

# 25–31 GHz Surface Mount Amplifier



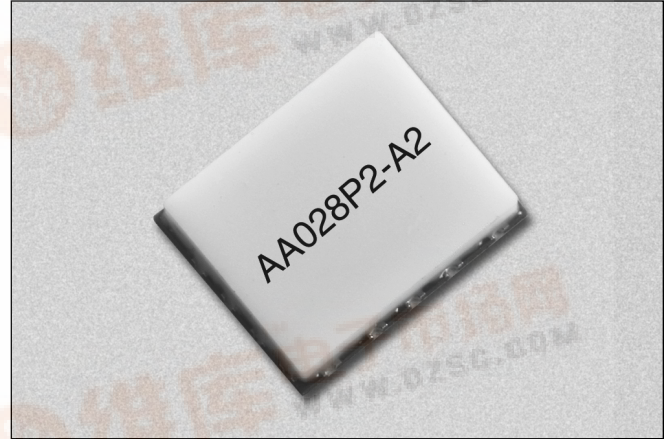
**AA028P2-A2**  
Patent Pending

## Features

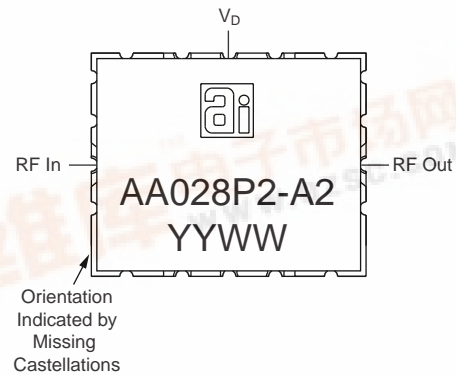
- Surface Mount Package
- 13 dB Gain
- +16 dBm Output Power
- Single Voltage Operation
- 100% RF and DC Testing

## Description

The AA028P2-A2 is a broadband millimeterwave driver amplifier in a rugged surface mount package which is compatible with high volume solder installation. The amplifier is designed for use in millimeterwave communication and sensor systems as a gain stage in the receiver, transmitter, or LO chain when high gain and linearity are required. The robust ceramic surface mount package provides excellent electrical performance and a high degree of environmental protection for long-term reliability. A single supply voltage simplifies bias requirements. All amplifiers are screened at the operating frequencies prior to shipment for guaranteed performance. Amplifier is targeted for high volume millimeterwave applications such as point-to-point and point-to-multipoint wireless communications systems.



## Pin Out



## Electrical Specifications at 25°C ( $V_D = 5.5 V$ )

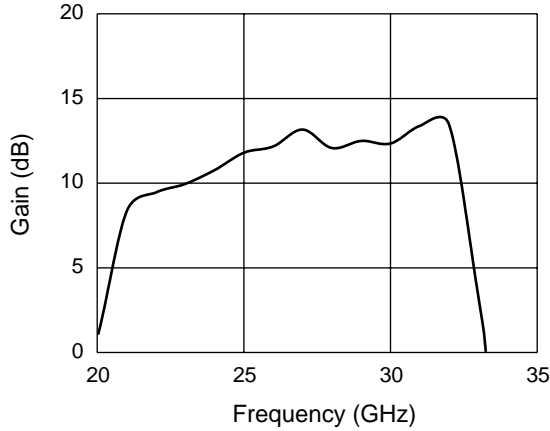
### RF

Parameter	Symbol	Min.	Typ.	Max.	Unit
Bandwidth	BW	25	24–32	31	GHz
Small Signal Gain	G	11	13		dB
Input Return Loss	RL <sub>I</sub>		7		dB
Output Return Loss	RL <sub>O</sub>		9		dB
Output Power at 1 dB Gain Compression	P <sub>1</sub> dB	14	16		dBm
Temperature Coefficient of Gain	dG/dT		-0.025		dB/C

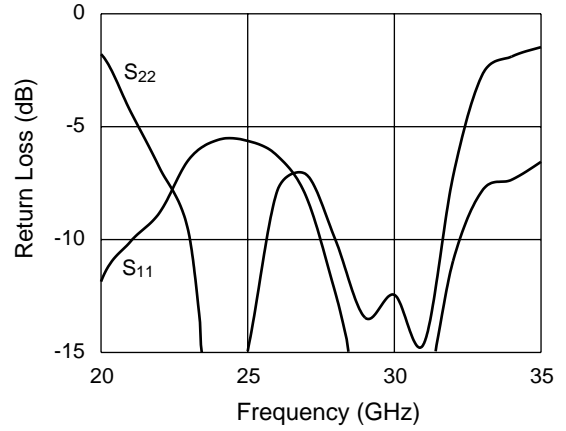
### DC

Parameter	Symbol	Min.	Typ.	Max.	Unit
Drain Current	I <sub>D</sub>		70	110	mA

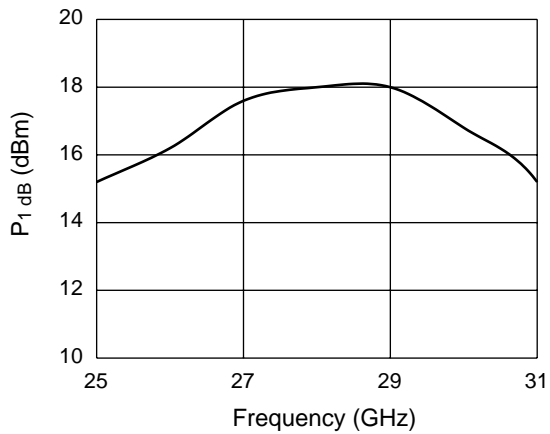
Typical Performance Data ( $V_D = 5.5\text{ V}$ )



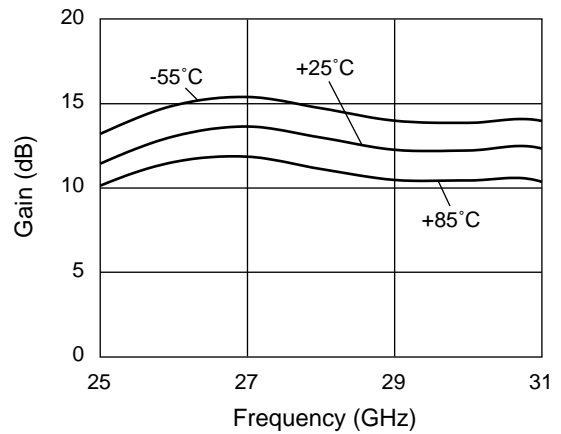
Gain vs. Frequency



Return Loss vs. Frequency

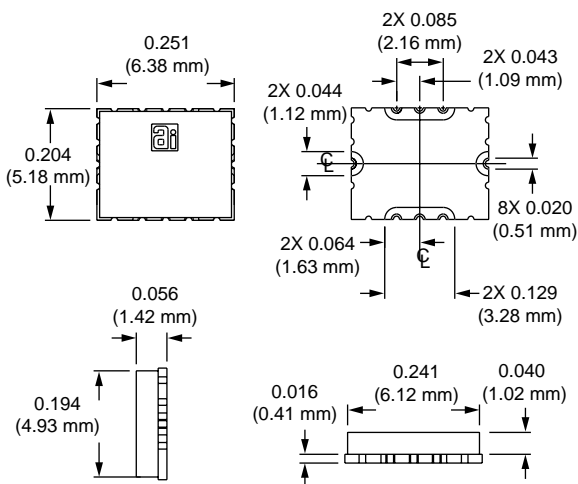


Output Power vs. Frequency



Gain vs. Frequency

Outline



Absolute Maximum Ratings

Characteristic	Value
Operating Temperature ( $T_C$ )	-55°C to +90°C
Storage Temperature ( $T_{ST}$ )	-65°C to +150°C
Bias Voltage ( $V_{D1}$ )	7 $V_{DC}$
Power In ( $P_{IN}$ )	13 dBm

Typical S-Parameters at 25°C ( $V_D = 5.5$  V)

Frequency (GHz)	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	Mag. (dB)	Ang. (Deg.)	Mag. (dB)	Ang. (Deg.)	Mag. (dB)	Ang. (Deg.)	Mag. (dB)	Ang. (Deg.)
1	-1.8891	-125.3600	-43.2540	164.3700	-58.670	-88.492	-1.12620	-126.7000
3	-2.4345	175.9900	-35.7840	90.2530	-53.792	-88.848	-3.10970	154.1000
5	-2.8771	99.7540	-29.3650	-42.4260	-66.955	60.394	-3.45190	-165.7400
7	-3.2392	27.9020	-25.1380	-138.9600	-45.067	-77.408	-5.02160	128.2200
9	-3.5435	-34.6070	-45.0210	28.5080	-46.099	-69.574	0.11855	55.1550
11	-3.7858	-83.1640	-44.3000	-80.0050	-41.912	-87.216	-0.33998	-9.6574
13	-4.0416	-122.2800	-42.2600	-73.9500	-46.329	-78.549	-1.22410	-58.8080
15	-4.6036	-159.9000	-32.2730	-110.7900	-43.375	-51.890	-1.80850	-96.3240
17	-6.7582	150.4900	-18.7250	171.5900	-42.826	-60.249	-1.97470	-127.2700
18	-10.4750	109.0100	-11.1660	129.3600	-41.750	-24.941	-1.96860	-142.4000
19	-16.9020	18.9510	-4.4860	77.5880	-37.305	-29.700	-1.81710	-158.8000
20	-11.8620	-131.0900	0.8482	44.5160	-40.473	-57.605	-1.78800	84.9140
21	-10.0930	142.7400	8.3172	-45.1180	-36.456	-119.280	-4.31700	38.4980
22	-8.7935	97.3620	9.4482	-120.5400	-35.487	165.880	-6.84150	3.4238
23	-6.4440	48.8610	9.9504	178.0300	-35.753	105.470	-9.76340	-40.7050
24	-5.5792	-1.6998	10.7623	121.8400	-35.559	42.297	-19.81200	-92.3350
25	-5.6318	-51.0240	11.7960	66.6550	-35.363	-19.760	-14.91000	27.3380
26	-6.2769	-100.3300	12.1690	4.0189	-34.294	-71.223	-7.86290	-34.2280
27	-8.1182	-152.0100	13.1640	-52.5350	-33.817	-128.310	-7.12030	-95.0830
28	-12.4100	161.5400	12.0730	-115.5400	-32.020	178.760	-10.03700	-142.3600
29	-17.1150	147.2600	12.4960	-170.9200	-31.971	121.260	-13.45400	-158.0600
30	-15.6470	120.7500	12.3430	128.7300	-32.153	69.648	-12.44600	-174.4100
31	-16.9560	37.1260	13.3830	62.0720	-30.995	12.728	-14.62300	156.8700
32	-10.9470	-164.3900	13.4400	-40.9440	-30.749	-79.782	-7.19450	-176.2900
33	-7.8258	88.1560	3.2386	-136.7100	-38.601	-171.040	-2.69680	111.5000
34	-7.3537	28.4740	-7.9820	168.9300	-41.455	151.590	-1.89540	56.9890
35	-6.5525	-19.3420	-15.7300	129.1800	-38.996	95.603	-1.47920	6.1703
36	-5.6230	-65.3560	-25.1300	97.3710	-38.487	56.350	-1.16540	-44.0600
38	-3.7803	-160.9200	-31.5360	4.8599	-33.430	-18.492	-0.98473	-148.8900
40	-2.2359	96.8240	-25.9250	-110.9000	-28.181	-125.890	-1.47240	101.8500

## “Alpha Two” Surface Mount Package Handling and Mounting

Millimeterwave components require careful mounting design to maintain optimal performance. The Alpha Two surface mount package (patent pending) provides a rugged and repeatable electrical connection using standard solder techniques.

### Handling

The Alpha Two surface mount package is very rugged. However, due to ceramic's brittle nature, one should exercise care when handling with metal tools. Do not apply heavy pressure to the lid. Vacuum tools may be used to pick and place this part.

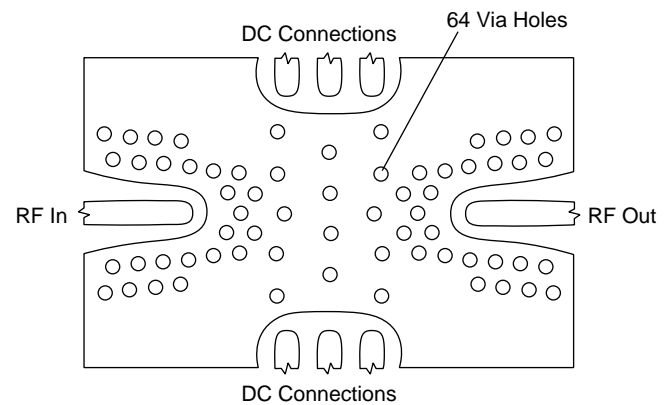
Only personnel trained in both ESD precautions and handling precautions should be allowed to handle these packages.

### Package Construction

The Alpha Two surface mount package consists of a base and a lid. The package base is ceramic with filled vias and plated castellations. The package lid is unplated alumina. The lid seal is epoxy.

### Mounting Design

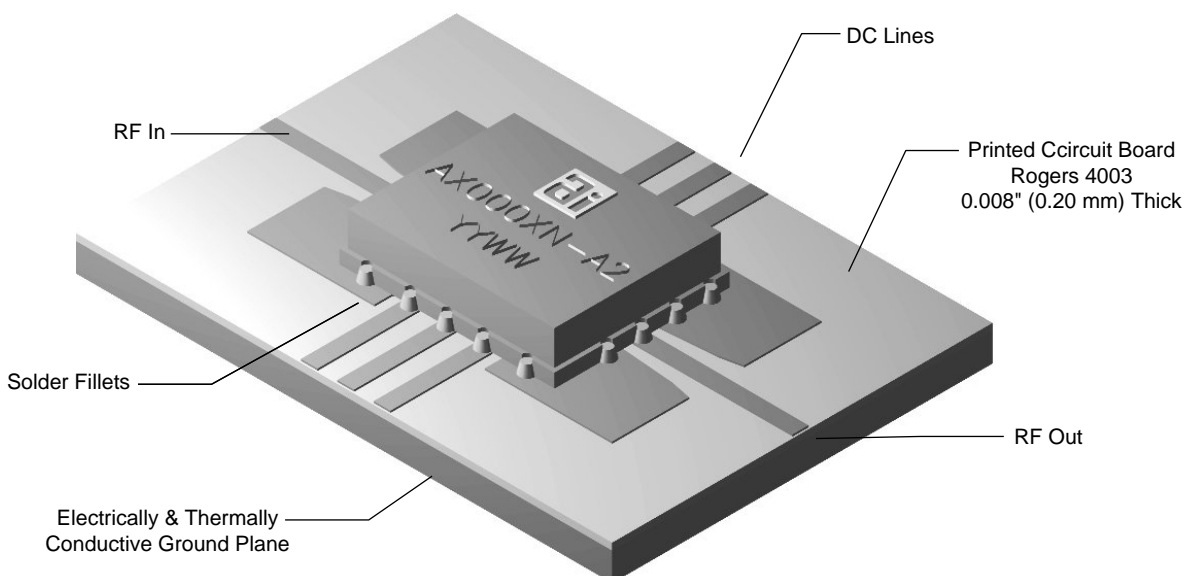
The Alpha Two surface mount package is installed on top of a printed circuit board on a specially designed footprint. Mounting footprint geometry will be supplied by Alpha Industries in electronic formats or paper drawing.



**Footprint Geometry for Alpha Two  
Surface Mount Package**

### Mounting the Package

The Alpha Two surface mount package is compatible with high-volume surface mount installation using solder. RF and DC connections are accomplished with metallized edge castellations that hold solder fillets. Ground connections are accomplished by both metallized edge castellations and filled vias to the bottom of the package. Care should be taken to ensure that there are no voids or gaps in the solder so that a good RF, DC, and ground contact is maintained.



**Alpha Two Surface Mount Package Installation**