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## GaAs MMIC SPDT SWITCH NON-REFLECTIVE, DC - 8 GHz

### Typical Applications

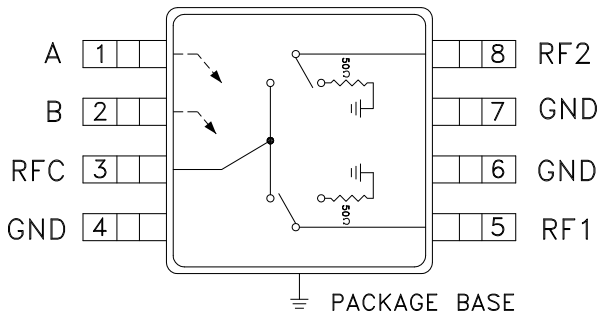
The HMC270MS8G / HMC270MS8GE is ideal for DC - 8.0 GHz applications:

- CATV
- MMDS & WirelessLAN
- Wireless Local Loop

### Features

- Broadband Performance: DC - 8 GHz
- Very High Isolation: 45 dB @ 6 GHz
- Non-Reflective Design
- Low Cost MSOP-8 Package: 14.8 mm<sup>2</sup>

### Functional Diagram



### General Description

The HMC270MS8G & HMC270MS8GE are broadband non-reflective GaAs SPDT switches in 8 lead MSOP grounded base surface mount plastic packages. 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. 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 - SMT

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , With 0/-5V Control, 50 Ohm system

| Parameter  | Frequency     | Min.                             | Typ. | Max. | Units |
|--|---------------|----------------------------------|------|------|-------|
| Insertion Loss   | DC - 2.0 GHz  |                                  | 0.8  | 1.2  | dB    |
|  | DC - 6.0 GHz  |                                  | 1.0  | 1.7  | dB    |
|  | DC - 8.0 GHz  |                                  | 1.5  | 2.4  | dB    |
| Isolation  | DC - 2.0 GHz  | 43                               | 48   |      | dB    |
|  | DC - 4.0 GHz  | 42                               | 47   |      | dB    |
|  | DC - 6.0 GHz  | 37                               | 45   |      | dB    |
|  | DC - 8.0 GHz  | 28                               | 33   |      | dB    |
| Return Loss  | 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   | DC - 2.0 GHz  | 15                               | 20   |      | dB    |
|  | DC - 6.0 GHz  | 13                               | 18   |      | dB    |
|  | DC - 8.0 GHz  | 10                               | 15   |      | dB    |
| Input Power for 1 dB Compression   | 0.5 - 8.0 GHz | 20                               | 23   |      | dBm   |
| Input third Order Intercept<br>(Two-Tone Input Power = +7 dBm 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    |

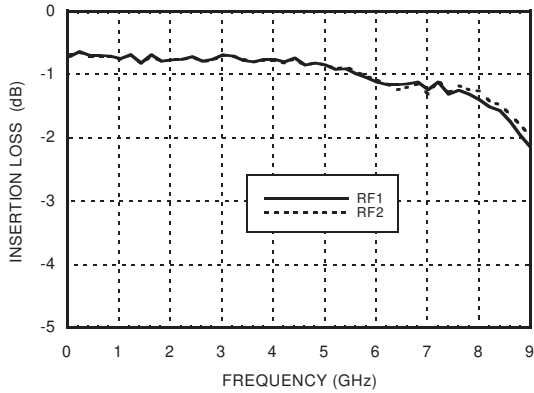
For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373  
Order On-line at [www.hittite.com](http://www.hittite.com)



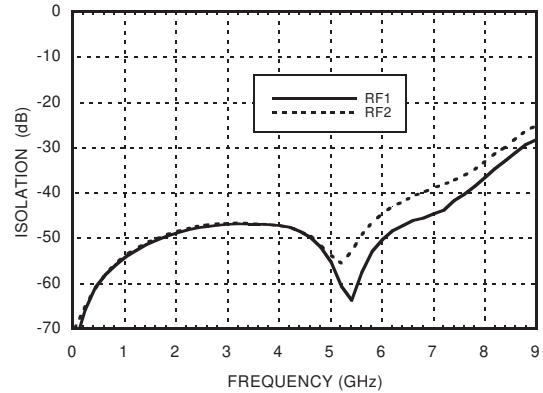
# HMC270MS8G / 270MS8GE

## GaAs MMIC SPDT SWITCH NON-REFLECTIVE, DC - 8 GHz

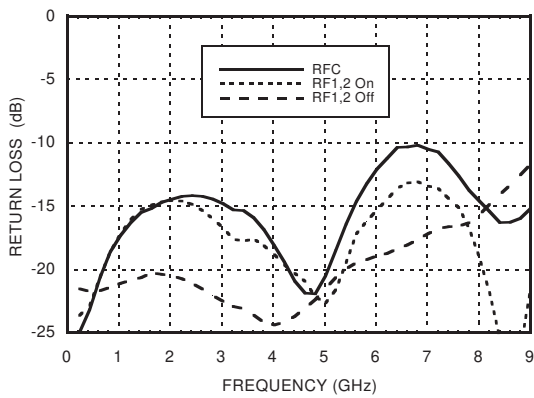
**Insertion Loss**



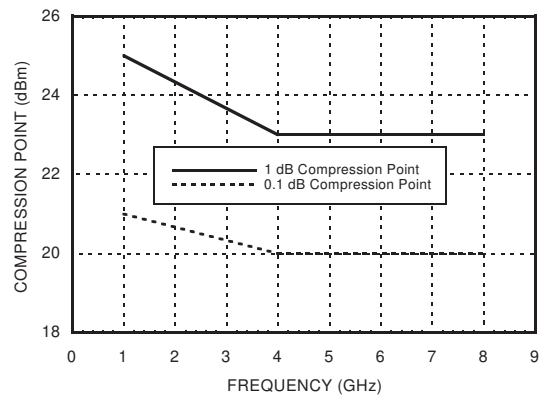
**Isolation**



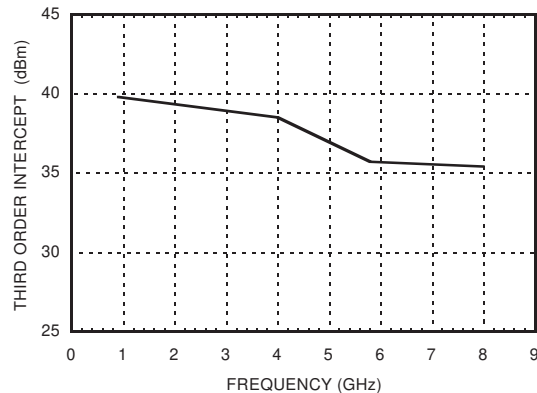
**Return Loss**



**0.1 and 1 dB Input Compression Point**



**Input Third Order Intercept Point**



**Control Voltages**

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

RFC, RF1, & RF2 should be at <100 mV 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)

**Truth Table**

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



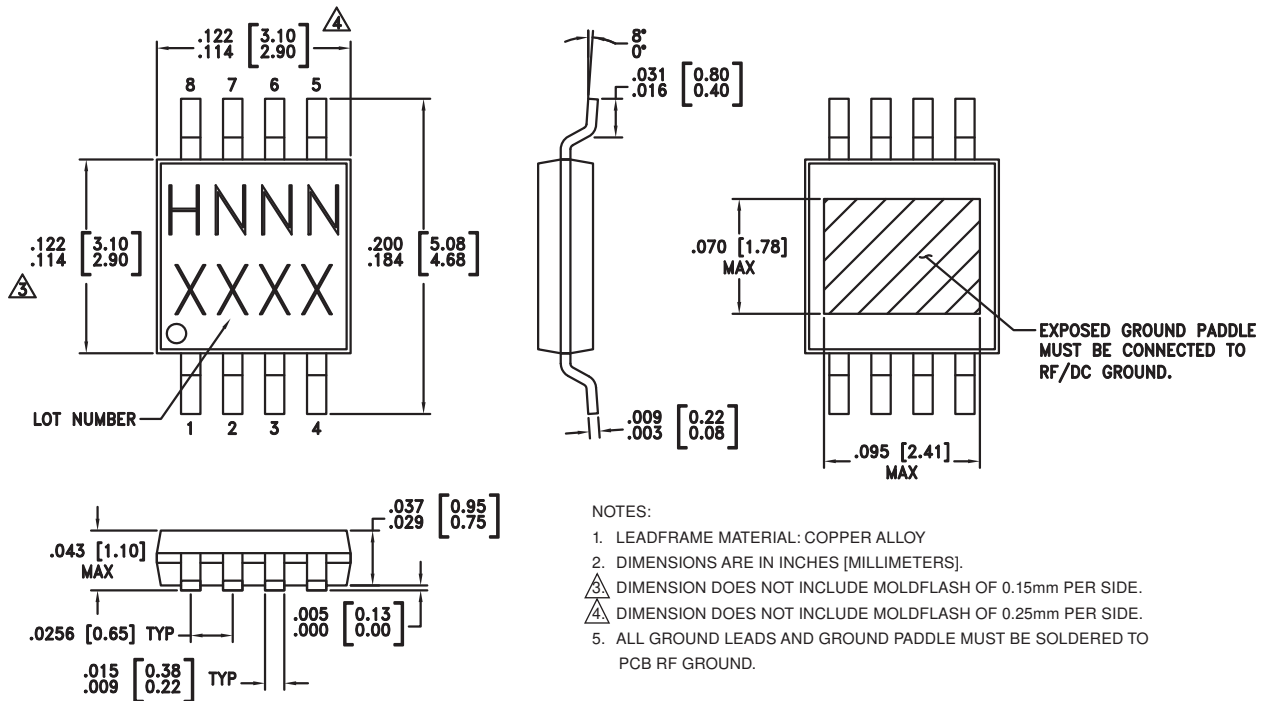
### Absolute Maximum Ratings

|                                |                  |
|--------------------------------|------------------|
| Max RF Input Power, Vctl = -5V | +24 dBm          |
| Control Voltage Range          | +0.5 to -7.5 Vdc |
| Storage Temperature            | -65 to +150 °C   |
| Operating Temperature          | -40 to +85 °C    |
| ESD Sensitivity (HBM)          | Class 1A         |



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Outline Drawing



### Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC70MS8G   | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | H270<br>XXXX                   |
| HMC270MS8GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | H270<br>XXXX                   |

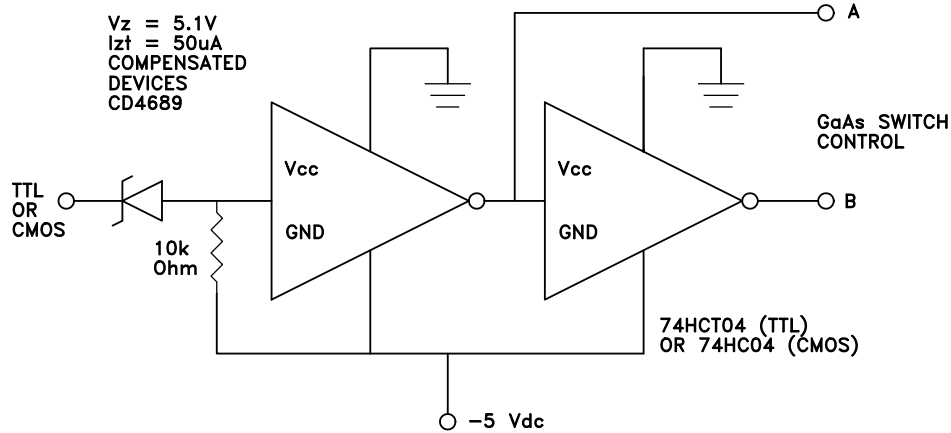
[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX



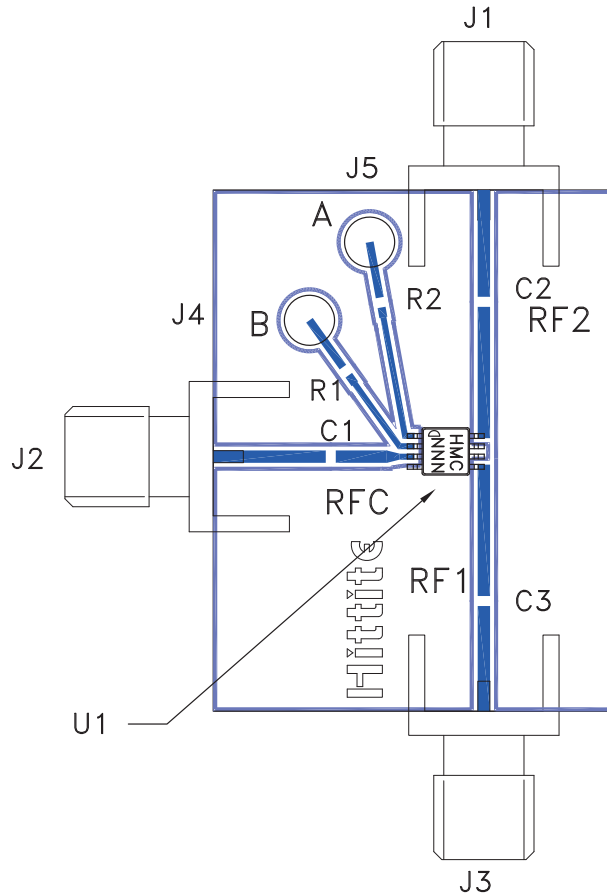
**Suggested Driver Circuit for HMC270MS8G**



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.



### Eval Board Layout (Top View)



\*R1 = R2 = 100 Ohm.  
These are optional resistors.

### List of Materials for Evaluation PCB 107949 [1]

| Item    | Description  |
|---------|--|
| J1 - J3 | PCB 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 / HMC270MS8GE SPDT Switch   |
| PCB [2] | 102807 Evaluation PCB 2.0" x 2.6"  |

[1] Reference this number when ordering complete evaluation PCB

[2] 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 ports 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.