

# Android™ Release Notes

## Contents

- [1 Release Description.... 1](#)
- [2 Supported Hardware SoC/Boards..... 1](#)
- [3 Release Package Contents..... 1](#)
- [4 Features ..... 2](#)
- [5 Multimedia Codecs.....5](#)
- [6 Extended Feature Packages..... 5](#)
- [7 Change Logs.....5](#)
- [8 Known Issues and Limitations.....5](#)
- [9 Revision History..... 6](#)

## 1 Release Description

i.MX Android P9.0.0\_2.3.1 is the RFP (GA) release for Android Pie9.0 (P) on NXP's i.MX 8M Nano application processor.

i.MX Android p9.0.0\_2.3.1 release includes all necessary codes, documents, and tools to assist users in building and running Pie 9.0 on i.MX 8M Nano board.

The prebuilt images are also included for a quick trial on NXP i.MX 8M Nano 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

## 3 Release Package Contents

The P9.0.0\_2.3.1 release package includes the following software and documents.

**Table 1. Release package contents**

i.MX Android proprietary source code package	<ul style="list-style-type: none"><li>• imx-p9.0.0_2.3.1.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>
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**Table 1. Release package contents (continued)**

Documents	<p>The following documents are included in android_p9.0.0_2.3.1_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 Android™ Extended Codec Release Notes (IMXACRN)</i>: A document that provides the extended codec information.</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_p9.0.0_2.3.1_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.</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>

**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	Remarks
Google Pie 9.0 release	Y	Based on android-9.0.0_r47 release
Linux 4.14.98 kernel (merged with the AOSP kernel)	Y	Based on Linux® OS BSP L4.14.98-2.2.0 release.
U-Boot	Y	v2018.03.
Trusty OS	Y	-
Graphic-HW	Y	VeriSilicon GC7000UL GPU with 6.2.4.p4 driver.
Graphic-HW 3D acceleration	Y	OpenGL ES1.1/2.0/3.1 through GC7000UL.
Graphic-HW accelerated UI surface composition	Y	OpenGL ES3.1 through GC7000UL.

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	Remarks
Boot source	SD/eMMC	-
Splash Screen	Y	-
UI (input)	Y	Supports USB Mouse and Multi-touch on the MIPI Panel display.
UI (display)	MIPI-to-HDMI/MIPI Panel Display	Supports MIPI-to-HDMI display and MIPI Panel display.
UI (dual display)	N	-
UI (brightness control)	N	-
Storage - External Media	Y	Supports the udisk on the USB host port.
Connectivity - Ethernet	Y	-
Connectivity - Bluetooth <sup>®</sup> wireless technology	Y	Hardware: Broadcom 1MW BCM43455 Profiles: <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	Hardware: Broadcom 1MW BCM43455 Features: <ul style="list-style-type: none"> <li>• STA mode</li> <li>• AP mode</li> <li>• Wi-Fi Direct</li> </ul>
Connectivity - USB Tethering	Y	Supports Wi-Fi and Ethernet as upstream.
Power - CPU Freq	Y	-
Power - Bus Freq	Y	-
Media - Music Play	Y	SSI + WM8524
Media-Sound Record	Y	SSI + WM8524

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Table 2. Features (continued)

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

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Table 2. Features (continued)

Feature	i.MX 8M Nano EVK	Remarks
USB Type-C PD	Y	Supports power role switch with devices that support USB power delivery
DM Verity	Y	-
TEE backed Keymaster HAL	Y	This is based on i.MX Trusty OS TEE firmware.
TEE backed AVB	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 P9.0.0\_2.3.0 release, P9.0.0\_2.3.1 for i.MX 8M Nano EVK has the following major change:

- Upgraded the Android code base from android-9.0.0\_r35 to android-9.0.0\_r47.
- Improved the quality of OpenGL ES and Vulkan test cases by updating the GPU binary.

## 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.

# 9 Revision History

**Table 4. Revision history**

<b>Revision number</b>	<b>Date</b>	<b>Substantive changes</b>
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_2.3.1	11/2019	i.MX 8M Nano GA release.



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