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# 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. The circuit uses the AD5360 to provide 16 DAC channels with 16-bit resolution. The AD5360 can be configured to have eight channels with an output span of ±10 V and eight channels with an output span of ±5 V.

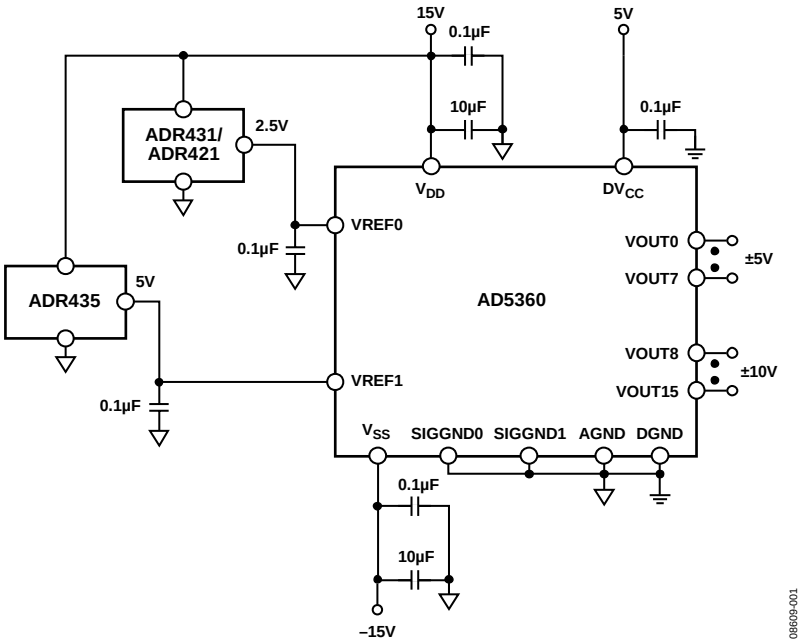


*Figure 1. 16 Channels of Programmable Output Voltage Span Using the AD5360 DAC (Simplified Schematic: Decoupling and All Connections Not Shown)*

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## REVISION HISTORY

**9/2018—Rev. 0 to Rev. A**

Document Title Changed from CN0131 to AN-1587...Universal
Changes to Figure 1 ..... 1
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Changed Learn More Section to References Section ..... 3

**10/2009—Revision 0: Initial Version**

## CIRCUIT DESCRIPTION

The AD5360 is a 16-channel, 16-bit digital-to-analog converter (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 Channel VOUT0 to Channel VOUT7. VREF1 is the reference pin for DAC Channel VOUT8 to Channel 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 midscale 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 has 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 midscale point of the span to be altered within the limits of part functionality and headroom.

The circuit must be constructed on a multilayer printed circuit board (PCB) 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). Use the EVAL-AD5360EBZ as a reference for how to properly lay out the design.

## 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 in this application note can be used with the AD5360, AD5361, AD5362, and AD5363 devices. The references can also be changed to give different output ranges if required.

## REFERENCES

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