

# MA4AGP907 MA4AGFCP910



## AlGaAs Flip Chip PIN Diodes

V4

### 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 MA4AGP907 and MA4AGFCP910 are Aluminum Gallium Arsenide (AlGaAs) flip-chip PIN diodes. These devices are fabricated on OMCVD epitaxial wafers using a process optimized for high device uniformity and exceptionally low parasitics. The end result is a diode with 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.

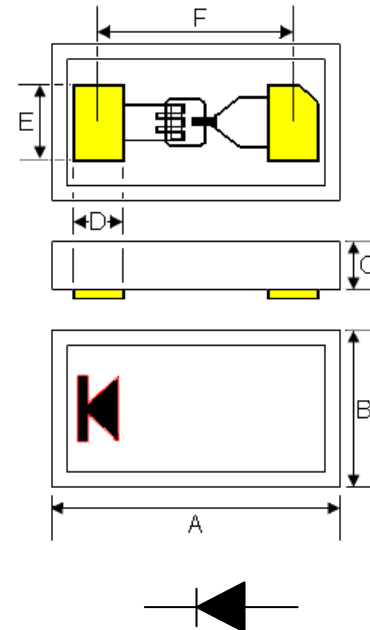
### Applications

The ultra low capacitance of the MA4AGP907 and MA4AGFCP910 make them ideal for RF switch and phase shifter applications through millimeter wave frequencies. The diodes are designed for use in pulsed or CW applications, where single digit nS switching speed is required. The low capacitance of these diodes make them ideal 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 $T_{AMB} = +25^{\circ}C$ (unless otherwise specified)

Parameter	Absolute Maximum
Reverse Voltage	MA4AGP907 -50V
	MA4AGFCP910 -75V
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

### Chip Dimensions MA4AGP907 and MA4AGFCP910



### Notes:

1. Gold Pads 14μM thick.
2. Yellow areas indicate ohmic gold mounting pads.
3. Dimensions A thru F are identical for both devices

DIM	INCHES		MM	
	MIN.	MAX.	MIN.	MAX.
A	0.0260	0.0270	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

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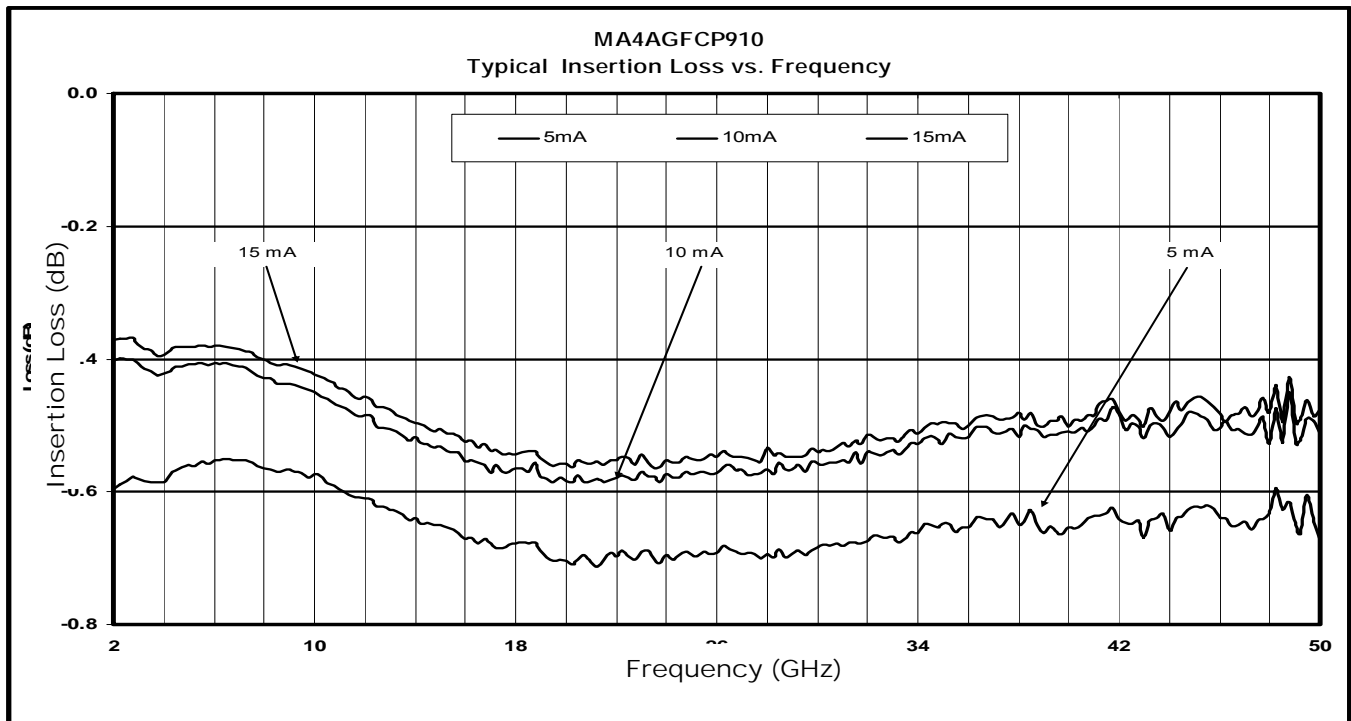
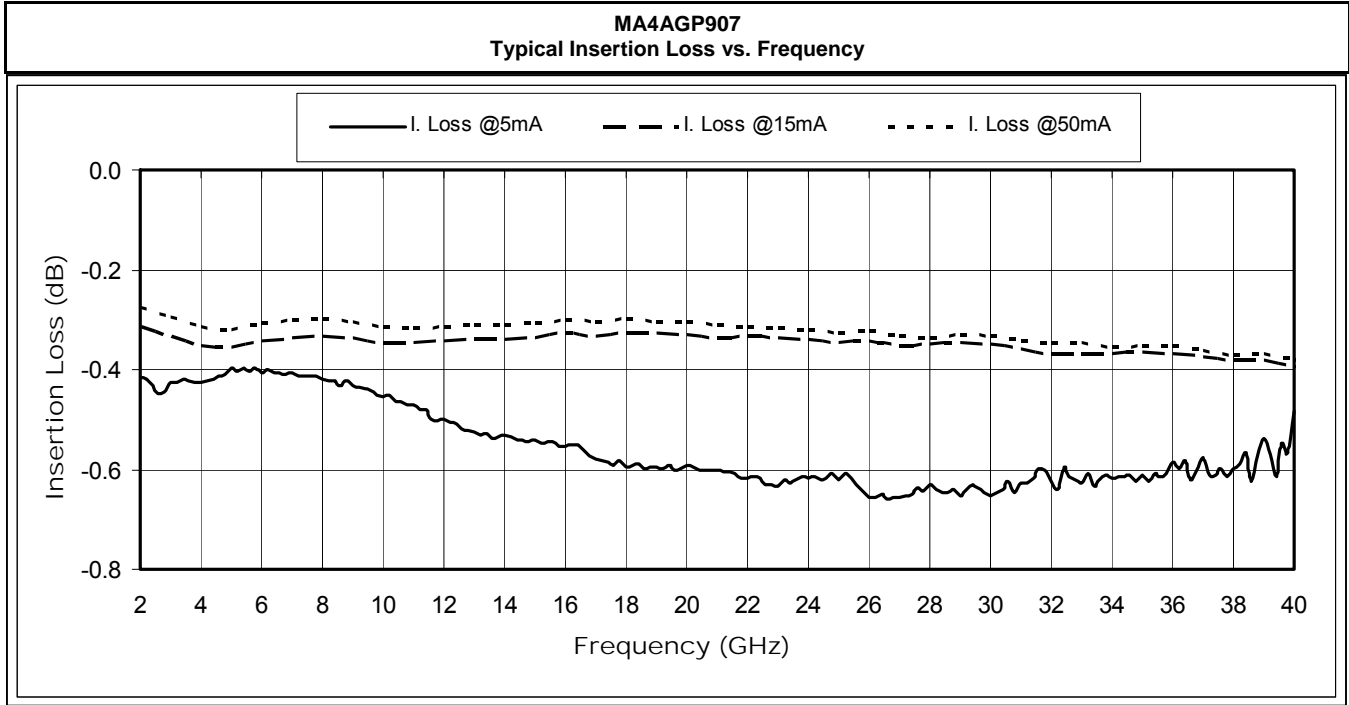
Electrical Specifications @  $T_{AMB} = +25^{\circ}\text{C}$

Parameter	Symbol	Conditions	Units	MA4AGP907		MA4AGFCP910	
				Typ.	Max.	Typ.	Max.
Total Capacitance	$C_T$	MA4AGP907 -5V,1MHz	pF	0.025	0.030	0.018	0.021
		MA4AGFCP910 -10V,1MHz					
Total Capacitance <sup>1</sup>	$C_T$	-5V, 10GHz	pF	0.020	—	0.018	0.021
Series Resistance	$R_S$	+10mA, 1MHz	$\Omega$	5.2	7.0	—	—
Series Resistance <sup>2</sup>	$R_S$	+10mA, 10GHz	$\Omega$	4.2	—	5.2	6.0
Forward Voltage	$V_F$	+10mA	V	1.33	1.45	1.33	1.45
Reverse Leakage Current <sup>3</sup>	$I_R$	MA4AGP907 $V_R = -50\text{V}$	$\mu\text{A}$	—	10	—	10
		MA4AGFCP910 $V_R = -75\text{V}$					
Switching Speed <sup>4</sup>	$T_{RISE}$ $T_{FALL}$	10GHz	nS	2	—	2	—
Carrier Lifetime	$T_L$	$I_F = 10\text{mA} / I_{REV} = 6\text{mA}$	nS	—	—	4	—

Notes:

- 1) Capacitance is determined by measuring the isolation of a single series diode in a  $50\Omega$  transmission line at 10GHz.
- 2) Series resistance is determined by measuring the insertion loss of a single series diode in a  $50\Omega$  transmission line at 10GHz.
- 3) The max rated  $V_R$ ( Reverse Voltage ) is sourced and the resultant reverse leakage current,  $I_r$ , is measured to be  $<10\mu\text{A}$
- 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.

Typical RF Performance @ T<sub>AMB</sub> = +25°C



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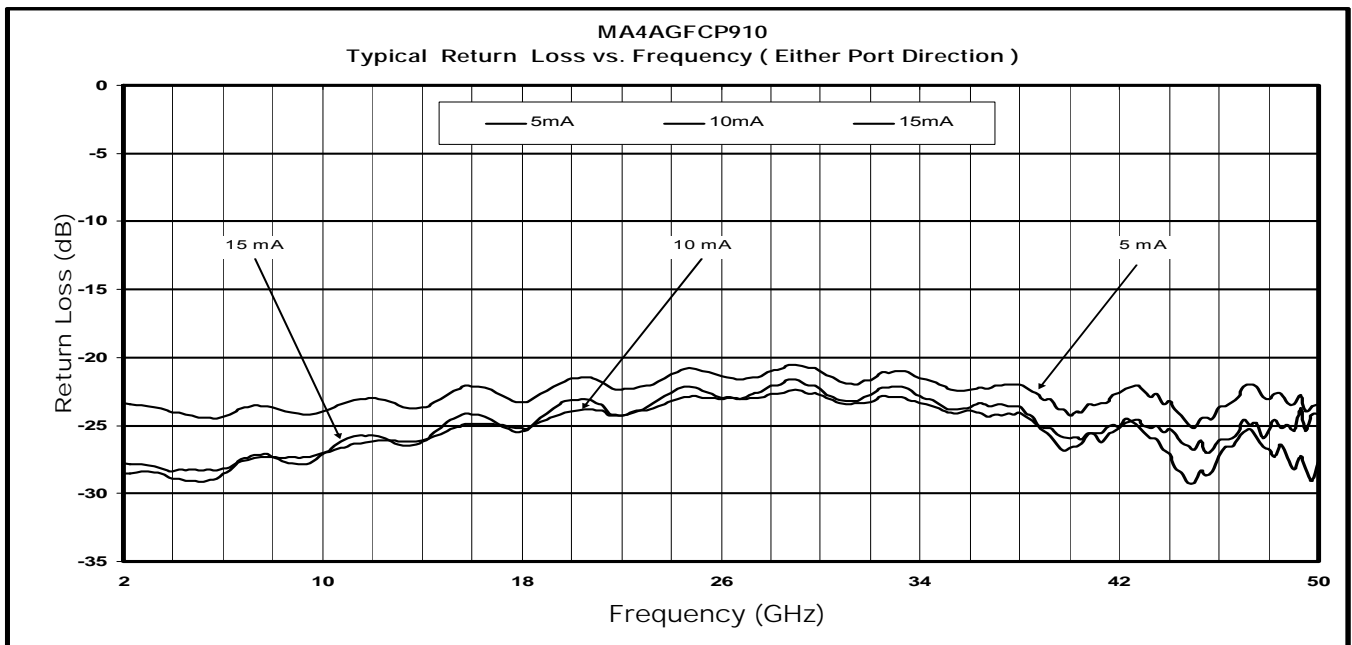
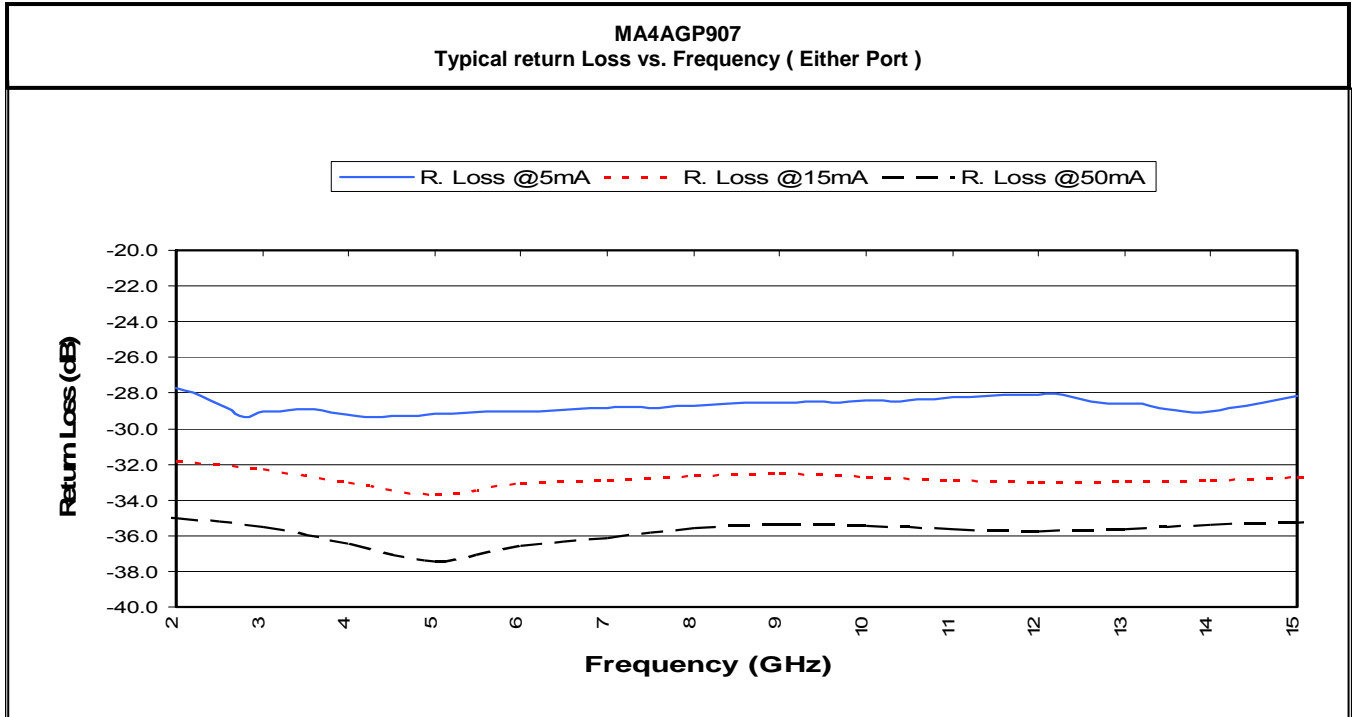
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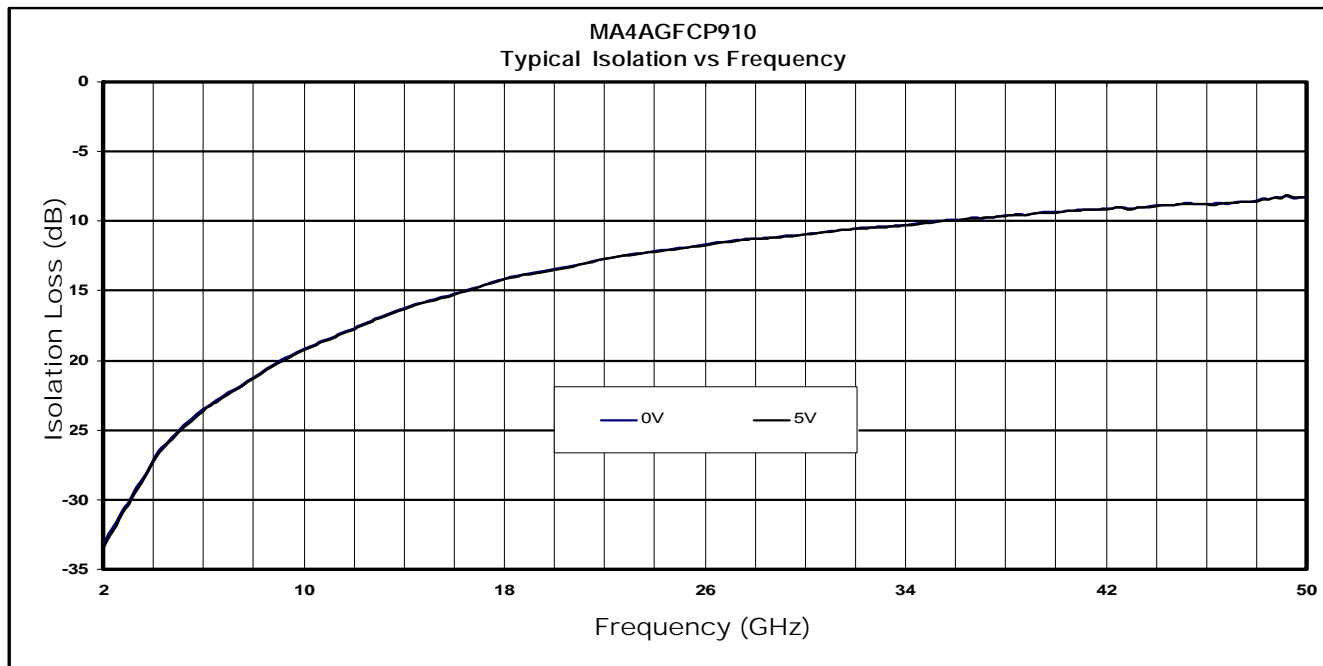
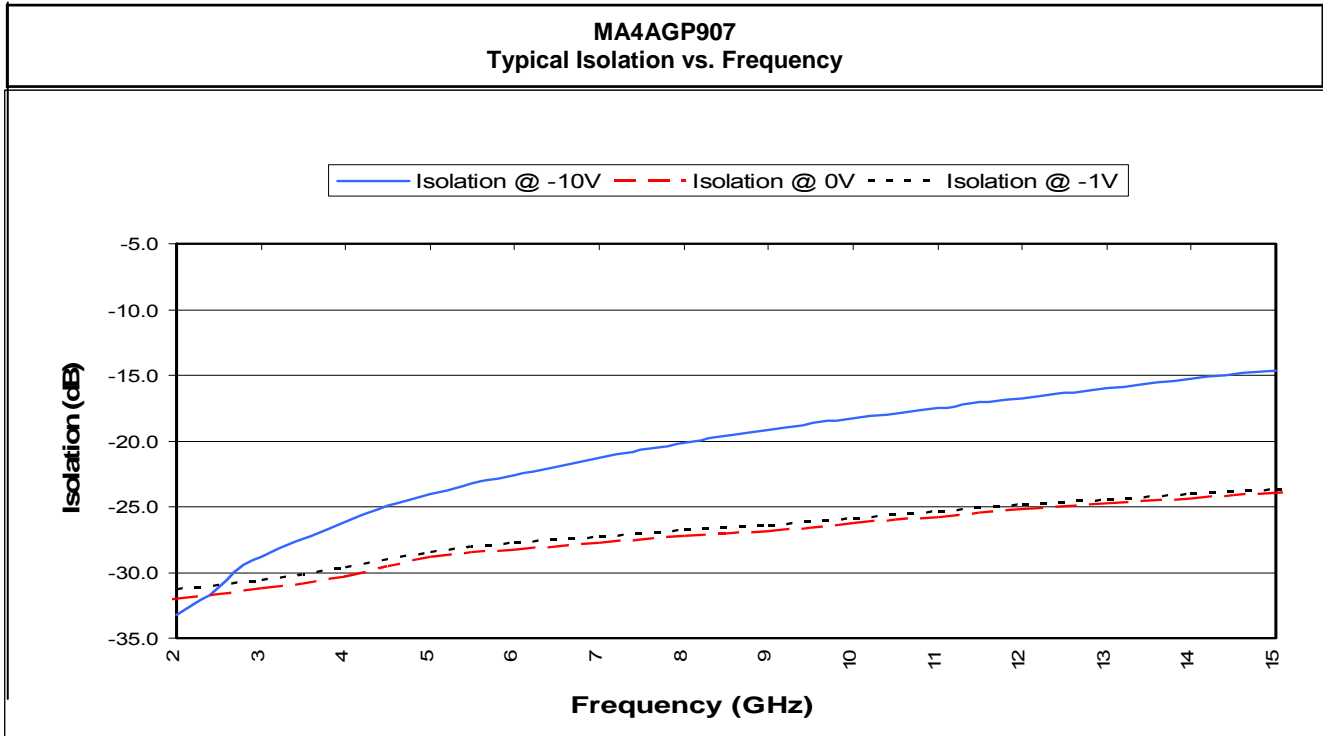
Typical RF Performance @  $T_{AMB} = +25^{\circ}C$



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## Device Installation Guidelines

### Cleanliness

These devices should be handled in a clean environment. The chips are resistant to solvents and may be cleaned using approved industry standard practices.

### 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

The 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 with a #27 tip vacuum pencil.

### Assembly Requirements using Electrically Conductive Silver Epoxy and Solder

These chips are designed to be inserted onto hard or soft substrates with the junction side down. They should be mounted onto silk-screened circuits 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 below 200°C.

### Eutectic Die Attached

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

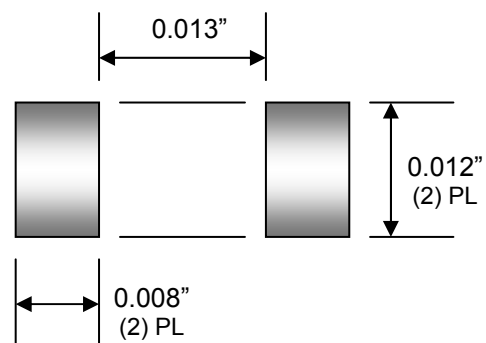
#### Note:

The MA4AGSBP907 which is a solder bumped version of the MA4AGP907, is also available. The datasheet can be viewed on the M/A-COM website at: <http://www.macom.com/DataSheets/MA4AGSBP907.pdf>

### Ordering Information

Part Number	Packaging
MA4AGP907	Gel Pack
MADP-001907-13050P	Pocket Tape
Part Number	Packaging
MA4AGFCP910	Gel Pack
MADP-000910-13050P	Pocket Tape

### Circuit Pad Layout



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