HMC393MS8G

GaAs MMIC DPDT DIVERSITY SWITCH, 5.0 - 6.0 GHz

Typical Applications

This switch is ideal for use as a DPDT Diversity Switch for 5.0 - 6.0 GHz applications:

- HiperLAN
- UNII

Features

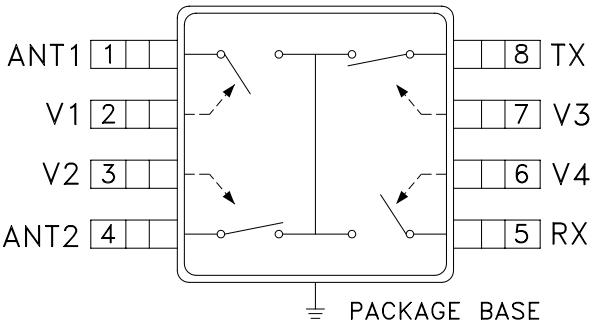
Low Insertion Loss: 1.2 dB @ 5.5 GHz

High IP3: 49 dBm

Positive Control: 0/+5V

Ultra Small MSOP8G Package: 14.8 mm^2

Functional Diagram



General Description

The HMC393MS8G is a low cost C-band DPDT switch that operates between 5.0 and 6.0 GHz. This switch can operate as an integrated antenna diversity and transmit/receive switch for the HyperLAN and UNII radio platforms. The design provides 20 dB of isolation between antennas and between Tx and Rx ports. The switch features 1.2 dB insertion loss and high power handling capability. Switch state is controlled using four CMOS level control voltage lines.

Electrical Specifications, T_A = +25° C, Vctl = 0/+5 Vdc, 50 Ohm System

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	5.0 - 6.0 GHz		1.2	2.0	dB
Isolation	5.0 - 6.0 GHz	15	20		dB
Return Loss (On State, Any Port)	5.0 - 6.0 GHz	13	20		dB
Input Power for 0.1 dB Compression	5.0 - 6.0 GHz	27	30		dBm
Input Third Order Intercept (Two-Tone Input Power = +22 dBm Each Tone)	5.0 - 6.0 GHz	45	49		dBm
Switching Characteristics	5.0 - 6.0 GHz				
tRISE / tFALL (10/90% RF)			11		ns
tON / tOFF (50% CTL to 10/90% RF)			22		ns

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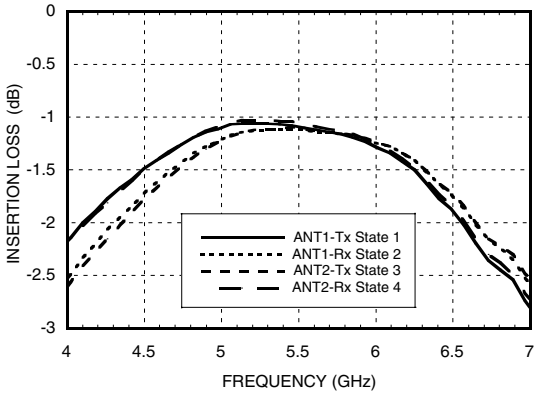
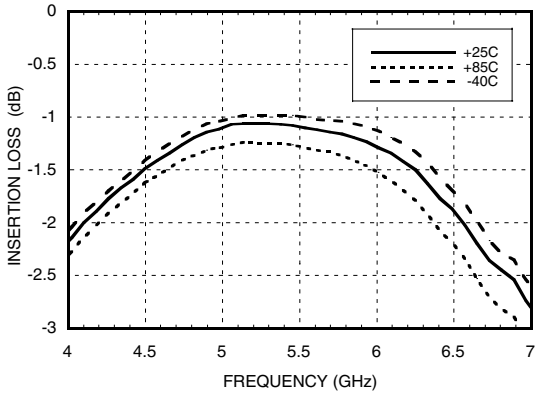
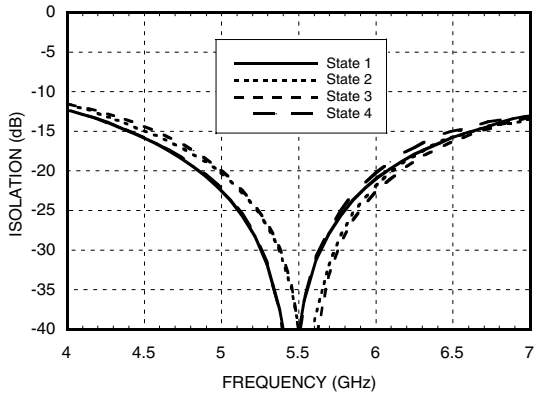
Insertion Loss



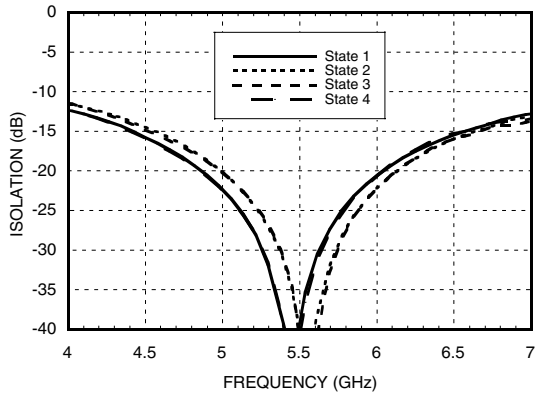
Insertion Loss vs. Temperature



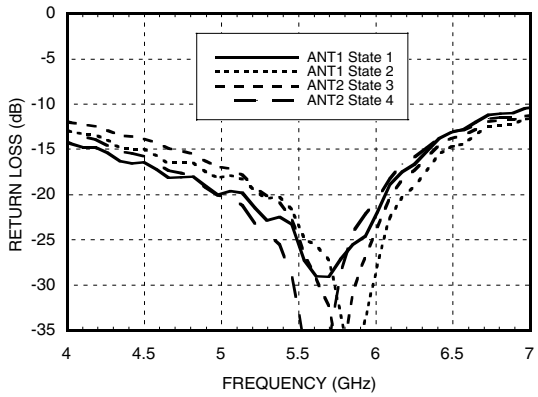
Isolation, Tx & Rx



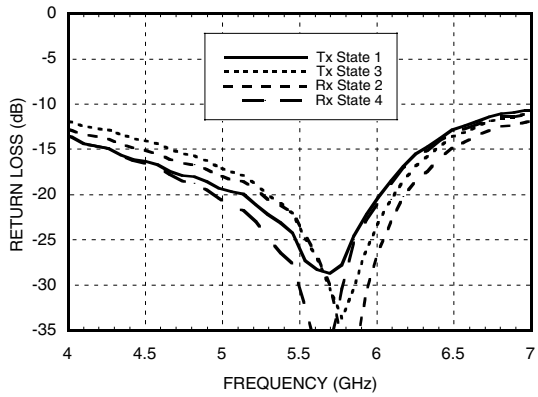
Isolation, ANT1 & ANT2



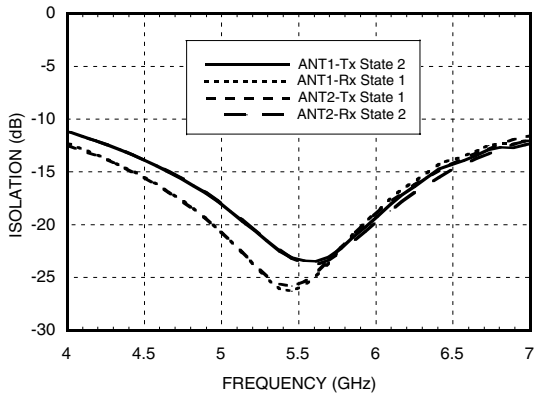
Return Loss, ANT1 & ANT2



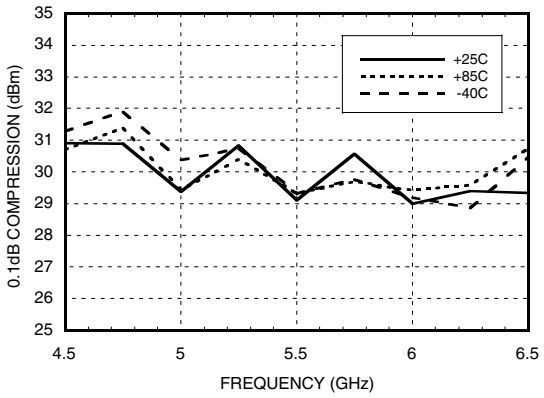
Return Loss, Tx & Rx



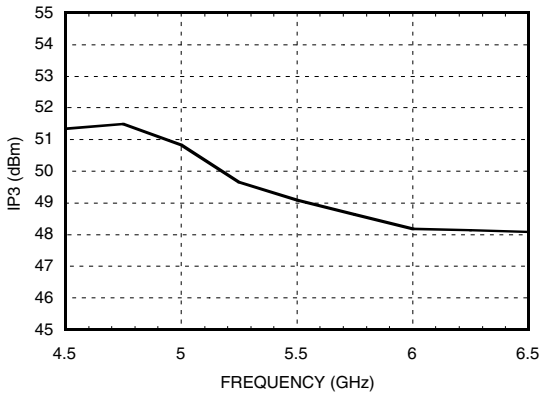
Isolation, ANT1 / ANT2 - Tx / Rx



Input 0.1 dB Compression Point



Input IP3 *



Control Voltages

State	Bias Condition
Low	0 to +0.5 Vdc @ 10 uA Typ.
High	+5.0 to +6.5 Vdc @ 10 uA 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

** Two-tone input power = +22 dBm each tone, 1 MHz spacing.*

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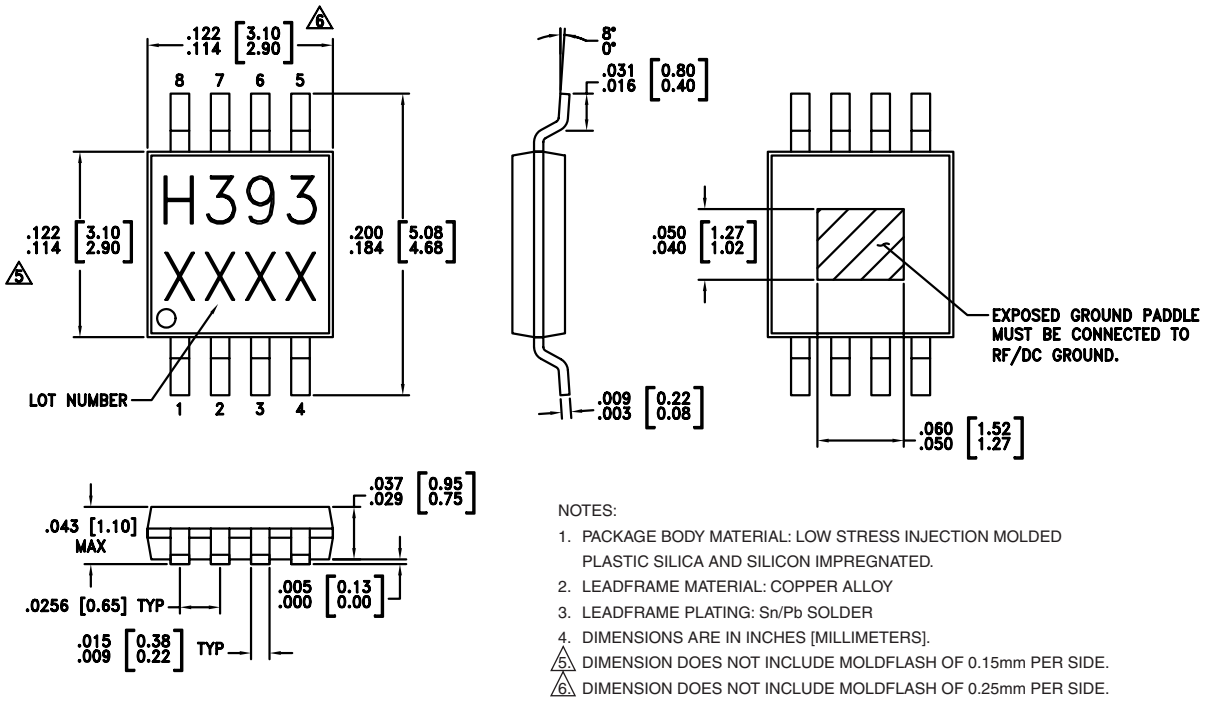
Absolute Maximum Ratings

RF Input Power Vctl = 0/+5V	+33 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/+5 Vdc).

DC blocking capacitors are required at ports ANT1, ANT2, Tx, Rx. Choose value for lowest frequency of operation.

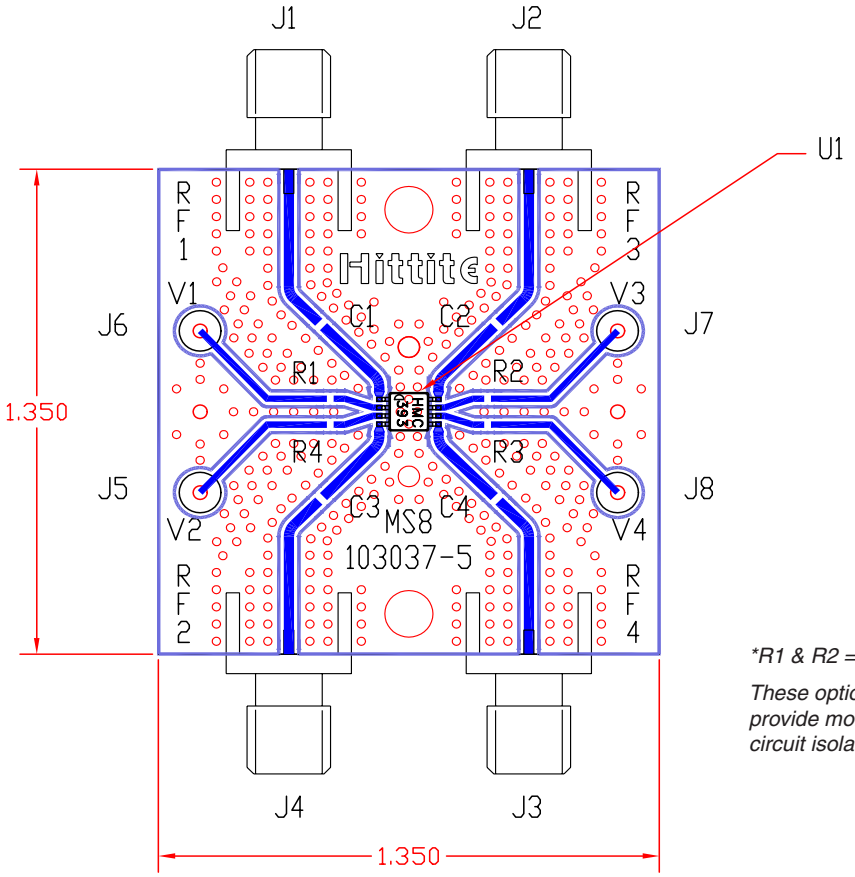
Outline Drawing



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].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Evaluation PCB



*R1 & R2 = 100 Ohm.

These optional resistors will provide more RF path to control circuit isolation.

List of Material

Item	Description
J1 - J4	PC Mount SMA Connector
J5 - J8	DC Pin
C1 - C4	Chip Capacitor, 0402 Pkg. Choose value for lowest frequency of operation. 100 pF is provided on PCB.
R1 - R2	100 Ohm Resistor, 0402 Pkg.
U1	HMC393MS8G DPDT Diversity Switch
PCB*	103037 Evaluation PCB 1.5"x1.5"
* 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.

Notes: