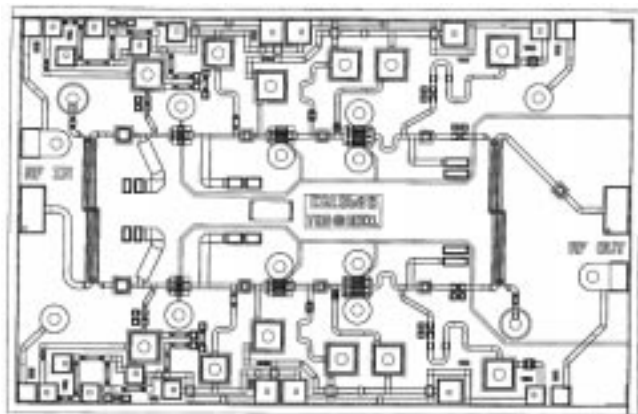


30-38 GHz Balanced Low Noise Amplifier

TGA4511-EPU

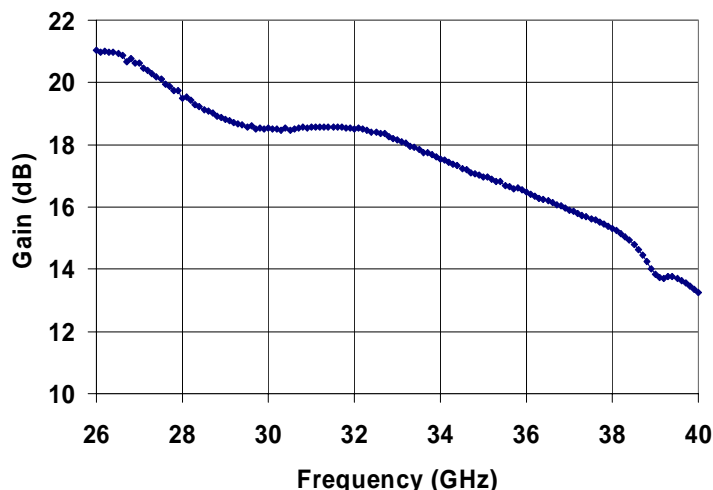
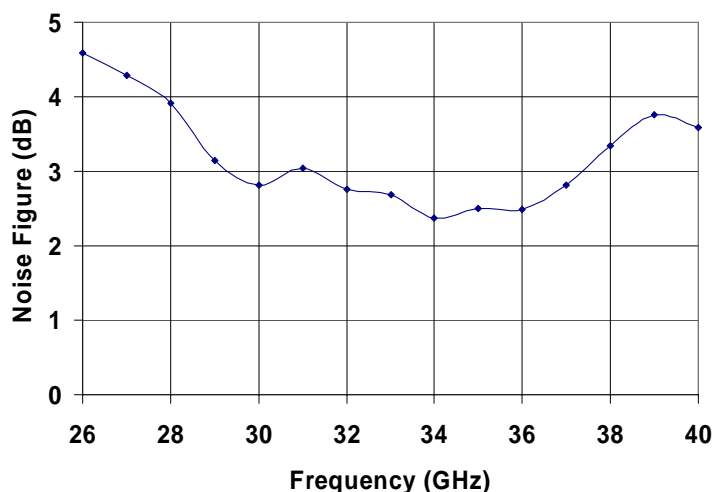


Key Features

- 0.15 μ m pHEMT Technology
- 15 dBm Nominal Pout @ 35 GHz
- 17 dB Nominal Gain @ 35 GHz
- 2.5 dB Noise Figure @ 35 GHz
- Bias Conditions: 3.5V, 110 mA
- Chip Dimensions: 2.7mm x 1.8mm

Preliminary Measured Data

Bias Conditions: $V_d = 3.5$ V, $I_d = 110$ mA



Primary Applications

- Point-to-Point Radio
- Point-to-Multipoint Radio

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

TABLE I
MAXIMUM RATINGS 5/

| SYMBOL | PARAMETER | VALUE | NOTES |
|------------------|-------------------------------------|---------------|--------------|
| V ⁺ | Positive Supply Voltage | 6 V | <u>4/</u> |
| V ⁻ | Negative Supply Voltage Range | -2 to 0 V | |
| I ⁺ | Positive Supply Current (Quiescent) | 400 mA | <u>4/</u> |
| I _G | Gate Supply Current | 40 mA | |
| P _{IN} | Input Continuous Wave Power | TBD | |
| P _D | Power Dissipation | TBD | <u>3/ 4/</u> |
| T _{CH} | Operating Channel Temperature | 150 °C | <u>1/ 2/</u> |
| T _M | Mounting Temperature (30 Seconds) | 320 °C | |
| T _{STG} | Storage Temperature | -65 to 150 °C | |

- 1/ These ratings apply to each individual FET.
- 2/ Junction operating temperature will directly affect the device median time to failure (T_M). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.
- 3/ When operated at this bias condition with a base plate temperature of TBD, the median life is reduced from TBD to TBD.
- 4/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.
- 5/ These ratings represent the maximum operable values for this device.

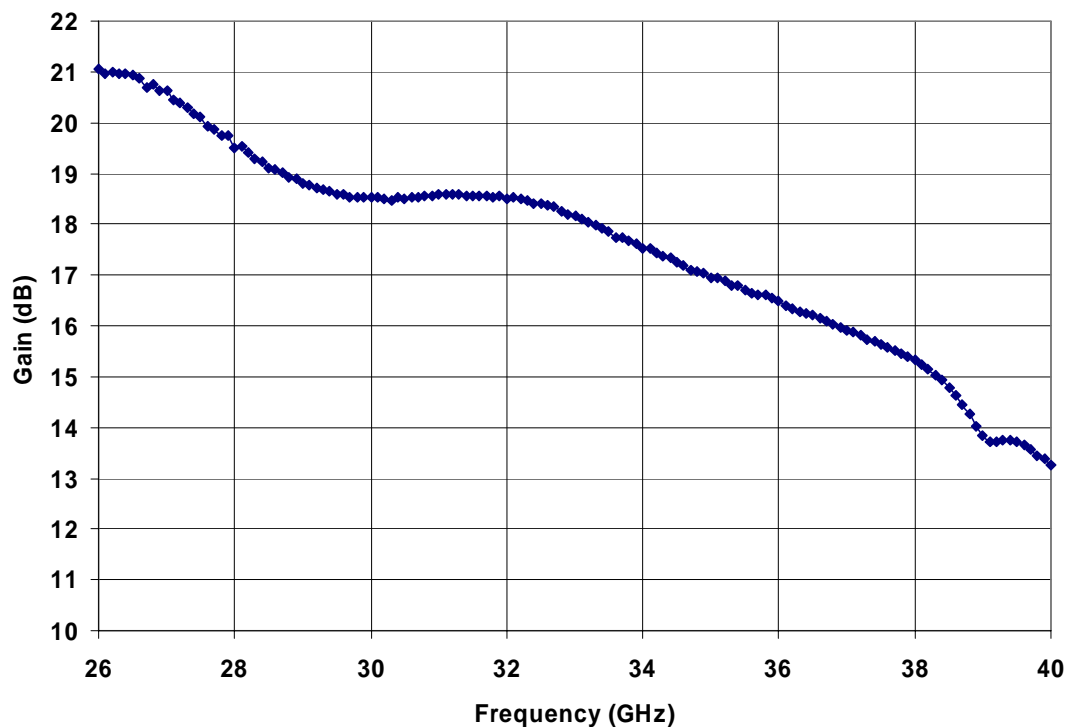
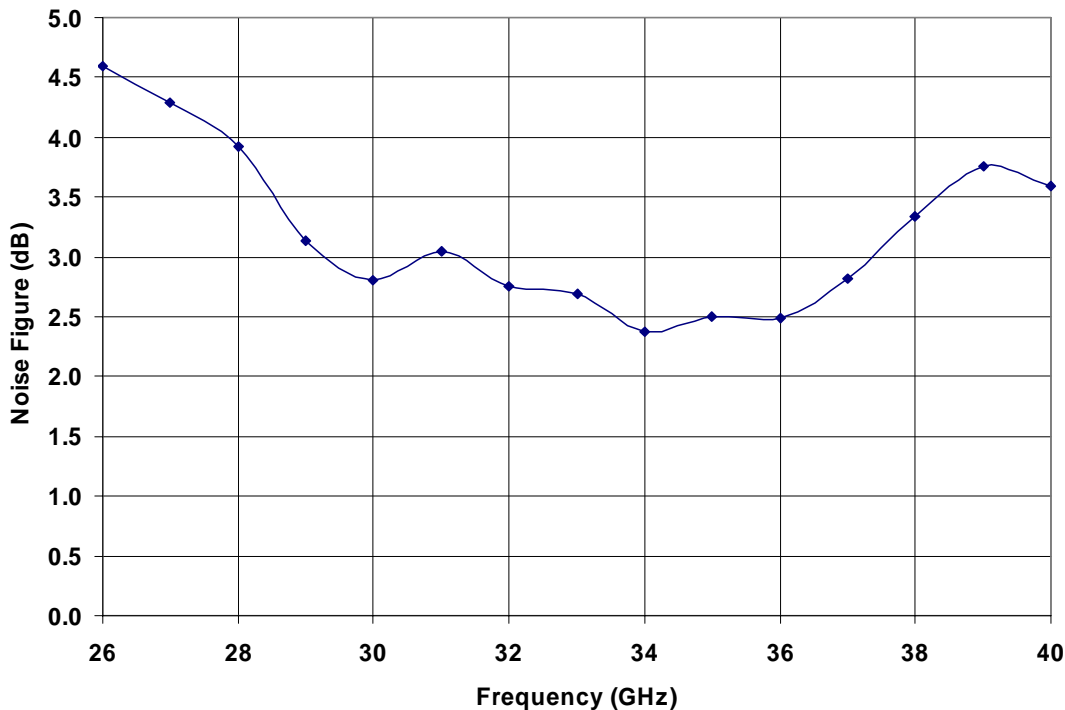
TABLE II
ELECTRICAL CHARACTERISTICS
(T_a = 25°C ± 5°C)

| PARAMETER | TYPICAL | UNITS |
|---|---------|-------|
| Drain Operating | 3.5 | V |
| Quiescent Current | 110 | mA |
| Small Signal Gain | 17 | dB |
| Input Return Loss (Linear Small Signal) | 18 | dB |
| Output Return Loss (Linear Small Signal) | 18 | dB |
| Output Power @ 1 dB Compression Gain | 15 | dBm |
| Third Order Intercept Point @ -12 dBm @ 35GHz | 25 | dBm |

Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Preliminary Measured Data

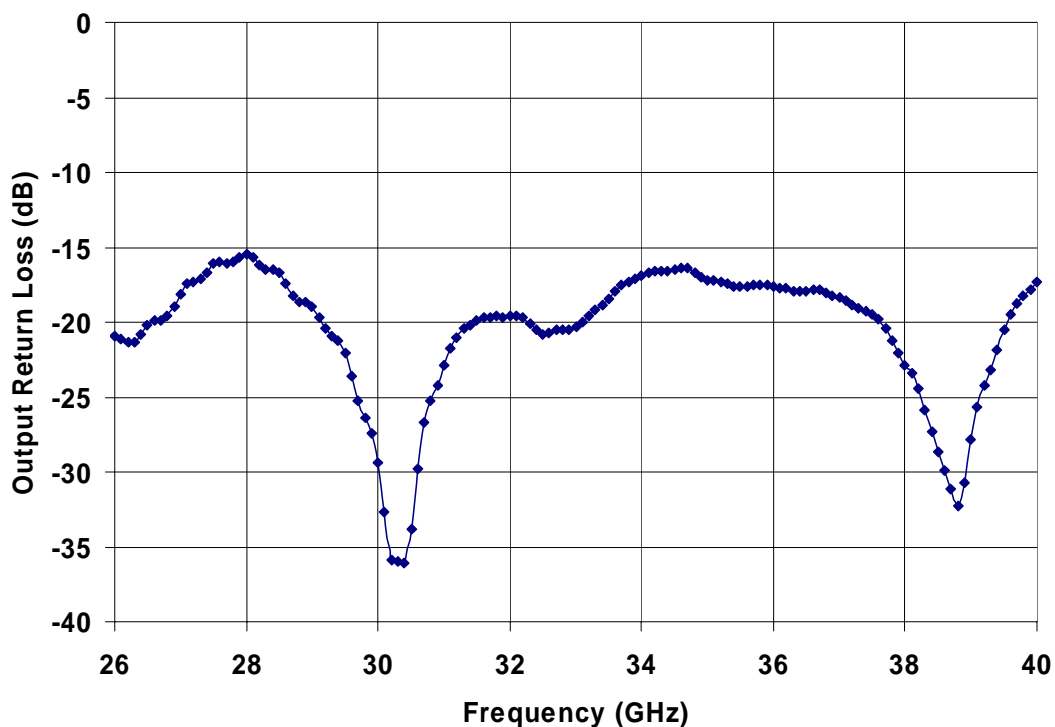
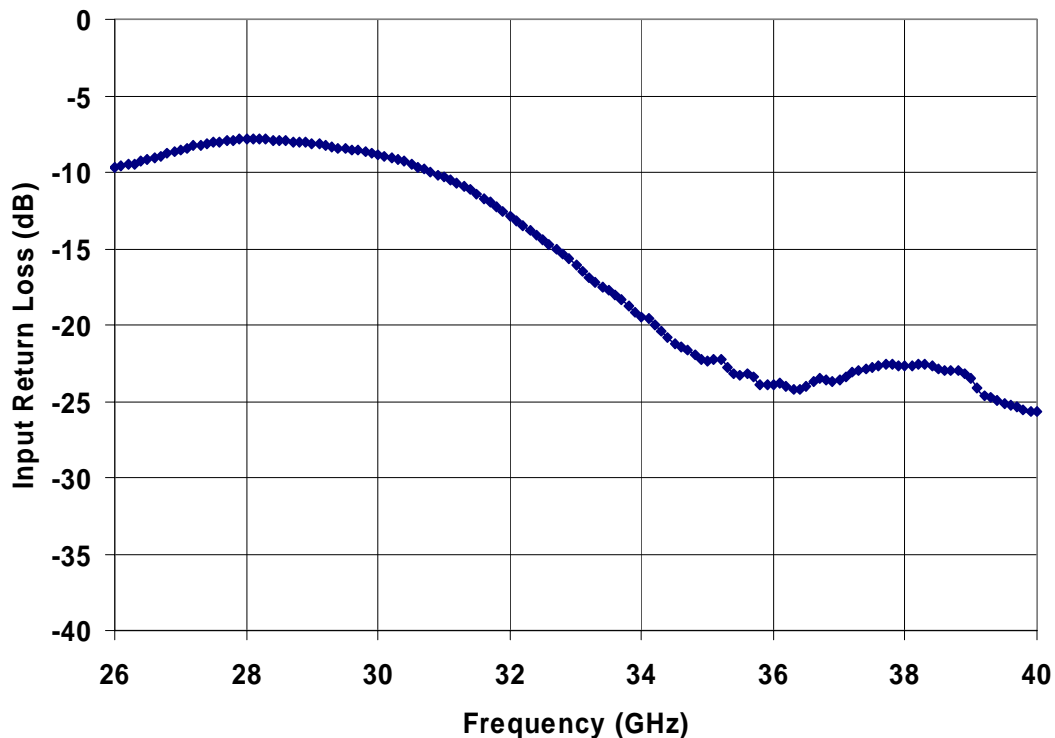
Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 110\text{ mA}$



Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Preliminary Measured Data

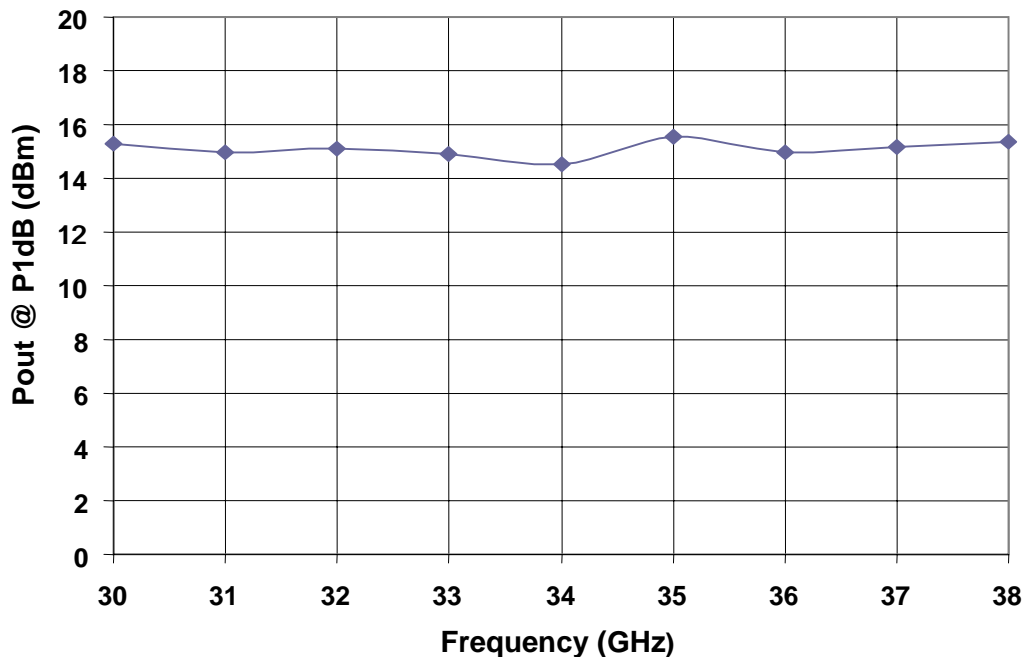
Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 110\text{ mA}$



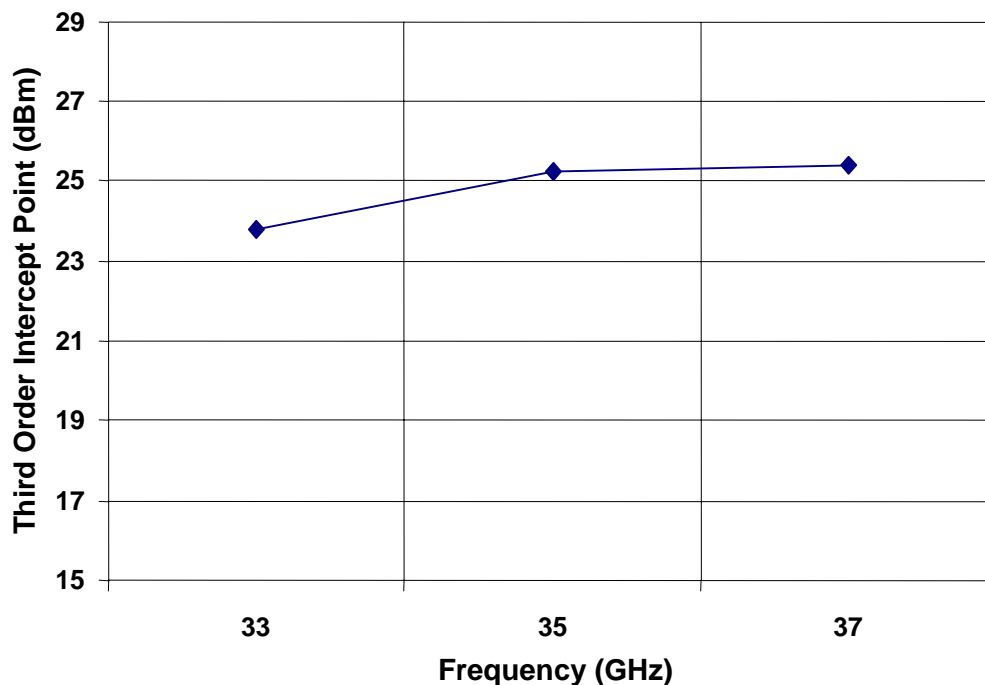
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Preliminary Measured Data

Bias Conditions: $V_d = 3.5\text{ V}$, $I_d = 110\text{ mA}$

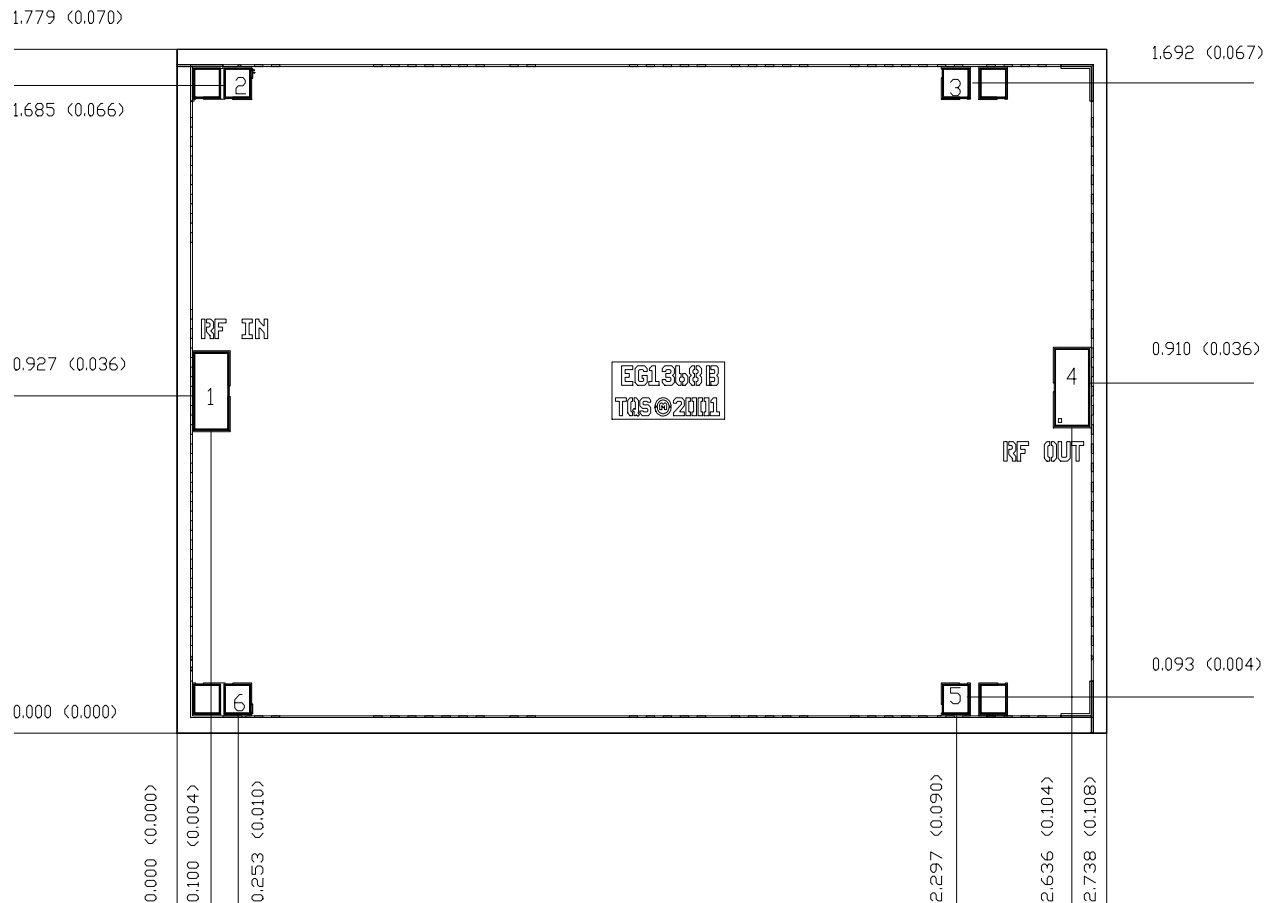


TOI at -12 dBm Input Power
(P1dB - 10 dB)



Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Mechanical Drawing



Units: millimeters (inches)

Thickness: 0.1016 (0.004)

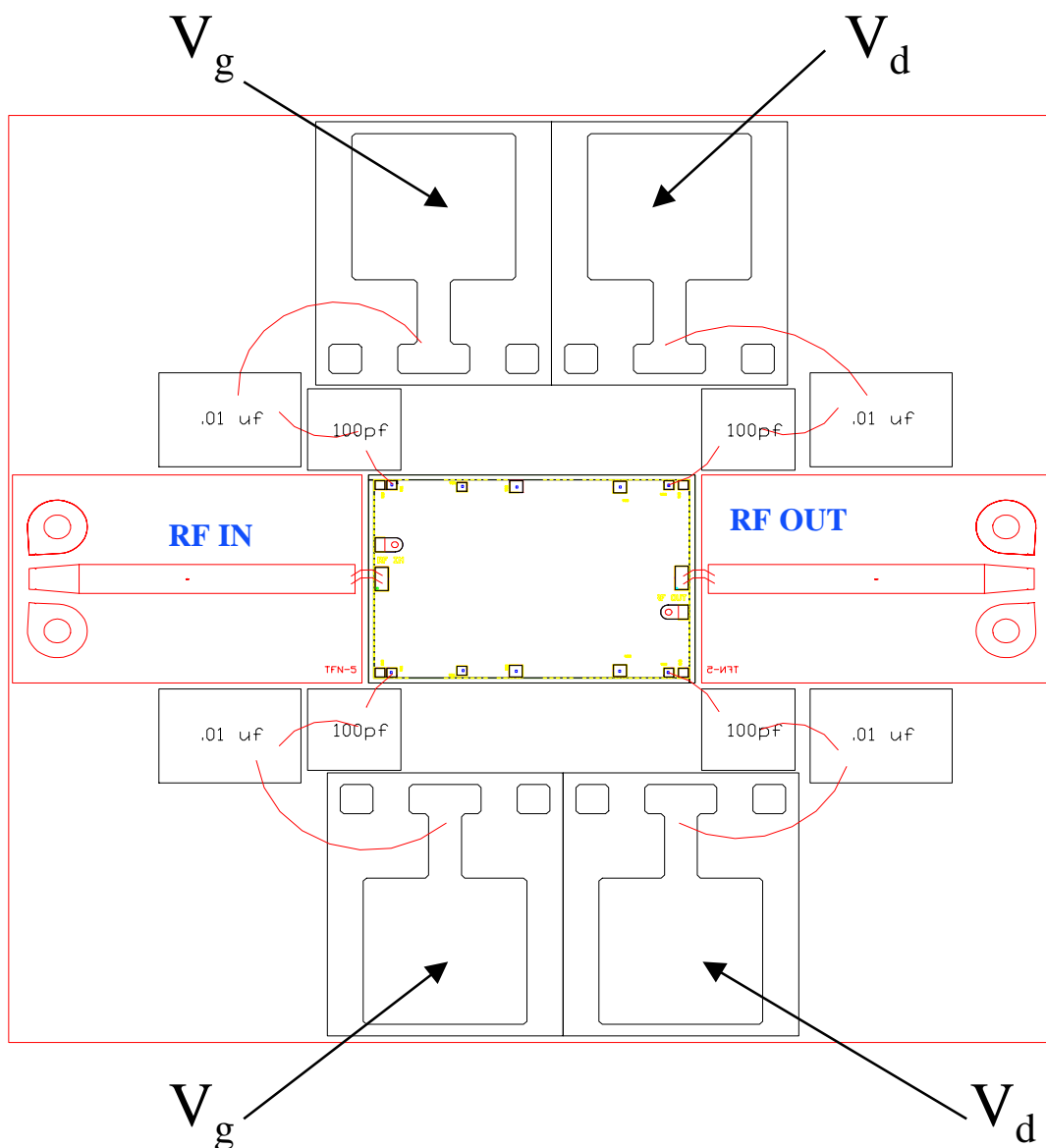
Chip edge to bond pad dimensions are shown to center of bond pad

Chip size tolerance: +/- 0.051 (0.002)

| | | |
|-------------|----------|-------------------------------|
| Bond pad #1 | (RF In) | 0.100 x 0.200 (0.004 x 0.008) |
| Bond pad #2 | (Vg) | 0.085 x 0.085 (0.003 x 0.003) |
| Bond pad #3 | (Vd) | 0.085 x 0.085 (0.003 x 0.003) |
| Bond pad #4 | (RF Out) | 0.100 x 0.200 (0.004 x 0.008) |
| Bond pad #5 | (Vd) | 0.085 x 0.085 (0.003 x 0.003) |
| Bond pad #6 | (Vg) | 0.085 x 0.085 (0.003 x 0.003) |

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Chip Assembly Diagram



GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

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Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300°C.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200°C.

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