

## Avantek Products

# Ultra Low Noise Narrowband Amplifier 1.2 to 1.6 GHz

## Technical Data

### ACT-161223

#### Features

- **Ultra Low Noise Figure:**  
1.1 dB (Typ)
- **Narrow Frequency Range:**  
1.2 to 1.6 GHz
- **Internal Voltage Regulator**
- **Available With High Reliability Screening**
- **Removable Connectors**

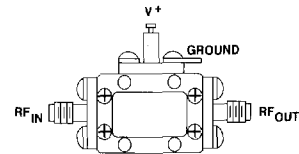
#### Applications

- **L Band Telemetry**
- **Satellite Downlinks (GPS, Marisat, and more)**
- **RF/IF Front Ends**
- **Low Signal Level Amplification**

#### Description

The ACT-161223 is a GaAs FET input, ultra low noise, narrowband amplifier using a single-ended, multi-stage design with lossless feedback and an internal voltage regulator. A custom thin-film matching network provides optimum performance over the 1.2 to 1.6 GHz frequency range. It has a noise figure of only 1.1 dB (typ), gain of 36 dB (typ), and power output of +16 dBm (typ). The ACT-161223 is packaged in a laser-welded, hermetically-sealed case with field-replaceable SMA connectors. Without connectors it is suitable for microstrip mounting.

#### Pin Configuration AX-2



(See Section 5 for detailed case drawings.)

#### Maximum Ratings

Parameter	Maximum
DC Voltage	+17 Volts
Continuous RF Input Power	+15 dBm
Operating Case Temperature	-55 to +125°C
Storage Temperature	-62 to +150°C
"R" Series Burn-In Temperature	+125°C

#### Thermal Characteristics<sup>1</sup>

$\theta_{jc}$	105°C/W
Active Transistor Power Dissipation	250 mW
Junction Temperature Above Case Temperature	27°C

Note 1: For further information, see Reliability Screening, Section 6.

**Weight:** (typical) 35 grams (with connectors),  
(typical) 28 grams (without connectors)

## Electrical Specifications

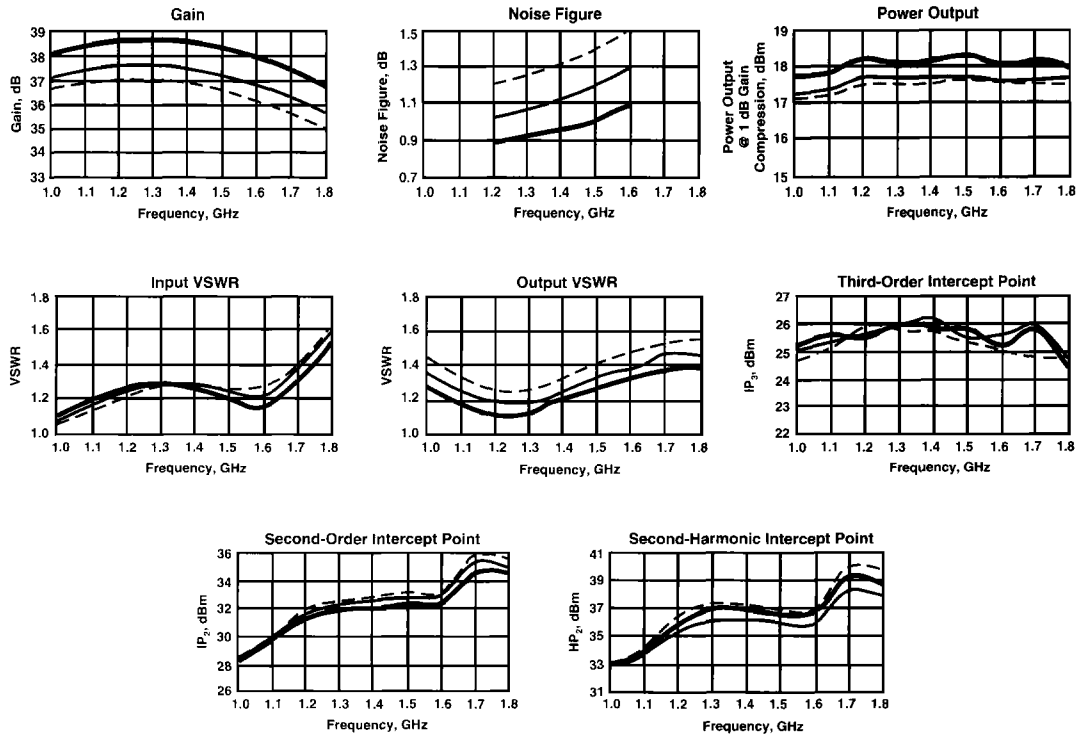
(Measured in 50 Ω system @ +12 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical $T_c = 25^\circ\text{C}$	Guaranteed Specifications		Unit
			$T_c = 0$ to $50^\circ\text{C}$	$T_c = -55$ to $+85^\circ\text{C}$	
BW	Frequency Range	1.2-1.6	1.2-1.6	1.2-1.6	GHz
GP	Small Signal Gain (Min.)	36.0	34.0	34.0	dB
—	Gain Flatness (Max.)	$\pm 0.3$	$\pm 0.7$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	1.1	1.5	1.5	dB
$P_{1dB}$	Power Output @ +1 dB Comp. (Min.)	+16.0	+15.0	+15.0	dBm
—	Input VSWR (Max.)	1.4	1.7	1.7	—
—	Output VSWR (Max.)	1.2	1.7	1.7	—
$IP_3$	Two Tone 3rd Order Intercept Point	+24	—	—	dBm
$IP_2$	Two Tone 2nd Order Intercept Point	+31	—	—	dBm
$HP_2$	One Tone 2nd Harmonic Intercept Point	+34	—	—	dBm
$I_D$	DC Current	90	110	110	mA
—	DC Voltage	12 to 15	—	—	V

1

## Typical Performance Over Temperature (@ +12 VDC unless otherwise noted)

Key: +25°C —  
+85°C - - -  
-55°C —



**Automatic Network Analyzer Measurements** (Typical production unit @ +25°C ambient)

**S-Parameters and Numerical Readings**

**Bias = 12 Volts, Current = 90 mA**

FREQ GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		GPDEL ns	PHASE DEG
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang		
0.100	-0.31	166.73	-25.73	90.38	-54.73	31.27	-0.41	-34.96		
0.200	-0.34	153.55	-16.35	157.43	-64.68	-140.68	-0.31	-73.05		
0.300	-0.43	138.74	5.97	107.66	-57.93	-18.43	-0.89	-119.23		
0.400	-0.64	121.87	18.27	33.76	-61.05	35.94	-2.88	-166.17		
0.500	-1.12	100.69	25.88	-31.54	-68.98	82.84	-5.78	152.59		
0.600	-2.72	75.28	31.05	-93.38	-62.89	103.06	-8.46	118.41		
0.700	-5.99	47.97	34.17	-152.23	-68.70	114.19	-10.69	87.96		
0.800	-11.54	27.49	35.62	155.01	-61.19	59.46	-12.56	60.82		
0.900	-19.96	20.52	36.29	107.66	-59.70	106.83	-14.42	35.05		
1.000	-32.35	72.56	36.65	67.41	-60.32	99.42	-16.54	18.48		
1.100	-24.15	142.49	36.97	29.69	-59.46	-125.37	-19.16	7.42		
1.200	-20.40	144.21	37.10	-6.70	-57.91	38.99	-21.39	11.34	0.81	0.99
1.300	-18.21	139.00	37.13	-41.76	-54.00	179.57	-21.62	24.29	-0.16	0.94
1.400	-18.55	134.57	37.00	-76.76	-58.66	-61.92	-19.11	27.25	-1.07	0.97
1.500	-19.43	139.28	36.70	-110.39	-60.79	163.16	-17.00	19.63	-0.61	0.94
1.600	-19.82	155.74	36.26	-142.84	-55.54	-143.55	-15.72	7.69	1.03	0.90
1.700	-16.75	175.64	35.73	-174.96	-58.02	-126.72	-14.63	-5.00		
1.800	-12.95	170.97	35.11	153.97	-56.88	-159.38	-14.28	-16.69		
1.900	-10.56	156.91	34.39	122.67	-58.26	169.03	-13.69	-27.33		
2.000	-9.03	143.44	33.58	91.48	-59.74	156.90	-13.11	-37.51		
2.200	-8.55	113.85	31.23	29.43	-66.23	-96.57	-11.84	-55.70		
2.400	-8.67	94.83	27.96	-25.92	-66.82	160.46	-10.80	-78.31		
2.600	-8.30	80.20	25.00	-64.92	-51.30	82.31	-10.52	-95.86		
2.800	-7.29	53.87	22.14	-109.48	-59.49	-104.59	-10.49	-115.28		
3.000	-6.39	21.79	19.45	-154.19	-59.94	171.69	-10.50	-135.43		
3.500	-5.73	-69.01	14.37	95.14	-61.44	-151.68	-10.93	170.27		
4.000	-2.65	-171.03	4.89	-155.22	-54.56	139.08	-12.12	115.56		
4.500	-1.68	86.05	-10.03	-2.17	-62.38	-167.12	-11.83	64.71		
5.000	-7.47	-37.28	-0.37	-120.17	-55.98	-148.79	-11.14	21.09		