

MMS008AA Datasheet
DC–8 GHz GaAs MMIC SP4T Non-Reflective
Switch



**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	Functional Block Diagram	7
2.2	Applications	7
2.3	Key Features.....	7
3	Electrical Specifications.....	8
3.1	Absolute Maximum Ratings	8
3.2	Typical Electrical Performance	8
3.3	Typical Performance Curves.....	9
3.4	Control Voltages.....	11
4	Chip Outline Drawing, Die Packaging, Bond Pad, and Assembly Information	12
4.1	Chip Outline Drawing	12
4.2	Die Packaging Information	12
4.3	Bond Pad Information	13
4.4	Assembly Diagram	13
5	Handling and Die Attachment Recommendations.....	14
6	Ordering Information	15

List of Figures

Figure 1 Functional Block Diagram	7
Figure 2 Insertion Loss vs. Temperature	9
Figure 3 Isolation	9
Figure 4 Return Loss.....	10
Figure 5 0.1 dB and 1 dB Input Compression Point	10
Figure 6 Input Third Order Intercept Point.....	11
Figure 7 Chip Outline	12
Figure 8 Assembly Diagram	13

List of Tables

Table 1	Absolute Maximum Ratings	8
Table 2	Typical Electrical Performance	8
Table 3	Switch Control Truth Table.....	11
Table 4	Digital Control Voltages.....	11
Table 5	Die Packaging Information	12
Table 6	Bond Pad Information	13
Table 7	Ordering Information	15

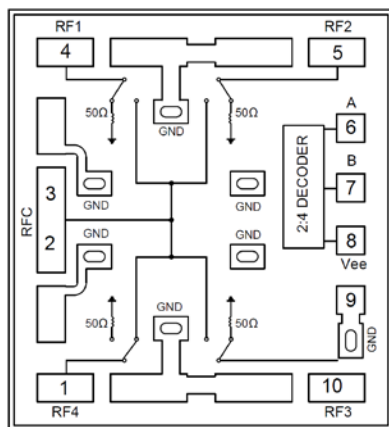
2 Product Overview

The MMS008AA is a DC-to-8 GHz, non-reflective gallium arsenide (GaAs) pseudomorphic high-electron mobility transistor (pHEMT) single pole 4 throw (SP4T) monolithic microwave integrated circuit (MMIC) switch chip. The switch delivers over 45 dB of isolation across the DC-to-8 GHz band while maintaining a low insertion loss of 1.6 dB. The RF ports are internally matched to 50 Ω , which allows for easy integration into multi-chip modules (MCMs).

2.1 Functional Block Diagram

The following illustration shows the primary functional blocks of the MMS008AA device.

Figure 1 Functional Block Diagram



2.2 Applications

The MMS008AA device is designed for the following applications:

- Test instrumentation
- Military radar, radio, EW and ECM applications
- General purpose microwave applications

2.3 Key Features

The following are key features of the MMS008AA device.

- Non-reflective topology
- Broadband performance: DC–8 GHz
- Fast switching: 10 ns
- Low insertion loss: <2 dB
- Excellent isolation: >45 dB
- Compact die size: 1.1 mm × 1.2 mm × 0.1 mm
- High Input P1dB: 28 dBm
- High Input IP3: 46 dBm

3 Electrical Specifications

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of the MMS008AA device.

Table 1 Absolute Maximum Ratings

Parameter	Rating
Storage temperature	–65 °C to 150 °C
Operating temperature	–40 °C to 85 °C
RF input power	30 dBm
Control voltage range (A/B)	0.5 V to –5 V
Hot switching power	27 dBm
Channel temperature	150 °C
Thermal resistance (insertion loss path)	130 °C/W
Thermal resistance (terminated path)	845 °C/W
ESD HBM	Class 1A

3.2 Typical Electrical Performance

The following table shows the typical electrical performance of the MMS008AA device at 25 °C, where V_{CONTROL} is 0 V, –5 V, and V_{EE} is –5 V. The system is 50 Ω .

Table 2 Typical Electrical Performance

Parameter	Test Conditions	Min	Typ	Max	Units
Operational frequency range		DC		8.0	GHz
Control voltage	Low	–3.0		0	V
	High	–5.0		–4.2	V
Insertion loss	DC–6.0 GHz		1.4	2.1	dB
	DC–8.0 GHz		1.6	2.2	dB
Isolation	DC–2.0 GHz	44	61		dB
	DC–4.0 GHz	37	52		dB
	DC–6.0 GHz	34	47		dB
	DC–8.0 GHz	30	45		dB
$T_{\text{RISE}}, T_{\text{FALL}}$	DC–8.0 GHz (10% to 90% and 90% to 10% RF)		10, 10		ns
$T_{\text{ON}}, T_{\text{OFF}}$	DC–8.0 GHz (50% control to 90% RF, and 50% control to 90% RF)		85, 35		ns
Return loss (on state)	DC–2.0 GHz	10	20		dB
	DC–8.0 GHz	7	17		dB
Return loss (off state)	DC–8.0 GHz	7	27		dB

Parameter	Test Conditions	Min	Typ	Max	Units
Input P1dB	0.5 GHz–8.0 GHz	17	28		dBm
Input third order intercept (IIP3)	0.5 GHz–8.0 GHz (two-tone input power, 0 dBm/tone)	43	46		dBm

3.3 Typical Performance Curves

The following graphs show the typical performance curves of the MMS008AA device.

Figure 2 Insertion Loss vs. Temperature

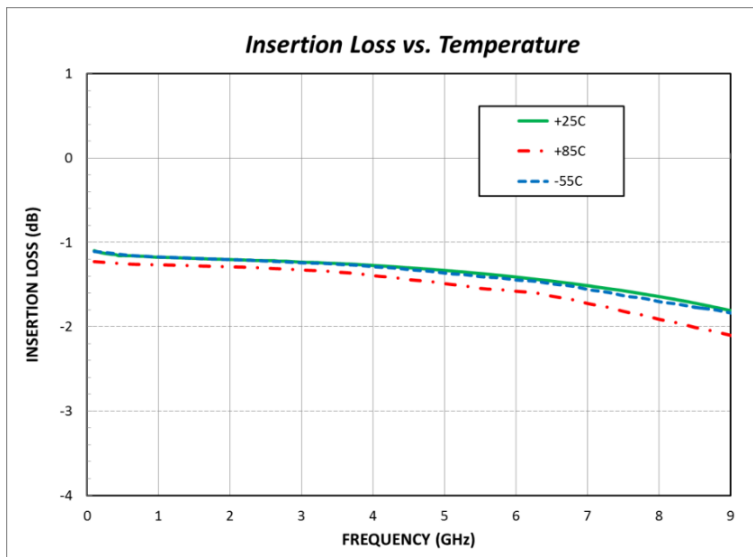


Figure 3 Isolation

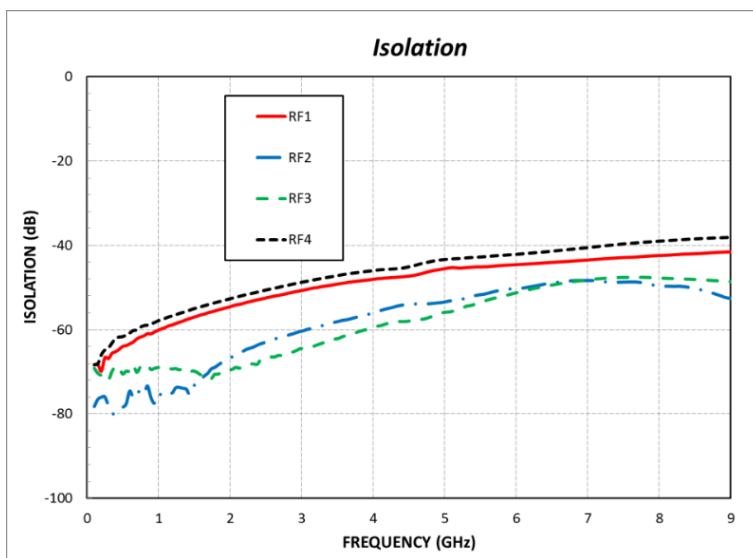


Figure 4 Return Loss

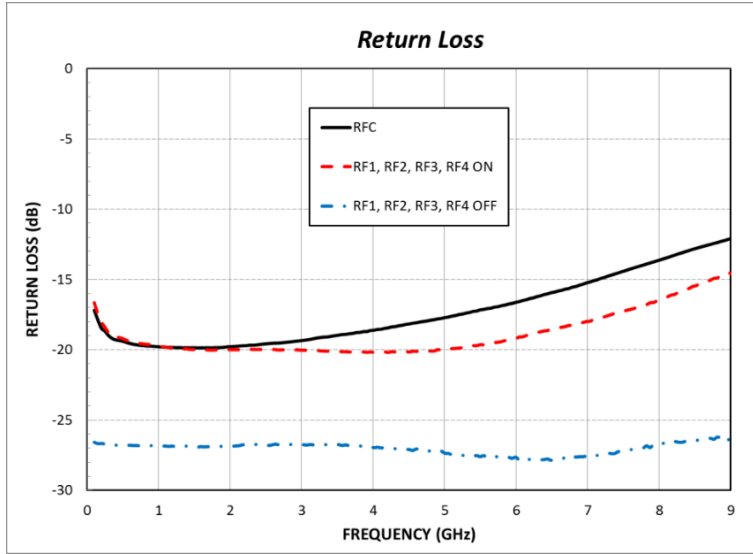


Figure 5 0.1 dB and 1 dB Input Compression Point

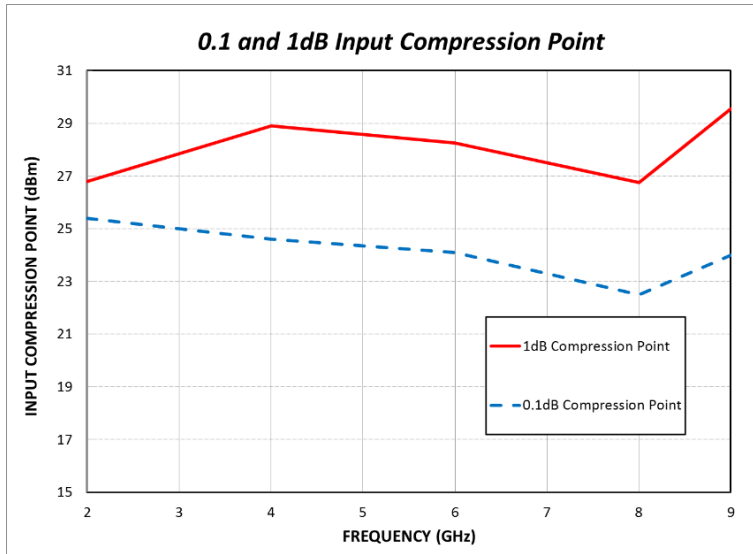
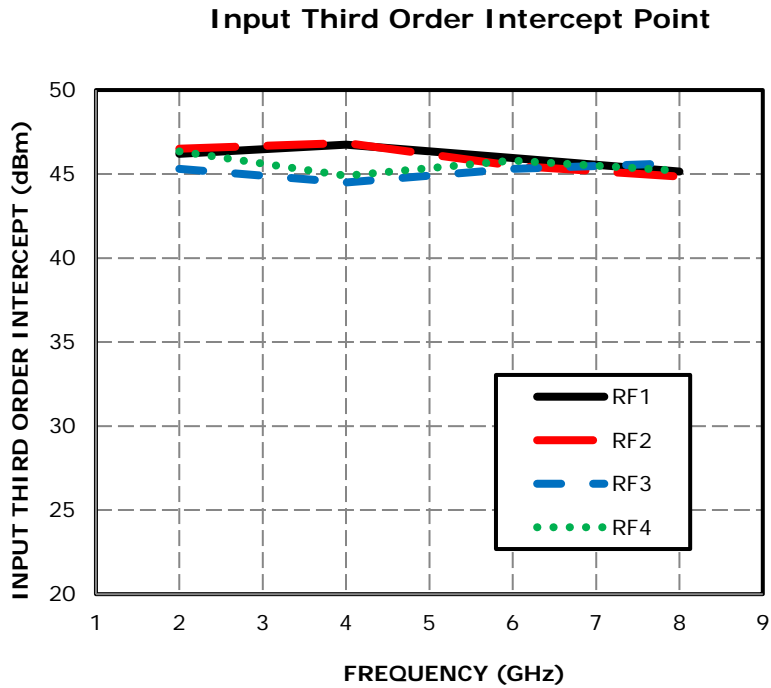


Figure 6 Input Third Order Intercept Point



3.4 Control Voltages

The following tables show the control voltages of the MMS008AA device.

Table 3 Switch Control Truth Table

Control Input		Signal Path Condition			
A	B	RF Common to RF1	RF Common to RF2	RF Common to RF3	RF Common to RF4
High	High	On	Off	Off	Off
Low	High	Off	On	Off	Off
High	Low	Off	Off	On	Off
Low	Low	Off	Off	Off	On

Table 4 Digital Control Voltages

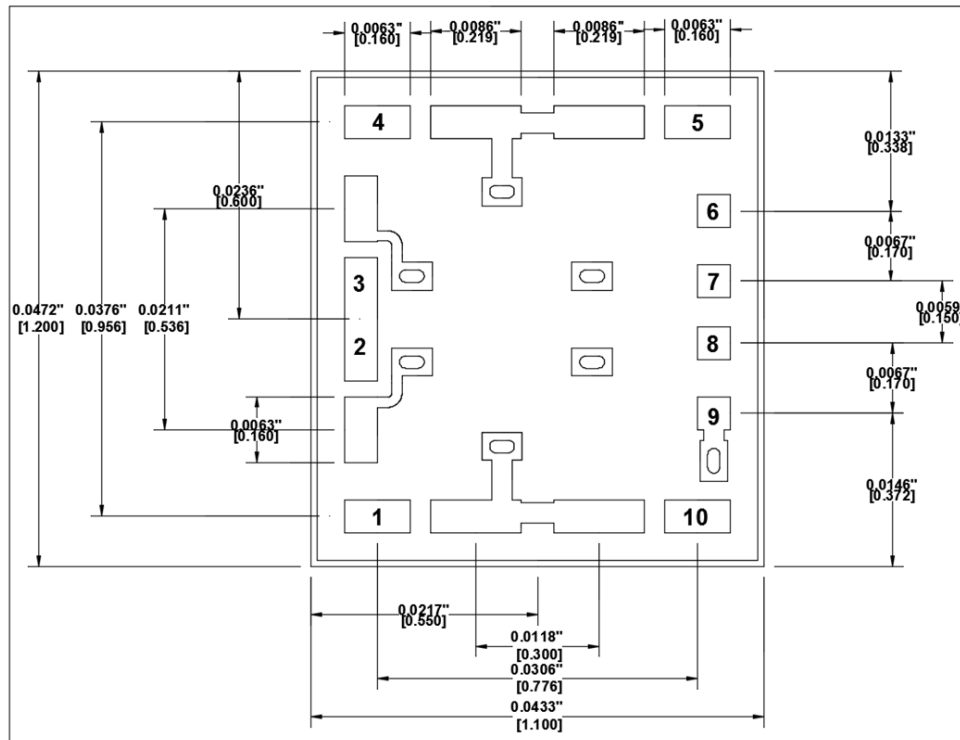
State	Bias Condition
Low	–3 V to 0 V
High	–5.0 V to –4.2 V

4 Chip Outline Drawing, Die Packaging, Bond Pad, and Assembly Information

4.1 Chip Outline Drawing

The following illustration shows the chip outline of the MMS008AA device. Dimensions are shown in inches and millimeters. The minimum bond pad size is 100 μm × 100 μm. Both the bond pad surface and the backside metal are 3 μm gold. The die thickness is 100 μm. The backside is the DC/RF ground. The airbridge keepout region is in crosshatch, and the unlabeled pads should not be bonded.

Figure 7 Chip Outline



4.2 Die Packaging Information

The following table shows the chip outline of the MMS008AA device. For additional packaging information, contact your Microsemi sales representative.

Table 5 Die Packaging Information

Standard Format	Optional Format
Waffle pack	Gel pack
50–100 pieces per pack	50 pieces per pack

4.3 Bond Pad Information

The following table shows the bond pad information for the MMS008AA device.

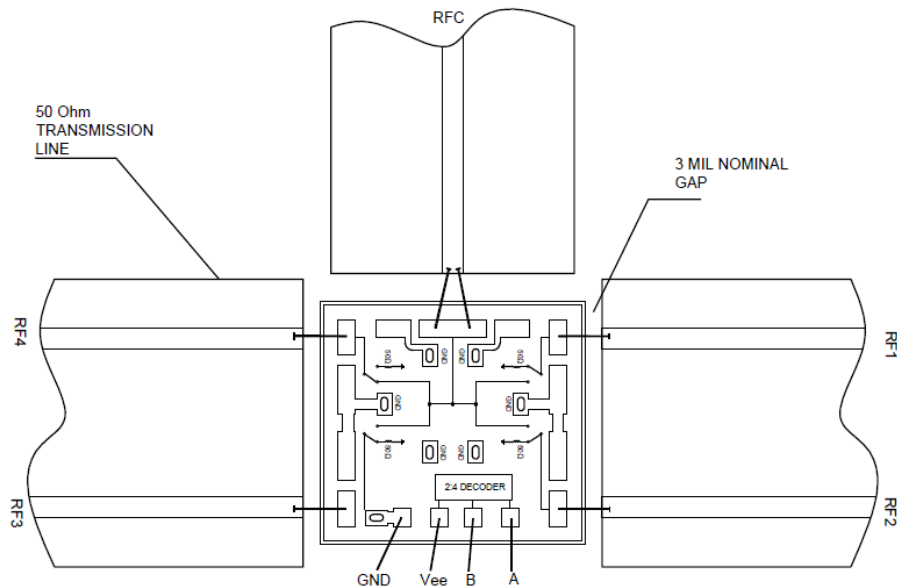
Table 6 Bond Pad Information

Bond Pad Number	Bond Pad Name	Description
1, 4, 5, 10	RF4, RF1, RF2, RF3	RF output 4, RF output 1, RF output 2 and RF output 3. These bond pads are DC-coupled and matched to 50 Ω . DC-blocking capacitors are required.
2, 3	RFC	RF Common. DC-blocking capacitor is required.
6, 7	A, B	Digital control voltage. Refer to Control Voltages section.
8	V _{EE}	DC voltage supply: –5.0 VDC \pm 10%.
9, backside paddle	RF/DC GND	RF/DC ground.

4.4 Assembly Diagram

The following figure shows the assembly diagram of the MMS008AA device.

Figure 8 Assembly Diagram



5 Handling and Die Attachment Recommendations

Gallium arsenide integrated circuits are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. It is recommended to follow all procedures and guidelines outlined in the Microsemi application note [AN01 GaAs MMIC Handling and Die Attach Recommendations](#).

6 Ordering Information

The following table shows the ordering information for the MMS008AA device.

Table 7 Ordering Information

Part Number	Package
MMS008AA	Die



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

Телефон: 8 (812) 309 58 32 (многоканальный)

Факс: 8 (812) 320-02-42

Электронная почта: org@eplast1.ru

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.