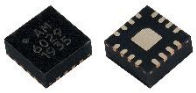
AM1136 – Amplifier

1.4 GHz to 20 GHz Driver Amplifier

Description

The AM1136 is a wideband, cascadable amplifier servicing the 1.4 to 20 GHz frequency range. The device exhibits high gain and high linearity across its bandwidth which makes it an excellent choice for a driver amplifier in an LO or transmit path. It is packaged in a 3 mm QFN with internal 50 Ω matching to achieve a compact total PCB footprint for low SWaP applications.

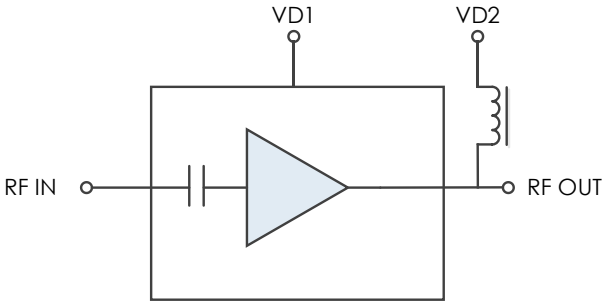


NOTE: *Similar part picture shown. Size and footprint identical.*

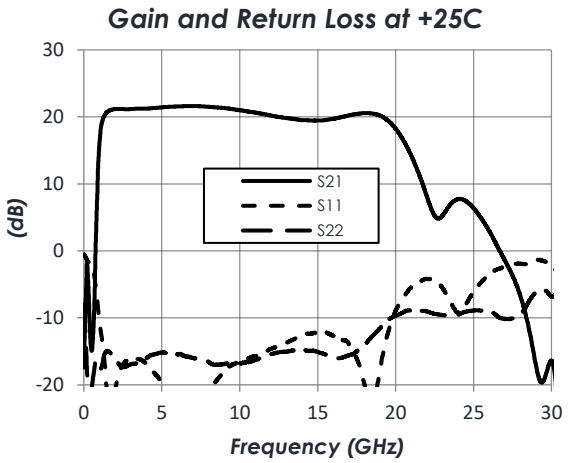
Features

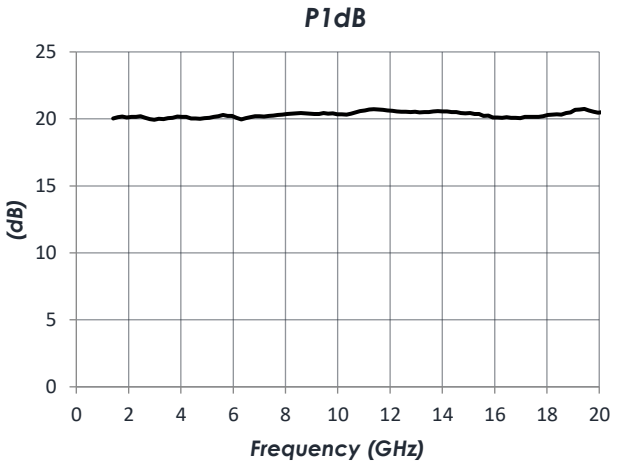
- 21 dB Gain
- +20 dBm P1dB
- +29 dBm OIP3
- 3.5 dB Noise Figure
- +3.3 & +4.1 V Operation
- 3 mm QFN
- -40 C to +85 C Operation

Functional Diagram



Characteristic Performance





To obtain price, delivery, or to place an order contact sales@atlantamicro.com
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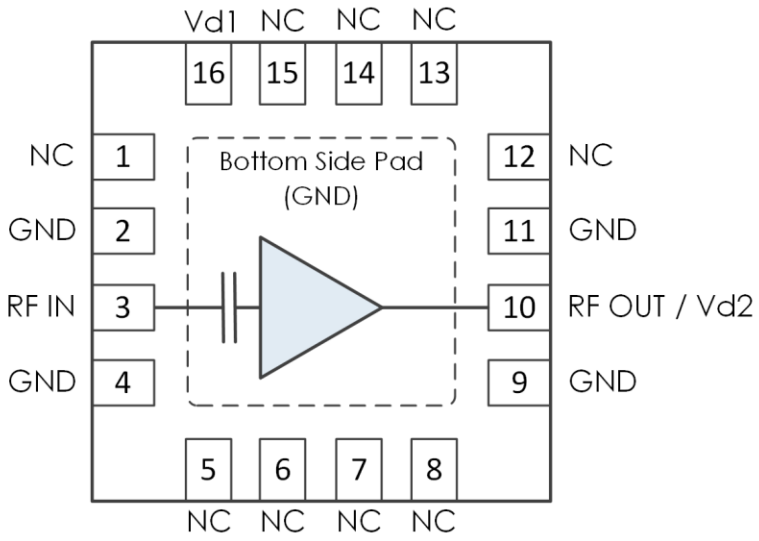
Table of Contents

Revision History

Date	Revision Number	Notes
June 20, 2023	1	Initial Release

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 – AC Coupled
4	GND	Ground – Common
5-8	NC	No Connect*
9	GND	Ground – Common
10	RF Out / Vd2	RF Output and DC Power Input – 50 Ohms – DC Coupled. External Bias Tee Required
11	GND	Ground – Common
12-15	NC	No Connect*
16	Vd1	DC Power Input

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

Specifications

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	6 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 3	

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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage (Vd1)		3.3 V	
Supply Voltage (Vd2)		4.1 V	4.3 V
Operating Case Temperature	-40 C		+85 C

Thermal Information

Junction to Case Thermal Resistance (θ_{JC})	156.4 C/W
Nominal Junction Temperature at +85C Ambient	165 C
Channel Temperature to Maintain 1 Million Hour MTTF	175 C

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DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
DC Supply Voltage (Vd1)			3.3 V	
DC Supply Voltage (Vd2)			4.1 V	4.3 V
DC Supply Current (Vd1)			53 mA	
DC Supply Current (Vd2)			63 mA	
Power Dissipated	Vd1 = 3.3 V, Vd2 = 4.1 V		0.43 W	

RF Performance

(T = 25 °C unless otherwise specified)

Parameter	Testing Conditions	Minimum	Typical	Maximum
Frequency Range		1.4 GHz		20 GHz
Gain [2]	f = 1.4 GHz		20.4 dB	
	f = 10 GHz		21.0 dB	
	f = 20 GHz		18.2 dB	
Return Loss [2]	f = 1.4 GHz		-18 dB	
	f = 10 GHz		-17 dB	
	f = 20 GHz		-9 dB	
Output IP3 [1,2]			+29 dBm	
Output P1dB [2]			+20 dBm	
Noise Figure [2]			3.5 dB	

Notes:

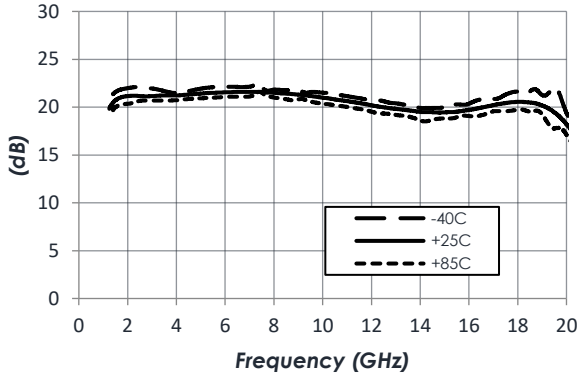
1. OIP3 measured with 10 MHz tone spacing with $P_{out/tone}$ = 0 dBm.
2. Data measured directly at output of device. Output bias voltage supplied through bias tee as shown in Typical Application and is measured exclusive of board and connector effects.

1.4 GHz to 20 GHz Driver Amplifier

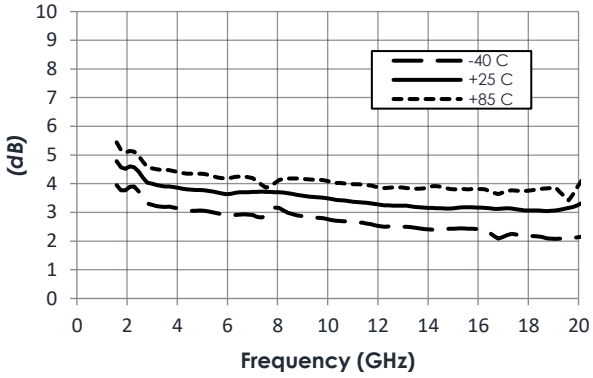
Typical Performance

(Vd1 = 3.3V, Vd2 = 4.1V, T = 25 °C unless otherwise specified)

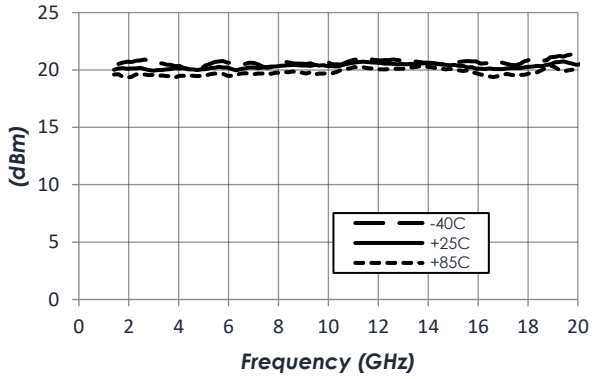
Gain vs Temperature



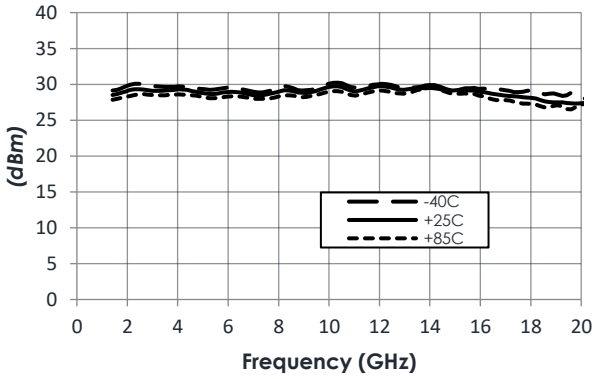
Noise Figure vs Temperature



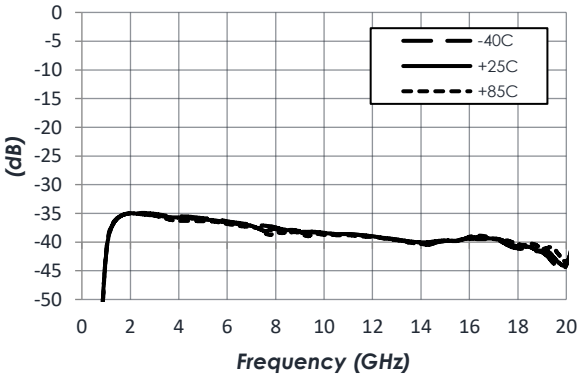
P1dB vs Temperature



Output IP3 vs Temperature



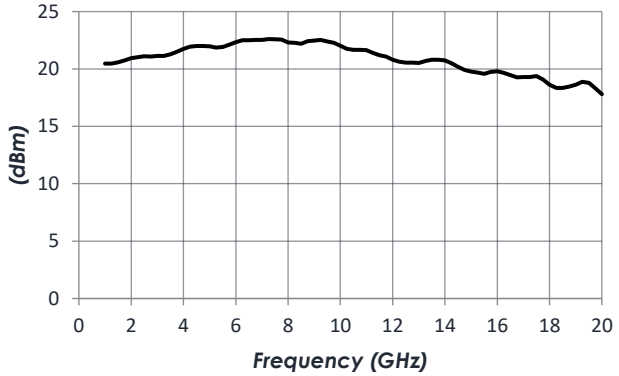
Reverse Isolation vs Temperature



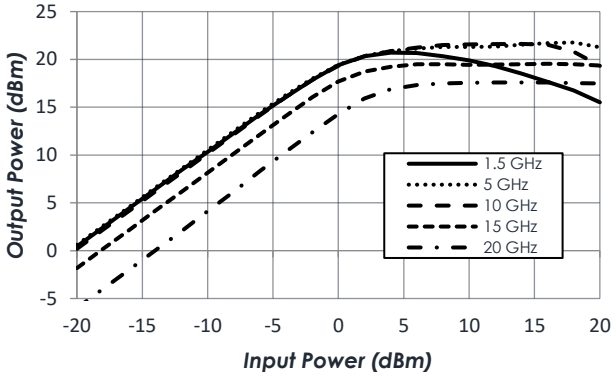
1.4 GHz to 20 GHz Driver Amplifier
Typical Performance (continued)

(Vd1 = 3.3V, Vd2 = 4.1V, T = 25 °C unless otherwise specified)

Power Saturation



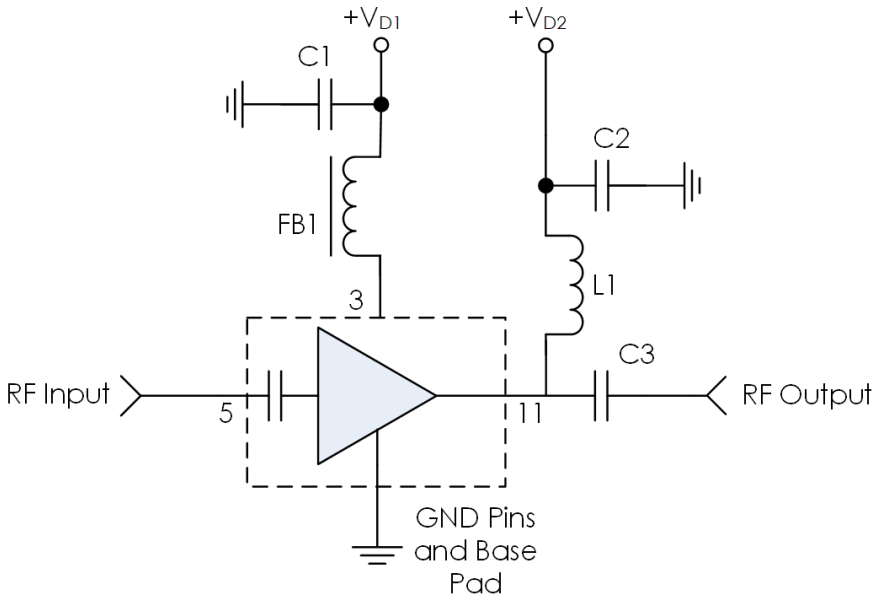
Pin vs. Pout at +25C



Typical Applications

Exact Voltages

(+Vd1 = 3.3V, +Vd2 = 4.1V)



Recommended Component List (or equivalent):

Part	Value	Part Number	Manufacturer
C1	0.1 µF	GRM155R71C104KA88	Murata
C2	0.1 µF	0201BB104KW160	Passive Plus
FB1	-	MMZ1005A222E	TDK
L1	250 nH	CC25T47K240G5-C	Piconics

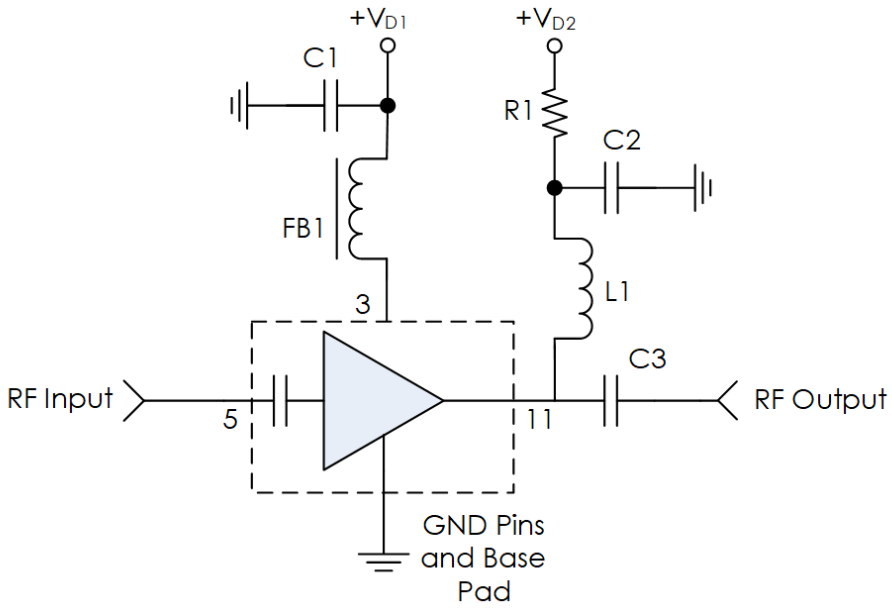
Notes:

1. DC blocking capacitor should be a high performance, low-loss, broadband capacitor for optimum performance.
2. High frequency performance is limited only by the frequency response of the output bias tees present in the application circuit. Conical shown performs well within frequency range though other high performance low loss bias tees may be used.

Typical Application

Standard Voltages

(+Vd1 = 3.3V, +Vd2 = 5.0V)



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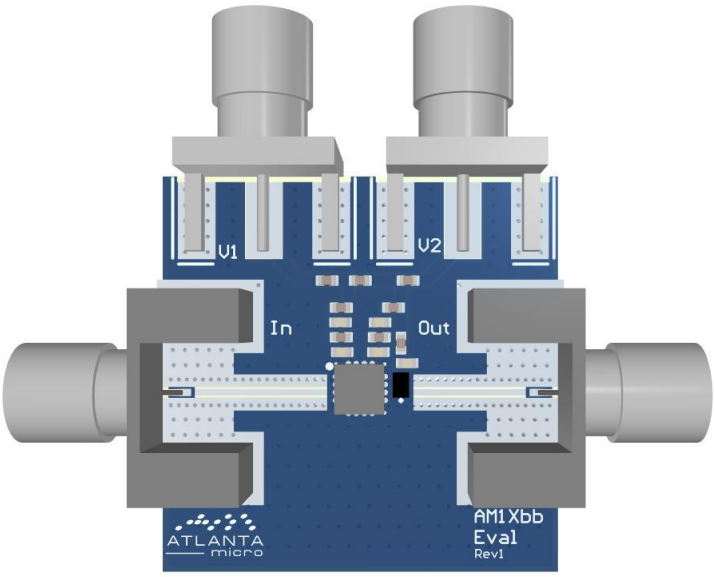
FB1	-	MMZ1005A222E	TDK
L1	250 nH	CC25T47K240G5-C	Piconics
R1	15 Ω	CRCW020115R0FNED	Vishay Dale

Notes:

1. DC blocking capacitor should be a high performance, low-loss, broadband capacitor for optimum performance.
2. High frequency performance is limited only by the frequency response of the output bias tees present in the application circuit. Conical shown performs well within frequency range though other high performance low loss bias tees may be used.
3. Dropping resistor may induce voltage drops as input power increases which can result in lower P1dB, Psat, and/or OIP3.
4. For better voltage stability and smaller performance impact consider a Zener diode circuit with R1.

Evaluation PC Board



Notes:

1. Due to connectors and trace lengths the evaluation board performance may differ from that of the data shown in this datasheet. Where possible de-embedding is recommended.

Related Parts

Part Number				Description
AM1095	6 GHz	to	22.25 GHz	Driver Amplifier
AM1111	2 GHz	to	18 GHz	Driver Amplifier
AM1137	20 MHz	to	20 GHz	Driver Amplifier
AM1142	20 MHz	to	18 GHz	Driver Amplifier

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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