

Features

- ◆ Low Series Resistance
- ◆ Ultra Low Capacitance
- ◆ Millimeter Wave Switching & Cutoff Frequency
- ◆ 2 Nanosecond Switching Speed
- ◆ Can be Driven by a Buffered TTL
- ◆ Silicon Nitride Passivation
- ◆ Polyimide Scratch Protection
- ◆ RoHS Compliant
- ◆ Solderable Bump Die Attach

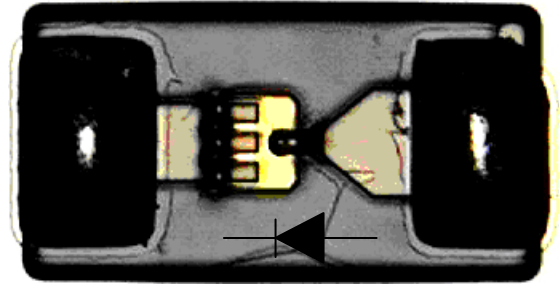
Description

M/A-COM's MA4AGSBP907 is an aluminum gallium arsenide flip-chip PIN diode with solder bumps. These devices are fabricated on OMCVD epitaxial wafers using a process designed for high device uniformity and extremely low parasitics. The diodes exhibit an extremely low RC product, 0.1ps and 2nS switching characteristics. The useable frequency range is 100MHz to 40GHz. They are fully passivated with silicon nitride and have an additional layer of a polymer for scratch protection. The protective coating prevents damage to the junction and the anode airbridge during handling and circuit attachment.

Applications

The 25fF capacitance of the MA4AGSBP907 allows usage through millimeter frequencies for RF switches and switched phase shifter applications. This diode is designed for use in pulsed or CW applications, where single digit nanosecond switching speed is required. For surface mount assembly, the low capacitance of the MA4AGSBP907 makes it ideal for use in microwave multi-throw switch assemblies, where the series capacitance of each "off" port adversely loads the input and affects VSWR.

Mounting Side with Solder Bumps



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

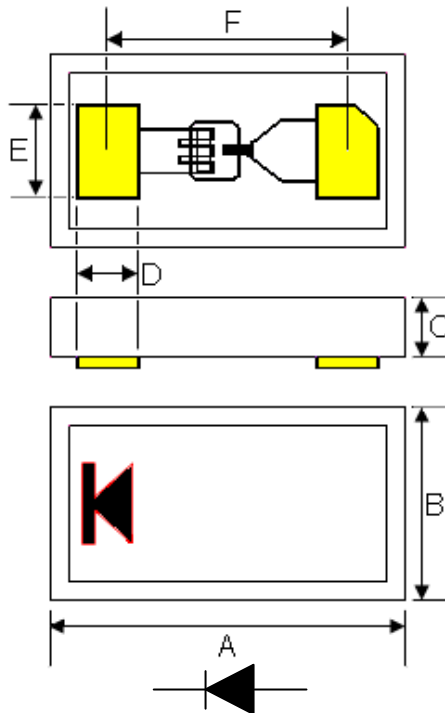
Parameter	Absolute Maximum
Reverse Voltage	-50V
Operating Temperature	-55°C to +125°C
Storage Temperature	-55°C to +150°C
Junction Temperature	+175°C
Dissipated Power (RF & DC)	50mW
C.W. Incident Power	+23 dBm
Mounting Temperature	+280°C for 10 seconds

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

Parameters and Test Conditions	Symbol	Units	1MHz & DC Specs.		10GHz Reference Data
			Typ.	Max.	Typ.
Total Capacitance at -10V	C_t	pF	0.025	0.030	0.025 ¹
Series Resistance at +10mA	R_s	Ω	5.2	7.0	4.2 ²
Forward Voltage at +10mA	V_F	Volts	1.33	1.45	—
Reverse Breakdown Voltage at $10\mu A^3$	V_B	Volts	45	50	—
Switching Speed 10 to 90% RF Voltage ⁴ 90 to 10% RF Voltage ⁴	T_{RISE} T_{FALL}	nS	—	—	2

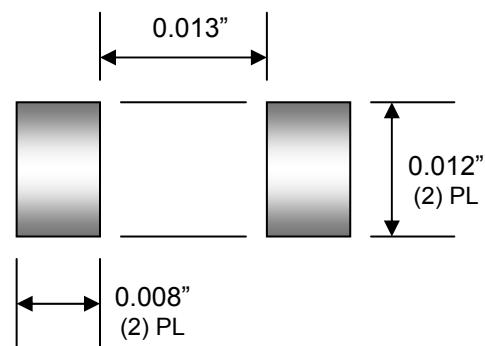
Notes:

1. Capacitance is determined by measuring single series diode isolation in a 50 Ω line at 10GHz.
2. Forward series resistance is determined by measuring single series diode insertion loss in a 50 Ω line at 10GHz.
3. Reverse current will not exceed 10 μA at the maximum voltage rating.
4. Switching speed is measured between 10% to 90% or 90% to 10% RF voltage for a single series mounted diode. driver delay is not included.



DIM	INCHES		MM	
	MIN.	MAX.	MIN.	MAX.
A	0.026	0.027	0.6604	0.6858
B	0.0135	0.0145	0.3429	0.3683
C	0.0065	0.0075	0.1651	0.1905
D	0.0043	0.0053	0.1092	0.1346
E	0.0068	0.0073	0.1727	0.1854
F	0.0182	0.0192	0.4623	0.4877

Circuit Pad Layout



Note:

1. Yellow areas indicate solder bumps.

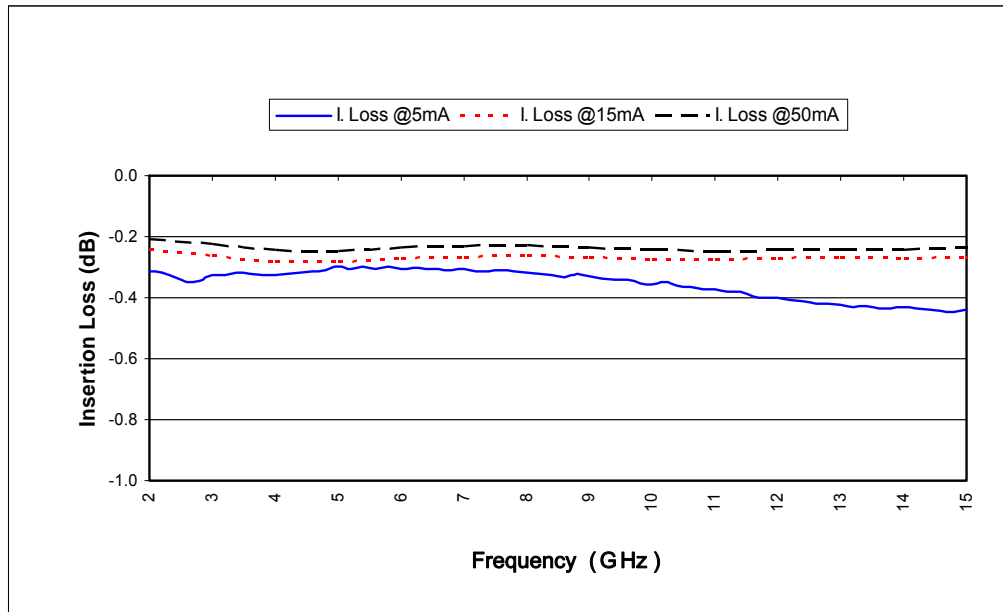
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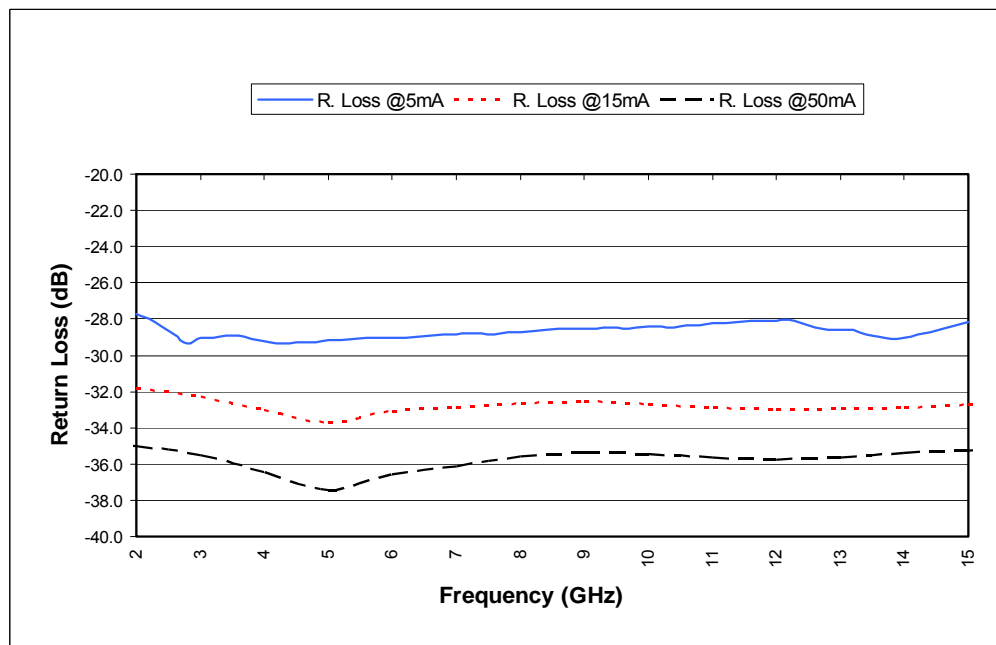
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Single Series Diode Insertion Loss vs. Frequency



Single Series Diode Return Loss vs. Frequency



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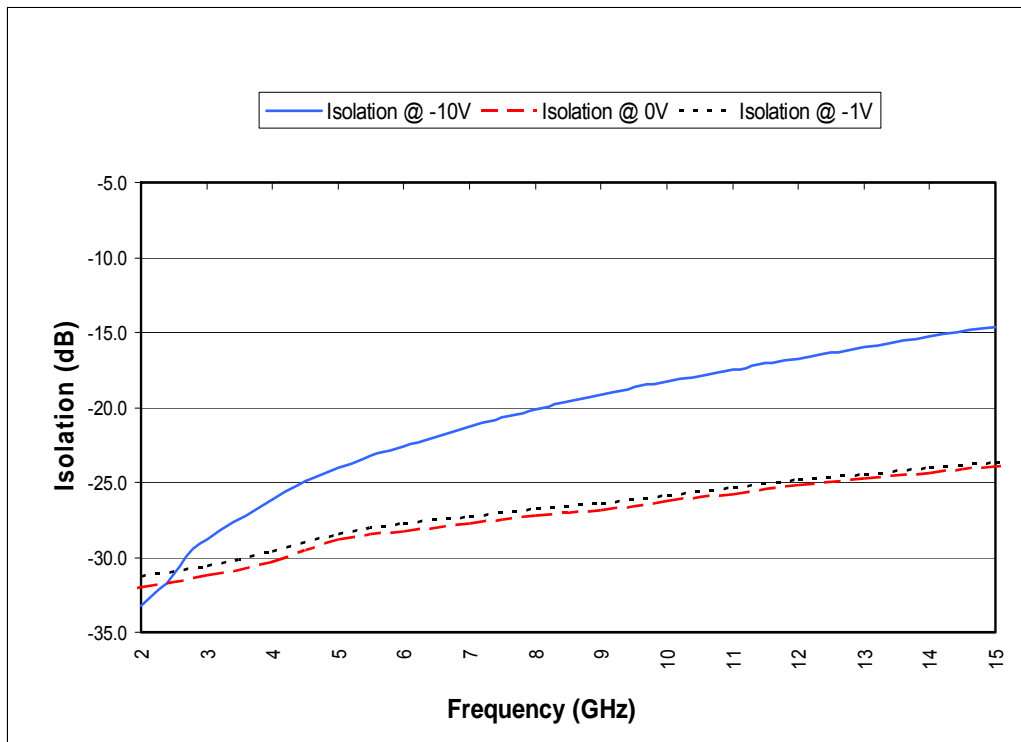
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Electrical Specifications @ $T_A = 25^\circ\text{C}$ (unless otherwise noted)

Single Series Diode Isolation vs. Frequency



Device Installation Guidelines

The following guidelines should be observed to avoid damaging the AlGaAs flip-chips.

Cleanliness

These devices should be handled in a clean environment.

Static Sensitivity

Aluminum gallium arsenide PIN diodes are ESD sensitive and can be damaged by static electricity. Proper ESD techniques should be used when handling these devices. These devices are rated Class 0, (0-199V) per HBM MIL-STD-883, method 3015.7 [C = 100pF±10%, R = 1.5kW±1%]. Even though tested die pass 50V ESD, they must be handled in a static-free environment.

General Handling

These devices have a polymer layer which provides scratch protection for the junction area and the anode air bridge. Die can be handled with plastic tweezers or picked and placed automatically with a #27 tip vacuum pencil.

Assembly Requirements using Tin / Lead Solder

The flip chip diode employs a 6µm thick, Sn/Pb, 63/37 solderable interface as part of the 50µm high solder bump. These chips are designed to be soldered onto hard or soft substrates with the junction side down. They should be mounted onto silkscreened circuits using 63/37 Sn/Pb solder paste. A typical profile for a Sn/Pb 63/37 soldering process is provided in on the M/A-COM website at this address: <http://www.macom.com/Application%20Notes/pdf/M538.pdf>.

Ordering Information

Part Number	Packaging
MA4AGSBP907	Die in Carrier