

DATA SHEET

# CDB, CDC, CDF Series: Silicon Schottky Diode Chips

## Applications

- Detectors
- Mixers

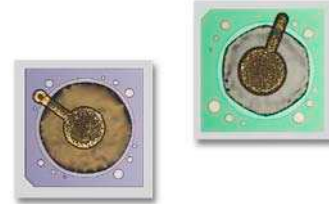
## Features

- Low capacitance for use beyond 40 GHz
- ZBD and low barrier designs
- P-type and n-type junctions
- Large bond pad chip design
- Packages rated MSL1, 260 °C per JEDEC J-STD-020)

**NEW**



Skyworks Green™ products are RoHS (Restriction of Hazardous Substances)-compliant, conform to the EIA/EICTA/JEITA Joint Industry Guide (JIG) Level A guidelines, are halogen free according to IEC-61249-2-21, and contain <1,000 ppm antimony trioxide in polymeric materials.



## Description

Skyworks silicon Schottky diode chips are intended for use as detector and mixer devices in hybrid integrated circuits at frequencies from below 100 MHz to higher than 40 GHz. Skyworks “Universal Chip” design features a four-mil diameter bond pad that is offset from the semiconductor junction, which prevents damage to the active junction as a result of wire bonding.

As detectors, these Schottky diode chips all have the same voltage sensitivity as long as the output video impedance is much higher than the video resistance of the diode.

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, lower series resistance, and perform with lower conversion loss in mixer circuits. The bond pad for the N-type Schottky diode is the anode.

**Table 1. CDB, CDC, CDF Diode Series Absolute Maximum Ratings**

Parameter	Symbol	Minimum	Maximum	Units
Reverse voltage	$V_R$		See minimum $V_b$ values in Table 2	V
Forward current	$I_F$		50	mA
Power dissipation	$P_D$		75	mW
Storage temperature	$T_{STG}$	-65	+150	°C
Operating temperature	$T_A$	-65	+150	°C

**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. The CDB, CDC, CDF series of Schottky diodes are Class 0 Human Body Model (HBM) and Class C4 Charged Device Model (CDM) ESD devices.

**Table 2. CDB, CDC, CDF Diode Series Electrical Specifications (Note 1)**  
( $T_A = +25\text{ °C}$ , Unless Otherwise Noted)

Part Number	Barrier	Junction Type	C <sub>J</sub> (Note 2)	R <sub>T</sub> (Note 3)	V <sub>F</sub> @ 1 mA	V <sub>B</sub> (Note 4)	R <sub>V</sub> @ Zero Bias	Outline Drawing	
			(pF)	(Ω)	(mA)	(V)	(kΩ)		
			Max	Max	Min-Max	Min	Typ		
CDB7619-000	Low	P	0.10	40	275-375	2	735	571-006	
CDB7620-000	Low	P	0.15	30	250-350	2	537	571-006	
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	
CDF7621-000	Low	N	0.10	20	270-350	2	680	571-011	
CDF7623-000	Low	N	0.30	10	240-300	2	245	571-011	

**Note 1:** Performance is guaranteed only under the conditions listed in this Table and is not guaranteed over the full operating or storage temperature ranges. Operation at elevated temperatures may reduce reliability of the device.

**Note 2:** C<sub>J</sub> for low barrier diodes specified at 0 V. C<sub>J</sub> for ZBD diodes specified at 0.15 V reverse bias.

**Note 3:** R<sub>T</sub> is the slope resistance at 10 mA. Maximum R<sub>S</sub> is calculated from: R<sub>S</sub> = R<sub>T</sub> - 2.8.

**Note 4:** V<sub>B</sub> for low barrier diodes is specified at reverse current (I<sub>R</sub>) = 10 μA; V<sub>B</sub> for ZBD diodes is specified at 100 μA.

### Electrical and Mechanical Specifications

The absolute maximum ratings of the CDB, CDC, and CDF series of Schottky diodes are provided in Table 1. Electrical specifications are provided in Table 2. Typical performance characteristics are illustrated in Figures 1 through 3.

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 a reverse voltage less than 10 kΩ may be more sensitive than a low-barrier diode with a reverse voltage 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. Forward biased diodes have better temperature stability and also may be used in temperature-compensated detector circuits.

Typical schematic diagrams for a zero biased and a biased detector are shown in Figure 4.

The associated SPICE model parameters for the CDB, CDC, and CDF series of Schottky diodes are listed in Table 3.

Package dimensions are provided in Figure 5.

### 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 CDB, CDC, CDF series of Schottky diodes is rated to Moisture Sensitivity Level 1 (MSL1) at 260 °C. 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. For packaging details, refer to the Skyworks Application Note, *Discrete Devices and IC Switch/Attenuators Tape and Reel Package Orientation*, document number 200083.

### Typical Performance Characteristics (Characteristic Impedance [Z<sub>0</sub>] = 50 Ω)

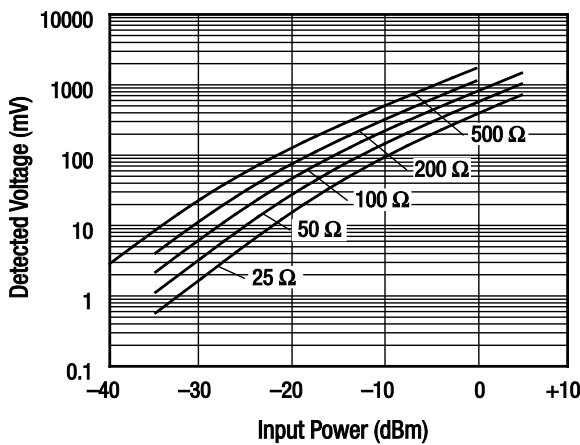


Figure 1. Detected Voltage vs Input Power and RF Source Impedance

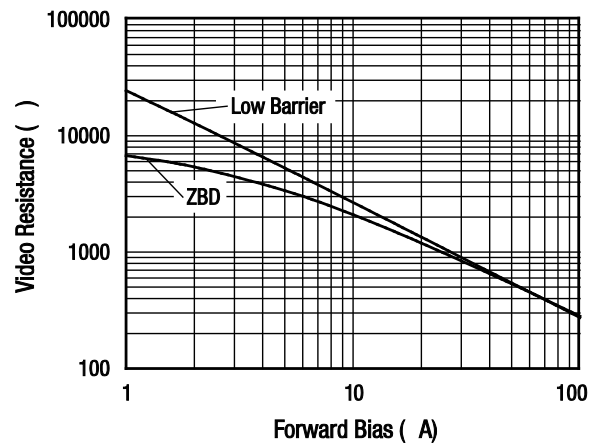


Figure 2. Video Resistance vs Forward Bias Current

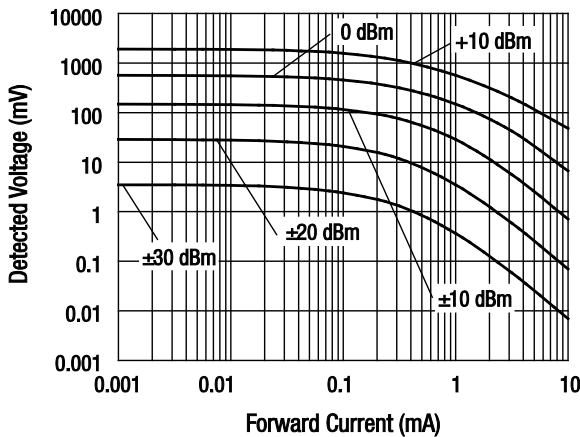
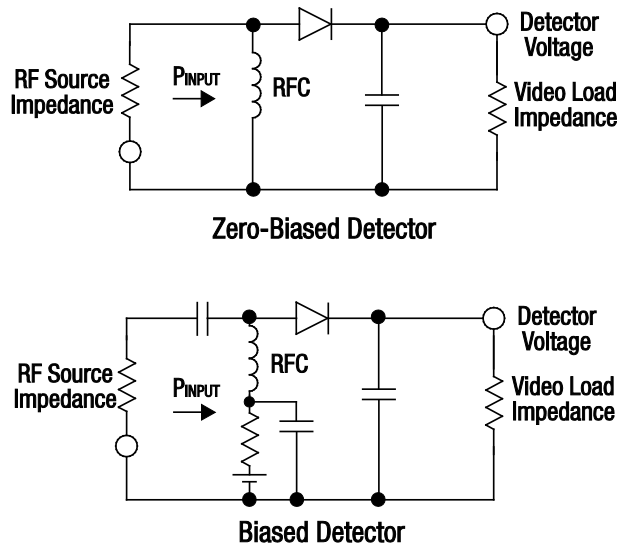


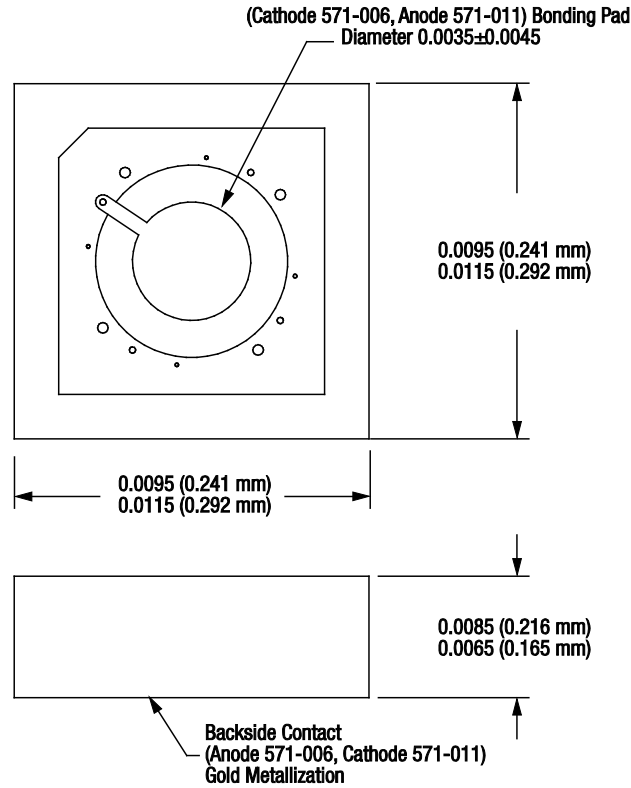
Figure 3. Detected Voltage vs Forward Current



**Figure 4. Typical Biased and Zero-Biased Detector Circuits**

**Table 3. CDB, CDC, CDF Diode Series SPICE Model Parameters**

Parameter	CDB7619	CDB7620	CDF7621	CDF7623	CDC7630	CDC7631	Units
Is	3.70E-08	5.40E-08	9.0E-08	1.1E-07	5.0E-06	3.8E-06	A
Rs	3	14	6	6	20	51	Ω
N	1.05	1.12	1.1	1.04	1.05	1.05	–
TT	1E-11	1E-11	1E-11	1E-11	1E-11	1E-11	sec
Cjo	0.08	0.15	0.1	0.22	0.14	0.08	pF
M	0.35	0.35	0.35	0.32	0.4	0.4	–
Eg	0.69	0.69	0.69	0.69	0.69	0.69	eV
XTI	2	2	2	2	2	2	–
Fc	0.5	0.5	0.5	0.5	0.5	0.5	–
Bv	2	4	3	2	2	2	V
Ibv	1E-05	1E-05	1E-05	1E-05	1E-04	1E-04	A
Vj	0.495	0.495	0.495	0.495	0.34	0.34	V



Dimensions are in inches (millimeters shown in parentheses)

**Figure 5. 571-006 (Cathode Bond Pad) or 571-011 (Anode Bond Pad) Package Dimensions**

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