



# HMC524ALC3B

v00.0815

## GaAs MMIC I/Q MIXER 22 - 32 GHz

### Typical Applications

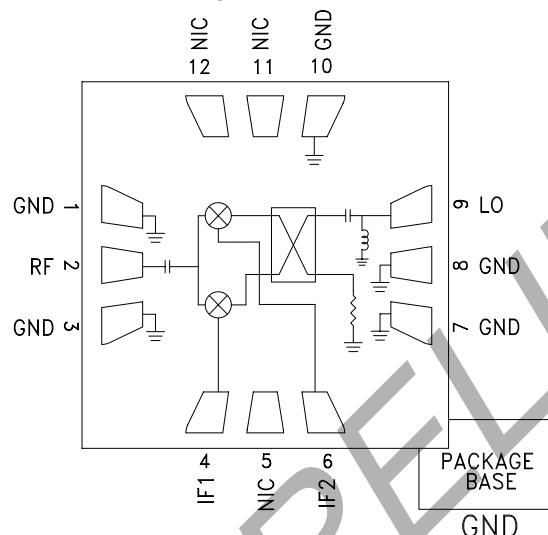
The HMC524ALC3B is ideal for:

- Point-to-Point and Point-to-Multi-Point Radios
- VSAT
- Test Equipment & Sensors
- Military End Use

### Features

- Conversion Loss: 9 dB
- Image Rejection: 26 dBc
- LO to RF Isolation: 41 dB
- LO to IF Isolation: 29 dB
- Input Third-Order Intercept (IP3): 24 dBm
- Input Power for 1 dB Compression (P1dB): 14 dBm
- Wide IF Bandwidth: DC - 4.5 GHz
- 12 Lead 3 mm x 3 mm SMT Ceramic Package

### Functional Diagram



### General Description

The HMC524ALC3B is a compact GaAs MMIC I/Q mixer in a leadless RoHS compliant SMT ceramic package. This device can be used as either an image reject mixer or a single sideband upconverter. The mixer utilizes two standard double balanced mixer cells and a 90 degree hybrid fabricated in a GaAs MESFET process. A low frequency quadrature hybrid was used to produce a 100 MHz IF output. This product is a much smaller alternative to hybrid style image reject mixers and single sideband upconverter assemblies. The HMC524ALC3B eliminates the need for wire bonding allowing use of surface mount manufacturing techniques.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , IF= 100 MHz, LO Power = 17 dBm <sup>[1]</sup>

| Parameter                               | Min. | Typ. | Max. | Units  |
|-----------------------------------------|------|------|------|--------|
| RF Frequency Range                      | 22   |      | 32   | GHz    |
| LO Frequency Range                      | 22   |      | 32   | GHz    |
| IF Frequency Range                      | DC   |      | 4.5  | GHz    |
| LO Power                                |      | 17   |      | dBm    |
| Conversion Loss (As IRM)                |      | 9    | 12   | dB     |
| Image Rejection                         | 22   | 26   |      | dB     |
| LO to RF Isolation                      | 35   | 41   |      | dB     |
| LO to IF Isolation                      | 20   | 29   |      | dB     |
| Input Third-Order Intercept (IP3)       | 20   | 24   |      | dBm    |
| Input Power for 1 dB Compression (P1dB) |      | 14   |      | dBm    |
| Amplitude Balance                       |      | ±0.2 |      | dB     |
| Phase Balance                           |      | ±4.5 |      | Degree |

[1] Unless otherwise noted all measurements performed as downconverter with lower sideband selected and external 90° IF hybrid at the IF ports.

# HMC524A\* PRODUCT PAGE QUICK LINKS

Last Content Update: 11/29/2017

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## COMPARABLE PARTS

View a parametric search of comparable parts.

## EVALUATION KITS

- HMC524A Evaluation Board

## DOCUMENTATION

### Data Sheet

- HMC524ALC3B: GaAs MMIC I/Q Mixer 22 to 32 GHz Preliminary Data Sheet

## TOOLS AND SIMULATIONS

- HMC524ALC3B S-Parameters

## REFERENCE MATERIALS

### Product Selection Guide

- RF, Microwave, and Millimeter Wave IC Selection Guide 2017

## DESIGN RESOURCES

- HMC524A Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## DISCUSSIONS

View all HMC524A EngineerZone Discussions.

## SAMPLE AND BUY

Visit the product page to see pricing options.

## TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

## DOCUMENT FEEDBACK

Submit feedback for this data sheet.

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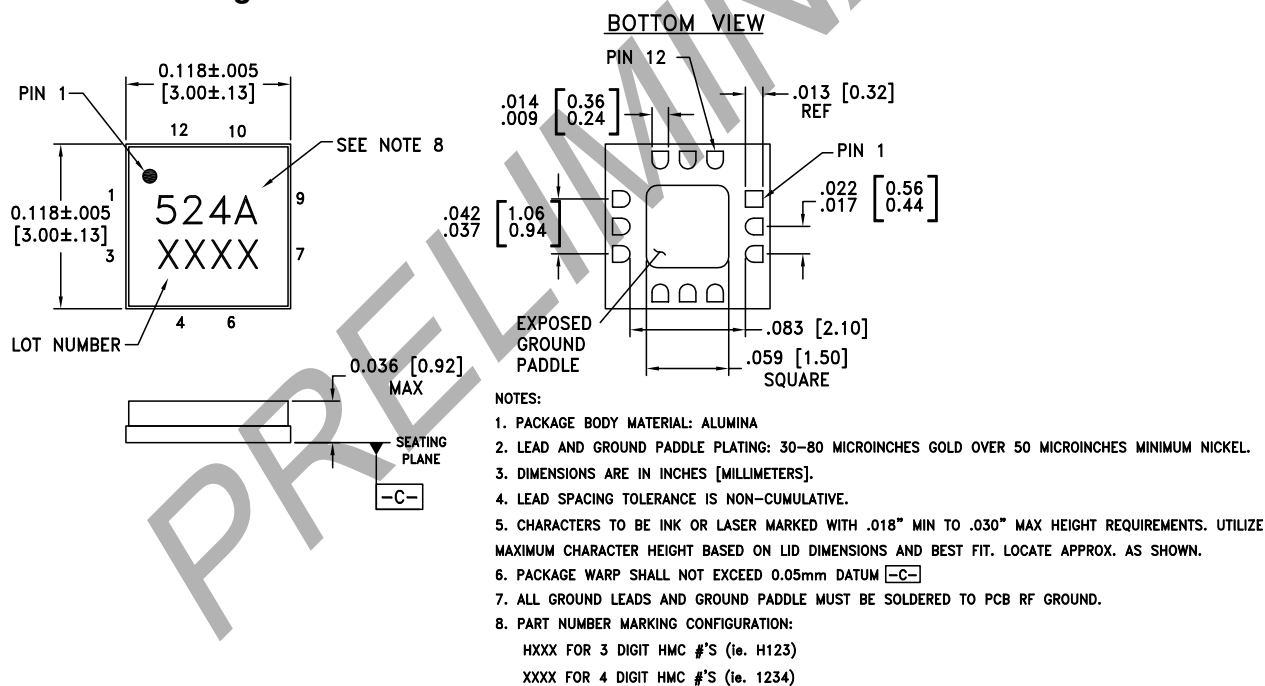
### Absolute Maximum Ratings

|                                                                      |                 |
|----------------------------------------------------------------------|-----------------|
| RF Input Power                                                       | 20 dBm          |
| LO Input Power                                                       | 20 dBm          |
| LO Drive                                                             | 27 dBm          |
| Channel Temperature                                                  | 150°C           |
| Continuous Pdiss (T = 85°C)<br>(derate (TBD) W / °C above 85 °C)     | (TBD) mW        |
| Thermal Resistance (R <sub>TH</sub> )<br>(junction to ground paddle) | (TBD) °C/W      |
| Operating Temperature Range                                          | -40°C to +85°C  |
| Storage Temperature Range                                            | -65°C to +150°C |
| ESD Sensitivity (HBM)                                                | TBD             |



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Outline Drawing



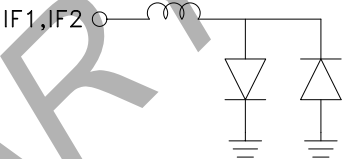
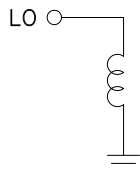
### Package Information

| Part Number | Package Body Material | Lead Finish      | MSL Rating          | Package Marking <sup>[2]</sup> |
|-------------|-----------------------|------------------|---------------------|--------------------------------|
| HMC524ALC3B | Alumina, White        | Gold over Nickel | MSL3 <sup>[1]</sup> | H524A<br>XXXX                  |

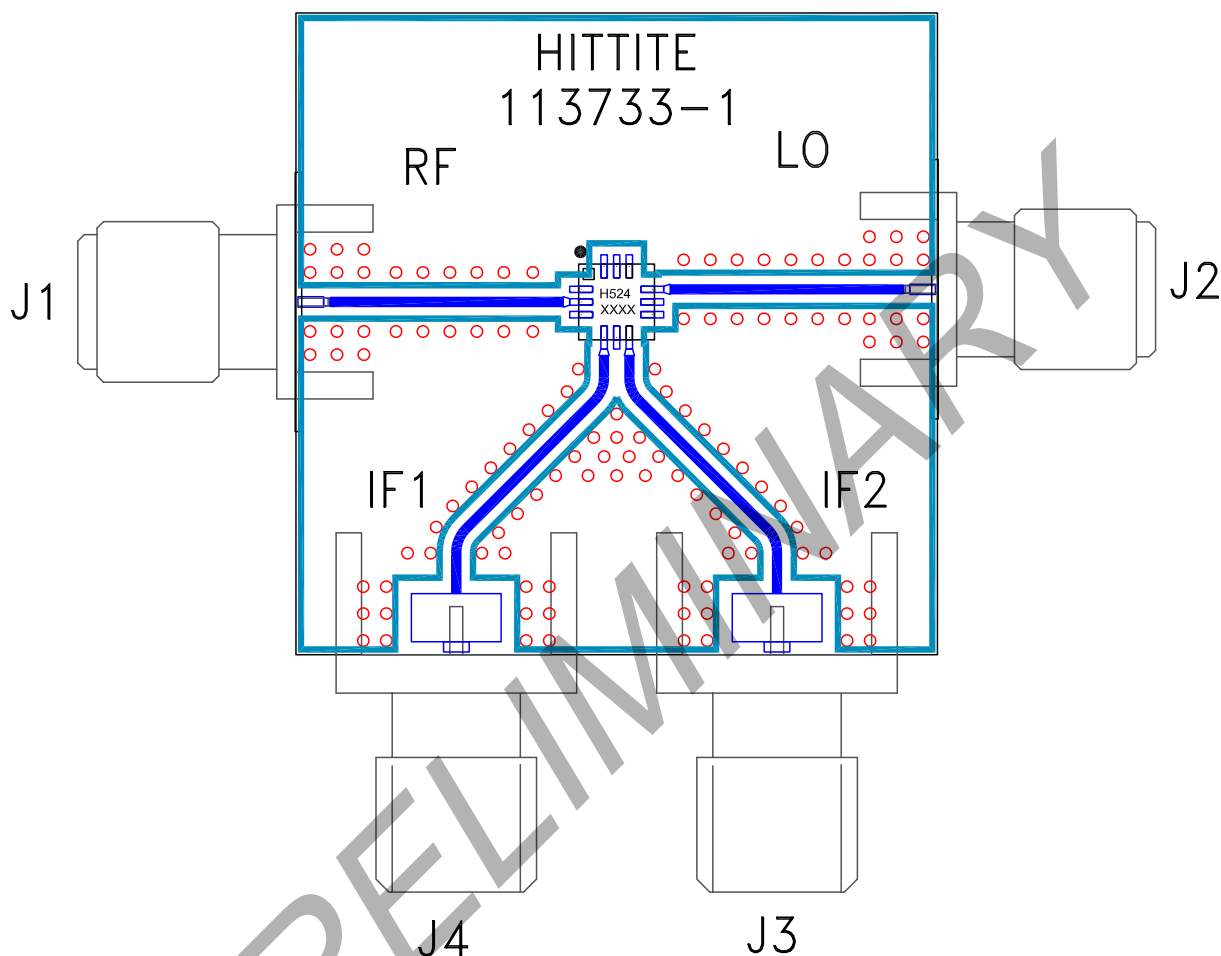
[1] Max peak reflow temperature of 260 °C

[2] 4-Digit lot number XXXX

## Pin Descriptions

| Pin Number             | Function | Description                                                                                                                                                                                                                                                                                                 | Pin Schematic                                                                        |
|------------------------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 1, 3, 7, 8, 10, 11, 12 | GND      | Ground Connect. These pins and package bottom must be connected to RF/dc ground.                                                                                                                                                                                                                            |   |
| 2                      | RF       | Radio Frequency port This pin is ac coupled and matched to 50 Ohms.                                                                                                                                                                                                                                         |   |
| 4                      | IF1      | First and Second Quadrature Intermediate Frequency output pins. For applications not requiring operation to dc, an off chip dc blocking capacitor should be used. For operation to dc these pins must not source/sink more than 3 mA of current or part non function and possible part failure will result. |   |
| 6                      | IF2      |                                                                                                                                                                                                                                                                                                             |                                                                                      |
| 5                      | NIC      | No Internal Connection. These pins are not connected internally.                                                                                                                                                                                                                                            |                                                                                      |
| 9                      | LO       | Local Oscillator port. This pin is dc coupled and matched to 50 Ohms.                                                                                                                                                                                                                                       |  |

**Evaluation PCB**



**Evaluation Order Information**

| Item                | Contents                   | Part Number       |
|---------------------|----------------------------|-------------------|
| Evaluation PCB Only | HMC524ALC3B Evaluation PCB | EV1HMC524ALC3 [1] |

[1] Reference this number when ordering Evaluation PCB Only

**List of Materials for Evaluation PCB**

| Item    | Description                      |
|---------|----------------------------------|
| J1, J2  | PCB Mount SMA RF Connector, SRI  |
| J3 - J4 | PCB Mount SMA Connector, Johnson |
| U1      | HMC524LC4                        |
| PCB [1] | 113733 Evaluation Board          |

[1] Circuit Board Material: Arlon 25FR, FR4 or Rogers 4350

The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used to connect the top and bottom ground planes. The evaluation circuit board shown is available from Analog Devices upon request.