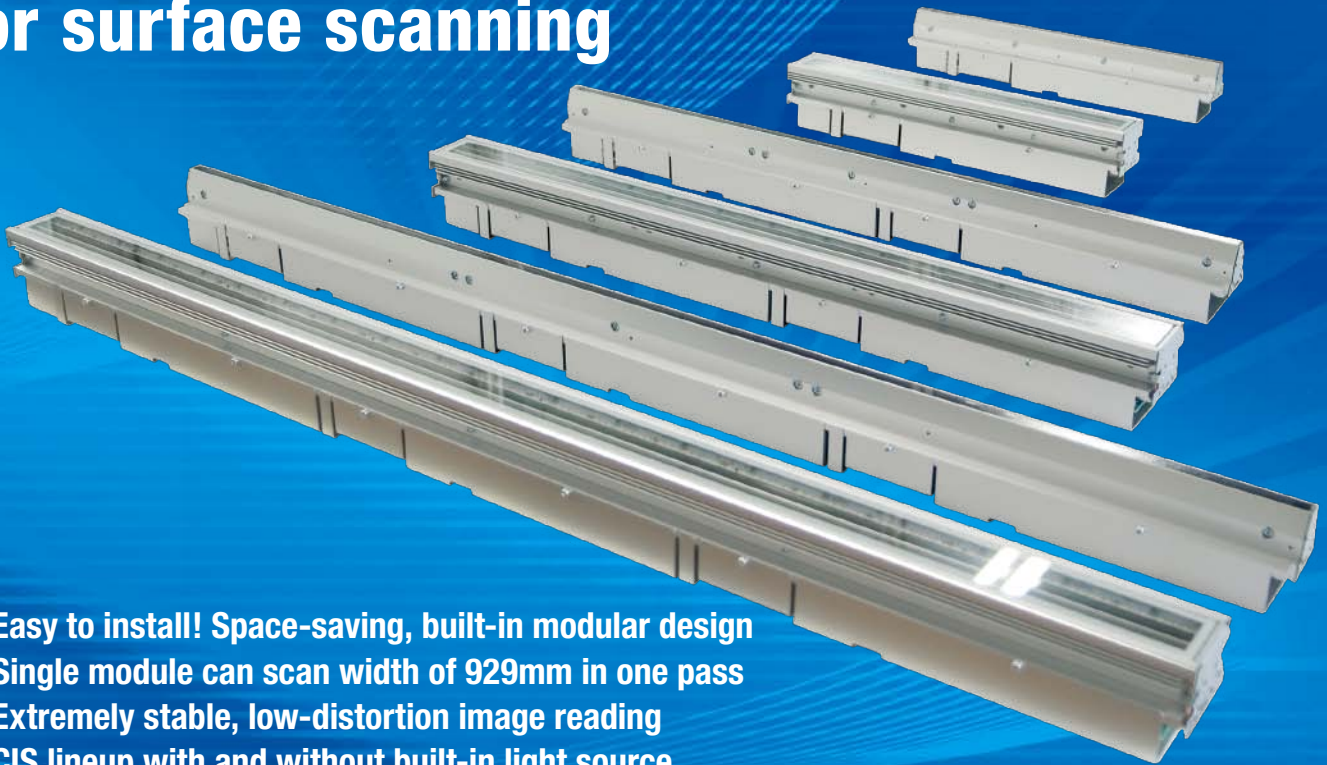## KD Series Contact Image Sensor for Surface Inspection

Replace cameras with new contact image sensors (CISs) designed for surface scanning
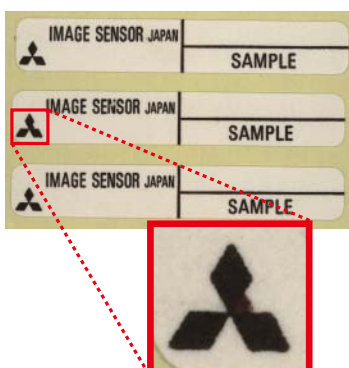

☐ **Easy to install! Space-saving, built-in modular design**
☐ **Single module can scan width of 929mm in one pass**
☐ **Extremely stable, low-distortion image reading**
☐ **CIS lineup with and without built-in light source**
☐ **High-speed scanning (Approx. 7.7m/sec set at 150dpi monochrome)**
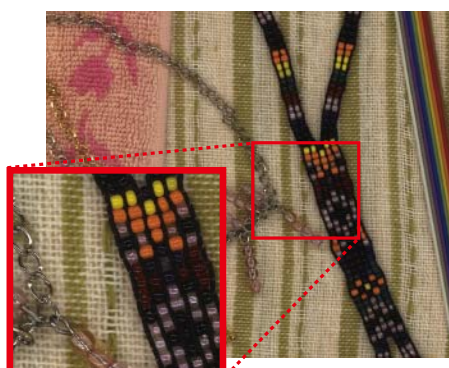☐ **Built-in Camera Link® interface**
  ● Camera Link® is a registered trademark of Automated Imaging Association (AIA).
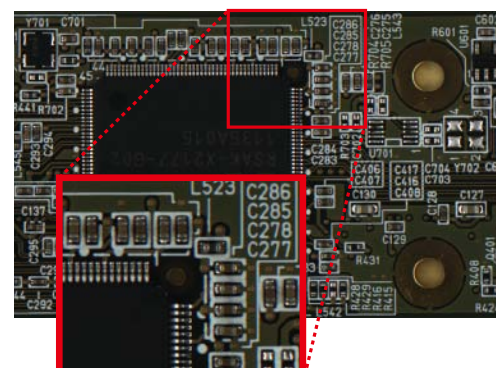
Applications

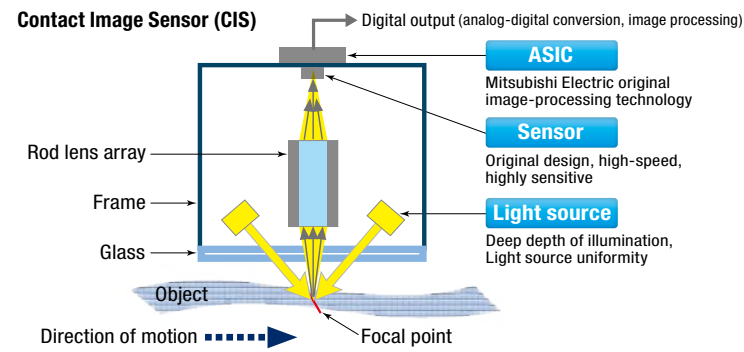| Printed Inspection/Label Scanning	Web Scanning	Solder Prints/Substrate Scanning

Applications include scanning the surfaces of planar objects such as printed materials, films, cloth, substrates and steel plate for scratches, dirt, defects, colormatching, positioning, etc.

Easy to install! Space-saving, built-in modular design

- Packaged in the all-in-one module are a lens, light source and light-sensitive IC sensors, eliminating the need to procure and design individual components.
- The simplified frame configuration and mounting mechanism help to make setup and adjustment of the built-in module amazingly easy.

Contact Image Sensor (CIS)

Digital output (analog-digital conversion, image processing)

ASIC
Mitsubishi Electric original image-processing technology

Sensor
Original design, high-speed, highly sensitive

Light source
Deep depth of illumination, Light source uniformity

Rod lens array
Frame
Glass
Object
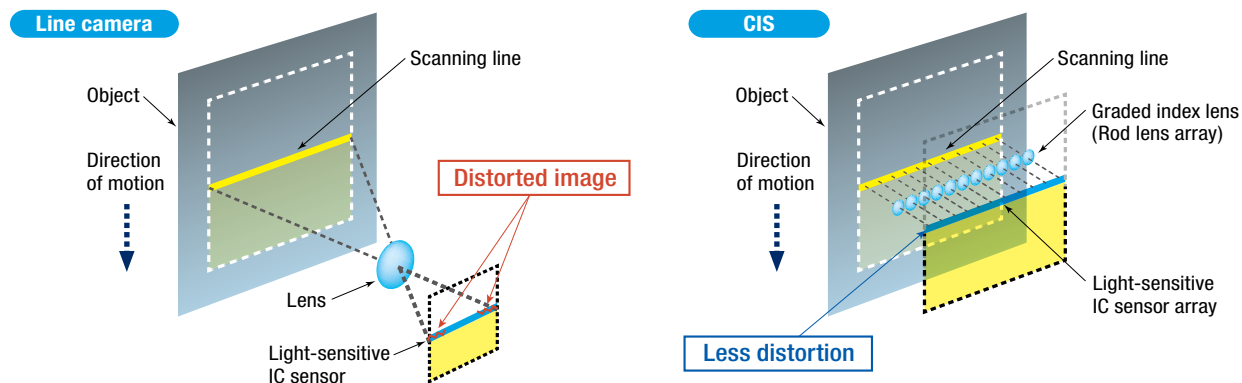Direction of motion
Focal point

Single module can scan width of 929mm in one pass

- KD Series CISs are available for three scanning widths: up to 309, 619 and 929mm. Choose the module that best matches your application needs.
- Compared to adjusting multiple line cameras, the procedure for adjusting the CIS is fast and easy.

Line cameras
Line cameras   Light source
Direction of motion
Object

CIS
CIS
Direction of motion
Object
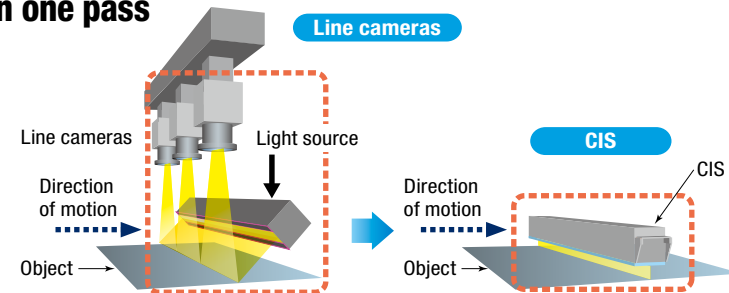
Extremely stable, low-distortion image reading

- CIS modules are equipped with a graded index lens, also called a rod lens array, which is the same length as the scanning line. Compared to the use of line cameras, scanning accuracy is highly stable and there is minimal distortion.

Line camera
Object
Scanning line
Direction of motion
Lens
Distorted image
Light-sensitive IC sensor

CIS
Object
Scanning line
Direction of motion
Graded index lens (Rod lens array)
Light-sensitive IC sensor array
Less distortion

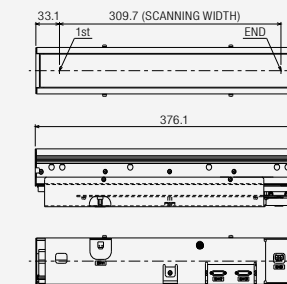## CIS lineup with and without built-in light source

- Based on your needs, select from two model variations: with or without the built-in light source.
- The built-in light source incorporated is a standard white LED array produced by Mitsubishi Electric.
- The frame of the CIS without the light source is designed slim and small, allowing the flexibility to use the module with other light sources and easily adjust the angle of light.
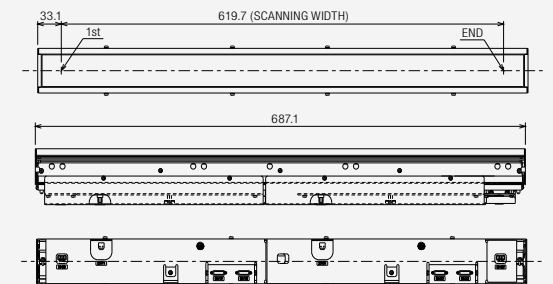
Built-in light source
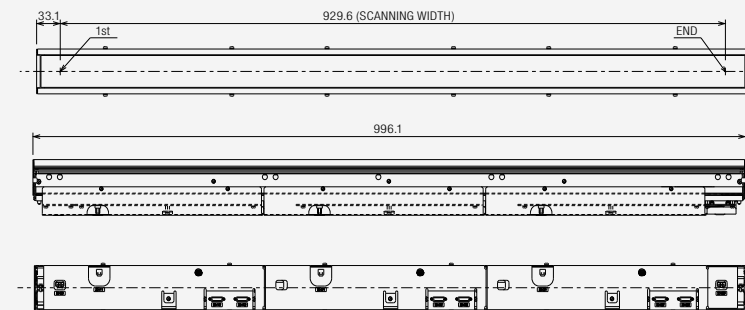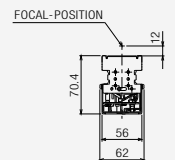**Built-in white LED array**

No light source
Slim frame design

23.2mm

56.5mm

Built-in light source

KD6R309AX3
KD6R309MX
33.1   309.7 (SCANNING WIDTH)   1st   END
376.1

KD6R617AX3
KD6R617MX
33.1   619.7 (SCANNING WIDTH)   1st   END
687.1

KD6R926AX3
KD6R926MX
33.1   929.6 (SCANNING WIDTH)   1st   END
996.1

Side view (common to all models)
FOCAL-POSITION
12
70.4
56
62

No light source

KD6R309AX3-NL
KD6R309MX-NL
33.1   309.7 (SCANNING WIDTH)   1st   END
376.1
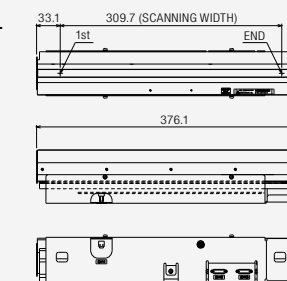
KD6R617AX3-NL
KD6R617MX-NL
33.1   619.7 (SCANNING WIDTH)
687.1
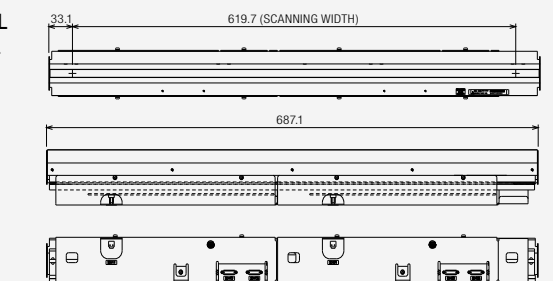
KD6R926AX3-NL
KD6R926MX-NL
33.1   929.6 (SCANNING WIDTH)
996.1

Side view (common to all models)
FOCAL-POSITION
14.5
67.1
56
62
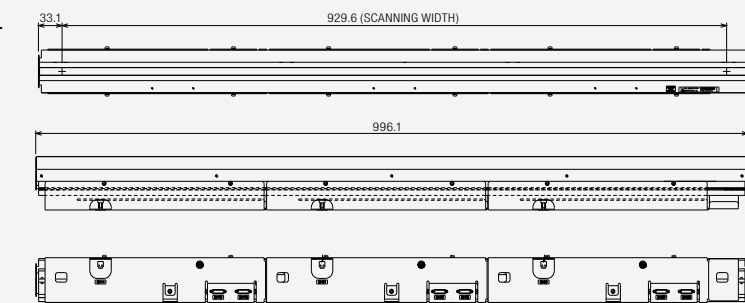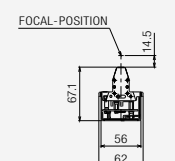
Basic Properties

■ Light source Photoluminescence spectrum

Relative emission intensity [a.u.]
100%
80%
60%
40%
20%
0%
380   480   580   680   780
Wave length [nm]
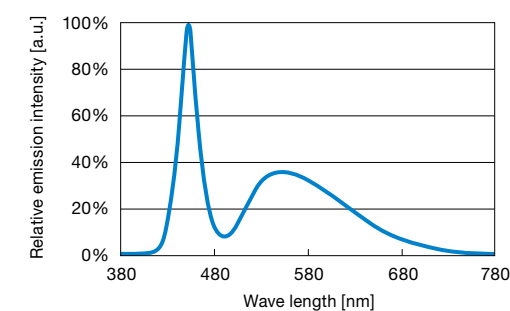
■ Sensor light-sensitivity spectrum

Sensitivity [%]
100
90
80
70
60
50
40
30
20
10
0
400   500   600   700   800   900
Incoming light wavelength [nm]
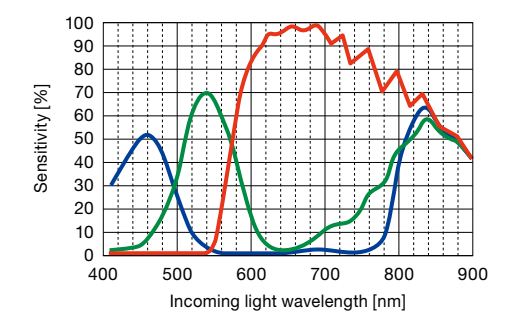
KD Series Contact Image Sensor for Surface Inspection

Basic Functions

Output clock setting	48 - 84MHz	Resolution setting	600dpi, 300dpi, 150dpi
Output format	Camera Link® compliant (Medium/ Base)	Image processing	White/Dark correction, interpolation, PGA, γ-correction, etc.
Sync signal setting	External/Internal sync. modes	Light source control	LED On/Off, LED duty control (*only for built-in light source model)

Specifications

Color sensors		Built-in light source			No light source		
		KD6R309AX3	KD6R617AX3	KD6R926AX3	KD6R309AX3-NL	KD6R617AX3-NL	KD6R926AX3-NL
Scan width	mm	309.7	619.7	929.6	309.7	619.7	929.6
Valid pixels	pixel	7,296	14,592	21,888	7,296	14,592	21,888
Pixel density	dpi	600					
Scan speed	kHz	22 (44μsec/line) : 8-bit RGB color 2ch (Medium configuration)					
		11 (88μsec/line) : 8-bit RGB color 1ch (Basic configuration)					
		11 (88μsec/line) : 10-bit RGB color 1ch (Medium configuration)					
Data output format	—	Camera Link®					
Port quantity	—	1	2	3	1	2	3
Power	Sensor	5V × 1 (3A max.)	5V × 2 (6A max.)	5V × 3 (9A max.)	5V × 1 (3A max.)	5V × 2 (6A max.)	5V × 3 (9A max.)
	Light source	24V × 1 (2.1A max.)	24V × 2 (3.9A max.)	24V × 3 (5.7A max.)	—	—	—
Output pixel clock	MHz	84 max.					
Light source	—	White LED array			—		
Focal point	mm	12.0 (from glass surface)			14.5 (from glass surface)		
Ext. dimensions (L×W×H)	mm	377 × 62 × 71	688 × 62 × 71	997 × 62 × 71	377 × 62 × 67	688 × 62 × 67	997 × 62 × 67
Weight	kg	1.9	3.3	4.8	1.2	2.3	3.3

Monochrome sensors		Built-in light source			No light source		
		KD6R309MX	KD6R617MX	KD6R926MX	KD6R309MX-NL	KD6R617MX-NL	KD6R926MX-NL
Scan width	mm	309.7	619.7	929.6	309.7	619.7	929.6
Valid pixels	pixel	7,296	14,592	21,888	7,296	14,592	21,888
Pixel density	dpi	600					
Scan speed	kHz	44 (22μsec/line) : 8-bit 4ch (Medium configuration)					
		44 (22μsec/line) : 10-bit 4ch (Medium configuration)					
		22 (44μsec/line) : 8-bit 2ch (Basic configuration)					
		11 (88μsec/line) : 8-bit 1ch (Basic configuration)					
Data output format	—	Camera Link®					
Port quantity	—	1	2	3	1	2	3
Power	Sensor	5V × 1 (3A max.)	5V × 2 (6A max.)	5V × 3 (9A max.)	5V × 1 (3A max.)	5V × 2 (6A max.)	5V × 3 (9A max.)
	Light source	24V × 1 (2.1A max.)	24V × 2 (3.9A max.)	24V × 3 (5.7A max.)	—	—	—
Output pixel clock	MHz	84 max.					
Light source	—	White LED array			—		
Focal point	mm	12.0 (from glass surface)			14.5 (from glass surface)		
Ext. dimensions (L×W×H)	mm	377 × 62 × 71	688 × 62 × 71	997 × 62 × 71	377 × 62 × 67	688 × 62 × 67	997 × 62 × 67
Weight	kg	1.9	3.3	4.8	1.2	2.3	3.3

● Camera Link® is a registered trade mark of Automated Imaging Association (AIA). ● These specifications are subject to change without notice.

(Ref.) Adaptable scanning speed limitations for each resolution

Resolution	600dpi	300dpi	150dpi
Color	Max. 57.7m/min (962mm/sec)	Max. 115.5m/min (1,924mm/sec)	Max. 230.9m/min (3,848mm/sec)
Mono	Max. 115.5m/min (1,924mm/sec)	Max. 230.9m/min (3,848mm/sec)	Max. 461.8m/min (7,697mm/sec)

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN