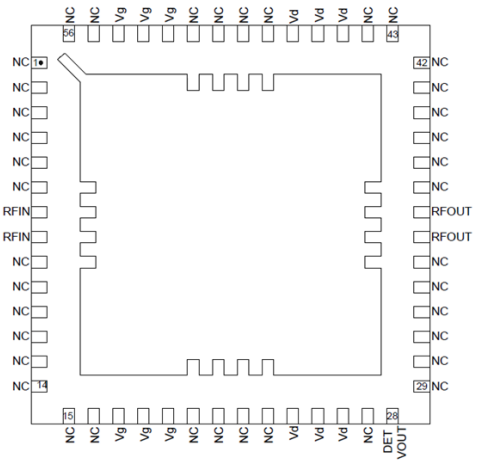
8.8 – 10.2 GHz 6 Watt Power Amplifier

Features

- Frequency Range : 8.8 – 10.2 GHz
- 23 dB Power gain
- 38 dBm Output Psat
- 40% PAE
- High IP3
- Dual bias operation
- No external matching required
- DC decoupled input and output
- On Chip Detector
- 0.25 µm InGaAs pHEMT Technology
- 8 x 8 x 0.8mm 56 Lead QFN Package

Functional Diagram



Typical Applications

- RADAR
- Military & Space
- LMDS, VSAT

Description

The ASL4043P8 is a X-band Power amplifier with 38 dBm output Psat. The PA uses two stages of amplification and operates in 8.8 – 10.2 GHz frequency range with 23 dB of gain. The PA has a high IP3 of 47dBm and 40% PAE. This feature enables it to be used in the applications requiring efficiency along with linearity. It operates with dual bias supply voltage. The packaged die is fabricated using a reliable 0.25µm 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 (V_d)	9V (10% Duty Cycle) 8V (CW Mode)	volts
Drain current (I_{dq})	2.2	A
RF input power (RFin at V_d=8.5V)	24	dBm
Operating temperature	-50 to +80	^oC
Storage Temperature	-65 to +150	^oC

1. Operation beyond these limits may cause permanent damage to the component
2. The data mentioned above corresponds to pulsed mode of operation @ 10% pulse duty cycle unless specified explicitly.

Electrical Specifications [1] @ T_A[2] = 25 ^oC, T_B[2] = 40 ^oC, $V_d = V_{d1} = V_{d2} = 8.5V$, $V_g = V_{g1} = V_{g2} = -0.9V$, $Z_o = 50\ \Omega$, Pulse Duty = 10%

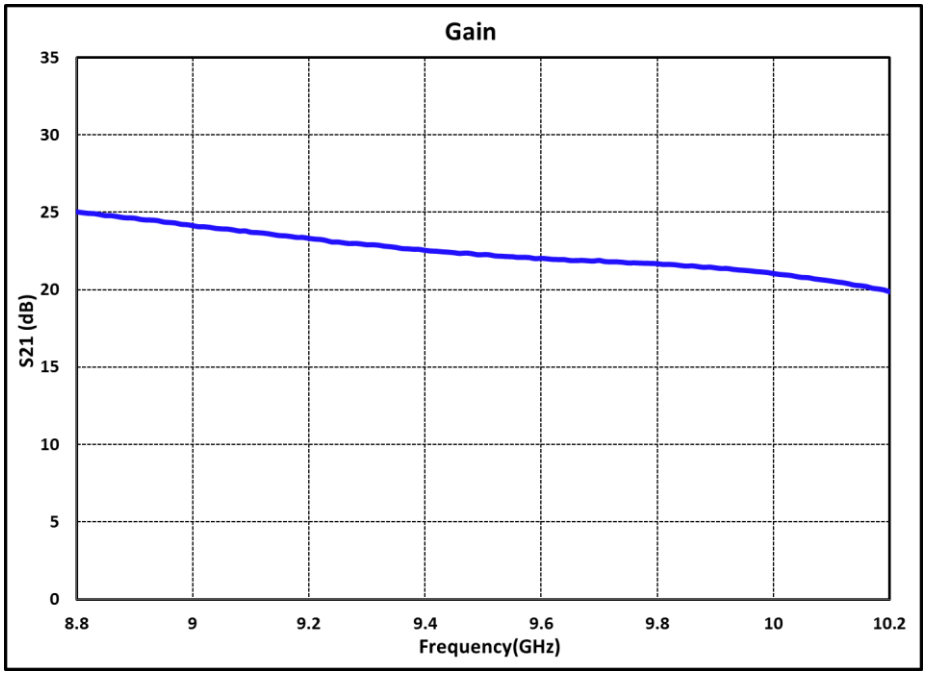
Parameter	Min.	Typ.	Max.	Units
Frequency Range	8.8		10.2	GHz
Gain	21	23		dB
Input Return Loss		8		dB
Output Return Loss		8		dB
Saturated output power (Psat)	37	38		dBm
Output Third Order Intercept (IP3)		47		dBm
Power Added Efficiency (PAE)		40%		--
Gate Voltage (V_g)	-1.2	-0.9	-0.65	V
Supply Current (I_{dq}[4])		1.25		A
Supply Current (I_{dsat}[3][4])		2.15		A

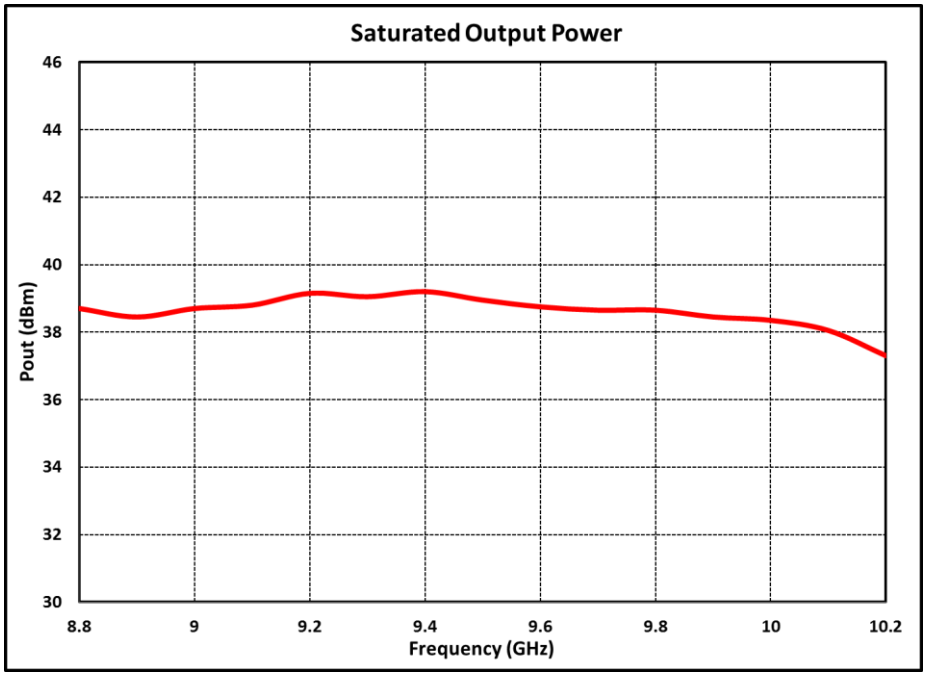
Note:

1. Electrical specifications as measured in test fixture.
2. T_A – Ambient Temperature; T_B – Base Plate Temperature
3. I_{dsat} - Drain Current at Saturated Output Power
4. Measured Peak Current Values.

Test fixture data

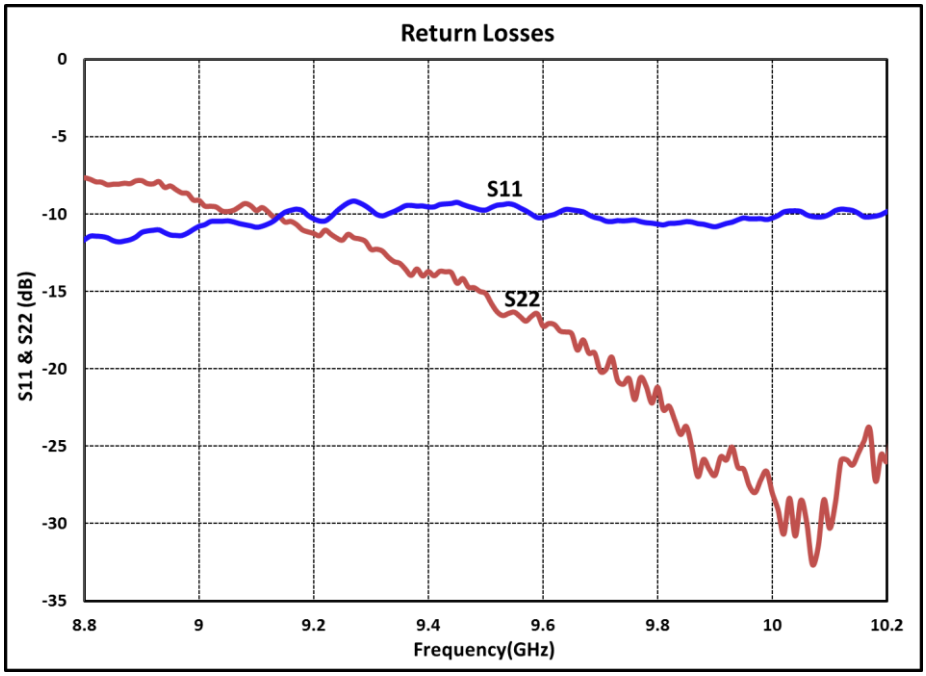
V_d = 8.5V, V_g = -0.9V, Total Current (I_{dq}) = 1.25A, T_A = 25 °C, Pulse Duty = 10%

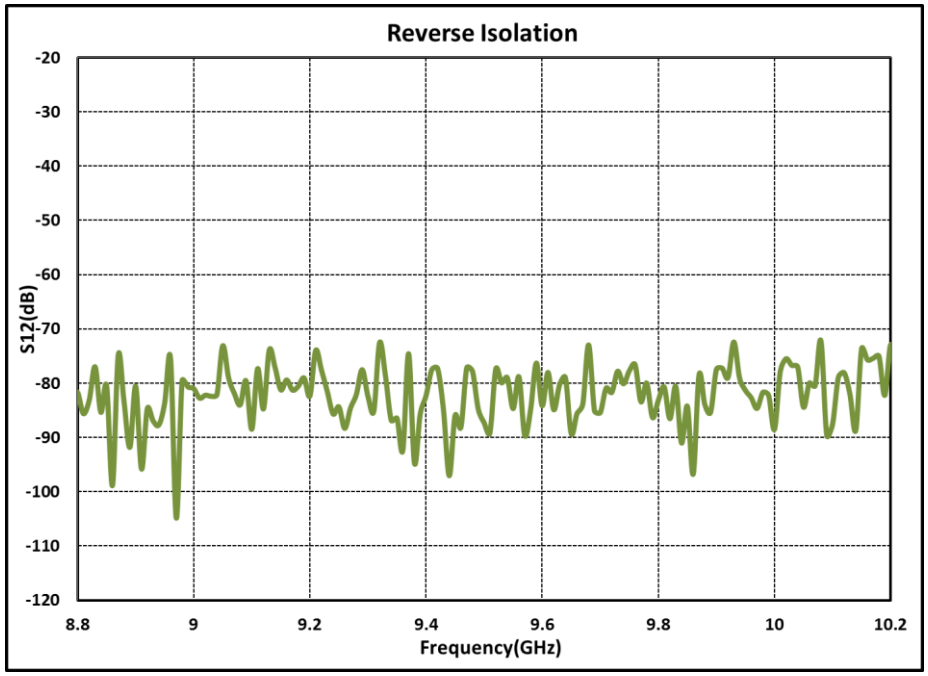




Test fixture data

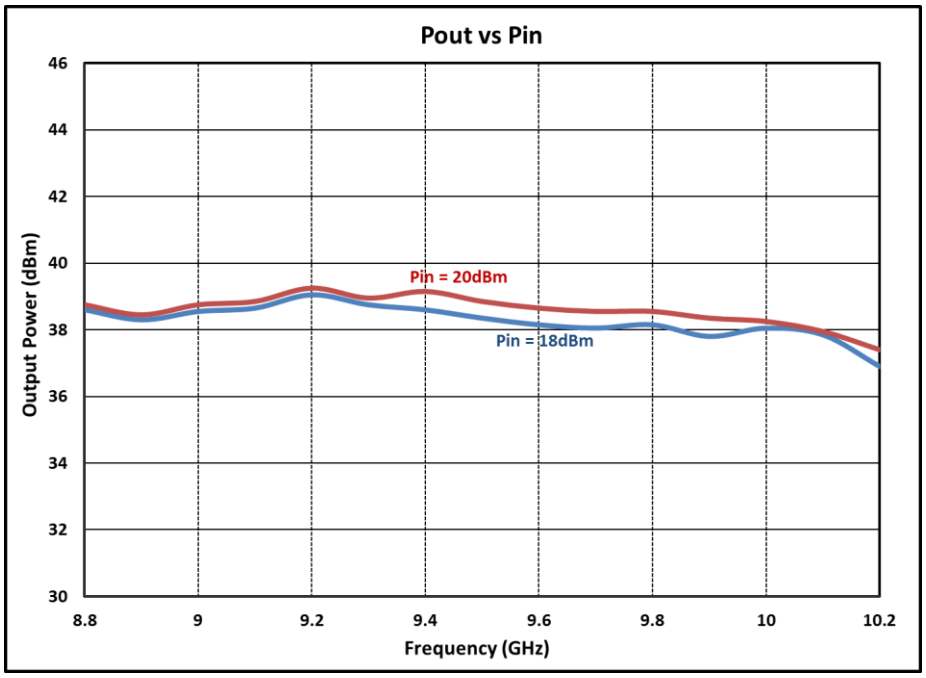
V_d = 8.5V, V_g = -0.9V, Total Current (I_{dq}) = 1.25A, T_A = 25 °C, Pulse Duty = 10%

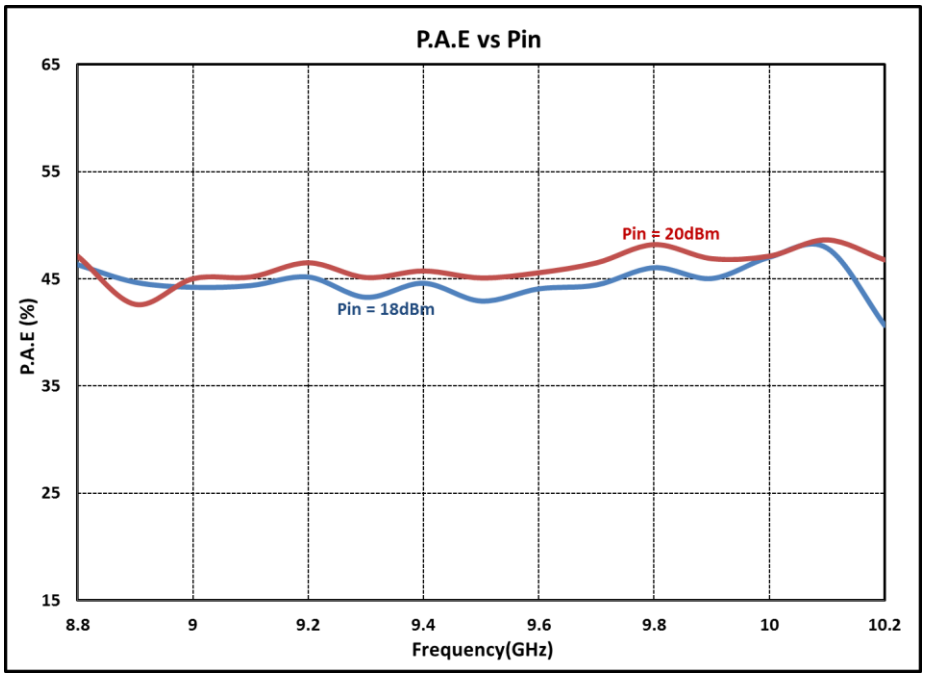




Test fixture data

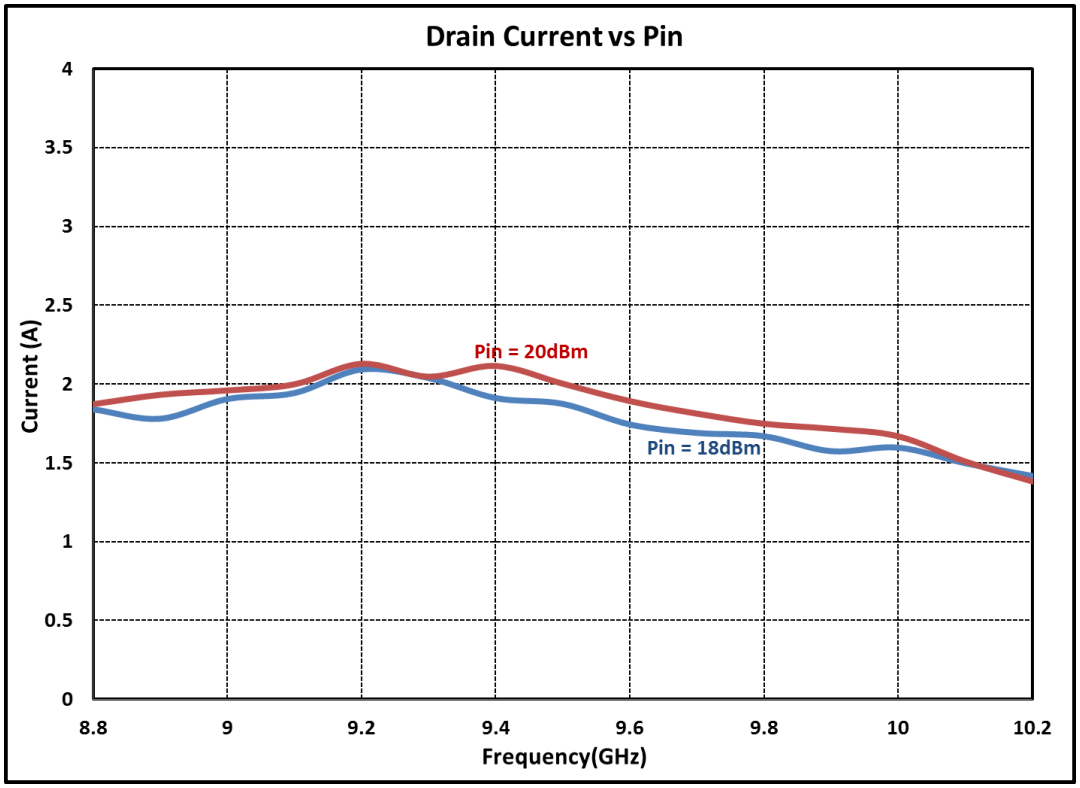
V_d = 8.5V, V_g = -0.9V, Total Current (I_{dq}) = 1.25A, T_A = 25 °C, Pulse Duty = 10%





Test fixture data

V_d = 8.5V, V_g = -0.9V, Total Current (I_{dq}) = 1.25A, T_A = 25 °C, Pulse Duty = 10%



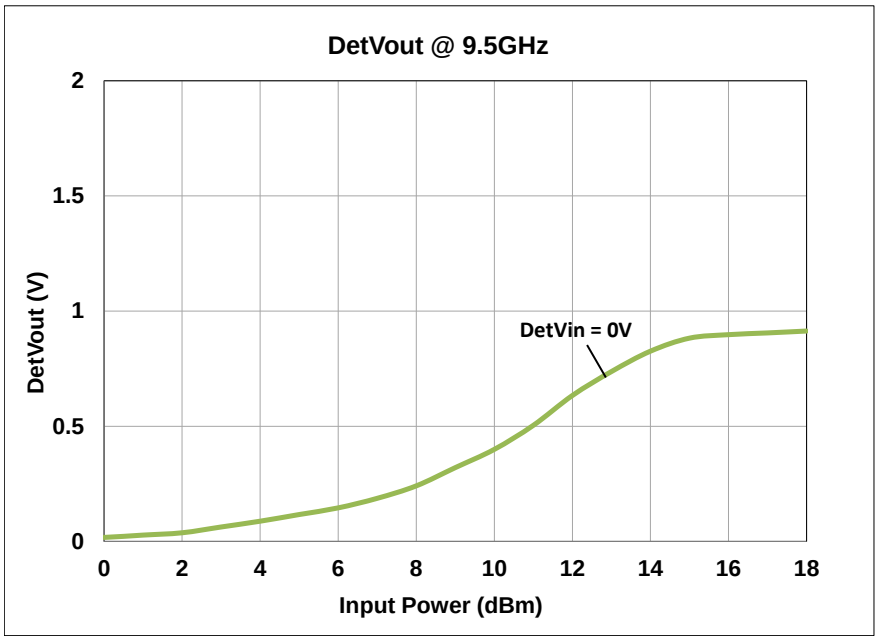
Power Detector Performance:

Test fixture data

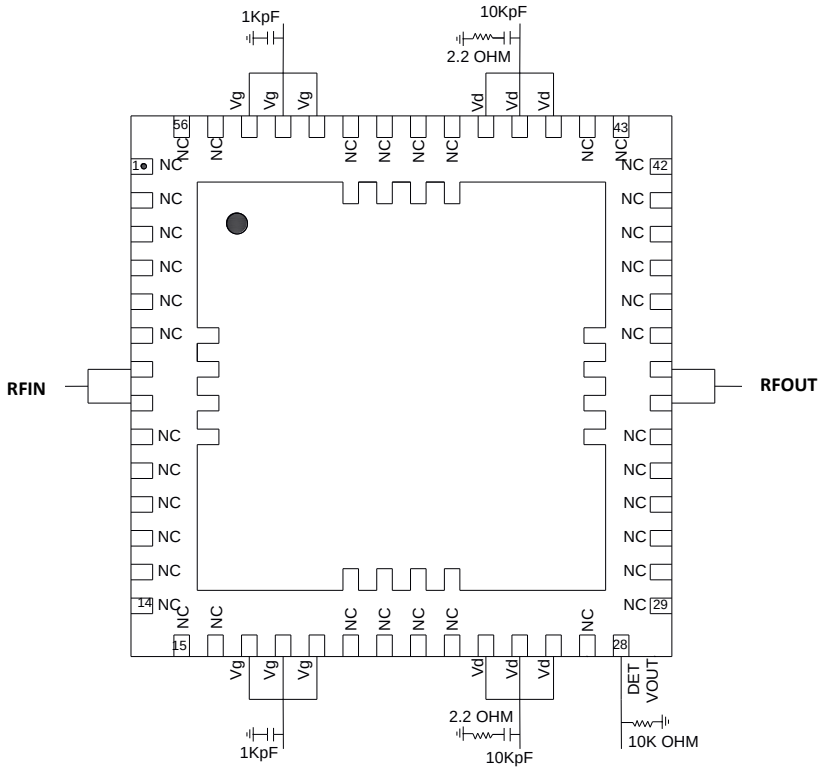
V_d = 8.5V, V_g = -0.9V, Total Current (I_{dq}) = 1.25A, T_A = 25 ^oC, DetVin = 0V, Pulse Duty Cycle = 10%

Pout (dBm)	9GHz	9.5GHz	10GHz
37dBm	DetVout = 0.95V	DetVout = 0.9V	DetVout = 0.8V
-30dBm	DetVout = 0V	DetVout = 0V	DetVout = 0V

Description: The Output Voltage of the detector ”DetVout” increases with increase in RF output power of the power amplifier. The On Chip Detector can be operated by connecting its input terminal ”DetVin” to ground and the output of the detector is tapped from ”DetVout”.
The performance of the detector with respect to variation of input power of the PA at 9.5GHz is plotted below.



Pin details:



TOP VIEW

Note:

1. Pin no. 7,8 : RF IN
2. Pin no. 17,18,19,52,53,54 : Vg
3. Pin no. 24,25,26.45,46,47 : Vd
4. Pin no. 35,36 : RF OUT
5. Pin no. 1,2,3,4,5,6,9,10,11,12,13,14
   15,16,20,21,22,23,27,28,29,30,31,32
   33,34,37,38,39,40,41,42,43,44,48,49
   50,51,55,56 : NC (No Connection)
6. Pin no. 28 : DETVOUT

Recommended PCB Drawing:

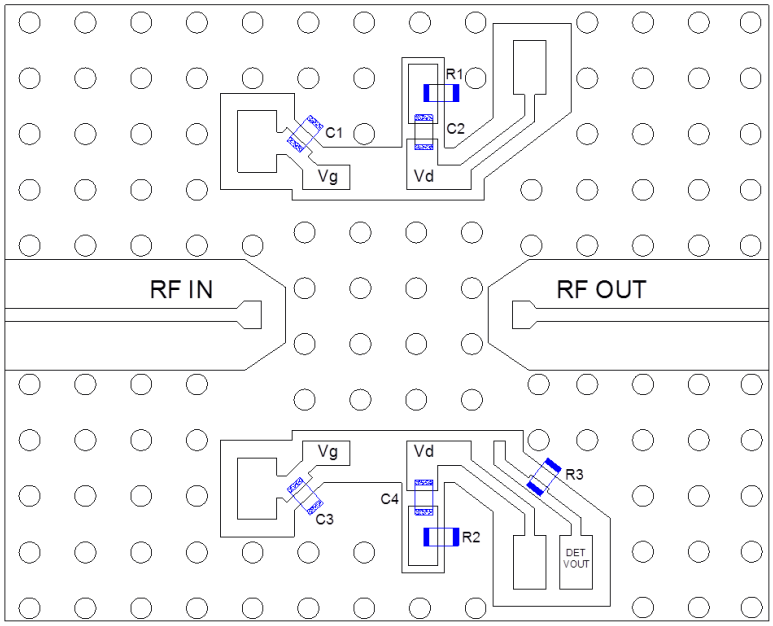


Fig: PCB Drawing

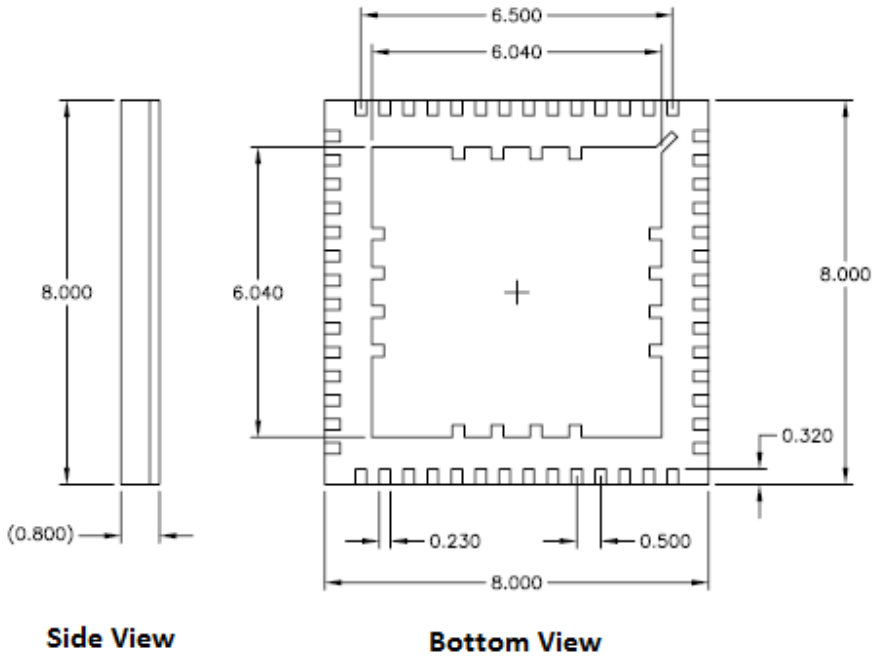
Note:

1. Input and output 50 ohm lines are preferably on 5 mil RT Duroid substrate.
2. Apart from 10kpF MLC bypass capacitors, higher values of capacitors such as 0.1uF can be used at the drain of the PA for reliable operation.
3. The RF input & output ports are DC decoupled.
4. Proper heat sink like Alluminium or copper to be used for better reliability of the PA.

Off Chip Components used while recording test fixture data:

Component	Part Number/Description	Vendor
1kpF (C1,C3)	VJ0402Y102KNAAJ/1kpF±10%;25V or Equivalent	Vishay
10kpF (C2,C4)	VJ0402Y103KNAAJ/10kpF±10%;25V or Equivalent	Vishay
2.2ohm (R1,R2)	CRCW04022R20JNTD/2.2ohm±1%;0.063W or Equivalent	Vishay
10kohm (R3)	CRCW040210K0JNEDIF/10kohm±5%;0.063W or Equivalent	Vishay

Package outline drawing:



Note: All Dimensions are in mm.

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 the datasheet from website.