

Avantek Products

# Thin-Film Cascadable Amplifier 10 to 100 MHz

## Technical Data

### UTO/UTC 103 Series

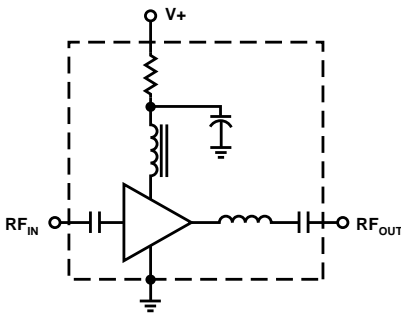
#### Features

- **Frequency Range: 10 to 100MHz**
- **High Gain: 27 dB (Typ)**
- **Low Noise: 1.6 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**

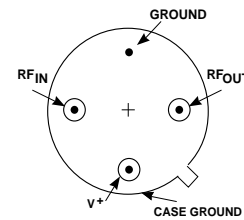
#### Schematic



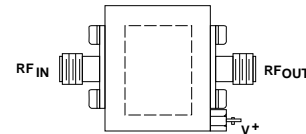
#### Description

The 103 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 low supply voltage. Resistive feedback and active bias circuits provide temperature compensation and increased immunity to bias voltage variations. The 103 Series is available in either the TO-8 hermetic package or the connected TC-1 package.

#### Pin Configuration UTO—TO-8T



#### UTC—TC-1



#### 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)	892,100 Hrs.

Note 1: For further information, see Reliability Screening, Pub. 5963-3240E.

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

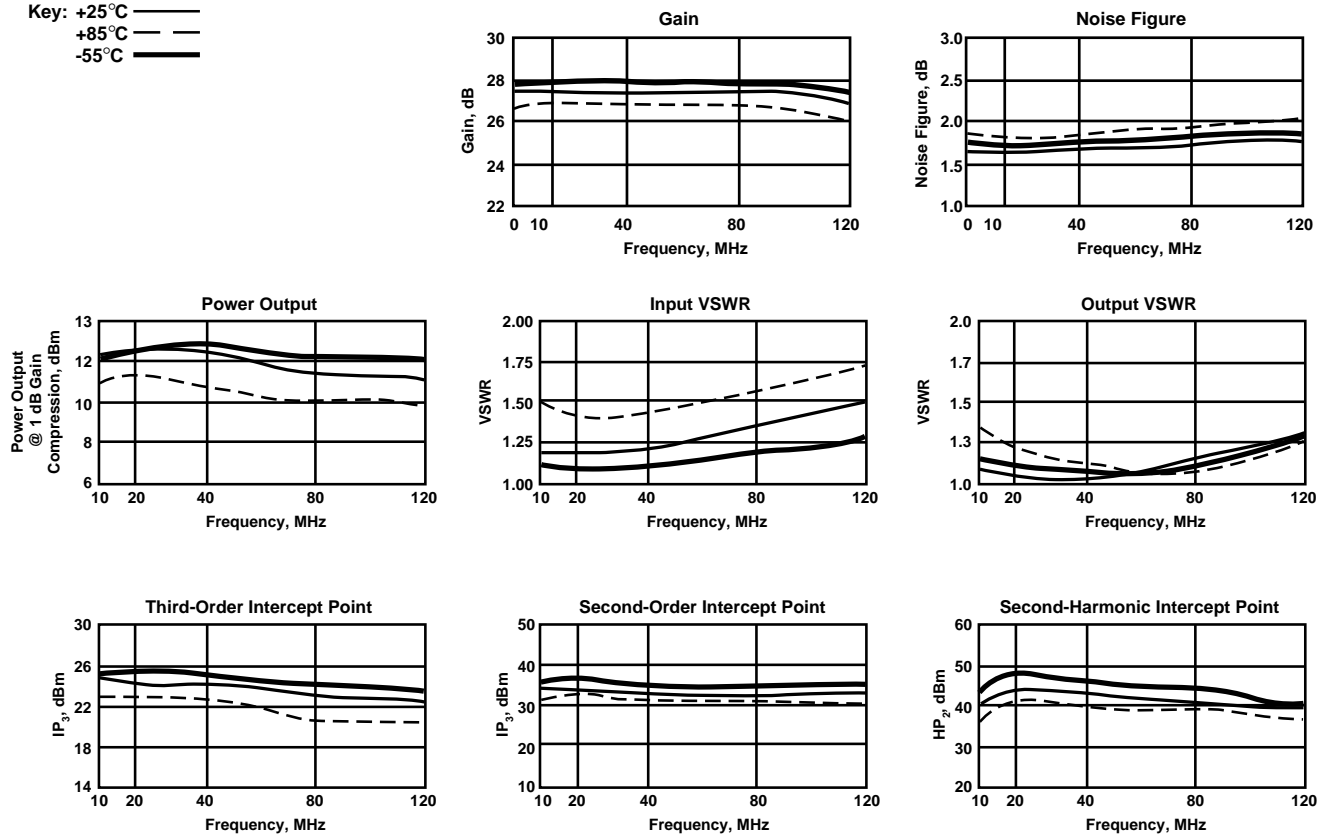
## Electrical Specifications

(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	5-120	10-100	10-100	MHz
GP	Small Signal Gain (Min.)	27.0	25.5	24.5	dB
—	Gain Flatness (Max.)	$\pm 0.2$	$\pm 1.0$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	1.6	2.1	2.4	dB
P <sub>1dB</sub>	Power Output @ +1 dB Comp. (Min.)	+11.0	+9.5	+9.0	dBm
—	Input VSWR (Max.)	1.5:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	1.3:1	2.0:1	2.0:1	—
IP <sub>3</sub>	Two Tone 3rd Order Intercept Point	+22.0	—	—	dBm
IP <sub>2</sub>	Two Tone 2nd Order Intercept Point	+33.0	—	—	dBm
HP <sub>2</sub>	One Tone 2nd Harmonic Intercept Point	+38.0	—	—	dBm
I <sub>D</sub>	DC Current	15	—	—	mA

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

Key: +25°C —  
+85°C - -  
-55°C —



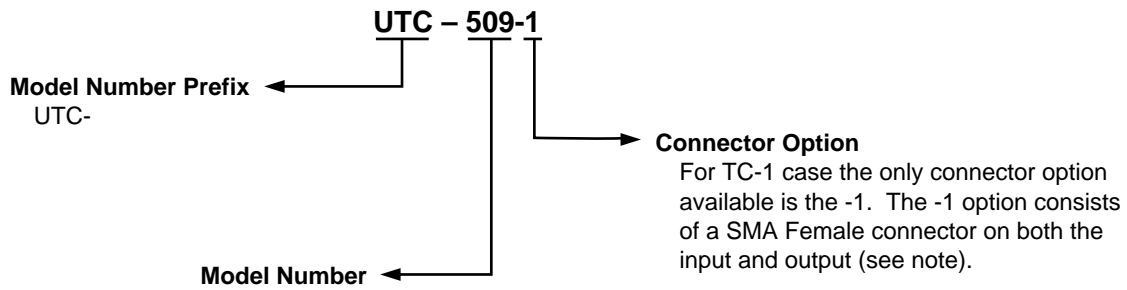
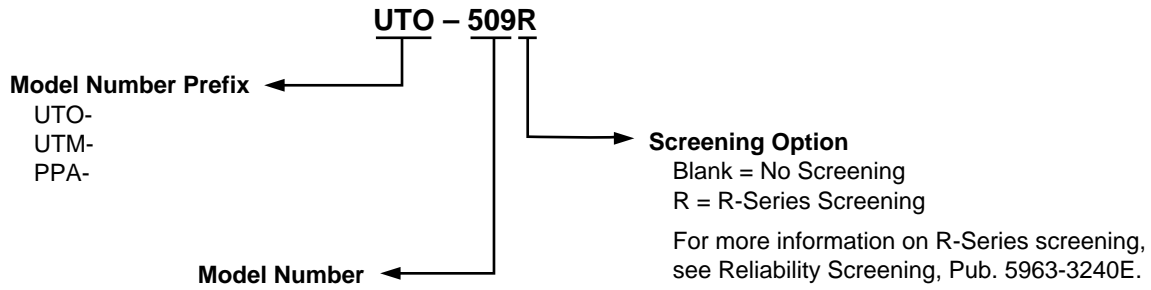
**Automatic Network Analyzer Measurements** (Typical production unit @ +25°C ambient)

**S-Parameters**
**Bias = 5 Volts, Current = 15.1 mA**

Freq. MHz	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	.09	-39.4	27.1	-171.5	-31.4	10.6	.06	155.97	4.27	
10	.07	-16.9	27.1	-179.2	-31.2	5.9	.03	151.84	4.27	1.48
20	.09	.5	27.1	173.6	-31.2	3.5	.02	154.30	2.00	-.50
30	.09	7.2	27.1	168.2	-31.2	2.8	.02	157.83	1.51	-.71
40	.10	9.1	27.1	163.1	-31.2	2.7	.01	175.93	1.41	-.58
50	.11	9.2	27.1	158.1	-31.3	3.4	.01	-97.59	1.39	-.31
60	.13	5.2	27.1	153.1	-31.3	3.9	.02	-71.26	1.39	-.07
70	.14	.9	27.1	148.1	-31.3	4.4	.03	-70.16	1.40	.12
80	.16	-3.9	27.0	142.9	-31.3	4.9	.04	-72.65	1.43	.19
90	.17	-9.7	26.9	137.7	-31.3	6.1	.05	-77.50	1.45	.20
100	.18	-15.5	26.8	132.5	-31.4	7.2	.08	-83.15	1.46	.18
110	.19	-22.1	26.7	127.2	-31.3	8.6	.09	-99.07	1.47	
120	.20	-28.6	26.5	121.9	-31.3	10.2	.11	-95.21	1.46	
130	.21	-35.1	26.2	116.8	-31.1	11.3	.13	-101.44	1.43	
140	.22	-41.5	26.0	111.7	-31.0	12.7	.15	-107.59	1.42	
150	.22	-47.5	25.7	106.7	-30.8	14.4	.16	-113.73	1.36	
160	.23	-53.8	25.4	102.0	-30.6	15.4	.18	-119.67	1.33	
170	.23	-58.7	25.0	97.4	-30.4	16.2	.19	-125.46	1.27	
180	.23	-65.2	24.7	93.0	-30.1	16.7	.21	-130.99	1.21	
190	.23	-70.6	24.3	88.8	-29.8	17.5	.22	-136.31	1.16	
200	.23	-75.9	23.9	84.8	-29.5	17.6	.23	-141.40	1.11	
210	.22	-80.6	23.5	81.1	-29.3	17.7	.24	-146.36	1.05	
220	.22	-85.3	23.1	77.4	-29.0	17.4	.25	-150.94	1.01	
230	.22	-89.6	22.8	74.0	-29.7	17.2	.26	-155.41	.96	
240	.21	-93.8	22.4	70.7	-28.4	16.7	.27	-159.63	.92	
250	.21	-97.9	22.0	67.6	-28.2	16.6	.27	-163.73	.87	
260	.20	-101.6	21.6	64.6	-28.0	15.8	.28	-167.65	.84	
270	.20	-105.0	21.2	61.7	-27.7	15.2	.29	-171.42	.80	
280	.20	-109.4	20.9	58.9	-27.5	14.3	.29	-175.08	.78	
290	.19	-111.7	20.5	56.2	-27.3	13.6	.30	-178.60	.75	
300	.19	-114.8	20.2	53.5	-27.1	12.8	.31	178.00	.74	
310	.18	-117.6	19.8	51.0	-26.9	11.9	.31	174.64	.71	
320	.18	-120.5	19.5	48.5	-26.8	10.6	.32	171.45	.69	
330	.17	-123.1	19.2	46.0	-26.6	9.7	.32	169.25	.67	
340	.17	-125.7	18.8	43.6	-26.4	8.7	.33	165.17	.69	
350	.16	-128.1	18.5	41.3	-26.2	7.6	.34	162.18	.65	
360	.15	-130.2	18.2	39.0	-26.1	6.5	.34	159.25	.64	
370	.15	-132.5	17.9	36.7	-25.9	5.2	.35	156.37	.63	
380	.14	-134.5	17.6	34.5	-25.8	4.1	.35	153.60	.62	
390	.14	-136.3	17.3	32.3	-25.7	3.2	.36	150.86	.61	
400	.13	-138.0	17.0	30.1	-25.6	1.7	.36	149.12	.60	
410	.13	-139.5	16.8	28.0	-25.5	.4	.37	145.49	.60	
420	.12	-140.8	16.5	25.8	-25.4	-.8	.37	142.84	.59	
430	.12	-142.1	16.2	23.7	-25.3	-2.1	.38	140.27	.59	
440	.11	-143.2	15.9	21.6	-25.2	-3.4	.38	137.71	.59	
450	.10	-144.0	15.7	19.6	-25.1	-4.7	.39	135.20	.56	
460	.10	-144.2	15.4	17.5	-25.0	-6.1	.39	132.71	.57	
470	.09	-144.9	15.1	15.4	-25.0	-7.3	.40	130.24	.59	
480	.09	-144.4	14.9	13.4	-24.9	-9.8	.40	127.84	.56	
490	.08	-144.3	14.6	11.4	-24.8	-10.0	.41	125.43	.56	
500	.08	-143.0	14.4	9.4	-24.7	-11.3	.41	123.06	.55	

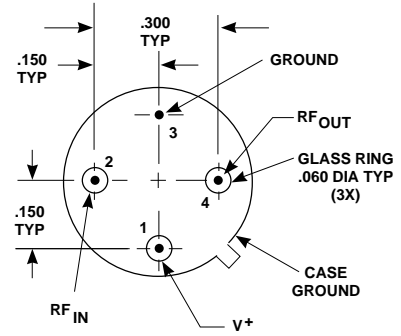
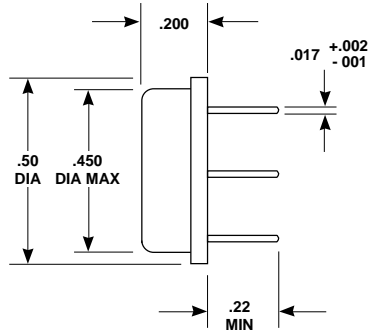
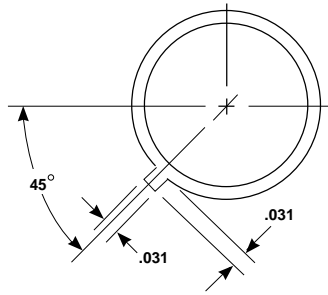
LINEARIZATION RANGE: 10.0 to 100.0 MHz

## Product Options



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

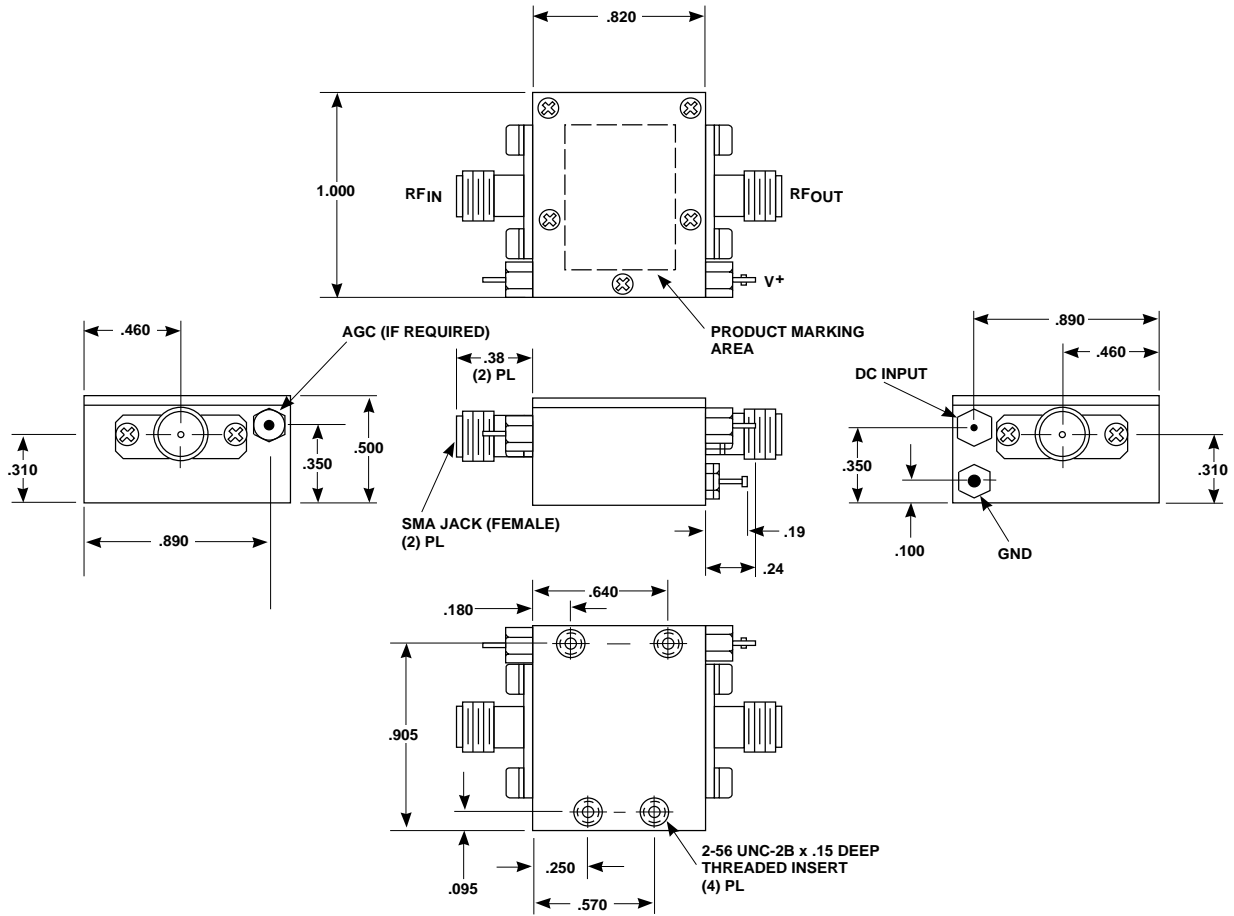
**Case Drawings  
TO-8T**



APPROXIMATE WEIGHT 2.1 GRAMS

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

## Case Drawings TC-1



TYPICAL WEIGHT WITH CONNECTORS = 21.5 GRAMS

- NOTES: 1. THE TC-1 CASE IS A NON-HERMETIC CASE.  
2. THE ONLY CONNECTOR OPTION AVAILABLE FOR THE TC-1 CASE IS THE -1, SMA FEMALE CONNECTORS AT BOTH INPUT AND OUTPUT PORTS.

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

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