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连接/参考器件

ADL5535/ ADL5536	20 MHz 至 1.0 GHz 16 dB/20 dB 中频增益模块
AD9268	16 位、80 MSPS/105 MSPS/125 MSPS、1.8 V 双通道模数转换器

差分输入中频采样 ADC 的低噪声、低失真单端输入驱动电路

电路功能与优势

图1所示电路采用ADL5535/ADL5536单端中频(IF)低噪声 50 Ω 增益模块驱动 16 位差分输入模数转换器(ADC) AD9268。该电路包括一个级间带通滤波器，用于降低噪声和抗混叠。单端IF增益级后接一个变压器，用于执行单端至差分转换。对于要求低噪声和低失真的应用，这是最优解决方案。

ADL5535/ADL5536是高线性度（190 MHz时，三阶输出截取点OIP3 = +45 dBm）、单端、固定增益放大器，可以用作高性能IF采样ADC的驱动器。ADL5535提供 16 dB的增益，能够轻松地将信号从约 400 mV p-p提升到ADC所需的 2 V p-p 满量程电平。ADL5535的低噪声系数（190 MHz时为 3.2 dB）和低失真特性确保ADC性能不受影响。当需要 20 dB的增益时，可以使用ADL5536。

电路描述

图1给出了ADL5535/ADL5536驱动 16 位ADC AD9268的示意图，其采样速率为 122.88 MSPS。ADL5535具有 50 Ω 的单端输入和输出阻抗。一个 1:1 阻抗变换器（M/A-COM BA-007159-000000，4.5 MHz至 3000 MHz）与端接电阻、串联磁珠一起使用，以向抗混叠滤波器接口提供 50 Ω 负载。ADL5535与AD9268之间的滤波器接口是一个利用标准滤波器程序设计的六阶巴特沃兹低通滤波器。它提供以 175 MHz 为中心频率的 50 MHz、1 dB带宽。六阶滤波器后接一个分流LC（72 nH、8.2 pF）振荡电路，用以进一步降低滤波器的低频响应，使滤波器具有更多的带通响应。归一化宽带响应如图 2所示。

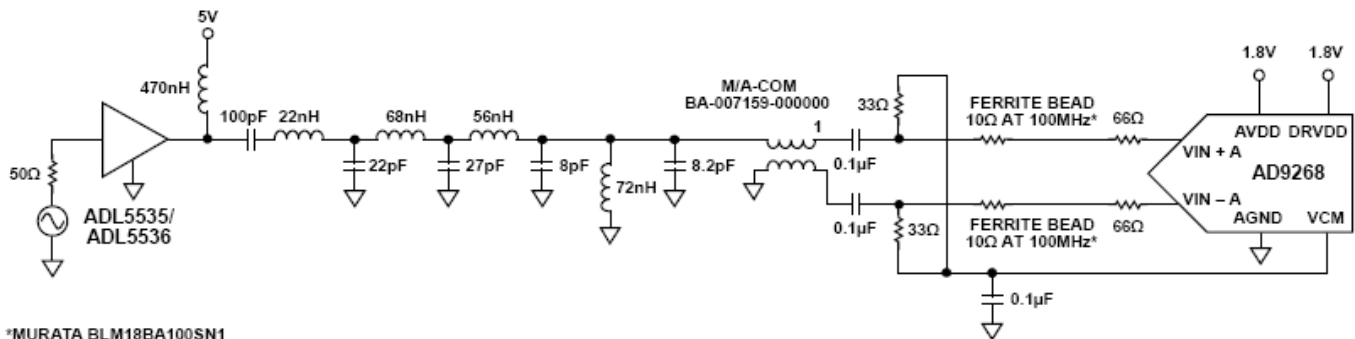


图1. ADL5535 驱动 16 位 ADC AD9268（原理示意图，未显示去耦和所有连接）

Rev.0

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对于 170 MHz 的输入频率和 122.88 MSPS 的采样速率，单音性能如图 3 所示，双音性能如图 4 所示。

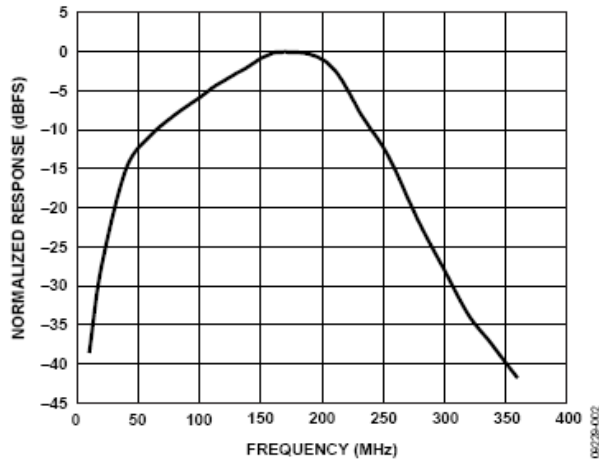


图2. 图1 所示 ADC 接口的归一化频率响应

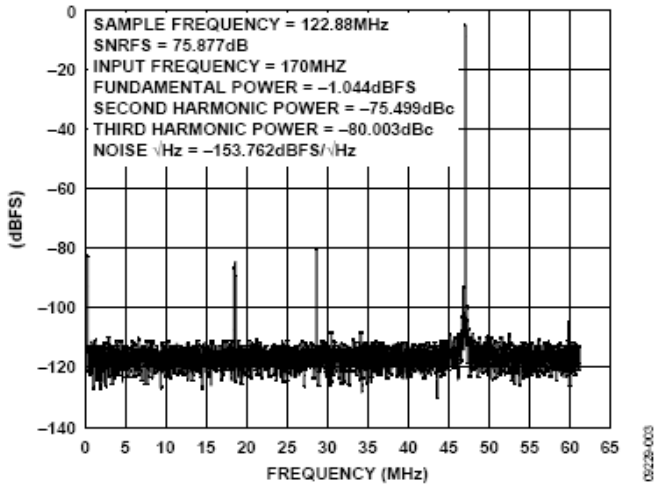


图3. 图1 所示电路在 170 MHz 输入频率和 122.88 MSPS 采样速率下测得的单音性能

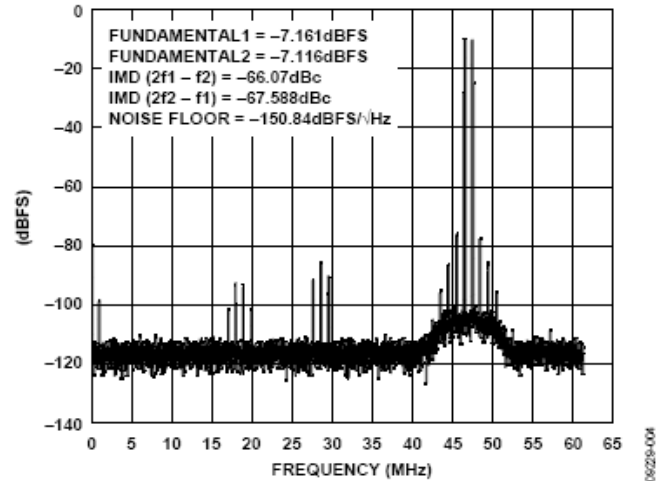


图4. 图1 所示电路在以 170 MHz 为中心频率的输入音和 122.88 MSPS 采样速率下测得的双音性能

常见变化

本文所述的应用电路可以针对 [ADL5535/ADL5536](#) 和 [AD9268](#) 工作范围内的任何中频频率进行修改。[AD9640](#)、[AD6657](#) 或 [AD9644](#) 可以替代本应用中的 ADC [AD9268](#)。

进一步阅读

AN-742 Application Note. *Frequency Domain Response of Switched Capacitor ADCs*. Analog Devices.

AN-827 Application Note. *A Resonant Approach to Interfacing Amplifiers to Switched-Capacitor ADCs*. Analog Devices.

CN-0002 Circuit Note, *Using the AD8376 VGA to Drive Wide Bandwidth ADCs for High IF AC-Coupled Applications*, Analog Devices.

CN-0046 Circuit Note, *An Ultra Low Distortion Differential RF/IF Front-End for High Speed ADCs*, Analog Devices.

Kester, Walt. *High Speed System Applications*, Chapter 2 "Optimizing Data Converter Interfaces," Analog Devices, 2006.

MT-007 Tutorial, *Aperture Time, Aperture Jitter, Aperture Delay Time—Removing the Confusion*, Analog Devices.

MT-031 Tutorial, *Grounding Data Converters and Solving the Mystery of "AGND" and "DGND,"* Analog Devices.

MT-073 Tutorial, *High Speed Variable Gain Amplifiers (VGAs)*, Analog Devices.

MT-075 Tutorial, *Differential Drivers for High Speed ADCs Overview*, Analog Devices.

MT-101 Tutorial, *Decoupling Techniques*, Analog Devices.

数据手册和评估板

ADL5535

ADL5536

AD9268

AD9268 Evaluation Board

修订历史

10/10—Revision 0: Initial Version

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