Document Number: ARN
Rev. P9.0.0_2.0.0-ga, 04/2019

Android™ Release Notes

Contents

1 Release Description

The i.MX Android™ P9.0.0_2.0.0-ga release is an RFP (GA) release for the Android Pie 9.0 (P) on NXP's i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus applications processors.

i.MX Android P9.0.0_2.0.0-ga release includes all necessary code, documents, and tools to assist users in building and running the Android Pie 9.0 on the i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus Board.

The prebuilt images are also included for a quick trial on NXP i.MX 8M Mini, i.MX 8M Quad, i.MX 8QuadMax, and i.MX 8QuadXPlus 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 Rev. B/C Board and Platform
- i.MX 8M Quad EVK Rev. B3/B4/A Board and Platform
- i.MX 8QuadMax MEK Rev. B0 Board and Platform
- i.MX 8QuadXPlus MEK Rev. B0 Board and Platform

3 Release Package Contents

The P9.0.0_2.0.0-ga release package includes the following software and documents.

Table 1. Release package contents

i.MX Android proprietary source code package	• imx-p9.0.0_2.0.0-ga.zip: i.MX Android proprietary source code package to enable Android on i.MX boards. For example, Hardware Abstraction Layer implementation, hardware codec acceleration, etc.
Documents	The following documents are included in android_p9.0.0_2.0.0-ga_docs.zip: • *Android™ Quick Start Guide* (AQSUG): A document that explains how to run the Android platform on an i.MX board using prebuilt images. • *Android™ User's Guide* (AUG): A document describing procedures for configuring and building this release package. • *Android™ Release Notes* (ARN): A document that introduces key updates and known issues in this release. • *i.MX Android™ Extended Codec Release Notes* (IMXACRN): A document that provides the extended codec information. • *i.MX Graphics User's Guide* (IMXGRAPHICUG): A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.
Prebuilt images	You can test the Android platform with a prebuilt image on i.MX reference board before building any code: • android_p9.0.0_2.0.0-ga_image_8mmevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Mini EVK board. The extended features include additional multimedia format support. • android_p9.0.0_2.0.0-ga_image_8mqevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Quad EVK board. The extended features include more multimedia format support. • android_p9.0.0_2.0.0-ga_image_8qmek.tar.gz: Prebuilt images with NXP extended features for the i.MX 8QuadMax/8QuadXPlus MEK board. The extended features include more multimedia format support. All prebuilt images are in a separate package. See the *Android™ Quick Start Guide* (AQSUG) and *Android™ User's Guide* (AUG) to choose the appropriate image.

NOTE

VivanteVTK tool is no longer provided in the Android release package. It is available on https://www.nxp.com/imx6tools (for example: Tools -> Vivante VTK -> VivanteVTK-v6.2.4.p4.1.7.8).

4 Features

This section contains features in this package.

Table 2. Features

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
Google Pie 9.0 release	Y	Y	Y	Y	Based on android-9.0.0_r30 release
Linux 4.14.98 kernel (merged with the AOSP kernel)	Y	Y	Y	Y	Based on Linux® OS BSP L4.14.98-2.0.0_ga release.
U-Boot	Y	Y	Y	Y	v2018.03.
Graphic-HW	Y	Y	Y	Y	VeriSilicon GC7000NanoUltr GPU with the 6.2.4.p4 driver for i.MX 8M Mini. VeriSilicon GC7000L GPU with 6.2.4.p4 driver for i.MX 8M Quad. VeriSilicon GC7000XSVX GPU with 6.2.4.p4 driver for i.MX 8QuadMax. VeriSilicon GC7000L GPU with 6.2.4.p4 driver for i.MX 8QuadXPlus.
Graphic-HW 3D acceleration	Y	Y	Y	Y	OpenGL ES1.1/2.0 through GC7000NanoUltr 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 GC7000NanoUltr 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	-
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.

Table continues on the next page...

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 8M Quad supports physical HDMI display, MIPI-DSI to HDMI display, and MIPI panel display. 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	Hardware: • Qualcomm 1PJ QCA9377 for i.MX 8M Mini EVK Rev. B • Qualcomm 1CQ QCA6174A for i.MX 8M Quad EVK Rev. B3/B4, i.MX 8QuadMax and i.MX 8QuadXPlus • Broadcom 1MW BCM43455 for i.MX 8M Mini EVK Rev. C • Broadcom 1CX BCM4356 for i.MX 8M Quad EVK Rev. A Profiles: • A2DP Source • AVRCP • BLE Host • HSP • HID Host • HID Device • PAN • OPP
Connectivity - Wi-Fi	Y	Y	Y	Y	Hardware: • Qualcomm 1PJ QCA9377 for i.MX 8M Mini EVK Rev. B • Qualcomm 1CQ QCA6174A for i.MX 8M Quad EVK Rev. B3/B4, i.MX 8QuadMax and i.MX 8QuadXPlus Features: • STA mode • AP mode • Wi-Fi Direct • AP/STA Concurrency

Table continues on the next page...

Table 2. Features (continued)

Feature	i.MX 8M Mini EVK	i.MX 8M Quad EVK	i.MX 8QuadMax MEK	i.MX 8QuadXPlus MEK	Remarks
					Hardware: • Broadcom 1MW BCM43455 for i.MX 8M Mini EVK Rev. C • Broadcom 1CX BCM4356 for i.MX 8M Quad EVK Rev. A Features: • STA mode • AP mode • Wi-Fi Direct
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	SSI + WM8524 for i.MX 8M Mini and i.MX 8M Quad. ESAI+CS42888 for i.MX 8QuadMax (not support multichannel). ESAI+CS42888 for i.MX 8QuadXPlus (supports multichannel).
Media-Sound Record	Y	Y	Y	Y	-
Media - Video Play	Y	Y	Y	Y	-
Media - Camera	Y	Y	Y	Y	OV5640CSI for i.MX 8M Mini and i.MX 8M Quad. OV5640MIPI for i.MX 8QuadXPlus. For i.MX 8M Quad, the camera cannot co-work with MIPI Display due to the I2C address conflict.
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	N	Y	N	N	Moderated download for licensees

Table continues on the next page...

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-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	N	N	N	High resolution audio output from Audio Expansion Board for i.MX 8M Mini. • 2 channel: 384000, 768000 sampling rate • 4 channel: 48000, 96000, 192000, 384000, 768000 sampling rate • 6 channel: 48000, 96000, 192000, 384000 sampling rate • 8 channel: 48000, 96000, 192000, 384000 sampling rate
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	-

5 Multimedia Codecs

For multimedia codecs and features, see Section 5 in the Google Pie 9.0 Compatibility Definition Document (CDD).

6 Extended Feature Packages

An enhanced multimedia experience is available for the Android platform. This release delivers an error-resilient, feature-rich multimedia solution by extending the existing multimedia features of the Android platform and introduces additional features.

For more information about the features below, contact "L2manager-android@nxp.com". For detailed extended and additional features, see *i.MX Android™ Extended Codec Release Notes* (IMXACRN).

7 Change Logs

Compared to the P9.0.0_1.0.0-ga release, this release has the following major changes:

- Upgraded the Android code base from android-9.0.0_r16 to android-9.0.0_r30.
- Upgraded the kernel from 4.14.78 to 4.14.98.

8 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.
The display is sometimes black on both the i.MX 8QuadMax MEK and i.MX 8QuadXPlus MEK boards.	The display is sometime black with the following log on both the i.MX 8QuadMax and i.MX 8QuadXPlus MEK board. `imx-dpu-crtc imx-dpu-crtc.4: flush - wait for content shdld done timeout.` It will be fixed in the next release.
For i.MX 8QuadXPlus, it fails to boot from some types of eMMC.	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. There are two possible solutions: • Download flash.bin in the eMMC Boot Partition + 0KB offset + eMMC fastboot enabled in fuse. • Download flash.bin in the eMMC User Partition + 32KB offset (eMMC fastboot can be either enabled or disabled in fuse). For more information, see https://community.nxp.com/docs/DOC-342285.

Table continues on the next page...

Table 3. Known issues and limitations (continued)

Issue description	Remarks
Video cannot be played any more after certain HTML5 H.264 or VP8 video playback on i.MX 8QuadMax MEK and i.MX 8QuadXPlux MEK boards.	It will be fixed in the next release.

9 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.

How to Reach Us:

Home Page:
nxp.com

Web Support:
nxp.com/support

Information in this document is provided solely to enable system and software implementers to use NXP products. There are no express or implied copyright licenses granted hereunder to design or fabricate any integrated circuits based on the information in this document. NXP reserves the right to make changes without further notice to any products herein.

NXP makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does NXP assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. “Typical” parameters that may be provided in NXP data sheets and/or specifications can and do vary in different applications, and actual performance may vary over time. All operating parameters, including “typicals,” must be validated for each customer application by customer’s technical experts. NXP does not convey any license under its patent rights nor the rights of others. NXP sells products pursuant to standard terms and conditions of sale, which can be found at the following address: nxp.com/SalesTermsandConditions.

While NXP has implemented advanced security features, all products may be subject to unidentified vulnerabilities. Customers are responsible for the design and operation of their applications and products to reduce the effect of these vulnerabilities on customer's applications and products, and NXP accepts no liability for any vulnerability that is discovered. Customers should implement appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Document Number ARN
Revision P9.0.0_2.0.0-ga, 04/2019