



# Thin-Film Cascadable Amplifier 10 to 200 MHz

## Technical Data

### UTO/UTC 221 Series

#### Features

- **Frequency Range: 10 to 200 MHz**
- **High Gain: 28.5 dB (Typ)**
- **Low Noise: 2.0 dB (Typ)**
- **High Dynamic Range**
- **Temperature Compensated**
- **High Efficiency**

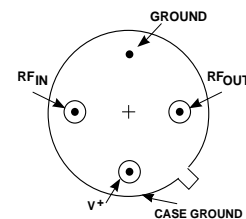
#### Applications

- **High Gain IF Stages**
- **Front End Amplifier**

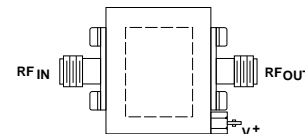
#### Description

The 221 Series is a thin-film high-gain, low-noise, RF cascade amplifier suitable for a variety of signal processing applications. Output transformer coupling provides high efficiency at low currents. Blocking capacitors couple the RF through the amplifier. The 221 is available in either the TO-8 hermetic case or connected TC-1A package.

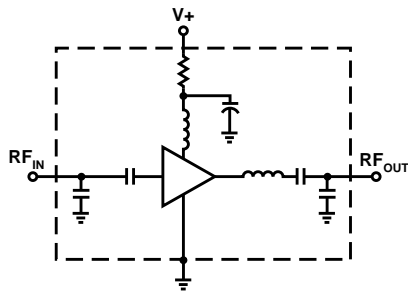
#### Pin Configuration UTO—TO-8T



#### UTC—TC-1A



#### Schematic



#### Maximum Ratings

Parameter	Maximum
DC Voltage	17 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>

$\theta_{JC}$	105/105°C/W <sup>2</sup>
Active Transistor Power Dissipation	69/230 mW <sup>2</sup>
Junction Temperature Above Case Temperature	7/24°C <sup>2</sup>
MTBF (MIL-HDBK-217E, $A_{UF}$ @ 90°C)	689,800 Hrs.

Notes:

1. Values refer to first and second stages, respectively.

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

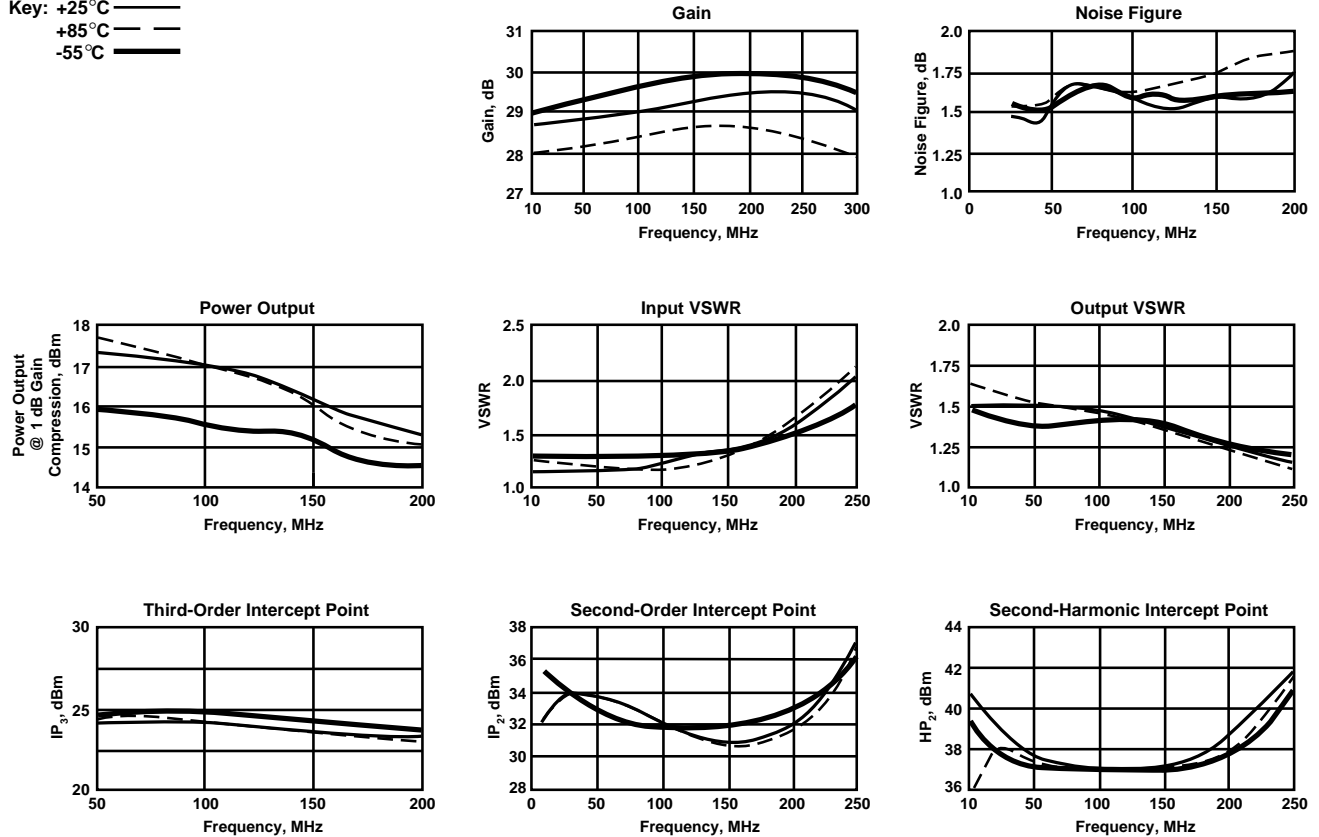
## Electrical Specifications

(Measured in 50  $\Omega$  system @ +15 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	10-200	10-200	10-200	MHz
GP	Small Signal Gain (Min.)	28.5	27.0	26.0	dB
—	Gain Flatness (Max.)	$\pm 0.3$	$\pm 0.7$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	2.0	2.5	3.0	dB
P <sub>1dB</sub>	Power Output @ +1 dB Comp. (Min.)	+15.5	+13.5	+13.0	dBm
—	Input VSWR (Max.)	1.5:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	1.4:1	2.0:1	2.0:1	—
IP <sub>3</sub>	Two Tone 3rd Order Intercept Point	+23.0	—	—	dBm
IP <sub>2</sub>	Two Tone 2nd Order Intercept Point	+28.0	—	—	dBm
HP <sub>2</sub>	One Tone 2nd Harmonic Intercept Point	+37.0	—	—	dBm
I <sub>D</sub>	DC Current	29	—	—	mA

## Typical Performance Over Temperature (@ +15 VDC unless otherwise noted)

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



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

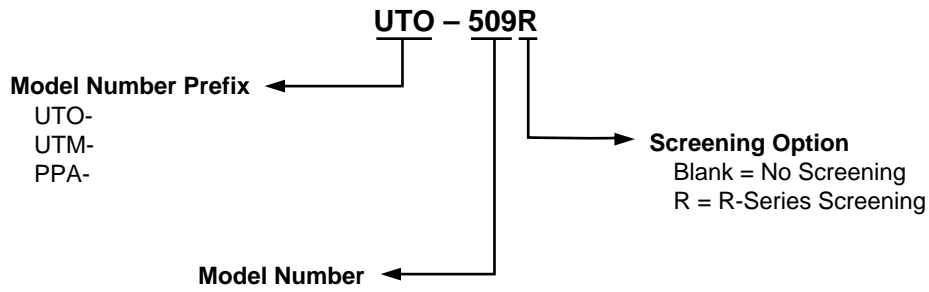
**Numerical Readings**
**Bias = 15.00 Volts**

FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.19	28.63	155.64	-.46	.00	1.40	33.60
200.0	1.59	29.04	125.98	-.34	.91	1.24	33.65
300.0	2.56	28.84	89.26		1.12	1.25	35.19

**S-Parameters**
**Bias = 15.00 Volts, Current = 28.60 mA**

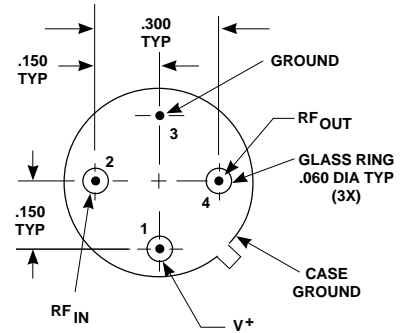
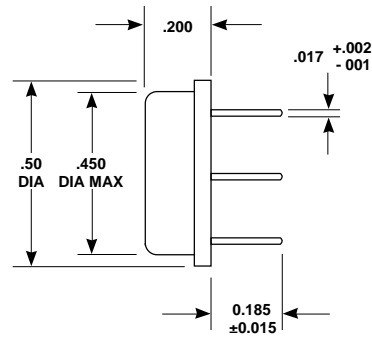
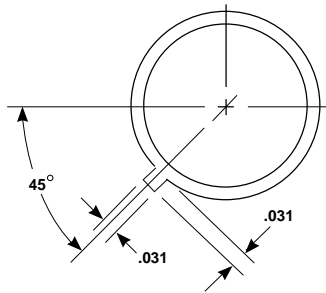
FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.090	83.2	28.565	155.6	-33.309	-10.2	.173	152.4
200.00	.226	21.1	28.970	125.6	-33.321	-22.3	.111	144.3
300.00	.450	-24.3	28.762	89.4	-34.917	-40.8	.115	-179.8
400.00	.595	-67.3	26.847	49.6	-37.789	-39.1	.273	163.5
500.00	.638	-97.9	23.130	19.2	-38.848	-37.3	.375	131.7
600.00	.632	-114.5	18.891	-3.0	-37.272	-39.3	.452	104.1
700.00	.657	-125.5	14.894	-3.1	-38.161	-41.3	.437	71.0
800.00	.615	-134.3	13.678	-17.8	-36.656	-48.0	.399	57.2
900.00	.576	-141.3	11.210	-31.3	-36.566	-55.8	.417	41.4
1000.00	.560	-146.7	8.679	-42.9	-36.094	-64.1	.415	25.5
1100.00	.550	-150.9	6.362	-52.6	-35.862	-71.9	.424	10.6
1200.00	.546	-152.2	4.307	-61.2	-36.379	-81.2	.420	-3.1
1300.00	.535	-153.5	2.254	-69.1	-36.077	-89.5	.418	-15.4
1400.00	.523	-154.2	.082	-78.8	-36.625	-96.0	.415	-28.2
1500.00	.513	-155.2	-1.910	-88.2	-37.139	-100.0	.404	-39.2

## 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  $\pm$  .02  
                  xxx  $\pm$  .010

# TC-1A

