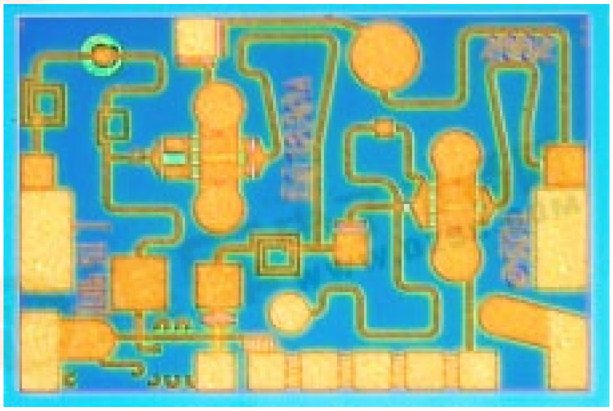
TriQuint SEMICONDUCTOR®

Advance Product Information

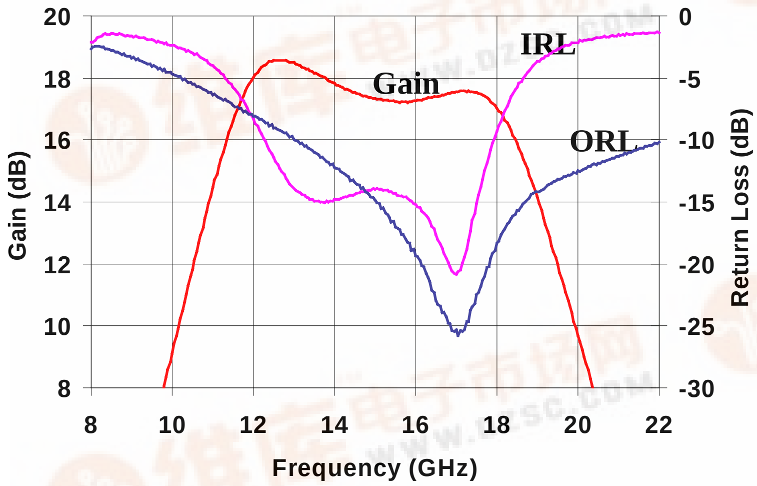
June 28, 2004

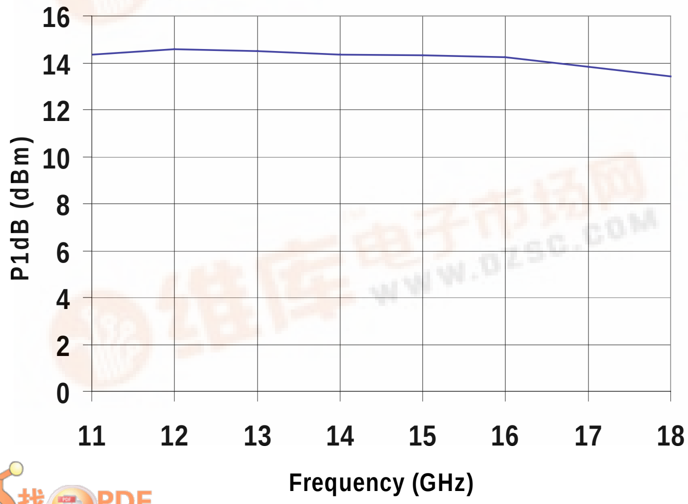
12-18 GHz Ku-Band 2-Stage Driver Amplifier TGA2506-EPU



Preliminary Measured Data

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





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

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^+	Positive Supply Voltage	8 V	2/
I^+	Positive Supply Current (Quiescent)	57 mA	2/
P_{IN}	Input Continuous Wave Power	20 dBm	
P_D	Power Dissipation	0.45	2/ 3/
T_{CH}	Operating Channel Temperature	150 ^{0}C	4/ 5/
T_M	Mounting Temperature (30 Seconds)	320 ^{0}C	
T_{STG}	Storage Temperature	-65 to 150 ^{0}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 ^{0}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_D.

5/ These ratings apply to each individual FET.

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

SYMBOL	PARAMETER	MINIMUM	MAXIMUM	VALUE
V_{BVGS2}	Breakdown Voltage gate-source	-30	-11	V
V_{BVGD2}	Breakdown Voltage gate-drain	-30	-11	V
V_{P2}	Pinch-off Voltage	-1.5	-0.3	V

TABLE III
ELECTRICAL CHARACTERISTICS
(Ta = 25 ^{0}C, Nominal)

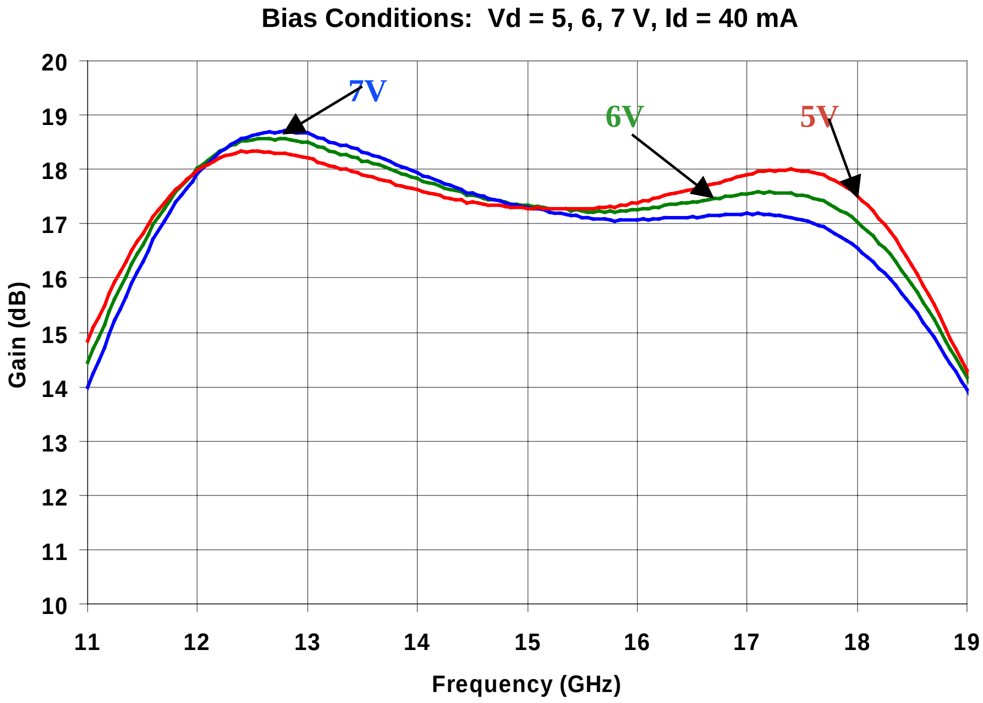
PARAMETER	TYPICAL	UNITS
Drain Operating	6	V
Quiescent Current	40 ± 10% Self Bias	mA
Small Signal Gain	17	dB
Input Return Loss	15	dB
Output Return Loss	15	dB
Output Power @ 1 dB Compression Gain	14	dBm
Noise Figure (@ Mid-band)	5.5	dB

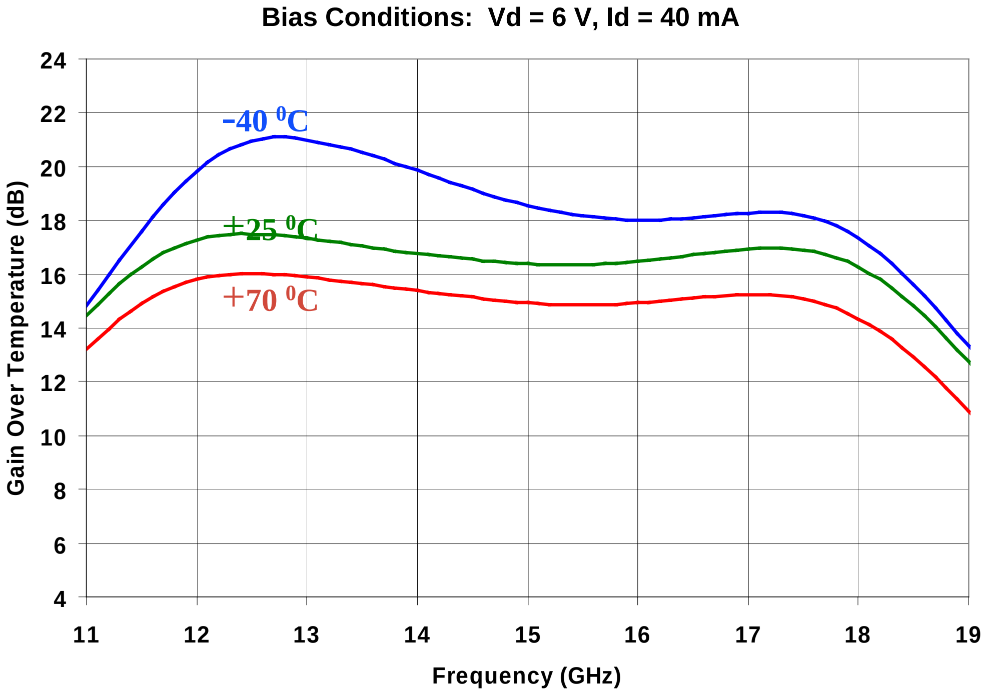
TABLE IV
THERMAL INFORMATION

PARAMETER	TEST CONDITIONS	T_{CH} (^{O}C)	$R_{\theta JC}$ (°C/W)	T_M (HRS)
$R_{\theta JC}$ Thermal Resistance (channel to Case)	Vd = 6 V Id = 40 mA Pdiss = 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^{o}C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

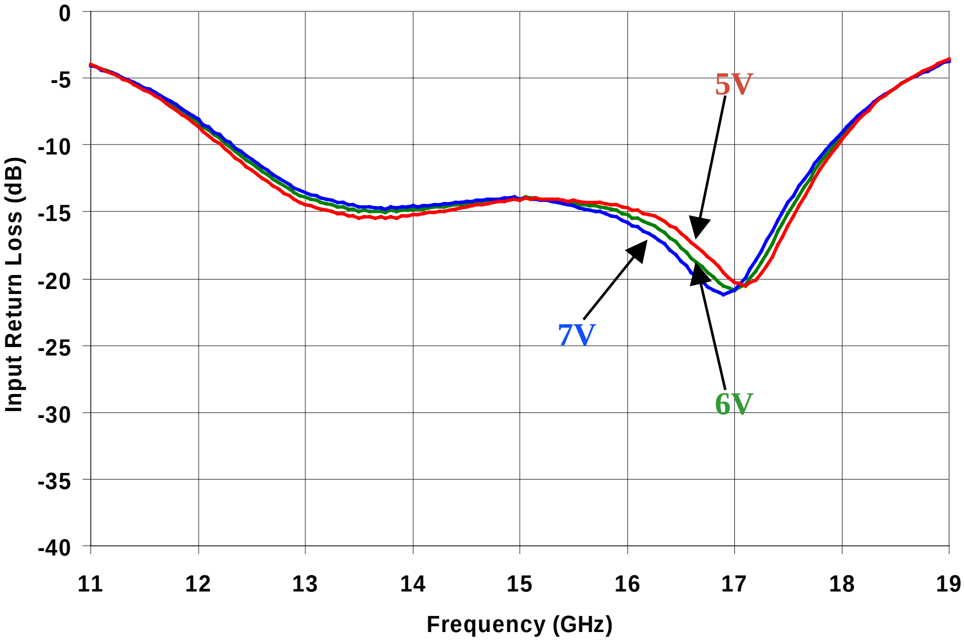
Preliminary Measured Data

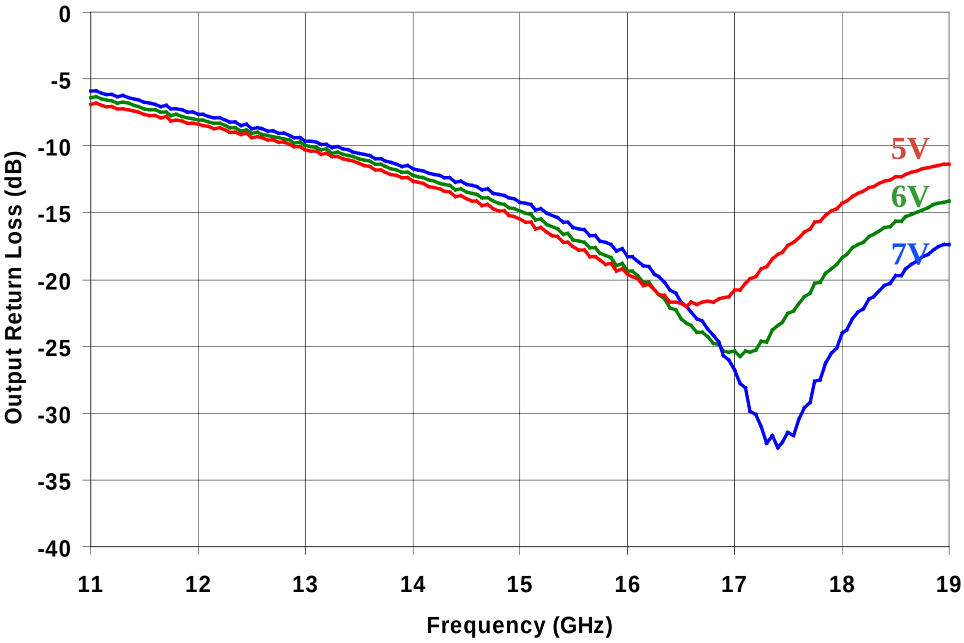




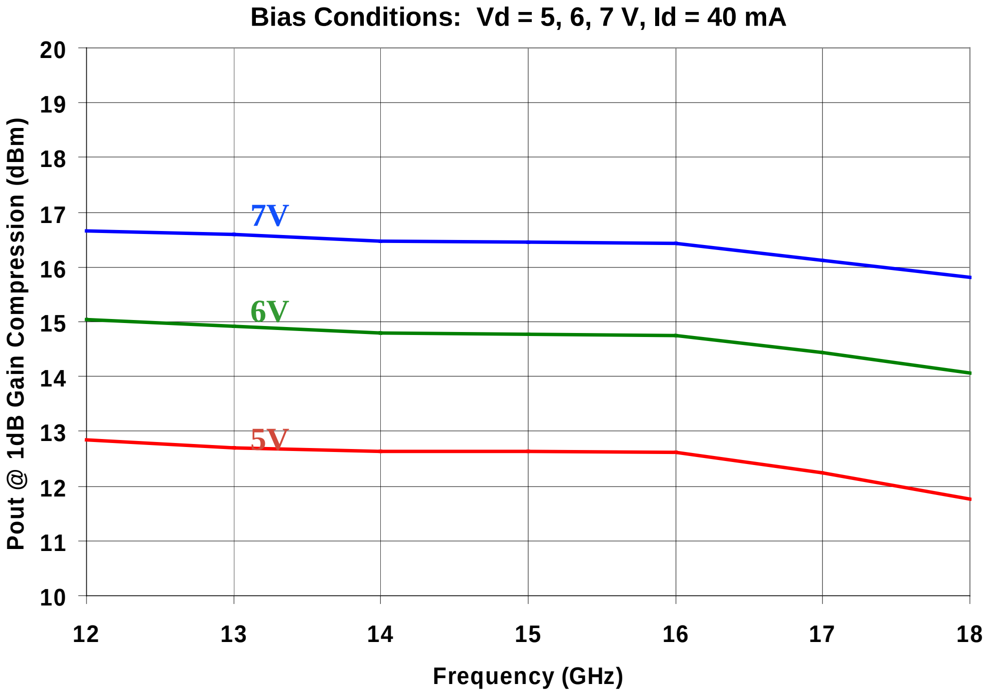
Preliminary Measured Data

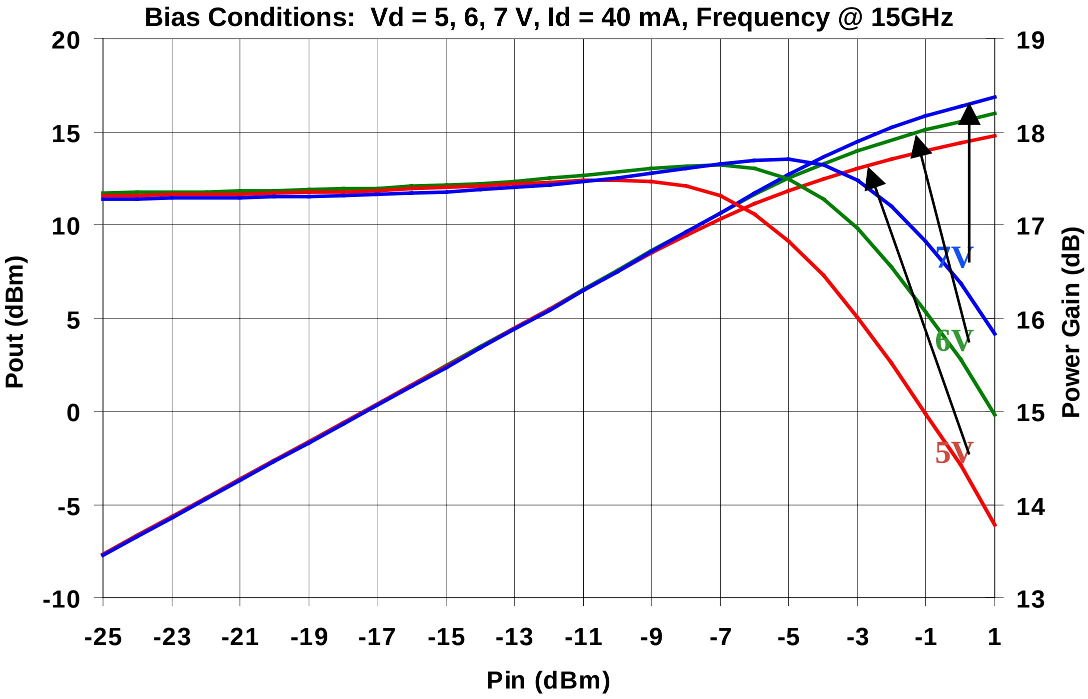
Bias Conditions: Vd =5, 6, 7 V, Id = 40 mA





Preliminary Measured Data

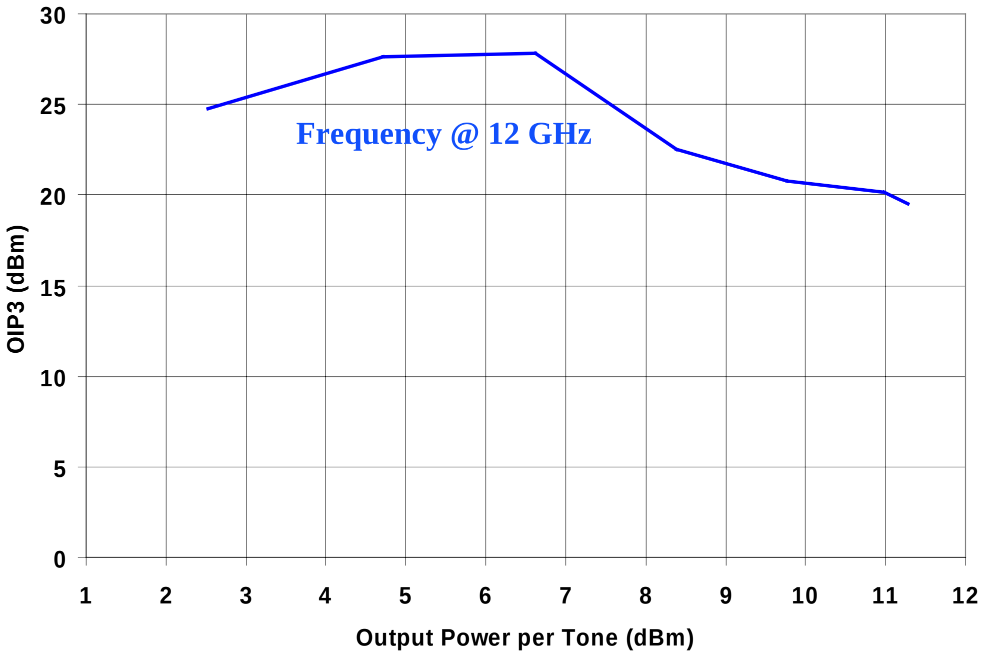


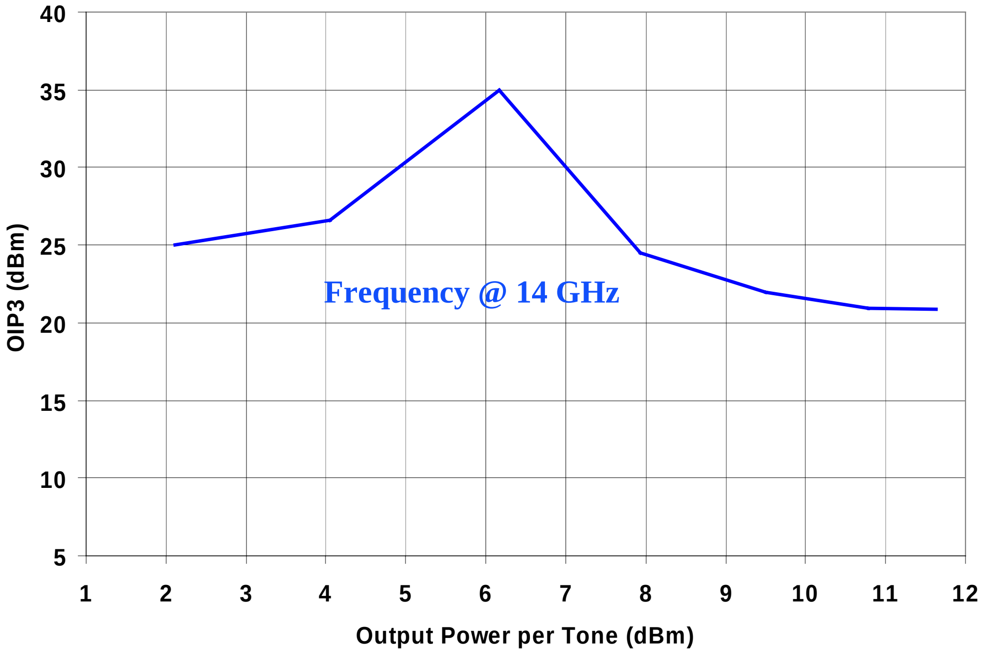


Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Preliminary Measured Data

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

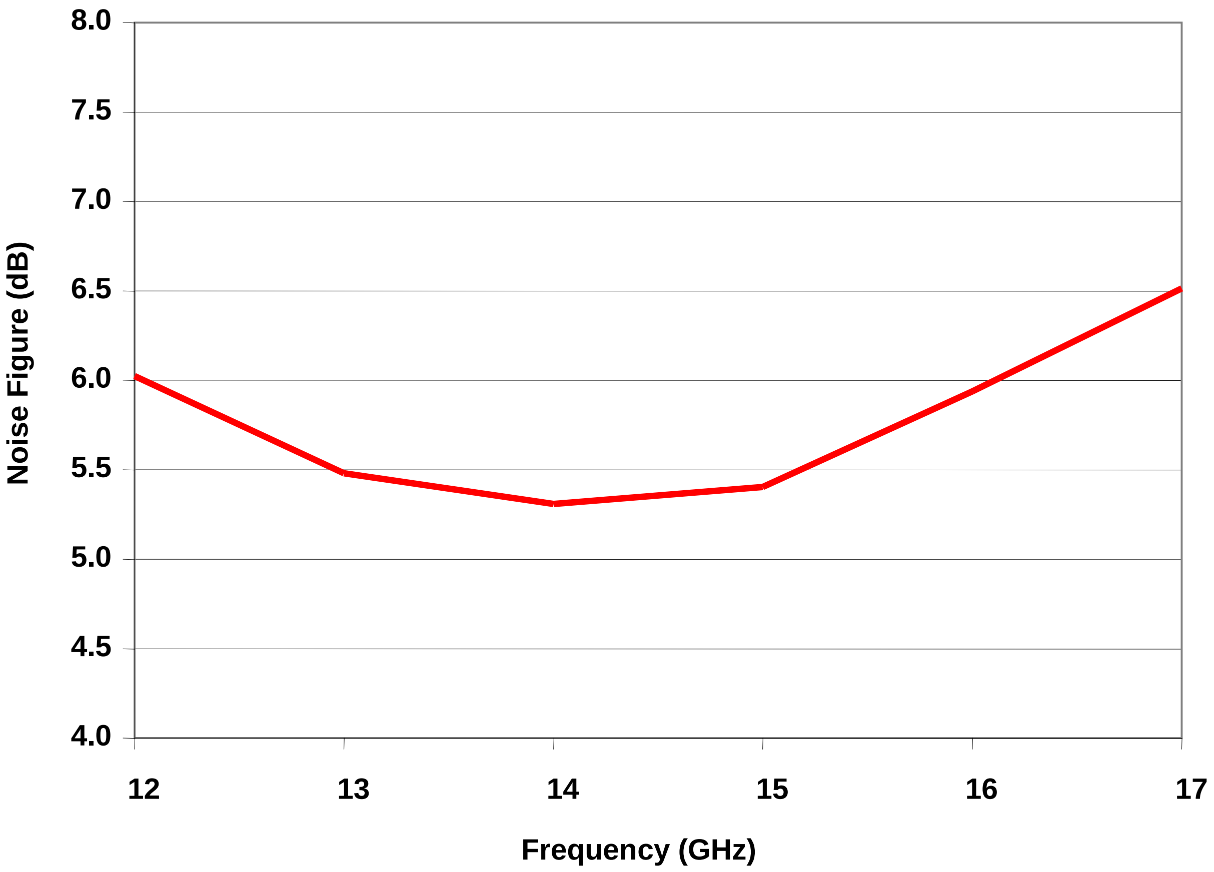




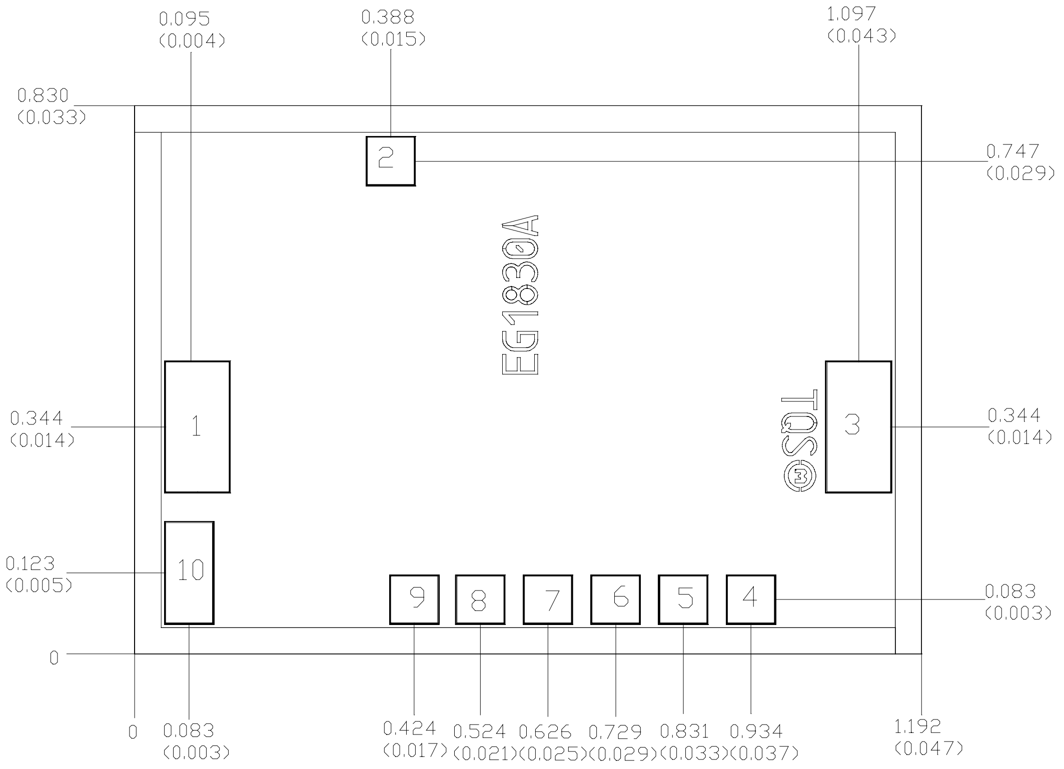
Note: Devices designated as EPU are typically early in their characterization process prior to finalizing all electrical and process specifications. Specifications are subject to change without notice

Preliminary Measured Data

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



Mechanical Drawing

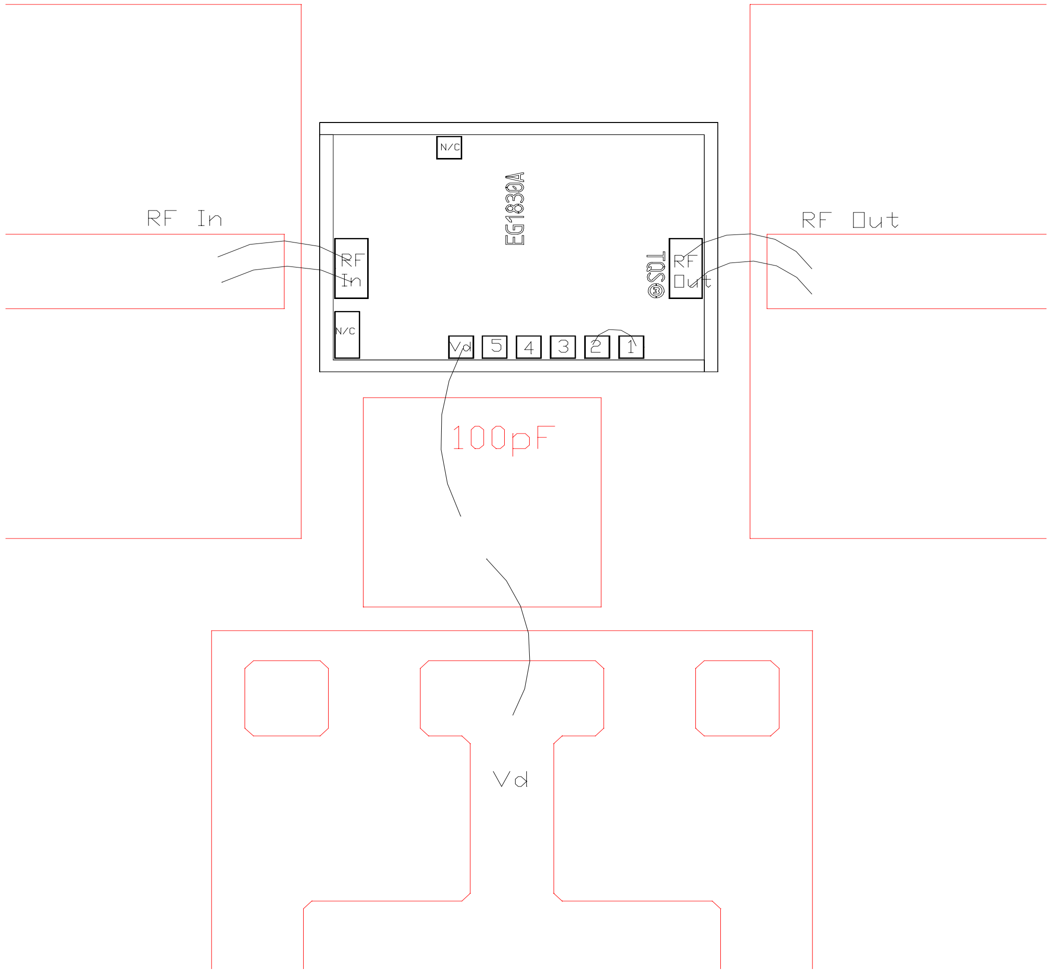


Units: millimeters (inches)
Thickness: 0.100 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)
GND is back side of MMIC

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.

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 ± 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.

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

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.

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