



**UTO/UTC 2303 Series**  
Thin-Film Cascadable Amplifier  
1700 to 2300 MHz

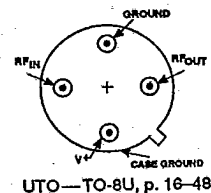
T-74-13-01

**FEATURES**

- Frequency Range: 1700 to 2300 MHz
- Medium Gain: 10.0 dB (Typ)
- Medium Output Power: +12.0 dBm (Typ)
- Low Noise Figure: 6.5 dB (Typ)
- Temperature Compensated

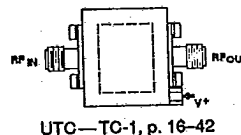
**APPLICATIONS**

- IF/RF Amplification
- Telemetry
- Military Communications

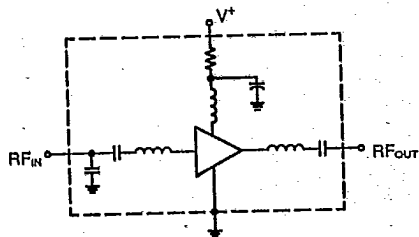
**DESCRIPTION**

The 2303 Series is a thin-film bipolar RF amplifier that incorporates resistive feedback and active bias for temperature compensation and increased immunity to bias voltage variations. Tuned inductive

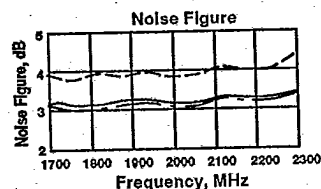
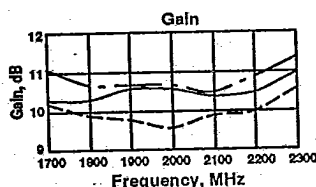
coupling maintains low VSWR over all conditions, while blocking capacitors couple RF through the amplifier. The 2303 Series is available in either the TO-8 hermetic case or connected TC-1 package.

**ELECTRICAL SPECIFICATIONS** (Measured in a 50-ohm system @ +15 VDC nominal unless otherwise noted)

| Symbol           | Characteristic                          | Typical<br>$T_c = 25^\circ\text{C}$ | Guaranteed Specifications                   |                                                | Unit |
|------------------|-----------------------------------------|-------------------------------------|---------------------------------------------|------------------------------------------------|------|
|                  |                                         |                                     | $T_c = 0^\circ\text{ to } 50^\circ\text{C}$ | $T_c = -55^\circ\text{ to } +85^\circ\text{C}$ |      |
| BW               | Frequency Range                         | 1700-2300                           | 1700-2300                                   | 1700-2300                                      | MHz  |
| GP               | Small Signal Gain (Min.)                | 10.0                                | 8.0                                         | 8.0                                            | dB   |
| —                | Gain Flatness (Max.)                    | $\pm 0.4$                           | $\pm 0.5$                                   | $\pm 1.0$                                      | dB   |
| NF               | Noise Figure (Max.)                     | 6.5                                 | 8.0                                         | 8.5                                            | dB   |
| $P_{1\text{dB}}$ | Power Output @ +1 dB Compression (Min.) | +12.0                               | +10.0                                       | +9.0                                           | dBm  |
| —                | Input VSWR (Max.)                       | <1.8:1                              | 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      | +20.0                               | —                                           | —                                              | dBm  |
| $IP_2$           | Two Tone 2nd Order Intercept Point      | +31.0                               | —                                           | —                                              | dBm  |
| $HP_2$           | One Tone 2nd Harmonic Intercept Point   | +40.0                               | —                                           | —                                              | dBm  |
| $I_o$            | DC Current                              | 30                                  | —                                           | —                                              | mA   |

**SCHEMATIC****TYPICAL PERFORMANCE OVER TEMPERATURE**  
(@ +15 VDC unless otherwise noted)

KEY: +25°C ———  
+85°C - - - - -  
-55°C - - - - -

**MAXIMUM RATINGS**

|                                |                 |
|--------------------------------|-----------------|
| DC Voltage                     | +17 Volts       |
| Continuous RF Input Power      | +13 dBm         |
| Operating Case Temperature     | -55°C to +125°C |
| Storage Temperature            | -62°C to +150°C |
| "R" Series Burn-In Temperature | +125°C          |

**THERMAL CHARACTERISTICS\***

|                                             |              |
|---------------------------------------------|--------------|
| $\theta_{JA}$                               | 105°C/W      |
| Active Transistor Power Dissipation         | 250 mW       |
| Junction Temperature Above Case Temperature | 27°C         |
| MTBF (MIL-HDBK-217E, $A_{UT}$ 90°C)         | 691,800 Hrs. |

\*For further information, see High Reliability section, p. 17-2.

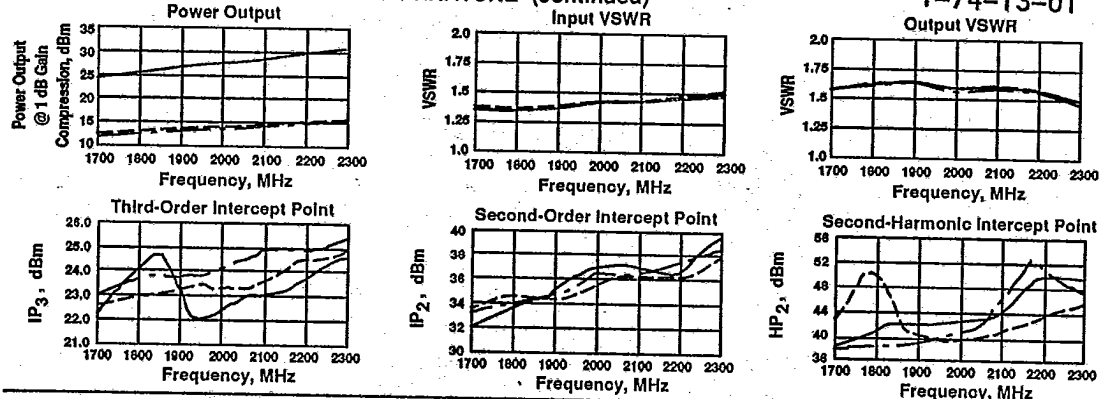
**WEIGHT:** (typical) UTO—2.1 grams; UTC—21.5 grams

Avantek, Inc. • 481 Cottonwood Drive, Milpitas, CA 95035 • Contact your local representative, distributor or field sales office for further information. Listings are in the back of this Data Book.

UTO/UTC 2303 Series  
Thin-Film Cascadable Amplifier

## TYPICAL PERFORMANCE OVER TEMPERATURE (continued)

T-74-13-01



## AUTOMATIC NETWORK ANALYZER MEASUREMENTS (Typical production unit @ +25°C ambient)

## NUMERICAL READINGS

BIAS = 15.00 VOLTS

| FREQ MHz | VSWR IN | GAIN dB | PHASE DEG | PHASE DEV | GPDEL nsec | VSWR OUT | ISOL dB |
|----------|---------|---------|-----------|-----------|------------|----------|---------|
| 400.0    | 4.88    | 8.30    | -156.19   | —         | .93        | 2.39     | 29.60   |
| 500.0    | 2.78    | 9.81    | 174.10    | —         | .73        | 2.24     | 26.92   |
| 600.0    | 2.11    | 10.15   | 151.18    | —         | .55        | 2.14     | 26.13   |
| 700.0    | 1.86    | 10.14   | 133.71    | —         | .43        | 2.09     | 25.47   |
| 800.0    | 1.78    | 9.93    | 119.37    | —         | .37        | 2.04     | 25.03   |
| 900.0    | 1.77    | 9.67    | 106.47    | —         | .34        | 1.99     | 24.51   |
| 1000.0   | 1.78    | 9.45    | 94.59     | —         | .32        | 1.94     | 24.13   |
| 1100.0   | 1.81    | 9.27    | 83.58     | —         | .30        | 1.89     | 23.61   |
| 1200.0   | 1.83    | 9.13    | 72.70     | —         | .29        | 1.84     | 23.01   |
| 1300.0   | 1.85    | 9.05    | 61.94     | —         | .29        | 1.77     | 22.40   |
| 1400.0   | 1.84    | 8.98    | 51.35     | —         | .29        | 1.73     | 21.94   |
| 1500.0   | 1.86    | 8.99    | 40.98     | —         | .29        | 1.67     | 21.39   |
| 1600.0   | 1.83    | 9.01    | 30.65     | —         | .28        | 1.60     | 21.09   |
| 1700.0   | 1.79    | 9.08    | 20.28     | -1.01     | .29        | 1.55     | 20.67   |
| 1800.0   | 1.73    | 9.13    | 9.93      | .01       | .31        | 1.49     | 20.13   |
| 1900.0   | 1.68    | 9.19    | -7.70     | .69       | .33        | 1.44     | 19.82   |
| 2000.0   | 1.59    | 9.32    | -12.56    | .29       | .32        | 1.39     | 19.31   |
| 2100.0   | 1.49    | 9.50    | -24.02    | .21       | .32        | 1.35     | 18.88   |
| 2200.0   | 1.37    | 9.84    | -35.61    | .00       | .34        | 1.34     | 18.65   |
| 2300.0   | 1.24    | 9.74    | -47.67    | -.69      | .35        | 1.36     | 18.37   |
| 2400.0   | 1.09    | 9.74    | -60.33    | —         | .39        | 1.47     | 18.25   |
| 2500.0   | 1.05    | 9.78    | -73.64    | —         |            |          | 18.27   |

LINEARIZATION RANGE: 1700 to 2300 MHz

## S-PARAMETERS

BIAS = 15.00 VOLTS

| FREQ MHz | S <sub>11</sub> |        | S <sub>21</sub> |        | S <sub>12</sub> |        | S <sub>22</sub> |        |
|----------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|
|          | Mag             | Ang    | dB              | Ang    | dB              | Ang    | Mag             | Ang    |
| 300.00   | .874            | -149.6 | 1.299           | -114.5 | -36.858         | 105.8  | .367            | -95.8  |
| 400.00   | .873            | 173.5  | 8.183           | -162.5 | -28.607         | 74.6   | .353            | -124.3 |
| 500.00   | .478            | 152.4  | 9.931           | 177.8  | -26.231         | 53.0   | .330            | -151.3 |
| 600.00   | .346            | 143.6  | 10.436          | 152.3  | -24.947         | 37.6   | .304            | -176.0 |
| 700.00   | .275            | 144.9  | 10.454          | 133.3  | -24.613         | 26.3   | .293            | 162.4  |
| 800.00   | .253            | 150.4  | 10.229          | 119.1  | -24.369         | 20.1   | .288            | 147.6  |
| 900.00   | .258            | 153.4  | 9.899           | 104.8  | -24.020         | 12.0   | .284            | 132.9  |
| 1000.00  | .274            | 153.5  | 9.571           | 91.6   | -23.613         | 6.2    | .275            | 120.1  |
| 1100.00  | .290            | 151.3  | 9.316           | 79.8   | -23.307         | .6     | .270            | 109.0  |
| 1200.00  | .307            | 148.4  | 9.090           | 70.0   | -22.921         | -3.0   | .268            | 100.5  |
| 1300.00  | .321            | 143.4  | 8.889           | 58.0   | -22.458         | -9.9   | .246            | 89.2   |
| 1400.00  | .329            | 137.6  | 8.722           | 46.3   | -22.147         | -15.2  | .226            | 78.7   |
| 1500.00  | .334            | 132.3  | 8.630           | 36.0   | -21.730         | -20.3  | .208            | 68.0   |
| 1600.00  | .333            | 127.6  | 8.616           | 26.7   | -21.451         | -24.8  | .184            | 57.5   |
| 1700.00  | .327            | 122.0  | 8.600           | 17.5   | -21.048         | -29.9  | .162            | 45.6   |
| 1800.00  | .318            | 114.1  | 8.648           | 5.2    | -20.507         | -36.6  | .133            | 27.9   |
| 1900.00  | .303            | 107.8  | 8.636           | -4.5   | -20.163         | -42.3  | .109            | 8.1    |
| 2000.00  | .282            | 104.0  | 8.747           | -12.3  | -19.747         | -46.3  | .093            | -14.7  |
| 2100.00  | .252            | 96.3   | 8.856           | -24.9  | -19.150         | -54.4  | .088            | -48.8  |
| 2200.00  | .211            | 87.2   | 9.025           | -37.5  | -18.799         | -62.9  | .096            | -96.0  |
| 2300.00  | .161            | 82.0   | 9.089           | -48.8  | -18.454         | -70.6  | .119            | -119.7 |
| 2400.00  | .102            | 77.1   | 9.168           | -60.1  | -18.148         | -79.2  | .148            | -136.1 |
| 2500.00  | .036            | 90.2   | 9.167           | -72.5  | -18.040         | -88.1  | .177            | -157.6 |
| 2600.00  | .058            | -154.7 | 9.115           | -86.5  | -17.893         | -98.9  | .215            | -179.3 |
| 2700.00  | .164            | -156.2 | 8.939           | -104.9 | -18.140         | -114.2 | .256            | 155.7  |
| 2800.00  | .252            | -162.1 | 8.659           | -116.9 | -18.374         | -123.8 | .289            | 138.8  |
| 2900.00  | .392            | -176.0 | 8.160           | -138.6 | -19.004         | -141.8 | .329            | 112.4  |
| 3000.00  | .474            | 175.5  | 7.656           | -152.1 | -19.945         | -163.4 | .356            | 94.8   |

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