

MAX2247 Power Amplifier for 802.11g WLAN

This application note presents component values and placement to configure the MAX2247 Power Amplifier for 802.11g WLAN operation with OFDM at 2450 MHz. Goal is to deliver +17 dBm with 3% EVM using 175 mA of supply current. The schematic is given, along with a photograph of the completed circuit board.

Overview

The MAX2247 2.4GHz power amplifier (PA), which is characterized to deliver up to +24dBm linear output power for 802.11b, is here optimized for 802.11g WLAN (wireless local area network) applications. From a single +3.3V power supply, the PA can deliver +17dBm linear output power, with 3% correct-EVM (error vector magnitude), at 175mA, while exceeding 802.11g and FCC out-of-band specs by at least 3dB. The device features a logic level shutdown pin with guaranteed enable time, that allows the supply current of the device to be reduced to 0.5uA. The device also integrates a power detector which has a buffered, single-ended output, allowing it to interface directly with the baseband power detection ADC (analog to digital converter). Externally adjustable bias current also allows the side-lobe suppression and ACP (adjacent channel power) to be optimized for a specific application. The device is featured in the ultra-small 3 x 4 UCSP (1.5mm x 2.0mm) package and utilizes Maxim's proprietary SiGe-BiPolar process. The performance, small size, low cost and the high volume availability of the PA make it an excellent choice for 802.11g WLAN transceivers.

MAX2247 Power Amplifier Optimization for 802.11g WLAN

The standard MAX2247 evaluation kit requires minimal optimization to tune the PA for 802.11g operation. The PA requires a small amount of inductance to optimize the interstage matching between the 1st and 2nd, and 2nd and 3rd stages of the PA. This inductance is provided in the form of a small PCB (printed circuit board) transmission line. The exact amount of inductance is tuned by adjusting the location of the shunt V_{CC} bypass capacitors, C4 - C7. The output stage of the amplifier is matched to the load by a series inductance, and a shunt capacitor to ground. Again, the low-loss high-Q nature of the output transmission line is utilized to provide the desired series inductance. The continuous nature of the transmission line allows fine-tuning of the series inductance which is not offered by a lumped element. The location of the shunt capacitor, C3, sets the amount of series inductance and completes the match to the load, optimizing the part for output power, EVM, ACP, gain and efficiency. Finally, the PA bias current of 160mA is determined by setting the V_{BIAS} pin to 2.1V.

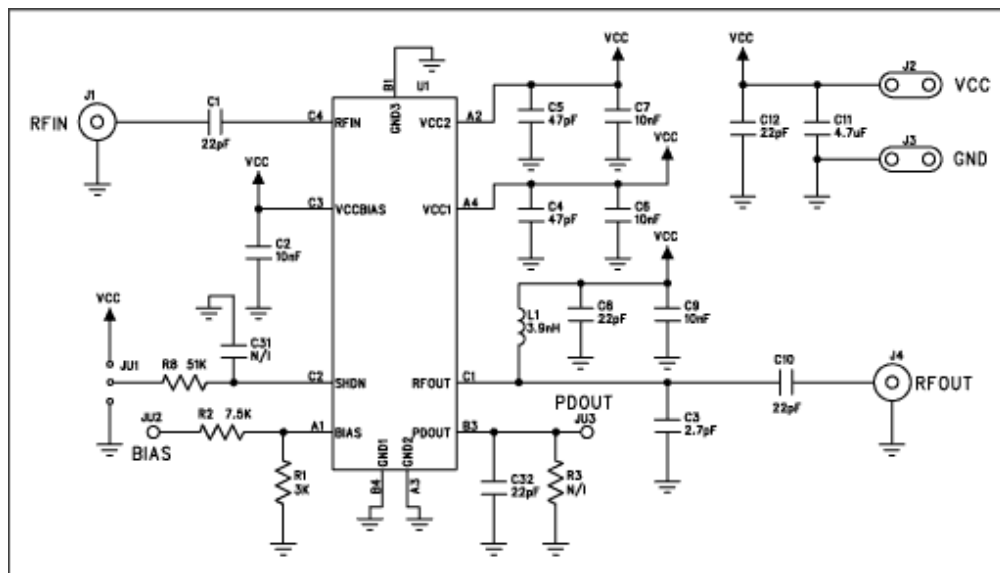


Figure 1. schematic of the MAX2247, optimized for 802.11g

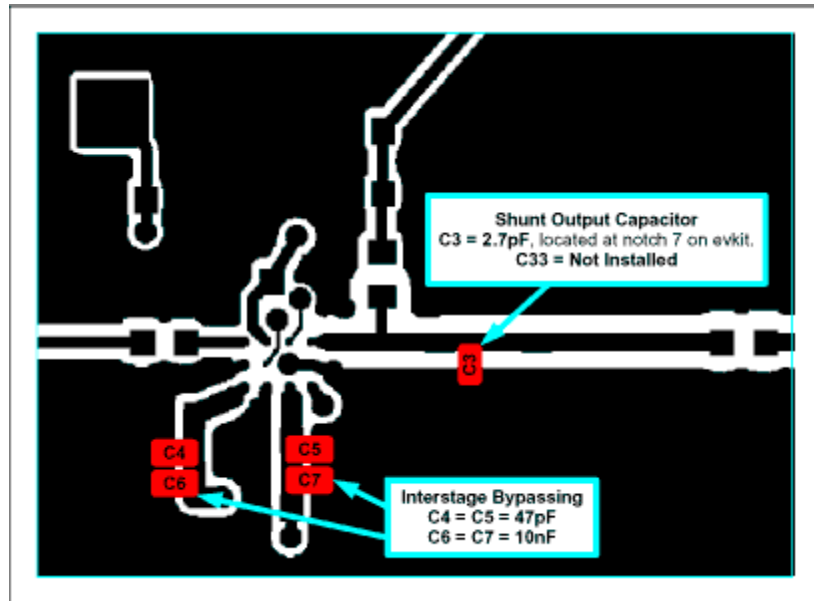


Figure 2. optimum location of the VCC1 and VCC2 bypass capacitors, and output matching capacitor



Figure 3. close-up photograph of the component locations

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