



QUICK START GUIDE

VAB-630

Linux EVK v1.0.1



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Revision History

Version	Date	Remarks
1.00	09/18/2017	Initial release

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1. Introduction

This Quick Start Guide provides an overview on how to boot the Linux EVK system image on the VAB-630 board and configure the supported hardware functions in the build.

The VAB-630 Linux EVK is developed based on debian-8.6.0-lxde-player (Debian 8.6) and it enables the hardware features of the VAB-630 board.

1.1. EVK Package Contents

There are two folders in the package as listed below.

Firmware folder	Description
VAB-630_Linux_EVK_v1.0.1.zip	Precompiled Image
Document folder	Description
VAB-630_Linux_EVK_v1.0.1_Quick_Start_Guide_v1.00_20170918.pdf	Quick Start Guide

VAB-630 Linux EVK contents

1.1.1. Firmware Folder Contents

VAB-630_Linux_EVK_v1.0.1.zip: contains installation script files and the precompiled U-boot and image for evaluating the VAB-630 board.

1.1.2. Document Folder Contents

VAB-630_Linux_EVK_v1.0.1_Quick_Start_Guide_v1.00_20170918.pdf: This Quick Start Guide explains how to boot the Linux EVK system image on the VAB-630 board in order to begin evaluating the platform.

1.2. Version Information and Supported Features

- U-Boot version: 1.1.4
- Kernel version: 3.4.5
- Evaluation image: Debian 8.6
- Development based on debian-8.6.0-lxde-player (Debian 8.6)
- Supports SPI with eMMC boot
- Supports HDMI or LVDS display
- Supports ONation capacitive touch panel (through USB interface)
 - ONation 10.1" LVDS Panel VIA1001 OT101RBWDLT-00 (1280x800)
- Supports HDMI audio output
- Supports Micro USB 2.0 OTG port
- Supports Debug UART connector
- Supports 10/100Mbps Ethernet
- Supports Line-out and Mic-in
- Supports EMIO-2531 miniPCle Wi-Fi & Bluetooth module
 - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-5531 USB Wi-Fi & Bluetooth module
 - Supports Bluetooth A2DP and SPP profile
- Supports EMIO-2550 miniPCle Mobile Broadband module
- Supports GPIO, UART and Watchdog timer

2. Image Installation

The VAB-630 only supports booting from the SPI ROM with eMMC. This section explains the setup requirements for booting from the SPI ROM with eMMC.

The installation script files, the precompiled U-boot and image are provided in the "Firmware" folder.

2.1. Requirements

- Host machine
- Micro SD card
- EVK package : VAB-630_Linux_EVK_v1.0.1.zip

2.2. Booting from the SPI ROM with eMMC

The first step is to insert a Micro SD card into the host machine and create a FAT formatted partition. Next, extract the **VAB-630_Linux_EVK_v1.0.1.zip** and copy the **bspinst** folder and **scriptcmd** file onto the Micro SD card.

Insert the prepared Micro SD card into the VAB-630, connect an HDMI display, and power on the device to initiate the update process.

```
VIA Linux BSP Installation
VAB-630_Debian8.6_v0.5.0_20170421

-----

W-Load 0.21.00.00 -> 0.21.00
U-Boot 0.00.00.00 -> 0.32.00_20170124
Kernel 0.41.00.00 -> 0.41.00
Base File System Version - Debian8.6
Reference File System Version - 20170124
OtherInfo -

[Progress Bar] 100 %
Please remove installation media!

Warnings! Please don't power off! Please wait...
```

Update process screen

*Note:

Keep the power on during the installation process. After the installation process has completed, the system will automatically restart.

Wait for the login prompt to appear. The default user name is *debian* and the password is *debian*.

3. Hardware Functions

This section explains how to enable and test the hardware functions precompiled in the VAB-630 Linux EVK including setting up U-Boot parameters, configuring display parameter, configuring watchdog timer, setting up GPIO, and configuring UART.

3.1. Setting Up U-Boot Parameters

VIA recommends that console board (P/N: 15GCU000000-20) and console cable (P/N: 99G33-192486) are used in order to configure the VAB-630 parameters.

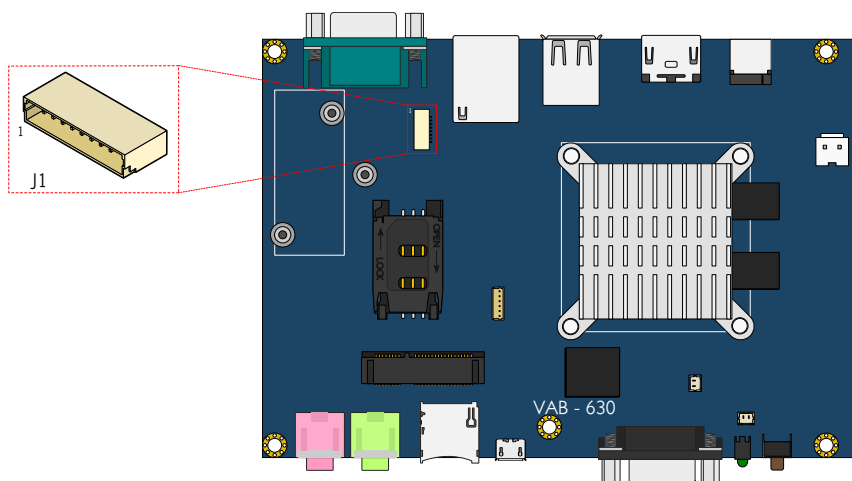
The first step is to connect the host machine to the console board, then connect the console board to the VAB-630 through the Debug UART connector (J1). Use a serial port communication program such as PuTTY, GtTerm, or Minicom, to configure the serial port setting and connect to the debug console. There you will be able to see the U-Boot boot log and adjust settings in the U-Boot console.

```

+-----+
| A  -   Serial Device           : /dev/ttymx0 |
| B  -   Lockfile Location       : /var/lock  |
| C  -   Callin Program          :            |
| D  -   Callout Program         :            |
| E  -   Bps/Par/Bits            : 115200 8N1 |
| F  -   Hardware Flow Control   : No        |
| G  -   Software Flow Control   : No        |
+-----+

```

Serial port setting of host machine



Debug UART connector (J1) diagram

Pin	Signal
1	UART0TXD
2	UART0RXD
3	SFCLK
4	GND
5	SFDO
6	SFDI
7	SFCS0-
8	VCC_SF

Debug UART connector (J1) pinout table

Next, power on the VAB-630 to initiate the boot process. When prompted, press any key to stop the boot process and enter the U-Boot console as illustrated by the screenshot below.

```
WonderMedia Technologies, Inc.
W-Load Version : 0.21.00.00

Uncompressing U-Boot... done, booting U-Boot.

U-Boot 1.1.4 (Jan 24 2017 - 15:55:04)
WonderMedia Technologies, Inc.
U-Boot Version : 0.32.00.00
logo = 675 ms
Hit any key to stop autoboot:  0
WMT #
```

Debug console view of boot process

3.2. Configuring Display Parameters

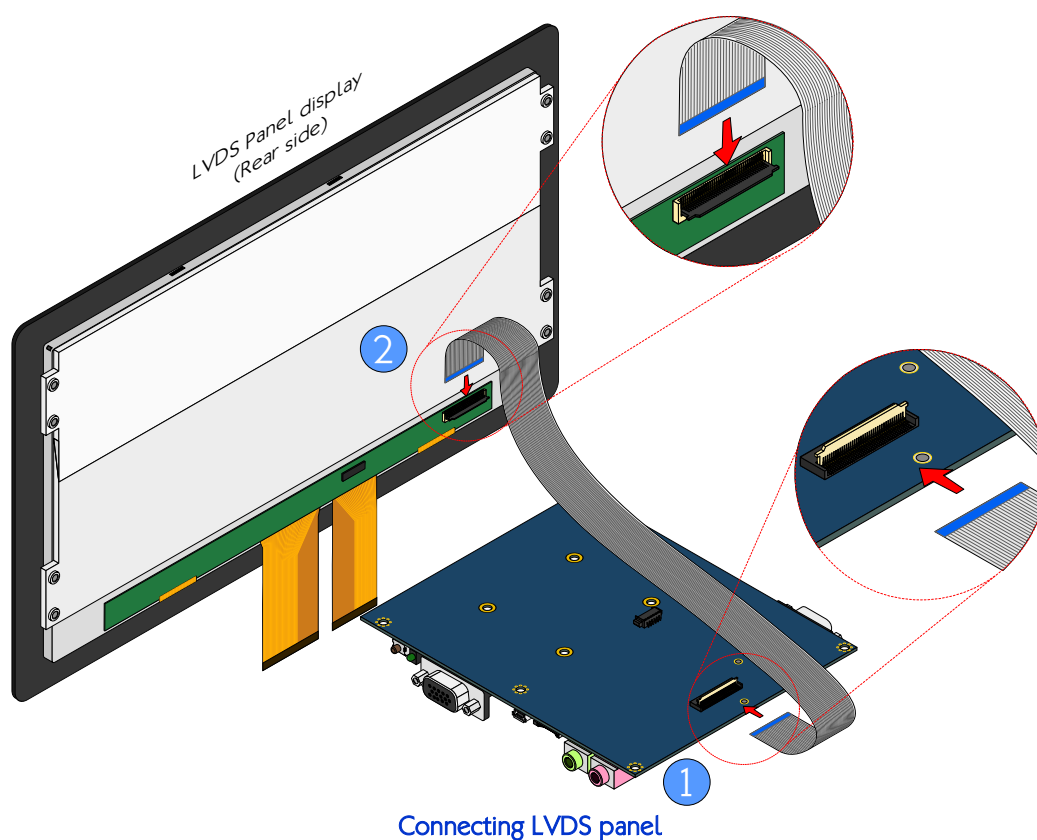
The VAB-630 Linux BSP v1.0.1 supports the following display devices:

- ONation 10.1" LVDS Panel VIA1001 OT101RBWDLT-00 (1280×800)
- HDMI monitor (default)

The following sections below describes how to switch the settings from HDMI to LVDS, and vice versa.

3.2.1. Setting Up the LVDS Display Parameter

To set up the LVDS monitor, first connect the ONation LVDS panel to the VAB-630 board through the LVDS1 connector.



Use the following command to change the U-Boot parameters for the ONation LVDS Panel.

```
WMT # setenv wmt.display.fb0 0:[6:0:18:1280:800:60]
WMT # saveenv
WMT # reset
```

To switch to LVDS mode, open and edit `/etc/X11/xorg.conf` file, Remove the pound sign “#” located in front of LVDS mode 1280x80 to enable it and add the pound sign “#” in front of HDMI mode 1920x1080 to disable it.

```
Section "Screen"
    Identifier      "Mali Screen"
    Device          "Mali FBDEV"
    Monitor         "Mali Monitor"
    DefaultDepth    16
    SubSection "Display"
        Depth       16
        #           Modes "1920x1080" "1280x720"
        Modes       "1280x800"
    EndSubSection
EndSection
```

3.2.2. Setting Up the HDMI Display Parameter

To set up an HDMI monitor as the display output, use the following command below to change the U-boot parameters.

Configuring U-boot only affects the resolution for the U-boot logo.

```
WMT # setenv wmt.display.fb0 0:[4:6:1:1920:1080:60]
WMT # saveenv
WMT # reset
```

To switch to HDMI mode, open and edit `/etc/X11/xorg.conf` file, Remove the pound sign “#” located in front of HDMI mode 1280x80 to enable it and add the pound sign “#” in front of LVDS mode 1920x1080 to disable it.

```
Section "Screen"
    Identifier      "Mali Screen"
    Device          "Mali FBDEV"
    Monitor         "Mali Monitor"
    DefaultDepth    16
    SubSection "Display"
        Depth       16
        Modes       "1920x1080" "1280x720"
        #           Modes "1280x800"
    EndSubSection
EndSection
```

3.3. Configuring Watchdog Timer

A Watchdog timer is an electronic timer that is used to detect and recover system malfunctions.

The **wdt_driver_test.out** provides an application to configure the Watchdog timer.

To enable the Watchdog with the default timeout (60 seconds), use the following command:

```
$ sudo ./wdt_driver_test.out enable
```

To change the timeout <value> and the system reboot <value> (seconds), use the following command:

```
$ sudo ./wdt_driver_test.out set_timeout <value>
```

To send keep-alive requests to the Watchdog <value> (seconds), use the following command:

```
$ sudo ./wdt_driver_test.out set_keep_alive <value>
```

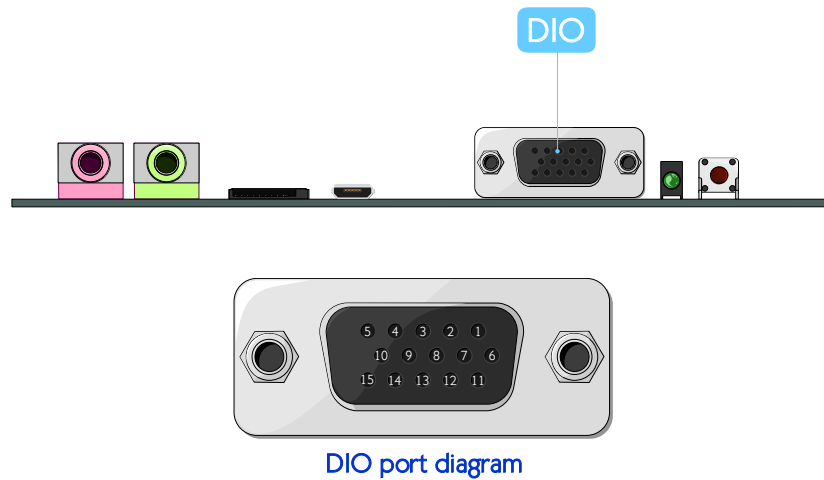
When the value of "set_keep_alive" is smaller than the value of "set_timeout", the system will not reboot.

To disable the Watchdog, use the following command:

```
$ sudo ./wdt_driver_test.out disable
```

3.4. Setting Up GPIO

The DIO port on the VAB-630 board consists of 15 pins. Pins 1~7 and 10~12 are the active pins. The following section explains setting up these pins for input/output communication.



3.4.1. Setting Up DIO Port for GPIO Functionality

The echo value of GPIO pins are listed below:

Pin	Signal	GPIO echo value
1	GPIO-1	1
2	GPIO-2	2
3	GPIO-3	3
4	GPIO-5	5
5	GPIO-6	6
6	GPIO-7	7
7	GPIO-8	8
8	GND	
9	NC	
10	GPIO-12	12
11	GPIO-13	13
12	GPIO-14	14
13	VO_33	
14	VO_33	
15	GND	

DIO port pinout table

Type the following command to login to root's shell

```
$ sudo -i
```

To set the multifunction pin as GPIO pin. Here is the example for GPIO pin 1:

```
# echo 1 > /sys/class/gpio/export
```

To disable the multifunction pin as GPIO pin. Here is the example for GPIO pin 1:

```
# echo 1 > /sys/class/gpio/unexport
```

To read the multifunction GPIO pin status; use the following command:

```
# cat /sys/kernel/debug/gpio
```

3.4.2. Setting Up GPI Mode

To set a pin to "input" mode (GPI), use the following command (here is the example for GPIO pin 1):

```
# echo in > /sys/class/gpio/gpio1/direction
```

To read the GPI input value, use the following command:

```
# cat /sys/class/gpio/gpio1/value
```

3.4.3. Setting Up GPO Mode

To set a pin to "output" mode (GPO), use the following command (here is the example for GPIO pin 1):

```
# echo out > /sys/class/gpio/gpio1/direction
```

To output a "Low" value on the GPO pin, use the following command:

```
# echo 0 > /sys/class/gpio/gpio1/value
```

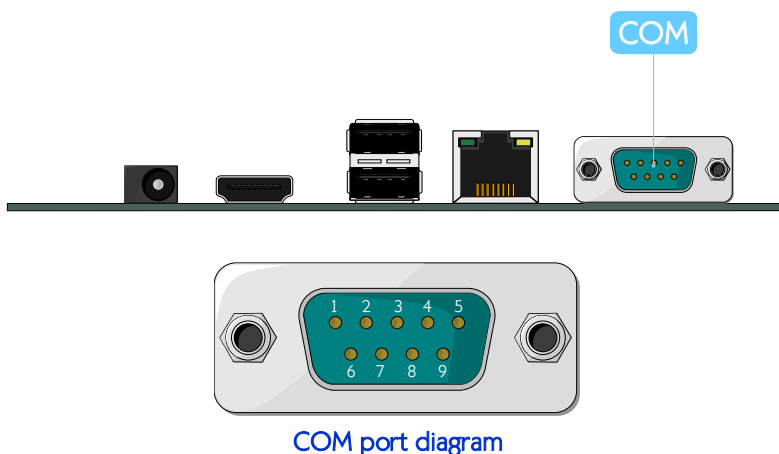
To output a "High" value on the GPO pin, use the following command:

```
# echo 1 > /sys/class/gpio/gpio1/value
```

3.5. Configuring UART

The COM port of the VAB-630 board supports RS-232 mode (Serial Device: /dev/ttyS1) and TX/RX communication with other devices.

The first step is to connect the host machine to the COM port on the VAB-630 using an RS-232 cable. Next on the host machine, and VAB-630 start a serial communication program such as Putty, GtkTerm or Minicom with the same serial port setting using the appropriate serial device.



COM port diagram

Pin	Signal
1	NC
2	IC_RXD1
3	IC_RXD1
4	NC
5	GND
6	NC
7	NC
8	NC
9	NC

COM port pinout table

To start the Minicom serial communication program on the VAB-630, use the following command:

```
# minicom -s
```

Start a serial communication program on the host machine with the same communication settings using the appropriate serial device. Afterwards the host machine and the VAB-630 will be able to communicate through the programs (for example sending a keypress on one machine will be shown on the other machine).

4. Accessories

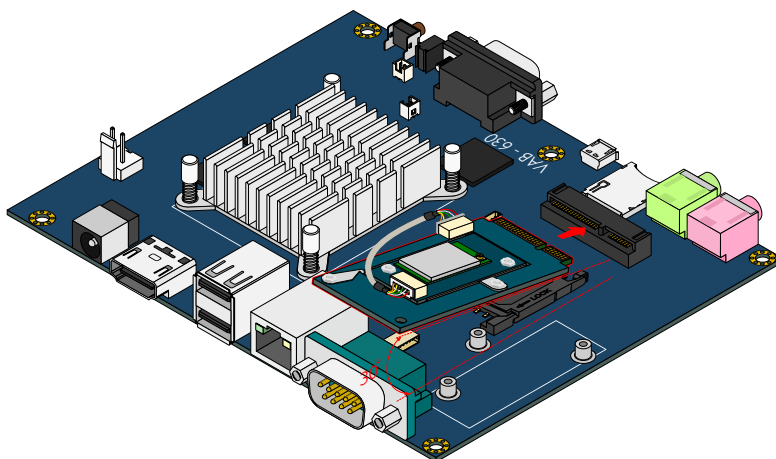
This section explains how to install and configure the various EMIO wireless modules available for the VAB-630 board.

4.1. Configuring the EMIO-2531 miniPCle/EMIO-5531 USB Wi-Fi & Bluetooth Module

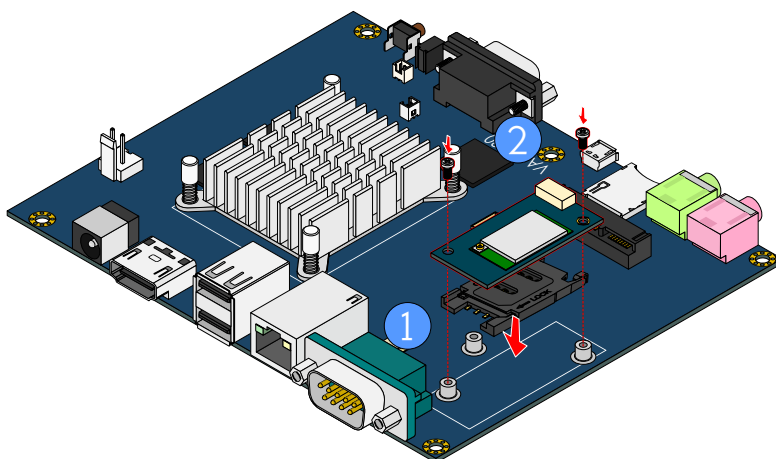
The VAB-630 default driver supports the EMIO-2531 miniPCle/EMIO-5531 USB Wi-Fi & Bluetooth module.

4.1.1. Connecting to the Internet

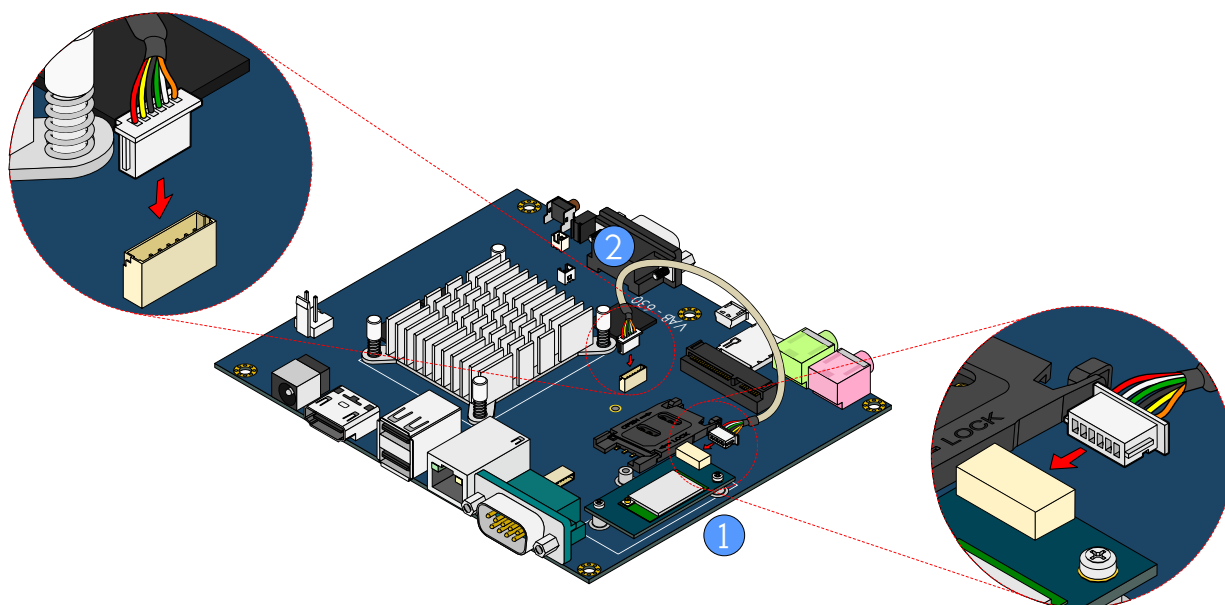
The first step is to insert the EMIO-2531 module into the miniPCle slot or connect the EMIO-5531 module to the onboard USB pin header (JUSB1) using the USB cable (P/N: 99G3-190042). After installing either module, connect the provided antenna to the module. Finally, power on the VAB-630.



Inserting the EMIO-2531 module

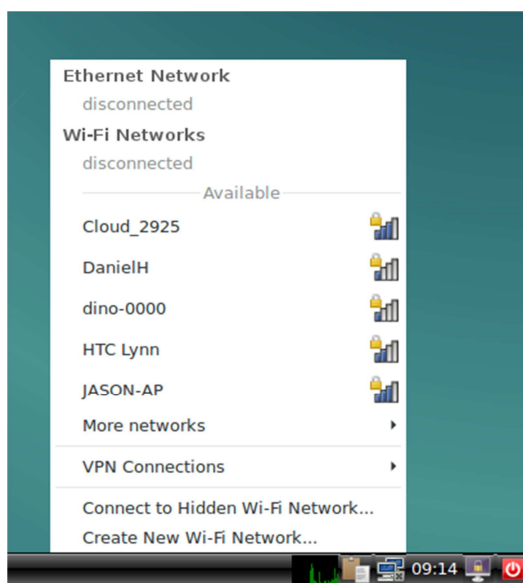


Inserting the EMIO-5531 module



Connecting the USB Wi-Fi & Bluetooth cable

When the boot process is completed, click on the "Network Manager" icon to configure the Wi-Fi.



A list of Wi-Fi connections will appear on the screen, select the appropriate device to complete the Wi-Fi connection.

After the connection is created, connect to the internet through your web browser.

4.1.2. Enabling Bluetooth

The following section explains setting up the Advanced Audio Distribution Profile (A2DP) and Serial Port Profile (SPP).

4.1.2.1. Setting Up Bluetooth A2DP Profile

Use the following commands to run the “bluetoothctl” to show the Bluetooth MAC address and set up pairing mode.

```
$ bluetoothctl
[NEW] Controller 5C:F3:70:24:4B:2E
[bluetooth]#
[bluetooth]# show
Controller 5C:F3:70:24:4B:2E
    Name: BlueZ 5.25
    Alias: BlueZ 5.25
    ....
[bluetooth]# select 5C:F3:70:24:4B:2E
[bluetooth]# power on
Changing power on succeeded
[bluetooth]# agent on
Agent registered
[bluetooth]# default-agent
Default agent request successful
[bluetooth]# discoverable on
Changing discoverable on succeeded
[CHG] Controller 5C:F3:70:24:4B:2E Discoverable: yes
[bluetooth]# pairable on
Changing pairable on succeeded
[bluetooth]# scan on
Discovery started
[CHG] Controller 5C:F3:70:24:4B:2E Discovering: yes
[NEW] Device 00:1D:82:BC:C1:C4 Jabra BT-530
...
[bluetooth]# scan off
[bluetooth]# devices
Device 00:1D:82:BC:C1:C4 Jabra BT-530
Device ...
[bluetooth]# pair 00:1D:82:BC:C1:C4
[bluetooth]# trust 00:1D:82:BC:C1:C4
```

To enable Bluetooth device, use the following commands:

```
[bluetooth]# connect 00:1D:82:BC:C1:C4
[bluetooth]# info 00:1D:82:BC:C1:C4
[bluetooth]# quit
```

4.1.2.2. Setting Up the Bluetooth SPP Profile

The VAB-630 supports SPP server mode and SPP client mode.

Use the following commands to run the “bluetoothctl” to show the Bluetooth MAC address and set up pairing mode for the EMIO-2531 or EMIO-5531 module. .

```
$ bluetoothctl
[NEW] Controller 5C:F3:70:24:4B:2E
[bluetooth]# scan on
Discovery started
[CHG] Controller 5C:F3:70:24:4B:2E Discovering: yes
[NEW] Device 5C:F3:70:25:DD:33 BlueZ 5.25
...
[bluetooth]# scan off
[bluetooth]# devices
Device 5C:F3:70:25:DD:33 BlueZ 5.25
Device ...
[bluetooth]# pair 5C:F3:70:25:DD:33
[bluetooth]# trust 5C:F3:70:25:DD:33
[bluetooth]# quit
```

SPP server mode:

If you do not change the listen channel number, the service will automatically use the default channel number. Make sure the server or client mode is using the same Bluetooth channel number.

To set up the SPP server mode and allow other devices to connect, use the following commands:

```
# sdptool add SP
Serial Port service registered
# rfcomm listen hci0
Waiting for connection on channel 1
Connection from 5C:F3:70:25:DD:33 to /dev/rfcomm0
Press CTRL-C for hangup
```

SPP client mode:

If you do not change the listen channel number, the service will automatically use the default channel number. Make sure the server or client mode is using the same listen channel number.

Use the following commands to set up the SPP client mode and request a connection to SPP server.

```
# sdptool add SP
Serial Port service registered
# rfcomm connect hci0 5C:F3:70:24:4B:2E
Connected /dev/rfcomm0 to 5C:F3:70:24:4B:2E on channel 1
Press CTRL-C for hangup
```

To open the minicom serial communication program, use the following command:

```
# minicom -s
```

Connect to the /dev/rfcomm0 serial device with the following settings:

```
+-----+
| A  -   Serial Device           : /dev/rfcomm0 |
| B  -   Lockfile Location       : /var/lock   |
| C  -   Callin Program          :             |
| D  -   Callout Program         :             |
| E  -   Bps/Par/Bits            : 115200 8N1  |
| F  -   Hardware Flow Control   : No          |
| G  -   Software Flow Control   : No          |
+-----+
```

Serial port setting

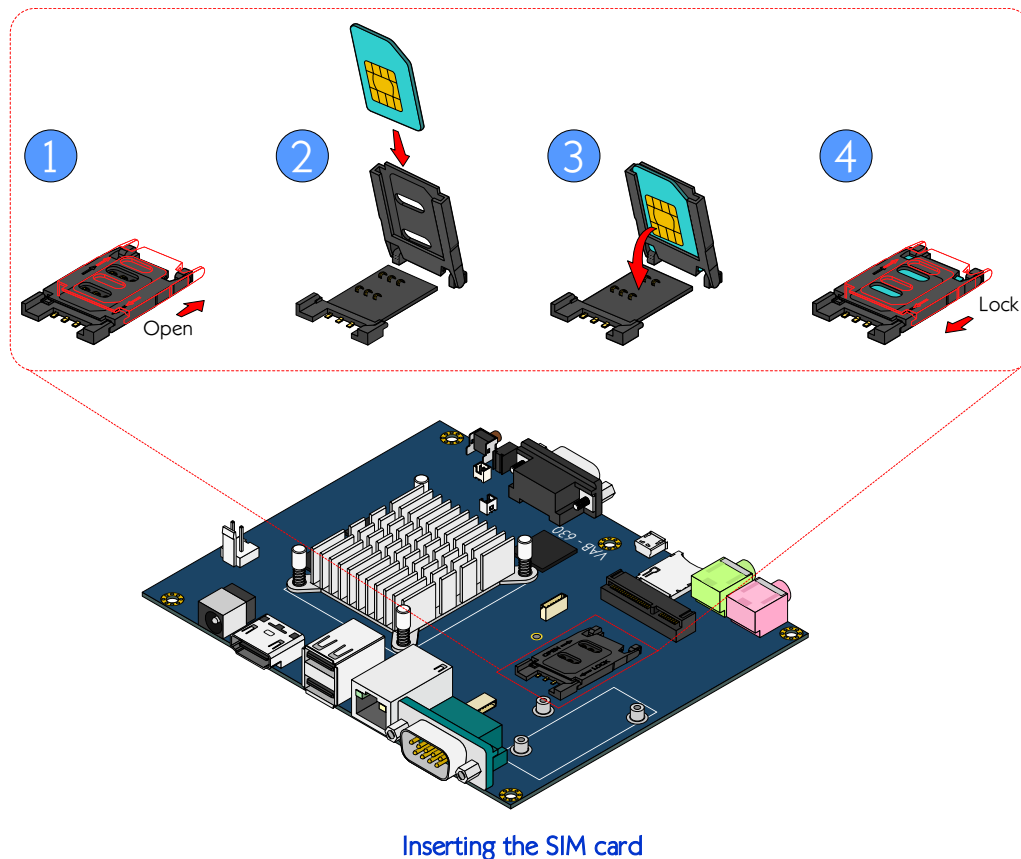
Start a serial communication program on the host machine with the same communication settings using the appropriate Bluetooth SPP device. Afterwards the Bluetooth SPP device and the VAB-630 will be able to communicate through the programs (for example sending a keypress on one machine should be shown on the other machine).

4.2. Configuring the EMIO-2550 miniPCle Mobile Broadband Module

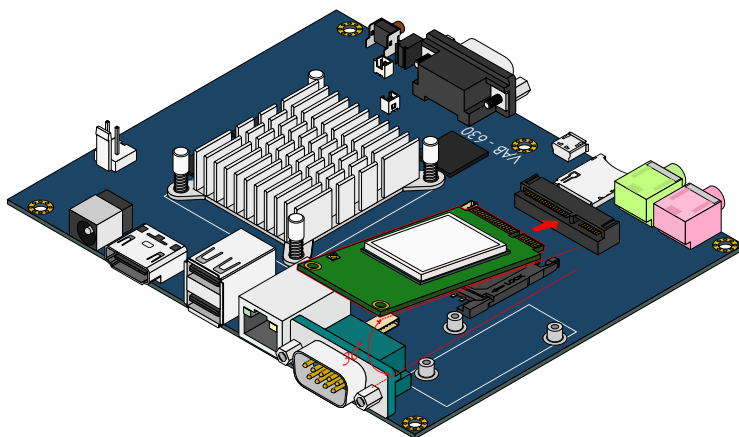
The EMIO-2550 miniPCle Mobile Broadband module supports 3G functions.

4.2.1. Connecting to the Internet

The first step is to insert an active SIM card into the SIM card slot on the VAB-630 board, and then insert the EMIO-2550 module into the miniPCle slot. After installing the module connect the provided antenna to the module. Next, make sure to unplug any LAN cables or USB Wi-Fi dongles you have installed. Finally, power on the VAB-630.

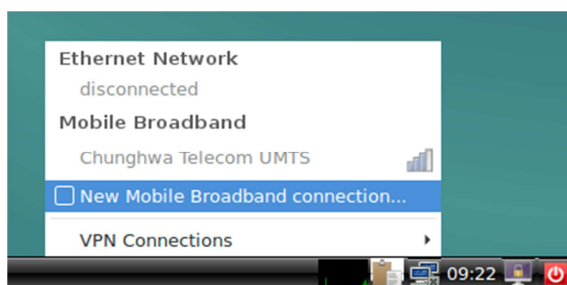


Next, insert the EMIO-2550 module into the miniPCle slot. Finally, power on the VAB-630.



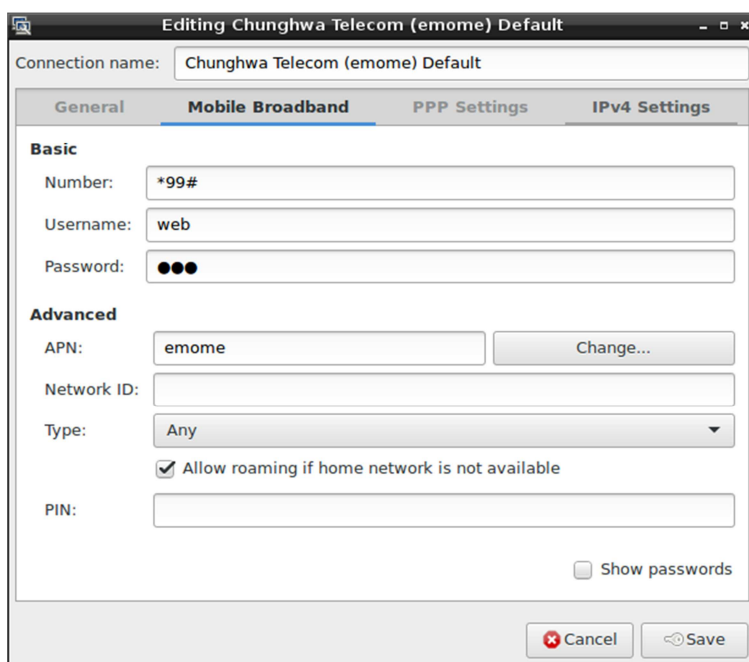
Inserting the EMIO-2550 module

To configure the Mobile broadband connection, click on the “Network Manager” icon located in the notification area then click “New Mobile Broadband connection” and a wizard will appear; follow the wizard screen dialogue box to create the connection.



Network Manger configuration

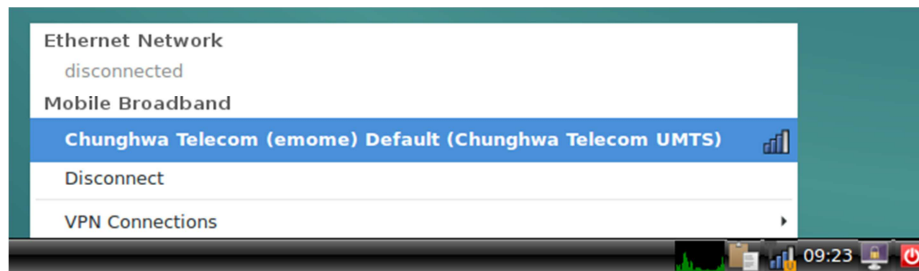
Fill in the required fields to setup your connection. If you are unsure of what the required fields and values are, check with your Mobile Broadband provider.



3G connection configuration

After the connection is created, click on the "Network Manager" icon again and select the connection you just created.

The successful connection looks like this:



Successful connection screen



Taiwan Headquarters

1F, 531 Zhong-zheng Road,
Xindian Dist., New Taipei City 231
Taiwan

Tel: 886-2-2218-5452
Fax: 886-2-2218-9860
Email: embedded@via.com.tw



USA

940 Mission Court
Fremont, CA 94539,
USA

Tel: 1-510-687-4688
Fax: 1-510-687-4654
Email: embedded@viatech.com



Japan

3-15-7 Ebisu MT Bldg. 6F,
Higashi, Shibuya-ku
Tokyo 150-0011
Japan

Tel: 81-3-5466-1637
Fax: 81-3-5466-1638
Email: embedded@viatech.co.jp



China

Tsinghua Science Park Bldg. 7
No. 1 Zongguancun East Road,
Haidian Dist., Beijing, 100084
China

Tel: 86-10-59852288
Fax: 86-10-59852299
Email: embedded@viatech.com.cn



Europe

Email: embedded@via-tech.eu