MAX2266 Power Amplifier for the CDMA Cellular Band with PIN Diode Switch

A complete application circuit for the MAX2266 cellular band CDMA power amplifier (PA) is introduced. Details of the PIN diode switch are provided, as well as output power, gain, ACPR, power-added efficiency (PAE) and idle supply current data for the circuit. The low-power mode (only 39mA idle current) offers 15-16% PAE at +15dBm output power, and 11% PAE at +13dBm.

Additional Information: Wireless Product Line Page

Quick View Data Sheet

Applications Technical Support

For Japanese CDMA applications see The MAX2269 Power Amplifier for the Japanese CDMA Cellular Band with the PIN Diode Switch

Introduction

The MAX2266 power amplifier is optimized for IS-98-based CDMA cellular telephones operating in the cellular-frequency band. With optimized efficiency for medium output power, it achieves good efficiency at medium power, resulting in low-average current consumption in typical urban scenarios and longer talk time.

On the standard evaluation board of the MAX2266, a SPDT switch is used. This board achieves 31% PAE at +28dBm output power and 17% PAE at +16dBm output power. But in this application the PIN diode switch is used instead of the SPDT switch. In changing to the PIN diode, better power-added efficiency (PAE) at maximum output power is possible; in addition, the MAX2266 has good PAE at medium and low output power levels.

PIN Diode Switch

Alpha Industries' SMP1321-079 was used in this application. Figure 1 shows the schematic of the PIN diode switch. When the MAX2266 is in high-power mode, SHDN = High, POW = High, and the PIN diode switches to OFF. In this condition, Pout goes to high impedance. Then when the MAX2266 is in low-power mode, SHDN = High, POW = Low, and the PIN diode switches to

ON.

L1 and L3 are choke coil, and L2 requires parallel resonance with internal capacitance of the PIN diode. The PIN diode forward current is determined by R1.
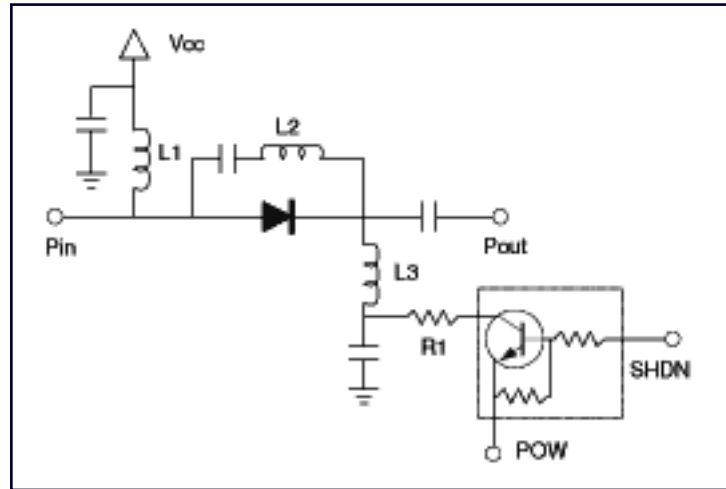

Figure 1

Figure 2 shows the output matching portion. If the low-power path isn't connected to the high-power path, the MAX2266's performance is almost the same as the MAX2265's performance. The MAX2265 achieves a PAE of over 37%. Poor isolation for the low-power path produces PAE and ACPR degradation. With the high-power mode, good isolation is needed for the low-power path to obtain good performance in that mode.
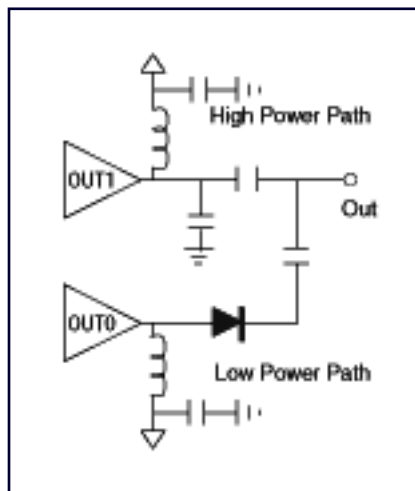

Figure 2

Performance

The performance results are shown in Table 1. There are three types of data: maximum output

power (+28dBm), switching point (+15dBm), and medium output power (+14dBm). When using the PIN diode switch, the PAE at maximum output power is improved because of obtaining high isolation between the two outputs. At maximum output power, an ACPR of over -45dBc and a PAE of 35% are achieved. At medium output power, an ACPR of over -46dBc and a PAE of 15% @ 15dBm and 11% @ 13dBm are achieved. Idle current is 39mA.

Table 1
(V_{CC} = 3.3V, Input Signal = CDMA Reverse Standard)

Frequency (MHz)	Gain (dB)	ACPR (885kHz) (dBc)	ACPR (1.98MHz) (dBc)	PAE (%)	Idle Current (mA)
High-Power Mode @ Pout = +28dBm					
824	26.72	-45.53	-56.03	34.45	
836	26.38	-46.44	-57.00	35.08	127
849	25.82	-45.88	-56.75	35.47	
Low-Power Mode @ Pout = +15dBm					
824	27.82	-45.92	-61.23	15.70	
836	27.62	-46.75	-61.34	15.97	39
849	27.26	-47.86	-61.26	15.70	
Low-Power Mode @ Pout = 13dBm					
824	28.06	-54.16	-64.10	11.19	
836	27.80	-54.91	-64.99	11.19	39
849	27.42	-54.65	-62.84	11.19	

Assuming the switching point from high-power mode to low-power mode to be +15dBm, Figures 3 and 4 show the field operation solution. In the CDMA system, the PAE at medium output power is very important for longer talk time in the field operation. If the MAX2266 is switched at +15dBm, the PAE increases at medium power; also, the ACPR at this point is less than -46dBc.
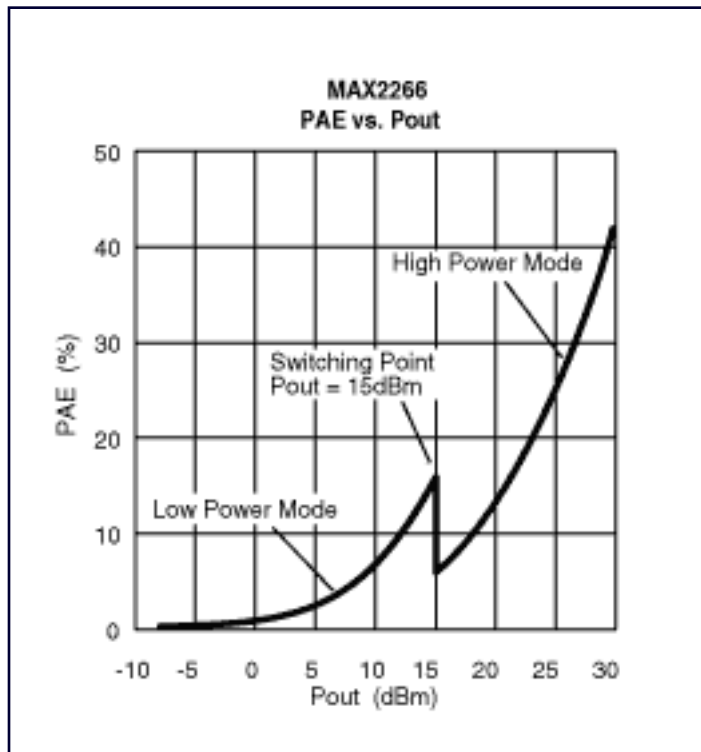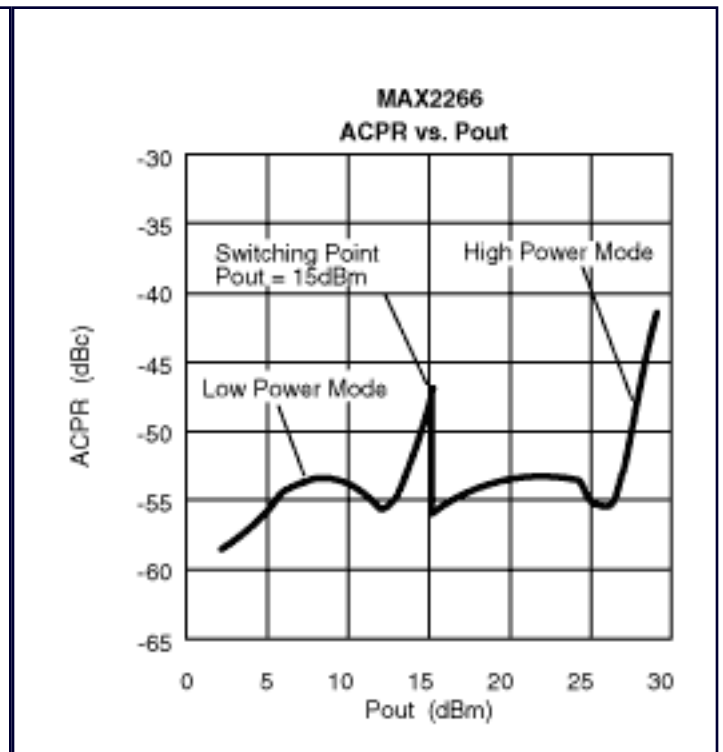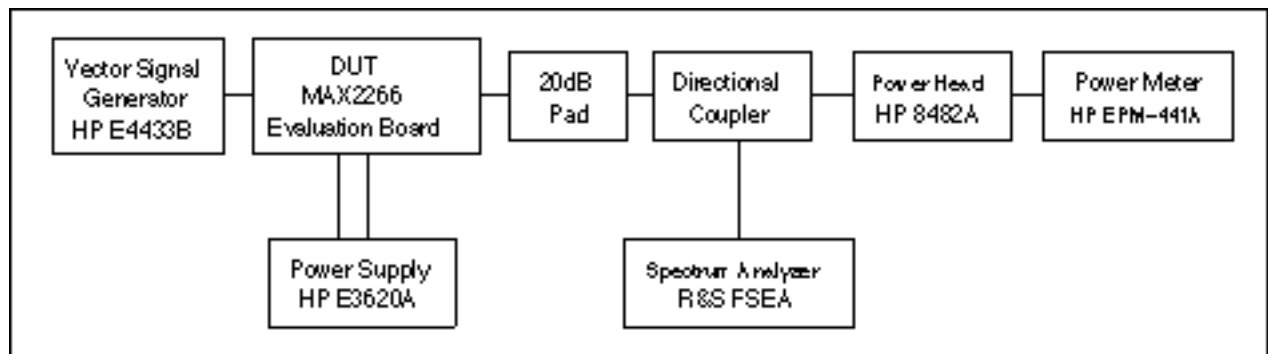
Figure 3
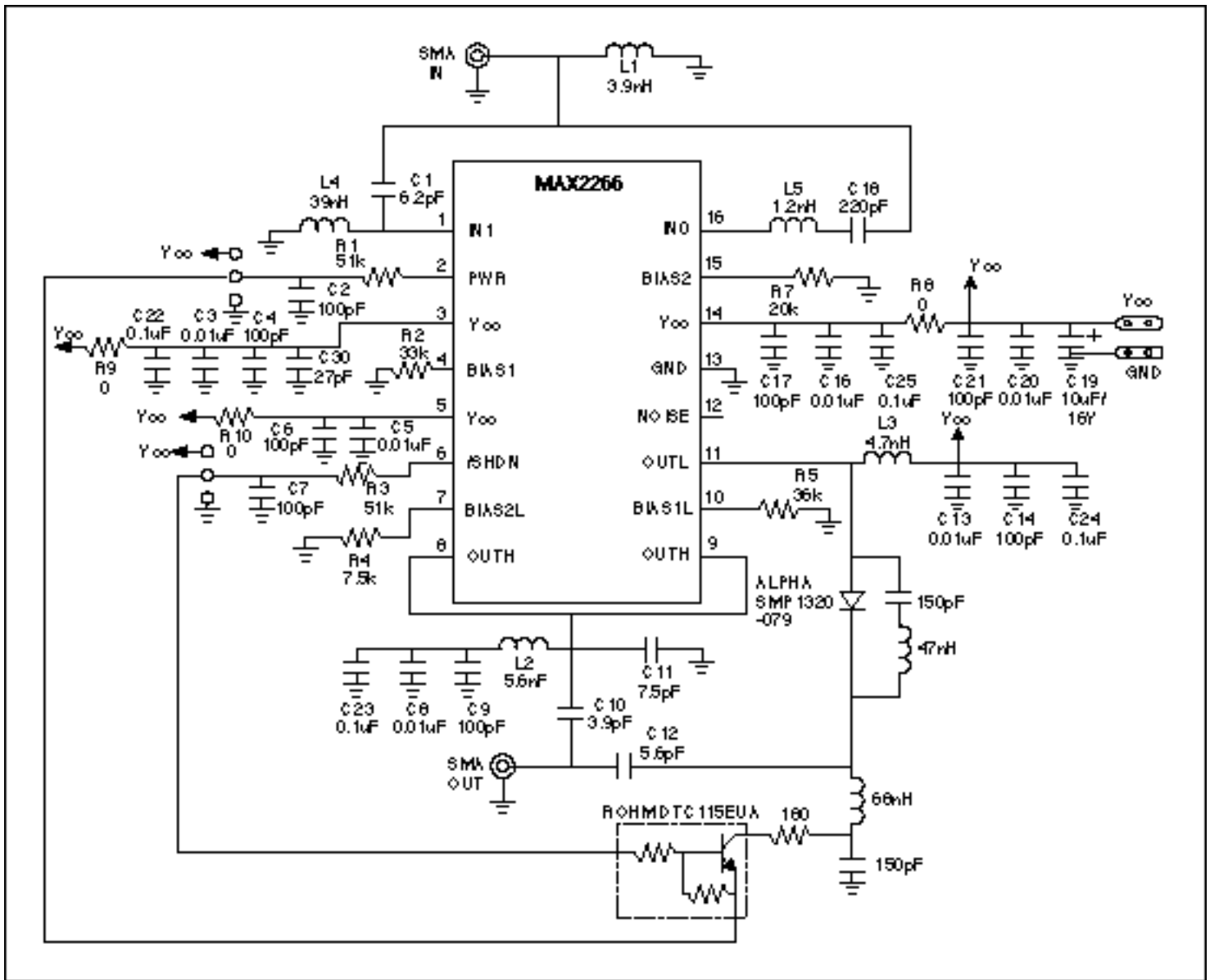

Figure 4

Figure 5. Test setup

Figure 6. Schematic

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More Information

MAX2266: QuickView -- Full (PDF) Data Sheet -- Free Samples