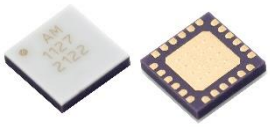
AM1127 – Amplifier

20 MHz to 6 GHz Gain Block

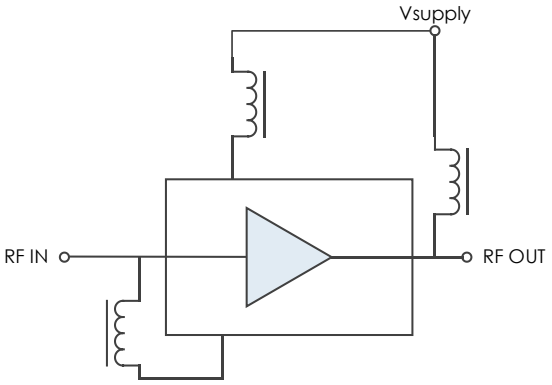


The AM1127 is a high dynamic range cascadable amplifier operating over the 20 MHz to 6.0 GHz frequency range. The device exhibits exceptional second and third order intercept performance as well as high P1dB and low noise figure. With only the need for one positive supply rail and packaged in a 4mm QFN, the AM1127 represents a compact total PCB footprint. Its high gain and linearity make the AM1127 an excellent choice for a receiver front end or transmitter backend.

FEATURES

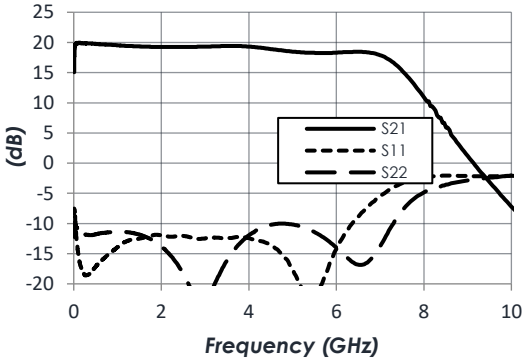
- 19 dB Gain
- +39 dBm OIP3
- +60 dBm OIP2
- +23 dBm P1dB
- 3.5 dB Noise Figure
- +3.0 to +6.0 V Supply Range
- 300mA Supply Current @ 6V
- 4mm QFN
- -40C to +85C Operation

FUNCTIONAL DIAGRAM

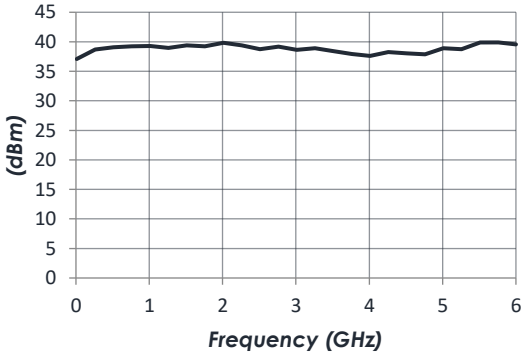


CHARACTERISTIC PERFORMANCE

Gain and Return Loss at +25C



Output IP3 at +25C

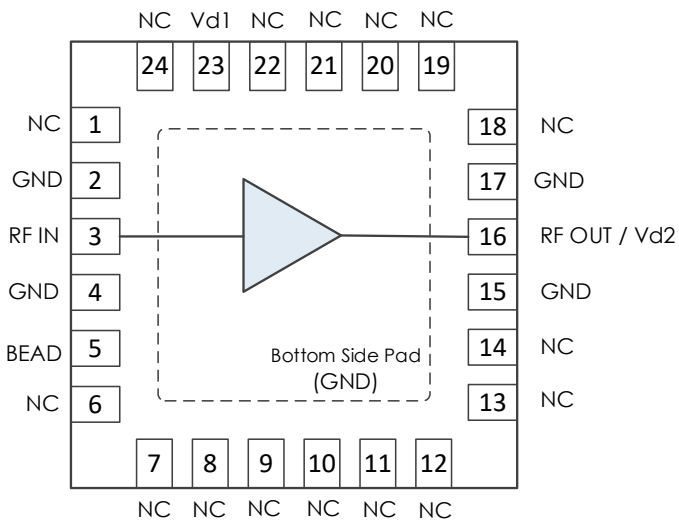


CONTENTS

REVISION HISTORY

Date	Revision	Notes
February 8, 2021	0	Preliminary Release
August 2, 2021	1	Initial Release
August 16, 2021	1.1	Updated component list in Typical Application.
August 19, 2021	2	Added Current Distribution
November 29, 2021	2.1	Corrected Thermal Information
November 19, 2024	3	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	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
6-14	NC	No Connect
15	GND	Ground - Common
16	RF OUT / Vd2	RF Output – 50 Ohms – DC Coupled. VD2 DC Power Input. External Bias Tee Required
17	GND	Ground - Common
18-22	NC	No Connect
23	Vd1	DC Power Input
24	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
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 1	

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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+3 V	+6 V	
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+150 C

Thermal Information

	Thermal Resistance (°C / W)
Junction to Case Thermal Resistance (θ_{JC})	32.1

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+3 V	+6 V	+6 V
DC Supply Current	VDD = +6 V, Total		300 mA	
	VD1 Current		150 mA	
	VD2 Current		150 mA	
Power Dissipated	VDD = +6 V		1.8 W	

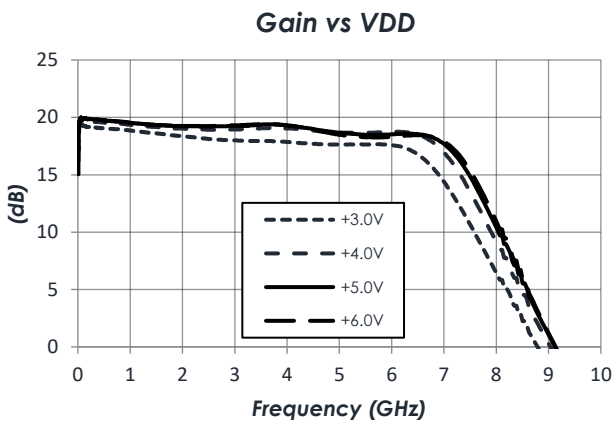
RF Performance

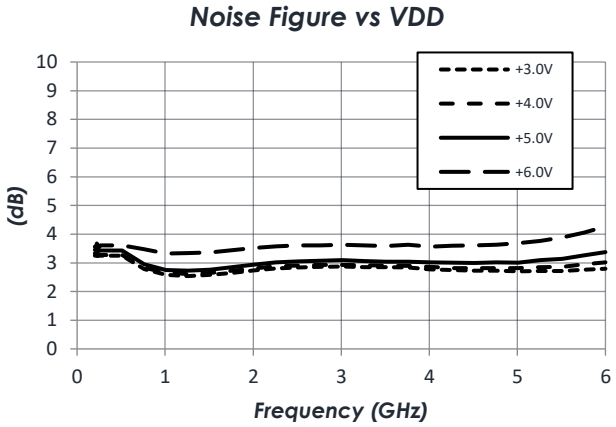
(T = 25 °C unless otherwise specified)

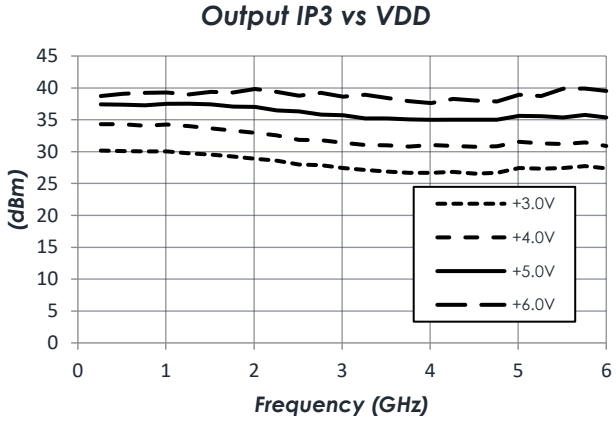
Param	Testing Conditions	Min	Typical	Max
Frequency Range		0.02 GHz		6 GHz
Gain			19 dB	
Return Loss			-12 dB	
Output IP3			+39 dBm	
Output P1dB			+23 dBm	
Output OIP2			+60 dBm	
Noise Figure			3.5 dB	

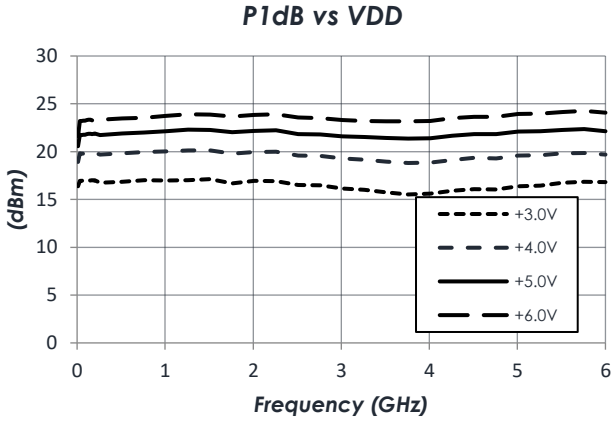
TYPICAL PERFORMANCE

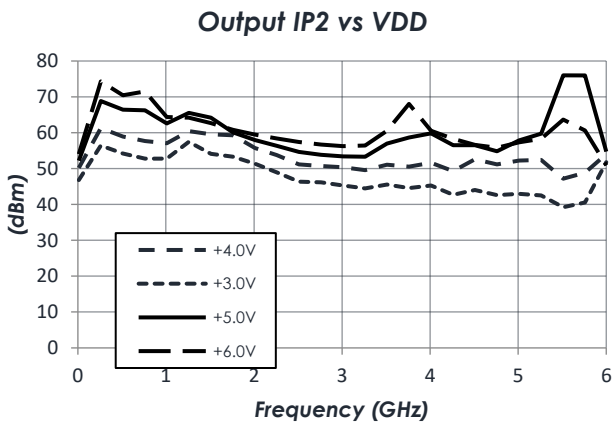
(VDD = +6.0V, T = 25 °C unless otherwise specified)

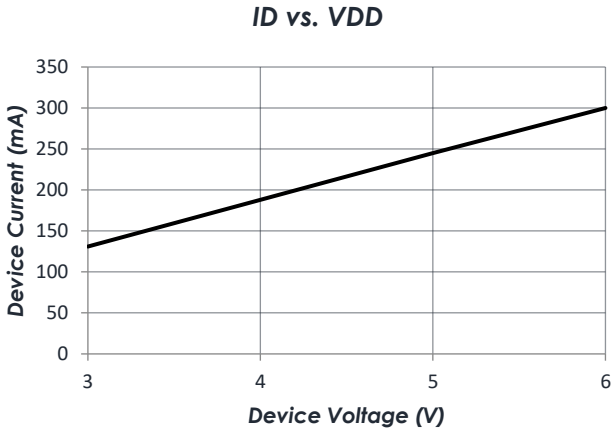










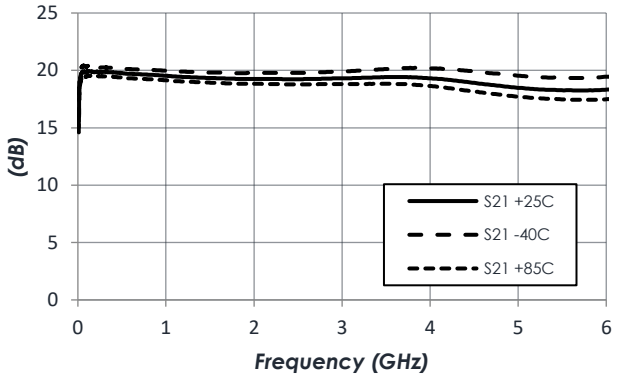


*Note: ID = ID2 + IDSW

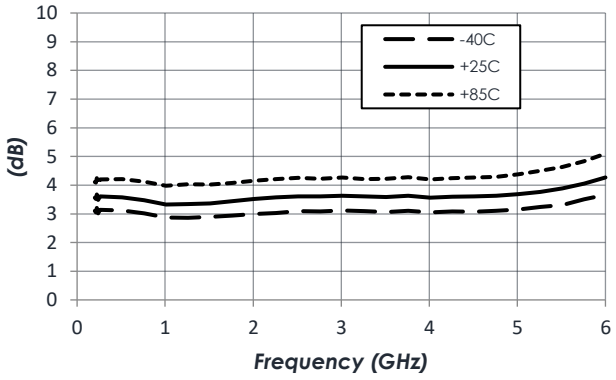
TYPICAL PERFORMANCE (CONTINUED)

(VDD= +6.0V, T = 25 °C unless otherwise specified)

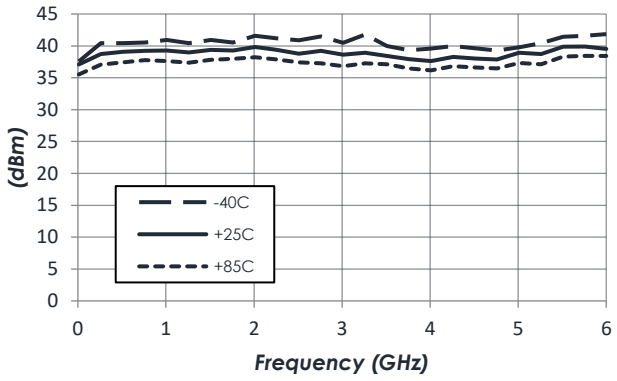
Gain vs Temperature



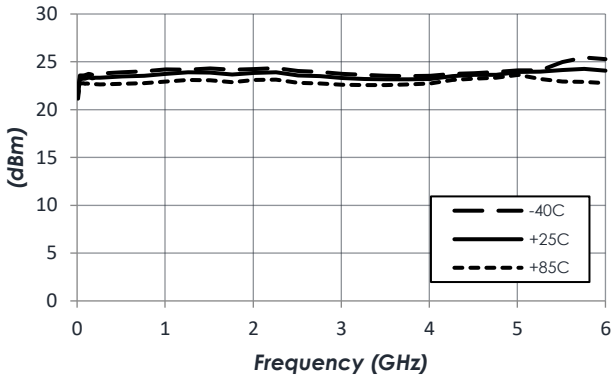
Noise Figure vs Temperature



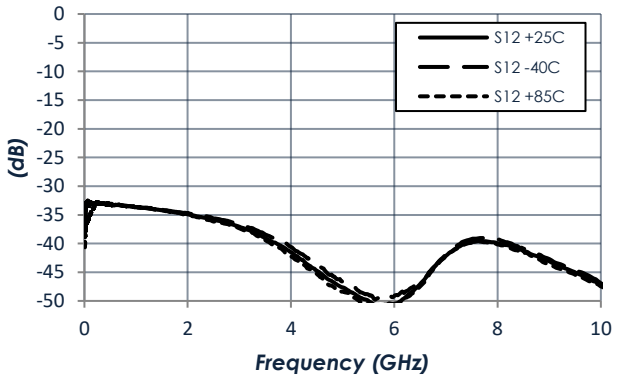
Output IP3 vs Temperature



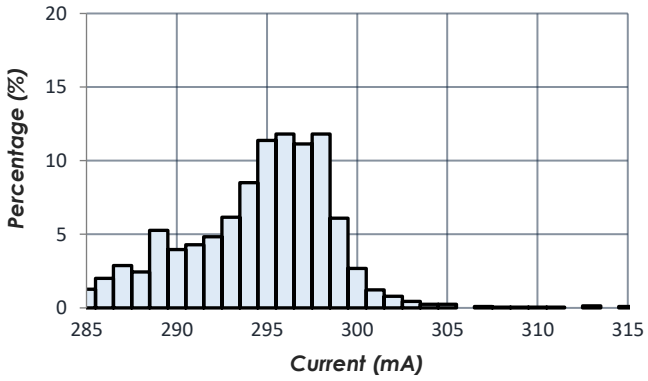
P1dB vs Temperature



Reverse Isolation vs Temperature



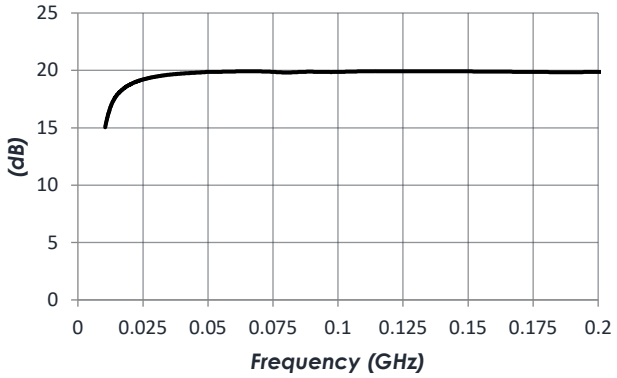
Current Distribution



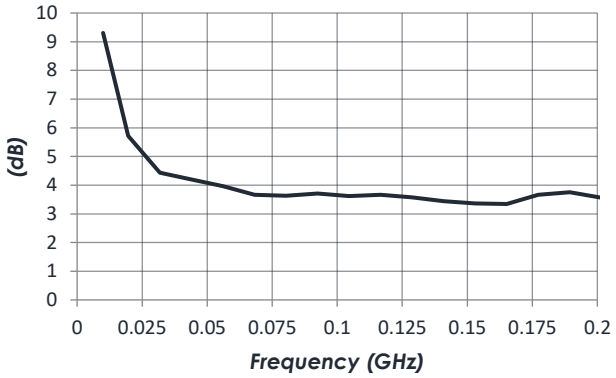
TYPICAL PERFORMANCE (CONTINUED)

(VDD= +6.0V, T = 25 °C unless otherwise specified)

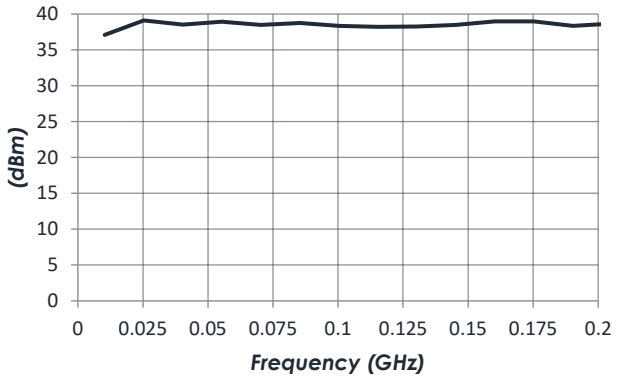
Low Frequency Gain



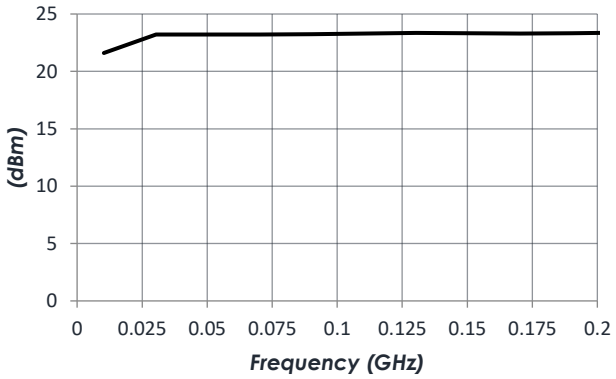
Low Frequency NF



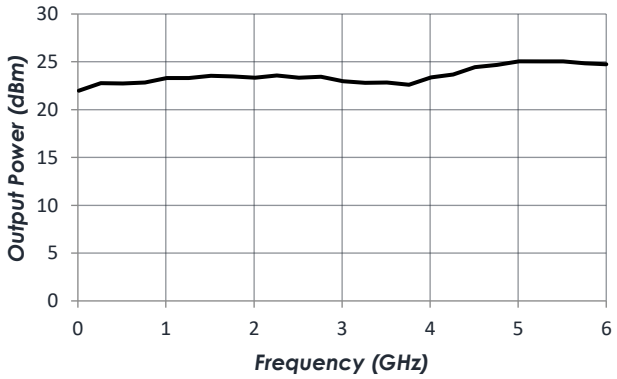
Low Frequency OIP3



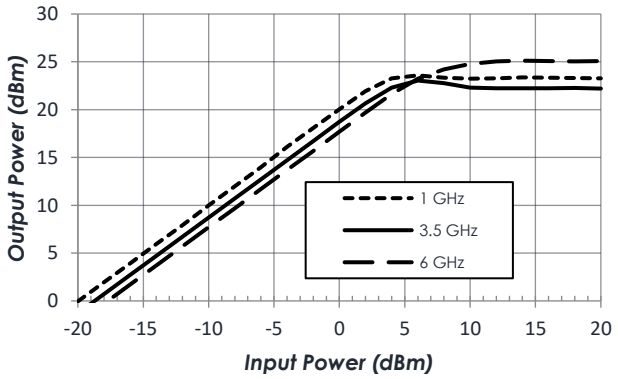
Low Frequency P1dB



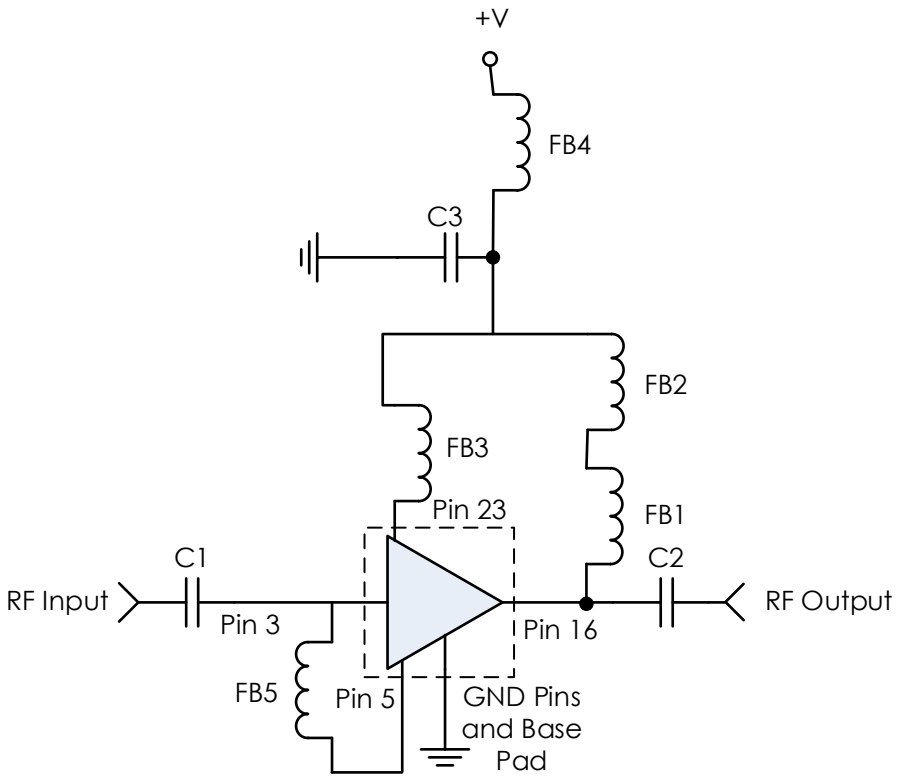
Saturatred Output Power



Pin vs. Pout at +25C



TYPICAL APPLICATION



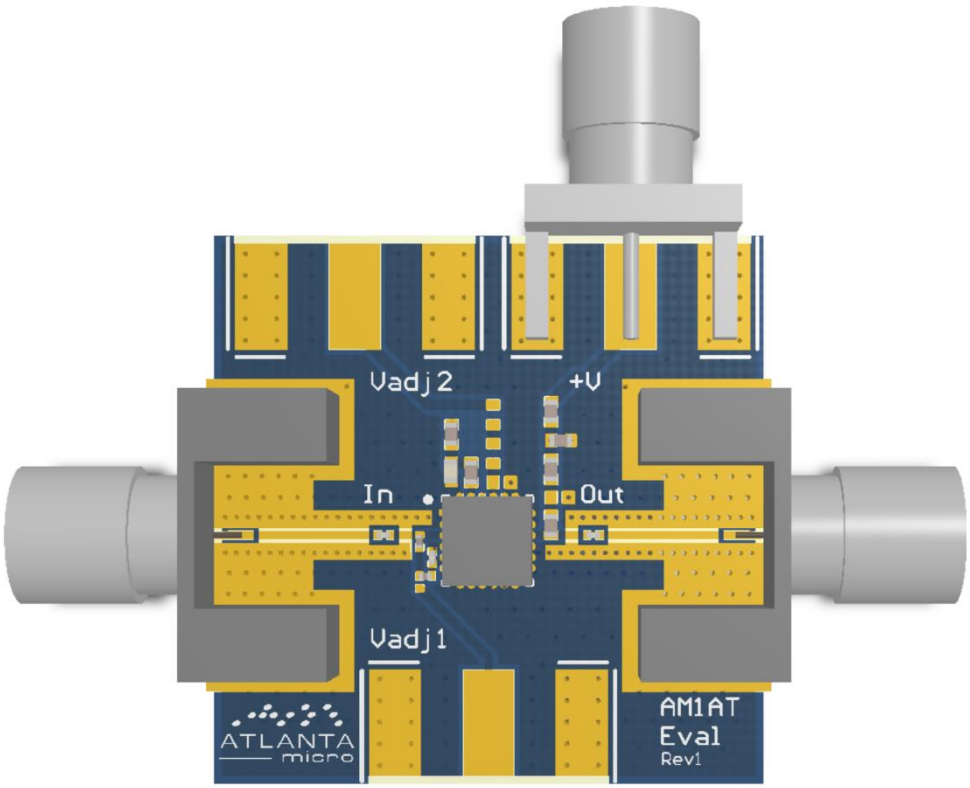
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 uF	0402BB104KW106	Passive Plus
C3	0.1 uF	GRM155R71C104KA88	Murata
FB1, FB2, FB3	-	MMZ1005A182ET000	TDK
FB4	-	MMZ1005S102HT000	TDK
FB5	-	MMZ1005A222E	TDK

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. FB1 and FB2 choke gives best low frequency performance extension without a capacitor to ground.
    a. Low frequency performance may be improved by replacing FB1 and FB2 with a different bead, inductor, or bias tee.

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM1018C	0.02 GHz to 6 GHz	Gain Block
AM1025B	0.02 GHz to 3 GHz	Gain Block
AM1084-1	DC to 6 GHz	Gain Block
AM1090-1	DC to 6 GHz	Gain Block

COMPONENT COMPLIANCE INFORMATION

RoHS: Mercury Systems, 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 Mercury 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 (CrVl)	<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)

REACH: Mercury Systems, 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: Mercury does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Mercury'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.

Mercury 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.

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