JENOPTIK

MORE LIGHT

EVIDIR alpha infrared camera modules

Technical Specifications for OEM-Modules

	EVIDIR alpha infrared camera cores
Detector Type	Uncooled microbolometer with 12 µm pixel pitch
Spectral range	LWIR 8 µm… 14 µm
Safe max detector load	Radiations corresponding to black body radiation of 1000°C
Dynamic range	16 bit
Frame rate options	• ≤ 9Hz (no export regulations) • 60Hz (30Hz on request)
Shutter Type	Mechanical shutter or long-term & stable shutterless
Image Data	• Corrected RAW 16 bit • Mono 8 bit • YCrCb 4:2:2 • YCrCb 4:4:4 • RGB 24 bit
Thermal sensitivity	≤ 30mK (≤ *20mK under special conditions*) Conditions for <30mK: • F number = f/1.0 • $T_{ambient}$ = 22°C • T_{object} = 30°C • smooth level - *smooth 9*
Electrical Data	
Supply voltage	3.3 V DC
Power consumption	• Cameras with detector 320x240: ≤ 0.85W • Cameras with detector 640x480: ≤ 1.05W
Environmental Operation	
Ambient temperature	–40°C … 70°C (Viewer) (to be verified!) –25°C … 60°C (Radiometer) (Depending on overall heat dissipation. Max. detector temperature must not be exceeded.) Lower or higher temperatures on request
Max detector temperature	+85°C Ensure forced cooling if required to limit detector temperature
Relative max. air humidity	10 ... 95% without condensation
Transport/storage	
Ambient temperature	-40°C... +85°C
Relative max air humidity	10 ... 95% without condensation
IP protection according to ISO 20553	• Body, OEM camera core: No protection • Lens: Front side sealing to IP 67 Protected against ingress of dust protected in case of temporary immersion in water
	EVIDIR alpha cameras as Viewer models
Spatial resolution	OEM Core 320 Viewer: 320 x 240 pixels OEM Core 640 Viewer: 640 x 480 pixels
Visualization range	-40°C… +120°C, optional +600°C

Non-Uniformity Correction	• Shutter based NUC with mechancial shutter (shutter NUC) • Shutterless algorithms with object NUC (external action required)
Video interface	• Parallel CMOS • Serial CameraLink
Control interface	Serial UART, command line based
Dimensions, weight (body only)	
Camera with shutter	30 x 30 x <20mm³ (width x height x length, without lens)
Camera without shutter	Customer specific solution 30 x 30 x <20mm³ (width x height x length, without lens) 25 x 25 x <20mm³ (width x height x length, without lens) - on request
Weight	≤ 30g (without lens)
Standard lens options (further lenses on request)	Camera: OEM Core 320 Viewer HFoV x VFoV / Focal length / F-Number 15.9° x 11.9° / 14.0mm / f/1.0 30° x 23° / 7.2mm / f/1.0 60° x 44° / 3.9mm / f/1.1 Camera: OEM Core 640 Viewer HFoV x VFoV / Focal length / F-Number 17.6° x 13.2° / 25.0mm / f/1.0 31° x 24° / 14mm / f/1.0 75° x 55° / 6.2mm / f/1.0
	EVIDIR alpha cameras as Radiometric models
Spatial resolution	OEM Core 320 Radiometer: 320 x 240 pixels OEM Core 640 Radiometer: 640 x 480 pixels
Measurement range	-40°C… +120°C 0°C… +600°C
Measurement Accuracy	• ≤ ± 5K or ± 5% (higher value is valid) (to be verified!) at temperatures: $T_{ambient}$ = -15°C ... 55°C T_{object} = -40°C … 600°C • High accuracy range of measurement range 1 ≤ ± 3K (to be verified!) at temperatures: $T_{ambient}$ = 5°C … 35°C T_{object} = 0°C … 120°C • High accuracy range of measurement range 2 • ≤ ± 3% (to be verified!) at temperatures: $T_{ambient}$ = 5°C … 35°C T_{object} = 120°C … 600°C
Radiometric functions	Three output options: • Camera generates temperature data of each pixel (16 Bit) • Viewer image (8 bit B/W or 16/24 Bit false color) with termperature information (8 isotherms and 3 operator defined regions of interest ROI) • Mixed mode - Viewer image (8 bit B/W) combined with additional output of radiometric data (16 bit) - on demand
Non-Uniformity Correction	• Shutter based NUC with mechancial shutter (shutter NUC)
Video interface	• Parallel CMOS • Serial CameraLink
Control interface	Serial UART, command line based
Dimensions, weight (body only)	30 x 30 x <20mm³ (width x height x length, without lens)
Weight	≤ 30g (without lens)
Standard lens options (further lenses on request)	Camera: OEM Core 320 Radiometer HFoV x VFoV / Focal length / F-Number 15.9° x 11.9° / 14.0mm / f/1.0 30° x 23° / 7.2mm / f/1.0 60° x 44° / 3.9mm / f/1.1 Camera: OEM Core 640 Viewer HFoV x VFoV / Focal length / F-Number 17.6° x 13.2° / 25.0mm / f/1.0 31° x 24° / 14mm / f/1.0 75° x 55° / 6.2mm / f/1.0

Command Interface (CMD)

General

Purpose	Control of the camera
interface type	Serial UART interface

Interface parameters

Default baud rate	115.200 baud (adjustable via command interface)
Maximum baud rate	depending on the design of the customers backend
data bits	8
stop bits	1
Parity	No parity

Operability

Image Failures

In the factory setting, all defective pixels are replaced by data from neighboring non-defective pixels. The operability is determined by the number, position and groupings of defects.

Cluster definition

A cluster is defined as a group of at least two dead pixels adjacent by side or corner. The clusters are defined by their size in term of dead pixels.

- 4C5 means 4 clusters of 5 dead pixels max
- A 3x3 cluster refers to any grouping of defective pixels in which there is a defective pixel which does not have at least 1 adjacent neighbor which is non-defective

For example, a 3x3 neighborhood in which all pixels are defective is a 3x3 cluster since the center pixel does not have a non-defective neighbor adjacent to it. Furthermore, a defective pixel on the edge of the array for which all 5 adjacent neighbors are defective also constitutes a 3x3 cluster, as does a defective pixel in a corner of the array for which all 3 adjacent pixels are defective.

The following table defines the requirements for operability.

Sensor Size	Total Defects	Bad Columns/lines	Defect Clusters
QVGA 320x240	≤ 1,5%	0	Area 160x120: 4C5* Area 320x240: no 3x3 clusters*
VGA 640x480	≤ 1,5%	0	Area 160x120: 4C5* Area 640x480: no 3x3 clusters*

Image disturbances (IMD)

The uniformity of an image may not be present despite a homogeneous surface such as a uniformly heated wall. These deviations can have several reasons such as contamination or surface defects.

These formation non-uniformities are perceived as deviations from the neighboring image environment as a disturbance.

The allowed number of IMDs are shown in the following table. The central for QVGA sensor is defined as 160x120 pixels as well as for VGA sensor as 320x240 pixels.

Type IMD 1: radius ≤ 10 pixels Type IMD 2: radius > 10 pixels

Sensor Size	In Central	Outside Central
QVGA 320x240	≤ 1 Type IMD 1 0 Type IMD 2	≤ 2 Type IMD 1 ≤ 1 Type IMD 2
VGA 640x480	≤ 1 Type IMD 1 0 Type IMD 2	≤ 3 Type IMD 1 ≤ 2 Type IMD 2

Mechanical test conditions

The following test conditions are fulfilled

Oscillations, noisy

Test norm:	DIN EN 60068-2-64, Tab. A8
Excitation:	wideband noise
Frequency:	10 Hz - 2000 Hz
Load:	10 Hz 100 Hz 4 $(m/s^2)^2/Hz$ 79,7 m/s^2 rms
Duration:	10 minutes per axis
Axes:	3
Operating mode:	unpacked, active

Oscillations, sinusoidal

Test norm:	DIN ISO 9022-(3)-36-06-2
Stimulation:	sinusoidal with floating frequency
Frequency:	10 Hz - 2000 Hz 10 Hz (1 cycle)
Load:	0.15 mm / 2 g
Cycle rate:	1 oct/min
Number of cycles:	10 per axis
Axes:	3
Operating mode:	unpacked, active

Continuous shock	Test norm: Stimulation: Load: Number of shocks: Operating mode:	DIN ISO 9022-(3)-31-05-1 semi-sinusoidal 50 g / 6 ms 1000 per direction Axes: 3 (6 directions) unpacked, passive
Climatic test conditions	The following test conditions are fulfilled	
Cold, Passive	Test norm: Temperature: Duration: Operating mode:	DIN ISO 9022-10-08-1 -40°C 16 h unpacked, passive
Cold Active	Test norm: Temperature: Duration: Operating mode: NUC Interval:	DIN ISO 9022-10-05-2 See "Environmental Operation" on page 1 16 h unpacked, active 2 sec.
Dry heat passive	Test norm: Temperature: Duration: Operating mode:	DIN ISO 9022-11-05-1 +85°C 16 h unpacked, passive
Dry heat, active	Test norm: Temperature: Duration: Operating mode: NUC Interval:	DIN ISO 9022-11-05-1 See "Environmental Operation" on page 1 16 h unpacked, active 2 sec.
Constant humid heat	Test norm: Temperature: Humidity: Duration: Operating mode:	DIN ISO 9022-12-02-1 +40°C 90-95% rel. humidity 96 h unpacked, passive
Rapid temperature change	Test norm: Temperature: Transfer time:	DIN ISO 9022-15-02-1 t_1 = -25°C t_2 = +40°C ≤ 20 sec

Electromagnetic compatibility	Test	Test norm	Target value
	Emitted interference	DIN EN 61326-1	
	Radio interference radiation	DIN EN 5511	Group 1 Class A (VGA) Class B (QVGA)
	Interference immunity	DIN EN 61326-1	
	electrostatic discharge	DIN EN 61000-4-2	
	electromagnetic RF fields	Din EN 61000-4-3	0.08 - 1 GHz 10 V/m
		Din EN 61000-4-3	1.4 - 2.0 GHz 3 V/m
		Din EN 61000-4-3	2.0 - 2.7 GHz 1 V/m

EVIDIR Front

EVIDIR Right

EVIDIR Left

EVIDIR Back

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