Power Amplifier Design and Testing

Functional Description and Complete System Block Diagram

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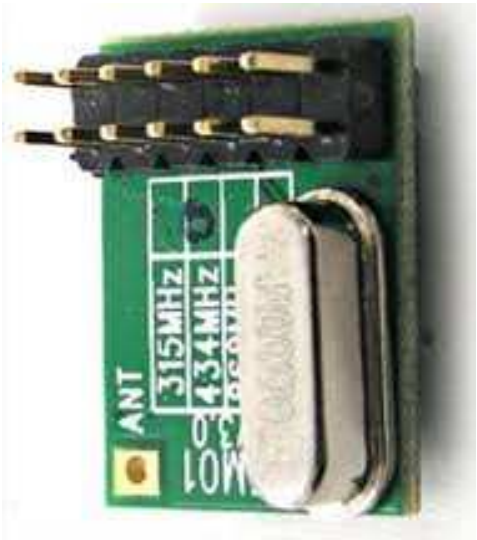


Introduction:

An RF power amplifier is a type of electronic amplifier used to convert a low-power radio-frequency signal into a larger signal of significant power, typically for driving the antenna of a transmitter. It is usually optimized to have high efficiency, high output power, good return losses on the input and output, and good gain.

RF power amplifiers are most commonly used in wireless communication. This is done by sending a signal through the air, and as the power is amplified the range is increased. The application we choose to pursue will be in this area.

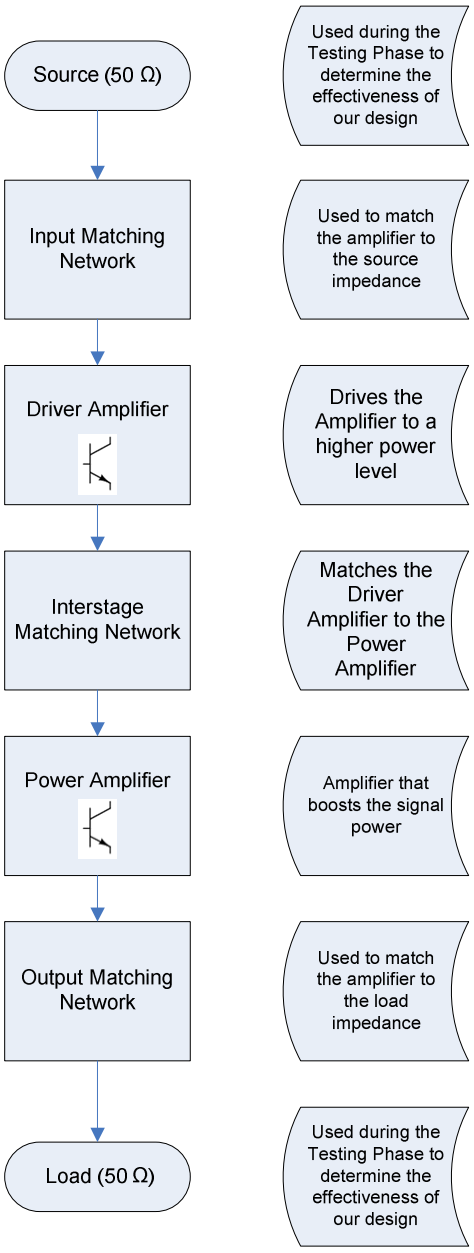
Project Goals:

The goal of our project will be to design and test a power amplifier that is best suited for the application of our choosing. The two important factors in determining a power amplifier are efficiency and linearity, which have an inversely proportional relationship (i.e. as efficiency increases, linearity decreases). The choices for our application include: Bluetooth, RFID, WiMax, Zigbee, and possibly WiFi. Also affecting our choice of power amplifier will be the regulations and specifications of the application, particularly the frequency range and output power. After determining this information and choosing our application, we will move on to selecting an appropriate topology and architecture for both the power amplifier and a suitable transistor.

After simulation of the amplifier, using Agilent ADS, we will fabricate it and begin extensive testing to see if it meets the design specifications. To fabricate, we will use a RF circuit board using micro-strips, and surface mount components, which include transistors, inductors, and or capacitors.

The testing will be done in the RF lab using both the network analyzer and spectrum analyzer. At this point, we will be measuring the S-Parameters, which will give us the gain and return losses, linearity, and efficiency. Time permitting we will demo our power amplifier in conjunction with other applications.

Complete System Block Diagram:



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