Template Specification sheet EMVA1288

Introduction: Purpose of this template is to list the data to be published for presentation of data according to EMVA1288 standard. This document is an example only. After completing your first series of measurements according to 1288 standard, this document can be helpful to guide you through the preparation of the first 1288 compliant datasheet. Use it to double chaeck that all mandatory data and graphs are presented. This document is made based on Module1 Rev. A1.03 and Module2 preliminary release. The unique binding document describing the data presentation is always the most up to date standard document. The mandatory data of the 1288 Standard reflects a minimum. It is strongly recommended the component vendor completes the data according to 1288 standard with additional characterization data relevant for the respective product.

General Information:

Vendor Name	
Model Name	
Sensor Type	
Sensor diagonal in mm	
Indication lens category (inch)	
Resolution (width x height)	
Pixel size	
Readout type (if applicable) Transfer type (if applicable)	
Shutter type (Rolling/ Global)	
Overlap capabilities (Integration overlaps Readout)	
Maximum frame rate at given operation point	
Type of presented data (typical /guaranteed/ guaranteed over live time)	
Definition of "typical" (number of samples etc..)	
Other relevant information (interface type etc...)	

Description of operation point:

In this section the detailed operation point is given. Preferably a full listing of programmable features regarding the operation point is given. E.g. listing of register settings.

Housing temperature fro measurement:

Measurement wavelength:

Module 1: Sensitivity, Temporal and Spatial Noise:

Figure 1: Mean gray value in [DN] versus set exposure time [s] and versus number of photons collected in a pixel during exposure time in [p~] on double X axis.

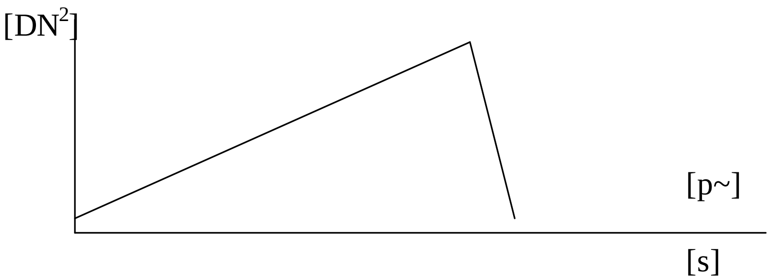

Figure 2: Variance of temporal distribution of gray values in [DN^2] versus number of photons collected in a pixel during exposure time in [p~] and versus exposure time set during acquisition [s] on double X axis.

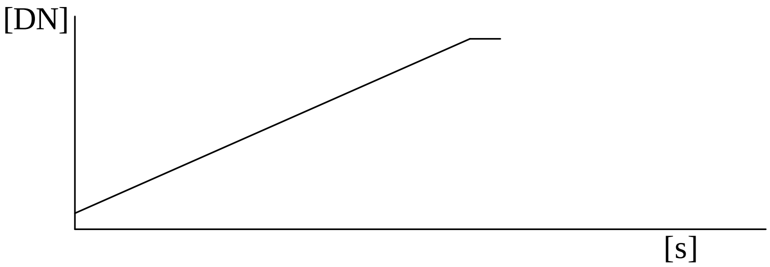

Figure 3: Mean of the gray values' dark signal in [DN] versus exposure time in [s]. (Note: This plot can also be combined with figure 1 in a single graphic.)

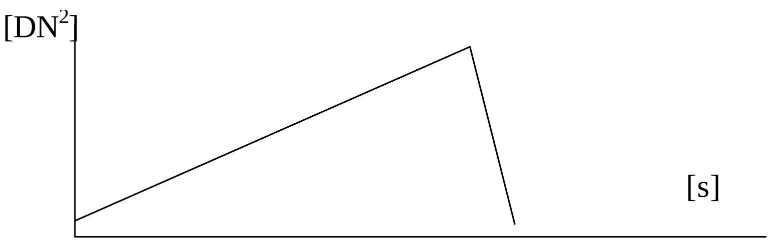

Figure 4: Variance of the gray values' temporal distribution in dark in [DN^2] versus exposure time in [s]. (Note this plot can also be combined with figure 2 in a single graphic)

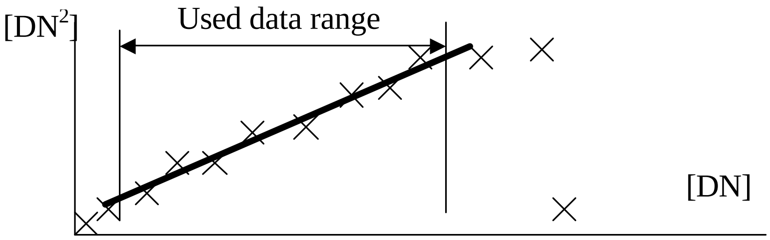

Figure 5: Light induced variance of temporal distribution of gray values in [DN^2] versus light induced mean gray value in [DN]. Indicate the measurement points which are used to fit a line for extraction of K and the linear fit.

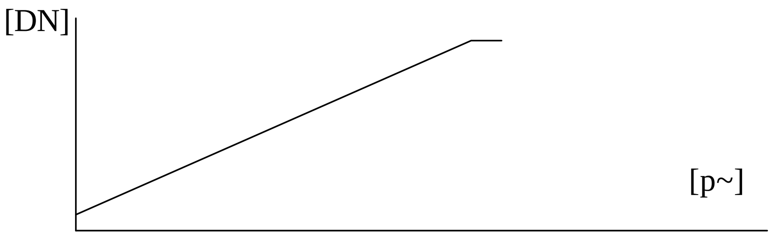

Figure 6: light induced mean gray value in [DN] versus the number of photons collected in a pixel during exposure time in [p~]. (Note, this plot can be combined with plot nr. 1. in a single graphic)

Derived Quantities:

Quantity	Value
$h(l)$: **Total quantum efficiency** in [%] at measurement wavelength	
s_{d0} : Standard deviation of the **temporal dark noise** referenced to electrons for exposure time zero in [e-].	
N_{d30} : **Dark current** for a housing temperature of 30°C in [e-/s].	
$\frac{1}{K}$: **Inverse of overall system gain** in [e-/DN].	
$m_{e.sat}$: **Saturation capacity** referenced to electrons in [e-].	
$m_{p.\min}(l)$: **Absolute sensitivity threshold** in [p~] at the measurement wavelength	
$SNR_y(m_p)$: **Signal to noise ratio** at saturation	
$DYN_{in} = DYN_{out}$: **Dynamic range** in [1]	
$DSNU_{1288}$	
$PRNU_{1288}$	
s_o : Standard deviation of the **spatial offset noise** referenced to electrons in [e-]	
S_g : Standard deviation of the **spatial gain noise** in [%].	

The following measurements can be either given as graph or as table, or preferably both:

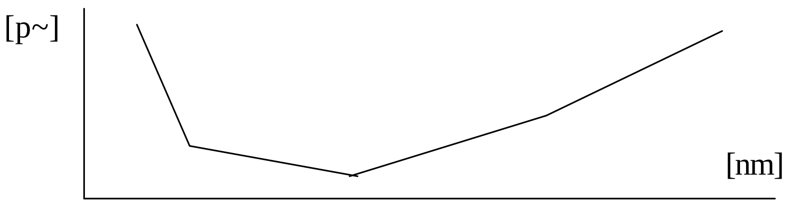

Figure 7: $m_{p.\min}(l)$: **Absolute sensitivity threshold** in [p~] for monochrome light versus wavelength of the light in [nm].

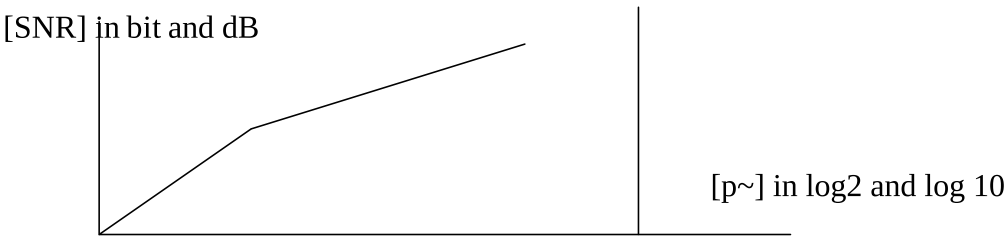

Figure 8: $SNR_y(m_p)$: **Signal to noise ratio** in [1] versus number of photons collected in a pixel during exposure time in [p~] for monochrome light with it's wavelength given in [nm]. The wavelength should be near the maximum of the quantum efficiency. If this data is given as a diagram, it must be plotted with SNR_y on the y-axis using a double scale $\log_2$ [bit] / 20 $\log_{10}$ [dB] and m_p on the x-axis using a single scale $\log_2$ [bit]

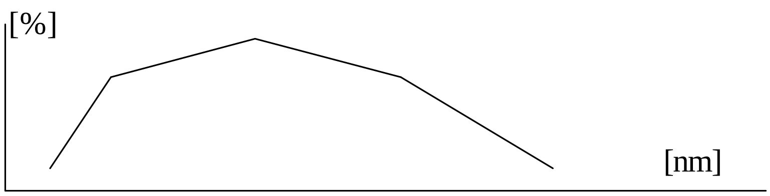

Figure 9: $h(l)$: **Total quantum efficiency** in [%] for monochrome light versus wavelength of the light in [nm].

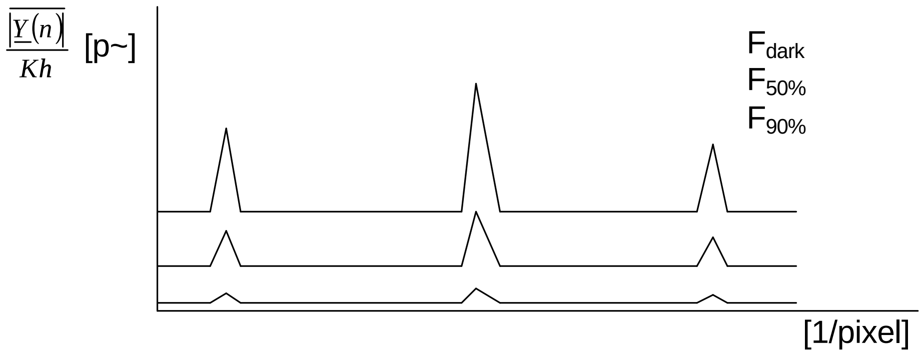

Figure 10: Spectrogram referenced to photons in [p~] versus spatial frequency in [1/pixel] for no light, 50% saturation and 90% saturation. Indicate the whiteness factor F for each of the three graphs.

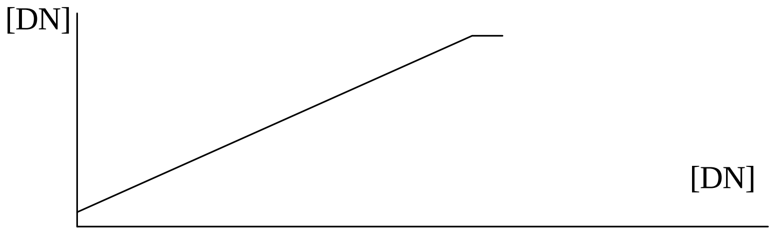

Figure 11: $\sqrt{s^2_{y.spat} - s^2_{y.spat.dark}}(m_y - m_{y.dark})$: Light induced standard deviation of the spatial noise in [DN] versus light induced mean of gray values [DN].

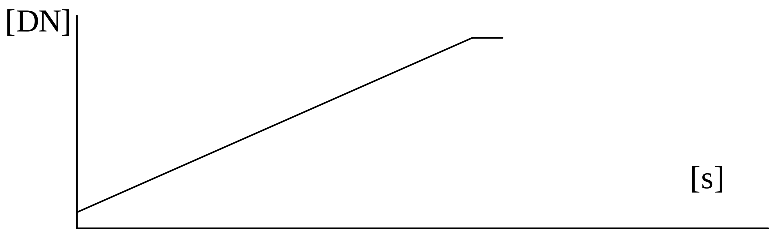

Figure 12: $s_{y.spat.dark}(T_{\exp})$: Standard deviation of the spatial dark noise in [DN] versus exposure time in [s].

Module 2: Linearity Error

The linearity error must be characterized at an operating point where data according to module 1 is presented.

The raw acquired measureme nt data has to be presented together the linear fit regression line.

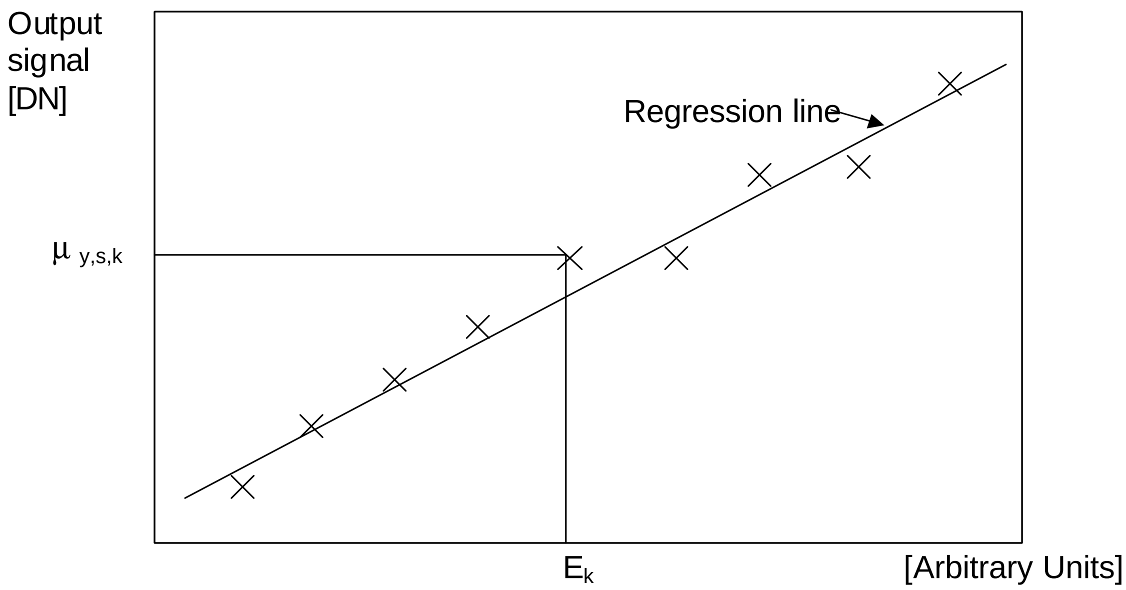

Figure 13: Mean gray value versus exposure. The fitted linear regression line is plotted together with the data points.

Parameter	Value
A Slope of the regression line [DN / AU]	
B Offset of the regression line [DN]	
$LE\%_{a-b}$ Peak linearity error in range of a% to b% saturation. At least a05% and b=59% is mandatory.	

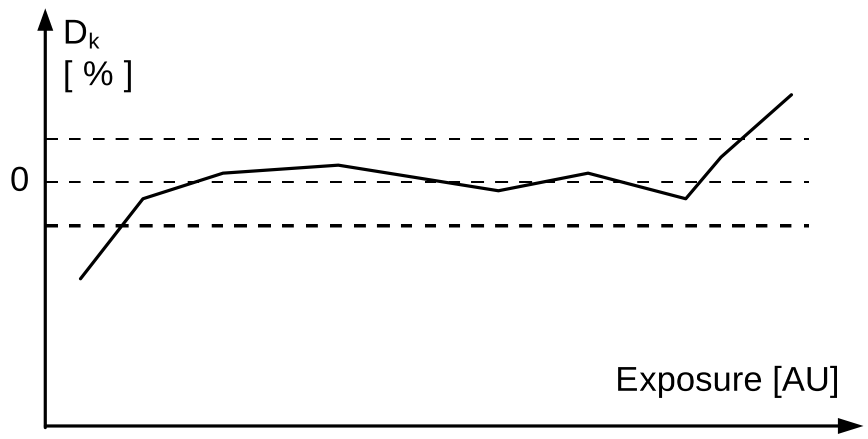

Figure 14: Deviation from the measurement point from the linear regression line.