

# HMC347LP3 / 347LP3E

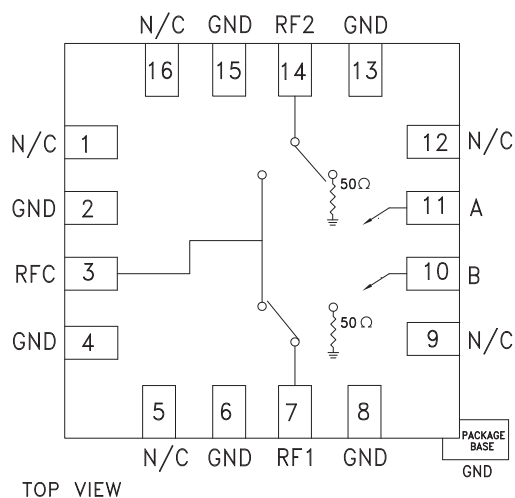
## GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 14 GHz

### Typical Applications

The HMC347LP3 / HMC347LP3E is ideal for:

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

### Functional Diagram



### Features

- High Isolation: >50 dB up to 3 GHz  
>45 dB up to 10 GHz
- Low Insertion Loss: 1.6 dB @ 10 GHz
- Non-Reflective Design
- 3x3 mm QFN SMT Package

### General Description

The HMC347LP3 & HMC347LP3E are broadband high isolation non-reflective GaAs MESFET SPDT switches in low cost leadless QFN surface mount plastic packages. Covering DC to 14 GHz, the switch offers high isolation and low insertion loss. The switch features >50 dB isolation up to 3 GHz and >40 dB isolation up to 13 GHz. The switch operates using complementary negative control voltage logic lines of -5/0V and requires no bias supply. This SPDT is an excellent alternative to the HMC132C8 SPDT.

### Electrical Specifications, $T_A = +25^\circ \text{C}$ , With 0/-5V Control, 50 Ohm System

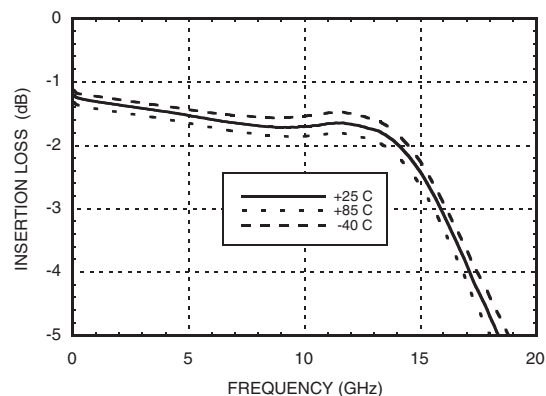
| Parameter                                                               | Frequency      | Min. | Typ. | Max. | Units |
|-------------------------------------------------------------------------|----------------|------|------|------|-------|
| Insertion Loss                                                          | DC - 3.0 GHz   |      | 1.5  | 1.9  | dB    |
|                                                                         | DC - 6.0 GHz   |      | 1.6  | 2.0  | dB    |
|                                                                         | DC - 12.0 GHz  |      | 1.6  | 2.1  | dB    |
|                                                                         | DC - 14.0 GHz  |      | 1.9  | 2.4  | dB    |
| Isolation                                                               | DC - 3.0 GHz   | 49   | 53   |      | dB    |
|                                                                         | DC - 6.0 GHz   | 41   | 46   |      | dB    |
|                                                                         | DC - 12.0 GHz  | 39   | 44   |      | dB    |
|                                                                         | DC - 14.0 GHz  | 33   | 38   |      | dB    |
| Return Loss                                                             | DC - 6.0 GHz   | 10   | 13   |      | dB    |
|                                                                         | DC - 14.0 GHz  | 8    | 13   |      | dB    |
| Return Loss RF1, RF2                                                    | DC - 6.0 GHz   | 7    | 10   |      | dB    |
|                                                                         | DC - 14.0 GHz  | 6    | 9    |      | dB    |
| Input Power for 1 dB Compression                                        | 0.5 - 14.0 GHz | 19   | 23   |      | dBm   |
| Input Third Order Intercept<br>(Two-Tone Input Power= +7 dBm Each Tone) | 0.5 - 14.0 GHz | 38   | 43   |      | dBm   |
| Switching Characteristics                                               | DC - 14 GHz    |      | 3    |      | ns    |
|                                                                         |                |      | 6    |      | ns    |

For price, delivery, and to place orders, please contact Hittite Microwave Corporation:  
20 Alpha Road, Chelmsford, MA 01824 Phone: 978-250-3343 Fax: 978-250-3373  
Order On-line at [www.hittite.com](http://www.hittite.com)

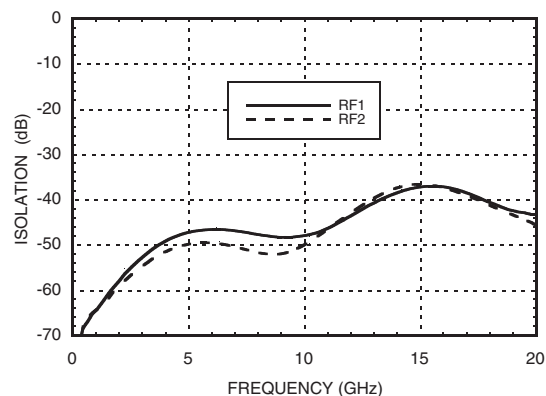
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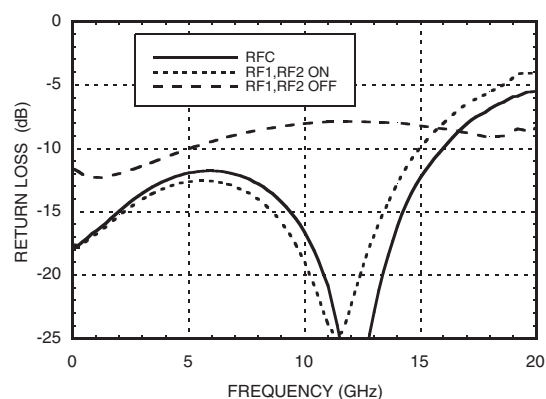
**Insertion Loss**



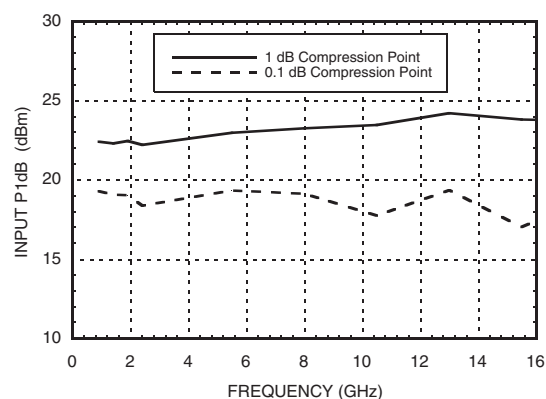
**Isolation**



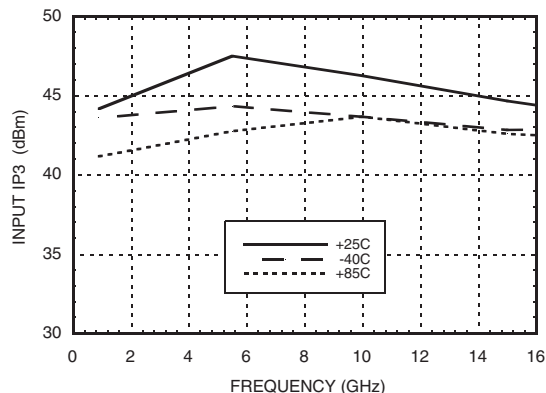
**Return Loss**



**0.1 and 1 dB Input Compression Point**



**Input Third Order Intercept Point**



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SWITCHES - SMT

## HMC347LP3 / 347LP3E

### 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<br>(Vctl = -5 V)                                | +23 dBm           |
| Channel Temperature                                                    | 150 °C            |
| Continuous P <sub>diss</sub> (T=85 °C)<br>(derate 2mW/ °C above 85 °C) | 0.12 W            |
| Thermal Resistance<br>(Insertion Loss Path)                            | 440 °C/W          |
| Thermal Resistance<br>(Terminated Path)                                | 540 °C/W          |
| Storage Temperature                                                    | -65 to +150 °C    |
| Operating Temperature                                                  | -55 to +85 °C     |
| ESD Sensitivity (HBM)                                                  | Class 1A          |

#### Control Voltages

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

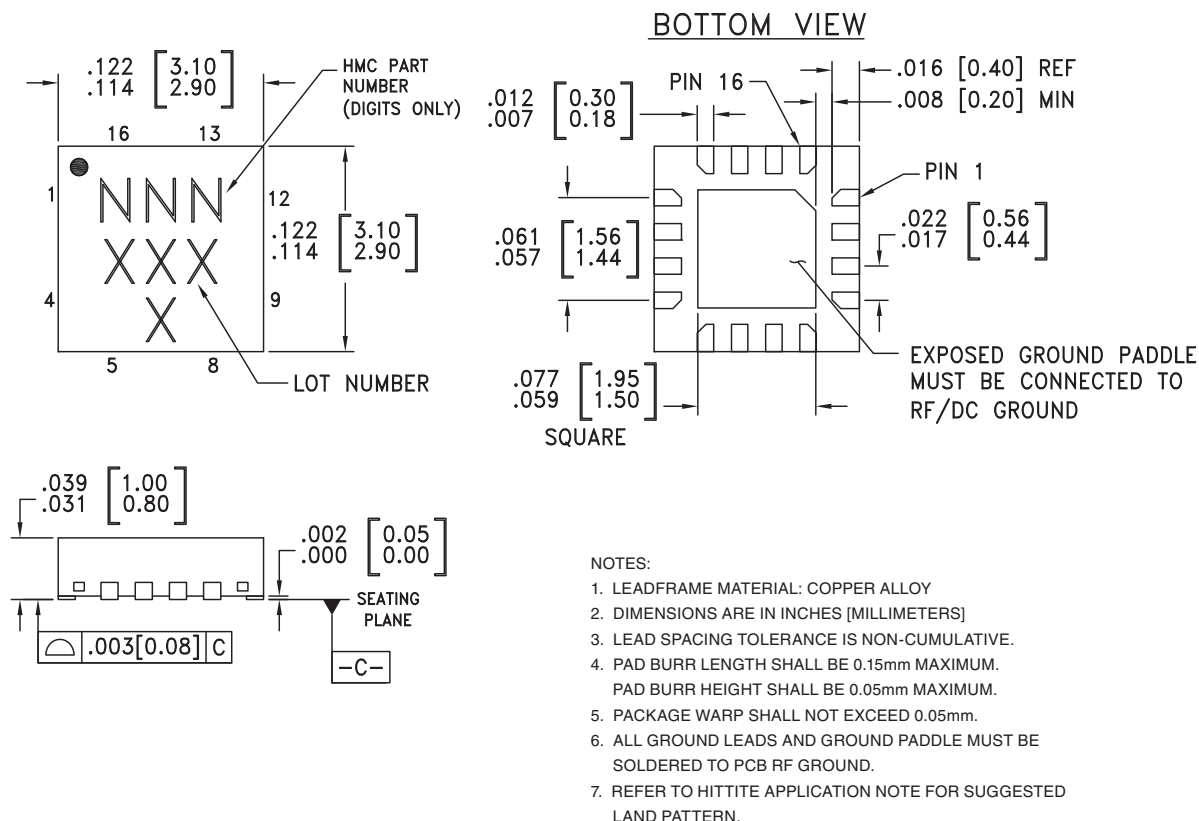


ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

## HMC347LP3 / 347LP3E

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

#### Outline Drawing



#### Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|----------------------------------------------------|---------------|---------------------|--------------------------------|
| HMC347LP3   | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | 347<br>XXXX                    |
| HMC347LP3E  | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | 347<br>XXXX                    |

[1] Max peak reflow temperature of 235 °C

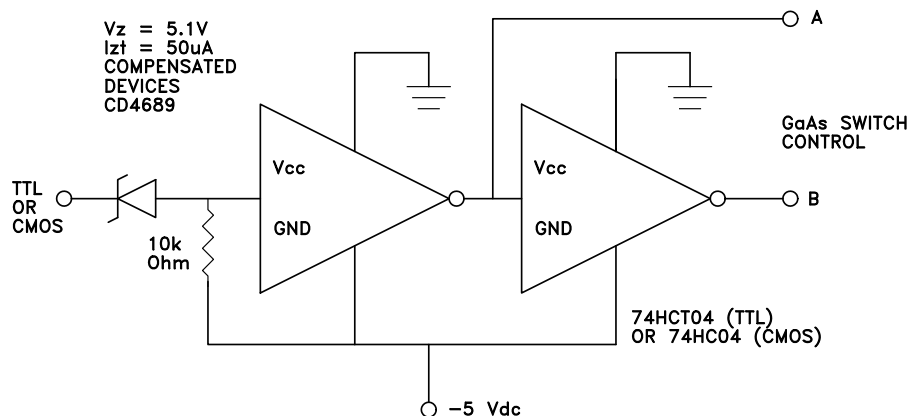
[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

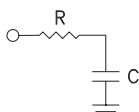
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### GaAs MMIC SPDT NON-REFLECTIVE SWITCH, DC - 14 GHz

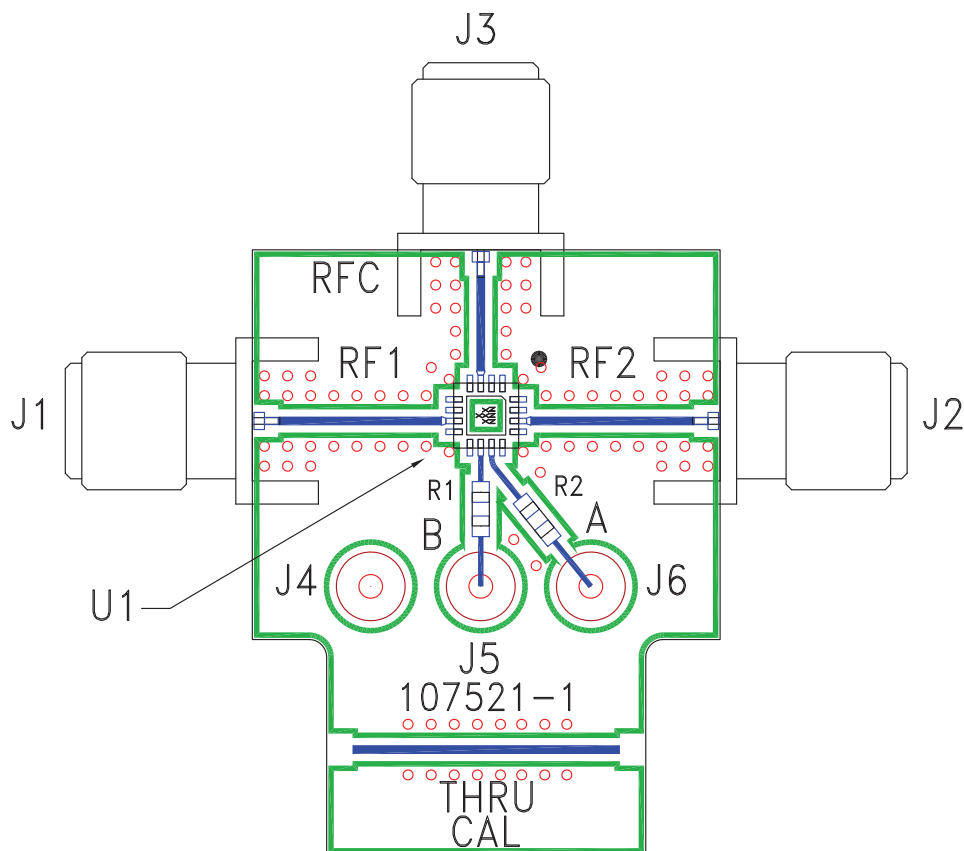
#### Suggested Driver Circuit



#### 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.                                                                              |                                                                                       |

### Evaluation PCB



### List of Materials for Evaluation PCB 105711 <sup>[1]</sup>

| Item    | Description                        |
|---------|------------------------------------|
| J1 - J3 | PCB Mount SRI SMA Connector        |
| J4 - J6 | DC Pin                             |
| R1 - R2 | 100 Ohm Resistor, 0603 Pkg.        |
| U1      | HMC347LP3 / HMC347LP3E 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 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.