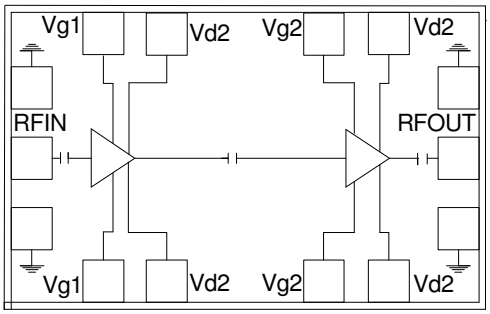
# 5 – 6 GHz 10 Watt Power Amplifier

## Features

- **Frequency Range : 5 – 6GHz**
- **40.5 dBm Psat**
- **18 dB Power gain**
- **30% PAE**
- **High IP3**
- **Input Return Loss > 12 dB**
- **Output Return Loss > 7 dB**
- **Dual bias operation**
- **No external matching required**
- **DC decoupled input and output**
- **0.5 µm InGaAs pHEMT Technology**
- **Chip dimension: 5.3 x 5.5 x 0.1 mm**

**Functional Diagram**




## Typical Applications

- **RADAR**
- **Military & space**
- **LMDS, VSAT**

## Description

The AMT2134032 is a C-band Power amplifier with 40dBm power output. The PA uses 2 stages of amplification and operates in 5 – 6 GHz frequency range. The PA features 18 dB of gain with input and output return losses of 12 dB and 7 dB respectively. The PA has a high IP3 of 47dBm and 30% PAE. This feature enables it to be used in the applications requiring efficiency along with linearity. The chip operates with dual bias supply voltage.The die is fabricated using a reliable 0.5µm InGaAs pHEMT technology. The Circuit grounds are provided through vias to the backside metallization.

## Absolute Maximum Ratings (1)

| Parameter | Absolute Maximum | Units |
|---|---|---|
| Drain bias voltage (Vd) | +10 | volts |
| Drain current (Id) | 4 | A |
| RF input power (RFin at Vd=9V) | 33 | dBm |
| Operating temperature | -50 to +85 | $^{o}$C |
| Storage Temperature | -65 to +150 | $^{o}$C |

**1**. Operation beyond these limits may cause permanent damage to the component

## Electrical Specifications [1] @ $T_A$ = 25 °C, $V_{d1}$ = $V_{d2}$ = 8V, $V_{g1}$ = $V_{g2}$ = -0.9V $Z_o$ =50 Ω

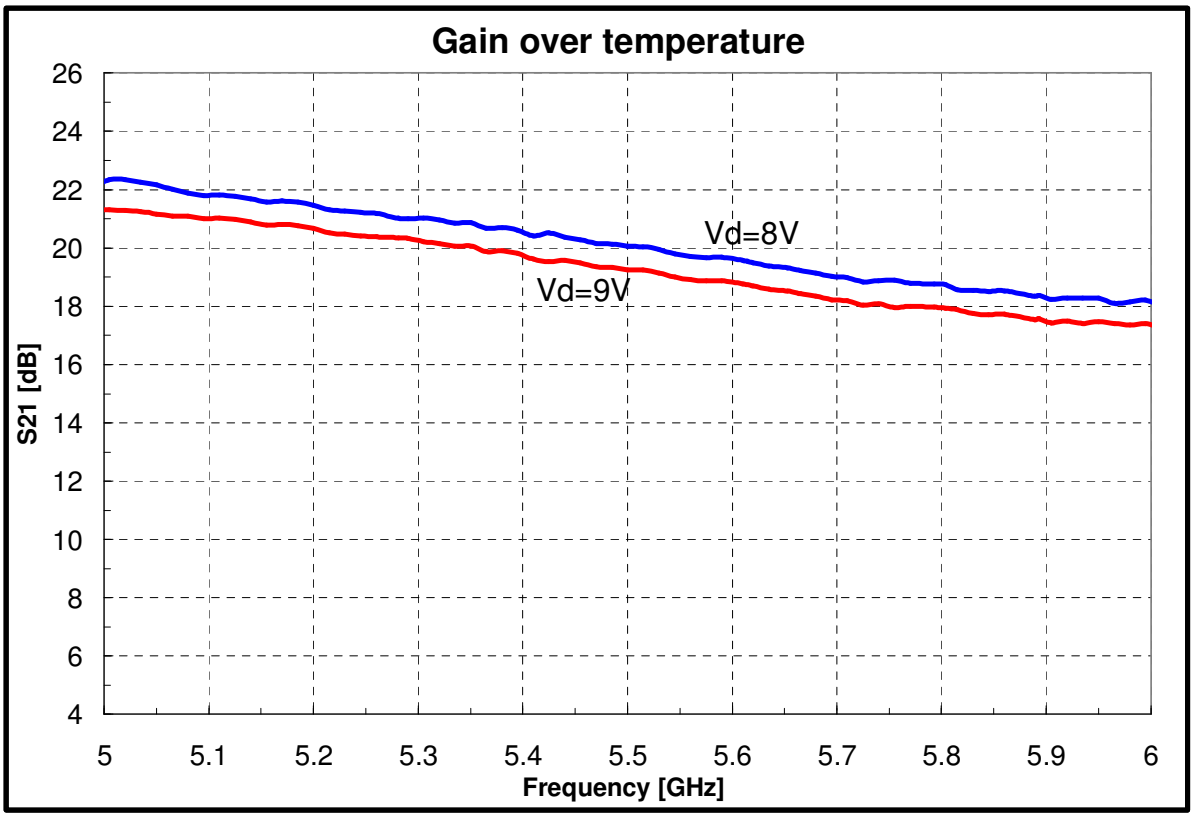
| Parameter | Typ. | Units |
|---|---|---|
| Frequency Range | 5 – 6 | GHz |
| Gain | 18 | dB |
| Gain Flatness | +/-1.25 | dB |
| Output Power (P1 dB) | 39.5 | dBm |
| Input Return Loss | 12 | dB |
| Output Return Loss | 7 | dB |
| Saturated output power (Psat) | 40.5 | dBm |
| Output Third Order Intercept (IP3) | 47 | dBm |
| Power Added Efficiency (PAE) | 30% | -- |
| Supply Current($I_{dq}$) | 2.9 | A |
| Supply Current($I_{dsat}^2$) | 3.6 | A |

***Note:***

1. Electrical specifications as measured in test fixture.
2. Idsat is the maximum current under input RF drive condition.

## Test fixture data

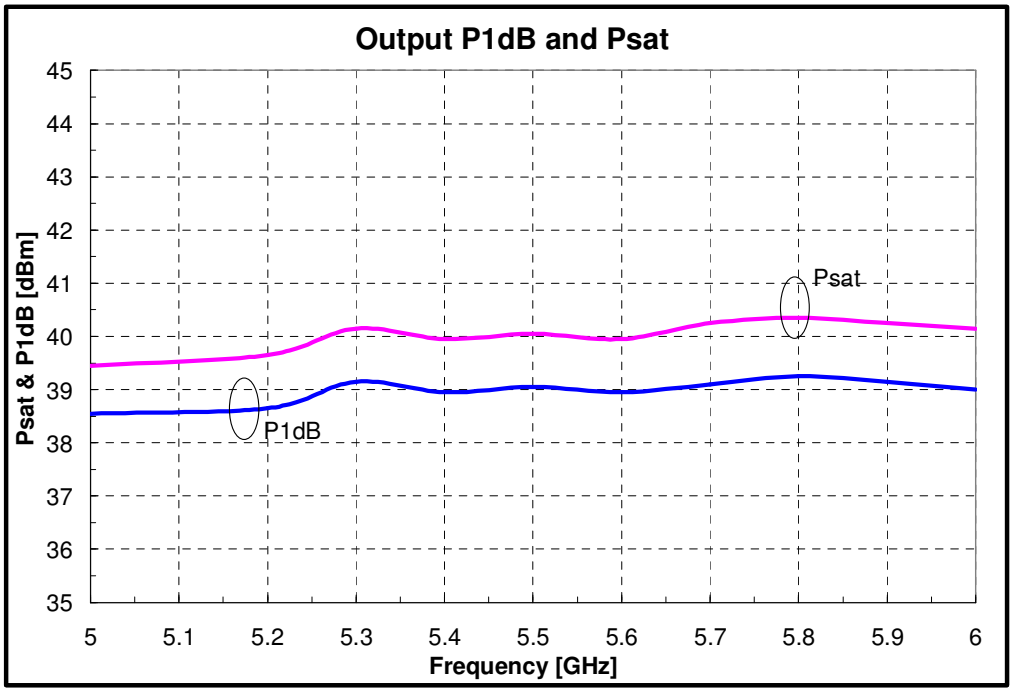
*$V_{d1}$ = $V_{d2}$ = Vd, $V_{g1}$ = $V_{g2}$ = -0.9V, Total Current =2.9A, $T_A$ = 25 °C*



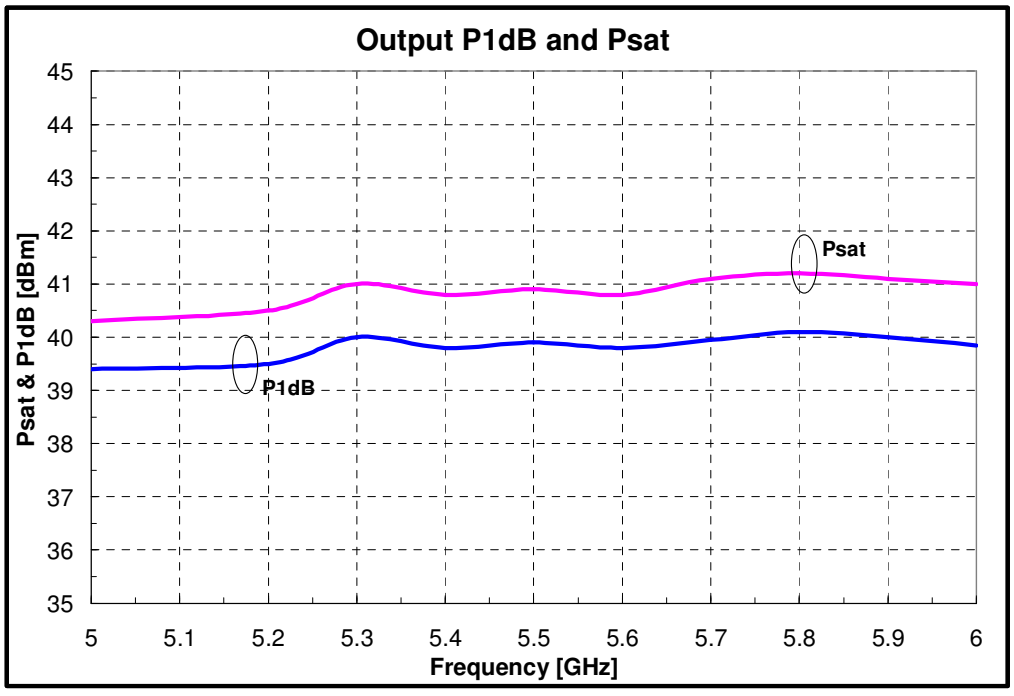

Gain curves at Vd = 8V and Vd = 9V bias

## Test fixture data

*$V_{d1}$ = $V_{d2}$ = Vd, $V_{g1}$ = $V_{g2}$ = -0.9V, Total Current =2.9A, $T_A$ = 25 °C*



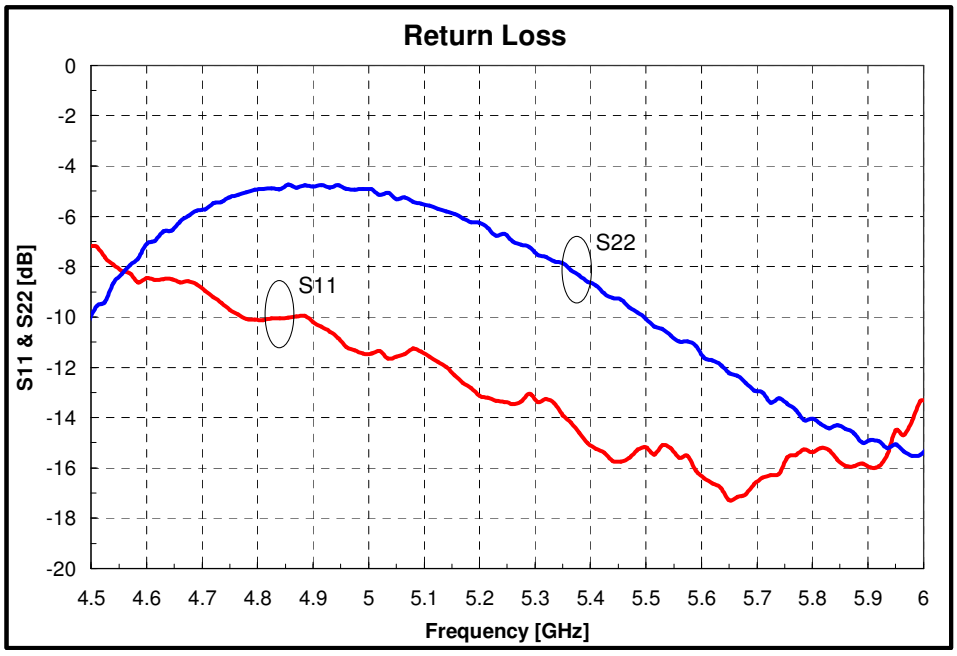

Output Power at Vd = 8V

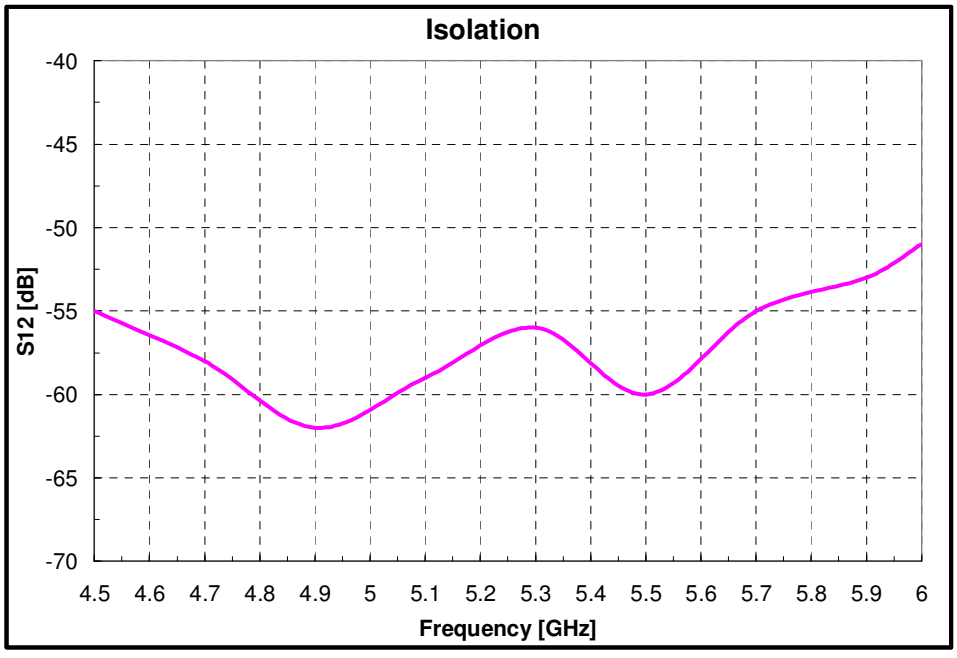



Output Power at Vd = 9V

## Test fixture data

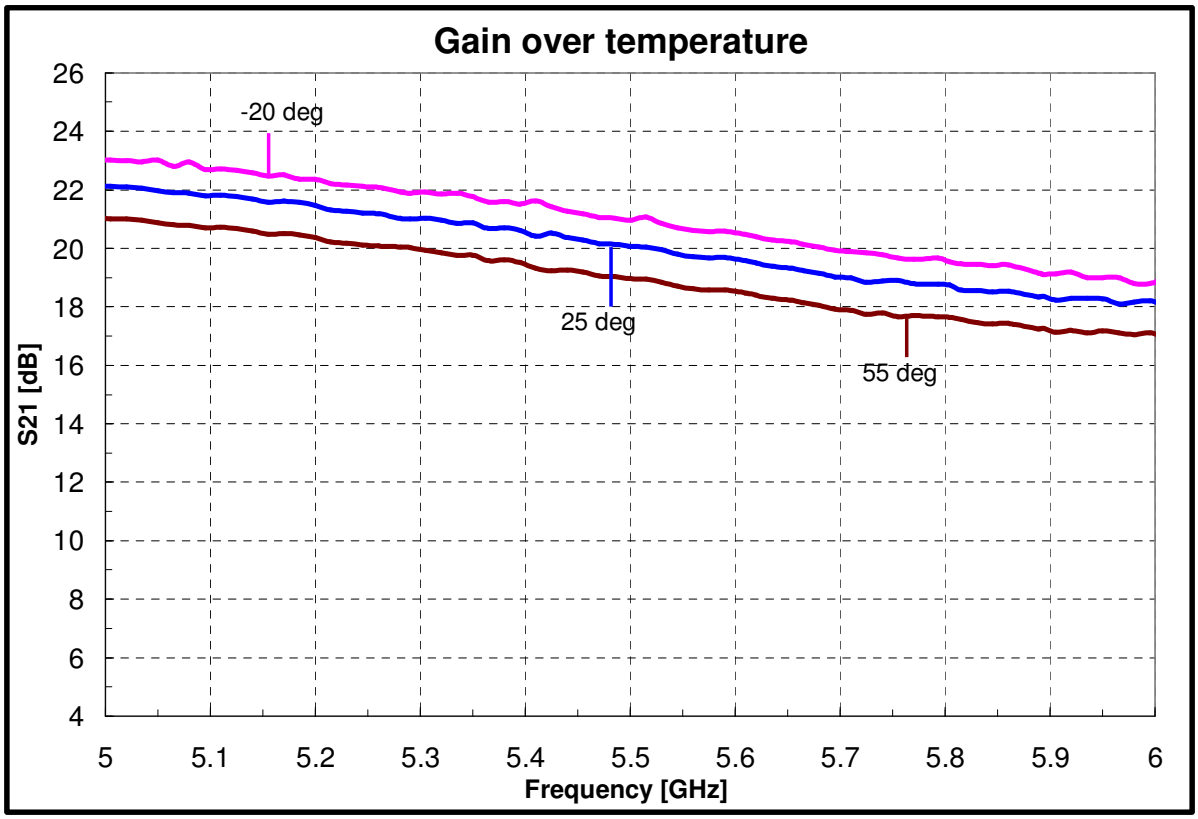
*$V_{d1}$ = $V_{d2}$ = 8V, $V_{g1}$ = $V_{g2}$ = -0.9V, Total Current =2.9A, $T_A$ = 25 °C*



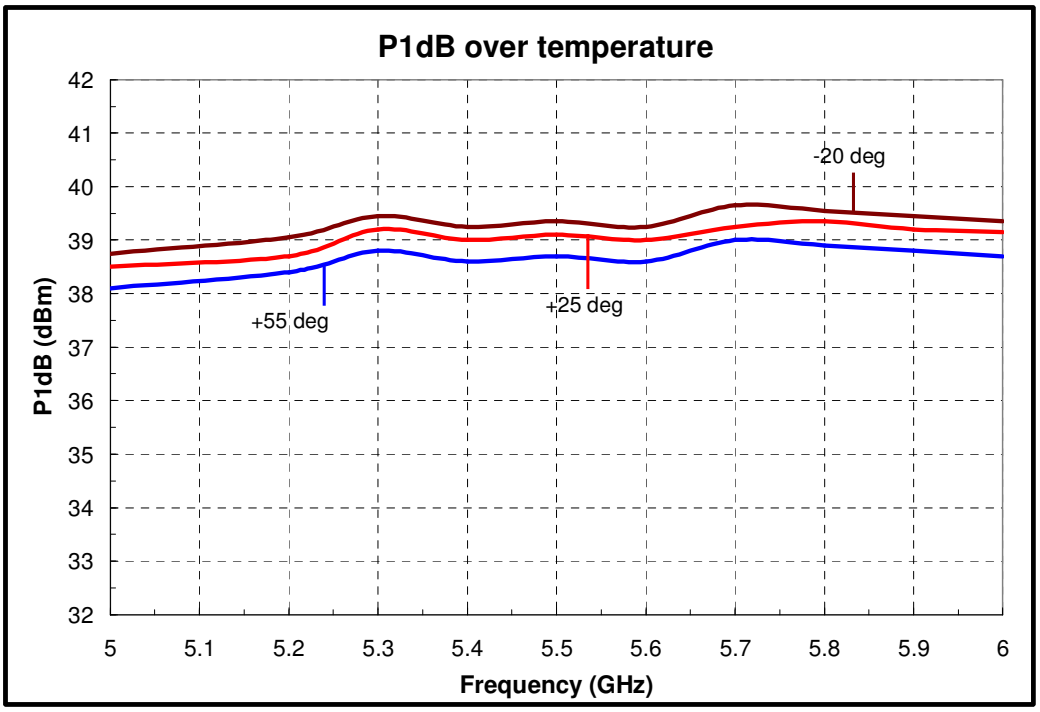
## Temperature data

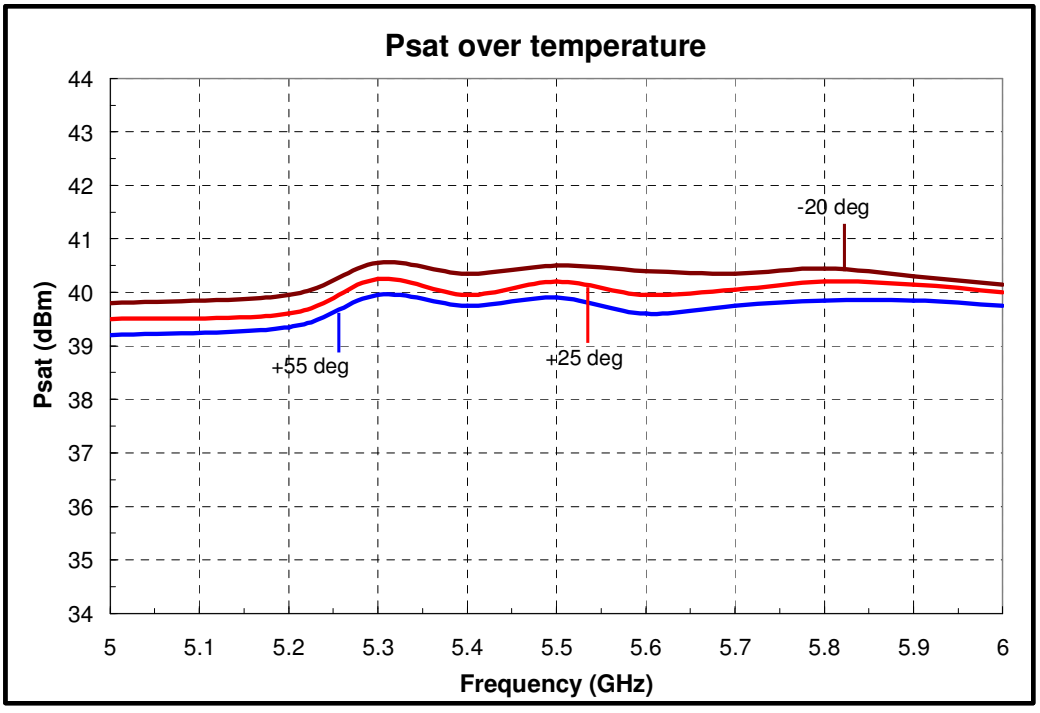
*$V_{d1}$ = $V_{d2}$ = 8V, $V_{g1}$ = $V_{g2}$ = -0.9V, Total Current =2.9A, $T_A$ = 25 °C*



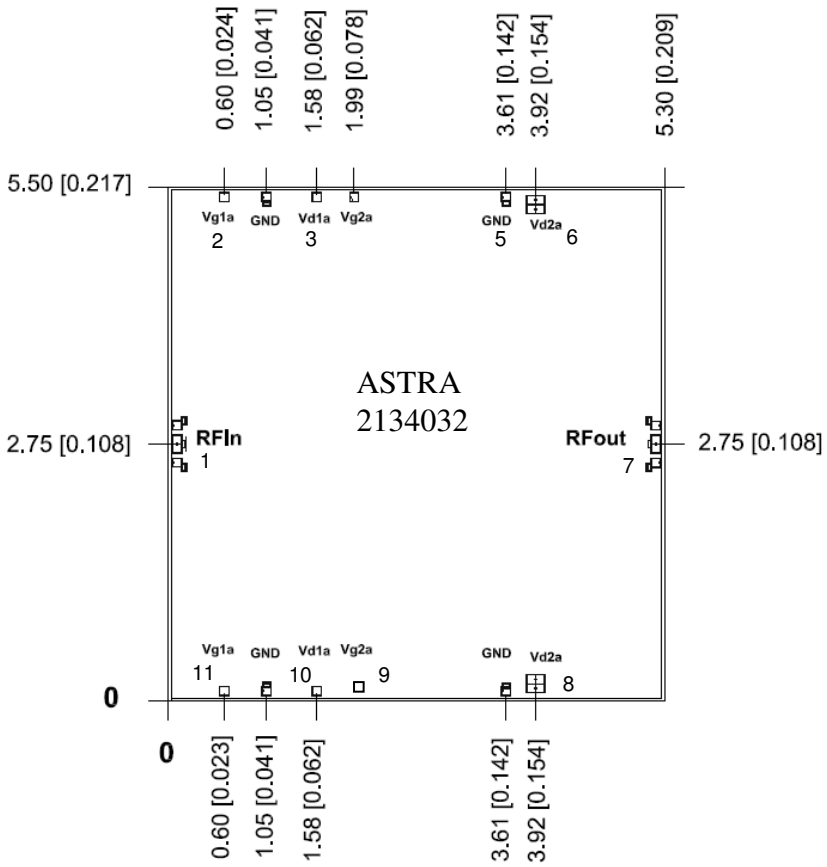
## Temperature data

*$V_{d1}$ = $V_{d2}$ = 8V, $V_{g1}$ = $V_{g2}$ = -0.9V, Total Current =2.9A, $T_A$ = 25 °C*



## Bond Pad Locations

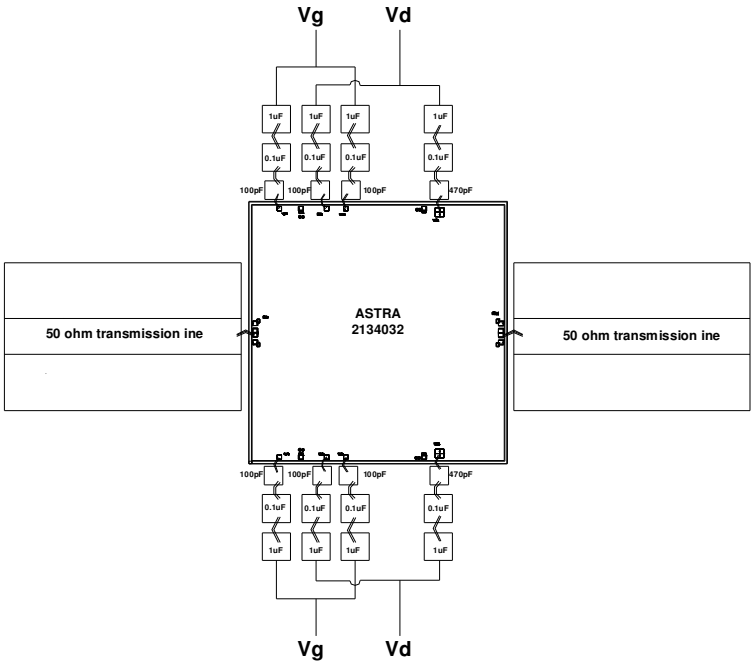



**Units:** millimeters (inches)

**Note:**

1. All RF and DC bond pads are 100µm x 100µm
2. Pad no. 1 : RF IN
3. Pad no. 3,10 : 1st stage drain voltage($V_{d1}$)
4. Pad no. 7 : RF Output
5. Pad no. 6,8 : 2nd stage drain voltage($V_{d2}$)
6. Pad no. 4,9 : $2^{nd}$ stage gate voltage($V_{g2}$)
7. Pad no. 2,11 : $1^{st}$ stage gate voltage ($V_{g1}$)

## Recommended Assembly Diagram




**Note :**

1. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
2. Two 1 mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 100pF capacitor.
3. Input and output 50 ohm lines are on 5 mil RT Duroid substrate
4. 0.1µF, 1µF and 10µF capacitors may be additionally used as a second level of bypass for reliable operation
5. The RF input & output ports are DC decoupled on-chip.
6. Proper heat sink like Copper tungsten or copper molybdenum to be used for better reliability of chip

**Die attach:** For Epoxy attachment, use of a two-component conductive epoxy is recommended. An epoxy fillet should be visible around the total die periphery. If Eutectic attachment is preferred, use of fluxless AuSn (80/20) 1-2 mil thick preform solder is recommended. Use of AuGe preform should be strictly avoided.

**Wire bonding:** For DC pad connections use either ball or wedge bonds. For best RF performance, use of 150 - 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

ATTENTION
OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES

***GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing***

All information and Specifications are subject to change without prior notice