

DAC and ADC Specifications

Important specifications for DAC/ADC

- Number of bits – determine precision.
- Maximum voltage – obvious!
- Linearity – average of (actual voltage – theoretical voltage) in terms of fraction of full range (or step size).
- Glitches (Particularly DAC) – in transition from one digital input to the next, like 0111 to 1000, it may effectively go through 1111 or 0000, which produces “unexpected” voltage briefly. If can cause problems else where.
- Monotonic – when the digital value input value increases, is the output analog value increases monotonically? Sometimes, this is not the case, and this would cause significant problem in the rest of your circuit. (Like ADC built from DAC and comparator).
- Offset – pedestal may be intentionally set to a positive value so that one can measure it. (negative offset is harder to measure)
- Slew rate (V/s when the voltage changes) (DAC)
- Settling time.
- Temperature coefficient

ADC

- We looked at an example of using a comparator and DAC to construct a ADC a month ago!
- Here is another example of using many comparators to construct an ADC.

Counter or Tracking ADC

Successive Approximation ADC

Most Commonly Used

Dual Slope Integrating ADC

Voltage to Frequency ADC

Fast Conversion

Software Implementation

Shaft Encoder