

Ch 5:

Mosfets and how to use them: (Video)

- it sunk in that Mosfets can act as a variable resistor dependent on how much voltage is applied to the gate until we reach our threshold voltage, then the resistance drops quickly
- when using Mosfets with arduino/raspberry Pi: make sure to use a logic level Mosfet, or a $V_t < 5V$

- if a heat sink is needed:

$$P_D = R_{DS} \times I^2 \rightarrow P_D = \frac{(T_{max} - T_{ambient})}{R_{\theta JA}}$$

$R_{\theta JA} \leftarrow$ junction to ambient coefficient

Ch 6:

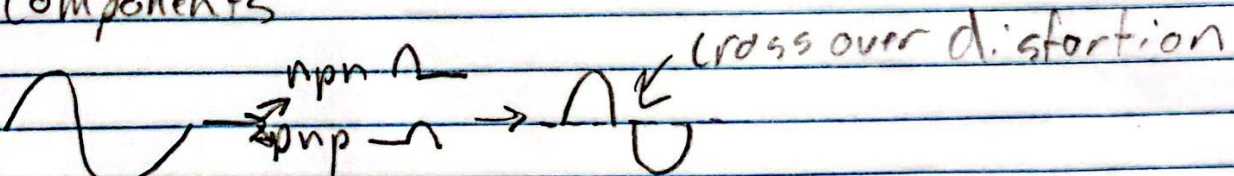
Class A, B, AB, C, D (Video)

Class A: Better high Frequency and Feedback loop stability

- 360° conduction angle (remains active the entire time through signal)
- high power losses ($\eta = 25\% - 30\%$)

Class B:

- splits the signal into positive and negative components



$$\eta = \pm 60\%$$



Class AB:

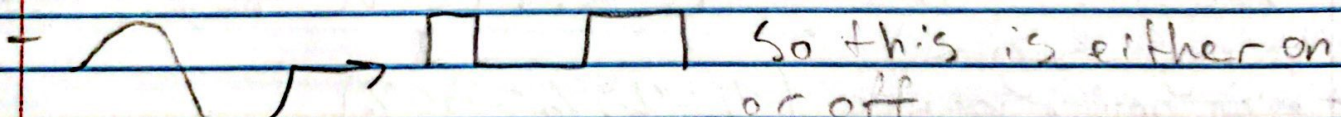
- overcomes the cross-over distortion with the addition of diodes. This biasing technique reduces mismatch in the deadzone.
- The efficiency is reduced from class B, but still remains higher than class A.

Class C:

- very efficient (40%) in radio frequency range.
- works in an untuned and tuned modes.
- only works for 180° conduction angle
- Huge distortion across the output.

Class: D

- conduction angle is not a factor since the AC input signal is changed to pulse square wave with variable pulse width.



- then reconstructed with low pass filters.
- highest power efficient amplifier class

ch 4

- 6 awesome applications for diodes (videos)
- 1) rectifiers (half and full wave)
- 2) protection against reverse polarity
 - IC's, micro-controllers, etc. so they don't blow components
- 3) Using diodes to connect multiple power sources
 - can be used to charge backup battery when main power is off (AC and DC Power together)
- 4) diodes can be used to reduce voltage in a circuit
 - 5V-diode = 4.3V based on temp
- 5) Diodes used as Fly back
 - diodes used in parallel with relays will reduce spikes while turning switch on.
 - all types of inductive loads make spikes (DC motors, solenoids)
- 6) zener diodes for regulating voltages
- 7) using zener diodes to protect from over-voltage
 - zener used with a fuse in reverse bias and parallel to main circuit will protect it from over voltage and burn out the fuse
- 8) Using LED for communication
 - pulses of light in the IR range can send information that is picked up by a sensor (TSOP31238).
 - (TV remote, other remotes at home)