TELEDYNE
MICROWAVE SOLUTIONS
Everywhereyoulook™

Thin-Film Cascadable Amplifier 1700 to 2300 MHz

Technical Data

UTO/UTC 2321 Series

Features

- **Frequency Range: 1700 to 2300 MHz**
- **Medium Gain: 15.0 dB (Typ)**
- **Medium Output Power: +12.0 dBm (Typ)**
- **Temperature Compensated**

Applications

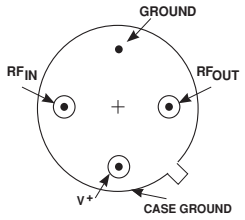
- **IF/RF Amplification**
- **Telemetry**
- **Military Communications**

Description

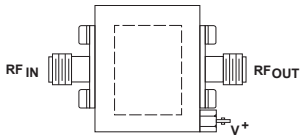
The 2321 Series is a two-stage thin-film bipolar RF amplifier using resistive feedback and active bias or temperature compensation and increased Immunity to bias voltage variations. Input/output blocking capacitors couple RF through the amplifier while a low VSWR Is maintained through inductive tuning. The 2321 Series amplifiers are available in either the TO-8 hermetic case or connectored TC-1A package.

Pin Configuration

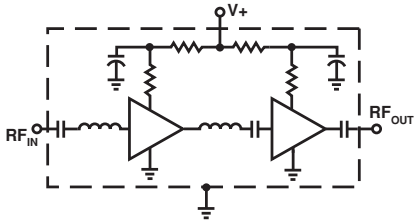
UTO—TO-8U



UTC—TC-1A



Schematic



Maximum Ratings

Parameter	Maximum
DC Voltage	+17 Volts
Continuous RF Input Power	+18 dBm
Operating Case Temperature	–55 to +115°C
Storage Temperature	–62 to +150°C
"R" Series Burn-In Temperature	+115°C

Thermal Characteristics[1]

θ_{JC}	105/75°C/W[2]
Active Transistor Power Dissipation	180/450 mW[2]
Junction Temperature Above Case Temperature	19/34°C[2]
MTBF (MIL-HDBK-217E, A_{UF} @ 90°C)	366,000 Hrs.

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

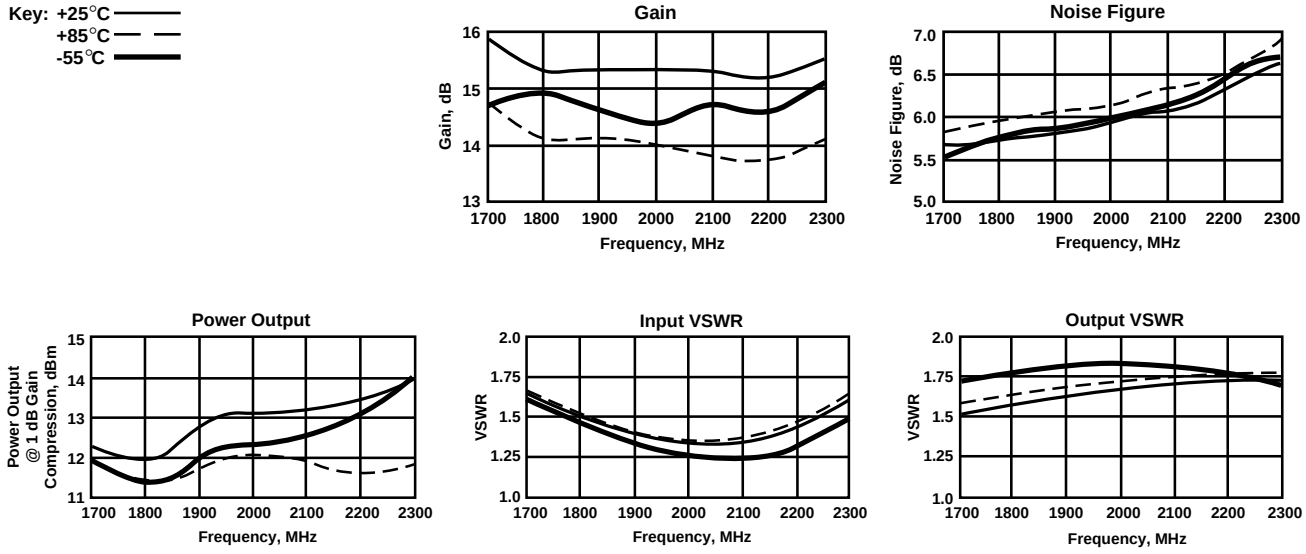
Weight: (typical) UTO—2.1 grams; UTC—21.5 grams

Electrical Specifications

(Measured in 50 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	1700-2300	1700-2300	1700-2300	MHz
GP	Small Signal Gain (Min.)	15.0	14.0	13.0	dB
—	Gain Flatness (Max.)	±0.5	±1.0	±1.0	dB
NF	Noise Figure (Max.)	7.0	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.)	<1.6:1	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	+35.0	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+41.0	—	—	dBm
I_D	DC Current	70	—	—	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**

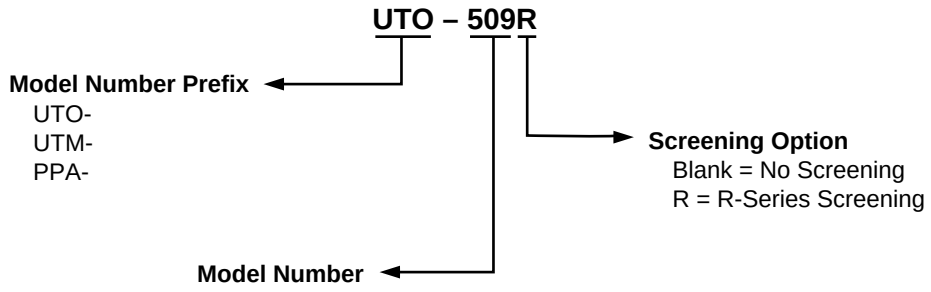
FREQUENCY MHz	VSWR IN	GAIN dB	PHASE DEGREES	PHASE DEV	GROUP DELAY ns	VSWR OUT	ISOLATION dB
500.0	2.53	14.27	54.15	—	1.01	3.86	42.19
600.0	2.05	15.40	20.93	—	.85	3.00	40.12
700.0	2.01	15.93	–7.33	—	.73	2.46	39.51
800.0	2.08	16.27	–31.37	—	.62	2.06	38.85
900.0	2.21	16.21	–52.07	—	.54	1.76	38.36
1000.0	2.27	16.06	–69.93	—	.48	1.53	38.49
1100.0	2.30	15.76	–86.55	—	.44	1.35	38.20
1200.0	2.29	15.60	–101.64	—	.40	1.24	37.76
1300.0	2.19	15.32	–115.02	—	.37	1.18	37.69
1400.0	2.13	15.01	–128.55	—	.37	1.19	38.03
1500.0	2.00	14.80	–141.86	—	.38	1.25	37.94
1600.0	1.88	14.76	–155.69	—	.37	1.34	37.77
1700.0	1.72	14.80	–168.27	–1.95	.34	1.43	37.71
1800.0	1.58	14.52	179.58	.04	.35	1.57	36.65
1900.0	1.49	15.00	166.56	1.17	.37	1.56	38.68
2000.0	1.40	15.05	152.69	1.46	.39	1.64	38.57
2100.0	1.41	14.98	138.50	1.43	.42	1.67	38.64
2200.0	1.56	15.10	122.45	–.45	.44	1.67	38.95
2300.0	1.82	15.12	107.05	–1.70	.47	1.66	39.53
2400.0	2.21	14.67	88.70	—	.52	1.61	39.45
2600.0	2.66	13.97	69.28	—	.50	1.55	39.21
2600.0	3.09	13.37	52.57	—	.48	1.48	40.23
2700.0	3.55	12.22	34.59	—	.48	1.43	40.52
2800.0	4.06	10.99	17.92	—	.46	1.43	40.94
2900.0	4.70	9.38	1.18	—	.44	1.49	40.95
3000.0	5.33	7.77	–13.79	—	.00	1.60	40.96

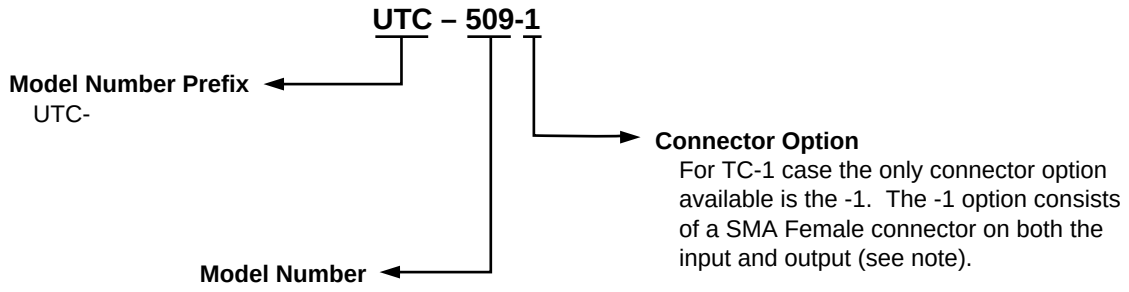
Linearization Range: 1700 to 2300 MHz

S-Parameters **Bias = 15.00 Volts**

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}	
MHz	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang
500.00	.437	–73.5	13.952	53.4	–42.019	134.1	.580	–72.0
600.00	.345	–67.1	15.169	21.3	–40.348	119.9	.490	–82.5
700.00	.328	–60.8	15.698	–6.4	–39.169	110.8	.410	–91.8
800.00	.363	–57.9	16.076	–30.6	–38.765	107.2	.328	–99.6
900.00	.371	–59.1	16.066	–50.9	–38.267	103.3	.246	–106.8
1000.00	.398	–67.1	15.983	-68.5	–38.026	99.8	.179	–112.1
1100.00	.411	–71.3	15.653	–85.2	–38.166	98.3	.123	–111.9
1200.00	.400	–78.6	15.569	–100.2	–37.669	99.9	.080	–99.9
1300.00	.400	–84.8	15.309	–113.8	–37.939	96.8	.062	–68.1
1400.00	.378	–91.3	15.062	–127.4	–37.710	95.8	.075	–40.3
1500.00	.363	–98.9	14.850	–141.0	–37.955	96.6	.103	–32.4
1600.00	.332	–104.7	14.837	–154.9	–37.930	97.0	.136	–31.2
1700.00	.290	–115.0	14.881	–167.8	–37.876	97.1	.165	–33.2
1800.00	.248	–119.4	14.601	–179.9	–36.654	85.3	.202	–43.6
1900.00	.207	–141.5	15.025	166.9	–38.709	91.2	.197	–44.0
2000.00	.169	–169.3	15.065	152.9	–38.586	91.4	.222	–50.7
2100.00	.148	152.0	15.016	138.7	–38.698	89.0	.229	–54.8
2200.00	.186	113.9	15.133	122.9	–38.997	87.7	.226	–59.9
2300.00	.259	85.4	15.155	107.5	–39.194	83.2	.225	–64.5
2400.00	.356	68.3	14.712	89.1	–39.515	81.7	.211	–67.6
2500.00	.440	54.2	14.071	69.7	–39.410	72.8	.192	–66.9
2600.00	.511	43.3	13.453	52.9	–40.173	69.1	.168	–66.4
2700.00	.566	34.5	12.331	34.8	–40.402	62.8	.149	–59.0
2800.00	.621	27.6	11.064	17.8	–40.704	62.7	.150	–47.2
2900.00	.605	23.1	9.439	1.2	–40.619	56.0	.172	–37.2
3000.00	.704	18.6	7.761	–14.1	–40.887	56.3	.204	–33.2

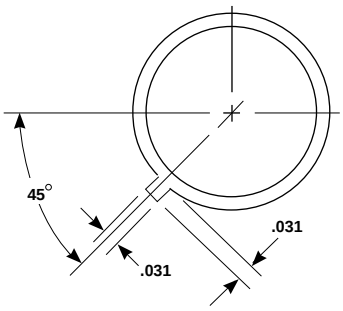
Product Options

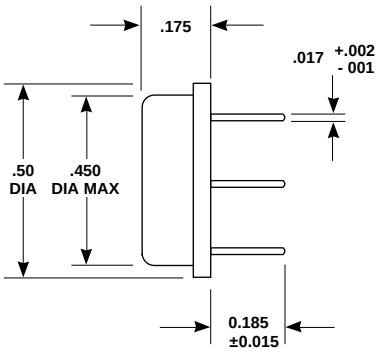


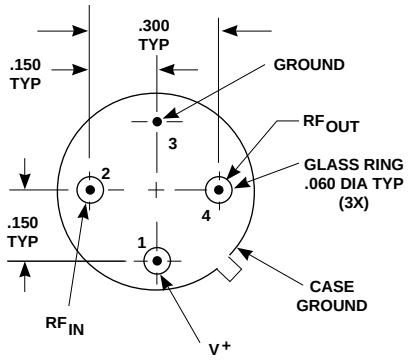


Note: R-Series screening is not available in the TC-1 case as the case is non-hermetic.

Case Drawings
TO-8U



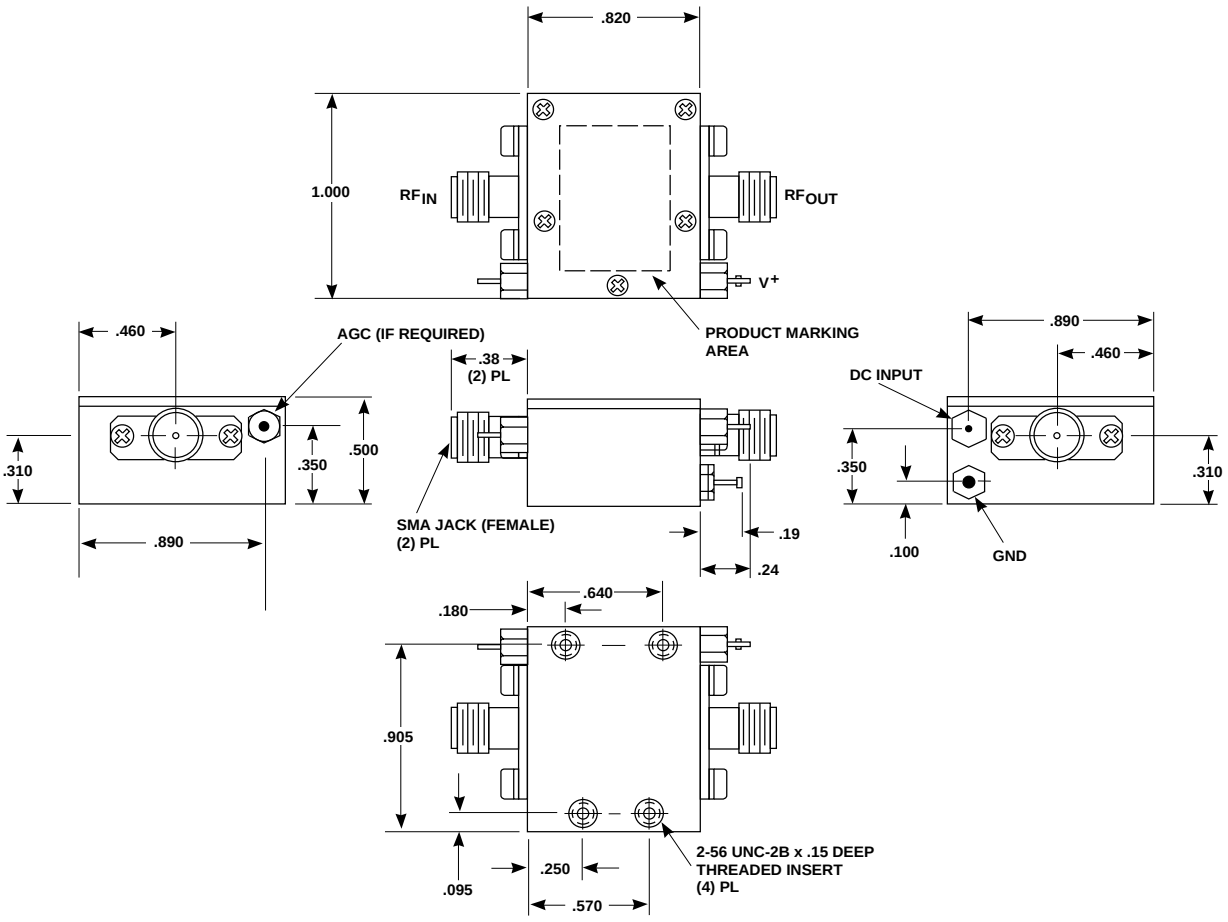




APPROXIMATE WEIGHT 2.1 GRAMS

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

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