DATA SHEET

SKY13286-359LF: 0.1 to 6.0 GHz High Isolation SPDT Absorptive Switch

Applications

- GSM, PCS, WCDMA base stations
- 2.4 and 5.8 GHz ISM devices
- Wireless local loops

Features

- Single, positive voltage control: 0 to 3 and 0 to 5 V
- High isolation 64 dB at 1 GHz and 2 GHz
- Integrated silicon CMOS driver
- Absorptive
- Small, QFN (16-pin, 4 x 4 mm) Pb-free package (MSL1, 260 °C per JEDEC J-STD-020)

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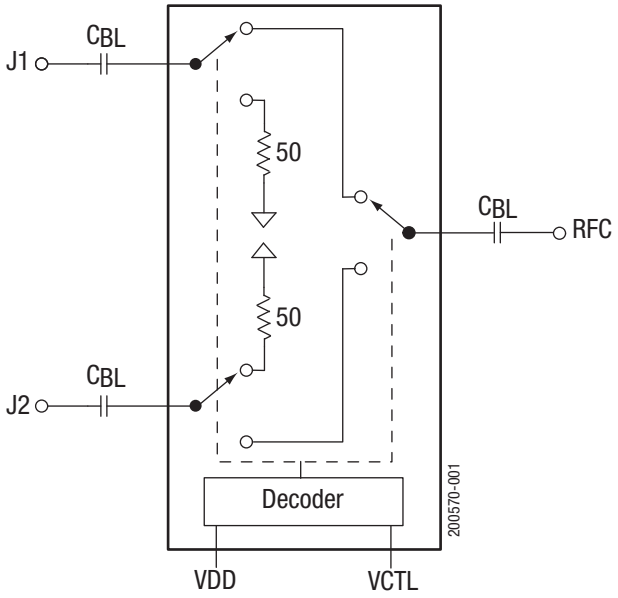


Figure 1. SKY13286-359LF Block Diagram

Description

The SKY13286-359LF is a GaAs pHEMT FET high-isolation, absorptive switch. The device is an ideal component for base station applications in which synthesizer isolation is critical.

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.

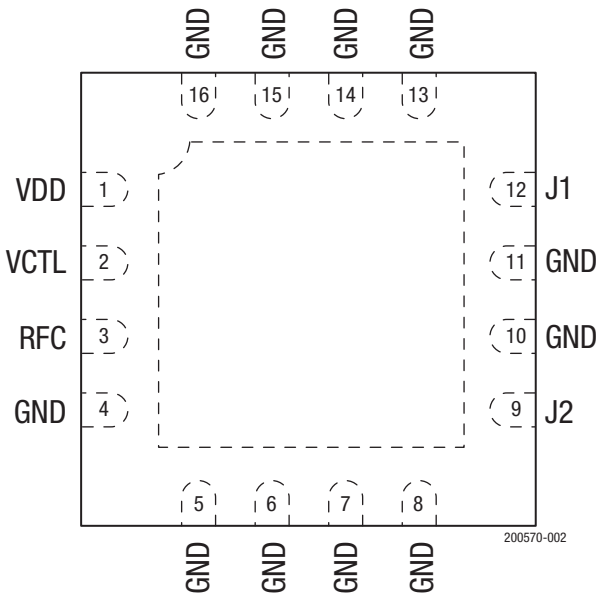


Figure 2. SKY13286-359LF Pinout (Top View)

Table 1. SKY13286-359LF Signal Descriptions

Pin	Name	Description	Pin	Name	Description
1	VDD	DC power supply	9	J2	RF output 2
2	VCTL	DC switch control pin. Switches insertion loss state from RFC to J1 or J2 (see Table 5).	10	GND	Ground
3	RFC	RF input	11	GND	Ground
4	GND	Ground	12	J1	RF output 1
5	GND	Ground	13	GND	Ground
6	GND	Ground	14	GND	Ground
7	GND	Ground	15	GND	Ground
8	GND	Ground	16	GND	Ground

Electrical and Mechanical Specifications

The absolute maximum ratings of the SKY13286-359LF 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 SKY13286-359LF are illustrated in Figures 3 through 9.

The state of the SKY13286-359LF is determined by the logic provided in Table 5.

Table 2. SKY13286-359LF Absolute Maximum Ratings[1]

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply voltage	VDD	2.7		5.5	V
RF input power @ >500 MHz	V_I		1		W
Operating temperature	T_{OP}	–40		+95	°C
Storage temperature	T_{STG}	–65		+150	°C

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

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Switching characteristics:						
Rise, fall		10/90% or 90/10% RF		30		ns
On/off		50% control to 90/10% RF		50		ns
Video feedthrough		T_{RISE} = 3 ns, measurement bandwidth = 500 MHz		25		mV
Input power for 1 dB compression	P_{INPUT}	V_{DD} = 3V, 0.7-2.0 GHz		+23		dBm
		V_{DD} = 5 V, 0.7-2.0 GHz	+26	+30		dBm
2nd harmonic	2fo	f_O = 2400 MHz, P_{IN} = –15 dBm		–80		dBm
Third order intercept point	IP3	For 2-tone input power, +8 dBm/tone, 1 MHz spacing:				
		V_{DD} = 3.3 V, 0.7-1.0 GHz		+49		dBm
		V_{DD} = 5.0 V, 0.7-1.0 GHz	+45	+47		dBm
		V_{DD} = 3.3 V, 1.0-2.0 GHz		+43		dBm
		V_{DD} = 5.0 V, 1.0-2.0 GHz	+45	+46		dBm
Control voltage:[1]						
Low with V_{DD} = 5 V	V_{CTL_LOW}		0		0.5	V
High with V_{DD} = 5 V	V_{CTL_HIGH}		2.7		V_{DD}	V
Low with V_{DD} = 3.3 V	V_{CTL_LOW}		0		0.5	V
High with V_{DD} = 3.3 V	V_{CTL_HIGH}		2.5		3.3	V
Supply current		V_{DD} = 5 V			100	µA
Control current		V_{CTL} = low or high		5		µA
Supply voltage			2.7		5.0	V

1 V_{DD} must be applied before a Vctl high signal. A latch-up condition may occur if a logic high signal is applied before the V_{DD} voltage. Control voltages switch the V_{DD} voltage to the GaAs switch.

Table 4. SKY13286-359LF Electrical Specifications[1]
(VCTL = 0 V/3 V, VDD = 5 V, TOP = +25 °C, PINPUT = 0 dBm, Characteristic Impedance [Z0] = 50 Ω, Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
CW insertion loss	IL	0.1 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz		0.8 0.8 1.0 1.5	1.10 1.25 1.35 1.80	dB dB dB dB
Isolation	Iso	0.1 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz	60 58 55 40	62 62 58 42		dB dB dB dB
Return loss (insertion loss state)[2]	RL	0.1 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz	10 15 13 10	22 22 18 12		dB dB dB dB
Return loss (isolation state) [2]	RL	0.1 to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz	10 12 12 11	12 15 15 13		dB dB dB dB
Insertion loss settling time	ΔIL	Insertion loss in db measured @ 1 µs (referenced to a rising 10% RF level on J1 & J2) minus the CW insertion loss in dB. Freq = 2 GHz, TOP = +25 °C, VCTL = 5 V, pulse width = 1.15 ms, 50% duty cycle.			0.40	dB

1 Performance is guaranteed only under the conditions listed in this table.
2 Lower frequency return loss is dependent on DC blocks.

Typical Performance Characteristics

(VCTL = 0 V/3 V, VDD = 5 V, TOP = +25 °C, PIN = 0 dBm, Characteristic Impedance [Zo] = 50 Ω, Unless Otherwise Noted)

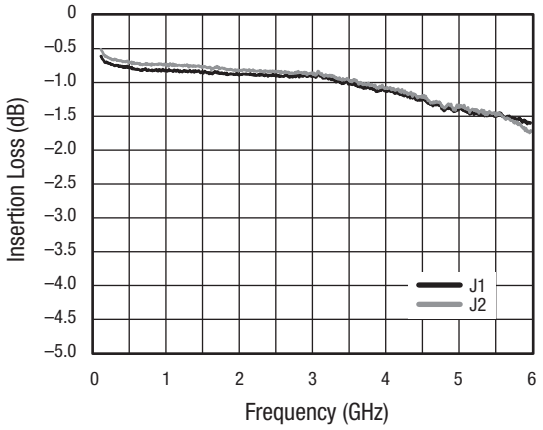


Figure 3. Insertion Loss vs Frequency

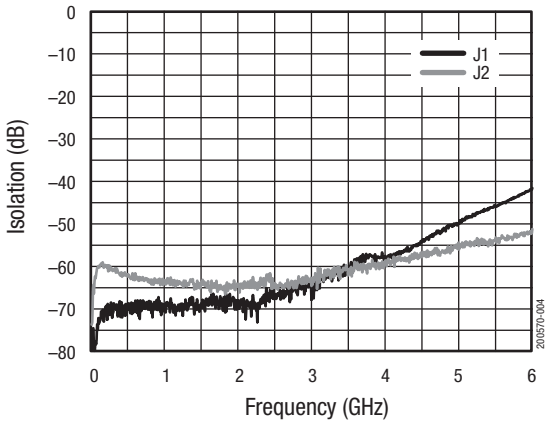


Figure 4. Isolation v s Frequency

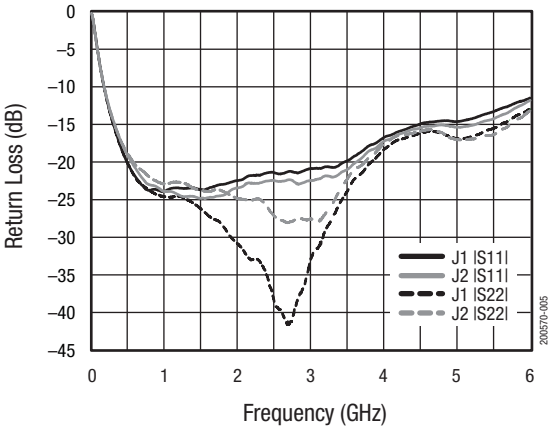


Figure 5. Return Loss vs Frequency (Insertion Loss State)

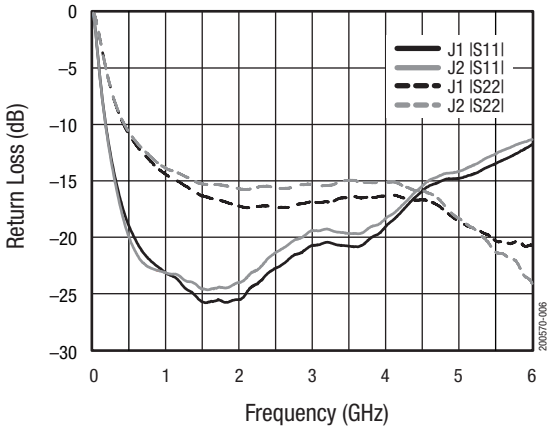


Figure 6. Return Loss vs Frequency (Isolation State)

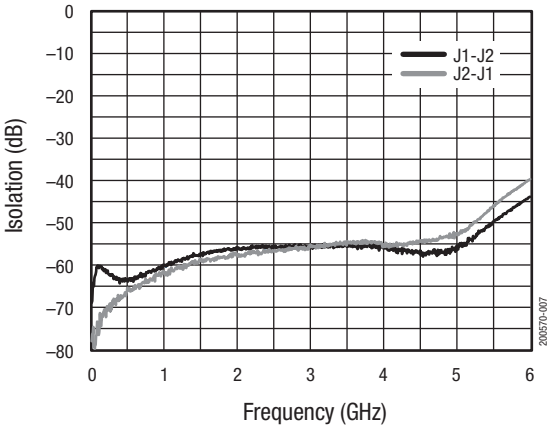


Figure 7. Output to Output Isolation

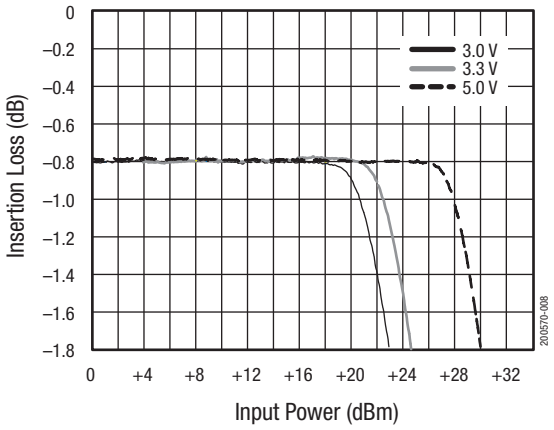


Figure 8. Insertion Loss vs Input Power Over Voltage

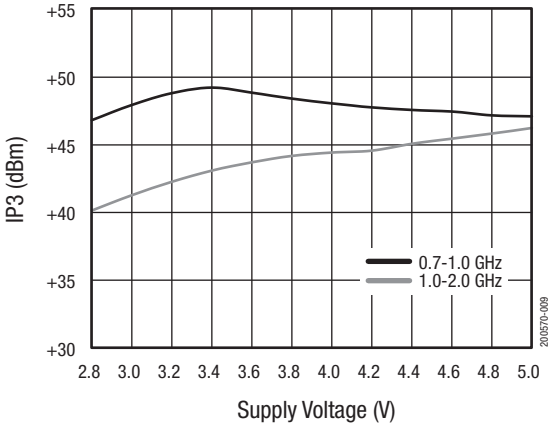


Figure 9. IP3 vs VDD Supply Voltage

Table 5. SKY13286-359LF Truth Table

VCTL	RFC to J1	RFC to J2
0	Insertion loss	Isolation
1	Isolation	Insertion loss

Evaluation Board Description

The SKY13286-359LF Evaluation Board is used to test the performance of the SKY13286-359LF SPDT absorptive switch. An assembly drawing for the Evaluation Board is shown in Figure 10.

Package Dimensions

The PCB layout footprint for the SKY13286-359LF is shown in Figure 11. Typical part markings are noted in Figure 12. Package dimensions are shown in Figure 13, and tape and reel dimensions are provided in Figure 14.

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 SKY13286-359LF 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.

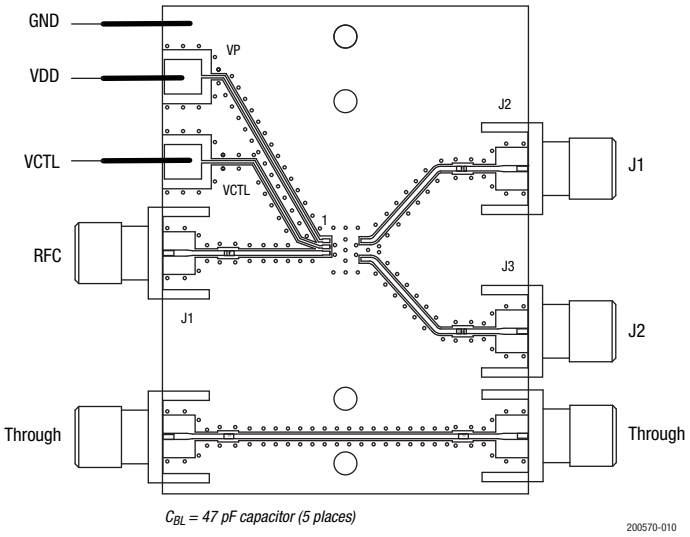


Figure 10. SKY13286-359LF Evaluation Board Assembly Diagram

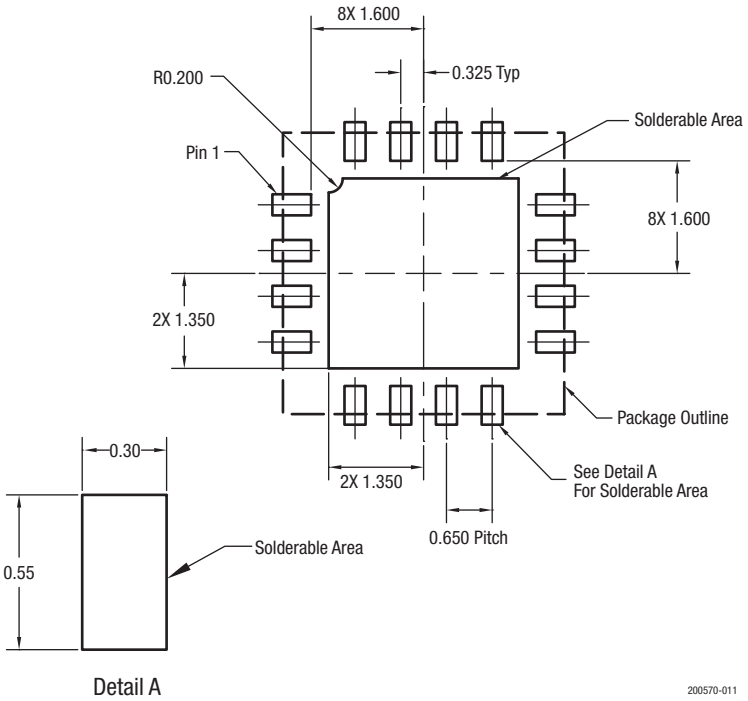


Figure 11. SKY13286-359LF PCB Layout Footprint

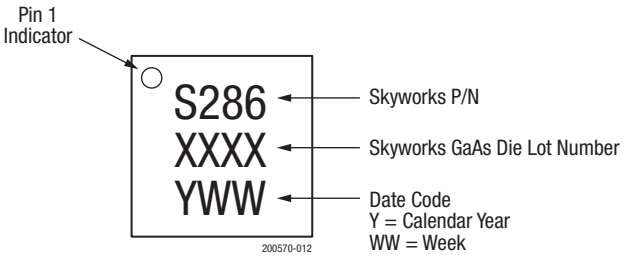
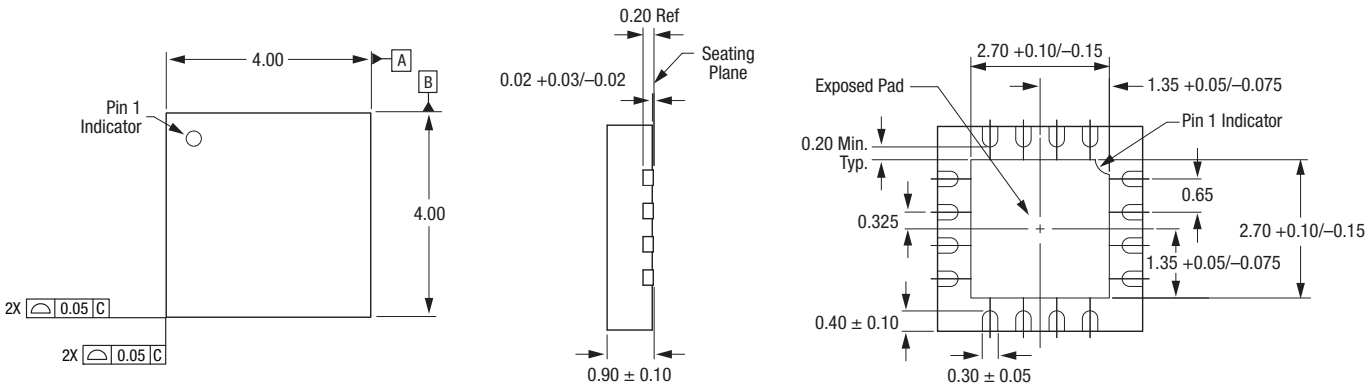


Figure 12. Typical Part Markings



All dimensions are in millimeters

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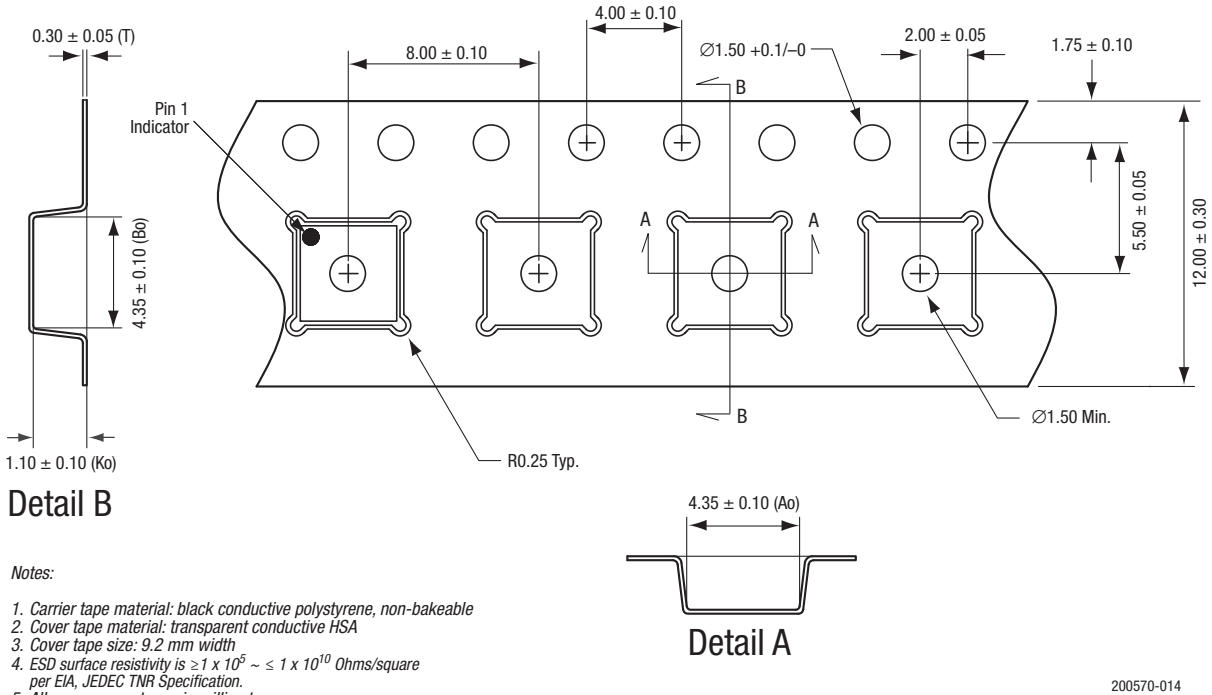
Figure 13. SKY13286-359LF Package Dimensions



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 ≥1 x 10^5 ~ ≤ 1 x 10^{10} 0hms/square per EIA, JEDEC TNR Specification.*
5. *All measurements are in millimeters*

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Figure 14. SKY13286-359LF Tape and Reel Dimensions

Ordering Information

Model Name	Manufacturing Part Number	Evaluation Board Part Number
SKY13286-359LF: SPDT Absorptive Switch	SKY13286-359LF	SKY13286-359LF-EVB

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