ANALOG DEVICES

AN-877
APPLICATION NOTE

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Interfacing to High Speed ADCs via SPI

by the High Speed Converter Division

INTRODUCTION

This application note describes how to use the SPI port on Analog Devices, Inc., high speed converters. In addition, this application note defines the electrical, timing, and procedural requirements for interfacing to these devices. The implementation is compatible with industry-standard SPI ports and employs, at minimum, a 2-wire mode and optional chip select.

DEFINITION

The SPI port consists of three pins: the serial clock pin (SCLK), the serial data input/output pin (SDIO), and the chip select bar pin (CSB). Optionally, some chips may implement a serial data out pin (SDO), which is referred to as 3-wire mode. To minimize pin count, most chips omit this pin. However, if it is included, it is used only for reading data from the device.

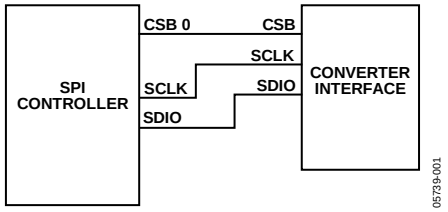

Figure 1. Single Device Control in 2-Wire Mode

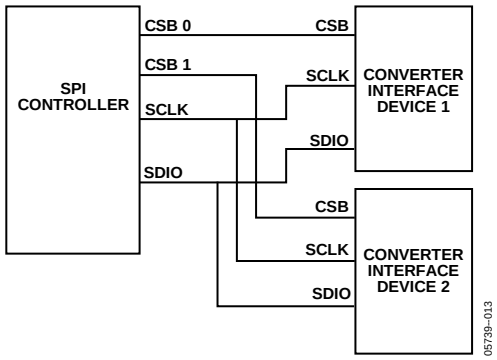

Figure 2. Multiple Device Control in 2-Wire Mode

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REVISION HISTORY

4/07— Initial Version to Rev. A

Updated Format ..... Universal
Changes to Transfer Register Section 8
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12/05— Revision 0: Initial Version

Address[1] and Parameter Name	Bit 7 (MSB)	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0 (LSB)	Default Value[1]	Comments
14–output_mode	0: Level Option 0 1: Level Option 1 2: Level Option 2 3: Level Option 3		Output mux enable (interleave)	Output enable	DDR enable	Output invert	0: Offset binary 1: Twos complement 2: Gray code 3: Reserved		device specific	Configures the outputs and the format of the data.
15–output_adjust	Output driver termination; Bits[7:4]				Output driver current; Bits[3:0]				device specific	Determines LVDS or other output properties. Primarily functions to set the LVDS span and common-mode levels in place of an external resistor.
16–output_phase	Output polarity				Output clock phase adjust; Bits[3:0]				00h	On devices that utilize clock divide, determines which phase of the divider output is used to supply the output clock. Internal latching is unaffected.
17–output_delay	Enable	DLL Enable	6-bit output delay; Bits[5:0]						00h	This sets the fine output delay of the output clock but does not change internal timing.
18–vref	V_{REF} select 0: Primary (0) 1: Secondary (1) 2: Option 2 3: Option 3		6-bit internal V_{REF} adjustment; Bits[5:0]						20h	Select and/or adjust the V_{REF}.
19–user_patt1_lsb	B7	B6	B5	B4	B3	B2	B1	B0	00h	User-Defined Pattern 1 LSB.
1A–user_patt1_msb	B15	B14	B13	B12	B11	B10	B9	B8	00h	User-Defined Pattern 1 MSB.
1B–user_patt2_lsb	B7	B6	B5	B4	B3	B2	B1	B0	00h	User-Defined Pattern 2 LSB.
1C–user_patt2_msb	B15	B14	B13	B12	B11	B10	B9	B8	00h	User-Defined Pattern 2 MSB.
1D–user_patt3_lsb	B7	B6	B5	B4	B3	B2	B1	B0	00h	User-Defined Pattern 3 LSB.
1E–user_patt3_msb	B15	B14	B13	B12	B11	B10	B9	B8	00h	User-Defined Pattern 3 MSB.
1F–user_patt4_lsb	B7	B6	B5	B4	B3	B2	B1	B0	00h	User-Defined Pattern 4 LSB.
20–user_patt4_msb	B15	B14	B13	B12	B11	B10	B9	B8	00h	User-Defined Pattern 4 MSB.
21–serial_control	LSB first				PLL optimize	000: Normal bit stream 001: 8 bits 010: 10 bits 011: 12 bits 100: 14 bits 101: 16 bits			00h	Serial stream control. Default causes MSB first and the native bit stream.
22–serial_ch_stat							Ch output reset	Ch power-down	00h	Used to power down individual sections of a converter(local).
24–misr_lsb	B7	B6	B5	B4	B3	B2	B1	B0	00h	Least significant byte of MISR (read-only).
25–misr_msb	B15	B14	B13	B12	B11	B10	B9	B8	00h	Most significant byte of MISR (read-only).
2A–features							OVR alternate pin	OVR output enable	00h	Auxiliary feature set control.
2B–high pass		Tune				Corner frequency Bit 0: DC Bit 1 to Bit 7: Alternate corner frequencies			00h	High-pass filter control.
2C–ain								Input impedance	00h	Analog input control.
2D–cross_point									00h	Analog input cross point switch.
FF–device_update	Enable HW transfer							SW transfer	00h	Synchronously transfers data from the master shift register to the slave.

[1] Hexadecimal.
[2] Not supported on most devices.