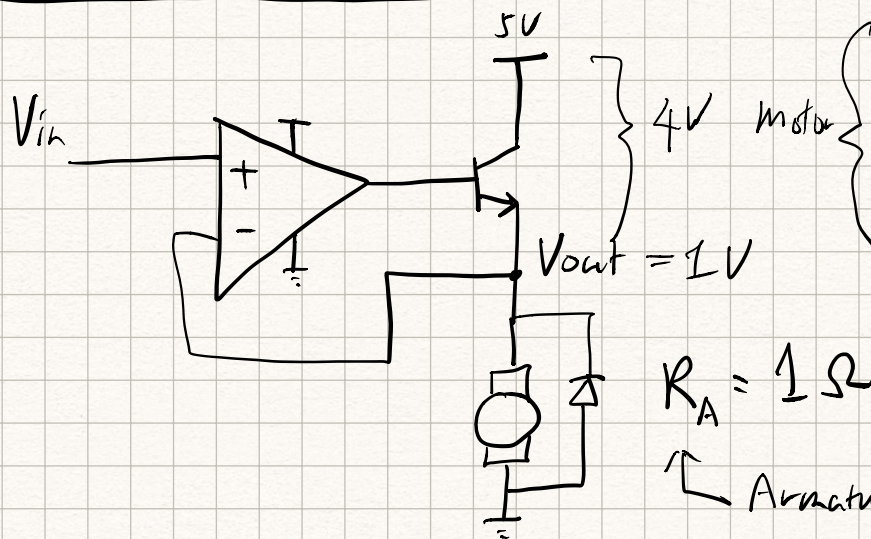


Power Consumption in Linear Amplifiers



Let's say $V_{out} = 1V$
 $\Rightarrow I_m = 1A$
 $\Rightarrow P_M = 1W$

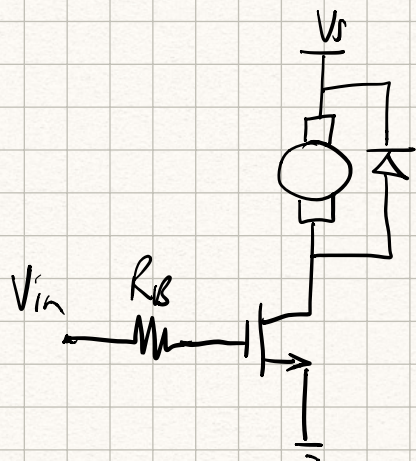
Amplifier

$$V_S - V_{out} = 4V$$

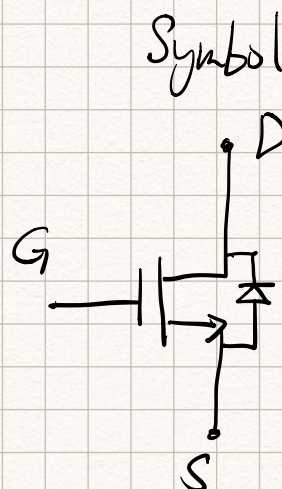
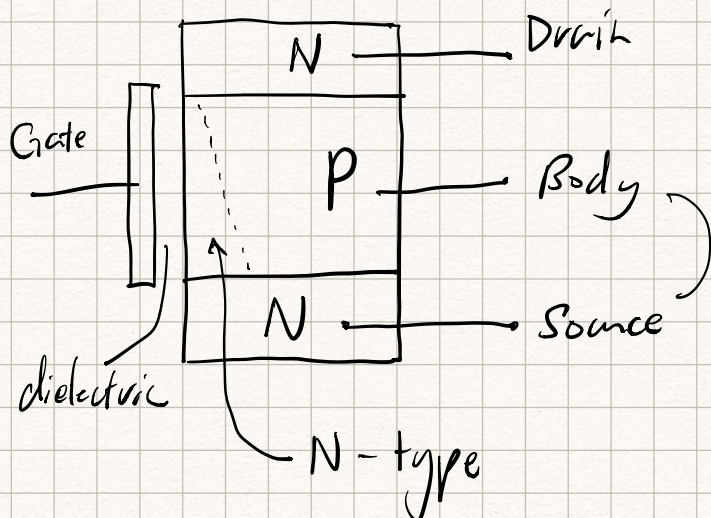
$$P_{Amp} = 4V \cdot 1A = 4W$$

In a linear amplifier, power not delivered to the load is dissipated in the amplifier.

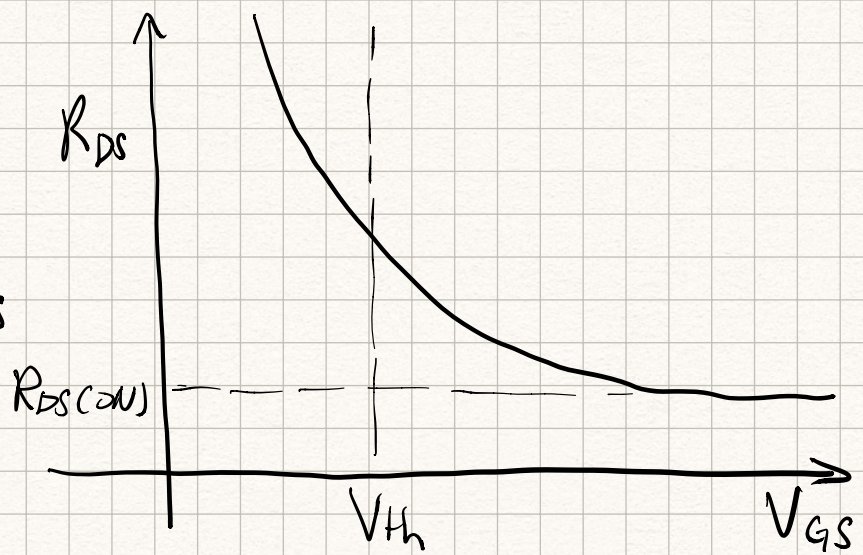
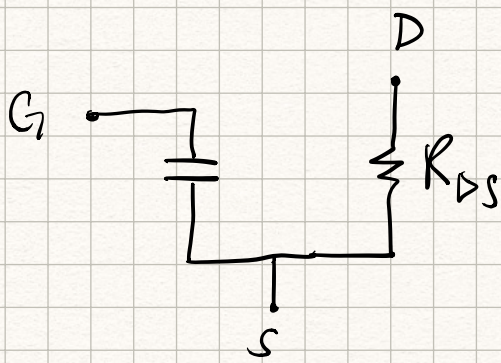
For most drivers, use PWM



MOSFETs



Electrical Model



Key specifications

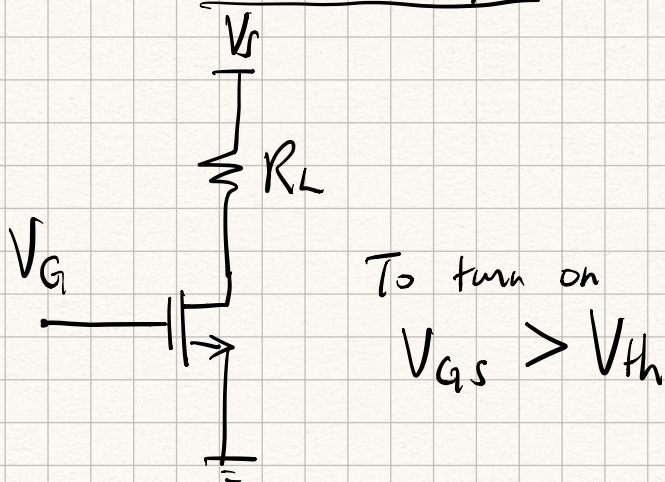
$R_{DS(ON)}$ — depends on V_{GS} — usually $< 100\text{ m}\Omega$

V_{Th} — Threshold voltage — depends on R_{DS} & I_D
— usually $> 4\text{ V}$

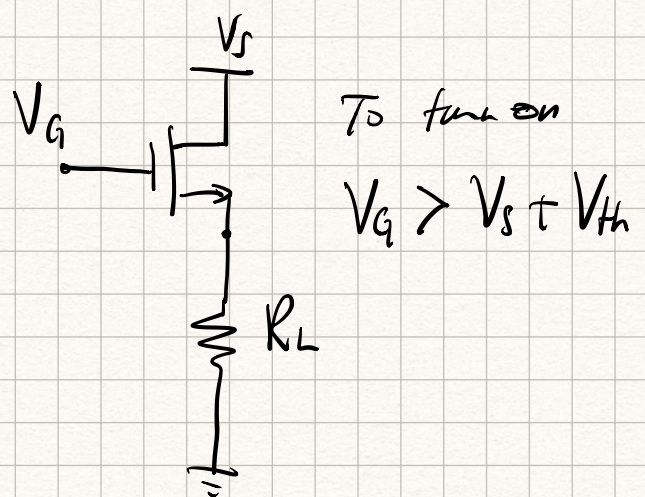
BV_{DSS} — Drain-to-source breakdown voltage
Typically $BV_{DSS} \geq 30\text{ V}$ for a 12 V supply.

MOSFETs as switches

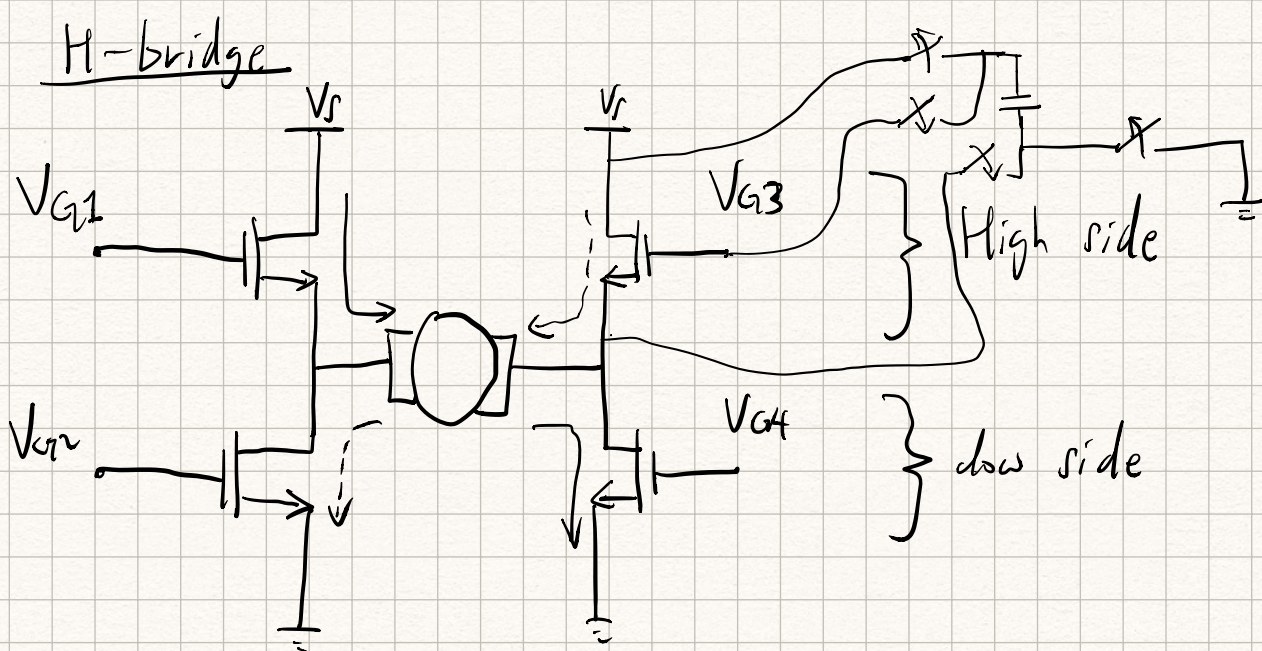
Load on top



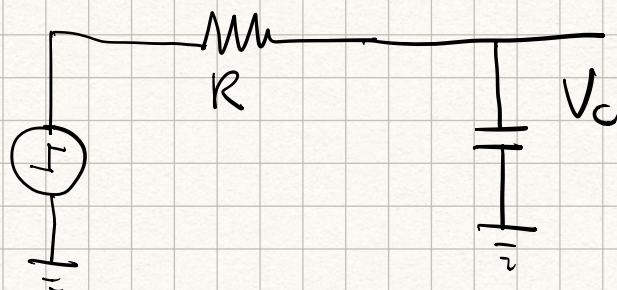
Load at the bottom



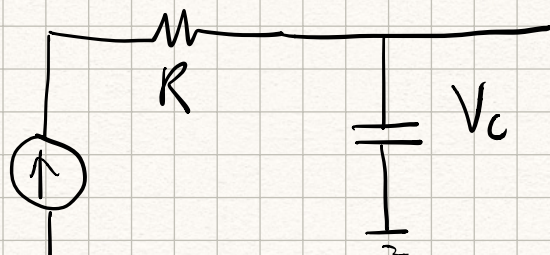
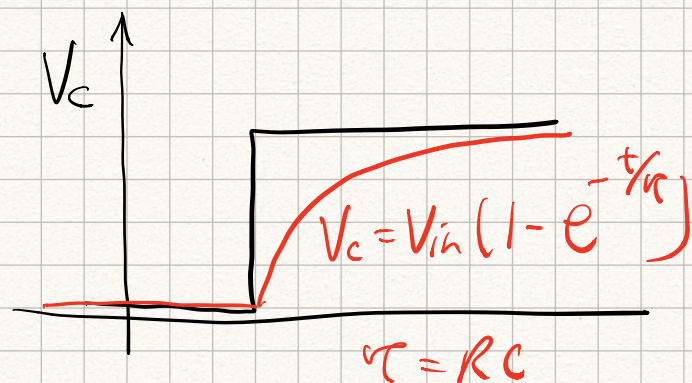
H-bridge



How to drive a MOSFET



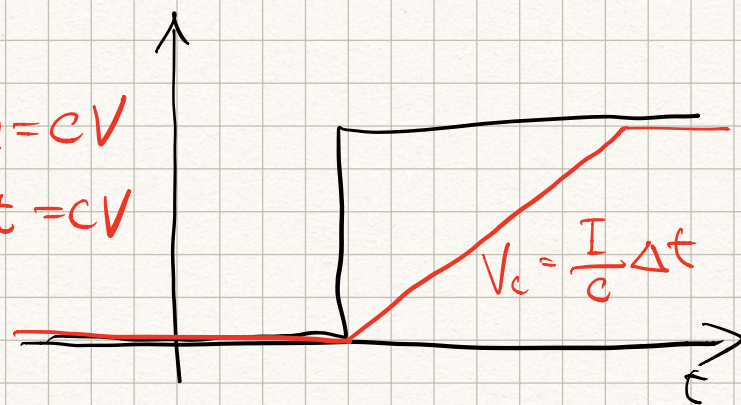
Resistance limited



Current limited.

$$Q = eV$$

$$I\Delta t = CV$$



Options for driving MOSFETs

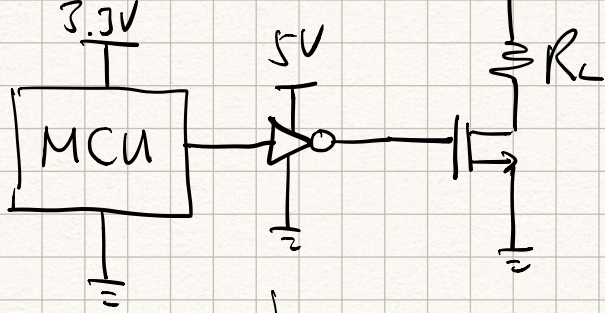
- ① Use a logic gate
- ② Use a FET driver (specially designed IC)

⇒ Use an op amp? — No.

Logic Gates



5V
T



74 ACT 14 "14"

Temp. Range	Technology - Transistor - Thresholds Input	Product
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(Inverter with Schmitt trigger)
like a comparator

Typically output current limited to 20mA

FET drivers

- Typically output current of $\pm 1A$

