i.MX 6SoloLite EVK Linux Release Notes

Contents

1   Release Contents

This document contains important information about the package contents, supported features, and known issues/limitations.

Additionally, the following sections contain release contents and license information.

1.1   Contents

This release consists of the following package files:

- L3.0.35_4.1.0_130816_source.tar.gz
- L3.0.35_4.1.0_130816_images_MX6SL.tar.gz
- L3.0.35_4.1.0_130816_docs.tar.gz

The release version is named as "L<Kernel_version>_<x.y.z>_<yymmdd>."

"<Kernel_version>": BSP Kernel version. (For example, "L3.0.35" indicates that this BSP release is based on the kernel version 3.0.35.)

"<x.y.z>":Semantic versioning specification, where X is the major version, Y is the minor version and Z is the patch version.

"<yymmdd>": Release candidate build date.

This is the second release for i.MX 6SoloLite after GA.

Tables below list the contents included in each package:

Table 1. Release Metadata

SoC	Kernel Version	Boards Supported
i.MX 6SoloLite	3.0.35	EVK Board

Table 2. L3.0.35_4.1.0_130816_images_MX6SL.tar.gz Content

File	Description
uImage	Binary kernel image for the Linux 3.0.35 kernel.
firmware-imx_L3.0.35_4.1.0_armel.deb	Debian package for the firmware files that includes VPU, SDMA, and Atheros Wi-Fi.
imx-lib_L3.0.35_4.1.0_armel.deb	Debian package for imx-lib binary.
imx-test_L3.0.35_4.1.0_armel.deb	Debian package for the imx unit test binary.
kernel_3.0.35-imx_L3.0.35_4.1.0_armel.deb	Debian package for the Linux kernel image, kernel modules, and the header files.
modeps_L3.0.35_4.1.0-1_armel.deb	Debian package for module dependencies.
udev-fsl-rules_L3.0.35_4.1.0-5_armel.deb	Debian package for udev rules.
atheros-wifi_L3.0.35_4.1.0_armel.deb	Debian package for Atheros WiFi driver.
gpu-viv-bin-mx6q_L3.0.35_4.1.0_armel.deb	Debian package for GPU base driver.
gpu-viv-wl-bin-mx6q_L3.0.35_4.1.0_armel.deb	Debian package for GPU wayland driver.

Table 3. L3.0.35_4.1.0_130816_source.tar.gz Content

File	Description
EULA	Freescale End User License Agreement.
install	Install script for LTIB.
ltib.tar.gz	LTIB (Linux Target Image Builder).
package_manifest.txt	Freescale LTIB open source packages.
pkgs	Source and patches for the root file system.
pkgs/imx-test-L3.0.35_4.1.0.tar.gz	Source code for the unit tests.
pkgs/imx-lib-L3.0.35_4.1.0.tar.gz	Source code for the libraries.
pkgs/linux-3.0.35-imx_L3.0.35_4.1.0.bz2	Freescale 3.0.35-L3.0.35_4.1.0 kernel patches.
pkgs/u-boot-v2009.08-imx_L3.0.35_4.1.0.tar.bz2	i.MX U-Boot patches based on U-Boot version 2009.08.
pkgs/firmware-imx-L3.0.35_4.1.0.tar.gz	i.MX firmware packages.
pkgs/gcc-4.6.2-glibc-2.13-linaro-multilib-2011.12-1.i386.rpm	Linaro toolchain 4.6.2 which is built by FSL for multiple ARM platform support.
tftp.zip	A Windows TFTP server program.

Table 4. L3.0.35_4.1.0_130816_docs.tar.gz Content

File	Description
EULA	Freescale End User License Agreement.
readme.html	Readme file containing links to additional documentation.
doc/mx6	i.MX 6 Linux BSP Release Notes, User's Guide, and Reference Manual.

1.2 License

All source code files of the Board Support Package (BSP) are either GNU General Public License (GPL), GNU Lesser General Public License (LGPL), or another open source license.

The following binary files contained in the included root file systems are built from proprietary source not included in the BSP:

Files in package gpu-viv-bin-mx6q-L3.0.35_4.1.0.tar.gz

2 System Requirements

The following subsections introduce the system requirements.

2.1 Linux Host Server

See *Setting Up a Linux Host for LTIB Builds on Ubuntu 9.04* document included in the release package to set up the Linux host server. This is tested against Ubuntu 9.04.

2.2 MFG Tool

The Mfgtools-Rel-4.1.0_130816_UPDATER.tar.gz package contains the image downloading tool.

2.3 EVK Board Components

Table below lists the hardware items contained in the EVK Board package. Read EVK Board Hardware User Guide before using it.

Table 5. Kit Components

Item	Description
Boards	i.MX 6SoloLite EVK
Cables	To connect the Debug port to a host computer, use a micro-B USB cable and connect J26 to the host computer. Drivers for the FTDI chip can be found at: http://www.ftdichip.com/Drivers/VCP.htm USB type A/M to MicroUSB type B/M shielded cable.

Table continues on the next page...

i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013

Table 5.   Kit Components (continued)

	Ethernet straight cable.
Power Supply	Dedicated power supply box.

3   What's New?

This section describes the changes in this release, including new features and defect fixes.

3.1   New Features

See ResolvedEnhancements.html for the complete list of new features and enhancements since the last release.

A summary of the main new features is as follows:

- Added support for SDMA buffers in IRAM.

3.2   Supported Power Management Features

- Audio playback mode support (DDR @50MHz, AHB @ 24MHz)
- Optimized IDLE power consumption

    - IDLE mode – All PLLs are in bypass mode when ARM is in WFI in system IDLE mode

    - Lower DDR I/O power in system IDLE mode

- VDDSOC/VDDPU voltages now track the VDDARM voltages as required by the HW design (in LDO bypass and enabled mode)

No new feature added into this release.

3.3   Defect Fixes

See ResolvedDefects.html, referenced inside the file readme.html, for the list of the defects fixed in this release. Only hot fixes are listed here.

- Enabled ARM_ERRATA_775420 workaround.
- ENGR00262435: Drained L1/L2 buffers before DDR enters self-refresh.
- ENGR00261285: Fixed HDMI. There was an unstable issue under some resolution/timing.
- ENGR00261451: Fixed an unexpected interrupt in the USB Host, which occurs during the system resume if USB wake up is not enabled.
- ENGR00261293: Fixed camera. V4l capture does not support resizing.

4 BSP Supported Features

Table below describes the features that are supported in this BSP release.

Table 6. Supported Features

Feature	Supported	Comments
Kernel		
Kernel	Yes	Kernel version: 3.0.35
File System	Yes	EXT2/EXT3/EXT4 are used as the file system in MMC/SD Hard Disk.
Bootloader		
U-Boot	Yes	• U-Boot delivery is based on U-Boot version 200908. • Supports LPDDR2 400MHz@32bit, ENET, UART, MMC/SD, eMMC4.3/4.4, SPI-NOR, OTP Fuse, Clock, Anatop regulator, boot using L2Cache as OCRAM, splash screen via EPDC, and secure boot.
Machine Specific Layer		
ARM Core	Yes	Supports Cortex-A9. Supports reboot and power-off.
Memory	Yes	512M memory is used.
Interrupt	Yes	GIC
Clock	Yes	Controls system frequency and clock tree distribution.
Timer (GPT)	Yes	System timer tick support.
GPIO/EDIO	Yes	GPIO is initialized in earlier phase according to hardware design.
IOMUX	Yes	Provides the interfaces for I/O configuration. IOMUX-V3 version is used.
DMA Engine		
SDMA	Yes	Conforms to DMA engine framework.
Character Device Drivers		
MXC UART	Yes	Console support via internal Debug UART.
Graphic Drivers		
CSI	Yes	Support CSI Camera (ov5640)
HDMI	Yes	Support external HDMI (sii902x)
WVGA panel	Yes	Supports SEIKO WVGA panel.
EPDC	Yes	Enable EPDC: - Support for RGB565 frame buffer format. - Support for Y8 frame buffer format. - Support for full and partial EPD screen updates. - Support for up to 256 panel-specific waveform modes. - Support for automatic optimal waveform selection for a given update. - Support for synchronization by waiting for a specific update request to complete. - Support for screen updates from an alternate (overlay) buffer. - Support for automated collision handling. - Support for 64 simultaneous update regions.

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i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013

Table 6. Supported Features (continued)

		- Support for pixel inversion in a Y8 frame buffer format.
		- Support for posterization of the update contents (driving all pixels to either solid black or white).
		- Supports use of a color map to remap Y8 frame buffer contents.
		- Support for 90, 180, and 270 degree HW-accelerated frame buffer rotation.
		- Support for panning (y-direction only).
		- Support for three EPDC driver display update schemes: Snapshot, Queue, and Queue and Merge.
		- Support for user control of the delay between completing all updates and powering down the EPDC.
		- Support for dithering.
SPDC	Yes	Enable SPDC:
		- Support for SPDC driver as a loadable or built-in module.
		- Support for RGB565 and Y4 frame buffer formats.
		- Support 800x600 resolution.
		- Support for full and partial EPD screen updates.
		- Support for automatic optimal waveform selection for a given update.
		- Support for synchronization by waiting for a specific update request to complete.
		- Support for screen updates from an alternate (overlay) buffer.
		- Support for 90, 180, and 270 degree HW-accelerated frame buffer rotation.
		- Support for panning (y-direction only).
		- Support for automated full and partial screen updates through the Linux fb_deferred_io mechanism.
		- Support for three SPDC driver display update schemes: Snapshot, Queue, and Queue and Merge.
		- Support for setting the ambient temperature through either a one-time designated API call or on a per-update basis.
		- Support for user control of the delay between completing all updates and powering down the SPDC.
GPU	Yes	GC355, GC320
Multimedia Drivers		
PxP	Yes	Enables PxP driver for EPDC.
Power Management Drivers		
Anatop Regulator	Yes	Supports Anatop regulator management.
Lower Power mode	Yes	Supports standby mode (map to SoC stop mode).
		Supports mem mode (map to SoC DSM mode).
CPUFreq	Yes	CPUFreq can be used for CPU frequency adjustment. The userspace, performance, conservative, and powersave governors are supported and conservative governor is enabled by default.
Bus scaling	Yes	Bus Scaling is enabled by default.
Battery charging	Yes	Done by hardware. No software intervention.
Sound Drivers		

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Table 6. Supported Features (continued)

WM8962/SSI	Yes	Supports playback.
Input Device Drivers		
Touch panel	Yes	Supports E Ink touch screen on DC2/DC3 add-on card.
Keypad	Yes	Supports 4x4 keypads on DC2/DC3 add-on card.
USB devices	Yes	Supports USB mouse and USB keypad via USB ports.
MTD driver		
SPI-NOR	Yes	
Networking Drivers		
ENET	Yes	
USB Drivers		
USB	Yes	- Supports USB OTG2.0 port. - USB Host mode: MSC, HID, UVC, USB audio. - USB device mode: MSC, Ethernet, Serial. - USB OTG pin detect.
Security Drivers		
Security drivers(DCP/ RNGB)	Yes	
General drivers		
uSDHC	Yes	- Supports SDHC2, SDHC3,SDIN5C2-8G via SDHC4. - SD2.0 - SD3.0 - eMMC 1bit/4bit/8bit SDR/DDR mode. - SDXC
WatchDog	Yes	Supports Watchdog reset.
I2C	Yes	Supports I2C master.
SPI	Yes	Supports SPI master mode.
PWM	Yes	Supports the backlight driver via PWM.
Temperature monitor	Yes	Requires chip calibration data.
WiFi	Yes	Supports AR6003 WiFi.
Bluetooth	Yes	Supports AR3001 Bluetooth, need board re-work. Supports SXSDMAN Bluetooth, need daughter card.

5 Kernel Boot Parameters

Depending on the booting/usage scenario, you may need different kernel boot parameters.

Table below describes the different boot parameters.

Table 7. Kernel Boot Parameters

Kernel Parameters	Description	Typical Values	Used When
console	Where to output kernel logging by printk.	console=ttymxc0,115200	All cases
ip	Tell kernel how or whether to get IP address.	ip=none ip = dhcp ip=static_ip_address	"ip=dhcp" or "ip=static_ip_address" is mandatory in "boot from TFTP/NFS."
nfsroot	The location of the NFS server/directory.	nfsroot=<ip_address>:<rootfs path>	Used in "boot from tftp/NFS" together with "root=/dev/nfs."
root	The location of the root file system.	root=/dev/nfs or root=/dev/mmcblk1p2	Used in "boot from tftp/NFS" (that is, root=/dev/nfs); Used in "boot from SD" (that is, root=/dev/mmcblk1p2).
rootfstype	Indicates the file system type of the root file system.	rootfstype=ext4	Used in "boot from SD" together with "root=/dev/mmcblk1p2."
rootwait	Wait (indefinitely) for root device to show up.	rootwait	Used when mounting SD root file system.
mem	Tell kernel how much memory can be used.	None or mem=864M	Note: MemTotal-<mem> -<gpu_memory> is reserved.
max17135	Configure Maxim17135 EPD PMIC pass number and VCOM voltage.	max17135:pass=[pass_num],vcom=[vcom_uV]	Used when enabling EPDC. pass_num should equal 2 for all IMXEBOOKDC2 cards. vcom_uV, in microvolts, should be equal to the value printed on the cable connector that is attached the E Ink panel being used.
video	Tells EPDC FB driver which E Ink panel is in use and what bpp should be used for the Frame Buffer.	video=mxcepdcfb:E060SCM,bpp=16	Used when enabling EPDC to select the correct E Ink panel parameters to use. bpp=16 selects RGB565 FB pix format bpp=8 selects Y8 FB pixel format
video	Tells SPDC FB driver which Sipix panel is in use and what bpp should be used for the Frame Buffer.	video=mxcspdcfb:ERK_1_4_A01,bpp=16	Used when enabling SPDC to select the correct Sipix panel parameters to use. bpp=16 selects RGB565 FB pix format
video	Tells ELCDIF FB driver which LCD panel is in use and which bpp should be used for the Frame Buffer.	video=mxc_elcdif_fb:SEIKO-WVGA,bpp=16	Used when enabling LCDIF to select the correct panel parameters to use. bpp=16 selects RGB565 FB pix format Note: if only use EPDC FB, then turn off ELCDIF FB by "video=mxc_elcdif_fb:off"
hdmi	Enable HDMI (sii902x) driver	hdmi	Used when enabling HDMI

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i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013

Table 7. Kernel Boot Parameters (continued)

csi	Enable CSI driver	csi	Used when enabling CSI driver(needed by ov5640) Note: CSI and EPDC has pin conflicts. When csi is enabled, then EPDC cannot be used.
bluetooth	Choose which bluetooth module on board.	bluetooth=ar3001 or, bluetooth=sxsdman	Choose AR3001 on UART2, or choose SXSDMAN on UART4.
fec_mac	Tells the Ethernet Mac address.	fec_mac=xx:xx:xx:xx:xx:xx	Changes MAC address.
enable_wait_mode	enable wait mode	enable_wait_mode=on	This feature is ON by default for this release.
arm_freq	Limit max CPU frequency and set default frequency to arm_freq.	arm_freq=800 arm_freq=1000	Used when changing ARM CPU frequency.The frequency that user set by the command line can't exceed the max CPU frequency that the speed_grading fuse specified.

6 Known Issues/Limitations

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

Table below lists some key known issues.

Table 8. Known Issues and Workarounds

Feature	Category	Description	Resolution/Workaround
EPDC	Software	Enabling E-Ink Auto-update mode (Device Drivers > Graphics Support > E-Ink Auto-update Mode Support) causes E Ink panel updates to be distorted and flaky.	Disable the E-Ink Auto-update Mode feature in the menuconfig.
Thermal	Hardware	Temperature Monitor should only be enabled for chips that have undergone proper thermal sensor calibration.	Ensure proper temperature calibration before using the temperature monitor.
vfat	Software	vfat file system hangs if udisk is unplugged during data transfer.	No.
VI editor	Software	After using aplay/arecord (version 1.0.24) software, VI editor can't be used.	Use aplay/arecord version other than 1.0.24.
dmesg	Software	After using aplay/arecord (version 1.0.24) software, dmesg command can't output the full kernel message.	Use aplay/arecord version other than 1.0.24.
GPU	Software	Driver recovery mechanism may not work properly sometimes.	No.

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i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013

Table 8.   Known Issues and Workarounds (continued)

GPU	Software	CTRL+C to exit some GPU applications may cause "GPU STATE DUMP".	No.
GPU	Software	Updating EGLImage can't take effect immediately.	No.
SDHC	Software	Occasionally, MMC will complain timeout during transferring.	No.
SDHC	Software	MMC will timeout during suspend/resume when transferring files with WiFi.	No.
SDHC	Hardware/ Software	SD card (e.g., 4GB VFAT) is inserted to EXT Slot (aka Slot1) before booting up EVK, kernel panic occurs on booting. The problem does not occur if only SD card is inserted in Slot2 (without SD card on EXT slot).	This is because SD Slot1 has first priority over others which means that, if there's SD card in Slot1, the system will boot from Slot1 regardless of the boot switch setting. If, unfortunately, the SD card (4GB VFAT) does not have the correct uboot/uImage/rootfs, boot may fail. The solution is to insert an SD card with the correct uboot/uImage/rootfs in Slot1, or remove any cards from Slot1 in order to boot from other Slots with correct boot switch setting.
Keypad	Hardware	Reset key on DC2/DC3 add-on card does not work.	No, since the signal is not connected to EVK board.
System	Hardware	Reboot may not work on EVK board.	Reboot function should be always okay if the hardware can trigger PMIC reset(which ensures RESET key and watchdog reset can control PMIC_ON_REQ pin).
CSI/EPDC	Hardware	Cannot be used simultaneously since these two modules share the same pins on the EVK board.	The board file in BSP will configure these pins for proper function per kernel cmdline. If 'csi' is assigned in kernel cmdline, then the group of pins will be configured for CSI. Otherwise, the group of pins will be configured for EPDC.
X-Acceleration	Hardware/ Software	meet out of memory during x11perf test.	It's a system limitation since the x11perf needs a lot of memory. No work-around on the EVK board (only with LPDDR2 memory of 512MB). Users may use a larger memory to work-around this issue.
Mfgtool2	Software	Mfgtool2 may fail to execute "frf" command if there is no "send" or "pipe" command executed prior to it.	Remove this "frf" command from ucl2.xml can fix this issue.
USB OTG wakeup	Software	USB OTG ID pin is not working during system suspend period.	Enable CONFIG_USB_ID_WAKEUP_ENABLE when compiling the kernel to make it work. If CONFIG_USB_ID_WAKEUP_ENABLE is disabled (default setting in the kernel), it will save some power but it has the following two issues when USB wakeup is enabled: - The system cannot enter the suspend state if there is a Micro B-To-A cable on the OTG port. - USB OTG ID pin system wakeup source is not supported.

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i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013

Table 8.   Known Issues and Workarounds (continued)

FUSE for RTC	Hardware	SEC_CONFIG[0] fuse bit is not burned which leads the RTC not to be functional.	In U-Boot prompt, run the command 'imxotp blow --force 4 0x2'
fbv in LTIB	Software	fbv package in LTIB can not build successfully.	Need a patch set for libpng to change the link order, including libpng-1.2.50-link_to_proper_libs-1.patch, a md5sum file and a patch for libpng.spec, provided in the release package.
USB OTG	Software	Do not use module dependency for loadable OTG driver module solution.	When building all the three USB drivers to modules (otg, host, and device), you must load and unload the three modules together and in the correct sequence, because there is no module dependency while function dependency exists. The loading sequence is: fsl_otg_arc > ehci_hcd > arcotg_udc, and unloading sequence is: arcotg_udc > ehci_hcd > arcotg_udc). Meanwhile, if a gadget module, such as g_mass_storage, needs to be installed and be removed from the fly, all USB modules need to be installed or removed.
USB Host Periodic Transfer	Software	Some USB periodic transfer devices may not work, such as the USB audio microphone.	Enable CONFIG_USB_EHCI_TT_NEWSCHED kernl configuration.

i.MX 6SoloLite EVK Linux Release Notes, Rev L3.0.35_4.1.0, 09/2013