HMC321ALP4E

v03.0717

GaAs MMIC SP8T NON-REFLECTIVE POSITIVE CONTROL SWITCH, DC* - 8 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 GHz

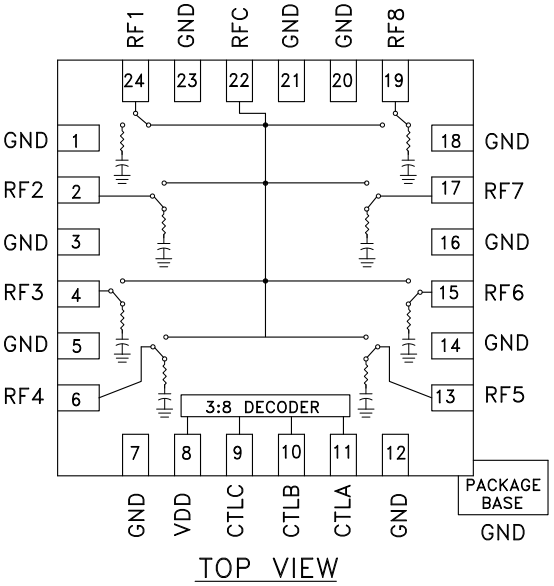
High Isolation: >30 dB at 6 GHz

Low Insertion Loss: 2.3 dB at 6 GHz

Integrated Positive Supply 3:8 TTL Decoder

24 Lead 4x4mm QFN Package: 9 mm²

Functional Diagram



General Description

The HMC321ALP4E is a broadband non-reflective GaAs SP8T switch in low cost leadless surface mount packages. 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 positive control voltage of 0/+5 volts, and requires a fixed bias of +5 volts. This switch is suitable for usage in 50-Ohm or 75-Ohm systems.

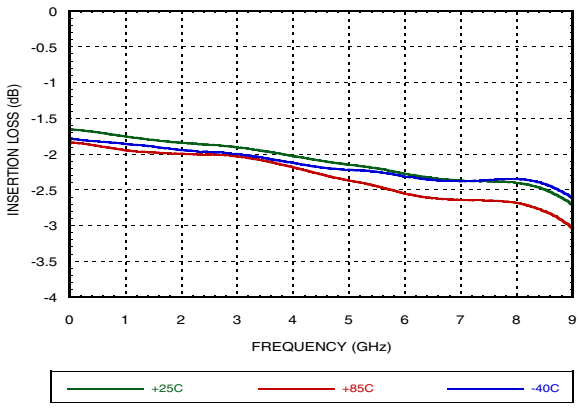
** DC blocking capacitors are required at ports RFC and RF1, 2, 3, 4, 5, 6, 7, 8. Their value will determine the lowest transmission frequency.*

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

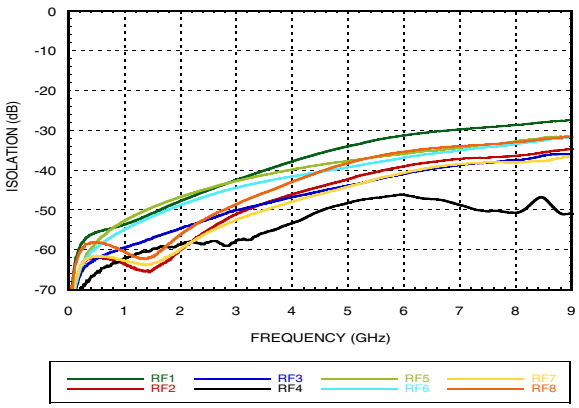
Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 2.0 GHz DC - 4.0 GHz DC - 8.0 GHz		1.7 1.8 2.2	1.8 1.9 3.1	dB dB dB
Isolation		DC - 2.0 GHz DC - 4.0 GHz DC - 6.0 GHz DC - 8.0 GHz	45 35 25 20	50 40 30 28		dB dB dB dB
Return Loss	"On State"	DC - 4.0 GHz DC - 8.0 GHz	12 10	16 15		dB dB
Return Loss (RF1 - RF8)	"Off State"	2.0 - 8.0 GHz	12	15		dB
Input Power for 1 dB Compression		0.5 - 8.0 GHz	25	26		dBm
Input Third Order Intercept (Two-tone Input Power = +7 dBm Each Tone, 1 MHz Spacing)		0.5 - 6.0 GHz	35	38		dBm
Switching Characteristics t_{RISE}, t_{FALL} (10/90% RF) t_{ON}, t_{OFF} (50% CTL to 10/90% RF)		DC - 8.0 GHz		25 150		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

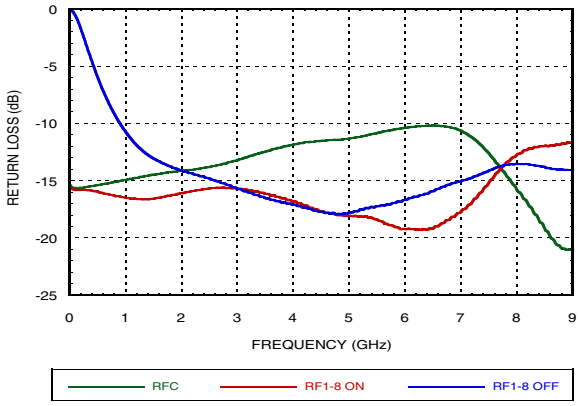
Insertion Loss vs. Temperature



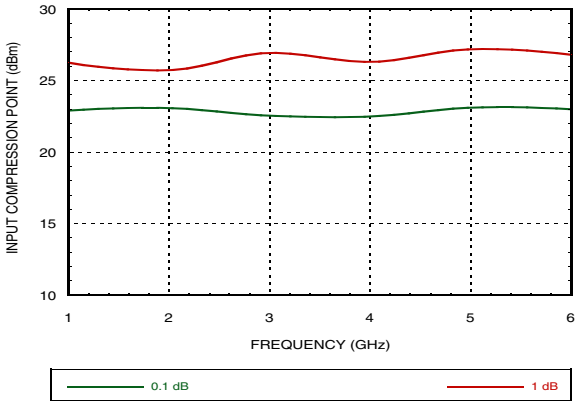
Isolation



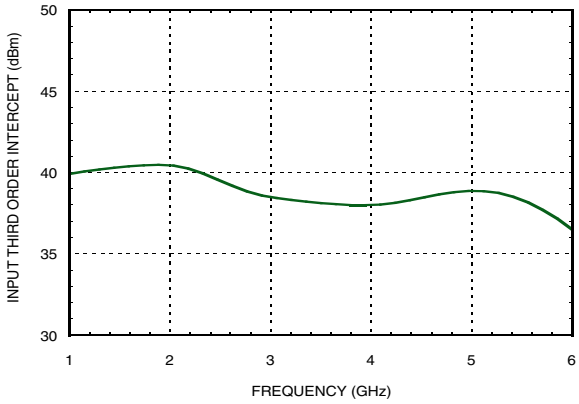
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



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Bias Voltage & Current

Vdd Range = +5 Vdc ± 10%		
Vdd (Vdc)	Idd (Typ.) (mA)	Idd (Max.) (mA)
+5	4	8

Control Voltages

State	Bias Condition
Low	0 to +0.8 Vdc at 0 µA Typical
High	+2.0 to +5 Vdc at 20 µA Typical

Truth Table

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

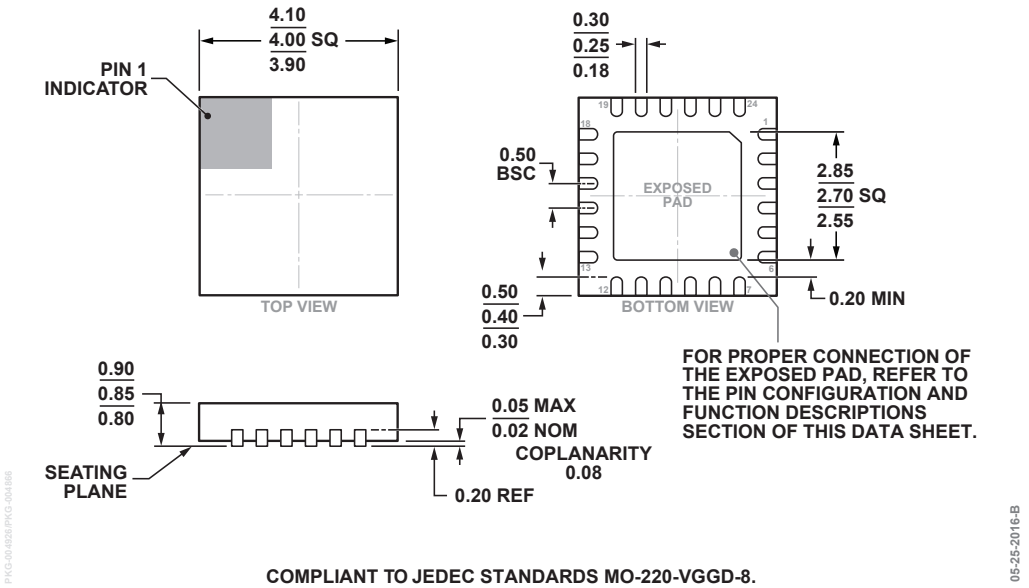
Note:
DC blocking capacitors are required at ports RFC and RF1, 2, 3, 4, 5, 6, 7, 8. Their value will determine the lowest transmission frequency.

Absolute Maximum Ratings

Bias Voltage Range (Port Vdd)	+7.0 Vdc
Control Voltage Range (A, B, & C)	-0.5V to Vdd +0.5 Vdc
Maximum Input Power Vdd = +5V	+26 dBm
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 1A
ESD Sensitivity (FICDM)	Class II

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



COMPLIANT TO JEDEC STANDARDS MO-220-VGGD-8.

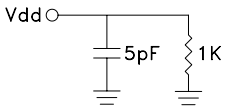
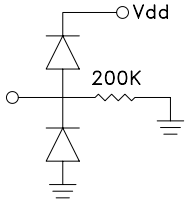
24-Lead Lead Frame Chip Scale Package [LFCSP]
4 mm × 4 mm Body and 0.85 mm Package Height
(CP-24-16)
Dimensions shown in millimeters

Package Information

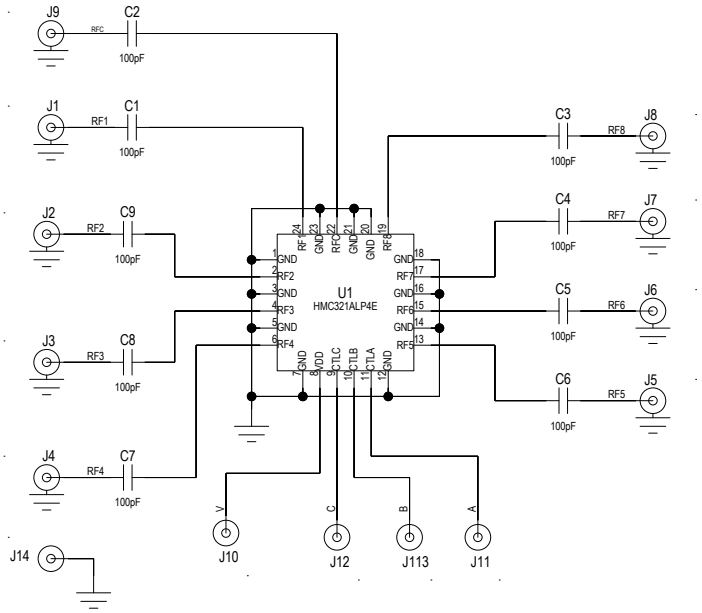
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [2]
HMC321ALP4E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 [1]	H321A XXXX

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

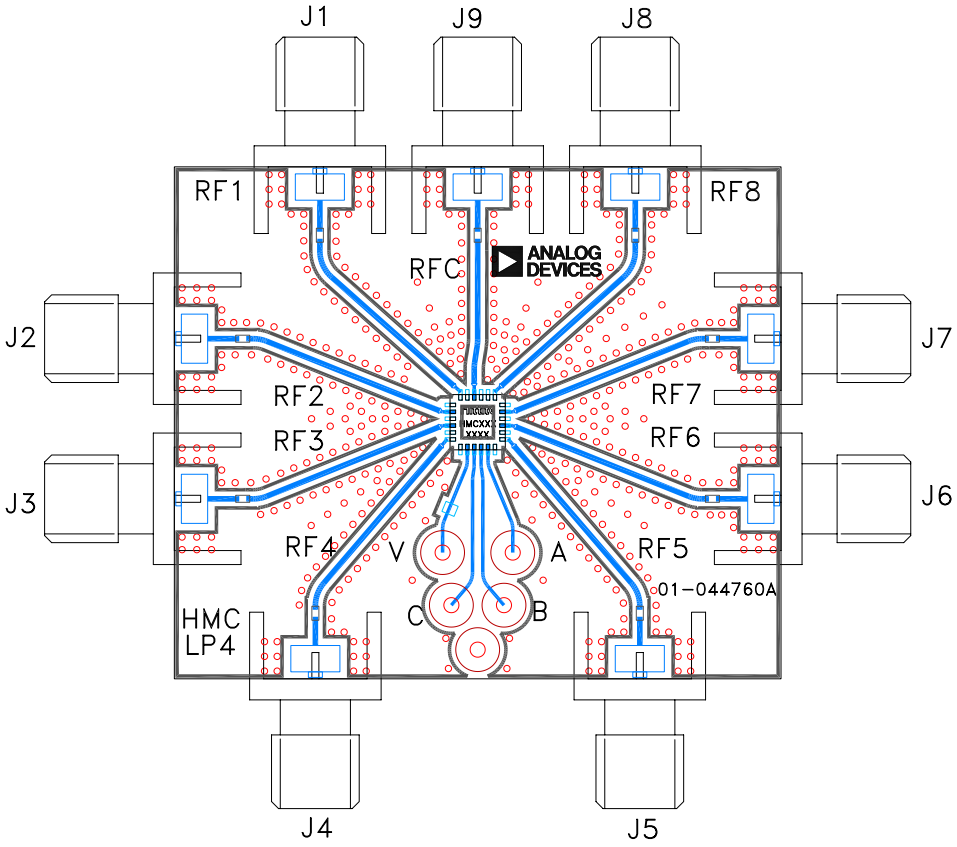
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 3, 5, 7, 12, 14, 16, 18, 20, 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.	
8	VDD	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.	

Application Circuit



Evaluation PCB



List of Materials for Evaluation PCB EV1HMC321ALP4E [1]

Item	Description
J1 - J9	PCB Mount SMA RF Connector
J10 - J14	DC Pin
C1 - C9	100 pF Capacitor, 0402 Pkg.
U1	HMC321ALP4E SP8T Switch
PCB [2]	01-044760 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 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 Analog Devices upon request.