

GaAs MMIC SPDT NON-REFLECTIVE SWITCH DC - 8.0 GHz

FEBRUARY 2001

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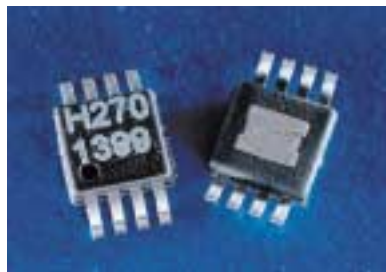
Features

BROADBAND PERFORMANCE: DC – 8 GHz

VERY HIGH ISOLATION: 45 dB @ 6 GHz

NON-REFLECTIVE DESIGN

LOW COST MSOP-8 PACKAGE: 14.8 mm²



General Description

The HMC270MS8G is a broadband non-reflective GaAs SPDT switch in an 8 lead MSOP grounded base surface mount plastic package. Covering DC to 8 GHz the switch offers excellent isolation, from 70 to 35 dB. The negative control voltage of -5 volts allows operation down to DC, satisfying CATV, cable modem, and all IF applications. Instrumentation applications can benefit from the wide bandwidth. The HMC270MS8G is also ideal for cellular, PCS, ISM (2.4 & 5.8 GHz), MMDS, and WLL. If positive control is required along with high isolation see the DC to 3.5 GHz HMC284MS8G non-reflective SPDT.

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SWITCHES

SPDT

SMT



Guaranteed Performance

With 0/-5V Control, 50 Ohm system, -40 to +85 deg C

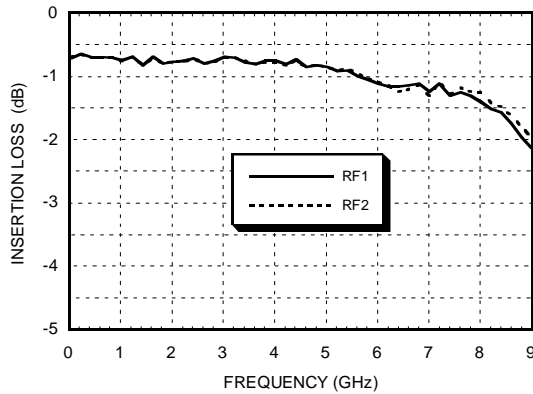
Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 2.0 GHz		0.8	1.2	dB
		DC - 6.0 GHz		1.0	1.5	dB
		DC - 8.0 GHz		1.5	2.2	dB
Isolation		DC - 2.0 GHz	43	48		dB
		DC - 4.0 GHz	42	47		dB
		DC - 6.0 GHz	40	45		dB
		DC - 8.0 GHz	28	33		dB
Return Loss	"On State"	DC - 2.0 GHz	11	14		dB
		DC - 6.0 GHz	9	12		dB
		DC - 8.0 GHz	7	10		dB
Return Loss RF1, RF2	"Off State"	DC - 2.0 GHz	15	20		dB
		DC - 6.0 GHz	13	18		dB
		DC - 8.0 GHz	10	15		dB
Input Power for 1dB Compression		0.5 - 8.0 GHz	20	23		dBm
Input Third Order Intercept (Two-Tone Input Power = +7dBm Each Tone)		0.5 - 8.0 GHz	33	36		dBm
Switching Characteristics		DC - 8.0 GHz				
tRISE, tFALL (10/90% RF)				20		ns
tON, tOFF (50% CTL to 10/90% RF)				50		ns

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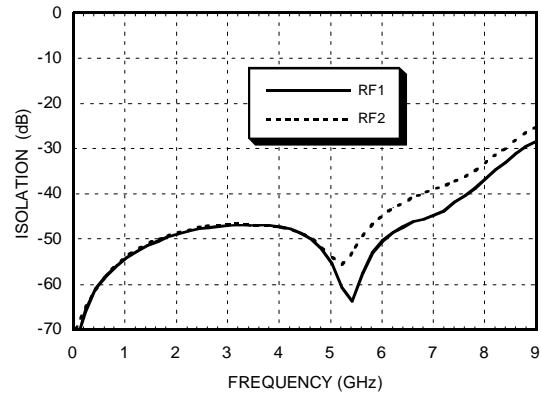
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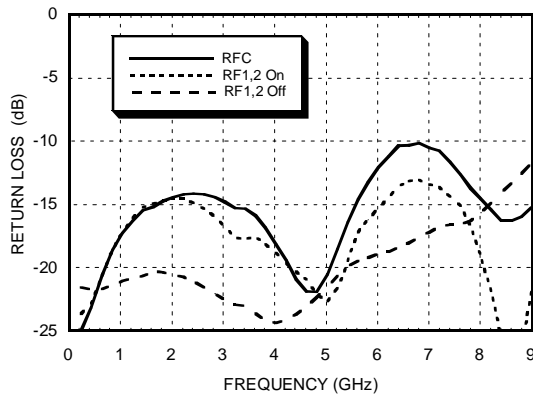
Insertion Loss



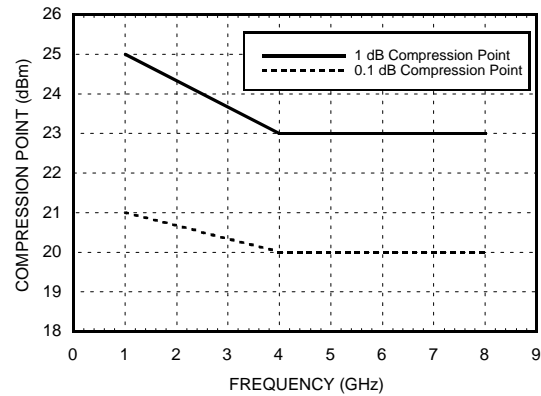
Isolation



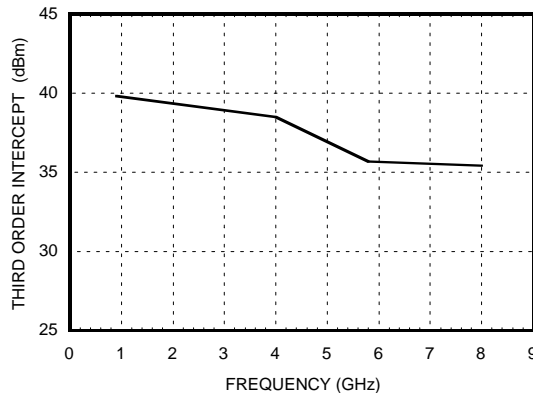
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point

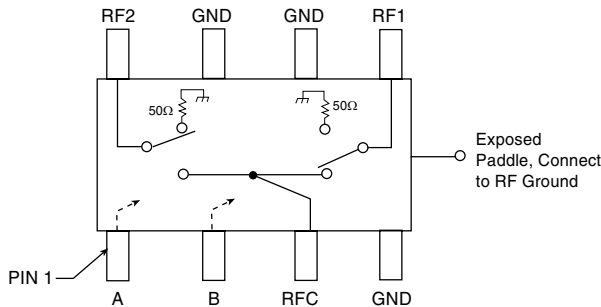


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Functional Diagram



Truth Table

Control Input		Signal Path State	
A	B	RFC to RF1	RFC to RF2
High	Low	ON	OFF
Low	High	OFF	ON

Control Voltages

State	Bias Condition
Low	0 to -0.2V @ 10uA Typ.
High	-5V @ 35uA Typ to -7V @ 100uA Typ (± 0.5 Vdc)

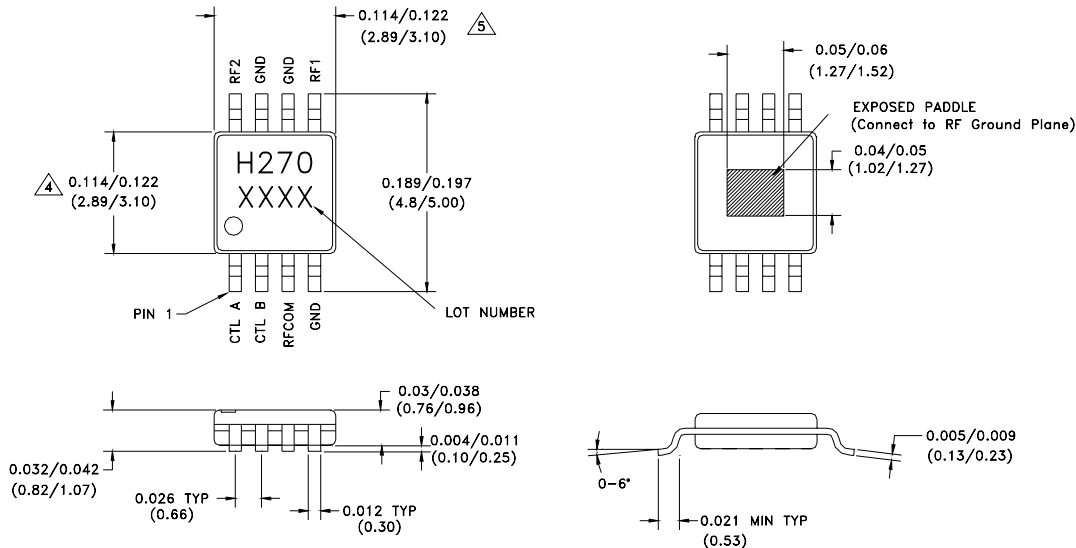
RFC, RF1, & RF2 should be at <100mV DC potential. Otherwise, DC blocking capacitors are recommended. Choose value for lowest frequency of operation.

Do not "HOT" switch power levels > +13 dBm (Vctl = 0/-5Vdc)

Absolute Maximum Ratings

Max RF Input Power, Vctl = -5V	+24 dBm
Control Voltage Range	+0.5 to -7.5 Vdc
Storage Temperature	-65 to +175 deg C
Operating Temperature	-55 to +85 deg C

Outline



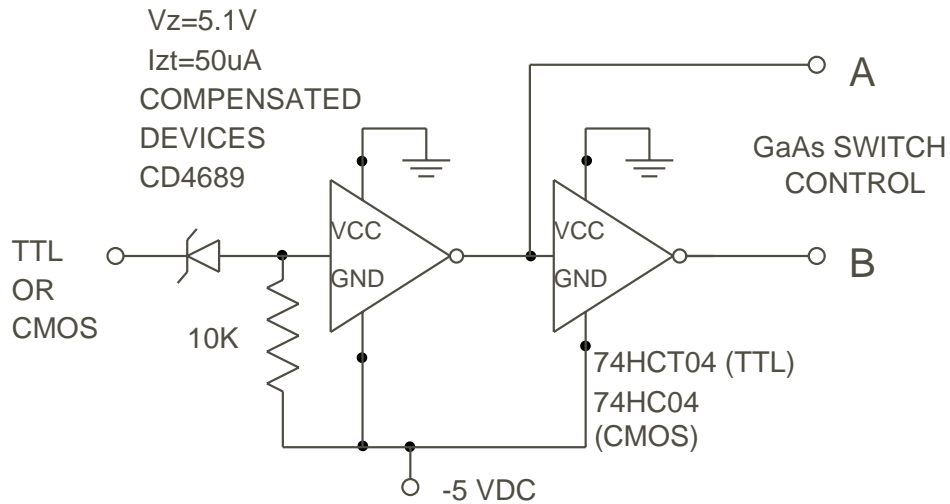
- MATERIAL:
 - PACKAGE BODY - LOW STRESS INJECTION-MOLDED PLASTIC, SILICA & SILICONE IMPREGNATED.
 - LEADFRAME & PADDLE MATERIAL: COPPER ALLOY
- PLATING: LEAD & PADDLE - TIN SOLDER PLATE.
- DIMENSIONS ARE IN INCHES (MILLIMETERS). UNLESS OTHERWISE SPECIFIED TOL. ARE ±0.005(±0.13).
 - DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15 mm PER SIDE.
 - DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25 mm PER SIDE.

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Suggested Driver Circuit for HMC270MS8G



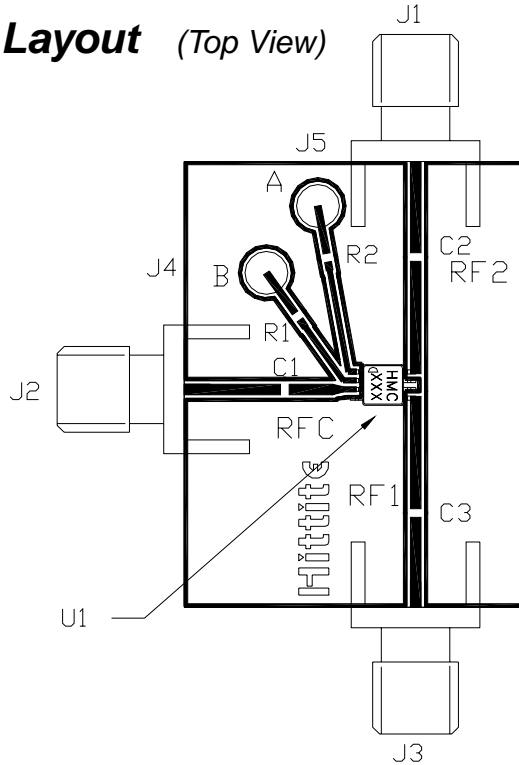
Simple driver using inexpensive standard logic ICs provides fast switching using minimum DC current while translating from standard positive voltage TTL or CMOS logic to negative voltage GaAs IC logic.

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Eval Board Layout (Top View)



* $R1 = R2 = 100\Omega$.
These are optional resistors.

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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 exposed ground paddle 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.

List of Material

Item	Description
J1 - J3	PC Mount SMA Connector
J4 - J5	DC Pin
C1 - C3	Chip Capacitor, 0402 Pkg, choose value for lowest frequency of operation. PCBs are provided with 100 ~ 300 pF capacitors. User may jumper capacitor mounting gaps on PCB to allow operation to "DC".
R1 - R2	100 Ohm Resistor, 0402 Pkg.
U1	HMC270MS8G SPDT Switch
PCB*	102807 Evaluation PCB 2.0" x 2.6"
* Circuit Board Material : Rogers 4350	

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NOTES:

