

Driving a Low Noise, Low Distortion 18-Bit, 1.6MSPS ADC

Design Note 494

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Introduction

The **LTC®2379-18** is an 18-bit, 1.6MSPS SAR ADC with an extremely high SNR of 101dB and THD of -120 dB. It also features a unique digital-gain compression function, which eliminates the need for a negative supply in the ADC driver circuit.

Designing a driver circuit to get the best possible performance from the LTC2379-18 is not difficult. The two circuits presented here demonstrate differential and single-ended solutions using dual and single supplies. Note that the components used here have been carefully chosen with the ADC's accuracy and acquisition time requirements in mind, so any modifications should be thoroughly tested.

Fully Differential Driver

The circuit of Figure 1 converts a fully differential ± 5 V signal to a fully differential 0V to 5V signal—the normal input range for the LTC2379-18. This circuit is useful for sensors that produce a fully differential output.

Filter networks R3, R5, C6 and R4, R6, C7 limit the input bandwidth to approximately 100kHz. Matching on these networks is important to achieve the lowest distortion, as a mismatch in delay results in the development of a common mode signal. The filter network comprising R1, R2, C1, C2 and C3 minimizes the noise contribution of

the **LT®6203** and minimizes disturbances reflected into the LT6203 from sampling transients. The 32k point FFT in Figure 2 shows the performance of the LTC2379-18 in the circuit of Figure 1.

Single Supply Driver

The circuit of Figure 3 uses the digital gain compression feature of the LTC2379-18, which defines the ADC full-scale input swing to be 10% to 90% of the reference voltage. This means that for a 5V reference the full-scale swing is

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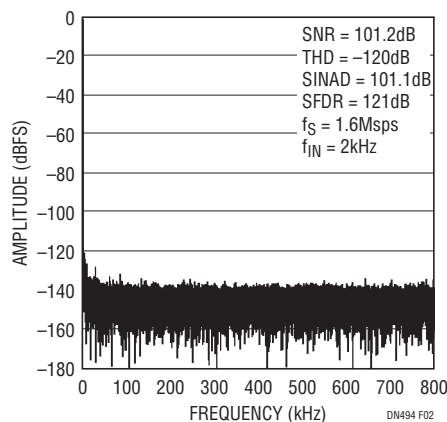


Figure 2. 32k Point FFT Using the Circuit of Figure 1

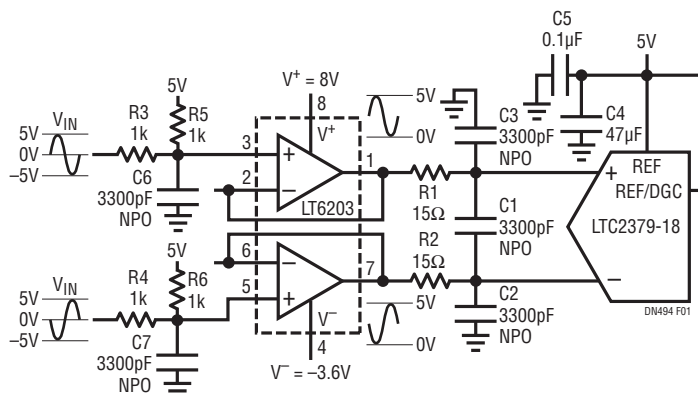


Figure 1. An LTC2379-18 Fully Differential ± 5 V Driver Using the LT®6203

