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Date: November 4, 2010
Subject: AD8347 VGA Response Time

A customer had requested the VGA response time for the AD8347 and this information was not documented on the data sheet. The AD8347 is a broadband direct quadrature demodulator with two RF VGAs and a baseband fixed gain amplifier. The overall RF gain range is -30 dB to approximately +39.5 dB and the baseband fixed gain is an additional +30 dB. Although the VGA can be driven by an external source, the AD8347 has an on-board sum of squares detector to allow the AD8347 to operate in an automatic gain mode.

The timing measurements as shown below were taken at the mixer outputs and do not include the baseband fixed gain. Since the baseband gain is fixed the response time will only be the latency of the path which should be fairly small. Because of the eval brd configuration the baseband outputs couldn't be measured reliably.

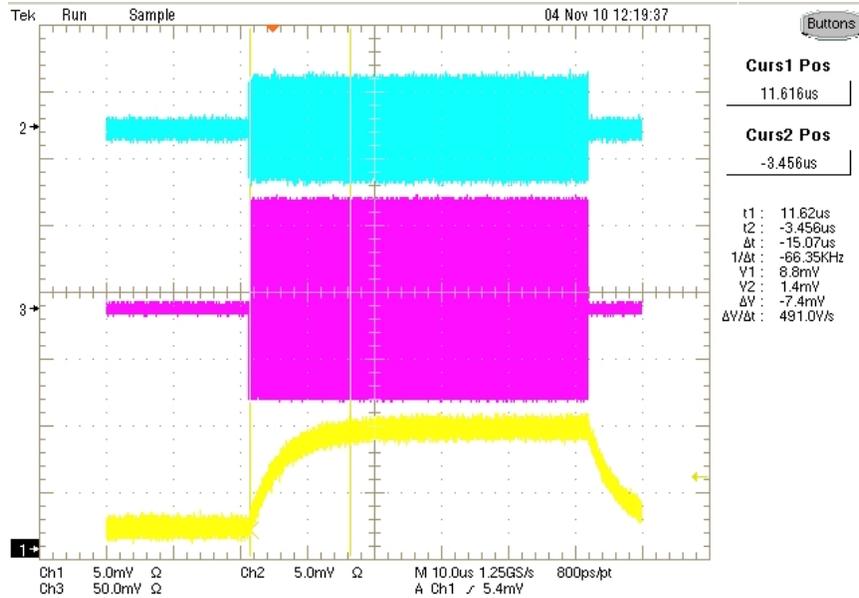
Experiment 1: AGC Loop Response Time

Experiment: Measure the time it takes for the VGA to settle to its final value in the automatic gain control mode.

Measurement Setup: A step input was applied to the RF ports and the amount of time it took the VGA to settle to its final value was recorded. The response time is dependent on the capacitor value on the VAGC pin. The expression relating the capacitor value to the AGC response time is ??????

Results:

CAP VALUE	RESPONSE TIME
1uF	50 usec
0.1uF	15 usec
0.01 uF	2 usec



Experiment 2: VGA Latency

Experiment: With the AGC mode disabled and a fixed voltage applied to the VGA, the time required for the mixer output to settle to its final value was recorded.

Measurement Setup: RF frequency with fixed amplitude was applied to the RFIN pin. A step response of 1.2V to 0.2V was applied to the VGIN pin. This will be the extreme condition where the VGA will be going from min to max gain. At the mixer output, the signal amplitude will slowly ramp to its final output. The amount of time required for the output to settle to its final value was recorded relative to the step input at the VGIN pin.

Results:

