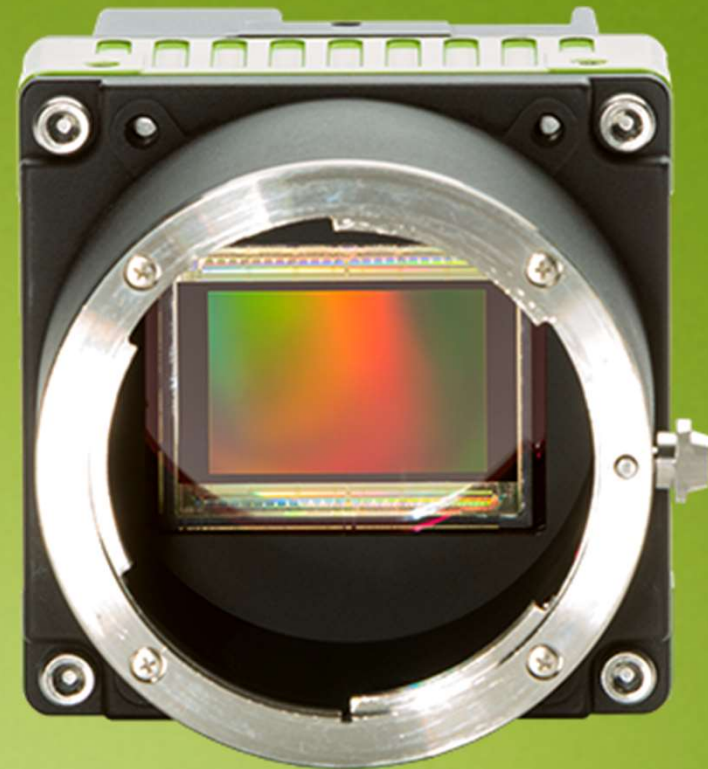




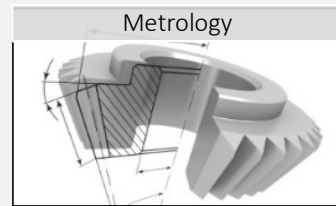
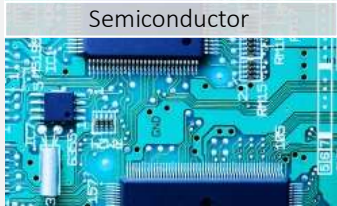
Spark Series

45-megapixel cameras with
CoaXPress v2.0 interface



November 2021

High resolution area scan camera delivering outstanding image quality for applications accross machine vision and outdoor imaging



Based on latest **cutting edge CMOS** sensor technology

CMOS
global shutter

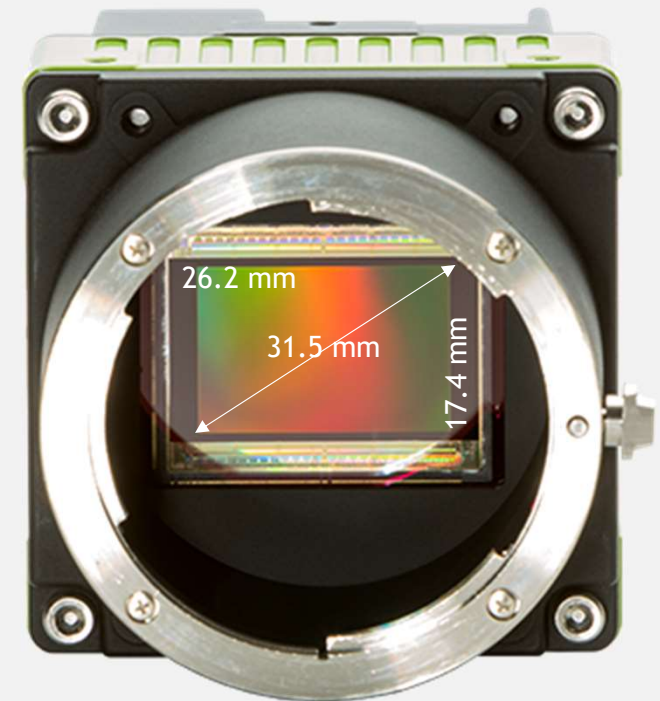
8192 x 5460 px
resolution

3.20 x 3.20 μm
pixel size

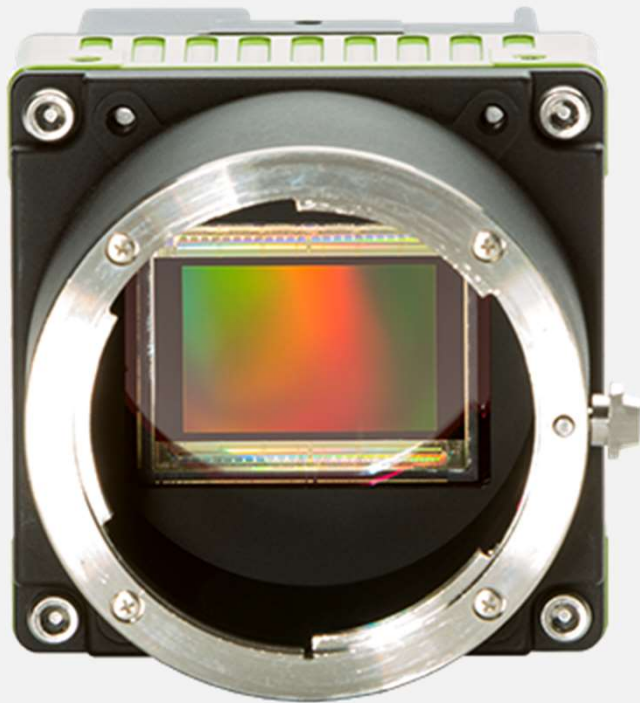
Super 35 mm
sensor size

Optical size
(Diagonal 31.5 mm)

Aspect ratio
3:2



Delivering **high resolution** images with **outstanding** quality



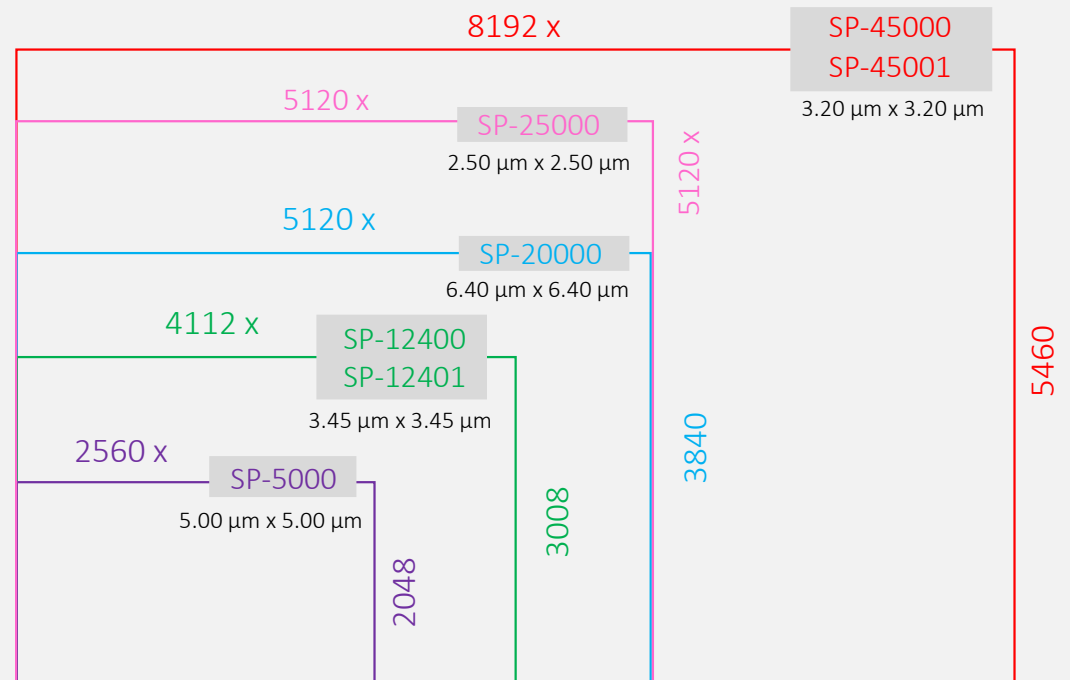
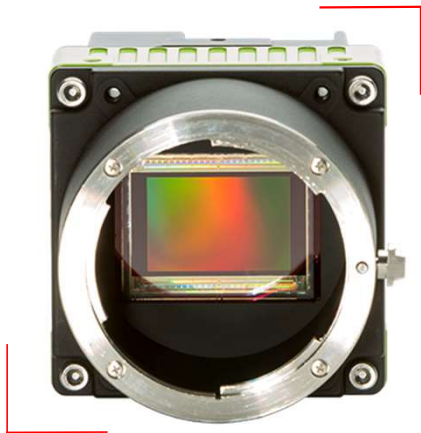
Dark
noise
4.5 e-

Dynamic
range
67 dB



73 dB with
Dual-gain
HDR

Sensor resolution and pixel size

...the 45-megapixel models compared to other Spark models



45-megapixel - 8 models to choose from

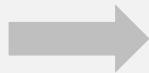
		COLOR	MONOCHROME	
Models with high-speed sensor		SP-45000 C -CXP4A	SP-45000 M -CXP4A	<i>CXP-12 lane speeds (12.5 Gbps)</i>
		SP-45000 C -CXP4	SP-45000 M -CXP4	<i>CXP-6 lane speeds (6.25 Gbps)</i>
Models with reduced speed sensor		SP-45001 C -CXP2A	SP-45001 M -CXP2A	<i>CXP-12 lane speeds (12.5 Gbps)</i>
		SP-45001 C -CXP4	SP-45001 M -CXP4	<i>CXP-6 lane speeds (6.25 Gbps)</i>

Connector types and data transfer speeds

With **CoaXPress** 6.25 Gbps lane speed

- SP-45000C-CXP4
- SP-45000M-CXP4
- SP-45001M-CXP4
- SP-45001C-CXP4

Din 1.0/2.3 connectors



With **CoaXPress** 12.5 Gbps lane speed

- SP-45000C-CXP4A
- SP-45000M-CXP4A
- SP-45001C-CXP2A
- SP-45001M-CXP2A

Micro BNC (HD BNC) connectors



Micro BNC connectors are better equipped to **handle CXP-12** high frequency signals

Note: 12.5 Gbps lane speed requires CoaXPress v2.0 frame grabber. With older frame grabber camera will support CXP-6 maximum lane speed.


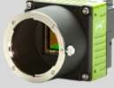


Advantages of CXP-12 vs. CXP-6 interface

(Models with high-speed sensors)

Achieve same maximum frame rates with fewer lanes/cables than CXP-6.

Achieve faster frame rates than CXP-6 when imaging at higher bit depths.

		SP-45000-CXP4 CXP-6 speeds (6.25 Gbps per lane) 		SP-45000-CXP4A CXP-12 speeds (12.5 Gbps per lane) 	
		Frames/s With full 45MP resolution (8192 x 5460)	Frames/s Set to 8K resolution (8192 x 4320)	Frames/s With full 45MP resolution (8192 x 5460)	Frames/s Set to 8K resolution (8192 x 4320)
8-Bit	4 lanes (cables)	51 fps	65 fps	52 fps	65 fps
	2 lanes (cables)	27 fps	34 fps	52 fps	65 fps
10-Bit	4 lanes (cables)	43 fps	55 fps	47 fps	60 fps
	2 lanes (cables)	21 fps	27 fps	43 fps	55 fps
12-Bit	4 lanes (cables)	36 fps	45 fps	47 fps	60 fps
	2 lanes (cables)	18 fps	23 fps	38 fps	45 fps





CXP-12 vs. CXP-6 interfaces

(Models with reduced-speed sensors)

CXP-12 provides significantly higher frame rates with simple two-cable configuration.

From 12% to 95% faster depending on CXP-6 bit depth and lane configuration.

		SP-45001-CXP4 CXP-6 speeds (6.25 Gbps per lane) 		SP-45001-CXP2A CXP-12 speeds (12.5 Gbps per lane) 	
		Frames/s With full 45MP resolution (8192 x 5460)	Frames/s Set to 8K resolution (8192 x 4320)	Frames/s With full 45MP resolution (8192 x 5460)	Frames/s Set to 8K resolution (8192 x 4320)
8-Bit	4 lanes (cables)	38 fps	48 fps	n/a	n/a
	2 lanes (cables)	27 fps	34 fps	52 fps	65 fps
10-Bit	4 lanes (cables)	32 fps	40 fps	n/a	n/a
	2 lanes (cables)	21 fps	27 fps	43 fps	55 fps
12-Bit	4 lanes (cables)	32 fps	40 fps	n/a	n/a
	2 lanes (cables)	18 fps	23 fps	38 fps	45 fps

Data transfer mode – Standard set-up



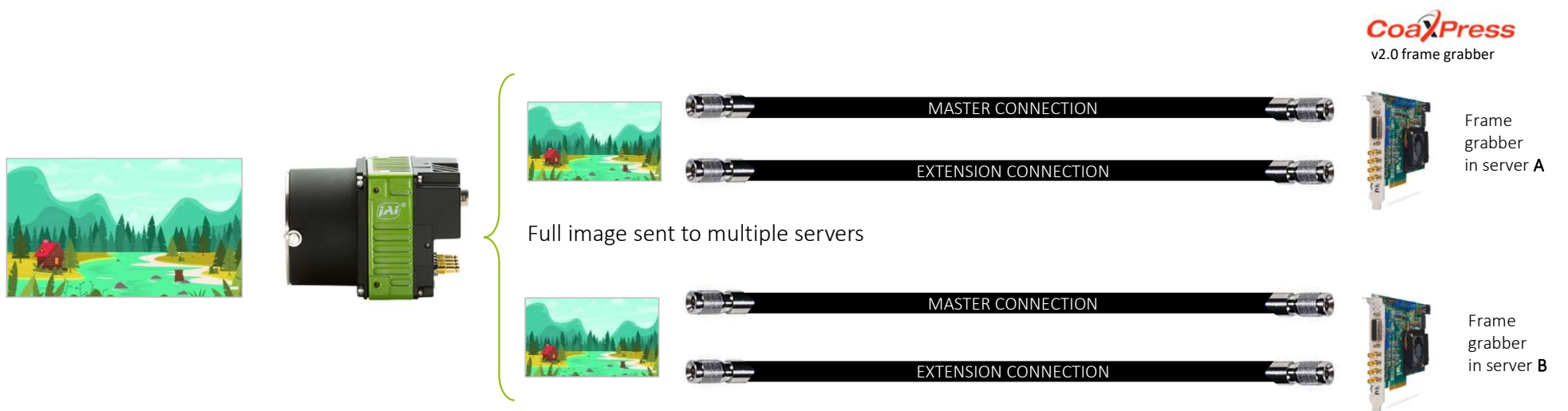
CoaPress
v2.0 frame grabber



Frame grabber in PC

Data transfer mode – Duplicate set-up

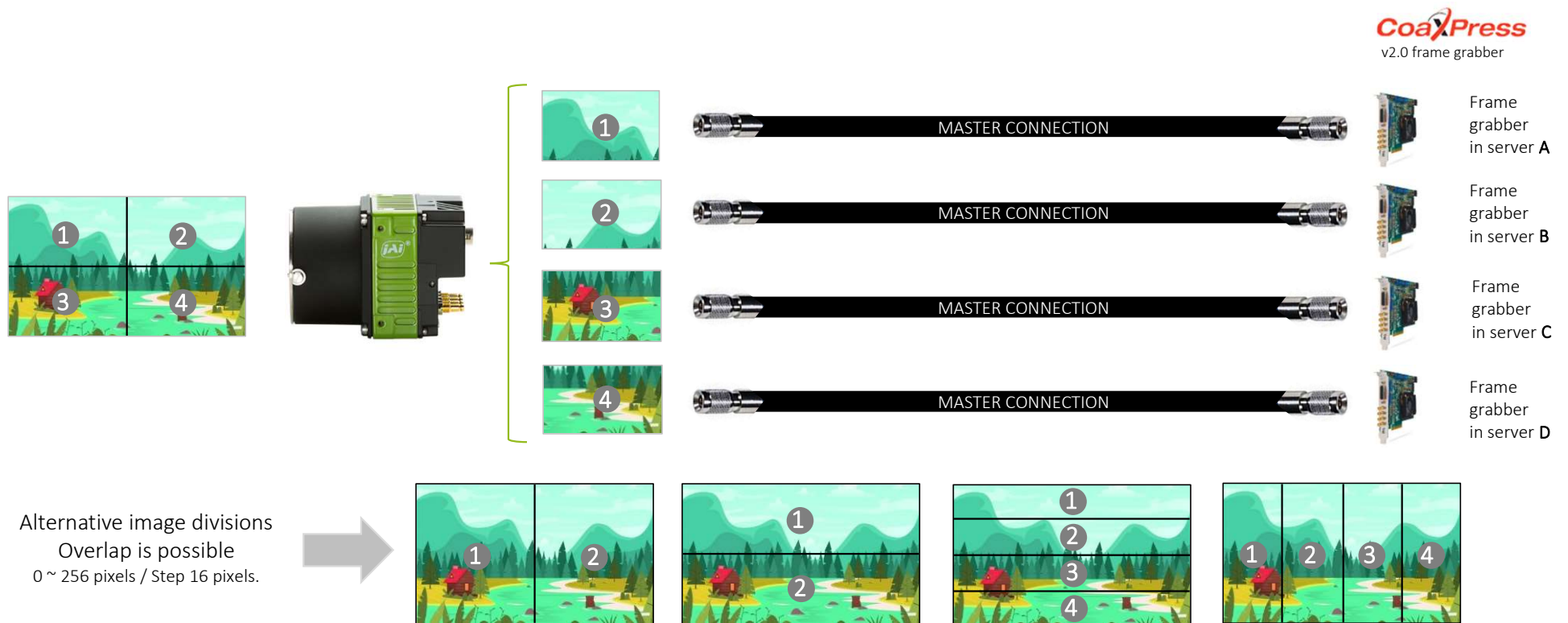
For load sharing on multiple servers for heavy data processing tasks



Can also be set up to send the full image to 4 different servers

Data transfer mode – image division set-up

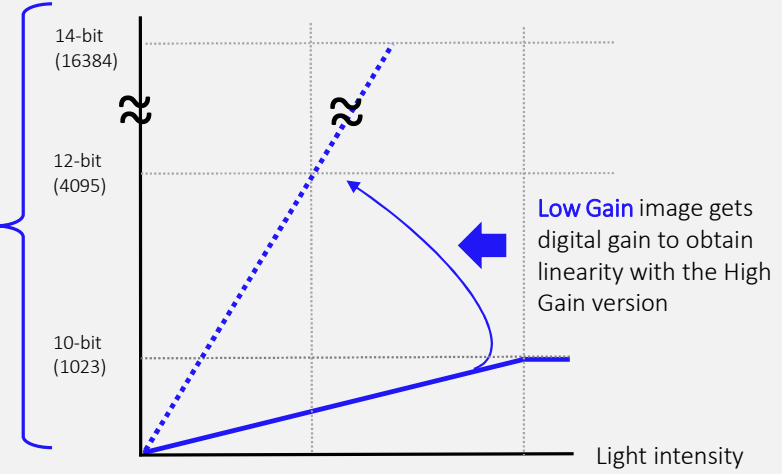
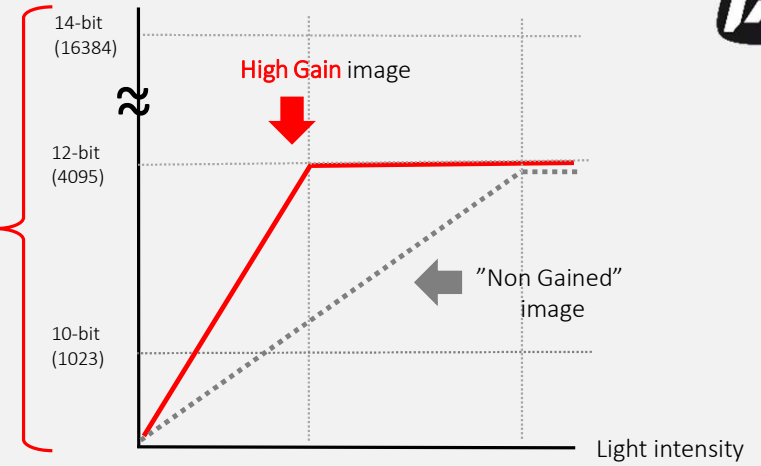
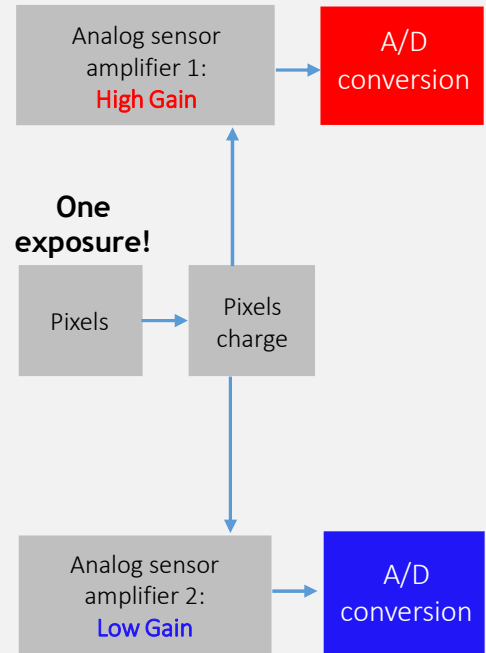
For load sharing on multiple servers for heavy data processing tasks



HDR imaging via dual sensor gain

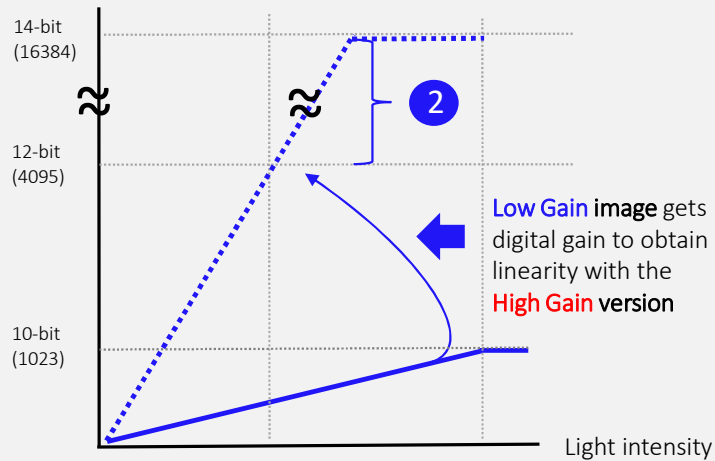
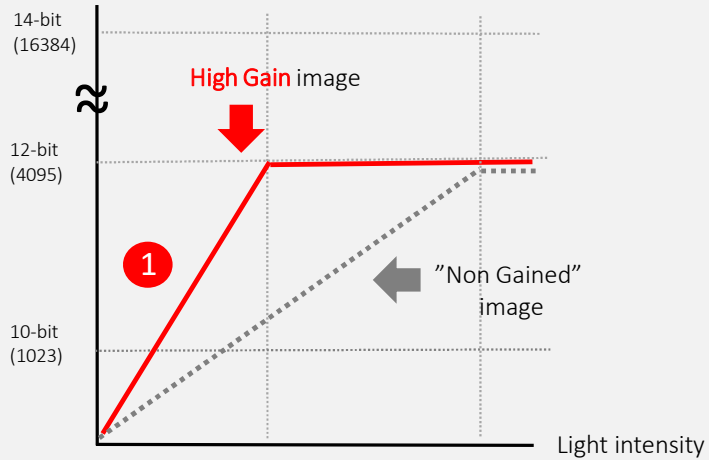
Based on **one exposure** (one frame) and **two separate** pixel amplifiers in the sensor.

Supports monochrome and color images.



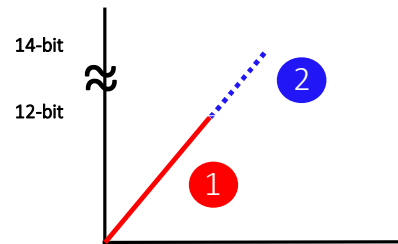
NOTE: In HDR imaging mode with dual sensor gain, the max frame rate is 30 fps. (In 8K resolution).

HDR imaging output via dual sensor gain



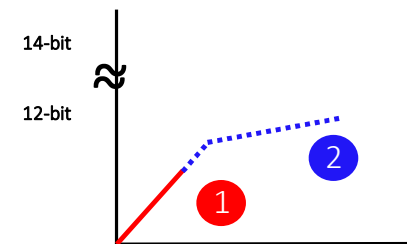
+6dB
73 dB
HDR

Linear HDR output



In linear mode, the synthesized 14-bit image is output as it is.

Compressed HDR output



In Knee mode, the synthesized 14-bit image is knee converted and output as 8-bit, 10-bit or 12-bit.

EXAMPLE OF ON-CAMERA DUAL GAIN HDR

Based on one exposure (one frame) and two separate pixel amplifiers in the sensor



The picture to the left - with the HDR function off - has trouble with the exposure. The calendar on the wall next to the window is too dark and the scene outside the window is over saturated.



In the image to the right the HDR knee point function is used to increase the exposure on the calendar while also significantly improving the exposure of the cars, house, and hills outside.

EXAMPLE OF ON-CAMERA DUAL GAIN HDR

Based on one exposure (one frame) and two separate pixel amplifiers in the sensor



Low gain

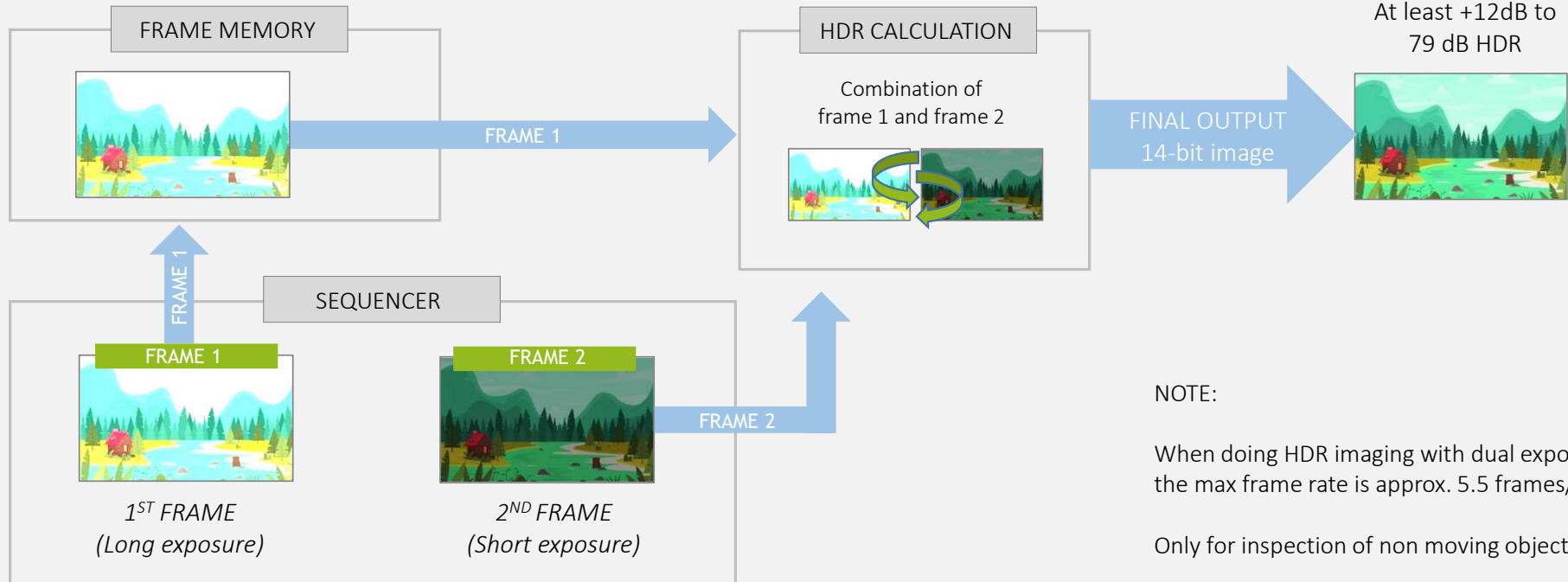


High gain

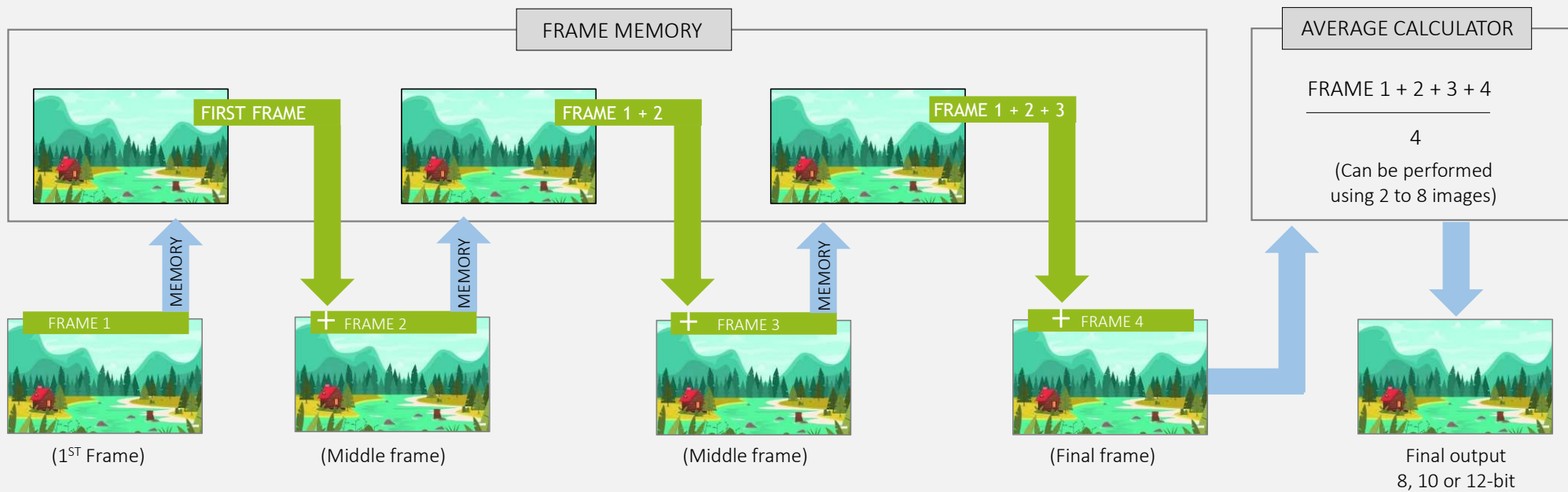


HDR imaging via two frame exposure

Based on two exposures (two frames) with different exposure times



Reduction of random shot noise via frame averaging



Note: For low speed application only

Multi-ROI

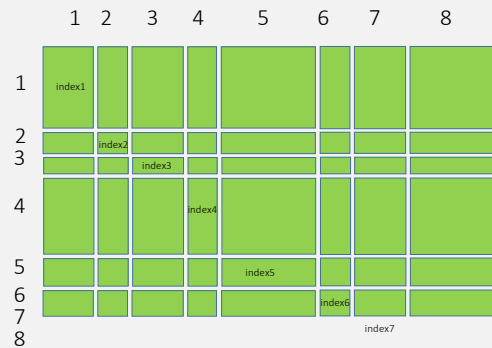
Increase frame rate and reduce processing load by selecting regions-of-interest (ROI)



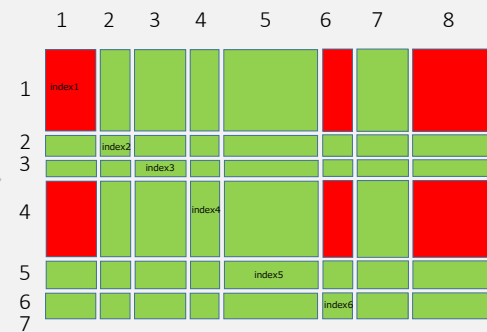
Full image



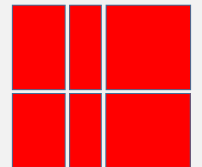
Multi-ROI Grid
(User-definable)



ROIs selected on sensor



ROI data to output



Overlay mode when setting multi-ROI

Makes it more convenient to set ROI areas

When the overlay mode is turned on, the image intensity for those areas that are not included in the ROI is reduced to 50%. The contrast difference makes it easier to set and work with ROI areas.



Original image

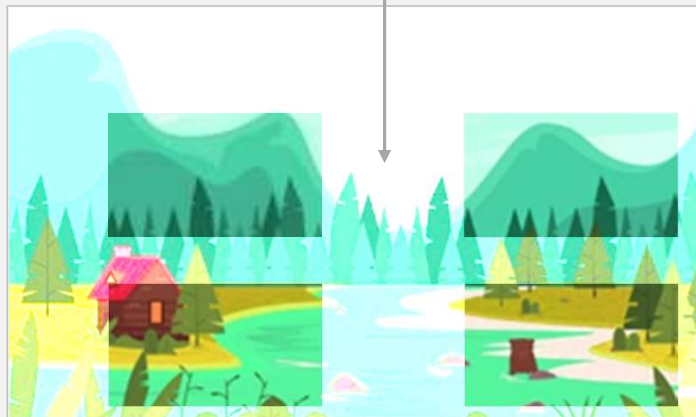


Image after defining ROI areas

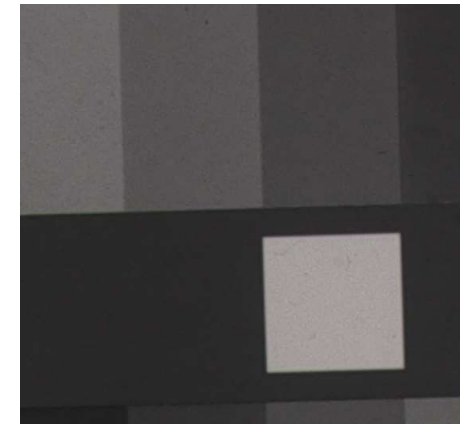
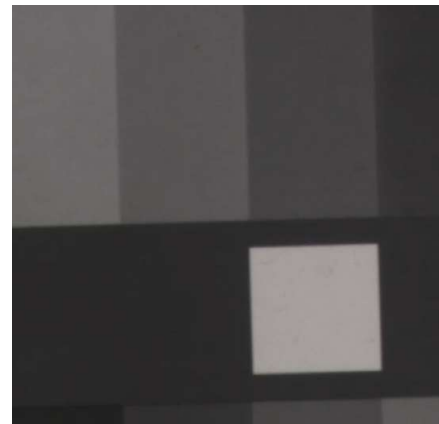


Output for processing

Note: Requires CoaXPress v2.0 frame grabber

Edge enhancer tool

The image processing filter identifies the boundaries between contrasting colors and **increases the contrast** in those areas, thereby improving edge **sharpness** and **definition**.



With egde enhancer

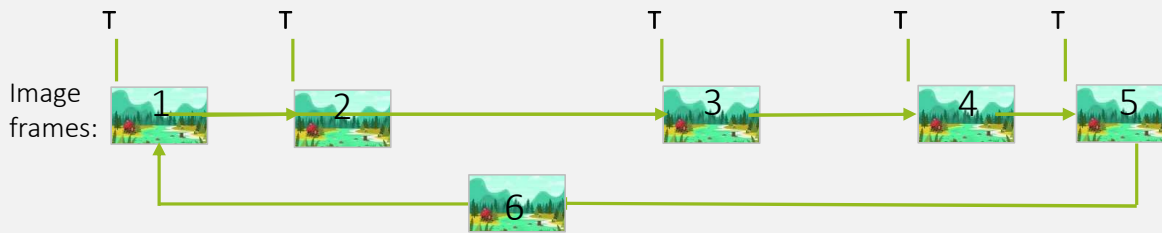
Emphasis levels in 4 steps:
Low, Middle, High and Strong

Note: Only monochrome models

Sequencer function

Two modes with up to 128 user-defined indexes (Sequencer Sets) available

Example: TriggerSequence mode



Sequence repetition:
1-255, or 0 to keep repeating indefinitely

Index parameters

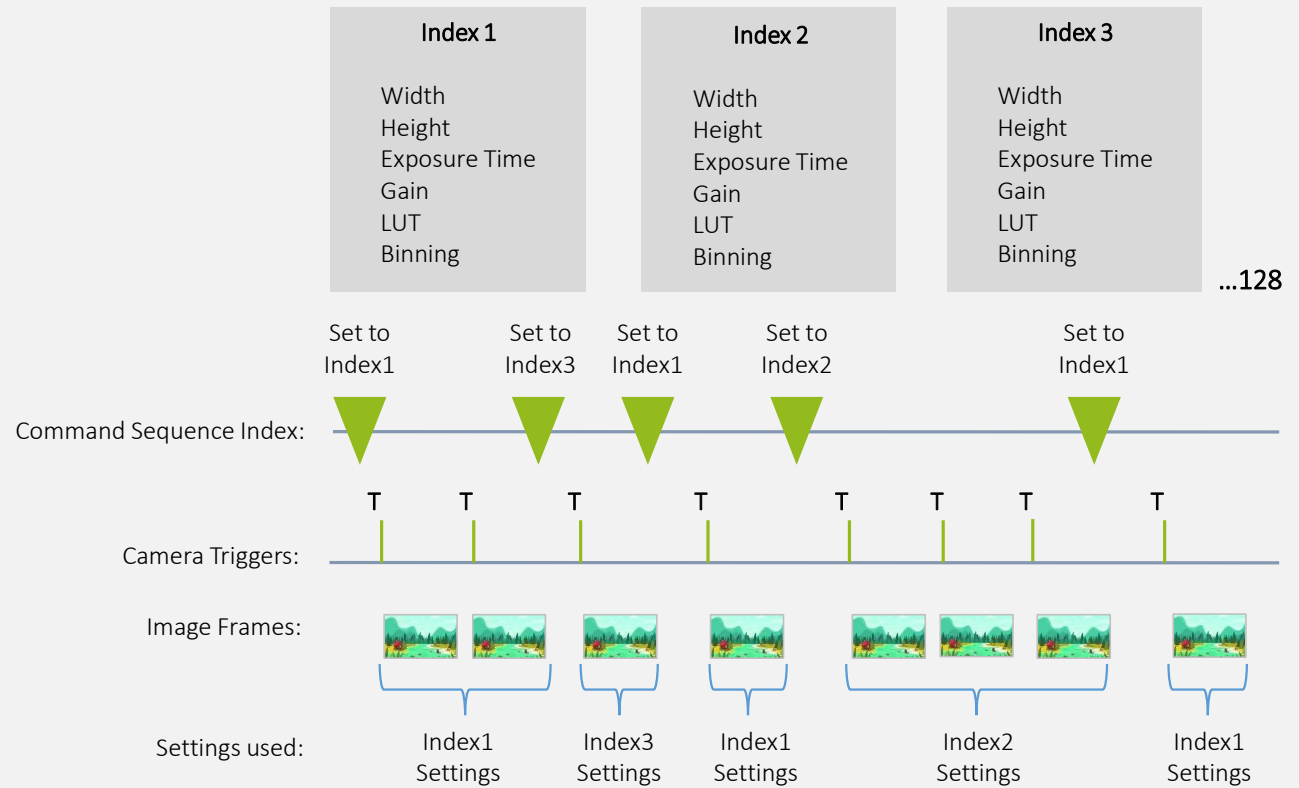
- SequencerFrameCount
- SequencerSetNext
- SequencerWidth
- SequencerHeight
- SequencerOffsetX
- SequencerOffsetY
- SequencerGainDigitalAll
- SequencerGainDigitalRed
- SequencerGainDigitalBlue
- SequencerExposureTime
- SequencerBinningHorizontal
- SequencerBinningVertical
- SequencerLutEnable
- SequencerBlackLevelAll
- SequencerSetNext

Sequencer function

CommandSequence mode:

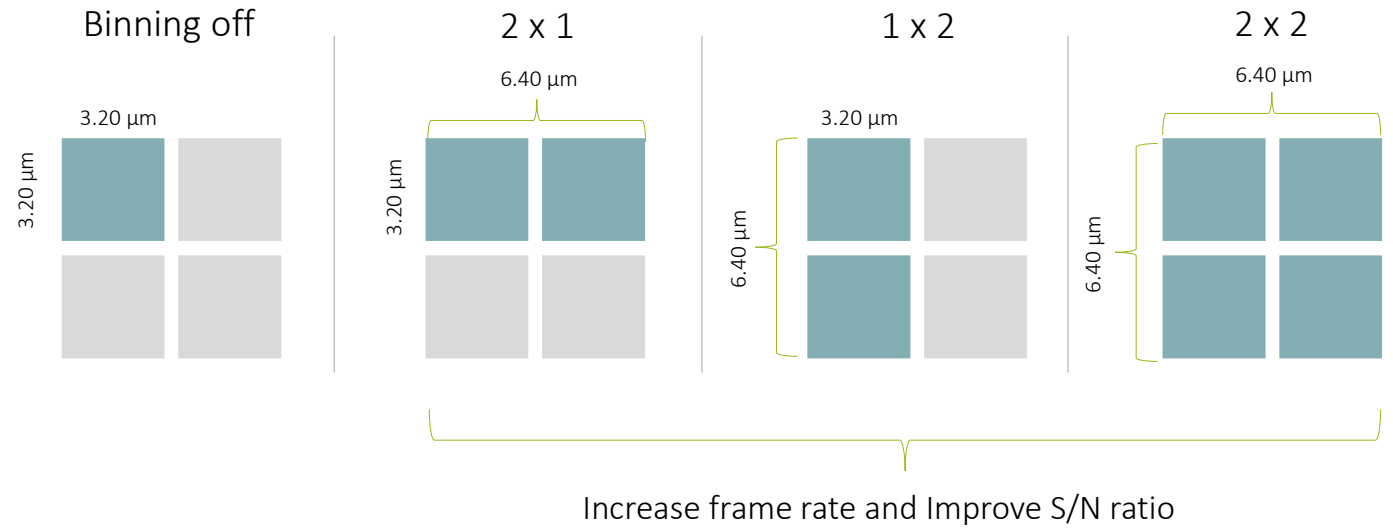
Active index can change programmatically based on response from the application.

Up to 128 user-defined indexes (Sequencer Sets) available



Pixel binning

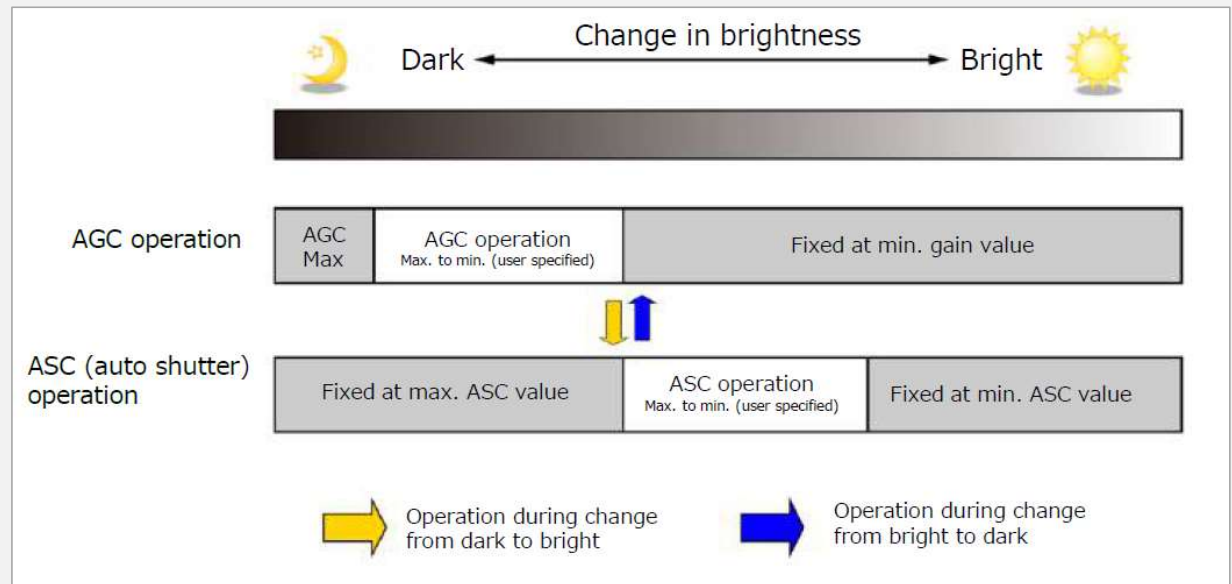
Increases pixel sensitivity



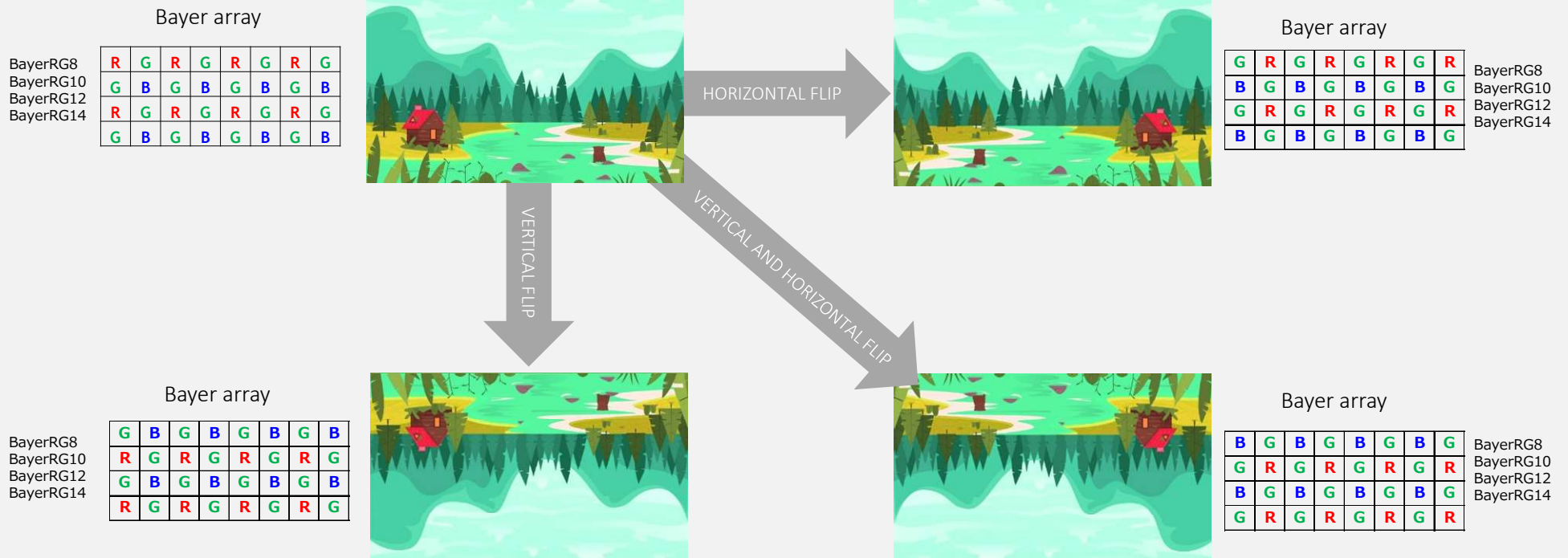
Note: Only monochrome models.

Automatic level control

The ALC function combines the automatic gain control and automatic exposure control functions to handle various changes in brightness while optimizing for image noise and lens aperture.



Horizontal and vertical image flip function

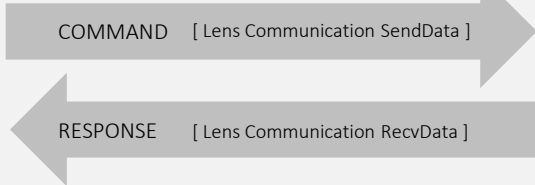


Lens control via Birger mount

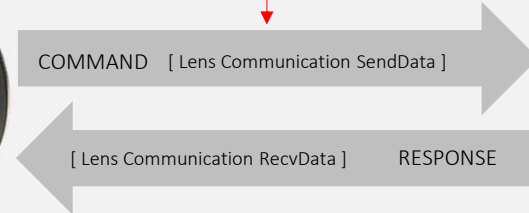
CoaPress
v2.0 frame grabber



AUX
Pin.6 : LENS POWER DC9V
Pin.7 : RS-232C-Tx
Pin.8 : RS-232C-Rx
Pin.5,9,10 : GND



Via RS-232C



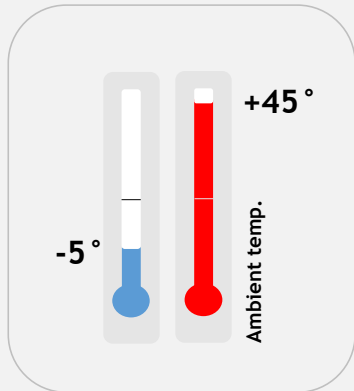
Birger mount





Industrial **robustness**

Outstanding **reliability** and **durability** in industrial environments



VIBRATION
10G

SHOCK
80G



Built to **work**. Built to **last**

Reliable: Avoid expensive system halts

Durable: Ensure low-cost-of-ownership

Compact and lightweight



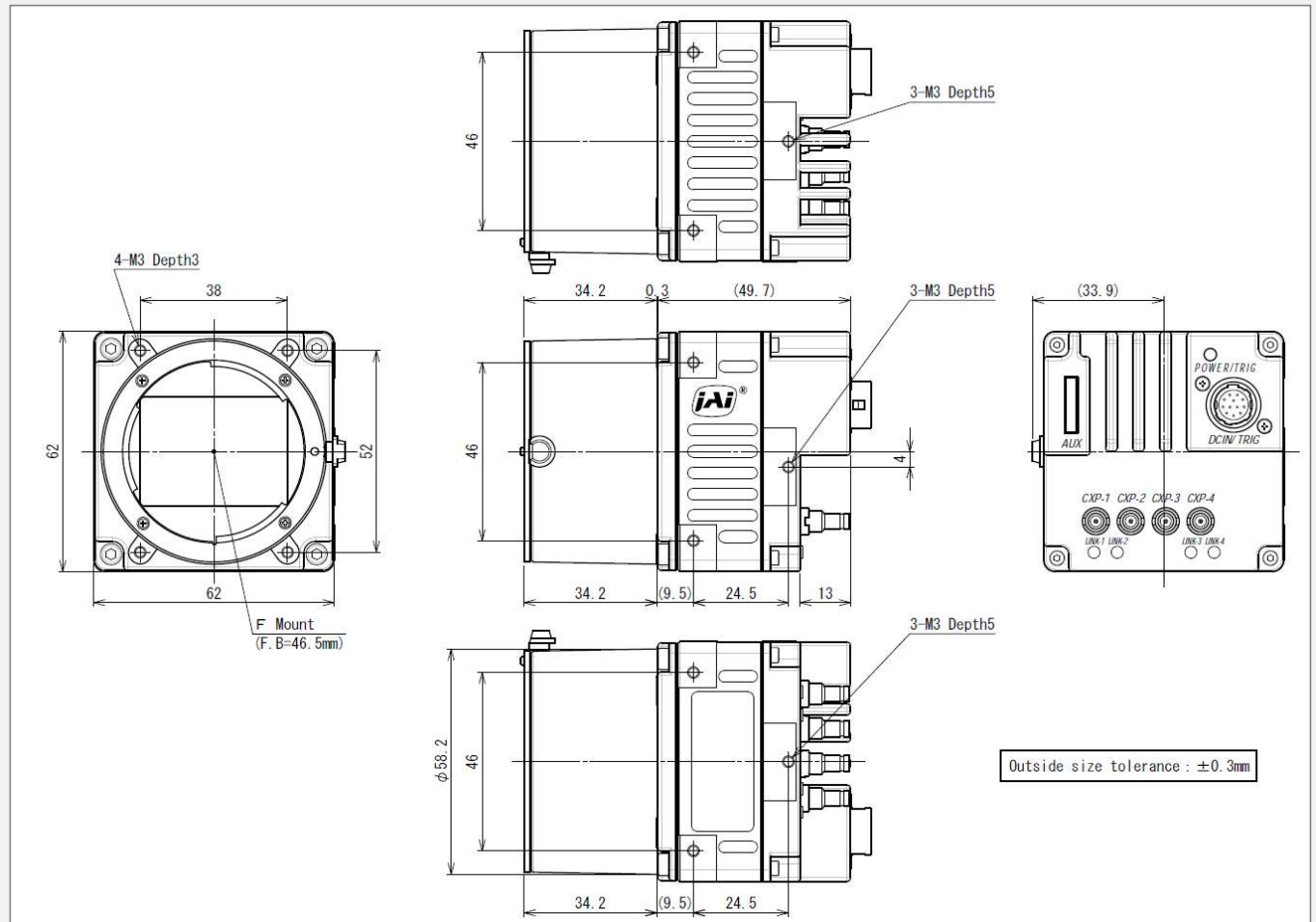
Compact
form factor
62 x 62 x 84.2 mm

330 grams
(340 g M42-mount)

Power
+10V to +25V DC

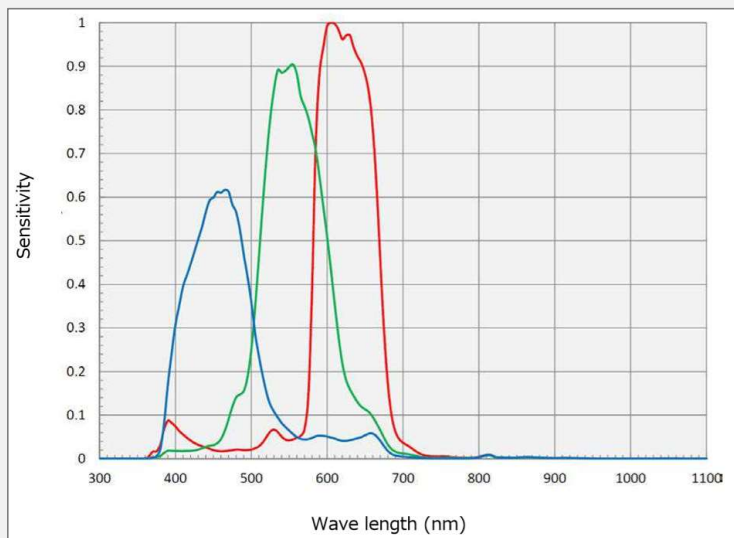
Power consumption
9.9 W – 13.7 W
(depending on model)

Dimensions

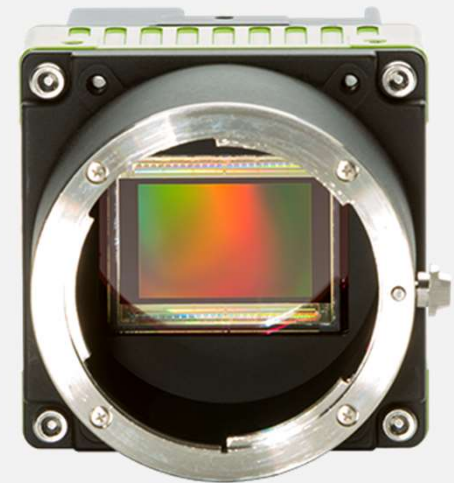
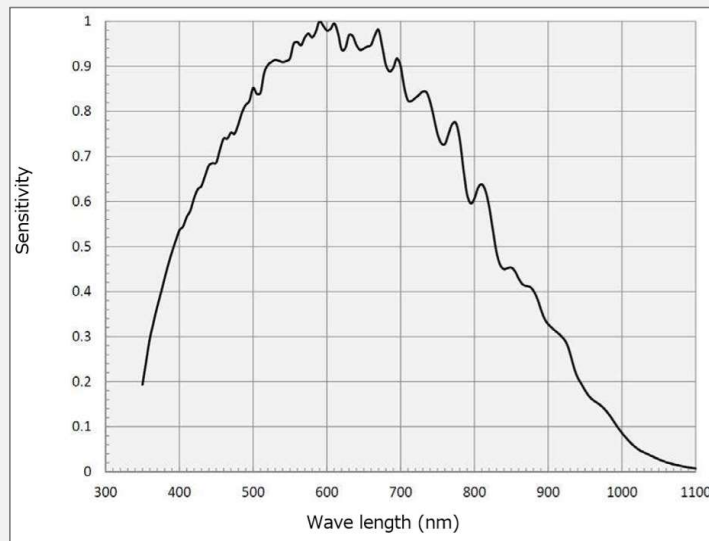


Spectral response

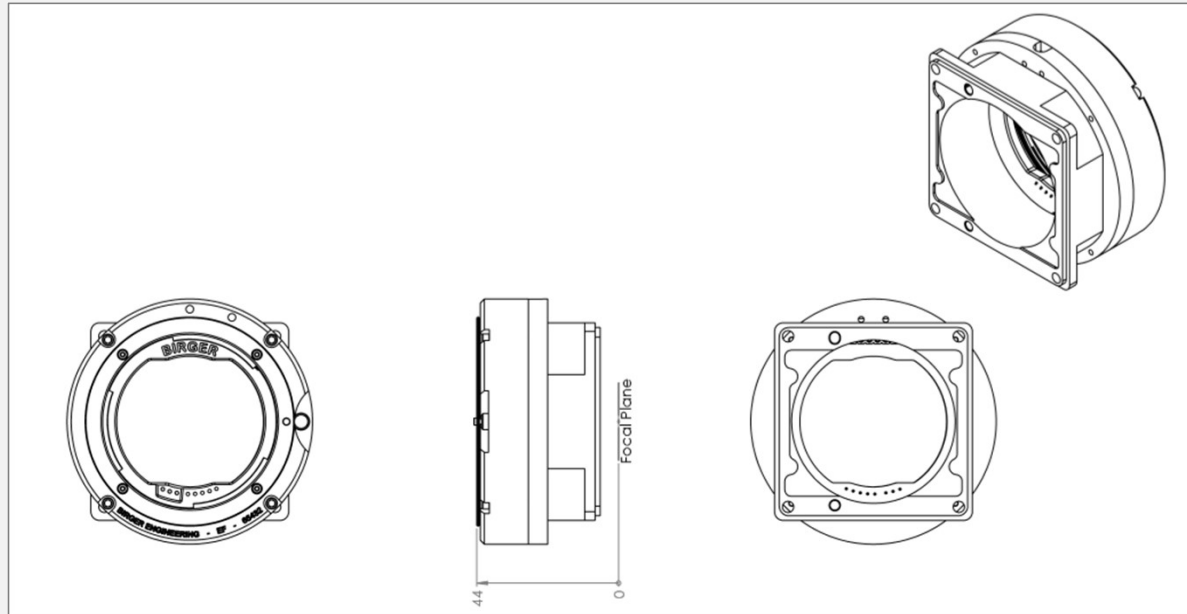
Color models



Monochrome models



Birger mount





The Spark family



5

MEGAPIXEL

- SP-5000-CXP4
- SP-5000-CXP2
- SP-5000-USB

12

MEGAPIXEL

- SP-12000-CXP4

12.4

MEGAPIXEL

- SP-12401-PGE
- SP-12401-USB
- SP-12400-PMCL

20

MEGAPIXEL

- SP-20000-CXP2
- SP-20000-PMCL
- SP-20000-USB

25

MEGAPIXEL

- SP-25000-CXP4A

45

MEGAPIXEL

- SP-45000-CXP4
- SP-45000-CXP4A
- SP-45001-CXP4
- SP-45001-CXP2A