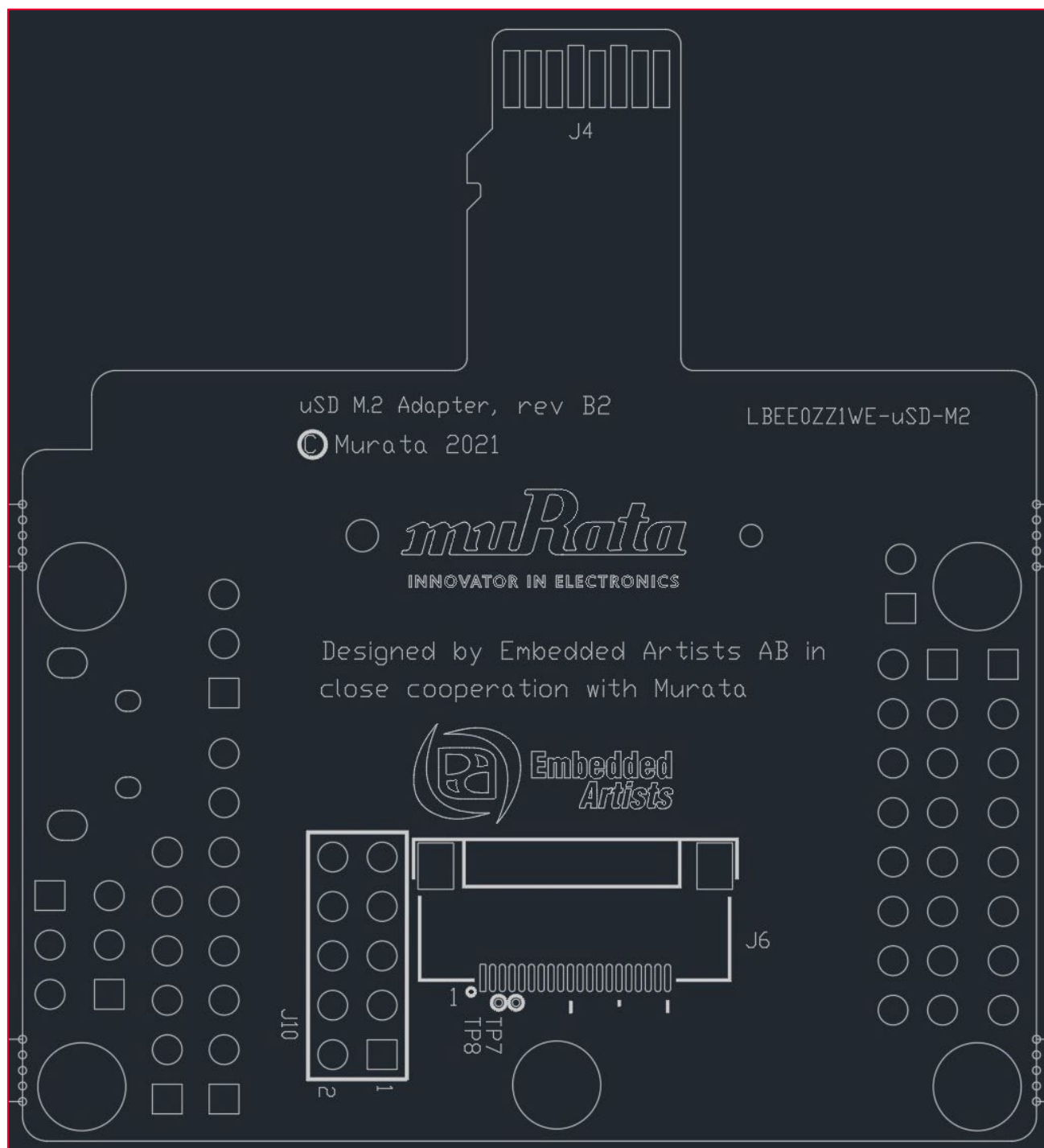



Figure 8: uSD-M.2 Adapter Layout (bottom)



## 7 Appendix A: Acronyms

**Table 8** describes the acronyms in this document.


**Table 8: Acronyms**

Acronyms	Meaning
1YM-SDIO	Type 1YM M.2 EVB configured (strapped) for WLAN-SDIO operation.
BT	Bluetooth
CTRL	Control
CTS	Clear to Send
EVB	Evaluation Board
EVK	Evaluation Kit
FFC	Flat Flexible Cable
GND	Ground
GPIO	General Purpose Input Output
JTAG	Joint Test Action Group
LED	Light-emitting Diode
M.2	Formerly known as the Next Generation Form Factor (NGFF), is a specification for internally mounted computer expansion cards and associated connectors. The M.2 specification is defined by <a href="#">PCI-SIG</a>  .
OOB IRQ	Out of Band Interrupt Request Line
PCIe	Peripheral Component Interconnect Express
PCM	Pulse Code Modulation
RTS	Request to Send
RX	Receive
SD	Secure Digital
SDIO	Secure Digital Input Output
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus
uSD	microSD
VBAT	Voltage of Battery
VDDIO	Voltage used by signals on memory bus
VIO	Input Offset Voltage
Wi-Fi	Wireless LAN: "Wi-Fi" is a registered trademark of Wi-Fi Alliance
WLAN	Wireless Local Area Network


## 8 Appendix B: References

For further information refer to the below.


### 8.1 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.


### 8.2 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.


### 8.3 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.


### 8.4 Murata's Community Forum Support

Murata's Community provides online support for the uSD-M.2 Adapter. Refer to [this link](#)  for the Forum's main Wi-Fi/Bluetooth landing page.


### 8.5 uSD-M.2 Adapter Rev B1 Datasheet

This [datasheet](#)  documents previous version of the Adapter. Customers are encouraged to transition to latest version (B2) of Adapter.

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

This [datasheet](#)  documents the legacy version of the Murata' uSD-M.2 adapter hardware and its interfacing options. This adapter version is no longer manufactured.

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

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

## Revision History

Revision	Date	Author	Change Description
1.0	04/15/2019	S. Kerr	Initial release.
1.1	07/30/2020	TF	Updated reference section.
2.0	11/17/2020	TF	Updated for Rev B1 Adapter.
2.1	1/26/2021	TF	Update to correct Type 1YM WLAN-SDIO VIO (1.8V only).
2.2	05/10/2022	TF	Updated to template 1.0.
3.0	10/03/2022	TF	<ul style="list-style-type: none"><li>• Updated to Rev B2 Adapter</li><li>• Removed reference to 1YM @1.8V only</li></ul>
4.0	11/23/2022	TF	Updated to template 2.0.



Copyright © Murata Manufacturing Co., Ltd. All rights reserved. The information and content in this document are provided “as-is” with no warranties of any kind and are for informational purpose only. Data and information have been carefully checked and are believed to be accurate; however, no liability or responsibility for any errors, omissions, or inaccuracies is assumed.

Wi-Fi® is a registered trademark of Wi-Fi Alliance. The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. Other brand and product names are trademarks or registered trademarks of their respective owners.

Specifications are subject to change without notice.