



Thin-Film Cascadable Amplifier

5 to 500 MHz

Technical Data

UTO/UTC 504 Series

Features

- **Frequency Range: 5 to 500 MHz**
- **High Output Power: +21.0 dBm (Typ)**
- **Temperature Compensated**
- **24-Volt Supply**

Applications

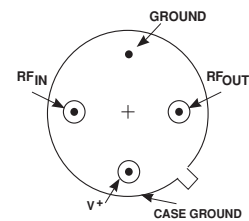
- **IF/RF Amplification**
- **Output Stage**

Description

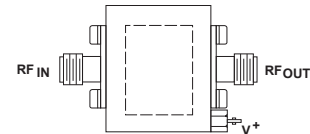
The 504 Series is a thin-film bipolar RF amplifier that uses resistive feedback and active bias. Input/output blocking capacitors couple the RF through the circuit and inductive tuning provides for low VSWR. The 504 Series is available in either the TO-8 hermetic case or connected TC-1A package.

Pin Configuration

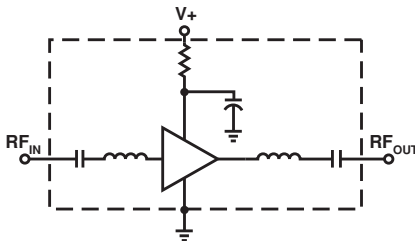
UTO—TO-8U



UTC—TC-1A



Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+26 Volts
Continuous RF Input Power	+13 dBm
Operating Case Temperature	-55 to +115°C
Storage Temperature	-62 to +150°C
"R" Series Burn-In Temperature	+115°C

Thermal Characteristics¹

θ_{JC}	85°C/W
Active Transistor Power Dissipation	380 mW
Junction Temperature Above Case Temperature	32°C
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	624,100 Hrs.

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

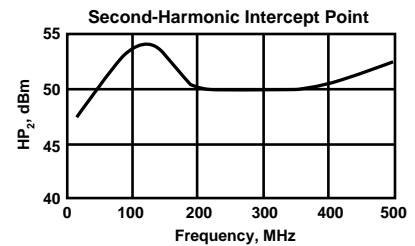
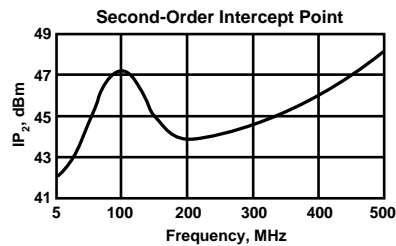
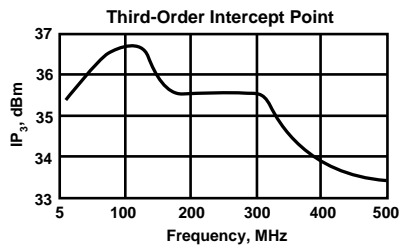
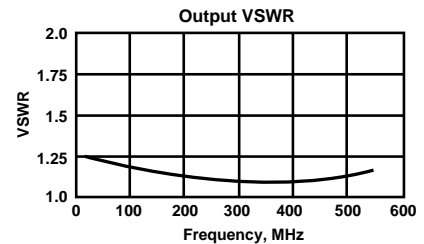
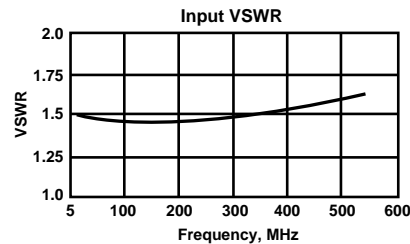
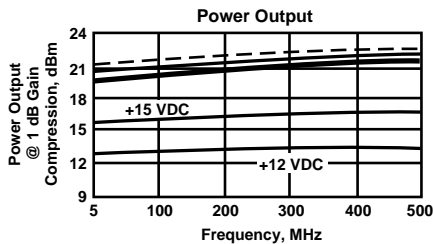
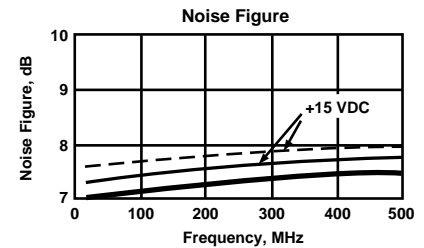
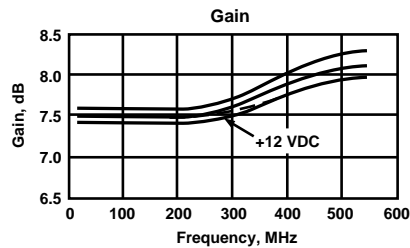
Electrical Specifications

(Measured in 50 Ω 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.)	7.0	6.0	6.0	dB
—	Gain Flatness (Max.)	± 0.5	± 1.0	± 1.0	dB
NF	Noise Figure (Max.)	7.5	11.0	11.0	dB
$P_{1\text{dB}}$	Power Output @ +1 dB Comp. (Min.)	+21.0	+17.0	+17.0	dBm
—	Input VSWR (Max.)	<1.5:1	2.0:1	2.0:1	—
—	Output VSWR (Max.)	<1.2:1	2.0:1	2.0:1	—
IP_3	Two Tone 3rd Order Intercept Point	+34.0	—	—	dBm
IP_2	Two Tone 2nd Order Intercept Point	+44.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+50.0	—	—	dBm
I_D	DC Current	100	—	—	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

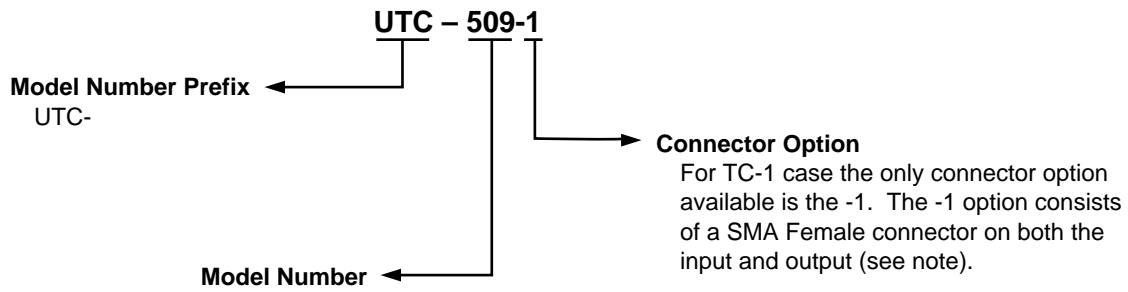
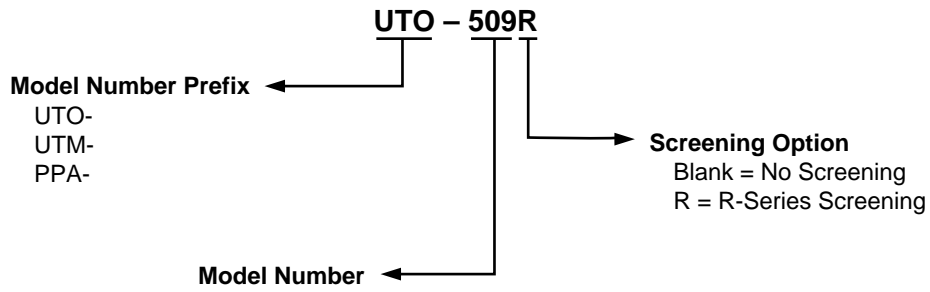
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
100.0	1.25	7.06	162.04	-.93	—	1.35	16.35
150.0	1.30	7.26	151.15	-1.39	.55	1.34	16.54
200.0	1.35	7.38	142.12	.00	.51	1.31	16.70
250.0	1.40	7.45	132.92	1.21	.53	1.28	16.87
300.0	1.46	7.52	122.88	1.59	.57	1.24	16.95
350.0	1.52	7.62	112.34	1.47	.61	1.19	17.00
400.0	1.58	7.70	100.98	.52	.54	1.15	16.92
450.0	1.64	7.79	89.32	-.71	.64	1.11	16.59
500.0	1.72	7.83	77.84	-1.77	.65	1.11	16.16
550.0	1.81	7.72	65.76	—	.67	1.16	15.71
600.0	1.92	7.64	53.70	—	.67	1.25	15.31
650.0	2.06	7.39	41.72	—	.68	1.36	14.95
700.0	2.29	6.99	29.32	—	.71	1.49	14.65
750.0	2.54	6.54	16.27	—	.72	1.64	14.38
800.0	2.90	5.97	3.42	—	.70	1.81	14.22

LINEARIZATION RANGE: 100.0 to 500.0 MHz

S-Parameters
Bias = 24.00 Volts

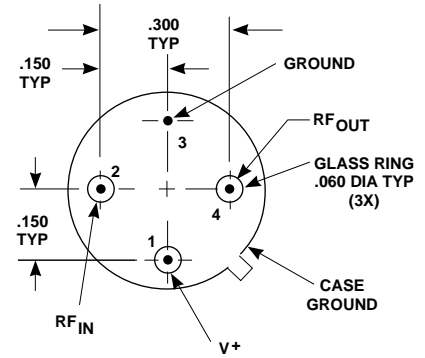
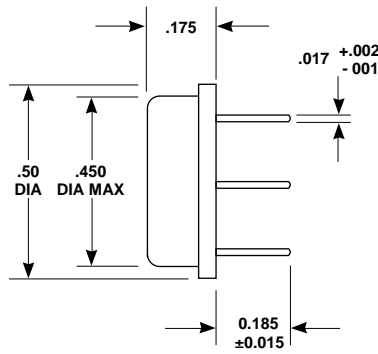
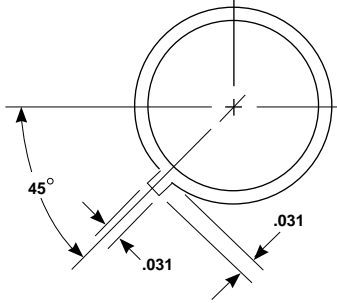
FREQUENCY MHz	S ₁₁		S ₂₁		S ₁₂		S ₂₂	
	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
100.00	.105	-16.9	7.113	165.0	-16.290	-6.8	.130	163.9
150.00	.094	-27.5	7.171	157.3	-16.493	-9.3	.129	157.7
200.00	.080	-43.1	7.260	148.6	-16.519	-12.4	.123	148.9
250.00	.065	-69.3	7.407	140.0	-16.644	-14.1	.116	143.0
300.00	.062	-112.5	7.574	130.7	-16.742	-16.1	.110	139.4
350.00	.087	-151.9	7.753	120.8	-16.752	-17.7	.106	139.2
400.00	.134	-176.8	7.923	110.8	-16.735	-19.4	.102	142.3
450.00	.197	165.0	7.991	100.6	-16.638	-20.5	.106	148.3
500.00	.268	150.3	7.959	89.8	-16.430	-22.6	.121	153.5
550.00	.347	137.5	7.800	78.9	-16.226	-25.3	.144	155.9
600.00	.427	125.8	7.475	67.9	-15.978	-28.7	.173	155.1
650.00	.499	115.4	7.041	57.1	-15.792	-32.8	.207	151.3
700.00	.563	105.8	6.506	47.0	-15.722	-37.1	.242	146.3
750.00	.616	96.6	5.850	37.2	-15.666	-41.2	.273	141.1
800.00	.659	88.2	5.143	28.1	-15.682	-45.7	.300	135.9
850.00	.697	80.6	4.406	19.8	-15.775	-49.8	.324	130.3
900.00	.729	73.7	3.672	11.9	-15.887	-53.9	.346	125.2
950.00	.754	67.5	2.933	4.7	-16.033	-57.9	.386	120.5
1000.00	.777	61.9	2.230	-2.0	-16.152	-61.6	.381	116.0
1050.00	.795	56.6	1.538	-8.3	-16.344	-64.9	.395	111.8
1100.00	.800	51.7	.871	-14.3	-16.529	-68.1	.410	107.9
1150.00	.821	47.0	.275	-20.4	-16.750	-71.4	.422	104.2

Product Options



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

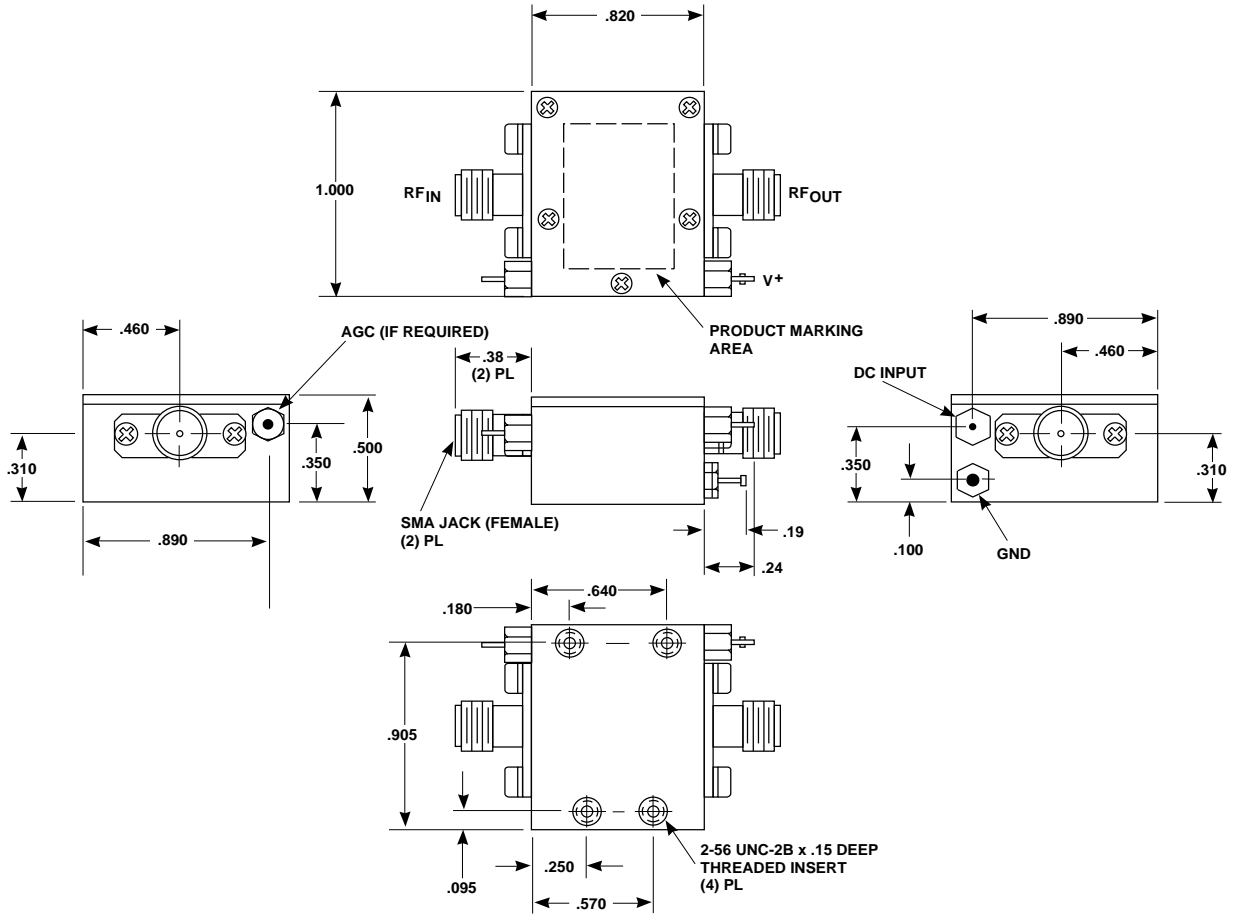
**Case Drawings
TO-8U**



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

Contact Teledyne Microwave Solutions:
650-691-9800
650-962-6845 fax

Check for updates:
www.teledynemicrowave.com