Upgrading BL653 Firmware via JTAG

BL653 Development Kit: Part # 453-00039-K1 and 453-00041-K1

BL653 Modules: Part # 453-00039 and 453-00041

BL653μ Modules: Part # 453-00059 and 453-00060

Application Note   *v1.0*

1   INTRODUCTION

The goals of this document include the following:

- To detail the setup procedure for interfacing with the BL653 development kit, Part # 453-00039-K1and 453-00041-K1
- To explain the method of upgrading the BL653 and BL653μ firmware over the JTAG interface

2   REQUIREMENTS

- Laird Connectivity BL653 development kit, Part # 453-00039-K1 and 453-00041-K1or equivalent (with USB to JTAG connection to the BL653 module, Part # 453-00039 and 453-00041 or BL653μ module, Part # 453-00059 and 453-00060)
- 1x USB-A to USB-micro cable
- PC with Windows/MacOS/Linux running UwTerminalX, provided by Laird Connectivity at https://github.com/LairdCP/UwTerminalX/releases
- Desired firmware package, found in the Software Downloads tab of the BL653 Product Page

    Note: BL653 and BL653μ use the same firmware image

For verification, you need the following:
- Laird Connectivity BL653 development kit (or equivalent RS-232 to serial connection to the BL653 or BL653μ module)
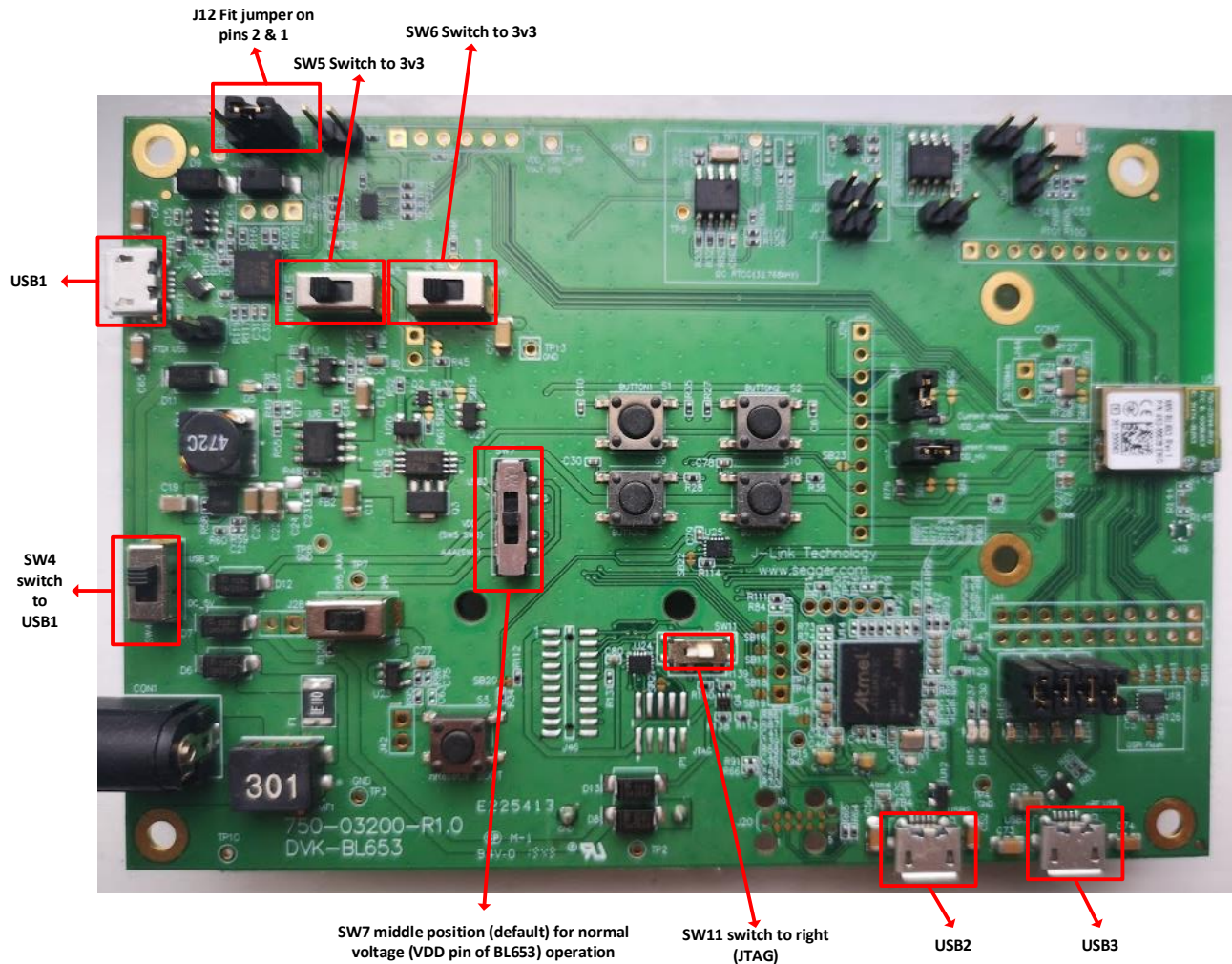- FTDI USB to serial drivers for the BL653 development kit (found at http://www.ftdichip.com/FTDrivers.htm)

3   OVERVIEW

To upgrade the module, you must use Laird Connectivity's development board or your own equivalent implementation to provide a JTAG access to the module.

3.1   Initial Setup Using BL653 Development Kit

To set up, complete the following steps.

1. Configure the BL653 development kit to the following settings:
    - DC/USB power source switch (SW4) to USB_5V
    - Switches SW6 and SW5 to 3V3
    - Set SW7 in the middle position – VDD (SW5 SW6) and SW11 to the right as shown on the Figure 1
2. Connect USB1 on the development kit to your PC via the included USB-A to USB micro cable.

J12 Fit jumper on pins 2 & 1

SW6 Switch to 3v3

SW5 Switch to 3v3

USB1

SW4 switch to USB1

SW7 middle position (default) for normal voltage (VDD pin of BL653) operation

SW11 switch to right (JTAG)

USB2

USB3

Figure 1: BL653 development board

3. Install the FTDI USB to serial driver (found at http://www.ftdichip.com/FTDrivers.htm).
4. Ensure that the Windows Device Manager displays a new virtual COM port for the USB to serial adapter.
5. Launch UwTerminalX (available at https://github.com/LairdCP/UwTerminalX/releases)
6. From the Update tab in UwTerminalX, click **Check for Updates** to ensure you're using the latest version of UwTerminalX with support for the BL653.
7. From the Config tab in the Device drop-down menu, select **BL65x** to populate the baud, parity, stop bits, data bits, and handshaking settings. If BL65x is not a selectable device because you have an older version of UwTerminalX, set the following:
    - Baudrate: 115200
    - Parity: None
    - Stop Bits: 1
    - Data Bits: 8
    - Handshaking: CTS/RTS
8. In the Port drop-down menu, select the COM port associated with your BL653 development kit.

    Note: If you have a cable connected to the USB2 port (at the bottom of Figure 1), it also installs another COM port. Do not select this port.

9. At the top of the screen, click **OK.**

4   CHECKING FIRMWARE VERSION

Once the module has been connected, type *AT I 0* to confirm you are connected to a BL653.

Type AT I 3 to display the firmware version (Figure 2).

Note: If your development board is pre-programmed with an autorun application, you must manually place the BL653 module into interactive mode.

To do this, complete the following:

1. Ensure the J12 jumper is positioned on pins 1-2.
2. In UwTerminalX, make sure the DTR checkbox on the terminal tab is unchecked.
3. Press the reset button on the module (or on UwTerminalX, check and uncheck the BREAK checkbox which results in a reset of the module).

Your module should now be in interactive mode.
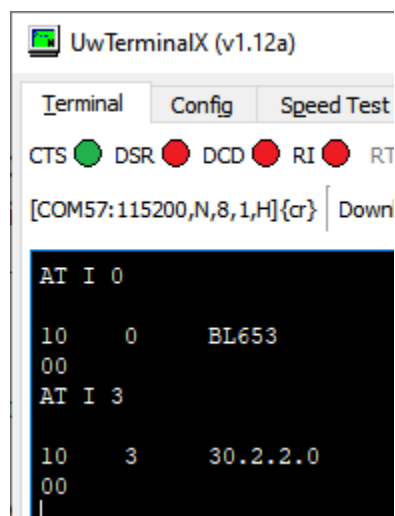
Figure 2: AT I 3 command returning the firmware version number

Now close UwTerminalX before proceeding to the next section.

Warning: Upgrading the firmware clears any programs, configuration keys or data stored on the module.

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4.1 Downloading and Installing the J-Link Driver

If the J-Link driver is already installed on your PC, you may skip this section and proceed to the Firmware Upgrade Procedure section.

To download and install the J-Link driver, follow these steps:
1. Download the Windows drivers for the J-Link from:
   https://www.segger.com/downloads/jlink/#J-LinkSoftwareAndDocumentationPack
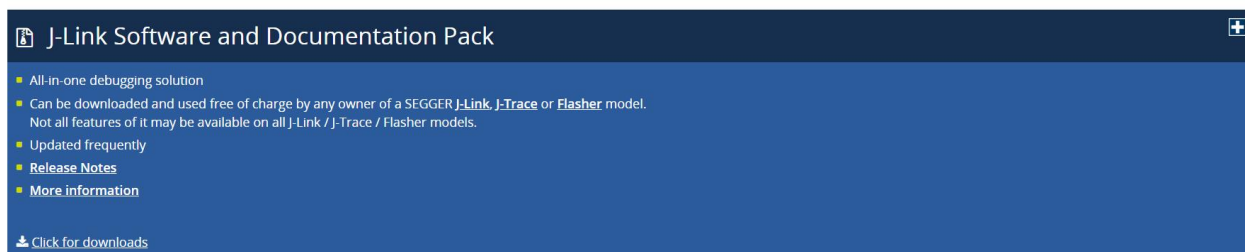
Figure 3: J-Link Driver download page

2. Run the executable to install the J-Link software.
3. Unplug the USB cable from USB1 port and plug it into USB2 port on the BL653 Development Kit (see below). Installation proceeds automatically.
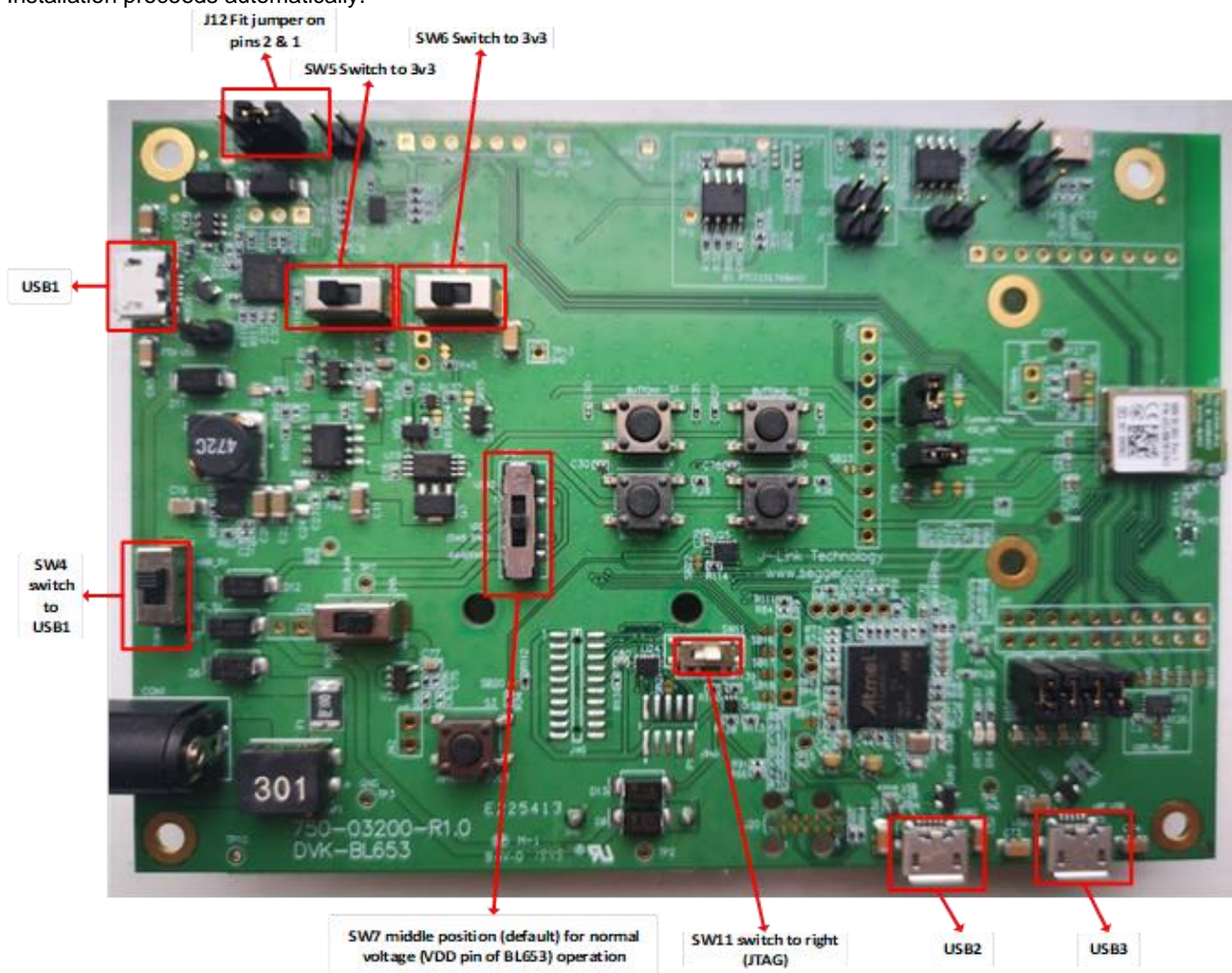
Figure 4: BL653 development board showing the JTAG USB2 port
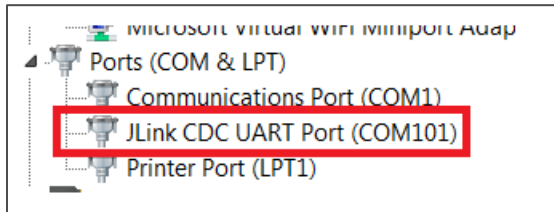
Figure 5: Device manager shows that the J-Link driver is correctly installed

If the J-Link driver is successfully installed, *JLink CDC UART Port (COMx)* appears in the device manager. **Do not use this port to check for BL653 version number as this virtual COM port is not connected through to the module UART.**

4.2 Firmware Upgrade Procedure

The upgrade package is provided as a .zip file, so decompress into a new folder of your choice. The filename is in the following format:

480-00073_1_ BL653_Firmware_For_Upgrade_v30_X_Y_Z-rN.zip where X,Y,Z is the version number of the firmware and –rN is an optional suffix that is present if the zip file has new content apart from the firmware image, like for example corrections in the user guide or other documentation.

Note: Do not decompress into an existing folder, as there is potential for confusion with regards to firmware upgrade files. We recommend you decompress the zip file into a folder with the same name as the zip filename.

1. In the decompressed folder, enter the Firmware directory and launch _**DownloadFirmwareJlink .bat** (either double-click it or launch it from a command prompt console window).
2. If the J-Link firmware is outdated, the following dialog box displays (Figure 6):

Figure 6: J-Link firmware update dialog

3. Click **Yes** to update the J-Link firmware. The BL653 firmware upgrade process resumes automatically and displays a command prompt box.
4. When the BL653 firmware download completes, the console window displays the following:

Figure 7: Firmware upgrade is in progress

5. If you see the following error (see Figure 8) when attempting to download the firmware, please check all jumpers and switches setting the BL653 development board are correct.

Figure 8: J-Link error message due to wrong jumper or switch position on the BL653 DVK

To check that the firmware version number matches the firmware upgrade package version, follow these steps:

1. Cycle power to the module.
2. Unplug the cable from USB2 port and plug it into the USB1 port.
3. Open UwTerminalX (or any other terminal emulator).
4. Select the COM port (associated with USB1) for the BL653 devkit at 115200,N,8,1.
5. Send the following command string: **AT   I   3**
6. Use the response string to confirm the version numbers match with the version in the filename of the zip file.

Note: Please note there is at least one space between the 'I' and 3.

5 FURTHER INFORMATION

Further information relating to the BL653 module is available from the BL653 product page of the Laird Connectivity website: https://www.lairdconnect.com/wireless-modules/bluetooth-modules/bluetooth-5-modules/bl653-series-bluetooth-51-802154-nfc-module.

6 REVISION HISTORY

Version	Date	Notes	Contributor(s)	Approver
1.0	11 Jan 2021	Initial Release	Kieran Mackey	Jonathan Kaye

www.lairdconnect.com/bluetooth
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