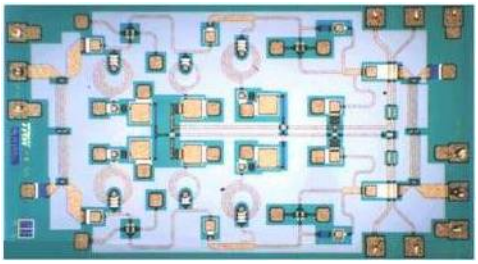
NORTHROP GRUMMAN

Velocium Products

ALH140
24 – 40 GHz Low Noise Amplifier

Product Datasheet

Revision: May 2007



X=2500 µm Y=1400 µm

Product Features

- RF frequency: 24 to 40 GHz
- Noise figure: 4 dB, typical
- Linear gain: 12 dB, typical
- P1dB: 15 dBm, typical
- Unconditionally stable
- Biasable from either side
- DC Power: 4.0 Vdc at 60 mA

Performance Characteristics (Ta = 25°C)

Specification	Min	Typ	Max	Unit
Frequency	24		40	GHz
Linear Gain	10	11.5		dB
Noise Figure		4		dB
Input Return Loss	10	13		dB
Output Return Loss	12	15		dB
Frequency	24		30	GHz
Linear Gain	10	12		dB
Noise Figure		4		dB
Input Return Loss	10	13		dB
Output Return Loss	12	15		dB
Frequency	35		40	GHz
Linear Gain	10	11.5		dB
Noise Figure		4		dB
Input Return Loss	18	20		dB
Output Return Loss	18	20		dB
P1dB		15		dBm
Vd		4		V
Vg		-0.2		V
Id		60		mA
Thermal Resistance		195		C/W

Applications

- Point-to-Point Digital Radios
- Point-to-Multipoint Digital Radios

Product Description

The ALH140 monolithic HEMT is a broadband, two-stage, low noise device, designed for use in commercial digital microwave radios and wireless LANs. The LNAs balanced design provides unconditional stability as well as excellent input and output VSWR. To ensure rugged and reliable operation, HEMT devices are fully passivated. Both bond pad and backside metallization are Ti/Au, which is compatible with conventional die attach, thermocompression and thermosonic wire bonding assembly techniques.

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Min	Max	Unit
Drain Voltage (Vds)		5.5	V
Gate Voltage (Vgs)	-1	+0.3	V
Drain-gate Voltage (Vdg)		6	V
Drain current		100	mA
Input drive level		6	dBm
Assy. Temperature (60 Seconds)		300	deg. C

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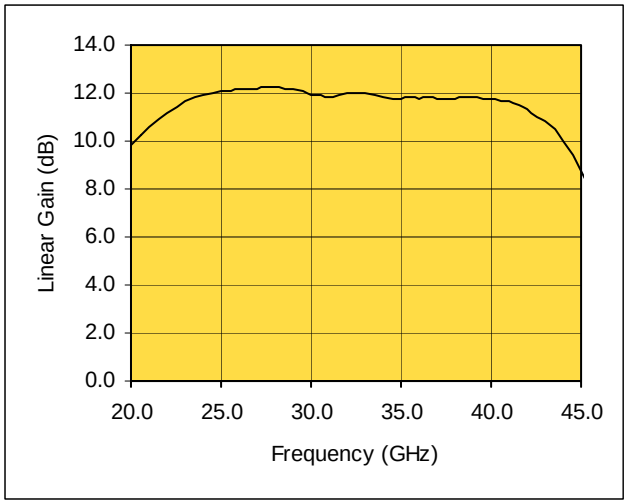
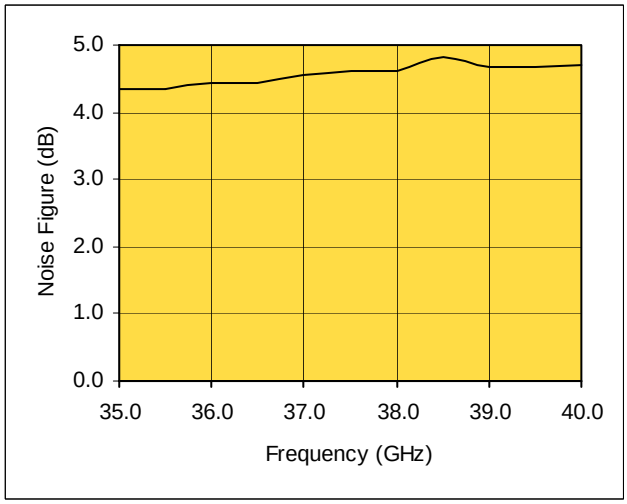
Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 4.0 V, Id = 60 mA

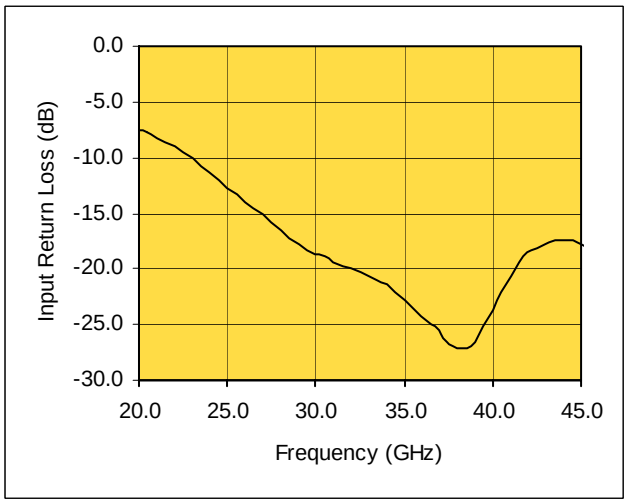
Linear Gain Versus Frequency



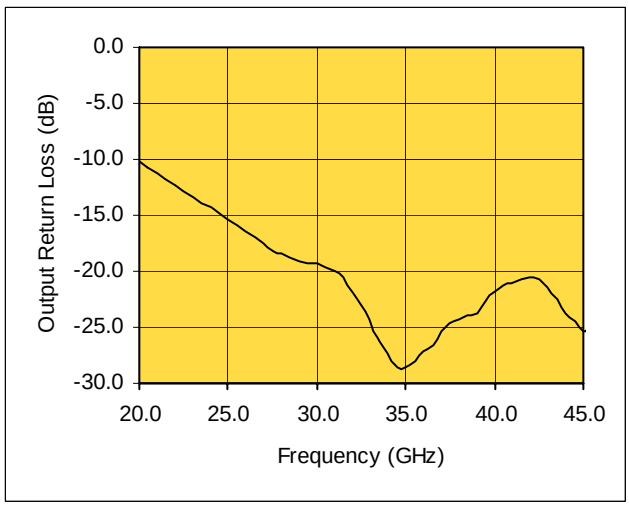
Noise Figure Versus Frequency



Input Return Loss Versus Frequency



Output Return Loss Versus Frequency



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Measured Performance Characteristics (Typical Performance at 25°C)
Vd = 4.0 V, Id = 60 mA

Freq (GHz)	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
20.0	0.42	68.55	3.10	105.66	0.02	-73.13	0.31	-23.06
21.0	0.39	47.27	3.39	80.10	0.02	-95.73	0.27	-33.12
22.0	0.35	26.49	3.63	54.05	0.02	-119.63	0.24	-41.61
23.0	0.31	7.03	3.82	28.28	0.02	-141.13	0.22	-49.37
24.0	0.27	-10.08	3.96	2.16	0.02	-163.36	0.19	-56.83
25.0	0.23	-24.98	4.00	-23.19	0.02	175.49	0.17	-64.29
26.0	0.20	-37.66	4.04	-47.35	0.02	155.64	0.15	-70.19
27.0	0.18	-47.86	4.07	-71.51	0.02	134.03	0.13	-74.74
28.0	0.15	-57.55	4.09	-96.07	0.02	117.71	0.12	-77.12
29.0	0.13	-65.22	4.05	-119.93	0.02	99.61	0.11	-81.05
30.0	0.12	-69.89	3.96	-142.77	0.02	83.61	0.11	-84.72
31.0	0.11	-73.98	3.92	-164.46	0.02	70.03	0.10	-93.36
32.0	0.10	-75.35	3.97	173.17	0.02	57.54	0.08	-103.11
33.0	0.09	-81.34	3.97	149.37	0.02	40.37	0.06	-105.57
34.0	0.09	-87.05	3.90	126.96	0.02	26.38	0.04	-97.94
35.0	0.07	-90.61	3.86	104.86	0.02	14.79	0.04	-76.62
36.0	0.06	-92.47	3.86	82.65	0.02	-1.53	0.04	-60.93
37.0	0.05	-88.91	3.87	59.53	0.02	-15.24	0.05	-51.66
38.0	0.04	-71.76	3.86	35.99	0.03	-30.74	0.06	-56.56
39.0	0.05	-51.61	3.89	11.75	0.03	-46.85	0.07	-52.69
40.0	0.07	-42.84	3.87	-13.34	0.03	-65.08	0.08	-53.67
41.0	0.09	-45.48	3.83	-39.51	0.03	-84.90	0.09	-63.18
42.0	0.12	-56.54	3.68	-66.56	0.03	-105.49	0.09	-74.49
43.0	0.13	-70.45	3.49	-94.01	0.03	-124.82	0.09	-86.49
44.0	0.14	-82.96	3.17	-123.31	0.03	-141.20	0.07	-86.60
45.0	0.13	-93.14	2.73	-151.66	0.03	-166.92	0.05	-69.24

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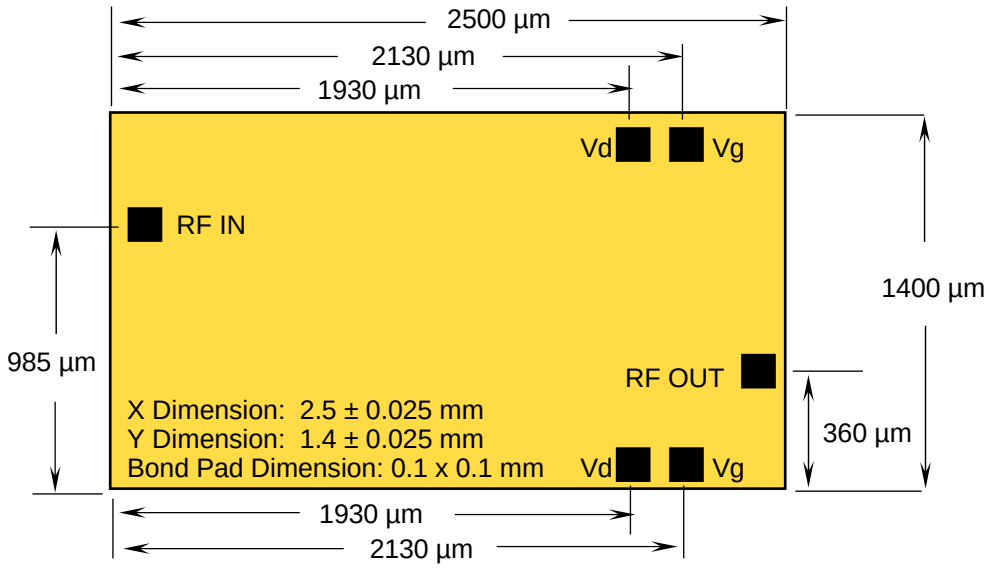
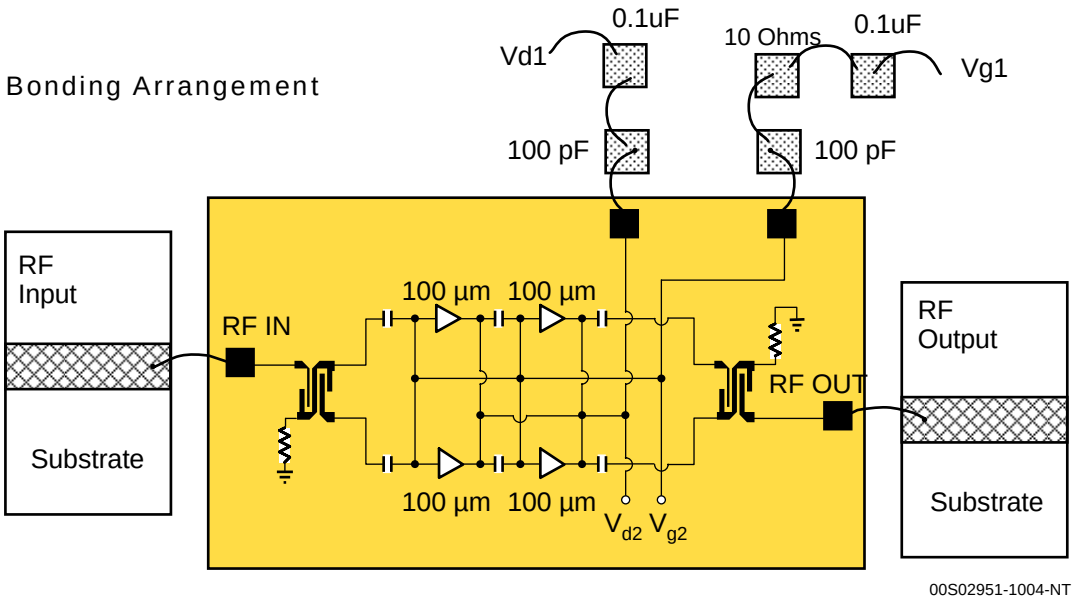
Die Size and Bond Pad Locations



Suggested Bonding Arrangement



*Note: Biasable from either side

Recommended Assembly Notes

1. Bypass caps should be 100 pF (approximately) ceramic (single-layer) placed no farther than 30 mils from the amplifier.
2. Best performance obtained from use of <10 mil (long) by 3 by 0.5 mil ribbons on input and output.