



Ultra-High Resolution Cameras

CV-X/XG-X Series

A New Era of High Resolution Inspection



LumiTrax™-compatible

21 megapixels



Ultra-high pixel model

64 megapixels



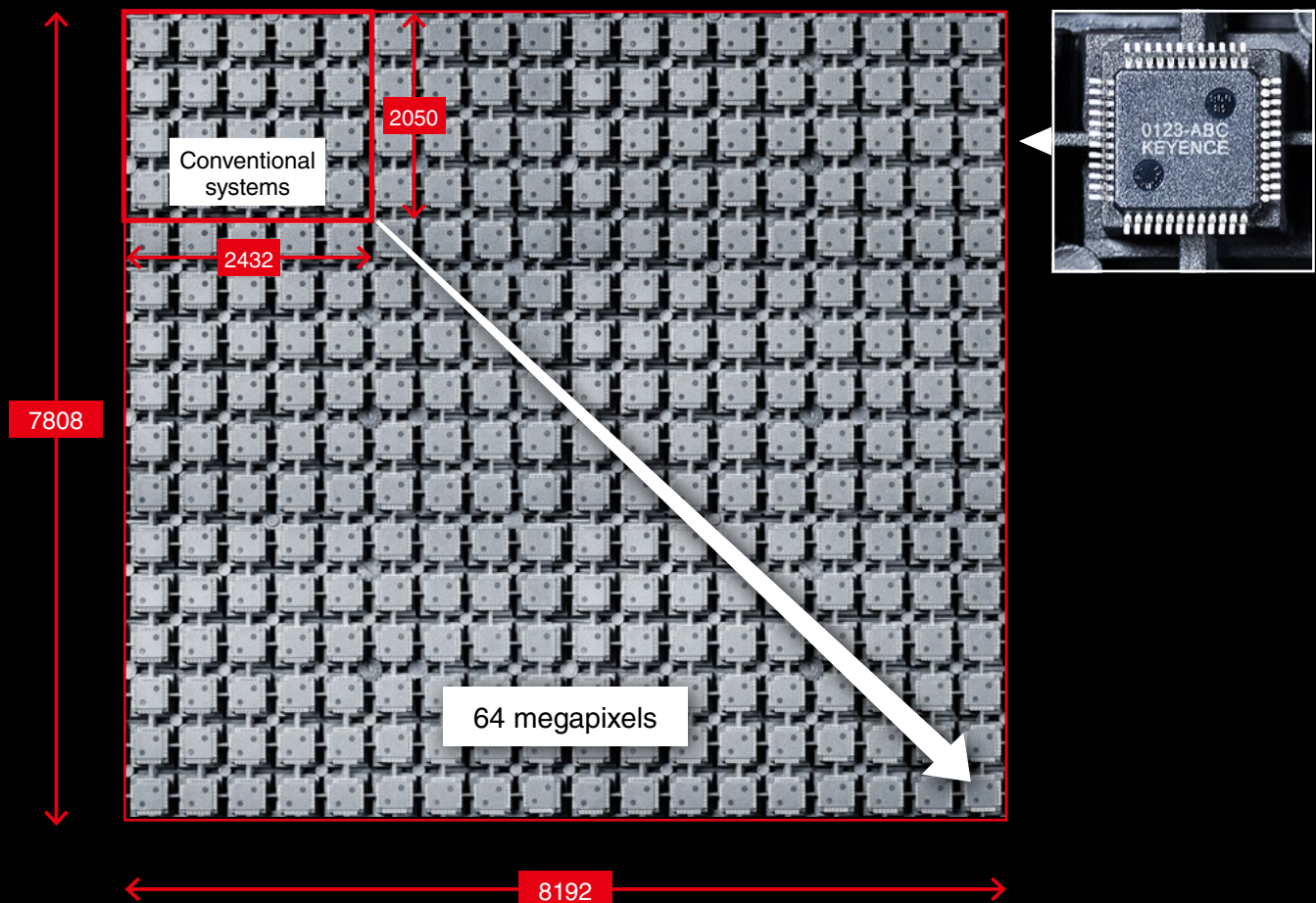
CV-X/XG-X Series

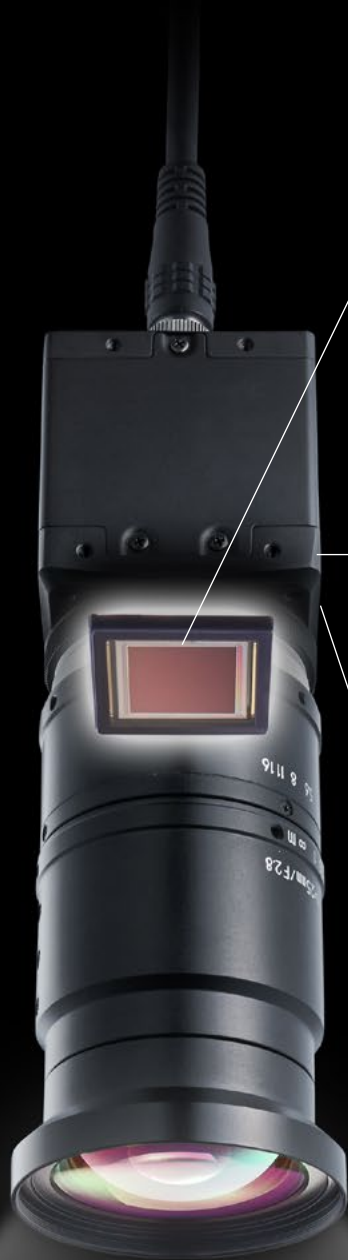
Wide Field of View × High Resolution

Introducing a 64 megapixel camera
for detailed inspection

The new 64 megapixel camera significantly improves accuracy in conventional inspections.

A single image capture delivers a wider range with clear details for increased inspection stability.





High-accuracy inspection over a wide field of view

Valid pixel count:

64 million pixels

Take advantage of high-accuracy inspections over a wider field of view with 12.8 times more pixels than a 5 megapixel camera. This ensures even greater stability for the vision inspection. Global shutter technology allows inspection even on production lines with moving targets.

Usable with high-speed lines

Image transfer time:

57.6 ms

The KEYENCE proprietary ultra-high-speed image data transfer technology provides an image-transfer frequency of 1.1 GHz, over 5 times that of conventional systems. This opens the door to high-speed, ultra-resolution inspections that were not possible before. This also allows the LumiTrax™ lighting technology to be used with the 21-megapixel model.

Simplified installation

Compact design:

50 × 50 mm

1.97" × 1.97"

Despite the high pixel count, the camera retains the same physical size as conventional models. This allows the use of general-purpose lenses. The built-in angle sensor allows stable camera installation with alerts if misalignment from the original setup occurs.

Ultimate pixel resolution & processing speed

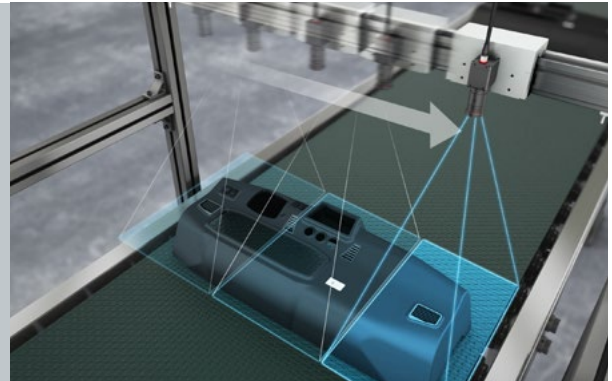
Simplified inspections with greater accuracy

Wide-area imaging

Problems with conventional systems

Camera movement takes time

When inspecting large targets, either the camera or the target must be moved to ensure accuracy, resulting in longer inspection times.



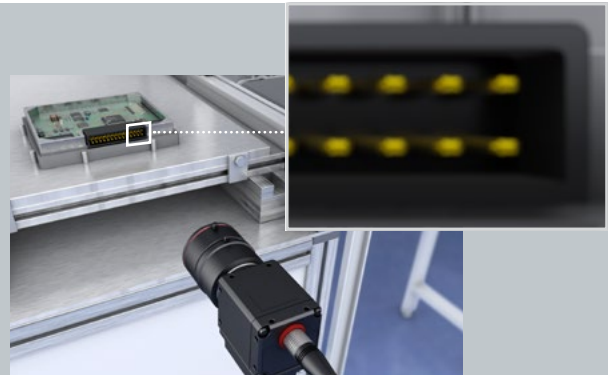
Automobile instrument panel inspection

Higher accuracy inspections

Problems with conventional systems

Insufficient resolution

For dimension inspections with multi-pin connectors, insufficient resolution can have a negative impact on inspection accuracy.



PCB connector inspection

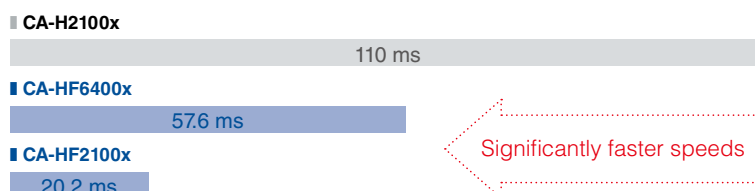
High-speed operation with LumiTrax™ support

Increased transfer speeds

More pixels and faster operating speeds

Transfer images up to 5.6 times faster (based on in-house comparison with CA-H2100x) for improved inspection accuracy even with high-speed lines.

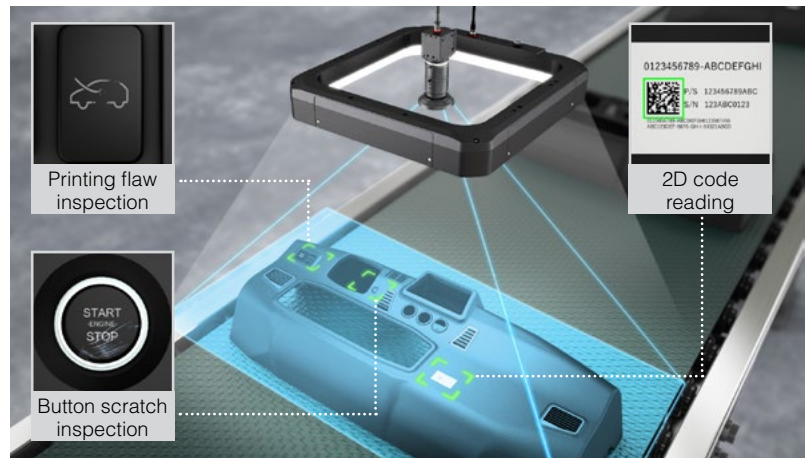
Image transfer time comparison (KEYENCE cameras)



High-pixel camera solution

Wide field of view for shortened inspection time

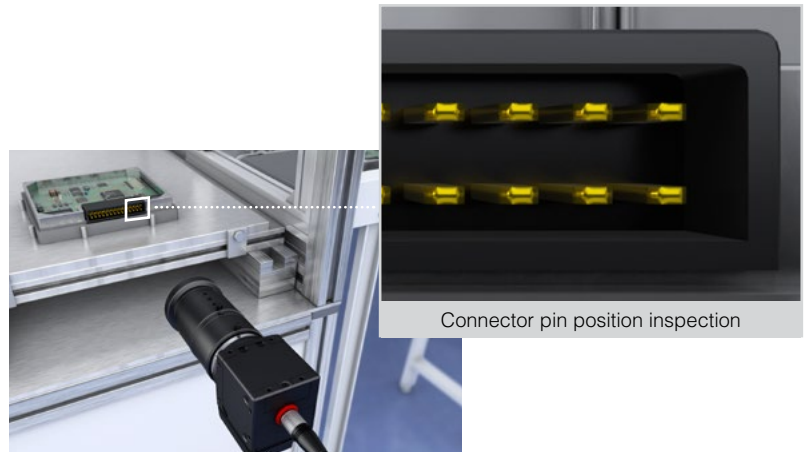
The entire target can be imaged with a single capture, without sacrificing accuracy, and inspection can be performed with the shortest possible machine takt time. This also helps simplify equipment installation.



High-pixel camera solution

Stable high-resolution, high-accuracy inspection

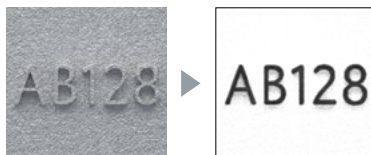
Operation is stable at the best possible resolution even for larger targets. This also eliminates the risk of camera calibration errors that are common with conventional multi-camera systems.



LumiTrax™ (when using CA-HF2100x)

High-speed control of directional lighting for advanced imaging

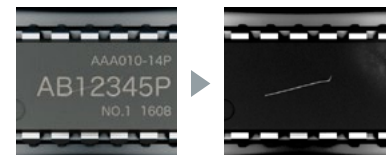
■ Stamping identification on cast products



■ Printed character inspection on film surface



■ Defect inspection for IC molds



Applicable models

Controller ▶

CV-X492F

XG-X2902

LED lighting ▶

CA-DQPxx

CA-DQW40X

CA-DRMxx*

Lighting unit ▶

CA-DC60E

* Usable with any color

Vast camera lineup to meet a wide variety of needs

64 megapixel camera



Model	CA-HF6400M/CA-HF6400C
Specifications	90x speed monochrome / 88x speed color
Applicable lens	2" special mount (M40 P0.75)
Camera cable	CA-CFx/CFxL
Capture range	8192 × 7808 pixels
Transfer time	57.6 ms

21 megapixel camera



LumiTrax™-compatible

Model	CA-HF2100M/CA-HF2100C
Specifications	85x speed LumiTrax™-compatible monochrome / color
Applicable lens	1" C-mount
Camera cable	CA-CFx/CFxL
Capture range	5104 × 4092 pixels
Transfer time	20.2 ms

Wide selection of cameras for various inspection applications

Line scan camera



Model	CA-HL02MX	CA-HL04MX	CA-HL08MX
Applicable lens	1" C-mount	1" C-mount	2" special mount (M40 P0.75)
Maximum number of pixels	2048	4096	8192
Maximum extended image size	2048 × 16384	4096 × 16384	8192 × 8192

5 megapixel camera



High-performance*1

IP64 rated*2

Model	CA-H500MX/CA-H500CX	CA-H500M/CA-H500C
Specifications	16x speed high-performance monochrome / color	16x speed environment-resistant monochrome / color
Capture range	2432 × 2040 pixels	2432 × 2050 pixels
Transfer time	27.7 ms / 29.2 ms	28.4 ms

2 megapixel camera



High-performance*1

IP64 rated*2

IP64 rated*2

Model	CA-H200MX/CA-H200CX	CA-H200M/CA-H200C	CA-200M/CA-200C	CA-HS200M/CA-HS200C
Specifications	16x speed high-performance monochrome / color	16x speed environment-resistant monochrome / color	Environment-resistant monochrome / color	16x speed compact monochrome / color
Capture range	1600 × 1200 pixels	1600 × 1200 pixels	1600 × 1200 pixels	1600 × 1200 pixels
Transfer time	11.7 ms	11.8 ms	56.5 ms	14.2 ms

0.31 to 0.47 megapixel camera



High-performance*1

IP64 rated*2

IP64 rated*2

Model	CA-H048MX/CA-H048CX	CA-H035M/CA-H035C	CA-035M/CA-035C	CA-HS035M/CA-HS035C
Specifications	16x speed high-performance monochrome / color	16x speed environment-resistant monochrome / color	Environment-resistant monochrome / color	7x speed compact monochrome / color
Capture range	784 × 596 pixels	512 × 480 pixels	640 × 480 pixels	640 × 480 pixels
Transfer time	2.9 ms	1.7 ms	2.9 ms	4.5 ms

*1 With the CV-X400/XG-X2000, color cameras support LumiTrax™ and pattern projection image capture, and monochrome cameras support LumiTrax™, multi-spectrum, and pattern projection image capture.
 *2 Use with KEYENCE-specified IP64-rated lens and environment-resistant cable to use as an IP64-rated environment-resistant camera.

High-capacity controller/camera input unit for 64 megapixel cameras



Model			CV-X482F	CV-X492F	XG-X2802	XG-X2902
Main image processor			14 cores (7 high-speed DSP cores)			
Supported cameras/ Camera units	0.31 to 0.47 megapixels	CA-E100	✓	✓	✓	✓
	2 megapixels	CA-E100	✓	✓	✓	✓
	5 megapixels	CA-E100	✓	✓	✓	✓
	CA-HF2100x	CA-E200	✓*	✓	✓*	✓
	CA-HF6400x	CA-E200	—	✓	—	✓
	Line scan camera	CA-E200L	—	—	✓	✓

* CV-X482F and XG-X2802 devices do not support LumiTrax™ image capture with a CA-HF camera.

2" high-resolution, low-distortion lenses



Model	CA-LHT18	CA-LHT25	CA-LHT35
Focal distance	18 mm 0.71*	25 mm 0.98*	35 mm 1.38*
F-stop	F2.8 to 16		
Minimum working distance	0.1 m 0.33'		
Mount	Special mount (M40 P0.75)		
Filter size	77 mm 3.03* P0.75	55 mm 2.17* P0.75	52 mm 2.05* P0.75
Compatible image sensor size	2"		
TV distortion	1.25%	0.59%	0.12%
Resolving power	160 cycles/mm at center, 100 cycles/mm on periphery*		
Ambient temperature/ humidity range	0 to 50°C 32 to 122°F, 35 to 80% RH (no condensation)		
Weight	Approx. 450 g	Approx. 390 g	Approx. 365 g

* Inspection value

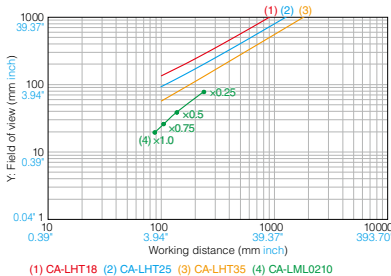
Model	OP-88578
Supported cameras	CA-HF6400x
Lens-side mount	C-mount
Weight	54 g

Lens chart

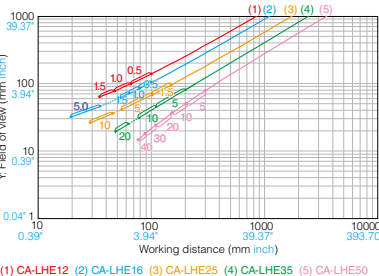
Using close-up rings may result in poor peripheral resolution.

CA-HF6400M/HF6400C

When using the CA-LHTx with 8192 × 7808 pixels (64 megapixel mode)

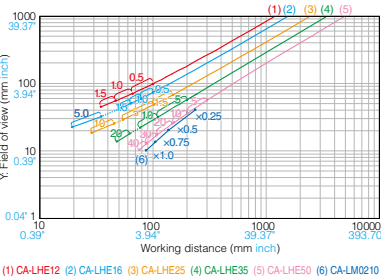


When using the CA-LHEx with 7168 × 5768 pixels (41 megapixel mode)



CA-HF2100M/HF2100C

When using the CA-LHEx with 5104 × 4092 pixels (21 megapixel mode)



When using a C-mount lens such as the CA-LHE with the CA-HF6400M/HF6400C, the camera mount on the camera body must be replaced with a C-mount adapter (OP-88578; sold separately). Note that 64 megapixel mode will not be supported. See the CA-HF6400M/HF6400C instruction manual for details.

Specifications (camera)

■ Camera (CA-HF6400M/CA-HF6400C)

Model		CA-HF6400M	CA-HF6400C
Image sensor		Monochrome CMOS Square pixel 90x high-speed reading	Color CMOS Square pixel 88x high-speed reading
Unit cell size		2.5 μm × 2.5 μm 0.10 Mil × 0.10 Mil	
Image size		Equivalent to 2" (ø32 mm ø1.26")*1	
Valid pixel count		64 megapixel mode: 8192 (H) × 7808 (V) 41 megapixel mode: 7168 (H) × 5768 (V) 21 megapixel mode: 5104 (H) × 4092 (V)	
Scanning system*2		Progressive 64 megapixel mode: 57.6 ms (4 ch)/114.1 ms (2 ch)/238.5 ms (1 ch) 41 megapixel mode: 40.4 ms (4 ch)/74.6 ms (2 ch)/156.8 ms (1 ch) 21 megapixel mode: 28.9 (4 ch)/39.2 ms (2 ch)/83.2 ms (1 ch)	Progressive 64 megapixel mode: 59.2 ms (4 ch)/117.2 ms (2 ch)/244.1 ms (1 ch) 41 megapixel mode: 40.4 ms (4 ch)/74.7 ms (2 ch)/160.0 ms (1 ch) 21 megapixel mode: 28.9 (4 ch)/39.2 ms (2 ch)/83.3 ms (1 ch)
Image transfer frequency		1110 MHz	1085 MHz
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		Special mount (M40 P0.75)*3	
Environmental resistance	Operating ambient temperature	0 to +40°C 32 to 104°F	
	Operating ambient humidity	35 to 85% RH	
Weight		Approx. 350 g (not including lens)	

*1 Equivalent to 4/3" (ø23 mm ø0.91") in 41 megapixel mode, and 1" (ø16 mm ø0.63") in 21 megapixel mode.
*2 Transfer time varies depending on the channel configuration.
*3 C-mount lenses can be used by replacing the lens mount on the camera with a C-mount adapter (OP-88578; sold separately). Note that 64 megapixel mode will not be supported.

■ Camera (CA-HF2100M/CA-HF2100C)

Model		CA-HF2100M	CA-HF2100C
Image sensor		Monochrome CMOS Square pixel 85x high-speed reading	Color CMOS Square pixel 85x high-speed reading
Unit cell size		2.5 μm × 2.5 μm 0.10 Mil × 0.10 Mil	
Image size		Equivalent to 1" (ø16 mm ø0.63")*1	
Valid pixel count		21 megapixel mode: 5104 (H) × 4092 (V) 5 megapixel mode: 2432 (H) × 2050 (V)	
Scanning system*2		Progressive 21 megapixel mode: 20.2 ms (4 ch)/39.3 ms (2 ch)/83.2 ms (1 ch) 5 megapixel mode: 10.8 ms (2 ch)/23.5 ms (1 ch)	Progressive 21 megapixel mode: 20.2 ms (4 ch)/39.4 ms (2 ch)/83.2 ms (1 ch) 5 megapixel mode: 10.8 ms (2 ch)/23.6 ms (1 ch)
Image transfer frequency		1037 MHz	1038 MHz
Transfer system		Digital serial transfer	
Electronic shutter		Can be set to 0.05 to 9000 msec by specifying the following numerical inputs: 1/15, 1/30, 1/60, 1/120, 1/240, 1/500, 1/1000, 1/2000, 1/5000, 1/10000, 1/20000	
Lens mount		C-mount	
Environmental resistance	Operating ambient temperature	0 to +40°C 32 to 104°F	
	Operating ambient humidity	35 to 85% RH	
Weight		Approx. 380 g (not including lens)	

*1 Equivalent to 1/2" (ø8 mm ø0.31") in 5 megapixel mode.
*2 Transfer time varies depending on the channel configuration.

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