



QUICK START GUIDE

VIA SOM-5000

Yocto 4.0.17 EVK



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Revision History

Version	Date	Remarks
1.01	21/03/2025	Added instructions in Section 3.5 for using the VTool application to configure the supported system memory size. Added instructions in Section 3.6 for using the VTool application to configure the display settings. Updated the camid values in Section 3.9 for optional cameras connected to the MIPI CSI connectors on the VIA SOMDB7 reference carrier board.
1.00	24/10/2024	Initial release

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1. Introduction

This Quick Start Guide provides an overview of how to boot the Yocto image for the VIA SOM-5000 Evaluation Kit and configure the supported hardware functions in the build.

**Note:**

The VIA SOM-5000 Evaluation Kit includes the VIA SOM-5000 module and VIA SOMDB7 reference carrier board.

The VIA SOM-5000 Yocto 4.0.17 EVK is developed based on the MediaTek Yocto 4.0.17 BSP, and it enables the hardware features of the VIA SOM-5000 Evaluation Kit.

1.1 EVK Package Contents

There are two folders in the package listed as below.

Firmware folder	Description
VIA_SOM-5000_Yocto_4.0.17_EVK.zip	Yocto evaluation image
Document folder	Description
VIA_SOM-5000_Yocto_4.0.17_EVK_Quick_Start_Guide.pdf	Quick Start Guide

1.1.1 Firmware Folder Contents

VIA_SOM-5000_Yocto_4.0.17_EVK.zip: Contains the precompiled Yocto image for evaluating the VIA SOM-5000 Evaluation Kit.

1.1.2 Document Folder Contents

VIA_SOM-5000_Yocto_4.0.17_EVK_Quick_Start_Guide.pdf: This Quick Start Guide provides an overview on how to boot the Yocto image for the VIA SOM-5000 Evaluation Kit and configure the supported hardware functions in the build.

1.2 Version Information and Supported Features

- Kernel version: 5.15.47
- Evaluation image: Yocto 4.0.17
- Development based on MediaTek Yocto 4.0.17 BSP
- Supports eMMC boot
- Supports HDMI 4K display and audio outputs
- Supports MIPI DSI capacitive touch panels:
 - NuWhole 7" NT070R11-12ACR5 (1200 x 1920)
 - Goodix I2C touch
- Supports debugging using the debug console
- Supports RGMII and USB 3.0 Gigabit Ethernet
- Supports MediaTek MT6365 Headphone-out and Mic-in
- Supports the optional AzureWave AW-XB468NF (MT7921) dual-band Wi-Fi 6 and Bluetooth 5.2 module
- Supports the optional 4G LTE mobile broadband M.2 modules:
 - Telit LN920A6
 - Quectel EM05-G
- Supports the optional MIPI CSI IMX258 and OV5648 camera modules
- Supports MediaTek NeuroPilot AI APU hardware acceleration

2. Image Installation

This section explains the setup requirements for installing the Yocto evaluation image on the VIA SOM-5000 Evaluation Kit.

The precompiled images are provided in the "Firmware" folder.

2.1 Installing with the Genio Tool

Follow the steps below to install the Yocto evaluation image:

Step 1

Refer to the instructions described in the following sections of the [MediaTek IoT Environment Setup](#) and set up the Genio tool environment on a Windows host machine:

- Setup Git for Windows
- Install Fastboot and ADB Device USB Driver
- Install Fastboot Tool on Windows
- Setup Python 3 on Windows
- Install Genio Tools

Step 2

Connect the Windows host machine and the VIA SOM-5000 Evaluation Kit through the Micro USB 2.0 port using a Micro USB cable. The Micro USB 2.0 port is located on the back panel of the VIA SOM-5000 Evaluation Kit.



Step 3

Extract the Yocto 4.0.17 evaluation image package "VIA_SOM-5000_Yocto_4.0.17_EVK.zip" on the Windows host machine.

Step 4

The VIA SOM-5000 Evaluation Kit is now ready to be flashed with the provided Yocto evaluation image. Set the path to the "platform tools" folder, and run the following commands.

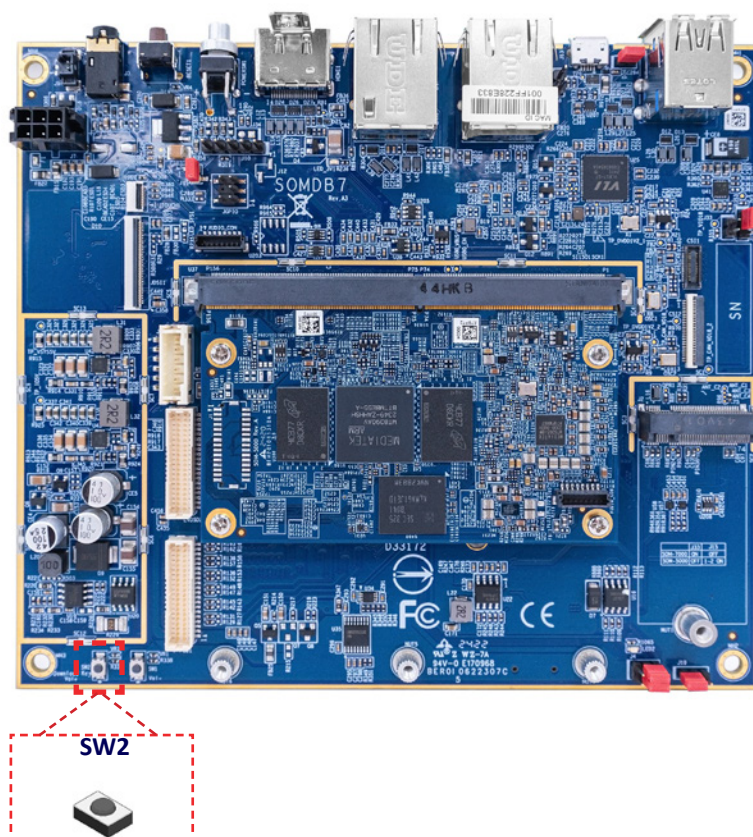
```
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>set PATH=D:\platform-tools;%PATH%
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>genio-flash
Genio Tools: v1.4.1
Yocto Image:
  name:      VIA Intelligent Solutions Image (rity-vis-image)
  distro:    VIA Intelligent Solutions Layer 24.0-release (rity-vis)
  codename:  kirkstone
  machine:   som-5000
  overlays:  ['video.dtbo', 'apusys.dtbo', 'gpu-mali.dtbo']

WARNING:aiot:Cannot find any FTDI device
WARNING:aiot:Unable to find and reset the board. Possible causes are:
1. This is not a Genio 350/700 EVK, nor a Pumpkin board.
2. The board port UART0 is not connected.
3. The UART0 port is being opened by another tool, such as TeraTerm on Windows.
You can now manually reset the board into DOWNLOAD mode.

INFO:aiot:Continue flashing...
Looking for MediaTek SoC matching USB device 0e8d:0003
```

Step 5

Next, press and hold the SW2 download key located on the top layer of the VIA SOM-5000 Evaluation Kit, and plug in the AC-to-DC power adapter. The VIA SOM-5000 Evaluation Kit will automatically power on.



Location of the SW2 key



Note:

After powering on the VIA SOM-5000 Evaluation Kit, make sure the Windows host machine detects it as an ADB device.

Step 6

Messages will start printing to show that the flashing process is loading, and will then pause to find the VIA SOM-5000 Evaluation Kit in bootloader mode. When the VIA SOM-5000 Evaluation Kit is found, the flashing process will begin and messages will start printing to show its progress. When the first message is printed, release the SW2 download key.

```
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>set PATH=D:\platform-tools;%PATH%
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>genio-flash
Genio Tools: v1.4.1
Yocto Image:
  name:      VIA Intelligent Solutions Image (rity-vis-image)
  distro:    VIA Intelligent Solutions Layer 24.0-release (rity-vis)
  codename:  kirkstone
  machine:   som-5000
  overlays:  ['video.dtbo', 'apusys.dtbo', 'gpu-mali.dtbo']

WARNING:aiot:Cannot find any FTDI device
WARNING:aiot:Unable to find and reset the board. Possible causes are:
1. This is not a Genio 350/700 EVK, nor a Pumpkin board.
2. The board port UART0 is not connected.
3. The UART0 port is being opened by another tool, such as TeraTerm on Windows.
You can now manually reset the board into DOWNLOAD mode.

INFO:aiot:Continue flashing...
Looking for MediaTek SoC matching USB device 0e8d:0003
Opening COM5 using baudrate=115200
Connected to MediaTek SoC: hw_code[0x8188]
Sending bootstrap to address: 0x201000
Jumping to bootstrap at address 0x201000 in AArch64 mode
erasing mmc0
< waiting for any device >
Erasing 'mmc0' (bootloader) request sz: 0x3a3e0000,
real erase len: 0x0
OKAY [ 1.003s]
Finished. Total time: 1.009s
```

Step 7

When the flashing process is complete, confirmation messages will be printed as shown below.

```
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>set PATH=D:\platform-tools;%PATH%
D:\VIA_SOM-5000_Yocto_4.0.17_EVK>genio-flash
Genio Tools: v1.4.1
Yocto Image:
  name:      VIA Intelligent Solutions Image (rity-vis-image)
  distro:    VIA Intelligent Solutions Layer 24.0-release (rity-vis)
  codename:  kirkstone
  machine:   som-5000
  overlays:  ['video.dtbo', 'apusys.dtbo', 'gpu-mali.dtbo']

WARNING:aiot:Cannot find any FTDI device
WARNING:aiot:Unable to find and reset the board. Possible causes are:
1. This is not a Genio 350/700 EVK, nor a Pumpkin board.
2. The board port UART0 is not connected.
3. The UART0 port is being opened by another tool, such as TeraTerm on Windows.
You can now manually reset the board into DOWNLOAD mode.

INFO:aiot:Continue flashing...
Looking for MediaTek SoC matching USB device 0e8d:0003
Opening COM5 using baudrate=115200
Connected to MediaTek SoC: hw_code[0x8188]
Sending bootstrap to address: 0x201000
Jumping to bootstrap at address 0x201000 in AArch64 mode
erasing mmc0
< waiting for any device >
Erasing 'mmc0' (bootloader) request sz: 0x3a3e0000,
real erase len: 0x0
OKAY [ 1.003s]
Finished. Total time: 1.009s
```

```

erasing mmc0boot0
Erasing 'mmc0boot0' (bootloader) request sz: 0x400000, real
erase len: 0x400000
OKAY [ 0.000s]
Finished. Total time: 0.000s
erasing mmc0boot1
Erasing 'mmc0boot1' (bootloader) request sz: 0x400000, real
erase len: 0x400000
OKAY [ 0.016s]
Finished. Total time: 0.031s
flashing mmc0=rity-vis-image-som-5000.wic.img
Sending sparse 'mmc0' 1/15 (231084 KB) OKAY [ 8.940s]
Writing 'mmc0' OKAY [ 9.266s]
Sending sparse 'mmc0' 2/15 (262140 KB) OKAY [ 10.627s]
Writing 'mmc0' OKAY [ 10.747s]
Sending sparse 'mmc0' 3/15 (262140 KB) OKAY [ 10.688s]
Writing 'mmc0' OKAY [ 10.607s]
Sending sparse 'mmc0' 4/15 (262140 KB) OKAY [ 10.269s]
Writing 'mmc0' OKAY [ 10.227s]
Sending sparse 'mmc0' 5/15 (262140 KB) OKAY [ 10.427s]
Writing 'mmc0' OKAY [ 10.204s]
Sending sparse 'mmc0' 6/15 (262140 KB) OKAY [ 10.234s]
Writing 'mmc0' OKAY [ 10.259s]
Sending sparse 'mmc0' 7/15 (262140 KB) OKAY [ 10.177s]
Writing 'mmc0' OKAY [ 10.213s]
Sending sparse 'mmc0' 8/15 (246108 KB) OKAY [ 9.692s]
Writing 'mmc0' OKAY [ 10.427s]
Sending sparse 'mmc0' 9/15 (262140 KB) OKAY [ 9.976s]
Writing 'mmc0' OKAY [ 10.195s]
Sending sparse 'mmc0' 10/15 (255256 KB) OKAY [ 10.004s]
Writing 'mmc0' OKAY [ 9.950s]
Sending sparse 'mmc0' 11/15 (262140 KB) OKAY [ 9.855s]
Writing 'mmc0' OKAY [ 10.214s]
Sending sparse 'mmc0' 12/15 (262140 KB) OKAY [ 10.398s]
Writing 'mmc0' OKAY [ 10.187s]
Sending sparse 'mmc0' 13/15 (262140 KB) OKAY [ 9.960s]
Writing 'mmc0' OKAY [ 10.778s]
Sending sparse 'mmc0' 14/15 (262140 KB) OKAY [ 10.646s]
Writing 'mmc0' OKAY [ 10.239s]
Sending sparse 'mmc0' 15/15 (37340 KB) OKAY [ 1.673s]
Writing 'mmc0' OKAY [ 1.485s]
Finished. Total time: 289.204s
flashing mmc0boot0=bl2.img
Warning: skip copying mmc0boot0 image avb footer (mmc0boot0 partition size: 0, mmc0boot0
image size: 279896).
Sending 'mmc0boot0' (273 KB) OKAY [ 0.047s]
Writing 'mmc0boot0' OKAY [ 0.016s]
Finished. Total time: 0.172s
flashing mmc0boot1=u-boot-env.bin
Warning: skip copying mmc0boot1 image avb footer (mmc0boot1 partition size: 0, mmc0boot1
image size: 4096).
Sending 'mmc0boot1' (4 KB) OKAY [ 0.000s]
Writing 'mmc0boot1' OKAY [ 0.000s]
Finished. Total time: 0.047s
Rebooting OKAY [ 0.000s]
Finished. Total time: 0.000s

D:\VIA_SOM-5000_Yocto_4.0.17_EVK>

```

Step 8

Unplug the AC-to-DC power adapter to power off the VIA SOM-5000 Evaluation Kit.

Step 9

Unplug the Micro USB cable, press the Power Button for 2 seconds and release it to power on the VIA SOM-5000 Evaluation Kit.

When the boot process has completed, you will see the Yocto 4.0.17 desktop.

3. Hardware Functions

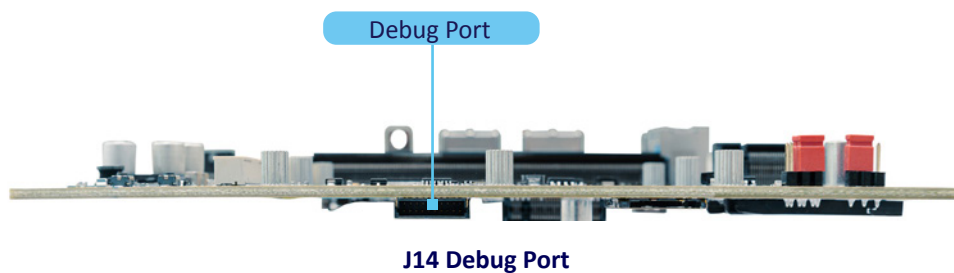
This section explains how to enable and test the hardware functions precompiled in the VIA SOM-5000 Yocto 4.0.17 EVK.

3.1 Using the Debug Console

Follow the steps below to use the debug console:

Step 1

Connect the Windows host machine and the VIA SOM-5000 Evaluation Kit through the "J14" debug port using the provided debug cable. The "J14" debug port is located on the front panel of the VIA SOM-5000 Evaluation Kit.

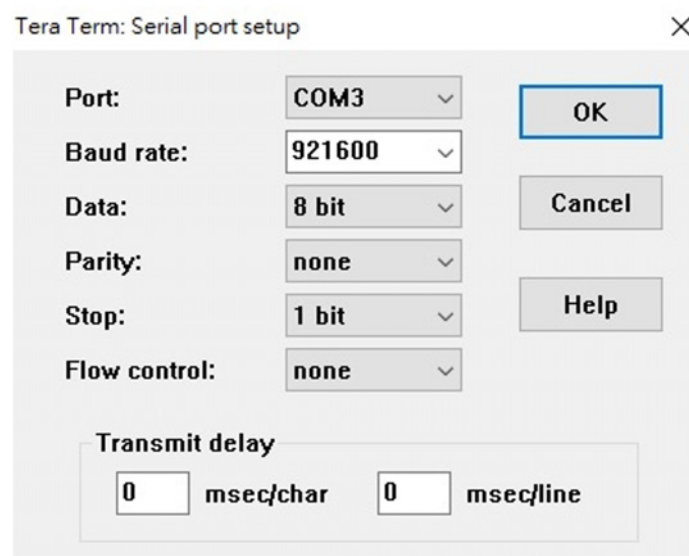


Step 2

Use a serial port communication program such as PuTTY or Tera Term to connect the debug console.

Step 3

Select the correct serial port and set the Console Baud Rate to "921600".



Step 4

Power on the VIA SOM-5000 Evaluation Kit to initiate the boot process.

Step 5

When the VIA SOM-5000 Evaluation Kit has completed booting, log in to the debug console. The default account is "username: root / password: root".

3.2 Changing the Kernel Debug Level

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

```
root@SOM-5000:~# echo 3 > /proc/sys/kernel/printk
```

3.3 Checking the BSP Version

To check the BSP version, use the following command:

```
root@SOM-5000:~# cat /etc/via-release
```

3.4 DVFS

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

```
root@som-5000:~# ls -l /sys/devices/system/cpu/cpu0/cpufreq/
total 0
-r--r--r-- 1 root root 4096 Aug 26 11:15 affected_cpus
-r----- 1 root root 4096 Aug 26 11:15 cpuinfo_cur_freq
-r--r--r-- 1 root root 4096 Aug 26 11:15 cpuinfo_max_freq
-r--r--r-- 1 root root 4096 Aug 26 11:15 cpuinfo_min_freq
-r--r--r-- 1 root root 4096 Aug 26 11:15 cpuinfo_transition_latency
-r--r--r-- 1 root root 4096 Aug 26 11:15 related_cpus
-r--r--r-- 1 root root 4096 Aug 26 11:15 scaling_available_frequencies
-r--r--r-- 1 root root 4096 Aug 26 11:15 scaling_available_governors
-r--r--r-- 1 root root 4096 Aug 26 11:15 scaling_cur_freq
-r--r--r-- 1 root root 4096 Aug 26 11:15 scaling_driver
-rw-r--r-- 1 root root 4096 Aug 26 11:15 scaling_governor
-rw-r--r-- 1 root root 4096 Aug 26 11:15 scaling_max_freq
-rw-r--r-- 1 root root 4096 Aug 26 11:15 scaling_min_freq
-rw-r--r-- 1 root root 4096 Aug 26 11:15 scaling_setspeed
drwxr-xr-x 2 root root 0 Aug 26 11:15 schedutil
drwxr-xr-x 2 root root 0 Aug 26 11:15 stats
root@som-5000:~#
```

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

```
root@som-5000:~# cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
2000000 1903000 1807000 1710000 1614000 1517000 1421000 1325000 1228000 1132000 1035000
939000 842000 746000 650000 500000
root@som-5000:~# cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq
1325000
```

3.5 System Memory

Follow instructions in steps 1 - 4 of [section 3.1 Using the Debug Console](#) to initiate the boot process. When prompted, press any key to stop the boot process and enter the U-Boot console as shown below:

```
U-Boot 2022.10-g1908346e2f (Jul 04 2024 - 08:09:40 +0000)

CPU:   MediaTek MT8390
DRAM:  4 GiB
Enabling SCP SRAM
Core:  75 devices, 24 uclasses, devicetree: separate
MMC:   mmc@11230000: 0
Loading Environment from MMC... OK
Warning: device tree node '/config/environment' not found
In:     serial
Out:    serial
Err:    serial
Net:    eth0: usb_ether
Hit any key to stop autoboot:  0
=>
```

U-Boot Console View

To set 4GB as the supported system memory size, use the following commands:

```
=> setenv boot_conf "#conf-mediatek_som-5000.dtb#conf-video.dtb#conf-gpu-mali.dtb#conf-
apusys.dtb#conf-dram-4gb.dtb"
=> setenv list_dtbo video.dtb gpu-mali.dtb apusys.dtb dram-4gb.dtb
=> saveenv
=> reset
```

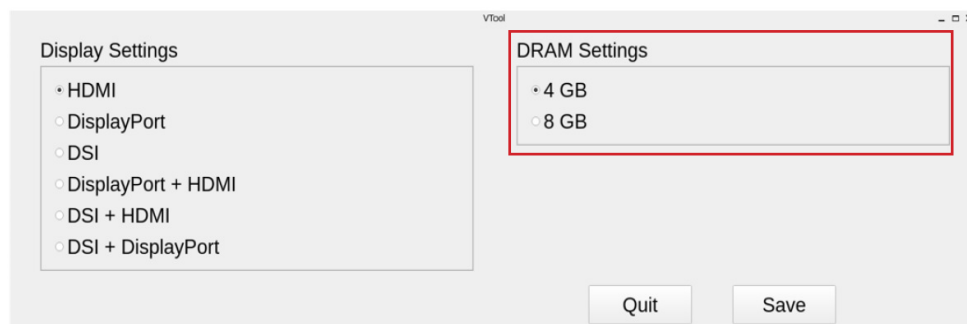
To set 8GB as the supported system memory size, use the following commands:

```
=> setenv boot_conf "#conf-mediatek_som-5000.dtb#conf-video.dtb#conf-gpu-mali.dtb#conf-
apusys.dtb#conf-dram-8gb.dtb"
=> setenv list_dtbo video.dtb gpu-mali.dtb apusys.dtb dram-8gb.dtb
=> saveenv
=> reset
```

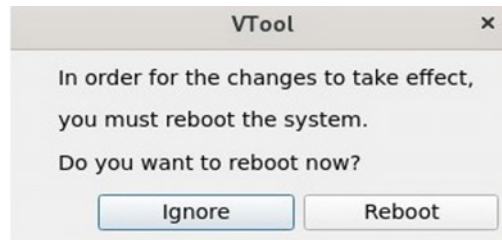
Supported system memory size can also be configured through the VTool application. Run the following command to open the application:

```
root@som-5000:~# vtool
```

After opening the application, select the desired supported system memory size on the right side of the window and save the configuration.



When a window pops up, click "Reboot" to make the change effective immediately, or "Ignore" to make the change effective on the next boot.


Note:

If the VIA SOM-5000 Evaluation Kit has 4GB of system memory onboard but 8GB is set as the supported system memory size, the EVK firmware will fail to boot.

3.6 Display

Follow instructions in steps 1 - 4 of [section 3.1 Using the Debug Console](#) to initiate the boot process. When prompted, press any key to stop the boot process and enter the U-Boot console as shown below:

```
U-Boot 2022.10-g1908346e2f (Jul 04 2024 - 08:09:40 +0000)

CPU:   MediaTek HT8390
DRAM:  4 GiB
Enabling SCP SRAM
Core:  75 devices, 24 uclasses, devicetree: separate
MMC:   mmc@11230000: 0
Loading Environment from MMC... OK
Warning: device tree node '/config/environment' not found
In:     serial
Out:    serial
Err:    serial
Net:    eth0: usb_ether
Hit any key to stop autoboot: 0
=>
```

U-Boot Console View

To set an HDMI monitor as the display output, use the following commands:

```
=> setenv boot_conf "#conf-mediatek_som-5000.dtb#conf-apusys.dtb#conf-gpu-mali.dtb#conf-
video.dtb"
=> setenv list_dtbo apusys.dtb gpu-mali.dtb video.dtb
=> saveenv
=> reset
```

To set the provided LCD panel as the display output, use the following commands:

```
=> setenv boot_conf "#conf-mediatek_som-5000.dtb#conf-apusys.dtb#conf-gpu-mali.dtb#conf-
video.dtb#conf-display-dsi.dtb"
=> setenv list_dtbo apusys.dtb gpu-mali.dtb video.dtb display-dsi.dtb
=> saveenv
=> reset
```

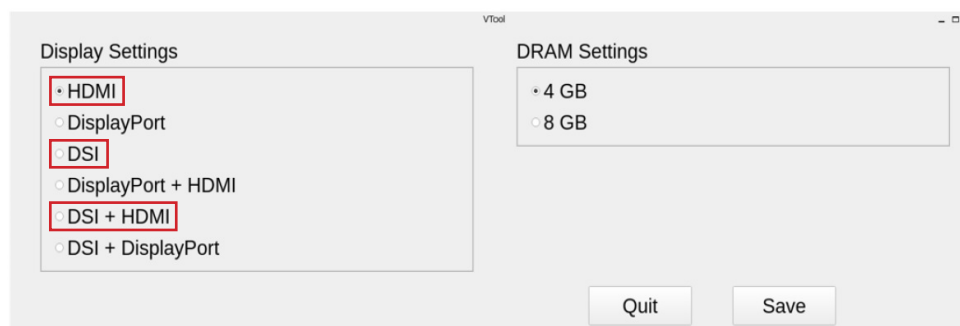
To set an HDMI monitor and the provided LCD panel as dual display outputs, use the following commands:

```
=> setenv boot_conf "#conf-mediatek_som-5000.dtb#conf-apusys.dtb#conf-gpu-mali.dtb#conf-
video.dtb#conf-display-dsi-hdmi.dtb"
=> setenv list_dtbo apusys.dtb gpu-mali.dtb video.dtb display-dsi-hdmi.dtb
=> saveenv
=> reset
```

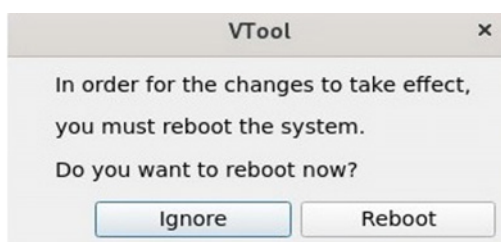
Display settings can also be configured through the VTool application. Run the following command to open the application:

```
root@som-5000:~# vtool
```

After opening the application, select the desired display setting on the left side of the window and save the configuration.



When a window pops up, click "Reboot" to make the change effective immediately, or "Ignore" to make the change effective on the next boot.



To control the LCD backlight, use the following commands:

```
root@som-5000:~# cd /sys/devices/platform/backlight-lcd0/backlight/backlight-lcd0
root@som-5000:/sys/devices/platform/backlight_lcd0/backlight/backlight_lcd0# cat max_
brightness
1023
root@som-5000:/sys/devices/platform/backlight_lcd0/backlight/backlight_lcd0# echo 512 >
brightness
root@som-5000:/sys/devices/platform/backlight_lcd0/backlight/backlight_lcd0# cat brightness
512
```



Note:

There are 1024 (0 - 1023) levels for LCD backlight control.

3.7 Video Playback

The VIA SOM-5000 Evaluation Kit supports H.265 and H.264 video decoding up to 4K@75fps/160Mbps.

Copy the "test.mp4" video file to a USB drive and connect the USB drive to the VIA SOM-5000 Evaluation Kit.

To playback H.265 or H.264 video, use the following command:

```
root@SOM-5000:~# vplay.sh -f /mnt/sda1/test.mp4
```



Note:

The "/mnt/sda1/" path in this example is of the USB drive.

3.8 Audio Output and Recording

Copy the "test.wav" audio file to a USB drive and connect the USB drive to the VIA SOM-5000 Evaluation Kit.

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

```
root@SOM-5000:~# aplay -D hdmi_dp_out /mnt/sda1/test.wav
```

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

```
root@SOM-5000:~# aplay -D jack_speaker /mnt/sda1/test.wav
```



Note:

The "/mnt/sda1/" path in this example is of the USB drive.

To change the audio volume, use the following command:

```
root@som-5000:~# amixer -c mt8390evk cset name='Headset Volume' 30
numid=338,iface=MIXER,name='Headset Volume'
; type=INTEGER,access=rw---R--,values=2,min=0,max=30,step=0
: values=30,30
| dBscale-min=-22.00dB,step=1.00dB,mute=0
```



Note:

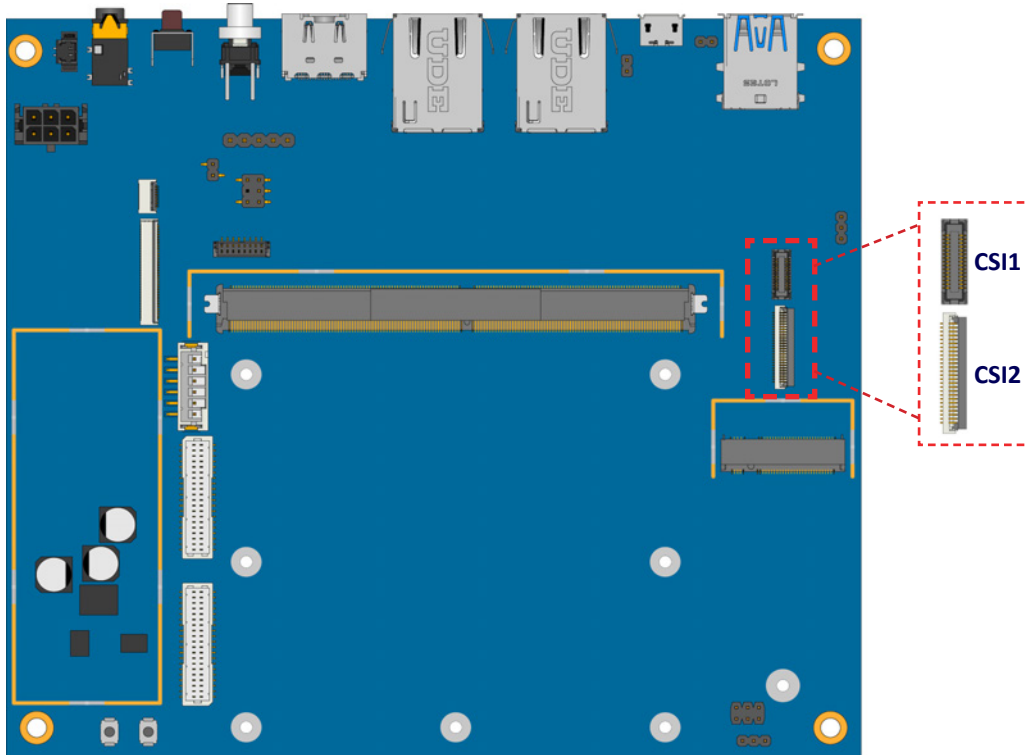
The audio volume level range is 0 - 30, with '0' being the minimum level and '30' being the maximum level.

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

```
root@SOM-5000:~# arecord -c 2 -r 48000 -f S16_LE /tmp/test.wav
Recording WAVE '/tmp/test.wav' : Signed 16 bit Little Endian, Rate 48000 Hz, Stereo
```

3.9 Camera

The VIA SOM-5000 Evaluation Kit comes with two MIPI CSI connectors "CSI1" and "CSI2" located on the VIA SOMDB7 carrier board.



Location of the MIPI CSI Connectors

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

```
root@SOM-5000:~# vcamera.sh -t csi -c <camid> -m preview -r 1280x720
```

The <camid> value depends on which MIPI CSI connectors are the optional cameras connected to. Check the table below for reference.

MIPI CSI Camera Connection Status		<camid> Value	
CSI2	CSI1	CSI2	CSI1
Connected	Connected	0	1
Connected	Not Connected	0	None
Not Connected	Connected	None	1

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

```
root@SOM-5000:~# vcamera.sh -t csi -c <camid> -m capture
```



Note:

If the optional CSI IMX258 camera is connected, the captured image will be saved as "csi-camera-<camid>-capture-1440x1088.jpg" in the "/home/root/" directory.

If the optional CSI OV5648 camera is connected, the captured image will be saved as "csi-camera-<camid>-capture-1920x1080.jpg" in the "/home/root/" directory.

To record a video file from an optional CSI camera, use the following command:

```
root@SOM-5000:~# vcamera.sh -t csi -c <camid> -m encode
```



Note:

The recorded video will be saved as "csi-camera-<camid>-encode-1280x720.mp4" in the "/home/root/" directory.

To playback a recorded video file from an optional CSI camera, use the following command:

```
root@SOM-5000:~# vplay.sh -f csi-camera-<camid>-encode-1280x720.mp4 -a 0
```

3.10 Wi-Fi

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

```
root@som-5000:~# systemctl start NetworkManager.service
root@som-5000:~# systemctl status NetworkManager.service
* NetworkManager.service - Network Manager
Loaded: loaded (/lib/systemd/system/NetworkManager.service; enabled; vendor preset: enabled)
Active: active (running) since Mon 2023-01-02 10:22:22 UTC; 1min 47s ago
Docs: man:NetworkManager(8)
Main PID: 687 (NetworkManager)
Tasks: 3 (limit: 4507)
Memory: 10.1M
CGroup: /system.slice/NetworkManager.service
└─ 687 /usr/sbin/NetworkManager --no-daemon
...
root@som-5000:~# nmcli device wifi connect <ssid> ifname wlpls0 password <psk>
Device 'wlpls0' successfully activated with '4868c8c6-866f-46a5-bad6-3fa2a40383c2'.
```



Note:

The Wi-Fi AP "ssid" and "psk" must be changed to the desired values.

Use the "ping" command to verify the network connection:

```
root@SOM-5000:~# ping 8.8.8.8
```

3.11 Bluetooth

The first step is to run the "bluetooth.service" and "bluetoothd" processes using the following commands.

```
root@som-5000:~# systemctl enable bluetooth.service
root@som-5000:~# systemctl start bluetooth.service
root@som-5000:~# systemctl status bluetooth.service
* bluetooth.service - Bluetooth service
Loaded: loaded (/lib/systemd/system/bluetooth.service; enabled; vendor preset: enabled)
Active: active (running) since Tue 2024-09-03 08:16:25 UTC; 1h 28min ago
Docs: man:bluetoothd(8)
Main PID: 609 (bluetoothd)
Status: "Running"
Tasks: 1 (limit: 4507)
Memory: 3.0M
CGroup: /system.slice/bluetooth.service
└─ 609 /usr/libexec/bluetooth/bluetoothd
...
root@som-5000:~# ps -aux | grep bluetoothd
root 502 0.0 0.1 8108 4596 ? Ss 03:08 0:00 /usr/libexec/bluetooth/bluetoothd
root 1243 0.0 0.0 2952 1316 ttyS0 S+ 03:47 0:00 grep bluetoothd
```

```
root@som-5000:~# hciconfig
hci0: Type: Primary Bus: USB
BD Address: 4C:50:DD:ED:2F:03 ACL MTU: 1021:6 SCO MTU: 240:8
DOWN
RX bytes:15636 acl:0 sco:0 events:2178 errors:0
TX bytes:549960 acl:0 sco:0 commands:2178 errors:0
```

To enter the "interactive mode" for Bluetooth function verification, use the following commands. The example below tests the connection with a Bluetooth mouse. The Bluetooth mouse's MAC address is obtained first, which is "00:1F:20:FA:3E:4F" in this example.

```
root@som-5000:~# bluetoothctl
Agent registered
[CHG] Controller 4C:50:DD:ED:2F:03 Pairable: yes
[bluetooth]# power on
[CHG] Controller 4C:50:DD:ED:2F:03 Class: 0x00000000
Changing power on succeeded
[CHG] Controller 4C:50:DD:ED:2F:03 Powered: yes
[bluetooth]# scan on
Discovery started
[CHG] Controller 4C:50:DD:ED:2F:03 Discovering: yes
[NEW] Device 59:95:1B:02:09:BA 59-95-1B-02-09-BA
[NEW] Device 4C:01:02:BA:B9:CF 4C-01-02-BA-B9-CF
[NEW] Device 5F:96:A1:C5:13:C5 5F-96-A1-C5-13-C5
...
...
[NEW] Device 00:1F:20:FA:3E:4F Bluetooth Mouse M557
...
[bluetooth]# scan off
```

To verify the Bluetooth function, use the following commands:

```
[bluetooth]# pair 00:1F:20:FA:3E:4F
Attempting to pair with 00:1F:20:FA:3E:4F
[CHG] Device 00:1F:20:FA:3E:4F Paired: yes
Pairing successful
[bluetooth]# connect 00:1F:20:FA:3E:4F
Attempting to connect to 00:1F:20:FA:3E:4F
[CHG] Device 00:1F:20:FA:3E:4F Connected: yes
Connection successful
[Bluetooth Mouse M557]# info
Device 00:1F:20:FA:3E:4F (public)
    Name: Bluetooth Mouse M557
    Alias: Bluetooth Mouse M557
    Class: 0x00002580
    Icon: input-mouse
    Paired: yes
    Bonded: yes
    Trusted: no
    Blocked: no
    Connected: yes
    LegacyPairing: yes
    UUID: Service Discovery Serve.. (00001000-0000-1000-8000-00805f9b34fb)
    UUID: Human Interface Device... (00001124-0000-1000-8000-00805f9b34fb)
    UUID: PnP Information (00001200-0000-1000-8000-00805f9b34fb)
    Modalias: usb:v046DpB010d1001
```

To stop the Bluetooth function, use the following commands:

```
[Bluetooth Mouse M557]# quit
root@SOM-5000:~#
```

3.12 MTK NeuroPilot AI APU Hardware Acceleration

To verify MTK NeuroPilot AI APU hardware acceleration, use the following commands:

```
root@som-5000:~# python3 /usr/share/benchmark_dla/benchmark.py --auto
2023-01-16 13:35:26,101 [INFO] /usr/share/benchmark_dla/mobilenet_v2_1.0_224_quant.tflite,
mdla3.0, avg inference time: 1.04
/usr/share/benchmark_dla/mobilenet_v2_1.0_224_quant.tflite, mdla3.0, avg inference time:
1.04
2023-01-16 13:35:28,275 [INFO] /usr/share/benchmark_dla/mobilenet_v2_1.0_224_quant.tflite,
vpu, avg inference time: 16.79
/usr/share/benchmark_dla/mobilenet_v2_1.0_224_quant.tflite, vpu, avg inference time: 16.79
2023-01-16 13:35:29,202 [INFO] /usr/share/benchmark_dla/ssd_mobilenet_v1_coco_quantized.
tflite, mdla3.0, avg inference time: 2.52
/usr/share/benchmark_dla/ssd_mobilenet_v1_coco_quantized.tflite, mdla3.0, avg inference
time: 2.52
2023-01-16 13:35:32,395 [INFO] /usr/share/benchmark_dla/ssd_mobilenet_v1_coco_quantized.
tflite, vpu, avg inference time: 23.99
/usr/share/benchmark_dla/ssd_mobilenet_v1_coco_quantized.tflite, vpu, avg inference time:
23.99
2023-01-16 13:35:34,059 [INFO] /usr/share/benchmark_dla/inception_v3_quant.tflite, mdla3.0,
avg inference time: 6.6
/usr/share/benchmark_dla/inception_v3_quant.tflite, mdla3.0, avg inference time: 6.6
2023-01-16 13:35:43,138 [INFO] /usr/share/benchmark_dla/inception_v3_quant.tflite, vpu, avg
inference time: 74.28
/usr/share/benchmark_dla/inception_v3_quant.tflite, vpu, avg inference time: 74.28
2023-01-16 13:35:44,788 [INFO] /usr/share/benchmark_dla/ResNet50V2_224_1.0_quant.tflite,
mdla3.0, avg inference time: 6.04
/usr/share/benchmark_dla/ResNet50V2_224_1.0_quant.tflite, mdla3.0, avg inference time: 6.04
2023-01-16 13:35:52,406 [INFO] /usr/share/benchmark_dla/ResNet50V2_224_1.0_quant.tflite,
vpu, avg inference time: 59.29
/usr/share/benchmark_dla/ResNet50V2_224_1.0_quant.tflite, vpu, avg inference time: 59.29
```

If the program runs and outputs results with "mdla3.0, avg inference time" or "vpu, avg inference time", MTK NeuroPilot AI APU hardware acceleration is enabled and running correctly.



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