

DATA SHEET

SMP1330 Series: Plastic Packaged Limiter Diodes

Applications

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



Features

- Low-distortion design
- Limiter performance to 2 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 2 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.

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

Table 1. SMP1330 Series Absolute Maximum Ratings

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 μ s 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

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.

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. The SMP1330 series of limiter diodes are Class 2 ESD devices.

Configurations

The SMP1330 series of diodes are available in SOT-23 and SOD-882 packages. As illustrated in Figure 1, the industry standard SOT-23 package has two wiring configurations:

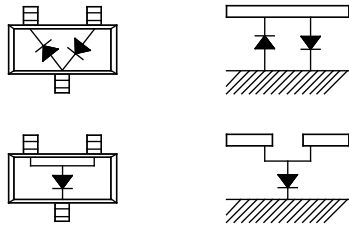


Figure 1. SMP1330 Series SOT-23 Configurations

Electrical and Mechanical Specifications

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 2. Package dimensions are shown in

Figures 3 (SOT-23) and 5 (SOD-882). Tape and reel dimensions are provided in Figures 4 (SOT-23) and 6 (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 2. Part Number and Configuration

Series Pair	Low Inductance	Single
SOT-23	SOT-23	SOD-882
SMP1330-005 Marking: PQ2	SMP1330-007 Marking: PQB	
SMP1330-005LF Green™ Marking: RQ2	SMP1330-007LF Green™ Marking: RQB	SMP1330-040LF Green™ Marking: F
L _S = 1.5 nH	L _S = 0.4 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 Specifications
($T_A = +25\text{ }^\circ\text{C}$ Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Min	Typical	Max	Units
Series resistance	R_s	$F = 100\text{ MHz}$, $I_f = 10\text{ mA}$		1.2	1.5	Ω
Capacitance	C_T	0 V $F = 1\text{ MHz}$ $F = 1\text{ GHz}$		0.7 0.7	1.0	pF pF
Conductance	G	0 V, $F = 1\text{ GHz}$		50		μS
Carrier lifetime	TI	$I_f = 10\text{ mA}$		4		ns
I region width				2		μm
Breakdown voltage	V_B	$I_R = 10\text{ }\mu\text{A}$	20	35	50	V

Note 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	

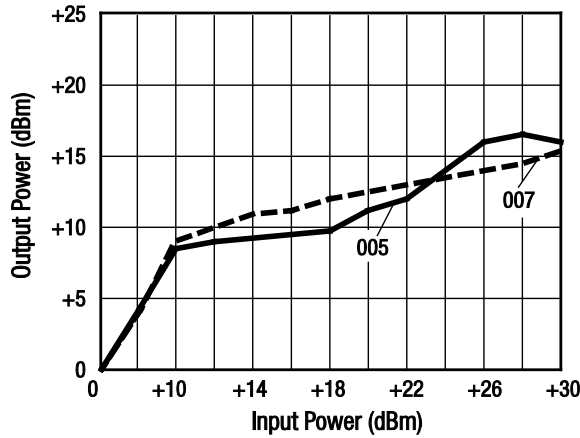


Figure 2. Typical 1 GHz Limiter Performance

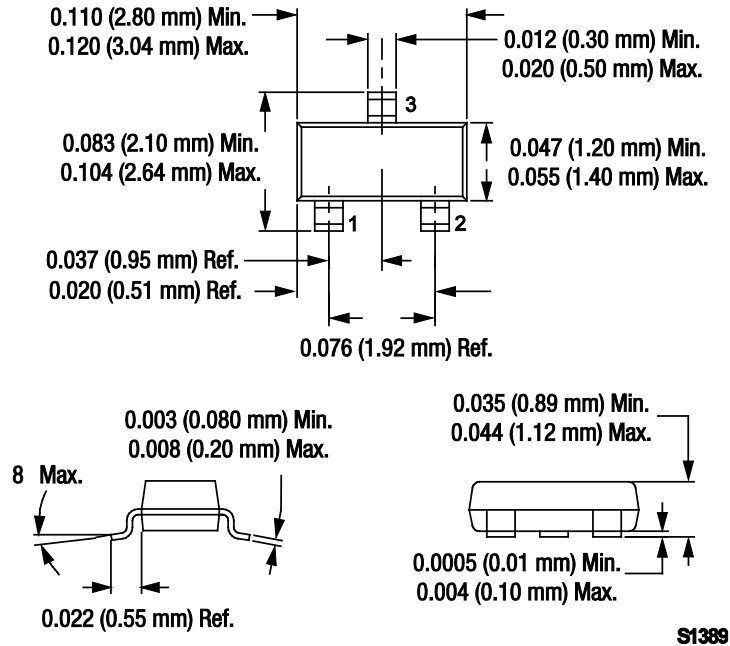
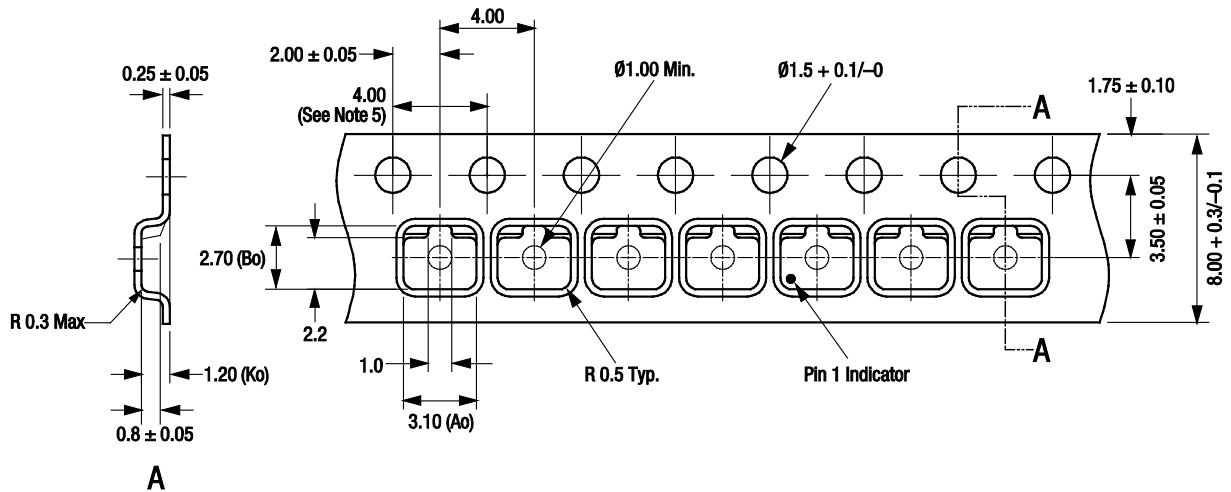


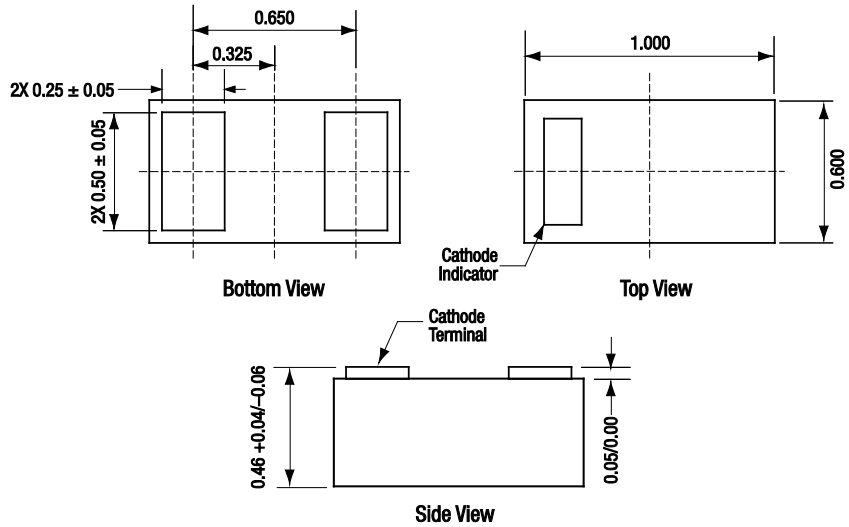
Figure 3. SOT-23 Package Dimension Drawing



- 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.

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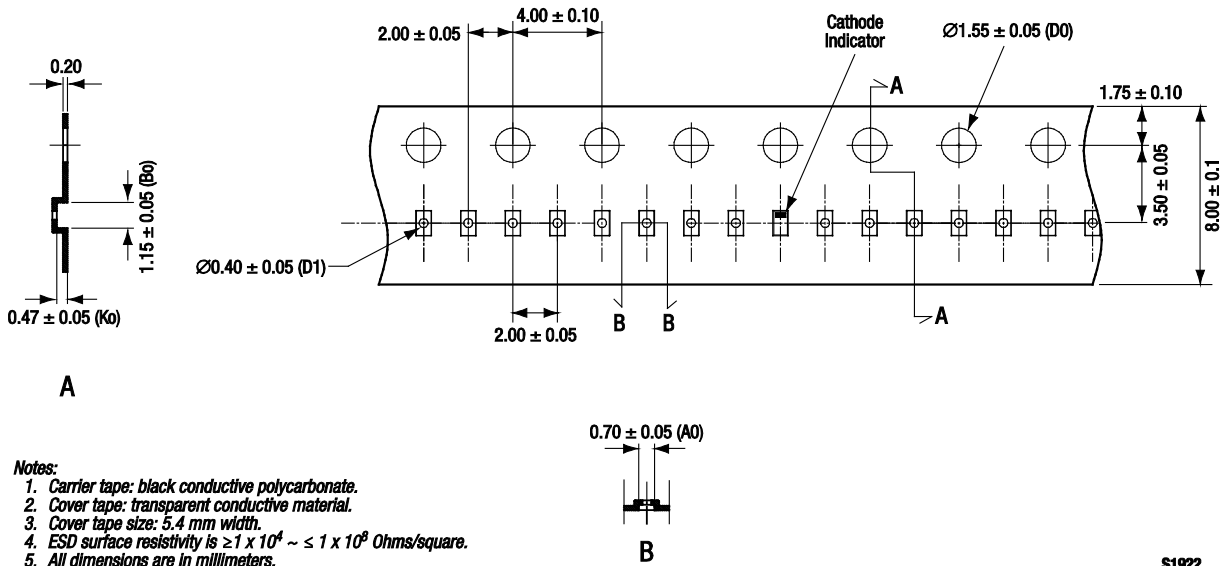
Figure 4. SOT-23 Tape and Reel Dimensions



All dimensions in millimeters

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Figure 5. SOD-882 Package Dimension Drawing



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.

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Figure 6. SOD-882 Tape and Reel Dimensions

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