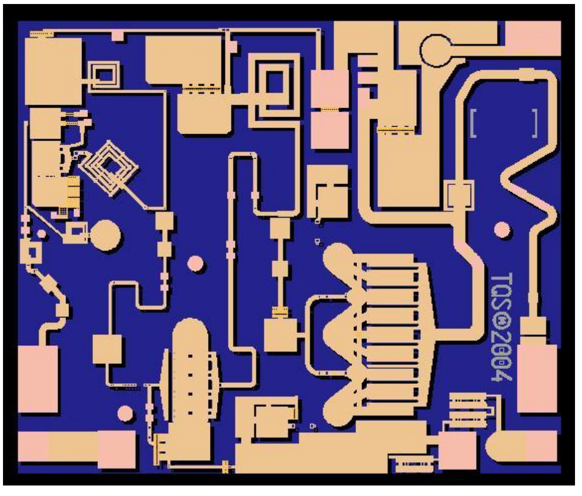
TriQuint SEMICONDUCTOR

TGA2700

X Band Driver Amplifier



Key Features

- Frequency Range: 7-13 GHz
- 25 dB Nominal Gain
- 30dBm Output Power @ Pin=10dBm, Midband
- 12 dB Input Return Loss
- 10 dB Output Return Loss
- 0.25 um 3MI pHEMT Technology
- Nominal Bias 9V @ 300 mA/225 mA
- Chip Dimensions: 1.57 x 1.33 x 0.10 mm
  (0.062 x 0.052 x 0.004 in)

Primary Applications

- X-band Driver
- Point-to-Point Radio

Product Description

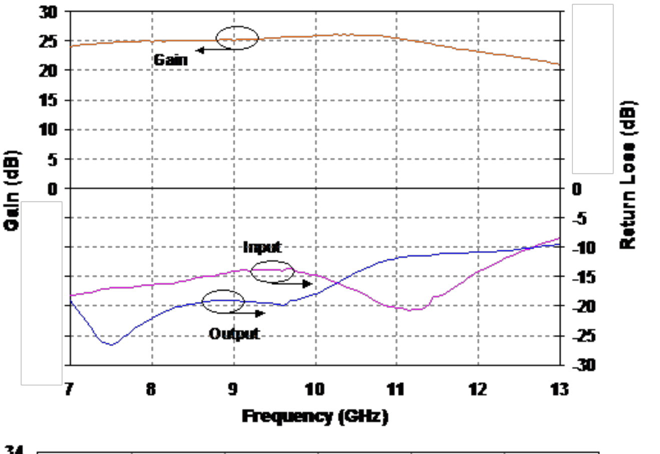
The TriQuint TGA2700 is an X-band Driver Amplifier that operates between 7-13 GHz, The Driver Amplifer is designed using TriQuint's proven standard 0.25 um gate pHEMT production process.

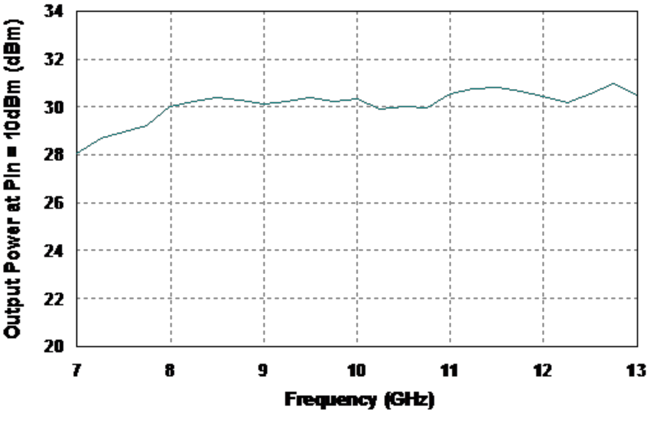
The TGA2700 provides typical 30dBm output power at +10 dBm input power and has a small signal gain of 25 dB.

The TGA2700 is 100% DC and RF tested on-wafer to ensure performance compliance.

Measured Fixtured Data

Bias Conditions: Vd = 9V, Idq= 300mA





Datasheet subject to change without notice

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TABLE I
MAXIMUM RATINGS

Symbol	Parameter 1/	Value	Notes
V^+	Positive Supply Voltage	10 V	2/
V^-	Negative Supply Voltage Range	-5V TO 0V	
I^+	Positive Supply Current	536 mA	2/
$\| I_G \|$	Gate Supply Current	14 mA	
P_{IN}	Input Continuous Wave Power	20 dBm	2/
P_D	Power Dissipation	3.7 W	2/, 3/
T_{CH}	Operating Channel Temperature	200 °C	4/, 5/
	Mounting Temperature (30 Seconds)	320 °C	
T_{STG}	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_D.

3/ When operated at this bias condition with a base plate temperature of 70 °C, the median life is 2.3E4 hours.

4/ Junction operating temperature will directly affect the device median time to failure (Tm). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

5/ These ratings apply to each individual FET.

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

Symbol	Parameter	Minimum	Maximum	Value
Idss	Saturated Drain Current	75	353	mA
Gm	Transconductance	165	398	mS
V_P	Pinch-off Voltage	-1.5	-0.5	V
B_{VGS}	Breakdown Voltage gate-source	-30	-8	V
B_{VGD}	Breakdown Voltage gate-drain	-30	-12	V

TABLE III
RF CHARACTERIZATION TABLE
(T_A = 25 °C, Nominal)
Vd = 9 V, Id = 300 mA

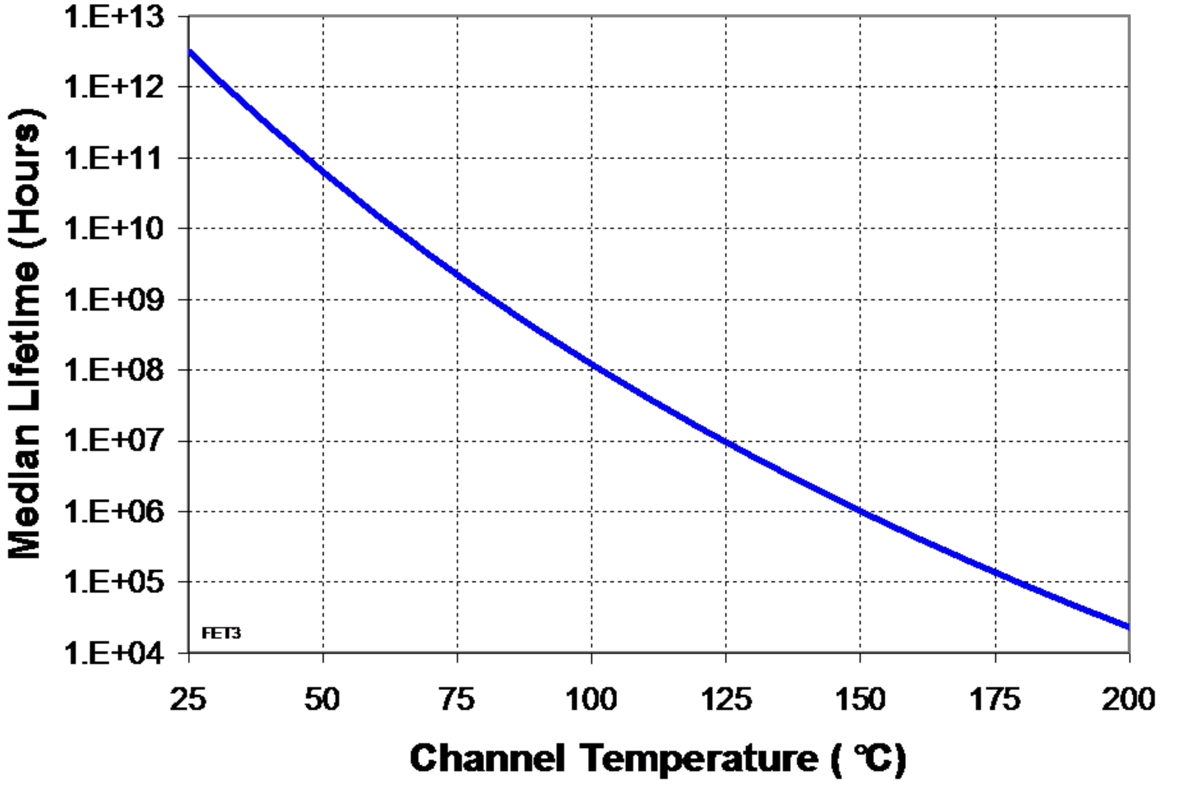
SYMBOL	PARAMETER	TEST CONDITION	NOMINAL	UNITS
Gain	Small Signal Gain	f = 7-13 GHz	25	dB
IRL	Input Return Loss	f = 7-13 GHz	12	dB
ORL	Output Return Loss	f = 7-13 GHz	10	dB
P_{sat}	Saturated Output Power	f = 8-13 GHz	30	dBm
TOI	Output TOI @ Pin = -5dBm	f = 8-12 GHz	> 36	dBm
PAE	Power Added Efficiency	f = 12 GHz	27	%

TABLE IV
THERMAL INFORMATION

Parameter	Test Conditions	$T_{baseplate}$ (°C)	T_{CH} (°C)	θ_{JC} (°C/W)	Tm (HRS)
θ_{JC} Thermal Resistance (channel to backside of package)	Vd = 9 V I_D = 225 mA Pdiss = 2.0 W	70	140	34.7	2.4 E+6

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

Median Lifetime (Tm) vs. Channel Temperature



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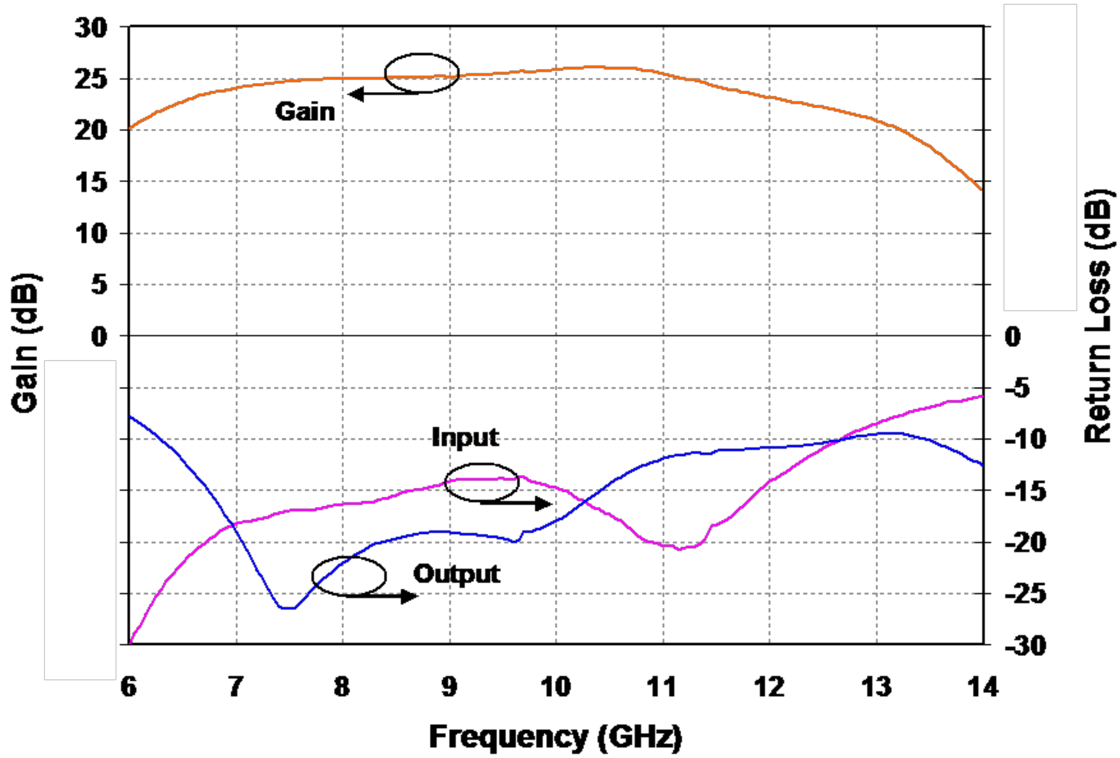
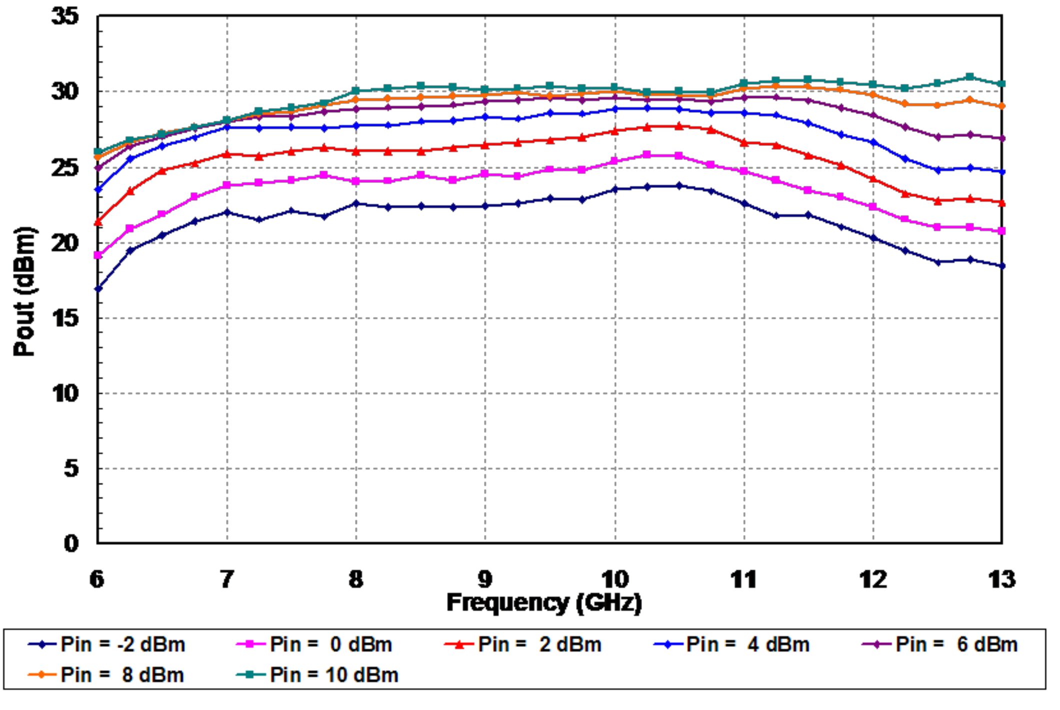
Typical Fixtured Performance

Bias Conditions: Vd = 9V, Idq = 300mA





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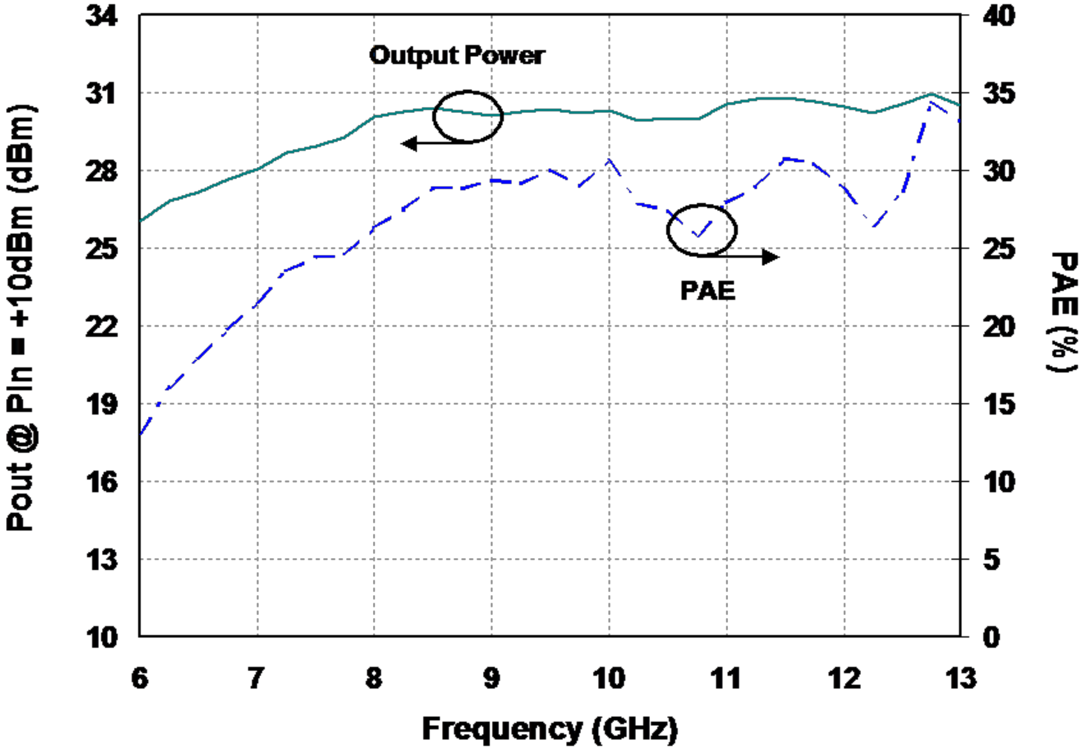

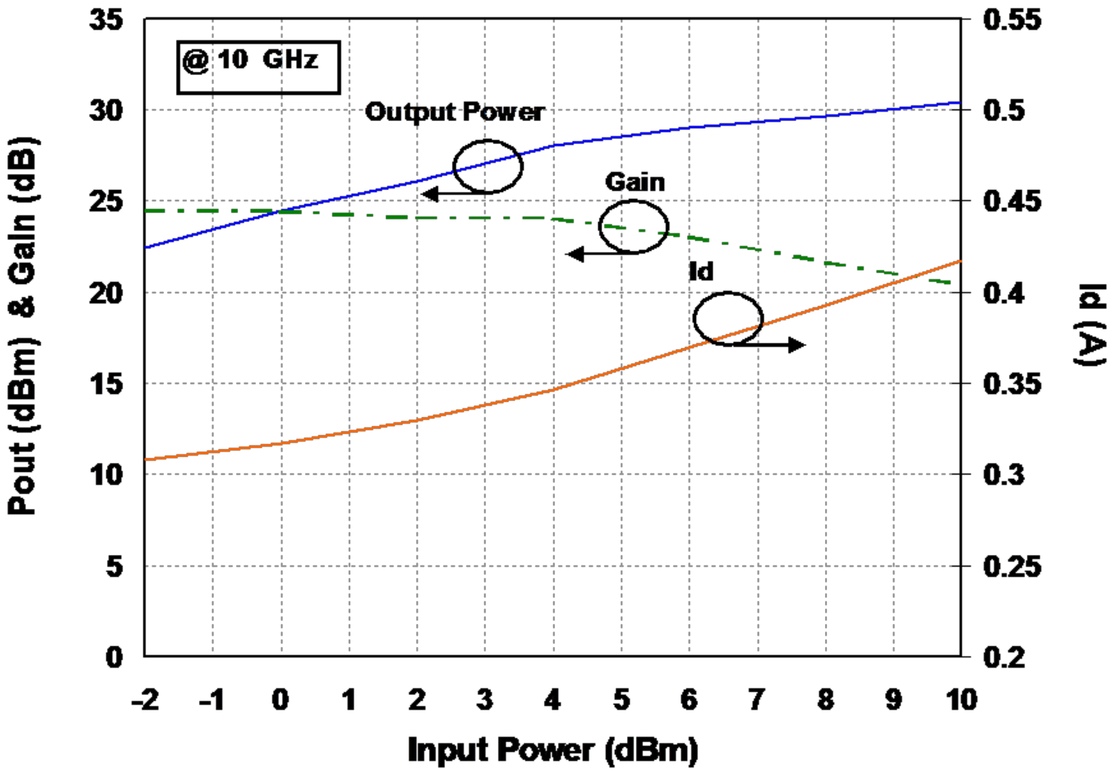

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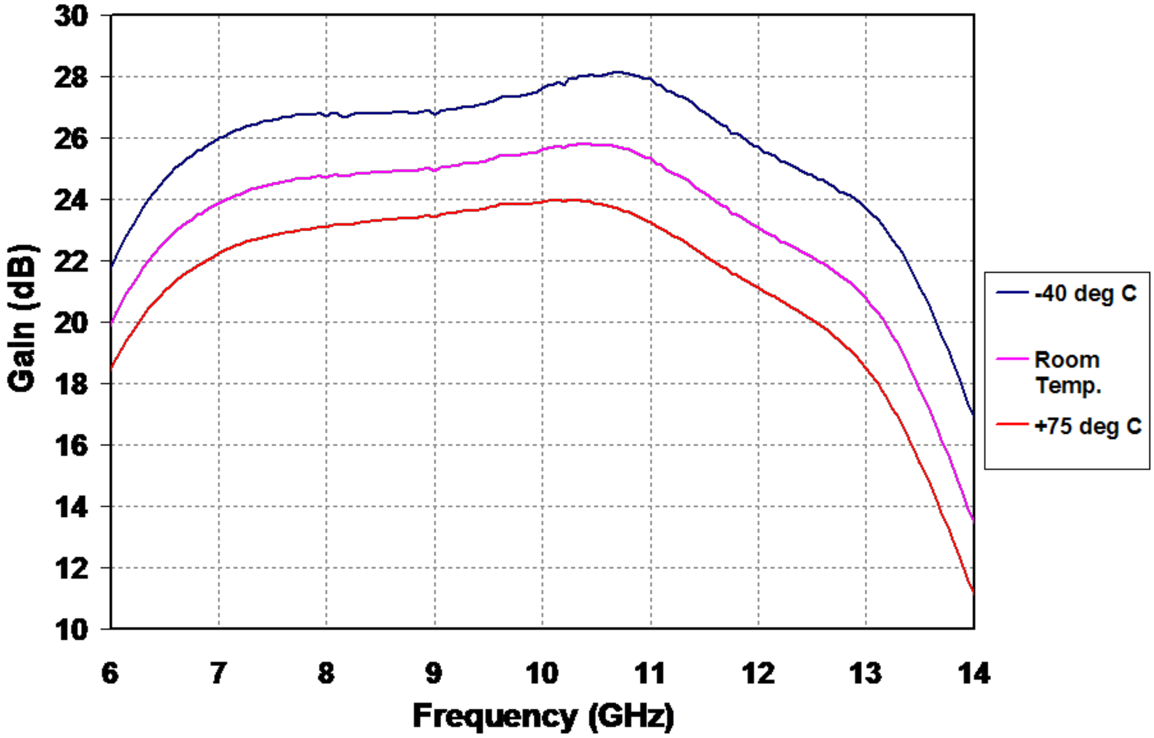

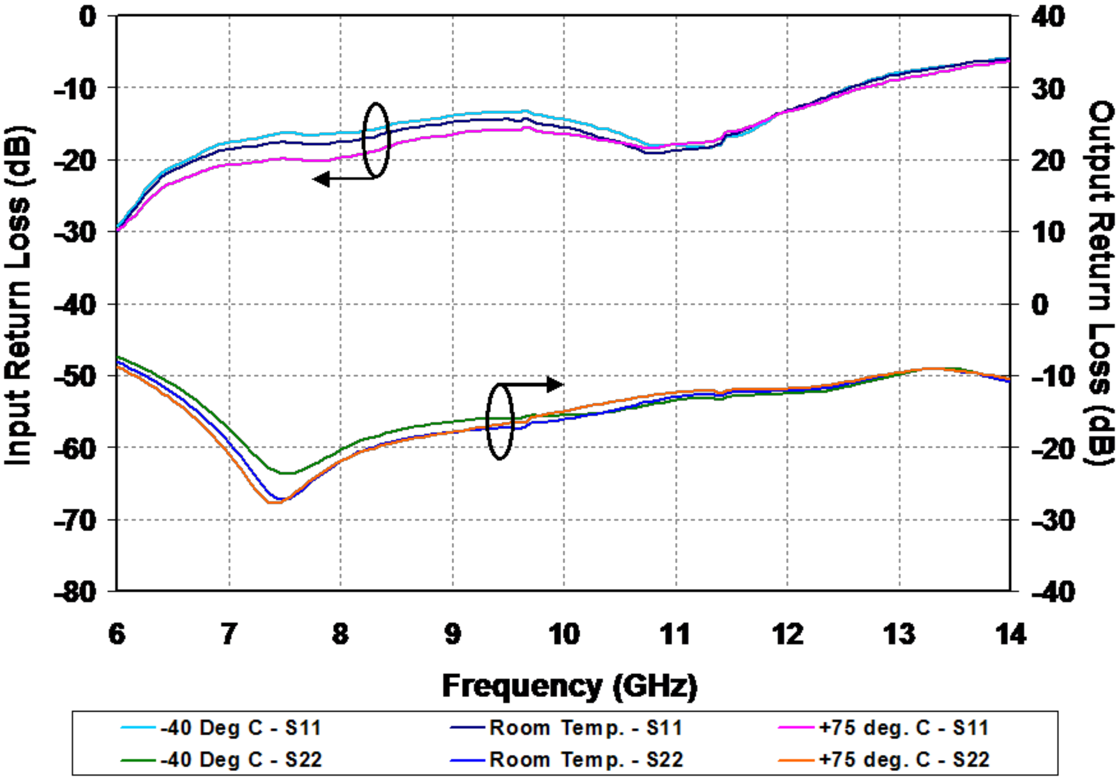

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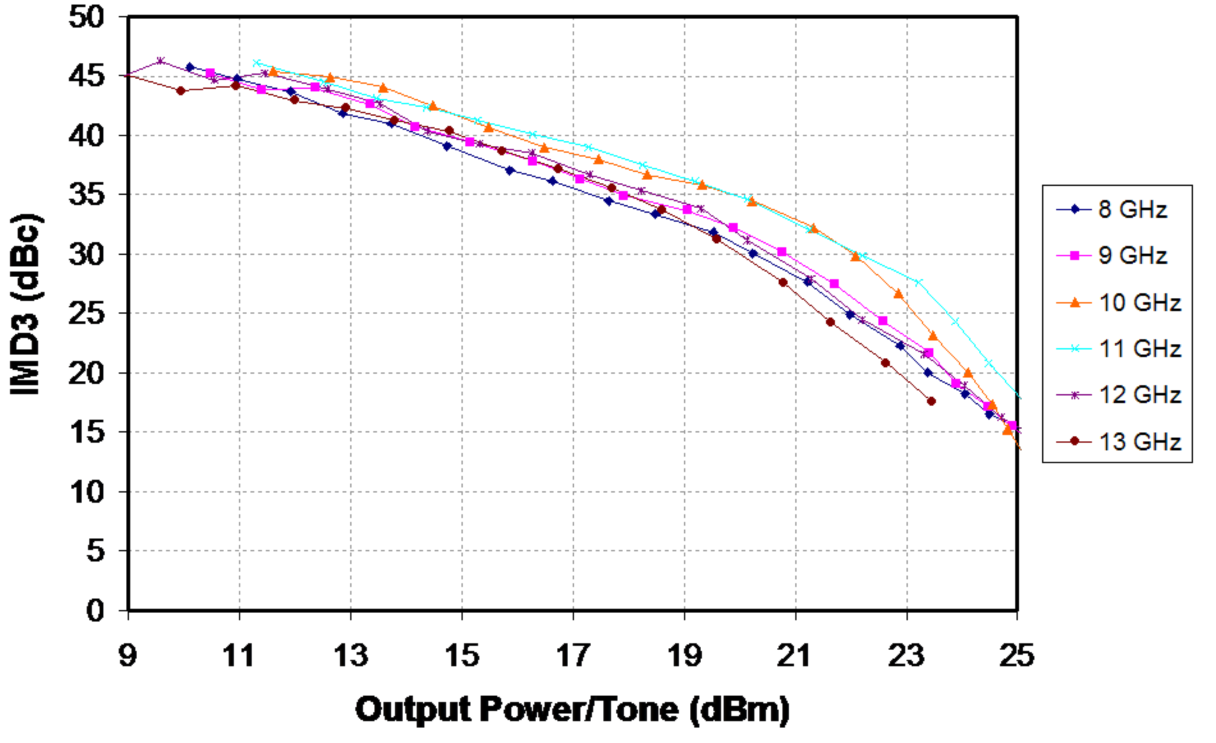

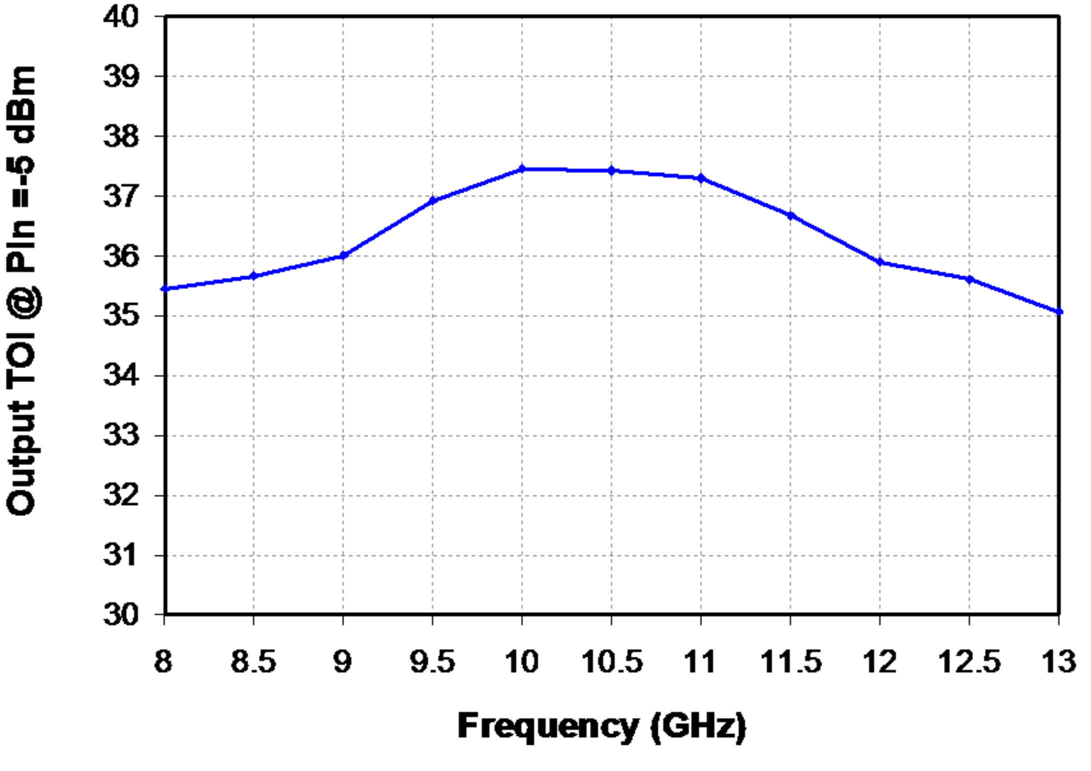

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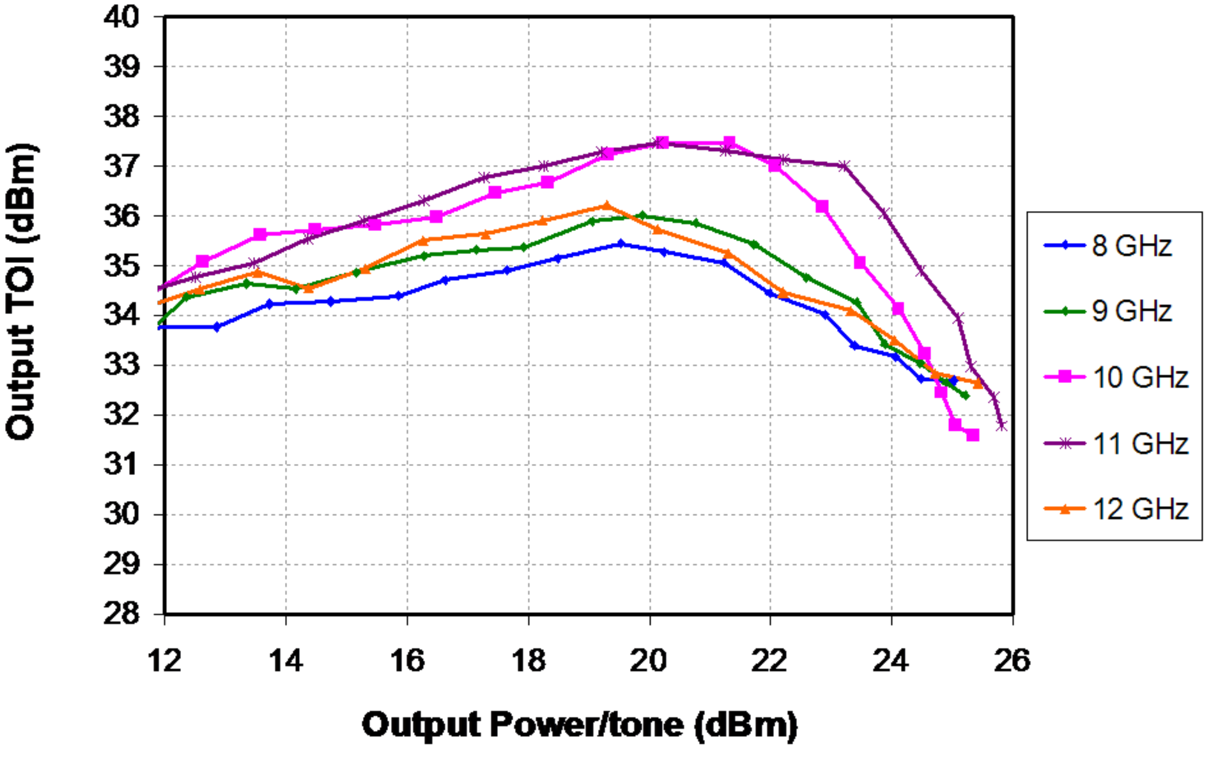
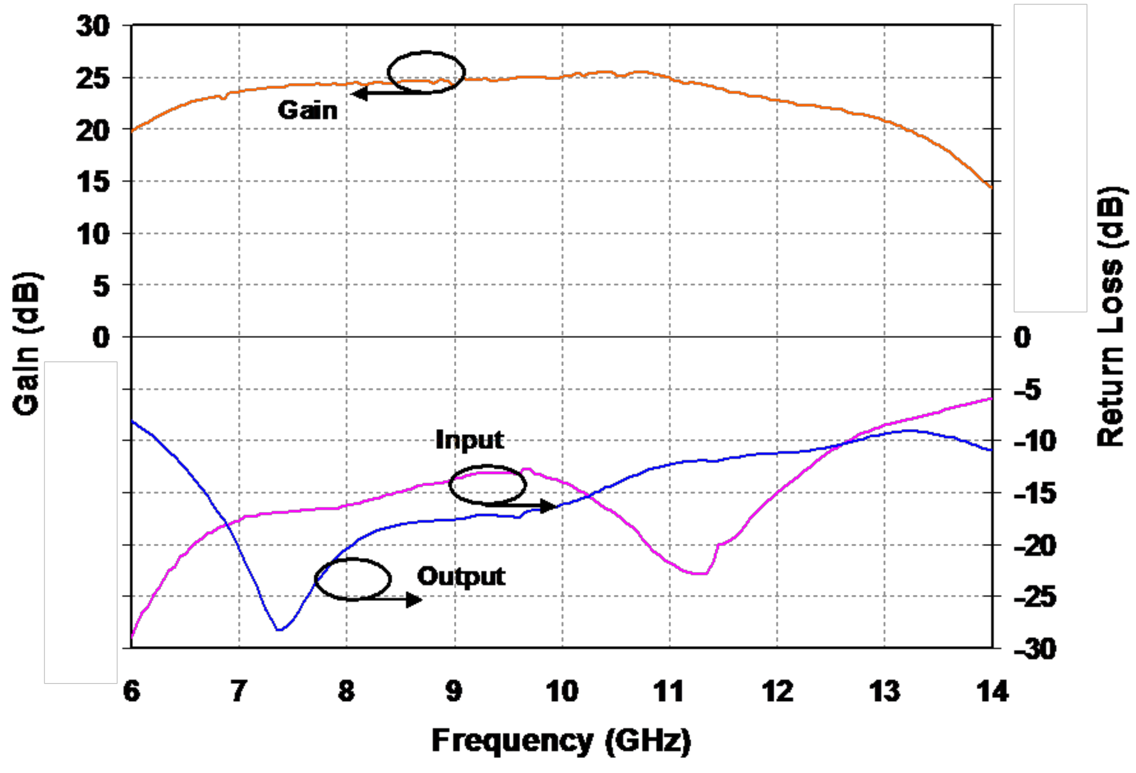
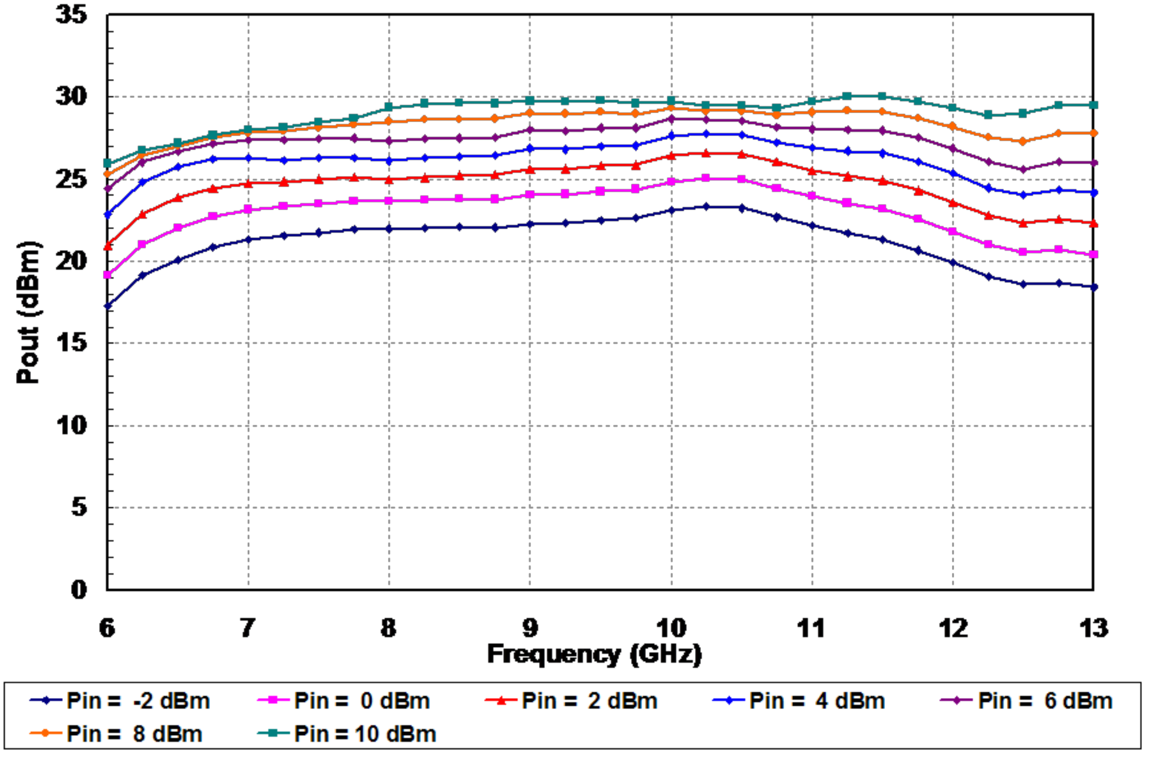


Typical Fixtured Performance

Bias Conditions: Vd = 9V, Idq = 225mA





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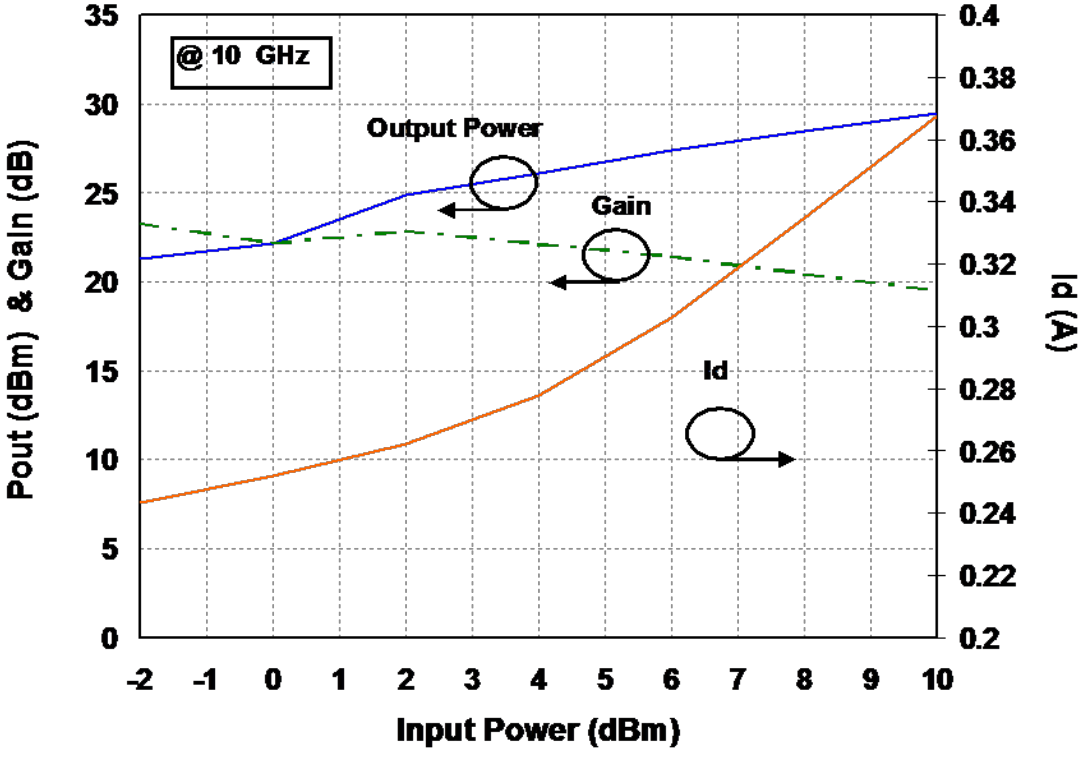

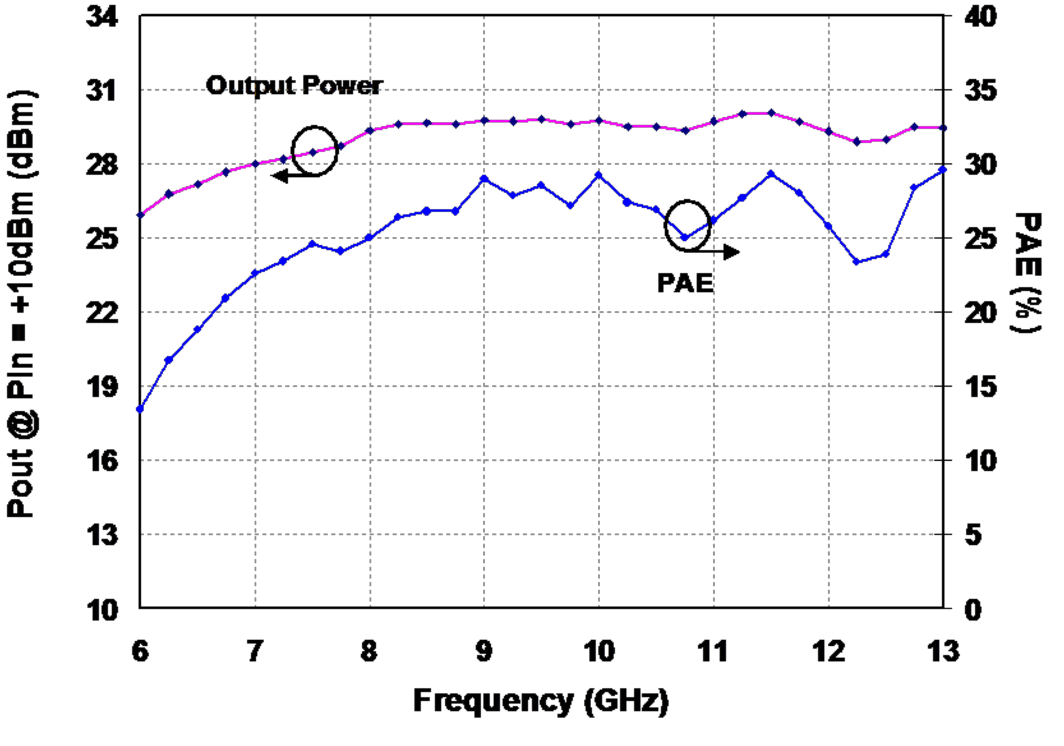

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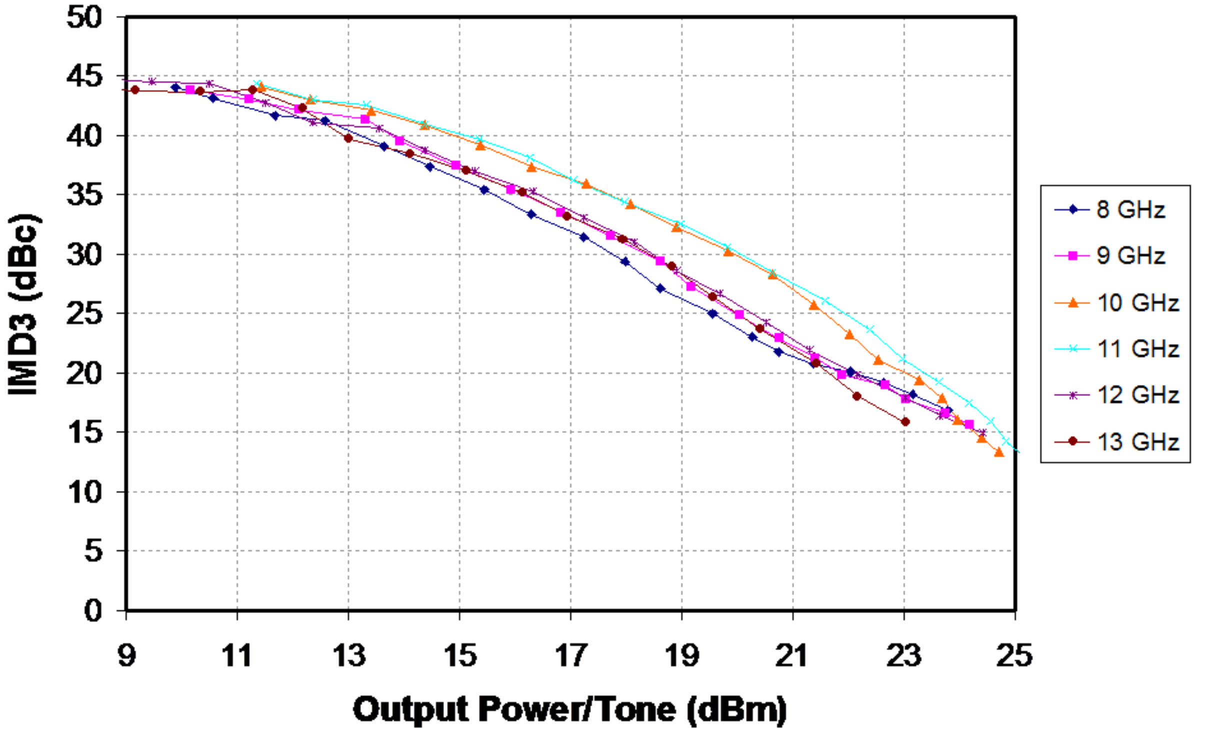

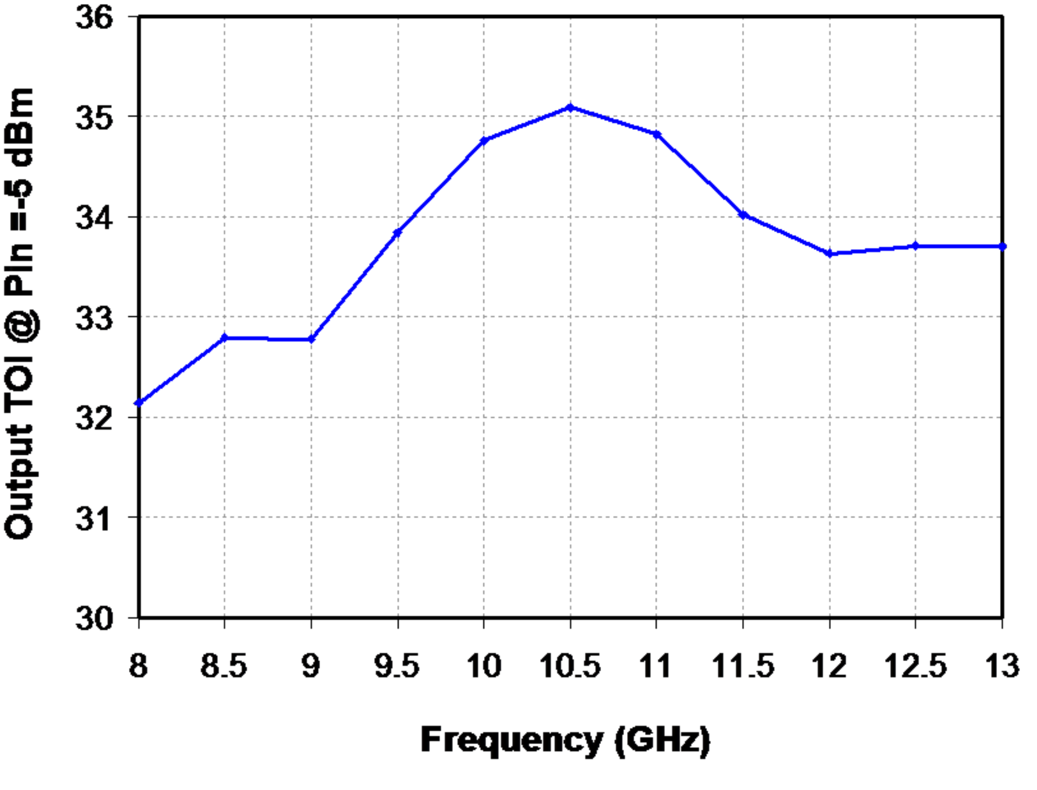

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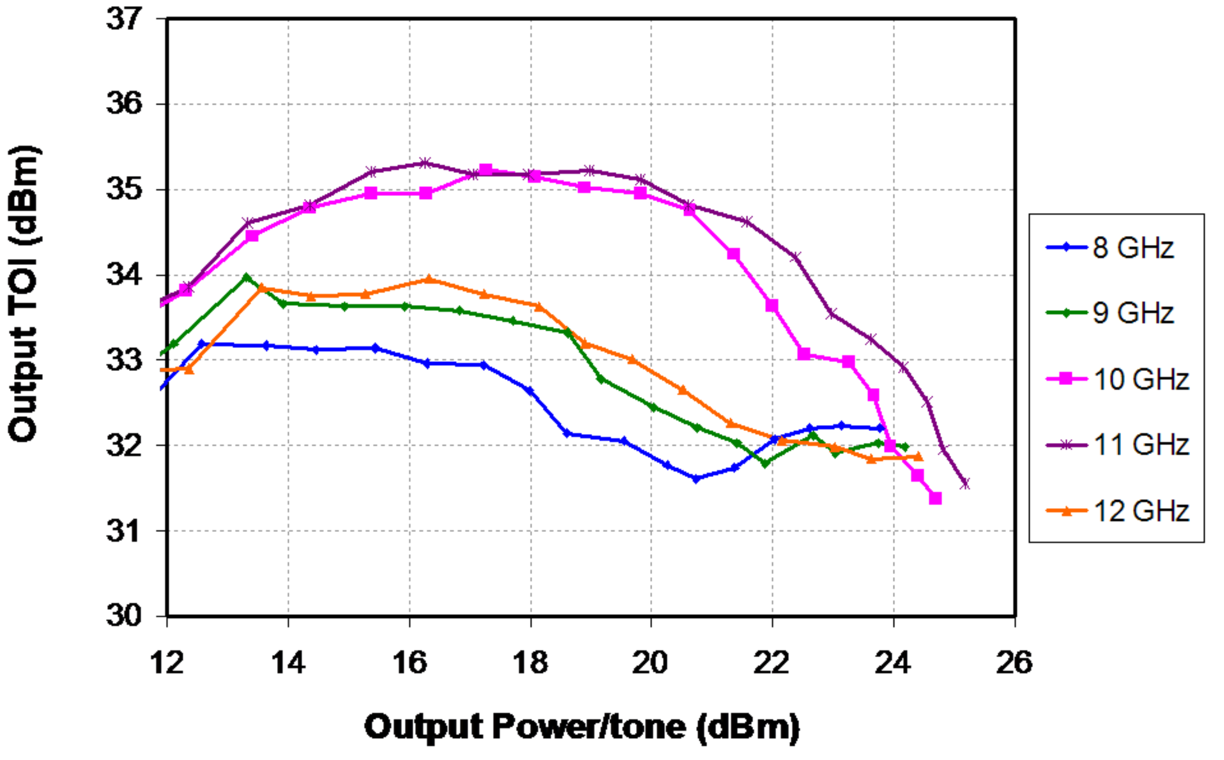
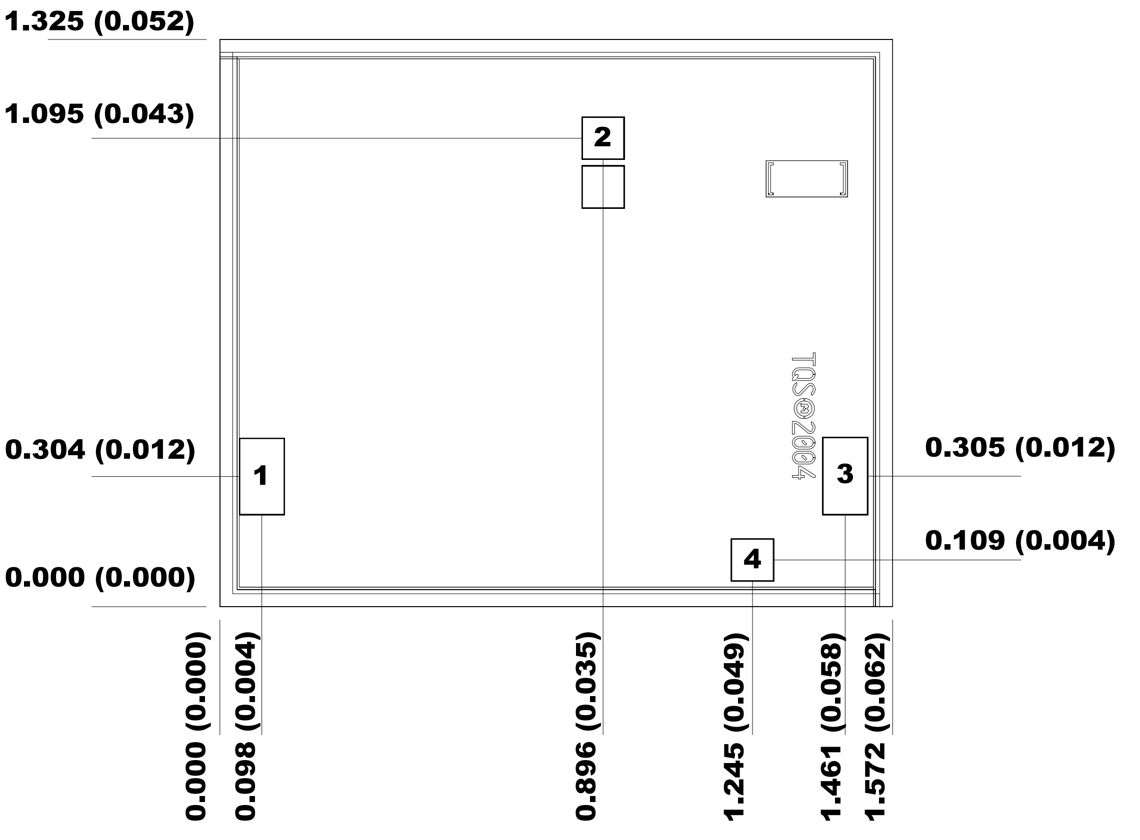


Mechanical Characteristics



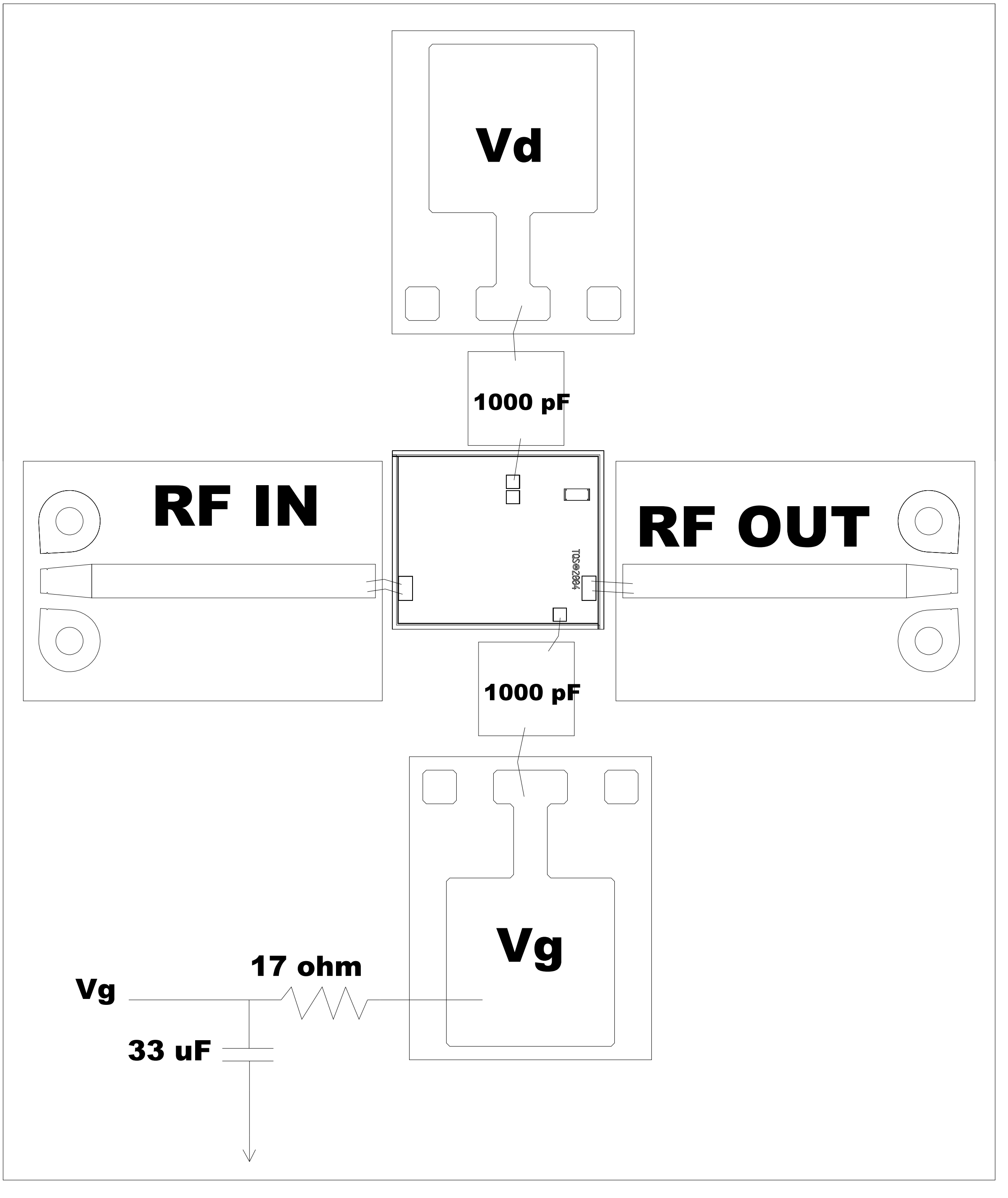
Units: millimeters (inches)
Thickness: 0.100 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.051 (0.002)

GND IS BACKSIDE OF MMIC

Bond pad #1	**(RF In)**	**0.105 x 0.180 (0.004 x 0.007)**
Bond pad #2	**(Vd)**	**0.098 x 0.098 (0.004 x 0.004)**
Bond pad #3	**(RF Out)**	**0.105 x 0.180 (0.004 x 0.007)**
Bond pad #4	**(Vg)**	**0.098 x 0.098 (0.004 x 0.004)**

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

Recommended Assembly Diagram



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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 for 30 sec
- 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.
- Devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200 °C.

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