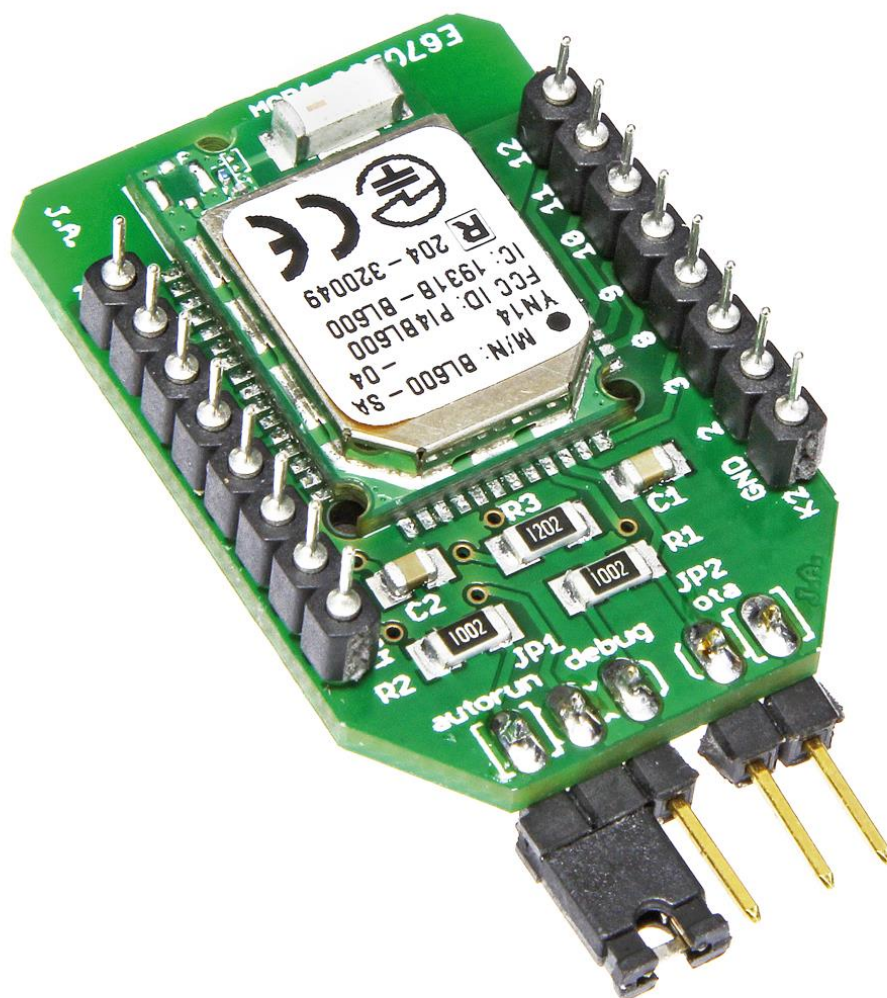# BL600-eBoB – User's Manual

## Product description

This BreakOut Board (BoB) will let you access the main signals on the BL600-SA Bluetooth module from Laird Technologies and experiment with Bluetooth 4.0 technology. It is breadboard-ready and easily jumper-configurable.

A program for the BL600 module can be written and compiled using the *smartBASIC*\* development environment, available from Laird Technologies (www.lairdtech.com/products/bl600-series). Registration is required to be able to download this software suite, which is free.  smartBASIC is available for Windows.

## Specifications

- Bluetooth Low Energy (BLE) / Bluetooth 4.0
- Ultra-low power consumption: 5 µA when quiescent, 10 mA during transmission
- Data rate 0.3 Mbps
- Compatible with iPhone 4S and iOS 5, Android 4.3 and Windows Phone 8
- 37 channels
- Available signals:
    - TX, RX, RTS, CTS, $\overline{\text{RESET}}$ , PGM, $V_{CC}$, GND via K1 for loading the program into the BL600
    - 7 logic in/outputs via K2:
        - Two 10-bit analog inputs (pins 2 &3)
        - I$^2$C port (pins 8 & 9)
        - SPI port (pins 10,11 and 12)
- Over The Air (OTA) allows a pre-compiled program to be downloaded via Bluetooth
- FT232R USB/Serial Bridge/BOB (www.elektor.com/110553-91) allows for uploading a pre-compiled program.
- 2 mode operation
- Runs on 3.3 V

*\* smartBASIC is an implementation of a structured BASIC programming language optimized for use on low-cost embedded systems with limited memory by being highly efficient in terms of memory usage. The BASIC programming language has been around for over 40 years in many variants and platforms, a good background and introduction is available at http://en.wikipedia.org/wiki/BASIC.*

## Assembly

This module comes with all SMT components pre-assembled. Headers K1 and K2 are not populated, but pin headers are supplied. It is up to the end-user to determine on which side of the board they are most convenient for the application. Please note that when the headers are mounted on the same side as the CR2032 battery holder, a battery will *not* fit.

## How to use

### Required hardware

The BL600-eBoB can be programmed using an *FT232R USB/Serial Bridge/BOB* (www.elektor.com/110553-91) or Over The Air (OTA) using a Bluetooth/Android 4.3 device.

### Software

On a Windows-PC download and unzip the *UW Terminal including Xcompiler* software, available after registration from the Lairdtech website:
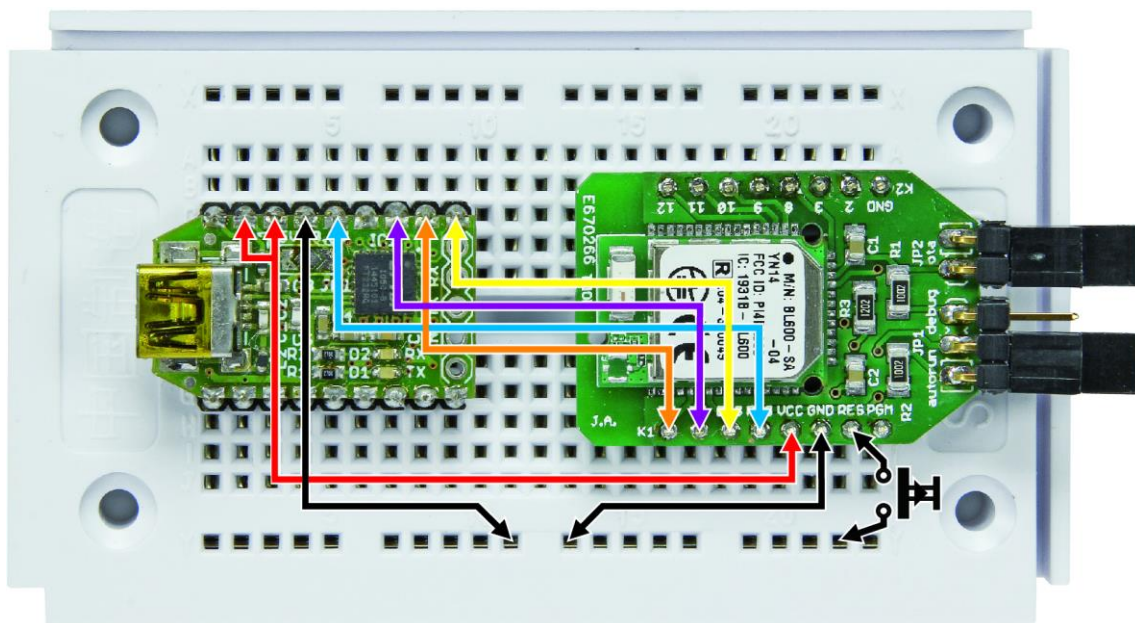
http://www.lairdtech.com/products/bl600-series.

Download and install drivers for the FT232 chip, available from FTDI:

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

### Connecting and programming via *FT232R USB/Serial Bridge/BOB*

Using a bread board, connect the BL600-eBoB to the FT232R USB/Serial Bridge/BOB following the wiring example below:

Make sure the solder jumper on the FT232R USB/Serial Bridge/BOB  is set to 3.3 V. On the BL600-eBoB, no jumpers should be set. Now connect the FT232R USB/Serial Bridge/BOB to your PC using a mini USB Cable. It should be recognized as a USB Serial Port:
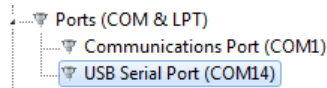
Now you're ready to start the UW Terminal program.  It comes up asking you to accept.
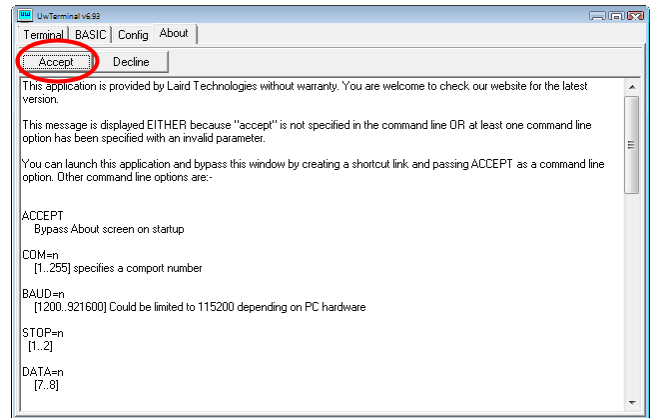
After you accept, the program shows you the settings. Make sure to select the correct COM port . The BL600-SA module comes factory-preset to 9600 baud, no parity, 1 stop bit and 8 data bits. Handshaking should be set to "CTS/RTS".
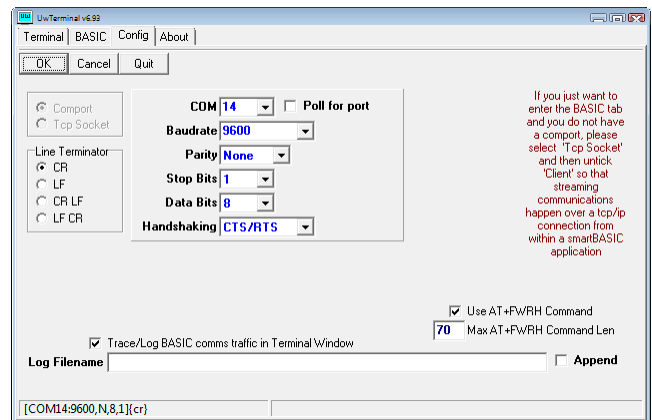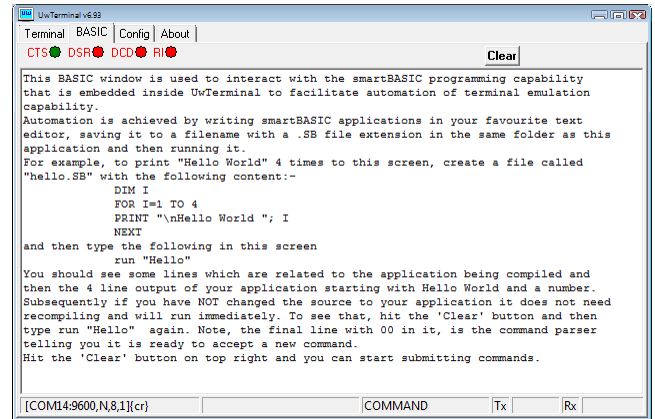
If the module isn't connected and you still want to use the program, you should select "TCP Socket" and untick "Client".

The Terminal program is now ready to use. Right clicking in the terminal area opens a pop-up menu where use can pick your command.
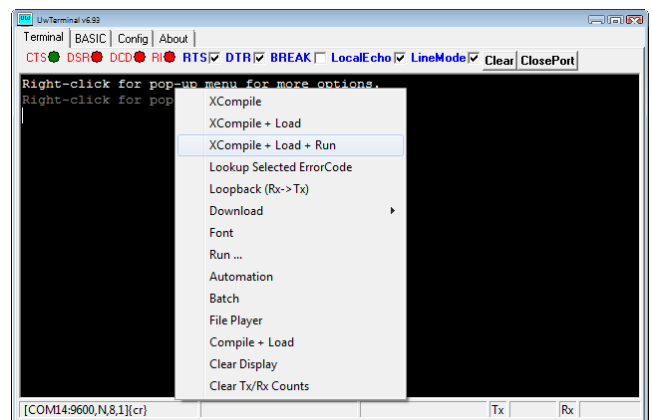
Under the BASIC tab you'll find instructions on how to use the program.

You are now ready to write your own application and program it into the BL600-eBoB. Example programs can be found after logging in at http://www.lairdtech.com/products/bl600-series.

*IMPORTANT!*

For correctly compiling your code, it is essential that a compiler version is used that is compatible with the firmware version that has been used in your BL600 module. The program automatically determines which compiler version it should use. This requires the BL600-eBoB to be connected to the PC. All compiler versions are included in the download. You can find out which firmware is in your BL600 module by typing

AT I 3



into the terminal screen, followed by "Enter". The module will return its firmware version. In the Readme.txt file you can find the corresponding compiler executable.
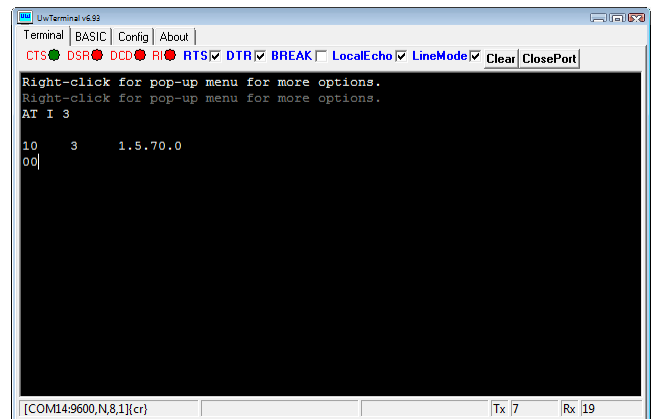
## Programming via Over The Air (OTA)

The BL600 module can also be programmed using the Over The Air service from the Bluetooth Low Energy protocol. Minimum requirements are Android 4.3 (Jelly Bean) and a Bluetooth 4.0 capable device.

On the BL600-eBoB, set jumper "OTA" to enable Over The Air programming. Also set jumper JP1 to "autorun". With UW Terminal choose XCompile to compile your program. Make sure you select the correct compiler version or have the module connected to your PC to enable UW Terminal to auto-

detect the correct compiler version. A .usw file will be created in the directory you loaded your program from. Copy this file onto your Android device.



On your Android device, download and install the "Laird Toolkit" app from Google Play Store and start the app. Select "OTA".
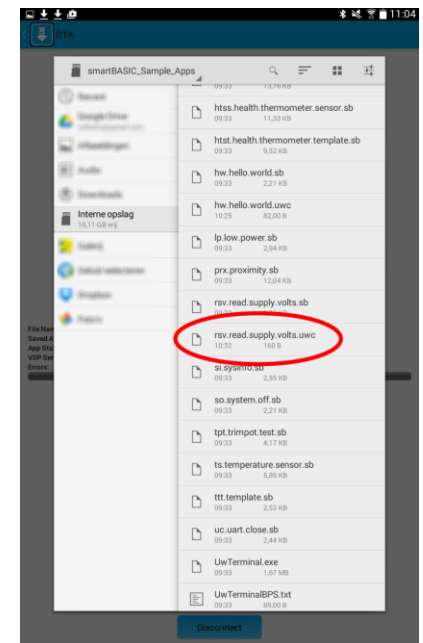


Reset the BL600 module (by connecting the RES pin to GND).

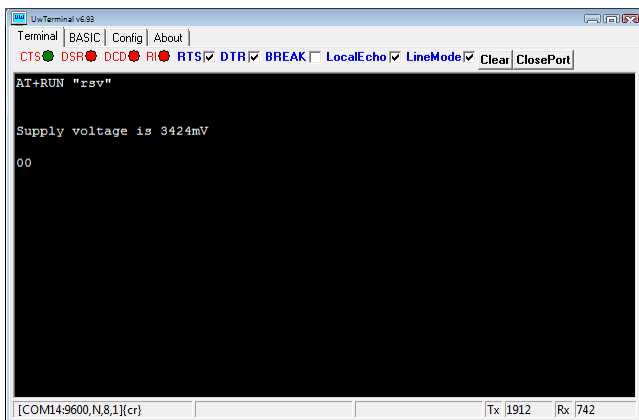Press the "Scan" button on the bottom and select your module
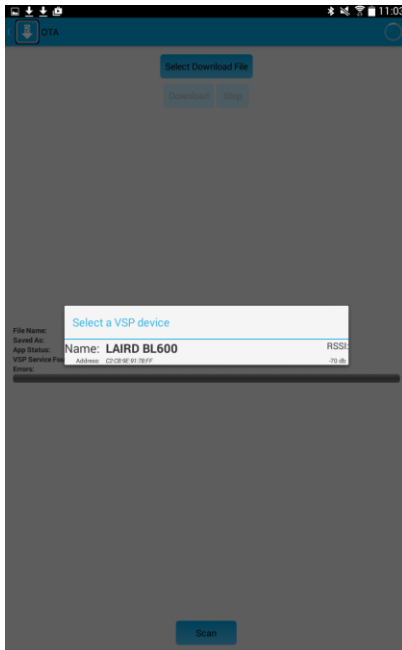


Now press "Select Download File" and select the .usw file you copied before.

Press the "Download" button.

You should now see a progress bar showing you how the process is proceeding.  When it has finished programming reset the BL600 module (RES to GND). Presto!
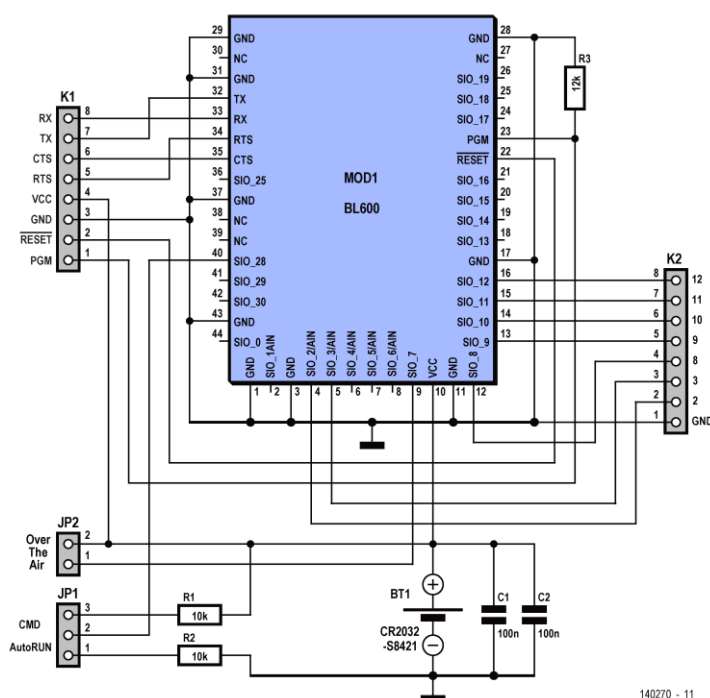


To check, you can use the UW Terminal program and run the command

 AT+RUN "rsv"

(for the rsv.read.supply.volts program, or AT+RUN "hw" for the hw.hello.world program) and the module sends the output of the program to the terminal.

## Schematic



K1 connects to a serial interface.

K2 connects to your circuit and sensors.

JP1&2 are used to control the operating mode.

## More information

More information about the BL600-eBoB can be found in Elektor Magazine, edition March/April 2015, see

www.elektor-magazine.com/140270 or www.elektor.com/march-april-2015-edition-pdf-download-en.

More information and example applications can be found the series of articles on the BL600 module published in Elektor Magazine, starting edition January/February 2015.