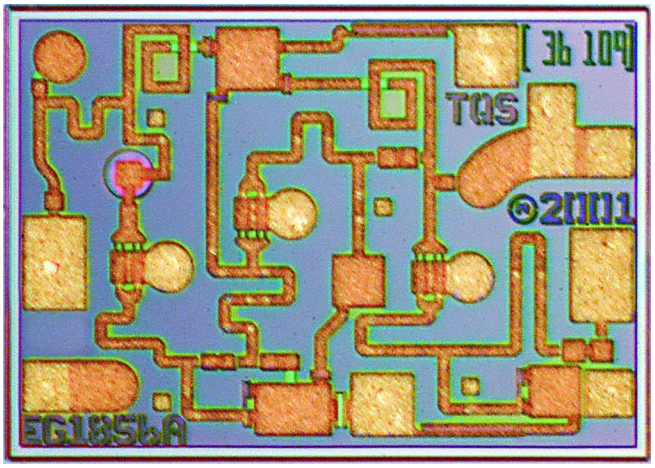
TriQuint SEMICONDUCTOR

**Product Data Sheet**
**August 5, 2008**

# 29-37 GHz Compact Driver Amplifier **TGA4510**




## Key Features

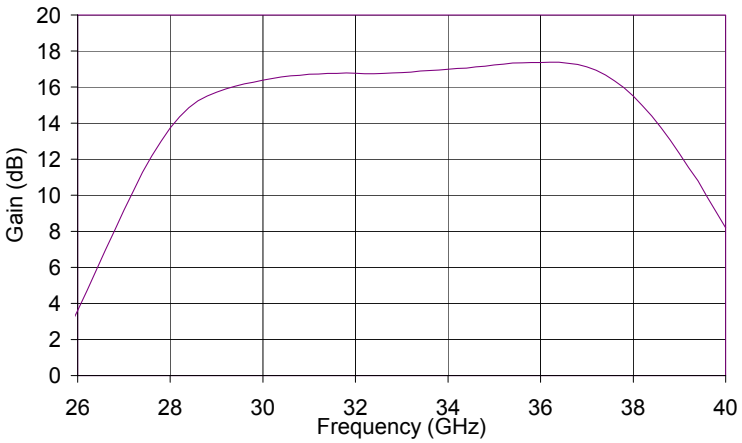
- 0.25 um pHEMT Technology
- >16 dB Nominal Gain @ 30 GHz
- 16 dBm Nominal Psat
- Bias Conditions: Vd = 6V, Id = 60 mA
- Compact Chip Size: 1.1 x 0.8 x 0.1 $mm^3$

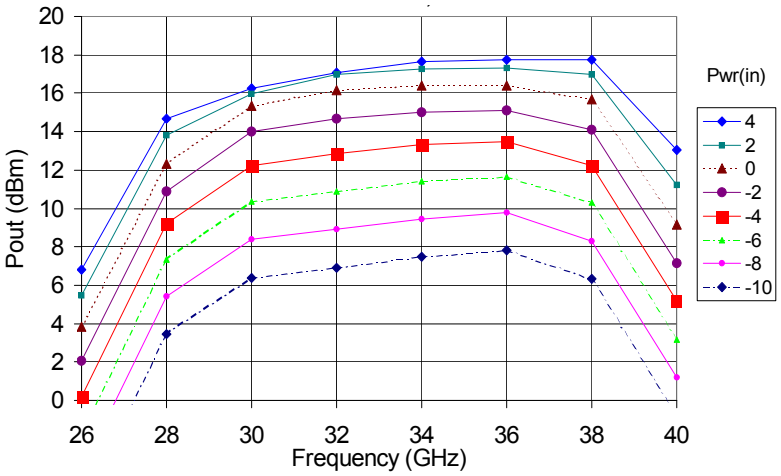
## Primary Applications

- LMDS
- Point-to-Point
- Base Stations

## Fixtured Measured Performance

Bias Conditions: Vd = 6V, Id = 60 mA ± 5%




*Note: Datasheet is subject to change without notice.*

**TABLE I**
**MAXIMUM RATINGS 1/**

| Symbol | Parameter | Value | Notes |
|---|---|---|---|
| $V^+$ | Positive Supply Voltage | 8V | |
| $I^+$ | Positive Supply Current (Quiescent) | 81mA | 2/ |
| $\|I_G\|$ | Gate Current | 3.5 mA | |
| $P_D$ | Power Dissipation | TBD | |
| $P_{IN}$ | Input Continuous Wave Power | 18 dBm | |
| $T_{CH}$ | Operating Channel Temperature | 150 °C | 3/, 4/ |
| $T_M$ | Mounting Temperature (30 seconds) | 320 °C | |
| $T_{STG}$ | Storage Temperature | -65 °C to 150 °C | |

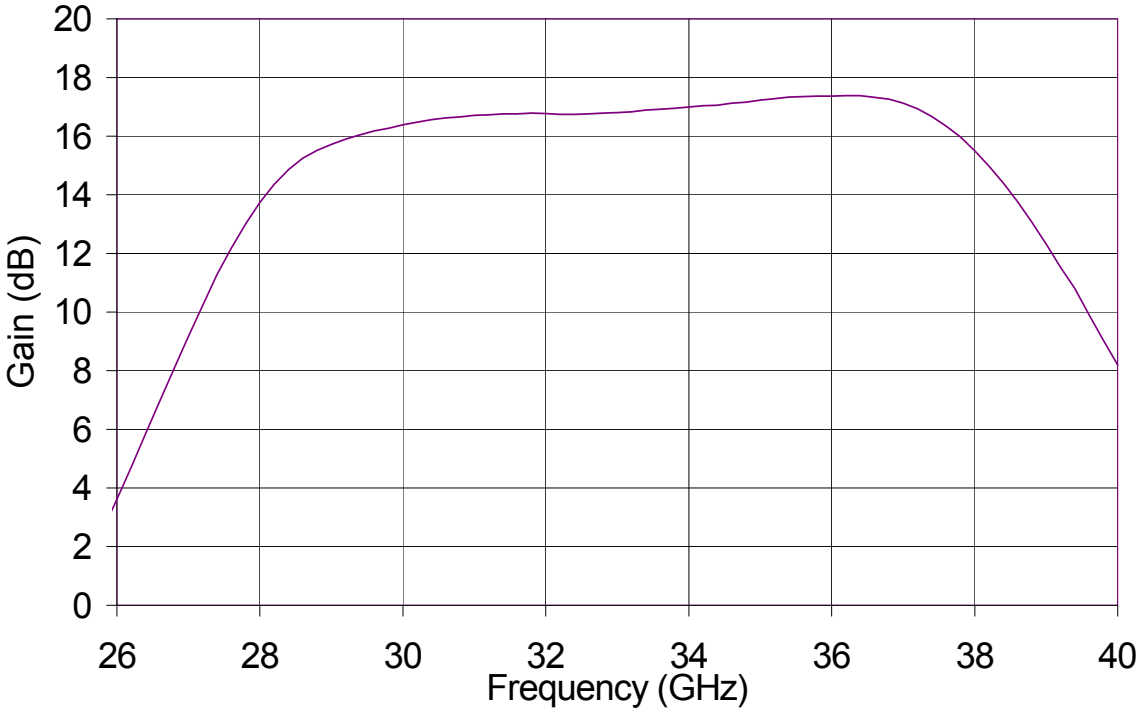
1/ These values represent the maximum operable values of this device
2/ Total current for the entire MMIC
3/ These ratings apply to each individual FET
4/ Junction operating temperature will directly affect the device mean time to failure (MTTF). For maximum life it is recommended that junction temperatures be maintained at the lowest possible levels.

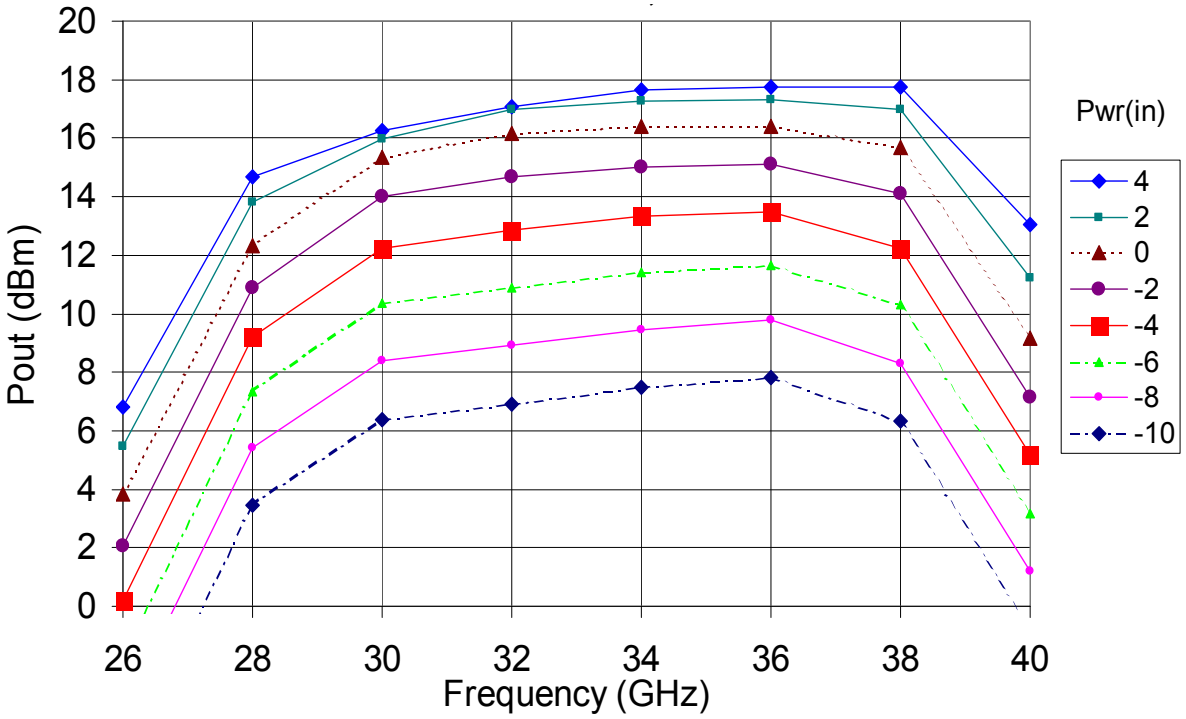
**TABLE II**
**ELECTRICAL CHARACTERISTICS**
**(Ta = 25°C ± 5°C)**

| Parameter | Units | Typical |
|---|---|---|
| Frequency Band | GHz | 29 - 37 |
| Drain Operating Voltage | V | 6 |
| Gate Operating Voltage | V | -0.6 |
| Drain Current | mA | 60 |
| Typical DC Power Consumption | W | 0.36 |
| Small Signal Gain | dB | 15.8 – 17.6 |
| Gain Flatness | dB | < 0.05 |
| Input Return Loss | dB | > 8 |
| Output Return Loss | dB | > 11 |
| TOI (Single Tone Power) @ 30 GHz | dBm | 22 |
| CW Output Power @ P1dB (dBm) | dBm | 14.0 – 16.2 |

## Measured Fixtured Data

Bias Conditions: Vd = 6V, Id = 60mA ± 5%

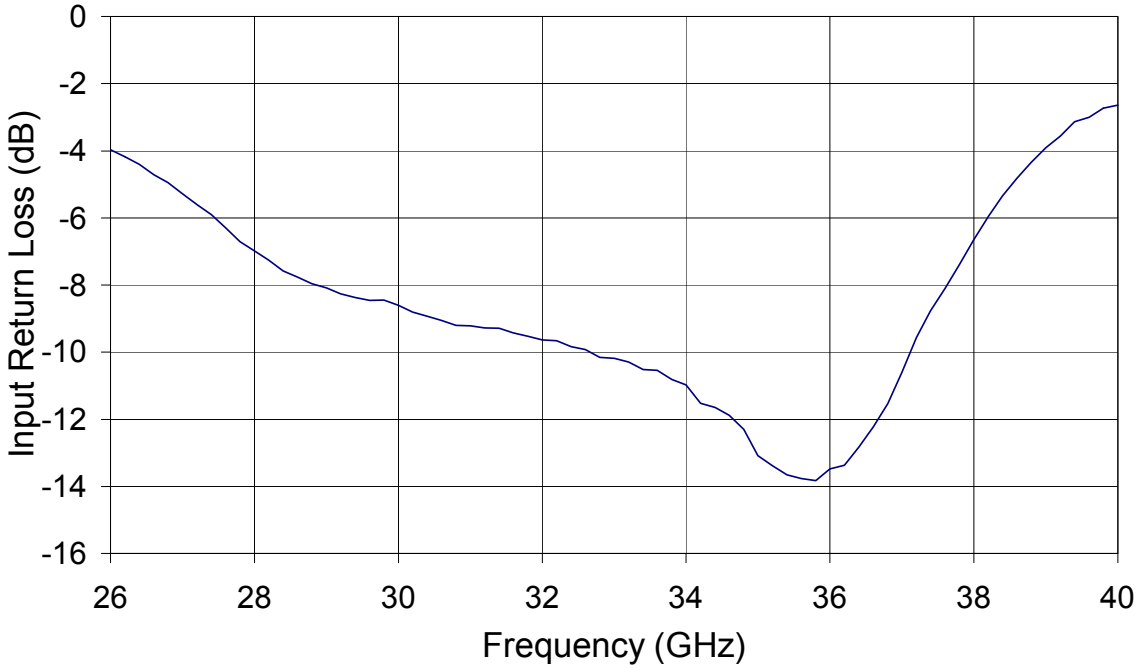


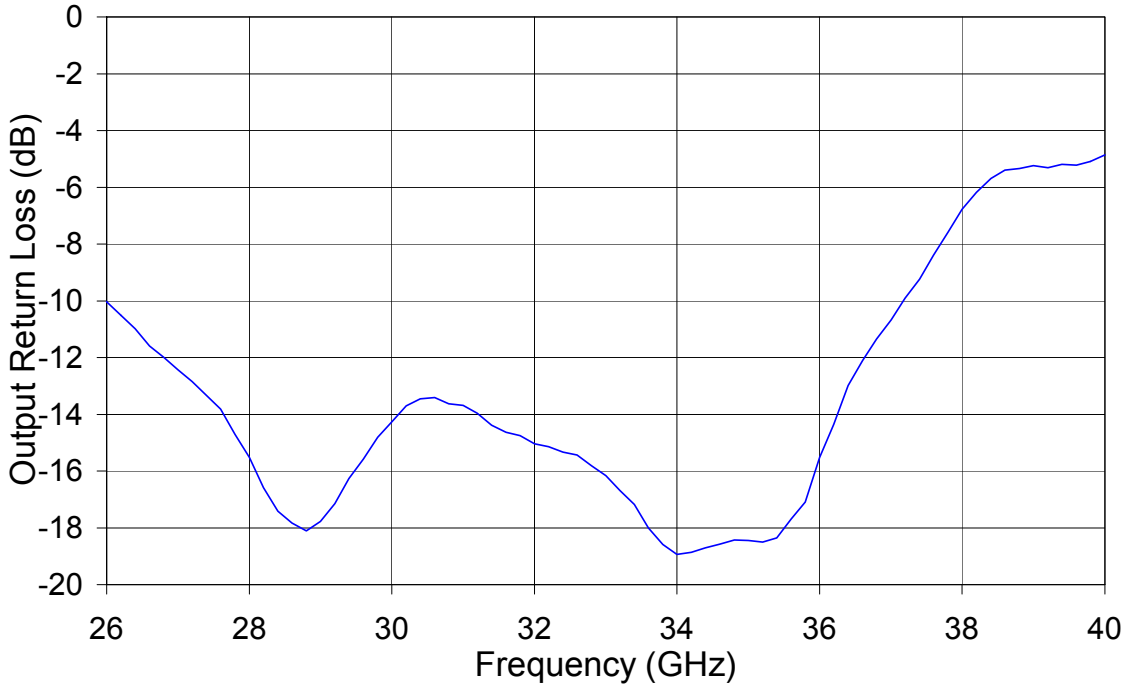




Note: Pwr (in) = 0dBm is approximately P1dB (dbM)

## Measured Fixtured Data

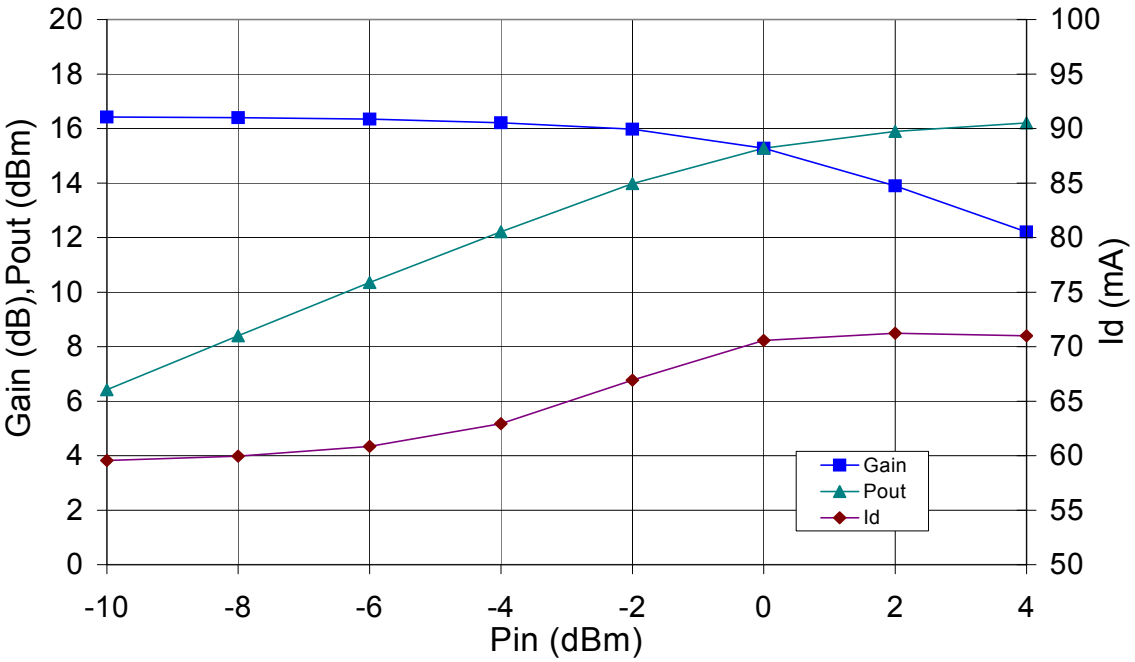
Bias Conditions: Vd = 6V, Id = 60mA ± 5%



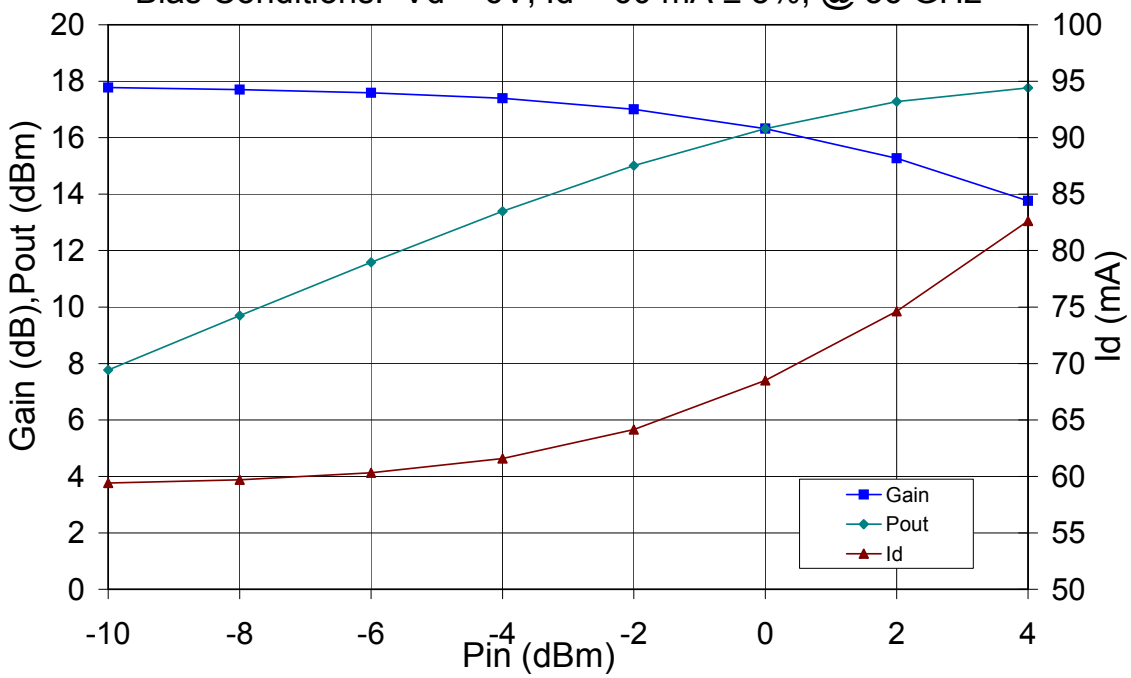



# Measured Fixtured Data

Bias Conditions: Vd = 6V, Id = 60 mA ± 5%, @ 30 GHz

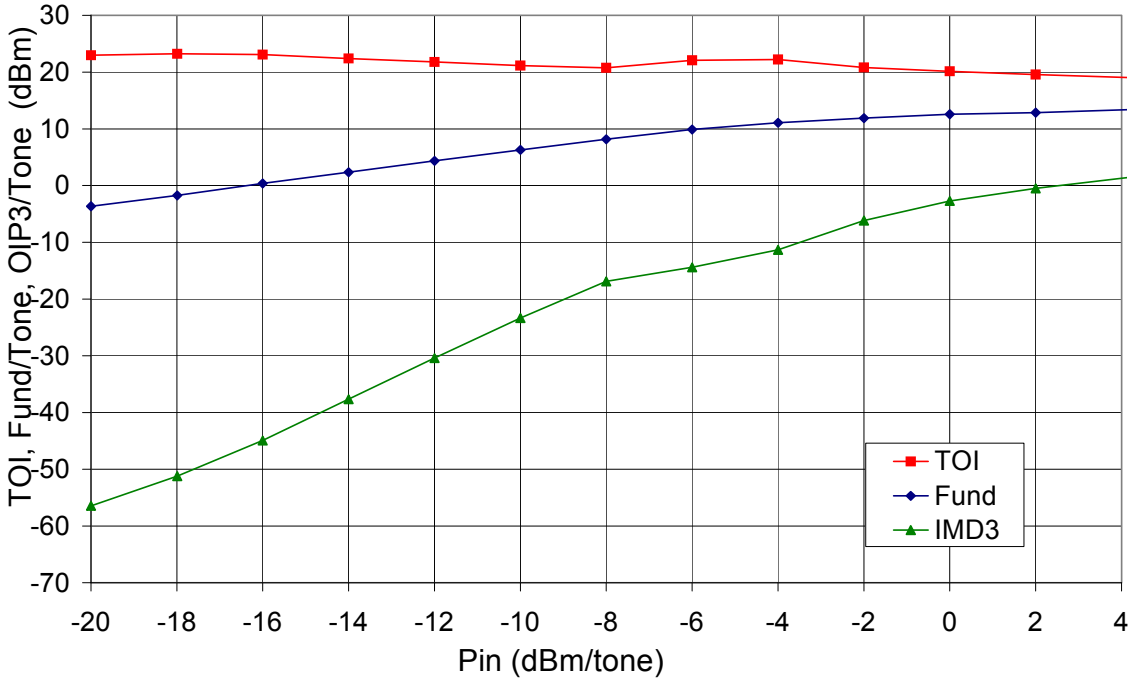



Bias Conditions: Vd = 6V, Id = 60 mA ± 5%, @ 36 GHz

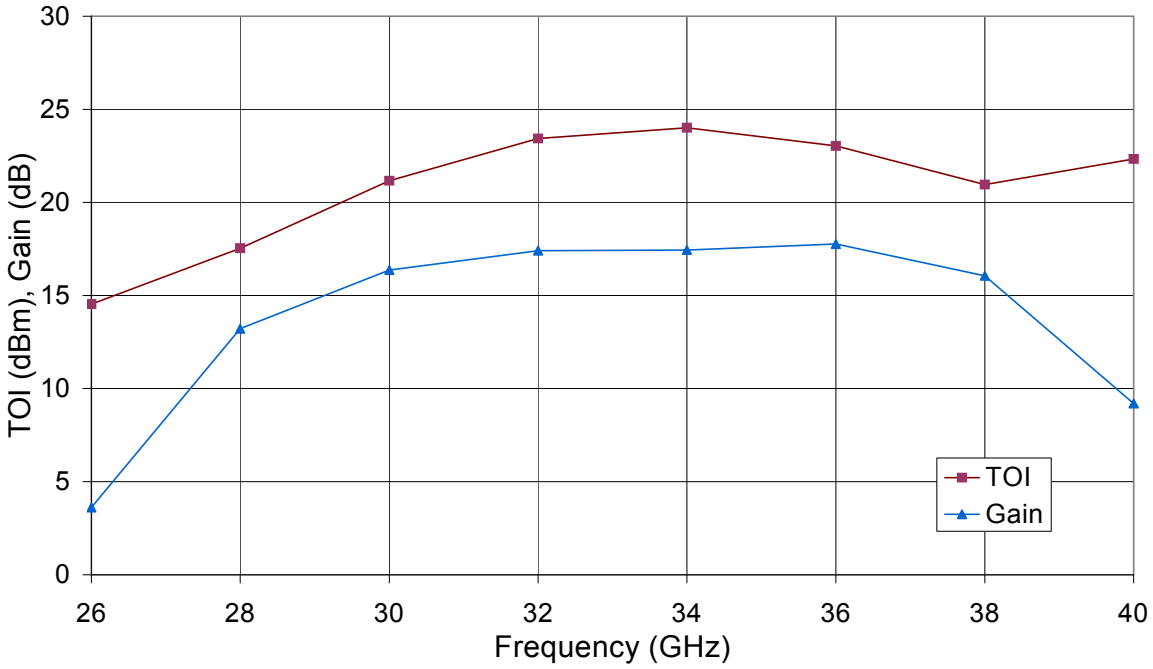


# Measured Fixtured Data

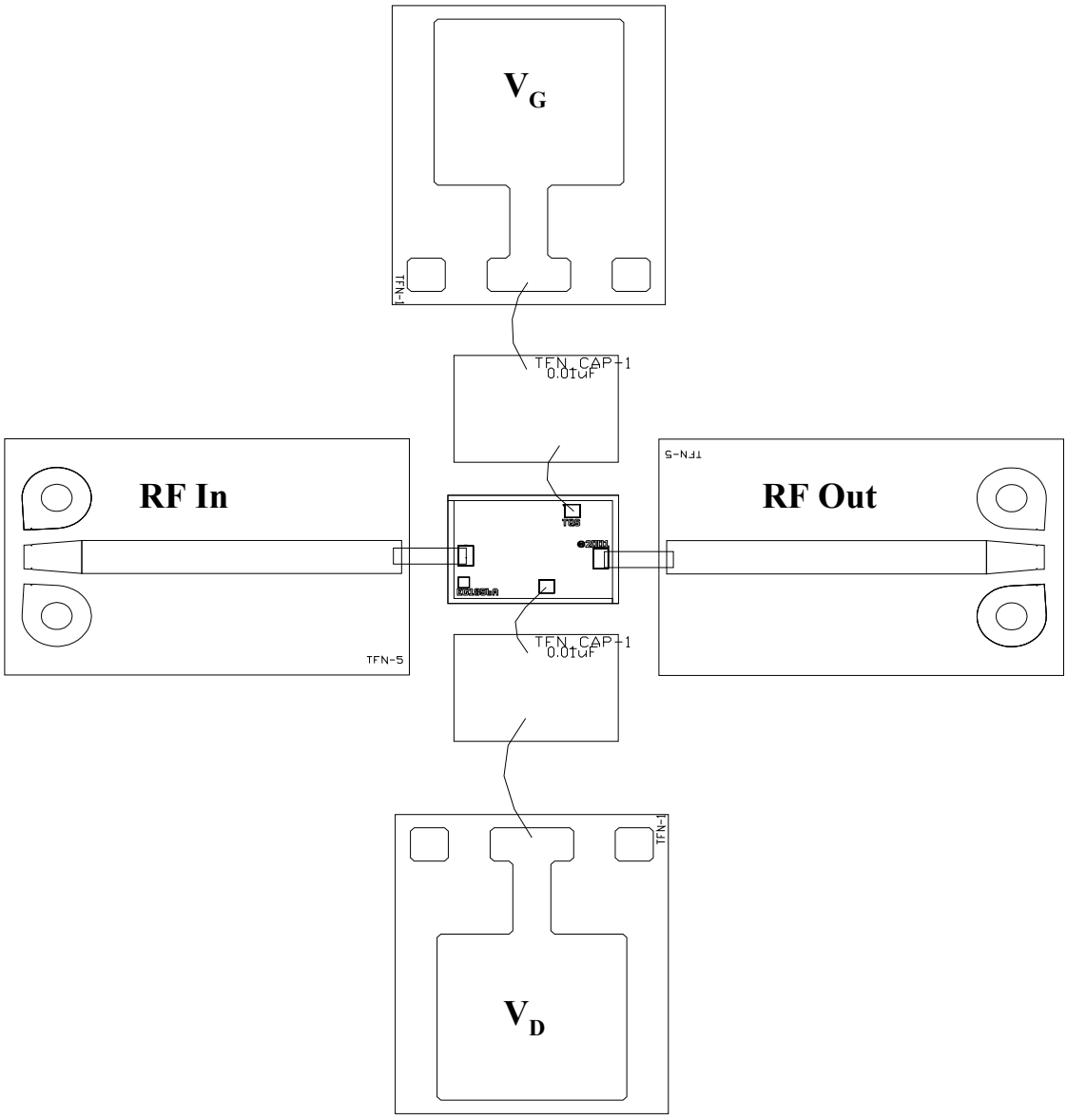
Bias Conditions: Vd = 6V, Id = 60 mA ± 5%, @ 30 GHz




Bias Conditions: Vd = 6V, Id = 60 mA ± 5%, @ Pin = -10dBm/Tone

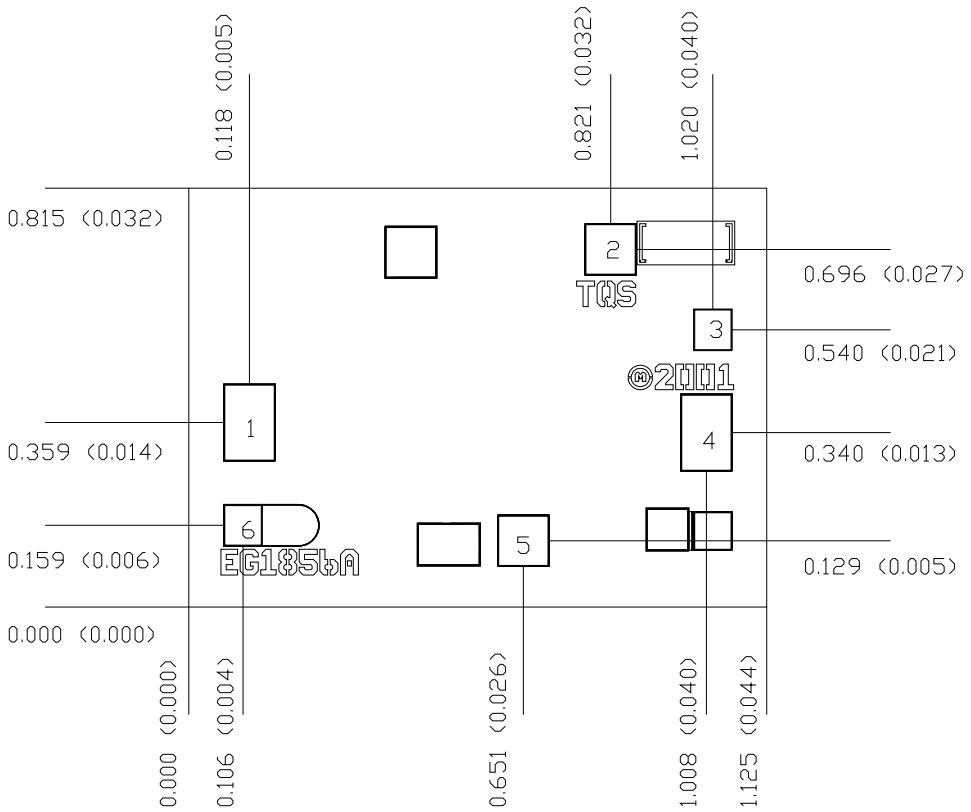


# Chip Assembly and Bonding Diagram




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

# 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 Input) | 0.096 x 0.146 (0.004 x 0.006) |
| Bond Pad #2 (VG) | 0.096 x 0.096 (0.004 x 0.004) |
| Bond Pad #3 (GND) | 0.075 x 0.075 (0.003 x 0.003) |
| Bond Pad #4 (RF OUT) | 0.098 x 0.148 (0.004 x 0.006) |
| Bond Pad #5 (VD) | 0.096 x 0.096 (0.004 x 0.004) |
| Bond Pad #6 (GND) | 0.075 x 0.075 (0.003 x 0.003) |

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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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