

DATA SHEET

## SMP1324-087LF: Surface Mount PIN Diode

### Applications

- Switches
- Attenuators

### Features

- Low-series resistance: 0.45  $\Omega$  maximum @ 50 mA
- Low total capacitance: 1.5 pF maximum @ 30 V
- QFN (2 x 2 mm) package  
(MSL1, 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.



### Description

The SMP1324-087LF is a surface mountable PIN diode suitable for use in an RF switch or attenuator circuit.

Maximum resistance at 50 mA is 0.45  $\Omega$  and maximum capacitance at 30 V is 1.5 pF. The combination of low capacitance, low parasitic inductance, and nominal 100  $\mu\text{m}$  I-region width, makes the SMP1324-087LF useful in large signal switches and attenuator applications.

The device has a 1 W dissipation power rating, which makes it capable of handling up to 55 W continuous wave (CW) and 550 W peak (1  $\mu\text{s}$  pulse, 1 percent duty cycle) in a series-connected transmit/receive (T/R) switch.

Design information for high power switches may be found in the Skyworks Application Note, *Design With PIN Diodes* (document number 200312).

### Electrical and Mechanical Specifications

The absolute maximum ratings of the SMP1324-087LF are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the SMP1324-087LF are illustrated in Figures 1, 2, and 3.

**Table 1. SMP1324-087LF Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Forward current	$I_F$		200	mA
Dissipated power @ 85 °C	$P_D$		1	W
Operating temperature	$T_A$	-55	+85	°C
Storage temperature	$T_{STG}$	-55	+200	°C
Junction temperature	$T_J$	-55	+175	°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. 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 2. SMP1324-087LF Electrical Specifications (Note 1)**

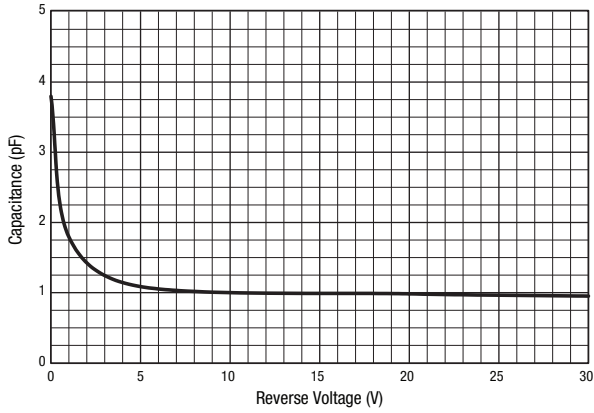
( $T_A = +25\text{ °C}$ , Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Forward voltage	$V_F$	$I_F = 50\text{ mA}$		0.9	1.2	V
Reverse leakage current	$I_R$	$V_R = 200\text{ V}$			10	$\mu\text{A}$
Series resistance	$R_S$	$I_F = 50\text{ mA}$ , $f = 100\text{ MHz}$			0.45	$\Omega$
Total capacitance	$C_{T0}$	$V_R = 0\text{ V}$ , $f = 100\text{ MHz}$		0.9	1.5	pF
	$C_{T30}$	$V_R = 30\text{ V}$ , $f = 1\text{ MHz}$		0.9	1.5	pF
Minority carrier lifetime	$T_L$	$I_F = 10\text{ mA}$	2	6		$\mu\text{s}$
Parallel resistance	$R_P$	$V_R = 0\text{ V}$ , $f = 100\text{ MHz}$	5	6		$\text{k}\Omega$
I region width	W			100		$\mu\text{m}$
Thermal resistance (Note 2)	$\Theta_{JC}$			98		°C/W

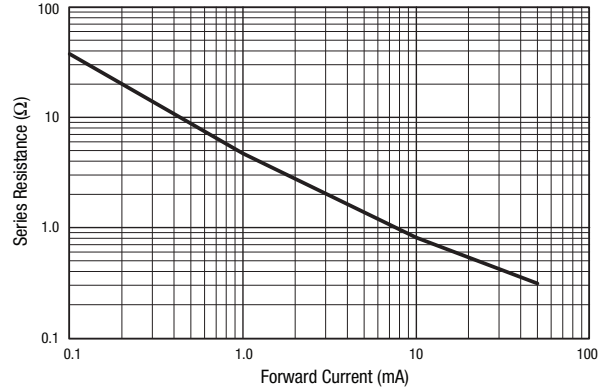
**Note 1:** Performance is guaranteed only under the conditions listed in this table.

**Note 2:** Assume a thermal resistance of 92 °C/W for the junction-to-bottom of circuit board.

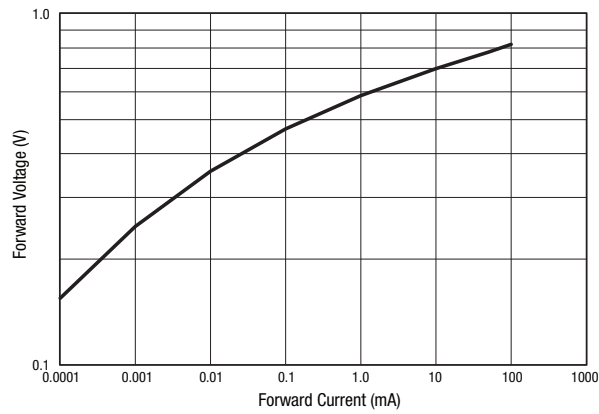
**Typical Performance Characteristics**  
 (TA = 25 °C, Unless Otherwise Noted)



**Figure 1. Capacitance vs Reverse Voltage @ 1 MHz**



**Figure 2. Series Resistance vs Forward Current @ 100 MHz**



**Figure 3. Forward Voltage vs Forward Current**

### Package Dimensions

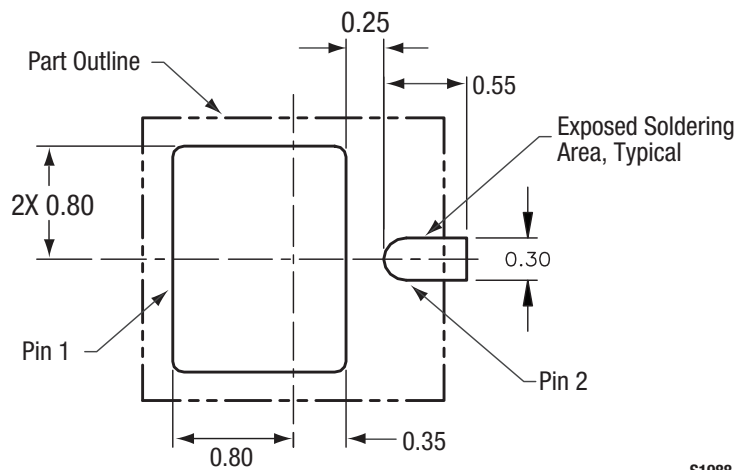
The PCB layout footprint for the SMP1324-087LF is provided in Figure 4. Typical part markings are shown in Figure 5. Package dimensions for the SMP1324-087LF are provided in Figure 6, and tape and reel dimensions are provided in Figure 7.

### 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.

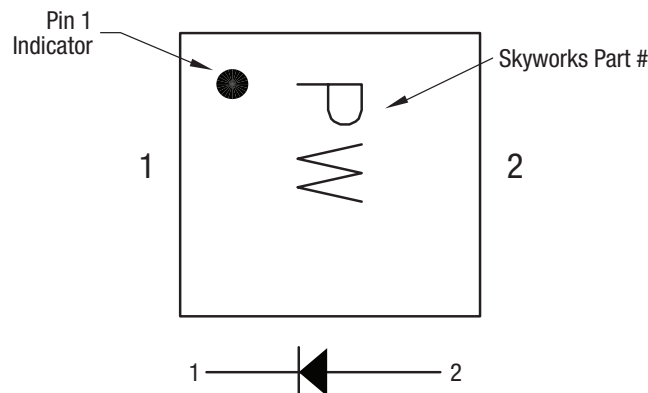
The SMP1324-087LF is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. It can be used for lead or lead-free soldering. For additional information, refer to the Skyworks Application Note, *Solder Reflow Information*, document number 200164.

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.

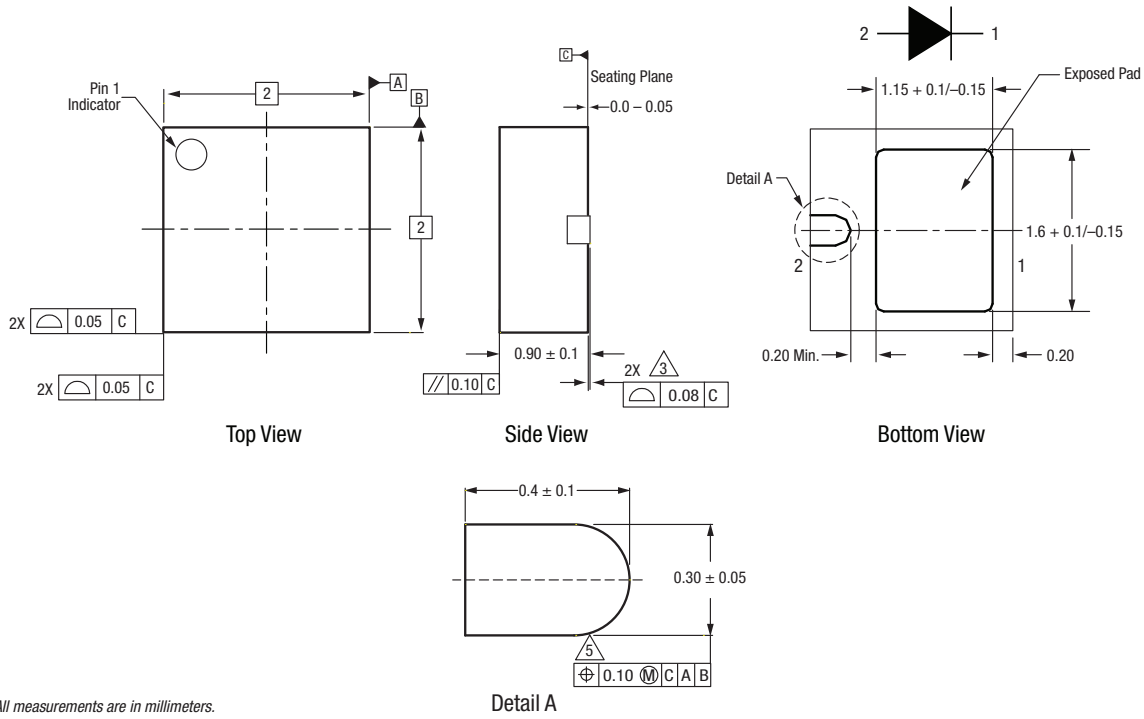


S1988

**Figure 4. SKY1324-087LF PCB Layout Footprint (Top View)**



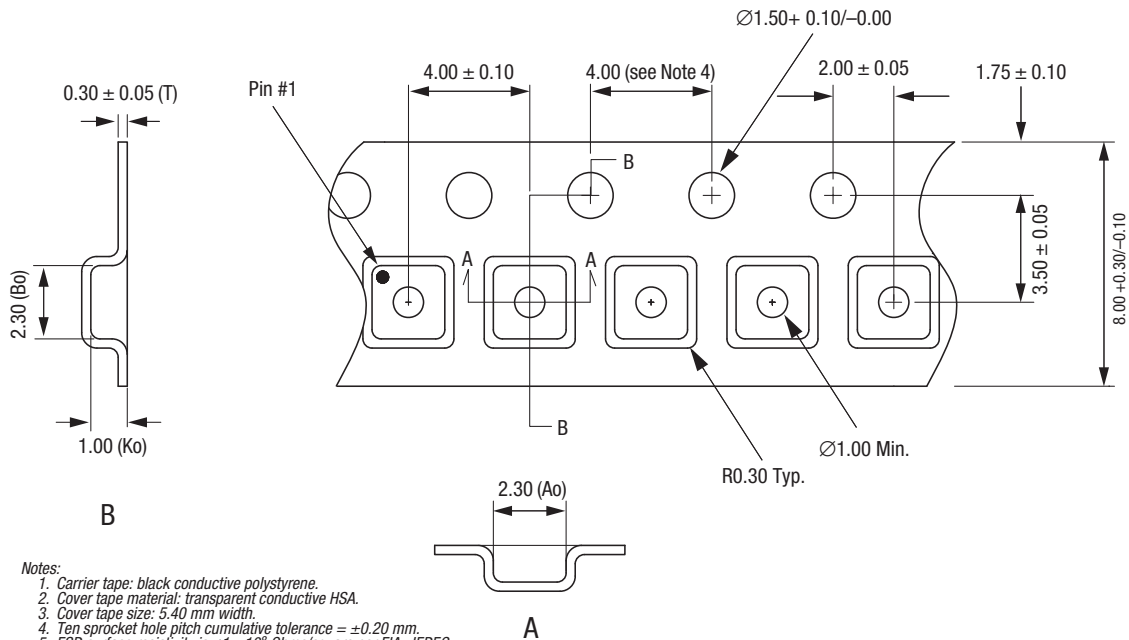
**Figure 5. Typical Part Markings (Top View)**



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.  
 Dimension applies to metalized terminal and is measured between 0.10 mm and 0.30 mm from terminal tip.

S1989

Figure 6. SMP1324-087LF Package Dimensions



Notes:  
 1. Carrier tape: black conductive polystyrene.  
 2. Cover tape material: transparent conductive HSA.  
 3. Cover tape size: 5.40 mm width.  
 4. Ten sprocket hole pitch cumulative tolerance = ±0.20 mm.  
 5. ESD surface resistivity is  $\leq 1 \times 10^9$  Ohms/square per EIA, JEDEC tape and reel specification.  
 6. Ao and Bo measurement point to be 0.30 mm from bottom pocket.  
 7. All measurements are in millimeters.

S1601

Figure 7. SMP1324-087LF Tape and Reel Dimensions

## Ordering Information

Model Name	Manufacturing Part Number
SMP1324-087LF: Surface Mount PIN Diode	SMP1324-087LF

Copyright © 2010-2013, 2015 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. (“Skyworks”) products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED “AS IS” WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks and the Skyworks symbol are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at [www.skyworksinc.com](http://www.skyworksinc.com), are incorporated by reference.