

# ARN

## Android Release Notes

Rev. automotive-12.0.0\_2.1.0 —  
1 September 2022

Release notes

### Document information

Information	Content
Keywords	Android, i.MX, automotive-12.0.0_2.1.0
Abstract	The i.MX Android automotive-12.0.0_1.1.0 release is an Android Automotive GA (RFP) release on NXP's i.MX 8QuadXPlus/8QuadMax MEK board and platform, which is based on Android 12.



## 1 Release Description

The i.MX Android automotive-12.0.0\_2.1.0 release is an Android Automotive GA (RFP) release on NXP's i.MX 8QuadXPlus/8QuadMax MEK board and platform, which is based on Android 12. It supports the device type In-vehicle infotainment defined in <https://source.android.com/devices/automotive/>.

i.MX Android automotive-12.0.0\_2.1.0 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.

## 2 Supported Hardware SoC/Boards

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

- i.MX 8QuadMax (Silicon Revision B0) MEK Board and Platform
- i.MX 8QuadXPlus (Silicon Revision B0, C0) MEK Board and Platform

## 3 Release Package Contents

The `automotive-12.0.0_2.1.0` 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>• <code>imx-automotive-12.0.0_2.1.0.tar.gz</code>: i.MX Android Automotive proprietary source code package to enable Android Automotive on i.MX boards. For example, Hardware Abstraction Layer implementation, and hardware codec acceleration.</li> </ul>
Documents	<p>The following documents are included in <code>android_automotive-12.0.0_2.1.0_docs.zip</code>:</p> <ul style="list-style-type: none"> <li>• <i>Android Quick Start Guide (AQSUG)</i>: A document that explains how to run Android Automotive 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 Extended Codec Release Notes (IMXACRN)</i>: A document that provides the extended codec information.</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 TensorFlow Lite on Android User's Guide (IMXTFLUG)</i>: A document that describes the TensorFlow Lite on Android platform.</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>

**Table 1. Release package contents...continued**

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"> <li>• <code>automotive-12.0.0_2.1.0_image_8qmek_car.tar.gz</code>: Prebuilt images with NXP extended features with the EVS function enabled in the Cortex-M4 CPU core for the i.MX 8QuadMax/8QuadXPlus MEK board. The extended features include more multimedia format support.</li> <li>• <code>automotive-12.0.0_2.1.0_image_8qmek_car2.tar.gz</code>: Prebuilt images with NXP extended features without EVS function enabled in the Cortex-M4 CPU core for the i.MX 8QuadMax/8QuadXPlus MEK board.</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>
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## 4 Features

This section describes features in this package.

**Table 2. Features**

Feature	i.MX 8QuadXPlus/8QuadMax MEK	Remarks
Google Android 12 release	Y	Based on android-12.0.0_r28 release.
Linux 5.15.41 kernel (merged with the AOSP kernel)	Y	Based on Linux OS BSP L5.15.32 GA release.
U-Boot	Y	v2022.04
Trusty OS	Y	-
Graphics-HW	Y	VeriSilicon GC7000L GPU for i.MX 8QuadXPlus, GC7000XSVX GPU for i.MX 8QuadMax with 6.4.3.p4 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.
SCFW	Y	Version 1.13.0
SECO firmware	Y	Version 3.8.5 for i.MX 8QuadMax B0 and i.MX 8QuadXPlus B0, Version 3.8.6 for i.MX 8QuadXPlus C0.
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	-

Table 2. Features...continued

Feature	i.MX 8QuadXPlus/ 8QuadMax MEK	Remarks
Storage - External Media	Y	-
Connectivity - Ethernet	Y	Atheros AR8031
Connectivity - Bluetooth wireless technology	Y	NXP 88W8997. Profiles: A2DP Sink, AVRCP, BLE Host, HFP, PBAPClient, MAPMCE, PAN, MAPMCE, PAN, HID Device.
Connectivity - Wi-Fi	Y	NXP 88W8997. Features: STA mode, AP mode, AP/STA Concurrency.
Connectivity - USB Tethering	Y	Supports Wi-Fi as upstream.
Power - CPU Freq	Y	-
Power - Bus Freq	Y	-
Media - Music Play	Y	SAI+WM8960 (for system sounds) ESAI+CS42888 (no support for multichannel). SOF+ESAI+CS42888 (with special dtbo image)
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	-
webGL	Y	-
Vulkan	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.
Car Audio Policy	Y	Alarm, notification, and system sounds are played from the audio jack on the CPU board. Other sounds such as music are played from the extended audio board.

## 5 Multimedia Codecs

For multimedia codecs and features, see the *i.MX Android Extended Codec Release Notes* (IMXACRN).

## 6 Change Log

Compared to the automotive-12.0.0\_1.1.0 release, android-12.0.0\_2.1.0 has the following major changes:

- Upgraded the Android code base from android-12.0.0\_r26 to android-12.0.0\_r28.
- Added support of Sound Open Firmware (SOF) running on DSP. With SOF enabled, multimedia playback is managed by DSP.
- Fixed crash of Local Media Player in case when Genres menu is accessed by users.
- Changed audio playback period size from 768 to 384 samples to pass Android CTS media tests.
- Fixed U-Boot Makefile to not use hardcoded CMake path.
- NCM USB gadget is used instead of RNDIS for USB Ethernet tethering.

## 7 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 materials 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.
For i.MX 8QuadXPlus silicon revision B0 chip, it fails to boot from some types of eMMC.	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. There are two possible solutions: <ul style="list-style-type: none"> <li>• Download <code>flash.bin</code> in the eMMC Boot Partition + 0KB offset + eMMC fastboot enabled in fuse.</li> <li>• Download <code>flash.bin</code> in the eMMC User Partition + 32KB offset (eMMC fastboot can be either enabled or disabled in fuse).</li> </ul> For more information, see <a href="https://community.nxp.com/docs/DOC-342877">https://community.nxp.com/docs/DOC-342877</a> .
The “carwatchdogd” service can cause shutdown of the application, which requires more system time.	This is a feature of Android automotive OS.

**Table 3. Known issues and limitations...continued**

Issue description	Remarks
Support of surround view application ( <code>sv_app</code> ) is experimental only and not fully tested.	Surround view application will be improved in a future release.
The board stays offline (no ADB or fastboot connection) during reboot stress test. The issue is reproducible after 1028 iteration (around 18 hours).	This issue will be fixed in next release.
Camera freezes in 10 minutes.	This issue will be fixed in next release.

## 8 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
P9.0.0_1.0.2-AUTO-alpha	11/2018	i.MX 8QuadXPlus/8QuadMax Automotive Alpha release
P9.0.0_1.0.2-AUTO-beta	01/2019	i.MX 8QuadXPlus/8QuadMax Automotive Beta release
P9.0.0_2.1.0-AUTO-ga	04/2019	i.MX 8QuadXPlus/8QuadMax Automotive GA release
P9.0.0_2.1.0-AUTO-ga	08/2019	Updated the location of the SCFW porting kit
automotive-10.0.0_1.1.0	03/2020	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0) GA release
android-10.0.0_2.2.0-AUTO	06/2020	i.MX 8QuadXPlus/8QuadMax MEK GA release
android-10.0.0_2.4.0	07/2020	i.MX 8QuadMax MEK GA release
android-11.0.0_1.1.0-AUTO	01/2021	i.MX 8QuadXPlus/8QuadMax MEK GA release
automotive-11.0.0_2.1.0	11/2021	Integrated the android-11.0.0_r36 version and upgraded the kernel to v5.10.35
automotive-11.0.0_2.3.0	12/2021	Integrated the android-11.0.0_r40 version and upgraded the kernel to v5.10.52
automotive-11.0.0_2.5.0	03/2022	Integrated the android-11.0.0_r46 version and upgraded the kernel to v5.10.72
automotive-12.0.0_1.1.0	06/2022	Integrated the android-12.0.0_r26 version
automotive-12.0.0_2.1.0	09/2022	Integrated the android-12.0.0_r28 version and upgraded the kernel to v5.15.41

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