



Thin-Film Cascadable Amplifier 5 to 1500 MHz

Technical Data

UTO/UTC 1501 Series

Features

- **Frequency Range: 5 to 1500 MHz**
- **Medium Gain: 10.0 dB (Typ)**
- **Low Supply Current**

Applications

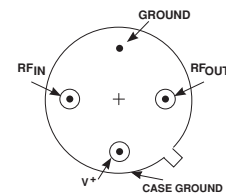
- **IF/RF Amplification**
- **Low Power Systems**

Description

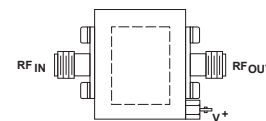
The 1501 Series is a wideband, thin-film bipolar RF amplifier that incorporates resistive feedback and active bias to provide a stable and reliable gain stage. Inductively coupled input and output networks provide good VSWR under all conditions. The 1501 Series amplifiers are available in either the TO-8 hermetic case or connected TC-1A package.

Pin Configuration

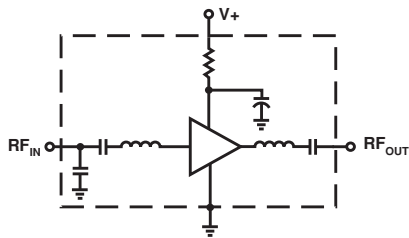
UTO—TO-8U



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 | 67 mW |
| Junction Temperature Above Case Temperature | 6°C |
| MTBF (MIL-HDBK-217E, A_{UF} @ 90°C) | 1,228,000 Hrs. |

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

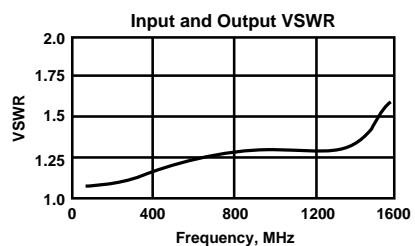
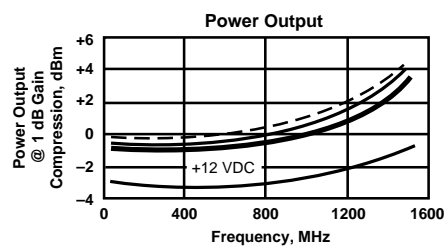
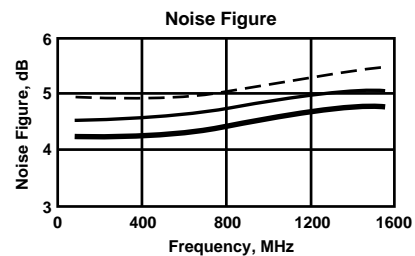
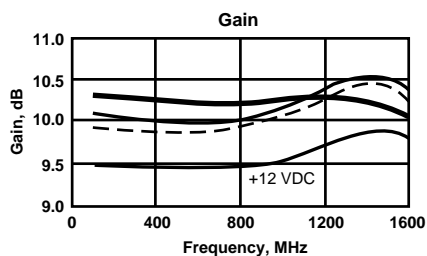
Electrical Specifications

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

| Symbol | Characteristic | Typical $T_C = 25^\circ\text{C}$ | Guaranteed Specifications | | Unit |
|-----------|------------------------------------|-------------------------------------|---------------------------------|------------------------------------|------|
| | | | $T_C = 0$ to 50°C | $T_C = -55$ to $+85^\circ\text{C}$ | |
| BW | Frequency Range | 5-1500 | 5-1500 | 5-1500 | MHz |
| GP | Small Signal Gain (Min.) | 10.0 | 9.0 | 8.5 | dB |
| — | Gain Flatness (Max.) | ± 0.3 | ± 0.5 | ± 1.0 | dB |
| NF | Noise Figure (Max.) | 4.5 | 5.5 | 6.0 | dB |
| P_{1dB} | Power Output @ +1 dB Comp. (Min.) | +0.0 | -3.0 | -4.0 | dBm |
| — | Input VSWR (Max.) | <1.5:1 | 2.0:1 | 2.0:1 | — |
| — | Output VSWR (Max.) | <1.5:1 | 2.0:1 | 2.0:1 | — |
| IP_3 | Two Tone 3rd Order Intercept Point | +10.0 | — | — | dBm |
| I_D | DC Current | 10 | — | — | mA |

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

Key: $+25^\circ\text{C}$ —
 $+85^\circ\text{C}$ - -
 -55°C —



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

Numerical Readings
Bias = 15.00 Volts

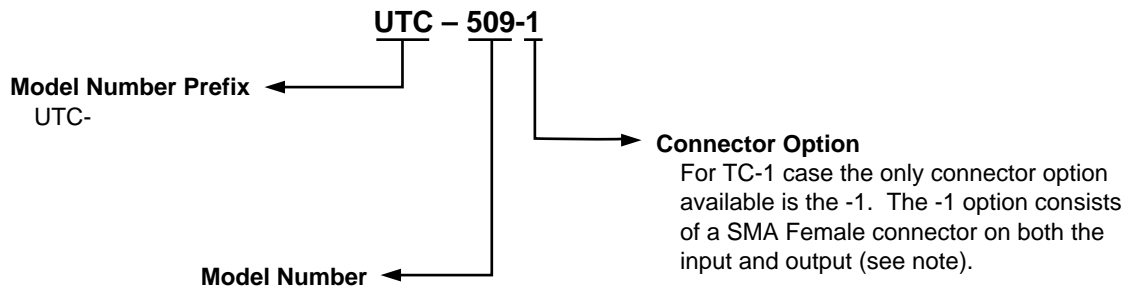
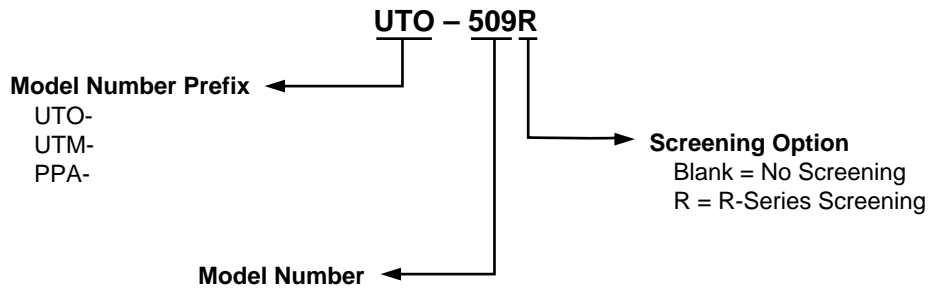
| FREQUENCY MHz | VSWR IN | GAIN dB | PHASE DEGREES | PHASE DEV | GROUP DELAY ns | VSWR OUT | ISOLATION dB |
|------------------|------------|------------|------------------|--------------|-------------------|-------------|-----------------|
| 100.0 | 1.10 | 10.19 | 164.95 | -1.96 | — | 1.15 | 16.20 |
| 200.0 | 1.11 | 10.04 | 150.08 | -2.11 | .41 | 1.16 | 16.30 |
| 300.0 | 1.14 | 10.04 | 135.54 | -1.94 | .40 | 1.19 | 16.33 |
| 400.0 | 1.17 | 10.10 | 121.40 | -1.36 | .38 | 1.23 | 16.38 |
| 500.0 | 1.20 | 10.14 | 107.77 | -.28 | .38 | 1.26 | 16.39 |
| 600.0 | 1.24 | 10.13 | 94.43 | 1.08 | .38 | 1.29 | 16.42 |
| 700.0 | 1.26 | 10.12 | 80.64 | 2.00 | .39 | 1.32 | 16.45 |
| 800.0 | 1.31 | 10.16 | 66.67 | 2.74 | .39 | 1.33 | 16.44 |
| 900.0 | 1.34 | 10.22 | 52.40 | 3.19 | .41 | 1.35 | 16.43 |
| 1000.0 | 1.38 | 10.32 | 37.60 | 3.11 | .42 | 1.35 | 16.42 |
| 1100.0 | 1.40 | 10.45 | 22.23 | 2.45 | .43 | 1.36 | 16.40 |
| 1200.0 | 1.42 | 10.62 | 6.34 | 1.25 | .46 | 1.36 | 16.38 |
| 1300.0 | 1.45 | 10.77 | -10.21 | -.58 | .47 | 1.38 | 16.34 |
| 1400.0 | 1.51 | 10.89 | -27.54 | -3.20 | .49 | 1.42 | 16.26 |
| 1500.0 | 1.64 | 10.87 | -45.92 | -6.86 | .54 | 1.52 | 16.21 |
| 1600.0 | 1.89 | 10.74 | -66.18 | — | .57 | 1.67 | 16.28 |
| 1700.0 | 2.31 | 10.46 | -86.81 | — | .57 | 1.87 | 16.55 |
| 1800.0 | 2.91 | 9.77 | -107.06 | — | .56 | 2.10 | 17.04 |

Linearization Range: 100.0 to 1500.0 MHz

S-Parameters
Bias = 15.00 Volts

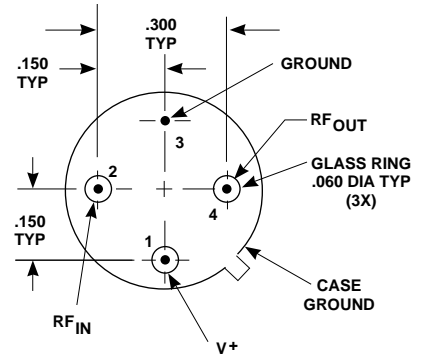
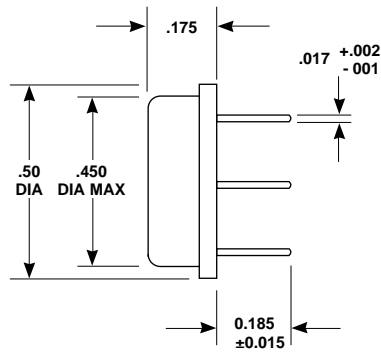
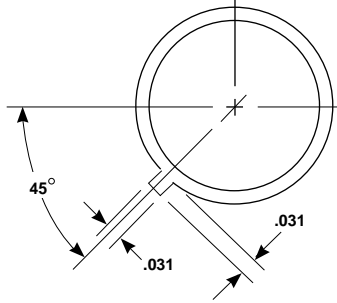
| FREQUENCY MHz | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|------------------|-----------------|--------|-----------------|-------|-----------------|--------|-----------------|-------|
| | Mag | Ang | dB | Ang | dB | Ang | Mag | Ang |
| 100.00 | .076 | -171.7 | 9.97 | 165.4 | -16.19 | -6.0 | .094 | 157.3 |
| 200.00 | .080 | -170.0 | 9.91 | 151.9 | -16.25 | -11.5 | .101 | 135.5 |
| 300.00 | .089 | -169.4 | 9.82 | 138.2 | -16.25 | -17.5 | .113 | 116.1 |
| 400.00 | .097 | -169.5 | 9.85 | 124.3 | -16.31 | -23.1 | .126 | 100.3 |
| 500.00 | .108 | -173.5 | 9.91 | 110.8 | -16.42 | -29.2 | .137 | 87.2 |
| 600.00 | .118 | -177.6 | 9.92 | 97.9 | -16.42 | -35.7 | .146 | 76.0 |
| 700.00 | .128 | 177.6 | 9.91 | 84.8 | -16.42 | -42.0 | .151 | 64.9 |
| 800.00 | .138 | 171.1 | 9.92 | 71.4 | -16.42 | -48.3 | .153 | 55.5 |
| 900.00 | .144 | 162.6 | 9.98 | 57.8 | -16.48 | -54.7 | .153 | 45.8 |
| 1000.00 | .150 | 152.7 | 9.98 | 44.0 | -16.42 | -61.1 | .148 | 38.2 |
| 1100.00 | .150 | 142.1 | 10.10 | 29.7 | -16.36 | -67.3 | .142 | 31.1 |
| 1200.00 | .150 | 127.0 | 10.18 | 14.8 | -16.36 | -74.4 | .137 | 27.3 |
| 1300.00 | .155 | 108.3 | 10.28 | -.8 | -16.31 | -81.8 | .134 | 23.9 |
| 1400.00 | .166 | 85.2 | 10.38 | -17.0 | -16.25 | -89.7 | .137 | 23.1 |
| 1500.00 | .194 | 59.8 | 10.41 | -33.5 | -16.19 | -98.5 | .150 | 20.5 |
| 1600.00 | .242 | 35.1 | 10.31 | -51.1 | -16.19 | -107.6 | .175 | 16.8 |
| 1700.00 | .315 | 12.9 | 10.12 | -70.3 | -16.25 | -116.9 | .208 | 7.9 |

Product Options



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

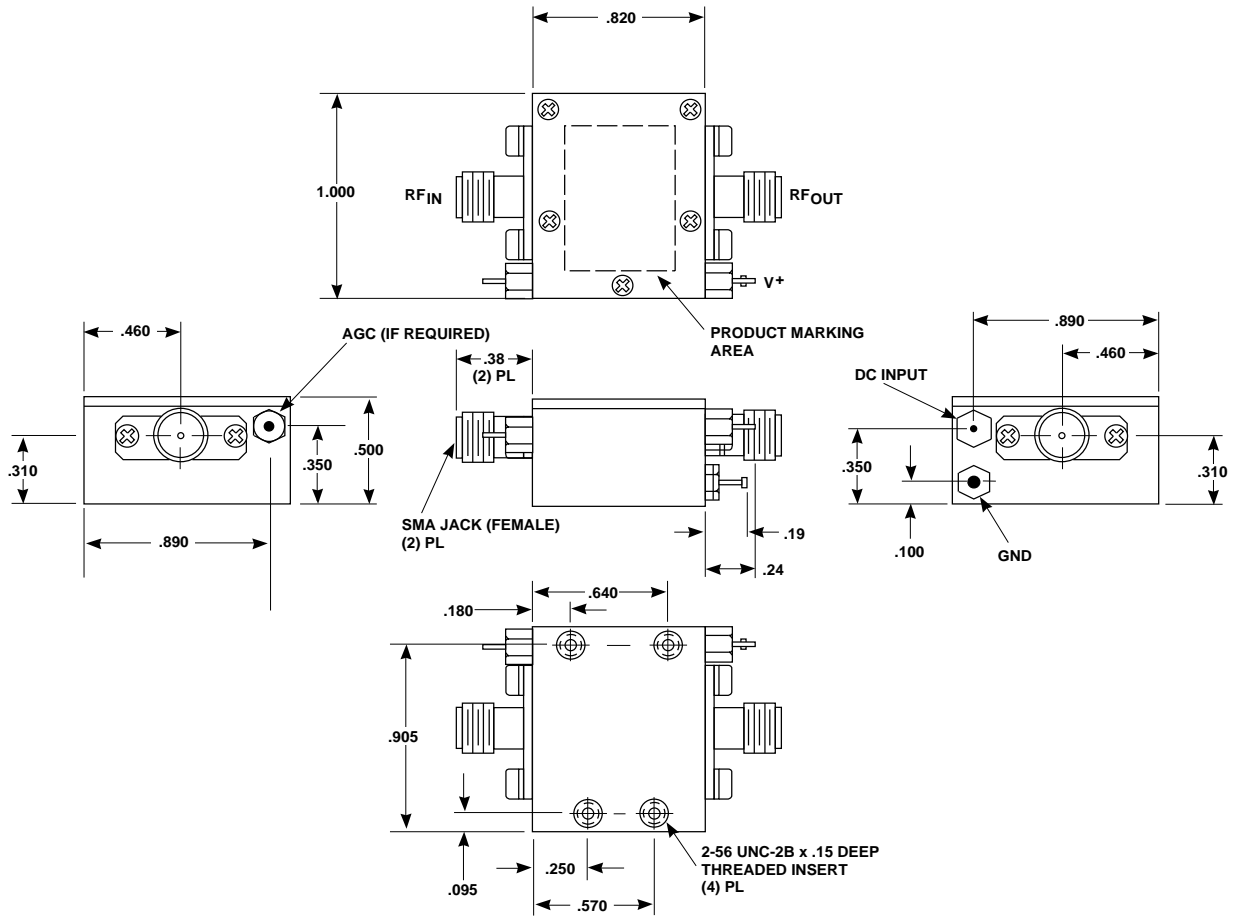
**Case Drawings
TO-8U**



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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