GaAs MMIC SOT26 SPDT SWITCH, DC- 3 GHz

SWITCHES - SPDT - SMT

Typical Applications

The HMC197BE is ideal for:

• MMDS & WirelessLAN

• PCMCIA Wireless Cards

• Portable Wireless

Functional Diagram
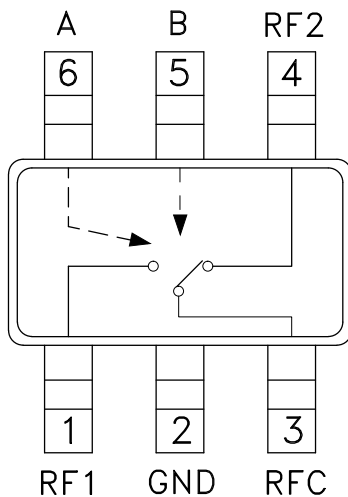
Features

Low Insertion Loss: 0.4 dB

Ultra Small Package: SOT26

Input IP3: +59 dBm

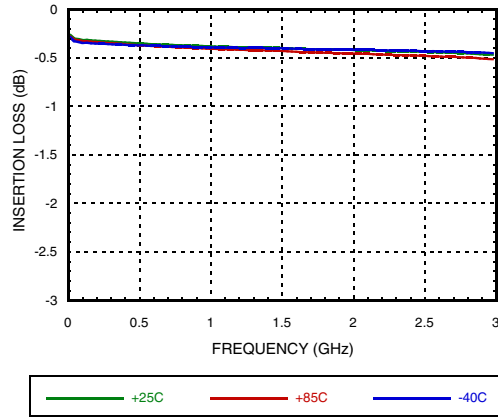Positive Control: 0/+3V @ 3 µA

General Description

The HMC197BE is a low-cost SPDT switch in a 6-lead SOT26 plastic package for use in general switching applications which require very low insertion loss and very small size. The device can control signals from DC to 3 GHz and is especially suited for 900 MHz, 1.8 - 2.2 GHz, and 2.4 GHz ISM applications with less than 1 dB loss. The design provides exceptional insertion loss performance, ideal for filter and receiver switching. RF1 and RF2 are reflective shorts when "Off". The two control voltages require a minimal amount of DC current and offer compatibility with most CMOS & TTL logic families. See HMC221BE for same performance in an alternate SOT26 pin-out.

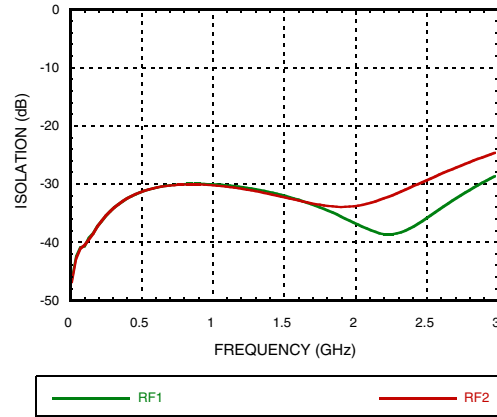### *Electrical Specifications, T_A = +25° C, Vctl = 0/+3 to +8 Vdc, 50 Ohm System*

Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz		0.4 0.4 0.4 0.5	0.7 0.8 0.9 1.1	dB dB dB dB
Isolation	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	24 24 18 14	30 34 29 24		dB dB dB dB
Return Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	20 16 14 10	35 31 28 24		dB dB dB dB
Input Power for 1dB Compression (Vctl = 0/+5V)	0.5 - 1.0 GHz 0.5 - 3.0 GHz	25 23	30 29		dBm dBm
Input Third Order Intercept (Vctl = 0/+5V) (Two-tone Input Power = +10 dBm Each Tone)	0.5 - 1.0 GHz 0.5 - 3.0 GHz	40 38	59 55		dBm dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 3.0 GHz		 3 10		 ns 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

GaAs MMIC SOT26 SPDT SWITCH, DC- 3 GHz

Insertion Loss

| +25C | +85C | -40C |

Return Loss

| RFC | RF1,RF2 |

Input Third Order Intercept Point vs. Control Voltage

| 900 MHz | 1900 MHz |

Isolation

| RF1 | RF2 |
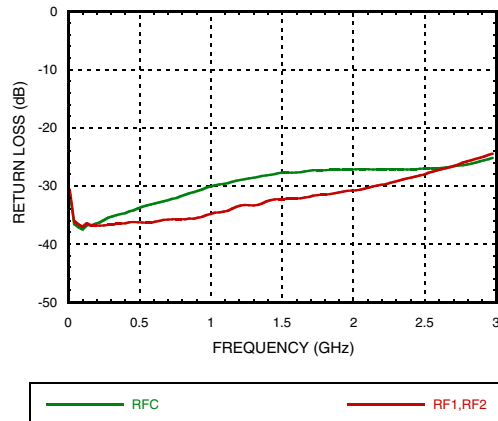
Input 0.1 and 1.0 dB Compression vs. Control Voltage

| 0.1 dB at 900 MHz | 0.1 dB at 1900 MHz |
| 1 dB at 900 MHz | 1 dB at 1900 MHz |
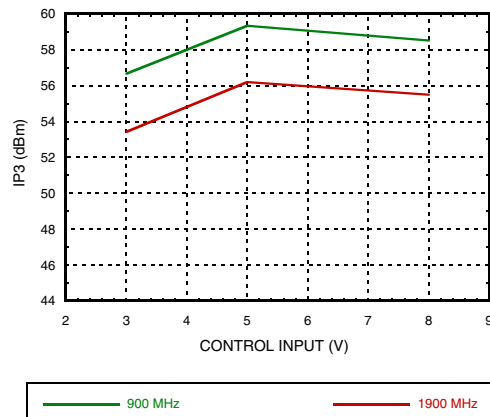
Distortion vs. Control Voltage

Control Input	Third Order Intercept (dBm) +10 dBm Each Tone	
(Vdc)	900 MHz	1900 MHz
+3	57	53
+5	59	56
+8	58	55

Truth Table
*Control Input Voltage Tolerances are ± 0.2 Vdc.

Control Input*		Control Current		Signal Path State	
A (Vdc)	B (Vdc)	Ia (µA)	Ib (µA)	RF to RF1	RF to RF2
0	+3	-0.5	0.5	ON	OFF
+3	0	0.5	-0.5	OFF	ON
0	+5	-1.1	1.1	ON	OFF
+5	0	1.1	-1.1	OFF	ON
0	+8	-8	8	ON	OFF
+8	0	8	-8	OFF	ON

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2

Compression vs. Control Voltage

Control Input	Carrier at 900 MHz		Carrier at 1900 MHz	
	Input Power for 0.1 dB Compression	Input Power for 1.0 dB Compression	Input Power for 0.1 dB Compression	Input Power for 1.0 dB Compression
(Vdc)	(dBm)	(dBm)	(dBm)	(dBm)
+3	21	24	21	24
+5	28	30	27	30
+8	32	34	32	34

Caution: Do not operate in 1dB compression at power levels above +31 dBm (Vctl = +5 Vdc) and do not "hot switch" power levels greater than +20 dBm (Vctl = +5Vdc). DC blocks are required at ports RFC, RF1 and RF2.
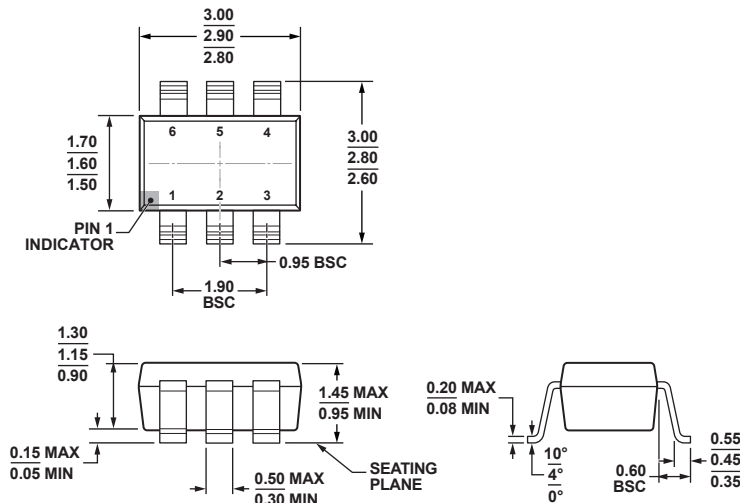
Absolute Maximum Ratings

Control Voltage Range (A & B)	-0.2 to +12 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

COMPLIANT TO JEDEC STANDARDS MO-178-AB

6-Lead Small Outline Transistor Package [SOT-23]
(RJ-6)
Dimensions shown in millimeters.

12-16-2008-A

Package Information

| Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [3]
HMC197BE	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL1 [1]	197BE XXXX

[1] Max peak reflow temperature of 260 °C
[2] 4-Digit lot number XXXX

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3

HMC197BE

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SWITCHES - SPDT - SMT

Typical Application Circuit

Notes:

1. Set logic gate and switch Vdd = +3V to +5V and use HCT series logic to provide a TTL driver interface.

2. Control inputs A/B can be driven directly with CMOS logic (HC) with Vdd of 5 to 8 Volts applied to the CMOS logic gates.

3. DC Blocking capacitors are required for each RF port as shown. Capacitor value determines lowest frequency of operation.

4. Highest RF signal power capability is achieved with Vdd = +8V and A/B set to 0/+8V.
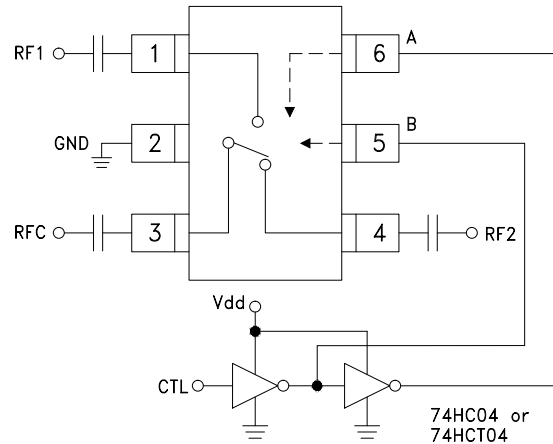
Evaluation Circuit Board
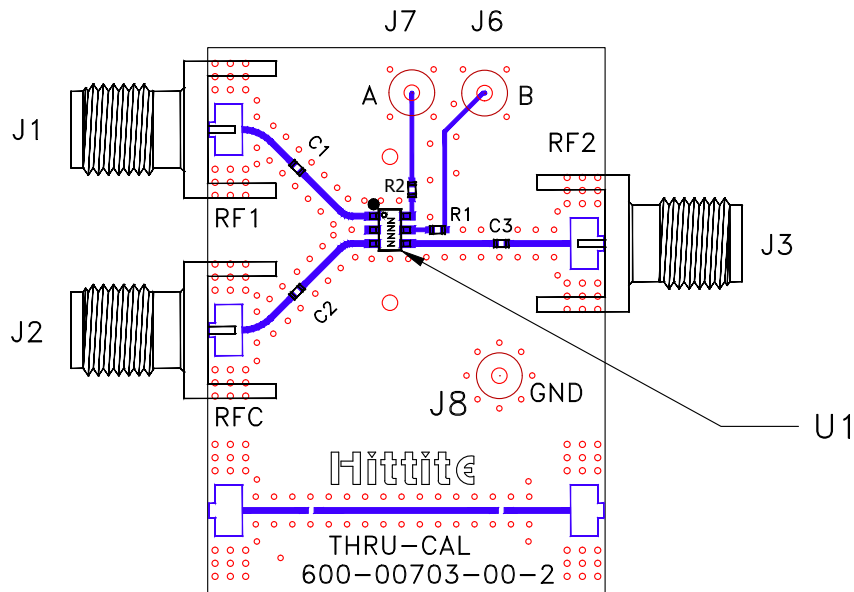
List of Materials for Evaluation PCB EVAL01-HMC197BE[1]

Item	Description
J1 - J3	PCB Mount SMA RF Connector
J6 - J8	DC Pin
C1 - C3	330 pF Capacitor, 0603 Pkg.
R1, R2	1 kOhm Resistor, 0402 Pkg.
U1	HMC197BE SPDT Switch
PCB [2]	600-00703-00 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 Analog Devices Inc. upon request.

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4