BlueEva+S50/Central Evaluation Kit User Guide

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APPLICABILITY TABLE

PRODUCTS

- BLUEEVA+S50/AI/CEN

CONTENTS

NOTICE **2**

COPYRIGHTS **2**

COMPUTER SOFTWARE COPYRIGHTS **2**

USAGE AND DISCLOSURE RESTRICTIONS **3**

APPLICABILITY TABLE **4**

CONTENTS **5**

1. INTRODUCTION **7**

1.1. Scope 7

1.2. Audience 7

1.3. Contact and Support Information 7

1.4. Text Conventions 8

1.5. Related Documents 8

2. PACKAGE CONTENT **9**

3. HARDWARE **10**

3.1. BlueMod+S50 10

3.2. Reset 10

3.3. USB Interface 10

3.4. LEDs 11

3.5. External Low Power Oscillator 11

3.6. Connectors / Jumpers 11

3.6.1. Jumper J2 11

3.6.2. Jumper J3 11

3.6.3. Jumper J4 11

3.6.4. Connector X2 12

3.6.5. Connector X3 13

3.6.6. Connector X4 14

3.7. Current Measurement 14

3.8. Power Supply 14

3.8.1. USB Power Supply 14

3.8.2. External Power Supply 14

3.8.3. Battery Holder 14

3.9. Buzzer 14

3.10. Push Button 14
3.11. How To Interface the UART Lines on TTL level 15
3.12. Default Configuration 16

4. SETUP 17
4.1. System Requirements 17
4.2. Startup 17
4.3. Installation of the BlueEva+S50/Central USB Driver 17

5. USAGE OF THE BLUEEVA+S50/CENTRAL 18
5.1. Configuration of the BlueEva+S50/Central 18
5.2. Connection with Telit “Terminal IO Utility” App 22
5.3. NFC Handover 28
5.3.1. Configure the BlueEva+S50/Central for NFC Handover 28
5.3.2. Example to Demonstrate the NFC Handover 29

6. FIRMWARE UPDATE 30
6.1. Telit IoT Updater 30
6.2. Firmware Update Over the Air (OTA) 32
6.2.1. Firmware Update Over The Air using Nordic nRF Toolbox on Android 32

7. DOCUMENT HISTORY 36

1. INTRODUCTION

1.1. Scope

This document describes the usage of the evaluation kit for the Bluetooth module BlueMod+S50.

1.2. Audience

This document is intended for Telit customers, especially system integrators, about to implement Bluetooth modules in their application.

1.3. Contact and Support Information

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

- TS-SRD@telit.com

Alternatively, use:

https://www.telit.com/contact-us/

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

https://www.telit.com/

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5. Related Documents

- [1] BlueMod+S50 Hardware User Guide, 1VV0301505
- [2] UICP+ UART Interface Control Protocol, 30507ST10756A
- [3] BlueMod+S50/Central AT Command Reference, 80578ST10890A
- [4] BlueEva+S50 Schematics

2. PACKAGE CONTENT

The BlueEva+S50/Central package contains the following components:

- 1 x BlueEva+S50 board
- 1 x NFC Antenna Class6/V1.0
- 1 x Mini USB cable
- 1 x Battery CR2032
- 1 x Printed card with download instructions

Figure 1: BlueEva+S50/Central package content

3. HARDWARE

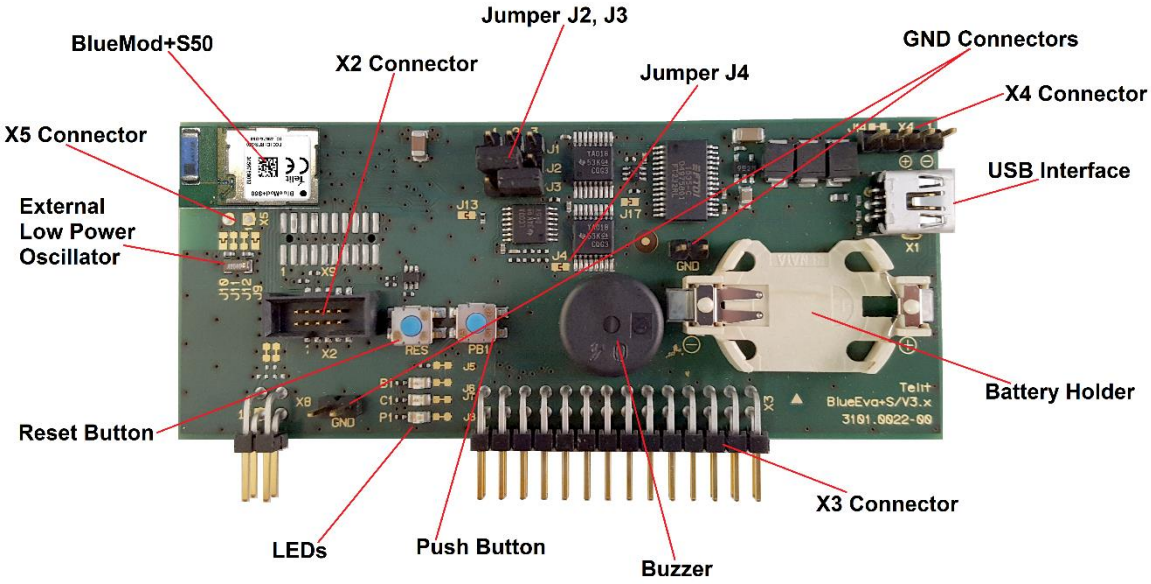


Figure 2: BlueEva+S50

3.1. BlueMod+S50

The BlueEva+S50/Central is equipped with a BlueMod+S50 Bluetooth module.

3.2. Reset

The BlueEva+S50/Central is equipped with a reset button. Pressing the reset button will trigger the BlueMod+S50 module to perform a reset. The USB port is not influenced by the reset.

3.3. USB Interface

The BlueEva+S50/Central provides an USB interface which is used to connect the evaluation board to the host and as power supply.

The USB interface is equipped with an FTDI USB to serial bridge, interfacing the serial port of the BlueMod+S50.

The serial port is a high-speed UART interface at CMOS levels and supports the following features:

- Transmission speed: 9,600 – 921,600 bps (asynchronous)
- Character representation: 8 bit, no parity, 1 stop bit (8N1)
- Hardware flow-control with RTS/CTS (active low)

For details please refer to the BlueMod+S50 Hardware User Guide [1].

3.4. LEDs

The BlueEva+S50/Central provides several LEDs for functional indication.

Interface	Position	Function
LEDs	B1	Connected to GPIO[3] (1)
	C1	Connected to GPIO[2] (1)
	P1	Indicates the presence of power supply voltage

(1) *Function depending on firmware support*

3.5. External Low Power Oscillator

The BlueEva+S50/Central provides an external low power crystal. This is connected to the BlueMod+S50 by default. For using alternatively low power oscillator sources refer to the schematics [4] and the BlueMod+S50 Hardware User Guide [1].

3.6. Connectors / Jumpers

3.6.1. Jumper J2

Jumper J2 provides the possibility to invoke the bootloader at start-up. This is required for firmware update.

J2 Position	Function
1-2	Normal application start
2-3	Invoke bootloader at start-up (BOOT0)

3.6.2. Jumper J3

Jumper J3 is used for either hangup or UICP functionality.

In hangup mode DTR# is connected to GPIO[4]. An existing connection is terminated by DTR drop (high signal on DTR#).

In UICP mode DTR# is used as IUR-IN# signal. UICP is an advanced power management protocol. For further information about UICP please refer to the UICP UART Interface Control Protocol Specification [2].

J3 Position	Function
1-2	DTR# connected to IUR-IN#
2-3	DTR# connected to GPIO[4]

3.6.3. Jumper J4

Jumper J4 provides the possibility to disable (by closing it with a soldering point) the USB to serial bridge. With a closed jumper J4, the in- and outputs of the FTDI chip are disconnected. Therefore the modules serial port can be controlled via Connector X3 (see chapter 0).

When using BlueEva+S50/Central, be sure to connect a serial interface via connector X3 only when jumper J4 is closed. Otherwise the serial interface and the USB to serial bridge will collide.

3.6.4. Connector X2

Connector X2 is used as “Debug in” to connect a debugger to the BlueMod+S50 module.

3.6.5. Connector X3

Connector X3 is a 28 pin extension header exposing all module signals.

Pin Number	Signal	Type	Description
1	+3V0	PWR	Supply voltage output
2	+3V0	PWR	Supply voltage output
3	GND	PWR	Ground
4	GND	PWR	Ground
5	GPIO[0]	DIS	Reserved
6	GPIO[1]	DIS	Reserved
7	GPIO[2]	DIS	Reserved
8	GPIO[3]	O / DIS	IOB
9	GPIO[4]	I-PD	HANGUP
10	GPIO[5]	DIS	Reserved
11	GPIO[6]	DIS	Reserved
12	GPIO[7]	DIS	Reserved
13	GPIO[8]	O / DIS	IOA
14	GPIO[9]	DIS	Reserved
15	GPIO[10]	DIS	Reserved
16	GPIO[11]	DIS	Reserved
17	GPIO[12]	DIS	Reserved
18	GPIO[13]	DIS	Reserved
19	GPIO[14]	DIS	Reserved
20	XL-OUT/SLCK	LXFO	32,768kHz slow clock crystal (optional, leave open without crystal), see schematic (1)
21	XL-IN/SLCK	LXFO	32,768kHz slow clock crystal (optional, leave open without crystal), see schematic (1)
22	EXT-RES#	I-PU	User reset
23	UART-TXD (2)	O-PP	UART data OUT
24	UART-RXD (2)	I	UART data IN
25	UART-CTS# (2)	I / I-PD	Flow control / IUC_IN
26	UART-RTS# (2)	O-PP	Flow control / IUC_OUT
27	IUR-IN# (2)	I / DIS	UICP control
28	IUR-OUT# (2)	O / DIS	UICP control

PU = PullUp, PD = PullDown, PP = PushPull, DIS = Disconnected, LXFO = Low Frequency Crystal I/O

(1) *Function depending on firmware support*

(2) *BlueEva+S50/Central: Disconnected from module, when jumper J4 is open*

3.6.6. Connector X4

Connector X4 provides the possibility to measure the supply current of the BlueMod+S50 and to power the evaluation board with an external power supply.

Pin Number	Signal
1	GND
2	ext. PWR
3	+3V0
4	+3V0-BT

3.7. Current Measurement

Current measurement can be performed by opening (cut off) jumper J14 and measuring the current drawn by BlueMod+S50 between pin 3 and 4 of connector X4. The currents drawn by other peripherals on BlueEva+S50 are not included in this measurement.

For measuring the minimum current, the serial interface must be disconnected from the module. This can be achieved by disconnecting the USB plug and powering the board via external or battery supply or by closing solder jumper J4.

3.8. Power Supply

The three power sources are decoupled from each other by diodes connected in series. The presence of the supply voltage is indicated by LED P1.

3.8.1. USB Power Supply

VBUS of the USB connector X1 directly powers the USB to serial converter and via a voltage regulator the rest of the circuitry.

3.8.2. External Power Supply

Pin 1 and 2 of connector X4 provides the possibility to connect an external power supply (see BlueMod+S50 Hardware User Guide [1]).

3.8.3. Battery Holder

The battery holder provides the possibility to run the BlueEva+S50/Central without external power (via USB or external power supply) by using a 3V coin cell battery CR2032. Opening jumper J8 will disconnect the power LED P1 and thus save 1.8mA of battery current. For safety reasons there should be permanently connected no other power supply, when a battery is inserted.

3.9. Buzzer

The Buzzer [(1)] can be used to generate alarm and other audible signals.

[(1)] Function depending on firmware support

3.10. Push Button

The Push Button [(1)] can be used as input for human interaction.

[(1)] Function depending on firmware support

3.11. How To Interface the UART Lines on TTL level

If you want to access the UART lines directly it is important to disable the onboard USB to serial bridge by closing jumper J4 with a soldering point.

All UART signals are available at connector X3 and can be connected to your application.

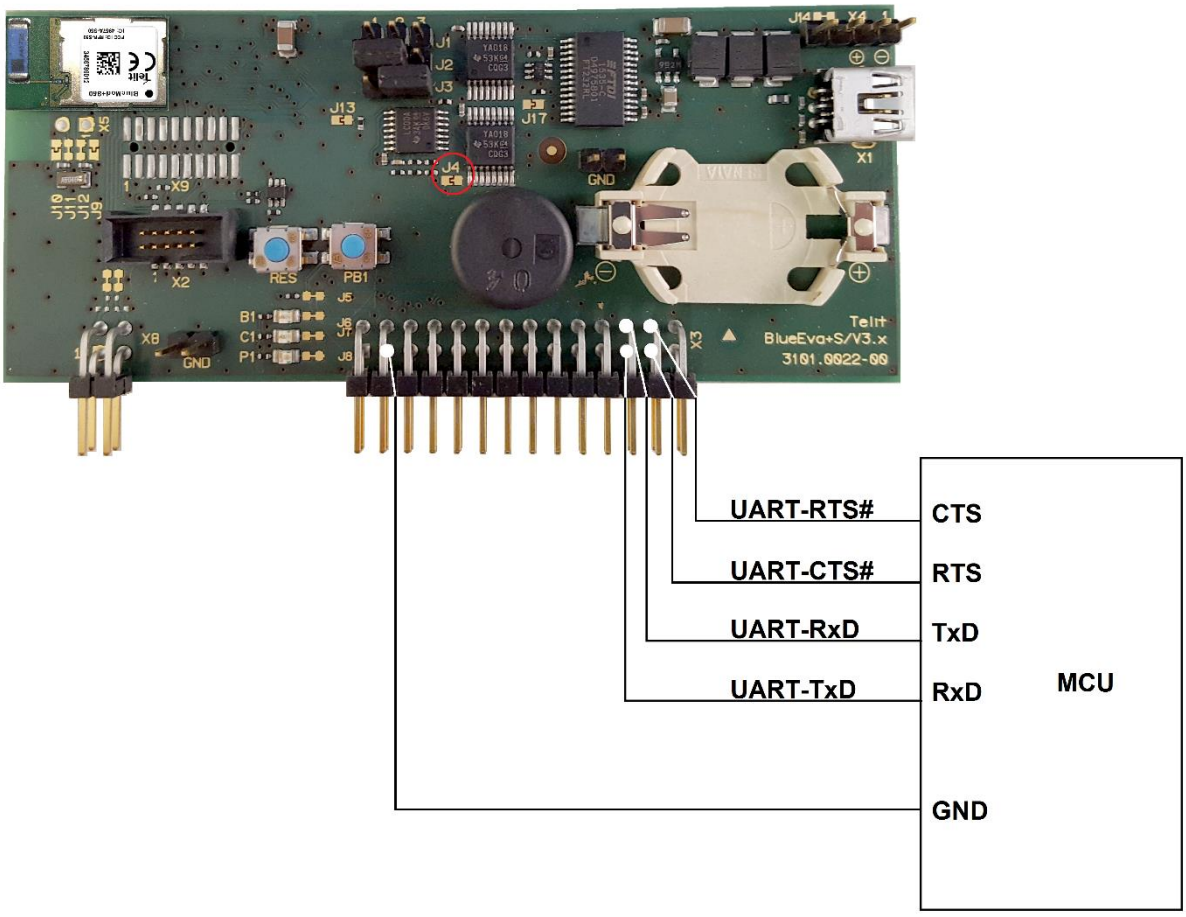


Figure 3: MCU connected to UART lines

3.12. Default Configuration

The BlueEva+S50/Central is preconfigured as described below:

Jumper Number	Position	Function
J2	1-2	Normal operation mode at start-up
J3	2-3	DTR# connected to GPIO[4] (Hangup mode)

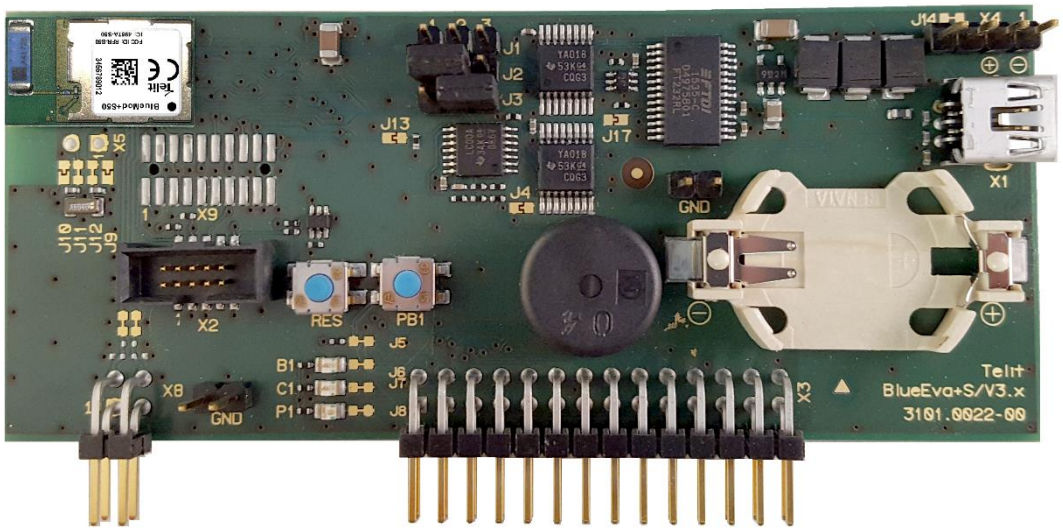


Figure 4: BlueEva+S50/Central default configuration

4. SETUP

4.1. System Requirements

- PC with Windows® XP or higher
- 1 free USB port
- Adobe Acrobat® Reader for reading the documentation

4.2. Startup

To install the BlueEva+S50/Central connect it as follows.

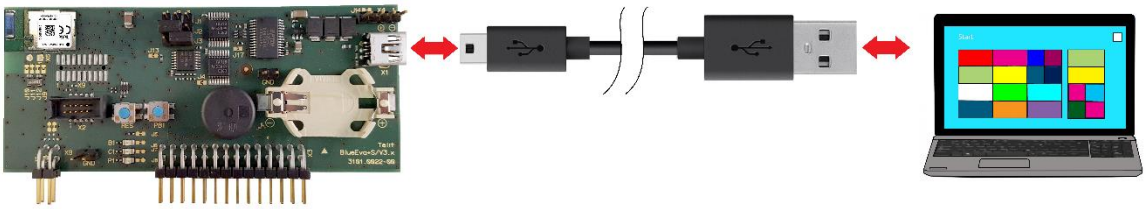


Figure 5: Connect the BlueEva+S50/Central to your PC

4.3. Installation of the BlueEva+S50/Central USB Driver

If required download the latest FTDI VCP USB to UART driver from:

http://www.ftdichip.com/Drivers/VCP.htm

Connect the BlueEva+S50/Central to a free USB port of a PC and install the USB device drivers by following the instructions of the Windows® Hardware Wizard using the downloaded FTDI VCP USB to UART driver.

The USB connection is used for power supply and for UART communication to a PC over a virtual COM port. This lets you use a terminal emulation program to perform the configuration or to control the Bluetooth connection.

You may use the Telit AT Controller (version 3.4.11 or higher) to communicate with the BlueEva+S50/Central. The Telit AT Controller is available in the download zone.

5. USAGE OF THE BLUEEVA+S50/CENTRAL

5.1. Configuration of the BlueEva+S50/Central

If the BlueEva+S50/Central is correctly connected to the PC, the Telit AT Controller (or any other terminal emulation program) can be used to read and modify the configuration settings.

Figure 6: Telit AT Controller main menu

As shipped by the factory, the BlueEva+S50/Central works at 115,200 bps, using the 8N1 data format (8 data bits, no parity, 1 stop bit). Please configure the Telit AT Controller accordingly. Select the COM port the BlueEva+S50/Central is connected to (COM7 in the example below).

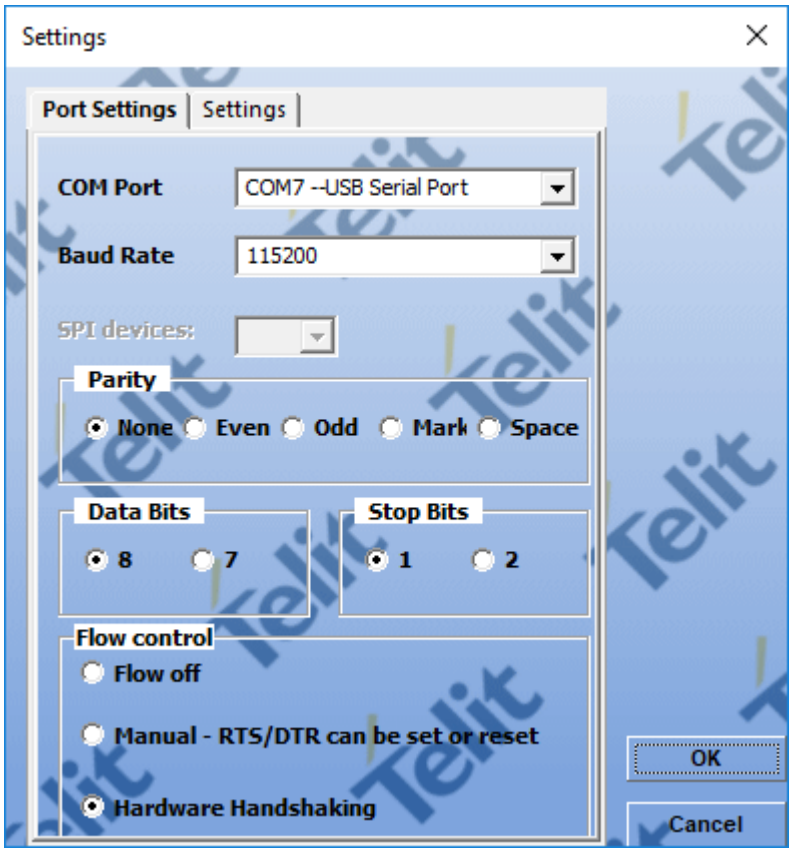


Figure 7: Telit AT Controller settings

Once you have successfully configured the Telit AT Controller press the “Connect” button to connect to the BlueEva+S50/Central and receive the device information.

Figure 8: Telit AT Controller device information

Now you can start the AT Terminal to communicate with the BlueEva+S50/Central using AT commands (e.g. set the local device name with at+bname=test123).

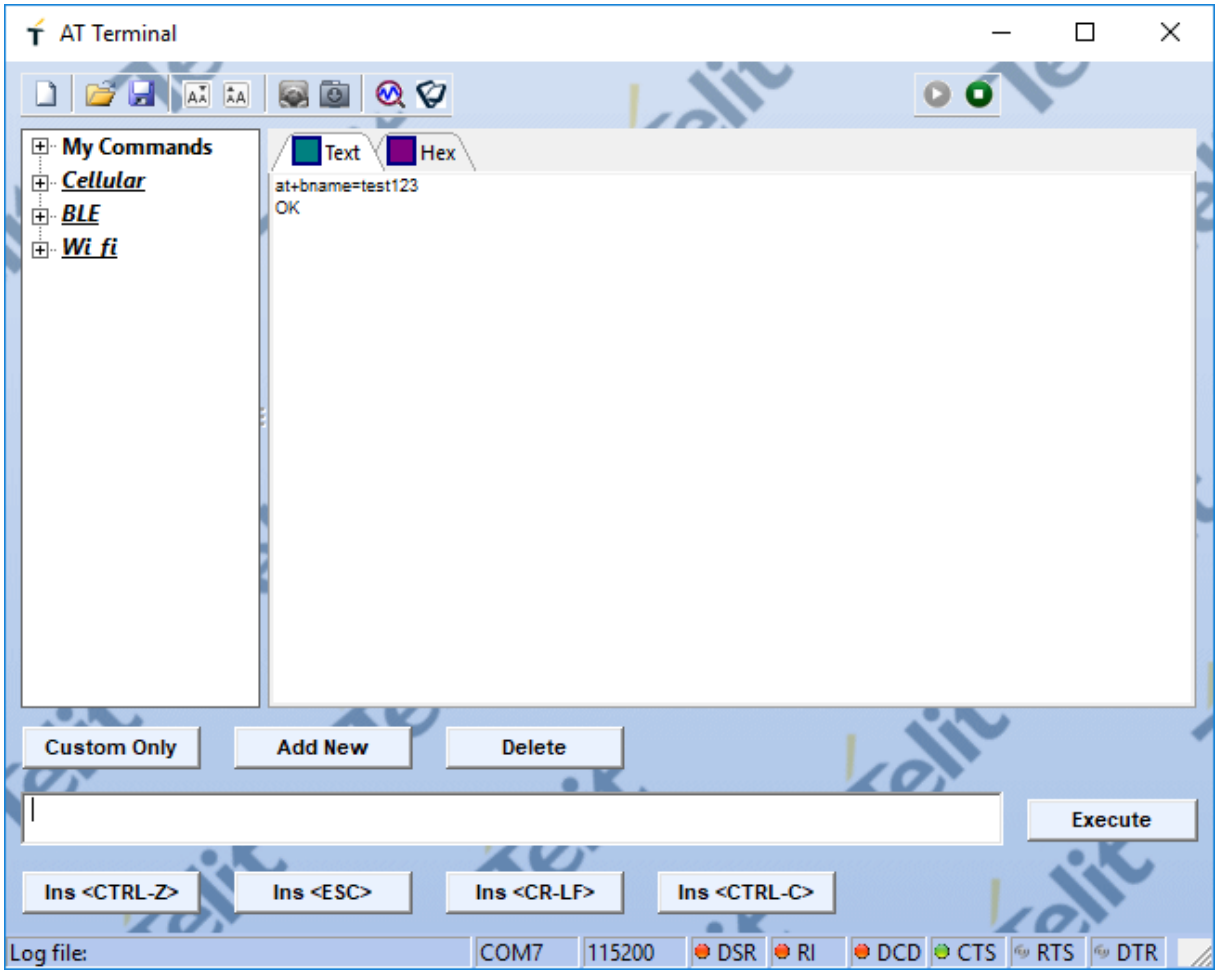


Figure 9: AT Terminal communication

For a more detailed description of the AT commands used for this purpose, please consult our BlueMod+S50/Central AT Command Reference [3].

5.2. Connection with Telit “Terminal IO Utility” App

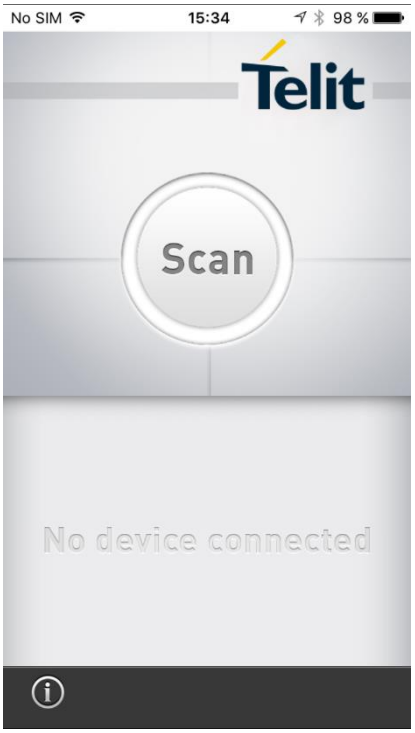
Telit provides the "Terminal IO Utility" App for iOS and Android which can be used to establish a Bluetooth Low Energy connection from a smartphone to the BlueEva+S50/Central.

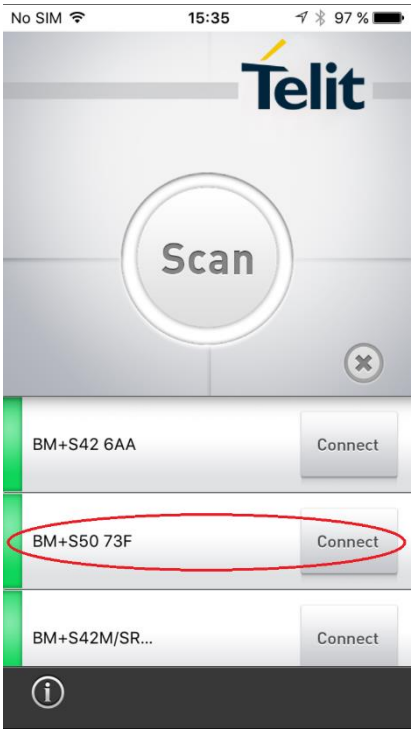
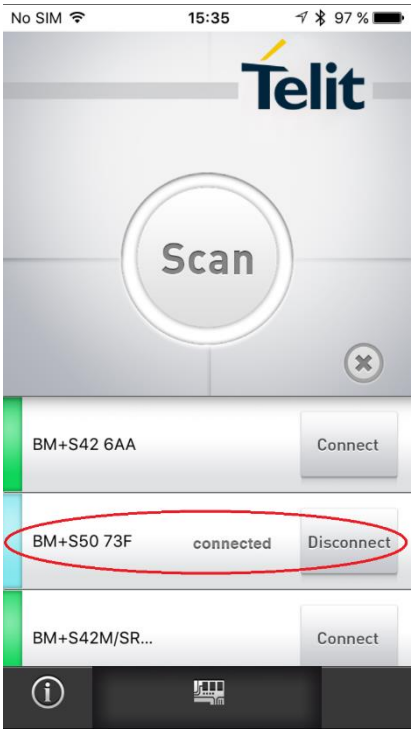
The following QR-Codes provide the link to download the "Terminal IO Utility".

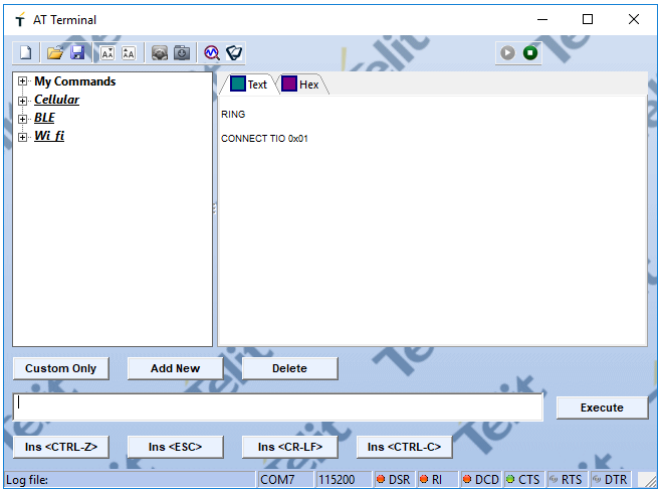
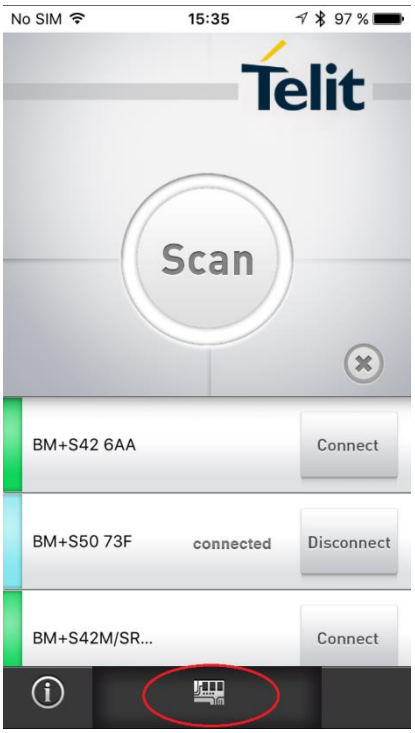
iOS	Logo	Android

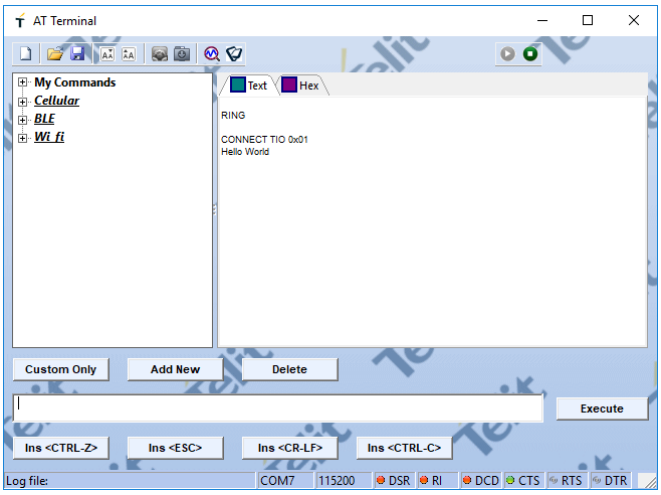
The “Terminal IO Utility” App allows the user to connect to Terminal I/O peripheral devices and exchange data providing a simple terminal emulation.

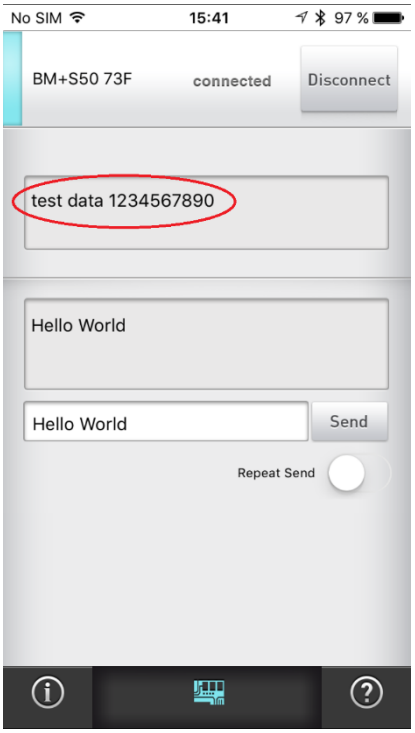
Please find below an example using the “Terminal IO Utility” App for iOS:

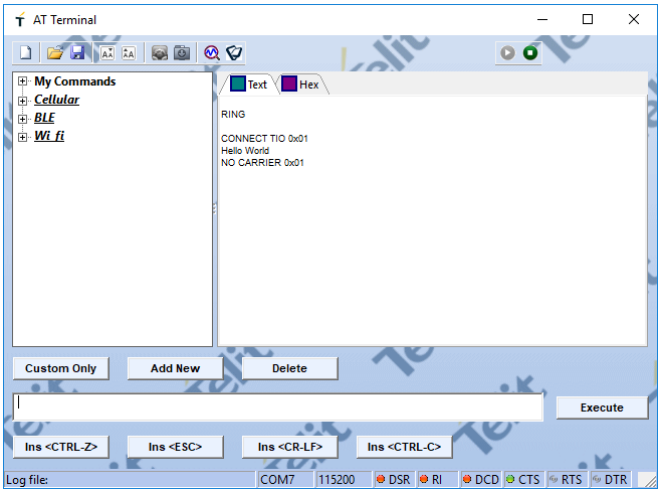
Press the “Scan” button to search for available Terminal I/O peripheral devices.	

Check if your BlueEva+S50/Central device (BM+S50 xxx) is found and press the “Connect” button to establish the connection to the BlueEva+S50/Central.	
The first connection attempt will last some seconds. If the connection attempt succeeded the device status is changed to “connected”.	

The BlueEva+S50/Central is sending a RING message followed by a CONNECT TIO 0x01 message at the serial port.	
For transmitting data to the BlueEva+S50/Central click on the icon at the bottom of the page.	

Enter data in the corresponding field and press the “Send” button.	
The BlueEva+S50/Central is receiving the sent data. To send data from the BlueEva+S50/Central to the iPhone just enter the data in the terminal emulation program (data are not echoed in the example).	

The “Terminal IO Utility” app on the iPhone is receiving the data.	
To terminate the connection, press the “Disconnect” button.	

After the connection is terminated the BlueEva+S50/Central is sending a NO CARRIER 0x01 message.	

5.3. NFC Handover

This chapter shows how to simplify the Bluetooth pairing via NFC by using the BlueEva+S50/Central and the NFC Utility app for NFC enabled Android devices.

Requirements regarding the smartphone:

- Android 4.1 or higher
- NFC supported
- Bluetooth and NFC activated

5.3.1. Configure the BlueEva+S50/Central for NFC Handover

To use the NFC functionality, connect the NFC board to the BlueEva+S50/Central board as follows:

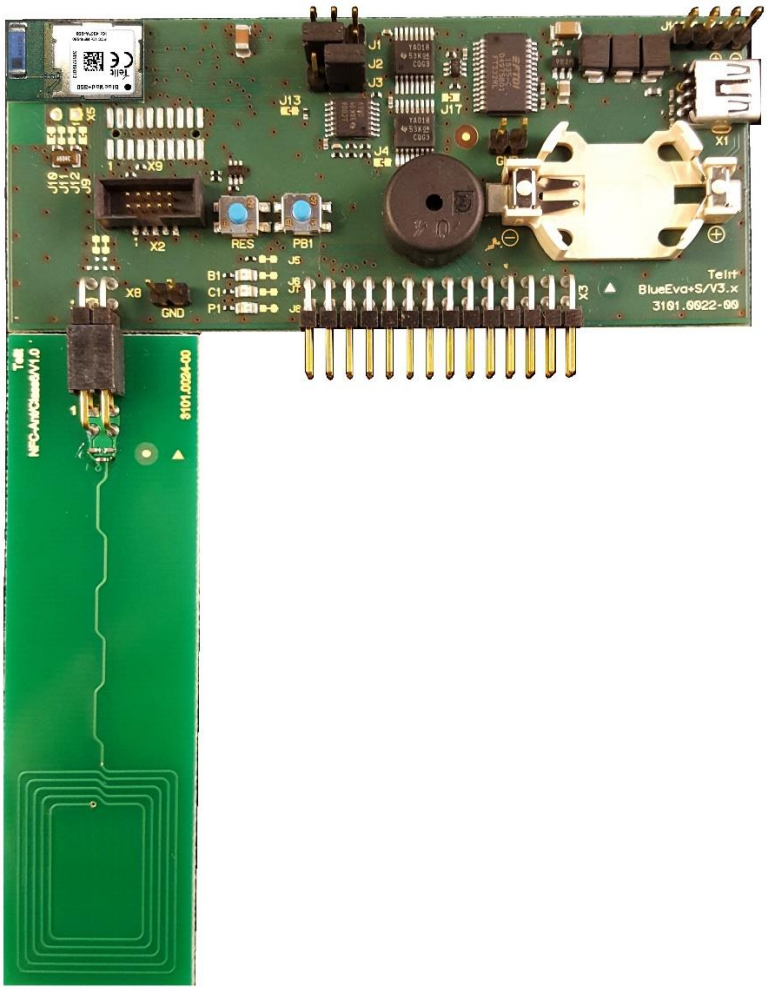


Figure 10: BlueEva+S50/Central with connected NFC board

Then connect the BlueEva+S50/Central to a free USB port on your PC and open the Telit AT Controller, press the “Connect” button and start the AT Terminal. The serial port settings are the same as described in chapter 4.2.

Enable the NFC Handover functionality by using the following AT command:

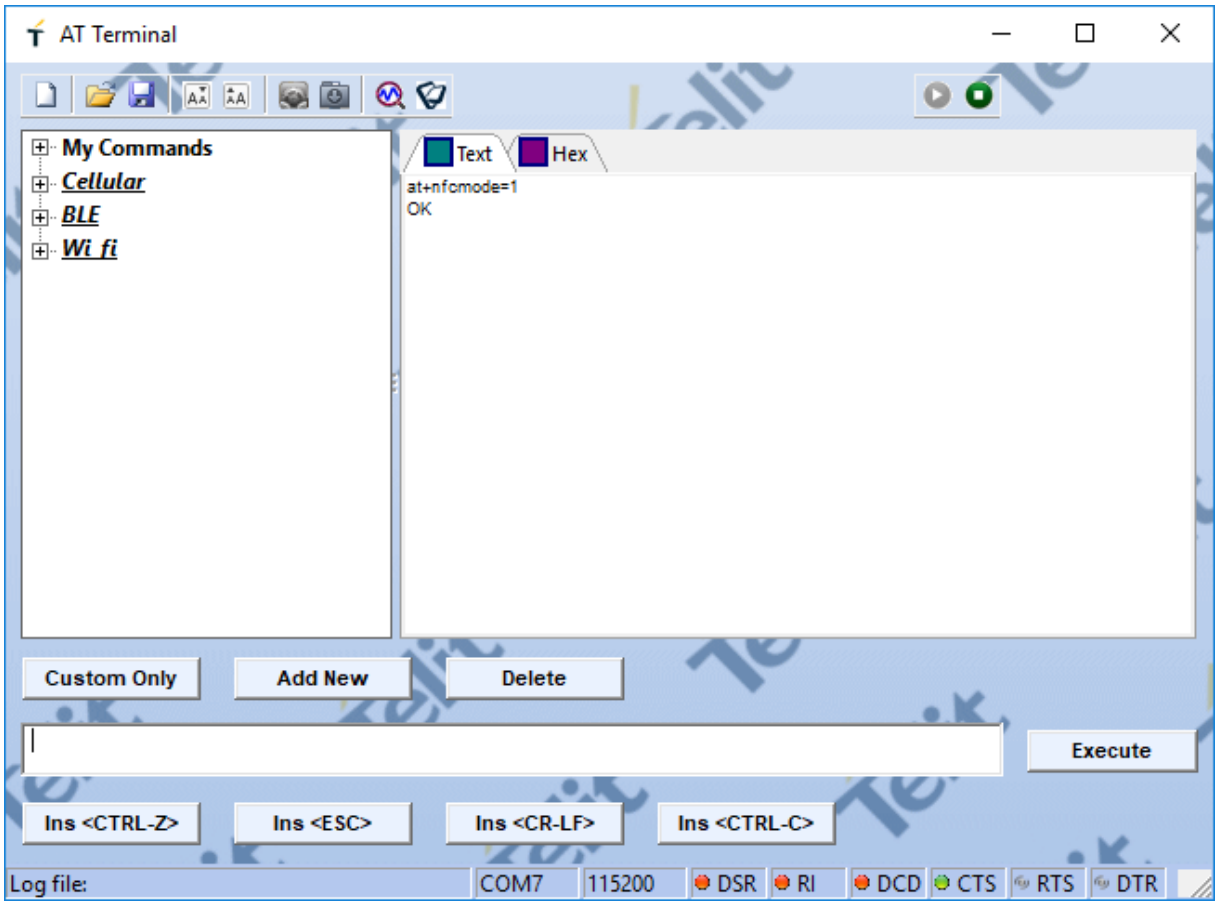
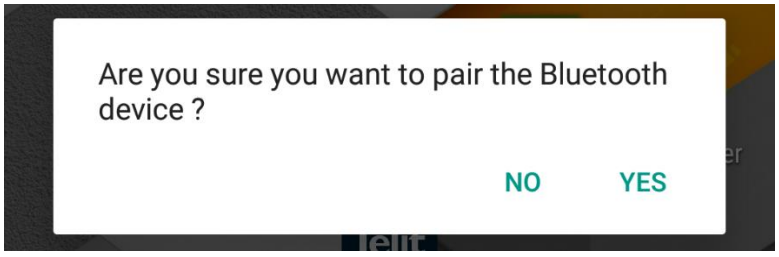


Figure 11: Enable NFC Handover

5.3.2. Example to Demonstrate the NFC Handover

Move the smartphone over the NFC board.

The Bluetooth address will be read out from the tag and the smartphone initiates a Bluetooth pairing request to the device of the given Bluetooth address and a Bluetooth pairing request message will appear. Now continue with “Pair” or “Yes” to accept the Bluetooth pairing request scenario.



After the pairing request ended successfully you will find the new paired device within the Bluetooth settings of your smartphone.

6. FIRMWARE UPDATE

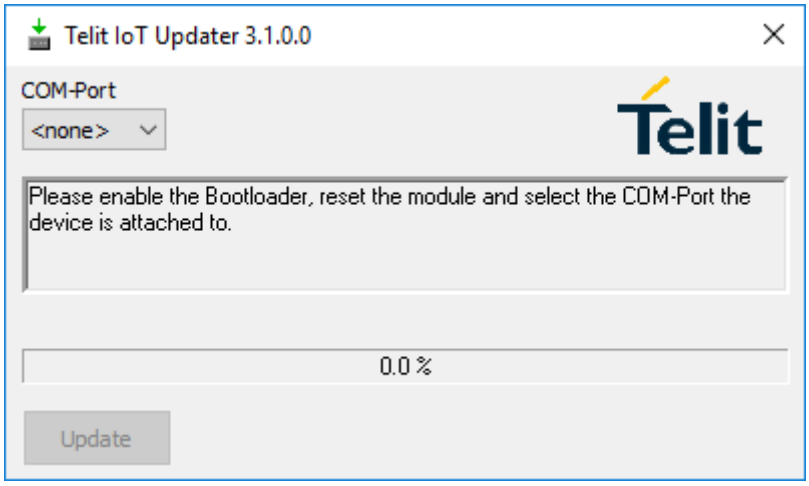
The firmware of the BlueEva+S50/Central can be updated via the local UART interface by using the Telit IoT Updater tool or over the air.

6.1. Telit IoT Updater

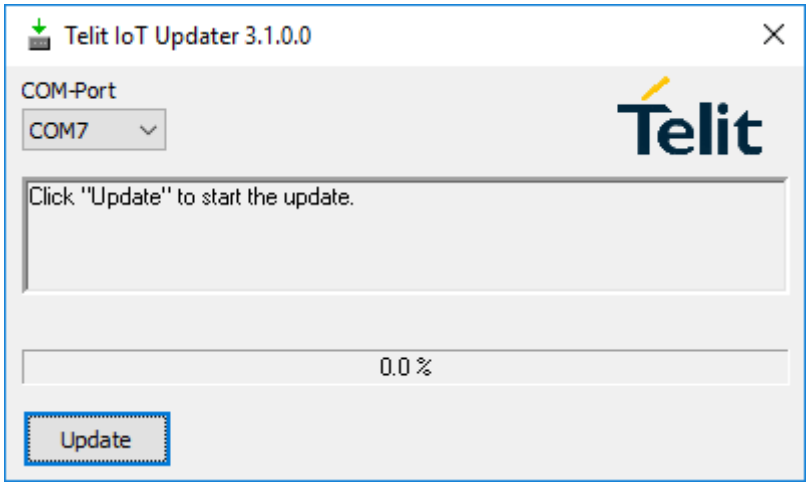
The Telit IoT Updater is a Windows™ program that contains the firmware and uses a PC with a serial port for the update. The file name of the executable program consists of version and patch information.

Please follow the instructions below for updating the firmware:

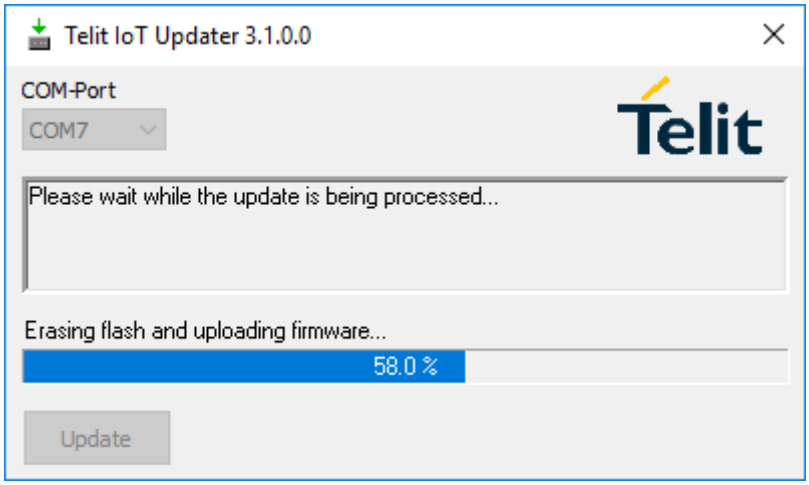
- Configure jumper J2 to position 2-3 to activate the bootloader at start-up.
- Connect the BlueEva+S50/Central to the USB port of a PC (make sure the FTDI VCP USB to UART driver is already installed).
- Start the BM+S50_xxx_FWupdate.exe program.



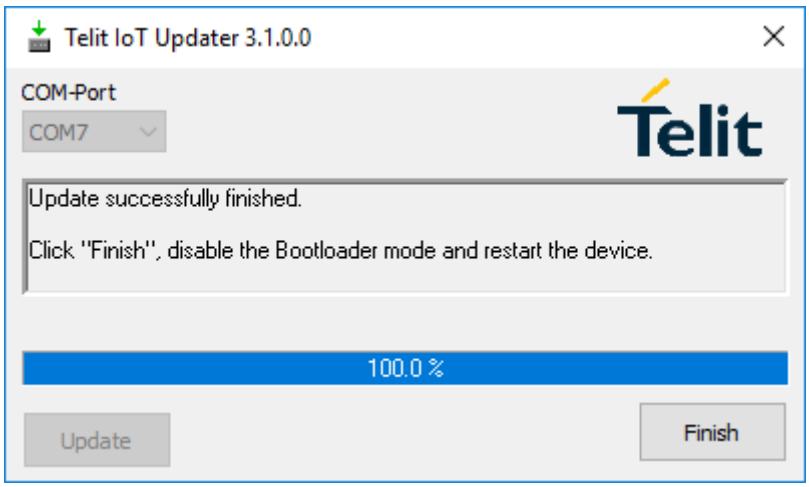
- Select the COM port the BlueEva+S50/Central is connected to and press the “Update” button.



- The firmware will be uploaded.



- After the update is completed click the “Finish” button.



- To set back the BlueEva+S50/Central into normal operation mode, move jumper J2 to position 1-2 again and perform a reset.
- Send the AT&F command to set the factory default values.

Do not disconnect the device while the update is in progress, otherwise the update will fail and has to be repeated. In case it is not possible to update the module please contact the Telit support (mailto:ts-srd@telit.com).

6.2. Firmware Update Over the Air (OTA)

The BlueEva+S50/Central supports firmware update over the air. The firmware update over the air can be performed by using the Nordic nRF ToolBox app available for iOS and Android or by using the Nordic Master Control Panel and the corresponding Nordic Bluetooth hardware.

The firmware over the air update will be enabled with the commands below:

- AT+DFUMODE=2
- AT+DFUSTART

After sending the AT+DFUSTART command the BlueEva+S50/Central is visible in the air as “BM+S_DFU” (name configured with command AT+DFUNAME) for a time period of 2 minutes. If no firmware update is performed during this time the BlueEva+S50/Central will continue with normal operation.

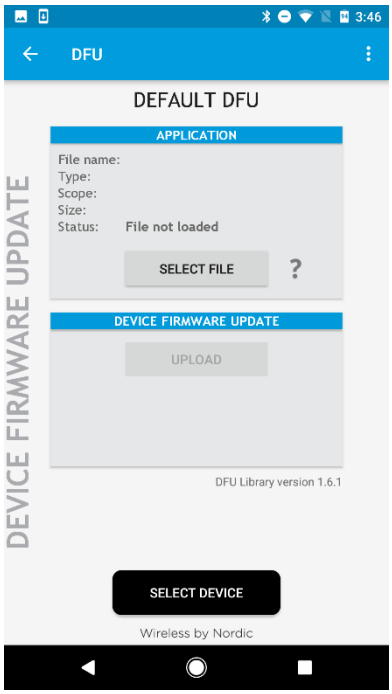
The following chapter describes the firmware over the air update by using the Nordic nRF Toolbox app on Android.

6.2.1. Firmware Update Over The Air using Nordic nRF Toolbox on Android

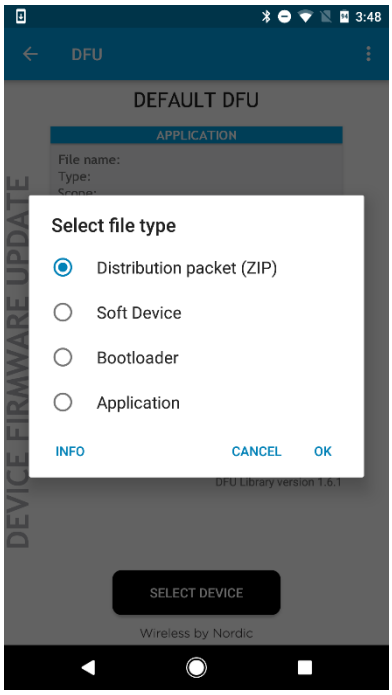
Make sure the BlueEva+S50/Central has already activated the firmware over the air update.

Open the nRF ToolBox app on the smartphone and choose “DFU“.

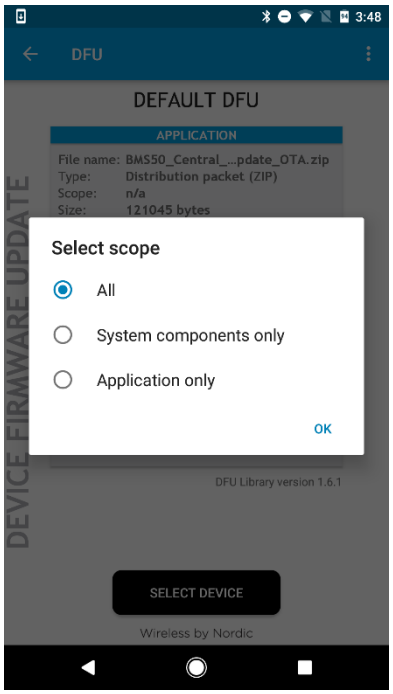
Press the button “SELECT FILE”.



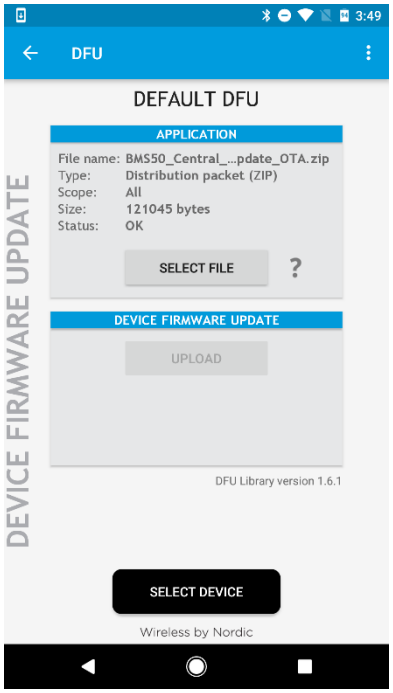
Select file type “Distribution packet (ZIP)”.



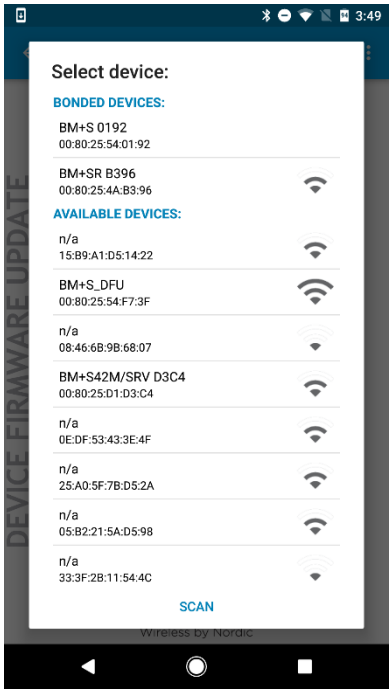
Select scope “All”.



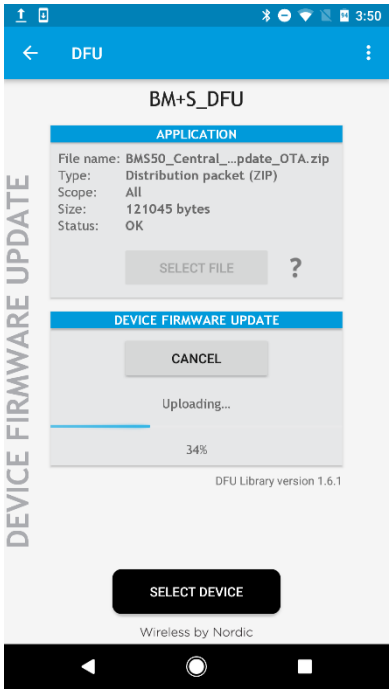
Search via file manager for the firmware package which was previously copied to the smartphone (e.g. BM+S50_Central_V5_0_0005_FWupdate_OTA.zip in the example below).



Press the button “SELECT DEVICE” and select the “BM+S_DFU” from the list of available devices.



Press the “UPLOAD” button to upload the firmware package over the air to the BlueEva+S50/Central.



After the file was uploaded successfully the BlueEva+S50/Central will start with the new firmware.

7. DOCUMENT HISTORY

Revision	Date	Changes
r0	2018-03-16	First issue

SUPPORT INQUIRIES

Link to **www.telit.com** and contact our technical support team for any questions related to technical issues.

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