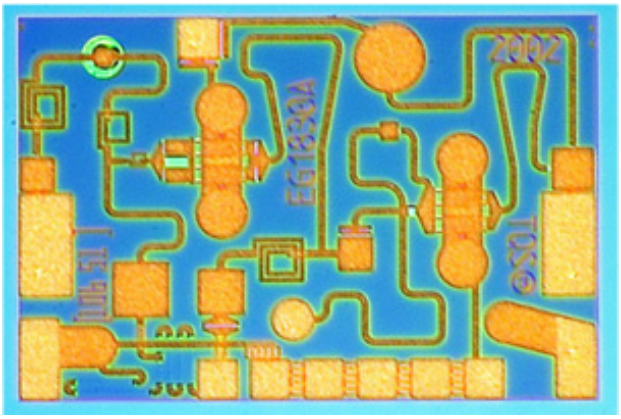
12-18 GHz Ku-Band 2-Stage Driver Amplifier TGA2506

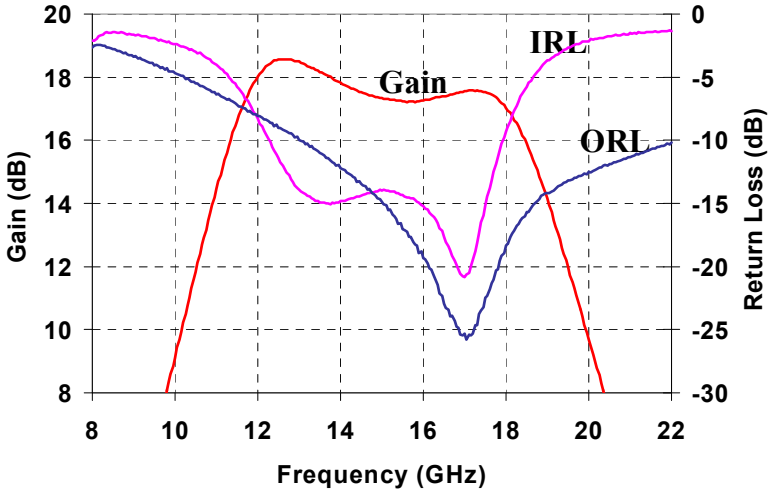


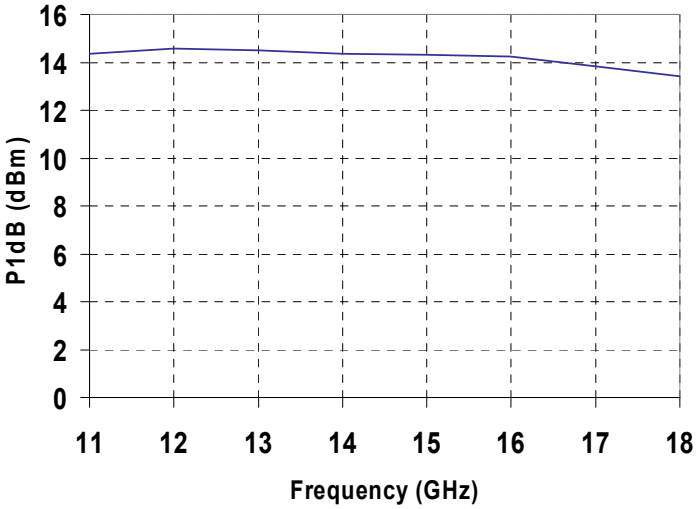
Key Features

- 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: Datasheet is subject to change without notice.

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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

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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°C baseplate temperature. Worst case condition with no RF applied, 100% of DC power is dissipated.

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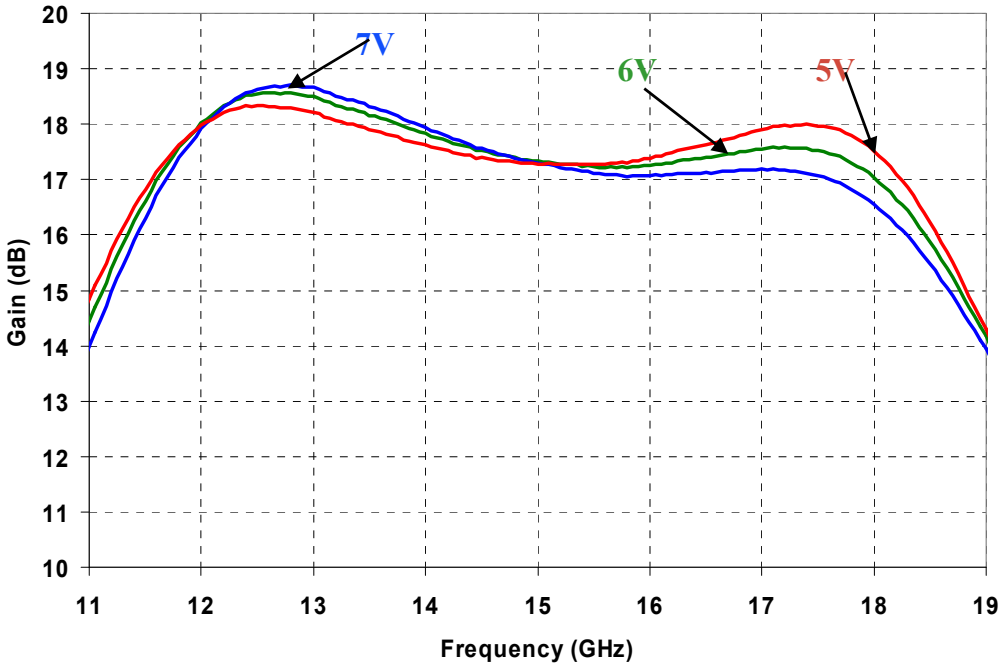
Preliminary Measured Data

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



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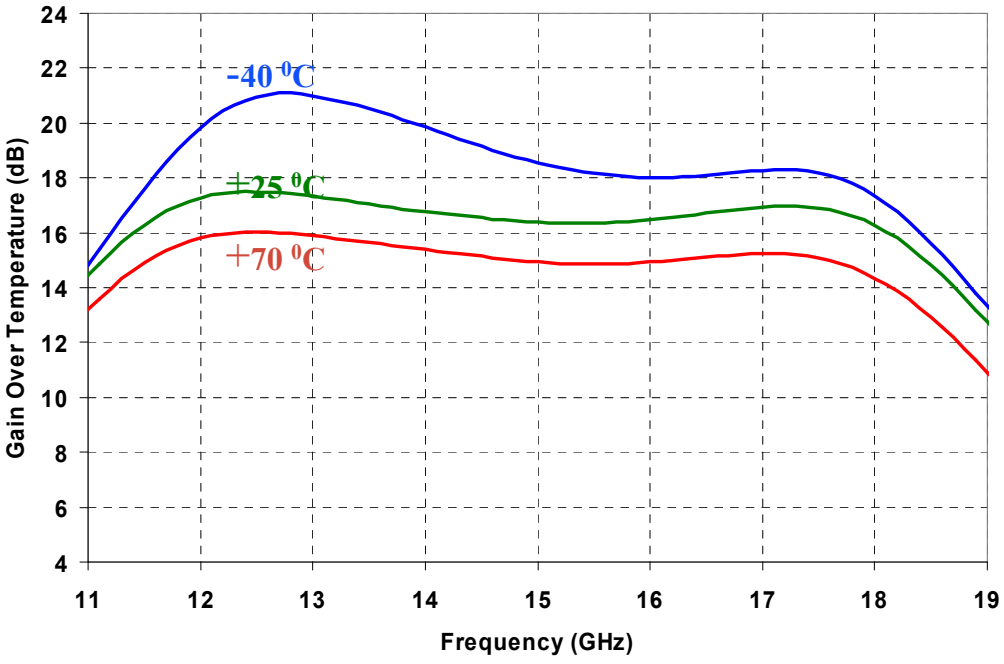

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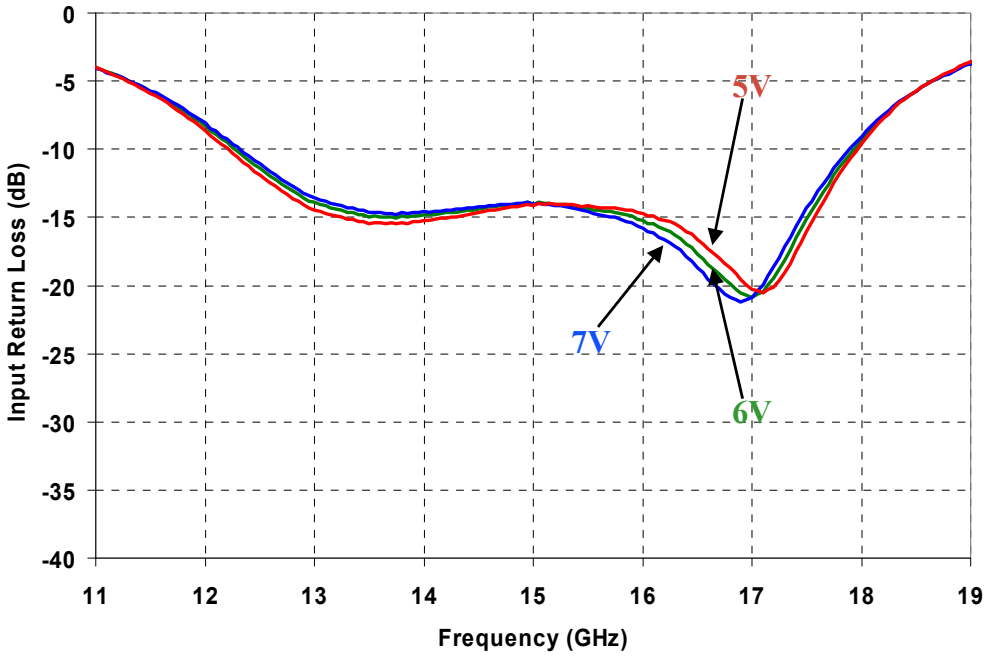

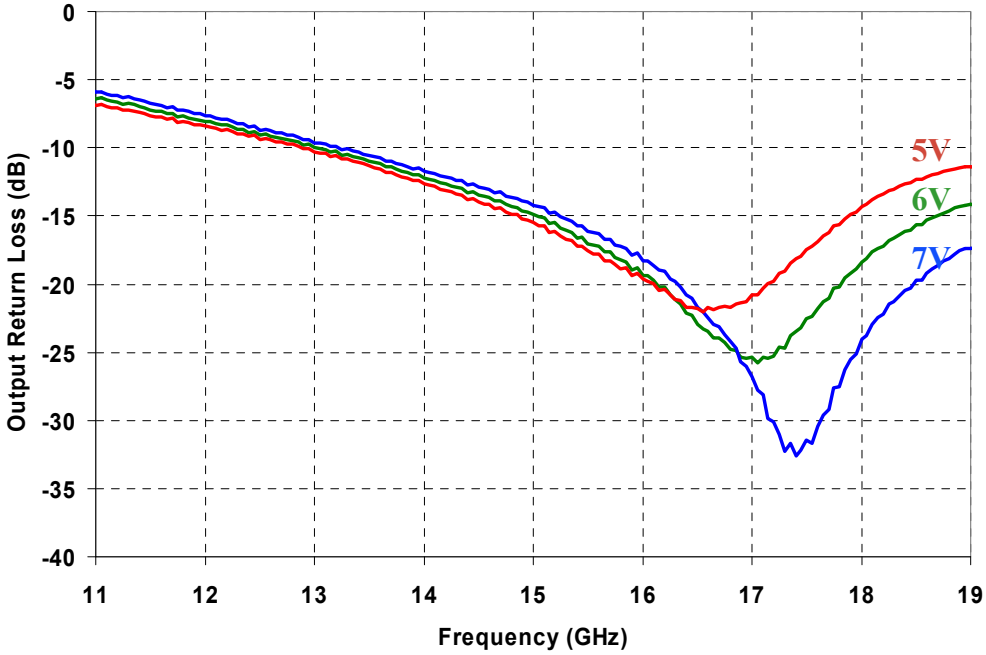

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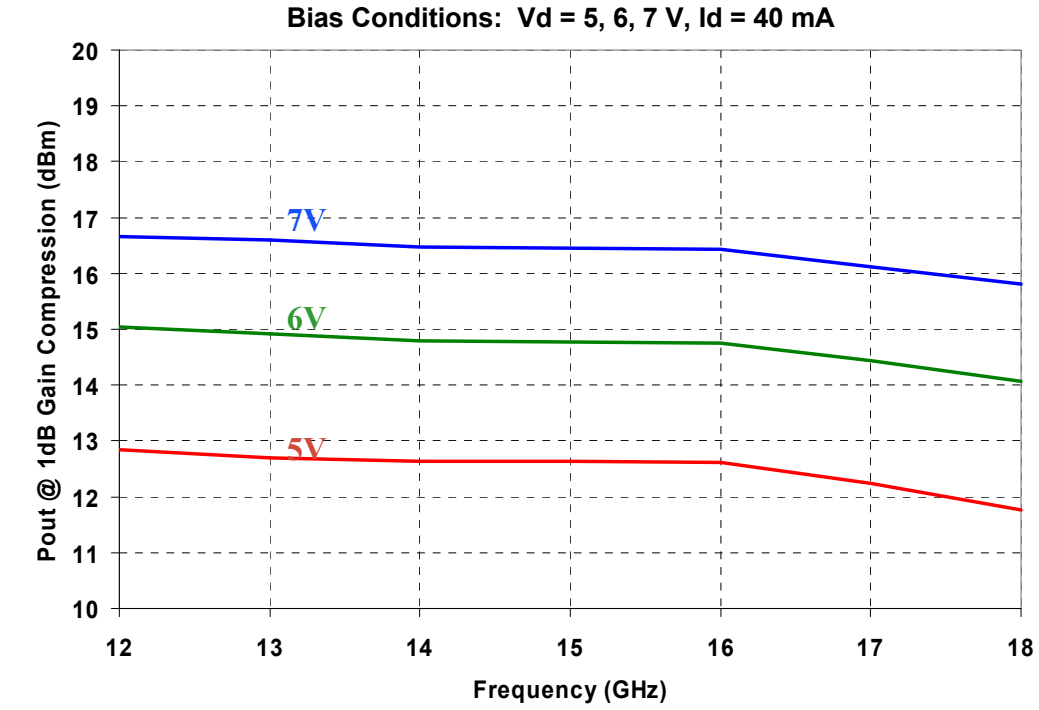
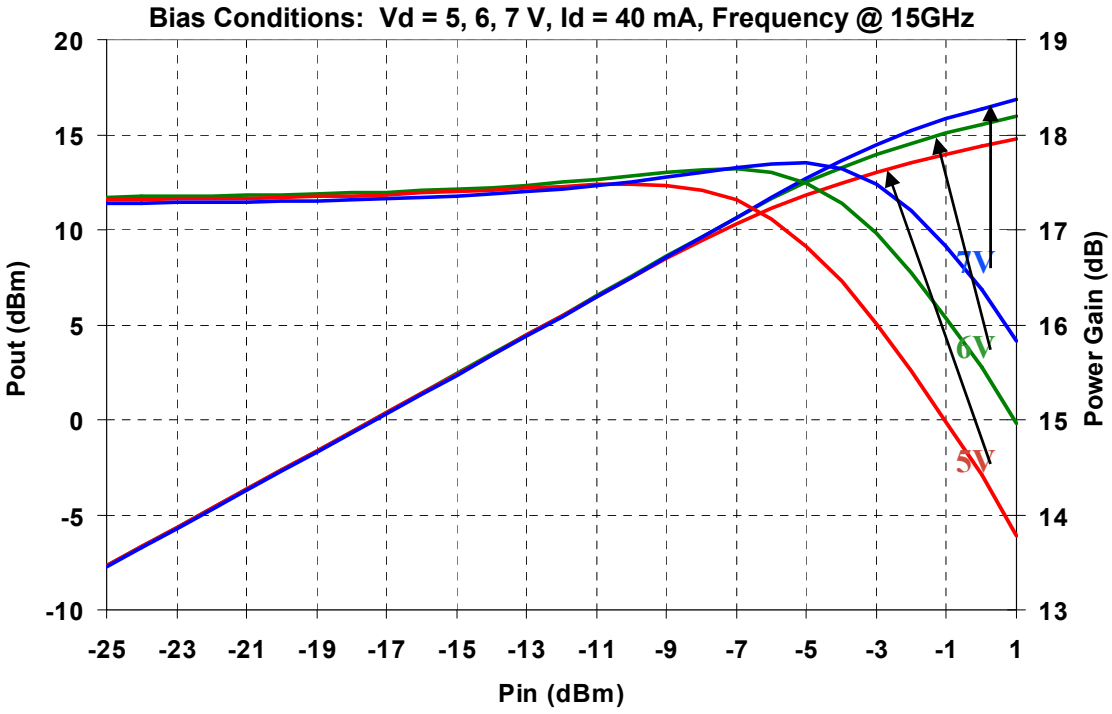
Preliminary Measured Data





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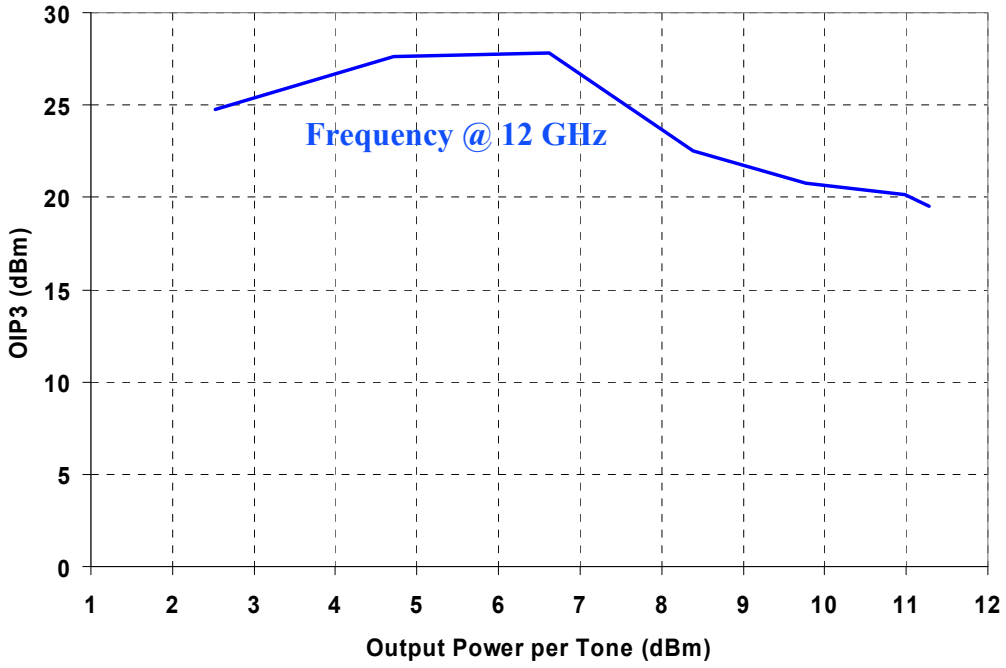

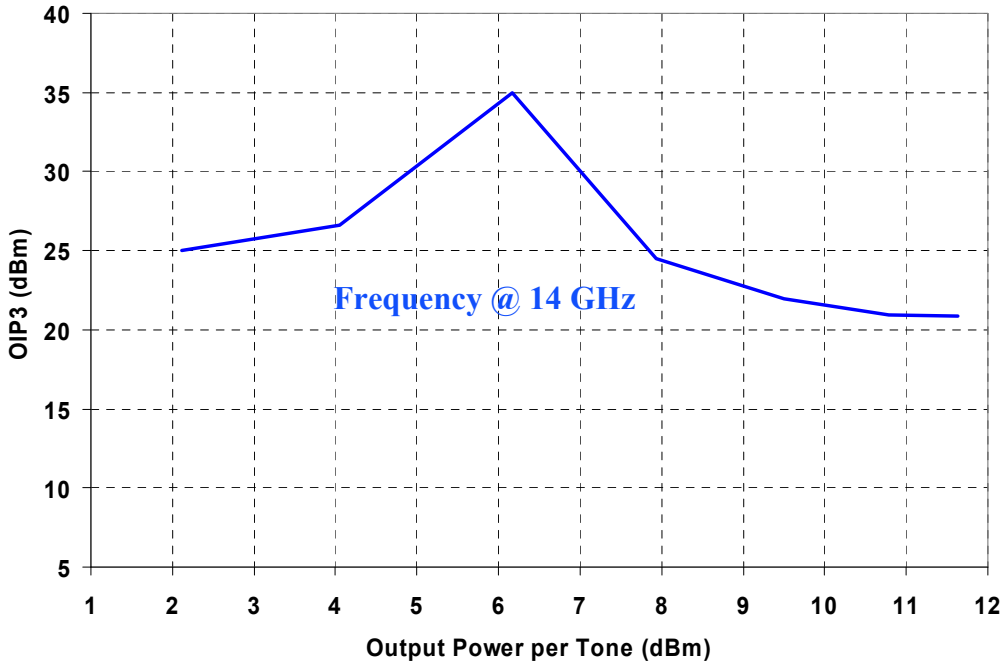

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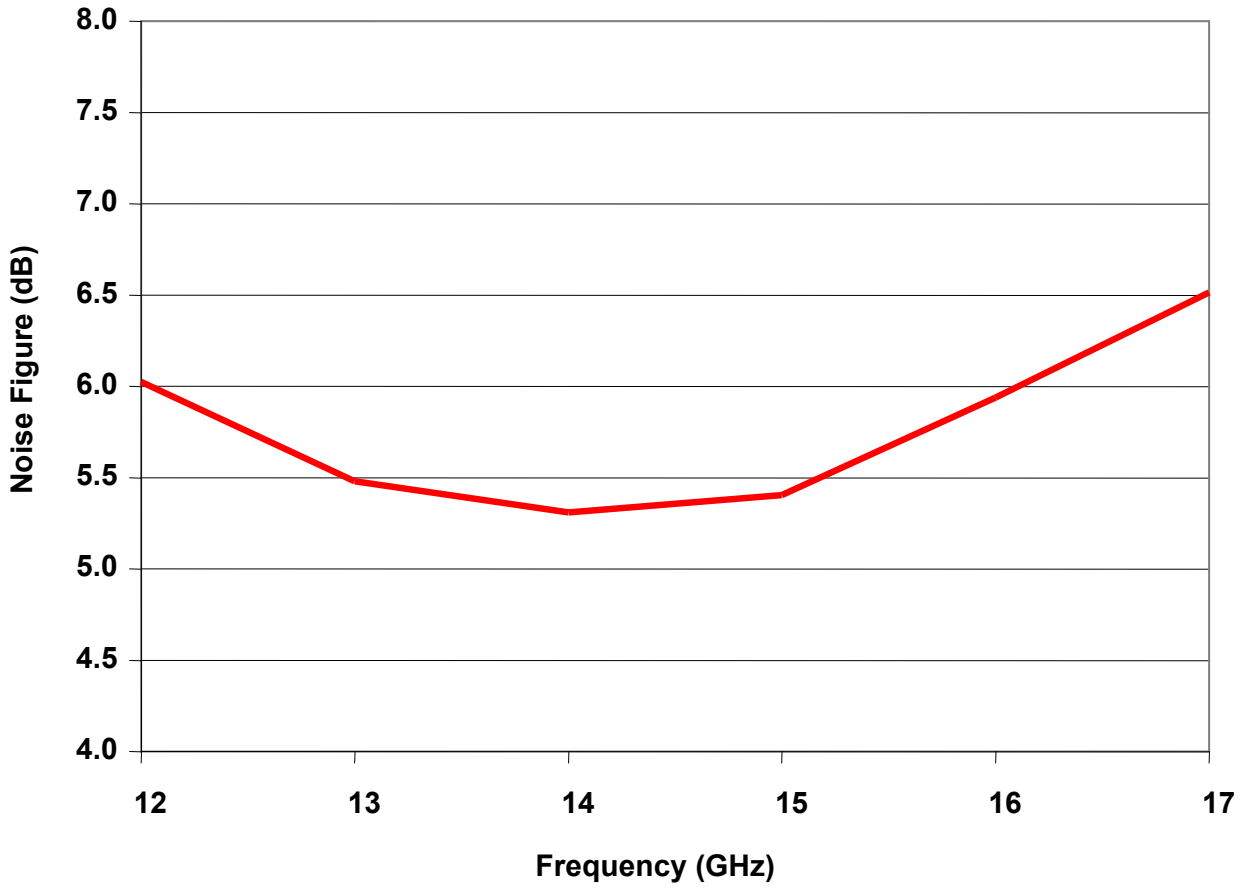

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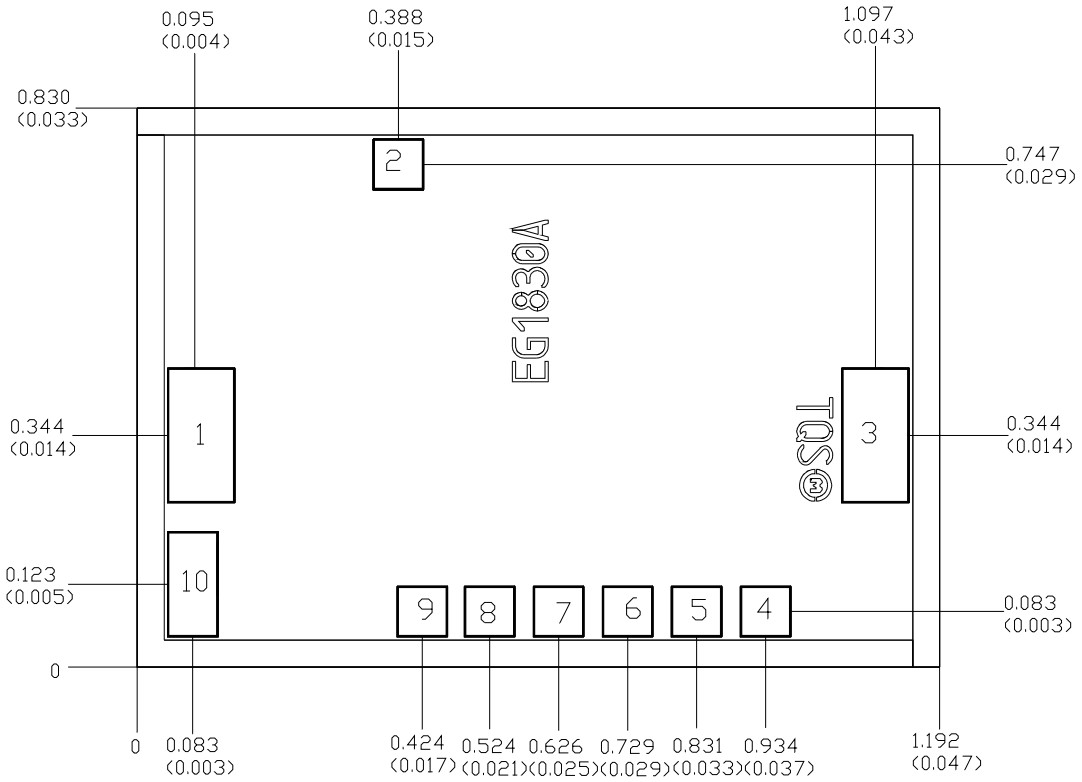
Mechanical Drawing

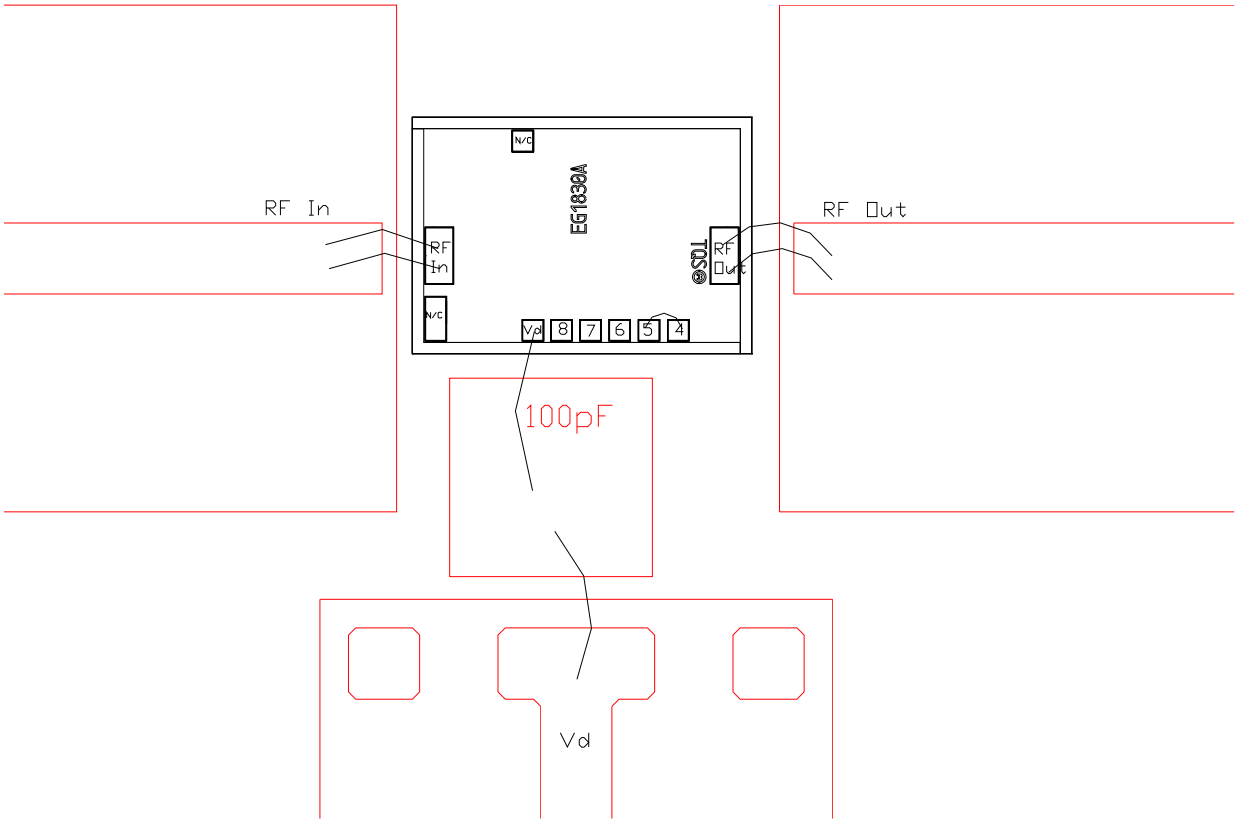


Units: millimeters (inches)
Thickness: 0.100 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)
GND is back side of MMIC

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

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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.