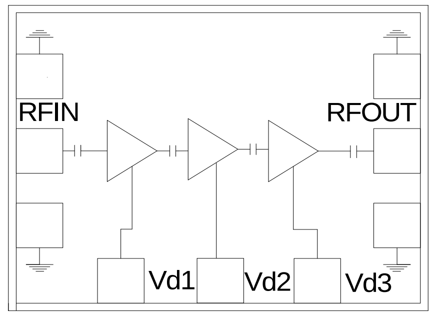
8.0-12.0 GHz Low Noise Amplifier

Features

- Frequency Range : 8.0-12.0 GHz
- Low Noise Figure < 1.7 dB
- 26 dB nominal gain
- 12 dBm P_{1dB}
- High IP3
- Input Return Loss > 10 dB
- Output Return Loss > 10 dB
- DC decoupled input and output
- 0.15 µm InGaAs pHEMT Technology
- Chip dimension: 3.0 x 3.0 x 0.1 mm

Functional Diagram



Typical Applications

- RADAR
- Military
- Test Equipment and sensors
- Point-to-Point Radios, Point-to-Multi-Point Radios & VSATS

Description

The Aelius ASL1013 is a three stage ultra low noise amplifier that operates from 8.0-12.0 GHz. The LNA features 26 dB gain and has a typical mid-band noise figure of 1.35 dB. The LNA has nominal input/output return losses of 10 dB. The nominal P1dB is 12 dBm.

Self bias technique has been employed to facilitate single supply operation. Circuit ground is provided through vias to backside metallization. The Aelius 2142051 performs well as a low noise amplifier in receive applications and as a driver or buffer amplifier where high gain, excellent linearity and low power consumption are important.

Absolute Maximum Ratings[1]

Parameter	Absolute Maximum	Units
Drain bias voltage (Vd)	+6	volts
RF input power	+10	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 @ T_A = 25 °C, V_{d1} = V_{d2} = 2V, V_{d3}= 5V Z_o =50 Ω

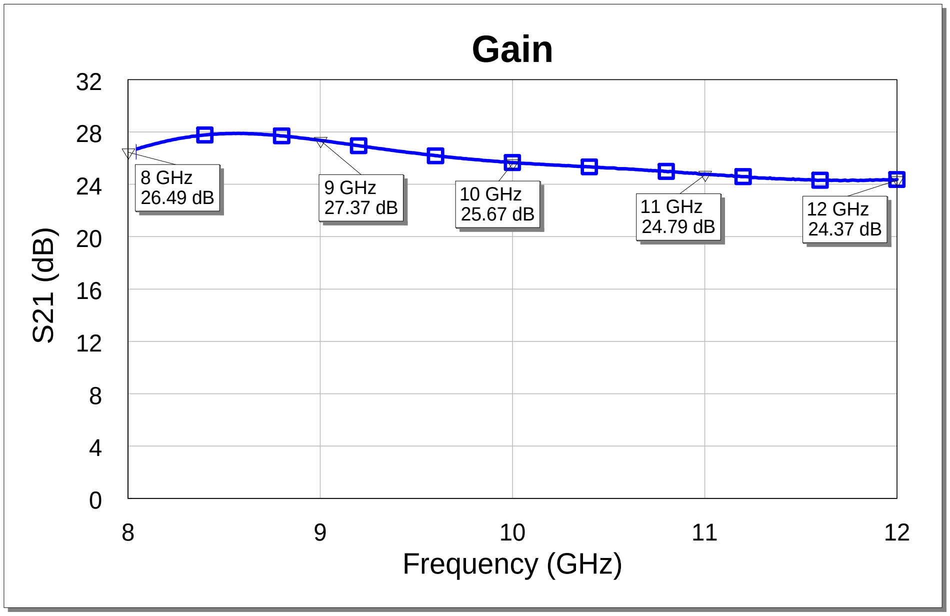
Parameter	Typ	Units
Frequency Range	8.0-12.0	GHz
Gain	26	dB
Gain Flatness	±2	dB
Noise Figure (mid-band)	1.4	dB
Input Return Loss	10	dB
Output Return Loss	10	dB
Output Power (P1dB)	+12	dBm
Saturated Output Power (Psat)	+15	dBm
Output Third Order Intercept (IP3)	23	dBm
Supply Current (Id) (Vd1 = Vd2= 2V, Vd3 = 5V)	80	mA

Note:

1. Electrical performance from test fixture measurements

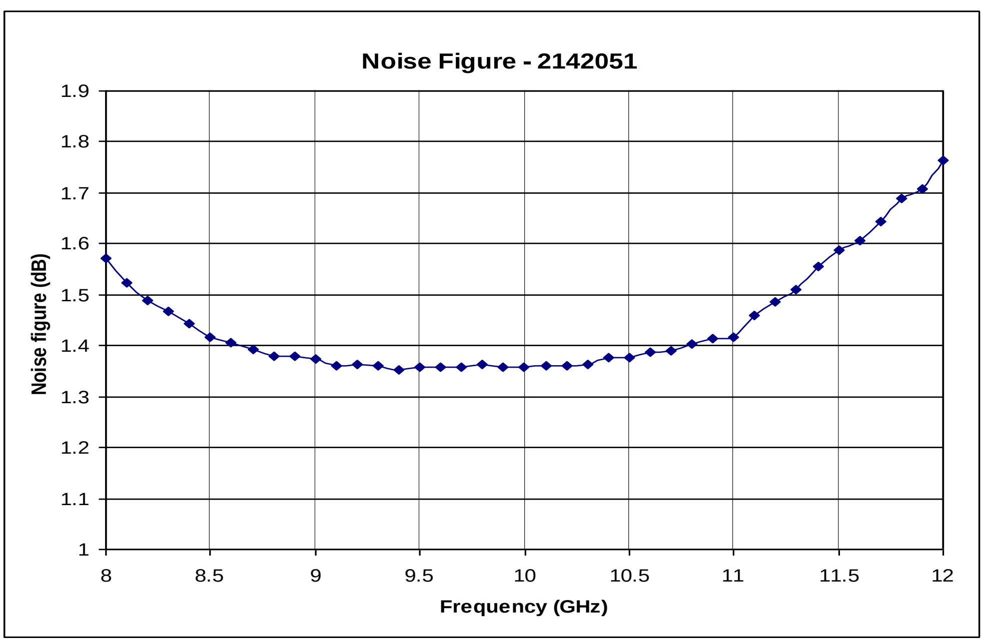
Test fixture data

Vd1=Vd2=2V, Vd3=5V, Total Current =80ma, T_A = 25 °C



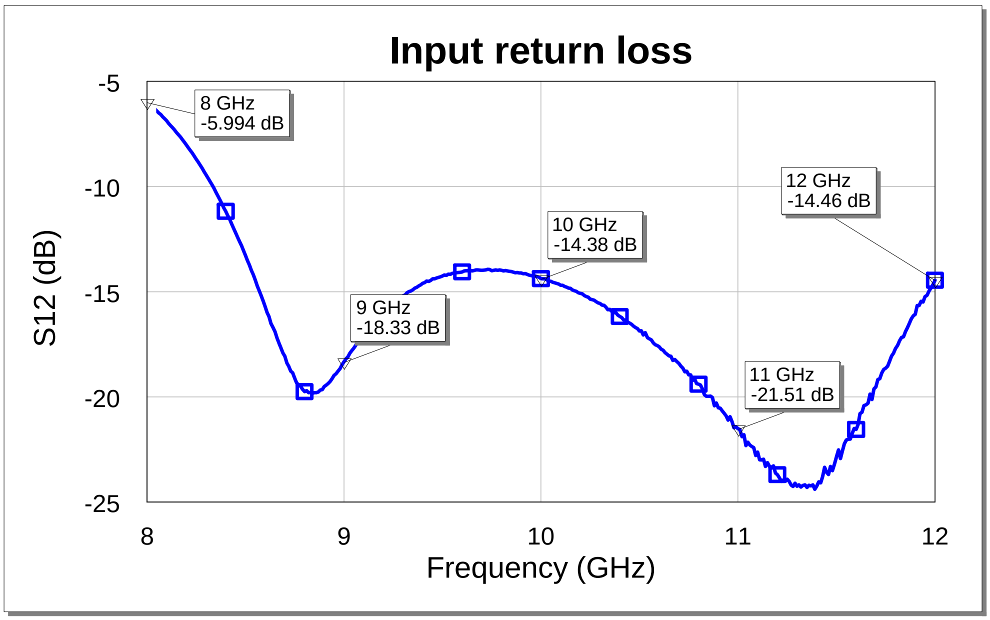
Test fixture data

Vd1=Vd2 = 2V, Vd3 = 5V, Total Current =80ma, T_A = 25 °C



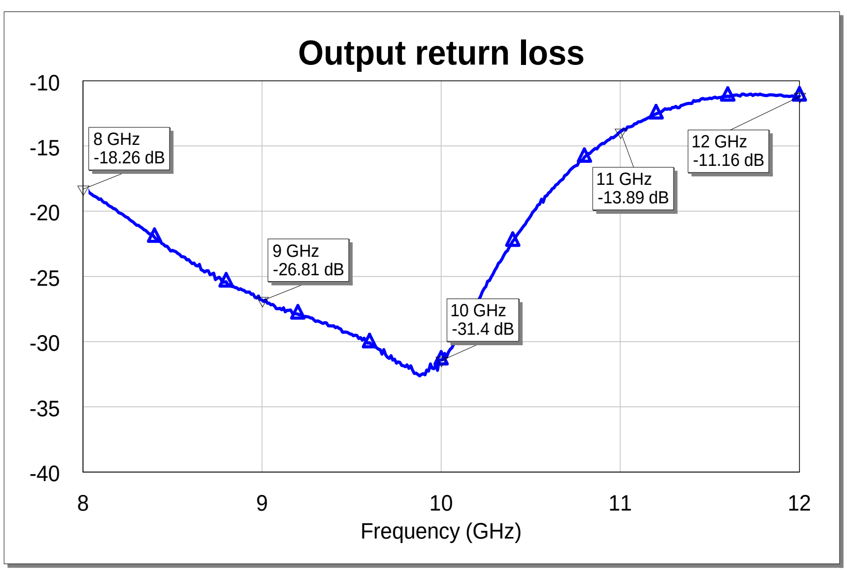
Test fixture data

Vd1=Vd2 =2V, Vd3 = 5V, Total Current =80ma, T_A = 25 °C



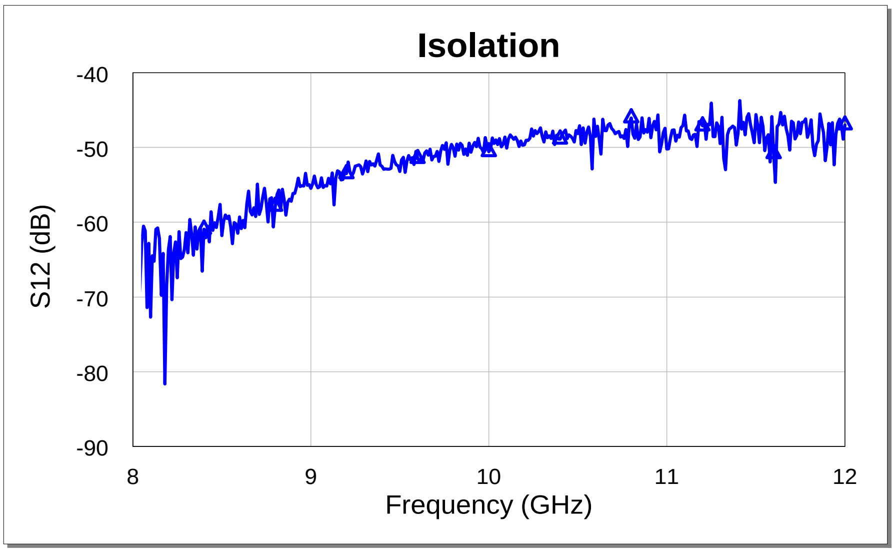
Test fixture data

Vd1=Vd2 = 2V, Vd3 = 5V, Total Current =80ma, T_A = 25 °C



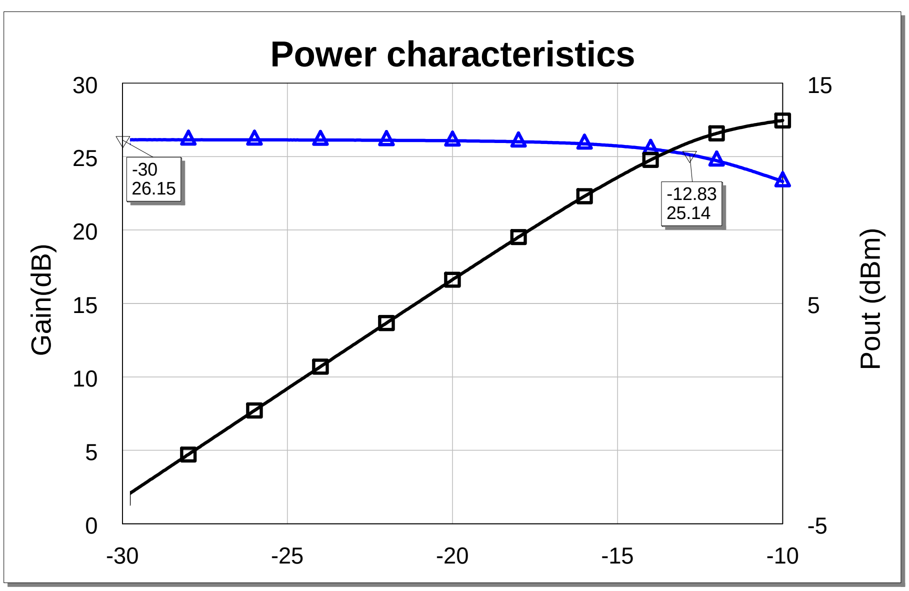
Test fixture data

Vd1 = Vd2 = 2V, Vd3 = 5V. Total Current =75ma, Gain Compression and P1dB measured at 9 GHz, T_A = 25 °C



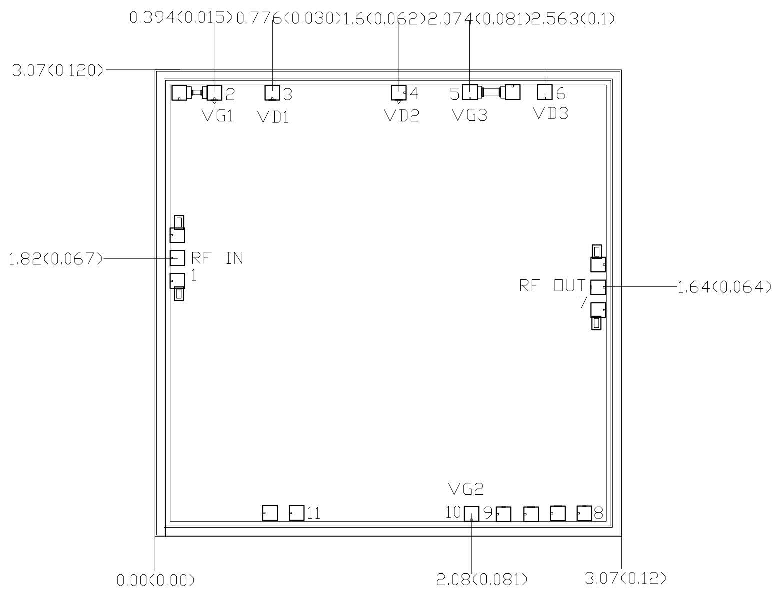
Test fixture data

Vd1=Vd2 = 2V, Vd3 = 5V, Frequency = 9.6 GHz Total Current =75ma, T_A = 25 °C



Pout at 1 dB compression @ 9.6 Ghz = 12 dBm

Mechanical Characteristics



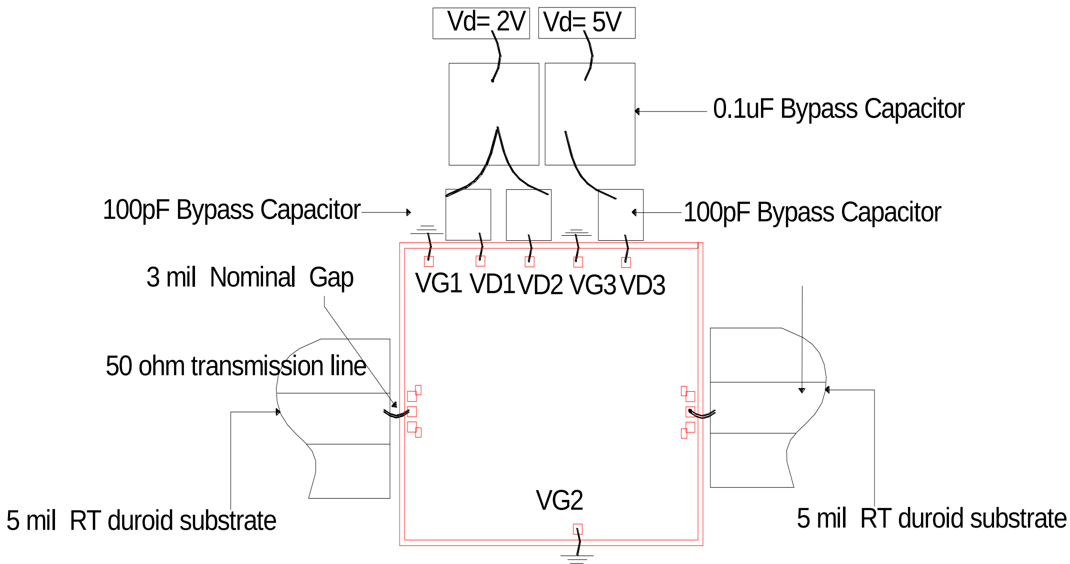
Units: Millimeters [Inches]

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

Note:

Pad 1 : RF in
Pad 2 : VG1 (Source grounding)
Pad 3 : VD1 (Drain bias)
Pad 4 : VD2 (Drain Bias)
Pad 5 : VG3 (Source grounding)
Pad 6 : VD3 (Drain Bias)
Pad 7 : RF out
Pad 10 : VG2 (Source grounding)

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 capacitor.
3. Input and output 50 ohm lines are on 5 mil substrate.
4. 0.1 µF capacitors may be additionally used as a second level of bypass for reliable operation.

Die attach: Use AuSn (80/20) 1-2 mil. Preform solder.

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. Ball bonds are also acceptable.

GaAs MMIC devices are susceptible to Electrostatic discharge. Proper precautions should be observed during handling, assembly & testing