SURMOUNT™ Low Barrier Silicon Schottky Diode

MA4E2501L-1290
Rev. V5

Features

- Extremely Low Parasitic Capacitance & Inductance.
- Extremely Small 0201 (600 x 300 µm) Footprint
- Surface Mountable in Microwave Circuits. No Wire bonds Required.
- Rugged HMIC Construction with Polyimide Scratch Protection
- Reliable, Multilayer Metalization with a Diffusion Barrier, 100% Stabilization Bake (300°C, 16 hours)

Description

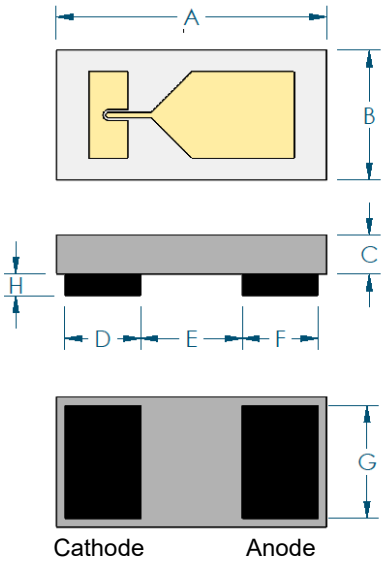
The MA4E2501L-1290 SURMOUNT™ Schottky diodes are silicon low barrier devices fabricated with the patented Heterolithic Microwave Integrated Circuit (HMIC) process. HMIC circuits consist of silicon pedestals which form diodes or via conductors embedded in a glass dielectric, which acts as the low dispersion, microstrip transmission medium. The combination of silicon and glass allows HMIC devices to have excellent loss and power dissipation characteristics in a low profile, reliable device.

The Schottky devices are excellent choices for circuits requiring the small parasitics of a beam lead device coupled with the superior mechanical performance of a chip. The SURMOUNT™ structure employs very low resistance silicon vias to connect the Schottky contacts to the metalized mounting pads on the bottom surface of the chip. These devices are reliable, repeatable, and a lower cost performance solution to conventional devices.

The multi-layer metalization employed in the fabrication of the SURMOUNT™ Schottky junctions includes a platinum diffusion barrier, which permits all devices to be subjected to a 16-hour non-operating stabilization bake at 300°C.

The extremely small “0201” outline allows for surface mount placement and multi-functional polarity orientations.

The MA4E2501L-1290 SURMOUNT™ low barrier Schottky diode is recommended for use in microwave circuits through Ku band frequencies for lower power applications such as mixers, sub-harmonic mixers, detectors and limiters.



Chip Dimensions

Dim.	In		mm	
	Min.	Max.	Min.	Max.
A	0.023	0.025	0.575	0.625
B	0.011	0.013	0.275	0.325
C	0.004	0.008	0.102	0.203
D	0.006	0.008	0.150	0.200
E	0.007	0.009	0.175	0.225
F	0.006	0.008	0.150	0.200
G	0.009	0.011	0.220	0.270
H	0.000009	0.000011	0.000228	0.000279

Ordering Information

Part Number	Package
MA4E2501L-1290	100 die in carrier

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

Electrical Specifications: +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Total Capacitance (C_T)	0 V, 1 MHz	pF	—	0.10	0.12
Dynamic Resistance (R_D)	9.5 - 10.5 mA	Ω	—	10	14
Forward Voltage (V_F)	1 mA	V	—	0.30	0.33
Reverse Breakdown Voltage (V_B)	-10 mA	V	3	5	—

Absolute Maximum Ratings[1,2]

Parameter	Absolute Maximum
Forward Current	20 mA
Reverse Voltage	5 V
RF CW Incident Power	20 dBm
RF & DC Dissipated Power	50 mW
Operating & Storage Temperature	-40°C to +150°C

1. Exceeding any one or combination of these limits may cause permanent damage to this device.
2. MACOM does not recommend sustained operation near these survivability limits.

Handling Procedures

The following precautions should be observed to avoid damaging these chips:

Cleanliness:

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

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 HBM Class 0 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. The use of plastic tipped tweezers or vacuum pickups is strongly recommended. These die are also suitable for automatic pick and place equipment.

Die Bonding

Die attach for these devices is made simple through the use of surface mount die attach technology. Mounting pads are conveniently located on the bottom surface of these devices, and are opposite the active junction. The devices are well suited for high temperature solder attachment onto hard substrates. Solders 80Au/20Sn and Sn63/Pb37 are acceptable for usage. Die attach with electrically conductive silver epoxy is not recommended.

For hard substrates, we recommend using a vacuum tip and a force of 60 to100 grams applied uniformly to the top surface of the device using a hot gas bonder with equal heat applied across the bottom mounting pads of the device.

For soft substrates, it is recommended to use a lead-tin interface at the circuit board mounting pads. Position the die so that its mounting pads are aligned with the circuit board mounting pads. Reflow the paste by applying equal heat to the circuit at both die mounting pads. The solder joint must not be made one at a time creating unequal heat flow and thermal stress. Solder reflow should not be performed by causing heat to flow through the top surface of the die. Since the HMIC glass is transparent, the edges of the mounting pads can be visually inspected through the die after die attach is completed.

Reference MACOM application note M538 which can be found on MACOM.com for additional surface mounting information.