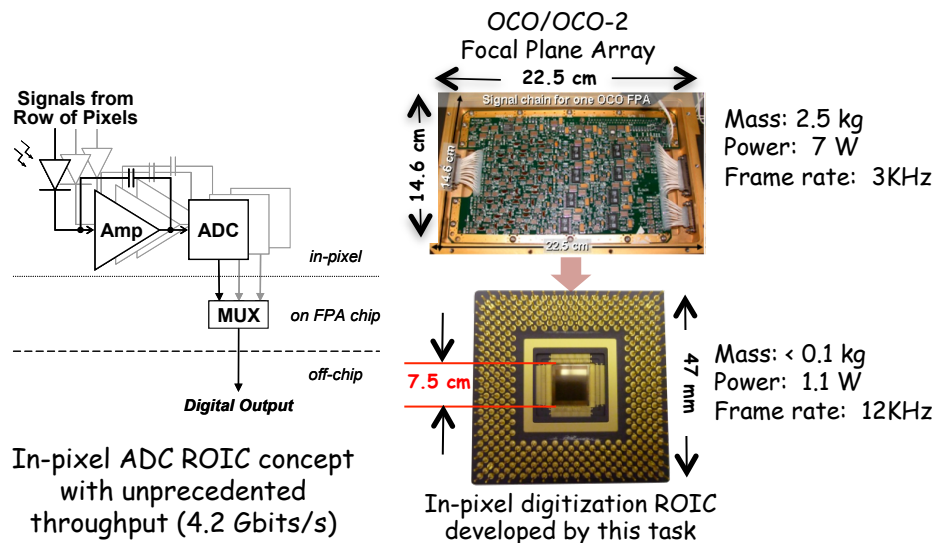


In-Pixel Digitization Read Out Integrated Circuit for the GEO-CAPE Mission

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Objective

- Demonstrate a high performance readout integrated circuit (ROIC) with an innovative analog-to-digital converter (ADC) in-pixel that works with a broad class of detectors commonly used to make earth science measurements in the ultra-violet to short wave infrared spectral range.
- Verify the performance by acquiring and analyzing atmospheric spectra with the ROIC in the Fourier Transform UV/Vis Spectrometer (FTUVS), an operational instrument at JPL's Table Mountain Facility that routinely measures total column abundances of transient species OH, NO₃, CO₂, BrO.



Accomplishments

- Developed an in-pixel current-to-frequency digitization design using commercial 180 nm process circuit design tools
- Developed a 128x128, 60 μm pixel imaging array design and layout
- Fabricated 128x128 pixel array ROIC CMOS chips at commercial foundry
- Demonstrated the 128x128 array ROIC's functions and performance in the laboratory environment, including: superb ADC resolution (14 bits); respectable frame readout rate (12 kHz); compact array size (1 cm x 1 cm); and low power consumption (1.1 W)
- Demonstrated the ROIC capability for measuring atmospheric composition using the FTUVS at the Table Mountain Facility

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TRL_{in} = 2 TRL_{out} = 5