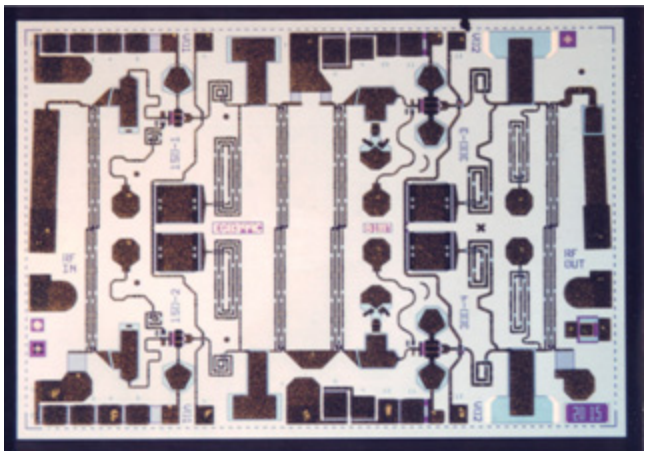
TriQuint SEMICONDUCTOR

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

# 8 - 18 GHz Wideband Driver Amplifier TGA8399C

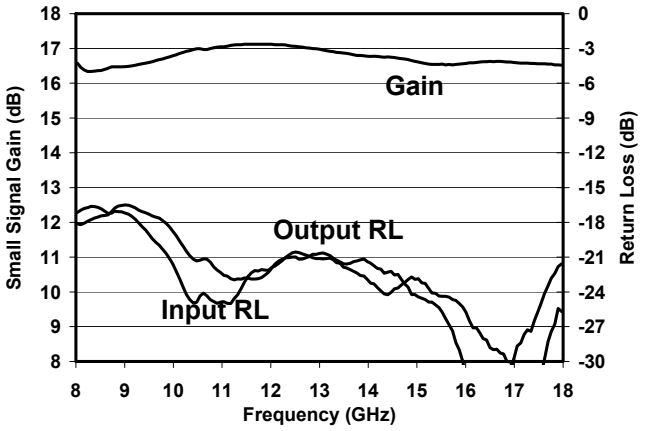


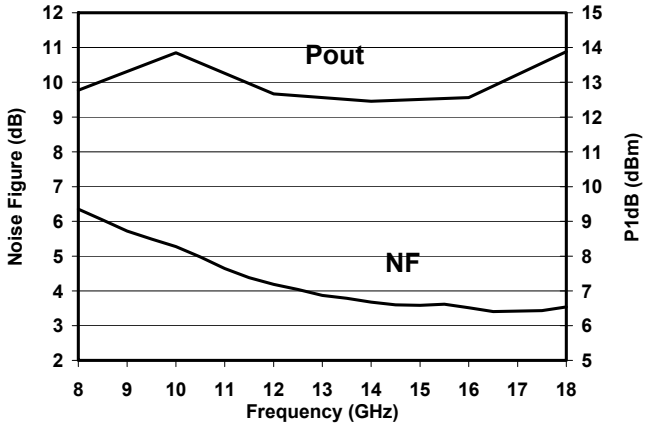
Chip Dimensions: 3.5mm x 2.4mm x 0.1 mm

## Key Features and Performance

- Two Stage Driver Amplifier
- 0.25µm pHEMT 2MI Technology
- 8-18 GHz Frequency Range
- 13 dBm Nominal Pout
- 17 dB Nominal Gain
- Balanced In/Out for Low VSWR
- 4.5V @ 50mA Self Bias
- Chip Dimensions: 3.5mm x 2.4mm x 0.1 mm

## Fixtured Measured Performance




## Primary Applications

- X and Ku band Driver
- Point-to-Point Radio

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



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## TABLE I
## MAXIMUM RATINGS

| Symbol | Parameter 1/ | Value | Notes |
|---|---|---|---|
| $V^+$ | Positive Supply Voltage | 8 V | 2/ |
| $I^+$ | Positive Supply Current | 180 mA | 2/ |
| $\| I_G \|$ | Gate Supply Current | 3.52 mA | |
| $P_{IN}$ | Input Continuous Wave Power | 17.0 dBm | 2/ |
| $P_D$ | Power Dissipation | 0.94 W | 2/, 3/ |
| $T_{CH}$ | Operating Channel Temperature | 150 °C | 4/, 5/ |
| $T_M$ | Mounting Temperature (30 seconds) | 320 °C | |
| $T_{STG}$ | Storage Temperature | -65 °C to 150 °C | |

1/ These ratings represent the maximum operable values for this device.

2/ Combinations of supply voltage, supply current, input power, and output power shall not exceed $P_D$.

3/ When operated at this bias condition with a base plate temperature of 70 °C, the median life is 1 E+6 hours.

4/ 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.

5/ These ratings apply to each individual FET.


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**TABLE II**
**DC PROBE TESTS**
**($T_A$ = 25 °C, Nominal)**

| Symbol | Parameter | Minimum | Maximum | Value |
|---|---|---|---|---|
| $V_P$ | Pinch-off Voltage | -1.5 | -0.5 | V |
| BVGS | Breakdown Voltage gate-source | -30 | -8 | V |
| BVGD | Breakdown Voltage gate-drain | -30 | -8 | V |

**TABLE III**
**RF CHARACTERIZATION TABLE**
**($T_A$ = 25 °C, Nominal)**
**$V_d$ = 5 V**

| Symbol | Parameter | Test Condition | Limit | | | Units |
|---|---|---|---|---|---|---|
| | | | Min | Nom | Max | |
| Gain | Small Signal Gain | F = 8 – 18 GHz | 12 | 16 | --- | dB |
| IRL | Input Return Loss | F = 8 – 18 GHz | --- | -18 | -12 | dB |
| ORL | Output Return Loss | F = 8 – 18 GHz | --- | -20 | -12 | dB |

**TABLE IV**
**THERMAL INFORMATION**

| Parameter | Test Conditions | $T_{CH}$ (°C) | $R_{\theta JC}$ (°C/W) | $T_M$ (Hours) |
|---|---|---|---|---|
| $R_{\theta JC}$ Thermal Resistance (channel to backside of carrier) | Vd = 4.5 V<br>Id = 50 mA<br>Pdiss = 0.225 W | 89 | 85 | 4.1 E+8 |

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.


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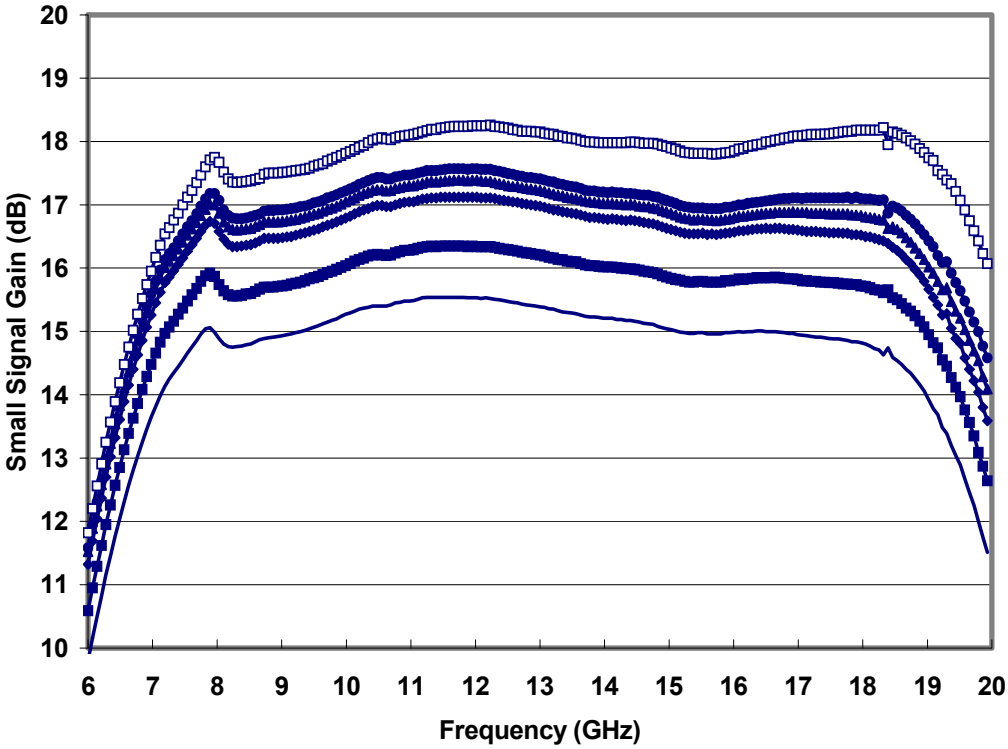
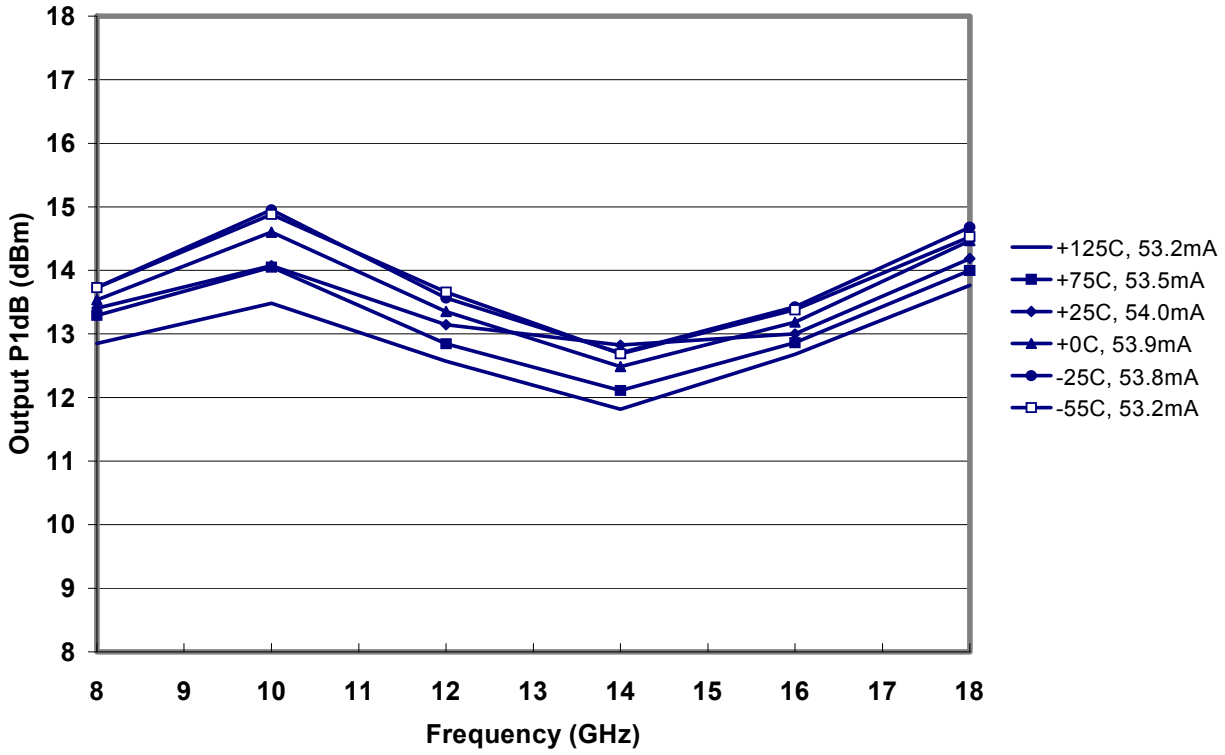
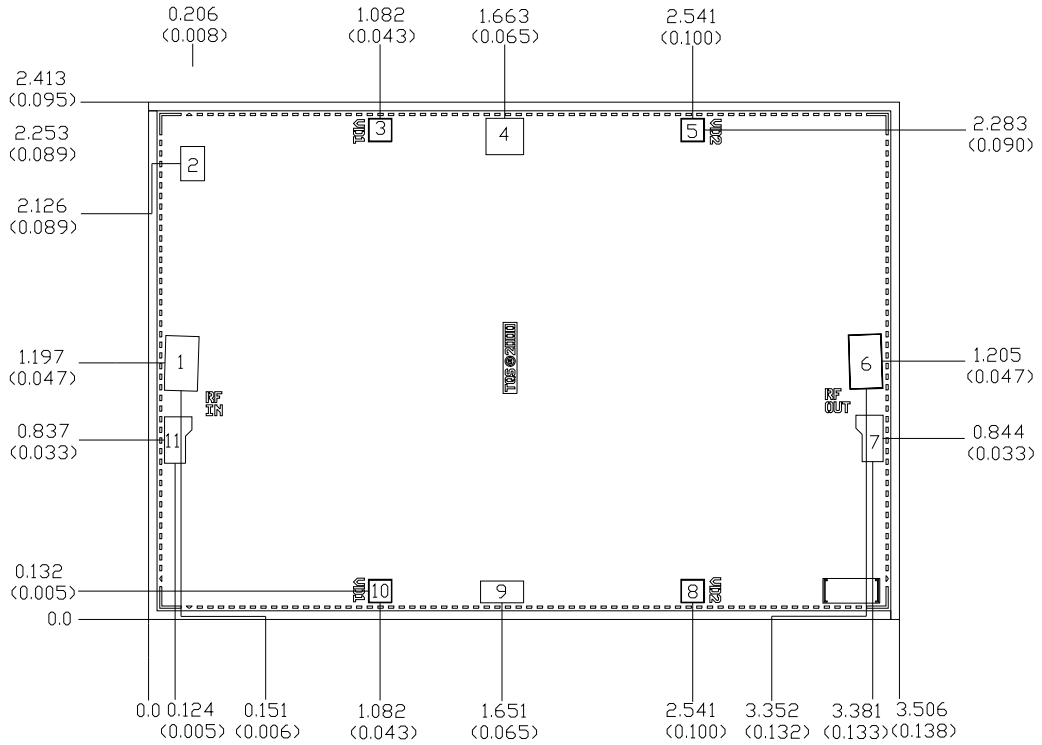
## TGA8399C Performance vs. Temperature



# Mechanical Drawing



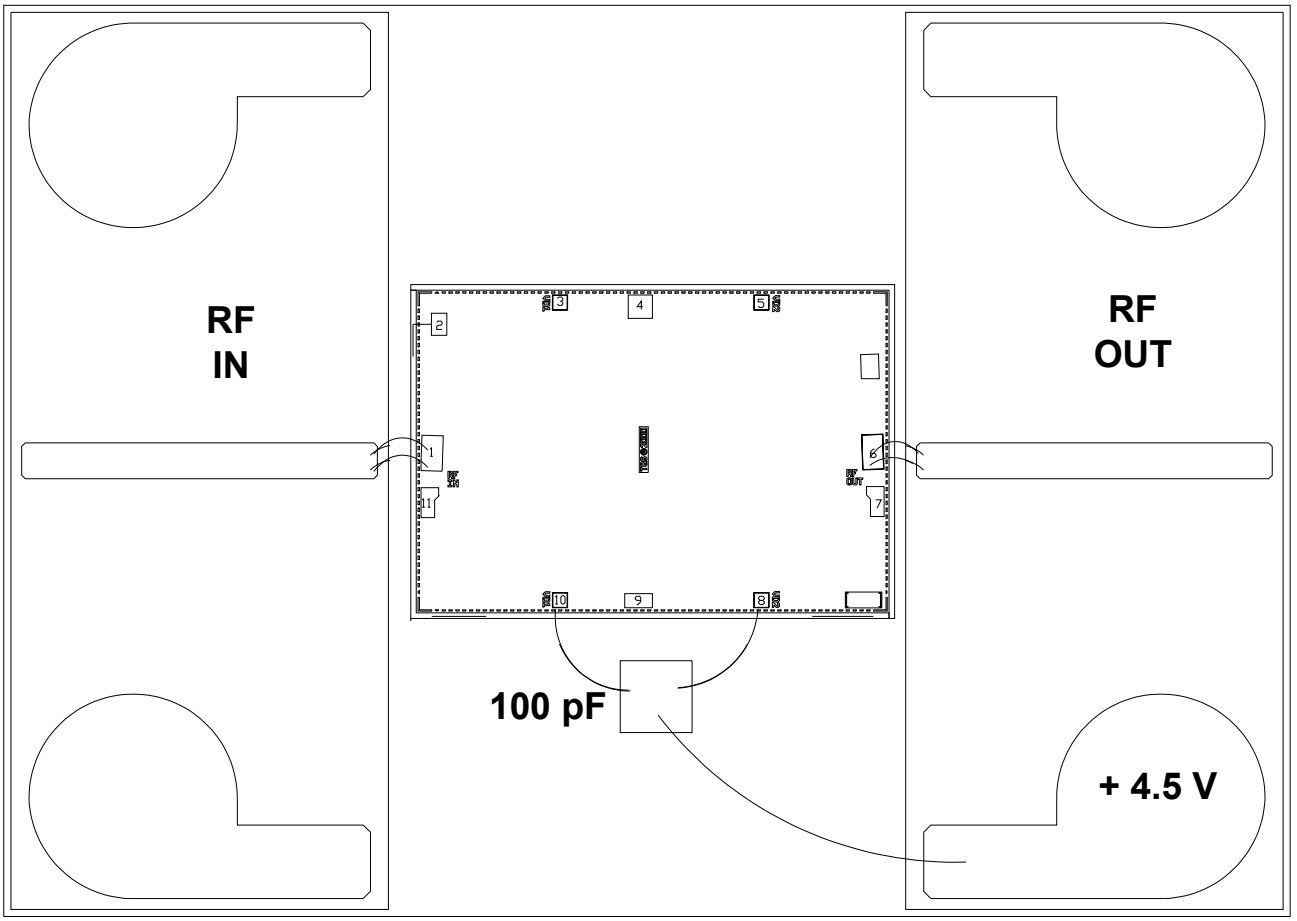

Units: millimeters (inches)
Thickness: 0.150 (0.006) (reference only)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

GND IS BACKSIDE OF MMIC

| | |
|---|---|
| Bond Pad #1 (RF Input) | 0.155 x 0.255 (0.006 x 0.010) |
| Bond Pad #2 (GND) | 0.111 x 0.160 (0.004 x 0.006) |
| Bond Pad #3,#10 (VD1) | 0.110 x 0.110 (0.004 x 0.004) |
| Bond Pad #4 (GND) | 0.170 x 0.175 (0.007 x 0.007) |
| Bond Pad #5,#8 (VD2) | 0.110 x 0.110 (0.004 x 0.004) |
| Bond Pad #6 (RF Output) | 0.155 x 0.255 (0.006 x 0.010) |
| Bond Pad #7,#11 (GND) | 0.098 x 0.217 (0.004 x 0.009) |
| Bond Pad #9 (GND) | 0.102 x 0.200 (0.004 x 0.008) |

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

# Recommended Assembly Layout

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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 (for 30 sec max).
- 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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