

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



**Microsemi Corporate Headquarters**

One Enterprise, Aliso Viejo,
CA 92656 USA

Within the USA: +1 (800) 713-4113

Outside the USA: +1 (949) 380-6100

Fax: +1 (949) 215-4996

Email: sales.support@microsemi.com

www.microsemi.com

©2016 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are registered trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

About Microsemi

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

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.

Contents

1	Revision History.....	3
1.1	Revision 1.0.....	3
2	Product Overview	7
2.1	Applications	7
2.1.1	Benefits.....	7
2.2	Key Features.....	7
3	Electrical Specifications.....	8
3.1	Absolute Maximum Ratings	8
3.2	Device Electrical Parameters.....	8
3.3	Typical Rs Performance	9
3.4	Typical Isolation and Insertion Loss Performance.....	9
4	Package Outline.....	10
5	Tape-and-Reel Format.....	12
6	Ordering Information	13

List of Figures

Figure 1 Functional Block Diagram	7
Figure 2 Typical Rs Performance.....	9
Figure 3 Functional Block Diagram	10
Figure 4 Package Outline	10
Figure 5 Tape-and-Reel Format	12



List of Tables

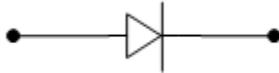
Table 1 Absolute Maximum Ratings	8
Table 2 Device Electrical Parameters	8
Table 3 Bias Table	8
Table 4 Package Dimensions	11
Table 5 Ordering Information	13

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	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 $I_R = 10 \mu A$ (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)	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.

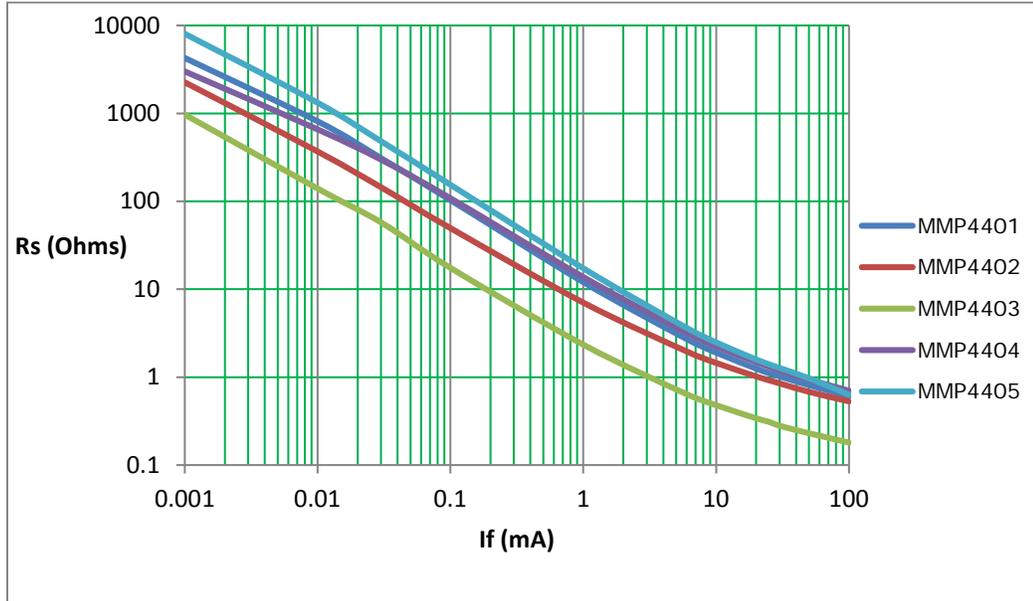
Table 3 Bias Table

RF State	Bias
On	100 mA
Off	100 V

3.3 Typical Rs Performance

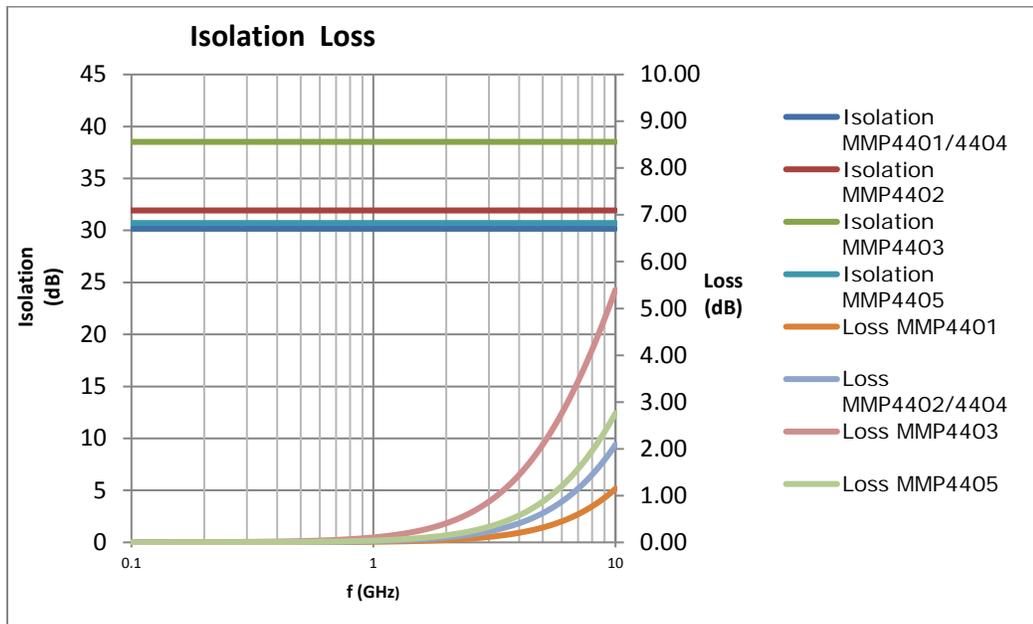
The following graph show the typical Rs performance of the MMP4400 series devices, where $f = 100$ MHz.

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

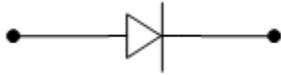
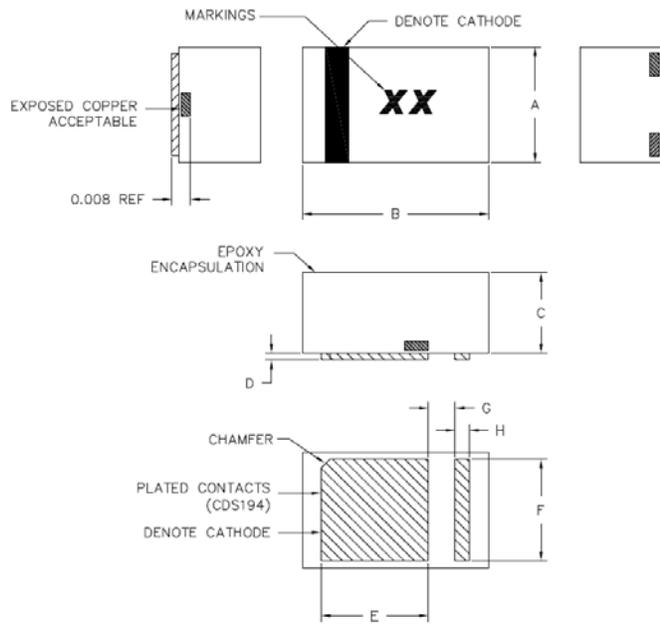


Figure 4 Package Outline



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

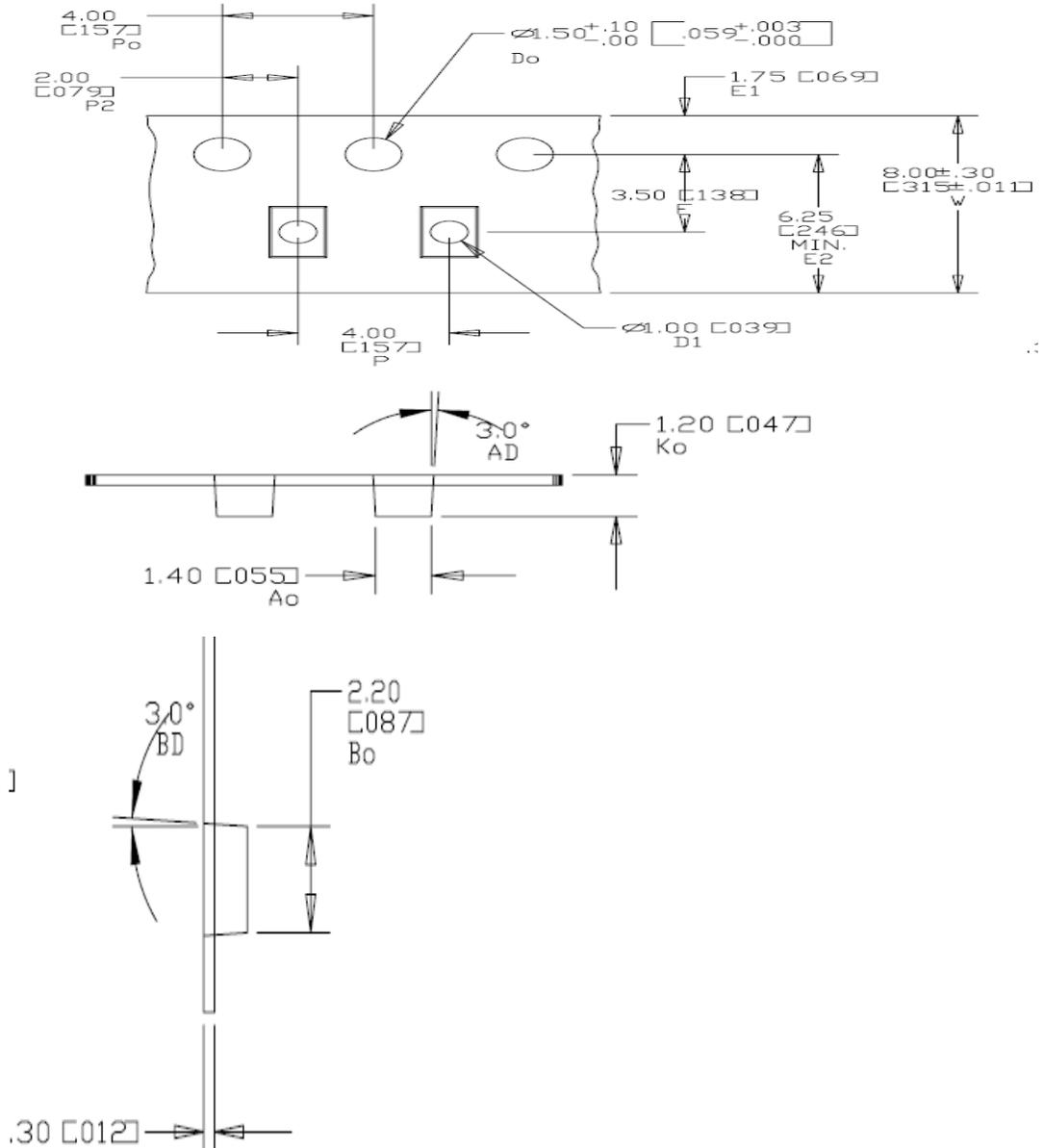
Table 4 Package Dimensions

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