

PRELIMINARY DATA SHEET

SKY65131: WLAN Power Amplifier Module

Applications

- IEEE802.11 b/g WLAN
- ISM band transmitters
- WCS fixed wireless
- Wireless access nodes

Features

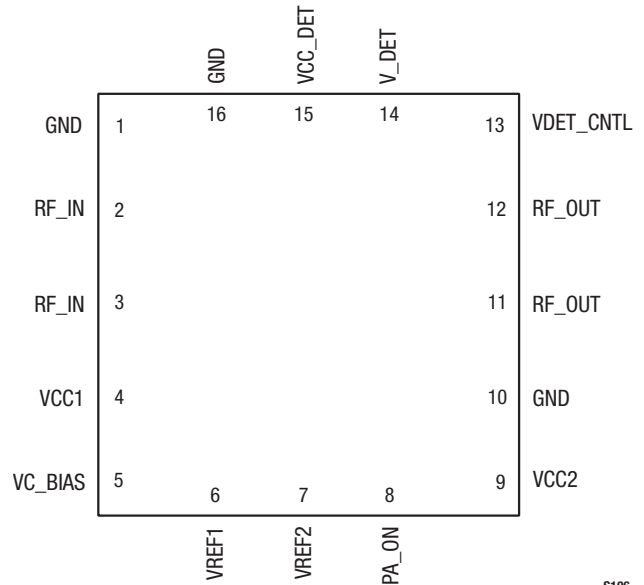
- Single 3.3 V supply
- Linear output power of +28 dBm for IEEE802.11b mask
- Linear output power of +26 dBm for IEEE802.11g mask
- High PAE of 38 percent
- Output power detector: 20 dB dynamic range
- Superior gain flatness
- Internal RF match and bias circuits
- Small footprint, MCM 4 x 4 mm SMT package
- PA shutdown control

Description

The Skyworks SKY65131 is a Microwave Monolithic Integrated Circuit (MMIC) Power Amplifier (PA) with superior output power, linearity, and efficiency. These features make the SKY65131 ideal for Wireless Local Area Network (WLAN) applications.

The device is fabricated using Skyworks high reliability Indium Gallium Phosphide (InGaP) Heterojunction Bipolar Transistor (HBT) technology. The device is internally matched and mounted in a 4 x 4 mm, Multi-Chip Module (MCM) Surface-Mounted Technology (SMT) package, which allows for a highly manufacturable low cost solution.

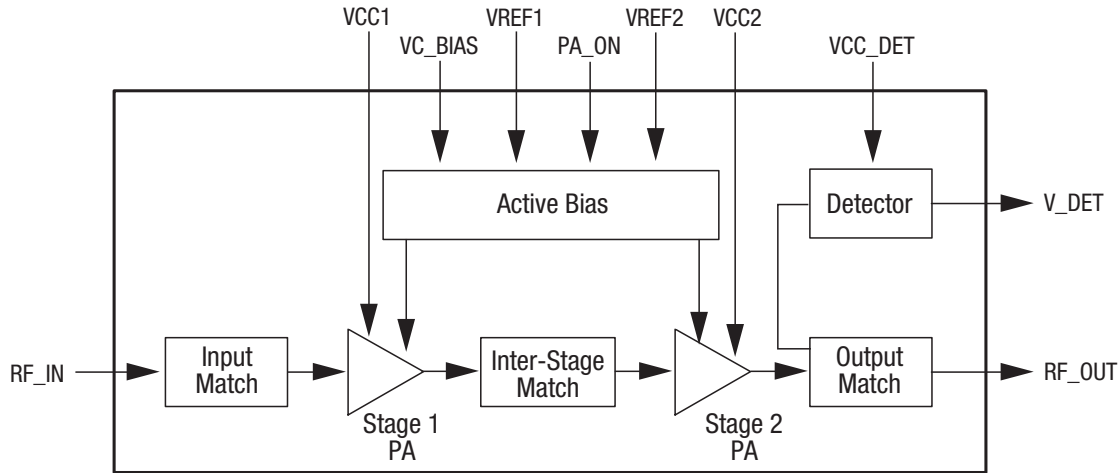
The device package and pinout are shown in Figure 1. A block diagram of the SKY65131 is shown in Figure 2.



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Figure 1. SKY65131 Pinout – 16-Pin MCM (Top View)

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Figure 2. SKY65131 Block Diagram

Technical Description

The SKY65131 PA contains all of the needed RF matching and DC biasing circuits. The device also provides an output power detector voltage and the ability to switch the PA on or off with a simple control signal.

The SKY65131 is a two-stage, HBT InGaP device optimized for high linearity and power efficiency. These features make the device suitable for wideband digital applications, where PA linearity and power consumption are of critical importance (e.g., WLANs).

The device has been characterized with the highest specified data rates for 802.11b (11 Mbps) and 802.11g (54 Mbps). Under these stringent test conditions, the device exhibits excellent spectral purity and power efficiency.

Electrical and Mechanical Specifications

Signal pin assignments and functional pin descriptions are described in Table 1. The absolute maximum ratings of the SKY65131 are provided in Table 2. Electrical specifications are provided in Table 3.

Typical performance characteristics are shown in Figures 3 through 8. Package dimensions for the SKY65131 16-pin MCM are shown in Figure 9, and tape and reel dimensions are shown in Figure 10.

Electrostatic Discharge (ESD) Sensitivity

The SKY65131 is a static-sensitive electronic device. Do not operate or store near strong electrostatic fields. Take proper ESD precautions.

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Pin #	Name	Description	Pin #	Name	Description
1	GND	Ground	9	VCC2	Stage 2 collector voltage
2	RF_IN	RF input	10	GND	Ground
3	RF_IN	RF input	11	RF_OUT	RF output
4	VCC1	Stage 1 collector voltage	12	RF_OUT	RF output
5	VC_BIAS	Bias voltage	13	VDET_CNTL	Detector voltage control
6	VREF1	Bias reference voltage 1	14	V_DET	Detector output signal
7	VREF2	Bias reference voltage 2	15	VCC_DET	Detector supply voltage
8	PA_ON	PA on/off control signal	16	GND	Ground

Table 2. SKY65131 Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
RF input power	P_{IN}		0	dBm
Supply voltage (VCC1, VC_BIAS, VREF1, VREF2, VCC2, and VCC_DET signals)	VCC		4	V
Supply current ($I_b + I_{BIAS}$)	I_{CC}		500	mA
Power dissipation			2	W
Case operating 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 value.

Table 3. SKY65131 Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
RF input power	P_{IN}			-3	dBm
Supply voltage (VCC1, VC_BIAS, VREF1, VREF2, VCC2, and VCC_DET signals)	VCC	3.0	3.3	3.6	V
Case operating temperature	T_C	-40		+85	°C
Storage temperature	T_{ST}	-55		+125	°C

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Table 4. SKY65131 Electrical Specifications
(VCC = 3.3 V, Tc = +25 °C, Test Frequency = 2.442 GHz unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Using IEEE802.11b Complimentary Code Keying Input Signal, Data Rate = 11 Mbps						
Supply current	I _{CC}			490		mA
Output power (Note 1)	P _{OUT}			28		dBm
Power added efficiency (Note 2)	PAE			41		%
Ramp-up/ramp-down (Note 3)	T _s			<0.5		μs
Using IEEE802.11g Orthogonal Frequency Division Multiplexing Input Signal, Data Rate = 54 Mbps						
Supply current	I _{CC}			400		mA
Output power (Note 4)	P _{OUT}			26		dBm
Power added efficiency (Note 2)	PAE			33		%
Using Continuous Wave Input Signals						
Small signal gain	G	P _{IN} = -15 dBm		26		dB
Gain flatness over band		From 2.4 GHz to 2.5 GHz		±1.0		dB
Gain flatness over channel (16.25 MHz)		Over any 16.25 MHz within band		±0.2		dB
Output power @ 1 dB compression	P _{1dB}	P _{IN} = 3 dBm		28		dBm
Quiescent Current	I _Q			150		mA
Noise Figure	NF			5		dB
Power added efficiency	PAE	P _{IN} = 3 dBm		38		%
Thermal resistance (junction-to-case)	R _{TH,J-C}			50		C/W
Power Up/Down Control						
Power up	PA_ON/OFF		2.7	3.3		V
Power down	PA_ON/OFF				0.5	V

Note 1: Defined as the maximum power level for which the IEEE802.11b transmit mask requirements are met.

Note 2: Measured at the specified average output RF power and modulation type.

Note 3: Ramp-up and ramp-down times are defined from the 10% to 90% power points.

Note 4: Defined as the maximum power level for which the IEEE802.11g transmit mask requirements are met.

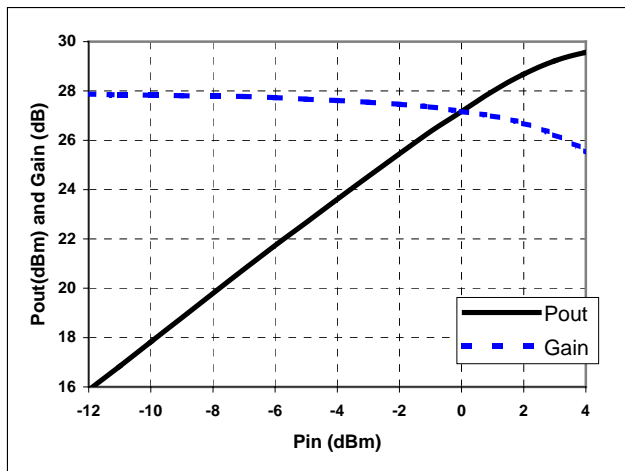


Figure 3. Typical P_{OUT} and Gain vs P_{IN} @ 2.442 GHz

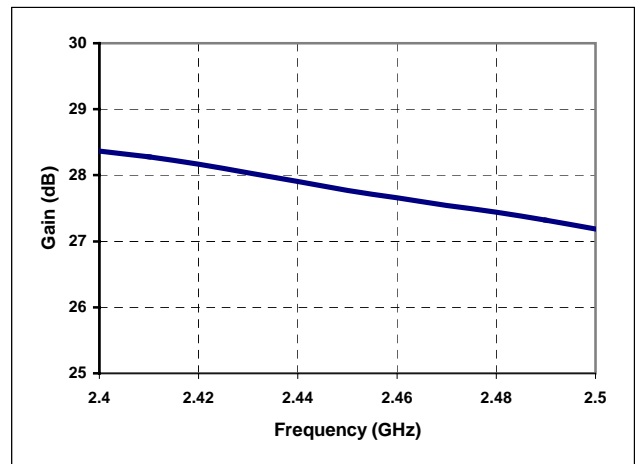


Figure 4. Typical Gain vs Frequency Response

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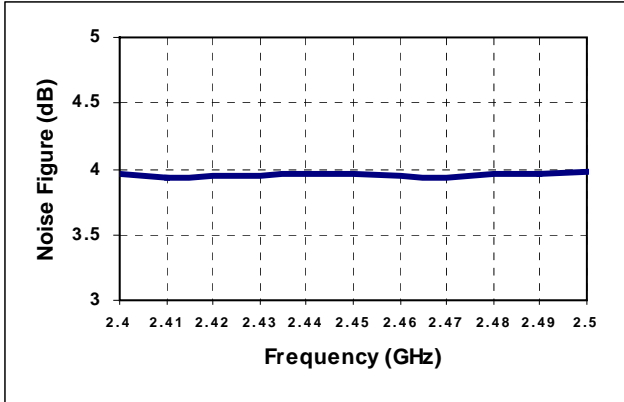


Figure 5. Typical Noise Figure Performance vs Frequency

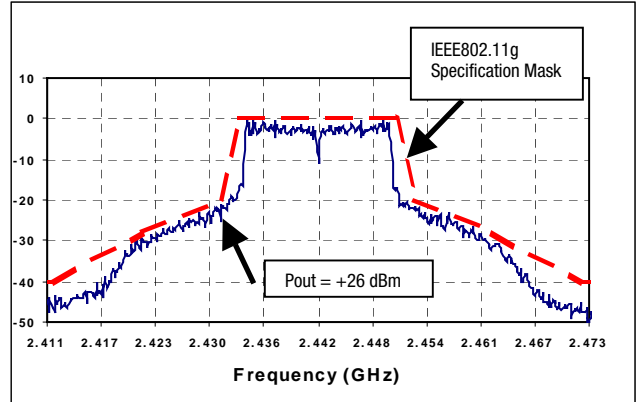


Figure 6. Output Spectrum Response for 802.11g (64 Quadrature Amplitude Modulated, 54 Mbps Input Signal)

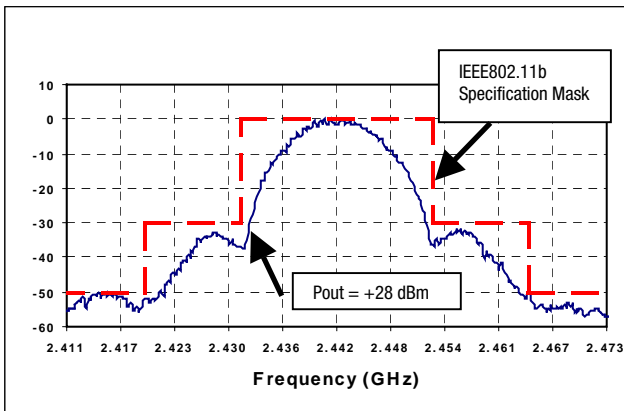


Figure 7. Output Spectrum Response for 802.11b CCK-Coded (11 Mbps Input Signal)

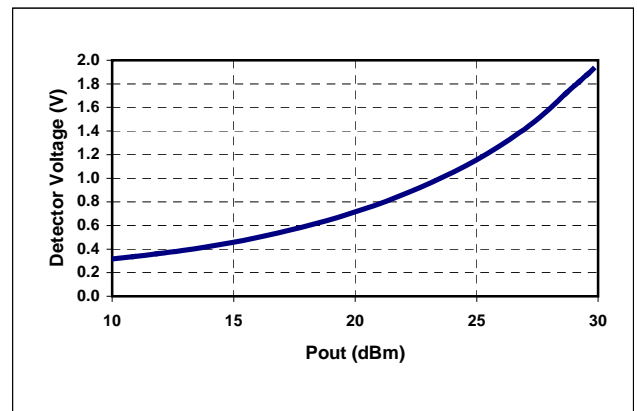


Figure 8. Detector Output Voltage vs RF Output Power

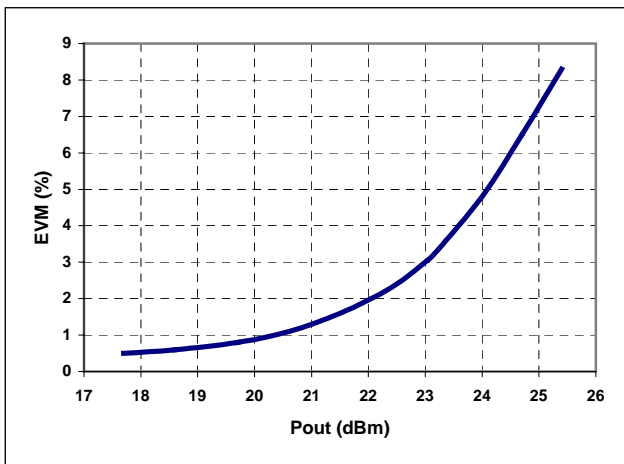
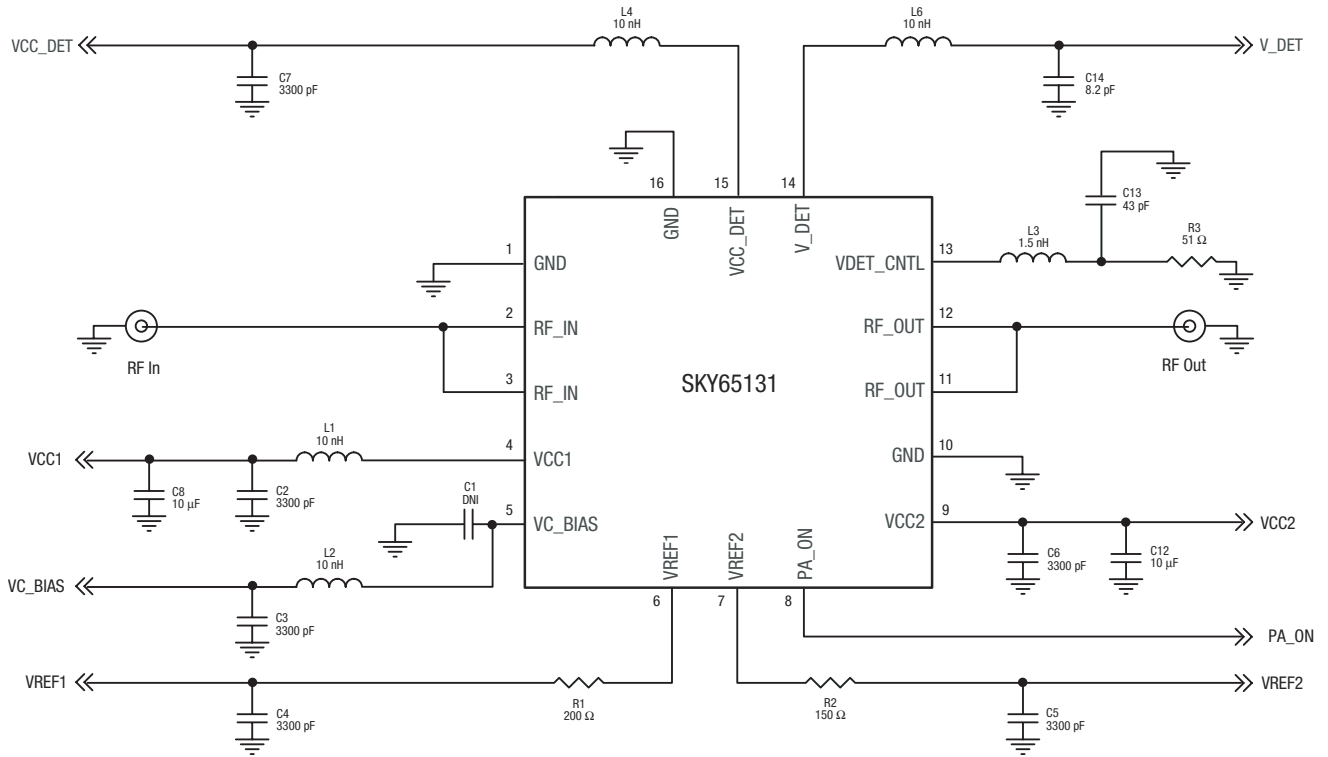


Figure 9. EVM vs Pout for 802.11g (64 Quadrature Amplitude Modulated, 54 Mbps Input Signal)

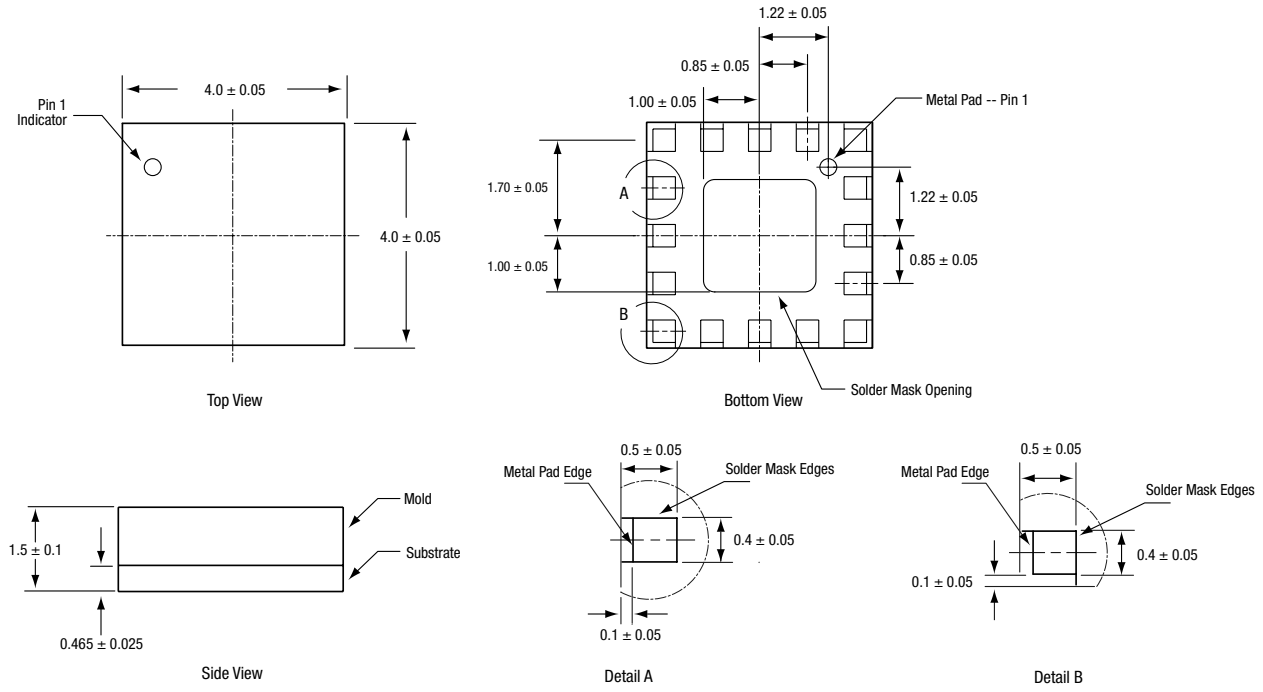
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Figure 10. SKY65131 Evaluation Board Schematic

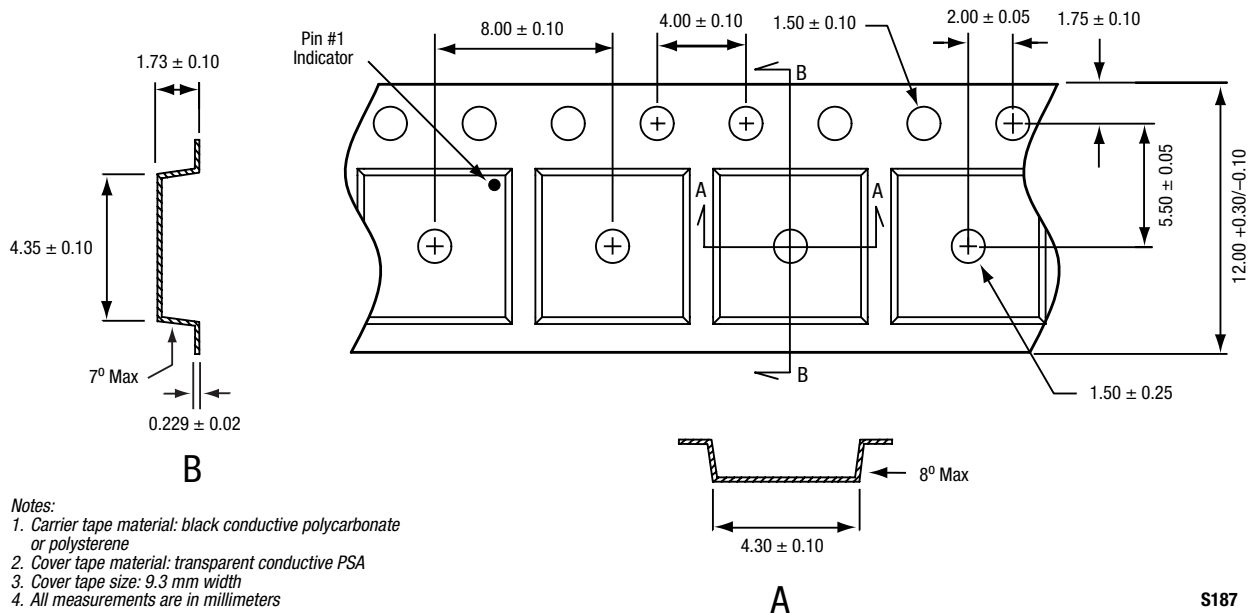
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All dimensions are in millimeters

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Figure 11. SKY65131 16-Pin MCM Package Dimensions



Notes:

1. Carrier tape material: black conductive polycarbonate or polystyrene
2. Cover tape material: transparent conductive PSA
3. Cover tape size: 9.3 mm width
4. All measurements are in millimeters

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Figure 12. SKY65131 16-Pin MCM Tape and Reel Dimensions

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Ordering Information

Model Name	Manufacturing Part Number	Evaluation Kit Part Number
SKY65131 WLAN Power Amplifier Module	SKY65131-11	TW13-D341

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