



**SKYWORKS™**

## DATA SHEET

# SKY65004: 250 – 2500 MHz Linear Power Amplifier Driver

### Applications

- UHF TV broadcasts
- TETRA radios
- GSM450, GSM480, GSM750 handsets
- AMPS, PCS, DCS, 2.5G, 3G handsets
- ISM band transmitters
- WCS fixed wireless
- 802.11b/g WLANs

### Features

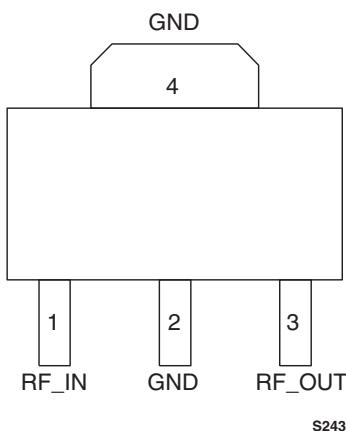
- Wideband frequency range: 250 to 2500 MHz
- High linearity: OIP3 > +40 dBm and P1dB > +24 dBm
- High efficiency: PAE 48%
- High gain: 20 dB
- Single DC supply, +3 V or +5 V
- Low-cost, SMT SOT-89 2.4 x 4.5 mm package

### Description

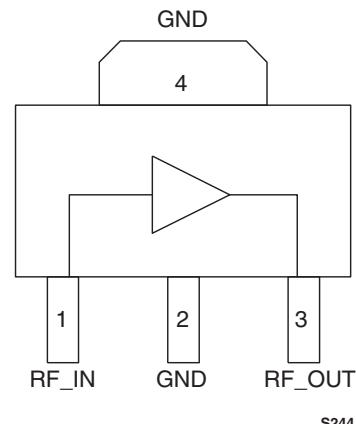
Skyworks' SKY65004 is a high performance, ultra-wideband amplifier with superior output power, linearity, and efficiency. The device is fabricated using Skyworks' high reliability Aluminum Gallium Arsenide (AlGaAs) Heterojunction Bipolar Transistor (HBT) technology.

The SKY65004 achieves a high linearity and superior Adjacent Channel Power Rejection/Adjacent Channel Leakage Power Ratio (ACPR/ACLR) performance. This makes it ideal for use in the driver stage of infrastructure transmit chains for Trans-European Trunked Radio (TETRA) transceivers, multi-band (GSM, AMPS, PCS, DCS) handsets, and many other wireless applications.

The SKY65004 uses low-cost Surface-Mount Technology (SMT) in the form of a 2.4 x 4.5 mm Small Outline Transistor (SOT) package, which allows for a highly manufacturable low-cost solution. The device package and pinout are shown in Figure 1. Figure 2 shows a functional block diagram for the SKY65004.



**Figure 1. SKY65004 Pinout – 4-Pin SOT-89 Package (Top View)**



**Figure 2. SKY65004 Functional Block Diagram**

## Electrical and Mechanical Specifications

Signal pin assignments and functional pin descriptions for the SKY65004 are provided in Table 1. The absolute maximum ratings of the SKY65004 are provided in Table 2. Recommended operating conditions are specified in Table 3 and electrical specifications are provided in Table 4.

Figures 3 through 15 illustrate the device performance in various operating bands. Figure 16 provides the package

dimensions for the 4-pin SOT-89 device, and Figure 17 provides the tape and reel dimensions.

## Electrostatic Discharge (ESD) Sensitivity

The SKY65004 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper ESD precautions.

**Table 1. SKY65004 Signal Descriptions**

Pin #	Name	Description
1	RF_IN	RF input
2	GND	Ground
3	RF_OUT	RF output
4	GND	Ground

**Table 2. SKY65004 Absolute Maximum Ratings**  
( $T_A = +25^\circ\text{C}$ , unless otherwise noted)

Parameter	Symbol	Min	Typical	Max	Units
Supply voltage	V <sub>CC</sub>			6	V
RF input power	P <sub>IN</sub>			13	dBm
Supply current	I <sub>CC</sub>			160	mA
Power dissipation	P <sub>D</sub>			1.2	W
Operating case temperature	T <sub>C</sub>	-40		+85	°C
Storage temperature	T <sub>ST</sub>	-55		+125	°C
Junction temperature	T <sub>J</sub>			150	°C

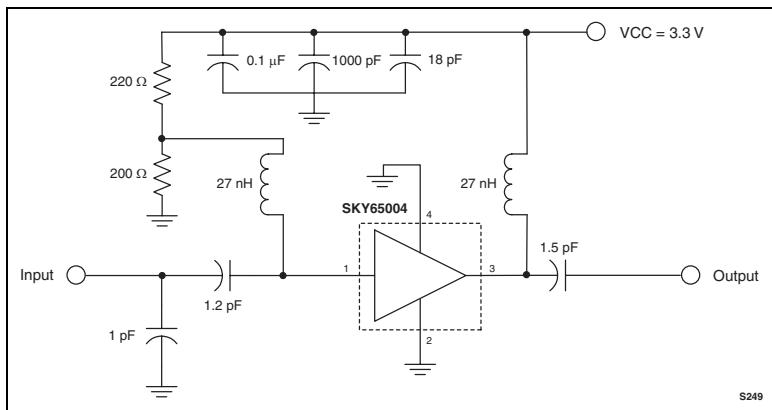
**Note:** Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal values.

**Table 3. SKY65004 Recommended Operating Conditions**

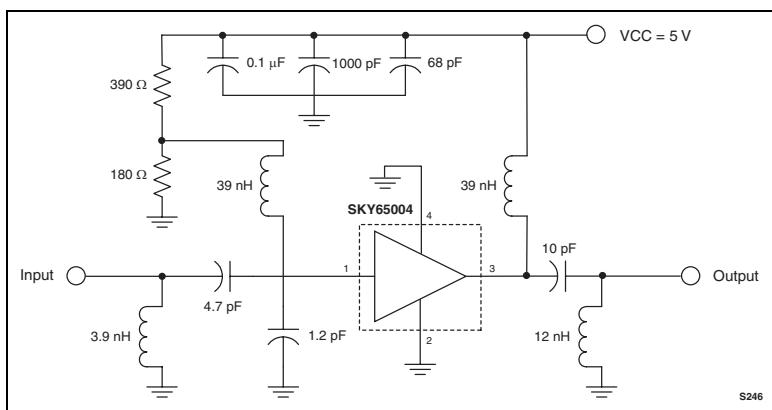
Parameter	Symbol	Min	Typical	Max	Units
Supply voltage	V <sub>CC</sub>		5		V
Frequency range	F	250		2500	MHz
Junction temperature	T <sub>J</sub>			+140	°C

**Table 4. SKY65004 Electrical Characteristics**  
(V<sub>CC</sub> = 5 V, T<sub>c</sub> = 25 °C, unless otherwise noted)

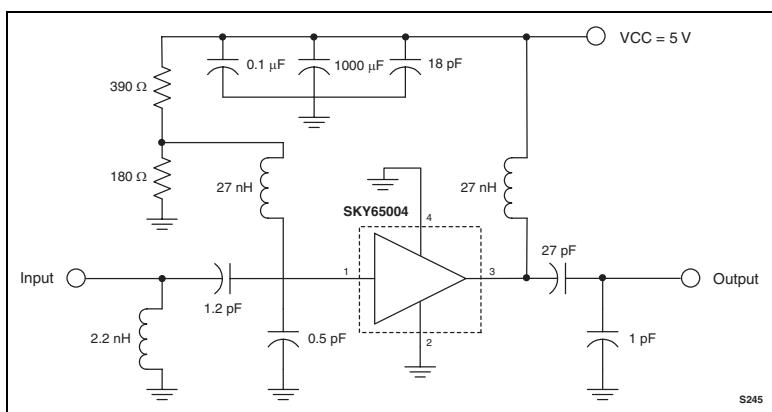
Parameter	Symbol	Test Conditions	Min	Typical	Max	Units
<b>Test Frequency = 900 MHz (See Figure 4)</b>						
Small signal gain	G	CW		22		dB
Output power @ 1 dB compression	P <sub>1dB</sub>	CW		24		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +6 dBm output power		42		dBm
Noise Figure	NF			4.0		dB
Output power @ ACPR = -45 dBc	P <sub>out</sub>	IS-95. Nine forward channels		18		dBm
<b>Test Frequency = 1960 MHz (See Figure 5)</b>						
Small signal gain	G	CW	14.0	15.5		dB
Output power @ 1 dB compression	P <sub>1dB</sub>	CW	23	25		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +7 dBm output power		44		dBm
Noise Figure	NF			5.5		dB
Power Added Efficiency	PAE	CW, P <sub>out</sub> = +25 dBm	42	48		%
Supply current	I <sub>s</sub>			125	135	mA
Output power @ ACPR = -45 dBc	P <sub>out</sub>	IS-95. Nine forward channels		19		dBm
<b>Test Frequency = 2140 MHz (See Figure 6)</b>						
Small signal gain	G	CW		15		dB
Output power @ 1 dB compression	P <sub>1dB</sub>	CW		25		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +9 dBm output power		42		dBm
Output power @ ACLR = -45 dBc	P <sub>out</sub>	WCDMA. Test model #1; 64 DPCH		17		dBm
<b>Test Frequency = 450 MHz (See Figure 7)</b>						
Small signal gain	G	CW		27		dB
Output power @ 1 dB compression	P <sub>1dB</sub>	CW		24		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +8 dBm output power		42		dBm
<b>Test Frequency = 2450 MHz (See Figure 8)</b>						
Small signal gain	G	CW		14		dB
Output power @ 1 dB compression	P <sub>1dB</sub>	CW		26		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +6 dBm output power		42		dBm
Noise Figure	NF			5.0		dB
Power Added Efficiency	PAE	CW, P <sub>out</sub> = +26 dBm		50		%



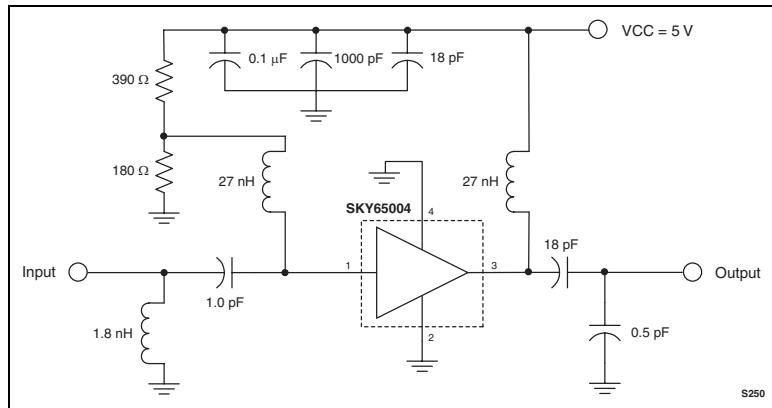
**Figure 3. Matching Circuit for 2450 MHz (VCC = 3.3 V)**  
**(Evaluation Kit #TW11-D638)**



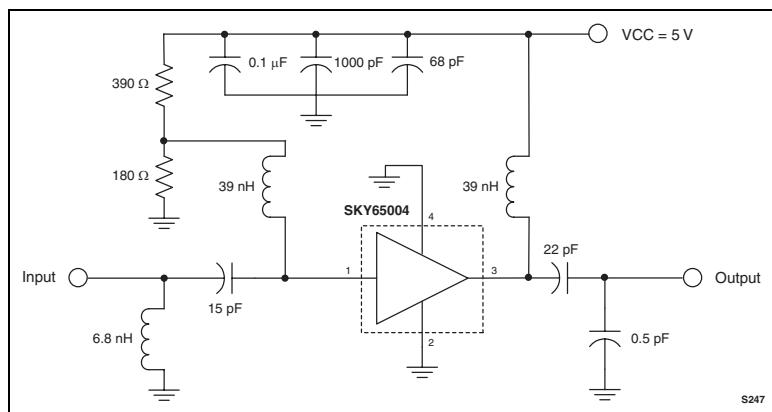
**Figure 4. Matching Circuit for 900 MHz**  
**(Evaluation Kit #TW11-D631)**



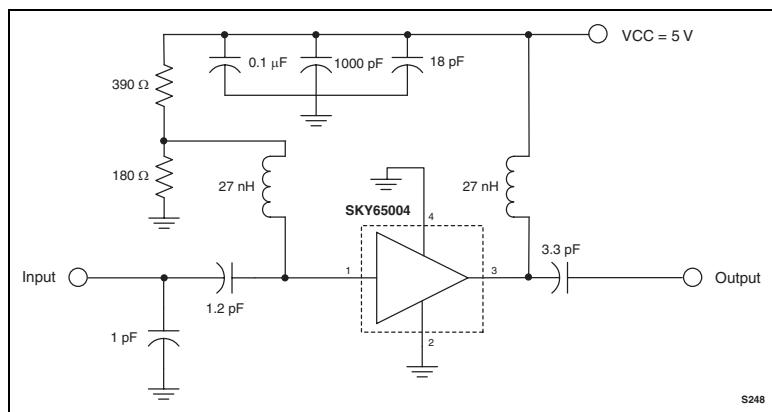
**Figure 5. Matching Circuit for 1960 MHz**  
**(Evaluation Kit #TW11-D632)**



**Figure 6. Matching Circuit for 2140 MHz  
(Evaluation Kit #TW11-D633)**



**Figure 7. Matching Circuit for 450 MHz  
(Evaluation Kit #TW11-D634)**



**Figure 8. Matching Circuit for 2450 MHz (VCC = 5 V)  
(Evaluation Kit #TW11-D636)**

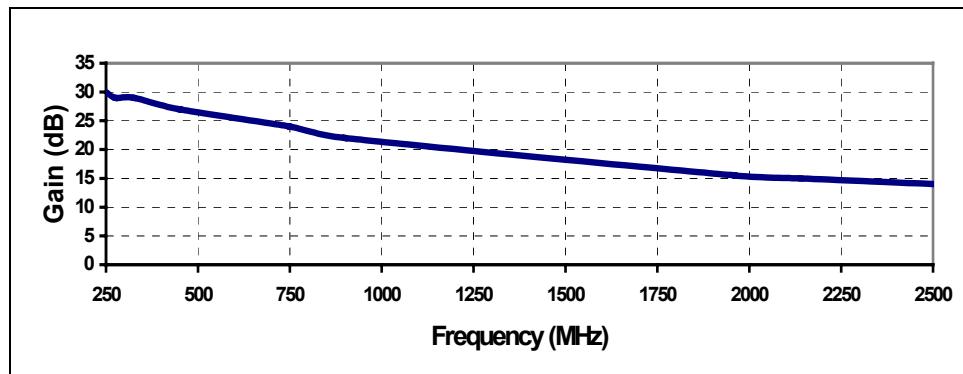


Figure 9. Typical Small Signal Gain vs Frequency Performance (VCC = 5 V)

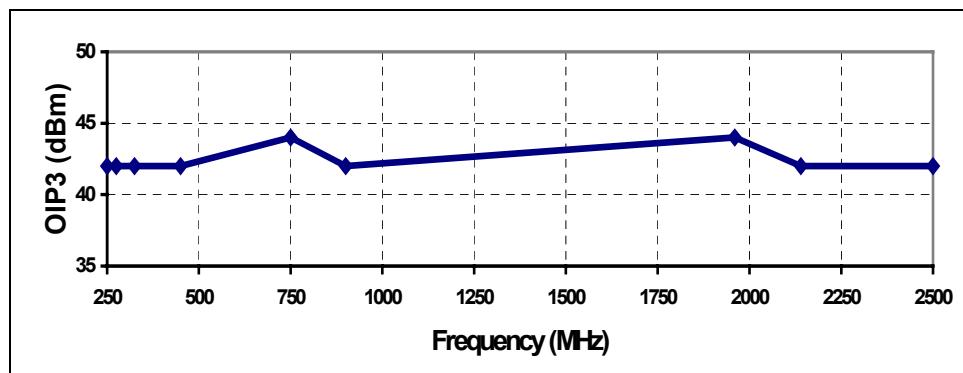


Figure 10. Typical OIP3 vs Frequency Performance (VCC = 5 V)

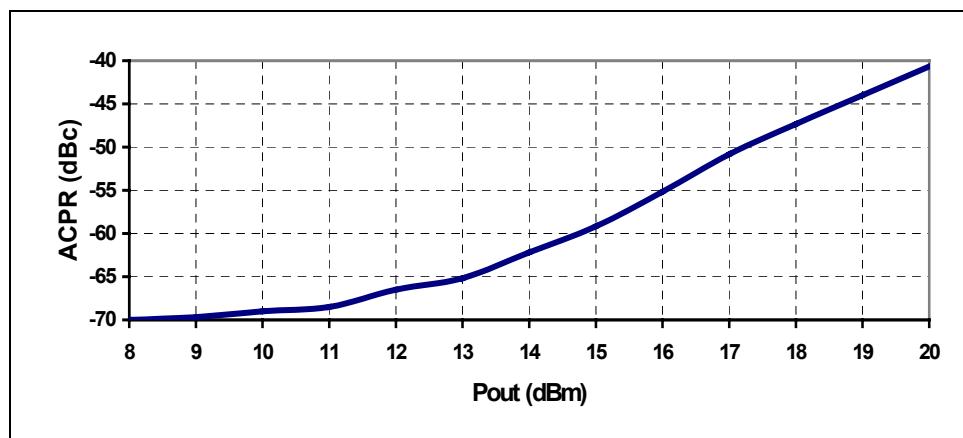
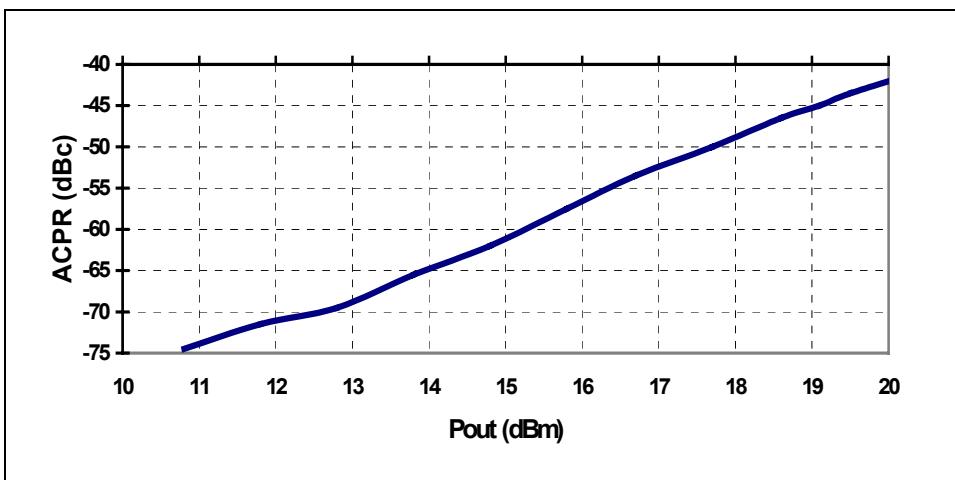
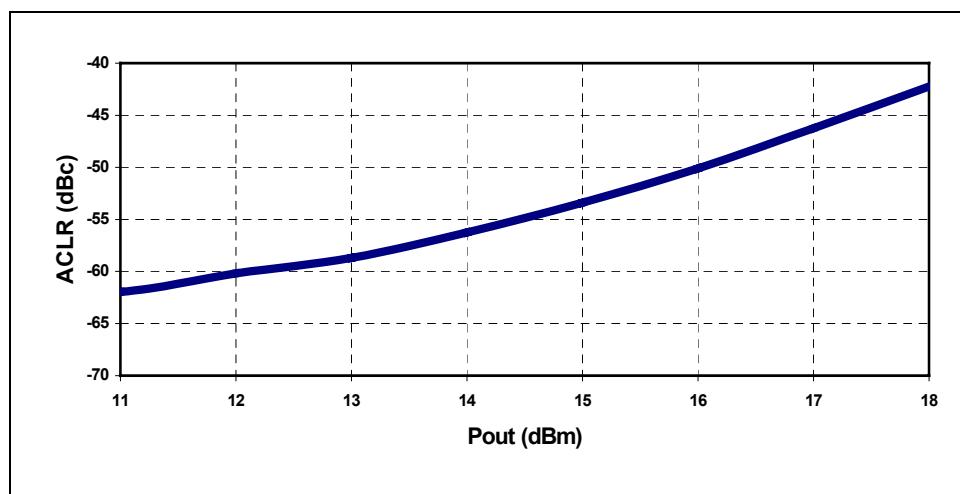


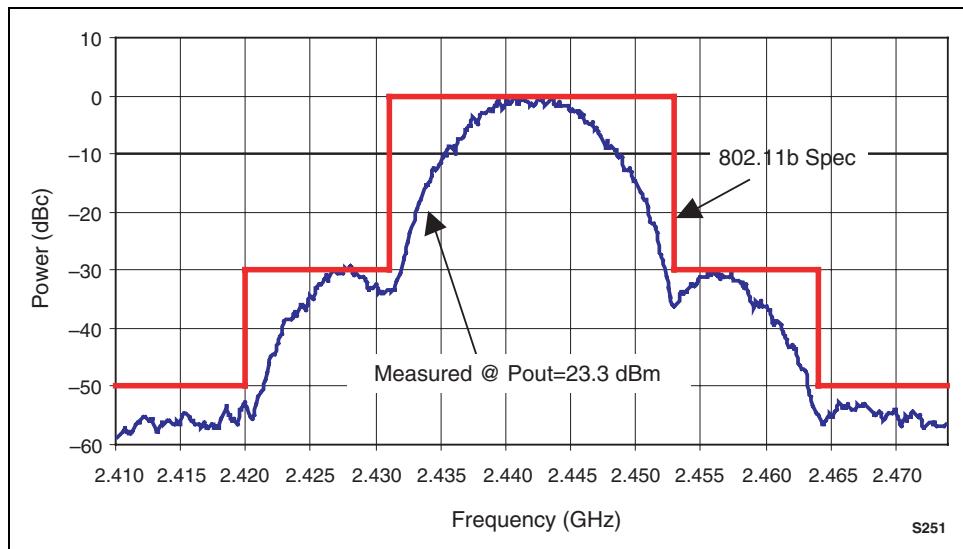
Figure 11. Typical ACPR vs Pout @ 900 MHz Using IS-95 Signal  
With Nine Forward Channels



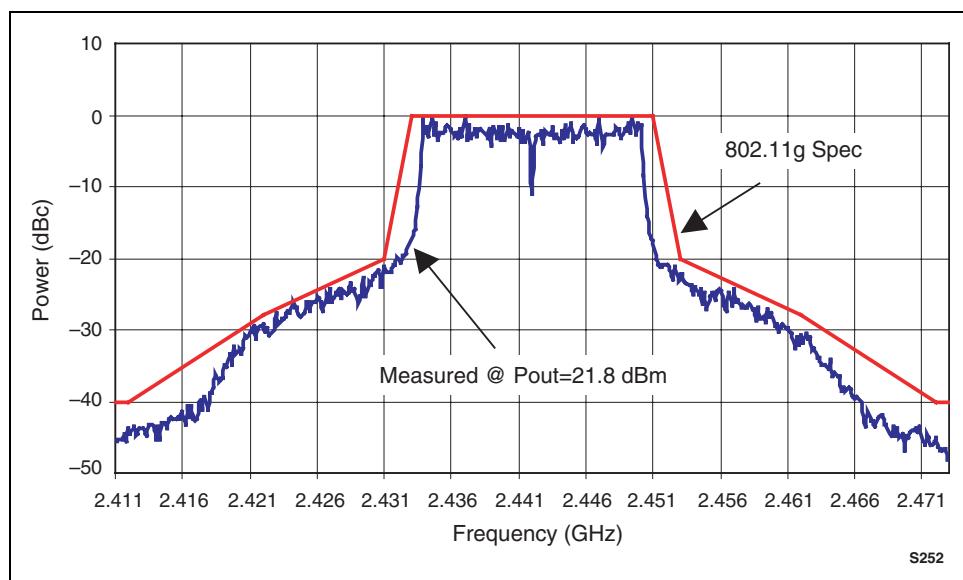
**Figure 12. Typical ACPR vs Pout @ 1960 MHz Using IS-95 Signal  
With Nine Forward Channels**



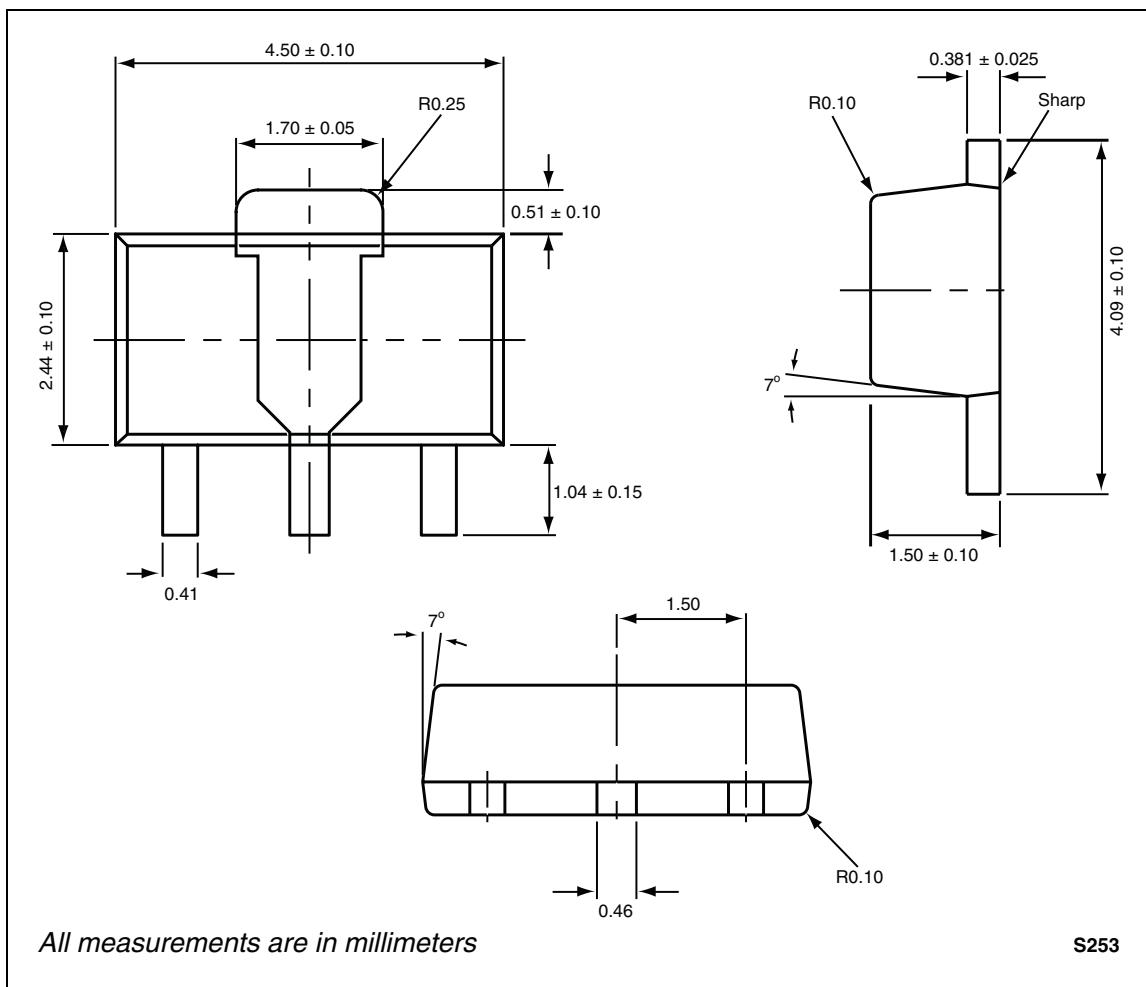
**Figure 13. Typical ACLR vs Pout @ 2140 MHz Using 3G-WCDMA Test Model #1  
With 64 Forward Channels (Test Circuit Shown in Figure 6)**



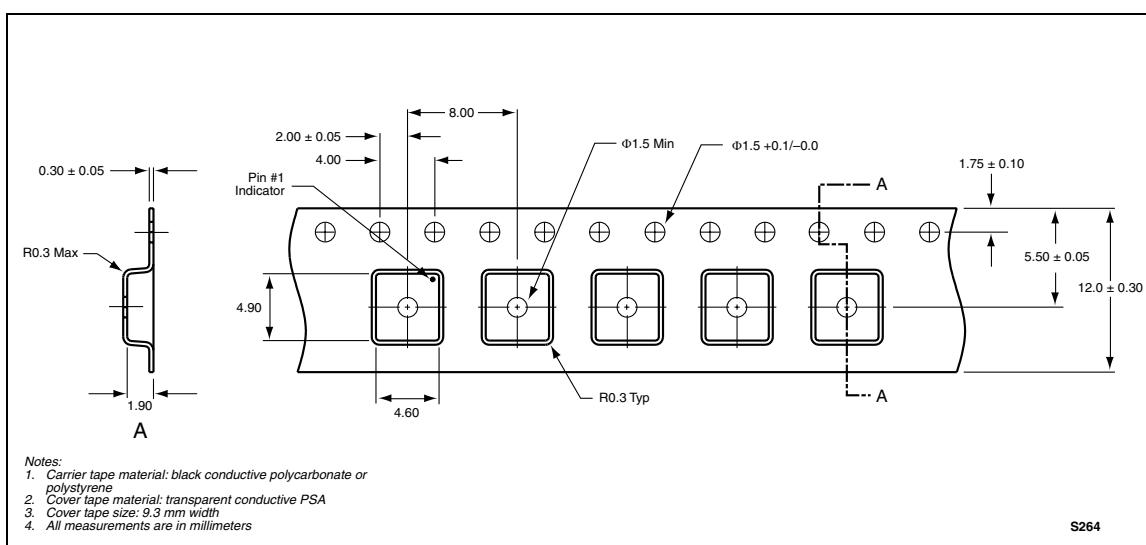
**Figure 14. Spectral Response With 802.11b Signal (CCK, 11 Mbps)**  
**(Note: VCC = 3.3 V, Test Circuit Shown in Figure 3)**



**Figure 15. Spectral Response With 802.11g Signal (64-QAM-OFDM, 54 Mbps)**  
**(Note: VCC = 3.3 V, Test Circuit Shown in Figure 3)**



### Figure 16. SKY65004 4-Pin SOT-89 Package Dimensions



**Figure 17. SKY65004 4-Pin SOT-89 Tape and Reel Dimensions**

## Ordering Information

Model Name	Ordering Part Number	Evaluation Kit Part Number
SKY65004 250-2500 MHz Linear Power Amplifier Driver	SKY65004-11	TW11-D631 (900 MHz) TW11-D632 (1960 MHz) TW11-D633 (2140 MHz) TW11-D634 (450 MHz) TW11-D636 (2450 MHz, VCC = 5 V) TW11-D638 (2450 MHz, VCC = 3.3 V) TW11-D637 (2600 MHz)

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