Schottky Diode Quad Mixer Chips Supplied on Film Frame

Applications

- Double-balanced mixers

Features

- Three barrier heights available
- Schottky diodes supplied 100% tested, sawn, mounted on film frame
- Low cost
- Available lead (Pb)-free, RoHS-compliant, and Green

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.
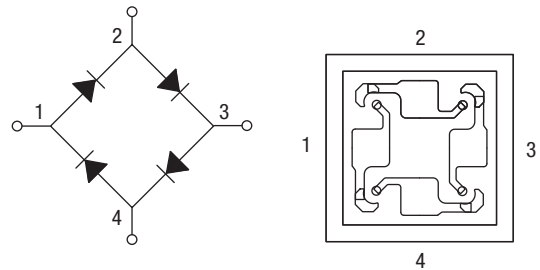
200165C-001

Description

The Skyworks SMS392x-099 family of Si Schottky diodes are configured as ring quads intended for use in double-balanced mixers. Each ring quad die is comprised of four Schottky junctions, connected anode to cathode. There are three barrier heights available:

- SMS3926 is composed of low-barrier diodes, which can be driven with low-power local oscillator signals
- SMS3927 is composed of medium-barrier diodes, for applications in which moderate-power local oscillator signals are available
- SMS3928 is composed of high-barrier diodes for applications that require very low distortion performance and have higher local oscillator power available.

These ring quads are 100% tested, sawn, and supplied on film frame in wafer quantities.

Electrical and Mechanical Specifications

The absolute maximum ratings of the Schotty Diode Quad Mixer Chips are provided in Table 2. Electrical specifications are provided in Table 3.

The chip dimensions of the different Schotty Diode Quad Mixer Chips are shown in Table 4.

Typical performance characteristics are shown in Figures 2, 3, and 4. SPICE model parameters are shown in Table 5.

Figure 5 shows the outline drawing of the Schotty Diode Quad Mixer Chips, and Figure 6 shows the wafer on film.

Table 2. Schotty Diode Quad Mixer Chips Absolute Maximum Ratings[1]

Parameter	Maximum	Units
Forward current (I_F)	75 mA	V
Power dissipation @ 25 °C at the base of the chip	75 mW per junction	V
Storage temperature	−65 °C to +200 °C	dBm
Operating temperature	−65 °C to +150 °C	V
Electrostatic discharge, Human Body Model	< 250	V

[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.

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 3. Schotty Diode Quad Mixer Chip Electrical Specifications at 25 °C

Part Number	Min. $V_B(1)$ $I_R = 10\ \mu A$ (V)	$C_J\ V_R = 0\ V$ F = 1 MHz (pF)	V_F @ I_F = 1mA (mV)	Max. Delta V_F @ 1 mA (mV)	Max. R_T I_F = 10 mA (Ω)
SMS3926-099	2	0.3 to 0.5 pF	200 to 260	10	8
SMS3927-099	3	0.3 to 0.5 pF	300 to 400	10	8
SMS3928-099	4	0.3 to 0.5 pF	500 to 600	10	8

Table 4. Schotty Diode Quad Mixer Chip Dimensions

Part Number	Quantity of Good Diodes per Wafer		Bonding Pad Nominal (inches)	Chip Size Nominal (inches)	Chip Height Nominal (inches)
	Min	Nom			
SMS3926-099	18,000	21,000	0.0035 ± 0.0005	0.0190 ± 0.001	0.006 ± 0.001
SMS3927-099	24,000	27,000	0.0035 ± 0.0005	0.0150 ± 0.001	0.006 ± 0.001
SMS3928-099	23,000	26,000	0.0035 ± 0.0005	0.0150 ± 0.001	0.006 ± 0.001

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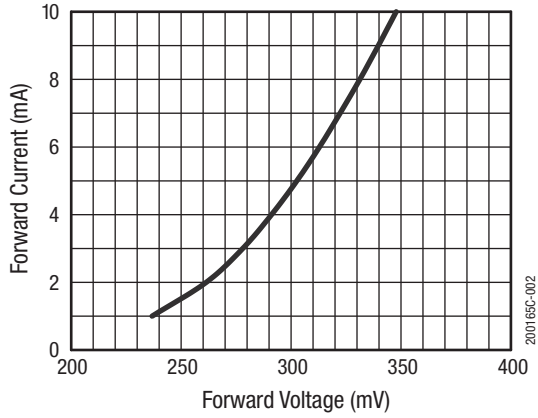
Typical Performance Data at 25 °C
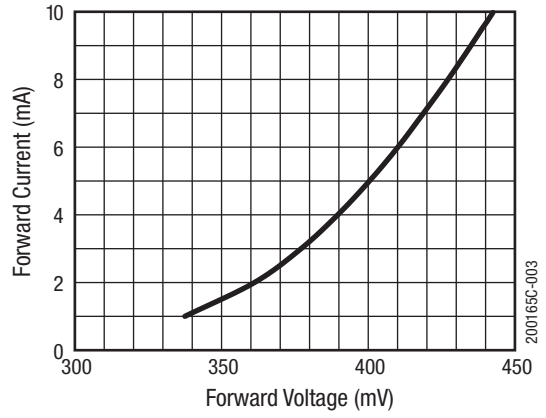

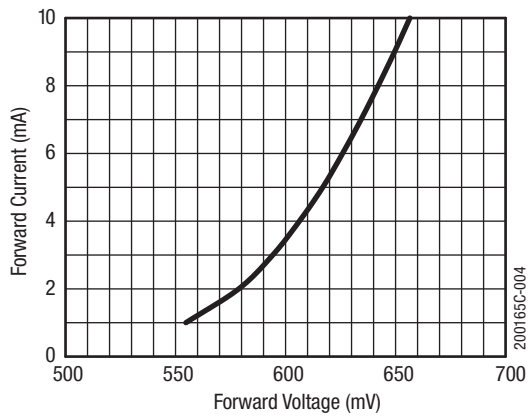Figure 2. SMS3926 DC Characteristics

Figure 3. SMS3927 DC Characteristics

Figure 4. SMS3928 DC Characteristics
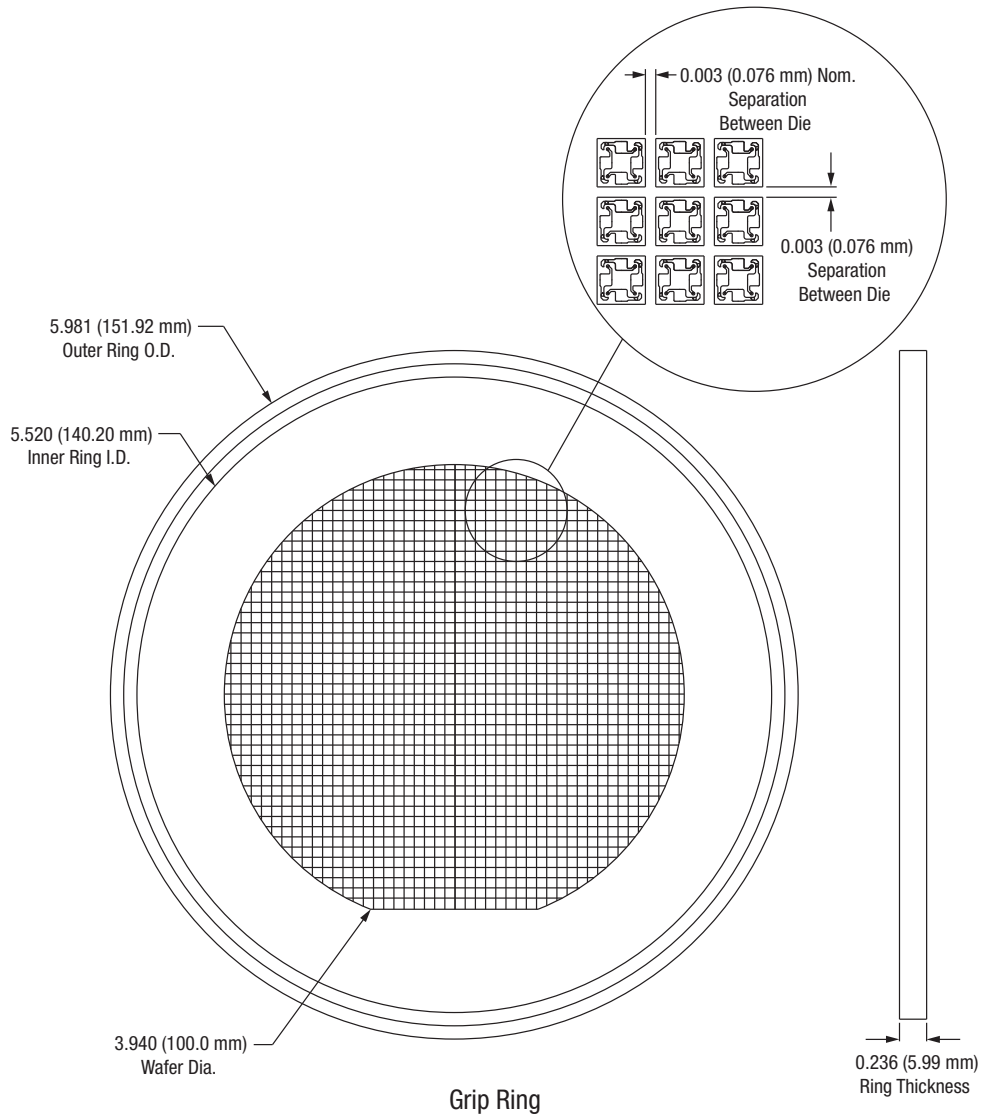
Table 5. SPICE Model Parameters (Per Junction)

Parameter	Units	SMS3926	SMS3927	SMS3928
I_S	A	2.5E-07	1.3E-09	9.0E-13
R_S	Ω	4.00	4.00	4.00
N	-	1.04	1.04	1.04
TT	s	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
XTI	-	2.00	2.00	2.00
F_C	-	0.50	0.50	0.50
B_V	V	2.00	3.00	4.00
I_{BV}	A	1.0E-05	1.0E-05	1.0E-05
V_J	V	0.495	0.595	0.800
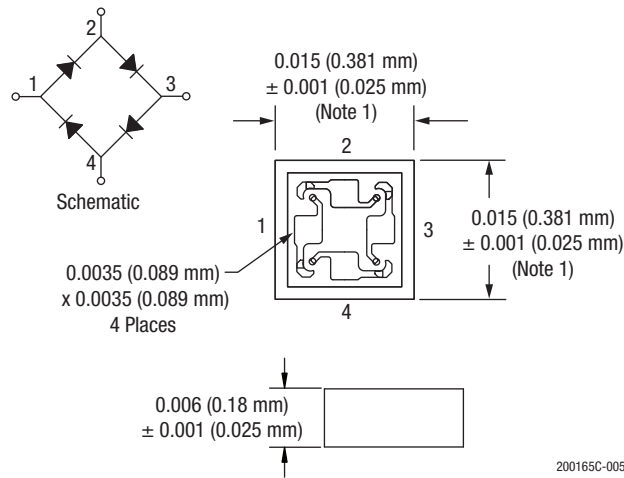
Note 1: The SMS3926 die size is 0.019 (0.483 mm) ± 0.001 (0.025 mm) (2 places).

Figure 5. Schottky Diode Quad Mixer Chips Outline Drawing

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0.003 (0.076 mm) Nom.
Separation
Between Die

0.003 (0.076 mm)
Separation
Between Die

5.981 (151.92 mm)
Outer Ring O.D.

5.520 (140.20 mm)
Inner Ring I.D.

3.940 (100.0 mm)
Wafer Dia.

Grip Ring

0.236 (5.99 mm)
Ring Thickness

Wafer Film Frame Description:

Wafer on nitto tape
Color: light blue
Thickness: 2.2 to 3.0 mils
Tensile strength: 6.6 (lbs. in width)
Ring material: plastic

200165C-006

Figure 6. Wafer on Film

Ordering Information

Model Name	Manufacturing Part Number
Schotty Diode Quad Mixer Chips	SMS3926-099
	SMS3927-099
	SMS3928-099

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