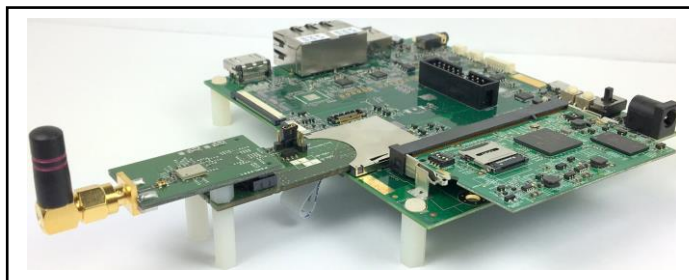


**Murata Wi-Fi/BT  
EVK for i.MX6**

**Quick Start Guide  
(Android)**



## Revision History

Revision	Date	Author	Change Description
1.0	March 1, 2016	S Kerr	Initial Release

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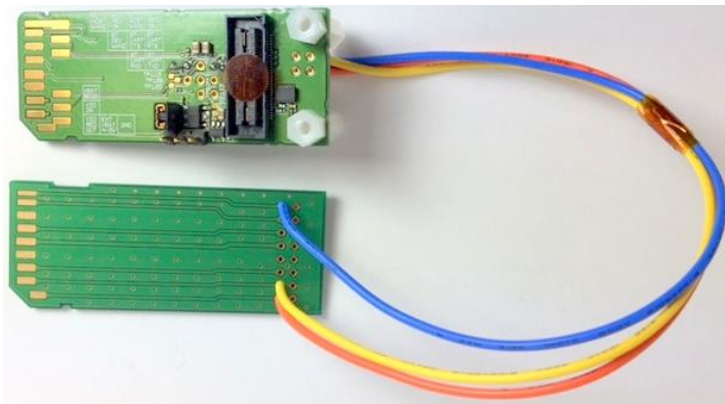
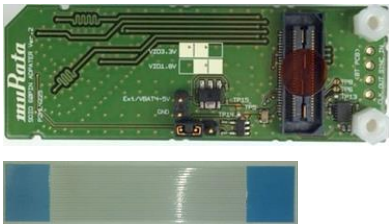

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# 1 Introduction

Murata has partnered with NXP Semiconductors N.V. and Broadcom Limited to offer a complete Wi-Fi and Bluetooth connectivity environment for building world class Internet-connected products. The Murata Connectivity Modules enable developers to minimize the development time and effort for connectivity function implementation. This guide provides details for getting started with Wi-Fi and Bluetooth on iMX6 platforms using [NXP Android 5.1.1 Lollipop GA BSP](#). A typical Murata Wi-Fi/BT EVK contains all the hardware necessary to enable Wi-Fi and Bluetooth functionality: contents are listed in **Table 1**.

**Table 1: Murata Wi-Fi/BT EVK (for i.MX6) Contents**

Part Number	Picture of Contents	Description of Contents
1		Murata Wi-Fi/BT EVB such as Type ZP, Type 1BW, Type 1DX, Type 1FX and SN8000. Type ZP is pictured. See <b>Table 2</b> .
2		<b>Murata i.MX InterConnect V1:</b> SD pins (DAT0..7) provide both Wi-Fi SDIO and Bluetooth UART connection. Wired SD Card Extender connects control signals: WL_REG_ON BT_REG_ON WL_HOST_WAKE (optional)
3		<b>Murata i.MX InterConnect V2:</b> SD pins provide Wi-Fi SDIO; ribbon cable connection provides Bluetooth UART and control signals. 50 mm ribbon cable included.
4		2.4/5.0 GHz Whip/Tilt SMA Antenna (for dual-band Wi-Fi)  Or 2.4 GHz Whip SMA Antenna (for single band Wi-Fi)

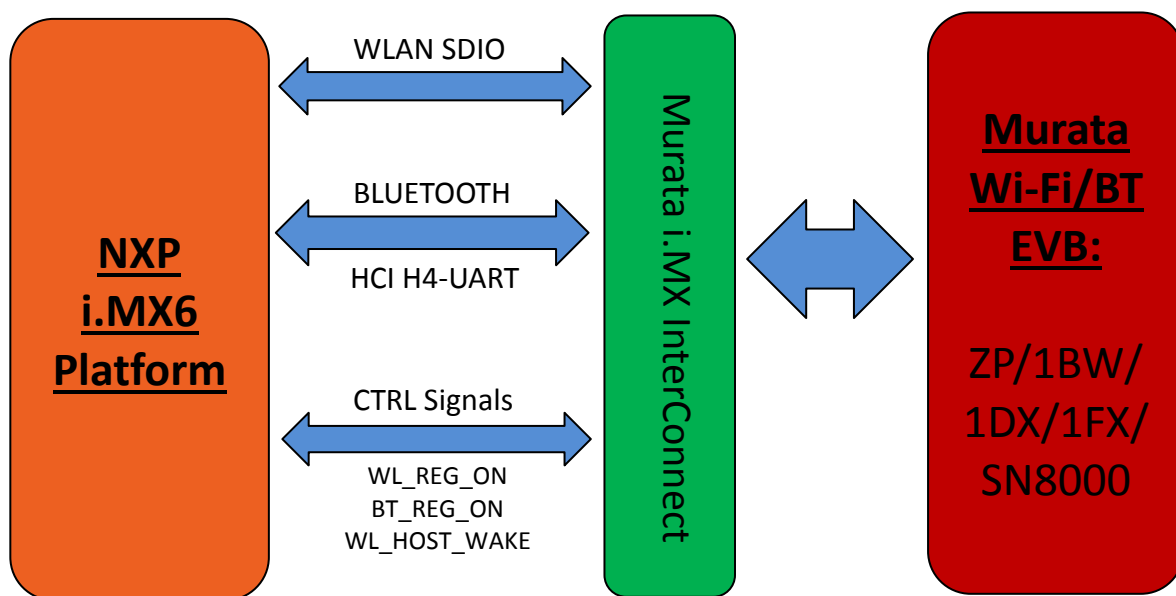
Murata Wi-Fi/BT EVK's supported on NXP i.MX6 Platforms are listed in **Table 2**. Five (5) different modules are available. If you are having difficulty obtaining the desired Murata EVK, please contact [Murata](#) for additional support. Alternatively please click on "Order part number" hyperlinks listed in **Table 2** to bring up the Murata module webpage. Now click on "purchase" tab, and scroll down to list currently available kits.

**Table 2: Murata Wi-Fi/BT EVK's Supported**

Part	Description	Order part number	Wi-Fi	Bluetooth Smart Ready
Type ZP EVK+	802.11b/g/n/ac and BT EVK for i.MX6	<a href="#">LBEH5HMZPC-TEMP-DS-SD</a>	b/g/n/ac	Yes
Type 1BW EVK+	802.11a/b/g/n and BT EVK for i.MX6	<a href="#">LBEH5DU1BW-TEMP-DS-SD</a>	a/b/g/n	Yes
Type 1DX EVK+	802.11b/g/n and BT EVK for i.MX6	<a href="#">LBEE5KL1DX-TEMP-DS-SD</a>	b/g/n	Yes
Type 1FX EVK+	802.11b/g/n EVK for i.MX6	<a href="#">LBWA1KL1FX-TEMP-DS-SD</a>	b/g/n	No
SN8000	802.11b/g/n EVK for i.MX6 FCC certified, industrial	<a href="#">88-00153-90</a>	b/g/n	No

Connection Diagram for the Murata Interconnect kit is provided in **Figure 1**. Murata Wi-Fi/BT kit for i.MX6 enables this configuration by providing two custom-built Adapter boards. Two adapter boards are provided in each kit to allowing the user to bring up the Wi-Fi/Bluetooth interfaces in the easiest manner possible.

**Figure 1: Murata IMX Interconnect Kit Interfaces**



**Note: 3<sup>rd</sup> party NXP i.MX6 EVK's are \*not\* supported.**

**Table 3** lists the official NXP branded i.MX6 Reference Platforms and which Murata Adapter Version should be used.

⇒ **NOTE: Murata strongly recommends the recommended Adapter configuration.**

As **Table 3** indicates, currently three (3) NXP i.MX6 Platforms are supported. There is only one complication for default (SDIO interrupt in-band signaling) configuration. Namely the i.MX 6Quad/DualLite SABRE-SD requires rework to successfully interface with the Murata hardware. As shipped from the factory, the i.MX 6Quad/DualLite SABRE-SD does not connect the J13 Bluetooth ribbon cable connector to the necessary UART and control signals. Please reference the [Murata Hardware User Manual](#) for necessary rework.

The only other optional hardware configuration is for i.MX 6SoloX SABRE-SD. The V1 adapter requires no rework for this platform and is the default configuration. However if the V2 adapter is desired (frees up one SD2 card slot) then rework is necessary. For specifics please reference the [Murata Hardware User Manual](#).

Note that the NXP Android 5.1.1 Lollipop release only supports SDIO in-band interrupts. Out-of-band interrupts are supported by hardware but require software modifications. Please reference the [Murata Android User Manual](#) on how to configure out-of-band interrupts.

**Table 3: Murata i.MX InterConnect Adapter Selection**

NXP i.MX6 Platform	Adapter	Notes
<a href="#">i.MX6Quad/DualLite SABRE-SD</a>	<a href="#">V2</a> (Rework Required)	Please reference the <a href="#">Murata Hardware User Manual</a> for necessary rework.
<a href="#">i.MX 6SoloX SABRE-SD</a>	<a href="#">V1</a>	To use V2 Adapter please reference the <a href="#">Murata Android User Manual</a> for software modifications, and <a href="#">Murata Hardware User Manual</a> for necessary rework.
<a href="#">i.MX 6SoloLite EVK</a>	<a href="#">V1</a>	Default support on this platform is Wi-Fi only. To enable Bluetooth please reference the <a href="#">Murata Android User Manual</a> .

⇒ For any given NXP Platform/Murata i.MX InterConnect Adapter combination, click on the corresponding “V1” or “V2” hyperlink to get redirected to relevant section in this document.

## 1.1 Acronyms

**Table 4: Acronyms used in Quick Start Guide**

Acronym	Meaning
API	Application Programming Interface
DTB	Device Tree Blob: Kernel reads in at boot time for configuration.
EVB	Evaluation Board (Murata module on custom PCB)
EVK	Evaluation Kit (includes EVB + Adapter)
FW	Firmware
GPIO	General Purpose Input/Output
PC	Personal Computer
SW	Software
UART	Universal Asynchronous Receiver/Transmitter
USB	Universal Serial Bus

## 1.2 References

### 1.2.1 Murata Android User Manual

Murata Wi-Fi/BT EVK for i.MX6 Android User Manual 1.0, “Murata Wi-Fi BT EVK for i.MX6 Android User Manual 1.0.pdf”.

This manual describes all steps necessary to build the Android 5.1.1 Lollipop software for supporting NXP i.MX6 Platforms and the Murata Wi-Fi/BT EVK.

### 1.2.2 Murata Hardware User Manual

Murata Wi-Fi/BT EVK for i.MX6 Hardware User Manual 2.0, “Murata Wi-Fi BT EVK for i.MX6 Hardware User Manual 2.0.pdf”.

This manual details the Murata Wi-Fi/BT EVK InterConnect Adapter hardware. All interface signals to the NXP i.MX6 Platforms are described. Specifics on interfacing each i.MX6 Platform to Murata Wi-Fi/BT EVK are provided.

### 1.2.3 Murata Quick Start Guide (Linux)

Murata Wi-Fi/BT EVK for i.MX6 Quick Start Guide (Linux) 3.0, “Murata Wi-Fi/BT EVK for i.MX6 Quick Start Guide (Linux) 3.0.pdf”

This Quick Start Guide details steps to get Murata Wi-Fi/BT EVK up and running quickly on i.MX6 platforms. It is specific to NXP i.MX Linux 3.14.52 GA BSP release.

### 1.2.4 NXP Android User's Guide

Android User's Guide, Rev. L5.1.1\_2.1.0-ga, 01/2016, Document Number: AUG; “Android\_User's\_Guide.pdf”.

This document provides the technical information related to the i.MX 6 and 7 series SABRE devices:

- Instructions for building from sources and using prebuilt images



- 
- Copying the images to a boot media
  - Hardware/software configurations for programming the boot media and running the images

This document describes how to configure a Linux® OS build machine and provides the steps to download, patch, and build the software components that create the Android™ system image when working with the sources.

### **1.2.5 NXP Android Quick Start Guide**

Android Quick Start Guide, Rev. L5.1.1\_2.1.0-ga, 01/2016, Document Number: AQSUG; “Android\_Quick\_Start\_Guide.pdf”.

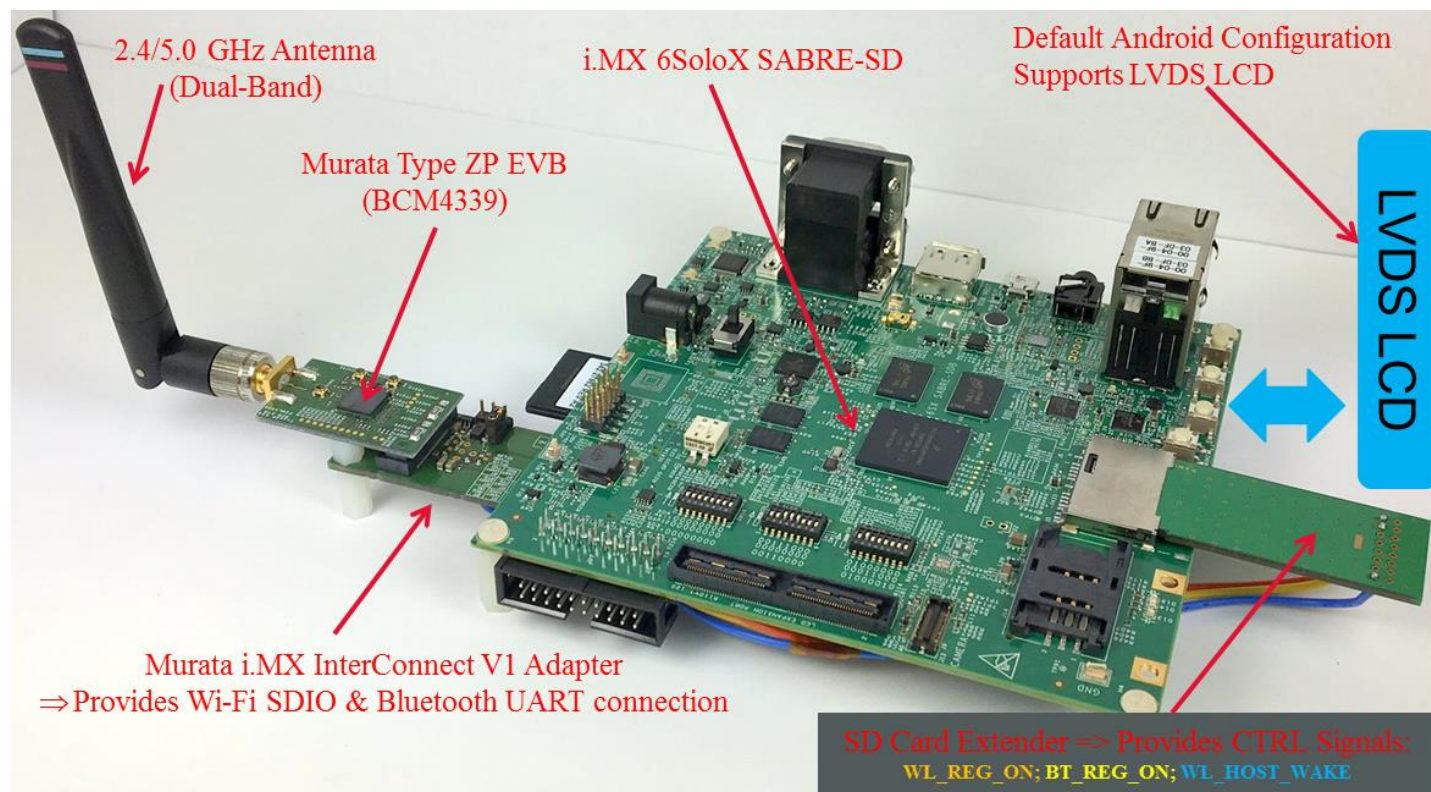
This document guides you through the processes of downloading and running this release package. It only explains how to download and run the default release image with default configuration. For details on using the release package, see [NXP Android User's Guide](#).

## 2 Connecting to i.MX 6SoloX SABRE-SD (V1 Adapter)

Referring to **Table 3**, the V1 Adapter is the recommended adapter for this platform. No rework is required, Murata Wi-Fi/BT EVB is oriented right-side up, and it provides both Wi-Fi and BT functionality via SD3/SD2 slots: see **Figure 2** below.

- [1] Make sure no power is applied to i.MX 6SoloX SABRE-SD.
- [2] Check that VIO setting on Murata i.MX6 Interconnect V1 Adapter (Part #2 in **Table 1**) is set to 3.3V (VBAT\_SDIO). Refer to **Red Rectangle** for correct jumper setting in **Figure 5**.
- [3] Insert V1 Adapter board into SD3 slot and SD Card Extender into SD2 slot. Note the orientation as shown in **Figure 2**.
- [4] Connect antenna (Part #4) to the SMA connector of the Murata EVB (Part #1).
- [5] Now you can connect the EVB to the 60-pin Samtec connector on the V1 Adapter board.
- [6] Make sure an appropriate LVDS LCD (touch screen display) is connected to SoloX as the blue arrow in **Figure 2** indicates. This is the default configuration for the SoloX binary image.
- [7] Prepare SD card to boot platform per Section 5.
- [8] Power on platform. If the EVB being used is not ZP (default) or additional utilities such as “wl” tool need to be added, then refer to Section 6 on necessary file modifications (i.e. has to be done for 1BW, 1DX, 1FX, and SN8000).
- [9] Refer to Section 7 to test/verify Wi-Fi and Bluetooth functionality.

**Figure 2: i.MX 6SoloX SABRE-SD with V1 Adapter and Type ZP EVB**

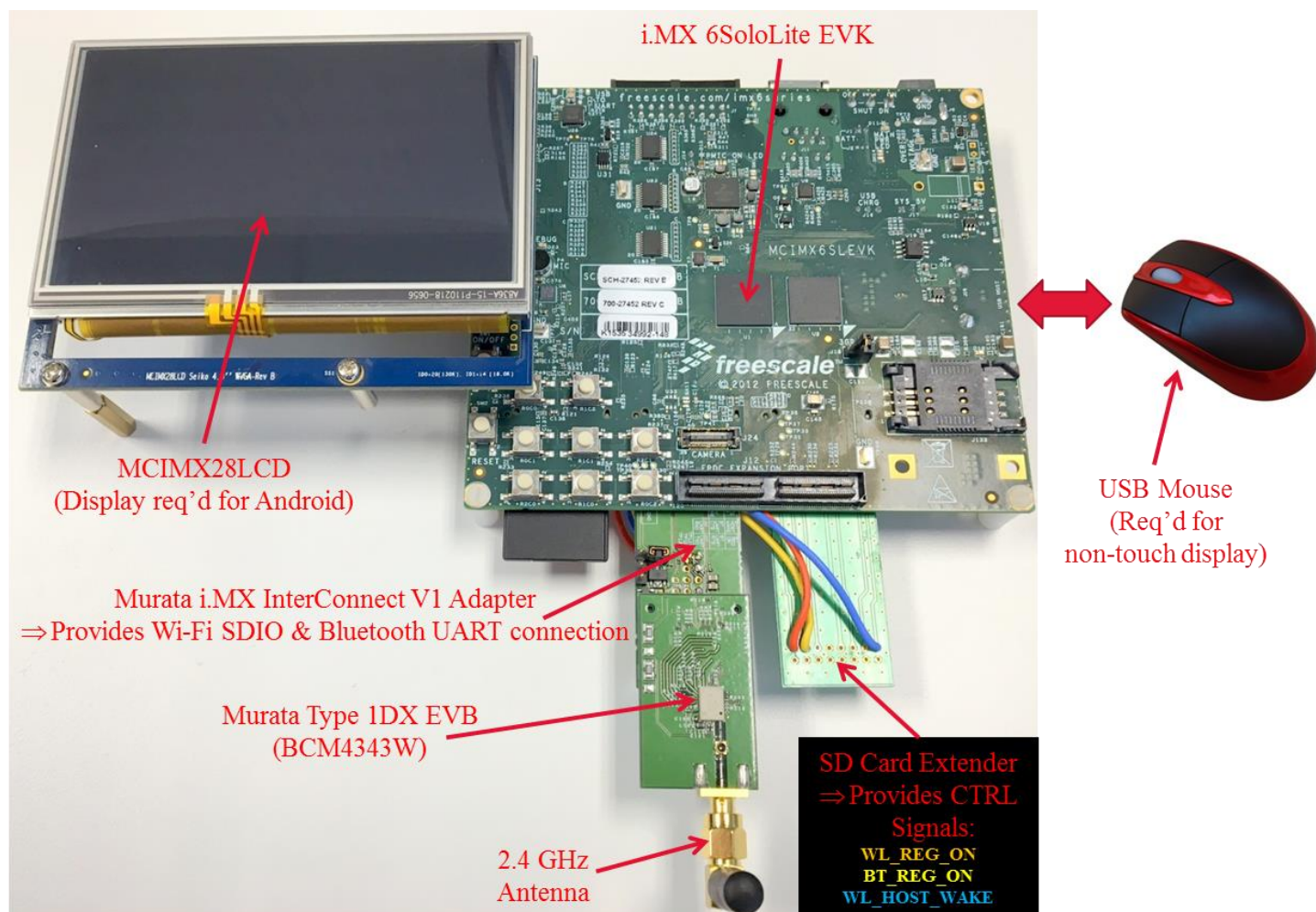


### 3 Connecting to i.MX 6SoloLite EVK (V1 Adapter)

Referring to **Table 3**, V1 Adapter is the only solution that will work for this platform. Murata Wi-Fi/BT EVB is oriented right-side up, and it provides both Wi-Fi and BT functionality via SD1 slot with control signals connected from SD3 slot using SD Card Extender: see **Figure 3** below.

- [1] Make sure no power is applied to i.MX 6SoloLite EVK.
- [2] Check that VIO setting on Murata i.MX6 Interconnect V1 Adapter (Part #2 in **Table 1**) is set to 3.3V (VBAT\_SDIO). Refer to **Red Rectangle** for correct jumper setting in **Figure 5**.
- [3] Insert V1 Adapter board into SD1 slot and SD Card Extender into SD3 slot. Note the orientation as shown in **Figure 3**.
- [4] Connect antenna (Part #4) to the SMA connector of the Murata EVB (Part #1).
- [5] Now you can connect the EVB to the 60-pin Samtec connector on the V1 Adapter board.
- [6] Default Android image requires MCIMX28LCD as a display and USB mouse connected.
- [7] Prepare SD card to boot platform per Section 5.
- [8] Power on platform. If the EVB being used is not ZP (default) or additional utilities such as “wl” tool need to be added, then refer to Section 6 on necessary file modifications (i.e. has to be done for 1BW, 1DX, 1FX, and SN8000).
- [9] Refer to Section 7 to test/verify Wi-Fi functionality. Bluetooth is not enabled in software. To add Bluetooth functionality please refer to the Murata [Android User Manual](#).

**Figure 3: i.MX 6SoloLite EVK with V1 Adapter and Type 1DX EVB**



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## 4 Connecting to i.MX 6Quad/DualLite SABRE-SD (V2 Adapter)

Referring to **Table 3**, the i.MX 6Quad/DualLite SABRE-SD presents additional challenges. As shipped from the factory, the i.MX 6Quad/DualLite SABRE-SD **does not** connect the J13 Bluetooth ribbon cable connector to the necessary UART and control signals. Please reference the [Murata Hardware User Manual](#) for necessary rework. NXP also details the board rework in their schematic file (Bluetooth page). Page 15 of the NXP schematic (SPF-27516\_C3.pdf) correctly captures the necessary rework to be done.

### Repeated here:

**NOTE:** To use J13, populate resistors R209 - R213 and depopulated 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.

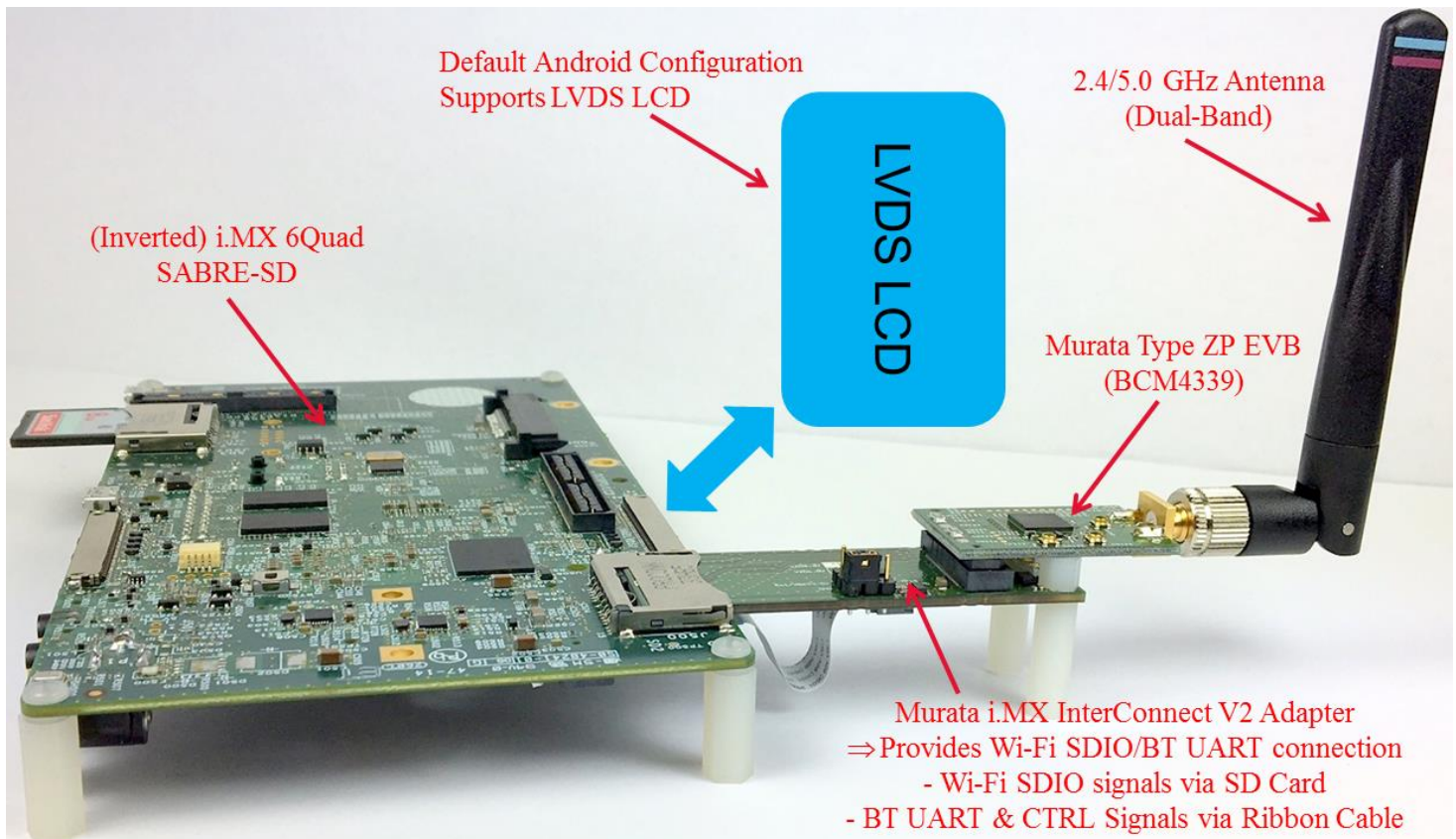
⇒ **The following steps will only pass if NXP Platform has been correctly reworked.**

**NOTE:** The NXP i.MX6 platform has been inverted. This makes working with Wi-Fi/BT EVK much easier. The one drawback is if Ethernet port must be accessed. To properly match Wi-Fi/BT EVK and i.MX6 platform heights, nylon washers are added as additional spacers to “standard” NXP i.MX6 standoffs.

- [1] Make sure no power is applied to i.MX 6Quad/DualLite SABRE-SD.
- [2] Check that VIO setting on Murata i.MX6 Interconnect V2 Adapter (Part #3 in **Table 1**) is set to 3.3V (VBAT\_SDIO). Refer to **Red Rectangle** for correct jumper setting in **Figure 8**.
- [3] After connecting ribbon cable to both adapter and i.MX6Q/DL, insert Adapter board into SD2 slot. Note the orientation as shown in **Figure 4**.
- [4] Connect antenna (Part #4) to the SMA connector of the Murata EVB (Part #1).
- [5] Now you can connect the EVB to the 60-pin Samtec connector on the Adapter board.
- [6] Make sure an appropriate LVDS LCD (touch screen display) is connected to SoloX as the blue arrow in **Figure 4** indicates. This is the default configuration for the Quad/DualLite SABRE-SD binary image.
- [7] Prepare SD card to boot platform per Section 5.
- [8] Power on platform. If the EVB being used is not ZP (default) or additional utilities such as “wl” tool need to be added, then refer to Section 6 on necessary file modifications (i.e. has to be done for 1BW, 1DX, 1FX, and SN8000).
- [9] Refer to Section 7 to test/verify Wi-Fi and Bluetooth functionality.



**Figure 4: i.MX 6Quad SABRE-SD (Inverted) with V2 Adapter and Type ZP EVB**



## 5 Preparing Bootable SD Card for i.MX6 with Murata Wi-Fi/BT EVK

The current release supported is [NXP Android 5.1.1 Lollipop GA BSP](#). This is the first GA release from NXP which provides verified/tested Wi-Fi/Bluetooth functionality on all major i.MX6 platforms (as detailed in this guide – i.MX 6UltraLite not supported on Android O/S). NXP provides pre-built images for each platform that include all necessary components to get (default) Murata Type ZP EVK up and running.

Although the Android “Demo Images” are made available [here](#), the tool for partitioning the SD card is only released as part of the source code (involves pulling code from “git” repository). As such flashing the NXP Android image to SD card is somewhat complicated without a pre-partitioned SD card (formatted for Android NXP image). For more information on SD card formatting, you can refer to Section 5.1.1 “Storage Partitions” in the [NXP Android User’s Guide](#).

The recommended approach to flashing the NXP “Demo Images” is to use **NXP’s Manufacturing Tool (Windows based)** which allows the user to partition/flash the SD card in one step (once Manufacturing Tool is downloaded/installed and necessary “Demo Image” files are downloaded and copied over). These steps are detailed in the [NXP Android Quick Start Guide](#).

To enable the remaining Murata Wi-Fi/BT EVK’s (1BW, 1DX, 1FX, and SN8000), it is necessary to modify the Wi-Fi NVRAM (calibration file – bcmdhd.cal), Wi-Fi firmware binaries (fw\_bcmdhd.bin,

fw\_bcmdhd\_apsta.bin), and Bluetooth patchfile (Type\_ZP.hcd is default). All these files reside in “/etc/firmware/bcm” folder. The “Demo Images” are built as Android “user images” so specific steps are required to modify the root file system. These steps are documented in Section 6. To further customize Wi-Fi/Bluetooth support on i.MX software, please reference the [Murata Android User Manual](#).

Lastly the user may desire to add tools for specific RF testing and/or performance tests. Please check the Broadcom Support Portal [here](#) for binaries of “WL” tool or “iperf”. For Broadcom documentation on “WL” tool please refer to this [link](#).

## 5.1 Getting Signed Up for Support Portals

You should already have access to “My.Murata” support portal. If not please download “My.Murata” support site access guide from [here](#).

For additional support resources, it is recommended to register at both [NXP](#) and [Broadcom](#) Community websites. Once you are registered please email [imxfaq@murata.com](mailto:imxfaq@murata.com) to gain access to both [Murata/i.MX Portal](#) (NXP site) and [NXP/Murata i.MX Support Portal](#) (Broadcom site).

Turnaround for support portal access is typically no more than 24 hours.

## 5.2 Downloading i.MX6 Demo Image Files to Flash SD Card (or EMMC)

**Table 5** provides direct download links to i.MX6 “Binary Demo File” for each NXP Platform. The available SD card images are included in these downloads. All download links below originate on this [NXP webpage](#). Simply click on the hyperlink for the desired “Demo Image File” and download the package. After downloading, extract the appropriate “full image” version from the bundle/package (note filename underneath “demo image” hyperlink).

The final extracted package (containing u-boot, kernel, recovery, and system image) will be copied over to NXP/Freescale MFGTool folder to flash the platform. Note that there may be multiple versions of the aforementioned components. Please reference the [NXP Android Quick Start Guide](#) for more details.

**Table 5: i.MX6 Platforms’ Demo Image Filenames**

i.MX6 Platform	Demo Image Filenames
<a href="#">i.MX 6Quad/DualLite SABRE-SD</a>	<a href="#">IMX6_L5.1_2.1.0_AND_DEMO_SD_BS.tar.gz</a> ⇒ android_L5.1.1_2.1.0_full_image_6dqsabresd.tar.gz
<a href="#">i.MX 6SoloX SABRE-SD</a>	<a href="#">IMX6_L5.1_2.1.0_AND_DEMO_SX_BS.tar.gz</a> ⇒ android_L5.1.1_2.1.0_full_image_6sxsabresd.tar.gz
<a href="#">i.MX 6SoloLite EVK</a>	<a href="#">IMX6_L5.1_2.1.0_AND_DEMO_EVK_BSP.tar.gz</a> ⇒ android_L5.1.1_2.1.0_full_image_6slevk.tar.gz

---

## 5.3 Flashing SD Card (or EMMC)

We recommend NXP/Freescale MFGTool to flash the Android image to SD Card or EMMC. It allows the end user to both partition and flash image files in one step. The procedure for using MFGTool is documented in the [NXP Android Quick Start Guide](#). There is a different section covering the steps used to flash each of the NXP i.MX6 platforms (refer to Sections 3, 5, and 6 for supported platforms).

The very first step is to download and install the MFGTool software to your Windows PC. Download the Android version of MFGTool located [here](#). Once downloaded, extract the MFGTool package to the desired folder on your Windows PC. Now refer to Sections 3, 5 or 6 in [NXP Android Quick Start Guide](#) to flash the Android image on i.MX 6Quad/DualLite SABRE-SD, i.MX 6SoloLite, and i.MX 6SoloX respectively.

### 5.3.1 MFGTool Notes

- 1) If after double-clicking the appropriate \*.vbs file, the “MfgTool\_MultiPanel” GUI does not come up correctly (i.e. no “HID-compliant device” found) make sure you have the correct USB driver installed. The “imxusb.inf” file is located at “<MFGTool-Dir>\Drivers\iMX\_BulkIO\_Driver”.
- 2) If prompted by Windows’ O/S to “format drive”, click the “cancel” option.
- 3) After flashing platform, make sure to power down and reset boot switches.

### 5.3.2 Enabling Shell Console on i.MX Platform

To enable shell console and ability to modify file system, make sure to append “androidboot.selinux=disabled” and “androidboot.dm\_verity=disabled” to U-Boot’s bootargs. Sections 3.4, 5.4, and 6.4 in [NXP Android Quick Start Guide](#) provide exact bootargs’ strings. The ability to modify file system is essential when using non-ZP EVB (i.e. 1BW, 1DX, 1FX, SN8000). It is also important for adding utilities such as “WL” tool which is used for RF testing.

## 6 File Modifications Necessary When Not Using Type ZP EVB

The default Android image from NXP only supports the Type ZP EVB. To support the other Murata EVB’s (1BW, 1DX, 1FX and SN8000) with the same Android image, we need to copy over the necessary files to the Android file system (replacing original ones). As shown in “Original File” column of **Table 6**, these files are located in the “/etc/firmware/bcm” folder.

### 6.1 Sourcing Replacement WLAN and Bluetooth Binary and Configuration Files

The easiest source to pull necessary files from is the NXP Linux 3.14.52 file system tarball. The file system for any of the major i.MX6 Platforms will work: i.MX 6Quad, i.MX 6SoloX, i.MX 6SoloLite, and i.MX 6UltraLite. **Table 6** quotes the i.MX 6UltraLite file system source: easiest to download given its

smaller file size. The “fsl-image-gui-x11-im6ul.tar.bz2” file can be extracted from the [i.MX 6 UltraLite Linux Binary Demo Files](#) package.

After the i.MX 6Ultralite Linux 3.14.52 file system is downloaded, please extract the specified files in the “Replacement File” column in **Table 6** for the given Murata EVB: 1BW, 1DX, 1FX, and SN8000.

**Table 6: Replacing WLAN Firmware and NVRAM files; Bluetooth Patchfile**

<b>Murata Module EVB</b>	<b>Original File (/etc/firmware/bcm)</b>	<b>Replacement File:</b> Used Linux 3.14.52 file system pulled from <a href="#">fsl-image-gui-x11-imx6ul.tar.bz2</a>	<b>Notes</b>
SN8000	bcmdhd.cal	/lib/firmware/bcm/SN8000_BCM43362/bcmdhd.SN8000.SDIO.cal	Default SDIO in-band interrupt NVRAM.
SN8000	fw_bcmdhd.bin	/lib/firmware/bcm/SN8000_BCM43362/fw_bcmdhd.bin	Client WLAN firmware.
SN8000	fw_bcmdhd_apsta.bin	/lib/firmware/bcm/SN8000_BCM43362/fw_bcmdhd_apsta.bin	SoftAP WLAN firmware.
SN8000	Type_ZP.hcd	N/A	No Bluetooth on SN8000.
1FX	bcmdhd.cal	/lib/firmware/bcm/1DX_BCM4343W/bcmdhd.1DX.SDIO.cal	Default SDIO in-band interrupt NVRAM.
1FX	fw_bcmdhd.bin	/lib/firmware/bcm/1DX_BCM4343W/fw_bcmdhd.bin	Client WLAN firmware.
1FX	fw_bcmdhd_apsta.bin	/lib/firmware/bcm/1DX_BCM4343W/fw_bcmdhd.bin	Same firmware supports Client and SoftAP.
1FX	Type_ZP.hcd	N/A	No Bluetooth on 1FX.
1DX	bcmdhd.cal	/lib/firmware/bcm/1DX_BCM4343W/bcmdhd.1DX.SDIO.cal	Default SDIO in-band interrupt NVRAM.
1DX	fw_bcmdhd.bin	/lib/firmware/bcm/1DX_BCM4343W/fw_bcmdhd.bin	Client WLAN firmware.
1DX	fw_bcmdhd_apsta.bin	/lib/firmware/bcm/1DX_BCM4343W/fw_bcmdhd.bin	Same firmware supports Client and SoftAP.
1DX	Type_ZP.hcd	/etc/firmware/BCM43430A1.1DX.hcd	Bluetooth patchfile.
1BW	bcmdhd.cal	/lib/firmware/bcm/1BW_BCM43340/bcmdhd.1BW.SDIO.cal	Default SDIO in-band interrupt NVRAM.
1BW	fw_bcmdhd.bin	/lib/firmware/bcm/1BW_BCM43340/fw_bcmdhd.bin	Client WLAN firmware.
1BW	fw_bcmdhd_apsta.bin	/lib/firmware/bcm/1BW_BCM43340/fw_bcmdhd.bin	Same firmware supports Client and SoftAP.
1BW	Type_ZP.hcd	/etc/firmware/BCM43341B0.1BW.hcd	Bluetooth patchfile.



---

## 6.2 Setting up System to Allow File Copy/Replace

- 1) Connect both USB console and USB OTG connections on i.MX Platform to Linux PC (or Windows PC with adb utility installed).
- 2) Ensure the shell console is enabled (refer to Section 5.3.2).
- 3) Boot the i.MX Platform and enable USB debugging by clicking on “Settings->About Tablet->Build Number” seven (7) times. This is standard procedure for Android platform.
- 4) Now go to “Settings->Developer options” and turn on “USB debugging”.
- 5) A pop-up window should now prompt you to “Allow USB debugging?” Select “OK” to confirm.
- 6) On shell console, enter the “mount” command to make file system writable: “mount -o remount -rw /system”

## 6.3 Additional Notes on WLAN and Bluetooth File Replacement

- The 1DX and 1FX files only differ when it comes to Bluetooth patchfile. 1FX is a WLAN-only module. The WLAN core on 1DX and 1FX are equivalent.
- “Type\_ZP.hcd” is the default Bluetooth patchfile name. This is specified in “/system/etc/bluetooth/bt\_vendor.conf” file. The approach of replacing this file is done to shorten/simplify the steps. Another option on adding BT patchfiles for other modules would be to modify the “bt\_vendor.conf” file to be consistent with the new patchfile name for the non-ZP module.
- There are two WLAN firmware files used for either Client (fw\_bcmdhd.bin) or SoftAP (fw\_bcmdhd\_apsta.bin) mode. Some modules use the same file for both modes. As such the two files only differ in name. Other modules (ZP and SN8000) have different firmware files: typically used to optimize SoftAP mode (enhance throughput).
- The default WLAN NVRAM file used has SDIO in-band signaling enabled. If out-of-band interrupts are needed, please refer to [Murata Android User Manual](#).

## 6.4 Example Command Sequence to Copy/Replace WLAN and Bluetooth Files

Given the number of different steps, this section is included to provide all the steps (line by line) to end user. In this example, we are modifying Android file system to support Murata Type 1DX EVB.

- ⇒ Follow steps 1 through 5 in Section 6.2. Now enter the “mount” command on the shell console and verify successful response (i.e. “re-mounted”):

```
root@sabresd_6sx:/ # mount -o remount -rw /system
EXT4-fs (mmcblk3p5): re-mounted. Opts: (null)
```

---

Now that the Android file system is re-mounted, we should be able to use “adb push” command from Host PC to transfer files to Android “/sdcard” partition.

- ⇒ Download the [i.MX 6 UltraLite Linux Binary Demo Files](#) package (assume downloads go to “~/Downloads”). Note that in following sequence the one Type 1DX WLAN firmware is being used for both SoftAP and Client. Also, to simplify process we are just renaming the 1DX Bluetooth patchfile to “Type\_ZP.hcd”.

```
cd ~/Downloads
mkdir ~/temp
mv L3.14.52_1.1.0-ga_images_MX6UL.tar.gz ~/temp/
cd ~/temp
tar -xvzf L3.14.52_1.1.0-ga_images_MX6UL.tar.gz
cd L3.14.52_1.1.0-ga_images_MX6UL
tar -xvjf fsl-image-gui-x11-imx6ul.tar.bz2
cd lib/firmware/bcm/1DX_BCM4343W
adb push bcmdhd.1DX.SDIO.cal /sdcard/bcmdhd.cal
adb push fw_bcmdhd.bin /sdcard/fw_bcmdhd.bin
cd ../../../../etc/firmware/
adb push BCM43430A1.1DX.hcd /sdcard/Type_ZP.hcd
```

Now all relevant 1FX files are on the Android “/sdcard” partition. We need to invoke copy command on shell console to move them to the right location on Android file system. However prior to copying over the original files (for Type ZP EVB), we should back the existing files up.

- ⇒ On shell console, enter the following commands:

```
root@sabresd_6sx:/ # mkdir /etc/firmware/bcm/Type_ZP_Backup
root@sabresd_6sx:/ # cp /etc/firmware/bcm/* /etc/firmware/bcm/Type_ZP_Backup/
```

- ⇒ Verify files copied over correctly with “ls” command:

```
root@sabresd_6sx:/ # ls /etc/firmware/bcm/Type_ZP_Backup/
Type_ZP.hcd
bcmdhd.cal
fw_bcmdhd.bin
fw_bcmdhd_apsta.bin
```

- ⇒ Now copy over new 1DX files to “/etc/firmware/bcm” folder from Android “/sdcard” partition:

```
root@sabresd_6sx:/ # cp /sdcard/bcmdhd.cal /etc/firmware/bcm/
root@sabresd_6sx:/ # cp /sdcard/fw_bcmdhd.bin /etc/firmware/bcm/
root@sabresd_6sx:/ # cp /sdcard/fw_bcmdhd.bin /etc/firmware/bcm/fw_bcmdhd_apsta.bin
root@sabresd_6sx:/ # cp /sdcard/Type_ZP.hcd /etc/firmware/bcm/
```

- ⇒ **1DX Wi-Fi and Bluetooth file setup complete!**

**We now have to power down the i.MX platform, connect Murata 1DX EVK and boot up again.**

---

## 7 Test/Verification of Wi-Fi and Bluetooth

With Android's polished interface, this step is definitely easier than Linux. We just use the graphical user interface to verify both Wi-Fi and Bluetooth functionality. The shell console is quite useful for verifying correct/expected output when bringing up either the Wi-Fi or Bluetooth interface.

If there are any issues bringing up either Wi-Fi and/or Bluetooth, then it is highly recommended to attempt bring-up with Linux as it is easier to diagnose failures. Please refer to the [Murata Quick Start Guide \(Linux\)](#) for more information regarding booting the platform with Linux.

### 7.1 Bringing up Wi-Fi for Quick Test/Verification

#### 7.1.1 Associating to Access Point or Wireless Router

Standard Android interface applies. Go to "Settings->Wi-Fi" and turn Wi-Fi on. If hardware/software configured correctly you should see the scan list of visible SSID's.

To show more functionality you can associate to a given Access Point or Wireless Router. Once the IP address is obtained, you can check connectivity by using "ping" command on shell console. Otherwise if AP (associated to) provides an internet connection, you can use the Internet Browser to pull up a desired webpage.

#### 7.1.2 Testing Wi-fi Direct

The Murata Wi-Fi solution on i.MX supports Wi-Fi Direct. You can test both modes: P2P GO (Group Owner) and P2P Client. Go to "Settings->Wi-Fi->Advanced->Wi-Fi Direct". From the "Wi-Fi Direct" menu, you can now initiate a P2P GO or respond to an "Invitation to Connect" (P2P Client). If a P2P connection is successful, you will see "Connected" under the "Peer devices" name.

Now that we have two devices associated in P2P network, we can invoke "ping" from shell console to test connectivity. To query the IP address of i.MX platform's wireless connection, you can invoke "ifconfig p2p-wlan0-0" at the shell console. **Note:** if "p2p-wlan0-0" does not work then look through the shell console output for "p2p-wlan0-x" where "x" is an integer.

#### 7.1.3 Testing Wi-Fi Hotspot (SoftAP)

The Murata Wi-Fi solution on i.MX supports Wi-Fi hotspot. Go to "Settings->More->Tethering & portable hotspot". Click on "Set up Wi-Fi hotspot" to customize SSID, security setting and password required by client for authentication. Now enable the hotspot by turning on "Portable Wi-Fi hotspot". If successful the string "Portable hotspot <SSID Name> active" should appear below "Portable Wi-Fi hotspot" field.

Second step is to now associate to Wi-Fi hotspot from a client. Once association is successful, you can run a connectivity test using "ping" command on shell console. To find IP address of Wi-Fi hotspot, enter "ifconfig wlan0" on shell console.

## 7.2 Bringing up Bluetooth for Quick Test/Verification

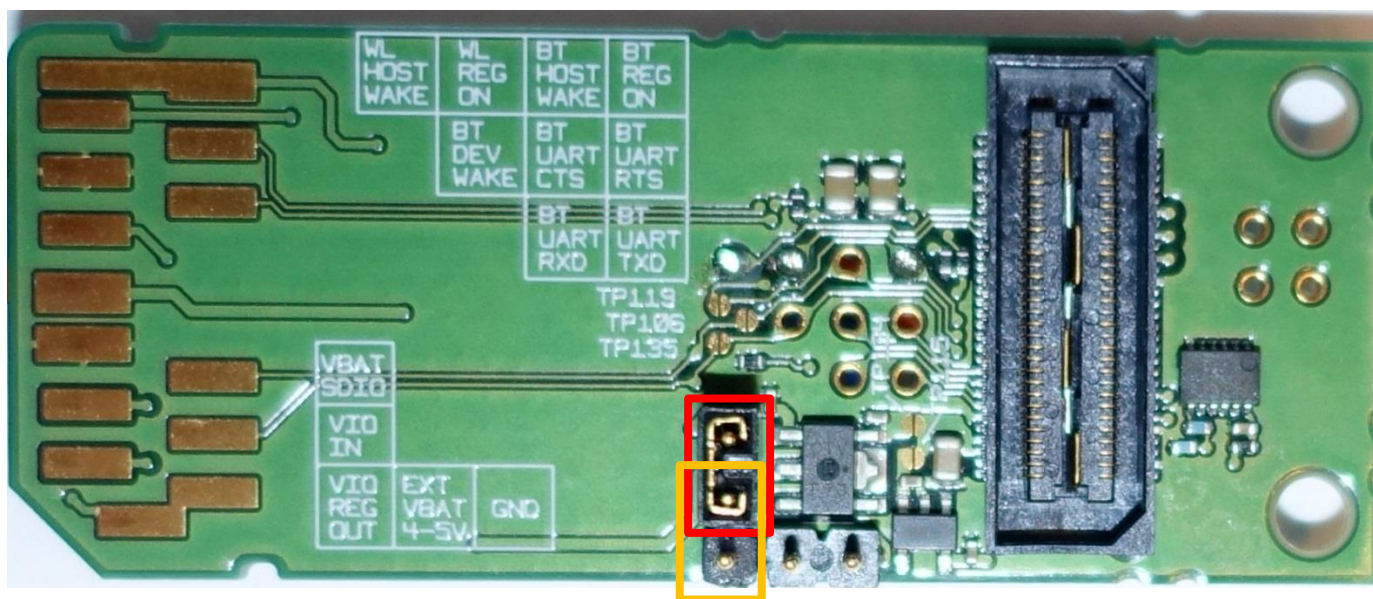
To verify Bluetooth connectivity (not enabled on i.MX 6SoloLite EVK), just go to “Settings->Bluetooth” and turn on. The visible Bluetooth devices should then come up under “Available devices”. To check connectivity you can pair/connect with a specific Bluetooth device.

## 8 Verifying Adapter Boards

To ensure correct functioning of Murata Wi-Fi/BT EVK, it is of key importance to check the adapter configuration based upon jumper settings and short pads open/closed.

### 8.1 Murata i.MX InterConnect V1 Adapter

Figure 5: Murata i.MX InterConnect V1 Adapter – Top

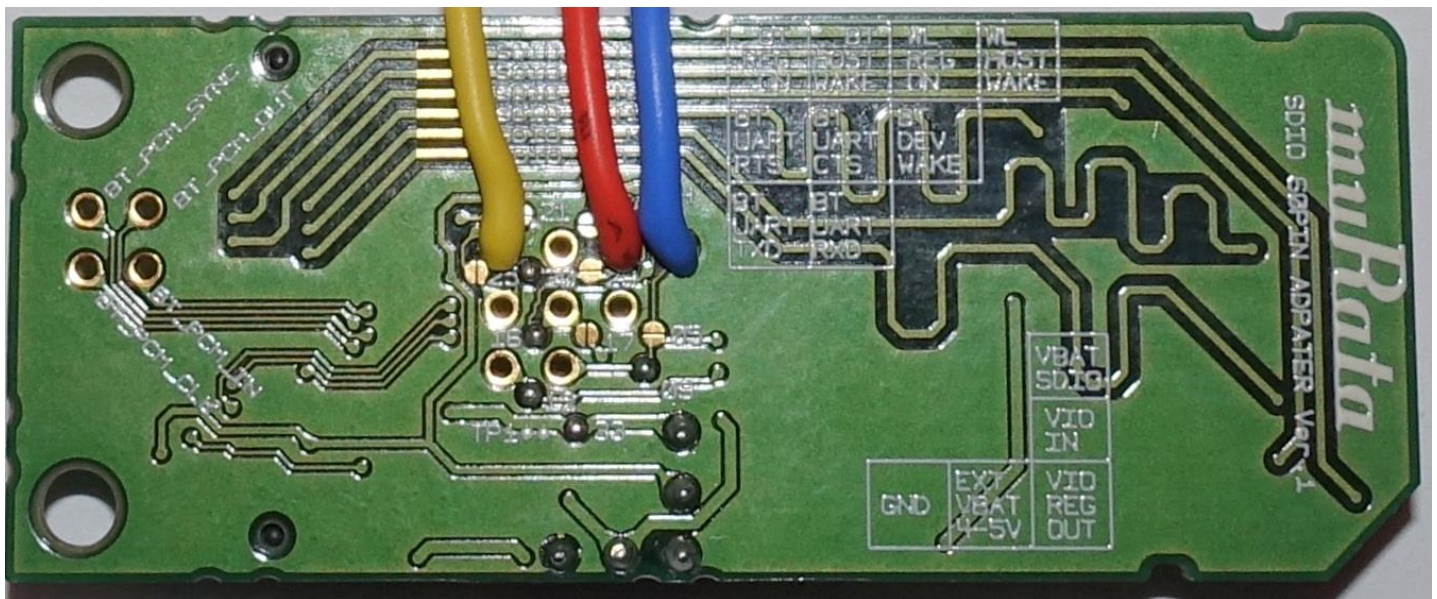


Refer to **Figure 5** for default configuration on V1 Adapter board. VIO jumper should be in **RED** position – set for VBAT\_SDIO which is approximately 3.3V (i.e. VIO = VBAT). The adapter allows for 1.8V VIO operation (**ORANGE** position) but this Quick Start Guide currently does not support that option. A future revision will support both 1.8V and 3.3V VIO signaling on platforms/configurations that permit it. Note that there are **no closed** (soldered) short-pads on V1 Adapter from top view. Of course you will see the soldered connections for WL\_HOST\_WAKE, WL\_REG\_ON, and BT\_REG\_ON. Two figures are presented for the bottom side of the Murata i.MX InterConnect V1 Adapter. This is done to give unobstructed views of all the short pads. Refer to **Figure 6: Murata i.MX InterConnect V1 Adapter – Bottom #1** and **Figure 7: Murata i.MX InterConnect V1 Adapter – Bottom #2** for default configuration on V1 Adapter Board. Compare your adapter with the short pads (open versus closed). There should be a one-to-one mapping. The short pad selections on bottom of adapter board connect Bluetooth UART through to SD\_DAT4..7 pins (TP109, TP122, TP116, and TP130 closed/soldered). TP133 short pad is closed/soldered to connect VBAT\_SDIO (voltage supply from SD VDD Pin #4) to VBAT\_IN which powers the Murata Wi-Fi/BT EVB. The other

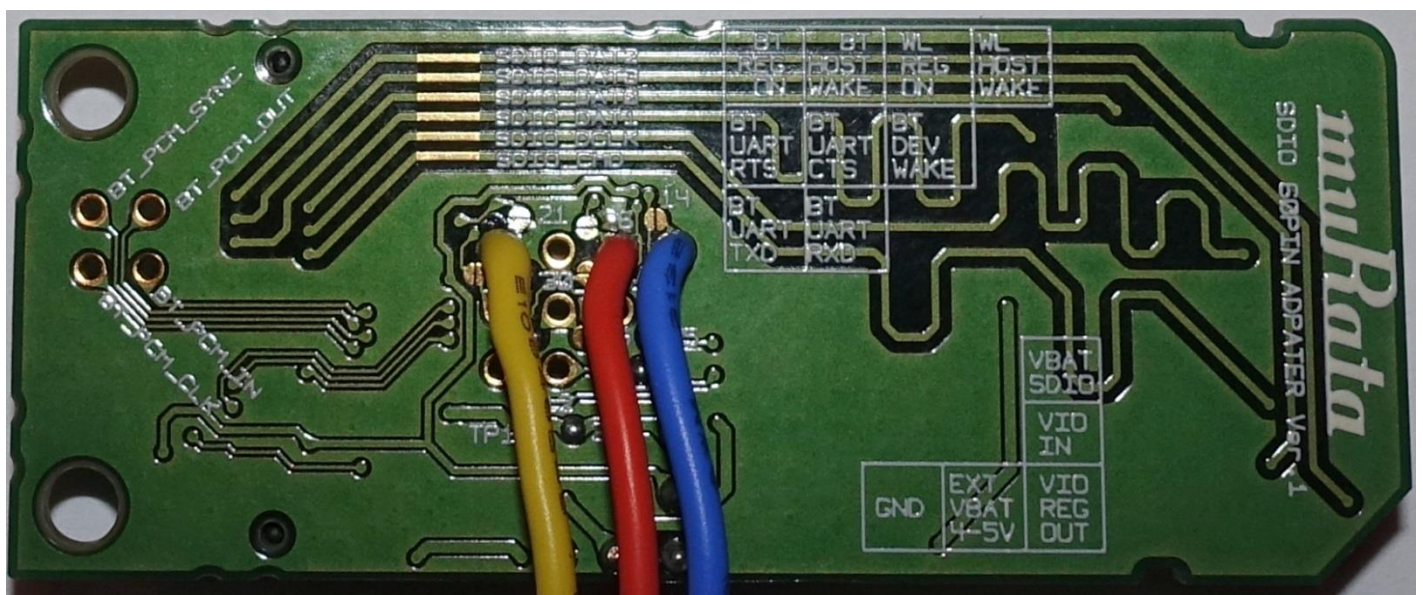


power supply option is to use an external power supply: short TP134 (with TP133 open) and connect external supply to TP131 and TP132 (marked “EXT VBAT 4-5V” and “GND” on silkscreen – see **Figure 5**. The V1 Adapter is pre-wired to SD Card Extender. This is done to provide “plug ‘n play” interoperability with NXP i.MX 6SoloX SABRE-SD and i.MX 6SoloLite EVK. The connected signals are BT\_REG\_ON (yellow), WL\_REG\_ON (orange), and WL\_HOST\_WAKE (blue). This allows direct mapping to i.MX6 GPIO’s to these control signals. For additional specific information on default configuration, please reference the [Murata Hardware User Manual](#).

**Figure 6: Murata i.MX InterConnect V1 Adapter – Bottom #1**



**Figure 7: Murata i.MX InterConnect V1 Adapter – Bottom #2**

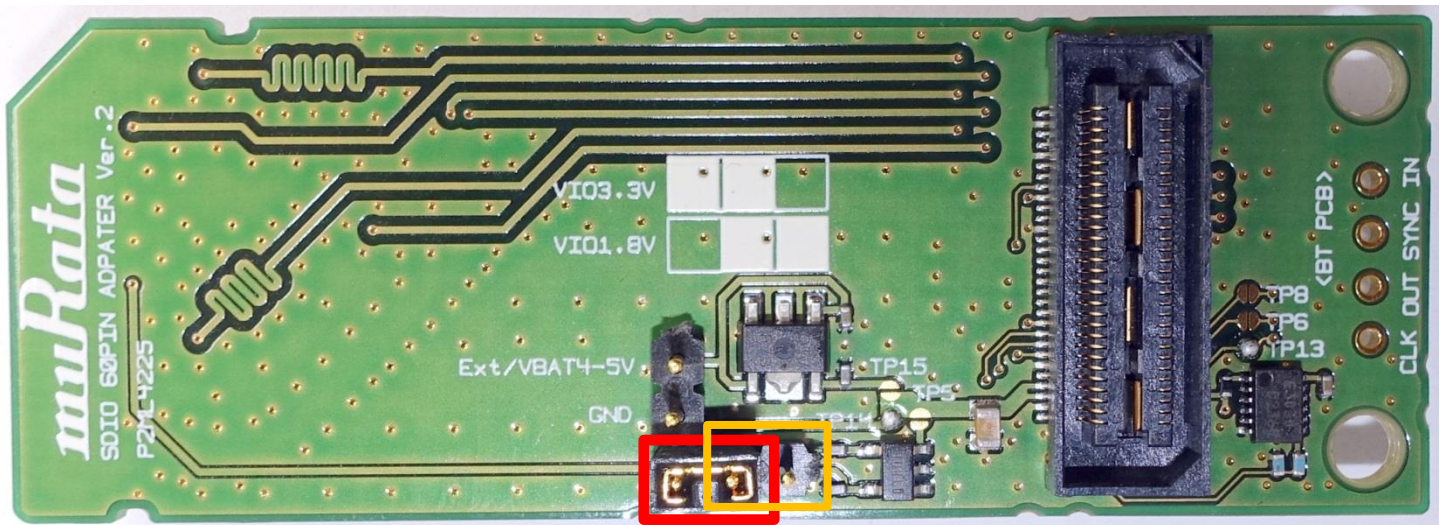




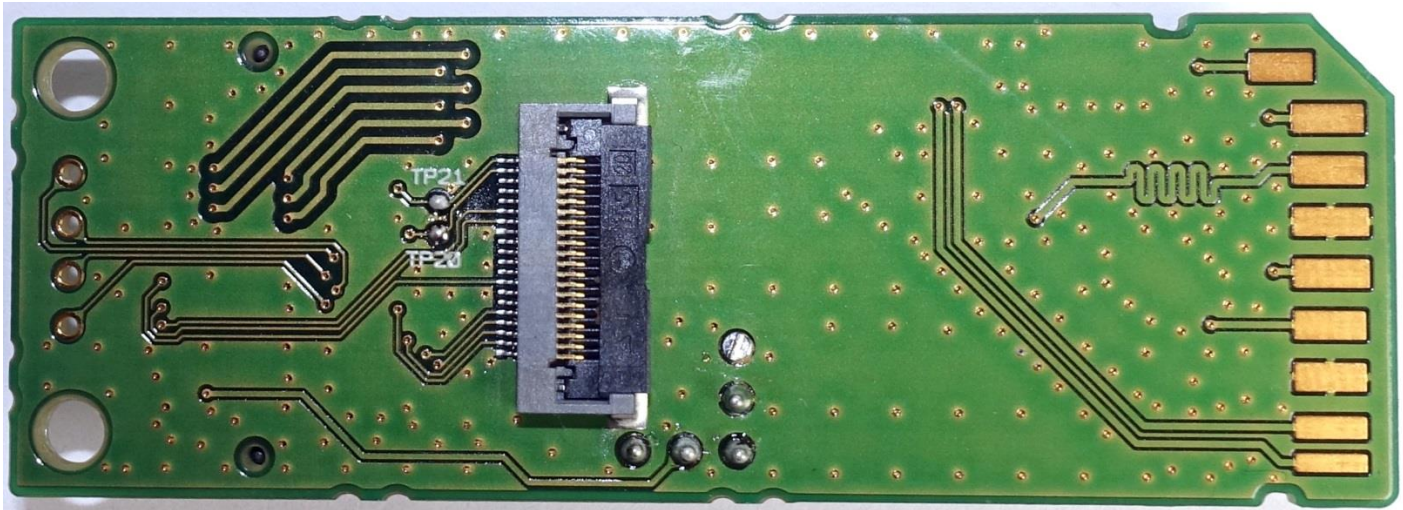
## 8.2 Murata i.MX InterConnect V2 Adapter

To ensure correct functioning of Murata Wi-Fi/BT EVK, it is of key importance to check the adapter configuration based upon jumper settings and short pads open/closed. V2 Adapter is much simpler than V1. However it is still important to check all connections to make sure they match defaults. Refer to **Figure 8: Murata i.MX InterConnect Adapter V2 Adapter – Top**. VIO jumper should be in **RED** position – set for VBAT\_SDIO which is approximately 3.3V (i.e. VIO = VBAT). The adapter allows for 1.8V VIO operation (**ORANGE** position) but this Quick Start Guide currently does not support that option. A future revision will support both 1.8V and 3.3V VIO signaling on platforms/configurations that permit it. Only two short pads are close on top: TP14 and TP13. TP14 short pad is closed/soldered to connect VBAT\_SDIO (voltage supply from SD VDD Pin #4) to VBAT\_IN which powers the Murata Wi-Fi/BT EVB. The other power supply option is to use an external power supply: short TP15 (with TP14 open) and connect external supply to TP11 and TP12 (marked “Ext/VBAT4-5V” and “GND” on silkscreen - see **Figure 8**). TP13 connects the BT\_REG\_ON control signal.

**Figure 8: Murata i.MX InterConnect Adapter V2 Adapter – Top**



**Figure 9: Murata i.MX InterConnect Adapter V2 Adapter - Bottom**



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Refer to **Figure 9: Murata i.MX InterConnect Adapter V2 Adapter - Bottom**. Both TP20 and TP21 short pads are closed to connect WL\_REG\_ON and WL\_HOST\_WAKE respectively. WL\_HOST\_WAKE is an optional out-of-band interrupt signal that is not defined in this Quick Start document. It will be documented (and optionally enabled) in future version. For additional specific information on default configuration, please reference the [Murata Hardware User Manual](#).

## 9 Technical Support Contact

Contact Wireless module application support at [imxfaq@murata.com](mailto:imxfaq@murata.com)