# HMC244AG16

v02.0116

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

### Typical Applications

The HMC244AG16 is ideal for:

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

### Features

Low Insertion Loss: 0.9 dB

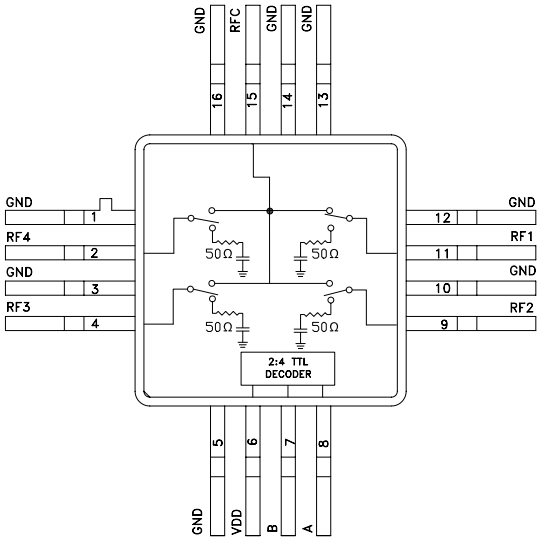
Non-Reflective Design

Integrated 2:4 TTL Decoder

Single Positive Supply: Vdd = +5V, +3V

16 Lead Hermetic SMT Package

### Functional Diagram




### General Description

The HMC244AG16 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 0.9 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.

### Electrical Specifications, $T_A$ = +25° C, With 0/+5V Control, 50 Ohm System

| Parameter | | Frequency | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| Insertion Loss | | DC - 1.0 GHz<br>DC - 3.0 GHz<br>DC - 3.5 GHz<br>DC - 4.0 GHz | | 0.6<br>0.9<br>1.0<br>1.2 | 0.9<br>1.1<br>1.4<br>1.8 | dB<br>dB<br>dB<br>dB |
| Isolation | | DC - 1.0 GHz<br>DC - 2.0 GHz<br>DC - 3.0 GHz<br>DC - 4.0 GHz | 40<br>36<br>30<br>24 | 45<br>40<br>35<br>28 | | dB<br>dB<br>dB<br>dB |
| Return Loss | "On State" | DC - 3.5 GHz<br>DC - 4.0 GHz | | 22<br>16 | | dB<br>dB |
| Return Loss | RF 1 -4 "Off State" | 0.2 - 4.0 GHz<br>0.5 - 4.0 GHz | | 10<br>15 | | dB<br>dB |
| Input Power for 1 dB Compression | | 0.5 - 4.0 GHz | 24 | 28 | | dBm |
| Input Third Order Intercept<br>(Two-Tone Input Power = +10 dBm Each Tone) | | 0.5 - 3.0 GHz<br>0.5 - 4.0 GHz | 43<br>40 | 47<br>45 | | dBm<br>dBm |
| Switching Characteristics<br>tRISE, tFALL (10/90% RF)<br>tON, tOFF (50% CTL to 10/90% RF) | | DC - 4.0 GHz | | 40<br>150 | | ns<br>ns |



*For price, delivery, and to place orders: Analog Devices, Inc., One Technology Way, P.O. Box 9106, Norwood, MA 02062-9106*
*Phone: 781-329-4700 • Order online at www.analog.com*
*Application Support: Phone: 1-800-ANALOG-D*

# HMC244A* PRODUCT PAGE QUICK LINKS

**Last Content Update: 02/23/2017**

## COMPARABLE PARTS

View a parametric search of comparable parts.

## EVALUATION KITS

- HMC244A Evaluation Board

## DOCUMENTATION

**Data Sheet**

- HMC244AG16: GaAs MMIC SP4T Non-Refelective Switch, DC-4 GHz Data Sheet

## DESIGN RESOURCES

- HMC244A Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## DISCUSSIONS

View all HMC244A EngineerZone Discussions.

## SAMPLE AND BUY

Visit the product page to see pricing options.

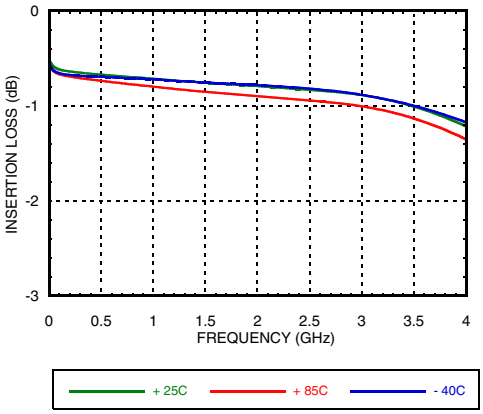
## TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

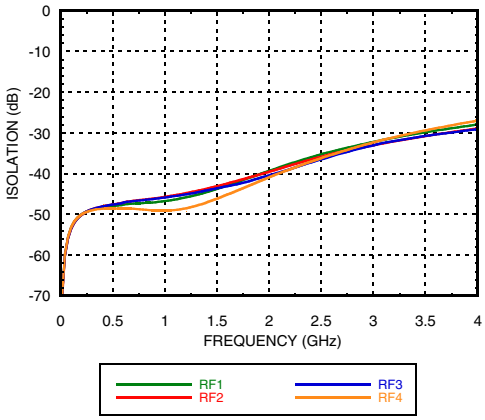
## DOCUMENT FEEDBACK

Submit feedback for this data sheet.

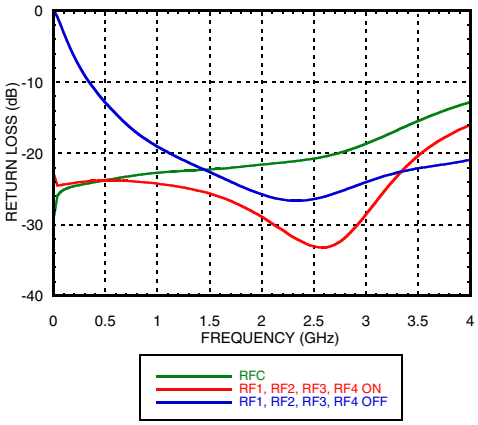
### Insertion Loss



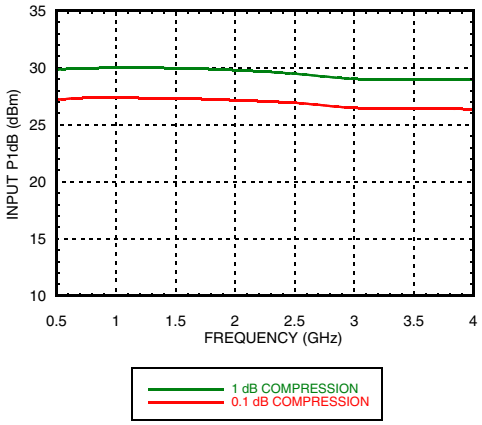

### Isolation



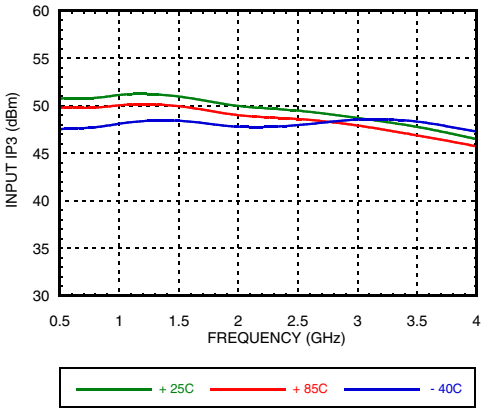

### Return Loss



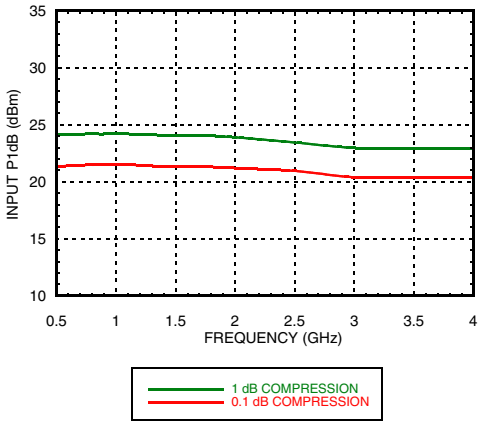

### 0.1 and 1 dB Input Compression Point




### Input Third Order Intercept Point




### 0.1 and 1 dB Input Compression Point, 3V



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



## 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) | 171 °C/W |
| Thermal Resistance (Terminated Path) | 332 °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)<br>+27 dBm (0.5 - 3.5 GHz) |

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

## Bias Voltage & Current

| Vdd Range= +5 Vdc ±10% | | |
|---|---|---|
| Vdd (Vdc) | Idd (Typ) (mA) | Idd (Max) (mA) |
| +5 | 3 | 7.0 |
| +3 | 7 | 7.0 |

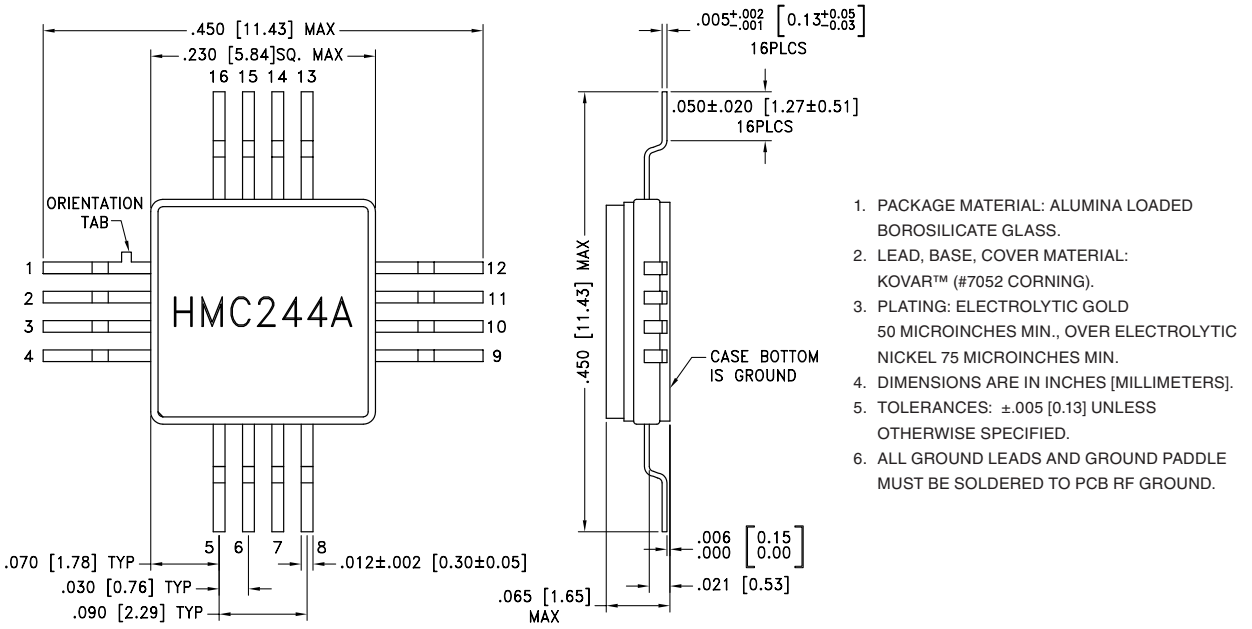
## TTL/CMOS Control Voltages

| State | Bias Condition |
|---|---|
| Low | 0 to +0.8 Vdc @ 0.5 µA Typ. |
| High | +2.0 to +Vdd @ 70 µA Typ. |

## Truth Table

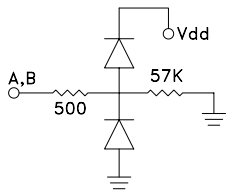
| Control Input | | Signal Path State |
|---|---|---|
| A | B | RF COM to: |
| Low | Low | RF1 |
| High | Low | RF2 |
| Low | High | RF3 |
| High | High | RF4 |

## Outline Drawing

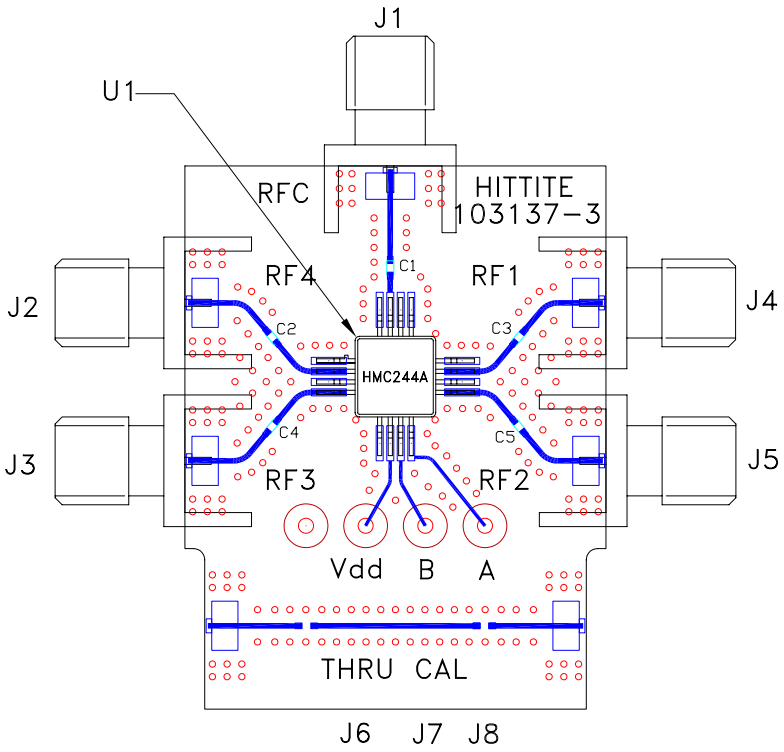



1. PACKAGE MATERIAL: ALUMINA LOADED BOROSILICATE GLASS.
2. LEAD, BASE, COVER MATERIAL: KOVAR™ (#7052 CORNING).
3. PLATING: ELECTROLYTIC GOLD 50 MICROINCHES MIN., OVER ELECTROLYTIC NICKEL 75 MICROINCHES MIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. TOLERANCES: ±.005 [0.13] UNLESS OTHERWISE SPECIFIED.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

## 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 Vdc ±10% | |
| 7 | B | See truth table and control voltage table. |   |
| 8 | A | See truth table and control voltage table. | |

## Evaluation PCB




## List of Materials for Evaluation PCB EV1HMC244AG16 [1]

| Item | Description |
|---|---|
| J1 - J5 | PCB Mount SMA RF Connector |
| J6 - J8 | DC Pin |
| C1 - C5 | 330 pF Capacitors, 0402 Pkg. |
| U1 | HMC244AG16 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 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 Analog Devices upon request.