



MT9P001: Recommended Register Settings Addendum Introduction

1/2.5-Inch 5-Megapixel CMOS Digital Image Sensor Addendum

MT9P001 – Recommended Register Settings

Introduction

This document supplements the Micron[®] Imaging MT9P001 data sheet (Revision D, dated 4/06) with recommended register settings to achieve improved sensor performance. The standard CMOS image sensor data sheet should be referenced for a complete description of this 1/2.5-inch 5-megapixel image sensor. The specifications contained in this addendum supersede the specifications listed in the referenced CMOS image sensor data sheet.

Table 1: Recommended Register Settings

| Register Name | Address (Hex) | Default Value (Hex) | Recommended Value (Hex) |
|---------------|---------------|---------------------|-------------------------|
| Reserved | 0x0029 | 0x00480 | 0x0481 |
| Reserved | 0x003E | 0x0400 | 0x0087 |
| Reserved | 0x003F | 0x0004 | 0x0007 |
| Reserved | 0x0041 | 0x0003 | 0x0003 |
| Reserved | 0x0042 | 0x0005 | 0x0003 |
| Reserved | 0x0043 | 0x0001 | 0x0003 |
| Reserved | 0x004F | 0x0017 | 0x0014 |
| Reserved | 0x005F | 0x231D | 0x1C16 |
| Reserved | 0x0070 | 0x0067 | 0x00AC |
| Reserved | 0x0071 | 0x6404 | 0xA700 |
| Reserved | 0x0072 | 0x6206 | 0xA700 |
| Reserved | 0x0073 | 0x1408 | 0x0300 |
| Reserved | 0x0074 | 0x160A | 0x0600 |
| Reserved | 0x0075 | 0x330C | 0x4B08 |
| Reserved | 0x0076 | 0x4735 | 0x664C |
| Reserved | 0x0077 | 0x4937 | 0x6B57 |
| Reserved | 0x0078 | 0x6039 | 0xA567 |
| Reserved | 0x0079 | 0x6602 | 0xAB00 |
| Reserved | 0x007A | 0x6404 | 0xA904 |
| Reserved | 0x007B | 0x6206 | 0xA700 |
| Reserved | 0x007C | 0x6206 | 0xA700 |
| Reserved | 0x007E | 0x6408 | 0xA900 |
| Reserved | 0x007F | 0x6404 | 0xA900 |

Tables 2, 3, 4 and 5 reflect timing changes resulting from applying the recommended register settings in Table 1.



MT9P001: Recommended Register Settings Addendum Introduction

Reference Table 8, Frame Time, on page 16, in the MT9P001 data sheet.

Table 2: Frame Time

| Parameter | Name | Equation | Default Timing at EXTCLK = 96 MHz |
|-------------------|-----------------------------|---|-----------------------------------|
| fps | Frame Rate | $1/t_{FRAME}$ | 14 |
| t_{FRAME} | Frame Time | $(H + \max(VB, VB_{MIN})) \times t_{ROW}$ | 71.66ms |
| t_{ROW} | Row Time | $2 \times t_{PIXCLK} \times \max(((W/2) + \max(HB, HB_{MIN})), (41 + 346 \times (\text{Row_Bin} + 1) + 99))$ | 36.38 μ s |
| W | Output Image Width | $2 \times \text{ceil}((\text{Column_Size} + 1) / (2 \times (\text{Column_Skip} + 1)))$ | 2592 PIXCLK |
| H | Output Image Height | $2 \times \text{ceil}((\text{Row_Size} + 1) / (2 \times (\text{Row_Skip} + 1)))$ | 1944 rows |
| SW | Shutter Width | $\max(1, (2 \times 16 \times \text{Shutter_Width_Upper}) + \text{Shutter_Width_Lower})$ | 1943 rows |
| HB | Horizontal Blanking | $\text{Horizontal_Blank} + 1$ | 1 PIXCLK |
| VB | Vertical Blanking | $\text{Vertical_Blank} + 1$ | 26 rows |
| HB _{MIN} | Minimum Horizontal Blanking | $346 \times (\text{Row_Bin} + 1) + 64 + (W_{DC}/2)$ | 450 PIXCLK |
| VB _{MIN} | Minimum Vertical Blanking | $\max(8, SW - H) + 1$ | 9 rows |
| t_{PIXCLK} | Pixclk Period | $1/t_{PIXCLK}$ | 10.42ns |

The minimum horizontal blanking (HB_{MIN}) values for various Row_{Bin} and Column_{Bin} settings are shown in Table 3. Reference Table 9, HB_{MIN} Values for Row_{bin} vs. Column_{bin} Settings, on page 16, in the MT9P001 data sheet.

Table 3: HB_{MIN} Values for Row_{bin} vs. Column_{bin} Settings

| | | Column _{bin} (W _{DC}) | | |
|--------------------|---|--|------|------|
| | | 0 | 1 | 3 |
| Row _{bin} | 0 | 450 | 430 | 420 |
| | 1 | 796 | 776 | 766 |
| | 3 | 1488 | 1468 | 1458 |

Reference Table 10, Standard Resolutions, on page 16, in the MT9P001 data sheet.

Table 4: Standard Resolutions

| Resolution | Frame Rate | Sub-sampling Mode | Column Size (R0x04) | Row Size (R0x03) | Shutter Width Lower (R0x09) | Row Bin (R0x22 [5:4]) | Row Skip (R0x22 [2:0]) | Column Bin (R0x23 [5:4]) | Column Skip (R0x23 [2:0]) |
|-------------------------------|------------|-------------------|---------------------|------------------|-----------------------------|-----------------------|------------------------|--------------------------|---------------------------|
| 2592 x 1944 (Full Resolution) | 14 | N/A | 2591 | 1943 | <1943 | 0 | 0 | 0 | 0 |
| 2,048 x 1,536 QXGA | 21 | N/A | 2047 | 1535 | <1535 | 0 | 0 | 0 | 0 |
| 1,600 x 1,200 UXGA | 31 | N/A | 1599 | 1199 | <1199 | 0 | 0 | 0 | 0 |
| 1,280 x 1,024 SXGA | 42 | N/A | 1279 | 1023 | <1023 | 0 | 0 | 0 | 0 |



MT9P001: Recommended Register Settings Addendum Introduction

Table 4: Standard Resolutions (continued)

| Resolution | Frame Rate | Sub-sampling Mode | Column Size (R0x04) | Row Size (R0x03) | Shutter Width Lower (R0x09) | Row Bin (R0x22 [5:4]) | Row Skip (R0x22 [2:0]) | Column Bin (R0x23 [5:4]) | Column Skip (R0x23 [2:0]) |
|-----------------|------------|-------------------|---------------------|------------------|-----------------------------|-----------------------|------------------------|--------------------------|---------------------------|
| 1,024 x 768 XGA | 63 | N/A | 1023 | 767 | <767 | 0 | 0 | 0 | 0 |
| | 63 | skipping | 2047 | 1535 | | 0 | 1 | 0 | 1 |
| | 47 | binning | 2047 | 1535 | | 1 | 1 | 1 | 1 |
| 800 x 600 SVGA | 90 | N/A | 799 | 599 | <599 | 0 | 0 | 0 | 0 |
| | 90 | skipping | 1599 | 1199 | | 0 | 1 | 0 | 1 |
| | 65 | binning | 1599 | 1199 | | 1 | 1 | 1 | 1 |
| 640 x 480 VGA | 123 | N/A | 639 | 479 | <479 | 0 | 0 | 0 | 0 |
| | 123 | skipping | 2559 | 1919 | | 0 | 3 | 0 | 3 |
| | 53 | binning | 2559 | 1919 | | 3 | 3 | 3 | 3 |

Reference Table 11, Wide Screen (16:9) Resolutions, on page 17, in the MT9P001 data sheet.

Table 5: Wide Screen (16:9) Resolutions

| Resolution | Frame Rate | Sub-sampling Mode | Column Size (R0x04) | Row Size (R0x03) | Shutter Width Lower (R0x09) | Row Bin (R0x22 [5:4]) | Row Skip (R0x22 [2:0]) | Column Bin (R0x23 [5:4]) | Column Skip (R0x23 [2:0]) |
|--------------------|------------|-------------------|---------------------|------------------|-----------------------------|-----------------------|------------------------|--------------------------|---------------------------|
| 1,920 x 1,080 HDTV | 31 | N/A | 1919 | 1079 | <1079 | 0 | 0 | 0 | 0 |
| 1,280 x 720 HDTV | 59 | N/A | 1279 | 719 | <719 | 0 | 0 | 0 | 0 |
| | 59 | skipping | 2559 | 1439 | <719 | 0 | 1 | 0 | 1 |
| | 45 | binning | 2559 | 1439 | <719 | 1 | 1 | 1 | 1 |



8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006, Tel: 208-368-3900
 prodmktg@micron.com www.micron.com Customer Comment Line: 800-932-4992
 Micron, the M logo, and the Micron logo are trademarks of Micron Technology, Inc.
 All other trademarks are the property of their respective owners.

Preliminary: This data sheet contains initial characterization limits that are subject to change upon full characterization of production devices.



MT9P001: Recommended Register Settings Addendum Revision History

Revision History

Rev. C, Preliminary6/06

- Updated Table 1, “Recommended Register Settings,” on page 1

Rev. B, Preliminary5/06

- Add Table 2, “Frame Time,” on page 2
- Add Table 3, “HBmin Values for Row_bin vs. Column_bin Settings,” on page 2
- Add Table 4 and Table 5 to note frame rate changes resulting from applying recommended register default changes

Rev. A, Preliminary4/06

- Initial release