

Technical Summary

The spaceflight proven P19800B spectrometer ASIC processes up to 4GHz bandwidth input signals provided by microwave front ends. The ASIC (Fig.1) includes a VGA, a 6-bit ADC, an FFT processor based on an initial polyphase filter followed by serial FFT and an accumulator capable of accumulating up to 34 seconds of frequency-domain data. The chip also includes a PLL based frequency synthesizer, an SPI interface for the ASIC's programming. Data readout can be done using the SPI interface or a high-speed LVDS interface. The chip (Fig.2) is offered in a BGA package and as an IP block for integration into SoCs. The P19800B ASIC is also offered on an evaluation board (Fig.3). Fig. 4 shows measured ASIC performance results.

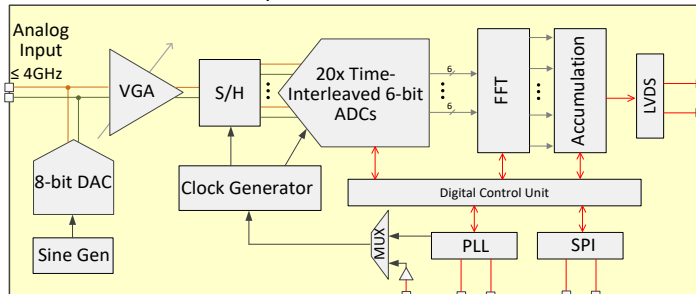


Figure 1. A block diagram of the ASIC.



Figure 2. The ASIC chip and the BGA package.



Figure 3. Evaluation board.

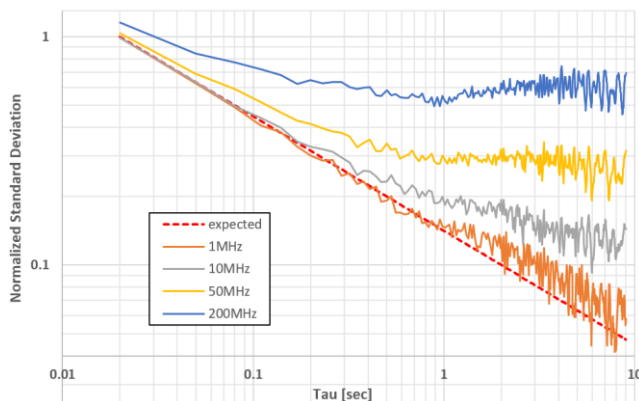


Figure 4. Measured std-dev for broadband noise

Operational Capabilities

The ASIC digitizes the RF signal and splits the spectrum into 8192 frequency bins, achieving down to 0.488MHz spectral resolution.

- Input signal -3dB bandwidth up to 8.5GHz
- Sampling rate up to 8GS/s
- Input signal FSR power -10dBm with adjustable gain
- Non-linearity of 0.04dB per 1dB of input power
- Digitizer ENOB > 4.5-bit to 4GHz
- Power consumption < 1.6W (full functionality)
- Up to 8192 Frequency bins within 0 to 4GHz
- Accumulation time programmable from 2us to 34s
- An integrated 16GHz PLL with selectable Fref
- An SPI interface for control, diagnostics and readout
- A high-speed 1Gbps LVDS data readout interface
- Temperature range -40°C to 110°C
- 15 x 15 BGA package (12.8mm x 12.8 mm)
- Fabrication technology 28nm CMOS

Potential Applications

- Remote sensing instruments
- Radio astronomy
- Synthetic aperture radiometers
- Spectrum analyzers
- Software Defined Radio (SDR)

Usage Example

A signal was composed of a sinusoidal tone at 227MHz along with bandpass noise (600MHz-900MHz). The top image shows a screen capture when measuring using a standard spectrum analyzer (50lbs). Bottom image shows the result using the P19800B ASIC.

