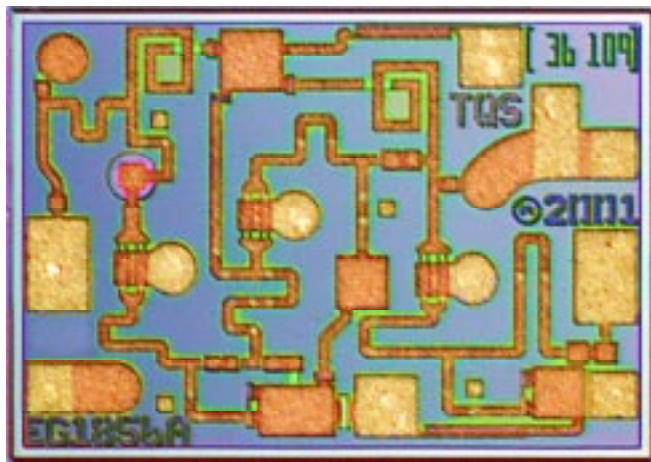


29-37 GHz Compact Driver Amplifier

TGA4510-EPU



Key Features

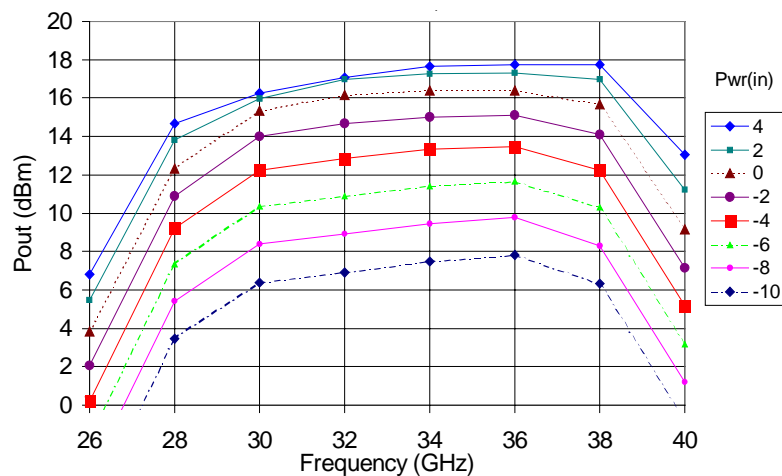
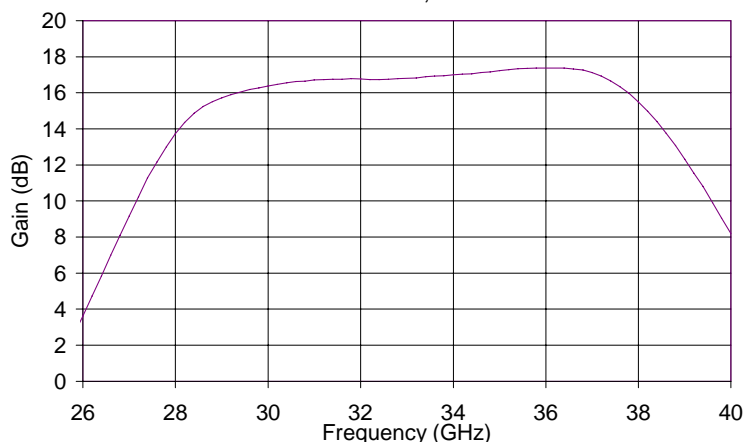
- 0.25 μ m pHEMT Technology
- >16 dB Nominal Gain @ 30 GHz
- 16 dBm Nominal Psat
- Bias Conditions: $V_d = 6V$, $I_d = 60$ mA
- Compact Chip Size: $1.1 \times 0.8 \times 0.1$ mm³

Primary Applications

- LMDS
- Point-to-Point
- Base Stations

Fixtured Measured Performance

Bias Conditions: $V_d = 6V$, $I_d = 60$ mA \pm 5%



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 1/

| Symbol | Parameter | Value | Notes |
|------------------|--|------------------|-----------------------|
| V ⁺ | Positive Supply Voltage | 8V | |
| I ⁺ | Positive Supply Current (Quiescent) | 81mA | <u>2/</u> |
| 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 | <u>3/</u> , <u>4/</u> |
| T _M | Mounting Temperature (30 seconds) | 320 °C | |
| T _{STG} | Storage Temperature | -65 °C to 150 °C | |

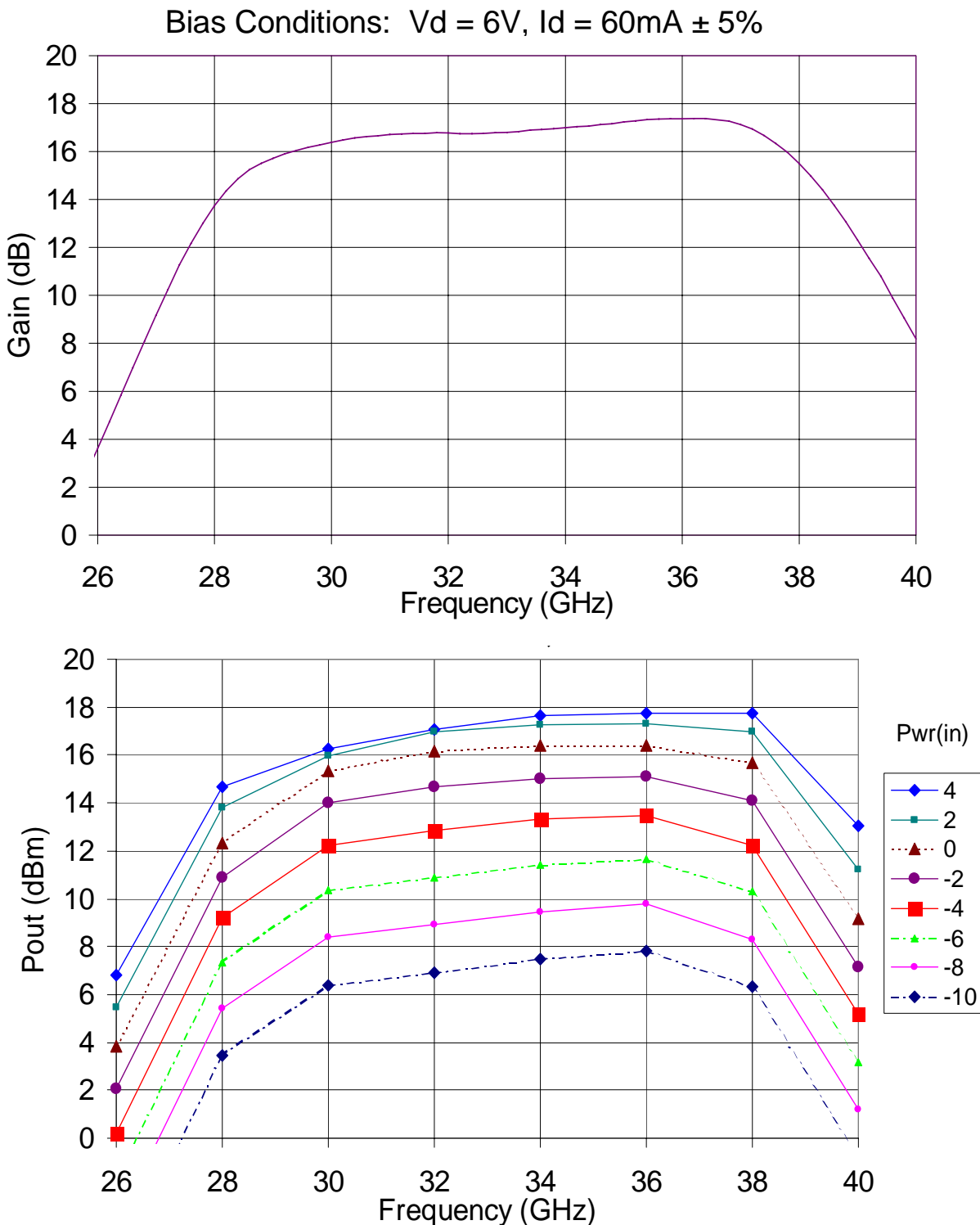
- 1/ These values represent the maximum operable values of this device
2/ Total current for the entire MMIC
3/ These ratings apply to each individual FET
4/ Junction operating temperature will directly affect the device mean time to failure (MTTF). For maximum life it is recommended that junction temperatures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

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.

Measured Fixtured Data

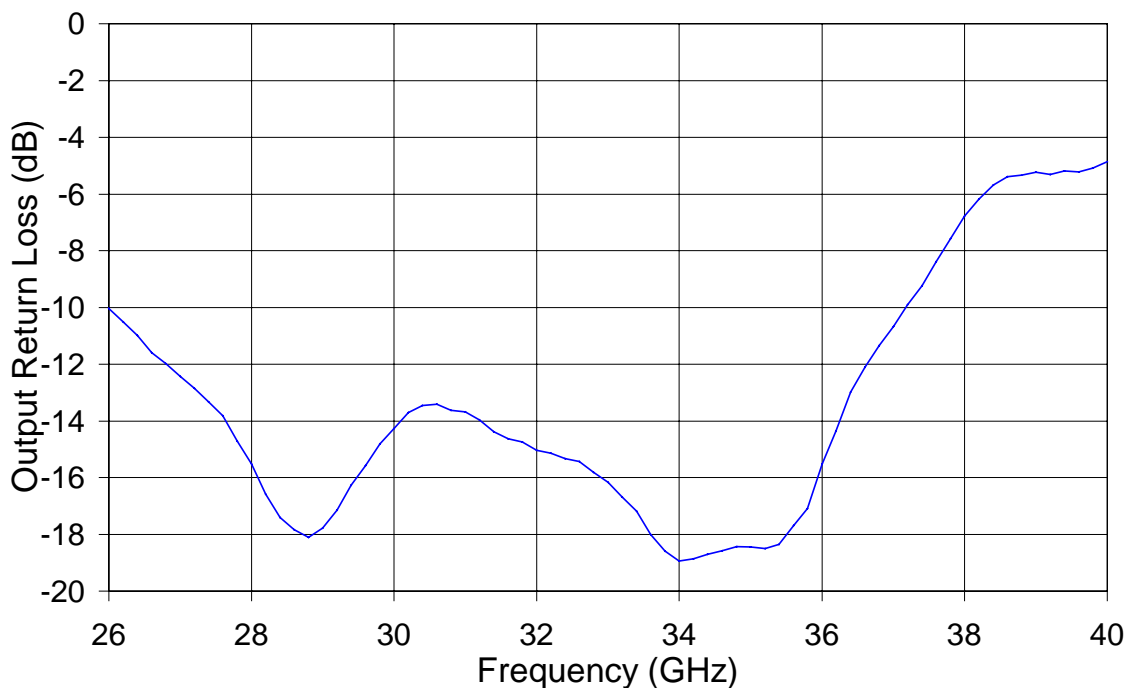
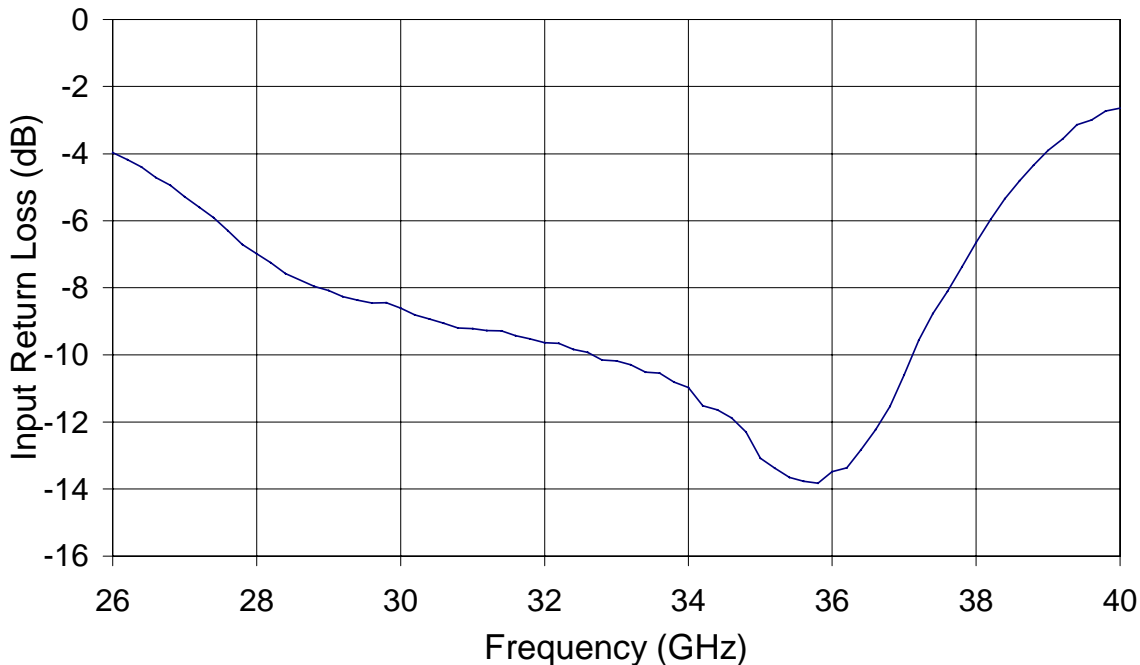


Note: $P_{wr} (in) = 0dBm$ is approximately $P1dB (dBm)$

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.

Measured Fixtured Data

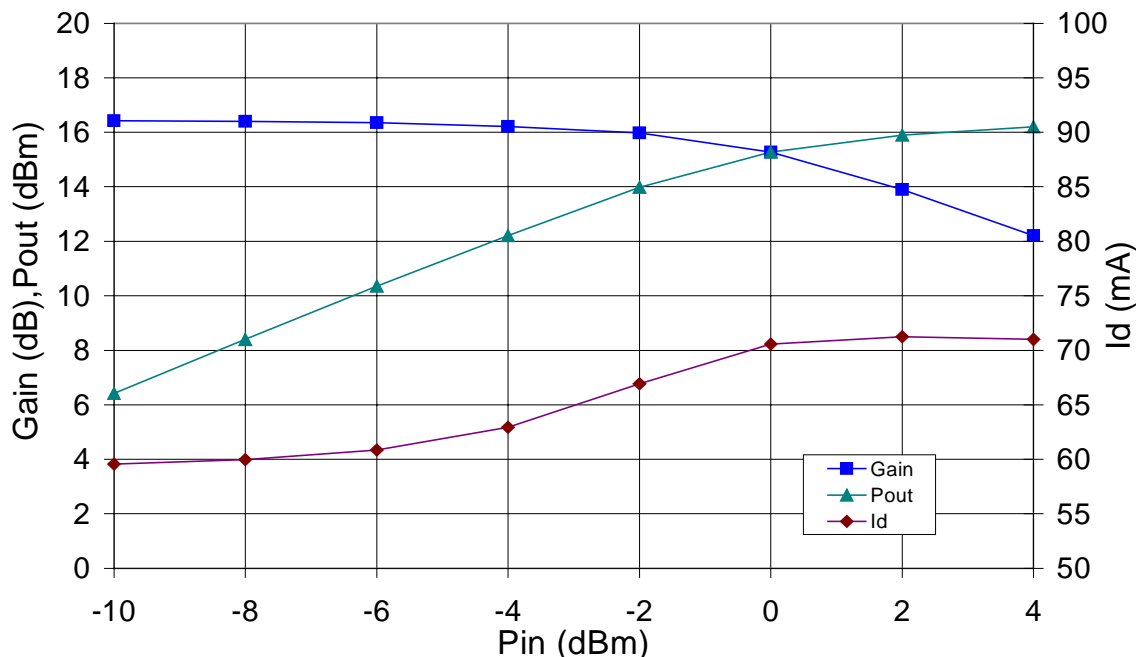
Bias Conditions: $V_d = 6V$, $I_d = 60mA \pm 5\%$



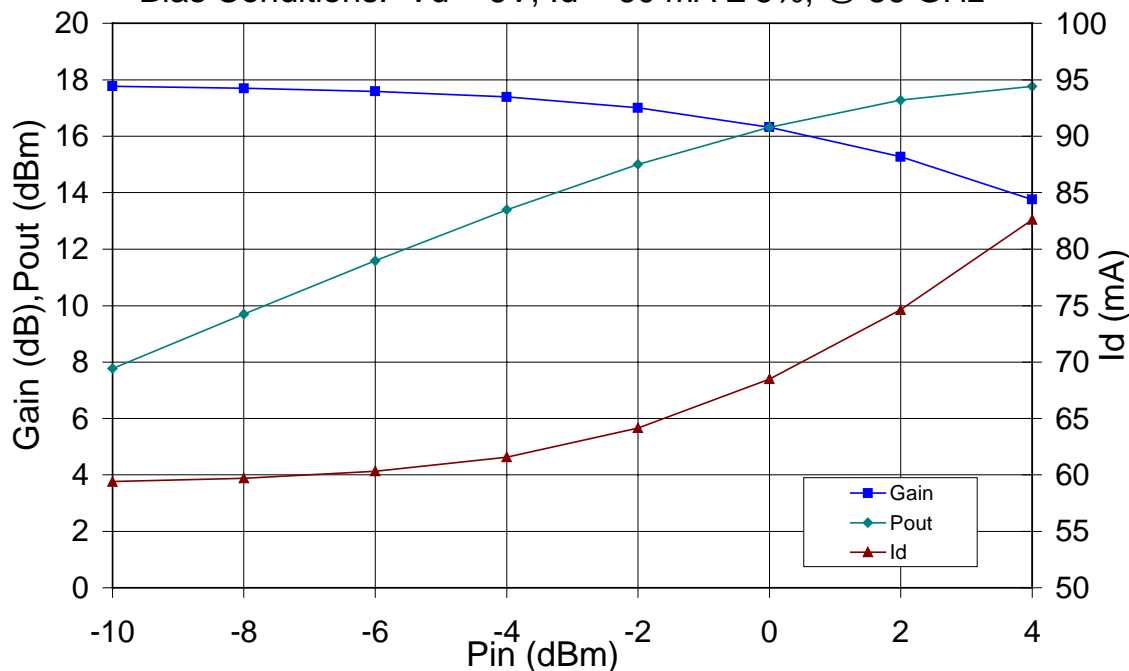
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Measured Fixtured Data

Bias Conditions: $V_d = 6V$, $I_d = 60 \text{ mA} \pm 5\%$, @ 30 GHz

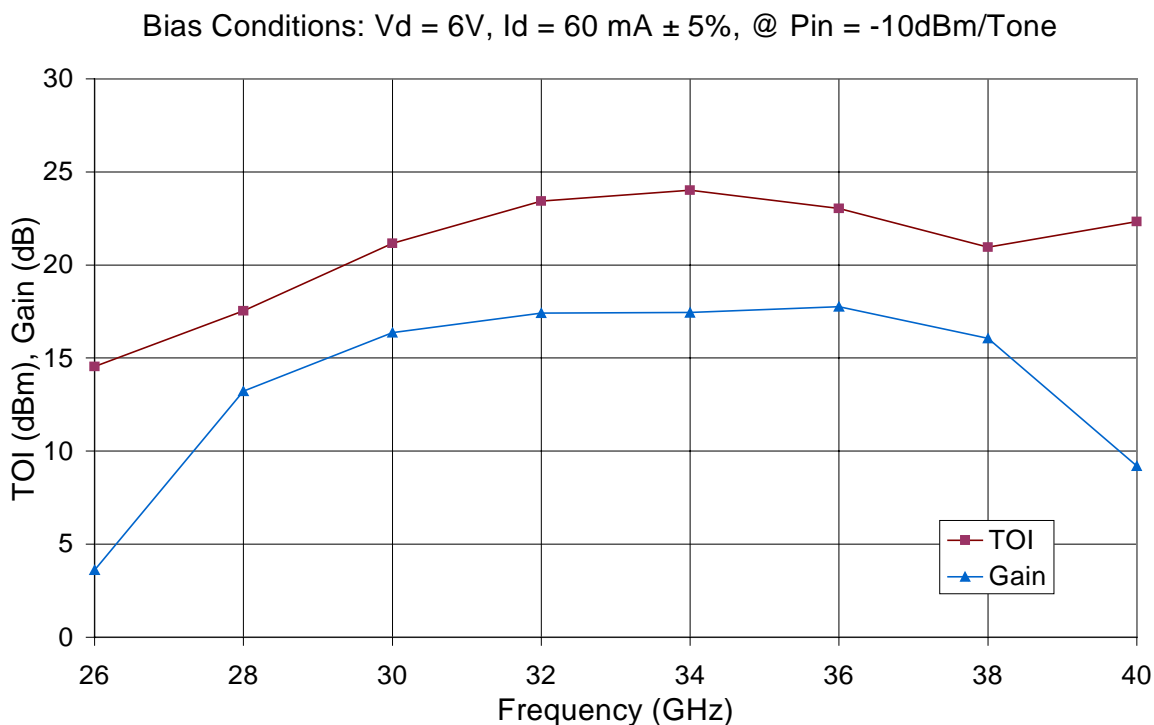
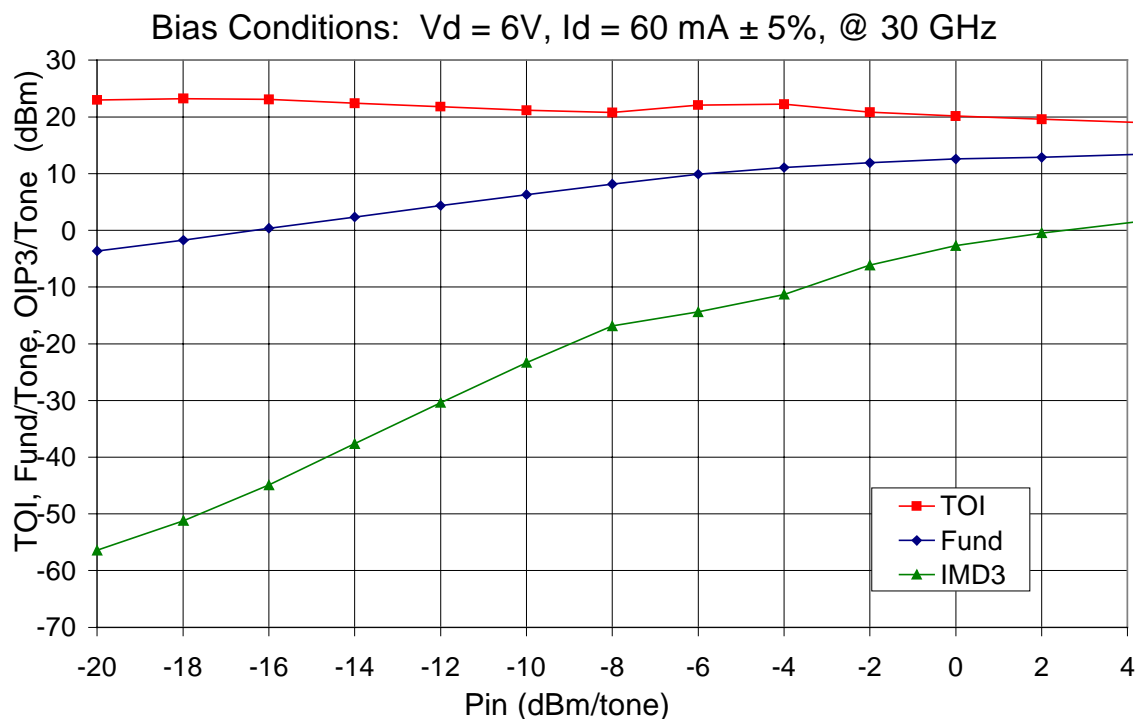


Bias Conditions: $V_d = 6V$, $I_d = 60 \text{ mA} \pm 5\%$, @ 36 GHz



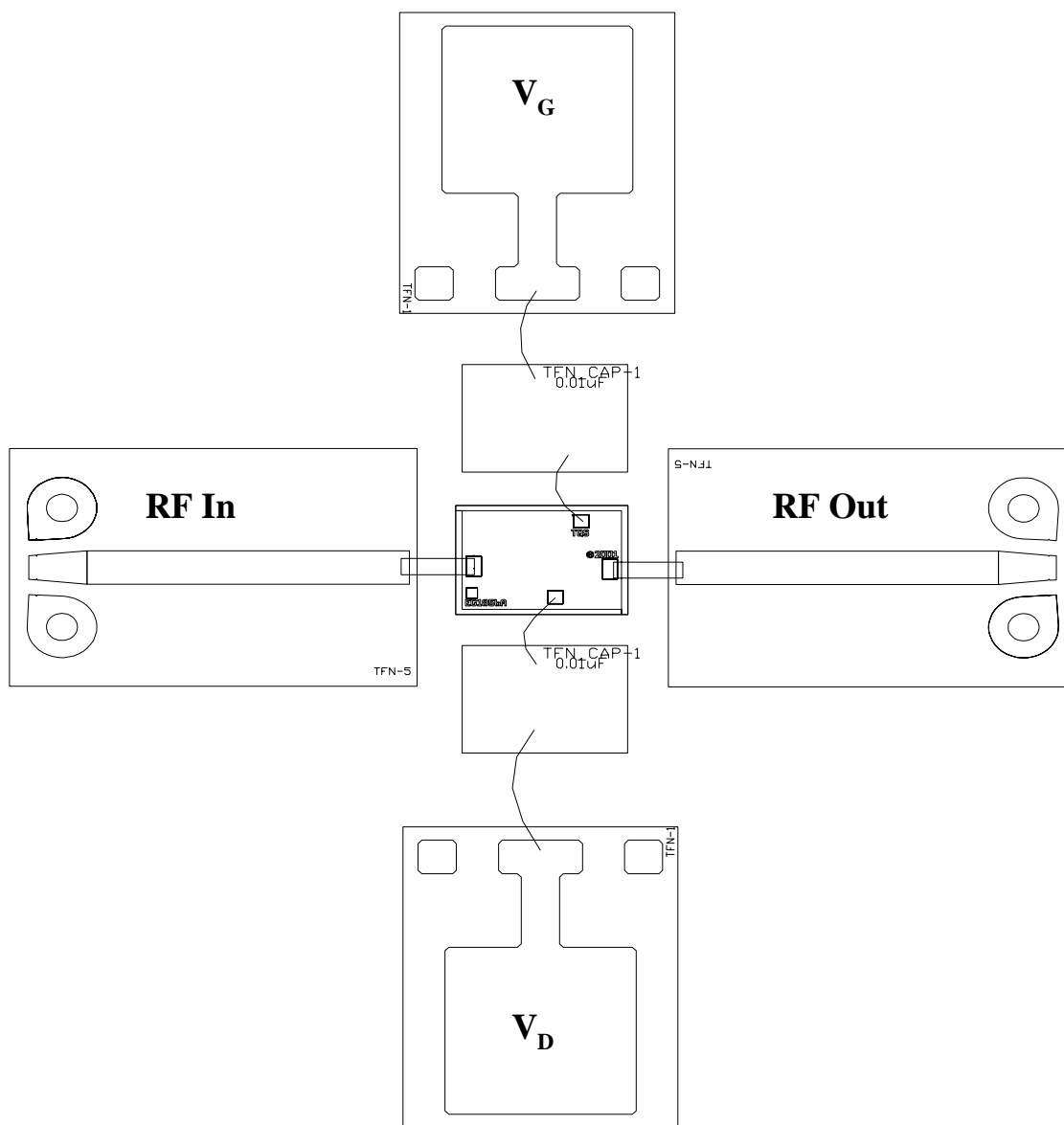
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice.

Measured Fixtured Data



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.

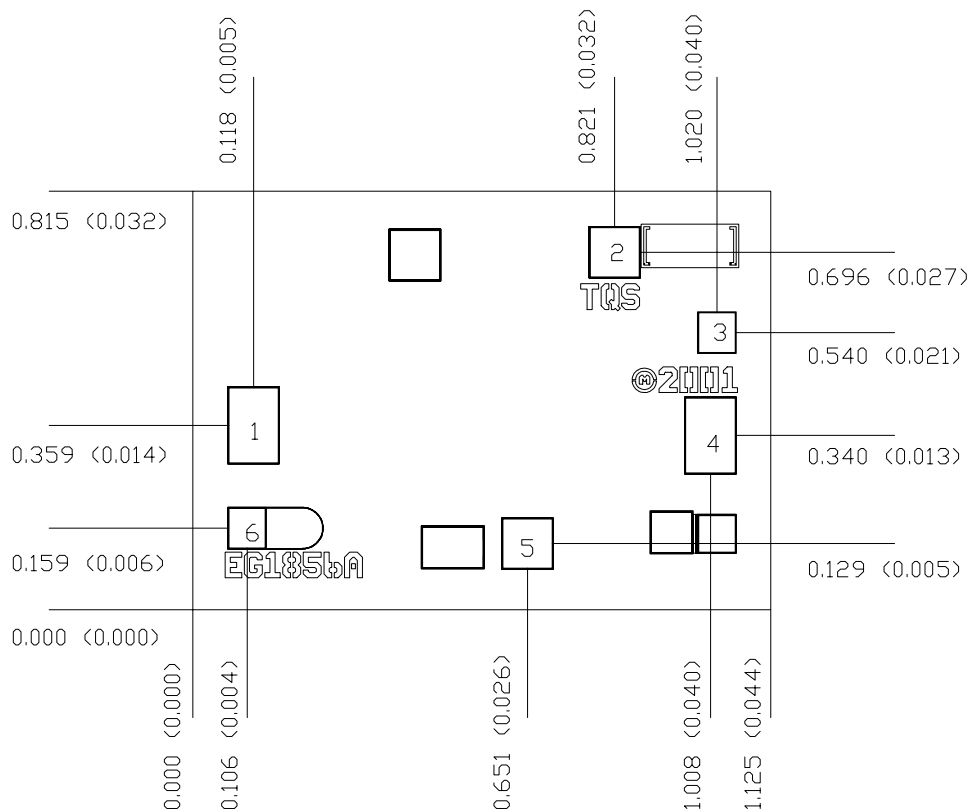
Chip Assembly and Bonding Diagram



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

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

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.

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

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.