

AARN_14.0.0_1.1.0

Android Automotive Release Notes

Rev. automotive-14.0.0_1.1.0 — 20 June 2024

Release notes

Document information

Information	Content
Keywords	Android, i.MX, Automotive, automotive-14.0.0_1.1.0
Abstract	The i.MX Android automotive-14.0.0_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 13.



1 Release Description

The i.MX Android automotive-14.0.0_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 14. It supports the device type In-vehicle infotainment defined in <https://source.android.com/devices/automotive/>.

i.MX Android automotive-14.0.0_1.1.0 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-14.0.0_1.1.0 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">• <code>imx-automotive-14.0.0_1.1.0.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.
Documents	<p>The following documents are included in <code>android_automotive-14.0.0_1.1.0_docs.zip</code>:</p> <ul style="list-style-type: none">• <i>Android Quick Start Guide (AQSUG)</i>: A document that explains how to run Android Automotive on an i.MX board using prebuilt images.• <i>Android User's Guide (AUG)</i>: A document describing procedures for configuring and building this release package.• <i>Android Release Notes (ARN)</i>: A document that introduces key updates and known issues in this release.• <i>i.MX Android Extended Codec Release Notes (IMXACRN)</i>: A document that provides the extended codec information.• <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.• <i>i.MX TensorFlow Lite on Android User's Guide (IMXTFLUG)</i>: A document that describes the TensorFlow Lite on Android platform.• <i>i.MX Graphics User's Guide (IMXGRAPHICUG)</i>: A document that describes graphics APIs, Tools, Memory, and Application programming guidelines.
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">• <code>automotive-14.0.0_1.1.0_image_8qmek_car.tar.gz</code>: Prebuilt-image for i.MX 8QuadXPlus/8QuadMax MEK board with Exterior View System (EVS) function enabled in the ARM Cortex-M4 CPU core during Android OS

Table 1. Release package contents...continued

	<p>boot process when EVS function is switched to Cortex-A CPU core, which includes NXP extended features.</p> <ul style="list-style-type: none">• <code>automotive-14.0.0_1.1.0_image_8qmek_car2.tar.gz</code>: Prebuilt-image for i.MX 8QuadMax/8QuadXPlus MEK board with EVS function enabled in the Arm Cortex-A CPU core only (EVS function is available after start Android OS from Cortex-A 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>
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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 14 release	Y	Based on android-14.0.0_r17 release.
Linux 6.1.55 kernel (merged with the AOSP kernel)	Y	Based on Linux OS BSP LF6.1.55_2.2.0 release.
Generic Kernel Image (6.1.43)	Y	Based on AOSP android14-6.1-2023-11_r1.
U-Boot	Y	v2023.04
Trusty OS	Y	-
Graphics-HW	Y	VeriSilicon GC7000L GPU for i.MX 8QuadXPlus, GC7000 XSVX GPU for i.MX 8QuadMax with 6.4.11.p2.745085 driver
Graphics-HW 3D acceleration	Y	OpenGL ES 1.1/2.0/3.1 through GC7000L for i.MX 8Quad XPlus, 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 1.15.0
SECO firmware	Y	Version 3.8.5 for i.MX 8QuadMax B0, i.MX 8QuadXPlus B0, and 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	-
Storage - External Media	Y	-
Connectivity - Ethernet	Y	Atheros AR8031
Connectivity - Bluetooth wireless technology	Y	PCIE9098 (Murata LBEE5ZZ1XL). Profiles: A2DP Sink, AVRCP, BLE Host, HFP, PBAPClient, MAPMCE, PAN, MAPMCE, PAN, HID Device.
Connectivity - Wi-Fi	Y	PCIE9098 (Murata LBEE5ZZ1XL). Features: STA mode, AP mode, AP/STA Concurrency.

Table 2. Features...continued

Feature	i.MX 8QuadXPlus/ 8QuadMax MEK	Remarks
Connectivity - USB Tethering	Y	Supports Wi-Fi as upstream.
Power - CPU Freq	Y	-
Power - Bus Freq	Y	-
Media - Music Play	Y	SAI+WM8960 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	All sounds are played from the audio jack on the CPU board. Rear zone audio is played to an extended audio board (CS42888 codec). Rear zone audio is an optional audio path.

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-13.0.0_2.3.0 release, automotive-14.0.0_1.1.0 has the following major changes:

- Upgraded the Android code base from android-13.0.0_r69 to android-14.0.0_r17.
- Upgraded the VeriSilicon GPU driver from 6.4.11.p1 to 6.4.11.p2.
- The NeuralNetworks HAL switches to use AIDL interfaces based on VSI opensource TIM-VX.
- The Allocator HAL switches to use AIDL interfaces.
- The Hardware Composer HAL switches to use AIDL interfaces.
- The Thermal HAL switches to use AIDL interfaces.
- The USB HAL and USB Gadget HAL switch to use AIDL interfaces.
- The onboard Camera HAL and external Camera HAL switch to use AIDL interfaces.

- The EVS HAL switches to use AIDL interfaces.
- The Vehicle HAL switches to use AIDL interfaces.
- Enables Widevine L1 on i.MX 8QuadMax MEK.

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
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">• Download <code>flash.bin</code> in the eMMC Boot Partition + 0KB offset + eMMC fastboot enabled in fuse.• Download <code>flash.bin</code> 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-342877 .
The camera might freeze if only one camera is connected to the MAX9286 board.	This issue will be fixed in future release.
Sound Open Firmware (SOF) is not working with i.MX8QuadXPlus.	This issue is related to the image flashed using the <code>-d sof</code> option (<code>dtbo-imx8qxp-sof.img</code>). When the SOF dtbo image is used, media audio is routed to i.MX 8QuadXPlus DSP (running SOF) but the SOF is crashing during boot (DSP crash observed in kernel log). This affects media audio, in which case CS42888 codec audio is not working.
Kernel panic when copying file through MTP (file transfer mode) with disabled ADB.	The file is not copied to the target. The copy operation freezes. The issue is caused by "ERR050149: USB3: TRB OUT endpoints transfer blockage and performance delays".
Dual Hotspots cannot be used simultaneously with Wi-Fi station.	Simultaneous usage of dual hotspots (AP+AP concurrency) with Wi-Fi station (board connected to the external network) is not supported (= STA+AP+AP concurrency is not supported).
Boot animation is not available when starting the Car image type.	Boot animation is terminated earlier during starting the <code>init</code> process.
Multi-display configuration shows nothing on the unused displays.	When using multi-display configuration, the unused displays are black. Additional tasks can still be launched on them.
No sound can be heard from CS42888 codec.	On the first boot after installation or after creating and switching to a new driver profile, no sound can be heard from CS42888.
EVS functionality degraded on the Car2 image.	Camera output is available after starting the surface flinger.
Screen recording from the front camera is not available.	ISI.0 channel resource conflict. ISI.0 channel is using the front camera and VPU encoder at the same time.
Changing the HVAC-Auto button value to OFF with the <code>report</code> or <code>echo</code> command does not work by default after boot.	The Auto button has to be interacted on the HVAC UI at least once. Then, the <code>report</code> or <code>echo</code> command works. This issue will be fixed in future release.

Table 3. Known issues and limitations...continued

Issue description	Remarks
Power consumption increases when running the EVS application.	The current EVS AIDL HAL implementation contains two buffer types, camera and display. EVS AIDL copies bitmaps between the two buffers by CPU. This issue will be fixed in future release.

8 Revision History

This table provides the revision history.

Table 4. Revision history

Document ID	Release date	Description
AARN_14.0.0_1.1.0	20 June 2024	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-13.0.0_2.3.0	4 January 2024	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-13.0.0_2.1.0	10/2023	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-13.0.0_1.3.0	07/2023	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-13.0.0_1.1.0	05/2023	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-12.1.0_1.1.0	12/2022	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-12.0.0_2.1.0	09/2022	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-12.0.0_1.1.0	06/2022	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-11.0.0_2.5.0	03/2022	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-11.0.0_2.3.0	12/2021	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0, C0) GA release
automotive-11.0.0_2.1.0	11/2021	Added the examples for i.MX 8QuadXPlus and upgraded the tool version
android-11.0.0_1.1.0-AUTO	01/2021	i.MX 8QuadXPlus/8QuadMax MEK GA release
android-10.0.0_2.4.0	07/2020	i.MX 8QuadMax MEK GA release
android-10.0.0_2.2.0-AUTO	06/2020	i.MX 8QuadXPlus/8QuadMax MEK GA release
automotive-10.0.0_1.1.0	03/2020	i.MX 8QuadXPlus/8QuadMax MEK (Silicon Revision B0) GA release
P9.0.0_2.1.0-AUTO-ga	08/2019	Updated the location of the SCFW porting kit
P9.0.0_2.1.0-AUTO-ga	04/2019	i.MX 8QuadXPlus/8QuadMax Automotive GA release
P9.0.0_1.0.2-AUTO-beta	01/2019	i.MX 8QuadXPlus/8QuadMax Automotive Beta release
P9.0.0_1.0.2-AUTO-alpha	11/2018	i.MX 8QuadXPlus/8QuadMax Automotive Alpha release
O8.1.0_1.1.0_AUTO-beta	05/2018	i.MX 8QuadXPlus/8QuadMax Beta release
O8.1.0_1.1.0_AUTO-EAR	02/2018	Initial release

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