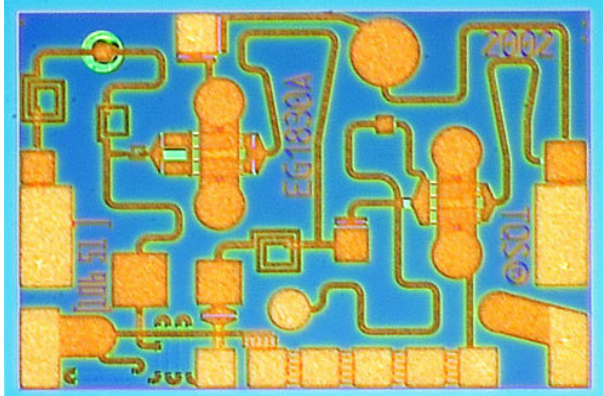


**12-18 GHz Ku-Band 2-Stage Driver Amplifier**

**TGA2506-EPU**

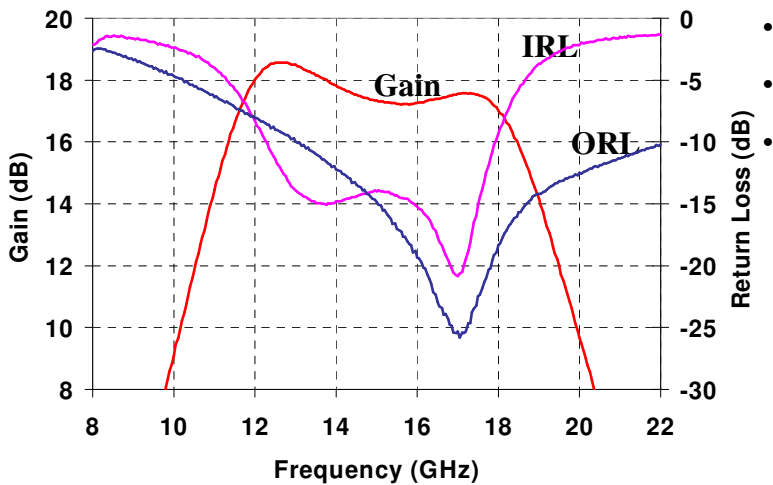


**Key Features**

- 12-18 GHz Bandwidth
- 17 dB Nominal Gain
- > 14 dBm P1dB
- Bias: 5,6,7 V, 40 ± 10% mA Self Bias
- 0.5 um 3MI mmW pHEMT Technology
- Chip Dimensions: 1.19 x 0.83 x 0.1 mm  
(0.047 x 0.031 x 0.004) in

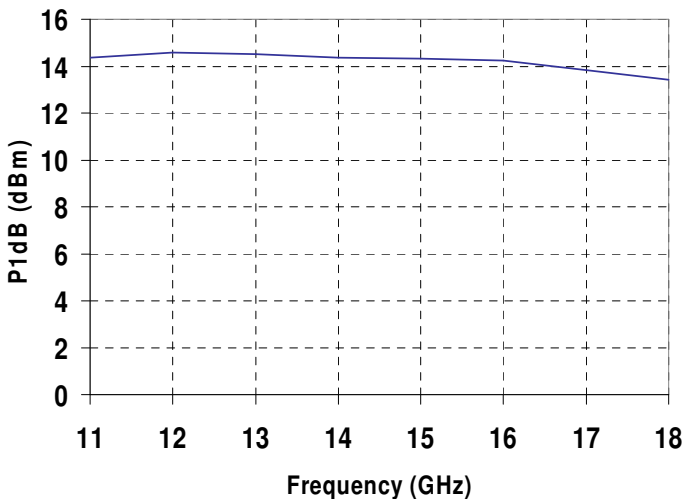
**Preliminary Measured Data**

Bias Conditions: Vd = 6 V, Id = 40 mA



**Primary Applications**

- Point to Point Radio
- Military Ku-Band
- Space Ku-Band
- VSAT



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 <sup>+</sup>   | Positive Supply Voltage             | 8 V           | <u>2/</u>    |
| I <sup>+</sup>   | Positive Supply Current (Quiescent) | 57 mA         | <u>2/</u>    |
| P <sub>IN</sub>  | Input Continuous Wave Power         | 20 dBm        |              |
| P <sub>D</sub>   | Power Dissipation                   | 0.45          | <u>2/ 3/</u> |
| T <sub>CH</sub>  | Operating Channel Temperature       | 150 °C        | <u>4/ 5/</u> |
| T <sub>M</sub>   | Mounting Temperature (30 Seconds)   | 320 °C        |              |
| T <sub>STG</sub> | Storage Temperature                 | -65 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<sub>D</sub>.
- 3/ When operated at this bias condition with a base plate temperature of 70 °C, the median life is reduced to 1E+7 hrs.
- 4/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P<sub>D</sub>.
- 5/ These ratings apply to each individual FET.

**TABLE II**  
**DC PROBE TESTS**  
(T<sub>A</sub> = 25 °C Nominal)

| SYMBOL             | PARAMETER                     | MINIMUM | MAXIMUM | VALUE |
|--------------------|-------------------------------|---------|---------|-------|
| V <sub>BVGS2</sub> | Breakdown Voltage gate-source | -30     | -11     | V     |
| V <sub>BVGD2</sub> | Breakdown Voltage gate-drain  | -30     | -11     | V     |
| V <sub>P2</sub>    | Pinch-off Voltage             | -1.5    | -0.3    | V     |

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**TABLE III**  
**ELECTRICAL CHARACTERISTICS**

(Ta = 25 °C, Nominal)

| PARAMETER                            | TYPICAL            | UNITS |
|--------------------------------------|--------------------|-------|
| Drain Operating                      | 6                  | V     |
| Quiescent Current                    | 40 ± 10% Self Bias | mA    |
| Small Signal Gain                    | 17                 | dB    |
| Input Return Loss                    | 15                 | dB    |
| Output Return Loss                   | 15                 | dB    |
| Output Power @ 1 dB Compression Gain | 14                 | dBm   |
| Noise Figure (@ Mid-band)            | 5.5                | dB    |

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

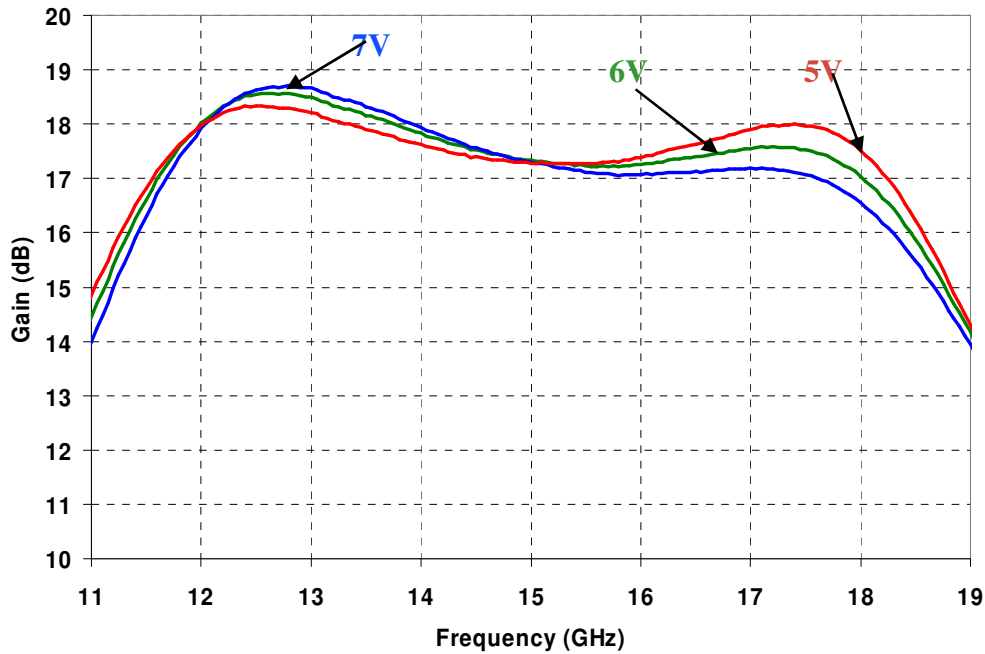
| PARAMETER  | TEST CONDITIONS                                      | T <sub>CH</sub><br>(°C) | R <sub>θJC</sub><br>(°C/W) | T <sub>M</sub><br>(HRS) |
|--|--|-------------------------|----------------------------|-------------------------|
| R <sub>θJC</sub> Thermal Resistance<br>(channel to Case) | Vd = 6 V<br>Id = 40 mA<br>P <sub>diss</sub> = 0.24 W | 99                      | 121                        | 1.4E+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.

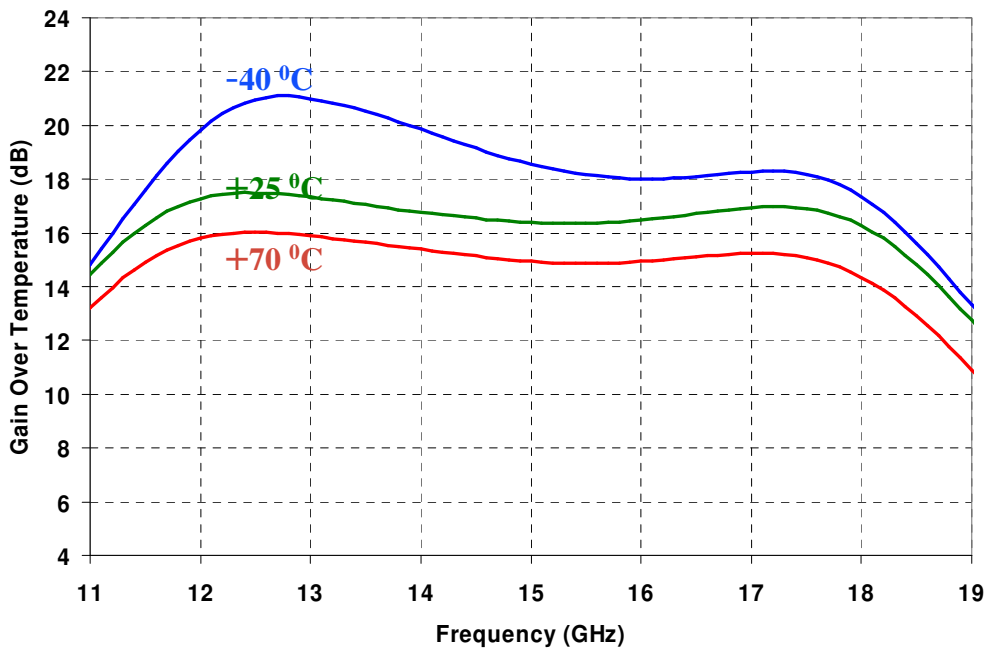
*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice*

**Preliminary Measured Data**

Bias Conditions:  $V_d = 5, 6, 7 \text{ V}$ ,  $I_d = 40 \text{ mA}$



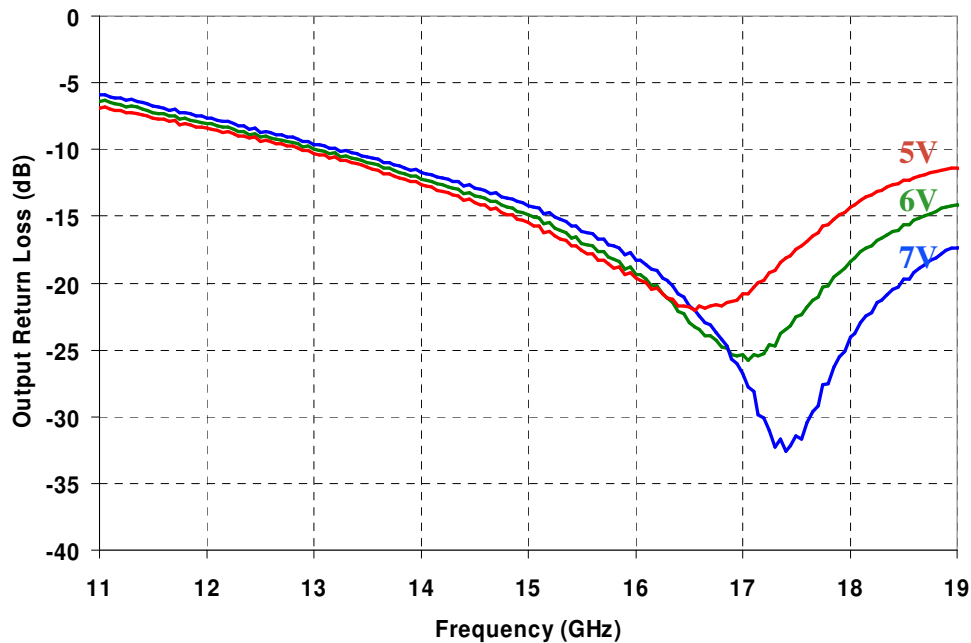
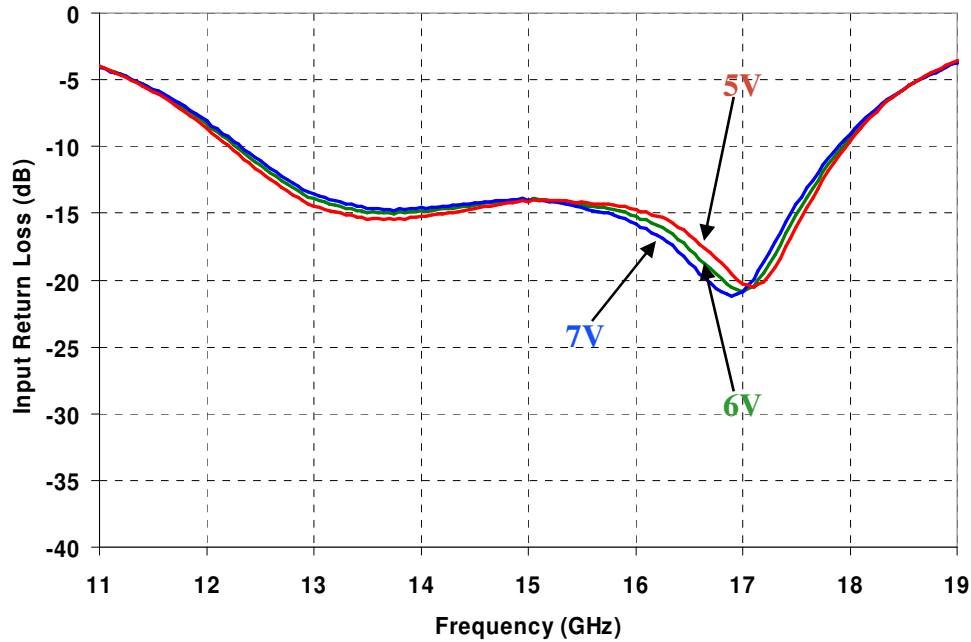
Bias Conditions:  $V_d = 6 \text{ V}$ ,  $I_d = 40 \text{ mA}$



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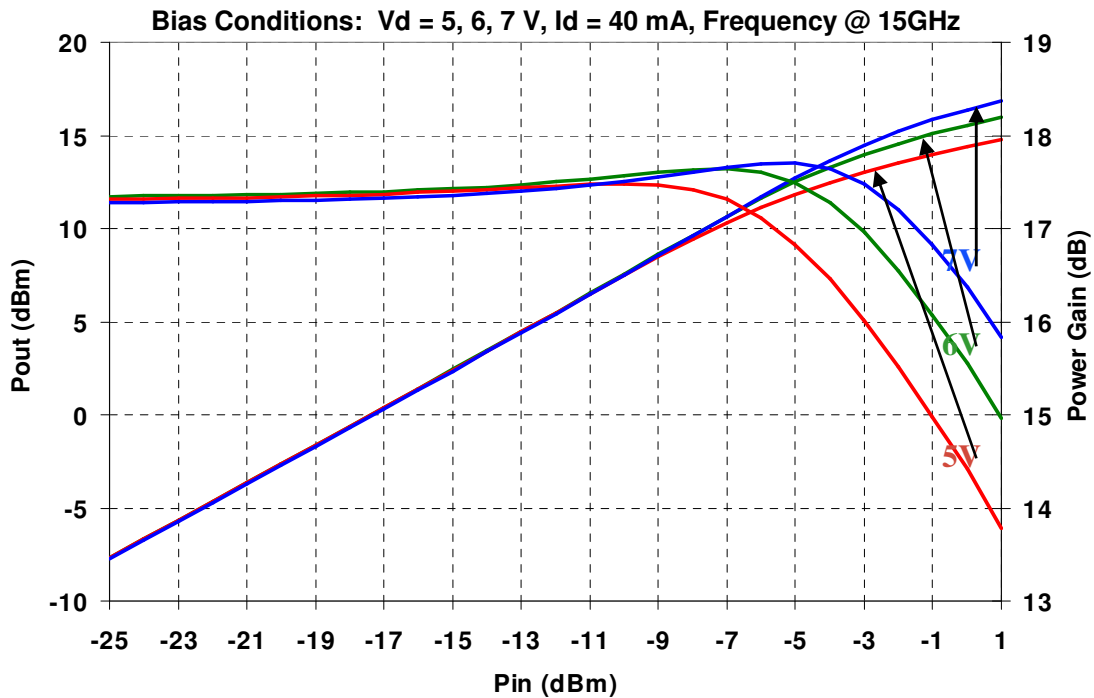
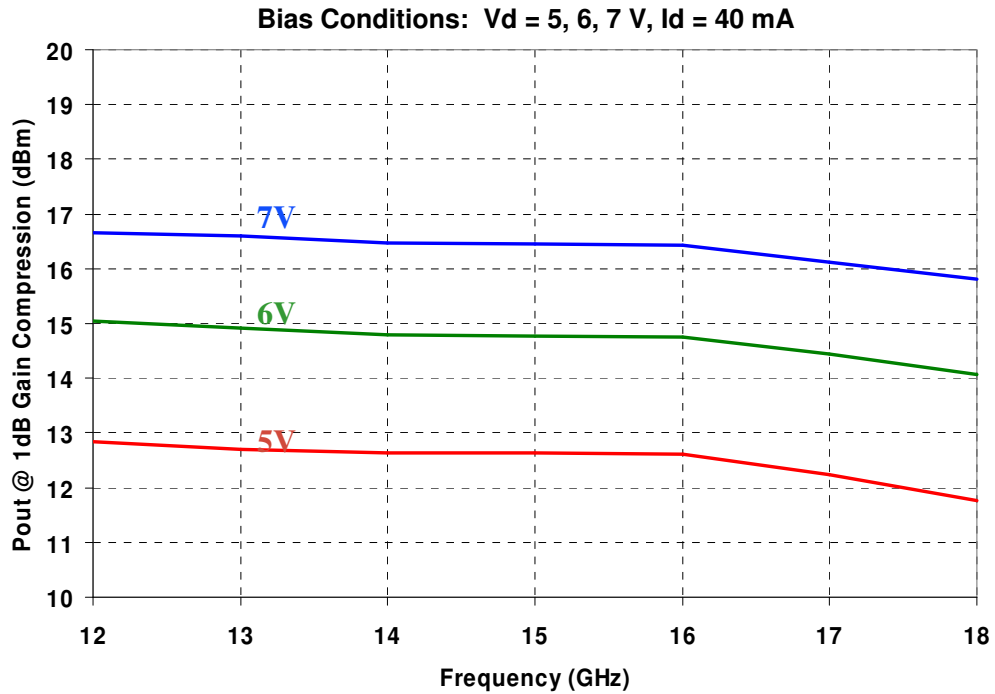
**Preliminary Measured Data**

Bias Conditions:  $V_d = 5, 6, 7 \text{ V}$ ,  $I_d = 40 \text{ mA}$



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

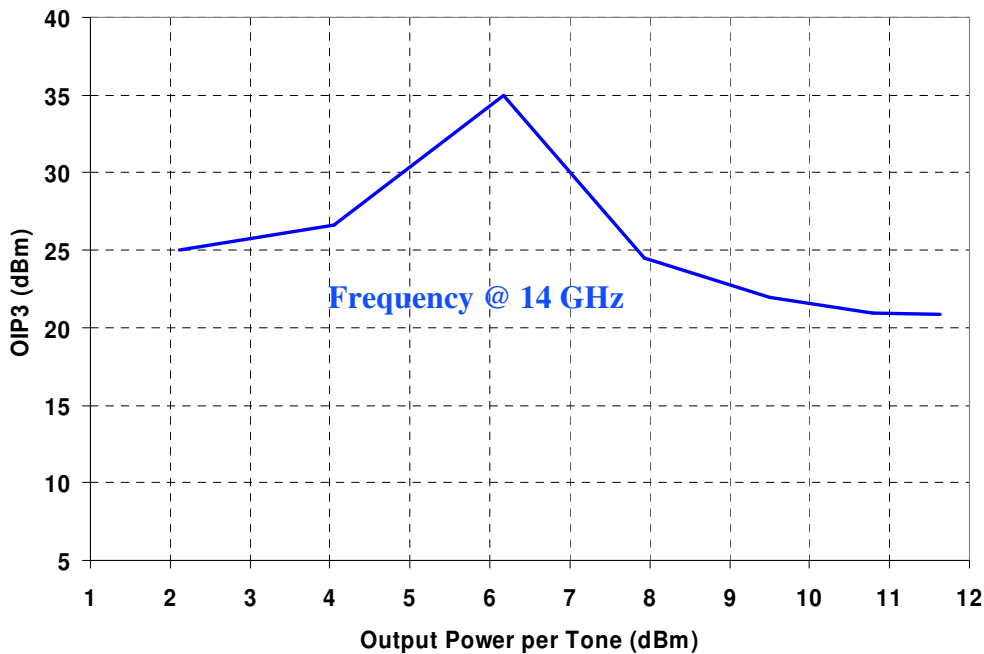
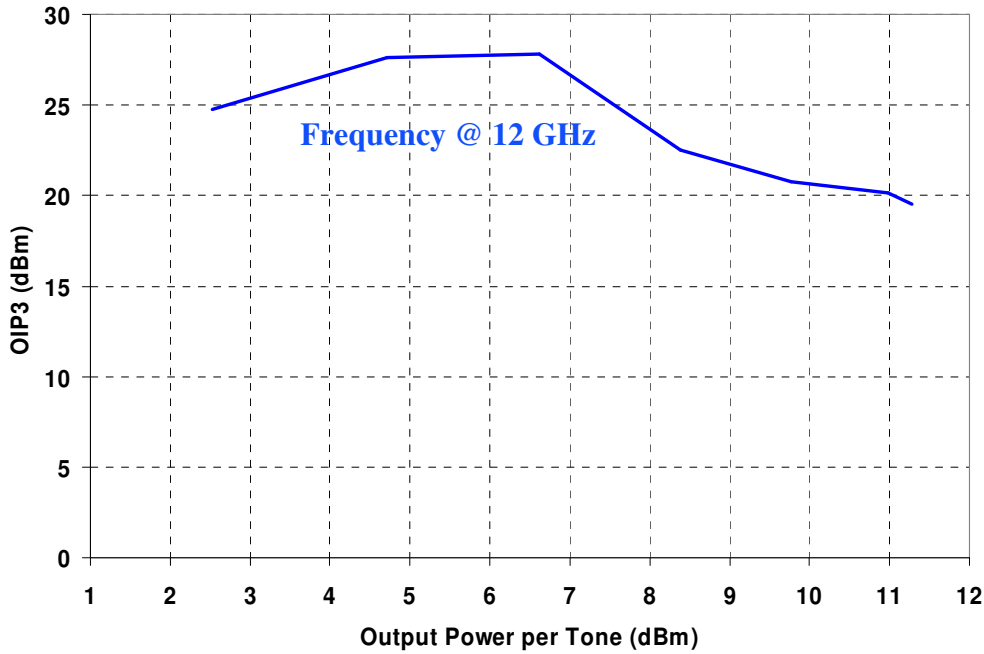
**Preliminary Measured Data**



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**

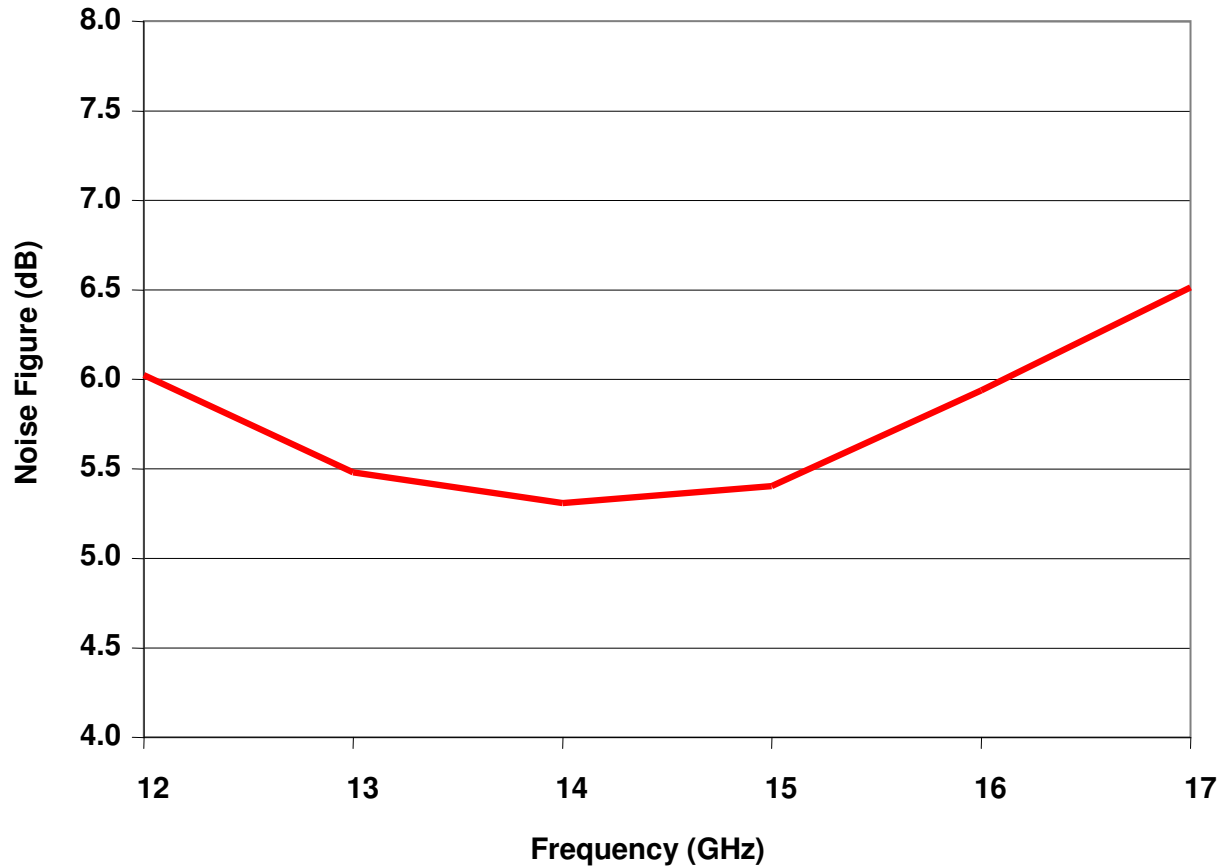
Bias Conditions:  $V_d = 6\text{ V}$ ,  $I_d = 40\text{ mA}$



*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

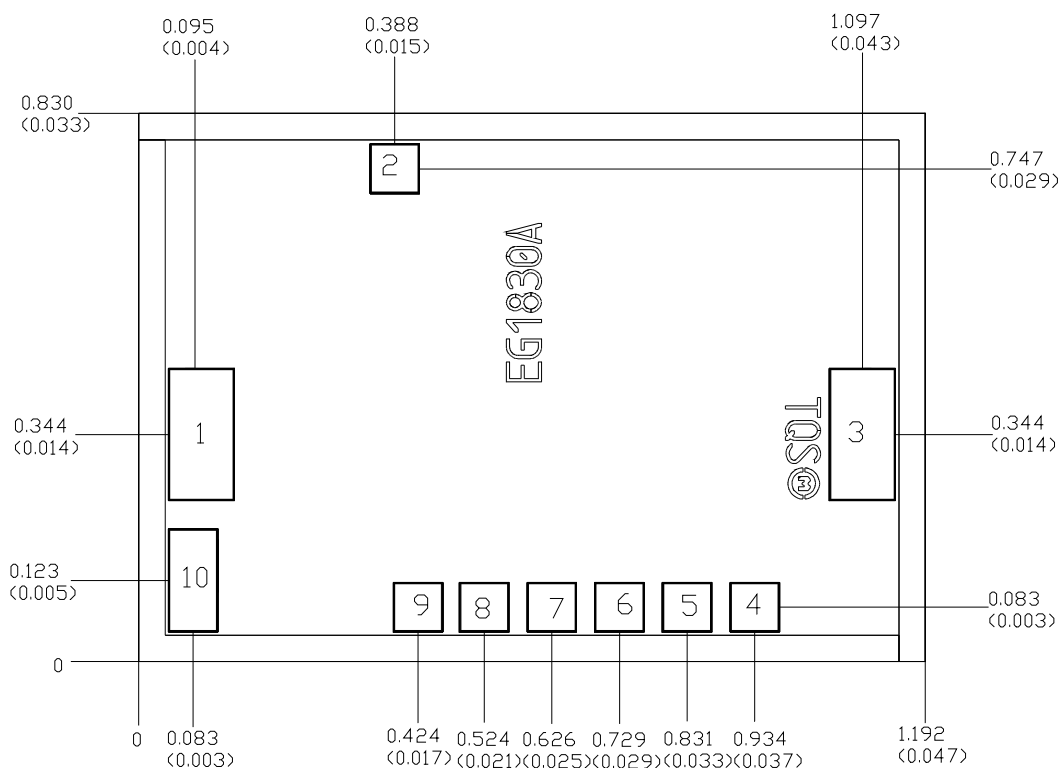
Bias Conditions:  $V_d = 6\text{ V}$ ,  $I_d = 40\text{ mA}$



*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*



**Mechanical Drawing**



Units: millimeters (inches)

Thickness: 0.100 (0.004)

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

Chip size tolerance: +/- 0.051 (0.002)

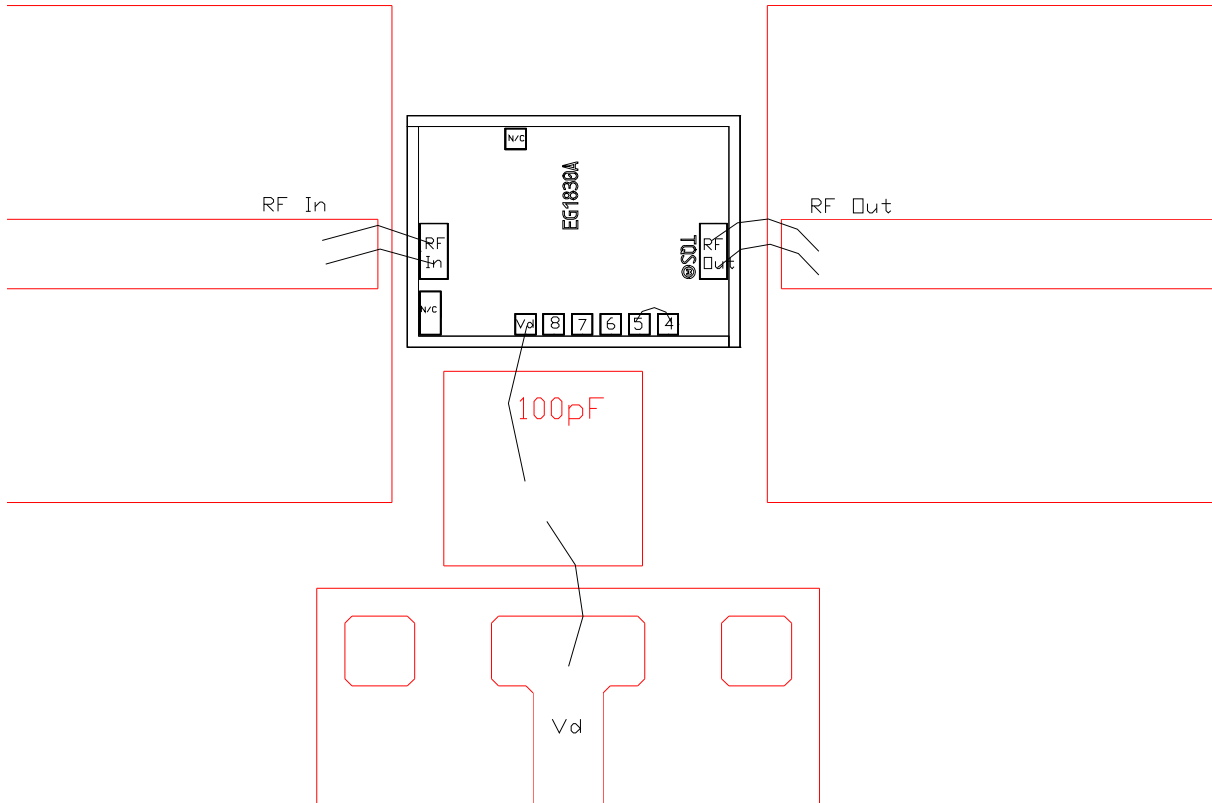
GND is back side of MMIC

|              |                  |               |                 |
|--------------|------------------|---------------|-----------------|
| Bond pad #1  | (RF In)          | 0.100 x 0.200 | (0.004 x 0.008) |
| Bond pad #2  | (N/C)            | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #3  | (RF Out)         | 0.100 x 0.200 | (0.004 x 0.008) |
| Bond pad #4  | (DC Bias ladder) | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #5  | (DC Bias ladder) | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #6  | (DC Bias ladder) | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #7  | (DC Bias ladder) | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #8  | (DC Bias ladder) | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #9  | (Vd)             | 0.075 x 0.075 | (0.003 x 0.003) |
| Bond pad #10 | (N/C)            | 0.075 x 0.155 | (0.003 x 0.006) |

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

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**Chip Assembly Diagram**



This configuration is for a self-bias logic pad current search with connection for bin # 1 . See Table IV for alternate bin # to get the current typical of  $40 \pm 10\%$  mA.

**TABLE IV  
PAD CONNECTIONS**

| BIN NO. | CONNECTION     |
|---------|----------------|
| 1       | Pad 4 to Pad 5 |
| 2       | Pad 4 to Pad 6 |
| 3       | Pad 4 to Pad 7 |
| 4       | Pad 4 to Pad 8 |

**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 (30 seconds 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.
- 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.***

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