



Thin-Film Cascadable Amplifier 10 to 150 MHz

Technical Data

UTO/UTC 104 Series

Features

- **Frequency Range: 10 to 150 MHz**
- **High Gain: 25 dB (Typ)**
- **Low Noise: 1.9 dB (Typ)**
- **Medium Power: 11 dBm (Typ)**
- **Temperature Compensated**
- **5 Volt Supply**

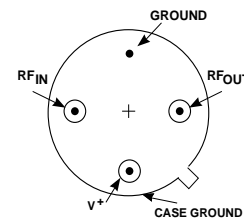
Applications

- **Low Frequency IF Stages**
- **Medical Instruments: Ultra-Sound, Magnetic Resonance**
- **High Efficiency or Battery Powered Systems**

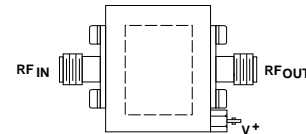
Description

The 104 Series is a single-stage, high-gain silicon bipolar amplifier that incorporates thin-film technology. Low noise figure and high efficiency are the result of an output transformer coupling design and lower supply voltage. Resistive feedback and active bias circuits provide temperature compensation and increased immunity to bias voltage variations. Blocking capacitors couple the RF through the amplifier, while a low VSWR is maintained through inductive tuning. The 104 Series is available in either the TO-8 hermetic package or the connected TC-1A package.

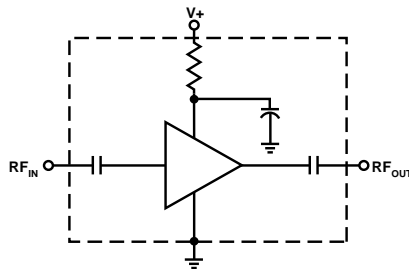
Pin Configuration UTO—TO-8T



UTC—TC-1A



Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	10 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°C/W
Active Transistor Power Dissipation	47 mW
Junction Temperature Above Case Temperature	5°C
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	848,400 Hrs.

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

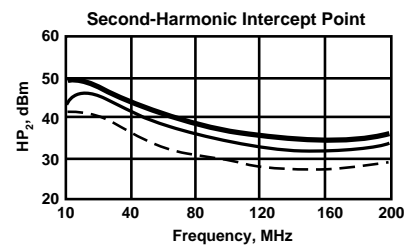
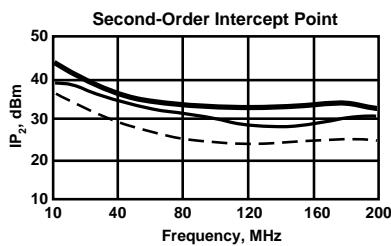
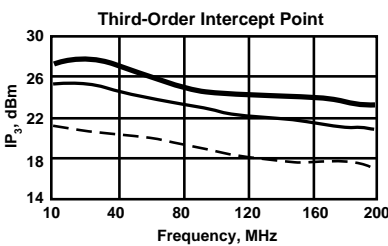
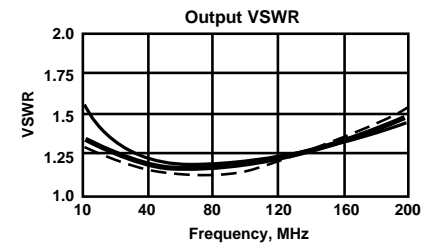
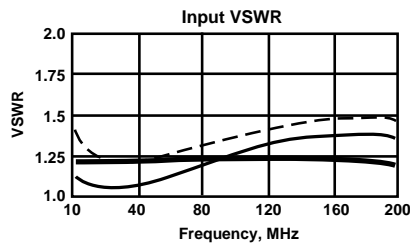
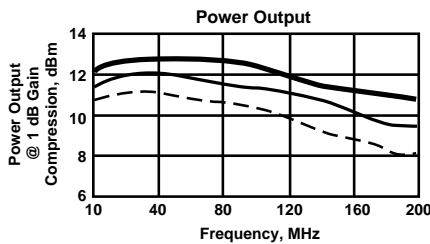
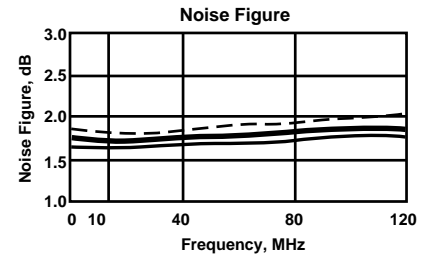
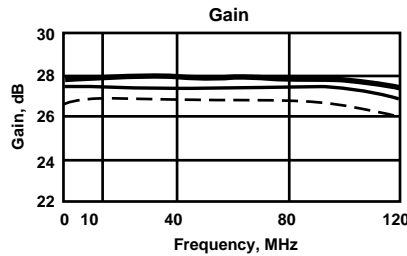
Electrical Specifications

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

Symbol	Characteristic	Typical $T_C = 25^\circ\text{C}$	Guaranteed Specifications		Unit
			$T_C = 0 \text{ to } 50^\circ\text{C}$	$T_C = -55 \text{ to } +85^\circ\text{C}$	
BW	Frequency Range	5-150	10-150	10-150	MHz
GP	Small Signal Gain (Min.)	25.0	24.5	23.0	dB
—	Gain Flatness (Max.)	± 0.3	± 1.0	± 1.0	dB
NF	Noise Figure (Max.)	1.9	2.3	2.6	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)	+10.5	+9.0	+8.0	dBm
—	Input VSWR (Max.)	1.4:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	1.4:1	2.0:1	2.0:1	—
IP_3	Two Tone 3rd Order Intercept Point	+22.0	—	—	dBm
IP_2	Two Tone 2nd Order Intercept Point	+29.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+35.0	—	—	dBm
I_D	DC Current	20	—	—	mA

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

Key: +25°C —
+85°C - -
-55°C = =



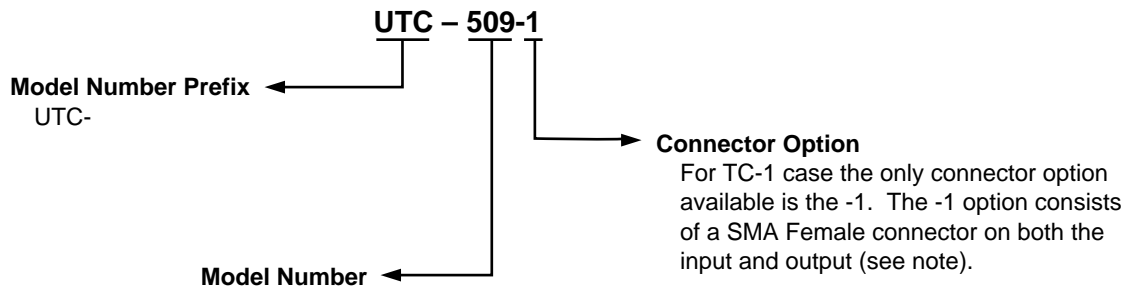
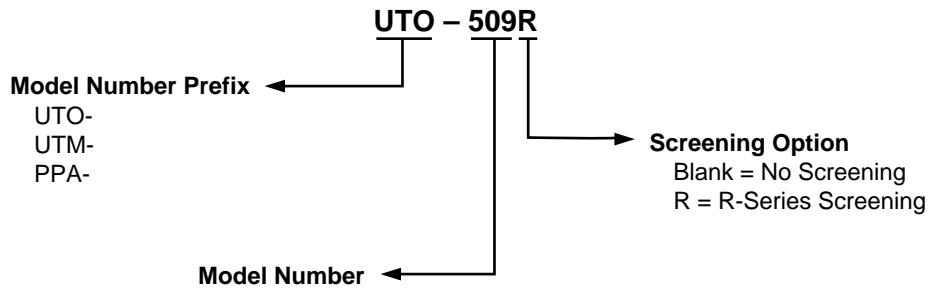
Automatic Network Analyzer Measurements (Typical production unit @ +25°C ambient)

S-Parameters
Bias = 5 Volts, Current = 20.1 mA

Freq. GHz	S ₁₁		S ₂₁		S ₁₁		S ₁₁		GPDEL (ns)	PHASE DEV (deg)
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang		
5	.17	-79.1	25.7	-162.9	-30.5	18.6	.22	151.01	6.51	
10	.07	-81.4	25.8	-174.4	-30.1	9.7	.15	152.04	6.51	
20	.02	-64.3	25.8	177.1	-30.0	5.8	.12	158.36	2.41	.44
30	.02	23.2	25.9	171.6	-29.9	4.6	.11	161.11	1.53	-.34
40	.03	46.0	25.9	166.8	-29.9	4.5	.10	162.81	1.33	-.47
50	.05	46.3	25.9	162.3	-29.8	4.6	.09	164.29	1.26	-.32
60	.07	42.9	25.9	157.8	-29.8	4.8	.09	166.32	1.24	-.10
70	.08	38.1	25.9	153.4	-29.8	5.2	.08	169.32	1.24	.12
80	.09	32.8	25.9	148.8	-29.8	5.6	.08	173.39	1.25	.27
90	.11	26.5	25.9	144.3	-29.8	6.2	.08	178.63	1.28	.33
100	.12	20.3	25.9	139.6	-28.7	6.8	.08	-175.23	1.29	.34
110	.13	13.6	25.8	134.9	-29.7	7.4	.08	-169.11	1.32	.27
120	.14	7.0	25.7	130.1	-29.6	7.8	.09	-164.00	1.34	.13
130	.14	.3	25.6	125.2	-29.6	8.9	.10	-160.48	1.34	-.02
140	.15	-6.5	25.5	120.4	-29.5	9.6	.11	-158.56	1.35	-.24
150	.15	-13.7	25.3	115.5	-29.4	10.4	.12	-158.13	1.34	-.39
160	.16	-20.7	25.1	110.7	-28.3	11.1	.14	-158.77	1.33	
170	.16	-27.6	24.9	106.0	-29.1	11.8	.15	-160.39	1.31	
180	.16	-34.5	24.6	101.4	-28.9	12.4	.17	-162.71	1.28	
190	.16	-41.3	24.3	96.9	-28.7	13.3	.18	-165.66	1.26	
200	.16	-48.2	24.0	92.5	-28.6	13.5	.20	-168.78	1.21	
210	.15	-55.1	23.7	88.3	-28.3	13.7	.21	-172.22	1.16	
220	.15	-61.7	23.3	84.2	-28.1	13.9	.23	-175.66	1.12	
230	.15	-68.5	22.9	80.4	-27.9	13.7	.24	-179.32	1.08	
240	.14	-75.0	22.6	76.6	-27.7	13.7	.25	177.14	1.04	
250	.14	-61.8	22.2	73.1	-27.5	13.6	.26	173.54	.99	
260	.13	-88.4	21.8	69.6	-27.3	12.8	.28	169.97	.95	
270	.13	-95.1	21.4	66.4	-27.1	12.5	.29	166.40	.91	
280	.12	-102.0	21.1	63.2	-26.9	12.0	.30	162.92	.88	
290	.12	-109.0	20.7	60.1	-26.7	11.3	.31	159.51	.84	
300	.12	-115.8	20.3	57.2	-26.5	10.7	.32	156.10	.82	
310	.11	-123.0	19.9	54.4	-26.3	9.9	.33	152.80	.78	
320	.11	-130.3	19.5	51.7	-26.2	8.9	.33	149.57	.76	
330	.11	-137.5	19.2	49.0	-26.0	8.0	.34	146.36	.73	
340	.10	-144.8	18.8	46.4	-25.8	7.2	.35	143.23	.72	
350	.10	-151.8	18.4	43.9	-25.7	6.2	.36	140.16	.70	
360	.10	-158.9	18.1	41.5	-25.6	5.2	.37	137.16	.67	
370	.10	-166.1	17.7	39.2	-25.4	4.0	.38	134.21	.65	
380	.10	-173.2	17.4	36.9	-25.3	3.2	.38	131.32	.65	
390	.10	-179.7	17.0	34.6	-25.2	2.1	.39	129.46	.62	
400	.10	174.0	16.7	32.4	-25.1	1.0	.40	125.66	.61	
410	.11	167.8	16.3	30.2	-25.0	-.2	.40	122.93	.60	
420	.11	161.9	16.0	28.1	-24.9	-1.4	.41	120.19	.59	
430	.11	156.3	15.7	26.0	-24.8	-2.5	.42	117.49	.58	
440	.11	150.9	15.3	24.0	-24.7	-3.6	.43	114.85	.57	
450	.12	145.9	15.0	22.0	-24.7	-5.0	.43	112.24	.54	
460	.12	141.1	14.7	20.0	-24.6	-6.2	.44	109.65	.55	
470	.12	136.3	14.3	18.1	-24.6	-7.4	.45	107.08	.55	
480	.13	132.1	14.0	16.2	-24.5	-8.5	.45	104.61	.53	
490	.13	127.7	13.7	14.3	-24.5	-9.8	.46	102.12	.53	
500	.14	123.9	13.4	12.4	-24.4	-11.1	.46	99.69	.51	

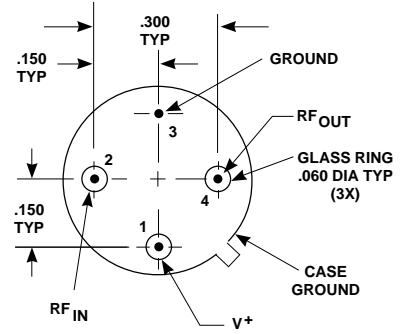
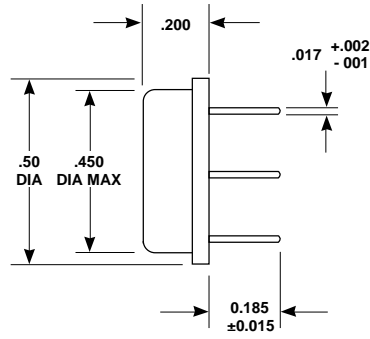
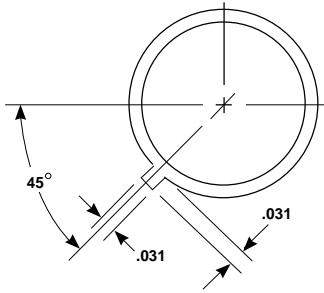
LINEARIZATION RANGE: 10.0 to 150.0 MHz

Product Options



Note: R-Series screening is not available in the TC-1 case as the case is non-hermetic.

**Case Drawings
TO-8T**



APPROXIMATE WEIGHT 2.1 GRAMS

- NOTES (UNLESS OTHERWISE SPECIFIED):**
 1. DIMENSIONS ARE SPECIFIED IN INCHES
 2. TOLERANCES: xx ± .02
 xxx ± .010

TC-1A

