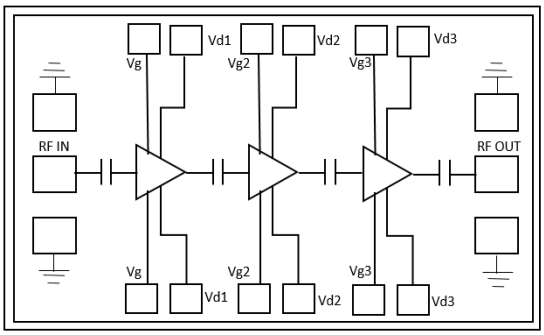
8 – 12GHz 12 Watt High Power Amplifier

Features

- **Frequency Range: 8 – 12GHz**
- **12W Psat**
- **25 dB Power gain**
- **35% PAE**
- **DC decoupled input and output**
- **0.25 µm InGaAs pHEMT Technology**
- **Chip dimension: 4.8 x 4.1 x 0.1 mm**

Functional Diagram



Typical Applications

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

Description

The ASL4039 is X-band Power amplifier operates in 8 – 12GHz frequency range with 12W output power over entire bandwidth. The PA uses 3 stages of amplification featuring 25 dB of Power Gain with input & output return losses better than 10dB and 35% PAE over the operating frequency. The die is fabricated using a reliable 0.25µm 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 @ I_{dq} = 3.5A)	+9	volts
Drain Current (Id) at Vd=8.5V	5.5	A
Gate Voltage	-2.2 < Vg < -0.55	V
RF input power (RFin at Vd=8.5V)	23	dBm
Operating temperature	-50 to +85	^oC
Storage Temperature	-65 to +150	^oC

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

Electrical Specifications (1) @ T_A = 25 ^oC, $V_{d1} = V_{d2} = V_{d3}$ = 8.5V, $V_{g1} = V_{g2} = V_{g3=}$ -0.7V. Z_o =50 Ω, Pulse Duty Cycle = 10%

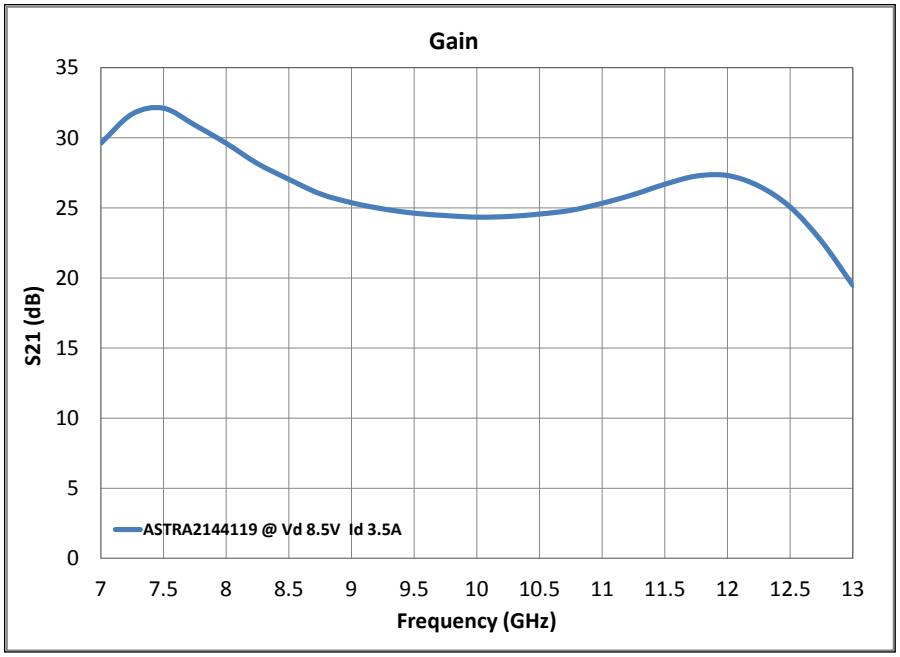
Parameter	Typ.	Units
Frequency Range	8 – 12	GHz
Gain	25	dB
Gain Flatness	+/-3	dB
Input Return Loss	<-10	dB
Output Return Loss	<-15	dB
Saturated output power (Psat)	12	W
Power Added Efficiency (PAE)	35	%
Supply Current(I_{dq})	3.5	A

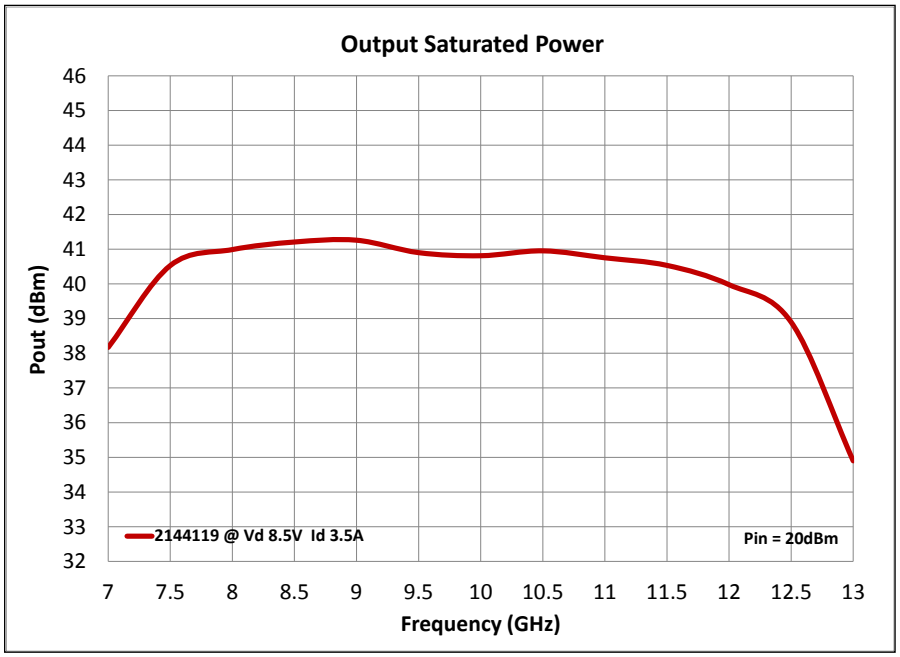
Note:

1. The above electrical specifications are on carrier measurements with 50 Ohms probes.

On Carrier Measurements with 50 Ohms Probes:

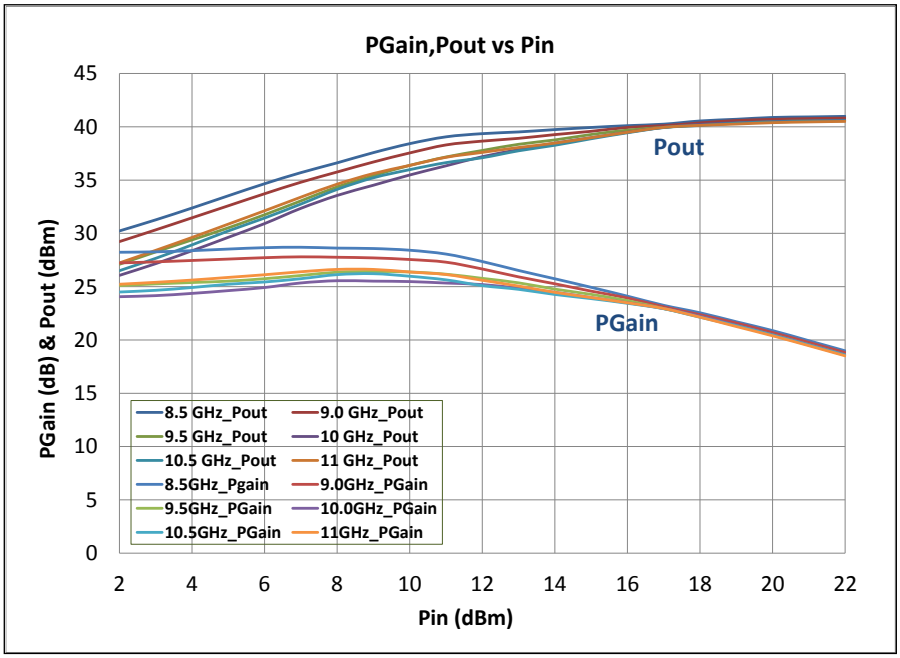
V_{d1} = V_{d2} = V_{d3}= 8.5V, V_{g1} = V_{g2} = V_{g3}= -0.7V, *Total Current (Idq) =3.5A,*
T_A = 25 °C, *Pulse Duty Cycle = 10%*

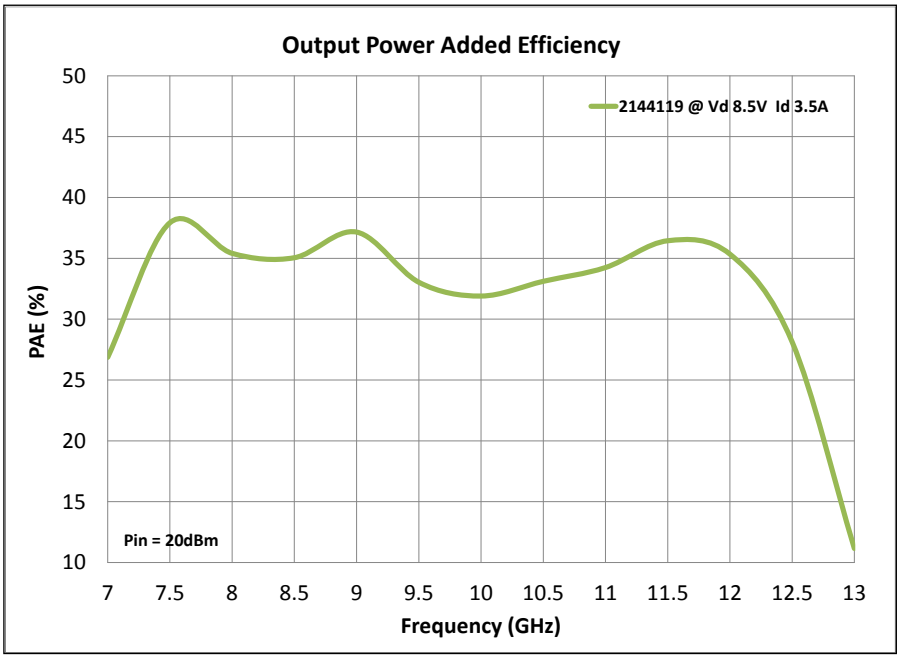




On Carrier Measurements With 50 Ohms Probes:

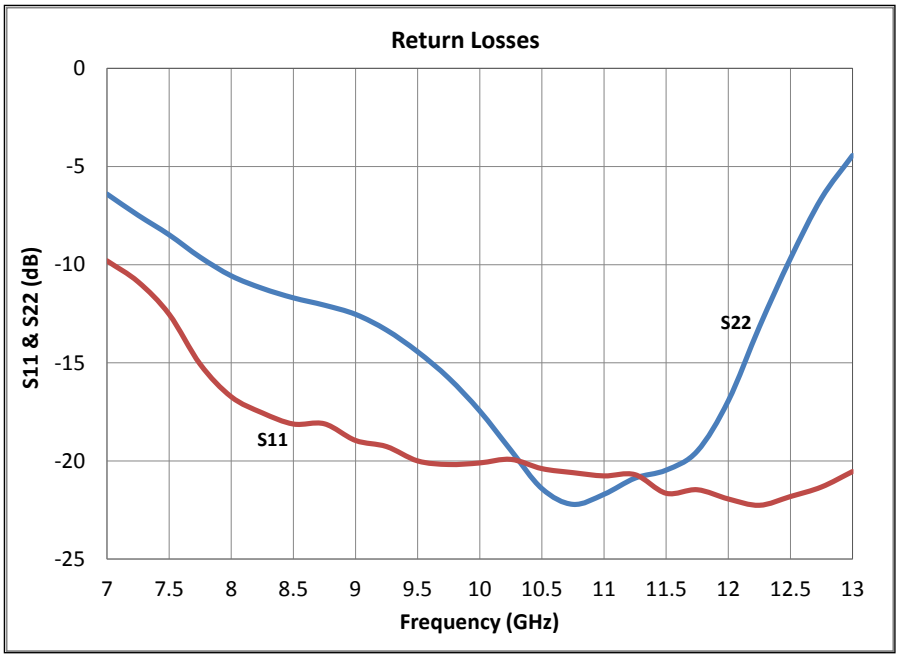
V_{d1} = V_{d2} = V_{d3}= 8.5V, V_{g1} = V_{g2} = V_{g3}= -0.7V, *Total Current (Idq) = 3.5A,*
T_A = 25 °C, Pulse Duty Cycle = 10%

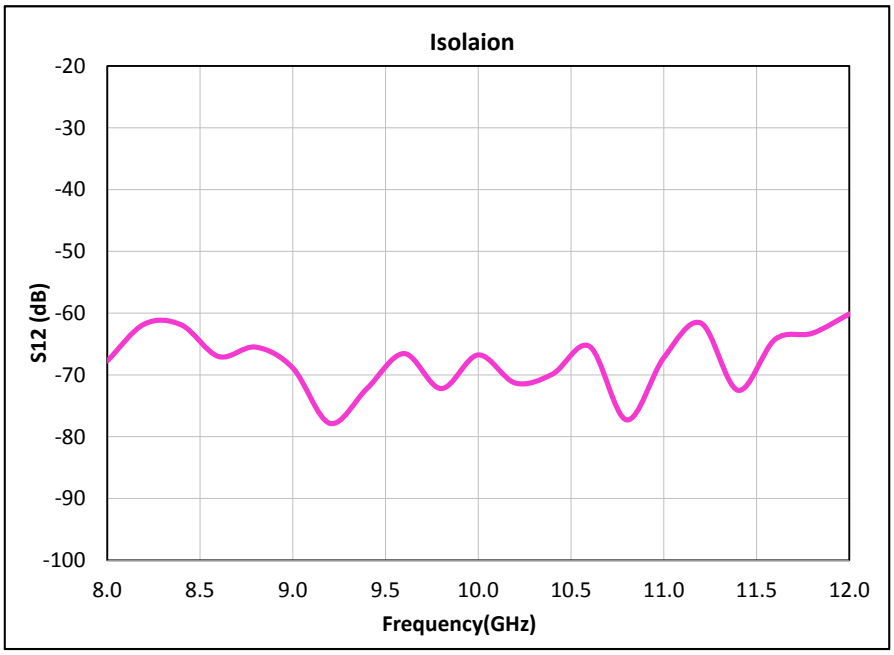




On Carrier Measurements With 50 Ohms Probes:

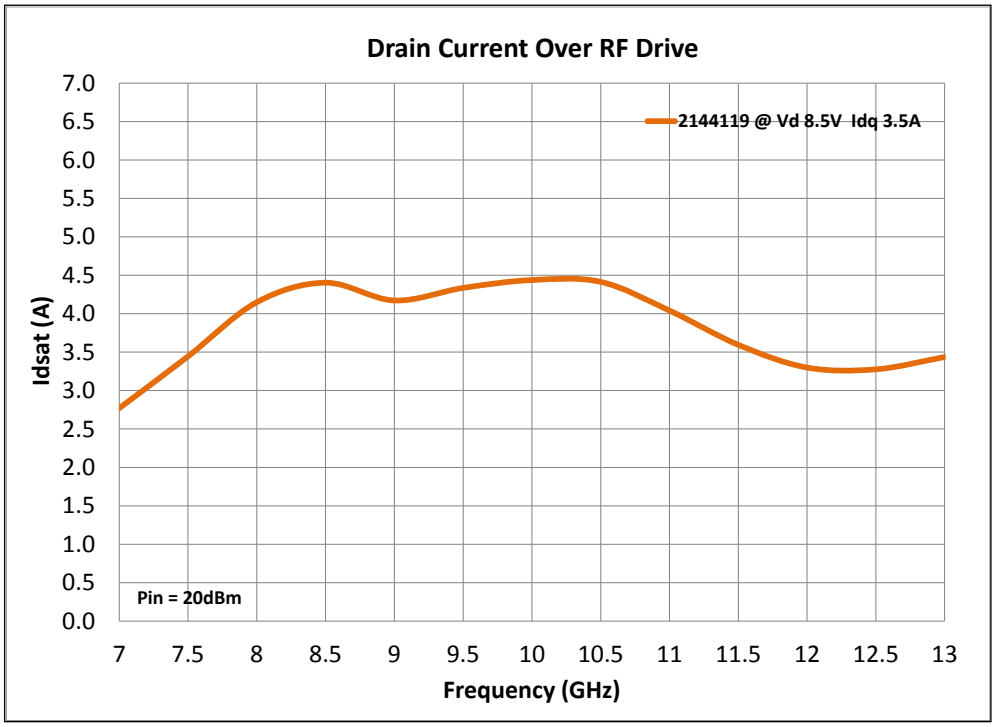
V_{d1} = V_{d2} = $V_{d3=}$ 8.5V, V_{g1} = V_{g2} = V_{g3}= -0.7V, *Total Current (Idq) = 3.5A,*
T_A = 25 °C, Pulse Duty Cycle = 10%



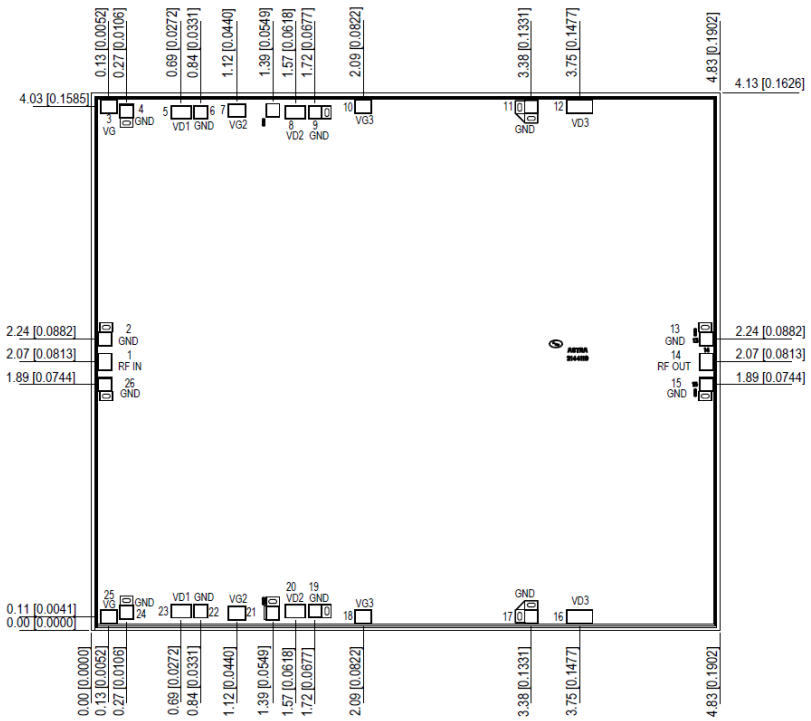


On Carrier Measurements With 50 Ohms Probes:

V_{d1} = V_{d2} = $V_{d3=}$ 8.5V, V_{g1} = V_{g2} = V_{g3}= -0.7V, *Total Current (Idq) = 3.5A,*
T_A = 25 °C, Pulse Duty Cycle = 10%



Bond Pad Details:



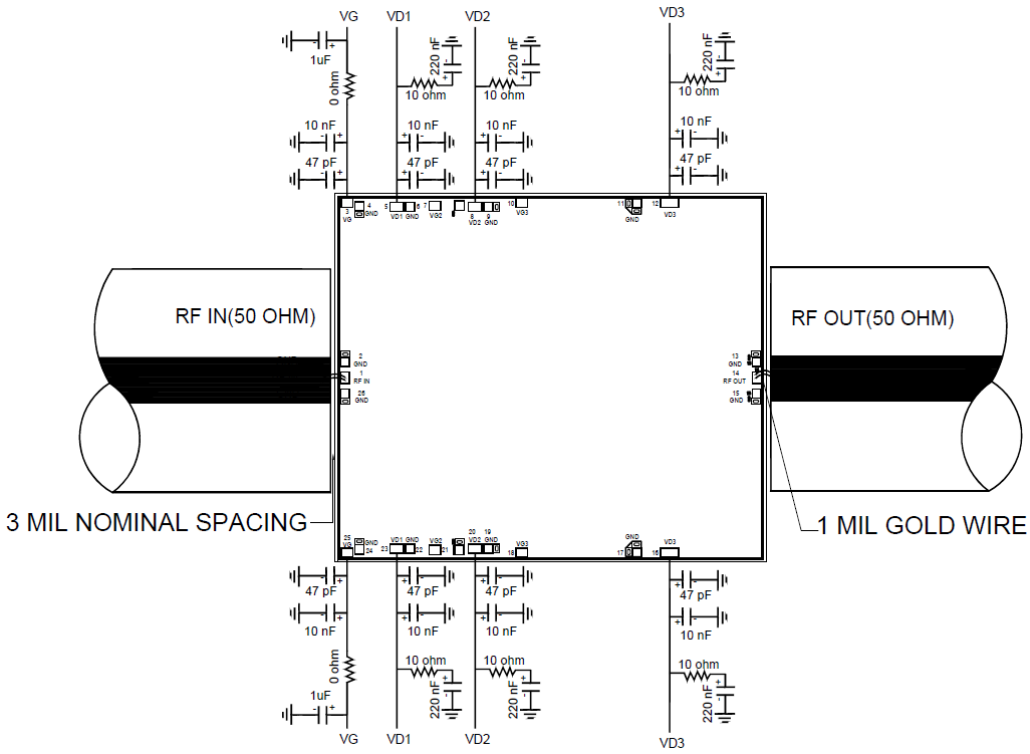
Units: millimeters (inches)

Note:

1. RF and DC bond pads are 100µm x 100µm
2. Pad no. 1 : RF IN
3. Pad no. 14 : RF Output
4. Pad no. 3,25 : Common Gate Voltage(V_g)
5. Pad no. 5,23 : 1st stage drain Voltage(V_{d1})
6. Pad no. 7,21 : 2nd stage gate Voltage(V_{g2}) – No Connection
7. Pad no. 8,20 : 2nd stage drain Voltage (V_{d2})
8. Pad no. 10,18 : 3rd stage gate Voltage(V_{g3}) – No Connection
9. Pad no. 12,16 : 3rd stage drain Voltage (V_{d3})
10. Pad no. 2,4,6,9,11,13,15, 17,19,22,24 : GND

All the dimensions shown above are measured taking bottom left corner

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 Single Layer bypass capacitors.
3. Input and output 50 ohm lines are preferably on 5 mil or 10 mil RT Duroid substrate.
4. 47pF single layer bypass capacitors mentioned above need to be placed at closest possible distance to the corresponding DC bond pads.
5. The RF input & output ports are DC decoupled on-chip.
6. This chip is not preferred to be operated under continuous DC voltages, unless it is applied with considerably low drain voltage level.
7. Proper heat sink like Copper tungsten or copper molybdenum to be used for better reliability of chip.

Die attach: Eutectic attachment using flux less 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 to 200µm length of wedge bonds is advised. Single Ball bonds of 250-300µm though acceptable, may cause a deviation in RF performance.

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. Before using the product, please download and refer to datasheet from website.