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 infrastucture 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.

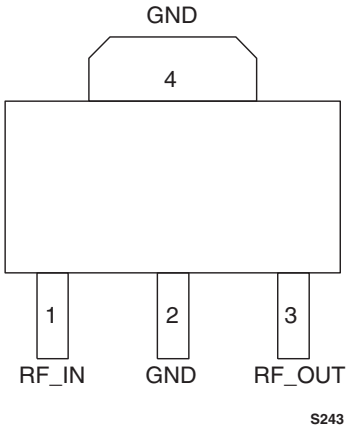

Figure 1. SKY65004 Pinout – 4-Pin SOT-89 Package (Top View)

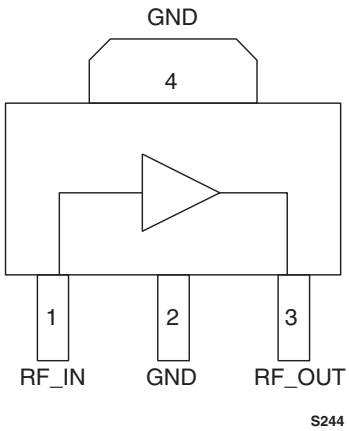

Figure 2. SKY65004 Functional Block Diagram

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 °C, unless otherwise noted)

Parameter	Symbol	Min	Typical	Max	Units
Supply voltage	VCC			6	V
RF input power	P_{IN}			13	dBm
Supply current	I_{CC}			160	mA
Power dissipation	P_D			1.2	W
Operating case temperature	T_C	–40		+85	°C
Storage temperature	T_{ST}	–55		+125	°C
Junction temperature	T_J			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	VCC		5		V
Frequency range	F	250		2500	MHz
Junction temperature	T_J			+140	°C

Table 4. SKY65004 Electrical Characteristics
(VCC = 5 V, T_C = 25 °C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typical	Max	Units
Test Frequency = 900 MHz (See Figure 4)						
Small signal gain	G	CW		22		dB
Output power @ 1 dB compression	P1dB	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_{OUT}	IS-95. Nine forward channels		18		dBm
Test Frequency = 1960 MHz (See Figure 5)						
Small signal gain	G	CW	14.0	15.5		dB
Output power @ 1 dB compression	P1dB	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_{OUT} = +25 dBm	42	48		%
Supply current	I_S			125	135	mA
Output power @ ACPR = –45 dBc	P_{OUT}	IS-95. Nine forward channels		19		dBm
Test Frequency = 2140 MHz (See Figure 6)						
Small signal gain	G	CW		15		dB
Output power @ 1 dB compression	P1dB	CW		25		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +9 dBm output power		42		dBm
Output power @ ACLR = –45 dBc	P_{OUT}	WCDMA. Test model #1; 64 DPCH		17		dBm
Test Frequency = 450 MHz (See Figure 7)						
Small signal gain	G	CW		27		dB
Output power @ 1 dB compression	P1dB	CW		24		dBm
Output 3rd Order Intercept Point	OIP3	Two tones, each @ +8 dBm output power		42		dBm
Test Frequency = 2450 MHz (See Figure 8)						
Small signal gain	G	CW		14		dB
Output power @ 1 dB compression	P1dB	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_{OUT} = +26 dBm		50		%

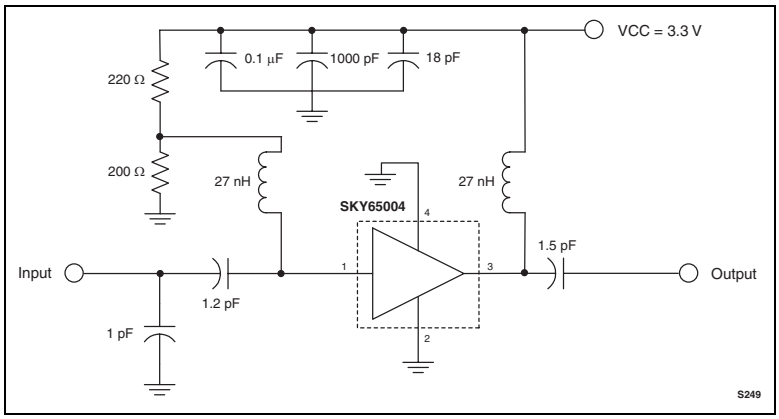

Figure 3. Matching Circuit for 2450 MHz (VCC = 3.3 V)
(Evaluation Kit #TW11-D638)

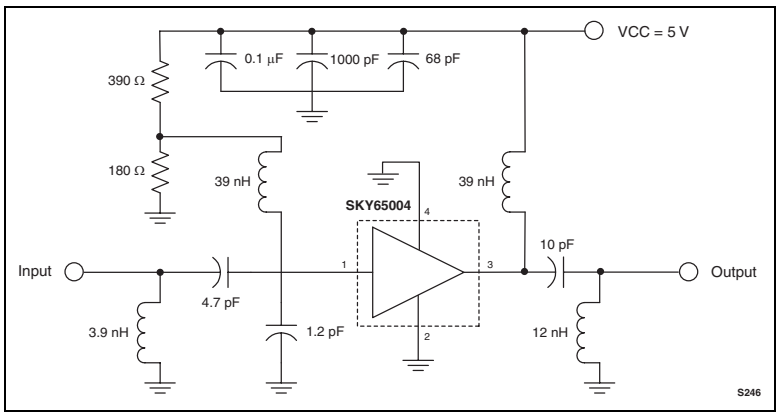

Figure 4. Matching Circuit for 900 MHz
(Evaluation Kit #TW11-D631)

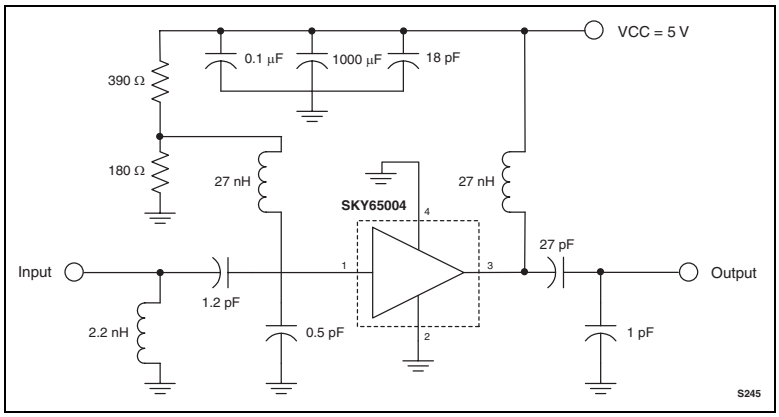

Figure 5. Matching Circuit for 1960 MHz
(Evaluation Kit #TW11-D632)

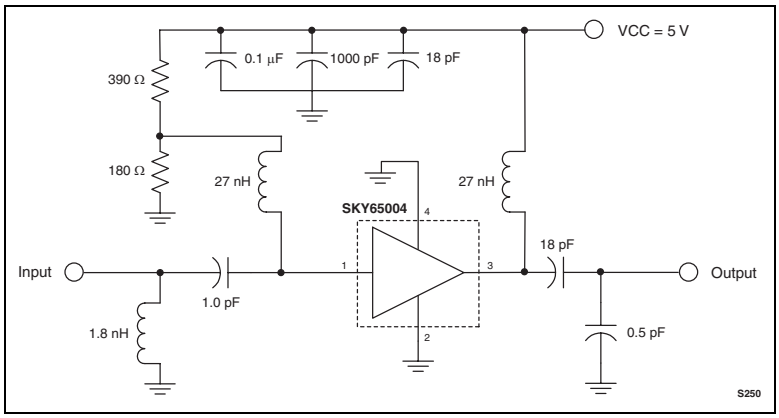

Figure 6. Matching Circuit for 2140 MHz (Evaluation Kit #TW11-D633)

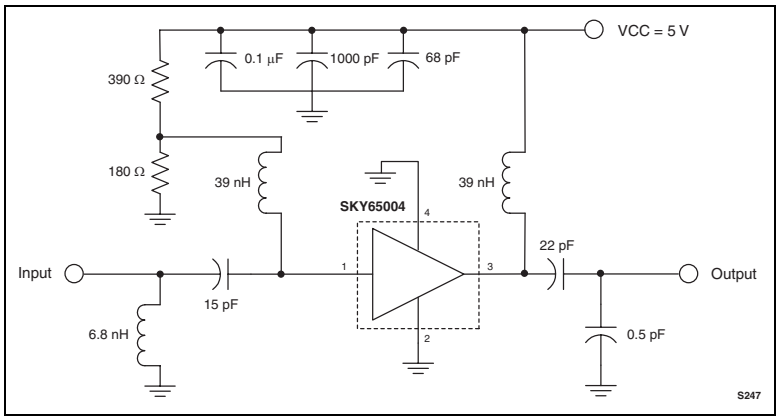

Figure 7. Matching Circuit for 450 MHz (Evaluation Kit #TW11-D634)

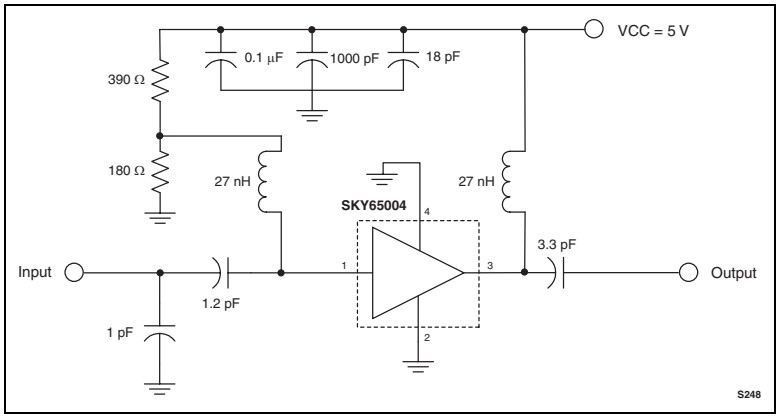

Figure 8. Matching Circuit for 2450 MHz (VCC = 5 V) (Evaluation Kit #TW11-D636)

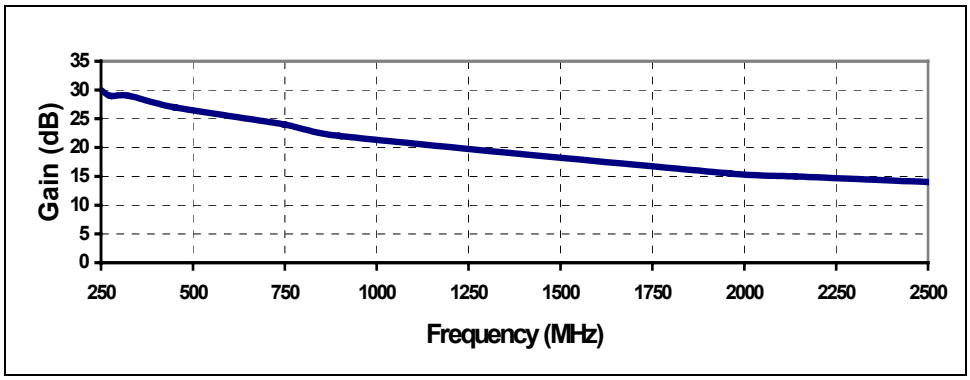

Figure 9. Typical Small Signal Gain vs Frequency Performance (VCC = 5 V)

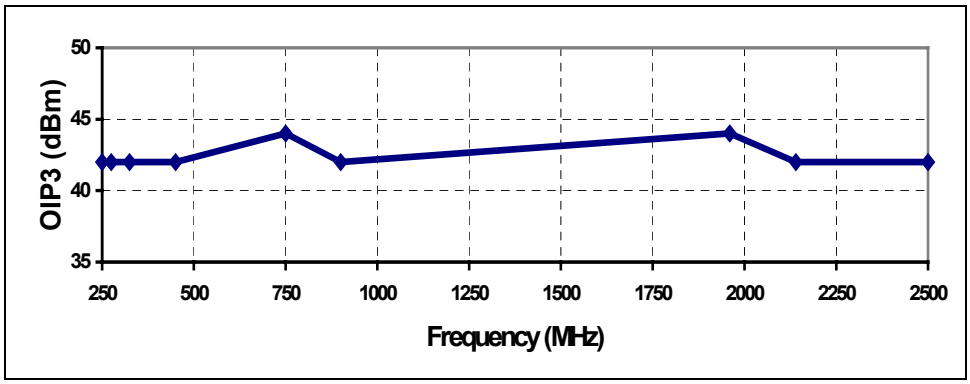

Figure 10. Typical OIP3 vs Frequency Performance (VCC = 5 V)

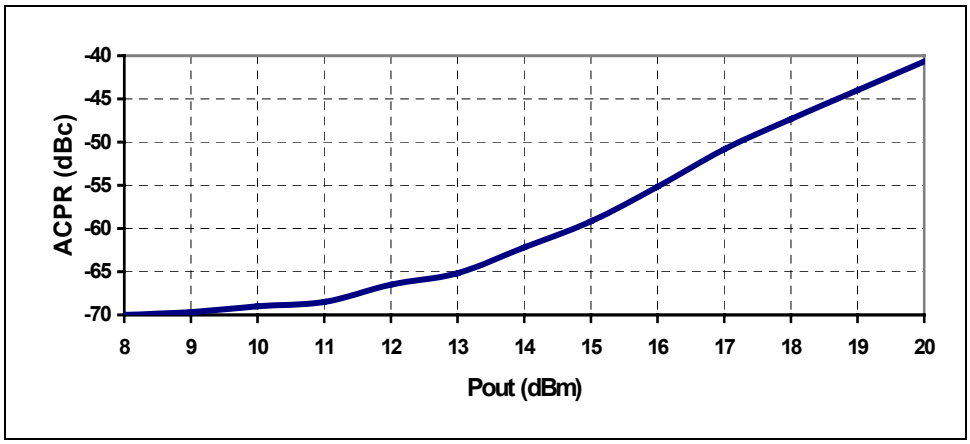

Figure 11. Typical ACPR vs POUT @ 900 MHz Using IS-95 Signal With Nine Forward Channels

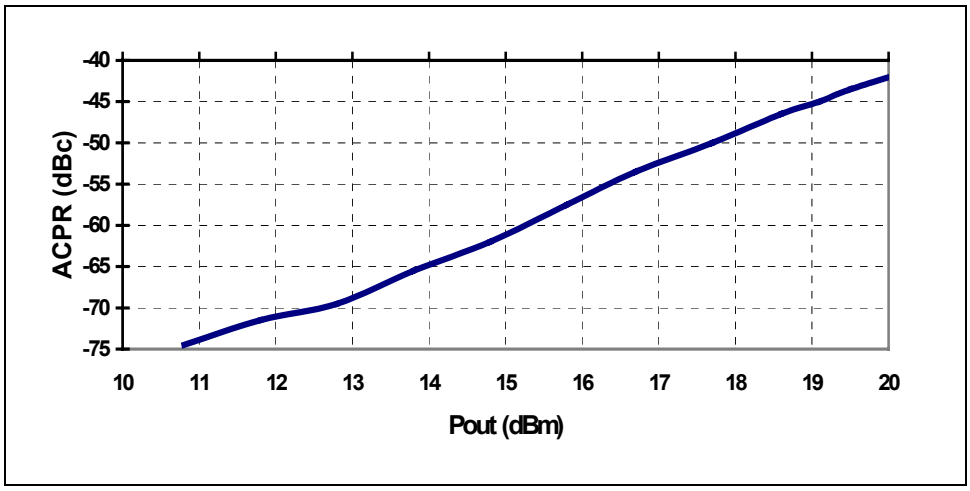

Figure 12. Typical ACPR vs POUT @ 1960 MHz Using IS-95 Signal With Nine Forward Channels

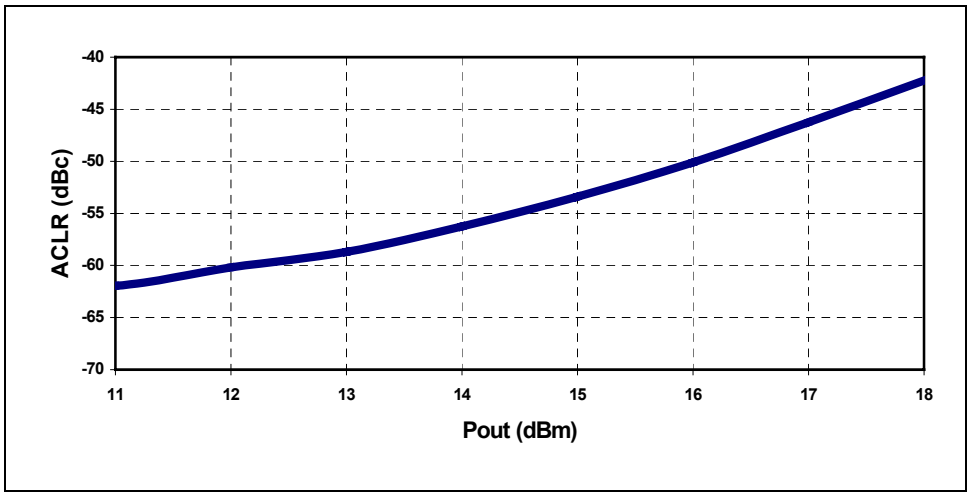

Figure 13. Typical ACLR vs POUT @ 2140 MHz Using 3G-WCDMA Test Model #1 With 64 Forward Channels (Test Circuit Shown in Figure 6)

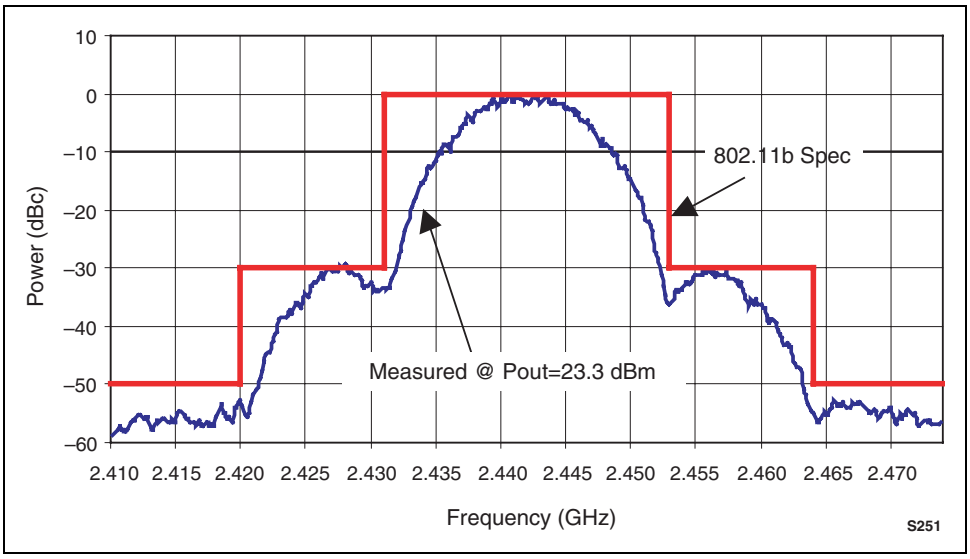

Figure 14. Spectral Response With 802.11b Signal (CCK, 11 Mbps)
(Note: VCC = 3.3 V, Test Circuit Shown in Figure 3)

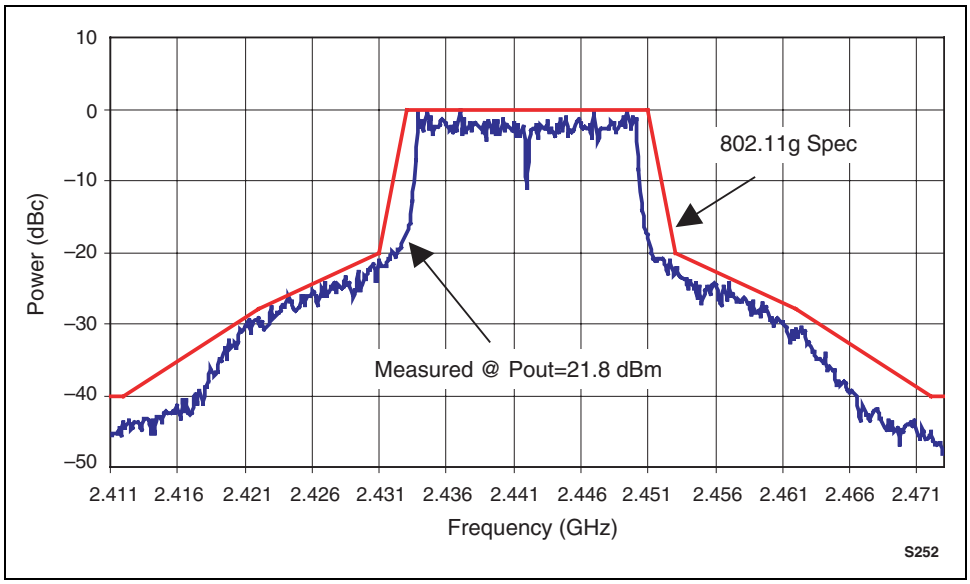

Figure 15. Spectral Response With 802.11g Signal (64-QAM-OFDM, 54 Mbps)
(Note: VCC = 3.3 V, Test Circuit Shown in Figure 3)

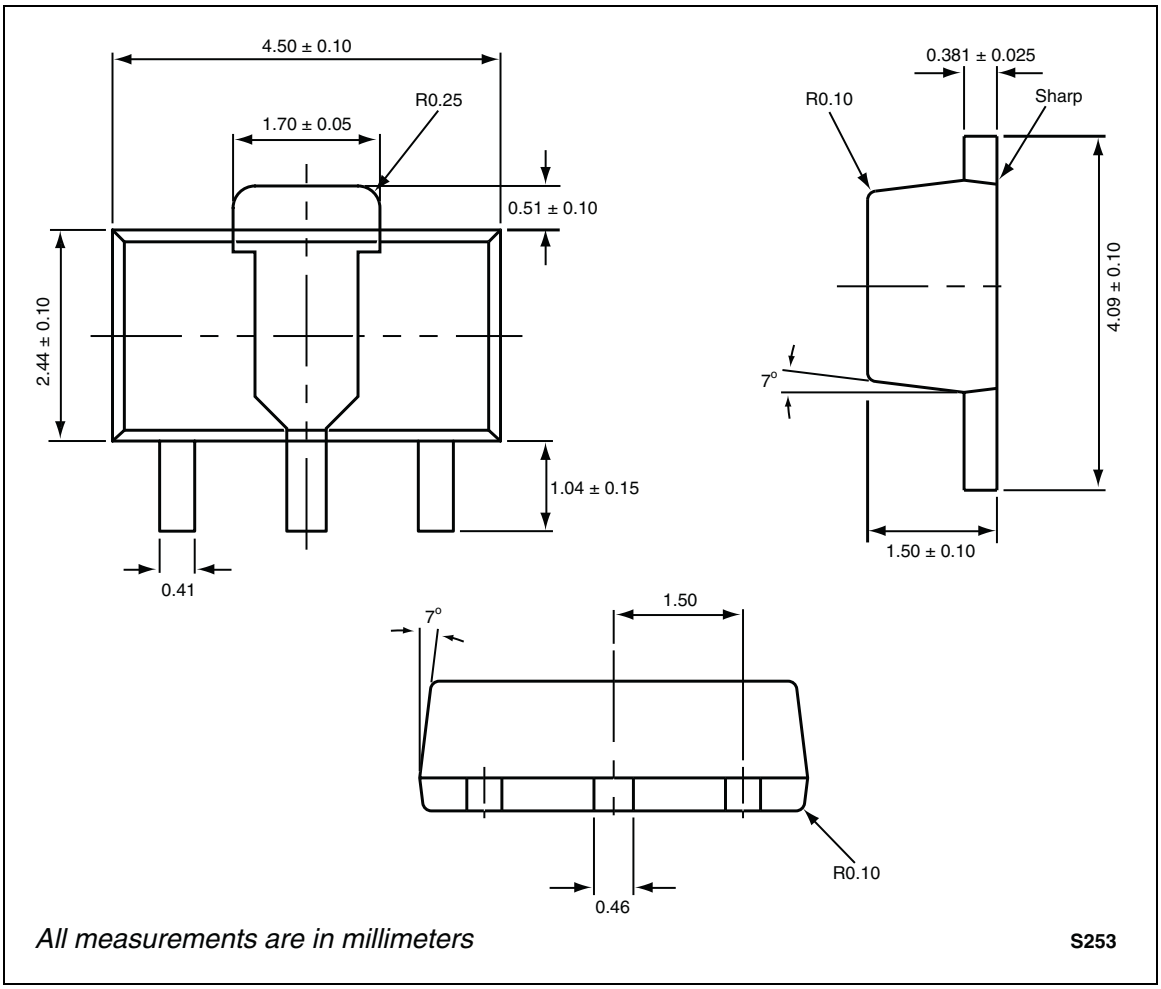

Figure 16. SKY65004 4-Pin SOT-89 Package Dimensions

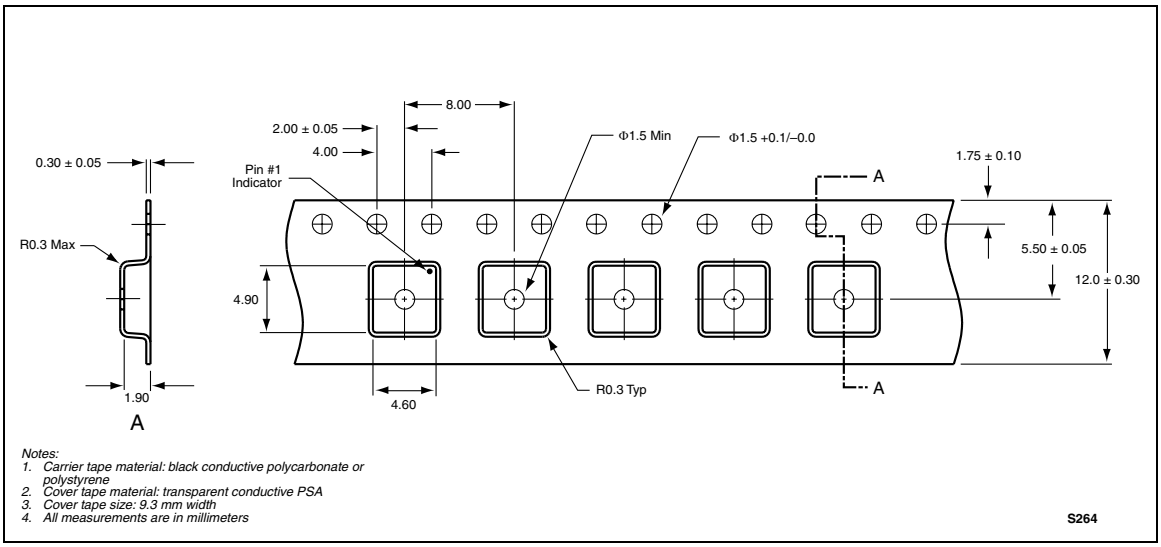

Figure 17. SKY65004 4-Pin SOT-89 Tape and Reel Dimensions

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)