

GAAS MMIC SPDT SWITCH NON-REFLECTIVE, DC - 8 GHz

Typical Applications

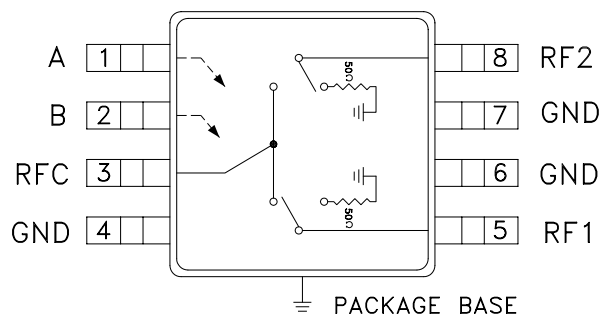
The HMC270AMS8GE is ideal for DC - 8.0 GHz applications:

- 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 mm²

Functional Diagram



General Description

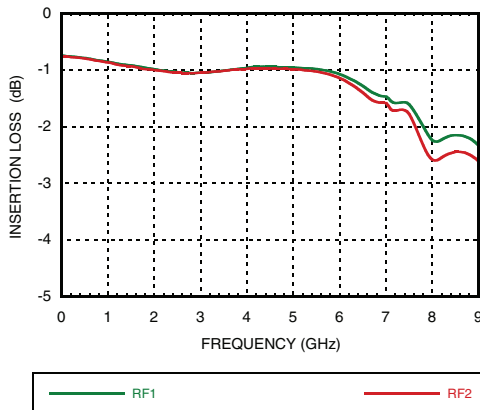
The HMC270AMS8GE are broad-band non-reflective GaAs SPDT switches in 8 lead MSOP grounded base surface mount plastic packages. Covering DC to 8 GHz, the switch offers excellent isolation from 70 to 35 dB. The negative control voltage of -5 volts allows operation down to DC. If positive control is required along with high isolation, see the DC to 3.5 GHz HMC284AMS8GE non-reflective SPDT.

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

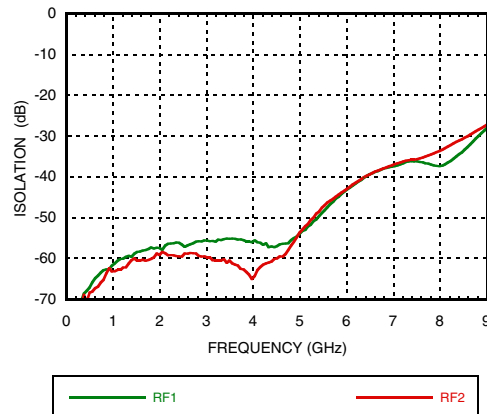
| Parameter | Frequency | Min. | Typ. | Max. | Units |
|---|---------------|----------------------------------|------|------|-------|
| Insertion Loss | DC - 2.0 GHz | | 0.8 | 1.2 | dB |
| | DC - 6.0 GHz | | 1.0 | 1.7 | dB |
| | DC - 8.0 GHz | | 2.4 | 2.8 | dB |
| Isolation | DC - 2.0 GHz | 43 | 53 | | dB |
| | DC - 4.0 GHz | 42 | 52 | | 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 | 24 | 28 | | dBm |
| Input third Order Intercept (Two-Tone Input Power = +10 dBm Each Tone) | 0.5 - 8.0 GHz | 37 | 42 | | dBm |
| Switching Characteristics | DC - 8.0 GHz | | | | |
| | | tRISE, tFALL (10/90% RF) | | 15 | ns |
| | | tON, tOFF (50% CTL to 10/90% RF) | | 50 | ns |

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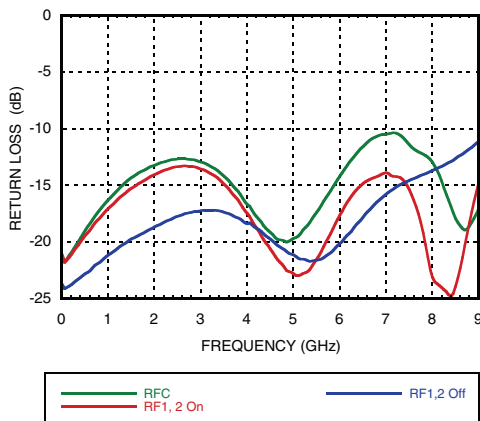
Insertion Loss



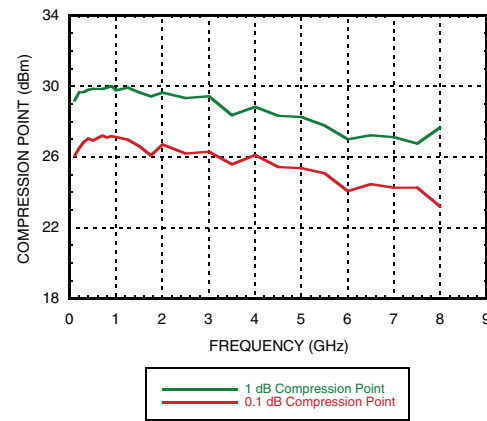
Isolation



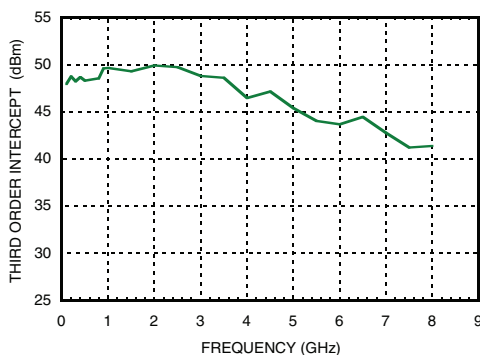
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



Control Voltages

| State | Bias Condition |
|-------|---|
| Low | 0 to -0.2V @ 0.5 uA Typ. |
| High | -5V @ 2 uA Typ. to -7V @ 15 uA Typ (±0.5 Vdc) |

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Absolute Maximum Ratings

| | |
|-------------------------------------|----------------|
| Max RF Input Power, $V_{ctl} = -5V$ | +29 dBm |
| Insertion Loss Path | 25.5 dBm |
| Terminated Path | |
| Control Voltage Range | +0.5 to -7 Vdc |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Thermal Resistance | |
| Insertion Loss Path | 143 °C/W |
| Terminated Path | 183 °C/W |
| ESD Sensitivity (HBM) | Class 1A |

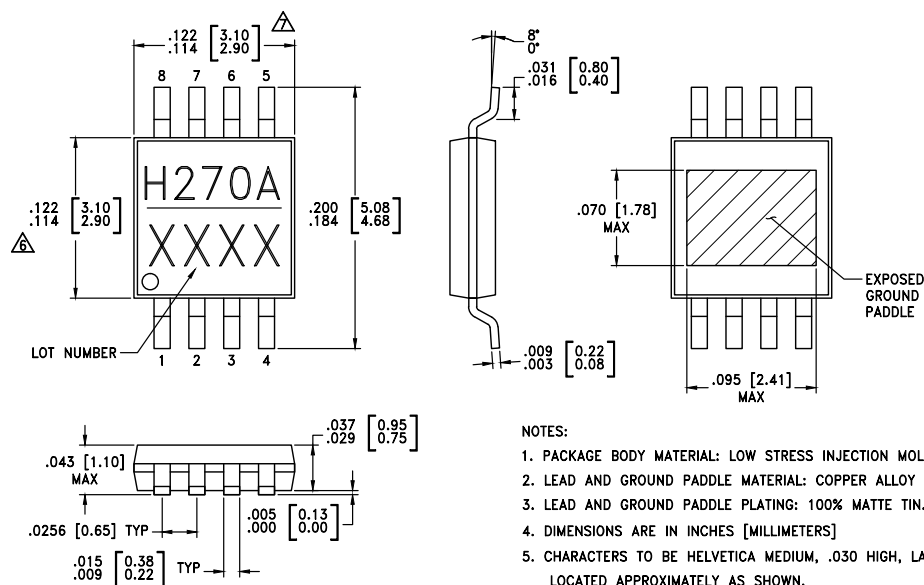
Truth Table

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



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

Outline Drawing



NOTES:

- PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC. SILICA AND SILICON IMPREGNATED.
 - LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY
 - LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
 - DIMENSIONS ARE IN INCHES [MILLIMETERS]
 - CHARACTERS TO BE HELVETICA MEDIUM, .030 HIGH, LASER OR WHITE INK, LOCATED APPROXIMATELY AS SHOWN.
- ⚠️ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
 ⚠️ DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
 8. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

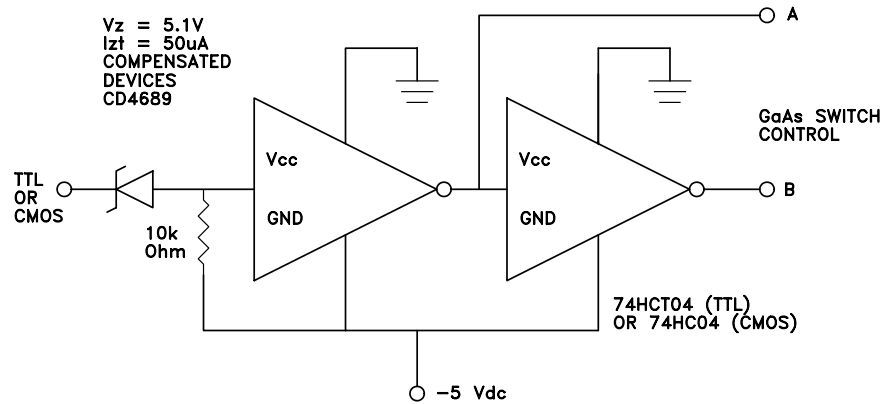
| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[2] |
|--------------|--|---------------|---------------------|--------------------------------|
| HMC270AMS8GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[1] | H270A XXXX |

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

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Suggested Driver Circuit



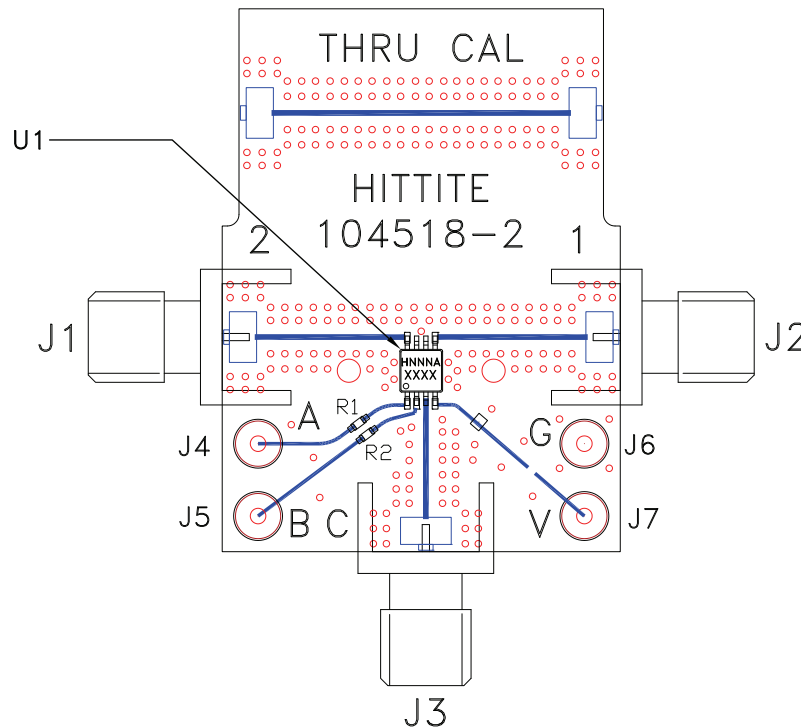
Simple driver using inexpensive standard logic ICs provides fast switching using minimum DC current while translating from standard positive voltage TTL or CMOS logic to negative voltage GaAs IC logic.

Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|------------|---------------|---|---------------------|
| 1 | A | See truth table and control voltage table. | |
| 2 | B | See truth table and control voltage table. | |
| 3, 5, 8 | RFC, RF1, RF2 | This pin is DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V. | |
| 4, 6, 7 | GND | This pin must be connected to RF/DC ground. | |

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Evaluation PCB



List of Materials for Evaluation PCB EV1HMC270AMS8G^[1]

| Item | Description |
|---------|-----------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| J4 - J5 | DC Pin |
| R1 - R2 | 100 Ohm Resistor, 0402 Pkg. |
| U1 | HMC270AMS8GE SPDT Switch |
| PCB [2] | 104518 Evaluation PCB |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the 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 Analog Devices Inc. upon request.