

Applications

- Mixer and detector

Features

- Low capacitance for usage beyond 40 GHz
- ZBD and low barrier designs
- P-type and N-type junctions
- Large bond pad chip design
- Chip products are Skyworks Green™



Silicon Schottky Diodes

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 $50\ \Omega$ 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 $10\ k\Omega$ may be more sensitive than a low-barrier diode with RV greater than $100\ k\Omega$. 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.



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Electrical Specifications at 25 °C

Part Number	Barrier	Junction Type	$C_j^{(1)}$ (pF) Max.	$R_t^{(2)}$ (Ω) Max.	V_f @ 1 mA (mV) Min.–Max.	$V_b^{(3)}$ (V) Min.	R_v @ Zero Bias (kΩ) Typ.	Outline Drawing
CDC7630-000	ZBD	P	0.25	30	135–240	1	5.5	571-006
CDC7631-000	ZBD	P	0.15	80	150–300	2	7.2	571-006
CDB7619-000	Low	P	0.1	40	275–375	2	735	571-006
CDB7620-000	Low	P	0.15	30	250–350	2	537	571-006
CDF7621-000	Low	N	0.1	20	270–350	2	680	571-011
CDF7623-000	Low	N	0.3	10	240–300	2	245	571-011

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_s Max. may be calculated from: $R_s = R_t - 2.6 \times N$.

3. V_b for low barrier diodes is specified at 10 μA. V_b for ZBDs is specified at 100 μA.

Typical Performance Data

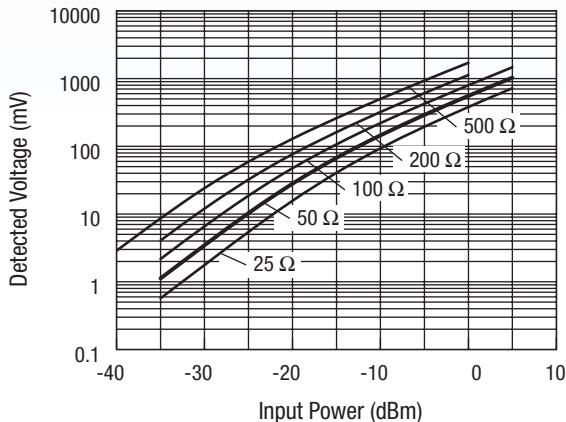


Figure 1. Detected Voltage vs. Input Power and RF Source Impedance

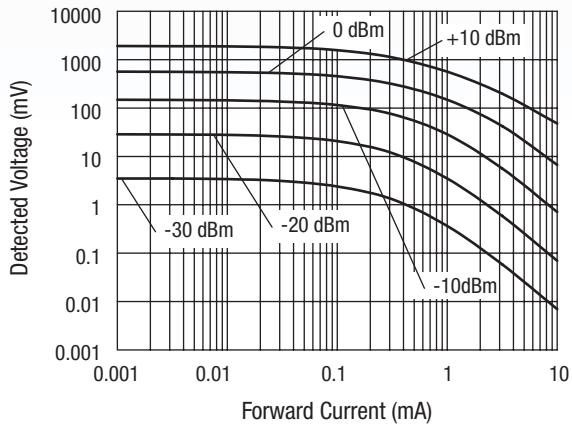


Figure 3. Detected Voltage vs. Forward Current

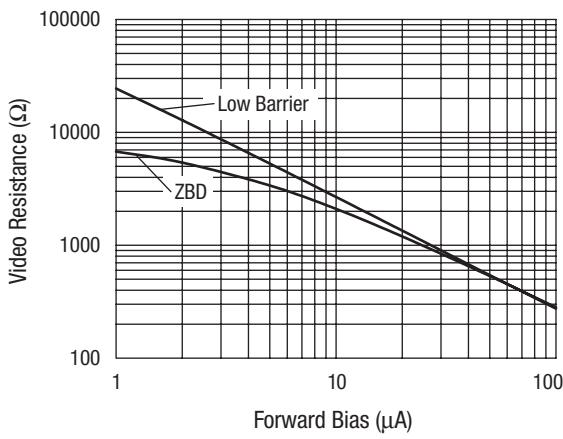
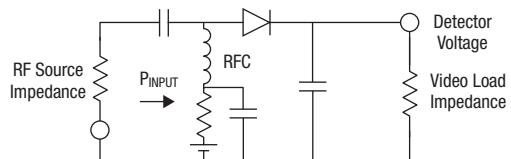
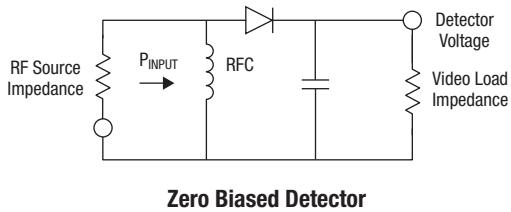


Figure 2. Video Resistance vs. Forward Bias Current

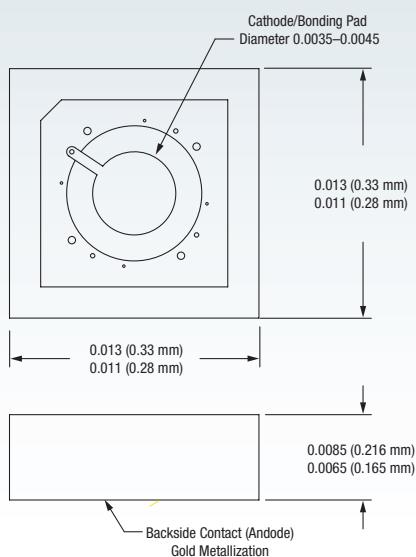


Outline Drawings

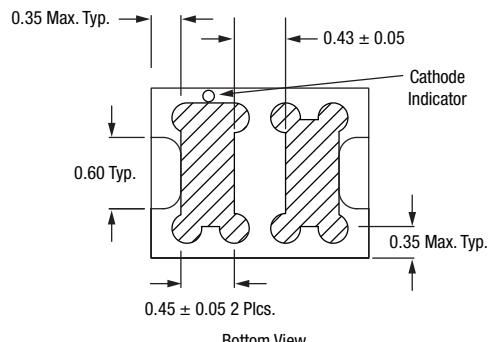
571-006 (Cathode Bond Pad),

571-011 (Anode Bond Pad)

-203



-108

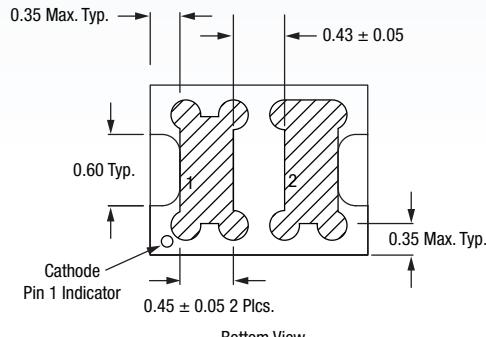


Bottom View



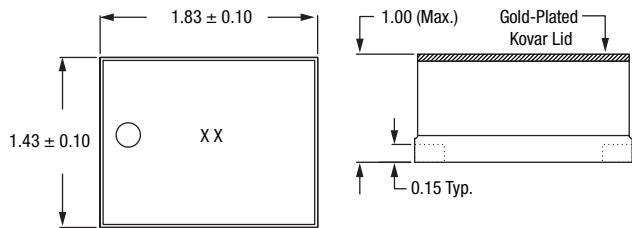
247-001

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Bottom View

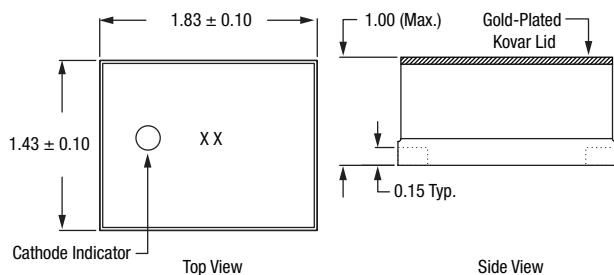
1 — 2



Top View

Side View

585-006

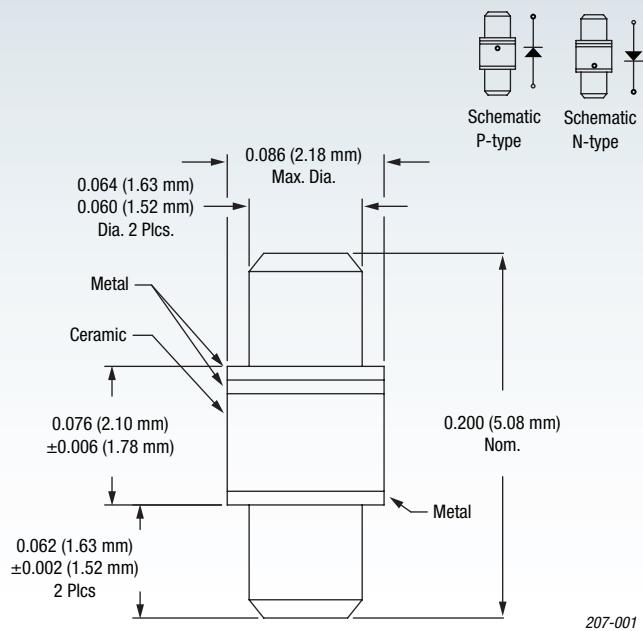


Side View

586-011

All dimensions in mm

All dimensions in mm



207-001

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.

Skyworks Solutions, Inc.

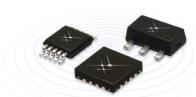
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