

AD7366/ AD7367	双极性输入、双核 12/14 位、双通道 SAR ADC
AD8021	低噪声、高速放大器

在低失真直流耦合应用中驱动双极性 SAR ADC AD7366/AD7367

电路功能与优势

本文所述电路可以对工业级直流耦合信号进行单端、低失真采样。图 1 所示驱动器电路针对要求最佳失真性能的应用进行了优化, 可提供充足的建立时间和低阻抗, 从而确保 AD7366/AD7367 发挥最大性能。

电路描述

AD7366 和 AD7367 分别是 12 位和 14 位、1 MSPS、双通道、同时采样 SAR ADC。这些器件总共有四路模拟多路复用输入（每通道两路），采用单端模式工作。AD7366/AD7367 的模拟输入范围可通过编程设置, 支持 $\pm 10\text{ V}$ 、 $\pm 5\text{ V}$ 、 0 V 至 10 V （采用 2.5 V 内部基准电压源）和 $\pm 12\text{ V}$ （采用 3 V 外部基准电压源）。

AD7366-5/AD7367-5 采用 ADI 公司的工业 CMOS 工艺 (iCMOS) 制造, 该技术平台兼具低电压和高电压 CMOS 的优点。AD7366/AD7367 的输入电路采用 $\pm 12\text{ V}$ 的 V_{DD} 和 V_{SS} 标称电压工作, 而 ADC 其它部分采用 AV_{CC} 、 DV_{CC} 和 $+5\text{ V } V_{DRIVE}$ 。利用 iCMOS 工艺, AD7366/AD7367 不仅降低了功耗和封装尺寸, 而且能接受高电压双极性信号。

在信号源具有高阻抗的应用中, 由于较大的源阻抗会对 ADC 交流性能造成较明显的影响, 因此应当先将模拟输入信号进行缓冲, 再施加于 AD7366/AD7367 的输入端。选择驱动输入端的运算放大器时, 主要取决于特定应用和所选的模拟输入电压范围。驱动器放大器必须能够在不到 140 ns 额定采样时间内, 以满量程步进建立至 14 位水平 (0.0061% , AD7367) 或 12 位水平 (0.024% , AD7366)。

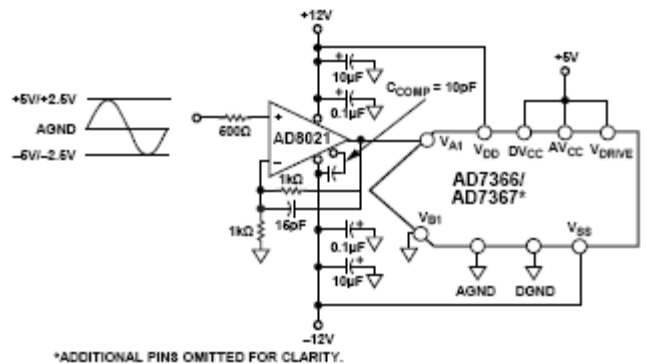


图 1. 采用 AD8021 驱动 AD7366/AD7367 模拟输入的典型连接图
(原理示意图: 未显示去耦和所有连接)

Rev.A

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AD8021 电压反馈型放大器具有异常出色的高性能、高速度、低噪声和低失真性能，非常适合用作AD7366/AD7367 的单端输入缓冲器/驱动器。以单端模式工作时，也能满足上述要求。图 1显示了AD7366/AD7367 的配置，AD8021 为单端配置。AD8021 需要一个外部补偿NPO型电容(C_{COMP})，如图 1所示。AD8021 采用同相模式连接，增益为 2。AD7366/AD7367 可编程双极性输入电压范围（折合到AD8021 的输入端）为 $\pm 5\text{ V}$ 和 $\pm 2.5\text{ V}$ 。

该电路必须构建在具有较大面积接地层的多层电路板上。为实现最佳性能，必须采用适当的布局、接地和去耦技术（请参考“教程MT-031”、“教程MT-101”以及AD7366/AD7367 评估板布局）。

常见变化

在要求双通道器件的高频应用中，可以用 AD8022 代替AD8021。对于低频应用，推荐使用的运算放大器为 AD797、AD845 和 AD8610。

进一步阅读

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

MT-036 Tutorial, *Op Amp Output Phase-Reversal and Input Over-Voltage Protection.* Analog Devices.

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

数据手册和评估板

[AD7366 Data Sheet.](#)

[AD7367 Data Sheet.](#)

[AD8021 Data Sheet.](#)

[OP177 Data Sheet.](#)

[AD7366/AD7367 Evaluation Board.](#)

修订历史

09/09—Rev. 0 to Rev. A

Updated Format Universal

10/08—Revision 0: Initial Version

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