MA4AGBL912

AlGaAs Beamlead PIN Diode

Features
- Low Series Resistance
- Low Capacitance
- 5 Nanosecond Switching Speed
- Can be Driven by a Buffered +5V TTL
- Silicon Nitride Passivation
- Polyimide Scratch Protection
- RoHS Compliant

Description
M/A-COM Technology Solutions MA4AGBLP912 is an Aluminum-Gallium-Arsenide anode enhanced, beam lead PIN diode. AlGaAs anodes, which utilize M/A-COM Tech’s patented hetero-junction technology, produce less diode “On” resistance than conventional GaAs or silicon devices. This device is fabricated in a OMCVD system using a process optimized for high device uniformity and extremely low parasitics. The result is a diode with low series resistance, 4Ω, low capacitance, 28fF, and an extremely fast switching speed of 5nS. It is fully passivated with silicon nitride and has an additional polymer coating for scratch protection. The protective coating prevents damage to the junction and the anode air bridges during handling and assembly.

Applications
The ultra low capacitance of the MA4AGBLP912 device makes it ideally suited for use up to 40GHz when used in a shunt configuration. The low RC product and low profile of the beamlead PIN diode allows for use in microwave switch designs, where low insertion loss and high isolation are required. The operating bias conditions of +10mA for the low loss state, and 0V, for the isolation state permits the use of a simple +5V TTL gate driver. AlGaAs, beamlead diodes, can be used in switching arrays on radar systems, high speed ECM circuits, optical switching networks, instrumentation, and other wideband multi-throw switch assemblies.

Absolute Maximum Ratings @ T_{AMB} = 25°C (unless otherwise specified)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Absolute Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse Voltage</td>
<td>-50V</td>
</tr>
<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>Junction Temperature</td>
<td>+175°C</td>
</tr>
<tr>
<td>Forward DC Current</td>
<td>40mA</td>
</tr>
<tr>
<td>C.W. Incident Power</td>
<td>+23dBm</td>
</tr>
<tr>
<td>Mounting Temperature</td>
<td>+235°C for 10 seconds</td>
</tr>
</tbody>
</table>
### Electrical Specifications at $T_{\text{AMB}} = 25^\circ\text{C}$

<table>
<thead>
<tr>
<th>Test Conditions</th>
<th>Parameters</th>
<th>Units</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Capacitance @ –5V/1 MHz</td>
<td>$C_t$</td>
<td>fF</td>
<td>–</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Forward Resistance @ +20mA/1 GHz</td>
<td>$R_s$</td>
<td>Ohms</td>
<td>–</td>
<td>4</td>
<td>4.9</td>
</tr>
<tr>
<td>Forward Voltage at +10mA</td>
<td>$V_f$</td>
<td>Volts</td>
<td>1.2</td>
<td>1.36</td>
<td>1.5</td>
</tr>
<tr>
<td>Leakage Current at –40 V</td>
<td>$I_r$</td>
<td>nA</td>
<td>–</td>
<td>50</td>
<td>300</td>
</tr>
<tr>
<td>Minority Carrier Lifetime</td>
<td>$T_L$</td>
<td>nS</td>
<td>–</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

### Dimensions

- **A**: 0.009 to 0.013 inches (0.2286 to 0.3302 mm)
- **B**: 0.0089 to 0.009 inches (0.2261 mm)
- **C**: 0.037 to 0.057 inches (0.940 to 1.448 mm)
- **D**: 0.0049 to 0.006 inches (0.1245 to 0.1524 mm)
- **E**: 0.0218 to 0.0278 inches (0.5537 to 0.70612 mm)
- **F**: 0.0218 to 0.0278 inches (0.5537 to 0.70612 mm)

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For further information and support please visit [https://www.macom.com/support](https://www.macom.com/support)
MA4AGBLP912 SPICE Model

\[ I_s = 1.0 \times 10^{-14} \text{ A} \]
\[ V_i = 0.0 \text{ V} \quad \text{wBv} = 50 \text{ V} \]
\[ \mu_e = 8600 \text{ cm}^2/\text{V-sec} \quad \text{wPmax} = 100 \text{ mW} \]
\[ W_i = 3.0 \text{ um} \quad F_{fe} = 1.0 \]
\[ R_r = 10 \text{ K Ohms} \]
\[ C_{jmin} = 0.020 \text{ pF} \]
\[ \text{Tau} = 10 \text{ nsec} \]
\[ R_s(l) = R_c + R_j(l) = 0.10 \text{ Ohm} + R_j(l) \]
\[ C_j = 0.022 \text{ pF} \]
\[ V_j = 1.35 \text{ V} \]
\[ M = 0.5 \]
\[ F_c = 0.5 \]
\[ I_{max} = 0.04 \text{ A} \]
\[ K_f = 0.0 \]
\[ A_f = 1.0 \]
Handling and Assembly Procedures

The following precautions should be observed to avoid damaging these devices.

Cleanliness
These devices should be handled in a clean environment.

Static Sensitivity
Aluminum Gallium Arsenide PIN diodes are Class 0, HBM, ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices.

General Handling
These devices have a polymer layer which provides scratch protection for the junction area and the anode air bridge. Beam lead devices must, however, be handled with extreme care since the leads may easily be distorted or broken by the normal pressures exerted when handled with tweezers. A vacuum pencil with a #27 tip is recommended for picking and placing.

Attachment
These devices were designed to be inserted onto hard or soft substrates. Recommended methods of attachment include thermo-compression bonding, parallel-gap welding and electrically conductive silver epoxy.

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Packaging</th>
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</thead>
<tbody>
<tr>
<td>MA4AGBLP912</td>
<td>Gel Pak</td>
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