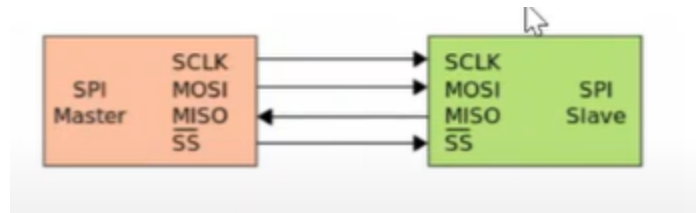


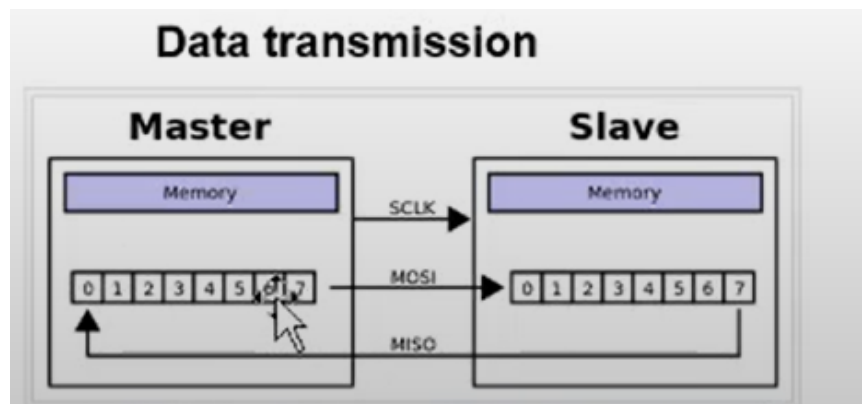
SPI



To enable a communication between master (Controller) and slave (peripheral devices like ADC, LCD)

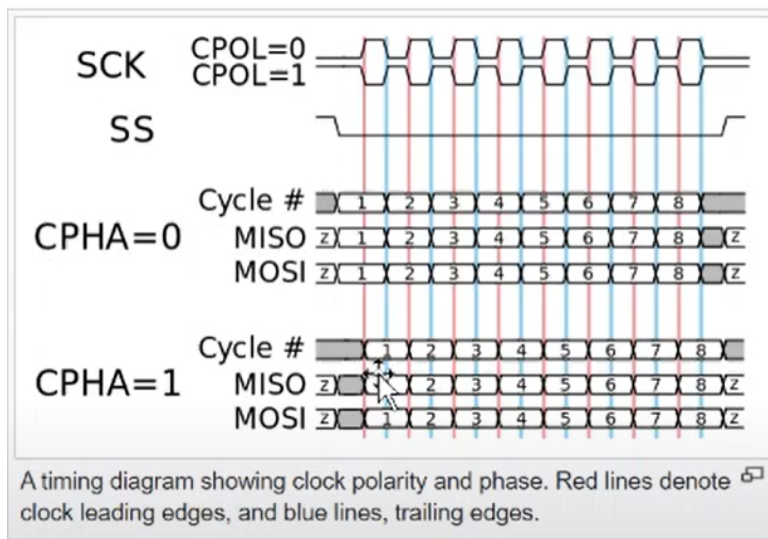
1. SCLK always from master to slave for synchronization.
2. MOSI - Master Out Slave In, serial data from Master to Slave.
3. MISO - Master In Slave Out, serial data from Slave to Master.
4. SS - Slave Select for selecting a slave for communication and its active low signal.

SPI is full duplex protocol



Wires Used	4
Maximum Speed	Up to 10 Mbps
Synchronous or Asynchronous?	Synchronous
Serial or Parallel?	Serial
Max # of Masters	1
Max # of Slaves	Theoretically unlimited*

Clock polarity and phase



SPI modes

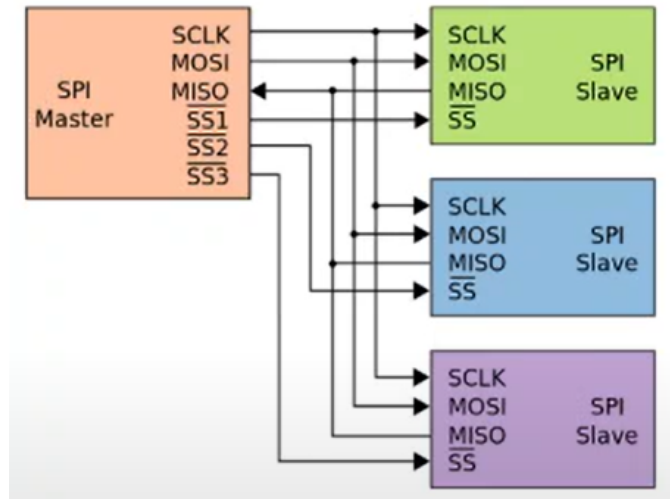
Mode	CPOL	CPHA
0	0	0
1	0	1
2	1	0
3	1	1

Configuration:

Independent slave configuration:

There is separate slave select pin for each slave.

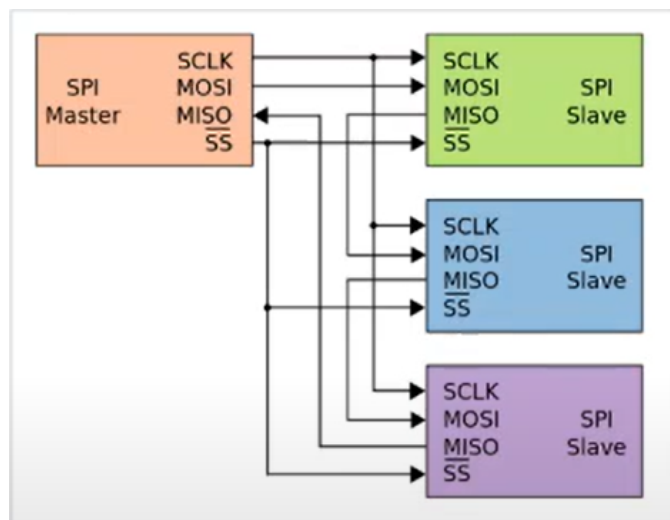
Communication enables between master to each independent slaves.



Daisy chain configuration:

There is single slave select for connecting all those slaves.

Communication enable from master to slave 1, then slave 1 to slave 2, then slave 2 to master again in a chain manner.



ADVANTAGES

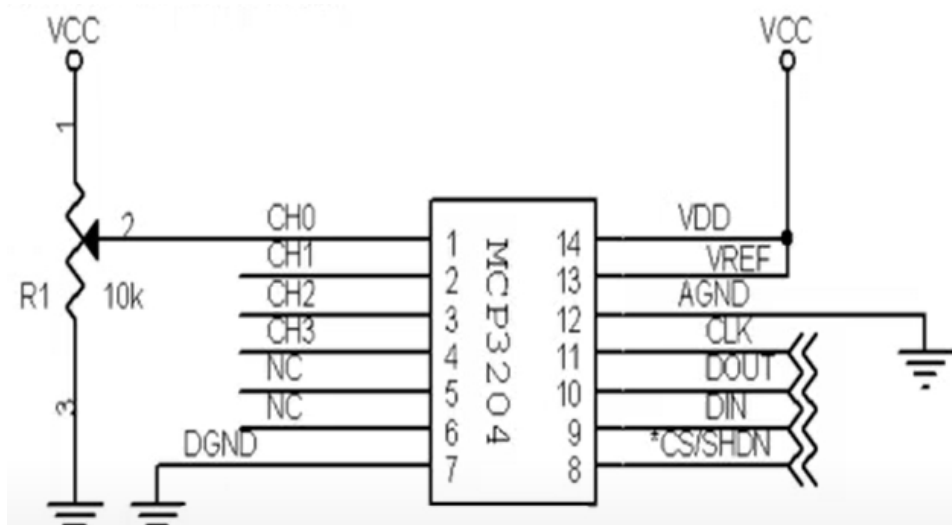
- No start and stop bits, so the data can be streamed continuously without interruption
- No complicated slave addressing system like I2C
- Higher data transfer rate than I2C (almost twice as fast)
- Separate MISO and MOSI lines, so data can be sent and received at the same time

DISADVANTAGES

- Uses four wires (I2C and UARTs use two)
- No acknowledgement that the data has been successfully received (I2C has this)
- No form of error checking like the parity bit in UART
- Only allows for a single master

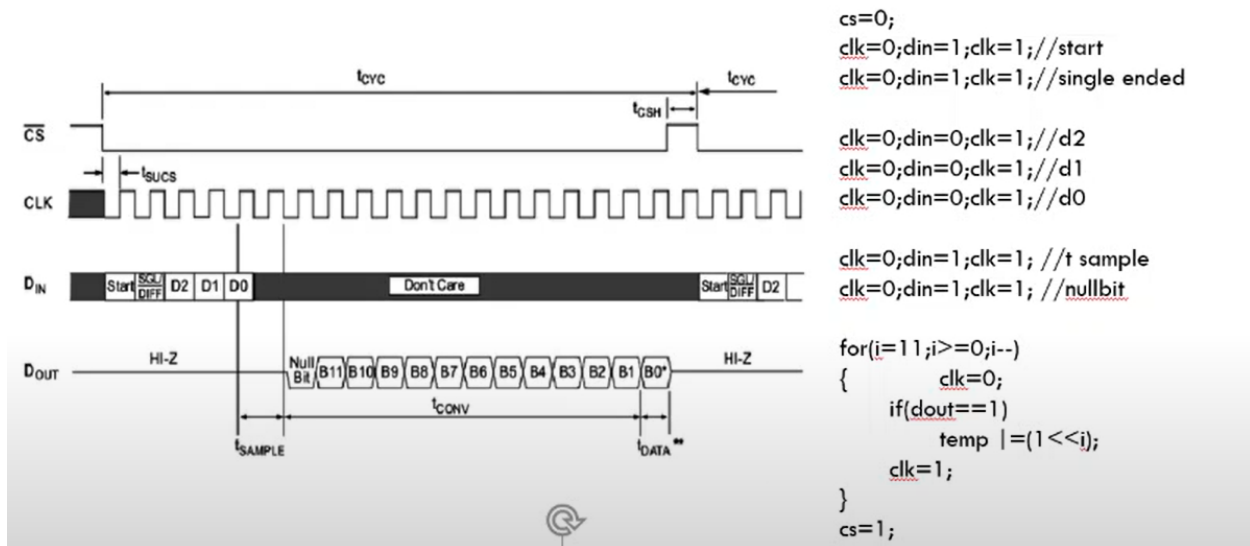
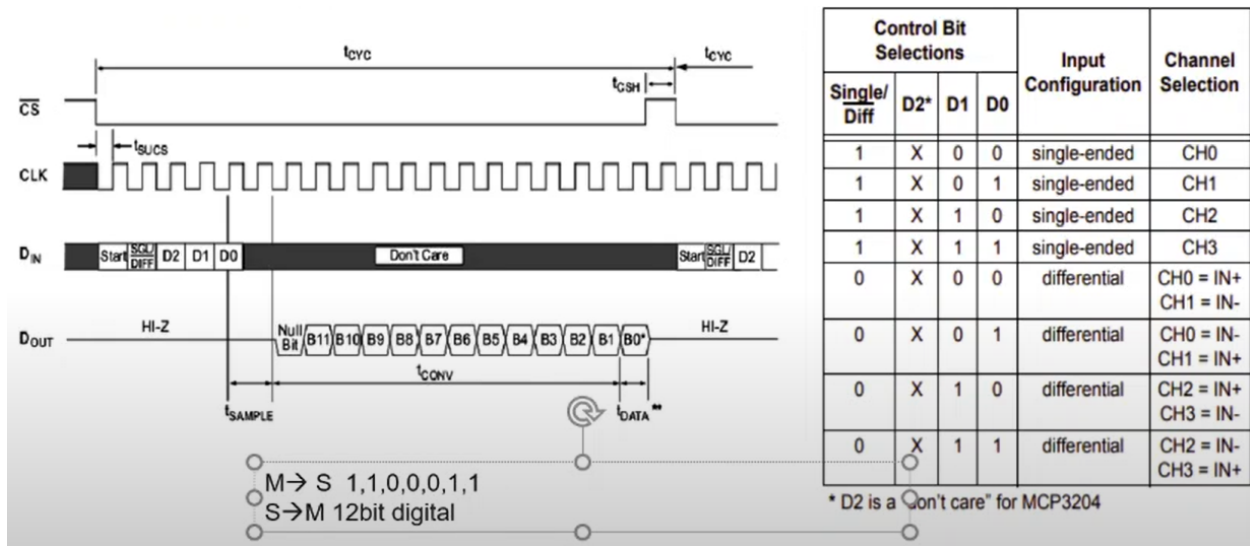
MPC 3204 ADC:

It is 4 channel, so only D0, D1 are enough no need of D2 (its for 8 channel)



1. CH for connecting sensors
2. DOUT - MISO
3. DIN - MOSI

4. CS/SHDN - slave select (active low signal)



Circuit Diagram:

