

Digital Logic Design – Lecture 1

Rise and fall times (or response times) describe how quickly a signal transitions between two levels in electronic circuits and waveforms.

Rise time t_r - defines the duration required for a signal to change from 10% to 90% of its peak value.

Fall time t_f - defines the duration required for a signal to change from 90% to 10%, measuring the transition in the opposite direction, as opposed to that of the rise time.

Why are rise and fall times important?

Rise and Fall times are fundamental parameters in high-speed electronics, as they measure a circuit's ability to respond to rapid input signals. Efforts to minimize response times focus on advancements in faster electron devices and reducing stray circuit parameters such as capacitance and inductance. However, in certain non-high-speed applications, longer response times are advantageous. For instance, slower response times can extend the lifespan of light bulbs by controlling dimming, or reduce capacitive feedthrough and coupling noise in analog signal control via digital switches.