

GaAs MMIC DPDT DIVERSITY SWITCH 5.0 - 6.0 GHz

FEBRUARY 2001

v00.0101

Features

Low Insertion Loss: <1.2 dB @ 5.5 GHz

High IP3: 49 dBm

Positive Control: 0/+5V

Ultra Small MSOP8G Package: 14.8 mm²



General Description

The HMC393MS8 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 radios 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.

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SMT DPDT SWITCHES



Guaranteed Performance $V_{ctl} = 0 / +5 V_{dc}$, 50 Ohm System, -40 to +85 deg. C

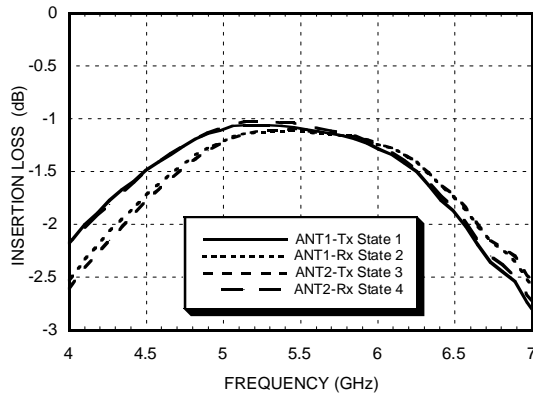
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	5.0 - 6.0 GHz		1.2	2.0	dB
Isolation	5.0 - 6.0 GHz	15	20		dB
Return Loss (On State, Any Port)	5.0 - 6.0 GHz	13	20		dB
Input Power for 0.1 dB Compression	5.0 - 6.0 GHz	27	30		dBm
Input Third Order Intercept (Two Tone Input Power= +22 dBm Each Tone)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

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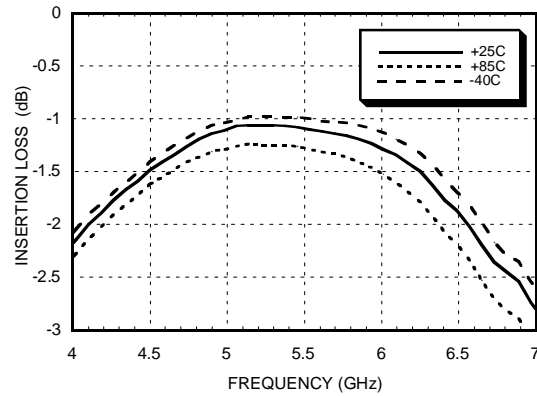
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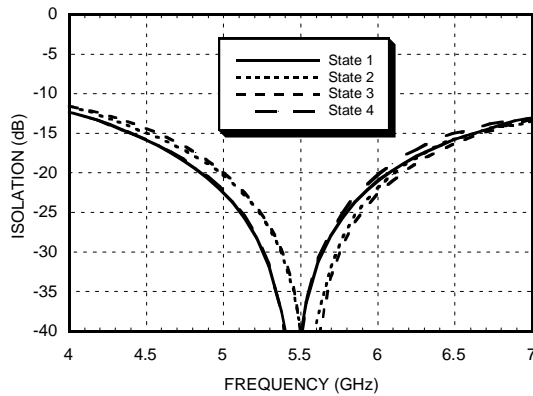
Insertion Loss



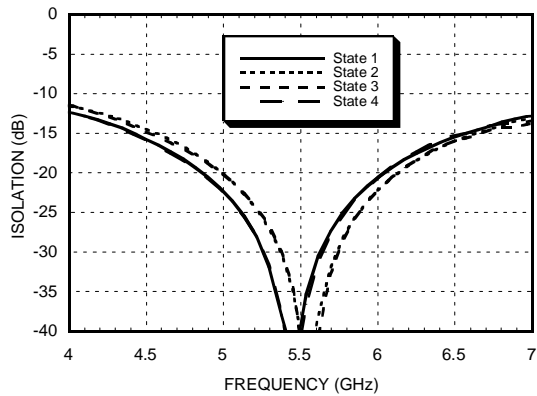
Insertion Loss vs. Temperature



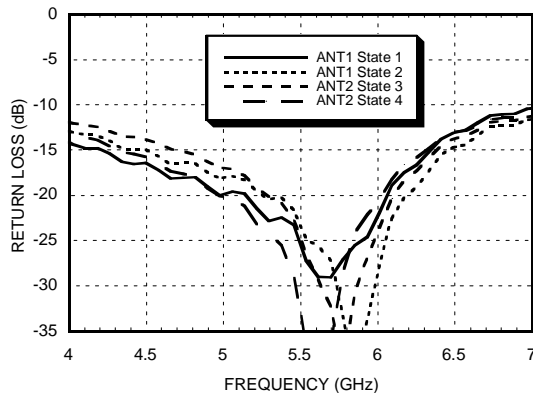
Isolation, Tx & Rx



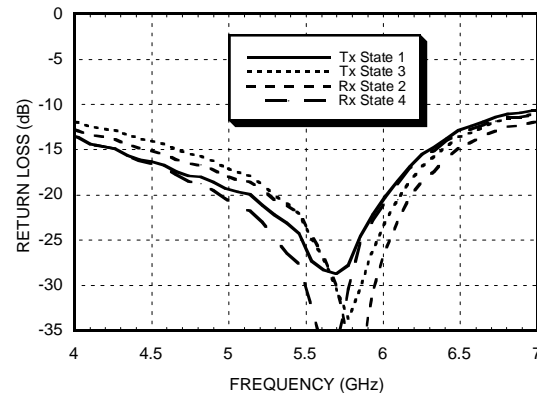
Isolation, ANT1 & ANT2



Return Loss, ANT1 & ANT2



Return Loss, Tx & Rx

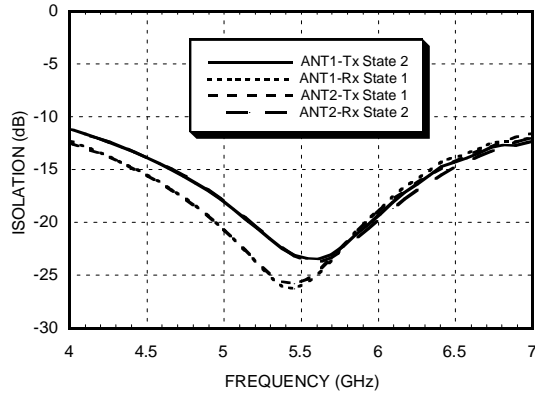


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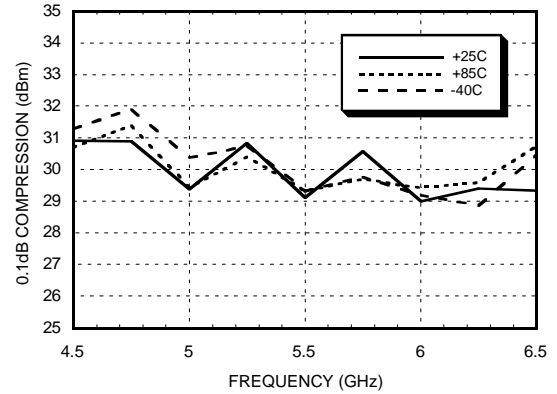
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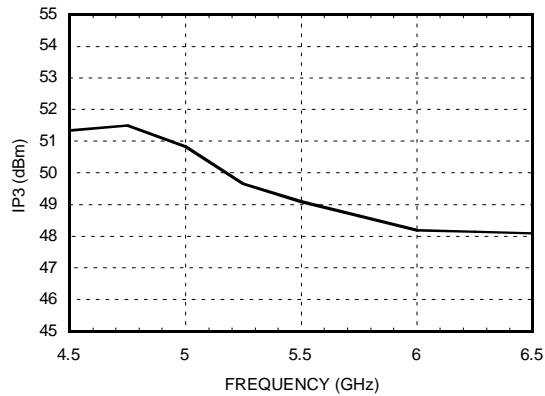
Isolation, ANT1/ANT2 - Tx/Rx



Input 0.1 dB Compression Point



Input IP3



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

Control Voltages

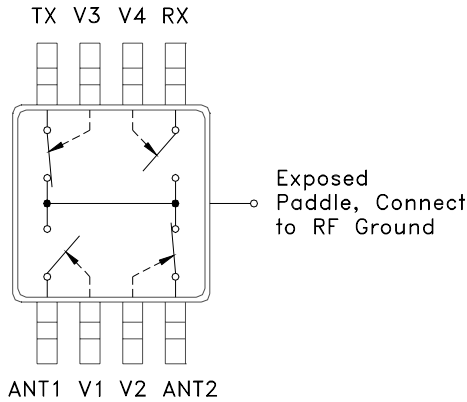
State	Bias Condition
Low	0 to +0.5 Vdc @ 3 uA Typ.
High	+5.0 to +6.5 Vdc @ 3 uA Typ.

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Functional Diagram



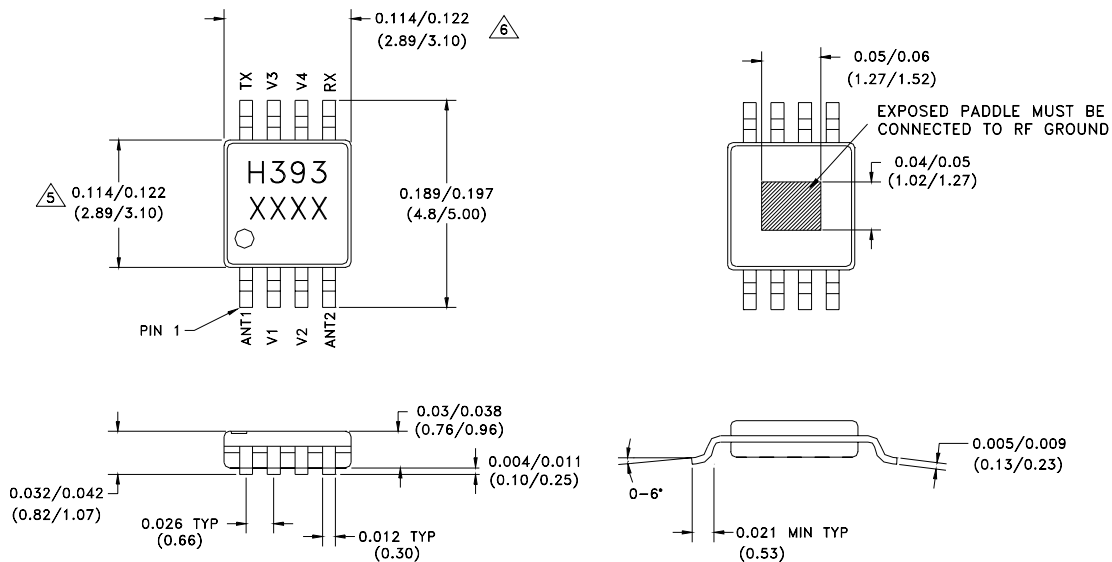
Absolute Maximum Ratings

RF Input Power $V_{ctl} = 0/+5V$	+33 dBm
Control Voltage Range (V1, V2, V3, V4)	-0.5 to +7.5 Vdc
Storage Temperature	-65 to +150 deg C
Operating Temperature	-40 to +85 dec C

Caution: Do not 'hot switch' power levels greater than +23 dBm ($V_{CTL} = 0/+5$ Vdc).

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

Outline Drawing



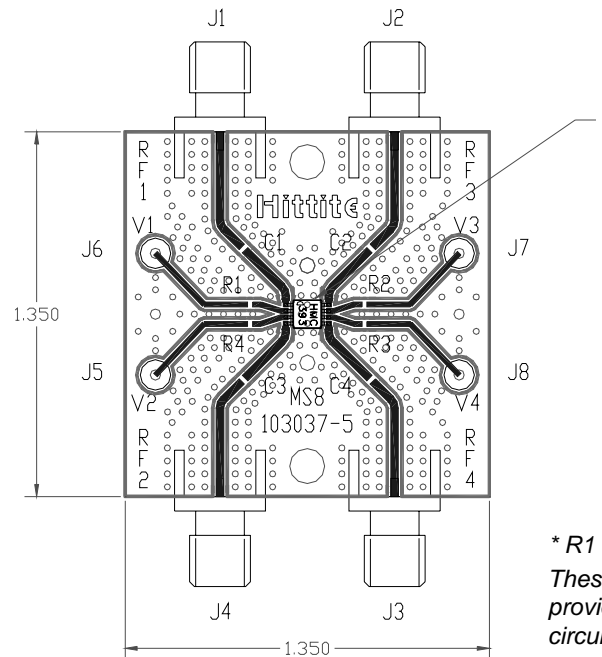
- | | |
|--|---|
| <ol style="list-style-type: none"> MATERIAL:
A) PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
B) LEADFRAME MATERIAL: COPPER ALLOY PLATING: LEAD-TIN SOLDER PLATE DIMENSIONS ARE IN INCHES (MILLIMETERS). | <ol style="list-style-type: none"> UNLESS OTHERWISE SPECIFIED ALL TOL. ARE ± 0.005 (± 0.13). CHARACTERS TO BE HELVETICA MEDIUM, APPROX .020 HIGH WHITE INK, LOCATED APPROXIMATELY AS SHOWN. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15 MM PER SIDE DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25 MM PER SIDE |
|--|---|

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Evaluation PCB for HMC393MS8G



* R1 & R2 = 100 Ω .
These optional resistors will provide more RF path to control circuit isolation.

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 as shown is available from Hittite upon request.

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" x 1.5"
* Circuit Board Material : Rogers 4350	



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NOTES:

