HEWLETT PACKARD

10-1500 MHz T0-8 CASCADABLE AMPLIFIER

HAMP-1002
HAMP-1002TXV

TECHNICAL DATA APRIL 1985

Features

WIDE 1 dB BANDWIDTH
5-1900 MHz

EXCEPTIONAL PHASE LINEARITY
1.8 Degree Deviation from 100 to 1500 MHz

LOW VARIATION OVER TEMPERATURE

OUTPUT POWER
10.5 dBm

EASILY CASCADABLE IN A 50 OHM SYSTEM

Description/Applications

The HAMP-1002 is a thin-film hybrid amplifier using bipolar transistors. The design uses resistive feedback which provides exceptional phase linearity and high performance over a wide temperature range and bandwidth. The internal bias network and coupling capacitors eliminate the need for external support circuitry.

This amplifier is ideal for IF, RF and high speed digital applications.

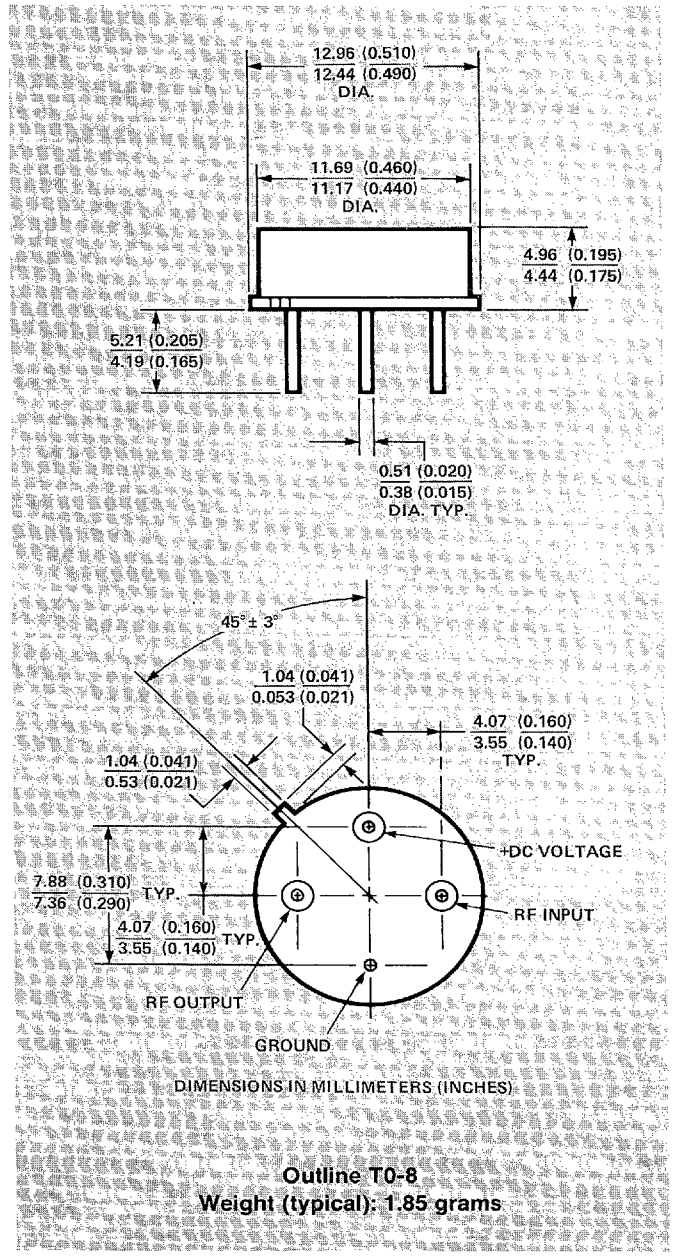
The HAMP-1002 is supplied in a standard rugged four leaded T0-8 hermetic package.

Absolute Maximum Ratings*

DC Voltage	30.0 V
Continuous RF Input Power	+15 dBm
Short Term RF Input Power (CW/1 Minute Duration)	+20 dBm
Max. Input Peak Power (3 Microsecond Pulse, One Single Pulse)	+27 dBm
Operating Case Temperature	−55° C to 125° C
Storage Temperature	−65° C to 150° C

*Operation in excess of any one of these conditions may result in permanent damage to this device.

MTTF: (Calculated, MIL-STD-217D): 1.2 x 10^7 Hours at Case Temperature +85° C.



Outline T0-8
Weight (typical): 1.85 grams

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Electrical Specifications (Measured in 50 Ohm System at +15 V)

Characteristic	Typical at 25° C	Guaranteed 0-50° C	Guaranteed −55 — +85° C
Frequency Range (MHz)	10-1500	10-1500	10-1500
1 dB Bandwidth (MHz)	5-1900		
Gain Max. (dB)	10.2	10.6	10.7
Gain Min. (dB)	9.7	9.2	8.4
Gain Flatness Max. (dB)	±0.2	±0.5	±0.7
Maximum Deviation from Linear Phase 100-1500 MHz (°)	1.8		
Noise Figure Max. (dB)	5.1	5.7	6.4

Characteristic	Typical at 25° C	Guaranteed 0-50° C	Guaranteed −55 — +85° C
Power Output at 1 dB Compression Min. (dBm)	10.5	8.8	6.9
VSWR Input/Output Max.	1.5	2.0	2.0
Second Order Harmonic Intercept Point (dBm)	31.0		
Second Order Two Tone Intercept Point (dBm)	27.0		
Third Order Two Tone Intercept Point (dBm)	20.0		
DC Current (mA)	52.0		

Typical Performance

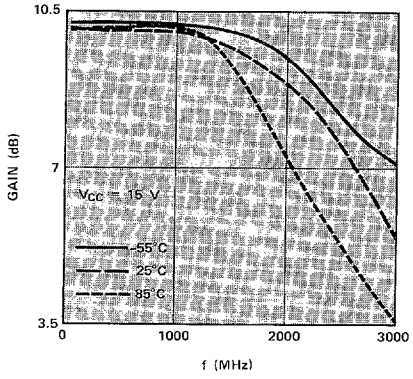

Figure 1. Gain at Three Temperatures

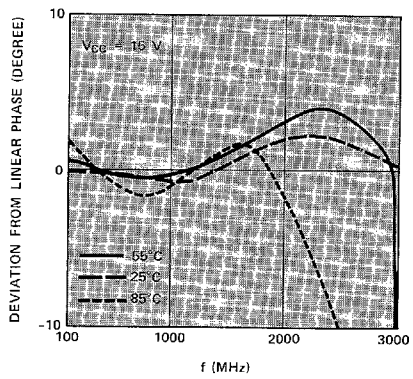

Figure 2. Phase at Three Temperatures

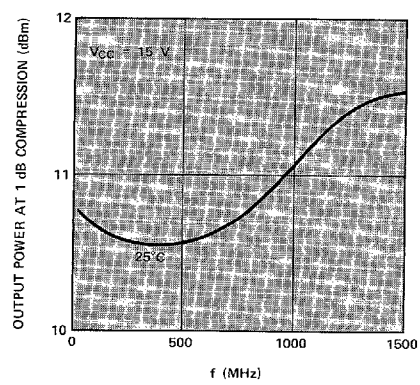

Figure 3. P_{1dB} at 25° C

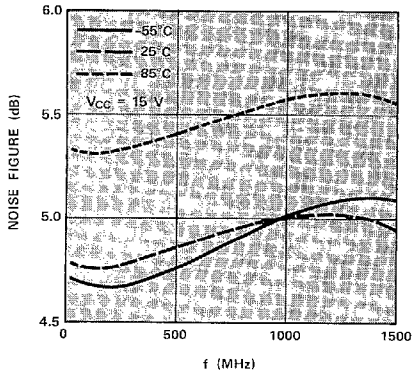

Figure 4. Noise Figure at Three Temperatures

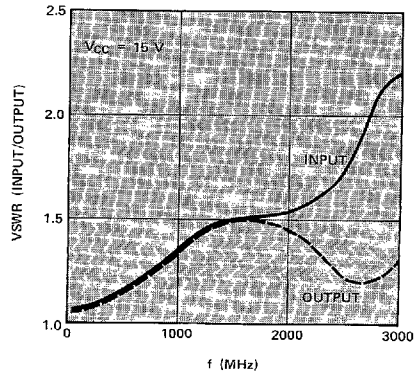

Figure 5. Input/Output VSWR at 25° C

Typical S-Parameters at 25°C

Frequency (MHz)	S_{11}		S_{21}		S_{12}		S_{22}	
	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.	Mag.	Ang.
100	0.015	–102	3.20	172	0.103	2	0.022	–58
200	0.028	–111	3.19	167	0.103	1	0.021	–82
300	0.037	–100	3.18	161	0.104	3	0.047	–81
400	0.051	–99	3.16	154	0.106	3	0.052	–78
500	0.066	–98	3.18	148	0.106	5	0.065	–85
600	0.080	–101	3.15	142	0.108	5	0.085	–87
700	0.098	–105	3.16	135	0.108	6	0.098	–85
800	0.115	–109	3.17	128	0.109	7	0.111	–90
900	0.131	–112	3.15	122	0.111	8	0.132	–92
1000	0.146	–118	3.18	116	0.114	9	0.145	–93
1100	0.162	–124	3.16	109	0.115	10	0.159	–97
1200	0.171	–130	3.14	101	0.120	9	0.174	–103
1300	0.184	–139	3.13	94	0.119	9	0.183	–108
1400	0.192	146	3.07	88	0.122	10	0.197	–112
1500	0.196	–156	3.04	81	0.126	10	0.200	–117
1600	0.204	–166	2.99	74	0.131	10	0.202	–122
1700	0.208	–177	2.96	68	0.134	11	0.209	–129
1800	0.203	171	2.89	61	0.139	9	0.203	–134
1900	0.205	158	2.83	53	0.140	8	0.194	–143
2000	0.208	143	2.79	47	0.147	8	0.187	–150
2100	0.220	129	2.69	40	0.153	6	0.175	–158
2200	0.227	113	2.62	33	0.154	4	0.160	–168
2300	0.238	97	2.55	27	0.159	4	0.139	–179
2400	0.255	83	2.43	20	0.165	2	0.118	165
2500	0.277	68	2.35	14	0.167	–1	0.104	149
2600	0.299	55	2.24	7	0.168	–2	0.090	127
2700	0.327	43	2.16	1	0.175	–3	0.089	103
2800	0.351	31	2.05	–5	0.181	–6	0.095	81
2900	0.371	20	1.95	–11	0.183	–9	0.111	61
3000	0.377	10	1.85	–18	0.182	–11	0.136	51

Typical Performance Parameters at 25°C

Frequency (MHz)	Linear Phase Deviation (deg.)	Relative Phase (deg.)	Gain Deviation (dB)	Gain Absolute (dB)	Group Delay (ns)	Input VSWR	Output VSWR
10				10.10		1.20	1.20
100	1.76	0	0.13	10.09	0.23	1.03	1.05
200	0.06	–5	0.10	10.07	0.14	1.06	1.04
300	–0.51	–11	0.08	10.05	0.17	1.08	1.10
400	–0.01	–18	0.02	9.99	0.20	1.11	1.11
500	–0.05	–25	0.09	10.05	0.18	1.14	1.14
600	–0.02	–30	–0.00	9.96	0.16	1.17	1.19
700	–0.33	–37	0.03	10.00	0.20	1.22	1.22
800	–0.21	–44	0.05	10.02	0.19	1.26	1.25
900	–0.54	–50	–0.01	9.96	0.17	1.30	1.30
1000	–0.99	–57	0.09	10.06	0.17	1.34	1.34
1100	–0.53	–64	0.04	10.00	0.20	1.39	1.38
1200	0.39	–71	–0.03	9.93	0.21	1.41	1.42
1300	0.63	–78	0.05	9.91	0.19	1.45	1.45
1400	0.54	–84	–0.23	9.73	0.18	1.48	1.49
1500	0.60	–91	–0.31	9.66	0.18	1.49	1.50
1600	1.28	–98	–0.45	9.52	0.20	1.51	1.51
1700	0.65	–104	–0.54	9.42	0.17	1.52	1.53
1800	1.12	–111	–0.76	9.21	0.20	1.51	1.51
1900	2.48	–119	–0.93	9.04	0.22	1.51	1.48
2000	1.54	–125	–1.06	8.91	0.16	1.53	1.46
2100	2.35	–132	–1.38	8.59	0.21	1.56	1.42
2200	2.09	–139	–1.60	8.36	0.18	1.59	1.38
2300	1.91	–145	–1.83	8.14	0.18	1.62	1.32
2400	1.92	–152	–2.26	7.71	0.18	1.68	1.27
2500	2.12	–159	–2.54	7.43	0.19	1.77	1.23
2600	2.18	–165	–2.97	6.99	0.18	1.85	1.20
2700	1.37	–171	–3.26	6.70	0.16	1.97	1.20
2800	1.18	–177	–3.75	6.22	0.18	2.08	1.21
2900	0.57	–183	–4.17	5.80	0.17	2.18	1.25
3000	0.55	–190	–4.60	5.37	0.18	2.21	1.32

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HIGH RELIABILITY AMPLIFIER PRODUCTS

HAMP-1002TXV

Since the advantages of products tested to well established reliability screening standards can be of significant value to reliability oriented customers, HP makes available products with Hi-Rel screening and testing patterned after MIL-STD-883, Method 5004.2 latest revision.

The table below depicts the screening program for this family of amplifiers.

100% SCREENING PROGRAM

Screening Test/Inspection	MIL-STD-883 Test Method	Conditions/Comments
1. Internal Visual Inspection (PreCap)	2017	
2. High Temperature Storage (Stabilization Bake)	1008	Condition B $T = 125°C$, $t = 24$ hours
3. Temperature Cycling	1010	Condition B $-55°$ to $125°C$
4. Constant Acceleration	2001	Condition B 20 kg's, Y_1 Direction
5. Pre Burn-in Electrical	—	Per Applicable Device Specification
6. Burn-in	1015	$t = 168$ hours $T_C = 80\%$ of Rated Case Temp. and 80% of Rated Bias Conditions
7. Post Burn-in Electrical (PDA ≤10%)	—	Per Applicable Device Specification
8. Hermeticity Tests (Fine and Gross)	1014	Conditions A and C
9. Final Electrical Tests	—	Per Applicable Device Specification
10. External Visual Inspection	2009	

Note: Additional tests, screens and qualification testings (e.g.: X-ray, PIND, Extended Burn-in, Group A, B, C and D) are available on request.

Ordering Information

Add suffix TXV to standard part number.

Example: Standard Product HAMP-1002
Hi-Rel Product HAMP-1002TXV

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For more information call your local HP sales office listed in the telephone directory white pages. Ask for the Components Department. Or write to Hewlett-Packard: **U.S.A.** — P.O. Box 10301, Palo Alto, CA 94303-0890. **Europe** — P.O. Box 999 1180 AZ Amstelveen, The Netherlands, **Canada** — 6877 Goreway Drive, Mississauga, L4V 1M8, Ontario. **Japan** — Yokogawa-Hewlett-Packard Ltd., 3-29-21, Takaido-Higashi, Suginami-ku, Tokyo 168. **Elsewhere** in the world, write to Hewlett-Packard Intercontinental, 3495 Deer Creek Road, Palo Alto, CA 94304.

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