

## Features

- Non-Magnetic Package Suitable for MRI Applications
- Axial Leaded Ceramic package
- Low Rs for Low Series Loss
- High Average Incident Power Handling
- RoHS\* Compliant

## Applications

- Multi Market

## Description

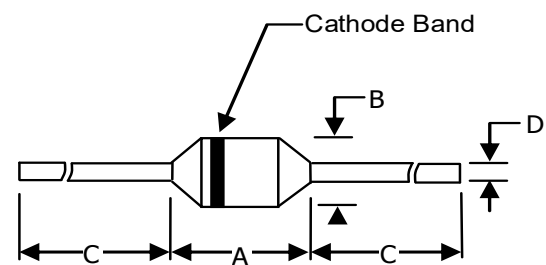
HIPAX PIN diode series are designed for usage in switch and attenuator applications requiring high power handling and low distortion. These diodes incorporate a fully passivated PIN diode chip resulting in an extremely low reverse bias leakage current. The semiconductor technology utilized in the HIPAX families draws on MACOM's substantial experience in PIN diode design and wafer fabrication. The result is a device which has a thick I-region and long carrier lifetime while maintaining low series resistance and capacitance values. The chips of the HIPAX PIN diodes are enclosed in a rugged ceramic package and is full face bonded to metal pins on both the anode and cathode. The result is a low loss PIN diode with low thermal resistance due to symmetrical thermal paths. The parts are offered in a non-magnetic, HIPAX (axial leaded) packages for MRI applications. All of the solderable surfaces are tin plated and compatible with industry standard reflow and vapor phase soldering processes. See Application Note M538 for a typical solder reflow profile.

HIPAX PIN diodes are designed for use in a wide variety of switch and attenuator applications from HF through UHF frequencies and at power levels above 1 kW, CW. The internal chip as well as each diode assembly has been comprehensively tested and characterized to ensure predictable and repeatable performance.

Designed for automated assembly. These HiPAX PIN diodes are designed for high volume tape and reel assembly. All solderable surfaces are tin plated and compatible with reflow and vapor phase soldering methods.



## Package Outline: ODS-401



Dimension	Inches		MM	
	Min.	Max.	Min.	Max.
A	—	0.130	—	3.30
B	—	0.090	—	2.29
C	0.975	—	24.77	—
D	0.027	0.029	0.69	0.74

## Ordering Information

Part Number	Package
MADP-07006B-NM401T	500 piece reel

\* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

## Electrical Specifications @ +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Forward Voltage	$I_F = +100 \text{ mA}$	$V_{DC}$	—	—	1
Voltage Rating	$I_R = -10 \text{ } \mu\text{A}$	$V_{DC}$	$  - 600  $	—	—
Total Capacitance	$-100 \text{ V @ } 100 \text{ MHz}$	pF	—	—	0.7
Series Resistance	$+100 \text{ mA @ } 100 \text{ MHz}$	$\Omega$	—	—	0.9
Parallel Resistance	$-10 \text{ V @ } 100 \text{ MHz}$	k $\Omega$	200	—	—
Carrier Lifetime	$+6 \text{ mA / } -10 \text{ mA @ } (50\% - 90\% \text{ Voltage})$	$\mu\text{s}$	—	5	—
I-Region Length	—	$\mu\text{m}$	—	175	—
CW Thermal Resistance	—	$^{\circ}\text{C/W}$	—	—	30
Power Dissipation in Free Air	$I_F = +100 \text{ mA}$	W	—	—	1.5
Power Dissipation	$I_F = +100 \text{ mA}$	W	—	—	5

## Absolute Maximum Ratings @ +25°C<sup>1,2</sup>

Parameter	Absolute Maximum
Reverse DC Voltage @ $-10 \text{ } \mu\text{A}$	$  - 600 \text{ V }  $
Junction Temperature <sup>3</sup>	$+175^{\circ}\text{C CW}$
Operating Temperature	$-55^{\circ}\text{C to } +175^{\circ}\text{C}$
Storage Temperature	$-55 \text{ C to } +200^{\circ}\text{C}$
Diode Mounting Temperature	$+280^{\circ}\text{C for } 30 \text{ seconds}$

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.
- Operating at nominal conditions with  $T_J \leq +175^{\circ}\text{C}$  will ensure  $\text{MTTF} > 1 \times 10^6$  hours.

## Handling Procedures

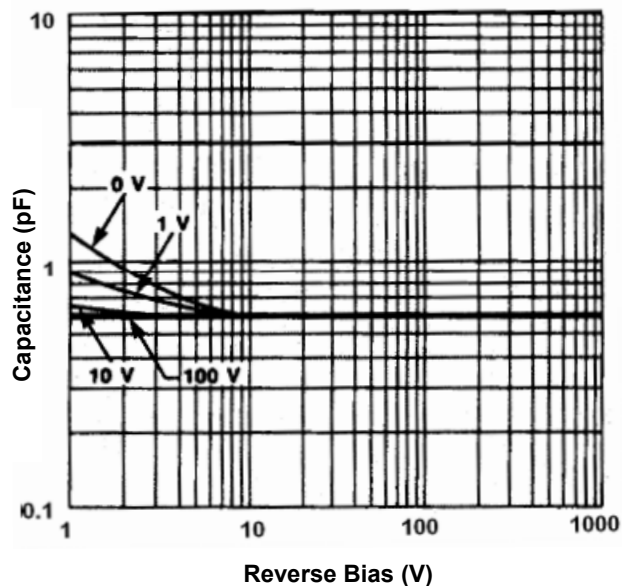
Please observe the following precautions to avoid damage:

## Static Sensitivity

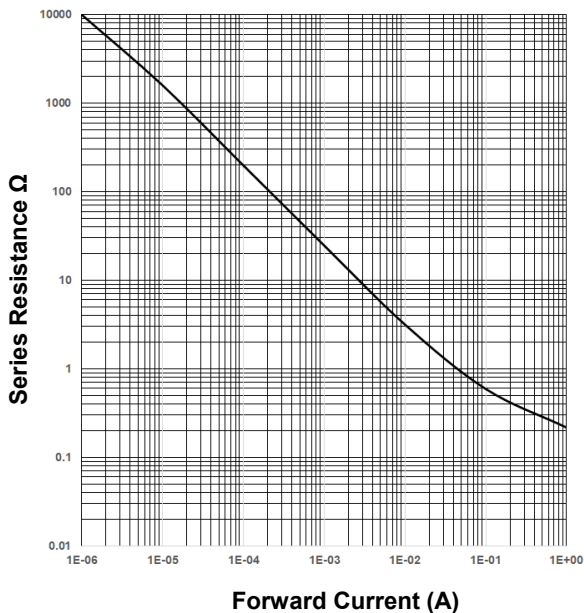
These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these devices.

## Typical Electrical Performance @ +25°C

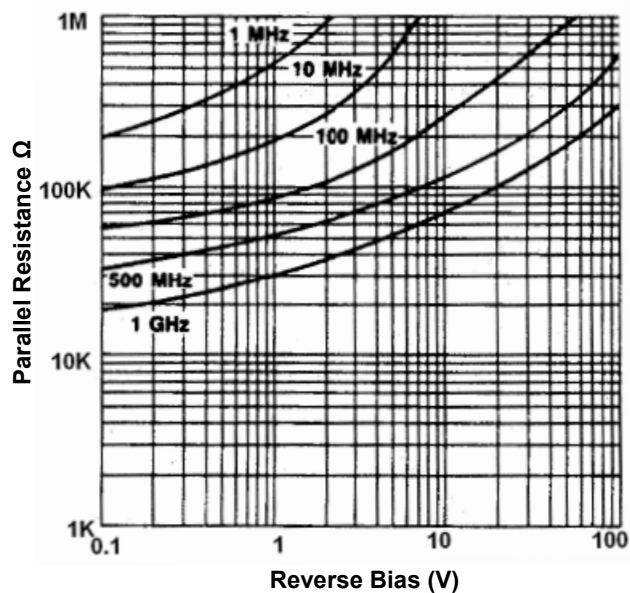
Capacitance vs. Frequency & Reverse Bias



Series Resistance vs Forward Bias Current



Parallel Resistance vs. Reverse Bias & Frequency



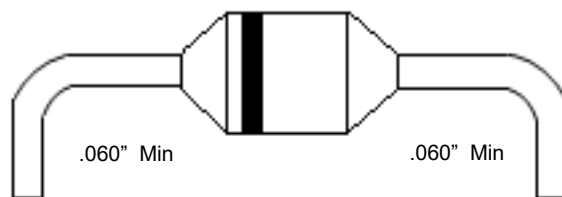
## Axial Leaded HIPAX Assembly Recommendations

Bends on case style 401, axially leaded devices, must be made while holding the lead firm and forming the bend no closer than .060 inches from the body of the part. Bending the lead <0.060 inches from the body of the part is not recommended and may cause internal damage to the chip. Appropriate fixturing should be used.

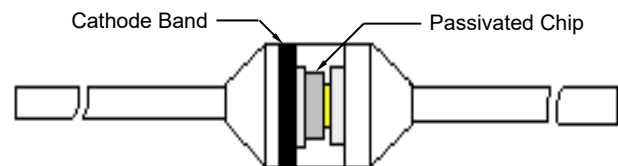
Devices may be soldered using standard 60Sn/40Pb or any RoHS compliant solders. Axial leads are tin plated 50 μm thick to ensure an optimum connection.

For recommended Sn/Pb and RoHS soldering profiles see Application Note M538 on the MACOM website.

### Case Style 401 Minimum Bend Distance



### Case Style 401 Internal Construction



## Environmental Ratings

HIPAX PIN diodes are designed to meet most environmental and electrical requirements and may be ordered screened to MIL-STD-750 specifications as described in the table below.

Test	Method	Description / Conditions
Moisture Resistance	1021	85°C, 85% Relative Humidity, 168 hrs
High Temperature Storage	1031	+175°C, 250 Hours
HTRB	1038	80% of rated V <sub>R</sub> , 50°C, 96 Hours
Temperature Shock	1051	-65°C to +175°C, 20 Cycles
Fine Leak	1071 Cond. H	1 x 10 <sup>-7</sup> CC/Sec
Constant Acceleration	2006	20,000 G's
Solderability	2026	IPC/JDEC J-STD-02
Tension <sup>4</sup>	2036.3 Cond. A	2 Lbs., 30 Seconds
Lead Fatigue <sup>4</sup>	2036.3 Cond. E	3 Cycles, 8 oz., 90°,

4. Test applicable to HIPAX axially leaded devices only.

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