

8-12GHz Driver Amplifier

GaAs Monolithic Microwave IC

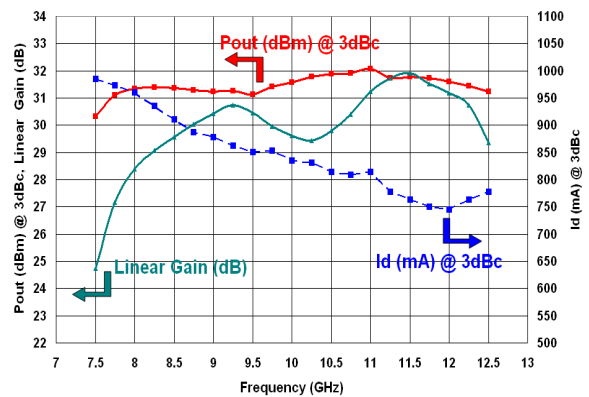
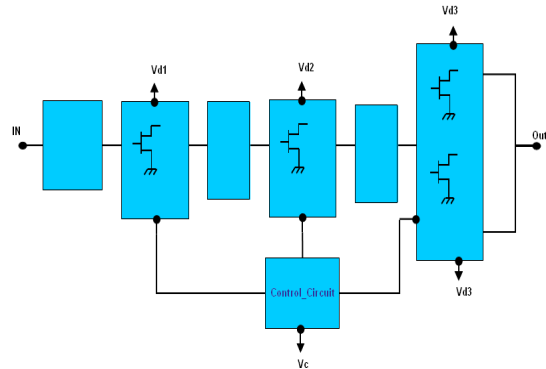
Description

The CHA6105 is a monolithic three-stage medium power amplifier designed for X band applications.

This device is suitable for systems requiring a high compression level.

The circuit is manufactured with a pHEMT process, 0.25 μ m gate length, via holes through the substrate, air bridges and electron beam gate lithography.

It is available in chip form.



P_{out} & PAE @ 3dB gain compression and Linear Gain (Pulse 25 μ s 10%T_{amb} 20°C)

Main Features

- Frequency range: 8-12GHz
- 31.5dBm Saturated output power
- 30dB Linear Gain
- Quiescent bias point: 8V@700mA
- Chip size: 2.80 x 2.21 x 0.07mm

Main Characteristics

T_{amb} = +20°C, V_c = +8V (Pulse 25 μ s 10%)

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------|--------------------------------|-----|------|-----|------|
| Fop | Operating frequency range | 8 | | 12 | GHz |
| G | Small signal gain | | 30 | | dB |
| Psat | Saturated output power | | 31.5 | | dBm |
| Idq | Power supply quiescent current | | 700 | | mA |

ESD Protections: Electrostatic discharge sensitive device observe handling precautions!

*Preliminary***Electrical Characteristics**Vd = +8V, Pulse 25 μ s 10%

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------------|--|-----|-------|-----|-------|
| Top | Operating temperature range | -40 | | 80 | °C |
| Fop | Operating frequency range | 8 | | 12 | GHz |
| G | Small signal gain at 20°C | | 30 | | dB |
| ΔG_T | Linear gain variation vs temperature | | -0.05 | | dB/°C |
| P1dB | Output power at 1dB gain compression at 20°C | | 31 | | dBm |
| P3dB | Output power at 3dB gain compression at 20°C | | 31.5 | | dBm |
| dBS11 | Input Return Loss | | 2:1 | | dB |
| dBS22 | Output Return Loss | | 2:1 | | dB |
| Vd | Power supply voltage | | 8 | | V |
| Idq | Power supply quiescent current | | 700 | | mA |
| Id_3dBc | Consumption under 3dB gain compression | | 925 | | mA |
| V_c | Drain current control voltage | | -5 | | V |
| I_c | Biasing circuit consumption | | 25 | | mA |

Absolute Maximum Ratings (1)

Tamb = 20°C

| Symbol | Parameter | Values | Unit |
|---------|--|-------------|------|
| Pin_max | Maximum RF input power | 13 | dBm |
| Cmp | Compression level | 13 | dB |
| Vd | Power supply voltage | 9 | V |
| <Id> | maximum value of CW power supply current | 850 | mA |
| V_c | Drain current control voltage | -4 | V |
| Tj | Maximum Junction temperature | 175 | °C |
| Tstg | Storage temperature range | -55 to +125 | °C |

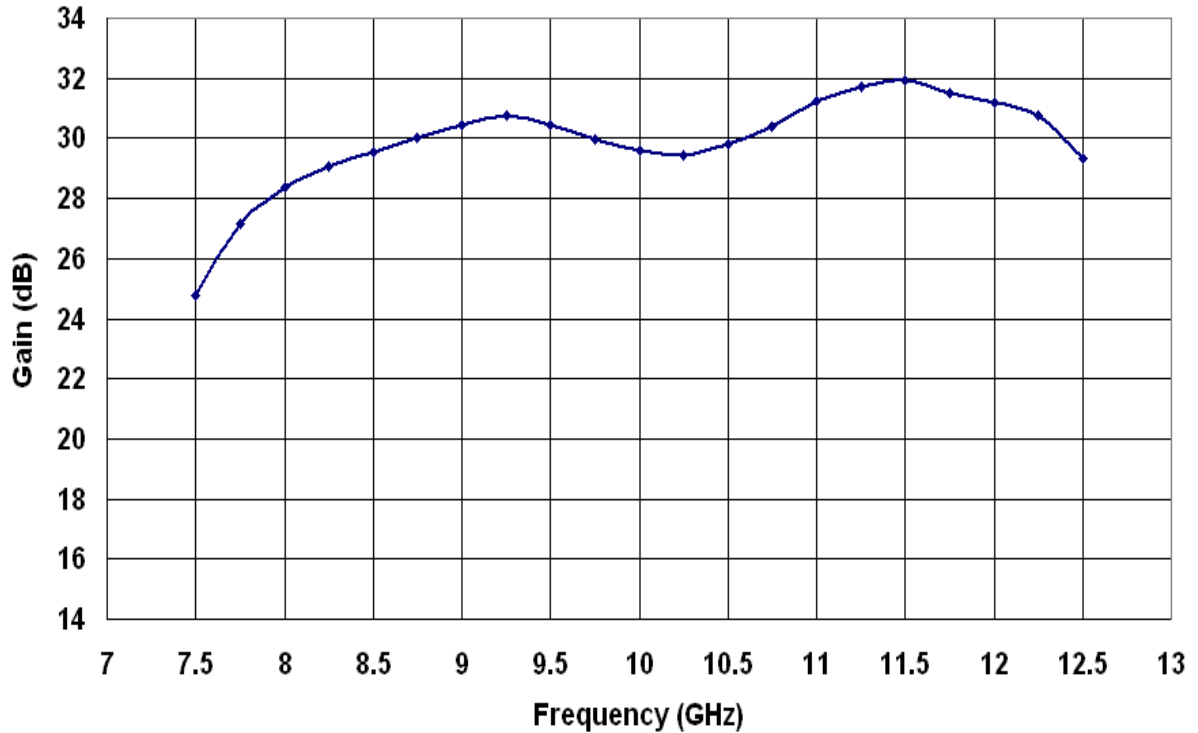
(1) Operation of this device above any one of these parameters may cause permanent damage

Typical measurement characteristics

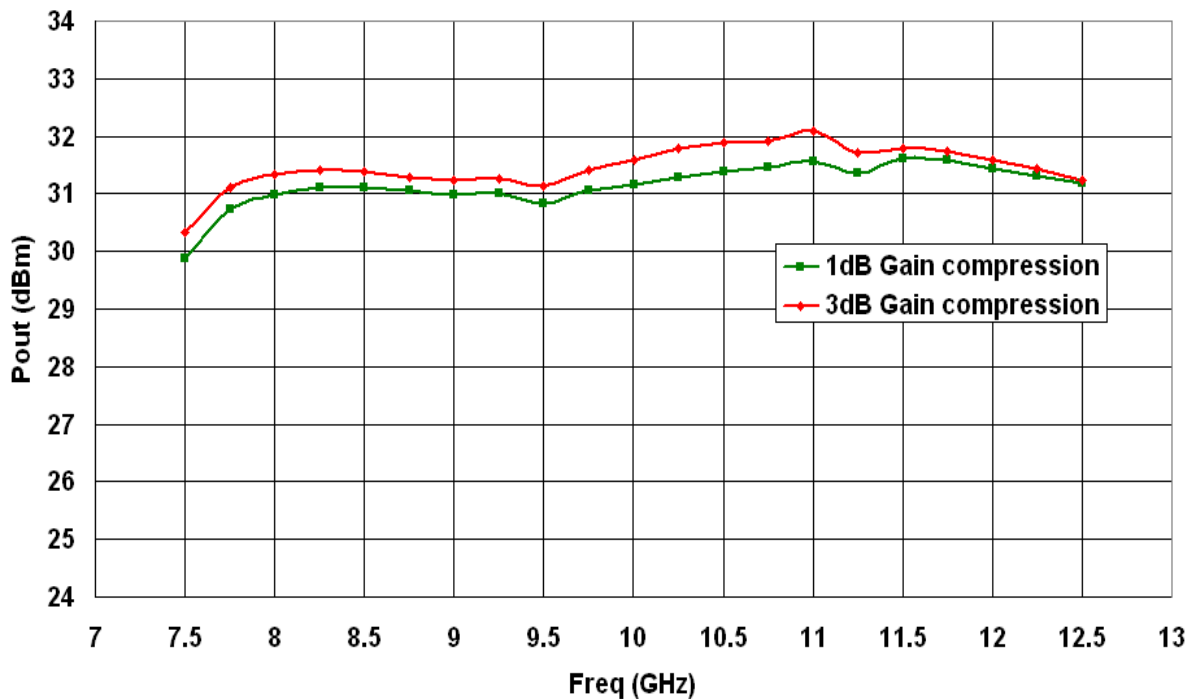
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Measurements

Tamb = 20°C, Vd = 8V ; Vctrl = -5V (Id Quiescent = 700mA) Pulse = 25µs 10%

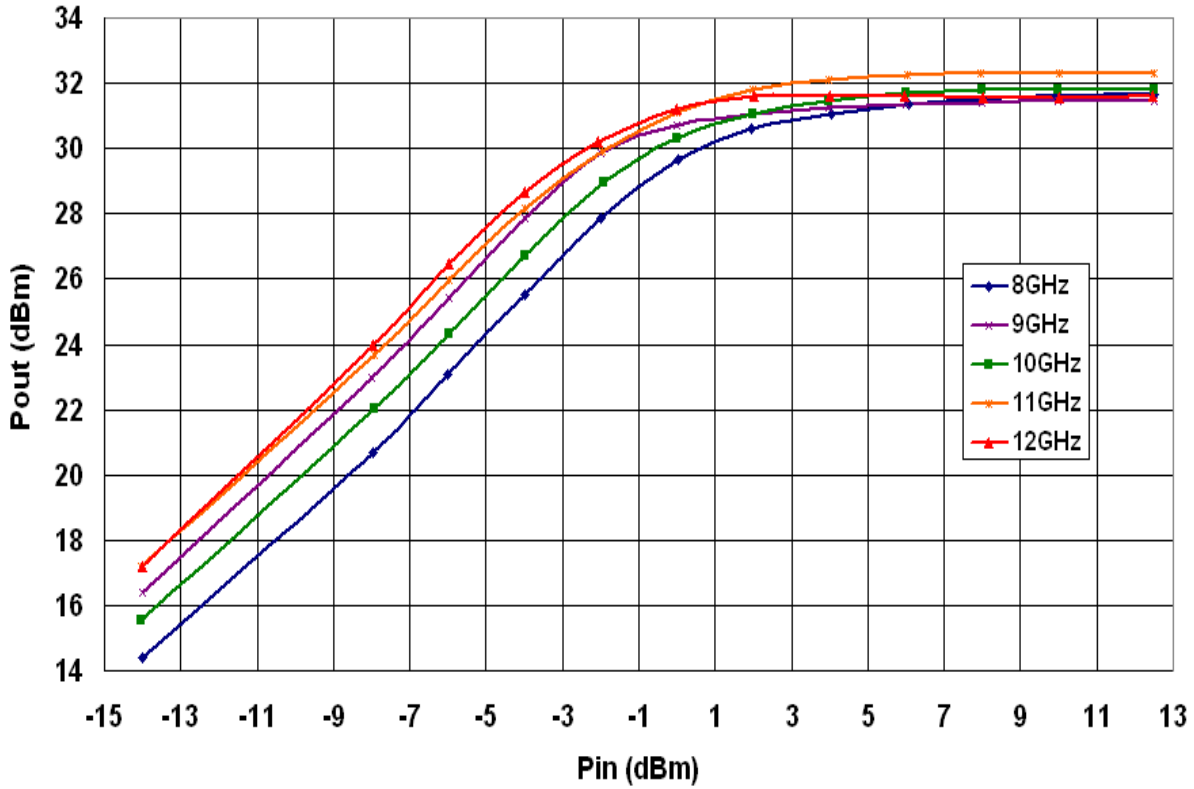


Linear gain vs frequency

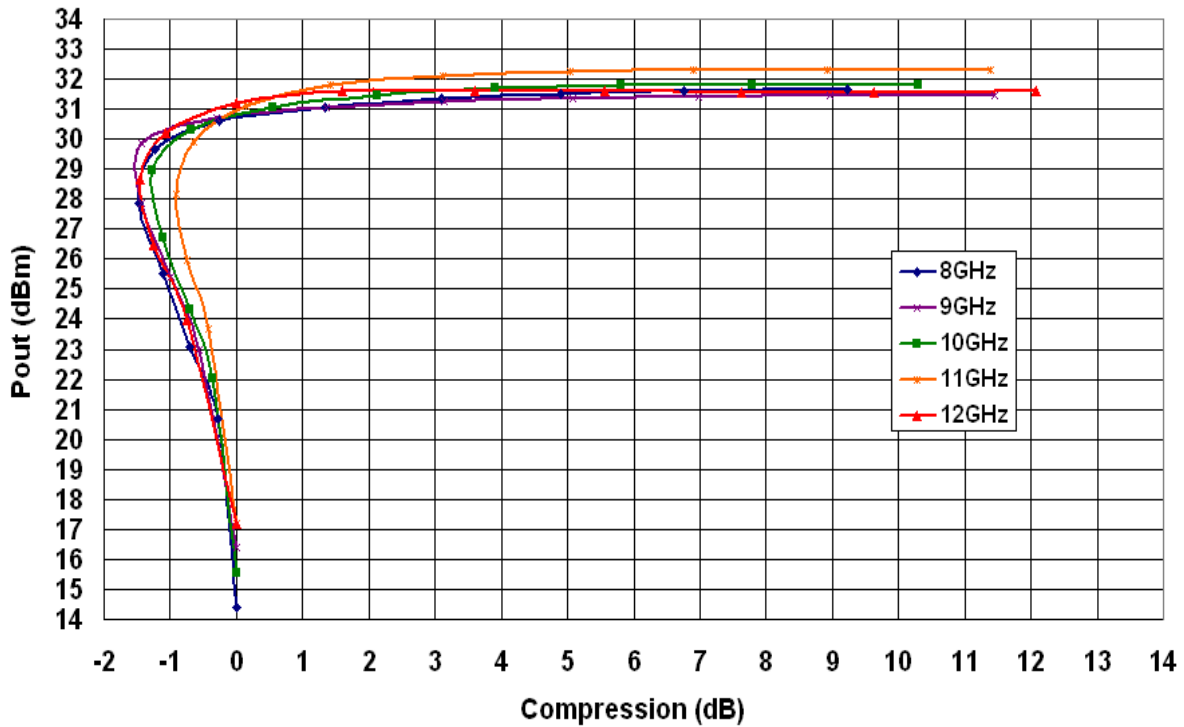


Output Power @ 1 and 3dB gain compression vs frequency

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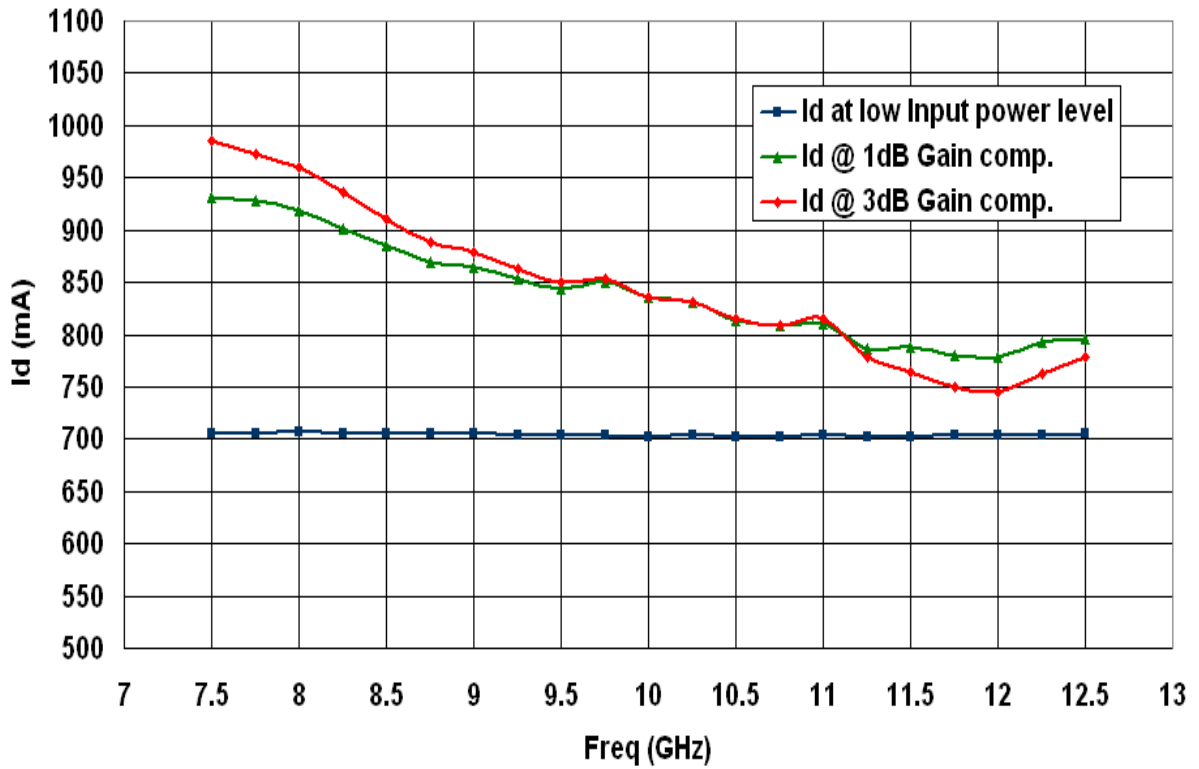


Output power vs Input power

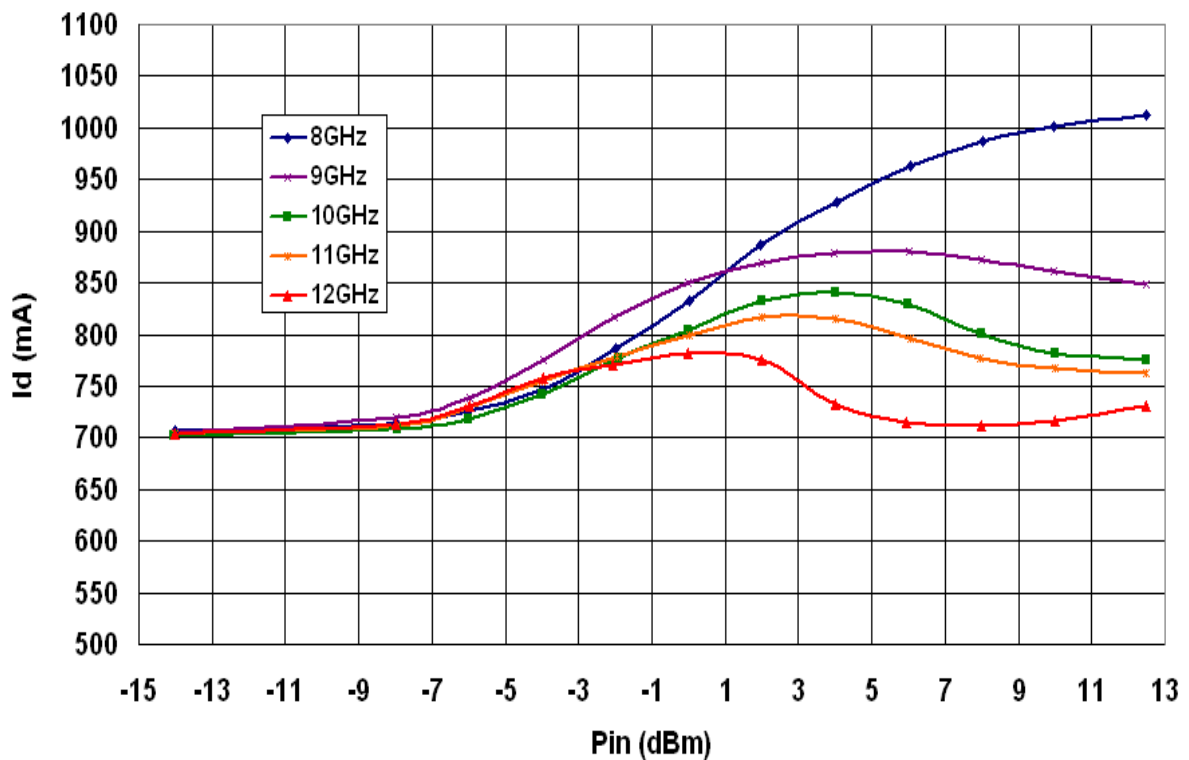


Output power vs Gain compression

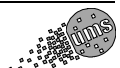
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Drain current @ 1 and 3dB gain compression vs frequency

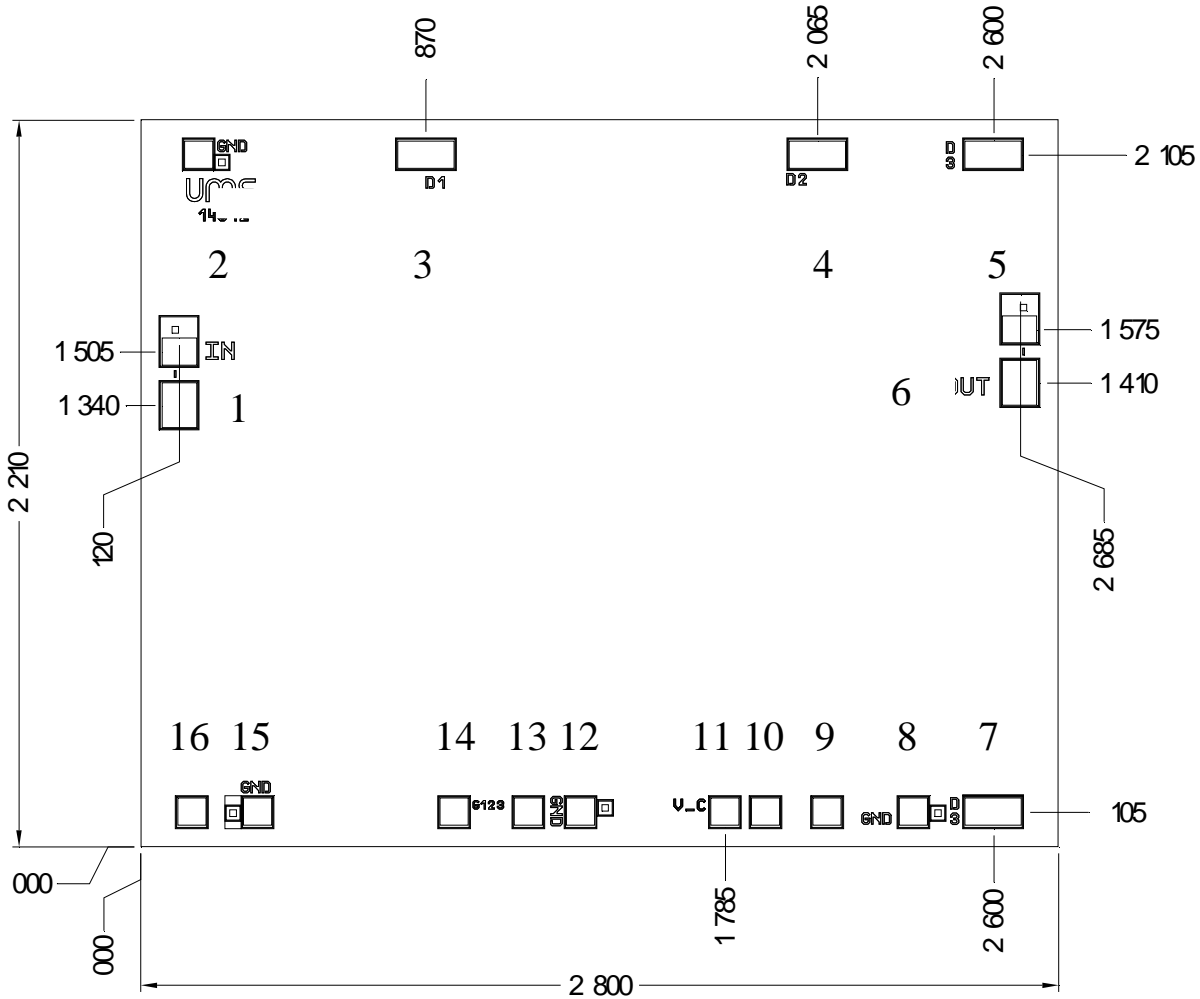


Drain current vs Input power



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Chip Mechanical Data and Pin references



UNITS : μm
Tol : $\pm 35\mu\text{m}$

Chip thickness = $70\mu\text{m} \pm 10\mu\text{m}$

RF pads (1, 6) = $122 \times 150\mu\text{m}^2$

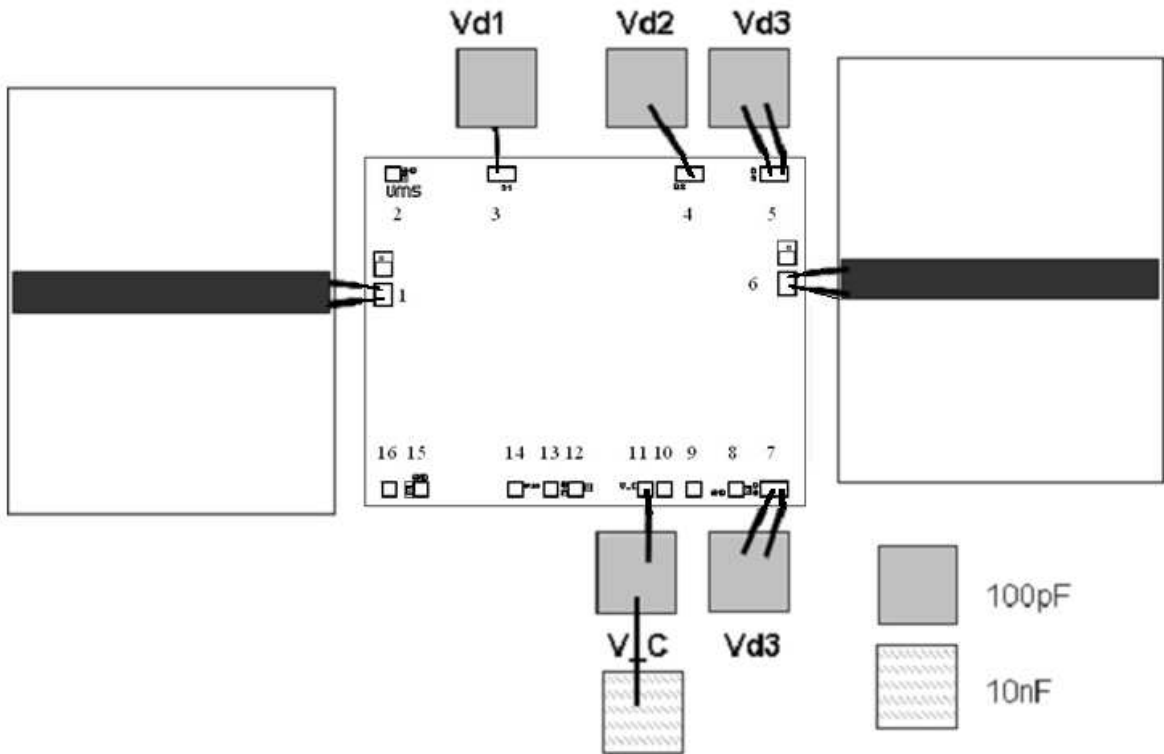
DC pads (2, 3, 8, 9, 10, 11, 12, 13, 14, 14, 16) = $100 \times 100\mu\text{m}^2$

DC pads (4, 5, 7) = $186 \times 100\mu\text{m}^2$

| Pin number | Pin name | Description |
|---------------|----------|----------------------|
| 1 | IN | Input RF |
| 11 | V_C | Control Voltage |
| 14 | GR | Not used |
| 2, 8, 12, 15 | GND | Ground (NC) |
| 9, 10, 13, 16 | - | Not Used |
| 3, 4, 5, 7 | VD | Drain supply voltage |
| 6 | OUT | Output RF |

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Assembly recommendations in test fixture



Recommended ESD management

Refer to the application note AN0020 available at <http://www.ums-gaas.com> for ESD sensitivity and handling recommendations for the UMS products.

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Ordering Information

Chip form : CHA6105-99F/00

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