

DATA SHEET

# SKY85806-11: Dual-Band 802.11a/g/n/ac Wireless LAN Front End

## Applications

- WLANs:
  - IEEE 802.11b DSSS
  - IEEE 802.11a/g OFDM
  - IEEE 802.11ac/n
- Access points
- PCMCIA cards
- PC cards

## Features

- All RF ports matched to 50  $\Omega$
- Integrated 2.4 GHz PA, 5 GHz PA, transmit filter, diplexers, and T/R switches
- Integrated logarithmic power detector for each transmit chain
- +21 dBm power, 802.11b, 11 Mbps, ACPR = +35 dBc
- +19 dBm @ 3.0% EVM, MCS7, HT40, 2G
- +17 dBm @ 3.0% EVM, MCS7, HT40, 5G
- +17 dBm @ 1.8% EVM, MCS9, HT40, 2G
- +15 dBm @ 1.8% EVM, MCS9, HT80, 5G
- Single supply voltage: 3.3 V  $\pm$  10%
- Sleep mode: < 1  $\mu$ A
- Bluetooth® ready; functional when Vcc = 0 V or 3.3 V
- Bluetooth and 5 GHz WiFi concurrent operation
- Multiple receive bypass step attenuation
- Small QFN (28-pin, 4.0 x 3.0 x 0.8 mm) package (MSL3, 260 °C per JEDEC J-STD-020)



Skyworks Green™ products are compliant with all applicable legislation and are halogen-free. For additional information, refer to *Skyworks Definition of Green™*, document number SQ04-0074.

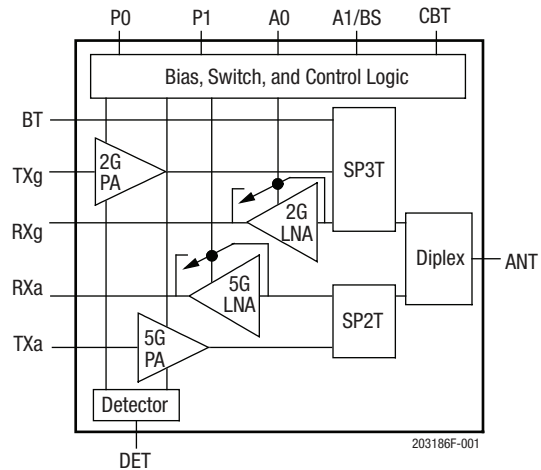


Figure 1. SKY85806-11 Block Diagram

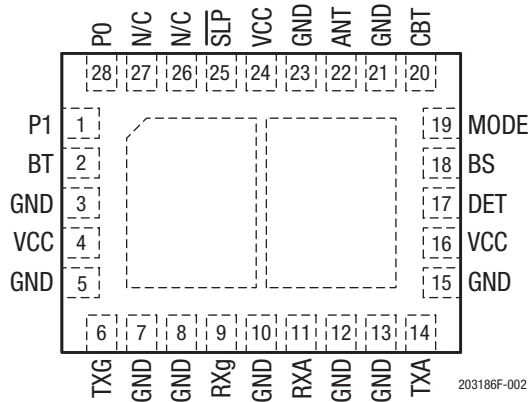
## Description

The SKY85806-11 is a complete 802.11a/b/g/n/ac Wireless Local Area Network (WLAN), RF front-end module (FEM) that provides all the functionality of a power amplifier (PA), filtering, power detector, transmit/receive (T/R) switch, diplexer, and associated matching. The SKY85806-11 provides a complete 2.4 GHz and 5 GHz WLAN RF solution, from the output of the transceiver to the antenna in an ultra-compact form factor. Designed to meet the stringent linearity conditions of the 802.11ac standard, the SKY85806-11 delivers less than 2% error vector magnitude (EVM) at the rated Alternating Current (AC) power.

Designed for ease of use, all RF ports are matched to 50  $\Omega$  to simplify the layout of the printed circuit board (PCB) and the interface to the transceiver. The SKY85806-11 also includes a transmitter power detector with +20 dB of dynamic range for each transmit chain. Each power amplifier has a separate digital enable control for transmitter on/off control. The power ramp rise/fall time is less than 0.5  $\mu$ s.

The SKY85806-11 provides Local Oscillator (LO) filters for the 2 GHz and 5 GHz transmit paths. The SKY85806-11 is packaged in a small 4.0 x 3.0 x 0.8 mm, Quad Flat No-Lead (QFN) package.

A block diagram of the SKY85806-11 is shown in Figure 1. The device package and pinout are shown in Figure 2. Signal pin assignments and functional pin descriptions are described in Table 1.



**Figure 2. SKY85806-11 Pinout (Top View)**

**Table 1. SKY85806-11 Signal Descriptions**

Pin	Name	Description	Pin	Name	Description
1	P1	Register control 1 select	15	GND	Ground
2	BT	Bluetooth bidirectional RF port	16	VCC	5 GHz supply voltage
3	GND	Ground	17	DET	Detector output
4	VCC	Supply voltage	18	BS	Band select
5	GND	Ground	19	MODE	Mode select
6	TXg	2GHz TX RF input	20	CBT	Bluetooth switch control
7	GND	Ground	21	GND	Ground
8	GND	Ground	22	ANT	Antenna
9	RXg	2 GHz RX RF output	23	GND	Ground
10	GND	Ground	24	VCC	Supply voltage
11	RXa	5 GHz RX RF output	25	SLP	Sleep (when pulled low)
12	GND	Ground	26	NC	Not connected
13	GND	Ground	27	NC	Not connected
14	TXa	5 GHz TX RF input	28	P0	Register control 0 select

## Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY85806-11 are provided in Table 2. The recommended operating conditions are specified in Table 3. The electrical specifications are provided in

Tables 4 through 13. The state of the SKY85806-11 is determined by the logic provided in Table 14.

The typical performance characteristics of the SKY85806-11 are illustrated in Figures 3 and 4.

**Table 2. SKY85806-11 Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Minimum	Maximum	Units
Supply voltage	VCC	-0.3	3.6	V
PA enable pins: ENa, ENg	Pu	-0.3	3.6	V
Maximum power input to TXa, TXg, with ANT terminated in 10:1 load or better	TX <sub>RF</sub>		12.0	dBm
Operating temperature	T <sub>A</sub>	-40	+85	°C
Storage temperature	T <sub>STG</sub>	-40	+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 1C (ANT pin zap to ground) Human Body Model (HBM), Class 1C (all remaining pins)	ESD		1.5 1	kV kV

<sup>1</sup> 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. Exceeding any of the limits listed here may result in permanent damage to the device.

**CAUTION:** Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.

**Table 3. SKY85806-11 Recommended Operating Conditions**

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply voltage	V <sub>CC</sub>	3.0	3.3	3.6	V
Ground pad temperature	T <sub>A</sub>	-40	+25	+85	°C

**Table 4. SKY85806-11 Electrical Specifications: DC Characteristics<sup>1</sup>**

(V<sub>CC</sub> = 3.3 V, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Total transmit supply current:						
802.11a	ICQ-A	Control state 9 or 18, no RF		175	185	mA
802.11g	ICQ-G	Control state 4, no RF		145	160	mA
802.11g	ICC-G	Control state 4, P <sub>OUT</sub> = +18 dBm, 54 Mbps OFDM signal, 64 QAM		220	245	mA
802.11b	ICC-B	Control state 4, P <sub>OUT</sub> = +21 dBm, 11 Mbps CCK signal, BT = 0.45		275	300	mA
802.11a/n	ICC-A	Control state 9 or 18, P <sub>OUT</sub> = +16.5 dBm, MCS7, 40 MHz		230	245	mA
802.11ac – 2G	ICC-AC2G	Control state 4, P <sub>OUT</sub> = +17 dBm, 256 QAM, MCS9, 40 MHz		200	225	mA
802.11ac – 5G	ICC-AC5G	Control state 9, P <sub>OUT</sub> = +15 dBm, 256 QAM, MCS9, 80 MHz		215	230	mA
Total receive supply current:						
2G	ICC-RX2	Control state 1			13.5	mA
5G	ICC-RX5	Control states 6 or 15			14	mA
Total supply current						
	IBYPASS	Control state 2, 3, 7, 8		12		μA
	IBTREADY	Control state 20		12		μA
	ISLEEP	Control state 21			1	μA

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 5. SKY85806-11 Electrical Specifications: AC Characteristics: 2.4 GHz Transmit Characteristics<sup>1</sup>**  
**(V<sub>CC</sub> = 3.3 V, Control State 4, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Frequency range	f <sub>IN</sub>		2400		2500	MHz
Error vector magnitude	EVM	MCS9, 40 MHz, P <sub>OUT</sub> ≤ +16 dBm MCS9, 40 MHz, P <sub>OUT</sub> ≤ +17 dBm MCS7, 40 MHz, P <sub>OUT</sub> ≤ +19 dBm		-37.0 -36.0 -32.0	-35.0 -34.0 -30.5	dB dB dB
802.11b mask	Mask 11b	P <sub>OUT</sub> = +21dBm, 11 Mbps, CCK ± RBW = VBW = 100 kHz + 11 MHz offset + 22 MHz offset		-35 -56	-32 -52	dBc dBc
802.11ac mask	Mask 11ac	P <sub>OUT</sub> = +18 dBm, 40 MHz, MCS0, RBW = 100 kHz, BW = 30 kHz	Compliant			
Small signal gain: Standard Variation over band	S <sub>21</sub> ΔS <sub>21</sub>		+28 -0.5		+32.5 +1.5	dB dB
VCO gain: Gain at ½ reference Gain at reference	S <sub>21</sub> 1.2 S <sub>21</sub> 3.6	1206 MHz to 1242 MHz 3618 MHz to 3726 MHz			+11 -11	dB dB
Reverse isolation	S <sub>12</sub>		43	50		dB
TxG to non-RF pin isolation	LTxGbcd	Isolation between TxG and any bias control pin or power detector pin	+40			dB
Harmonics	2f <sub>o</sub> 3f <sub>o</sub>	P <sub>OUT</sub> = ≤ +20 dBm, CCK P <sub>OUT</sub> = ≤ +20 dBm, CCK			-50 -50	dBm/ MHz
Delay and rise and fall time	t <sub>DR</sub> , t <sub>DF</sub>	50% of V <sub>EN</sub> edge to 10%/90% of final ANT power: State 1 to state 4, 5, 9, or 10 State 2 or 3 to state 4, 5, 9, or 10 State 4, 5, 9, or 10 to state 1		350 350 350	500 500 500	ns ns ns
Return loss: Input Output	S <sub>11</sub> S <sub>22</sub>				-10 -8	dB dB
Stability	S <sub>TAB</sub>	CW, P <sub>OUT</sub> = +21 dBm 0.1 GHz to 21.0 GHz Load VSWR = 6:1	All non-harmonically related outputs < -42 dBm/MHz			
Ruggedness	R <sub>U</sub>	T <sub>g</sub> = +12 dBm, ANT load varies over 10:1 VSWR	No irreversible damage			

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 6. SKY85806-11 Electrical Specifications: AC Characteristics: 2.4 GHz Receive Characteristics<sup>1</sup>**  
**(V<sub>CC</sub> = 3.3 V, Control State 1, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Frequency range	f <sub>OUT</sub>		2400		2500	MHz
Receive gain: LNA enabled Bypass mode	S <sub>21</sub>	Control state 1 LNA bypassed: Control state 2 Control state 3	+11 -3.2 -10	+12 -3 -9	+14 -2 -8.5	dB dB dB
Gain step	GS <sub>g</sub>	LNA gain vs LNA bypass, control state 1 – control state 3	20	21	23	dB
ANT → RXg isolation	L <sub>TXRXg</sub>	Control state 4	+36			dB
Gain variation	ΔS <sub>21</sub>	Over the full range	-0.5		+0.5	dB
Noise figure	NF	Control state 1		2.7	3.2	dB
Delay and rise and fall time	t <sub>DR</sub> , t <sub>DF</sub>	50% of V <sub>EN</sub> edge and 90%/10% of final output power level		200	500	ns
Return loss: Input Output	S <sub>11</sub> S <sub>22</sub>	At antenna port for all 2 GHz receive gain states At RXg port for all 2 GHz receive gain states			-10 -10	dB dB
Input: 1 dB input compression point	IP <sub>1dB</sub>	Control state 1 Control state 2 Control state 3	-6 +15 +15	-4.5		dBm dBm dBm
Third order input intercept point	IIP <sub>3</sub>	Control state 1 Control state 2 Control state 3	+3 +25 +25	+4.5		dBm dBm dBm
Rx gain switching	t <sub>EN</sub>	50% edge of the P0/P1 signal to 90%/10% of the final output power at the RXG port: From state 1 to state 2 and 3 From state 2 to state 1 and 3 From state 3 to state 1 and 2		120 120 120	200 200 200	ns ns ns
High band gain	S <sub>21_00B</sub>	Control states 1, 2, or 3			-25	dB

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 7. SKY85806-11 Electrical Specifications: AC Characteristics: 5 GHz Transmit Characteristics<sup>1</sup>**  
**(V<sub>CC</sub> = 3.3 V, Control States 9 or 18, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Frequency range	f		5150		5900	MHz
Error vector magnitude	EVM	MCS9, 40 MHz, P <sub>OUT</sub> ≤ +14 dBm MCS9, 40 MHz, P <sub>OUT</sub> ≤ +15 dBm MCS7, 40 MHz, P <sub>OUT</sub> ≤ +16.5 dBm		-39 -37 -33	-37 -35 -31	dB dB dB
802.11ac mask	Mask 11ac	P <sub>OUT</sub> = +20 dBm, HT20 to HT80, MCS0, RBW = 100 kHz, BVW = 30 kHz	Compliant			
Small signal gain: Standard	S <sub>21</sub> S <sub>21</sub> S <sub>21</sub>	5150 MHz 5700 MHz 5875 MHz	+26.5 +26.5 +26.5		+32 +32 +32	dB dB dB
Variation over band	ΔS <sub>21</sub> ΔS <sub>21</sub>	5150 MHz to 5700 MHz 5700 MHz to 5875 MHz	-0.8 -0.75		+0.8 +0.75	dB dB
VCO gain: Gain at ½ reference Gain at reference	S <sub>21</sub> 1.6 S <sub>21</sub> 3.2	1640 MHz to 1942 MHz 3280.0 MHz to 3883.3 MHz			+12 -1.5	dB dB
Reverse isolation	S <sub>12</sub>		-40	-45		dB
Harmonics	2f  3f	P <sub>OUT</sub> = ≤ +20 dBm, 802.11a/ac/n, all data rates 5.1 to 5.3 GHz 5.3 to 5.9 GHz		-46 -49 -50	-45.5 -46.5	dBm/MHz dBm/MHz dBm/MHz
Delay and rise and fall time	t <sub>DR</sub> , t <sub>DF</sub>	50% of V <sub>EN</sub> edge to 10%/90% of final ANT power: State 6 to state 4, 5, 9, or 10 State 7 or 8 to state 4, 5, 9, or 10 State 4, 5, 9, or 10 to state 6		350 350 350	500 500 500	ns ns ns
Return loss: Input Output	S <sub>11</sub> S <sub>22</sub>				-5 -8.5	dB dB
Stability	S <sub>TAB</sub>	CW, P <sub>OUT</sub> = +20 dBm, 0.1 GHz to 21.0 GHz, Load VSWR = 10:1	All non-harmonically related outputs < -42 dBm/MHz			
Ruggedness	R <sub>U</sub>	T <sub>g</sub> = +12 dBm, ANT load varies over 10:1 VSWR	No irreversible damage			

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 8. SKY85806-11 Electrical Specifications: AC Characteristics: 5 GHz Receive Characteristics<sup>1</sup>****(V<sub>CC</sub> = 3.3 V, Control States 6 or 15, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Frequency range	f <sub>OUT</sub>		5150		5900	MHz
Receive gain: LNA enabled Bypass mode	S <sub>21</sub>	5150 MHz to 5900 MHz, control state 6 or 15 LNA bypassed: Control state 7 or 16 Control state 8 or 17	+9.5 -6.2 -9.2	+11 -6 -9	+12.5 -4.7 -7.7	dB dB dB
Gain step	GSg	LNA gain vs LNA bypass, from control state 6 or 15 to control state 8 or 17	19	20	21	dB
ANT → RXa isolation	L <sub>TXRXa</sub>	Control states 9, 10, 18, and 19	+37			dB
BT → RXa isolation	L <sub>BTRXa</sub>	Control states 9, 10, 18, and 19	+37			dB
Gain variation	ΔS <sub>21</sub>	Over any 80 MHz band Over the entire range	-0.5 -1.3		+0.5 +1.3	dB dB
Noise figure	NF	Control state 6 or 15		+3.6	+3.8	dB
Return loss: Input Output	S <sub>11</sub> S <sub>22</sub>	At antenna port for all 5 GHz receive gain states At RXa port for all 5 GHz receive gain states		-14	-6 -10	dB dB
Input: 1 dB Input Compression Point 3rd Order Input Intercept Point	IP1dB IIP3	Control state 6 or 15 Control state 7, 8, 16, or 17 Control state 6 or 15 Control state 7, 8, 16, or 17	-4 +13 +3 +23			dBm dBm dBm dBm
Rx gain switching	t <sub>EN</sub>	50% edge of the P0/P1 signal to 90%/10% of final output power at the RXa port: State 6 (or 15) to state 7 (or 16) and 8 (or 17) State 7 (or 16) to state 6 (or 15) and 8 (or 17) State 8 (or 18) to state 6 (or 15) and 7 (or 16)		160 160 160	250 250 250	ns ns ns
Low band gain	S <sub>21_00B</sub>	2400 MHz to 2500 MHz, control states 6, 7, 8, 15, 16, or 17		-40	-37	dB

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.**Table 9. SKY85806-11 Electrical Specifications: Logic Characteristics<sup>1</sup>****(V<sub>CC</sub> = V<sub>EN</sub> = 3.3 V, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Control voltage: On state (Bluetooth only) On state (all other controls) Off state (all controls)	V <sub>CBT_ON</sub> V <sub>CTL_ON</sub> V <sub>CTL_OFF</sub>		3.0 3.0 0	3.3	3.6 3.6 0.2	V V V
Loss switch control: Low High	SW <sub>ON</sub> SW <sub>OFF</sub>	High state = V <sub>CTL_ON</sub> to V <sub>CTL_OFF</sub> Low state = V <sub>CTL_OFF</sub> to V <sub>CTL_OFF</sub>	1.8 0		V <sub>CC</sub> 0.3	V V
Bias current, each control line	I <sub>CTL_ON</sub>	No unused pull-up/down resistors (excludes CBT pin when CBT = 3.3 V and V <sub>DD</sub> = 0.0 V)			1	μA
Control input capacitance	C <sub>CTL</sub>				0.500	pF

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 10. SKY85806-11 Electrical Specifications: Special States<sup>1</sup>**

Special State	Test Condition	Control Logic
Bluetooth ready	All other control pins = V <sub>CTL_OFF</sub>	VCC = 0 V; CBT = V <sub>CTL_ON</sub>

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 11. SKY85806-11 Electrical Specifications: Low-Band Bluetooth Path Specifications<sup>1</sup>  
(V<sub>cc</sub> = 3.3 V, Control States 11 through 19 and Bluetooth Ready, T<sub>a</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Loss:						
Input return	S <sub>11</sub>	At ANT port			-10	dB
Output return	S <sub>22</sub>	At BT port			-10	dB
Insertion	S <sub>21</sub>	ANT port to BT port	-1.7			dB
Insertion variation	ΔS <sub>21</sub>	Over entire frequency range	-0.2		+0.2	dB
Bluetooth high-band gain	S <sub>21HB</sub>	ANT port to BT port gain, measured at 5.1 to 5.9 GHz			-15	dB
Bluetooth to non-RF pin isolation	L <sub>BTbcd</sub>	External bypass capacitor required on the BT control line (see the schematic)	+40			dB
Input:						
1dB input compression point	IP <sub>1dB</sub>		+24			dBm
Third order input intercept point	IIP <sub>3</sub>		+35			dBm
2 <sup>nd</sup> and 3 <sup>rd</sup> harmonic power spectral density (PSD):						
HD <sub>2</sub>		P <sub>OUT</sub> = +18 dBm			-55	dBm/MHz
HD <sub>3</sub>		P <sub>OUT</sub> = +18 dBm			-55	dBm/MHz

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 12. SKY85806-11 Electrical Specifications: Power Detector Characteristics<sup>1</sup>  
(V<sub>cc</sub> = 3.3 V, Control State 4, T<sub>a</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Minimum	Typical	Maximum	Units
Frequency range	f <sub>OUT</sub>		2400		2500	MHz
Power detect range, peak power	PDR	Measured at ANT	0		+22	dBm
DC output impedance	PDZ <sub>OUT</sub>			4		kΩ
Output voltage:						
+21 dBm	PDV <sub>P21</sub>	P <sub>OUT</sub> = +21 dBm	820	900	950	mV
No RF	PDV <sub>pnoRF</sub>	P <sub>OUT</sub> = No RF	125		225	mV
Power detect low pass filter, +3 dB corner frequency	LPF <sub>-3dB</sub>	Measured at P <sub>OUT</sub> = 18 dBm		900		kHz
Power detector accuracy	Pdet <sub>acc</sub>	Measured into 2:1 load at ANT port	-1.5		+1.5	dB
Power detector:						
Operating voltage	V <sub>PDOP</sub>	0 dBm to +22 dBm	200		975	mV
Maximum limit	V <sub>PDLM</sub>	Maximum PDET voltage			1.2	V
Sensitivity	V <sub>PDSENS</sub>	0 dBm to +22 dBm	±10		±100	mV/dB

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.



**Table 13. SKY85806-11 Electrical Specifications: Power Detector Characteristics<sup>1</sup>**  
**(V<sub>CC</sub> = 3.3 V, Control State 9 or 18, T<sub>A</sub> = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)**

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Frequency	f <sub>out</sub>		5150		5900	MHz
Power detector range, peak power	PDR	Measured at ANT pin	0		+20	dBm
DC output impedance	PDZ <sub>out</sub>			4		kΩ
Output voltage	PDV <sub>p20</sub> PDV <sub>pnoRF</sub>	@ +20 dBm No RF	850 135	900	950 215	mV mV
Power detector low pass filter, +3 dB corner frequency	LPF <sub>-3db</sub>	Measured at P <sub>OUT</sub> = 18 dBm		800		kHz
Power detector accuracy	PDET <sub>acc</sub>	Measured into 2:1 load at ANT port	-1.25		+1.25	dB
Power detector operating voltage	V <sub>pdop</sub>	0 dBm to +20 dBm	200		900	mV
Power detector maximum limit	V <sub>pdlim</sub>	Maximum PDET voltage			1.2	V
Power detector sensitivity	V <sub>pdsens</sub>	0 dBm to +20 dBm	±10		±100	mV/dB

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

**Table 14. SKY85806-11 Electrical Specifications: Switch Control Logic<sup>1</sup>**

State	Logic						Register Description
	CBT	A1/BS	P1	P0	Mode	Sleep	
1	0	0	0	0	X <sup>2</sup>	1	2 GHz LNA enabled
2	0	0	0	1	X	1	2 GHz LNA bypassed (insertion loss = +3 dB)
3	0	0	1	0	X	1	2 GHz LNA bypass (insertion loss = +9 dB)
4	0	0	1	1	1	1	2 GHz PA, high linearity, with loopback
5	0	0	1	1	0	1	2 GHz PA, low linearity, with loopback
6	0	1	0	0	X	1	5 GHz LNA enabled
7	0	1	0	1	X	1	5 GHz LNA bypass (insertion loss = +4 dB)
8	0	1	1	0	X	1	5 GHz LNA bypass (insertion loss = +7 dB)
9	0	1	1	1	1	1	5 GHz PA, high linearity, with loopback
10	0	1	1	1	0	1	5 GHz PA, low linearity, with loopback
11	1	0	0	0	X	1	BT
12	1	0	0	1	X	1	BT
13	1	0	1	0	X	1	BT
14	1	0	1	1	X	1	BT
15	1	1	0	0	X	1	BT, 5 GHz LNA enabled
16	1	1	0	1	X	1	BT, 5 GHz LNA bypass (IL = +4 dB)
17	1	1	1	0	X	1	BT, 5 GHz LNA bypass (IL = +7 dB)
18	1	1	1	1	1	1	BT, 5 GHz PA, high linearity, with loopback
19	1	1	1	1	0	1	BT, 5 GHz PA, low linearity, with loopback
20	1	X	X	X	X	0	BT ready
21	0	X	X	X	X	0	Sleep mode
All other states							Not supported

<sup>1</sup> Performance is guaranteed only under the conditions listed in this table.

<sup>2</sup> X = Don't Care.

### Typical Performance Characteristics

(Vcc = 3.3 V, TA = 25 °C as Measured on the Evaluation Board, All Unused Ports are Terminated with 50 Ω, Unless Otherwise Noted)

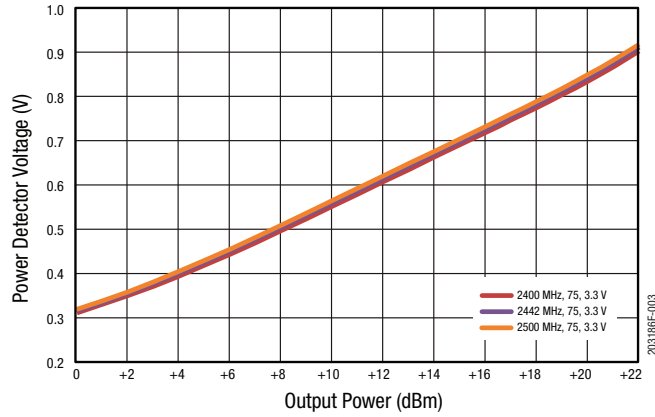


Figure 3: SKY85806-11 Power Detector vs Output Power over Frequency (2 GHz Band)

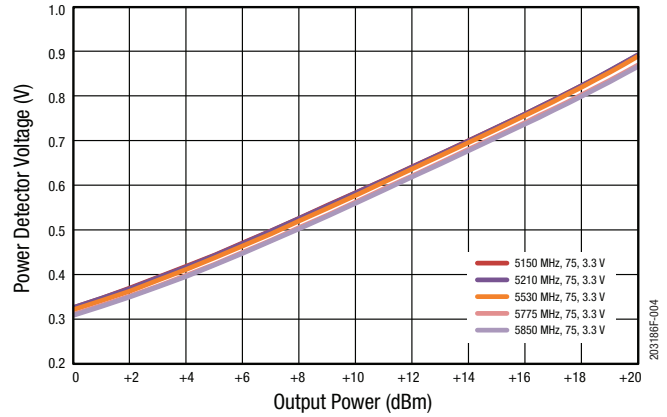


Figure 4: SKY85806-11 Power Detector vs Output Power over Frequency (5 GHz Band)

## Evaluation Board Description

The SKY85806-11 Evaluation Board is used to test the performance of the SKY85806-11 WLAN PA. The Evaluation Board schematic diagram is shown in Figure 5. A photograph of the SKY85806-11 Evaluation Board is shown in Figure 6. Table 15 provides the Bill of Materials (BOM) for Evaluation Board components.

## Evaluation Board Test Procedure

1. Connect system ground to pin 3 on connectors J7 and J8.
2. Apply 3.3 V to pin1 on connector J7; apply 3.3 V to pins 1 and 2 on connector J8.
3. Apply 0 V and 3.3 V to appropriate control pin(s) as specified in Table 13 for a given mode of operation.
4. Select an RF path to test according to the modes shown in Table 13.
5. Connect a multimeter or oscilloscope to pin 11 of connector J7 (labeled VDET).
6. Apply an RF signal to connector J6 (ANT) to monitor the BT port. Measure the response from the output of connector J1 (BT).
7. Apply an RF signal to connector J6 (ANT) to monitor the RXg to ANT performance. Measure the response from the output of connector J4 (RXg).
8. Apply an RF signal to connector J6 (ANT) to monitor the RXa to ANT performance. Measure the response from the output of connector J2 (RXa).
9. Apply an RF signal to connector J5 (TXg) to monitor the ANT to TXg performance. Monitor the output power on connector J6 (ANT). Take care not to overdrive the amplifier by applying too much RF on the input to the device (–20 dBm provides a suitable starting input power).
10. Apply an RF signal to connector J3 (TXa) to monitor the ANT to TXa performance. Monitor the output power on connector J6 (ANT).

---

**CAUTION:** Take care not to overdrive the amplifier by applying too much RF on the input to the device. A suitable starting input power is –20 dBm.

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## Circuit Design Considerations

The following design considerations are general in nature and must be followed regardless of final use or configuration:

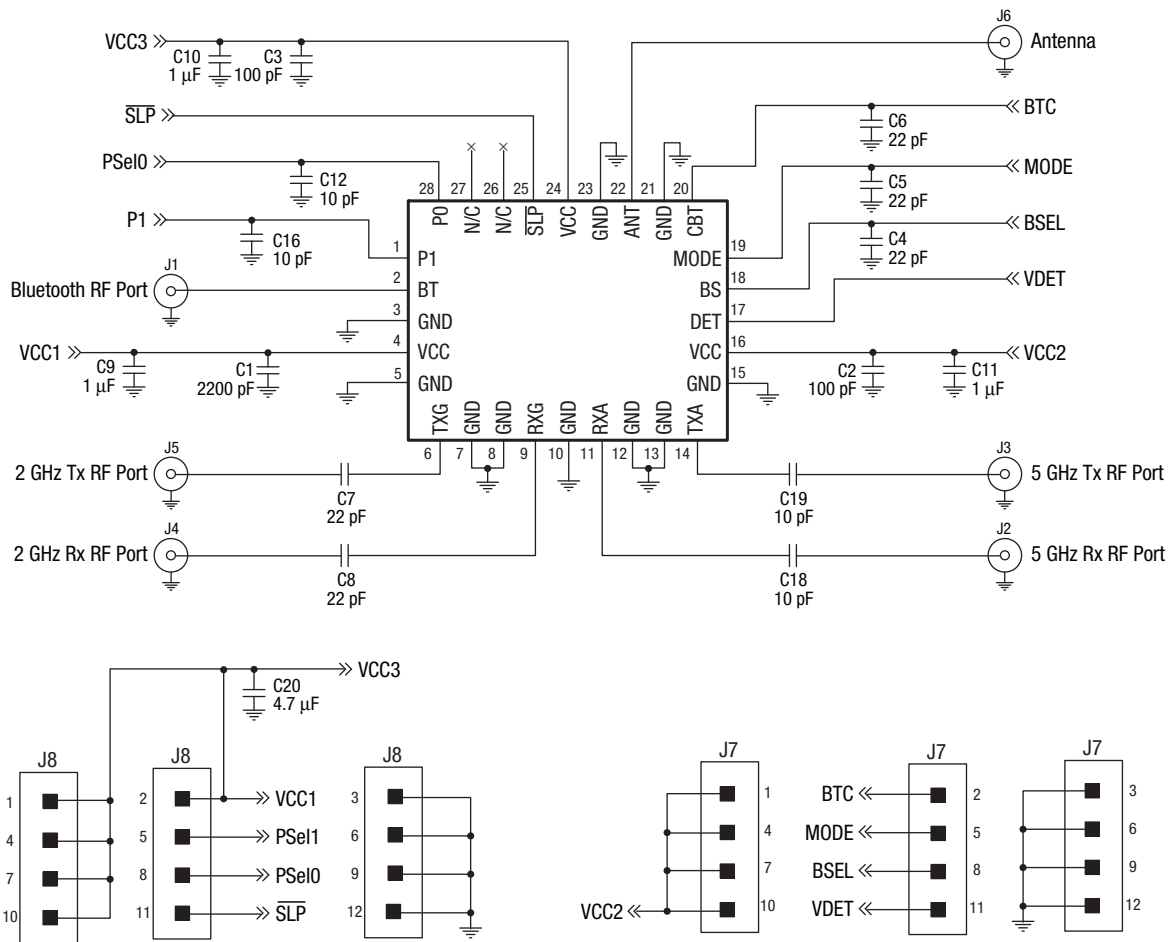
- Paths to ground should be made as short as possible.
- RF paths should be on the outer layer.
- There is no DC present on the RF ports but they must be DC blocked per the recommended values in the schematic if there is DC present on the lines connecting to them.
- Capacitors C1, C2, C3 (all 100 pF) should be on the primary side of the Evaluation Board at a minimum manufacturable distance from the FEM.

## Board Losses

Losses for the SKY85806-11 Evaluation Board are as follows:

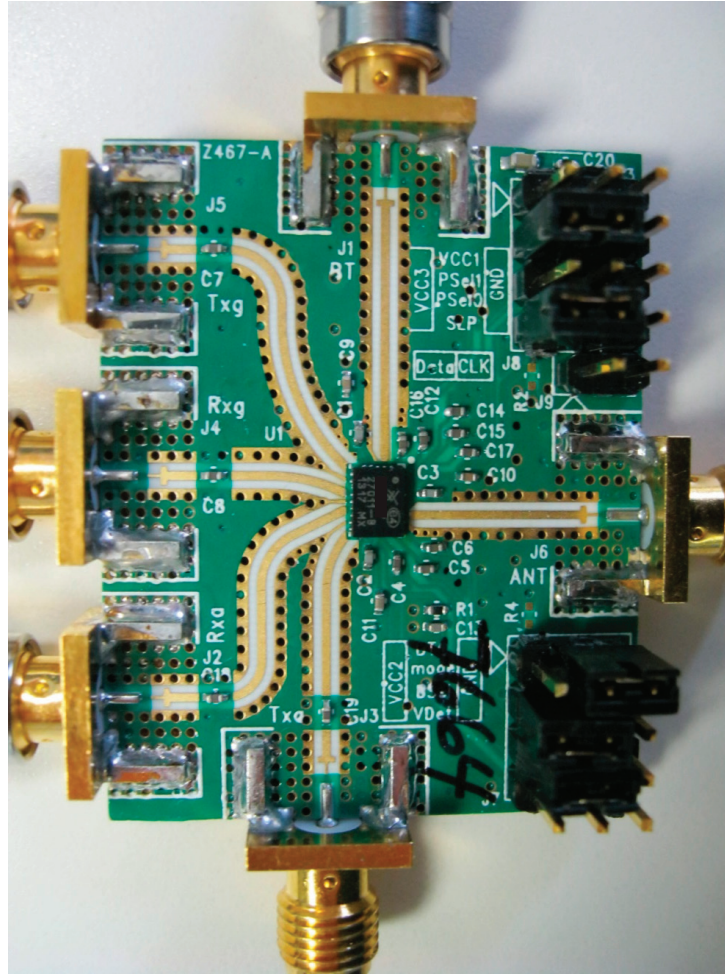
2 GHz TX:	0.22 dB
2 GHz RX:	0.16 dB
5 GHz TX:	0.28 dB
5 GHz RX:	0.31 dB
BT:	0.15 dB
ANT 2 GHz:	0.12 dB
ANT 5 GHz:	0.23 dB

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203186F-005

**Figure 5. SKY85806-11 Evaluation Board Schematic**



203186F-006

Figure 6. SKY85806-11 Evaluation Board

Table 15. SKY85806-11 Evaluation Board Bill of Materials (BOM)

Component	Value	Size	Manufacturer	Mfr Part Number	Characteristics
C1	2200 pF	0402	Murata	GRM155R71H222KA01D	Multilayer ceramic capacitor
C2, C11, C13	DNI <sup>1</sup>	–	–	–	–
C3	100 pF	0402	Murata	GRM1555C1H101JZ01	Multilayer ceramic capacitor
C4, C5, C6, C7, C8	22 pF	0402	Murata	GRM1555C1H220JZ01	Multilayer ceramic capacitor
C9, C10	1 μF	0402	TDK	C1005X5R1A105K	Multilayer ceramic capacitor
C12, C16, C17, C18, C19	10 pF	0402	Murata	GRM1555C1H100JZ01	Multilayer ceramic capacitor
C20	4.7 μF	0603	Murata	GRM188R60J475KE19	Multilayer ceramic capacitor
J1, J2, J3, J4, J5, J6	SMA	end launch	Johnson Components	142-0701-851	SMA end launch straight jack receptacle, tab contact
J7, J8	100 mil	4x3	Samtec	TSW-104-07-G-T	100 mil header
R2, R3, R4	DNI	–	–	–	–

<sup>1</sup> DNI components are not shown in the Evaluation Board schematic.

### Package Dimensions

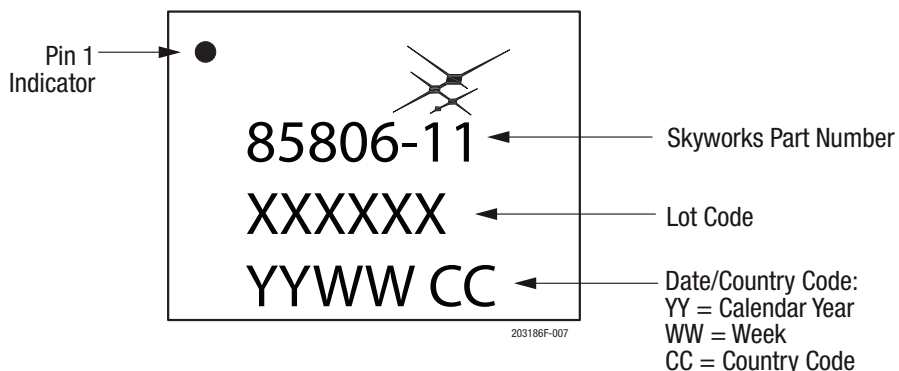
Typical part markings for the SKY85806-11 are shown in Figure 7. The PCB layout footprint for the SKY85806-11 is provided in Figure 8. Package dimensions for the SKY85806-11 are shown in Figure 9, and tape and reel dimensions are provided in Figure 10.

### Package and Handling Information

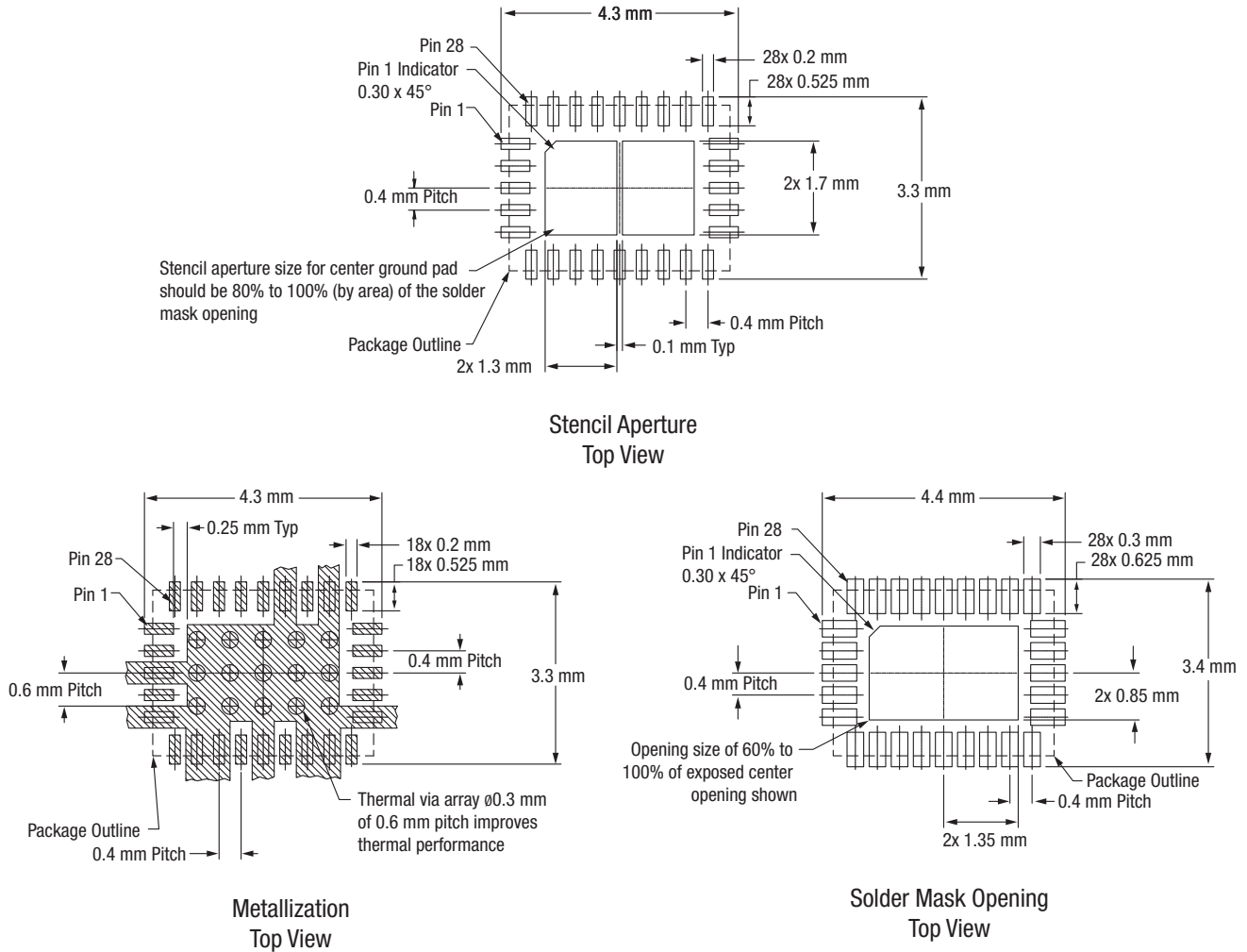
Since the device package is sensitive to moisture absorption, it is baked and vacuum packed before shipping. Instructions on the shipping container label regarding exposure to moisture after the container seal is broken must be followed. Otherwise, problems related to moisture absorption may occur when the part is subjected to high temperature during solder assembly.

The SKY85806-11 is rated to Moisture Sensitivity Level 3 (MSL3) at 260 °C, and can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information* (Document Number 200164).

Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



**Figure 7. SKY85806-11 Typical Part Markings (Top View)**



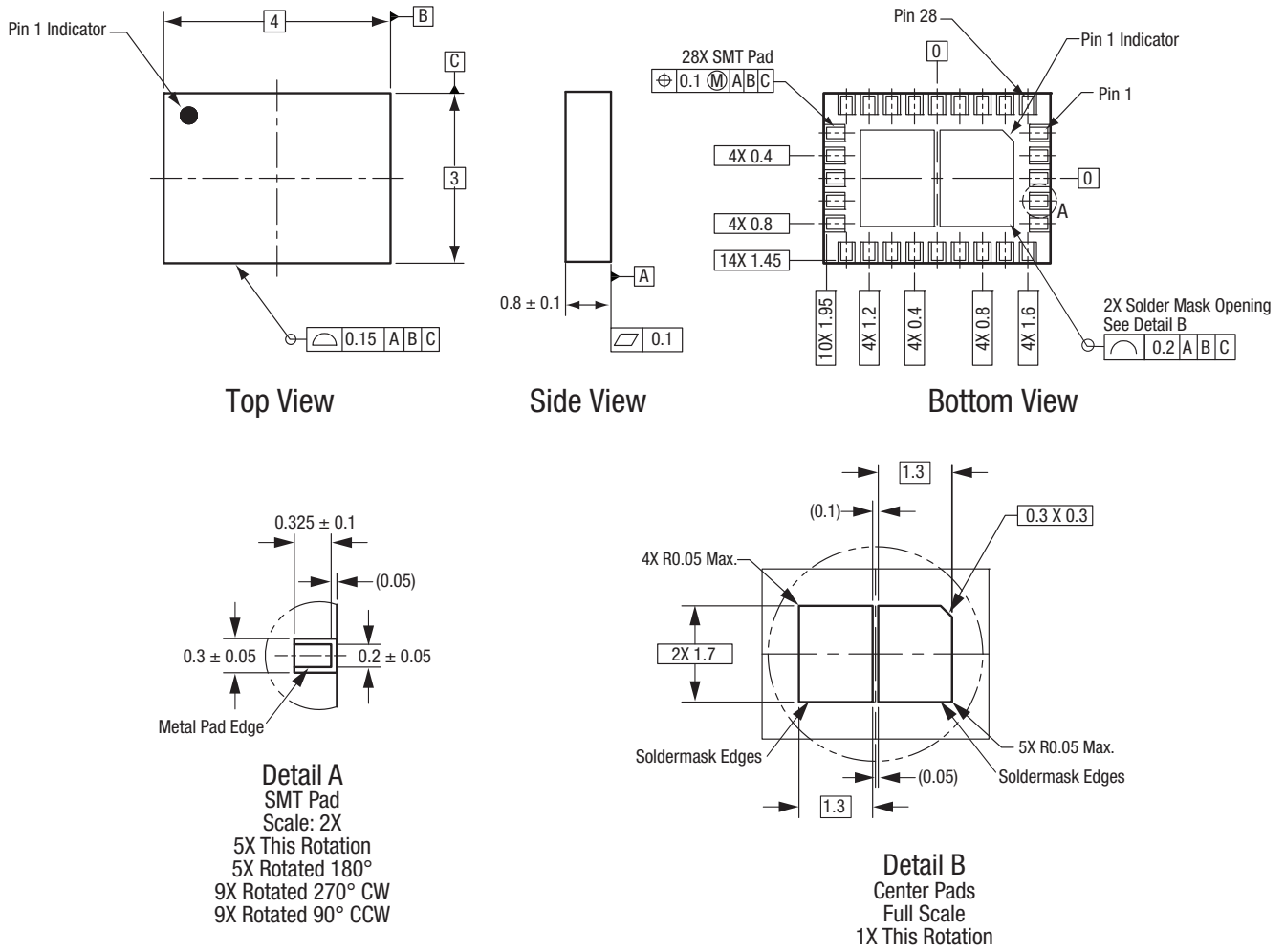
Notes:

Thermal vias should be resin filled and capped in accordance with IPC-4761 type VII vias.  
Recommended Cu thickness is 30 to 35  $\mu\text{m}$ .

203186F-008

Figure 8. SKY85806-11 PCB Layout Footprint

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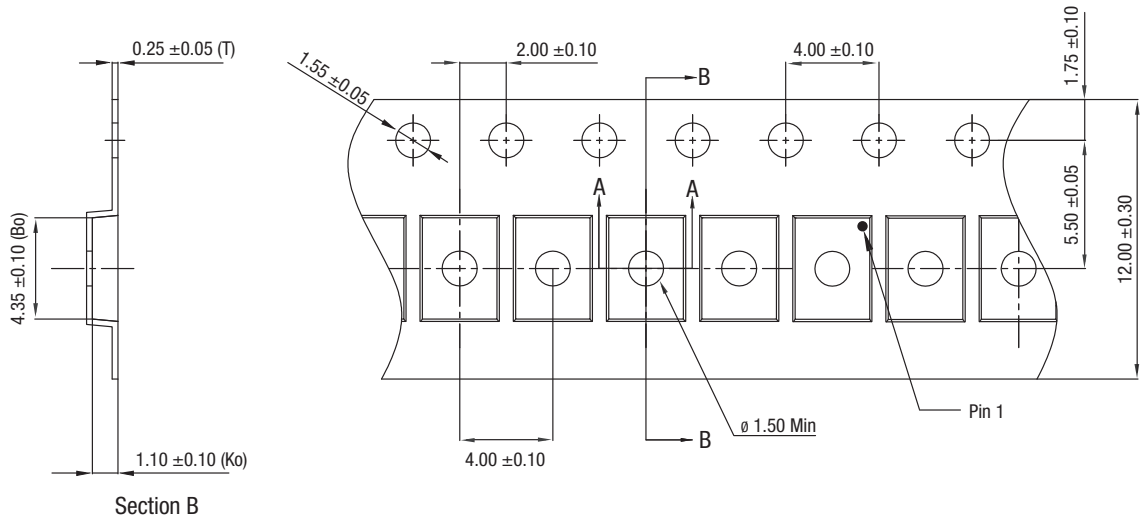
**Notes:**

1. All measurements are in millimeters.
2. Dimensions and tolerances according to ASME Y14.5M-1994.

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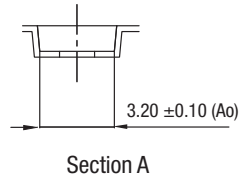
**Figure 9. SKY85806-11 Package Dimensions**





Notes:

1. Carrier tape: black conductive polystyrene.
2. Cover tape material: transparent conductive.
3. ESD-surface resistivity shall meet GP01-D232.
4. 10-sprocket hole pitch cumulative tolerance:  $\pm 0.20$  mm.
5. Ao and Bo measurement point to be 0.30 mm from bottom pocket.
6. All dimensions are in millimeters.



203186F-010

Figure 10. SKY85806-11 Tape and Reel Dimensions

## Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
SKY85806-11: Dual-Band WLAN Front End	SKY85806-11	SKY85806-11-EK1

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