i.MX53 ARD 11.05.01 Linux

Release Notes

This document contains important information about the package contents, supported features, and known issues/limitations for MX53 ARD RevB board (DDR3).

Contents

1 Release Contents

1.1 Contents

This release consists of 3 package files: `L2.6.35_11.05.01_ER_source.tar.gz`, `L2.6.35_11.05.01_ER_images_MX5X.tar.gz`, `L2.6.35_11.05.01_ER_docs.tar.gz`.

Release version is named as "`L<Kernel_version>_<yy>.<mm>.<ij>`".

- `<Kernel_version>`: BSP Kernel version. "`L2.6.35`" indicates this BSP release is based on kernel version 2.6.35.

- `<yy>.<mm>.<ij>`": Release time. For example, "`11.05.01`" indicates this BSP is released on May, 2011.

Tables 1-1 to 1-4 list the content included in each file.

Table 1-1. L2.6.35_11.05.01_ER_images_MX5X.tar.gz content

File	Description
u-boot-mx53-ard.bin	U-Boot bootloader for the i.MX53 ARD RevA board
u-boot-mx53-ard-ddr3.bin	U-Boot bootloader for the i.MX53 ARD RevB board
uImage	Binary kernel image for the Linux 2.6.35 kernel. The same image can run in all i.MX5 boards.
amd-gpu-x11-bin-mx51_11.05.01-1_armel.deb	Debian package for the GPU driver and the application for X11
atheros-wifi_11.05.01-1_armel.deb	Debian package for the Atheros WiFi AR6102 driver
firmware-imx_11.05.01-1_armel.deb	Debian package for the firmware files which includes VPU and Atheros WiFi.
imx-lib_11.05.01-1_armel.deb	Debian package for imx-lib binary
imx-test_11.05.01-1_armel.deb	Debian package for the imx unit test binary
kernel_2.6.35.3-imx_11.05.01_armel.deb	Debian package for the Linux kernel image, kernel modules and the header files.
libz160-bin_11.05.01-1_armel.deb	Debian package for the GPU Z160 2D driver.
modeps_11.05.01-1_armel.deb	Debianpackage for module dependencies
xserver-xorg-video-imx_10.10.00-2_armel.deb	Debian package for the i.MX accelerated video driver.
udev-fsl-rules_11.05.01-5_armel.deb	Debian package for udev rules

Table 1-2. L2.6.35_11.05.01_ER_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

File	Description
pkgs/ imx-test-11.05.01.tar.gz	Source code for the unit tests
pkgs/ imx-lib-11.05.01.tar.gz	Source code for the libraries
pkgs/ linux-2.6.35.3-imx_11.05.01.bz2	Freescale 2.6.35.3-11.05.01 kernel patches
pkgs/ u-boot-v2009.08-imx_11.05.01.tar.bz2	i.MX U-Boot patches based on U-Boot version 200908
pkgs/firmware-imx-11.05.01.tar.gz	i.MX firmware packages
pkgs/atheros-wifi-11.05.01.tar.gz	Source code of the Atheros WiFi AR6102 drivers
pkgs/ xserver-xorg-video-imx-11.05.01.tar.gz	Source code of the i.MX accelerated video driver
Pkgs/ kobs-ng-11.05.01.tar.gz	Source code of kobs-ng package which is used to flash MX53 U-Boot.
pkgs/gcc-4.4.4-glibc-2.11.1-multilib-1.0-1.i386.rpm	FSL Open source optimized toolchain gcc 4.4.4 which enables NEON for ARM cortex-A8.
tftp.zip	A Windows TFTP server program

Table 1-4. L2.6.35_11.05.01_ER_docs.tar.gz content

File	Description
EULA	Freescale End User License Agreement
readme.html	Readme file containing links to additional documentation
doc/mx5	i.MX53 Linux BSP Release Notes, User's Guide, Reference Manual

1.2 License

All Board Support Package (BSP) source-code files are GNU General Public License (GPL) or 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 libz160-bin-11.05.01.tar.gz
- Files in package amd-gpu-bin-mx51-11.05.01.tar.gz

2   System Requirements

2.1 Linux Host server

See "ltib_build_host_setup.pdf" for host server setup.

2.2 MFG tool

Use Mfgtools-Rel-11.05.01_ER_MX53_UPDATER.tar.gz for the image downloading.

2.3 i.MX53 ARD Components

Table 2-1 lists the hardware items contained in the i.MX53 ARD package. Please read MX53 ARD Hardware user guide before using it.

Table 2-1 Kit Components

Item	Description
Boards	i.MX53 ARD board
Display	LVDS panel (TOSHIBA LT084AC37300) for Rev A board. HannStar LVDS panel for RevB board. VGA output
Cables	DB9 M/F RS-232 serial cable USB type A/M to MicroUSB type B/M, shielded cable Ethernet straight cable
Data storage	● 4GB SD cards or above ● NAND
Power Supply	Dedicate power supply box

3   What's New

The 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:

- Add MX53 ARD RevB board support

- Add VGA support

- Add HannStar LVDS support.

3.2 Defect Fixes

See ResolvedDefects.html, referenced inside the file readme.html, for the list of the defects fixed in this release..

4   BSP Supported Features

Table 4-1 describes the features that are supported in this BSP release.

Table 4-1 Supported features

Feature	Supported?	Comments
Kernel		
Kernel	Yes	Kernel version: 2.6.35.3
File System	Yes	EXT2/EXT3/EXT4 are used as the file system in MMC/SD, Hard Disk, UBIFS, JFFS2 are used for NAND.
Bootloader		
U-Boot	Yes	U-Boot delivery is based on U-Boot version 200908. Supports MMC/SD and NAND boot. See "README_MX53_NAND_BOOT.pdf" for more details about NAND boot. Supports external Ethernet and console output. Supports fuse and clock operations.
Machine Specific Layer		
ARM Core	Yes	Supports Cortex-A8 (800MHz)
Memory	Yes	1G memory is used. The user/kernel space is split as 2G/2G.
Interrupt	Yes	Supports MXC TZIC module
Clock	Yes	Control system frequency, clock tree distribution
Timer (GPT)	Yes	System timer tick support
GPIO/EDIO	Yes	GPIO is initialized in earlier phase according to hardware design Note that all GPIO activate/deactivate functions used in the drivers are dummies (see the MSL code for the details)
IOMUX	Yes	Provides the interfaces for IO configuration. IOMUX-V3 version is used.
SPBA	Yes	Provides the interfaces to allow different masters to take or release ownership of a shared peripheral
SDMA	Yes	SDMA script version is V1.1.0.
Character Device Drivers		
MXC UART	Yes	Console support via internal UART1 for console output.
Graphic Drivers		
Frame Buffer Driver	Yes	MXC Frame buffer driver for IPU V3
LVDS	Yes	Supports TOSHIBA LT084AC37300 LVDS panel on RevA board. Supports HannStar LVDS panel on RevB board. The pixel format is IPU_PIX_FMT_RGB666. LVDS0 is the default display on MX53 ARD board. If no additional video mode is set, LVDS0 on the CPU board is treated as the display output.
VGA	Yes	Support VGA output. Due to the pin conflict with WEIM, please note the following steps when running VGA on MX53 ARD RevB board: -add boot option "ard-vga" in kernel launch command line. For example, **video=mxcdi1fb:GBR24,VGA-XGA di1_primary vga ard-vga ldb=off** -Flash the images on SD or NAND and avoid to use Ethernet. -HW configuration: Short PIN1-2 for J14 and J16 on CPU board.
GPU	Yes	GPU software version: AMD Production Release 1.1. Supports Z430 (3D) and Z160 (2D). Support s OpenGL ES 2.0 and 1.1, OpenVG 1.1, C2D custom API using Z160 Provides debian packages to support EGL X-Window in Ubuntu lucid or earlier version.
MultiMedia Drivers		

Feature	Supported?	Comments
IPU V3 driver	Yes	Provides the interfaces to access IPU V3 modules
V4L2 Output/Capture	Yes	Provides V4L2 implementations. Currently V4L only supports one instance. IPU library located in the imx-lib package can support multiple instances. De-interlace function for split mode (> 1024x1024) is not supported in this version.
Camera	NO	
TVIN	Yes	Support ADV7180 TVIN module.
VPU	Yes	VPU firmware version: v1.4.29 Supports VPU encoder and VPU decoder For Real Video and DivX3 support information contact a Freescale representative
Power Management Drivers		
PMIC	Yes	Supports the LTC3589 PMIC via a I2C interface.
Lower Power mode	Yes	Supports stop mode in mem state.
DVFS-Core	NO	The datasheet of MX53 Automotive chip only have one working point. So no need to enable DVFS-Core.
CPUFreq	NO	The datasheet of MX53 Automotive chip only have one working point. So no need to enable CPU Frequency driver.
Bus scaling	No	No need to enable bus scaling driver.
Sound Drivers		
S/PDIF	Yes	Support S/PDIF IN.
ESAI/ CS42888	Yes	Support CS42888 audio codec via ESAI interface.
Input Device Drivers		
Touch panel	Yes	Support P1003 and eGalax touch screen on RevB board. The touch screens are only enabled for LVDS0 ports. Support max11801 touch screen on RevA board.
USB devices	Yes	Supports USB mouse and USB keypad via USB ports
MTD driver		
SPI NOR	No	Conflict with Ethernet.
NAND	Yes	Support NAND driver. The following NAND devices were tested on MX53 ARD: • MT29F16G08ABACA (The default NAND flash model for MX53 ARD) • MT29F16G08MAA • MT29F4G08AAA • K9LBG08U0D
NOR	No	
SATA	Yes	Support SATA driver
Networking Drivers		
External Ethernet	Yes	Supports LAN9220 PHY
MediaLB	Yes	Support MLB.
FlexCAN	Yes	Compatible with CAN2.0 protocol.
USB Drivers		
USB Host	Yes	Supports USB HOST1, USBHOST2 and USB OTG host
USB Device	Yes	Supports USBOTG device mode
USBOTG	Yes	Support USB Host/device switch by ID PIN detection.
Security Drivers		
Security drivers	Yes	Supports SCC2 and SAHARA
General drivers		
SRTC	Yes	Support for the LP domain. It's disabled by default. It can be enabled via "CONFIG_RTC_DRV_MXC_V2" config.

Feature	Supported?	Comments
MMC/SD/SDIO	Yes	Supports i.MX eSDHC module with PIO and DMA modes.
WatchDog	Yes	Supports Watchdog reset
I2C	Yes	Supports I2C master. Supports I2C1, I2C2
SPI	Yes	Supports SPI master mode
PWM	Yes	Supports the backlight driver via PWM
I/O Expander	Yes	Support MAX7310 (I/O Expander) chip via GPIO interface
BT	No	
WiFi	No	
GPS	No	

5 Kernel boot parameters

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

Kernel Parameters	Description	Typical Values	Used When
console	Where to output kernel logging by printk	console=ttymxc0	*All cases*
ip	Tell kernel how/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/mmcblk0p2	*Used in "boot from* *tftp/NFS" (i.e., root=/dev/nfs);* *Used in "boot from* *SD" (i.e., root=/dev/mmcblk0p2)*
rootfstype	Indicates the file system type of the root file system	rootfstype=ext4	*Used in "boot from* *SD" together with "root=/* *dev/mmcblk0p2"*
rootwait	Wait (indefinitely) for root device to show up.	Rootwait	*Used when mounting SD rootfs*

tve	Enable TVOUT feature.	Tve	*Used to enable TVOUT. After enabling tve, the video modes below will be added into the di1 FB mode list:*
			TV-1080P24: D:1920x1080p-24
			TV-1080P25: D:1920x1080p-25
			TV-1080P30: D:1920x1080p-30
			TV-1080I50: D:1920x1080i-50
			TV-1080I60: D:1920x1080i-60
			TV-720P30: D:1280x720p-30
			TV-720P60: D:1280x720p-60
			TV-PAL: D:720x576i-50
			TV-NTSC: D:720x480i-60
			First column is FB mode's string name.
vga	Enable VGA feature.	Vga	*Used to enable VGA output. After enabling vga, the video modes below will be added into the di1 FB mode list:*
			VGA-WSXGA+: D:1680x1050p-60
			VGA-SXGA: D:1280x1024p-60
			VGA-XGA: D:1024x768p-60
			VGA-SVGA: D:800x600p-60
			The first column is the name of the FB mode's string..
ldb=di<x>	Tells the kernel/driver to enable LDB driver	ldb=di1 or ldb=di0	*Used when an LVDS panel is connected via LVDS1 port* *Used when an LVDS panel is connected via LVDS0 port*
di1_prima ry	Tells the kernel/driver that DI1 is the primary display	di1_primary	Used when primary display is on the DI1 port.
di0_prima ry	Tells the kernel/driver that DI0 is the primary display	di0_primary	Used when primary display is on the DI0 port.
ddc	Enable common MXC DDC driver. It will try to read EDID info from the I2C bus platform data defined.	Ddc	*After enabling ddc, if EDID reading is successful, the video modes will be added to the defined di framebuffer modelist.*

video	Tell 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=mxcdi0fb:RGB666,XGA di0_primary ldb=di0` 2. `video=mxcdi1fb:RGB666,XGA di1_primary ldb=di1` 3. `video=mxcdi1fb:GBR24,VGA-XGA di1_primary vga ldb=off ard-vga`	*1. Used when displaying on the HannStar LVDS via LVDS0 in the CPU board. If no video option is set, LVDS0 is the default display.* *2. Used when displaying on the HannStar LVDS via LVDS1 in the main board.* *3. Used when displaying on the VGA output. To use VGA, the other additional settings are needed:* *- Flash the images on SD or NAND and avoid to use Ethernet.* *-HW configuration: Short PIN 1-2 for J14 and J16 on CPU board* *NOTE: GBR24/RGB565/YUV444 etc represent the display HW interface format. Typical values for some different display devices are shown below:* *TVOUT: YUV444* *VGA: GBR24* *HDMI&DVI: RGB24* *CLAA WVGA LCD: RGB565*
dmfc	Tells the kernel/driver how to set 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*
mem	Tell kernel how much memory can be used.	None or mem=864M	*Note: 1G -<mem> - <gpu_memory> is reserved for X-Acceleration.*
gpu_memory	Tell kernel how much memory is reserved for GPU usage.	None or gpu_memory =128M	*Used to indicate the memory size reserved for the GPU.*

6   Known Issues/Limitations

Please read through all hardware related materials and ensure the necessary hardware reworks are done before using the software. Table 5-1 lists some key known issues.

Table 5-1 Known issues and workarounds

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Features	Category	Description	Resolution/Workaround
Video	Hardware	Frame dropping is observed when playing 1080p stream on 1080p display with resize operation.	Please contact business manager to get the detailed 1080p capability document.
NAND Boot	Hardware	Linux SW supports 16-bit ECC. But HW boot dips can only select 8-bit ECC. You have to use resistor options to enable 16-bit ECC for NAND boot tests.	If you want to test Linux NAND boot on MX53 ARD RevA board, mount R231 to select 16bit ECC. With this rework, the default SD boot will be changed as "boot from bottom slot".
Display	Configuration	Display automatic blank functionality is enabled by default. So the display will power off automatically when the time is expired.	To disable LCD automatic blank functionality, enter the command: `echo -e "\033[9;0]" > /dev/tty0` When the display is off, enter the following command to power on the display: `echo 0 > /sys/class/graphics/fb0/blank`
Video	Configuration	When playing the video for a long time, allocation of contiguous memory may fail (memory fragmentation).	To play video when the system memory is low, run the command: `echo 1 > /proc/sys/vm/lowmem_reserve_ratio` It protects the DMA zone and avoids memory allocation errors.
LTIB Build	LTIB	When you install LTIB host packages and build elftosb, the following error is reported /usr/bin/ld: ElftosbAST.o: in function elftosb::BinaryOpExprASTNode::reduce(elftosb::EvalContext&):/opt/freescale/ltib/usr/src/rpm/BUILD/elftosb-10.10.00/elftosb2/ElftosbAST.cpp:758: error: undefined reference to 'powf'	Please modify elftosb-10.10.00/makefile.rules and change as the following: -LIBS = -lstdc++ +LIBS = -lstdc++ -lm
ARMV7	Hardware	ENGcm11413 (Data abort when AXI access with BL>8 is made): If a 8-bits NEON load to strongly ordered/device memory, and if the access size is more than 8 bytes , the AXI bus will use the burst (burst len more than 8, burst size is 1 byte). MX53 M4IF just supports the burst	The user should avoid pgprot_noncached to be used in xxx_mmap for DDR memory. The user should use pgprot_writecombine instead of pgprot_noncached to map the DDR memory to the user space. If the pgprot_writecombine is used for mapping a DDR area and DMA is enabled for this area, the user must do DSB(Data Synchronization Barrier) by using dsb() function to drawing the write buffer, before

Features	Category	Description	Resolution/Workaround
		length up to 8.if burst length is larger than 8, MX53 reports the data abort.	the DMA starting read from this area.
NEON	Software	NEON should not be used at all for Linux kernel modules	Follow this rule.

toolchain	toolchain	When writing assembly code to use neon/vfpv3 fpu and assemble it by binutils, the vcvt instruction will be incorrectly encoded as vcvtr. This leads to a major loss of performance
		
		For example, assembly code `test.s` with content as:
		`.text`
		`                .globl  test`
		`                .align  2`
		`test:`
		`                vcvt.s32.f32    s1, s1`
		
		Assemble with command:
		`arm-fsl-linux-gnueabi-as -march=armv7-a -mfpu=neon -mfloat-abi=softfp test.s -o test.o`
		
		The instruction:
		`      vcvt.s32.f32    s1, s1`
		`is wrongly encoded to:`
		`                vcvtr.s32.f32    s1, s1`
			Avoid using vcvt instructions.

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How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
+1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064, Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 010 5879 8000
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution
Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or 303-675-2140
Fax: 303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

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