A Low Power, Baseband, Impulse-UWB Transceiver
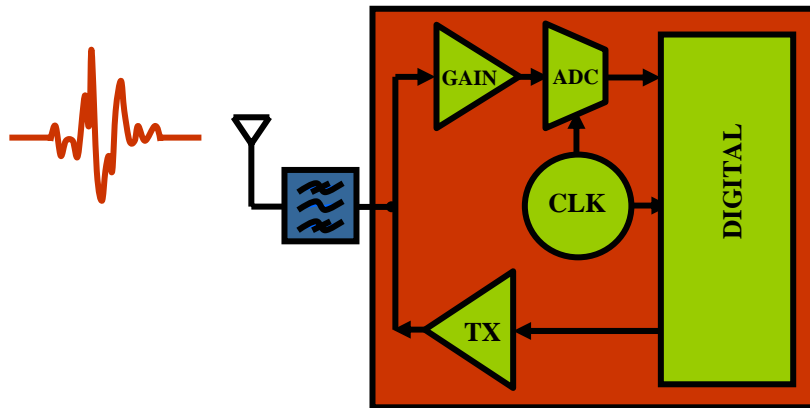
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Berkeley Impulse Transceiver (BIT)

Targeting Sensor Network Application

Specifications:
- 100kbps over 10m with 10^{-3} BER
- 1mW total (TX+RX) power consumption
- 0-1GHz bandwidth

All-CMOS integrated UWB transceiver
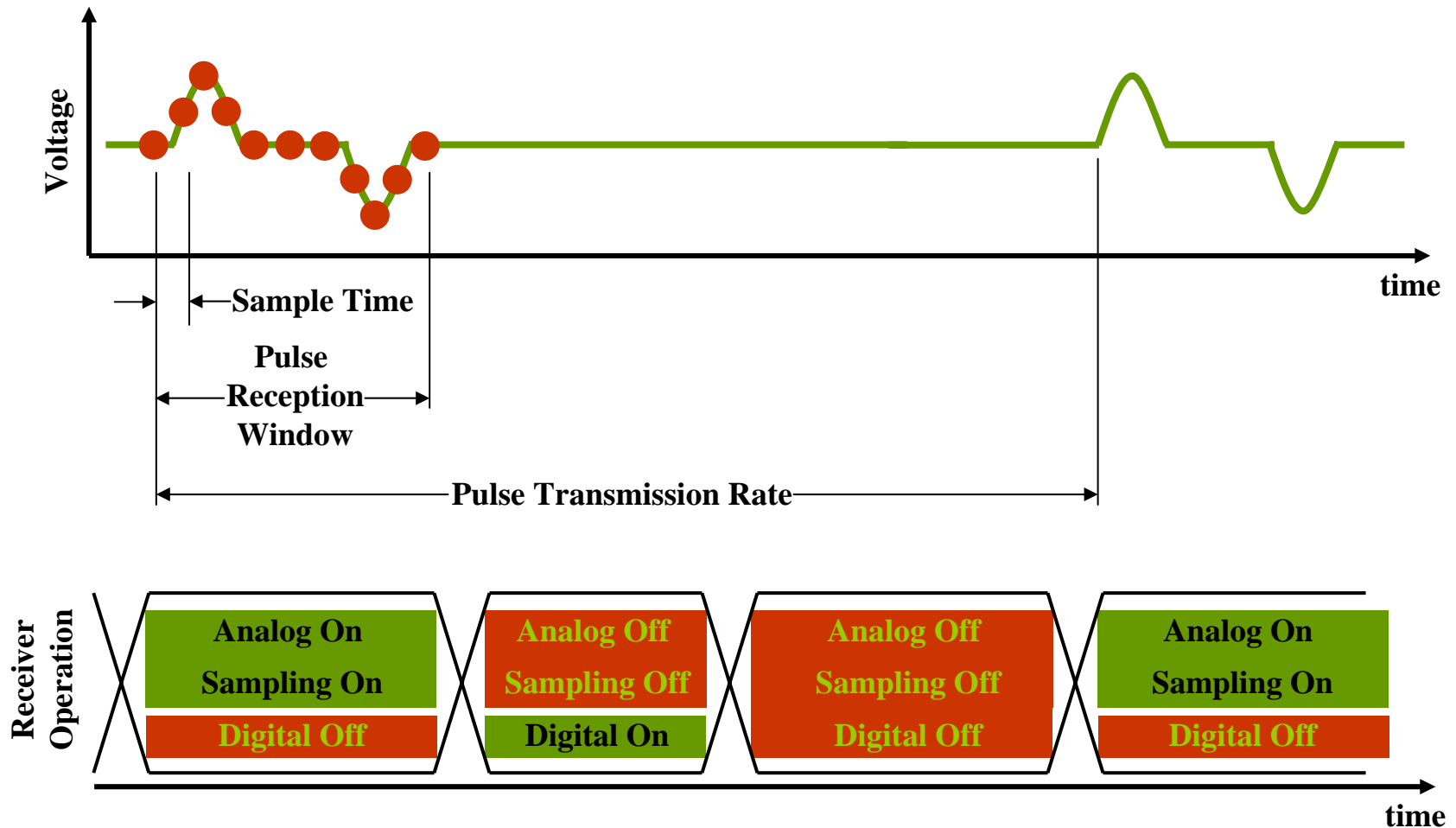for comm. and ranging/locationing
Aggressive low-power design
"Mostly-digital" approach, simplify analog
front-end
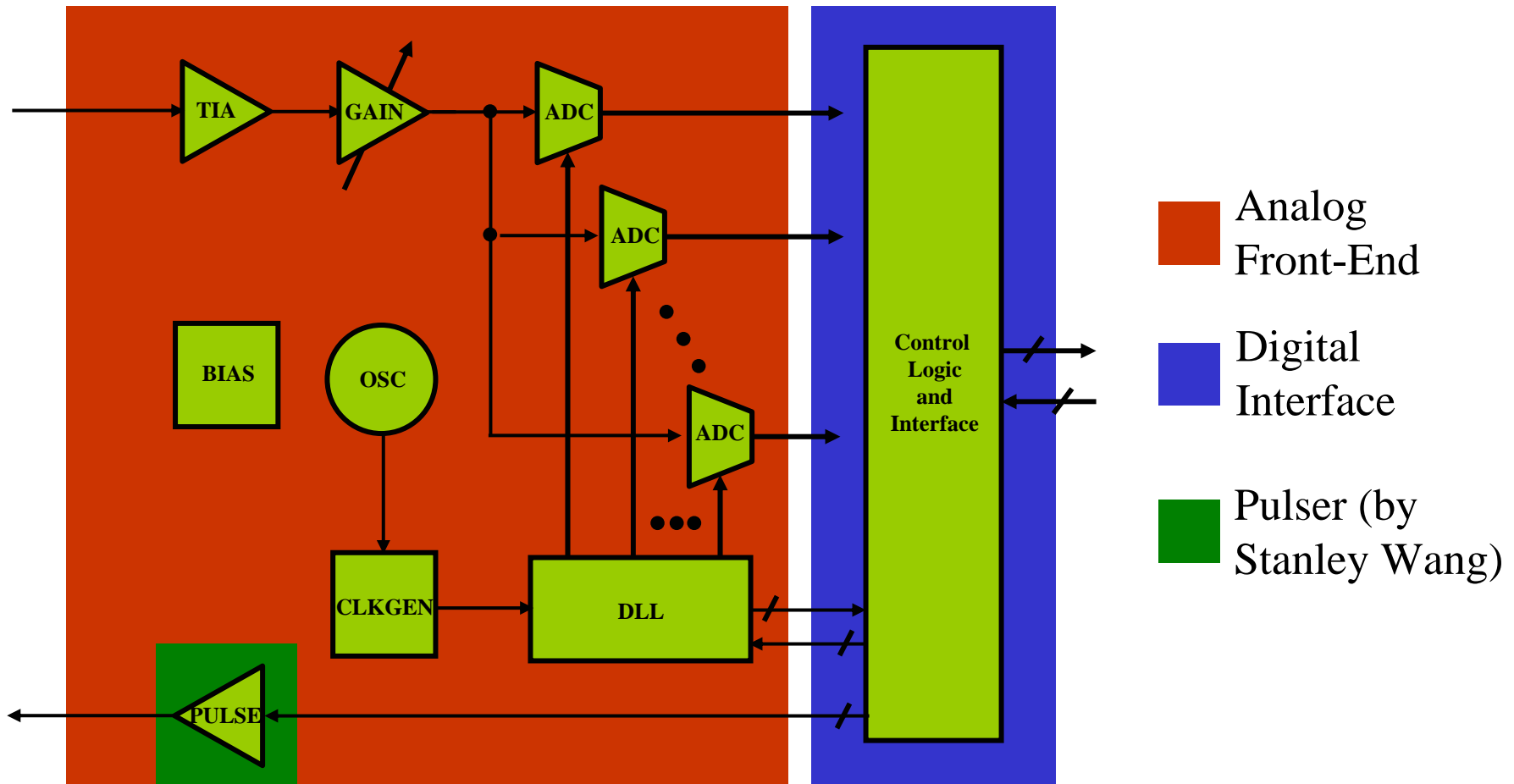Provide flexible platform for further research

Pulse Reception
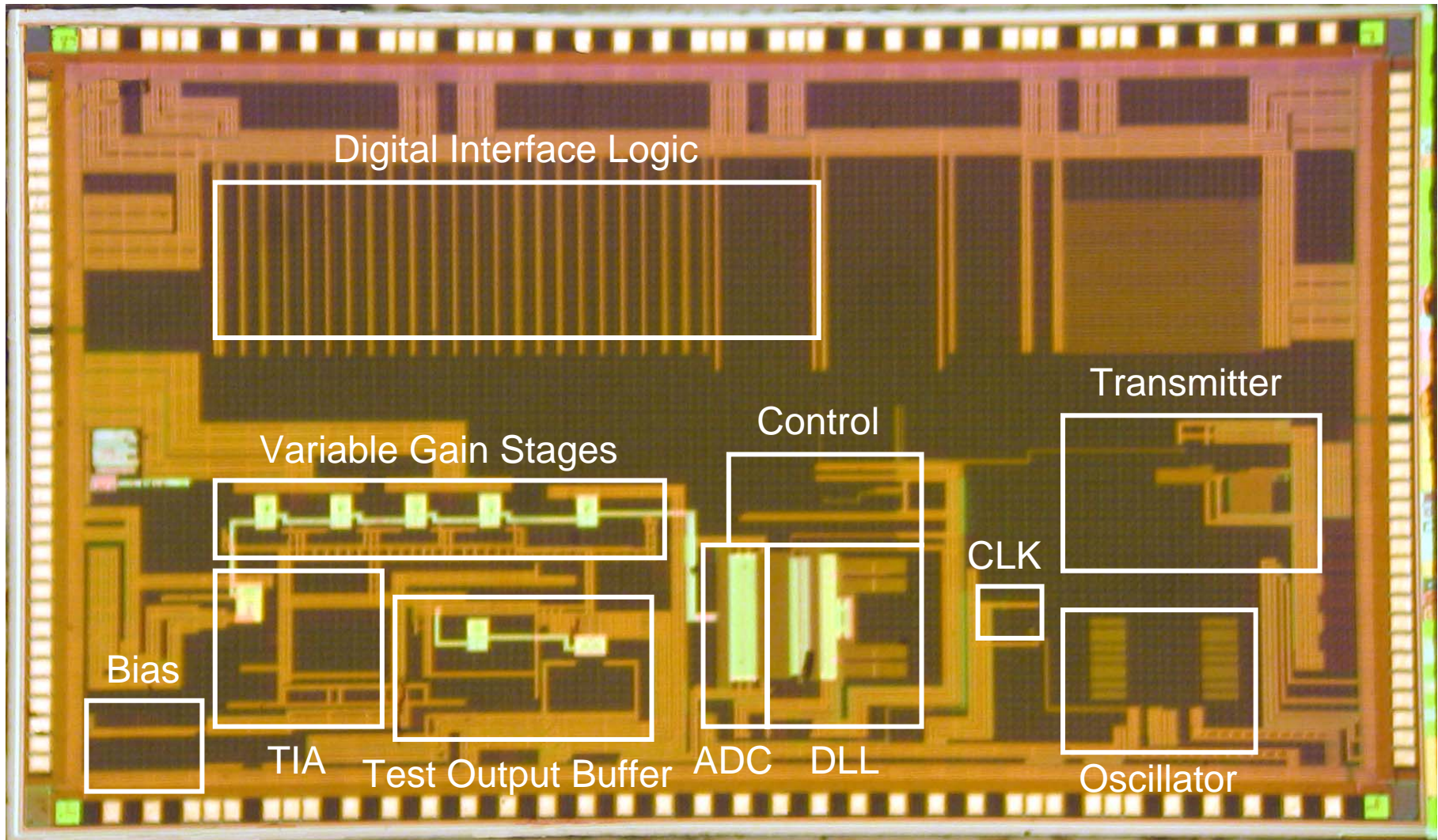
Only process data from a window of time:

UWB Transceiver Prototype

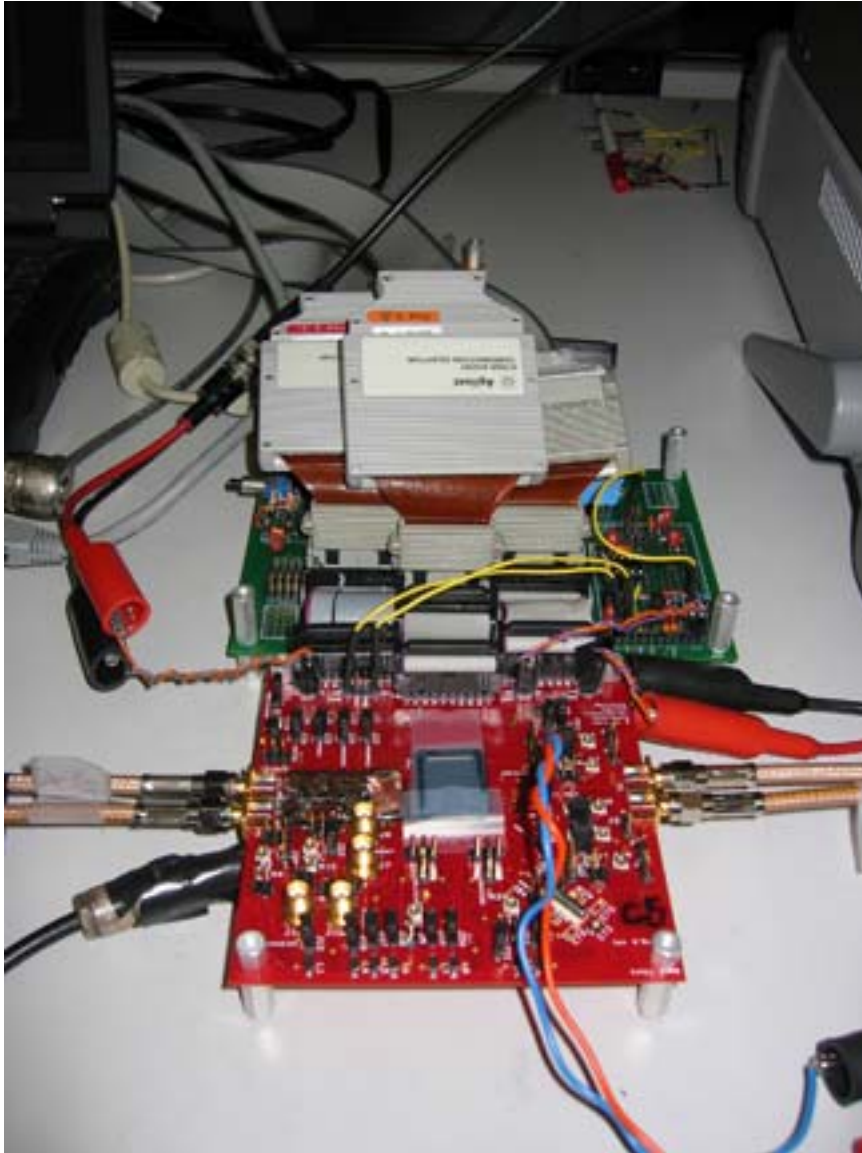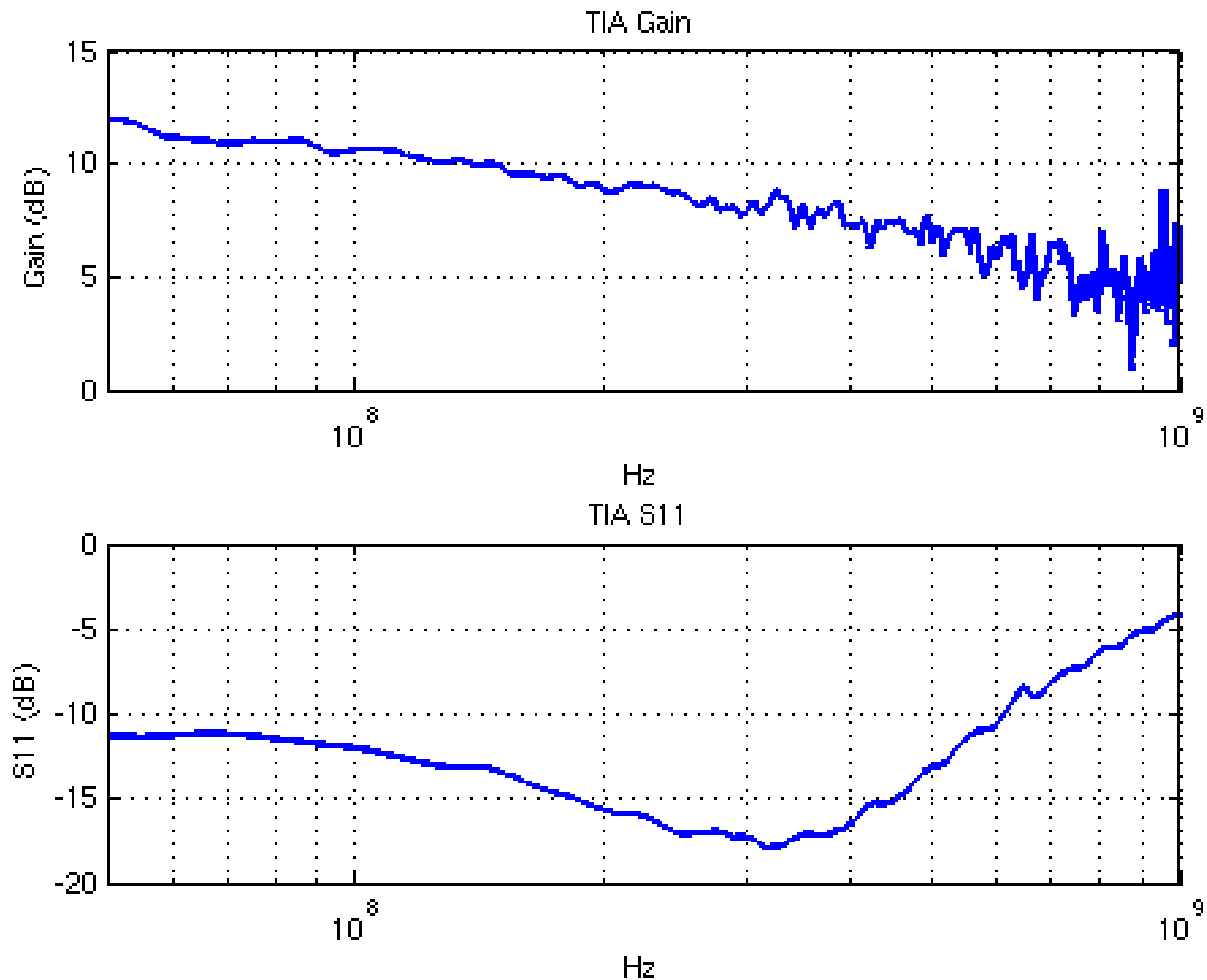## Based on Digital Sampling/Acquisition Oscilloscopes
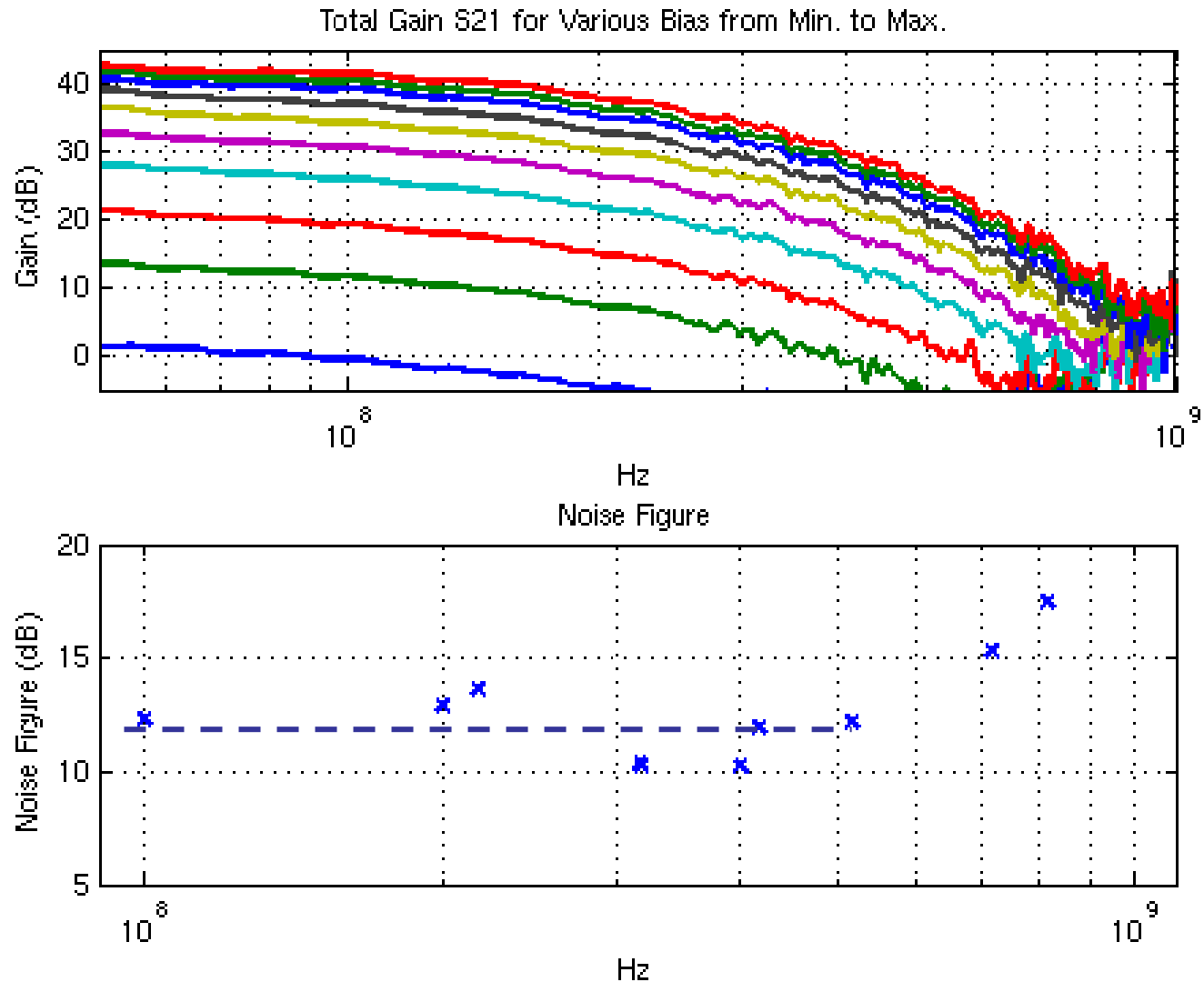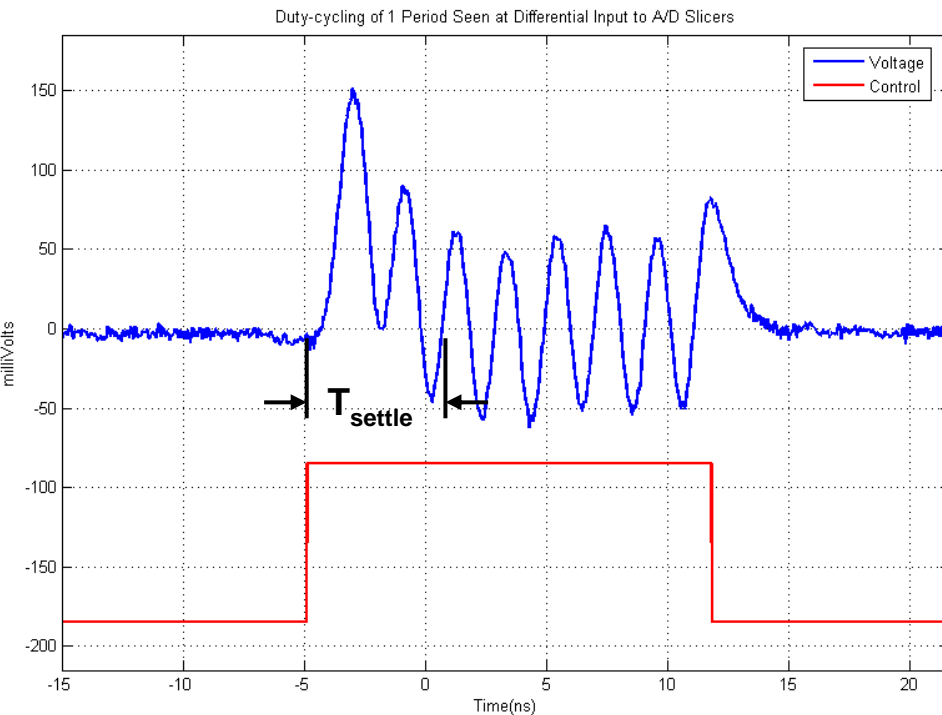
The Chip!

2.8 x 4.7 mm^2 (13.2 mm^2)

Test Setup

Trans-Impedance Amp S-Params

Total Gain and Noise Figure

Total Gain S21 for Various Bias from Min. to Max.
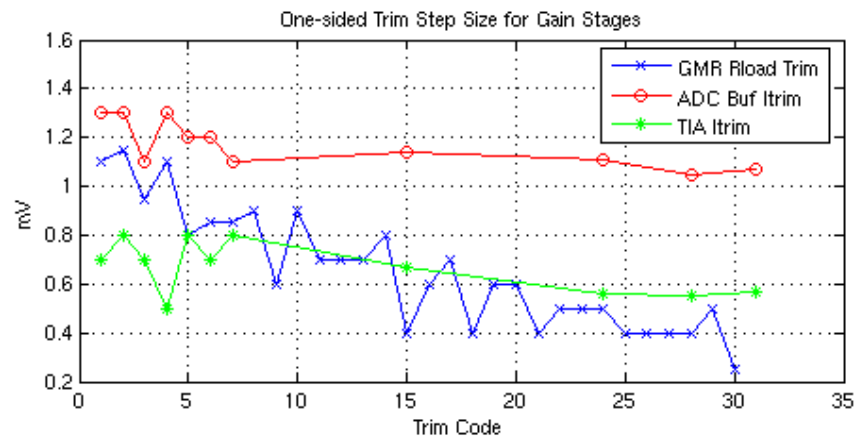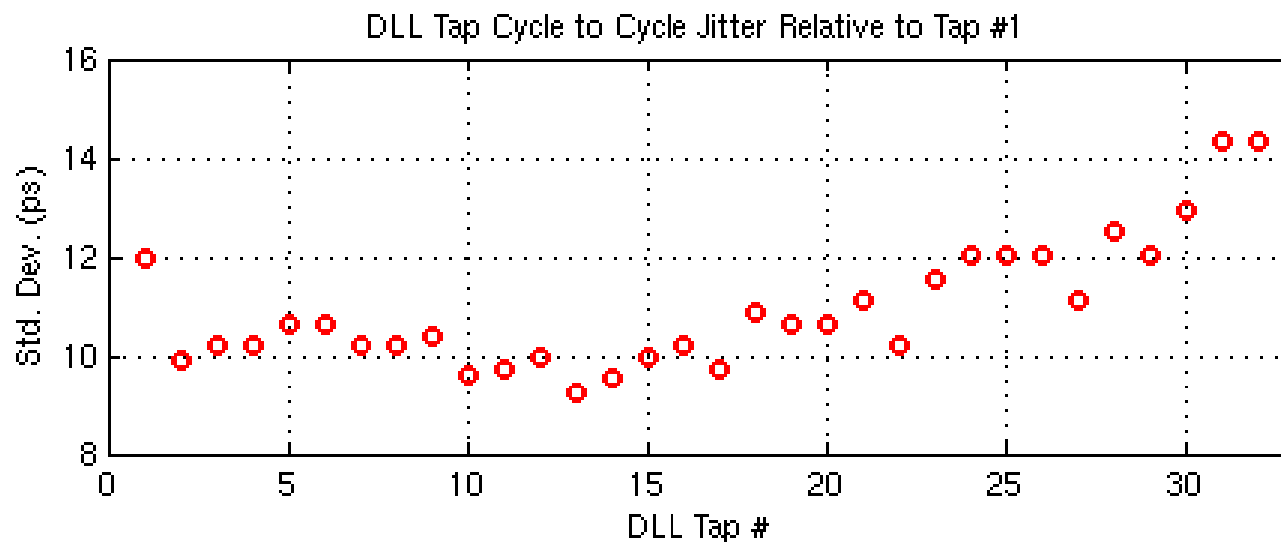
Noise Figure

Gain Duty-Cycling and Offset Trimming

Duty-cycling of 1 Period Seen at Differential Input to A/D Slicers

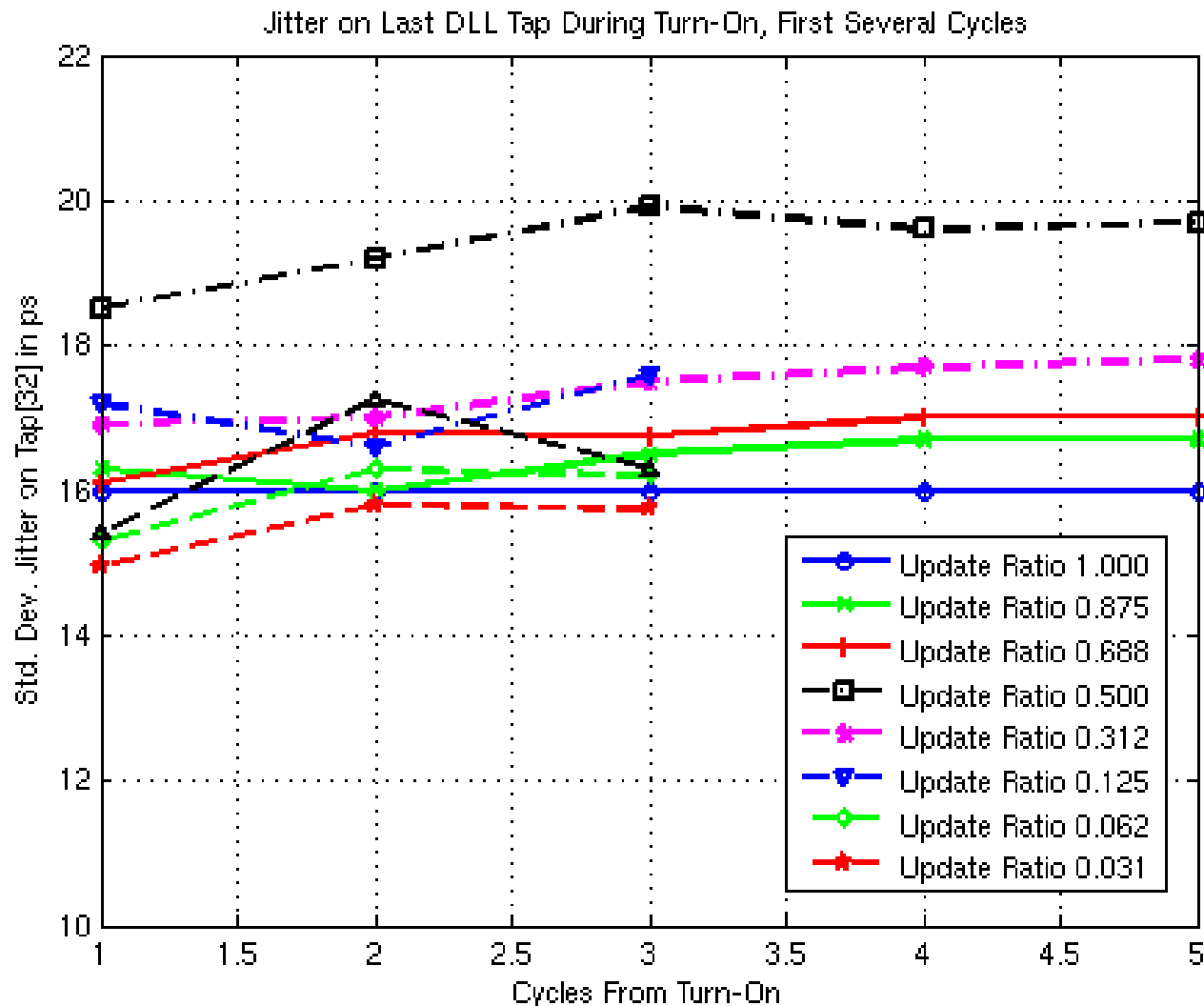**480MHz Sinusoidal input; On for 1 period (16.667ns); Off for 7. Settling time ~ 6ns**

One-side Trim of Gain Stages

- GMR Rload Trim
- ADC Buf Itrim
- TIA Itrim

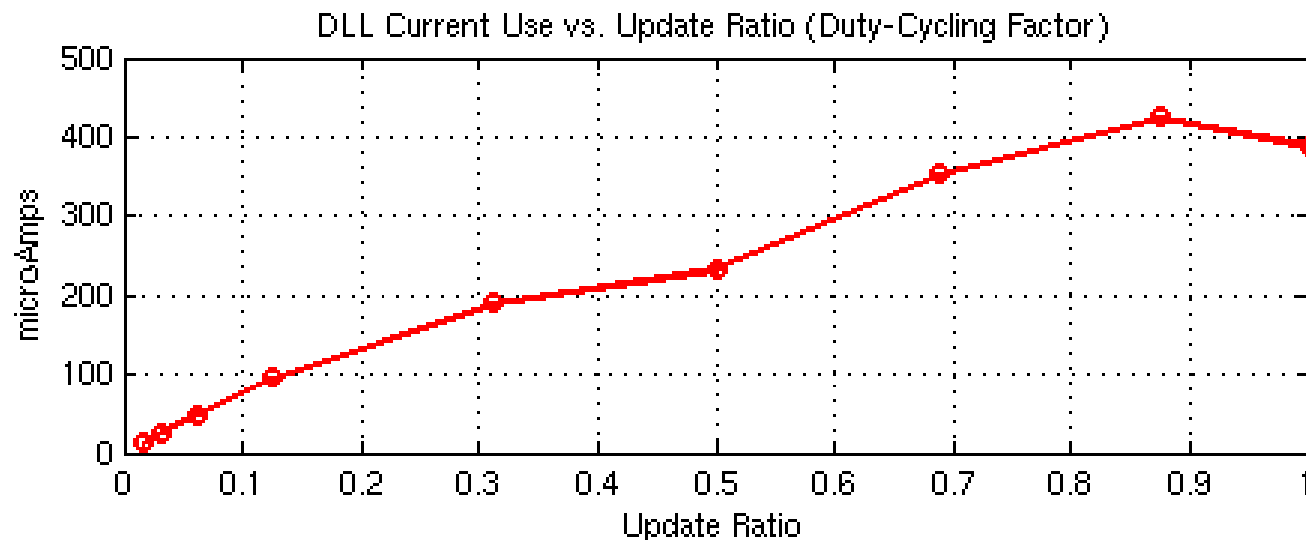One-sided Trim Step Size for Gain Stages

- GMR Rload Trim
- ADC Buf Itrim
- TIA Itrim
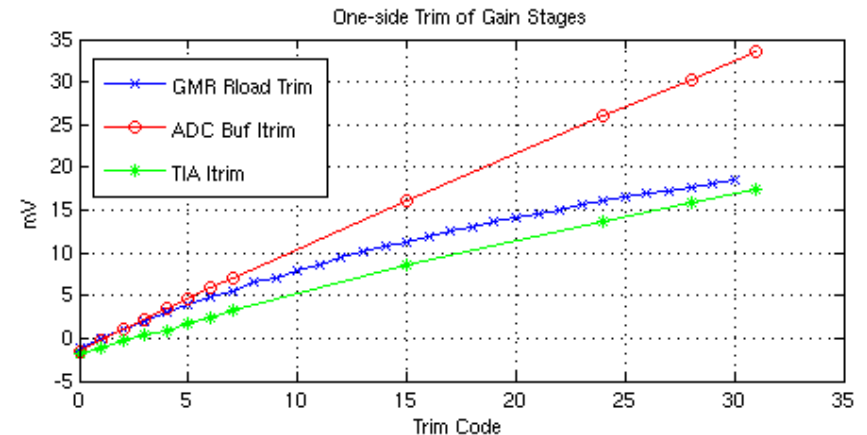
Delay Locked Loop

Duty-Cycled DLL: Jitter

Jitter on Last DLL Tap During Turn-On, First Several Cycles
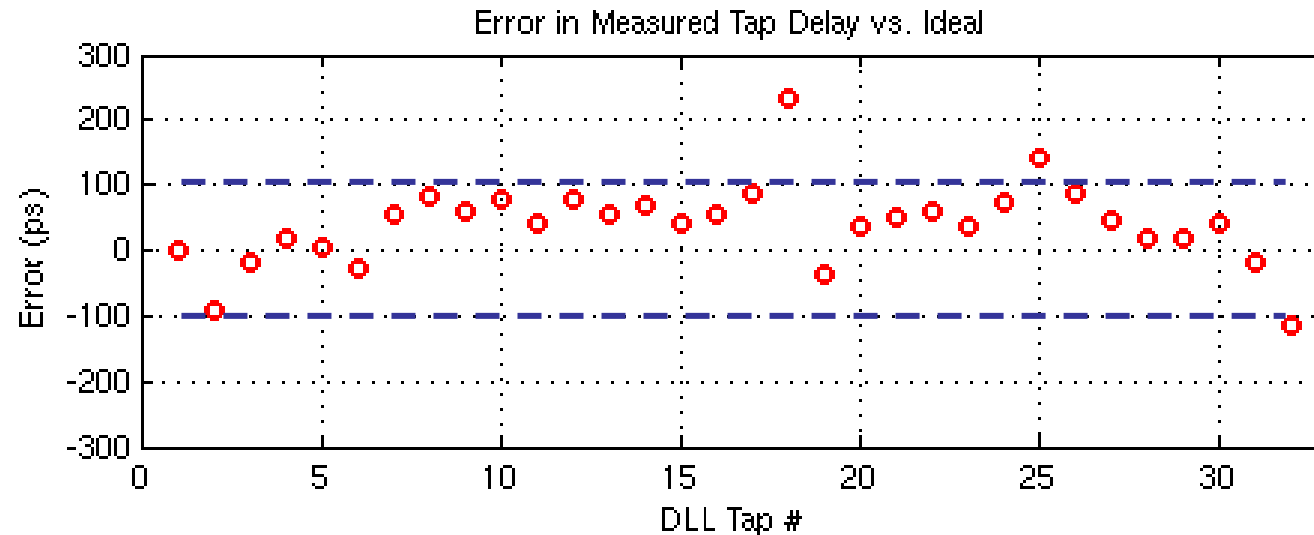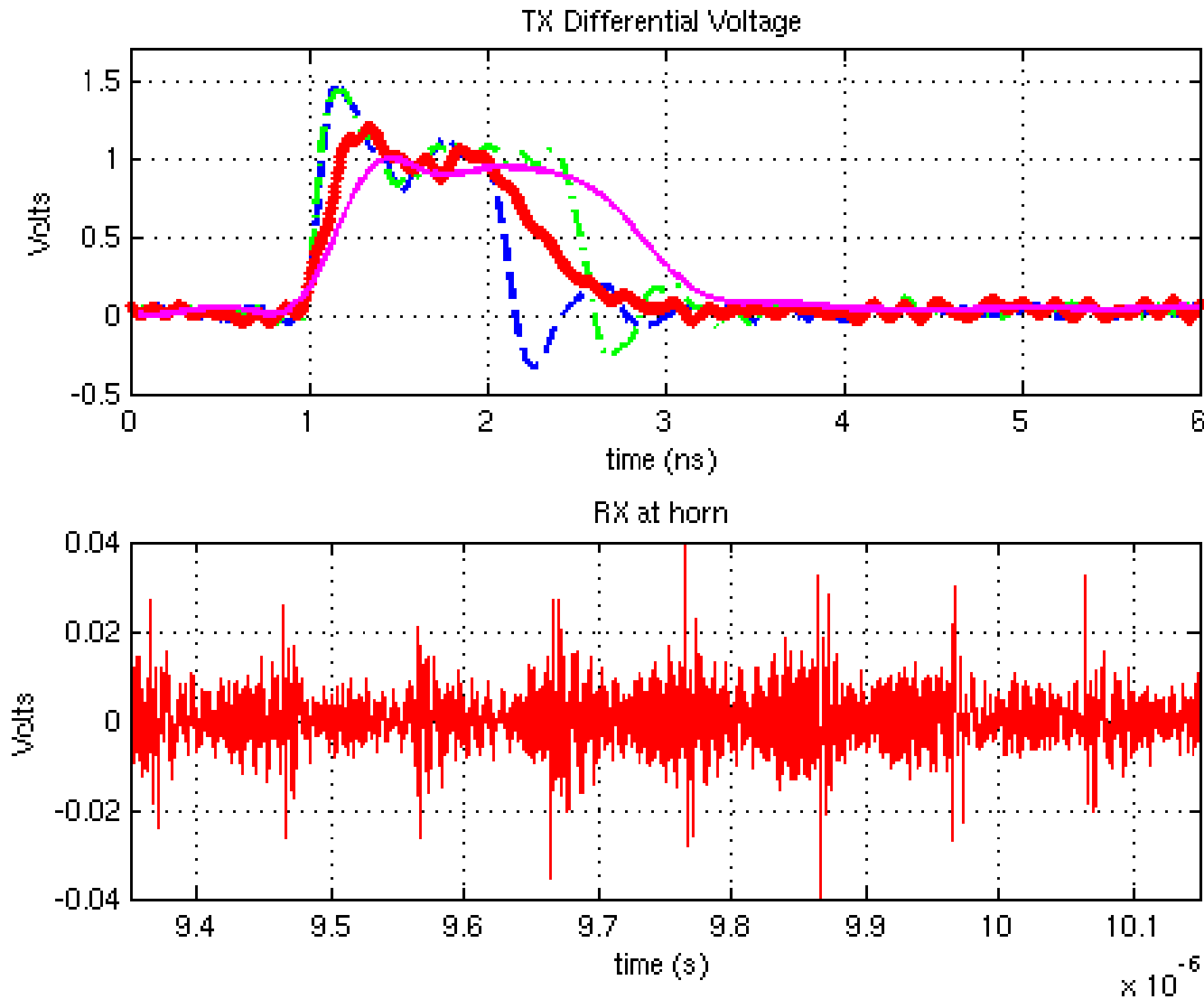
Duty-Cycled DLL: Accuracy and I$_{Vdd}$
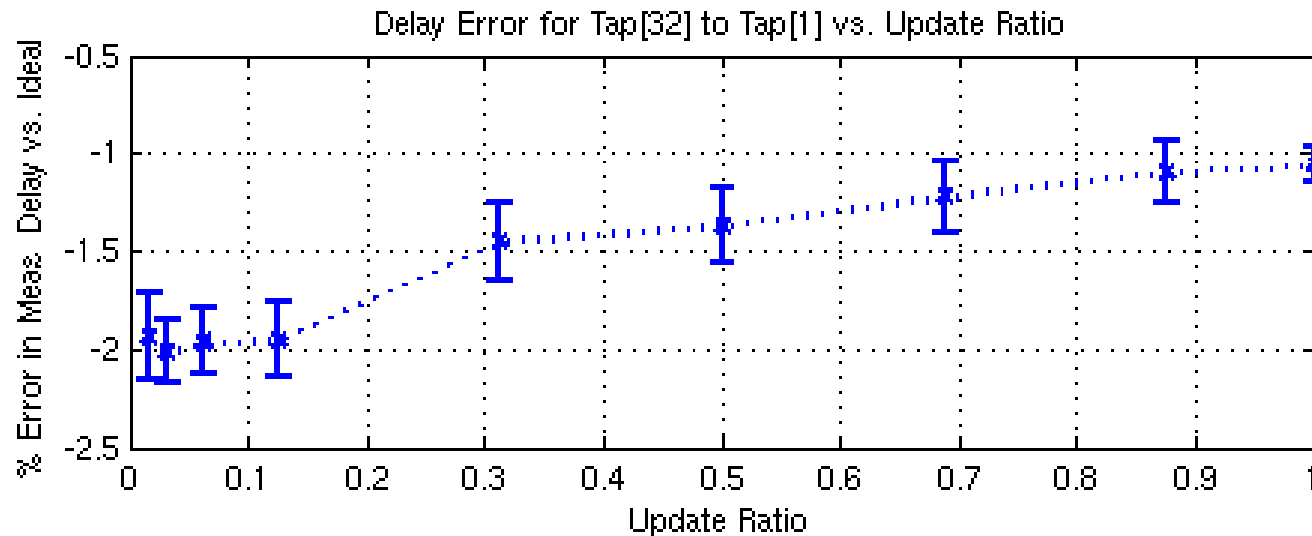
Pulse Transmission & Reception

Example Output Correlation

Received Differential Signal at ADC Input

Correlation for 11x11-bit Barker Code
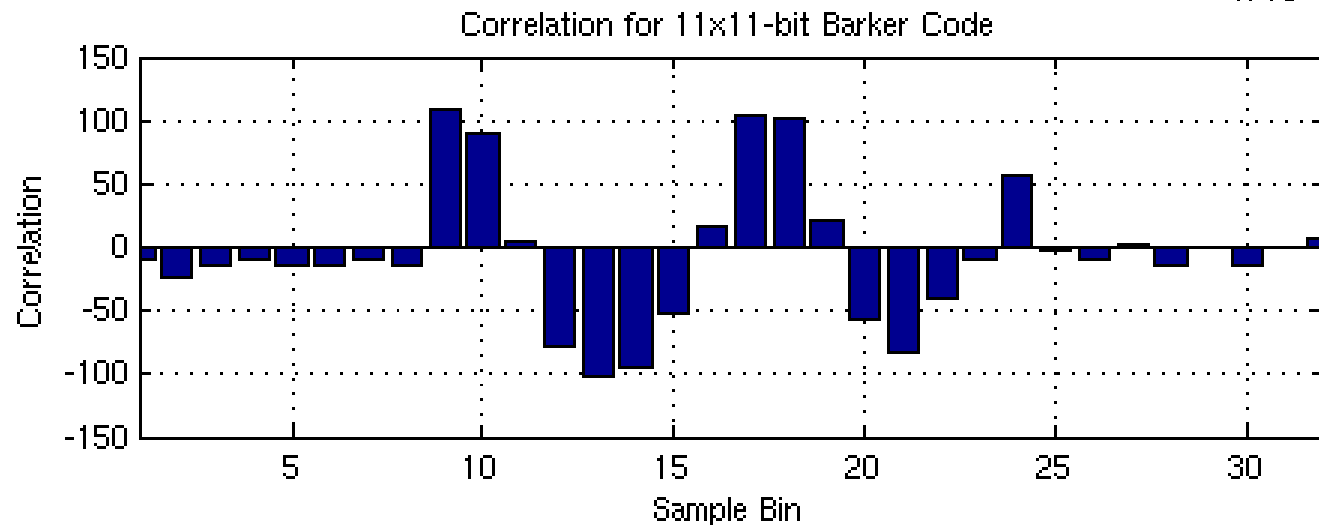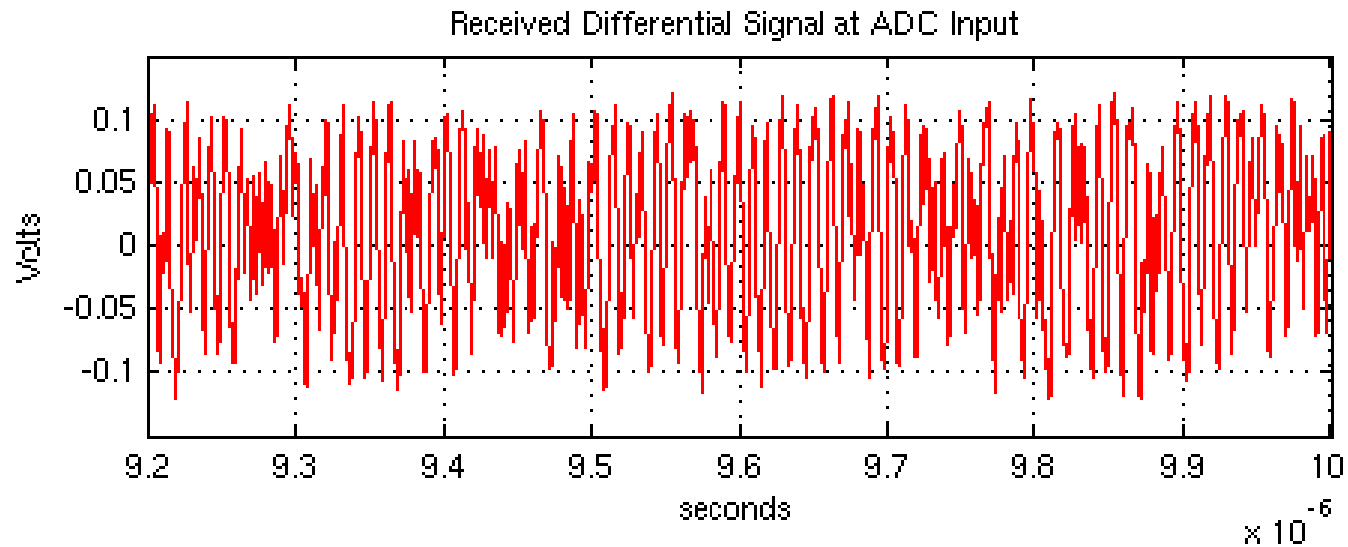
Duty-Cycled Power Consumption

Duty-Cycled Transceiver Power Consumption
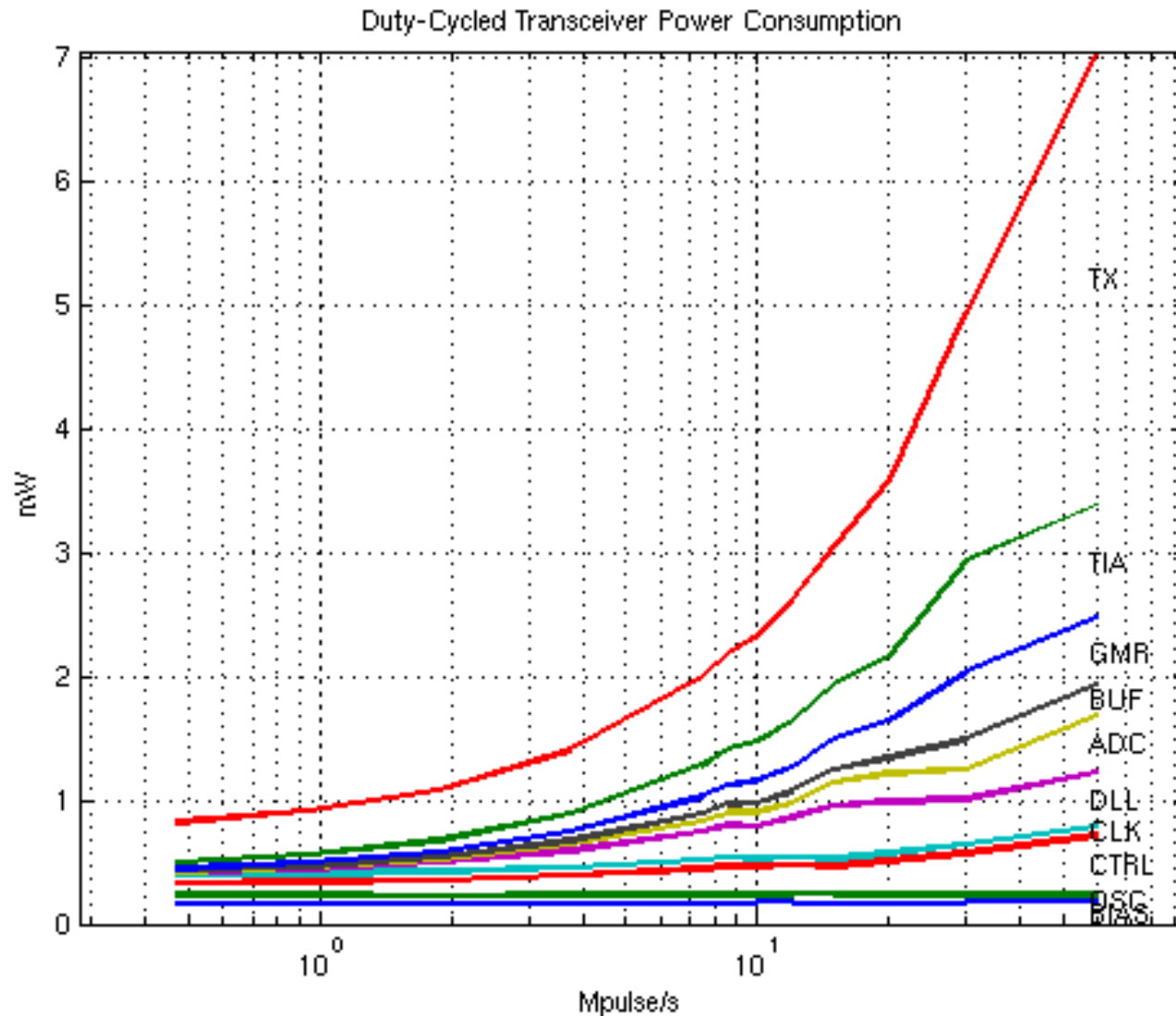
Acknowledgement

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