



Thin-Film Cascadable Amplifier 5 to 500 MHz

Technical Data

UTO/UTC 502 Series

Features

- **Frequency Range: 5 to 500 MHz**
- **Medium Gain Stage: 14.5 dBm (Typ)**
- **Medium Output Power: +8.0 dBm (Typ)**
- **Temperature Compensated**

Applications

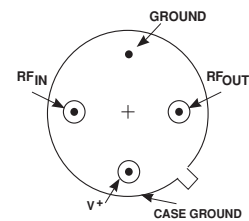
- **IF/RF Amplification**

Description

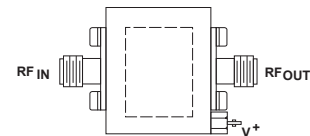
The 502 Series is a thin-film bipolar RF amplifier that uses resistive feedback and active bias. Input/output blocking capacitors couple the RF through the circuit and inductive tuning provides low VSWR. The 502 Series is available in either the TO-8 hermetic case or connected TC-1A package.

Pin Configuration

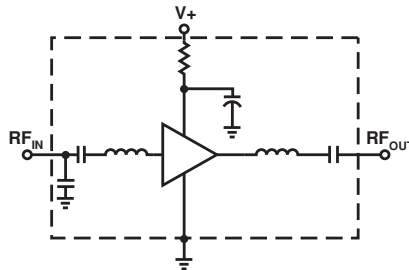
UTO—TO-8U



UTC—TC-1A



Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+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 Characteristics¹

θ_{JC}	90°C/W
Active Transistor Power Dissipation	120 mW
Junction Temperature Above Case Temperature	11°C
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	1,165,000 Hrs.

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

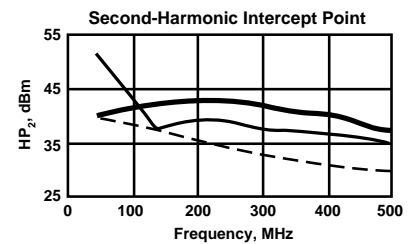
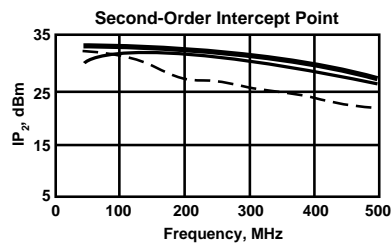
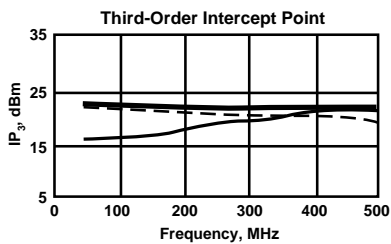
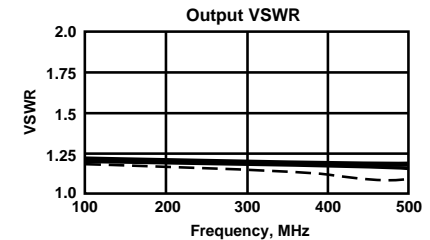
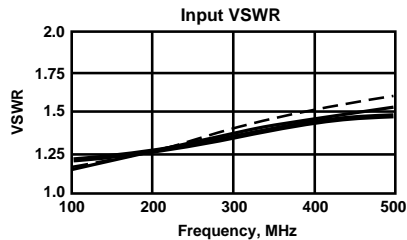
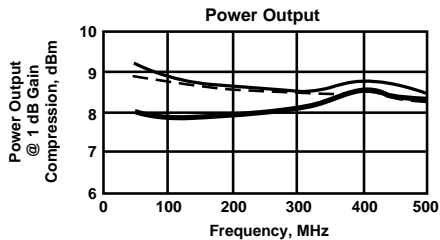
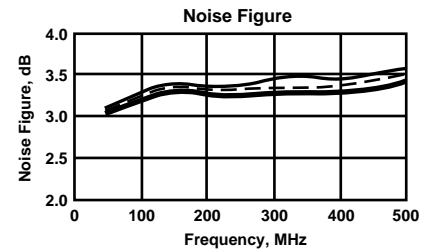
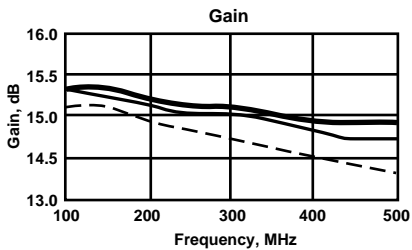
Electrical Specifications

(Measured in 50 Ω 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	5-500	5-500	5-500	MHz
GP	Small Signal Gain (Min.)	14.5	14.0	13.5	dB
—	Gain Flatness (Max.)	± 0.5	± 1.0	± 1.0	dB
NF	Noise Figure (Max.)	3.5	4.0	4.5	dB
P _{1dB}	Power Output @ +1 dB Comp. (Min.)	+8.0	+7.0	+7.0	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 ₃	Two Tone 3rd Order Intercept Point	+21.0	—	—	dBm
IP ₂	Two Tone 2nd Order Intercept Point	+30.0	—	—	dBm
HP ₂	One Tone 2nd Harmonic Intercept Point	+37.0	—	—	dBm
I _D	DC Current	23	—	—	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

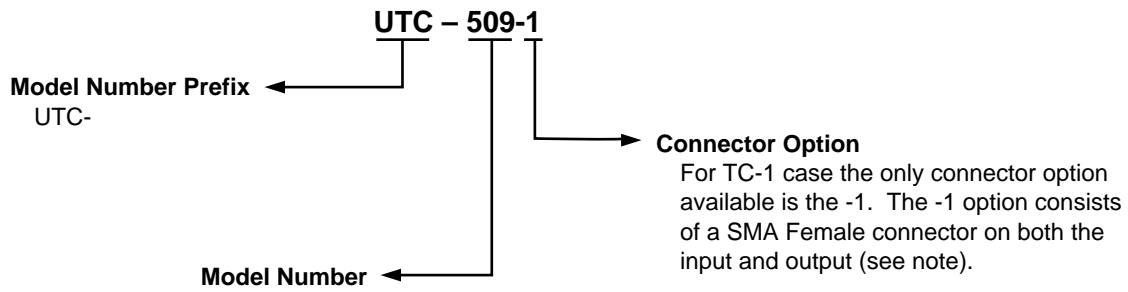
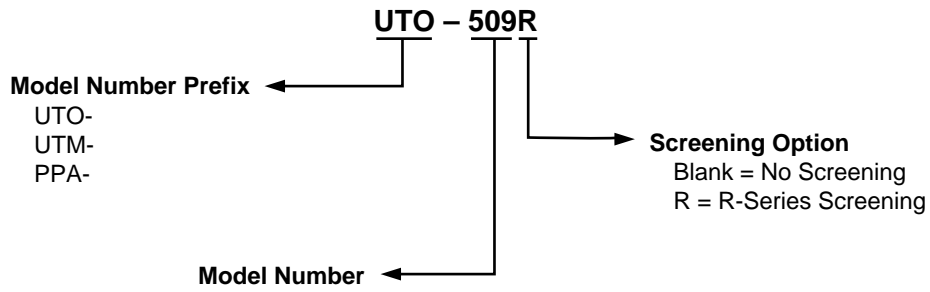
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.06	14.88	159.07	-.72	—	1.06	20.91
150.0	1.11	14.78	149.98	.35	.53	1.10	20.51
200.0	1.13	14.74	140.11	.65	.59	1.12	21.06
250.0	1.14	14.74	128.87	-.40	.58	1.15	20.82
300.0	1.17	14.81	119.31	.21	.54	1.16	20.69
350.0	1.18	14.67	109.49	.55	.59	1.21	21.10
400.0	1.19	14.68	98.24	-.51	.58	1.25	20.98
450.0	1.19	14.79	88.51	-.07	.55	1.25	20.81
500.0	1.19	14.76	78.37	-.04	.57	1.29	20.89
550.0	1.19	14.81	68.04	—	.59	1.35	20.52
600.0	1.18	14.83	57.17	—	.60	1.38	20.58
650.0	1.23	14.74	46.35	—	.63	1.41	20.01
700.0	1.29	14.85	34.54	—	.61	1.45	20.86
750.0	1.41	14.89	24.51	—	.60	1.45	21.78
800.0	1.56	14.77	12.88	—	.67	1.45	21.09
850.0	1.77	14.71	.23	—	.68	1.43	21.20
900.0	2.02	14.62	-11.75	—	.69	1.39	21.26
950.0	2.41	14.32	-24.58	—	.72	1.38	22.47
1000.0	2.81	14.15	-37.67	—	.70	1.33	22.11
1050.0	3.34	13.77	-49.83	—	.64	1.29	21.94
1100.0	4.20	13.26	-80.89	—	.66	1.27	22.13
1150.0	5.33	12.88	-73.51	—	.70	1.27	23.24
1200.0	6.49	12.10	-86.00	—	.68	1.29	23.94

LINEARIZATION RANGE: 100.0 to 500.0 MHz

S-Parameters
Bias = 15.00 Volts

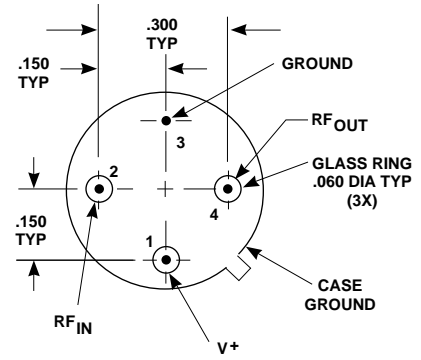
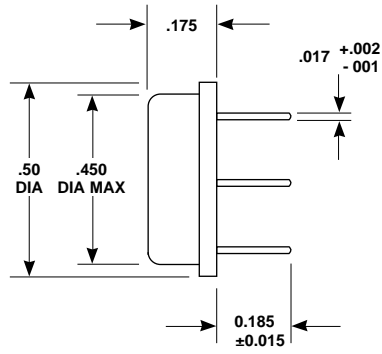
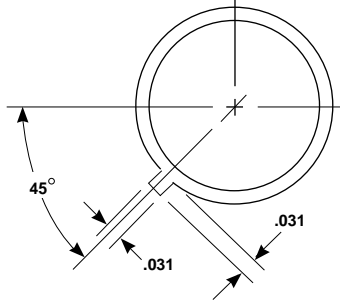
FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.030	73.6	14.66	157.7	-20.54	-5.4	.025	-153.0
200.00	.056	69.3	14.55	139.9	-20.63	-12.2	.040	-164.0
300.00	.073	63.1	14.59	119.8	-20.54	-19.8	.062	178.5
400.00	.079	59.3	14.50	99.4	-20.72	-27.0	.086	161.3
500.00	.074	62.4	14.59	80.1	-20.54	-35.8	.116	143.5
600.00	.066	84.8	14.68	59.7	-20.72	-43.4	.139	126.3
700.00	.093	115.5	14.83	38.1	-20.94	-51.7	.164	106.3
800.00	.173	125.4	14.73	16.9	-20.82	-61.9	.177	86.0
900.00	.293	120.1	14.76	-8.3	-21.11	-74.6	.179	60.4
1000.00	.438	108.3	14.47	-32.7	-21.51	-86.9	.154	31.5

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

