1/4-Inch Wide-VGA CMOS Digital Image Sensor

MT9V126 Firmware Release Notes

For additional information, refer to the MT9V126 data sheet at www.aptina.com

Introduction

This firmware release note summarizes the currently released patches for Aptina's MT9V126 and is provided to Aptina customers of this product only. Any permanent changes may or may not be incorporated into the data sheet.

All patches are identified by an identifier number, followed by a version number, each consisting of two digits. For instance, patch 0x0611 represents patch number 6, version 11. All patches occupy their own address spaces and operate independently. Some patches incorporate upgrades made through a previous patch. Refer to the individual patch descriptions for details.

Critical Patches

Table 1 summarizes the critical patches released in the current silicon revision. The patches must be loaded upon startup in order to operate the sensor properly. For additional questions, please contact your Aptina applications engineer.

Table 1: Critical Patches

Patch ID	Description
0x0611 (patch 06, version 11)	Due to an additional delay, the sensor's analog gain changes are not synchronized with the extended gain changes, resulting in a flickering effect while AE is adjusting to scene changes. This patch is necessary for correct operation of the sensor.

Recommended Patches

Table 2 summarizes the recommended patches released in the current silicon revision. The patches are incorporated into the default settings of the demo camera to enhance the functions of the sensor.

Table 2:   **Recommended Patches**

Patch ID	Description
0x0211 (patch 02, version 11)	Due to a firmware defect, the Overlay Manager does not handle bitmap properties correctly. This patch is recommended if overlay is used.
0x0711 (patch 07, version 11)	The firmware incorrectly limits the saturation control range from 0 to 127 (rather than the full 0 to 255). This patch removes this restriction and allows the full 0-255 range of saturation control.
0x0911 (patch 09, version 11)	This patch dampens the red/green and blue/green ratios which control the white-balance and CCM position calculations. By dampening the ratios, the speed with which the AWB algorithm adjusts the white-balance and the CCM position can be controlled. The patch uses CAM1_AET_EXT_GAIN_SETUP_0 (VAR=18,0x00BE) to control the dampening factor (no other firmware algorithm uses this variable). The range of values are 1 to 32, where 32 is no dampening, and 1 is maximum dampening. For backwards-compatibility, the default dampening factor upon loading the patch is 32. To prevent possible AWB oscillation, Aptina recommends using this patch and setting the dampening factor to 16.

Optional Patches

Table 3 summarizes the optional patches released in the current silicon revision. These patches are applications specific and may not need to be used in normal operation of the sensor.

Table 3:   **Optional Patches**

Patch ID	Description
0x0311 (patch 03, version 11)	This patch addresses a potential bitmap loading problem when a second bitmap is loaded while the first command to load a bitmap is still in progress. This patch is not needed if the host implement one field delay between loading bitmaps.
0x0411 (patch 04, version 11)	This patch supports calibration of the physical image centre offset of the device. Refer to the Calibration Statistics engine patch documentation for details.
0x0811 (patch 08, version 11)	AE 'Indoor' patch - prevents the AE Track algorithm entering zone 0 (this means that coarse integration time will be always a multiple of the Flicker period). This patch is enabled by setting bit 4 in the AE_TRACK_ALGO variable after the patch has been loaded and applied. One of the limitations is that this bit has to be enabled during configuration; the reason is that if we are streaming, already in zone 0 and the AE is stable, AE will not re-run and the indoor setting will not be triggered. Since this patch prevents the AE algorithm from operating in zone 0 (for bright conditions), bright outdoor scenes (for example, > 1000 lux under daylight) will result in overexposed images. Patch 10 incorporates the changes in this patch. As a result, when loading patch 10, it is not necessary to load patch 8.

Table 3:   Optional Patches (continued)

Patch ID	Description
0x1011 (patch 10, version 11)	1) 'Indoor' mode: This patch incorporates the "Indoor" mode operation to restrict the sensor to enter AE zone 0. Refer to patch 8 for details. 2) 'Adaptive' Minimum Gain Step Size: The patch calculates the minimum gain step based upon the current scene brightness, which permits the AE_TRACK_GATE control variable (driver 10, offset 0x14) to be reduced to 4 without inducing oscillation. This allows the AE Track algorithm to track scene brightness changes more closely. This patch incorporates the changes in patch 8. As a result,when loading this patch, it is not necessary to load patch 8.
0x1311 (patch13, version 11)	The SPI clock defaults at 4.5MHz. This patch allows the SPI clock to be configured to operate at a different clock rate (using the Flash Manager's Config command).
0x1411 (patch14, version 11)	The SOC firmware supports fixed 60/50 frames-per-second operation for NTSC/PAL video modes. However, in some cases the user may want variable frame-rate operation (provided the progressive output through the parallel port is selected). This patch removes the 'hard' 60/50 frames-per-second restriction and allows the host to control the minimum frame-rate through the CAM1_SENSOR_0_MAX_FDZONE_n variables, and the maximum frame-rate through CAM1_SENSOR_0_FRAME_LENGTH_LINES. Variable frame-rate support is enabled by default by applying this patch. Variable frame rate can be disabled by setting bit 5 inthe AE_TRACK_ALGO register. Note: the auto-synchronization feature required for NTSC/PAL operation MUST be disabled before the frame rate can be changed. It is highly recommended that this patch is loaded AFTER switching to progressive output and disabling auto- synchronization using Host Command 0x8300. This patch incorporates the changes in patch 6. As a result, when loading this patch, it is not necessary to load patch 6 .
0x1711 (patch17, version 11)	Patch 17 allows horizontal offsets with a step size of 1 using CAM1_SENSOR_X_OFFSET. Otherwise, we are currently limited to offsets with step size of 4 due to a sensor core limitation.

Reserved Patch Space

Table 4 summarizes the patch spaces that are currently not being used. These patch spaces are reserved for future enhancements.

Table 4:   Reserved Patches

Patch ID	Description
0x0511 (patch 05, version 11)	This patch is not needed for proper operation.
0x1111 (patch11, version 11)	This patch is reserved and may be used for future enhancements.
0x1211 (patch12, version 11)	This patch is reserved and may be used for future enhancements.
0x1511 (patch15, version 11)	This patch is reserved and may be used for future enhancements.
0x1611 (patch16, version 11)	This patch is reserved and may be used for future enhancements.

Revision History

Rev. A 3/29/10

- Initial release

This data sheet contains minimum and maximum limits specified over the power supply and temperature range set forth herein. Although considered final, these specifications are subject to change, as further product development and data characterization sometimes occur.