

Android™ Release Notes

1 Release Description

The i.MX Android™ 08.1.0_2.0.0-AUTO-beta release is an Android Automotive Beta (PRC) release on NXP's i.MX 8QuadXPlus/8QuadMax MEK board and platform, which is based on Oreo 8.1. It supports the device type In-vehicle infotainment defined in <https://source.android.com/devices/automotive/>.

i.MX Android 08.1.0_2.0.0-AUTO-beta release includes all necessary code, documents, and tools to assist users in building and running Android Automotive on the i.MX 8QuadXPlus/8QuadMax MEK board from scratch. Pre-built images are also included for a quick trial on the following platforms:

- i.MX 8QuadXPlus/8QuadMax MEK Board and Platform

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.

Contents

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



2 Supported Hardware SoC/Boards

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

- i.MX 8QuadXPlus/8QuadMax MEK Board and Platform

3 Release Package Contents

The O8.1.0_2.0.0-AUTO-beta 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"> • imx-o8.1.0_2.0.0-auto-beta.tar.gz: i.MX Android Automotive proprietary source code package to enable Android Automotive on i.MX boards. For example, Hardware Abstraction Layer implementation, hardware codec acceleration, etc.
Documents	<p>The following documents are included in android_o8.1.0_2.0.0-auto-beta_docs.zip:</p> <ul style="list-style-type: none"> • <i>Android™ Quick Start Guide</i> (AQSUG): A document that explains how to run Android Automotive 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>Android™ Frequently Asked Questions</i> (FAQ): A document that contains the answers to the Frequently Asked Questions (FAQs). • <i>i.MX Graphics User's Guide</i> (IMXGRAPHICUG): A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.
Tools	<p>Tools in android_o8.1.0_2.0.0-auto-beta_tools.tar.gz</p> <ul style="list-style-type: none"> • VivanteVTK-6.2.4.p2.1.7.6.tgz: GPU tools for VeriSilicon GPU 6.2.4.p2 driver. For more information about these tools, see <i>i.MX Graphics User's Guide</i> (IMXGRAPHICUG). • fastboot_imx_flashall.sh: A script for Linux system. It invokes the fastboot tool to automatically flash Android images. • fastboot_imx_flashall.bat: A batch file for Windows system. It invokes the fastboot tool to automatically flash Android images. • uuu_imx_android_flash.sh: A script for Linux system. It invokes UUU and fastboot tool to automatically flash Android images. • uuu_imx_android_flash.bat: A batch file for Windows system. It invokes UUU and fastboot tool to automatically flash Android images.
Prebuilt images	<p>You can test Android Automotive with a prebuilt image on i.MX reference board before building any code:</p> <ul style="list-style-type: none"> • android_o8.1.0_2.0.0-auto-beta_image_8qmek.tar.gz: Prebuilt-image and UUU script files for i.MX 8QuadXPlus/8QuadMax MEK board with EVS function enabled in the Arm Cortex-M4 CPU core, which includes NXP extended features. • android_o8.1.0_2.0.0-auto-beta_image_8qmek2.tar.gz: Prebuilt-image and UUU script files for i.MX 8QuadMax/8QuadXPlus MEK board without EVS function enabled in the Arm Cortex-M4 CPU core, which includes NXP extended features. <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>

4 Features

This section contains features in this package.

Table 2. Features

Feature	i.MX 8QuadXPlus/ 8QuadMax MEK	Remarks
Google Oreo 8.1 release	Y	Based on android-8.1.0_r51 release.
Linux 4.14.78 kernel (merged with the AOSP kernel)	Y	Based on Linux® OS BSP L4.14.78-1.0.0_ga release.
U-Boot	Y	v2018.03.
Graphics-HW	Y	VeriSilicon GC7000L GPU for i.MX 8QuadXPlus, GC7000XSVX GPU for i.MX 8QuadMax with 6.2.4.p2 driver.
Graphics-HW 3D acceleration	Y	OpenGL ES 1.1/2.0/3.1 through GC7000L for i.MX 8QuadXPlus, OpenGL ES 1.1/2.0/3.1/3.2 through GC7000XSVX for i.MX 8QuadMax.
Graphics-HW accelerated UI surface composition	Y	OpenGL ES 3.1 through GC7000L for i.MX 8QuadXPlus, OpenGL ES 3.2 through GC7000XSVX for i.MX 8QuadMax.
Boot source	eMMC	-
Splash Screen	Y	Supports USB mouse.
UI (input)	Y	-
UI (display)	HDMI display	Supports LVDS-to-HDMI display.
UI (brightness control)	N	-
Storage - External Media	Y	-
Connectivity - Ethernet	N	-
Connectivity - Bluetooth® wireless technology	Y	Qualcomm 1CQ QCA6174A. Profiles: A2DP Sink, AVRCP, BLE Host, HFP, PBAPClient, MAPMCE, PAN, HID Device.
Connectivity - Wi-Fi	Y	Qualcomm 1CQ QCA6174A. Features: STA mode, AP mode, Wi-Fi Direct, AP/STA Concurrency.
Connectivity - USB Tethering	Y	Supports Wi-Fi as upstream.
Power - CPU Freq	Y	-
Power - Bus Freq	Y	-
Media - Music Play	Y	ESAI+CS42888 (no support for multichannel).
Media - HDMI audio output	N	-
Misc - ADB over USB	Y	-
Misc - Fastboot utility	Y	-
Misc - SW update and factory reset	Y	-
File-based Encryption	Y	-
Ethernet APK	N	-

Table continues on the next page...

Table 2. Features (continued)

Feature	i.MX 8QuadXPlus/ 8QuadMax MEK	Remarks
webGL	Y	-
USB TYPEC PD	Y	-
OTA for A/B	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, the RPMB part needs to be initialized manually.
Media rearview camera	Y	MAX9286 camera.

5 Multimedia Codecs

For multimedia codecs and features, see Section 5 in the [Google Oreo 8.1 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 and details, contact "L2manager-android@nxp.com"

7 Change Log

Compared to the O8.1.0_1.1.0_AUTO-beta release, this release has the following major changes:

- Upgraded the Android code base from android-8.1.0_r1 to android-8.1.0_r51.
- Upgraded the kernel from 4.9.69 to 4.14.78.
- Upgraded U-Boot from v2017.03 to v2018.03.
- Added rearview camera support.
- Added Trusty OS(TEE) backed security services, such as secure storage and keymaster support.
- Shortened Android Automotive boot time to 14.45s for i.MX 8QuadMax MEK and 18.85s for i.MX 8QuadXPlus MEK.
- Added Android Automotive image without EVS function in the Cortex-M4 CPU Core.
- Added support to specify the AVB key and manage the public key with the trusty backed secure storage (RPMB).

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
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.
The display is sometimes black on both i.MX 8QuadMax MEK and i.MX 8QuadXPlus MEK boards.	<ul style="list-style-type: none"> The display is sometime black without any abnormal log or with the following log on both the i.MX 8QuadMax and i.MX 8QuadXPlus MEK board. <pre>imx-dpu-crtc imx-dpu-crtc.4: flush - wait for content shld done timeout.</pre> <ul style="list-style-type: none"> It is caused by the hardware PMIC issue on both the i.MX 8QuadMax and i.MX 8QuadXPlus board. The workaround is as follows: Disable selinux and switch to root user by <code>su</code>. <pre>echo performance > /sys/devices/system/cpu/cpufreq/policy4/scaling_governor.</pre>
The resolution of the screen recorded video is different from the one specified by the recording command, and the color of the video is different from the screen color.	Android platform needs RGBA format output, but the V4L2 framework does not support this format. To support RGBA format output in the mem2mem driver, the V4L2 format needs to be extended.
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 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"> 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). <p>For more information, see https://community.nxp.com/docs/DOC-342285.</p>

9 Revision History

Table 4. Revision history

Revision number	Date	Substantive changes
O8.1.0_1.1.0_AUTO-EAR	02/2018	Initial release
O8.1.0_1.1.0_AUTO-beta	05/2018	i.MX 8QuadXPlus/8QuadMax Beta release
O8.1.0_2.0.0-AUTO-beta	01/2019	i.MX 8QuadXPlus/8QuadMax Beta 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.

NXP, the NXP logo, NXP SECURE CONNECTIONS FOR A SMARTER WORLD, COOLFLUX, EMBRACE, GREENCHIP, HITAG, I2C BUS, ICODE, JCOP, LIFE VIBES, MIFARE, MIFARE CLASSIC, MIFARE DESFire, MIFARE PLUS, MIFARE FLEX, MANTIS, MIFARE ULTRALIGHT, MIFARE4MOBILE, MIGLO, NTAG, ROADLINK, SMARTLX, SMARTMX, STARPLUG, TOPFET, TRENCHMOS, UCODE, Freescale, the Freescale logo, AltiVec, C-5, CodeTEST, CodeWarrior, ColdFire, ColdFire+, C-Ware, the Energy Efficient Solutions logo, Kinetis, Layerscape, MagniV, mobileGT, PEG, PowerQUICC, Processor Expert, QorIQ, QorIQ Qonverge, Ready Play, SafeAssure, the SafeAssure logo, StarCore, Symphony, VortiQa, Vybrid, Airfast, BeeKit, BeeStack, CoreNet, Flexis, MXC, Platform in a Package, QUICC Engine, SMARTMOS, Tower, TurboLink, and UMEMS are trademarks of NXP B.V. All other product or service names are the property of their respective owners. AMBA, Arm, Arm7, Arm7TDMI, Arm9, Arm11, Artisan, big.LITTLE, Cordio, CoreLink, CoreSight, Cortex, DesignStart, DynamIQ, Jazelle, Keil, Mali, Mbed, Mbed Enabled, NEON, POP, RealView, SecurCore, Socrates, Thumb, TrustZone, ULINK, ULINK2, ULINK-ME, ULINK-PLUS, ULINKpro, μ Vision, Versatile are trademarks or registered trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. The related technology may be protected by any or all of patents, copyrights, designs and trade secrets. All rights reserved. Oracle and Java are registered trademarks of Oracle and/or its affiliates. The Power Architecture and Power.org word marks and the Power and Power.org logos and related marks are trademarks and service marks licensed by Power.org.

© 2019 NXP B.V.

