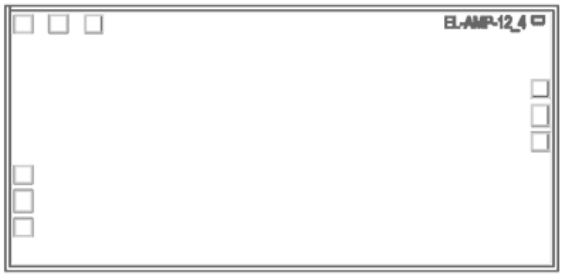
SUPER WIDEBAND, LOW NOISE

Monolithic Amplifier Die AVA-0233LN-D+

50Ω 2 to 30 GHz

THE BIG DEAL

- Super Wideband & Flat Gain, 16.8±0.3 dB @ 2 to 30 GHz
- Outstanding Match for Signal Chain Integration, >15 dB
- Low Noise Figure (NF<2 dB), and High OIP3 (OIP3 > +26 dBm at Mid Band)



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

SEE ORDERING INFORMATION ON THE LAST PAGE

APPLICATIONS

- Test & Instrument
- Military & Space
- Fixed Satellite
- Mobile

PRODUCT OVERVIEW

AVA-0233LN-D+ is a GaAs, pHEMT, MMIC Distributed Amplifier Die that operates from 2 to 30GHz. The amplifier typically provides 16.8 dB Gain and 2.0 dB Noise Figure, +14 dBm Output Power at 1 dB Gain Compression, +25.7 dBm OIP3. The amplifier is well-matched to 50 Ohm at both input and output. AVA-0223LN-D+ is a self-biased single positive supply device with V_{DD} = +5 V and I_{DD} = 65.2 mA Typical.

KEY FEATURES

Feature	Advantages
Super-Wide Bandwidth with Flat Gain • 16.8 ±0.3 dB over 3 - 20 GHz	General Purpose Wideband Amplifier with adjustable gain vs. control voltage is suitable for wide variety of applications.
Low Noise Figure Typical: • <3 dB from 3.5 to 27.5 GHz • <2 dB from 5 to 20 GHz	Enables lower system noise figure performance.
High Output IP3 • +27 dBm from 2 to 20 GHz • +25 dBm from 20 to 30 GHz	Easy to integrate into signal chain.
Excellent Wideband In/Out Return Loss • >15 dB from 2 to 30 GHz	
Unpackaged Die	Enables user to integrate it directly into hybrids

REV. A
ECO-021862
AVA-0233LN-D+
MCLNY
240529

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ELECTRICAL SPECIFICATIONS[1] AT +25°C, 50Ω, UNLESS NOTED OTHERWISE

Parameter	Condition (MHz)	V_{DD} = +5 V & V_C = Open			Units
		Min.	Typ.	Max.	
Frequency range		2000		30000	MHz
Gain	2000 10000 20000 30000		16.8 16.8 17.0 16.7		dB
Input Return loss	2000 10000 20000 30000		26.0 16.0 17.8 22.7		dB
Output Return loss	2000 10000 20000 30000		13.3 23.5 20.1 26.8		dB
P1dB	2000 10000 20000 30000		+16.5 +15.0 +13.5 +12.3		dBm
OIP3 (P_{OUT}= 0 dBm/Tone)	2000 10000 20000 30000		+28.3 +26.8 +25.7 +22.0		dBm
Noise Figure	2000 10000 20000 30000		4.1 1.4 2.2 3.9		dB
Device operating voltage (V_{DD})		+4.75	+5	+5.25	V
Device operating current (I_{DD})			65.2	92	mA
Device current variation vs. temperature[2]			-10		µA/°C
Device current variation vs voltage[3]			0.0128		mA/mV
Thermal resistance, junction-to-ground Lead			14.7		°C/W

1. Measured on Mini-Circuits Characterization Test Board MB-089. See Characterization Test & Application Circuit (Fig. 2)
2. Device Current Variation vs. Temperature= (Current in mA at 85°C - Current in mA at -45°C)/130°C
3. Device Current Variation vs. Voltage = (Current in mA at 5.25V – Current in mA at 4.75V) / (5.25V-4.75V)*1000 mA/mV)

ABSOLUTE MAXIMUM RATINGS[4]

Parameter	Ratings
Operating temperature (ground lead)	-40°C to 85°C
Storage Temperature	-65°C to 150°C
Junction Temperature	150°C[5]
Total power dissipation	1.55 W
Input power (CW)	+20 dBm
DC voltage at VC	-2.5 V to 3.0 V
DC voltage at V_{DD}	+8 V

4. Permanent damage may occur if any of those limits are exceeded. Electrical maximum ratings are not intended for continuous normal operation.
5. Tj = 85˚C + (V_{DD})*(I_{DD})*Ø(JC) = 90˚C
Nominal Operating Condition with Tj = 90˚C will ensure MTTF > 428Years

FIG 1. GAIN VS. CONTROL VOLTAGE (VC)

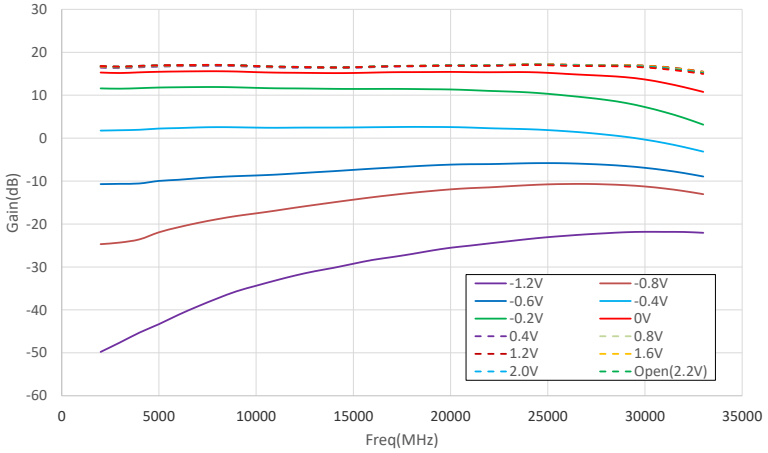

FIG 1. When VC = Open, the measured VC = 2.2V typical. For RF Performance at different VC, please see View Data and Graph.

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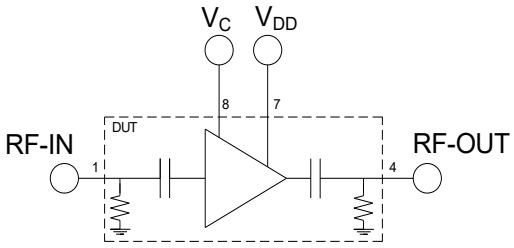
SIMPLIFIED SCHEMATIC AND PAD DESCRIPTION



Pad Number	Description
1	RF IN
4	RF OUT
7	V_{DD}
8	V_C
2, 3, 5, 6, 9 & Bottom of Die	GROUND

BONDING PAD POSITION

Dimension in µm

L1	L2	L3	L4	L5	H1	H2
102	300	500	3021	3120	246	396

H3	H4	H5	H6	H7	H8
546	732	882	1032	1398	1500

Thickness	Die size	Pad size 1,4	Pad size 2, 3, 5, 6,7, 8 & 9
100	3120 x 1500	93 x 113	93 x 93

CHARACTERIZATION, APPLICATION CIRCUIT & ASSEMBLY DRAWING

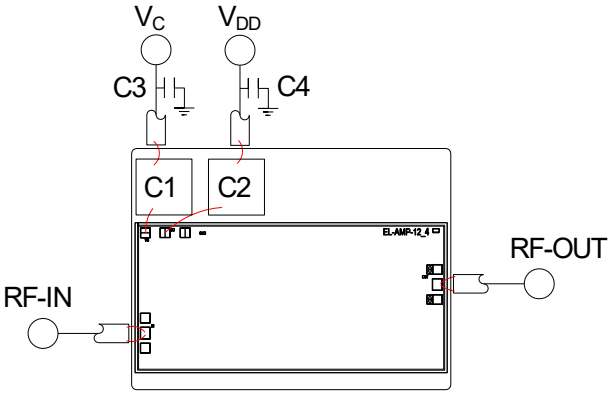


Fig 2. Characterization, Application Circuit & Assembly Drawing
Note: This block diagram is used for characterization. (DUT was soldered on test board of Mini-Circuits Characterization Test Board MB-089). Gain, Return Loss, Output power at 1dB compression (P1dB), output IP3 (OIP3) and noise figure measured using Agilent's N5242A PNA-X microwave network analyzer.

Conditions:
1. V_{DD}= +5 V, V_C=Open
2. Gain and Return Loss: P_{IN}= -25dBm
3. Output IP3 (OIP3): Two tones, spaced 1 MHz apart, 0 dBm/tone at output.

Component#	Size	Value	Manufacturer	P/N
C1, C2	22x22mil	100pF	Macon Inc	MA4M3100
C3,C4	0402	0.1uF	Murata	GRM155R71C04KA88D

ASSEMBLY PROCEDURE

1. Storage
   Dice should be stored in a dry nitrogen purged desiccators or equivalent.

2. ESD
   MMIC PHEMT amplifer dice are susceptible to electrostatic and mechanical damage. Die are supplied in antistatic protected material, which should be open in clean room conditions at an appropriately grounded anti-static workstation.

3. Die Handling and Attachment
   Devices need careful handling using correctly designed collets, it is recommended to handle the chip along the edges with a custom design collet. The die mounting surface must be clean and flat. Using conductive silver filled epoxy, recommended epoxies are Ablestik 84-1 LMISR4 or equivalents. Apply sufficent epoxy to meet required epoxy bond line thickness, epoxy fillet height and epoxy coverage around total periphery. Parts shall be cured in a nitrogen filled atmosphere per manufacturer's cure condition. The surface of the chip has exposed air bridges and should not be touched with vacuum collet, tweezers or fingers.

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. Thermo-sonic bonding is used with minimized ultrasonic content. Bond force, time, ultrasonic power and temperature are all critical parameters. Suggested wire is pure gold, 1mil diameter. Bonds must be made from the bond pads on the die to the packaged or substrate. All bond wires should be kept as short as low as reasonable to minimize performance degradation due to undesirable series inductance.

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ADDITIONAL DETAILED TECHNICAL 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-0233LN-DG+ Medium†, Partial wafer: KGD*<464 — AVA-0233LN-DP+ Full Wafer — AVA-0233LN-DF+ †Available upon request contact sales representative Refer to AN-60-067
Environmental Ratings	ENV80

*Known Good Die ("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 provide a higher degree of confidence that die are capable of meeting typical RF electrical parameters specified by Mini-Circuits.

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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