

# AM115A – Amplifier / Attenuator

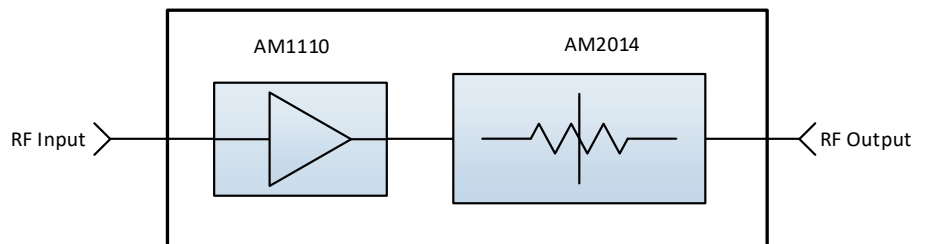
## 2 to 18 GHz Gain Block / Step Attenuator

**AM115A is a broadband MCM combining a digital step attenuator and a low noise amplifier covering the 2 to 18 GHz frequency range.** With internal 50Ω matching and packaged in a 4mm QFN, the AM115A is a dramatic reduction in size from a discrete implementation of a variable gain block making it an ideal candidate for low SWaP applications.

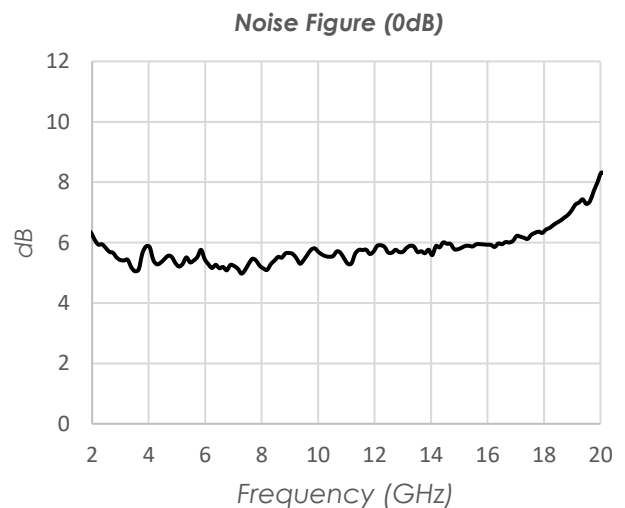
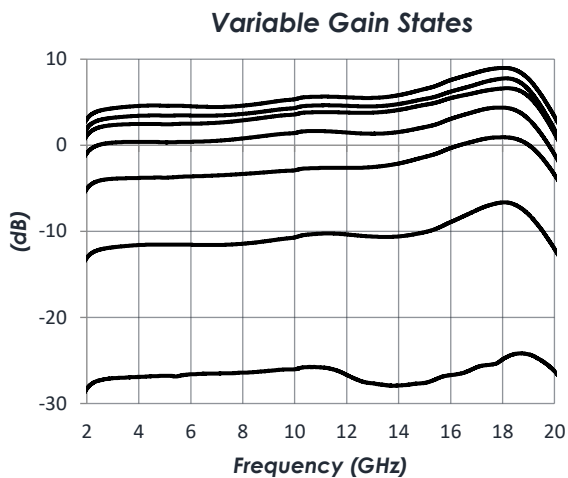
### FEATURES

- Broadband, 2.0 to 18 GHz
- +3.3V Supply, 62mA
- 0 to 31 dB step attenuator
- Positive gain slope vs frequency
- 4mm QFN Package
- -40C to +85C Operation

### FUNCTIONAL DIAGRAM



### CHARACTERISTIC PERFORMANCE



CONTENTS

FEATURES ..... 1

FUNCTIONAL DIAGRAM ..... 1

CHARACTERISTIC PERFORMANCE ..... 1

REVISION HISTORY ..... 2

PIN LAYOUT AND DEFINITIONS ..... 3

SPECIFICATIONS ..... 4

TYPICAL PERFORMANCE ..... 6

TYPICAL APPLICATION ..... 10

EVALUATION PC BOARD ..... 11

RELATED PARTS ..... 11

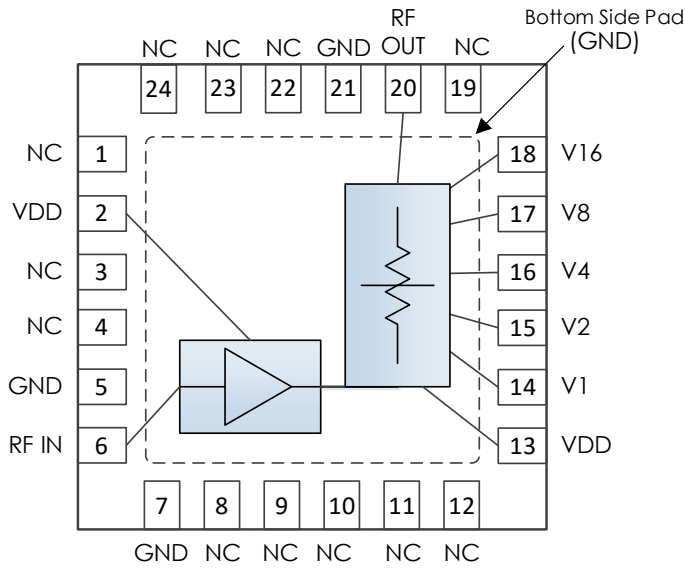
COMPONENT COMPLIANCE INFORMATION ..... 12

REVISION HISTORY

Date	Revision	Notes
December 10, 2025	1	Initial Release



PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	NC	Not Connected
2	VDD	+3.3V DC voltage
3-4	NC	Not Connected
5	GND	Ground
6	RF In	RF Input - DC Blocked
7	GND	Ground
8-12	NC	Not Connected
13	VDD	+3.3V DC voltage
14	V1	Attenuator Control 1dB
15	V2	Attenuator Control 2 dB
16	V4	Attenuator Control 4 dB
17	V8	Attenuator Control 8 dB
18	V16	Attenuator Control 16 dB
19	NC	Not connected
20	RF Out	RF Output - DC coupled Ext blocking cap required
21	GND	Ground
22-24	NC	Not connected

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

**SPECIFICATIONS**

**Absolute Maximum Ratings**

	Minimum	Maximum
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
Moisture Sensitivity Level	MSL 3	



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

**Recommended Operating Conditions**

	Minimum	Typical	Maximum
Operating Case Temperature	-40 C		+85 C

**Thermal Information**

Thermal Resistance (°C / W)	
Junction to Ground pad Thermal Resistance ( $\theta_{JC}$ )	279 C/W
Nominal Junction Temperature at +85 C ambient	142 C
Channel Temperature to Maintain 1 Million Hour MTTF	150 C

**DC Electrical Characteristics**

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage	VDD = +3.3V	+3.0 V	+3.3 V	+3.6V
DC Supply Current	VDD1 = +3.3V		62 mA	
Power Dissipated	VDD1 = +3.3V		205 mW	
Logic Level Low		-0.1V		+0.5 V
Logic Level High		+2.0 V		+VDD V



**RF Performance**

Param	Testing Conditions	Min	Typical	Max
Frequency Range		2.0 GHz		18 GHz
Gain	f = 10 GHz, 0 dB Attenuation		5.5 dB	
	f = 10 GHz, 31 dB Attenuation		-25.5 dB	
Return Loss	f = 10 GHz, 0 dB Attenuation		-11.5 dB	
	f = 10 GHz, 31 dB Attenuation		-9.6 dB	
Output IP3	f = 10 GHz, 0 dB Attenuation		25.6 dBm	
Output P1dB	f = 10 GHz, 0 dB Attenuation		12 dBm	
Noise Figure	f = 10 GHz, 0 dB Attenuation		5.6 dB	

**Timing Characteristics**

Param	Min	Typical	Max
0 dB to 31 dB 50% CTL to 10% RF		100 ns	
31 dB to 0 dB 50% CTL to 90% RF		300 ns	

**State Table**

V16	V8	V4	V2	V1	Attenuation (dB)
L	L	L	L	L	Maximum Gain
L	L	L	L	H	1
L	L	L	H	L	2
L	L	H	L	L	4
L	H	L	L	L	8
H	L	L	L	L	16
H	H	H	H	H	31

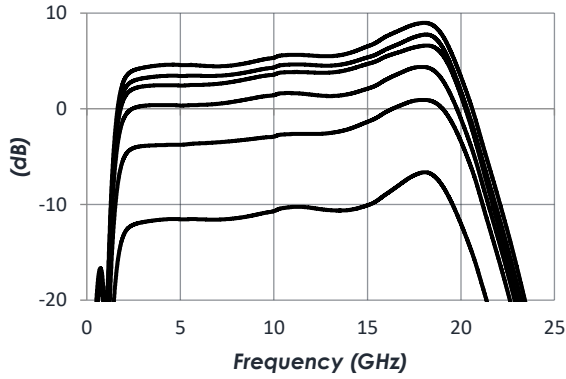
**Notes:**

1. T = 25 °C unless otherwise specified
2. Data shown in this document is measured directly at output of device exclusive of board and connector effects.

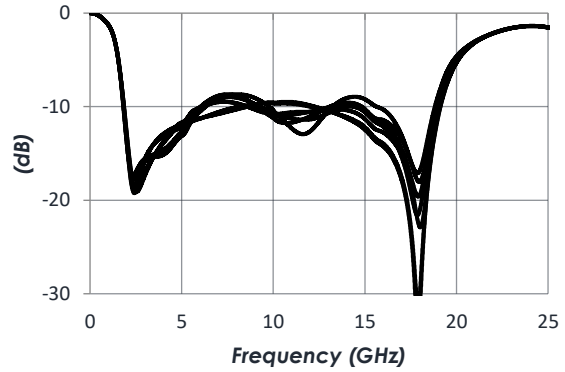
TYPICAL PERFORMANCE

(T = 25 °C unless otherwise specified.)

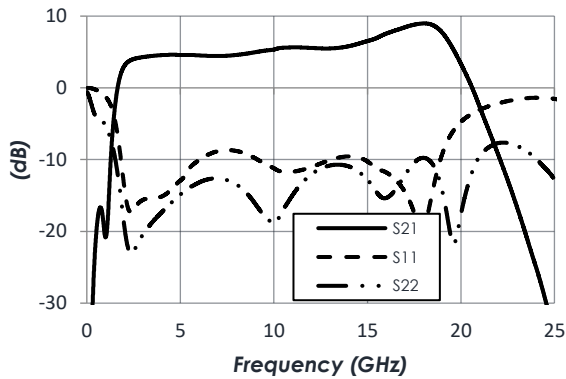
Variable Gain States



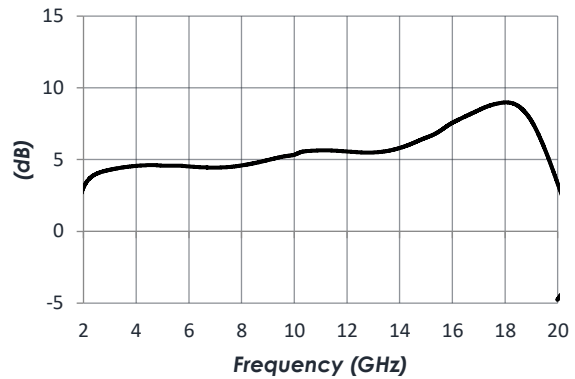
Input Return Loss



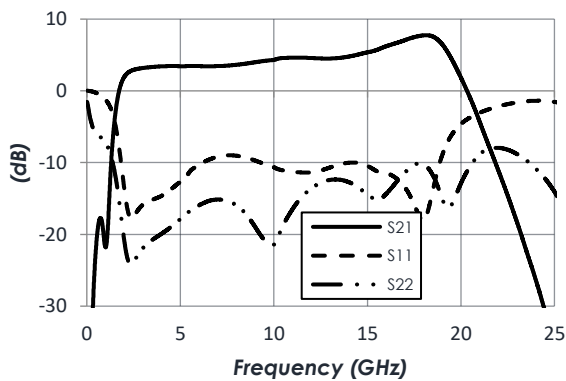
0dB Attn



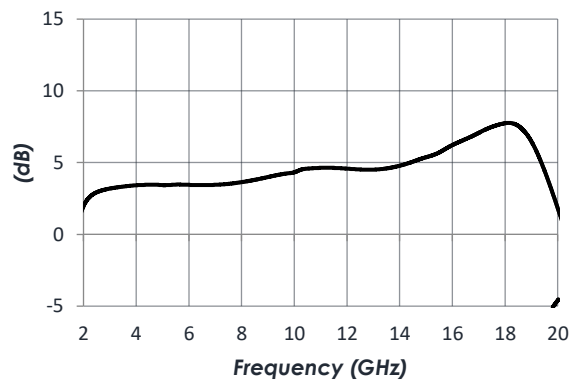
0dB Attn



1dB Attn

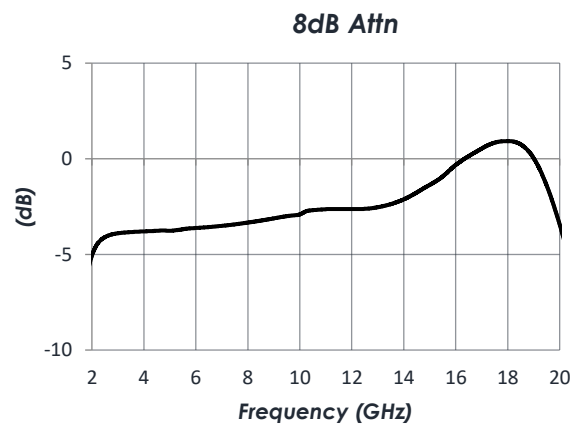
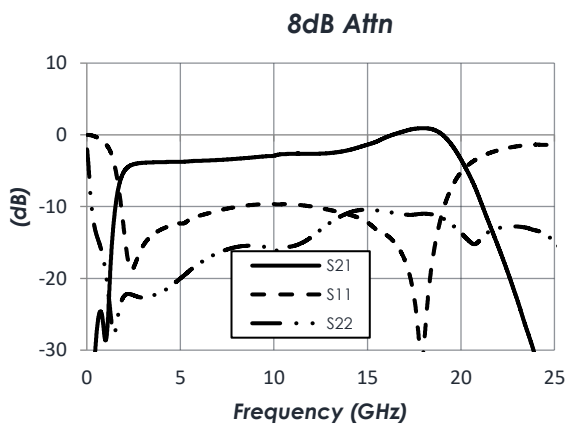
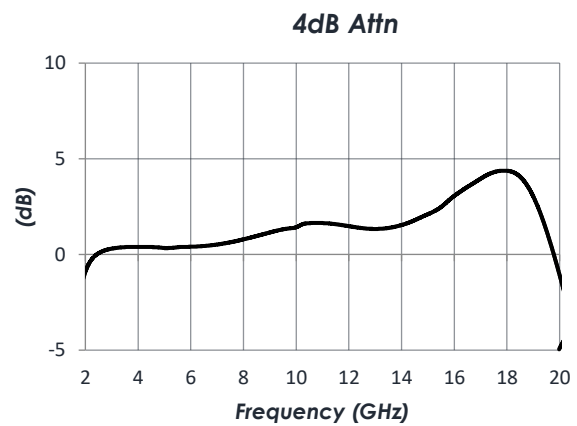
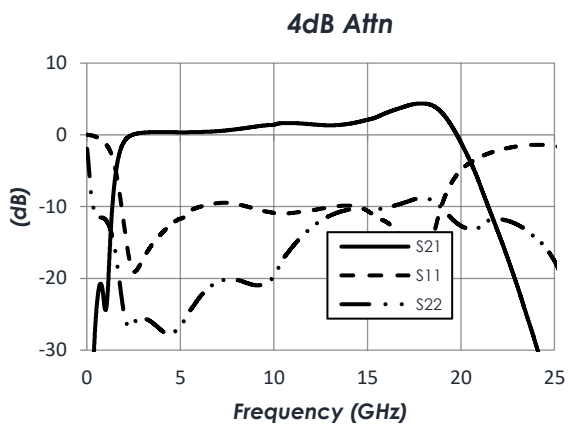
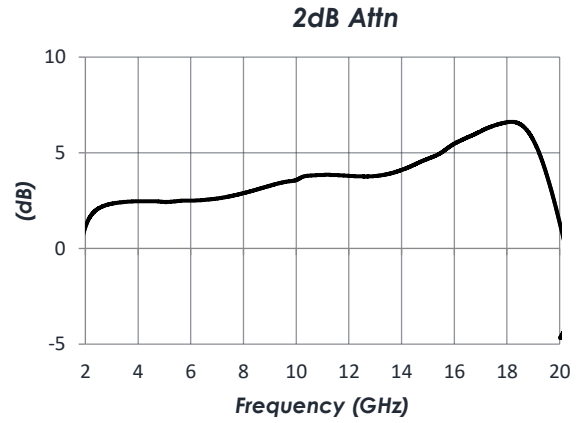
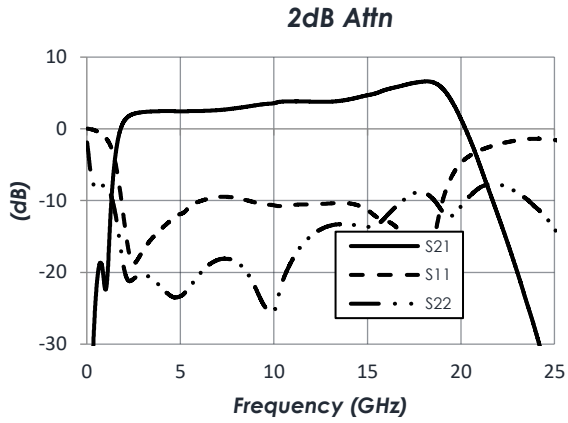


1dB Attn



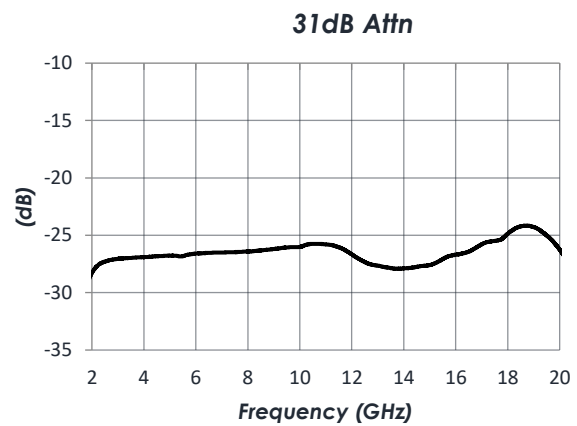
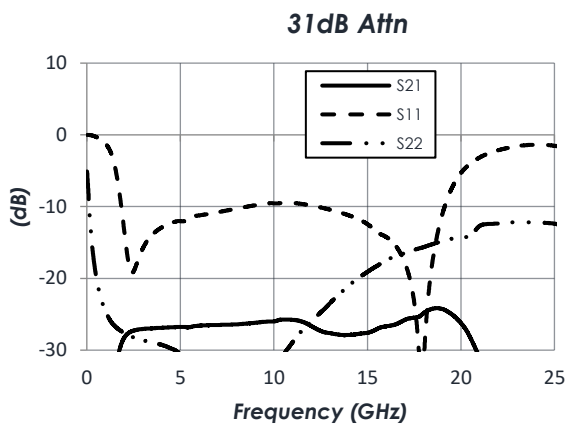
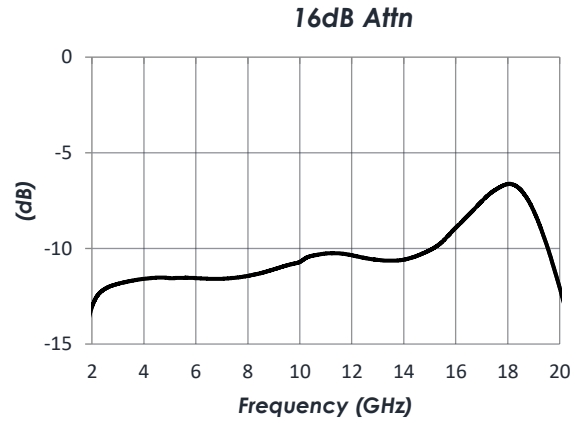
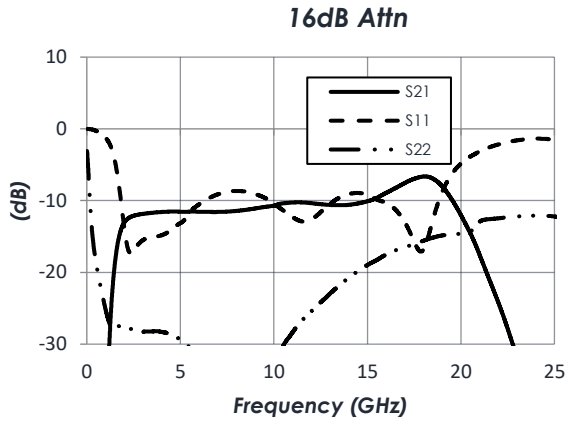
TYPICAL PERFORMANCE (CONTINUED)

(T = 25 °C unless otherwise specified.)



TYPICAL PERFORMANCE (CONTINUED)

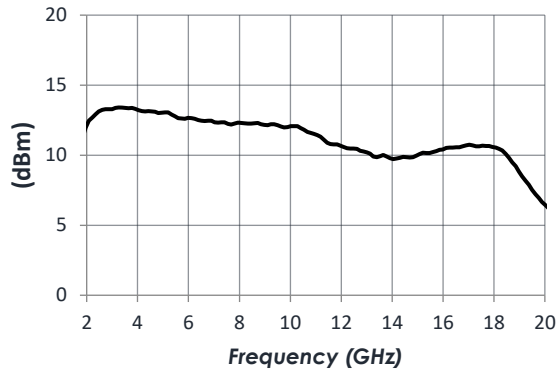
(T = 25 °C unless otherwise specified.)



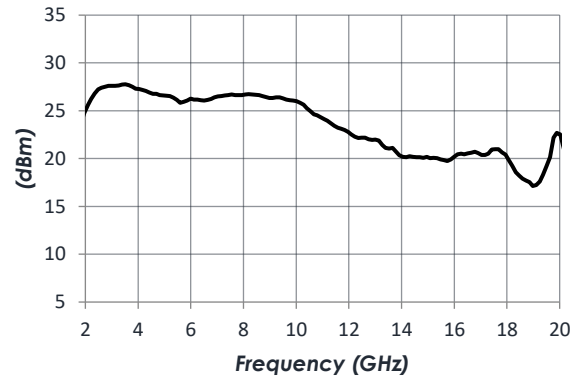
TYPICAL PERFORMANCE (CONTINUED)

(Data shown at 0dB attenuation)

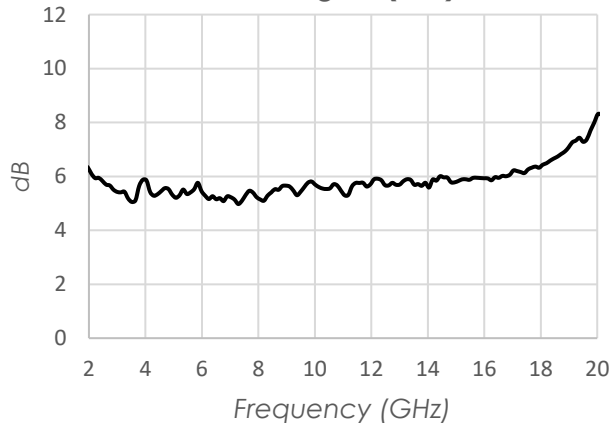
**P1dB (0dB)**



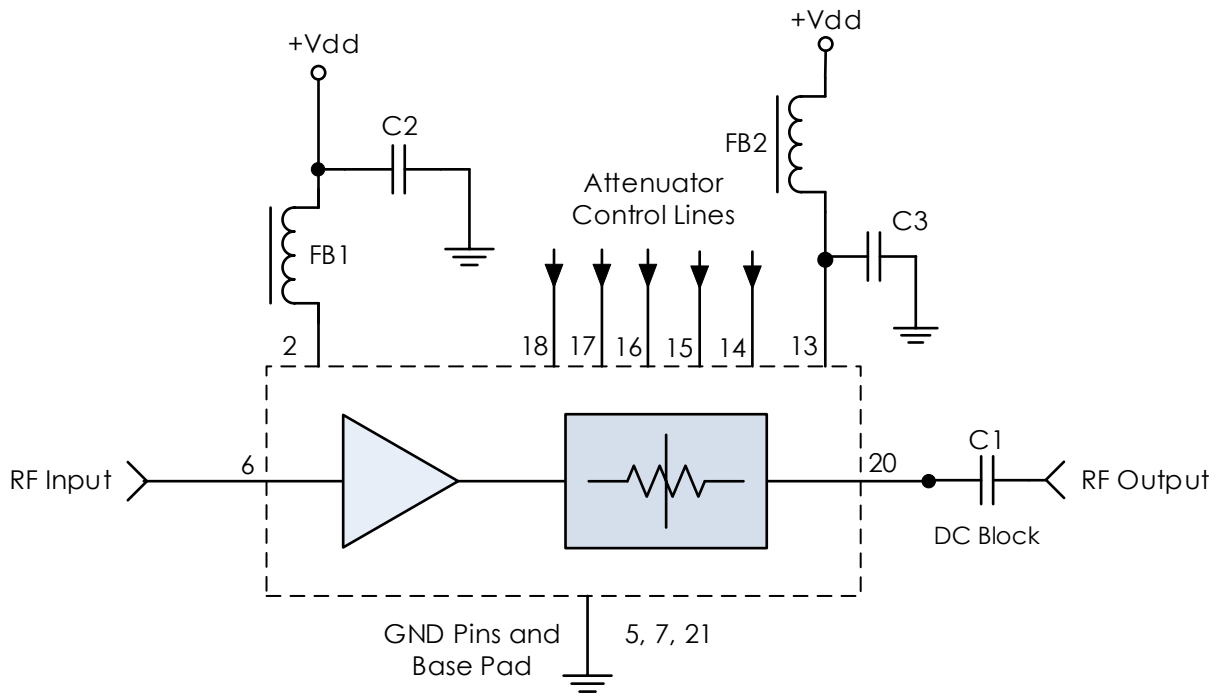
**OIP3 (0dB)**



**Noise Figure (0dB)**



TYPICAL APPLICATION



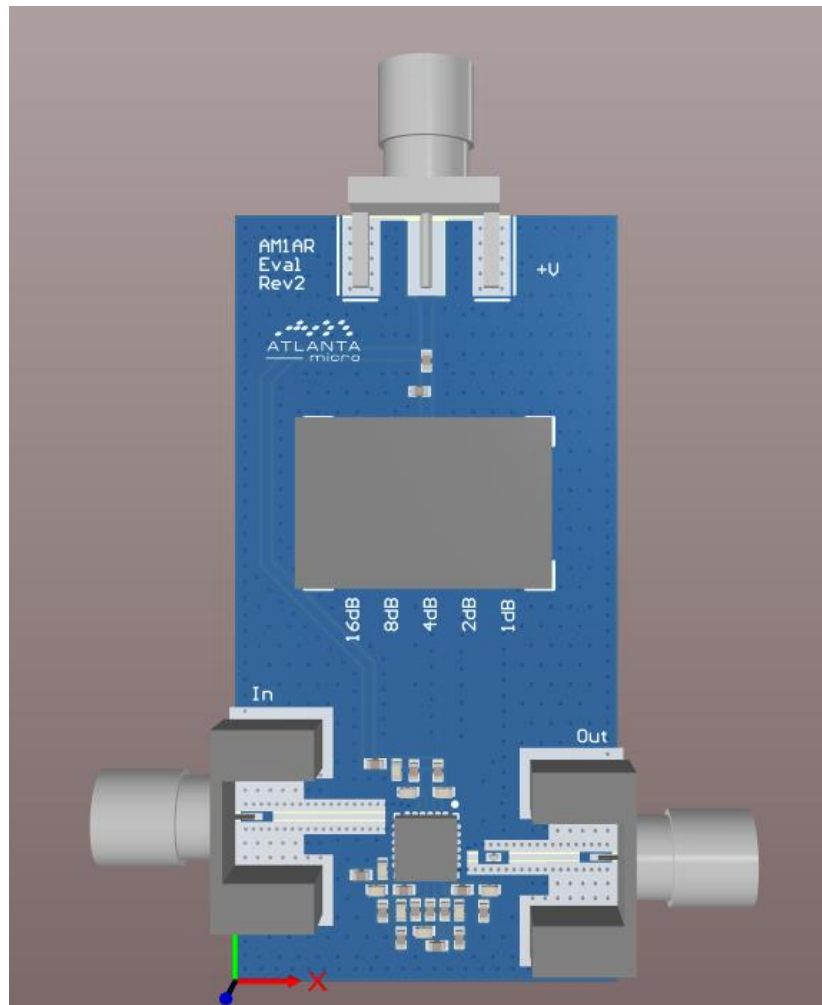
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1	0.1 uF	0201BB104KW160	Passives Plus
C2, C3	0.1 uF	GRM155R71C104KA88	Murata
FB1, FB2		MMZ1005A222E	TDK

Note:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimal performance.
2. Attenuator Control Lines do not have internal RC filtering. External RC filtering should be added to each control line if required.

EVALUATION PC BOARD



RELATED PARTS

Part Number	Description	
AM1159	1.4 to 20 GHz	Step Attenuator/ Gain Block
AM1110	2 GHz to 18 GHz	Slope correcting gain block amplifier
AM1135	6 GHz to 26.5 GHz	Variable Gain Amplifier
AM1146	2 GHz to 18 GHz	Variable Gain 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-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)

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