AM1160 – Amplifier

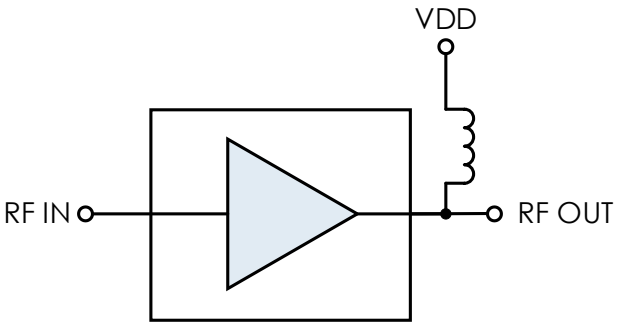
1.2 GHz to 18GHz Low Noise Amplifier

AM1160 is a wideband, cascadable amplifier servicing the 1.2 to 18 GHz frequency range. The device pairs low noise figure with exceptional linearity which makes it an ideal choice for many applications with high dynamic range requirements. It also includes a slight positive gain slope to aide in overcoming passive losses that build up in an RF system. The AM1160 draws less than 450mW of DC power and is packaged in a 3mm QFN.

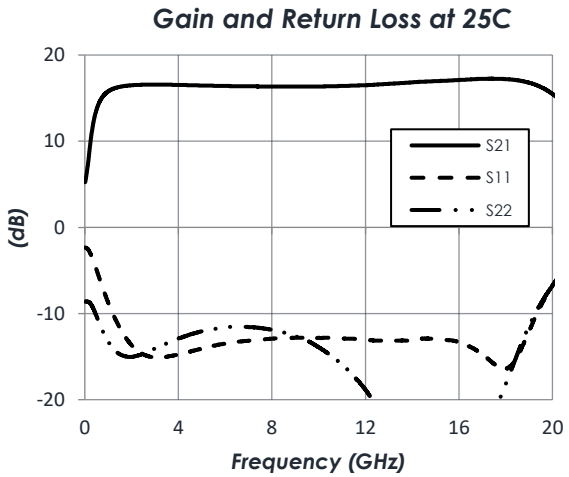
FEATURES

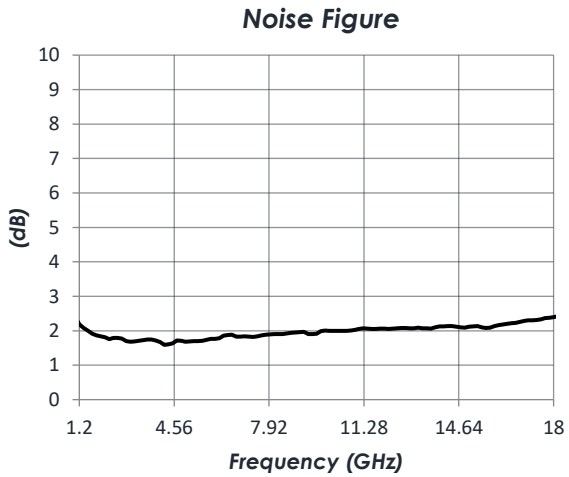
- 16.3 dB Gain
- 1.9 dB Noise Figure
- +31 dBm OIP3
- +19.5 dBm P1dB
- +20.8 dBm Psat
- 5V / 84 mA Operation
- 3mm QFN
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE





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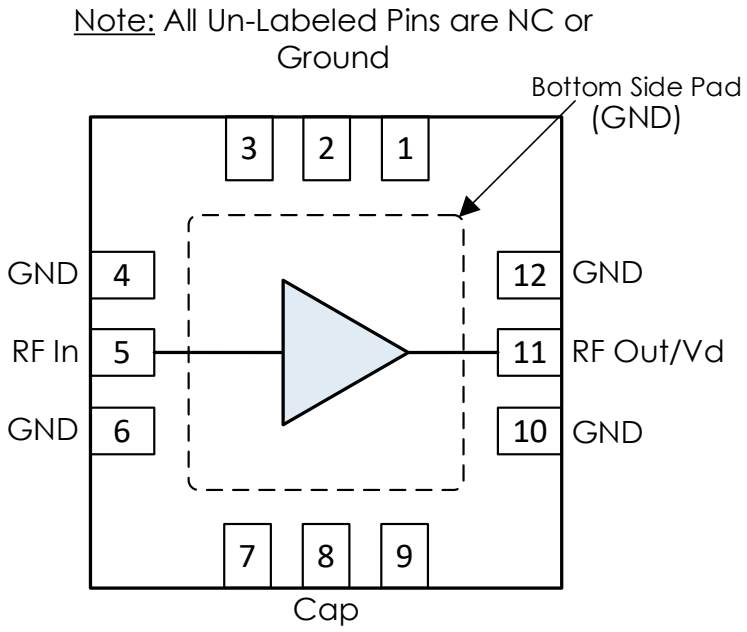
REVISION HISTORY

Date	Revision	Notes
10/5/2022	1	Initial Release
3/26/2025	2	Updated to Mercury Standard Format and Updated Plots

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1-3	NC	No Connection*
4	GND	Ground – Common
5	RF In	RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
6	GND	Ground – Common
7	NC	No Connection*
8	Cap	AC Ground – Connect capacitor from pin 8 to GND
9	NC	No Connection*
10	GND	Ground – Common
11	RF Out	RF Output – 50 Ohms – DC Coupled. External Bias Tee Required
12	GND	Ground – Common

Note: NC pins may be grounded or left floating.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 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	

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

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage		+5.0 V	+5.2 V
Operating Case Temperature	-40 C		+85 C

Thermal Information

	Thermal Resistance (°C / W)
Junction to Package Ground Thermal Resistance (θ_{JC})	191 C/W
Nominal Junction Temperature at +85 C ambient	166 C
Channel Temperature to Maintain 1 Million Hour MTTF	175 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage			+5.0 V	
DC Supply Current	VDD = +5.0 V		80 mA	
Power Dissipated	VDD = +5.0 V		400 mW	

RF Performance

(T = 25 °C unless otherwise specified)

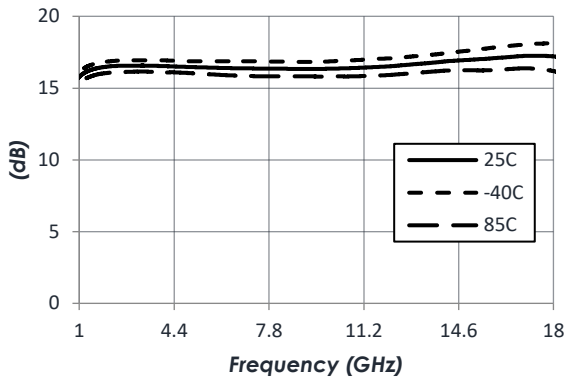
Param	Testing Conditions	Min	Typical	Max
Frequency Range		1.2 GHz		18 GHz
Gain	f = 1.2 GHz		16.1 dB	
	f = 9 GHz		16.3 dB	
	f = 18 GHz		17.2 dB	
Return Loss	f = 9 GHz		-12 dB	
Output IP3	f = 9 GHz		31.1 dBm	
Output P1dB	f = 9 GHz		19.5 dBm	
Noise Figure	f = 9 GHz		1.9 dB	

NOTE: Performance Data measured directly at QFN input and output exclusive of loss due to connectors, traces, and/or bias tees.

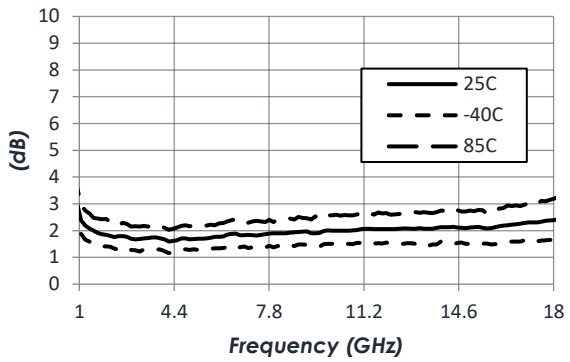
TYPICAL PERFORMANCE

(VDD = 5.0 V, T = 25°C unless otherwise specified)

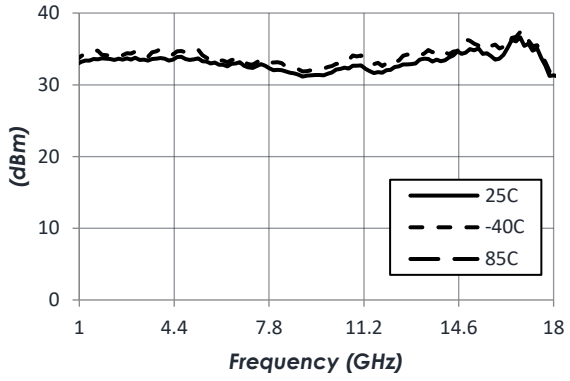
Gain vs. Temperature



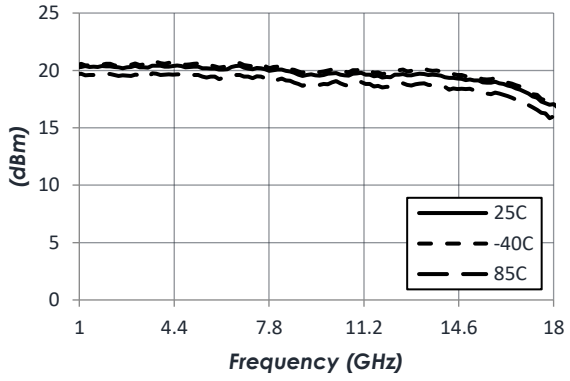
Noise Figure vs. Temperature



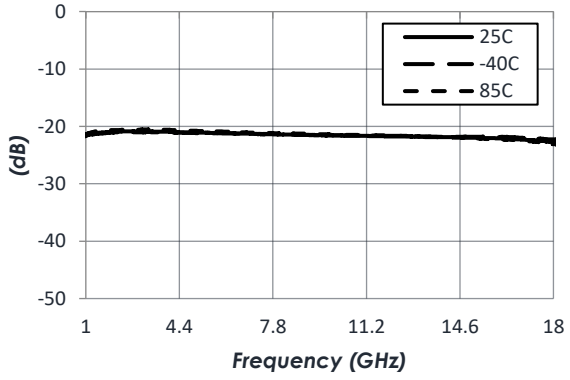
Output IP3 vs. Temperature



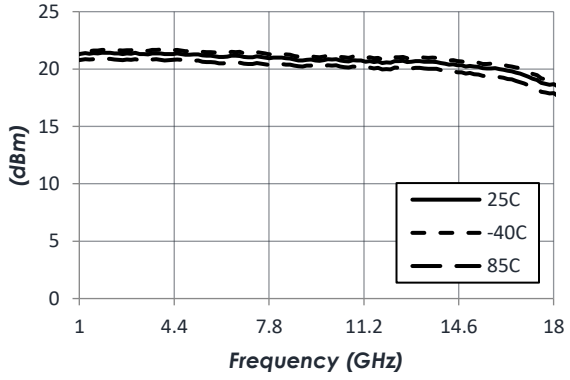
P1dB vs. Temperature



Reverse Isolation vs. Temperature

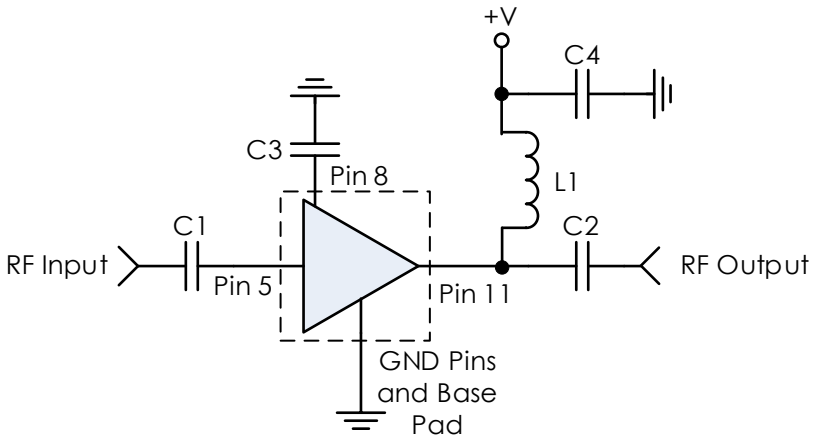


Psat vs. Temperature



NOTE: OIP3 measured with two tones spaced 10MHz apart at -17dBm Pin/tone

TYPICAL APPLICATION



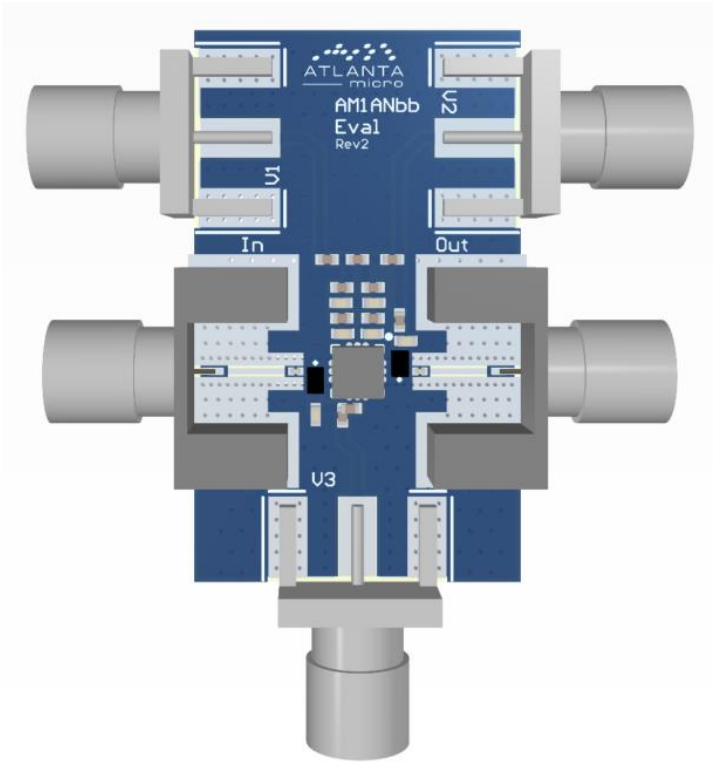
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 uF	0201BB104KW160	Passive Plus
C3, C4	0.1 uF	GRM155R71C104KA88	Murata
L1	-	CC25T47K240G5	Piconics

Note:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimal performance.
2. Output bias tee should be optimized for the frequency range of interest. Performance may be improved by choosing a different inductor, or bias tee in place of FB1.
3. C3 should be placed as close to the package as possible for optimal performance.

EVALUATION PC BOARD



Note: Not all components shown will be installed for AM1160.

RELATED PARTS

Part Number				Description
AM1102	20 MHz	to	22 GHz	Low Noise Amplifier
AM1109	2 GHz	to	20 GHz	Low Noise Amplifier
AM1111	2 GHz	to	18 GHz	Driver Amplifier
AM1142	20 MHz	to	18 GHz	Driver Amplifier

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 (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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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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