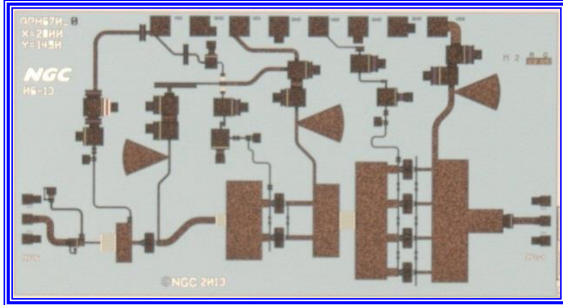
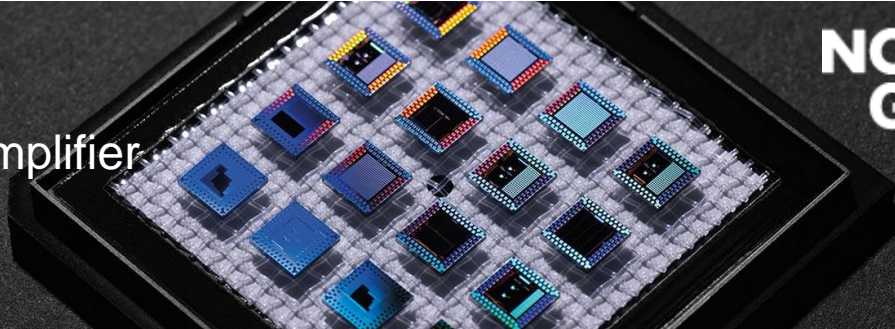


APH670 71-76 GHz High Power Amplifier



x=2.80 mm; y=1.49 mm

Product Features

- RF Frequency: 71 to 76 GHz
- Linear Gain: 21 dB typ.
- Psat: 25 dBm typ.
- Die Size: 4.17 sq. mm.
- 2 mil substrate
- DC Power: 4 VDC @ 305 mA

Applications

- FCC E-band Communication Systems @ 71-76 GHz Frequency Band
- Short Haul / High Capacity Links
- Enterprise Wireless LAN
- Wireless Fiber Replacement

Product Description

The APH670 is a Gallium Arsenide-based broadband, three-stage power amplifier device, designed for use in commercial digital radios and wireless LANs. To ensure rugged and reliable operation, GaAs pHEMT 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.

Performance Characteristics (Ta = 25°C)

Specification *	Min	Typ	Max	Unit
Frequency	71		76	GHz
Linear Gain	18	21		dB
Input Return Loss	6	10		dB
Output Return Loss	8	11		dB
P1db (PP*)		20		dBm
Psat (PP*)	24	25		dBm
PAE @Psat		23		%
Vd1, Vd2		4		V
Vg1		0.02		V
Vg2		0.03		V
Id1		135		mA
Id2		180		mA

* Pulsed-Power On-Wafer unless otherwise noted

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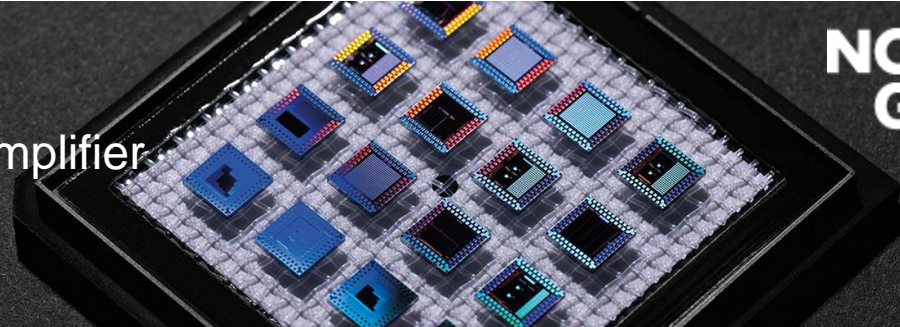
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71-76 GHz

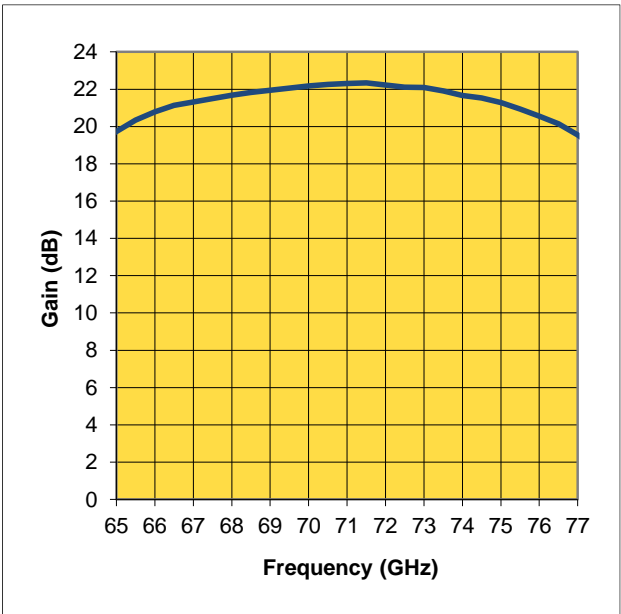
High Power Amplifier



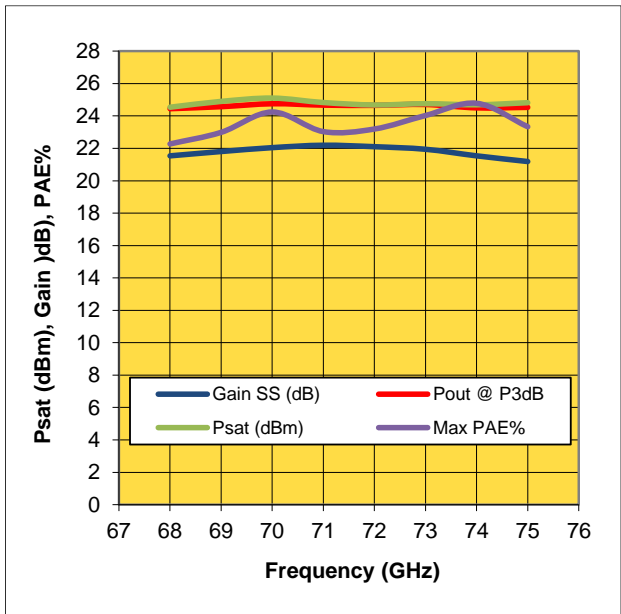
On wafer measured Performance Characteristics (Typical Performance at 25°C)

Vd = 4.0 V, Id1 = 135 mA, Id2 = 180 mA

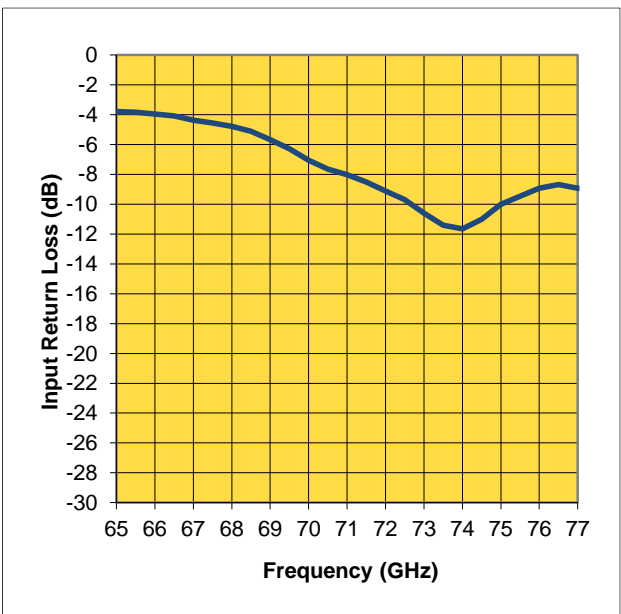
Linear Gain vs. Frequency



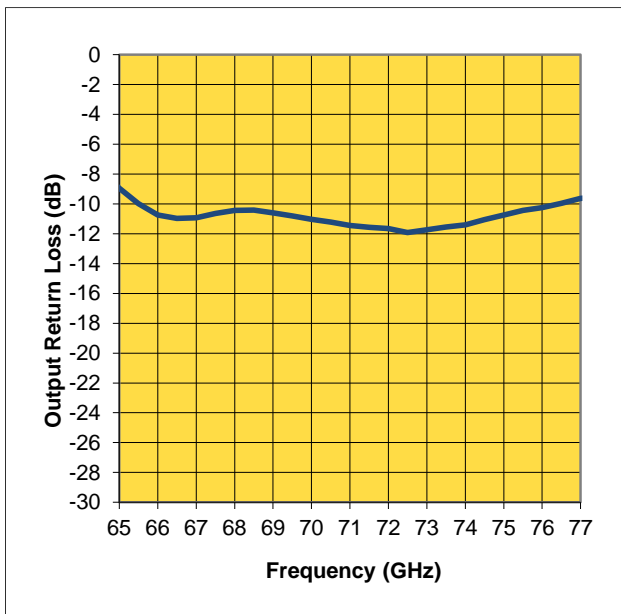
PSAT, GAIN, PAE vs. Frequency



Input Return Loss vs. Frequency



Output Return Loss vs. Frequency



* Pulsed-Power On-Wafer

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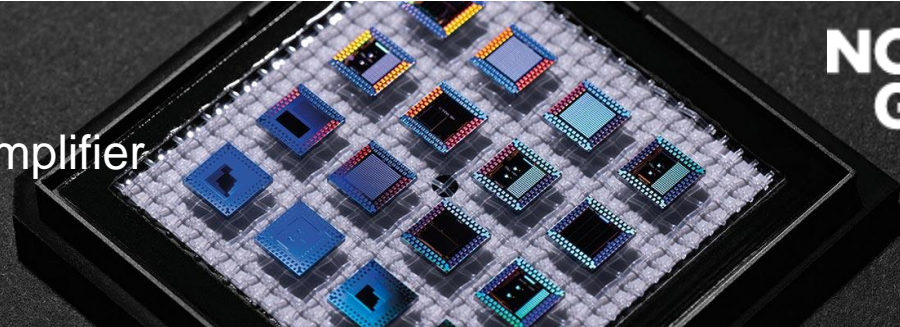
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71-76 GHz

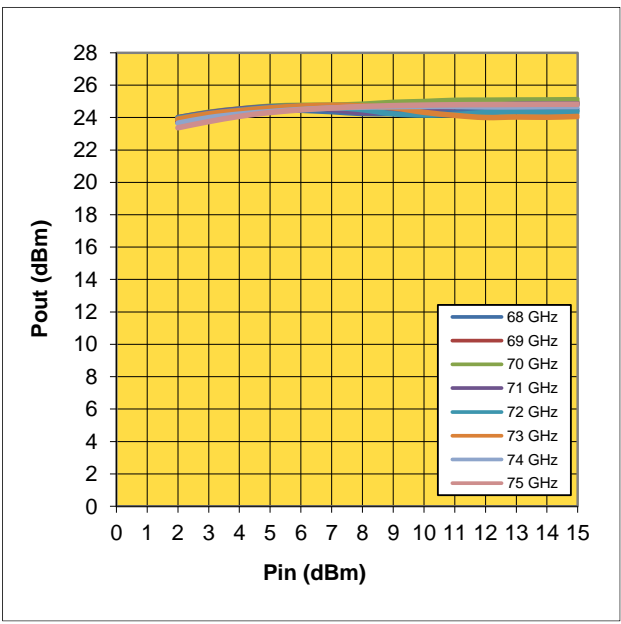
High Power Amplifier



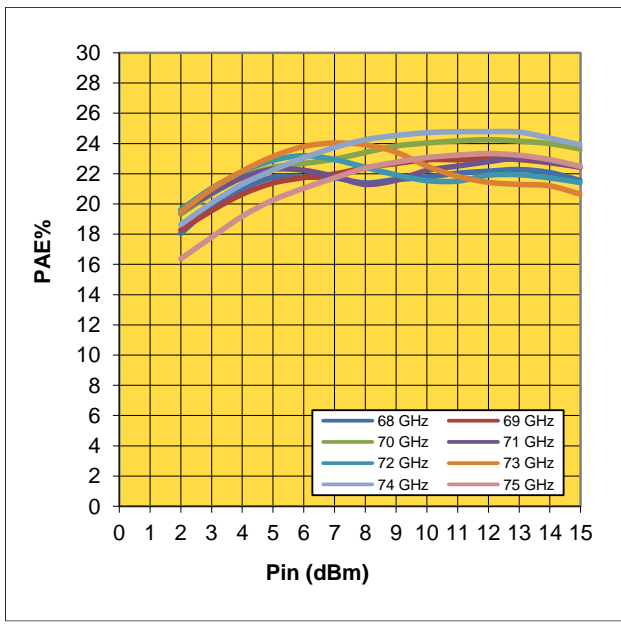
On wafer measured Performance Characteristics (Typical Performance at 25°C)

Vd = 4.0 V, Id1 = 135 mA, Id2 = 180 mA

Pout vs. Pin*



PAE% vs. Pin*



* Pulsed-Power On-Wafer

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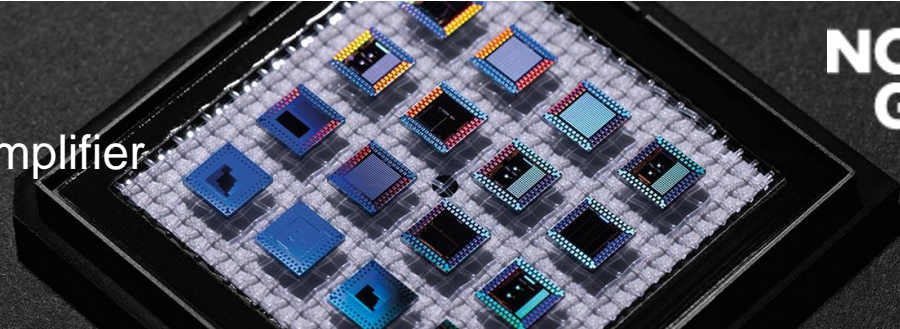
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71-76 GHz

High Power Amplifier



On wafer measured Performance Characteristics (Typical Performance at 25°C)

Vd = 4.0 V, Id1 = 135 mA, Id2 = 180 mA

Freq GHz	S11 Mag	S11 Ang	S21 Mag	S21 Ang	S12 Mag	S12 Ang	S22 Mag	S22 Ang
68.0	0.580	81.360	12.730	73.870	0.006	-7.952	0.297	38.535
68.5	0.564	75.217	12.928	57.642	0.006	-2.334	0.295	33.489
69.0	0.533	68.987	13.024	42.338	0.008	-10.017	0.295	26.747
69.5	0.496	62.037	13.209	27.092	0.009	-28.898	0.290	18.728
70.0	0.456	56.420	13.367	12.231	0.009	-33.564	0.286	11.218
70.5	0.428	51.573	13.515	-3.200	0.008	-37.175	0.282	1.718
71.0	0.410	47.258	13.652	-18.335	0.007	-39.047	0.279	-8.850
71.5	0.389	42.087	13.732	-33.525	0.006	-49.028	0.277	-19.768
72.0	0.362	37.369	13.634	-49.204	0.007	-49.074	0.276	-32.427
72.5	0.338	31.534	13.565	-63.983	0.006	-50.195	0.267	-43.682
73.0	0.299	24.493	13.617	-79.153	0.006	-53.797	0.271	-54.779
73.5	0.269	16.183	13.543	-95.080	0.007	-52.124	0.279	-66.347
74.0	0.248	7.514	13.298	-110.250	0.008	-72.001	0.275	-79.469
74.5	0.255	-3.816	13.276	-126.041	0.005	-77.082	0.289	-89.102
75.0	0.272	-12.373	13.126	-141.704	0.006	-86.269	0.298	-100.267
75.5	0.281	-23.943	12.820	-158.693	0.004	-81.699	0.308	-111.279
76.0	0.295	-34.944	12.433	-175.351	0.004	-89.487	0.314	-120.551
76.5	0.295	-48.428	11.948	167.357	0.003	-71.660	0.330	-128.928
77.0	0.285	-66.384	11.304	149.875	0.004	-70.902	0.336	-137.901
77.5	0.284	-85.618	10.590	131.959	0.004	-73.631	0.349	-146.149
78.0	0.296	-106.325	9.611	114.015	0.004	-61.032	0.352	-153.625
78.5	0.334	-124.337	8.573	96.363	0.004	-66.422	0.355	-160.477
79.0	0.374	-140.326	7.612	79.890	0.004	-63.155	0.360	-166.599
79.5	0.406	-152.260	6.655	63.852	0.003	-72.417	0.361	-171.367
80.0	0.420	-161.780	5.736	49.157	0.004	-71.102	0.362	-176.900
80.5	0.430	-171.330	4.917	35.931	0.003	-68.850	0.363	177.752
81.0	0.436	179.154	4.246	23.432	0.002	-63.704	0.363	173.644
81.5	0.447	170.538	3.659	10.984	0.003	-53.623	0.361	169.439
82.0	0.455	162.842	3.105	-0.698	0.004	-62.049	0.360	166.011
82.5	0.466	156.366	2.668	-11.427	0.003	-57.580	0.361	162.526
83.0	0.475	150.161	2.307	-22.356	0.003	-62.791	0.362	159.524
83.5	0.483	144.723	1.989	-32.483	0.003	-65.678	0.363	156.481
84.0	0.489	139.695	1.725	-42.733	0.003	-75.331	0.363	153.375
84.5	0.494	134.572	1.508	-51.598	0.003	-54.358	0.364	149.918
85.0	0.498	129.658	1.325	-60.523	0.003	-62.875	0.365	146.857
85.5	0.502	125.079	1.163	-68.977	0.002	-65.609	0.367	143.985
86.0	0.508	120.754	1.028	-77.497	0.003	-81.620	0.367	141.337

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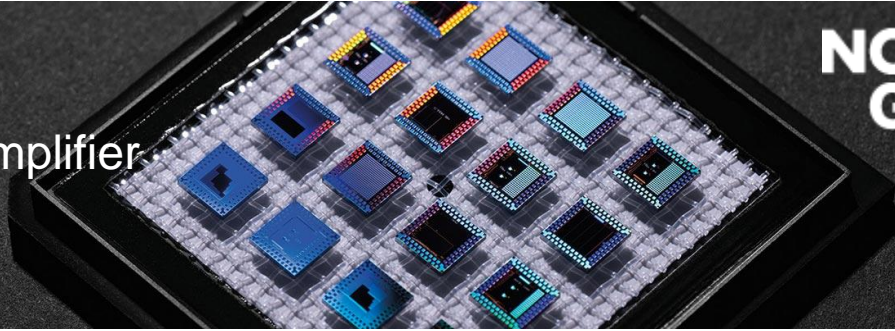
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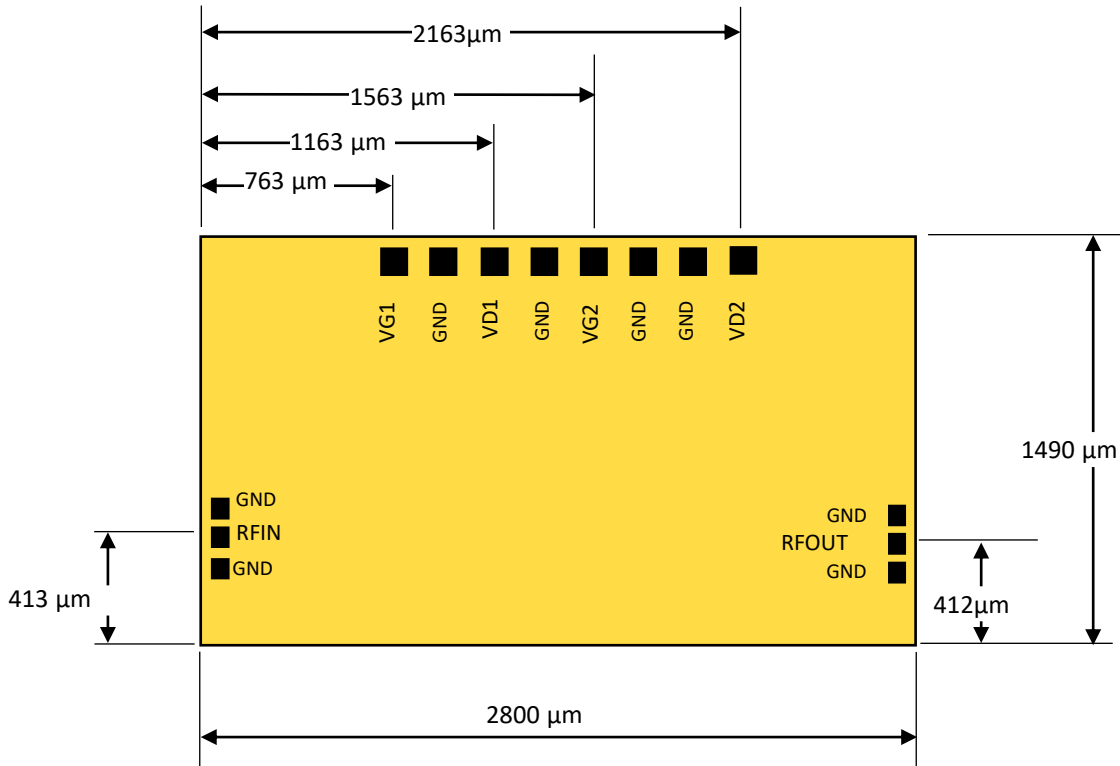
71-76 GHz

High Power Amplifier



Die Size and Bond Pad Locations (Not to Scale)

X = $2800 \mu\text{m} \pm 25 \mu\text{m}$
 Y = $1490 \pm 25 \mu\text{m}$
 DC Bond Pad = $100 \times 100 \pm 0.5 \mu\text{m}$
 RF Bond Pad = $50 \times 50 \pm 0.5 \mu\text{m}$
 Chip Thickness = $50 \pm 5 \mu\text{m}$



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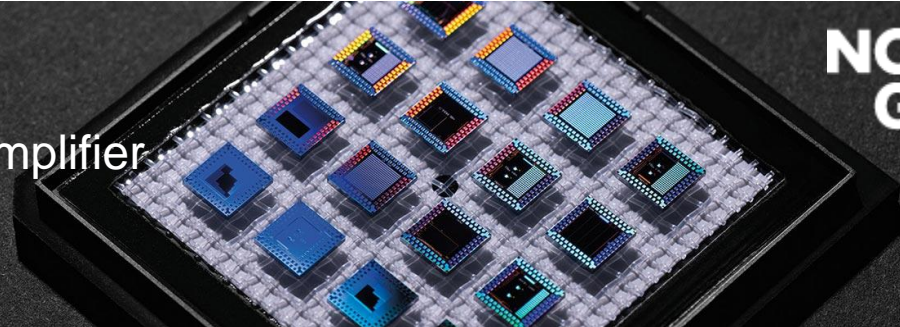
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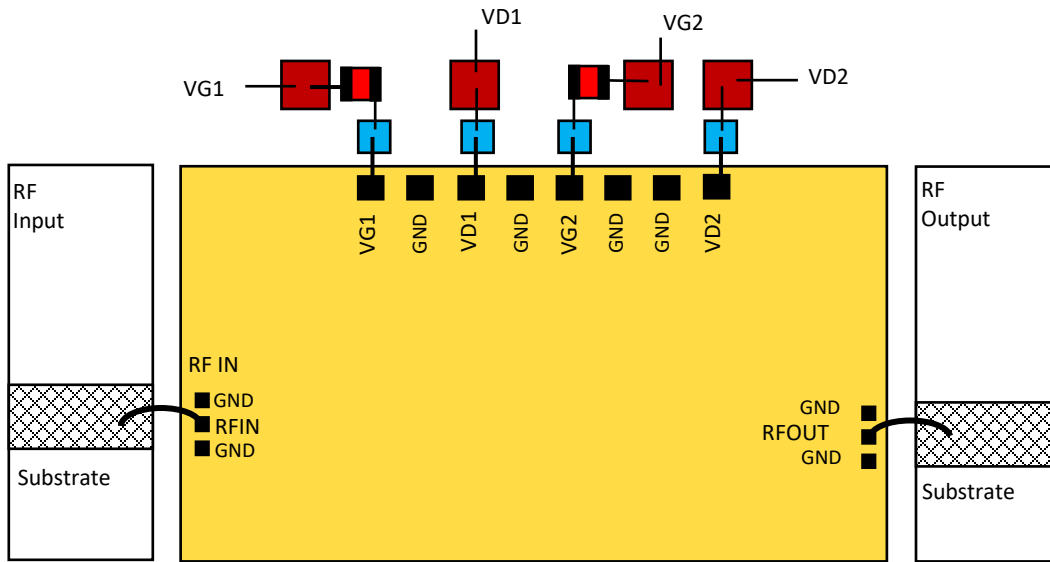
71-76 GHz

High Power Amplifier



Suggested Bonding Arrangement

-  = 0.1uF, 15V (Shunt)
-  = 10 Ohms, 30V (Series)
-  = 100 pF, 15V (Shunt)



Recommended Assembly Notes

1. Bypass caps should be 100 pF ceramic (single-layer) placed no further 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.

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