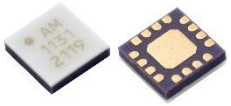
AM1129 – Amplifier

20 MHz to 6 GHz Gain Block

Description

The AM1129 is a high dynamic range gain block amplifier operating over the 20 MHz to 6.0 GHz frequency range. The device exhibits exceptional second and third order intercept performance as well as high P1dB and low noise figure. It operates from a single positive supply rail and is packaged in a standard 3mm QFN.

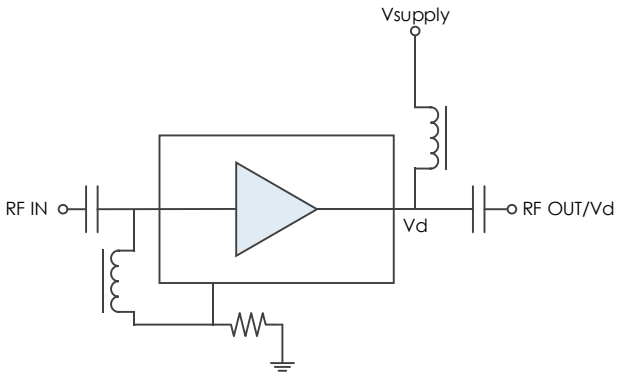


Note: Image is of similar part

Features

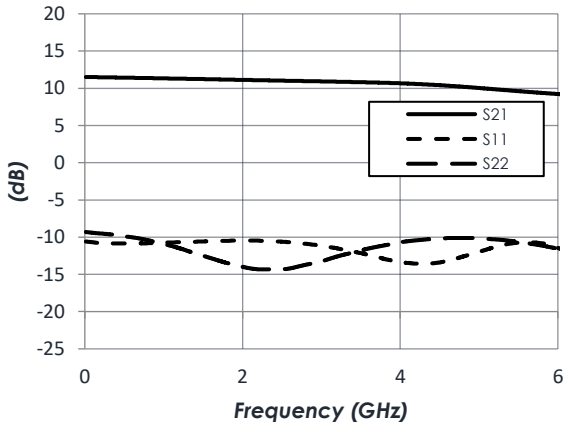
- 40 dBm OIP3
- 28 dBm IIP3
- 63 dBm OIP2
- 2.5 dB Noise Figure
- 24 dBm P1dB
- 11 dB Gain
- +6 V Operation
- 930 mW Power Consumption
- 3mm QFN Ceramic
- -40 to +85C operation

Functional Diagram



Characteristic Performance

Gain and Return Loss at +25C



Output IP3 at +25C

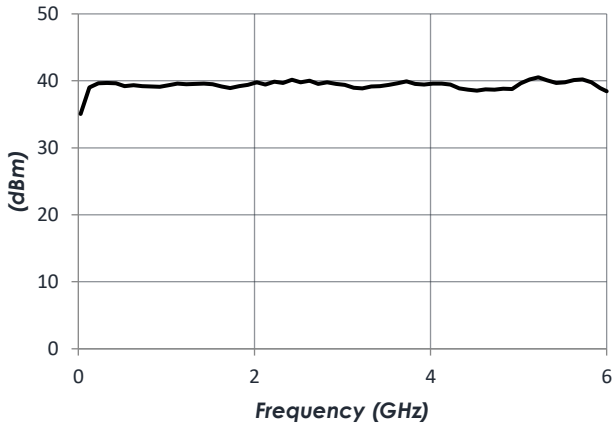


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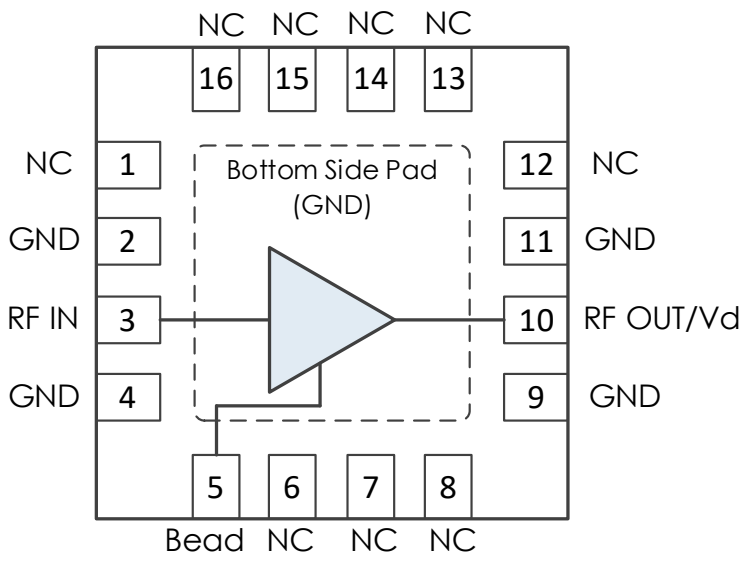
Table of Contents

Description **1**
Features **1**
Functional Diagram **1**
Characteristic Performance **1**
Revision History **2**
Pin Layout and Definitions **3**
Specifications **4**
Absolute Maximum Ratings 4
Handling Information 4
Recommended Operating Conditions ... 4
Thermal Information 4
DC Electrical Characteristics 5
RF Performance 5
Typical Performance 6
Typical Application **7**
Evaluation PC Board **8**
Related Parts **8**
Component Compliance Information **9**

Revision History

Date	Revision Number	Notes
January 28, 2021	1	Initial Release
March 16, 2021	2	
September 8, 2022	3	Updated Recommended Component List
June 20, 2023	4	Updated Typical Application and Components

Pin Layout and Definitions



Pin Number	Pin Name	Pin Function
1	NC	No Connect
2	GND	Ground – Common
3	RF IN	RF Input – 50 Ohms – DC Coupled. External DC blocking capacitor required
4	GND	Ground – Common
5	Bead	Connect to RF IN through external ferrite bead or large inductor with shunt 261 ohm resistor to ground.
6-8	NC	No Connect
9	GND	Ground – Common
10	RF OUT/Vd	RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC blocking capacitor required
11	GND	Ground – Common
12-16	NC	No Connect

***Note: NC pins may be grounded or left open**

Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.3 V
RF Input Power		+20 dBm
Storage Temperature Range	-55 C	+150 C

Note: *Any device operation beyond the* Absolute Maximum Ratings *may result in permanent damage to the device. The values listed in this table are extremes and do not imply functional operation of the device at these or any other conditions beyond what is listed under* Recommended Operating Conditions. *Any part subjected to conditions outside of what is recommended for an extended amount of time may suffer from reliability concerns.*

Handling Information

	Minimum	Maximum
Moisture Sensitivity Level	MSL 1	

Atlanta Micro products are electrostatic sensitive.
Follow safe handling practices to avoid damage

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage		+6.0 V	
Operating Case Temperature	-40 C		+85 C

Thermal Information

Junction to Case Thermal Resistance (θ_{JC})	80.7 C/W
Nominal Junction Temperature at +85C Ambient	+160 C
Channel Temperature to Maintain 1 Million Hour MTTF	+175 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage			+6.0 V	
DC Supply Current	VDD = +6.0 V		155 mA	
Power Dissipated	VDD = +6.0 V		0.93 W	

RF Performance

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		20 MHz		6GHz
Gain			+11dB	
Return Loss			-13.5dB	
Output IP3			+40dB	
Output IP2			+63dBm	
Output P1dB			+24dBm	
Noise Figure			+2.5dB	

Notes:

1. IP3 measured with 10MHz tone spacing
2. IP2 characterized with sum and difference measurements

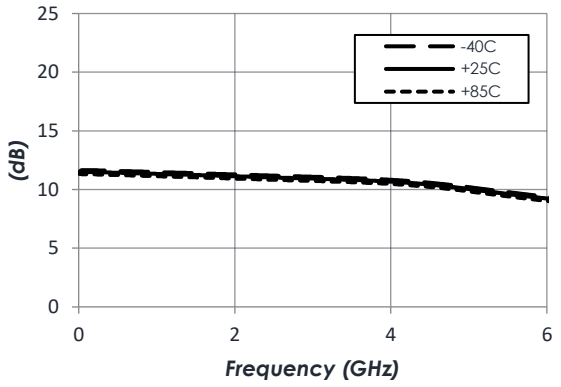
   -IP2 sum measured with 10MHz tone spacing. IM2 measured at $f_1 + f_2$

   -IP2 difference measured with tones at f_1 and $f_2 = (2 \times f_1) - 10MHz$. IM2 measured at $f_2 - f_1$

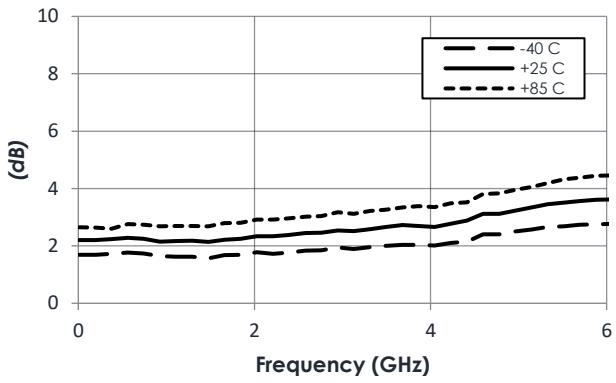
Typical Performance

(VDD = 6V, ID = 155mA, T = 25 °C unless otherwise specified)

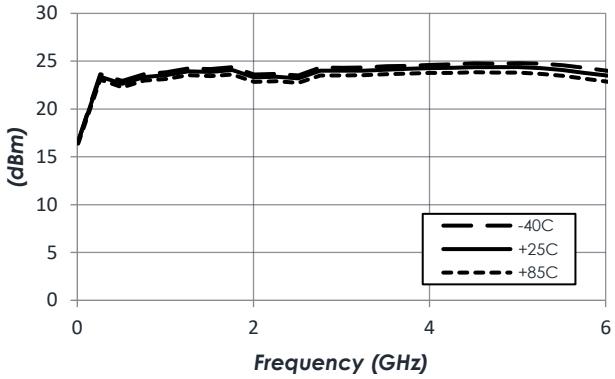
Gain vs Temperature



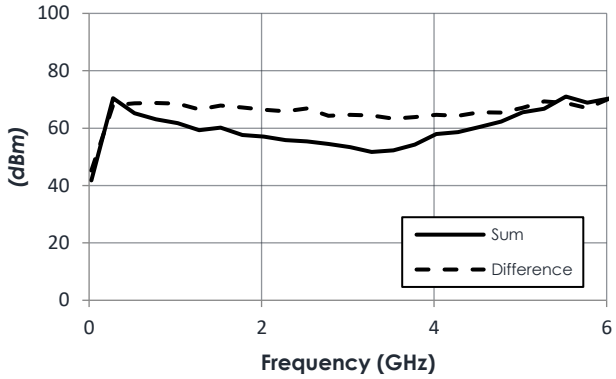
Noise Figure vs Temperature



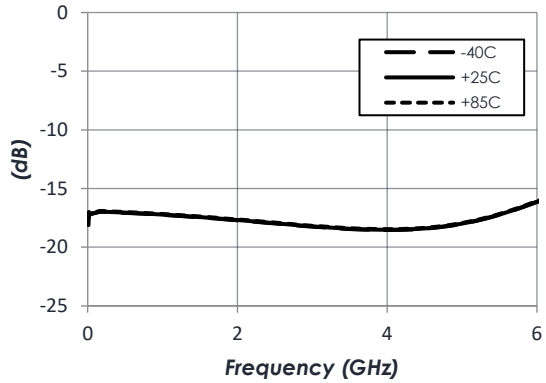
P1dB vs Temperature



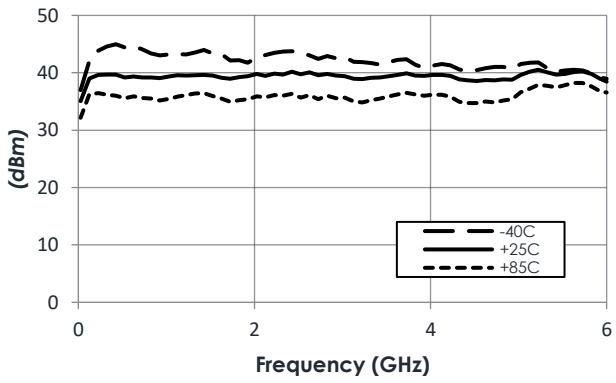
Output IP2



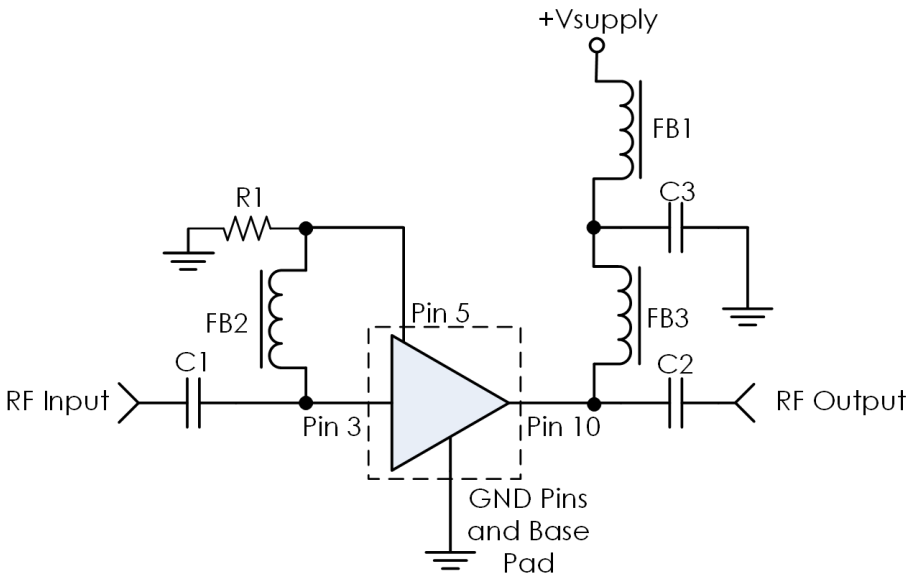
Reverse Isolation vs Temperature



Output IP3 vs Temperature



Typical Application



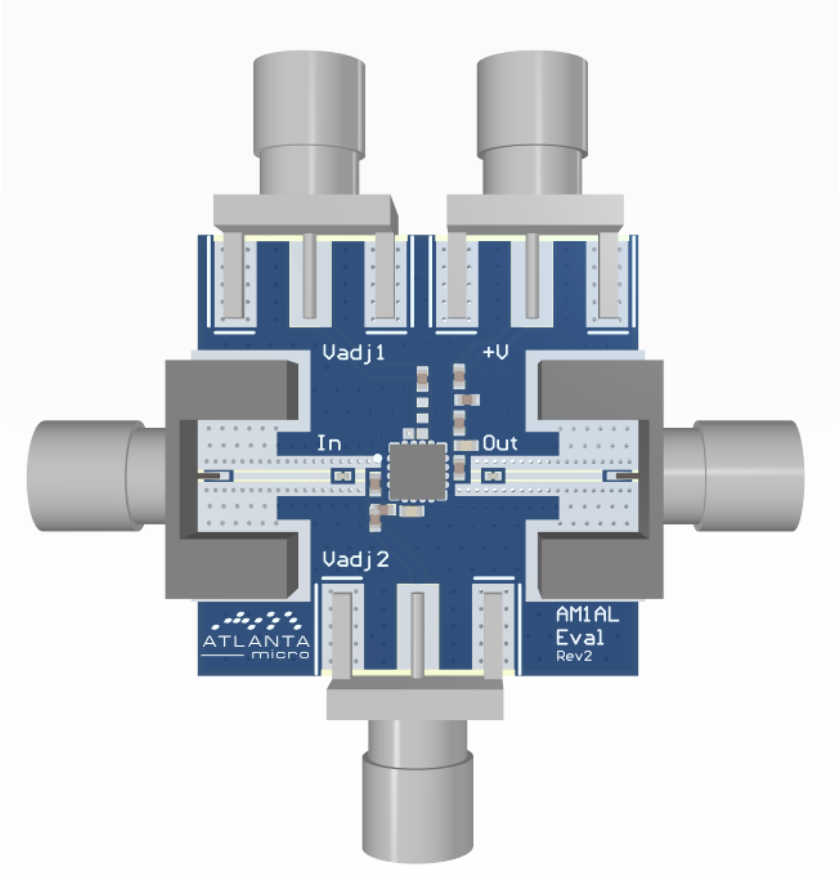
Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1, C2	0.1 µF	0201BB104KW160	Passives Plus
C3	0.1 µF	GRM155R71C104KA88	Murata
FB1, FB3	-	MMZ1005A182E	TDK Corporation
FB2	-	MMZ1005A222E	TDK Corporation
R1	261 Ω	CRCW0402261RFKED	Vishay Dale

Notes:

1. NC pins may be grounded or left open
2. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance
3. Low frequency performance may be improved by replacing FB1-3 with different beads, inductors, or bias tees.
4. The function of R1 is to lower the voltage at pin 3. The total DC resistance of FB2 and R1 should equal 263 ohms ± 10 ohms.

Evaluation PC Board



Related Parts

Part Number				Description
AM1122	0.02GHz	to	6GHz	Gain Block
AM1123	0.02GHz	to	8GHz	Gain Block
AM1127	0.02GHz	to	6GHz	Gain Block
AM1143	0.02GHz	to	6GHz	Gain Block

Component Compliance Information

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Substance List	Allowable Maximum Concentration
Lead (Pb)	<1000 PPM (0.1% by weight)
Mercury (Hg)	<1000 PPM (0.1% by weight)
Cadmium (Cd)	<75 PPM (0.0075% by weight)
Hexavalent Chromium (CrVI)	<1000 PPM (0.1% by weight)
Polybrominated Biphenyls (PBB)	<1000 PPM (0.1% by weight)
Polybrominated Diphenyl ethers (PBDE)	<1000 PPM (0.1% by weight)
Decabromodiphenyl Deca BDE	<1000 PPM (0.1% by weight)
Bis (2-ethylheyl) Phthalate (DEHP)	<1000 PPM (0.1% by weight)
Butyl Benzyl Phthalate (BBP)	<1000 PPM (0.1% by weight)
Dibutyl Phthalate (DBP)	<1000 PPM (0.1% by weight)
Diisobutyl Phthalate (DIBP)	<1000 PPM (0.1% by weight)

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