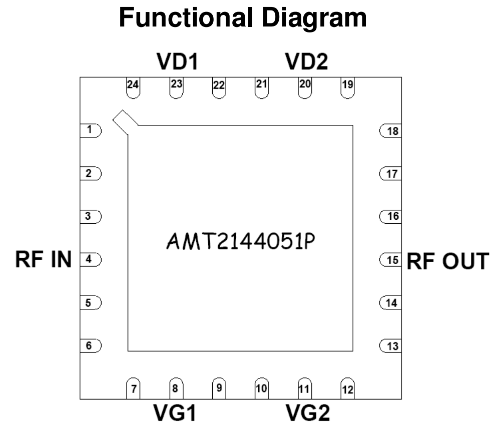
8.5 – 10.5 GHz 1 Watt Power Amplifier

Features

- Frequency Range : 8.5 – 10.5GHz
- 29.5 dBm output P1dB
- 16.5 dB Power gain
- 30% PAE
- High IP3
- Input Return Loss > 8.5 dB
- Output Return Loss > 12 dB
- Dual bias operation
- No external matching required
- DC decoupled input and output
- 0.5 µm InGaAs pHEMT Technology
- Open cavity QFN Package

Functional Diagram



Typical Applications

- RADAR
- Military & space
- LMDS, VSAT

Description

The AMT2144051P is a X-band Power amplifier with 29.5dBm output P1dB. The PA uses two stages of amplification and operates in 8.5 – 10.5 GHz frequency range. The PA features 16.5 dB of gain with input and output return loss 8.5dB and 12 dB respectively. The PA has a high IP3 of 38dBm 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 package used is a SMD open cavity QFN Package with base metal made up of copper composite.

Absolute Maximum Ratings (1)

Parameter	Absolute Maximum	Units
Drain bias voltage (Vd)	+10	volts
Drain current (Id)	0.5	A
RF input power (RFin at Vd=8V)	26	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_d = 8V, V_g = -1V, Z_o =50 Ω

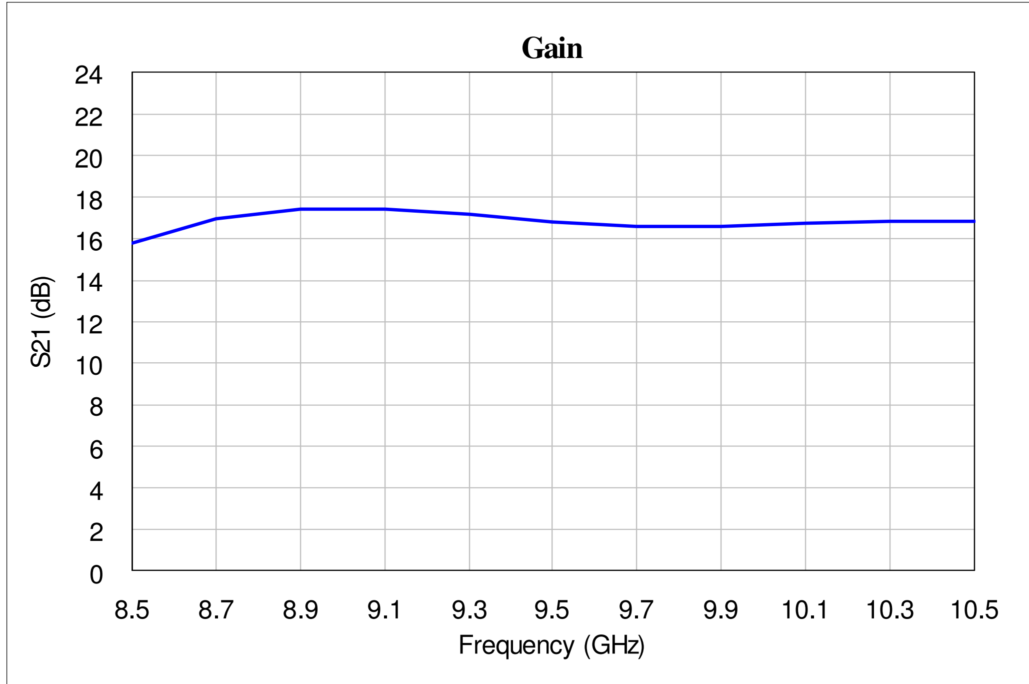
Parameter	Typ.	Units
Frequency Range	8.5 – 10.5	GHz
Gain	16.5	dB
Gain Flatness	+/-0.5	dB
Output Power (P1 dB)	29.5	dBm
Input Return Loss	8.5	dB
Output Return Loss	12	dB
Saturated output power (Psat)	30.5	dBm
Output Third Order Intercept (IP3)	38	dBm
Power Added Efficiency (PAE)	30%	--
Supply Current (I_{dq})	370	mA
Supply Current (I_{dsat} [2])	520	mA

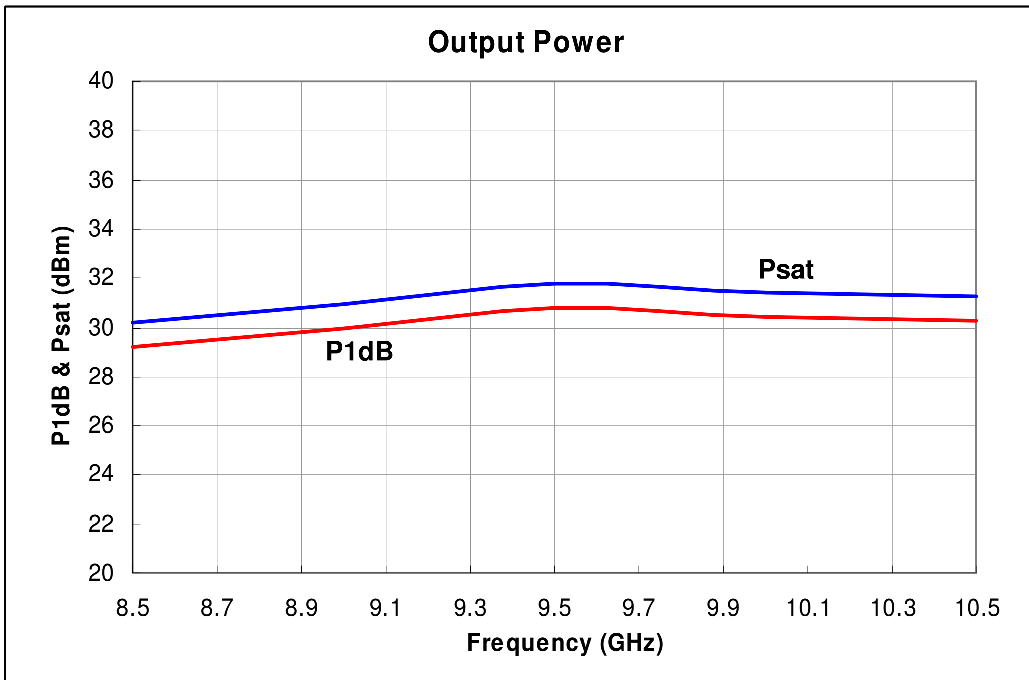
Note:

1. Electrical specifications as measured in test fixture.
2. I_{dsat} is the maximum current under input RF drive condition.

Test fixture data

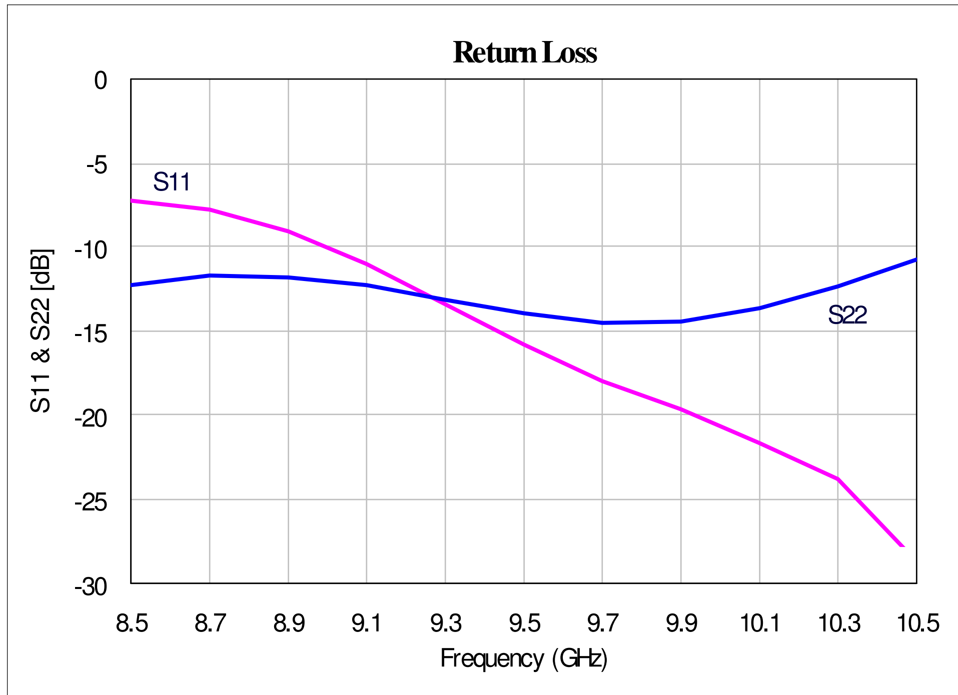
V_d = 8V, V_g = -1V, Total Current =370mA, T_A = 25 °C

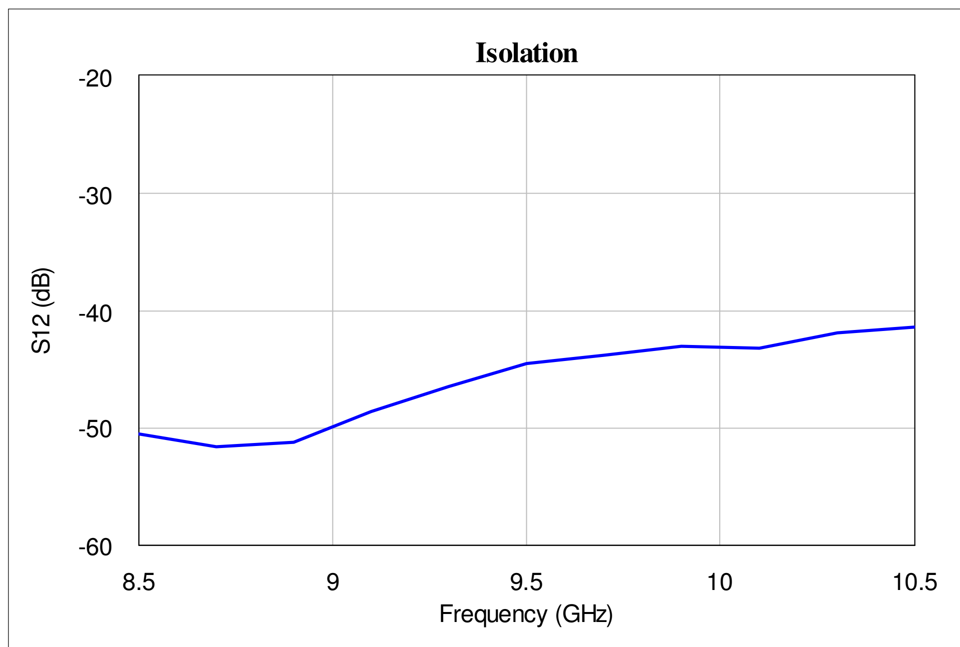




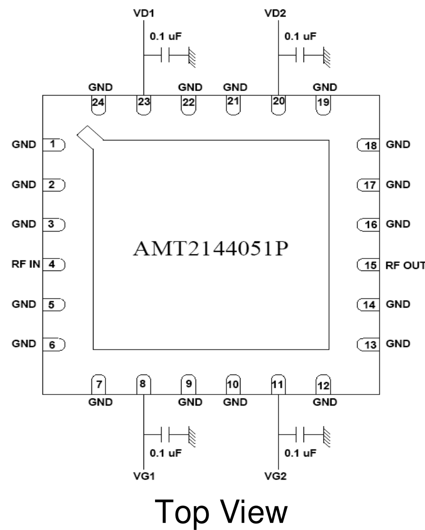
Test fixture data

V_d = 8V, V_g = -1V, Total Current = 370mA, T_A = 25 °C





Pin details



Top View

Note:

1. Pad no. 4 : RF IN
2. Pad no. 8,11 : Vg1, Vg2
3. Pad no. 23,20 : Vd1, Vd2
4. Pad no. 15 : RF OUT

Recommended Assembly Diagram

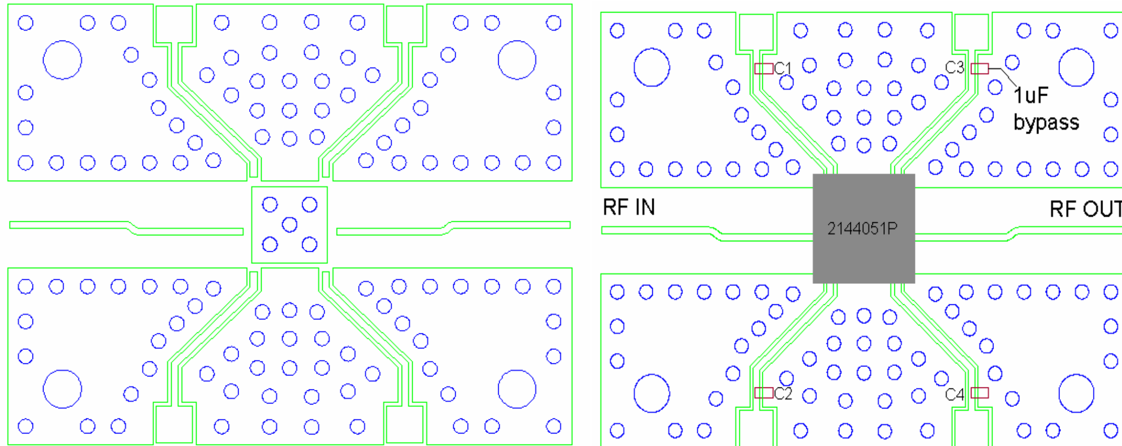


Fig: PCB Drawing   Fig: Package assembled on PCB

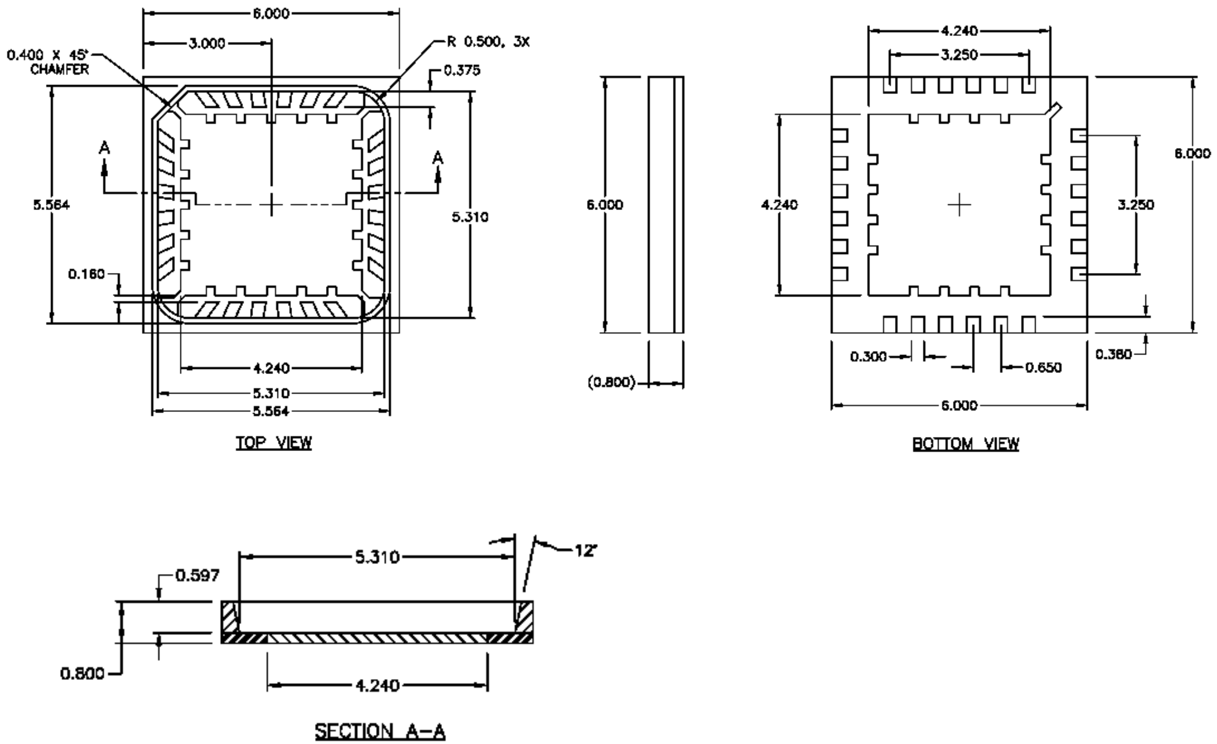
Note :

1. Input and output 50 ohm lines are on 5 mil RT Duroid substrate
2. 0.1 µF and 1µF capacitors may be additionally used as a second level of bypass for reliable operation
3. The RF input & output ports are DC decoupled on-chip.
4. Proper heat sink like Alluminium or copper to be used for better reliability of package

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.

Package outline drawing



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

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