



Outgoing Defect Specification

MT9T013

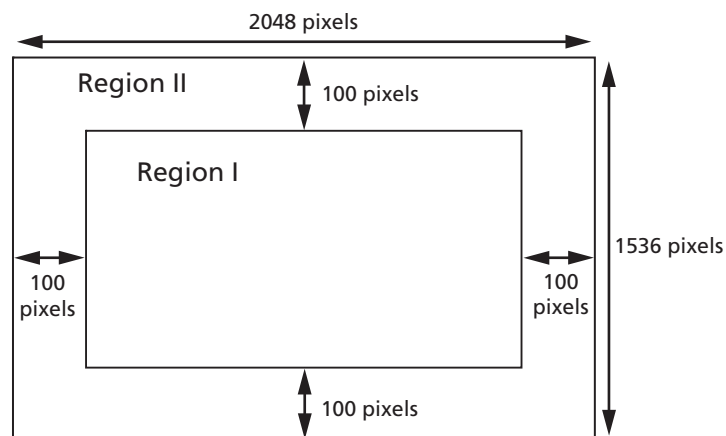
Introduction

This document defines outgoing defect specifications (preliminary) for Micron's MT9T013 CMOS digital image sensor. The sensor defect regions, as well as types of pixel and cluster defects, are defined.

Sensor Defect Specifications

The sensor array is partitioned into two regions: Region I and Region II. These dimensions are defined in Figure 1.

Figure 1: Sensor Array





MT9T013: Outgoing Defect Specification Sensor Defect Specifications

Defect Specifications (Bayer Format)

Table 1 specifies the allowable number of defects for each of the regions defined in Figure 1 on page 1.

Table 1: Defect Specification with Defect Correction Disabled (Bayer Format)

Setup: VAA = VAA_PIX = VDD_PLL = 2.8V; VDD = VDD_IO = 1.8V;
Operating conditions: T_J = 55°C (±3°C)

| Defect Definition | Number of Defects | | Definition Number |
|---|-------------------|-----------|-------------------|
| | Region I | Region II | |
| Very hot, very bright, or very dark pixel defects | Total ≤ 100 | | 1, 3, 5 |
| Hot or bright pixel defects | Total ≤ 200 | | 2, 4 |
| Dark pixel defects | Total ≤ 100 | | 6 |
| Clusters | 0 | 0 | 7, 8 |

Notes: 1. Image sensor is tested without a lens. Multiple images captured and analyzed in Bayer format.

Conditions for Image Test A

- Full resolution images (four frames) are captured at 15 fps in dark condition without a lens system. Frames are averaged for analysis.
- Sensor analog gain is 8x for all color planes and digital gain is 1x (unity).

Conditions for Image Test B

- Full resolution images (four frames) are captured at 15 fps with light condition equivalent to get 50 percent of sensor full-scale output without a lens system. Frames are averaged for analysis.
- Sensor analog gain is 1x for all color planes and digital gain is 1x (unity).



Cluster Defects

Figure 2 and Figure 3 represent the same sub-area of pixels. Figure 2 represents the raw Bayer pixel output form and Figure 3 represents the pixel output separated by color plane. Clusters are analyzed by looking at one particular pixel and its surrounding eight adjacent pixels within the same color plane, as seen in Figure 3. For example, if the center pixel is a dark pixel and any of its surrounding eight pixels within the same color plane are dark pixels, then it is defined as a dark cluster.

Figure 2: Raw Pixel Output

| Row | Column | | | | | |
|-----|--------|----|----|----|----|----|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | Gr | R | Gr | R | Gr | R |
| 2 | B | Gb | B | Gb | B | Gb |
| 3 | Gr | R | Gr | R | Gr | R |
| 4 | B | Gb | B | Gb | B | Gb |
| 5 | Gr | R | Gr | R | Gr | R |
| 6 | B | Gb | B | Gb | B | Gb |

Figure 3: Raw Pixel Output Separated by Color Plane

| Row | Column | | | Column | | |
|-----|--------|----|----|--------|----|----|
| | 1 | 3 | 5 | 2 | 4 | 6 |
| 1 | R | R | R | Gr | Gr | Gr |
| 3 | R | R | R | Gr | Gr | Gr |
| 5 | R | R | R | Gr | Gr | Gr |
| 2 | Gb | Gb | Gb | B | B | B |
| 4 | Gb | Gb | Gb | B | B | B |
| 6 | Gb | Gb | Gb | B | B | B |



Defect Definitions in Bayer Format

Defect definitions with no defect correction are defined in this section.

Definition 1: Very Hot Pixel Defect

A very hot pixel defect is defined as any single pixel that is greater than 50 percent of the sensor full-scale output when the sensor is operated as in image test A.

Definition 2: Hot Pixel Defect

A hot pixel is defined as any single pixel that is greater than 15 percent of the sensor full-scale output when the sensor is operated as in image test A.

Definition 3: Very Bright Pixel Defect

Within a color plane, each pixel is compared to the mean of the neighboring 11 x 11 pixels. If the pixel value is 50 percent or more above the mean, it is considered a very bright pixel defect when the sensor is operated as in image test B.

Definition 4: Bright Pixel Defect

Within a color plane, each pixel is compared to the mean of the neighboring 11 x 11 pixels. If the pixel value is 15 percent or more above the mean, it is considered a bright pixel defect when the sensor is operated as in image test B.

Definition 5: Very Dark Pixel Defect

Within a color plane, each pixel is compared to the mean of the neighboring 11 x 11 pixels. If the pixel value is 50 percent or more below the mean, it is considered a very dark pixel defect when the sensor is operated as in image test B.

Definition 6: Dark Pixel Defect

Within a color plane, each pixel is compared to the mean of the neighboring 11 x 11 pixels. If the pixel value is 15 percent or more below the mean, it is considered a dark pixel defect when the sensor is operated as in image test B.

Definition 7: Cluster

Using definition 4 results, the defects within each color plane are examined. If any two or more adjacent pixels that are considered bright pixel defects are detected, they are then defined as a bright cluster.

Definition 8: Dark Cluster

Using definition 6 results, the defects within a color plane are examined. If any two or more adjacent pixels that are considered dark pixel defects are detected, they are then defined as a dark cluster.



MT9T013: Outgoing Defect Specification Revision History

Revision History

Rev. A 05/15/2007

- Initial release



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