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### 连接/参考器件

AD7999	四通道、8 位 ADC
AD8599	超低失真、超低噪声双路运算放大器
AD780	超高精度带隙基准电压源

## AD8599 运算放大器用作 4 通道、8 位 ADC AD7999 的超低失真驱动器

### 电路功能与优势

本文所述电路为 8 位、4 通道 ADC AD7999 提供超低失真驱动器电路，旨在实现最佳交流和直流性能。该电路采用超低失真、超低噪声双电源运算放大器 AD8599 和超高精度带隙基准电压源 AD780，能够提供具有充足建立时间的低阻抗驱动器，以及高精度基准电压，从而确保 AD7999 发挥最大性能。AD8599 是一款双路运算放大器，采用  $\pm 4.5\text{ V}$  至  $\pm 18\text{ V}$  电源供电。AD7999 配有一个 I<sup>2</sup>C 兼容型串行接口，并提供 8 引脚 SOT-23 封装。

### 电路描述

建议将模拟信号施加于 AD7999 等采用开关电容输入的 ADC 之前，务必先缓冲信号，这在信号源具有高阻抗，并且低失真和高信噪比极为关键的应用中尤为重要。图 1 所示电路说明如何用适合高精度设计的 AD8599 来缓冲模拟输入通道。

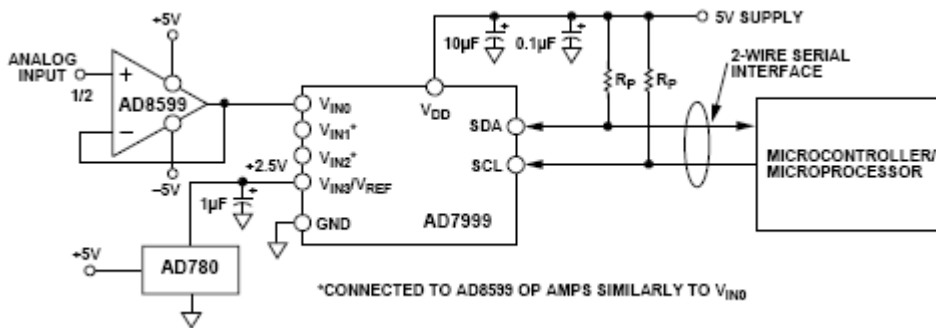


图 1. 采用低失真驱动器 AD8599 和超高精度基准电压源 AD780 的 AD7999 ADC 电路  
(原理示意图：未显示去耦和所有连接)

Rev.A

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AD7999 可以用作 4 通道输入器件，将  $V_{DD}$  作为基准电压（输入电压范围为 0 V 至  $V_{DD}$ ），或者用作 3 通道输入器件，将第四个通道用作外部基准电压输入  $V_{REF}$ （输入范围为 0 V 至  $V_{REF}$ ）。这些选项可通过 I<sup>2</sup>C 兼容型接口编程。AD780 是一款 2.5 V/3 V 超高精度带隙基准电压源，建议与 AD7999 配合使用。为获得最佳性能，建议对  $V_{IN3}/V_{REF}$  信号用 1  $\mu$ F 去耦电容。

切记，该 ADC 的模拟输入信号不能超过供电轨 300mV 以上，如果信号超过此电平，内部 ESD 保护二极管将呈正偏，并开始向基板内传导电流。各二极管最大导电电流为 10 mA，而不会导致不可恢复的器件损坏。“教程 MT-036”探讨了保护运算放大器和 ADC 的输入电路不受此类损坏的方法。

此外，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 AD7999 评估板布局）。

### 常见变化

如果要求进行单电源运算放大器操作，以便缓冲输入信号，可选择 AD8605。请注意，AD8605 采用 +5 V 单电源供电并且输出仅可达到高于地约 20 mV，因此无法运用 AD7999 的输入范围（0 V 至 +20 mV）（请参考“教程 MT-035”）。

AD7995 可以接受 1.2 V 至  $V_{DD}$  范围内的基准输入电压，因此可以用不同的基准电压源。

### 进一步阅读

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

MT-035 Tutorial, *Op Amp Inputs, Outputs, Single-Supply, and Rail-to-Rail Issues.* 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

[AD7999 Data Sheet.](#)

[AD8599 Data Sheet.](#)

[AD8605 Data Sheet.](#)

[AD780 Data Sheet.](#)

[AD7999 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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