Features

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

Description

M/A-COM's MA4E1310 is a 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.

Applications

The high cutoff frequency of this diode allows use through millimeter wave frequencies. Typical applications include single and double balanced mixers in PCN transceivers and radios, police radar detectors, automotive radar detectors, etc. This device can be used through 110 GHz.
## Electrical Specifications @ + 25 °C

<table>
<thead>
<tr>
<th>Parameters and Test Conditions</th>
<th>Symbol</th>
<th>Units</th>
<th>MA4E1310</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min.</td>
<td>Typ.</td>
</tr>
<tr>
<td>Junction Capacitance at 0V at 1 MHz</td>
<td>Cj</td>
<td>pF</td>
<td>.010</td>
</tr>
<tr>
<td>Total Capacitance at 0V at 1 MHz(^1)</td>
<td>Ct</td>
<td>pF</td>
<td>.025</td>
</tr>
<tr>
<td>Slope Resistance (^2)</td>
<td>Rd</td>
<td>Ohms</td>
<td>7</td>
</tr>
<tr>
<td>Forward Voltage at 1mA</td>
<td>Vf1</td>
<td>Volts</td>
<td>.60</td>
</tr>
<tr>
<td>Reverse Breakdown Voltage at @ 10uA</td>
<td>Vbr</td>
<td>Volts</td>
<td>4.5</td>
</tr>
<tr>
<td>SSB Noise Figure (Estimated)</td>
<td>NF</td>
<td>dB</td>
<td>6.5</td>
</tr>
</tbody>
</table>

### Notes:
1. Total capacitance is equivalent to the sum of junction capacitance Cj and parasitic capacitance Cp.
2. Slope Resistance = (Vf1 - Vf2) / (10.5mA - 9.5mA)
GaAs Flip Chip Schottky Barrier Diode

**Forward Current vs Temperature**

![Graph showing forward current vs temperature at different temperatures](image)

**Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>-65 °C to +125 °C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-65 °C to +150 °C</td>
</tr>
<tr>
<td>Incident LO Power</td>
<td>+20 dBm</td>
</tr>
<tr>
<td>Incident RF Power</td>
<td>+20 dBm</td>
</tr>
<tr>
<td>Mounting Temperature</td>
<td>+235°C for 10 seconds</td>
</tr>
<tr>
<td>Electrostatic Discharge (ESD) Classification</td>
<td>Class 0</td>
</tr>
</tbody>
</table>

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Human Body Model

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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:** 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 greater than 235°C, or greater than 200°C for longer than 10 seconds. No more than three 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.
Flip Chip Outline Drawing

<table>
<thead>
<tr>
<th>DIM.</th>
<th>INCHES MIN.</th>
<th>INCHES MAX.</th>
<th>MILLIMETERS MIN.</th>
<th>MILLIMETERS MAX.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0.013</td>
<td>0.014</td>
<td>0.330</td>
<td>0.335</td>
</tr>
<tr>
<td>B</td>
<td>0.026</td>
<td>0.027</td>
<td>0.660</td>
<td>0.685</td>
</tr>
<tr>
<td>C</td>
<td>0.008</td>
<td>0.009</td>
<td>0.203</td>
<td>0.228</td>
</tr>
<tr>
<td>D</td>
<td>0.007</td>
<td>0.008</td>
<td>0.177</td>
<td>0.203</td>
</tr>
<tr>
<td>E</td>
<td>0.016</td>
<td>0.017</td>
<td>0.406</td>
<td>0.430</td>
</tr>
<tr>
<td>F</td>
<td>0.004</td>
<td>0.006</td>
<td>0.101</td>
<td>0.152</td>
</tr>
<tr>
<td>G</td>
<td>0.006</td>
<td>0.007</td>
<td>0.152</td>
<td>0.177</td>
</tr>
<tr>
<td>H</td>
<td>0.0075</td>
<td>0.0085</td>
<td>0.190</td>
<td>0.216</td>
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</tbody>
</table>
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