TELEDYNE
MICROWAVE SOLUTIONS
Everywhereyoulook™

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

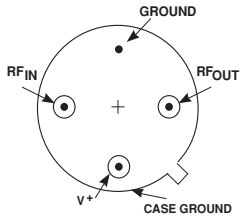
- **IF/RF Amplification**

Description

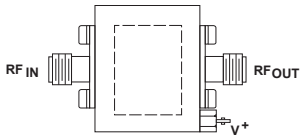
The 502 Series is a thin-film bipolar RF amplifier that uses resistive feedback and active bias. Input/output blocking capacitors couple the RF through the circuit and inductive tuning provides low VSWR. The 502 Series is available in either the TO-8 hermetic case or connectored TC-1A package.

Pin Configuration

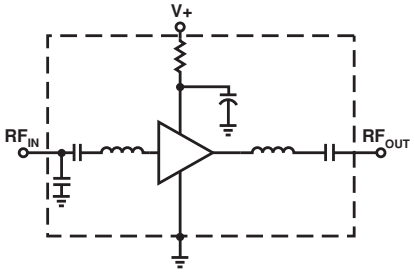
UTO—TO-8U



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[1]

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.

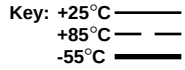
Weight: (typical) UTO—2.1 grams; UTC—21.5 grams

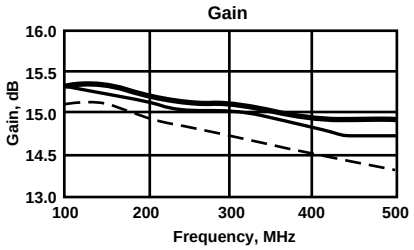
Electrical Specifications

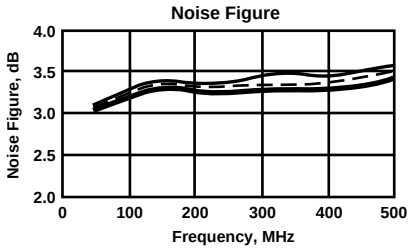
(Measured in 50 Ω system @ +15 VDC nominal unless otherwise noted)

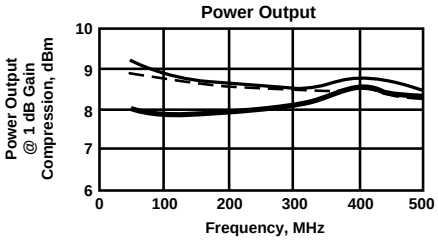
Symbol	Characteristic	Typical	Guaranteed Specifications		Unit
		T_C = 25°C	T_C = 0 to 50°C	T_C = –55 to +85°C	
BW	Frequency Range	5-500	5-500	5-500	MHz
GP	Small Signal Gain (Min.)	14.5	14.0	13.5	dB
—	Gain Flatness (Max.)	±0.5	±1.0	±1.0	dB
NF	Noise Figure (Max.)	3.5	4.0	4.5	dB
P_{1dB}	Power Output @ +1 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

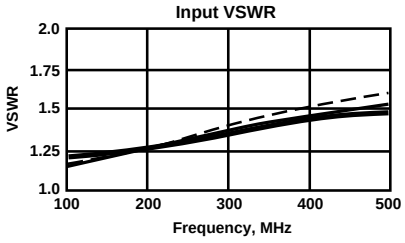
Typical Performance Over Temperature (@ +15 VDC unless otherwise noted)

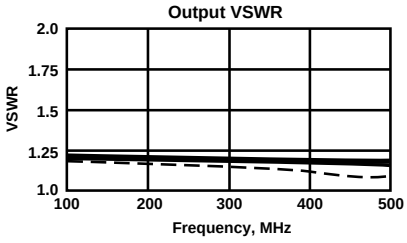


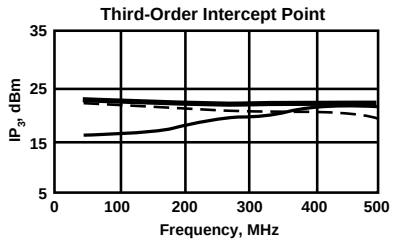


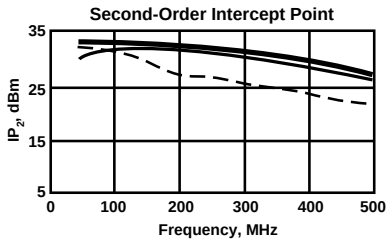


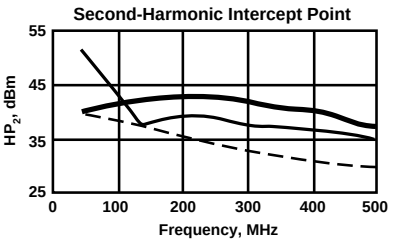












Automatic Network Analyzer Measurements (Typical production unit @ +25°C ambient)

Numerical Readings **Bias = 15.00 Volts**

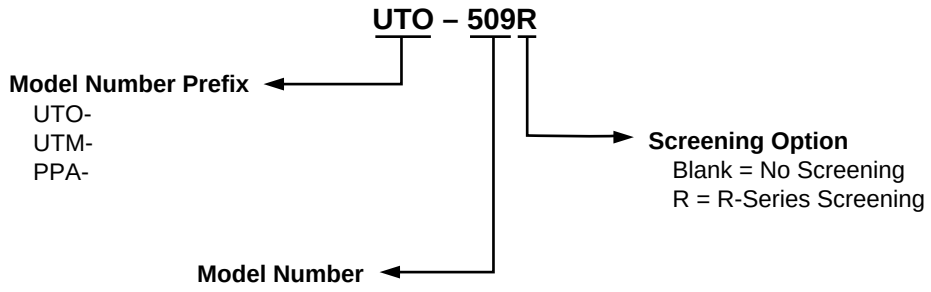
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.06	14.88	159.07	–.72	—	1.06	20.91
150.0	1.11	14.78	149.98	.35	.53	1.10	20.51
200.0	1.13	14.74	140.11	.65	.59	1.12	21.06
250.0	1.14	14.74	128.87	–.40	.58	1.15	20.82
300.0	1.17	14.81	119.31	.21	.54	1.16	20.69
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

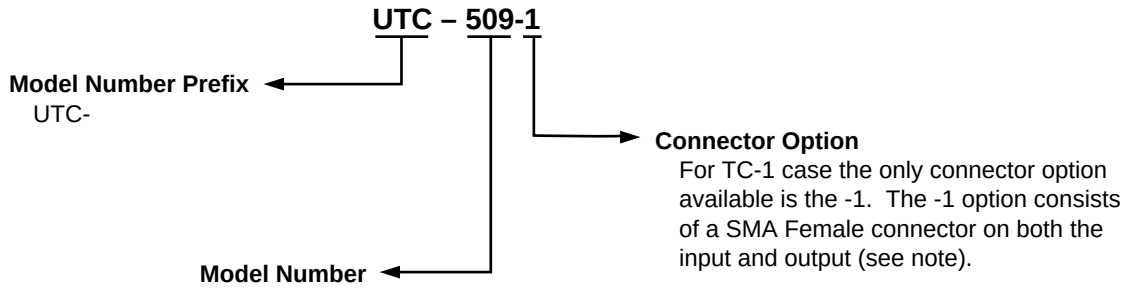
LINEARIZATION RANGE: 100.0 to 500.0 MHz

S-Parameters **Bias = 15.00 Volts**

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	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

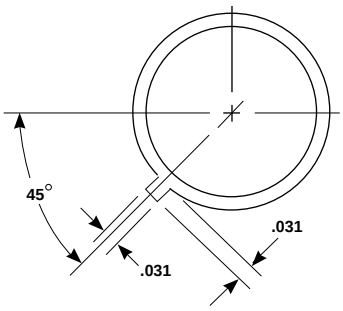
Product Options

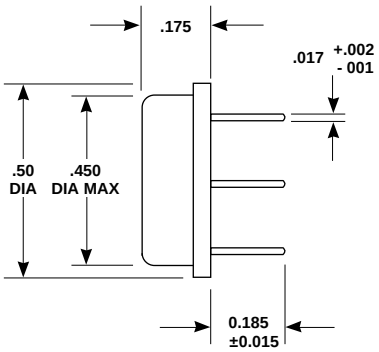


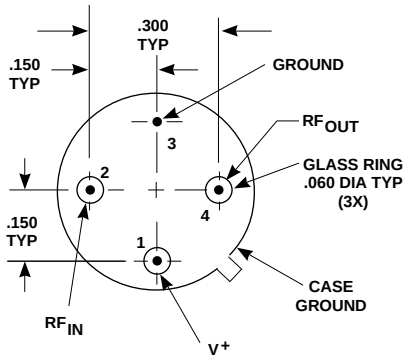


Note: R-Series screening is not available in the TC-1 case as the case is non-hermetic.

Case Drawings
TO-8U



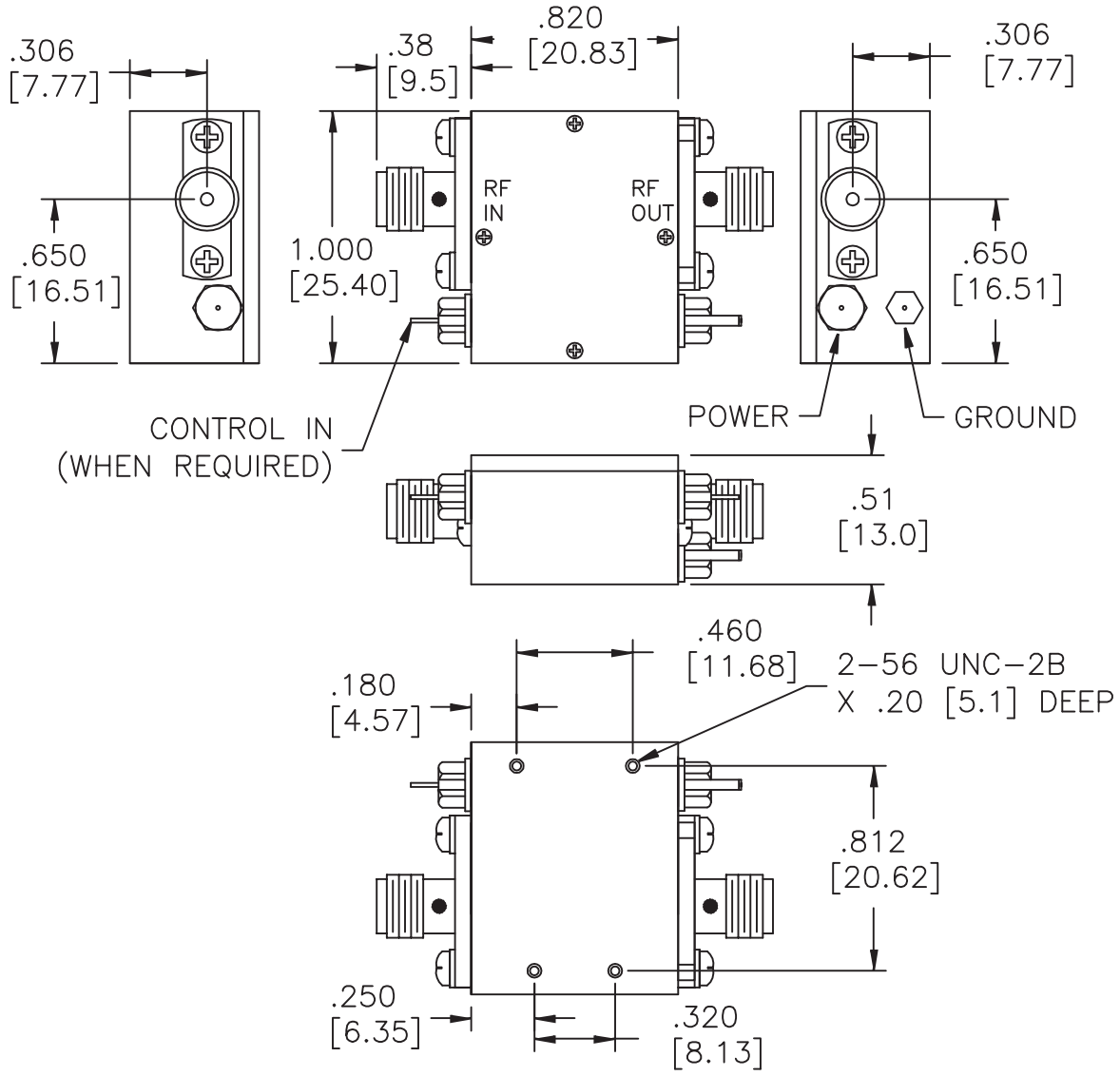




APPROXIMATE WEIGHT 2.1 GRAMS

NOTES (UNLESS OTHERWISE SPECIFIED):
1. DIMENSIONS ARE SPECIFIED IN INCHES
2. TOLERANCES: xx ±.02
   xxx ±.010

TC-1A



THIRD ANGLE PROJECTION

INCH [MM]

.XX = ±.02 [.5]
.XXX = ±.010 [.25]

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