

SMT GaAs MMIC x2 ACTIVE FREQUENCY MULTIPLIER, 25 - 31 GHz OUTPUT



Typical Applications

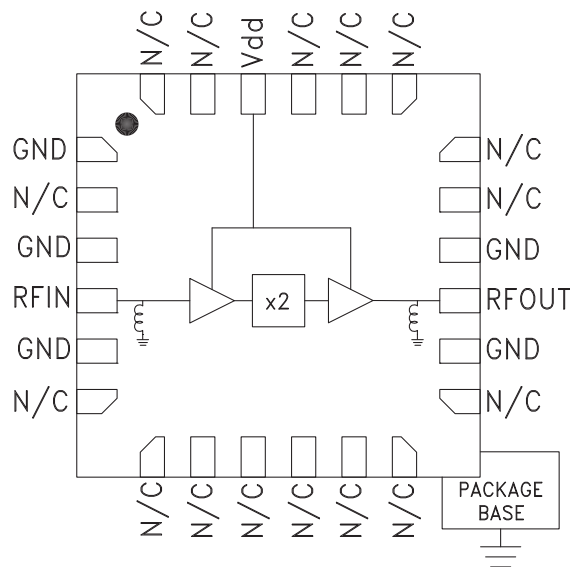
The HMC942LP4E is ideal for:

- Clock Generation Applications:
SONET OC-192 & SDH STM-64
- Point-to-Point & VSAT Radios
- Test Instrumentation
- Military & Space
- Sensors

Features

- High Output Power: +21 dBm
- Low Input Power Drive: 0 to +6 dBm
- Fo Isolation: >45 dBc
- Single Supply: +4.5V @ 214 mA
- 24 Lead 4x4 mm SMT Package: 16 mm²

Functional Diagram



General Description

The HMC942LP4E is a x2 active broadband frequency multiplier utilizing GaAs pHEMT technology in a leadless RoHS compliant SMT package. When driven by a +4 dBm signal, the multiplier provides +17 dBm typical output power from 13 to 24.6 GHz. The Fo and 3Fo isolations are >20 dBc at 19 GHz. The HMC942LP4E is ideal for use in LO multiplier chains for Pt-to-Pt & VSAT Radios yielding reduced parts count vs. traditional approaches.

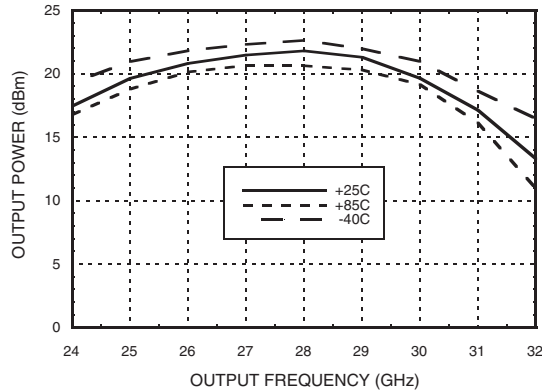
Electrical Specifications, $T_A = +25^\circ\text{C}$, $V_{dd} = +4.5\text{V}$, +4 dBm Drive Level

| Parameter | Min. | Typ. | Max. | Min. | Typ. | Max. | Units |
|---|------|-------------|------|-------------|------|------|-------|
| Frequency Range, Input | | 12.5 - 15.0 | | 15.0 - 15.5 | | | GHz |
| Frequency Range, Output | | 25 - 30 | | 30 - 31 | | | GHz |
| Output Power | 17 | 21 | | 14 | 18 | | dBm |
| Fo Isolation (with respect to output level) | | 55 | | 55 | | | dBc |
| Input Return Loss | 4 | 12 | | 4 | 9 | | dB |
| Output Return Loss | 6 | 12 | | 5 | 10 | | dB |
| Supply Current (Idd1 & Idd2) | | 214 | 240 | | 214 | 240 | mA |

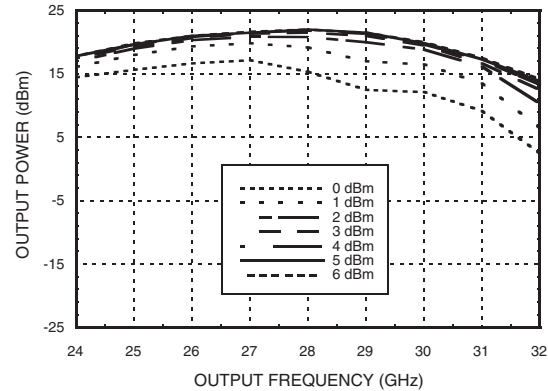


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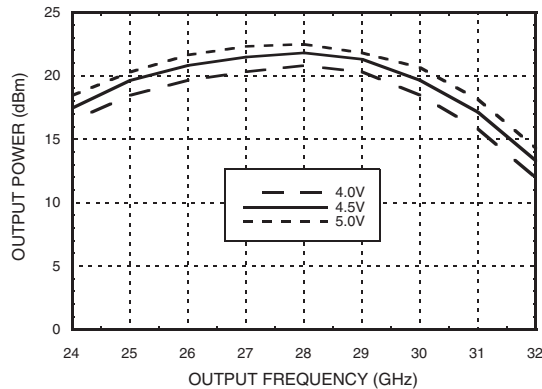
**Output Power vs.
Temperature @ +4 dBm Drive Level**



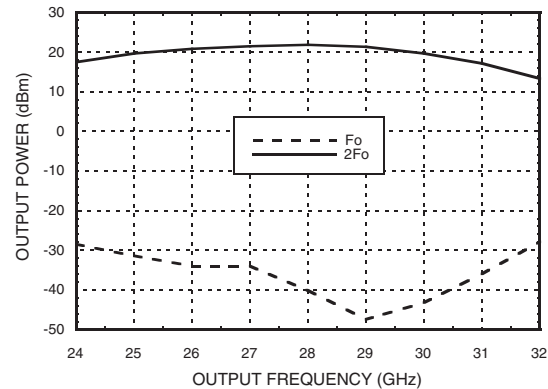
Output Power vs. Drive Level



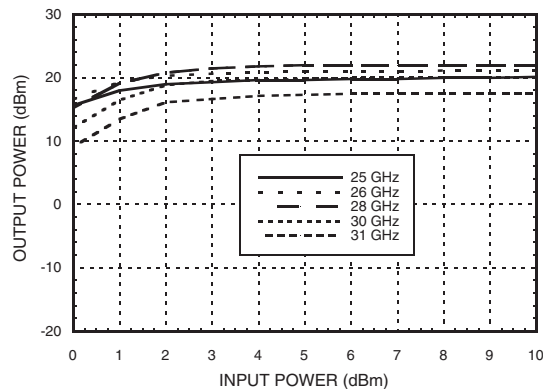
**Output Power vs.
Supply Voltage @ +4 dBm Drive Level**



Isolation @ +4 dBm Drive Level



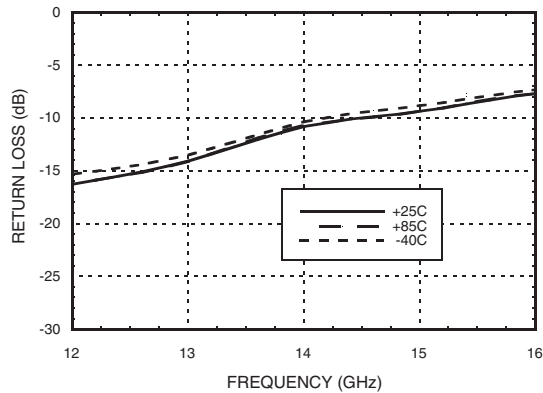
Output Power vs. Input Power



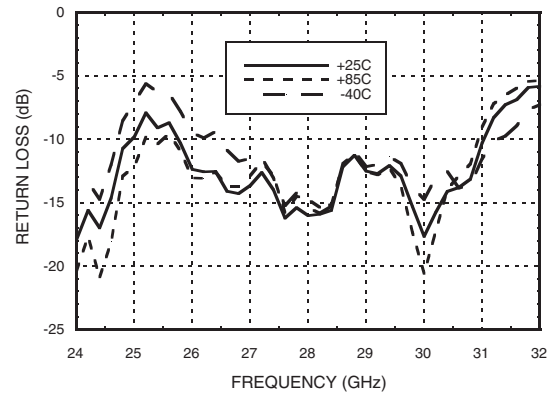


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Input Return Loss vs. Temperature



Output Return Loss vs. Temperature





**SMT GaAs MMIC x2 ACTIVE FREQUENCY
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Typical Supply Current vs. Vdd

| | |
|---|----------------|
| RF Input (Vdd = +5V) | +10 dBm |
| Supply Voltage (Vdd1, Vdd2) | +5.5 Vdc |
| Channel Temperature | 175 °C |
| Continuous P _{dis} (T= 85 °C) (derate 16.4 mW/°C above 85 °C) | 1.48 W |
| Thermal Resistance (channel to ground paddle) | 60 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 1B |

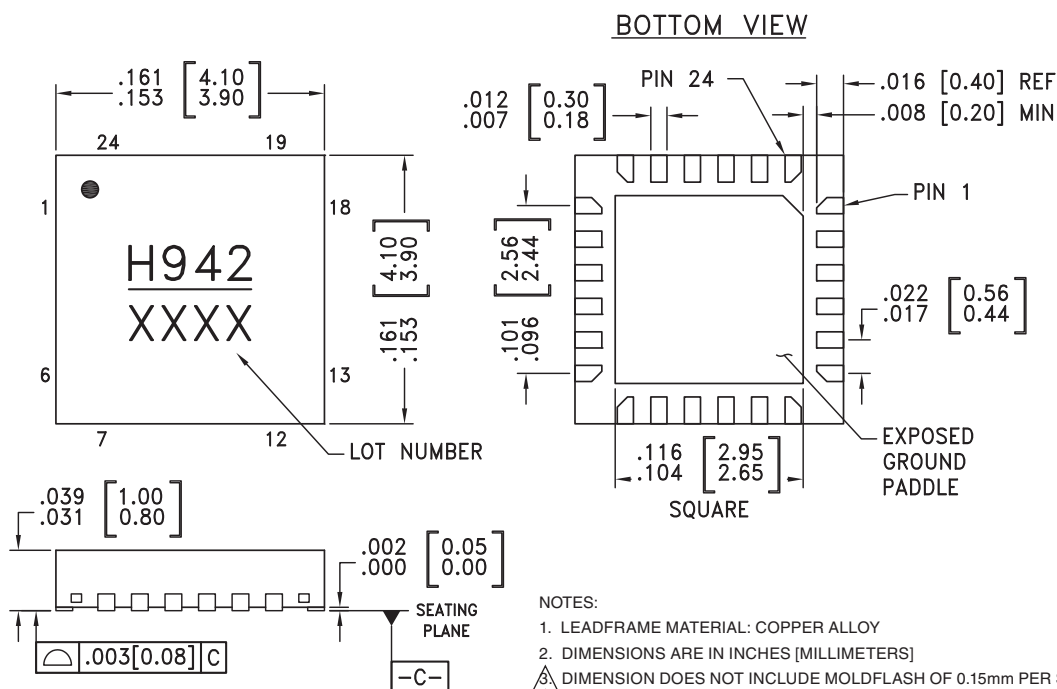
| Vdd (Vdc) | Idd (mA) |
|-----------|----------|
| 4.0 | 211 |
| 4.5 | 214 |
| 5.0 | 217 |

Note:
Multiplier will operate over full voltage range shown above.



ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS

Outline Drawing



NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.15mm PER SIDE.
4. DIMENSION DOES NOT INCLUDE MOLDFLASH OF 0.25mm PER SIDE.
5. 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 ^[1] |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC942LP4E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | <u>H942</u> XXXX |


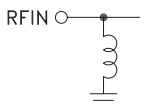
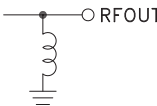
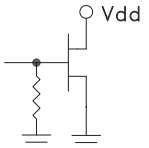
[1] 4-Digit lot number XXXX

[2] Max peak reflow temperature of 260 °C



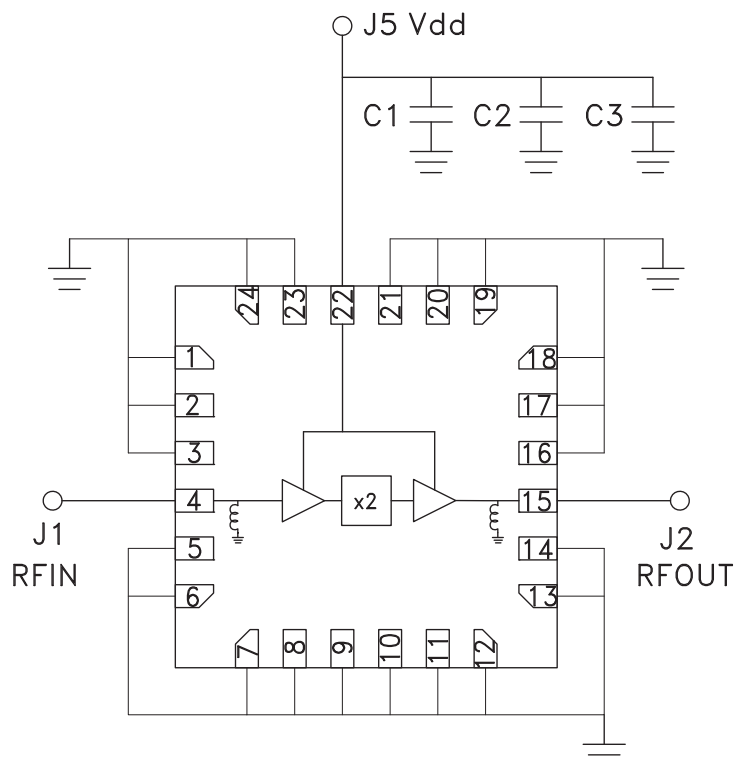
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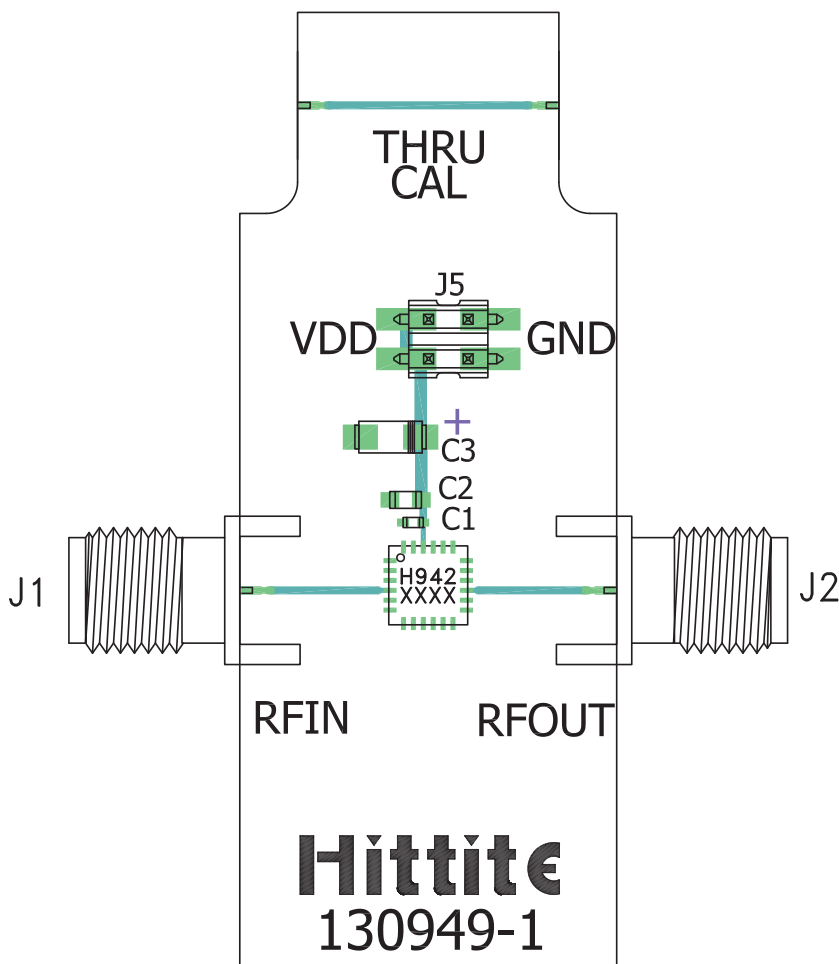
Pin Description

| Pin Number | Function | Description | Interface Schematic |
|---|----------|--|--|
| 1, 3, 5, 6, 7, 12, 13, 14, 16, 18, 19, 24 | GND | Package bottom must also be connected to RF/DC ground. |  |
| 4 | RFIN | This pin is DC coupled and matched to 50 Ohms. |  |
| 2, 8, 9, 10, 11, 17, 20, 21, 23 | N/C | These pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/ DC ground. | |
| 15 | RFOUT | This pin is AC coupled and matched to 50 Ohms. |  |
| 22 | Vdd | Supply voltage 4.5V ± 0.5V. External bypass capacitors of 100 pF, 1,000 pF and 2.2 µF are recommended. |  |

Application Circuit

| Component | Value |
|-----------|----------|
| C1 | 100 pF |
| C2 | 1,000 pF |
| C3 | 4.7 µF |




**SMT GaAs MMIC x2 ACTIVE FREQUENCY
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Evaluation PCB

List of Materials for Evaluation PCB 130602 ^[1]

| Item | Description |
|--------------------|---------------------------------|
| J1 - J2 | PCB Mount SRI K Connector |
| J5 | DC Pin |
| C1 | 100 pF Capacitor, 0402 Pkg. |
| C2 | 1,000 pF Capacitor, 0603 Pkg. |
| C3 | 4.7 μ F Tantalum Capacitor |
| U1 | HMC942LP4E x2 Active Multiplier |
| PCB ^[2] | 130949 Eval Board |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350 or Arlon 25FR

The circuit board used in the application should be generated with proper 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 Hittite upon request.

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