HMC197

GaAs MMIC SOT26 SPDT SWITCH, DC - 3 GHz

Typical Applications

The HMC197 is ideal for:

- MMDS & WirelessLAN
- PCMCIA Wireless Cards
- Portable WIreless

Features

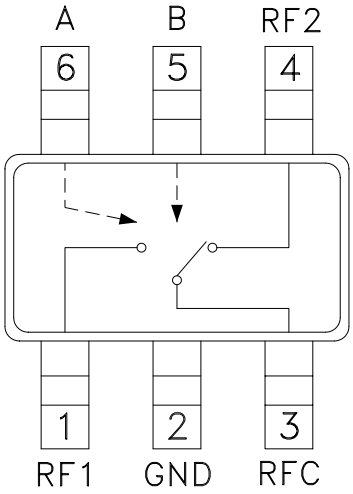
Low Insertion Loss: 0.4 dB

Ultra Small Package: SOT26

Input IP3: +45 dBm

Positive Control: 0/+3V @ 10 uA

Functional Diagram



General Description

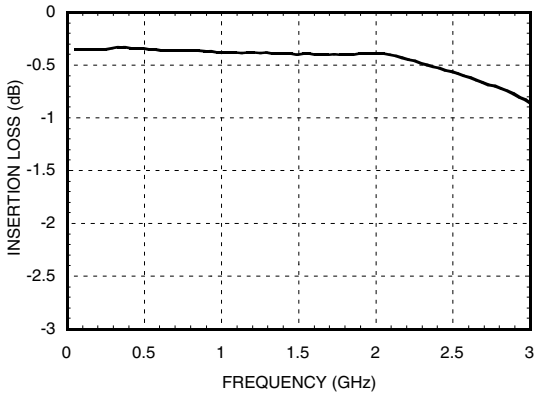
The HMC197 is a low-cost SPDT switch in a 6-lead SOT26 plastic package for use in general switching applications which require very low insertion loss and very small size. The device can control signals from DC to 3.0 GHz and is especially suited for 900 MHz, 1.8 - 2.2 GHz, and 2.4 GHz ISM applications 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 HMC221 for same performance in an alternate SOT26 pin-out.

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

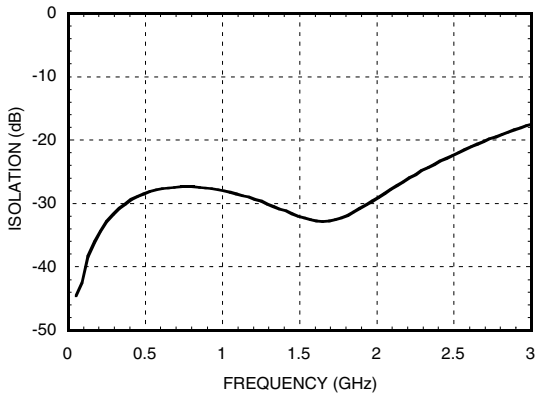
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz		0.4 0.45 0.7 0.8	0.7 0.8 0.9 1.1	dB dB dB dB
Isolation	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	24 24 18 14	28 28 22 18		dB dB dB dB
Return Loss	DC - 1.0 GHz DC - 2.0 GHz DC - 2.5 GHz DC - 3.0 GHz	20 16 14 10	30 22 17 13		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 = +7 dBm Each Tone)	0.5 - 1.0 GHz 0.5 - 3.0 GHz	40 38	45 43		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, please contact Hittite Microwave Corporation:
12 Elizabeth Drive, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373
Order Online at www.hittite.com

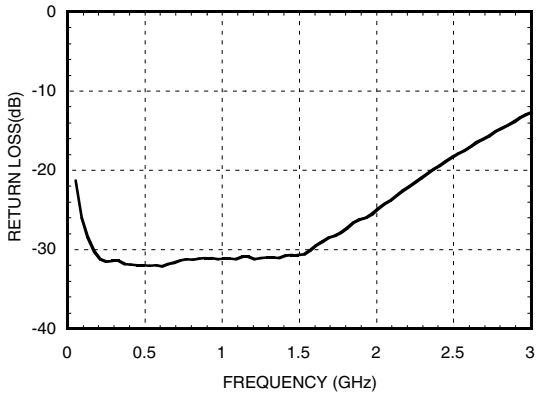
Insertion Loss



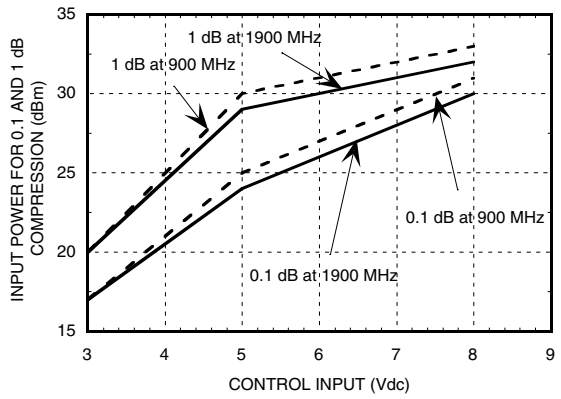
Isolation



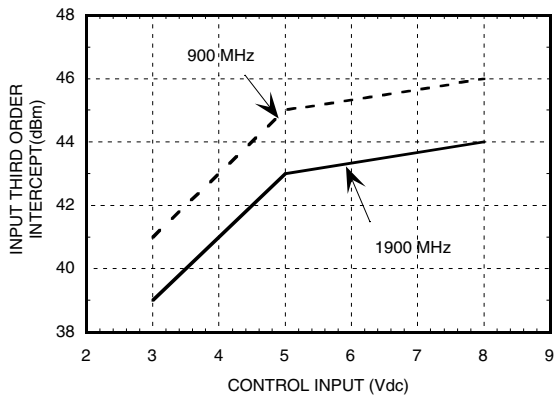
Return Loss



Input 0.1 and 1.0 dB Compression vs. Control Voltage



Input Third Order Intercept Point vs. Control Voltage



Compression vs. Control Voltage

	Carrier at 900 MHz		Carrier at 1900 MHz	
Control Input	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	17	20	17	20
+5	25	30	24	29
+8	31	33	30	32

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.

Distortion vs. Control Voltage

Control Input	Third Order Intercept (dBm) +7 dBm Each Tone	
(Vdc)	900 MHz	1900 MHz
+3	41	39
+5	45	43
+8	46	44

Truth Table

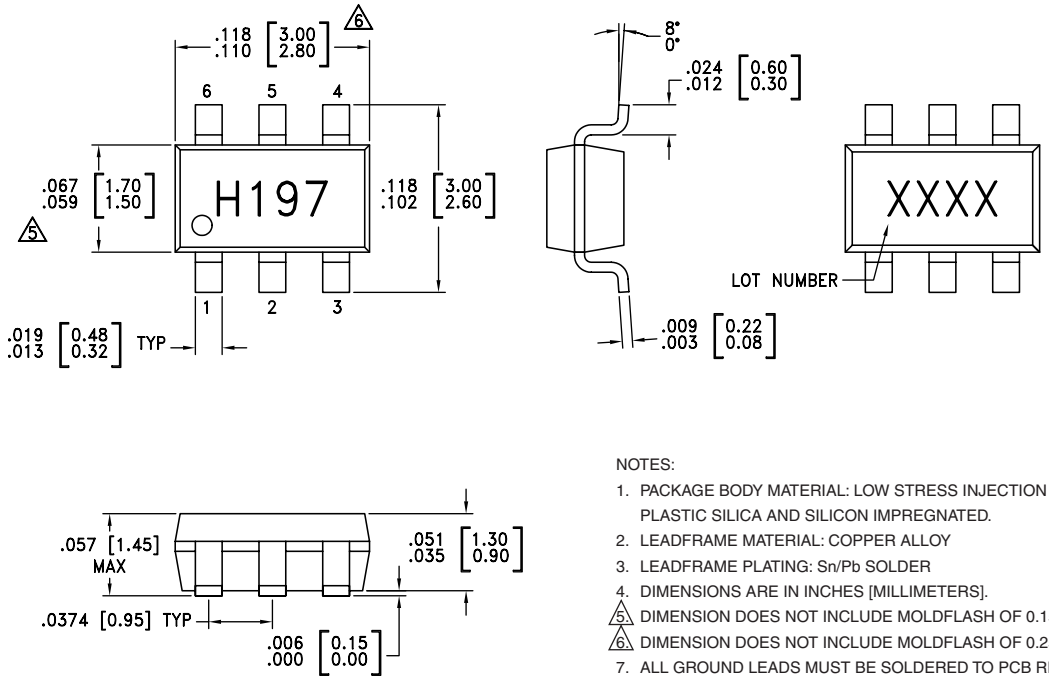
***Control Input Voltage Tolerances are ± 0.2 Vdc.**

Control Input*		Control Current		Signal Path	
A (Vdc)	B (Vdc)	Ia (uA)	Ib (uA)	RF to RF1	RF to RF2
0	+3	-10	10	ON	OFF
+3	0	10	-10	OFF	ON
0	+5	-55	55	ON	OFF
+5	0	55	-55	OFF	ON
0	+7	-210	210	ON	OFF
+7	0	210	-210	OFF	ON
0	+8	-280	280	ON	OFF
+8	0	280	-280	OFF	ON

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

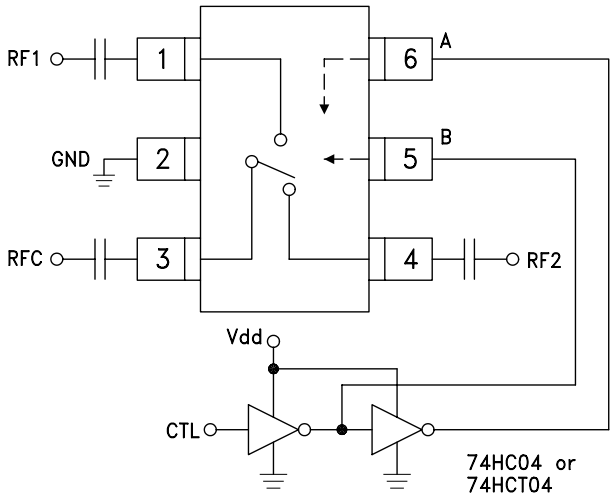
Outline Drawing



NOTES:

1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEADFRAME MATERIAL: COPPER ALLOY
3. LEADFRAME PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
6. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
7. ALL GROUND LEADS MUST BE SOLDERED TO PCB RF GROUND.

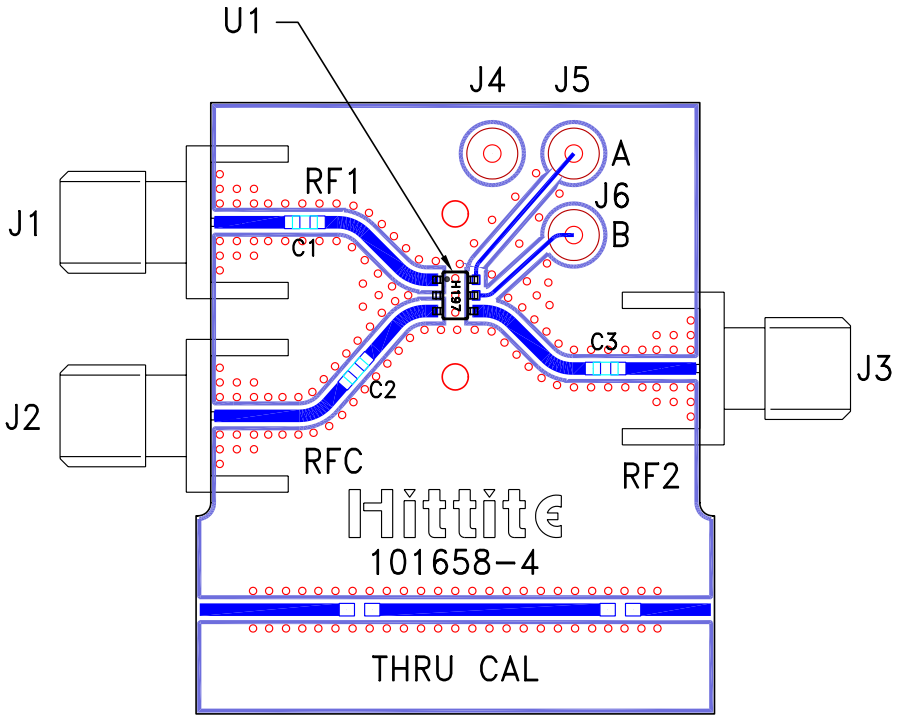
Typical Application Circuit



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 Material

Item	Description
J1 - J3	PC Mount SMA RF Connector
J4 - J6	DC Pin
C1 - C3	330 pF capacitor, 0603 Pkg.
U1	HMC197 SPDT Switch
PCB*	101658 Evaluation PCB
* 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.