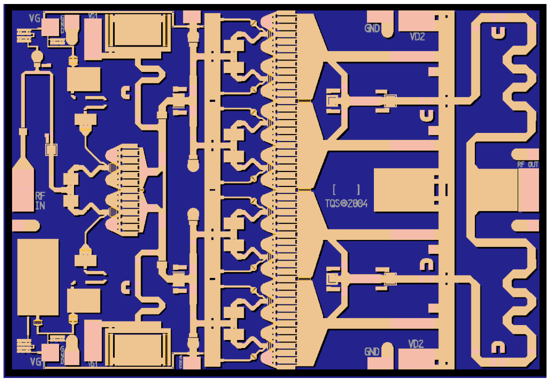
TriQuint SEMICONDUCTOR®

TGA2701

7 – 8.5GHz High Power Amplifier



Key Features

- Frequency Range: 7.0 -8.5 GHz
- 37 dBm Nominal Output Power
- 21 dB Nominal Gain
- Bias: 5 V & 7 V, 1.05 A (2A under RF drive)
- 0.25 um 3MI pHEMT Technology
- Chip Dimensions 3.80 x 2.61 x 0.10 mm (0.150 x 0.103 x 0.004 in)

Primary Applications

- Point-to-Point Radio
- Communications

Product Description

The TriQuint TGA2701 is a High Power Amplifier MMIC for 7 – 8.5 GHz applications. The part is designed using TriQuint's 0.25 um 3MI pHEMT production process.

The TGA2701 nominally provides 37 dBm output power and 42% PAE. The typical gain is 21 dB.

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

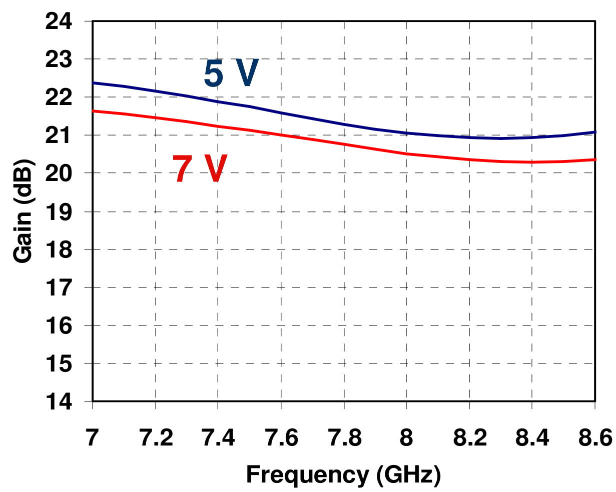
The TGA2701 is 100% DC and RF tested on-wafer to ensure performance compliance.

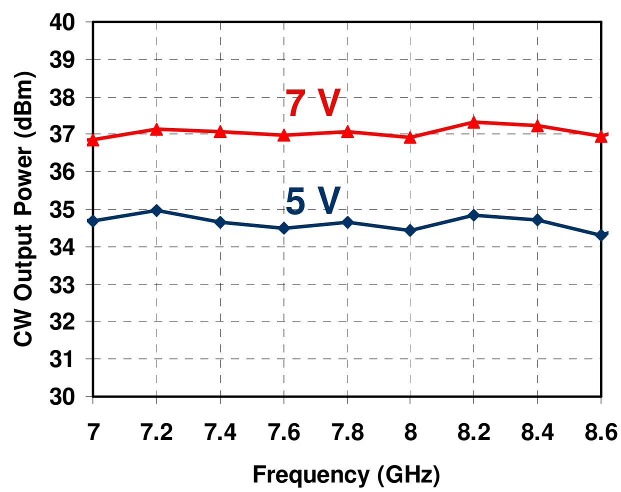
The TGA2701 has a protective surface passivation layer providing environmental robustness.

Lead-Free & RoHS compliant.

Measured Fixtured Data

Bias: Vd = 5 V & 7 V, Idq = 1.05 A





Note: Devices is early in the characterization process prior to finalizing all electrical specifications. Specifications are subject to change without notice

TABLE I
ABSOLUTE MAXIMUM RATINGS 1/

SYMBOL	PARAMETER	VALUE	NOTES
Vd	Drain Voltage	10 V	
Vg	Gate Voltage Range	-1 TO +0.5 V	
Id	Drain Current	3.85 A	
$\lvert Ig \rvert$	Gate Current	85 mA	
P_{IN}	Input Continuous Wave Power	29 dBm	
P_D	Power Dissipation	38.5 W	
Tchannel	Channel Temperature	200 ^{0}C	2/
	Mounting Temperature (30 Seconds)	320 ^{0}C	
	Storage Temperature	-65 to 150 ^{0}C	

1/ These ratings represent the maximum operable values for this device. Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device and/or affect device lifetime. These are stress ratings only, and functional operation of the device at these conditions is not implied.

2/ Junction operating temperature will directly affect the device median lifetime. 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	7.0 – 8.5	7.0 – 8.5	GHz
Drain Voltage, Vd	5	7	V
Drain Current, Id	1.05	1.05	A
Gate Voltage, Vg	-0.7	-0.7	V
Small Signal Gain, S21	21	20.5	dB
Input Return Loss, S11	12	12	dB
Output Return Loss, S22	10	10	dB
CW Saturated Output Power @ 22 dBm Pin	34.5	37	dBm
Pulsed Saturated Output Power @ 22 dBm Pin & 25% Duty Cycle	34.5	37	dBm
CW Power Added Eff. @ 22 dBm Pin	40	42	%
Pulsed Power Added Eff. @ 22 dBm Pin & 25% Duty Cycle	40	42	%
Small Signal Gain Temperature Coefficient	-0.03	-0.03	dB/^{0}C

TABLE III
THERMAL INFORMATION

PARAMETER	TEST CONDITIONS	Tchannel (°C)	θ_{JC} (°C/W)	Tm (HRS)
θ_{JC} Thermal Resistance (channel to Case)	Vd = 7 V Id = 1.05 A P_{diss} = 7.35 W Small Signal	122	7.1	1.2E+7
θ_{JC} Thermal Resistance (channel to Case)	Vd = 7 V Id = 1.8 A @ Psat P_{diss} = 7.4 W P_{out} = 5.2 W (RF)	123	7.1	1.2E+7

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

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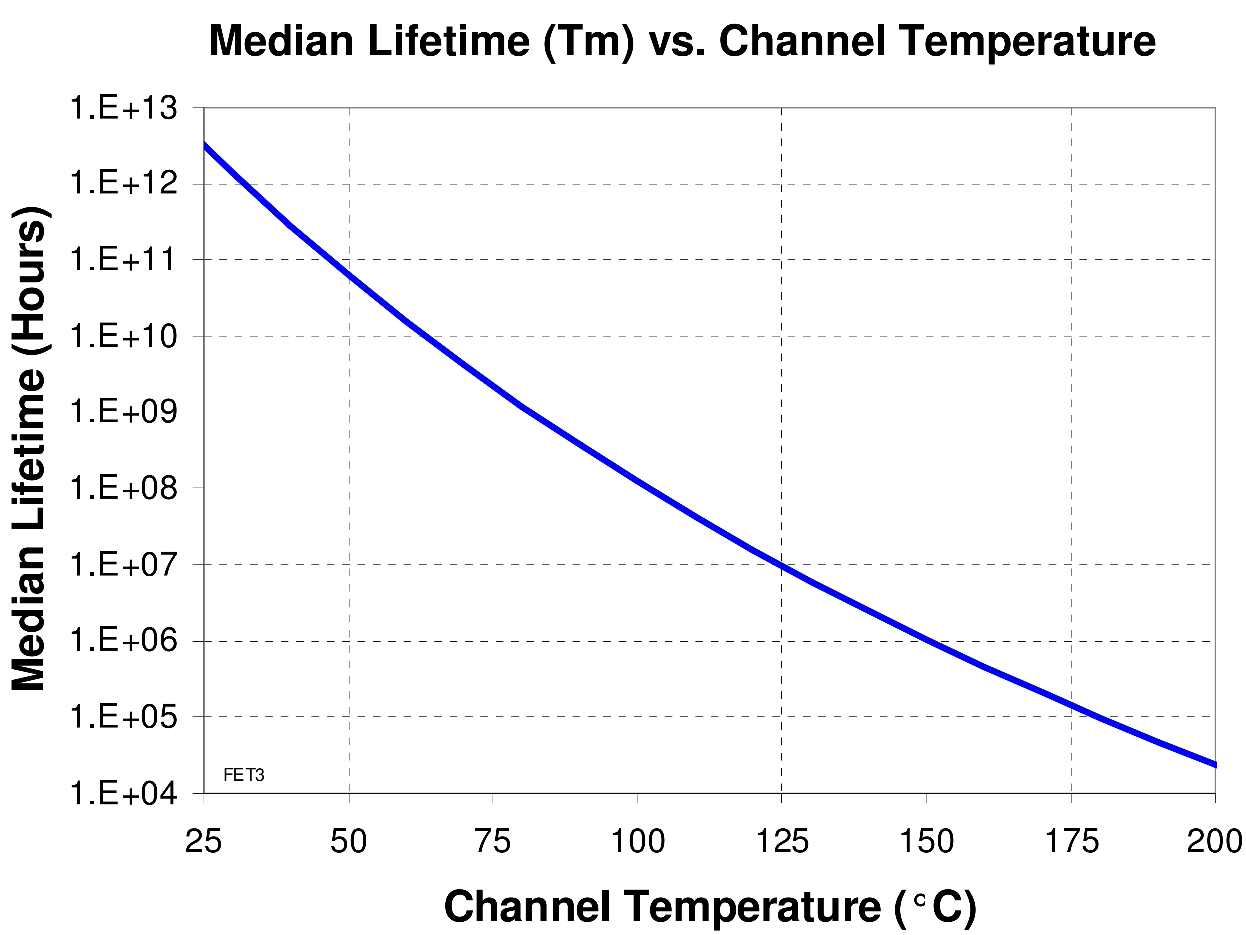
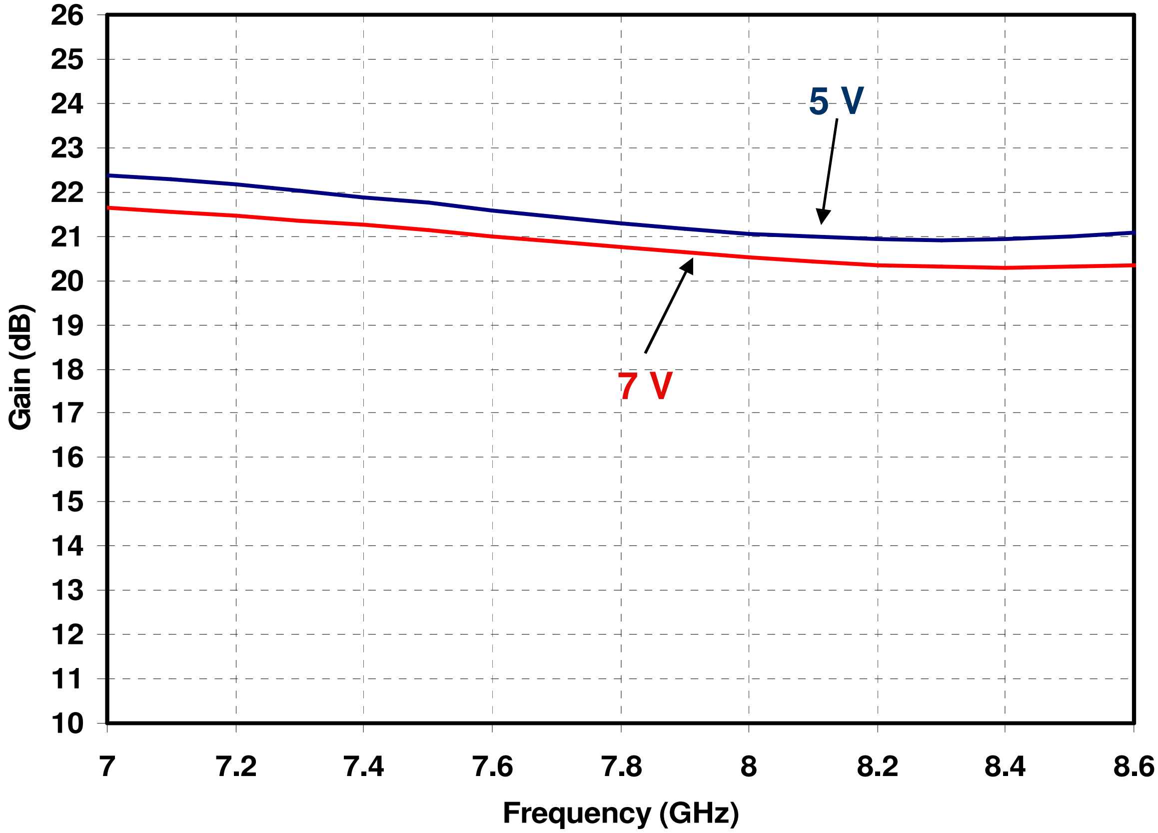


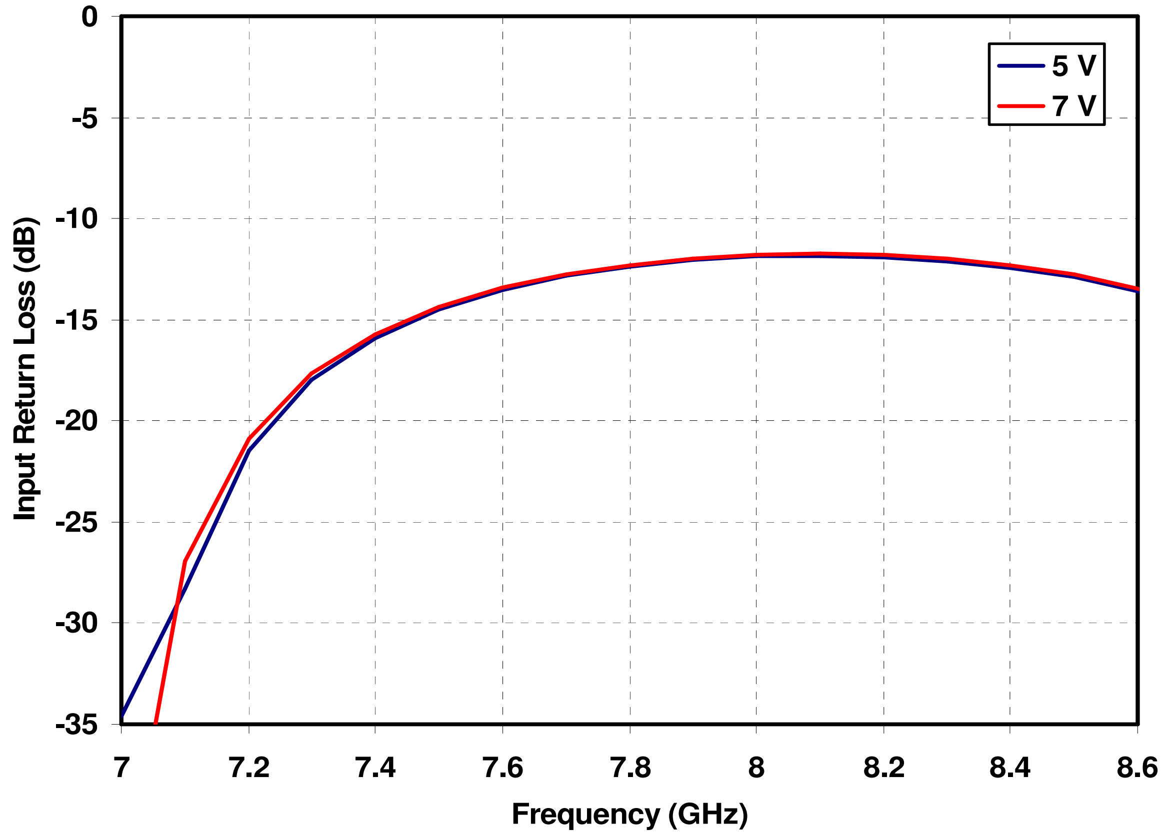
Measured Data

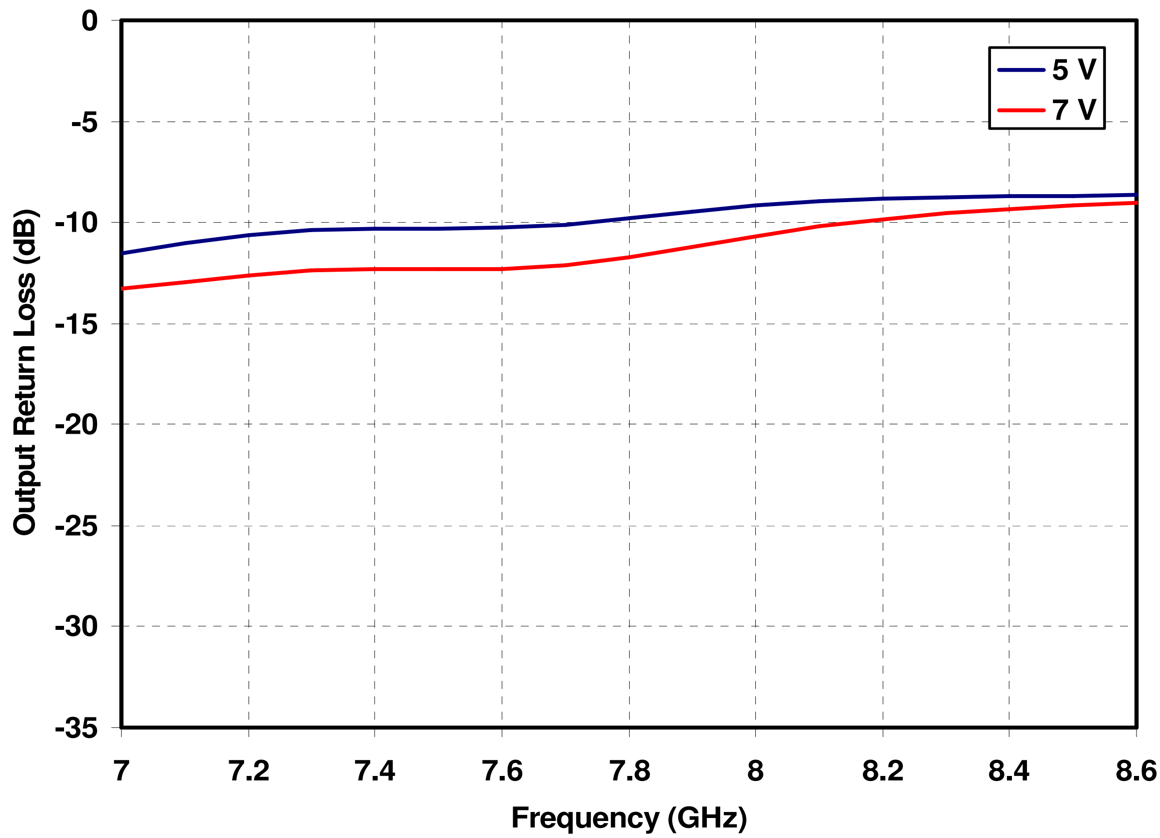
Bias Conditions: Vd = 5 V & 7 V, Idq = 1.05 A



Measured Data

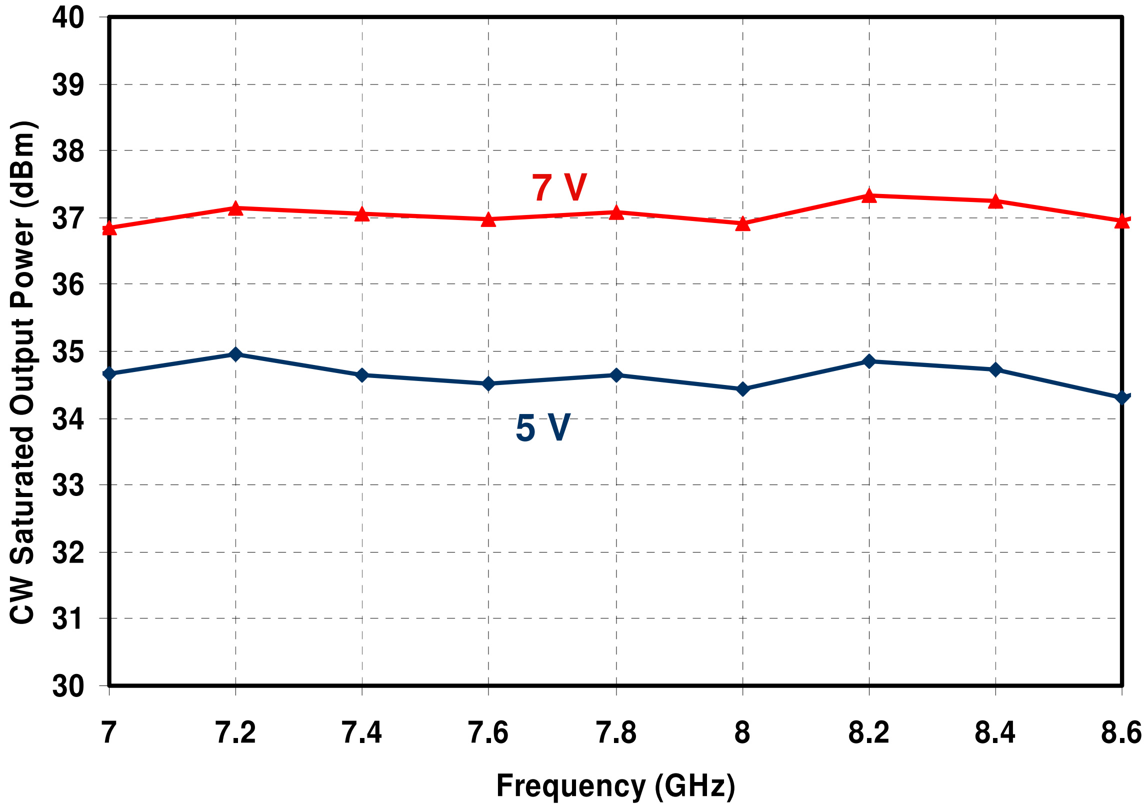
Bias Conditions: Vd = 5 V & 7 V, Idq = 1.05 A

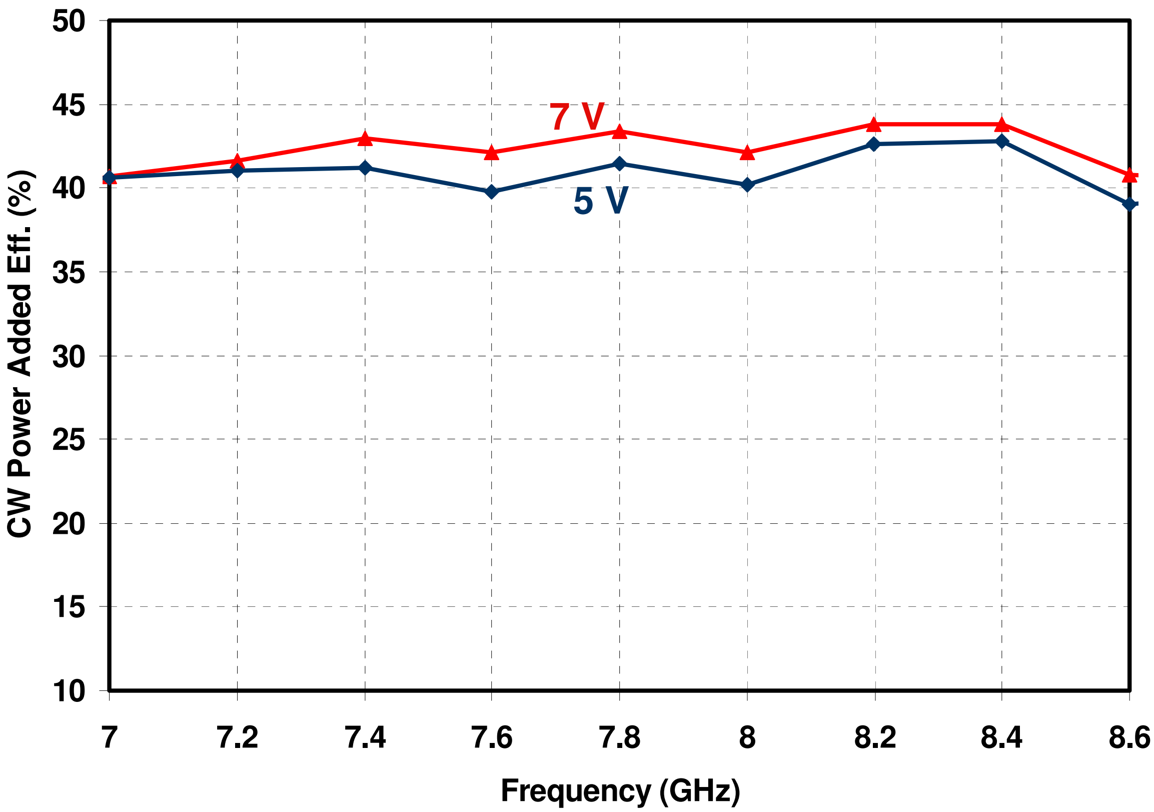




Measured Data

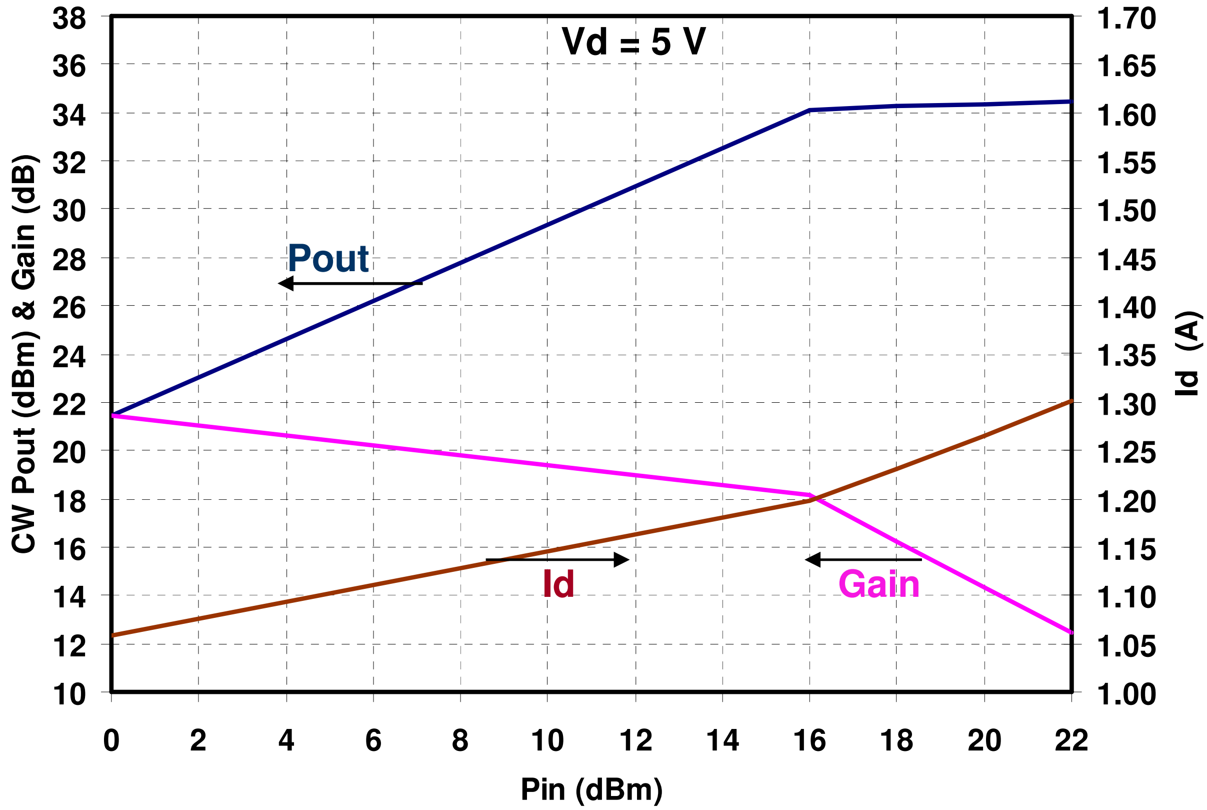
Bias: Vd = 5 V & 7 V, Idq = 1.05 A, Pin = 22 dBm, CW Power

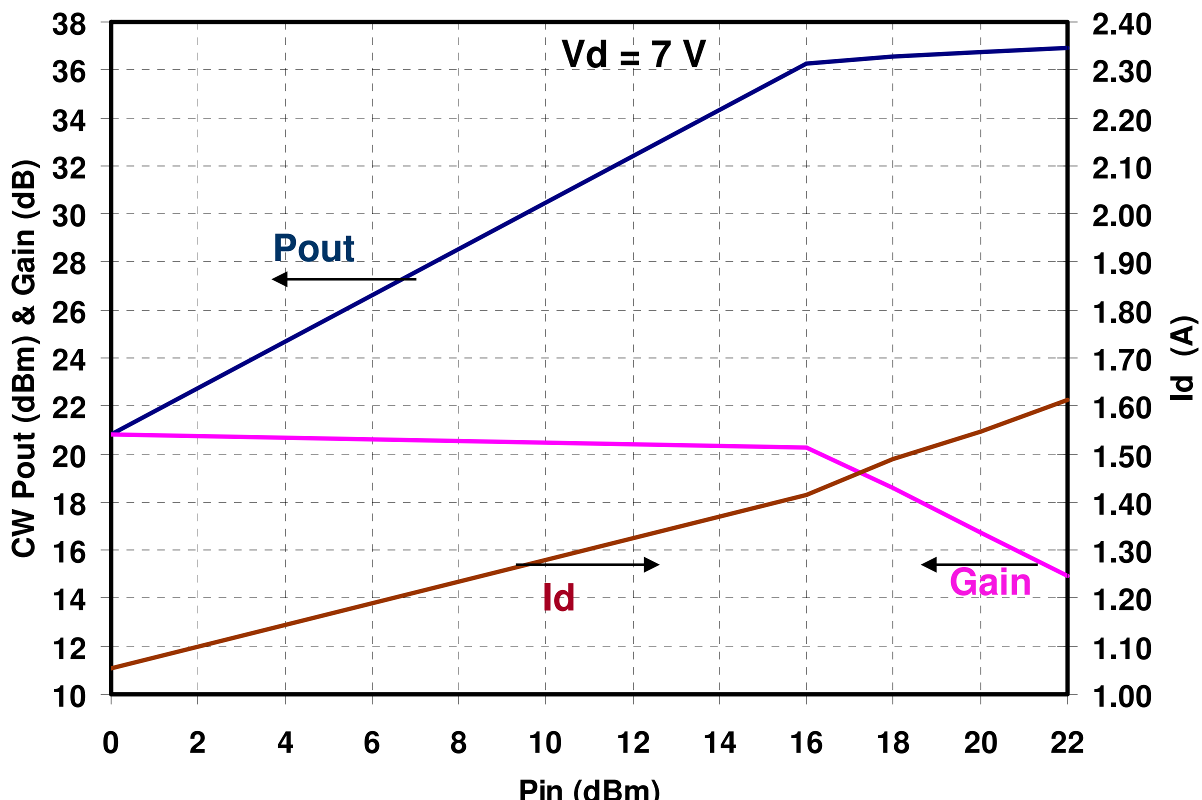




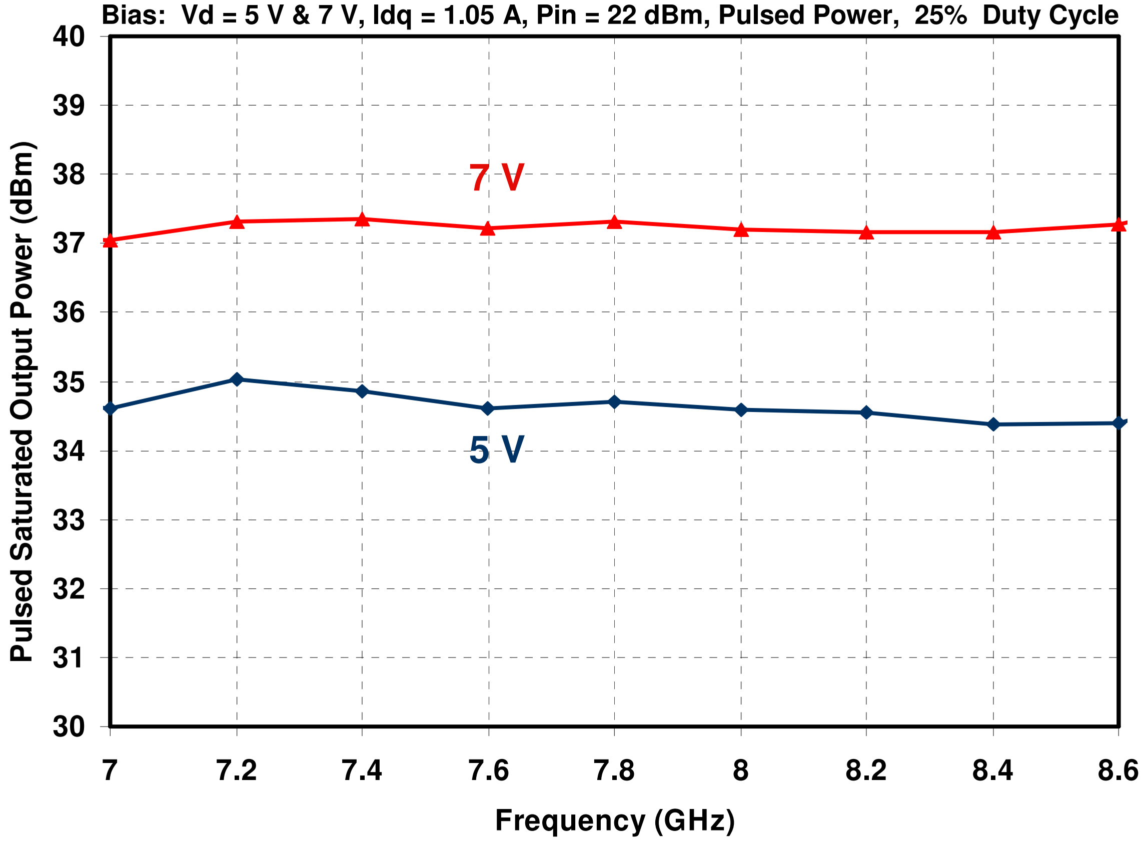
Measured Data

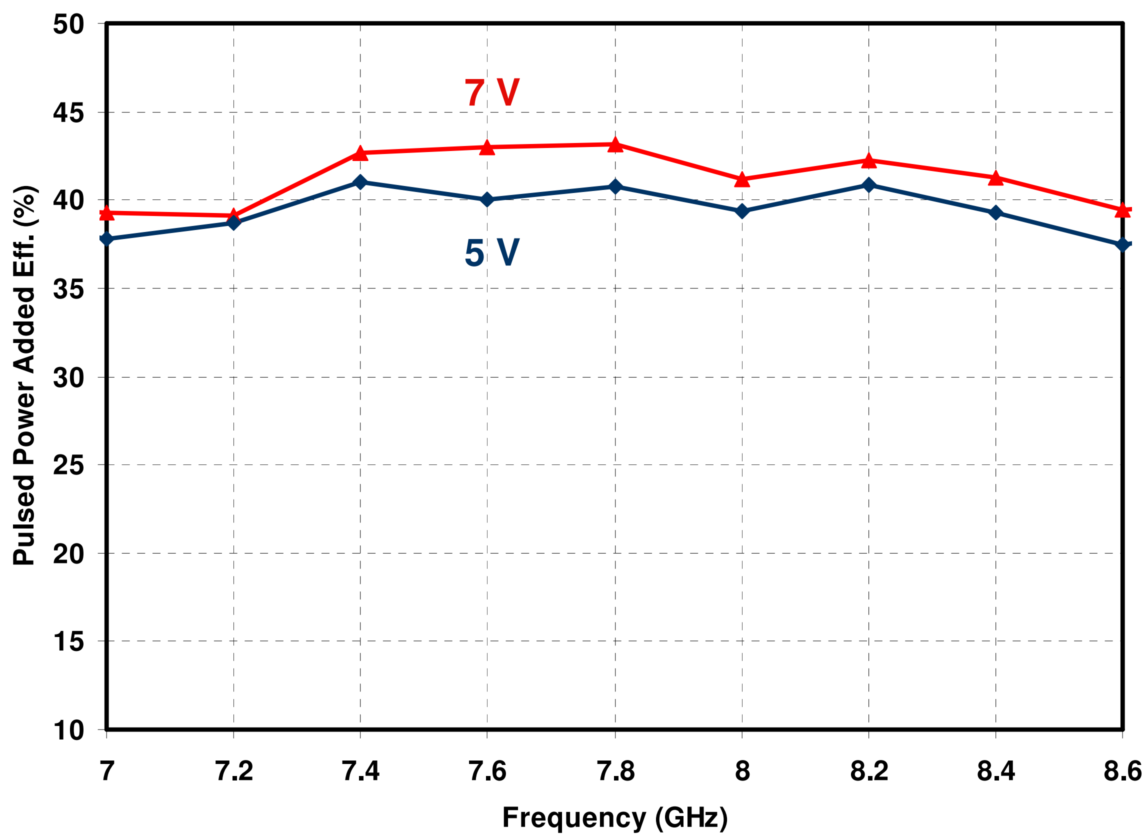
Bias: Vd = 5 V & 7 V, Idq = 1.05 A, Freq = 8 GHz, CW Power





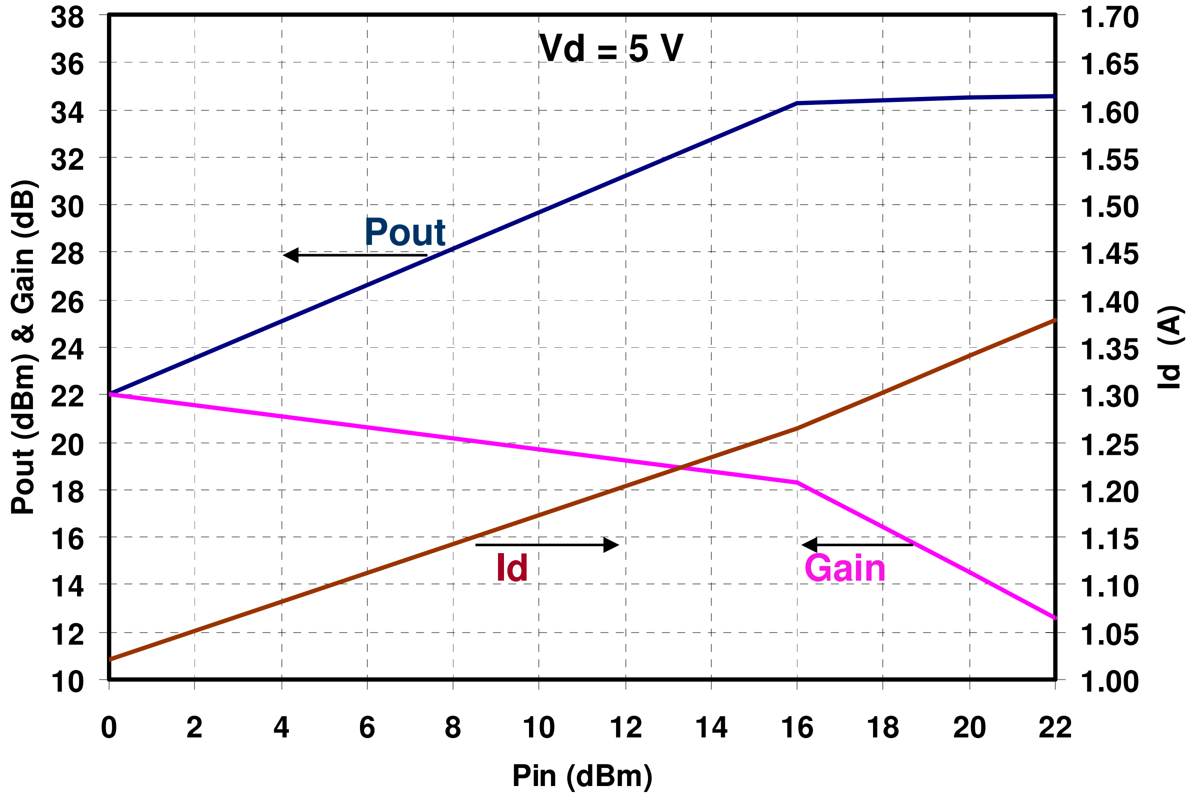
Measured Data

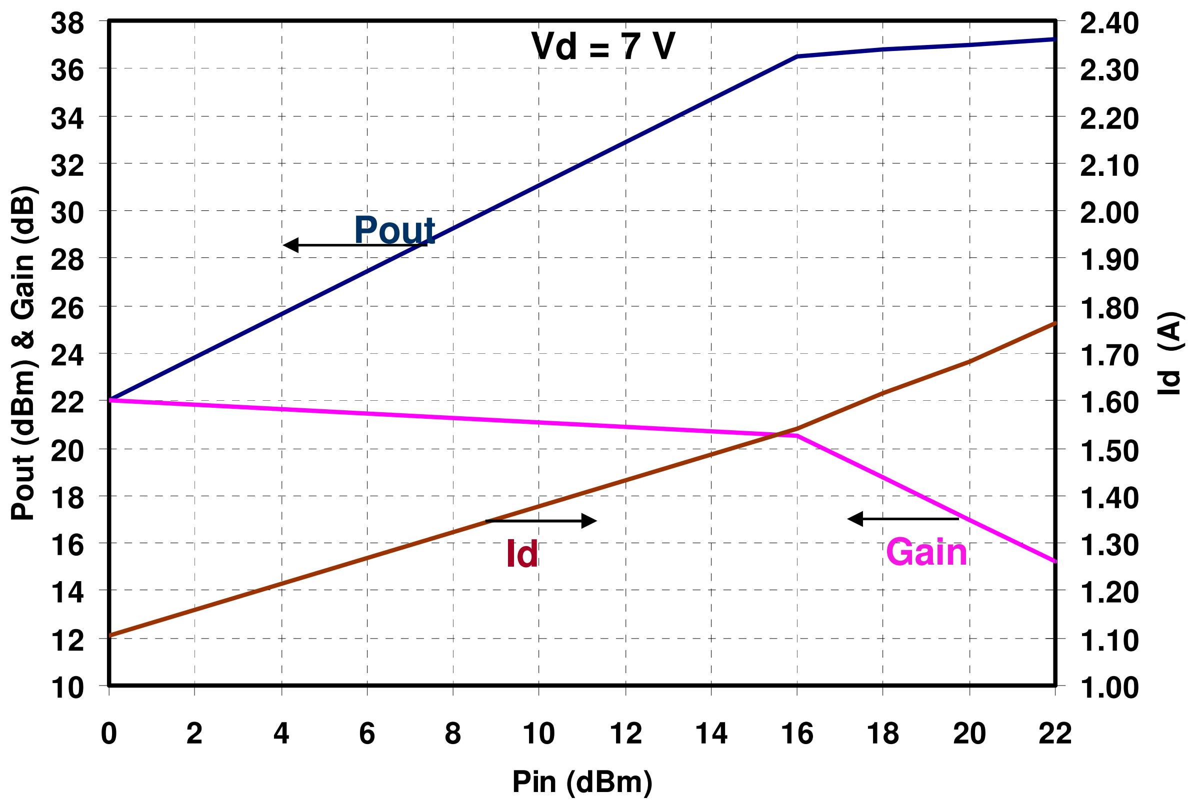




Measured Data

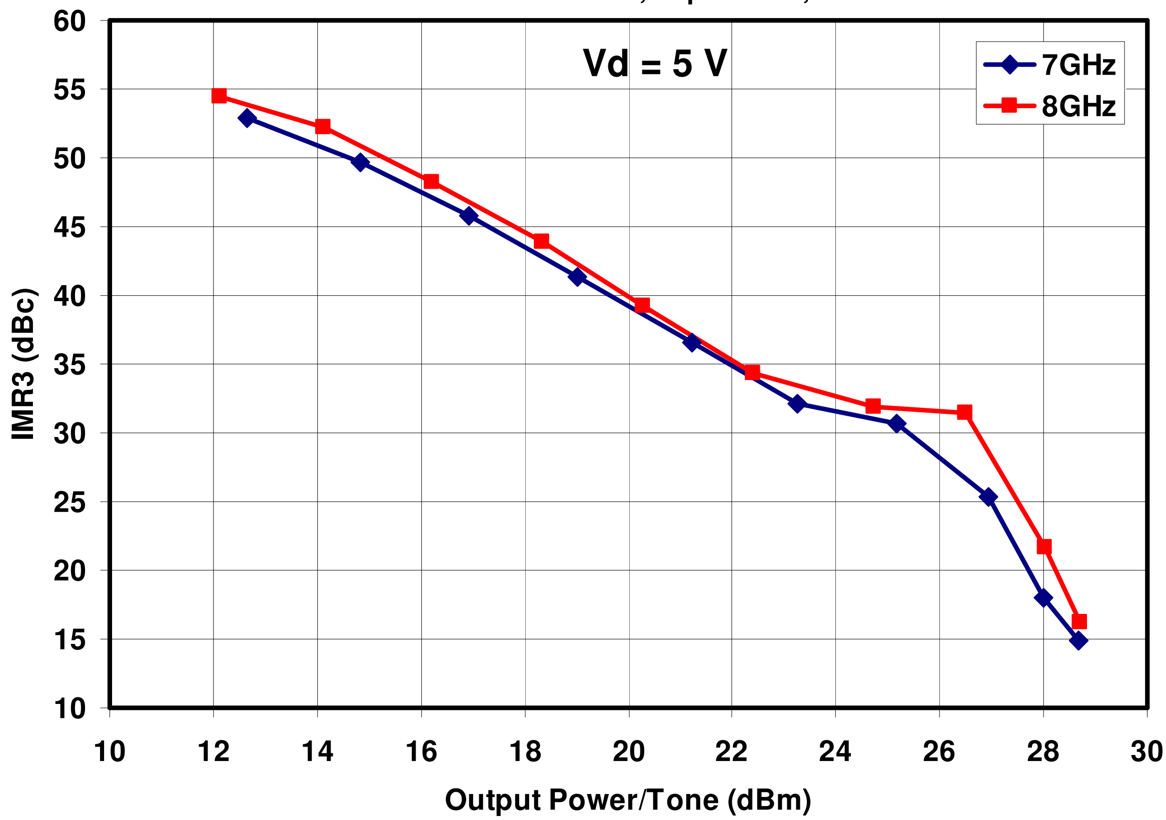
Bias: Idq = 1.05 A, Frequency = 8 GHz, Pulsed Power, 25% Duty Cycle

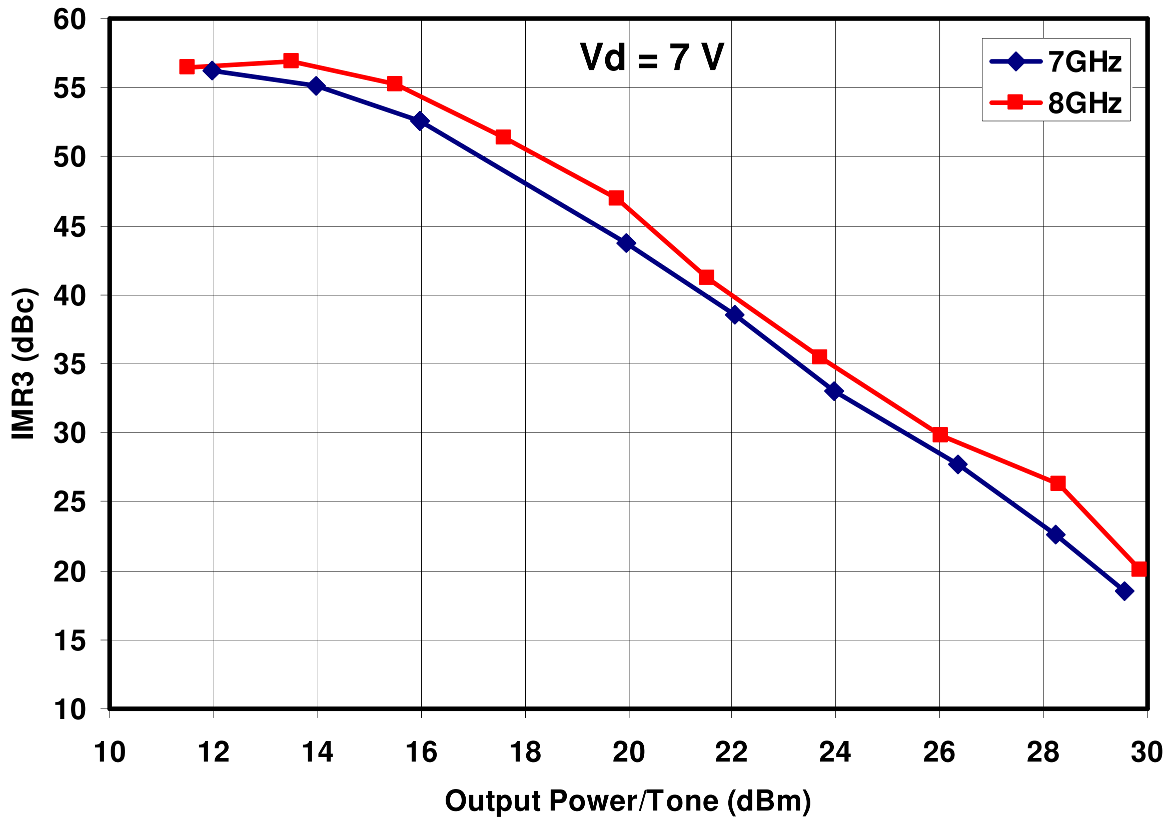




Measured Data

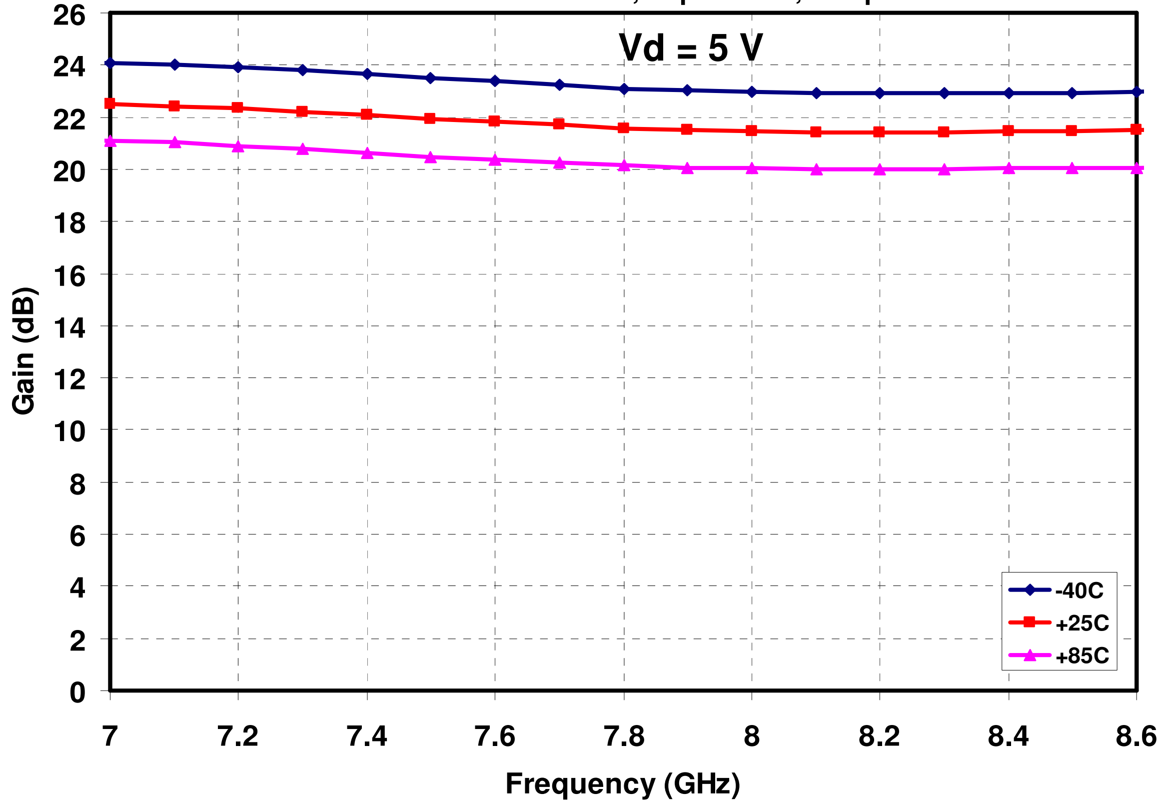
Bias: Vd = 5 V & 7 V, Idq = 1.05 A, CW TOI

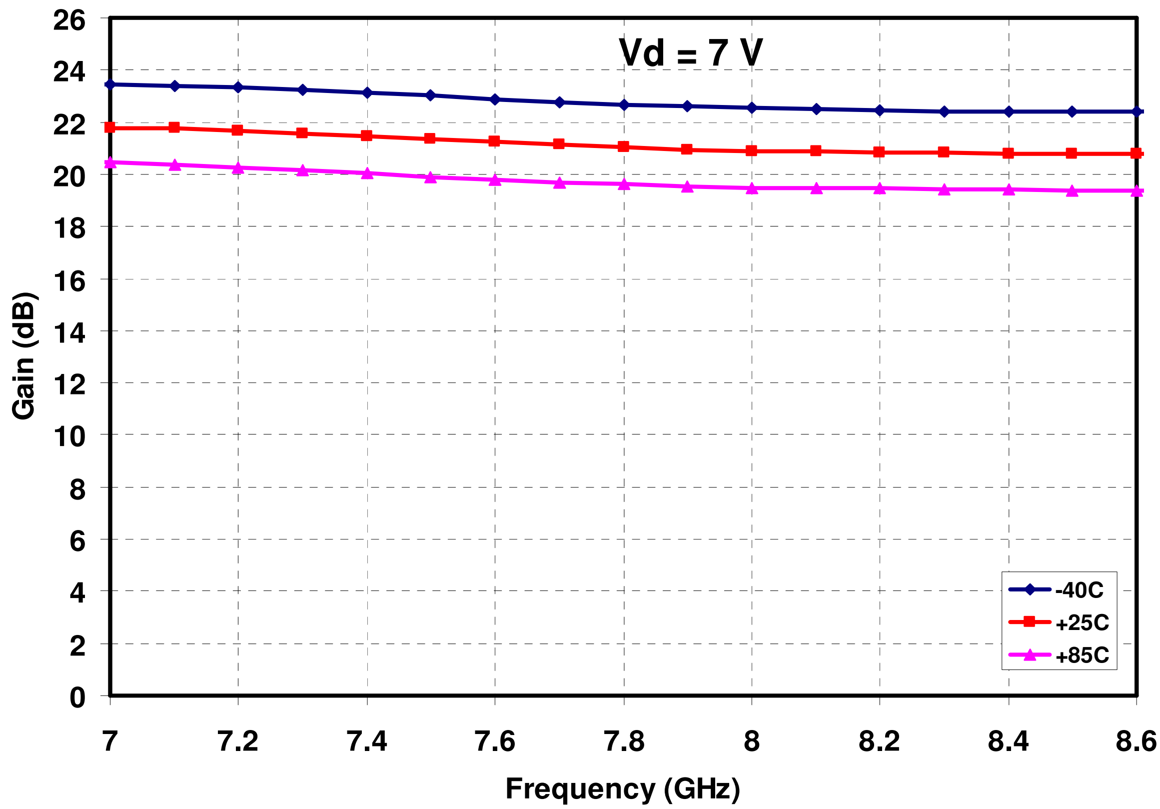




Measured Data

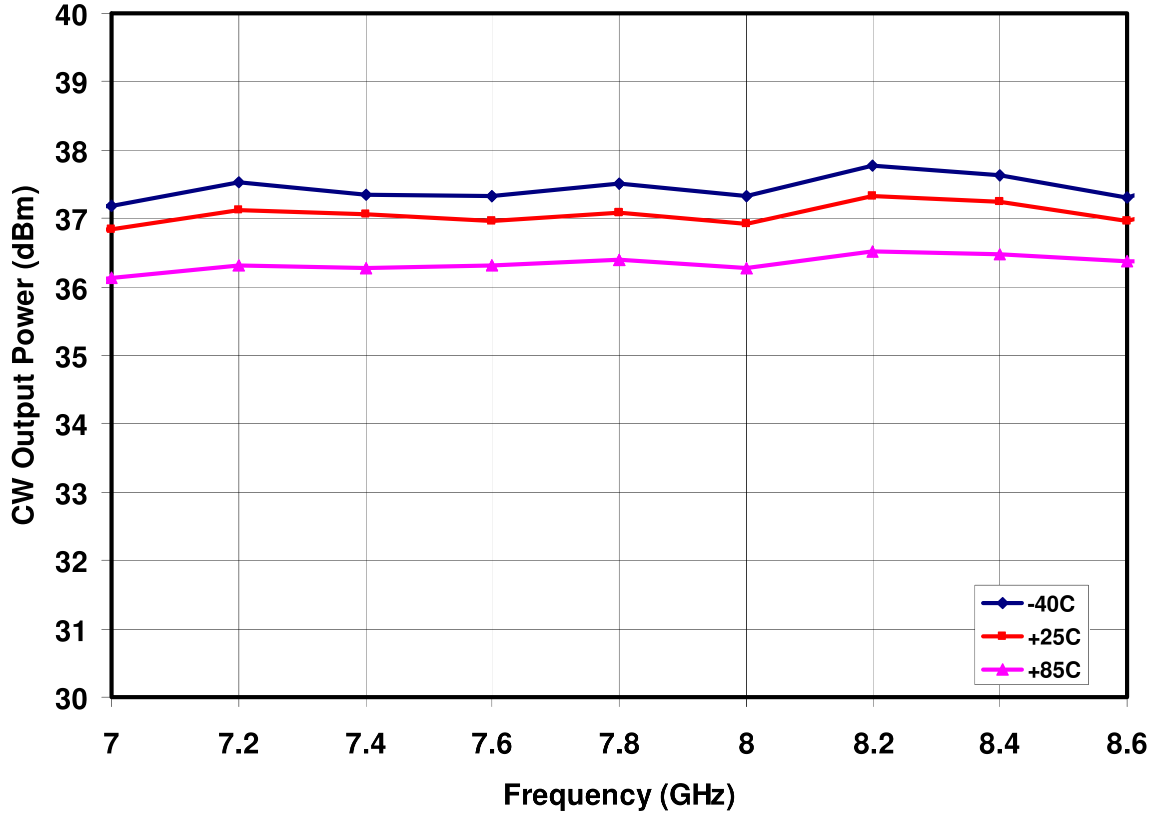
Bias Conditions: Vd = 5 V & 7 V, Idq = 1.05 A, Temperature Data

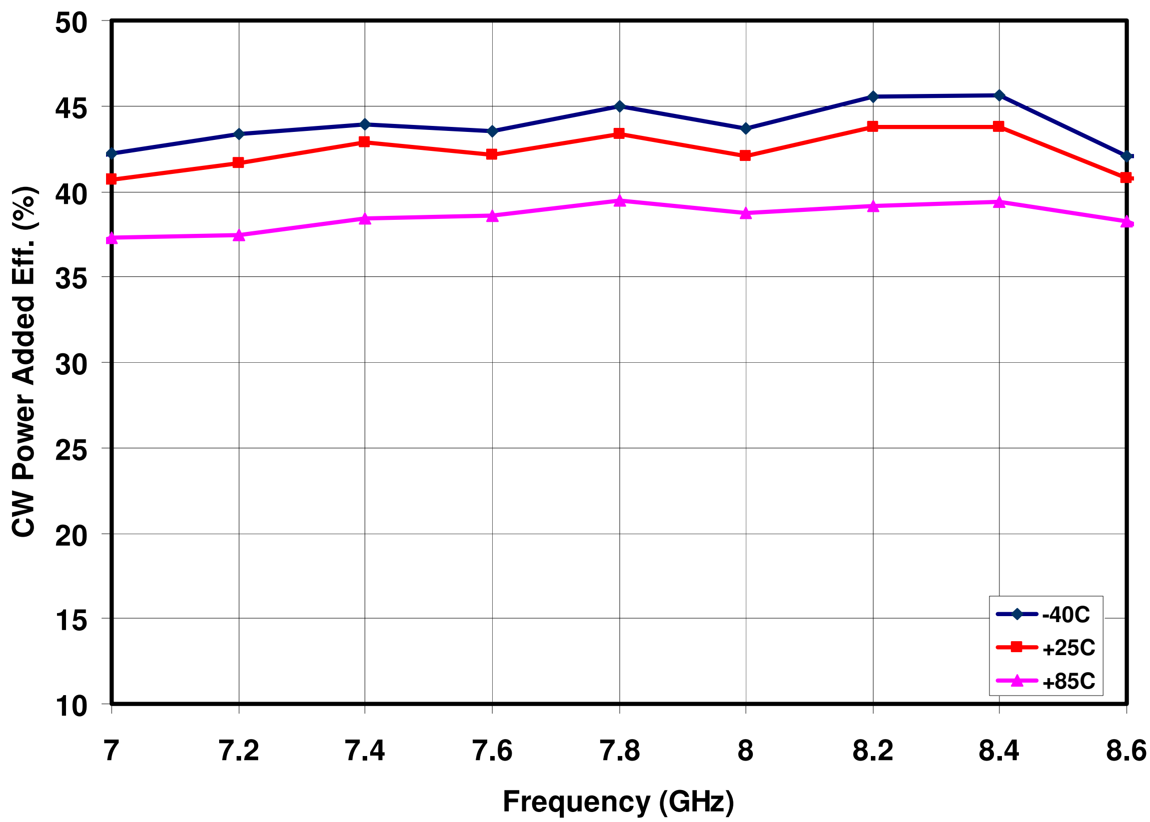




Measured Data

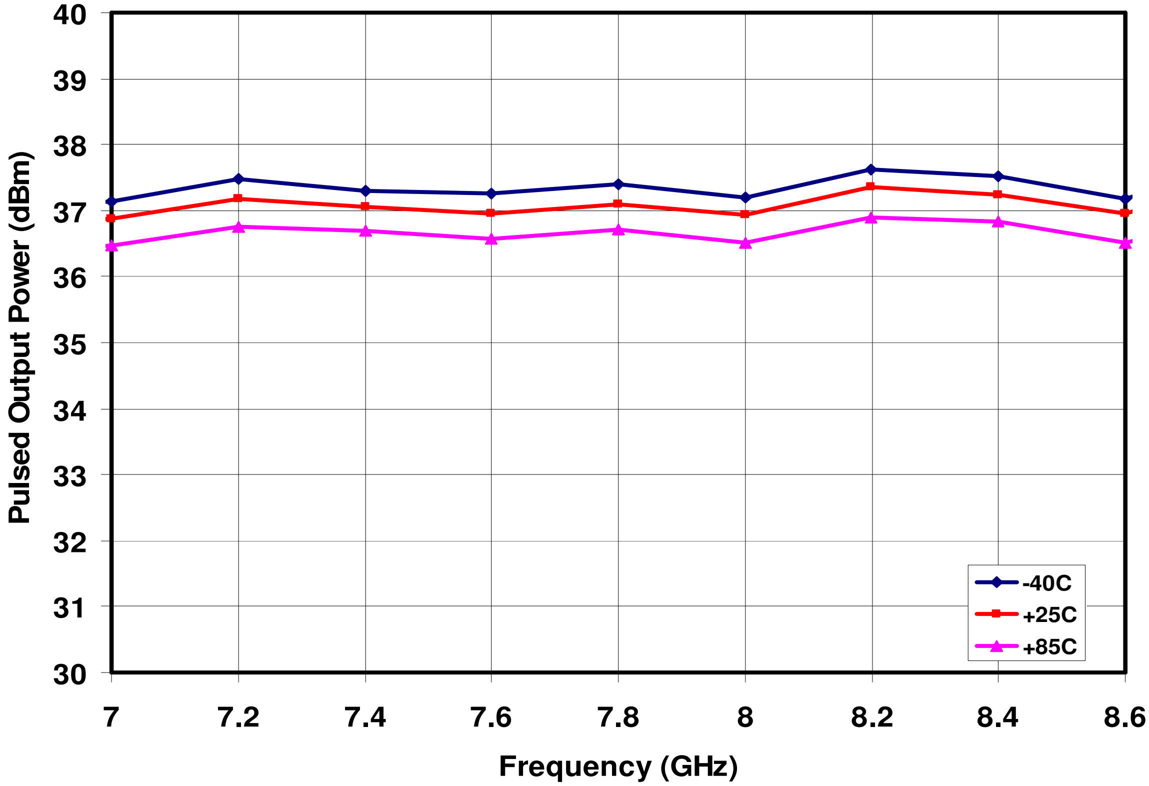
Bias: Vd = 7 V, Idq = 1.05 A, Pin = 22 dBm, CW Power, Temperature Data

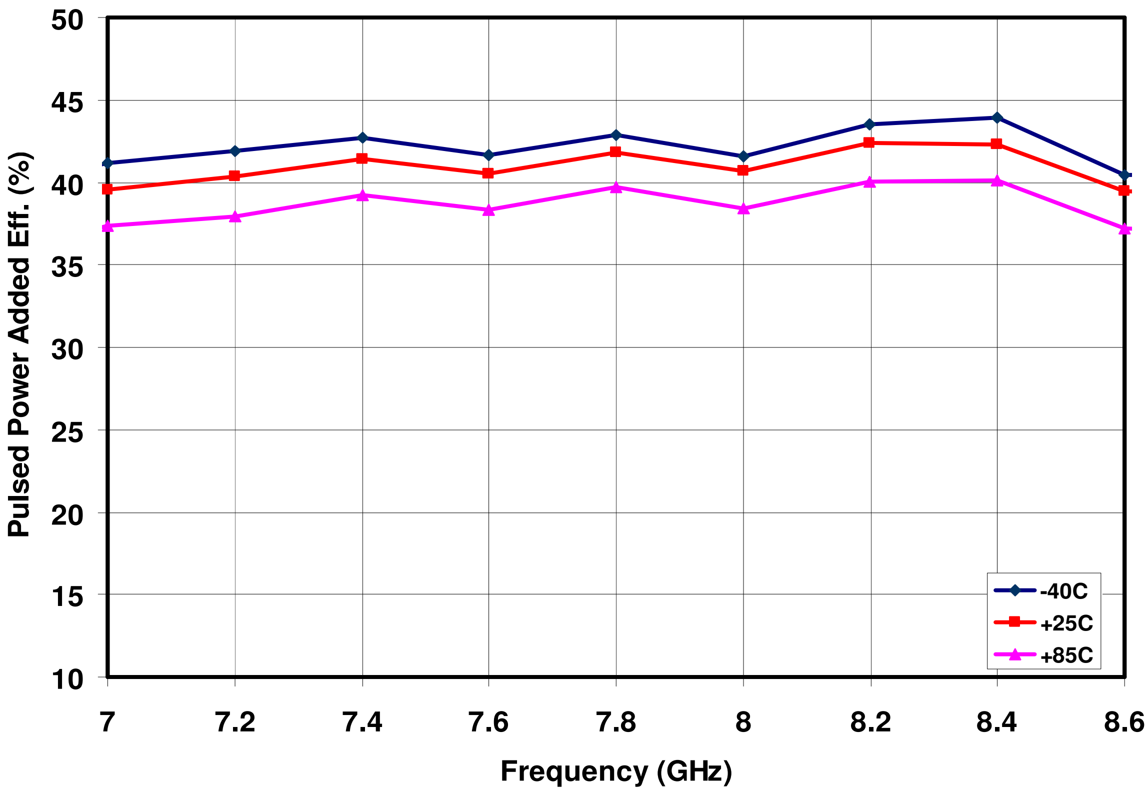




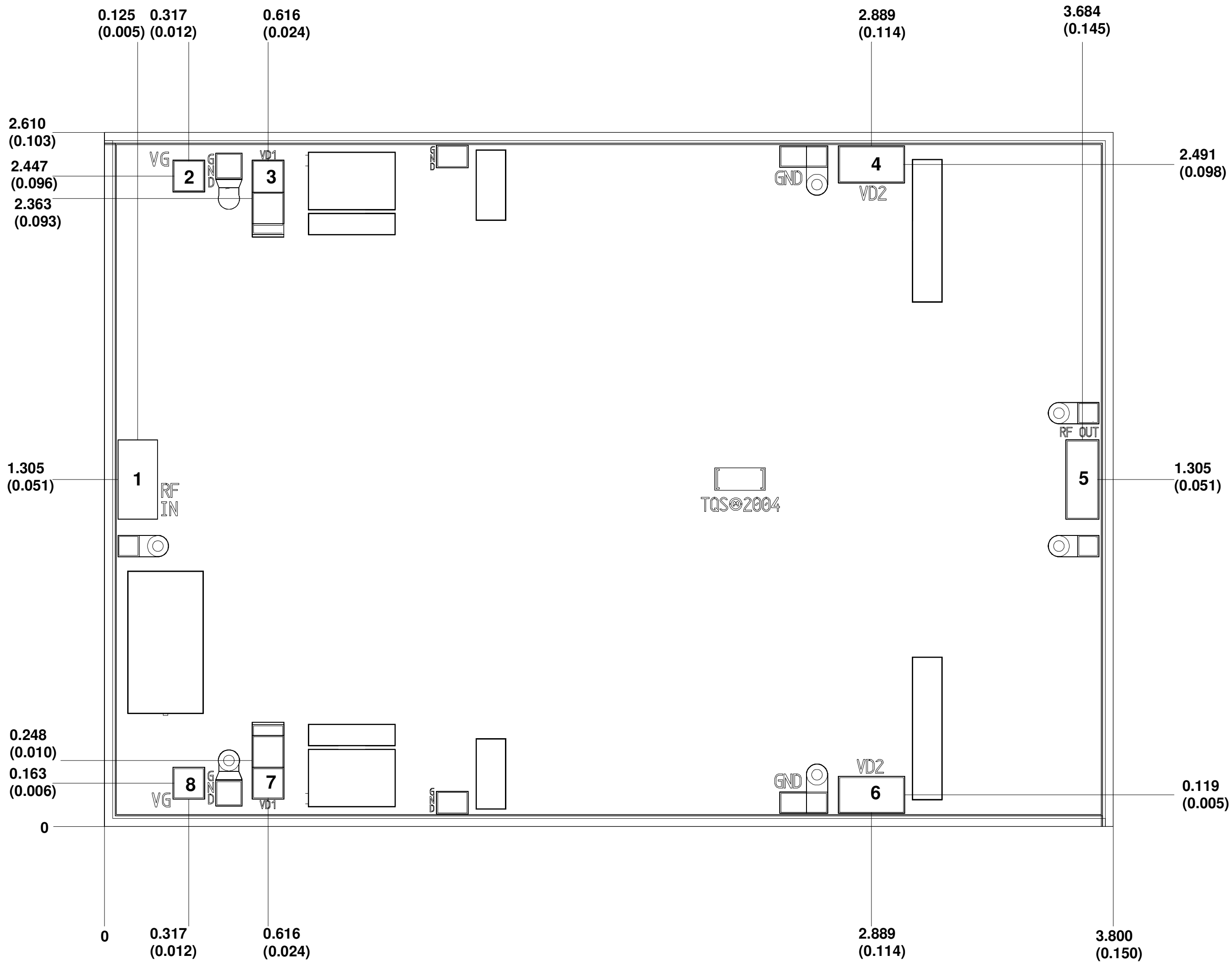
Measured Data

Bias: Vd = 7 V, Idq = 1.05 A, Pin = 22 dBm, Pulsed Power, 25% Duty Cycle, Temperature Data





Mechanical Drawing



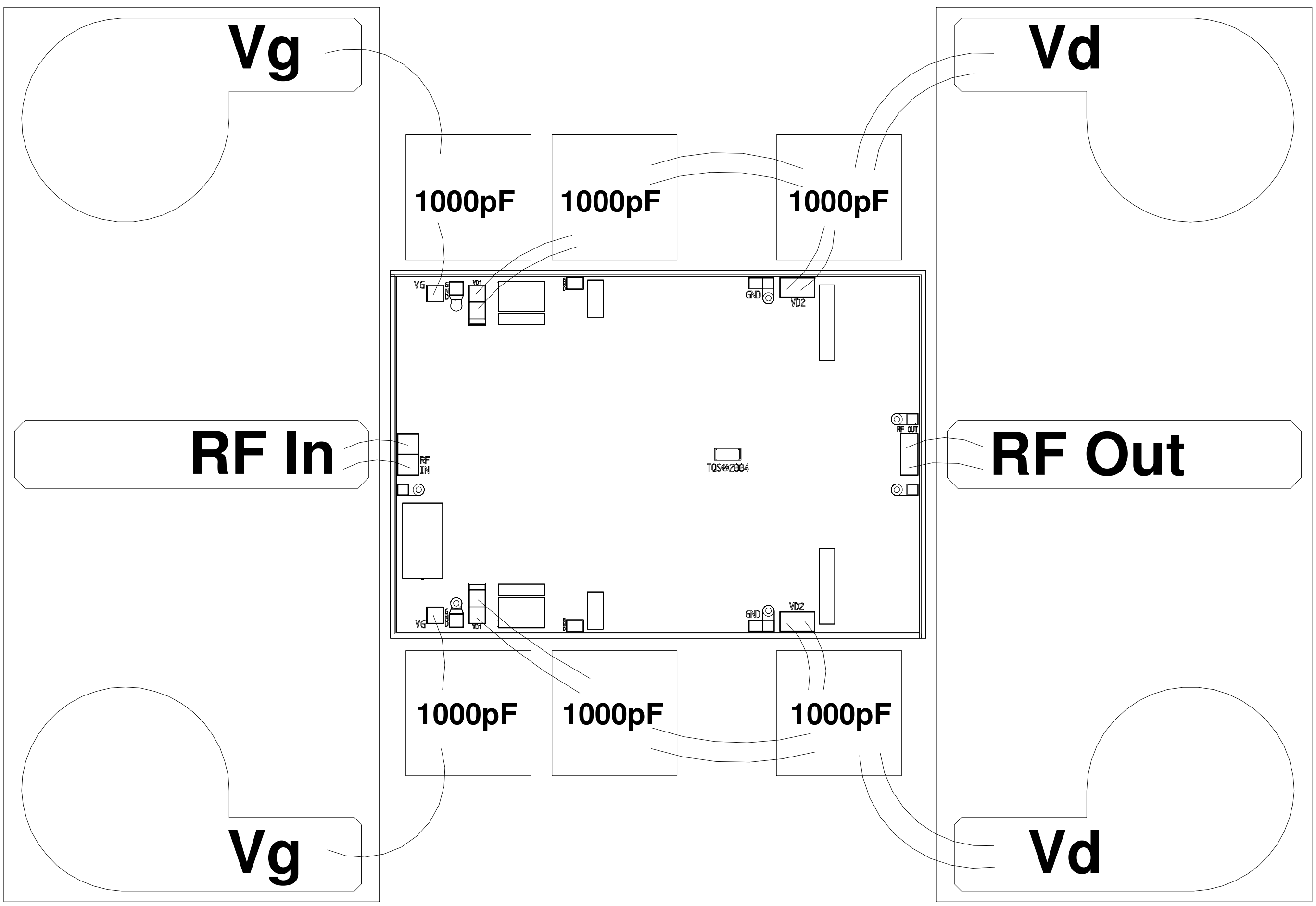
Units: Millimeters (inches)
Thickness: 0.10 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/- 0.05 (0.002)

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 = 5 to 7 V

Vg = -0.7 V Typical

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

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.

Ordering Information

Part	Package Style
TGA2701	GaAs MMIC Die

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