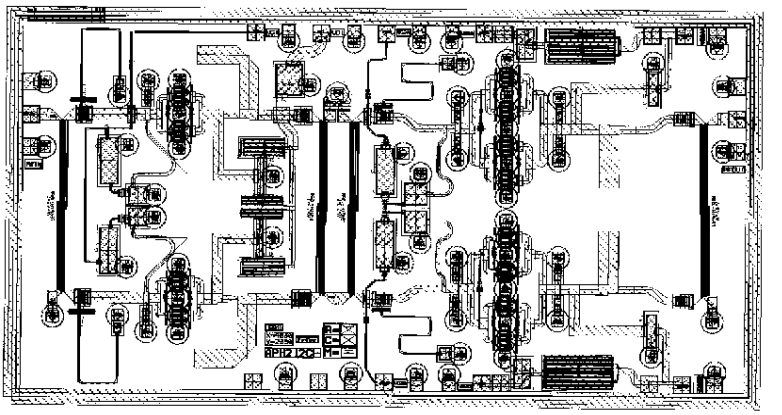
K-Band Power HEMT Amplifier

APH212C

Features

- RF frequency: 17 to 27 GHz
- Linear gain: 16 dB, typical
- P1dB: 31 dBm, typical
- Unconditionally stable
- Balanced design provides excellent input and output VSWR
- DC power: 4 Vdc at 1350 mA



Description and Applications

The APH212C monolithic HEMT amplifier, a broadband, two-stage power device, is designed for use in commercial digital microwave radios, wireless LANs, and military high-reliability applications. The 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 eutectic die attach, thermocompression, and thermosonic wire bonding assembly techniques.

Absolute Maximum Ratings (Ta = 25°C)

Parameter	Minimum	Maximum	Unit
Vd1, Vd2	4.0	4.5	V
Id1		500	mA
Id2		1000	mA
Vg1, Vg2	-2	+0.5	V
Input drive level		18	dBm
Maximum assembly temperature (60 seconds)		300	°C

Performance Characteristics (Ta = 25°C)

Specification	Minimum	Typical	Maximum	Unit
17 to 27 GHz				
Linear gain		16		dB
P1 dB		31		dBm
VSWR input		1.4:1	2:1	
VSWR output		1.2:1	2:1	
17.1 to 19.7 GHz				
Linear gain	15	16		dB
P1 dB	30	31		dBm
24.4 to 26.4 GHz				
Linear gain	13	15.5		dB
P1 dB	30	31		dBm
Vd1, Vd2A, Vd2B		4	4.5	V
Id1 (Stage 1)		450		mA
Id2 (Stage 2)		900		mA
Vg1, Vg2A, Vg2B	-1	-0.1	+0.3	V
Thermal resistance	Stage 1	48		°C/W
	Stage 2	26		°C/W

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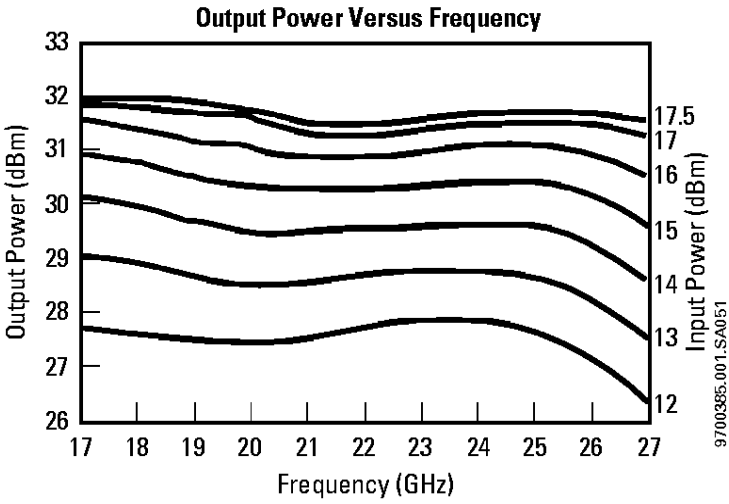
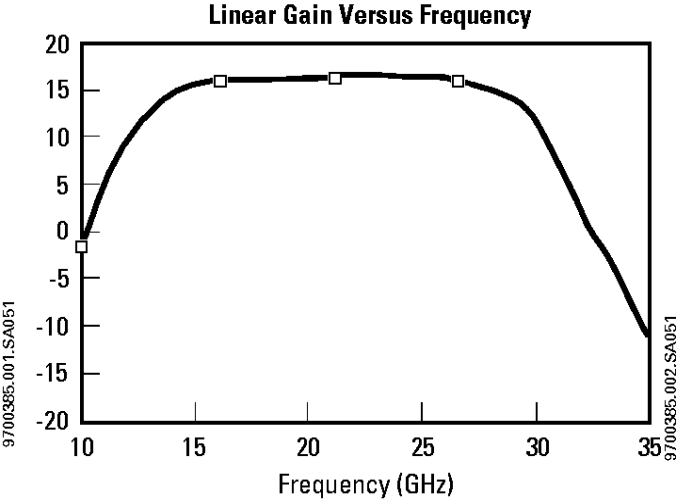
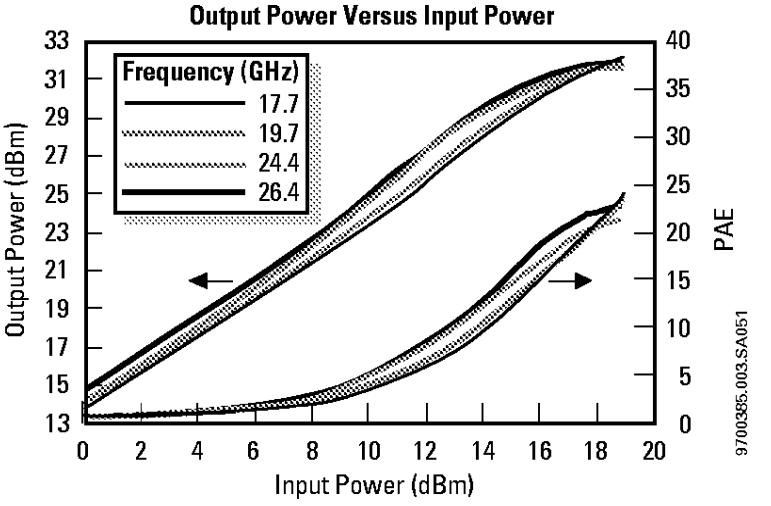
Simulated S-Parameters Vd1, Vd2 = 4 V, Id1 = 450, Id2A + Id2B = 900

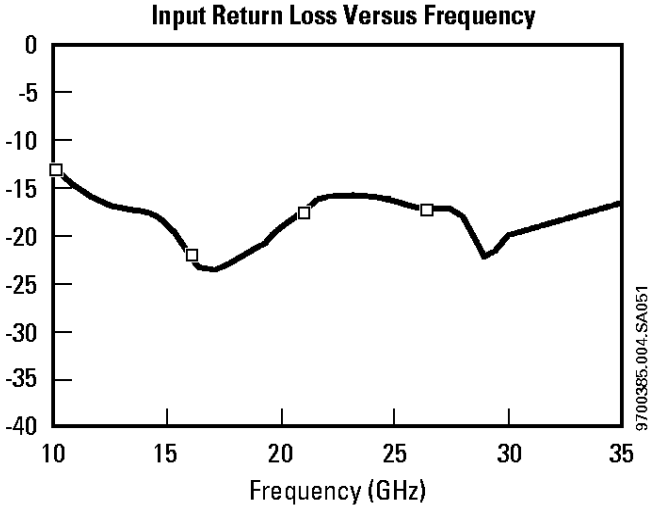
	S11		S21		S12		S22	
Freq GHz	Magnitude	Angle°	Magnitude	Angle°	Magnitude	Angle°	Magnitude	Angle°
5	0.664	-170.2	0.001	-138.3	1.5E-08	87.4	0.724	-90.9
6	0.577	161.3	0.002	-151.6	6.8E-08	83.1	0.674	-106.7
7	0.485	132.1	0.011	-81.3	5.4E-07	162.2	0.602	-124.1
8	0.391	100.3	0.076	-160.0	4.9E-06	92.3	0.525	-141.2
9	0.301	63.7	0.249	154.2	2.1E-05	55.2	0.445	-158.6
10	0.228	19.9	0.801	87.5	8.5E-05	-2.9	0.362	-176.5
11	0.183	-30.7	1.844	9.4	2.5E-04	-72.5	0.275	164.9
12	0.157	-76.0	3.113	-67.9	0.001	-141.5	0.188	146.8
13	0.145	-105.9	4.362	-140.9	0.001	153.7	0.109	129.9
14	0.141	-130.2	5.383	150.5	0.001	93.0	0.042	119.7
15	0.118	-151.8	6.051	86.2	0.002	36.6	0.017	-139.2
16	0.081	-158.2	6.394	25.7	0.002	-16.2	0.047	-130.2
17	0.067	-141.7	6.518	-31.1	0.003	-65.5	0.057	-143.8
18	0.077	-131.5	6.536	-84.9	0.003	-112.0	0.049	-152.1
19	0.088	-126.8	6.525	-136.7	0.004	-156.7	0.037	-141.2
20	0.109	-123.9	6.536	172.7	0.005	159.7	0.043	-120.0
21	0.138	-129.6	6.559	122.7	0.005	116.4	0.057	-118.0
22	0.157	-140.7	6.600	72.6	0.006	72.9	0.065	-125.0
23	0.161	-151.0	6.639	22.1	0.007	28.8	0.063	-130.7
24	0.159	-159.1	6.656	-29.6	0.009	-16.6	0.056	-128.0
25	0.152	-166.6	6.624	-82.6	0.010	-63.7	0.057	-109.5
26	0.140	-170.2	6.479	-137.5	0.011	-112.8	0.091	-98.5
27	0.140	-173.5	6.180	165.5	0.012	-164.1	0.145	-114.1
28	0.126	173.9	5.729	105.8	0.013	141.7	0.171	-142.3
29	0.077	179.8	5.015	42.0	0.013	83.1	0.134	-168.7
30	0.101	-159.6	3.960	-24.7	0.012	21.6	0.082	-159.7
31	0.084	-167.5	3.153	-90.5	0.011	-39.3	0.110	-141.0
32	0.111	-150.2	1.406	-152.4	0.005	-96.4	0.157	-151.4
33	0.149	-139.2	1.111	155.1	0.005	-144.4	0.181	-172.8
34	0.163	-157.3	0.605	94.1	0.003	159.1	0.177	165.8
35	0.143	-152.4	0.288	37.2	0.002	106.4	0.158	144.7

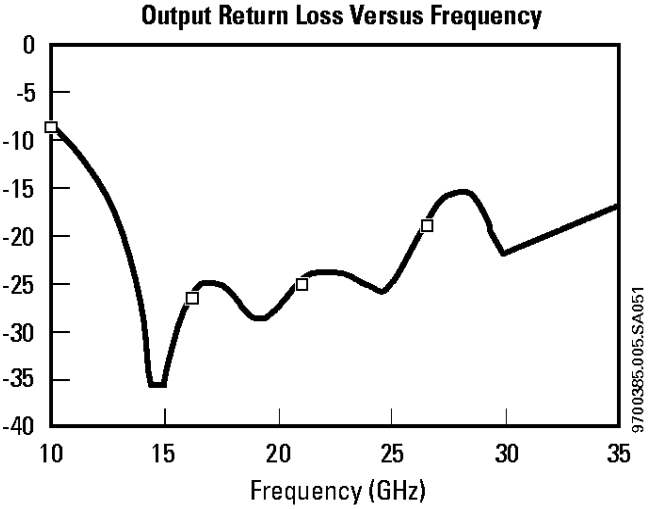
APH212C Simulated Performance Characteristics (Typical Performance at 25°C)







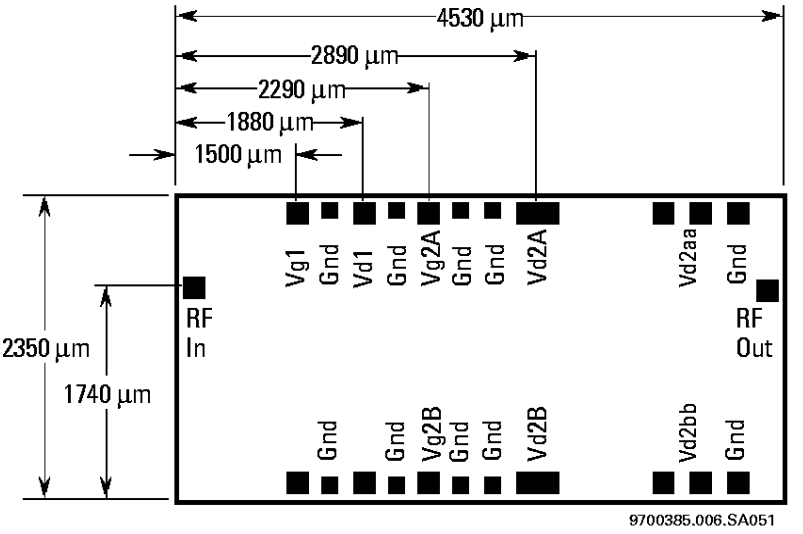




Advance Information. This document describes new products in the sampling or preproduction phase of development. Characteristic data and other specifications are subject to change without notice.

Die Size and Bond Pad Locations

X Dimension:
4.53 ± 0.025 mm
Y Dimension:
2.35 ± 0.025 mm
Bond Pad
Dimension:
0.1 x 0.1 mm



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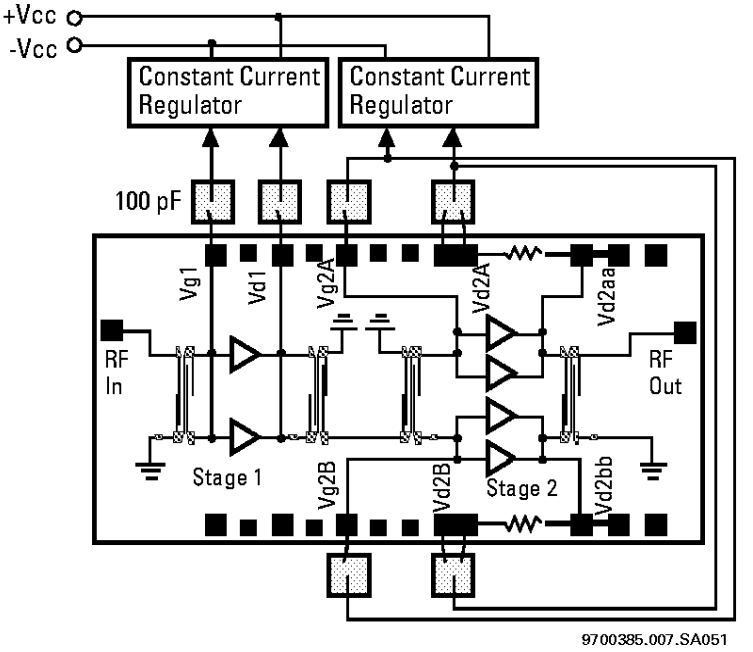
Suggested Bonding Arrangement



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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 ouptut.
3. Part should be operated with a current regulation circuit to provide gate bias.
4. Bondwires to both output FETs can bridge over chip.

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