HMC239S8

GaAs MMIC SPDT SWITCH DC - 2.5 GHz

Typical Applications

The HMC239S8 is ideal for:

- MMDS & WirelessLAN
- Basestation Infrastructure
- Portable Wireless

Features

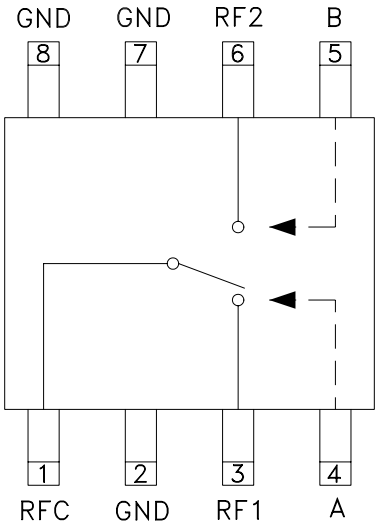
Low Insertion Loss: 0.4 dB

High Isolation: 35 dB

Fast Switching Speed: 2ns

High Input IP3: +50 dBm

Functional Diagram



General Description

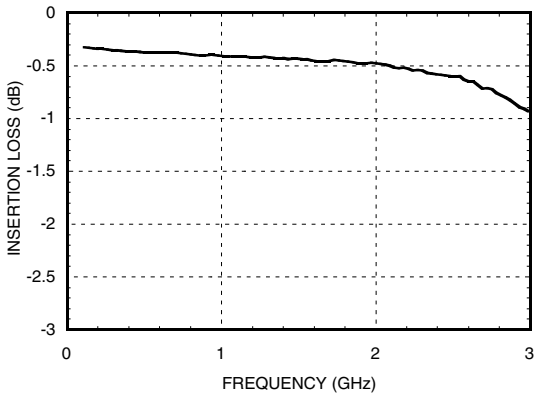
The HMC239S8 is a low-cost GaAs MMIC SPDT switch in an 8-lead SOIC package. The switch can control signals from DC to 2.5 GHz. It is especially suited for low or medium power applications which require extremely fast switching with minimal insertion loss. The two control voltages require a minimal amount of DC current which is optimal for battery powered radio systems. RF1 and RF2 are reflective shorts when "Off".

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

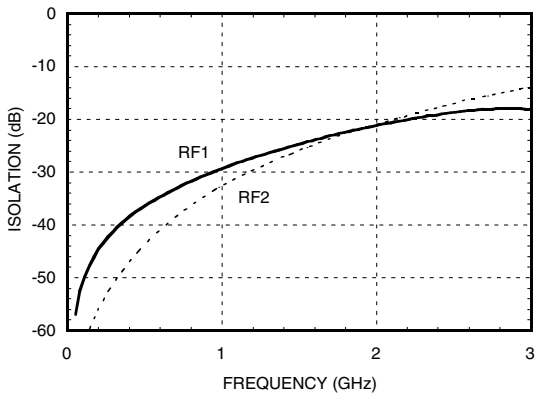
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 0.1 GHz DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz		0.4 0.4 0.5 0.6 0.7	0.6 0.6 0.7 0.8 1.0	dB dB dB dB dB
Isolation	DC - 0.5 GHz DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz	33 26 18 14	36 29 21 17		dB dB dB dB
Return Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz	18 17 15	21 21 20		dB dB dB
Input Power for 1dB Compression 0/-5V Control	0.5 - 1.0 GHz 0.5 - 2.5 GHz	25 23	29 27		dBm dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone) 0/-5V Control	0.5 - 1.0 GHz 0.5 - 2.5 GHz	45 44	50 49		dBm dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 2.5 GHz		 2 10		 ns ns

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

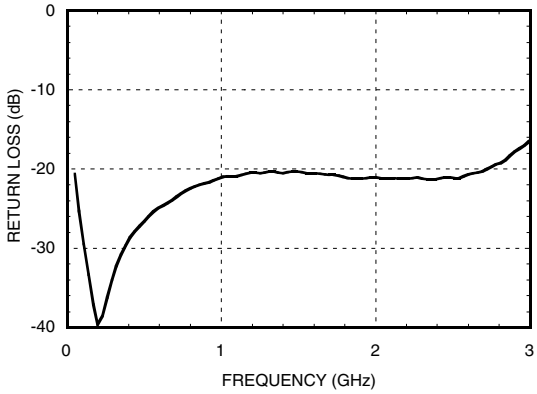
Insertion Loss



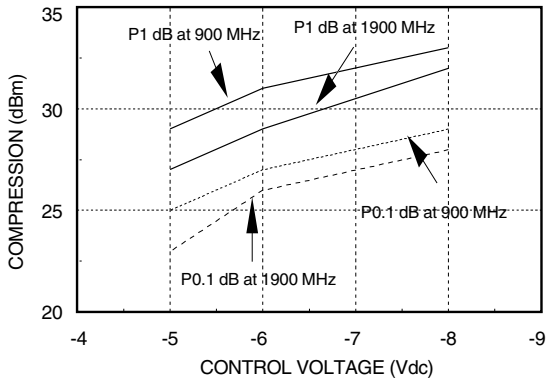
Isolation



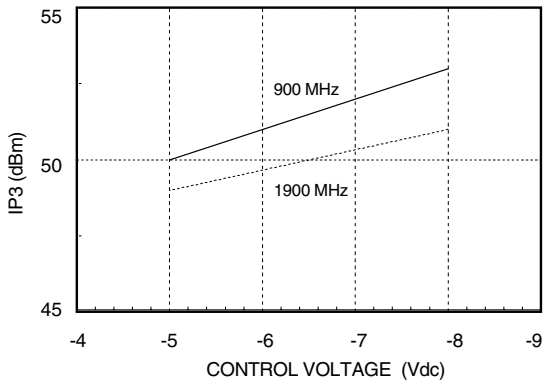
Return Loss



Input 0.1 and 1.0 dB Compression vs. Control Voltage



Input Third Order Distortion vs. Control Voltage



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Truth Table

***Control Input Voltage Tolerances are ± 0.2 Vdc.**

Control Input*		Control Current		Signal Path State	
A (Vdc)	B (Vdc)	Ia (uA)	Ib (uA)	RF to RF1	RF to RF2
-5	0	-25	10	ON	OFF
0	-5	10	-25	OFF	ON
-6	0	-75	30	ON	OFF
0	-6	30	-75	OFF	ON
-7	0	-130	60	ON	OFF
0	-7	60	-130	OFF	OM
-8	0	-190	80	ON	OFF
0	-8	80	-190	OFF	ON

Compression vs. Bias Voltage

	Carrier at 900 MHz		Carrier at 1900 MHz	
Control Input	Input Power for 0.1 dB Compression	Input Power for 1.0 dB Compression	Input Power for 0.1 dB Compression	Input Power for 1.0 dB Compression
(Vdc)	(dBm)	(dBm)	(dBm)	(dBm)
-5	25	29	23	27
-6	27	31	26	29
-8	29	33	28	32

Caution: Do not operate in 1 dB compression at power levels above +30 dBm and do not "hot switch" power levels greater than +20 dBm (Vctl= -5 Vdc).

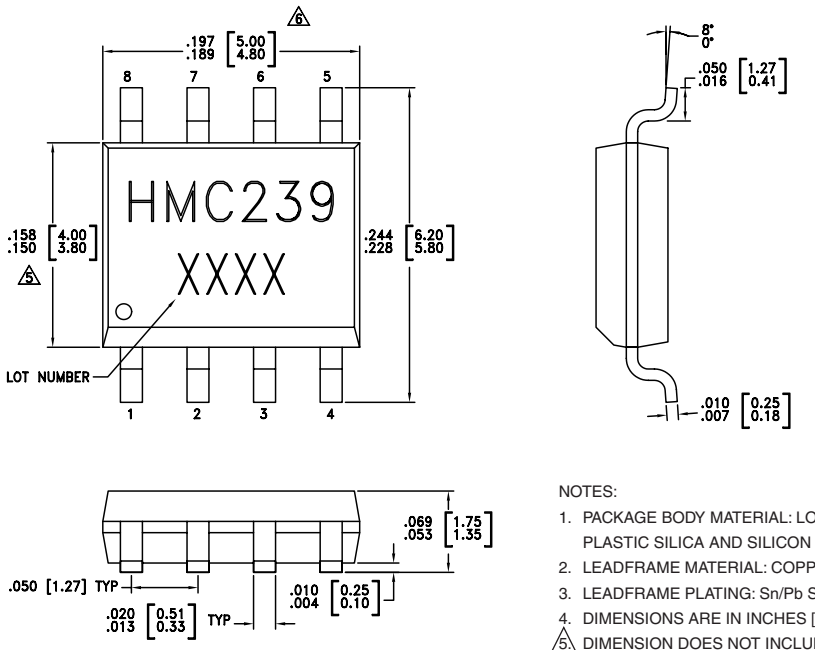
Distortion vs. Bias Voltage

Control Input	Third Order Intercept (dBm) +7 dBm Each Tone	
(Vdc)	900 MHz	1900 MHz
-5	50	49
-8	53	51

Absolute Maximum Ratings

Max. Input Power (VCTL = 0/-8V)	0.05 GHz 0.5 - 2 GHz	+27 dBm +34 dBm
Control Voltage Range (A & B)		+2 to -12 Vdc
Storage Temperature		-65 to +150 °C
Operating Temperature		-40 to +85 °C

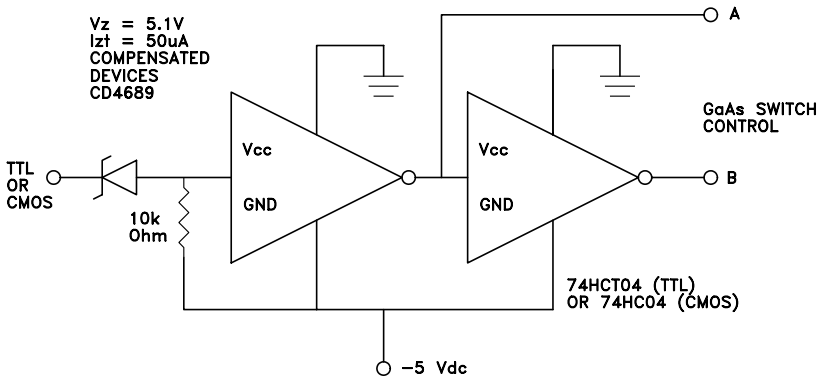
Outline Drawing



NOTES:

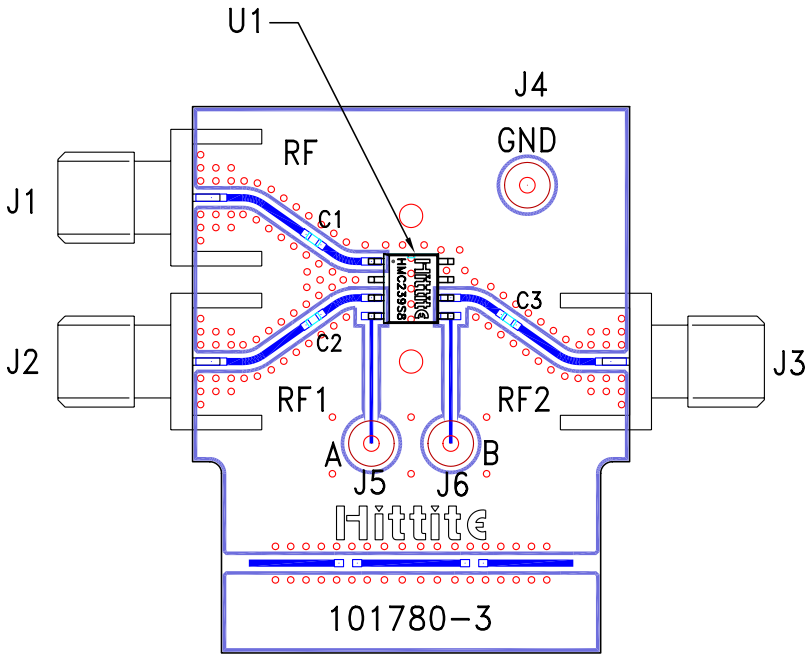
1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH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

Typical Application Circuit



Simple driver using inexpensive standard logic ICs provides fast switching using minimum DC current.

Evaluation Circuit Board



List of Material

Item	Description
J1 - J3	PC Mount SMA RF Connector
J4 - J6	DC Pin
C1 - C3	330 pF capacitor, 0402 Pkg.
U1	HMC239S8 SPDT Switch
PCB*	101780 Evaluation PCB
* Circuit Board Material: Rogers 4350	

The circuit board used in the final application should be generated with proper RF circuit design techniques. Signal lines at the RF port should have 50 ohm impedance and the package ground leads and package bottom should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Hittite Microwave Corporation upon request.