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, crossover quads, bridge quads, and octoquads
- 100% DC tested
- Packages rated MSL1, 260 °C per JEDEC J-STD-020)

Skyworks Pb-free products are compliant with all applicable legislation. For additional information, refer to *Skyworks Definition of Lead (Pb)-Free*, document number SQ04-0073.

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, crossover quads, and bridge quads. Octoquad rings are also offered for high dynamic range applications. 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. The bridge quads are designated for modulators and frequency multiplier applications.

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	Bridge Quad	Octoquad	Crossover Octoquad
SOT-143	SOT-143	SOT-143	SOT-143	SOT-143
SMS3926-022 Marking: SE4				
SMS3926-022LF Marking: XE4	♦ **SMS3926-023LF** Marking: XE5			
	SMS3927-023LF Marking: XJ5	**SMS3930-021LF** Marking: XRE		
	♦ **SMS3928-023** Marking: SK5			
	♦ **SMS3928-023LF** Marking: XK5	**SMS3931-021LF** Marking: XSE		
			SMS3940-026LF Marking: XTG	**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.

Innovation to Go™
Select Linear Products (indicated by ♦) now available for purchase online.

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	V_R		Rated V_B	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: Charged Device Model (CDM), Class 2 Human Body Model (HBM), Class 1A Machine Model (MM), Class A	ESD		 500 500 150	 V V V

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.*

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 °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
SMS3930-021LF	Med	2	0.3 to 0.5	310 to 370	10	8
SMS3928-023/023LF	High	4	0.3 to 0.5	520 to 580	10	8
SMS3931-021LF	High	4	0.3 to 0.5	520 to 580	10	8
SMS3940-026LF	High Dual-Junction	8	0.3 to 0.5	1000 to 1200	20	16
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 SMS3929	SMS3927 SMS3930	SMS3928 SMS3931 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
TT	sec	1E-11	1E-11	1E-11
C_{JO}	pF	0.42	0.39	0.39
M	–	0.32	0.37	0.42
E_G	eV	0.69	0.69	0.69
XTI	–	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
SMS3928	423	488	555	641
SMS3940	862	989	1123	1304

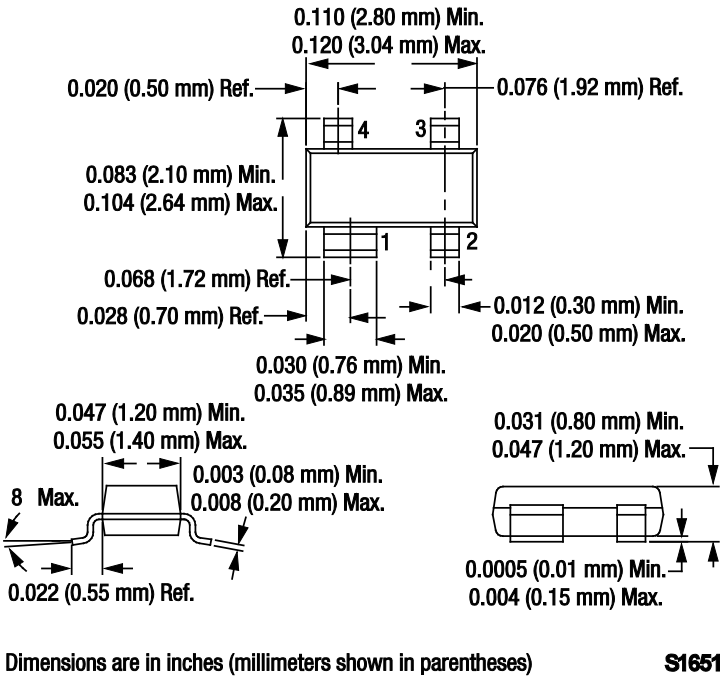
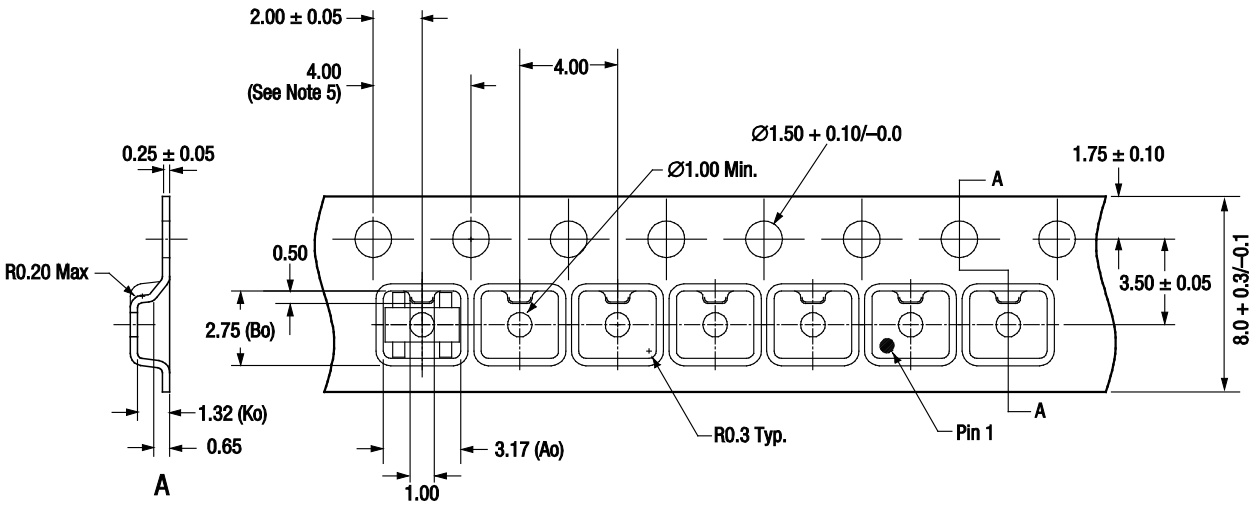


Figure 1. SOT-143 Package Dimension Drawing



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 = ±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