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连接/参考器件

ADXL345	3 轴、 $\pm 2\text{ g}$ / $\pm 4\text{ g}$ / $\pm 8\text{ g}$ / $\pm 16\text{ g}$ 数字加速度计
ADuC7024	精密模拟微控制器, 12 位模拟 I/O, ARM7TDMI® MCU

利用精密模拟微控制器 ADuC7024 和 数字加速度计 ADXL345 检测低 g 加速度

电路功能与优势

ADXL345 是一款小巧纤薄的低功耗三轴加速度计, 可以对高达 $\pm 16\text{ g}$ 的加速度进行高分辨率 (13 位) 测量。数字输出数据为 16 位二进制补码格式, 可通过 SPI (3 线或 4 线) 或者 I²C 数字接口访问。

ADXL345 非常适合移动设备应用。它可以在倾斜检测应用中测量静态重力加速度, 还可以测量运动或冲击导致的动态加速度。它具有高分辨率 (4 mg/LSB), 能够测量约 0.25° 的倾角变化。使用 ADXL345 等数字输出加速度计时, 无需进行模数转换, 从而可以节省系统成本和电路板面积。此外,

ADXL345 内置多种功能。活动/非活动检测、单击/双击检测以及自由落体检测均在内部完成, 无需主机处理器执行任何计算。内置 32 级 FIFO 存储缓冲器可以减轻主机处理器的负担, 起到简化算法和省电的作用。利用内置的活动/非活动检测功能, 将 ADXL345 用作“运动开关” (无活动时关闭整个系统, 检测到活动时才开启), 系统可以实现进一步省电。ADXL345 通过 I²C 或 SPI 接口进行通信。本文所述电路演示如何通过这些协议实现通信。

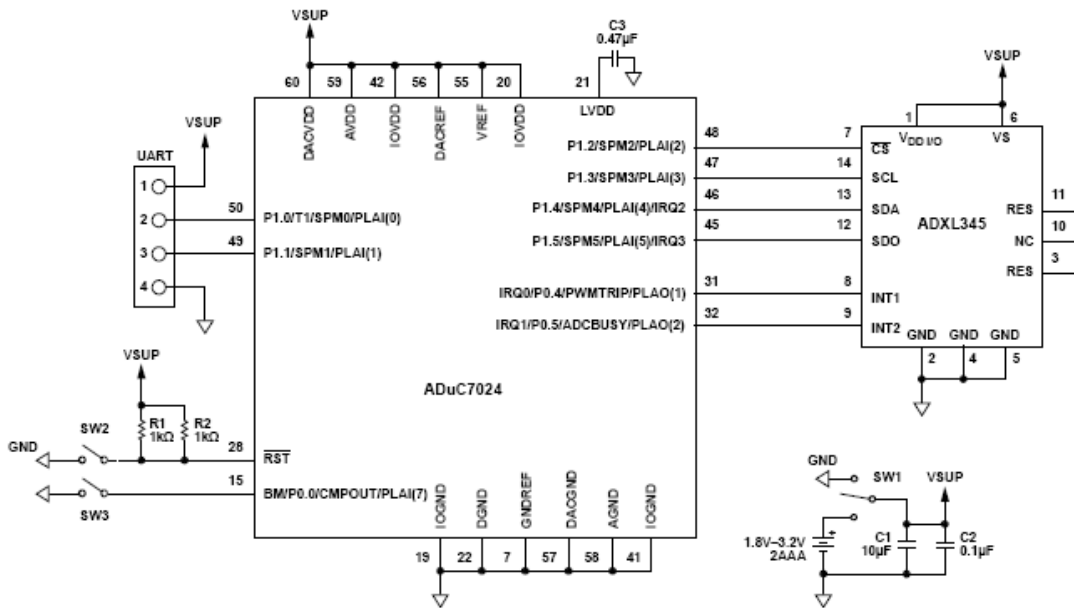


图 1. ADXL345 和 ADuC7024 的 4 线 SPI 配置 (原理示意图, 未显示去耦和所有连接)

Rev.0

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常见变化

图 1 显示了 ADXL345 的 4 线式 SPI 配置, 但它也能通过 3 线式 SPI 进行通信。图 3 显示了这种配置。

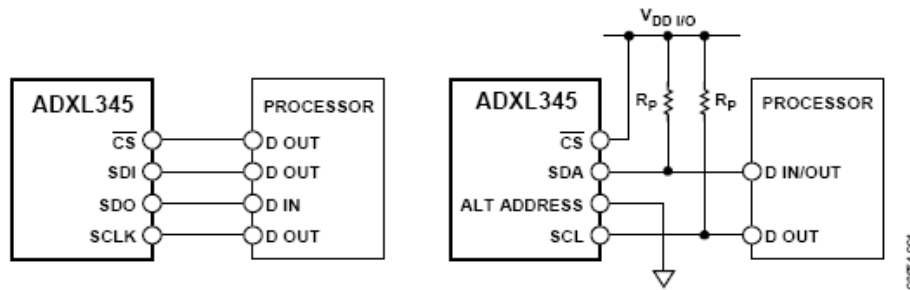


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上述电路采用ADuC7024 微控制器。同样的配置可以适用于任何支持SPI或I²C的微控制器,如图4所示,其中采用标准I²C和SPI连接。表1列出了两种协议的引脚功能。

和SPI连接。表1列出了两种协议的引脚功能。

引脚编号	引脚名称	功能	
		I ² C	SPI
7	$\overline{\text{CS}}$	(连接到V _{DD} 以支持I ² C)	片选
12	SDO/ALT ADDRESS	备选地址选择	串行数据输出
13	SDA/SDI/SDIO	串行数据	串行数据输入 (4 线式 SPI) / 串行数据输入和输出 (2 线式 SPI)
14	SCL/SCLK	串行通信时钟	串行通信时钟

图4. SPI (左) 和I²C (右) 连接图

进一步阅读

This circuit is used in the [ADXL345 Development Board](#) (model number EVAL-ADXL345Z-DB). For information on ADXL345 operation and register functions, please refer to the [ADXL345 data sheet](#).

For information on programming the ADuC7024, please see the [ADuC7024 data sheet](#). Sample code for the I²C configuration shown in Figure 2 is available at http://www.analog.com/static/imported-files/circuit_notes/CN0133_Source_Code.zip.

数据手册和评估板

[ADXL345 Data Sheet](#)

[ADXL345 Evaluation Tools](#)

[ADuC7024 Data Sheet](#)

[ADuC7024 Evaluation Tools](#)

修订历史

10/09—Revision 0: Initial Version

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