

X-ray TDI camera C12200 series

High speed readout

Large field of view

High Resolution

High Sensitivity



Evolutional high speed scanning with TDI technology

High speed readout

36.8
m/min.

Detection area

293
mm

Horizontal spatial
resolution

6144
pixels

X-ray TDI camera C12200 Series is useful for in-line applications requiring high-speed operation with high sensitivity. TDI imaging is appropriate for applications where it is desired to record a linear movement, or where the aspect ratio of the subject being imaged is significantly asymmetric. Low brightness under high resolution usage, a problem with conventional line sensor cameras, is improved with this X-ray TDI camera, making it suitable for applications which require high resolution.

Printed circuit board (PCB) inspection

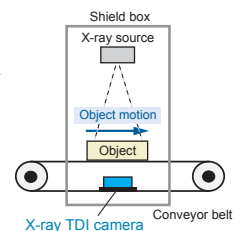
Surface-mounted component inspection

Battery inspection

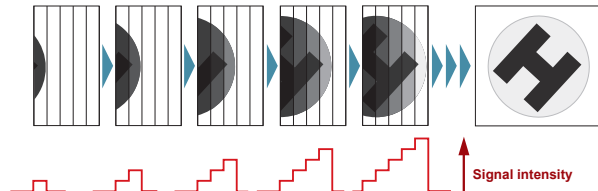
High-resolution in-line non-destructive inspection

TDI technology

Time Delay Integration is a technology of scanning in which a frame transfer device produces a continuous video image of a moving object by means of a stack of linear arrays aligned with and synchronized to the motion of the object to be imaged in such a way that, as the image moves from one line to the next, the integrated charge moves along with it, providing higher resolution at lower light levels than is possible with a line-scan camera.



TDI sensor



Features

- High S/N ratio with 12 bit (-321) /16 bit (-461) output
- Camera Link interface (Base configuration)
- Single power supply (+15 V) operation
- Real time dark current / shading correction function
- Frame readout mode for easy installation alignment

High-resolution, High-speed Camera with a Large Field of View for In-line 100 % X-ray Inspection

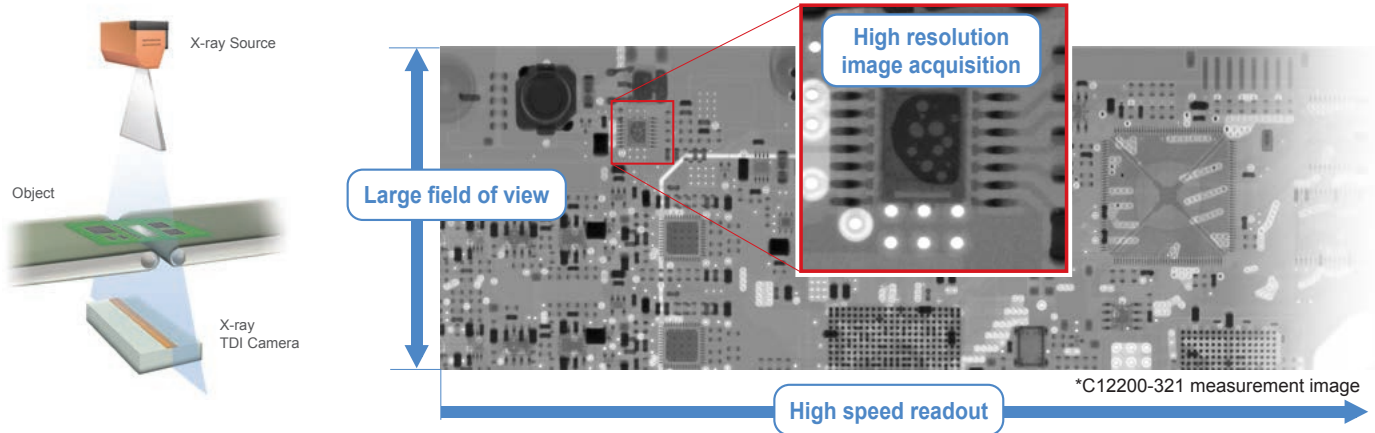
High speed readout

Large field of view

High Resolution

High Sensitivity

TDI technology offers all four simultaneously.



SPECIFICATIONS

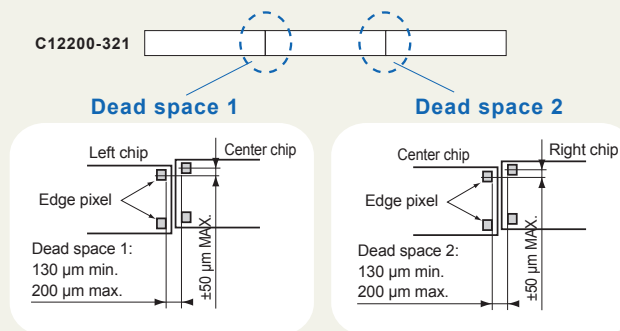
Type number	C12200-321	C12200-461
Scintillator	Csl Scintillator	
Window	FOS (Fiber optic plate with scintillator)	
Effective X-ray tube voltage range	Approx. 25 kV to 90 kV *1	
CCD pixel size	48 μm × 48 μm	
Number of pixels	4608 (H) × 110 (V)	6144 (H) × 110 (V) *2
X-ray sensitive area	221.1 mm (H) × 5.2 mm (V)	293.4 mm (H) × 5.2 mm (V)
Line speed	2.88 m/min to 23.04 m/min	
TDI line rate	1 × 1	Max. 8.0 kHz (23.04 m/min)
	Binning 2 × 2	Max. 6.4 kHz (36.864 m/min)
CCD pixel clock	5.0 MHz	
A/D converter	12 bit	16 bit
Digital interface	Camera Link	
Interface (Camera Link)	Base Configuration	
Pixel clock (Camera Link)	40 MHz	50 MHz
Output signals (Image data)	12 bit digital output	16 bit digital output
Power supply	DC +15 V	
Power consumption	Approx. 40 VA	

*1 Usable range of X-ray strength may vary depending on the tube current, the tube voltage and the distance.

*2 "Active CCD pixel number" is all outputting pixel number including overlapped pixel. When the overlapped pixels are deleted, actual pixel numbers will vary. And also, X-ray sensitive area will vary.

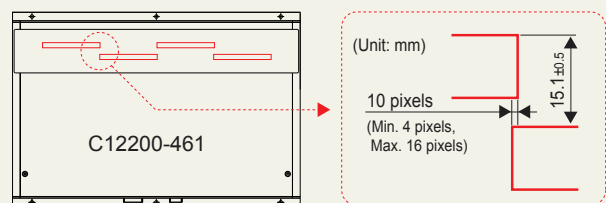
Dead space between chips

C12200-321 has a following dead space between chips.

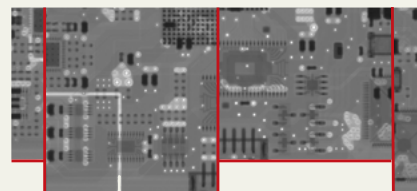


Wide detection width with no dead areas.

C12200-461 offers a wide detection area with no dead areas due to its staggered sensors.

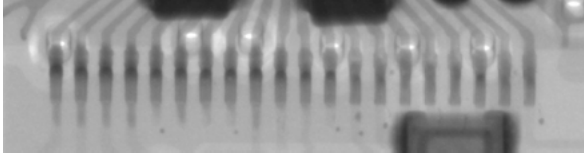


Overlapped type measurement example

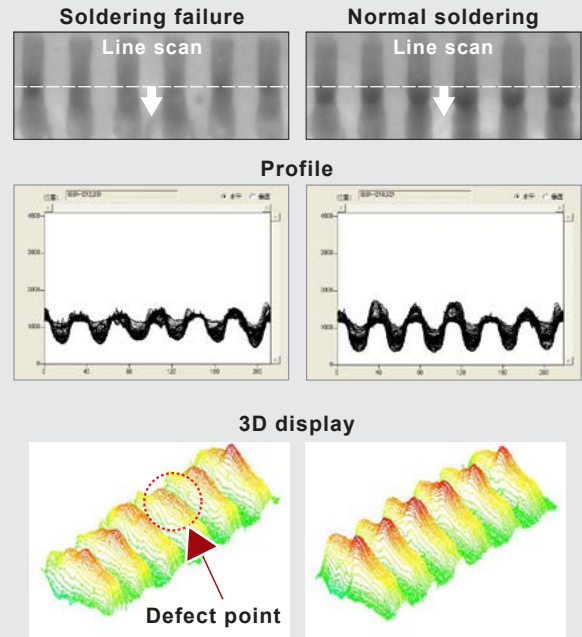


MEASUREMENT EXAMPLES

Inspection of a solder's back fillet



If the back fillet of the solder on a PCB has a defect, a connection error will occur even with small vibrations. For observation of the back fillet part, X-ray transmission technique has been applied but only with an off-line system. Our X-ray TDI camera realizes in-line inspection because it can acquire high speed profile data with high sensitivity. 3D brightness level can be displayed using software.

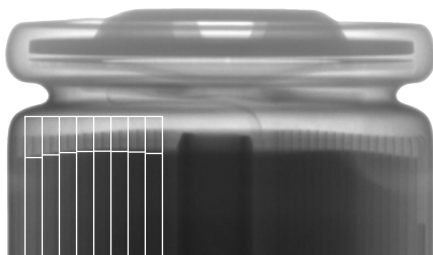


Lithium-ion battery inspection

In case of 2D sensor, the dimensional measurement cannot be implemented correctly because the image is distorted on the corner areas of the X-ray irradiation. The long length sample needs to be located on center of X-ray source, so the sample has to be relocated each time. X-ray TDI camera can capture the image with no distortion by line scan method, so it is not necessary to relocate the samples and it enables the continuous inspection for long length object without stopping.

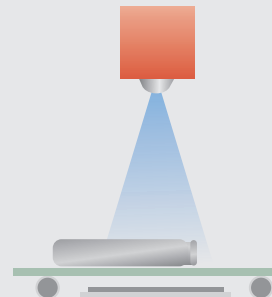


Not necessary to relocate the samples and possible to inspect the long length object with no distortion.



Possible to inspect the mismatch of rolling and measure the length of electrode with no distortion.

Inspection by 2D sensor

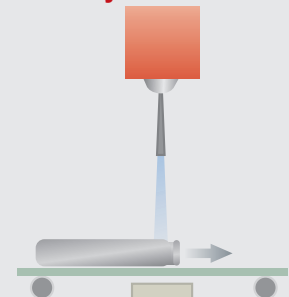


X-ray image intensifier (I.I.) camera :

The image is distorted on the corner areas in thickness direction, and the dimensional measurement cannot be implemented correctly.

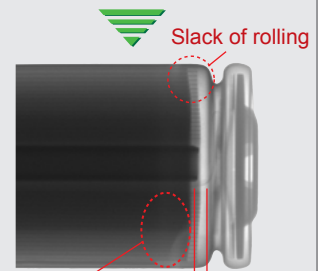


Inspection by X-ray TDI camera



X-ray TDI camera :

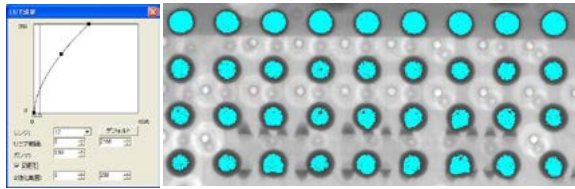
The non-distortion image can be realized since X-ray is radiated vertically to the object and the dimensional measurement can be implemented correctly.



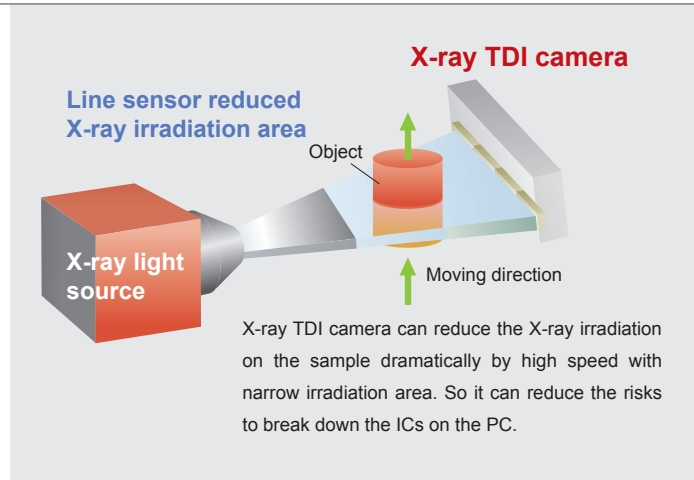
Condition of the connection on electrode

MEASUREMENT EXAMPLES

Void inspection of BGAs (Ball Grid array)

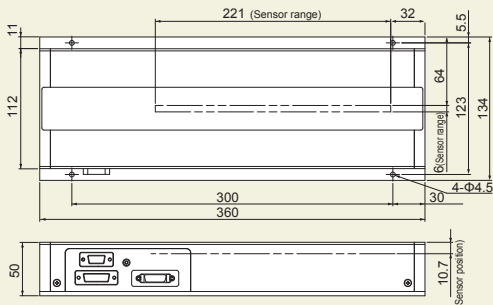


X-ray TDI camera can inspect the samples easily by high speed scan with narrow irradiate area.
S/N ratio is one of advantage and low X-ray radiation is enough to inspect the void existence.
Furthermore it contribute to make a smaller size of system by reducing a lot of X-ray irradiation.

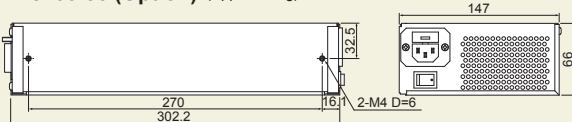


DIMENSIONAL OUTLINES (Unit: mm)

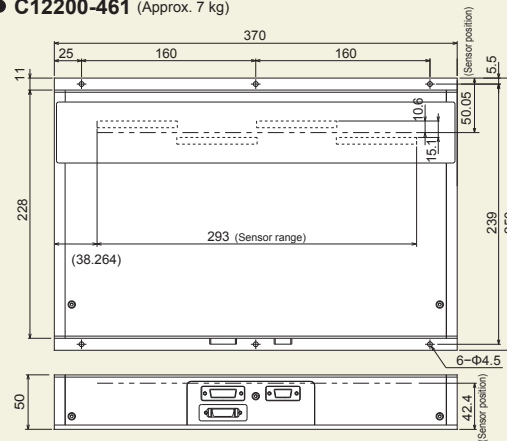
● C12200-321 (Approx. 5 kg)



● A8206-35 (Option) (Approx. 2 kg)



● C12200-461 (Approx. 7 kg)



OPTIONS

- Power supply unit : A8206-35
- Power cable 5 m : A10847-05
- Software API Support (Microsoft Windows) : DCAM-API (<http://www.dcamapi.com>)

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HAMAMATSU PHOTONICS K.K. www.hamamatsu.com

HAMAMATSU PHOTONICS K.K., Systems Division

812 Joko-cho, Higashi-ku, Hamamatsu City, 431-3196, Japan, Telephone: (81)53-431-0124, Fax: (81)53-435-1574, E-mail: export@sys.hpk.co.jp

U.S.A.: Hamamatsu Corporation: 360 Foothill Road, Bridgewater, NJ 08807, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218 E-mail: usa@hamamatsu.com

Germany: Hamamatsu Photonics Deutschland GmbH.: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-265-8 E-mail: info@hamamatsu.de

France: Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr

United Kingdom: Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, UK, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk

North Europe: Hamamatsu Photonics Norden AB: Torshamnsgatan 35 16440 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: info@hamamatsu.se

Italy: Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-935-81-733, Fax: (39)02-935-81-741 E-mail: info@hamamatsu.it

China: Hamamatsu Photonics (China) Co., Ltd.: 1201 Tower B, Jiaming Center, 27 Dongsanhuan Beilu, Chaoyang District, 100020 Beijing, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

Taiwan: Hamamatsu Photonics Taiwan Co., Ltd.: 8F-3, No.158, Section2, Gongdao 5th Road, East District, Hsinchu, 300, Taiwan R.O.C. Telephone: (886)03-659-0080, Fax: (886)07-811-7238 E-mail: info@tw.hpk.co.jp

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