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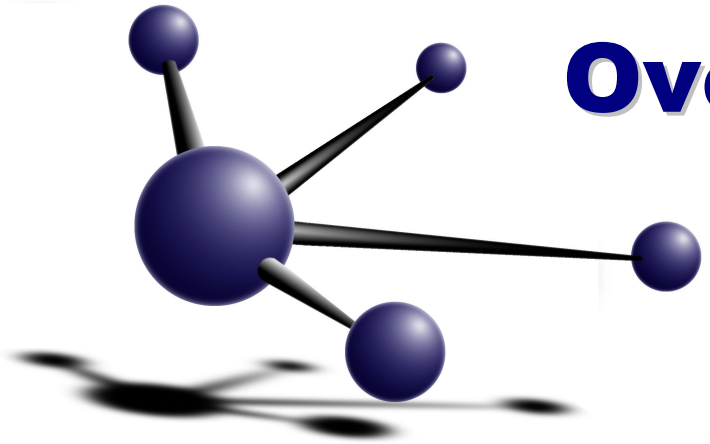
Critical Link embedded…

CCDsp

Read-out and Binning

Overview



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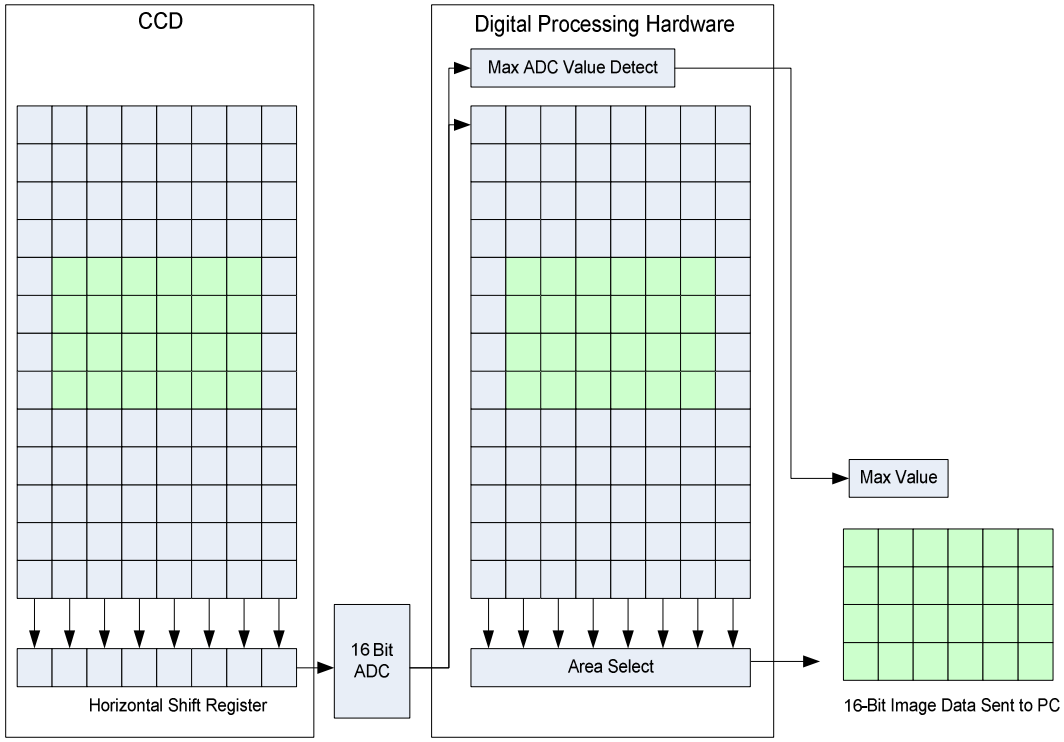
Outline

Data Acquisition & Read-out modes

- CCD Area Reads
  - Raw image (sub-image) delivered to application
  - Any rectangular section of CCD matrix
  - Pixel data presented as 16-bit signed integers
- CCD Bin Reads
  - Unlimited binning combinations using sensor and MityDSP
  - Flexible vertical binning – in CCD and/or in DSP
    - Bin in CCD for better noise/speed performance
    - Bin in FPGA/DSP for better dynamic range
    - Binning can be adjusted based on image content – more binning in darker areas, less in brighter areas
  - Horizontal binning in FPGA / DSP
  - 2D Mask binning in FPGA / DSP
  - Support multiple concurrent binning patters
  - Pixel data presented as 32 bit signed integer
- Exposure modes
  - Precise exposure time for image read and clears

Data Acquisition - Area Reads

- Raw image delivered to application
- Supports Full Image and sub-area
- Any rectangular section of the CCD matrix
- Pixel Data represented as 16 bit integers



Data Acquisition - Binned Reads

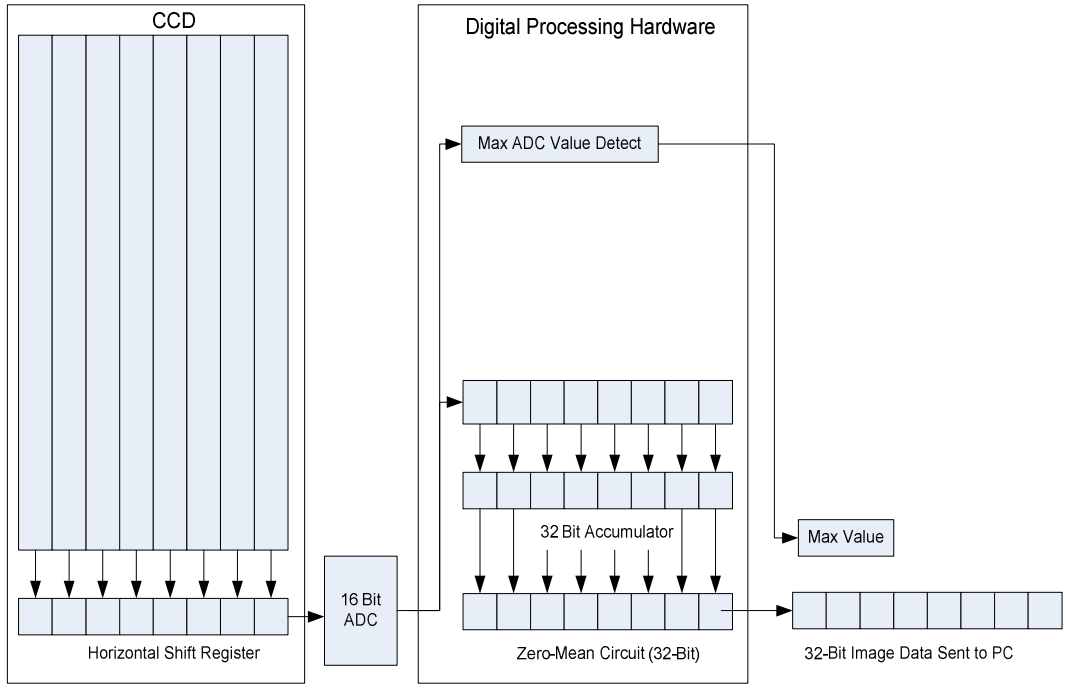
- Full binning in CCD

- Commonly used for low light levels – where saturation not an issue

- All rows summed column wise onto CCD horizontal readout register

- Fastest acquisition time

- Best SNR



Data Acquisition - Binned Reads

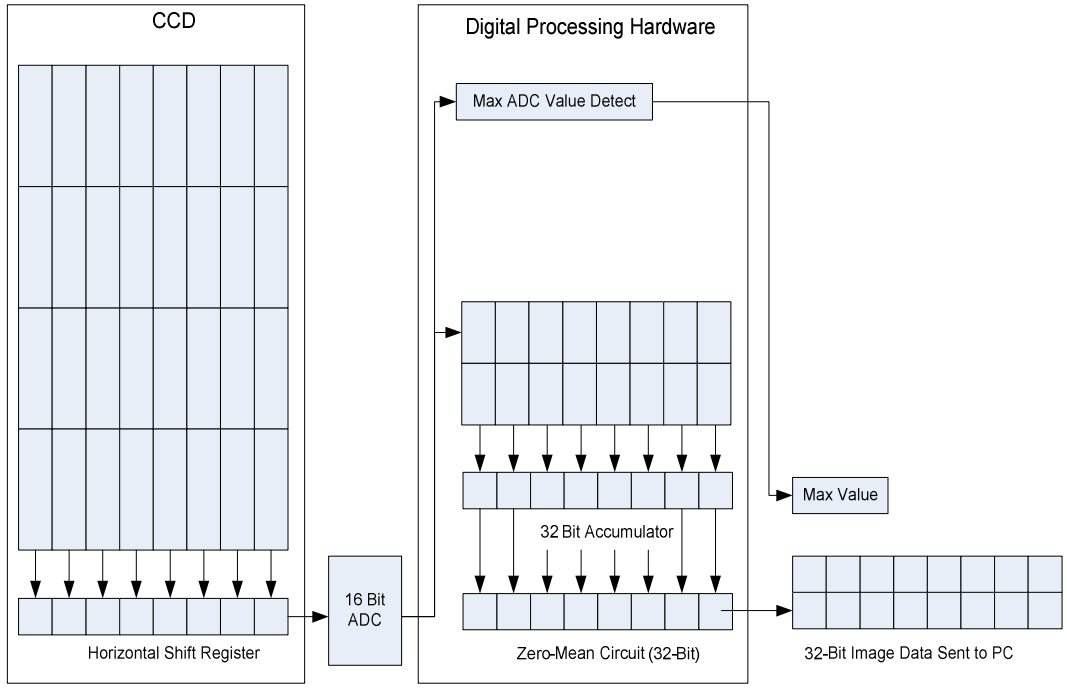
- Partial Binning in CCD / Hardware

- Commonly used for high light levels – where saturation can occur

- Some rows summed column wise onto CCD horizontal readout register (16 bits)

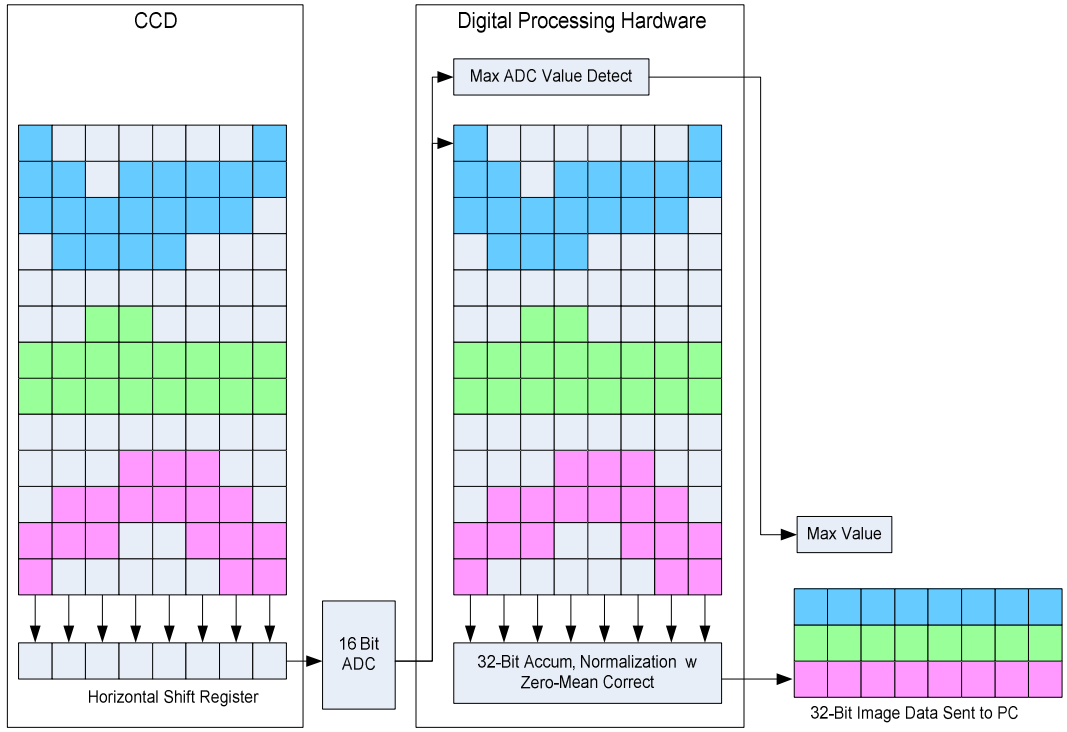
- Partial results are summed in DSP (32 bits)

- Fast acquisition time



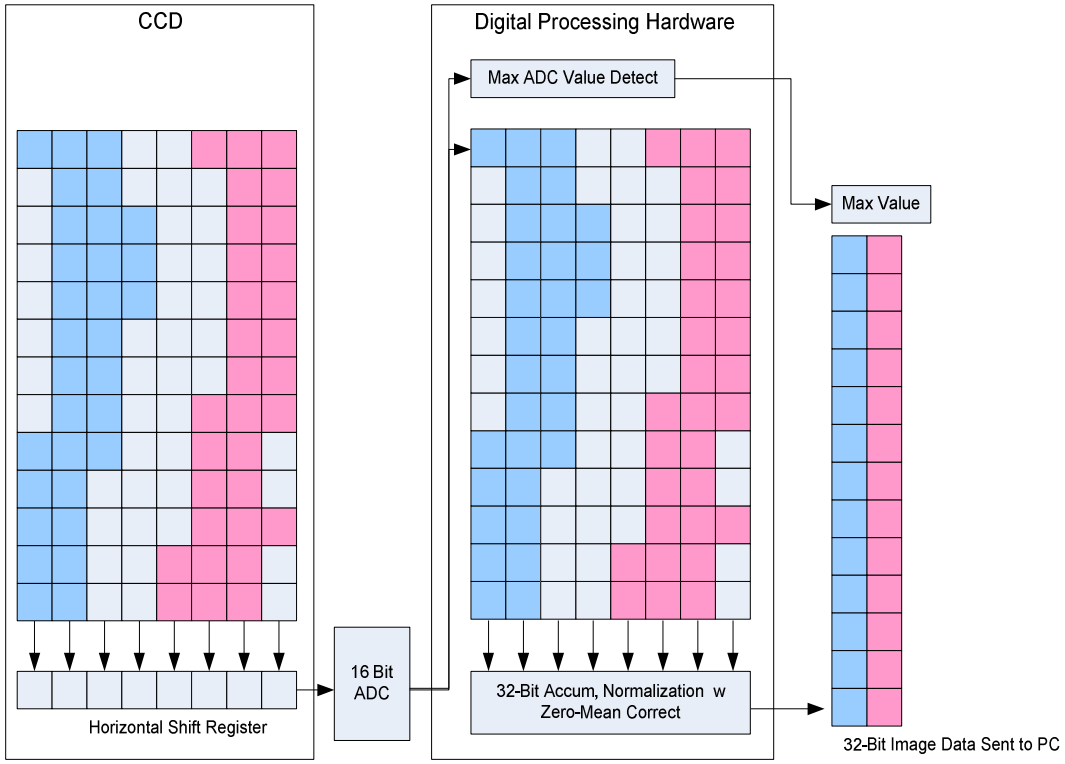
Data Acquisition - Binned Reads

- Area Mask Binning
- Binning pixel by pixel to get around non-linear effects (e.g. warping) Commonly used for high light levels where complete on-chip binning will result in saturation
- Entire CCD array transferred to DSP, then summed vertically / horizontally according to mask
- For N row x M column camera binning in the vertical dimension will result in M reported values, and binning in the horizontal dimension will yield N values
- Binning values are normalized via averaging the selected pixels in the mask
- Fast read-out / good SNR



Data Acquisition - Binned Reads

- Area Mask Binning (contd)
- Following averaging, CCD offset will be subtracted from result
- Area mask applies horizontally or vertically



Multiple Binning Patterns

- Multiple binning patterns in use concurrently
- Multiple patterns downloaded and stored in on-board RAM
- Patterns swapped in on a cycle by cycle basis
- Support for external trigger

Contact Information

Contact our application engineer to discuss your imaging requirements

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