Schottky Diode
W Band

MADZ-011001-1278G0
Rev. V1

Features

- High Cutoff Frequency: 1.27 THz Typical
- Low Series Resistance
- Low Capacitance
- Silicon Nitride Passivation
- Polyimide Scratch Protection
- Designed for Easy Circuit Insertion

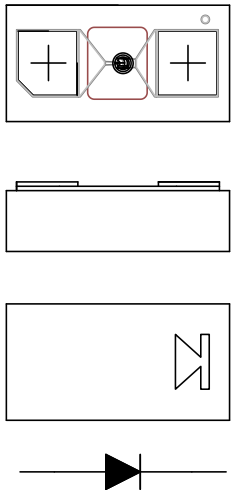
Applications

- Radar
- Communications
- Test and Measurement

Description

The MADZ-011001 is a terahertz cutoff frequency, gallium arsenide flip chip Schottky barrier diode. This diode is fabricated on a OMCVD epitaxial wafer using a process designed for high device uniformity and extremely low parasitics. This device is fully passivated with silicon nitride and has an additional layer of polyimide for scratch protection. The protective coatings prevent damage to the junction during automated or manual handling. The flip chip configuration is suitable for pick and place insertion.

The high cutoff frequency of this diode allows use through W band and higher frequencies. Typical applications include single and double balanced mixers in radar transceivers, communications transceivers, test and measurement equipment, etc.



Case Style ODS-1278

Ordering Information

Part Number	Package
MADZ-011001	DIE

Electrical Specifications @ +25°C

Parameters	Test Conditions	Units	Min.	Typ.	Max.
Junction Capacitance (C_J)	V_R = 0 V, f = 1 MHz	pF	—	0.010	—
Total Capacitance[1] (C_T)	V_R = 0 V, f = 1 MHz	pF	0.025	0.040	0.045
Series Resistance (R_S)	I_F = 10 mA	Ω	—	3.4	—
Forward Voltage (V_F1)	I_F = 1 mA	V	0.6	0.7	0.8
DC Slope Resistance[2] (R_D)	—	Ω	—	7	9
Reverse Breakdown Voltage (V_B)	I_R = 10 µA	V	4.5	7.0	—
Intrinsic Cutoff Frequency	—	THz	—	1.0	—
Extrinsic Cutoff Frequency	—	GHz	—	65	—
Single Sideband Noise Figure (NF)	—	dB	—	6.5	—

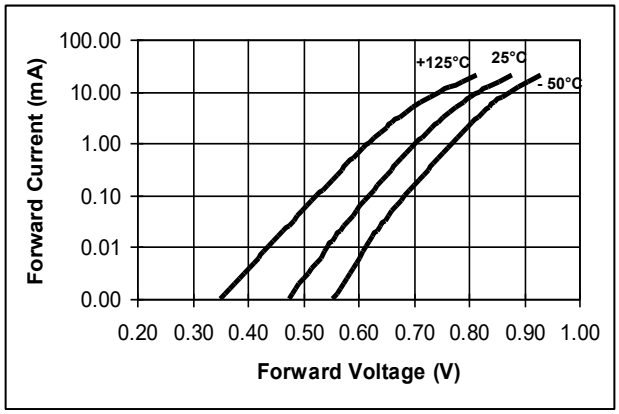
1. Total capacitance is equivalent to the sum of junction capacitance (C_J) and parasitic capacitance (C_P).

Absolute Maximum Ratings[2]

Parameter	Absolute Maximum
LO & RF Incident Power	20 dBm
Mounting Temperature	+235°C for 10 seconds
Operating Temperature	-65°C to +125°C
Storage Temperature	-65°C to +150°C

2. Operation of this device above any one of these parameters may cause permanent damage.

Forward Current vs. Temperature



Handling Procedures

Please observe the following precautions to avoid damage:

Static Sensitivity

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these Human Body Model (HBM) Class 0 devices.

Cleanliness:

The chips should be handled in a clean environment. Do not attempt to clean die after installation.

Static Sensitivity:

Schottky barrier diodes are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

General Handling:

The protective polymer coating on the active areas of these die provides scratch protection, particularly for the metal air bridge which contacts the anode. Die can be handled with tweezers or vacuum pickups and are suitable for use with automatic pick-and-place equipment.

Mounting Techniques

This device is designed to be inserted onto hard or soft substrates with the junction side down. It can be mounted with conductive epoxy or with a low temperature solder preform.

Solder Die Attach:

Solder which does not scavenge gold, such as Indalloy #2, is recommended. Sn-Pb based solders are not recommended due to solder embrittlement. Do not expose die to a temperature >235°C, or >200°C for longer than 10 seconds. No more than 3 seconds of scrubbing should be required for attachment.

Epoxy Die Attach:

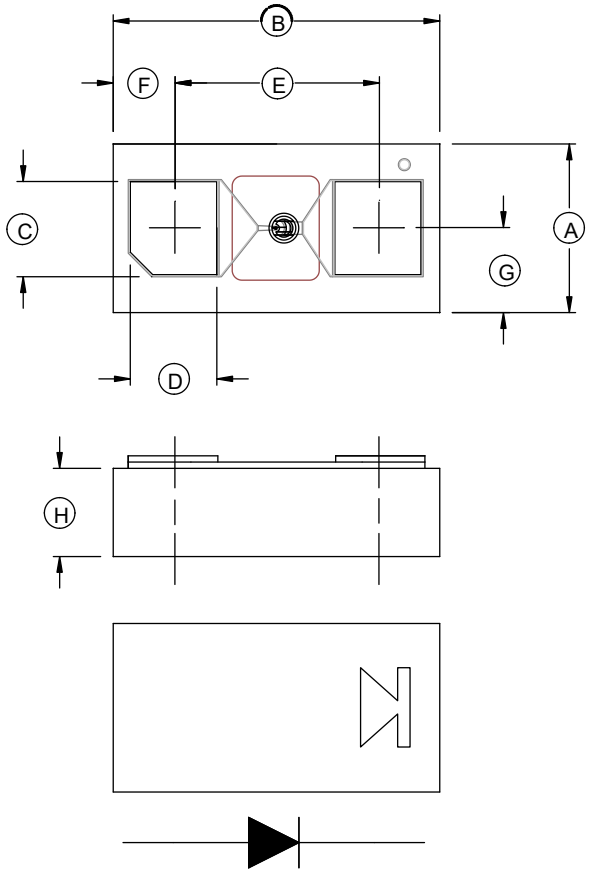
Assembly can be preheated to 125 - 150°C. Use a minimum amount of epoxy. Cure epoxy as per manufacturer's schedule. For extended cure times, temperatures should be kept below 200°C.

SPICE Parameters

Parameter	Area	Periphery	Is	N	Rs	Jsw	Ns
Value	1	1	3.9667e-15	1.12	3.38	6.23e-12	4.9989

Parameter	Rsw	Gleak	Bv	Ibv	Nbv	Ibvl	Nbvl
Value	3.38	1.12e-18	1.688	1.96e-11	18.32	2.59e-14	13.606

Outline Drawing (Case Style 1278)



Dim.	Inches		Mm	
	Min.	Max.	Min.	Max.
A	0.013	0.014	0.330	0.335
B	0.026	0.027	0.660	0.685
C	0.008	0.009	0.203	0.228
D	0.007	0.008	0.177	0.203
E	0.016	0.017	0.406	0.430
F	0.004	0.006	0.101	0.152
G	0.006	0.007	0.152	0.177
H	0.0075	0.0085	0.190	0.216