

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 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

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	

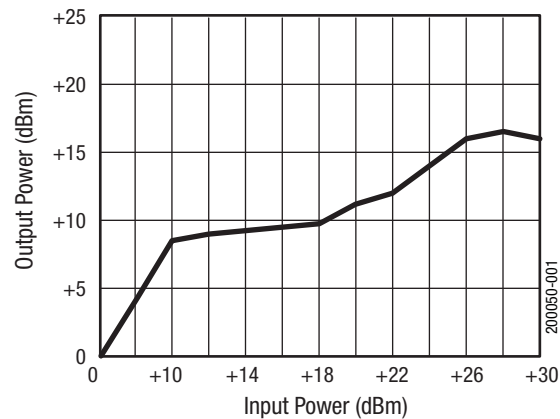
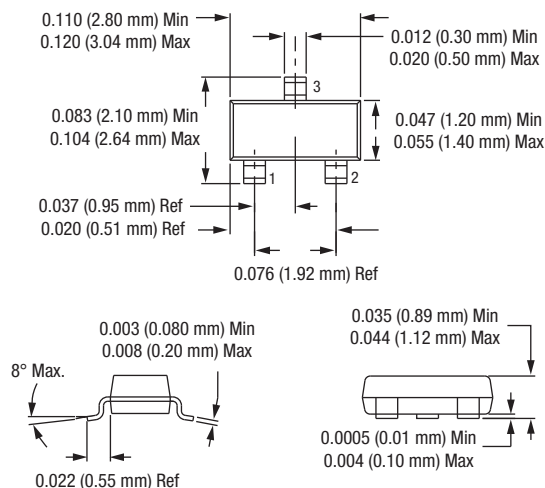


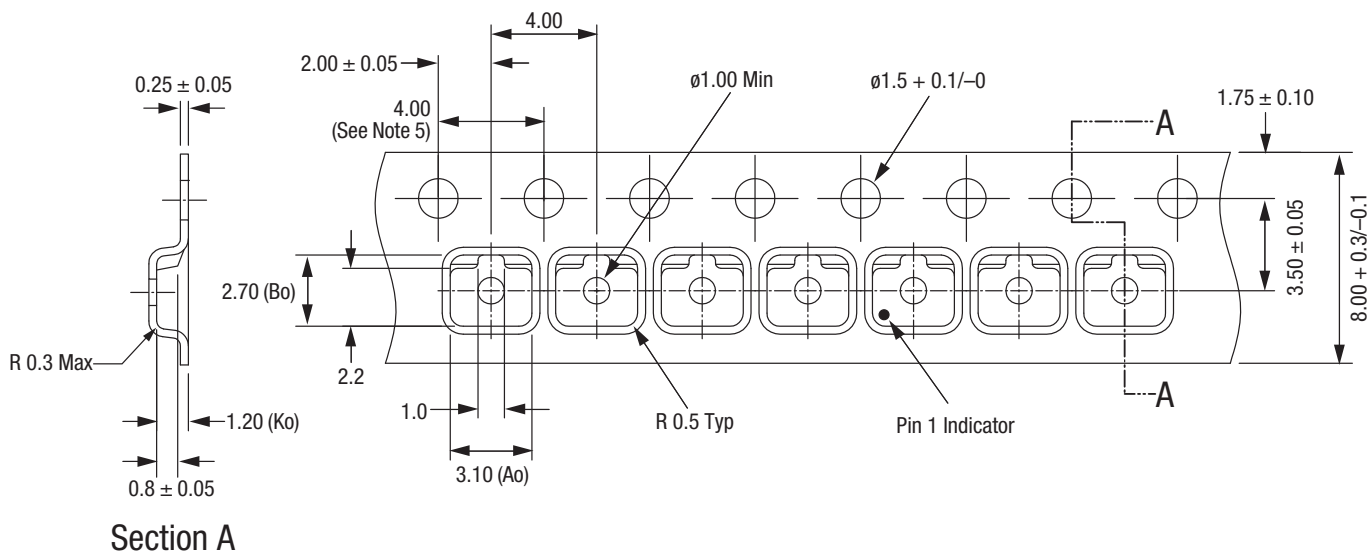
Figure 1. Typical 1 GHz Limiter Performance



Dimensions are in inches (millimeters shown in parentheses)

200050-002

Figure 2. SOT-23 Package Dimension Drawing



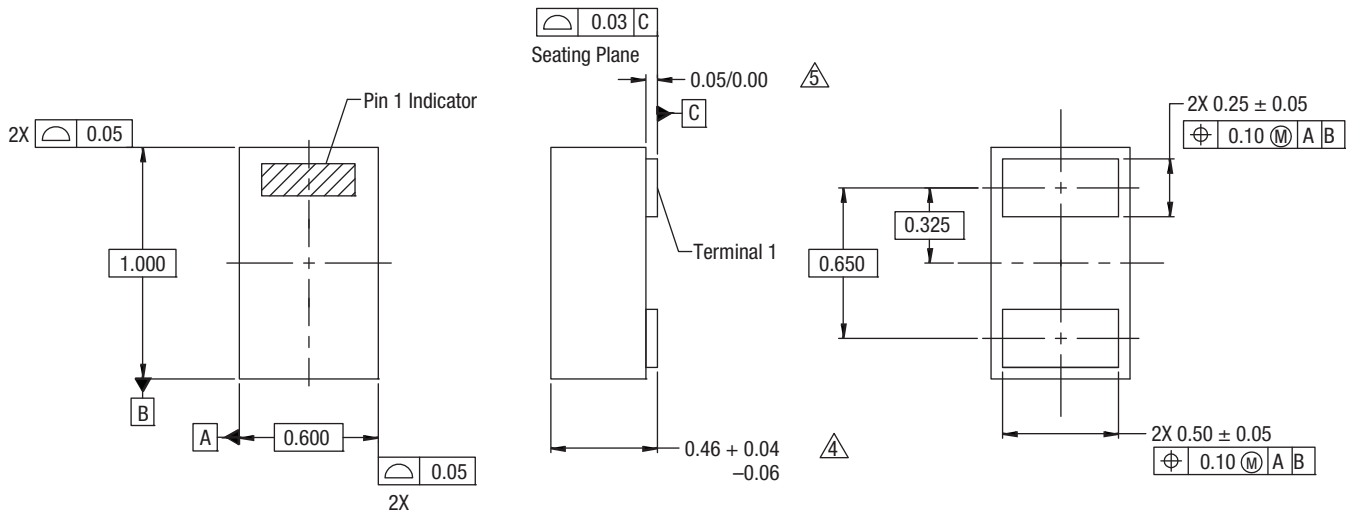
Section A

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:
 $Ao = 3.3$
 $Bo = 2.9$
 $Ko = 1.22$

200050-003

Figure 3. SOT-23 Tape and Reel Dimensions

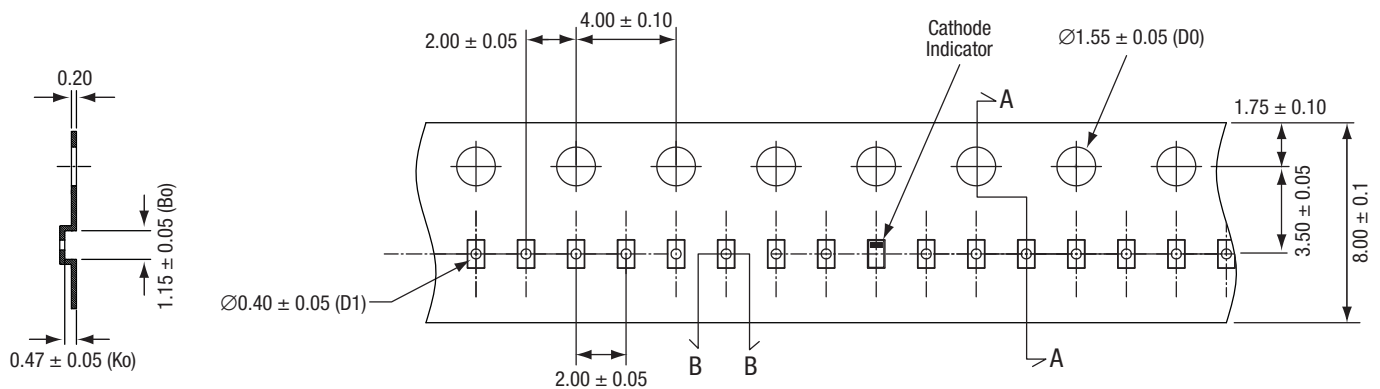


Notes:

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

Copyright © 2009-2010, 2012-2016 Skyworks Solutions, Inc. All Rights Reserved.

Information in this document is provided in connection with Skyworks Solutions, Inc. ("Skyworks") products or services. These materials, including the information contained herein, are provided by Skyworks as a service to its customers and may be used for informational purposes only by the customer. Skyworks assumes no responsibility for errors or omissions in these materials or the information contained herein. Skyworks may change its documentation, products, services, specifications or product descriptions at any time, without notice. Skyworks makes no commitment to update the materials or information and shall have no responsibility whatsoever for conflicts, incompatibilities, or other difficulties arising from any future changes.

No license, whether express, implied, by estoppel or otherwise, is granted to any intellectual property rights by this document. Skyworks assumes no liability for any materials, products or information provided hereunder, including the sale, distribution, reproduction or use of Skyworks products, information or materials, except as may be provided in Skyworks Terms and Conditions of Sale.

THE MATERIALS, PRODUCTS AND INFORMATION ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, WHETHER EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR USE, MERCHANTABILITY, PERFORMANCE, QUALITY OR NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHT; ALL SUCH WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED. SKYWORKS DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. SKYWORKS SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING BUT NOT LIMITED TO ANY SPECIAL, INDIRECT, INCIDENTAL, STATUTORY, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS THAT MAY RESULT FROM THE USE OF THE MATERIALS OR INFORMATION, WHETHER OR NOT THE RECIPIENT OF MATERIALS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Skyworks products are not intended for use in medical, lifesaving or life-sustaining applications, or other equipment in which the failure of the Skyworks products could lead to personal injury, death, physical or environmental damage. Skyworks customers using or selling Skyworks products for use in such applications do so at their own risk and agree to fully indemnify Skyworks for any damages resulting from such improper use or sale.

Customers are responsible for their products and applications using Skyworks products, which may deviate from published specifications as a result of design defects, errors, or operation of products outside of published parameters or design specifications. Customers should include design and operating safeguards to minimize these and other risks. Skyworks assumes no liability for applications assistance, customer product design, or damage to any equipment resulting from the use of Skyworks products outside of stated published specifications or parameters.

Skyworks and the Skyworks symbol are trademarks or registered trademarks of Skyworks Solutions, Inc., in the United States and other countries. Third-party brands and names are for identification purposes only, and are the property of their respective owners. Additional information, including relevant terms and conditions, posted at www.skyworksinc.com, are incorporated by reference.