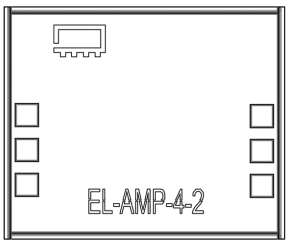
Wideband, Positive Gain Slope

Monolithic Amplifier Die AVA-183P-D+

50Ω 0.5 to 18 GHz



The Big Deal

- Ultra-wideband, 0.5 to 18 GHz
- Positive gain slope
- Single positive supply voltage

Product Overview

The AVA-183P-D+ is a InGaAs E-PHEMT based wideband, positive gain slope MMIC amplifier die. This design operates on a single 5V supply, is well matched for 50Ω. Having a positive gain slope makes the amplifier useful for compensating the negative slope of many wideband passive microwave devices and eliminating the need for equalization.

Key Features

Feature	Advantages
Positive Gain Slope vs. Frequency +0.13 dB/GHz (0.5-10 GHz) +0.25 dB/GHz (10-18 GHz)	Useful for compensating the negative slope of many wideband passive microwave devices and eliminating the need for equalization.
Positive Supply Voltage	Simplifies external circuit by eliminating need for negative voltage and sequencing.
Unpackaged Die	Enables the user to integrate the amplifier directly into hybrids.

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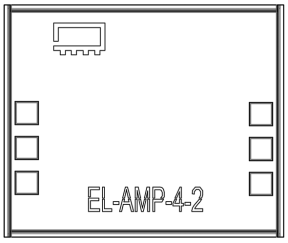


Product Features

- Wideband, 0.5 to 18 GHz
- Positive Gain Slope
- Single Positive Supply Voltage

Typical Applications

- WiFi
- WLAN
- LTE
- WiMAX
- C-band Satcom

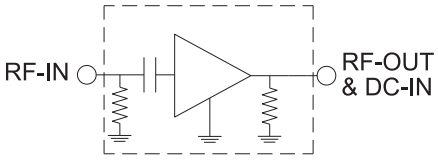
+RoHS Compliant
The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications

Ordering Information: Refer to Last Page

General Description

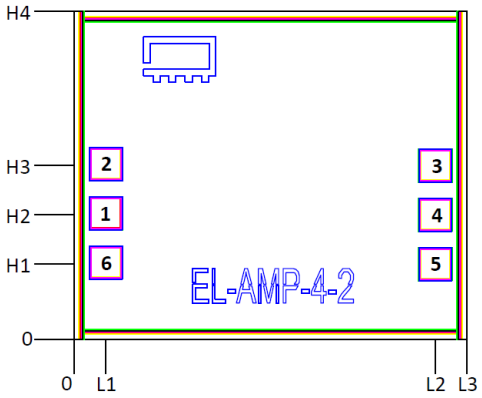
The AVA-183P-D+ is a InGaAs E-PHEMT based wideband, positive gain slope MMIC amplifier die. This design operates on a single 5V supply, is well matched for 50Ω. Having a positive gain slope makes the amplifier useful for compensating the negative slope of many wideband passive microwave devices and eliminating the need for equalization.

Simplified Schematic and Pad description



Pad#	Function
1	RF-IN
4	RF-OUT & DC-IN
2,3,5,6 & bottom of die	GND

Bonding Pad Position



Dimensions in µm, Typical

L1	L2	L3	H1	H2	H3	H4
97	1103	1200	229	379	529	998

Thickness	Die size	Pad Size 1,2,3,4,5&6
100	1200 x 998	89 x 89

Electrical Specifications[1] at 25°C and 5V, unless noted

Parameter	Condition (GHz)	Min.	Typ.	Max.	Unit
Frequency Range		0.5		18	GHz
Gain	0.5		6.8		dB
	5		7.5		
	10		8.1		
	15		9.8		
	18		10.8		
Gain Slope	0.5 - 10		0.13		dB/GHz
	10 -18		0.25		
Input Return Loss	0.5		15		dB
	5		13		
	10		10		
	15		23		
	18		14		
Output Return Loss	0.5		11		dB
	5		8		
	10		7		
	15		9		
	18		19		
Output Power at 1dB Compression	0.5		10.9		dB
	5		10.6		
	10		11.7		
	15		12.3		
	18		11.6		
OIP3 (Pout = -3dBm/Tone)	0.5		22.8		dBm
	5		21.4		
	10		21.5		
	15		20.6		
	18		19.1		
Noise Figure	0.5		7.5		dBm
	5		5.3		
	10		4.8		
	15		4.6		
	18		5.0		
Device Operating Voltage(VDD)		4.75	5	5.25	V
Device Operating Current (IDD)		—	46.3	54	mA
Device Current Variation vs. Temperature[2]			-168.13		µA/°C
Device Current Variation vs. Voltage[3]			0.0085		mA/mV

1. Die is packaged in 3x3 mm, 12-lead MCLP package & soldered on Mini-Circuits characterization board TB-AVA-183P+. See Characterization Test Circuit (Fig. 1)
2. Current variation vs temperature=(Current at 100°C-Current at -55°C)/155°C
3. Current variation vs Voltage=(Current at 5.25V - Current at 4.75V)/(5.25V-4.75V)

Absolute Maximum Ratings[4]

Parameter	Ratings
Operating Temperature (ground	-55°C to 100°C
Junction Temperature	161°C
Total Power Dissipation	0.46W[5]
Input Power (CW), V_{DD}=5V[5]	+22 dBm (5 minutes max.) +13 dBm (continuous)
DC Voltage	6V

4. Permanent damage may occur if any of these limits are exceeded.
   Electrical maximum ratings are not intended for continuous normal operation.
5. Derates linearly to 0.24W at 100°C

Recommended Characterization Test Circuit

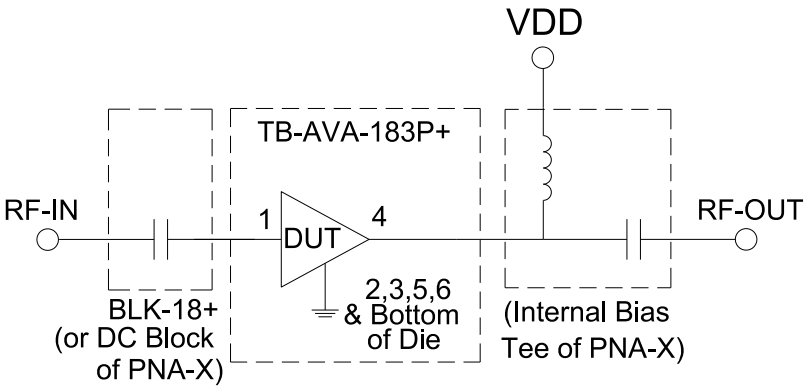
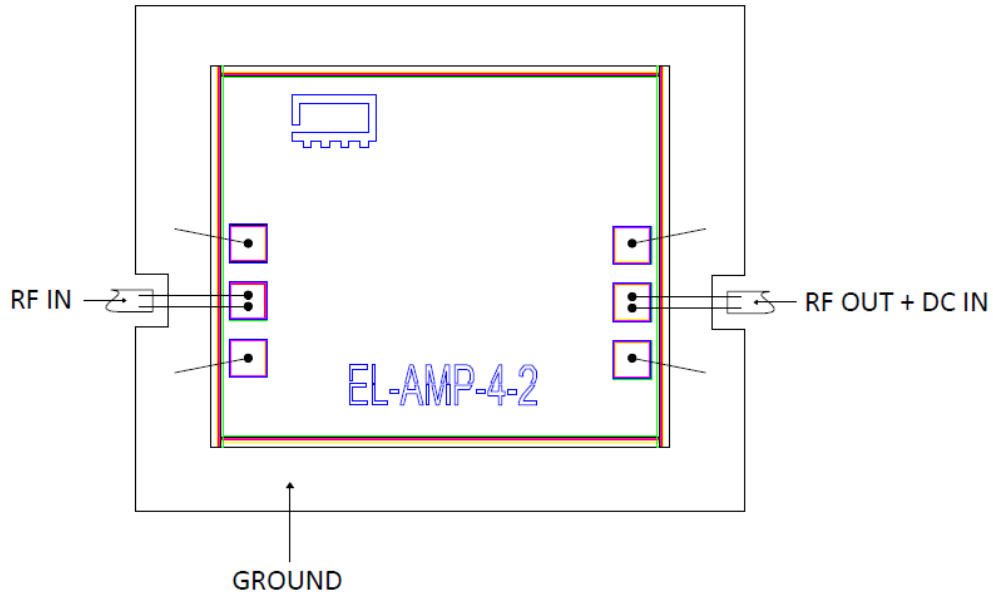


Fig 1. Characterization Test Circuit
Note: This block diagram is used for characterization. (DUT is packaged in a 3x3 mm, 12-lead MCLP and soldered on Mini-Circuits Characterization test board TB-AVA-183P+).
Gain, Return loss, Output power at 1dB compression (P1dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. Gain and Return loss: Pin= -25dBm
2. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, -3 dBm/tone at output.

Assembly Diagram



Assembly and Handling Procedure

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.
2. ESD
   MMIC E-PHEMT amplifier dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be opened in clean room conditions at an appropriately grounded anti-static workstation. Devices need careful handling using correctly designed collets, vacuum pickup tips or sharp antistatic tweezers to deter ESD damage to dice.
3. Die Attach
   The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are DieMat DM6030HK-PT/H579 or Ablestik 84-1LMISR4. Apply sufficient epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total die periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. It is recommended to use antistatic die pick up tools only.
4. Wire Bonding
   Bond pad openings in the surface passivation above the bond pads are provided to allow wire bonding to the dice gold bond pads. Thermosonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1 mil diameter. Bonds must be made from the bond pads on the die to the package or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

Additional Detailed Technical Information *additional information is available on our dash board.*	
Performance Data	Data Table
	Swept Graphs
	S-Parameter (S2P Files) Data Set with and without port extension(.zip file)
Case Style	Die
Die Ordering and packaging information	Quantity, Package — Model No. Small, Gel - Pak: 5,10,50,100 KGD* — AVA-183P-DG+ Medium†, Partial wafer: KGD*<1292 — AVA-183P-DP+ Large†, Full Wafer — AVA-183P-DF+ †*Available upon request contact sales representative* Refer to AN-60-067
Environmental Ratings	ENV80

*Known Good Dice ("KGD") means that the dice in question have been subjected to Mini-Circuits DC test performance criteria and measurement instructions and that the parametric data of such dice fall within a predefined range. While DC testing is not definitive, it does help to provide a higher degree of confidence that dice are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

ESD Rating**

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

** Tested in industry standard 3x3 mm, 12-lead MCLP package.

Additional Notes

A. 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.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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Mini-Circuits

Environmental Specifications ENV80

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

Specification	Test/Inspection Condition	Reference/Spec
Operating Temperature	-40° to 85° C or -40° to 105° C or -55° to 105° C or -45° to 105° C Ambient Environment	Refer to Individual Model Data Sheet
Storage Environment (Die)	-65° to 150°C	Individual Model Data Sheet
Storage Environment(Packaging)	-40° to 70°C and 40 to 60% humidity (In Factory Shipped Package)	