



QUICK START GUIDE

VIA VAB-950

Yocto 2.6 EVK



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Revision History

Version	Date	Remarks
1.00	23/11/2020	Initial release

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1. Introduction

This Quick Start Guide provides an overview on how to boot the Yocto image for the VIA VAB-950 and configure the supported hardware functions in the build.

The VIA VAB-950 Yocto 2.6 EVK is developed based on the MediaTek Yocto 2.6 BSP and it enables the hardware features of the VIA VAB-950.

1.1 EVK Package Contents

There are three folders in the package listed as below.

Firmware folder	Description
VIA_VAB-950_Yocto_2.6_EVK.zip	Yocto image and scatter-loading file
Document folder	Description
VIA_VAB-950_Yocto_2.6_EVK_Quick_Start_Guide.pdf	Quick Start Guide
Tool folder	Description
Driver_Auto_Installer_EXE.zip	MTK USB cable driver
UniversalAdbDriverSetup.zip	Universal ADB driver
SP_Flash_Tool_exe_Windows.zip	MTK SP Flash Tool

1.1.1 Firmware Folder Contents

VIA_VAB-950_Yocto_2.6_EVK.zip: contains scatter-loading file and the precompiled Yocto image for evaluating the VIA VAB-950.

1.1.2 Document Folder Contents

VIA_VAB-950_Yocto_2.6_EVK_Quick_Start_Guide.pdf: This Quick Start Guide provides an overview on how to boot the Yocto image for the VIA VAB-950 and configure the supported hardware functions in the build.

1.1.3 Tool Folder Contents

Driver_Auto_Installer_EXE.zip: MTK USB cable driver.

UniversalAdbDriverSetup.zip: Universal ADB driver.

SP_Flash_Tool_exe_Windows.zip: MTK SP Flash Tool.

1.2 Version Information and Supported Features

- Kernel version: 4.4.146
- Evaluation image: Yocto 2.6
- Development based on MediaTek Yocto 2.6 BSP
- Supports eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports MIPI DSI capacitive touch panel
 - AUO 10.1 B101UAN01.7 (1920×1200)
 - eGalax I2C touch
- Supports COM1 as RS-232 mode (TX/RX) and COM as debug port
- Supports two 10/100Mbps Ethernet ports
- Supports MediaTek MT6358 Headphone and Mic-in
- Supports MediaTek MT7668 Wi-Fi 802.11ac and Bluetooth 5.0
- Supports VIA EMIO-2574 (SIM7600JC-H) 4G LTE mobile broadband miniPCle module
- Supports MIPI CSI OV5648 camera module

2. Image Installation

This section explains the setup requirements for booting from the eMMC.

The scatter-loading file and precompiled image are provided in the "Firmware" folder.

2.1 Installing with the SP Flash Tool

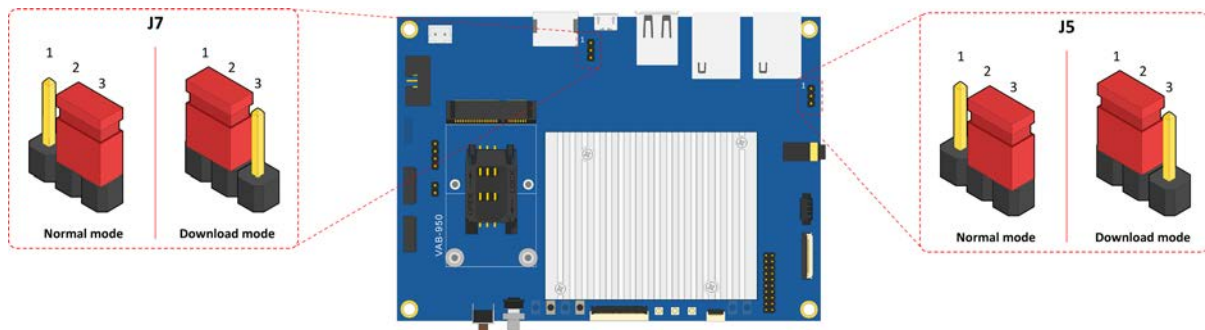
The first step is to install the "MTK USB cable driver" and "Universal ADB driver" into your Windows 10 host machine.

Then connect the Windows 10 host machine and the VIA VAB-950 through the Micro USB 2.0 port using the Micro USB cable.



Micro USB 2.0 port diagram

Next, on the VIA VAB-950, set the two OS image jumpers (J7 and J5) to download mode as shown in the diagram below.



OS image jumpers diagram

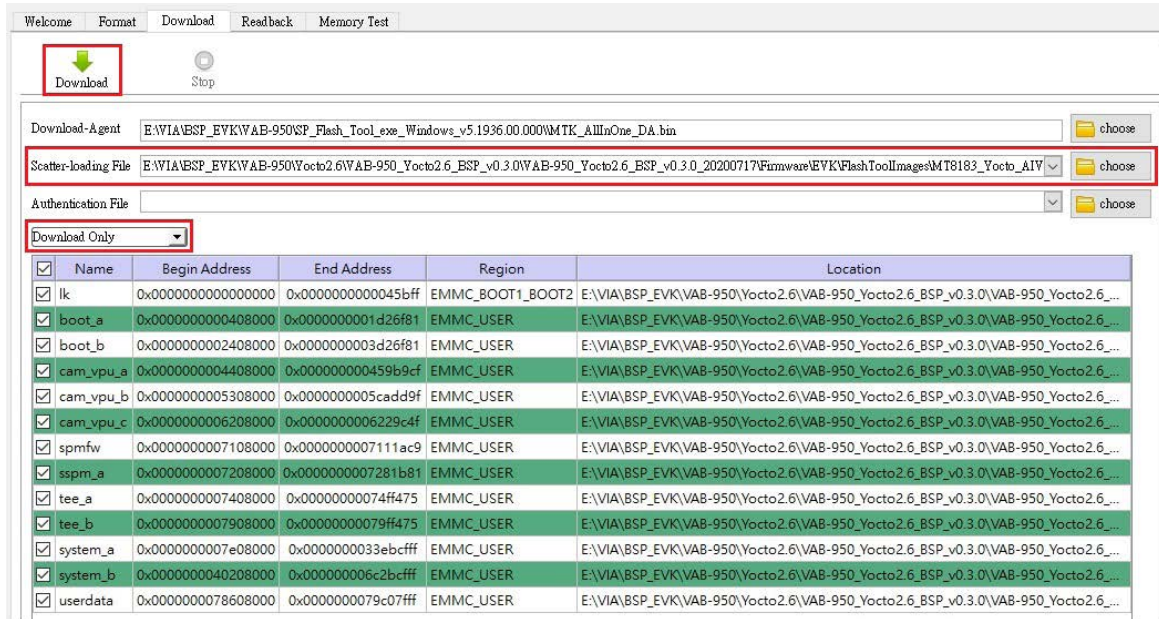
J5 and J7 Settings	Pin 1	Pin 2	Pin 3
Normal mode (default)	Open	Short	Short
Download mode	Short	Short	Open

OS image jumper settings

Extract the **VIA_VAB-950_Yocto_2.6_EVK.zip** file, and run the **flash_tool.exe** from the **SP_Flash_Tool_exe_Windows** folder on your Windows 10 host machine.

In the "Scatter-loading File" box, choose the **MT8183_Yocto_AIV_scatter.txt** from the \Firmware\ folder.

Next, click the drop-down arrow and select the "Download Only". Then click the "Download" button.

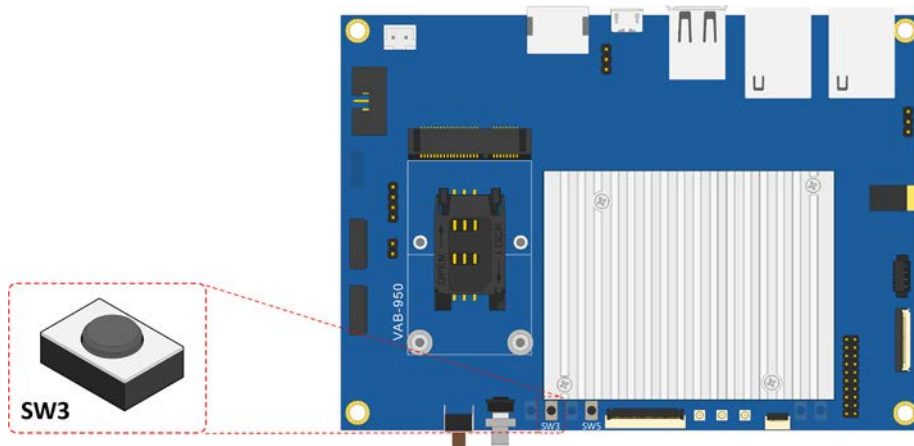


Plug in the AC-to-DC power adapter to power on the VIA VAB-950.



Note:
Make sure the Windows 10 host machine detects the VAB-950 as ADB device.

Press and hold the SW3 button + Reset button at the same time and then release them.



SW3 button diagram



Reset button diagram

If the bar on the flash_tool becomes red, it means the image installation has started.

If the color does not change, press the Reset button + SW3 button at the same time again and then release them.

Welcome **Format** Download **Readback** Memory Test

Download Stop

Download-Agent: E:\VIA\ESP_EVK\VAB-950\SP_Flash_Tool_exe_Windows_v5.1936.00.000\MTK_AllInOne_DA_bin

Scatter-loading File: E:\VIA\ESP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_BSP_v0.3.0_20200717\Firmware\EVK\FlashToolImages\MT8183_Yocto_AIV

Authentication File:

Download Only

<input checked="" type="checkbox"/>	Name	Begin Address	End Address	Region	Location
<input checked="" type="checkbox"/>	lk	0x0000000000000000	0x000000000045bfff	EMMC_BOOT1_BOOT2	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	boot_a	0x00000000009408000	0x00000000013207ff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	boot_b	0x0000000002408000	0x0000000003d26f81	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_a	0x0000000004408000	0x0000000005300000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_b	0x0000000005308000	0x0000000005cadd9f	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_c	0x0000000006308000	0x0000000006200000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	spmfw	0x0000000007108000	0x0000000007111ac9	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	tee_m_a	0x0000000007208000	0x0000000007281000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	tee_a	0x0000000007408000	0x00000000074ff475	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	tee_b	0x0000000007908000	0x00000000079ff475	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	system_a	0x0000000007e08000	0x00000000033ebcfff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	system_b	0x00000000040208000	0x0000000005c3bcfff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	userdata	0x00000000078608000	0x00000000079c07ff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...

Downloaded 100%

12.67M/s 220.71K **EMMC** High Speed 0:03 MediaTek USB Port (COM4)

When the image installation is completed, the color of the bar will change to yellow. Then you will see the "Download OK" pop-up message as shown below.

Download Agent: E:\VIA\BSP_EVK\VAB-950\SP_Flash_Tool_exe_Windows_v5.1936.00.000\MTK_AllInOne_DA.bin

Scatter-loading File: E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_BSP_v0.3.0_20200717\Firmware\EVK\FlashTool\Images\MT8183_Yocto_AIV

Authentication File: [empty]

Download Only: [dropdown]

<input checked="" type="checkbox"/>	Name	Begin Address	End Address	Region	Location
<input checked="" type="checkbox"/>	lk	0x0000000000000000	0x000000000045bfff	EMMC_BOOT1_BOOT2	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	boot_a	0x0000000000408000	0x0000000001d26f81	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	boot_b	0x0000000002408000	0x0000000003d26f81	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_a	0x0000000004408000	0x000000000459b9cf	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_b	0x0000000005308000	0x0000000005408000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	cam_vpu_c	0x0000000006208000	0x0000000006308000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	spmfw	0x0000000007108000	0x0000000007208000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	sspm_a	0x0000000007208000	0x0000000007308000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	tee_a	0x0000000007408000	0x0000000007508000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	tee_b	0x0000000007908000	0x0000000007a08000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	system_a	0x0000000007e08000	0x0000000007f08000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	system_b	0x00000000040208000	0x00000000041208000	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
<input checked="" type="checkbox"/>	userdata	0x00000000078608000	0x00000000079607fff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...

[userdata] Download Flash 100%

11.70M/s | 22.00M | **EMMC** | High Speed | 0.52 | MediaTek USB Port (COM4)

Unplug AC-to-DC power adapter to power off the VIA VAB-950.

Set the two OS image jumpers (J7 and J5) back to the normal mode setting.

Unplug the Micro USB cable and plug the power adapter back in.

Press the Power Button for 2 seconds and then release it to power on the VIA VAB-950.

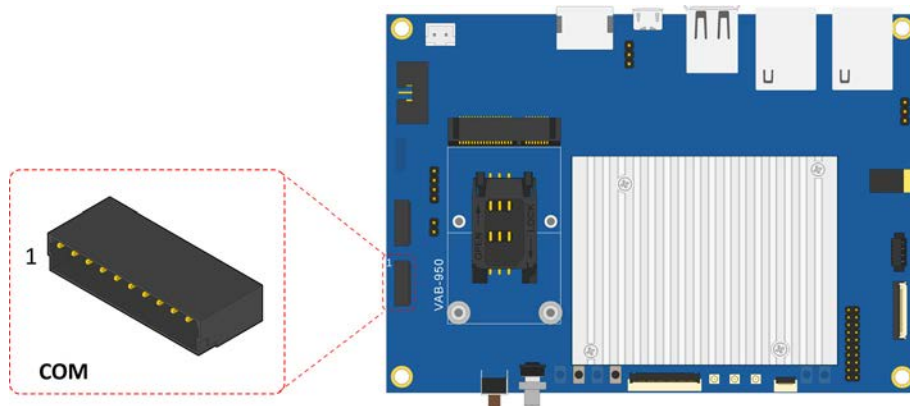
When the boot process is completed, you will see the Yocto desktop.

3. Hardware Functions

This section explains how to enable and test the hardware functions precompiled in the Yocto EVK including using the debug console.

3.1 Using the Debug Console

The first step is to connect the host machine and the VIA VAB-950 through the COM connector labeled as "COM". Use a serial port communication program such as PuTTY or Tera Term to connect the debug console. Set the console Baud Rate to "921600".



COM connector diagram

Next, power on the VIA VAB-950 to initiate the boot process.

When the boot process is completed, log in to the debug console. The default account is "username: root / password: root".

3.2 Changing Kernel Debug Level

To disable many more kernel messages, modify the debug level using the following command:

```
root@aiv8385-linux:~# echo 3 > /proc/sys/kernel/printk
```

3.3 Checking BSP Version

To check the BSP version, use the following command:

```
root@aiv8385-linux:~# cat /proc/version
```

3.4 DVFS

To verify the DVFS (Dynamic Voltage Frequency Scaling) function and list all the supported features, use the following commands:

```
root@aiv8385-linux:~# ls -al /sys/devices/system/cpu/cpu0/cpufreq/
total 0
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 affected_cpus
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 cpuinfo_cur_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 cpuinfo_max_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 cpuinfo_min_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 cpuinfo_transition_latency
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 related_cpus
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_available_frequencies
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_available_governors
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_cur_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_driver
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_governor
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_max_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_min_freq
-rwxr-xr-x 1 root root 4096 Dec 31 10:21 scaling_setspeed
drwxr-xr-x 2 root root 0 Dec 31 10:21 stats
```

To check the supported and current CPU frequency, use the following commands:

```
:~# cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
1989000 1924000 1846000 1781000 1716000 1677000 1625000 1586000 1508000 1417000 1326000
1248000 1131000 1014000 910000 793000
:~# cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq
793000
```

3.5 Display

The VIA VAB-950 supports a choice of HDMI and LCD Panel display devices. To set the display device, first connect the Windows 10 host machine and the VIA VAB-950 through the Micro USB 2.0 port using the Micro USB cable.

Then set the two OS image jumpers (J7 and J5) to the download mode.

Press and hold the SW3 button. Then plug in the AC-to-DC power adapter to power on the VIA VAB-950.

Make sure there is a "fastboot: processing commands" message in the debug console. Then release the SW3 button.

Next, run the **cmd.exe** on your Windows10 host machine.

Use the **fastboot.exe** from the \Firmware\ folder to set the display device by using the following commands:

```
C:\>fastboot.exe oem display dsi
C:\>fastboot.exe oem display hdmi
```

Use the following command to check the current display device. In this example below, the current display device is LCD panel output.

```
C:\>fastboot.exe getvar all
(bootloader) display: dsi
(bootloader) max-download-size: 0x4000000
(bootloader) version: 0.5
all: Done!!
Finished. Total time: 0.002s
```

Power off the VIA VAB-950 and set the two OS image jumpers (J7 and J5) back to the normal mode setting. Unplug the Micro USB cable, and then power on the VIA VAB-950.

When the boot process is completed, LCD panel output will be set as the display device.

**Note:**

The default display device is HDMI output. After changing the display device, you must restart the VIA VAB-950.

3.6 Video Playback

The VIA VAB-950 supports H.265 and H.264 video decoding up to 1080p@30fps/40Mbps.

To playback the video, use the following command:

```
root@aiv8385-linux:~# gst-launch-1.0 -q playbin uri=file:///mnt/test.mp4 flags=0x42 video-sink="mtkmdp width=640 height=480 ! mtkwaylandsink" audio-sink="fakesink"
```

3.7 Audio Output and Record

To set up the speaker audio output, use the following command:

```
root@aiv8385-linux:~# amixer cset numid=4 1
root@aiv8385-linux:~# amixer cset numid=12 1
root@aiv8385-linux:~# aplay -Dhw:0,0 /mnt/test.wav
```

To set up the HDMI audio output, use the following command:

```
root@aiv8385-linux:~# aplay -Dhw:0,28 /mnt/test.wav
```

To set up the headphone audio output, use the following command:

```
root@aiv8385-linux:~# amixer cset numid=1 1
root@aiv8385-linux:~# amixer cset numid=2 1
root@aiv8385-linux:~# aplay -Dhw:0,0 /mnt/test.wav
```

To set up the Mic-in audio recording, use the following command:

```
root@aiv8385-linux:~# amixer cset numid=35 ADC2
root@aiv8385-linux:~# amixer cset numid=22 1
root@aiv8385-linux:~# amixer cset numid=23 1
root@aiv8385-linux:~# amixer cset numid=26 IN_ADC2
root@aiv8385-linux:~# amixer cset numid=44 IN_ADC2
root@aiv8385-linux:~# arecord -Dhw:0,1 -c 2 -r 48000 -f S16_LE /mnt/t1.wav
```

3.8 Camera

To preview an image from the CSI camera, use the following command:

```
root@aiv8385-linux:~# gst-launch-1.0 -v v4l2src device=/dev/video3 ! video/x-raw,format=YUY2,width=1280,height=720,framerate=30/1 ! videoconvert ! mtkwaylandsink sync=false
```

To record a video file from the CSI camera, use the following command.

```
root@aiv8385-linux:~# gst-launch-1.0 -v v4l2src device="/dev/video3" ! video/x-raw,format=(string)YUY2,width=1280,height=720,framerate=30/1 ! mtkmdp width=1280 height=720 ! video/x-raw,format=I420 ! v4l2h264enc bitrate= 9000000 gop=1 ! avimux ! filesink location=/data/test.avi
```

3.9 Wi-Fi

To verify the Wi-Fi function, use the following commands:

```
root@aiv8385-linux:~# wpa_cli -i wlan0
wpa_cli v2.6
Copyright (c) 2004-2016, Jouni Malinen <j@w1.fi> and contributors
This software may be distributed under the terms of the BSD license.
See README for more details.

Interactive mode

>
```

To enter “interactive mode”, use the following command.

To exit “interactive mode”, type in the “q” command.

```
> add_network
0
> set_network 0 ssid "<your wireless AP SSID name>"
OK
> set_network 0 psk "<your wireless AP password>"
OK
> enable_network 0
OK
<3>CTRL-EVENT-SCAN-STARTED
<3>CTRL-EVENT-SCAN-RESULTS
<3>WPS-AP-AVAILABLE
<3>Trying to associate with 90:94:e4:aa:12:b2 (SSID='via_sw2_01' freq=2422 MHz)
<3>Associated with 90:94:e4:aa:12:b2
<3>CTRL-EVENT-SUBNET-STATUS-UPDATE status=0
<3>WPA: Key negotiation completed with 90:94:e4:aa:12:b2 [PTK=CCMP GTK=TKIP]
<3>CTRL-EVENT-CONNECTED - Connection to 90:94:e4:aa:12:b2 completed [id=1 id_str=]
> q
```

Type the commands below, and press the <Ctrl+C> when the “Adding DNS” message is shown.

To verify if the Wi-Fi connection is workable, type the “ping” command:

```
root@aiv8385-linux:~# busybox udhcpd -b -i wlan0
udhcpd: started, v1.29.3
```

```
Failed to revert interface configuration: Connection timed out
udhcpd: sending discover
udhcpd: sending select for 192.168.0.105
udhcpd: lease of 192.168.0.105 obtained, lease time 86400
/etc/udhcpd.d/50default: Adding DNS 192.168.0.1
^C
root@aiv8385-linux:~# ping 8.8.8.8
```

3.10 Bluetooth

To enter “interactive mode” for BT function verification, use the following commands:

```
root@aiv8385-linux:~# btut
<V> History file path: /home/root/.btut_history
<D> [Tools] btut_register_mod() returns: 0
<I> [GAP] btut_register_mod() returns: 0
.....
<I> [GATT] Register server callback : '0' server_if = 6
Press <Enter>
btut_cli> GAP status
.....
Press <Enter>
btut_cli> GAP set_local_name i500_bt
.....
Press <Enter>
btut_cli> GAP set_scan_mode 2
.....
Press <Enter>
btut_cli>
```

Use your mobile phone or tablet with Bluetooth enabled to scan the VAB-950. Then you will see the “i500_bt” device name.

To exit “interactive mode”, type in the “quit” command.

```
btut_cli> quit
.....
root@aiv8385-linux:~#
```



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