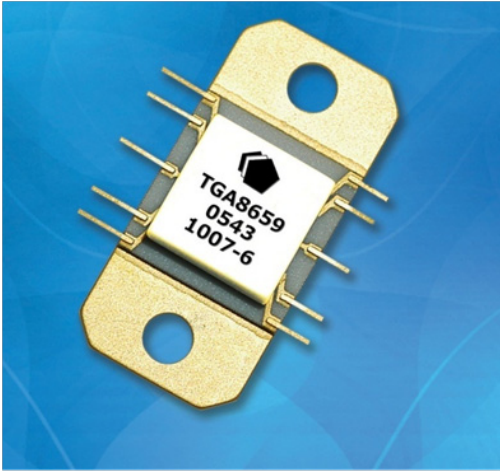


## 13 – 15 GHz 4W Power Amplifier



### Key Features

- Frequency Range: 13 - 15 GHz
- >25 dB Nominal Gain
- >36 dBm Nominal Psat
- Bias 6 - 7.5V @ 1.3 - 1.6A Idq
- Package Dimensions: 0.33 x 0.70 x 0.12 in  
8.4 x 17.8 x 3.0 mm

### Primary Applications

- Ku-Band VSAT Transmit
- Point-to-Point Radio

The TriQuint TGA8659-FL is a packaged Power Amplifier delivering more than 4 Watts in the VSAT Band. The power amplifier works over the extended frequency range of 13 to 17 GHz and is designed using TriQuint's proven standard 0.5 um gate pHEMT production process.

The TGA8659-FL provides a nominal gain greater than 25dB with excellent input and output VSWR.

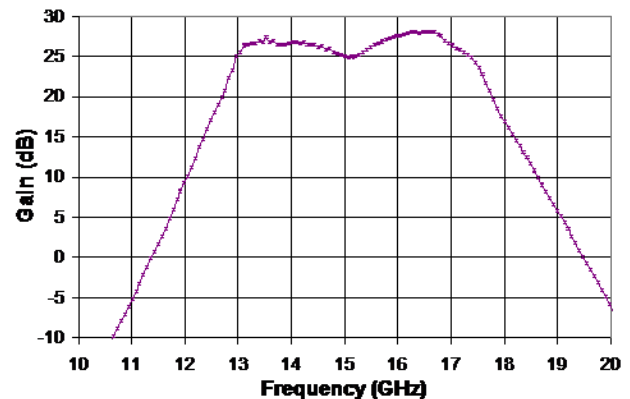
The TGA8659-FL is designed for Ku-Band VSAT transmitters and can also provide high power over a wider frequency band.

Evaluation Boards are available upon request.

Lead-free and RoHS compliant

### Fixtured Measured Performance

**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**



**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**   
**Frequency at 14.5 GHz**

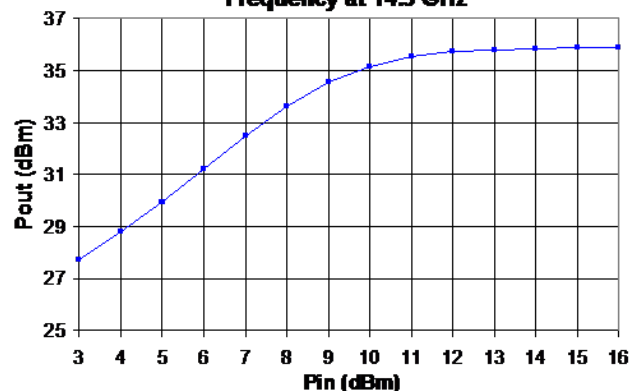


TABLE I  
MAXIMUM RATINGS 1/

| Symbol    | Parameter                           | Value            | Notes                 |
|-----------|-------------------------------------|------------------|-----------------------|
| $V^+$     | Positive Supply Voltage             | 8V               |                       |
| $I^+$     | Positive Supply Current (Quiescent) | 1.7 A            | <u>2/</u>             |
| $P_D$     | Power Dissipation                   | 13.6 W           |                       |
| $P_{IN}$  | Input Continuous Wave Power         | 24 dBm           |                       |
| $T_{CH}$  | Operating Channel Temperature       | 200 °C           | <u>3/</u> , <u>4/</u> |
|           | Mounting Temperature (30 seconds)   | 260 °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 ( $T_m$ ). 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)

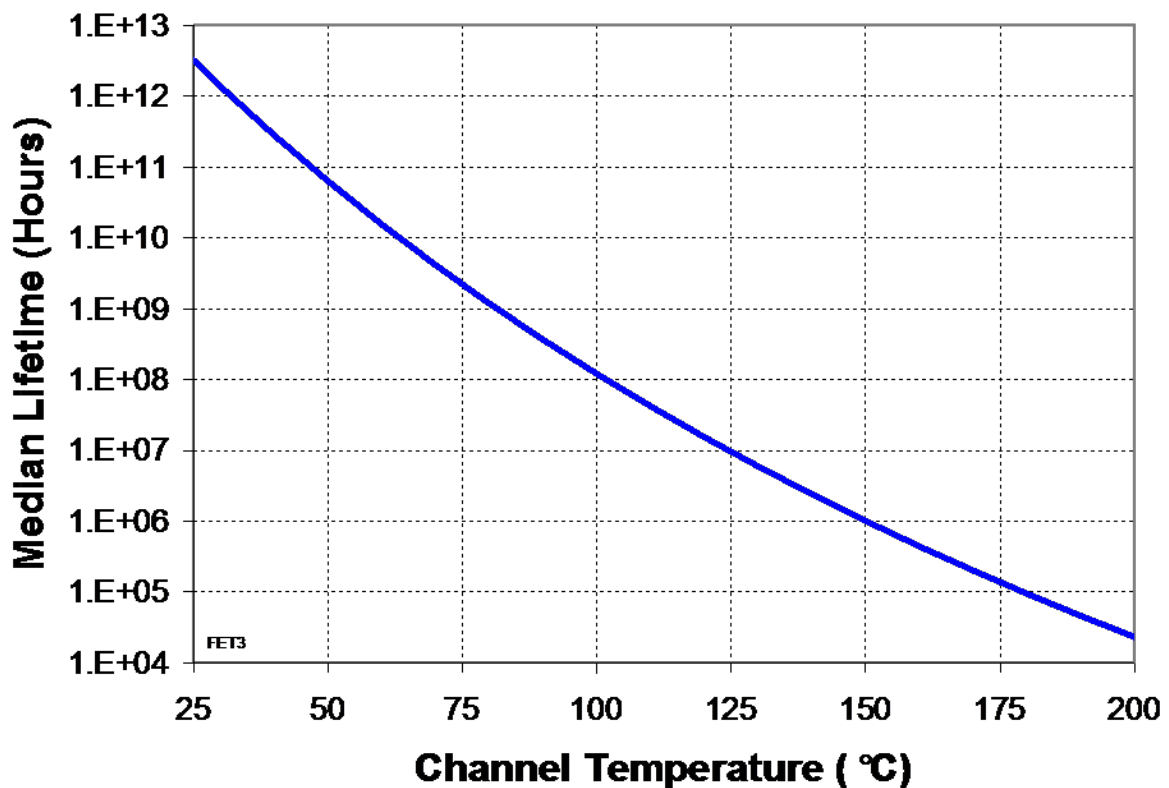
| Parameter                                  | Units     | Typical |
|--------------------------------------------|-----------|---------|
| Drain Operating Voltage                    | V         | 7       |
| Quiescent Current                          | A         | 1.3     |
| Small Signal Gain                          | dB        | 25      |
| Gain Flatness (Freq = 13.5 - 15 GHz)       | dB/100MHz | 0.1     |
| Input Return Loss (Linear Small Signal)    | dB        | 10      |
| Output Return Loss (Linear Small Signal)   | dB        | 10      |
| Reverse Isolation                          | dB        | > 50    |
| CW Output Power @Psat at 14.5GHz           | dBm       | 36      |
| TOI at 14.5 GHz with Pout/tone of 28 dBm   | dBm       | 41      |
| Power Added Efficiency@Psat                | %         | 30      |
| P1dB temperature coeff. TC (-40 to +70 °C) | dB/deg C  | -0.01   |

**TABLE III**  
**THERMAL INFORMATION**

| PARAMETER                                               | TEST CONDITIONS                                                             | T <sub>CH</sub><br>(°C) | θ <sub>JC</sub><br>(°C/W) | T <sub>m</sub><br>(HRS) |
|---------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------|---------------------------|-------------------------|
| θ <sub>JC</sub> Thermal Resistance<br>(channel to Case) | V <sub>d</sub> = 7 V<br>I <sub>d</sub> = 1.3 A<br>P <sub>diss</sub> = 9.1 W | 123                     | 5.8                       | 1.2E+7                  |

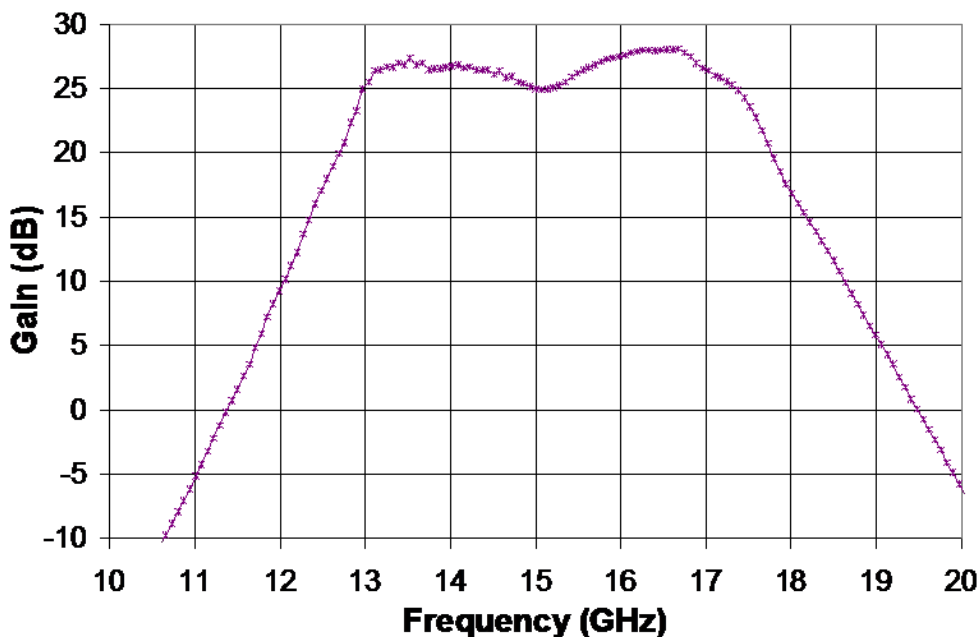
Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70 °C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

### Median Lifetime (T<sub>m</sub>) vs. Channel Temperature

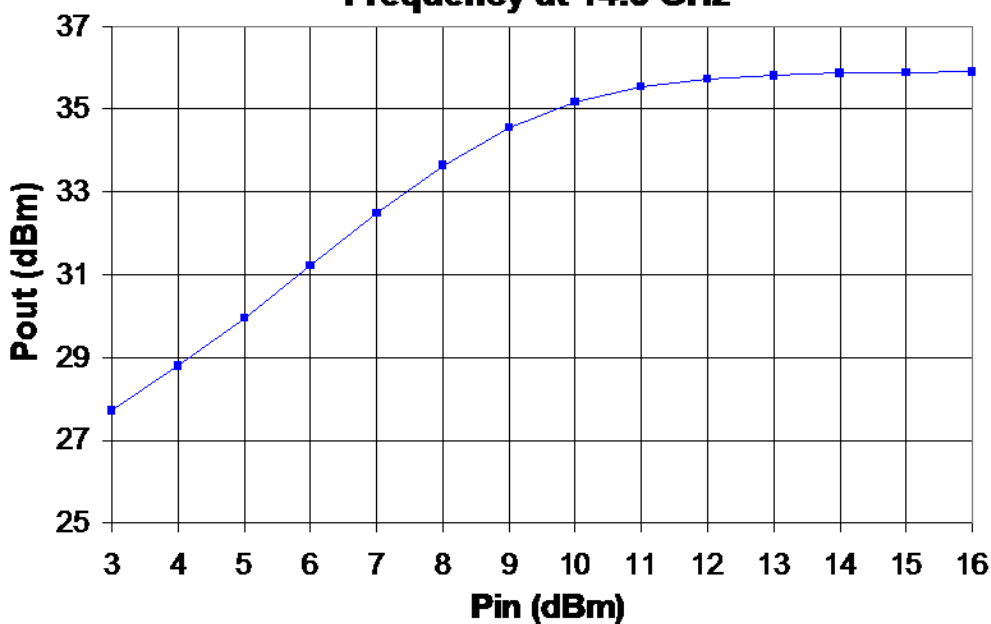


## Measured Fixtured Data

**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**

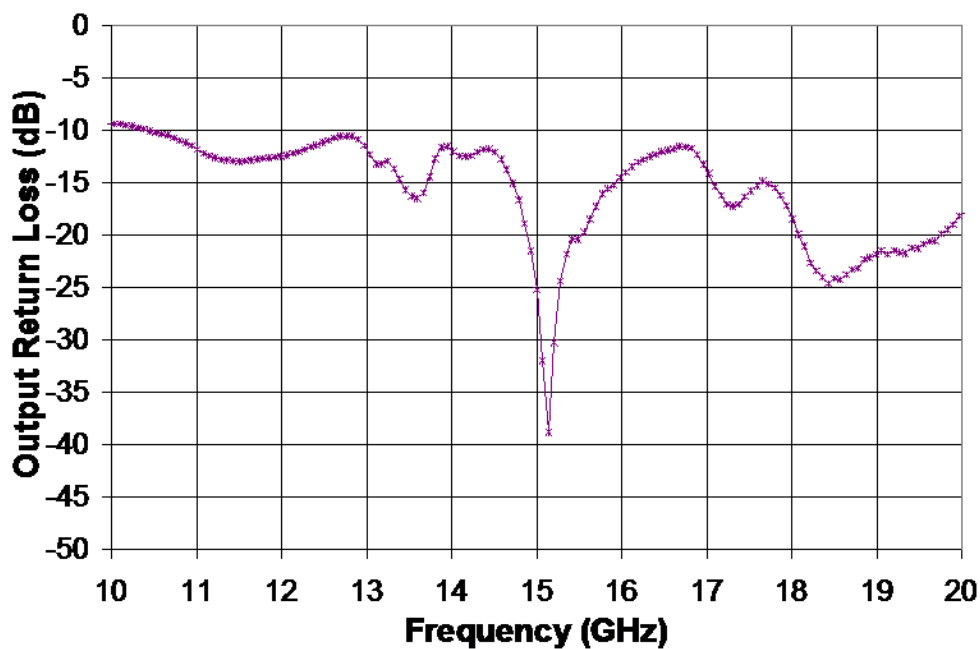
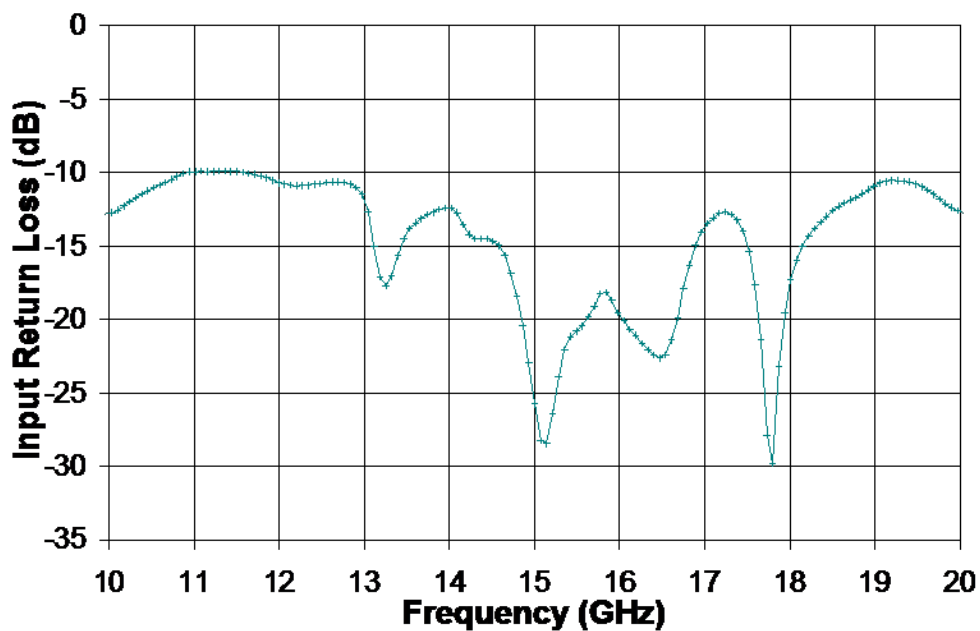


**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**   
**Frequency at 14.5 GHz**



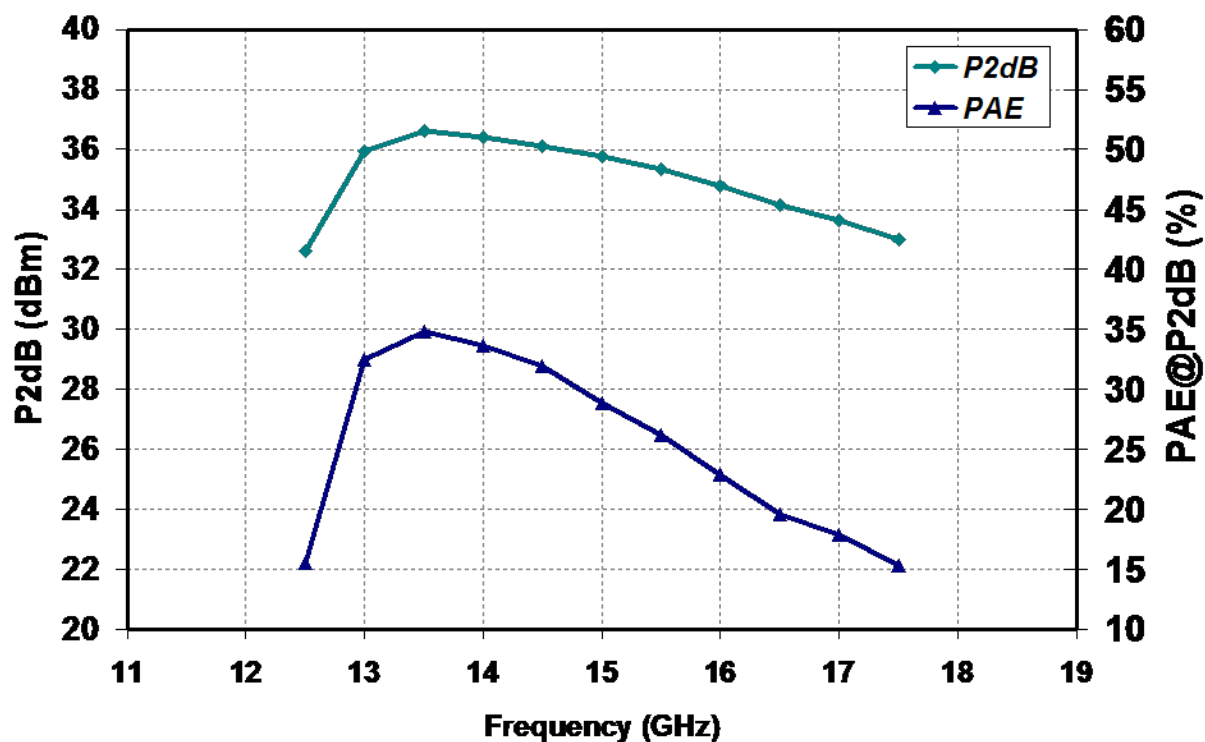
**Measured Fixtured Data**

**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**

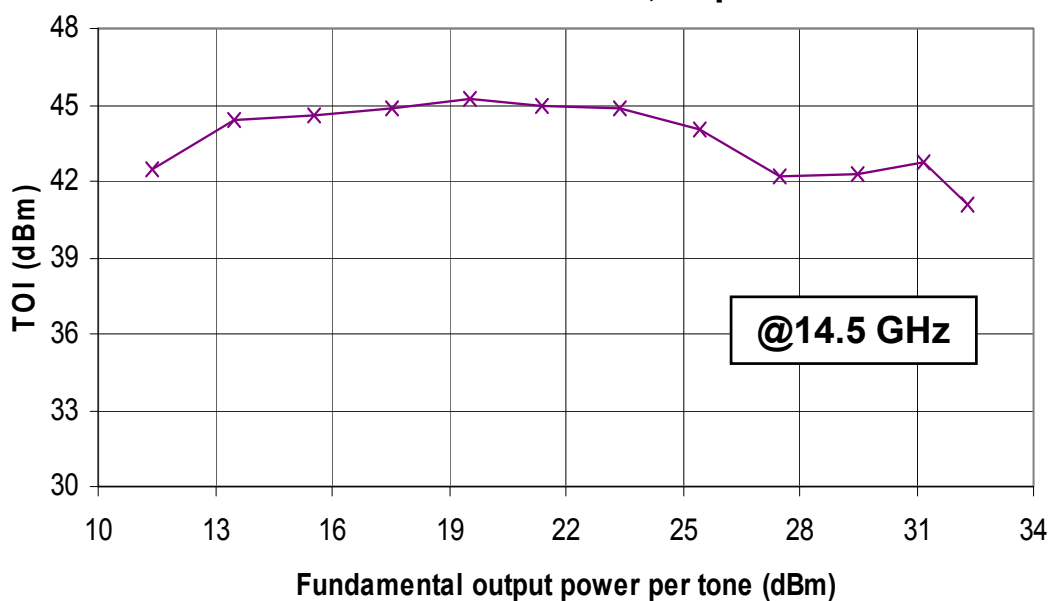


**Measured Fixtured Data**

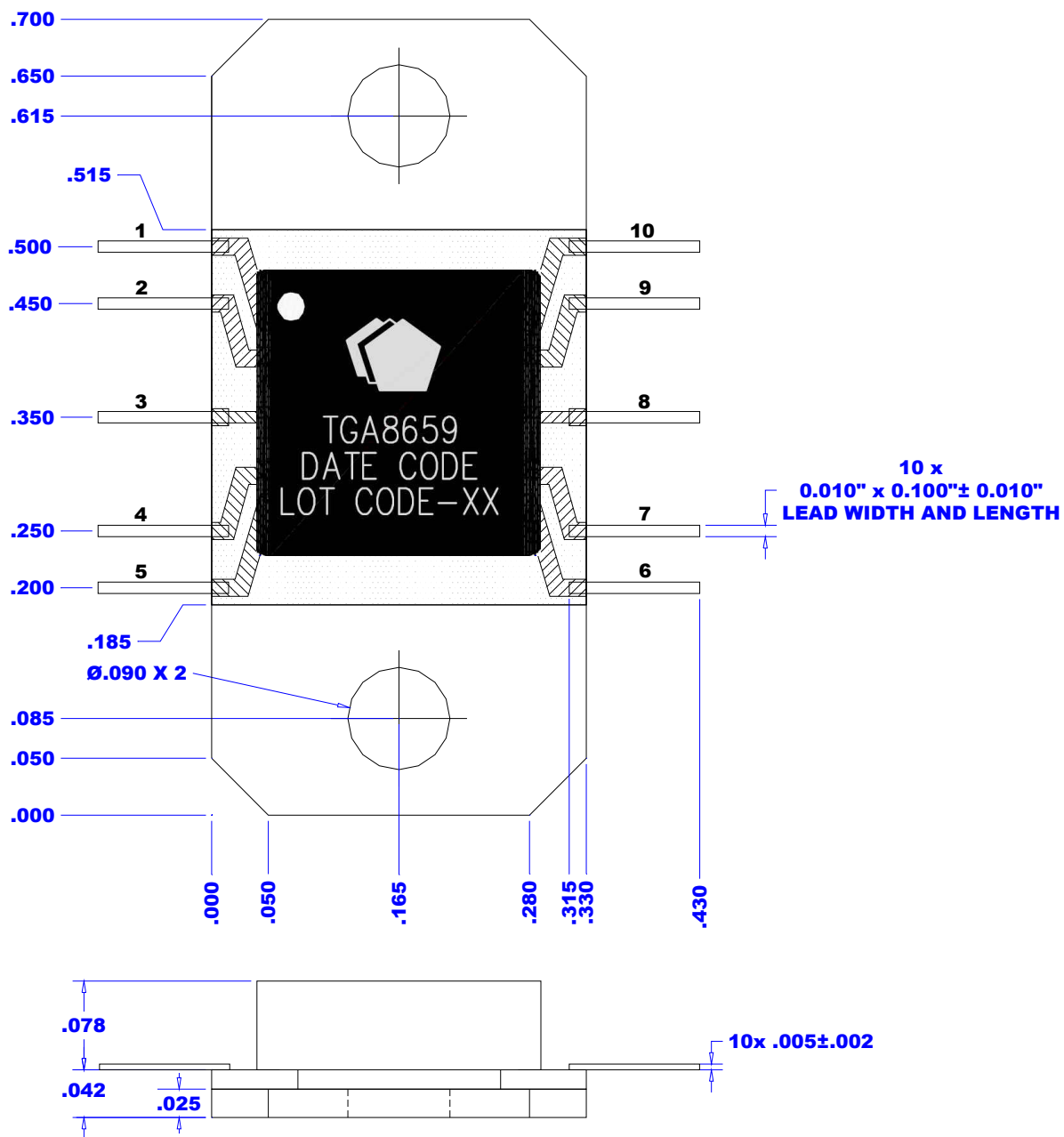
**Bias Conditions:  $V_d = 7V$ ,  $I_{dq} = 1.3A \pm 5\%$**



**Bias Conditions:  $V_d = 6V$ ,  $I_{dq} = 1.3A \pm 5\%$**

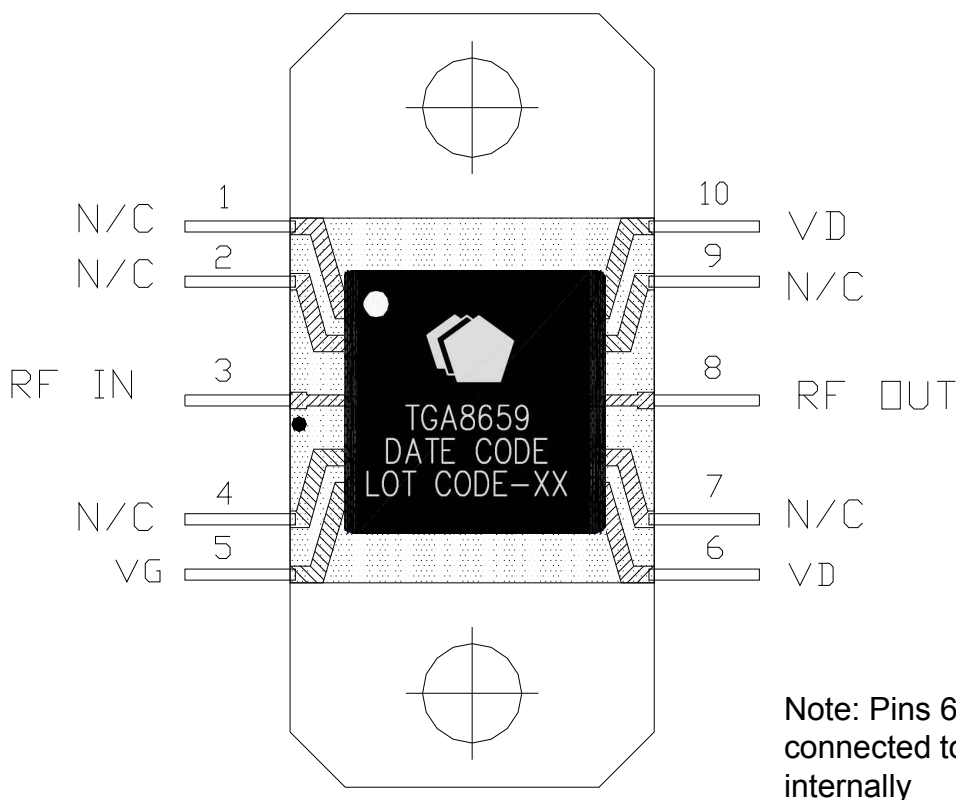


## Mechanical Drawing



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





#### Bias Procedure

- 1) Make sure no RF power is applied to the device before continuing.
- 2) Pinch off device by setting  $V_G$  to  $-1.5V$ .
- 3) Raise  $V_D$  to  $7.0V$  while monitoring drain current.
- 4) Raise  $V_G$  until drain current reaches  $1.3 A$ .  $V_G$  should be between  $-0.6V$  and  $-0.3V$ .
- 5) Apply RF power.

#### Ordering Information

| Part       | Package Style             |
|------------|---------------------------|
| TGA8659-FL | Flange, leads bolted down |

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

## Evaluation Board and Schematic

