

GaAs MMIC DPDT DIVERSITY SWITCH, 4.9 - 5.9 GHz

Typical Applications

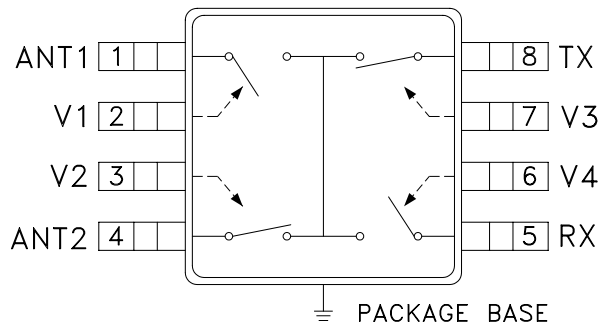
This switch is ideal for use as a DPDT Diversity Switch for 4.9 - 5.9 GHz applications:

- HiperLAN & 802.11a WLAN
- UNII Radios

Features

- Low Insertion Loss: 1.0 dB
- High IP3: +50 dBm
- P1dB Compression: 1 Watt
- Positive Control: 0/+3V
- Ultra Small MSOP8G Package: 14.8 mm²

Functional Diagram



General Description

The HMC436MS8G is a low cost C-band DPDT switch that operates between 4.9 and 5.9 GHz. This switch can operate as an integrated antenna diversity and transmit/receive switch for the 802.11a/HiperLAN and UNII radio platforms. The design provides 20 dB of isolation between antennas and between Tx and Rx ports. The switch features 1 dB insertion loss and high power handling capability. Switch state is controlled using four control voltage lines toggled between 0 and +3 to +5V.

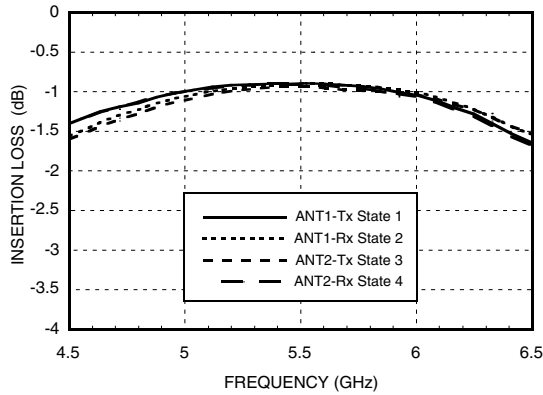
Electrical Specifications,

$T_A = +25^\circ\text{C}$, $V_{ctl} = 0/+3\text{Vdc}$ (Unless Otherwise Stated), 50 Ohm System

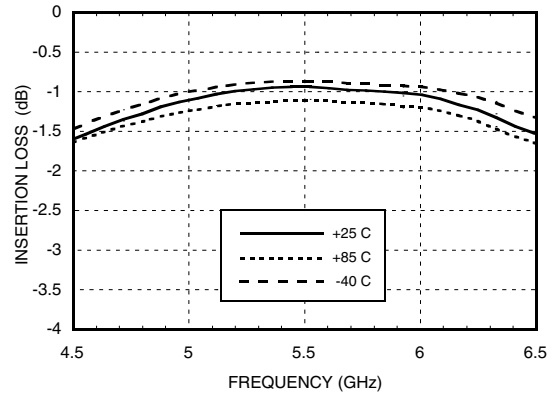
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	4.9 - 5.1 GHz		1.2	1.5	dB
	5.1 - 5.9 GHz		1.0	1.3	
Isolation	4.9 - 5.1 GHz	14	18		dB
	5.1 - 5.4 GHz	16	20		
	5.4 - 5.9 GHz	20	25		
Return Loss (On State, Any Port)	4.9 - 5.1 GHz	17	20		dB
	5.1 - 5.4 GHz	16	20		
	5.4 - 5.9 GHz	13	17		
Input Power for 1 dB Compression	4.9 - 5.9 GHz	$V_{ctl} = 0/+3\text{V}$	27	30	dBm
		$V_{ctl} = 0/+5\text{V}$	30	33	
Input Power for 0.1 dB Compression	4.9 - 5.9 GHz	$V_{ctl} = 0/+3\text{V}$	23	26	dBm
		$V_{ctl} = 0/+5\text{V}$	29	32	
Input Third Order Intercept (Two-Tone Input Power= +17 dBm Each Tone)	4.9 - 5.9 GHz	$V_{ctl} = 0/+3\text{V}$	47	50	dBm
		$V_{ctl} = 0/+5\text{V}$	49	52	
Switching Characteristics	4.9 - 5.9 GHz	t_{RISE} / t_{FALL} (10/90% RF)		10	ns
		t_{ON} / t_{OFF} (50% CTL to 10/90% RF)		25	

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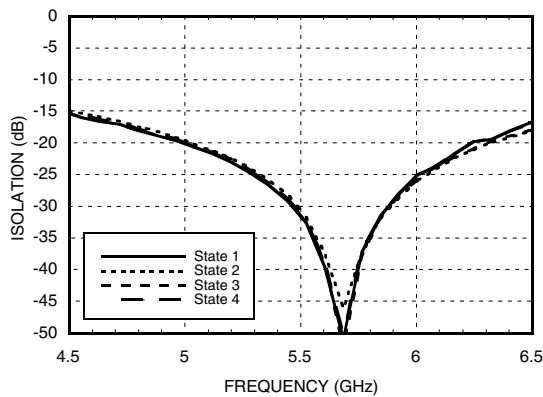
Insertion Loss



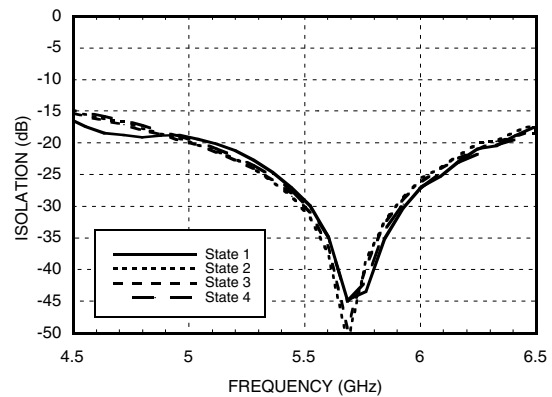
Insertion Loss vs. Temperature



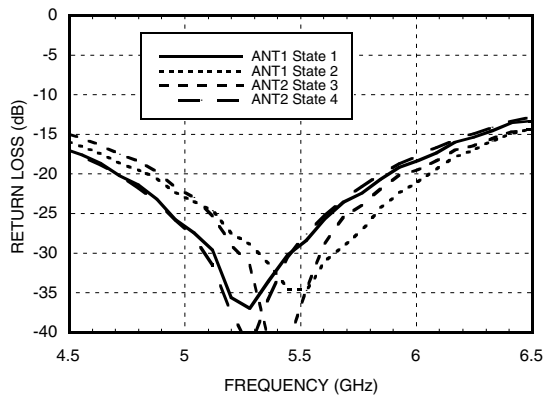
Isolation, Tx & Rx



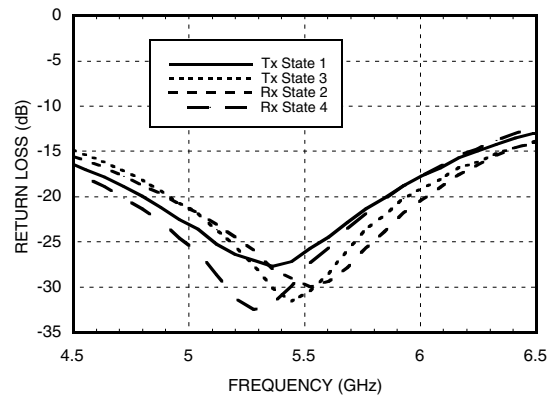
Isolation, ANT1 & ANT2



Return Loss, ANT1 & ANT2

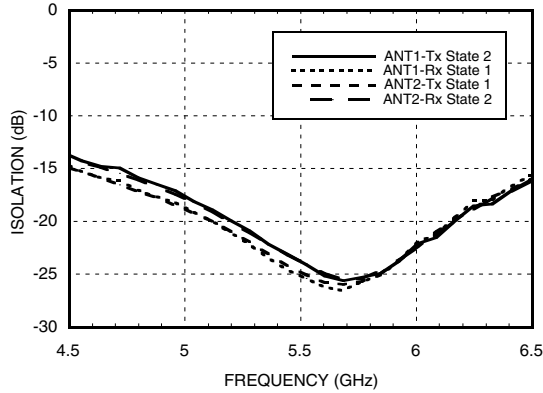


Return Loss, Tx & Rx

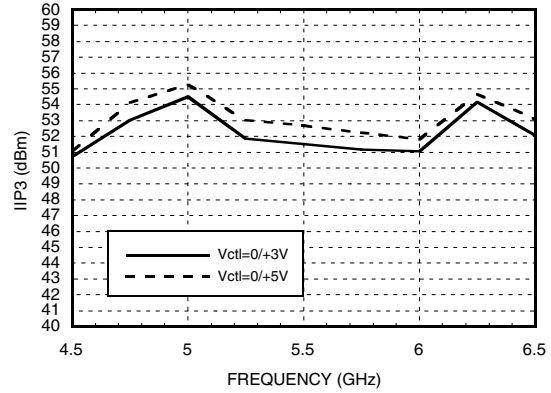


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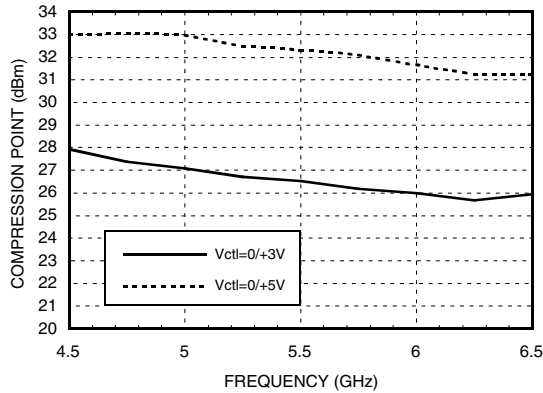
Isolation, ANT1 / ANT2 - Tx / Rx



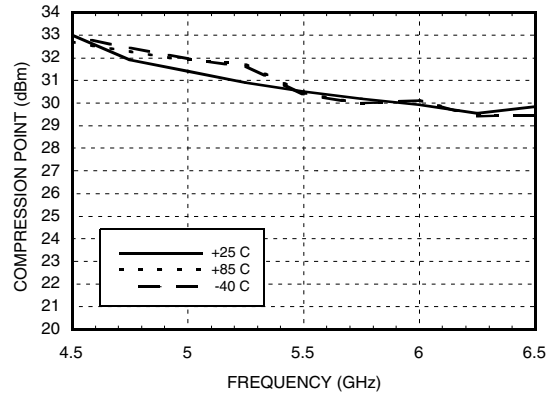
Input IP3 *



Input 0.1 dB Compression Point



Input 1 dB Compression Point, Vctl= 0/+3V



Control Voltages

State	Bias Condition
Low	0 to +0.5 Vdc @ 20 μ A
High	+3.0 to +5.5 Vdc @ 20 μ A Typ.

Truth Table

Path	V1	V2	V3	V4	State
ANT1 - Tx	High	Low	High	Low	1
ANT1 - Rx	High	Low	Low	High	2
ANT2 - Tx	Low	High	High	Low	3
ANT2 - Rx	Low	High	Low	High	4
All Off*	Low	Low	Low	Low	5

* External components are necessary if "all off" isolation state is desired. See HMC436MS8G product note.

* Two-tone input power = +17 dBm each tone, 1 MHz spacing.

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:
 12 Elizabeth Drive, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373
 Order Online at www.hittite.com

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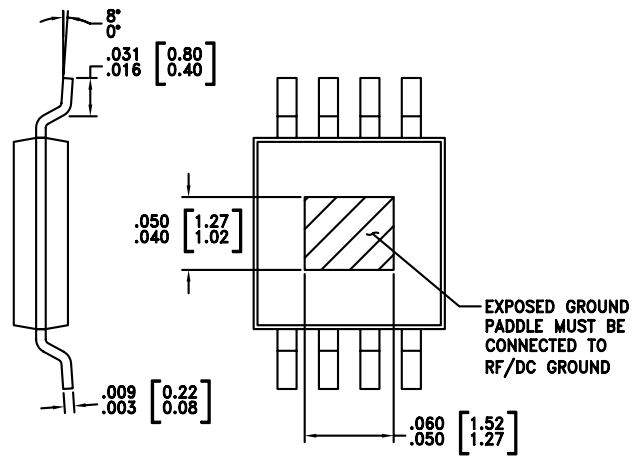
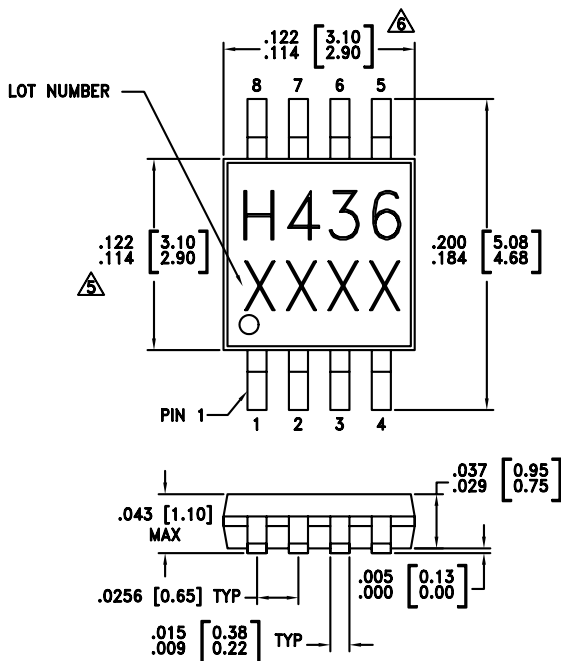
Absolute Maximum Ratings

RF Input Power Vctl= 0/+3V	+30 dBm
Control Voltage Range (V1, V2, V3, V4)	-0.5 to +7.5 Vdc
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C

Caution: Do not "Hot Switch" power levels greater than +23 dBm (Vctl = 0/+3 Vdc).

DC blocking capacitors are required at ports ANT1, ANT2, Tx, Rx.

Outline Drawing

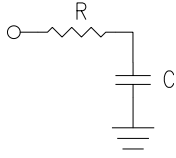
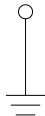


NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
- △ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

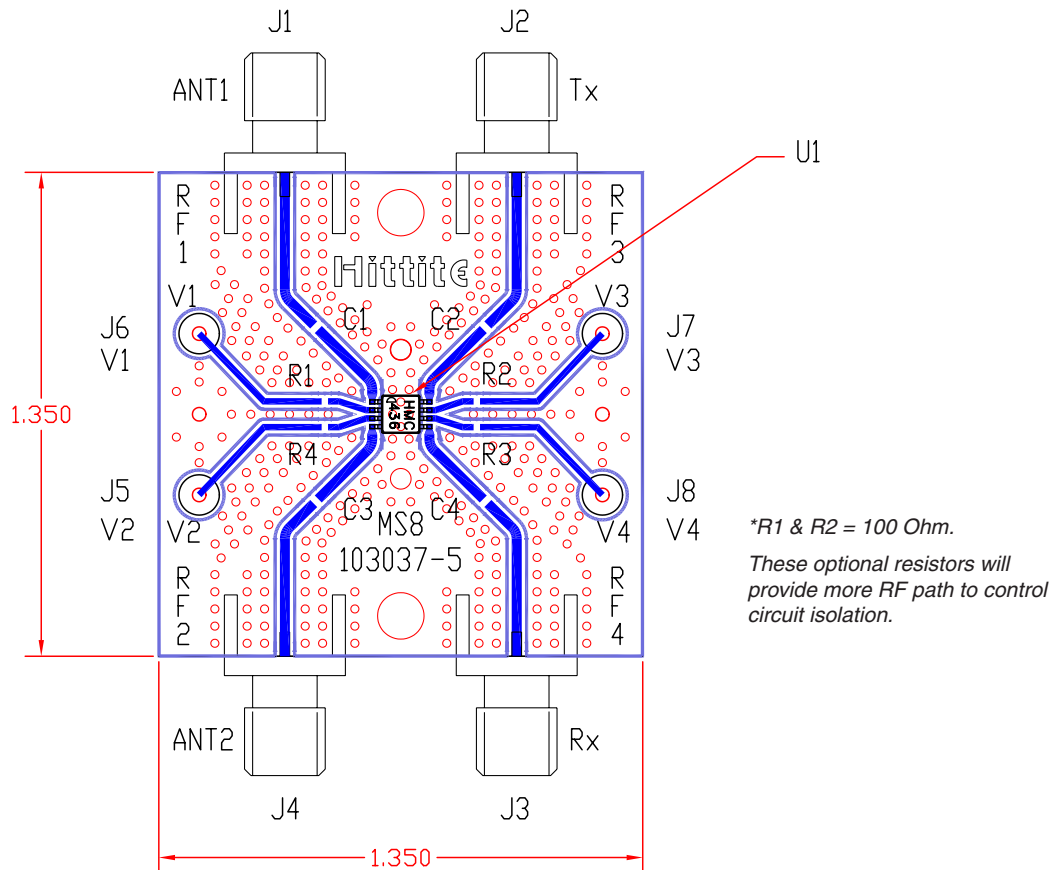
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Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 4	ANT1, ANT2	These pins are DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
2, 3, 6, 7	V1, V2, V4, V3	See truth and control voltage tables.	
5, 8	Rx, Tx	These pins are DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
	GND	Package bottom has exposed metal paddle that must be connected to PCB RF ground.	

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Evaluation PCB



List of Material

Item	Description
J1 - J4	PC Mount SMA Connector
J5 - J8	DC Pin
C1 - C4	100 pF Capacitor, 0402 Pkg.
R1 - R2	100 Ohm Resistor, 0402 Pkg.
U1	HMC436MS8G DPDT Diversity Switch
PCB*	103037 Evaluation PCB 1.5" x 1.5"
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown above. A sufficient number of VIA holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown above is available from Hittite upon request.