Packaged and Bondable Chips

GaAs Schottky Diodes

MS8001 – MS8004

Features

- Low-Noise Performance
- High Cut-off Frequency
- Passivated to Enhance Reliability
- Packaged Diodes and Bondable Chips

Applications

- Single and Balanced Mixers and Detectors
- Transceivers X, K and Ka Bands
- 30 and 60 GHz Radios
- Automotive Radar Detectors

Maximum Ratings

Incident Power	100 mW @ 25°C Derate Linearly to 0 at 175°C
Forward Current	15 mA @ 25°C
Reverse Voltage	5 V
Operating Temperature	-55°C to +175°C
Storage Temperature	-55°C to +200°C

Description

Microsemi's MS8000 series of GaAs Schottky barrier diodes are available in packaged form and bondable chip configurations. These Schottky devices have low series resistance and low junction capacitance. The resulting low noise figure makes these diodes suitable for sensitive mixer and detector applications from below X band to beyond Ka band frequencies.

Ordering Information

P00 is the designation for the bondable chip Schottky (e.g. MS8001-P00). Packaged diodes are designated by the package outline number (e.g. MS8001-30)

IMPORTANT: For the most current data, consult our website: ***www.MICROSEMI.com***
Specifications are subject to change. Consult factory for the latest information.

These devices are ESD sensitive and must be handled using ESD precautions.

[1] The MS8000 Series of products are supplied with a RoHS complaint Gold finish.

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Microsemi
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75 Technology Drive, Lowell, MA. 01851, 978-442-5600, Fax: 978-937-3748

SPICE Model Parameters for MS8004

I_S (A)	R_S (Ω)	N	TT (Sec.)	C_{JO} (pF)	m	E_G (ev)	V_J (V)	B_V (V)	IB_V (A)
8×10^{-13}	6	1.05	0	0.06	0.50	1.42	0.85	5.0	1×10^{-5}

Specifications @ 25°C

Part Number	Typ. C_J @ 0 V (pF)[2]	Max. R_S (Ω)[3]	LO Frequency (GHz)	Typ. Noise Figure (dB)[4]	IF Impedance (Ω)	Min. V_{BR} (V)[5]
MS8001[1]	0.12	6	9.375	5.6	250–500	5
MS8002[1]	0.10	6	16.000	5.6	250–500	5
MS8003[1]	0.07	6	24.000	6.5	250–500	5
MS8004[1]	0.06	6	36.000	6.5	250–500	5

[1] Suffix of the model number indicates the package style. Available in style 30, 34 and 79 and in chip form P00. e.g. MS8001-P00.
[2] C_J is specified at 1 MHz.
[3] Series resistance, R_S, is calculated by subtracting the barrier resistance $R_D = kT/qI$ from the measured total resistance R_T at 10 mA: $R_S = R_T - R_D$: k = Boltzmann Constant, T = diode temperature in degrees K, q = electronic charge, I = forward current.
[4] The quoted noise figure (NF) is a single side band NF measured at 6 dBm LO power in a single-ended mixer, and 10 dBm in a balanced mixer with a 30 MHz IF amplifier with 1.5 dB NF.
[5] The breakdown voltage, V_{BR}, is specified at a reverse current of 10 µA.

Device Reliability

The reliability of GaAs Schottky barrier diodes has been established through long-term operation and step-stress testing. A high-temperature refractory metallization structure, Ti-Pt- Au, eliminates potential problems arising from the penetration of metallization into the semiconductor during long-term use in the RF systems. Well established chip fabrication and manufacturing techniques further enhance device reliability by reducing the possibility of surface breakdown or chip damage in mounting.

Long-term operation and step stress tests have indicated that for a junction temperature of 200°C, MTTF will be greater than 1E6 hours.

Precautions for Handling Schottky Barrier Diodes

Microwave and millimeter wave Schottky barrier diodes have very small junction areas and are therefore extremely sensitive to accidental electrostatic discharge (ESD) and over voltage burnout. The first or most sensitive indication of excessive electrical stress or burnout is an increase in the reverse leakage current I_R of the diode. A large overload will cause the reverse breakdown voltage to decrease to a lower value, and also degrade the forward voltage characteristics of the diode. ESD is responsible for both catastrophic and latent failures of high-frequency Schottky barrier diodes.

Static electricity, or ESD, is more prevalent in dry climates such as experienced during the winter months, and may be generated on one's person or by the diode packaging material. Therefore, extreme care must be taken when handling these diodes.

Grounded dual wrist straps with continuous monitor, table-top ionizers and ESD bags/enclosures should be used when handling Schottky barrier diodes.

If auxiliary test equipment, such as an oscilloscope or a digital voltmeter, is to be connected and used for a monitoring diode operation, it should be connected electrically before the diode is installed if possible. If not, the ground side of the instrument must be connected first, or the diode may be damaged by the AC current flowing in the ground loop and through the diode.

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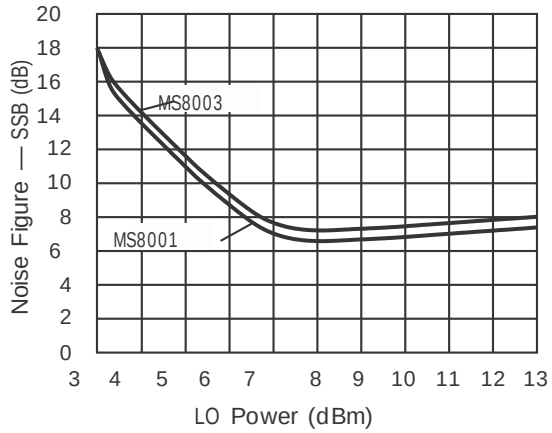
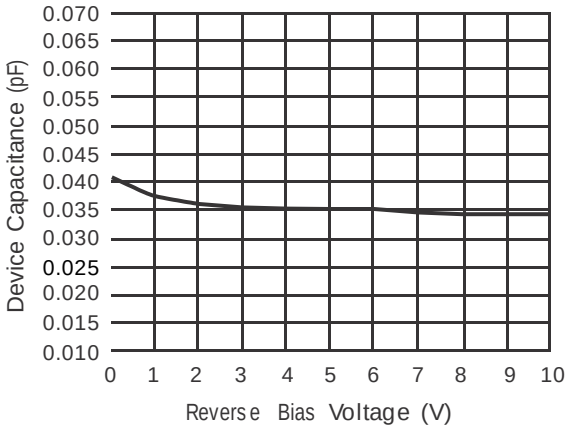
Typical Characteristics

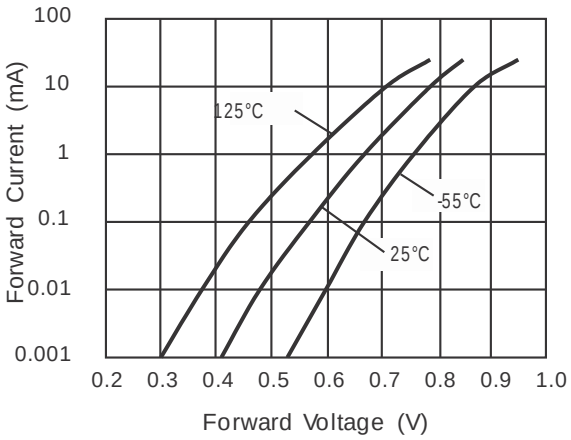


Noise Figure (dB) @ 24 GHz (Balanced Mixer)

The quoted noise figure (NF) is a single side band NF measured at LO power of 6 dBm for a single, and 10 dBm for a balanced mixer with a 30 MHz IF amplifier with a noise figure of 1.5 dB.



Junction Capacitance



I-V Characteristics for GaAs Schottky Diode

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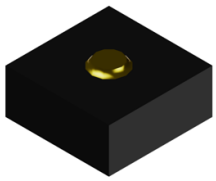
TYPICAL SCHOTTKY DIODE PACKAGE STYLES	
PACKAGE STYLE P00	PACKAGE STYLE 30
	
PACKAGE STYLE 34	PACKAGE STYLE 79
	
OTHER PACKAGE STYLES AVAILABLE – CONSULT FACTORY	

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