Application Note 1104: Jun 14, 2002

+19dBm Linear Power Amplifier for 2.4GHz IEEE802.11b DSSS WLAN Applications: MAX2242

This application note presents the optimum modifications to the MAX2242 power amplifier evaluation kit. The result supports +19dBm in IEEE802.11b DSSS applications. The device operates at 2.4GHz, and measured data is presented for gain, supply current and side-lobe suppression. Printed circuit component locations are shown in detail.

Additional Information: Wireless Product Line Page
Quick View Data Sheet for the MAX2242
Applications Technical Support

General Description

The MAX2242 is a low-cost, ultra-small (1.5mm x 2.0mm), highly versatile power amplifier (PA) for linear and non-linear applications in the 2.4GHz frequency band, with on-chip power detector. The device was originally characterized to deliver +22.5dBm linear output power (-33dBc side-lobe suppression under 11Mbps IEEE802.11b modulation) at a supply current of 310mA from a 3.3V supply (refer to the MAX2242 data sheet for further performance information). An adjustable bias control allows the PA to be tuned for linear output power levels up to +22.5dBm and non-linear applications at saturated output power levels up to +27dBm. This application note covers the tuning of the MAX2242 for +18dBm of linear output power, and the performance of the device over frequency and temperature variations. Refer to Table 1 for the MAX2242 performance vs. frequency.

Table 1. The MAX2242 Optimized for +19dBm Output Power (V_{cc} = +3.3V, 802.11b 11 Mbps, RBW = VBW = 100kHz)

Frequency (MHz)	Input Power (dBm)	Gain (dB)	Supply Current (mA)	Side-Lobe Suppression (dBc)	Side-Lobe Suppression (dBc)
2412	-8.52	27.52	167	-36.7	-34.2
2452	-8.26	27.26	164	-33.8	-34.7
2482	-7.82	26.82	162	-35.2	-34.0

Matching and Bias

The MAX2242 is a three-stage amplifier that requires output matching as well as some interstage matching for optimum gain and side-lobe suppression. Figure 1 demonstrates the

layout of the MAX2242 EV kit with optimized component location for +19dBm output power. Replace the shunt output capacitor, C2, with a 2.2pF capacitor and locate the capacitor at notch 5 of the EV kit.

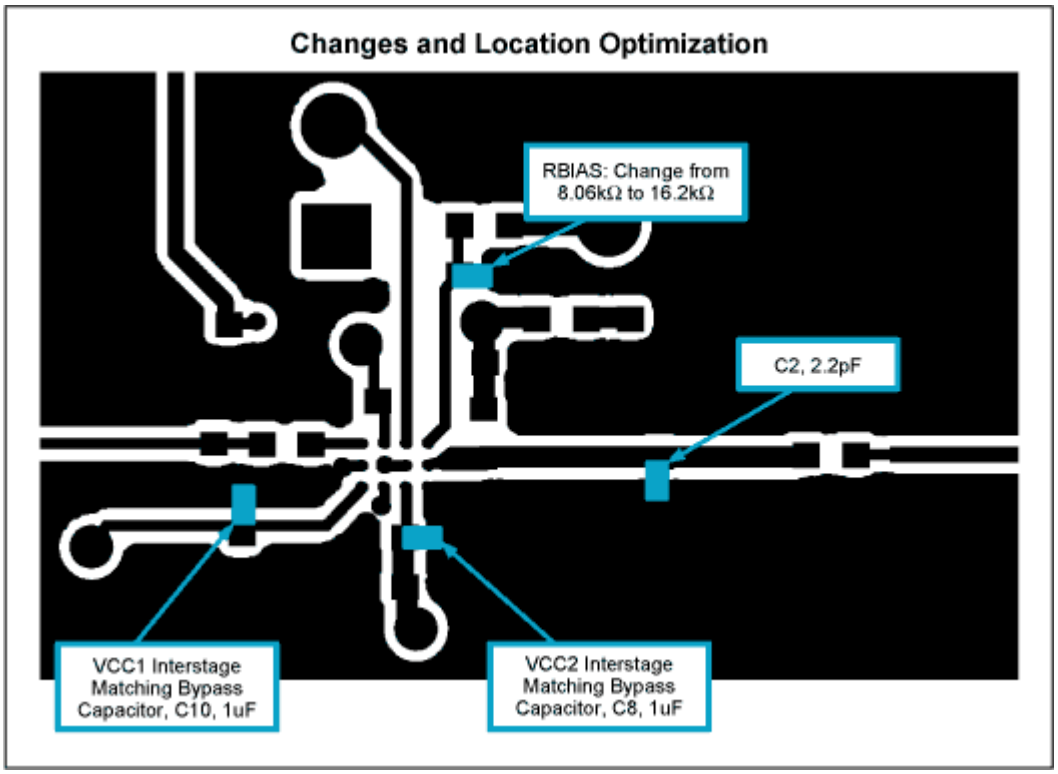

Figure 1. The MAX2242 +19dBm matching component changes and location optimization

Figure 2 is the schematic of the MAX2242 EV kit optimized for +19dBm. Some slight adjustment of the location of the capacitor may be required to optimize performance. Moving the location of C2 away from the PA output tends to improve efficiency and degrade gain and side-lobe suppression, while moving the capacitor in towards the PA output, has the opposite effect. The MAX2242 EV kit provides a small amount of inductance in the form of a transmission line on the V_{CC1} and V_{CC2} lines. Adjusting the location of the bypass capacitors on the V_{CC} lines adjusts the amount of pull-up inductance seen by the amplifier and thus the match between stages. Locate V_{CC1} bypass capacitor, C10, on the pad for C10. Move V_{CC2} bypass capacitor, C8, from pad C8 to pad C7. Some experimentation with the location of these bypass capacitors will optimize performance for your application. In addition to adjusting the location of the bypass and matching capacitors, the value of the bias resistor, R1, needs to be changed to 16.2kΩ. This sets the DC bias of the PA to around 138mA from a 3.3V voltage supply. Refer to the MAX2242 EV kit data sheet for further assistance with the EV kit schematic, PC board trace dimensions and characteristics, and critical grounding information.

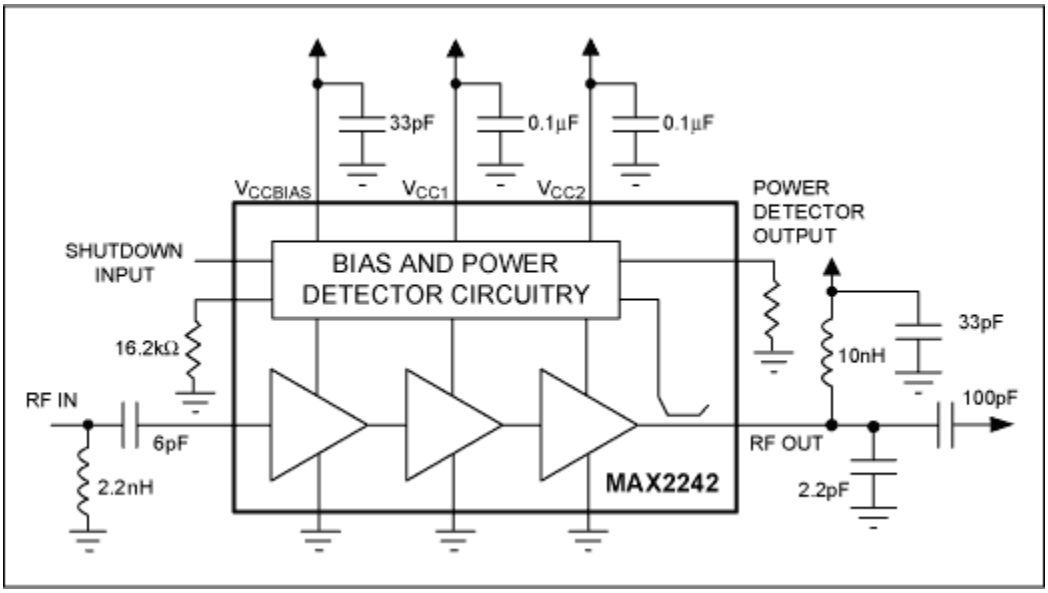

Figure 2. The MAX2242 +19dBm application circuit

MORE INFORMATION

MAX2242: QuickView -- Full (PDF) Data Sheet (200k) -- Free Sample