

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

Typical Applications

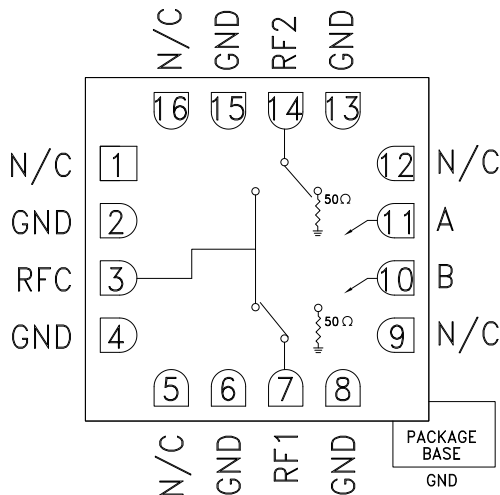
The HMC547ALC3 is ideal for:

- 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: 9mm²

Functional Diagram



General Description

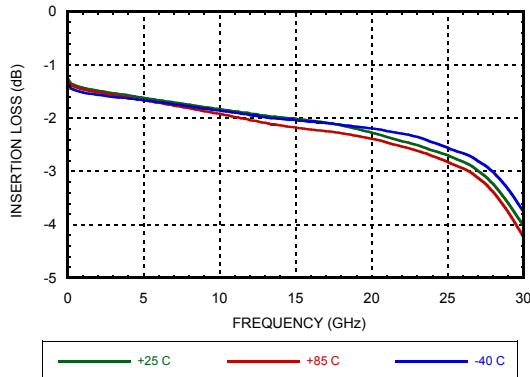
The HMC547ALC3 is a general purpose broadband high isolation non-reflective GaAs pHEMT SPDT switch in a ceramic 3x3 mm leadless surface mount package. Covering DC to 28.0 GHz, the switch offers over 40 dB isolation and less than 2 dB insertion loss at midband. The wide bandwidth, fast switching, and compact size make this absorptive 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, $T_A = +25^\circ \text{C}$, With 0/-5V Control, 50 Ohm System

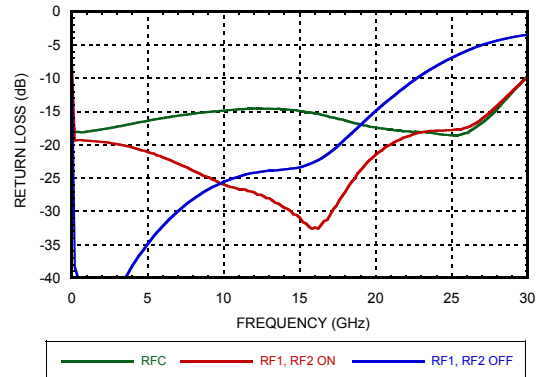
| Parameter | Frequency | Min. | Typ. | Max. | Units |
|---|-----------------|----------------------------------|------|------|-------|
| Insertion Loss | DC - 10.0 GHz | | 1.9 | 2.4 | dB |
| | 10.0 - 20.0 GHz | | 2.2 | 2.8 | dB |
| | 20.0 - 26.0 GHz | | 2.8 | 3.4 | dB |
| | 26.0 - 28.0 GHz | | 3.1 |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

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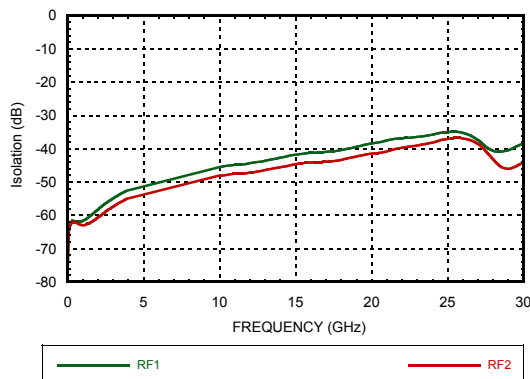
Insertion Loss



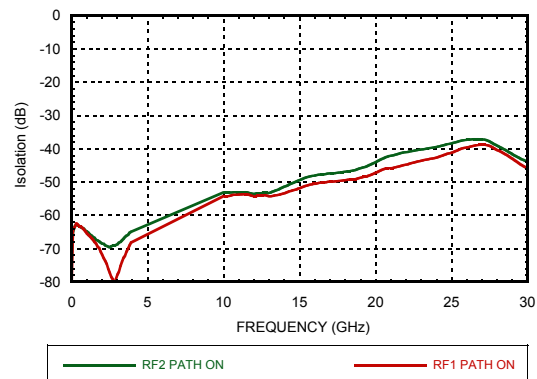
Return Loss



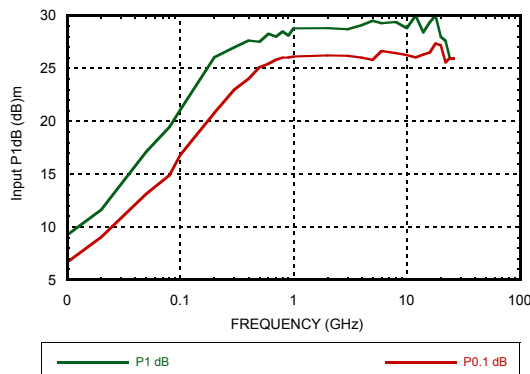
Isolation Between Ports RFC and RF1/RF2



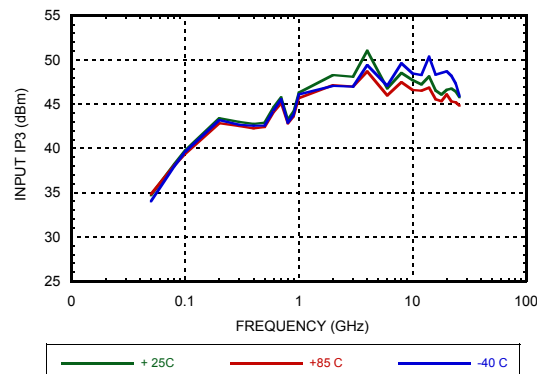
Isolation Between Ports RF1 and RF2



Input P1dB and P0.1dB Compression Point



Input Third Order Intercept Point



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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

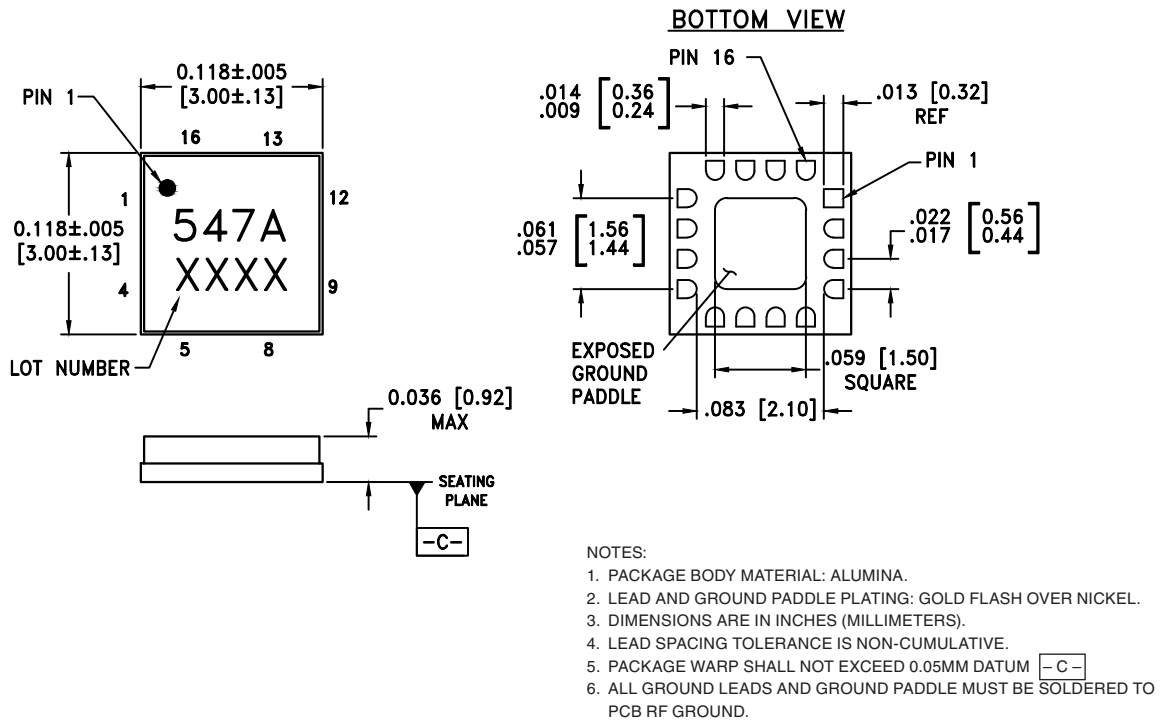
| Control Input | | Signal Path State | |
|---------------|------|-------------------|------------|
| A | B | RFC to RF1 | RFC to RF2 |
| High | Low | On | Off |
| Low | High | Off | On |



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

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Outline Drawing



Package Information


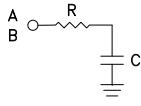
| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[2] |
|-------------|-----------------------|------------------|---------------------|--------------------------------|
| HMC547ALC3 | Alumina, White | Gold over Nickel | MSL3 ^[1] | 547A XXXX |

[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

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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. | |