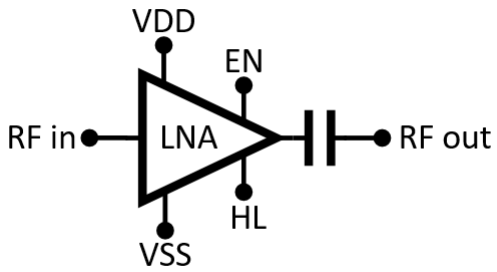
Product Overview

The ASL6011 is a GaN pHEMT MMIC Low Noise Amplifier (LNA) chip which operates from 8.5 to 10.5 GHz. The ASL6011 features extremely flat performance characteristics including 19.8 dB of small signal gain (at high gain), about 14 dB gain switching feature, 2.7 dB of noise figure at high gain, output IP3 of +32 dBm and output P1dB of +23 dBm across the operating band. With a reflective power limiter, the ASL6011 has a power handling capacity of 37 dBm continues wave (CW). Also, ASL6011 can be switched on/off with a digital voltage of 0/5 V. Note that it is essential to first apply VSS voltage and then apply other pins' voltage. This versatile LNA is ideal for hybrid and MCM assemblies due to its compact size, consistent output power and DC blocked RF output. All data is measured with the chip in a 50 Ohm test fixture connected via two 0.025 mm (1 mil) diameter bond wires of minimal length 0.51 mm (20 mil).

Key Features

1. Fully integrated, high performance variable gain LNA
2. Integrated DC blocking at RF output
3. Enable/Disable mode with digital signal
4. Bandwidth: 8.5 GHz to 10.5 GHz
5. 14 dB gain switching
6. Power Gain : 19.8 dB
7. Low Noise Figure: 2.7 dB
8. Output P1dB: +21 dBm
9. Power Handling: 37 dBm (CW), 40 dBm (Pulsed)
10. 50 Ohm Matched Input/output
11. Die Size: 3.1 x 1.9 x 0.1 mm

Functional Block Diagram



Applications

1. Instrumentation
2. Point-to-point communication

Absolute Maximum Rating

Drain Bias Voltage (VDD)	+25 Vdc
Gate Bias Voltage (VSS)	-25 Vdc
RF Input Power (CW)(VDD = +10 Vdc)	37 dBm
RF Input Power (Pulsed)(VDD = +10 Vdc)	40 dBm
Channel Temperature	230 °C
Continuous Pdiss(T = 85 °C)	10 W
Storage Temperature	-65 to +150 °C
Operating Temperature	-40 to +65 °C


ELECTROSTATIC SENSITIVE DEVICE OBSERVE HANDLING PRECAUTIONS

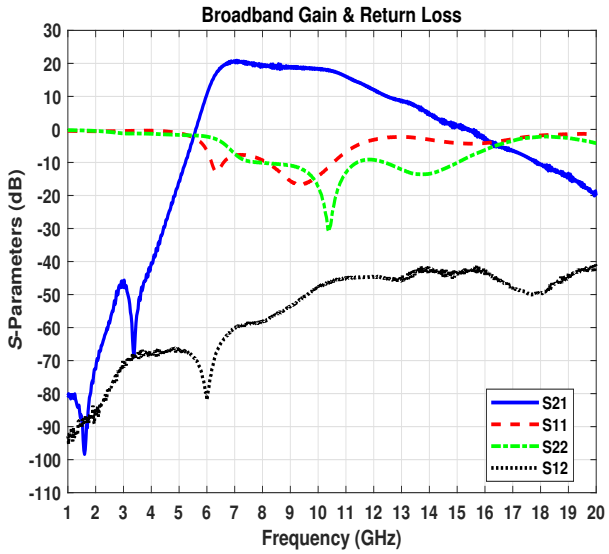
Electrical Specifications

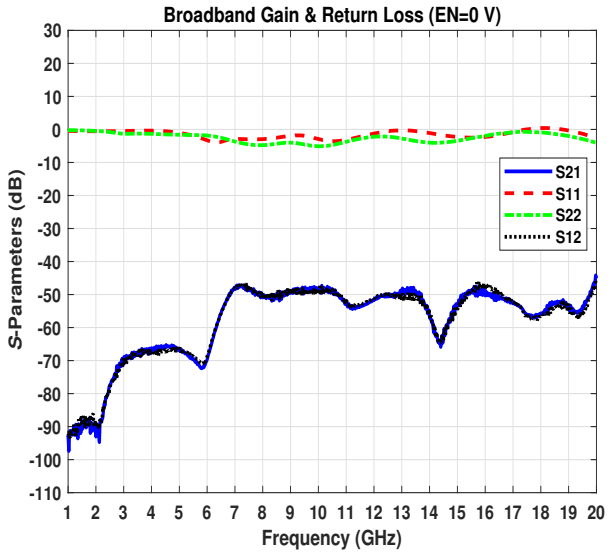
Parameter	Min.	Typ.	Max.	Units
Frequency Range	8.5	-	10.5	GHz
Gain (at high gain HL=5V)	17.8	18.8	19.8	dB
Attenuation at low gain (HL=0V)	-	14	-	dB
Noise Figure (at high gain HL=5)	-	2.7	-	dB
Input Return Loss	-	15	-	dB
Output Return Loss	-	13	-	dB
Output Power for 1 dB Compression (P1dB)	-	21	-	dBm
Saturated Output Power	-	26.1	-	dBm
Output Third Order Intercept Point (OIP3)	-	32	-	dBm
Supply Current	-	220	-	mA

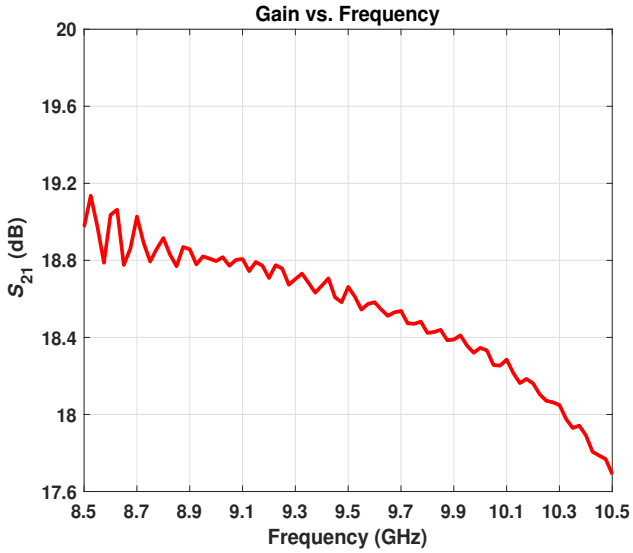
Test conditions unless otherwise noted:TA=+25 °C, VDD=10 V, VSS=-6 V, EN=5 V, ID=220 mA, Z0=50 Ω

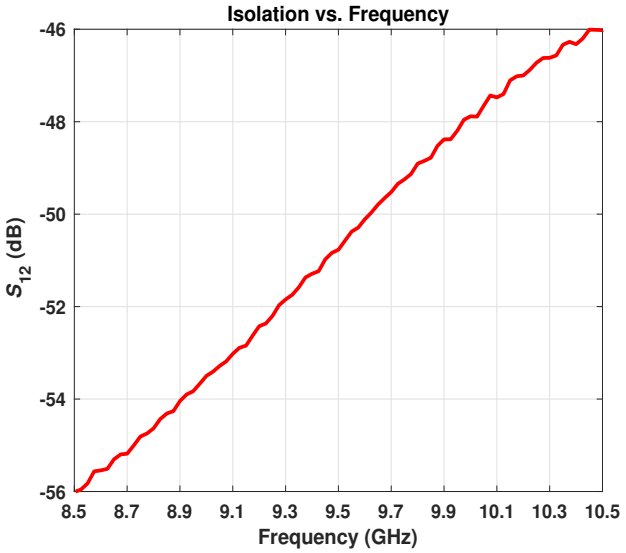
Typical Performance Curves

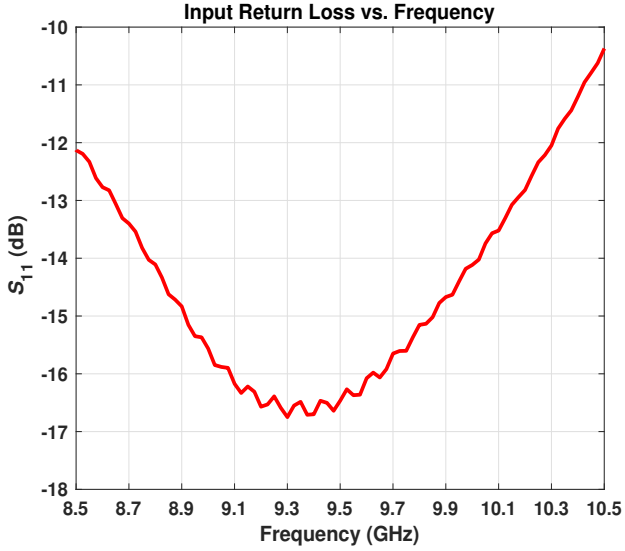
Test conditions unless otherwise noted:VDD=10 V, VSS=-6 V, EN=5 V, HL=5 V

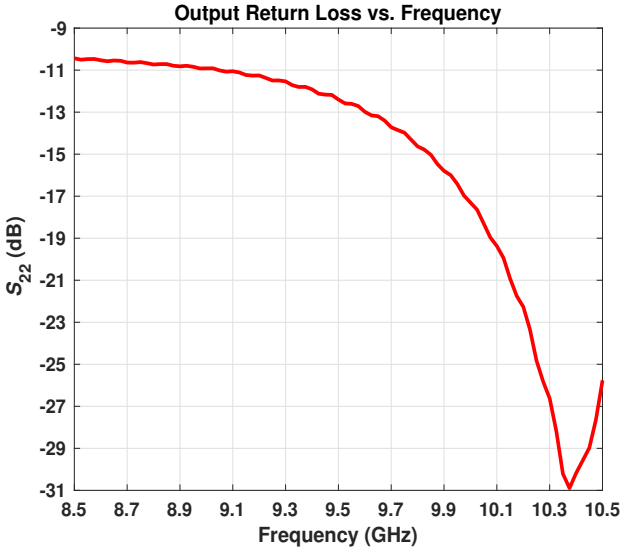












Typical Performance Curves

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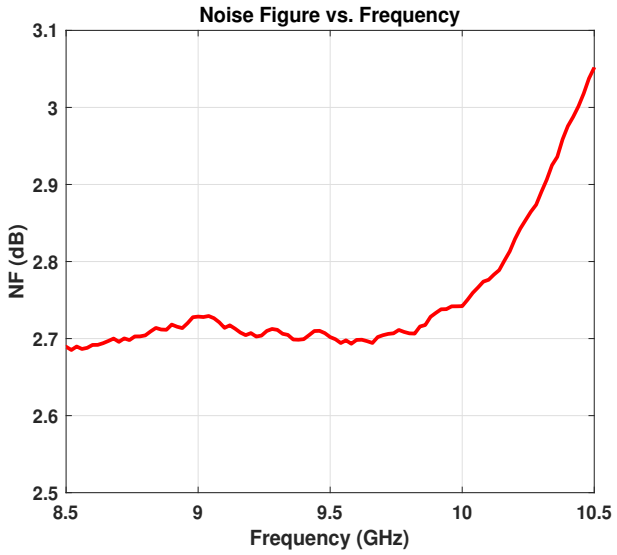
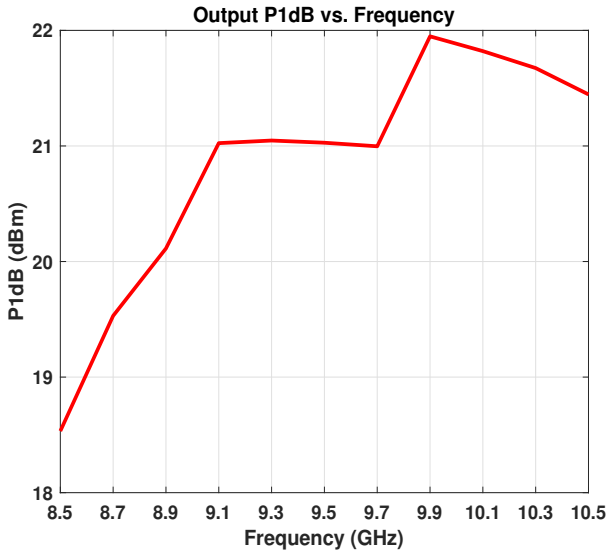
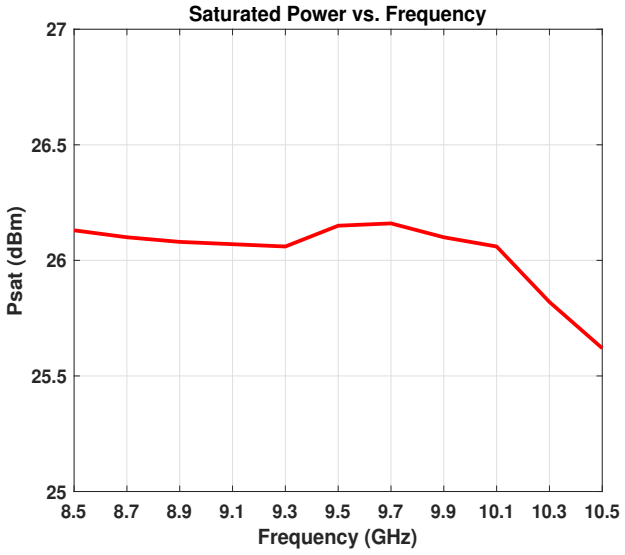
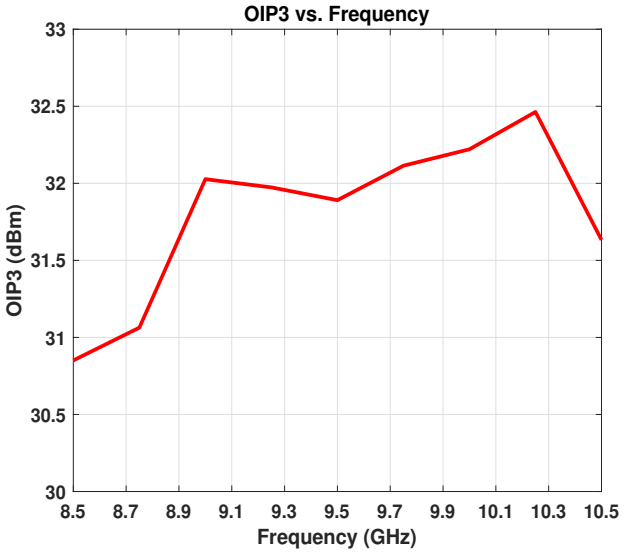
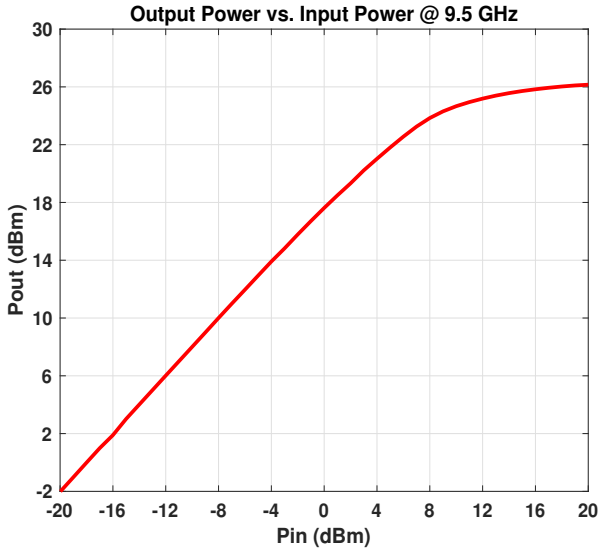
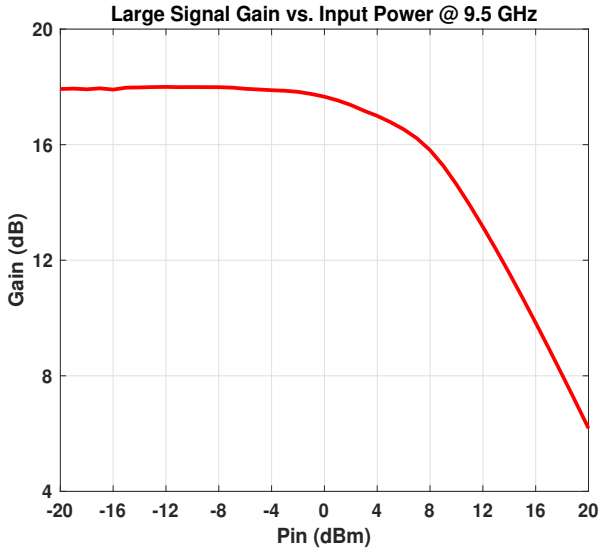






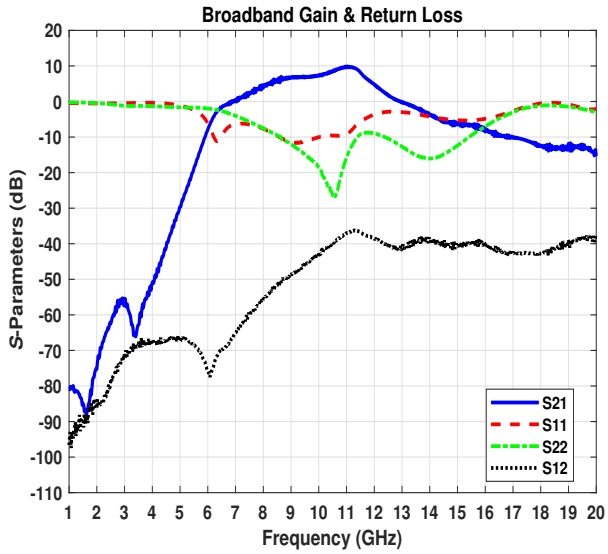


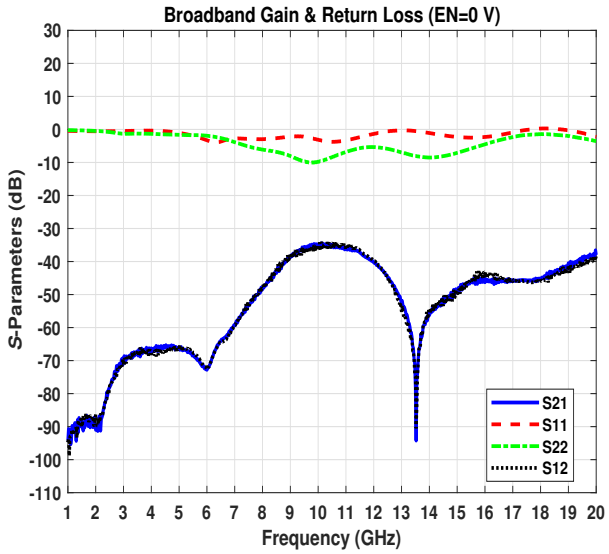


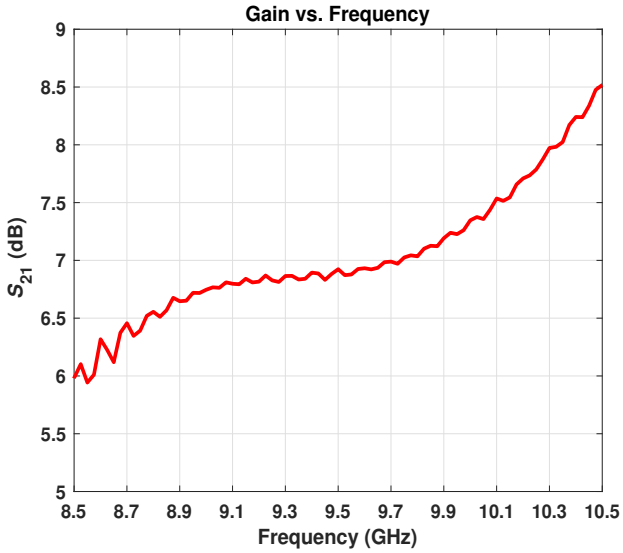


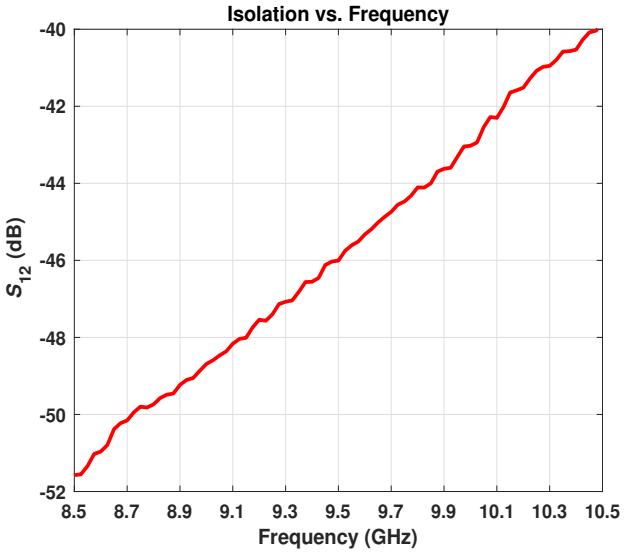
Typical Performance Curves

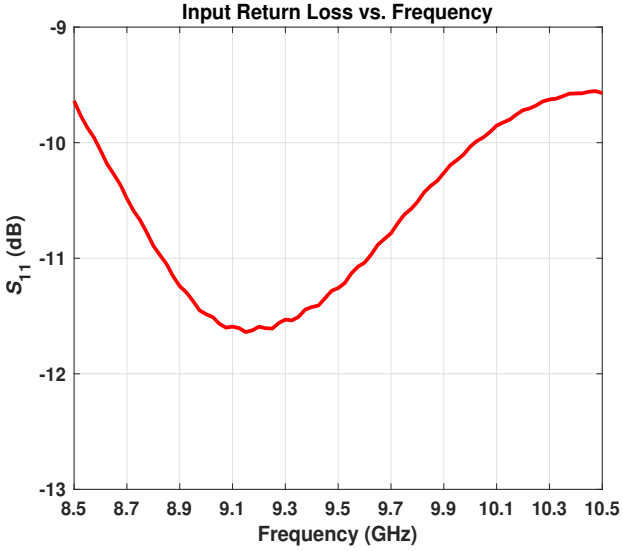
Test conditions unless otherwise noted:VDD=10 V, VSS=-6 V, EN=5 V, HL=0 V

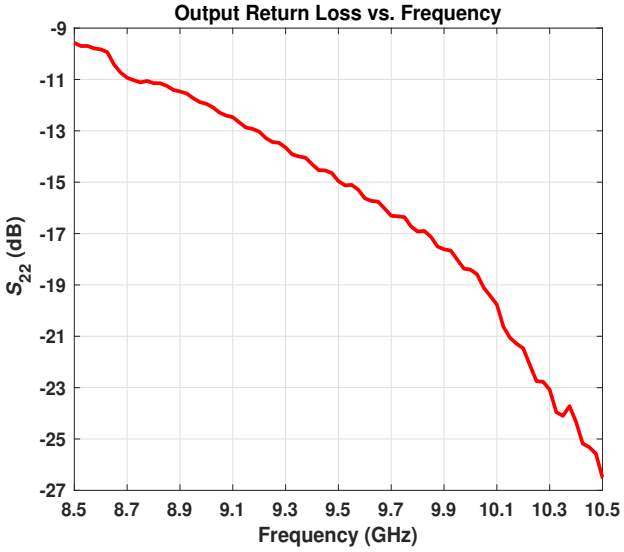






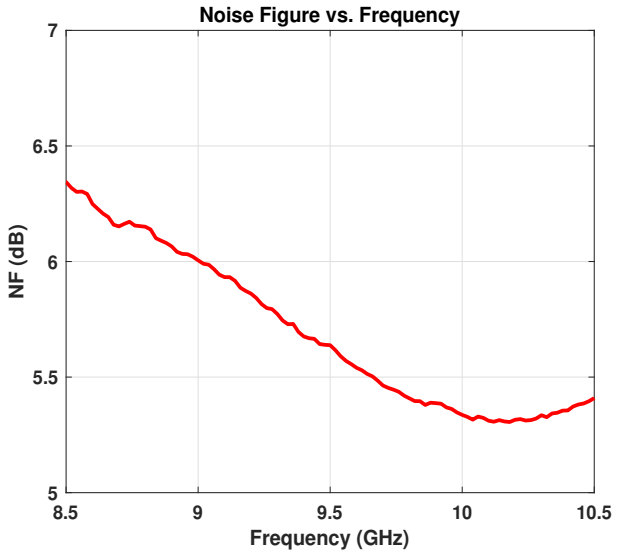


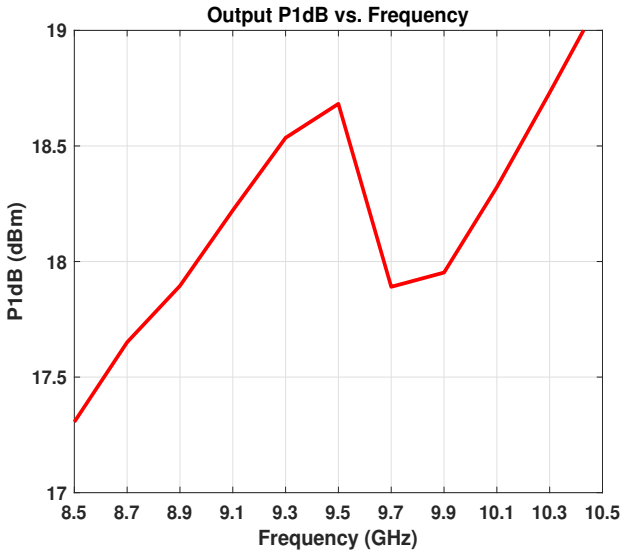


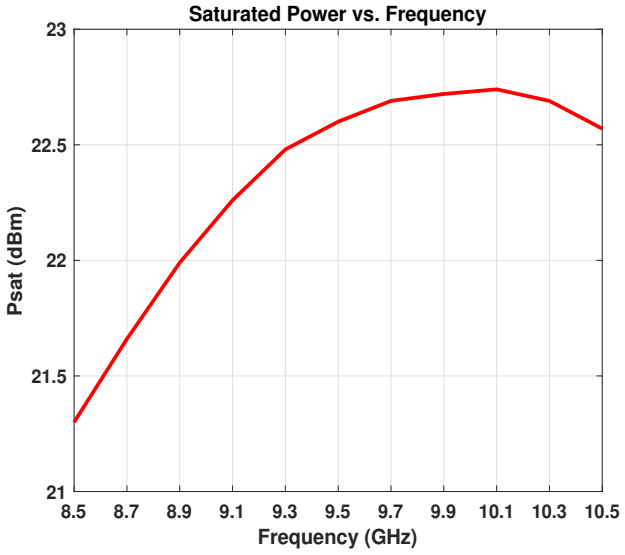


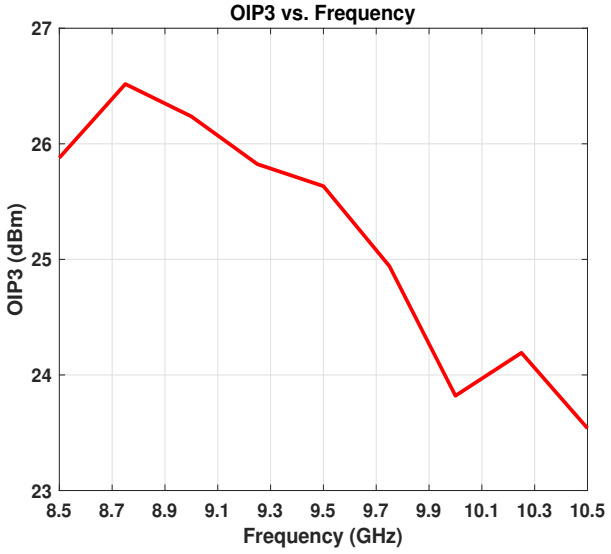
Typical Performance Curves

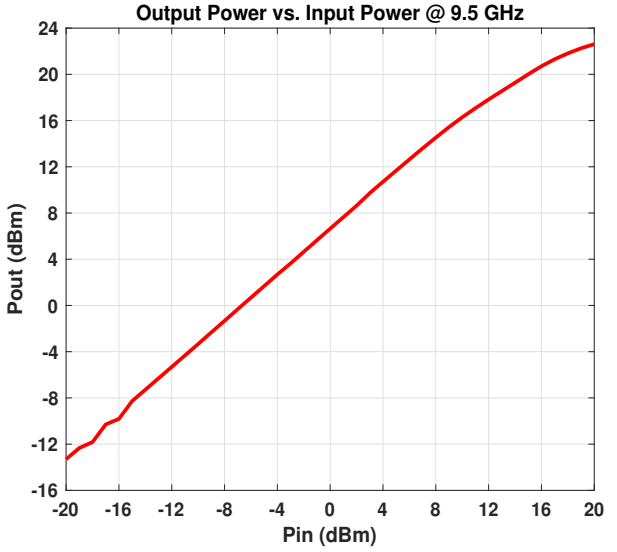
Test conditions unless otherwise noted:VDD=12 V, VSS=-6 V, EN=5 V, HL=0 V

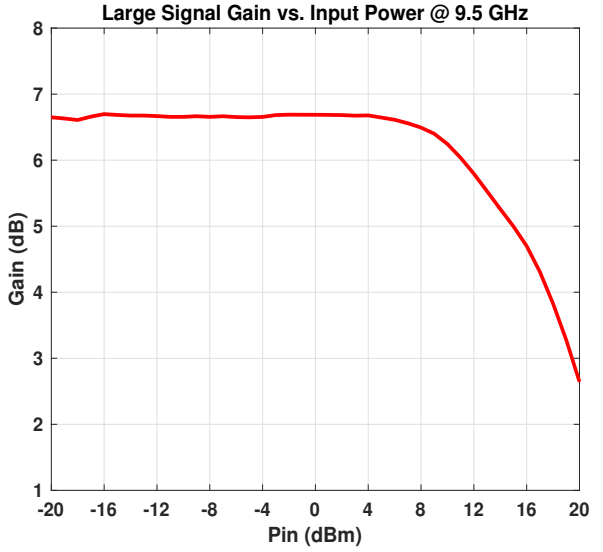




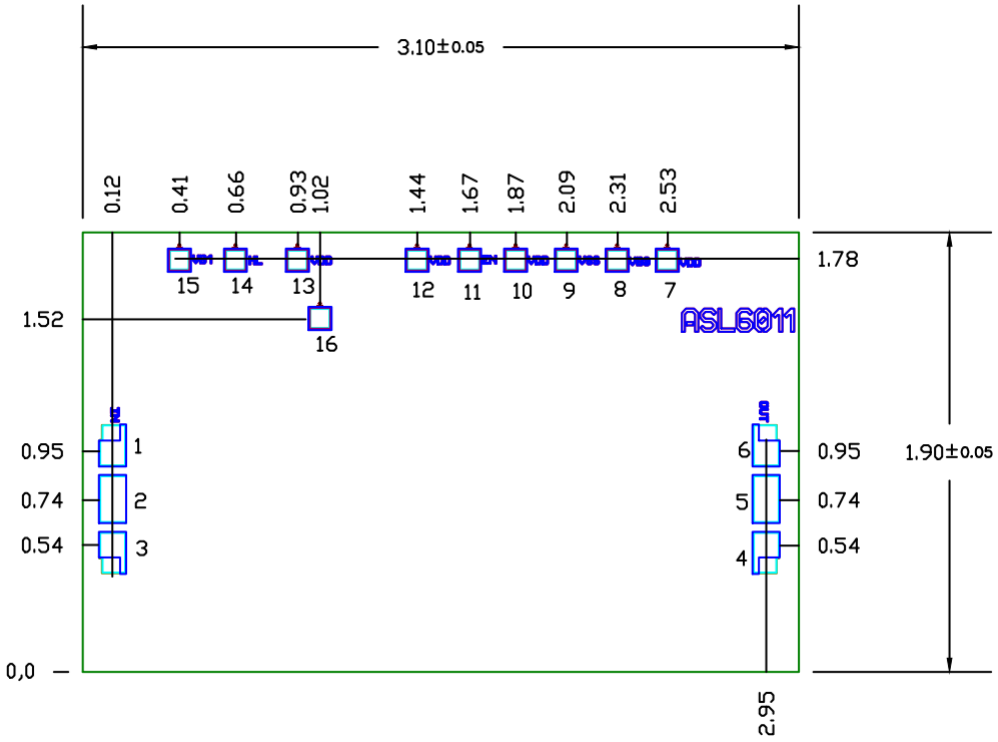








Mechanical Information



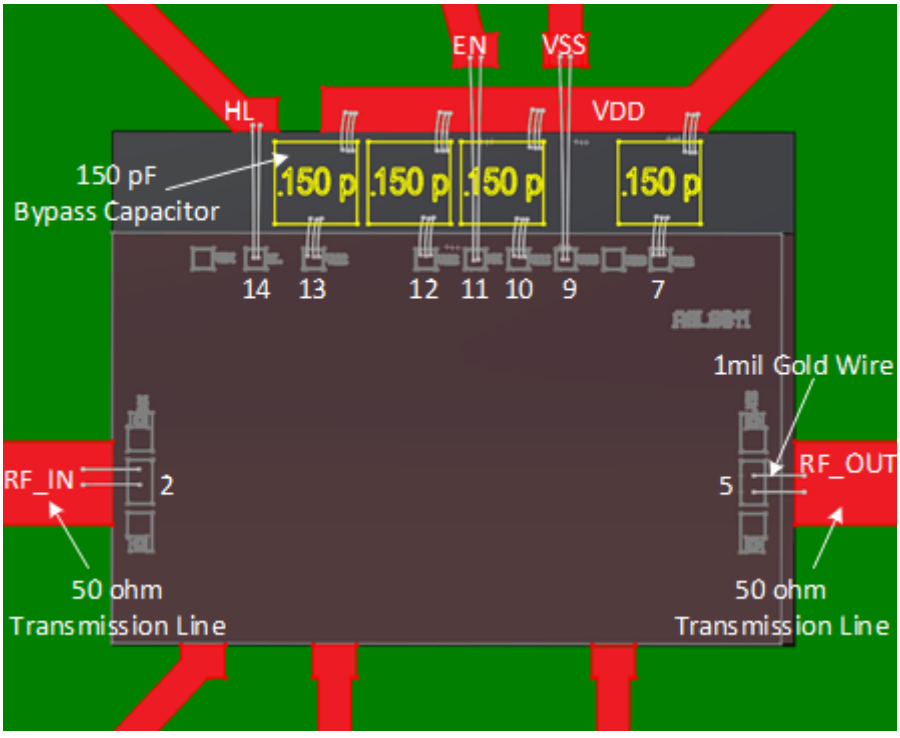
NOTES:

1. ALL DIMENSIONS IN MILLIMETERS
2. DIE THICKNESS IS 100 µm
3. TYPICAL BOND PAD IS 0.01 mm2
4. BACKSIDE METALLIZATION: GOLD
5. BACKSIDE METAL IS GROUND
6. BOND PAD METALLIZATION: GOLD
7. NO CONNECTION REQUIRED FOR UNLABELED BOND PADS
8. Die Size: OVERALL DIE SIZE ±50 µm

Bond Pad Description

2	RF-IN	This pad is matched to 50 Ohms and it does not have integrated DC block. External DC block can be used if needed.
5	RF-OUT	This pad is AC coupled and matched to 50 Ohms.
1,3,4,6(Die bottom)	GND	These pads & die bottom are RF/DC ground. The die bottom must be connected to the RF/DC ground. Other pads connections are not required.
7,10,12,13	VDD	Positive Supply Voltage for the amplifier. External bypass capacitors of 150 pF are required.
9	VSS	Negative Supply Voltage for the amplifier.
11	EN	This pad is for enabling/disabling of amplifier (Active High). A digital signal 0/3.5V with minimum current of 5 mA. This pad is pulled down internally.
14	HL	This pad is for gain switching. For high gain and low gain HL=5V and HL=0V is needed, respectively. Floating pad is not allowed.
8,15,16	-	Not connected.

Assembly Diagram



Assembly Notes

Component Placement and Adhesive Attachment Assembly Notes:

1. Use vacuum collet to pick up the die.
2. The force should be controlled during placement and mounting specially no force should be applied to air bridges.

Reflow process assembly notes:

1. Use CMC or MoCu carrier to decrease thermal expansion mechanical stress
2. Use AuSn (80/20) solder and limit exposure to temperatures above 300 °C to 3-4 minutes, maximum.
3. An alloy station or conveyor furnace with reducing atmosphere should be used.
4. Do not use any kind of flux.
5. Devices must be stored in a dry nitrogen atmosphere.
6. Use Au bond wire.

Contact Information

For the latest specifications, additional product information:
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Email: info@abba-semi.com