HMC322LP4

GaAs MMIC SP8T NON-REFLECTIVE SWITCH, DC - 8.0 GHz

Typical Applications

This switch is suitable for usage in DC - 8.0 GHz 50-Ohm or 75-Ohm systems:

- Broadband
- Fiber Optics
- Switched Filter Banks
- Wireless below 8 GHz

Features

Broadband Performance: DC - 8.0 GHz

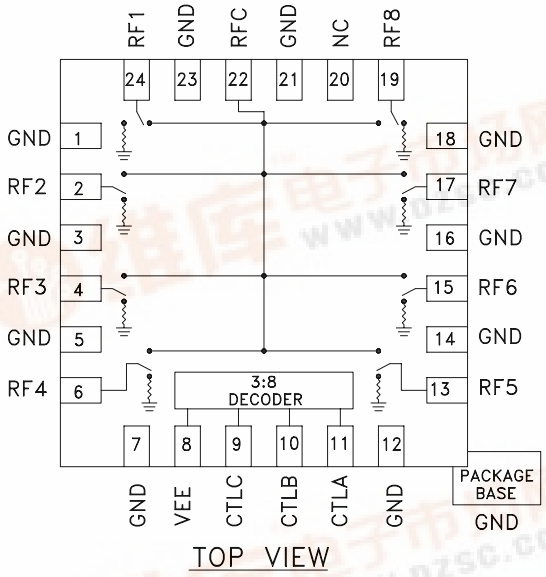
High Isolation: >30 dB@ 6 GHz

Low Insertion Loss: 2.4 dB@ 6 GHz

Integrated 3:8 TTL Decoder

4 mm x 4 mm x 1 mm SMT Package

Functional Diagram



TOP VIEW

General Description

The HMC322LP4 is a broadband non-reflective GaAs MESFET SP8T switch in a low cost lead-less surface mount package. Covering DC to 8 GHz, this switch offers high isolation and low insertion loss. This switch also includes an on board binary decoder circuit which reduces the required logic control lines to three. The switch operates using a negative control voltage of 0/-5 volts, and requires a fixed bias of -5v. This switch is suitable for usage in 50-Ohm or 75-Ohm systems.

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

Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 2.0 GHz DC - 4.0 GHz DC - 8.0 GHz		2.1 2.3 2.5	2.5 2.7 2.9	dB dB dB
Isolation		DC - 2.0 GHz DC - 4.0 GHz DC - 6.0 GHz DC - 8.0 GHz	35 30 25 20	40 35 30 25		dB dB dB dB
Return Loss	"On State"	DC - 2.0 GHz DC - 8.0 GHz	9 6	12 10		dB dB
Return Loss	"Off State"	DC - 8.0 GHz	7	10		dB
Input Power for 1 dB Compression		0.5 - 8.0 GHz	19	23		dBm
Input Third Order Intercept (Two-Tone Input Power = +7 dBm Each Tone)		0.5 - 8.0 GHz	36	40		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		DC - 8.0 GHz		 50 150		 ns ns

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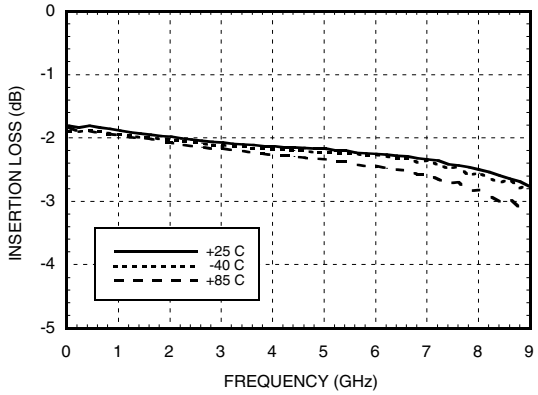
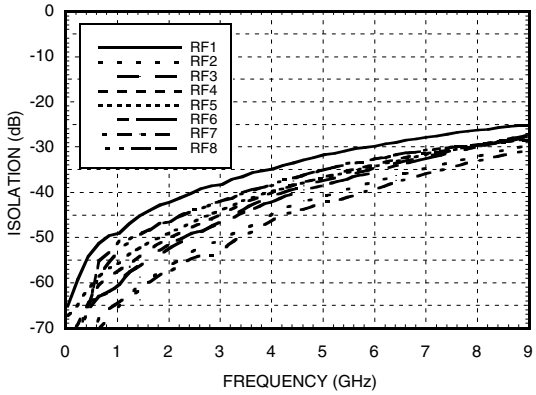
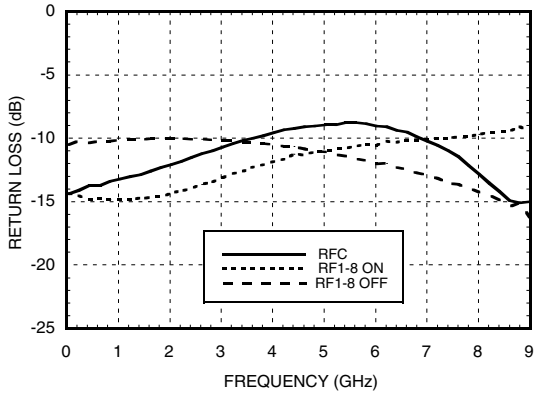
Insertion Loss vs. Temperature



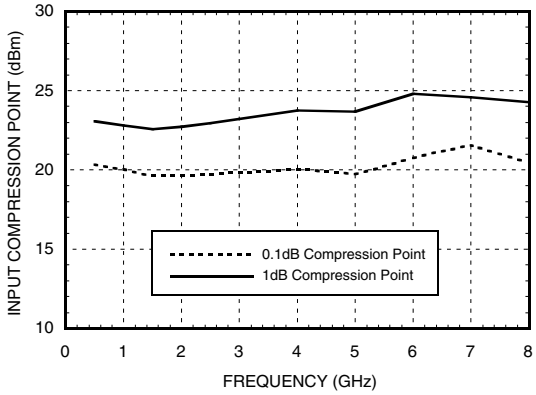
Isolation



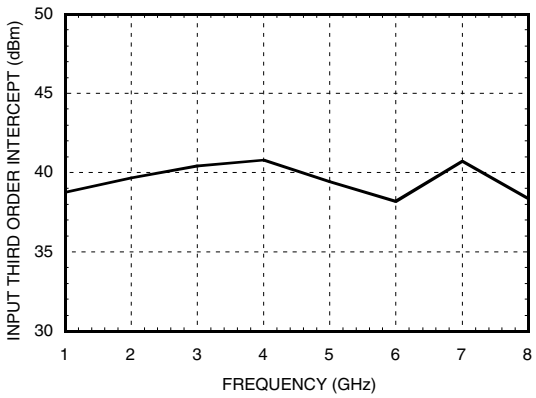
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Truth Table

Control Input			Signal Path State
A	B	C	RFCOM to:
High	High	High	RF1
Low	High	High	RF2
High	Low	High	RF3
Low	Low	High	RF4
High	High	Low	RF5
Low	High	Low	RF6
High	Low	Low	RF7
Low	Low	Low	RF8

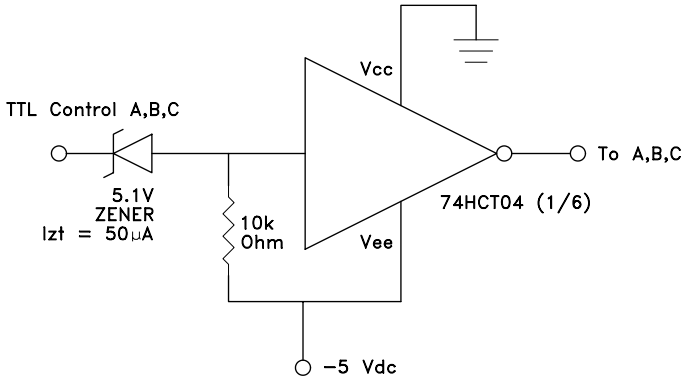
Bias Voltage & Current

Vee Range = -5.0 Vdc ± 10%		
Vee (Vdc)	Iee (Typ.) (mA)	Iee (Max.) (mA)
-5.0	5.0	9.0

Control Voltages

State	Bias Condition
Low	-3V to 0 Vdc @ 25 uA Typical
High	-5 to -4.2 Vdc @ 5 uA Typical

TTL Interface Circuit



Note:
Control inputs A, B, and C can be driven directly with TTL logic with -5 Volts applied to the HCT logic gates Vee pin and to Vee (pin 8) of the RF Switch.

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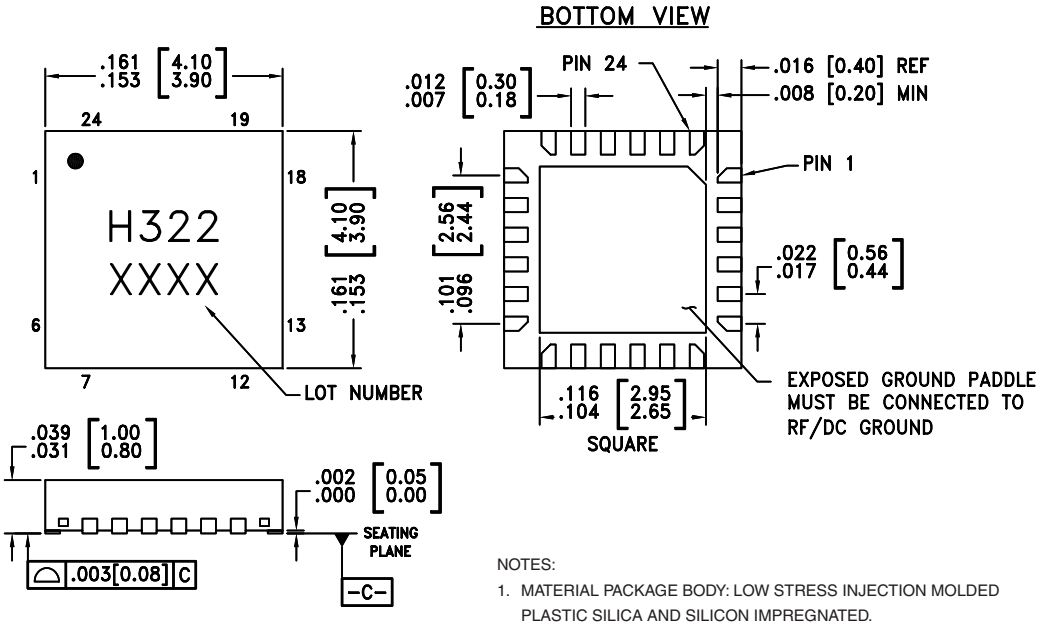
Absolute Maximum Ratings

Bias Voltage Range (Vee)	-7.0 Vdc
Control Voltage Range (A, B, & C)	Vee -0.5V to +1.0 Vdc
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power	26 dBm

Outline Drawing



NOTES:

1. MATERIAL PACKAGE BODY: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY
3. LEAD AND GROUND PADDLE PLATING: Sn/Pb SOLDER
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE
6. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM. PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
7. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
8. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
9. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN.

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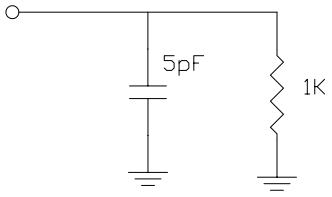
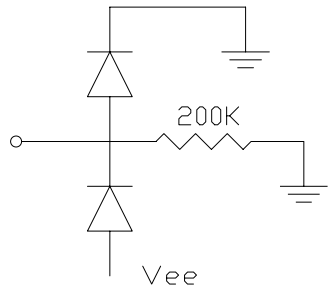
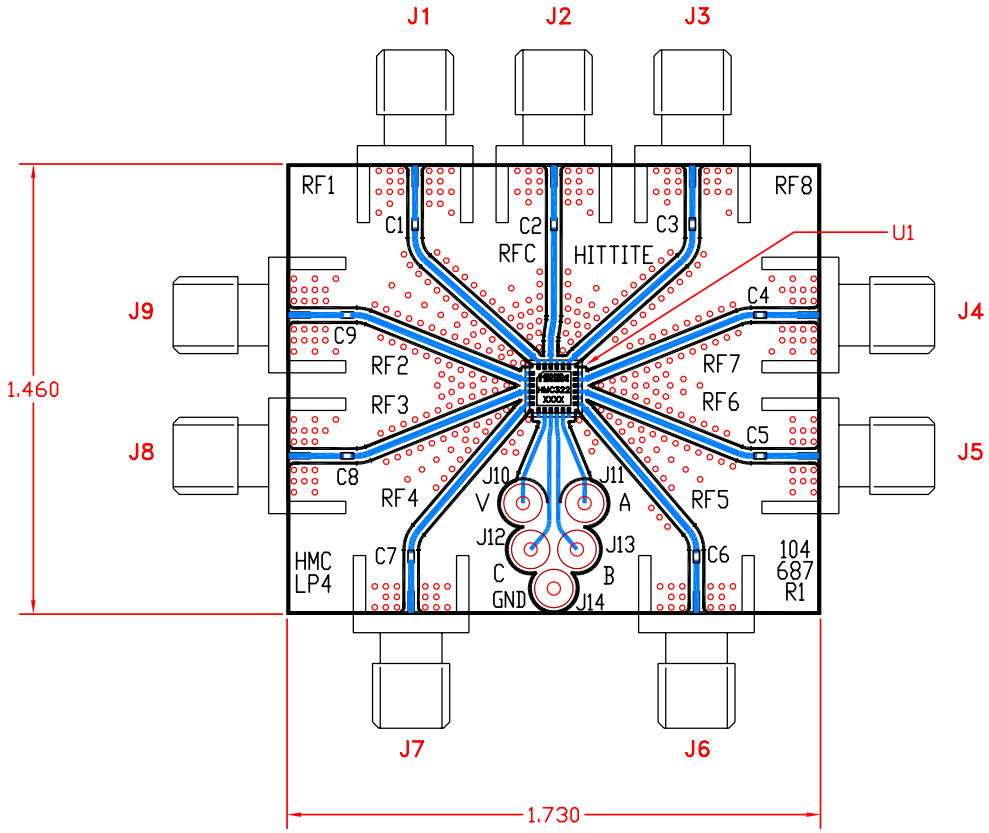
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 5, 7, 12, 14, 16, 18, 21, 23	GND	Package bottom has exposed metal paddle that must also be connected to PCB RF ground.	
2, 4, 6, 13, 15, 17, 19, 22, 24	RF1 - RF8 & RFC	This pin is DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V.	
8	VEE	Supply Voltage =5V ± 10%	
9	CTLC	See truth table and control voltage table.	
10	CTLB	See truth table and control voltage table.	
11	CTLA	See truth table and control voltage table.	
20	N/C	This pin should be connected to PCB RF ground to maximize isolation.	

Evaluation PCB



List of Material

Item	Description
J1 - J9	PC Mount SMA RF Connector
J10 - J14	DC Pin
C1 - C9	100 pF Capacitor, 0402 Pkg.
U1	HMC322LP4 SP8T Switch
PCB*	104687 Evaluation PCB 1.73"x1.46"
* Circuit Borad 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 backside ground slug 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.