i.MX 6Solo/6DualLite SABRE-AI Linux Release Notes

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_MX6.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.

Contents

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This release is also referred to as the GA release for i.MX 6Solo/6DualLite.

Tables below list the contents included in each package:

Table 1. Release Metadata

SoC	Kernel Version	Boards Supported
i.MX 6Solo/6DualLite	3.0.35	SABRE-AI (Automotive Infotainment)

Table 2. L3.0.35_4.1.0_130816_images_MX6.tar.gz Content

File	Description
u-boot-mx6solo-sabreauto.bin	U-Boot bootloader for the SABRE-AI (Automotive Infotainment).
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-L3.0.35_4.1.0_130816_MX6DL_UPDATER.tar.gz package contains the image downloading tool.

2.3   SABRE-AI (Automotive Infotainment) Components

For more information about SABRE-AI components, see *SABRE for Automotive Infotainment based on the i.MX 6 series - Fact Sheet*.

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:

- HDMI HDCP support
- HDMI CEC support
- HDMI HDCP certification
- Upgrade GPU to 4.6.9 p12 version
- VPU integrate firmware 2.3.10

3.2   Supported Power Management Features

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.

- ENGR00255073 crypto: kernel dump when do crypto module speed test in single mode
- ENGR00271977-1 imx6_defconfig: enable PL310_ERRATA_769419
- ENGR00271718 ASoC: Fix check for symmetric rate enforcement
- ENGR00264650 VPU can not playback after driver reload

4   BSP Supported Features

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

Table 5.   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. UBIFS is used for NAND. JFFS2 is used for Parallel NOR.
Bootloader		
U-Boot	Yes	• U-Boot delivery is based on U-Boot version 2009.08. • Supports DDR3 400MHz@32bit, ENET, UART, MMC/SD, eMMC4.3/4.4, SPI-NOR, Parallel NOR, NAND, OTP Fuse, Clock, Anatop regulator, and splash screen via LVDS.
Machine Specific Layer		
ARM Core	Yes	Supports Cortex-A9. CPUFREQ freq of up to 1GHz is supported Supports reboot and power-off.
Memory	Yes	1G The user/kernel space is split 2G/2G.

Table continues on the next page...

Table 5.   Supported Features (continued)

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.
APBH-Bridge-DMA	Yes	Conforms to DMA engine framework.
Character Device Drivers		
MXC UART	Yes	Console support via internal Debug UART3.
Graphic Drivers		
Frame Buffer Driver	Yes	MXC Frame buffer driver for IPU V3.
VDOA	Yes	Supports Video Data Order Adapter.
LVDS	Yes	Supports HannStar LVDS panel. It's the default display if no other video option is setup.
HDMI	Yes	Supports the on-chip DesignWare HDMI hardware module.
WVGA panel	Yes	Supports boundary devices Nit6X_800x480 panel. Refer to http://boundarydevices.com/products/7-800x480-display/.
GPU	Yes	GC880, GC320. OpenGL ES2.0, OpenGL ES1.1
Multimedia Drivers		
IPU V3 driver	Yes	Provides the interfaces to access IPU V3 modules.
V4L2 Output	Yes	The V4L2 output driver uses the IPU post-processing functions for video output.
V4L2 Capture	Yes	Supports dual camera.
VPU	Yes	MPEG4/H263/H264/VC1/MPEG2/AVS/MJPEG/VP8 decode and H263/MPEG4/H264/MJPEG encoder.
MIPI-CSI	No	
TV-IN	Yes	Supports TV-IN via ADV7180. Supports bt656, NTSC, and PAL.
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 Interactive governor is added and enabled by default.
Bus scaling	Yes	
Battery charging	Yes	
Sound Drivers		
S/PDIF	Yes	S/PDIF Rx
ASRC	Yes	Supports ASRC module for sample rate conversion.
ESAI/CS42888	Yes	Supports CS42888 audio codec via ESAI interface.
HDMI Audio	Yes	

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Table 5. Supported Features (continued)

Input Device Drivers		
Touch panel	Yes	Supports eGalax capacitive touch screen driver.
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	Supports M25P32 SPI-NOR flash.
NAND	Yes	
Parallel NOR	Yes	
Networking Drivers		
ENET	Yes	Supports AR8031 PHY.
MediaLB	Yes	
FlexCAN	Yes	
USB Drivers		
USB	Yes	- Supports USB OTG2.0 and USB Host2.0 ports. - USB Host mode: MSC, HID, UVC, USB audio. - USB device mode: MSC, Ethernet, Serial. - USB OTG pin detect.
Security Drivers		
Security drivers(CAAM)	Yes	
General drivers		
MAX7310	Yes	Supports MAX7310 GPIO expander.
SNVS RTC	Yes	Low power section only.
uSDHC	Yes	- Supports SDHC3. - SD2.0 - SD3.0 UHS-I - eMMC 1bit/4bit/8bit SDR/DDR mode.
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.
Accelerometer	Yes	Supports MMA8451 driver.
Ambient Light Sensor	Yes	Supports ISL29023 driver.
WiFi	Yes	Supports AR6003 WiFi.
AM/FM module	Yes	Supports SI4763 AM/FM module.

5 Kernel Boot Parameters

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

Table below describes the different boot parameters.

In order to force i.MX 6DualLite SABRE-AI board to run at CPU 800MHz and disable smp to remove overhead, add boot parameters "nosmp arm_freq=800" by default. Disabling CONFIG_SMP configuration can remove further overhead for single core.

Table 6. Kernel Boot Parameters

Kernel Parameters	Description	Typical Values	Used When
weim-nor	To enable the WEIM-NOR since WEIM-NOR has pin conflicts with other modules on the board.	weim-nor	When wishing to use the WEIM-NOR on the board.
spi-nor	To enable the SPI-NOR since SPI-NOR has pin conflicts with other modules on the board.	spi-nor	When wishing to use the SPI-NOR on the board.
console	Where to output kernel logging by printk.	console=ttymxc3,115200	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.
maxcpus	[SMP] Maximum number of processors that SMP kernel should use.	maxcpus=1	maxcpus=n : n >= 0 limits the kernel to using 'n' processors. n=0 is a special case. It is equivalent to "nosmp".

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Table 6.   Kernel Boot Parameters (continued)

ldb=\<x>	Tells the kernel/driver which ldb mode will be used.	1. ldb=sin0/1 2. ldb=spl0/1 3. ldb=dul0/1 4. ldb=sep0/1	1. Used when an LVDS use single mode on display port0/1. 2. Used when an LVDS use split mode on display port0/1. 3. Used when two LVDS use dual mode on display port0/1. 4. Used when two LVDS use separate mode on display port0/1. There are two LVDS channels, LVDS0 and LVDS1, which can transfer video data. These two channels can be used as split/dual/single/separate mode. The source for LVDS channel data is the IPUv3 display interfaces, DI0, or DI1. Split mode means display data from DI0 or DI1 will be sent to both channels LVDS0 and LVDS1. Dual mode means display data from DI0 or DI1 will be duplicated on LVDS0 and LVDS1. That is, LVDS0 and LVDS1 will display the same content. Single mode means that only DI0->LVDS0 or DI1->LVDS1 will be active at once. Separate mode means that DI0->LVDS0 and DI1->LVDS1 may be simultaneously active.It is suggested to use ldb=sep1 mode, which is the default kernel settings to support multi display devices better.
video	Tells kernel/driver which resolution/ depth and refresh rate should be used for display port 0 or 1. See the parameter information under Documentation/fb/ modedb.txt Tells the kernel/driver which IPU display interface format should be used.	1. video=mxcfb0:dev=hdmi, 1920x1080M@60,if=RGB24 2. video=mxcfb0:dev=ldb,LDB-XGA,if=RGB666, None or ldb=sin0 3. ldb=sep1 4. video=mxcfb0:dev=lcd,CLAA-WVGA,if=RGB666 ldb=sin0 5. video=mxcfb0:dev=hdmi, 1920x1080M@60,if=RGB24 ldb=sep1 6. To enable dual LVDS panels, there is no need for any options.	1. Used when primary displaying on hdmi with 1080P60 mode. 2. Used when primary displaying on the HannStar LVDS0. 3. Used when primary displaying on the HannStar LVDS1. 4. Used when enabling HDMI 1080P60 mode and LVDS0. To enable second display, run "echo 0 > /sys/class/graphics/fb2/blank 5. Used when enabling HDMI 1080P60 mode and LVDS1. To enable second display, run "echo 0 > /sys/class/graphics/fb2/blank NOTE: GBR24/RGB565/YUV444 etc represents the display HW interface format. Typical values for certain different display devices are shown below: TVOUT: YUV444 VGA: GBR24 HDMI&DVI: RGB24 CLAA WVGA LCD: RGB565

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Table 6.   Kernel Boot Parameters (continued)

			Typical values for dev= are shown below:
			lcd: LCD interface
			ldb: LVDS
			hdmi: HDMI on chip or sii902x
			dvi: DVI port
			vga: VGA through TVE
			tve: TVOUT
dmfc	Tells the kernel/driver how to set the IPU DMFC segment size.	None Or dmfc=3	"dmfc=1" means DMFC_HIGH_RESOLUTION_DC. "dmfc=2" means DMFC_HIGH_RESOLUTION_DP. "dmfc=3" means DMFC_HIGH_RESOLUTION_ONLY_DP. Note: DMFC_HIGH_RESOLUTION_ONLY_DP can only be set by the command line. It is recommended to be set when no IPU connects the two panels. When it is set, each IPU can only connect one panel.
fec_mac	Tells the Ethernet Mac address.	fec_mac=xx:xx:xx:xx:xx:xx	Changes MAC address.
mtdparts	Tells the kernel mtd partition information.	mtdparts=gpmi-nand:16m(boot), 16m(kernel),1024m(rootfs),-(user)	When to enable NAND. The partition: 16m(boot),16m(kernel),1024m(rootfs) is an example, you can change it according to your needs.
enable_wait_mode	enable wait mode	enable_wait_mode=on	This feature is ON by default for this release. Please see the wait mode issue on the Known Issues/Limitations chapter.
mipi_sensor	MIPI and csi share MCLK__CCM_CLKO.	mipi_sensor	When to enable MIPI csi.
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.
uart3	Uart3 shares pins with NAND flash controller.	uart3	Enable when uart 3 is used. NAND flash controller will be disabled.

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 7. Known Issues and Workarounds

Feature	Category	Description	Resolution/Workaround
USB	Hardware	The voltage drop in the P5V0_H1_VBUS is observed. If VBUS does not reach 5V, the USB PHY 3p0 will not reach 3.0V which causes USB PHY work abnormally.	Hardware rework is required. Leave R194 = 0 ohm for short-term solution.
Hardware manufacture	Hardware	HDMI, SD3 card detection, and eGalax touch screens are found to fail on some boards.	This is because some PINs are not soldered well. If any basic feature, which is announced to be supported, does not work on your board, please check the board.
ARM	Software	smp_wmb performance is very low.	This is the common side-effect of SMP. No fix plan.
ARM	Software	CONFIG_SMP should be disabled for i.MX 6Solo chip.	To remove overhead caused by SMP for better performance, CONFIG_SMP is expected to be disabled for single core. Complete support with SMP disabled will be provided with future Linux BSP release.
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.
CPU hotplug	Software	System hangs after conducting CPU hot plug many times during heavy interrupt.	Known ARM linux limitation. No workaround as of yet. Please refer to the link for more details: http://thread.gmane.org/ gmane.linux.ports.arm.omap/68798/ focus=68801
VPU	Software	Cannot support "-x 1" option for unit test program mxc_vpu_test.out because IPU library is removed.	To avoid this issue, do not use "-x 1", since "-x 1" means enable for IPU library.
IPU	Software	IPU library is removed from i.MX 6.	Should not use IPU library interfaces in i.MX 6 SW.
IPU	Software	Framebuffer driver and v4l2 output driver share the same fb device.For example, /dev/video16 also uses the /dev/fb0 to do video playback.	fb operations should be banned during video playback on the same fb device.
uSDHC	Hardware	SD3.0: U-Boot can't boot with SDR50 and SDR104.	Fixed in TO1.1.
S/PDIF	Software	System may hang when testing RX above 44.1kHz 24bits.	No.
S/PDIF	Software	Spdif Rx captured stream sounds different with original audio stream.	No.

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Table 7. Known Issues and Workarounds (continued)

vfat	Software	vfat file system hangs if udisk is unplugged during data transfer.	No.
eCompass	Hardware	eCompass can't work after WEIM-NOR or SPI-NOR are enabled on kernel.	No.
USB OTG	Software	USB OTG can't work after WEIM-NOR or SPI-NOR are enabled on kernel.	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.
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.
ENET	Hardware	The limitations of rx bandwidth more than 200 Mbps to use switches with pause-frame enable System: Ethernet MAC generates RX FIFO overruns	In userspace change MTU size: echo 512 > /sys/class/net/eth0/mtu or: ifconfig eth0 mtu 512
PCIe	Hardware/ Software	PCIe doesn't support Hot Plug and Power Management.	No.
TV-IN	Software	Error messages may be expected along with bad quality at first frames on TV-IN interface. This may occur on a hot plug connection.	No.
U-Boot	Hardware	ENGR00236878: eMMC 4.4 fails to boot on SABRE-AI boards.	No.
Wait mode	Software	System will not boot up successfully on the pre-production chip such as the TO1.0 chip.	Freescale decided to drop the pre-production TO1.0 chip support. You can use the production chip.
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,

Table 7. Known Issues and Workarounds

			such as g_mass_storage, needs to be installed and be removed from the fly, all USB modules need to be installed or removed.

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