High Performance Schottky Diodes
Ultramiiniature 0201 Surface Mount Technology Packaging
Skyworks Solutions

Skyworks Solutions, Inc. is an innovator of high reliability analog semiconductors. Leveraging core technologies, Skyworks offers high performance analog products supporting automotive, broadband, cellular infrastructure, energy management, industrial, medical, military, wireless networking, smartphone, and tablet applications. The Company’s portfolio includes amplifiers, attenuators, circulators, detectors, diodes, directional couplers, front-end modules, hybrids, infrastructure RF subsystems, isolators, lighting and display solutions, mixers/demodulators, optocouplers, optoisolators, phase shifters, PLLs/synthesizers/VCOs, power dividers/combiners, power management devices, receivers, switches, and technical ceramics.

Headquartered in Woburn, Massachusetts, USA, Skyworks is worldwide with engineering, manufacturing, sales, and service facilities throughout Asia, Europe, and North America.

New products are continually being introduced at Skyworks. For the latest information, visit our Web site at www.skyworksinc.com. For additional information, please contact your local sales office or email us at sales@skyworksinc.com.

The Skyworks Advantage

- Broad front-end module and precision analog product portfolio
- Market leadership in key product segments
- Solutions for all air interface standards, including CDMA, GSM / GPRS / EDGE, LTE, WCDMA, and WLAN
- Engagements with a diverse set of top-tier customers
- Strategic partnerships with all leading baseband suppliers
- Analog, RF, and mixed-signal design capabilities
- Access to all key process technologies: GaAs HBT, pHEMT, BiCMOS, SiGe, CMOS and RF CMOS, and Silicon
- World-class manufacturing capabilities and scale
- Unparalleled level of customer service and technical support
- Commitment to technology innovation
Silicon Schottky Diodes for Mixer and Detector Applications

Skyworks Solutions, Inc., an innovator of high performance analog and mixed signal semiconductors enabling mobile connectivity, has engineered the industry’s smallest and lowest profile silicon radio frequency (RF) schottky diodes in a 0201 surface mount technology (SMT) footprint. This family of ultraminiature and high-performance packaged diodes, which is priced comparably to traditional plastic packages, is ideal for a wide range of high-volume and cost-sensitive mixer and detector applications including CATV/DBS set-top boxes, mobile handsets, microwave radios, RFID tags, wireless infrastructure and embedded WLAN 802.11a,b,g,n modules, automotive radar, and Doppler radar sensors.

These devices are well suited for RF, microwave, and millimeterwave signal detection applications up to 100 GHz—traditional plastic packaging is typically only specified up to 10 GHz.

Key Benefits

Extension of current proven beamless technology:

- Significantly smaller, lighter, and lower profile (0.3 mm or lower), when compared to plastic packaged alternative
- Less RF performance degradation when compared to leaded parts and/or wire bonded devices, resulting in better predictability of component characteristics
- High frequency performance, lower parasitic impedance, compared to alternative assembly
- Replace traditional chip and wire approach, thereby reducing assembly cost while increasing overall assembly yield

Features

- Cu (copper) pillars with Ni/Sn/Ag (nickel/tin/silver) terminations provides an excellent packaging configuration for high performance and high reliability
- Device packaging format is compatible with existing high-speed 0201 surface mount assembly technology
- RoHS-compliant and Skyworks Green™ with Cu/Ni/Sn/Ag terminations
- Wafer level construction exhibits low parasitic inductance (<0.2 nH) and low parasitic capacitance <0.05 pF

Schottky Diodes for Mixer and Detector Applications

The SMS7621-060 is a silicon low barrier N-type Schottky single junction diode which can be used for very sensitive power detector circuits, in sampling circuits, or in mixer circuits. The SMS7621-092 anti-parallel diode is also available.

The SMS7630-061 is silicon zero bias detector diode with very low barrier height, which can be used for very sensitive power detector circuits or in sampling circuits.

The very low barrier height on both the devices produces a very small forward voltage. This low forward voltage, along with the diode’s very low junction capacitance, make these diodes an excellent detector at frequencies as high as 100 GHz.

These devices can operate over the temperature range of -65° C to 150° C, and complement Skyworks’ extensive line of plastic packaged diodes and diode chips. SPICE parameters are provided on the data sheets.
## Key Specifications

**SMS7630-061 (P-Type) Single Junction**

<table>
<thead>
<tr>
<th>Min. Breakdown Voltage @ $I_k = 10 \mu A$ (V)</th>
<th>Typical Total Capacitance @ $V_n = 0.15$ V (pF)</th>
<th>Forward Voltage @ $I_f = 1$ mA (mV)</th>
<th>Video Resistance @ $V_n = 0$ V (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.3</td>
<td>135–240</td>
<td>3000–7000</td>
</tr>
</tbody>
</table>

**SMS7621-060 (N-Type) Single Junction**

<table>
<thead>
<tr>
<th>Min. Breakdown Voltage @ $I_k = 10 \mu A$ (V)</th>
<th>Max. Total Capacitance @ $V_n = 0$ V, F = 1 MHz (pF)</th>
<th>Forward Voltage @ $I_f = 1$ mA (mV)</th>
<th>Max. Series Resistance @ $I_f = 5$ mA (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.18</td>
<td>260–320</td>
<td>12</td>
</tr>
</tbody>
</table>

**SMS7621-092 (CN-Type) Anti-Parallel Junction**

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<tr>
<th>Min. Breakdown Voltage @ $I_k = 10 \mu A$ (V)</th>
<th>Max. Total Capacitance @ $V_n = 0$ V, F = 1 MHz (pF)</th>
<th>Forward Voltage @ $I_f = 1$ mA (mV)</th>
<th>Max. Series Resistance @ $I_f = 5$ mA (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.125</td>
<td>260–320</td>
<td>18</td>
</tr>
</tbody>
</table>

Skyworks Green™ products are compliant to all applicable materials legislation and are halogen-free. For additional information, refer to Skyworks Definition of Green™, document number SQ04-0074.
Typical Performance

SMS7630-061 Detector Voltage vs. Input Power (25°C)

SMS7630-060 Detector Voltage at 2.45 GHz (TA = 25 °C) 100 kΩ Video Resistance

Detector Circuit

SMS7630-061 Detected Output Voltage Consistency
High Frequency Performance

Detector Performance at 24 GHz

24 GHz Detector Circuit

Detected Output Voltage vs. Input Power, $f = 24$ GHz

24 GHz RF Detector

Conversion Loss vs. Local Oscillator (LO) Power, $f = 24$ GHz

24 GHz Mixer Circuit

24 GHz Mixer
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