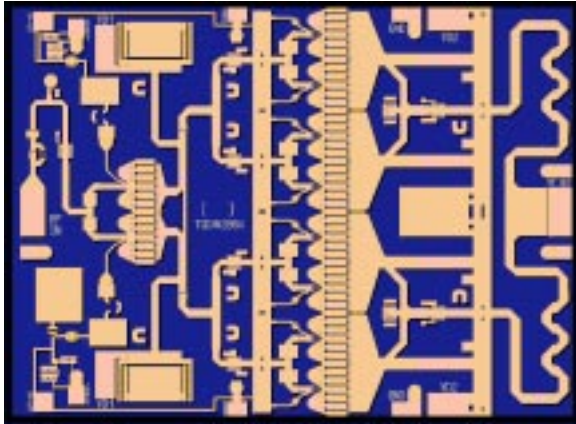


10.5 – 12GHz High Power Amplifier

TGA2710



Key Features

- Frequency Range: 10.5 -12.0 GHz
- 38 dBm Nominal Output Power
- 19 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 TGA2710 is a High Power Amplifier MMIC for 10.5 – 12GHz applications. The part is designed using TriQuint's 0.25um 3MI pHEMT production process.

The TGA2710 nominally provides 38 dBm output power and 41% PAE for bias of 9V, 1.05A. The typical gain is 19dB.

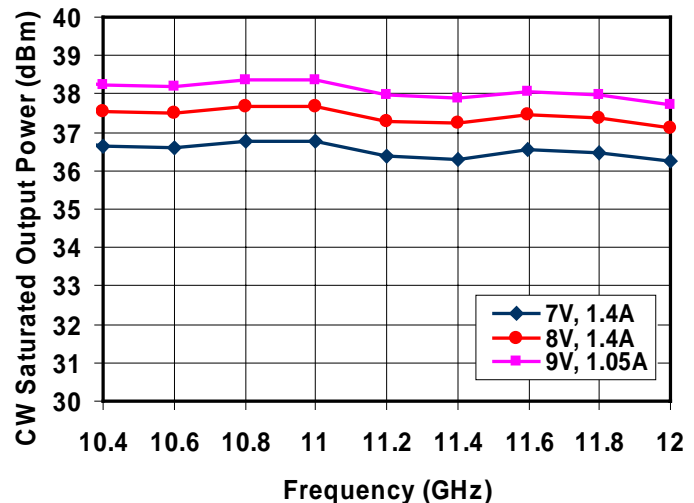
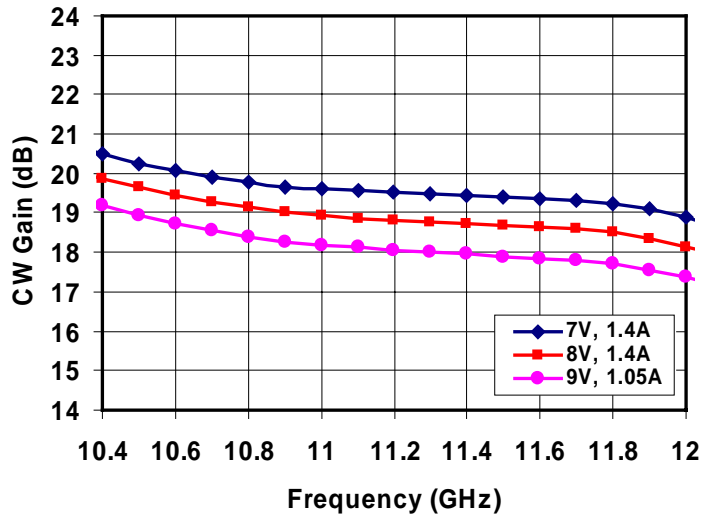
The part is ideally suited for low cost markets such as Point-to-Point Radio and Communications.

The TGA2710 is 100% DC and RF tested on-wafer to ensure performance compliance.

The TGA2710 has a protective surface passivation layer providing environmental robustness.

Lead-Free & RoHS compliant.

Measured Fixtured Data



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

TABLE I
MAXIMUM RATINGS 1/

| SYMBOL | PARAMETER | VALUE | NOTES |
|------------------|-----------------------------------|---------------|--------------|
| V _d | Drain Voltage | 10 V | <u>2/</u> |
| V _g | Gate Voltage Range | -1 TO +0.5 V | |
| I _d | Drain Current | 3.85 A | <u>2/ 3/</u> |
| I _g | Gate Current | 85 mA | <u>3/</u> |
| P _{IN} | Input Continuous Wave Power | 23 dBm | |
| P _D | Power Dissipation | 11.3 W | <u>2/ 4/</u> |
| T _{CH} | Operating Channel Temperature | 150 °C | <u>5/</u> |
| T _M | 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 60°C, the median life is 1.0E+6 hrs.
- 5/ Junction operating temperature will directly affect the device median time to failure (MTTF). For maximum life, it is recommended that junction temperatures be maintained at the lowest possible levels.

TABLE II
ELECTRICAL CHARACTERISTICS
(Ta = 25 °C Nominal)

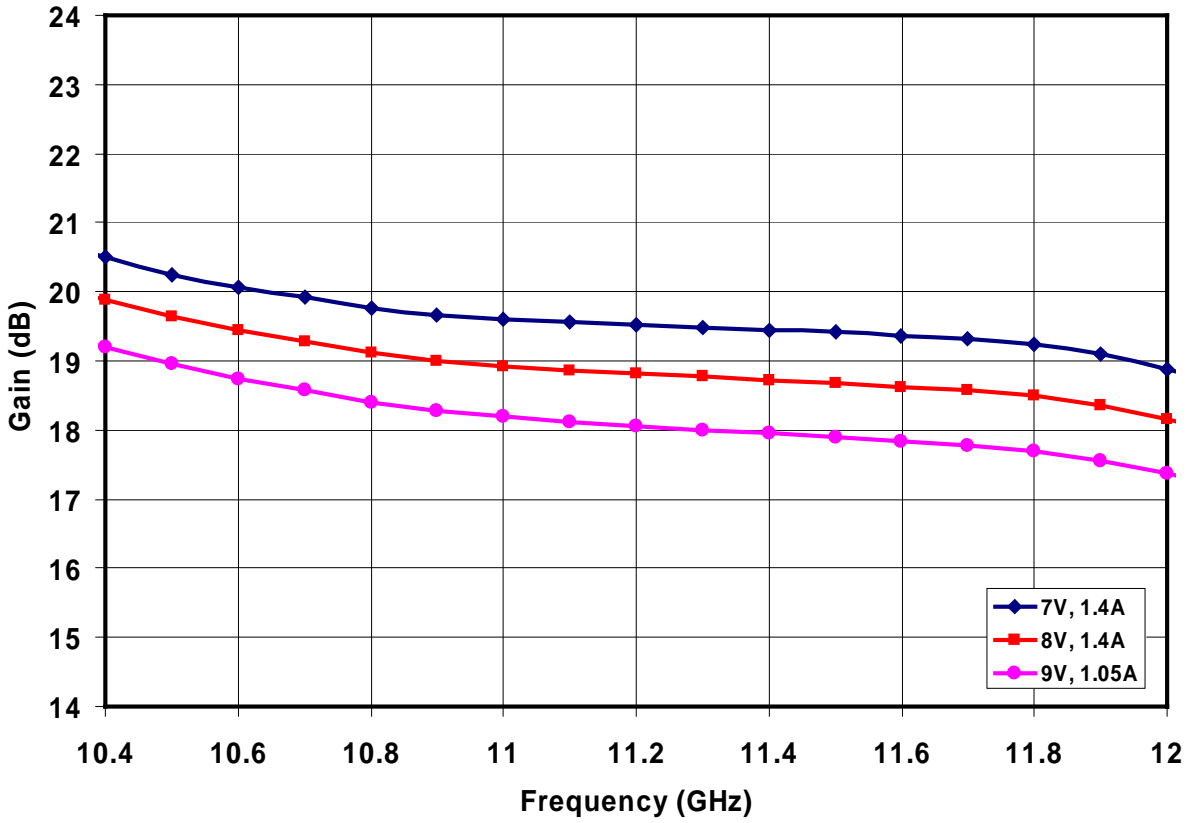
| PARAMETER | TYPICAL | TYPICAL | UNITS |
|---|-----------|-----------|-------|
| Frequency Range | 10.5 - 12 | 10.5 - 12 | GHz |
| Drain Voltage, Vd | 7 | 9 | V |
| Drain Current, Id | 1.4 | 1.05 | A |
| Gate Voltage, Vg | -0.6 | -0.65 | V |
| Small Signal Gain, S21 | 19.5 | 18 | dB |
| Input Return Loss, S11 | 12 | 12 | dB |
| Output Return Loss, S22 | 12 | 12 | 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 | 38 | 36 | % |
| Small Signal Gain Temperature Coefficient | -0.03 | -0.03 | dB/°C |

TABLE III
THERMAL INFORMATION

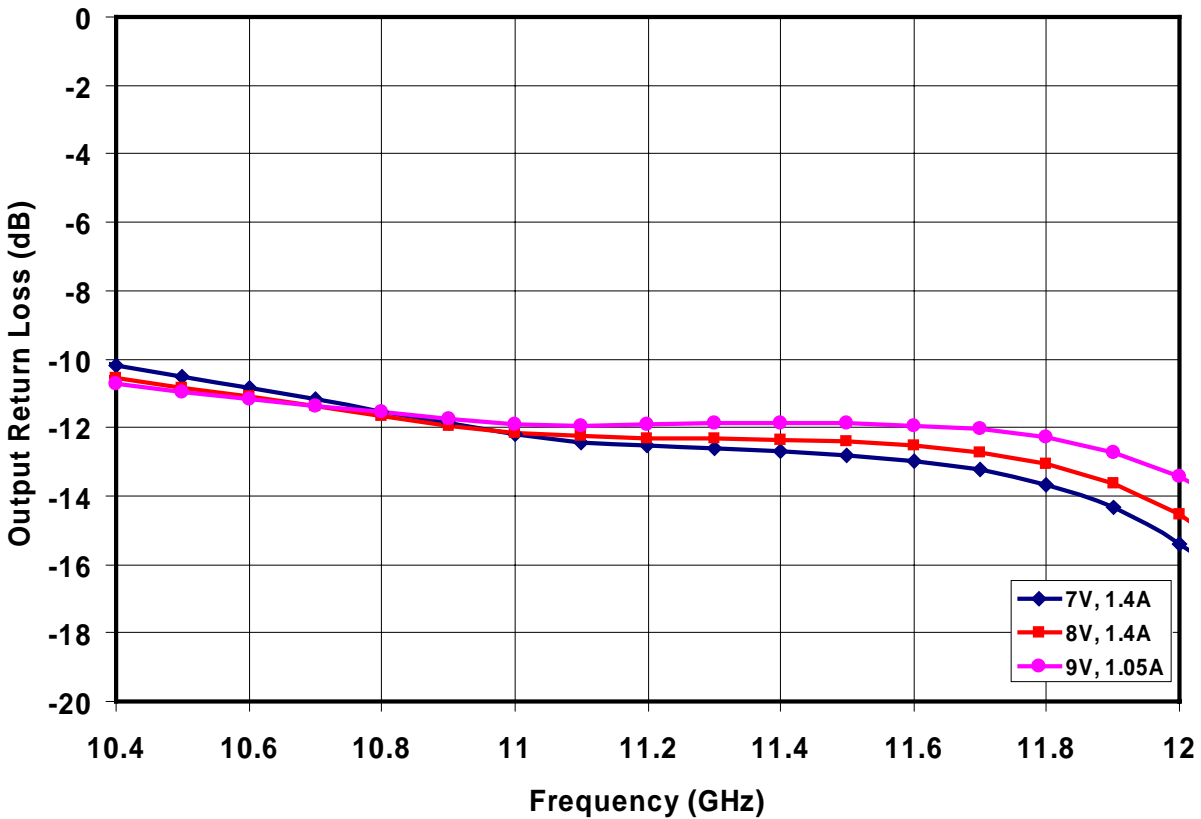
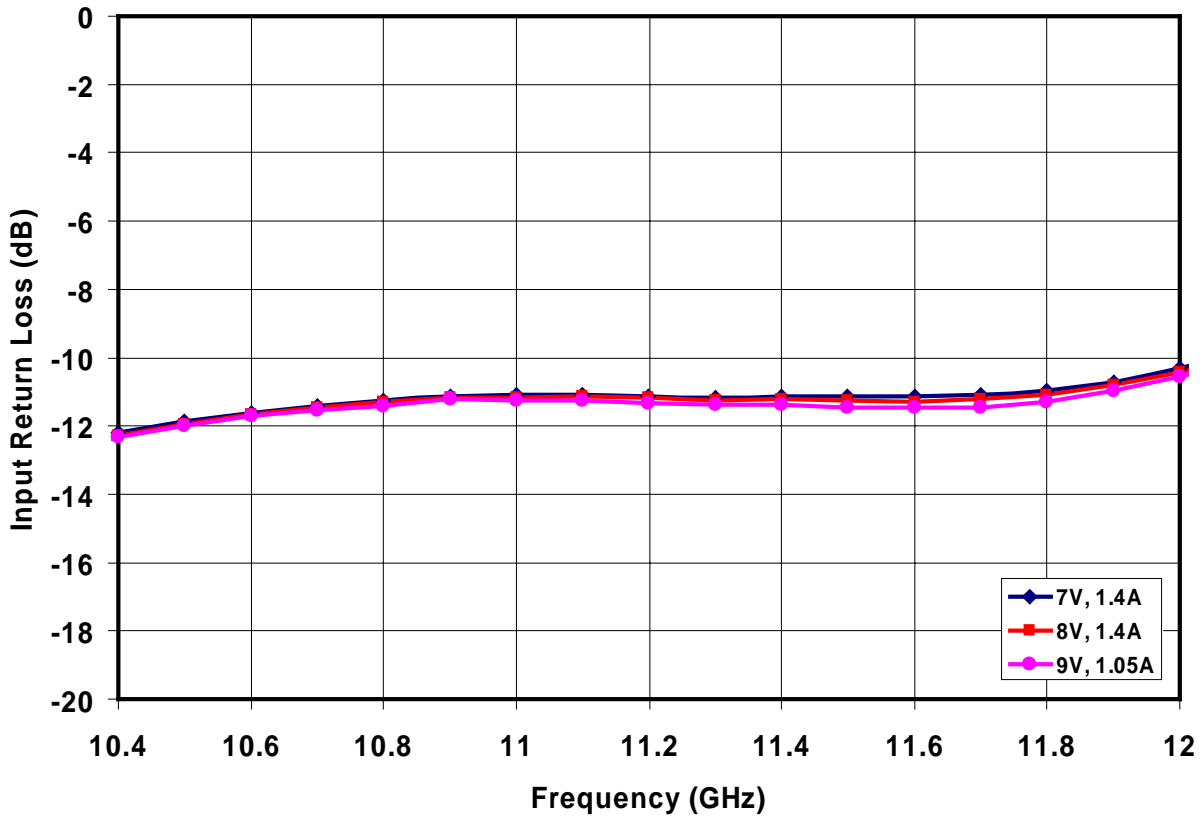
| PARAMETER | TEST CONDITIONS | T _{CH} (°C) | θ _{JC} (°C/W) | T _M (HRS) |
|---|---|-------------------------|---------------------------|-------------------------|
| θ _{JC} Thermal Resistance (channel to Case) | Vd = 7 V Id = 1.4 A P _{diss} = 9.8W Small Signal | 140 | 7.1 | 2.4E+6 |
| θ _{JC} Thermal 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°C baseplate temperature.

Measured Data

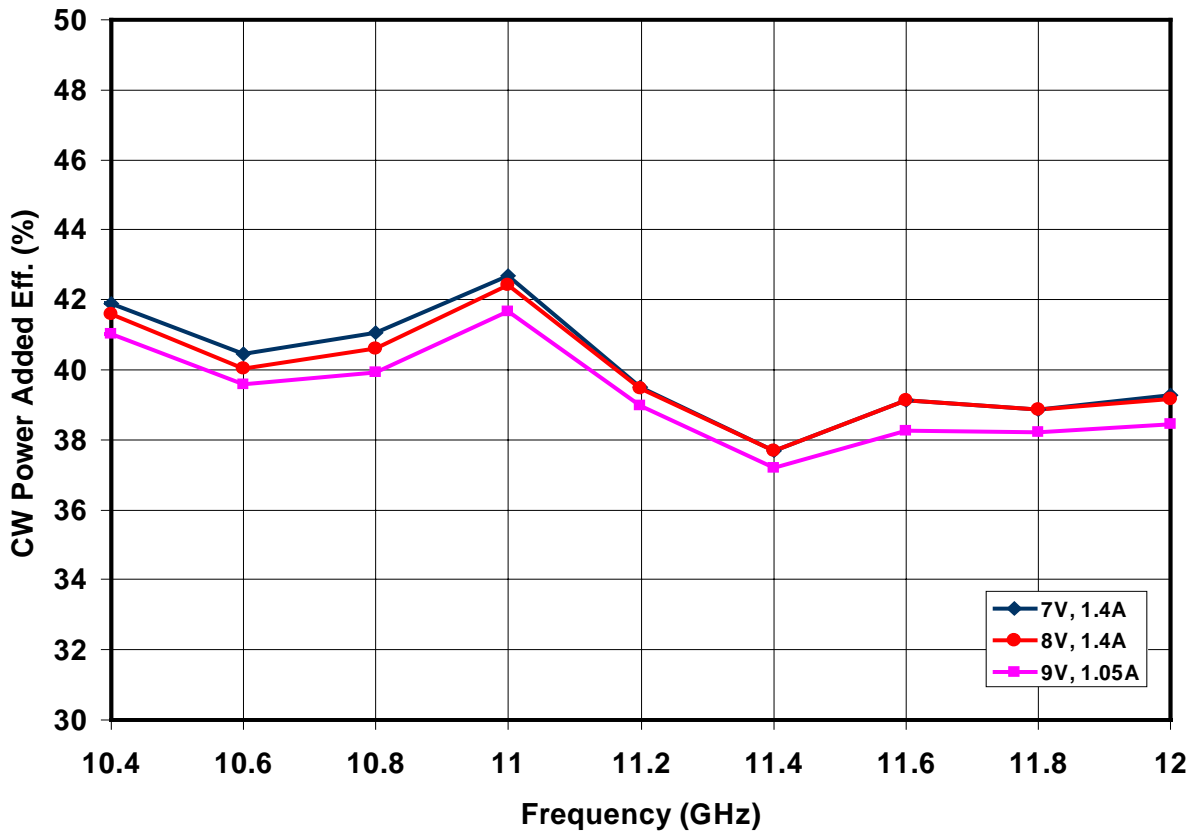
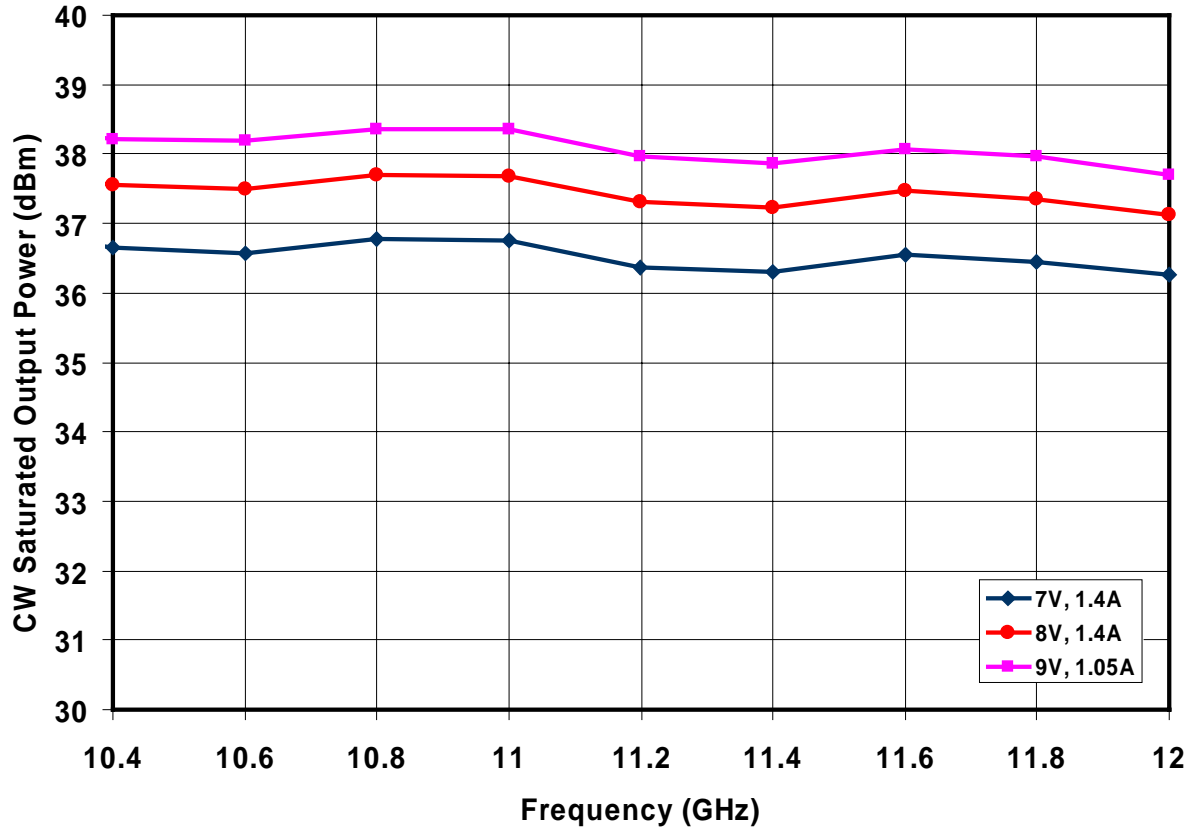


Measured Data



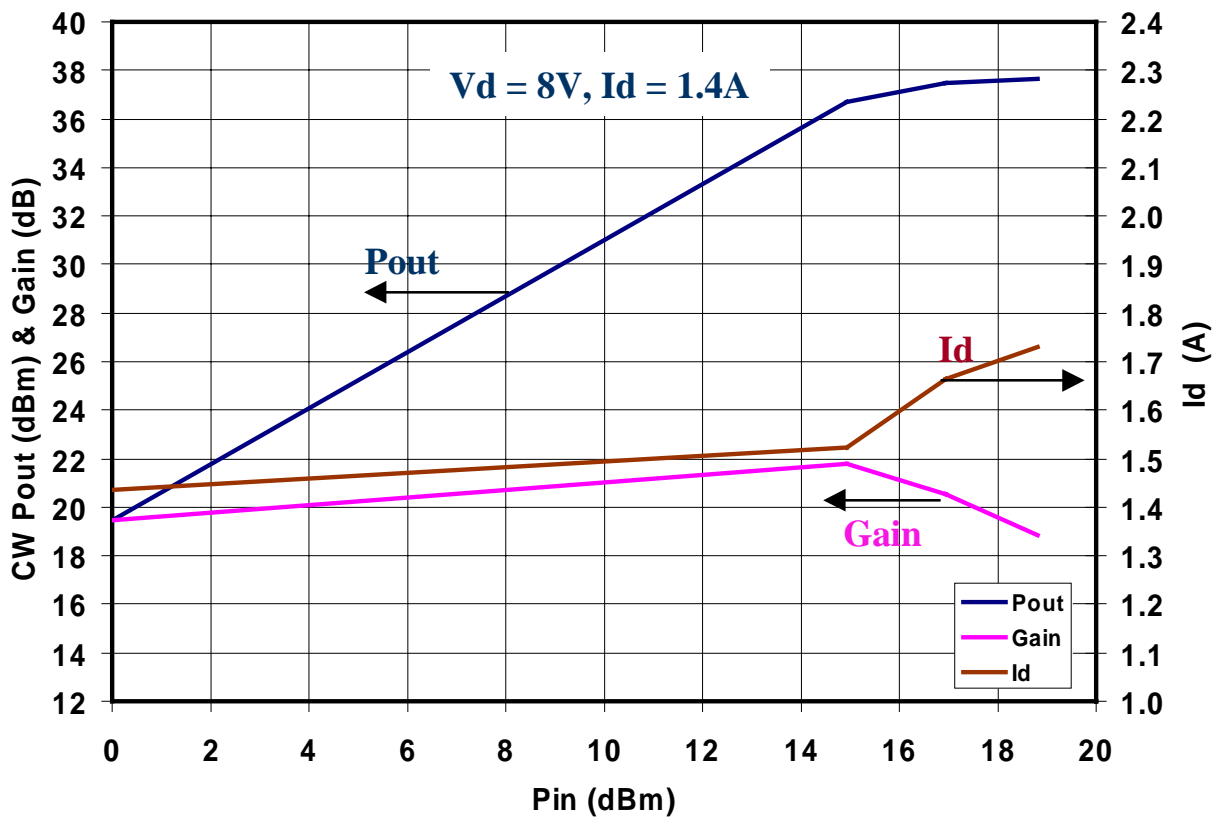
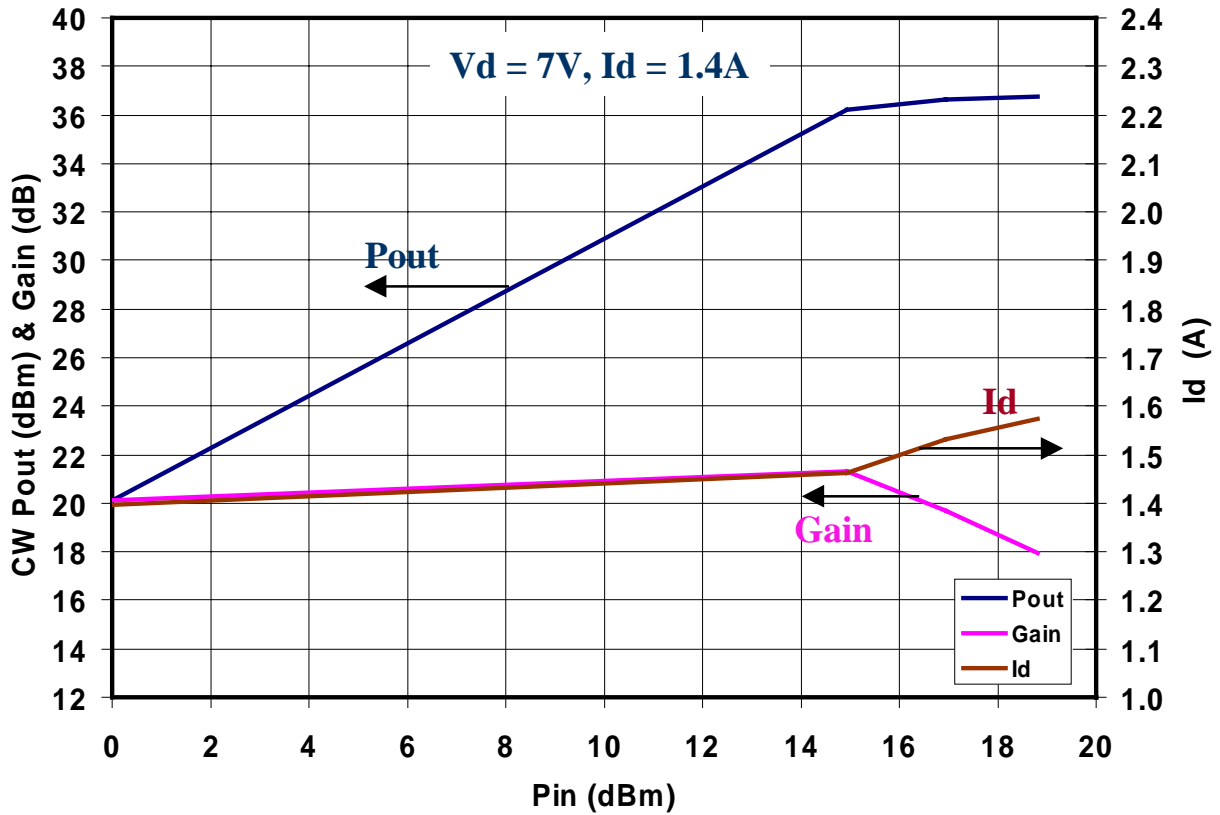
Measured Data

Pin = 19dBm, CW Power



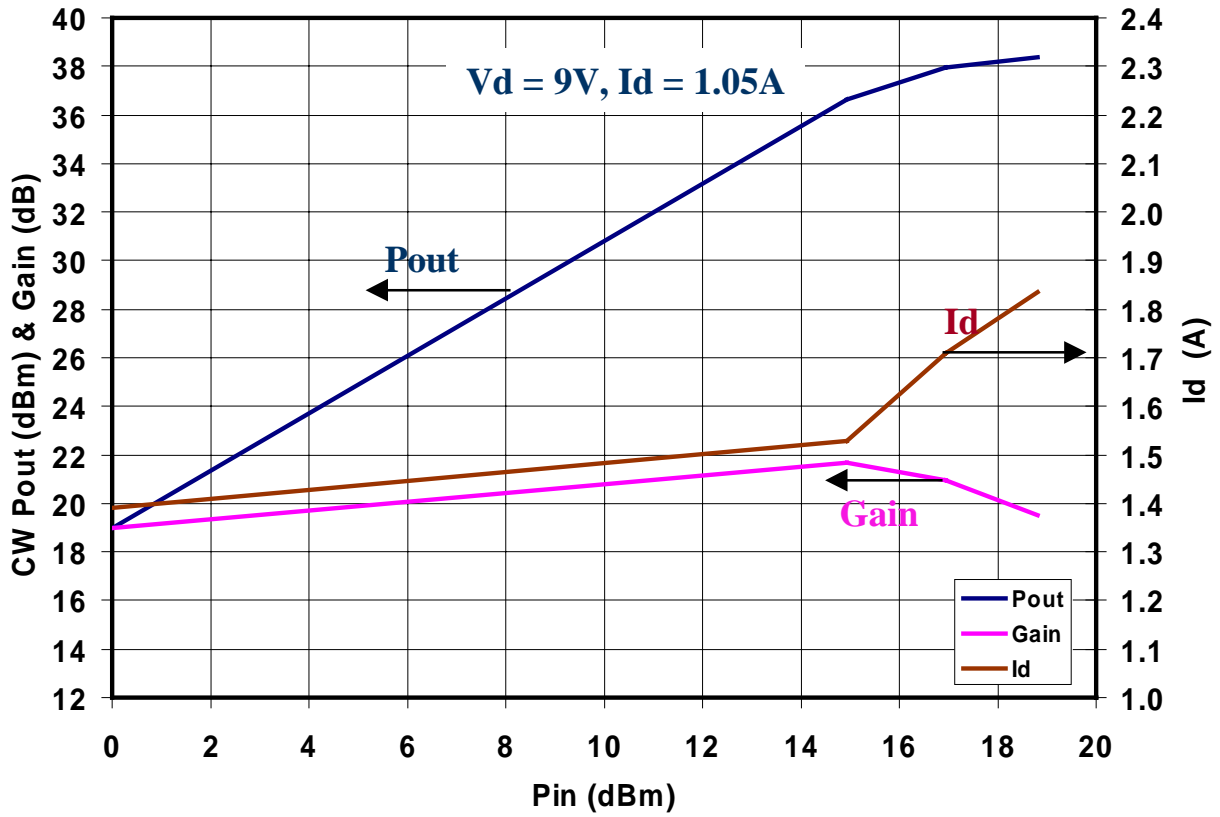
Measured Data

Frequency @ 11GHz, CW Power



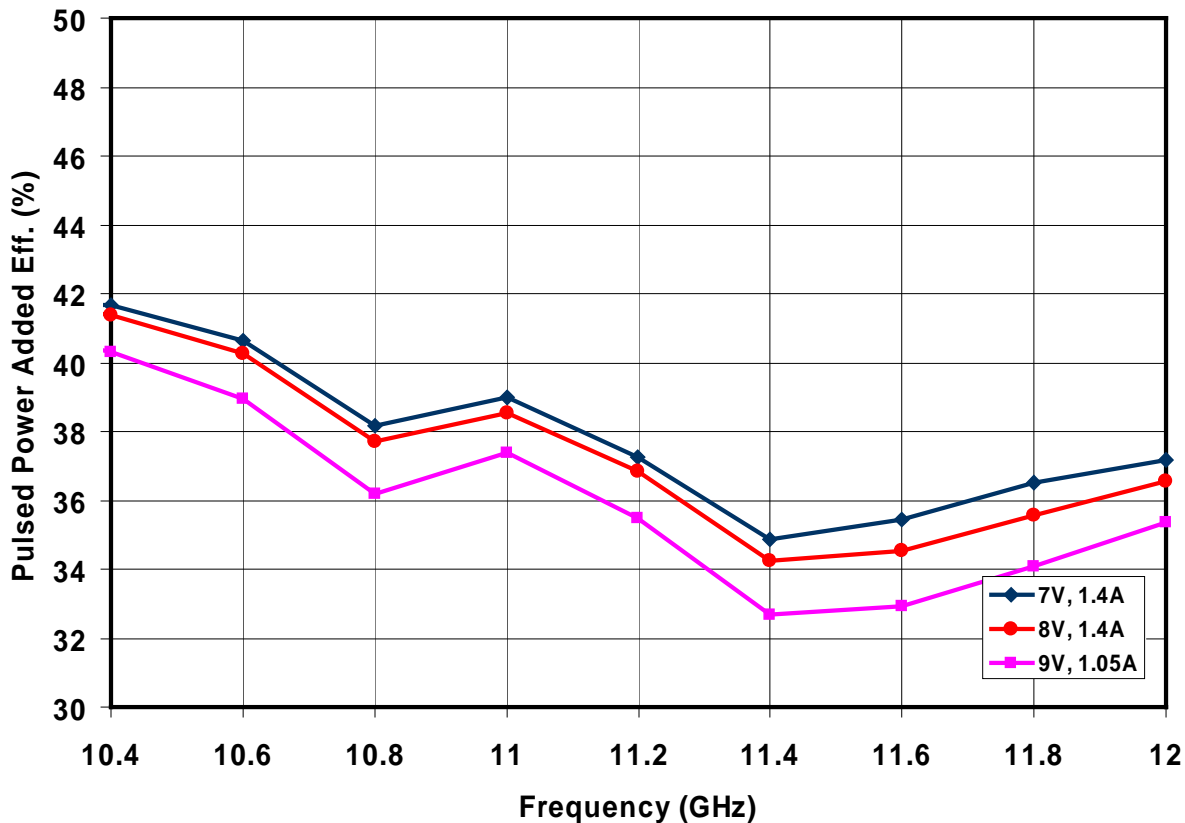
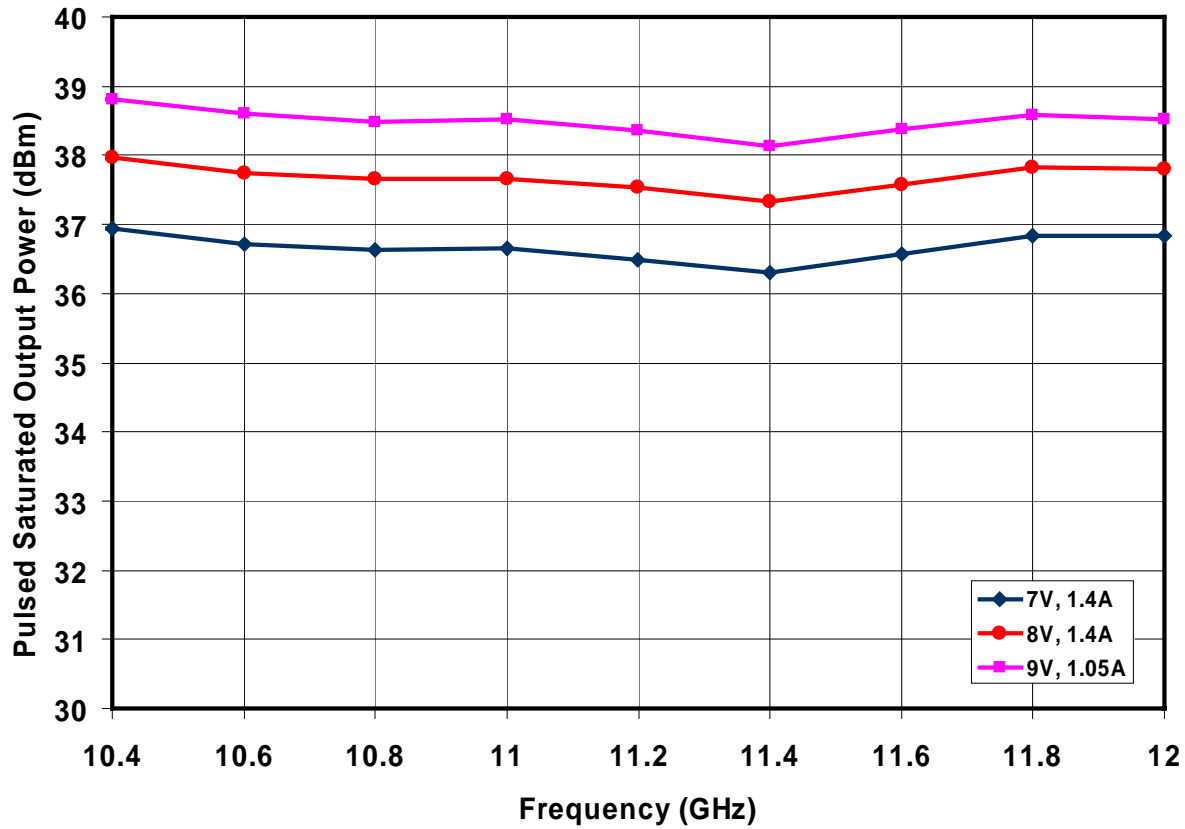
Measured Data

Frequency @ 11GHz, CW Power



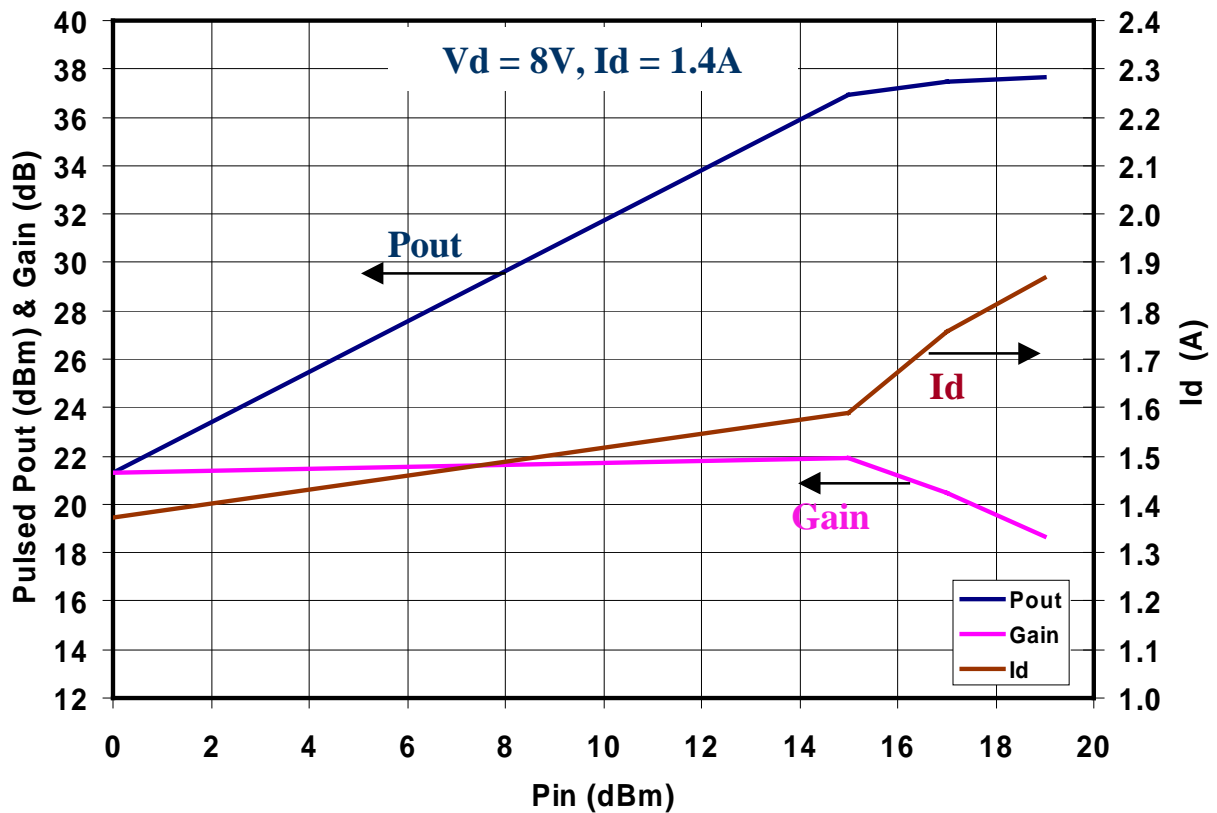
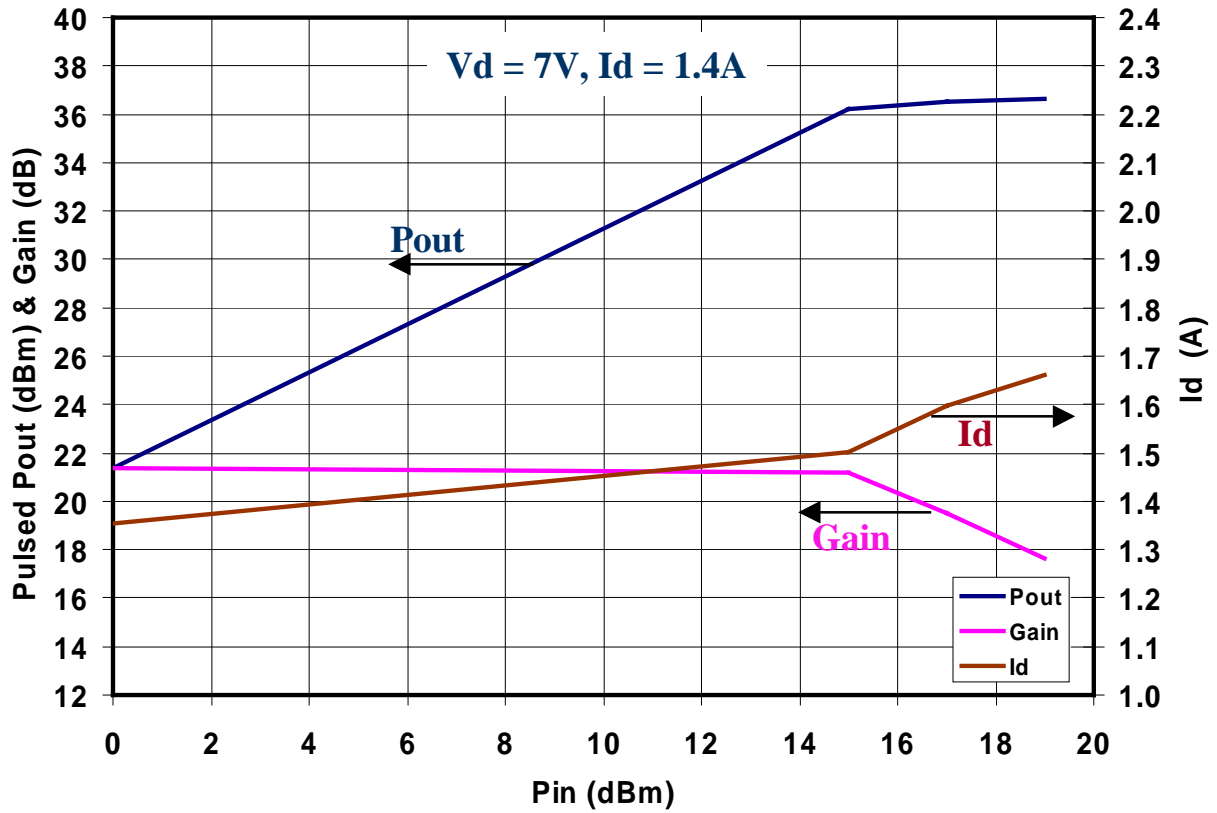
Measured Data

Pin = 19dBm, Pulsed Power, 25% DC



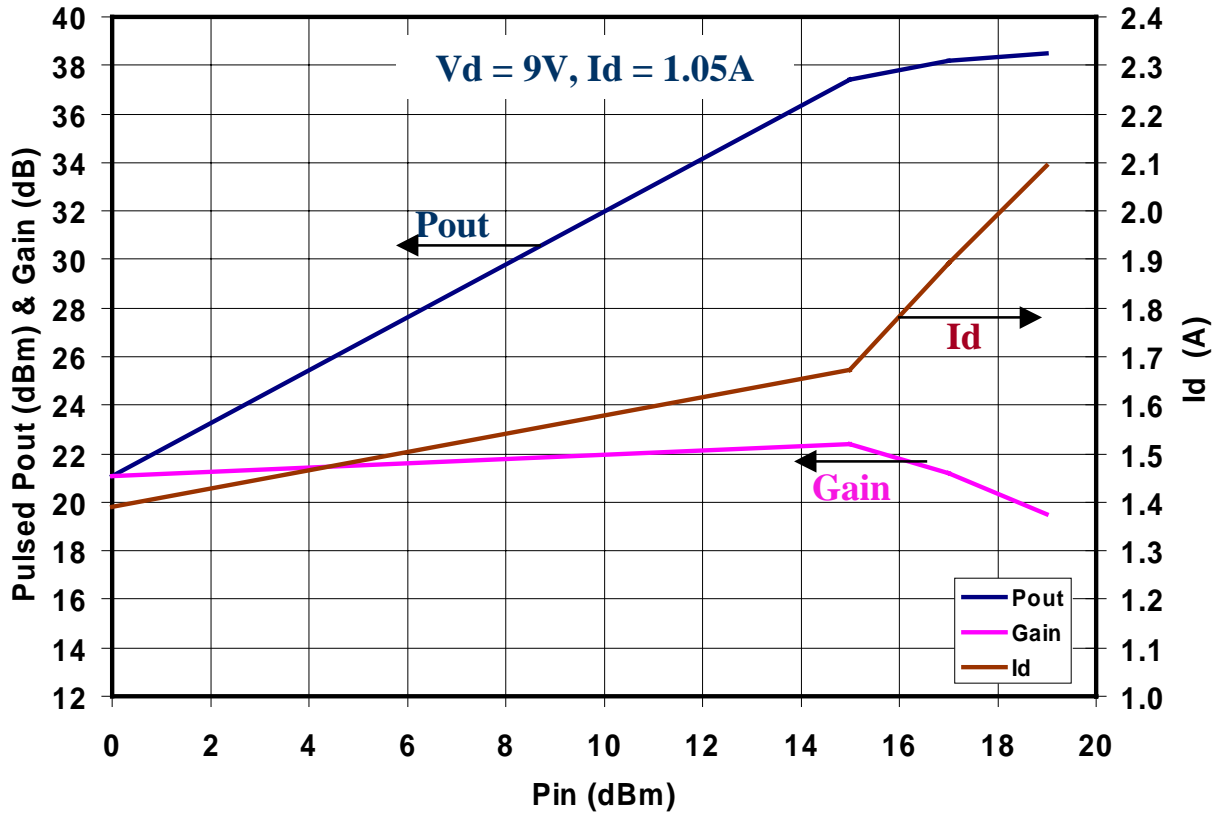
Measured Data

Frequency @ 11GHz, Pulsed Power, 25% DC



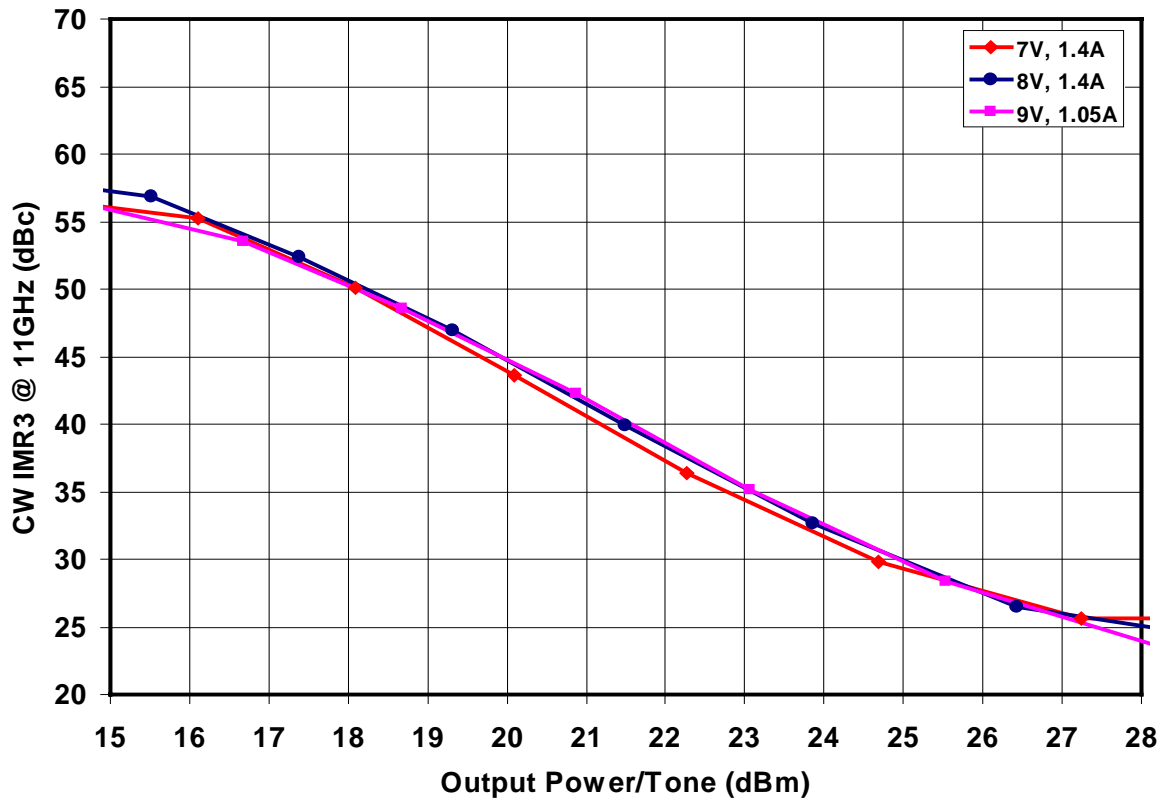
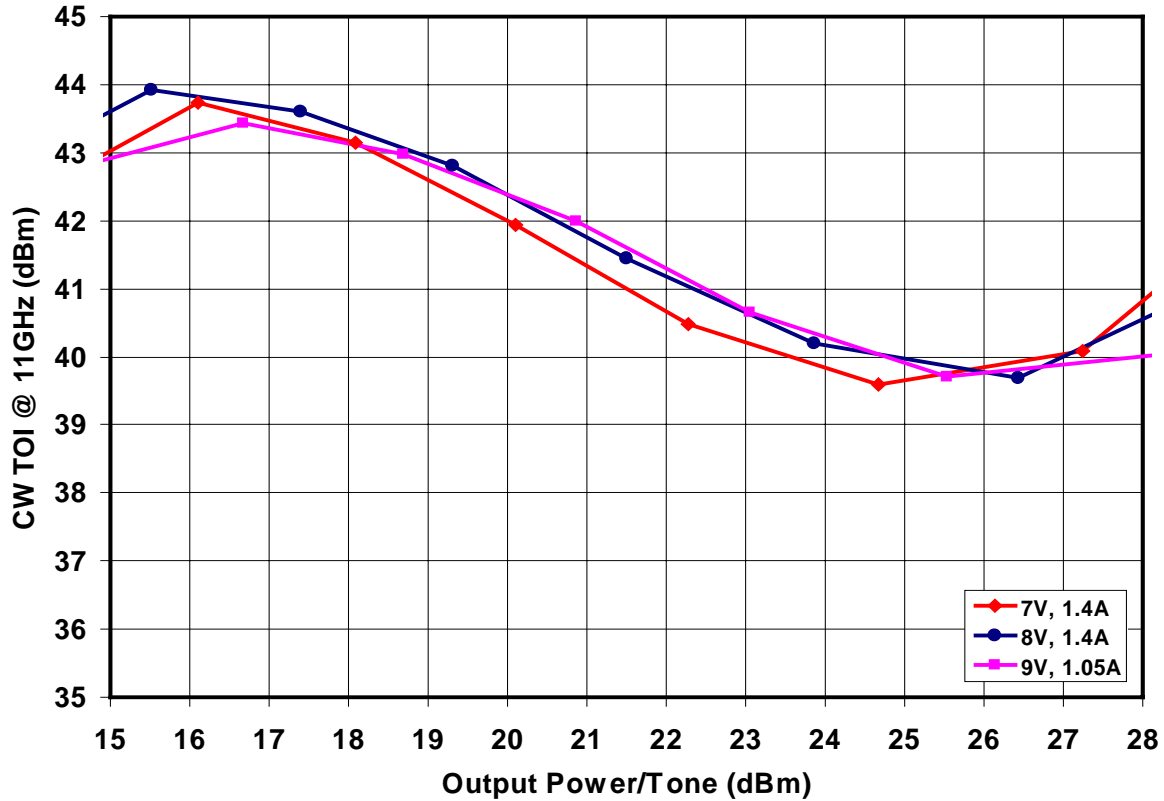
Measured Data

Frequency @ 11GHz, Pulsed Power, 25% DC

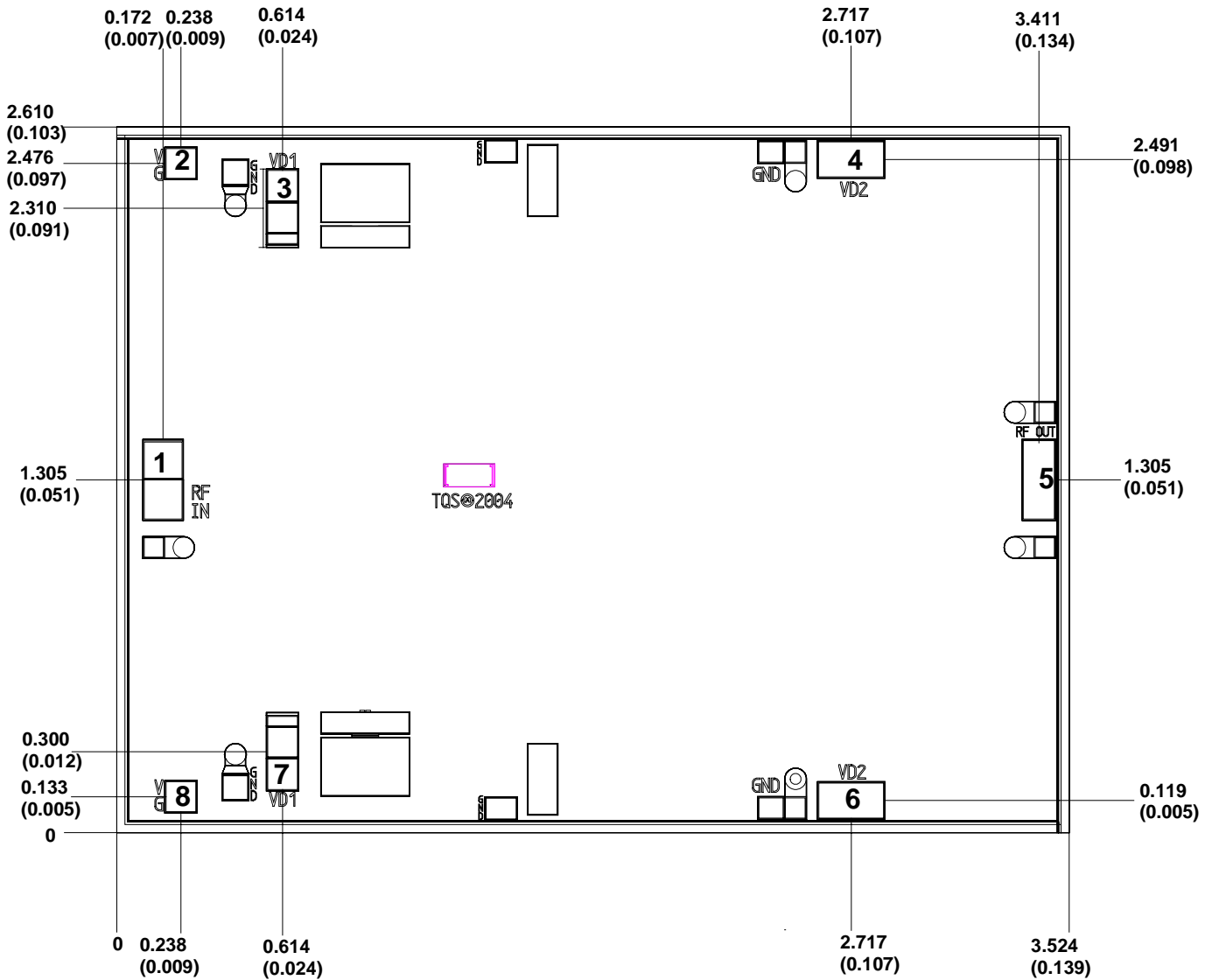


Measured Data

Frequency @ 11GHz, CW TOI



Mechanical Drawing



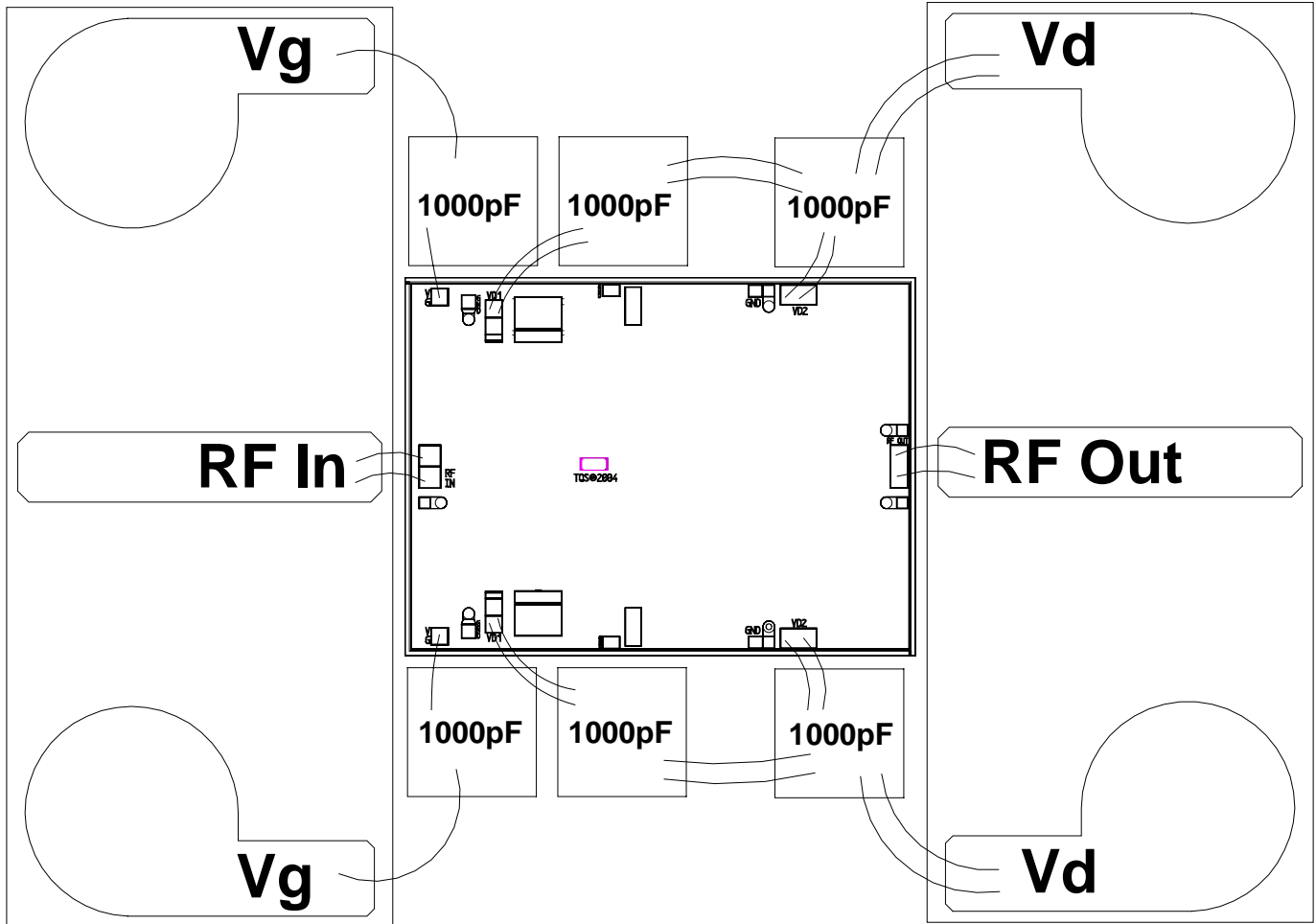
Units: Millimeters (inches)
 Thickness: 0.10 (0.004)
 Chip edge to bond pad dimensions are shown to center of bond pad
 Chip size tolerance: +/- 0.05 (0.002)

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



$V_d = 7$ to 9 V

$V_g = -0.6$ 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 300⁰C (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 200⁰C.

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