

## SMT GaAs MMIC x2 ACTIVE FREQUENCY MULTIPLIER, 6 - 9 GHz OUTPUT



### Typical Applications

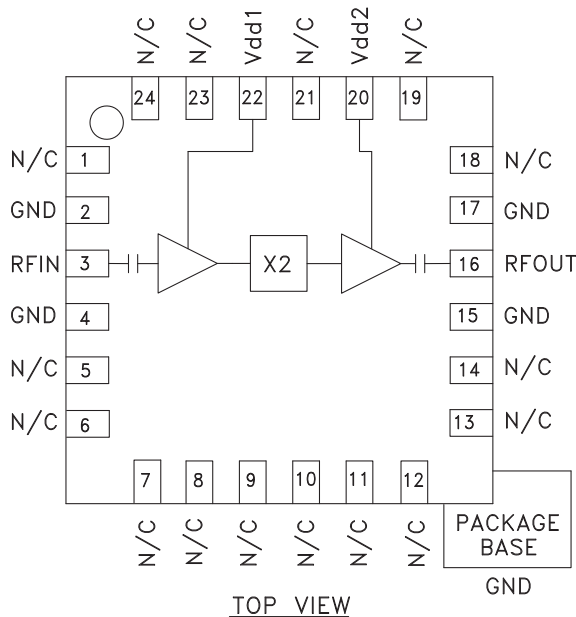
The HMC575LP4 / HMC575LP4E is suitable for:

- Wireless Local Loop
- Point-to-Point & VSAT Radios
- Test Instrumentation
- Military & Space

### Features

- High Output Power: +17 dBm
- Low Input Power Drive: -2 to +6 dBm
- Fo, 3Fo Isolation: 15 dBc
- 100 KHz SSB Phase Noise: -140 dBc/Hz
- Single Supply: +5V@ 90 mA
- RoHS Compliant 4x4 mm SMT Package

### Functional Diagram



### General Description

The HMC575LP4 & HMC575LP4E are x2 active broadband frequency multipliers utilizing GaAs PHEMT technology in a leadless RoHS compliant SMT package. When driven by a 3 dBm signal, the multiplier provides +17 dBm typical output power from 6 to 9 GHz. The Fo and 3Fo isolations are 15 dBc with respect to output signal level. This frequency multiplier features DC blocked I/O's, and is ideal for use in LO multiplier chains for Pt to Pt & VSAT Radios yielding reduced parts count vs. traditional approaches. The low additive SSB Phase Noise of -140 dBc/Hz at 100 kHz offset helps maintain good system noise performance. The HMC575LP4 & HMC575LP4E are compatible with surface mount manufacturing techniques.

### Electrical Specifications, $T_A = +25^\circ C$ , $V_{dd1}, V_{dd2} = +5V$ , 3 dBm Drive Level

| Parameter   | Min.    | Typ. | Max. | Units  |
|---|---------|------|------|--------|
| Frequency Range, Input                                | 3 - 4.5 |      |      | GHz    |
| Frequency Range, Output                               | 6 - 9   |      |      | GHz    |
| Output Power  | 14      | 17   |      | dBm    |
| Fo Isolation (with respect to output level)           |         | 15   |      | dBc    |
| 3Fo Isolation (with respect to output level)          |         | 15   |      | dBc    |
| Input Return Loss                                     |         | 15   |      | dB     |
| Output Return Loss                                    |         | 12   |      | dB     |
| SSB Phase Noise (100 kHz Offset)                      |         | -140 |      | dBc/Hz |
| Supply Current (I <sub>dd1</sub> & I <sub>dd2</sub> ) |         | 90   |      | mA     |

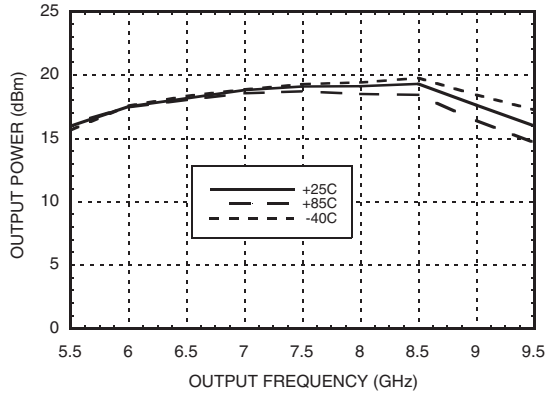
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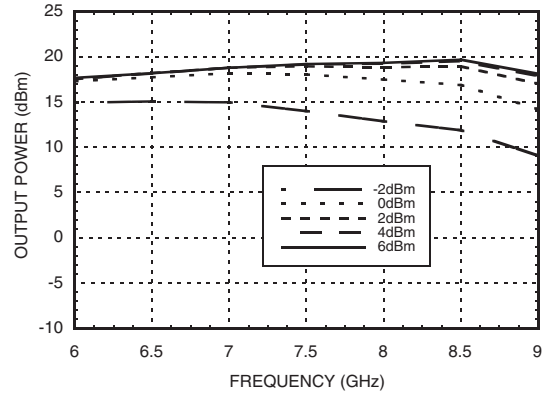
**SMT GaAs MMIC x2 ACTIVE FREQUENCY MULTIPLIER, 6 - 9 GHz OUTPUT**



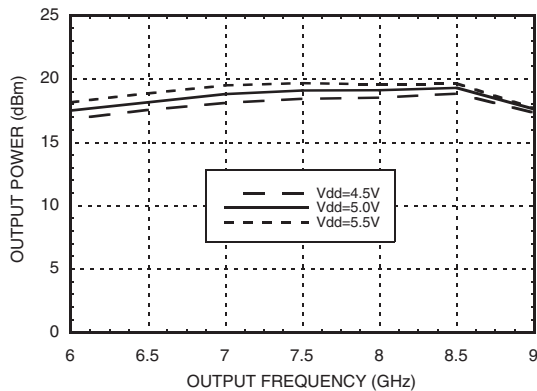
**Output Power vs. Temperature @ 3 dBm Drive Level**



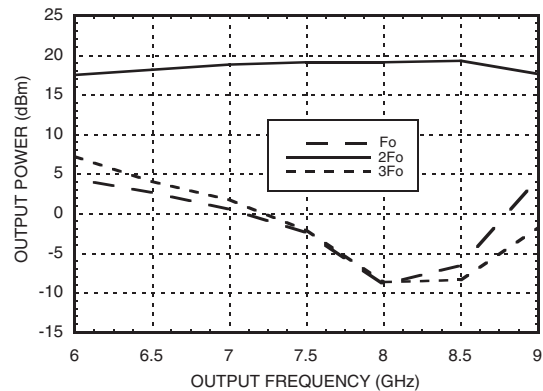
**Output Power vs. Drive Level**



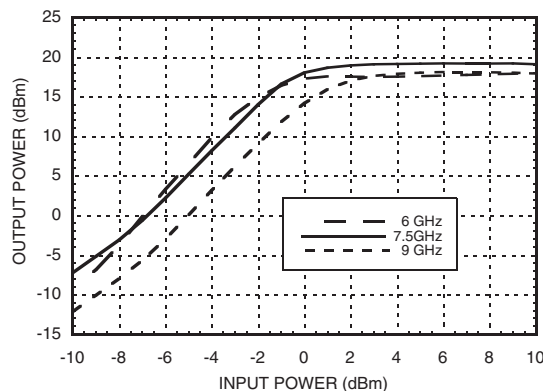
**Output Power vs. Supply Voltage @ 3 dBm Drive Level**



**Isolation @ 3 dBm Drive Level**



**Output Power vs. Input Power**



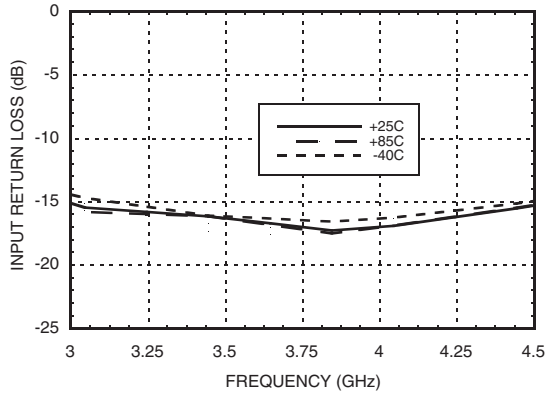
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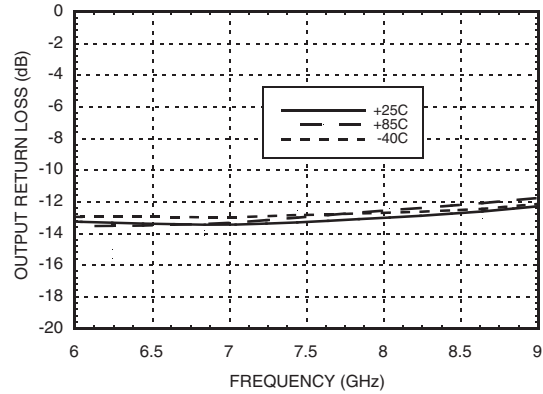
**SMT GaAs MMIC x2 ACTIVE FREQUENCY  
MULTIPLIER, 6 - 9 GHz OUTPUT**



**Input Return Loss vs. Temperature**



**Output Return Loss vs. Temperature**



**Absolute Maximum Ratings**

|   |                |
|---|----------------|
| RF Input (Vdd = +5V)  | +13 dBm        |
| Supply Voltage (Vdd)  | +6.0 Vdc       |
| Channel Temperature   | 150 °C         |
| Continuous Pdiss (T= 85 °C)<br>(derate 7.9 mW/°C above 85 °C) | 512 mW         |
| Thermal Resistance<br>(channel to ground paddle)              | 127 °C/W       |
| Storage Temperature   | -65 to +150 °C |
| Operating Temperature   | -40 to +85 °C  |

**Typical Supply Current vs. Vdd**

| Vdd (Vdc) | Idd (mA) |
|-----------|----------|
| 4.5       | 89       |
| 5.0       | 90       |
| 5.5       | 91       |

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

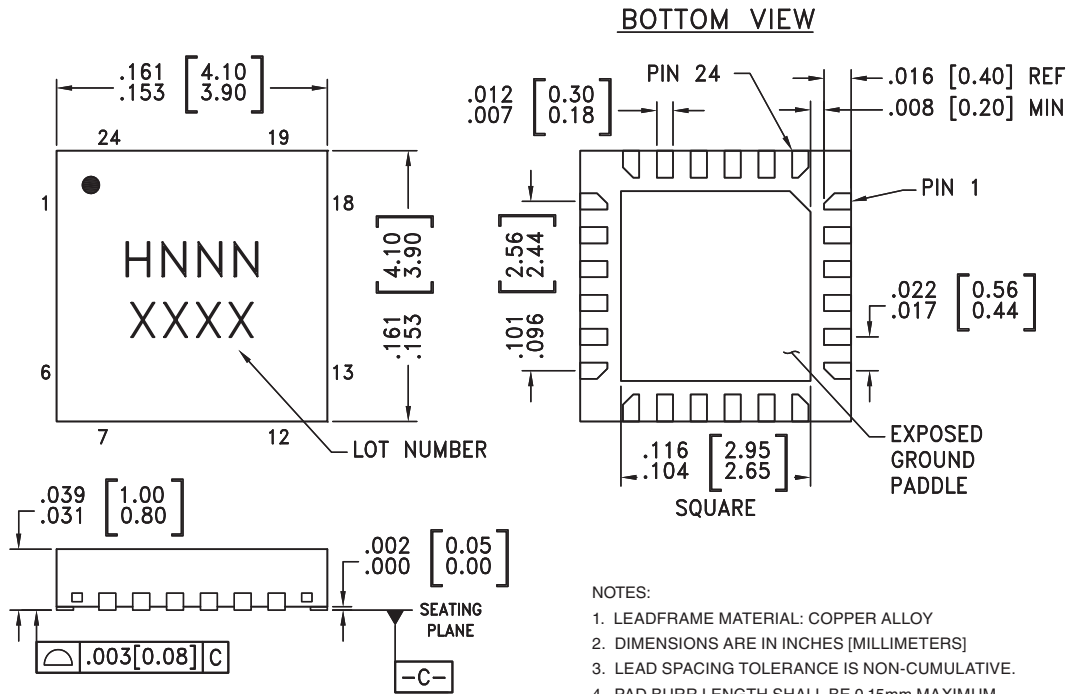


**ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS**

## SMT GaAs MMIC x2 ACTIVE FREQUENCY MULTIPLIER, 6 - 9 GHz OUTPUT



### Outline Drawing



NOTES:

1. LEADFRAME MATERIAL: COPPER ALLOY
2. DIMENSIONS ARE IN INCHES [MILLIMETERS]
3. LEAD SPACING TOLERANCE IS NON-CUMULATIVE.
4. PAD BURR LENGTH SHALL BE 0.15mm MAXIMUM.  
PAD BURR HEIGHT SHALL BE 0.05mm MAXIMUM.
5. PACKAGE WARP SHALL NOT EXCEED 0.05mm.
6. ALL GROUND LEADS AND GROUND PADDLE MUST BE SOLDERED TO PCB RF GROUND.
7. REFER TO HITTITE APPLICATION NOT FOR SUGGESTED LAND PATTERN.

### Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC575LP4   | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | H575<br>XXXX                   |
| HMC575LP4E  | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | H575<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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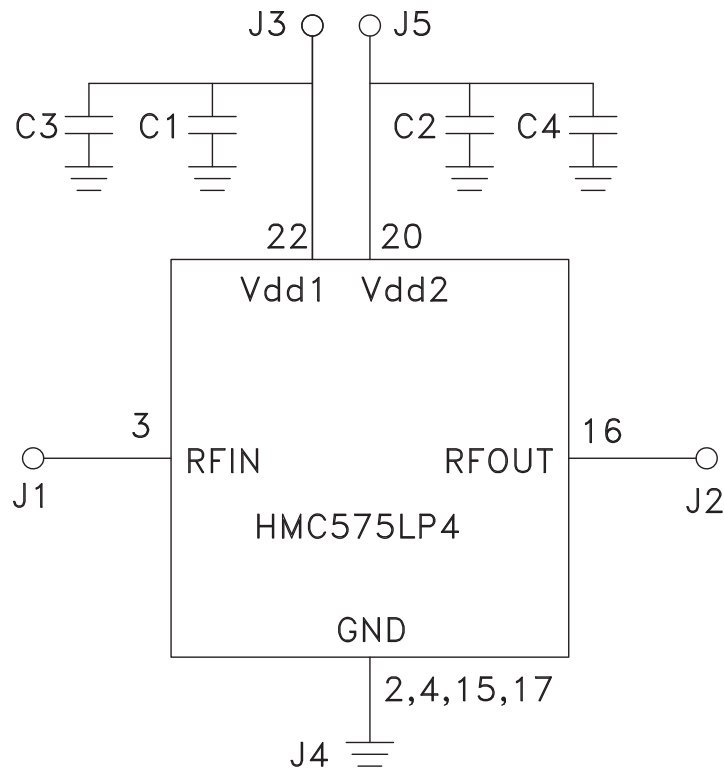


**Pin Description**

| Pin Number                    | Function   | Description  | Interface Schematic |
|-------------------------------|------------|--|---------------------|
| 1, 5 - 14, 18, 19, 21, 23, 24 | N/C        | These pins are internally not connected; however, this product was specified with these pins connected to RF/ DC ground. |                     |
| 2, 4, 15, 17                  | GND        | Package bottom must also be connected to RF/DC ground.   |                     |
| 3                             | RFIN       | Pin is AC coupled and matched to 50 Ohms from 3 - 4.5 GHz.   |                     |
| 16                            | RFOUT      | Pin is AC coupled and matched to 50 Ohms from 6 - 9 GHz.   |                     |
| 20, 22                        | Vdd2, Vdd1 | Supply voltage 5V ± 0.5V. External bypass capacitors of 100 pF and 2.2 μF are required.                                  |                     |

**Application Circuit**

| Component | Value  |
|-----------|--------|
| C1, C2    | 100 pF |
| C3, C4    | 2.2 μF |

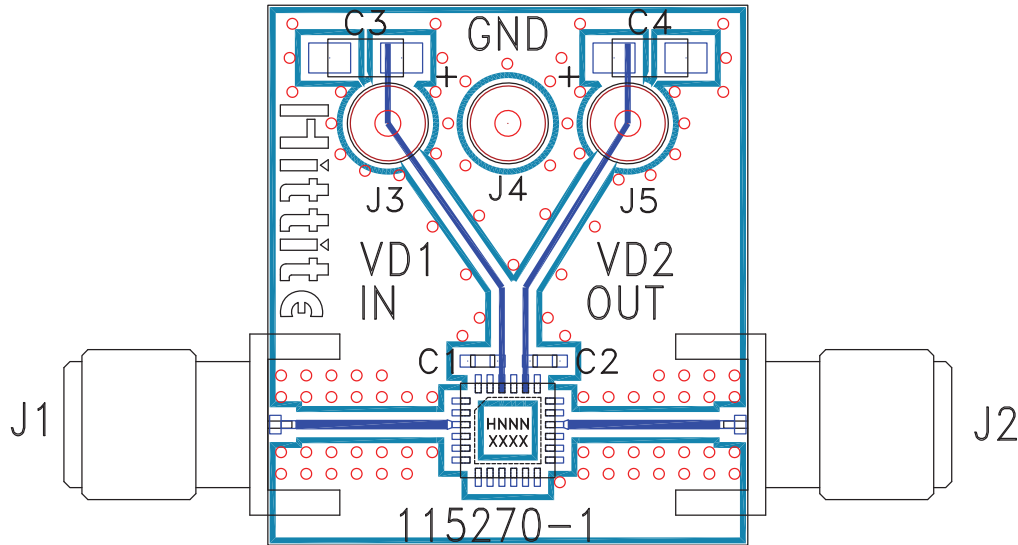


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### Evaluation PCB



### List of Materials for Evaluation PCB 112405 [1]

| Item    | Description                                    |
|---------|--|
| J1, J2  | PCB Mount SRI SMA Connector                    |
| J3 - J5 | DC Pin   |
| C1, C2  | 100 pF Capacitor, 0402 Pkg.                    |
| C3, C4  | 2.2 μF Tantalum Capacitor                      |
| U1      | HMC575LP4 / HMC575LP4E<br>x2 Active Multiplier |
| PCB [2] | 115270 Eval Board                              |

[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 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. The evaluation circuit board shown is available from Hittite upon request.