

DATA SHEET

Surface Mount Schottky Quad Mixer Diodes

Applications

- High-volume commercial systems
- Modulators and frequency multipliers
- Double balanced mixers

Features

- Tight parameter distribution
- Available as ring quads and crossover quads
- 100% DC tested
- 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

Skyworks offers a series of low-cost quad mixer diodes in an SOT-143 package. This series includes low, medium, and high barrier junctions as ring quads and crossover quads. These devices are constructed using Skyworks monolithic chip technology, ensuring uniformity of electrical characteristics for each junction.

The low capacitance of Skyworks ring and crossover quads is optimal for double balanced mixer applications that cover wireless frequencies into the C-band.

These diodes are 100 percent DC tested and deliver tight parameter distribution, which minimizes performance variability. They compliment the Skyworks product line of Schottky singles and pairs available in SC-70, SC-79, SOD-323, SOT-23, and SOT-143 packages.

Table 1 describes the various packages and markings of the Schottky quad mixer diodes.

Table 1. Schottky Quad Mixer Diode Packaging and Marking

		
Ring Quad	Crossover Quad	Crossover Octoquad
SOT-143	SOT-143	SOT-143
SMS3926-022 Marking: SE4		
SMS3926-022LF Marking: XE4	◆ SMS3926-023LF Marking: XE5	
	SMS3927-023LF Marking: XJ5	
		SMS3940-029LF Marking: XTN



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 2. Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		Rated V_R	V
Forward current, steady state	I_F		50	mA
Power dissipation	P_D		75	mW
Storage temperature	T_{STG}	-65	+150	°C
Operating temperature	T_A	-65	+150	°C
Junction temperature	T_J		+150	°C
Electrostatic discharge:	ESD			
Charged Device Model (CDM), Class 2			500	V
Human Body Model (HBM), Class 1A			500	V
Machine Model (MM), Class A			150	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.

Electrical and Mechanical Specifications

The absolute maximum ratings of the quad mixer Schottky diodes are provided in Table 2. Electrical specifications are provided in Table 3.

Associated SPICE model parameters are provided in Table 4. Typical forward voltage characteristics are shown in Table 5.

Dimensions for the SOT-143 package are shown in Figure 1, and tape and reel dimensions are provided in Figure 2.

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 quad mixer Schottky diodes are rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C for 5 seconds. They 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 3. Electrical Specifications (Note 1)
($T_A = +25\text{ }^\circ\text{C}$ Per Junction, Unless Otherwise Noted)

Part Number	Barrier	Min V_B @ 10 μA (V)	C_J @ 0 V, 1 MHz (pF)	V_F @ 1 mA (mV)	Max ΔV_F @ 1 mA (mV)	Max R_T @ 10 mA (Note 2) (Ω)
SMS3926-022/022LF	Low	2	0.3 to 0.5	200 to 270	10	8
SMS3926-023LF	Low	2	0.3 to 0.5	200 to 270	10	8
SMS3927-023LF	Med	2	0.3 to 0.5	310 to 370	10	8
SMS3940-029LF	High Dual-Junction	8	0.3 to 0.5	1000 to 1200	20	16

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

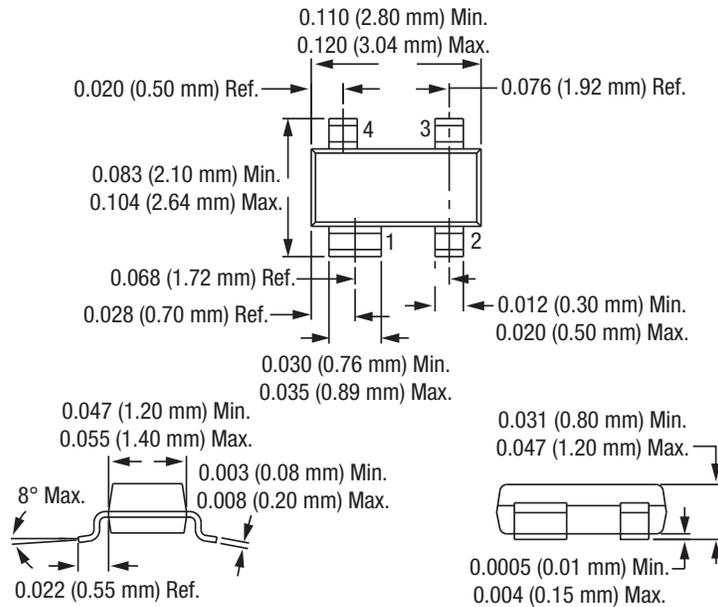
Note 2: R_T is the slope resistance. All parameters are based on a single leg.

Table 4. SPICE Model Parameters (Per Junction)

Parameter	Units	SMS3926	SMS3927	SMS3940
I_S	A	2.5E-7	1.3E-9	9E-13
R_S	Ω	4	4	4
N	–	1.04	1.04	1.04
T_T	sec	1E-11	1E-11	1E-11
C_{J0}	pF	0.42	0.39	0.39
M	–	0.32	0.37	0.42
E_G	eV	0.69	0.69	0.69
X_{TI}	–	2	2	2
F_C	–	0.5	0.5	0.5
B_V	V	2	3	4
I_{BV}	A	1E-5	1E-5	1E-5
V_J	V	0.495	0.595	0.800

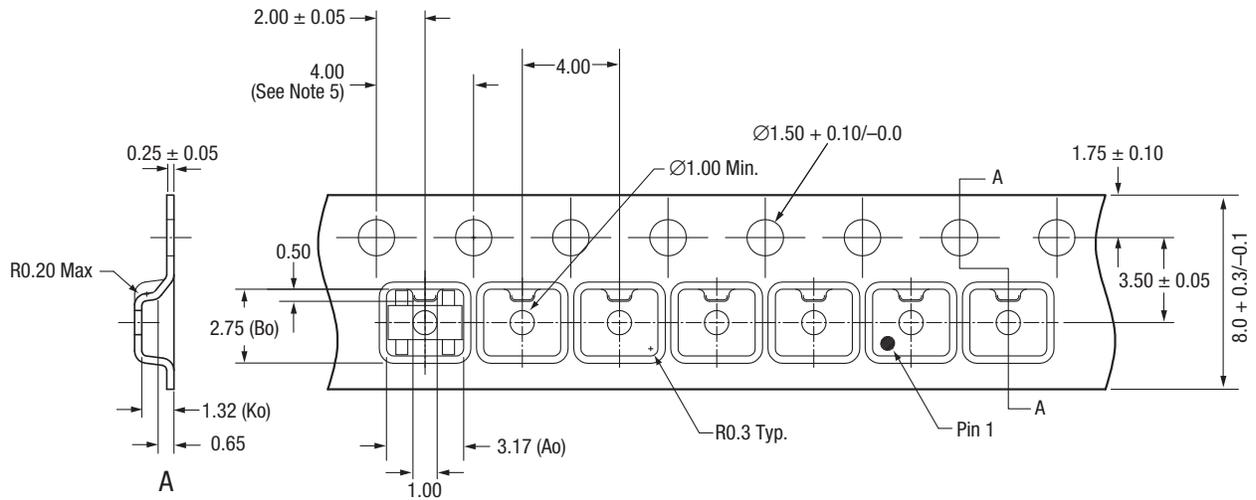
Table 5. Typical Forward Voltage Characteristics at 25 °C

Part Number	V _F @ 0.01 mA (mV)	V _F @ 0.1 mA (mV)	V _F @ 1 mA (mV)	V _F @ 10 mA (mV)
SMS3926	100	165	232	324
SMS3927	206	271	338	428
SMS3940	862	989	1123	1304



Dimensions are in inches (millimeters shown in parentheses) **S1651**

Figure 1. 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: $XX = \pm 0.10$
5. Ten sprocket hole pitch cumulative tolerance: ± 0.2 mm.
6. All measurements are in millimeters.

S2515a

Figure 2. SOT-143 Tape and Reel Dimensions

Copyright © 2002-2007, 2009-2015 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.