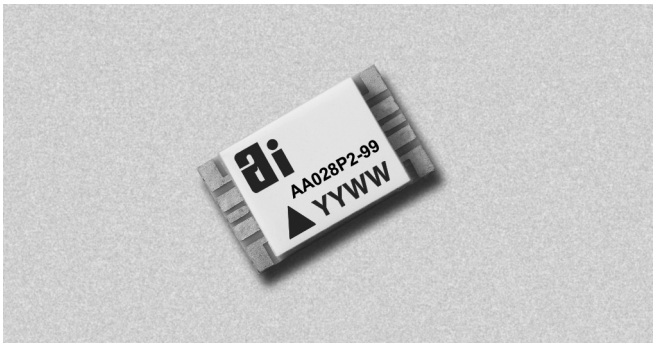
25–31 GHz Amplifier

AA028P2-99

Features

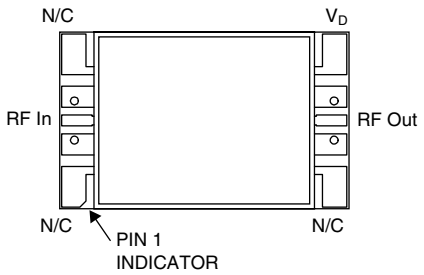
- 15 dB Gain
- +16 dBm Output Power
- Rugged, Reliable Package
- Single Voltage Operation
- 100% RF and DC Testing



Description

The AA028P2-99 is a broadband millimeterwave amplifier in a rugged package. The amplifier is designed for use in millimeterwave communication and sensor systems as a gain stage in the receiver, transmitter, or local oscillator chain. The robust ceramic and metal package provides excellent electrical performance, excellent thermal 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 millimeterwave point-to-point and point-to-multipoint wireless communications systems.

Pin Out



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

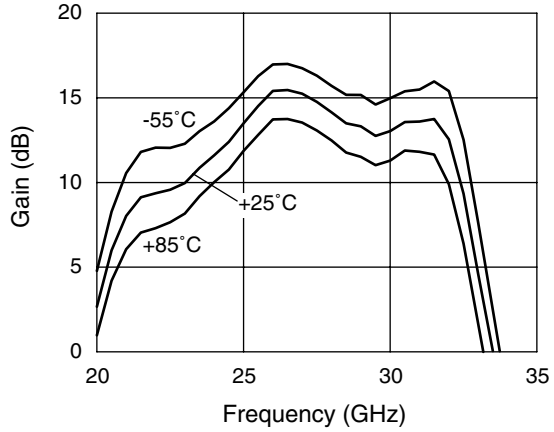
RF

Parameter	Symbol	Min.	Typ.	Max.	Unit
Bandwidth	BW	25	24—32	31	GHz
Small Signal Gain	G	12.5	15		dB
Input Return Loss	RL_I		7		dB
Output Return Loss	RL_O		11		dB
Output Power at 1 dB Gain Compression	$P_{1\ dB}$	14	16		dBm
Temperature Coefficient of Gain	dG/dT		-0.025		dB/C

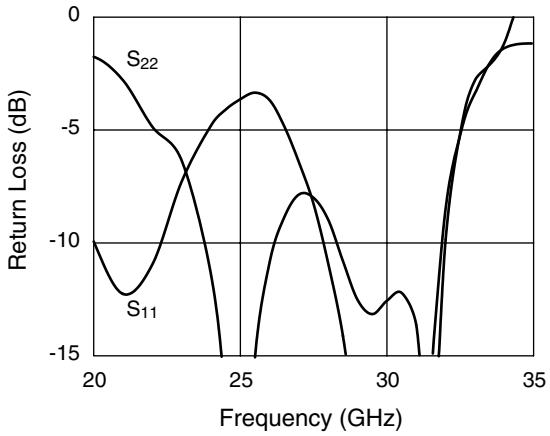
DC

Parameter	Symbol	Min.	Typ.	Max.	Unit
Drain Current	I_D		70	110	mA

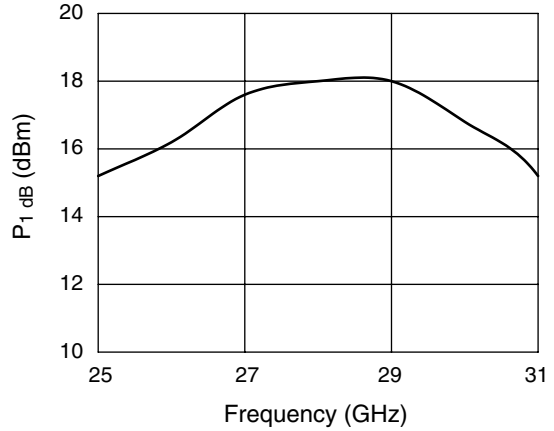
Typical Performance Data



Gain vs. Frequency



Return Loss vs. Frequency

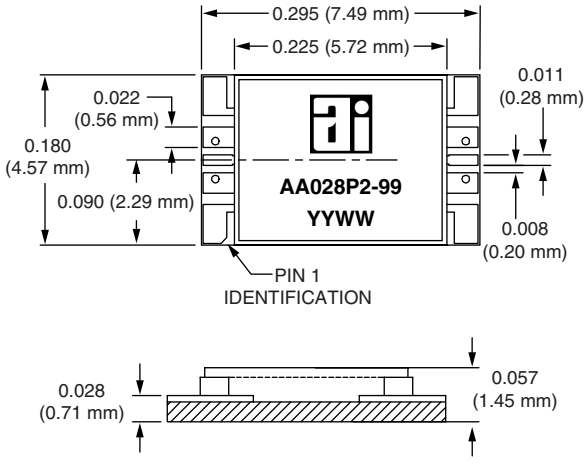


Output Power vs. Frequency

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

Outline



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

Frequency (GHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
16.0	-4.85	152.7	-25.23	-153.3	-63.11	164.5	-1.85	-100.5
18.0	-22.12	70.9	-13.67	123.7	-56.09	3.3	-2.09	-135.0
19.0	-6.24	78.7	-5.74	120.8	-51.64	-45.9	-1.95	-151.8
20.0	-9.94	-19.7	2.66	47.9	-44.79	-43.6	-1.76	-172.1
21.0	-12.26	-100.9	8.02	-27.2	-36.34	-101.1	-2.80	162.8
22.0	-10.95	-129.8	9.36	-103.7	-33.60	178.6	-4.86	147.3
23.0	-7.28	-160.3	9.96	-160.3	-32.63	122.6	-6.35	125.1
24.0	-4.80	167.0	11.61	147.9	-31.12	61.7	-11.42	97.0
24.5	-4.09	148.3	12.40	119.7	-31.48	29.4	-17.03	91.7
25.0	-3.63	130.1	13.50	90.6	-31.62	3.6	-25.61	163.6
25.5	-3.34	109.9	14.51	59.3	-32.27	-18.7	-15.07	-168.1
26.0	-3.68	89.4	15.41	25.1	-31.92	-43.2	-10.85	-179.3
26.5	-4.84	69.8	15.46	-10.0	-32.99	-65.3	-8.85	167.5
27.0	-6.43	50.7	15.24	-44.0	-31.91	-96.7	-7.86	151.6
27.5	-8.29	34.2	14.76	-76.6	-32.44	-112.7	-8.01	136.5
28.0	-10.93	19.1	14.15	-106.7	-31.83	-149.7	-8.98	123.5
28.5	-14.13	7.9	13.49	-132.6	-32.00	-165.7	-10.81	115.6
29.0	-18.80	16.5	13.32	-160.2	-32.53	162.0	-12.53	116.1
29.5	-21.91	37.3	12.75	170.7	-32.92	132.5	-13.15	123.2
30.0	-21.44	46.2	13.03	141.9	-32.84	107.7	-12.56	129.1
30.5	-21.35	23.6	13.57	106.6	-32.41	75.0	-12.21	122.5
31.0	-23.03	-38.4	13.60	70.9	-32.28	41.7	-13.63	114.3
31.5	-15.72	-140.9	13.75	29.7	-30.59	-3.3	-19.81	142.5
32.0	-8.48	167.1	12.55	-19.9	-32.45	-54.3	-9.85	-177.8
32.5	-5.19	127.6	9.33	-73.4	-34.70	-74.9	-5.11	159.1
33.0	-3.37	99.0	4.60	-112.3	-35.29	-100.0	-2.79	140.9
34.0	-1.37	52.2	-6.55	-169.7	-35.54	-139.1	-1.15	101.2
36.0	-1.39	-18.7	-25.55	111.9	-32.62	106.3	6.24	36.6
38.0	-2.82	-77.9	-36.95	34.4	-52.23	66.3	2.80	-49.7
40.0	-4.29	-123.0	-38.71	-98.0	-47.21	147.9	-0.80	-94.1

Co-Planar Millimeterwave Package Handling and Mounting

Millimeterwave amplifiers require careful mounting design to maintain optimal performance.

Handling

The co-planar millimeterwave 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 co-planar millimeterwave package is constructed from metal and ceramic. The base of the package is gold-plated copper-molybdenum-copper. The lid is unplated alumina. The lid seal is epoxy.

Mounting Design

The co-planar millimeterwave package is mounted by placing it in a hole cut in a printed circuit board. The RF interface on the package should be in the same plane as the surface of the printed circuit board. The hole should be cut as close as possible to the outer dimensions of the package to minimize the gap between package and printed circuit board. The gap should be no more than 0.005" (0.127 mm). The base of the package should be mounted directly to a surface which provides a good ground plane for the printed circuit board and provides a good thermal ground.

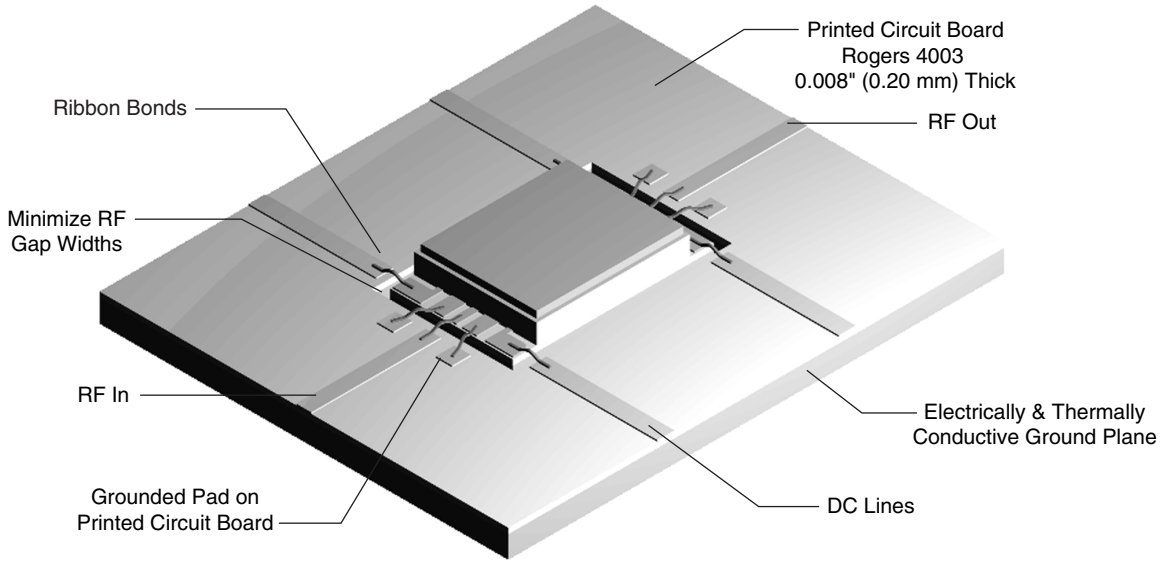
The RF connection on the printed circuit board should include a microstrip line and two grounded pads, one on either side of the microstrip line. The RF connection between the package and the printed circuit board should be accomplished with three ribbon bonds, one connecting the RF lines on package and printed circuit board and two connecting the ground pads on the package and printed circuit board.

Mounting the Package

The package should be attached to its mounting surface using a silver-filled conductive paste epoxy. Care should be taken to ensure that there are no voids or gaps in the epoxy underfill so that a good ground contact is maintained.

Connecting the Package

Thermosonic ribbon attachment with 0.00025" x 0.005" (0.0064 mm x 0.127 mm) gold ribbon is used to make the connections from the RF and DC package interfaces to the printed circuit board. Lengths of ribbons should be minimized.



Co-Planar Millimeterwave Package Mounting