

DATA SHEET

SMPA1304-019LF: Low Distortion Attenuator Plastic Packaged PIN Diode

Automotive Applications

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



Features

- AEC-Q101 qualified
- ISO/TS16949 certified facility
- Designed for low distortion attenuator applications
- Frequency range from 10 MHz to >1 GHz
- Configured for PI attenuators
- Packages 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 SMPA1304-019LF plastic packaged, surface mountable, low capacitance (0.045 pF) silicon PIN diode is designed for attenuator applications from 10 MHz to beyond 1 GHz.


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

The SMPA1304-019LF-019, a three-diode junction designed for insertion in PI attenuators, is available in an SOT-143 package.

Table 1 describes the SMPA1304-019LF package and marking.

Table 1. Package and Marking

| |
|---|
|  |
| PI |
| SOT-143 |
| SMPA1304-019LF Marking: RGJ |
| Ls = 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.

SMPA1304-019LF PI Attenuator PIN Diodes

The SMPA1304-019LF uses three PIN diode junctions in an SOT-143 package (see Figure 1). The junctions are configured for ease of insertion in PI attenuator circuits in common use from 10 MHz to >1 GHz. The SMPA1304-019LF PIN diode junction is designed for low capacitance, a wide resistance dynamic range, and low distortion performance.

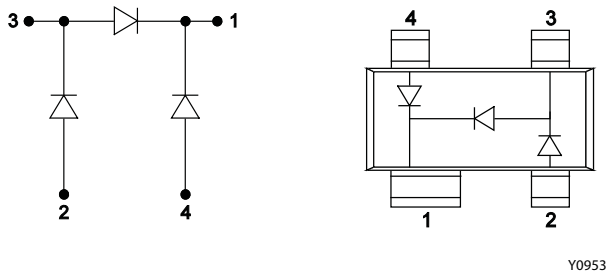


Figure 1. SMPA1304-019LF Package (PI)

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMPA1304-019LF 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 SMPA1304-019LF are illustrated in Figures 2 to 5. Package dimensions are shown 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 SMPA1304-019LF 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.

Table 2. SMPA1304-019LF Absolute Maximum Ratings (Note 1)

| 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 |

Note 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.

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. SMPA1304-019LF Electrical Specifications (Note 1)
(T_A = +25 °C, Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Typical | Max | Units |
|------------------|----------------|--|---------|--------------|-------------|
| Reverse current | I _R | V _R = 200 V | | 10 | μA |
| Capacitance | C _T | f = 1 MHz, V = 30 V | | 0.45 | pF |
| Resistance | R _S | f = 100 MHz I = 1 mA I = 10 mA I = 100 mA | 40 | 50 7 2 | Ω Ω Ω |
| Forward voltage | V _F | I _F = 10 mA | 0.8 | | V |
| Carrier lifetime | TI | I _F = 10 mA | 1 | | μs |
| I region width | | | 100 | | μm |

Note 1: 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 (Ω) | R _S @ -15 °C (Ω) | R _S @ +25 °C (Ω) | R _S @ +65 °C (Ω) | R _S @ +100 °C (Ω) |
|------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|
| 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

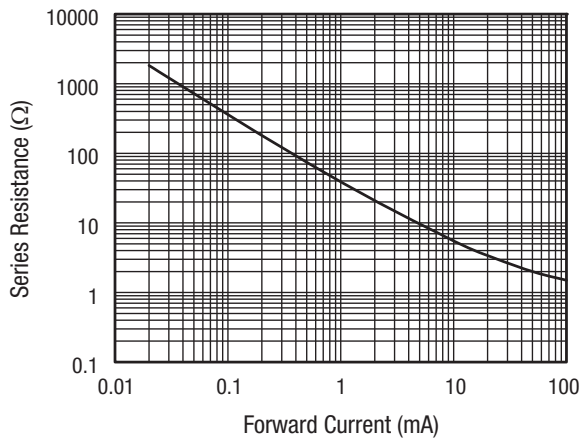


Figure 2. Series Resistance vs Current @ 100 MHz

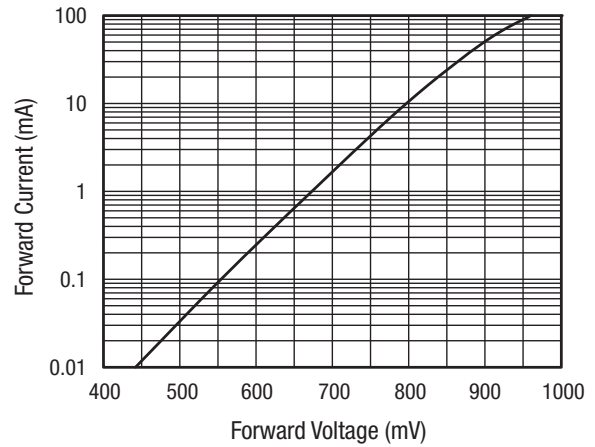


Figure 3. DC Characteristic

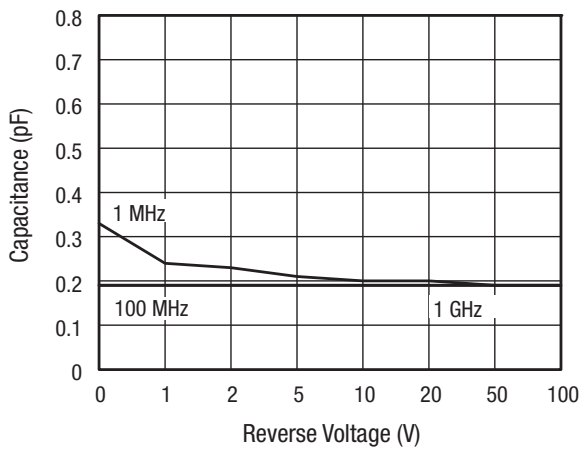


Figure 4. Capacitance vs Reverse Voltage

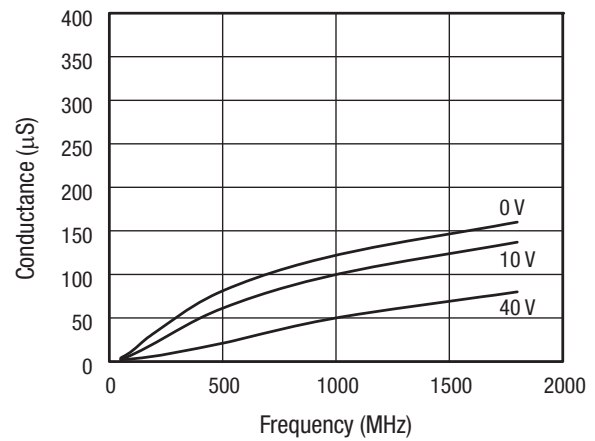
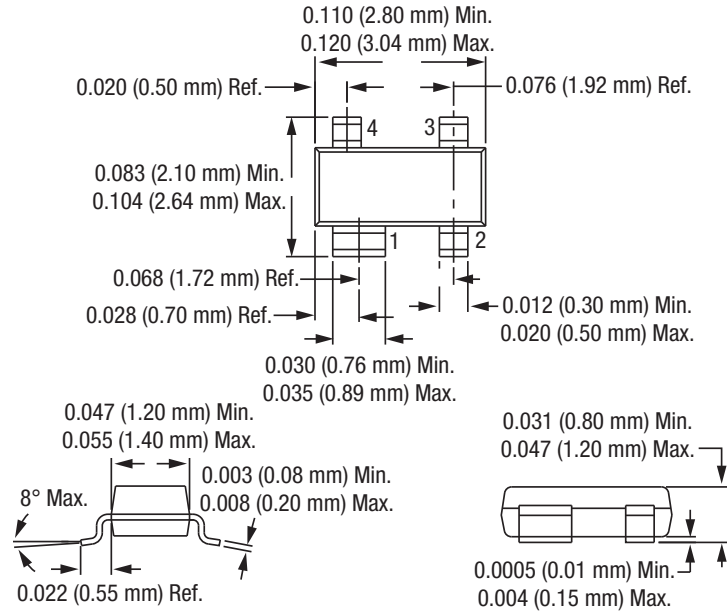


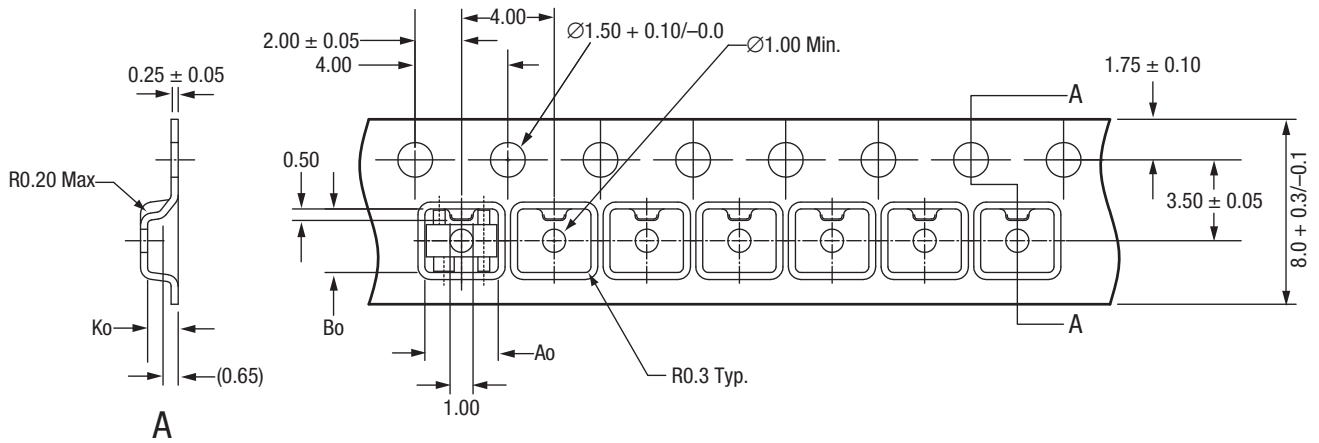
Figure 5. Conductance vs Frequency and Reverse Voltage



Dimensions are in inches (millimeters shown in parentheses)

S1651

Figure 6. SOT-143 Package Dimension Drawing



Notes:

1. Carrier tape: black conductive polycarbonate.
2. Cover tape material: transparent conductive PSA.
3. Cover tape size: 5.4 mm width.
4. Tolerance: .XX = ±0.10
5. All measurements are in millimeters.

Ao = 3.17
Bo = 2.75
Ko = 1.32

S2515

Figure 7. SOT-143 Tape and Reel Dimensions

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