QUICK START GUIDE

VIA AMOS-825

Linux EVK v3.0.4

1.00-10042018-154700

Revision History

Version	Date	Remarks
1.00	10/04/2018	Initial release

Table of Contents

1. Introduction

This Quick Start Guide provides an overview of how to boot the Android EVK system image on the VIA AMOS-825 system (Bare board: VIA VAB-820 with NXP i.MX 6Quad Cortex-A9 processor) and configure the supported hardware function in the build.

The VIA AMOS-825 Linux EVK v3.0.4 is developed based on the NXP fsl-yocto-3.14.28_1.0.0 (Yocto 1.7 Dizzy) and enables the hardware features of the VIA AMOS-825 system.

1.1 EVK Package Contents

There are three folders in the package listed as below.

Firmware folder	Description
via-image-gui-imx6qamos825.sdcard	SD card image
u-boot.imx	U-Boot boot loader
zImage	Kernel
zImage-imx6q-amos825.dtb	Device tree
modules-imx6qamos825.tgz	All module drivers
Document folder	**Description**
AMOS-825_Linux_EVK_v3.0.4_Quick_Start_Guide _v1.00_20181004.pdf	Quick Start Guide
Tools folder	**Description**
BT_Config.zip	Bluetooth A2DP configuring file

VIA AMOS-825 Linux EVK contents

1.1.1 Firmware Folder Contents

via-image-gui-imx6qamos825.sdcard: is the precompiled image for evaluating the VIA AMOS-825 system with an Open Embedded filesystem.

u-boot.imx: is the U-Boot boot loader file which can be flashed to either the onboard SPI ROM or a Micro SD card.

zImage: is a self-extracting compressed Linux kernel image.

zImage-imx6q-amos825.dtb: is the device tree binary. It is a database that represents the hardware components of the VIA AMOS-825 system.

modules-imx6qamos825.tgz: contains the drivers for the Wi-Fi & Bluetooth module and the VIA EMIO-2550 miniPCIe Mobile Broadband module.

1.1.2 Document Folder Contents

AMOS-825_Linux_EVK_v3.0.4_Quick_Start_Guide_v1.00_20181004.pdf: This Quick Start Guide provides an overview of how to boot the Linux EVK system image on the VIA AMOS-825 system and configure the supported hardware function in the build.

1.1.3 Tools Folder Contents

BT_Config.zip: contains the Bluetooth A2DP configuring file.

1.2 Version Information and Supported Features

- U-Boot version: 2014.04
- Kernel version: 3.14.28
- Evaluation image: OpenEmbedded-core built with Yocto 1.7 Dizzy
- Development based on NXP fsl-yocto-3.14.28_1.0.0 (Yocto 1.7 Dizzy)
- Supports SPI with eMMC or Micro SD boot (default)
- Supports 7” Projective capacitive touch monitor (800 x 480) (through I²C interface)
- Supports COM as debug port
- Supports two FlexCAN TX/RX
- Supports Gigabit Ethernet
- Supports Line-out and Mic-in
- Supports IEEE 802.11b/g/n Wi-Fi
- Supports Bluetooth 4.0
  - A2DP and SPP profile
- Supports u-blox MAX-7 GPS/GNSS module
- Supports VIA EMIO-2550 miniPCIe Mobile Broadband module
- Supports Watchdog timer, and RTC

2. Image Installation

This section explains the setup requirements for booting from a Micro SD card or the SPI ROM and eMMC.

The precompiled U-boot and image are provided in the “Firmware” folder.

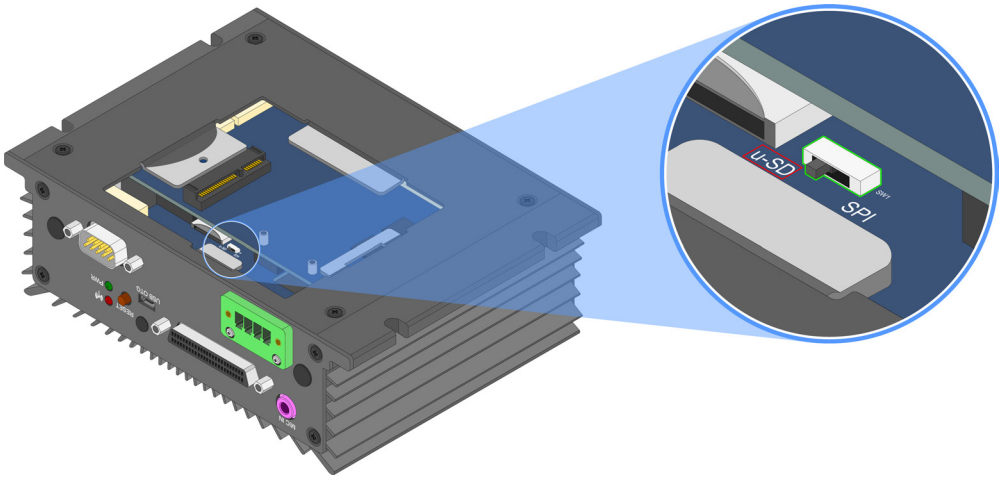
2.1 Booting from a Micro SD Card

The first step is to install this image onto a Micro SD card. Insert a Micro SD card into your Linux host machine and make sure it is not mounted. Install the SD card image onto the Micro SD card with the commands below, replacing <device name> with the correct value for the card.

***Important:** Make sure you are writing to the correct device or the host system environment could be damaged.

```
$ sudo dd if=via-image-gui-imx6qamos825.sdcard of=/dev/<device name> bs=1M conv=fsync
```

Next, on the VIA AMOS-825, set the boot switch to the Micro SD position as shown below.



Micro SD/SPI boot switch diagram

Insert the prepared Micro SD card into the VIA AMOS-825, connect the specified touch monitor, and power on the VIA AMOS-825 to initiate the boot process.

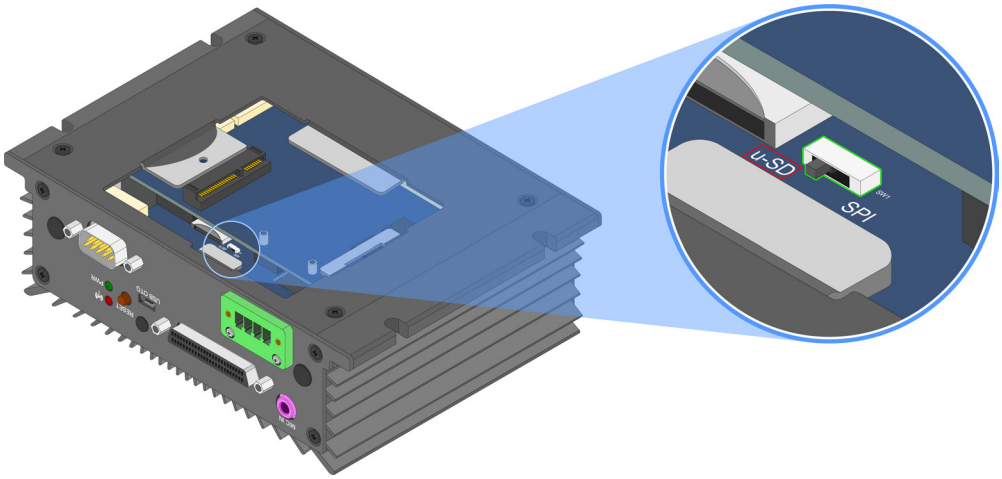
When the boot process is completed, you will see the OpenEmbedded desktop.

2.2 Booting from the SPI ROM with eMMC

The VIA AMOS-825 supports booting from the SPI ROM while loading the kernel and root filesystem from eMMC.

The first step is to prepare the Micro SD card with the default image stored on it, according to section 2.1. Next, copy the **u-boot.imx** and **via-image-gui-imx6qamos825.sdcard** files from the Firmware folder onto a mass storage device such as a USB thumb drive. Make sure the boot selector is set to Micro SD boot then insert the Micro SD card and the USB thumb drive into the VIA AMOS-825.

Next, on the VIA AMOS-825, set the boot switch to the Micro SD position as shown below.



Micro SD/SPI boot switch diagram

To check that the system has been correctly setup to the SPI ROM as an MTD block device, use the following command:

```
$ ls /dev/mtdblock*/dev/mtdblock0
```

Please note that if you have previously saved the U-Boot parameters, it is recommended to clear that area of the SPI ROM with the following command:

```
$ sudo dd if=/dev/zero of=/dev/mtdblock0 bs=512 seek=1536 count=16
```

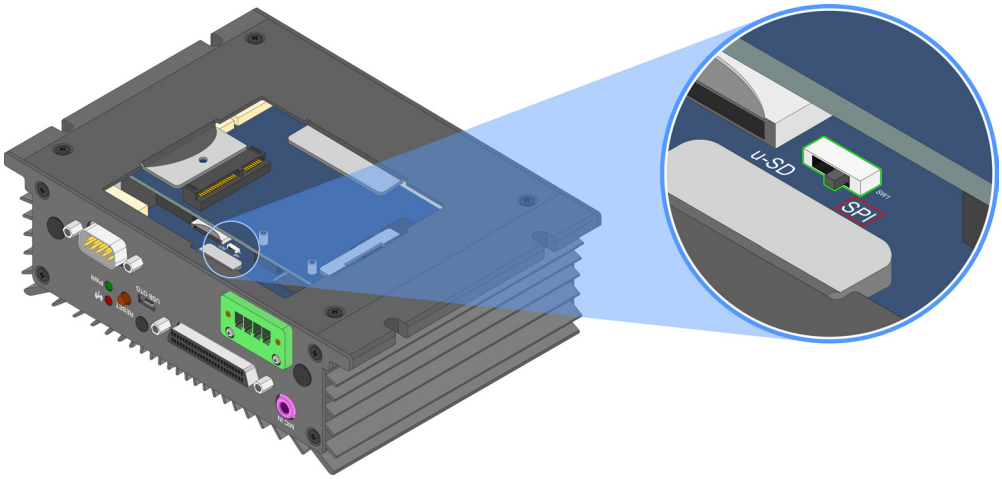
To flash the U-Boot binary from the mass storage device onto the SPI ROM, use the following command:

```
$ sudo dd if=u-boot.imx of=/dev/mtdblock0 bs=512 seek=2
```

To copy the root filesystem image from the mass storage device onto the eMMC storage, use the following command:

```
$ sudo dd if=via-image-gui-imx6qamos825.sdcard of=/dev/mmcblk0 bs=1M
```

Next, in order to boot from the SPI ROM make sure the boot switch is set to SPI ROM boot.



Micro SD/SPI boot switch diagram

Next, connect the specified touch monitor, and power on the device to initiate the boot process.

When the boot process is completed, you will see the OpenEmbedded desktop.

3. Hardware Functions

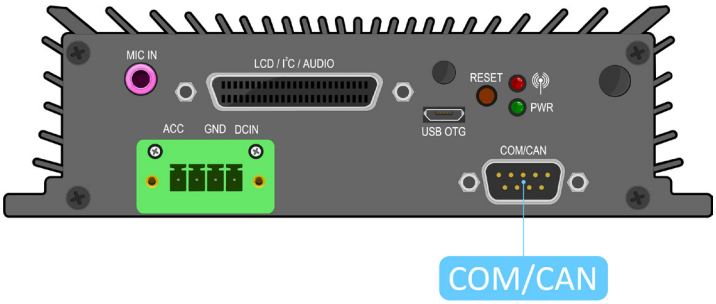
This section explains how to enable and test the hardware functions precompiled in the VIA AMOS-825 Linux EVK including setting U-Boot parameters, restoring default U-Boot parameters, using the OpenEmbedded console, configuring FlexCAN, configuring Watchdog timer, configuring RTC, connecting Wi-Fi, enabling Bluetooth, and configuring GPS.

3.1 Setting Up U-Boot Parameters

When setting up the U-Boot parameters, the first step is to connect the host machine and the VIA AMOS-825 through the COM port. Use a serial port communication program such as PuTTY, GtkTerm, 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/ttymxc0     |
|  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



COM port diagram

Next, power on the VIA AMOS-825 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.

```
U-Boot 2014.04 (Oct 17 2015 - 18:49:13)AMOS825 ver:3.0.4

CPU:   Freescale i.MX6Q rev1.5 at 996 MHz
CPU:   Temperature 30 C
Reset cause: POR
Board: MX6Q-AMOS825
I2C:   ready
DRAM:  1 GiB
MMC:   FSL_SDHC: 0, FSL_SDHC: 1
SF: Detected W25Q32BV with page size 256 Bytes, erase size
4 KiB, total 4 MiB

No panel detected: default to Hannstar-XGA
Display: Hannstar-XGA (1024x768)
In:    serial
Out:   serial
Err:   serial
Net:   FEC [PRIME]
Warning: failed to set MAC address

Normal Boot
Hit any key to stop autoboot:  0
=>
```

Debug console view of boot process

To list the current U-Boot parameters, use the following command:

```
=> printenv
```

To have more information make sure the printout message includes “bootcmd=run bootcmd_auto”.

The default “bootcmd” parameter is set to auto detect the system location by first attempting to load the kernel from the Micro SD card. If it is not detected it will continue to boot from the eMMC.

To load the kernel from the specified device, refer to the two examples below.

To load the kernel from the Micro SD card, use the following commands:

```
=> setenv bootcmd ‘run bootcmd_sd’
=> saveenv
=> boot
```

To load the kernel from the eMMC, use the following commands:

```
=> setenv bootcmd ‘run bootcmd_mmc’
=> saveenv
=> boot
```

3.2 Restoring Default U-Boot Parameters

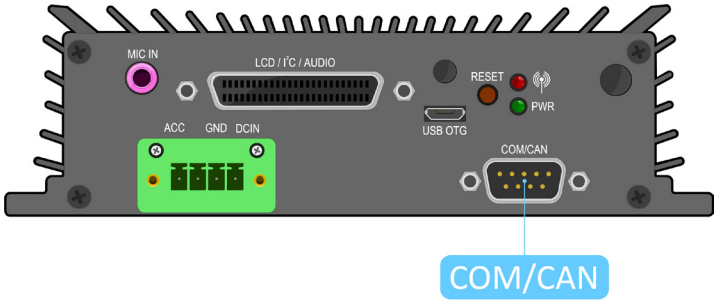
If the U-Boot parameters have been modified, the “destroyenv” command in the U-Boot console can restore the factory default settings.

To restart the device, use the following commands:

```
=> destroyenv
=> reset
```

3.3 Using the OpenEmbedded Console

The first step is to connect the host machine and the VIA AMOS-825 through the COM port. Use a serial port communication program such as PuTTY, GtkTerm, or Minicom to 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. Next, power on the VIA AMOS-825 to initiate the boot process. When the boot process is completed you will be prompted to login.



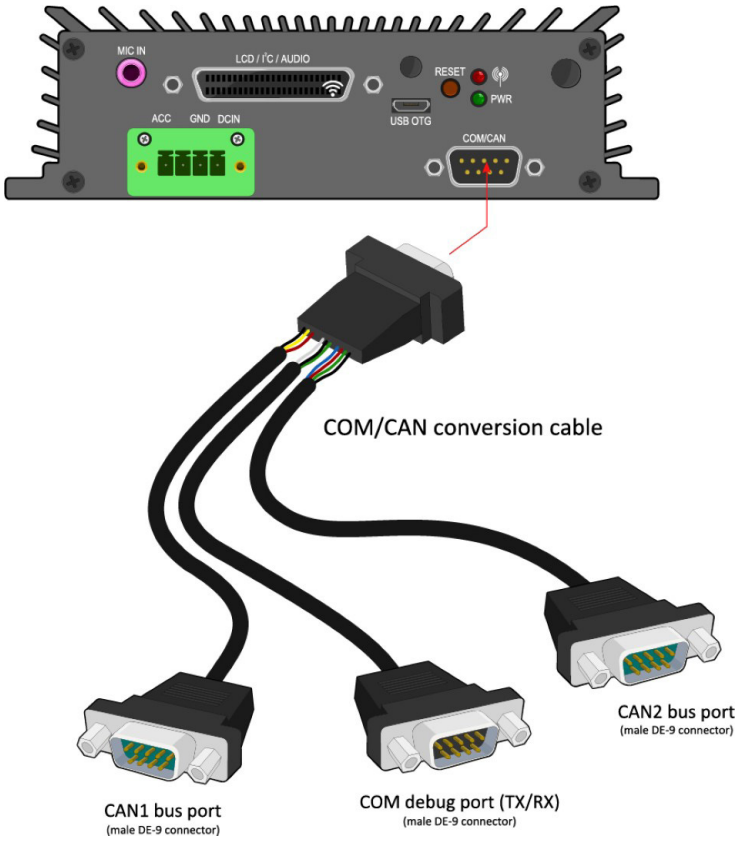
COM port diagram

The default account is “root”, with no password set (just press Enter when prompted for password).

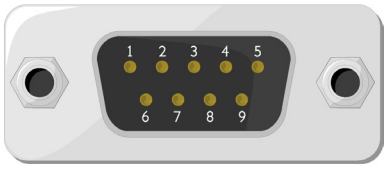
```
...
Poky (Yocto Project Reference Distro) 1.7 imx6qamos825 /dev/ttymxc1
imx6qamos825 login: root
```

3.4 Configuring FlexCAN

The COM/CAN port of the VIA AMOS-825 supports debug port (COM) and two CAN bus ports. The CAN bus supports CAN protocol specification Version 2.0B while the COM supports TX/RX for debugging purposes only. The first step is to connect the COM/CAN converter cable.



Connecting COM/CAN conversion cable diagram



COM/CAN port diagram

Pin	Signal
1	CANH1
2	RX
3	TX
4	CANL2
5	GND
6	CANL1
7	GND
8	CANH2
9	VCC5

COM/CAN port pinout table

Please note that you need to disable the CAN bus first, set the CAN bus bitrate. The CAN bus bitrate should be 5000 < [BRT_value] < 1000000.

CAN bus 1 is can0 and CAN bus 2 is can1.

To set the CAN bus 1 bitrate [BRT_value], use the following command:

```
# ip link set can0 type can bitrate [BRT_value]
```

To enable the CAN bus 1, use the following command:

```
# ifconfig can0 up
```

To disable the CAN bus 1, use the following command:

```
# ifconfig can0 down
```

Use the cansend command to send CAN bus 1 data:

```
# cansend can0 <ID>#<Data>
```

<ID>: Device ID of CAN bus

<Data>: Send out data

Use the candump command to receive data from CAN bus 1:

```
# candump can0 &
```

3.5 Configuring Watchdog Timer

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

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

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

```
$ /unit_tests/wdt_driver_test.out enable wdt
```

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

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

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

```
$ /unit_tests/ 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 timer, use the following command:

```
$ /unit_tests/wdt_driver_test.out disable wdt
```

3.6 Configuring RTC

The RTC (Real-Time Clock) keeps track of the current time values. The time values include the year, month, date, hours, minutes and seconds. To configure the RTC on the VIA AMOS-825, set the system time with the Linux date command as in the example shown below.

```
$ date mmddHHMMYYYY
```

Time	Value
mm	2-digit month
dd	2-digit day
HH	2-digit hours in 24h system
MM	2-digit minutes
YYYY	4-digit year

Time value table

For example, the value 061110072013 means June 11, 2013 10:07. The date command also accepts other time formats. For more information, use the following command:

```
$ date --help
```

To write the system time to the RTC, use the following command:

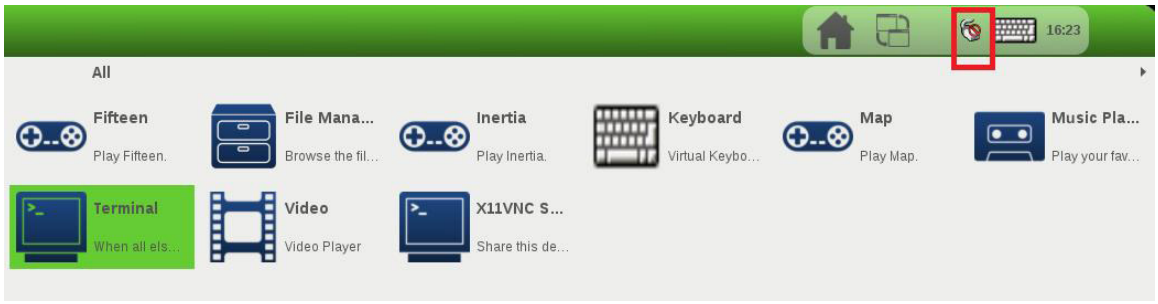
```
$ hwclock -w -f /dev/rtc0
```

To read the RTC time, use the following command:

```
$ hwclock -r
```

3.7 Connecting Wi-Fi

When the boot process is completed, click on the "**Connection Manager**" icon to configure WLAN.



Connection manager icon diagram

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

3.8 Enabling Bluetooth

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

3.8.1 Setting Up Bluetooth A2DP Profile

To add A2DP support to the AMOS-825, first copy and replace the **pulseaudio-system.conf**, **bluetooth.conf** to the **/etc/dbus-1/system.d** folder. Next, copy and replace the system.pa files to the **/etc/pulse/folder**. These files are located in the EVK/BT_Config folder of the BSP.

To enable the Bluetooth service, use the following commands:

```
$ rfkill unblock bluetooth
$ hciconfig hci0 up
$ hciconfig hci0 piscan
$ /usr/lib/bluez5/bluetooth/bluetoothd -C -d &
```

Use the following commands to run the “bluetoothctl” to show the Bluetooth MAC address and set up pairing mode for the VIA VAB-820-W module.

```
$ 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
```

The default audio output setting for the VIA AMOS-825 is Line-out.

To list all the available audio output devices, use the following commands:

```
$ pactl list short sinks
0 alsa_output.platform-sound.22.analog-stereo  module-alsa-card.c s16le 2ch 44100Hz
SUSPENDED
1 bluez_sink.14_06_05_24_09_E3    module-bluez5-device.c  s16le 2ch 44100Hz
SUSPENDED
```

From the output, we can see the following:

- 1 = Line-out
- 2 = Bluetooth device

To set up the audio output to a Bluetooth device, use the following command:

```
$ pacmd set-default-sink 1
```

***Note:** If you would like to change audio output after enabling a Bluetooth device, use the commands below:

To set up the audio output to Line-out, use the following command:

```
$ pacmd set-default-sink 0
```

3.8.2 Setting Up Bluetooth SPP Profile

The VIA AMOS-825 supports SPP server mode and SPP client mode.

To enable the Bluetooth service, use the following commands:

```
$ rfkill unblock bluetooth
$ hciconfig hci0 up
$ hciconfig hci0 piscan
$ /usr/lib/bluez5/bluetooth/bluetoothd -C -d &
```

Use the following commands to run the “bluetoothctl” to show the Bluetooth MAC address and set up pairing mode for the VIA VAB-820-W 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 the 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 of VIA VAB-820-W module

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 VIA AMOS-825 will be able to communicate through the programs (for example sending a keypress on one machine should be shown on the other machine).

3.9 Configuring GPS

The GPS-listener provides an application to configure the GPS function. To enable the GPS function, use the following command:

```
$ gps-listener
```

It will output the data received from the GPS module as illustrated in the screenshot below.

```
$GPRMC,142015,00,A,2501.93961,N,12133.66111,E,0.068,,030314,,,A*73
$GPGSV,4,1,13,01,34,184,29,03,49,023,47,06,26,042,41,07,44,317,26*75
$GPGSV,4,2,13,08,13,323,,11,60,192,,13,29,242,38,16,33,071,16*79
$GPGSV,4,3,13,19,65,356,44,23,18,208,12,27,35,034,27,30,37,145,29*7B
$GPGSV,4,4,13,32,01,154,*4B
$GPZDA,142015.00,03,03,2014,00,00*62
```

GPS NMEA message

4. Accessories

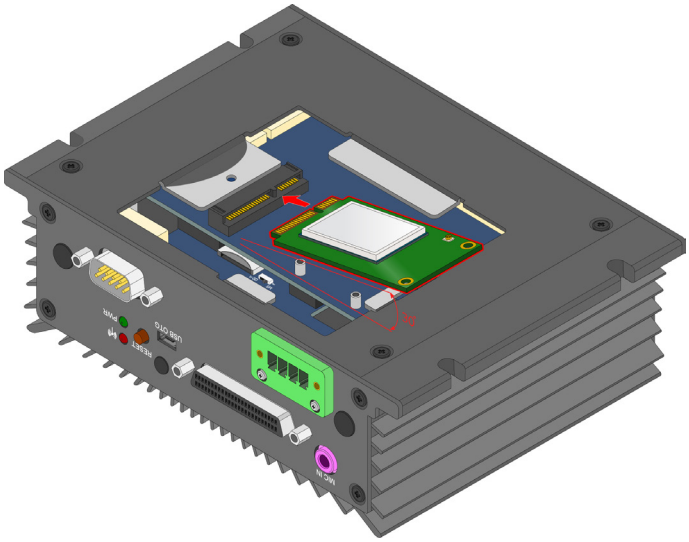
This section explains how to install and configure the module available for the VIA AMOS-825 system.

4.1 Configuring the VIA EMIO-2550 miniPCIe Mobile Broadband Module

The VIA EMIO-2550 miniPCIe Mobile Broadband module supports 3G function.

4.1.1 Connecting to the Internet

The first step is to insert an active SIM card into the VIA EMIO-2550 module, and then insert the VIA EMIO-2550 module into the miniPCIe 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 VIA AMOS-825.



Inserting the VIA EMIO-2550 module diagram

To check that the system has correctly detected the VIA EMIO-2550 module, use the following command:

```
$ lsusb
```

Make sure the printout message includes “Bus 001 Device 004: ID 1545:1102 U-Blox AG”.

To configure the 3G function by creating a PPP connection with root privilege, use the following command:

```
$ pppd call Module-ZU200
```

Once the PPP connection has been created, connect to the internet through your web browser.

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