Application Note 1914: Mar 06, 2003

# Power Amplifier Delivers +25dBm for 5.8GHz Cordless Phone or UNII Band Transmitters

*The MAX2840 SiGe PA features an integrated power detector, low-power shutdown, and adjustable bias current, that allows the performance of the device to be optimized for different application requirements. Originally optimized to deliver +15dBm of linear output power for 802.11a applications in the 5.15 to 5.35GHz band, the device has been optimized for the 5.8GHz UNII band, and can deliver up to 25.5dBm of CW output power from a 3.3V power supply.*

Additional Information: Wireless Product Line Page
Quick View Data Sheet for the MAX2840, MAX2841
Quick View Data Sheet for the MAX2648
Quick View Data Sheet for the MAX2649
Applications Technical Support

## Introduction

The MAX2840 SiGe PA (power amplifier) features an integrated power detector, low power shutdown, and adjustable bias current, that allows the performance to be optimized for different application requirements. The MAX2840 was originally optimized to deliver +15dBm of linear output power for 802.11a applications in the 5.15 to 5.35GHz band. In this application report, the device is optimized for the 5.8GHz UNII band. The MAX2840 delivers up to 25.5dBm of CW output power from a 3.3V power supply in 5.8GHz applications.

## Measured Performance

- **Output Power**. Please refer to Figure 1 for a graph of output power vs. input power for various bias settings. The gain of the power amplifier can be optimized from 20 to 27dB by adjusting the bias current of the PA.

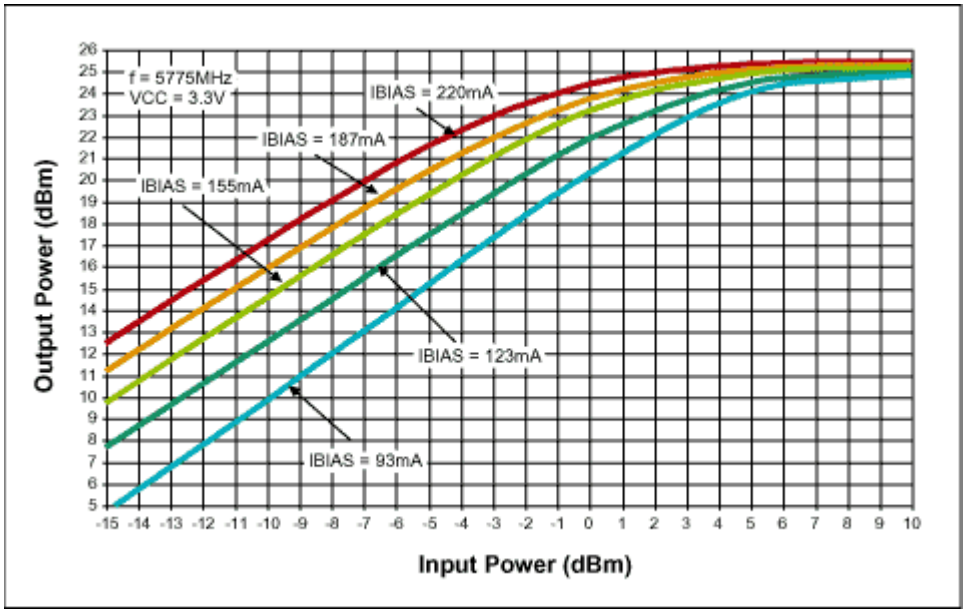


*Figure 1. The MAX2840 5.8GHz PA output power vs. input power*

- **Gain**. Refer to Figure 2 for a graph of gain vs. input power for various bias current settings. In addition, lowering the bias current of the PA, lowers the overall bias current of the device under RF drive.

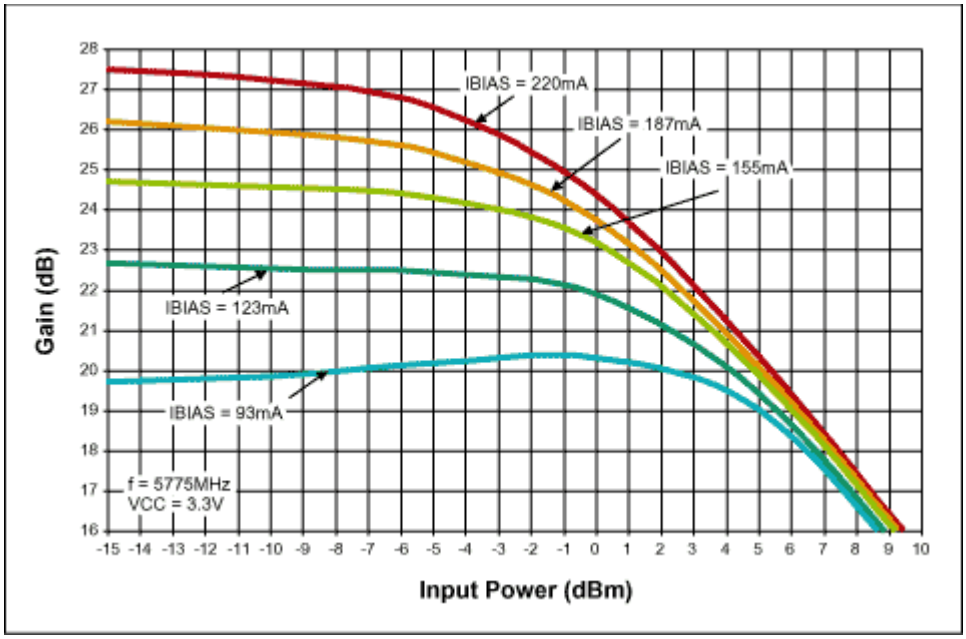


*Figure 2. The MAX2840 5.8GHz PA gain vs. input power and bias current*

- **Supply Current**. Refer to Figure 3 for a graph of supply current vs. input power for various bias current settings. The PA can be optimized to deliver up to 23% PAE efficiency at 5.8GHz

under CW operation. Figure 4 demonstrates the PAE achieved for various input drive levels and bias current settings.

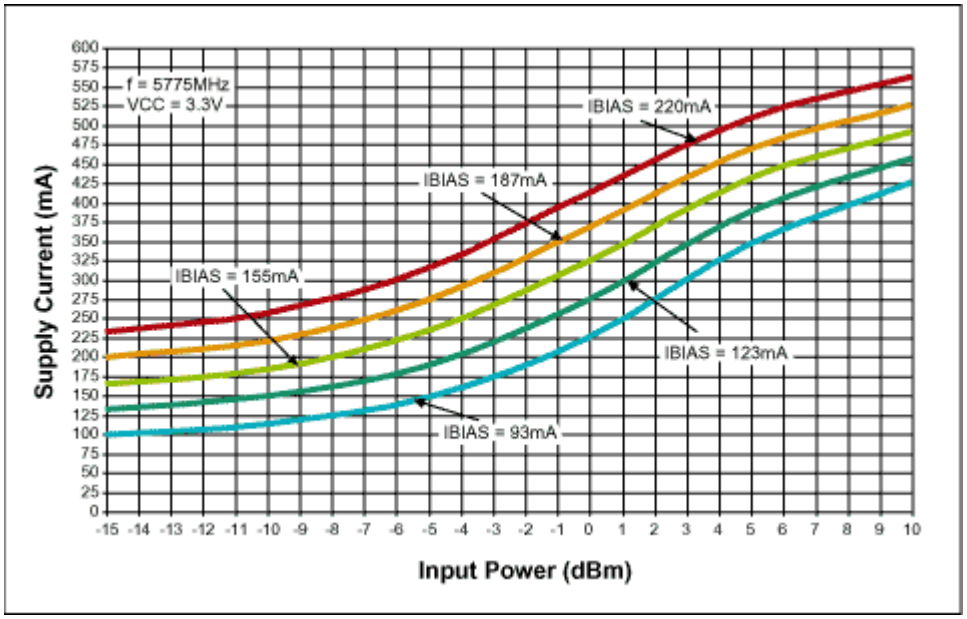


*Figure 3. The MAX2840 5.8GHz PA supply current vs. input power and bias current*

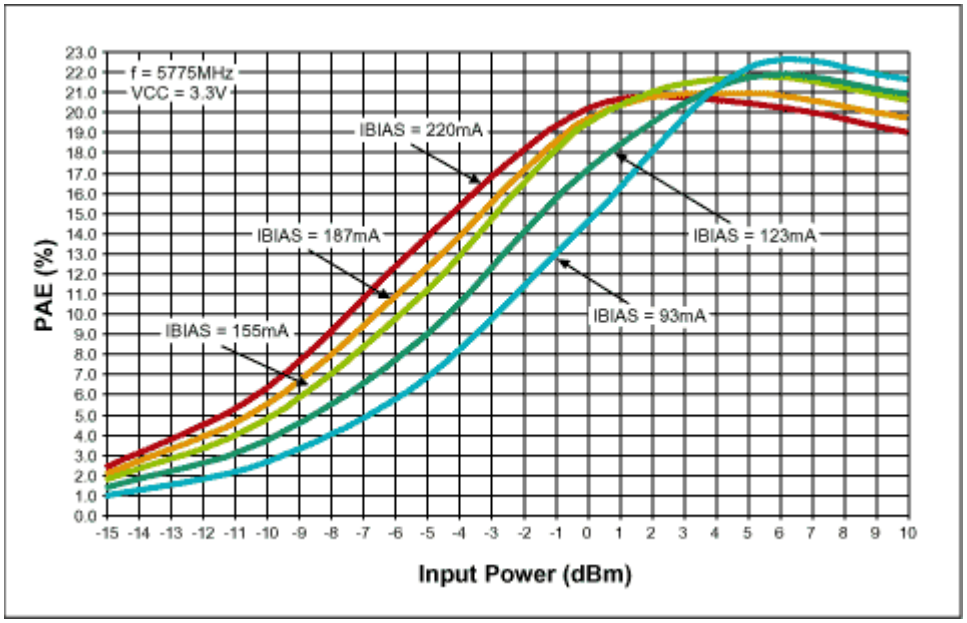


*Figure 4. The MAX2840 5.8GHz PA PAE vs. input power and bias current*

- **Input Match and Gain**. Figure 5 demonstrates the input return loss and gain of the device from 5 to 6GHz.

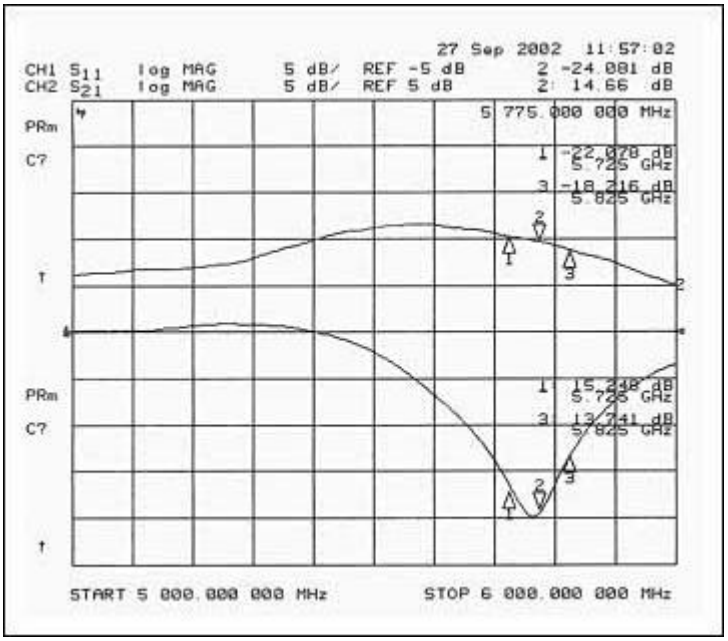


*Figure 5. The MAX2840 5.8GHz power amplifier input return loss and gain vs. frequency ($V_{DAC}$ = 1.6V).*

- **Schematic**. Refer to Figure 6 for the schematic of the MAX2840, which demonstrates the component changes that need to be made to the MAX2840 EV kit to achieve the above performance.

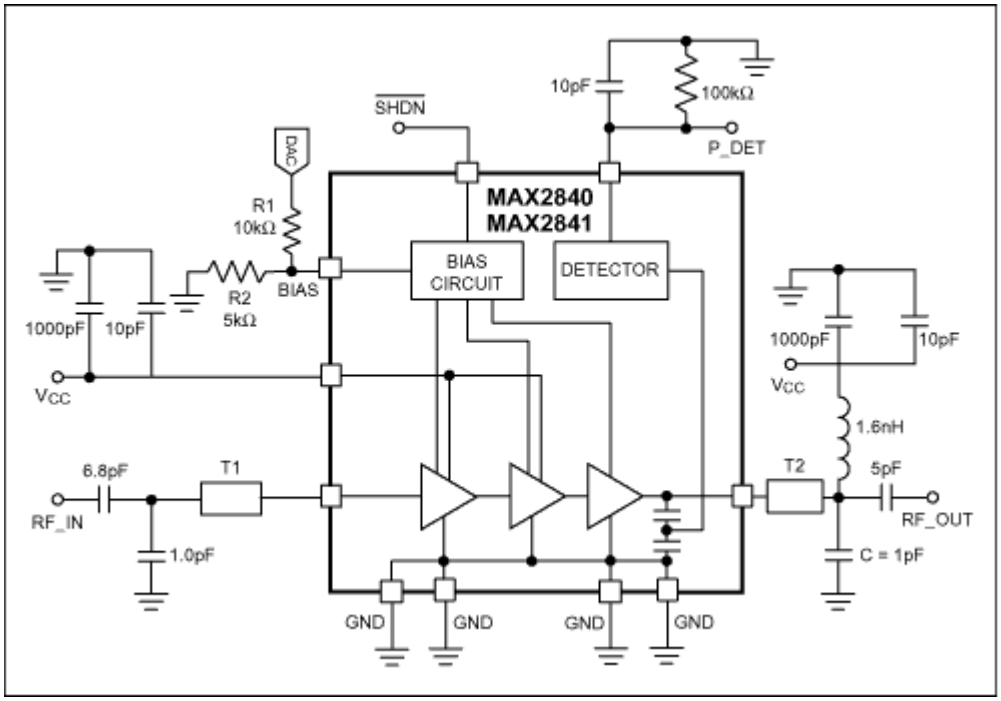


*Figure 6. The MAX2840 5.8GHz PA schematic*

- **Photograph**. Figure 7 is a photograph of the MAX2840 evaluation kit optimized for 5.8GHz and demonstrates the locations of the input and output matching components.

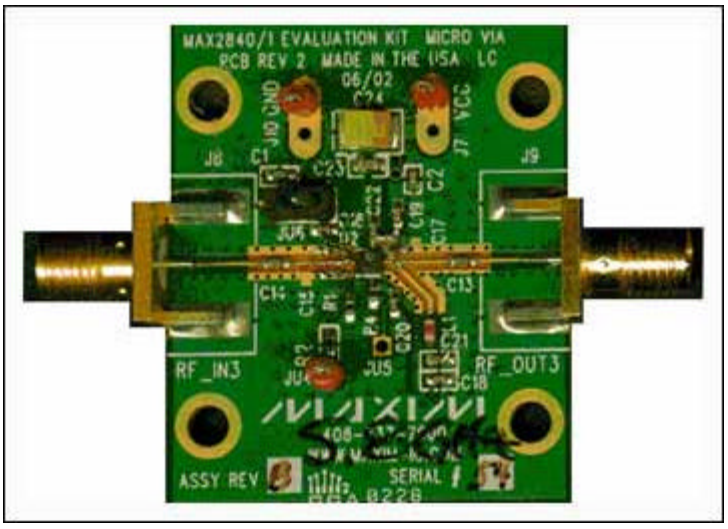


*Figure 7. The MAX2840 EVkit*

- **Predriver Candidates**. The MAX2648 and MAX2649 5 to 6GHz LNAs (low noise amplifier) with an output P1dB (1dB compression) point of +6.5dBm and 16dB of gain, are excellent pre-drivers for the MAX2840. Refer to the data sheet for the MAX2648 5GHz LNA for further information. For 5.15 to 5.35GHz 802.11a WLAN applications, refer to the MAX2840 data sheet.

**MORE INFORMATION**

MAX2648: QuickView -- Full (PDF) Data Sheet (160k) -- Free Sample

MAX2649: QuickView -- Full (PDF) Data Sheet (152k) -- Free Sample

MAX2840: QuickView -- Full (PDF) Data Sheet (7k)