

Avantek Products

Thin-Film Cascadable Amplifier 5 to 1000 MHz

Technical Data

UTO/UTC 1013 Series

Features

- **Frequency Range:** 5 to 1000 MHz
- **Medium Output Power:** 10.5 dB (Typ)
- **Temperature Compensated**

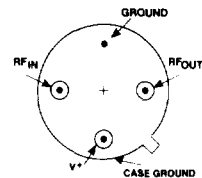
Applications

- **IF/RF Amplification**

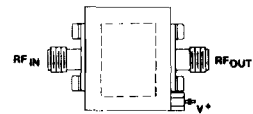
Description

The 1013 Series is a wideband general purpose thin-film bipolar RF amplifier using resistive feedback and active bias for stability over temperature and bias variations. Input and output blocking capacitors couple the RF through the amplifier while output inductance maintains a low VSWR. The 1013 Series amplifiers are available in either the TO-8 hermetic case or connected TC-1 package.

Pin Configuration UTO—TO-8U

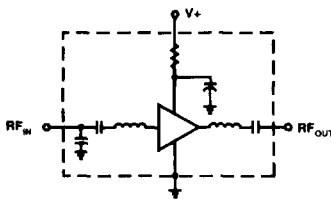


UTC—TC-1



(See Section 5 for detailed case drawings.)

Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+17 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_{IC}	105°C/W
Active Transistor Power Dissipation	200 mW
Junction Temperature Above Case Temperature	21°C
MTBF (MIL-HDBK-217E, A_{TF} @ 90°C)	1,249,000 Hrs.

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

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

Electrical Specifications

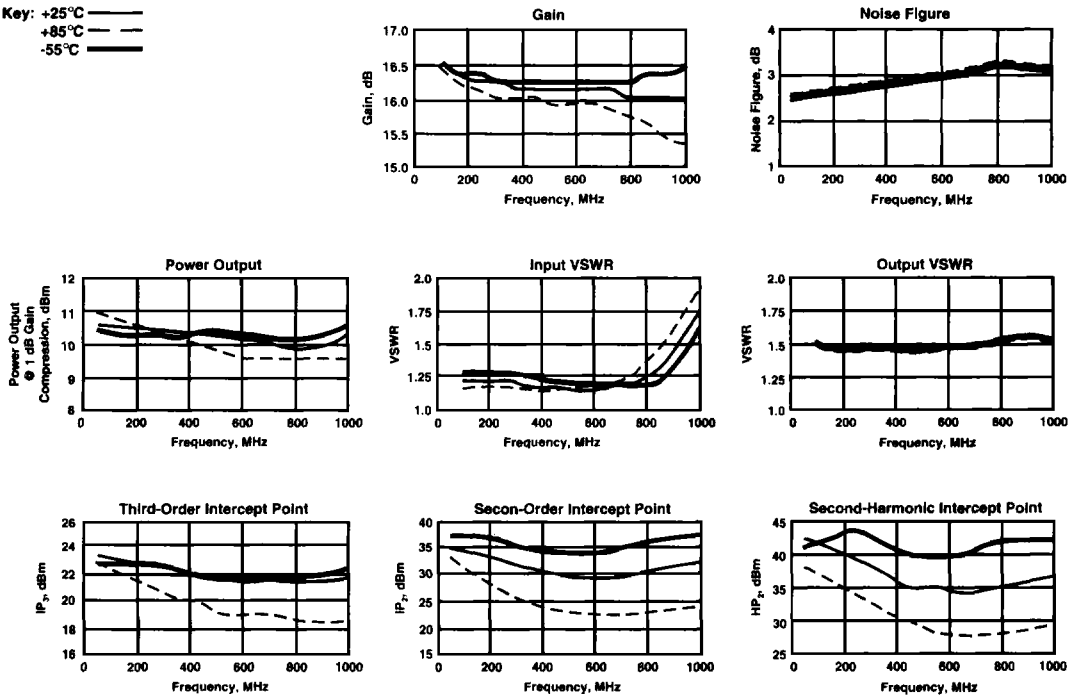
(Measured in 50 Ω system @ +15 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical $T_C = 25^\circ\text{C}$	Guaranteed Specifications		Unit
			$T_C = 0$ to 50°C	$T_C = -55$ to $+85^\circ\text{C}$	
BW	Frequency Range	5-1000	5-1000	5-1000	MHz
GP	Small Signal Gain (Min.)	16.0	15.0	14.0	dB
—	Gain Flatness (Max.)	± 0.5	± 1.0	± 1.0	dB
NF	Noise Figure (Max.)	3.0	4.5	5.0	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)	+10.5	+9.0	+8.0	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	+20.0	—	—	dBm
IP_2	Two Tone 2nd Order Intercept Point	+27.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+33.0	—	—	dBm
I_D	DC Current	29	—	—	mA

1

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

Key: $+25^\circ\text{C}$ —
 $+85^\circ\text{C}$ - - -
 -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
100.0	1.15	16.80	168.54	-1.03	.00	1.44	21.69
150.0	1.13	16.90	163.11	-1.16	.29	1.42	21.87
200.0	1.14	16.91	158.23	-.71	.27	1.42	21.85
250.0	1.13	16.83	153.30	-.33	.27	1.42	22.16
300.0	1.13	16.80	148.47	.16	.27	1.41	22.29
350.0	1.13	16.78	143.57	.59	.29	1.41	22.21
400.0	1.12	16.72	138.41	.73	.29	1.41	22.35
450.0	1.12	16.67	133.32	.96	.30	1.40	22.35
500.0	1.11	16.58	127.63	.59	.29	1.39	22.42
550.0	1.12	16.54	122.75	1.03	.29	1.37	22.54
600.0	1.11	16.53	117.05	.66	.33	1.36	22.86
650.0	1.11	16.59	111.04	-.01	.31	1.35	22.89
700.0	1.12	16.70	105.89	.15	.28	1.33	22.91
750.0	1.13	18.74	100.81	.40	.29	1.31	23.27
800.0	1.16	16.74	95.61	.52	.30	1.28	23.31
850.0	1.19	16.80	90.00	.23	.31	1.24	23.54
900.0	1.24	16.86	64.48	.02	.32	1.21	23.63
950.0	1.81	16.93	78.37	-.77	.35	1.17	23.97
1000.0	1.40	16.99	71.78	-2.04	.38	1.12	24.10
1100.0	1.69	17.16	57.57	—	.43	1.06	24.93
1200.0	2.17	17.19	41.05	—	.45	1.19	26.56
1300.0	2.90	16.56	24.54	—	.51	1.43	29.10
1400.0	3.82	15.39	6.14	—	.48	1.73	32.43
1500.0	4.75	13.80	-9.81	—	.38	2.01	31.88

LINEARIZATION RANGE: 100.0 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
100.00	.101	177.4	16.864	168.8	-22.054	-4.4	.179	169.6
150.00	.092	-178.6	16.695	163.7	-21.943	-4.4	.173	163.5
200.00	.090	-177.3	18.824	158.1	-21.843	-4.8	.176	156.6
250.00	.088	-176.5	16.792	152.6	-22.033	-8.0	.171	151.0
300.00	.080	-177.1	18.834	147.3	-22.121	-9.8	.172	145.4
350.00	.079	-175.3	16.838	142.1	-22.414	-10.8	.171	140.9
400.00	.073	-174.1	16.848	137.2	-22.395	-13.2	.170	135.4
450.00	.087	-170.9	16.789	132.2	-22.276	-15.3	.169	130.8
500.00	.062	-166.8	16.764	127.3	-22.535	-16.7	.167	126.8
550.00	.057	-185.4	16.788	122.3	-22.590	-18.2	.165	122.7
600.00	.054	-157.7	16.748	117.3	-22.645	-20.8	.158	117.8
650.00	.052	-147.8	16.755	112.2	-22.792	-22.6	.153	112.7
700.00	.054	-138.4	16.795	107.1	-22.784	-24.8	.147	108.5
750.00	.057	-128.4	16.829	101.8	-22.980	-28.8	.139	-103.8
800.00	.067	-119.3	16.647	96.4	-23.214	-28.0	.127	98.7
850.00	.082	-115.3	16.902	90.4	-23.532	-30.3	.115	93.6
900.00	.103	-113.0	16.989	84.8	-23.644	-33.2	.100	87.3
950.00	.128	-114.9	17.051	78.6	-23.893	-34.3	.083	80.2
1000.00	.159	-117.3	17.102	71.9	-24.072	-38.4	.064	70.0
1100.00	.246	-127.5	17.216	57.5	-24.932	-41.6	.024	-7.4
1200.00	.358	-143.0	17.186	41.5	-28.478	-46.6	.081	-97.3
1300.00	.478	-161.6	16.709	23.4	-28.700	-46.8	.173	-125.6
1400.00	.596	178.7	15.624	6.0	-31.741	-31.8	.285	-148.0
1500.00	.654	160.2	14.076	-7.7	-31.789	-1.7	.335	-187.4