



QUICK START GUIDE

VIA VAB-950

Android 10.0 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 of how to boot the Android image for the VIA VAB-950 and configure the supported hardware functions in the build.

The VIA VAB-950 Android 10.0 EVK is developed based on the MediaTek Android 10.0 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_Android_10.0_EVK.zip	Android image and scatter-loading file
Document folder	Description
VIA_VAB-950_Android_10.0_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_Android_10.0_EVK.zip: contains scatter-loading file and the precompiled Android image for evaluating the VIA VAB-950.

1.1.2 Document Folder Contents

VIA_VAB-950_Android_10.0_EVK_Quick_Start_Guide.pdf: This Quick Start Guide provides an overview on how to boot the Android 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: 4.14.141
- Evaluation image: Android 10.0
- Development based on MediaTek Android 10.0 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
- Supports MediaTek NeuroPilot AI APU hardware acceleration

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

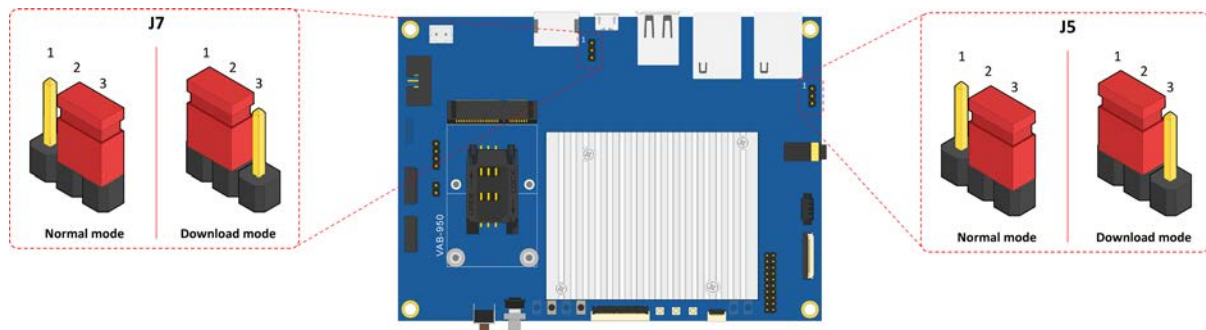
The first step is to install the "MTK USB cable driver" and "Universal ADB driver" into your Windows 10 host machine.

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

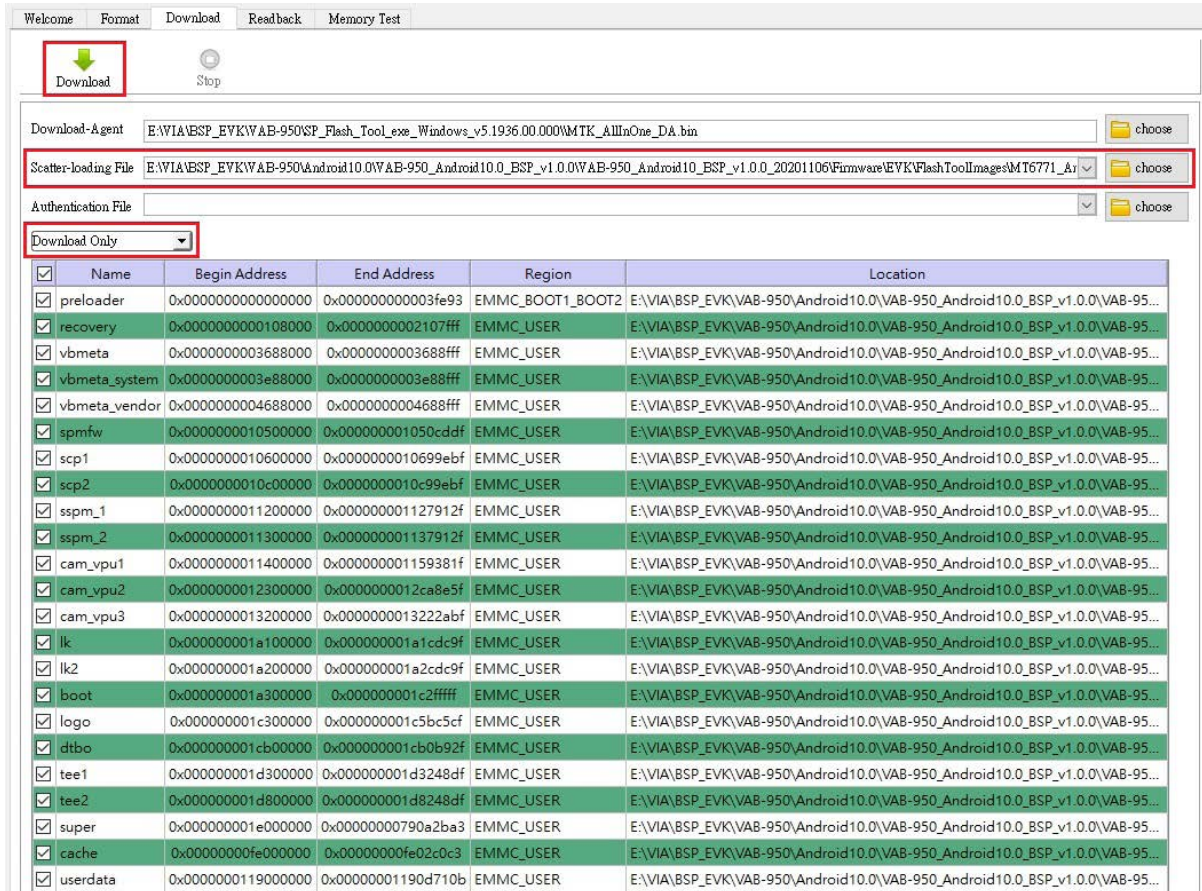
J5 and J7 Settings	Pin 1	Pin 2	Pin 3
Normal mode (default)	Open	Short	Short
Download mode	Short	Short	Open

OS image jumper settings

Extract the **VIA_VAB-950_Android_10.0_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 **MT6771_Android_scatter.txt** from the \Firmware\ folder.

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

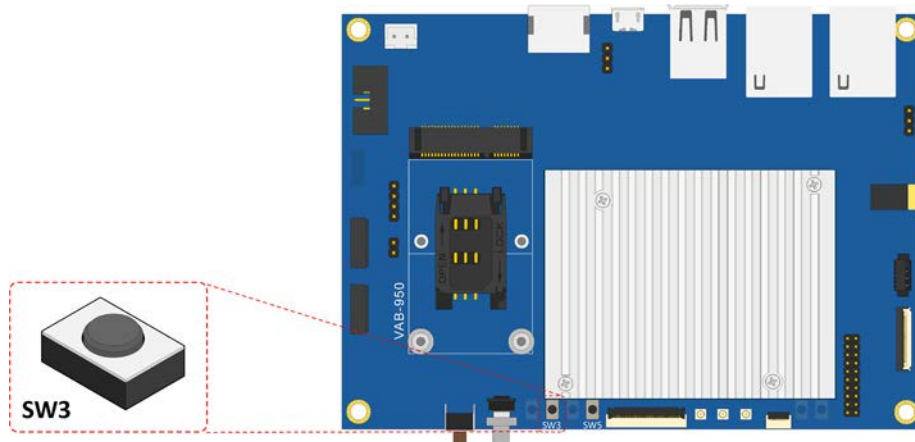


Plug in the AC-to-DC power adapter to power on the VIA VAB-950.



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.

The screenshot shows the Flash_Tool software interface. At the top, there are tabs for 'Welcome', 'Format', 'Download', 'Readbck', and 'Memory Test'. The 'Download' tab is active. Below the tabs, there are buttons for 'Download' and 'Stop'. The 'Download - Agent' field contains the path: E:\VIA\BSP_EVK\VAB-950\WP_Flash_Tool_exe_Windows_v5.1936.00.000\MTK_AllInOne_DA.bin. The 'Scatter-loading File' field contains: 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. The 'Authentication File' field is empty. Below these fields is a 'Download Only' dropdown menu. A table lists various files to be downloaded, including lk, boot_a, boot_b, cam_vpu_a, cam_vpu_b, cam_vpu_s, spmfw, isom_a, tee_a, tee_b, system_a, system_b, and userdata. At the bottom, a red progress bar shows 'Download DA 100%' with a speed of 12.67M/s, 220.71K, EMMC, HighSpeed, 0:03, and MediaTek USB Port (COM4).

Name	Begin Address	End Address	Region	Location
lk	0x0000000000000000	0x000000000045bff	EMMC_BOOT1_BOOT2	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
boot_a	0x0000000001408000	0x0000000001e26f91	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
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_...
cam_vpu_a	0x0000000004408000	0x000000000459b9d7	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
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_...
cam_vpu_s	0x0000000006208000	0x0000000006229c4f	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
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_...
isom_a	0x0000000007208000	0x0000000007281b21	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
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_...
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_...
system_a	0x0000000007e08000	0x0000000003ebcfff	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
system_b	0x0000000008208000	0x00000000082b5c7f	EMMC_USER	E:\VIA\BSP_EVK\VAB-950\Yocto2.6\VAB-950_Yocto2.6_BSP_v0.3.0\VAB-950_Yocto2.6_...
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_...

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	0x000000000045bff	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	0x000000000408000	0x000000001d26f81	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 the 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, press the Power Button for 2 seconds, then release it to power on the VAB-950.

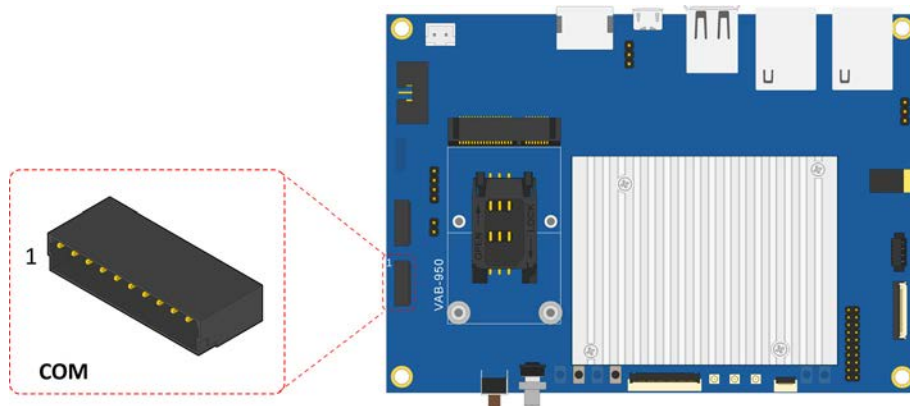
When the boot process is completed, you will see the Android 10.0 desktop.

3. Hardware Functions

This section explains how to enable and test the hardware functions precompiled in the Android 10.0 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, you will log in to the debug console.

3.2 Changing the Kernel Debug Level

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

```
console:/ # su
console:/ # echo 3 > /proc/sys/kernel/printk
```

3.3 Checking the BSP Version

To check the BSP version, use the following command:

```
console:/ # 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:

```
console:/ # ls -l /sys/devices/system/cpu/cpu0/cpufreq/
total 0
-r--r--r-- 1 root root 4096 2020-04-06 06:34 affected_cpus
-r----- 1 root root 4096 2020-04-06 06:34 cpuinfo_cur_freq
-r--r--r-- 1 root root 4096 2020-04-06 06:34 cpuinfo_max_freq
-r--r--r-- 1 root root 4096 2020-04-06 06:34 cpuinfo_min_freq
```

```

-r--r--r-- 1 root root 4096 2020-04-06 06:34 cpuinfo_transition_latency
-r--r--r-- 1 root root 4096 2020-04-06 06:34 related_cpus
-r--r--r-- 1 root root 4096 2020-04-06 06:34 scaling_available_frequencies
-r--r--r-- 1 root root 4096 2020-04-06 06:34 scaling_available_governors
-r--r--r-- 1 root root 4096 2020-04-06 06:34 scaling_cur_freq
-r--r--r-- 1 root root 4096 2020-04-06 06:34 scaling_driver
-rw-rw---- 1 system system 4096 2010-01-01 00:00 scaling_governor
-rw-rw---- 1 system system 4096 2010-01-01 00:00 scaling_max_freq
-rw-rw-r-- 1 system system 4096 2010-01-01 00:00 scaling_min_freq
-rw-r--r-- 1 root root 4096 2020-04-06 06:34 scaling_setspeed
console:/ #

```

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

```

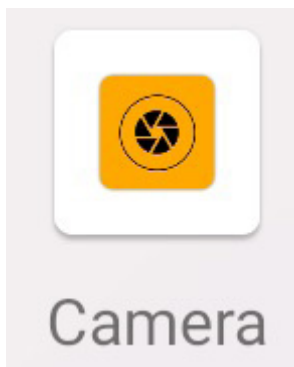
3.5 Display

There is no need to set the display device. If you connect an HDMI display, HDMI output will be automatically enabled after booting. If you connect an LCD panel, LCD panel output will be automatically enabled after booting.

3.6 Camera

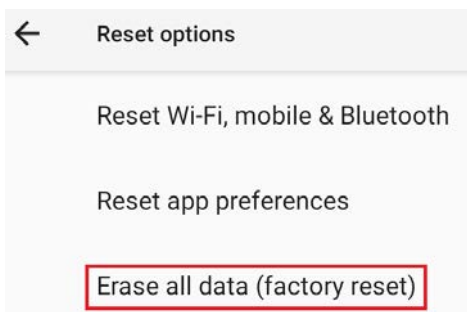
You must connect the CSI camera before booting the VIA VAB-950 after the image installation.

Click the “Camera” APK on the Android desktop to verify the camera function.



If the CSI camera is connected correctly, but there is no “Camera” APK on the Android desktop, go to “Settings -> System -> Advanced -> Reset options” and press “Erase all data (factory reset)” to restart the system.

The “Camera” APK will be generated after the system is rebooted.



3.7 MTK NeuroPilot AI APU Hardware Acceleration

We recommend that you install the third-party APK “image_classification_MobileNet_app-debug.apk” for verification.

To enlarge the logcat buffer to 64MB, use the following command.

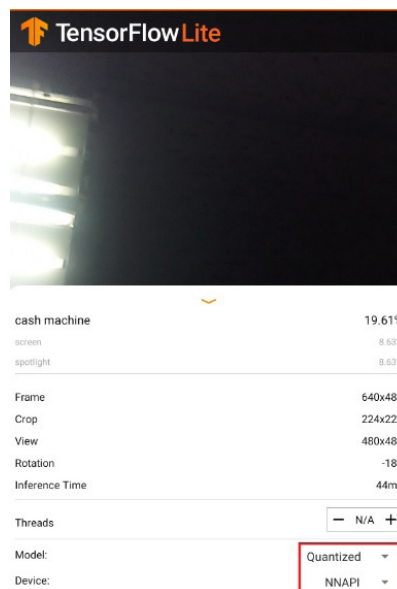
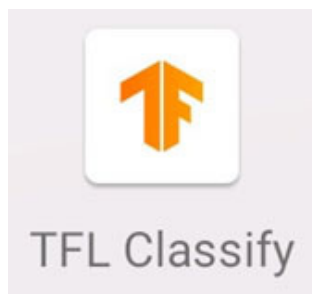
```
console:/ # logcat -G 64M
```

To enable the NeuroPilot relative log for getting the NN relative log in logcat, use the following command:

```
console:/ # su
console:/ # setprop debug.nn.vlog 1
console:/ # setprop debug.neuropilot.apu_nn.log 1
console:/ # setprop debug.neuropilot.gpu_nn.log 1
console:/ # setprop debug.neuropilot.arm_nn.log 1
```

Run the third-party APK “image_classification_MobileNet_app-debug.apk”.

Then choose “Model: Quantized” and “Device: NNAPI”.



To check that the NeuroPilot AI APU hardware acceleration is enabled, use the following command:

```
console:/ # logcat | grep findBestDeviceForEachOperation
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(CONV_2D) = 0 (apunn)
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(DEPTHWISE_CONV_2D) = 0 (apunn)
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(CONV_2D) = 0 (apunn)
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(AVERAGE_POOL_2D) = 0 (apunn)
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(CONV_2D) = 0 (apunn)
11-05 04:31:15.502 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(RESHAPE) = 0 (apunn)
11-05 04:31:15.503 3728 6893 I ExecutionPlan:
ModelBuilder::findBestDeviceForEachOperation(SOFTMAX) = 0 (apunn)
```



Note:

When the value 0 is displayed, it means that the APU hardware acceleration is enabled.



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