

Android™ Release Notes

Contents

1 Release Description

The i.MX Android™ P9.0.0_2.2.0-ga release is a general availability (GA) release for the Android 9.0 Pie (P) platform on the i.MX 6Quad, i.MX 6QuadPlus, i.MX 6Dual, i.MX 6SoloX, i.MX 7Dual, and i.MX 7ULP applications processors.

i.MX Android P9.0.0_2.2.0-ga release includes all necessary code, documents, and tools to assist users in building and running the Android 9.0 platform on the i.MX 6Quad, i.MX 6QuadPlus, i.MX 6Dual, i.MX 6DualLite, i.MX 6Solo, i.MX 6SoloX, i.MX 7Dual, and i.MX 7ULP hardware board from scratch. Pre-built images are also included for a quick trial on the following platforms:

- i.MX 6Quad, i.MX 6QuadPlus, and i.MX 6DualLite SABRE-SD Boards and Platforms
- i.MX 6Quad, i.MX 6QuadPlus, and i.MX 6DualLite SABRE-AI Boards and Platforms
- i.MX 6SoloX SABRE-SD Rev. B/C Board and Platform
- i.MX 7Dual SABRE-SD Board and Platform
- i.MX 7ULP EVKB Rev. A and i.MX 7ULP EVK Rev.B Board and Platform

This release includes all NXP 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.

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2 Supported Hardware SoC/Boards

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

- i.MX 6QuadPlus SABRE-SD Board and Platform
- i.MX 6QuadPlus SABRE-AI Board and Platform
- i.MX 6Quad SABRE-SD Board and Platform
- i.MX 6Quad SABRE-AI Board and Platform
- i.MX 6DualLite SABRE-SD Board and Platform
- i.MX 6DualLite SABRE-AI Board and Platform
- i.MX 6SoloX SABRE-SD Rev. B/C Board and Platform
- i.MX 7Dual SABRE-SD Board and Platform
- i.MX 7ULP EVKB Rev. A and i.MX 7ULP EVK Rev.B Board and Platform

3 What's in This Release

The P9.0.0_2.2.0-ga release package includes the following software and documents.

Table 1. Release package contents

Android source code package	<ul style="list-style-type: none"> • imx-p9.0.0_2.2.0-ga.tar.gz: i.MX Android proprietary source code package to enable the Android platform on i.MX-based boards. For example, Hardware Abstraction Layer implementation and hardware codec acceleration.
Documents	<p>The following documents are included in android_p9.0.0_2.2.0-ga_docs.zip:</p> <ul style="list-style-type: none"> • <i>Android™ Quick Start Guide</i> (AQSUG): A document that explains how to run the Android platform on an i.MX board using prebuilt images. • <i>Android™ User's Guide</i> (AUG): A document describing procedures for configuring and building this release package. • <i>Android™ Release Notes</i> (ARN): A document that introduces key updates and known issues in this release. • <i>i.MX Android™ Extended Codec Release Notes</i> (IMXACRN): A document that provides the extended codec information. • <i>i.MX Android™ Camera Issues on the SDP Platform</i> (ACOI): A document that describes the camera issues on the SDP platform. • <i>i.MX Graphics User's Guide</i> (IMXGRAPHICUG): A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.
Prebuilt images	<p>You can test the Android platform with a prebuilt image on i.MX board before building any code:</p> <ul style="list-style-type: none"> • android_p9.0.0_2.2.0-ga_image_6qsabresd.tar.gz: Prebuilt images with NXP extended features for the SABRE-SD board. The extended features include more multimedia format support. • android_p9.0.0_2.2.0-ga_image_6qsabreauto.tar.gz: Prebuilt images with NXP extended features for the SABRE-AI board. The extended features include more multimedia format support. • android_p9.0.0_2.2.0-ga_image_6xsabresd.tar.gz: Prebuilt images with NXP extended features for the i.MX 6SoloX SABRE-SD board.

Table 1. Release package contents

	<p>The extended features include more multimedia format support.</p> <ul style="list-style-type: none"> android_p9.0.0_2.2.0-ga_image_7dsabresd.tar.gz: <p>Prebuilt images with NXP extended features for the i.MX 7Dual SABRE-SD board.</p> <p>The extended features include more multimedia format support.</p> <ul style="list-style-type: none"> android_p9.0.0_2.2.0-ga_image_7ulpvk.tar.gz: <p>Prebuilt images with NXP extended features for the i.MX 7ULP EVKB Rev. A and i.MX 7ULP EVK Rev.B board.</p> <p>The extended features include more multimedia format support.</p> <p>Prebuilt imx7ulp_m4_demo.img is loaded and executed by the Cortex-M4 core. It is flashed to the NOR flash and supplies some essential functions to run Linux OS.</p> <p>All prebuilt images are in a separate package. See the <i>Android™ Quick Start Guide</i> (AQSUG) and <i>Android™ User's Guide</i> (AUG) to choose the appropriate image.</p>
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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 6Quad/ 6QuadPlus/ 6DualLite SABRE-SD	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-AI	i.MX 6SoloX SABRE-SD	i.MX 7Dual SABRE-SD	i.MX 7ULP EVKB/EVK	Remarks
Linux 4.14.98 kernel	Y	Y	Y	Y	Y	Based on Linux® OS BSP L4.14.98 GA release
Google Pie 9.0 release	Y	Y	Y	Y	Y	Based on android-9.0.0_r35 release
U-Boot	Y	Y	Y	Y	Y	v2018.03
Cortex-M4 core image	N	N	N	N	Y	Based on the imx7ulp-m4-demo-2.5.1.bin release package
Graphic-HW	Y	Y	Y	Y	Y	VeriSilicon GC880 for i.MX 6DualLite, GC2000 for i.MX 6Quad, GC2000+ for i.MX 6QuadPlus, VeriSilicon GC400T for i.MX 6SoloX, VeriSilicon GC7000NanoUltra for i.MX 7ULP, GPU with 6.2.4 p4 driver, and PXP 2D for i.MX 7Dual.

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Table 2. Features (continued)

Feature	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-SD	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-AI	i.MX 6SoloX SABRE-SD	i.MX 7Dual SABRE-SD	i.MX 7ULP EVKB/EVK	Remarks
Graphic-HW 3D acceleration	Y	Y	Y	N	Y	OpenGL ES 1.1/2.0/3.0 through GC880/GC2000/ GC2000+ respectively for i.MX 6DualLite, i.MX 6Quad, and i.MX 6QuadPlus. OpenGL ES 1.1/2.0 through GC400T for i.MX 6SoloX. OpenGL ES 1.1/2.0 through GC7000NanoUltra for i.MX 7ULP.
Graphic-HW accelerated UI surface composition	Y	Y	Y	Y	Y	HWC through GC320 for i.MX 6QuadPlus/Quad/ DualLite, HWC through GC400T for i.MX 6SoloX. HWC through PXP 2D for i.MX 7Dual. HWC through GPU 2D for i.MX 7ULP.
Boot source	eMMC, External SD	External SD	External SD	External SD	External SD	-
Splash Screen for LVDS	Y	Y	Y	Y	Y	-
UI (input)	Y	Multitouch on LVDS panel	Multitouch on LVDS panel	Single-touch on LCD panel	Y	Supports USB Mouse and Multi-touch on LVDS for i.MX 6Quad/6QuadPlus/6DualLite/ 6SoloX. Support USB Mouse and Single-touch on LCD for i.MX 7Dual SABRE-SD. Supports USB Mouse and Multi-touch on MIPI Panel display i.MX 7ULP EVKB.
UI (display)	LVDS panel, HDMI display	LVDS panel, HDMI display	LVDS panel	LCD panel, HDMI display	HDMI/MIPI display	-
UI (dual display, LVDS+HDMI, UI mirror displayed on second device)	Y	Y	N	N	N	-
UI (brightness control)	Y	Y	Y	Y	N	-
Storage - External Media	Y	Y	Y	Y	Y	SD, External SD, and UDisk on i.MX 6QuadPlus/6Quad/ 6DualLite SABRE-SD/ SABRE-AI

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Table 2. Features (continued)

Feature	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-SD	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-AI	i.MX 6SoloX SABRE-SD	i.MX 7Dual SABRE-SD	i.MX 7ULP EVKB/EVK	Remarks
						Only support U-disk for i.MX 6SoloX SABRE-SD, i.MX 7Dual SABRE-SD, and i.MX 7ULP EVKB-SD
Connectivity - Ethernet	Y	Y	Y	Y	N	-
Connectivity - Bluetooth® wireless technology	Y	N	Y	Y	Y	<p>Hardware:</p> <ul style="list-style-type: none"> Broadcom BCM4339 for i.MX 6QuadPlus/6Quad/6DualLite SABRE-SD, i.MX6 SoloX SABRE-SD, and i.MX 7Dual SABRE-SD Broadcom BCM43430 for i.MX 7ULP EVKB-SD <p>Profiles:</p> <ul style="list-style-type: none"> A2DP Source BLE Host <p>Hardware:</p> <ul style="list-style-type: none"> Qualcomm QCA-9377 for i.MX 7ULP EVK-SD <p>Profiles:</p> <ul style="list-style-type: none"> A2DP Source AVRCP BLE Host HSP HID Host HID Device PAN OPP
Connectivity - Wi-Fi	Y	N	Y	Y	Y	<p>Hardware:</p> <ul style="list-style-type: none"> Broadcom BCM4339 for i.MX 6QuadPlus/6Quad/6DualLite SABRE-SD, i.MX6 SoloX SABRE-SD, and i.MX 7Dual SABRE-SD Broadcom BCM43430 for i.MX 7ULP EVKB-SD <p>Features:</p> <ul style="list-style-type: none"> AP mode STA mode Wi-Fi Direct <p>Hardware:</p>

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Table 2. Features (continued)

Feature	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-SD	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-AI	i.MX 6SoloX SABRE-SD	i.MX 7Dual SABRE-SD	i.MX 7ULP EVKB/EVK	Remarks
						<ul style="list-style-type: none"> Quacommm QCA-9377 for i.MX 7ULP EVK-SD Features: <ul style="list-style-type: none"> STA mode AP mode Wi-Fi Direct AP/STA
Connectivity - USB Tethering	Y	Y	Y	Y	Y	Supports Wi-Fi or Ethernet as upstream
Power - CPU Freq	Y	Y	Y	Y	Y	-
Power - Bus Freq	Y	Y	Y	Y	Y	-
Media - Music Play	Y	Y	Y	Y	Y	SSI WM8962 for SABRE-SD, ESAI CS42888 for SABRE-AI
Media - Sound Record	Y	Y	Y	Y	Y	SSI WM8962 for SABRE-SD, ESAI CS42888 for SABRE-AI
Media - Video Play	Y	Y	Y	Y	Y	-
Media - Camera	Y	Y	Y	N	N	<ul style="list-style-type: none"> For i.MX 6QuadPlus/6Quad/6DualLite SABRE-SD: <ul style="list-style-type: none"> Front Camera: OV5642/OV5640 CSI camera Rear Camera: OV5640 MIPI camera For i.MX 6QuadPlus/6Quad/DualLite SABRE-AI: <ul style="list-style-type: none"> Front Camera: UVC camera Rear Camera: TV IN For i.MX 6SoloX SABRE-SD: <ul style="list-style-type: none"> Front Camera: UVC camera Rear Camera: OV5640 CSI camera
Media - TVIN	N	Y	N	N	N	PAL/NTSC
Media - Dual Camera	Y	Y	N	N	N	-

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Table 2. Features (continued)

Feature	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-SD	i.MX 6Quad/ 6QuadPlus/ 6DualLite SABRE-AI	i.MX 6SoloX SABRE-SD	i.MX 7Dual SABRE-SD	i.MX 7ULP EVKB/EVK	Remarks
Media - Camcorder	Y	Y	Y	N	Y	No recorder function for Rear Camera on SABRE-AI.
Media - USB Camera	Y	Y	Y	N	Y	Logitech: <ul style="list-style-type: none"> • C920 • C525 • C270 Camera panorama is not supported on the i.MX 6SoloLite EVK and i.MX 6SoloX SABRE-SD board.
Media - USB Mic	Y	Y	Y	Y	Y	-
Media - HDMI audio output	Y	Y	N	Y	N	-
Misc - ADB over USB	Y	Y	Y	Y	Y	-
Misc - Fastboot utility	Y	Y	Y	Y	Y	-
Misc - SW update and factory reset	Y	Y	Y	Y	N	-
Sensor - Magnetometer	Y	N	Y	Y	N	MAG3110 for i.MX 6, FXAS8700 for i.MX 7Dual
Sensor - Accelerometer	Y	Y	Y	Y	N	MMA8451Q for i.MX 6, FXOS8700 for i.MX 7Dual
Sensor - Gyroscope	N	N	N	Y	N	FXAS2100
Sensor - Light	Y	Y	Y	N	N	Intersil ISL29023
Sensor - Pressure	N	N	N	N	N	-
Sensor - Temperature	N	N	N	N	N	-
Sensor-step detector	N	N	N	N	Y	-
Sensor-step counter	N	N	N	N	Y	-
Data Partition Encryption	Y	Y	Y	Y	Y	-
USB Accessory	Y	Y	Y	Y	Y	Google AOA v2.0
Screen Recording	Y	Y	N	N	N	-
Ethernet APK	Y	Y	Y	Y	N	-
webGL	Y	Y	Y	N	Y	-

5 Multimedia Codecs

For multimedia codecs and features, see Section 5 in the Google Pie 9.0 Compatibility Definition Document (CDD). The document can be found on the website [Android Open Source Project](#).

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 detailed extended and additional features, see *i.MX Android Extended Codec Release Notes* (IMXACRN).

For more information and details, contact "L2manager-android@nxp.com".

7 Change Log

Compared to the O8.0.0_1.0.0 release, this release has the following major changes:

- Upgraded the Android code base from android-8.0.0_r25 to android-9.0.0_r35.
- Upgraded the kernel from 4.9.11 to 4.14.98.
- Upgraded U-Boot from v2017.03 to v2018.03.
- Upgraded the GPU driver from 6.2.2 to 6.2.4.

8 Known Issues and Limitations

The known issues about the hardware and hardware rework instructions are not included in this document. Read all hardware-related reference material and ensure the necessary hardware modifications have been made before using the software.

Table 3. Known issues and limitations

Issue description	Remarks
Huawei® EM770W 3G modem with the China Mobile SIM card consumes too much power, which flashes the LVDS screen.	-
UI is Landscape while camera preview is portrait on the SABRE-SDP board.	It is a SABRE-SDP board issue. For details, see the <i>i.MX Android Camera issue on SDP board</i> (ACOI).
PCIe does not support hot plug and power management.	<ul style="list-style-type: none"> • PCIe Intel Wi-Fi source code has been integrated into this release. • However, PCIe is not enabled by default, because power management is not supported. • See https://community.nxp.com/docs/DOC-94045 for the instructions to enable PCIe Wi-Fi.
The L/R channel is swapped in the SABRE-AI board.	It is a hardware issue. Connect the red line to white port, white line to red port.

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Table 3. Known issues and limitations (continued)

Issue description	Remarks
The 3G modem cannot work if Bluetooth is enabled in bootargs of bootloader.	The IO pin KEY_COL4 is either used by UART5 as UART RTS pin or by 3G modem as DISABLE pin.
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.
There is an external storage setting on the i.MX 6 DualQuad SABRE-SD board.	The system will take the boot SD storage as the external storage. EMMC and SD cards use the same fstab.freescale. Users can delete the external storage in fstab.freescale when choosing the SD card as boot storage.
The CTS test blocks when the size of the boot storage (8 GB) is insufficient.	<ul style="list-style-type: none"> The CTS test downloads the media package into the device when running CTS. The size of the media package (android-cts-media-1.4) is about 4 GB. Users can use a larger SD card (16 GB or 32 GB) or skip copying the media package (<code>--skip-preconditions</code>) to run the CTS test.
U-Boot hangs when erasing the Kingston's SD card.	U-Boot hangs when sending the erase command on some Kingston SD cards.

9 Revision History

Table 4. Revision history

Revision number	Date	Substantive changes
O8.0.0_1.0.0	02/2018	Initial release
O8.0.0_1.0.0	10/2018	Updated the Graphic - HW 3D acceleration feature for the i.MX 7Dual to N/A.
P9.0.0_2.2.0-ga	07/2019	i.MX 6 and i.MX 7 GA release.
P9.0.0_2.2.0-ga	08/2019	Added information for i.MX 7ULP EVK.

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