# Power Amplifier Trade Study

## IC

## Discrete

### Class A

Class A power amplifiers have their transistors biased in the active region continuously. An example would be the emitter follower circuit, which as shown in Sedra/Smith’s Microelectronic Circuits has a maximum attainable efficiency of 25%. Based on this efficiency rating, we might want to look for a more power efficient solution for our CubeSat

### Class B

Class B power amplifiers have one transistor amplify the positive portion of the waveform and another amplify the negative portion. It does this with a complementary pair of transistors (for BJTs, one NPN and one PNP). However, as each transistor has a turn on voltage, there is a dead band around 0V. As the signal crosses through this deadband, there is crossover distortion, which would most likely be unsuitable for our SSB signals. However, the advantage of this design is a theoretical maximum attainable efficiency of 78.5%

### Class AB

The class AB is very similar to the class B amplifier, with two complementary transistors used to amplify the positive and negative portions of the waveform. However, this amplifier avoids some of the crossover distortion by biasing each transistor such that they are both “turned on” at the zero crossing. As such, the efficiency depends on the amount of crossover distortion tolerated. As the idle current increases, there is more power lost when the amplifier is producing no output.

### High Efficiency Linear Amplifier by Parametric Synthesis (AO-7 Style)

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### Doherty