QUICK START GUIDE

VIA SOM-9X50-STK

Android 12.0 EVK

1.00-30012024

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Revision History

Version	Date	Remarks
1.00	30/01/2024	Initial release

Table of Contents

1. Introduction

This Quick Start Guide provides an overview of how to boot the Android image for the VIA SOM-9X50 starter kit and configure the supported hardware functions in the build.

Note:
The VIA SOM-9X50 starter kit includes the VIA SOM-9X50 module and the VIA VAB-950 reference carrier board.

The VIA SOM-9X50-STK Android 12.0 EVK is developed based on the MediaTek Android 12.0 BSP, and it enables the hardware features of the VIA SOM-9X50 starter kit.

1.1 EVK Package Contents

There are three folders in the package listed as below.

Firmware folder	Description
VIA_SOM-9X50-STK_Android_12.0_EVK.zip	Android evaluation image
Document folder	**Description**
VIA_SOM-9X50-STK_Android_12.0_EVK_Quick_Start_Guide.pdf	Quick Start Guide
Tool folder	**Description**
VIA_Android_USB_Driver.zip	VIA USB driver
PoseDetector_Image.apk	Sample test program

1.1.1 Firmware Folder Contents

VIA_SOM-9X50-STK_Android_12.0_EVK.zip: Contains the precompiled Android image for evaluating the VIA SOM-9X50 starter kit.

1.1.2 Document Folder Contents

VIA_SOM-9X50-STK_Android_12.0_EVK_Quick_Start_Guide.pdf: This Quick Start Guide provides an overview on how to boot the Android image for the VIA SOM-9X50 starter kit and configure the supported hardware functions in the build.

1.1.3 Tool Folder Contents

VIA_Android_USB_Driver.zip: The VIA driver for ADB-over-USB.

PoseDetector_Image.apk: A sample program to test MTK NeuroPilot AI APU hardware acceleration.

1.2 Version Information and Supported Features

- Kernel version: 4.19.191
- Evaluation image: Android 12.0
- Development based on MediaTek Android 12.0 BSP
- Supports eMMC boot
- Supports HDMI display
- Supports HDMI audio output
- Supports MIPI DSI capacitive touch panel
  - NuWhole 7" NT070R11-12ACR5 (1200 x 1920)
  - Goodix 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 miniPCIe module
- Supports MIPI CSI OV5648 camera module
- Supports MediaTek NeuroPilot AI APU hardware acceleration

2. Image Installation

This section explains the setup requirements for installing the Android evaluation image on the VIA SOM-9X50 starter kit.

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

2.1 Installing with the Fastboot Mode

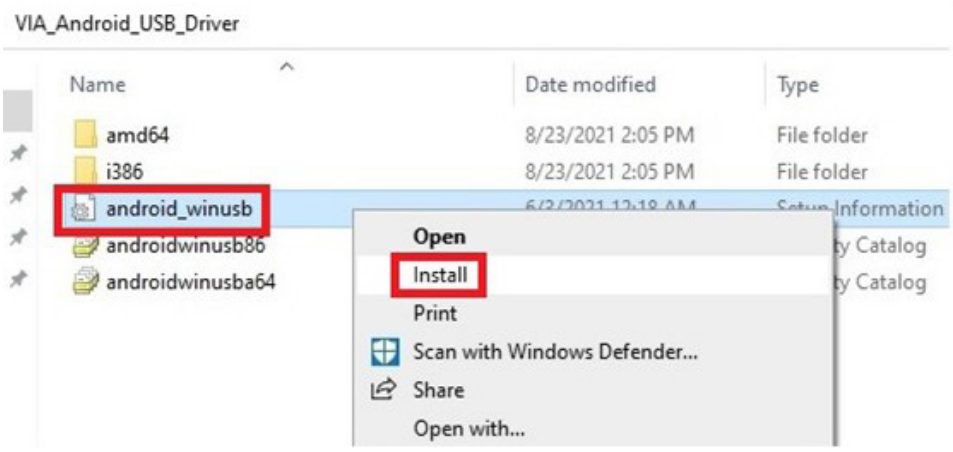
Follow the steps below to install Android EVK image:

Step 1

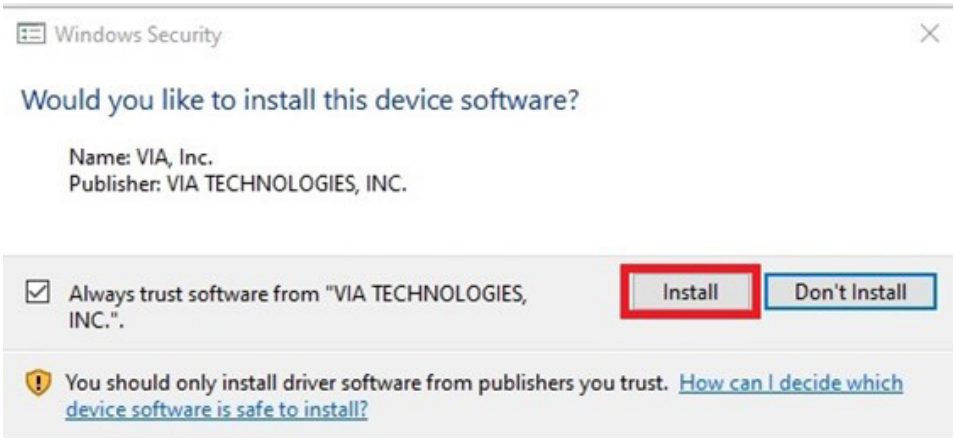
Prepare the "fastboot tool" and install the "VIA USB driver" into your Windows 10 host machine.

To get the "fastboot tool" for Windows, please refer to the "SDK Platform Tools release notes" chapter on the Android developer website https://developer.android.com/studio/releases/platform-tools.

To install the "VIA USB driver", right-click "android_winusb" and select "Install".



Then click "Install" when the installer opens.



When the installer finishes, it will show a confirmation message "The operation completed successfully".

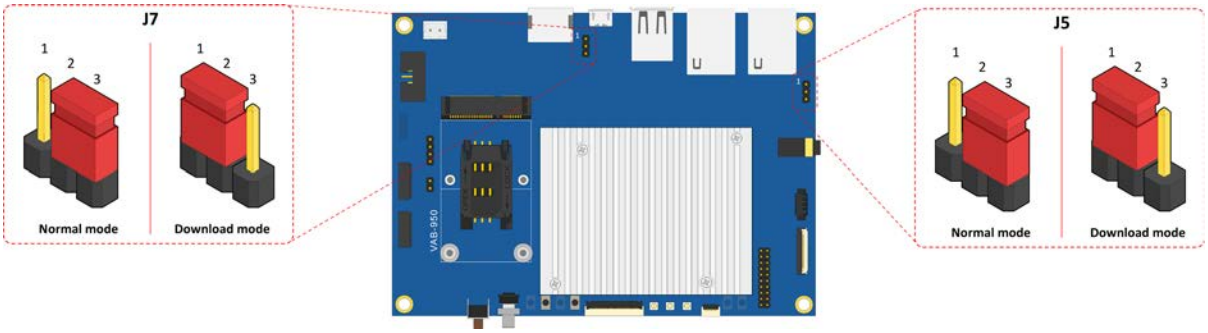
Step 2

Connect the Windows 10 host machine and the VIA SOM-9X50 starter kit through the Micro USB 2.0 port using the Micro USB cable.

Micro USB 2.0 port diagram

Step 3

On the VIA SOM-9X50 starter kit, 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

Step 3

Plug in the AC-to-DC power adapter to power on the VIA SOM-9X50 starter kit.

If the EVK image is not installed, the VIA SOM-9X50 starter kit will stop at "fastboot: processing commands" as shown in the debug console below. Proceed to step 4 directly.

Fastboot Mode

If the EVK image is already installed, use the following command to enter the Fastboot Mode on your Windows 10 host machine.

```
D:\platform-tools>adb shell reboot bootloader
```

Note:
After powering on the VIA SOM-9X50 starter kit, make sure the Windows 10 host machine detects it as an ADB device.

Step 4

Extract the VIA_SOM-9X50-STK_Android_12.0_EVK.zip file on your Windows 10 host machine.

To install the image, use the following command:

```
D:\VIA_SOM-9X50-STK_Android_12.0_EVK>set PATH=D:\platform-tools;%PATH%
D:\VIA_SOM-9X50-STK_Android_12.0_EVK>viaflash.exe
++++++++++++++++++++++++++++++++++++++++++++++++++

         VIAFlash version v2.0.0
    (built: May  5 2023 10:03:44 UTC)

++++++++++++++++++++++++++++++++++++++++++++++++++
    To let this tool work well, please
    ensure the system is under fastboot mode!

  If yes, please press any key to continue.
++++++++++++++++++++++++++++++++++++++++++++++++++
>> The OS of images is "Android 12.0"
Sending 'preloader_a' (256 KB)                     OKAY [  0.031s]
Writing 'preloader_a'                              OKAY [  0.015s]
Finished. Total time: 0.105s

Erasing 'pgpt'                                     OKAY [  0.014s]
Finished. Total time: 0.023s

Sending 'pgpt' (17 KB)                             OKAY [  0.026s]
Writing 'pgpt'                                     OKAY [  0.008s]
Finished. Total time: 0.078s

Sending 'logo' (3409 KB)                           OKAY [  0.104s]
Writing 'logo'                                     OKAY [  0.083s]
Finished. Total time: 0.288s

Sending 'vbmeta_a' (4 KB)                          OKAY [  0.025s]
Writing 'vbmeta_a'                                 OKAY [  0.007s]
Finished. Total time: 0.145s

Sending 'vbmeta_system_a' (4 KB)                   OKAY [  0.026s]
Writing 'vbmeta_system_a'                          OKAY [  0.006s]
Finished. Total time: 0.097s

Sending 'vbmeta_vendor_a' (4 KB)                   OKAY [  0.026s]
Writing 'vbmeta_vendor_a'                          OKAY [  0.006s]
Finished. Total time: 0.068s

Sending 'spmfw_a' (47 KB)                          OKAY [  0.027s]
Writing 'spmfw_a'                                  OKAY [  0.008s]
Finished. Total time: 0.085s

Sending 'scp_a' (608 KB)                           OKAY [  0.038s]
Writing 'scp_a'                                    OKAY [  0.022s]
Finished. Total time: 0.124s

Sending 'sspm_a' (481 KB)                          OKAY [  0.036s]
Writing 'sspm_a'                                   OKAY [  0.018s]
Finished. Total time: 0.113s

Sending 'cam_vpu1_a' (1610 KB)                     OKAY [  0.060s]
Writing 'cam_vpu1_a'                               OKAY [  0.044s]
Finished. Total time: 0.185s

Sending 'cam_vpu2_a' (11973 KB)                    OKAY [  0.284s]
Writing 'cam_vpu2_a'                               OKAY [  0.268s]
Finished. Total time: 0.738s

Sending 'cam_vpu3_a' (135 KB)                      OKAY [  0.029s]
Writing 'cam_vpu3_a'                               OKAY [  0.012s]
Finished. Total time: 0.143s
```

```
Sending 'lk_a' (834 KB)                            OKAY [  0.043s]
Writing 'lk_a'                                     OKAY [  0.027s]
Finished. Total time: 0.147s

Sending 'dtbo_a' (8192 KB)                         OKAY [  0.314s]
Writing 'dtbo_a'                                   OKAY [  0.193s]
Finished. Total time: 0.569s

Sending 'tee_a' (147 KB)                           OKAY [  0.029s]
Writing 'tee_a'                                    OKAY [  0.011s]
Finished. Total time: 0.134s

Sending 'gz_a' (1230 KB)                           OKAY [  0.051s]
Writing 'gz_a'                                     OKAY [  0.035s]
Finished. Total time: 0.157s

Sending 'boot_a' (32768 KB)                        OKAY [  0.991s]
Writing 'boot_a'                                   OKAY [  0.720s]
Finished. Total time: 1.799s

Sending 'userdata' (115360 KB)                     OKAY [  2.557s]
Writing 'userdata'                                 OKAY [  2.595s]
Finished. Total time: 6.556s

Erasing 'proinfo'                                  OKAY [  0.015s]
Finished. Total time: 0.026s

Erasing 'boot_para'                                OKAY [  0.013s]
Finished. Total time: 0.022s

Erasing 'vbmeta_b'                                 OKAY [  0.012s]
Finished. Total time: 0.021s

Erasing 'vbmeta_system_b'                          OKAY [  0.013s]
Finished. Total time: 0.022s

Erasing 'vbmeta_vendor_b'                          OKAY [  0.013s]
Finished. Total time: 0.026s

Erasing 'spmfw_b'                                  OKAY [  0.013s]
Finished. Total time: 0.020s

Erasing 'scp_b'                                    OKAY [  0.012s]
Finished. Total time: 0.020s

Erasing 'sspm_b'                                   OKAY [  0.012s]
Finished. Total time: 0.024s

Erasing 'cam_vpu1_b'                               OKAY [  0.012s]
Finished. Total time: 0.022s

Erasing 'cam_vpu2_b'                               OKAY [  0.011s]
Finished. Total time: 0.026s

Erasing 'cam_vpu3_b'                               OKAY [  0.012s]
Finished. Total time: 0.026s

Erasing 'para'                                     OKAY [  0.012s]
Finished. Total time: 0.021s

Erasing 'expdb'                                    OKAY [  0.014s]
Finished. Total time: 0.023s

Erasing 'frp'                                      OKAY [  0.012s]
Finished. Total time: 0.021s

Erasing 'nvcfg'                                    OKAY [  0.015s]
Finished. Total time: 0.027s

Erasing 'nvdata'                                   OKAY [  0.015s]
Finished. Total time: 0.026s
```

```
Erasing 'md_udc'                                   OKAY [  0.014s]
Finished. Total time: 0.027s

Erasing 'metadata'                                 OKAY [  0.014s]
Finished. Total time: 0.023s

Erasing 'protect1'                                 OKAY [  0.013s]
Finished. Total time: 0.025s

Erasing 'protect2'                                 OKAY [  0.014s]
Finished. Total time: 0.026s

Erasing 'seccfg'                                   OKAY [  0.012s]
Finished. Total time: 0.021s

Erasing 'sec1'                                     OKAY [  0.014s]
Finished. Total time: 0.023s

Erasing 'nvram'                                    OKAY [  0.014s]
Finished. Total time: 0.023s

Erasing 'vendor_boot_a'                            OKAY [  0.014s]
Finished. Total time: 0.024s

Erasing 'vendor_boot_b'                            OKAY [  0.013s]
Finished. Total time: 0.022s

Erasing 'gz_b'                                     OKAY [  0.019s]
Finished. Total time: 0.028s

Erasing 'boot_b'                                   OKAY [  0.029s]
Finished. Total time: 0.036s

Erasing 'dtbo_b'                                   OKAY [  0.028s]
Finished. Total time: 0.041s

Erasing 'tee_b'                                    OKAY [  0.027s]
Finished. Total time: 0.040s

Erasing 'otp'                                      OKAY [  0.029s]
Finished. Total time: 0.038s

Erasing 'flashinfo'                                OKAY [  0.029s]
Finished. Total time: 0.037s

Sending sparse 'super' 1/17 (131068 KB)            OKAY [  5.517s]
Writing 'super'                                    OKAY [  2.971s]
Sending sparse 'super' 2/17 (119664 KB)            OKAY [  4.096s]
Writing 'super'                                    OKAY [  2.727s]
Sending sparse 'super' 3/17 (131068 KB)            OKAY [  5.099s]
Writing 'super'                                    OKAY [  2.963s]
Sending sparse 'super' 4/17 (131068 KB)            OKAY [  4.726s]
Writing 'super'                                    OKAY [  2.910s]
Sending sparse 'super' 5/17 (131068 KB)            OKAY [  5.064s]
Writing 'super'                                    OKAY [  2.925s]
Sending sparse 'super' 6/17 (131071 KB)            OKAY [  5.399s]
Writing 'super'                                    OKAY [  6.783s]
Sending sparse 'super' 7/17 (131068 KB)            OKAY [  4.999s]
Writing 'super'                                    OKAY [  2.988s]
Sending sparse 'super' 8/17 (128332 KB)            OKAY [  4.900s]
Writing 'super'                                    OKAY [  2.901s]
Sending sparse 'super' 9/17 (131068 KB)            OKAY [  4.939s]
Writing 'super'                                    OKAY [  3.014s]
Sending sparse 'super' 10/17 (114828 KB)           OKAY [  4.555s]
Writing 'super'                                    OKAY [  2.583s]
Sending sparse 'super' 11/17 (114708 KB)           OKAY [  4.302s]
Writing 'super'                                    OKAY [  2.591s]
Sending sparse 'super' 12/17 (125472 KB)           OKAY [  4.897s]
Writing 'super'                                    OKAY [  3.672s]
Sending sparse 'super' 13/17 (131071 KB)           OKAY [  4.642s]
Writing 'super'                                    OKAY [  3.692s]
Sending sparse 'super' 14/17 (130412 KB)           OKAY [  4.707s]
```

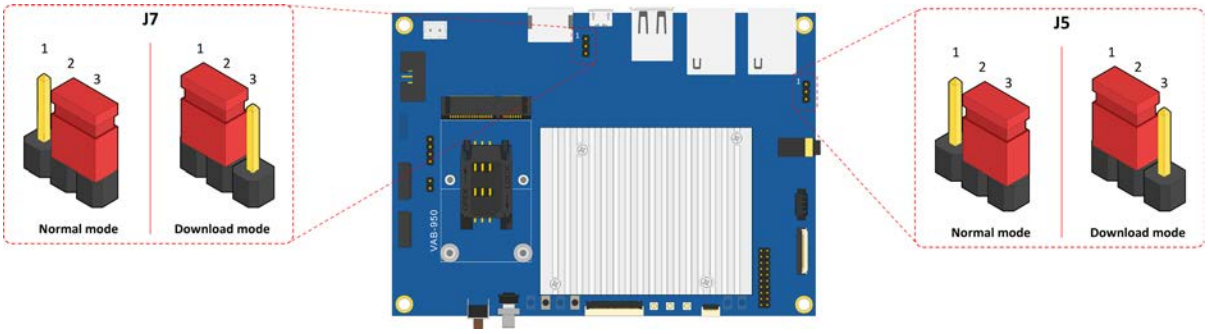
```
Writing 'super'                                    OKAY [  2.937s]
Sending sparse 'super' 15/17 (131068 KB)           OKAY [  4.713s]
Writing 'super'                                    OKAY [  2.929s]
Sending sparse 'super' 16/17 (118944 KB)           OKAY [  4.420s]
Writing 'super'                                    OKAY [  2.700s]
Sending sparse 'super' 17/17 (36460 KB)            OKAY [  1.390s]
Writing 'super'                                    OKAY [  0.864s]
Finished. Total time: 132.536s

Rebooting                                          OKAY [  0.003s]
Finished. Total time: 0.005s

============================================
Finished. Re-Starting system ...
============================================

D:\VIA_SOM-9X50-STK_Android_12.0_EVK>
```

Step 5

Unplug the AC-to-DC power adapter to power off the VIA SOM-9X50 starter kit.

Step 6

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



OS image jumper settings

Step 7

Unplug the Micro USB cable, press the Power Button for 2 seconds and release it to power on the VIA SOM-9X50 starter kit.

When the boot process has completed, you will see the Android 12.0 desktop.

3. Hardware Functions

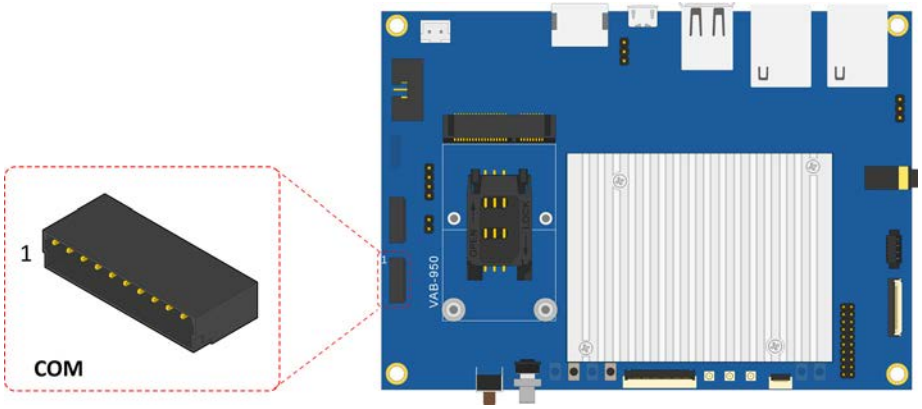
This section explains how to enable and test the hardware functions precompiled in the VIA SOM-9X50-STK Android 12.0 EVK.

3.1 Using the Debug Console

Follow the steps below to use the debug console:

Step 1

Connect the host machine and the VIA SOM-9X50 starter kit through the COM connector labeled as "COM".



COM connector diagram

Step 2

Use a serial port communication program such as PuTTY or Tera Term to connect the debug console. Set the console Baud Rate to "921600".

Step 3

Power on the VIA SOM-9X50 starter kit to initiate the boot process.

Step 4

When the VIA SOM-9X50 starter kit has completed booting, 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
-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:

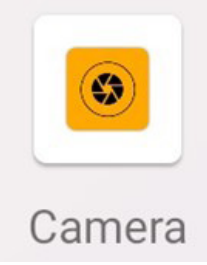
```
:~# cat /sys/devices/system/cpu/cpu0/cpufreq/scaling_available_frequencies
1989000 1924000 1846000 1781000 1716000 1677000 1625000 1586000 1508000 1417000 1326000
1248000 1131000 1014000 910000 793000
:~# cat /sys/devices/system/cpu/cpu0/cpufreq/cpuinfo_cur_freq
793000
```

3.5 Display

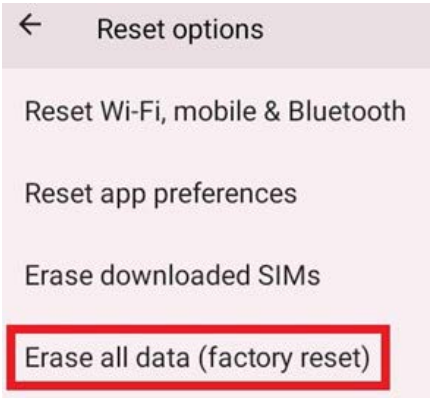
There is no need to set the display device. If you connect an HDMI display, HDMI output will be automatically enabled after booting. If you connect an LCD panel, LCD panel output will be automatically enabled after booting.

3.6 Camera

If a desired CSI camera module was connected correctly to the VIA SOM-9X50 starter kit before booting the VIA SOM-9X50 starter kit, a "Camera" APK can be found on the Android desktop. Click to open it and test the camera functions.



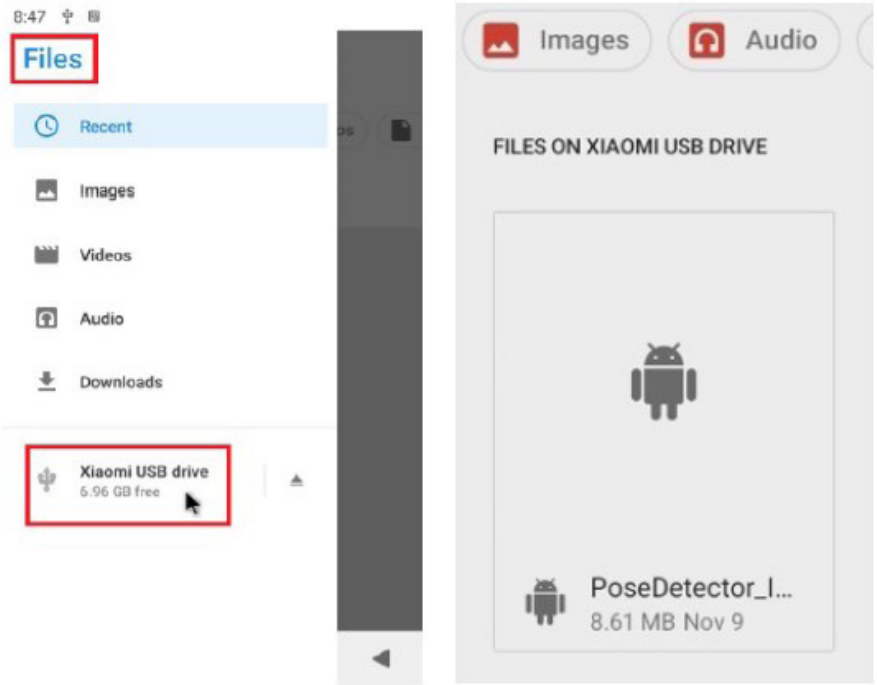
If the CSI camera module was connected correctly before booting the VIA SOM-9X50 starter kit, but there is no "Camera" APK on the Android desktop, navigate to "Settings > System > Reset options" and click "Erase all data (factory reset)" to reboot. The "Camera" APK will be generated after the system reboots.



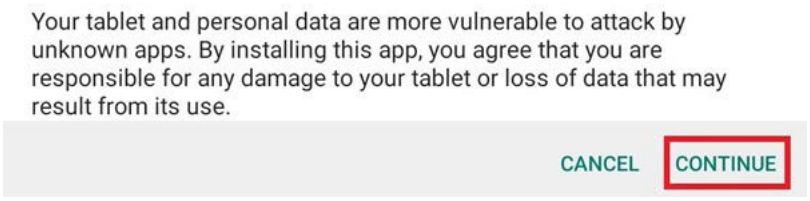
3.7 MTK NeuroPilot AI APU Hardware Acceleration

We recommend running the "PoseDetector_Image.apk" sample program for testing MTK NeuroPilot AI APU hardware acceleration. To install the program, follow the steps below:

1. Copy the "PoseDetector_Image.apk" file to a USB drive and connect the USB drive to the VIA SOM-9X50 starter kit.
2. Next, navigate to "Files" and click on the USB drive's name to find "PoseDetector_Image.apk" as shown below. Double-click the program



3. When the program opens, it will display a dialog box as shown below. Click "Continue" to confirm.



4. After installation, double-click "PoseDetector" to run the program.

5. Check the Pose Detection inference time on the bottom left corner of the program:
   - If the inference time is less than 200ms, MTK NeuroPilot AI APU hardware acceleration is enabled and running correctly.
   - If the inference time is greater than 200ms, MTK NeuroPilot AI APU hardware acceleration is disabled.

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