

Description of SPI

Serial Peripheral Interface - SPI is a serial and synchronous data protocol that controllers use to communicate with one or more peripherals or with another controller at high data speeds and over short distances.

Hardware

In SPI there is always one main device (usually the controller) that controls the peripherals. Usually, there are three common lines between all devices:

1. SCLK - Serial Clock

The clock determines the data transfer rate and this line transmits the clock pulses that synchronize the data transmission generated by the main party. Every bit of data transmitted on this line coincides with a single clock pulse or signal. The goal is to enable the recipient to receive the bits in the message at the same rate at which they were transmitted to ensure that no bit is lost and for the receiver to be able to interpret it correctly.

2. MOSI - Master Out Slave In

The main device uses it to send data to the peripheral devices. The most significant bit is sent first.

3. MISO - Master In Slave Out

The master device receives data from the peripheral devices over this line. The most significant bit is received first.

There is one line for each sub machine and it is connected to the main device:

4. SS - Slave Select

The subsidiary machine on this line is informed that it must prepare to receive data and that it is the one concerned with receiving this data. There is a separate

pin terminal for each slave device connected to the primary device. In the normal case, the signal for this line is high (1), and when we want to communicate with one of the parties, all we have to do is make the line value of the terminal device low (0) and then raise it again after the completion of the transmission process.

SPI patterns

When two devices communicate via SPI, there are two important things they must agree on:

What is the watch position during periods of inactivity?

And when is the data to be sampled?

These two properties are often referred to as clock polarity and clock phase respectively.

Clock polarity determines whether the clock mode is Low 0 or High 1 when data is not transmitted (inactive state); Meaning, is the watch inactive when it is high or low? If polarity is set to 0, clock mode will be low 0 when inactive. And when polarity is 1 it will be at 1 o'clock mode when inactive.

The clock phase indicates the edge at which the machine will preview the first byte of data. Whether the data transmission is on the rising or falling edge of the clock signal. If the phase is 0, then the data is previewed on the first edge of the watch. If the phase is 1, then the data is previewed at the second edge of the watch.