ANALOG DEVICES

Circuit Note
CN-0131

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Devices Connected/Referenced	
AD5360	16-Channel, 16-Bit Voltage Output DAC
ADR431/ ADR421	2.5 V Ultralow Noise Voltage Reference
ADR435	5 V Ultralow Noise Voltage Reference

16 Channels of Programmable Output Span Using the AD5360 16-Bit Voltage Output DAC

CIRCUIT FUNCTION AND BENEFITS

This circuit is a multichannel DAC configuration with different output spans on groups of channels. It utilizes the AD5360 to provide 16 DAC channels with 16 bits of resolution. The AD5360 is configured to have eight channels with an output span of ±10 V and eight channels with an output span of ±5 V.

CIRCUIT DESCRIPTION

The AD5360 is a 16-channel, 16-bit DAC available both in 56-lead LFCSP and 52-lead LQFP packages. The AD5360 has two reference input pins. VREF0 is the reference pin for DAC channels VOUT0 to VOUT7. VREF1 is the reference pin for DAC channels VOUT8 to VOUT15.

Figure 1 shows a typical configuration for the AD5360 using two external references. The nominal output span for the AD5360 is four times the reference voltage, with the mid-scale point at 0 V. The ADR431 and ADR421 are low noise precision 2.5 V references. The ADR435 is a low noise precision 5 V reference. When connected as shown in Figure 1, the AD5360 will have an output span of ±5 V on VOUT0 to VOUT7 and an output span of ±10 V on VOUT8 to VOUT15. The AD5360 has two offset DAC registers, which allow the mid-scale point of the span to be altered within the limits of part functionality and headroom.

The circuit must be constructed on a multilayer PC board with a large area ground plane. Proper layout, grounding, and decoupling techniques must be used to achieve optimum performance (see Tutorial MT-031 and Tutorial MT-101).

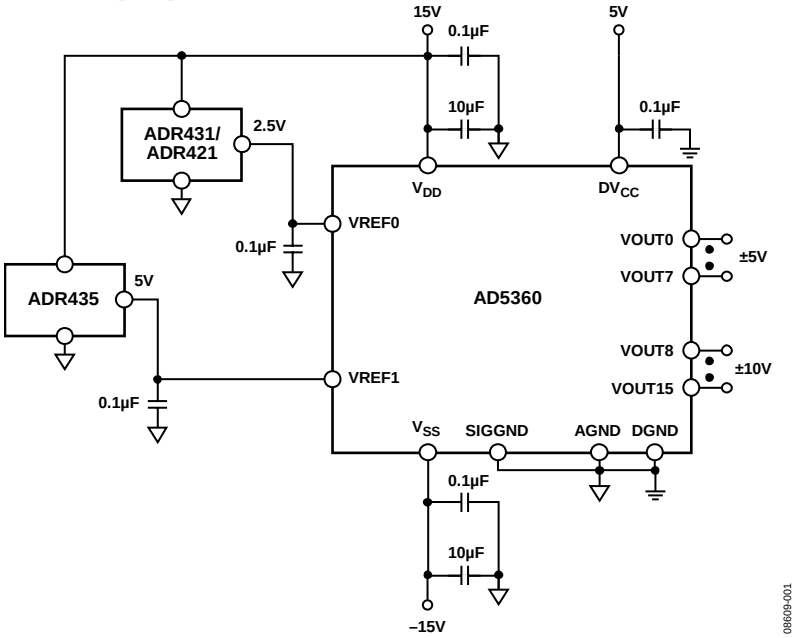

Figure 1. 16 Channels of Programmable Output Voltage Span Using the AD5360 DAC (Simplified Schematic: Decoupling and All Connections Not Shown)

Rev. 0

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COMMON VARIATIONS

The AD5362 is an 8-channel version of the AD5360. The AD5361 and AD5363 are 14-bit versions of the AD5360 and AD5362, respectively.

The circuit described here can be used with any of the AD536x devices mentioned above. The references can also be changed to give different output ranges if required.

LEARN MORE

Kester, Walt. *The Data Conversion Handbook*. Chapter 3, 7. Analog Devices. 2005.

MT-015 Tutorial, *Basic DAC Architectures II: Binary DACs*. Analog Devices.

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

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

Voltage Reference Wizard Design Tool. Analog Devices.

Data Sheets and Evaluation Boards

AD5360 Data Sheet

AD5360 Evaluation Board

AD5361 Data Sheet

AD5362 Data Sheet

AD5363 Data Sheet

ADR421 Data Sheet

ADR431 Data Sheet

ADR435 Data Sheet

REVISION HISTORY

10/09—Revision 0: Initial Version