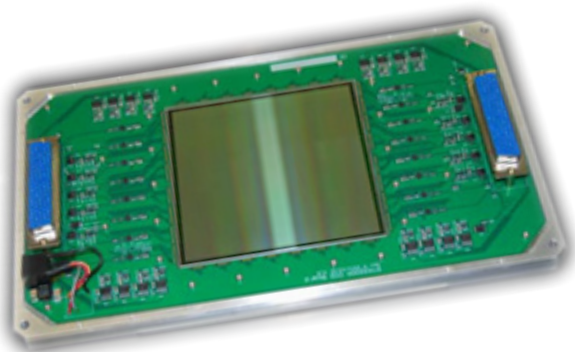


X-ray direct-detection CCDs

Preliminary Short Form Datasheet



CCD3200A Direct Detection CCD

Si-CCD chip on sensor-board

General Description:

Direct Detection CCDs convert x-rays into electrical carriers directly in the Silicon, without using a scintillator to transform the x-ray radiation into visible light first.

X-ray energy bands:

0.12 eV – 12 keV (soft x-rays):

Several local detection maxima with high x-ray detection efficiency up to > 80 %, e.g. at 12 keV (without window)

12 keV – 120 keV (hard x-rays):

can also be well detected with a scintillator in front of the CCD.

Design Examples:

Front Illuminated (FI):

- Highest quantum efficiency for $E > 4$ KeV
- Number of Pixels: 4k x 4k
- Pixel Size: 24 μ m x 24 μ m
- No. of outputs: 16
- Frame Rate: 2 fps
- X-ray resolution: 22 μ m (PSF at FWHM)
- Lower Cost than BI

Back Illuminated (BI):

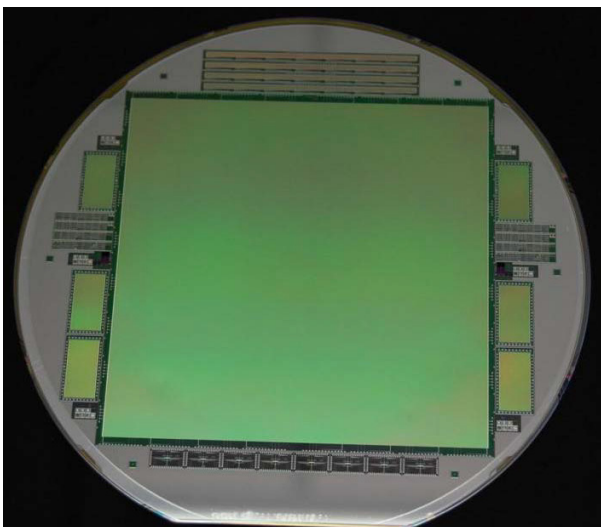
- Highest quantum efficiency for $E < 12$ KeV
- Number of Pixels: 4k x 4k
- Pixel Size: 24 μ m x 24 μ m
- No. of outputs: 16
- Frame Rate: 2 fps
- X-ray resolution: e.g. 20 (40) μ m at 20 (10) keV (PSF at FWHM)

X-ray specific properties:

- Excellent X-ray detection efficiency combined with highest spatial resolution
- Detection efficiency up to > 80 %, e.g. at 12 keV (without window)
- Spatial Resolution up to 4k x 4k (16 MPixels) monolithic,
- X-ray resolution down to 50 μ m and better (20 μ m) (FWHM of PSF)
- Low Radiation Damage by adequate CCD-design

Si-CCD-specific properties:

- 100% Fill Factor!
- Deep depletion high resistivity silicon > 10 k Ω cm, e.g. 700 μ m thick
- Back illuminated or Front illuminated
- Pixel Sizes: 7.5 μ m - 150 μ m (24 μ m x 24 μ m at 4k x 4k resolution)
- Chip-Dimensions: up to 96 mm x 96 mm (monolithic)
- Pixel-Resolution up to 10 k x 10k (111 Mpixel) (monolithic)
- Low Crosstalk between channels



CCD3200A-Wafer:
Chip-Dimension 96mm x 96mm

Applications:

- Synchrotron Research and Measurements
- Crystallography
- X-ray astronomy
- X-ray microscopy and spectroscopy
- High Energy Physics
- Medical research