
VD55G0 visible domain limitation

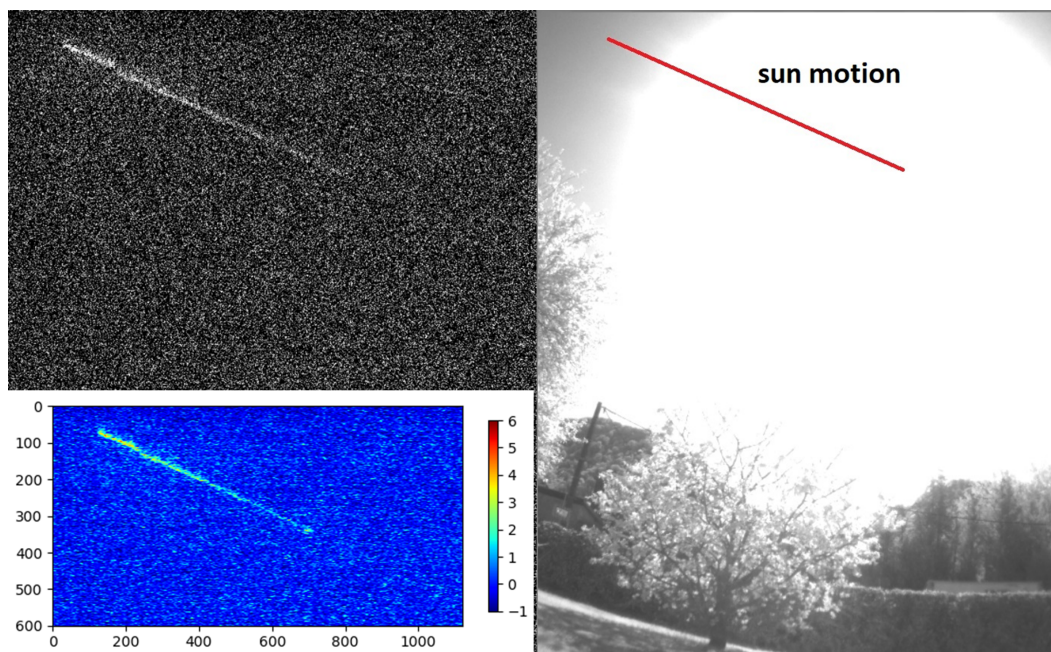
Introduction

VD55G0 is sensitive to ultra-high and sharp illumination in the visible domain, whether the sensor is powered/streaming or not. Some very powerful light sources (such as the sun) can create artifacts on the image sensor.

1 Example of the sun

The following figure shows the image generated over time by the sun, as captured by the sensor.

Figure 1. Capturing the sun



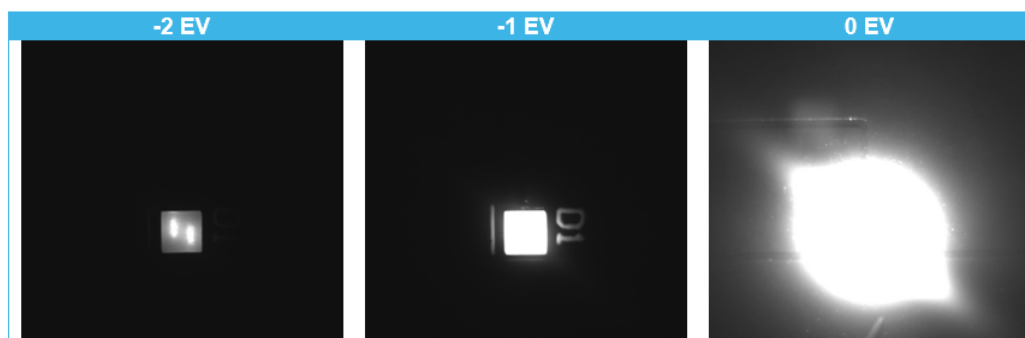
The light trail on the top left is the artifact generated by the sun, as it moves through the sky. Only the center of the sun creates the line. The image is taken in the dark, at high gain after being exposed to the sun. The light colors are in codes on 10 bits.

2 Measurement in a controlled environment

To estimate the impact of such phenomenon, a sensor is placed in front of a strong light (LED) for 100 hours then left in the dark for the following 100 hours. Periodically during the experiment, for a brief period, the light is switched off and the sensor is turned on to acquire images.

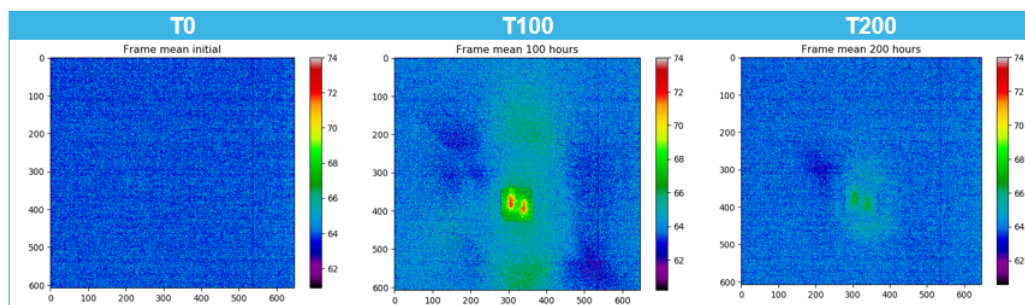
To help visualize, the following figure shows the actual scene captured by the image sensor.

Figure 2. Scene captured



The following figure shows the set of images taken by the sensor at T0, T100, and T200. These images were taken with the light off and a high analog gain.

Figure 3. Sensor images



In this example, the sensor pedestal is set to 64. The image artifact is at +10 codes (on 10 bits) on the worst part. The artifact is monitored for 200 hours with the regions of interest illustrated below.

Figure 4. Artifact ROI

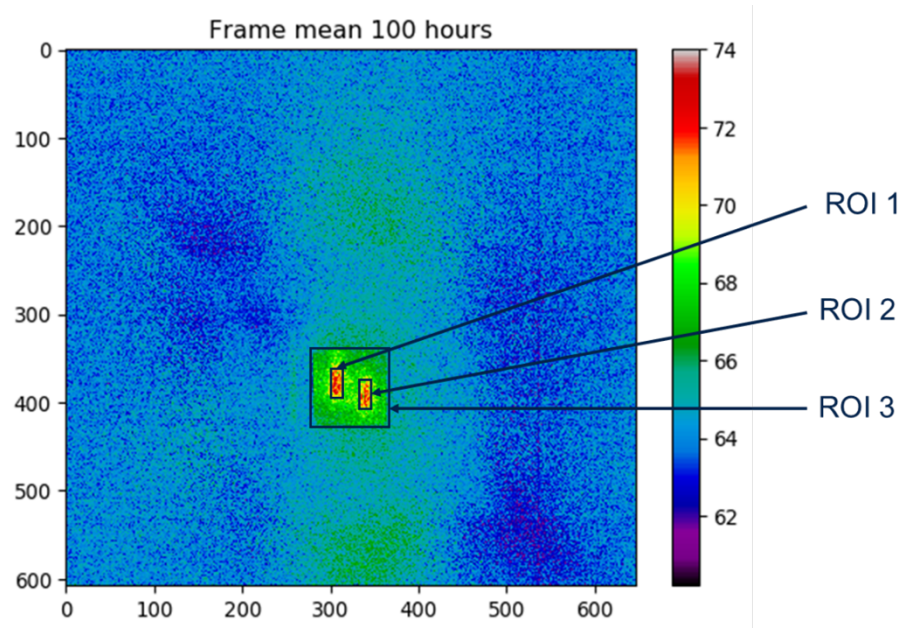
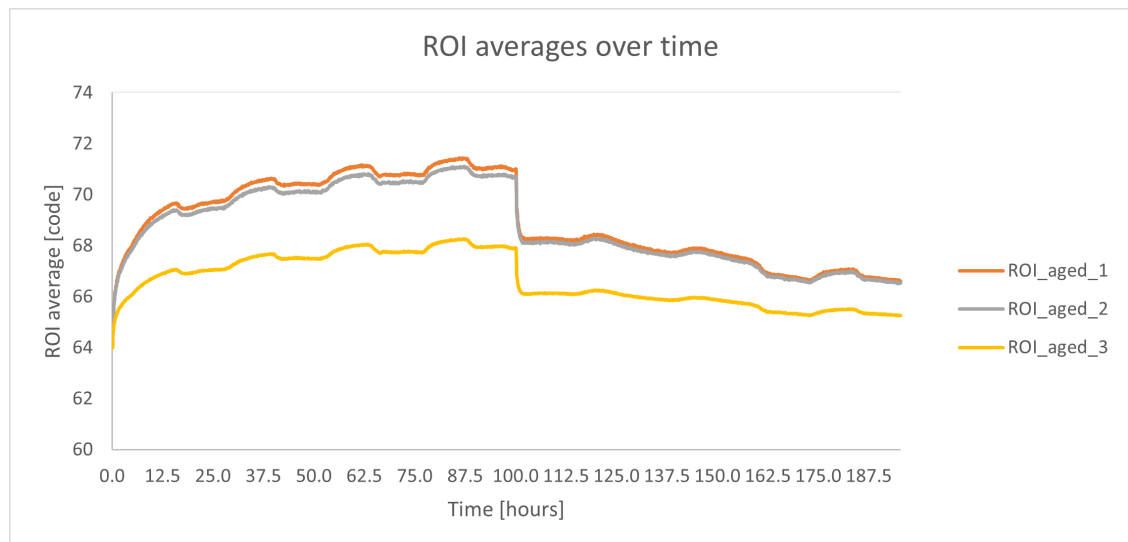


Figure 5. ROI over time



In the above use case, you can note:

- From 0 to 100h, light is ON. After 100h, the light is switched off
- At 100h: +0.7% FPN (vs total dynamic, so +7 codes vs pedestal)
- At 102h: +0.3% FPN (vs total dynamic, so +3 codes vs pedestal)
- At 200h: +0.2% FPN (vs total dynamic, so +2 codes vs pedestal)

3 Conclusion

An ultra-high illumination focused on the image can generate an artifact in the visible domain on the image sensor. This artifact quickly decreases without light, but remanence may subsist. The artifact afterglow strongly depends on the light source power density, the stress time, and the optical stack. The visibility of this artifact needs a dark scene and a high analog gain.

Indoor illumination and reflected light (scattered) may not create perceptible artifacts on the images. Applications using only IR illumination are not impacted by this effect.

Revision history

Table 1. Document revision history

Date	Version	Changes
13-Jun-2022	1	Initial release

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