MMP4400 Series Datasheet

RoHS-Compliant Control Devices-Surface Mount PIN Diodes

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1 Revision History

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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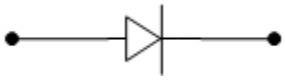
2 Product Overview

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 °C to 150 °C and will operate over the range from –55 °C to 150 °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 °C/W–35 °C/W
- High shunt isolation: >30 dB
- Low distortion
- RoHS compliant and 260 °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 VB)	IR	0.5	µA
Operating temperature	T_{OP}	–55 to 150	°C
Storage temperature	T_{STG}	–65 to 150	°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 µA (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)	θ_P Thermal Resistance (Max)	Power Dissipation (Max)
MMP4401	500 V	0.35 pF	0.80 Ω	1.5 µs	35 ˚C/W	3.5 W
MMP4402	500 V	0.50 pF	0.65 Ω	2.0 µs	30 ˚C/W	4.0 W
MMP4403	500 V	1.0 pF	0.30 Ω	3.0 µs	25 ˚C/W	5.0 W
MMP4404	750 V	0.50 pF	0.80 Ω	3.5 µs	25 ˚C/W	5.0 W
MMP4405	1000 V	0.60 pF	0.75 Ω	5.0 µs	15 ˚C/W	8.0 W

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

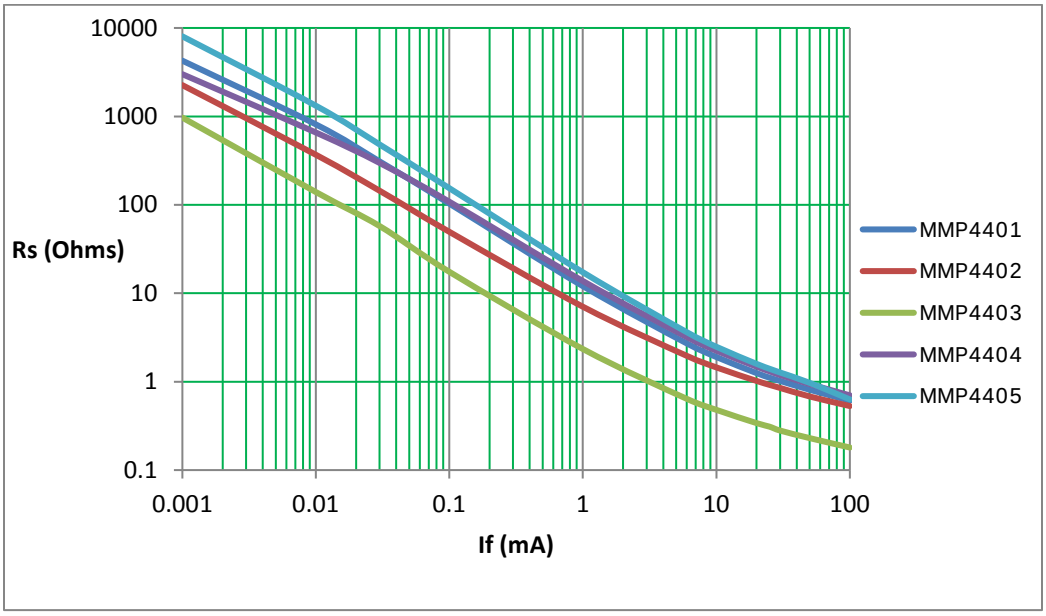
Table 3 Bias Table

RF State	Bias
On	100 mA
Off	100 V

3.3 Typical Rs Performance

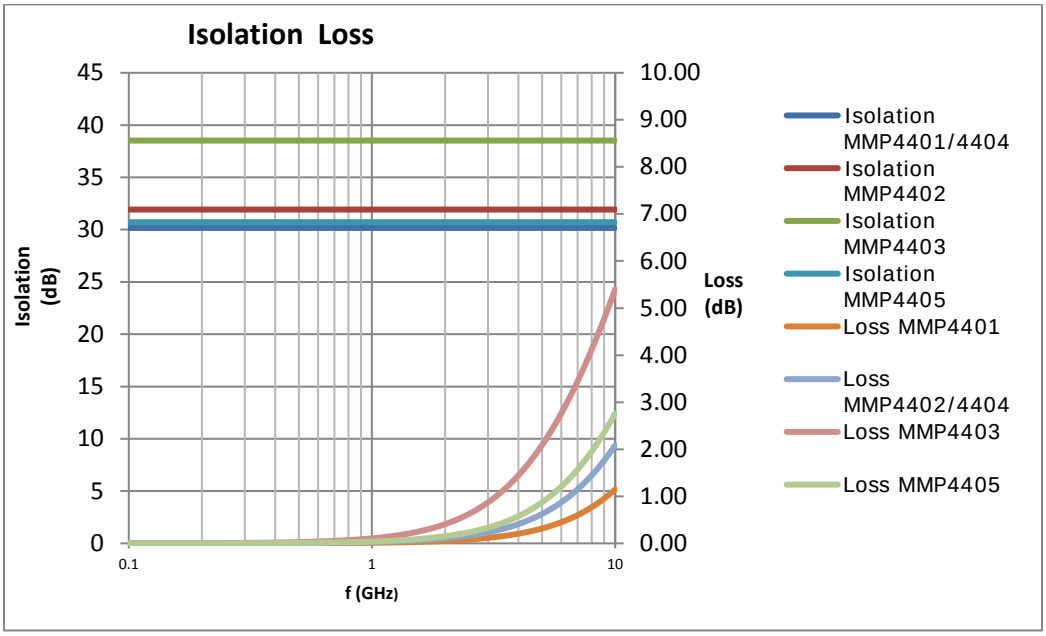
The following graph show the typical Rs performance of the MMP4400 series devices, where f = 100 MHz.

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

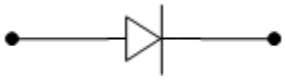
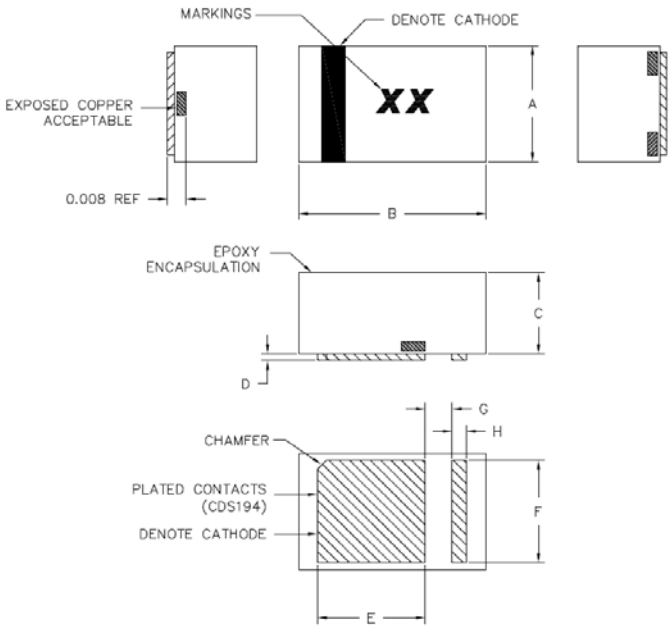


Figure 4 Package Outline



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

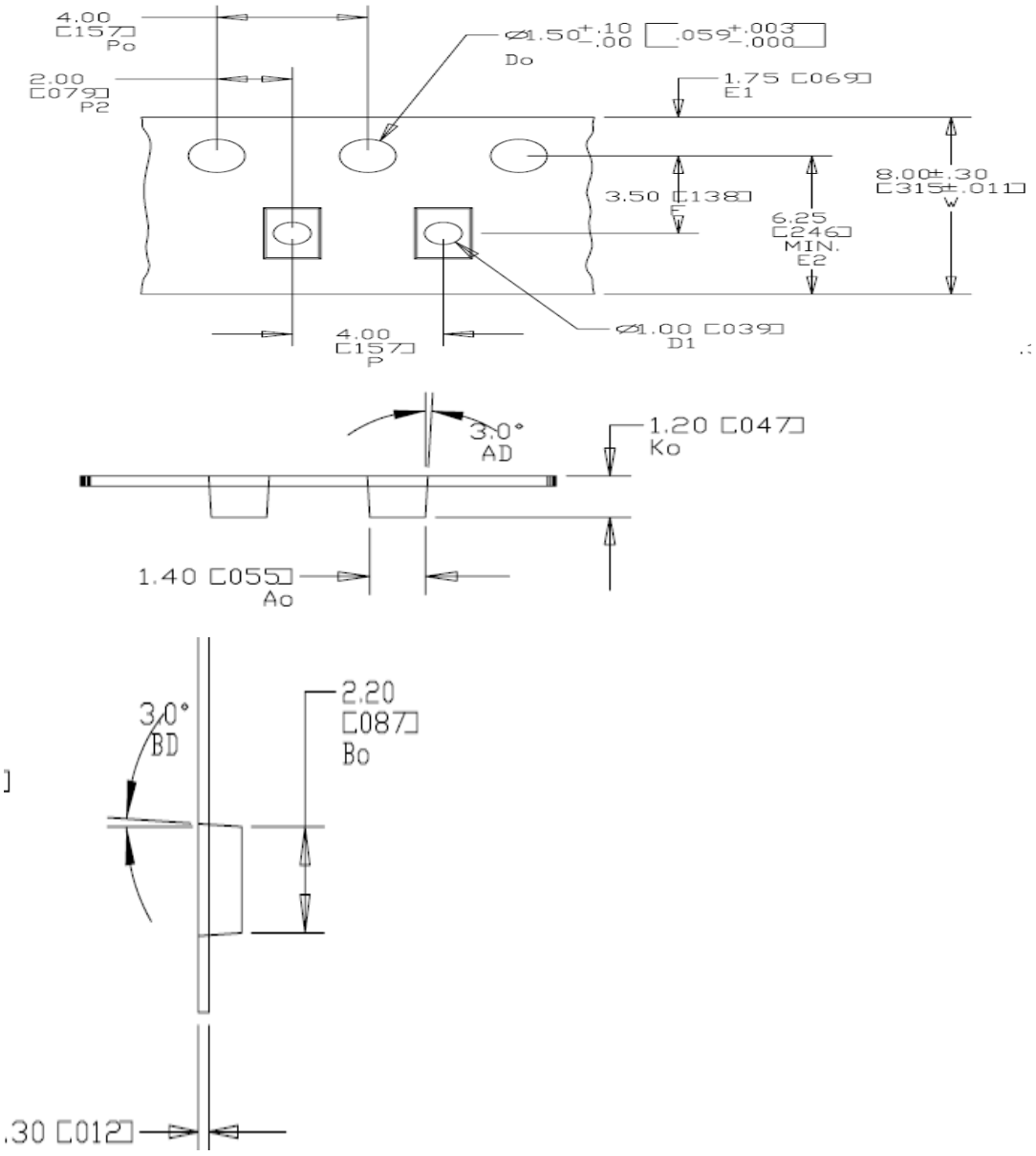
Table 4 Package Dimensions

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



6 Ordering Information

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