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Android™ Release Notes

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1 Release Description

The i.MX Android™ P9.0.0_2.3.2 is a release for the Android Pie 9.0 (P) on NXP's i.MX 8M Nano, i.MX 8QuadXPlus b0, and i.MX 8QuadXPlus c0 applications processors.

i.MX Android P9.0.0_2.3.2 release includes all necessary codes, documents, and tools to assist users in building and running Pie 9.0 on the i.MX 8M Nano EVK, and i.MX 8QuadXPlus MEK.

The prebuilt images are also included for a quick trial on NXP i.MX 8M Nano EVK, 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 Nano EVK Board and Platform
- i.MX 8QuadXPlus MEK Board and Platform

3 Release Package Contents

The P9.0.0_2.3.2 release package includes the following software and documents.

Table 1. Release package contents

i.MX Android proprietary source code package	• mx-p9.0.0_2.3.2.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.
Documents	The following documents are included in android_p9.0.0_2.3.2_docs.tar.gz:

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Table 1. Release package contents (continued)

	• *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™ Security User's Guide* (ASUG): A document that describes how to do customization work on security features supported by i.MX Android software. • *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_2.3.2_image_8qmek.tar.gz: Prebuilt images with NXP extended features for the i.MX 8QuadXPlus MEK board. The extended features include more multimedia format support. • android_p9.0.0_2.3.2_image_8mnevk.tar.gz: Prebuilt images with NXP extended features for the i.MX 8M Nano EVK 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

Table 2. Features

Feature	i.MX 8M Nano EVK	i.MX 8QuadXPlus MEK	Remarks
Google Pie 9.0 release	Y	Y	Based on android-9.0.0_r47 release
Linux 4.14.98 kernel (merged with the AOSP kernel)	Y	Y	Based on Linux® OS BSP L4.14.98-2.1.0_ga release.
U-Boot	Y	Y	v2018.03.
Trusty OS	Y	Y	-
SCFW	N	Y	Version 1.2.2
SECO Firmware	N	Y	Version 2.3.1

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	i.MX 8QuadXPlus MEK	Remarks
Graphic-HW	Y	Y	VeriSilicon GC7000UL GPU with 6.2.4.p4 driver for i.MX 8M Nano. VeriSilicon GC7000L GPU with 6.2.4.p4 driver for i.MX 8QuadXPlus.
Graphic-HW 3D acceleration	Y	Y	OpenGL ES1.1/2.0/3.1 through GC7000UL for i.MX 8M Nano. OpenGL ES 1.1/2.0/3.1 through GC7000L for i.MX 8QuadXPlus.
Graphic-HW accelerated UI surface composition	Y	Y	OpenGL ES3.1 through GC7000UL for i.MX 8M Nano. OpenGL ES 3.1 through GC7000L for i.MX 8QuadXPlus.
Boot source	SD/eMMC	SD/eMMC	-
Splash Screen	Y	Y	-
UI (input)	Y	Y	-
UI (display)	MIPI-to-HDMI/MIPI Panel Display	HDMI display	i.MX 8M Nano EVK support MIPI-DSI to HDMI display and MIPI Panel display. i.MX 8QuadXPlus supports LVDS-to-HDMI/MIPI-to-HDMI display.
UI (dual display, HDMI+HDMI, UI mirror displayed on second device)	N	Y	Supports dual LVDS-to-HDMI display.
UI (brightness control)	N	N	-
Storage - External Media	Y	Y	For i.MX 8QuadXPlus MEK, USB 2.0 port supports udisk, but USB 3.0 port does not support udisk.
Connectivity - Ethernet	Y	Y	-
Connectivity - Bluetooth® wireless technology	Y	Y	Hardware: • Qualcomm 1CQ QCA6174A for i.MX 8QuadXPlus MEK • Broadcom 1MW BCM43455 for i.MX 8M Nano EVK Profiles: • A2DP Source

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	i.MX 8QuadXPlus MEK	Remarks
			• AVRCP • BLE Host • HSP • HID Host • HID Device • PAN • OPP
Connectivity - Wi-Fi	Y	Y	Hardware: • Qualcomm 1CQ QCA6174A for i.MX 8QuadXPlus MEK Features: • STA mode • AP mode • Wi-Fi Direct • AP/STA Concurrency Hardware: • Broadcom 1MW BCM43455 for i.MX 8M Nano EVK Features: • STA mode • AP mode • Wi-Fi Direct
Connectivity - USB Tethering	Y	Y	Supports Wi-Fi and Ethernet as upstream.
Power - CPU Freq	Y	Y	-
Power - Bus Freq	Y	Y	-
Media - Music Play	Y	Y	SSI + WM8524 for i.MX 8M Nano EVK. WM8960+CS42888 for i.MX 8QuadXPlus MEK.
Media-Sound Record	Y	Y	SSI+wm8524 for i.MX 8M Nano EVK. ESAI+CS42888 for i.MX 8QuadXPlus MEK.
Media - Video Play	Y	Y	-
Media - Camera	Y	Y	OV5640CSI for i.MX 8M Nano EVK. OV5640MIPI for i.MX 8QuadXPlus.

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	i.MX 8QuadXPlus MEK	Remarks
Media - TVIN	N	N	-
Media - Dual Camera	Y	Y	OV5640MIPI and OV5640CSI for i.MX 8QuadXPlus MEK.
Media - Camcorder	Y	Y	-
Media - USB Camera	Y	N	USB camera supports C920, C270, and C525.
Media - USB Mic	Y	Y	-
Media - HDMI audio output	N	N	-
Media-DSD Playback	N	N	DSD stream output from Audio Expansion Board.
Media-PlayReady DRM	N	N	-
Media-WideVine DRM	N	N	-
Media-M4 Playback/Media-M7 Playback	N	N	-
Media-Hi-Res audio output	N	N	-
Misc - ADB over USB	Y	Y	-
Misc - Fastboot utility	Y	Y	-
Misc - SW update and factory reset	Y	Y	-
Sensor - Magnetometer	N	Y	FXOS8700
Sensor - Accelerometer	N	Y	FXOS8700
Sensor - Gyroscope	N	Y	FXAS2100
Sensor - Light	N	Y	ISL29023
Sensor - Pressure	N	Y	MPL3115
Sensor - Temperature	N	Y	MPL3115
File Based Encryption	Y	Y	-
USB Accessory	Y	Y	Google AOA v2.0
Ethernet APK	Y	Y	-
webGL	Y	Y	-
Vulkan	N	Y	-
OTA for A/B	Y	Y	-

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	i.MX 8QuadXPlus MEK	Remarks
USB Type-C PD	Y	Y	Supports power role switch with devices that support USB power delivery
DM Verity	Y	Y	-
TEE backed Keymaster HAL	Y	Y	This is based on i.MX Trusty OS TEE firmware.
TEE backed AVB	Y	Y	This is based on i.MX Trusty OS TEE firmware and secure storage of eMMC chip. In this release, users need to initialize the RPMB part manually.

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_2.3.1 release, P9.0.0_2.3.2 for i.MX 8M Nano EVK has the following major change:

- Added support for i.MX 8M Nano EVK LPDDR4 board.

Compared to the P9.0.0_2.3.0 release, P9.0.0_2.3.2 for i.MX 8QuadXPlus MEK has the following major changes:

- Upgraded the Android code base from android-9.0.0_r35 to android-9.0.0_r47.
- Added support for i.MX 8QuadXPlus MEK with c0 chip.
- Enabled Trusty OS.

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 i.MX 8QuadXPlus MEK board may power down during the CTS full running process.	This is an issue about communication between Cortex-A core and Cortex-M core. It will be fixed in the P9.0.0_2.3.4 release.
Power on the i.MX 8QuadXPlus MEK board when the board is connected to the PC through the Type-C cable. This may cause PC shutdown.	This is a hardware known issue about TCPC PHY chip. Check the content on https://community.nxp.com/docs/DOC-345672 to learn how to avoid this issue.
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.	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.

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, and i.MX 8QuadXPlus GA release.
P9.0.0_2.0.0-ga	04/2019	i.MX 8M, i.MX 8QuadMax, and i.MX 8QuadXPlus GA release.
P9.0.0_2.3.0	08/2019	i.MX 8M Mini, i.MX 8M Quad, i.MX 8M Nano, and i.MX 8QuadXPlus Alpha release.
P9.0.0_2.3.2	02/2020	i.MX 8M Nano, i.MX 8QuadMax, and i.MX 8QuadXPlus GA release.
P9.0.0_2.3.2	03/2020	Removed the i.MX 8QuadMax related content.

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