

High Resolution X-ray CCD cameras

High-resolution digital imaging system for different types of radiation (X-ray, electron and UV) based on a thin YAG:Ce or LuAG:Ce scintillating screen and on a specially designed high-sensitivity CCD camera.

Fast X-ray CCD Digital Camera

Parameters

One or four-stack fiber optic taper with a scintillator, optional R/AR layers.
 Spectral range: according to the used scintillator screen.
 Active area: 14.5 or 58 mm x 10.9 mm (661 or 2468 x 464 pixels).
 Scintillator: optimized according to customer specification (thickness, resolution).
 Reflective layer: optional, Al reflective layer to increase light efficiency.
 True single frame dynamic range: 885:1 typ.
 Total readout noise: 26 e⁻ typ. at 5 MHz.
 Max. usable signal (linear range): 23,000 e⁻/pixel typ. (antiblooming disabled).
 CCD signal processing: correlated double sampling (CDS) + 16 bit A/D converter.
 Readout rate: up to 40 Mp/s (up to 27 frames/s).
 Cooling: T=20°C with respect to the camera head temp.
 Exposure time range: 100 ns to 38 min.
 Dark noise: 10 e⁻/pixel/s at 275 K.
 Sync and exposure control: completely controlled via frame grabber.
 On-chip binning: 1 x 1 to 9 x 9, independent in X and Y.
 Data interface: Camera Link™.
 Camera Link mode: 12 bit/tap data width.



Taper with YAG:Ce screen

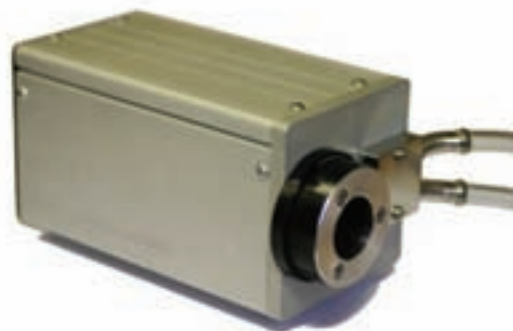


Application

- X-ray Semiconductor metrology
- X-ray Imaging
- X-ray Spectroscopy
- X-ray Profiles

The effective pixel size is typically 23.5 microns. On request, we are also able to bond the imaging screen onto fiber optics and CCD supplied by the customer.

High Resolution X-ray CCD Camera



Parameters

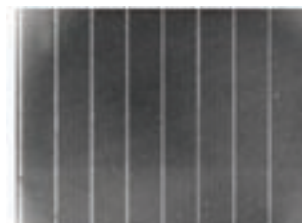
- Fast readout rate up to 10 Mp/s (27 frames/s).
- Standard Camera Link™.
- Total readout noise: 23 e⁻ at 5 MHz.
- Cooled system.
- Equipped with optical system and high-resolution extremely thin scintillator imaging screen.
- Robust and compact camera head design.



Extremely thin imaging screen.

Advantages

- Long operation life of the imaging system.
- High resolution down to 1 micron.
- X-ray, electron and UV detection with the same system.
- Complete system solution and supply.



A grid with 2 microns grooves in X-ray taken by using the hi-res camera

Application

- X-ray high-resolution imaging.
- X-ray semiconductor defects imaging.
- Gamma and synchrotron beams inspection.

The resolution of X-ray images obtained by the high resolution digital CCD camera is about 1 micron.

Large Format CCD Digital Camera



CCD head unit

Parameters

CCD size: 11 Mpix, 4104 x 2684 pixels.
 Pixel size: 9 x 9 μ m.
 Binning: 1x1 to 16x16.
 Reading: one or two ADC gateways.
 Antiblooming: SW controlled.
 Exposure time range: 0.8 s to 200 s.
 Frames accumulation: 1x to 99x.
 CCD signal processing: correlated double sampling (CDS) + 16 bit A/D converter.
 Image acquisition: Quick preview mode/ acquire mode.
 Features: Background subtracting, Flat field correction.
 Cooling: Peltier with precise regulation and temperature set point.
 Data interface: 100Mbit/s Ethernet (100BASE-T).

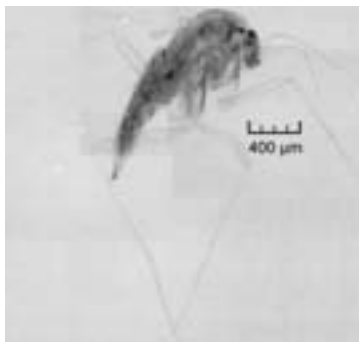


Power and controller unit

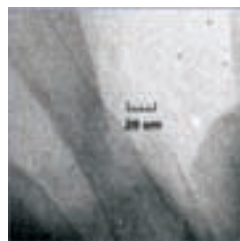
The large format CCD digital camera is designed for high resolution imaging.

Application

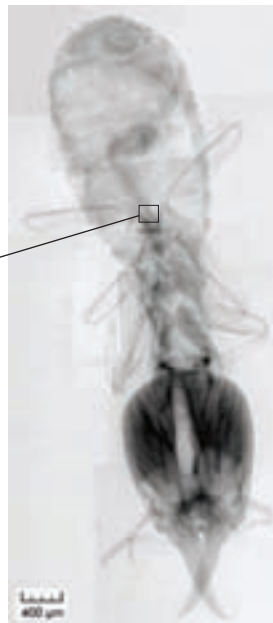
Biological and medical objects



Drosophila

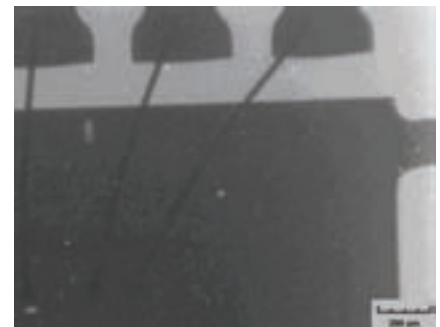


Detail, resolution
1 micrometer



Termite

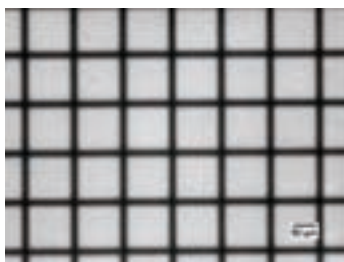
Electronics - integrated circuits inspections



Integrated circuit

The images were taken using a microfocus X-ray Cu anode source at 40 kV/2 mA.

X-ray inspection of highly detailed part



8-micron Au wire grid

Other applications:

- X-ray spectroscopy
- X-ray topography
- X-ray beam adjustment
- X-ray thin films diffraction
- X-ray optics adjustment
- X-ray microfocus spot measurement
- X-ray imaging in industry
- X-ray food inspection
- ... and many others

X-ray, UV, synchrotron beam inspection and measurement

X-ray beam in-situ adjustment,
double diffraction on silicon wafers:



Diffraction plane [111]



Diffraction plane [333]

We are able to design and supply a complete imaging system customized to your application.