# HMC370LP4 / 370LP4E

v04.0110

## SMT GaAs HBT MMIC x4 ACTIVE FREQUENCY MULTIPLIER, 14.4 - 16.4 GHz OUTPUT

### Typical Applications

The HMC370LP4(E) is ideal for:

- Point-to-Point & VSAT Radios
- Fiber Optic
- Military

### Features

Output Power: 0 dBm

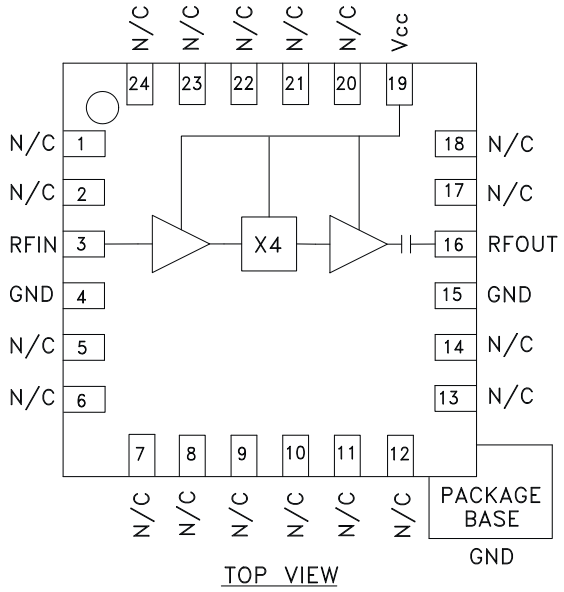
Sub-Harmonic Suppression: >22 dBc

SSB Phase Noise: -140 dBc/Hz

Single Supply: +5V @ 55 mA

24 Lead 4x4 mm SMT Package: 16 $mm^2$

### Functional Diagram




### General Description

The HMC370LP4(E) is an active miniature x4 frequency multiplier utilizing InGaP GaAs HBT technology in a 4x4 mm leadless surface mount package. Power output is 0 dBm typical from a 5V supply voltage and varies little vs. input power, temperature and supply voltage. Suppression of undesired fundamental and sub-harmonics is >22 dBc typical with respect to output signal level. The low additive SSB phase noise of -140 dBc/Hz at 100 kHz offset helps the user maintain good system noise performance. The HMC370LP4(E) are ideal for use in LO multiplier chains allowing reduced parts count vs. traditional approaches.

### Electrical Specifications, $T_A$ = +25° C, Vcc = 5V

| Parameter | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range, Input | | | 3.6 - 4.1 | | GHz |
| Frequency Range, Output | | | 14.4 - 16.4 | | GHz |
| Input Power Range | | -15 | | +5 | dBm |
| Output Power | | -4 | 0 | | dBm |
| Sub-Harmonic Suppression | | | 22 | | dBc |
| Input Return Loss | | | 18 | | dB |
| Output Return Loss | | | 7 | | dB |
| SSB Phase Noise (100 kHz Offset) | Pin = 0 dBm | | -140 | | dBc/Hz |
| Supply Current (Icc) | | | 55 | 73 | mA |



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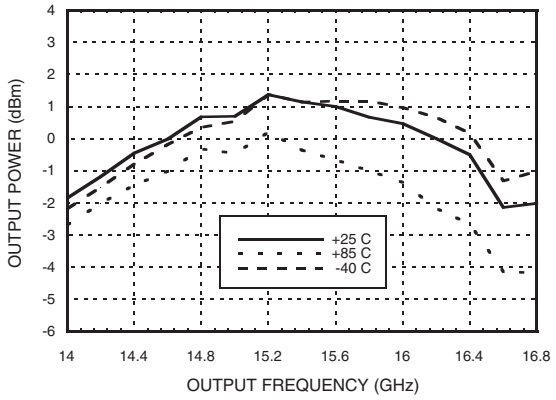
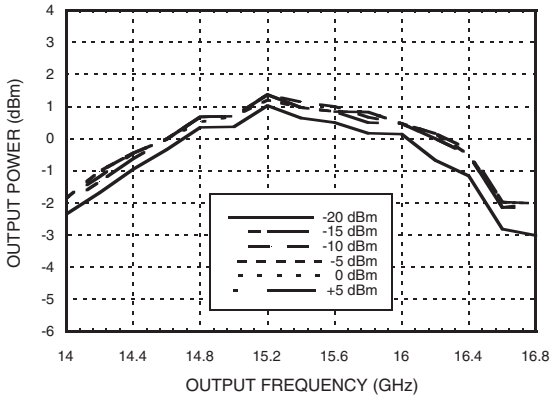
RoHS✓ EARTH FRIENDLY

## SMT GaAs HBT MMIC x4 ACTIVE FREQUENCY MULTIPLIER, 14.4 - 16.4 GHz OUTPUT

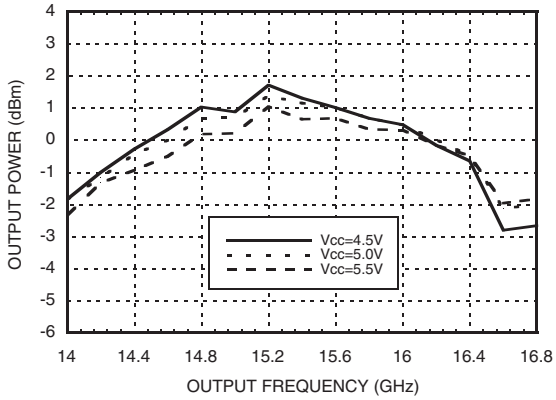
### Output Power vs. Temperature @ -10 dBm Drive Level



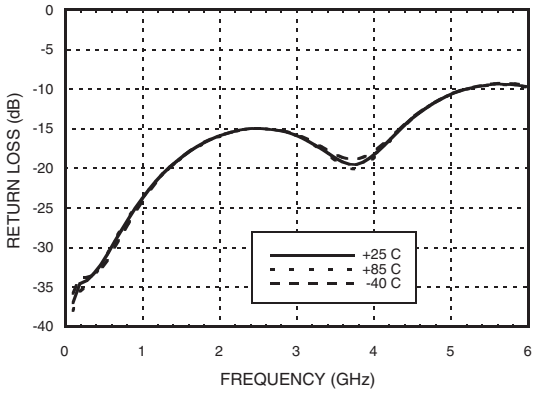

### Output Power vs. Drive Level



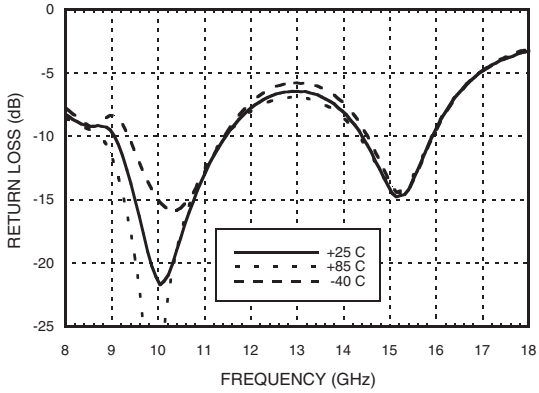

### Output Power vs. Supply Voltage @ -10 dBm Drive Level




### Input Return Loss vs. Temperature




### Output Return Loss vs. Temperature





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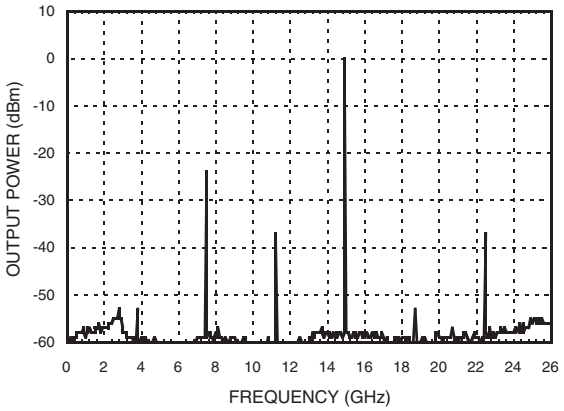
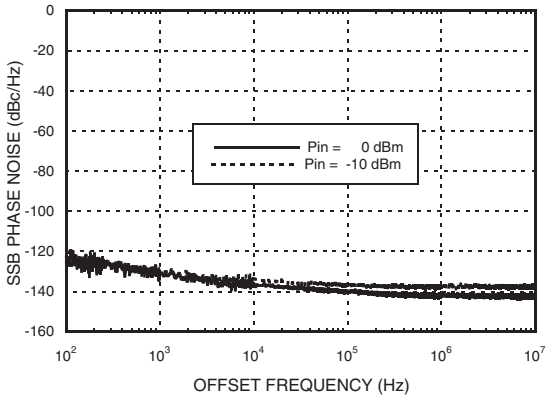
### Output Spectrum




### SSB Phase Noise Performance, Fout= 15.0 GHz



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# SMT GaAs HBT MMIC x4 ACTIVE FREQUENCY MULTIPLIER, 14.4 - 16.4 GHz OUTPUT



## Absolute Maximum Ratings

| | |
|---|---|
| RF Input (Vcc = +5V) | +20 dBm |
| Vcc | +5.5V |
| Channel Temperature | 135 °C |
| Continuous Pdiss (T=85 °C) (derate 8.1 mW/°C above 85 °C) | 530 mW |
| Thermal Resistance ($R_{th}$) (junction to ground paddle) | 123.6 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |

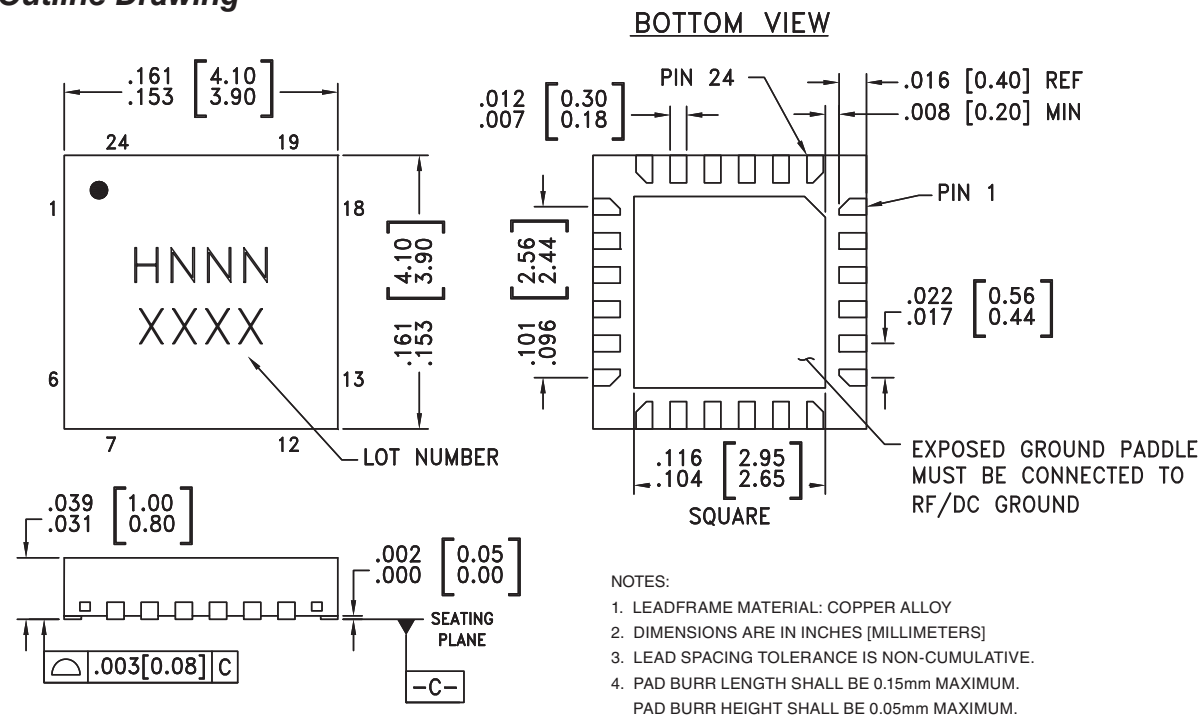
## Typical Supply Current vs. Vcc

| Vcc (V) | Icc (mA) |
|---|---|
| 4.5 | 54 |
| 5.0 | 55 |
| 5.5 | 57 |

*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. 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 NOTE FOR SUGGESTED LAND PATTERN.

## Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking [3] |
|---|---|---|---|---|
| HMC370LP4 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 [1] | H370<br>XXXX |
| HMC370LP4E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 [2] | H370<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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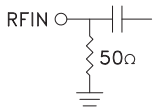
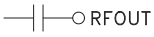
## Pin Description

| Pin Number | Function | Description | Interface Schematic |
|---|---|---|---|
| 1, 2, 5-14, 17, 18, 20-24 | N/C | The pins are not connected internally; however, all data shown herein was measured with these pins connected to RF/DC ground externally. | |
| 3 | RFIN | RF input needs to be DC blocked only if there is an external DC voltage applied to RF IN. |   |
| 4, 15 | GND | All ground leads and ground paddle must be soldered to PCB RF/DC ground. |   |
| 16 | RFOUT | Multiplied Output. AC coupled. No external DC blocks necessary. |   |
| 19 | Vcc | Supply voltage 5V ± 0.5V. | |



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