

AM1109 – Amplifier

2 to 20 GHz Broadband LNA

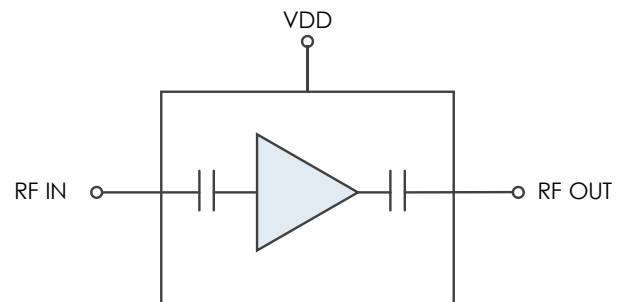
Description

AM1109 is a wideband, cascadable amplifier servicing the 2 to 20 GHz frequency range. The device exhibits moderate noise figure and gain flatness. Packaged in a 3mm QFN with internal 50Ω matching, and drawing less than 180mW of power, the AM1109 is well suited for low SWaP applications.

Features

- 14 dB Gain
- 2 dB Noise Figure
- +30 dBm OIP3
- +16 dBm P1dB
- +3.3V Operation
- 178 mW Power Consumption
- 3mm QFN
- -40C to +85C Operation

Functional Diagram



Characteristic Performance

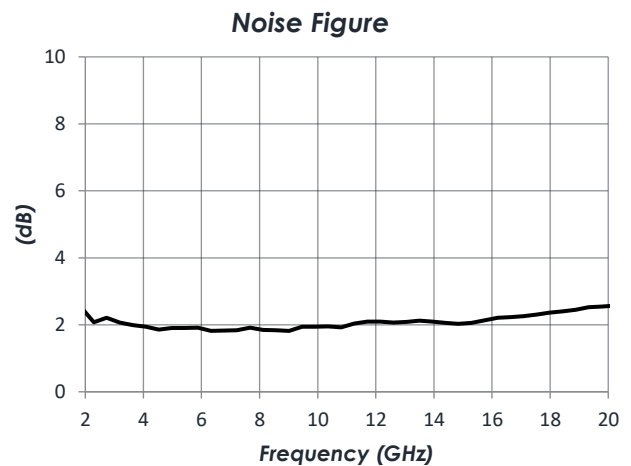
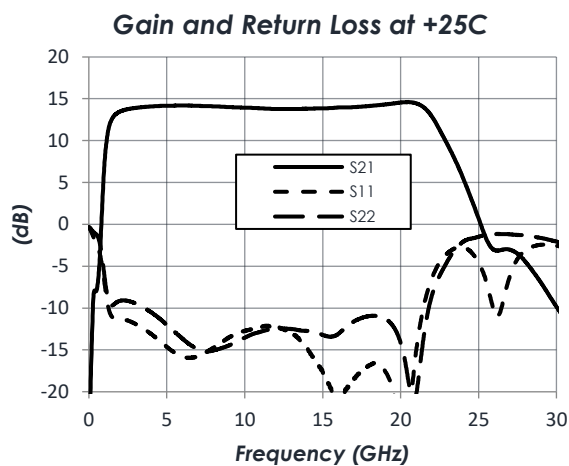


Table of Contents

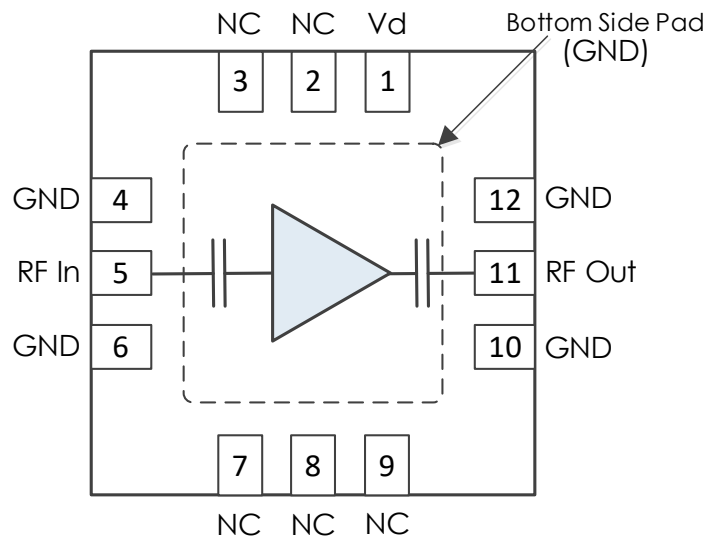
Description	1	Recommended Operating Conditions ...	4
Features	1	DC Electrical Characteristics	5
Functional Diagram	1	RF Performance	5
Characteristic Performance	1	Typical Performance	6
Revision History	2	Typical Application	8
Pin Layout and Definitions	3	Evaluation PC Board	9
Specifications	4	Related Parts	9
Absolute Maximum Ratings	4	Component Compliance Information	10
Handling Information	4		

Revision History

Date	Revision Number	Notes
April 13, 2021	1	Initial Release
October 2, 2023	2	Added thermal information.

Pin Layout and Definitions

Note: All Un-Labeled Pins are NC or Ground



Pin Number	Pin Name	Pin Function
1	Vd	DC Power Input
2-3	NC	Not Connected
4	GND	Ground – Common
5	RF In	RF Input – 50 Ohms – DC Blocked
6	GND	Ground – Common
7-9	NC	Not Connected
10	GND	Ground – Common
11	RF Out	RF Output – 50 Ohms – DC Blocked
12	GND	Ground – Common

Note: NC pins may be grounded or left open

AM1109 – Amplifier

2 to 20 GHz Broadband LNA



Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+3.5 V
RF Input Power		+20 dBm
Operating Junction Temperature	-40 C	+150 C
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
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level	MSL 3	



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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3.0 V	+3.3 V	+3.5 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

	Thermal Resistance (°C / W)
Junction to Case Thermal Resistance (θ_{JC})	152.7 C/W
Nominal Junction Temperature at +85C Ambient	+112 C
Channel Temperature to Maintain 1 Million Hour MTF	+175 C

AM1109 – Amplifier

2 to 20 GHz Broadband LNA

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage	VD		+3.3 V	
DC Supply Current	VD = +3.3V		54 mA	
Power Dissipated	VD = +3.3V		178 mW	

RF Performance

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		2 GHz		20 GHz
Gain	f = 2 GHz		13.5 dB	
	f = 12 GHz		14 dB	
	f = 20 GHz		14.5 dB	
Return Loss	f = 2 GHz		10 dB	
	f = 12 GHz		13 dB	
	f = 20 GHz		7 dB	
Output IP3	f = 12 GHz		30 dBm	
Output P1dB	f = 12 GHz		16 dBm	
Noise Figure	f = 12 GHz		2 dB	

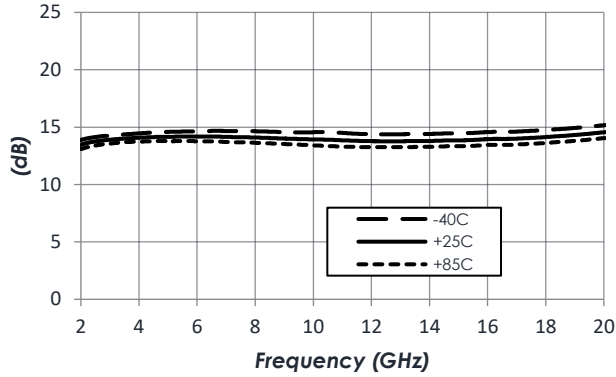
AM1109 – Amplifier

2 to 20 GHz Broadband LNA

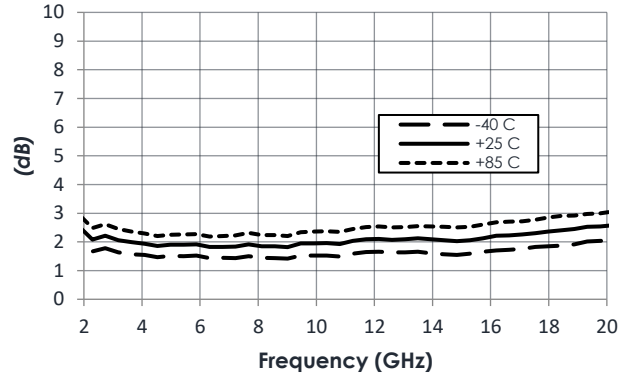
Typical Performance

(VD = +3.3V, T = 25°C unless otherwise specified)

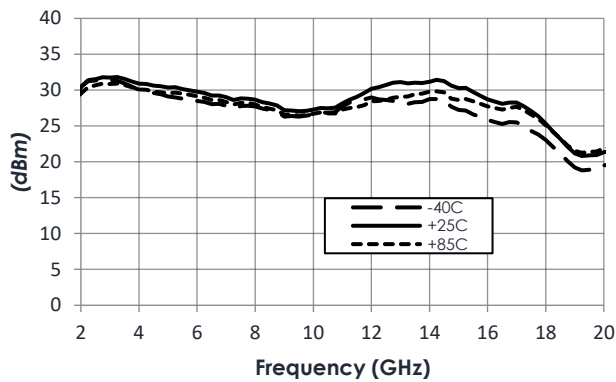
Gain vs Temperature



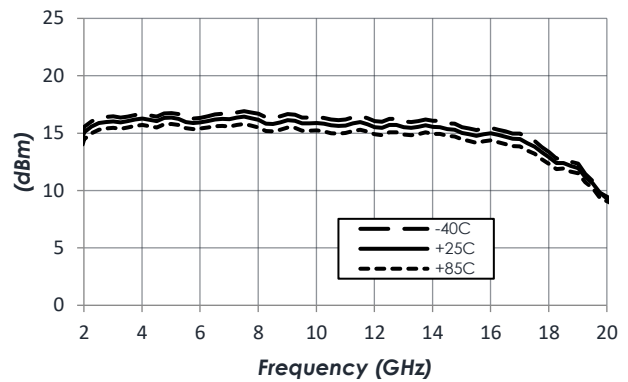
Noise Figure vs Temperature



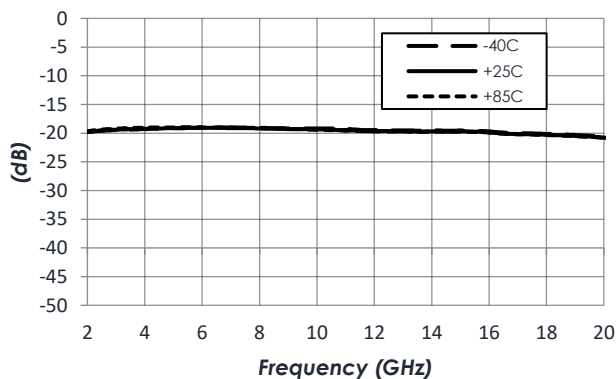
Output IP3 vs Temperature



P1dB vs Temperature



Reverse Isolation vs Temperature



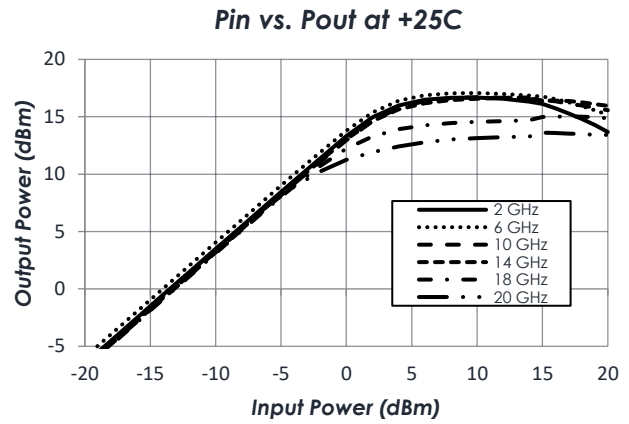
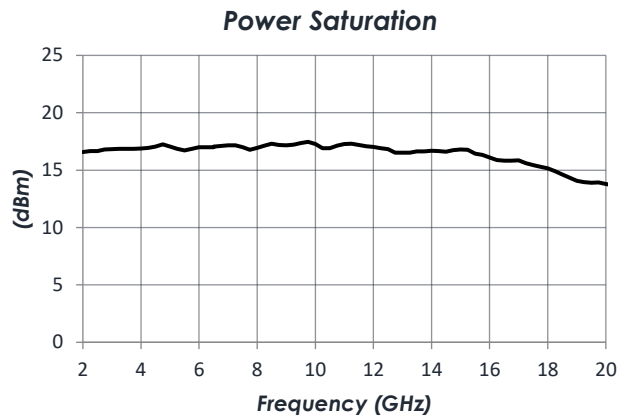
OIP3 Test Conditions: Two -15dBm tones at input with 10 MHz spacing.

AM1109 – Amplifier

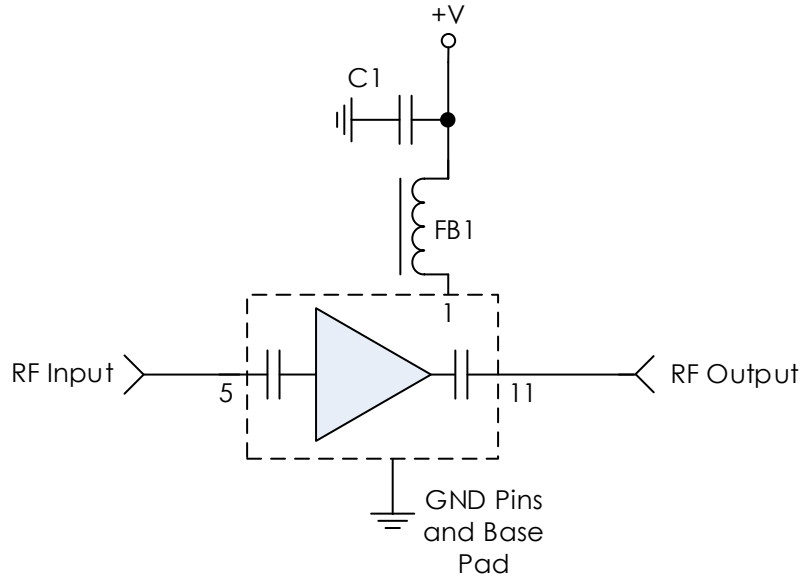
2 to 20 GHz Broadband LNA

Typical Performance (continued)

(VD = +3.3V, T = 25°C unless otherwise specified)



Typical Application



Note: NC pins may be grounded or left open

Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1	0.1 uF	GRM155R71C104KA88	Murata
FB1	-	MMZ1005A222E	TDK

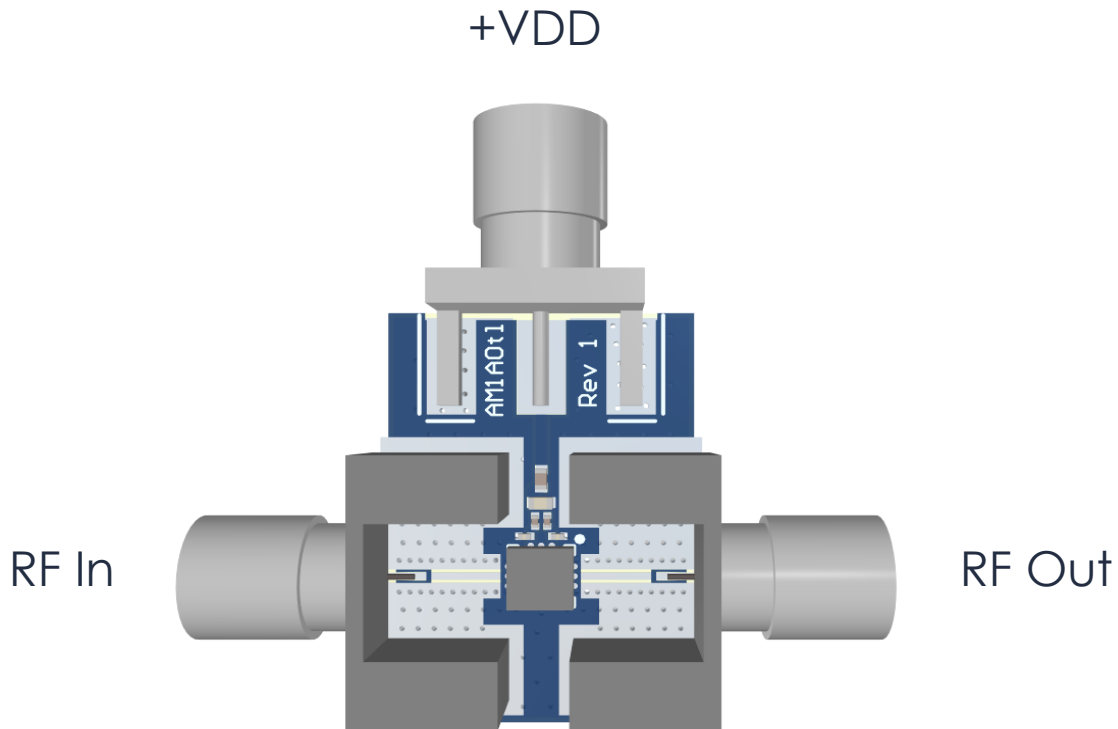
Notes:

1. RF Input and Output pins are internally DC blocked

AM1109 – Amplifier

2 to 20 GHz Broadband LNA

Evaluation PC Board



Note: Not all components shown may be installed.

Related Parts

Part Number	Description
AM1053	5 GHz to 20 GHz Gain Block
AM1067	5 GHz to 20 GHz Bypassable Gain Block
AM1070	DC to 18 GHz Broadband Gain Block
AM1071	DC to 18 GHz Broadband Gain Block
AM1077	5 GHz to 20 GHz Bypassable Gain Block w/ Isolation State
AM1100	2 GHz to 26.5 GHz Low Noise Amplifier
AM1101	2 GHz to 26.5 GHz Bypassable Amplifier
AM1102	DC to 22 GHz Low Noise Amplifier

Component Compliance Information

RoHS: Atlanta Micro, Inc. hereby certifies that all products comply with the EC Directive 2011/65/EC on the Restriction of Hazardous Substances, commonly known as EU-RoHS 6 and 10. All products supplied by Atlanta Micro shall be compliant with the European Directive 2011/65/EC based on the following substance list.

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-ethylhexyl) 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)

REACH: Atlanta Micro, Inc. neither uses nor intentionally adds any of the substances considered to be a Substance of Very High Concern (SVHC) as defined by the EU Regulation (EC) No. 1907-2006 on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH).

Conflict Materials: Atlanta Micro does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Atlanta Micro's supply chain is comprised of sources that are both environmentally and socially responsible. We periodically review this requirement with our vendors to ensure continued compliance.

Atlanta Micro takes its responsibility as a global partner seriously and will use due diligence within our supply chain to ensure all standards are met to the best of our knowledge.