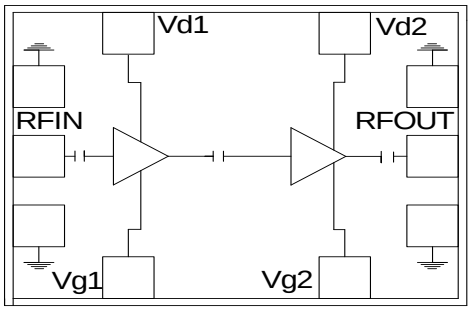
Ku-Band Medium Power Amplifier

Features

- **Frequency Range : 15 - 18GHz**
- **25 dBm output Psat**
- **13 dB Power gain**
- **25% PAE**
- **High IP3**
- **Dual bias operation**
- **No external matching required**
- **DC decoupled input and output**
- **0.5 µm InGaAs pHEMT Technology**
- **Chip dimension: 1.7 x 1.7 x 0.1 mm**

Functional Diagram



Typical Applications

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

Description

The ASL4033 is a Ku-band Power amplifier with 25dBm power output. The PA uses 2 stages of amplification and operates in 15 - 18 GHz frequency range with Small Signal Gain of 13dB. The PA has a high IP3 of 35dBm and 25% PAE. 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 (Idq)	200	mA
RF input power (RFin at Vd=9V)	23	dBm
Operating temperature	-50 to +85	°C
Storage Temperature	-65 to +150	°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

RF Performance measured without off-chip matching :

Parameter	Min.	Typ.	Max.	Units
Frequency Range	--	15 - 18	--	GHz
Gain	11.5	13	--	dB
Gain Flatness	--	+/-0.75	--	dB
Output Power (P1 dB)	22	23	--	dBm
Input Return Loss	--	8	--	dB
Output Return Loss	--	8	--	dB
Saturated output power (Psat)	24	25	--	dBm
Output Third Order Intercept (IP3)	--	35	--	dBm
Power Added Efficiency (PAE)	--	25%	--	--
Supply Current (Idq)	--	83	--	mA

RF Performance measured with open stub at output:

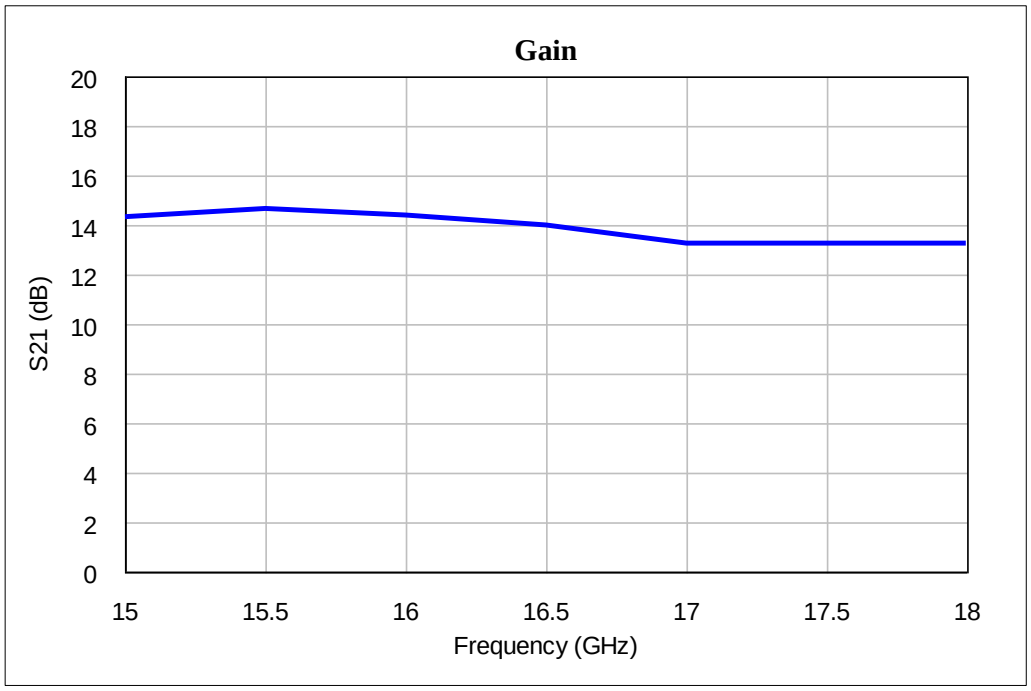
Parameter	Min.	Typ.	Max.	Units
Frequency Range	--	14 - 15	--	GHz
Gain	11.5	13	--	dB
Gain Flatness	--	+/-0.5	--	dB
Output Power (P1 dB)	22	23	--	dBm
Input Return Loss	--	10	--	dB
Output Return Loss	--	15	--	dB
Saturated output power (Psat)	23.5	24.5	--	dBm
Output Third Order Intercept (IP3)	--	35	--	dBm
Power Added Efficiency (PAE)	--	25%	--	--
Supply Current (Idq)	--	83	--	mA

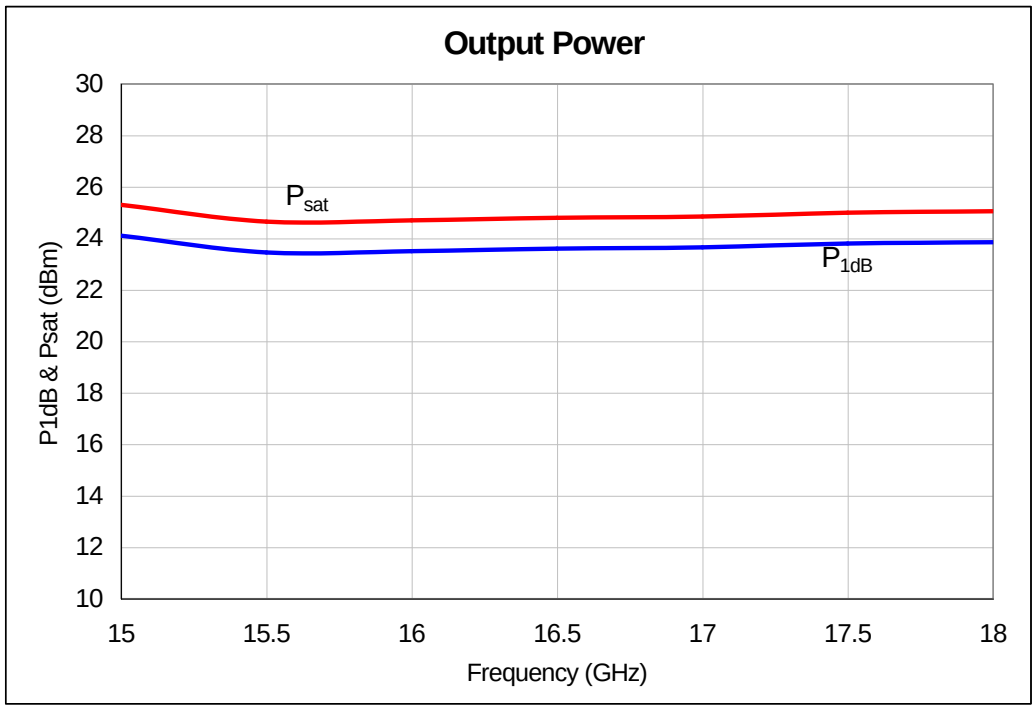
Note:

1. Electrical specifications as measured in test fixture.
2. RF Performance is between 15-18 GHz unless otherwise stated. However, an open stub is required to be used at output (as mentioned in assembly diagram) to achieve optimum performance over 14-15 GHz frequency.

Test fixture data (measured without open stub):

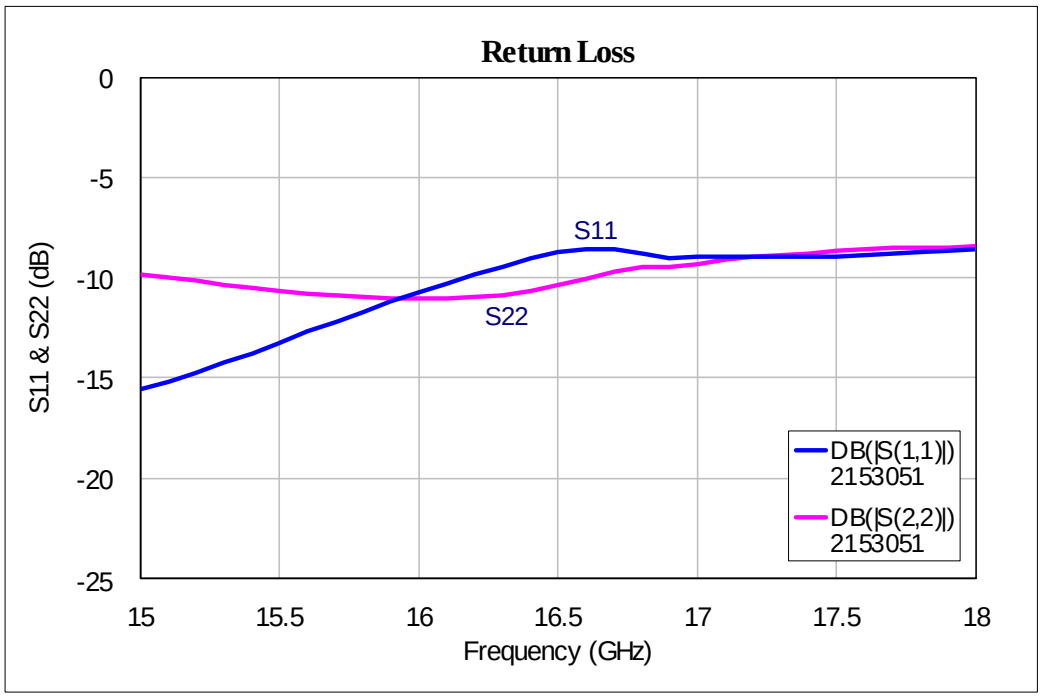
V_{d1} = V_{d2} = 8V, V_{g1} = V_{g2} = -0.9V, Total Current (Idq) = 83mA, T_A = 25 °C

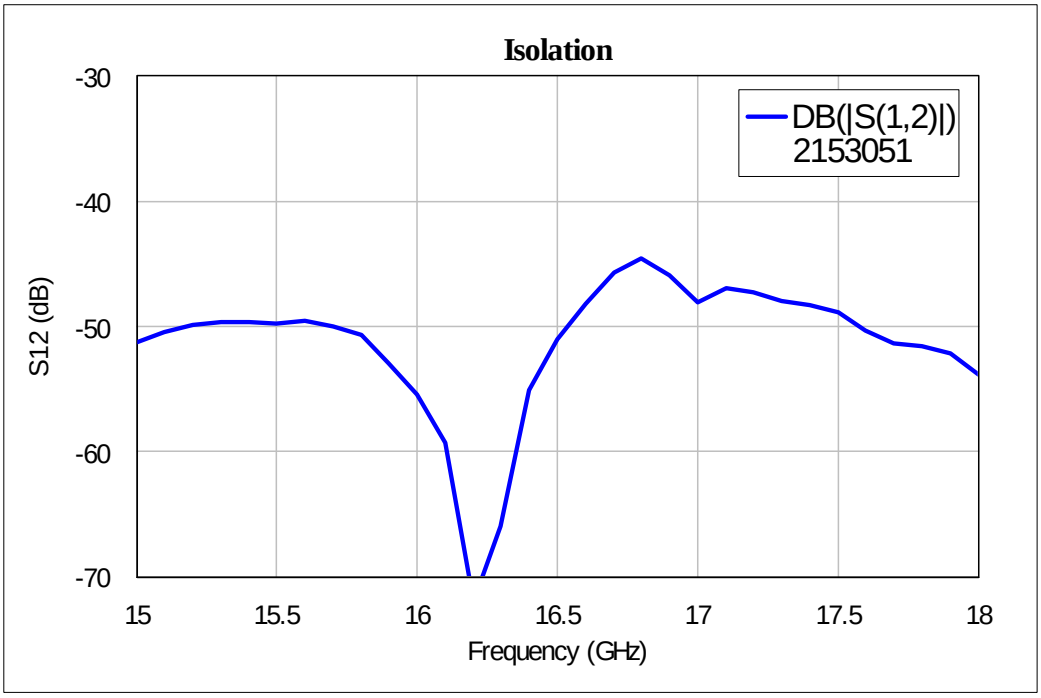




Test fixture data (measured without open stub):

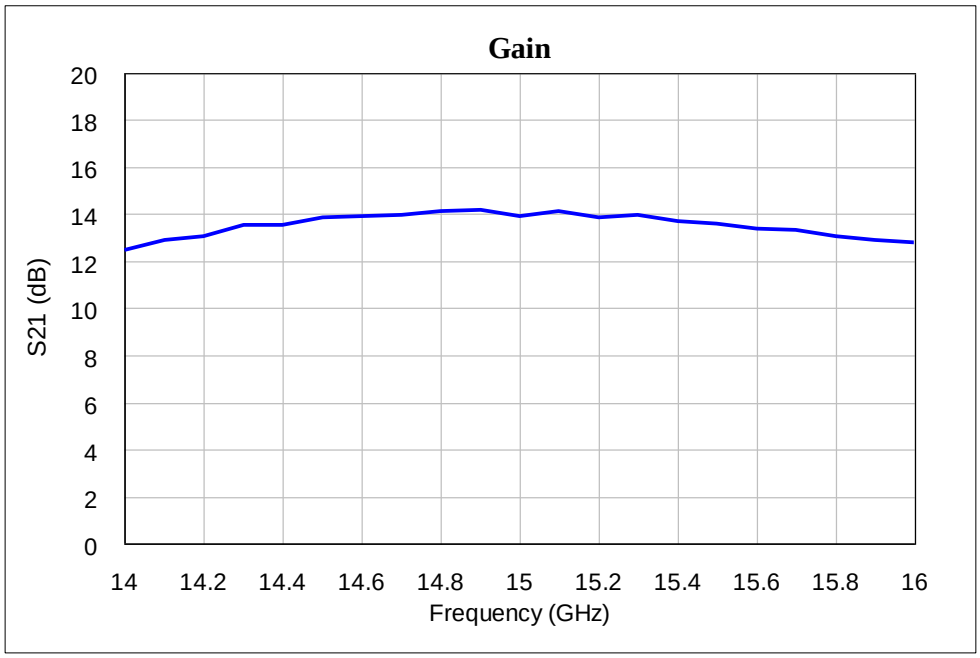
V_{d1} = V_{d2} = 8V, V_{g1} = V_{g2} = -0.9V, Total Current (Idq) = 83mA, T_A = 25 °C

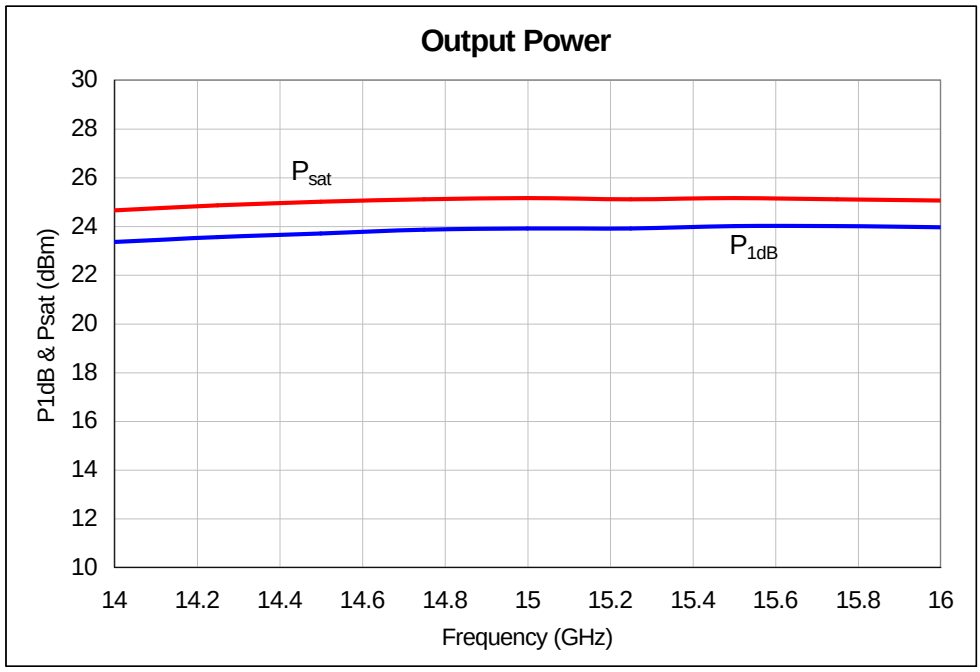




Test fixture data (measured with open stub at output):

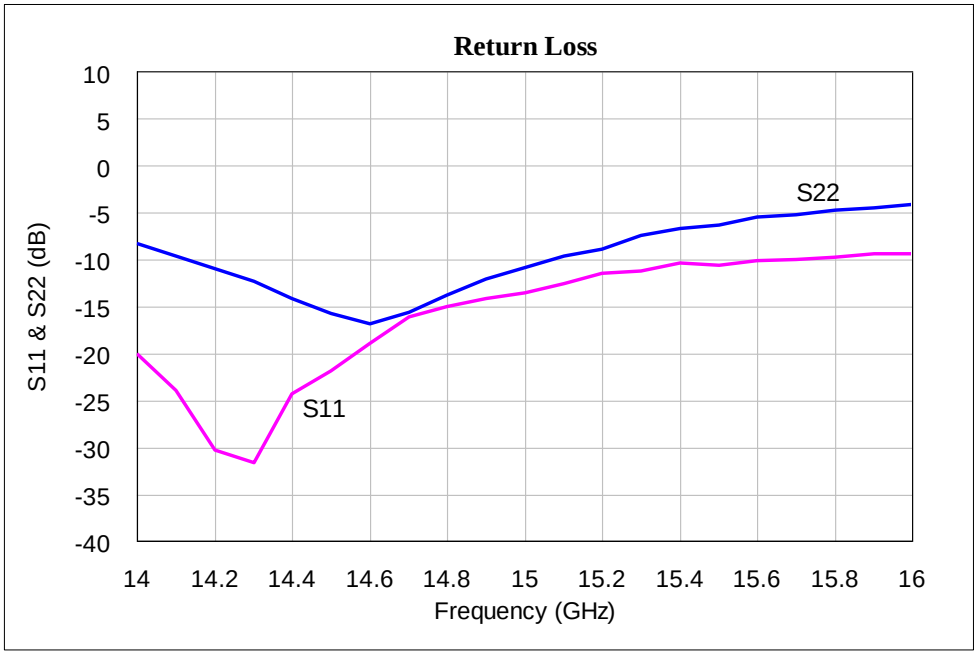
V_{d1} = V_{d2} = 8V, V_{g1} = V_{g2} = -0.9V, Idq = 83 mA, T_A = 25 °C

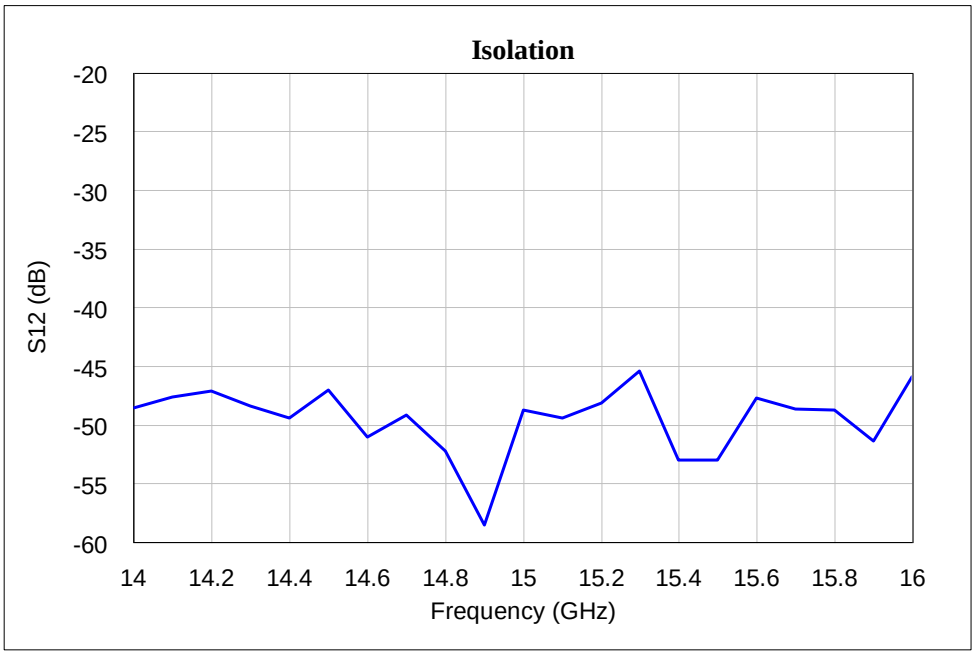




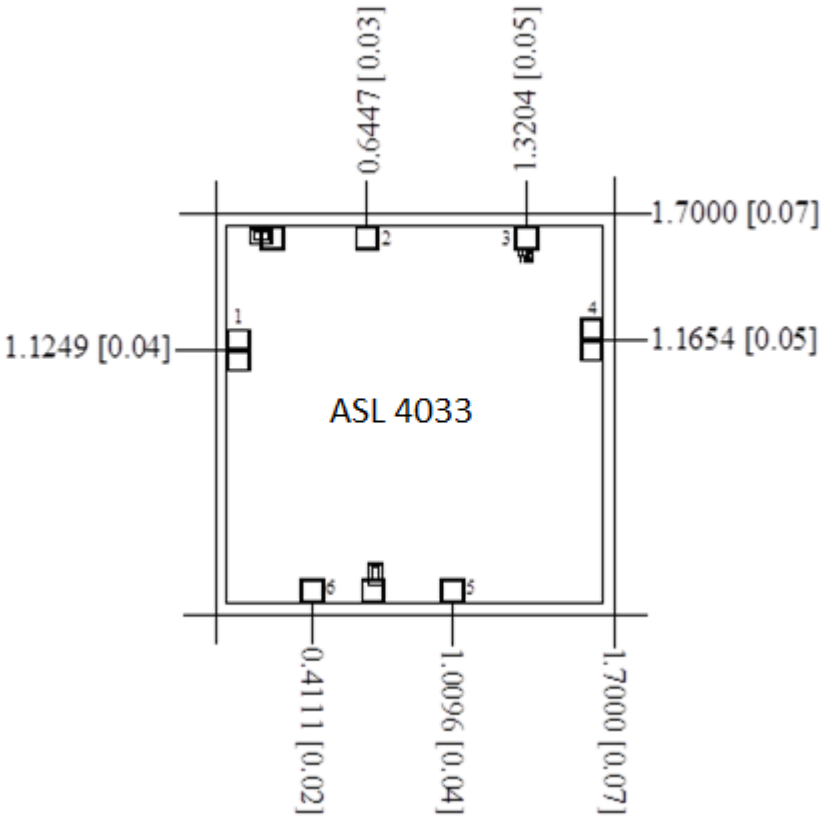
Test fixture data (measured with open stub at output):

V_{d1} = V_{d2} = 8V, V_{g1} = V_{g2} = -0.9V, Idq = 83 mA, 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. 2 : 1st stage drain voltage(V_{d1})
4. Pad no. 4 : RF Out
5. Pad no. 3 : 2nd stage drain voltage(V_{d2})
6. Pad no. 5 : 2^{nd} stage gate voltage(V_{g2})
7. Pad no. 6 : 1^{st} stage gate voltage (V_{g1})

Recommended Assembly Diagram :

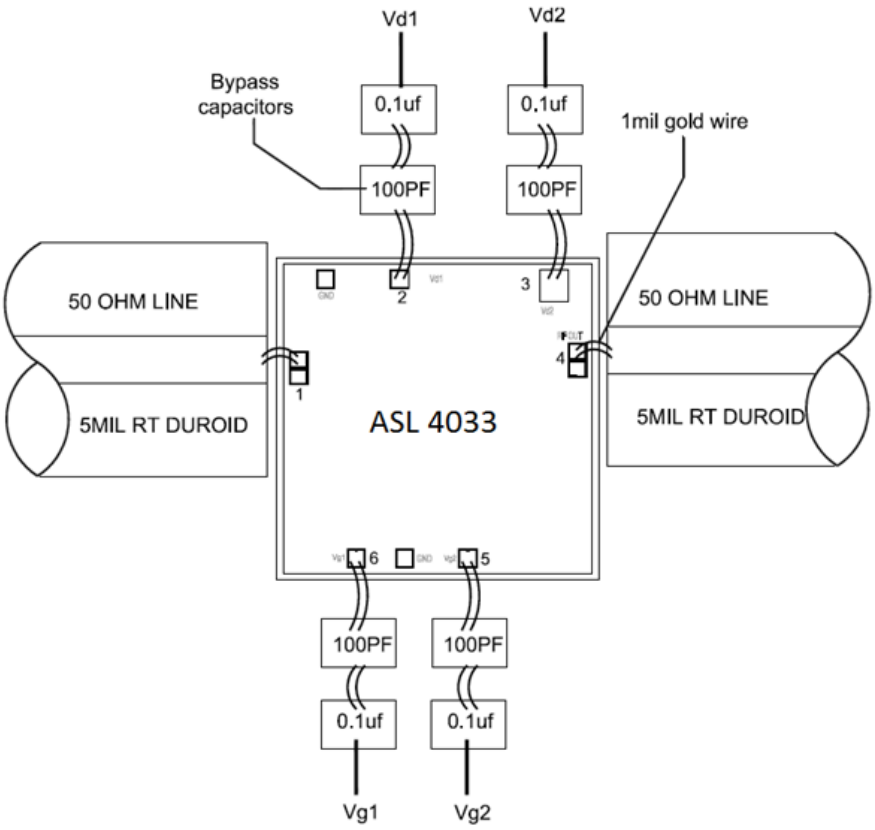


Fig : Assembly Drawing without off-chip matching

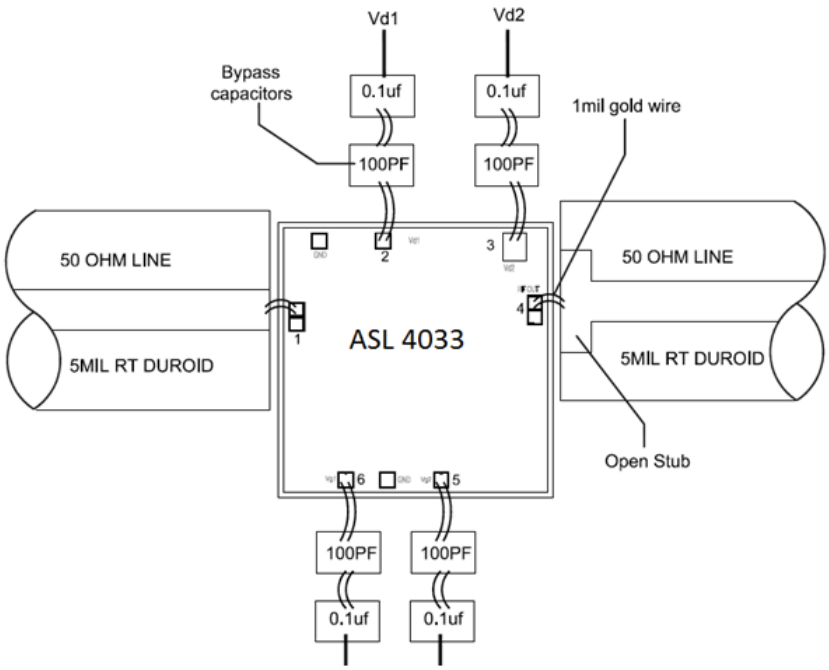


Fig : Assembly Drawing with Open Stub at Output.

Note :

1. An output stub with a width of 0.25mm and length of 4mm to be used at output immediate to the chip to get optimum performance at 14-15GHz frequency band.
2. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
3. Two 1 mil (0.0254mm) bond wires of minimum length should be used from chip bond pad to 100pF capacitor.
4. Input and output 50 ohm lines are on 5 mil RT Duroid substrate
5. 1µF capacitors may be additionally used as a second level of bypass for reliable operation
6. The RF input & output ports are DC decoupled on-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.

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