



# Thin-Film Cascadable Amplifier 5 to 500 MHz

## Technical Data

### UTO/UTC 503 Series

#### Features

- **Frequency Range: 5 to 500 MHz**
- **Medium Output Power: +15.0 dBm (Typ)**
- **24-Volt Supply**
- **Temperature Compensated**

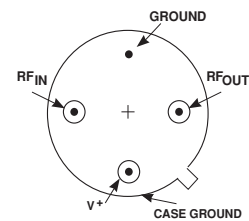
#### Applications

- **IF/RF Amplification**

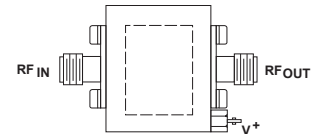
#### Description

The 503 Series is a thin-film bipolar RF amplifier that uses resistive feedback and active bias. Input/output blocking capacitors couple the RF through the circuit and inductive tuning provides low VSWR. The 503 Series is available in either the TO-8 hermetic case or connected TC-1A package.

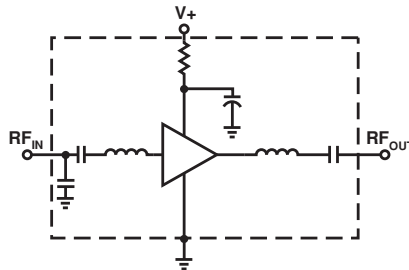
#### Pin Configuration UTO—TO-8U



#### UTC—TC-1A



#### Schematic



#### Maximum Ratings

Parameter	Maximum
DC Voltage	+26 Volts
Continuous RF Input Power	+13 dBm
Operating Case Temperature	-55 to +115°C
Storage Temperature	-62 to +150°C
“R” Series Burn-In Temperature	+115°C

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

$\theta_{JC}$	85°C/W
Active Transistor Power Dissipation	360 mW
Junction Temperature Above Case Temperature	31°C
MTBF (MIL-HDBK-217E, $A_{UF}$ @ 90°C)	1,178,000 Hrs.

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

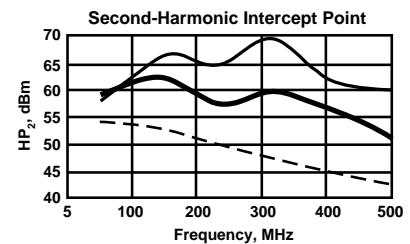
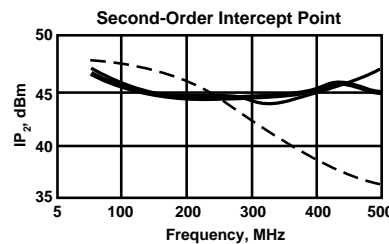
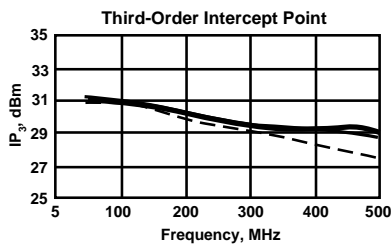
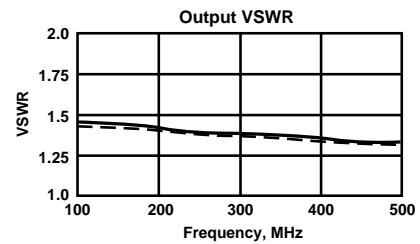
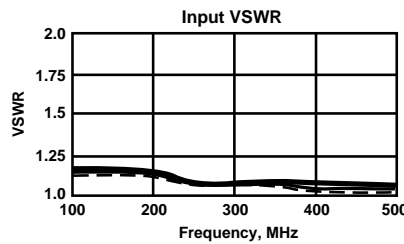
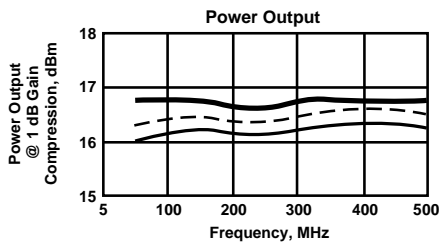
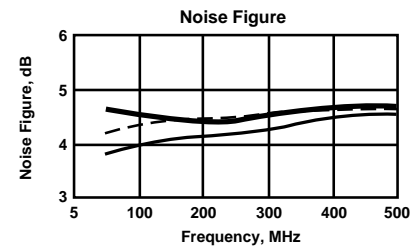
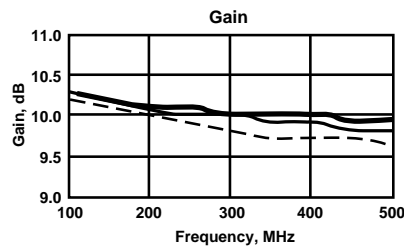
## Electrical Specifications

(Measured in 50  $\Omega$  system @ +24 VDC nominal unless otherwise noted)

Symbol	Characteristic	Typical $T_C = 25^\circ\text{C}$	Guaranteed Specifications		Unit
			$T_C = 0$ to $50^\circ\text{C}$	$T_C = -55$ to $+85^\circ\text{C}$	
BW	Frequency Range	5-500	5-500	5-500	MHz
GP	Small Signal Gain (Min.)	10.0	9.0	8.5	dB
—	Gain Flatness (Max.)	$\pm 0.5$	$\pm 1.0$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	4.5	5.0	6.0	dB
P <sub>1dB</sub>	Power Output @ +1 dB Comp. (Min.)	+15	+13.0	+13.0	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 <sub>3</sub>	Two Tone 3rd Order Intercept Point	+29.0	—	—	dBm
IP <sub>2</sub>	Two Tone 2nd Order Intercept Point	+42.0	—	—	dBm
HP <sub>2</sub>	One Tone 2nd Harmonic Intercept Point	+48.0	—	—	dBm
I <sub>D</sub>	DC Current	50	—	—	mA

## Typical Performance Over Temperature (@ +24 VDC unless otherwise noted)

Key: +25°C ———  
+85°C - - - -  
-55°C ———



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

**Numerical Readings**
**Bias = 24.00 Volts**

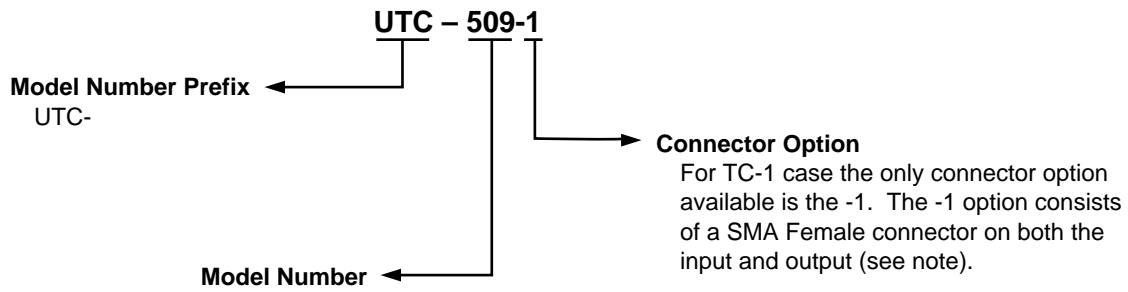
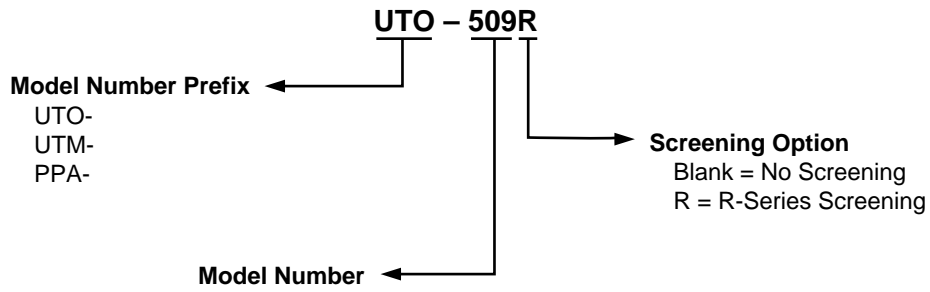
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.16	10.90	163.43	.08	—	1.09	16.96
150.0	1.18	10.79	155.51	.26	.45	1.10	16.96
200.0	1.23	10.82	147.23	.09	.47	1.11	16.94
250.0	1.28	10.85	138.76	-.28	.46	1.12	16.96
300.0	1.33	10.98	130.74	-.19	.45	1.14	16.98
350.0	1.39	11.11	122.54	-.30	.45	1.15	17.01
400.0	1.48	11.24	114.64	-.10	.44	1.16	17.02
450.0	1.57	11.39	106.81	.16	.44	1.17	17.06
500.0	1.68	11.60	98.81	.27	.45	1.18	17.10
550.0	1.83	11.82	90.45	—	.46	1.19	17.19
600.0	1.98	12.06	82.09	—	.49	1.20	17.32
650.0	2.18	12.36	72.90	—	.53	1.19	17.47
700.0	2.39	12.72	63.04	—	.57	1.19	17.67
750.0	2.66	13.13	52.30	—	.64	1.19	17.92
800.0	3.07	13.57	40.09	—	.73	1.18	18.25

LINEARIZATION RANGE: 100.0 to 500.0 MHz

**S-Parameters**
**Bias = 24.00 Volts**

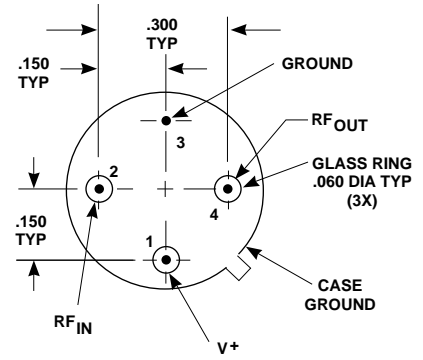
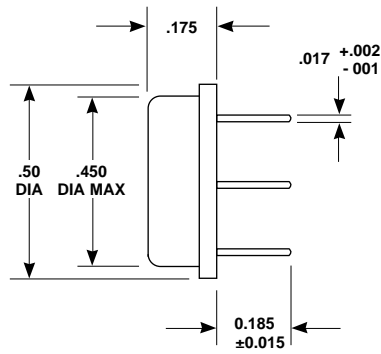
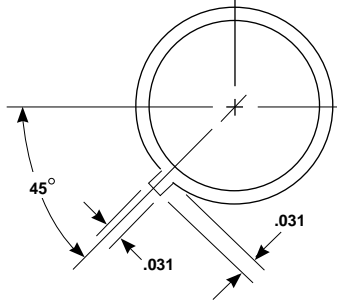
FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.061	174.0	9.07	162.5	-16.13	-7.6	.149	162.1
200.00	.046	170.6	9.62	148.9	-16.25	-15.7	.153	144.9
300.00	.027	176.0	9.72	133.2	-16.25	-24.6	.164	128.4
400.00	.018	-116.4	9.70	117.0	-16.54	-33.3	.170	114.3
500.00	.045	-87.7	9.97	101.6	-16.48	-44.1	.177	103.3
600.00	.079	-97.1	10.20	85.6	-16.77	-53.6	.176	94.2
700.00	.105	-113.5	10.59	67.7	-17.14	-62.5	.172	85.7
800.00	.113	-143.2	11.04	49.5	-17.85	-72.0	.160	81.4
900.00	.098	154.3	11.65	26.2	-18.56	-80.7	.139	80.3
1000.00	.189	63.2	11.88	-1.3	-19.02	-85.5	.118	95.8

## Product Options



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

**Case Drawings  
TO-8U**



APPROXIMATE WEIGHT 2.1 GRAMS

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

# TC-1A

