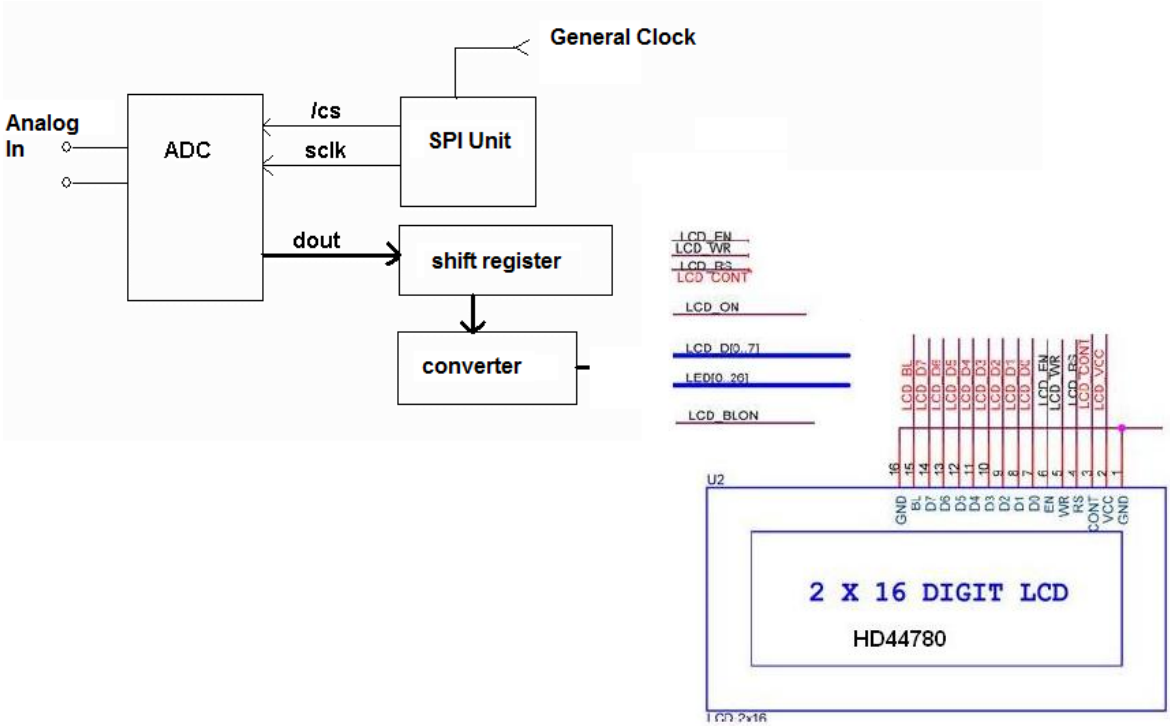
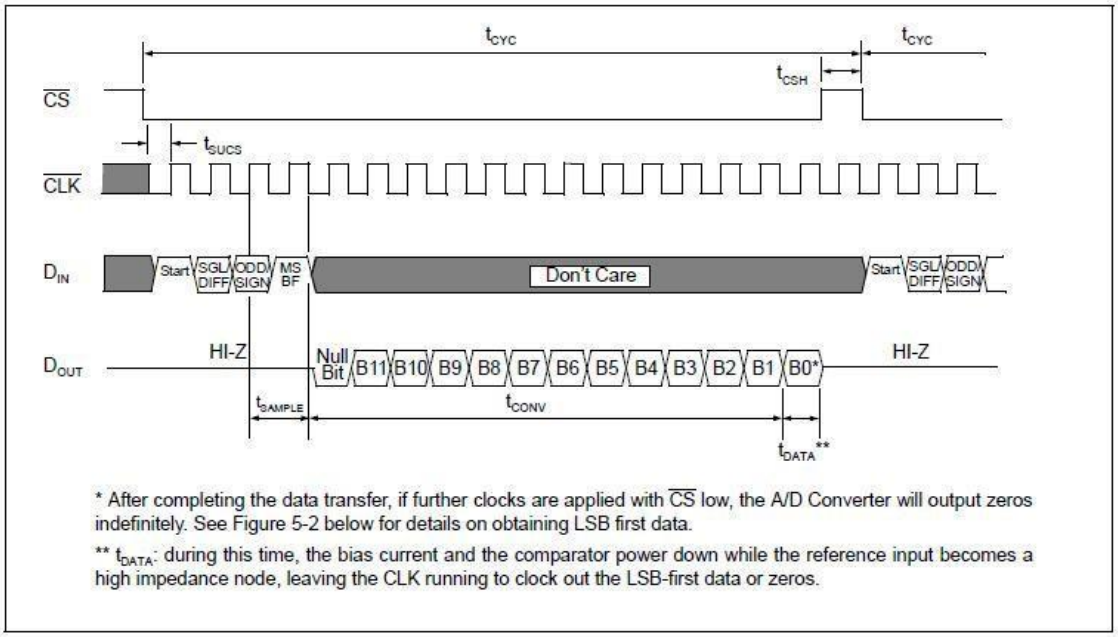
Proj 6 Volt-meter

There is a data transfer protocol called SPI (Serial Peripheral Interface) that is used in several digital circuits e.g analog to digital converters (ADC's). A simpler volt-meter can be built with a CPLD-circuit that at even time-spans is sampling and fetches data from an ADC using the SPI protocol, and displays the data in decimal form with an LCD display. In the figure below is shown a principle drawing over how all can be connected together.



The SPI protocol that is used works like:



* After completing the data transfer, if further clocks are applied with $\overline{CS}$ low, the A/D Converter will output zeros indefinitely. See Figure 5-2 below for details on obtaining LSB first data.

** t_{DATA}: during this time, the bias current and the comparator power down while the reference input becomes a high impedance node, leaving the CLK running to clock out the LSB-first data or zeros.

Communication with the MCP3202 using MSB first format only.

When sclk is asserted during a clock-pulse (the pulse-length can be assumed to be about 1us) followed by that /cs is deasserted (/cs should be kept low until the data-transfer is over). When the data-signal dout is asserted the conversion is over and it is possible to put out a number of clock-pulses and shift the data into the dout input. In our case we have a 16-bit shift-register. When the shifting is ready /cs is asserted high again. This process can be repeated at for example about 100 times/sec.. The LCD display is on the DE2 board and is called (ATM12864D) and we will use its datasheet together with the datasheet for the MCP3202 ADC.