

## GaAs MMIC SP4T NON-REFLECTIVE SWITCH, DC - 8 GHz

### Typical Applications

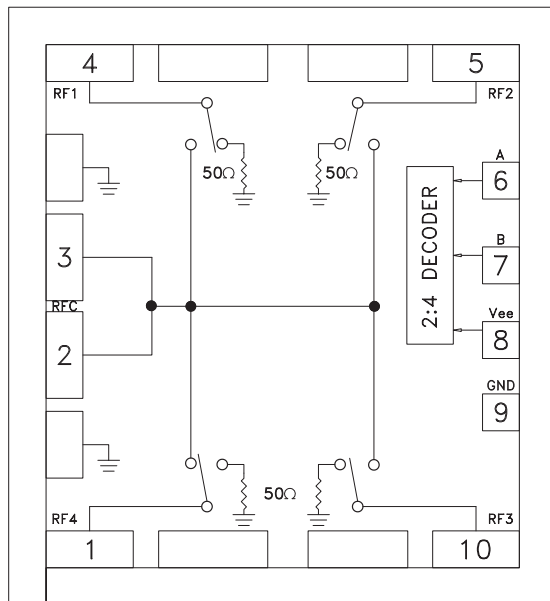
The HMC344 is ideal for:

- Telecom Infrastructure
- Microwave Radio & VSAT
- Military & Space
- Test Instrumentation

### Features

- Broadband Performance: DC - 8 GHz
- Non-Reflective Topology
- Low Insertion Loss: 1.8 dB @ 6 GHz
- Integrated 2:4 TTL Decoder
- Small Size: 1.08 x 1.05 x 0.10 mm

### Functional Diagram



### General Description

The HMC344 is a broadband non-reflective GaAs MESFET SP4T switch chip. Covering DC to 8 GHz, this switch offers high isolation, low insertion loss, and a compact form factor. This switch also includes an on board binary decoder circuit which reduces the number of required logic control lines to two. The switch operates using a negative control voltage of 0/-5V, and requires a fixed bias of -5V. All data is tested with the chip in a 50 Ohm test fixture connected via 0.025 mm (1 mil) diameter wire bonds of minimal length 0.31 mm (12 mils). This SP4T switch is also available in SMT packaged form as the HMC344LC3.

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

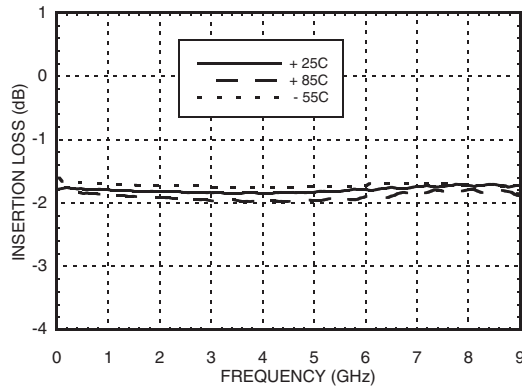
Parameter	Frequency	Min.	Typ.	Max.	Units
Insertion Loss	DC - 6.0 GHz		1.8	2.1	dB
	DC - 8.0 GHz		1.9	2.2	dB
Isolation	DC - 2.0 GHz	44	49		dB
	DC - 4.0 GHz	37	42		dB
	DC - 6.0 GHz	34	39		dB
	DC - 8.0 GHz	30	35		dB
Return Loss	"On State"	DC - 2.0 GHz	10	14	dB
		DC - 8.0 GHz	7	10	dB
Return Loss	"Off State"	DC - 8.0 GHz	7	10	dB
Input Power for 1 dB Compression	0.5 - 8.0 GHz	17	21		dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone)	0.5 - 8.0 GHz	37	40		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 8.0 GHz		35		ns
			150		ns

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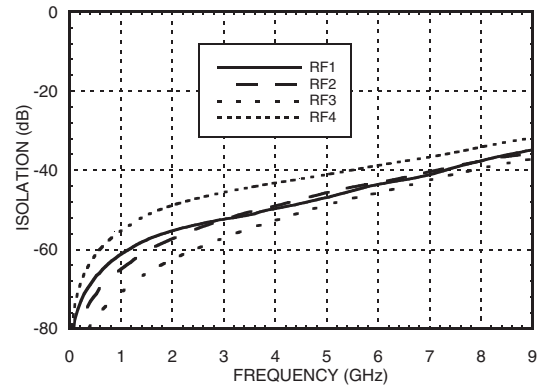
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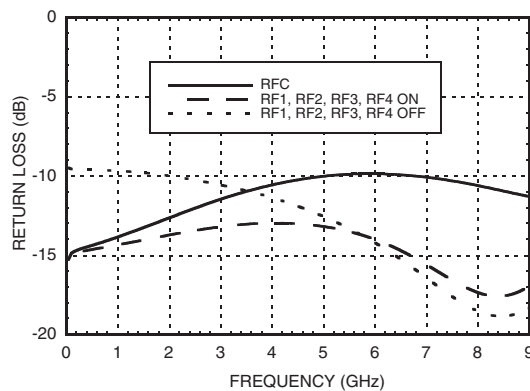
**Insertion Loss vs. Temperature**



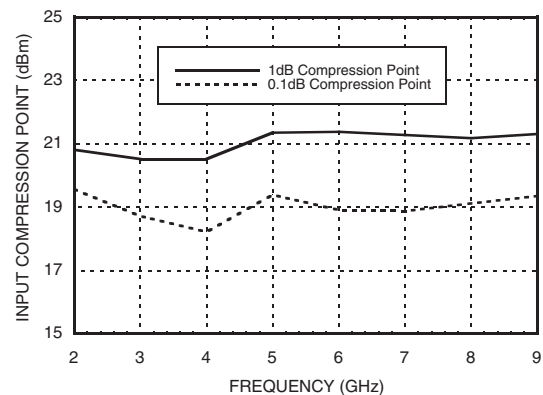
**Isolation**



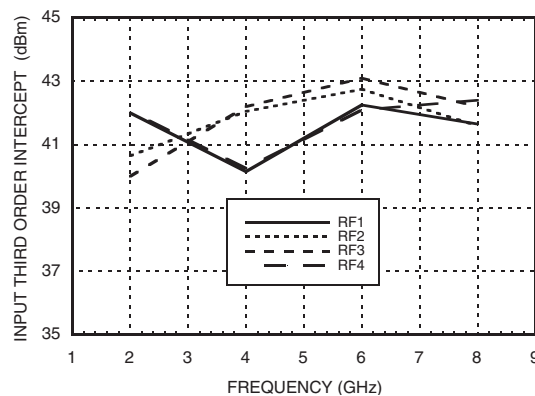
**Return Loss**



**0.1 and 1 dB Input Compression Point**



**Input Third Order Intercept Point**



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### Absolute Maximum Ratings

Bias Voltage Range (Vee)	-7V
Control Voltage Range (A & B)	Vee -0.5V to +1V
Channel Temperature	150 °C
Thermal Resistance (Insertion Loss Path)	143 °C/W
Thermal Resistance (Terminated Path)	1,030 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C
Maximum Input Power	+24 dBm
ESD Sensitivity (HBM)	Class 1A

### Truth Table

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

### Bias Voltage & Current

Vee Range = -5 Vdc ±10%		
Vee (V)	I <sub>dd</sub> (Typ) (mA)	I <sub>dd</sub> (Max) (mA)
-5	3	6



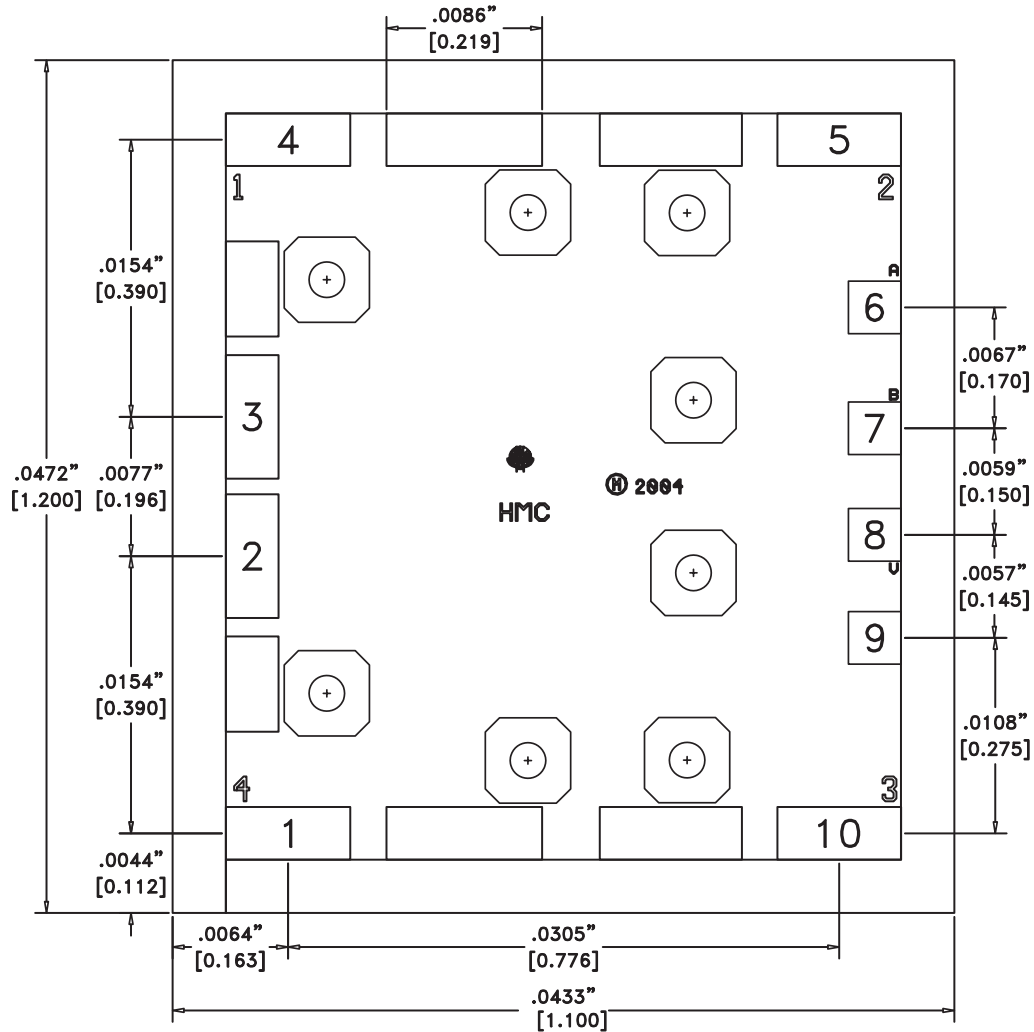
ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### TTL/CMOS Control Voltages

State	Bias Condition
Low	-3V to 0 Vdc @ 60 uA Typ.
High	-5 to 4.2 Vdc @ 5 uA Typ.

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**Outline Drawing**



**Die Packaging Information [1]**

Standard	Alternate
WP-2 (Waffle Pack)	[2]

[1] Refer to the "Packaging Information" section for die packaging dimensions.

[2] For alternate packaging information contact Hittite Microwave Corporation.

**NOTES:**

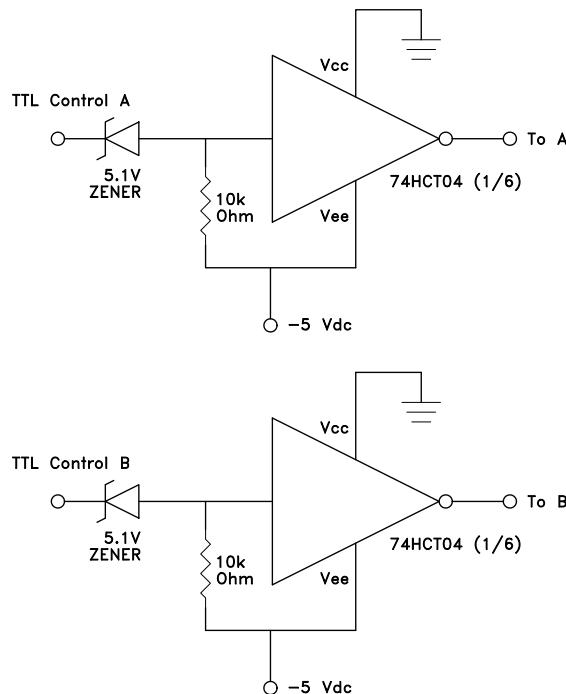
1. DIMENSIONS IN INCHES [MILLIMETERS].
2. DIE THICKNESS IS 0.004".
3. TYPICAL BOND PAD IS 0.004" SQUARE.
4. TYPICAL BOND PAD SPACING IS 0.006" CENTER TO CENTER.
5. BOND PAD METALLIZATION: GOLD.
6. BACKSIDE METALLIZATION: GOLD.
7. BACKSIDE METAL IS GROUND.
8. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS.

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**Pad Descriptions**

Pad Number	Function	Description	Interface Schematic
1, 2, 3, 4, 5, 10	RF4, RFC, RF1, RF2, RF3	These pads are DC coupled and matched to 50 Ohms. Blocking capacitors are required.	
6	A	See truth table and control voltage table.	
7	B	See truth table and control voltage table.	
8	Vee	Supply Voltage -5.0 Vdc ±10%	
9, Die Bottom	GND	Die bottom and pad must be connected to RF/DC ground.	

**TTL Interface Circuit**



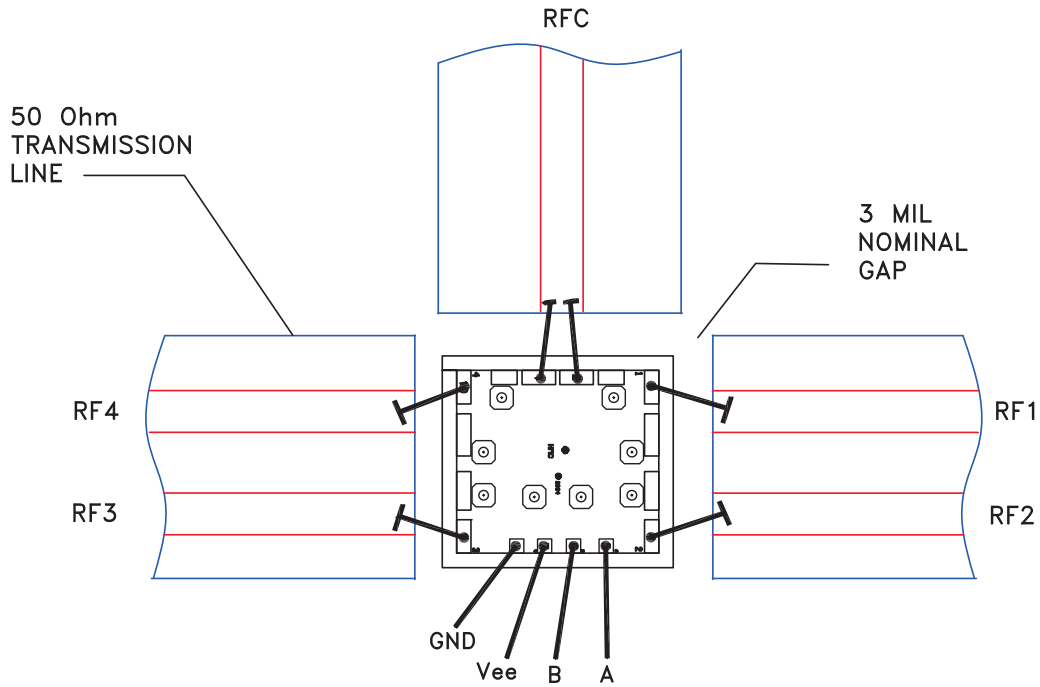
**Note:**  
Control inputs A and B can be driven directly with TTL logic with -5 Volts applied to the HCT logic gates Vee pin and to Vee (pad) of the RF Switch.

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**Assembly Diagram**



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