

BlueEva+S42 Evaluation Kit User Guide

1VV0301313 Rev. 0 - 2016-08-15





APPLICABILITY TABLE

PRODUCT

BlueEva+S42



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1. Introduction

1.1. Scope

This document describes the usage of the evaluation kit for the Bluetooth module BlueMod+S42.

1.2. Audience

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

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-SRD@telit.com

Alternatively, use:

http://www.telit.com/support

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

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

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+S42 Hardware User Guide
- [2] UICP UART Interface Control Protocol Specification
- [3] BlueMod+S42 AT Command Reference
- [4] BlueEva+S42 Schematic





2. Package Content

The BlueEva+S42 package contains the following components:

- 1 x BlueEva+S42 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+S42 package content



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3. Hardware

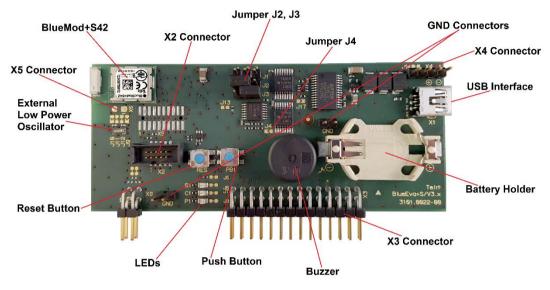


Figure 2: BlueEva+S42

3.1. BlueMod+S42

The BlueEva+S42 is equipped with a BlueMod+S42 Bluetooth module.

3.2. Reset

The BlueEva+S42 is equipped with a reset button. Pressing the reset button will trigger the BlueMod+S42 module to perform a reset. The USB port is not influenced by the reset.

3.3. USB Interface

The BlueEva+S42 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+S42.

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+S42 Hardware User Guide [1].



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3.4. LEDs

The BlueEva+S42 provides several LEDs for functional indication.

Interface	Position	Function		
LEDs	B1	onnected 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+S42 provides an external low power crystal. This is connected to the BlueMod+S42 by default. For using alternatively low power oscillator sources refer to the *schematics* [4] and the *BlueMod+S42 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	Not used in demo application.

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].

Jumper Number	Position	Function
J3	1-2	DTR# connected to IUR-IN#
J3	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 3.6.5).

When using BlueEva+S42, 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+S42 module.

3.6.5. Connector X3

Pin Number	Signal	Туре	Description
1	+3V0	PWR	Supply voltage output
2	+3V0	PWR	Supply voltage output
3	GND	PWR	Ground
4	GND	PWR	Ground
5	GPIO[0]	I/O	GPIO ⁽¹⁾
6	GPIO[1]	I/O	GPIO ⁽¹⁾
7	GPIO[2]	I/O	LED C1, user IO
8	GPIO[3]	I/O	LED B1, user IO
9	GPIO[4]	I/O	GPIO ⁽¹⁾
10	GPIO[5]	I/O	GPIO ⁽¹⁾
11	GPIO[6]	I/O	GPIO ⁽¹⁾
12	GPIO[7]	I/O	GPIO ⁽¹⁾
13	GPIO[8]	I/O	GPIO ⁽¹⁾
14	GPIO[9]	I/O	GPIO ⁽¹⁾
15	GPIO[10]	I/O	GPIO ⁽¹⁾
16	GPIO[11]	I/O	GPIO ⁽¹⁾
17	GPIO[12]	I/O	GPIO ⁽¹⁾

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





18	GPIO[13]	I/O	GPIO ⁽¹⁾
19	GPIO[14]	I/O	GPIO ⁽¹⁾
20	PO26_AIN0		See schematic ⁽¹⁾
21	PO27_AIN1		See schematic ⁽¹⁾
22	EXT-RES#	I-PU	User reset
23	UART-TXD ⁽²⁾	O-PP	IUR data OUT
24	UART-RXD ⁽²⁾	Ι	IUR data IN
25	UART-CTS# ⁽²⁾	Ι	Flow control
26	UART-RTS# ⁽²⁾	O-PP	Flow control
27	IUR-IN# ⁽²⁾	I/O	GPIO ⁽¹⁾
28	IUR-OUT# (2)	I/O	GPIO ⁽¹⁾

PU = PullUp, PD = PullDown, PP = PushPull, I-DIS = InputBufferDisconnected

(1) Function depending on firmware support

⁽²⁾ BlueEva+S42: 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+S42 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+S42 between pin 3 and 4 of connector X4. The currents drawn by other peripherals on BlueEva+S42 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+S42 Hardware User Guide [1]*).

3.8.3. Battery Holder

The battery holder provides the possibility to run the BlueEva+S42 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 can be used to generate alarm and other audible signals.

3.10. Push Button

The Push Button can be used as input for human interaction.





3.11. How To Interface the UART Lines on TTL level



NOTE:

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.

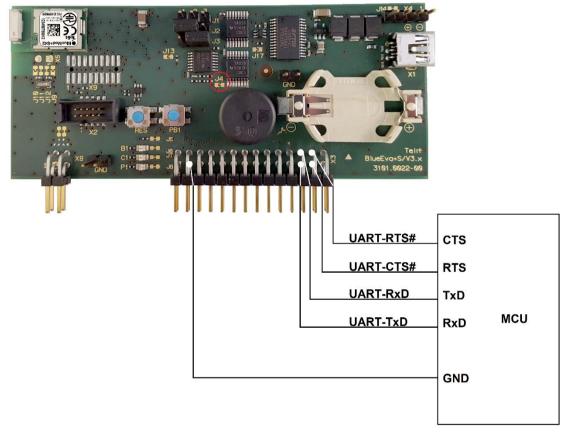


Figure 3: MCU connected to UART lines



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3.12. Default Configuration

The BlueEva+S42 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)

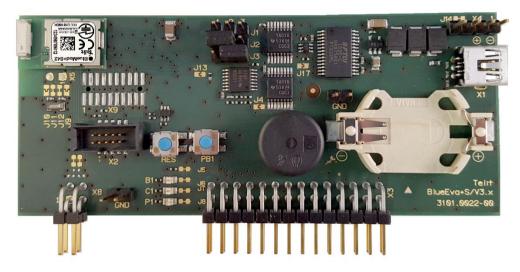


Figure 4: BlueEva+S42 default configuration



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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+S42 connect it as follows.



Figure 5: Connect the BlueEva+S42 to your PC

4.3. Installation of the BlueEva+S42 USB Driver

If required download the latest FTDI VCP USB to UART driver from: http://www.ftdichip.com/Drivers/VCP.htm

Connect the BlueEva+S42 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 download the TeraTerm terminal program from the official open source web site: <u>https://en.osdn.jp/projects/ttssh2/releases/</u>



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5. Usage of the BlueEva+S42

5.1. Configuration of the BlueEva+S42

If the BlueEva+S42 is correctly connected to the PC, a terminal emulation program can be used to read and modify the configuration settings.

For a more detailed description of the AT commands used for this purpose, please consult our *BlueMod+S42 AT Command Reference [3]*.

As shipped by the factory, the BlueEva+S42 works at 115,200 bps, using the 8N1 data format (8 data bits, no parity, 1 stop bit). Please configure your terminal emulation program accordingly. Select the COM port the BlueEva+S42 is connected to (COM42 in the example below).

Tera Term: Serial port setup			×		
Port:	COM42	•	ок		
Baud rate:	115200	•			
Data:	8 bit	•	Cancel		
Parity:	none	•			
Stop:	1 bit	•	Help		
Flow control:	hardware	•			
Transmit delay O msec/char O msec/line					

Figure 6: COM port configuration with TeraTerm

Once you have successfully configured the terminal emulation program, issuing the "AT" command without parameters should prompt the BlueEva+S42 to return OK.

Now you can readout information about the type of the connected device using the "ATI" command.

In the next step, you should issue the "ATI99" command to determine the firmware version installed and check to see whether that is the most recent version.

Finally, you should use the "AT+BOAD" command to determine the Bluetooth address of the BlueEva+S42. The Bluetooth address is unique, letting you identify the correct device for each Bluetooth address.



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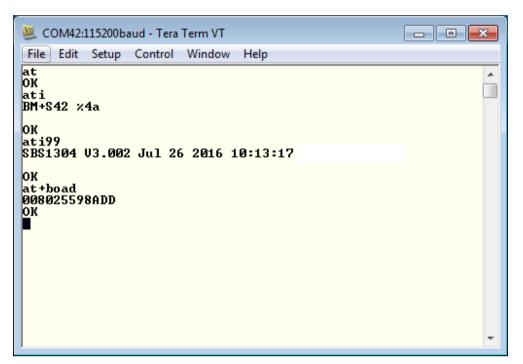


Figure 7: Reading some BlueEva+S42 settings with TeraTerm

5.2. Connection with Telit "Terminal IO Utility" App

Telit provides the "Terminal IO Utility" App for iPhone which can be used to establish a Bluetooth Low Energy connection from the iPhone to the BlueEva+S42.

The following QR-Code provides the link to download the "Terminal IO Utility".



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



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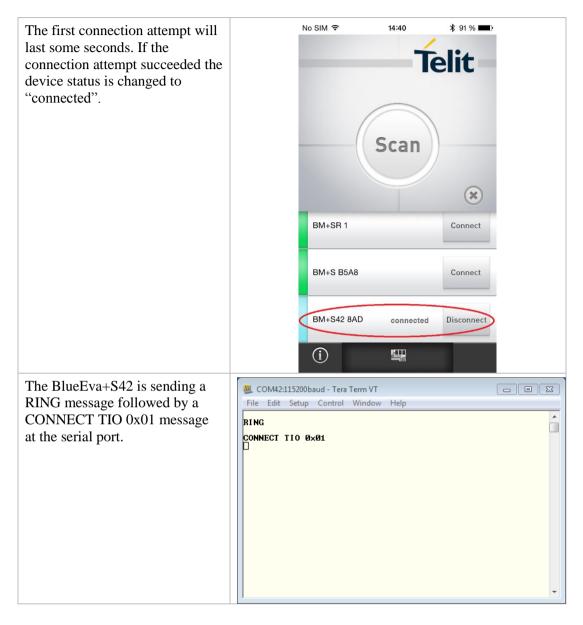
Please find an example below:





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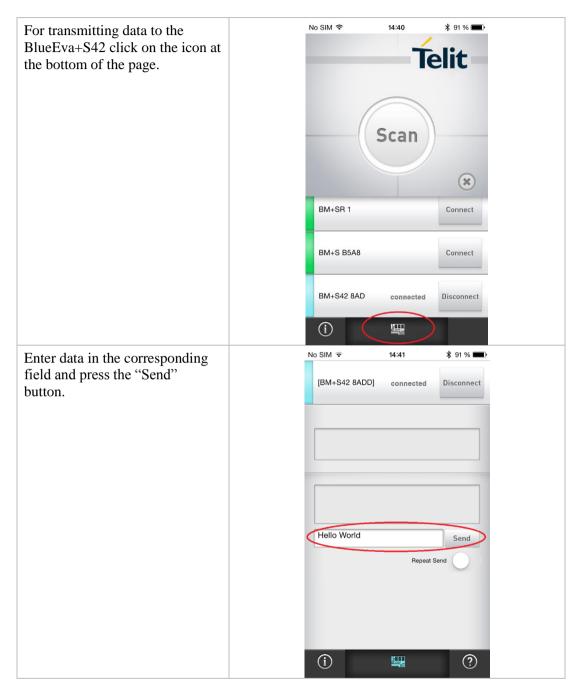






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The BlueEva+S42 is receiving the sent data. To send data from the BlueEva+S42 to the iPhone just enter the data in the terminal emulation program (data are not echoed in the example).	COM42:115200baud - Tera Term VT File Edit Setup Control Window Help RING CONNECT TIO Øx01 Hello World
The "Terminal IO Utility" app on the iPhone is receiving the data.	No SIM * 14.42 \$ 91% [BM+S42 8ADD] connected Disconnect test data 1234567890 Helio World Send Repeat Send Image: Content of the send of the se



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To terminate the connection press the "Disconnect" button.	No SIM	
	Hello World Send Repeat Send	
After the connection is terminated the BlueEva+S42 is sending a NO CARRIER 0x01 message.	COM42:115200baud - Tera Term VT File Edit Setup Control Window Help RING CONNECT TIO Øx01 Hello World NO CARRIER Øx01	



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5.3. NFC Handover

This chapter shows how to simplify the Bluetooth pairing via NFC by using the BlueEva+S42 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+S42 for NFC Handover

To use the NFC functionality connect the NFC board to the BlueDev+S42 board as follows:

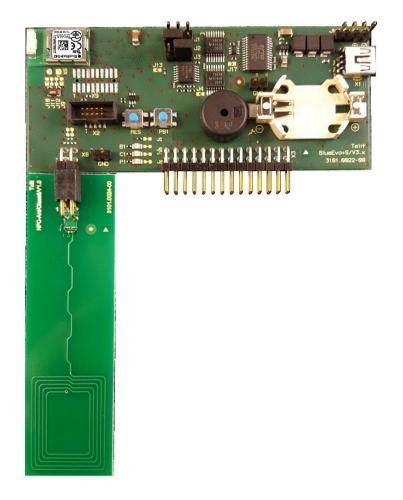


Figure 8: BlueEva+S42 with connected NFC board

Then connect the BlueEva+S42 to a free USB port on your PC and open a terminal program (e.g. TeraTerm). The serial port settings are the same as described in chapter 4.2.



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

😃 COM42:115200baud - Tera Term VT				
File Edit Setup Control Window Help				
at +nfcmode =1 OK	<u> </u>			
	T			

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.

Are you sure you want to pain device ?	r the Blu	etooth	2
	NO	YES	er

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



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6. Firmware Update

The firmware of the BlueEva+S42 can be updated by using the BlueMod+S Updater tool or over the air.

6.1. BlueMod+S Updater

The BlueMod+S Updater is a WindowsTM 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+S42 to the USB port of a PC (make sure the FTDI VCP USB to UART driver is already installed). If the BlueEva+S42 is already connected to the PC perform a reset using the reset button.
- Start the *BM*+*S*42_*xxx*_*FWupdate.exe* program.

🛓 BlueMod+S Updater 3.0.0.1 🔤 🗠
COM-Port
Please enable the Bootloader, reset the module and select the COM-Port the device is attached to.
0.0 %
Update



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• Select the COM port the BlueEva+S42 is connected to and press the "Update" button.

🛓 BlueMod+S Updater 3.0.0.1		
COM-Port	Telit	
Click "Update" to start the update.		
0.0%		
0.0 %		
Update		

• The firmware will be uploaded.

🛓 BlueMod+S Updater 3.0.0.1	×
COM-Port COM15 V	Telit
Please wait while the update is being processed	
Erasing flash and uploading firmware	
59.0 %	
Update	

• After the update is completed click the "Finish" button.

BlueMod+S Updater 3.0.0.1	×
COM-Port COM15 V	Telit
Update successfully finished.	
Click "Finish", disable the Bootloader mode and r	estart the device.
100.0 %	
Update	Finish



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- To set back the BlueEva+S42 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.



NOTE:

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 (e-mail: ts-srd@telit.com).

6.2. Firmware Update Over The Air (OTA)

The BlueMod+S42 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 BlueMod+S42 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 BlueMod+S42 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 BlueMod+S42 has already activated the firmware over the air update. Open the nRF ToolBox app on the smartphone and choose "DFU".



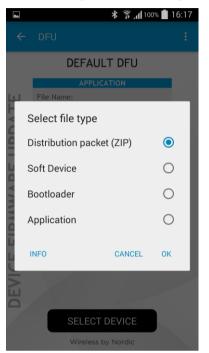
Press the button "SELECT FILE":





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Select file type "Distribution packet (ZIP)":

Search via file manager for the firmware package which was previously copied to the smartphone (e.g. SBS2404_V3.001.zip in the example below):







Press the button "SELECT DEVICE" and select the "BM+S_DFU" from the list of available devices:

-	1 🗔	* N	≱ '	() 1	Al 61% 🖻	15:32
	Select dev	ice:				
	BONDED DEVI	CES:				- 8
	BM+SR 28CB 00:80:25:48:28:	СВ				
8	AVAILABLE DE	VICES:				- 8
	BATT 55F9 00:80:25:54:55:	F9			Ŧ	. 1
d	BM+S_DFU 00:80:25:54:55:	EB			(;	
RF	BM+S 01F2 00:80:25:54:01:	F2			•	
W A	BM+S/ADC FB:D8:BC:2E:03	:F4			•	
IRM	WH00101011 00:80:25:54:1B:				Ŷ	
LL LL	BM+SR 9 00:80:25:48:9E:	2E			Ŧ	
VIC	BM+S/ADC 00:80:25:54:13:	50			•	
Ľ	BM+SR B 00:80:25:4A:B3:	96			Ŷ	
		CAN	CEL			
	VVI	reless b	y Nor	dic		

Press the "UPLOAD" button to upload the firmware package over the air to the BlueMod+S42:



After the file was uploaded successfully the BlueMod+S42 will start with the new firmware.



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7. Document History

Revision	Date	Changes
r0	2016-08-15	First release

