

# Android™ Release Notes

## 1 Release Description

i.MX android-10.0.0\_1.0.0 is the GA (RFP) release for Android 10 on NXP's i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus applications processors.

i.MX android-10.0.0\_1.0.0 release includes all necessary codes, documents, and tools to assist users in building and running Android 10 on the i.MX 8M Mini EVK, i.MX 8M Quad EVK, i.MX 8QuadMax MEK, and i.MX 8QuadXPlus MEK Board.

The prebuilt images are also included for a quick trial on NXP i.MX 8M Mini EVK, i.MX 8M Quad EVK, i.MX 8QuadMax MEK, and i.MX 8QuadXPlus MEK Board and Platforms.

This release includes all porting and enhancements based on the Android open source code.

Most of the deliveries in this release are provided in source code with the exception of some proprietary modules/libraries from third parties.

## 2 Supported Hardware SoC/Boards

The supported hardware system-on-chip (SoCs)/boards are listed as follows:

- i.MX 8M Mini EVK DDR4/LPDDR4 Board and Platform
- i.MX 8M Quad EVK Rev. A Board and Platform
- i.MX 8QuadMax (Silicon Revision B0) MEK Board and Platform
- i.MX 8QuadXPlus (Silicon Revision B0) MEK Board and Platform

## 3 Release Package Contents

The android10.0.0\_1.0.0 release package includes the following software and documents.

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**Table 1. Release package contents**

i.MX Android proprietary source code package	<ul style="list-style-type: none"> <li>imx-android-10.0.0_1.0.0.tar.gz: i.MX Android proprietary source code package to enable Android on i.MX boards. For example, Hardware Abstraction Layer implementation, hardware codec acceleration, etc.</li> </ul>
Documents	<p>The following documents are included in android-10.0.0_1.0.0_docs.tar.gz:</p> <ul style="list-style-type: none"> <li><i>Android™ Quick Start Guide (AQSUG)</i>: A document that explains how to run the Android platform on an i.MX board using prebuilt images.</li> <li><i>Android™ User's Guide (AUG)</i>: A document describing procedures for configuring and building this release package.</li> <li><i>Android™ Release Notes (ARN)</i>: A document that introduces key updates and known issues in this release.</li> <li><i>i.MX Android™ Security User's Guide (ASUG)</i>: A document that describes how to do customization work on security features supported by i.MX Android software.</li> <li><i>i.MX Graphics User's Guide (IMXGRAPHICUG)</i>: A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.</li> </ul>
Prebuilt images	<p>You can test the Android platform with a prebuilt image on i.MX reference board before building any code:</p> <ul style="list-style-type: none"> <li>android-10.0.0_1.0.0_image_8mmevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Mini EVK board.</li> <li>android-10.0.0_1.0.0_image_8mmevkddr4.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Mini EVK DDR4 board.</li> <li>android-10.0.0_1.0.0_image_8mqevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Quad EVK board.</li> <li>android-10.0.0_1.0.0_image_8qmek.tar.gz: Prebuilt images with NXP extended features for the i.MX 8QuadMax/8QuadXPlus MEK board.</li> </ul> <p>All prebuilt images are in a separate package. See the <i>Android™ Quick Start Guide (AQSUG)</i> and <i>Android™ User's Guide (AUG)</i> to choose the appropriate image.</p>

## 4 Features

**Table 2. Features**

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Google Android 10 release	Y	Y	Y	Y	Based on android-10.0.0_r14 release
Linux 4.19.42 kernel (merge with AOSP kernel)	Y	Y	Y	Y	Based on Linux® OS BSP L4.19.35_1.1.0 release.
U-Boot	Y	Y	Y	Y	v2019.04.

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Trusty OS	Y	Y	Y	Y	-
Graphic-HW	Y	Y	Y	Y	VeriSilicon GC7000NanoUltr GPU with the 6.4.0.p2 driver for i.MX 8M Mini.  VeriSilicon GC7000L GPU with 6.4.0.p2 driver for i.MX 8M Quad.  VeriSilicon GC7000XSVX GPU with 6.4.0.p2 driver for i.MX 8QuadMax.  VeriSilicon GC7000L GPU with 6.4.0.p2 driver for i.MX 8QuadXPlus.
Graphic-HW 3D acceleration	Y	Y	Y	Y	OpenGL ES1.1/2.0 through GC7000NanoUltra for i.MX 8M Mini.  OpenGL ES1.1/2.0/3.1 through GC7000L for i.MX 8M Quad.  OpenGL ES 1.1/2.0/3.1/3.2 through GC7000XSVX for i.MX 8QuadMax.  OpenGL ES 1.1/2.0/3.1 via GC7000L for i.MX 8QuadXPlus.
Graphic-HW accelerated UI surface composition	Y	Y	Y	Y	OpenGL ES2.0 through GC7000NanoUltra for i.MX 8M Mini.  OpenGL ES3.1 through GC7000L for i.MX 8M Quad, OpenGL ES 3.2 through GC7000XSVX for i.MX 8QuadMax.  OpenGL ES 3.1 through GC7000L for i.MX 8QuadXPlus.
Boot source	SD/eMMC	SD/eMMC	SD/eMMC	SD/eMMC	-
SCFW	N	N	Y	Y	Version 1.2.7.1
SECO firmware	N	N	Y	Y	Version 2.3.1
Splash Screen	Y	Y	Y	Y	-
UI (input)	Y	Y	Y	Y	-
UI (display)	MIPI-to-HDMI/MIPI panel display	HDMI/MIPI-to-HDMI/MIPI panel display	HDMI display	HDMI display	i.MX 8M Mini supports MIPI-DSI to HDMI display and MIPI Panel display.  i.MX 8M Quad supports physical HDMI display, MIPI-DSI to HDMI display, and MIPI panel display.

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					i.MX 8QuadMax supports LVDS-to-HDMI/MIPI-to-HDMI and physical HDMI display.
UI (dual display, HDMI +HDMI, UI mirror displayed on second device)	N	Y	Y	Y	Supports dual LVDS-to-HDMI display.
UI (brightness control)	N	N	N	N	-
Storage - External Media	Y	Y	Y	Y	USB 2.0 port supports udisk, but USB 3.0 port does not support udisk.
Connectivity - Ethernet	Y	Y	Y	Y	-
Connectivity - Bluetooth® wireless technology	Y	Y	Y	Y	<p>Hardware:</p> <ul style="list-style-type: none"> <li>Qualcomm 1PJ QCA9377 for i.MX 8M Mini EVK LPDDR4 board</li> <li>Broadcom 1MW BCM43455 for i.MX 8M Mini EVK DDR4 board</li> <li>Broadcom 1CX BCM4356 for i.MX 8M Quad EVK Rev. A, i.MX 8QuadMax MEK and i.MX 8QuadXPlus MEK</li> </ul> <p>Profiles:</p> <ul style="list-style-type: none"> <li>A2DP Source</li> <li>AVRCP</li> <li>BLE Host</li> <li>HSP</li> <li>HID Host</li> <li>HID Device</li> <li>PAN</li> <li>OPP</li> </ul>
Connectivity - Wi-Fi	Y	Y	Y	Y	<p>Hardware:</p> <ul style="list-style-type: none"> <li>Qualcomm 1PJ QCA9377 for i.MX 8M Mini EVK LPDDR4 board</li> </ul>

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					<p>Features:</p> <ul style="list-style-type: none"> <li>• STA mode</li> <li>• AP mode</li> <li>• Wi-Fi Direct</li> <li>• AP/STA Concurrency</li> </ul> <p>Hardware:</p> <ul style="list-style-type: none"> <li>• Broadcom 1MW BCM43455 for i.MX 8M Mini EVK DDR4 board</li> <li>• Broadcom 1CX BCM4356 for i.MX 8M Quad EVK Rev. A, i.MX 8QuadMax MEK and i.MX 8QuadXPlus MEK</li> </ul> <p>Features:</p> <ul style="list-style-type: none"> <li>• STA mode</li> <li>• AP mode</li> <li>• Wi-Fi Direct</li> </ul>
Connectivity - USB Tethering	Y	Y	Y	Y	Supports Wi-Fi and Ethernet as upstream.
Power - CPU Freq	Y	Y	Y	Y	-
Power - Bus Freq	Y	Y	Y	Y	-
Media - Music Play	Y	Y	Y	Y	<p>SSI + WM8524 for i.MX 8M Mini and i.MX 8M Quad.</p> <p>ESAI+CS42888 for i.MX 8QuadMax (not support multichannel).</p> <p>ESAI+CS42888 for i.MX 8QuadXPlus (supports multichannel).</p>
Media-Sound Record	Y	Y	Y	Y	-
Media - Video Play	Y	Y	Y	Y	-
Media - Camera	Y	Y	Y	Y	<p>OV5640CSI for i.MX 8M Mini and i.MX 8M Quad.</p> <p>OV5640MIPI for i.MX 8QuadXPlus.</p> <p>For i.MX 8M Quad, the camera cannot co-work with MIPI Display due to the I2C address conflict.</p>

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Media - TVIN	N	N	N	N	-
Media - Dual Camera	Y	Y	Y	Y	Dual OV5640MIPI for i.MX 8QuadMax OV5640MIPI and OV5640CSI for i.MX 8QuadXPlus.
Media - Camcorder	Y	Y	Y	Y	-
Media - USB Camera	Y	Y	N	N	USB camera supports C920, C270, and C525.
Media - USB Mic	Y	Y	Y	Y	-
Media - HDMI audio output	N	Y	Y	N	-
Media-DSD Playback	Y	Y	N	N	DSD stream output from Audio Expansion Board.
Media-PlayReady DRM	N	Y	N	N	Moderated download for licensees
Media-WideVine DRM	Y	Y	N	N	Supports WideVine DRM Level 3.
Media-M4 Playback	Y	N	N	N	Audio playback based on FreeRTOS on the Cortex-M4 core for i.MX 8M Mini.
Media-Hi-Res audio output	Y	Y	Y	Y	High resolution audio output from Audio Expansion Board for i.MX 8M Mini EVK and i.MX 8M Quad EVK. <ul style="list-style-type: none"> <li>• 2 channel: 384000, 768000 sampling rate</li> <li>• 4 channel: 48000, 96000, 192000, 384000, 768000 sampling rate</li> <li>• 6 channel: 48000, 96000, 192000, 384000 sampling rate</li> <li>• 8 channel: 48000, 96000, 192000, 384000 sampling rate</li> </ul> High resolution audio output from Audio Expansion Board for i.MX 8QuadMax MEK and i.MX 8QuadXPlus MEK:

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Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					<ul style="list-style-type: none"> <li>• 4 channel: 48000, 96000, 192000 sampling rate</li> <li>• 6 channel: 48000, 96000, 192000 sampling rate</li> <li>• 8 channel: 48000, 96000, 192000 sampling rate</li> </ul>
Misc - ADB over USB	Y	Y	Y	Y	-
Misc - Fastboot utility	Y	Y	Y	Y	-
Misc - SW update and factory reset	Y	Y	Y	Y	-
Sensor - Magnetometer	N	N	Y	Y	FXOS8700
Sensor - Accelerometer	N	N	Y	Y	FXOS8700
Sensor - Gyroscope	N	N	Y	Y	FXAS2100
Sensor - Light	N	N	Y	Y	ISL29023
Sensor - Pressure	N	N	Y	Y	MPL3115
Sensor - Temperature	N	N	Y	Y	MPL3115
File Based Encryption	Y	Y	Y	Y	-
USB Accessory	Y	Y	Y	Y	Google AOA v2.0
Ethernet APK	Y	Y	Y	Y	-
webGL	Y	Y	Y	Y	-
Vulkan	N	Y	Y	Y	-
OTA for A/B	Y	Y	Y	Y	-
USB Type-C PD	Y	Y	Y	Y	Supports power role switch with devices that support USB power delivery
DM Verity	Y	Y	Y	Y	-
TEE backed Keymaster HAL	Y	Y	Y	Y	This is based on i.MX Trusty OS TEE firmware.
TEE backed AVB	Y	Y	Y	Y	This is based on i.MX Trusty OS TEE firmware and secure storage of eMMC chip. In this release, users

Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					need to initialize the RPMB part manually.

## 5 Multimedia Codecs

For multimedia codecs and features, see Section 5 in the [Google Android 10 Compatibility Definition Document \(CDD\)](#).

## 6 Change Logs

Compared to the P9.0.0\_2.3.0 release, android-10.0.0\_1.0.0 for i.MX 8M Mini EVK has the following major changes:

- Upgraded the Android code base from android-9.0.0\_r35 to android-10.0.0\_r14.
- Upgraded the kernel from v4.14.98 to v4.19.42.
- Upgraded the Uboot from v2018.03 to v2019.04.
- Upgraded mapper HAL from 2.0 to 2.1.
- Upgraded composer HAL from 2.1 to 2.3.
- Integrate power HAL.
- Integrate thermal HAL.
- Integrate oemlock HAL.

Compared to the P9.0.0\_2.3.0 release, android-10.0.0\_1.0.0 for i.MX 8QuadXPlus MEK has the following major changes:

- Upgraded the Android code base from android-9.0.0\_r35 to android-10.0.0\_r14.
- Upgraded the kernel from v4.14.98 to v4.19.42.
- Upgraded the U-Boot from v2018.03 to v2019.04.
- Upgraded mapper HAL from 2.0 to 2.1.
- Upgraded composer HAL from 2.1 to 2.3.
- Upgraded the SCFW version from 1.2.2 to 1.2.7.1.
- Integrated power HAL.
- Integrated thermal HAL.
- Integrated oemlock HAL.
- Enabled Multi-display.

Compared to the P9.0.0\_2.0.1-ga release, android-10.0.0\_1.0.0 for i.MX 8QuadMax MEK has the following major changes:

- Upgraded the Android code base from android-9.0.0\_r30 to android-10.0.0\_r14.
- Upgraded the kernel from v4.14.98 to v4.19.42.
- Upgraded the U-Boot from v2018.03 to v2019.04.
- Upgraded mapper HAL from 2.0 to 2.1.
- Upgraded composer HAL from 2.1 to 2.3.



- Upgraded SCFW version from 1.2.1 to 1.2.7.1.
- Integrated power HAL.
- Integrated thermal HAL.
- Integrated oemlock HAL.
- Enabled Multi-display.

Compared to the P9.0.0\_2.0.0-ga release, android-10.0.0\_1.0.0 for i.MX 8M Quad EVK has the following major changes:

- Upgraded the Android code base from android-9.0.0\_r30 to android-10.0.0\_r14.
- Upgraded the kernel from v4.14.98 to v4.19.42.
- Upgraded the U-Boot from v2018.03 to v2019.04.
- Upgraded mapper HAL from 2.0 to 2.1.
- Upgraded composer HAL from 2.1 to 2.3.
- Integrated power HAL.
- Integrated thermal HAL.
- Integrated oemlock HAL.
- Enabled Multi-display.

## 7 Known Issues and Limitations

The known issues about the hardware and hardware rework instructions are not included in this document. There may be hardware-related reference materials for some reference boards. Make sure to check the link [i.MX Application Processors](#) to see if it is applicable.

**Table 3. Known issues and limitations**

Issue description	Remarks
The Google USB driver must be installed multiple times for the MTP, PTP, MTP&ADB, PTP&ADB, and ADB function settings.	Some Windows XP environments may display MTP and PTP windows even with only PTP enabled in the device.
U-Boot will hang when erasing Kingston SD card.	U-Boot will hang when sending the erase command on some Kingston SD cards.
For i.MX 8QuadXPlus, it fails to boot from some types of eMMC.	<p>In the default settings, the UUU script burns the boot image into the eMMC Boot Partition with 32KB offset. Although it works properly on the MEK board, it fails to read the boot image on some types of eMMC.</p> <p>There are two possible solutions:</p> <ul style="list-style-type: none"> <li>• Download flash.bin in the eMMC Boot Partition + 0KB offset + eMMC fastboot enabled in fuse.</li> <li>• Download flash.bin in the eMMC User Partition + 32KB offset (eMMC fastboot can be either enabled or disabled in fuse).</li> </ul> <p>For more information, see <a href="https://community.nxp.com/docs/DOC-342285">https://community.nxp.com/docs/DOC-342285</a>.</p>

## 8 Revision History

Table 4. Revision history

Revision number	Date	Substantive changes
P9.0.0_1.0.0-beta	11/2018	Initial release
P9.0.0_1.0.0-ga	01/2019	i.MX 8M, i.MX 8QuadMax, i.MX 8QuadXPlus GA release.
P9.0.0_2.0.0-ga	04/2019	i.MX 8M, i.MX 8QuadMax, i.MX 8QuadXPlus GA release.
P9.0.0_2.0.0-ga	08/2019	Updated the location of the SCFW porting kit.
android-10.0.0_1.0.0	02/2020	i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus GA release.



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