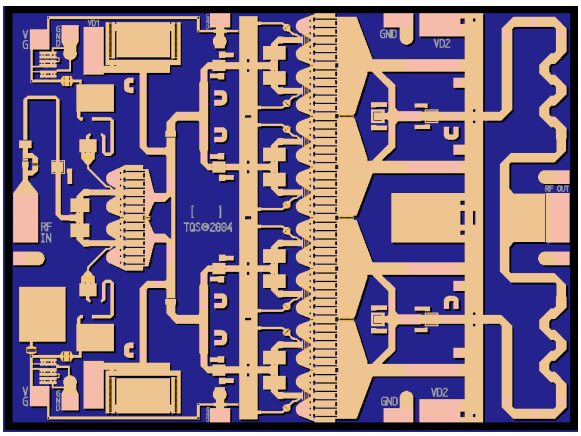
TriQuint SEMICONDUCTOR

TGA2704

9 – 10.5 GHz High Power Amplifier



Key Features

- Frequency Range: 9.0 -10.5 GHz
- 38 dBm Nominal Output Power
- 20 dB Nominal Gain
- Bias: 7-9V, 1.4A & 1.05A (~ 2A under RF drive)
- 0.25 um 3MI pHEMT Technology
- Chip Dimensions 3.52 x 2.61 x 0.10 mm (0.139 x 0.103 x 0.004 in)

Primary Applications

- Point-to-Point Radio
- Communications

Product Description

The TriQuint TGA2704 is a High Power Amplifier MMIC for 9 – 10.5GHz applications. The part is designed using TriQuint's 0.25um 3MI pHEMT production process.

The TGA2704 nominally provides 38 dBm output power and 40% PAE for bias of 9V, 1.05A. The typical gain is 20 dB.

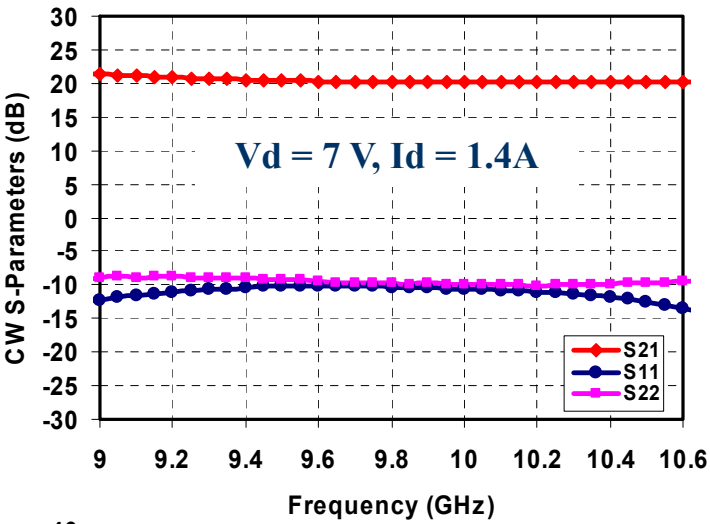
The part is ideally suited for low cost markets such as Point-to-Point Radio and Communications.

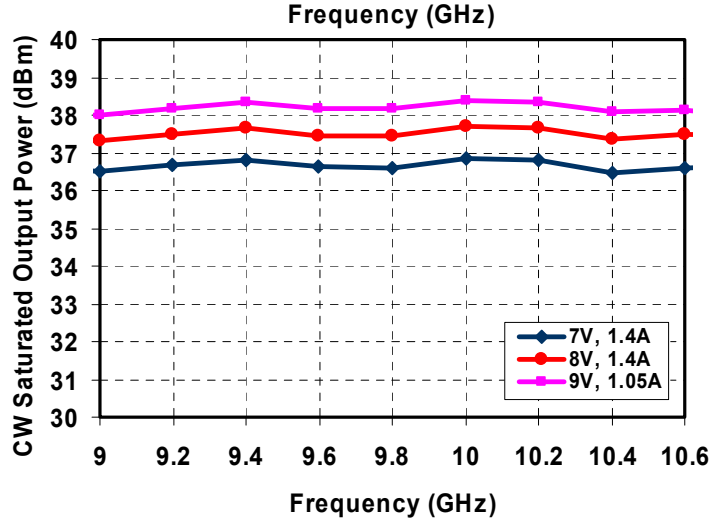
The TGA2704 is 100% DC and RF tested on-wafer to ensure performance compliance.

The TGA2704 has a protective surface passivation layer providing environmental robustness.

Lead-Free & RoHS compliant.

Measured Fixtured Data





Datasheet subject to change without notice

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TABLE I
MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
Vd	Drain Voltage	10 V	2/
Vg	Gate Voltage Range	-1 TO +0.5 V	
Id	Drain Current	3.85 A	2/ 3/
$\|Ig\|$	Gate Current	85 mA	3/
P_{IN}	Input Continuous Wave Power	23 dBm	
P_D	Power Dissipation	18.3 W	2/ 4/
T_{CH}	Operating Channel Temperature	200 °C	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/ Total current for the entire MMIC.

4/ When operated at this power dissipation with a base plate temperature of 70 °C, the median life is 2.3E4 hrs.

5/ 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.

TABLE II

ELECTRICAL CHARACTERISTICS

(Ta = 25 ^{0}C Nominal)

PARAMETER	TYPICAL	TYPICAL	UNITS
Frequency Range	9.0 – 10.5	9.0 – 10.5	GHz
Drain Voltage, Vd	7	9	V
Drain Current, Id	1.4	1.05	A
Gate Voltage, Vg	-0.6	-0.6	V
Small Signal Gain, S21	20	19	dB
Input Return Loss, S11	10	10	dB
Output Return Loss, S22	10	10	dB
CW Saturated Output Power @ 19 dBm Pin	36.5	38	dBm
Pulsed Saturated Output Power @ 19 dBm Pin & 25% Duty Cycle	36.7	38.5	dBm
CW Power Added Eff. @ 19 dBm Pin	40	39	%
Pulsed Power Added Eff. @ 19 dBm Pin & 25% Duty Cycle	39	38	%
Small Signal Gain Temperature Coefficient	-0.03	-0.03	dB/^{0}C

TABLE III
THERMAL INFORMATION

PARAMETER	TEST CONDITIONS	T_{CH} (^{O}C)	θ_{JC} (°C/W)	Tm (HRS)
θ_{JC} Thermal Resistance (channel to Case)	Vd = 7 V Id = 1.4 A P_{diss} = 9.8W Small Signal	140	7.1	2.4E+6
θ_{JC} Thermal Resistance (channel to Case)	Vd = 7 V Id = 1.7 A @ Psat P_{diss} = 7.2 W P_{out} = 4.8 W (RF)	121	7.1	1.4E+7

Note: Assumes eutectic attach using 1.5 mil 80/20 AuSn mounted to a 20 mil CuMo Carrier at 70^{o}C baseplate temperature.

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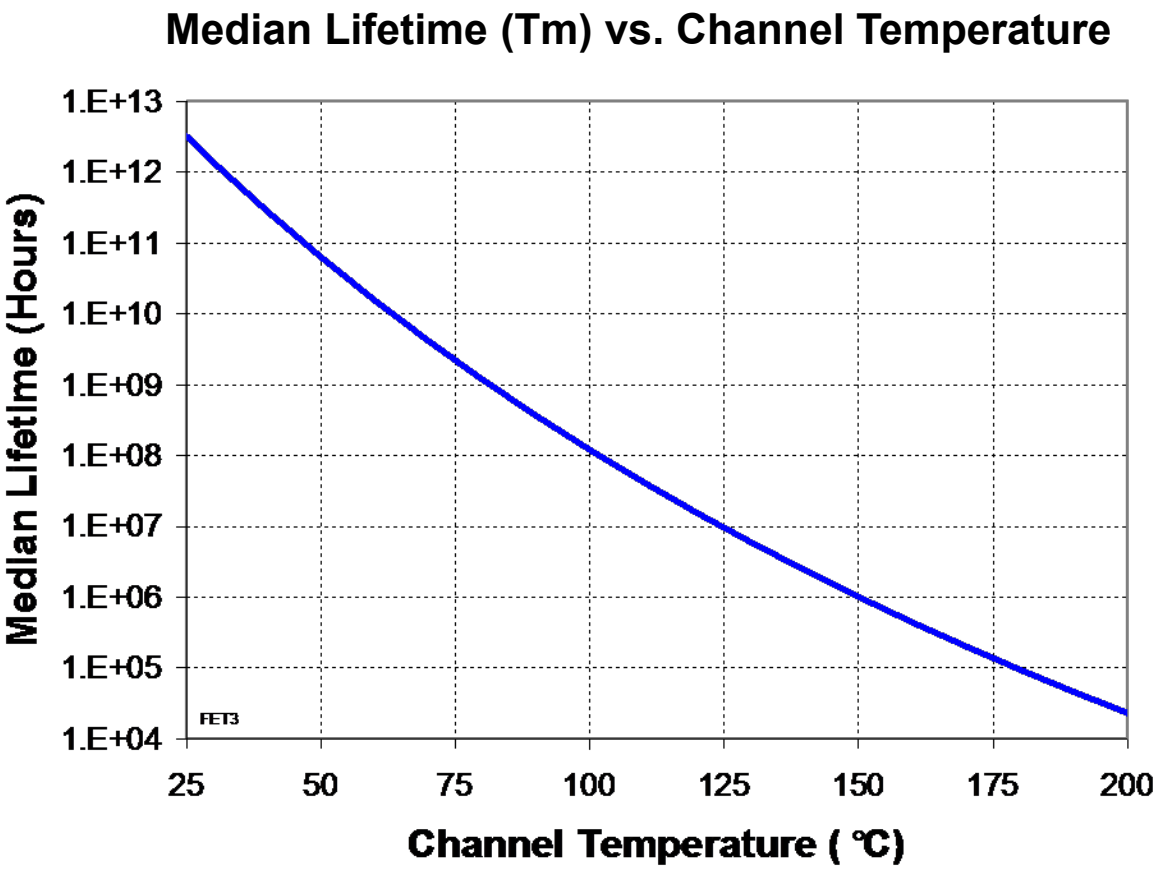
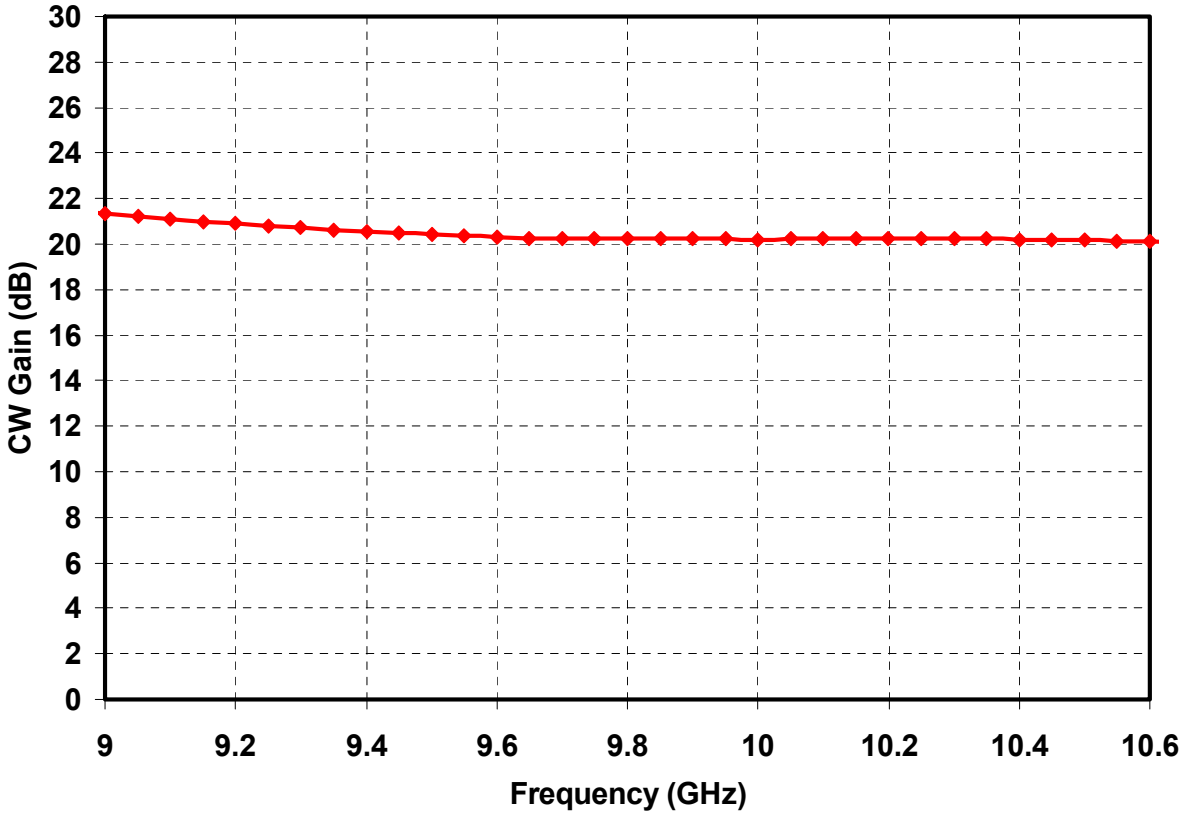
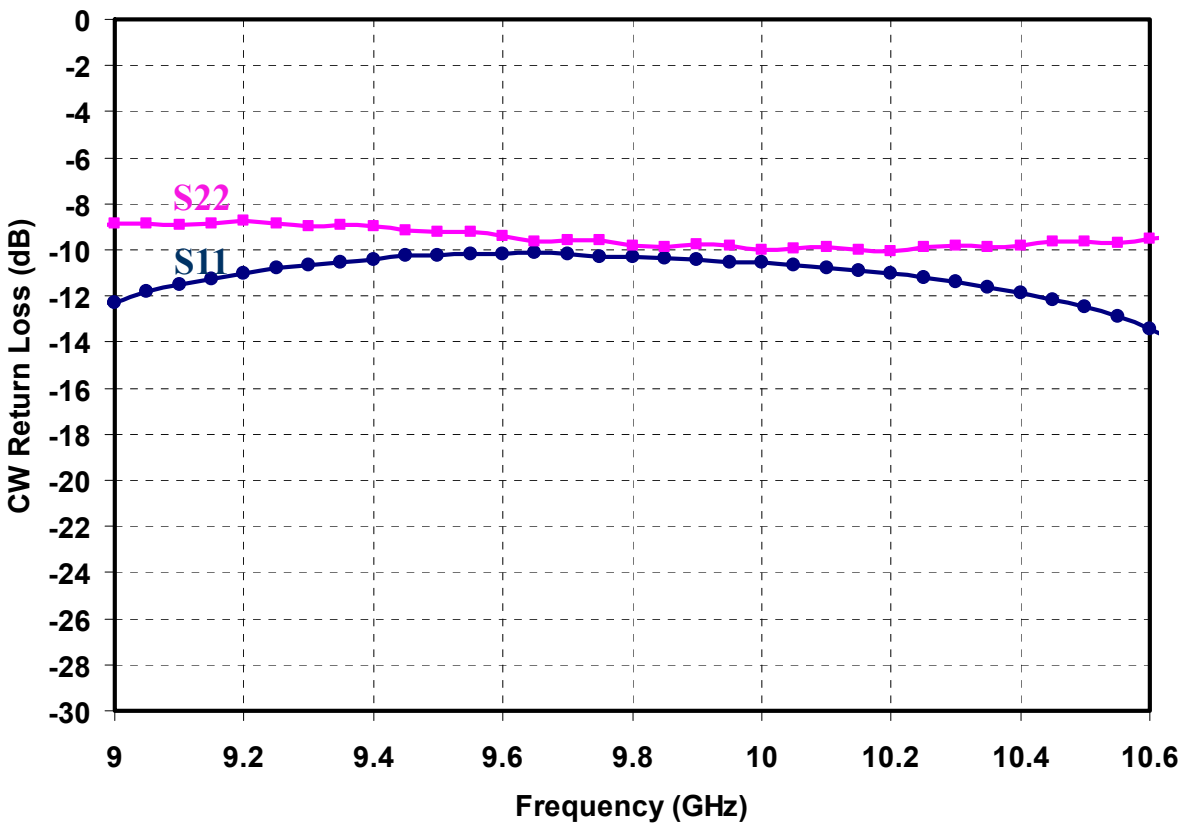


Measured Data

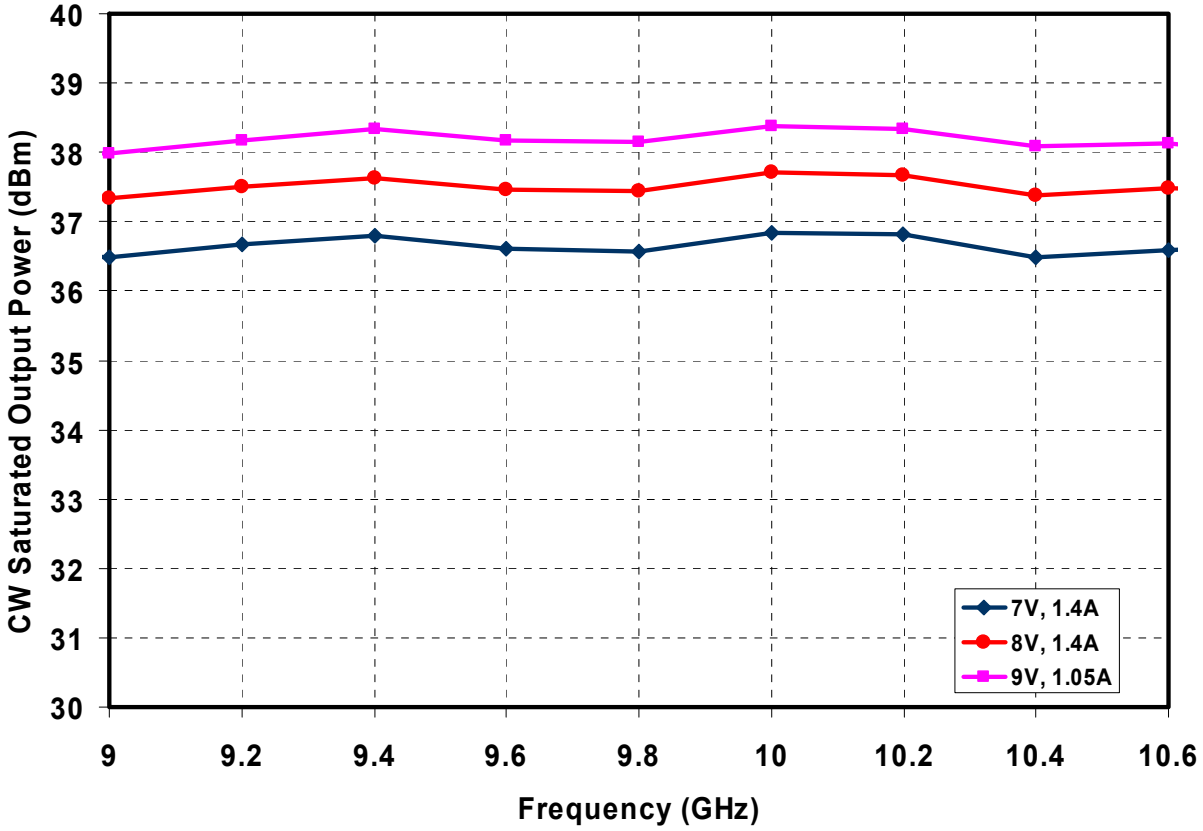
Bias Conditions: Vd = 7V, Idq = 1.4 A

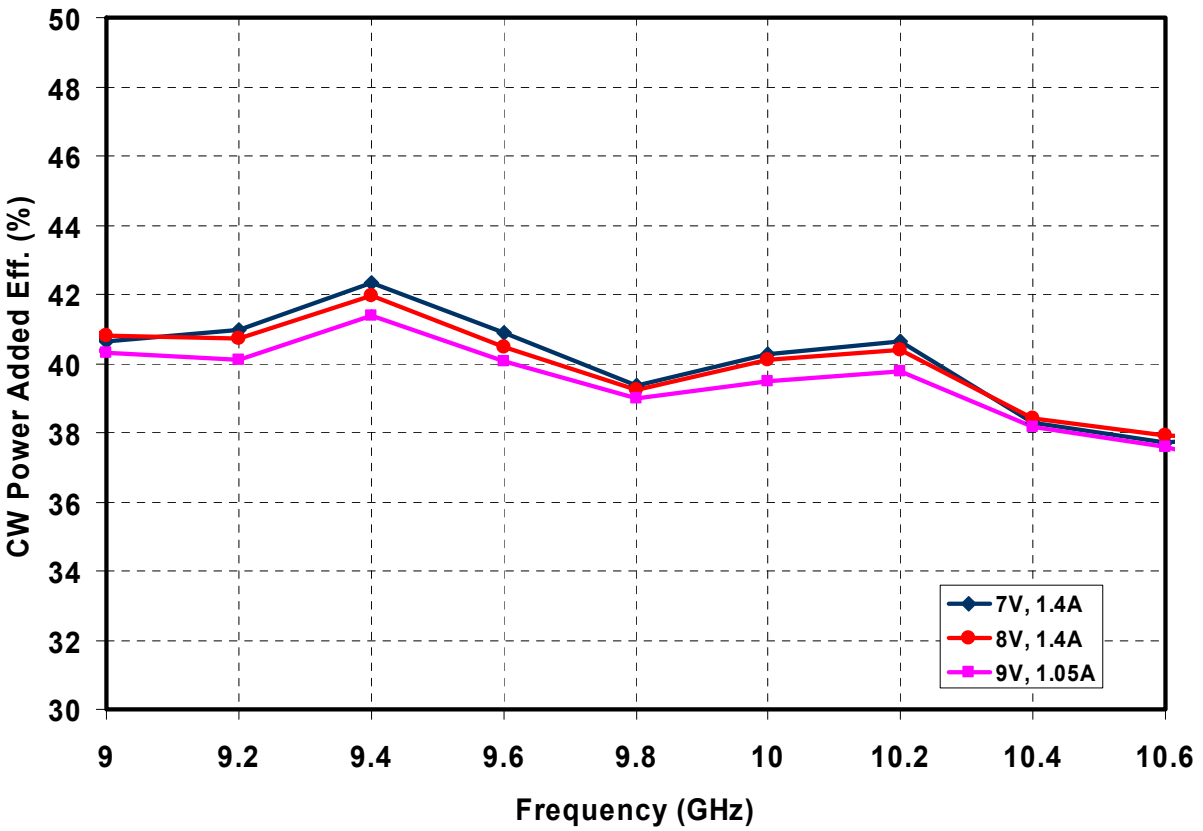




Measured Data

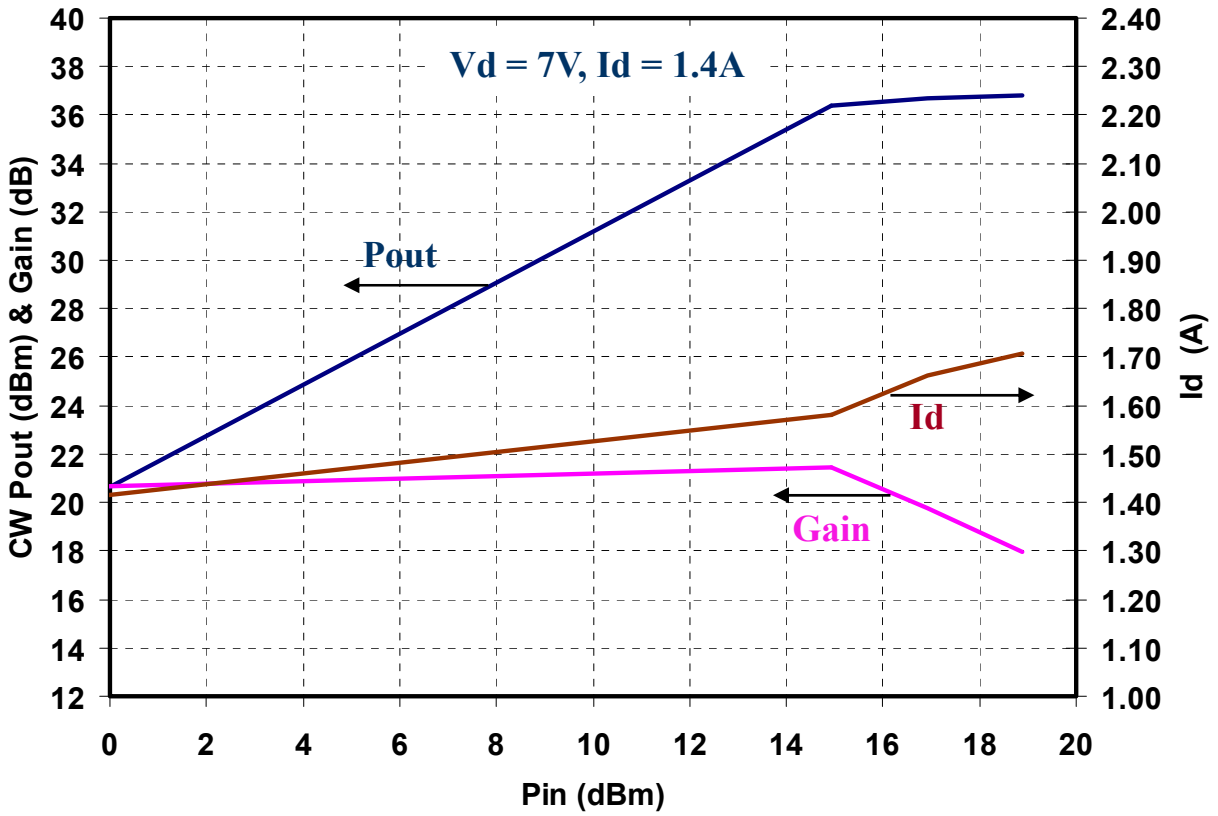
Pin = 19dBm, CW Power

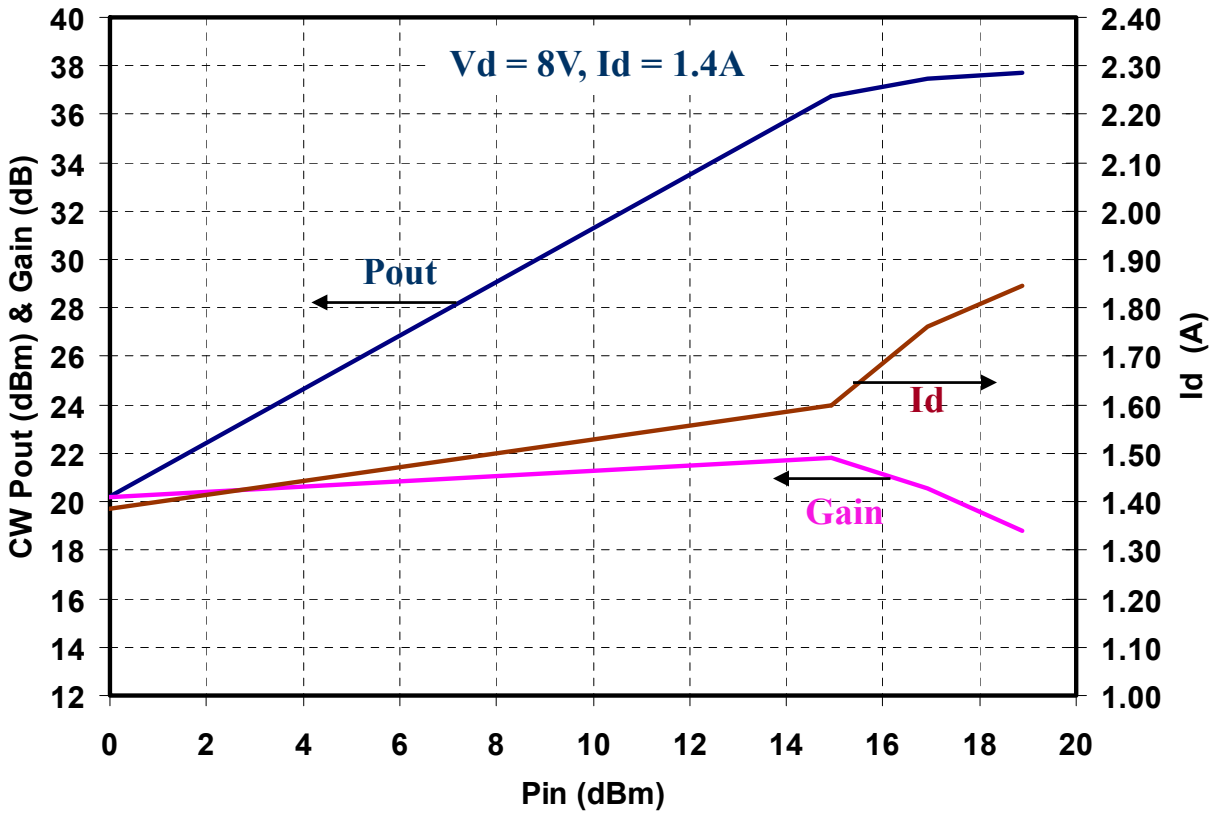




Measured Data

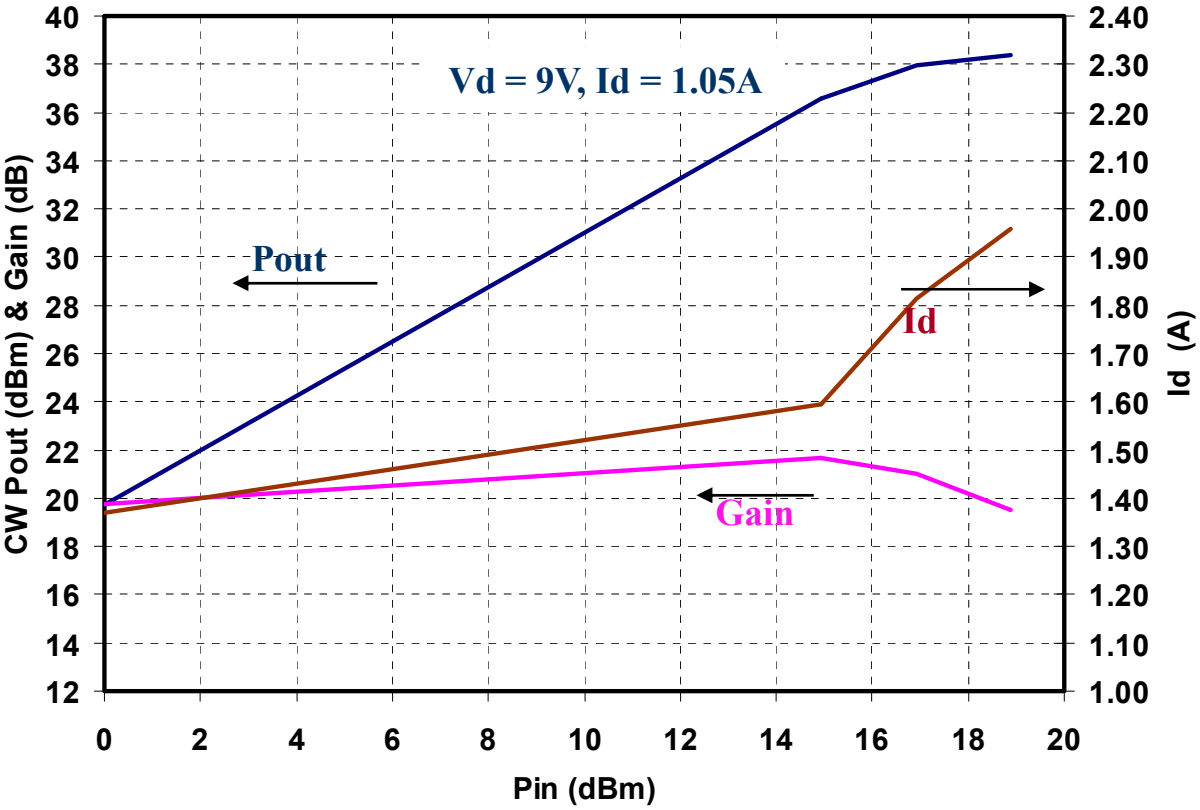
Frequency @ 10GHz, CW Power





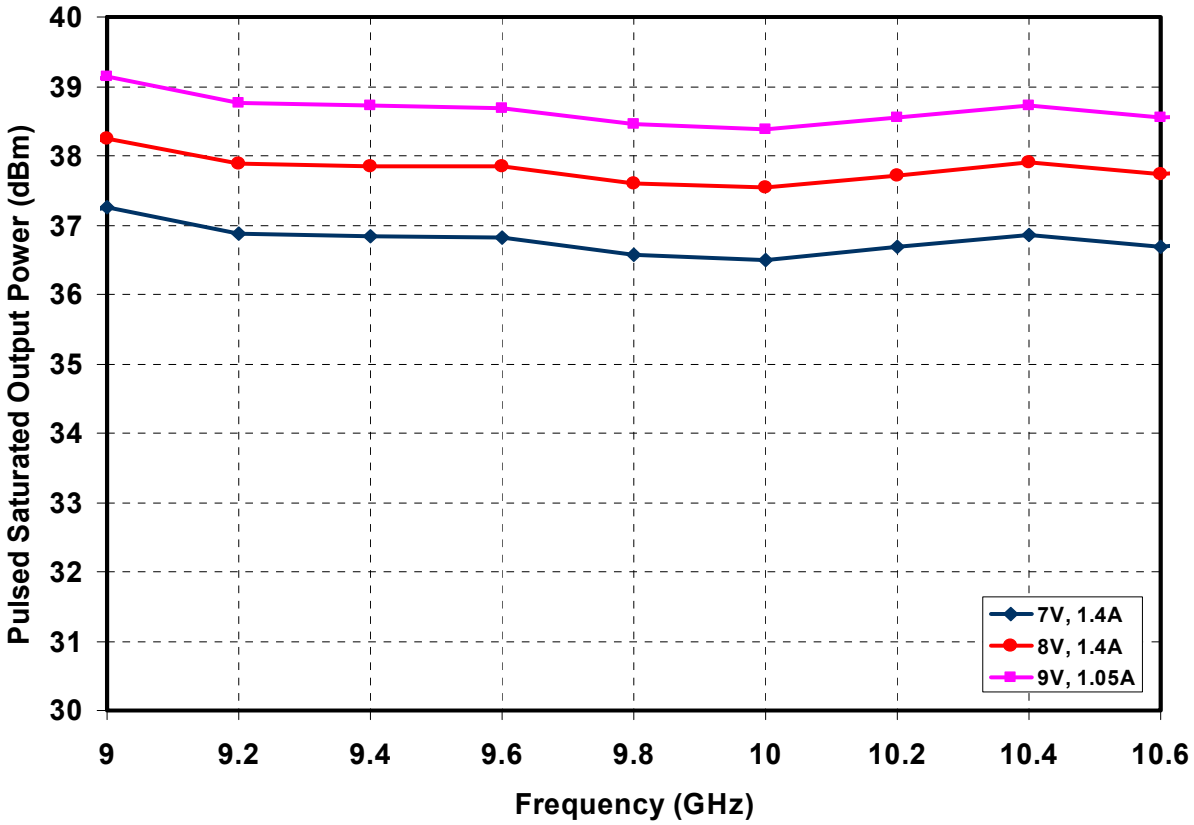
Measured Data

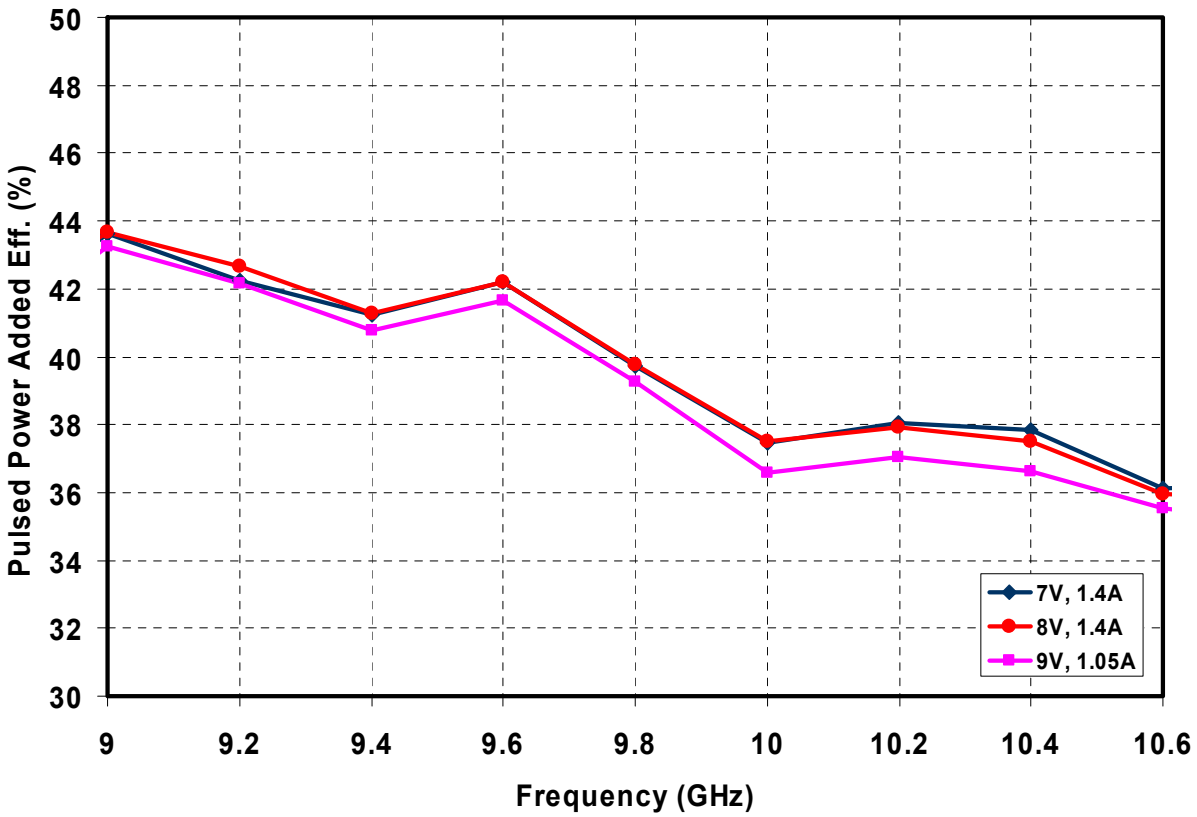
Frequency @ 10GHz, CW Power



Measured Data

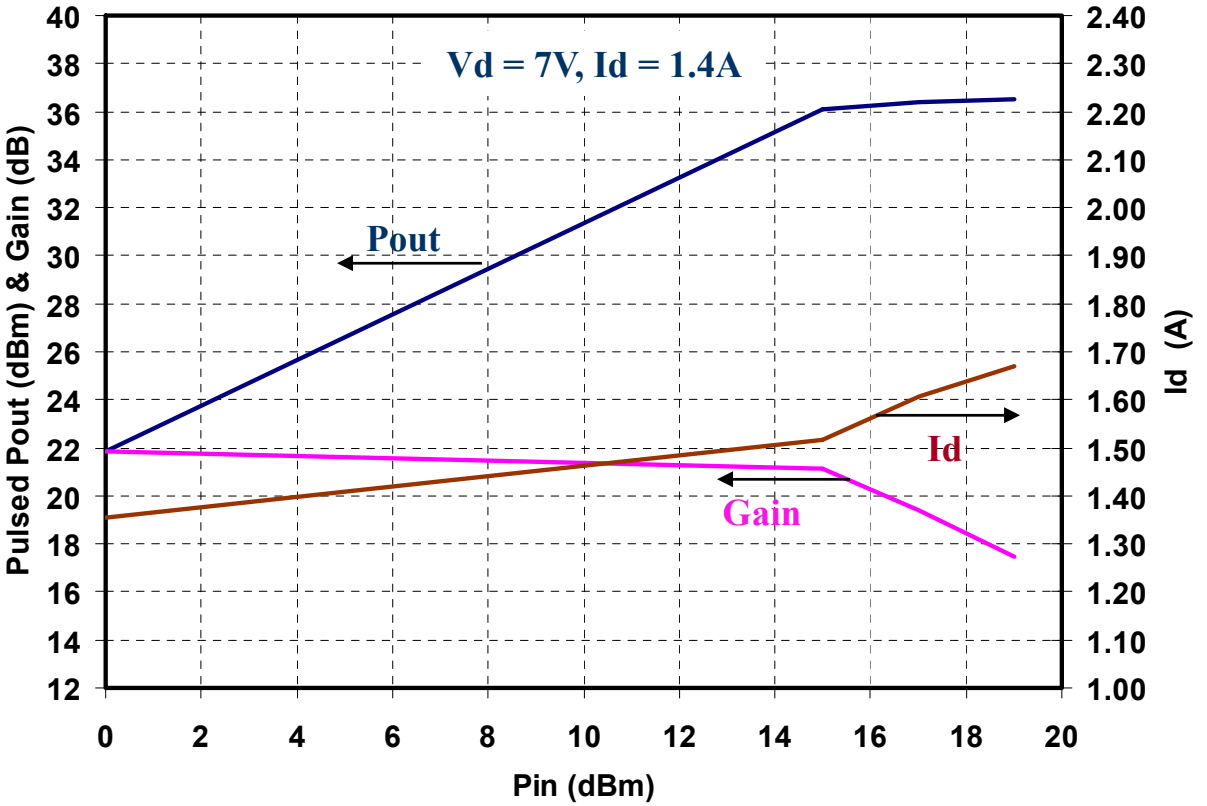
Pin = 19dBm, Pulsed Power, 25% DC

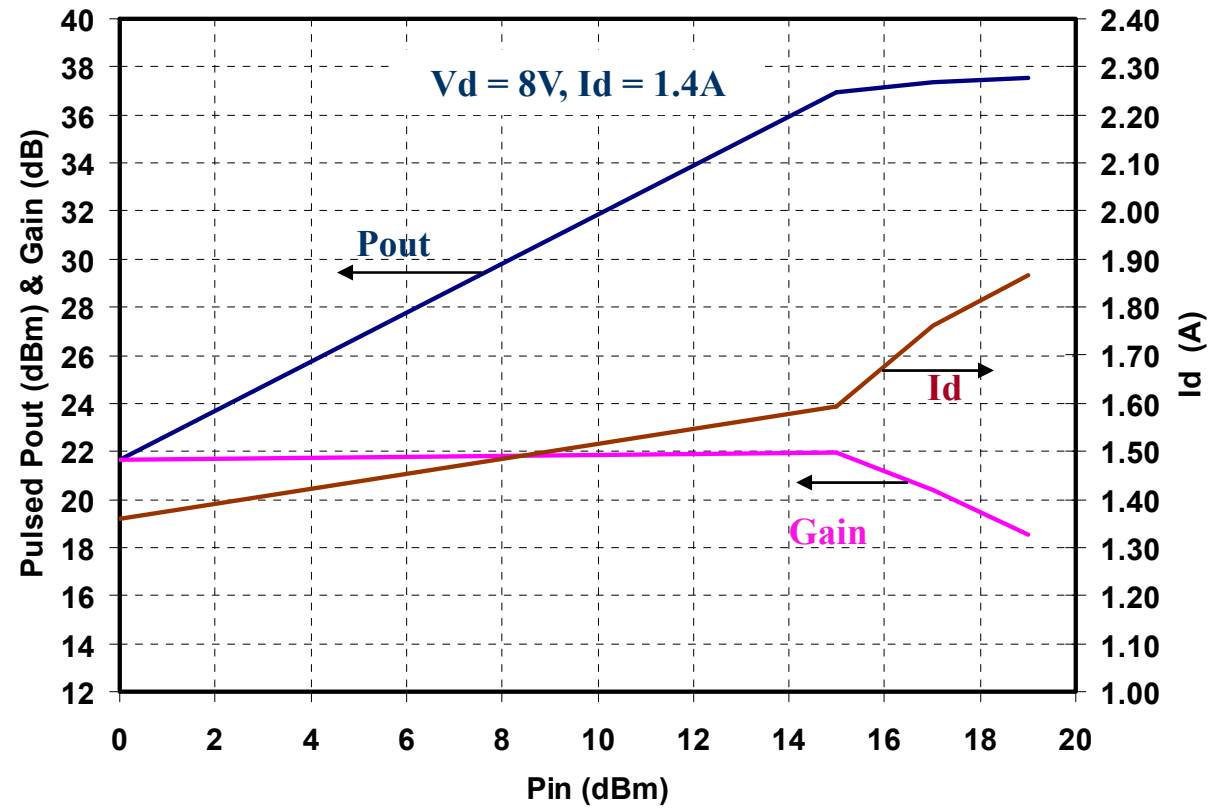




Measured Data

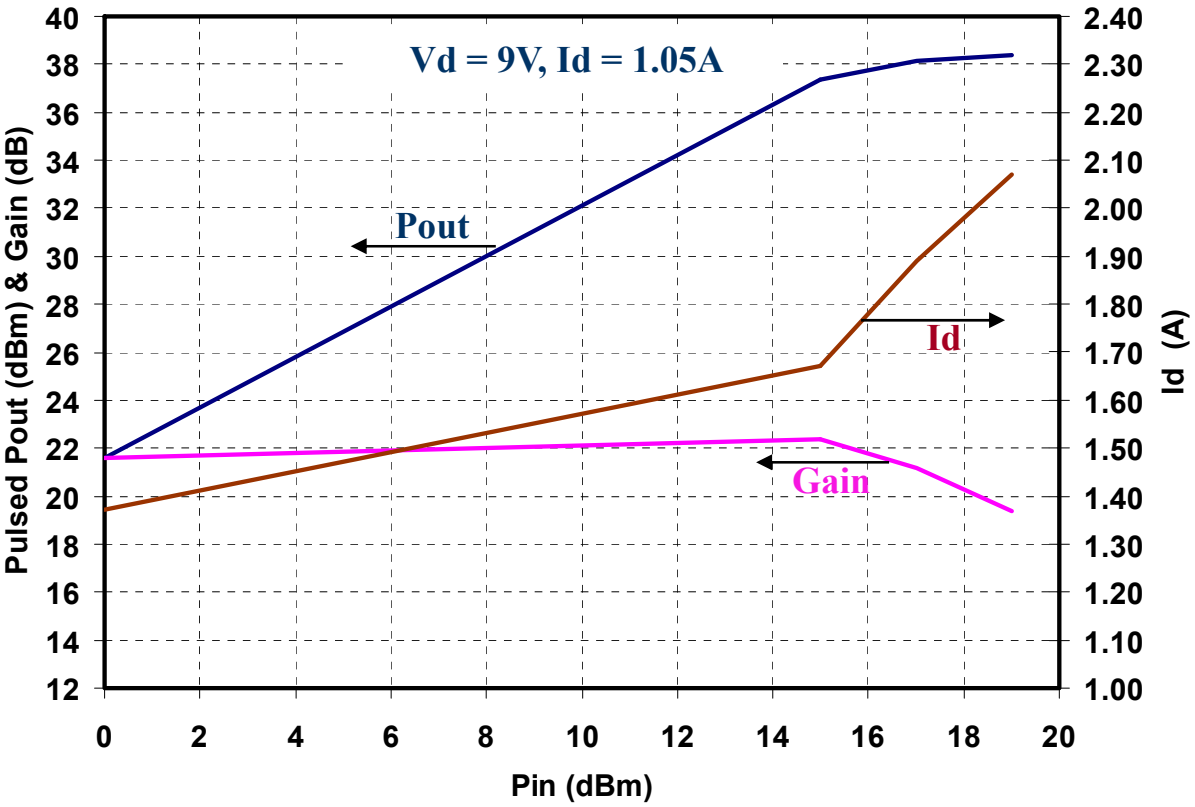
Frequency @ 10GHz, Pulsed Power, 25% DC





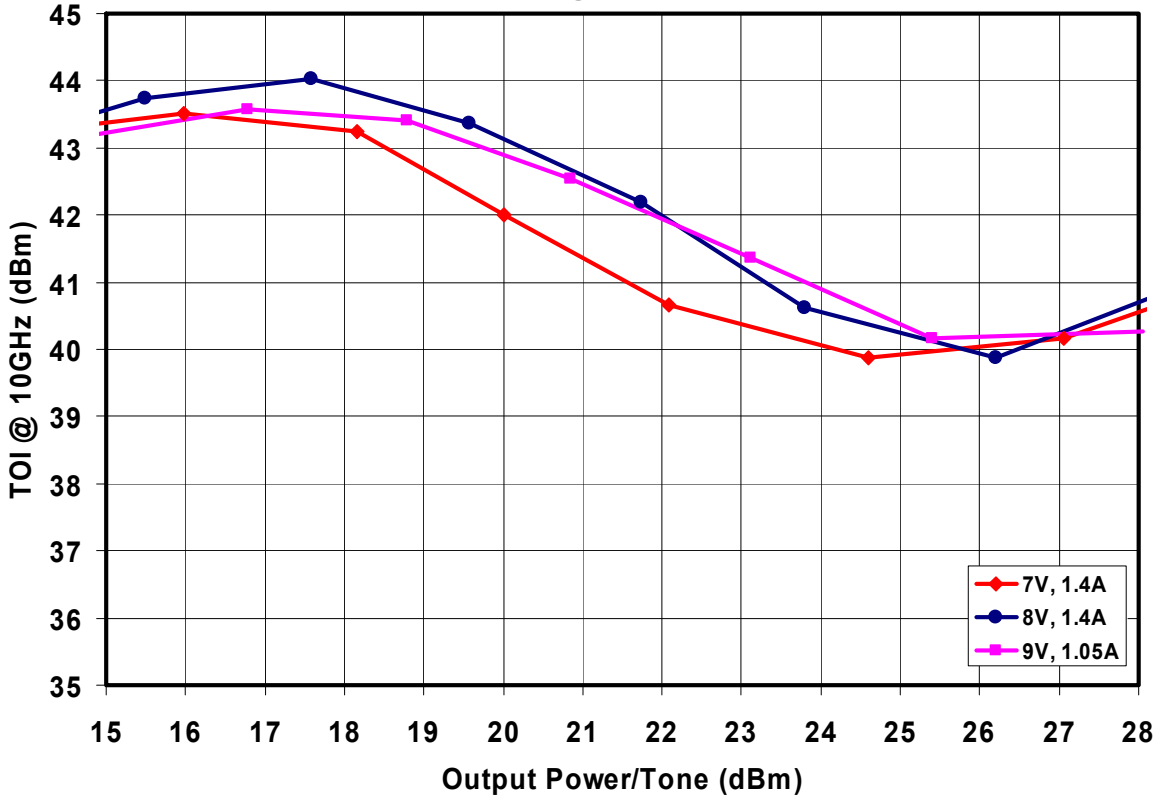
Measured Data

Frequency @ 10GHz, Pulsed Power, 25% DC

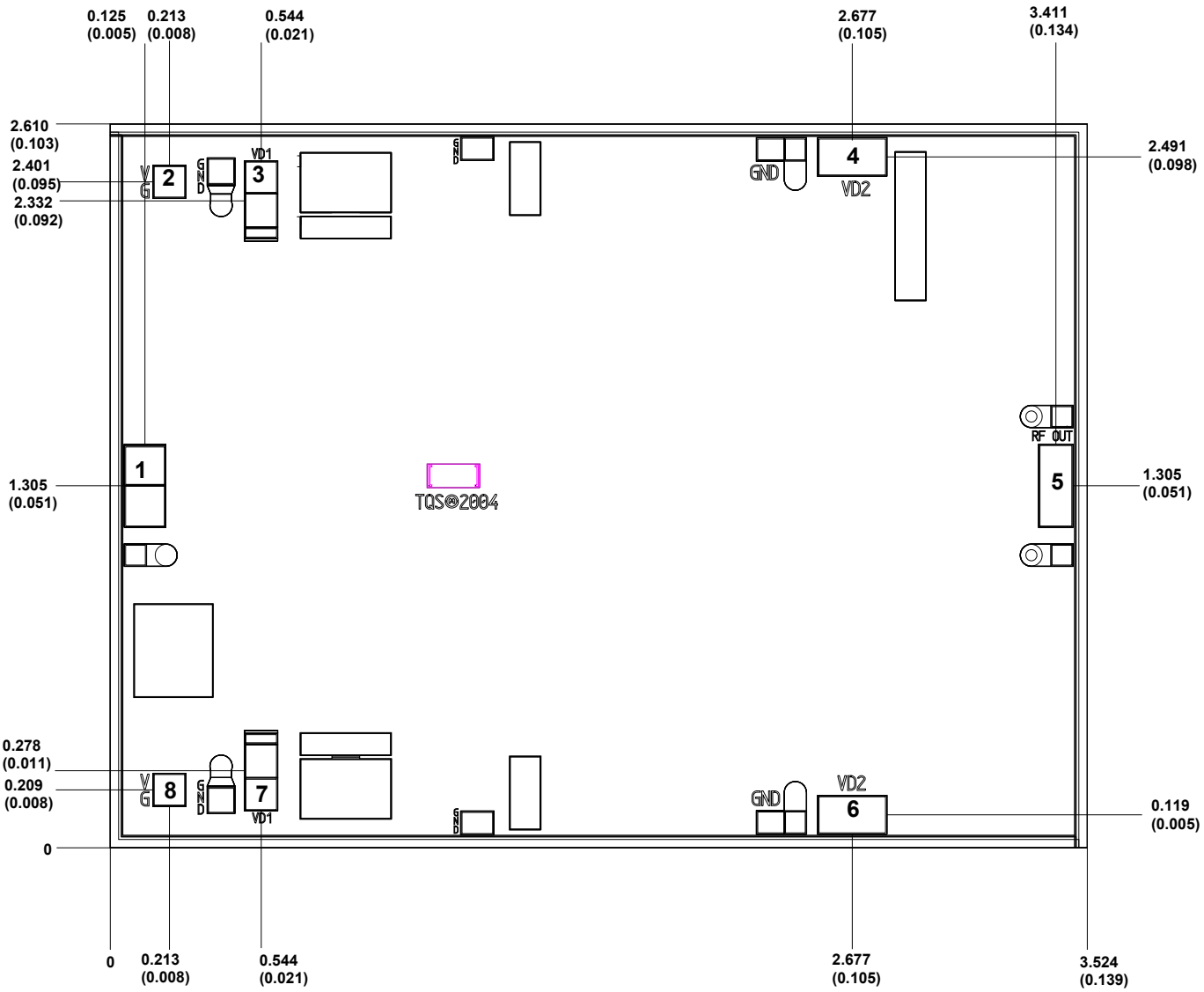


Measured Data

Frequency @ 10GHz, CW TOI



Mechanical Drawing



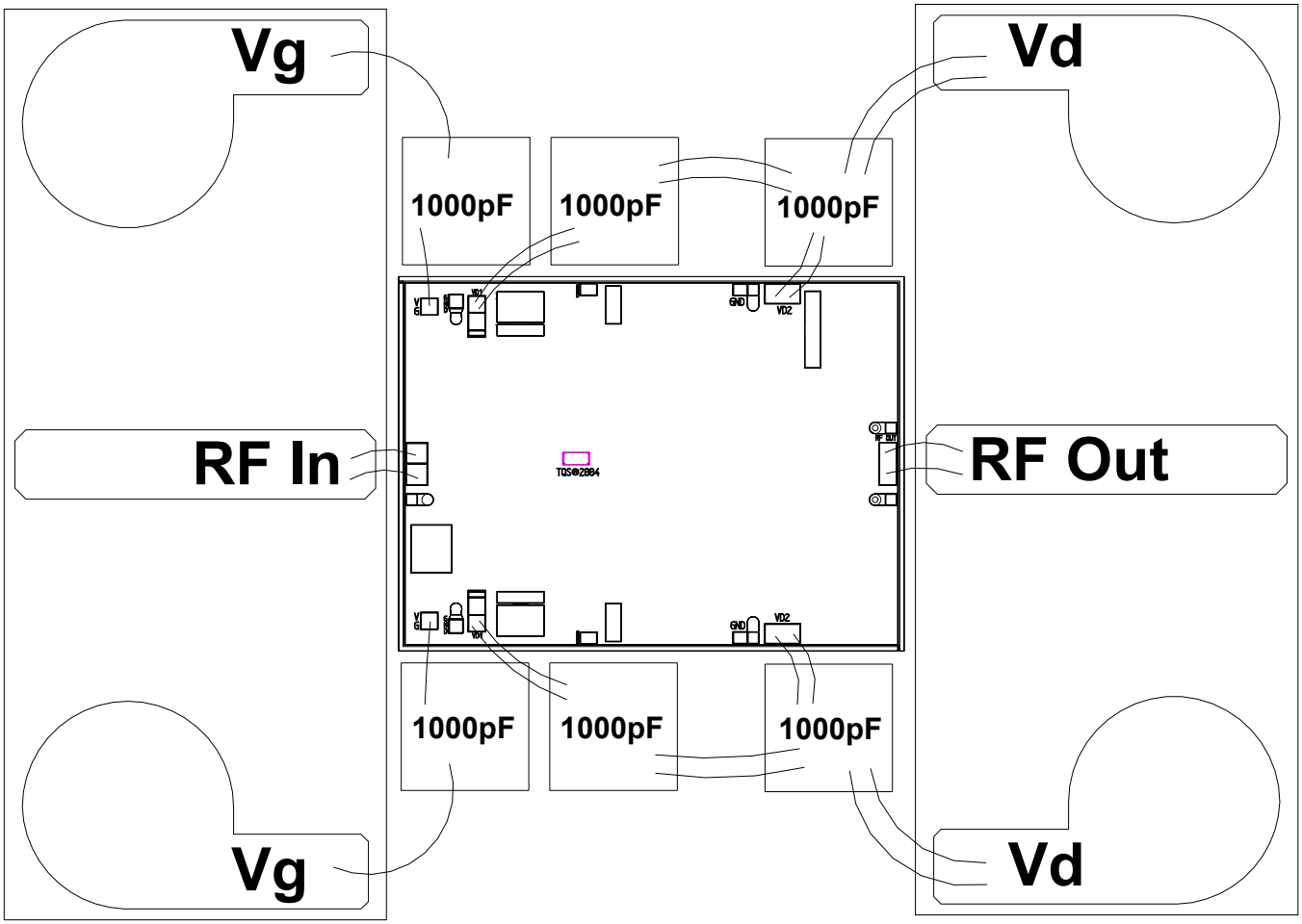
Units: Millimeters (inches)
Thickness: 0.10 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.05 (0.002)

GND IS BACKSIDE OF MMIC

Bond pad # 1	**(RF Input)**	**0.150 x 0.300 (0.006 x 0.012)**
Bond pad # 2, 8	**(Vg)**	**0.120 x 0.120 (0.005 x 0.005)**
Bond pad # 3, 7	**(Vd1)**	**0.120 x 0.290 (0.005 x 0.011)**
Bond pad # 4, 6	**(Vd2)**	**0.250 x 0.140 (0.010 x 0.006)**
Bond pad # 5	**(RF Output)**	**0.125 x 0.300 (0.005 x 0.012)**

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

Recommended Chip Assembly Diagram



Vd = 7 to 9 V

Vg = -0.6 V Typical

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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^{0}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^{0}C.

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