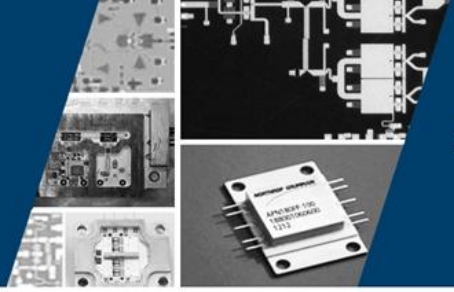
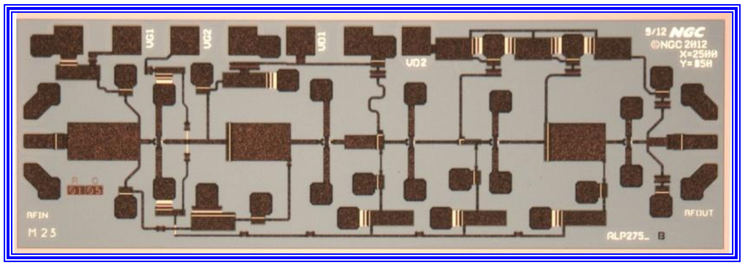
ALP275
71-96 GHz
Low Noise Amplifier



Product Datasheet

Revision: May 2014



X = 2.5mm Y = 0.85mm

Product Features

- RF frequency: 71-96 GHz
- Broadband Operation
- Linear gain: >= 26 dB, typical
- Noise Figure: 3 dB, typical
- P1dB : 4 dBm *
- Microstrip Topology MMIC, In-line Input & Output
- 0.1 um InP HEMT Process
- 3 mil substrate
- DC Power: 30 mW
- Die Size 2.125 sq. mm

Performance Characteristics (Ta = 25°C)

Specification	Min	Typ	Max	Unit
Frequency	71		96	GHz
Linear Gain	26	29		dB
Input Return Loss				
71-76 GHz	5	10		dB
81-86 GHz	2	10		dB
92-96 GHz	8	14		dB
Output Return Loss				
71-86 GHz	4	11		dB
92-96 GHz	10	14		dB
Noise Figure				
71-76 & 81-86 GHz		3	4.5	dB
92-96 GHz		3	3.5	dB
P1dB		4*		dBm
Vd1, Vd2		1		V
Vg1		0.1		V
Vg2		0.1		V
Id1		12		mA
Id2		18		mA

Applications

- W-Band Imaging
- Sensors
- Radar
- Short Haul / High Capacity Links
- E-Band and W-Band Communication Links

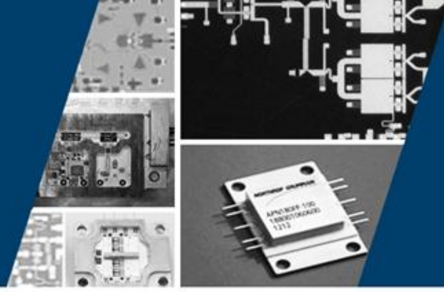
Product Description

The ALP275 W-band InP Low Noise Amplifier is a broadband, ultra low noise amplifier MMIC. It can be used in applications such as W-band Imaging, Radar, commercial digital microwave radios and wireless LANs. The small die size allows for extremely compact packaging. 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)

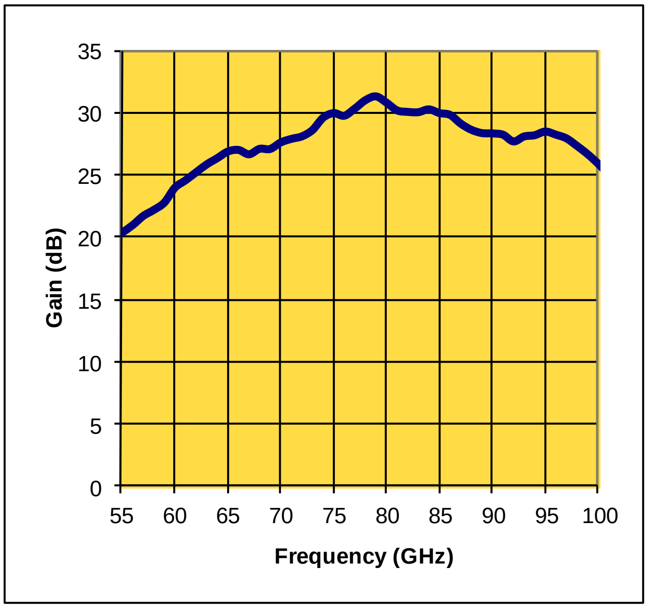
Parameter	Min	Max	Unit
Vd1, Vd2		1.34	V
Vg1, vg2	-1	0.4	V
Id1 (@Vd1 = 1V)		12.48	mA
Id1 (@Vd1 = 1.34V)		9	mA
Id2 (@Vd2 = 1V)		18.72	mA
Id2 (@Vd2 = 1.34V)		13.5	mA
Input Drive Level		-24*	dBm
Assy. Temperature		150	deg. C

* Estimated

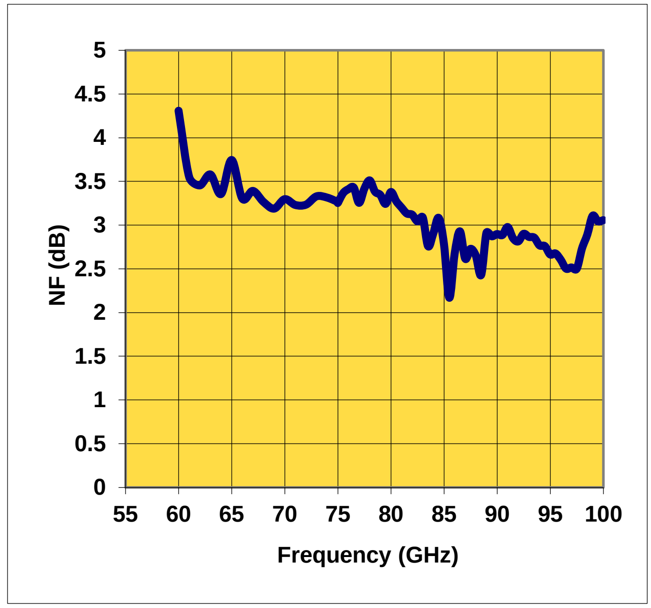


Measured Performance Characteristics (Typical Performance at 25°C)
Vd1 = Vd2 = 1.0 V, Id1 = 12 mA, Id2 = 18 mA *

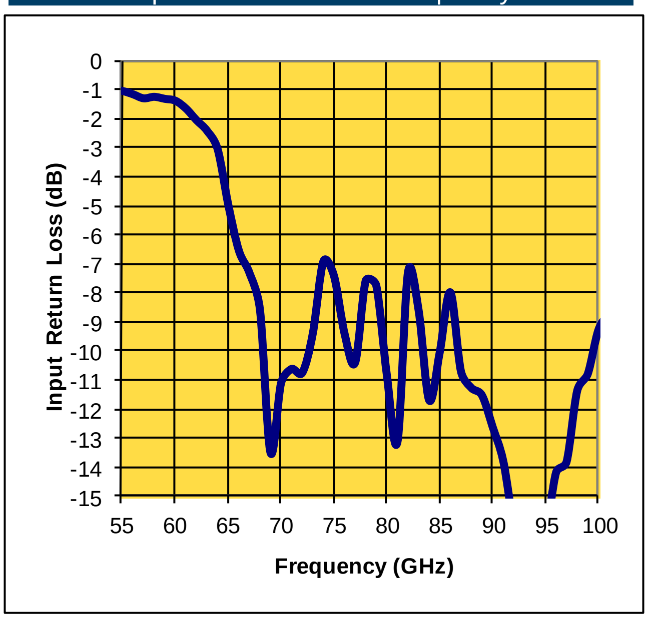
Linear Gain vs. Frequency



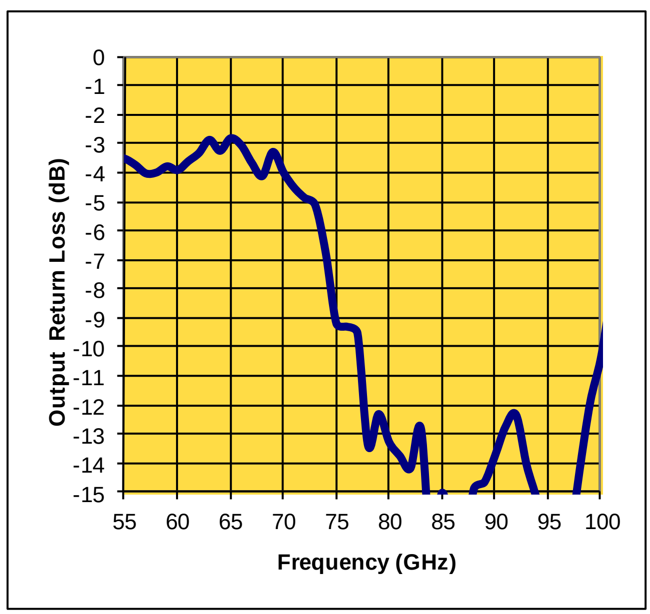
Noise Figure vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* On-Wafer

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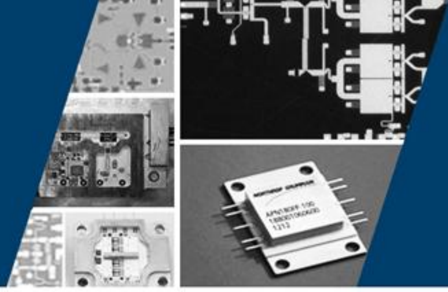
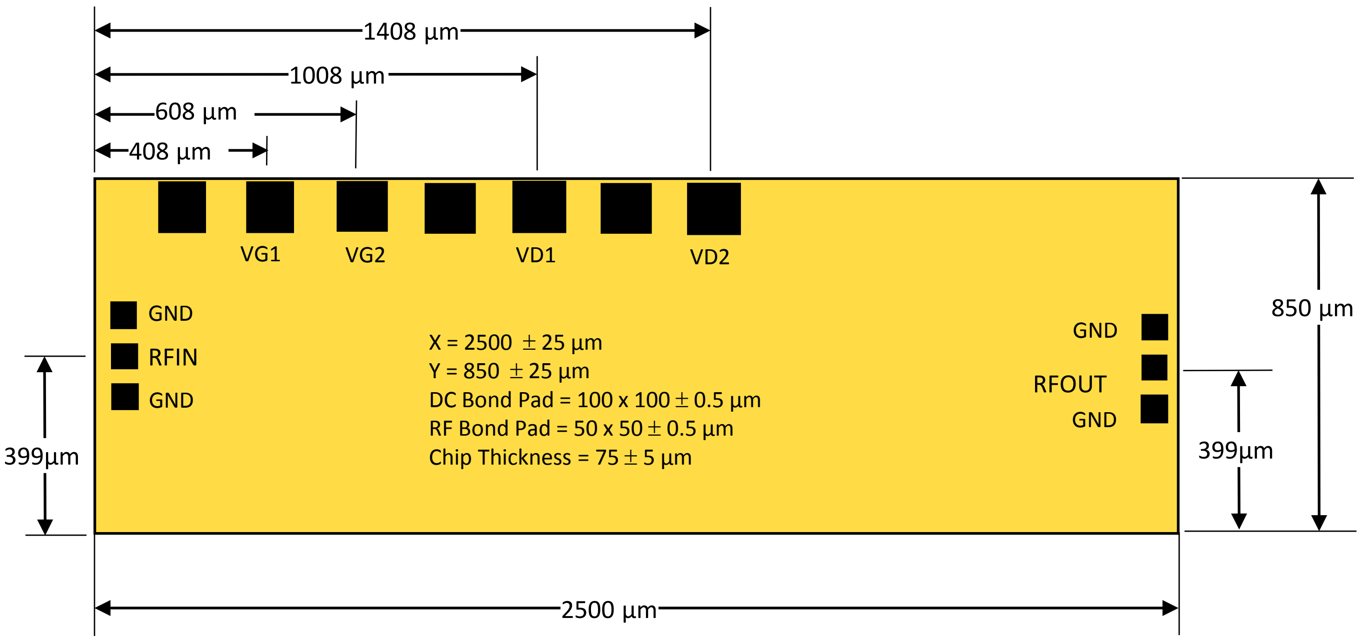


Measured Performance Characteristics (Typical Performance at 25°C)
Vd1 = Vd2 = 1.0 V, Id1 = 12 mA, Id2 = 18 mA *

Freq GHz	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
65.0	0.597	-69.545	20.590	-36.776	0.006	75.267	0.726	129.734
66.0	0.505	-77.025	20.688	-56.486	0.010	36.908	0.701	120.972
67.0	0.435	-85.242	20.176	-76.383	0.007	34.249	0.646	119.054
68.0	0.352	-103.759	21.275	-95.077	0.002	-10.018	0.602	117.815
69.0	0.176	-99.690	21.205	-113.602	0.003	81.246	0.678	114.380
70.0	0.226	-78.423	22.161	-126.033	0.006	77.576	0.618	104.920
71.0	0.245	-95.052	23.040	-142.793	0.005	36.717	0.582	102.821
72.0	0.262	-93.344	23.593	-159.580	0.007	104.073	0.567	95.734
73.0	0.268	-85.763	24.379	-171.361	0.007	27.817	0.550	91.793
74.0	0.422	-115.179	28.619	174.708	0.007	0.061	0.470	73.995
75.0	0.453	-153.462	30.801	147.175	0.009	21.802	0.300	78.779
76.0	0.315	-172.214	29.293	124.165	0.003	69.078	0.303	78.243
77.0	0.272	-170.823	29.111	105.199	0.003	-33.077	0.327	68.036
78.0	0.406	164.559	31.310	82.330	0.011	32.249	0.124	78.224
79.0	0.372	137.021	32.344	61.501	0.002	7.885	0.209	114.195
80.0	0.267	122.056	31.313	42.352	0.002	72.387	0.165	114.216
81.0	0.201	115.658	30.339	26.154	0.003	35.868	0.174	93.241
82.0	0.452	89.016	29.891	-5.984	0.007	21.102	0.243	138.674
83.0	0.377	54.455	29.219	-22.039	0.008	-2.860	0.237	106.922
84.0	0.254	47.593	30.133	-40.735	0.008	26.652	0.150	122.580
85.0	0.306	34.015	28.416	-60.556	0.008	-5.221	0.189	120.526
86.0	0.396	19.265	26.968	-76.664	0.011	6.467	0.192	113.847
87.0	0.281	-4.563	25.297	-95.041	0.005	1.540	0.140	124.089
88.0	0.316	-4.079	23.818	-109.971	0.008	-22.206	0.170	127.686
89.0	0.312	-18.522	23.963	-124.891	0.006	5.606	0.123	124.411
90.0	0.259	-16.433	24.453	-139.048	0.009	-7.105	0.151	157.947
91.0	0.221	-42.540	23.874	-154.479	0.012	-8.901	0.173	160.683
92.0	0.188	-40.236	21.942	-171.312	0.009	-8.229	0.213	154.695
93.0	0.199	-43.502	22.758	174.385	0.012	-11.646	0.198	145.150
94.0	0.163	-24.107	23.016	159.300	0.011	-15.627	0.202	149.496
95.0	0.107	2.610	23.771	143.604	0.017	-11.985	0.207	149.386
96.0	0.168	-4.879	23.672	124.967	0.010	-13.761	0.148	147.331
97.0	0.197	8.710	23.816	106.612	0.015	-13.042	0.111	160.051
98.0	0.318	-0.044	22.904	84.672	0.016	-27.448	0.095	-177.396
99.0	0.331	-6.460	21.382	63.282	0.012	-59.930	0.170	-145.703
100.0	0.451	-15.383	19.705	43.405	0.019	-18.400	0.224	-149.668
101.0	0.455	-23.200	17.477	25.800	0.023	-39.753	0.316	-153.442
102.0	0.467	-32.601	15.132	9.954	0.013	-44.739	0.362	-162.589
103.0	0.466	-33.693	13.229	-4.089	0.012	-60.932	0.410	-168.319
104.0	0.472	-37.981	11.837	-18.037	0.020	-79.732	0.446	-174.944
105.0	0.513	-40.429	10.692	-31.252	0.014	-82.984	0.455	178.314

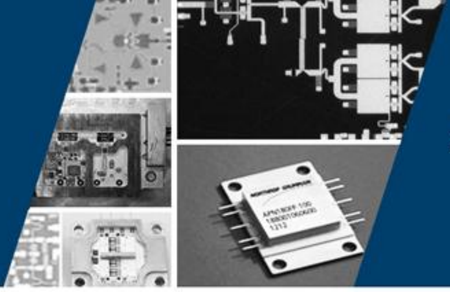
* On-Wafer

Die Size and Bond Pad Locations (Not to Scale)

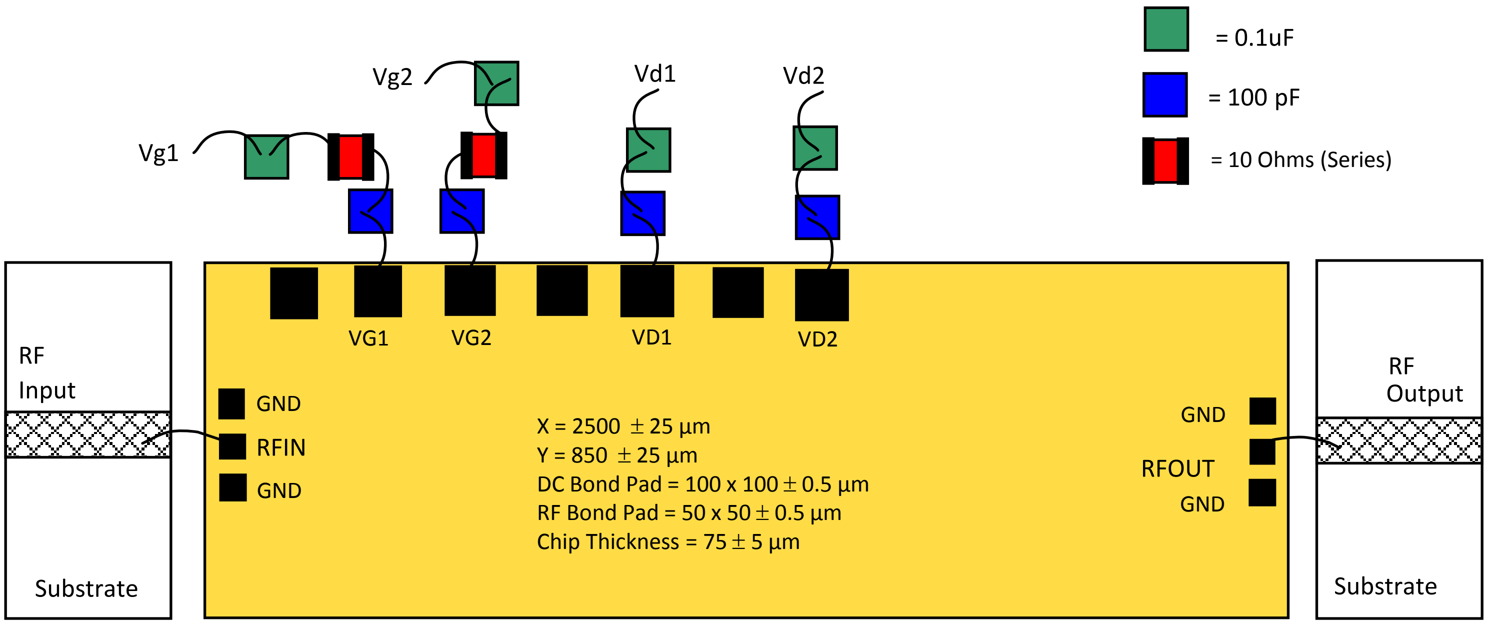


Recommended Assembly Notes

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 < 6 mil (long) by 1.5 by 0.5 mil ribbons on input and output.



Suggested Bonding Arrangement



Biasing/De-Biasing Details:

Bias up sequence:

Set Vd1 & Vd2 = 0V
Set Vg1 to -0.3V and check to make sure there is no gate current. High gate current indicates leaky devices.
Increase Vd1 to +0.4V and check to make sure there are no oscillations.
If no oscillations are evident, increase Vd1 voltage to recommended value (1V).
Adjust Vg1 to realize the desired Id (12mA)
Repeat same steps for Vd2.
Set Vg2 to -0.3V and check to make sure there is no gate current .
Increase Vd2 to +0.4V and check to make sure there are no oscillations.
If no oscillations are evident, increase Vd2 voltage to recommended value (1V).
Adjust Vg2 to realize the desired Id (18mA)

Bias down sequence:

Reduce Vd2 down to 0V
Reduce Vd1 down to 0V
Set Vg2 to 0V
Set Vg1 to 0V

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