

논리회로 및 설계

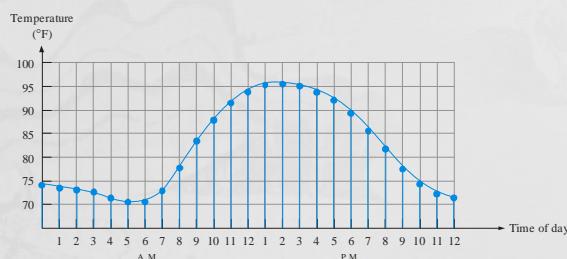
Chapter 1

일부 이미지 저작권:
Wikipedia, Creative Commons
Pearson Educations

Floyd, Digital Fundamentals, 10th ed.

아날로그와 디지털

Natural quantities : **analog**



Digital value : **discrete value**, processing, store, transmit

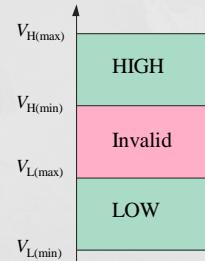
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전압의 이진수 대응

전압값 :

HIGH와 LOW 상태를 이진수의 1과 0으로 대응

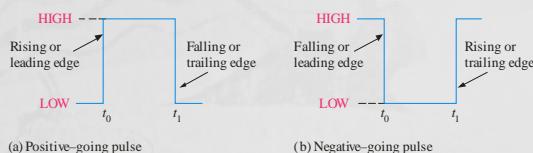
그러나 전압은 아날로그 물리량
디지털화를 위해 범위를 설정



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디지털 파형

Digital waveforms : LOW and HIGH levels, ideal form

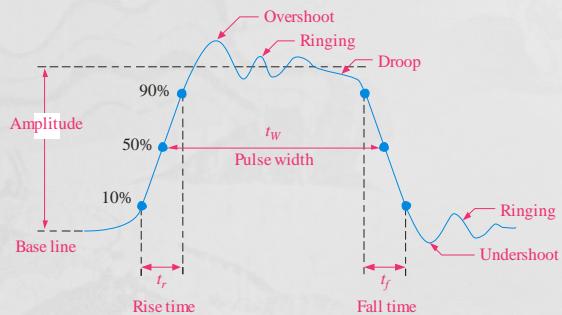


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Pulse 의 정의

Actual pulse : Analog domain

Parameters : rise time, fall time, amplitude ..



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주기적 Pulse

Periodic pulse : 일정 주기로 반복됨, 주파수(hertz)

$$f = \frac{1}{T} \quad T = \frac{1}{f}$$

clock : 주기적 pulse를 이용한 동작 기준이 되는 waveform

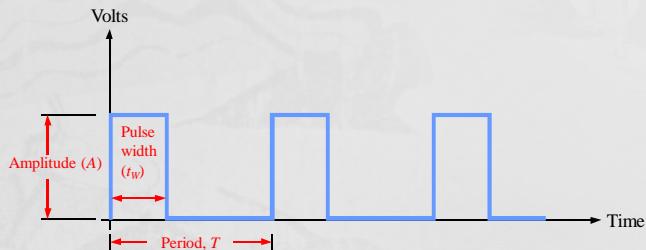
$$f = 3.2 \text{ GHz} \text{ 의 주기는? } \quad T = \frac{1}{f} = \frac{1}{3.2 \text{ GHz}} = 313 \text{ ps}$$

$$f = 1 \text{ GHz} \text{ 의 주기는? } \quad T = \frac{1}{f} = \frac{1}{1 \text{ GHz}} = 1 \text{ ns}$$

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디지털 pulse의 정의

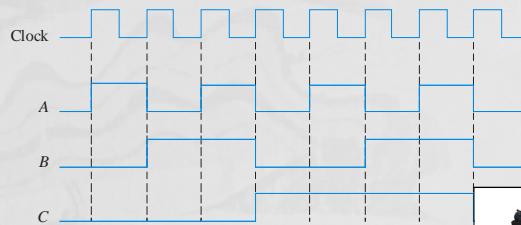
Frequency, period
amplitude (A), pulse width (t_w), duty cycle.



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Timing Diagram

A timing diagram : 여러 디지털 신호의 상호관계

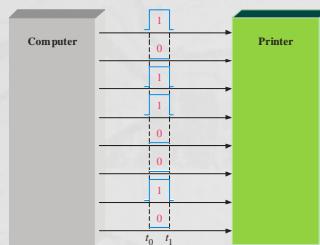
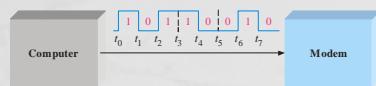


logic analyzer : 계측



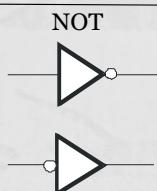
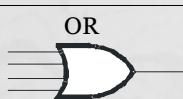
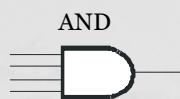
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Serial, Parallel data



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Logic symbols

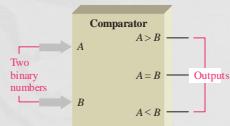


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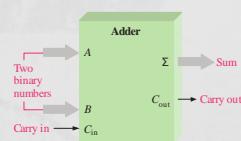
System Functions

And, or, not 의 집합 = System Function

Comparator



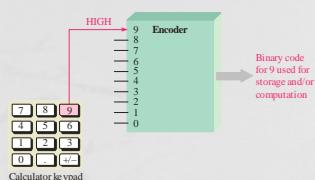
Adder



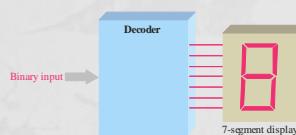
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System Functions

Encoder



Decoder

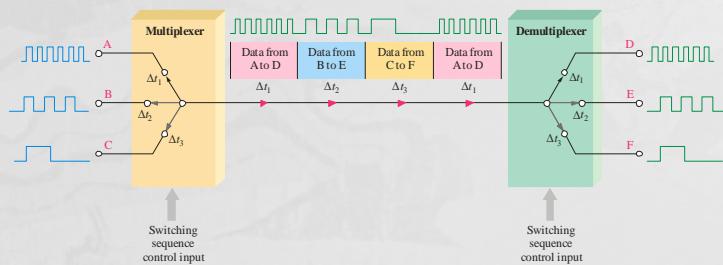


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System Functions

Multiplexer(Mux),

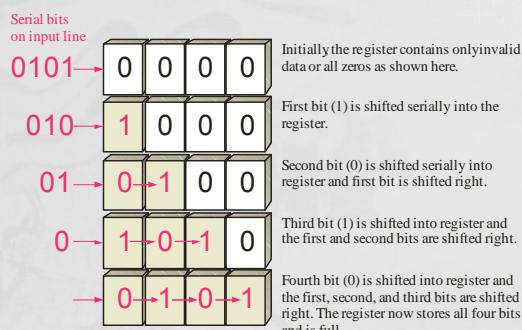
Demultiplexer(Demux)



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System Functions : Storage

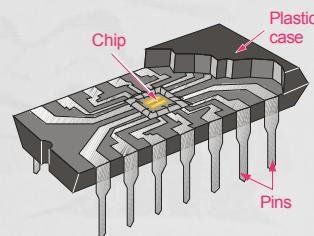
Shift register



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Implement

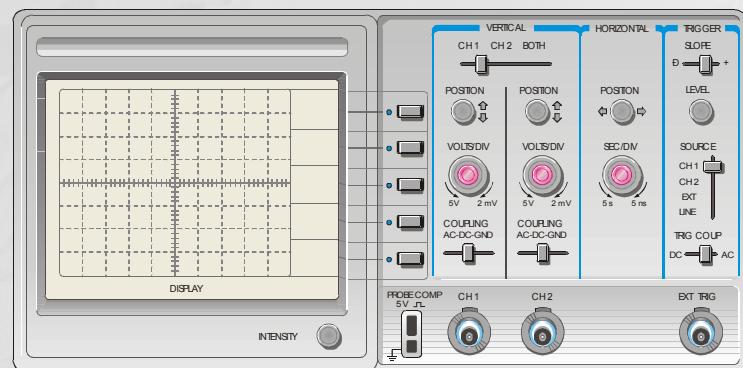
Integrated Circuit(IC)



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Measurement : Oscilloscope

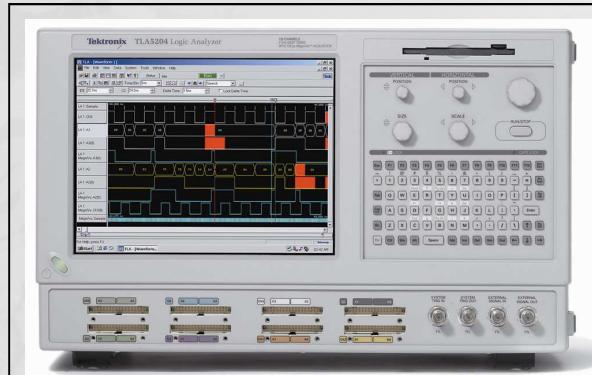
Analog domain



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Measurement : Logic Analyzer

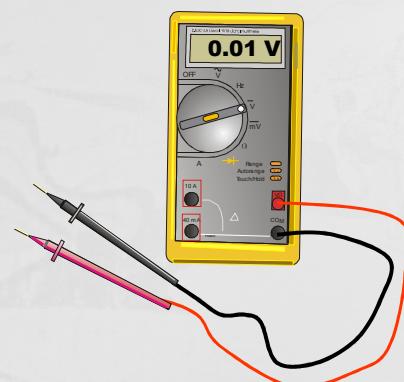
Digital Domain



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Measurement : Digital Multimeter

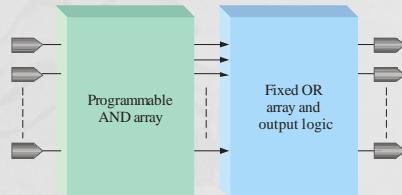
Voltage
Resistance
Current



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Programmable Logic

PLD : PAL, GAL, FPGA



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Check point

- Analog/Digital : Analog의 Digital 해석
- Clock
- Waveform
- System Functions : *, +, ~ 집합
- Storage : 기억의 구현
- Measurement : Analog, Digital 계측, 해석

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