Baumer
Passion for Sensors

Application Note

Parasitic exposure times of ON Semiconductor® Python sensors
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Description
This document describes the characteristics of the parasitic exposure time of ON Semiconductor® PYTHON (short: OSP) sensors.

Products (integrating PYTHON sensors by ON Semiconductor®)
Baumer VCXx
Baumer LXx-250

Content

1 Introduction

The sensors of the PYTHON family from ON Semiconductor® have a special characteristic regarding the duration of the exposure time. This is expressed in the extension of the set exposure time by a so-called parasitic exposure time.

2 Terms and Definitions

Term		Description
Exposure Time	t_{exp}	Exposure time configured in ExposureTime
Active Exposure Time	t_{exp_active}	Active time of exposure
Parasitic Exposure Time	$t_{exp\_parasitic}$	Duration of active exposure after start of readout (within frame overhead time, FOT), constant value
Frame Overhead Time	FOT	Start Readout (Pixel sampling)
Exposure Active	$t_{exp\_active\_output}$	Exposure Active signal

3 Signal patterns

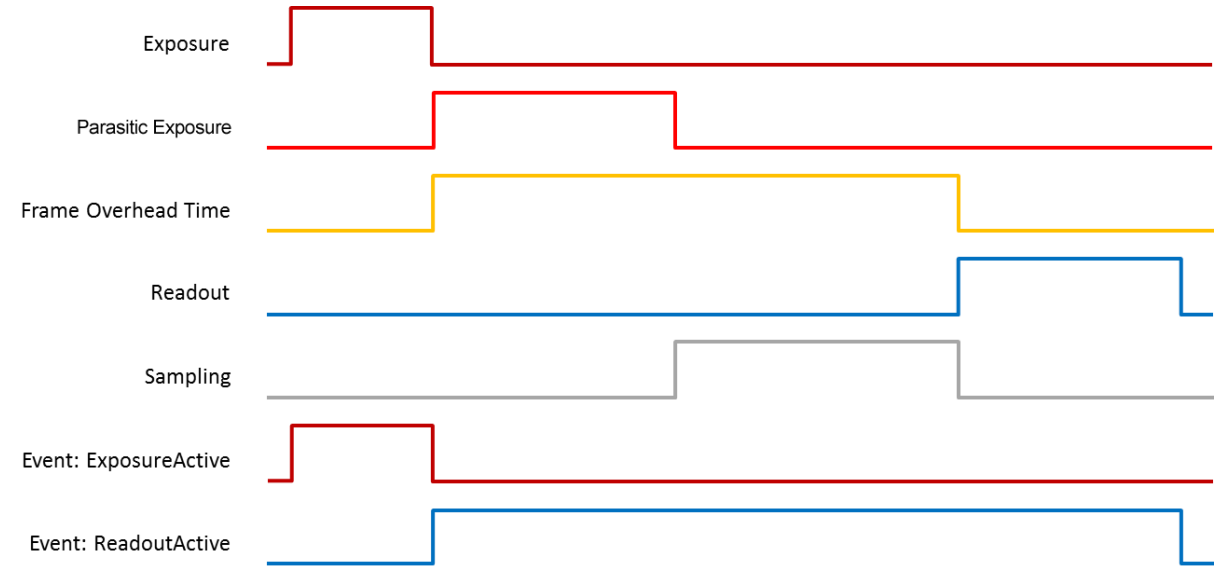

Fig. 1: Timing diagram

4 Cause

At the end of the exposure follows the Frame Overhead Time (FOT), in which among other things the sampling of the pixels in the sensor takes place. At the beginning of this time the sensor is still light sensitive. This is called parasitic exposure.

Since neither the calculation bases of the sensor manufacturer nor any signals at the status pins of the sensor are available, this time can only be determined experimentally.

5 Determining the active exposure time

5.1 Measuring equipment

Baumer developed the exposure time meter to determine the real active exposure time. The time meter consists of a LED panel and a controller for individual LED trigger as well as image acquisition trigger of the camera under measurement.

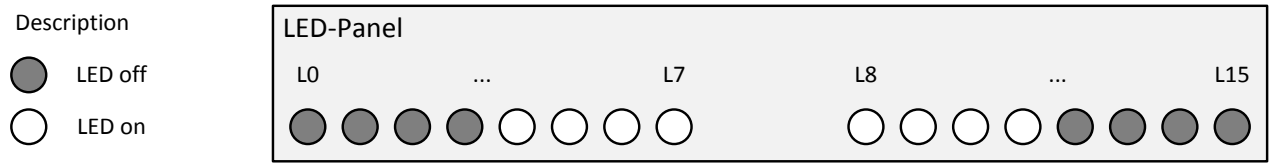

Fig. 2: LED panel (diagram)

5.2 Measuring methods

Each LED (L0 .. L15) at the panel switches on and off with 0.1µs accuracy.
The set exposure time interacting with the LEDs' on-time sequence allows for conclusions on both active and parasitic exposure time.

Formula:

$$t_{exposure_{active}} = t_{exposure_{configured}} + t_{exposure_{parastic}}$$

Example: If LED panel configuration provides every LED with on-time $t_{ON_{LED}}$ to switch on and off sequentially, the number of light points (LEDs) to appear in the camera image can be calculated in advance:

$$n_{calculated} = \frac{t_{exposure_{configured}}}{t_{ON_{LED}}}$$

Parasitic exposure is present if there are more light points on the image than calculated ($n_{calcualted} < n_{image}$), The number of excessive light points informs on the amount of parasitic exposure.

$$t_{exposure_{parasitic}} = \left(n_{image} - n_{calculated}\right) \cdot t_{ON_{LED}}$$

5.3 Results

The cameras concerned were measured using the measurement setup described above. The resulting values are as follows:

Modell	ExposureTime [µs]	Active Exposure Time [µs]	Parasitic Exposure Time [µs]
VCXG-02/13	20	63	43
VEXG-02/13	40	117	77
VCXG-25/53	20	81	61
VEXG-25	40	107	67
VCXU-02/13	20	48	28
VCXU-25/53	20	50	30
LXG/C-250	27	67	40

6 Support

Please contact our Technical & Application Support Center with any questions.

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7 Legal notes

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Baumer Group

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