

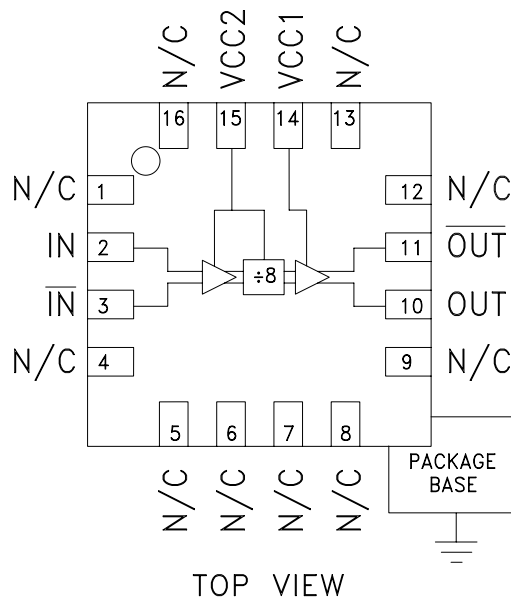


Typical Applications

Prescaler for DC to 18 GHz PLL Applications:

- Point-to-Point / Multi-Point Radios
- VSAT Radios
- Fiber Optic
- Test Equipment
- Military

Functional Diagram



Features

- Ultra Low SSB Phase Noise: -150 dBc/Hz
- Very Wide Bandwidth
- Output Power: -4 dBm
- Single DC Supply: +5V
- 16 Lead 3x3mm QFN Package: 9 mm²

General Description

The HMC494LP3 & HMC494LP3E are low noise Divide-by-8 Static Dividers utilizing InGaP GaAs HBT technology packaged in leadless 3x3 mm QFN surface mount plastic packages. This device operates from DC (with a square wave input) to 18 GHz input frequency from a single +5V DC supply. The low additive SSB phase noise of -150 dBc/Hz at 100 kHz offset helps the user maintain excellent system noise performance.

Electrical Specifications, $T_A = +25^\circ \text{C}$, 50 Ohm System, $V_{CC} = +5V$

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|--|---------------------------------------|------|------|------|--------|
| Maximum Input Frequency | | 18 | 19 | | GHz |
| Minimum Input Frequency | Sine Wave Input. [1] | | 0.2 | 0.5 | GHz |
| Input Power Range | $F_{in} = 2$ to 12 GHz | -20 | -15 | +10 | dBm |
| | $F_{in} = 12$ to 16 GHz | -20 | -15 | +3 | dBm |
| | $F_{in} = 16$ to 18 GHz | -15 | -10 | 0 | dBm |
| Output Power | $F_{in} = 0.5$ to 18 GHz | -7 | -4 | | dBm |
| Reverse Leakage | Both RF Outputs Terminated | | 55 | | dB |
| SSB Phase Noise (100 kHz offset) | $P_{in} = 0$ dBm, $F_{in} = 6$ GHz | | -150 | | dBc/Hz |
| Output Transition Time | $P_{in} = 0$ dBm, $F_{out} = 882$ MHz | | 100 | | ps |
| Supply Current ($I_{CC1} + I_{CC2}$) | | | 103 | | mA |

1. Divider will operate down to DC for square-wave input signal

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HMC494* PRODUCT PAGE QUICK LINKS

Last Content Update: 02/23/2017

COMPARABLE PARTS

View a parametric search of comparable parts.

EVALUATION KITS

- HMC494LP3 Evaluation Board

DOCUMENTATION

Data Sheet

- HMC494 Data Sheet

REFERENCE MATERIALS

Quality Documentation

- Package/Assembly Qualification Test Report: 16L 3x3mm QFN Package (QTR: 11003 REV: 02)
- Package/Assembly Qualification Test Report: LP2, LP2C, LP3, LP3B, LP3C, LP3D, LP3F, LP3G (QTR: 2014-0364)
- Package/Assembly Qualification Test Report: Plastic Encapsulated QFN (QTR: 05006 REV: 02)
- Semiconductor Qualification Test Report: GaAs HBT-A (QTR: 2013-00228)

DESIGN RESOURCES

- HMC494 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

DISCUSSIONS

View all HMC494 EngineerZone Discussions.

SAMPLE AND BUY

Visit the product page to see pricing options.

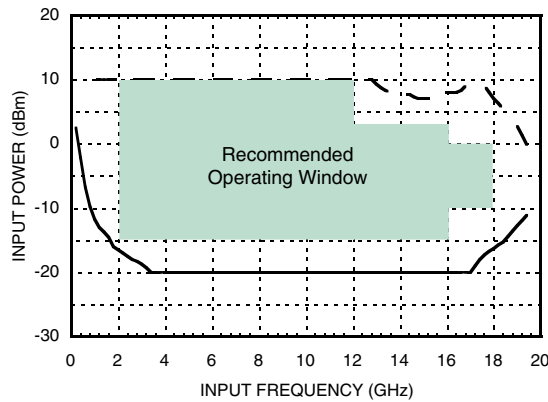
TECHNICAL SUPPORT

Submit a technical question or find your regional support number.

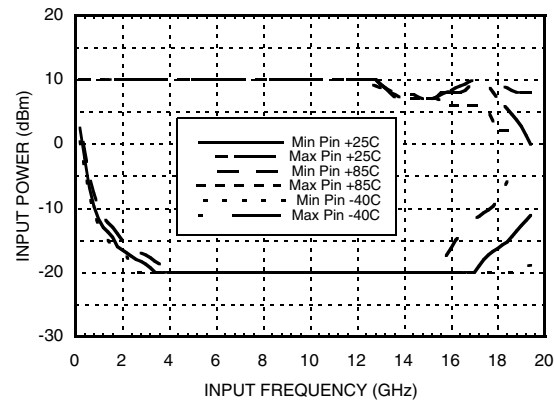
DOCUMENT FEEDBACK

Submit feedback for this data sheet.

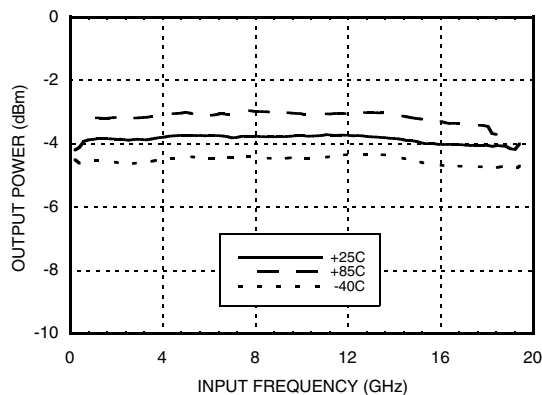
Input Sensitivity Window, $T = 25^\circ\text{C}$



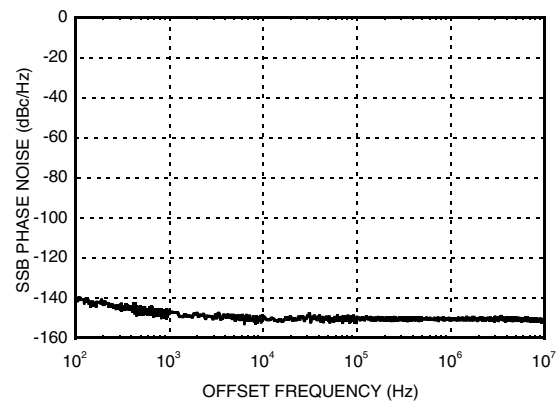
Input Sensitivity Window vs. Temperature



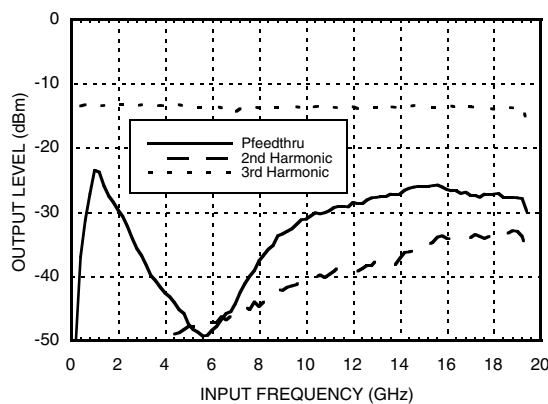
Output Power vs. Temperature



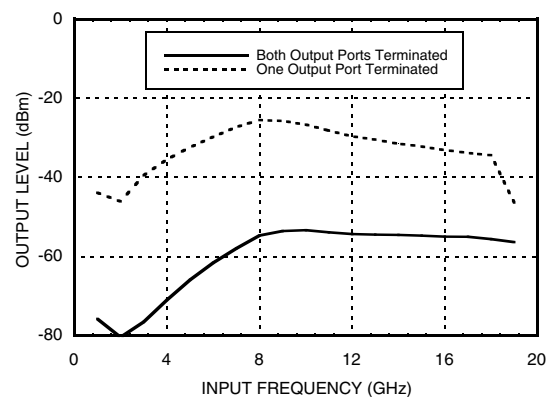
**SSB Phase Noise Performance,
 $P_{in} = 0\text{ dBm}$, $T = 25^\circ\text{C}$**



**Output Harmonic Content,
 $P_{in} = 0\text{ dBm}$, $T = 25^\circ\text{C}$**

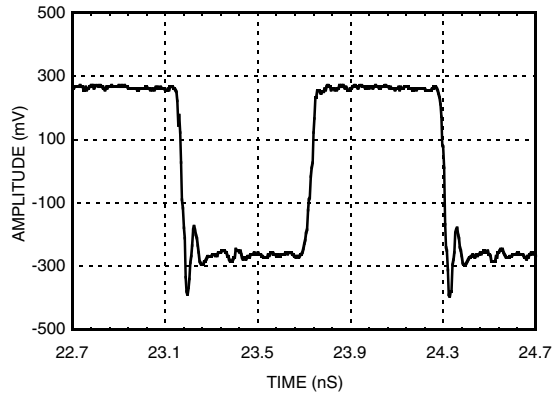


Reverse Leakage, $P_{in} = 0\text{ dBm}$, $T = 25^\circ\text{C}$



**SMT GaAs HBT MMIC
DIVIDE-BY-8, DC - 18 GHz**


Output Voltage Waveform,
Pin= 0 dBm, Fout= 882 MHz, T= 25 °C



**ELECTROSTATIC SENSITIVE DEVICE
OBSERVE HANDLING PRECAUTIONS**

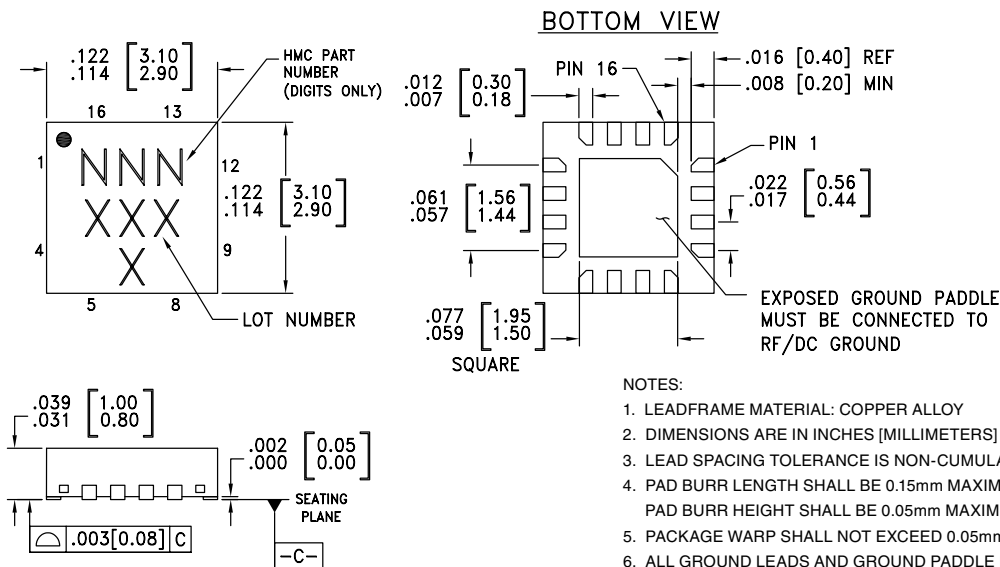
Absolute Maximum Ratings

| | |
|---|----------------|
| RF Input (Vcc = +5V) | +13 dBm |
| Supply Voltage (Vcc1, Vcc2) | +5.5V |
| Channel Temperature (Tc) | 135 °C |
| Continuous P _{diss} (T = 85 °C) (derate 11.9 mW/°C above 85 °C) | 593 mW |
| Thermal Resistance (R _{TH}) (junction to ground paddle) | 84 °C/W |
| Storage Temperature | -65 to +150 °C |
| Operating Temperature | -40 to +85 °C |
| ESD Sensitivity (HBM) | Class 1A |

Typical Supply Current vs. Vcc

| Vcc1, Vcc2 (V) | Icc (mA) |
|----------------|----------|
| 4.75 | 90 |
| 5.0 | 103 |
| 5.25 | 115 |

Note: Divider will operate over full voltage range shown above

Outline Drawing

Package Information

| Part Number | Package Body Material | Lead Finish | MSL Rating | Package Marking ^[3] |
|-------------|--|---------------|---------------------|--------------------------------|
| HMC494LP3 | Low Stress Injection Molded Plastic | Sn/Pb Solder | MSL1 ^[1] | 494 XXXX |
| HMC494LP3E | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 ^[2] | 494 XXXX |

[1] Max peak reflow temperature of 235 °C

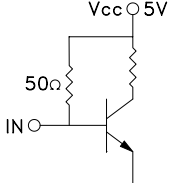
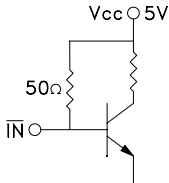
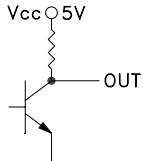
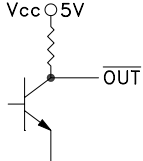

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

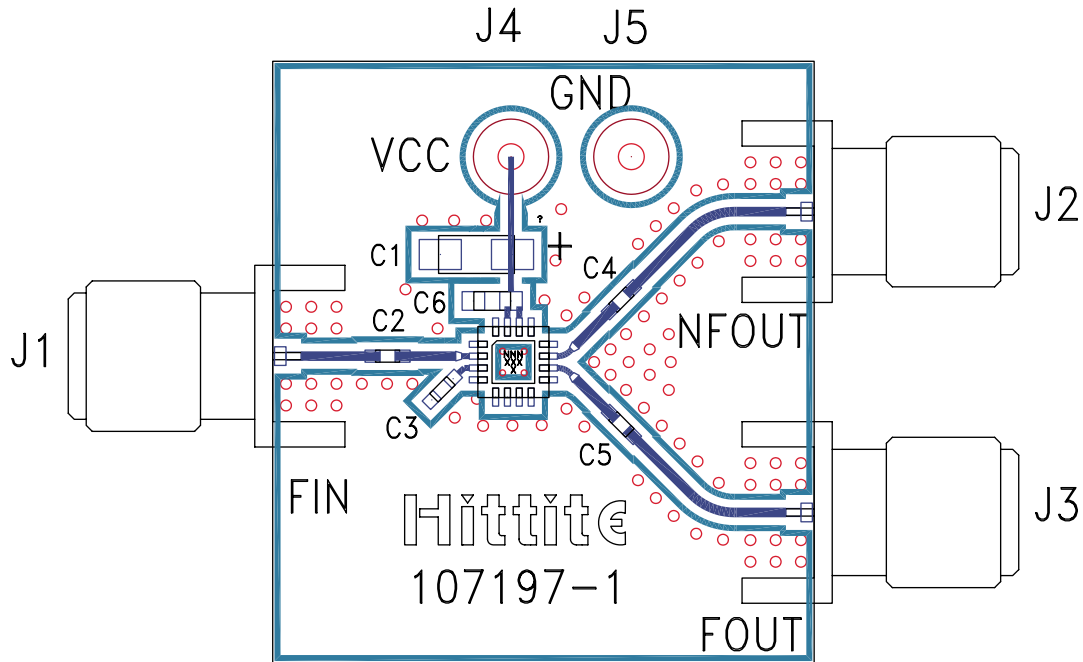
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Pin Description

| Pin Number | Function | Description | Interface Schematic |
|-----------------------|-------------------------|--|---|
| 1, 4-9, 12, 13, 16 | N/C | No connection. | |
| 2 | IN | RF Input must be DC blocked. |  |
| 3 | $\overline{\text{IN}}$ | RF Input 180° out of phase with pin 2 for differential operation. AC ground for single ended operation. |  |
| 10 | OUT | Divided Output. |  |
| 11 | $\overline{\text{OUT}}$ | Divided output 180° out of phase with pin 10. |  |
| 14, 15 | Vcc1, Vcc2 | Supply voltage 5V ± 0.25V. Connect both pins to +5V supply. | |
| | GND | Ground: Backside of package has exposed metal ground slug which must be connected to RF/DC ground. |  |

Evaluation PCB



List of Materials for Evaluation PCB 107384 [1]

| Item | Description |
|---------|------------------------------------|
| J1 - J3 | PCB Mount SMA RF Connector |
| J4, J5 | DC Pin |
| C2 - C5 | 100 pF Capacitor, 0402 Pkg. |
| C6 | 1000 pF Capacitor, 0603 Pkg. |
| C1 | 2.2 uF Tantalum Capacitor |
| U1 | HMC494LP3 / HMC494LP3E Divide-by-2 |
| PCB [2] | 107197 Eval Board |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350

The circuit board used in the application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and backside ground slug 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. This evaluation board is designed for single ended input testing. J2 and J3 provide differential output signals.

Application Circuit

