

# Innovative Industrial Camera Solutions

● Area Scan ● Line Scan ● Single-Sensor ● Multi-Sensor



## Camera Selection Guide 2018/2019



# Quality industrial cameras from JAI

No matter what vision business you're in, you must be reliable and deliver results. That calls for an industrial camera supplier with a long, proven track record of delivering cameras with innovative engineering, high-end quality, and long lasting operational reliability and durability.

Our industrial cameras and accessories are routinely expected to perform under the most demanding conditions - from high-speed production and inspection machinery to applications in life sciences, outdoor surveillance, aerospace, and scientific research.

Today, JAI cameras are running in applications and industries around the world, where vision technology is relied upon as an

integral part of a production process, product, or service with the aim of improving quality and accuracy of products, lowering production line inspection costs, increasing production yields or creating higher efficiency in road traffic.

Common to all our customers is that they value the trademark characteristics of our products: proven technology, high reliability, consistent quality and superior image fidelity backed by JAI's long-term viability.

The JAI camera selection guide is also available as an on-line dynamic selection tool with filters and sorting capabilities. Please also visit [www.jai.com](http://www.jai.com) to explore the easy-to-use on-line camera selection guide.



## **Strict quality assurance throughout the manufacturing process**

Every electronic board mounted in a JAI camera undergoes thorough automated optical inspection, x-ray inspection and soldering inspection to ensure flawless electronics. During camera assembly, cameras are further submitted to aging tests, optical tests and a complete finish test including measurements and documentation against the EMVA 1288 standard.



## **Designed to perform in tough environments**

You can rely on a JAI camera! Rugged designs are able to withstand operating conditions with high vibration effects (up to 10G) and high shock occurrence (up to 80G), classifying JAI cameras among the very best in relation to industrial reliability and durability.



## **Pick your preferred interface**

JAI offers a range of different industry standard interfaces, so you are able to choose the interface of your preference for each individual vision task. JAI offers cameras with USB3 Vision, GigE Vision, GigE Vision LAG, CoaXPress, Camera Link and Mini Camera Link interfaces.



## **A JAI camera for every vision need**

JAI offers a broad range of cameras to suit almost every imaging need in industrial, medical, science and outdoor imaging, including traffic and sports/entertainment applications. You can choose from a wide range of single-imager cameras starting at very attractive price levels or - if your vision application needs the very best in color fidelity - you can choose from a broad selection of prism-based multi-imager area scan and line scan cameras. JAI has it all.



## **Low cost-of-ownership**

Every detail in a JAI camera - electronics, mechanicals and software - is carefully engineered to ensure excellent product reliability and supreme image quality. As a result cameras from JAI offer high MTBF numbers, ensuring long lasting and trouble-free operation. For you, this means low cost of ownership for any JAI camera.



## **Close support - when you need it**

You can post an e-mail question to our on-line helpdesk ([support@jai.com](mailto:support@jai.com)) at any time - day or night. JAI's technical experts monitor incoming support questions round-the-clock and the first vacant support technician will take the case to help you solve your problem and get your project moving.

**Ultraviolet (uv)**  
200nm to 400 nm

**Visible**  
400nm to 700nm

**Near Infrared (NIR)**  
700nm to 1000nm

**Short Wave Infrared (SWIR)**  
900nm to 1700nm

*JAI supplies industrial CCD and CMOS area and line scan cameras for UV light, visible light, NIR light and SWIR light. Please also visit JAI's on-line camera selection guide to filter your way to the camera you need.*

## Area Scan Cameras

### Spark Series (Single-sensor)

Advanced area scan cameras delivering high resolution, high frame rates, and high image quality.



Single  
CMOS

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### Go Series (Single-sensor)

Megapixel area scan cameras with small dimensions, high frame rates and cutting edge sensor technology.



Single  
CMOS

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### B-Series (Single-sensor)

Cameras for applications that demand high image quality with traditional CCD imagers.



Single  
CCD

Page 8

### C-Series (Single-sensor)

Compact value-oriented CCD cameras with resolutions from VGA to 2 megapixels.



Single  
CCD

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### CV/RM/TM Series (Single-sensor)

A collection of other customer favorites with a range of speeds, resolutions, and interfaces.



Single  
CCD

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### Apex Series (Multi-sensor, prism-based)

3-CMOS and 3-CCD prism-based RGB area scan cameras providing better color fidelity and spatial precision than traditional Bayer cameras.



3 X  
CMOS  
prism

and

3 X  
CCD  
prism

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### Fusion Series (Multi-sensor, prism-based)

Dual-sensor area scan cameras with unique capabilities for specialized imaging applications.



2 X  
CCD  
prism

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## Line Scan Cameras

### Sweep+ Series (Multi-sensor, prism-based)

High performance multi-sensor prism-based color/NIR line scan cameras combining precision, sensitivity and multi-spectral options.



3 X  
CMOS  
prism

3 X  
CCD  
prism

4 X  
CMOS  
prism

and

4 X  
CCD  
prism

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### Wave Series (Multi-sensor, prism-based)

Prism-based dual-sensor InGaAs line scan cameras for Short Wave InfraRed (SWIR) imaging.



2 X  
InGaAs  
prism

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### Sweep-Series (Single-sensor & trilinear)

Monochrome and trilinear line scan cameras with fast scan rates and high image quality.



Single  
CMOS

Trilinear  
CMOS

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## Graphical product selection charts

### Single-sensor area scan cameras (Frame rate vs. resolution)

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### Multi-sensor area scan cameras (Frame rate vs. resolution)

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### Line-Scan cameras (Line rate vs. resolution)

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### Interface types - area scan cameras Interface type vs. resolution

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### Interface, data throughput and cable length

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# Spark Series

*Advanced area scan cameras delivering high resolution, high frame rates, and high image quality.*

JAI's Spark Series is the perfect choice for applications that demand high quality images with the highest possible throughput. Spark Series cameras feature the latest CMOS imagers capable of delivering high resolution images at speeds as much as 10 times faster than traditional CCD cameras.

With high sensitivity, industrial grade construction, and an attractive price point, it's easy to see why the Spark Series is an ideal solution for high performance vision applications.

The ultimate in  
megapixel-per-second  
performance



Here are some of the advantages you get with JAI Spark cameras:

- **High throughput:**

Spark Series cameras deliver outstanding megapixels-per-second performance, such as 20-megapixels at 30 fps (SP-20000), 12-megapixels at up to 189 fps (SP-12000) and 5-megapixels at up to 253 fps (SP-5000). Using flexible ROI capabilities, even higher frame rates can be obtained.

- **Excellent image quality and unique features:**

Despite their speed, Spark Series cameras feature advanced functions like in-camera pattern correction, multi-region-of-interest, true correlated double sampling (SP-20000/SP-12000), combined analog and digital gain control (SP-5000), and efficient global shutters to ensure low noise, high quality images with high pixel uniformity and no shutter distortion.

- **Outstanding sensitivity and dynamic range:**

Large, low-noise pixels provide outstanding low light performance, while Auto Level Control (ALC) adjusts to lighting changes in outdoor imaging applications. Special high dynamic range (HDR) options are available to capture both bright and dark details under high contrast conditions.



Based on well-crafted JAI electronics design, the Spark SP-12000-CXP4 delivers a super-fast frame rate of 189 frames/s in full 12 megapixel resolution at 8-bit.
















Scan QR-code to watch video on Spark SP-20000



Scan QR-code to watch video on Spark SP-5000



The table below lists all available Spark Series cameras.

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size (μm)	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
SP-20000-CXP2	 (F-mount) <sup>2)</sup>	20 MP (5120 x 3840)	30 fps	41 mm CMOS	6.4 x 6.4	8/10 RGB	C/M	CMV20000 (Global)	 CoaXPress 2-connector (CXP2)
SP-20000-PMCL	 (F-mount) <sup>2)</sup>	20 MP (5120 x 3840)	30 fps	41 mm CMOS	6.4 x 6.4	8/10	C/M	CMV20000 (Global)	 Power over Camera Link (PMCL) Deca
SP-20000-USB	 (F-mount) <sup>2)</sup>	20 MP (5120 x 3840)	16 fps	41 mm CMOS	6.4 x 6.4	8/10	C/M	CMV20000 (Global)	 USB Vision (USB)
SP-12000-CXP4 <sup>1)</sup>	 (C-mount)	12 MP (4096 x 3072)	189 fps	APS-C CMOS	5.5 x 5.5	8/10	C/M	CMV12000 (Global)	 CoaXPress 4-connector (CXP4)
SP-5000-CXP4	 (C-mount)	5 MP (2560 x 2048)	253 fps	1" CMOS	5.0 x 5.0	8/10/12	C/M	Lince5M (Global)	 CoaXPress 4-connector (CXP4)
SP-5000-CXP2	 (C-mount)	5 MP (2560 x 2048)	211 fps	1" CMOS	5.0 x 5.0	8/10/12 RGB	C/M	Lince5M (Global)	 CoaXPress 2-connector (CXP2)
SP-5000-PMCL	 (C-mount)	5 MP (2560 x 2048)	137 fps	1" CMOS	5.0 x 5.0	8/10/12	C/M	Lince5M (Global)	 Power over Camera Link (PMCL) Deca
SP-5000-USB	 (C-mount)	5 MP (2560 x 2048)	62 fps	1" CMOS	5.0 x 5.0	8/10/12	C/M	(Global)	 USB Vision (USB)
SP-5000-GE2	 (C-mount)	5 MP (2560 x 2048)	44 fps	1" CMOS	5.0 x 5.0	8/10/12 R G B / YUV	C/M	Lince5M (Global)	 GigE Vision LAG (GE2)

1) The SP-12000-CXP4-XT model includes a cooling fan and extends the camera's operating temperature to +45°C.

2) Also available with M-42x1 mount.

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

## Interface types

**mini Camera Link**  
Power over Camera Link (PMCL)



**GigE VISION**  
GigE Vision LAG (GE2)



**USB VISION**  
USB3 Vision (USB)



**CoaXPress**  
CoaXPress 2-connector (CXP2)



**CoaXPress**  
CoaXPress 4-connector (CXP4)





# Go Series

*Megapixel area scan cameras with small dimensions, high frame rates and cutting edge sensor technology.*

JAI's Go Series delivers an exceptional blend of small size, high versatility, and excellent performance, all at an entry-level price, making them the perfect starting point for a wide range of machine vision applications.

The GO-5000 for example - packs a high performance 5-megapixel CMOS imager into a compact form factor that fits in your fingertips and weighs only 46 grams. Using a combination of ROI and binning capabilities, this tiny camera can become almost anything you want - from a superfast VGA camera (at nearly 450 fps) to a super sensitive camera using binning to create 10-micron, or even 20-micron effective pixel sizes.

Other Go Series models feature Sony's latest CMOS imager technology, providing exceptional low-noise characteristics for outstanding sensitivity and image quality.

All Go Series cameras are built for the real world, with robust housings and extensive shock (80G) and vibration (10G) testing to maximize their ability to withstand the rigors of industrial environments. Go Series cameras come with full 3-year warranties.

**Go Series cameras offer many advantages, including:**

- **Small size and weight:**

Go Series cameras measure 29 x 29 x 41.5 mm (excluding lens mount) and weigh less than 50 grams, enabling them to fit into small spaces or into vehicles or other applications where weight and size is critical.

- **High frame rates:**

High performance CMOS imager technology lets Go Series cameras maintain high frame rates despite their small size. The GO-5000-PMCL, for example, can provide full 5-megapixel images at up to 107 fps whereas the GO-2400 delivers up to 165.5 fps in full resolution (2.35 megapixels).

- **High image quality:**

CMOS technology, large pixels, global shutter, a built-in lookup table, multi-ROI, sequencer, and other advanced features help ensure image quality and operational flexibility beyond entry-level expectations.




If you're facing a tough price/performance challenge  
give it a Go!

GLOBAL  
SHUTTERVIBRATION  
10GSHOCK  
80GMTBF  
>200K  
HOURSTEMP  
-5° / +45°POWER  
12V - 24V  
DC46  
GRAMSMULTI  
ROI3  
YEARS  
WARRANTY

Small and robust industrial area scan cameras at  
a great price/performance point.

Check the table below for a list of all available Go Series cameras.

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size (µm)	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
GO-5100-USB	 (C-mount)	5 MP (2464 x 2056)	74	2/3" CMOS	3.45 x 3.45	8/10/12	C/M	IMX250 (Global)	 USB Vision (USB)
GO-5100-PGE	 (C-mount)	5.1 MP (2464 x 2056)	22.7	2/3" CMOS	3.45 x 3.45	8/10	C/M	IMX250 (Global)	 GigE Vision (PGE)
GO-5101-PGE	 (C-mount)	5 MP (2464 x 2056)	22.7	2/3" CMOS	3.45 x 3.45	8/10/12	C/M	IMX264 (Global)	 GigE Vision (PGE)
GO-5101-PMCL	 (C-mount)	5 MP (2464 x 2056)	35	2/3" CMOS	3.45 x 3.45	8/10/12	C/M	IMX264 (Global)	 Power over Mini Camera Link Deca (PMCL)
GO-5000-PMCL	 (C-mount)	5 MP (2560 x 2048)	107	1" CMOS	5.0 x 5.0	8/10/12	C/M	Lince5M (Global)	 Power over Mini Camera Link (PMCL) Deca
GO-5000-USB	 (C-mount)	5 MP (2560 x 2048)	62	1" CMOS	5.0 x 5.0	8/10/12	C/M	Lince5M (Global)	 USB Vision (USB)
GO-5000-PGE	 (C-mount)	5 MP (2560 x 2048)	22.3	1" CMOS	5.0 x 5.0	8/10/12	C/M	Lince5M (Global)	 GigE Vision (PGE)
GO-2400-PMCL	 (C-mount)	2.35 MP (1936 x 1216)	165.5	1/1.2" CMOS	5.86 x 5.86	8/10	C/M	IMX174 (Global)	 Power over Mini Camera Link (PMCL) Deca
GO-2400-USB	 (C-mount)	2.35 MP (1936 x 1216)	159	1/1.2" CMOS	5.86 x 5.86	8/10	C/M	IMX174 (Global)	 USB Vision (USB)
GO-2400-PGE	 (C-mount)	2.35 MP (1936 x 1216)	48	1/1.2" CMOS	5.86 x 5.86	8/10	C/M	IMX174 (Global)	 GigE Vision (PGE)
GO-2401-PGE	 (C-mount)	2.35 MP (1936 x 1216)	41	1/1.2" CMOS	5.86 x 5.86	8/10	C/M	IMX249 (Global)	 GigE Vision (PGE)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

#### Interface types

**GigE**  
VISION  
GigE Vision  
(PGE)



**mini**  
**Link**  
Mini Camera Link  
(PMCL)



**USB**  
VISION  
USB Vision  
(USB)



# B Series

*High fidelity area scan cameras providing excellent sensitivity and uniformity.*

JAI's B Series includes a set of popular camera models designed for applications that demand high image quality with traditional CCD imagers.

The Sony imager technology delivers high levels of sensitivity, uniformity, and NIR response, while minimizing shutter leakage and readout noise. The cameras' versatile "cube" design allows exceptional flexibility in terms of mounting and orientation.

B Series cameras are available in both monochrome and color versions, and are equipped with more advanced features than those found in JAI's compact "C Series" CCD cameras.

**Key B Series features include:**

● **Compact optical format:**

All B Series cameras have a 2/3" optical format. This means even the 5-megapixel BM-500/BB-500 cameras give users a wide range of lens and filter choices without the expense of 1-inch or larger optics.

● **Advanced exposure and triggering:**





B Series cameras excel in outdoor imaging applications thanks to a range of advanced features. These include auto shutter, auto gain, and auto iris capabilities, as well as Reset Continuous Triggering (RCT) in some models for continuous auto exposure adjustment even in triggered applications.



Combining traditional imager technology  
with advanced features



The table below lists the available B Series cameras.

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
BB-500CL BM-500CL	 (C-mount)	5 MP (2456 x 2058)	15	2/3" CCD	3.45 x 3.45	8/10/12	C/M	ICX625 (Global)	 Camera Link (CL) (Base)
BB-500GE BM-500GE	 (C-mount)	5 MP (2456 x 2058)	15	2/3" CCD	3.45 x 3.45	8/10/12	C/M	ICX625 (Global)	 GigE Vision (GE)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

### Interface types

  
Camera Link  
(CL)



  
GigE Vision  
(GE)



# C Series

*Compact value-oriented CCD cameras with resolutions from VGA to 2 megapixels.*

Since their introduction in 2007, JAI's C Series cameras have tackled a wide range of industrial applications. Their compact form factor, single-tap high frame rate architecture, and standard digital interfaces have provided vision system designers the flexibility and simplicity needed to switch from analog to digital interfacing with minimal mechanical/optical re-design.

**JAI's C Series provides:**

- **Six different base resolutions**

Each base model is available with multiple variations, including remote head configurations and UV sensitivity on some models.

- **Standard digital interfaces**

Interface options include GigE Vision, Mini Camera Link, and Power over Mini Camera Link.

- **A range of possibilities**

More than 20 different configurations are possible, letting you find the perfect fit for your application.



Proven performers for a range of tasks

The table below lists the C Series models currently available.

	Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
	CB-200MCL* CM-200MCL*	 (C-mount)	2 MP (1620 x 1220)	25	1/1.8" CCD	4.4 x 4.4	8/10	C/M	ICX274 (Global)	 Camera Link (CL) (Base)
	CB-200GE CM-200GE	 (C-mount)	2 MP (1620 x 1220)	25	1/1.8" CCD	4.4 x 4.4	8/10	C/M	ICX274 (Global)	 GigE Vision (GE)
	CB-140GE CM-140GE	 (C-mount)	1.4 MP (1392 x 1040)	31	1/2" CCD	4.65 x 4.65	8/10	C/M	ICX267 (Global)	 GigE Vision (GE)
	CB-140MCL* CM-140MCL*	 (C-mount)	1.4 MP (1392 x 1040)	31	1/2" CCD	4.65 x 4.65	8/10	C/M	ICX267 (Global)	 Camera Link (CL) (Base)
UV	CM-140MCL- UV	 (C-mount)	1.4 MP (1392 x 1040)	16	1/2" CCD	4.65 x 4.65	8/10	M	ICX407BLA (Global)	 Camera Link (CL) (Base)
UV	CM-140PMCL- UV	 (C-mount)	1.4 MP (1392 x 1040)	16	1/2" CCD	4.65 x 4.65	8/10	M	ICX407BLA (Global)	 Camera Link (CL) (Base)
UV	CM-140GE- UV	 (C-mount)	1.4 MP (1392 x 1040)	16	1/2" CCD	4.65 x 4.65	8/10	M	ICX407BLA (Global)	 GigE Vision (GE)
	CB-080GE CM-080GE	 (C-mount)	0.8 MP (1024 x 768)	30	1/3" CCD	4.65 x 4.65	8/10	C/M	ICX204 (Global)	 GigE Vision (GE)
	CB-040GE CM-040GE	 (C-mount)	0.4 MP (776 x 582)	60	1/2" CCD	8.3 x 8.3	8/10	C/M	ICX415 (Global)	 GigE Vision (GE)
	CB-040MCL CM-040MCL	 (C-mount)	0.4 MP (776 x 582)	60	1/2" CCD	8.3 x 8.3	8/10	C/M	ICX415 (Global)	 Camera Link (CL) (Base)

\*These models also available with Power over Mini Camera Link interface (PMCL)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

## Interface types



# CV/RM/TM Series

*A collection of other customer favorites with a range of speeds, resolutions, and interfaces.*

With more than 50 years in the vision industry, JAI has created many different camera models over the years to meet the needs of a continually growing and changing market. While older models are regularly retired from the JAI product line, there is always a range of proven, mature product offerings that remain available to support the needs of JAI customers and end-users.

These models feature combinations of capabilities and form factors that set them apart from other products in the market and provide the perfect solution for particular systems and tasks.

## Included in these series are:

### ● Multiple analog options

Analog choices range from megapixel analog progressive models, to small TV-standard cameras with extended features for more demanding applications.

### ● UV sensitive option

JAI's CV-A1 is also available in a UV-sensitive configuration, the CV-A1-UV. This model utilizes a special version of the Sony sensor with a Lumogen coating for increased sensitivity at wavelengths as short as 150 nm, and a quartz cover glass for protection.



Additional choices for specific needs

Available models in the CV/RM/TM Series.

	Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size ( $\mu\text{m}$ )	Color/ Mono	Sensor name (Shutter type)	Interface
	CV-A1	 (C-mount)	1.4 MP (1380 x 1035)	16	1/2" CCD	4.65 x 4.65	M	ICX205AL (Global)	 Analog progressive (Analog BNC)
UV	CV-A1 UV	 (C-mount)	1.4 MP (1380 x 1035)	16	1/2" CCD	4.65 x 4.65	M	ICX407BLA (Global)	 Analog progressive (Analog BNC)
	RMC-675 RM-675NIR	 (C-mount)	0.4 MP (752 x 582)	25	1/2" CCD	8.6 x 8.3	C/M	ICX429 (Global)	 PAL/CCIR (Analog D-sub)
	RMC-673 RM-673NIR	 (C-mount)	0.4 MP (752 x 582)	25	1/3" CCD	6.5 x 6.25	C/M	ICX259 (Global)	 PAL/CCIR (Analog D-sub)
	RM-670	 (C-mount)	0.4 MP (752 x 582)	25	2/3" CCD	11.6 x 11.2	M	ICX423 (Global)	 CCIR (Analog D-sub)
	TMC-775 TM-775NIR	 (C-mount)	0.4 MP (756 x 494)	30	1/2" CCD	8.4 x 9.8	C/M	ICX428 (Global)	 NTSC/EIA (Analog D-sub)
	TMC-773 TM-773NIR	 (C-mount)	0.4 MP (756 x 494)	30	1/3" CCD	6.35 x 7.4	C/M	ICX258 (Global)	 NTSC/EIA (Analog D-sub)
	TM-770	 (C-mount)	0.4 MP (756 x 494)	30	2/3" CCD	11.6 x 13.5	M	ICX422 (Global)	 NTSC (Analog D-sub)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

## Interface types

Analog  
(BNC)



Analog  
(D-sub)



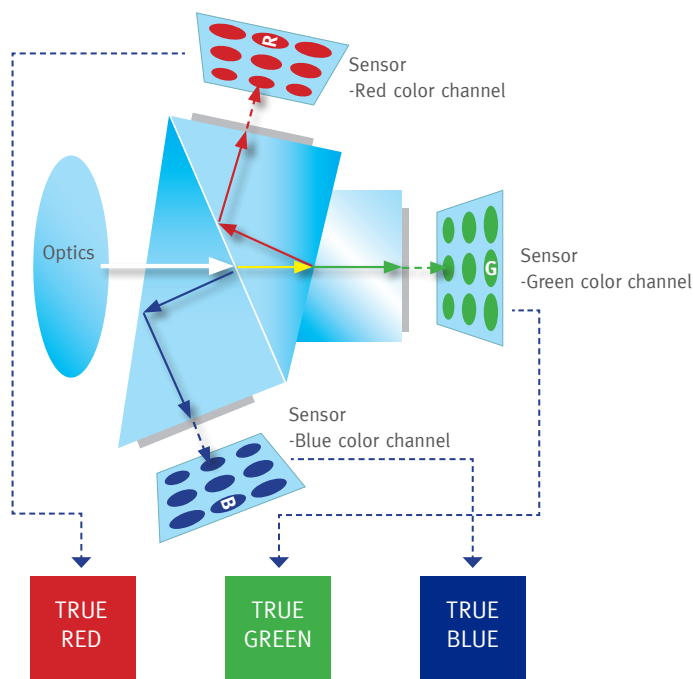


# Apex Series

*3-CCD and 3-CMOS area scan cameras providing better color fidelity and spatial precision than traditional Bayer color cameras.*

JAI's Apex Series is a range of 3-CCD and 3-CMOS area scan cameras delivering advanced RGB color imaging that's ideal for demanding machine vision applications across a diverse range of industries.

Advanced prism technology separates the incoming light into red, green, and blue wavelengths, which are directed to three precisely-aligned image sensors.

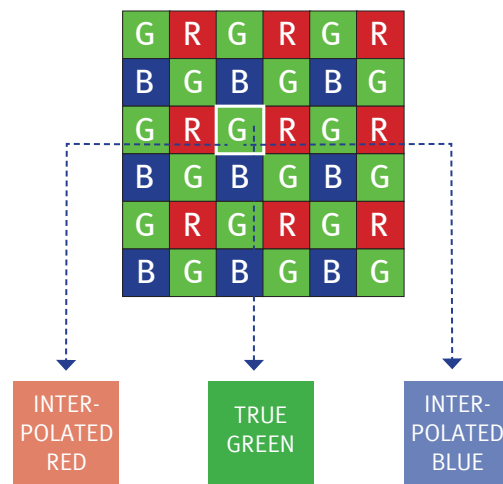


## PRISM-BASED IMAGING Delivering TRUE colors!

*In JAI's prism-based RGB cameras the incoming light is separated into red, green and blue wavelengths, which are directed to three precisely-aligned image sensors. The JAI RGB color imaging technique provides better color accuracy and spatial precision than traditional color cameras using the Bayer mosaic technique.*

## The Apex series provides:

- Accurate colors:**  
More accurate per-pixel color values than those derived from Bayer color cameras with interpolation routines.
- Steep spectral curves:**  
Steep spectral curves (less crosstalk) producing exceptionally accurate color image data.
- Sharper details:**  
More precise spatial resolution, enabling more accurate edge detection and the ability to resolve smaller details on the inspected items.



## BAYER MOSAIC IMAGING Delivering "only" INTERPOLATED colors!

*With the Bayer technique, each pixel is filtered to capture only one of three colors. Therefore the data from each pixel cannot fully specify each of the red, green, and blue values on its own. To obtain a full-color image, the Bayer technique interpolate a set of complete red, green, and blue values for each pixel, making use of the surrounding pixels of the corresponding colors. This provides an estimation of the red, green and blue values for a particular pixel. However, the result of this interpolation technique is less color accuracy than with a prism-based camera.*



Superior color image data for the most demanding applications

Check the table below for a list of Apex Series Cameras.

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size (µm)	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
AP-3200T-PMCL	 (C-mount)	3 x 3.2 MP (2064 x 1544)	55	1/1.8" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX265 (Global)	 Power over Mini Camera Link (PMCL) Deca
AP-3200T-USB	 (C-mount)	3 x 3.2 MP (2064 x 1544)	38	1/1.8" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX265 (Global)	 USB3 Vision (USB)
AP-3200T-PGE	 (C-mount)	3 x 3.2 MP (2064 x 1544)	12	1/1.8" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX265 (Global)	 GigE Vision (PGE)
AT-200CL	 (C-mount)	3 x 2 MP (1620 x 1236)	20	1/1.8" 3-CCD	4.4 x 4.4	8/10/12	R-G-B	ICX274AL (Global)	 Camera Link (CL) (Base/Medium)
AT-200GE	 (C-mount)	3 x 2 MP (1620 x 1220)	15	1/1.8" 3-CCD	4.4 x 4.4	8/10	R-G-B	ICX274AL (Global)	 GigE Vision (GE)
AP-1600T-PMCL	 (C-mount)	3 x 1.6 MP (1456 x 1088)	126	1/2.9" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX273 (Global)	 Power over Mini Camera Link (PMCL) Deca
AP-1600T-USB	 (C-mount)	3 x 1.6 MP (1456 x 1088)	79	1/2.9" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX273 (Global)	 USB3 Vision (USB)
AP-1600T-PGE	 (C-mount)	3 x 1.6 MP (1456 x 1088)	24	1/2.9" 3-CMOS	3.45 x 3.45	8/10/12	R-G-B	IMX273 (Global)	 GigE Vision (PGE)
AT-140CL	 (C-mount)	3 x 1.4 MP (1392 x 1040)	25	1/2" 3-CCD	4.65 x 4.65	8/10/12	R-G-B	ICX267AL (Global)	 Camera Link (CL) (Base/Medium)
AT-140GE	 (C-mount)	3 x 1.4 MP (1392 x 1040)	20	1/2" 3-CCD	4.65 x 4.65	8/10	R-G-B	ICX267AL (Global)	 GigE Vision (GE)
CV-M9CL	 (C-mount)	3 x 0.8 MP (1024 x 768)	30	1/3" 3-CCD	4.65 x 4.65	8/10	R-G-B	ICX204AL (Global)	 Camera Link (CL) (Base/Medium)
CV-M9GE	 (C-mount)	3 x 0.8 MP (1024 x 768)	30	1/3" 3-CCD	4.65 x 4.65	8/10	R-G-B	ICX204AL (Global)	 GigE Vision (GE)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

#### Interface types



# Fusion Series

*Dual-Sensor area scan cameras with unique capabilities for specialized imaging applications.*

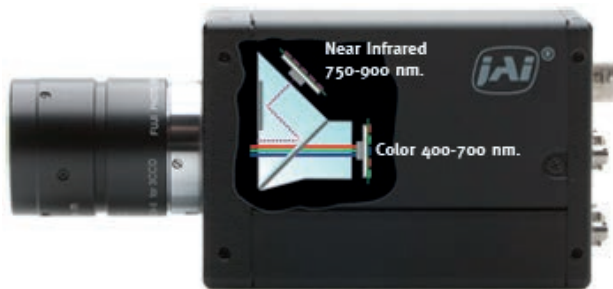
JAI's Fusion Series uses dual-sensor prism technology to deliver imaging solutions that are both innovative and cost-effective.

Multi-spectral cameras perform both visible and near-infrared inspection simultaneously, by splitting incoming light to two separate imagers. This makes it possible to use a single camera to simultaneously inspect both visible elements and sub-surface defects or other information that is optimally detected at NIR wavelengths.

High Dynamic Range (HDR) cameras also split light to two separate sensors, but in this case, the imagers are used to provide two separate exposures, which are then fused together in the camera or in post processing. In this way, details in both bright and dark areas can be properly captured, extending the camera's dynamic range to nearly twice the dynamic range of a standard CCD.

**With the Fusion Series you get:**

- **Two-in-one camera:**  
Multi-spectral imaging technology allows users to replace multiple inspection stations with a single set up.
- **Ease-of-use:**  
JAI multi-spectral cameras offer ease-of use and lower equipment and maintenance costs.
- **Exceptionally good HDR images:**  
The dual-sensor HDR design enables the capture of full linear high dynamic range image data without the image compression and noise found in typical single sensor HDR cameras.



*JAI Fusion Series of multi-spectral area scan cameras, performs simultaneous, separate imaging of visible and NIR light through a single lens.*

*The unique concept of simultaneous capture of color and Near-IR images helps solve a wide variety of inspection tasks. Surface properties are visible in the color channel while the near-IR channel detects just below the surface.*



Innovative solutions for  
multi-spectral imaging and  
high dynamic range

CCD1

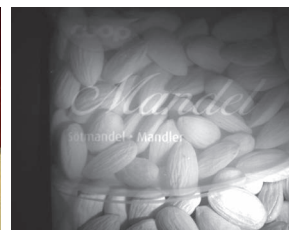


CCD2

Fusion









CCD1: Visible image











CCD2: NIR image

## Fusion Multi-Spectral Cameras

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
AD-130GE	 (C-mount)	2 x 1.3 MP (1296 x 966)	31	1/3" 2-CCD	3.75 x 3.75	8/10/12	C/NIR	ICX447 (Global)	 GigE Vision (GE)
AD-080CL	 (C-mount)	2 x 0.8 MP (1024 x 768)	30	1/3" 2-CCD	4.65 x 4.65	8/10/12	C/NIR	ICX204 (Global)	 Camera Link (CL) (Dual Base)
AD-080GE	 (C-mount)	2 x 0.8 MP (1024 x 768)	30	1/3" 2-CCD	4.65 x 4.65	8/10/12	C/NIR	ICX204 (Global)	 GigE Vision (GE)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

## Fusion High Dynamic Range (HDR) Cameras

Model	Front View (Lens mount)	Resolution Megapixels (MP) (horizontal x vertical pixels)	Frame rate fps	Optical format/ Sensor tech.	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Sensor name (Shutter type)	Interface
AD-131GE	 (C-mount)	2 x 1.3 MP (1296 x 966)	31	1/3" 2-CCD	3.75 x 3.75	8/10/12	M	ICX447 (Global)	 GigE Vision (GE)
AD-132GE	 (C-mount)	2 x 1.3 MP (1296 x 966)	31	1/3" 2-CCD	3.75 x 3.75	8/10/12	C	ICX447 (Global)	 GigE Vision (GE)
AD-081CL	 (C-mount)	2 x 0.8 MP (1024 x 768)	30	1/3" 2-CCD	4.65 x 4.65	8/10	M	ICX204 (Global)	 Camera Link (CL) (Dual Base)
AD-081GE	 (C-mount)	2 x 0.8 MP (1024 x 768)	30	1/3" 2-CCD	4.65 x 4.65	8/10/12	M	ICX204 (Global)	 GigE Vision (GE)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

### Interface types

  
Camera Link  
(CL)



  
GigE Vision  
(GE)



# Sweep+ Series

*High performance prism-based color line scan cameras combining color precision, light sensitivity, fast line rates, ease of use and multi-spectral options.*

JAI's Sweep+ Series uses advanced prism technology to provide the best possible performance, precision, and versatility for line scan cameras in web-based or continuous imaging applications. Multiple CCD (3-CCD and 4-CCD) or multiple CMOS (3-CMOS and 4-CMOS) line sensors are precisely-aligned to a common optical path providing solutions that are easier to set up, with higher color precision and less color degradation over time than tri-linear or quad-linear color cameras. With efficient manufacturing facilities and reliable and durable technology, these cameras are available at good price/performance points and offer low cost of ownership as well as supreme color line scan image quality.

## **This is what you get with the Sweep+ Series:**

- **Better images in all inspection situations:**  
Eliminates parallax issues (no halo effects) and eliminates complex alignment procedures associated with off-angle viewing or inspection of cylindrical or wavy objects.
- **Lower configuration costs:**  
Lower setup costs due to faster configuration and a single optical plane that simplifies positioning and encoding tasks.
- **High speed and high sensitivity:**  
Advanced sensor technology and better light transmittance reduces illumination requirements, for better performance at lower cost.



Multi-Sensor precision color  
line scan cameras





Advanced prism technology supports up to four separate sensors for precise R-G-B values and NIR imaging capabilities. The incoming light is split into 3 or 4 spectral bands (R, G, B) or (R, G, B + NIR) with perfect pixel-to-pixel alignment.

See available models in the table below.

Model	Front View (Lens mount)		Resolution (Pixels/line)	Line rate lps (kHz)	Sensor format	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Interface
SW-4000T-MCL			3-CMOS x 4096	68,212 (68 kHz)	30.72 mm 3-CMOS	7.5 x 7.5	8/10	R-G-B	Mini Camera Link (MCL) Deca
LT-400CL			3-CMOS x 4096	16,180 (16 kHz)	28.67 mm 3 CMOS	7.0 x 7.0	8/10	R-G-B	Camera Link (CL) (Base/medium)
LQ-401-CL			4-CMOS x 4096	18,252 (18 kHz)	28.67 mm 4 CMOS	7.0 x 7.0 $\mu\text{m}$	8/10	R-G-B + NIR	Camera Link (CL) (Base/medium)
LT-200CL			3-CMOS x 2048	30,383 (30 kHz)	28.67 mm 3 CMOS	14.0 x 14.0	8/10	R-G-B	Camera Link (CL) (Base/medium)
LQ-201-CL			4-CMOS x 2048	33,014 (33 kHz)	28.67 mm 4 CMOS	14.0 x 14.0 $\mu\text{m}$	8/10	R-G-B + NIR	Camera Link (CL) (Base/medium)
SW-2001T-CL			3-CCD x 2048	19048	28.7 mm 3-CCD	14.0 x 14.0	8/10	R-G-B	Camera Link (CL) (Base/Medium)
SW-2001Q-CL			4-CCD x 2048	19048	28.7 mm 4-CCD	14.0 x 14.0	8/10	R-G-B + NIR	Camera Link (CL) (Base/Medium)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

## Interface types

Camera Link  
(CL)



Mini Camera Link  
(MCL)



# Wave Series

*The Wave Series cameras are dual-band line scan cameras capable of sensing Short Wave InfraRed (SWIR) light. The cameras are based on Indium/Gallium /Arsenide (InGaAs) sensor technology and JAI's prism line scan technology, making them capable of delivering dual-band imaging in the SWIR light spectrum (900 – 1700 nm).*

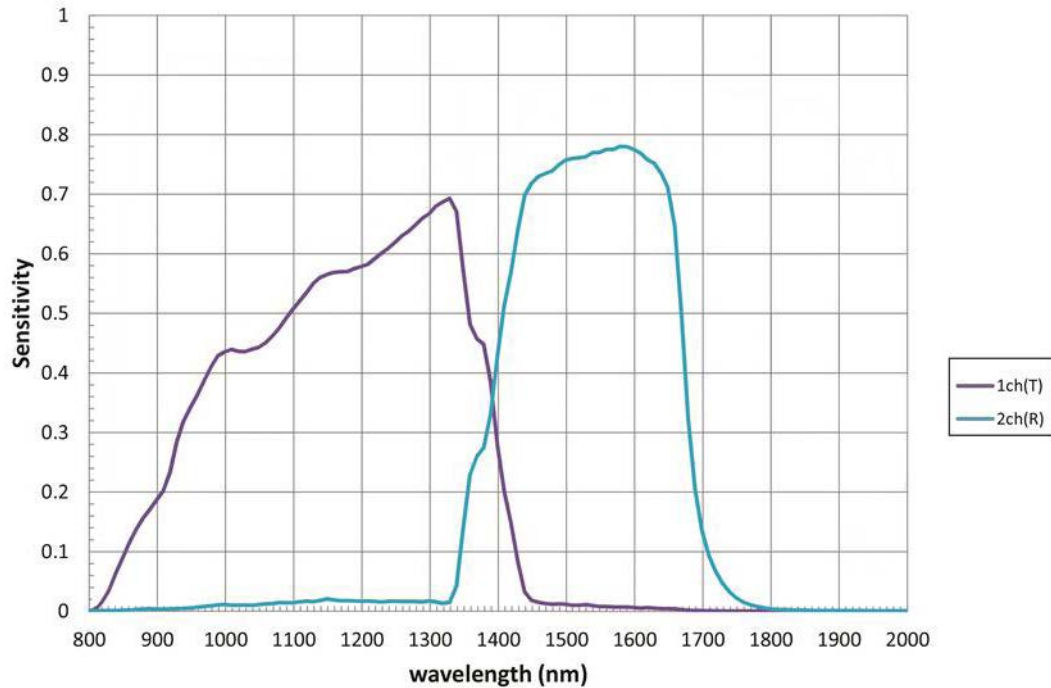
Multi-imager camera technology is a JAI core competence and over the years JAI has delivered cameras covering RGB and NIR into various applications.

The new Wave Series camera brings dual-band imaging to the SWIR light spectrum to provide lots of extra “hidden” vision data. This capability can enhance current machine vision systems with imaging beyond what is possible when imaging the visible and/or the near infrared light spectrum. The Wave

Series can open up a range of new applications in automated visual inspection.

Thanks to prism-based simultaneous image acquisition, it's possible to precisely align images in two different spectral bands even when objects are moving at high speeds. The WA-1000D-CL has a resolution of 2 x 1024 pixels and a maximum line frequency of 39 kHz.







WA-1000D-CL is capable of delivering dual-band imaging in the SWIR light spectrum (900 – 1700 nm)

Operation of the Wave Series camera is straightforward; no cooling is required and the data interface is standard Camera Link. The price level of the Wave Series line scan camera is lower than you may expect and the cost of ownership is comparable to a standard machine vision camera.

An advantage in SWIR is the variety of off-the-shelf optics available in comparison with MWIR cameras that require custom lenses and windows made of expensive materials.

Available Wave Series cameras:

Model	Front View (Lens mount)	Resolution (Pixels/line)	Line rate lps	Sensor format	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Sensor name	Interface
WA-1000D-CL	 (M52-mount)	2-InGaAs x 1024	39230	25.6 mm	25 x 25	8/10/12	SWIR	-	 Camera Link (CL) (Base/Medium)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

Interface types

**Camera Link**  
(CL)



# Sweep Series

*High performance monochrome and trilinear line scan cameras for a wide range of applications.*

JAI's Sweep Series includes both monochrome and trilinear line scan cameras with line rates that are among the fastest available for their type and resolution. Utilizing custom-designed image sensors, these Sweep Series cameras offer outstanding image quality, advanced feature sets, and attractive pricing.

The SW-4000TL-PMCL model is a 4K trilinear model delivering outstanding color line scan performance for applications that don't require the ultimate precision provided by the prism technology in JAI's Sweep+ Series. It features a maximum line rate of 66 kHz for 24-bit RGB output, making it one of the fastest 3 x 4096 color line scan cameras on the market. And it offers advanced features like vertical and horizontal binning and built-in color space conversion not available on similar trilinear cameras.

The Sweep SW-4000M-PMCL and SW-8000M-PMCL are among the fastest monochrome line scan cameras in the industry. The SW-4000M-PMCL features 4096 pixels per line and is capable of running at up to 200,000 lines per second, while the SW-8000M-PMCL offers 8K resolution at up to a 100 kHz line rate. The SW-4000M-PMCL even includes a selectable quantum well size so users can adjust responsivity and dynamic range to suit their application.

**Among the advantages offered by the Sweep Series are:**

- **Ultra-fast scan rates:**

Custom CMOS sensors deliver fast line rates to maximize the throughput of your vision systems.

- **Application flexibility:**

Trilinear and monochrome models support a wide range of applications such as electronics component inspection, wafer inspection, raw material inspection (e.g., wood, food, minerals, etc.), sports imaging (finish line), print inspection (monochrome or color), waste management, and color web inspection of paper, plastic, textiles, and more.

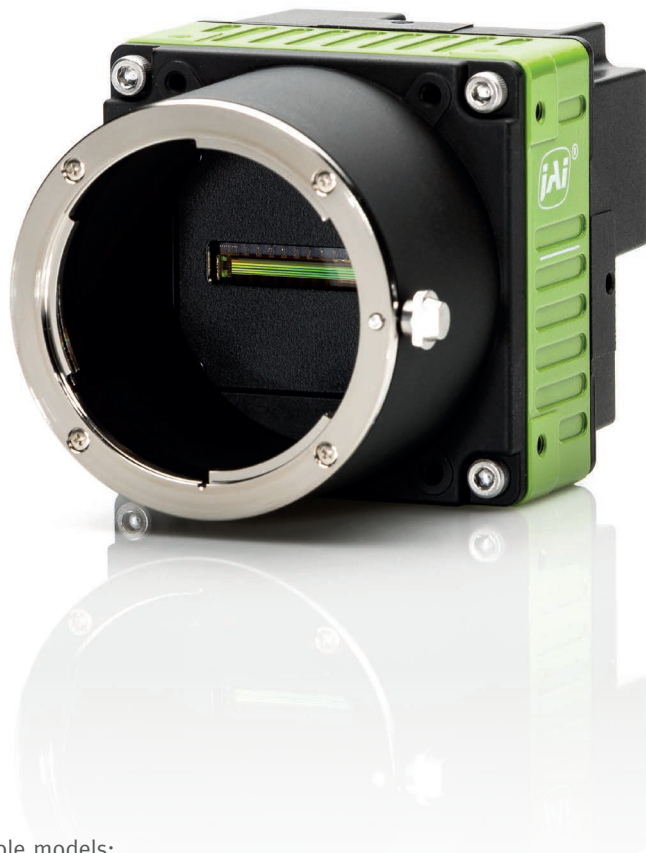
- **Excellent value:**

All models offer an excellent price/performance ratio, so you can stretch your camera budget further, getting more cameras for the same investment.



**Trilinear color camera.**







*The sweep SW-4000TL-PMCL is also available with F-mount.*



### Monochrome Line scan cameras.

The Sweep SW-4000M-PMCL and SW-8000M-PMCL are also available with M-42x1 lens mount.

Available models:

Model	Front View (Lens mount)	Resolution (Pixels/line)	Line rate lps (kHz)	Sensor format	Cell size ( $\mu\text{m}$ )	Data output (Bit)	Color/ Mono	Custom Sensor name	Interface
SW-4000TL-PMCL	 (M42-mount) <sup>1)</sup>	3 x 4096	65,963 (66 kHz)	30.72 mm Trilinear	7.5 x 7.5	8/10	R-G-B	Custom	 Power over Mini Camera Link (PMCL) Deca
Sweep SW-4000M-PMCL	 (F-mount) <sup>2)</sup>	4096	200,000 (200 kHz)	30.72 mm CMOS	7.5 $\mu\text{m}$ x 7.5 $\mu\text{m}$	8/10	M	Custom	 Camera Link (CL) (Deca)
Sweep SW-8000M-PMCL	 (F-mount) <sup>2)</sup>	8192	100,000 (100 kHz)	30.72 mm CMOS	3.75 $\mu\text{m}$ x 5.78 $\mu\text{m}$	8/10	M	Custom	 Camera Link (CL) (Deca)

Datasheets and manuals for each model with detailed specifications are available at [www.jai.com](http://www.jai.com)

1) Also available with F- mount.

2) Also available with M-42x1 mount.

### Interface types



Mini Camera Link  
(PMCL)



Mini Camera Link  
(PMCL)





# JAI SDK

*Standards-driven software that's both vendor and interface independent.*

The JAI SDK and Control Tool is a robust software package for integrating cameras into vision applications. It is available for free from JAI and is an open software environment, meaning it can be used with JAI cameras as well as third-party cameras that comply with the GigE Vision®, GenICam™, and GenTL™ standards.

The Control Tool's GigE Vision and GenICam compliance ensures full interoperability with virtually all standard GigE Vision cameras, making it the perfect choice for testing and evaluating cameras. In addition, its support of the GenTL standard enables it to be used with GenTL-compliant cameras utilizing Camera Link, USB3 Vision, and CoaXPress interfaces. These include JAI's Spark Series, and Go Series cameras, with additional cameras expected to be supported shortly.

## **With the JAI SDK and Control tool you get:**

### ● **True vendor independence**

There are no “locks” or JAI-only restrictions. Use it with any standards-compliant cameras to evaluate or develop complete applications.

### ● **User-friendly setup**

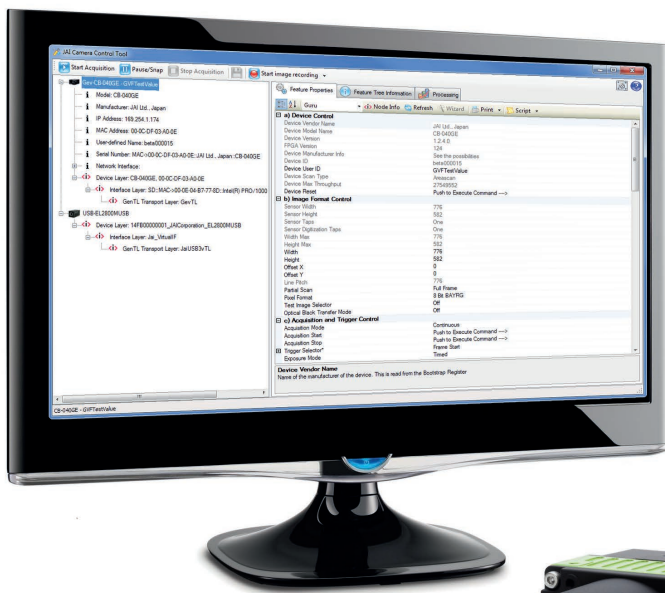
The Control Tool's graphical user interface allows the user to see and activate all the available features and functions of the connected camera(s) automatically, based on an XML file stored within the camera's firmware. Streaming and viewing capabilities vary depending on the interface.

### ● **Powerful functions and examples**

The SDK itself includes a wide range of image processing functions and libraries, as well as reference documentation and C++/C# sample code for the Visual Studio IDE. Also included is a JAI filter driver for fast and efficient streaming of packet-based data.

The JAI SDK and Control Tool runs on the latest Windows operating systems and is also available upon request for the most popular Linux distributions. Contact JAI for more information.

# The perfect software starting point



**GiGE**<sup>™</sup>  
VISION

**USB**<sup>™</sup>  
VISION

**CAMERA**  
**Link**

**CoaXPress**

**GEN*i*CAM**




















# CAMERA SELECTION CHART: SINGLE - SENSOR AREA SCAN CAMERAS


Frames/ second					
151-260*			GO-2400-PMCL 2.35 MP 165 FPS ▶ P 7 GO-2400-USB 2.35 MP 160 FPS ▶ P 7	SP-5000-CXP4 5 MP 253 FPS ▶ P 5 SP-5000-CXP2 5 MP 211 FPS ▶ P 5	SP-12000-CXP4 12 MP 189 FPS ▶ P 5
91-150				SP-5000-PMCL 5 MP 137 FPS ▶ P 5 GO-5000-PMCL 5 MP 107 FPS ▶ P 7	
71-90				GO-5100-USB 5 MP 74 FPS ▶ P 7	
61-70				SP-5000-USB 5 MP 62 FPS ▶ P 5 GO-5000-USB 5 MP 62 FPS ▶ P 7	
51-60	CM/CB-040GE 0.4 MP 60 FPS ▶ P 11 CM/CB-040MCL 0.4 MP 60 FPS ▶ P 11				
41-50			GO-2400-PGE 2.35 MP 48 FPS ▶ P 7	SP-5000-GE2 5 MP 44 FPS ▶ P 5	
31-40		CM/CB-140GE 1.4 MP 31 FPS ▶ P 11 CM/CB-140MCL 1.4 MP 31 FPS ▶ P 11	GO-2401-PGE 2.35 MP 33 FPS ▶ P 7	GO-5101-PMCL 5 MP 35 FPS ▶ P 7	
21-30	CM/CB-080GE 0.8 MP 30 FPS ▶ P 11 RM/RMC-675NIR 0.4 MP 25 FPS ▶ P 13 RM/RMC-673NIR 0.4 MP 25 FPS ▶ P 13 RM-670 0.4 MP 25 FPS ▶ P 13 TM/TMC-775NIR 0.4 MP 30 FPS ▶ P 13 TM/TMC-773 0.4 MP 30 FPS ▶ P 13 TM-770 0.4 MP 30 FPS ▶ P 13	CM/CB-200MCL 2 MP 25 FPS ▶ P 11 CM/CB-200GE 2 MP 25 FPS ▶ P 11		GO-5100-PGE 5 MP 22 FPS ▶ P 7 GO-5000-PGE 5 MP 22 FPS ▶ P 7 GO-5101-PGE 5 MP 22 FPS ▶ P 7	SP-20000-CXP2 20 MP 30 FPS ▶ P 5 SP-20000-PMCL 20 MP 30 FPS ▶ P 5
10-20		CV-A1 1.4 MP 16 FPS ▶ P 13 CV-A1-UV 1.4 MP 16 FPS ▶ P 13 CM-140MCL-UV 1.4 MP 16 FPS ▶ P 11 CM-140PMCL-UV 1.4 MP 16 FPS ▶ P 11 CM-140GE-UV 1.4 MP 16 FPS ▶ P 11		BM/BB-500CL 5 MP 15 FPS ▶ P 9 BM/BB-500GE 5 MP 15 FPS ▶ P 9	SP-20000-USB 20 MP 16 FPS ▶ P 5
	<b>0.3 - 0.9 Megapixels</b>	<b>1.0 - 2.0 Megapixels</b>	<b>2.1 - 4.0 Megapixels</b>	<b>5.0 Megapixels</b>	<b>12.0 - 20 Megapixels</b>


\*) Higher frames can be obtained using Region of Interest (ROI). ROI is available in selected models.


All JAI area scan cameras are available in color and monochrome versions, except the following cameras which are only available in monochrome versions: (TM-770, RM-670, CV-A1, CVA1-UV, CM-140MCL-UV, CM-140PMCL-UV and CM-140GE-UV).

# CAMERA SELECTION CHART: MULTI-SENSOR AREA SCAN CAMERAS

Frames/ second		<div>AP-1600T-PMCL</div> <div>3x1.6 MP 126 FPS  P 15</div> <div>AP-1600T-USB</div> <div>3x1.6 MP 79 FPS  P 15</div>	<div>AP-3200T-PMCL</div> <div>3x3.2 MP 55 FPS  P 15</div>
31-40		<div>AD-130GE</div> <div>2x1.3 MP 31 FPS  P 17</div> <div>AD-131GE</div> <div>2x1.3 MP 31 FPS  P 17</div> <div>AD-132GE</div> <div>2x1.3 MP 31 FPS  P 17</div>	<div>AP-3200T-USB</div> <div>3x3.2 MP 38 FPS  P 15</div>
21-30	<div>CV-M9CL</div> <div>3x0.8 MP 30 FPS  P 15</div> <div>CV-M9GE</div> <div>3x0.8 MP 30 FPS  P 15</div> <div>AD-080CL</div> <div>2x0.8 MP 30 FPS  P 17</div> <div>AD-080GE</div> <div>2x0.8 MP 30 FPS  P 17</div> <div>AD-081CL</div> <div>2x0.8 MP 30 FPS  P 17</div> <div>AD-081GE</div> <div>2x0.8 MP 30 FPS  P 17</div>	<div>AT-140CL</div> <div>3x1.4 MP 25 FPS  P 15</div> <div>AP-1600T-PGE</div> <div>3x1.6 MP 24 FPS  P 15</div>	
10-20		<div>AT-200CL</div> <div>3x2 MP 20 FPS  P 15</div> <div>AT-200GE</div> <div>3x2 MP 15 FPS  P 15</div> <div>AT-140GE</div> <div>3x1.4 MP 20 FPS  P 15</div>	<div>AP-3200T-PGE</div> <div>3x3.2 MP 12 FPS  P 15</div>
	0.3 - 0.9 Megapixels	1.0 - 2.0 Megapixels	2.1 - 4.0 Megapixels











 3-CCD or 3-CMOS: Red/Green/Blue

 2-CCD: Color-Bayer/NIR


 2-CCD: Mono/mono (HDR)

 2-CCD: Color-Bayer/color-Bayer (HDR)

# CAMERA SELECTION CHART: LINE SCAN CAMERAS

Line Rate:				
200,000 (200 kHz)			SW-4000M-PMCL 1x4086 px  P 23	
100,000 (100 kHz)				SW-8000M-PMCL 1x8192 px  P 23
80,000 (80 kHz)				
70,922 (70 kHz)				
68,212 (68kHz)			SW-4000T-MCL 3x4096 px  P 23	
65,963 (66 kHz)			SW-4000TL-PMCL 3x4096 px  P 23	
33,014 (33 kHz)		LQ-201-CL 4x2048 px  P 19		
30,383 (30 kHz)		LT-200-CL 3x2048 px  P 19		
19,048 (19 kHz)		SW-2001Q-CL 4x2048 px  P 19 SW-2001T-CL 3x2048 px  P 19		
18,252 (18 kHz)			LQ-401-CL 4x4096 px  P 19	
16,180 (16 kHz)			LT-400-CL 3x4096 px  P 19	
Pixels per line:	512 pixels	2048 pixels	4096 pixels	8192 pixels

 4-CCD or 4-CMOS: Red/Green/Blue + NIR





 3-CCD or 3-CMOS: Red/Green/Blue

 Color trilinear: Red/Green/Blue

 1-CMOS: Monochrome



# CAMERA SELECTION CHART: AREA SCAN CAMERAS - INTERFACE

	<b>Models with USB<sub>3</sub> Vision interface</b>  USB = USB3 Vision:	<b>Models with GigE Vision interface</b>  GE = GigE Vision GE2 = GigE Vision Link Aggregation PGE = Power over Ethernet/GigE Vision	<b>Models with CoaXPress interface</b>  CXP = CoaXPress with 1-connector: CXP2 = CoaXPress with 2-connectors: CXP4 = CoaXPress with 4-connectors	<b>Models with Camera Link interface</b>  CL = Camera Link MCL = Mini Camera Link PMCL = Power over Mini Camera Link
<b>12.0 - 20.0 Megapixels</b>	SP-20000-USB 20 MP 16 FPS ▶ P 5		SP-12000-CPX4 12 MP 189 FPS ▶ P 5  SP-20000-CXP2 20 MP 30 FPS ▶ P 5	SP-20000-PMCL 20 MP 30 FPS ▶ P 5
<b>5.0 Megapixels</b>	SP-5000-USB 5 MP 62 FPS ▶ P 5  GO-5000-USB 5 MP 62 FPS ▶ P 7  GO-5100-USB 5 MP 74 FPS ▶ P 7	SP-5000-GE2 5 MP 44 FPS ▶ P 5  GO-5100-PGE 5 MP 22 FPS ▶ P 7  GO-5000-PGE 5 MP 22 FPS ▶ P 7  GO-5101-PGE 5 MP 22 FPS ▶ P 7  BM/BB-500GE 5 MP 15 FPS ▶ P 9	SP-5000-CPX4 5 MP 253 FPS ▶ P 5  SP-5000-CXP2 5 MP 211 FPS ▶ P 5	SP-5000-PMCL 5 MP 137 FPS ▶ P 5  GO-5000-PMCL 5 MP 107 FPS ▶ P 7  GO-5101-PMCL 5 MP 35 FPS ▶ P 7  BM/BB-500CL 5 MP 15 FPS ▶ P 9
<b>2.1 - 4.0 Megapixels</b>	GO-2400-USB 2.35 MP 160 FPS ▶ P 7  AP-1600T-USB 3x1.6 MP 79 FPS ▶ P 15  AP-3200T-USB 3x3.2 MP 38 FPS ▶ P 15	AP-3200T-PGE 3x3.2 MP 12 FPS ▶ P 15  GO-2400-PGE 2.35 MP 48 FPS ▶ P 7  GO-2401-PGE 2.35 MP 33 FPS ▶ P 7  AP-1600T-PGE 3x1.6 MP 24 FPS ▶ P 15		AP-3200T-PMCL 3x3.2 MP 55 FPS ▶ P 15  GO-2400-PMCL 2.35 MP 165 FPS ▶ P 7  AP-1600T-PMCL 3x1.6 MP 126 FPS ▶ P 15
<b>1.0 - 2.0 Megapixels</b>		AT-200GE 3x2 MP 15 FPS ▶ P 15  AT-140GE 3x1.4 MP 20 FPS ▶ P 15  AD-130GE 2x1.3 MP 31 FPS ▶ P 17  AD-131GE 2x1.3 MP 31 FPS ▶ P 17  AD-132GE 2x1.3 MP 31 FPS ▶ P 17  CM/CB-200GE 2 MP 25 FPS ▶ P 11  CM/CB-140GE 1.4 MP 31 FPS ▶ P 11  CM-140GE-UV 1.4 MP 16 FPS ▶ P 11		CM/CB-200MCL 2 MP 25 FPS ▶ P 11  AT-200CL 3x2 MP 20 FPS ▶ P 15  AT-140CL 3x1.4 MP 25 FPS ▶ P 15  CM/CB-140MCL 1.4 MP 31 FPS ▶ P 11  CM-140MCL-UV 1.4 MP 16 FPS ▶ P 11  CM-140PMCL-UV 1.4 MP 16 FPS ▶ P 11
<b>0.3 - 0.9 Megapixels</b>		CV-M9GE 3x0.8 MP 30 FPS ▶ P 15  AD-080GE 2x0.8 MP 30 FPS ▶ P 17  AD-081GE 2x0.8 MP 30 FPS ▶ P 17  CM/CB-080GE 0.8 MP 30 FPS ▶ P 11  CM/CB-040GE 0.4 MP 60 FPS ▶ P 11		CM/CB-040MCL 0.4 MP 60 FPS ▶ P 11  CV-M9CL 3x0.8 MP 30 FPS ▶ P 15  AD-080CL 2x0.8 MP 30 FPS ▶ P 17  AD-081CL 2x0.8 MP 30 FPS ▶ P 17

OTHER INTERFACES TYPES AND AVAILABLE MODELS:

PAL/CCIR: RM-675NIR, RMC-675, RMC-673, RM-673NIR  
 CCIR: RM-670  
 NTSC/EIA: TMC-775, TM-775NIR, TMC-773, TM-773NIR  
 EIA: TM-770

# INTERFACE, DATAOUT AND CABLE LENGTH



CXP = CoaXPress with one connector	CXP2 = CoaXPress with two connectors	CXP4 = CoaXPress with four connectors
<b>In CXP-3 configuration</b> Max interface throughput: 3.125 Gbit/s Effective data throughput: 312 MB/S Max cable length: 85 meters	<b>In CXP-3 configuration</b> Max interface throughput: $2 \times 3.125 \text{ Gbit/s} = 6.25 \text{ Gbit/s}$ Effective data throughput: 625 MB/S Max cable length: 85 meters	<b>In CXP-3 configuration</b> Max interface throughput: $4 \times 3.125 \text{ Gbit/s} = 12.5 \text{ Gbit/s}$ Effective data throughput: 1250 MB/S Max cable length: 85 meters
<b>In CXP-6 configuration</b> Max interface throughput: 6.25 Gbit/s Effective data throughput: 625 MB/S Max cable length: 35 meters	<b>In CXP-6 configuration</b> Max interface throughput: $2 \times 6.25 \text{ Gbit/s} = 12.5 \text{ Gbit/s}$ Effective data throughput: 1250 MB/S Max cable length: 35 meters	<b>In CXP-6 configuration</b> Max interface throughput: $4 \times 6.25 \text{ Gbit/s} = 25 \text{ Gbit/s}$ Effective data throughput: 2500 MB/S Max cable length: 35 meters



GE = GigE Vision Interface	GE2 = GigE Vision Interface - Link Aggregation	PGE = Power Over Ethernet/GigE Vision
Max interface throughput: 1 Gbit/s Effective data throughput: 115 MB/S Max cable length: 100 meters	Max interface throughput: 2 Gbit/s Effective data throughput: 230 MB/S Max cable length: 100 meters	Max interface throughput: 1 Gbit/s Effective data throughput: 115 MB/S Max cable length: 100 meters



CL = Camera Link interface MCL = Mini Camera Link PMCL = Power Over Mini Camera Link (In Base configuration)	CL = Camera Link interface MCL = Mini Camera Link PMCL = Power Over Mini Camera Link (In Medium configuration)	CL = Camera Link interface MCL = Mini Camera Link PMCL = Power Over Mini Camera Link (In Full configuration)	CL = Camera Link interface MCL = Mini Camera Link PMCL = Power Over Mini Camera Link (In full 80-bit Deca configuration)
Max interface throughput: 2.0 Gbit/s Effective data throughput: 255 MB/S* Max cable length: 10 meters	Max interface throughput: 4.08 Gbit/s Effective data throughput: 510 MB/S* Max cable length: 10 meters	Max interface throughput: 5.44 Gbit/s Effective data throughput: 680 MB/S* Max cable length: 10 meters	Max interface throughput: 6.80 Gbit/s Effective data throughput: 850 MB/S* Max cable length: 7 meters

\*) Depending on Sensor tap configuration.



USB = USB3 Vision Interface
Max interface throughput: 5 Gbit/s Effective data throughput: 400 MB/S Max cable length 3 - 5 meters

The USB3 Vision interface also supports "power over the interface" as a standard capability. (Except where the power requirements of the camera exceeds the capacity of the interface. Consult the documentation for details.)

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