photon focus

Swiss innovation in CMOS image sensors and CMOS cameras

CMOS Image Sensors
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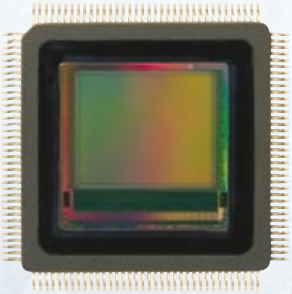
CMOS Image Sensor

A1312 SERIES

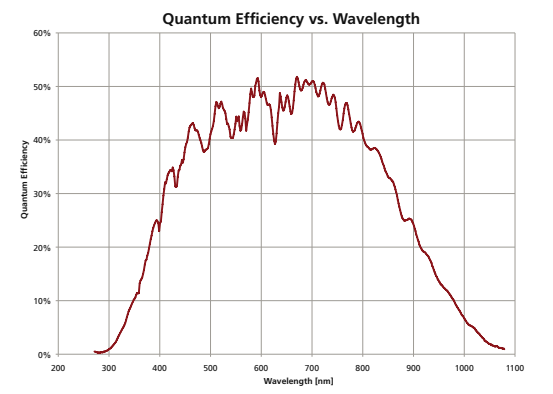
1.4 Megapixel Photonfocus monochrome CMOS image sensor

Features



- 1312 x 1082 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series (NIR, colour, -40, -160) are fully pin compatible
- Global shutter
- Over 60 % fill factor without microlenses
- Good NIR spectral response
- Exceptional SNR up to 370:1
- Multiple HDR Features, dynamic range up to 120 dB via LinLog®
- Up to 165 fps @ full resolution(5)
- Sequential, simultaneous or nondestructive read out
- Horizontal and vertical windowing
- Flexible ROI and Multiple ROI
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A1312 CMOS image sensor



	A1312-40	A1312-160
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in X and Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd/even rows with independent exposure time and response curve	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	
Resolution	1312 x 1082 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity / SNR	140 ke^- [2] / SNR > 370:1 [2]	
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)	
Responsivity	819 V/J/m² [3]	
Quantum Efficiency	> 50 % [3]	
Sensitivity (for 10dB SNR)	4.0 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®, odd/even HDR	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	1	4 (1 or 4 taps active)
Pixel clock	40 MHz [5]	
Maximum frame rate	27 fps @ max. resolution 37 fps @ 1024 x 1024 resolution	108 fps @ max. resolution [5] 145 fps @ 1024 x 1024 resolution [5]
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	< 480 mW during full-speed read out	< 600 mW during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	144-pin CQFP	
Cover glass	No cover glass	

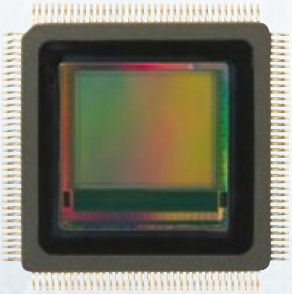
[1] Varies strongly with temperature
[2] When configured for 1.1 V output swing
[3] Under red illumination (625 nm)
[4] Under white LED illumination
[5] 60 MHz possible with slightly reduced image quality (165 fps @ full resolution, 216 fps @ 1024²)

CMOS Image Sensor

A1312I SERIES

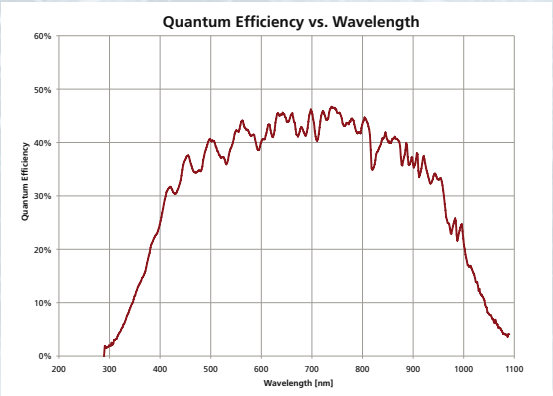
Near Infrared (NIR) 1.4 Megapixel monochrome CMOS image sensor

Features



- 1312 x 1082 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series (NIR, colour, -40, -160) are fully pin compatible
- Global shutter
- Over 60 % fill factor without microlenses
- Excellent NIR spectral response
- Exceptional SNR up to 370:1
- Multiple HDR Features, dynamic range up to 120 dB via LinLog®
- Up to 165 fps @ full resolution(5)
- Sequential, simultaneous or nondestructive read out
- Horizontal and vertical windowing
- Flexible ROI and Multiple ROI
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A1312I CMOS image sensor



	A1312I-40	A1312I-160
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in X and Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd/even rows with independent exposure time and response curve	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	
Resolution	1312 x 1082 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity	140 ke^- [2]	
Spectral range	< 370 to 1100 nm (to 10 % of peak responsivity)	
Responsivity	1200 V/J/m² [3]	
Quantum Efficiency	> 50 % [3]	
Sensitivity (for 10dB SNR)	3.0 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode; 120 dB with LinLog® [3]	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®, odd/even HDR	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	1	4 (1 or 4 taps active)
Pixel clock	40 MHz [5]	
Maximum frame rate	27 fps @ max. resolution 37 fps @ 1024 x 1024 resolution	108 fps @ max. resolution 145 fps @ 1024 x 1024 resolution
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	< 480 mW during full-speed read out	< 600 mW during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	144-pin CQFP	
Cover glass	No cover glass	

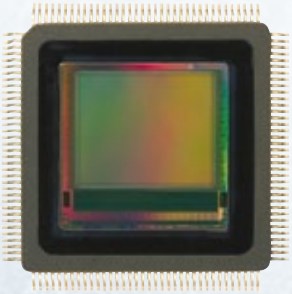
[1] Varies strongly with temperature
[2] When configured for 1.1 V output swing
[3] Under red illumination (625 nm)
[4] Under white LED illumination
[5] 60 MHz possible with slightly reduced image quality (165 fps @ full resolution, 216 fps @ 1024²)

CMOS Image Sensor

A1312IE SERIES

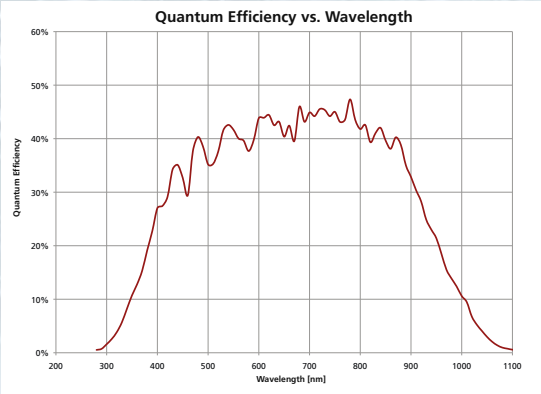
1.4 Megapixel Photonfocus monochrome (NIR) CMOS image sensor

Features



- 1312 x 1082 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series (NIR, colour, -40, -160) are fully pin compatible
- Global shutter
- Over 60 % fill factor without microlenses
- Very good NIR spectral response
- Exceptional SNR up to 370:1
- Multiple HDR Features, dynamic range up to 120 dB via LinLog®
- Up to 165 fps @ full resolution[5]
- Sequential, simultaneous or nondestructive read out
- Horizontal and vertical windowing
- Flexible ROI and Multiple ROI
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A1312IE CMOS image sensor



	A1312IE-40	A1312IE-160
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in X and Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd/even rows with independent exposure time and response curve	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	
Resolution	1312 x 1082 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity	140 ke^- [2] / SNR > 370:1 [2]	
Spectral range	< 370 to 1050 nm (to 10 % of peak responsivity)	
Responsivity	819 V/J/m² [3]	
Quantum Efficiency	> 45 % [3]	
Sensitivity (for 10dB SNR)	4.0 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®, odd/even HDR	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	1	4 (1 or 4 taps active)
Pixel clock	40 MHz [5]	
Maximum frame rate	27 fps @ max. resolution 37 fps @ 1024 x 1024 resolution	108 fps @ max. resolution[5] 145 fps @ 1024 x 1024 resolution[5]
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	< 480 mW during full-speed read out	< 600 mW during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	144-pin CQFP	
Cover glass	No cover glass	

[1] Varies strongly with temperature
[2] When configured for 1.1 V output swing
[3] Under red illumination (780 nm)
[4] Under white LED illumination
[5] 60 MHz possible with slightly reduced image quality (165 fps @ full resolution, 216 fps @ 1024²)

CMOS Image Sensor

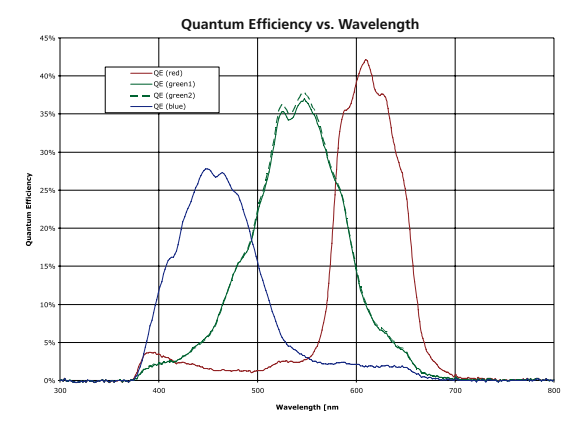
A1312C SERIES

1.4 Megapixel Photonfocus colour CMOS image sensor

Features

- 1312 x 1082 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series (NIR, colour, -40, -160) are fully pin compatible
- Global shutter
- Over 60 % fill factor without microlenses
- Integrated NIR cut-off filter[5]
- Exceptional SNR up to 370:1
- Multiple HDR Features
- Up to 165 fps @ full resolution[6]
- Sequential, simultaneous or nondestructive read out
- Horizontal and vertical windowing
- Flexible ROI and Multiple ROI
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A1312C CMOS image sensor



	A1312C-40	A1312C-160
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in X and Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd/even rows with independent exposure time and response curve	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	
Resolution	1312 x 1082 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity / SNR	140 ke^- [2] / SNR > 370:1 [2]	
Spectral range	390 to 670 nm (to 10 % of peak responsivity) [5]	
Responsivity	745 V/J/m² [3]	
Quantum Efficiency	> 40 % [3]	
Sensitivity (for 10dB SNR)	4.4 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode	
Colour format	RGB Bayer (raw)	
Characteristic curve	Linear	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	1	4 (1 or 4 taps active)
Pixel clock	40 MHz [6]	
Maximum frame rate	27 fps @ max. resolution 37 fps @ 1024 x 1024 resolution	108 fps @ max. resolution[6] 145 fps @ 1024 x 1024 resolution[6]
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	< 480 mW during full-speed read out	< 600 mW during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	144-pin CQFP	
Cover glass	Integrated NIR cut-off filter[5]	

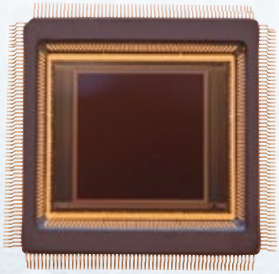
[1] Varies strongly with temperature
[2] Maximum, when configured for 1.1V output swing
[3] Under red illumination (625 nm)
[4] Under white LED illumination
[5] A1312C image sensor available without NIR cut-off filter on request
[6] 60 MHz possible with slightly reduced image quality (165 fps @ full resolution, 216 fps @ 1024²)

CMOS Image Sensor

A2080 SERIES

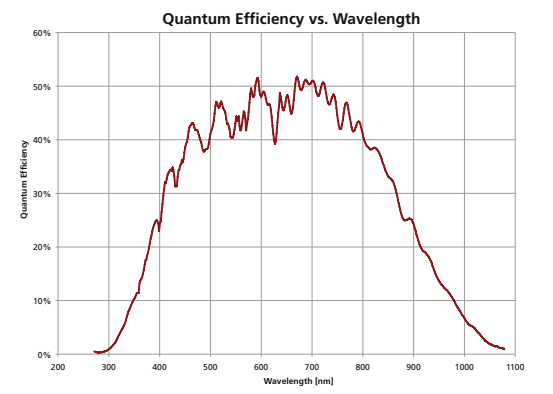
4.3 Megapixel Photonfocus monochrome CMOS image sensor

Features



- 2080 x 2080 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series are fully pin compatible
- Monochrome
- Global shutter
- Over 60 % fill factor without microlenses
- Good NIR spectral response
- Exceptional SNR up to 370:1
- Multiple HDR Features, dynamic range up to 120 dB via LinLog®
- Up to 210 fps @ full resolution(5)
- Sequential, simultaneous or nondestructive read out
- Vertical windowing
- Flexible ROI and Multiple ROI in Y direction
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A2080 CMOS image sensor



	A2080-160	A2080-640
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd/even rows with independent exposure time and response curve	
Optical format / diagonal	23.5 mm diagonal @ max. resolution (< 25 mm image circle)	
Resolution	2080 x 2080 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	16.64 mm x 16.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity	140 ke$^-$ [2] / SNR > 370:1 [2]	
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)	
Responsivity	819 V/J/m² [3]	
Quantum Efficiency	> 50 % [3]	
Sensitivity (for 10dB SNR)	4.0 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®, odd/even HDR	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	4	16 (4 or 16 taps active)
Pixel clock	40 MHz [5]	
Maximum frame rate	35 fps @ max. resolution	140 fps @ max. resolution[5]
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	TBD mW during full-speed read out	TBD mW during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	240-pin CQFP	
Cover glass	No cover glass	

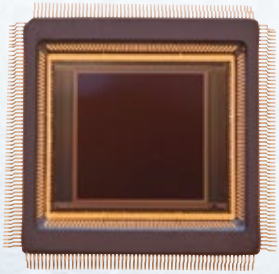
[1] Varies strongly with temperature
[2] When configured for 1.1 V output swing
[3] Under red illumination (625 nm)
[4] Under white LED illumination
[5] 60 MHz possible with slightly reduced image quality (210 fps @ full resolution)

CMOS Image Sensor

A2080IE SERIES

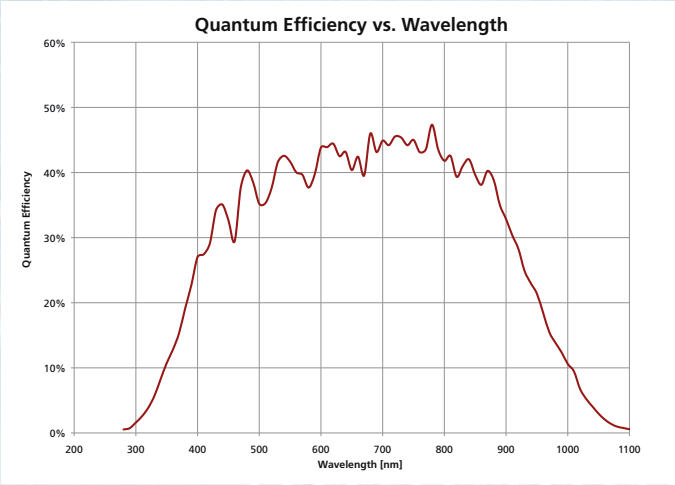
4.3 Megapixel Photonfocus monochrome (NIR) CMOS image sensor

Features



- 2080 x 2080 pixel resolution
- 8 µm x 8 µm square pixel
- All sensors within the series are fully pin compatible
- Monochrome
- Global shutter
- Over 60% fill factor without microlenses
- Very good NIR spectral response
- Exceptional SNR up to 370:1
- Multiple HDR Features, dynamic range up to 120 dB via LinLog®
- Up to 210 fps @ full resolution(5)
- Sequential, simultaneous or nondestructive read out
- Vertical windowing
- Flexible ROI and Multiple ROI in Y direction
- Integrated test pattern, temperature sensor and black level reference

Spectral response of the Photonfocus A2080IE CMOS image sensor



	A2080IE-160	A2080IE-640
Image Sensor		
Technology	CMOS active pixel (APS)	
Scanning system	• Progressive scan • Arbitrary row adressing • Region of Interest (ROI) in Y • Multiple Region of Interest (MROI) in Y • Multiple nondestructive readout • Odd / even rows with independent exposure time and response curve	
Optical format / diagonal	23.5 mm diagonal @ max. resolution (< 25 mm image circle)	
Resolution	2080 x 2080 pixels (active pixels)	
Pixel size	8 µm x 8 µm	
Active optical area	16.64 mm x 16.64 mm (maximum)	
Output swing	1.05 V (typical application)	
Random noise (RMS)	1.1 mV	
FPN (RMS, uncorrected)	13.5 mV	
Dark current	0.65 fA/pixel @ 27°C [1]	
Full well capacity / SNR	140 ke^- [2] / SNR > 370:1 [2]	
Spectral range	< 370 to 1050 nm (to 10 % of peak responsivity)	
Responsivity	819 V/J/m² [3]	
Quantum Efficiency	> 45 % [3]	
Sensitivity (for 10dB SNR)	4.0 µJ/m² [3]	
Shutter efficiency	99.85 % [4]	
Optical fill factor	> 60 % [3]	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®, odd/even HDR	
Shutter mode	Global shutter	
Read out mode	Sequential or simultaneous read out (read out during exposure)	
Analog taps	4	16 (4 or 16 taps active)
Pixel clock	40 MHz [5]	
Maximum frame rate	35 fps @ max. resolution	140 fps @ max. resolution[5]
Supply voltages	3.1 V, 3.3 V, 4.6 V	
Power consumption	< 1.2 W during full-speed read out	< 1.6 W during full-speed read out
Operating temperature range	Industrial (-20°C ... +85°C)	
Package	240-pin CQFP	
Cover glass	No cover glass	

[1] Varies strongly with temperature
[2] When configured for 1.1 V output swing
[3] Under red illumination (625 nm)
[4] Under white LED illumination
[5] 60 MHz possible with slightly reduced image quality (210 fps @ full resolution)

OEM CAMERA MODULES

Perfect Fit For Embedded Solutions

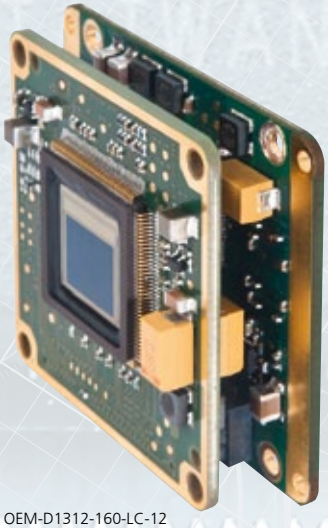
For OEM that prefer to design their own camera solution but do not want to spend time on the sensor integration we offer all standard cameras as OEM camera modules.

All of the features and technical data are identical to the standard cameras except for the interface board which is not included. Thus making it a perfect solution to interface to your own embedded system.

Customized OEM camera modules with different dimensions, components and features are another interesting option for OEM's. This option enables you to further speed up your time to market.

Please ask Photonfocus for solutions!

OEM-D1024E-160-LC-12



OEM-D1312-160-LC-12

BOARD LEVEL CAMERAS

Compact Solution For Application-Specific Systems

For easier integration into tailored customer applications and especially where space or weight is a limiting factor we offer all our standard cameras as „Board Level“ models.

All of the features and technical data are identical to the standard cameras except for the mechanical dimensions. The footprint of these cameras is as small as 46 mm x 46 mm. The depth varies depending on the product type and chosen interface.

BL1-D1312-160-CL-12

BL1-D1024E-40-CL-12

BL1-D1024E-80-CL-12

PHOTONFOCUS CMOS CAMERA PLATFORM

Data acquisition

optimized for

Low Light		HDR / SNR	
		1.0 Mpix A1024B	B/W
1.3 Mpix 76C560 76C660	B/W Colour NIR	**1.4 Mpix** A1312	B/W Colour NIR
2.0 Mpix CMV2000 76C570	B/W Colour NIR		
4.0 Mpix CMV4000	B/W Colour NIR	**4.3 Mpix** A2080	B/W NIR

Data processing

FPGA real time Pre-Processing in Xilinx FPGAs

3x3 and 5x5 convolver
morphologic operations
histogram, min, max operations
image substraction
peak detector for laser triangulation
custom operators

DSP Processing

C6415 @ 1 GHz and C6455 @ 1.2GHz
da Vinci DM6435
Black Fin BF527, BF537 and BF561

Data transmission

Interfaces

CameraLink
PoCL
Fiber Optic*
GigE (GigE Vision & GenICam compliant)
CoaXPress*
Embedded platforms with:
- GigE interface
- Ethernet interface
- EtherCat Interface
- SercosIII*
- USB2.0 Host interface*
- USB3.0 Host interface*
- RS485 Interface
- RS232 Interface
- isolated I/Os

*on request

CMOS Camera

DS1-D1024 SERIES

1 Megapixel resolution with Photonfocus sensor

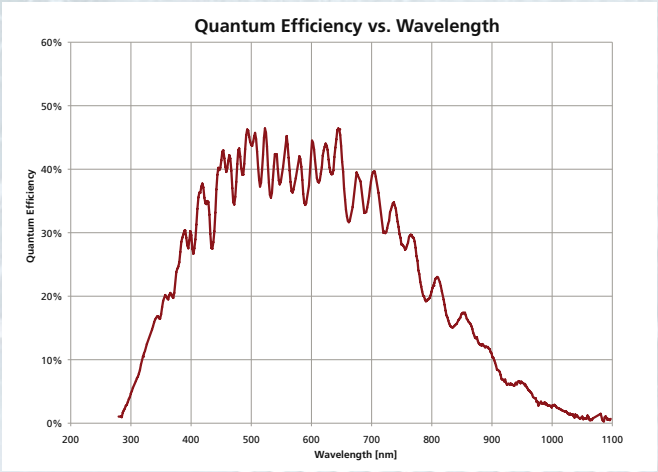
Features

- Photonfocus A1024B CMOS image sensor
- 1024 x 1024 pixel resolution
- Dynamic range up to 60 dB
- Up to 150 fps @ full resolution
- Global shutter
- Monochrome
- Standard features
- CameraLink® and PoCL interface
- 10 bit greyscale resolution

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1024B CMOS image sensor



	DS1-D1024-40-CL-10 DS1-D1024-40-PC-10	DS1-D1024-80-CL-10 DS1-D1024-80-PC-10	DS1-D1024-160-CL-10 DS1-D1024-160-PC-10
Image Sensor			
Image sensor	Photonfocus A1024B (2. Generation)		
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1" (15.42 mm diagonal)		
Resolution	1024 x 1024 pixels		
Pixel size	10.6 µm x 10.6 µm		
Active optical area	10.9 mm x 10.9 mm (maximum)		
Dark current	2 fA/pixel @ 30°C		
Full well capacity	~200 ke$^-$		
Spectral range	< 400 to 900 nm		
Responsivity	120 x 10^3 DN / (J/m²) @ 610 nm / 8 bit / gain = 1 (approximately 350 DN / (lux s) @ 610 nm / 8 bit / gain = 1)		
Quantum Efficiency	45 % @ 550 nm		
Optical fill factor	35 % (geometrical)		
Dynamic range	Up to 60 dB		
Colour format	Monochrome		
Characteristic curve	Linear		
Shutter mode	Global shutter		
Read out mode	Sequential read out	Sequential or simultaneous read out (read out during exposure)	
Camera			
Exposure time	10 µs … 0.41 s / 25 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.41 s / 25 ns steps
Frame rate	37 fps	75 fps	150 fps
Pixel clock	40 MHz		80 MHz
Camera taps	1	2	
Greyscale resolution	8 bit / 10 bit		
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1		
Analogue gain	1		
Digital gain	1		
Configuration interface	CL SERIAL (9600 Baud)		
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input		
Features	• Region of Interest (ROI) • Image correction • Image information • Standard trigger input and strobe output functionality		
Interface	CameraLink® Base PoCL - Power over CameraLink® Base	CameraLink® Base PoCL - Power over CameraLink® Base	
Operating temperature	0°C ... +60°C		
Power supply	+12 V DC (±10 %)		
Power consumption	1.6 W	3.0 W	3.2 W
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	55 x 55 x 32 mm³ (CL)	55 x 55 x 40 mm³	
Mass	200 g	210 g	
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os		
Software			
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK)		
OS	CL: Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request		

CMOS Camera

MV-D1024E SERIES

1 Megapixel resolution with Photonfocus sensor

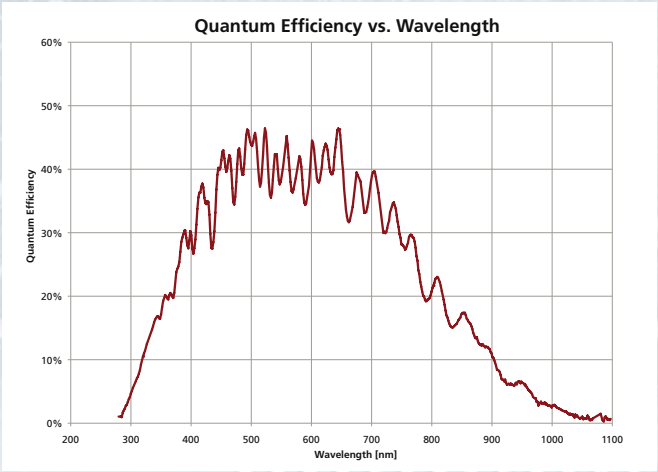
Features

- Photonfocus A1024B CMOS image sensor
- 1024 x 1024 pixel resolution
- Dynamic range up to 120 dB via LinLog®
- Up to 150 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and PoCL interface
- 12 bit greyscale resolution
- Boardlevel or OEM solution available

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1024B CMOS image sensor



	MV-D1024E-40-CL-12 MV-D1024E-40-PC-12	MV-D1024E-80-CL-12 MV-D1024E-80-PC-12	MV-D1024E-160-CL-12 MV-D1024E-160-PC-12
Image Sensor			
Image sensor	Photonfocus A1024B (2. Generation)		
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1" (15.42 mm diagonal)		
Resolution	1024 x 1024 pixels		
Pixel size	10.6 µm x 10.6 µm		
Active optical area	10.9 mm x 10.9 mm (maximum)		
Dark current	2 fA/pixel @ 30°C		
Full well capacity	~200 ke$^-$		
Spectral range	< 400 to 900 nm		
Responsivity	120 x 10^3 DN / (J/m²) @ 610 nm / 8 bit / gain = 1 (approximately 350 DN / (lux s) @ 610 nm / 8 bit / gain = 1)		
Quantum Efficiency	45 % @ 550 nm		
Optical fill factor	35 % (geometrical)		
Dynamic range	60 dB in linear mode; 120 dB with LinLog®		
Colour format	Monochrome		
Characteristic curve	Linear, LinLog®, Skimming		
Shutter mode	Global shutter		
Read out mode	Sequential read out	Sequential or simultaneous read out (read out during exposure)	
Camera			
Exposure time	10 µs … 0.41 s / 25 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.41 s / 25 ns steps
Frame rate	37 fps	75 fps	150 fps
Pixel clock	40 MHz		80 MHz
Camera taps	1	2	
Greyscale resolution	8 bit / 10 bit / 12 bit		
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON		
Analogue gain	1		
Digital gain	1 / 2 / 4		
Configuration interface	CL SERIAL (9600 Baud)	CL SERIAL (9600 or 57600 Baud, user selectable)	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input		
Features	• Region of Interest (ROI) • 16 Multiple ROI (MROI) • Decimation X[1] and Y • Image correction • Look-up table (LUT) • Constant frame rate • Image information • Extended trigger input and strobe output functionality		
Interface	CameraLink® Base PoCL – Power over CameraLink® Base	CameraLink® Base PoCL – Power over CameraLink® Base	
Operating temperature	0°C ... +60°C		
Power supply	+12 V DC (±10 %)		
Power consumption	1.6 W	3.0 W	3.2 W
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	55 x 55 x 32 mm³	55 x 55 x 40 mm³	
Mass	200 g	210 g	
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os		
Software			
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK)		
OS	CL: Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request		

[1] Feature only available for MV-D1024E-40 cameras

CMOS Camera

DS1-D1312 SERIES

1.4 Megapixel resolution with Photonfocus sensor

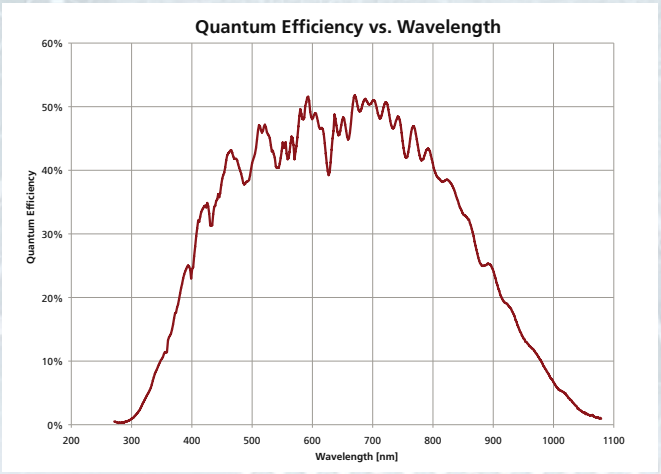
Features

- Photonfocus A1312 CMOS image sensor
- 312 x 1082 pixel resolution
- Good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 60 dB
- Up to 108 fps @ full resolution
- Global shutter
- Monochrome
- Standard features
- CameraLink® interface
- 10 bit greyscale resolution

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1312 CMOS image sensor



	DS1-D1312-40-CL-10	DS1-D1312-80-CL-10	DS1-D1312-160-CL-10
Image Sensor			
Image sensor	Photonfocus A1312 (3. Generation)		
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution		
Resolution	1312 x 1082 pixels		
Pixel size	8 µm x 8 µm		
Active optical area	10.48 mm x 8.64 mm (maximum)		
Dark current	0.65 fA/pixel		
Full well capacity / SNR	~90 ke⁻ / 300:1		
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)		
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)		
Quantum Efficiency	> 50 %		
Optical fill factor	> 60 %		
Dynamic range	Up to 60 dB		
Colour format	Monochrome		
Characteristic curve	Linear		
Shutter mode	Global shutter		
Read out mode	Sequential read out or simultaneous read out (read out during exposure)		
Camera			
Exposure time	10 µs … 1.68 s / 100 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.41 s / 25 ns steps
Frame rate	27 fps	55 fps	108 fps
Pixel clock	40 MHz		80 MHz
Camera taps	1	2	
Greyscale resolution	8 bit / 10 bit		
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON		
Analogue gain	1		
Digital gain	1		
Configuration interface	CL SERIAL (9600 Baud)		
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input		
Features	• Region of Interest (ROI) • Image correction • Standard trigger input and strobe output functionality		
Interface	CameraLink® Base		
Operating temperature	0°C … +50°C		
Power supply	+12 V DC (±10 %)		
Power consumption	2.5 W	< 3.0 W	< 3.3 W
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	60 x 60 x 45 mm³		
Mass	265 g		
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os		
Software			
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK)		
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request		

CMOS Camera

MV1-D1312 SERIES

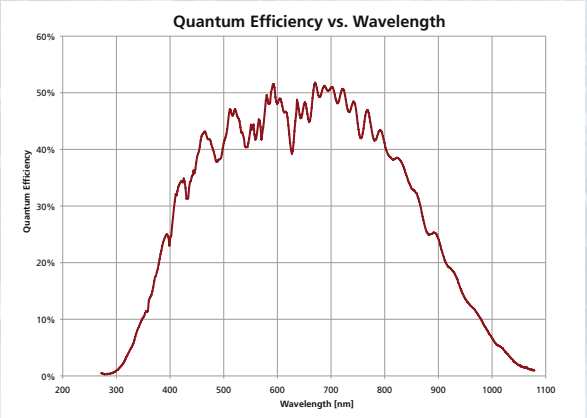
1.4 Megapixel resolution with Photonfocus sensor

Features

- Photonfocus A1312 CMOS image sensor
- 1312 x 1082 pixel resolution
- Good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 170 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- 12 bit greyscale resolution
- Boardlevel or OEM solution available

Compatible with

Spectral response of the Photonfocus A1312 CMOS image sensor



	MV1-D1312-40-CL-12 MV1-D1312-40-G2-12	MV1-D1312-80-CL-12 MV1-D1312-80-G2-12	MV1-D1312-160-CL-12 MV1-D1312-100-G2-12	MV1-D1312-240-CL-8
Image Sensor				
Image sensor	Photonfocus A1312 (3. Generation)			
Technology	CMOS active pixel (APS)			
Scanning system	Progressive scan			
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution			
Resolution	1312 x 1082 pixels			1248 x 1082 pixels
Pixel size	8 µm x 8 µm			
Active optical area	10.48 mm x 8.64 mm (maximum)			
Dark current	0.65 fA/pixel			
Full well capacity / SNR	~90 ke^- / 300:1			
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)			
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)			
Quantum Efficiency	> 50 %			
Optical fill factor	> 60 %			
Dynamic range	60 dB in linear mode; 120 dB with LinLog®			
Colour format	Monochrome			
Characteristic curve	Linear, LinLog®			
Shutter mode	Global shutter			
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates			
Camera				
Exposure time	10 µs … 1.68 s / 100 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.67 s / 40 ns steps (GigE) 10 µs … 0.41 s / 25 ns steps (CL)	10 µs … 0.279 s / 16.67 ns steps
Frame rate	27 fps	55 fps	68 fps (GigE) / 108 fps (CL)	170 fps
Pixel clock	40 MHz		50 MHz (GigE) / 80 MHz (CL)	
Camera taps	1	1 (GigE) / 2 (CL)		3
Greyscale resolution	8 bit / 10 bit / 12 bit			8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON			
Analogue gain	1			
Digital gain	0.1 to 15.99 (Fine Gain)[1]			
Configuration interface	CL SERIAL (Baudrate user selectable) (CL); Gigabit Ethernet (GigE)			
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger			
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality			
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)			
Operating temperature	0°C … +50°C			
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)			
Power consumption	2.5 W (CL) / < 4.5 W (GigE)	< 3.0 W (CL) / < 5.0 W (GigE)	< 3.3 W (CL) / < 5.2 W (GigE)	< 5.2 W
Lens mount	C-Mount (CS-Mount optional)			
Dimensions (H x W x L)	60 x 60 x 45 mm³ (CL) / 60 x 60 x 51 mm³ (GigE)			
Mass	265 g (CL) / 310 g (GigE)			
Conformity	CE / RoHS / WEEE			
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)			

Software	
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request

[1] Some models may support only digital gain 1/2/4/8

CMOS Camera

MV1-D1312C SERIES

1.4 Megapixel resolution with Photonfocus sensor

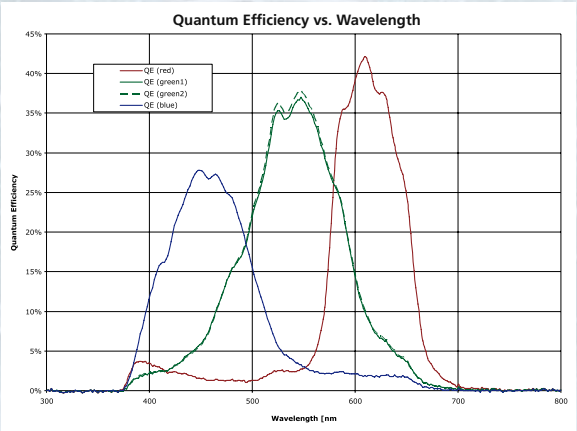
Features

- Photonfocus A1312C CMOS image sensor
- 1312 x 1082 pixel resolution
- Integrated NIR cut-off filter(1)
- Exceptional SNR up to 300:1
- Dynamic range up to 60 dB
- Up to 170 fps @ full resolution
- Global shutter
- Colour (RGB Bayer)
- Standard features
- CameraLink® and GigE interface
- 12 bit output format
- Boardlevel or OEM solution available

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1312C CMOS image sensor



	MV1-D1312C-40-CL-12 MV1-D1312C-40-G2-12*	MV1-D1312C-80-CL-12* MV1-D1312C-80-G2-12	MV1-D1312C-160-CL-12 MV1-D1312C-100-G2-12*	MV1-D1312C-240-CL-8*
Image sensor				
Image sensor	Photonfocus A1312C (3. Generation)			
Technology	CMOS active pixel (APS)			
Scanning system	Progressive scan			
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution			
Resolution	1312 x 1082 pixels			1248 x 1082 pixels
Pixel size	8 µm x 8 µm			
Active optical area	10.48 mm x 8.64 mm (maximum)			
Dark current	0.65 fA/pixel			
Full well capacity / SNR	~90 ke$^-$ / 300:1			
Spectral range	390 to 670 nm (to 10 % of peak responsivity)[1]			
Responsivity	190 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 560 DN / (lux s) @ 625 nm / 8 bit / gain = 1)			
Quantum Efficiency	> 40 %			
Optical fill factor	> 60 %			
Dynamic range	60 dB in linear mode			
Colour format	RGB Bayer (raw)			
Characteristic curve	Linear			
Shutter mode	Global shutter			
Read out mode	Sequential or simultaneous read out (read out during exposure) for higher frame rates			
Camera				
Exposure time	10 µs … 1.68 s / 100 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.67 s / 40 ns steps (GigE) 10 µs … 0.41 s / 25 ns steps (CL)	10 µs … 0.279 s / 16.67 ns steps
Frame rate	27 fps	55 fps	68 fps (GigE) / 108 fps (CL)	170 fps
Pixel clock	40 MHz		80 MHz (CL) / 50 MHz (GigE)	
Camera taps	1	1 (GigE) / 2 (CL)		3
Greyscale resolution	8 bit / 10 bit / 12 bit			8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON			
Analogue gain	1			
Digital gain	0.1 to 15.99 (Fine Gain)			
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)			
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger			
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality			
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)			
Operating temperature	0°C … +50°C			
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)			
Power consumption	2.5 W (CL) / < 4.5 W (GigE)	< 3.0 W (CL) / < 5.0 W (GigE)	< 3.3 W (CL) / < 5.2 W (GigE)	< 5.2 W (CL)
Lens mount	C-Mount (CS-Mount optional)			
Dimensions (H x W x L)	60 x 60 x 45 mm³ (CL) / 60 x 60 x 51 mm³ (GigE)			
Mass	265 g (CL) / 310 g (GigE)			
Conformity	CE / RoHS / WEEE			
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)			
Software				
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam			
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request			

[1] A1312C image sensor available without NIR cut-off filter on request

* Model available upon request

CMOS Camera

MV1-D1312I SERIES

1.4 Megapixel resolution with proprietary Photonfocus sensor

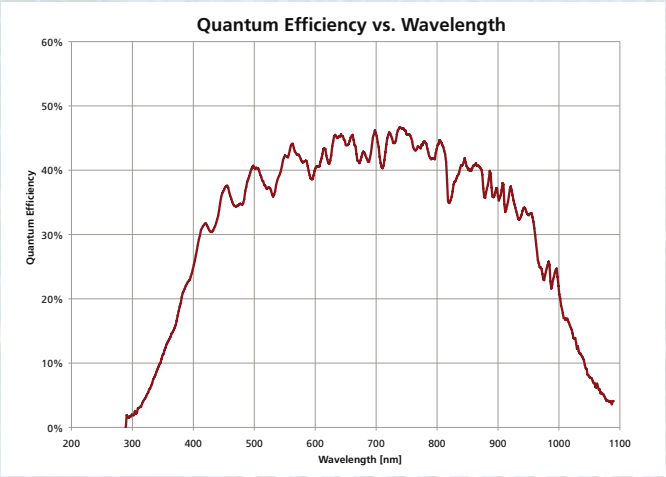
Features

- Photonfocus A1312I CMOS image sensor
- 1312 x 1082 pixel resolution
- Excellent NIR response
- Dynamic range up to 120 dB via LinLog®
- Up to 108 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- 12 bit greyscale resolution

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1312I CMOS image sensor



	MV1-D1312I-40-CL-12 MV1-D1312I-40-GB-12	MV1-D1312I-80-CL-12 MV1-D1312I-80-GB-12	MV1-D1312I-160-CL-12 MV1-D1312I-100-GB-12
Image Sensor			
Image sensor	Photonfocus A1312I (3. Generation)		
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution		
Resolution	1312 x 1082 pixels		
Pixel size	8 µm x 8 µm		
Active optical area	10.48 mm x 8.64 mm (maximum)		
Dark current	1.15 fA/pixel		
Full well capacity	~100 ke⁻		
Spectral range	< 370 to 1100 nm (to 10 % of peak responsivity)		
Responsivity	300 x 10^3 DN / (J/m²) @ 850 nm / 8 bit / gain = 1		
Quantum Efficiency	> 50 %		
Optical fill factor	> 60 %		
Dynamic range	60 dB in linear mode; 120 dB with LinLog®		
Colour format	Monochrome		
Characteristic curve	Linear, LinLog®		
Shutter mode	Global shutter		
Read out mode	(read out during exposure only in linear mode) for higher frame rates		
Camera			
Exposure time	10 µs … 1.68 s / 100 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.67 s / 40 ns steps (GigE) 10 µs … 0.41 s / 25 ns steps (CL)
Frame rate	27 fps	55 fps	68 fps (GigE) / 108 fps (CL)
Pixel clock	40 MHz		50 MHz (GigE) / 80 MHz (CL)
Camera taps	1	2	
Greyscale resolution	8 bit / 10 bit / 12 bit		
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON		
Analogue gain	1		
Digital gain	1 / 2 / 4 / 8		
Configuration interface	Gigabit Ethernet / CL SERIAL (9600, 57600 or 115'200 Baud, user selectable)		
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger		
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI)[1] • Decimation Y[1] • Image correction • 2 Look-up tables (LUT)[1] • Constant frame rate • Crosshair[1] • Convolver 3x3 • Temperature[1] • Image information • Extended trigger input and strobe output functionality		
Interface	CameraLink® Base or GigE		
Operating temperature	0°C ... +50°C		
Power supply	+12 V DC (±10%)		
Power consumption	2.5 W (CL) / < 4.5 W (GigE)	< 3.0 W (CL) / < 5.0 W (GigE)	< 3.3 W (CL) / < 5.2 W (GigE)
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	60 x 60 x 45 mm³ (CL) / 60 x 60 x 99 mm³ (GigE)		
Mass	265 g (CL) / 465 g (GigE)		
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os		
Software			
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK) GigE: graphical user interface GEV Player and SDK		
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request		

[1] Features only available for CameraLink® cameras (for GigE cameras on request)

CMOS Camera

MV1-D1312IE SERIES

1.4 Megapixel resolution with Photonfocus sensor

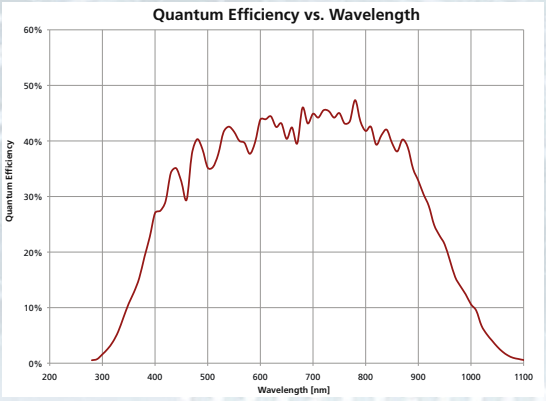
Features

- Photonfocus A1312IE CMOS image sensor
- 1312 x 1082 pixel resolution
- Very good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 170 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- 12 bit greyscale resolution
- Boardlevel or OEM solution available

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A1312IE CMOS image sensor



	MV1-D1312IE-40-CL-12 MV1-D1312IE-40-G2-12*	MV1-D1312IE-80-CL-12 MV1-D1312IE-80-G2-12*	MV1-D1312IE-160-CL-12 MV1-D1312IE-100-G2-12	MV1-D1312IE-240-CL-8
Image Sensor				
Image sensor	Photonfocus A1312IE (3. Generation)			
Technology	CMOS active pixel (APS)			
Scanning system	Progressive scan			
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution			
Resolution	1312 x 1082 pixels			1248 x 1082 pixels
Pixel size	8 µm x 8 µm			
Active optical area	10.48 mm x 8.64 mm (maximum)			
Dark current	0.65 fA/pixel			
Full well capacity / SNR	~90 ke$^-$ / 300:1			
Spectral range	< 370 to 1050 nm (to 10 % of peak responsivity)			
Responsivity	280 x 10^3 DN / (J/m²) @ 850 nm / 8 bit / gain = 1			
Quantum Efficiency	> 45 %			
Optical fill factor	> 60 %			
Dynamic range	60 dB in linear mode; 120 dB with LinLog®			
Colour format	Monochrome			
Characteristic curve	Linear, LinLog®			
Shutter mode	Global shutter			
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates			
Camera				
Exposure time	10 µs … 1.68 s / 100 ns steps	10 µs … 0.83 s / 50 ns steps	10 µs … 0.67 s / 40 ns steps (GigE) 10 µs … 0.41 s / 25 ns steps (CL)	10 µs … 0.279 s / 16.67 ns steps
Frame rate	27 fps	55 fps	68 fps (GigE) / 108 fps (CL)	170 fps
Pixel clock	40 MHz		80 MHz (CL) / 50 MHz (GigE)	
Camera taps	1	1 (GigE) / 2 (CL)		3
Greyscale resolution	8 bit / 10 bit / 12 bit			8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON			
Analogue gain	1			
Digital gain	0.1 to 15.99 (Fine Gain)			
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)			
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger			
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality			
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)			
Operating temperature	0°C … +50°C			
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)			
Power consumption	2.5 W (CL) / < 4.5 W (GigE)	< 3.0 W (CL) / < 5.0 W (GigE)	< 3.3 W (CL) / < 5.2 W (GigE)	< 5.2 W (CL)
Lens mount	C-Mount (CS-Mount optional)			
Dimensions (H x W x L)	60 x 60 x 45 mm³ (CL) / 60 x 60 x 51 mm³ (GigE)			
Mass	265 g (CL) / 310 g (GigE)			
Conformity	CE / RoHS / WEEE			
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)			

Software	
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request

* Model available upon request

CMOS Camera

MV1-D2080 SERIES

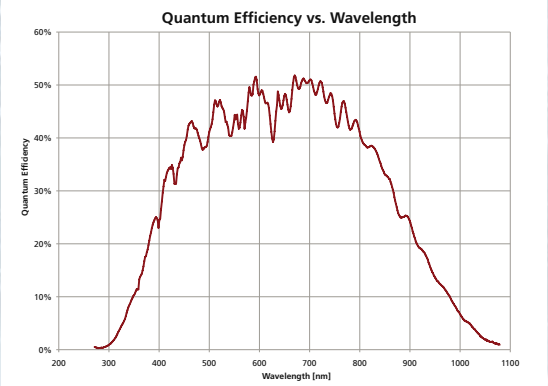
4.3 Megapixel resolution with Photonfocus sensor

Features

- Photonfocus A2080 CMOS image sensor
- 2080 x 2080 pixel resolution
- Good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 51 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- Up to 12 bit greyscale resolution
- Configuration via register based ASCII protocol
- Boardlevel or OEM solution available

Compatible with

Spectral response of the Photonfocus A2080 CMOS image sensor



	MV1-D2080-160-CL-12 MV1-D2080-160-G2-12	MV1-D2080-240-CL-8*
Image Sensor		
Image sensor	Photonfocus A2080 (3. Generation)	
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	23.5 mm diagonal @ max. resolution (< 25 mm image circle)	
Resolution	2080 x 2080 pixels	
Pixel size	8 µm x 8 µm	
Active optical area	16.64 mm x 16.64 mm (maximum)	
Dark current	0.65 fA/pixel	
Full well capacity / SNR	~90 ke^- (Max SNR > 300:1)	
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)	
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)	
Quantum Efficiency	> 50 %	
Optical fill factor	> 60 %	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®	
Shutter mode	Global shutter	
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates	
Camera		
Exposure time	10 µs … 0.41 s / 25 ns steps	10 µs … 0.279 s / 16.67 ns steps
Frame rate	25 fps sustained, 34 fps for 5 frames, (GigE) / 34 fps (CL)	51 fps
Pixel clock	80 MHz	
Camera taps	1 (GigE) / 2 (CL)	3
Greyscale resolution	8 bit / 10 bit / 12 bit	8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)	
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger	
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Convolver • Crosshair • Temperature & Image information • Extended trigger input and strobe output functionality • Status line	
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)	
Operating temperature	0°C … +50°C	
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)	
Power consumption	< 3.3 W (CL) / < 5.2 W (GigE)	< 5.2 W (CL)
Lens mount	M42x1, F-Mount, C-Mount 1.3"	
Dimensions (H x W x L)	60 x 60 x 38 mm³ (CL) / 60 x 60 x 47 mm³ (GigE)	
Mass	222 g (CL) / 294 g (GigE)	
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)	
Software		
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam	
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request	

* Model available upon request

CMOS Camera

MV1-D2080IE SERIES

4.3 Megapixel resolution with Photonfocus sensor

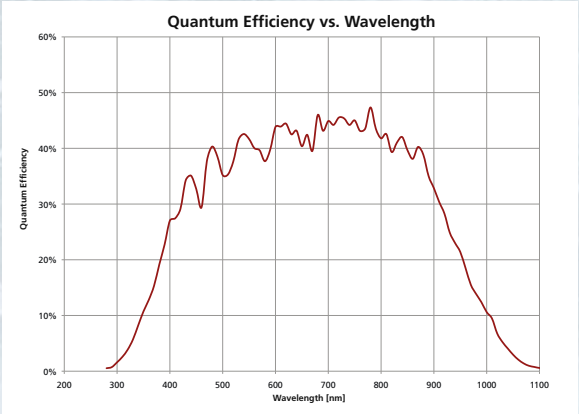
Features

- Photonfocus A2080IE CMOS image sensor
- 2080 x 2080 pixel resolution
- Very good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 51 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- Up to 12 bit greyscale resolution
- Configuration via register based ASCII protocol
- Boardlevel or OEM solution available

Compatible with

HALCON LabVIEW MATROX IMAGING

Spectral response of the Photonfocus A2080IE CMOS image sensor



	MV1-D2080IE-160-CL-12 MV1-D2080IE-160-G2-12	MV1-D2080IE-240-CL-8*
Image Sensor		
Image sensor	Photonfocus A2080IE (3. Generation)	
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	23.5 mm diagonal @ max. resolution (< 25 mm image circle)	
Resolution	2080 x 2080 pixels	
Pixel size	8 µm x 8 µm	
Active optical area	16.64 mm x 16.64 mm (maximum)	
Dark current	0.65 fA/pixel	
Full well capacity / SNR	~90 ke^- (Max SNR > 300:1)	
Spectral range	< 370 to 1050 nm (to 10 % of peak responsivity)	
Responsivity	280 x 10^3 DN / (J/m^2) @ 850 nm / 8 bit / gain = 1	
Quantum Efficiency	> 50 %	
Optical fill factor	> 60 %	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®	
Shutter mode	Global shutter	
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates	
Camera		
Exposure time	10 µs … 0.41 s / 25 ns steps	10 µs … 0.279 s / 16.67 ns steps
Frame rate	25 fps sustained, 34 fps for 5 frames (GigE) / 34 fps (CL)	51 fps
Pixel clock	80 MHz	
Camera taps	1 (GigE) / 2 (CL)	3
Greyscale resolution	8 bit / 10 bit / 12 bit	8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)	
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger	
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Convolver • Crosshair • Temperature & Image information • Extended trigger input and strobe output functionality • Status line	
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)	
Operating temperature	0°C … +50°C	
Power supply	+12 V DC (±10 %)(CL) / +12 V … +24 V DC (±10 %) (GigE)	
Power consumption	< 3.3 W (CL) / < 5.2 W (GigE)	< 5.2 W (CL)
Lens mount	M42x1, F-Mount, C-Mount 1.3"	
Dimensions (H x W x L)	60 x 60 x 38 mm^3 (CL) / 60 x 60 x 47 mm^3 (GigE)	
Mass	222 g (CL) / 294 g (GigE)	
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)	
Software		
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam	
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request	

* Model available upon request

CMOS Camera

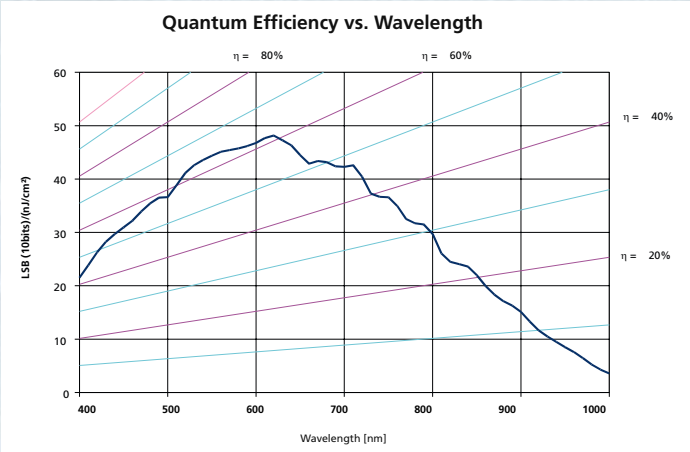
MV1-D1280 SERIES

1.3 Megapixel resolution with CMOS image sensor

Features

- E2V EV76C560 and EV76C660 CMOS image sensors
- 1280 x 1024 pixel resolution
- Good NIR spectral response
- Suitable for standard and low light applications
- Up to 60 fps @ full resolution
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- 10 bit greyscale resolution
- Binning possibility
- Configuration via register based ASCII protocol possible
- Boardlevel or OEM solution available

Spectral response of the EV76C560 CMOS image sensor



	MV1-D1280-120-CL-10 MV1-D1280-80-G2-10	MV1-D1280I-120-CL-10 MV1-D1280I-80-G2-10	MV1-D1280C-120-CL-10 MV1-D1280C-80-G2-10
Image Sensor			
Image sensor	EV76C560	EV76C660	EV76C560 Colour
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1/1.8" (8.7 mm diagonal)		
Resolution	1280 x 1024 pixels		
Pixel size	5.3 µm x 5.3 µm		
Active optical area	6.9 mm x 5.5 mm (maximum)		
Dark current	< 420 LSB_{10} / s @ ta 25°C		
Full well capacity / SNR	~12 ke^- / 109:1		
Spectral range	< 370 to 930 nm [1]	< 370 to 1000 nm [1]	< 370 to 670 nm [1]
Responsivity	6600 LSB_{10} / (Lux.s)		
Quantum Efficiency	> 47 %		
Optical fill factor	TBD		
Dynamic range	~ 60 dB		
Colour format	Monochrome	enhanced NIR	Colour
Characteristic curve	Linear, HDR		
Shutter mode	Global shutter		
Read out mode	Sequential read out or simultaneous read out (read out during exposure) for better SNR and dynamic range		
Camera			
Exposure time	TBD	TBD	TBD
Frame rate	60 fps (CL) / 40 fps (GigE)		
Pixel clock	60 MHz (CL) / 80 MHz (GigE)		
Camera taps	2 (CL) / 1 (GigE)		
Greyscale resolution	8 bit / 10 bit		
Fixed pattern noise (FPN)	< 1 DN @ 8 bit		
Analogue gain	1		
Digital gain	0.1 to 15.99 (Fine Gain)		
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)		
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger		
Features	• Region of Interest (ROI) • binning • Image correction • • Constant frame rate • Crosshair • Temperature • Image information • Extended trigger input and strobe output functionality		
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)		
Operating temperature	0°C ... +50°C		
Power supply	+12 V DC (±10 %) (CL) / +12 V ... +24 V DC (±10 %) (GigE)		
Power consumption	TBD W (CL) / < TBD W (GigE)		
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	55 x 55 x 32 mm³ (CL) / 55 x 55 x 44 mm³ (GigE)		
Mass	TBD g (CL) / TBD g (GigE)		
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs (GigE)		
Software			
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam		
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request		

[1] to 10 % of peak responsivity

CMOS Camera

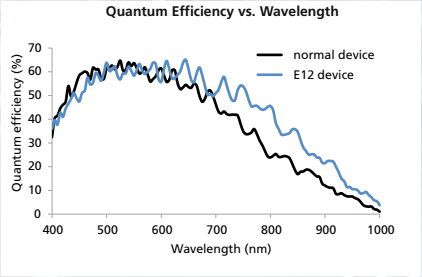
MV1-D2048x1088 SERIES

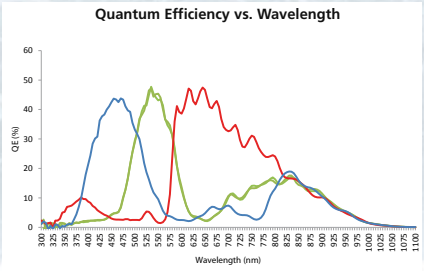
2.2 Megapixel resolution with CMOS image sensor

Features

- CMOSIS CMV2000 CMOS image sensor
- 2048 x 1088 pixel resolution
- Available in monochrome, enhanced NIR and color
- Suitable for standard and low light applications
- Up to 105 fps @ full resolution
- Global shutter
- Extended features
- Global shutter
- CameraLink® and GigE interface
- 10 bit greyscale resolution
- Configuration via register based ASCII protocol possible
- Boardlevel or OEM solution available

Spectral response of the CMOSIS CMV2000 CMOS image sensor monochrome (left) and color (right)





	DR1-D2048x1088-G2-192-8	MV1-D2048x1088-G2-80-12	MV1-D2048x1088-160-CL-12 MV1-D2048x1088-96-G2-12	MV1-D2048x1088-240-CL-8
Image Sensor				
Image sensor	CMOSIS CMV2000			
Technology	CMOS active pixel (APS)			
Scanning system	Progressive scan			
Optical format / diagonal	2/3" (12.76 mm diagonal)			
Resolution	2048 x 1088 pixels			2046 x 1088 pixels
Pixel size	5.5 µm x 5.5 µm			
Active optical area	11.26 mm x 5.984 mm (maximum)			
Dark current	125 e^- /s @ 25°C			
Full well capacity / SNR	~13.5 ke^-			
Spectral range	< 350 to 900 nm (to 10 % of peak responsivity)			
Sensitivity	5.56 V / lux.s			
Quantum Efficiency	60 % @ 550 nm with micro lenses			
Optical fill factor	42 % without micro lenses			
Dynamic range	60 dB in linear mode			
Colour format	Monochrome, Colour, enhanced NIR			
Characteristic curve	Linear, Piecewise linear			
Shutter mode	Global shutter			
Read out mode	Simultaneous read out (read out during exposure)			
Camera				
Exposure time	12.56 µs … 0.349 s	14.87 µs … 0.419 s	14.87 µs … 0.419 s (CL) 12.56 µs … 0.349s (GigE)	12.56 µs … 0.349 s
Frame rate	85	35 fps	42 fps (GigE) / 70 fps (CL)	105 fps
Pixel clock	48 MHz	40 MHz	80 MHz (CL) / 48 MHz (GigE)	80 MHz
Camera taps	1	1 (GigE) / 2 (CL)		3
Greyscale resolution	8 bit / 10 bit[1]	8 bit / 10 bit		8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON			
Analogue gain	1			
Digital gain	0.1 to 15.99 (Fine Gain)[1]			
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)			
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger			
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality • Modulation can be disabled to transmit original image data[2]			
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)			
Operating temperature	0°C … +50°C			
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)			
Power consumption	< 4.2 W			
Lens mount	C-Mount (CS-Mount optional)			
Dimensions (H x W x L)	60 x 60 x 42 mm³ (CL) / 60 x 60 x 51.5 mm³ (GigE)			
Mass	230 g (CL) / 265 g (GigE)			
Conformity	CE / RoHS / WEEE			
Specials	Adjustable backfocus; Opto-isolated I/Os ; Dual RS-422 Inputs (GigE); Evaluation software for the Double Rate Technology			
Software				
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam Demodulator DLL for implementation in GigE Vision and GenICam compatible image processing platforms[2]; HALCON extension package with demodulator sample[2]			
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request			

[1] If DR Mode active, 8 bit greyscale output only; 10 bit via LUT
[2] Appplicable for DR Camera only

CMOS Camera

MV1-D2048 SERIES

4.2 Megapixel resolution with CMOS image sensor

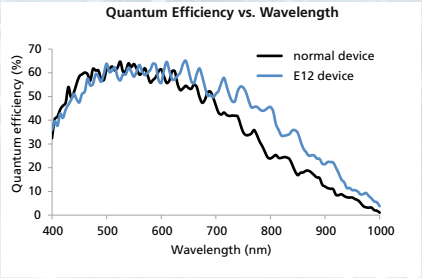
Features

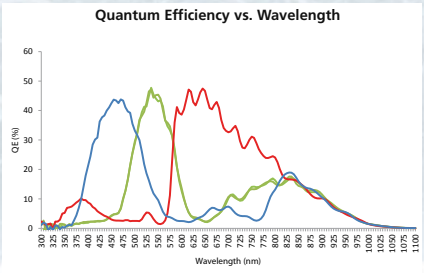
- CMOSIS CMV4000 CMOS image sensors
- 2048 x 2048 pixel resolution
- Available in monochrome, enhanced NIR and color
- Suitable for standard and low light applications
- Up to 56 fps @ full resolution
- Global shutter
- Extended features
- Global shutter
- CameraLink® and GigE interface
- 10 bit greyscale resolution
- Configuration via register based ASCII protocol
- Boardlevel or OEM solution available

Advantages

Special readoutmodes for highest possible framerates

Spectral response of the CMOSIS CMV4000 CMOS image sensor monochrome (left) and color (right)





	DR1-D2048-G2-192-8	MV1-D2048-G2-80-12	MV1-D2048-160-CL-12 MV1-D2048-96-G2-12	MV1-D2048-240-CL-8
Image Sensor				
Image sensor	CMOSIS CMV4000			
Technology	CMOS active pixel (APS)			
Scanning system	Progressive scan			
Optical format / diagonal	1" (15.92 mm diagonal)			
Resolution	2048 x 2048 pixels			2046 x 2048 pixels
Pixel size	5.5 µm x 5.5 µm			
Active optical area	11.26 mm x 11.26 mm (maximum)			
Dark current	125 e^- /s @ 25°C			
Full well capacity / SNR	~13.5 ke^-			
Spectral range	< 350 to 900 nm (to 10 % of peak responsivity)			
Sensitivity	5.56 V / lux.s			
Quantum Efficiency	60 % @ 550 nm with micro lenses			
Optical fill factor	42 % without micro lenses			
Dynamic range	60 dB in linear mode			
Colour format	Monochrome, Colour, enhanced NIR			
Characteristic curve	Linear, Piecewise linear			
Shutter mode	Global shutter			
Read out mode	Simultaneous read out (read out during exposure)			
Camera				
Exposure time	24.1 µs … 0.349 s	28.7 µs … 0.419 s	28.7 µs … 0.419 s (CL) 24.1 µs … 0.349s (GigE)	28.7 µs … 0.349 s
Frame rate	45	19 fps	37 fps (CL); 22 fps (GigE)	45 fps (56 fps [3])
Pixel clock	48 MHz	40 MHz	80 MHz (CL) / 48 MHz (GigE)	80 MHz
Camera taps	1	1 (GigE) / 2 (CL)		3
Greyscale resolution	8 bit / 10 bit[1]	8 bit / 10 bit		8 bit
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON			
Analogue gain	1			
Digital gain	0.1 to 15.99 (Fine Gain)[1]			
Configuration interface	CL SERIAL (Baudrate user selectable) (CL) / Gigabit Ethernet (GigE)			
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger			
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality • Modulation can be disabled to transmit original image data[2]			
Interface	CameraLink® Base or GigE (GigE Vision & GenICam compliant)			
Operating temperature	0°C … +50°C			
Power supply	+12 V DC (±10 %) (CL) / +12 V … +24 V DC (±10 %) (GigE)			
Power consumption	< 4.2 W			
Lens mount	C-Mount (CS-Mount optional)			
Dimensions (H x W x L)	60 x 60 x 42 mm^3 (CL) / 60 x 60 x 51.5 mm^3 (GigE)			
Mass	230 g (CL) / 265 g (GigE)			
Conformity	CE / RoHS / WEEE			
Specials	Adjustable backfocus; Opto-isolated I/Os ; Dual RS-422 Inputs (GigE); Evaluation software for the Double Rate Technology			
Software				
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam Demodulator DLL for implementation in GigE Vision and GenICam compatible image processing platforms[2]; HALCON extension package with demodulator sample[2]			
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request			

[1] If DR Mode active, 8 bit greyscale output only; 10 bit via LUT
[2] Appplicable for DR Camera only
[3] Model available upon request

CMOS Smart Camera

SM1 SERIES

1.0 or 1.3 or 2.2 Megapixel smart camera with programmable DSP

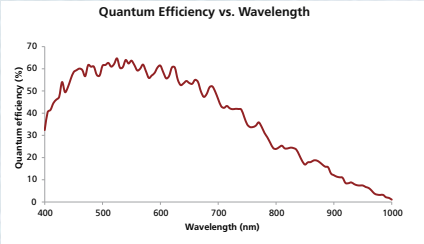
Features

- Available with multiple image sensors
- Programmable Texas Instruments DSP
- Exceptional SNR up to 427:1
- Dynamic range up to 120 dB via LinLog®
- Global shutter
- Monochrome, Enhanced NIR and Colour variants
- Ethernet 100 interface
- 12 bit greyscale resolution
- Internal microSD card

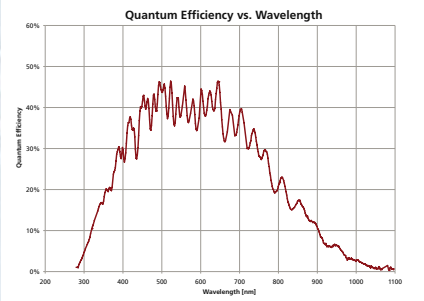
Compatible with

HALCON Embedded

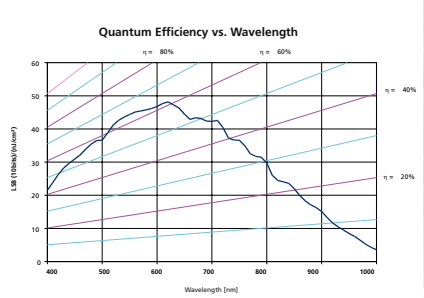
Spectral response of the CMOSIS CMV2000 CMOS image sensor



Spectral response of the Photonfocus A1024B CMOS image sensor



Spectral response of the EV76C560 CMOS image sensor



	SM1-D1024-40*	SM1-D1280*	SM1-D2048x1088*
Image sensor			
Image sensor	Photonfocus A1024B (2. Generation)	EV76C560	CMOSIS CMV2000
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1"	1/1.8"	2/3"
Resolution	1024 x 1024 pixels	1280 x 1024 pixels	2048 x 1088 pixels
Full well capacity / SNR	~200 ke⁻ / 447:1	~12 ke⁻ / 109:1	~13.5 ke⁻ / 116:1
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	60 dB	60 dB
Colour format	Monochrome	Monochrome, colour, enhanced NIR	Monochrome, colour, enhanced NIR
Characteristic curve	Linear, LinLog®	Linear	Linear, piecewise linear
Frame rate	TBD	TBD	TBD
Processor			
Processor frequency	600 MHz		
Calculation power of the processor	4800 MIPS		
Processor manufacturer, type	Texas Instruments DM6435		
SDRAM (DDR2)	256 Mbyte		
Flash Memory	2 Gbyte (internal microSD card)		
Outputs			
Ethernet TCP/IP, FTP	100 Mbit/s		
Serial interface	RS232 and RS485		
Optocoupled Digital Inputs	2		
Optocoupled Digital Outputs	4		
Mechanical-Electrical			
Lens mount	C-Mount (CS-Mount optional)		
IO-Connector	M12 - 17 Pin		
Ethernet Connector	M12 - 4 Pin		
Power supply	24 VDC / (11....30V)		
Dimensions (H x W x L)	55 x 55 x 48 mm³		
Mass	230 g		
Conformity	CE / RoHS / WEEE		
DSP Development tools	Texas Instruments Code Composer Studio		

* Model available upon request

CMOS Smart Camera

SM2-D1024 SERIES

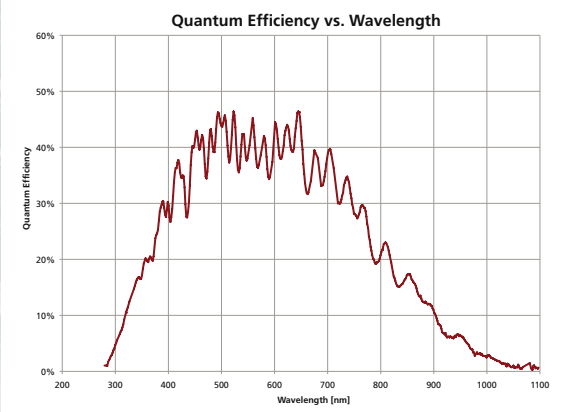
1 Megapixel smart camera with programmable DSP

Features

- Photonfocus A1024B CMOS image sensor
- 1024 x 1024 pixel resolution
- Programmable Texas Instruments DSP
- HALCON Embedded compatible
- Dynamic range up to 120 dB via LinLog®
- Up to 75 fps @ full resolution
- Global shutter
- Monochrome
- GigE interface
- 12 bit greyscale resolution

Compatible with

Spectral response of the Photonfocus A1024B CMOS image sensor



	SM2-D1024-80-GB-12 VisionCam PS Type 1*
Image sensor	
Image sensor	Photonfocus A1024B (2. Generation)
Technology	CMOS active pixel (APS)
Scanning system	Progressive scan
Optical format / diagonal	1" (15.42 mm diagonal)
Resolution	1024 x 1024 pixels
Pixel size	10.6 µm x 10.6 µm
Active optical area	10.9 mm x 10.9 mm (maximum)
Dark current	2 fA/pixel @ 30°C
Full well capacity	~200 ke$^-$
Spectral range	< 400 to 900 nm
Responsivity	120 x 10^3 DN / (J/m²) @ 610 nm / 8 bit / gain = 1 (approximately 350 DN / (lux s) @ 610 nm / 8 bit / gain = 1)
Quantum Efficiency	45 % @ 550 nm
Optical fill factor	35 % (geometrical)
Dynamic range	60 dB in linear mode; 120 dB with LinLog®
Colour format	Monochrome
Characteristic curve	Linear, LinLog®, Skimming
Shutter mode	Global shutter
Read out mode	Sequential or simultaneous read out (read out during exposure)
Camera	
Exposure time	10 µs … 0.83 s / 50 ns steps
Frame rate	75 fps
Pixel clock	40 MHz
Camera taps	2 (internal)
Greyscale resolution	8 bit / 10 bit / 12 bit
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON
Analogue gain	1
Digital gain	1 / 2 / 4
Configuration interface	Built-in Webserver
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input
Features	• Region of Interest (ROI) • 16 Multiple ROI (MROI) • Decimation Y • Image correction • Look-up table (LUT) • Constant frame rate • Image information • Realtime clock • FTP Server • Extended trigger input and strobe output functionality
CPU / RAM / Storage	Texas Instruments TMS320 C6415 @ 1GHz, 8000 MIPS / 256 MB SDRAM / 2 GB SD Card
Interface	GigE
Operating temperature	0°C ... +50°C
Power supply	+12 V DC (±10 %)
Power consumption	8.0 W
Lens mount	C-Mount (CS-Mount optional)
Dimensions (H x W x L)	60 x 60 x 127 mm³
Mass	532 g
Conformity	CE / RoHS / WEEE
Specials	Adjustable backfocus; Opto-isolated I/Os; JTAG, RS232 Interface, RS422 Interface
Software	
Camera control	Built-in webserver
DSP Development tools	Texas Instruments Code Composer Studio 3.3, HALCON Embedded

* Product name used by Imago Technologies

CMOS Smart Camera

SM2-D1312 SERIES

1.4 Megapixel smart camera with programmable DSP

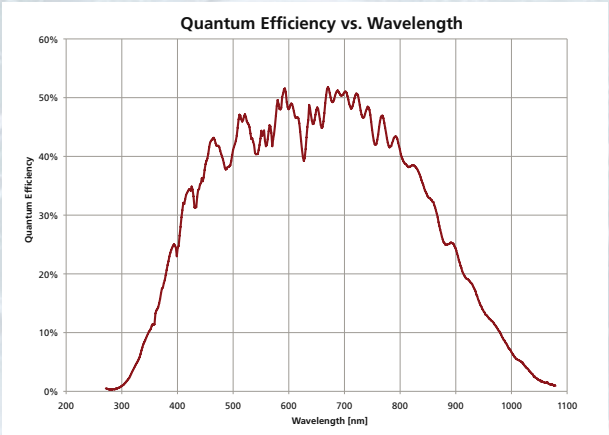
Features

- Photonfocus A1312 CMOS image sensor
- 1312 x 1082 pixel resolution
- Programmable Texas Instruments DSP
- HALCON Embedded compatible
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 108 fps @ full resolution
- JPEG compression @ 68 fps(1)
- Global shutter
- Monochrome
- GigE interface
- 12 bit greyscale resolution

Compatible with

HALCON Embedded

Spectral response of the Photonfocus A1312 CMOS image sensor



	SM2-D1312-80-GB-12 VisionCam PS Type 2*	SM2-D1312-JPEG-100-GB-12 VisionCam PS Type 2*	SM2-D1312-160-GB-12 VisionCam PS Type 2*
Image sensor			
Image sensor	Photonfocus A1312 (3. Generation)		
Technology	CMOS active pixel (APS)		
Scanning system	Progressive scan		
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution		
Resolution	1312 x 1082 pixels		
Pixel size	8 µm x 8 µm		
Active optical area	10.48 mm x 8.64 mm (maximum)		
Dark current	0.65 fA/pixel		
Full well capacity / SNR	~90 ke$^-$ / 300:1		
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)		
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)		
Quantum Efficiency	> 50 %		
Optical fill factor	> 60 %		
Dynamic range	60 dB in linear mode; 120 dB with LinLog®		
Colour format	Monochrome		
Characteristic curve	Linear, LinLog®		
Shutter mode	Global shutter		
Read out mode	Sequential or simultaneous read out (read out during exposure only in linear mode) for higher frame rates		
Camera			
Exposure time	10 µs … 0.83 s / 50 ns steps	10 µs … 0.67 s / 40 ns steps	10 µs … 0.41 s / 25 ns steps
Frame rate	55 fps	68 fps	108 fps
Pixel clock	40 MHz	50 MHz	80 MHz
Camera taps	2 (internal)		
Greyscale resolution	8 bit / 10 bit / 12 bit		8 bit
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON		
Analogue gain	1		
Digital gain	1 / 2 / 4 / 8		
Configuration interface	Built-in Webserver		
Trigger modes	• Free running (non triggered) • DSP controlled trigger • External trigger input		
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Realtime clock • JPEG Compression[1] • FTP Server • Extended trigger input and strobe output functionality		
CPU / RAM / Storage	Texas Instruments TMS320 C6415 @ 1GHz, 8000 MIPS / 256 MB SDRAM / 2 GB SD Card[2]		
Interface	GigE		
Operating temperature	0°C ... +50°C		
Power supply	+12 V DC (±10 %)		
Power consumption	10 W		
Lens mount	C-Mount (CS-Mount optional)		
Dimensions (H x W x L)	60 x 60 x 137 mm³		
Mass	572 g		
Conformity	CE / RoHS / WEEE		
Specials	Adjustable backfocus; Opto-isolated I/Os; JTAG, RS232 Interface, RS422 Interface		
Software			
Camera control	Built-in webserver		
DSP Development tools	Texas Instruments Code Composer Studio 3.3, HALCON Embedded		

* Product name used by Imago Technologies

(1) Feature only available for SM2-D1312-JPEG-100-GB-12 camera (for other cameras on request)

(2) DSP TI TMS320 C6455 @ 1.2GHz, 9600 MIPS / 512 MB SDRAM (available on request)

photon focus

IMAGO TECHNOLOGIES

CMOS Smart Camera

SM2-D2048X1088 SERIES

2.0 Megapixel smart camera with programmable DSP

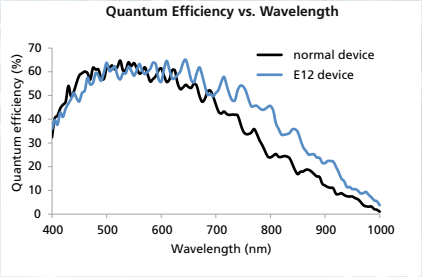
Features

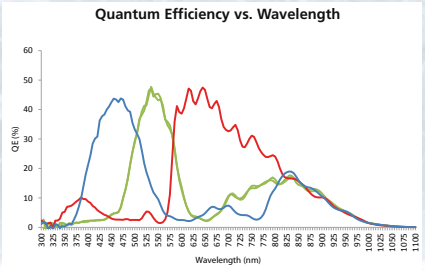
- CMOSIS CMV2000 CMOS image sensor
- 2048 x 1088 pixel resolution
- Programmable Texas Instruments DSP
- Available in monochrome, NIR an colour
- Up to 70 fps @ full resolution
- Highspeed linescan mode with 25700 fps (2048 x 2 pixel, colour and monochrome)
- Global shutter
- GigE interface
- 10 bit greyscale resolution
- Suitable for standard and low light applications

Compatible with

HALCON Embedded

Spectral response of the CMOSIS CMV2000 CMOS image sensor monochrome (left) and color (right)





	SM2-D2048x1088(I)-80-GB-12 VisionCam PS Type 2*	SM2-D2048x1088(I)-160-GB-12 VisionCam PS Type 2*
Image sensor	CMOSIS CMV2000	
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	2/3" (12.76 mm diagonal)	
Resolution	2048 x 1088 pixels	
Pixel size	5.5 µm x 5.5 µm	
Active optical area	11.26 mm x 5.984 mm (maximum)	
Dark current	125 e^- /s @ 25°C	
Full well capacity / SNR	~13.5 ke^-	
Spectral range	< 350 to 900 nm (to 10 % of peak responsivity)	
Responsivity	5.56 V / lux.s	
Quantum Efficiency	60 % @ 550 nm with micro lenses	
Optical fill factor	42 % without micro lenses	
Dynamic range	60 dB in linear mode	
Colour format	Monochrome, enhanced NIR	
Characteristic curve	Linear, Piecewise linear	
Shutter mode	Global shutter	
Read out mode	Simultaneous read out (read out during exposure)	
Exposure time	12.56 µs … 0.349 s	
Frame rate	42 fps	
Pixel clock	80 MHz	
Camera taps	2	
Greyscale resolution	8 bit / 10 bit	
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)[1]	
Configuration interface	Built-in Webserver	
Trigger modes	• Free running (non triggered) • DSP controlled trigger • External trigger input	
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Realtime clock • FTP Server • Extended trigger input and strobe output functionality • Highspeed linescan mode	
CPU / RAM / Storage	Texas Instruments TMS320 C6415 @ 1GHz, 8000 MIPS / 256 MB SDRAM / 2 GB SD Card[1]	
Interface	GigE	
Operating temperature	0°C … +50°C	
Power supply	+12 V DC (±10 %)	
Power consumption	10 W	
Lens mount	C-Mount (CS-Mount optional	
Dimensions (H x W x L)	60 x 60 x 137 mm^3	
Mass	572 g	
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os; JTAG, RS232 Interface, RS422 Interface	
Camera control	Built-in webserver	
DSP Development tools	Texas Instruments Code Composer Studio 3.3, HALCON Embedded	

* Product name used by Imago Technologies

[1] DSP TI TMS320 C6455 @ 1.2GHz, 9600 MIPS / 512 MB SDRAM (available on request)

CMOS 3D Camera

MV-D1024E-3D01-160-CL-12

1 Megapixel 3D camera for laser triangulation applications

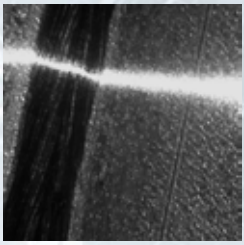
Features

- Photonfocus A1024B CMOS image sensor
- 1024 x 1024 pixel resolution
- Realtime laserline Peak Detection algorithm on camera
- Dynamic range up to 120 dB via LinLog®
- Up to 2500 profiles/s @ 1024 x 32 pixel resolution
- Global shutter
- Monochrome
- CameraLink® interface
- 12 bit greyscale resolution

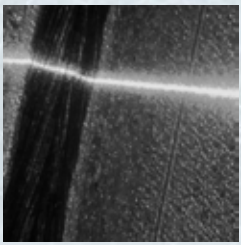
Compatible with

Advantages

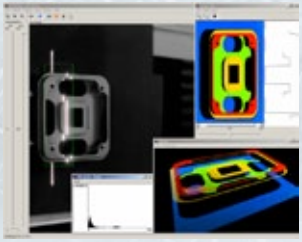
- No additional calculations on CPU
- Reduction of vision system computer CPU load
- PF 3D Suite, a free GUI for an easy system set up and visualisation of 3D scans
- Higher accuracy and robustness through new Peak Detection algorithm



Standard camera
with linear response (< 60 dB)



Photonfocus CMOS camera
with LinLog® response (120 dB)



PF 3D Suite

	MV-D1024E-3D01-160-CL-12
Image sensor	
Image sensor	Photonfocus A1024B (2. Generation)
Technology	CMOS active pixel (APS)
Scanning system	Progressive scan
Optical format / diagonal	1" (15.42 mm diagonal)
Resolution	1024 x 1024 pixels
Pixel size	10.6 µm x 10.6 µm
Active optical area	10.9 mm x 10.9 mm (maximum)
Dark current	2 fA/pixel @ 30°C
Full well capacity	~200 ke$^-$
Spectral range	< 400 to 900 nm
Responsivity	120 x 10^3 DN / (J/m²) @ 610 nm / 8 bit / gain = 1 (approximately 350 DN / (lux s) @ 610 nm / 8 bit / gain = 1)
Quantum Efficiency	45 % @ 550 nm
Optical fill factor	35 % (geometrical)
Dynamic range	60 dB in linear mode; 120 dB with LinLog®
Colour format	Monochrome
Characteristic curve	Linear, LinLog®, Skimming
Shutter mode	Global shutter
Read out mode	Sequential or simultaneous read out (read out during exposure)
Camera	
Exposure time	10 µs … 0.41 s / 25 ns steps
Frame rate	150 fps @ full resolution / 2500 fps @ 1024 x 32 resolution / 3900 fps @ 512 x 32 resolution
Pixel clock	80 MHz
Camera taps	2
Greyscale resolution	8 bit / 10 bit / 12 bit
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON
Analogue gain	1
Digital gain	1 / 2 / 4
Configuration interface	CL SERIAL (9600 or 57600 Baud, user selectable)
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input
Features	• Region of Interest (ROI) • 16 Multiple ROI (MROI) • Decimation Y • Image correction • Look-up table (LUT) • Constant frame rate • Image information • Peak Detector • Extended trigger input and strobe output functionality
Interface	CameraLink® Base
Operating temperature	0°C ... +50°C
Power supply	+12 V DC (±10%)
Power consumption	3.7 W
Lens mount	C-Mount (CS-Mount optional)
Dimensions (H x W x L)	55 x 55 x 40 mm³
Mass	210 g
Conformity	CE / RoHS / WEEE
Specials	Adjustable backfocus; Opto-isolated I/Os
Software	
Camera control	PF 3D Suite graphical user interface (GUI) and PF3DLib (SDK)
OS	win2k; winxp; winvista; other OS (Linux, QNX, etc) on request

CMOS 3D Camera

MV1-D1312-3D02-160-G2-8

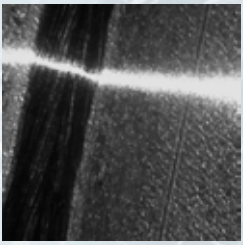
1.4 Megapixel 3D camera for laser triangulation applications

Features

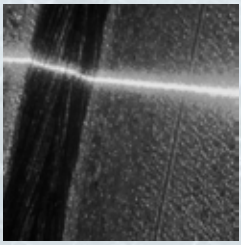
- Photonfocus A1312 CMOS image sensor
- 1312 x 1082 pixel resolution
- Realtime laserline Peak Detection algorithm on camera
- Dynamic range up to 120 dB via LinLog®
- Up to 3266 profiles/s @ 1312 x 16 pixel resolution
- Global shutter
- Monochrome
- Gigabit Ethernet interface
- 12 bit greyscale resolution
- Halcon toolkit available

Advantages

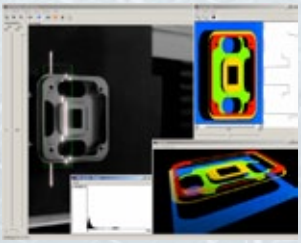
- No additional calculations on CPU
- Reduction of vision system computer CPU load
- PF 3D Suite, a free GUI for an easy system set up and visualisation of 3D scans
- Higher accuracy and robustness through new Peak Detection algorithm



Standard camera
with linear response (< 60 dB)



Photonfocus CMOS camera
with LinLog® response (120 dB)



PF 3D Suite

	MV1-D1312-3D02-160-G2-8
Image sensor	
Image sensor	Photonfocus A1312 (3. Generation)
Technology	CMOS active pixel (APS)
Scanning system	Progressive scan
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution
Resolution	1312 x 1082 pixels (1312 x 1009 for 3D measurement)
Pixel size	8 µm x 8 µm
Active optical area	10.48 mm x 8.64 mm (maximum)
Dark current	0.65 fA/pixel
Full well capacity / SNR	~90 ke$^-$ / 300:1
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)
Quantum Efficiency	> 50 %
Optical fill factor	> 60 %
Dynamic range	60 dB in linear mode; 120 dB with LinLog®
Colour format	Monochrome
Characteristic curve	Linear, LinLog®
Shutter mode	Global shutter
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates
Camera	
Exposure time	10 µs … 0.41 s / 25 ns steps
Frame rate (3D mode)	113 fps @ full resolution / 3266 fps @ 1312 x 16 resolution / 5500 fps @ 544 x 16 resolution
Pixel clock	80 MHz
Camera taps	2
Greyscale resolution	8 bit / 10 bit / 12 bit
Fixed pattern noise (FPN)	< 1 DN RMS @ 8 bit / gain = 1 / offset correction ON
Analogue gain	1
Digital gain	0.1 to 15.99 (Fine Gain)
Configuration interface	Gigabit Ethernet
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input
Features	• Region of Interest (ROI) • Constant frame rate • A/B RS-422 shaft encoder interface • Decimation Y • Image correction • Look-up table (LUT) • Image information • Peak Detector • Extended trigger input and strobe output functionality
Interface	GigE (GigE Vision & GenICam compliant)
Operating temperature	0°C ... +50°C
Power supply	+12 V … +24 V DC (±10 %)
Power consumption	< 6 W
Lens mount	C-Mount (CS-Mount optional)
Dimensions (H x W x L)	60 x 60 x 51 mm³
Mass	310 g
Conformity	CE / RoHS / WEEE
Specials	Adjustable backfocus; Opto-isolated I/Os
Software	
Camera control	PF 3D Suite graphical user interface (GUI) and PF3DLib (SDK); Graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam[1]
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request

[1] 3D and 2D data extraction must be done by the user

CMOS Camera

MV1-D2048X1088-3D03-760-G2-8

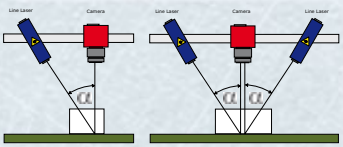
2.2 Megapixel 3D camera for laser triangulation applications

Features

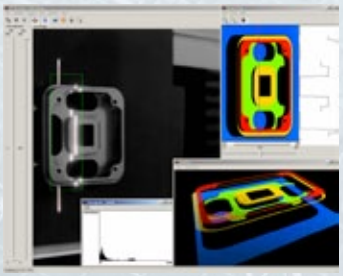
- CMOSIS CMV2000 CMOS image sensor
- 2048 x 1088 pixel resolution
- Realtime DUAL laserline Peak Detection algorithm on camera
- Additional peak information (width and quality) for scatter measurements
- Combined 3D and linescan mode
- Up to 8450 profiles/s @ 2048 x 32 resolution
- Global shutter
- Monochrome
- Gigabit Ethernet Interface
- 8 bit greyscale resolution with subpixel accuracy
- Boardlevel or OEM solution available
- Halcon toolkit available

Advantages

- Dual Peak eliminates the need of a 2nd camera for various setups
- Scatter measurement with additional peak information possible
- Dual 2D single line for 2D surface inspection and overlay
- No additional calculations on CPU
- Reduction of vision system computer CPU load
- PF 3D Suite a free GUI for an easy system set up and visualisation of 3D scan
- Higher accuracy and robustness through new Peak Detection algorithm



triangulation setups



PF 3D Suite

	MV-D2048x1088-3D03-760-G2-8
Image Sensor	
Image sensor	CMOSIS CMV2000
Technology	CMOS active pixel (APS)
Scanning system	Progressive scan
Optical format / diagonal	2/3" (12.76 mm diagonal)
Resolution	2048 x 1088 pixels (2048 x 1009 for 3D measurement)
Pixel size	5.5 µm x 5.5 µm
Active optical area	11.26 mm x 5.984 mm (maximum)
Dark current	125 e^-/s @ 25°C
Full well capacity / SNR	~13.5 ke^-
Spectral range	< 350 to 900 nm (to 10 % of peak responsivity)
Sensitivity	5.56 V / lux.s
Quantum Efficiency	60 % @ 550 nm with micro lenses
Optical fill factor	42 % without micro lenses
Dynamic range	60 dB in linear mode
Colour format	Monochrome
Characteristic curve	Linear, Piecewise linear
Shutter mode	Global shutter
Read out mode	Simultaneous read out (read out during exposure)
Camera	
Exposure time	12.56 µs … 0.349
Frame rate	348 fps[2] @ full resolution / 8450 fps[2] @ 2048 x 32 resolution
Pixel clock	48 MHz
Camera taps	1
Greyscale resolution	8 bit / 10 bit
Fixed pattern noise (FPN)	< 1 DN RMS @ 10 bit / gain = 1 / offset correction ON
Analogue gain	1
Digital gain	0.1 to 15.99 (Fine Gain)
Configuration interface	GigE (GigE Vision & GenICam compliant)
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input
Features	• Region of Interest (ROI) • Decimation Y • Constant frame rate • Extended trigger input and strobe output functionality • Dual Peak Detector with dual 2D single line for 2D surface inspection • A/B RS-422 shaft encoder interface
Interface	Gigabit Ethernet
Operating temperature	0°C … +50°C
Power supply	+12 V … +24 V DC (±10 %)
Power consumption	< 5 W
Lens mount	C-Mount (CS-Mount optional)
Dimensions (H x W x L)	55 x 55 x 51.5 mm^3
Mass	265 g
Conformity	CE / RoHS / WEEE
Specials	Adjustable backfocus; isolated I/Os; A/B RS-422 shaft encoder interface; dual peak; combined 3D and linescan mode
Software	
Camera control	PF 3D Suite graphical user interface (GUI) and PF3DLib (SDK); Graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam[1]
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request

[1] 3D and 2D data extraction must be done by the user
[2] Output 3D only with additional 2D line (max. 2048 x 1009)

CMOS Camera

HD1 SERIES

1.4 or 4.3 Megapixel resolution with Photonfocus sensor

Features

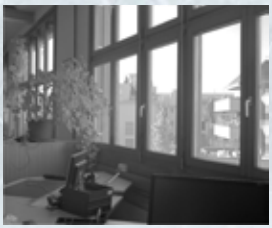
- Photonfocus A1312 or A2080 CMOS image sensor
- 1312 x 1082 or 2080 x 2080 pixel resolution
- Odd/even rows with independent exposure time and response curve
- Good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®, extended dynamic range with odd/even HDR
- Up to 108 fps (1.4 MP), 577 fps (VGA) or 34 fps (4MP) @ full resolution over single standard GigE Interface
- Global shutter
- Monochrome
- Extended features
- CameraLink® and GigE interface
- 12 bit greyscale resolution
- Configuration via register based ASCII protocol possible
- Boardlevel or OEM solution available

Advantages

- Odd/even HDR results in a linear response curve

Odd image

Even image



Combined image

	HD1-D1312-160-CL-12 HD1-D1312-80-G2-12	HD1-D2080-160-CL-12*
Image Sensor		
Image sensor	Photonfocus A1312 (3. Generation)	Photonfocus A2080 (3. Generation)
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	23.5 mm diagonal @ max. resolution (< 25 mm image circle)
Resolution	1312 x 1082 pixels	2080 x 2080 pixels
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	16.64 mm x 16.64 mm (maximum)
Dark current	0.65 fA/pixel	
Full well capacity / SNR	~90 ke^- (Max SNR > 300:1)	
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)	
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)	
Quantum Efficiency	> 50 %	
Optical fill factor	> 60 %	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear or LinLog® can be set for for odd/even rows independent	
Shutter mode	Global shutter	
Read out mode	Sequential read out	
Camera		
Exposure time	10 µs … 0.41 s / 25ns steps	10 µs … 0.33 s / 25ns steps
Frame rate	108 fps (CL); 55fpd (GigE)	34 fps (full resolution)
Pixel clock	40 MHz	
Camera taps	4	
Greyscale resolution	8 bit / 10 bit[1] / 12 bit[1]	
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)	
Configuration interface	CL SERIAL (Baudrate user selectable)	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger	
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality • Modulation can be disabled to transmit original image data	
Interface	CameraLink® Base	
Operating temperature	0°C ... +50°C	
Power supply	+12 V DC (±10 %)	
Power consumption	< 3.3 W	
Lens mount	C-Mount (CS-Mount optional)	M42x1, F-Mount, C-Mount 1.3"
Dimensions (H x W x L)	60 x 60 x 45 mm³	60 x 60 x 47 mm³
Mass	265 g	222 g
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os Application example software for the HD1 technology	
Software		
Camera control	PFRemote™ graphical user interface (GUI) and PFLib (SDK); GigE: graphical user interface GEV Player and SDK; All 3rd party tools providing full support for GigE Vison and GenICam	
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request	

[1] If DR Mode active, 8 bit greyscale output only

* Model available upon request

CMOS Camera

DR1 SERIES WITH PHOTONFOCUS SENSOR

1.4 or 4.3 Megapixel resolution with Photonfocus sensor

Features

- Photonfocus A1312 or A2080 CMOS image sensor
- 1312 x 1082 or 2080 x 2080 pixel resolution
- Good NIR spectral response
- Exceptional SNR up to 300:1
- Dynamic range up to 120 dB via LinLog®
- Up to 135 fps (1.4 Mp), 42 fps (4Mp), 600 fps (544 x 544 pixel)
- Photonfocus Double Rate technology
- Global shutter
- Monochrome
- GigE interface (GigE Vision and GenICam compatible with standard single cable connection)
- 8 bit greyscale resolution
- Boardlevel or OEM solution available

Compatible with

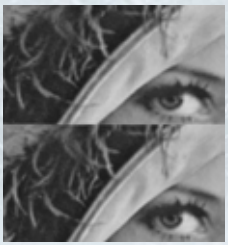
HALCON LabVIEW MATROX IMAGING

Advantages

- ~100 % faster than standard GigE cameras
- Modulation can be disabled to transmit original image data
- No Link-Aggregation

Original image

Modulated–demodulated image



Detailed view

	DR1-D1312-200-G2-12	DR1-D2080-200-G2-12*
Image Sensor		
Image sensor	Photonfocus A1312 (3. Generation)	Photonfocus A2080 (3. Generation)
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	1" (13.6 mm diagonal) maximum resolution 2/3" (11.6 mm diagonal) 1024 x 1024 resolution	23.5 mm diagonal @ max. resolution (< 25 mm image circle)
Resolution	1312 x 1082 pixels	2080 x 2080 pixels
Pixel size	8 µm x 8 µm	
Active optical area	10.48 mm x 8.64 mm (maximum)	16.64 mm x 16.64 mm (maximum)
Dark current	0.65 fA/pixel	
Full well capacity / SNR	~90 ke^- (Max SNR > 300:1)	
Spectral range	< 370 to 1000 nm (to 10 % of peak responsivity)	
Responsivity	210 x 10^3 DN / (J/m²) @ 625 nm / 8 bit / gain = 1 (approximately 620 DN / (lux s) @ 625 nm / 8 bit / gain = 1)	
Quantum Efficiency	> 50 %	
Optical fill factor	> 60 %	
Dynamic range	60 dB in linear mode; 120 dB with LinLog®	
Colour format	Monochrome	
Characteristic curve	Linear, LinLog®	
Shutter mode	Global shutter	
Read out mode	Sequential read out or simultaneous read out (read out during exposure only in linear mode) for higher frame rates	
Camera		
Exposure time	10 µs … 0.33 s / 25ns steps	10 µs … 0.33 s / 25ns steps
Frame rate	135 fps (full resolution), 577 fps (VGA)	42 fps (full resolution)
Pixel clock	50 MHz	
Camera taps	1	
Greyscale resolution	8 bit / 10 bit[1] / 12 bit[1]	
Fixed pattern noise (FPN)	< 1 DN @ 8 bit / correction ON	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)	
Configuration interface	GigE	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger	
Features	• Region of Interest (ROI) • 512 Multiple ROI (MROI) • Decimation Y • Image correction • 2 Look-up tables (LUT) • Constant frame rate • Crosshair • Convolver 3x3 • Temperature • Image information • Extended trigger input and strobe output functionality • Modulation can be disabled to transmit original image data	
Interface	GigE	
Operating temperature	0°C ... +50°C	
Power supply	+12 V … +24 V DC (±10 %)	
Power consumption	< 5.2 W	
Lens mount	C-Mount (CS-Mount optional)	M42x1, F-Mount, C-Mount 1.3"
Dimensions (H x W x L)	60 x 60 x 51 mm³	60 x 60 x 47 mm³
Mass	222 g	294 g
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs Evaluation software for the Double Rate Technology	
Software		
Camera control	GUI (GEVPlayer) and Pleora SDK for image acquisition and development of applications Demodulator DLL for implementation in GigE Vision and GenICam compatible image processing platforms HALCON extension package with demodulator sample	
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request	

[1] If DR Mode active, 8 bit greyscale output only

* Model available upon request

CMOS Camera

DR1 SERIES WITH CMOSIS SENSOR

2.2 or 4.1 Megapixel resolution with CMOSIS sensor

Features

- CMOSIS CMV2000 or CMV4000 CMOS image sensor
- 2048 x 1088 or 2048 x 2048 pixel resolution
- Standard, NIR and colour versions
- SNR up to 110:1
- Up to 135 fps (1.4 Mp), 45 fps (4Mp), 709 fps (512 x 512 pixel), 570 fps (rot. VGA)
- Photonfocus Double Rate technology
- Global shutter
- Monochrome, enhanced NIR and Colour
- GigE interface (GigE Vision and GenICam compatible with standard single cable connection)
- 8 bit greyscale resolution
- Boardlevel or OEM solution available

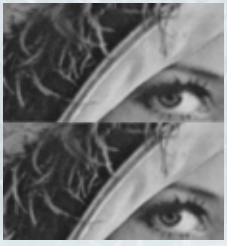
Advantages

- ~100 % faster than standard GigE cameras
- Modulation can be disabled to transmit original image data
- No Link-Aggregation
- Single standard GigE cable

Colour version awailable

Original image

Modulated–demodulated image



Detailed view

	DR1-D2048x1088(I/C)-192-G2-8	DR1-D2028(I/C)-192-G2-8*
Image Sensor		
Image sensor	CMOSIS CMV2000	CMOSIS CMV4000
Technology	CMOS active pixel (APS)	
Scanning system	Progressive scan	
Optical format / diagonal	2/3" (12.76 mm diagonal)	1" (16 mm diagonal)
Resolution	2048 x 1088 pixels	2048 x 2048 pixels
Pixel size	5.5 µm x 5.5 µm	
Active optical area	11.26 mm x 5.984 mm (maximum)	11.26 mm x 11.26 mm (maximum)
Dark current	125 e^-/s @ 25°C	
Full well capacity / SNR	~13.5 ke^-	
Spectral range	< 350 to 900 nm (to 10 % of peak responsivity)	
Responsivity	5.56 V / lux.s	
Quantum Efficiency	60 % @ 550 nm with micro lenses	
Optical fill factor	42 % without micro lenses	
Dynamic range	60 dB in linear mode	
Colour format	Monochrome	
Characteristic curve	Linear, Piecewise linear	
Shutter mode	Global shutter	
Read out mode	Simultaneous read out (read out during exposure)	
Camera		
Exposure time	12.56 µs … 0.349 s / 20.8 ns steps	24.1 µs … 0.349 s / 20.8 ns steps
Frame rate	135 fps (full resolution), 709 fps (rot. VGA)	45 fps (full resolution), 709 fps (rot. VGA)
Pixel clock	48 MHz	
Camera taps	1	
Greyscale resolution	8 bit / 10 bit[1] /	
Fixed pattern noise (FPN)	< TBD DN @ 8 bit	
Analogue gain	1	
Digital gain	0.1 to 15.99 (Fine Gain)	
Configuration interface	GigE (Gigabit Ethernet)	
Trigger modes	• Free running (non triggered) • Interface trigger • External trigger input • Software trigger	
Features	• Region of Interest (ROI) • • Constant frame rate • Temperature • Image information • Extended trigger input and strobe output functionality • Modulation can be disabled to transmit original image data	
Interface	GigE (Gigabit Ethernet)	
Operating temperature	0°C ... +50°C	
Power supply	+12 V … +24 V DC (±10 %)	
Power consumption	< TBD W	
Lens mount	C-Mount (CS-Mount optional)	C-Mount (CS-Mount optional)
Dimensions (H x W x L)	55 x 55 x 51.5 mm^3	60 x 60 x 47 mm^3
Mass	260 g	260 g
Conformity	CE / RoHS / WEEE	
Specials	Adjustable backfocus; Opto-isolated I/Os; Dual RS-422 Inputs Evaluation software for the Double Rate Technology	
Software		
Camera control	GUI (GEVPlayer) and Pleora SDK for image acquisition and development of applications Demodulator DLL for implementation in GigE Vision and GenICam compatible image processing platforms HALCON extension package with demodulator sample	
OS	Windows and Linux (32 & 64 Bit); other OS (QNX, etc) on request	

[1] If DR Mode active, 8 bit greyscale output only
* Model available upon request

Accessories

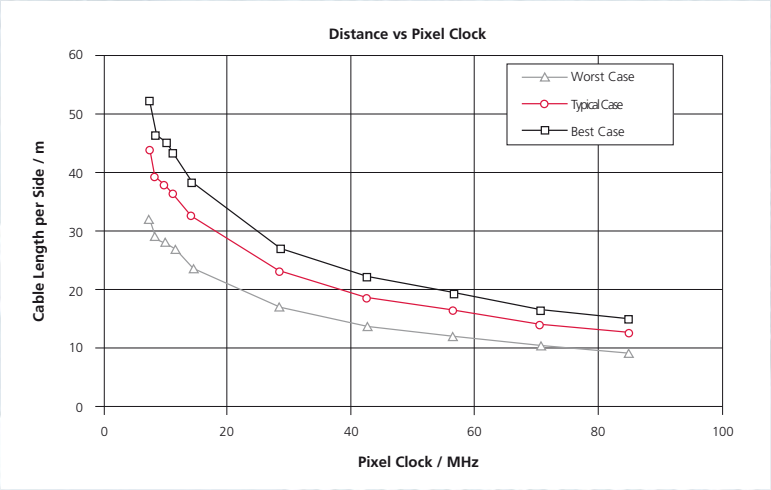
CAMERALINK® REPEATER

Link to the Success

Features

- CameraLink® extension up to 40 m
- 100% CameraLink® compatible
- Compact & robust industrial housing
- Active clock and data regeneration
- With "zero skew"
- Bridging of long distances with
- CameraLink® interface
- No cable insertion losses
- Automatic stand-by mode
- Power-up failsafe
- Plug and play

Range of CameraLink® with AWG 28 standard cable



Digipeater® CLB26

Image Sensor	
Cable length	Up to 20 m per side @ 20 MHz
Digital interface	CameraLink® Base and Medium Configuration
Max. pixel clock	85 MHz @ 8 m cable length (with AWG 28 cable)
Min. pixel clock	20 MHz @ 20 m cable length (with AWG 28 cable)
Features	• Power-up failsafe • Active clock and data regeneration with "zero skew" • Hot swappable plug • Automatic stand-by mode
Operating temperature	0 °C ... + 60 °C
Power supply	+ 5 V ... + 8 V DC (+/-10 %)
Power consumption	1.0 W
Interface connector	MDR26 (CameraLink®)
Power connector	Binder connector series 712
Dimensions	57 x 36 x 107 mm³
Mass	160 g
Conformity	CE / RoHS / WEE

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