HMC347ALP3E

v02.0217

GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 14 GHz

Typical Applications

The HMC347ALP3E is ideal for:

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

Features

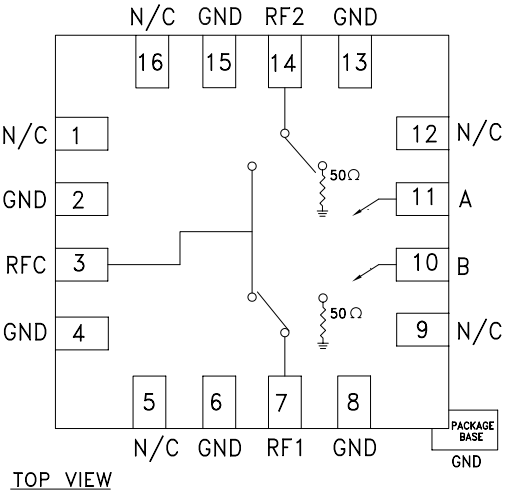
High Isolation: >54 dB up to 3 GHz
>44 dB up to 10 GHz

Low Insertion Loss: 1.8 dB @ 10 GHz

Non-Reflective Design

3x3 mm QFN SMT Package

Functional Diagram



General Description

The HMC347ALP3E is a broadband high isolation non-reflective GaAs pHEMT SPDT switch in low cost leadless QFN surface mount plastic package. Covering DC to 14 GHz, the switch offers high isolation and low insertion loss. The switch features >54 dB isolation up to 3 GHz and >44 dB isolation up to 13 GHz. The switch operates using complementary negative control voltage logic lines of -5/0V and requires no bias supply.

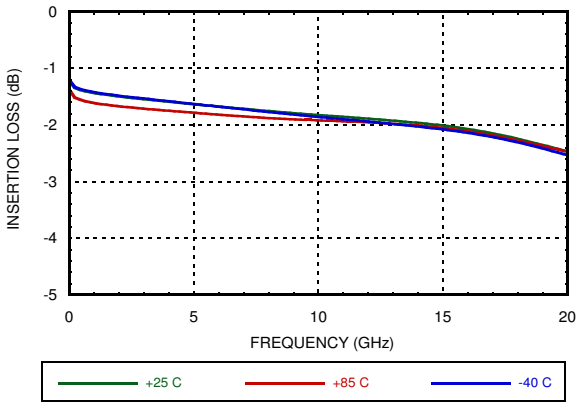
Electrical Specifications, T_A = +25° C, With 0/-5V Control, 50 Ohm System

Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 3.0 GHz DC - 6.0 GHz DC - 12.0 GHz DC - 14.0 GHz		1.5 1.7 1.9 2.0	1.9 2.1 2.4 2.5	dB dB dB dB
Isolation		DC - 3.0 GHz DC - 6.0 GHz DC - 12.0 GHz DC - 14.0 GHz	50 44 40 34	54 48 44 40		dB dB dB dB
Return Loss RFC	“On State”	DC - 6.0 GHz DC - 14.0 GHz	14 12	17 17		dB dB
Return Loss RF1, RF2	“Off State”	DC - 6.0 GHz DC - 14.0 GHz	23 15	26 18		dB dB
Input Power for 1 dB Compression		0.5 - 14.0 GHz	24	29		dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone)		0.5 - 14.0 GHz	42	47		dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		DC - 14 GHz		 2 10		 ns ns

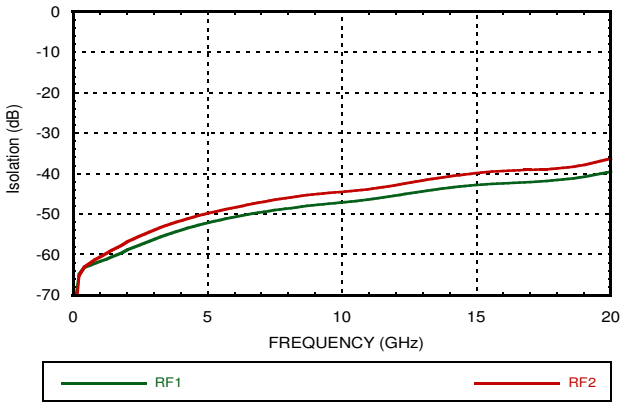
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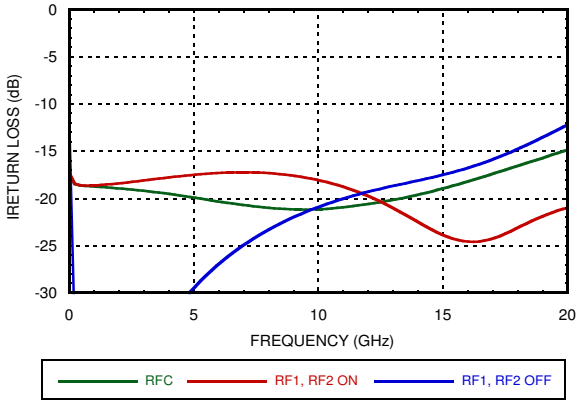
Insertion Loss



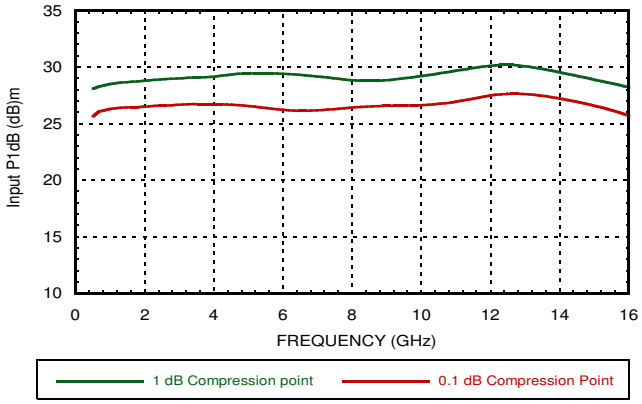
Isolation



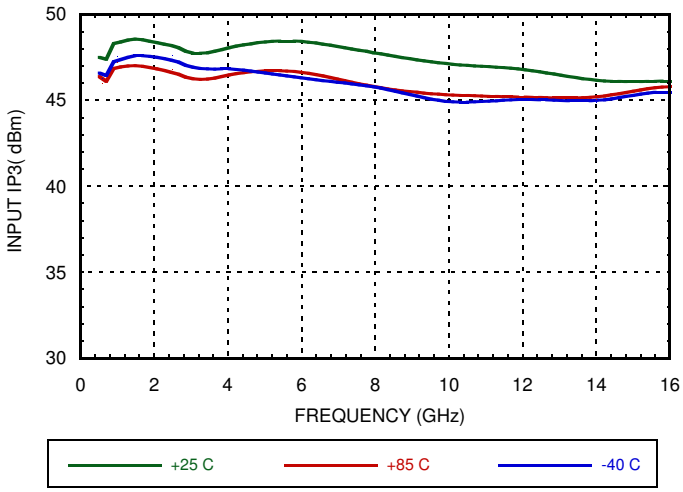
Return Loss



0.1 and 1 dB Input Compression Point



Input Third Order Intercept Point



GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 14 GHz

Absolute Maximum Ratings

RF Input Power (Vctl = -5V)	+27 dBm
Control Voltage Range (A & B)	+0.5V to -7.5 Vdc
Hot Switch Power Level (Vctl = -5 V)	+23 dBm
Channel Temperature	150 °C
Terminated Power Level (Vctl = -5V)	+25dBm
Thermal Resistance (Insertion Loss Path)	118 °C/W
Thermal Resistance (Terminated Path)	200 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-55 to +85 °C
ESD Sensitivity (HBM)	Class 1A

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

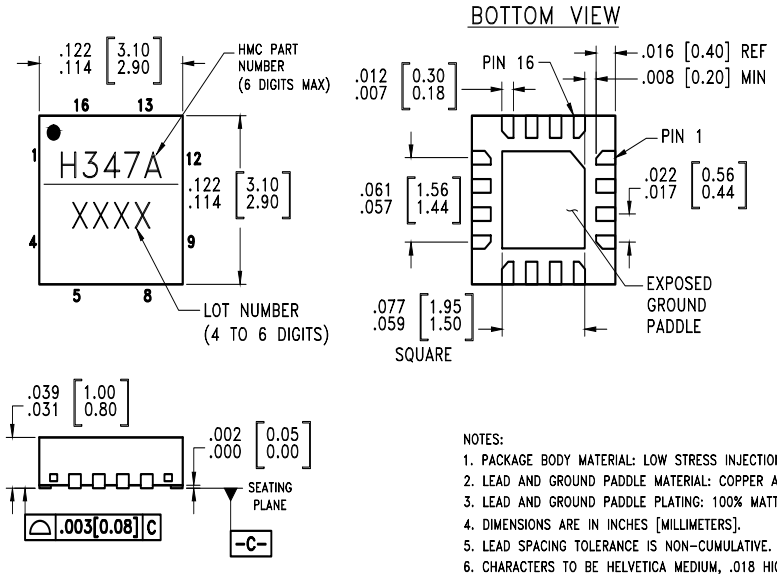
Control Voltages

State	Bias Condition
Low	0 to -0.5V @ 10 uA Max.
High	-5V @ 3uA Typ. to -7V @ 40 uA Max (± 0.5 Vdc)

Truth Table

Control Input		Signal Path State	
A	B	RFC to RF1	RFC to RF2
High	Low	On	Off
Low	High	Off	On

Outline Drawing



NOTES:

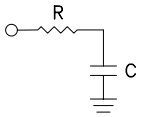
1. PACKAGE BODY MATERIAL: LOW STRESS INJECTION MOLDED PLASTIC SILICA AND SILICON IMPREGNATED.
2. LEAD AND GROUND PADDLE MATERIAL: COPPER ALLOY.
3. LEAD AND GROUND PADDLE PLATING: 100% MATTE TIN.
4. DIMENSIONS ARE IN INCHES [MILLIMETERS].
5. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
6. CHARACTERS TO BE HELVETICA MEDIUM, .018 HIGH, WHITE INK, OR LASER MARK LOCATED APPROX. AS SHOWN.
7. PAD BURR LENGTH SHALL BE 0.15mm MAX. PAD BURR HEIGHT SHALL BE 0.05mm MAX.
8. PACKAGE WARP SHALL NOT EXCEED 0.05mm
9. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
10. REFER TO HITTITE APPLICATION NOTE FOR SUGGESTED PCB LAND PATTERN.
11. UNDERLINE THE LOT NUMBER TO DESIGNATE 2000A FIRST LAYER NITRIDE DIE FAB OPTION AS SPECIFIED BY THE PO

Package Information

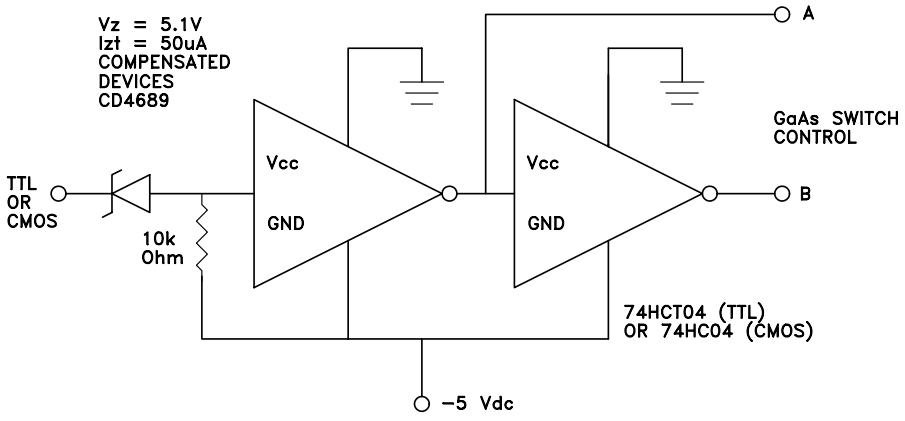
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [2]
HMC347ALP3E	RoHS-compliant Low Stress Injection Molded Plastic	100% matte Sn	MSL3 [1]	H347A XXXX

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

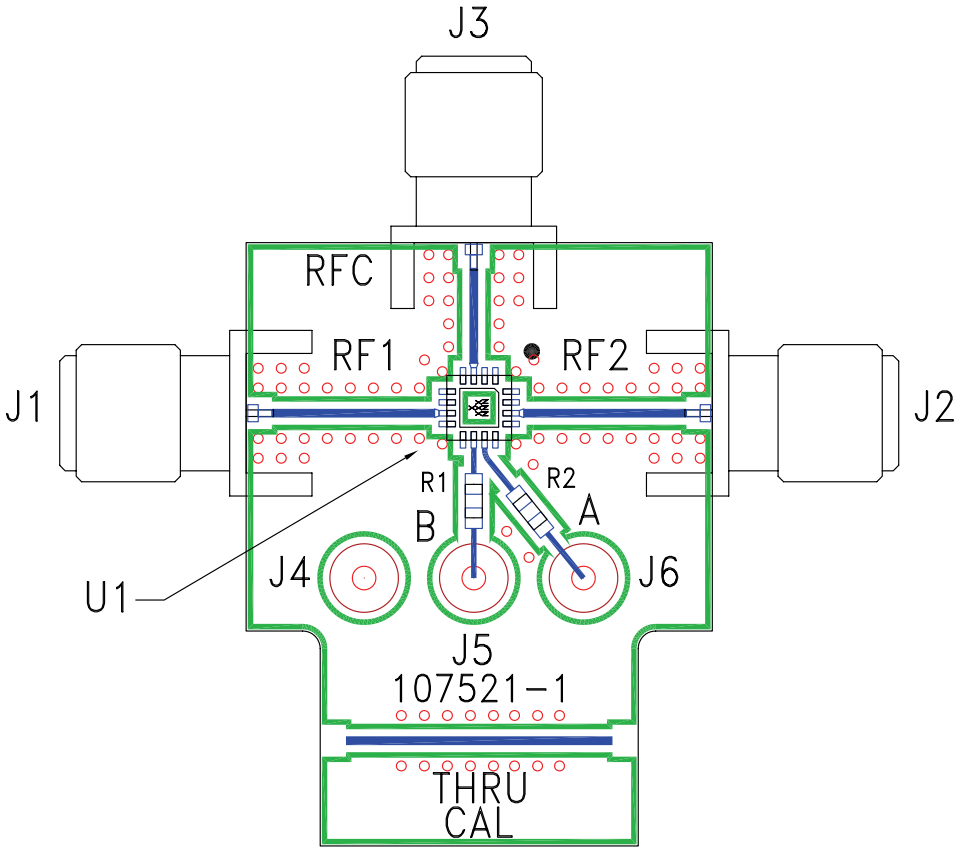
Pin Descriptions

Pin Number	Function	Description	Interface Schematic
1, 5, 9, 12, 16	N/C	This pin should be connected to PCB RF ground to maximize isolation	
2, 4, 6, 8, 13, 15	GND	Package bottom has exposed metal paddle that must also be connected to PCB RF ground.	
3, 7, 14	RFC, RF1, RF2	This pin is DC coupled and matched to 50 Ohm. Blocking capacitors are required if RF line potential is not equal to 0V.	
10	CTLB	See truth table and control voltage table.	
11	CTLA	See truth table and control voltage table.	

Suggested Driver Circuit



Evaluation PCB



List of Materials for EV1HMC347ALP3 [1]

Item	Description
J1 - J3	PCB Mount SRI SMA Connector
J4 - J6	DC Pin
R1 - R2	100 Ohm Resistor, 0603 Pkg.
U1	HMC347ALP3E SPDT Switch
PCB [2]	107521 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 package bottom should be connected directly to the ground plane similar to that shown above. The evaluation circuit board shown above is available from Analog Devices Inc. upon request.