



# Thin-Film Cascadable Amplifier 5 to 500 MHz

## Technical Data

### UTO/UTC 513 Series

#### Features

- **Frequency Range: 5 to 500 MHz**
- **Medium Power Output: +16 dB (Typ)**
- **Medium Gain: 17 dB (Typ)**
- **Temperature Compensated**
- **24-Volt Supply**

#### Applications

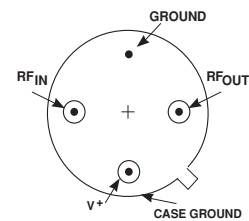
- **IF/RF Amplification**

#### Description

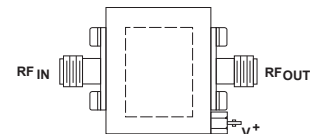
The 513 Series is a thin-film bipolar RF amplifier that uses resistive feedback and active bias to provide temperature compensation and increased immunity to bias voltage variations. Blocking capacitors couple the RF through the amplifier. The 513 Series is available in either the TO-8 hermetic case or connected TC-1A package.

#### Pin Configuration

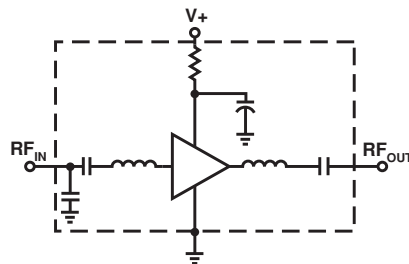
##### UTO—TO-8U



##### UTC—TC-1A



#### Schematic



#### Maximum Ratings

Parameter	Maximum
DC Voltage	+26 Volts
Continuous RF Input Power	+13 dBm
Operating Case Temperature	-55 to +125°C
Storage Temperature	-62 to +150°C
“R” Series Burn-In Temperature	+125°C

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

$\theta_{JC}$	85°C/W
Active Transistor Power Dissipation	260 mW
Junction Temperature Above Case Temperature	22°C
MTBF (MIL-HDBK-217E, $A_{UF}$ @ 90°C)	1,221,000 Hrs.

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

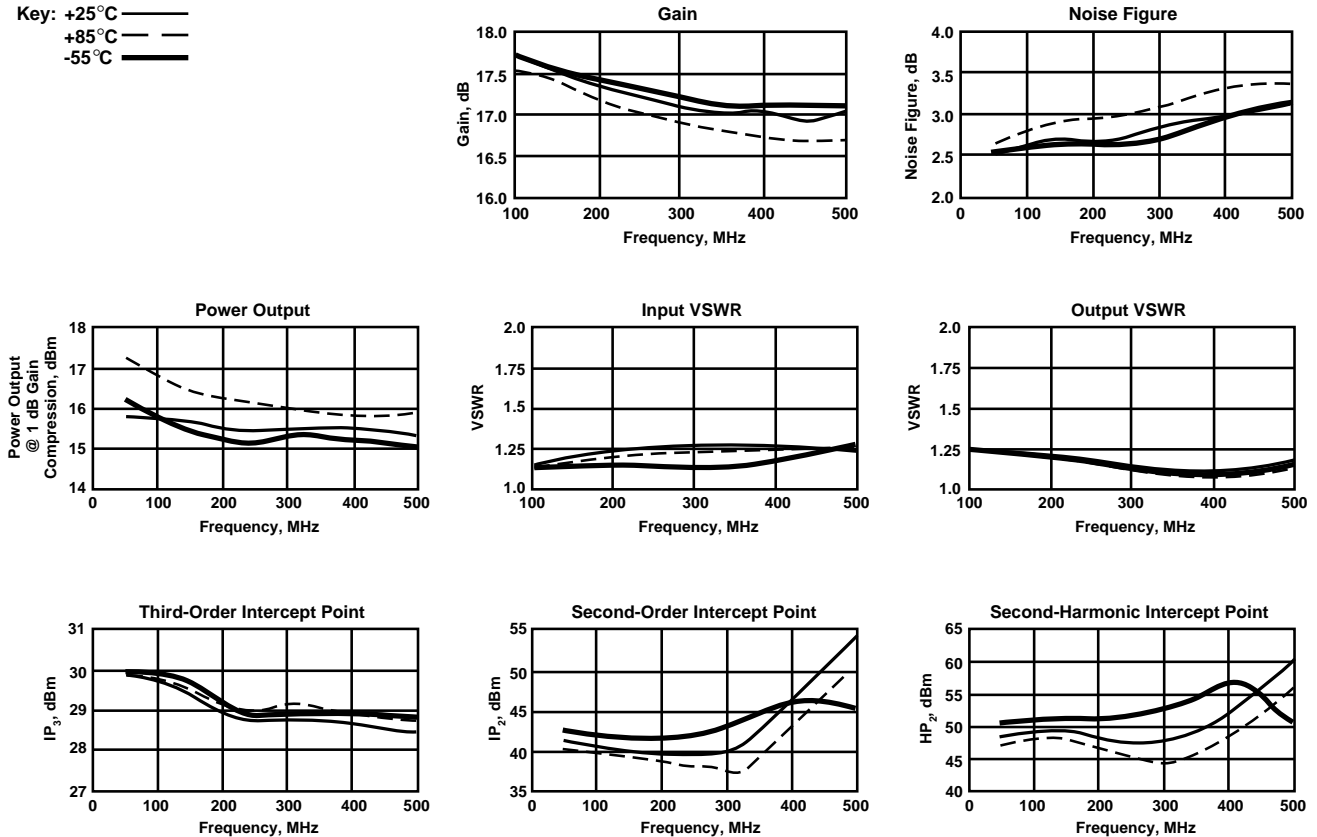
## Electrical Specifications

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

Symbol	Characteristic	Typical $T_C = 25^\circ\text{C}$	Guaranteed Specifications		Unit
			$T_C = 0 \text{ to } 50^\circ\text{C}$	$T_C = -55 \text{ to } +85^\circ\text{C}$	
BW	Frequency Range	5-500	5-500	5-500	MHz
GP	Small Signal Gain (Min.)	17.0	16.0	15.5	dB
—	Gain Flatness (Max.)	$\pm 0.5$	$\pm 1.0$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	3.0	4.0	5.0	dB
P <sub>1dB</sub>	Power Output @ +1 dB Comp. (Min.)	+16.0	+14.0	+14.0	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	+29.0	—	—	dBm
IP <sub>2</sub>	Two Tone 2nd Order Intercept Point	+40.0	—	—	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**

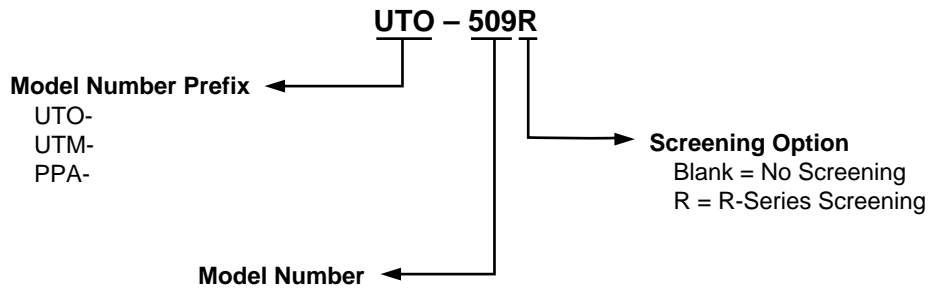
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.17	17.18	151.55	-1.67	—	1.06	22.61
150.0	1.27	17.02	137.68	-.74	.79	1.08	22.75
200.0	1.36	17.00	123.18	-.42	.79	1.10	22.89
250.0	1.46	17.01	109.32	.53	.76	1.12	22.97
300.0	1.54	17.07	95.67	1.71	.77	1.14	23.18
350.0	1.60	17.10	81.47	2.32	.81	1.15	23.30
400.0	1.59	17.19	66.50	2.17	.88	1.18	23.35
450.0	1.50	17.27	49.83	.31	1.00	1.24	23.17
500.0	1.40	17.32	30.47	-4.21	1.16	1.34	22.66
550.0	1.59	16.95	8.04	—	1.29	1.50	22.00
600.0	2.38	15.83	-15.82	—	1.28	1.69	21.58
650.0	3.83	13.95	-37.86	—	1.11	1.84	21.84

LINEARIZATION RANGE: 100.0 to 500.0 MHz

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

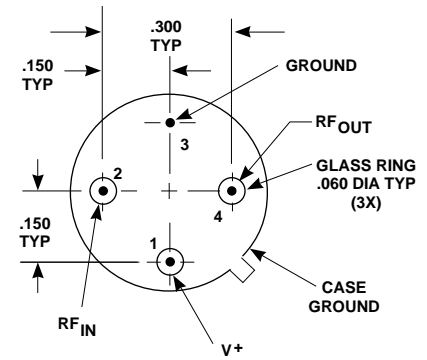
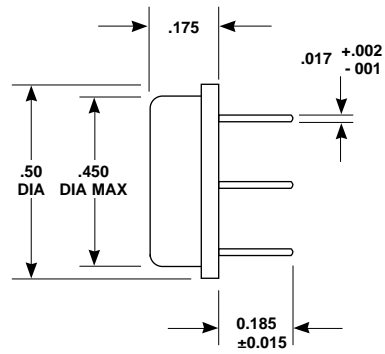
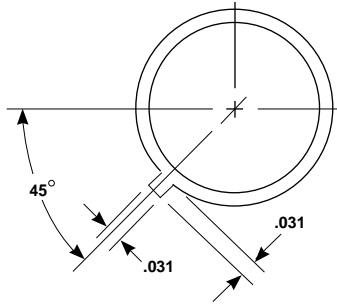
FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.076	-99.8	16.91	152.4	-22.73	-10.7	.028	85.7
150.00	.112	-107.9	16.84	139.2	-22.97	-15.6	.038	68.8
200.00	.147	-115.9	16.81	125.5	-23.10	-21.4	.046	49.0
250.00	.179	-126.2	16.85	111.6	-23.22	-26.9	.052	28.9
300.00	.206	-139.2	16.97	97.7	-23.22	-31.9	.055	6.9
350.00	.225	-154.5	17.09	83.5	-23.48	-36.3	.058	-21.7
400.00	.230	-177.3	17.27	68.2	-23.48	-40.0	.072	-55.9
450.00	.219	147.4	17.43	50.6	-23.10	-44.9	.102	-89.5
500.00	.234	94.3	17.42	30.3	-22.50	-51.0	.154	-120.4
550.00	.339	36.6	16.93	7.0	-21.83	-61.1	.222	-148.7

## 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 ± .02  
 xxx ± .010

# TC-1A

