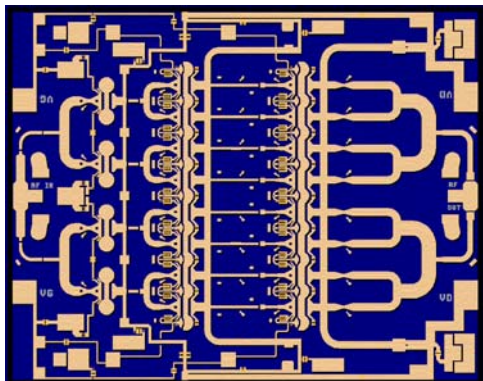


## Ka Band 2W Power Amplifier

## TGA4514-EPU

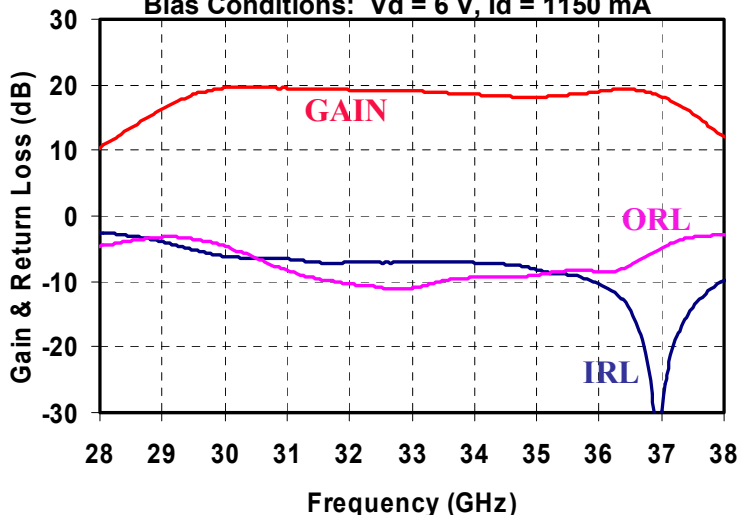


### Key Features

- Typical Frequency Range: 31 - 35 GHz
- 33.5 dBm Nominal Psat @ Vd = 7V
- 31.5 dBm Nominal P1dB
- IMD3: 31dBc at Pout/tone=22dBm
- 19 dB Nominal Gain
- Bias 6 - 7 V, 1150 mA
- 0.25 um 2MI pHEMT Technology
- Chip Dimensions 4.0 x 3.2 x 0.1 mm  
(0.161 x 0.128 x 0.004) in

### Preliminary Measured Data

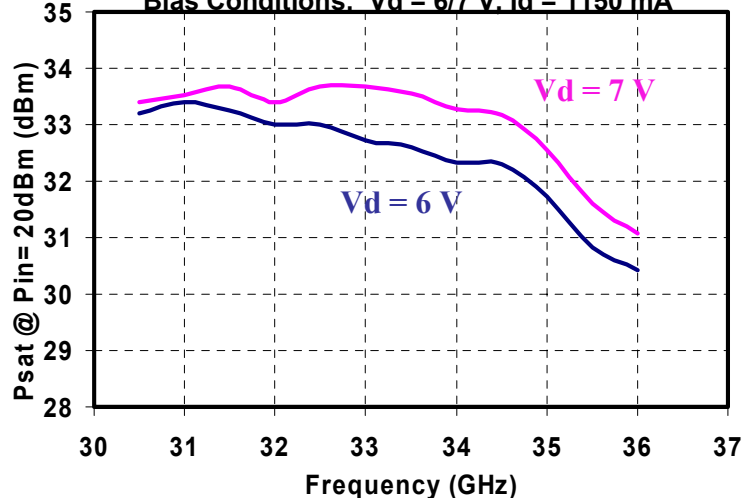
Bias Conditions: Vd = 6 V, Id = 1150 mA



### Primary Applications

- Point-to-Point Radio
- Military Radar Systems
- Ka Band Sat-Com

Bias Conditions: Vd = 6/7 V, Id = 1150 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

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

SYMBOL	PARAMETER	VALUE	NOTES
V <sub>d</sub>	Drain Voltage	8 V	<u>2/</u>
V <sub>g</sub>	Gate Voltage Range	-5 TO 0 V	
I <sub>d</sub>	Drain Current	2.5 A	<u>2/</u> <u>3/</u>
I <sub>g</sub>	Gate Current	70 mA	<u>3/</u>
P <sub>IN</sub>	Input Continuous Wave Power	27 dBm	
P <sub>D</sub>	Power Dissipation	TBD	<u>2/</u> <u>4/</u>
T <sub>CH</sub>	Operating Channel Temperature	150 °C	<u>5/</u> <u>6/</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/ Total current for the entire MMIC.
- 4/ When operated at this bias condition with a base plate temperature of TBD, the median life is reduced from TBD to TBD hrs.
- 5/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.
- 6/ These ratings apply to each individual FET.

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

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNITS
I <sub>DSS,Q1</sub>	Saturated Drain Current		114		mA
G <sub>M,Q1</sub>	Transconductance		150		mS
V <sub>BVGS,Q1-Q6</sub>	Breakdown Voltage gate-source		-16		V
V <sub>BVGD,Q1-Q6</sub>	Breakdown Voltage gate-drain		-16		V
V <sub>P,Q1-Q6</sub>	Pinch-off Voltage		-1		V

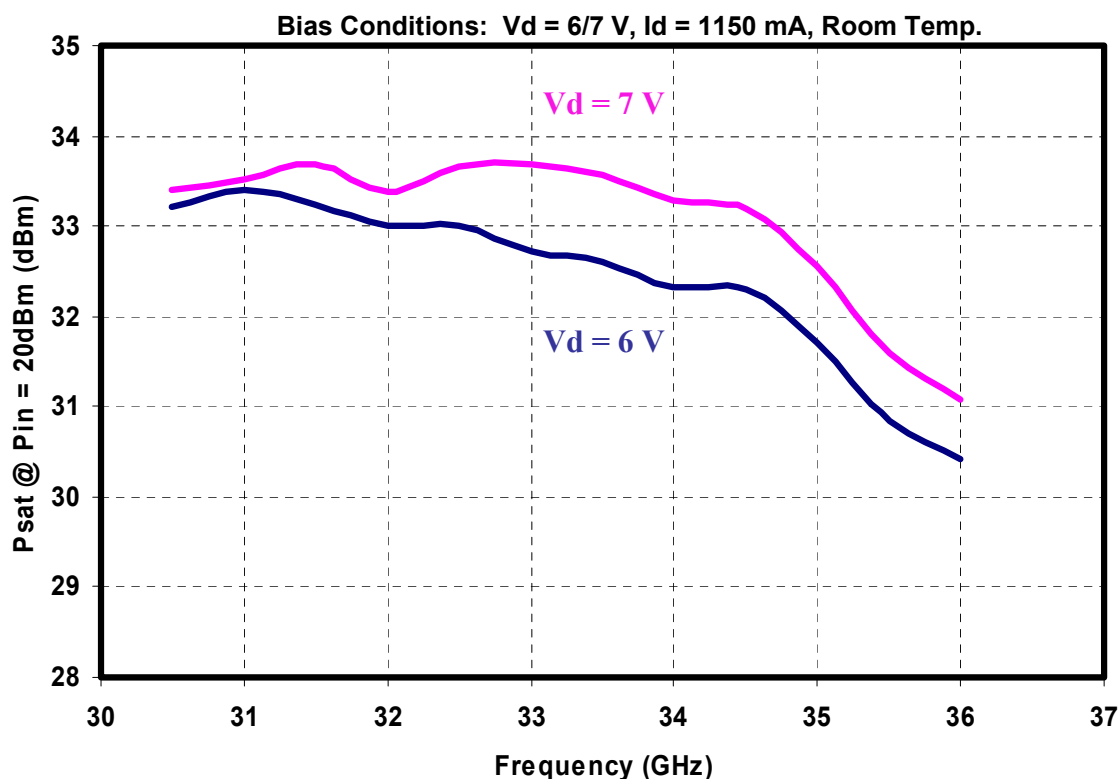
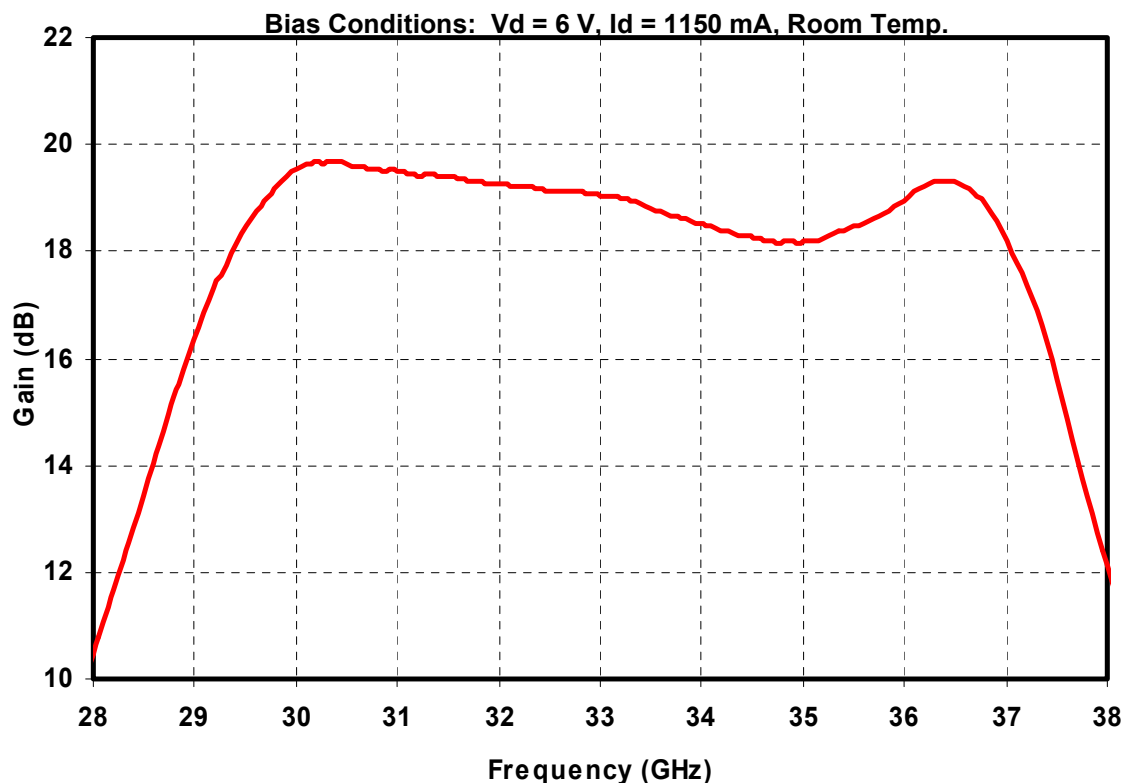
Q1- Q4 are 400 um FETs, Q5 is 3200 um FET, Q6 is 4000 um FET

**TABLE III**  
**ELECTRICAL CHARACTERISTICS**  
(Ta = 25 °C, Nominal)

PARAMETER	TYPICAL	UNITS
Frequency Range	31 - 35	GHz
Drain Voltage, Vd	6	V
Drain Current, Id	1150	mA
Gate Voltage, Vg	-0.5	V
Small Signal Gain, S21	19	dB
Input Return Loss, S11	-7	dB
Output Return Loss, S22	-10	dB
Output Power @ 1 dB Compression Gain, P1dB	31.5	dBm
Saturated Power @ Pin = 20 dBm, Psat	32.5	dBm
IMD3, Freq = 33 GHz, Pout/Tone = 22 dBm	31	dBc

*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*

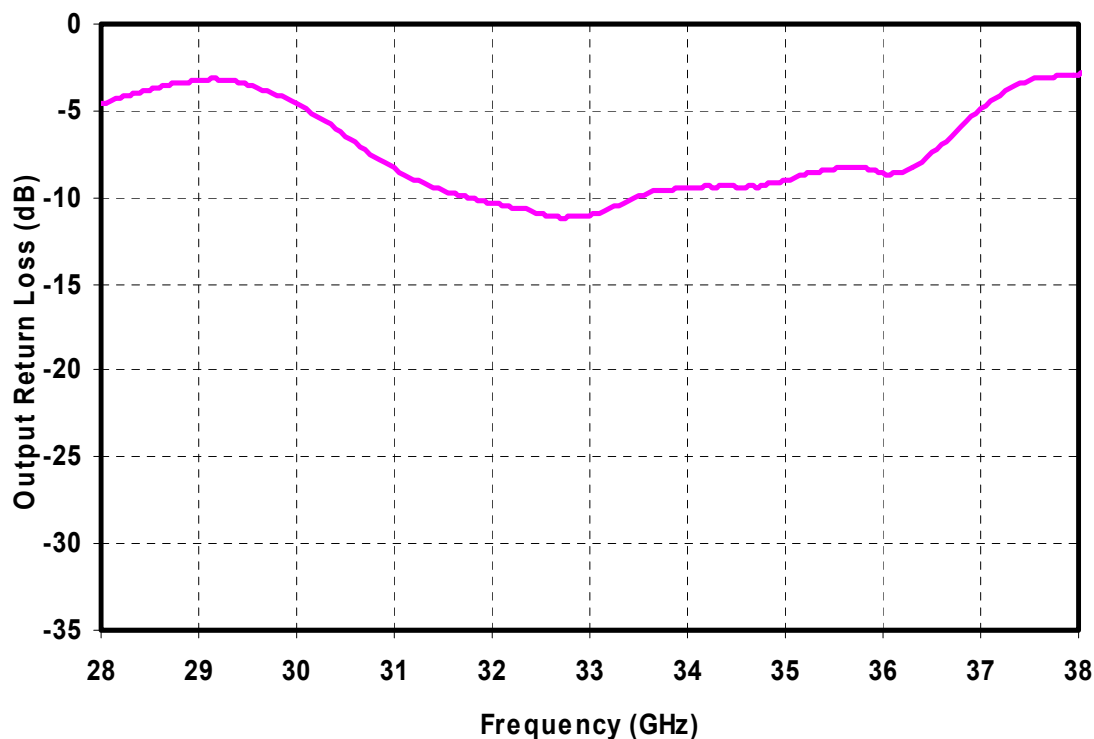
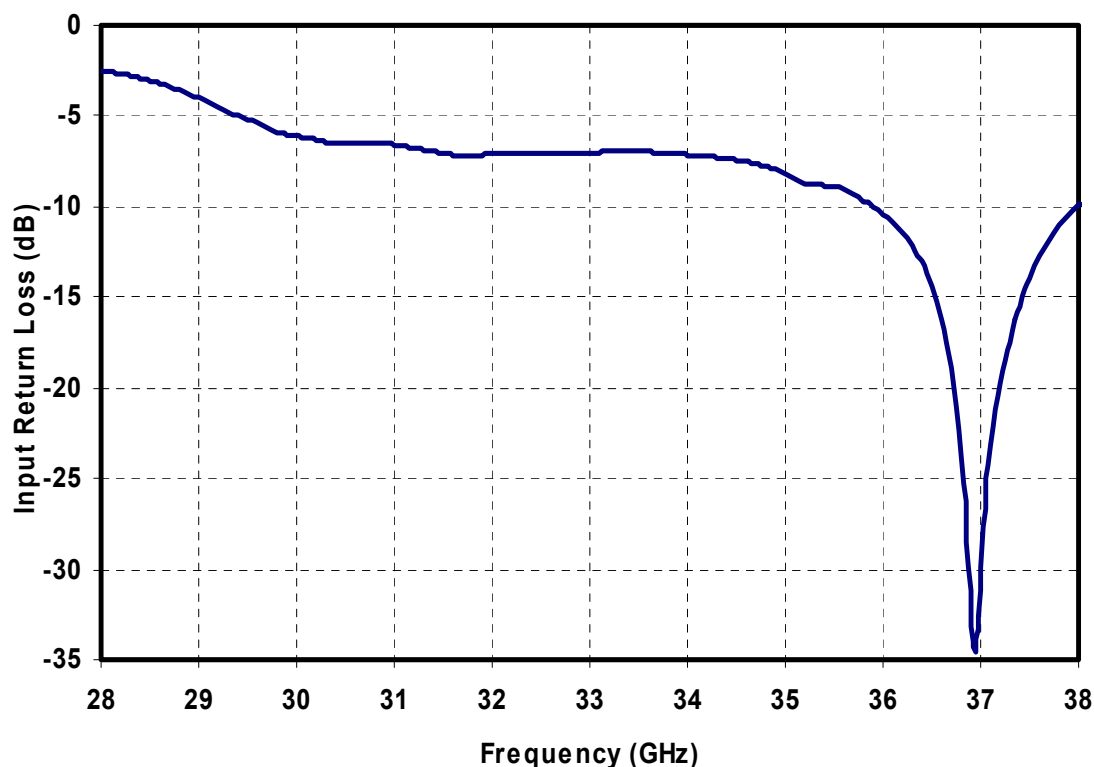
## Preliminary Measured Data



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

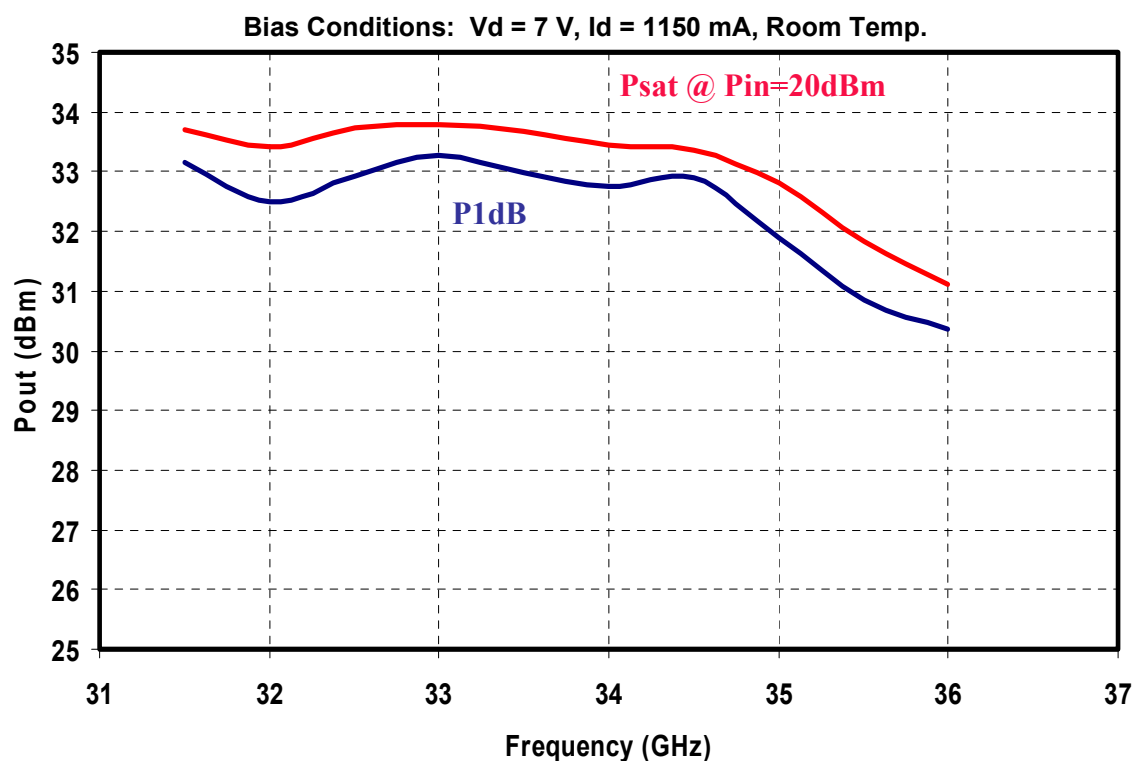
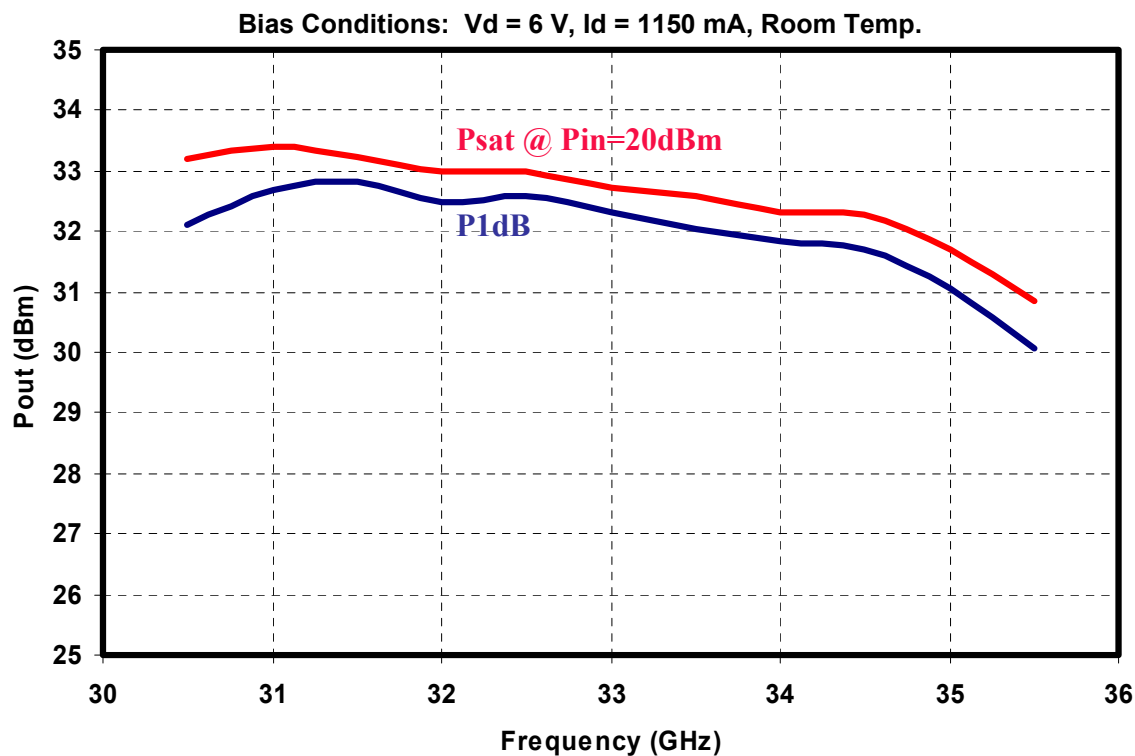
## Preliminary Measured Data

Bias Conditions:  $V_d = 6\text{ V}$ ,  $I_d = 1150\text{ mA}$ , Room Temp.



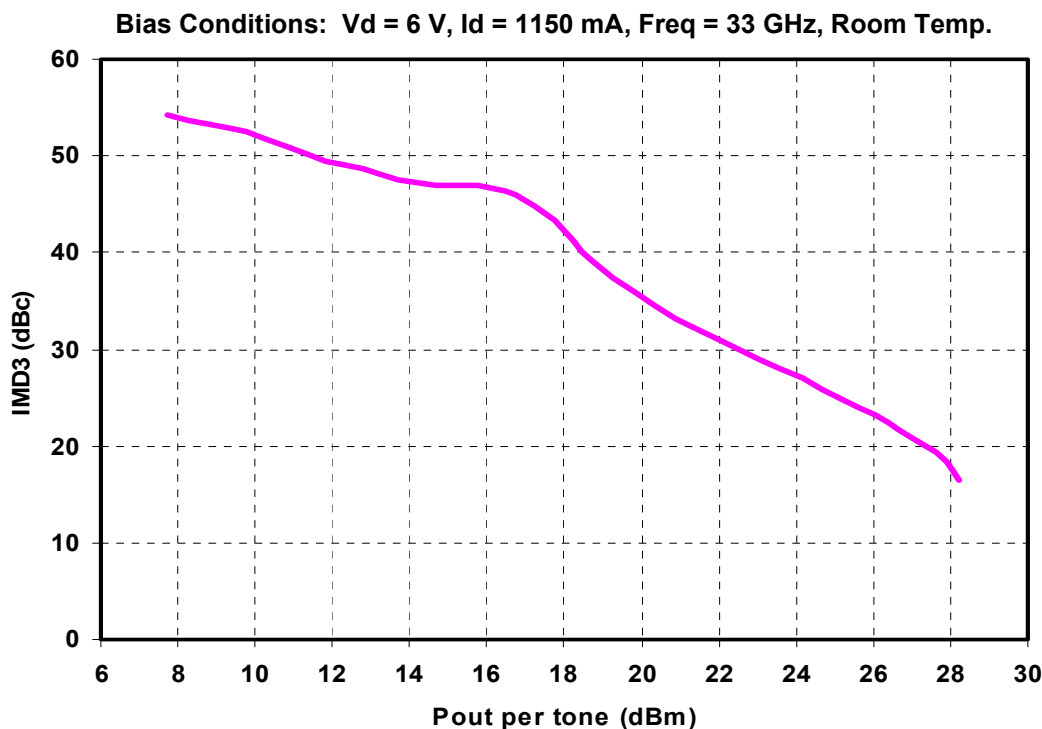
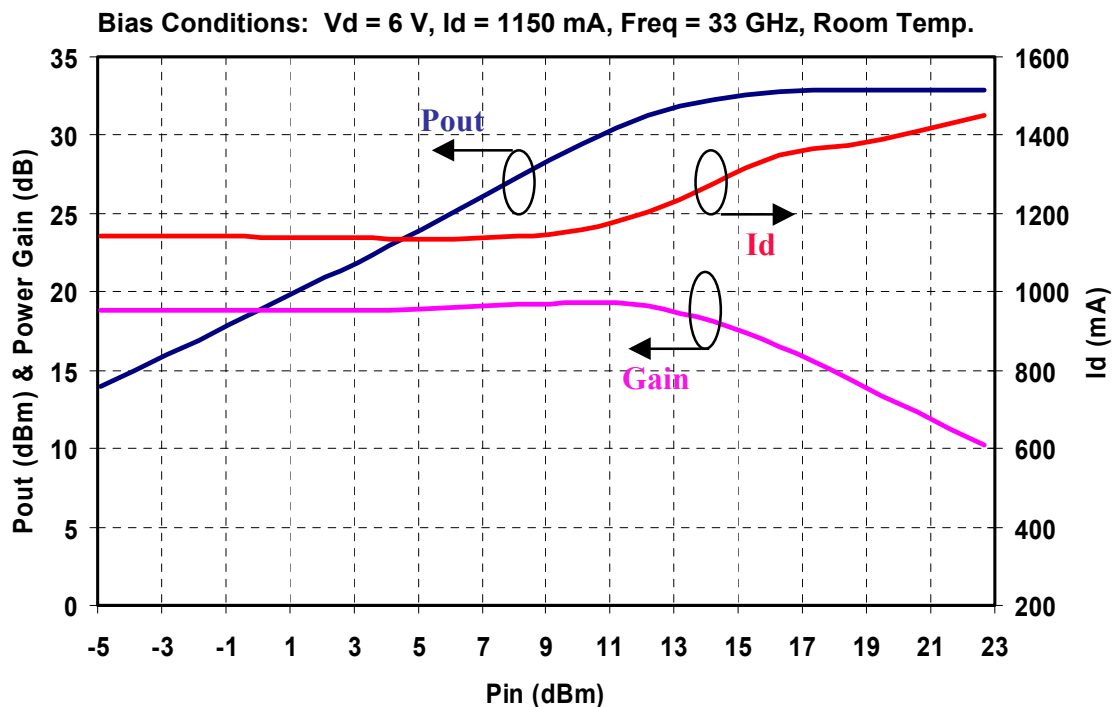
*Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice*

## 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

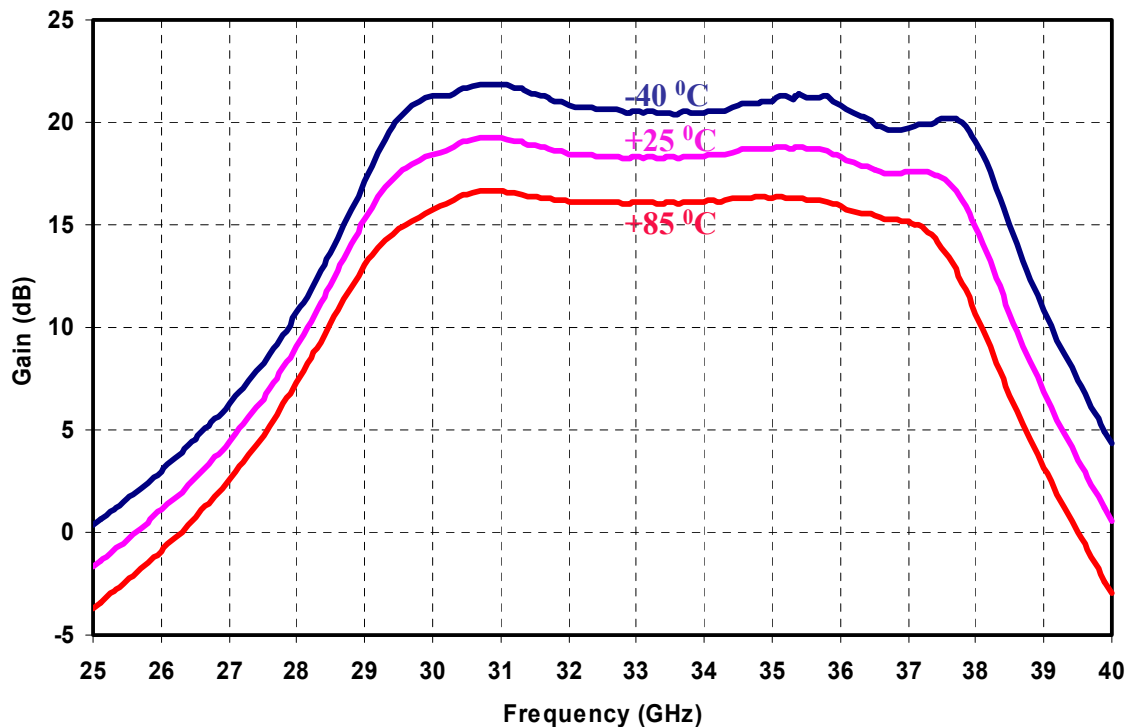
## Preliminary Measured Data



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## Preliminary Measured Data

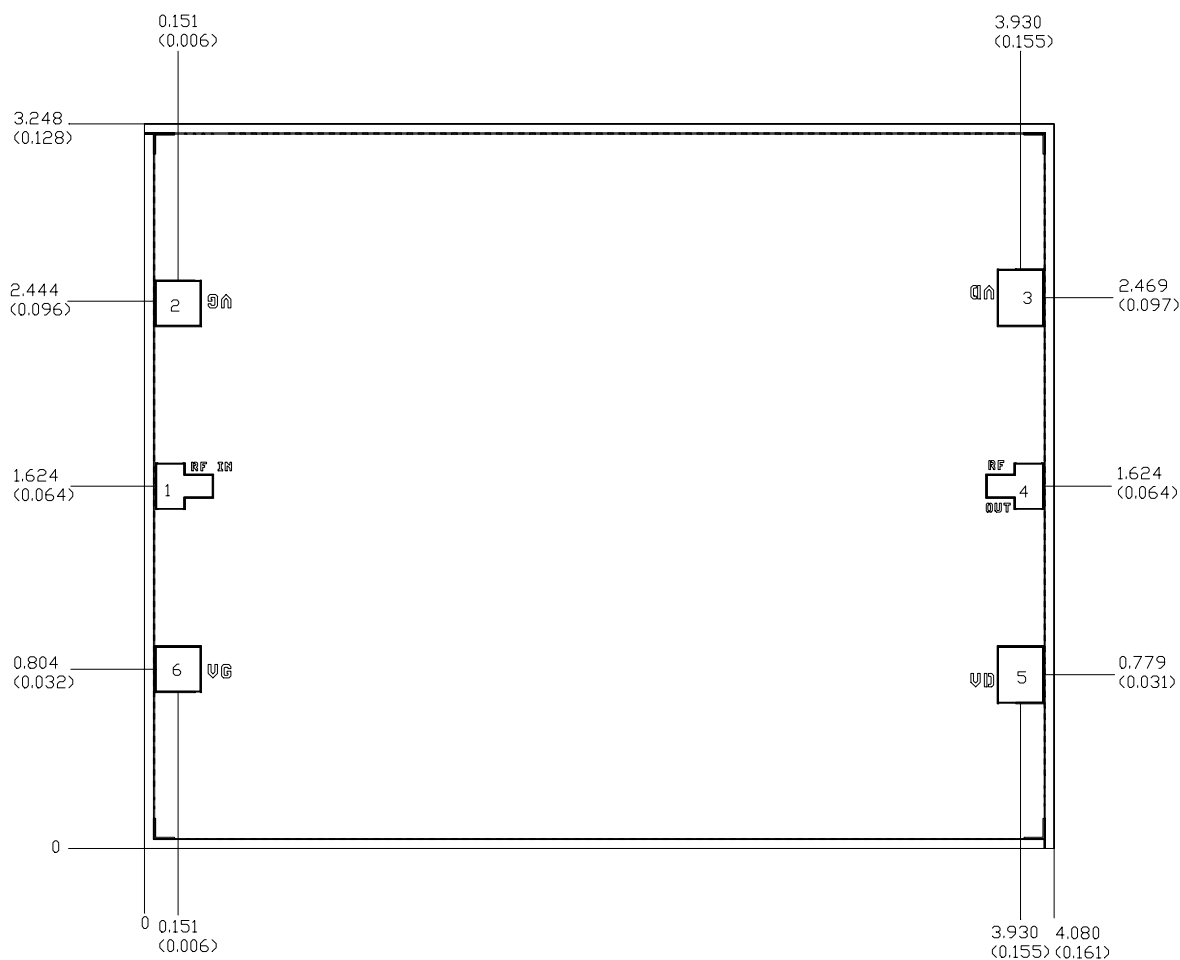
Bias Conditions:  $V_d = 6\text{ V}$ ,  $I_d = 920\text{ mA}$



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)

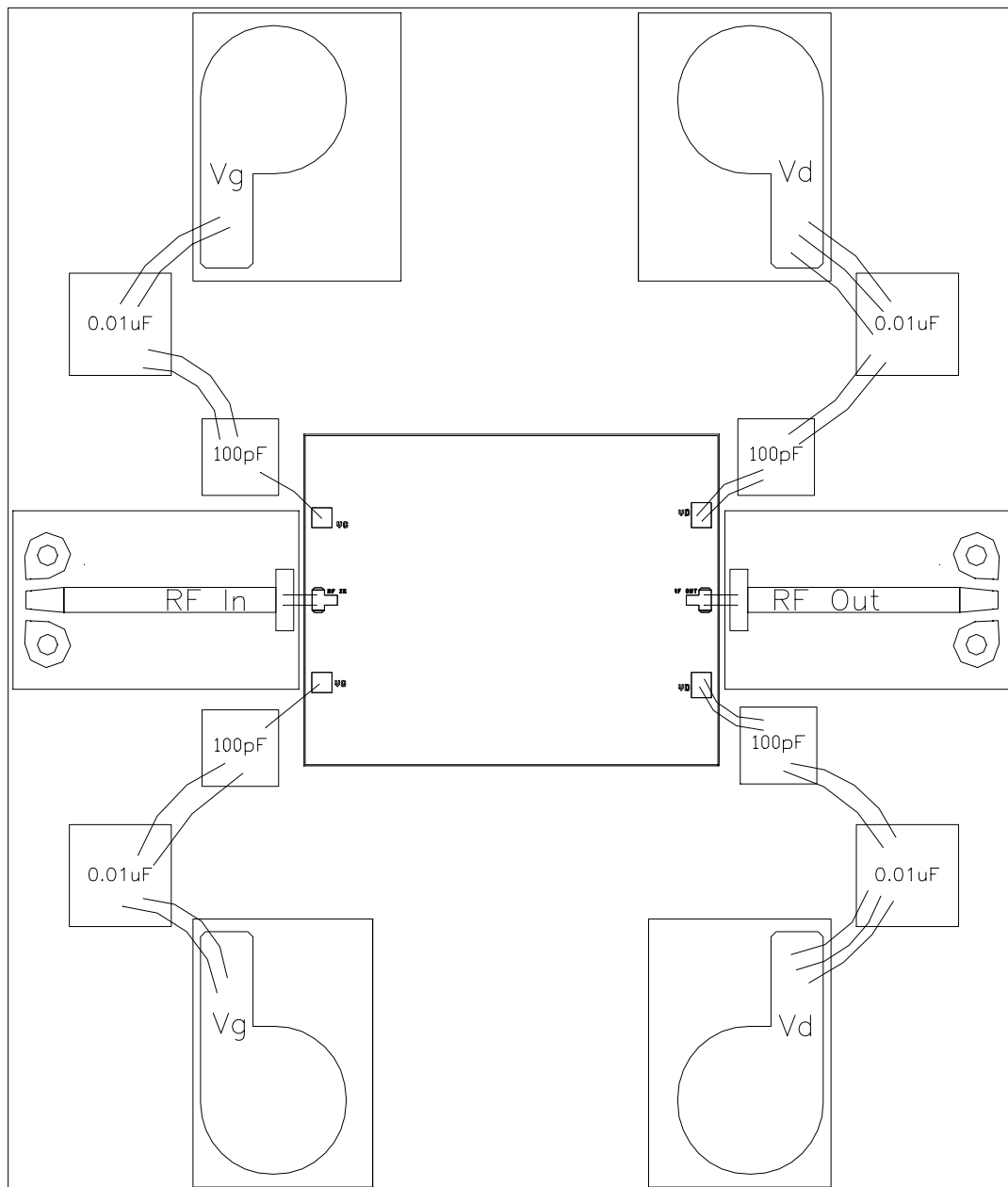
GND is back side of MMIC

Bond pad #1	<RF In>	0.135 x 0.210 (0.005 x 0.008)
Bond pad #2, #6	<VG>	0.210 x 0.210 (0.008 x 0.008)
Bond pad #4	<RF Out>	0.135 x 0.210 (0.005 x 0.008)
Bond pad #3, #5	<VG>	0.210 x 0.260 (0.008 x 0.010)

**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*

## Chip Assembly Diagram



**Note:** Apply bias for Vd on both sides. Bias may be applied for Vg from either side.

**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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