HEWLETT PACKARD

Avantek Products

Thin-Film Cascadable Amplifier 5 to 1000 MHz

Technical Data

UTO/UTC 1054 Series

Features

- **Frequency Range: 5 to 1000 MHz**
- **High Gain: 24 dB (Typ)**
- **Low Noise Figure: 3.5 dB (Typ)**
- **5-Volt Supply**
- **High Dynamic Range**
- **Temperature Compensated**

Applications

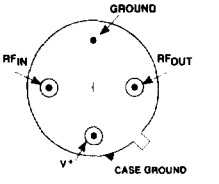
- **IF/RF Amplification**
- **5 Volt Systems**

Description

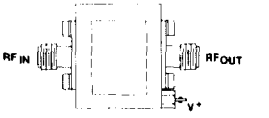
The 1054 Series is a 5-volt two-stage, thin-film RF amplifier using active bias and resistive feedback for temperature compensation and increased immunity to bias voltage variations. Low VSWR is maintained by inductive tuning while the RF is coupled through the amplifier by internal blocking capacitors. The 1054 Series amplifiers are available in either the TO-8 hermetic case or connectored TC-1 package.

Pin Configuration

UTO—TO-8T

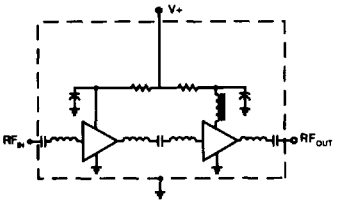


UTC—TC-1



(See Section 5 for detailed case drawings.)

Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+10.0 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 Characteristics[1]

θ_{JC}	105/75°C/W[2]
Active Transistor Power Dissipation	48/109 mW[2]
Junction Temperature Above Case Temperature	5/8°C[2]
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	575,700 Hrs.

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

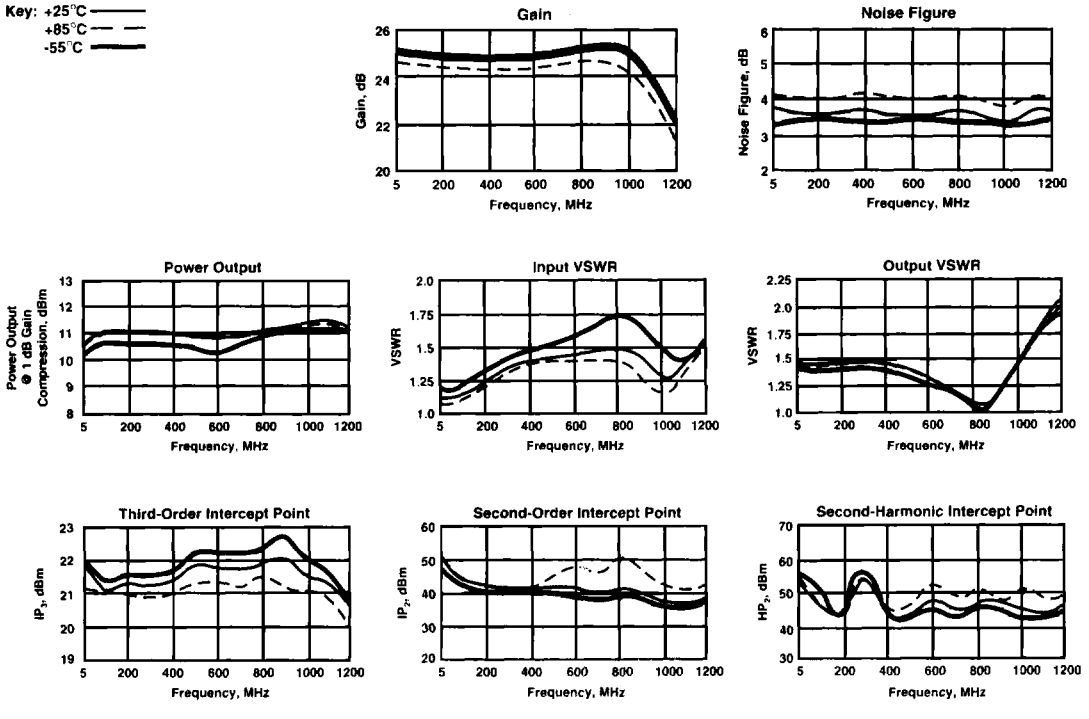
Weight: (typical) UTO—2.1 grams; UTC—21.5 grams

Electrical Specifications

(Measured in 50 Ω system @ +5 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical	Guaranteed Specifications		Unit
		T_C = 25°C	T_C = 0 to 50°C	T_C = −55 to +85°C	
BW	Frequency Range	5-1000	5-1000	5-1000	MHz
GP	Small Signal Gain (Min.)	24.0	23.5	23.0	dB
—	Gain Flatness (Max.)	±0.3	±0.7	±0.7	dB
NF	Noise Figure (Max.)	3.5	4.0	4.5	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)	+10.5	+9.5	+9.0	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	+21.0	—	—	dBm
IP_2	Two Tone 2nd Order Intercept Point	+38.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+44.0	—	—	dBm
I_D	DC Current	40	—	—	mA

Typical Performance Over Temperature (@ +5 VDC unless otherwise noted)



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

Numerical Readings **Bias = 5.00 Volts**

FREQ GHz	GPDEL ns	PHASE DEG	FREQ GHz	GPDEL ns	PHASE DEG
.050	.78	-2.18	.525	.73	2.76
.075	.78	-2.30	.550	.73	3.11
.100	.77	-2.37	.575	.73	3.46
.125	.77	-2.50	.600	.74	3.64
.150	.75	-2.40	.625	.75	3.79
.175	.74	-2.18	.650	.75	3.90
.200	.74	-1.91	.675	.76	3.91
.225	.74	-1.78	.700	.77	3.80
.250	.71	-1.31	.725	.79	3.56
.275	.72	-.90	.750	.80	3.20
.300	.73	-.65	.775	.82	2.71
.325	.72	-.29	.800	.83	2.05
.350	.73	.05	.825	.85	1.25
.375	.72	.40	.850	.87	.25
.400	.71	.82	.825	.80	-.86
.425	.70	1.32	.900	.92	-2.29
.450	.73	1.66	.925	.93	-3.88
.475	.72	2.05	.950	.06	-5.59
.500	.72	2.43	.975	.08	-7.47
			1.000	.96	9.28

Linearization Range: .05 to 1.00 GHz

S-Parameters **Bias = 5.00 Volts**

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
.005	.07	-178.1	24.6	20.5	-34.0	21.1	.21	166.95
.010	.05	-179.7	24.6	7.8	-34.0	9.8	.19	172.71
.020	.04	-175.4	24.6	.1	-33.9	3.6	.18	174.29
.030	.04	-171.7	24.6	-4.4	-33.9	1.0	.18	174.63
.040	.04	-167.7	24.6	-7.9	-33.9	-.8	.18	174.60
.050	.04	-164.4	24.6	-11.1	-33.9	-2.4	.18	174.50
.100	.06	-152.2	24.6	-25.4	-34.0	-7.5	.18	173.04
.150	.07	-148.8	24.5	-38.7	-34.0	11.4	.18	171.17
.200	.09	-150.3	24.5	-51.8	-34.0	-15.4	.18	168.66
.250	.11	-154.5	24.4	-64.8	-34.1	-19.7	.18	166.00
.300	.13	-159.8	24.4	-77.7	-34.1	-23.3	.19	162.32
.350	.14	-165.6	24.4	-90.6	-34.2	-27.4	.19	157.86
.400	.16	-172.5	24.4	-103.5	-34.2	-31.0	.18	152.91
.450	.16	-179.3	24.4	-116.5	-34.3	-34.5	.18	147.27
.500	.17	171.3	24.4	-129.6	-34.4	-38.6	.17	141.05
.550	.17	162.0	24.5	-142.8	-34.3	-42.6	.15	134.50
.600	.18	151.4	24.5	-156.3	-34.4	-46.5	.14	127.59
.650	.18	139.9	24.6	-169.9	-34.4	-50.5	.12	121.05
.700	.19	127.6	24.6	176.1	-34.4	-54.6	.10	115.30
.750	.19	114.9	24.7	161.8	-34.4	-59.5	.08	111.99
.800	.19	101.4	24.8	146.9	-34.6	-64.1	.05	116.92
.850	.19	86.8	24.8	131.4	-34.6	-69.3	.03	152.00
.900	.17	69.5	24.8	115.2	-34.8	-74.2	.06	-158.75
.950	.15	47.1	24.7	98.1	-35.1	-79.1	.11	-149.77
1.000	.12	15.1	24.4	80.4	-35.5	-83.9	.17	-153.20
1.100	.14	-63.7	23.3	44.8	-36.8	-91.3	.28	-168.85
1.200	.22	-105.7	21.5	11.6	-37.6	-91.7	.33	173.92
1.250	.24	-117.8	20.4	-3.5	-37.6	-89.5	.33	165.62
1.300	.25	-126.5	19.3	-17.9	-37.4	-89.8	.31	157.44
1.400	.23	-139.1	17.1	-44.8	-36.5	-92.0	.26	139.07
1.500	.17	-144.5	14.9	-70.1	-35.5	-102.1	.19	115.14
2.000	.26	-97.6	4.2	-175.1	-34.8	-159.0	.11	-83.31
3.000	.76	171.8	-16.4	45.9	-36.5	105.7	.41	136.14