

ADC with SPI Controller

Functional Description:

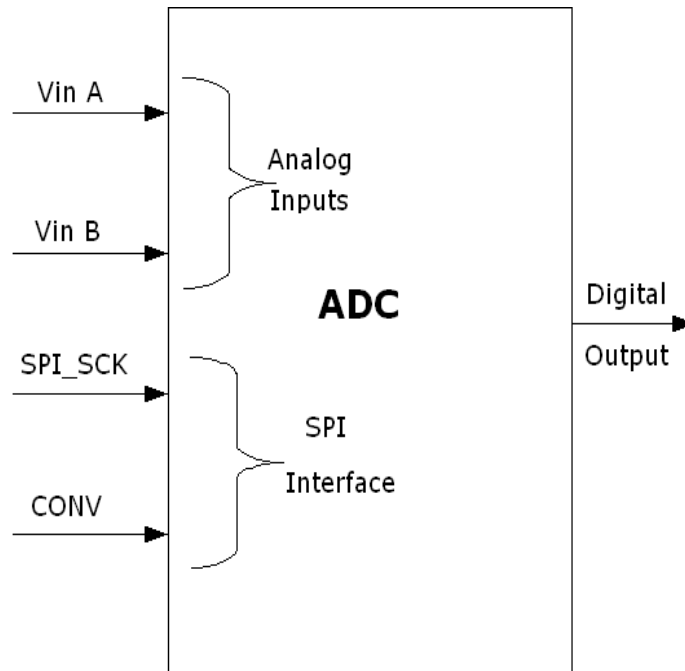
The controller designed converts the analog input into digital form, where the analog input is available from any source, SPI controller controls the conversion and ADC(LTC 1407A-1) is used to perform the conversion. The digital values so obtained are stored in a RAM.

Features:

- Converts any analog input to 14 bit digital value

- Simultaneously converts 2 analog inputs to digital value
- Continuous analog samples are converted to digital based on the sample frequency
- SPI provides 2 wire interface to the ADC, .i.e, clock and conversion enable signal
- The bus slave i.e, ADC provides serial data back to the SPI master, which is stored in the RAM
- It supports clock frequency rates up to the maximum of 1.5 MHz

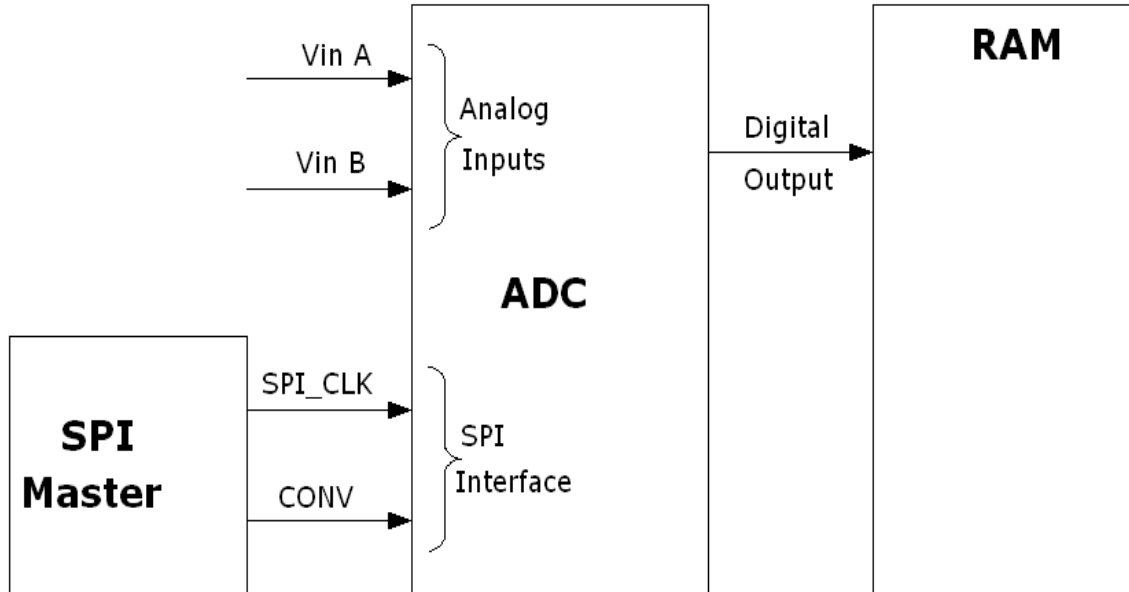
Symbol:



Pin Descriptions:

<i>Pin</i>	<i>Type</i>	<i>Description</i>
SPI_SCK	Input	SPI clock input
CONV	Input	Active-high, initiates conversion
Vin A	Input	Analog Input A
Vin B	Input	Analog Input B
Digital Output	Output	Serial data output from the ADC

Block Diagram:



SPI Master Controller:

SPI controller block generates the SPI master output signals to enable conversion. SPI Controller continuously sends the clock to the ADC along with conversion initiation signal.

RAM:

RAM block is used to store the data. It stores the data values that are coming from ADC in the form of FIFO.

ADC:

This block is responsible for conversion from analog to digital. Each analog input is converted to 14 bit binary form. The digital output from the ADC is 34 bit value with two 14 bit digital data and six high impedance bits. The required

values are captured and stored in a RAM.

Verification:

The SPI Master with ADC has been verified with following approaches:

- Exhaustive functional and timing verification.
- Prototyped on Spartan-3A board and verified by observing analog output waveforms on the oscilloscope

Deliverables:

Verilog RTL source code
Test benches
Synthesis and Simulation scripts