

Avantek Products

Thin-Film Cascadable Amplifier 10 to 500 MHz

Technical Data

UTO/UTC 547 Series

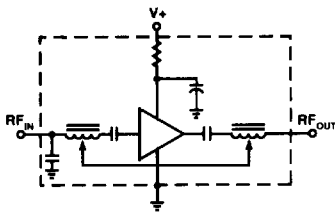
Features

- **Frequency Range:** 10 to 500 MHz
- **High Dynamic Range**
- **Low Noise:** 2.8 dB (Typ)
- **High Output Power:** +19.0 dBm (Typ)
- **Medium Gain:** 12.5 dB (Typ)
- **Temperature Compensated**

Applications

- IF/RF Amplification
- System Front End

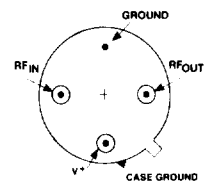
Schematic



Description

The 547 Series is a thin-film RF bipolar amplifier using lossless feedback for optimum noise figure and high dynamic range, and active bias to compensate for temperature and voltage variations. Internal blocking capacitors couple the RF through the amplifier. The 547 Series amplifiers are available in either the TO-8 hermetic case or connected TC-1 package.

Pin Configuration UTO—TO-8T



UTC—TC-1



(See Section 5 for detailed case drawings.)

Maximum Ratings

Parameter	Maximum
DC Voltage	+15 Volts
Continuous RF Input Power	+13 dBm
Operating Case Temperature	-55 to +125°C
Storage Temperature	-62 to +150°C
"R" Series Burn-In Temperature	+125°C

Thermal Characteristics¹

θ_{jc}	105/105°C/W ²
Active Transistor Power Dissipation	255/255 mW ²
Junction Temperature Above Case Temperature	27/27°C ²
MTBF (MIL-HDBK-217E, A_{VF} @ 90°C)	1,103,000 Hrs.

Notes:

1. For further information, see Reliability Screening, Section 6.
2. Values refer to first and second stages, respectively.

Weight: (typical) UTO—2.1 grams; UTC—21.5 grams

Electrical Specifications¹

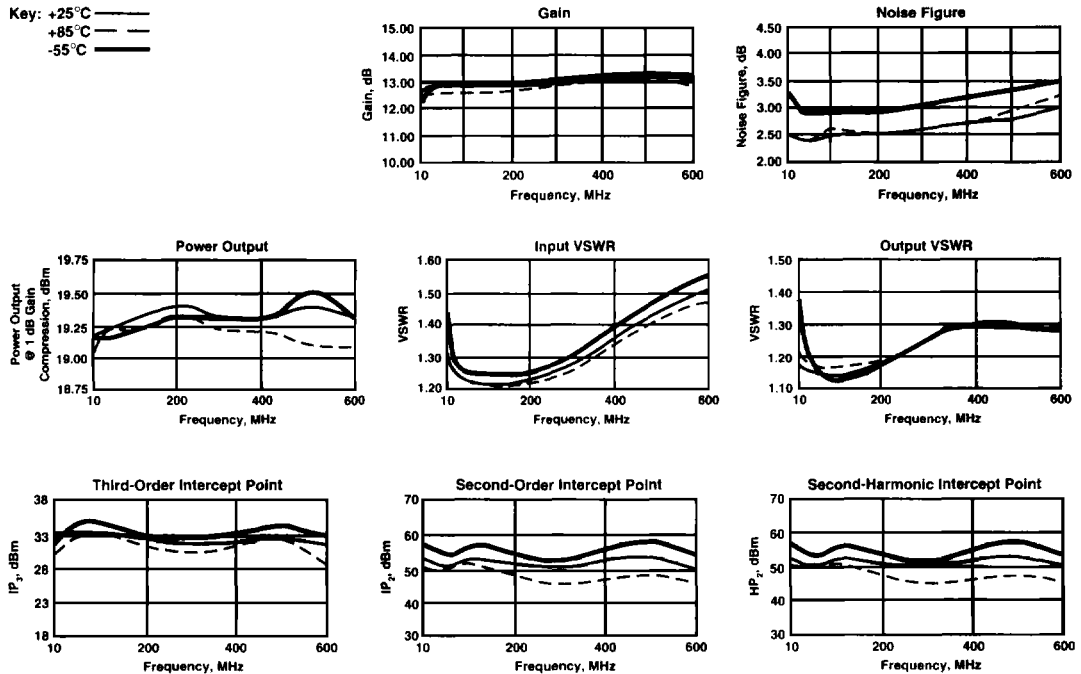
(Measured in 50 Ω system @ +15 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical T _C = 25°C	Guaranteed Specifications		Unit
			T _C = 0 to 50°C	T _C = -55 to +85°C	
BW	Frequency Range	10-500	10-500	10-500	MHz
GP	Small Signal Gain (Min.)	12.5	11.5	11.0	dB
—	Gain Flatness (Max.)	±0.2	±0.7	±0.7	dB
NF	Noise Figure (Max.)	2.8	3.5	4.0	dB
P _{1dB}	Power Output @ +1 dB Comp. (Min.)	+19.0	+18.0	+17.5	dBm
—	Input VSWR (Max.)	<1.5:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	<1.5:1	2.0:1	2.0:1	—
IP ₃	Two Tone 3rd Order Intercept Point	+31.0	+28.0	+27.0	dBm
IP ₂	Two Tone 2nd Order Intercept Point	+47.0	—	—	dBm
HP ₂	One Tone 2nd Harmonic Intercept Point	+55.0	—	—	dBm
I _D	DC Current	55.0	—	—	mA

Notes: 1. Both RF input and RF output pins are at DC ground – no blocking capacitor.

Typical Performance Over Temperature (@ +15 VDC unless otherwise noted)

Key: +25°C —
+85°C —
-55°C —



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

Numerical Readings

Bias = 15.00 Volts

FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
1.0	4.26	1.2	-85.6			2.92	16.1
5.0	1.63	12.4	-154.6			1.35	25.5
10.0	1.33	12.7	-168.2	8.94	2.29	1.20	22.6
20.0	1.22	12.8	-176.5	2.60	2.29	1.15	21.9
50.0	1.20	12.8	173.9	-1.10	.67	1.15	21.7
100.0	1.20	12.8	164.0	-1.54	.50	1.15	21.7
150.0	1.20	12.8	155.0	-1.02	.49	1.17	21.8
200.0	1.20	12.8	146.1	-.39	.49	1.22	21.8
250.0	1.20	12.9	137.2	.19	.49	1.25	21.9
300.0	1.22	12.9	128.2	.66	.50	1.27	21.9
350.0	1.25	13.0	118.9	.74	.52	1.30	21.9
400.0	1.30	13.1	109.4	.48	.54	1.30	22.0
450.0	1.35	13.1	99.5	-.07	.56	1.30	22.0
500.0	1.41	13.2	89.3	-1.00	.59	1.30	22.1
550.0	1.47	13.1	78.8			1.27	22.1
600.0	1.53	13.1	67.8			1.27	22.2
650.0	1.56	12.9	56.5			1.33	22.3
700.0	1.63	12.7	45.2			1.38	22.5
750.0	1.70	12.3	34.0			1.47	22.8
800.0	1.82	11.9	22.9			1.56	23.2
850.0	1.90	11.4	12.3			1.63	23.6
900.0	1.99	10.9	2.0			1.70	24.0
950.0	2.03	10.3	-8.1			1.78	24.6
1000.0	2.08	9.7	-17.9			1.90	25.2
1500.0	2.23	3.3	-109.3			3.55	22.9
2000.0	1.82	-7.2	-171.0			2.03	15.9
2500.0	2.51	-11.7	137.0			1.67	17.3
3000.0	5.06	-17.3	74.0			1.38	20.0

LINEARIZATION RANGE: 10.0 to 500.0 MHz

S-Parameters

Bias = 15.00 Volts

FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
1.0	.62	-1.6	1.2	-85.6	-16.1	-172.8	.49	-149.90
5.0	.24	-87.5	12.4	-154.6	-25.5	-155.5	.15	-44.62
10.0	.14	-111.0	12.7	-168.2	-22.6	-166.9	.09	-98.44
20.0	.10	-136.9	12.8	-176.5	-21.9	-175.8	.07	-140.34
50.0	.09	-166.6	12.8	173.9	-21.7	174.3	.07	174.87
100.0	.09	174.5	12.0	164.0	-21.7	163.9	.07	140.75
150.0	.09	162.0	12.8	155.0	-21.8	154.6	.08	117.85
200.0	.09	149.4	12.9	146.1	-21.8	145.6	.10	97.79
250.0	.09	138.2	12.9	137.2	-21.9	136.7	.11	79.23
300.0	.10	129.0	12.9	128.2	-21.9	128.2	.12	61.56
350.0	.11	121.1	13.0	118.9	-21.9	119.5	.13	44.66
400.0	.13	115.9	13.1	109.4	-22.0	110.9	.13	28.39
450.0	.15	112.0	13.1	99.5	-22.0	102.2	.13	12.19
500.0	.17	108.4	13.2	89.3	-22.1	93.5	.13	-4.66
550.0	.19	102.8	13.1	78.8	-22.1	84.5	.12	-24.56
600.0	.21	94.3	13.1	67.8	-22.2	75.3	.12	-48.04
650.0	.22	83.7	12.9	56.5	-22.3	66.0	.14	-72.52
700.0	.24	70.8	12.7	45.2	-22.5	56.6	.16	-94.29
750.0	.26	57.8	12.3	34.0	-22.8	47.3	.19	-112.98
800.0	.29	45.7	11.9	22.9	-23.2	38.3	.22	-129.84
850.0	.31	35.1	11.4	12.3	-23.6	29.6	.24	-145.74
900.0	.33	25.8	10.9	2.0	-24.0	21.4	.26	-161.36
950.0	.34	16.5	10.3	-8.1	-24.6	13.6	.28	-176.11
1000.0	.35	6.4	9.7	-17.9	-25.2	6.2	.31	-170.45
1500.0	.38	-86.7	3.3	-109.3	-22.9	1.2	.56	70.43
2000.0	.29	-74.9	-7.2	-171.0	-15.9	-127.3	.34	-7.27
2500.0	.43	-83.0	-11.7	137.0	-17.3	142.0	.25	-36.04
3000.0	.67	-106.2	-17.3	74.0	-20.0	69.5	.16	-86.14