MA4GP907

GaAs Flip Chip PIN

Rev. V6

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

Description

M/A-COM Technology Solutions MA4GP907 is a Gallium Arsenide (GaAs) flip-chip PIN diode. It is fabricated using an OMCVD epitaxial wafer and a process optimized for high device uniformity and extremely low parasitics. The diode exhibits an extremely low RC product, (0.1ps) and 2-3nS switching characteristics. They are fully passivated with silicon nitride and have an added polymer layer for scratch protection. The protective coating prevents damage to the junction and the anode air-bridge during handling and assembly.

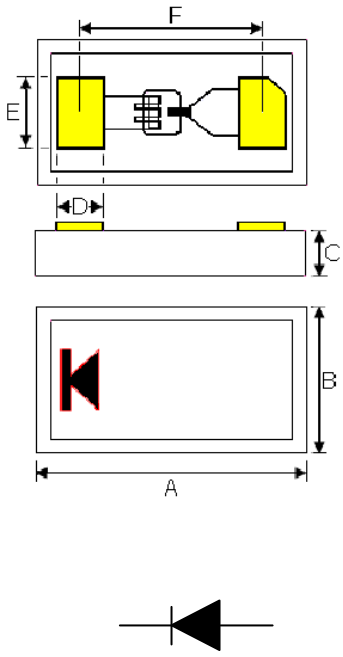
Applications

The ultra low capacitance of the MA4GP907 allows for operation up to millimeter frequencies for RF switches and switched phase shifter applications. The diode is designed for use in pulsed or CW applications, where single digit nS switching speed is required. The low capacitance of the MA4GP907 makes it for use in microwave multi-throw switch assemblies, where the series capacitance of each “off” port adversely loads the input and affects VSWR.

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)	250mW
C.W. Incident Power	+23 dBm
Mounting Temperature	+280°C for 10 seconds

Chip Dimensions



Notes:

1. Gold Pads 14µM thick.
2. Yellow areas indicate ohmic gold mounting pads.

DIM	Inches		Millimeters	
	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

- **North America** Tel: 800.366.2266 / Fax: 978.366.2266
- **Europe** Tel: 44.1908.574.200 / Fax: 44.1908.574.300
- **Asia/Pacific** Tel: 81.44.844.8296 / Fax: 81.44.844.8298
Visit www.macom.com for additional data sheets and product information.

Electrical Specifications @ T_{AMB} = +25°C

Parameter	Symbol	Conditions	Units	Typ.	Max.
Total Capacitance	C_T	-10V,1MHz	pF	0.025	0.030
Total Capacitance [1]	C_T	-10V,10GHz	pF	0.025	——
Series Resistance	R_S	+10mA, 1MHz	Ω	5.2	7.0
Series Resistance [2]	R_S	+10mA, 10GHz	Ω	4.2	——
Forward Voltage	V_F	+10mA	V	1.33	1.45
Reverse Voltage Current [3]	I_R	V_R = -50V	µA	——	10
Switching Speed [4]	T_{RISE} T_{FALL}	10GHz	nS	2	——

Notes:

1) Capacitance is determined by measuring the isolation of a single series diode in a 50Ω transmission line at 10GHz.
2) Series resistance is determined by measuring the insertion loss of a single series diode in a 50Ω transmission line at 10GHz.
3) The max rated V_R(Reverse Voltage) is sourced and the resultant reverse leakage current, Ir, is measured to be <10µA
4) Switching speed is measured between 10% and 90% or 90% to 10% RF voltage for a single series mounted diode. Driver delay is not included.

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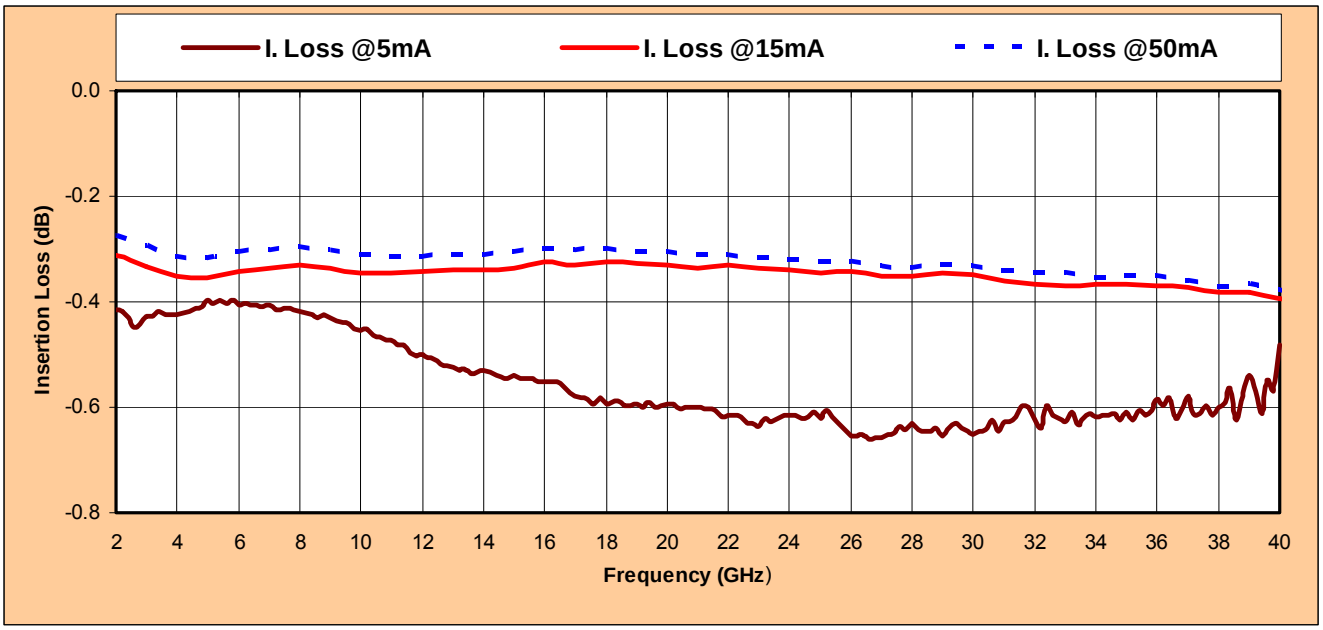
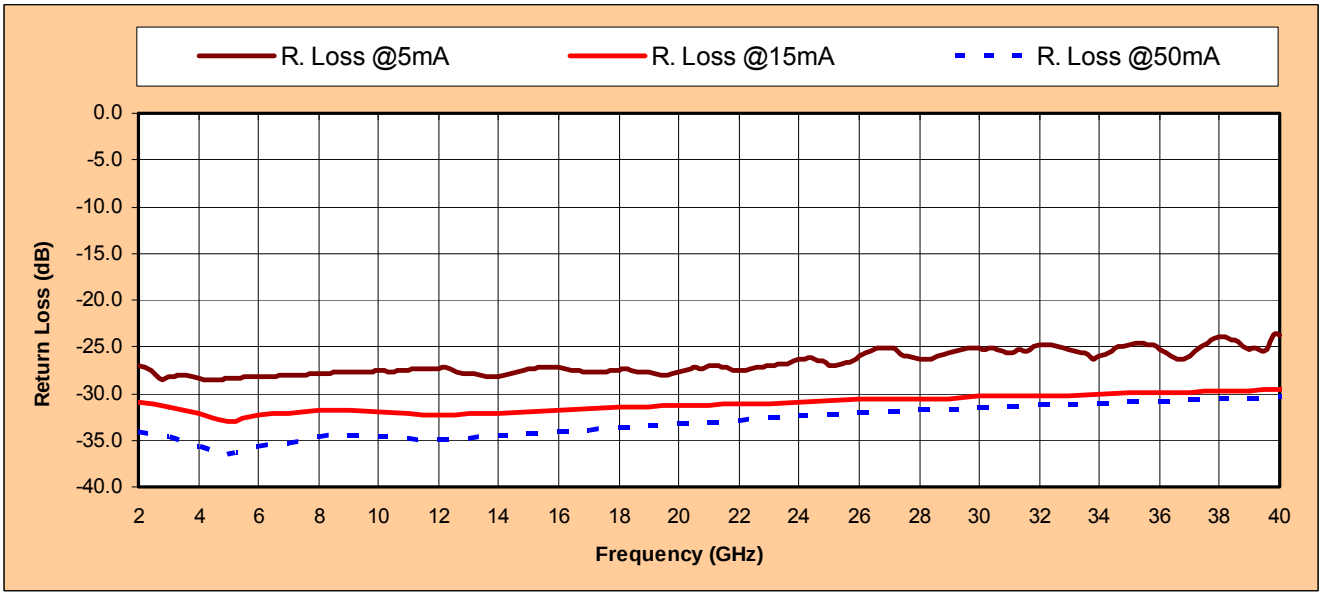
Typical RF Performance @ T_{AMB} = +25°C

Insertion Loss vs. Frequency

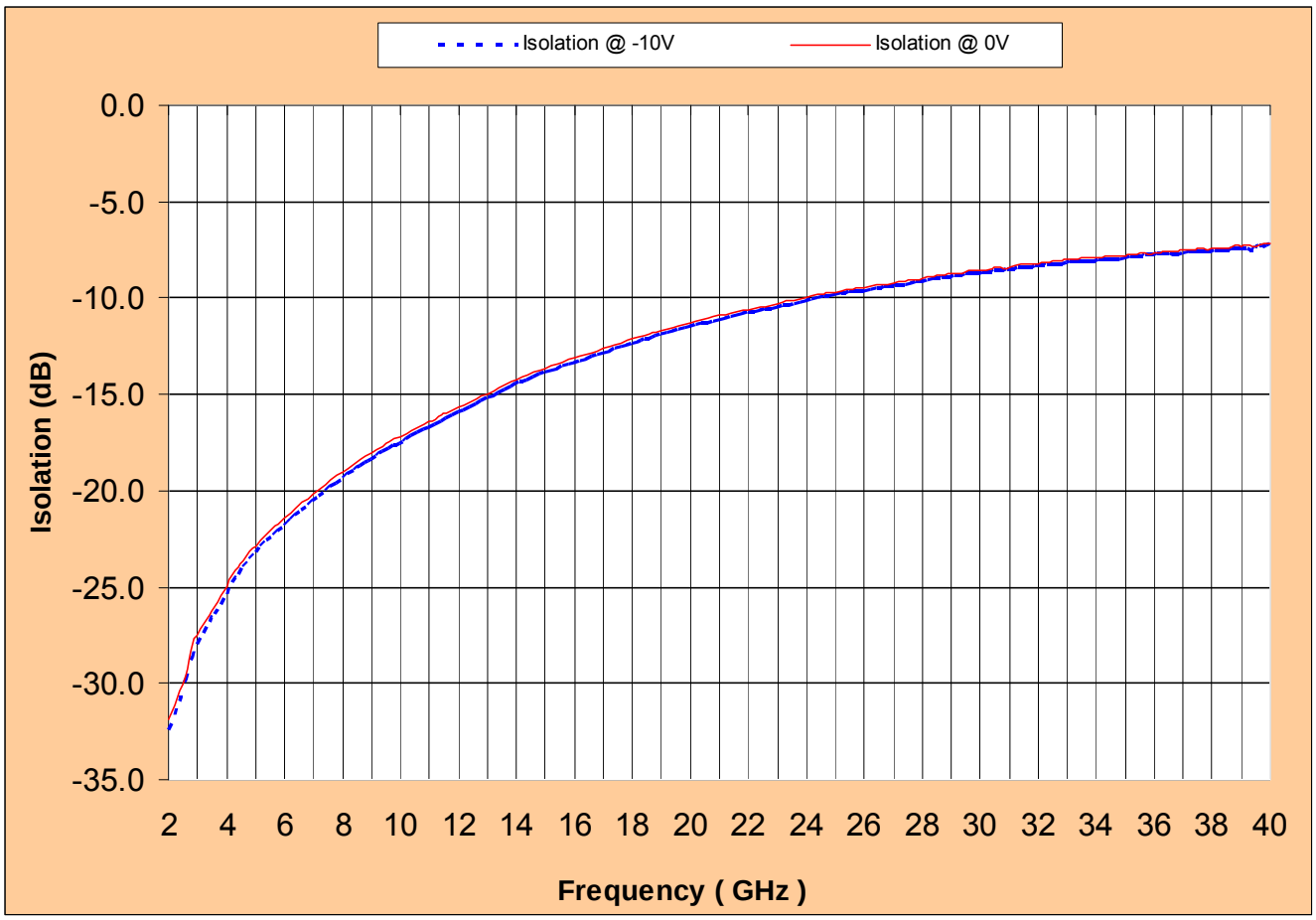


Return Loss vs. Frequency



Typical RF Performance @ T_{AMB} = +25°C

Isolation vs. Frequency



Device Installation Guidelines

Cleanliness

This device should be handled in a clean environment. The chip is resistant to solvents and may cleaned using approved industry standard practices and chemicals.

Static Sensitivity

Gallium Arsenide PIN diodes are ESD sensitive and can be damaged by static electricity. Proper ESD handling techniques should be used. These devices are rated Class 0, (0-199V)per HBM MIL-STD-883, method 3015.7 should be handled in a static-free environment.

General Handling

The die has 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 with a #27 tip vacuum pencil.

Assembly Requirements using Electrically Conductive Silver Epoxy and Solder

The MA4GP907 is designed to be inserted onto hard or soft substrates with the junction/pad side down. It may be mounted onto a silk-screened circuit using electrically conductive silver epoxy, approximately 1-2 mils in thickness and cured at approximately 90°C to 150°C per manufacturer's schedule. For extended cure times, > 30 minutes, temperatures must be kept below 200°C.

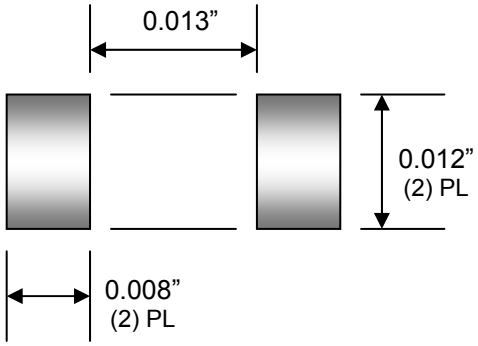
Eutectic Die Attached

Tin rich solders (>30% Sn by weight) are not recommended as they will scavenge gold from the contact pads exposing the tungsten metallization beneath and creating a poor solder connection. Indalloy or 80Au/20Sn type solders are acceptable. Maximum soldering temperature must be kept below 280°C for less than 10 seconds.

Ordering Information

Part Number	Packaging
MA4GP907	Waffle Pack
MADP-000907-13050P	Pocket Tape

Circuit Pad Layout



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