

Circuit Designs Using Analog Devices Products
Apply these product pairings quickly and with confidence.
 For more information and/or support call 1-800-AnalogD
 (1-800-262-5643) or visit www.analog.com/circuit.

Devices Connected/Referenced

AD5752	Complete, Dual, 16-Bit, Unipolar/Bipolar Voltage Output DAC
REF192	Precision 2.5V Voltage Reference

Software Configurable 16-Bit Dual-Channel Unipolar/Bipolar Voltage Output Using the AD5752 DAC

CIRCUIT FUNCTION AND BENEFITS

This circuit provides unipolar and bipolar data conversion using the AD5752BREZ, a dual, 16-bit, serial input, unipolar/bipolar voltage output DAC and the REF192ESZ precision 2.5 V voltage reference. The only other external components needed for this 16-bit DAC circuit are decoupling capacitors on the supply pins and reference input, leading to savings in cost and board space. This circuit is well suited for closed-loop servo control applications.

CIRCUIT DESCRIPTION

The AD5752 is a digital-to-analog converter that offers guaranteed 16-bit monotonicity, integral nonlinearity (INL) of ± 16 LSB, 0.1% total unadjusted error (TUE), and 10 μ s settling time. The AD5752 also integrates reference buffers and output amplifiers, which leads to further savings in both cost and board space. Performance is guaranteed over the following supply voltage ranges: AV_{DD} supply range from +4.5 V to +16.5 V, and AV_{SS} supply range from -4.5 V to -16.5 V. AV_{SS} can be connected to 0 V if only unipolar outputs are required.

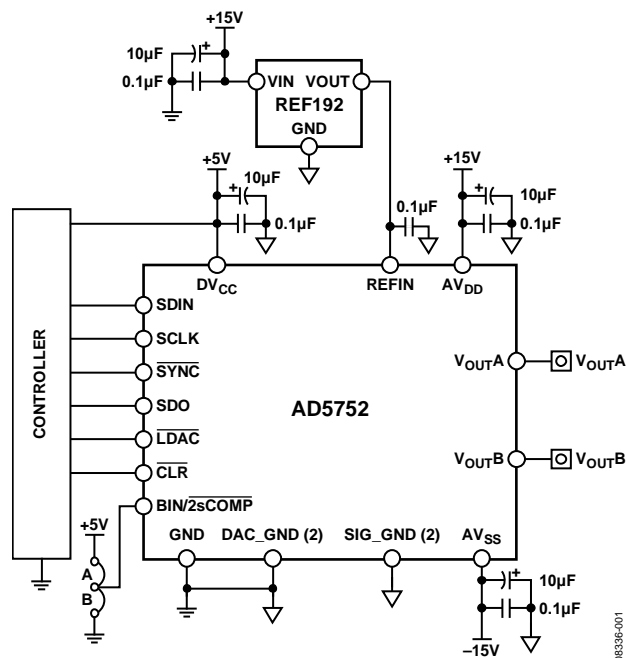


Figure 1. Unipolar/Bipolar Configuration for the AD5752 DAC (Simplified Schematic)

Rev. 0

"Circuits from the Lab" from Analog Devices have been designed and built by Analog Devices engineers. Standard engineering practices have been employed in the design and construction of each circuit, and their function and performance have been tested and verified in a lab environment at room temperature. However, you are solely responsible for testing the circuit and determining its suitability and applicability for your use and application. Accordingly, in no event shall Analog Devices be liable for direct, indirect, special, incidental, consequential or punitive damages due to any cause whatsoever connected to the use of any "Circuit from the Lab". (Continued on last page)

The output range can be individually programmed for each channel output with these options: 0 V to +5 V, 0 V to +10 V, 0 V to +10.8 V, -5 V to +5 V, -10 V to +10 V, and -10.8 V to +10.8 V. The input coding is user selectable 2's complement or offset binary for a bipolar output (depending on the state of the BIN/2sCOMP pin). Coding is straight binary for a unipolar output. Figure 2 shows that the typical output error of this circuit at 25°C ambient temperature is less than 0.06 %FSR.

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 MT-031 Tutorial, *Grounding Data Converters and Solving the Mystery of AGND and DGND* and MT-101 Tutorial, *Decoupling Techniques*).

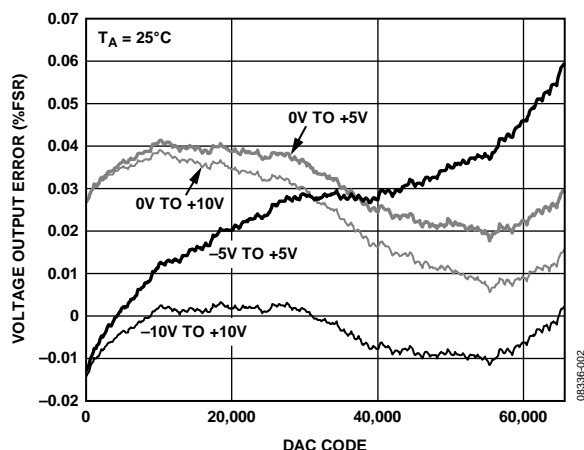


Figure 2. Voltage Output Error

LEARN MORE

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

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.

Data Sheets and Evaluation Boards

AD5752 Data Sheet.

REF192 Data Sheet.

AD5754R Evaluation Board (Compatible with AD5752).

REVISION HISTORY

7/09—Revision 0: Initial Version

(Continued from first page) "Circuits from the Lab" are intended only for use with Analog Devices products and are the intellectual property of Analog Devices or its licensors. While you may use the "Circuits from the Lab" in the design of your product, no other license is granted by implication or otherwise under any patents or other intellectual property by application or use of the "Circuits from the Lab". Information furnished by Analog Devices is believed to be accurate and reliable. However, "Circuits from the Lab" are supplied "as is" and without warranties of any kind, express, implied, or statutory including, but not limited to, any implied warranty of merchantability, noninfringement or fitness for a particular purpose and no responsibility is assumed by Analog Devices for their use, nor for any infringements of patents or other rights of third parties that may result from their use. Analog Devices reserves the right to change any "Circuits from the Lab" at any time without notice, but is under no obligation to do so. Trademarks and registered trademarks are the property of their respective owners.