

FEATURES

- High Output Intercept Point
- High Linearity
- True Surface Mount Package
- Internal Bias Circuit Requiring Nominal Input Voltages $\pm 10\%$
- Low Cost
- Off Chip Output Matching Circuit Allows Application Optimization

PRODUCT DESCRIPTION

The AWT1921 is a four stage monolithic amplifier for use in communication systems that require high gain and output intercept point. The device has been specifically designed for fixed satellite access equipment and handset booster amplifier applications.



Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|-------------------|-----------------------|--|
| 1,14,1-5,28, slug | GND | AC and RF Ground |
| 2 | V_{GS1} & RF_{IN} | First Stage Gate terminal & RF Input |
| 27 | V_{DD} | Positive Supply of Bias Circuit(+5V) |
| 4 | V_{D2} | Second Stage drain supply (+9V) |
| 3 | V_{D1} | First Stage drain supply (+9V) |
| 5,6,7,8 | GND | First and Second Stage Source ground |
| 9,10 | V_{D3} | Third Stage drain supply (+9V) |
| 11 | V_{GS2} | Second Stage Gate Terminal |
| 26 | V_{REF} | Bias control Pin (+5V) |
| 12 | V_{SS} | Negative Supply for Bias Circuit (-5V) |
| 13 | V_{GS3} | Third Stage Gate terminal |
| 16,17 | V_{GS4} | Fourth Stage Gate terminal |
| 18-25 | V_{D4} | Fourth Stage drain supply (+9V) & RF out |

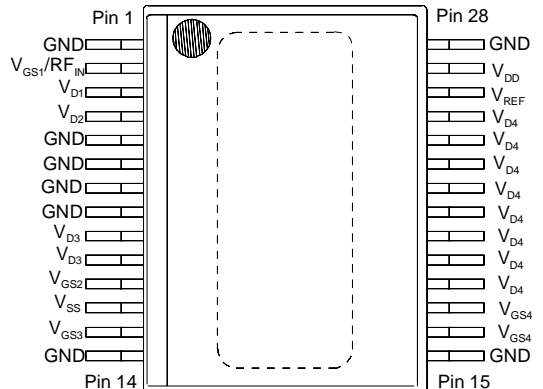


Figure 1: Pin Layout

ELECTRICAL CHARACTERISTICS

Table 2: Electrical Specifications⁽¹⁾
 (Pin with CDMA modulation, fo = 1610 – 1626.5 MHz, $V_{DS1} = V_{DS2} = V_{DS3} = V_{DS4} = 9.0V, V_{SS} = -5V, V_{REF} = +5V, V_{DD} = +5V, T_c = 25C, 50 \Omega$ System⁽²⁾)

| PARAMETER | MIN | TYP | MAX | UNIT |
|--|------------------|------------------------|-------------|-----------------------------|
| Frequency | 1610 | | 1626.5 | MHz |
| Power Output | 35 | 36 | | dBm |
| Power Added Efficiency | - | 25 | | % |
| Gain ⁽³⁾ | 27 | 30 | | dB |
| ACPR ⁽³⁾ 0.730 MHz 1.23 MHz | - - | 25 -28 | 100 | dBc |
| Harmonics 2nd 3rd 4th | - - - | -45 -52 -45 | | dBc |
| Stability: - 60 dBc all spurious outputs relative to desired signal | - | - | 3:1 | VSWR load, all phase angles |
| Bias Supply Currents I_{SS} I_{REF} I_{DD} | - - - | 15 5 15 | | mA |
| Quiescent Currents I_{DQ1} I_{DQ2} I_{DQ3} I_{DQ4} | - - - - | 60 90 150 200 | - - - | mA |
| Input Return Loss | - | 11 | - | dB |
| Gain Flatness ⁽³⁾ @ P _{OUT} = +35 dBm | - | 0.8 | - | dB |
| Thermal Resistance ⁽⁴⁾ | - | 4.5 | - | C/W |

Notes:

1. As measured in ANADIGICS test fixture, see application section.
2. 50Ω Measurement system after off chip matching circuit, input terminated in 50Ω.
3. Measured at P_{OUT} = +35 dBm
4. Thermal Resistance for junction to bottom of slug

$$\Theta_{jc} = \frac{T_j - T_c}{(I_{D1} + I_{D2} + I_{D3} + I_{D4})V_{SUP} - P_{OUT}}$$

Table 3: Absolute Max Ratings

| PIN | NAME | MAX RATING | PIN | NAME | MAX RATING |
|-----|-----------|------------|--|-----------|------------|
| 2 | V_{DD} | +7VDC | 11 | V_{REF} | +7 VDC |
| 3 | RF_{IN} | +20 dBm | 12 | V_{SS} | -7 VDC |
| 4,5 | V_{D1} | +10 VDC | 18,19,- 20,21,- 22,23,- 24,25 | V_{D3} | +10 VDC |
| 8,9 | V_{D2} | +10 VDC | | | |

Stresses in excess of the absolute ratings may cause permanent damage. Functional operation is not implied under these conditions. Exposure to absolute ratings for extended periods of time may adversely affect reliability.

Operating Temperature: - 30 to + 85 °C

Storage Temperature: - 55 to +100 °C

PERFORMANCE DATA

Figure 2: ACPR @ $P_{OUT} = 35$ dBm

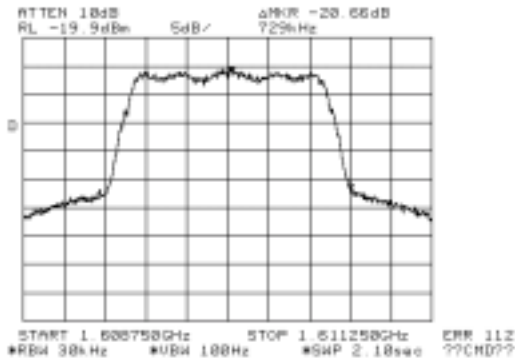


Figure 3: ACPR @ $P_{OUT} = 35$ dBm

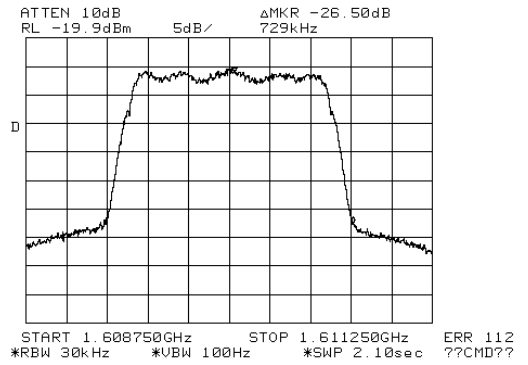
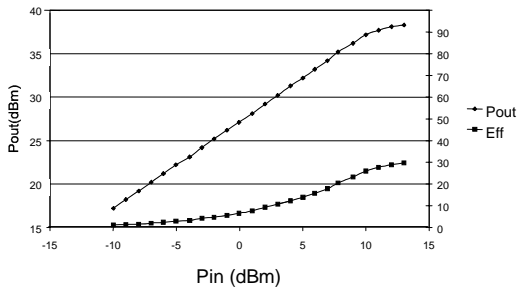
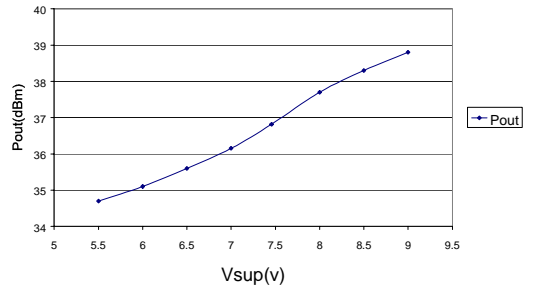


Figure 4: P_{OUT} & Eff vs P_{IN}



* P_{OUT} with CDMA Modulation

Figure 5: P_{OUT} vs Supply Voltage



$P_{IN} = 10$ dBm, with CDMA Modulation

Figure 6: S11 Forward Reflection Impedance

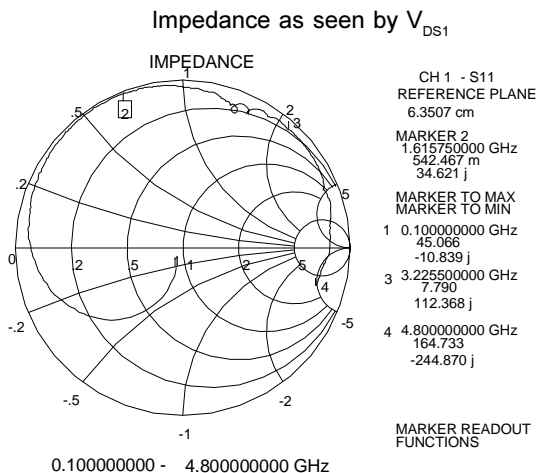


Figure 7: S11 Forward Reflection Impedance

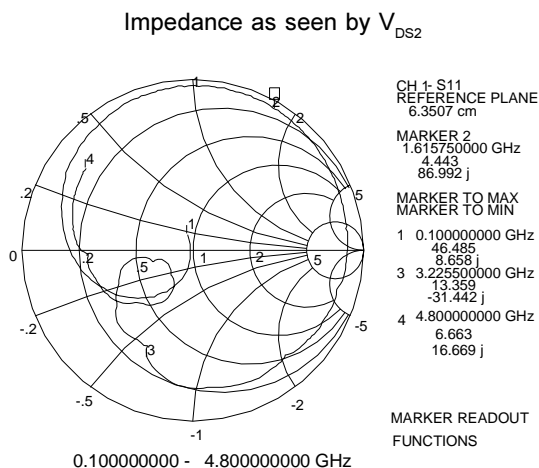


Figure 8: S11 Forward Reflection Impedance

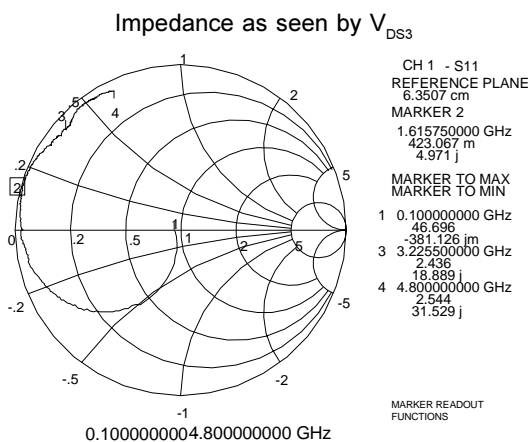
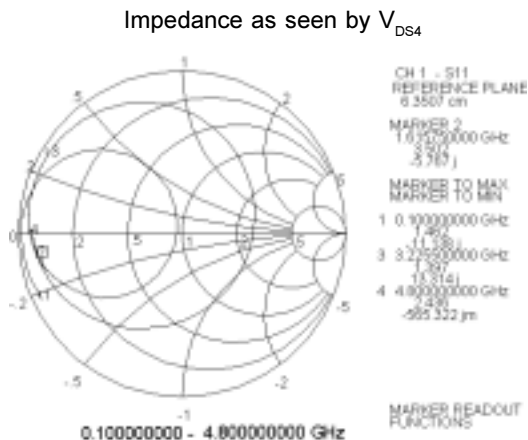


Figure 9: S11 Forward Reflection Impedance



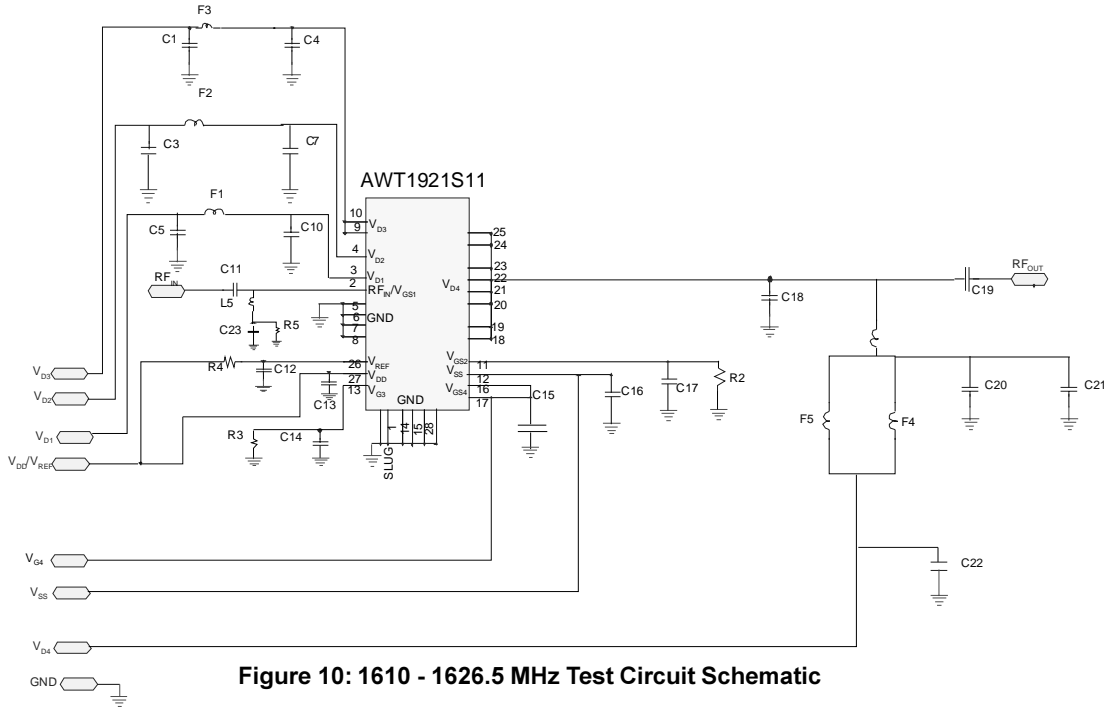


Figure 10: 1610 - 1626.5 MHz Test Circuit Schematic

Table 4: Pin Designations

| DESIGNATION | VALUE |
|-----------------|----------|
| C1,C3,C5,C22 | 2.2 F |
| C2,C7,C9,C24 | Not Used |
| C4 | 15 pF |
| C6, C10 | 10 pF |
| C11,C19 | 27 pF |
| C12,C13,C20,C21 | 33 pF |
| C14,C16,C17,C23 | 0.01 uF |
| C15 | 22 pF |
| C18 | 4.7 pF |
| F1,F2,F3,F4,F5 | Feritte |
| L1,L3 | Shim |
| L2 | 2.7 nH |
| L4 | 8 nH |
| L5 | 47 nH |
| R2, R5 | 5600 |
| R3 | 1500 |
| R4 | 2200 |

Procedure for Amplifier Operation and Test

- 1) Slug must be thermally and electrically connected to obtain rated performance.
- 2) The V_{SS} voltage should be applied first to the amplifier prior to V_{D1} , V_{D2} , V_{D3} , or V_{D4} voltages.
- 3) V_{GS1} , V_{GS2} , V_{GS3} , V_{GS4} may be used as monitor points to verify that the bias circuit is working properly. These pins should measure as negative voltage potential, after V_{SS} is applied.
- 4) The Bias Pins V_{DD} and V_{REF} may be applied with no V_{SS} voltage present.
- 5) Always follow ESD precautions when handling these devices.

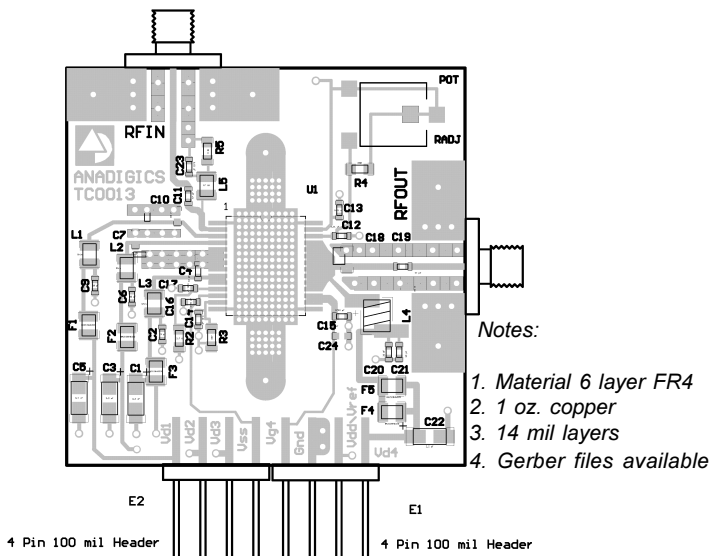
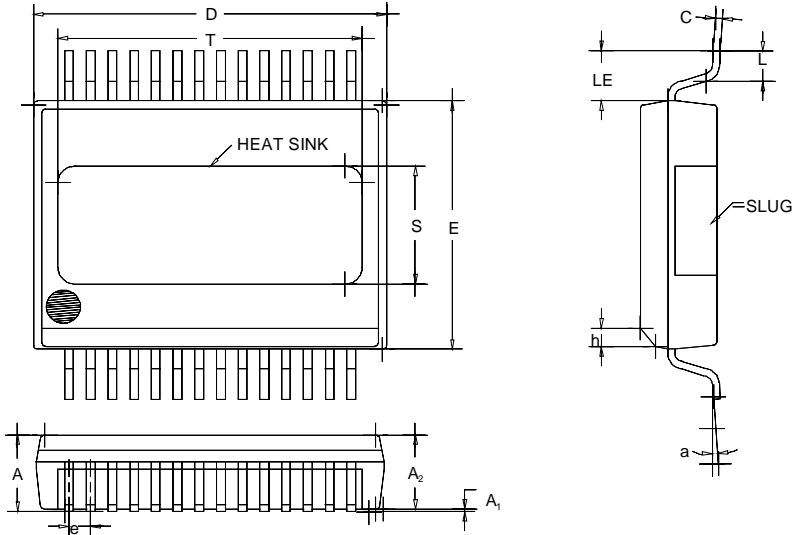


Figure 11: 1610 - 1626.5 MHz Test Circuit Layout

Table 5: Parts List Table

| DESIGNATION | VALUE | MANUFACTURE | MANUFACTURE PART # | WEB ADDRESS |
|------------------|--|-----------------------------|--------------------|--|
| C1,C3,C5,C22 | 2.2 μ F | Panasonic | ECS-H1AY225R | www.panasonic.com |
| C2,C7,C9,C24 | Not Used | | | |
| C4 | 15 pF | Murata | GRM36COG150J50 | www.murata.com |
| C6,C10 | 10 pF | Murata | GRM36COG100J50 | |
| C11,C19 | 27 pF | Murata | GRM36COG270J50 | www.murata.com |
| C12,C13,C20,C21 | 33 pF | Murata | GRM36COG330J50 | www.murata.com |
| C14,C16,C17, C23 | 0.01 uF | Murata | GRM36X7R103K16 | www.murata.com |
| C15 | 22 pF | Murata | GRM36COG220J50 | www.murata.com |
| C18 | 4.7 pF | American Technical Ceramics | ATC100A4R7CW150X | www.atc-cap.com |
| F1,F2,F3,F4,F5 | Ferrite 47 Ω @ 100 MHz, 1A Rating | Taiyo Yuden | BK2125HS470 | www.t-yuden.com |
| L1, L3 | Shim | | | |
| L2 | 2.7 nH | Toko | LL2012-F2N7S | www.tokoam.com |
| L4 | 8 nH | Coilcraft | A03T | www.coilcraft.com |
| L5 | 47 nH | Coilcraft | 0805CS470XMBC | www.coilcraft.com |
| R2,R5 | 5600 Ω | Panasonic | ERJ-36SYJ562V | www.panasonic.com |
| R3 | 1500 Ω | Panasonic | ERJ-36SYJ302V | www.panasonic.com |
| R4 | 2200 Ω | Panasonic | ERJ-36SYJ512V | www.panasonic.com |



Notes:

1. Controlling dimensions : inches
2. Dimension "d" does not include mold flash, protrusions or gate burrs. Mold flash, protrusions and gate burrs shall not exceed 0.006 (0.16mm)
3. Dimension "e" does not include inter-lead or protrusions. Inter-lead flash and protrusions shall not exceed 0.010 (0.25mm) per side.
4. Maximum lead twist/skew to be 0.002 (0.05mm)
5. Mold flash shall not extend more than 0.010 (0.25mm) on any edge of heat slug

Figure 12: Package Outline Drawing

| SYMBOL | INCHES | | MILLIMETERS | | NOTE |
|--------|--------|-------|-------------|-------|------|
| | MIN | MAX | MIN | MAX | |
| A | 0.087 | 0.093 | 2.21 | 2.36 | |
| A1 | 0.000 | 0.004 | 0.00 | 0.10 | |
| A2 | 0.087 | 0.089 | 2.21 | 2.25 | |
| B | 0.008 | 0.012 | 0.36 | 0.46 | |
| C | 0.007 | 0.009 | 0.18 | 0.25 | |
| D | 0.400 | 0.408 | 10.16 | 10.36 | 2 |
| E | 0.292 | 0.296 | 7.42 | 7.52 | 2 |
| e | 0.025 | BSC | 0.64 | BSC | 4 |
| H | 0.410 | 0.418 | 10.41 | 40.62 | |
| h | 0.018 | 0.024 | 0.48 | 0.61 | |
| L | 0.034 | 0.038 | 0.86 | 0.97 | |
| LE | 0.84 | | 1.37 | | |
| a | 0 | 8 | 0 | 8 | |
| S | 0.139 | 0.141 | 3.54 | 3.55 | 5 |
| T | 0.349 | 0.351 | 8.86 | 8.92 | 5 |

NOTES

AWT1921

NOTES

NOTES

ORDERING INFORMATION

| ORDER NUMBER | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|--------------|---------------------|----------------------------|
| AWT1921S11 | S11 | 28 Pin Body with Heat Slug |

**ANADIGICS, Inc.**

141 Mount Bethel Road
 Warren, New Jersey 07059, U.S.A.
 Tel: +1 (908) 668-5000
 Fax: +1 (908) 668-5132

URL: <http://www.anadigics.com>
 E-mail: Mktg@anadigics.com

IMPORTANT NOTICE

ANADIGICS, Inc. reserves the right to make changes to its products or to discontinue any product at any time without notice. The product specifications contained in Advanced Product Information sheets and Preliminary Data Sheets are subject to change prior to a product's formal introduction. Information in Data Sheets have been carefully checked and are assumed to be reliable; however, ANADIGICS assumes no responsibilities for inaccuracies. ANADIGICS strongly urges customers to verify that the information they are using is current before placing orders.

WARNING

ANADIGICS products are not intended for use in life support appliances, devices or systems. Use of an ANADIGICS product in any such application without written consent is prohibited.