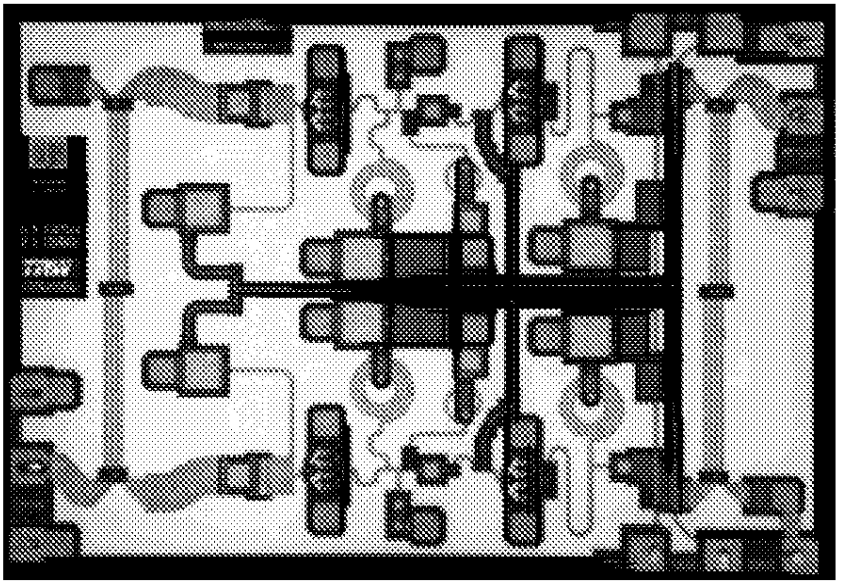
ALH216C
K-Band HEMT Low-Noise Amplifier

GaAs Telecom Products

Features

- RF frequency: 11 to 27 GHz
- Linear gain: 17 dB
- NF: 3 dB
- Unconditionally stable
- Balanced design provides excellent input and output VSWR
- Biasable from either side of chip
- P1dB: 14 dBm
- DC power: 3.5 Vdc at 90 mA



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Description and Applications

The ALH216C monolithic HEMT amplifier is a broadband, two-stage, low-noise device designed for use in commercial digital microwave radios, wireless LANs, and military high-reliability applications. 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 metalization are Ti/Au, which is compatible with eutectic die attach, thermocompression and thermosonic wire bonding assembly techniques.

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Minimum	Maximum	Unit
Drain voltage (Vds)		6.5	V
Gate voltage (Vgs)	-2	+0.5	V
Drain-gate voltage (Vdg)		6	V
Drain current		190	mA
Input drive level		16	dBm

Performance Characteristics Ta = 25°C

	Minimum	Typical	Maximum	Unit
Frequency	14		18	GHz
Gain	14	17		dB
Noise figure		3.5	4.5	dB
Input VSWR		1.7		
Output VSWR		1.8		
Frequency	18		27	GHz
Gain	14	17		dB
Noise figure		2.7	3.5	dB
Input VSWR		1.7		
Output VSWR		1.5		
P1dB		14		dBm
Vd		3.5		V
Vg	-1	-0.2	+0.3	V
Id		90		mA
Thermal resistance		60		°C/W

Status: In first production run.
First samples due 12/97

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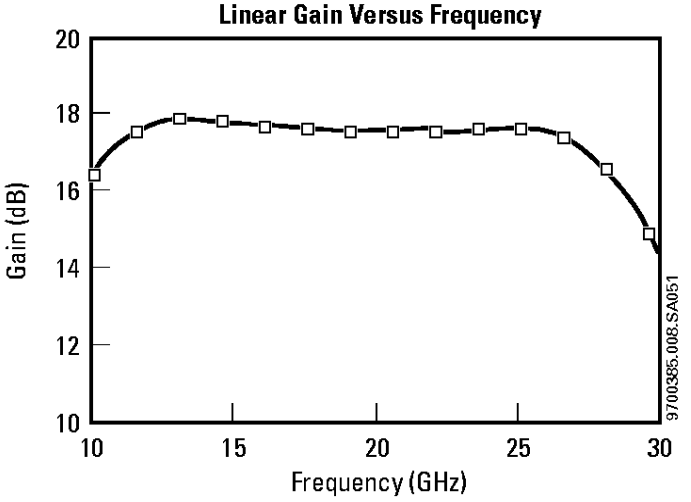
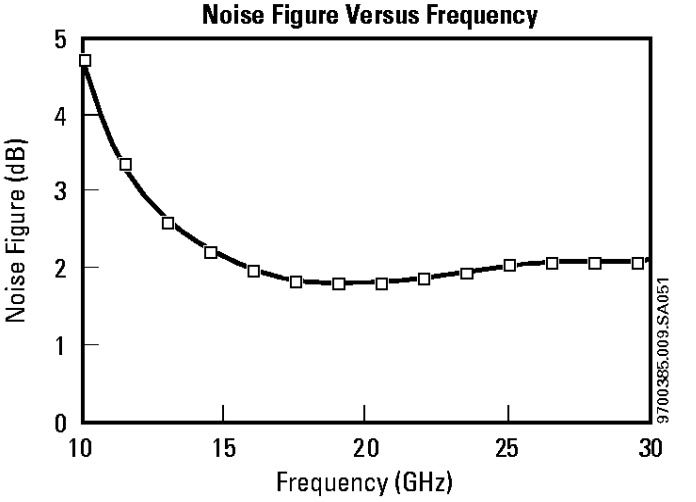
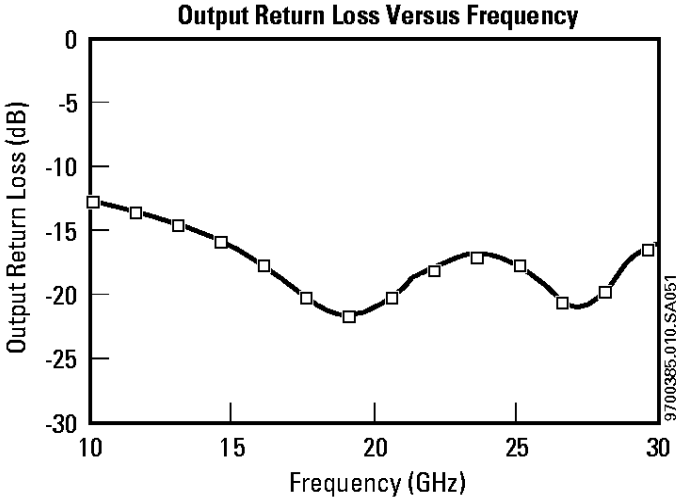
Simulated S-Parameters Vd = 3.5V, Id = 92mA

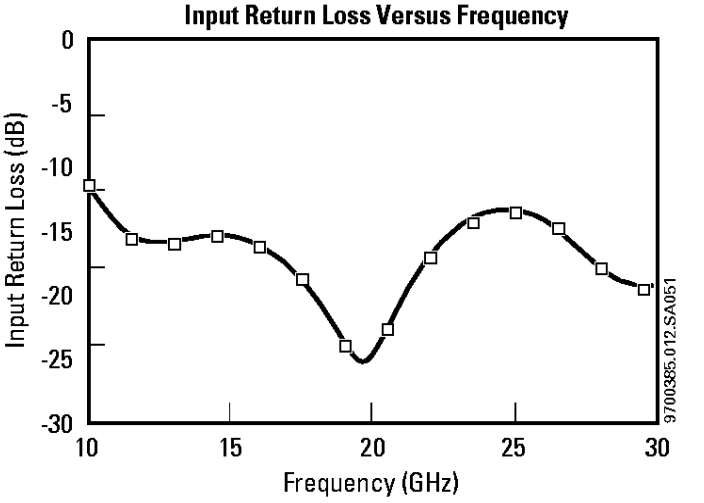
Freq GHz	S11 Mag	S11 Angle	S21 Mag	S21 Angle	S12 Mag	S12 Angle	S22 Mag	S22 Angle
10.0	0.267	21.4	6.679	-40.1	0.003	172.6	0.230	-142.7
10.5	0.222	0.5	7.069	-58.5	0.004	155.9	0.223	-146.4
11.0	0.189	-21.7	7.385	-76.2	0.004	139.8	0.216	-149.8
11.5	0.169	-44.3	7.589	-93.2	0.005	124.5	0.209	-153.2
12.0	0.160	-66.0	7.735	-109.6	0.005	109.9	0.202	-156.5
12.5	0.159	-85.6	7.828	-125.3	0.006	95.9	0.195	-159.7
13.0	0.162	-102.8	7.867	-140.3	0.006	82.7	0.188	-163.0
13.5	0.166	-117.8	7.877	-154.8	0.006	69.9	0.180	-166.2
14.0	0.169	-130.9	7.861	-168.7	0.007	57.7	0.172	-169.2
14.5	0.171	-142.6	7.821	177.6	0.007	45.9	0.163	-172.4
15.0	0.170	-153.2	7.797	164.6	0.008	34.6	0.153	-175.0
15.5	0.165	-162.9	7.760	151.7	0.008	23.5	0.142	-177.3
16.0	0.158	-171.6	7.720	139.3	0.009	12.9	0.131	-179.2
16.5	0.147	-179.5	7.694	126.9	0.009	2.4	0.120	-179.9
17.0	0.133	173.7	7.666	114.7	0.009	-7.9	0.109	-179.5
17.5	0.117	168.3	7.652	102.8	0.010	-18.0	0.099	-177.9
18.0	0.099	165.1	7.640	90.7	0.010	-28.1	0.091	-174.4
18.5	0.081	165.5	7.621	79.0	0.011	-38.0	0.085	-168.8
19.0	0.065	172.3	7.617	67.2	0.011	-47.8	0.083	-162.9
19.5	0.055	-171.9	7.621	55.5	0.012	-57.6	0.085	-156.7
20.0	0.059	-152.5	7.616	43.7	0.012	-67.4	0.091	-151.7
20.5	0.074	-140.2	7.625	32.0	0.013	-77.1	0.098	-149.0
21.0	0.095	-136.2	7.630	20.1	0.013	-87.0	0.107	-148.0
21.5	0.118	-137.3	7.605	8.1	0.014	-96.9	0.118	-148.7
22.0	0.141	-140.9	7.608	-3.5	0.014	-106.5	0.126	-151.0
22.5	0.163	-146.3	7.624	-15.4	0.015	-116.3	0.133	-154.1
23.0	0.182	-152.8	7.636	-27.5	0.015	-126.4	0.141	-158.0
23.5	0.198	-159.8	7.659	-39.7	0.016	-136.4	0.142	-162.5
24.0	0.209	-167.3	7.659	-52.2	0.016	-146.7	0.141	-167.2
24.5	0.215	-175.0	7.647	-64.8	0.017	-157.1	0.140	-171.8
25.0	0.216	177.3	7.658	-77.7	0.017	-167.8	0.130	-176.1
25.5	0.210	169.8	7.634	-90.9	0.018	-178.9	0.119	-178.8
26.0	0.199	162.9	7.565	-104.6	0.018	169.7	0.109	-179.4
26.5	0.183	156.8	7.483	-118.6	0.019	158.1	0.095	-176.3
27.0	0.164	152.6	7.331	-133.0	0.019	145.9	0.088	-168.2
27.5	0.145	150.8	7.073	-147.5	0.018	133.7	0.094	-160.6
28.0	0.128	151.5	6.809	-162.1	0.018	121.5	0.103	-153.2
28.5	0.116	155.0	6.449	-176.8	0.018	109.2	0.120	-151.6
29.0	0.110	159.3	6.041	168.8	0.017	97.2	0.138	-155.3
29.5	0.108	163.8	5.610	154.4	0.016	85.4	0.151	-158.3
30.0	0.108	167.2	5.158	140.4	0.015	73.8	0.162	-163.4

Simulated Performance Characteristics (Typical Performance at 25°C)

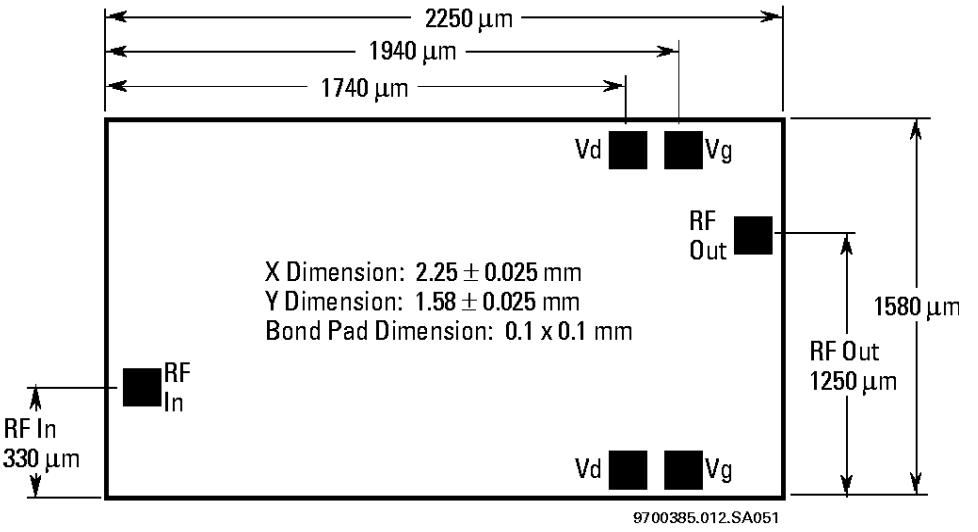




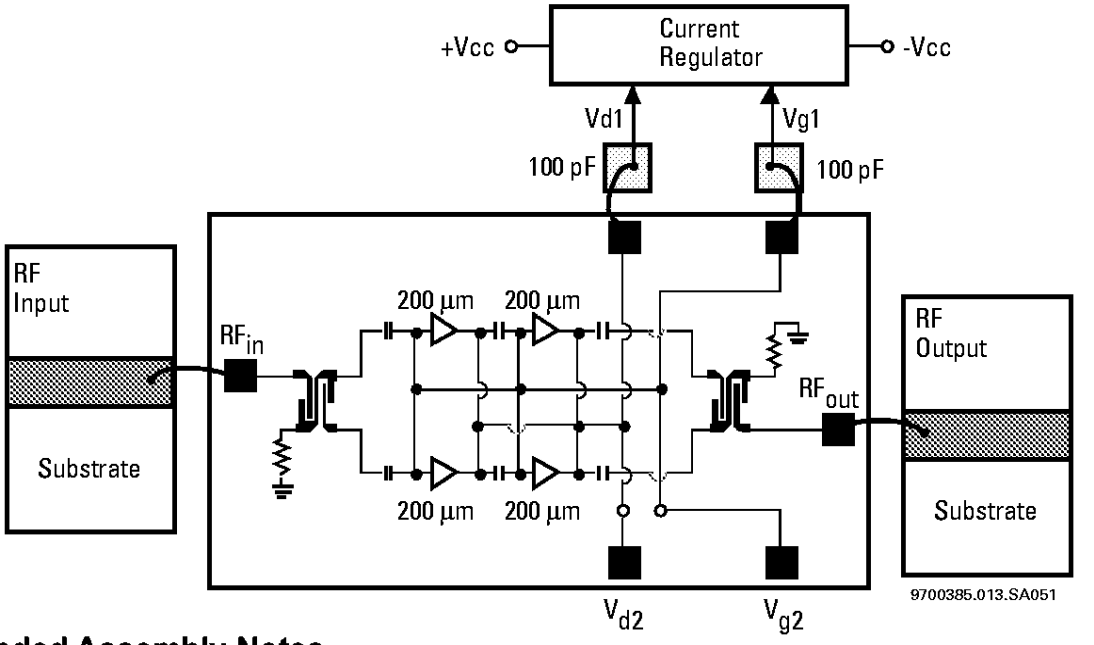




Die Size and Bond Pad Locations



Suggested Bonding Arrangement



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.
3. Part should be operated with a current regulation circuit to provide gate bias.
4. Part can be biased from either side.