SKY12207-306LF: 0.9 to 4.0 GHz 50 W High-Power Silicon PIN Diode SPDT Switch

Applications

- Transmit/receive switching and failsafe switching in TD-SCDMA, WiMAX, and LTE base stations
- Transmit/receive switching in land mobile radios and military communication systems

Features

- High-power handling: 50 W CW, 300 W peak
- Low insertion loss: 0.4 dB typical
- Controlled with positive power supply
- Bias driver circuit available on request
- Small, QFN (16-pin, 4 x 4 mm) Pb-free package (MSL1, 260 °C per JEDEC J-STD-020)

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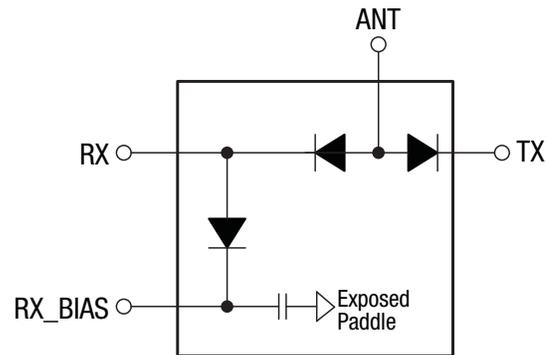
S2403

Figure 1. SKY12207-306LF Block Diagram

Description

The SKY12207-306LF is a high-power handling, single-pole, double-throw (SPDT) silicon PIN diode switch. The device operates over the 900 MHz to 4 GHz band. It features low insertion loss, excellent power handling, and superb linearity with low DC power consumption.

The SKY12207-306LF is well-suited for use as a high power transmit/receive switch in a variety of telecommunication systems such as WiMAX, TD-SCDMA, or LTE base stations.

The device is provided in a 4 x 4 mm, 16-pin Quad Flat No-Lead (QFN) package. A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.
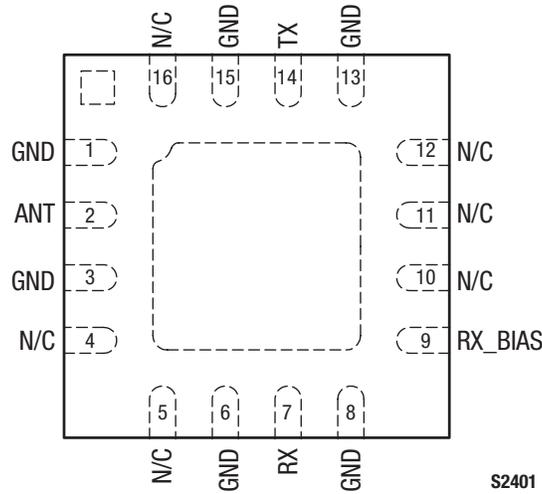
Figure 2. SKY12207-306LF Pinout
(Top View)

Table 1. SKY12207-306LF Signal Descriptions

Pin	Name	Description	Pin	Name	Description
1	GND	Ground. Must be connected to ground using lowest possible impedance.	9	RX_BIAS	RF ground port and DC bias input port
2	ANT	Antenna RF port and DC bias input port	10	N/C	No connection
3	GND	Ground. Must be connected to ground using lowest possible impedance.	11	N/C	No connection
4	N/C	No connection	12	N/C	No connection
5	N/C	No connection	13	GND	Ground. Must be connected to ground using lowest possible impedance.
6	GND	Ground. Must be connected to ground using lowest possible impedance.	14	TX	Transmit RF input port and DC bias input port
7	RX	Receive output port and DC bias input port	15	GND	Ground. Must be connected to ground using lowest possible impedance.
8	GND	Ground. Must be connected to ground using lowest possible impedance.	16	N/C	No connection

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Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY12207-306LF are provided in Table 2. Recommended operating conditions are specified in Table 3 and electrical specifications are provided in Table 4.

Typical performance characteristics of the SKY12207-306LF are illustrated in Figures 3 through 16.

The state of the SKY12207-306LF is determined by the logic provided in Table 6. Table 7 provides the logic for use with the SKY12207-306LF Evaluation Board.

Power derating data is plotted against temperature in Figures 17 and 18. Equivalent circuit diagrams for transmit and receive are shown in Figure 19.

Table 2. SKY12207-306LF Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Maximum	Units
RF CW input power, TX and ANT ports ($T_{SUBSTRATE}$ = 25 °C)	P_{IN}		75	W
RF peak input power, TX and ANT ports ($T_{SUBSTRATE}$ = 25 °C, RF burst width = 10 µs, RF burst repetition rate = 25 kHz)	P_{IN}		300	W
RF CW input power, RX port ($T_{SUBSTRATE}$ = 25 °C)	P_{IN}		60	W
RF peak input power, RX port ($T_{SUBSTRATE}$ = 25 °C, RF burst width = 10 µs, RF burst repetition rate = 25 kHz)	P_{IN}		240	W
Control port reverse voltage	V_{CTL}		200	V
Control port forward current	I_{CTL}		200	mA
Operating temperature	T_{OP}	-55	+175	°C
Storage temperature	T_{STG}	-55	+200	°C
Electrostatic discharge:	ESD			
Charged Device Model (CDM), Class 4			1000	V
Human Body Model (HBM), Class 1A			250	V
Machine Model (MM), Class B			150	V

[1] 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.

ESD HANDLING: *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 when handling or transporting. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD handling precautions should be used at all times.*

Table 3. Recommended Operating Conditions (Per ANT, TX, RX, and RX_BIAS Inputs)

Parameter	Symbol	Min	Typ	Max	Units
Control port reverse voltage	V_{CTL}	5	28	100	V
Control port forward current	I_{CTL}	20	50	100	mA

Table 4. SKY12207-306LF Electrical Specifications, Bias Voltage = 28 V[1] (1 of 3)
(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Insertion loss, TX to ANT ports	IL_{TX-ANT}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, TX port P_{IN} @ pin 14 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz		 0.60 0.31 0.32 0.40 0.54	 0.45 0.55	 dB dB dB dB dB
Insertion loss, ANT to RX ports	IL_{ANT-RX}	V_{PIN_2} = 1 V, V_{PIN_14} = 28 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 28 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz		 0.58 0.35 0.37 0.45 0.67	 0.50 0.60	 dB dB dB dB dB
Isolation, TX to RX ports	Iso_{TX-RX}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, TX port P_{IN} @ pin 14 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 42.5 37.0	 38.0 44.0 45.0 39.0 29.0		 dB dB dB dB dB
Isolation, ANT to TX ports	Iso_{ANT-TX}	V_{PIN_2} = 1 V, V_{PIN_14} = 28 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 28 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 17.5 17.0	 26.0 22.0 21.0 20.0 16.0		 dB dB dB dB dB
Isolation, ANT to RX ports	Iso_{ANT-RX}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 39 36	 37 41 41 37 28		 dB dB dB dB dB

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Table 4. SKY12207-306LF Electrical Specifications, Bias Voltage = 28 V[1] (2 of 3)
(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Input return loss		1.8 to 2.5 GHz: RX insertion loss state, ANT port (@ pin 2)		28		dB
		TX insertion loss state, TX port (@ pin 14)		26		dB
Transmit 2nd harmonic	2fo	TX insertion loss state, TX port P_{IN} @ pin 14 = +30 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.50 GHz 3.55 GHz		−88 −85 −95 −95 −89		dBc dBc dBc dBc dBc
Transmit 3rd harmonic	3fo	TX insertion loss state, TX port P_{IN} @ pin 14 = +30 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.50 GHz 3.55 GHz		−99 −97 −105 −97 −90		dBc dBc dBc dBc dBc
Transmit third order input intercept point	IIP3	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, TX port P_{IN} @ pin 14 = +30 dBm/tone, tone spacing = 1 MHz, 2.01 GHz		+78		dBm
Transmit 0.1 dB compression point	IP0.1dB	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, 0.9 to 3.55 GHz		+45		dBm
Receive 0.1 dB compression point	IP0.1dB	V_{PIN_2} = 1 V, V_{PIN_14} = 28 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 28 V, 0.9 to 3.55 GHz		+46		dBm

Table 4. SKY12207-306LF Electrical Specifications, Bias Voltage = 28 V[1] (3 of 3)
(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Maximum transmit CW input power	P_{IN_CW}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 28 V, 0.9 to 3.55 GHz		50		W
Maximum transmit TDD LTE input power[2]	$P_{IN\_TDD\ LTE}$	V_{PIN_2} = 1 V, Ipin_14 = -50 mA, Ipin_9 = -50 mA, Vpin_7 = 28 V, PAR = 8 dB, 3.6 GHz			46	dBm
Maximum receive CW input power	P_{IN_CW}	V_{PIN_2} = 1 V, V_{PIN_14} = 28 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 28 V, 0.9 to 3.55 GHz		40		W
Transmit RF switching time	t_{SW}	10% to 90% RF on, repetition rate = 0.5 MHz, @ 2.60 GHz		85		ns

1 Performance is guaranteed only under the conditions listed in this table.

2 Not 100% tested in production. Guaranteed by design

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Table 5. SKY12207-306LF Electrical Specifications, Bias Voltage = 5 V[1] (1 of 3)
(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Insertion loss, TX to ANT ports	IL_{TX-ANT}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 5 V, TX port P_{IN} @ pin 14 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz		 0.63 0.34 0.36 0.44 0.61	 0.45 0.55	 dB dB dB dB dB
Insertion loss, ANT to RX ports	IL_{ANT-RX}	V_{PIN_2} = 1 V, V_{PIN_14} = 5 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 5 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz		 0.60 0.36 0.38 0.47 0.72	 0.50 0.60	 dB dB dB dB dB
Isolation, TX to RX ports	Iso_{TX-RX}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 5 V, TX port P_{IN} @ pin 14 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 42.5 37.0	 37.0 44.0 45.0 39.0 29.0		 dB dB dB dB dB
Isolation, ANT to TX ports	Iso_{ANT-TX}	V_{PIN_2} = 1 V, V_{PIN_14} = 5 V, I_{PIN_7} = −50 mA, V_{PIN_9} = 5 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 17.5 17.0	 26.0 22.0 21.0 19.0 16.0		 dB dB dB dB dB
Isolation, ANT to RX ports	Iso_{ANT-RX}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 5 V, ANT port P_{IN} @ pin 2 = 0 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.3 to 2.7 GHz 3.3 to 3.8 GHz	 39 35	 36 41 41 36 27		 dB dB dB dB dB

Table 5. SKY12207-306LF Electrical Specifications, Bias Voltage = 5 V[1] (2 of 3)
(T$_{OP}$ = +25 °C, Characteristic Impedance [Z$_0$] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

| Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Input return loss		1.8 to 2.5 GHz:				
		RX insertion loss state, ANT port (@ pin 2)		23		dB
		TX insertion loss state, TX port (@ pin 14)		23		dB
Transmit 2nd harmonic	2fo	TX insertion loss state, TX port P$_{IN}$ @ pin 14 = +30 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.50 GHz 3.55 GHz		−46 −50 −52 −54 −68		dBc dBc dBc dBc dBc
Transmit 3rd harmonic	3fo	TX insertion loss state, TX port P$_{IN}$ @ pin 14 = +30 dBm: 900 MHz 1.80 GHz 2.01 GHz 2.50 GHz 3.55 GHz		−57 −70 −72 −71 −62		dBc dBc dBc dBc dBc
Transmit third order input intercept point	IIP3	V$_{PIN\_2}$ = 1 V, I$_{PIN\_14}$ = −50 mA, I$_{PIN\_9}$ = −50 mA, V$_{PIN\_7}$ = 5 V, TX port P$_{IN}$ @ pin 14 = +30 dBm/tone, tone spacing = 1 MHz, @ 2.01 GHz		+74		dBm
Transmit 0.1 dB compression point	IP0.1dB	V$_{PIN\_2}$ = 1 V, I$_{PIN\_14}$ = −50 mA, I$_{PIN\_9}$ = −50 mA, V$_{PIN\_7}$ = 5 V, 1.8 to 2.5 GHz		+33		dBm
Receive 0.1 dB compression point	IP0.1dB	V$_{PIN\_2}$ = 1 V, V$_{PIN\_14}$ = 5 V, I$_{PIN\_7}$ = −50 mA, V$_{PIN\_9}$ = 5 V, 0.9 to 3.55 GHz		+34		dBm

Table 5. SKY12207-306LF Electrical Specifications, Bias Voltage = 5 V[1] (3 of 3)
(T_{OP} = +25 °C, Characteristic Impedance [Z_0] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Maximum transmit CW input power	P_{IN_CW}	V_{PIN_2} = 1 V, I_{PIN_14} = −50 mA, I_{PIN_9} = −50 mA, V_{PIN_7} = 5 V, 0.9 to 3.55 GHz		15		W
Maximum transmit TDD LTE input power[2]	$P_{IN\_TDD\,LTE}$	V_{PIN_2} = 1 V I_{PIN_14} = -50 mA I_{PIN_9} = - 50 mA V_{PIN_7} = 5 V PAR = 8 dB 3.6 GHz			39	dBm
Maximum receive CW input power	P_{IN_CW}	V_{PIN_2} = 1 V, V_{PIN_14} = 5 V, I_{PIN_7} = 50 mA, V_{PIN_9} = 5 V, 0.9 to 3.55 GHz		10		W
Transmit RF switching time	t_{SW}	10% to 90% RF on, repetition rate = 0.5 MHz, @ 2.60 GHz		85		ns

[1] Performance is guaranteed only under the conditions listed in this table.

[2] Not 100% tested in production. Guaranteed by design.

Typical Performance Characteristics

(T$_{OP}$ = +25 °C, Characteristic Impedance [Z$_0$] = 50 Ω, EVB Optimized for 2.6 GHz Operation, Unless Otherwise Noted)
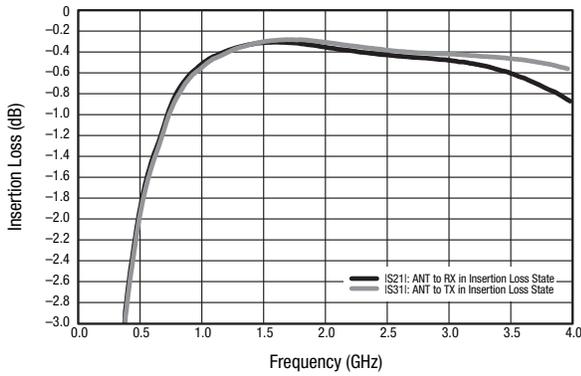
Figure 3. Insertion Loss vs Frequency
(ANT to RX and ANT to TX Ports; V$_{CTL}$ = 28 V, I$_{CTL}$ = −50 mA)
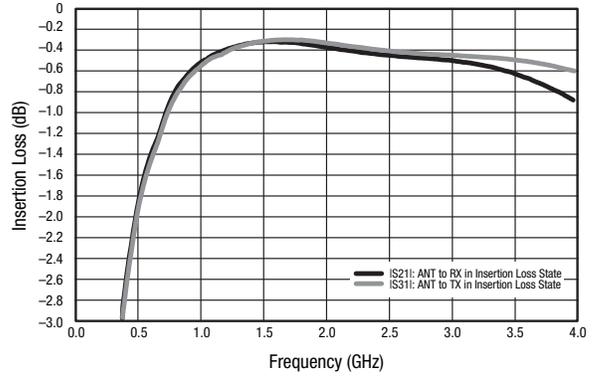
Figure 4. Insertion Loss vs Frequency
(ANT to RX and ANT to TX Ports; V$_{CTL}$ = 5 V, I$_{CTL}$ = −50 mA)
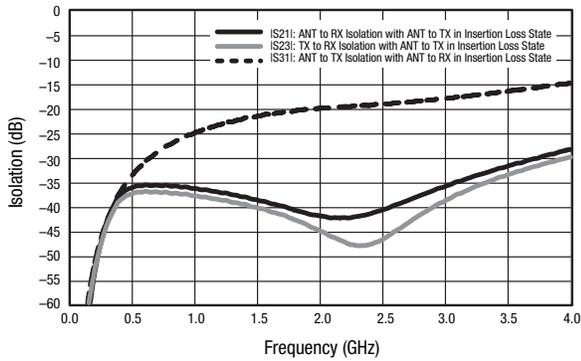
Figure 5. Isolation vs Frequency
(ANT to RX, TX to RX, and ANT to TX Ports;
V$_{CTL}$ = 28 V, I$_{CTL}$ = −50 mA)
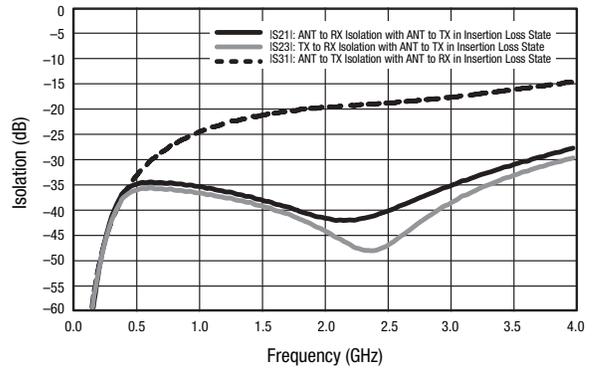
Figure 6. Isolation vs Frequency
(ANT to RX, TX to RX, and ANT to TX Ports;
V$_{CTL}$ = 5 V, I$_{CTL}$ = −50 mA)
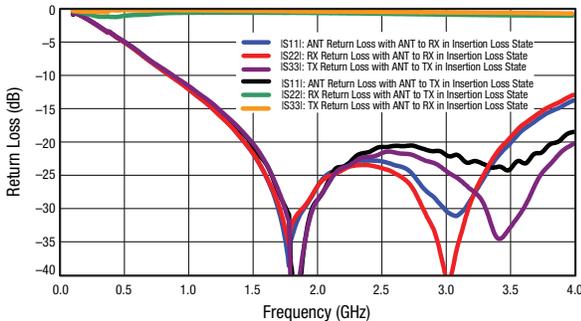
Figure 7. Return Loss vs Frequency
(ANT, TX, and RX Ports; V$_{CTL}$ = 28 V, I$_{CTL}$ = −50 mA)
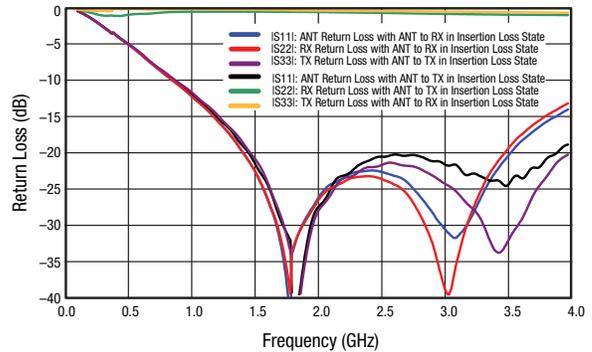
Figure 8. Return Loss vs Frequency
(ANT, TX, and RX Ports; V$_{CTL}$ = 5 V, I$_{CTL}$ = −50 mA)

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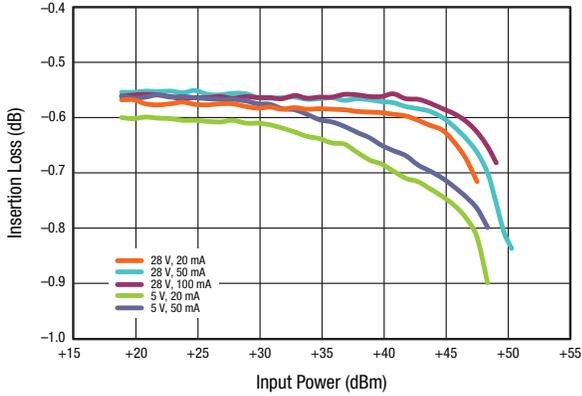
Figure 9. Insertion Loss vs CW Input Power
(ANT to RX Port, f = 2.6 GHz)
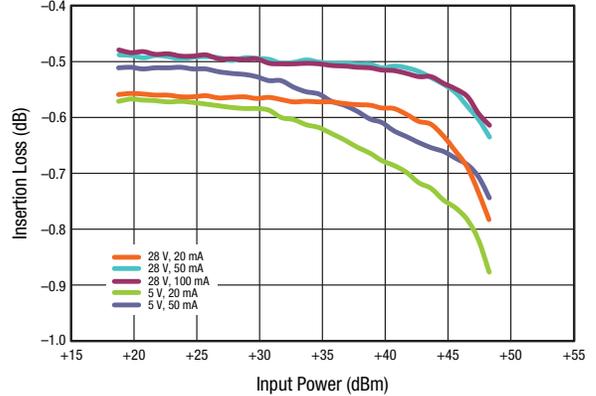
Figure 10. Insertion Loss vs CW Input Power
(TX to ANT Port, f = 2.6 GHz)
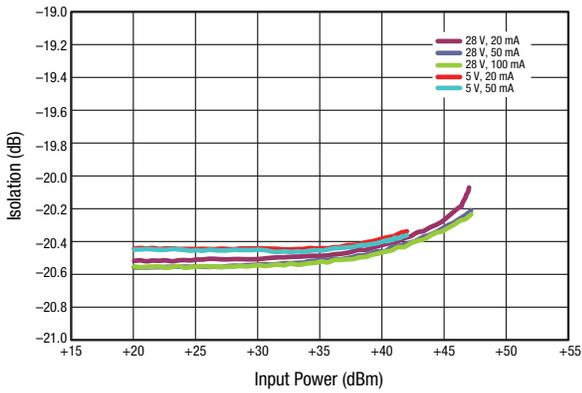
Figure 11. Isolation vs CW Input Power
(ANT to RX Port, f = 2.6 GHz)
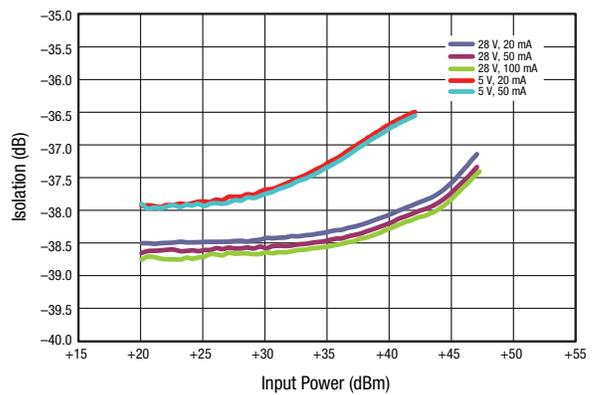
Figure 12. Isolation vs CW Input Power
(TX to ANT Port, f = 2.6 GHz)
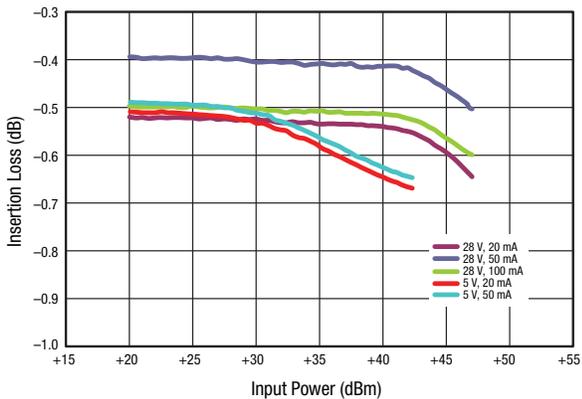
Figure 13. Insertion Loss vs CW Input Power
(ANT to RX Port, f = 2.3 GHz)
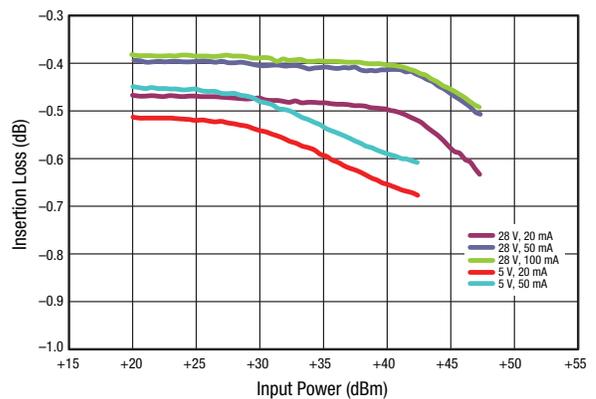
Figure 14. Insertion Loss vs CW Input Power
(TX to ANT Port, f = 2.3 GHz)
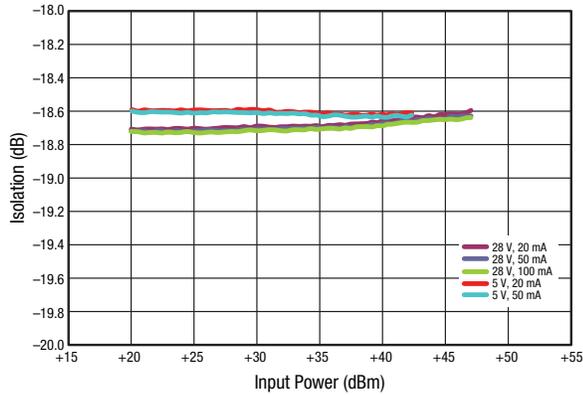
**Figure 15. Isolation vs CW Input Power
(ANT to RX Port, f = 2.3 GHz)**
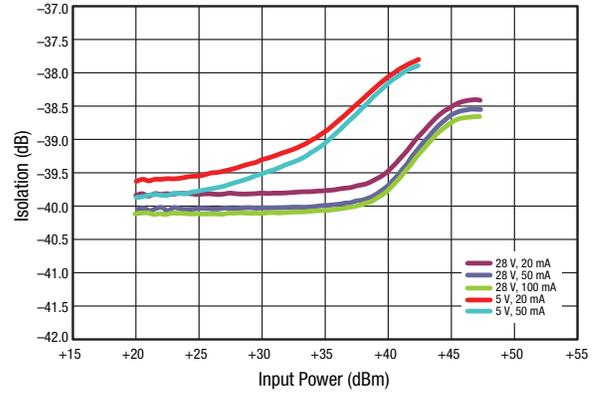
**Figure 16. Isolation vs CW Input Power
(TX to ANT Port, f = 2.3 GHz)**

Table 6. SKY12207-306LF Truth Table

Switch State	Path		Control Conditions			
	Antenna-to-Receiver Port (Pin 2 to Pin 7)	Transmitter-to-Antenna Port (Pin 14 to Pin 2)	Antenna Port Bias Input (Pin 2)	Nominal Receiver Output Port (Pin 7)	Nominal Transmitter Port Bias Input (Pin 14)	RX_BIAS Input (Pin 9)
Receive (see Figure 12)	Low insertion loss	High isolation	1 V	–50 mA	28 V	28 V
Transmit (see Figure 12)	High isolation	Low insertion loss	1 V	28 V	–50 mA	–50 mA

Table 7. SKY12207-306LF Evaluation Board Truth Table

Switch State	Path		Control Conditions			
	Antenna-to-Receiver Port	Transmitter-to-Antenna Port	Antenna Port Bias Input	Receiver Output Port	Transmitter Port Bias Input	RX_BIAS Input
Receive (see Figure 12)	Low insertion loss	High isolation	28 V	0 V (ground)	28 V	28 V
Transmit (see Figure 12)	High isolation	Low insertion loss	28 V	28 V	0 V (ground)	0 V (ground)

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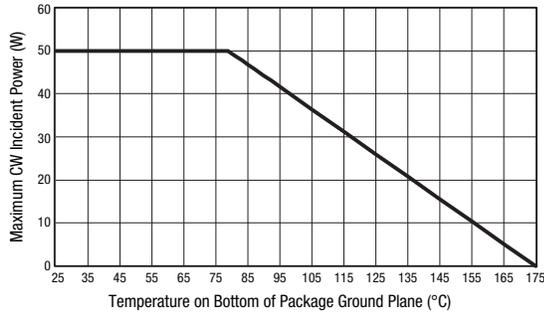
Figure 17. Transmit Power Derating, Maximum CW Incident Power (Insertion Loss = 0.3 dB) vs Temperature on Bottom of Package Ground Plane
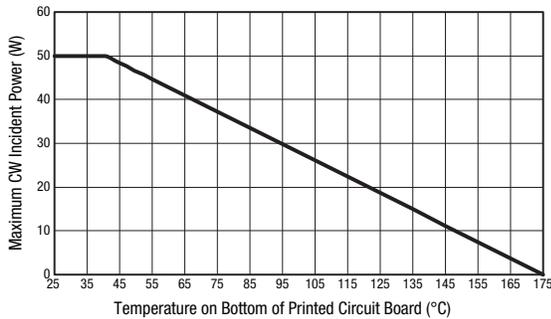
Figure 18. Transmit Power Derating, Maximum CW Incident Power (Insertion Loss = 0.3 dB) vs Temperature on Bottom of Printed Circuit Board

Figure 19. SKY12207-306LF Equivalent Circuit Diagrams

Evaluation Board Description

The SKY12207-306LF Evaluation Board is used to test the performance of the SKY12207-306LF PIN Diode SPDT switch. An assembly drawing for the Evaluation Board is shown in Figure 20. The layer detail is provided in Figure 21.

The SKY12207-306LF is designed to handle very large signals. Sufficient power may be dissipated by this switch to cause heating of the PIN diodes contained in the switch. It is very important to use a printed circuit board design that provides adequate cooling capability to keep the junction temperature of the PIN diodes below their maximum rated operating temperature.

As indicated in Figure 17, the x-axis temperature is referenced to the bottom of the QFN package. A printed circuit board with a very low thermal resistance and external heat sink design must be used to achieve the results shown in this Figure. The power derating curve with the x-axis temperature referenced to the bottom of the printed circuit board is provided in Figure 18.

The evaluation circuit is designed to facilitate control of the SKY12207-306LF transmit/receive switch with bias signals derived from positive voltages.

The state of the PIN diodes within the SKY12207-306LF is controlled with 5 V applied to the ANT port and bias voltages of either 28 V or 0 V applied to the remaining bias inputs (RX and TX ports). The switch state circuit diagrams are shown in Figure 19.

The value of resistor R1, 80 Ω, is selected to provide 50 mA of forward current through the "on" series diode with 5 V applied to the ANT port bias pin. The R2 resistance value of 540 Ω is selected to produce approximately 50 mA of forward bias current in the RX shunt diode with a source voltage of 28 V.

The magnitudes of the voltages applied to the TX and RX ports determine which of the RX or TX series diodes is biased into forward conduction. For example, to place the SKY12207-306LF into the transmit state, 0 V is applied to the TX port (which forward biases the diode between pins 2 and 14), 28 V is applied to the RX port (which reverse biases the diode between pins 2 and 7), and 0 V is applied to the RX_BIAS port (which applies a forward bias through R2 to the diode connected between pins 7 and 9).
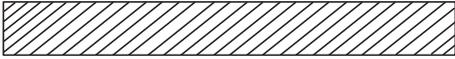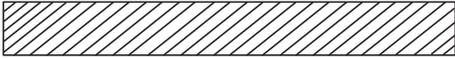
The component values shown in the Evaluation Board circuit diagram (Figure 22) were selected to optimize performance in the 2.0 to 3.5 GHz band.

Refer to Table 8 for the Evaluation Board Bill of Materials. Table 9 provides voltage, current, and resistor values for bias adjustments.
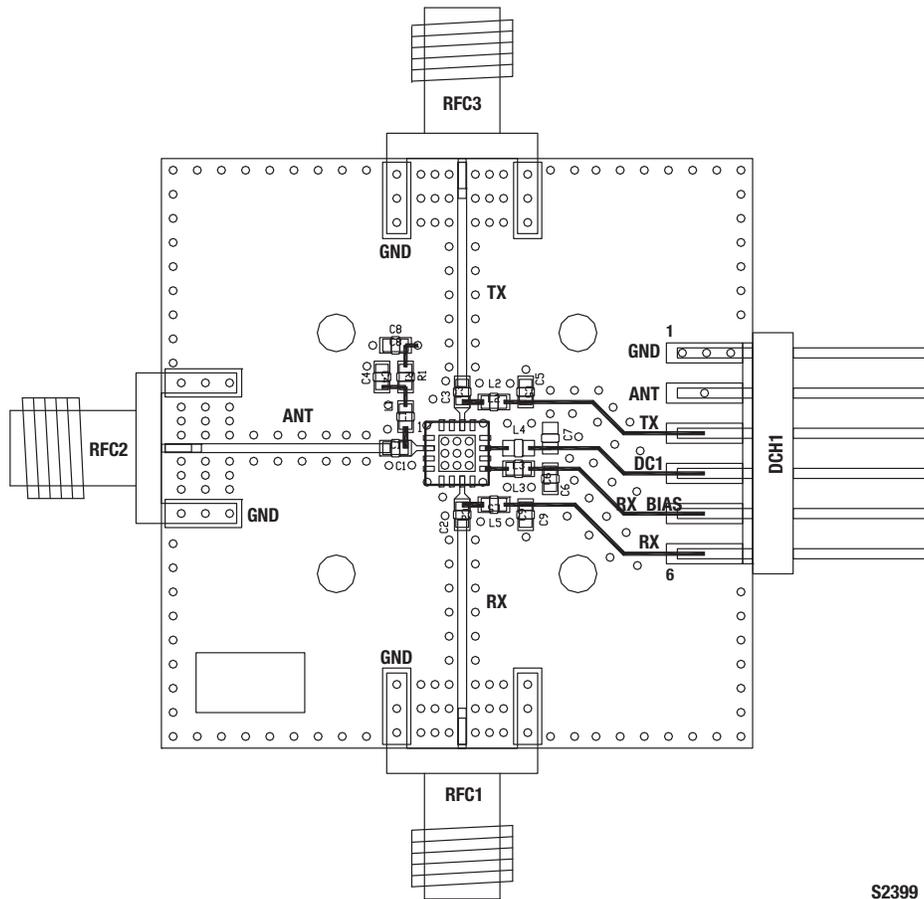

S2399

Figure 20. SKY12207-306LF Evaluation Board Assembly Diagram

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Cross Section	Name	Thickness (in)	Material
	Top Soldermask		
	L1	(0.0028)	Cu foil
	Laminate	0.012 ± 0.0006	Rogers RO4003C Core
	L2	(0.0014)	Cu foil
	Laminate	(Note 1)	FR4 Prepreg
	L3	(0.0014)	Cu foil
	Laminate	0.010 ± 0.0006	FR4 Core
	L4	(0.0028)	Cu foil
	Bottom Soldermask		

Note 1: Adjust this thickness to meet total thickness goal of 0.062 ± 0.005 inches.

S2531

Figure 21. Layer Detail Physical Characteristics
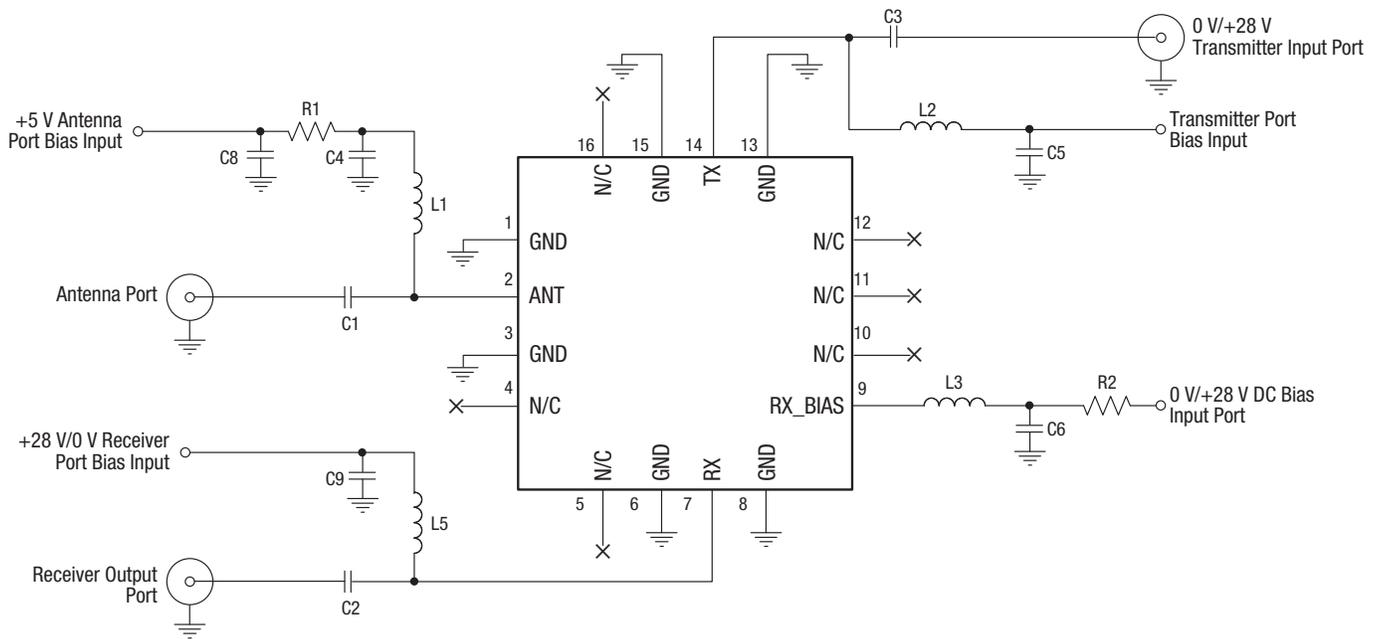
NOTE: The N/C pins (4, 5, 10, 11, 12, and 16) are not internally connected,
so they can be left open or grounded.

S2402

Figure 22. Evaluation Board Schematic

Table 8. Evaluation Board Bill of Materials[1]

Component	Value	Size	Product Number	Manufacturer	Mfr Part Number	Characteristics
C1, C2, C3, C4, C5, C6, C9	1000 pF	0603	5404R23-057	TDK	C1608C0G1H102JT	COG, 50 V, ±5%
C8	1 µF	0603	5404R29-070	TDK	C2012X7R1H104K	X7R, 50 V, ±10%
L1, L2, L5	22 nH	0603	55332R34-028	Taiyo-Yuden	HK160822NJ-T	SRF, 1600 MHz, ±5%
L3	560 nH	0603		Coil Craft	0603LS-561XJLB	SRF, 525 MHz, ±5%
R1 (Note 2)	80 Ω	0603		Panasonic	ERJ-3GEYJ161V	0.1 W, 5%
R2 (Note 3)	540 Ω					Axial leaded (off board)

[1] Component values selected are based on the desired frequency and bias level. Values may be adjusted for a specific response.

[2] Two 160 Ω resistors are combined in parallel to achieve a minimum power handling requirement and an 80 Ω resistance.

[3] Evaluation Board does not include resistor R2. Operating at 28 V and 50 mA requires the R2 resistor with a power dissipation greater than 1.35 W.

Table 9. Component Calculation Values[1]

Vs (V)	V_{DIODE} (V)	V_{RES} (V)	Current (A)	Resistance (Ω)	Power Dissipation (W)
28	1	27	0.05	540	1.35
28	1	27	0.02	1350	0.54
5	1	4	0.05	80	0.20
5	1	4	0.02	200	0.08

[1] Vs = supply voltage; V_{DIODE} = voltage drop across the diode; V_{RES} = voltage drop across the resistor.
    R1 and R2 values are calculated by (V_S – V_{DIODE})/I, where I is the desired bias current.
    The power dissipation in R1 or R2 is calculated by I x (V_S – V_{DIODE}). The resistor selected must be safely rated with a power greater than the dissipated power.

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Package Dimensions

The PCB layout footprint for the SKY12207-306LF is shown in Figure 23. Typical part markings are noted in Figure 24. Package dimensions are shown in Figure 25, and tape and reel dimensions are provided in Figure 26.

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Package and Handling Information

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 SKY12207-306LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It 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
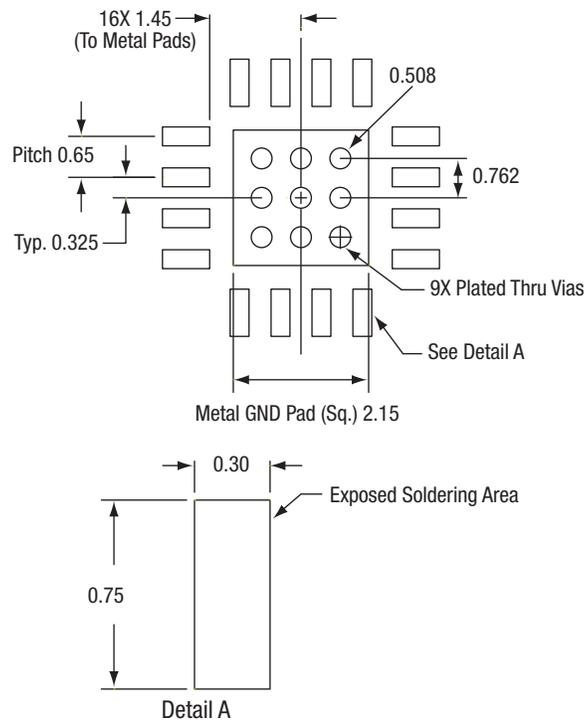
All measurements in millimeters

S2274

Figure 23. SKY12207-306LF PCB Layout Footprint
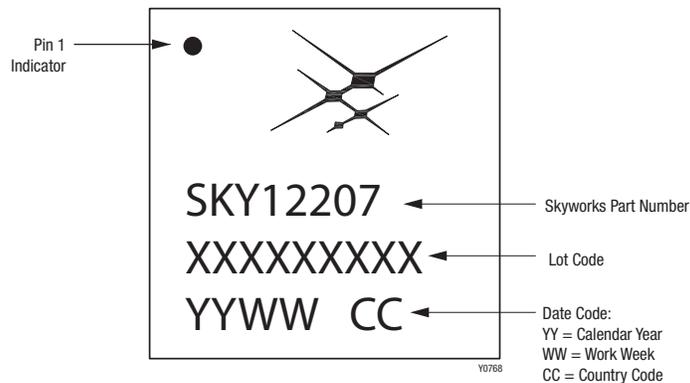
Figure 24. Typical Part Markings

Top View

Side View

Bottom View

Detail A
Scale: 40X
16 Places

Detail B
Scale: 20X
Even Terminal Side

Option A
Pin 1 Indicator
Scale: 10X

Option B
Pin 1 Indicator
Scale: 20X
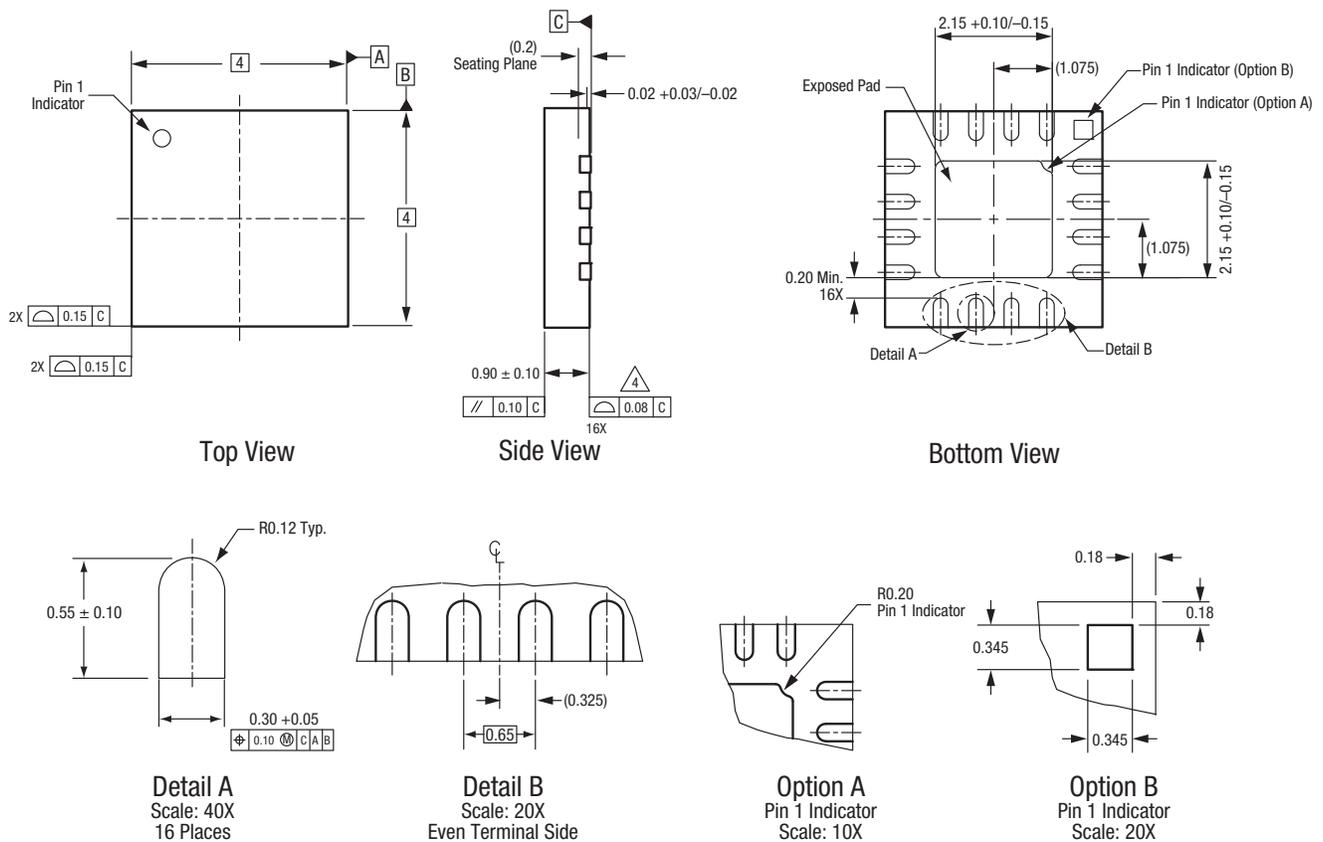
All measurements are in millimeters.
Dimensioning and tolerancing according to ASME Y14.5M-1994.
Coplanarity applies to the exposed heat sink slug as well as the terminals.
Package may have option A or option B pin 1 indicator.

S2400

Figure 25. SKY12207-306LF Package Dimensions

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Notes:
1. Carrier tape material: black conductive polystyrene, non-bakeable
2. Cover tape material: transparent conductive HSA
3. Cover tape size: 9.2 mm width
4. ESD surface resistivity is $\geq 1 \times 10^5 \sim \leq 1 \times 10^{10}$ Ohms/square
   per EIA, JEDEC TNR Specification.
5. All measurements are in millimeters

S1846

Figure 26. SKY12207-306LF Tape and Reel Dimensions

Ordering Information

Part Number	Product Description	Evaluation Board Part Number
SKY12207-306LF	0.9 to 4.0 GHz 50 W High-Power Silicon PIN Diode SPDT Switch	SKY12207-306LF-EVB

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