

MPS4101-6LP Datasheet
50 MHz–25 GHz RoHS-Compliant Control Device
QFN SPST PIN



**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.....	9
3.1	Absolute Maximum Ratings	9
3.2	Device Electrical Parameters.....	9
4	Small Signal Measurements	11
5	Package Outline.....	12
6	Evaluation Board Assembly.....	13
7	Tape-and-Reel Format.....	14
8	Ordering Information	15

List of Figures

Figure 1 Functional Block Diagram	7
Figure 2 Insertion Loss	11
Figure 3 Input Return Loss	11
Figure 4 Isolation	11
Figure 5 Functional Block Diagram	12
Figure 6 Package Dimensions	12
Figure 7 Package Outline	12
Figure 8 Evaluation Board Assembly.....	13
Figure 9 Tape-and-Reel Format	14

List of Tables

Table 1	Absolute Maximum Ratings	9
Table 2	Device Electrical Parameters	9
Table 3	Device Electrical Specifications	10
Table 4	Bias Table	10
Table 5	Ordering Information	15

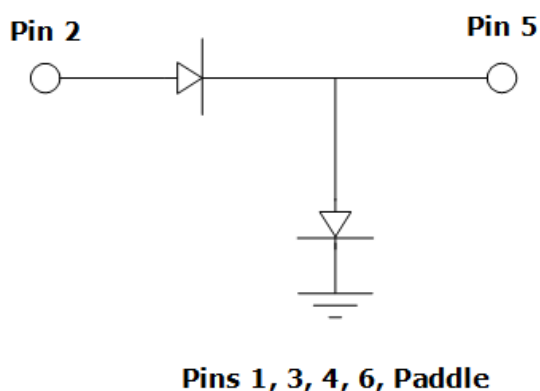
2 Product Overview

The MPS4101-6LP is a QFN-packaged series/shunt element. The parasitic inductance is minimized in this design resulting in wide-band, low-loss, high-isolation performance.

This product meets RoHS requirements according to EU directives 2011/65/EC and 2002/95 EC. The standard terminal finish is matte tin unless otherwise specified. Contact your Microsemi representative if you have special requirements.

The following illustration shows the primary functional blocks of the MPS4101-6LP device.

Figure 1 Functional Block Diagram



2.1 Applications

This shunt/series QFN-packaged switching element provides optimum insertion loss and isolation characteristics up to 25 GHz. It replaces the conventional shunt-mounted chip and series-mounted beam lead pin diode normally used in the manufacture of broadband microwave switches.

The QFN package facilitates ease of installation and high production yield with little danger of device degradation at assembly as a result of bonding trauma. It is compatible with automatic insertion equipment. Additionally, the device's power-handling ability is enhanced by the superior heat conduction path inherent in the series portion of this monolithically fabricated switching element.

2.1.1 Benefits

The MPS4101-6LP device provides the following application benefits:

- 0.05 GHz–25 GHz switching
- Improved power handling
- High reliability

2.2 Key Features

The following are key features of the MPS4101-6LP device:

- QFN SPST PIN switch element
- Wide band operation: 0.05 GHz–25 GHz

- Low insertion loss
 - o <1.1 dB at 20 GHz
 - o <1.5 dB at 25 GHz
- High isolation
 - o >30 dB at 20 GHz
 - o >25 dB at 25 GHz
- Power handling: 2 W CW
- Rugged silicon monolithic design
- Fast switching: 5 ns typical
- Series capacitance: 0.12 pF typical
- Shunt capacitance: 0.20 pF typical
- RoHS compliant

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
Minimum-rated breakdown voltage	V_B	80	V
Storage temperature	T_{ST}	–65 to 200	°C
Operating temperature	T_{OP}	–55 to 150	°C
CW RF operating power	P_{CW}	2	W
Forward DC current	I_F	100	mA
Reverse DC voltage	V_R	100	V
ESD sensitivity (HBM)		Class 1B (500 V)	
Moisture sensitivity level		MSL 1	

3.2 Device Electrical Parameters

The following tables show the device electrical parameters at 25 °C.

Table 2 Device Electrical Parameters

Element	V_b $I_R = 10 \mu A$ (Min)	C_T at 50 V (Typ)	R_s $I_F = 100 \text{ mA}$ $F = 1.0 \text{ GHz}$ (Max)	T_L (Typ)	V_F $I_F = 10 \text{ mA}$ (Typ)	θ_p Thermal Resistance (Typ)
Series element	80 V	0.12 pF	2.5 Ω	40 ns	1.05 V	100 °C/W
Shunt element	80 V	0.20 pF	0.8 Ω	60 ns	0.85 V	50 °C/W

Table 3 Device Electrical Specifications

Parameter	Conditions	Specification
Insertion loss	50 MHz–5 GHz	0.6 dB max
	50 MHz–10 GHz	0.8 dB max
	50 MHz–20 GHz	1.1 dB max
	50 MHz–25 GHz	1.5 dB max
Return loss	50 MHz–5 GHz	20 dB max
	50 MHz–10 GHz	18 dB max
	50 MHz–20 GHz	16 dB max
	50 MHz–25 GHz	10 dB max
Isolation	50 MHz–5 GHz	45 dB min
	50 MHz–10 GHz	36 dB min
	50 MHz–20 GHz	30 dB min
	50 MHz–25 GHz	28 dB min
1.0 dB compression point	50 MHz–25 GHz	33 dB min
Rise time	10%–90% RF	20 ns max
Fall time	90%–10% RF	5 ns max
IOP3		62 dBm min
IOP2		83 dBm min

Table 4 Bias Table

Bias	Condition
Pin 2 to pin 5: 20 mA	On-state (low loss)
Pin 5 to ground: –10 V	
Pin 2 to pin 5: –10 V	Off-state (isolation)
Pin 5 to ground: 20 mA	

4 Small Signal Measurements

The following graphs show the small signal measurement curves of the MPS4101-6LP device.

Figure 2 Insertion Loss

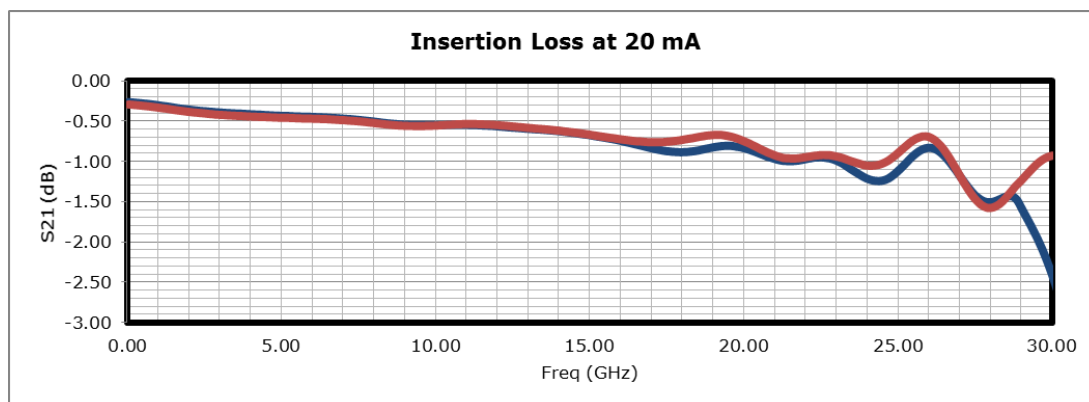


Figure 3 Input Return Loss

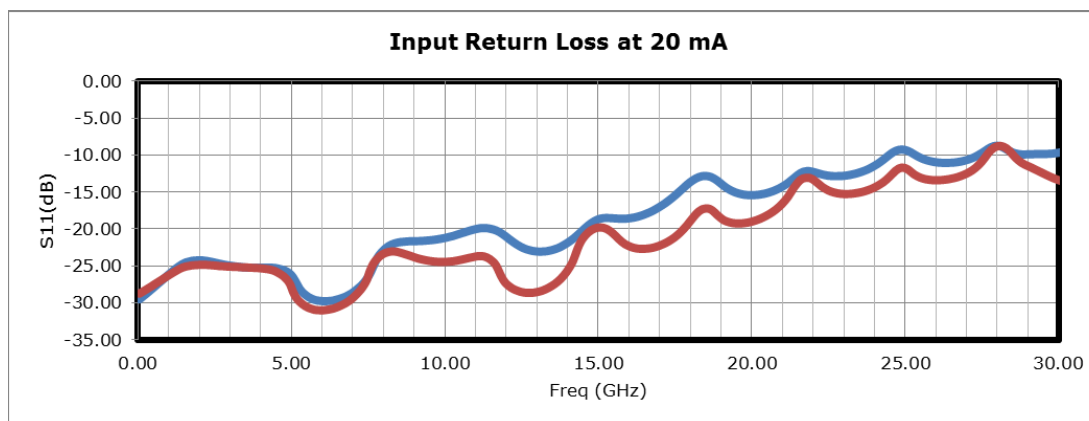
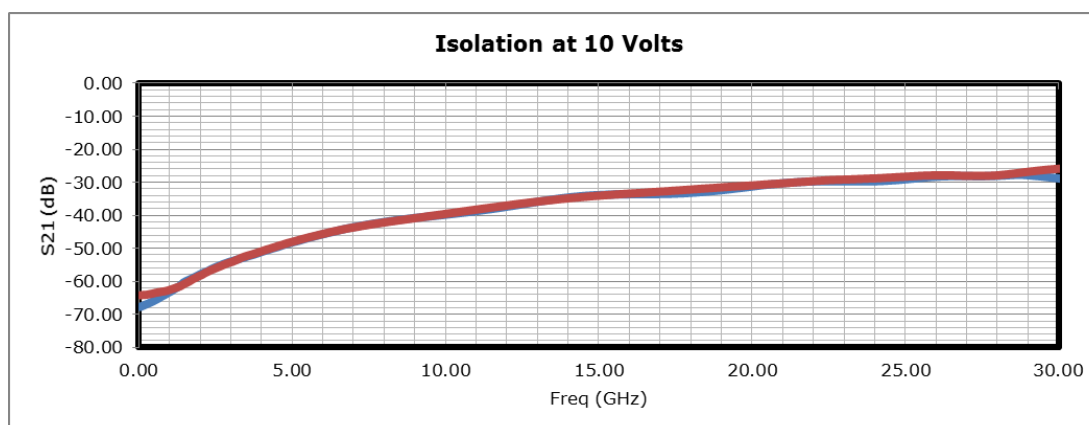


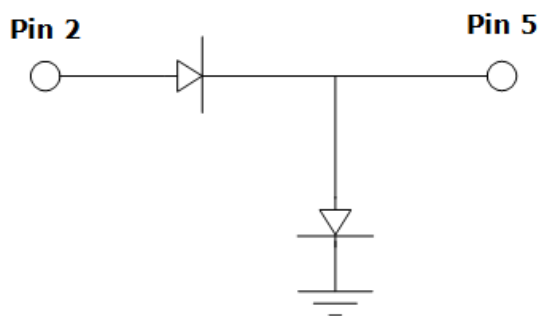
Figure 4 Isolation



5 Package Outline

The following illustration shows the package outline of the MPS4101-6LP device. Units are in millimeters.

Figure 5 Functional Block Diagram



Pins 1, 3, 4, 6, Paddle

Figure 6 Package Dimensions

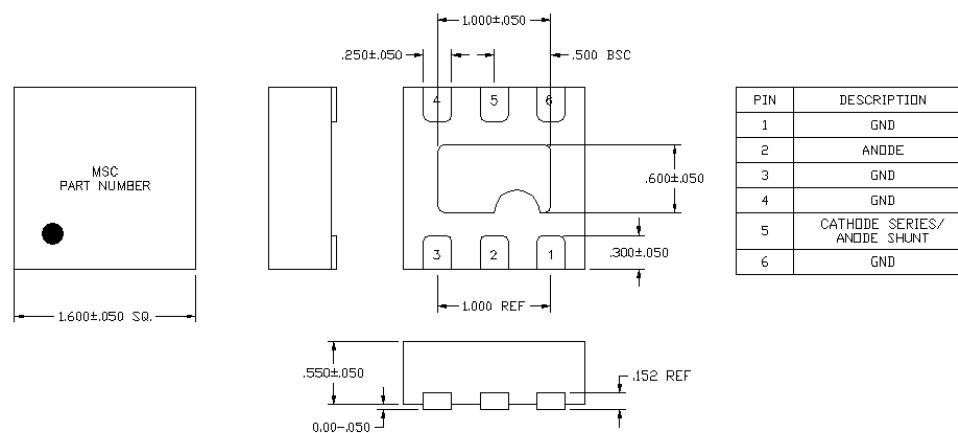
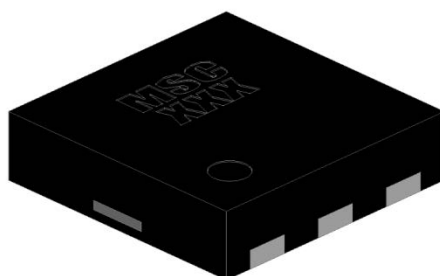


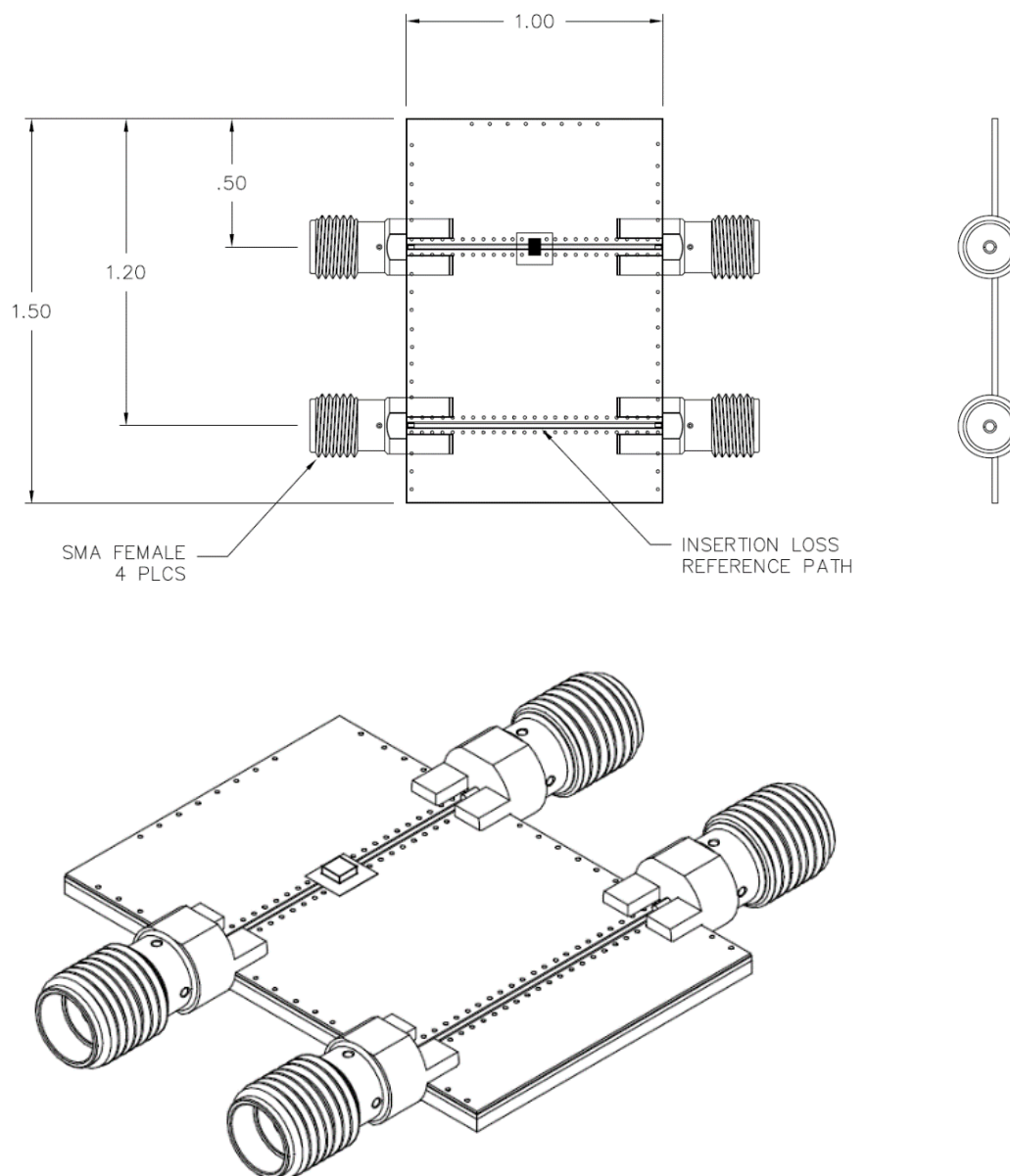
Figure 7 Package Outline



6 Evaluation Board Assembly

The following illustrations show the evaluation board assembly of the MPS4101-6LP device (ordering part number: MSTF0012). The board material is 0.016 Rogers 4003, 0.5 oz. copper cladding on both sides (starting thickness). It has a full-metal backside and an electroless nickel immersion gold (ENIG) finish on both sides. Solder mask is applied to the topside only. Units are in inches.

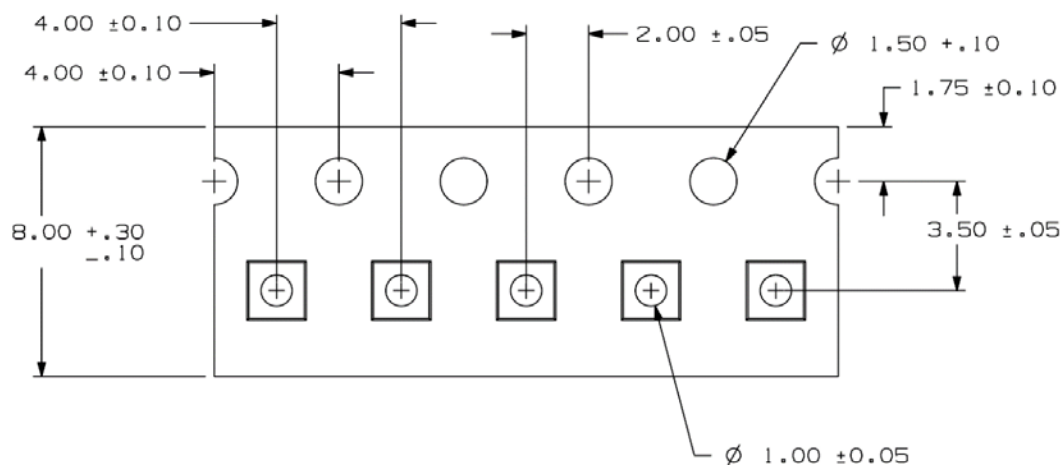
Figure 8 Evaluation Board Assembly



7 Tape-and-Reel Format

The following illustration shows the tape-and-reel format of the MPS4101-6LP device.

Figure 9 Tape-and-Reel Format



8 Ordering Information

The following table shows the ordering information for the MPS4101-6LP device.

Table 5 Ordering Information

Part Number	Package
MPS4101-6LP	Plastic QFN
MSTF0012	Evaluation board assembly

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[MPS4101-6LP](#)