HMC427LP3

GaAs MMIC POSITIVE CONTROL TRANSFER SWITCH, DC* - 8.0 GHz

Typical Applications

The HMC427LP3 is ideal for:

- Test Instrumentation
- Fiber Optics & Broadband Telecom
- Basestation Infrastructure
- Microwave Radio & VSAT
- Military Radios, Radar, & ECM

Features

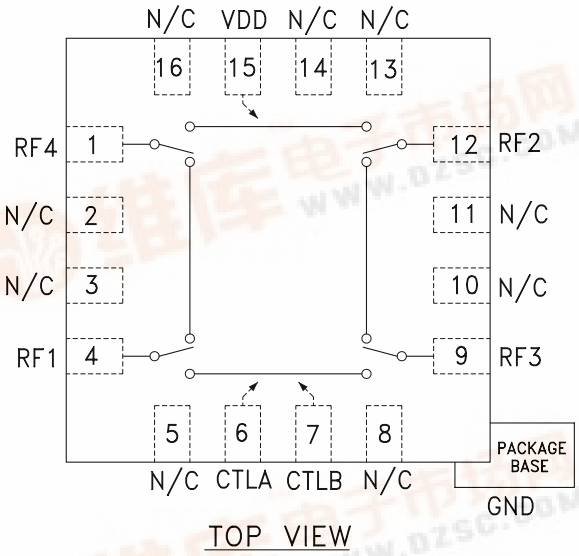
High Isolation: 40 ~ 45 dB thru 6 GHz

Low Insertion Loss: 1.2 dB@ 6 GHz

Non-Reflective Design

3 mm x 3 mm x 1 mm SMT Package

Functional Diagram



TOP VIEW

General Description

The HMC427LP3 is a low loss broadband positive control transfer switch in a leadless surface mount package. Covering DC to 8 GHz, this switch offers high isolation and low insertion loss. The switch operates using a positive control voltage of 0/+5V and requires a fixed bias of +5V @ < 20 µA.

** Blocking capacitors are required at ports RF1, 2, 3, & 4. 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 - 6.0 GHz DC - 8.0 GHz		1.2 1.6	1.6 2.1	dB dB
Isolation	DC - 1.0 GHz DC - 2.0 GHz DC - 6.0 GHz DC - 8.0 GHz	42 37 33 27	48 42 38 32		dB dB dB dB
Return Loss	DC - 6.0 GHz DC - 8.0 GHz	14 12	17 15		dB dB
Input Power for 1 dB Compression	1.0 - 8.0 GHz	23	26		dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone, 1 MHz Tone Separation)	1.0 - 8.0 GHz	37	43		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)	DC - 8.0 GHz		 2 4		 ns ns

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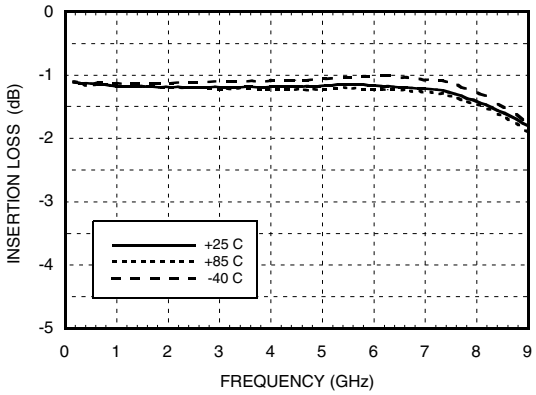
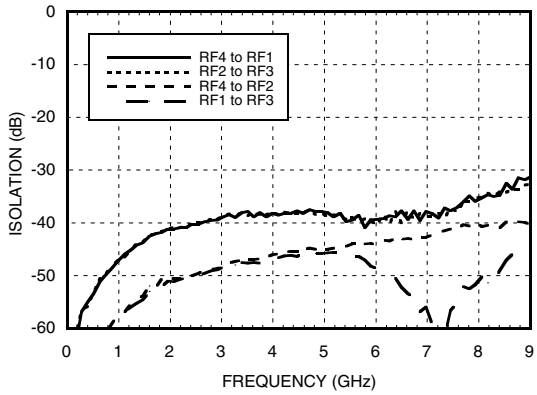
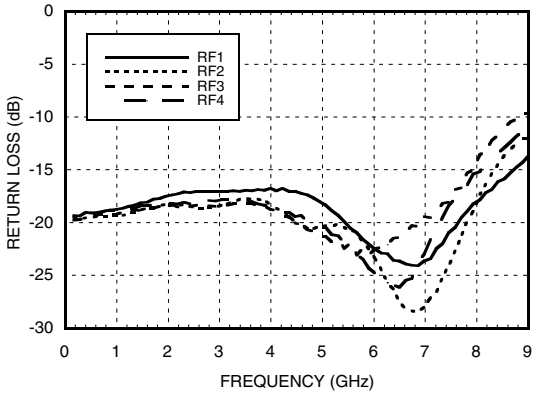
Insertion Loss vs. Temperature



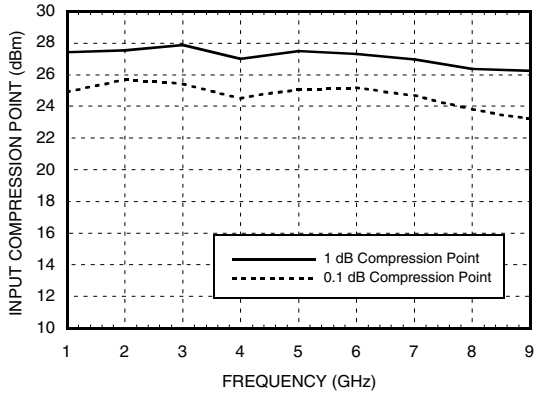
Isolation



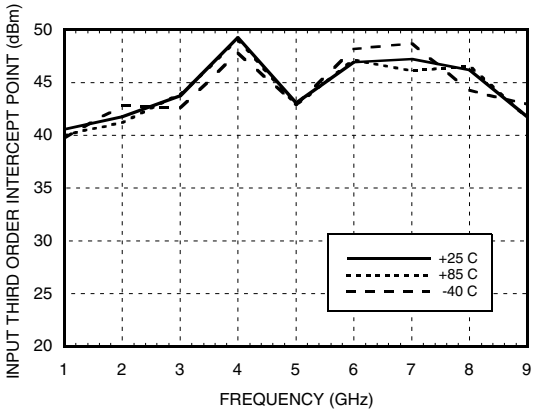
Return Loss



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	RF4 to RF2	RF1 to RF3	RF4 to RF1	RF2 to RF3
Low	High	On	On	Off	Off
High	Low	Off	Off	On	On

Bias Voltage & Current

Vdd Range = +5.0 Vdc ± 10 %		
Vdd (Vdc)	Idd (Typ.) (µA)	Idd (Max.) (µA)
+5.0	5	10

Control Voltages

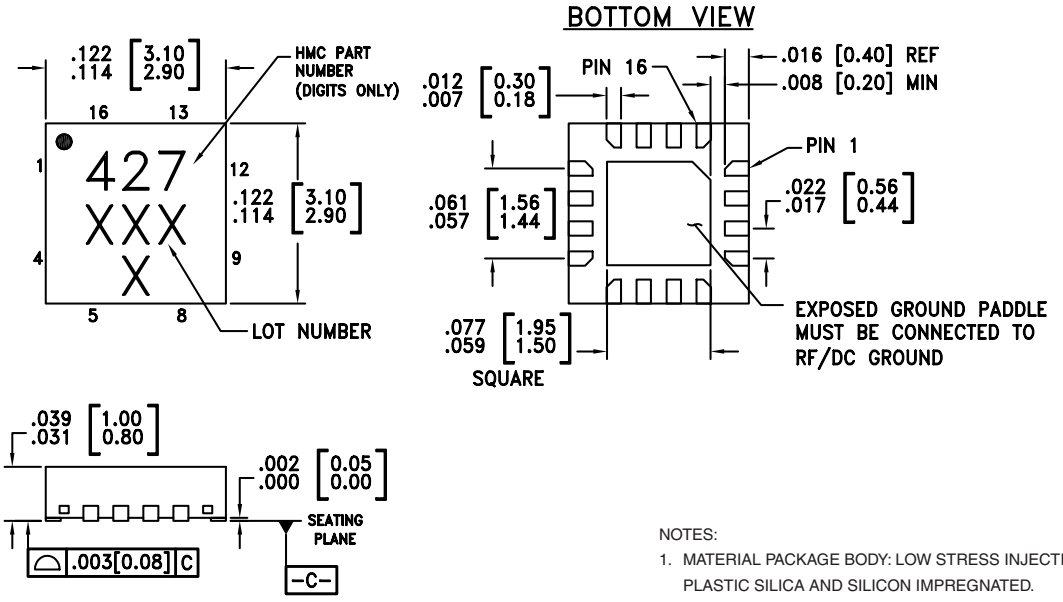
State	Bias Condition
Low	0 to +0.2 Vdc @ 5 µA Typical
High	Vdd ± 0.2 Vdc @ 5 µA Typical

Absolute Maximum Ratings

Bias Voltage Range (Vdd)	+7.0 Vdc
Control Voltage Range (A & B)	-0.5V to Vdd +1.0 Vdc
Channel Temperature	150 °C
Thermal Resistance	130 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
Maximum Input Power	+27 dBm

Note:
DC blocking capacitors are required at ports RF1, 2, 3, & 4. Their value will determine the lowest transmission frequency.

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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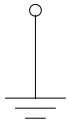
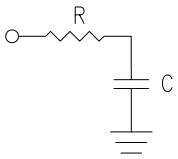
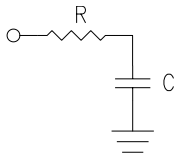
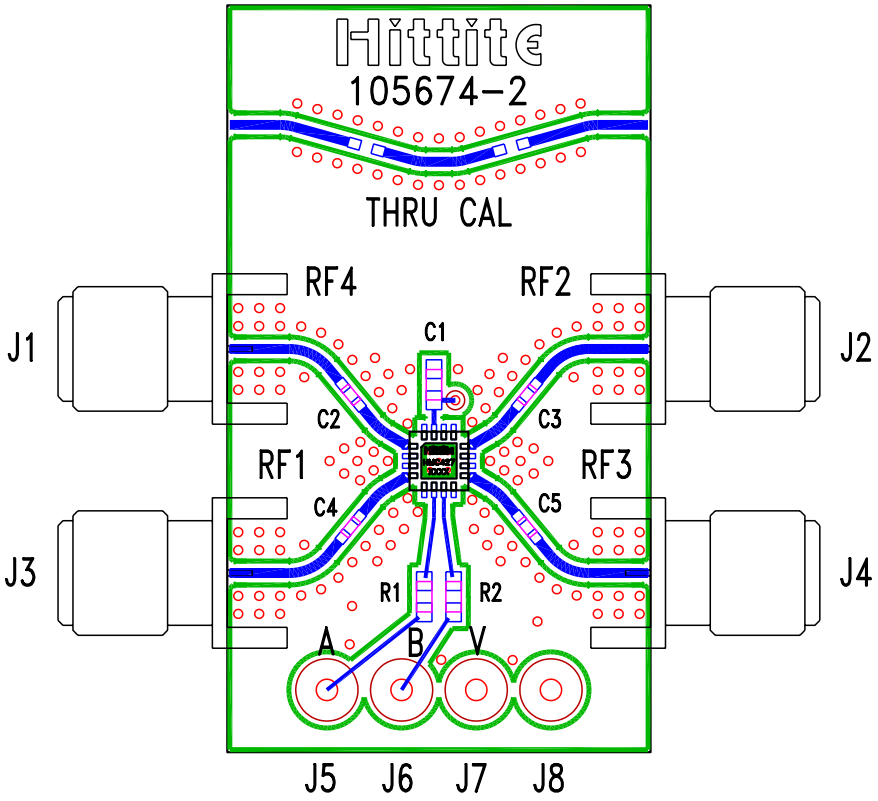
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 4, 9, 12	RF4, RF1, RF3, RF2	This pin is DC coupled and matched to 50 Ohm. Blocking capacitors are required.	
2, 3, 5, 8, 10, 11, 13, 14, 16	N/C	This pin should be connected to PCB RF ground to maximize isolation.	
	GND	Package bottom has exposed metal paddle that must be connected to PCB RF ground.	
6	CTRLA	See truth table and control voltage table.	
7	CTRLB	See truth table and control voltage table.	
15	VDD	Supply Voltage +5V ± 10%.	

Evaluation PCB



List of Material

Item	Description
J1 - J4	PC Mount SMA RF Connector
J5 - J8	DC Pin
C1	1000 pF Capacitor, 0603 Pkg.
C2 - C5	100 pF Capacitor, 0402 Pkg.
R1 - R2	100 Ohm Resistor, 0603 Pkg.
U1	HMC427LP3 Transfer Switch
PCB*	105674 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.