

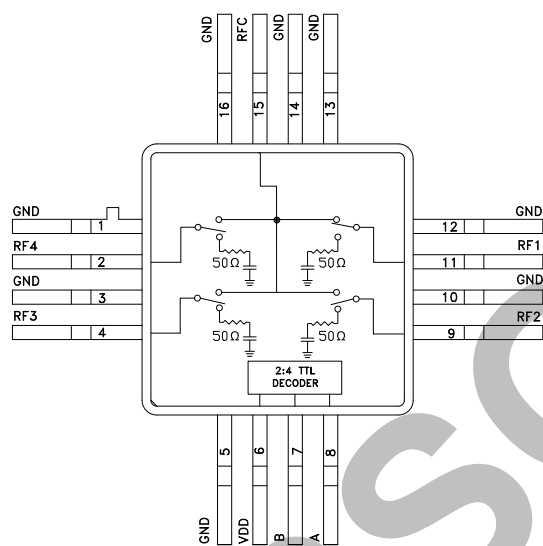
GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 4 GHz

Typical Applications

The HMC244G16 is ideal for:

- Telecom Infrastructure
- Military Radios, Radar & ECM
- Space Applications
- Test Instrumentation

Functional Diagram



Features

- Low Insertion Loss: 0.7 dB
- Non-Reflective Design
- Integrated 2:4 TTL Decoder
- Single Positive Supply: Vdd = +5V
- 16 Lead Hermetic SMT Package

General Description

The HMC244G16 is a non-reflective SP4T switch in a 16 lead glass/metal (hermetic) package. Covering DC to 4 GHz, the switch offers 30~50 dB isolation and a low insertion loss of 0.7 dB through 3 GHz. A 2:4 TTL/CMOS compatible decoder is integrated on the switch requiring only 2 control lines and a positive 5V bias to select each path, replacing 8 control lines normally required by GaAs SP4T switches.

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SWITCHES - SMT

Electrical Specifications, $T_A = +25^\circ C$, With 0/+5V Control, 50 Ohm System

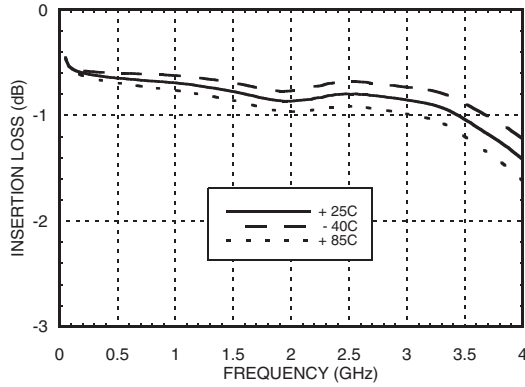
| Parameter | Frequency | Min. | Typ. | Max. | Units |
|---|----------------------|---------------|------|------|-------|
| Insertion Loss | DC - 1.0 GHz | | 0.6 | 0.9 | dB |
| | DC - 3.0 GHz | | 0.7 | 1.0 | dB |
| | DC - 3.5 GHz | | 1.0 | 1.4 | dB |
| | DC - 4.0 GHz | | 1.4 | 1.8 | dB |
| Isolation | DC - 1.0 GHz | 40 | 45 | | dB |
| | DC - 2.0 GHz | 36 | 40 | | dB |
| | DC - 3.0 GHz | 30 | 35 | | dB |
| | DC - 4.0 GHz | 24 | 28 | | dB |
| Return Loss | "On State" | DC - 3.5 GHz | 18 | | dB |
| | | DC - 4.0 GHz | 13 | | dB |
| Return Loss | RF 1 - 4 "Off State" | 0.2 - 4.0 GHz | 10 | | dB |
| | | 0.5 - 4.0 GHz | 15 | | dB |
| Input Power for 1 dB Compression | 0.5 - 4.0 GHz | 21 | 25 | | dBm |
| Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone) | 0.5 - 3.0 GHz | 43 | 47 | | dBm |
| | 0.5 - 4.0 GHz | 40 | 43 | | dBm |
| Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF) | DC - 4.0 GHz | | 40 | | ns |
| | | | 150 | | ns |

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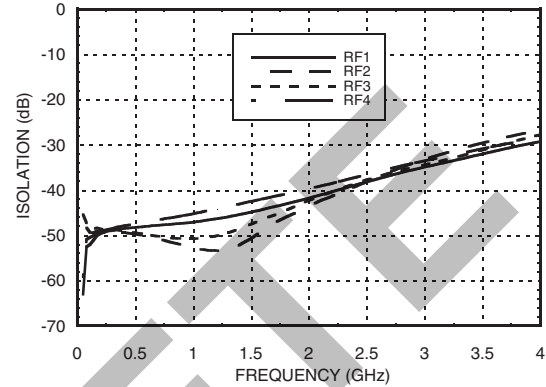
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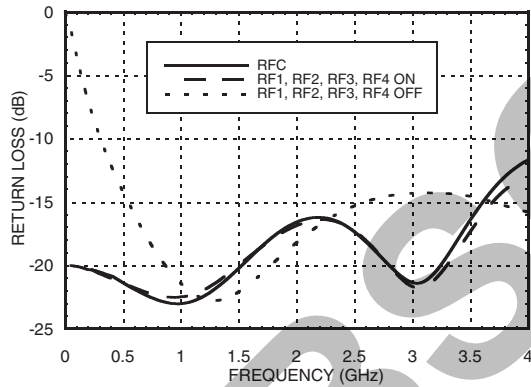
Insertion Loss



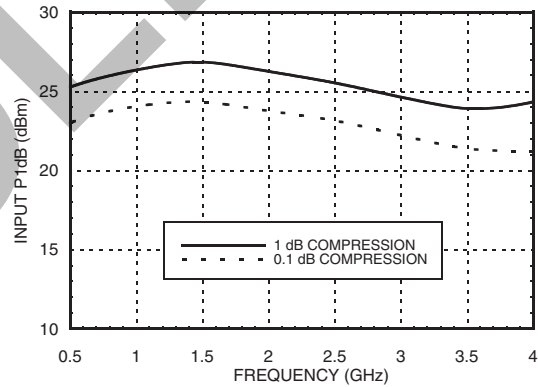
Isolation



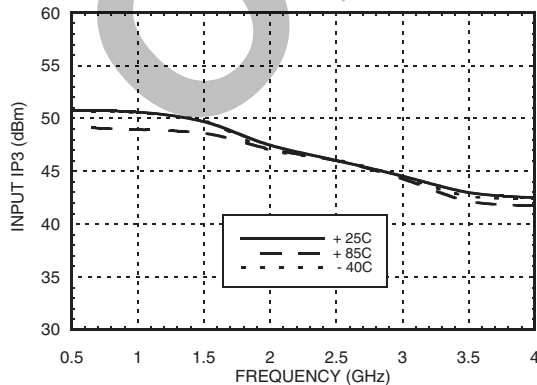
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



Bias Voltage & Current

| Vdd Range= +5.0 Vdc ±10% | | |
|--------------------------|----------------|----------------|
| Vdd (Vdc) | Idd (Typ) (mA) | Idd (Max) (mA) |
| +5.0 | 3.0 | 7.0 |

TTL/CMOS Control Voltages

| State | Bias Condition |
|-------|-------------------------------|
| Low | 0 to +0.8 Vdc @ 5 uA Typ. |
| High | +2.0 to +5.0 Vdc @ 70 uA Typ. |

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Absolute Maximum Ratings

| | |
|--|---|
| Bias Voltage Range (Port Vdd) | +7.0 Vdc |
| Control Voltage Range (A & B) | -0.5V to Vdd +1 Vdc |
| Channel Temperature | 150 °C |
| Thermal Resistance (Insertion Loss Path) | 210 °C/W |
| Thermal Resistance (Terminated Path) | 250 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| Maximum Input Power Vdd = +5 Vdc | +20 dBm (0.05 - 0.5 GHz) +27 dBm (0.5 - 3.5 GHz) |

Truth Table

| Control Input | | Signal Path State |
|---------------|------|-------------------|
| A | B | RF COM to: |
| Low | Low | RF1 |
| High | Low | RF2 |
| Low | High | RF3 |
| High | High | RF4 |

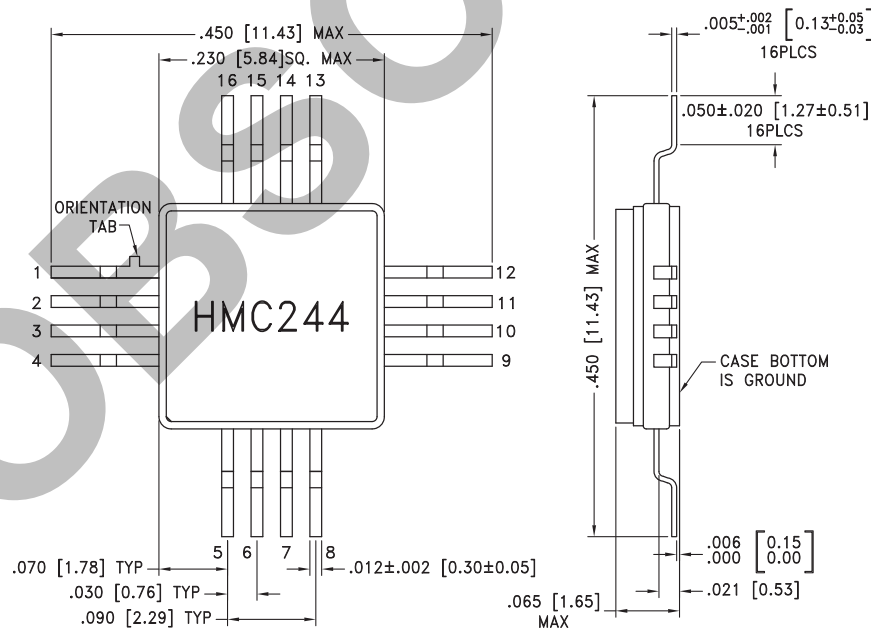
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SWITCHES - SMT



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:


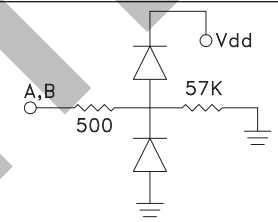
1. PACKAGE MATERIAL: ALUMINA LOADED BOROSILICATE GLASS.
2. LEAD, BASE, COVER MATERIAL: KOVAR™ (#7052 CORNING).
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

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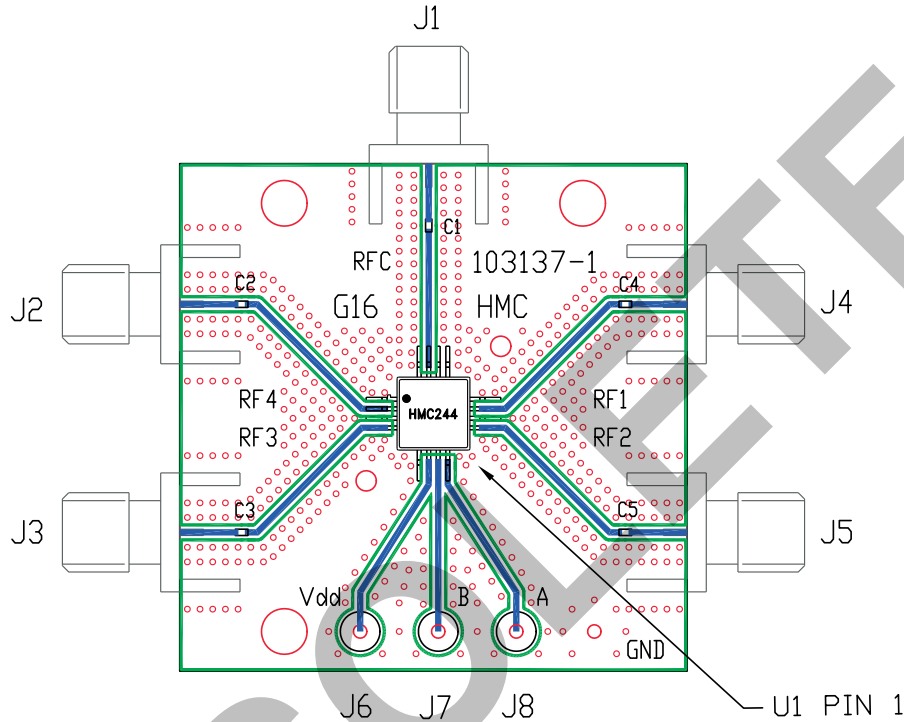
Pin Descriptions

| Pin Number | Function | Description | Interface Schematic |
|-----------------------------|-------------------------|---|---|
| 1, 3, 5, 10, 12, 13, 14, 16 | GND | Package bottom has exposed metal paddle that must also be connected to PCB RF ground. |  |
| 2, 4, 9, 11, 15 | RF4, RF3, RF2, RF1, RFC | These pins are DC coupled and matched to 50 Ohms. Blocking capacitors are required. | |
| 6 | Vdd | Supply Voltage +5.0 Vdc ±10% | |
| 7 | B | See truth table and control voltage table. |  |
| 8 | A | See truth table and control voltage table. | |

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Evaluation PCB



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SWITCHES - SMT

List of Materials for Evaluation PCB 104172 [1]

| Item | Description |
|---------|------------------------------|
| J1 - J5 | PCB Mount SMA RF Connector |
| J6 - J8 | DC Pin |
| C1 - C5 | 330 pF Capacitors, 0402 Pkg. |
| U1 | HMC244G16 SP4T Switch |
| PCB [2] | 103137 Evaluation PCB |

[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 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.

**GaAs MMIC SP4T NON-REFLECTIVE
SWITCH, DC - 4 GHz****Notes:**

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