



# 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**

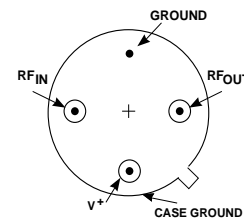
#### Applications

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

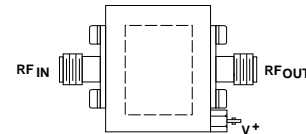
#### Description

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.

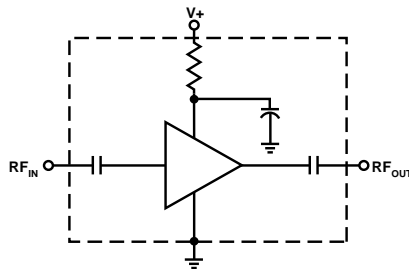
#### Pin Configuration UTO—TO-8T



#### 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 Characteristics<sup>1</sup>

$\theta_{JC}$	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

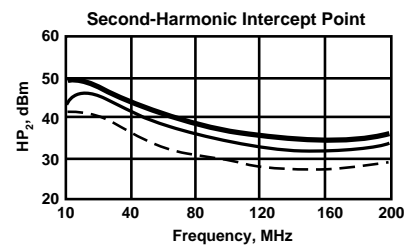
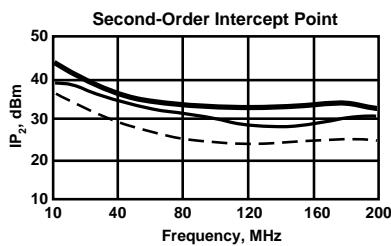
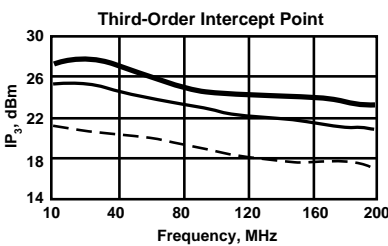
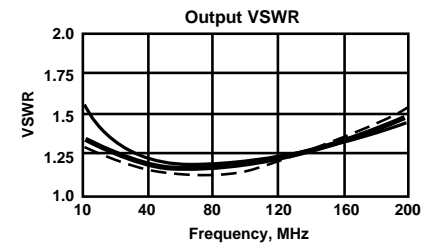
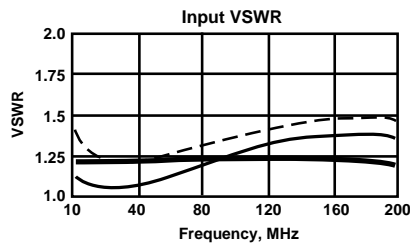
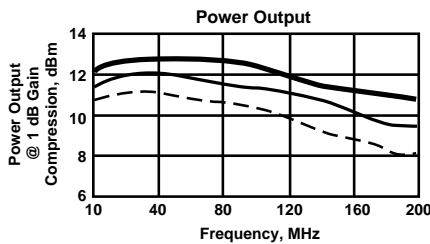
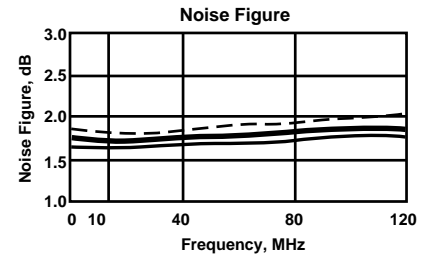
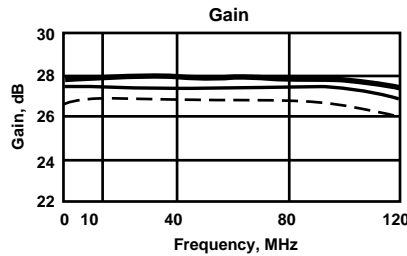
## Electrical Specifications

(Measured in 50  $\Omega$  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.)	$\pm 0.3$	$\pm 1.0$	$\pm 1.0$	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 —



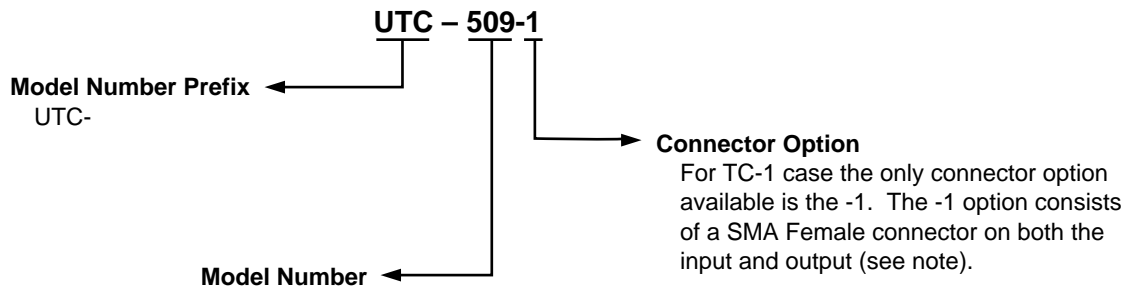
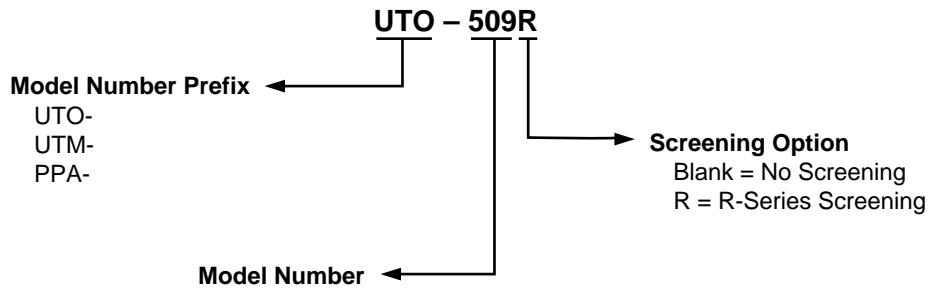
**Automatic Network Analyzer Measurements** (Typical production unit @ +25°C ambient)

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

Freq. GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>11</sub>		S <sub>11</sub>		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	

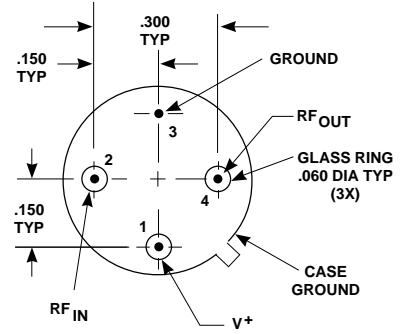
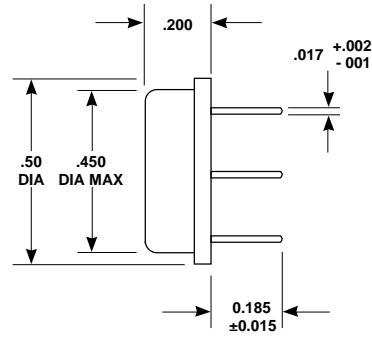
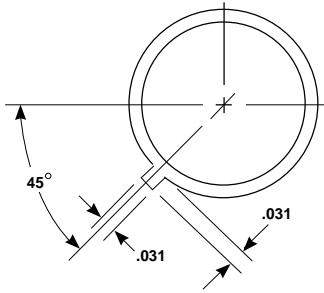
LINEARIZATION RANGE: 10.0 to 150.0 MHz

## 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

