

# MA4AGBLP912

## AlGaAs Beamlead PIN Diode

V3

### Features

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

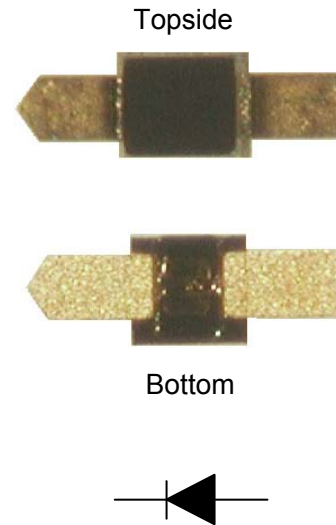
### Description

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 patent pending hetero-junction technology, produce less diode "On" resistance than a conventional GaAs device. This device is fabricated on a OMCVD epitaxial wafer using a process optimized for high device uniformity and extremely low parasitics. The diode exhibits 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 layer 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 through W-band. The low RC product and low profile of the beamlead PIN diode allows for use in microwave and millimeter wave 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.

### MA4AGBLP912

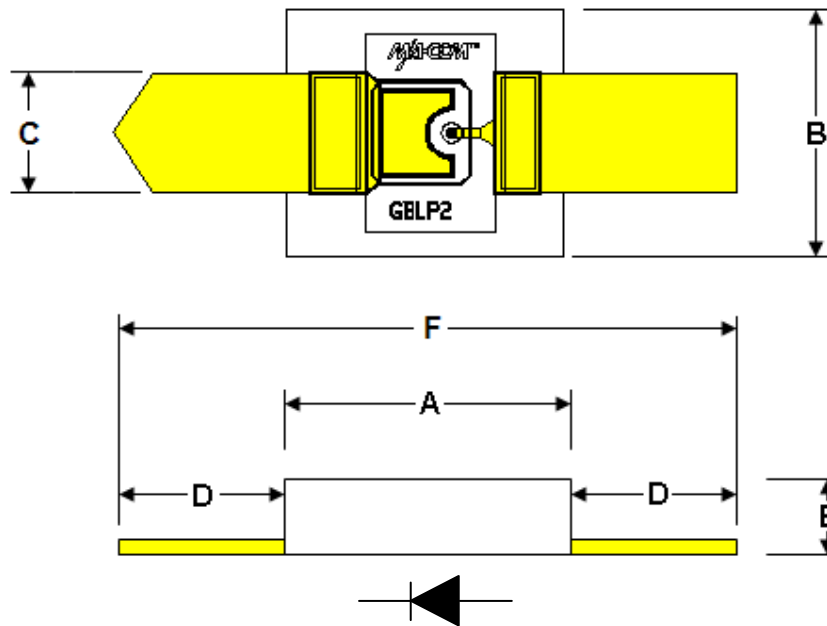


### Absolute Maximum Ratings @ T<sub>AMB</sub> = 25°C (unless otherwise specified)

| Parameter             | Absolute Maximum      |
|-----------------------|-----------------------|
| Reverse Voltage       | -50V                  |
| Operating Temperature | -65°C to +125°C       |
| Storage Temperature   | -65°C to +150°C       |
| Junction Temperature  | +175°C                |
| Forward DC Current    | 40mA                  |
| C.W. Incident Power   | +23dBm                |
| Mounting Temperature  | +235°C for 10 seconds |

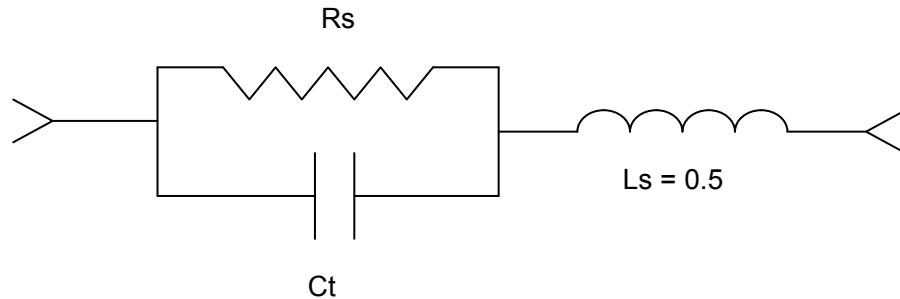
### Electrical Specifications at $T_{AMB} = 25^{\circ}C$

| Test Conditions                  | Parameters | Units | Min | Typical | Max. |
|----------------------------------|------------|-------|-----|---------|------|
| Total Capacitance @ -5V/1 MHz    | Ct         | fF    | -   | 26      | 30   |
| Forward Resistance @ +20mA/1 GHz | Rs         | Ohms  | -   | 4       | 4.9  |
| Forward Voltage at +10mA         | Vf         | Volts | 1.2 | 1.36    | 1.5  |
| Leakage Current at -40 V         | Ir         | nA    | -   | 50      | 300  |
| Minority Carrier Lifetime        | TL         | nS    | -   | 5       | 10   |



| DIM | INCHES |        | MM     |         |
|-----|--------|--------|--------|---------|
|     | MIN.   | MAX.   | MIN.   | MAX.    |
| A   | 0.009  | 0.013  | 0.2286 | 0.3302  |
| B   | 0.0049 | 0.0089 | 0.1245 | 0.2261  |
| C   | 0.0037 | 0.0057 | 0.0940 | 0.1448  |
| D   | 0.0049 | 0.0089 | 0.1245 | 0.2261  |
| E   | 0.002  | 0.006  | 0.0508 | 0.1524  |
| F   | 0.0218 | 0.0278 | 0.5537 | 0.70612 |

### Diode Model



### MA4AGBLP912 SPICE Model

$I_s = 1.0E-14$  A  
 $V_i = 0.0$  V                       $wBv = 50$  V  
 $\mu_e = 8600$  cm<sup>2</sup>/V-sec       $wPmax = 100$  mW  
 $W_i = 3.0$   $\mu$ m                       $Ffe = 1.0$   
 $R_r = 10$  K Ohms  
 $C_{jmin} = 0.020$  pF  
 $\tau = 10$  nsec  
 $R_s(I) = R_c + R_j(I) = 0.10$  Ohm +  $R_j(I)$   
 $C_{j0} = 0.022$  pF  
 $V_j = 1.35$  V  
 $M = 0.5$   
 $F_c = 0.5$   
 $I_{max} = 0.04$  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 1 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

| Part Number | Packaging |
|-------------|-----------|
| MA4AGBLP912 | Gel Pak   |