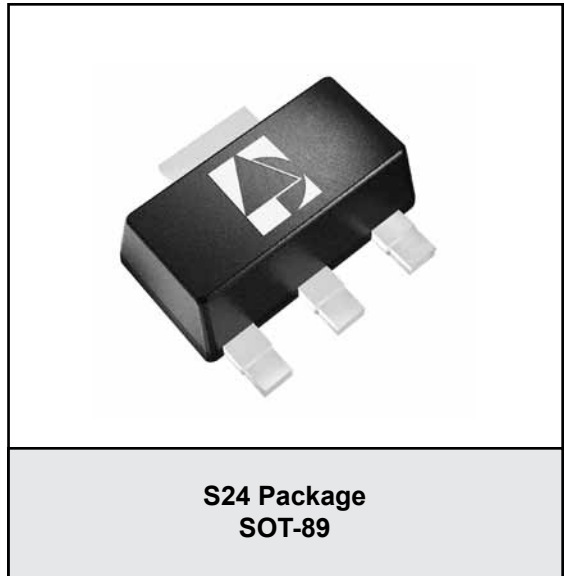


FEATURES

- 12 dB Gain
- 50 to 1000 MHz Frequency Range
- Noise Figure: 2.3 dB
- Single +5 V Supply
- Small SOT-89 Package
- RoHS Compliant/Lead-free

APPLICATIONS

- Low Noise Amplifier for CATV Set-Top Boxes
- CATV Drop Amplifier



PRODUCT DESCRIPTION

The ADA1200 is a highly linear amplifier developed to meet the stringent requirements of CATV systems. Offered in a low cost SOT-89 package, this GaAs MESFET design offers low noise and low distortion over a wide frequency range. The device is ideally

suited for applications as a Low Noise Amplifier in CATV Set-Top Boxes, and as a Drop Amplifier in CATV distribution systems. The ADA1200 requires a single +5 V supply, and typically consumes 400 mW of power.

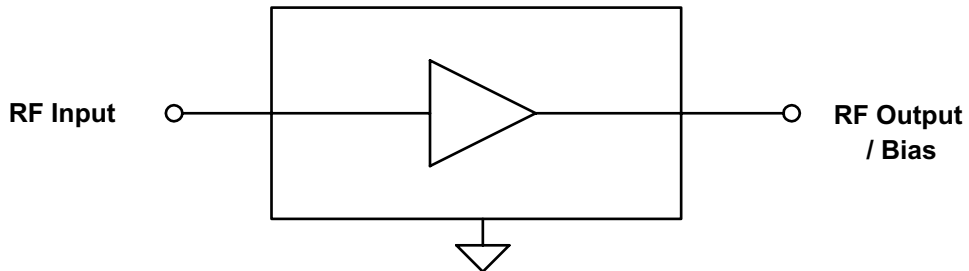


Figure 1: Block Diagram

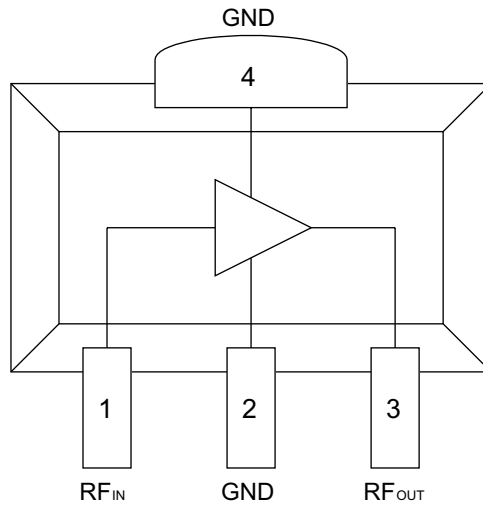


Figure 2: Pinout

Table 1: Pin Description

| PIN | NAME | DESCRIPTION |
|-----|-------------------|------------------|
| 1 | RF _{IN} | RF INPUT |
| 2 | GND | Ground |
| 3 | RF _{OUT} | RF Output / Bias |
| 4 | GND | Ground |

ELECTRICAL CHARACTERISTICS

Table 2: Absolute Minimum and Maximum Ratings

| PARAMETER | MIN | MAX | UNIT |
|-----------------------------------|-----|------|------|
| Device Voltage (V_{CC}) | 0 | +9 | VDC |
| RF Input Power (P_{IN}) | - | +10 | dBm |
| Storage Temperature (T_{STG}) | -40 | +150 | °C |
| Channel Temperature | - | +150 | °C |

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.

Table 3: Operating Ranges

| PARAMETER | MIN | TYP | MAX | UNIT |
|-------------------------------|-----|-----|------|------|
| RF Input/Output Frequency (f) | 50 | - | 1000 | MHz |
| Supply Voltage (V_{DD}) | - | +5 | - | VDC |
| Case Temperature (T_C) | -40 | - | +100 | °C |

The device may be operated safely over these conditions; however, parametric performance is guaranteed only over the conditions defined in the electrical specifications.

Table 4: Electrical Specifications
 (T_A = +25 °C, V_{DD} = +5 VDC, f = 50 to 860 MHz, 75 Ω system, ref. Figure 3)

| PARAMETER | MIN | TYP | MAX | UNIT |
|---|------|-----|-----|------|
| Gain | 10.5 | 12 | 13 | dB |
| Noise Figure | - | 2.3 | 3.5 | dB |
| CSO ⁽¹⁾ CH 5 & 6 (77.25 MHz & 83.25 MHz) | - | - | -57 | dBc |
| CSO ⁽¹⁾ all other channels | - | - | -59 | dBc |
| CTB ⁽¹⁾ | - | -75 | -64 | dBc |
| XMOD ⁽¹⁾ | - | -73 | -63 | dBc |
| P1dB | - | 66 | - | dBmV |
| OIP ⁽²⁾ | +101 | - | - | dBmV |
| 3-Tone OIP3 ⁽³⁾ | +81 | - | - | dBmV |
| Input Return Loss | - | -25 | -16 | dB |
| Output Return Loss | - | -25 | -16 | dB |
| Thermal Resistance (θ _{JC}) | - | - | 50 | °C/W |
| Supply Current | - | 80 | 100 | mA |

Notes:

- (1) 132 total channels, flat input; 110 analog channels @ +15 dBmV per channel; 22 digital channels (757.25 MHz to 871.25 MHz) @ 6 dB below analog channels; Standard NTSC channel plan (55.25 MHz to 871.25 MHz)
- (2) Two tones, 38 dBmV per tone at input (439.25 MHz and 853.25 MHz); IMD2 measured at 414.00 MHz.
- (3) Three tones, 38 dBmV per tone at input (67.25, 439.25 MHz, 853.25 MHz); IMD3 measured at 481.25 MHz (note that the related 2-tone IP3 is 3 dB higher than the 3-tone IP3).

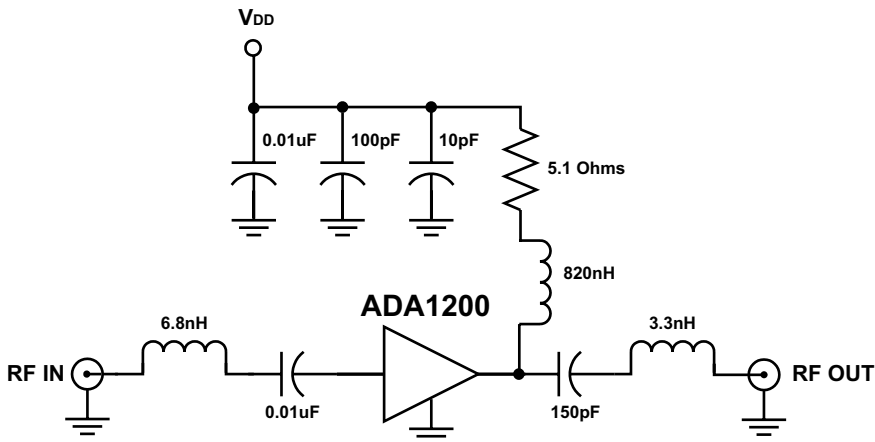


Figure 3: Test Circuit

PERFORMANCE DATA

Figure 4: Gain vs. Frequency
 (T_A = +25 °C, V_{DD} = +5 V, 75 Ω System)

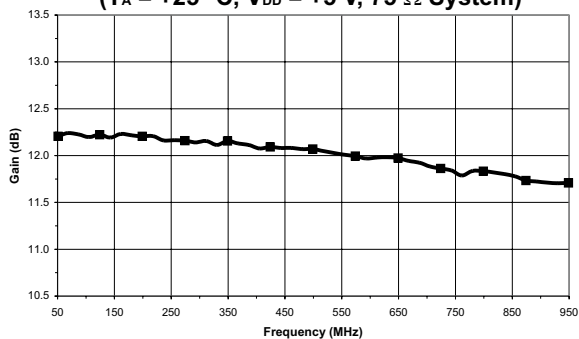


Figure 5: Noise Figure vs. Frequency
 (T_A = +25 °C, V_{DD} = +5 V, 75 Ω System)

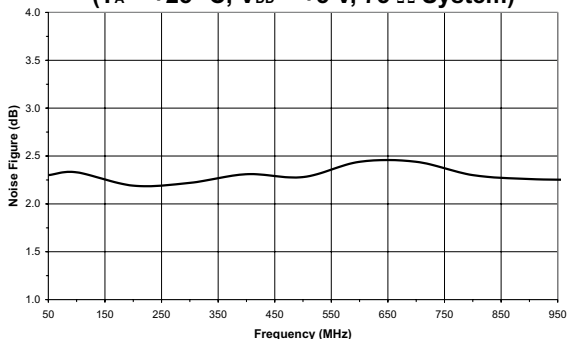


Figure 6: Input Return Loss vs. Frequency
 (T_A = +25 °C, V_{DD} = +5 V, 75 Ω System)

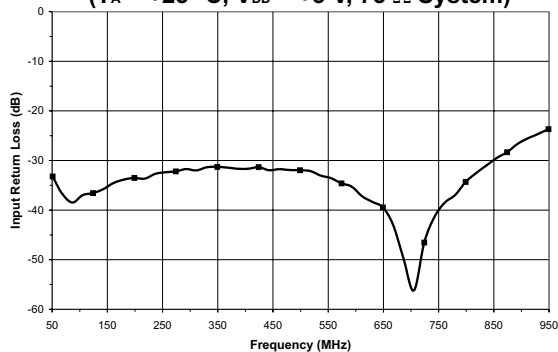


Figure 7: Output Return Loss vs. Frequency
 (T_A = +25 °C, V_{DD} = +5 V, 75 Ω System)

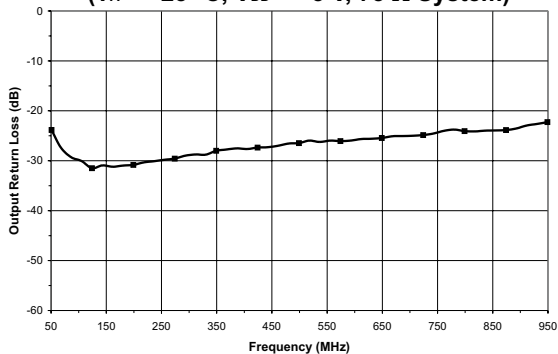


Figure 8: CTB vs. Frequency
 (T_A = +25°C, V_{DD} = +5 V, 132 analog channels,
 +15 dBmV input power per channel)

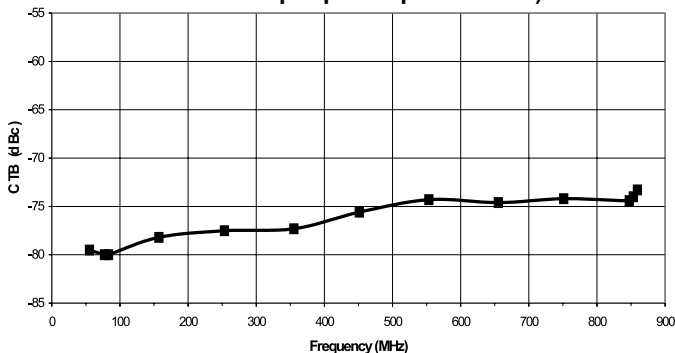


Figure 9: CSO vs. Frequency
 (T_A = +25°C, V_{DD} = +5 V, 132 analog channels,
 +15 dBmV input power per channel)

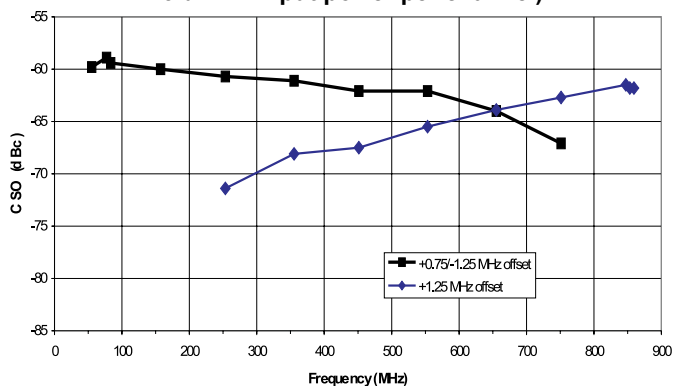
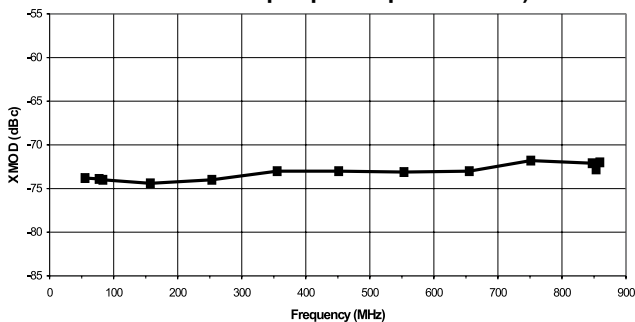
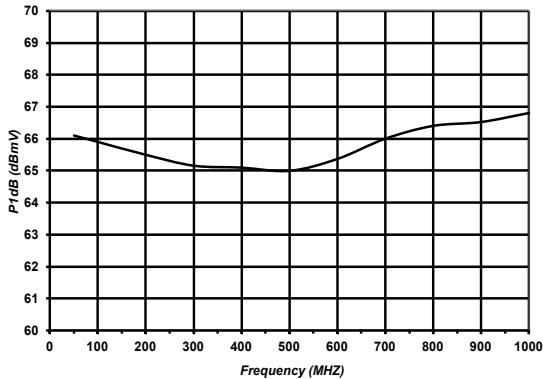


Figure 10: XMOD vs. Frequency
 (T_A = +25°C, V_{DD} = +5 V, 132 analog channels,
 +15 dBmV input power per channel)



P1DB MEASUREMENTS

Figure 11: ADA1200 P1dB vs. Frequency



MER MEASUREMENTS

Figure 12: ADA1200 MER – 64 QAM @ 85 MHz

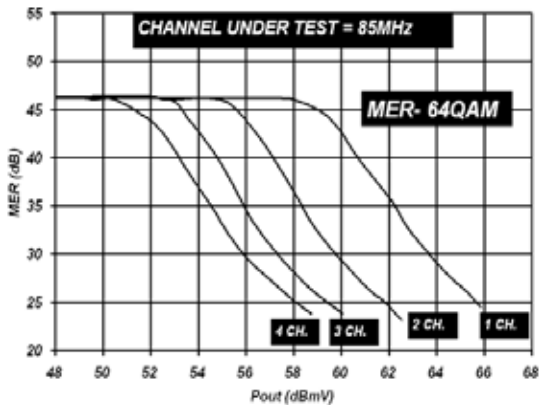


Figure 13: ADA1200 MER – 64 QAM @ 543 MHz

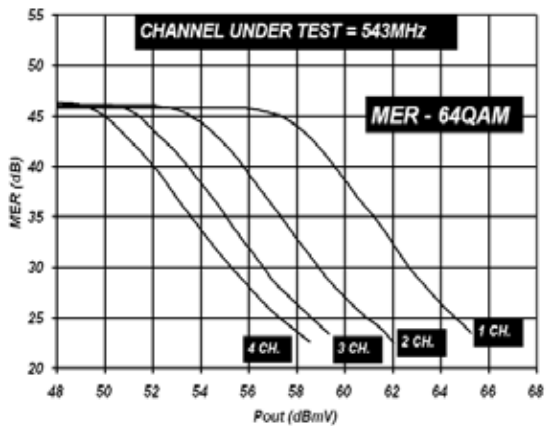


Figure 14: ADA1200 MER – 64 QAM @ 987 MHz

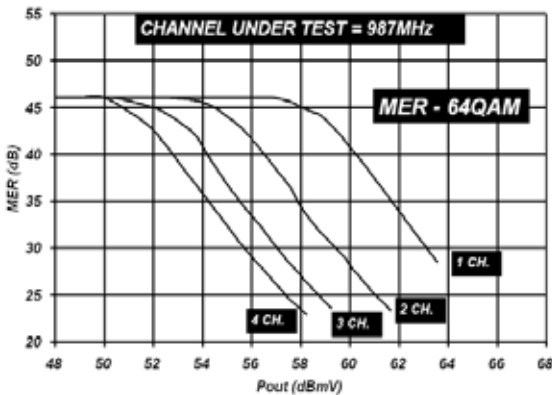


Figure 15: ADA1200 MER – 256 QAM @ 85 MHz

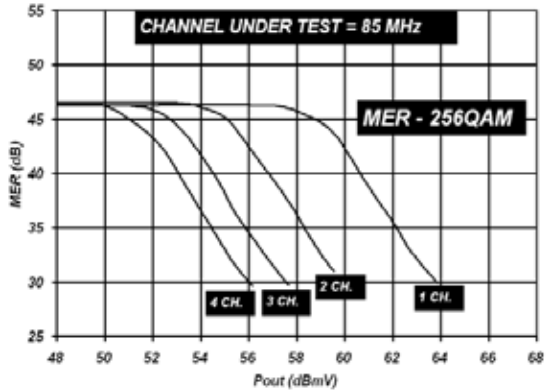


Figure 16: ADA1200 MER – 256 QAM @ 543 MHz

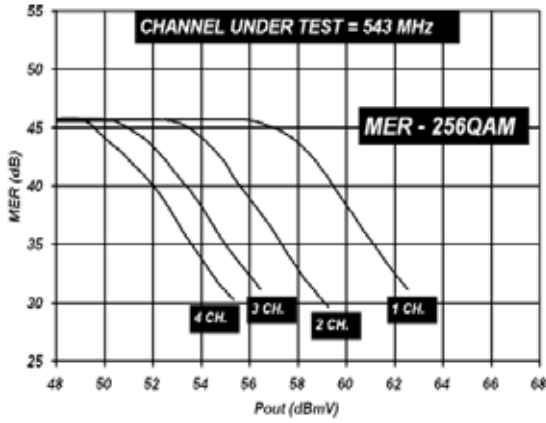
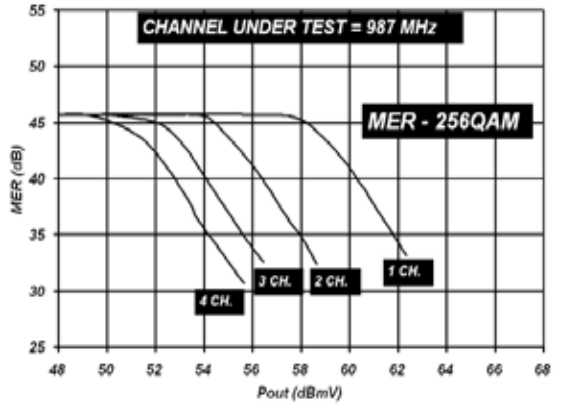


Figure 17: ADA1200 MER – 256 QAM @ 987 MHz

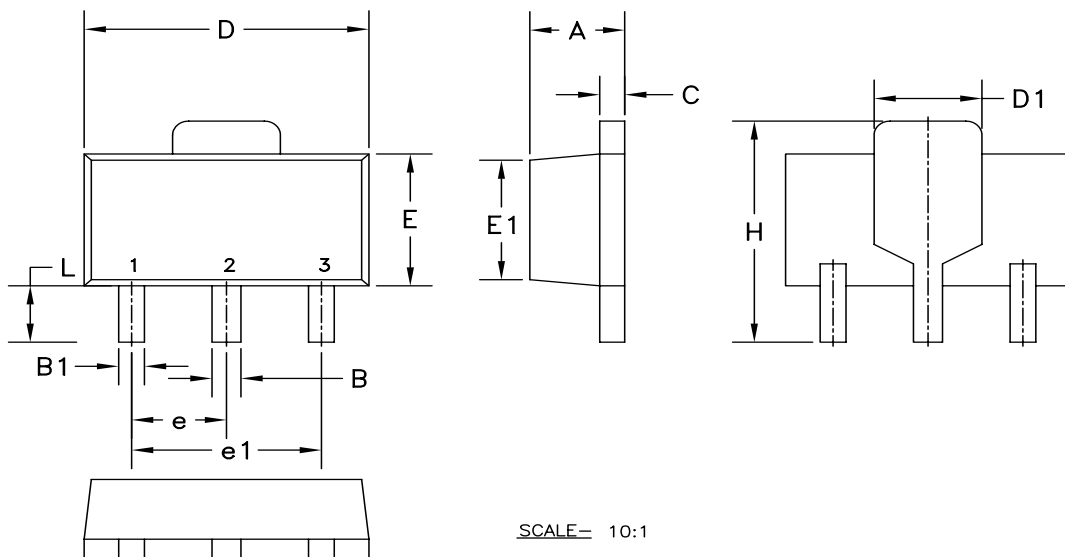


APPLICATION INFORMATION

Table 5: In Circuit S-Parameters
 (T_A = +25 °C, V_{DD} = +5.0 VDC, 75 Ω system, ref. Figure 3)

| FREQ | S11 | | S21 | | S12 | | S22 | | K Factor |
|------|-------|--------|------|--------|-------|--------|-------|--------|----------|
| | MHz | DB | ANG | DB | ANG | DB | ANG | DB | |
| 25 | -17.8 | -108.4 | 11.6 | -140.4 | -17.2 | 37.8 | -13.0 | -146.5 | 1.01 |
| 50 | -31.1 | -103.9 | 12.3 | -171.3 | -16.5 | 8.8 | -23.9 | -170.5 | 1.12 |
| 100 | -37.9 | -37.5 | 12.3 | 168.9 | -16.5 | -8.9 | -30.2 | -169.0 | 1.12 |
| 150 | -35.8 | -8.2 | 12.3 | 155.8 | -16.5 | -20.6 | -31.0 | -155.9 | 1.12 |
| 200 | -35.2 | -1.9 | 12.2 | 144.2 | -16.6 | -30.4 | -30.6 | -153.9 | 1.13 |
| 250 | -33.6 | -1.0 | 12.2 | 133.3 | -16.6 | -39.9 | -30.1 | -157.2 | 1.13 |
| 300 | -32.7 | -1.6 | 12.2 | 122.9 | -16.7 | -49.2 | -29.1 | -160.8 | 1.13 |
| 350 | -31.9 | -3.2 | 12.1 | 112.5 | -16.7 | -58.0 | -28.0 | -164.1 | 1.14 |
| 400 | -32.0 | -11.4 | 12.1 | 102.1 | -16.7 | -66.9 | -27.4 | -167.7 | 1.14 |
| 450 | -32.8 | -17.0 | 12.1 | 91.8 | -16.8 | -75.8 | -27.0 | -172.2 | 1.15 |
| 500 | -33.2 | -23.2 | 12.1 | 81.6 | -16.8 | -84.8 | -26.3 | -175.8 | 1.15 |
| 550 | -35.9 | -33.7 | 12.0 | 71.4 | -16.9 | -93.7 | -26.3 | -112.0 | 1.16 |
| 600 | -40.1 | -57.8 | 12.0 | 61.2 | -17.0 | -102.6 | -25.7 | 124.4 | 1.16 |
| 650 | -46.2 | -113.4 | 12.0 | 50.8 | -17.1 | -111.6 | -25.3 | 174.1 | 1.17 |
| 700 | -38.1 | 145.8 | 11.9 | 40.5 | -17.1 | -121.3 | -25.0 | 39.0 | 1.18 |
| 750 | -31.0 | 127.6 | 11.8 | 30.0 | -17.2 | -129.9 | -25.0 | 174.8 | 1.19 |
| 800 | -28.2 | 117.1 | 11.8 | 20.1 | -17.3 | -138.1 | -23.6 | 163.8 | 1.20 |
| 850 | -25.0 | 107.3 | 11.7 | 9.6 | -17.5 | -147.6 | -23.3 | 166.6 | 1.21 |
| 900 | -22.4 | 97.7 | 11.7 | -0.7 | -17.5 | -156.9 | -23.2 | 167.7 | 1.22 |
| 950 | -20.3 | 90.3 | 11.6 | -11.4 | -17.6 | -166.0 | -22.2 | 164.1 | 1.23 |
| 1000 | -18.3 | 82.4 | 11.5 | -22.1 | -17.8 | -175.6 | -20.9 | 160.4 | 1.24 |

PACKAGE OUTLINE



SCALE= 10:1

| SYMBOL | INCHES | |
|--------|--------|-------|
| | MIN. | MAX. |
| A | 0.055 | 0.063 |
| B | 0.017 | 0.022 |
| B1 | 0.014 | 0.019 |
| C | 0.014 | 0.017 |
| D | 0.173 | 0.181 |
| D1 | 0.066 | 0.070 |
| E | 0.090 | 0.099 |
| E1 | 0.084 | 0.086 |
| e | 0.059 | BSC |
| e1 | 0.118 | BSC |
| H | 0.155 | 0.167 |
| L | 0.029 | 0.041 |

NOTES:

1. CONTROLLING DIMENSIONS: INCHES.
2. TOP PACKAGE ANGLE IS 9° =1°/-2° TOLERANCE. PACKAGE ANGLE IS 3° MAX.
3. PACKAGE CORNER RADIUS IS 5 MILS MAX ON ALL CORNERS.
4. SHINNY PACKAGE FINISH ON ALL SIDES EXCEPT TOP SIDE. FINISH MINIMUM MATTE OF 10-14VDI.

Figure 18: S24 Package Outline – SOT-89

TOP BRAND



NOTES:

1. ANADIGICS LOGO SIZE: X=0.040±0.010 Y=0.048±0.010
2. PART NUMBER: FOUR NUMERIC CHARACTERS
3. WAFER LOT NUMBER: LLLL= FOUR NUMERIC CHARACTERS
NN= TWO ALPHABETIC CHARACTERS
4. TYPE : ELITE
SIZE : 2-POINT
COLOR : LASER

Figure 19: Branding Specification

ORDERING INFORMATION

| PART NUMBER | TEMPERATURE RANGE | PACKAGE DESCRIPTION | COMPONENT PACKAGING |
|--------------------|--------------------------|----------------------------|----------------------------|
| ADA1200GS24Q1 | -40 to +100°C | SOT-89 Package | 1,000 piece Tape and Reel |

**ANADIGICS, Inc.**

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