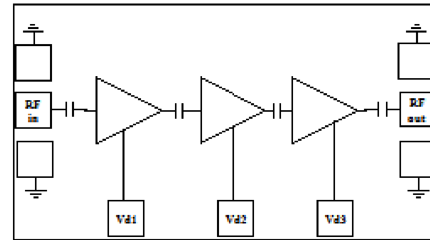
8 – 20 GHz Low Noise Amplifier

Features

- **Frequency Range: 8 - 20 GHz**
- **22 dB Nominal Gain**
- **Noise Figure: <3 dB**
- **I/O Return Losses > 10 dB**
- **Output P1dB ~ 10dBm**
- **Self bias operation**
- **DC decoupled Input and Output**
- **Chip Dimensions: 2.5mm x 1.35mm x 0.1mm**

Functional diagram



Typical Applications

- Radar
- Military
- Instrumentation & Test Equipment's

Description

The ASL1040 is a Low Noise Amplifier operating in 8.0 – 20.0 GHz frequency range. The LNA uses 3 stages of amplification and provides >20dB of gain with mid-band noise figure of less than 3dB. The amplifier is well matched to 50ohms over the entire operating bandwidth having input & output return losses better than 10dB. The LNA has P1 dB of 10 dBm over the entire operating frequency band and operates on +2V or +3V DC supply with a minimal current consumption of 67mA (typ). The circuit grounds on the die are provided through vias to the backside metallization. The die is fabricated using In GaAs pHEMT technology

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum	Units
Positive DC voltage	+6	V
RF input power	+20	dBm
Supply Current	100	mA
Operating Temperature	-55 to +85	°C
Storage Temperature	-65 to +150	°C

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

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Electrical Specifications @ T_A = 25 °C, Vd = +2V, Z_o= 50Ω

Parameter	Min.	Typ.	Max.	Units
Frequency	8.0	-	20.0	GHz
Gain [(1)]	20	22	-	dB
Noise Figure [(1)]	2	2.5	3	dB
Input Return Loss [(1)]	-	10	-	dB
Output Return Loss [(1)]	-	10	-	dB
Output Power (P_1dB) [(1)]		10[(1)]/12[(2)]		dBm
Supply Voltage (Vd1, Vd2, Vd3)		2, 2, 2		V
Supply Current		67		mA

Note:

1. The above mentioned electrical specifications are measured On-Wafer.
2. 12dBm/14dBm P1dB can be achieved by operating last stage drain supply voltage at 3V/4V.

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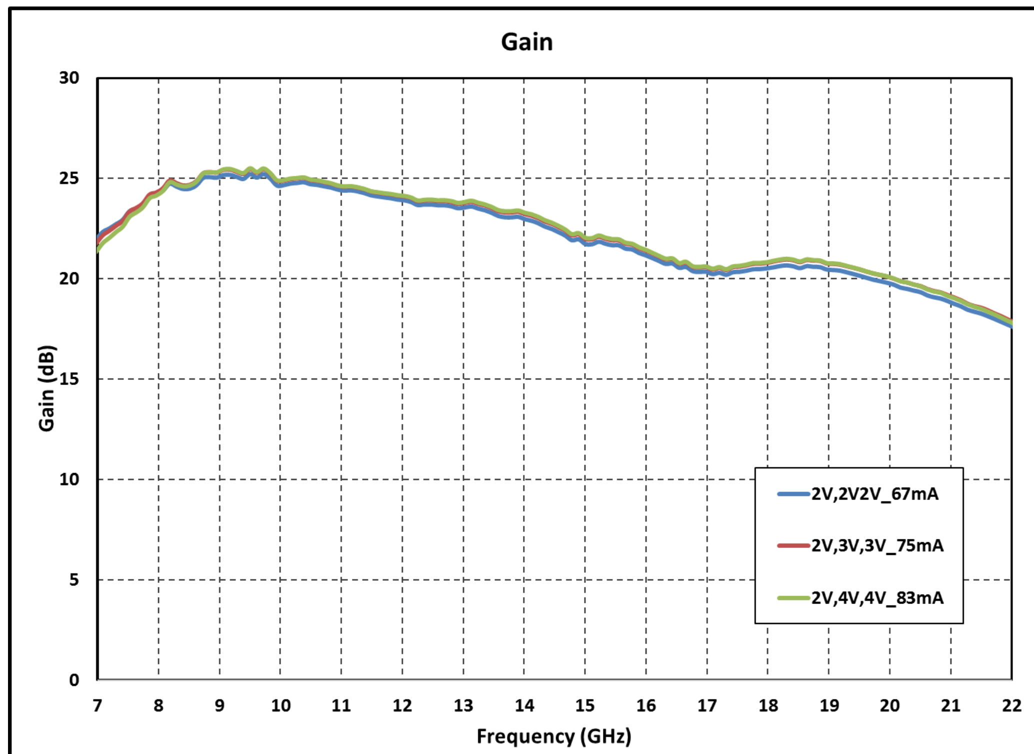
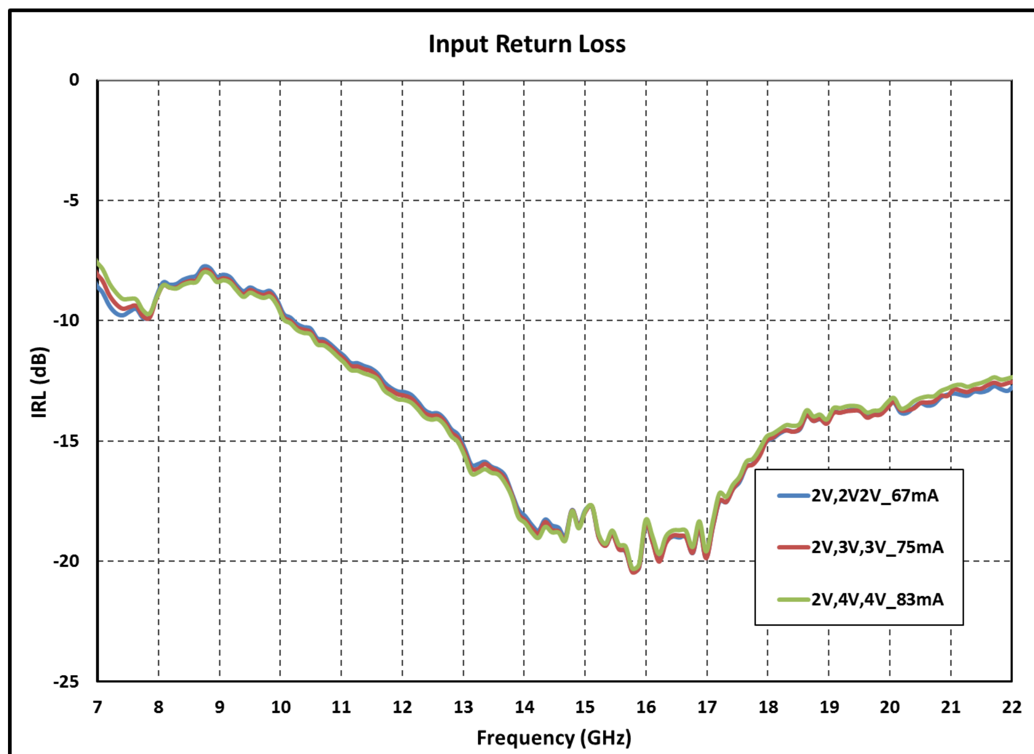
On-Wafer Probed data

Vd1, Vd2, Vd3 = 2V, Total Current = 67 mA, T_A = 25 °C





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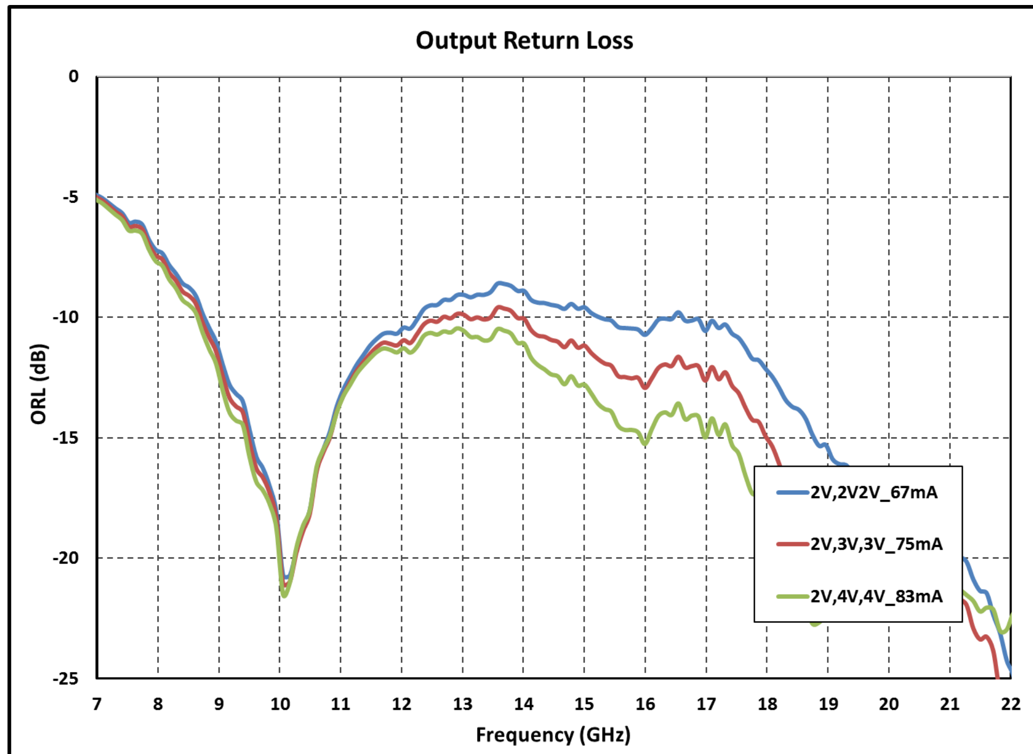

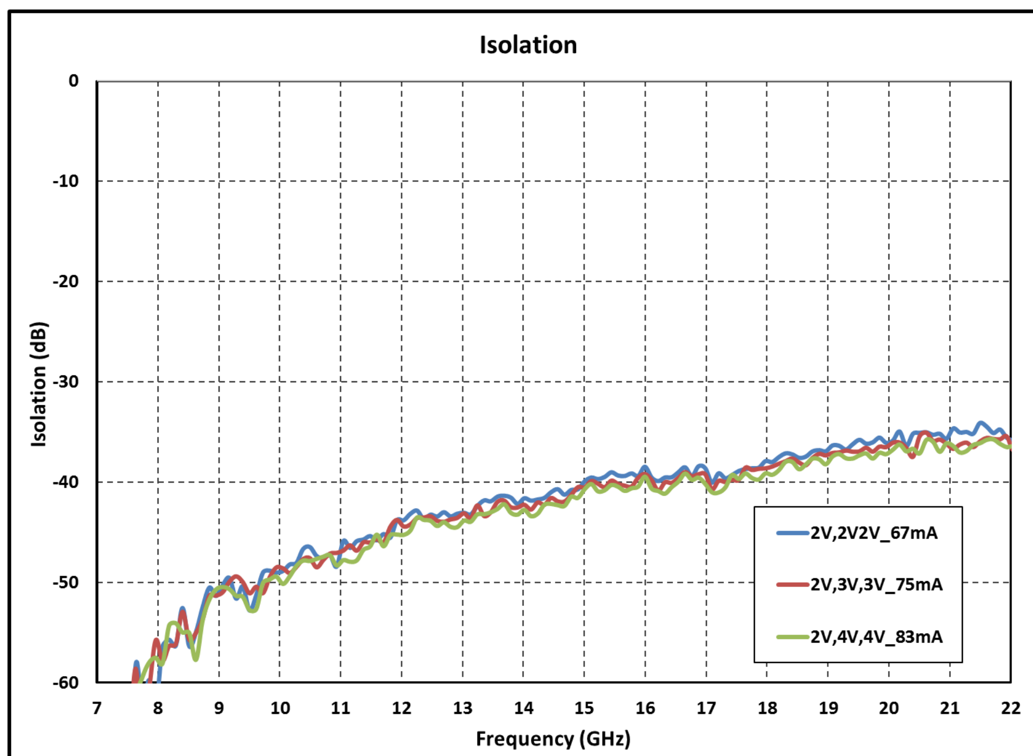

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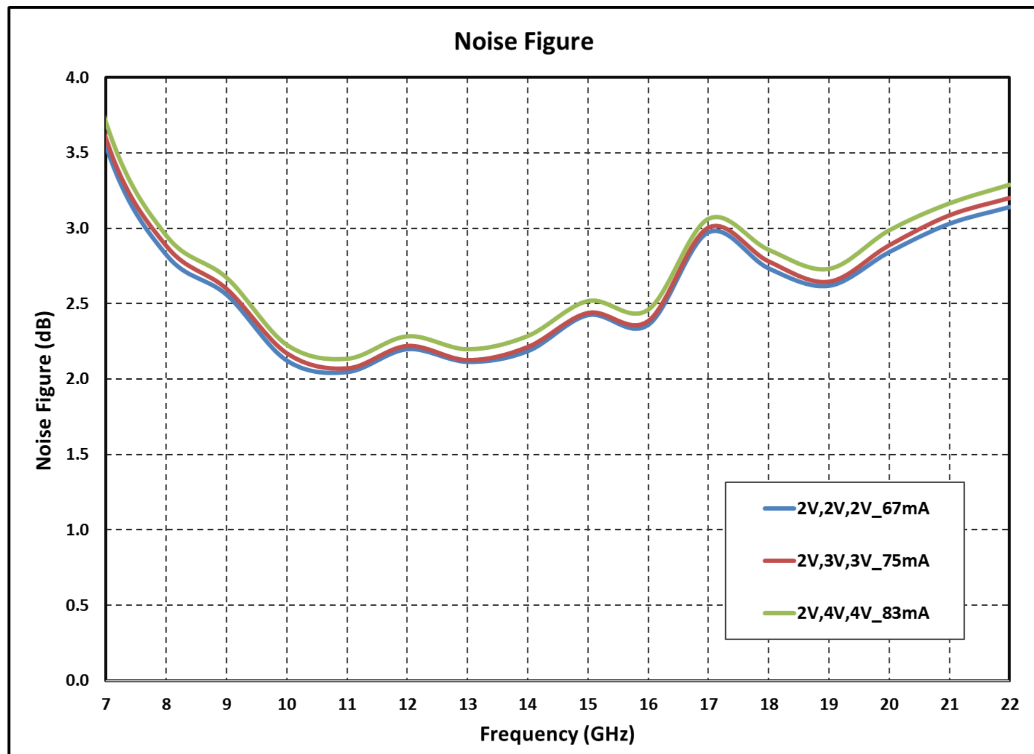

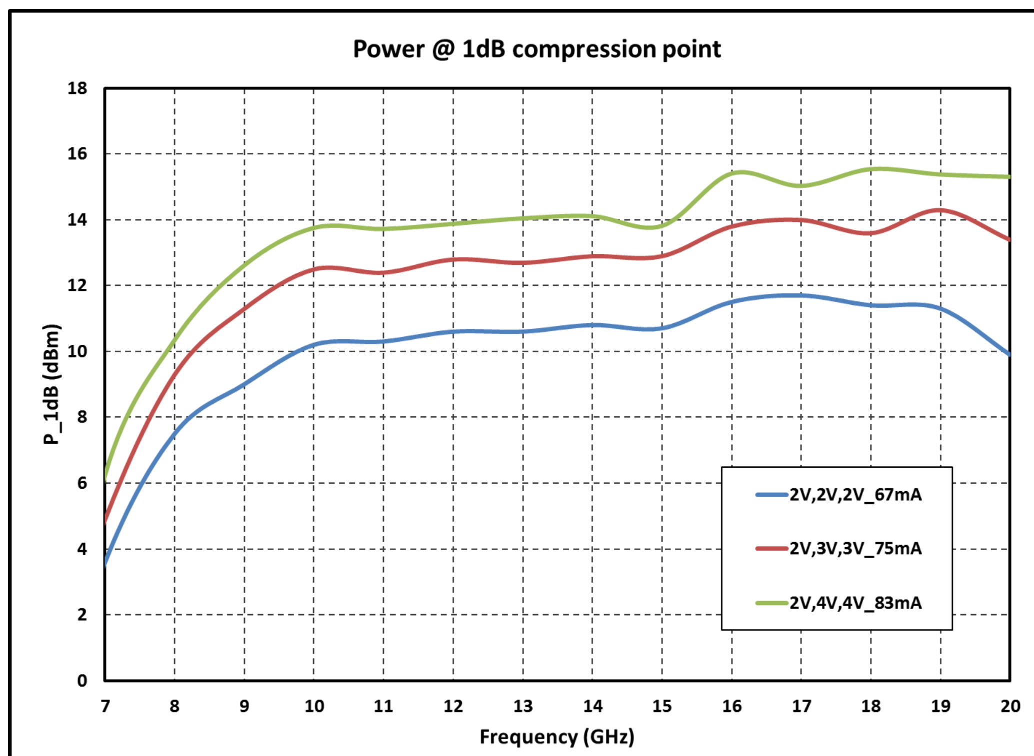

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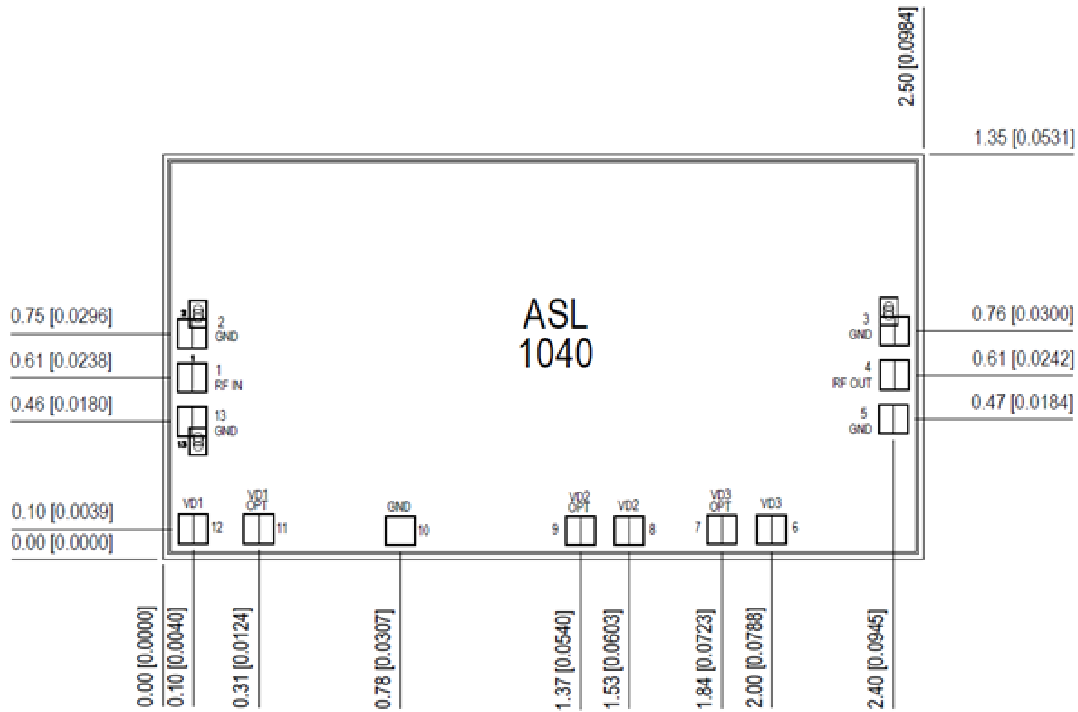
Mechanical Characteristics



Units: millimeters (inches)

All RF and DC bond pads are 100µm x 100µm

Note:

1. **Pad no. 1 : RF in**
2. **Pad no. 4 : RF out**
3. **Pad no. 6 : Vd3**
4. **Pad no. 7 : Optional Vd3 (VD3 OPT)**
5. **Pad no. 8 : Vd2**
6. **Pad no. 9 : Optional Vd2 (VD2 OPT)**
7. **Pad no. 11 : Optional Vd1 (VD1 OPT)**
8. **Pad no. 12 : Vd1**
9. **Pad no. 2, 3, 5, 10, 13 : GND**

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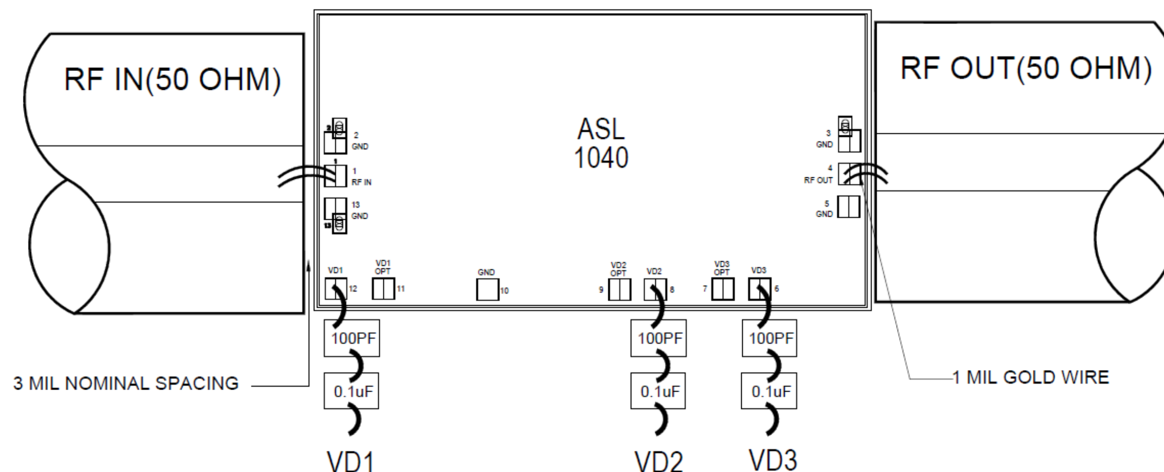
Recommended Assembly Diagram



Note:

1. Two 1 mil (0.0254mm) bond wires of minimum length should be used for RF input and output.
2. 0.1 µF capacitors may be additionally used as a second level of bypass at the power supplies for reliable operation.

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.

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