HMC547ALC3

v01.0317

GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 28.0 GHz

Typical Applications

The HMC547ALC3 is ideal for:

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

Features

High Isolation: 45 dB @ 10 GHz
39 dB @ 20 GHz

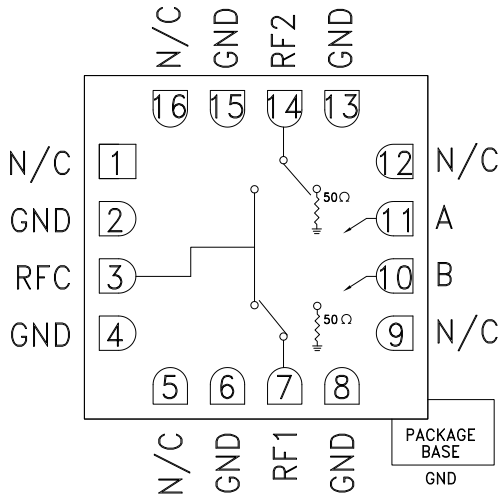
Low Insertion Loss: 1.9 dB @ 10 GHz
2.2 dB @ 20 GHz

Fast Switching: 6 ns

Non-Reflective Design

16 Lead Ceramic 3x3 mm SMT Package: $9mm^2$

Functional Diagram



General Description

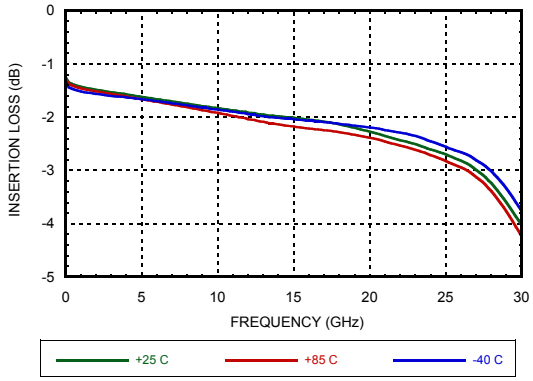
The HMC547ALC3 is a general purpose broadband high isolation non-reflective GaAs pHEMT SPDT switch in a ceramic 3x3 mm leadless surface mount package. Covering DC to 28.0 GHz, the switch offers over 40 dB isolation and less than 2 dB insertion loss at midband. The wide bandwidth, fast switching, and compact size make this absorbtive SPDT ideal for military EW/ECM and test equipment applications. 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

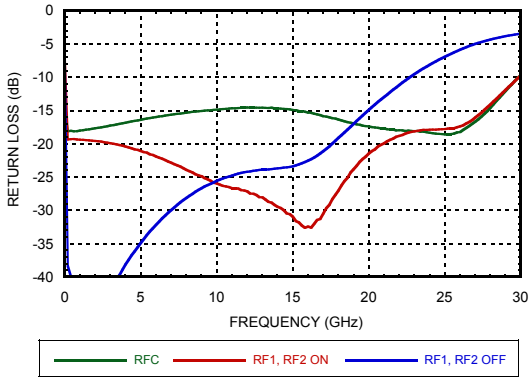
Parameter		Frequency	Min.	Typ.	Max.	Units
Insertion Loss		DC - 10.0 GHz 10.0 - 20.0 GHz 20.0 - 26.0 GHz 26.0 - 28.0 GHz		1.9 2.2 2.8 3.1	2.4 2.8 3.4 3.7	dB dB dB dB
Isolation		DC - 10.0 GHz 10.0 - 20.0 GHz 20.0 - 28.0 GHz	40 34 30	45 40 34		dB dB dB
Return Loss	“On State”	DC - 28.0 GHz		17		dB
Return Loss RF1, RF2	“Off State”	DC - 10.0 GHz 10.0 - 20.0 GHz 20.0 - 28.0 GHz		25 15 8		dB dB dB
Input Power for 1 dB Compression		DC - 0.5 GHz 0.5 - 28.0 GHz	 20	16 26		dBm dBm
Input Third Order Intercept (Two-Tone Input Power= +7 dBm Each Tone)		DC - 0.5 GHz 0.5 - 28.0 GHz		35 46		dBm dBm
Switching Characteristics tRISE, tFALL (10/90% RF) tON, tOFF (50% CTL to 10/90% RF)		DC - 28.0 GHz		 3 6		 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

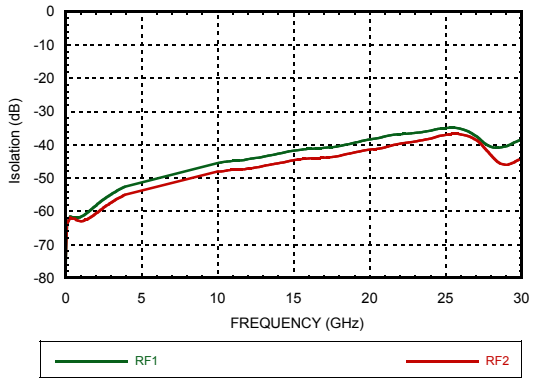
Insertion Loss



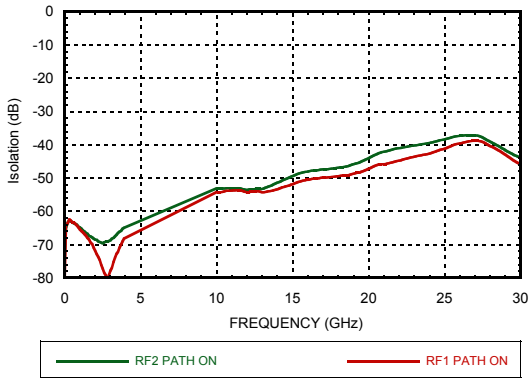
Return Loss



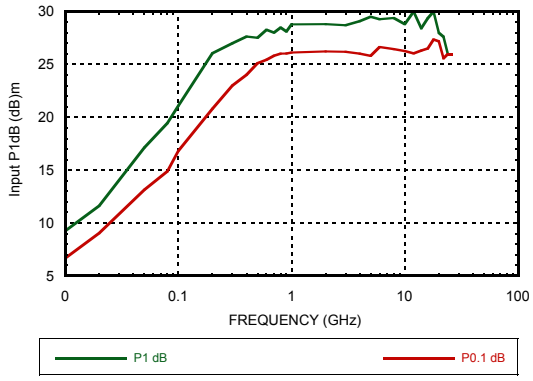
Isolation Between Ports RFC and RF1/RF2



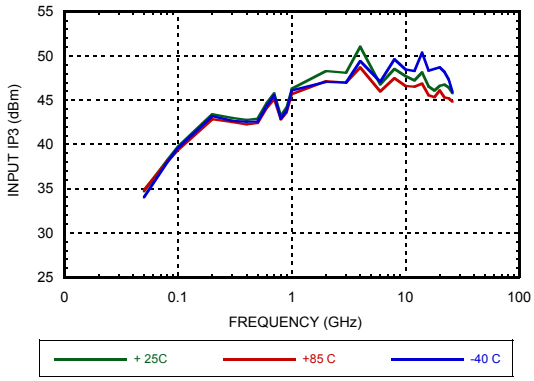
Isolation Between Ports RF1 and RF2



Input P1dB and P0.1dB Compression Point



Input Third Order Intercept Point



GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 28.0 GHz

Absolute Maximum Ratings

RF Input Power (Vctl = -5V)	+29 dBm
Control Voltage Range (A & B)	+0.5V to -7.5 V
Hot Switch Power Level (Vctl = -5V)	+23 dBm
Channel Temperature	150 °C
Continuous Pdiss (T=85°C) (derate 8.5 mW/°C above 85°C) (Insertion Loss Path)	0.55W
Thermal Resistance (Insertion Loss Path)	118 °C/W
Terminated Power Level (Vctl =-5V)	+25dBm
Continuous Pdiss (T=85°C) (derate 5.0 mW/°C above 85°C) (Terminated Path)	0.32W
Thermal Resistance (Terminated Path)	200 °C/W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +85 °C
ESD Sensitivity (HBM)	Class 0; Passed 150V

Control Voltages

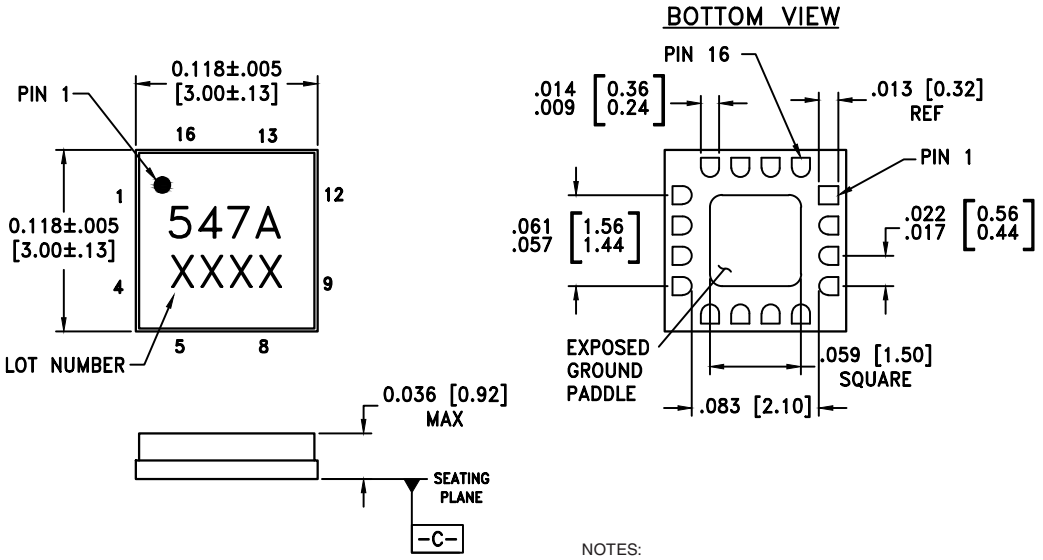
State	Bias Condition
Low	0 to -0.2V @ 10 uA Max.
High	-5V @ 10 uA Typ. to -7V @ 40 uA Typ. (± 0.5V)

Truth Table

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

ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

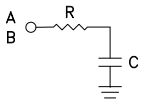
1. PACKAGE BODY MATERIAL: ALUMINA.
2. LEAD AND GROUND PADDLE PLATING: GOLD FLASH OVER NICKEL.
3. DIMENSIONS ARE IN INCHES (MILLIMETERS).
4. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
5. PACKAGE WARP SHALL NOT EXCEED 0.05MM DATUM – C –
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.

Package Information

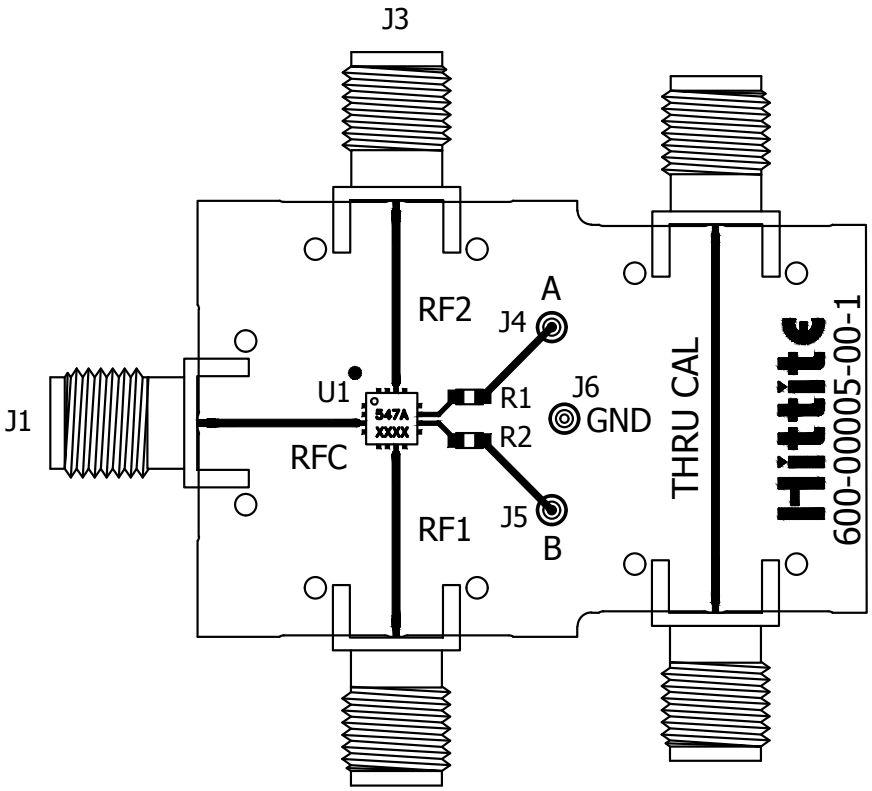
Part Number	Package Body Material	Lead Finish	MSL Rating	Package Marking [2]
HMC547ALC3	Alumina, White	Gold over Nickel	MSL3 [1]	547A XXXX

[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	B	See truth table and control voltage table.	
11	A	See truth table and control voltage table.	

Evaluation PCB



List of Materials for Evaluation PCB EV1HMC547ALC3 [1]

Item	Description
J1 - J3	PCB Mount SRI SMA Connector
J4 - J6	DC Pin
R1 - R2	100 Ohm Resistor, 0603 Pkg.
U1	HMC547ALC3 SPDT Switch
PCB [2]	600-00005-00-1 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 upon request.