

OMAP35x EVM Linux PSP

Release Notes



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Release Notes

This release notes provides important information that will assist you in using the OMAP35x EVM Linux PSP. This document contains product information and known issues that are specific to the Linux PSP for the OMAP35x EVM.

The PSP Package serves to provide a fundamental software platform for development, deployment and execution. This abstracts the functionality provided by the hardware. The product forms the basis for all application development on this platform.



Important

This release is based on open source Linux Kernel Version 2.6.31-rc7. (commit-id :58cf2f1425abf... on pm branch) It has been tested on the OMAP35x EVM2 (Rev E and Rev G) with the ES3.1 processor.



Note

The linux-omap git does not include full support for Video/PM Subsystems. It was expected that most of the Video/PM functionality will be rolled into linux-omap git by the time PSP 03.00.00.xx release is made. Since the convergence is taking longer, this release package includes a series of patches on top of the 2.6.31-rc7 kernel baseline (reflection of work from pm branch, dss2 library, psp patches). Based on review and acceptance of these patches in the community, the current implementation can change in the future.

For the list of patches included in the release package, the following table summarizes the origin of the patches and their current state of acceptance in the community.

Video Display	linux-omap git supports only minimal fbdev driver (no V4L2 support). This release is based on the DSS2 library and frame buffer driver submitted by Tomi to the community (http://www.bat.org/~tomba/git/linux-omap-dss.git). The release includes enhancements/fixes to the DSS2 library and fbdev driver (support for rotation, wait_for_vsync, dvi, argb). Also included in the release is the V4L2 driver, built around the DSS2 library.
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All patches are under various stages of submission/review/acceptance and can change in the future.

Video Capture	linux-omap git lacks support for the video capture driver. This release includes snapshot of work in progress (Nokia/TI). Patches for capture driver have been posted to the community and are under review.
Resizer Driver	linux-omap git lacks support for memory-to-memory resizer driver. RFC for the same has been posted to the community for feedback. This release includes a snapshot of current implementation for the resizer driver.
Audio Driver	This release includes patches (posted for community review) that add support for OMAP35x EVM under ASOC.
Power Management	Power management support is based on work from "pm" branch of linux-omap git (PM changes not on "master" branch yet). Patches from the pm branch are merged against the chosen kernel baseline and tested with other drivers. Further fixes/enhancements included in the release package have been submitted back to the community.
USB	Includes patches that have submitted/accepted in the community (linux-usb git). These patches have been ported against the release baseline.

The release notes contain following sections:

- General Information
 - Related Documentation
 - Tool Chain Version used in this release
 - Limitations
- Driver Information
- Reporting Issues

1. General Information

The release package includes the following deliverables:

- Boot loader (U-Boot) sources
- Pre-built binary of U-Boot (u-boot.bin)
- Linux Kernel Sources (based on 2.6.31-rc7, commit: 58cf2f1425abf...)
- Pre-built Linux kernel image (uImage)
- Pre-built RAM disk image containing root file system (built using OpenEmbedded/Angstrom Distribution)
- Pre-built NFS mountable root file system (built using OpenEmbedded/Angstrom Distribution)

1.1. Related Documentation

In addition to these release notes, the release package includes the following documentation:

- User Guide
- Migration Guide
- Data Sheet
- Getting Started Document

1.2. Tool Chain Version Used In This Release

- Code Sourcery arm-2009q1

1.3. Limitations

2. Drivers

2.1. U-Boot

This section provides an overview of the U-Boot driver.

The u-boot sources are based on the open source implementation from mainline U-Boot. (commit id: e60beb13cf0... tag: v2009.03)

The tree can be accessed at

denx-u-boot.git [<http://git.denx.de/cgi-bin/gitweb.cgi?p=u-boot.git;a=summary>]

2.1.1. Features

1. Supports boot from Micron NAND, MMC.
2. Supports read, write and erase operations on Micron NAND.
3. Supports 128/256MB of DDR RAM.
4. Supports bad block management on Micron NAND.
5. Supports TFTP protocol to fetch binary images.

2.1.2. Known Issues and Limitations

1. U-boot: OneNand is not supported on the older EVMs. U-boot doesn't support single binary for Nand/OneNand support.

2.2. Baseport

2.2.1. Features

1. Based on 2.6.31-rc7 kernel (commit:ef25c2a0...) from the linux-omap git(pm branch). The GIT can be accessed at linux-omap GIT. [<http://git.kernel.org/?p=linux/kernel/git/tmlind/linux-omap-2.6.git;a=shortlog;h=pm>]

2.2.2. Known Issues and Limitations

1. Only Sanity testing has been carried on the OMAP3EVM (EVM2 Rev.G) for this release. Future releases will undergo extensive testing

2.3. Audio Driver

2.3.1. Features

1. Supports TWL4030 audio codec in ALSA SoC framework.
2. Supports audio in both mono and stereo modes.
3. Supports multiple sample rates for both playback and capture.
4. Supports simultaneous playback and record (full-duplex mode).
5. Supports start, stop, pause and resume feature.
6. Supports mixer interface for TWL4030 audio codec.

2.3.2. Known Issues and Limitations

None

2.4. OneNAND Driver

This sections provides an overview of the OneNAND driver.

2.4.1. Features

1. Supports JFFS2 file system.
2. Out of total 128MB, NAND has been divided into 5 partitions listed below:
 - a. 512 KB Read only partition for X-Loader.
 - b. 1792 KB Read-only partition for u-boot
 - c. 256 KB Read-only partition for environment variables.
 - d. 5 MB Read/Write partition for Linux.
 - e. Remaining space is used for file system and others (Read/Write).

2.4.2. Known Issues and Limitations

1. OneNAND mount operation, read and write operations are slow on a filled flash.
2. OneNAND read and write operations are slow compared to earlier releases.
3. OneNAND has not been validated with this release.

2.5. NAND Driver

This sections provides an overview of the NAND driver.

2.5.1. Features

1. Supports JFFS2 file system.
2. Out of total 128MB, NAND has been divided into 5 partitions listed below:
 - a. 512 KB Read only partition for X-Loader.
 - b. 1792 KB Read-only partition for u-boot
 - c. 256 KB Read-only partition for environment variables.
 - d. 5 MB Read/Write partition for Linux.
 - e. Remaining space is used for file system and others (Read/Write).

2.5.2. Known Issues and Limitations

1. NAND mount operation, read and write operations are slow on a filled flash.
2. NAND read and write operations are slow compared to earlier releases.

2.6. USB Driver

This section provides an overview of the USB driver.

2.6.1. Features

2.6.1.1. MUSB OTG : Slave mode

1. Supports data transfer in DMA and interrupt mode.
2. File backed storage driver with SD media as the storage medium.
3. CDC/RNDIS gadget.

2.6.1.2. MUSB OTG : Host Mode (MSC, HID, Audio, Video)

1. USB Host works fine in DMA and Interrupt mode
2. USB mouse and USB keyboard functionality.

3. USB MSC functionality.
4. USB Audio, Video has been tested with aplay and mplayer.

2.6.1.3. MUSB OTG : OTG Mode (HNP, SRP)

1. Device to Host role switching (HNP).
2. Request A-device for enabling Vbus (SRP).

2.6.1.4. EHCI Host: (MSC, HID, Audio, Video)

1. USB mouse and USB keyboard functionality via a high speed hub.
2. High speed USB MSC functionality.
3. USB Audio, Video has been tested with aplay and mplayer.

2.6.2. MUSB OTG: Known Issues and Limitations

1. Older revisions of EVM requires two modifications for USB to work properly:
 - a. Select the ISP1504 PHY.
 - b. Remove large surge suppressors in the D+ and D- lines.
2. There is a limitation in the power that is supplied by the charge pump of the ISP1504 PHY on OMAP3EVM-1 (<=Rev-E). If you notice VBUSERR messages in the system console, then connect a self powered USB hub and then attach the device to the hub.

OMAP3EVM-2 (>=Rev-E) can support upto 500mA power and thus self powered hub is not required.

USB Vbus is switched off whenever a device is disconnected and no other device is connected again within 1.1ms. If a device is to be connected after this then switch-on the Vbus and start the session using below command.

```
$ echo "F" > /proc/driver/musb_hdrc
```

3. Rx throughput is very low compared to Tx throughput. Currently the driver always programs the DMA hardware in mode 0 for Rx. This means that for every USB wMaxPacketSize data the DMA hardware needs to be programmed. On the other hand the DMA hardware provides mode 1 where in a single programming of the DMA hardware a chain of wMaxPacketSize data packets can be transferred. The driver however correctly uses mode 1 when necessary for Tx DMA. Thus we see a discrepancy in throughput numbers for Mass Storage Class Host. Currently we are unable to use Mode-1 in Rx direction for Mass Storage class protocol due to unavailability of RqPktCount register in Mentor OTG v1.4.

4. Image flickering has been observed for 640*480 size image capture from Creative USB camera which uses high bandwidth isochronous transfer and with Logitech camera 640*480 image capture fails. When audio is played in parallel to 640*480 size capture on Creative camera then audio quality is affected.
5. USB audio/video stress failure observed when both audio and video are run in parallel for one full day.
6. OTG Protocol Test (OPT) failure has been observed for MUSB as A-device but all the test cases have passed for MUSB as B-device. The failed test cases for A-device are,
 - A-device not sending b_hnp_enable
 - B-OPT did not detect J-state on bus at sample time TWTRSTHS
 - UUT did not connect in HNP sequence
 - A-UUT Started Device Chirp
 - B-OPT did not detect device chirp K in reset. Aborting test
 - A-UUT continued resume
 - Did not receive an SOF before suspend detected
7. Read performance drops when CPUIDLE is enabled.
8. Ping failure is observed in RNDIS driver when ping of 64K size is performed from EVM to Windows XP. This is a known limitation with Windows XP.
9. NFS retry message is observed when CDC/RNDIS module is inserted after bootup.
10. File-storage gadget enumeration fails with Linux-2.4 host machine.

2.6.3. EHCI: Known Issues and Limitations

1. Only high speed devices can be connected directly to EHCI port on Mistral daughter card. All low/full speed devices can be connected via a high speed hub to EHCI port.
2. On some EVMs, bus errors are reported when IO is initiated.
3. EHCI driver doesn't leverage the power saving features supported by the silicon as it doesn't enable/disable ushbc clocks effectively while doing data transfer.
4. Compilation warnings have been observed for some functions.
5. EHCI ports become unusable when a full speed device is connected and disconnected.

2.7. V4L2 and FBDEV Display Driver

This section lists the features, limitations and issues in the V4L2 display driver and FBDEV display driver. V4L2 display driver controls both video pipelines of the DSS and FBDEV driver controls graphics pipeline of DSS.

This release is based on the DSS2 library and basic Frame buffer driver submitted by Tomi to the open source community which includes all the development activities, bug fixes like, rotation, wait_for_vsync, etc...

V4L2 driver is built on top of Tomi's DSS2 library.

Link to Tomi's Repository -
[git://gitorious.org/linux-omap-dss2/linux.git](https://gitorious.org/linux-omap-dss2/linux.git)

2.7.1. Features

Supported Pixel formats - Video plane: YUV, UYVU, RGB565, RGB24P and RGB24 unpacked and ARGB on Video2, GFX plane: RGB565, RGB24P, RGB24, RGB32, ARGB and RGBA

1. Video pipelines controlled through V4L2 user interface. Graphic pipeline controlled through FBDEV user interface.
2. Supports LCD display interface at VGA resolution (480*640)
3. Supports TV display interface at NTSC and PAL resolutions (both S-Video and Composite out is supported)
4. Configuration of parameters such as height and width of display screen, bits-per-pixel etc.
5. Supports setting up of OSD window destinations (TV or LCD) through sysfs on FBDEV interface while compile time option for V4L2 interface for video window.
6. Supports driver allocated (mmaped) and user, memory buffer in V4L2 and only driver allocated buffers in FBDEV.
7. Supports rotation - 0, 90, 180 and 270 degrees.
8. Supports DVI interface with configurable through SYSFS or boot argument.
9. Scaling is supported from 1/2X to 8X on video pipelines. Hardware supports scaling from 1/4x to 8x.
10. Wait for Vsync and Panning supported with FBDEV.
11. Alpha blending supported on video and graphics planes.
12. Source and destination color keying is supported through v4L2 ioctls.

2.7.2. Known limitations and features not supported

1. Sync Lost is observed when incorrect parameters are programmed on video and graphics pipeline.
2. For RGB888 rotation is not supported because of hardware limitation.
3. PAL resolution can be set maximum to 720 X 574 instead of 720 X 576 because of hardware limitation. It is mentioned in hardware errata.
4. Upscaling and downscaling with images more that 720X574 resolution is not supported because of dss functional clock frequency limitation.
5. Linking feature not supported on video pipelines.
6. Dynamic configuration of modes in TV not supported.
7. None of the modules (Fbdev, V4L2 and DSS2) can be build as module.
8. Pixel clock for display is not coming exactly what is required. So frame rate will not be exact 60Fps but it will be very near to it. Since the pixel clock is not coming exact driver will throw some warning messages. But that can be ignored.

2.7.3. Known issues

1. SDOCM00053357: Flicker and color corruption observed on TV display
2. SDOCM00053359: Sharpness is reduced when image is up-scaled.
3. SDOCM00053360: On some EVMs that have a Micron Nand part, display quality is bad.
4. SDOCM00053361: Directing any of the pipeline to TV cuts image on top left corner by few pixels.
5. SDOCM00053362: Frame rate may fall below 60Hz when rotation enabled for V4L2 driver under heavy system load.
6. SDOCM00053364: down scaling is not supported beyond 1/2x.
7. SDOCM00056810/SDOCM00062554: Video V4L2: V4L2 driver does not support modular build.
8. SDOCM00062721: Kconfig option for selection between PAL & NTSC is not USED

9. SDOCM00059300: Suspend/Resume is not supported when any of output is on TV (VENC).

This is mainly due to the hardware issue, VENC doesn't work properly after multiple enable/disable cycles.

2.8. Resizer Driver

This section provides an overview of the Resizer driver. The GIT baseline for this release doesn't support resizer driver for OMAP. Hence custom patches that provide Resizer support have been included as part of this release.

This release is based on the ISP-Camera library and Master Camera driver Patches developed/submitted by Sakari and Sergio.

Links to Sakari's and Sergio's Repository -

Sakari's Repo -

<http://git.gitorious.org/omap3camera/mainline.git>

Sergio's Repo -

<http://dev.omapzoom.org/pub/scm/saaguirre/linux-omap-camera.git>



Note

Please note that, the standalone resizer and previewer driver is not part of the Sakari's patch-sets. We have forward ported Resizer standalone driver ontop of it.

2.8.1. Features

1. Resizes input frame stored in RAM and stores output frame in RAM.
2. Supports resizing from 1/4x to 4x.
3. Supports independent horizontal and vertical resizing.
4. Supports YUV422 packed data and Color Separate data.
5. Supports driver allocated and user provided buffers.
6. Supports Luminance Enhancement.

2.8.2. Known Issues and Limitations

1. Output image size cannot be more than 2047x2047.
2. SDOCM00062550: Stack dump occurs on IOMMU buffers.
3. SDOCM00053412: Blockiness and feathering effect (at edges) are observed with 4x scaling.

2.9. Capture Driver

This section provides overview of the V4L2 Capture driver for OMAP3.

This release is based on the ISP-Camera library and Master Camera driver Patches developed/submitted by Sakari/Sergio.

Links to Sakari's and Sergio's Repository -

Sakari's Repo -

<http://git.gitorious.org/omap3camera/mainline.git>

Sergio's Repo -

<http://dev.omapzoom.org/pub/scm/saaguirre/linux-omap-camera.git>

2.9.1. Features

1. Supports OMAP3 Camera driver and TVP5146 decoder driver modules(built-in and as kernel modules)
2. Supports one software channel of capture and a corresponding device node (/dev/video0) is created.
3. Supports single I/O instance and multiple control instances.
4. Supports both memory map and user pointers buffer access mechanism.
5. Supports dynamic switching of input interfaces with some necessary restrictions wherever applicable.
6. Supports NTSC and PAL standards on Composite and S-Video interfaces.
7. Supports 8-bit BT.656 capture in UYVY and YUYV interleaved formats.
8. Supports standard V4L2 IOCTLs to get/set various control parameters like brightness, contrast, saturation, hue and auto gain control.

2.9.2. Known Constraints and Limitations

1. Dynamic switching of resolution and dynamic switching of interfaces is not supported when streaming is on.
2. Driver buffer addresses and pitch must be aligned to 32 byte boundary.
3. Cropping and scaling operations and their corresponding V4L2 IOCTLs are not supported.
4. Driver doesn't supports IO memory.

5. Both MMDC and OMAP3EVM-2 (\geq Rev-E) does not work simultaneously, they are mutual exclusive from software point of view.
6. It is observed that on Rev G board, most of the time TVP5146 decoder driver unable to read decoder ID. Removal of power cable and powering up again fixes this issue.

2.9.3. Known Issues

1. SDOCM00055260: In loopback sample application, the video displayed on the LCD has interlacing artifacts when viewing fast moving objects. This is because the input video is in interlaced mode @ 30 FPS while the LCD works in progressive mode @ 60 FPS. The frame rate conversion and de-interlacing is not done in the current sample application.
2. SDOCM00053374: Video quality issues observed with video test patterns.
3. SDOCM00053373: Field id is not coming proper on mass market daughter card. This results in flickering of image.
4. SDOCM00055567: VIDIOC_G_INPUT ioctl does not return active input on plug in plug out. It returns the previously detected input.
5. SDOCM00062554: Modular build is not supported.

2.10. Ethernet Driver

2.10.1. Features

1. Supports operations at 10/100 Mbps.
2. Supports NFS.
3. Support for auto-negotiation

2.10.2. Known Issues and Limitations

1. The driver reads the MAC address from associated EEPROM. If a valid address is not detected, the driver tries to preserve the already programmed (from U-boot) MAC address. If both the options fails, a random MAC address is Auto-generated
2. The ethernet controller has limited FIFO space and requires CPU cycles to read/write data to the FIFOs(no DMA). Hence the performance numbers for Ethernet are low as compared to the theoretical maximum.
3. Traffic flow freezes when the interface is brought down/up repeatedly under high traffic conditions. Issue seen when testing with IXIA traffic generator.

4. Under stress test, it is observed that the counter for erroneous packets is incremented.

2.11. MMC/SD Driver

This sections provides an overview of the MMC/SD driver.

2.11.1. Features

1. Supports MMC and SD memory cards
2. Supports 1-bit and 4-bit modes.
3. Supports high-speed and high-capacity SD cards.

2.11.2. Known Issues and Limitations

1. SDIO functionality is not supported
2. Interop Issues: Some MMC cards report compliance to MMC 4.x Specs though they can run at max.clock rate of 20MHz(notably Transcend cards)- the driver fails with such faulty cards.
3. MMC 8-bit mode has not been validated. Hence some MMC 8-bit card may not be enumerated.
4. MMC/SD cards cannot be removed while mount operation is in progress. If the card is removed, data integrity cannot be guaranteed.
5. CRC errors may be reported under heavy IO operation(specifically on read operation) with ES2.1 Si revision.

2.12. Touch Screen Driver

This sections provides an overview of the Touch Screen driver.

2.12.1. Features

1. Touch screen (LS037V7DW01) is supported.

2.12.2. Known Issues and Limitations

1. None

2.13. Power Management

2.13.1. Features

This is list of features supported in this release:

1. Supports Dynamic Tick framework.
2. Supports the *cpuidle* framework with MPU and Core transition to RETENTION and OFF states. The *menu* governor is supported.
3. Basic implementation for *cpufreq*.
4. Support SmartReflex with automatic (hardware-controlled) mode of operation.

2.13.2. Known Issues and Limitations

1. Allow drivers and applications to limit the idle state that can be entered.
2. Support for SmartReflex with manual (software-controlled) mode of operation.
3. Some of the drivers do not leverage the power-saving features supported by the silicon.

They need to enable/ disable corresponding clocks via `clk_enable()` and `clock_disable()` only when the clocks are *really* needed.

4. The *cpufreq* driver is not fully supported.
5. After the system is suspended, the resume operation does not succeed from the keypad and touchscreen.
6. Once the system enters OFF state, resume event from the keypad does not wake-up the system.
7. Resume event from the touchscreen does not wakeup the system.
8. When OFF mode is enabled and system is allowed to stay idle for long, virtual paging error is observed on the console. Sometimes, the system may not recover from this exception.
9. When the *cpuidle* framework is used, the statistics for OFF states do not match actuals.
10. When compiling kernel sources there are warnings in `clock34xx.c`. These relate to static table definitions in the file `omap3-opp.h`.

2.14. Root Filesystem

This sections provides an overview of the Root Filesystem.

The root filesystem binaries are built using Arago(based on OpenEmbedded)

2.14.1. Features

1. Includes ramdisk image

2. Includes NFS mountable filesystem
3. Supports for udev for initial population and dynamic updates to device nodes.

2.14.2. Known Issues and Limitations

None

3. Fixed in this release

3.1. Baseport

	Fix - Exception while handling mem hole on ARM
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3.2. USB

SDOCM00055422	Unable to resume from suspend when the kernel was RNDIS built in
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4. Reporting Issues

To report issues in this release, send an email to software support [mailto:softwaresupport@ti.com] describing the issue.