# Pulse Width Modulation vs. Digital to Analog Conversion
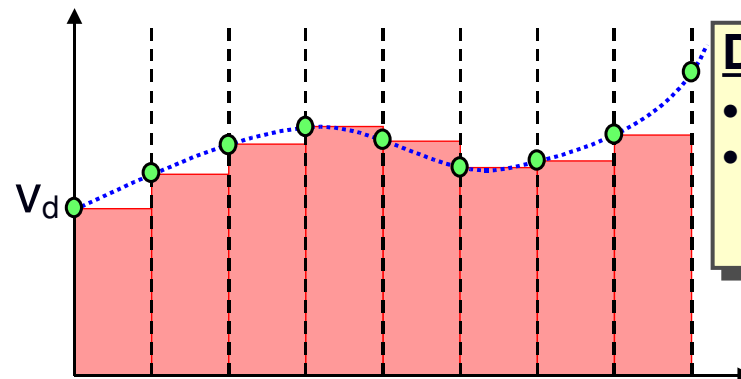
**discrete signal**
n bits
$(2^n$ values)

→ continuous signal

T

$t_d$

V

**PWM**
- Constant voltage
- Time modulation $(2^n$ values)
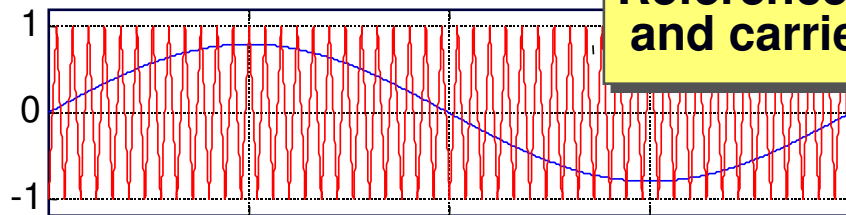
**Same volts per time**

$$V \cdot t_d = v_d \cdot T$$

$v_d$

**D/A converter**
- Constant time
- Voltage modulation $(2^n$ values)

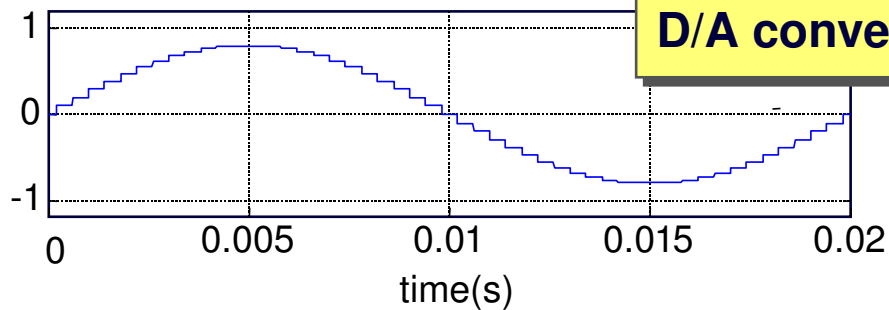# Pulse Width Modulation vs. Digital to Analog Conversion
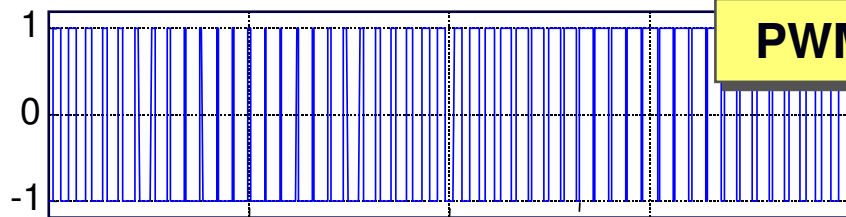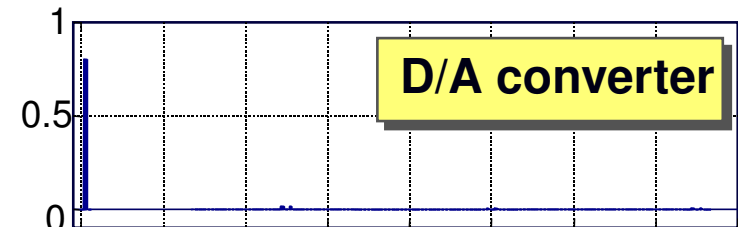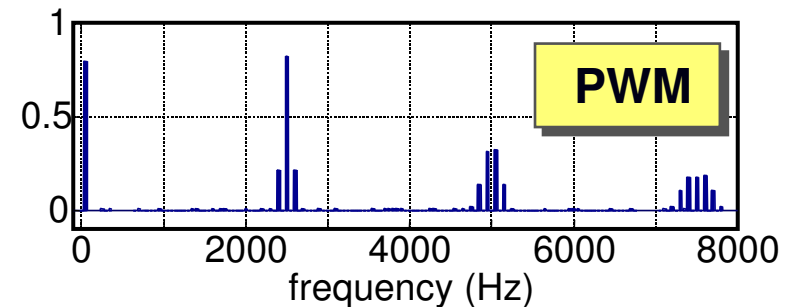
# Linear vs. Switched Amplifiers

## Linear amplifier

Losses = $(V_{dc}-V_L) * i_L$

$V_{dc}$

$V^*$

$i_L$

$V_L$ | Load
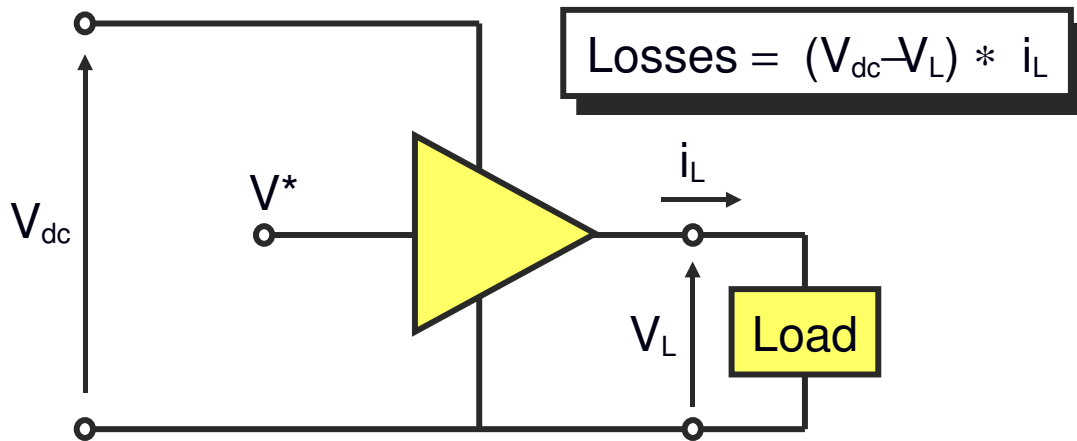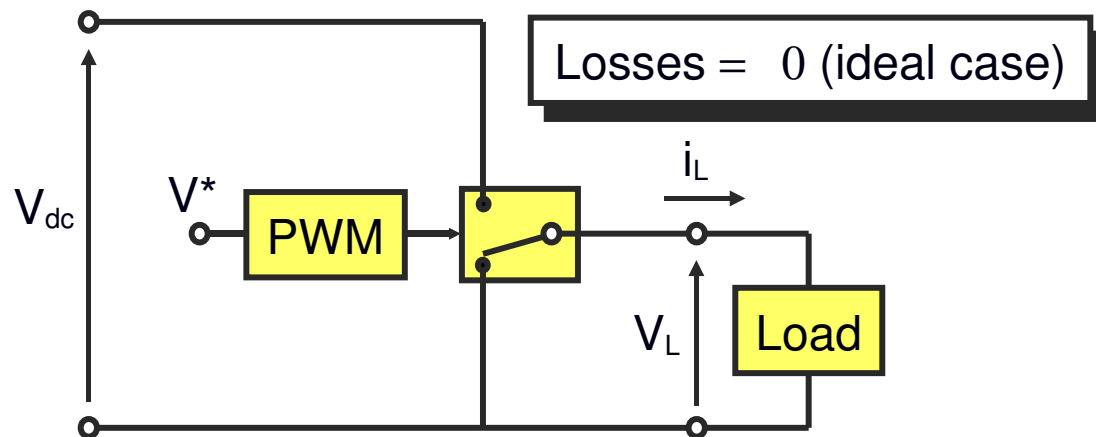
**Pulse width modulation using a triangular carrier signal (half-bridge configuration)**

## Switched amplifier

Losses = 0 (ideal case)

$V_{dc}$

$V^*$ | PWM

$i_L$

$V_L$ | Load

$V_{dc}/2$

Inverter

$V_L^*$

$-$

$V_L$

$V_{dc}/2$