

# Android™ Release Notes

## 1 Release Description

The i.MX Android™ L5.0.0\_1.0.0-ga is a GA release for Android 5.0 Lollipop (L) on Freescale's i.MX 6Quad, i.MX 6Dual, i.MX 6DualLite, i.MX 6Solo, i.MX 6SoloLite, and i.MX 6SoloX applications processors.

The i.MX Android L5.0.0\_1.0.0-ga release includes all necessary codes, documents and tools to assist users in building and running Android 5.0 on the i.MX 6Quad, i.MX 6DualLite, i.MX 6Solo, i.MX 6SoloLite, and i.MX 6SoloX hardware boards from scratch. The pre-built images are also included for a quick trial on Freescale i.MX 6Quad and i.MX 6DualLite SABRE-SD board and platform, i.MX 6Quad and i.MX 6DualLite SABRE-AI board and platform, i.MX 6SoloLite EVK platform, i.MX 6SoloX SABRE-SD board and platforms, and i.MX 6SoloX SABRE-AI board and platforms. This release includes all Freescale porting and enhancements based on 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

- i.MX 6Quad SABRE-SD board and platform

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## Release Package Contents

- Full validation test on full image
- i.MX 6DualLite SABRE-SD platform
  - Function validation test on full image
- i.MX 6Quad SABRE-AI board and platform
  - Function validation test on full image
- i.MX 6DualLite SABRE-AI board and platform
  - Function validation test on full image
- i.MX 6SoloLite EVK platform
  - Full validation test on full image
- i.MX 6SoloX SABRE-SD board
  - Full validation test on full image
- i.MX 6SoloX SABRE-AI board and platform
  - Full validation test on full image

### 3 Release Package Contents

The L5.0.0\_1.0.0-ga release package includes the following software and documents:

Android source code patch	<ul style="list-style-type: none"><li>• android_L5.0.0_1.0.0-ga_core_source.tar.gz: Freescale i.MX-specific patches (apply to Google Android repo) to enable the Android platform on i.MX-based boards. For example, Hardware Abstraction Layer implementation, hardware codec acceleration, etc.</li></ul>
Documents	<p>The following documents are included in android_L5.0.0_1.0.0-ga_docs.tar.gz</p> <ul style="list-style-type: none"><li>• <i>Android™ Quick Start Guide (AQSUG)</i>: A manual 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 detailed manual for this release package.</li><li>• <i>Android™ Frequently Asked Questions (AFAQ)</i>: A document that contains Frequently Asked Questions (FAQs).</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 6 Graphic User's Guide (IMX6GRAPHICUG)</i>: A document that describes GPU 2D API, Tools, Memory, and Application programming guidelines.</li></ul>
Tools	<p>Tools in android_L5.0.0_1.0.0-ga_tools.tar.gz</p> <ul style="list-style-type: none"><li>• MFGTool: Manufacturing tools for i.MX platform.</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_L5.0.0_1.0.0-ga_core_image_6qsabresd.tar.gz: Prebuilt images with default Android features for the SABRE-SD board.</li><li>• android_L5.0.0_1.0.0-ga_core_image_6qsabreauto.tar.gz: Prebuilt images with default Android features for the SABRE-AI board.</li><li>• android_L5.0.0_1.0.0-ga_core_image_6slevk.tar.gz: Prebuilt images with default Android features for the 6SoloLite EVK platform.</li><li>• android_L5.0.0_1.0.0-ga_core_image_6sxsabresd: Prebuilt images with default Android features for the i.MX 6SoloX SABRE-SD board.</li></ul>

- android\_L5.0.0\_1.0.0-ga\_core\_image\_6xsabreauto: Prebuilt images with default Android features for the i.MX 6SoloX SABRE-AI board.
- android\_L5.0.0\_1.0.0-ga\_full\_image\_6qsabresd.tar.gz: Prebuilt images with Freescale Extended Multimedia features for the SABRE-SD board. For more information about the Freescale Extended Multimedia Feature Package, see Section 6.
- android\_L5.0.0\_1.0.0-ga\_full\_image\_6qsabreauto.tar.gz: Prebuilt images with Freescale Extended Multimedia features for the SABRE-AI board. For more information about the Freescale Extended Multimedia Feature Package, see Section 6.
- android\_L5.0.0\_1.0.0-ga\_full\_image\_6slevk.tar.gz: Prebuilt images with Freescale extended features for the i.MX 6SoloLite EVK board. The extended features include more multimedia format support.
- android\_L5.0.0\_1.0.0-ga\_full\_image\_6xsabresd.tar.gz: Prebuilt images with Freescale extended features for the i.MX 6SoloX SABRE-SD board. The extended features include more multimedia format support.
- android\_L5.0.0\_1.0.0-ga\_full\_image\_6xsabreauto.tar.gz: Prebuilt images with Freescale extended features for the i.MX 6SoloX SABRE-AI board. The extended features include more multimedia format support.

All prebuilt images are in a separate package. See the *Android™ Quick Start Guide* (AQSUG) and *Android™ User's Guide* (AUG) to understand which image should be used.

## 4 Features

Feature	i.MX 6Quad/ 6DualLite SABRE-SD	i.MX 6Quad/ 6DualLite SABRE-AI	i.MX 6SoloLite EVK	i.MX 6SoloX SABRE- SD	i.MX 6SoloX SABRE- AI	Remarks
Linux 3.10.53 kernel	Y	Y	Y	Y	Y	Based on Linux® OS BSP L3.10.53 GA release
Google Lollipop 5.0.0 release	Y	Y	Y	Y	Y	Based on android-5.0.2_r1 release
Boot source	eMMC, External SD	SD, NAND	External SD	External SD	External SD, NAND	Default NAND chip supported is Micron MT29F64G08AFAAA
Splash Screen for LVDS	Y	Y	Y	Y	Y	-
UI (input)	Multi-touch on LVDS panel	Multi-touch on LVDS panel	N	Multi-touch on LVDS panel	Multi-touch on LVDS panel	-
UI (display)	LVDS panel, HDMI display	LVDS panel, HDMI display	LCD panel	LVDS panel	LVDS panel	-
UI (dual display, LVDS +HDMI, UI mirror)	Y	Y	N	N	N	-

Table continues on the next page...

## Features

Feature	i.MX 6Quad/ 6DualLite SABRE-SD	i.MX 6Quad/ 6DualLite SABRE-AI	i.MX 6SoloLite EVK	i.MX 6SoloX SABRE- SD	i.MX 6SoloX SABRE- AI	Remarks
displayed on second device)						
UI (brightness control)	Y	Y	Y	Y	Y	-
Storage - External Media	Y	Y	Y	Y	Y	SD, External SD, and UDisk
Connectivity - Ethernet	Y	Y	Y	Y	Y	-
Connectivity - BT	Y	N	N	Y	N	Hardware: <ul style="list-style-type: none"> <li>Silex AR6233X SDIO card</li> </ul> Profiles: <ul style="list-style-type: none"> <li>A2DP Source</li> <li>A2DP Sink</li> <li>HID</li> <li>OPP</li> <li>PBAP</li> <li>AVRCP</li> <li>PAN</li> <li>FTP</li> <li>BLE Host</li> </ul>
Connectivity - Wi-Fi	Y	Y	Y	Y	Y	Hardware: <ul style="list-style-type: none"> <li>Realtek 8821AS SDIO card</li> </ul> Features: <ul style="list-style-type: none"> <li>AP mode</li> </ul>
Connectivity - 3G	Y	N/A	N/A	N/A	N/A	Hardware: <ul style="list-style-type: none"> <li>HUAWEI EM770W modem</li> </ul>
Connectivity - USB Tethering	Y	Y	Y	Y	Y	Supports Wi-Fi or Ethernet as upstream
Power - Battery status report	Y	N/A	N/A	N/A	N/A	Known limitations about the accuracy in some use cases
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

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Feature	i.MX 6Quad/ 6DualLite SABRE-SD	i.MX 6Quad/ 6DualLite SABRE-AI	i.MX 6SoloLite EVK	i.MX 6SoloX SABRE- SD	i.MX 6SoloX SABRE- AI	Remarks
Media - Video Play	Y	Y	Y	Y	Y	-
Media - Camera	Y	Y	Y	Y	Y	Camera panorama is not supported on the i.MX 6SoloLite EVK and i.MX 6SoloX SABRE-SD boards.
Media - TVIN	N/A	Y	N/A	N/A	Y	PAL/NTSC
Media - Dual Camera	Y	Y	Y	Y	Y	Hardware for SABRE-SD: <ul style="list-style-type: none"> <li>• Front camera: OV5642/OV5640 CSI camera</li> <li>• Rear camera: OV5640 MIPI camera</li> </ul> Hardware for SABRE-AI: <ul style="list-style-type: none"> <li>• Front camera: UVC camera</li> <li>• Rear camera: TV IN</li> </ul> Hardware for i.MX 6SoloLite EVK and i.MX 6SoloX SABRE-SD: <ul style="list-style-type: none"> <li>• Front camera: UVC camera</li> <li>• Rear camera: OV5640</li> </ul>
Media - Camcorder	Y	Y	Y	Y	Y	No recorder function for Rear Camera on SABRE-AI.
Media - USB Camera	Y	Y	Y	Y	Y	Logitech: <ul style="list-style-type: none"> <li>• C250</li> <li>• E3500</li> </ul> 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/A	N/A	N/A	-
Graphic - HW 3D acceleration	Y	Y	N/A	Y	Y	OpenGL-ES 1.1/2.0/3.0 through GC2000, GC880 3D core, or GC400T
Graphic - HW accelerated UI surface composition	Y	Y	Y	Y	Y	-
Misc - ADB over USB	Y	Y	Y	Y	Y	-
Misc - Fastboot utility	Y	Y	Y	Y	Y	-

Table continues on the next page...

## Multimedia Codecs

Feature	i.MX 6Quad/ 6DualLite SABRE-SD	i.MX 6Quad/ 6DualLite SABRE-AI	i.MX 6SoloLite EVK	i.MX 6SoloX SABRE- SD	i.MX 6SoloX SABRE- AI	Remarks
Misc - SW update and factory reset	Y	Y	Y	Y	Y	-
Sensor - Magnetometer	Y	Y	N	Y	N/A	Freescale MAG3110
Sensor - Accelerometer	Y	Y	N	Y	N/A	Freescale MMA8451Q
Sensor - Light	Y	Y	Y	Y	N/A	Intersil ISL29023
NTFS-3G File System	Y	Y	Y	Y	Y	For external Storage
NAND	N/A	Y	N	N	Y	Tested NAND chip: - Micron MT29F64G08AFAAA
Wi-Fi Display Source	Y	Y	N/A	N/A	N/A	Hardware: • Realtek 8821AS SDIO card
Data Partition Encryption	Y	Y	Y	Y	Y	Not supported for NAND boot in Sabre-AI
USB Accessory	Y	Y	Y	Y	Y	Google AOA v2.0
Infrared transmitter	Y	N	N	N/A	N/A	-
Screen Recording	Y	Y	N/A	N/A	N/A	-
Ethernet APK	Y	Y	Y	Y	Y	-
webGL	Y	Y	N/A	Y	Y	-
UIBC in Wi-Fi Display Source	Y	Y	N/A	N/A	N/A	-

## 5 Multimedia Codecs

See the Google Android Lollipop 5.0 Compatibility Definition Document (CDD), Section 5 for multimedia codecs and features.

## 6 Freescale Extended Feature Packages

Available for the release are several packages to extend the base Android Multimedia features. For more information and details about any of the below packages, please send inquiry to "L2manager-android@freescale.com".

## 6.1 Extended multimedia feature package

Freescale offers an enhanced multimedia experience for the Android platform. This package delivers an error resilient, feature rich multimedia solution by extending the existing multimedia features of the Android platform and introduces additional features. Extended and additional features include:

- Local playback
  - Freescale Enhanced Codecs, Demultiplexer, and File Format support
    - MOV, AVI, ASF, FLV, MPEG-PS, MPEG-TS, REAL MEDIA
  - Trick Mode Playback
  - Multiple Audio Track Selection
  - Audio pass through to AV receiver
- Recording
- Streaming playback
  - HTTP
  - RTSP
  - RTP
  - UDP
- Subtitle support

## 6.2 Microsoft codec support

Licensed package feature support is described in the following table.

File extension	Demuxers	Video decoders	Audio decoders
.wma	ASF		WMA STD, PRO, Lossless
.wmv/.asf	ASF	VC-1 SP/MP/AP WMV 7/8	WMA STD, PRO, Lossless
.mkv/.mka	MKV	VC-1 SP/MP/AP	WMA STD, PRO, Lossless

## 6.3 Real media support

Licensed package feature support is described in the following table.

File extension	Demuxers	Video decoders	Audio decoders
.rmvb .rm .ra	RM	RV 8/9/10	RA Cook AAC

## 6.4 Dolby digital audio

Freescale offers two Dolby Digital Audio solutions which can be integrated into the Extended Multimedia Package.

- Dolby Digital (AC-3) with support for Audio Pass-through
- Dolby Digital Plus

## 6.5 Wi-Fi Display Sink feature package

Freescale extends the Android platform by offering a Wi-Fi Display Sink feature. The Wi-Fi hardware module used for this feature is the Atheros AR6203 and Realtek 8821AS SDIO Card, but the design of this feature allows porting to any Wi-Fi hardware module. Using the Freescale Wi-Fi Display Sink API and the demonstration application, users can easily develop their own Sink Application. This feature has been verified using several of the most popular Android phones and tablets.

## 7 Change List

Compared to the L5.0.0\_1.0.0-alpha release, this release has the following major changes:

- Applies Cortex-A9 Errata 845369, which will cause performance drop in memcpy.
- Prefetches offset change for PL310 to improve the memcpy performance.
- Disables shell as Android CTS requirement.
- Switches the default NAND chip from MT29F8G08ABACA to MT29F64G08AFAAA.
- Includes several fixes to pass CTS android-cts-5.0\_r2.

## 8 Known Issues and Limitations

Read through all hardware related reference material and ensure the necessary hardware modifications have been made before using the software.

Issue description	Remarks
Battery level info is incorrect when charged in i.MX 6DualQuad/6DualLite SABRE-SD board and platform.	To resolve this issue, add a fuel gauge in hardware.
UI is Landscape while camera preview is portrait on the SABRE-SD platform.	SABRE-SD platform issue. See " <i>i.MX Android Camera Issue on the SDP Board</i> " for more details.
PCIe does not support Hot Plug and Power Management.	PCIe Intel Wi-Fi source code has been integrated into this release. However, PCIe is not enabled by default because the power management is not supported. See <a href="http://community.freescale.com/docs/DOC-94045">community.freescale.com/docs/DOC-94045</a> about the instructions to enable PCIe Wi-Fi.
L/R channel is swapped in SABRE-AI board.	It is hardware issue. Please connect red line to white port, white line to red port.
3G modem cannot work if the BT in bootargs of the bootloader is enabled.	The I/O pin KEY_COL4 is either used by UART5 as UART RTS pin or by 3G modem as DISABLE pin.
Google USB driver must be installed multiple times for the MTP, PTP, MTP&ADB, PTP&ADB, and ADB function settings.	Some Windows® XP OS environments may display MTP and PTP Windows OS even though PTP only is enabled in the device.

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**Known Issues and Limitations**

<b>Issue description</b>	<b>Remarks</b>
When Accessibility -> Magnification is enabled, several blue lines appear if sliding from bottom when playing a video.	Known issue, it is related with DPI, and should be Android SystemUI or Gallery3D layout issue. There will be no such issue if set DPI to 128 in init.freescale.rc, but we set DPI to 160 by default in the release.
There is silence in the first few seconds for HDMI output when connecting the board to a TV set.	This issue is related with the TV set. Some TV sets have no issues while some TV sets have issues.
A certain CTS use case may fail randomly during the whole CTS test for the i.MX 6DualLite SABRE-SD/SABRE-AI board and the i.MX 6SoloX SABRE-SD board.	Still under debugging.

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