Skyworks broad product portfolio includes Schottky diodes as packaged and bondable silicon chips, in addition to ceramic hermetic, chip on board, beam-lead, flip chip and plastic surface mount packaged devices for mixer or detector applications.

Skyworks series of Silicon Schottky diodes, CDB7619-000, CDB7620-000, CDB7630-000, CDB7631-000, CDB7621-000 and CDB7623-000 are optimized for use as detector and mixer diodes at frequencies from below 100 MHz to higher than 40 GHz. This family of products includes low and "zero bias detector (ZBD)" barrier height Schottky junctions with low junction capacitance and low series resistance. Schottky junctions are formed by depositing specific metals on either n-type-doped silicon (low barrier height) or on p-type-doped silicon (low or ZBD barrier height). The characteristics of the diode are determined by the type of metal deposited on the semiconductor material as well as the type of dopant in the semiconductor layer, among other parameters.

Skyworks “Universal Chip” design features a 4-mil-diameter bond pad that is offset from the Schottky junction, preventing damage to the active junction that might occur as a result of wire bonding.

**Applications**
As power-sensing detectors, these Schottky diode chips all have the same voltage sensitivity so long as the output video impedance is much higher than the video resistance of the diode. Figure 1 shows the expected detected voltage sensitivity as a function of RF source impedance in an untuned circuit. Note that sensitivity is substantially increased by transforming the source impedance from 50 Ω to higher values. Maximum sensitivity occurs when the source impedance equals the video resistance. In a detector circuit operating at zero bias, depending on the video load impedance, a ZBD device with RV less than 10 kΩ may be more sensitive than a low-barrier diode with RV greater than 100 kΩ. Applying forward bias reduces the diode video resistance as shown in Figure 2. Lower video resistance also increases the video bandwidth but does not increase voltage sensitivity, as shown in Figure 3. Biased Schottky diodes have better temperature stability and also may be used in temperature compensated detector circuits.

P-type Schottky diodes generate lower 1/F noise and are preferred for Doppler mixers and biased detector applications. The bond pad for the P-type Schottky diode is the cathode. N-type Schottky diodes have lower parasitic resistance, $R_s$, and will perform with lower conversion loss in mixer circuits. The bond pad for the N-type Schottky diode is the anode.
Electrical Specifications at 25 °C

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Barrier</th>
<th>Junction Type</th>
<th>$C_J^{(1)}$ (pF) Max.</th>
<th>$R_T^{(2)}$ (Ω) Max.</th>
<th>$V_{F} @ 1$ mA (mV) Min.–Max.</th>
<th>$V_J^{(3)}$ (V) Min.</th>
<th>$R_V @ Zero Bias$ (kΩ) Typ.</th>
<th>Outline Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDC7630-000</td>
<td>ZBD</td>
<td>P</td>
<td>0.25</td>
<td>30</td>
<td>135–240</td>
<td>1</td>
<td>5.5</td>
<td>571-006</td>
</tr>
<tr>
<td>CDC7631-000</td>
<td>ZBD</td>
<td>P</td>
<td>0.15</td>
<td>80</td>
<td>150–300</td>
<td>2</td>
<td>7.2</td>
<td>571-006</td>
</tr>
<tr>
<td>CDB7619-000</td>
<td>Low</td>
<td>P</td>
<td>0.1</td>
<td>40</td>
<td>275–375</td>
<td>2</td>
<td>735</td>
<td>571-006</td>
</tr>
<tr>
<td>CDB7620-000</td>
<td>Low</td>
<td>P</td>
<td>0.15</td>
<td>30</td>
<td>250–350</td>
<td>2</td>
<td>537</td>
<td>571-006</td>
</tr>
<tr>
<td>CDF7621-000</td>
<td>Low</td>
<td>N</td>
<td>0.1</td>
<td>20</td>
<td>270–350</td>
<td>2</td>
<td>680</td>
<td>571-011</td>
</tr>
<tr>
<td>CDF7623-000</td>
<td>Low</td>
<td>N</td>
<td>0.3</td>
<td>10</td>
<td>240–300</td>
<td>2</td>
<td>245</td>
<td>571-011</td>
</tr>
</tbody>
</table>

1. $C_J$ for low barrier diodes specified at 0 V. $C_J$ for ZBDs specified at 0.15 V reverse bias.
2. $R_T$ is the slope resistance at 10 mA. $R_T$ Max. may be calculated from: $R_T = R_i - 2.6 \times N$.
3. $V_J$ for low barrier diodes is specified at 10 μA. $V_J$ for ZBDs is specified at 100 μA.

Typical Performance Data

![Figure 1. Detected Voltage vs. Input Power and RF Source Impedance](image1)

![Figure 3. Detected Voltage vs. Forward Current](image3)

![Figure 2. Video Resistance vs. Forward Bias Current](image2)

![Zero Biased Detector](image4)

![Biased Detector](image5)
Outline Drawings
571-006 (Cathode Bond Pad), 571-011 (Anode Bond Pad)

-203

Schematic
N-Type

-109

Bottom View
Cathode Indicator
0.35 Max. Typ.
0.43 ± 0.05
-2 Plcs.
0.45 ± 0.05

Top View
1.43 ± 0.10
XX

Side View
0.15 Typ.

Gold-Plated Kovar Lid

-108

Bottom View
Cathode Indicator
0.35 Max. Typ.
0.43 ± 0.05
-2 Plcs.
0.45 ± 0.05

Top View
1.43 ± 0.10
XX

Side View
0.15 Typ.

Gold-Plated Kovar Lid

All dimensions in mm

Gold Metallization

Backside Contact (Anode)
Application Notes
For additional information, please refer to the following Application Notes.

Diode Chips, Beam-Lead Diodes, Capacitors: Bonding Methods and Packaging

ESD Compliance Testing and Recommended Protection Circuits for GaAs Devices

Handling Precautions for Schottky Barrier Mixer and Detector Diodes

Mixer and Detector Diodes

Quality/Reliability

Through our Green Initiative™, we are committed to manufacturing products that comply with global government directives and industry requirements.

Skyworks is continuously innovating RF, analog and mixed-signal ICs. For the latest product introductions and information about Skyworks, visit our Web site at www.skyworksinc.com

For additional information on our broad overall product portfolio, please contact your local sales office or email us at sales@skyworksinc.com.

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