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# HMC326\* Product Page Quick Links

Last Content Update: 08/30/2016

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## Comparable Parts

View a parametric search of comparable parts

## Evaluation Kits

- HMC326MS8G Evaluation Board

## Documentation

### Application Notes

- AN-1363: Meeting Biasing Requirements of Externally Biased RF/Microwave Amplifiers with Active Bias Controllers
- Broadband Biasing of Amplifiers General Application Note
- MMIC Amplifier Biasing Procedure Application Note
- Thermal Management for Surface Mount Components General Application Note

### Data Sheet

- HMC326 Data Sheet

## Tools and Simulations

- HMC326 S-Parameter

## Reference Materials

### Quality Documentation

- HMC Legacy PCN: MS##, MS##E and MS##G,MS##GE packages - Relocation of pre-existing production equipment to new building
- Package/Assembly Qualification Test Report: MS8G (QTR: 2014-00393)
- PCN: MS, QS, SOT, SOIC packages - Sn/Pb plating vendor change
- Semiconductor Qualification Test Report: GaAs HBT-B (QTR: 2013-00229)

## Design Resources

- HMC326 Material Declaration
- PCN-PDN Information
- Quality And Reliability
- Symbols and Footprints

## Discussions

View all HMC326 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

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# HMC326MS8G / 326MS8GE

## GaAs InGaP HBT MMIC DRIVER AMPLIFIER, 3.0 - 4.5 GHz

### Typical Applications

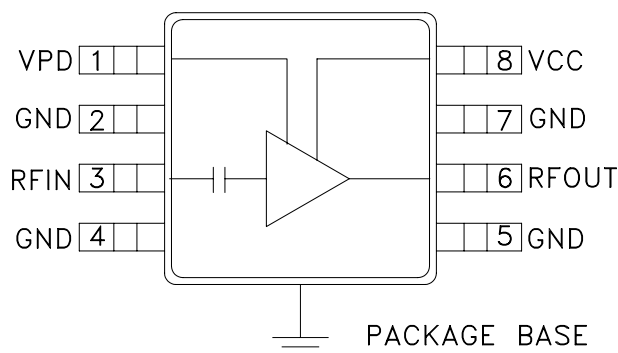
The HMC326MS8G / HMC326MS8GE is ideal for:

- Microwave Radios
- Broadband Radio Systems
- Wireless Local Loop Driver Amplifier

### Features

Psat Output Power: +26 dBm  
> 40% PAE  
Output IP3: +36 dBm  
High Gain: 21 dB  
Vs: +5V  
Ultra Small Package: MSOP8G

### Functional Diagram



### General Description

The HMC326MS8G & HMC326MS8GE are high efficiency GaAs InGaP Heterojunction Bipolar Transistor (HBT) MMIC driver amplifiers which operate between 3.0 and 4.5 GHz. The amplifier is packaged in a low cost, surface mount 8 leaded package with an exposed base for improved RF and thermal performance. The amplifier provides 21 dB of gain and +26 dBm of saturated power from a +5V supply voltage. Power down capability is available to conserve current consumption when the amplifier is not in use. Internal circuit matching was optimized to provide greater than 40% PAE.

### Electrical Specifications, $T_A = +25^\circ\text{C}$ , $V_s = 5\text{V}$ , $V_{pd} = 5\text{V}$

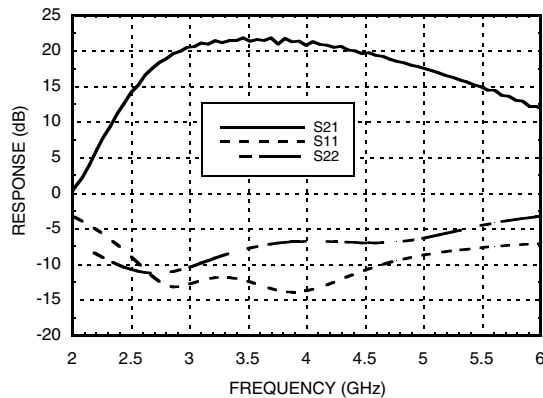
| Parameter                                 | Min.      | Typ.  | Max.  | Units   |
|-------------------------------------------|-----------|-------|-------|---------|
| Frequency Range                           | 3.0 - 4.5 |       |       | GHz     |
| Gain                                      | 18        | 21    |       | dB      |
| Gain Variation Over Temperature           |           | 0.025 | 0.035 | dB / °C |
| Input Return Loss                         |           | 12    |       | dB      |
| Output Return Loss                        |           | 7     |       | dB      |
| Output Power for 1dB Compression (P1dB)   | 21        | 23.5  |       | dBm     |
| Saturated Output Power (Psat)             |           | 26    |       | dBm     |
| Output Third Order Intercept (IP3)        | 32        | 36    |       | dBm     |
| Noise Figure                              |           | 5     |       | dB      |
| Supply Current (Icc) $V_{pd} = 0\text{V}$ |           | 1     |       | uA      |
| Supply Current (Icc) $V_{pd} = 5\text{V}$ | 110       | 130   | 160   | mA      |
| Control Current (Ipd)                     |           | 7     |       | mA      |
| Switching Speed $t_{on}/t_{off}$          |           | 10    |       | ns      |

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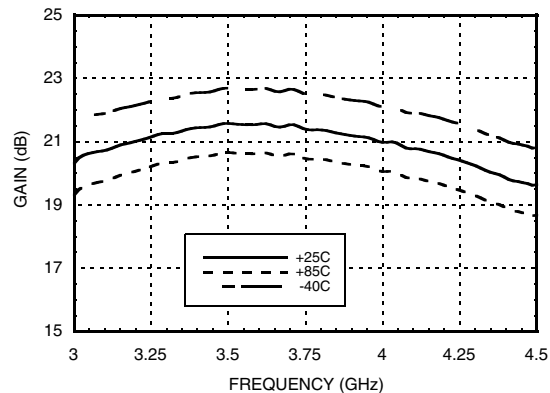
Phone: 978-250-3343 Fax: 978-250-3373 Order On-line at [www.hittite.com](http://www.hittite.com)

Application Support: Phone: 978-250-3343 or [apps@hittite.com](mailto:apps@hittite.com)

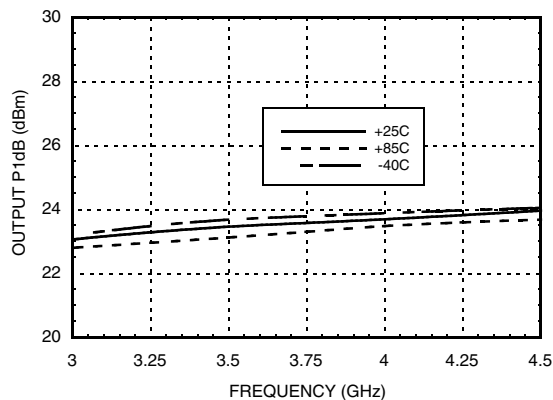
**Broadband Gain & Return Loss**



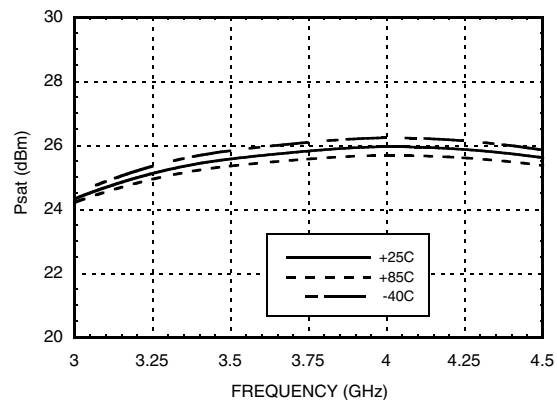
**Gain vs. Temperature**



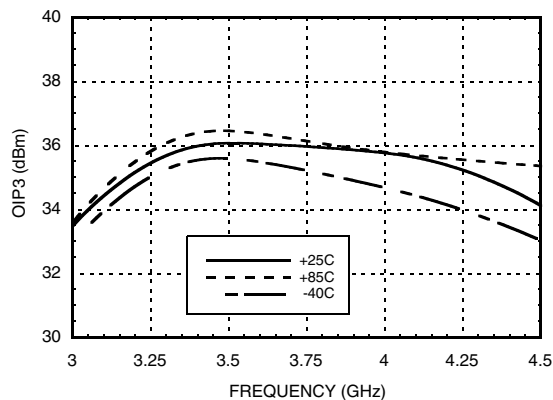
**P1dB vs. Temperature**



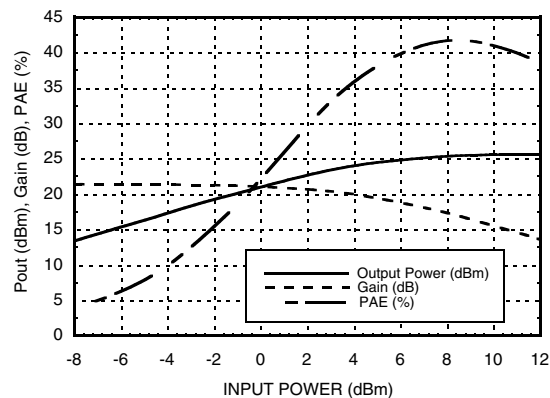
**Psat vs. Temperature**



**Output IP3 vs. Temperature**



**Power Compression @ 3.5 GHz**





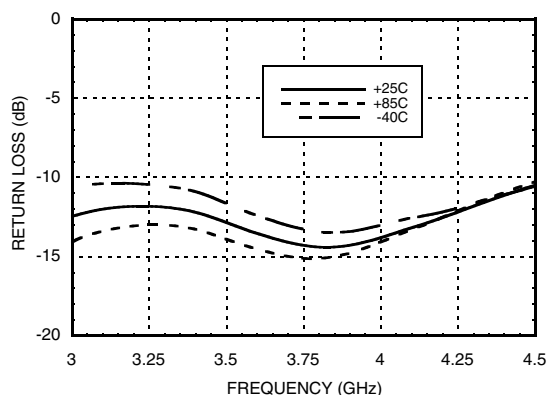
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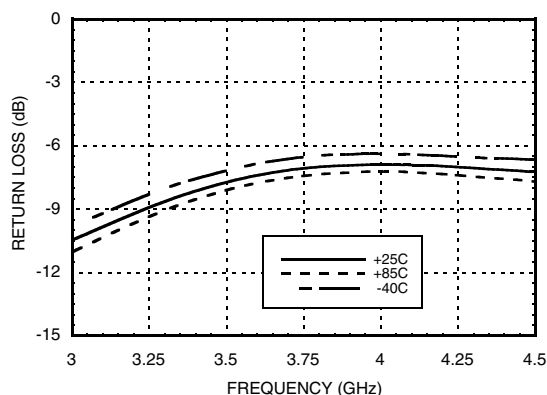
# HMC326MS8G / 326MS8GE

## GaAs InGaP HBT MMIC DRIVER AMPLIFIER, 3.0 - 4.5 GHz

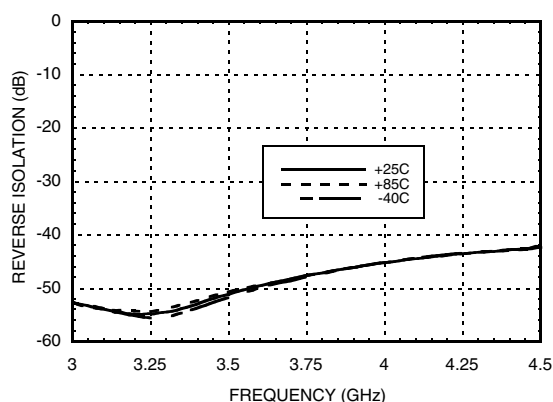
**Input Return Loss vs. Temperature**



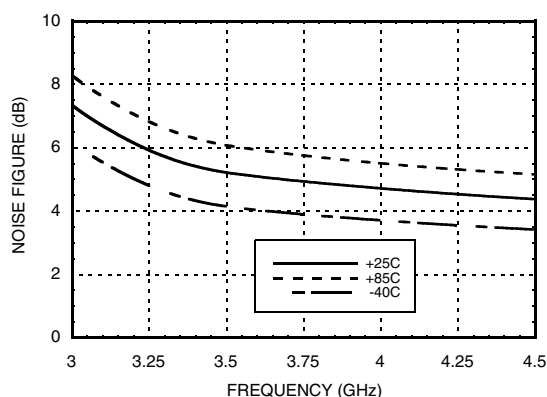
**Output Return Loss vs. Temperature**



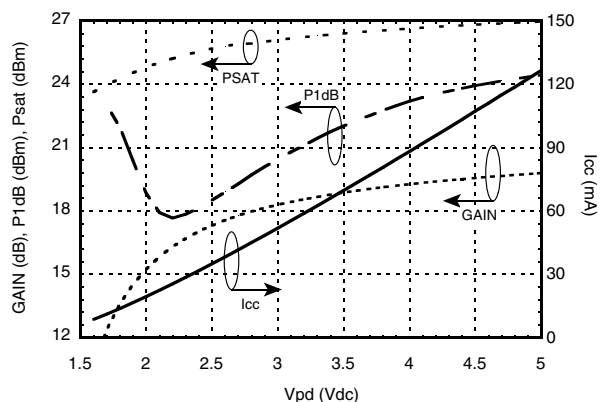
**Reverse Isolation vs. Temperature**



**Noise Figure vs. Temperature**



**Gain, Power & Quiescent Supply  
Current vs. Vpd @3.5 GHz**



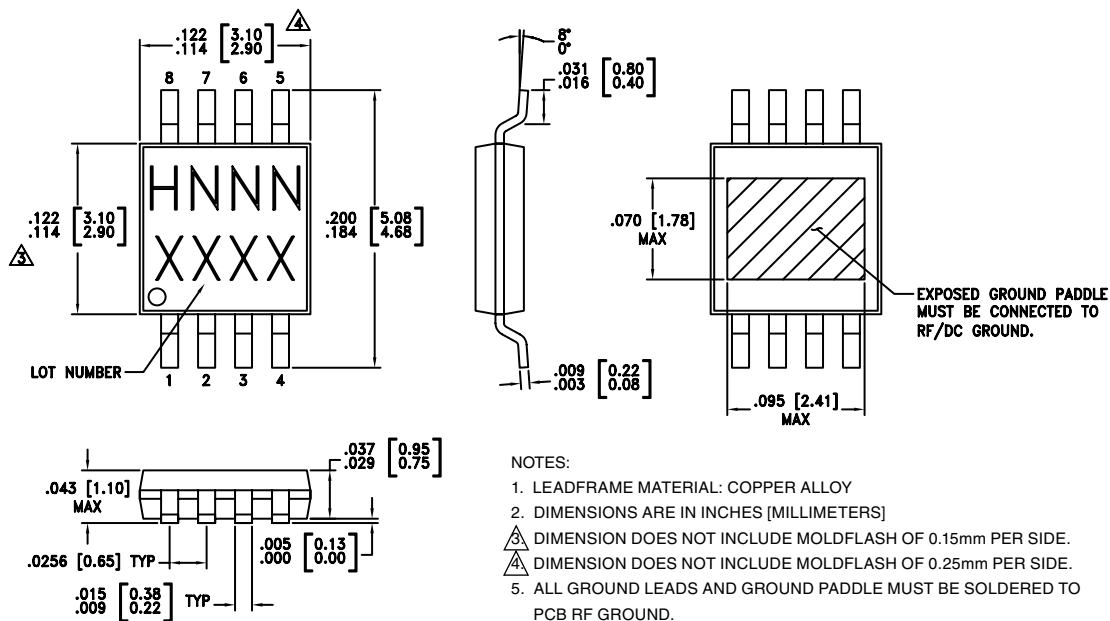
### Absolute Maximum Ratings

|                                                                           |                |
|---------------------------------------------------------------------------|----------------|
| Collector Bias Voltage (Vcc)                                              | +5.5 Vdc       |
| Control Voltage Range (Vpd)                                               | +5.5 Vdc       |
| RF Input Power (RFIN)(Vs = Vpd = +5Vdc)                                   | +15 dBm        |
| Junction Temperature                                                      | 150 °C         |
| Continuous P <sub>diss</sub> (T = 85 °C)<br>(derate 14 mW/°C above 85 °C) | 0.916 W        |
| Thermal Resistance<br>(junction to ground paddle)                         | 71 °C/W        |
| Storage Temperature                                                       | -65 to +150 °C |
| Operating Temperature                                                     | -40 to +85 °C  |
| ESD Sensitivity (HBM)                                                     | Class 1A       |



ELECTROSTATIC SENSITIVE DEVICE  
OBSERVE HANDLING PRECAUTIONS

### Outline Drawing



### Package Information

| Part Number | Package Body Material                              | Lead Finish   | MSL Rating          | Package Marking <sup>[3]</sup> |
|-------------|----------------------------------------------------|---------------|---------------------|--------------------------------|
| HMC326MS8G  | Low Stress Injection Molded Plastic                | Sn/Pb Solder  | MSL1 <sup>[1]</sup> | H326<br>XXXX                   |
| HMC326MS8GE | RoHS-compliant Low Stress Injection Molded Plastic | 100% matte Sn | MSL1 <sup>[2]</sup> | H326<br>XXXX                   |

[1] Max peak reflow temperature of 235 °C

[2] Max peak reflow temperature of 260 °C

[3] 4-Digit lot number XXXX

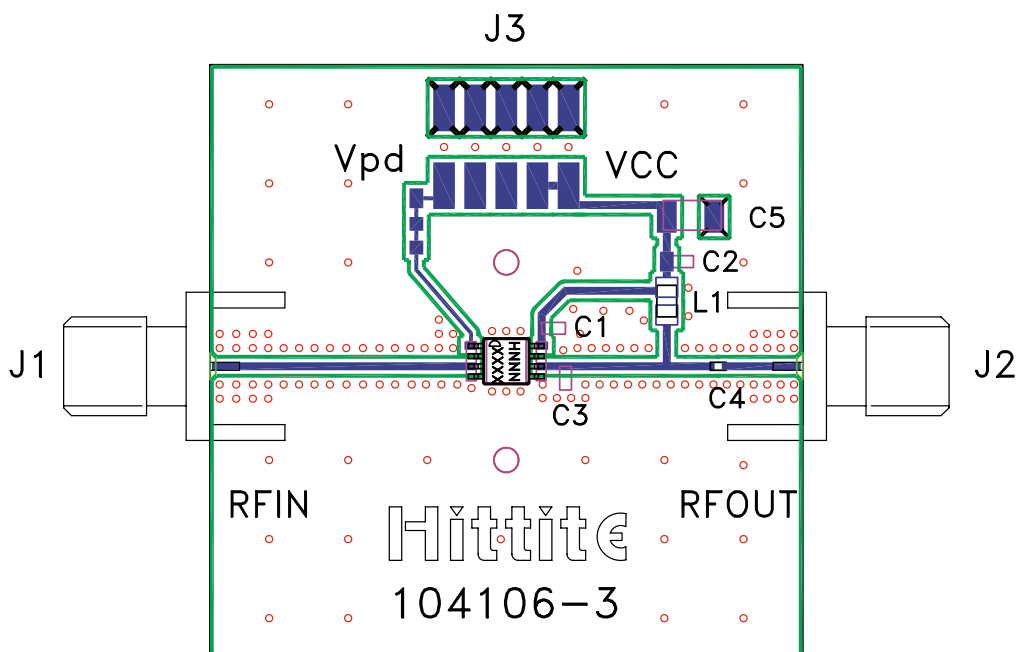
For price, delivery and to place orders: Hittite Microwave Corporation, 2 Elizabeth Drive, Chelmsford, MA 01824

Phone: 978-250-3343 Fax: 978-250-3373 Order On-line at [www.hittite.com](http://www.hittite.com)

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**HMC326MS8G / 326MS8GE****GaAs InGaP HBT MMIC DRIVER  
AMPLIFIER, 3.0 - 4.5 GHz****Evaluation PCB****List of Materials for Evaluation PCB 104356 <sup>[1]</sup>**

| Item               | Description                        |
|--------------------|------------------------------------|
| J1 - J2            | PCB Mount SMA RF Connector         |
| J3                 | 2mm DC Header                      |
| C1 - C2            | 330 pF Capacitor, 0603 Pkg.        |
| C3                 | 0.7 pF Capacitor, 0603 Pkg.        |
| C4                 | 3.0 pF Capacitor, 0402 Pkg.        |
| C5                 | 2.2 $\mu$ F Capacitor, Tantalum    |
| L1                 | 3.3 nH Inductor, 0805 Pkg.         |
| U1                 | HMC326MS8G / HMC326MS8GE Amplifier |
| PCB <sup>[2]</sup> | 104106 Eval Board                  |

[1] Reference this number when ordering complete evaluation PCB

[2] Circuit Board Material: Rogers 4350, 10 mil thick,  $\epsilon_r = 3.48$ 

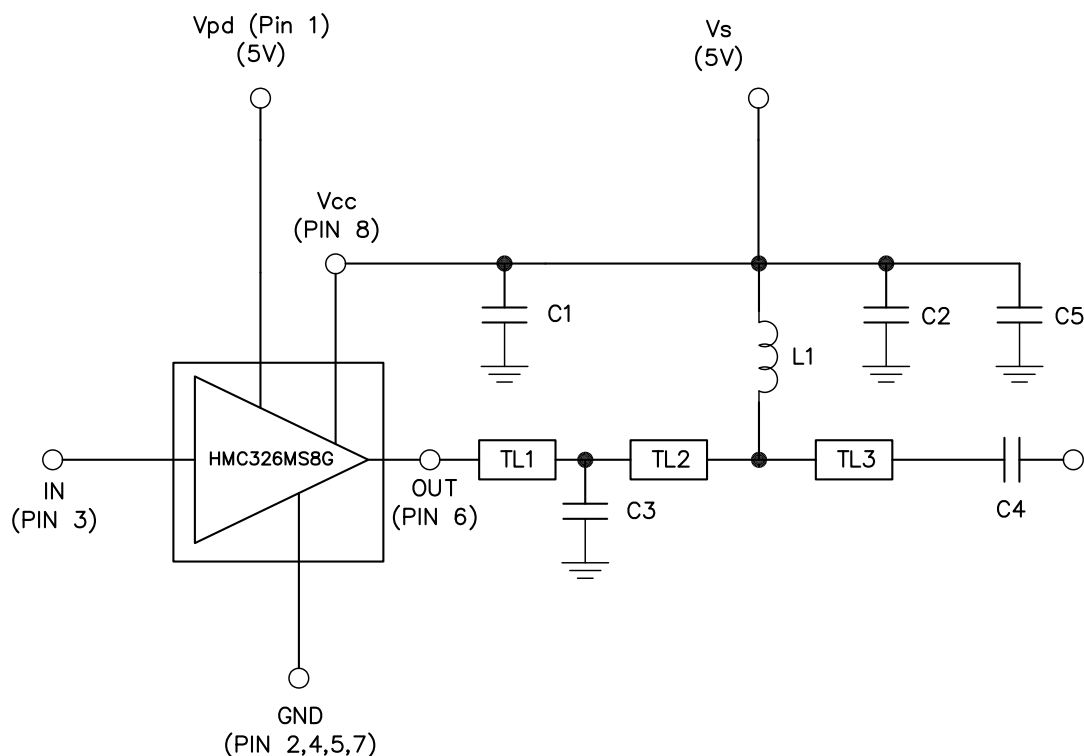
The circuit board used in the final application should use RF circuit design techniques. Signal lines should have 50 Ohm impedance while the package ground leads and exposed paddle should be connected directly to the ground plane similar to that shown. A sufficient number of via holes should be used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

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Phone: 978-250-3343 Fax: 978-250-3373 Order On-line at [www.hittite.com](http://www.hittite.com)Application Support: Phone: 978-250-3343 or [apps@hittite.com](mailto:apps@hittite.com)



### Application Circuit



|                              | TL1                                              | TL2                                               | TL3                                                |
|------------------------------|--------------------------------------------------|---------------------------------------------------|----------------------------------------------------|
| Impedance                    | 50 ohm                                           | 50 ohm                                            | 50 ohm                                             |
| Physical Length              | 0.0614"                                          | 0.2561"                                           | 0.110"                                             |
| Electrical Length @ 3.75 GHz | 10.7°                                            | 44.6°                                             | 19.2°                                              |
| Measurement                  | Center of package pin to center of capacitor C3. | Center of capacitor C3 to center TL for inductor. | Center of TL for inductor to edge of capacitor C4. |

PCB Material: 10 mil Rogers 4350 or Arlon 25FR

| Recommended Component Values |             |
|------------------------------|-------------|
| L1                           | 3.3 nH      |
| C1 - C2                      | 330 pF      |
| C3                           | 0.7 pF      |
| C4                           | 3.0 pF      |
| C5                           | 2.2 $\mu$ F |