

DATA SHEET

# SMP1330-040LF: 0402 Surface Mount Limiter PIN Diode

## Applications

- WLAN, WiMAX
- Cellular infrastructure
- RFID readers
- Test instruments



## Features

- Low total capacitance: 1 pF maximum @ 0 V
- Low-series resistance: 1.9  $\Omega$  maximum @ 10 mA
- Industry-standard 0402 footprint
- Packages rated MSL1, 260 °C per JEDEC J-STD-020

**NEW**



Skyworks Green™ products are RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, are halogen free according to IEC-61249-2-21, and contain <1,000 ppm antimony trioxide in polymeric materials.

## Description

The SMP1330-040LF is a surface mountable limiter PIN diode excellent for use in receiver protector circuits.

Maximum resistance at 10 mA is 1.9  $\Omega$  and maximum capacitance at 0 V is 1 pF. The intrinsic layer thickness is nominally 3 microns, which produces a threshold level of approximately +13 dBm.

The combination of low package capacitance, low parasitic inductance, and excellent electrical characteristics make the SMP1330-040LF useful in fast, sensitive receiver protection applications.

Design information for receiver protection limiters may be found in the Skyworks Application Note, *PIN Limiter Diodes in Receiver Protectors* (document number 200480).

**Table 1. SMP1330-040LF Absolute Maximum Ratings**

| Parameter                    | Symbol           | Minimum | Maximum           | Units |
|------------------------------|------------------|---------|-------------------|-------|
| Forward current              | I <sub>F</sub>   |         | 150               | mA    |
| Reverse voltage              | V <sub>R</sub>   |         | breakdown voltage | V     |
| Dissipated power @ 25 °C     | P <sub>D</sub>   |         | 750               | mW    |
| Storage temperature          | T <sub>STG</sub> | -55     | +200              | °C    |
| Junction temperature         | T <sub>J</sub>   | -55     | +175              | °C    |
| Solder interface temperature | T <sub>S</sub>   | -40     | +85               | °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. SMP1330-040LF Electrical Specifications (Note 1)**  
**(T<sub>s</sub> = +25 °C, Characteristic Impedance [Z<sub>0</sub>] = 50 Ω, Unless Otherwise Noted)**

| Parameter                 | Symbol           | Test Condition                      | Min | Typical | Max | Units |
|---------------------------|------------------|-------------------------------------|-----|---------|-----|-------|
| Breakdown voltage         | V <sub>B</sub>   | I <sub>R</sub> = 10 μA              | 20  |         | 50  | V     |
| Series resistance         | R <sub>S1</sub>  | I <sub>F</sub> = 1 mA, f = 100 MHz  |     | 11      |     | Ω     |
|                           | R <sub>S10</sub> | I <sub>F</sub> = 10 mA, f = 100 MHz |     | 1.2     | 1.9 | Ω     |
| Total capacitance         | C <sub>T0</sub>  | V <sub>R</sub> = 0 V, f = 1 MHz     |     | 0.7     | 1.0 | pF    |
|                           | C <sub>T0</sub>  | V <sub>R</sub> = 0 V, f = 1 GHz     |     | 0.7     |     | pF    |
| Minority carrier lifetime | T <sub>L</sub>   | I <sub>F</sub> = 10 mA              |     | 4       |     | ns    |
| I region width            | W                |                                     |     | 2       |     | μm    |

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

**Electrical and Mechanical Specifications**

The absolute maximum ratings of the SMP1330-040LF are provided in Table 1. Electrical specifications are provided in Table 2.

Typical performance characteristics of the SMP1330-040LF are illustrated in Figures 1, 2, and 3.

### Typical Performance Characteristics

(TA = 25 °C, Unless Otherwise Noted)

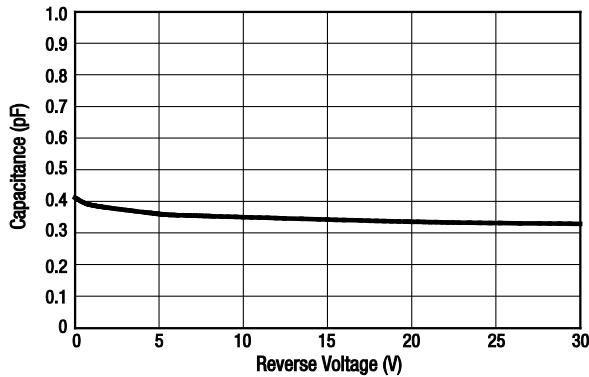


Figure 1. Capacitance vs Reverse Voltage

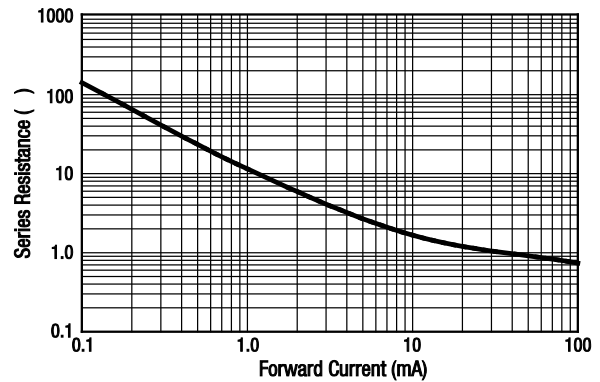


Figure 2. Series Resistance vs Forward Current

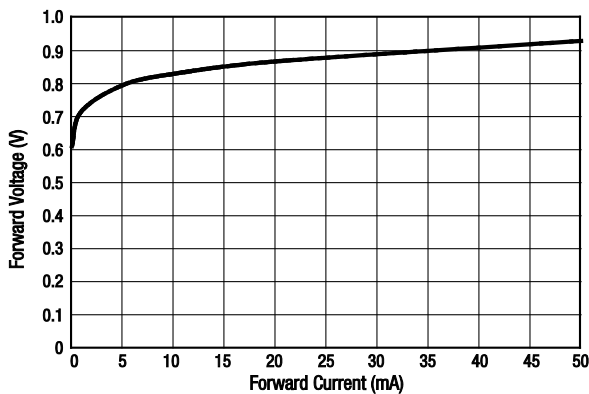


Figure 3. Forward Voltage vs Forward Current

### Package Dimensions

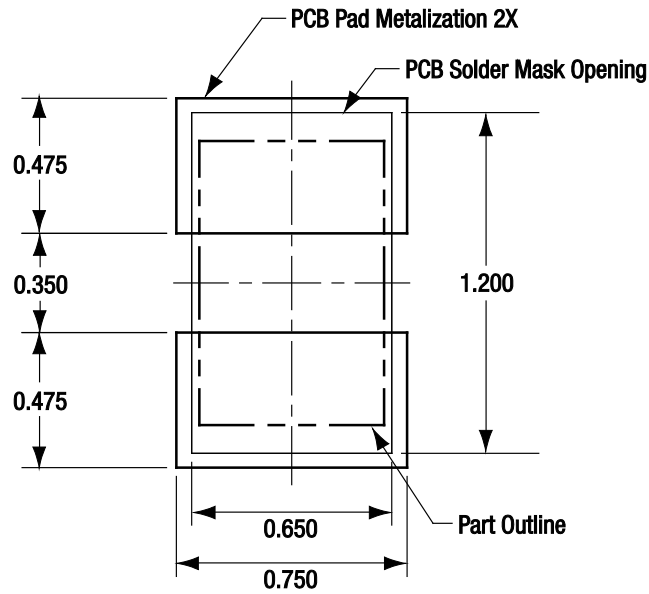
The PCB layout footprint for the SMP1330-040LF is provided in Figure 4. Typical case markings are shown in Figure 5. Figure 6 shows the package dimensions and Figure 7 provides the tape and reel dimensions.

### 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 SMP1330-040LF 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

S1997

Figure 4. SMP1330-040LF PCB Layout Footprint

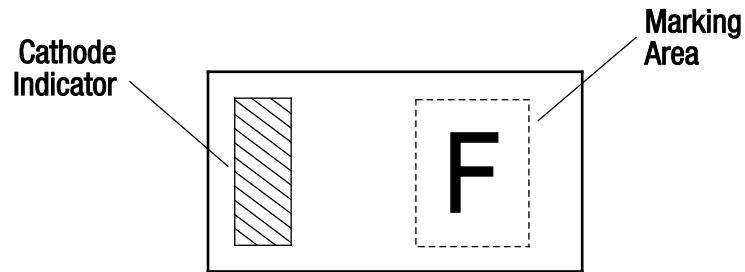
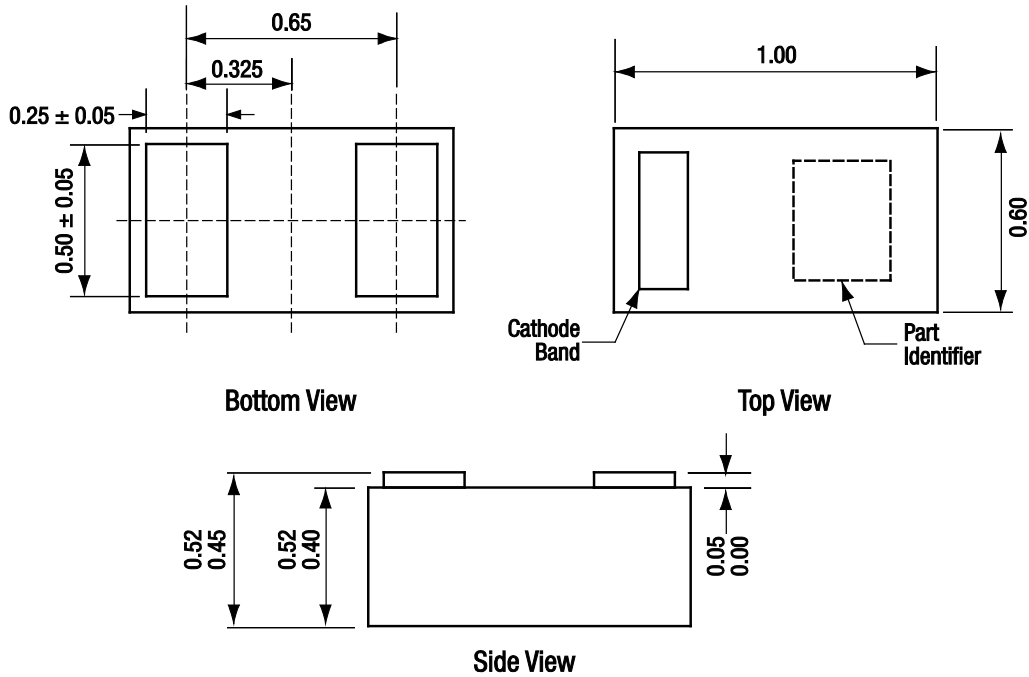


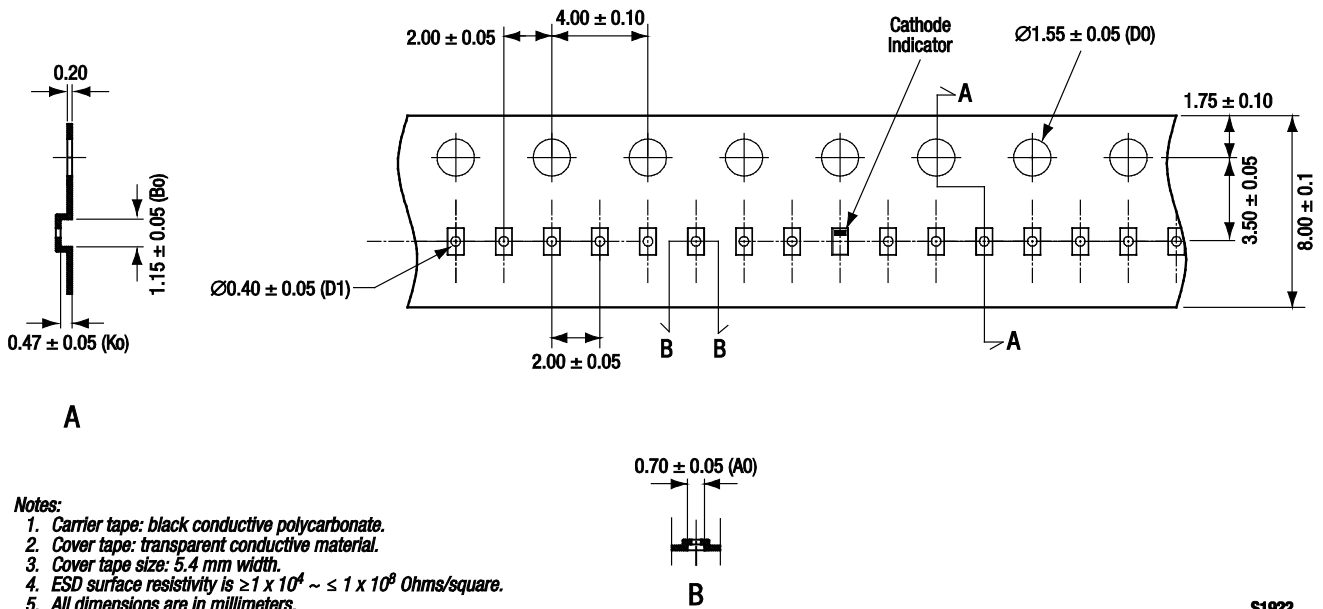
Figure 5. Typical Case Markings (Top View)



All dimensions in mm

S1892

Figure 6. SMP1330-040LF Package Dimensions



Notes:

1. Carrier tape: black conductive polycarbonate.
2. Cover tape: transparent conductive material.
3. Cover tape size: 5.4 mm width.
4. ESD surface resistivity is  $\geq 1 \times 10^4 \sim \leq 1 \times 10^8$  Ohms/square.
5. All dimensions are in millimeters.

S1922

Figure 7. SMP1330-040LF Tape and Reel Dimensions

## Ordering Information

| Model Name                                    | Manufacturing Part Number |
|---|---------------------------|
| SMP1330-040LF Surface Mount Limiter PIN Diode | SMP1330-040LF             |

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