



40 Channels of Programmable Voltage with Excellent Temperature Drift Performance Using the AD5380 DAC

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Circuit Function and Benefits

The circuit described in this document is a multi-channel DAC configuration with excellent temperature drift performance. It provides 40 individual voltage channels with 14 bits of resolution and a temperature stability of typically less than 3ppm/C.

Circuit Description

Figure 1 shows a typical configuration for the AD5380-5 when configured for use with an external reference. In the circuit shown, all AGND, SIGNAL_GND, and DAC_GND pins are tied together to a common AGND. AGND and DGND are connected together at the AD5380 device. On power-up, the AD5380 defaults to external reference operation.

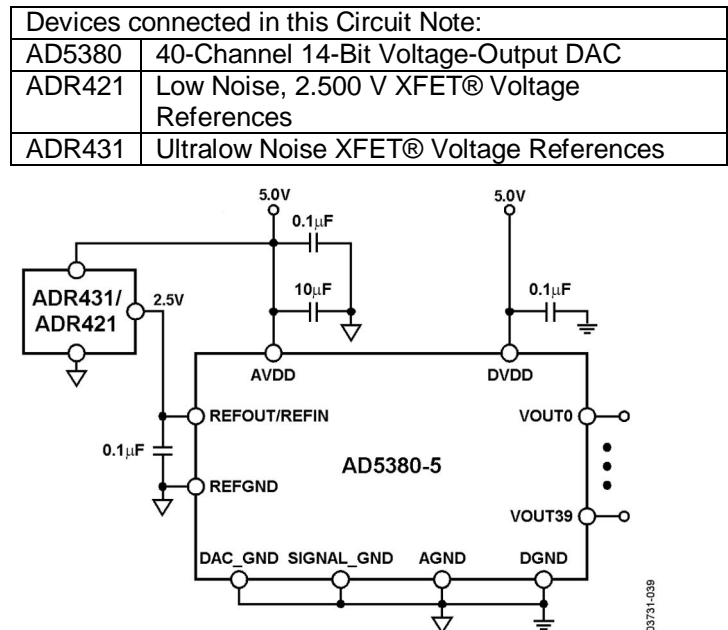


Figure 1: AD5380 Typical Configuration with External Reference

This design uses two separate 5.0V power supplies – one to power the voltage reference and the analog portion of the AD5380 (AVDD) and the other to power the digital portion of the AD5380 (DVDD). For best performance, a linear regulator should always be used to power the analog portion of the circuit. If a switching regulator is used to power the digital portion, care should be taken to minimize switching noise at the DVDD supply pins. The AD5380 digital (DVDD) power supply can operate off of a 3V or 5V supply which provides for maximum flexibility when interfacing to digital components. Both supplies can be tied together to a common 5V supply provided that supply is derived from a linear regulator. Refer to the ADIsimPower tool for guidance on the power supply designs.

It is recommended to decouple close to the device with a 0.1 μF ceramic and a 10 μF tantalum capacitor. In this application, the reference for the AD5380 is provided externally from either an ADR421 or ADR431 2.5 V reference. The ADR431 provides a lower output voltage noise specification for applications where that specification is important. The reference should be decoupled at the REFOUT/REFIN pin of the device with a 0.1 μF capacitor.

Common Variations

A variation of this circuit is the AD5380-3 with the ADR280 1.2 V reference where all other components are the same as those outlined above.

Additional Documentation

Datasheets for the AD5380 and ADR431/ADR421 can be found at the following locations:

<http://www.analog.com/en/AD5380/productsearch.html>

<http://www.analog.com/en/ADR421/productsearch.html>

<http://www.analog.com/en/ADR431/productsearch.html>