EMVA 1288 Summary Sheet

This datasheet describes the specification according to the standard 1288 for Characterization and Presentation of Specification Data for Image Sensors and Cameras of the European Machine Vision Association (EMVA) (see www.standard1288.org). The measurements were performed with an AEON ACC3 RGB Release 3, 20.01.2104, SN 0005(). The performance parameters and estimated accuracy of the measurements are described in the technical report for the instrument, its calibration in the corresponding calibration report.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>MATRIX VISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>mvBlueCOUGAR-X1010C</td>
</tr>
<tr>
<td>Serial number</td>
<td>GX005063</td>
</tr>
<tr>
<td>Sensor diagonal</td>
<td>7.92 mm</td>
</tr>
<tr>
<td>Lens category</td>
<td>C-Mount</td>
</tr>
<tr>
<td>Resolution</td>
<td>3856 × 2764, 12 bit</td>
</tr>
<tr>
<td>Pixel size</td>
<td>1.67 μm × 1.67 μm</td>
</tr>
<tr>
<td>Sensor type</td>
<td>CMOS</td>
</tr>
<tr>
<td>Shutter type</td>
<td>Rolling</td>
</tr>
<tr>
<td>Overlap capabilities</td>
<td>Overlapping</td>
</tr>
<tr>
<td>Maximum frame rate</td>
<td>5.6 Hz</td>
</tr>
<tr>
<td>Interface type</td>
<td>GigE Vision</td>
</tr>
</tbody>
</table>

Type of data presented  Single

**Operation point 1, (page 5)**
- Wavelength centroid 467.3 nm
- Wavelength FWHM 20.5 nm
- Gain, offset Gain = 0 dB, Offset = 0.3

**Operation point 2, (page 17)**
- Wavelength centroid 534.2 nm
- Wavelength FWHM 30.9 nm
- Gain, offset Gain = 0 dB, Offset = 0.3

**Operation point 3, (page 29)**
- Wavelength centroid 629.5 nm
- Wavelength FWHM 13.1 nm
- Gain, offset Gain = 0 dB, Offset = 0.3

Optional data measured
None

![Spectral sensitivity](attachment://m0390.png)
EMVA 1288 Summary Sheet for Operating Point 1

Type of data  | Single
---|---
Exposure time | 4.0 ms
Frame rate | 0.0 Hz
Data transfer mode | BayerGR12

Gain, offset | Gain = 0dB, Offset = 0.3

Environmental temperature | 26.8°C
Camera temperature | 38.9°C
Wavelength, centr., FWHM | 467 nm, 20.5 nm

Quantum efficiency | \( \eta = 0.378 \)
Gain | \( K = 0.665 \)
\( \frac{1}{K} = 1.505 \)

Dark noise & DSNU
\( \sigma_d \) (DN) | 5.04
\( \sigma_0 \) (e) | 7.6
DSNU\(_{1288}\) (DN) | 1.00
DSNU\(_{1288}\) (e) | 1.50

Signal-to-noise ratio & PRNU
SNR\(_{\text{max}}\) | 72
SNR\(_{\text{max}}\) (dB) | 37.1
SNR\(_{\text{max}}\) (bits) | 6.2
\( \frac{1}{\text{SNR}_{\text{max}}} \) (%) | 1.40
PRNU\(_{1288}\) (%) | 1.083

Nonlinearity | LE (%) = 0.22

Sensitivity & saturation
\( \mu_{p,\text{min}} \) (p) | 21.4
\( \mu_{e,\text{min}} \) (e) | 8.1
\( \mu_{p,\text{sat}} \) (p) | 13573
\( \mu_{e,\text{sat}} \) (e) | 5124

Dynamic range
DR | 633
DR (dB) | 56.0
DR (bit) | 9.3

Dark current
\( \mu_{c,\text{mean}} \) (DN/s) | 0.19
\( \mu_{c,\text{mean}} \) (e/s) | 0.29
\( \mu_{c,\text{var}} \) (e/s) | 3.41
**EMVA 1288 Summary Sheet for Operating Point 2**

**Type of data**  
Single

**Exposure time**  
4.0 ms

**Frame rate**  
0.0 Hz

**Data transfer mode**  
BayerGR12

**Gain, offset**  
Gain = 0dB, Offset = 0.3

**Environmental temperature**  
26.8°C

**Camera temperature**  
38.9°C

**Wavelength, centr., FWHM**  
534 nm, 30.9 nm

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**Quantum efficiency**  
\[ \eta = 0.312 \]

**Gain**  
\[ K \text{ (DN/e)} = 0.681 \]
\[ 1/K \text{ (e/DN)} = 1.469 \]

**Dark noise & DSNU**  
\[ \sigma_d \text{ (DN)} = 4.94 \]
\[ \sigma_0 \text{ (e)} = 7.2 \]
\[ \text{DSNU}_{1288} \text{ (DN)} = 1.65 \]
\[ \text{DSNU}_{1288} \text{ (e)} = 2.43 \]

**Signal-to-noise ratio & PRNU**  
\[ \text{SNR}_{\text{max}} = 74 \]
\[ \text{SNR}_{\text{max}} \text{ (dB)} = 37.3 \]
\[ \text{SNR}_{\text{max}} \text{ (bits)} = 6.2 \]
\[ 1/\text{SNR}_{\text{max}} \text{ (%)} = 1.36 \]
\[ \text{PRNU}_{1288} \text{ (%)} = 1.306 \]

**Nonlinearity**  
\[ \text{LE} \text{ (%)} = 0.23 \]

**Sensitivity & saturation**  
\[ \mu_p, \text{min} \text{ (p)} = 24.9 \]
\[ \mu_e, \text{min} \text{ (e)} = 7.8 \]
\[ \mu_p, \text{sat} \text{ (p)} = 17379 \]
\[ \mu_e, \text{sat} \text{ (e)} = 5429 \]

**Dynamic range**  
\[ \text{DR} = 698 \]
\[ \text{DR (dB)} = 56.9 \]
\[ \text{DR (bit)} = 9.4 \]

**Dark current**  
\[ \mu_c, \text{mean} \text{ (DN/s)} = 0.02 \]
\[ \mu_c, \text{mean} \text{ (e/s)} = 0.03 \]
\[ \mu_c, \text{var} \text{ (e/s)} = 2.86 \]
EMVA 1288 Summary Sheet for Operating Point 3

Type of data  | Single  
---|---
Exposure time  | 4.0 ms  
Frame rate  | 0.0 Hz  
Data transfer mode  | BayerGR12  

Gain, offset  | Gain = 0dB, Offset = 0.3  
Environmental temperature  | 26.8°C  
Camera temperature  | 38.9°C  
Wavelength, centr., FWHM  | 630 nm, 13.1 nm  

Gain

Photon transfer m0390, 630 nm, 19.06.2015

SNR m0390, 630 nm, 19.06.2015

Quantum efficiency

\[ \eta = 0.180 \]

Gain

\[ K \ (DN/e) = 0.699 \]
\[ 1/K \ (e/DN) = 1.430 \]

Dark noise & DSNU

\[ \sigma_d \ (DN) = 5.01 \]
\[ \sigma_0 \ (e) = 7.2 \]
\[ DSNU_{1288} \ (DN) = 2.46 \]
\[ DSNU_{1288} \ (e) = 3.51 \]

Signal-to-noise ratio & PRNU

\[ SNR_{max} = 74 \]
\[ SNR_{max} \ (dB) = 37.3 \]
\[ SNR_{max} \ (bits) = 6.2 \]
\[ 1/SNR_{max} \ (%) = 1.36 \]
\[ PRNU_{1288} \ (%) = 1.302 \]

Nonlinearity

\[ LE \ (%) = 0.26 \]

Sensitivity & saturation

\[ \mu_{p,\text{min}} \ (p) = 42.8 \]
\[ \mu_{e,\text{min}} \ (e) = 7.7 \]
\[ \mu_{p,\text{sat}} \ (p) = 30161 \]
\[ \mu_{e,\text{sat}} \ (e) = 5420 \]

Dynamic range

\[ DR = 705 \]
\[ DR \ (dB) = 57.0 \]
\[ DR \ (bit) = 9.5 \]

Dark current

\[ \mu_{c,\text{mean}} \ (DN/s) = 1.07 \]
\[ \mu_{c,\text{mean}} \ (e/s) = 1.53 \]
\[ \mu_{c,\text{var}} \ (e/s) = 3.05 \]