

**MMP4400 Series Datasheet**  
**RoHS-Compliant Control Devices-Surface Mount**  
**PIN Diodes**



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# 1 Revision History

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The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

## 1.1 Revision 1.0

Revision 1.0 was the first publication of this document.

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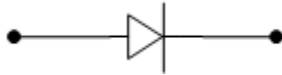
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## 2 Product Overview

The MMP4400 series are high-voltage, high-power (cathode base) PIN diodes. These high-resistivity silicon devices are glass passivated for high stability and reliability, and have been proven by thousands of device hours in high-reliability systems. Each device can withstand storage temperatures from  $-65\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$  and will operate over the range from  $-55\text{ }^{\circ}\text{C}$  to  $150\text{ }^{\circ}\text{C}$ .

The MMP4400 series will operate typically with 50 mA forward bias. Breakdown voltages are available up to 1000 V. Consult the factory for higher-voltage devices. This product meets RoHS requirements according to EU directives 2011/65/EC and 2002/95 EC.

**Figure 1 Functional Block Diagram**



### 2.1 Applications

The MMP4400 series can be used in RF circuits as an on/off element, as a switch, or as a current-controlled resistor in attenuators extending over the frequency range from UHF through X-band.

Switch applications include high-speed switches (ECM systems), TR or lobing switches, channel or antenna-selection switches (telecommunications), duplexers (radar), and digital phase shifters (phased arrays).

The MMP4400 series can be used in RF circuits as an on/off element at moderate RF power levels. Attenuator type applications include amplitude modulators, AGC attenuators, power levelers, and level set attenuators.

#### 2.1.1 Benefits

The MMP4400 series devices provide the following application benefits:

- TR switches
- Antenna selector switches
- Duplexers
- Digital phase shifters

### 2.2 Key Features

The following are key features of the MMP4400 series devices:

- Compact 0805 SMT package
- Suitable for application through X-band: 50 MHz–12 GHz
- High-power handling: >100 W peak
- Low thermal resistance:  $15\text{ }^{\circ}\text{C}/\text{W}$ – $35\text{ }^{\circ}\text{C}/\text{W}$
- High shunt isolation: >30 dB
- Low distortion
- RoHS compliant and  $260\text{ }^{\circ}\text{C}$  reflow compatible

## 3 Electrical Specifications

### 3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings at 25 °C unless otherwise specified.

**Table 1 Absolute Maximum Ratings**

Rating	Symbol	Value	Unit
Maximum leakage current (at 80% of minimum-rated $V_B$ )	$I_R$	0.5	$\mu A$
Operating temperature	$T_{OP}$	-55 to 150	$^{\circ}C$
Storage temperature	$T_{STG}$	-65 to 150	$^{\circ}C$
ESD sensitivity (HBM)		Class 1A	
Moisture sensitivity level		MSL 1	

### 3.2 Device Electrical Parameters

The following table shows the device electrical parameters at 25 °C.

**Table 2 Device Electrical Parameters**

Model Number	$V_b$ $I_R = 10 \mu A$ (Min)	$C_T$ $V_R = 50 V$ (Max)	$R_s$ $I_F = 100 mA$ $F = 100 MHz$ (Max)	$T_L$ $I_R = 6 mA$ $I_F = 10 mA$ (Typ)	$\theta_p$ Thermal Resistance (Max)	Power Dissipation (Max)
MMP4401	500 V	0.35 pF	0.80 $\Omega$	1.5 $\mu s$	35 $^{\circ}C/W$	3.5 W
MMP4402	500 V	0.50 pF	0.65 $\Omega$	2.0 $\mu s$	30 $^{\circ}C/W$	4.0 W
MMP4403	500 V	1.0 pF	0.30 $\Omega$	3.0 $\mu s$	25 $^{\circ}C/W$	5.0 W
MMP4404	750 V	0.50 pF	0.80 $\Omega$	3.5 $\mu s$	25 $^{\circ}C/W$	5.0 W
MMP4405	1000 V	0.60 pF	0.75 $\Omega$	5.0 $\mu s$	15 $^{\circ}C/W$	8.0 W

The following table shows the bias specifications for the MMP4400 series devices.

**Table 3 Bias Table**

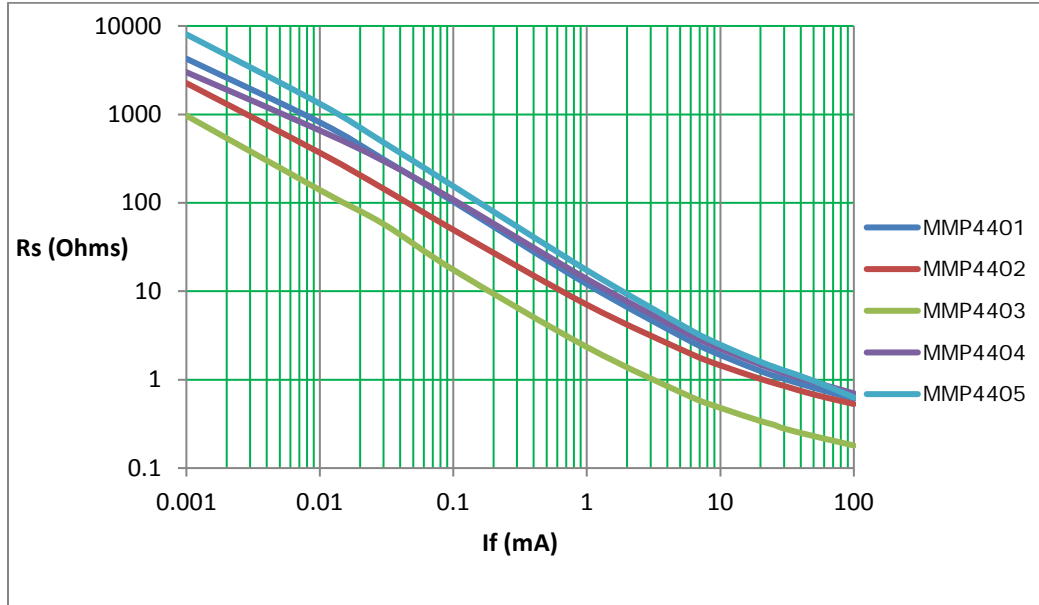
RF State	Bias
On	100 mA
Off	100 V



### 3.3 Typical Rs Performance

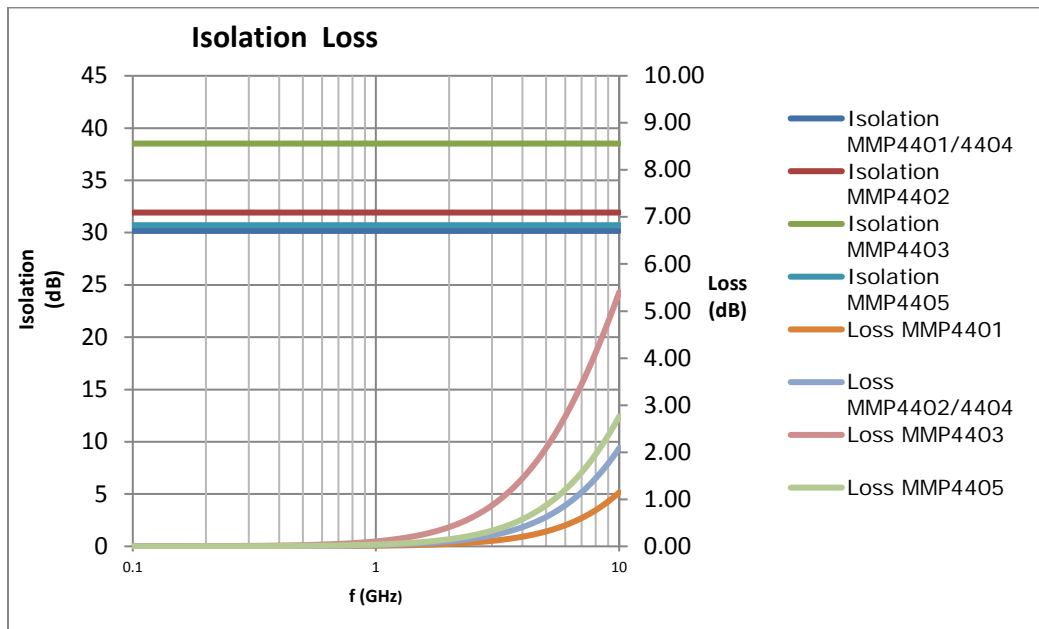
The following graph show the typical Rs performance of the MMP4400 series devices, where  $f = 100 \text{ MHz}$ .

**Figure 2 Typical Rs Performance**



### 3.4 Typical Isolation and Insertion Loss Performance

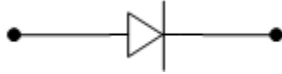
The following graph shows the typical Isolation and insertion loss performance of the MMP4400 series devices.



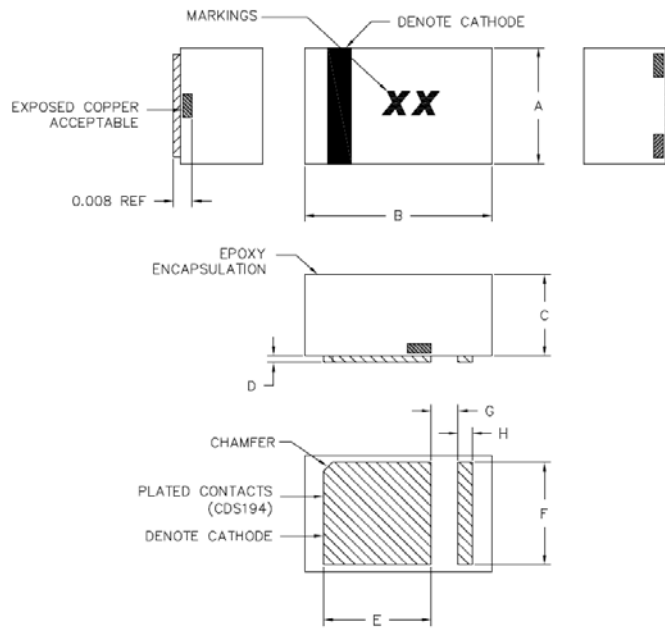
## 4 Package Outline

The following illustrations show the package outline of the MMP4400 series devices.

**Figure 3 Functional Block Diagram**



**Figure 4 Package Outline**



The following table shows the package dimensions of the MMP4400 series devices.

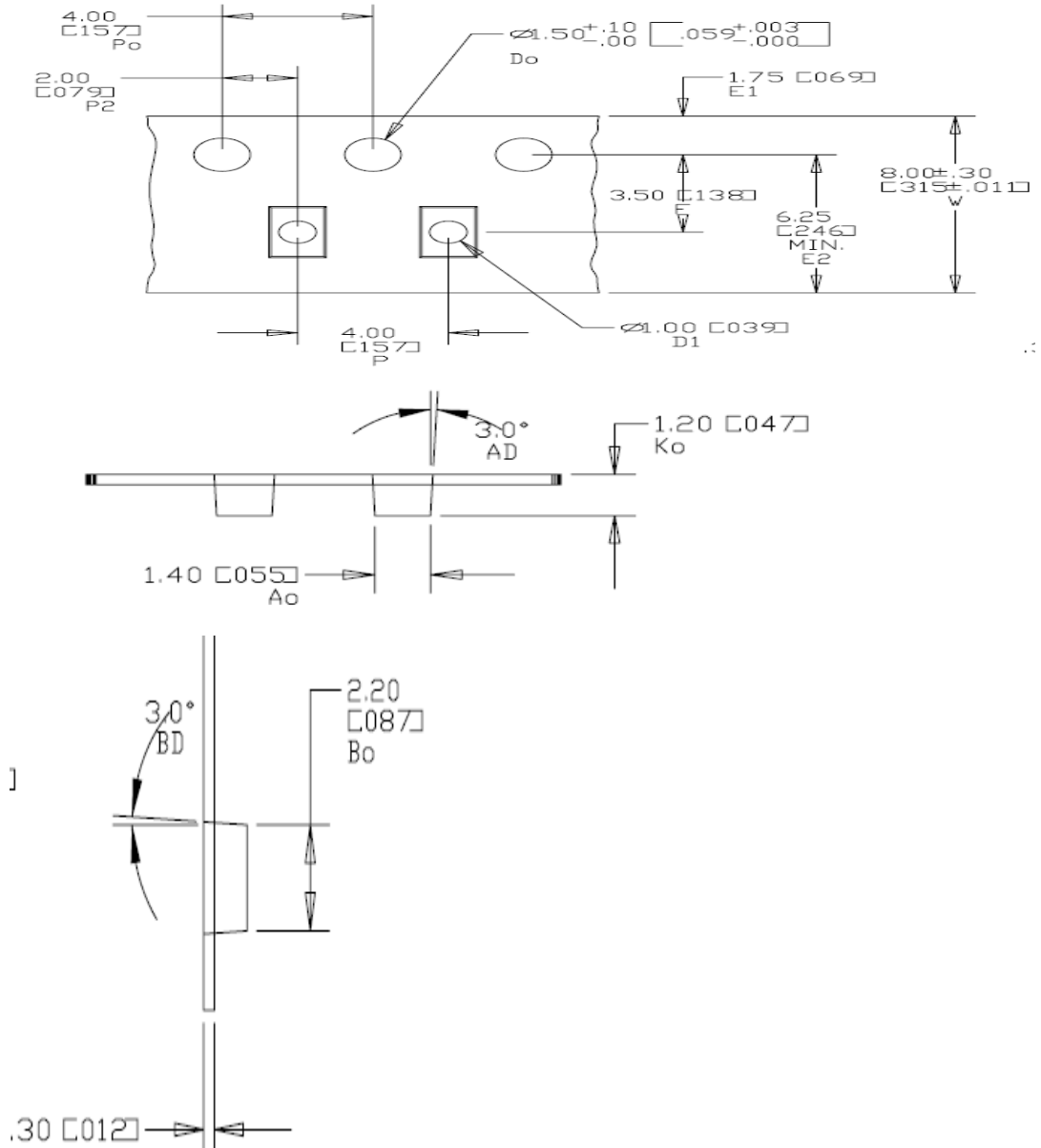
**Table 4 Package Dimensions**

DIM	Inches			Millimeters		
	Min	Typ	Max	Min	Typ	Max
A	0.045	0.050	0.055	1.143	1.270	1.397
B	0.075	0.080	0.085	1.905	2.032	2.159
C	0.030	0.035	0.040	0.762	0.889	1.016
D			0.003			0.076
E		0.046			1.168	
F		0.044			1.118	
G		0.011			0.279	
H		0.006			0.152	

## 5 Tape-and-Reel Format

The following illustration shows the tape-and-reel format of the MMP4400 series devices in inches and millimeters.

**Figure 5** Tape-and-Reel Format



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## 6 Ordering Information

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The following table shows the ordering information for the MMP4400 series devices.

**Table 5 Ordering Information**

Part Number	Package
MMP4401-GM2	0805 SMT Package
MMP4402-GM2	0805 SMT Package
MMP4403-GM2	0805 SMT Package
MMP4404-GM2	0805 SMT Package
MMP4405-GM2	0805 SMT Package

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