

DATA SHEET

# SMPA1304-011LF: Low Distortion Attenuator Plastic Packaged PIN Diode

## Automotive Applications

- Infotainment
- Navigation
- Telematics
- Garage door openers
- Wireless control systems

## Features

- AEC-Q101 qualified
- Designed for low distortion attenuator applications
- Frequency range from 5 MHz to >2 GHz
- Package rated 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 SMPA1304-011LF plastic packaged, surface mountable, low capacitance (0.3 pF) silicon PIN diode is designed for attenuator applications from 5 MHz to beyond 2 GHz.

The thick 100 μm I region of this PIN diode makes this device very attractive for use in low distortion attenuators in vehicle infotainment applications.

The 1 μs typical carrier lifetime of this diode results in a resistance of 20 Ω maximum at 1 mA and 7 Ω maximum at 10 mA.

Table 1 describes the SMPA1304-011LF package and marking.

**Table 1. Package and Marking**


Single
SOD-323 Green™
<b>SMPA1304-011LF</b> Marking: RG
L <sub>s</sub> = 1.5 nH



The Pb-free symbol or "LF" in the part number denotes a lead-free, RoHS-compliant package unless otherwise noted as Green™. Tin/lead (Sn/Pb) packaging is not recommended for new designs.

## Electrical and Mechanical Specifications

The absolute maximum ratings of the SMPA1304-011LF are provided in Table 2. Electrical specifications are provided in Table 3.

Resistance versus temperature measurements are provided in Table 4. Typical performance characteristics of the SMPA1304-011LF are illustrated in Figures 1 to 4.

**Table 2. SMPA1304-011LF Absolute Maximum Ratings<sup>1</sup>**

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	$V_R$		200	V
Power dissipation @ 25 °C lead temperature	$P_D$		250	mW
Storage temperature	$T_{STG}$	-65	+150	°C
Operating temperature	$T_A$	-65	+150	°C
Electrostatic discharge: Human Body Model (HBM), Class 1C	ESD		2000	V

<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.

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**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.*

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**Table 3. SMPA1304-011LF Electrical Specifications<sup>1</sup>**  
( $T_A = +25\text{ °C}$ , Unless Otherwise Noted)

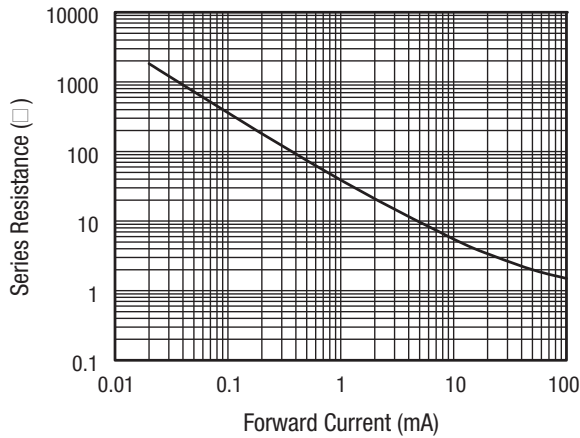
Parameter	Symbol	Test Condition	Typical	Maximum	Units
Reverse current	$I_R$	$V_R = 200\text{ V}$		10	$\mu\text{A}$
Capacitance	$C_T$	$f = 1\text{ MHz}, V = 30\text{ V}$		0.3	pF
Resistance	$R_S$	$f = 100\text{ MHz}$	40	50	$\Omega$
		$I = 1\text{ mA}$		7	$\Omega$
		$I = 10\text{ mA}$		2	$\Omega$
Forward voltage	$V_F$	$I_F = 10\text{ mA}$	0.8		V
Carrier lifetime	$T_I$	$I_F = 10\text{ mA}$	1		$\mu\text{s}$
I region width			100		$\mu\text{m}$

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

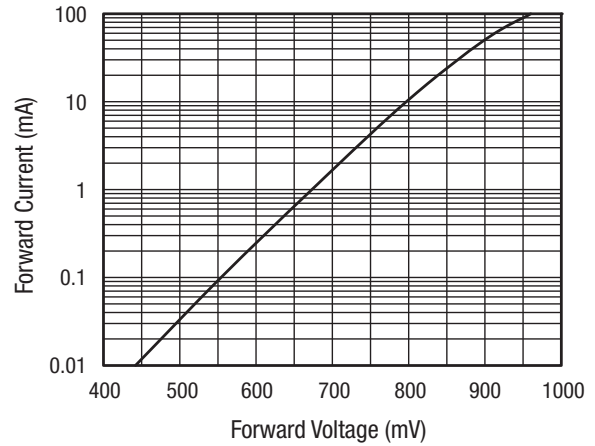
**Table 4. Resistance vs Temperature @ 100 MHz**

$I_F$ (mA)	$R_S$ @ -55 °C ( $\Omega$ )	$R_S$ @ -15 °C ( $\Omega$ )	$R_S$ @ +25 °C ( $\Omega$ )	$R_S$ @ +65 °C ( $\Omega$ )	$R_S$ @ +100 °C ( $\Omega$ )
0.02	1590	1660	1752	1770	1760
0.10	315	340	367	396	409
0.30	108	118	128	141	147
1.0	34.5	37.9	41.6	46.3	48.8
10	4.8	5.3	5.8	6.6	7.0
20	3.0	3.3	3.6	4.1	4.3
100	1.3	1.4	1.5	1.7	1.8

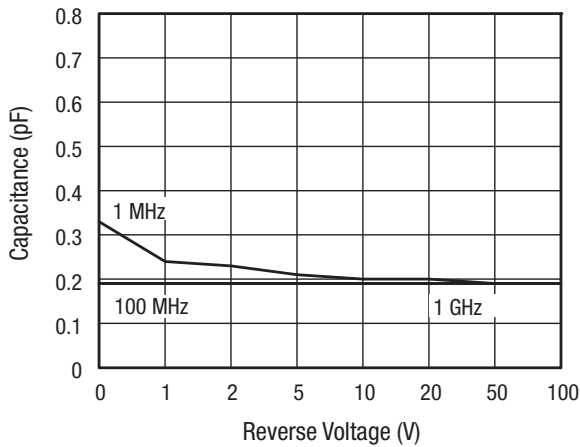
**Typical Performance Characteristics**



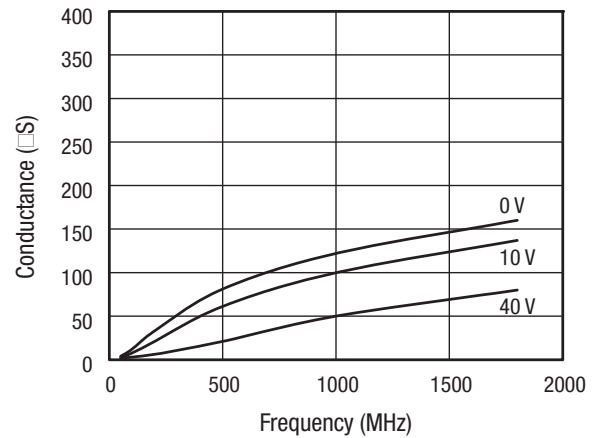
**Figure 1. Series Resistance vs Current @ 100 MHz**



**Figure 2. DC Characteristic**



**Figure 3. Capacitance vs Reverse Voltage**



**Figure 4. Conductance vs Frequency and Reverse Voltage**

### Package Dimensions

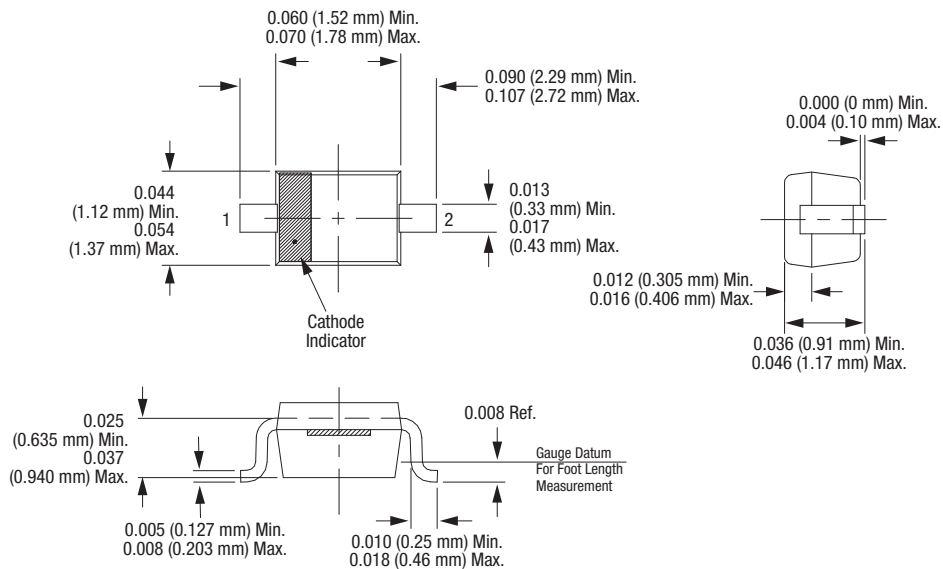
Package dimensions are shown in Figure 5, and tape and reel dimensions are provided in Figure 6.

### 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 SMPA1304-011LF 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

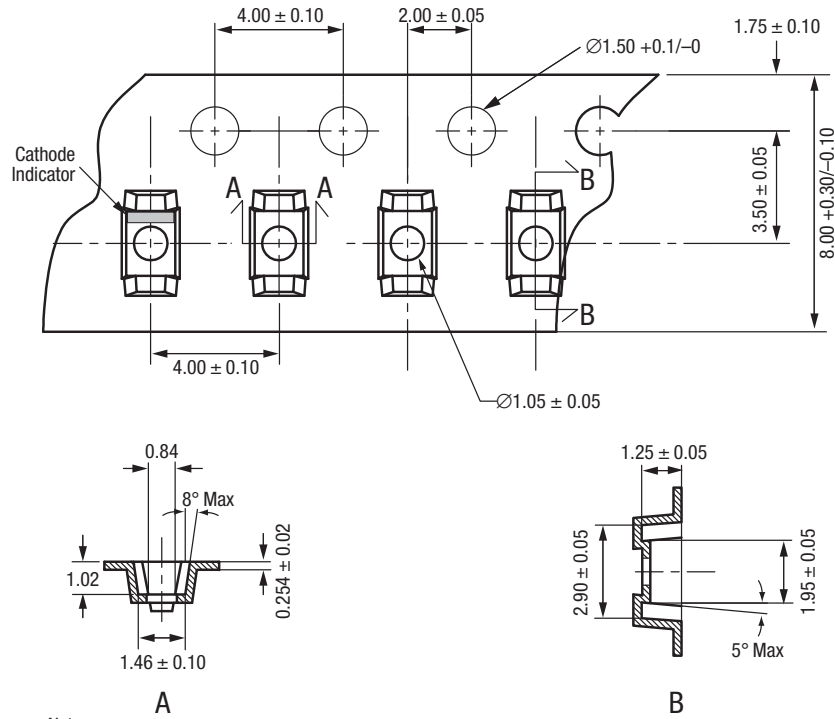
Care must be taken when attaching this product, whether it is done manually or in a production solder reflow environment. Production quantities of this product are shipped in a standard tape and reel format.



Dimensions are in inches (millimeters shown in parentheses)

S1619

Figure 5. SOD-323 Package Dimension Drawing



Notes:

1. Carrier tape: black conductive polycarbonate or polystyrene.
2. Cover tape: transparent conductive material.
3. Cover tape size: 5.5 mm width.
4. ESD surface resistivity is  $\geq 1 \times 10^5 \sim \leq 1 \times 10^{11}$  Ohms/square.
5. 10 sprocket hole pitch cumulative tolerance:  $\pm 0.20$  mm.
6.  $A_0$  and  $B_0$  measured on plane 0.30 mm above bottom of the pocket.
7. All measurements are in millimeters.
8. Standard reel size is 7 inches. Standard reel quantity is 3000 pcs.

S2061

Figure 6. SOD-323 Tape and Reel Dimensions

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