

DATA SHEET

SMP1330 Series: Plastic Packaged Limiter Diodes

Applications

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

Features

- Low-distortion design
- Limiter performance to 4 GHz and higher
- Low insertion loss
- Low-cost plastic package
- 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 SMP1330 series of limiter diodes is designed for use as passive receiver protectors in wireless and other RF systems covering frequencies up to 4 GHz and higher. These diodes use Skyworks limiter diode technology to produce gold-doped, thin base limiters for low-loss, low-distortion performance and good limiter action.

The SMP1330 series of diodes has been characterized in limiter circuits and tightly specified to ensure consistent performance.

Electrical and Mechanical Specifications

The absolute maximum ratings of the SMP1330 series are provided in Table 1.

The part numbers and configurations for the SMP1330 series are provided in Table 2. Electrical specifications are provided in Table 3. Typical 1 GHz limiter performance measurements are provided in Table 4.

Input power versus output power performance for the SMP1330 series is illustrated in Figure 1. Package dimensions are shown in Figures 2 (SOT-23) and 4 (SOD-882). Tape and reel dimensions are provided in Figures 3 (SOT-23) and 5 (SOD-882).

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 series is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. These diodes 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 1. SMP1330 Series Absolute Maximum Ratings¹

| Parameter | Symbol | Minimum | Maximum | Units |
|--|------------------|---------|---------|-------|
| Reverse voltage | V _R | | 20 | V |
| Forward current | I _F | | 100 | mA |
| CW incident power @ 25 °C lead temperature | | | 1 | W |
| Peak incident power @ 1% duty factor, 1 μs pulse | | | 100 | W |
| Power dissipation @ 25 °C lead temperature | P _d | | 250 | mW |
| Storage temperature | T _{STG} | -65 | +150 | °C |
| Operating temperature | T _A | -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.

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 2. Part Number and Configuration

| | |
|---|--|
|  |  |
| Series Pair | Single |
| SOT-23 | SOD-882 |
| SMP1330-005LF Green™ Marking: RQ2 | SMP1330-040LF Green™ Marking: F |
| L _S = 1.5 nH | L _S = 0.45 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.

Table 3. SMP1330 Series Electrical Specifications¹
(T_A = +25 °C Unless Otherwise Noted)

| Parameter | Symbol | Test Condition | Min | Typical | Max | Units |
|-------------------|-----------------|---|-----|------------|------|----------|
| Series resistance | R _s | F = 100 MHz, I _F = 10 mA | | 1.2 | 1.5 | Ω |
| Capacitance | C _T | 0 V F = 1 MHz F = 1 GHz | | 0.7 0.7 | 1.0 | pF pF |
| Capacitance ratio | C _{TR} | C _T @ 0 V/C _T @ 6 V | | | 1.22 | – |
| Conductance | G | 0 V, F = 1 GHz | | 50 | | μS |
| Carrier lifetime | τ _I | I _F = 10 mA | | 4 | | ns |
| I region width | | | | 2 | | μm |
| Breakdown voltage | V _B | I _R = 10 μA | 20 | 35 | 50 | V |

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

Table 4. Typical 1 GHz Limiter Performance

| Parameter | SMP1330-005 | Condition |
|-----------------------|-------------|-----------------------|
| Connection | Parallel | |
| Insertion loss | 0.3 dB | Input power = -20 dBm |
| IP3 | +30 dBm | Input power = < 0 dBm |
| 1 dB compression | +10 dBm | |
| Attenuation @ +20 dBm | 8.8 dB | |
| Attenuation @ +30 dBm | 14 dB | |

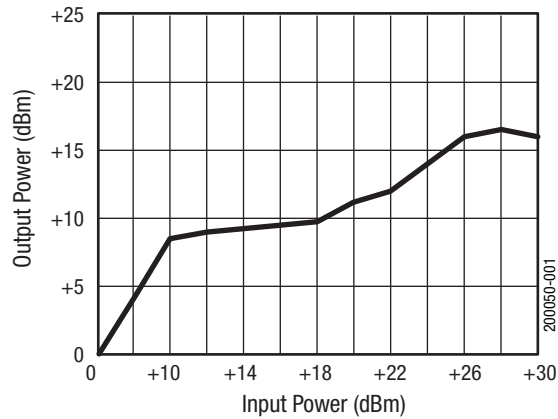
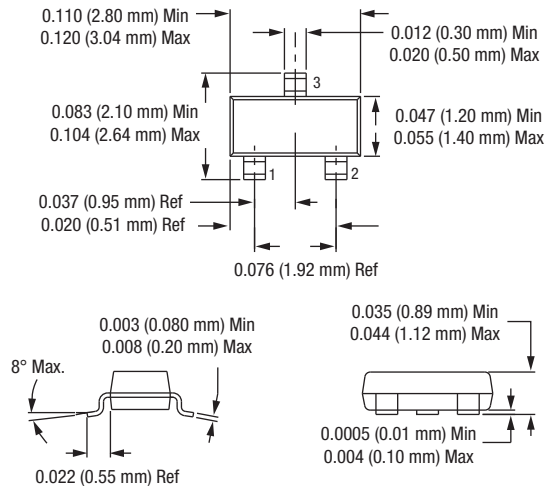


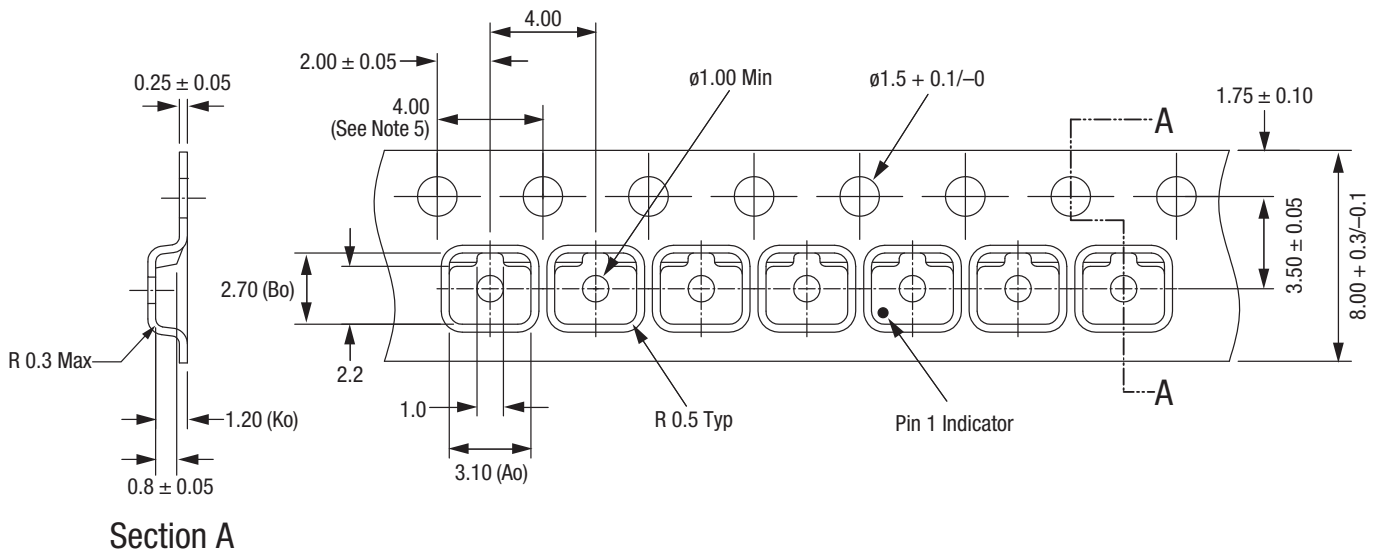
Figure 1. Typical 1 GHz Limiter Performance



Dimensions are in inches (millimeters shown in parentheses)

200050-002

Figure 2. SOT-23 Package Dimension Drawing



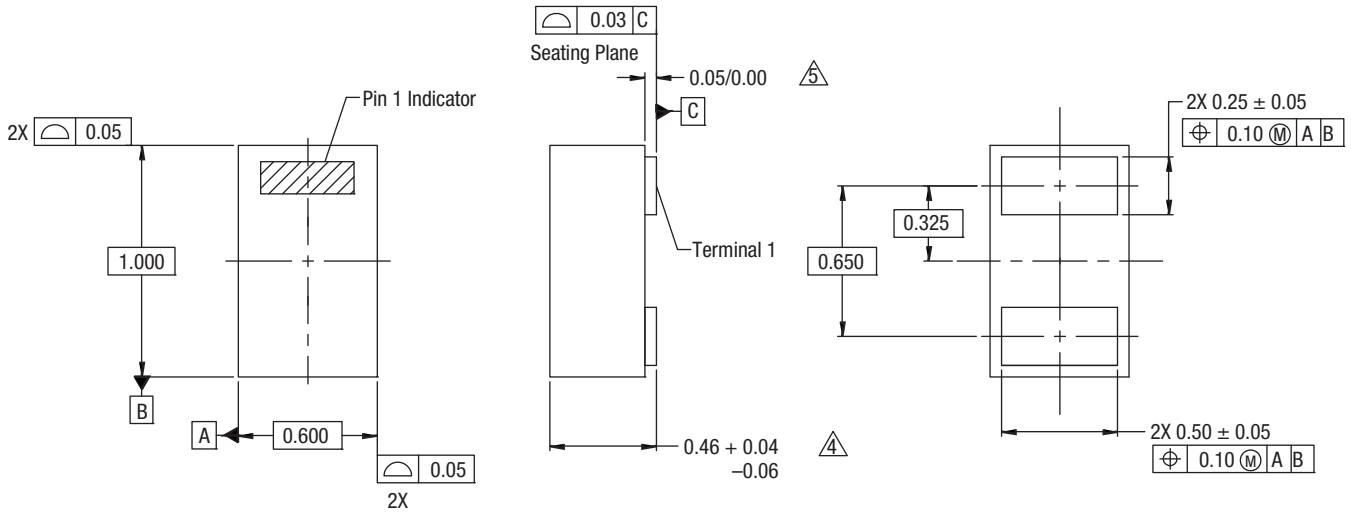
Section A

Notes:

1. Carrier tape: black conductive polycarbonate.
2. Cover tape material: transparent conductive PSA.
3. Cover tape size: 5.40 mm width.
4. Tolerance ± 0.10 mm.
5. Ten sprocket hole pitch cumulative tolerance: ± 0.2 mm.
6. All measurements are in millimeters.
7. Alternative carrier tape dimensions are:
 $A_0 = 3.3$
 $B_0 = 2.9$
 $K_0 = 1.22$

200050-003

Figure 3. SOT-23 Tape and Reel Dimensions

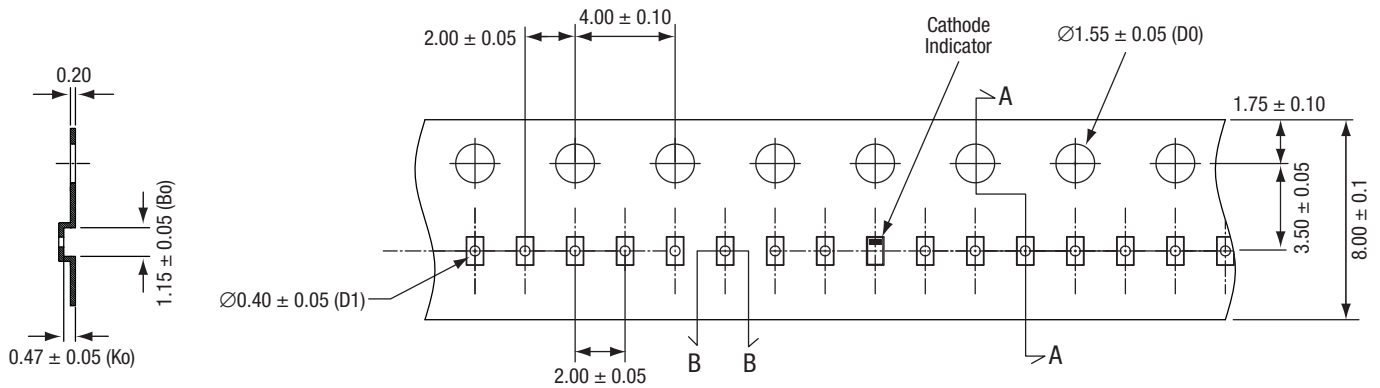


Notes:

1. All measurements are in millimeters.
2. Dimensions and tolerances according to ASME Y14.5M-1994.
3. These packages are used principally for discrete devices.
4. This dimension includes stand-off height and package body thickness, but does not include attached features, e.g., external heatsink or chip capacitors. An integral heatslug is not considered an attached feature.
5. This dimension is primarily terminal plating, but does not include small metal protrusion.

200050-004

Figure 4. SOD-882 Package Dimension Drawing



Section A

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.

0.70 ± 0.05 (A0)

Section B

200050-005

Figure 5. SOD-882 Tape and Reel Dimensions

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