Android™ Quick Start Guide

1   Overview

This document guides you through the processes of downloading and running this release package. It only explains how to download and run the default release image with default configuration. For details on using the release package, see the *Android™ User's Guide* (AUG) included in this release package.

2   Hardware Requirements

The hardware requirements for using this release package are as follows:

Supported system-on-chips (SoCs):

- i.MX 8QuadMax
- i.MX 8QuadXPlus

Supported boards:

- MEK board and Platform

Contents

3   Working with the i.MX 8QuadMax/8QuadXPlus MEK Board

3.1   Board hardware

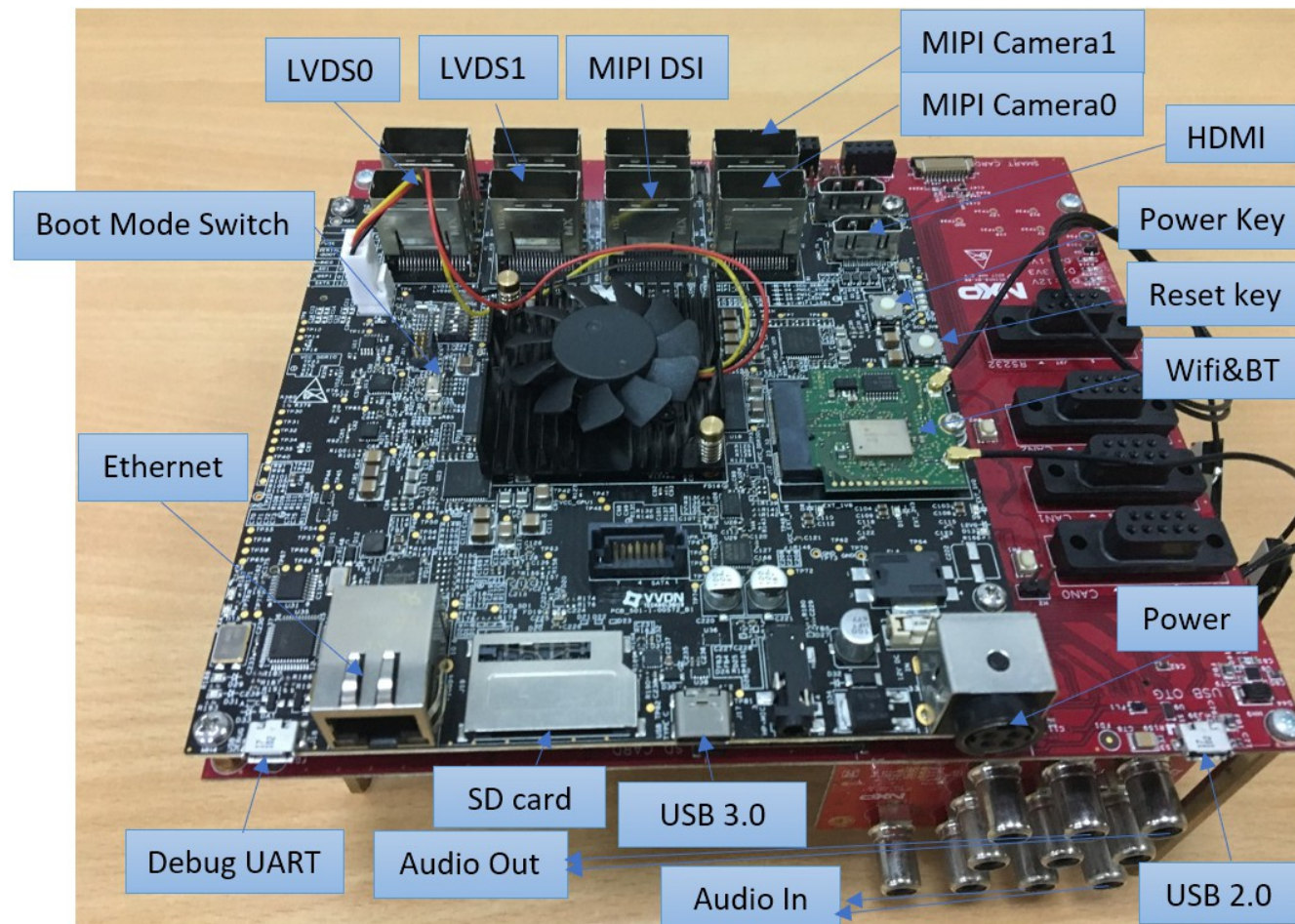The figures below show the different components of the i.MX 8QuadMax/8QuadXPlus MEK board.

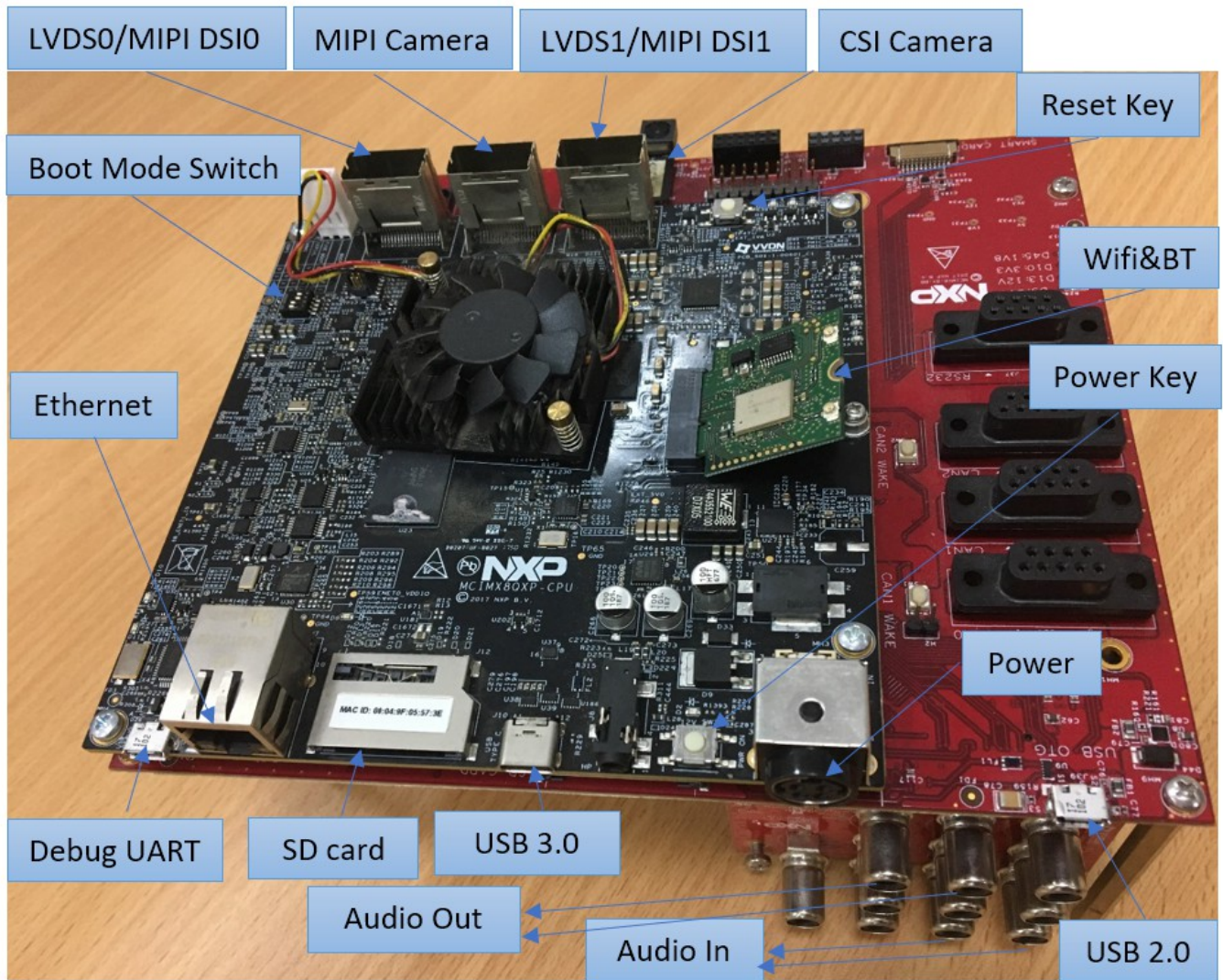**Figure 1. i.MX 8QuadMax MEK board**

Figure 2. i.MX 8QuadXPlus MEK board

Figure 3. i.MX mini SAS cable with DSI-to-HDMI adapter

Figure 4. i.MX mini SAS cable with LVDS-to-HDMI adapter

Figure 5. i.MX MIPI panel

Figure 6. i.MX MIPI camera

NOTE

- To test the MIPI-DSI to HDMI display, use the i.MX mini SAS cable to connect the DSI-to-HDMI adapter to the "HDMI DSI" port.
- To test the LVDS-to-HDMI display, use the i.MX mini SAS cable to connect the LVDS-to-HDMI adapter to the "LVDS0/LVDS1" port.
- To test the camera, connect the i.MX MIPI Camera to the "MIPI Camera" port and connect the OV5640 Camera to "CSI Camera" port at the same time.
    - i.MX 8QuadMax MEK
        - To test the camera, connect two i.MX MIPI cameras to the "MIPI Camera0" and "MIPI Camera1" ports at the same time.
        - To test the MIPI panel display, conect the i.MX MIPI panel to the "MIPI DSI" port.
    - i.MX 8QuadXPlus MEK
        - To test the camera, connect the i.MX MIPI camera to the "MIPI Camera" port and connect the OV5640 camera to the "CSI Camera" port at the same time.

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3.2   Board images

The table below describes the location in the board partitions of the software images in android_o8.1.0_2.0.0-beta_image_8qmek.tar.gz.

Table 1.   Board images

Image name	Download target
/u-boot-imx8qm.imx	0 KB offset of eMMC and 32 KB offset of SD card for i.MX 8QuadMax.
/u-boot-imx8qxp.imx	32 KB offset of MMC for i.MX 8QuadXPlus.
u-boot-imx8qm-mek-uuu.imx	Bootloader used by UUU for i.MX 8QuadMax MEK board. It is not flashed to MMC.
/u-boot-imx8qxp-mek-uuu.imx	Bootloader used by UUU for the i.MX 8QuadMax MEK board. It is not flashed to MMC.
/dtbo-imx8qm.img	dtbo_a and dtbo_b partitions for i.MX 8QuadMax to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display.
/dtbo-imx8qm-hdmi.img	dtbo_a and dtbo_b partitions for i.MX 8QuadMax to support physical HDMI display.
dtbo-imx8qm-mipi-panel.img	dtbo_a and dtbo_b partitions for i.MX 8QuadMax to support MIPI panel display.
/dtbo-imx8qxp.img	dtbo_a and dtbo_b partitions for i.MX 8QuadXPlus to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI displays with dual-camera support.
/dtbo-imx8qxp-ov5640mipi.img	dtbo_a and dtbo_b partitions for i.MX 8QuadXPlus to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI displays with single MIPI camera support.
/vbmeta-imx8qm.img	vbmeta_a and vbmeta_b partitions for i.MX 8QuadMax to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display.
/vbmeta-imx8qm-hdmi.img	vbmeta_a and vbmeta_b partitions for i.MX 8QuadMax to support physical HDMI display.
/vbmeta-imx8qm-mipi-panel.img	vbmeta_a and vbmeta_b partitions for i.MX 8QuadMax to support MIPI panel display.
/vbmeta-imx8qxp.img	vbmeta_a and vbmeta_b partitions for i.MX 8QuadXPlus to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display with dual-camera support.
/vbmeta-imx8qxp-ov5640mipi.img	vbmeta_a and vbmeta_b partitions for i.MX 8QuadXPlus to support single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI displays with single MIPI camera support.
/boot.img	boot_a and boot_b paritions
/partition-table.img	Program to the first 17 KB, and then back up to the last 17 KB of the boot storage. GPT table image for 16 GB boot storage.
/partition-table-7GB.img	Program to the first 17 KB, and then back up to last 17 KB of the boot storage. GPT table image for 8 GB boot storage.
/partition-table-28GB.img	Program to first 17 KB, and then back up to last 17 KB of the boot storage. GPT table image for 32 GB boot storage.

Table continues on the next page...

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Table 1.   Board images (continued)

/system.img	system_a and system_b partitions.
/vendor.img	vendor_a and vendor_b partitions.

The table below describes UUU scripts in android_o8.1.0_2.0.0-beta_image_8qmek.tar.gz. They are used with the UUU binary file to download the images above into the board. For detailed information on how to download images with UUU, see Section 3.3 "Flashing board images".

Table 2.   UUU scripts

UUU script name	Function
uuu-android-mx8qm-mek-emmc.lst	Used with the UUU binary file to download image files into eMMC for i.MX 8QuadMax.
uuu-android-mx8qm-mek-sd.lst	Used with the UUU binary file to download image files into the SD card for i.MX 8QuadMax.
uuu-android-mx8qxp-mek-emmc.lst	Used with the UUU binary file to download image files into eMMC for i.MX 8QuadXPlus.
uuu-android-mx8qxp-mek-sd.lst	Used with the UUU binary file to download image files into the SD card for i.MX 8QuadXPlus.

3.3   Flashing board images

The board image files can be flashed into the target board using Universal Update Utility (UUU).

For the UUU binary file, download it from github: uuu release page on github. You can download the latest version (1.2.31 for now).
- For Linux OS, download the file named "uuu".
- For Windows OS, download the file named "uuu.exe".

    You can put these files in a path containing the system environment variable "PATH", and then directly call uuu in command line or shell terminal.

There are two ways as follows to use UUU to flash images:
- Directly invoke UUU with the lst scripts in the command line to flash images.
- Use the uuu_imx_android_flash shell script or Windows batch file to invoke UUU and fastboot tool to flash images.

uuu_imx_android_flash is a new tool, which is more flexible. If the users are not familiar with this tool, the way to use UUU with the lst scripts is still maintained, and it will be removed in the future.

The two ways are described as follows. Users can choose either of it to flash images.

3.3.1   Directly invoking UUU with the lst scripts in command line to flash images

For detailed information on the UUU lst scripts used in this way, see Section 3.2 "Board images".

NOTE

UUU uses the integrated fastboot tool to flash images. Make sure you have fastboot driver software installed on your computer.

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Perform the following steps to flash the board images:

1. Download the UUU binary file from github as described above.
2. Make the board enter serial download mode.
   - Change the board's SW2 (boot mode) to 001000 (1-6 bit) for i.MX 8QuadMax.
   - Change the board's SW2 (boot mode) to 1000 (1-4 bit) for i.MX 8QuadXPlus.
3. Power on the board. Connect the PC with the board using the USB cable on the board USB 3.0 type-C port.

NOTE
   - There are three USB ports on the i.MX 8QuadMax MEK board: USB-to-UART, USB 2.0, and USB 3.0.
   - The USB-to-UART port is known as debug UART, and can be used to watch the log of the hardware boot processing.
   - USB 2.0 is USB Host and USB 3.0 is USB OTG.

4. Decompress release_package/android_o8.1.0_2.0.0-beta_image_8qmek.tar.gz, which contains the image files and UUU scripts. Choose the correct UUU script file as shown in the following table.

Target device and boot storage	UUU script file
i.MX 8QuadMax MEK SD	uuu-android-mx8qm-mek-sd.lst
i.MX 8QuadMax MEK eMMC	uuu-android-mx8qm-mek-emmc.lst
i.MX 8QuadXPlus MEK SD	uuu-android-mx8qxp-mek-sd.lst
i.MX 8QuadXPlus MEK eMMC	uuu-android-mx8qxp-mek-emmc.lst

NOTE
   - If your SD card is 16 GB or the on-board eMMC is used as the boot device, you do not need to change the "partition-table.img" part of the UUU script.
   - If your SD card is 32 GB, change partition-table.img to partition-table-28GB.img in the corresponding UUU script.
   - If your SD card is 8 GB, change partition-table.img to partition-table-7GB.img in the corresponding UUU script.
   - For i.MX 8QuadMax:
       - To test the LVDS-to-HDMI/MIPI-to-HDMI display, you do not need to change the "dtbo-imx8qm.img and vbmeta-imx8qm.img" part of the UUU script.
       - To test the physical HDMI display, change dtbo-imx8qm.img and vbmeta-imx8qm.img to dtbo-imx8qm-hdmi.img and vbmeta-imx8qm-hdmi.img in the corresponding UUU script.
   - For i.MX 8QuadXPlus:
       - To test the single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display with dual-camera support, you do not need to change the "dtbo-imx8qxp.img and vbmeta-imx8qxp.img" part of the UUU script.
       - To test the single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display with single MIPI camera support, change dtbo-imx8qxp.img and vbmeta-imx8qxp.img to dtbo-imx8qxp-ov5640mipi.img and vbmeta-imx8qxp-ov5640mipi.img.

5. Use UUU and the proper script file to flash image files.

   Execute the following command to invoke the UUU binary file and UUU scripts to flash the image files.

   - On a Linux system, open the shell terminal. Execute the command below. `${uuu_script_path}` is the file path (including the name of the UUU script) of the UUU script that is used. It can be a relative path or an absolute path.

```
> sudo uuu ${uuu_script_path}
```
- On a Windows system, open the cmd interface. Execute the command below. `${uuu_script_path}` is the absolute file path (including the name of the UUU scripts) of the UUU script.

```
> uuu.exe ${uuu_script_path}
```

6. Wait for the script file execution to complete. If there are no errors, you will get information on the command window as follows:

```
    PS C:\Users\user_01\tools\uuu> uuu.exe  C:\Users\user_01\images
\android_o8.1.0_2.0.0-beta_image_8qmek\uuu-android-mx8qm-mek-sd.lst
    uuu (Universal Update Utility) for nxp imx chips -- libuuu_1.2.24-0-g0d63ca3

    Powershell: Enjoy auto [tab] command complete by run below command or put into
Documents\WindowsPowerShell\Microsoft.PowerShell_profile.ps1
        Register-ArgumentCompleter -CommandName uuu -ScriptBlock {param($commandName,
$parameterName,$wordToComplete,$commandAst,$fakeBoundParameter); C:\Users\user_01\tools
\uuu>uuu.exe -autocomplete $parameterName }

    Succuess 1    Failure 0

         1/ 0    [                                     ]
    2:2   20/20   [Done                                 ] FB: done
```

As you can see, it is on the Windows system, and the absolute file path of the UUU script is used. The target device is the SD card. For the output information on the command complete feature, it is recommendations given by UUU itself. This feature is not used here.

7. Power off the board.
8. Change the boot device as eMMC or SD card.
    - Change SW2 to switch the board back to 000100 (1-6 bit) to enther eMMC boot mode for i.MX 8QuadMax.
    - Change SW2 to sithch the board back to 001100 (1-6 bit) to enther SD boot mode for i.MX 8QuadMax.
    - Change SW2 to switch the board back to 0100 (1-4 bit) to enter eMMC boot mode for i.MX 8QuadXPlus.
    - Change SW2 to switch the board back to 1100 (1-4 bit) to enter SD boot mode for i.MX 8QuadXPlus.

Problems may be encountered when using UUU:
- If the partition table image file being used needs a larger storage capacity than what is really on the board, for example, the default partition table image file needs more than 13 GB storage capacity, and a 8 GB target SD card device is plugged after power-on, the command line interface prompts as follows:

```
2:2   5/19   [write backup GPT image fail ] FB: flash gpt partition-table.img
```
- If the data speed of the target device is too slow, the command line interface prompts as follows when flashing system.img. In this situation, you may use an SD card with high data speed, or just modify the UUU script file, changing the number after "-t" to a lager value. Currently, it is 100000, as shown in the following prompt:

```
2:2   14/19   [Bulk read failure          ] FB[-t 100000]: flash system_a system.img
```

3.3.2   Using the uuu_imx_android_flash tool to invoke UUU and fastboot tool to flash images

The uuu_imx_android_flash shell script and windows batch file are provided to flash Android images with much more flexibility.

Perform the following steps to download the board images:

1. Download the UUU binary file from github as described above. Install fastboot into a directory contained by the system environment variable of "PATH".
2. Make the board enter serial download mode.
    - Change the board's SW2 (boot mode) to 001000 (1-6 bit) for i.MX 8QuadMax.
    - Change the board's SW2 (boot mode) to 1000 (1-4 bit) for i.MX 8QuadXPlus.
3. Power on the board. Connect the PC with the board using the USB cable on the board USB 3.0 type-C port.

NOTE
- There are three USB ports on the i.MX 8QuadMax MEK board: USB-to-UART, USB 2.0, and USB 3.0.
- The USB-to-UART port is known as debug UART, and can be used to watch the log of the hardware boot processing.
- USB 2.0 is USB Host and USB 3.0 is USB OTG.

4. Decompress release_package/android_o8.1.0_2.0.0-beta_image_8qmek.tar.gz, which contains the image files and uuu_imx_android_flash tool.
5. Execute the uuu_imx_android_flash tool to flash images.

   The uuu_imx_android_flash tool can be executed with options to get help information and specify the images to be flashed. For Android images on the i.MX 8QuadMax/8QuadXPlus MEK board, related options are described as follows.

Table 3.   Options for uuu_imx_android_flash tool

Option	Description
-h	Displays the help information of this tool.
-f soc_name	Specifies the SoC information. For i.MX 8QuadMax, it should be "imx8qm". For i.MX 8QuadXPlus MEK, it should be "imx8qxp". This option is mandatory.
-a	Only flashes slot a. If this option and "-b" option are not used, slots a and b are both flashed.
-b	Only flashes slot b. If this option and "-a" option are not used, slots a and b are both flashed.
-c card_size	Specifies which partition table image file to be flashed. For i.MX 8QuadMax and i.MX 8QuadXPlus MEK, it can be followed with "7" or "28". If this option is not used, default "partition-table.img" is flashed.
-d dev	Specifies some images with "dev" in its name. For i.MX 8QuadMax, it can be "hdmi" or "mipi-panel". For i.MX 8QuadXPlus MEK, it can be "ov5640mipi". If this option is not used, default dtbo and vbmeta images are flashed.
-e	Erases user data after images are flashed.
-D directory	Specifies the directory in which there are the images to be flashed. If this option is not used, images in the current working directory are flashed.

- On Linux system, open the shell terminal. For example, you can execute a command as follows:

  ```
  > sudo ./uuu_imx_android_flash.sh -f imx8qm -a -e
  ```
- On Windows system, open the command line interface, the corresponding command is as follows:

  ```
  > .\uuu_imx_android_flash.bat -f imx8qm -e
  ```

When the command above is executed, the default images are flashed into both eMMC slot a and slot b for i.MX 8QuadMax.
- To flash the SD card, execute the tool with "-t sd". To flash eMMC, it does not need to use the -t option.
- If your SD card is 16 GB or the on-board eMMC is used as the boot device, it does not need to use the -c option.
- If your SD card is 32 GB, execute the tool with "-c 28".
- If your SD card is 8 GB, execute the tool with "-c 7".
- For i.MX 8QuadMax:
  - To test the LVDS-to-HDMI/MIPI-to-HDMI display, it does not need to use the -d option.
  - To test MIPI panel output, execute the tool with "-d mipi-panel".
  - To test the physical HDMI display, execute the tool with "-d hdmi".
- For i.MX 8QuadXPlus:

- To test single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display with dual camera support, it does not need to use the -d option.
- To test single LVDS-to-HDMI/MIPI-to-HDMI or dual LVDS-to-HDMI display with single MIPI camera support, execute the tool with "-d ov5640mipi".

6. Wait for the uuu_imx_android_flash execution to complete. If there is not any error, you will get information on the command window indicating that images are already flashed.
7. Power off the board.
8. Change boot device as eMMC or SD card.
   - Change SW2 to switch the board back to 000100 (1-6 bit) to enter eMMC boot mode for i.MX 8QuadMax.
   - Change SW2 to sithch the board back to 001100 (1-6 bit) to enter SD boot mode for i.MX 8QuadMax.
   - Change SW2 to switch the board back to 0100 (1-4 bit) to enter eMMC boot mode for i.MX 8QuadXPlus.
   - Change SW2 to switch the board back to 1100 (1-4 bit) to enter SD boot mode for i.MX 8QuadXPlus.

3.4   Booting

After downloading the images, boot the board by connecting it to the power supply.

3.4.1   Booting with single LVDS-to-HDMI/MIPI-to-HDMI/MIPI panel or dual LVDS-to-HDMI display

The i.MX 8QuadMax and 8QuadXPlus MEK boards support single LVDS-to-HDMI, single MIPI-to-HDMI and dual LVDS-to-HDMI Display. The i.MX 8QuadMax MEK board supports MIPI panel display. They share the same bootargs.

In the U-Boot prompt, set the U-Boot environment variables as follows:

```
U-Boot > setenv bootargs console=ttyLP0,115200 earlycon=lpuart32,0x5a060000,115200 init=/
init androidboot.console=ttyLP0 consoleblank=0 androidboot.hardware=freescale
androidboot.fbTileSupport=enable cma=800M@0x960M-0xe00M androidboot.primary_display=imx-drm
firmware_class.path=/vendor/firmware transparent_hugepage=never swiotlb=49152
U-Boot > saveenv
```

With above settings, the Android platform does not start the shell console. To disable selinux, append "androidboot.selinux=permissive" to the U-Boot's bootargs. Boot environment variables are as follows:

```
U-Boot > setenv append_bootargs androidboot.selinux=permissive
U-Boot > saveenv
```

3.4.2   Booting with physical HDMI display

Only the i.MX 8QuadMax MEK board supports Physical HDMI display.

In the U-Boot prompt, set the U-Boot environment variables as follows:

```
U-Boot > setenv bootargs console=ttyLP0,115200 earlycon=lpuart32,0x5a060000,115200 init=/
init androidboot.console=ttyLP0 consoleblank=0 androidboot.hardware=freescale
androidboot.fbTileSupport=enable cma=1184M@0x960M-0xe00M androidboot.primary_display=imx-drm
firmware_class.path=/vendor/firmware transparent_hugepage=never swiotlb=49152
U-Boot > saveenv
```

With the settings above, the Android platform does not start the shell console. To disable selinux, append "androidboot.selinux=permissive" to the U-Boot's bootargs. Boot environment variables are as follows:

```
U-Boot > setenv append_bootargs androidboot.selinux=permissive
U-Boot > saveenv
```

3.5 Board reboot

After you have completed download and setup, reboot the board and wait for the Android platform to boot up.
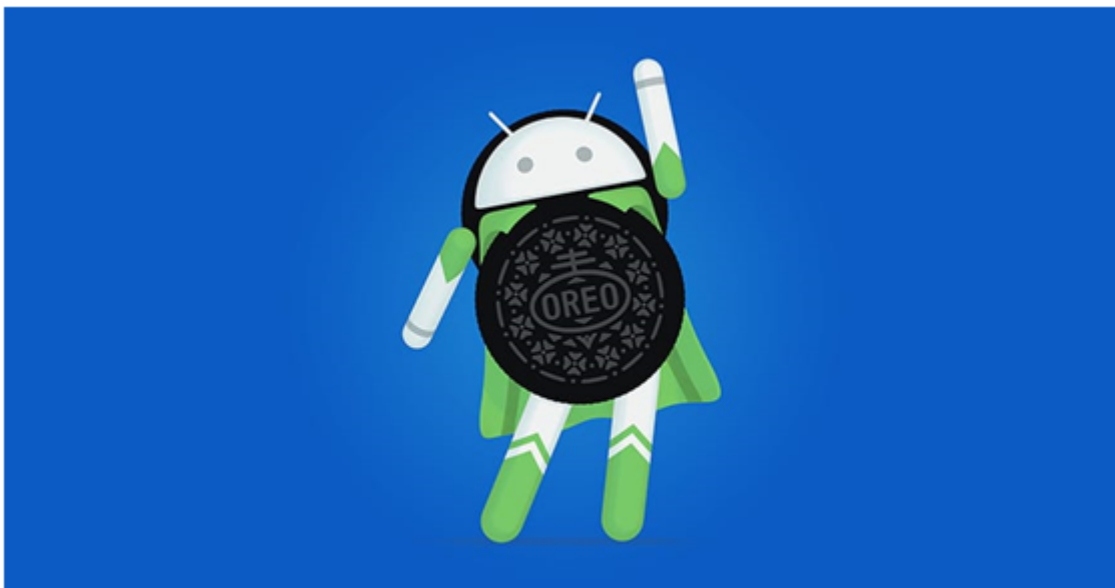
Figure 7. Android Oreo image

4 Revision History

Table 4.   Revision history

Revision number	Date	Substantive changes
O8.0.0_1.2.0_8QXP-EAR	12/2017	Initial release
O8.1.0_1.2.0_8QXP-PRC	03/2018	i.MX 8QuadXPlus PRC/Beta release
O8.1.0_1.2.0_8QXP-beta2	08/2018	i.MX 8QuadXPlus Beta2 release
O8.1.0_2.0.0-beta	01/2019	i.MX 8QuadXPlus/8QuadMax Beta release