

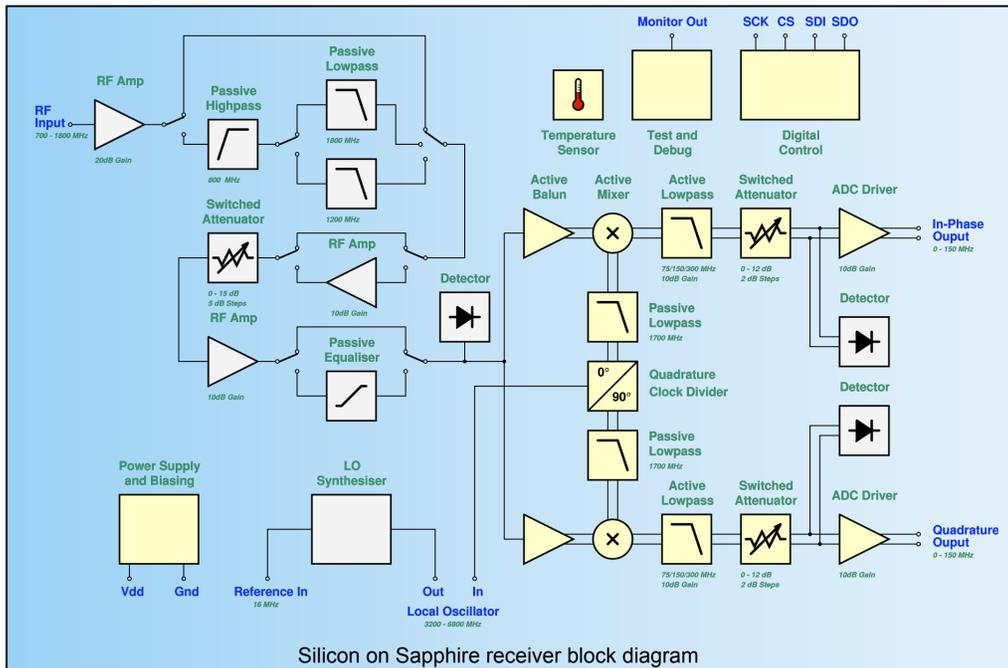
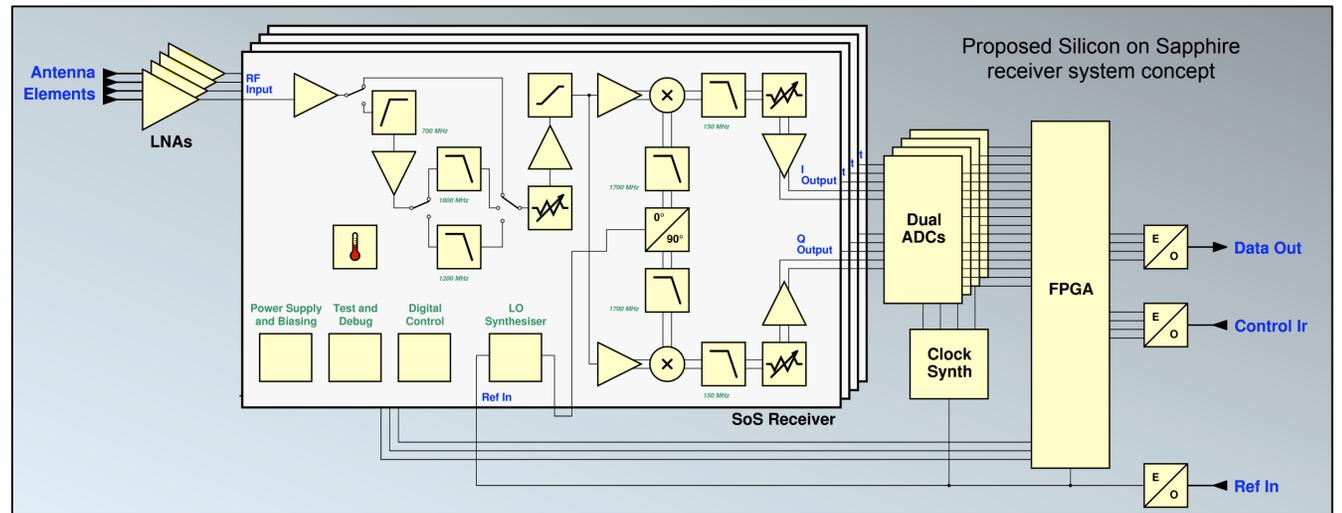
Highly integrated Silicon on Sapphire receiver for next-generation radio telescopes

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A new System-on-Chip (SoC) receiver is proposed utilising an advanced Silicon on Sapphire CMOS process, to be developed as a collaborative venture between CSIRO Astronomy and Space Science and Sapphicon Semiconductor.

Receiver Specifications

- Targeted for mid-band Square Kilometre Array (SKA) pathfinder use
- RF tuning range of 250 to 2500 MHz,
- Selectable RF filters.
- 150/300/600 MHz selectable instantaneous bandwidth.
- >40dB dynamic range.
- Low 2dB noise figure.
- Highly configurable gain and bandwidth.

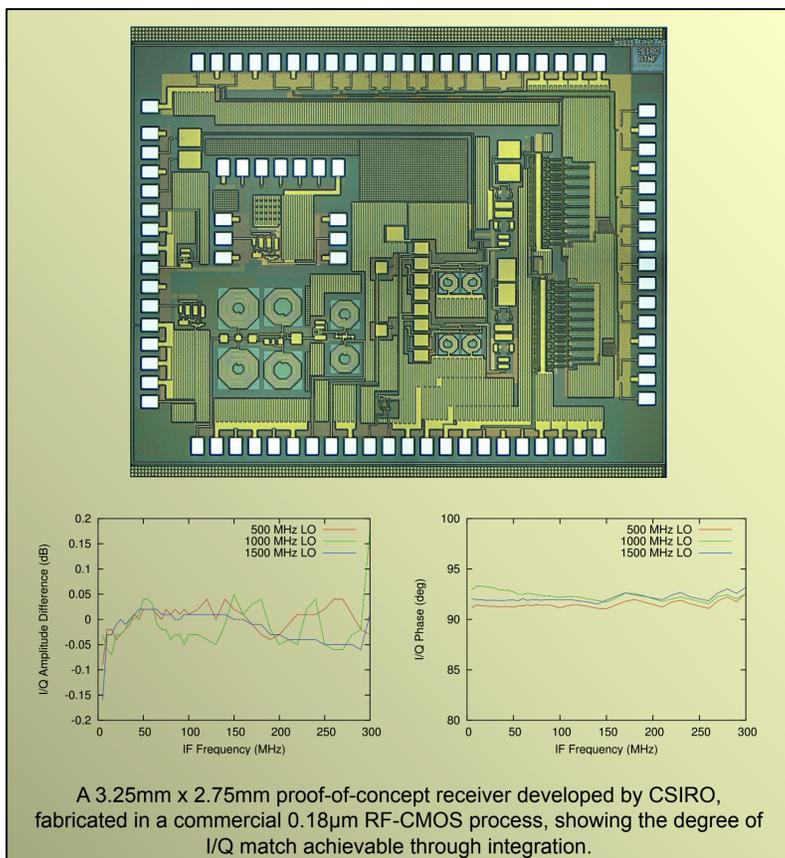


Development

The proposed receiver will integrate all components from the LNA output to the ADC input, and will include an LO synthesiser. It is intended that the receiver will utilise a commercial off-the-shelf ADC and an external LNA. The new receiver will:

- Be developed as a collaboration between CSIRO and Sapphicon Semiconductor.
- Build on the learnings of the proof-of-concept device.
- Utilise an advanced 0.25um CMOS process, built on a thin layer of silicon grown on a sapphire wafer.

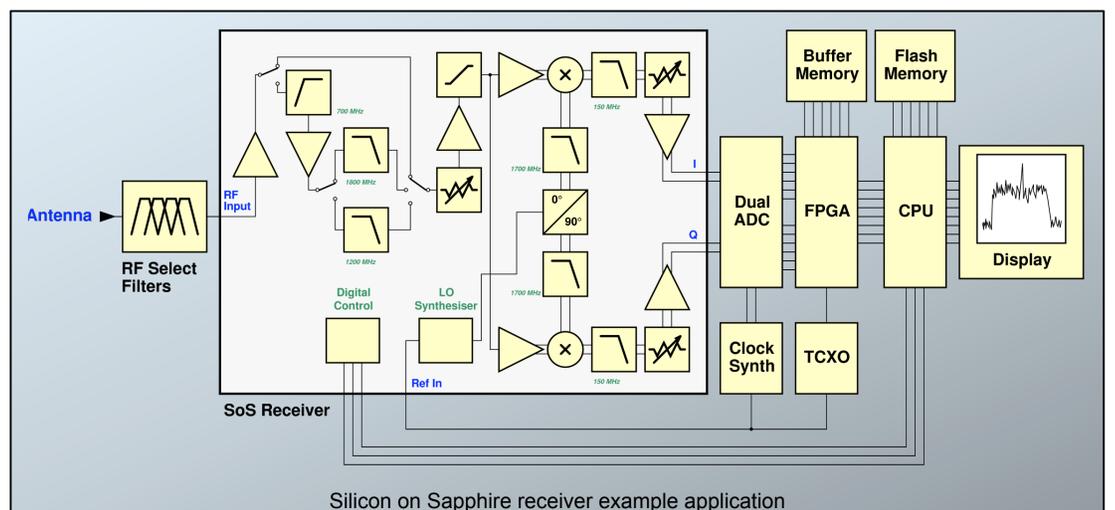
The sapphire substrate is an extremely good insulator, allowing for the fabrication of very high-Q passive devices, as well as a significant reduction in substrate-borne coupling, making possible the design of components with high levels of reverse isolation.



Other Potential Applications

The proposed receiver has a wide range of other potential applications outside the radio-astronomy community, including:

- Wide-band spectrum monitoring, with the ability to capture 600 MHz of RF spectrum instantaneously,
- General purpose ultra wide-band, low noise, low-power RF front end systems,
- Low-cost portable FFT spectrum analysers and communications test equipment.



Silicon on Sapphire receiver example application