



# Thin-Film Cascadable Amplifier 1700 to 2300 MHz

## Technical Data

### UTO/UTC 2303 Series

#### Features

- **Frequency Range: 1700 to 2300 MHz**
- **Medium Gain: 10.0 dB (Typ)**
- **Medium Output Power: +12.0 dB (Typ)**
- **Low Noise Figure: 6.5 dB (Typ)**
- **Temperature Compensated**

#### Applications

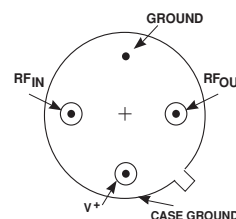
- **IF/RF Amplification**
- **Telemetry**
- **Military Communications**

#### Description

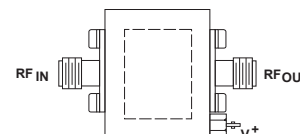
The 2303 Series is a thin-film bipolar RF amplifier that incorporates resistive feedback and active bias for temperature compensation and Increased Immunity to bias voltage variations. Tuned inductive coupling maintains low VSWR over all conditions, while blocking capacitors couple RF through the amplifier. The 2303 Series amplifiers are available in either the TO-8 hermetic case or connected TC-1A package.

#### Pin Configuration

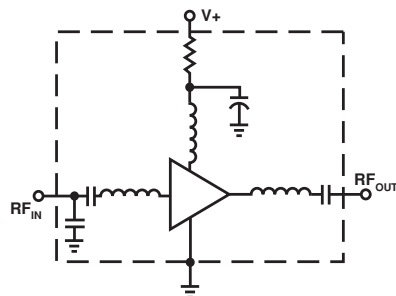
##### UTO—TO-8U



##### UTC—TC-1A



#### Schematic



#### Maximum Ratings

Parameter	Maximum
DC Voltage	+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°C/W
Active Transistor Power Dissipation	250 mW
Junction Temperature Above Case Temperature	27°C
MTBF (MIL-HDBK-217E, $A_{UF}$ @ 90°C)	619,800 Hrs.

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

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

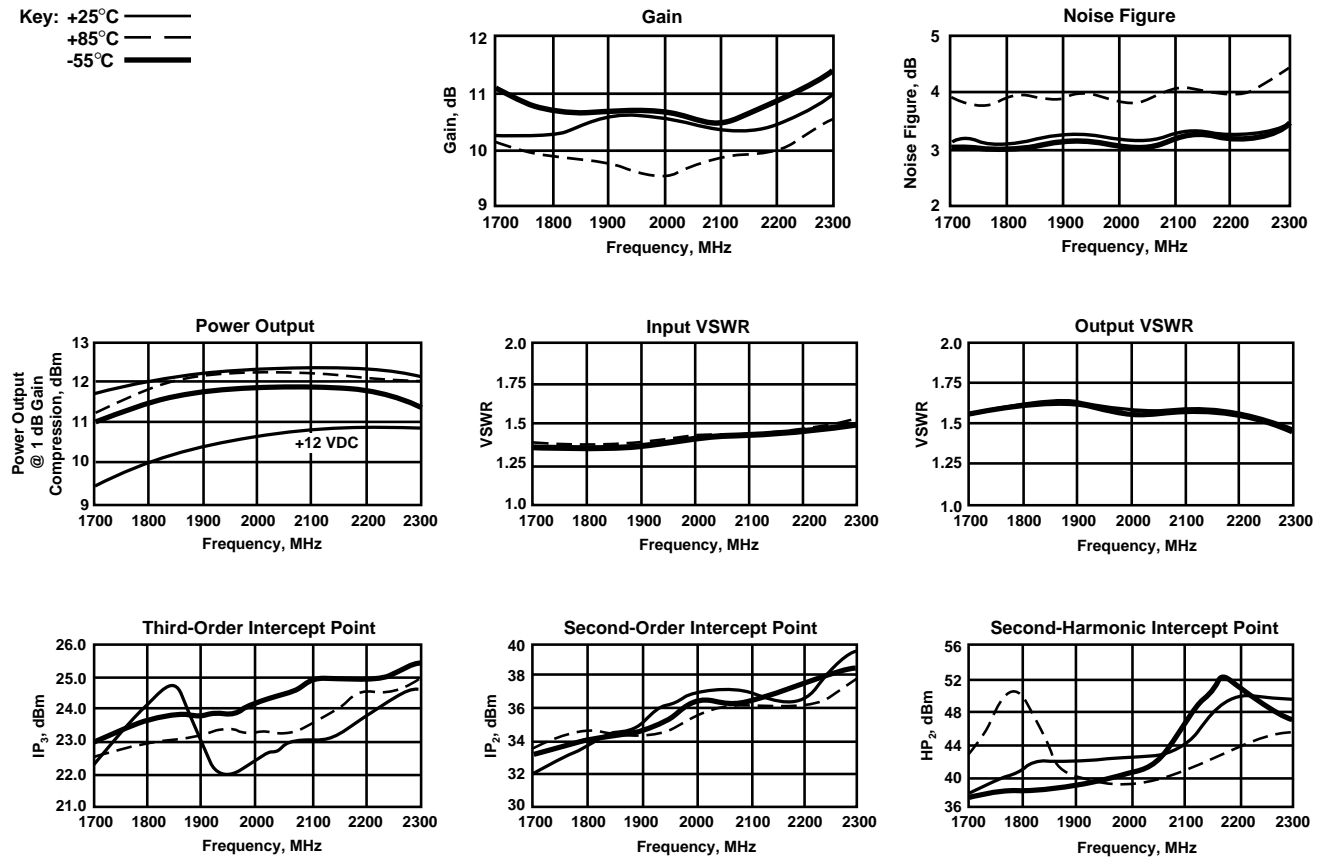
## Electrical Specifications

(Measured in 50  $\Omega$  system @ +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	1700-2300	1700-2300	1700-2300	MHz
GP	Small Signal Gain (Min.)	10.0	8.0	8.0	dB
—	Gain Flatness (Max.)	$\pm 0.4$	$\pm 0.5$	$\pm 1.0$	dB
NF	Noise Figure (Max.)	6.5	8.0	8.5	dB
$P_{1dB}$	Power Output @ +1 dB Comp. (Min.)	+12.0	+10.0	+9.0	dBm
—	Input VSWR (Max.)	<1.8:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	<1.5:1	2.0:1	2.0:1	—
$IP_3$	Two Tone 3rd Order Intercept Point	+20.0	—	—	dBm
$IP_2$	Two Tone 2nd Order Intercept Point	+31.0	—	—	dBm
$HP_2$	One Tone 2nd Harmonic Intercept Point	+40.0	—	—	dBm
$I_D$	DC Current	30	—	—	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**

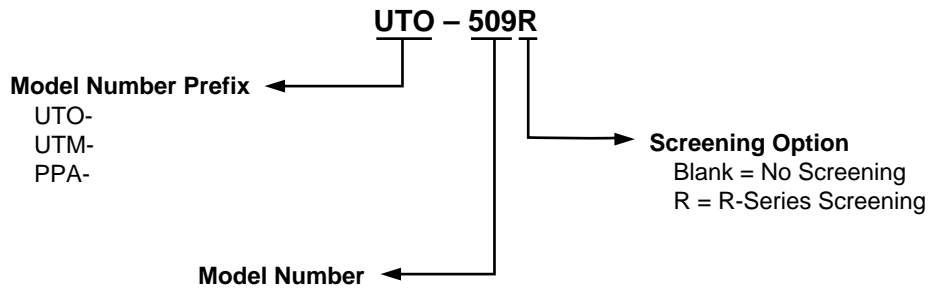
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
400.0	4.88	8.30	-156.19	—	.93	2.39	29.60
500.0	2.78	9.81	174.10	—	.73	2.24	26.92
600.0	2.11	10.15	151.18	—	.56	2.14	26.13
700.0	1.86	10.14	133.71	—	.43	2.09	25.47
800.0	1.78	9.93	119.37	—	.37	2.04	25.03
900.0	1.77	9.67	106.47	—	.34	1.99	24.51
1000.0	1.78	9.45	94.59	—	.32	1.84	24.13
1100.0	1.81	9.27	83.58	—	.30	1.89	23.61
1200.0	1.83	9.13	72.70	—	.30	1.84	23.01
1300.0	1.85	9.05	61.94	—	.29	1.77	22.40
1400.0	1.84	8.98	51.35	—	.29	1.73	21.84
1500.0	1.88	8.99	40.98	—	.29	1.67	21.39
1600.0	1.83	g.01	30.65	—	.29	1.60	21.09
1700.0	1.79	9.08	20.28	-1.01	.28	1.55	20.67
1800.0	1.73	9.13	9.93	.01	.29	1.49	20.13
1900.0	1.68	9.19	-7.0	.69	.31	1.44	19.82
2000.0	1.59	9.32	-12.56	.29	.33	1.39	19.31
2100.0	1.49	9.50	-24.02	.21	.32	1.35	18.88
2200.0	1.37	9.64	-35.61	.00	.32	1.34	18.55
2300.0	1.24	9.74	-47.67	-.69	.34	1.34	18.37
2400.0	1.09	9.74	-60.33	—	.35	1.36	18.25
2500.0	1.05	9.78	-73.64	—	.39	1.47	18.27

Linearization Range: 1700 to 2300 MHz

**S-Parameters**
**Bias = 15.00 Volts**

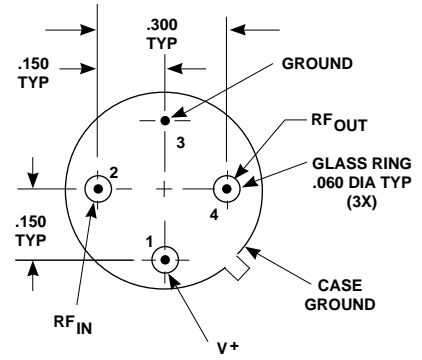
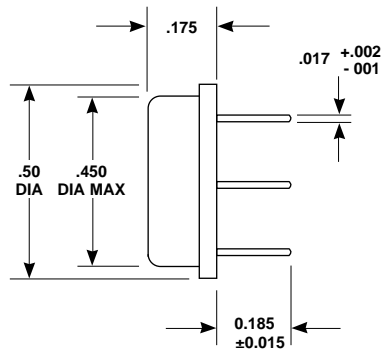
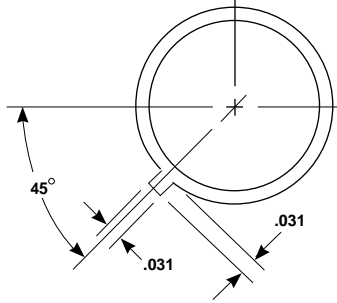
FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
300.00	.874	-149.6	1.299	-114.5	-36.858	105.8	.367	-95.8
400.00	.673	173.5	8.183	-152.5	-28.607	74.6	.353	-124.3
500.00	.478	152.4	9.931	177.8	-26.231	53.0	.330	-151.3
600.00	.346	143.6	10.436	152.3	-24.947	37.6	.304	-176.0
700.00	.275	144.9	10.454	133.3	-24.613	26.3	.293	162.4
800.00	.253	150.4	10.228	119.1	-24.369	20.1	.288	147.6
900.00	.258	153.4	9.899	104.8	-24.020	12.0	.284	132.9
1000.00	.274	153.5	9.571	91.6	-23.613	6.2	.275	120.1
1100.00	.290	151.3	9.316	79.8	-23.307	.6	.270	109.0
1200.00	.307	148.4	9.090	70.0	-22.921	-3.0	.258	100.5
1300.00	.321	143.4	8.869	58.0	-22.456	-9.9	.246	89.2
1400.00	.329	137.6	8.722	46.3	-22.147	-15.2	.226	78.7
1500.00	.334	132.3	8.630	36.0	-21.730	-20.3	.208	68.0
1600.00	.333	127.6	8.616	26.7	-21.451	-24.8	.184	57.5
1700.00	.327	122.0	8.600	17.5	-21.048	-29.9	.162	45.6
1800.00	.318	114.1	6.648	5.2	-20.507	-36.6	.133	27.9
1900.00	.303	107.8	8.636	-4.5	-20.163	-42.3	.108	8.1
2000.00	.282	104.0	8.747	-12.3	-19.747	-46.3	.093	-14.7
2100.00	.252	96.3	8.856	-24.9	-19.150	-54.4	.088	-48.8
2200.00	.211	87.2	9.025	-37.5	-18.799	-62.9	.096	-86.0
2300.00	.161	82.0	9.089	-48.8	-18.454	-70.6	.119	-113.7
2400.00	.102	77.1	9.168	-60.1	-18.148	-79.2	.148	-136.1
2500.00	.036	90.2	9.167	-72.5	-18.040	-88.1	.177	-157.6
2600.00	.058	-154.7	9.115	-86.5	-17.893	-98.9	.215	-179.3
2700.00	.164	-158.2	8.939	-104.9	-18.140	-114.2	.256	155.7
2800.00	.252	-162.1	8.659	-116.9	-18.374	-123.8	.289	138.8
2900.00	.382	-176.0	8.160	-138.6	-19.004	-141.8	.328	112.4
3000.00	.474	175.5	7.656	-152.1	-19.845	-153.4	.356	94.8

## Product Options



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

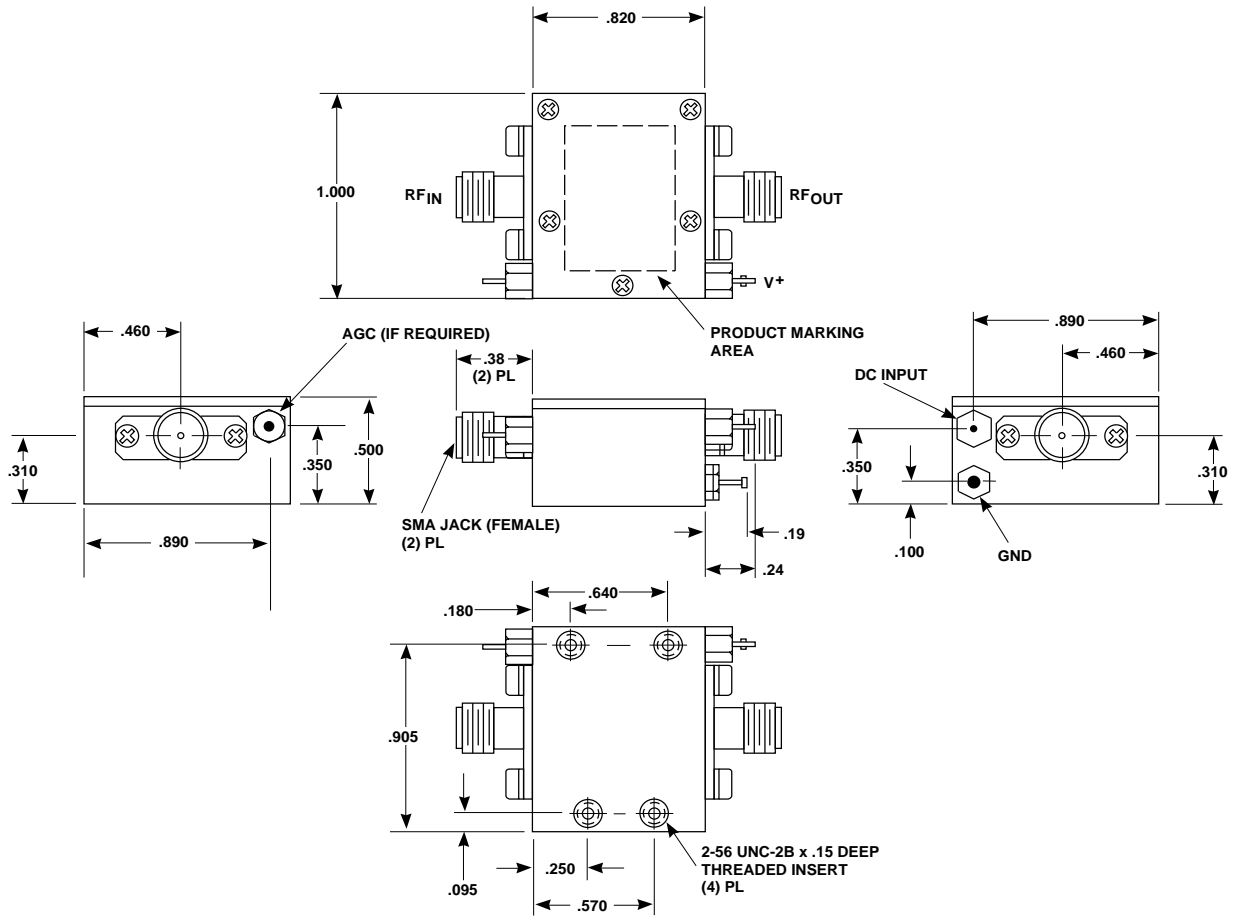
**Case Drawings  
TO-8U**



APPROXIMATE WEIGHT 2.1 GRAMS

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