TELEDYNE
MICROWAVE SOLUTIONS
Everywhereyoulook™

Wideband High Efficiency Amplifier 10 to 2000 MHz

Technical Data

UTO/UTC 2020 Series

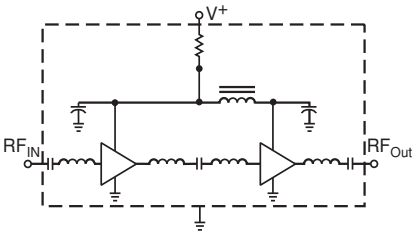
Features

- **Low Current: 52 mA (Typ)**
- **+16 dBm (Typ) Output Power**
- **Wideband: 10 to 2000 MHz**
- **High Gain: 19 dB (Typ)**
- **High Efficiency**

Applications

- **Low Current Applications**
- **Portable Communications**
- **Battery Operated Systems**
- **Wideband IF/RF Amplification**
- **Mixer Post Amp –Broadband Match**

Schematic

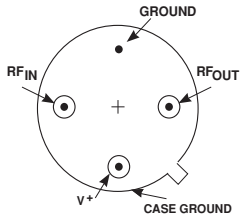


Description

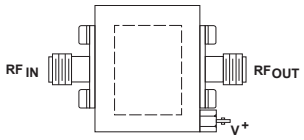
The 2020 series is a two-stage, medium-gain silicon bipolar amplifier that incorporates thin-film technology. Medium noise figure and high efficiency are a result of shared bias techniques. Resistive feedback and active bias circuits provide a very wideband, temperature compensated amplifier which has increased immunity to bias voltage variation. Blocking capacitors couple the RF through the amplifier which is optimized for easy cascading in 50 Ω systems. The 2020 series amplifiers are available in either the TO-8 hermetic case or connectored TC-1A package.

Pin Configuration

UTO—TO-8T



UTC—TC-1A



Maximum Ratings

Parameter	Maximum
DC Voltage	+17 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 Characteristics[1]

θ_{JC}	105/87°C/W[2]
Active Transistor Power Dissipation	100/340 mW[2]
Junction Temperature Above Case Temperature	11/30°C[2]

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

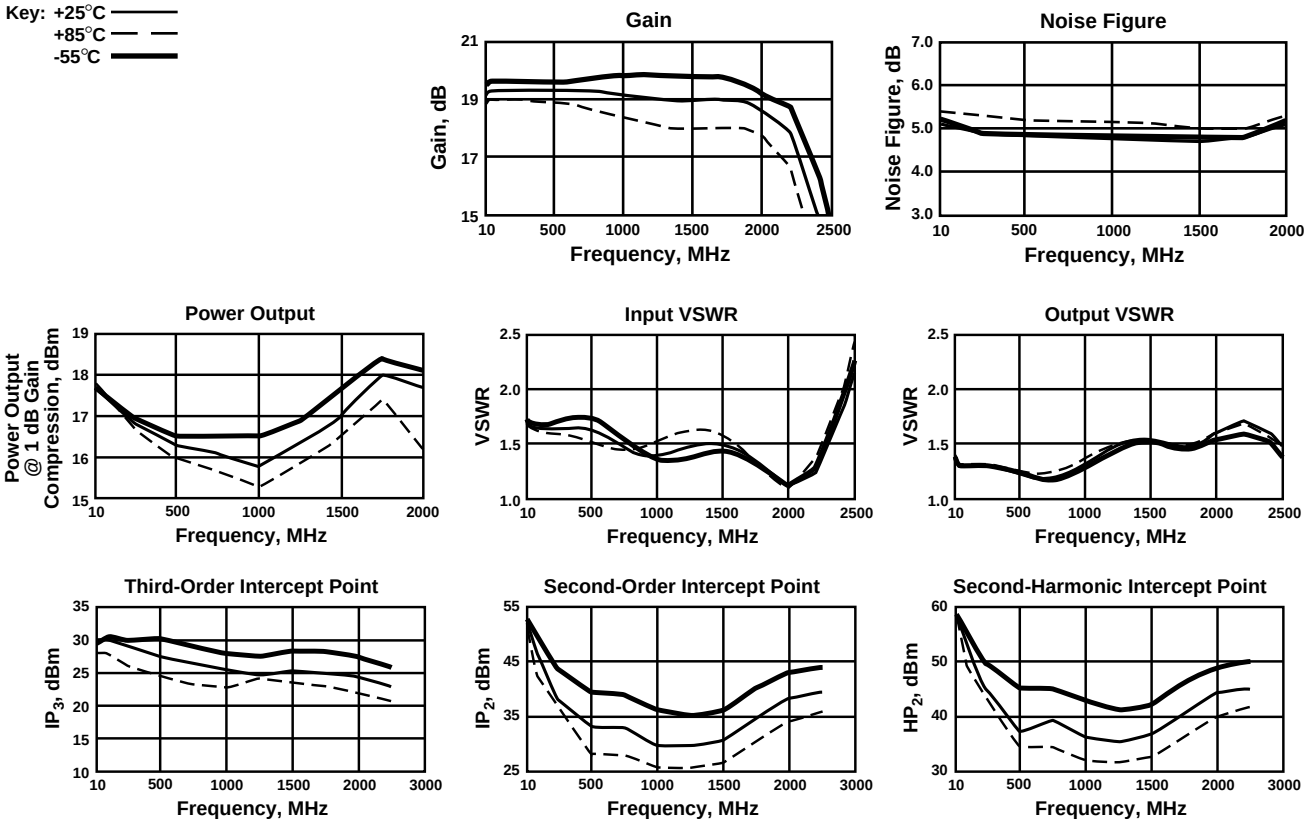
Weight: (typical) UTO—2.1 grams; UTC—21.5 grams

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	10-2000	10-2000	10-2000	MHz
GP	Small Signal Gain (Min.)	19	17.0	16.5	dB
—	Gain Flatness (Max.)	±0.5	±1.0	±1.0	dB
NF	Noise Figure (Max.)	5.0	6.0	6.0	dB
P_{1dB}	Power Output @ +1 dB Comp. (Min.)	+16.0	+14.5	+14.0	dBm
—	Input VSWR (Max.)	1.6:1	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	+25	+20	+20	dBm
IP_2	Two Tone 2nd Order Intercept Point	+32	—	—	dBm
HP_2	One Tone 2nd Harmonic Intercept Point	+38	—	—	dBm
I_D	DC Current	52	—	—	mA

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



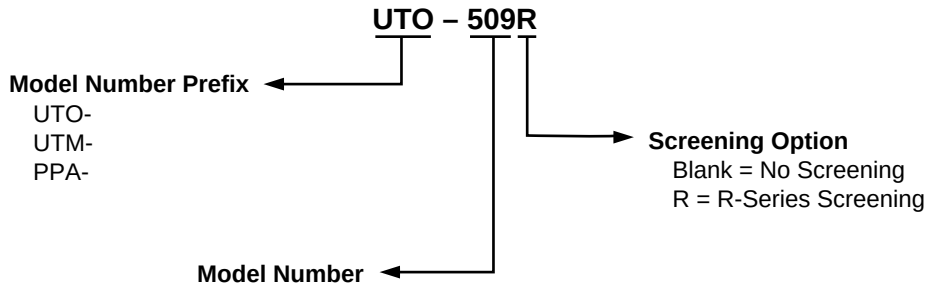
Automatic Network Analyzer Measurements (Typical production unit @ +25°C ambient)

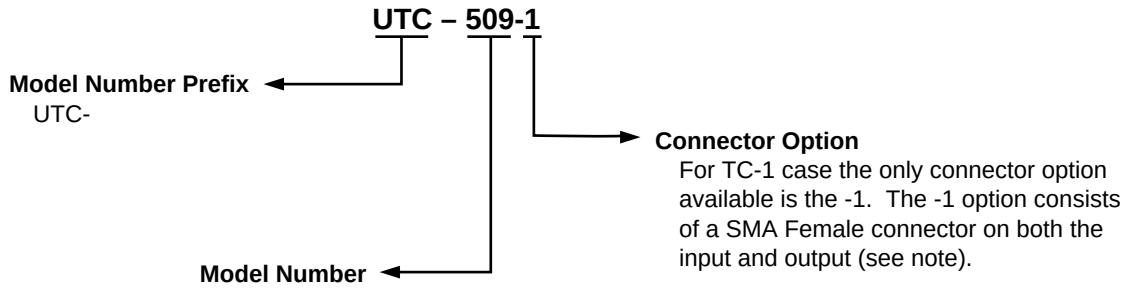
S-Parameters and Numerical Readings **Bias = 15.00 Volts**

FREQ	S_{11}		S_{21}		S_{12}		S_{22}		GPDEL	PHASE
GHz	Mag	Ang	dB	Ang	dB	Ang	Mag	Ang	ns	DEV (DEG)
.010	.26	171.9	19.2	20.1	-30.2	12.1	.19	-31.5	1.56	14.96
.050	.23	175.1	19.3	-5.8	-30.7	-1.4	.09	-12.6	1.56	-2.34
.100	.23	174.7	19.3	-18.6	-30.7	-7.4	.09	-3.0	.66	-3.55
.150	.22	174.0	19.3	-29.8	-30.7	-12.2	.09	.4	.61	-3.78
.200	.23	173.3	19.3	-40.7	-30.8	-16.8	.10	1.2	.59	-3.65
.250	.23	172.8	19.3	-51.4	-30.8	-21.3	.10	1.3	.58	-3.41
.300	.23	171.5	19.3	-62.0	-30.9	-25.5	.09	.4	.58	-3.14
.350	.23	170.6	19.3	-72.6	-30.9	-29.7	.09	-1.0	.58	-2.80
.400	.24	169.4	19.3	-83.2	-31.1	-34.1	.09	-2.0	.57	-2.46
.450	.23	168.4	19.3	-93.8	-31.2	-37.9	.08	-2.4	.58	-2.18
.500	.23	167.7	19.3	-104.4	-31.3	-42.5	.08	-2.4	.58	-1.82
.550	.23	166.9	19.3	-114.9	-31.3	-46.3	.07	-1.1	.58	-1.48
.600	.22	166.6	19.3	-125.5	-31.4	-50.0	.07	1.3	.58	-1.22
.650	.22	166.6	19.3	-136.1	-31.5	-54.0	.07	3.3	.58	-.85
.700	.21	167.2	19.3	-146.8	-31.6	-58.1	.08	4.9	.58	-.57
.750	.20	168.0	19.3	-157.4	-31.6	-62.3	.08	6.0	.58	-.24
.800	.20	169.3	19.3	-168.1	-31.7	-66.6	.09	5.2	.58	.09
.850	.19	170.6	19.3	-178.8	-31.8	-71.4	.10	2.6	.58	.39
.900	.19	171.7	19.2	170.5	-31.9	-74.7	.12	-.6	.58	.66
.950	.19	173.0	19.2	159.8	-31.9	-79.7	.13	-5.0	.58	1.04
1.000	.19	173.6	19.2	149.1	-32.1	-84.0	.14	-10.2	.58	1.35
1.050	.19	173.3	19.1	138.4	-32.1	-87.9	.15	-15.6	.58	1.70
1.100	.19	172.3	19.1	127.6	-32.2	-92.4	.17	-21.6	.57	2.12
1.150	.20	170.3	19.1	116.9	-32.3	-96.5	.18	-27.8	.57	2.48
1.200	.20	167.6	19.0	106.3	-32.3	-100.7	.19	-34.2	.58	2.87
1.250	.20	164.5	19.0	95.6	-32.5	-105.4	.20	-40.8	.58	3.13
1.300	.20	160.4	19.0	84.8	-32.5	-109.5	.21	-47.7	.58	3.53
1.350	.20	156.2	19.0	74.1	-32.5	-114.3	.22	-54.9	.58	3.74
1.400	.20	151.5	18.9	63.2	-32.5	-118.8	.22	-62.7	.59	3.89
1.450	.20	146.7	18.9	52.3	-32.5	-123.4	.22	-71.1	.59	3.88
1.500	.19	141.5	18.9	41.4	-32.4	-127.6	.22	-80.3	.61	3.66
1.550	.18	136.3	19.0	30.2	-32.4	-133.1	.22	-90.4	.62	3.20
1.600	.17	131.2	19.0	18.8	-32.3	-137.7	.21	-101.5	.63	2.60
1.650	.15	126.3	19.0	7.2	-32.3	-142.5	.21	-113.6	.64	1.81
1.700	.13	121.5	19.0	-4.6	-32.2	-148.0	.21	-126.8	.65	.81
1.750	.11	116.7	19.0	-16.7	-32.2	-153.2	.21	-140.8	.66	-.33
1.800	.09	112.5	19.0	-28.9	-32.1	-158.7	.21	-154.9	.66	-1.51
1.850	.07	108.2	18.9	-41.5	-32.0	-164.3	.21	-169.2	.66	-2.78
1.900	.05	104.1	18.9	-54.1	-32.1	-170.2	.22	177.2	.69	-4.45
1.950	.03	96.9	18.8	-67.1	-32.0	-176.5	.23	164.7	.70	-6.42
2.000	.01	72.4	18.7	-80.3	-32.0	178.1	.23	153.2	.74	-8.91
2.200	.10	-42.0	17.8	-137.5	-32.6	156.7	.26	116.4	—	—
2.400	.27	-74.8	15.0	162.5	-33.0	142.9	.24	87.6	—	—
2.600	.43	-102.9	11.1	111.5	-31.8	131.5	.18	78.8	—	—
2.800	.59	-126.5	7.0	63.9	-29.9	110.0	.19	96.7	—	—
3.000	.70	-146.7	2.1	18.9	-29.7	85.1	.29	88.1	—	—

LINEARIZATION RANGE: .010 to 2.000 GHz

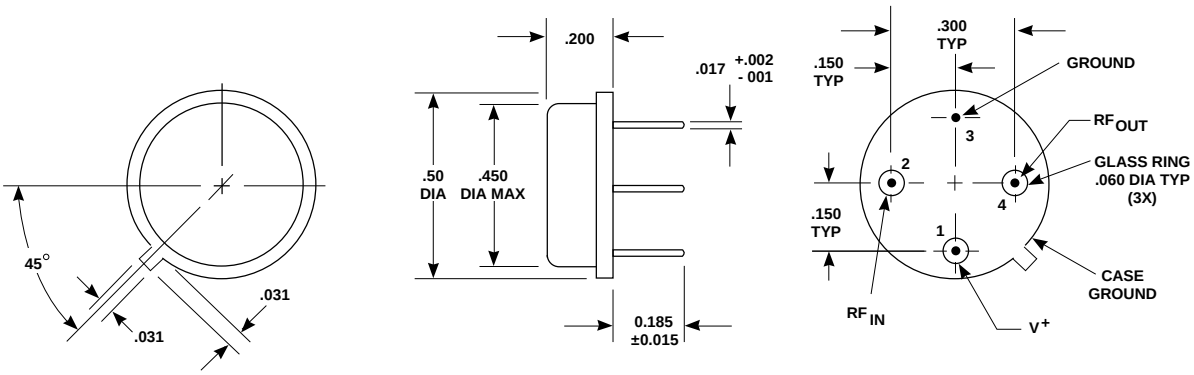
Product Options





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

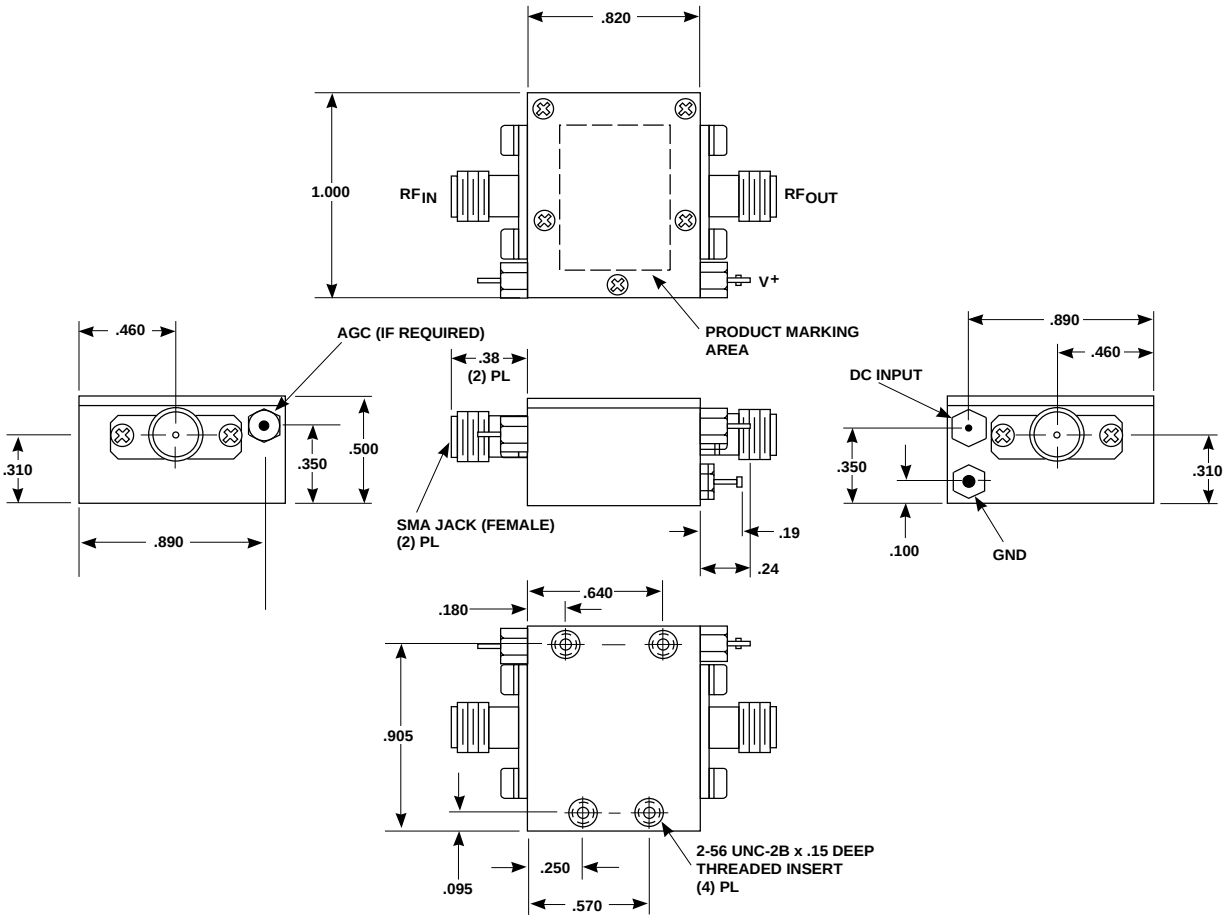
Case Drawings
TO-8T



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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