HMC436MS8G / 436MS8GE

GaAs MMIC DPDT DIVERSITY OR SP3T SWITCH, 4.9 - 5.9 GHz

Typical Applications

This switch is ideal for use as a DPDT Diversity or SP3T Switch for:

- HiperLAN & 802.11a WLAN
- WiMAX & Fixed Wireless
- UNII Radios
- Mulit-beam Antenna Switching

Features

DPDT or SP3T Functionality

Low Insertion Loss: 1.0 dB

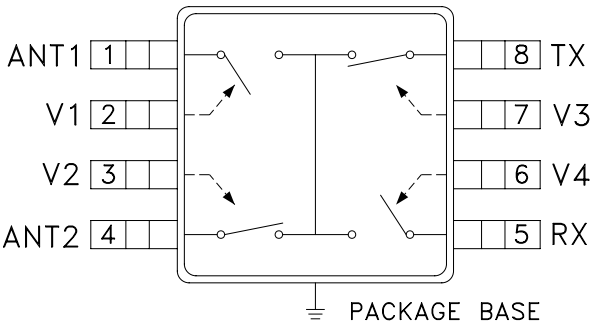
High IP3: +52 dBm

High Input P0.1dB: +32 dBm

Positive Control: 0/+3V or 0/+5V

Optional "All-Off" State

Functional Diagram



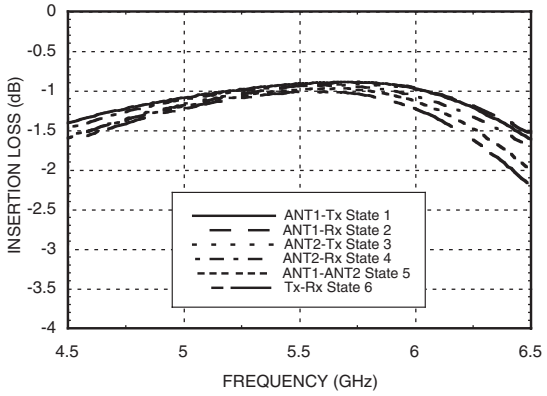
General Description

The HMC436MS8G & HMC436MS8GE are low cost C-band DPDT switches that operate 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 switch can also operate as a SP3T switch with any of the RF ports serving as the common port. 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.

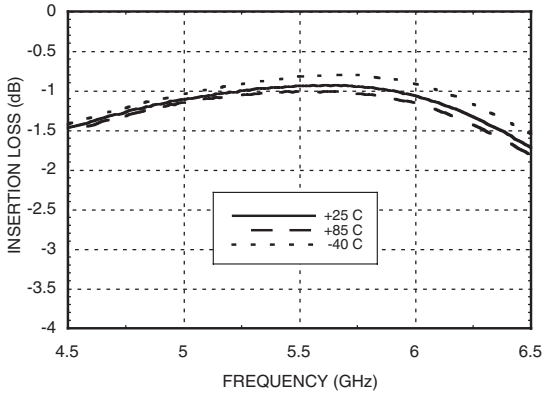
Electrical Specifications, T_A = +25° C, Vctl = 0/+3 Vdc (Unless Otherwise Stated), 50 Ohm System

Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		4.9 - 5.1 GHz 5.1 - 5.9 GHz		1.2 1.0	1.5 1.4	dB dB
Isolation		4.9 - 5.1 GHz 5.1 - 5.4 GHz 5.4 - 5.9 GHz	14 16 20	18 20 25		dB dB dB
Return Loss (On State, Any Port)		4.9 - 5.1 GHz 5.1 - 5.4 GHz 5.4 - 5.9 GHz	17 16 13	20 20 17		dB dB dB
Input Power for 1 dB Compression	Vctl= 0/+3V Vctl= 0/+5V	4.9 - 5.9 GHz	27 30	30 33		dBm dBm
Input Power for 0.1 dB Compression	Vctl= 0/+3V Vctl= 0/+5V	4.9 - 5.9 GHz	23 29	26 32		dBm dBm
Input Third Order Intercept (Two-Tone Input Power= +17 dBm Each Tone)	Vctl= 0/+3V Vctl= 0/+5V	4.9 - 5.9 GHz	47 49	50 52		dBm dBm
Switching Characteristics tRISE / tFALL (10/90% RF) tON / tOFF (50% CTL to 10/90% RF)		4.9 - 5.9 GHz		 10 25		 ns ns

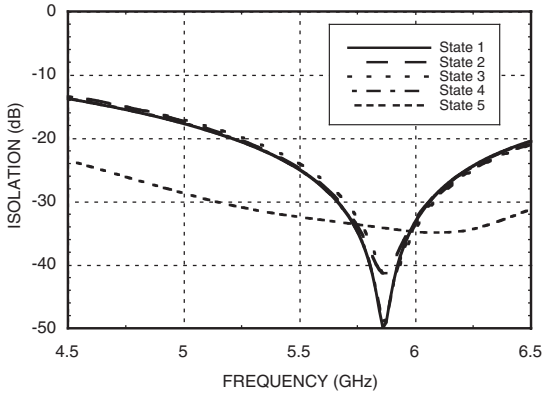
Insertion Loss



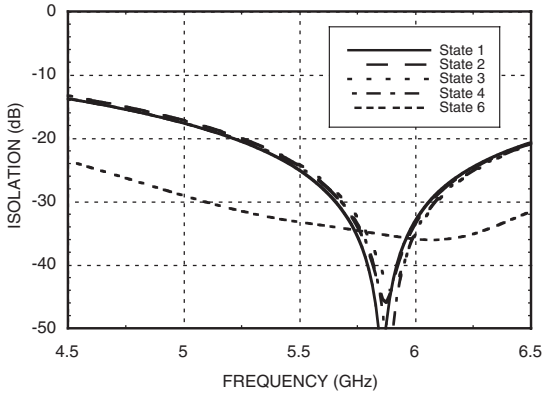
Insertion Loss vs. Temperature



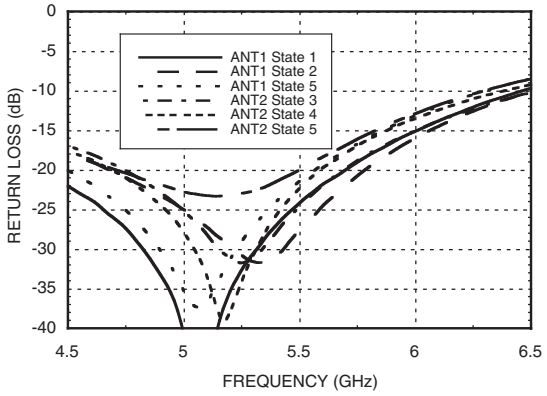
Isolation, Tx & Rx



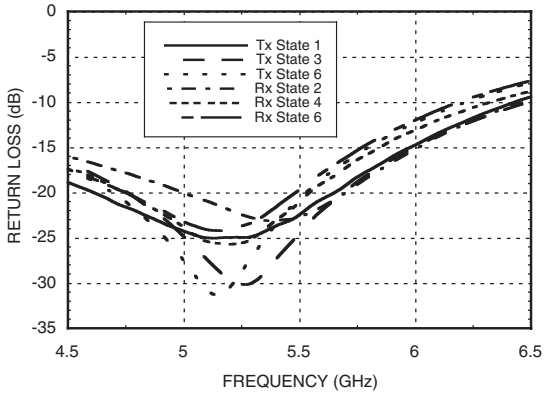
Isolation, ANT1 & ANT2



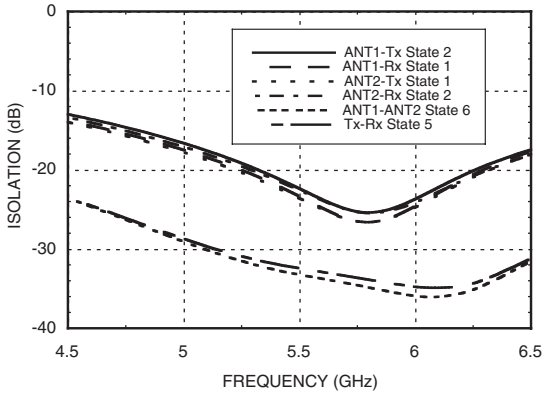
Return Loss, ANT1 & ANT2



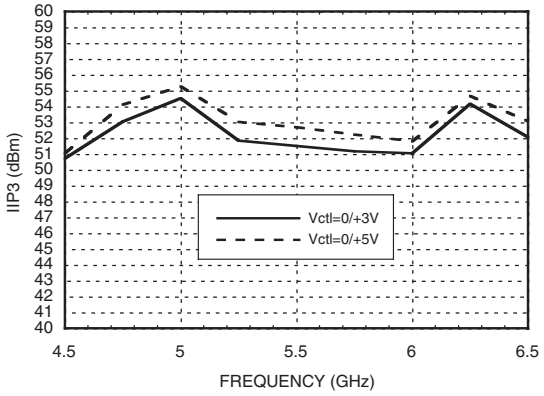
Return Loss, Tx & Rx



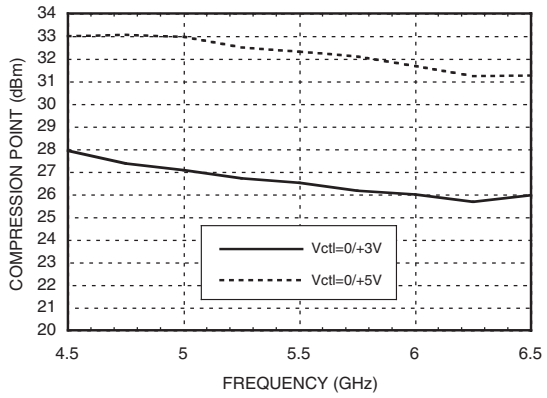
Isolation, ANT1 / ANT2 - Tx / Rx



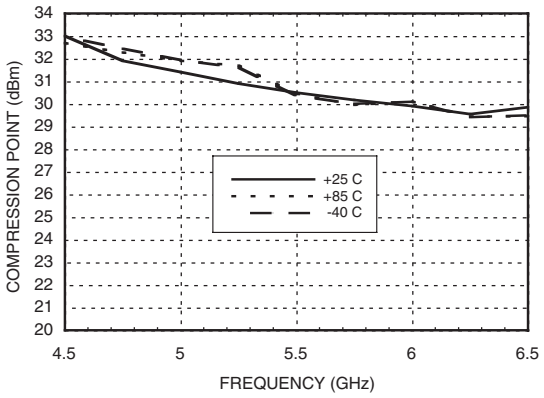
Input IP3 *



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 µA
High	+3.0 to +5.5 Vdc @ 20 µA 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
ANT1 - ANT2	High	High	Low	Low	5
Tx - Rx	Low	Low	High	High	6
All Off*	Low	Low	Low	Low	7

** 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.*

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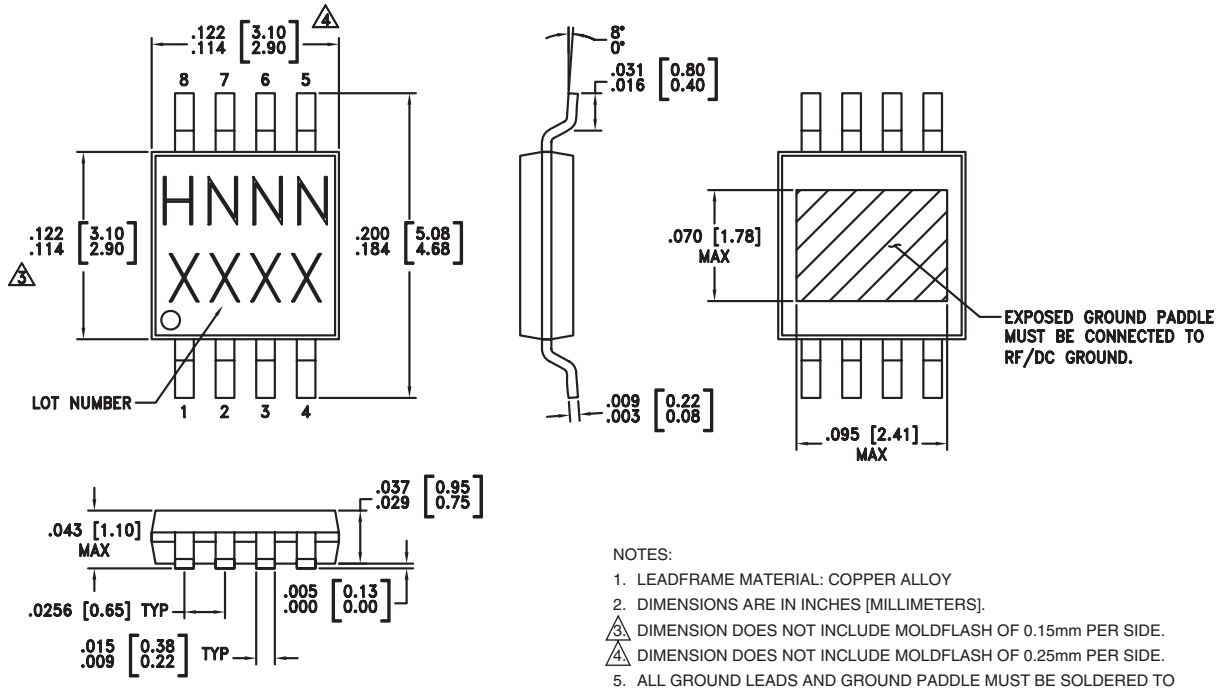
Absolute Maximum Ratings

RF Input Power Vctl= 0/+3V	+30 dBm
Control Voltage Range (V1, V2, V3, V4)	-0.5 to +7.5 Vdc
Hot Switch Power Level (Vctl = 0/+3V)	+26 dBm
Channel Temperature	150 °C
Continuous Pdiss (T=85 °C) (derate 16.7 mW/ °C above 85°C)	1 W
Thermal Resistance	60 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A

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

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

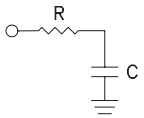
1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS].
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

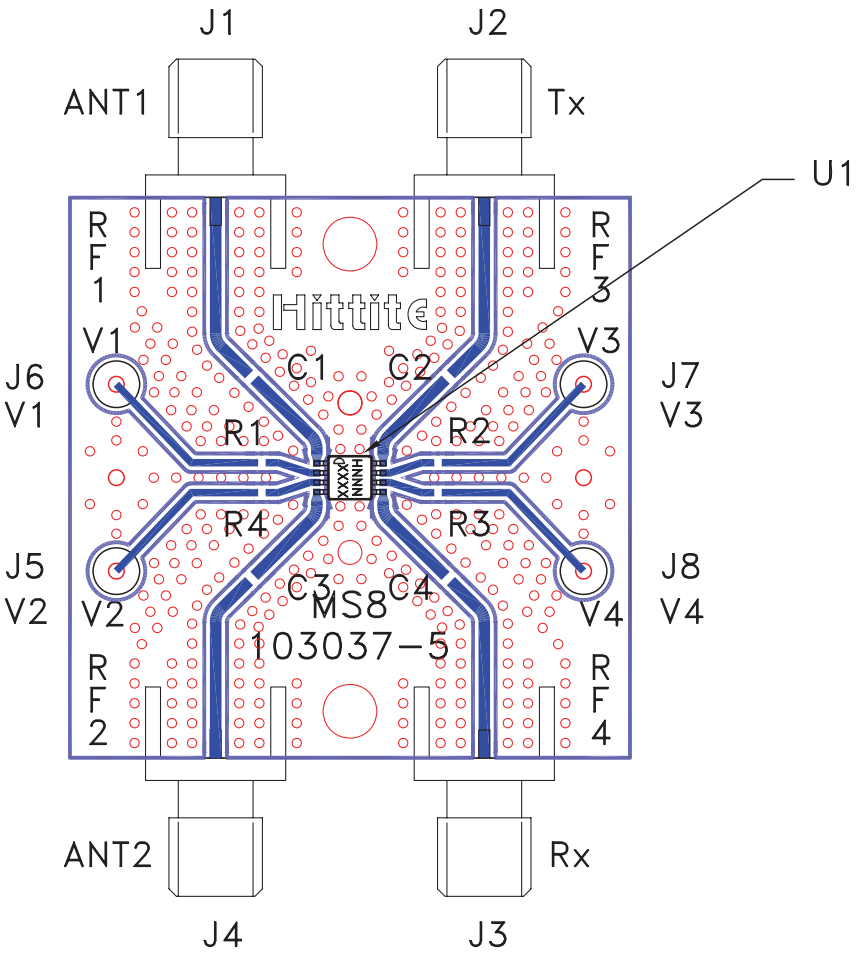
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC436MS8G	Low Stress Injection Molded Plastic	Sn/Pb Solder	MSL1 [1]	H436 XXXX
HMC436MS8GE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [2]	H436 XXXX

[1] Max peak reflow temperature of 235 °C
[2] Max peak reflow temperature of 260 °C
[3] 4-Digit lot number XXXX

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.	

Evaluation PCB



List of Materials for Evaluation PCB 103132 [1]

Item	Description
J1 - J4	PCB Mount SMA Connector
J5 - J8	DC Pin
C1 - C4	100 pF Capacitor, 0402 Pkg.
R1 - R4 [3]	100 Ohm Resistor, 0402 Pkg.
U1	HMC436MS8G / HMC436MS8GE DPDT Diversity or SP3T Switch
PCB [2]	103037 Evaluation PCB 1.5" x 1.5"

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

[3] These optional resistors will provide isolation between the DC and RF circuitry.

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.