

利用 AD5420 提供 16 位、4 mA 至 20 mA 输出简化解决方案

电路功能与优势

本电路利用单通道、16 位、串行输入、4 mA 至 20 mA 电流源 DAC AD5420，提供 4 mA 至 20 mA 输出。它只需用产品 AD5420，所需外部元件只有电源引脚和参考输入上的去耦电容，以及用于开漏故障输出的上拉电阻。当输出端丧失兼容电压或 AD5420 温度过高时，开漏故障输出会予以警示。这种解决方案具有很高的集成度，可节省成本和电路板空间。本电路非常适合工业控制应用中的可编程逻辑控制器(PLC)和分布式控制系统(DCS)。

电路描述

AD5420 是一款低成本、精密、高度集成的 16 位数模转换器，提供可编程电流源输出，针对工业过程控制应用的要求而设计。电流输出可通过编程设置为 4 mA 至 20 mA、0 mA 至 20 mA 或 0 mA 至 24 mA。AD5420 内置一个 5 V、10 ppm/°C（最大值）基准电压源，从而可以进一步节省成本和电路板空间。该电路采用最高 24 V 的 AV_{DD} 额定电源电压工作；不过，AD5420 能够以最高 40 V 的 AV_{DD} 电源电压工作。该器件含有 4.5 V 片内稳压输出（ DV_{CC} 引脚），能够提供最大 5 mA 源电流。这可以用作上拉电阻的端电极，或者为数字电路供电，从而无需产生逻辑电源电压。

图 2 显示，该电路在 25°C 环境温度时的典型精度优于 0.016%。

本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 — “实现数据转换器的接地并解开 AGND 和 DGND 的迷团”，以及教程 MT-101 — “去耦技术”）。

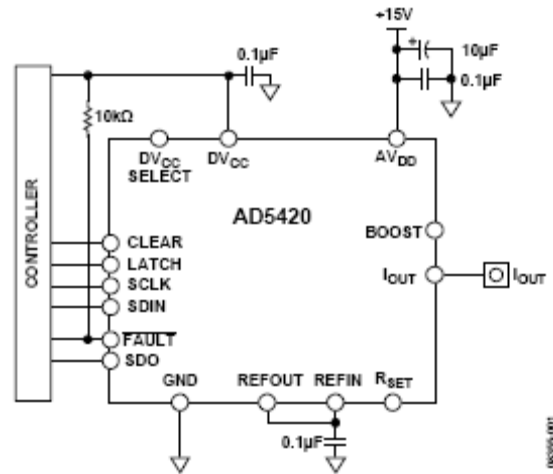


图 1. AD5420 电路配置（原理示意图）

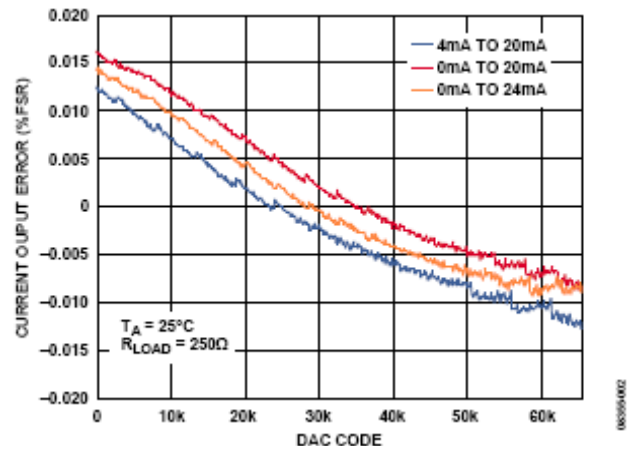


图 2. 电流输出精度

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)

进一步阅读

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.

数据手册和评估板

[AD5420 Data Sheet](#).

[AD5420 Evaluation Board](#).

修订历史

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.