



Mini-Circuits

WIDEBAND, MICROWAVE

Monolithic Amplifier

AVA-183A+

50Ω

5 to 18 GHz

THE BIG DEAL

- Surface Mount Amplifier Up to 18 GHz
- Integrated DC blocks, Bias-Tee & Microwave Bypass Capacitor
- Suitable for Low Phase Noise Applications
- Gain, 13.4 dB Typ. & Flatness, ± 1.2 dB
- P1dB, Typ. +19.0 dBm
- Output Power, Up to +19.0 dBm Typ.
- Excellent Isolation, 36 dB Typ. at 12 GHz
- Single Positive Supply Voltage, +5 V
- Unconditionally Stable
- Aqueous Washable; 3 mm x 3 mm SMT Package



Generic photo used for illustration purposes only

CASE STYLE: DQ849

+RoHS Compliant

The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

APPLICATIONS

- Military EW and Radar
- DBS
- Microwave Point-to-Point Radios
- Satellite Systems

PRODUCT OVERVIEW

The AVA-183A+ is a surface-mount microwave amplifier fabricated using InGaAs pHEMT technology and is a fully integrated gain block up to 18 GHz. It is packaged in Mini-Circuits industry standard 3x3 mm MCLP package, which provides excellent RF and thermal performance. The AVA-183A+ integrates the entire matching network with the majority of the bias circuit inside the package, reducing the need for complicated external circuits. This approach makes the AVA-183A+ extremely flexible and enables simple, straightforward use.

KEY FEATURES

| Feature | Advantages |
|--|--|
| Wideband, 5 to 18 GHz | Broad frequency range supports a wide array of applications from microwave radio and radar , to military communications and countermeasures. |
| Excellent Gain Flatness | Typical ± 1.2 dB gain flatness across the entire frequency range minimizes the need for external equalizer networks making it a great fit for instrumentation and EW applications. |
| High Isolation | With reverse isolation of 31-42 dB (17-23 dB directivity), the AVA-183A+ is an excellent choice for buffering broadband circuits. It is an ideal LO driver amplifier and provides designers system flexibility and margin when integrating cascaded RF components. |
| Single +5 V Supply | This single-supply implementation is much simpler to use than competing amplifiers with dual supply voltages. No power supply sequencing or complicated bias tee circuits are required, reducing board space and cost. |
| Manufacturability | MSL1 and ESD Class 1A (HBM) ratings minimize special handling on production lines. |
| Low Additive Phase Noise, Typically -151 dBc/Hz @10 KHz Offset | Ideal for low phase noise synthesizer applications |

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ELECTRICAL SPECIFICATIONS¹ AT 25°C, Z₀=50Ω, (REFER TO CHARACTERIZATION CIRCUIT, FIG. 1)

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Units |
|---|-----------------|-------|-------|------|--------|
| Frequency Range | | 5.0 | | 18.0 | GHz |
| DC Voltage (V _{D1} , V _{D2}) | | | +5.0 | | V |
| DC Current (I _{D1} +I _{D2}) | | 104 | 131 | 166 | mA |
| Gain | 5.0 | | 12.9 | | dB |
| | 8.0 | 12.0 | 14.7 | | |
| | 10.0 | 12.0 | 14.0 | | |
| | 12.0 | | 13.4 | | |
| | 14.0 | | 13.1 | | |
| | 16.0 | | 13.6 | | |
| | 18.0 | 10.8 | 12.4 | | |
| Input Return Loss | 5.0 | | 10.4 | | dB |
| | 8.0 | | 17.0 | | |
| | 10.0 | | 11.0 | | |
| | 12.0 | | 11.0 | | |
| | 14.0 | | 11.0 | | |
| | 16.0 | | 11.0 | | |
| | 18.0 | | 7.5 | | |
| Output Return Loss | 5.0 | | 8.0 | | dB |
| | 8.0 | | 18.0 | | |
| | 10.0 | | 14.0 | | |
| | 12.0 | | 11.0 | | |
| | 14.0 | | 10.6 | | |
| | 16.0 | | 11.2 | | |
| | 18.0 | | 11.8 | | |
| Output IP3 ² | 5.0 | | +32.2 | | dBm |
| | 8.0 | | +29.0 | | |
| | 10.0 | | +27.7 | | |
| | 12.0 | | +26.3 | | |
| | 14.0 | | +25.1 | | |
| | 16.0 | | +24.3 | | |
| | 18.0 | | +24.4 | | |
| Output Power @ 1 dB Compression | 5.0 | +16.0 | +17.6 | | dBm |
| | 8.0 | | +18.0 | | |
| | 10.0 | | +19.0 | | |
| | 12.0 | | +19.0 | | |
| | 14.0 | | +19.9 | | |
| | 16.0 | | +19.6 | | |
| | 18.0 | | +18.7 | | |
| Noise Figure | 5.0 | | 7.4 | | dB |
| | 8.0 | | 4.3 | | |
| | 10.0 | | 4.5 | | |
| | 12.0 | | 4.8 | | |
| | 14.0 | | 5.1 | | |
| | 16.0 | | 5.1 | | |
| | 18.0 | | 6.0 | | |
| Additive Phase Noise 5.0 GHz, 10 KHz offset | | | -151 | | dBc/Hz |
| Directivity (Isolation-Gain) | 12 | | 23.1 | | dB |
| DC Current Variation vs. Temperature ³ | | | 0.046 | | mA/°C |
| Thermal Resistance | | | 61 | | °C/W |

1. Measured on Mini-Circuits Characterization test fixture TB-547-2+. See Characterization Test Circuit (Fig. 1).

2. At P_{OUT}=+9 dBm/100 Hz.

3. (Current at +85°C - Current at -45°C) / 130.

ABSOLUTE MAXIMUM RATINGS⁴

| Parameter | Ratings |
|------------------------------------|-----------------|
| Operating Temperature ⁵ | -40°C to +85°C |
| Storage Temperature | -65°C to +150°C |
| Channel Temperature | +150°C |
| DC Voltage (Pad 7,8) | +5.5 V |
| DC Voltage (Pads 2, 5) | +10 V |
| Power Dissipation | 980 mW |
| DC Current (Pad 7+8) | 180 mA |
| Input Power (CW) | +20 dBm |

4. Permanent damage may occur if any of these limits are exceeded. These maximum ratings are not intended for continuous normal operation.

5. Defined with reference to ground pad temperature.





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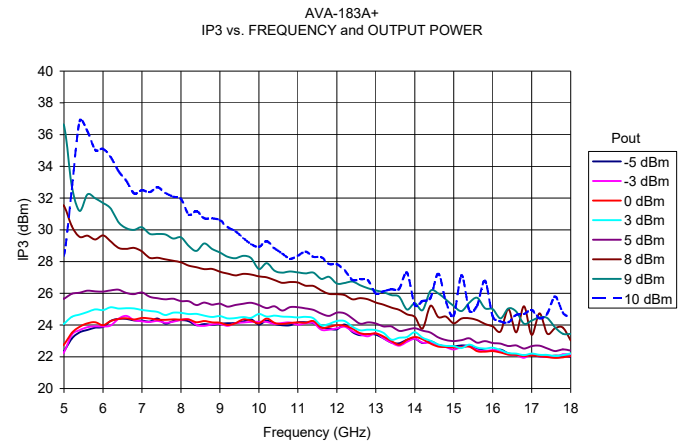
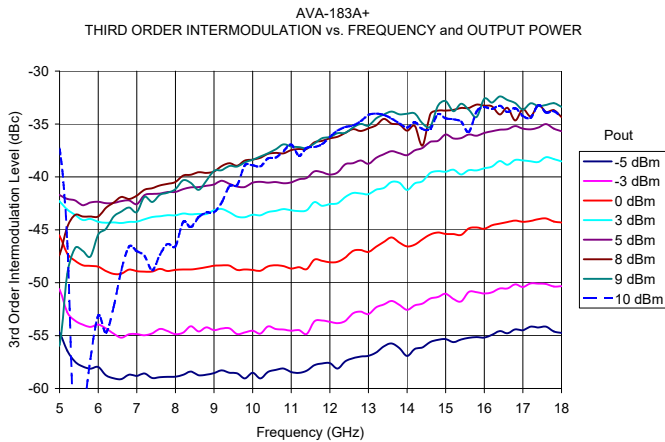
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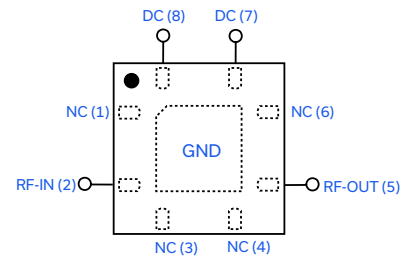
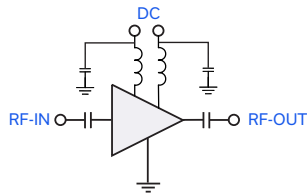
50 Ω

5 to 18 GHz

INTERMODULATION AND IP3 VS. FREQUENCY AND OUTPUT POWER



SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



| Function | Pad Number | Description (See Application Circuit, Fig. 2) |
|----------|--|--|
| RF-IN | 2 | RF input pad |
| RF-OUT | 5 | RF output pad |
| DC | 8(V _{D1}), 7(V _{D2}) | DC power supply |
| GND | Paddle in Center of Bottom | Connected to ground |
| NOT USED | 1,3,4,6 | No internal connection; recommended use: per PCB Layout PL-328 |

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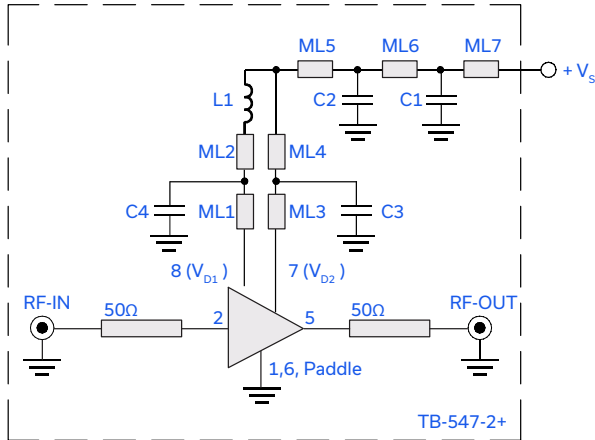
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CHARACTERIZATION TEST CIRCUIT



C1=5.6 pF, 0402 (NPO)
 C2=18 pF, 0402 (NPO)
 C3=0.001 μF, 0402 (NPO)
 C4=0.1 μF, 0402 (X7R)
 L1=3.3 nH, 0805 (wire wound)

ML1-ML7 are short microstrip lines.
 Refer to 98-PL-328.

Fig 1. Block Diagram of Test Circuit used for characterization. (DUT soldered on Mini-Circuits Characterization Test Board TB-547-2+) Gain, Output Power at 1 dB Compression (P1dB), Noise Figure, Output IP3 (OIP3) are measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:

1. Gain: $P_{IN} = -25$ dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, +9 dBm/tone at output.
3. V_s adjusted for +5.0 V at device (V_{D1} and V_{D2}), compensating loss of bias lines.

RECOMMENDED APPLICATION CIRCUIT

(Refer to Evaluation Board for PCB Layout and Component Values)

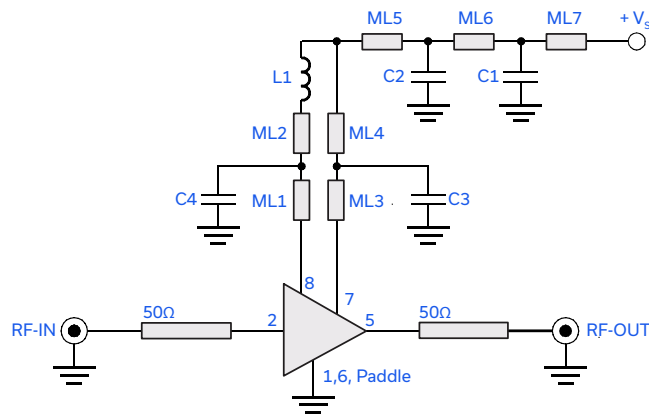


Fig 2. Recommended Application Circuit

C1=5.6 pF, 0402 (NPO)
 C2=18 pF, 0402 (NPO)
 C3=0.001 μF, 0402 (NPO)
 C4=0.1 μF, 0402 (X7R)
 L1=3.3 nH, 0805 (wire wound)

ML1-ML7 are short microstrip lines.
 Refer to 98-PL-328.

PRODUCT MARKING



Black Body
 Model Family Designation

Marking may contain other features or characters for internal lot control.

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ADDITIONAL DETAILED TECHNICAL INFORMATION IS AVAILABLE ON OUR DASHBOARD. TO ACCESS [CLICK HERE](#)

| | |
|--|--|
| Performance Data | Data Table Swept Graphs S-Parameter (S2P Files) Data Set (.zip file) |
| Case Style | DQ849 Plastic package, exposed paddle, lead finish: Matte-tin |
| Tape & Reel Standard Quantities Available on Reel | F104 7" reels with 20, 50, 100, 200, 500, 1000 or 2000 devices |
| Suggested Layout for PCB Design | PL-328 |
| Evaluation Board | TB-547-2+ |
| Environmental Ratings | ENV08T1 |

ESD RATING

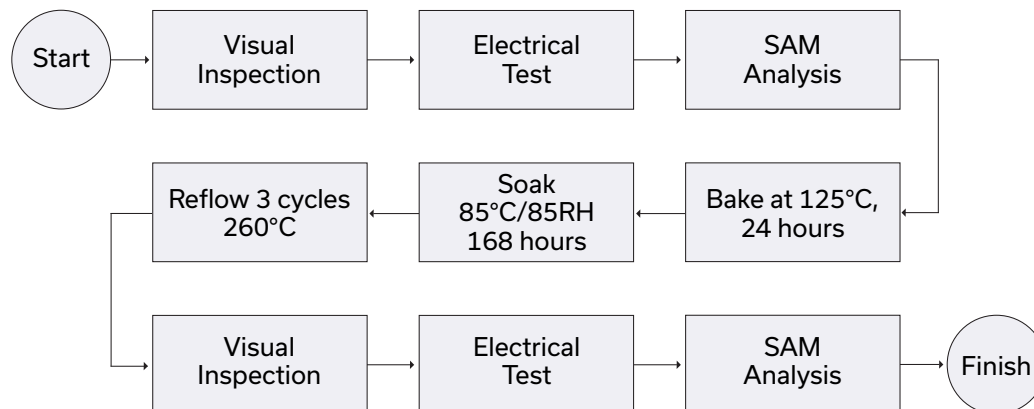
Human Body Model (HBM): 1A (250 to <500 V) in accordance with ANSI/ESD STM 5.1 - 2001

Machine Model (MM): M1 (25 V) in accordance with ANSI/ESD STM5.2-1999

MSL RATING

Moisture Sensitivity: MSL1 in accordance with IPC/JEDEC J-STD-020D

MSL TEST FLOW CHART



NOTES

- Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuits' applicable established test performance criteria and measurement instructions.
- The parts covered by this specification document are subject to Mini-Circuits' standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the standard terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/terms/viewterm.html

