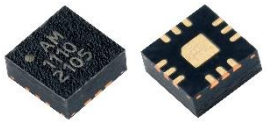
AM1110 – Amplifier

2 GHz to 18 GHz Slope Correcting Gain Block

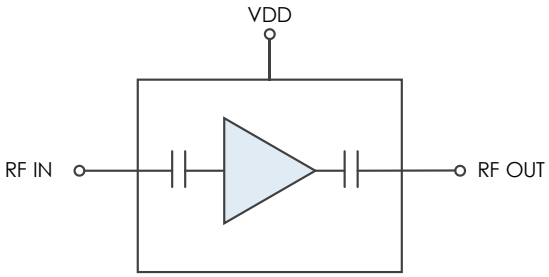


AM1110 is a wideband, cascadable amplifier servicing the 2 to 18 GHz frequency range. The device exhibits low gain at the lower frequencies ascending to moderate gain at the higher frequencies. The increasing gain across frequency makes the AM1110 an ideal solution to equalize gain/insertion loss across an RF system. Packaged in a 3mm QFN with internal 50Ω matching and drawing less than 220mW of power, the AM1110 is suited for low SWaP applications.

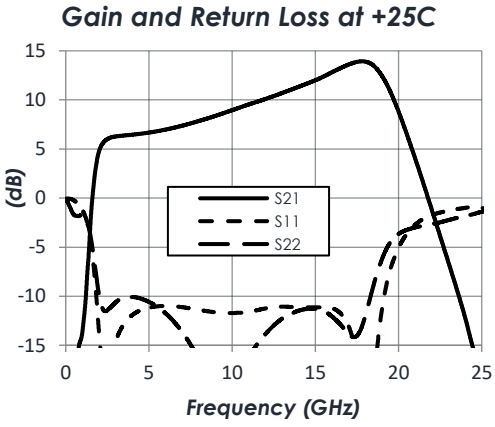
FEATURES

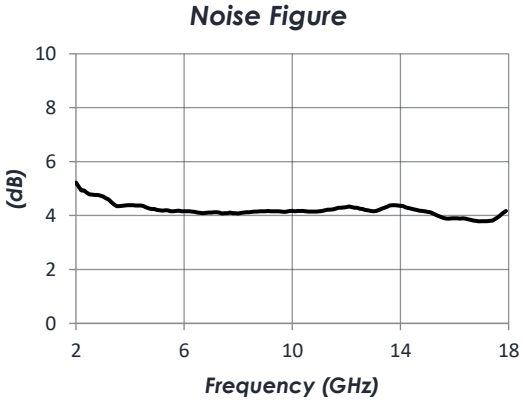
- 9 dB Gain Slope
- 5 dB Gain at 2 GHz
- 14 dB Gain at 18 GHz
- 4 dB Noise Figure
- +27 dBm OIP3
- +17 dBm P1dB
- +3.3V Operation
- 205 mW Power Consumption
- 3mm QFN
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE



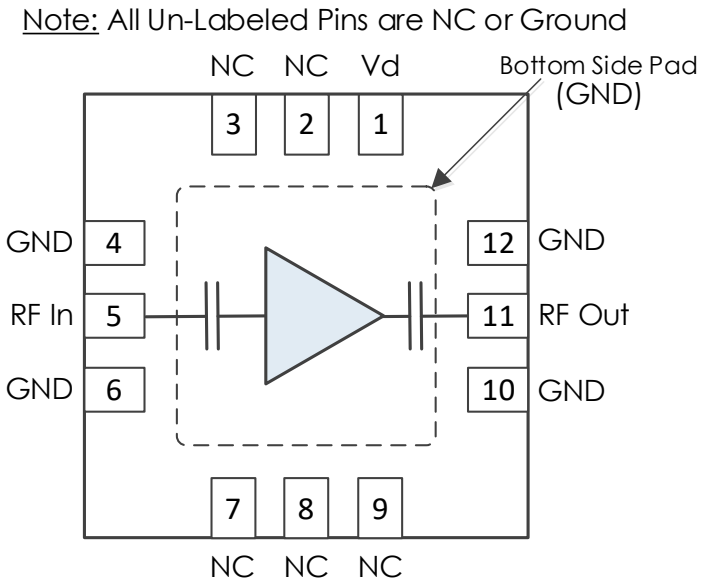


CONTENTS

REVISION HISTORY

Date	Revision	Notes
April 13, 2021	1	Initial Release
August 18, 2021	2	Notes added to Typical Application. Added part picture to front page.
February 7, 2023	3	Added thermal Information
June 20, 2024	4	Changed to Mercury branding. No content changes.
July 11, 2024	5	Modified current limits

PIN LAYOUT AND DEFINITIONS



Pin	Name	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.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+3.5 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
Storage Temperature Range (Recommended)	-50 C	+125 C
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	+3.0 V	+3.3 V	+3.5 V
Operating Case Temperature	-40 C		+85 C

Thermal Information

	Thermal Resistance (°C /W)
Junction to Case Thermal Resistance (θ_{JC})	279 C/W
Nominal Junction Temperature at +85C Ambient	+138 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			+3.3 V	
DC Supply Current	VD = +3.3 V	51 mA	59 mA	62 mA
Power Dissipated	VD = +3.3 V	168 mW	195 mW	205 mW

RF Performance

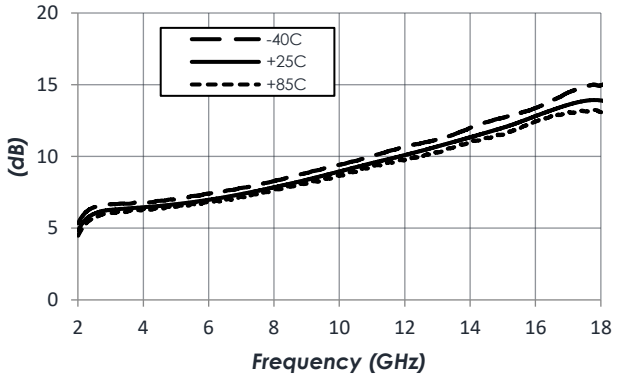
(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		2 GHz		18 GHz
Gain	f = 2 GHz		4.8 dB	
	f = 10 GHz		8.9 dB	
	f = 18 GHz		13.9 dB	
Return Loss	f = 2 GHz		13.7 dB	
	f = 10 GHz		11.7 dB	
	f = 18 GHz		25.7 dB	
Output IP3	f = 10 GHz		27 dBm	
Output P1dB	f = 10 GHz		17 dBm	
Noise Figure	f = 10 GHz		4.1 dB	

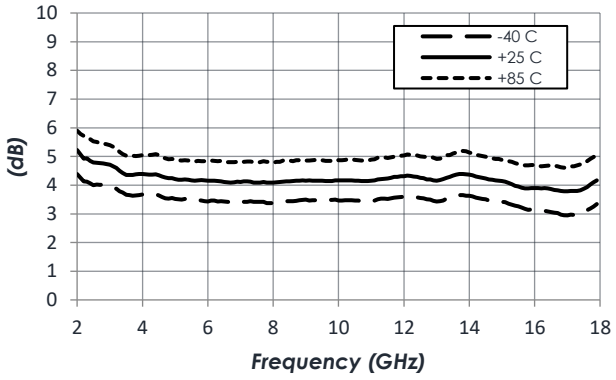
TYPICAL PERFORMANCE

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

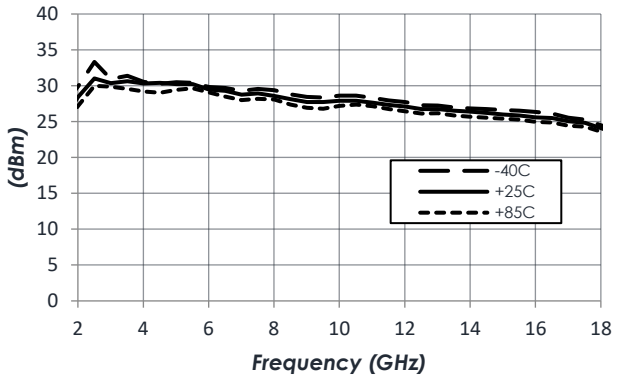
Gain vs Temperature



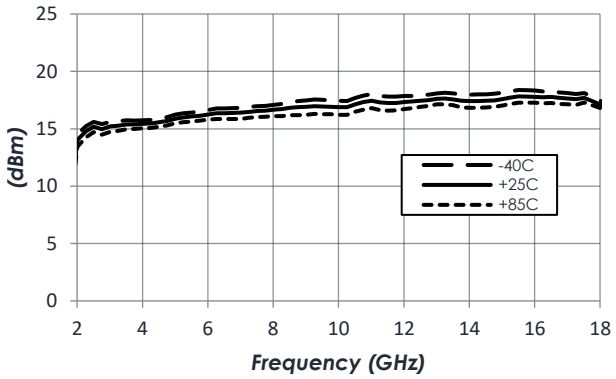
Noise Figure vs Temperature



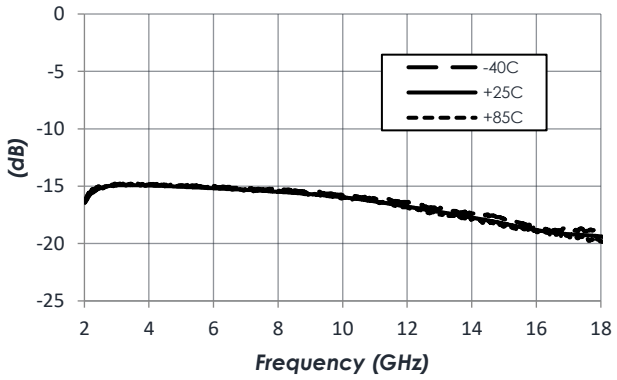
Output IP3 vs Temperature



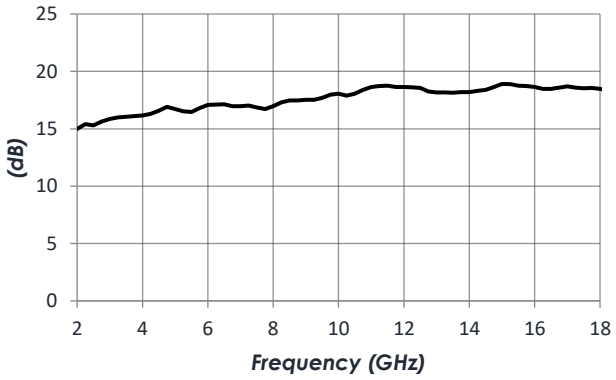
P1dB vs Temperature



Reverse Isolation vs Temperature



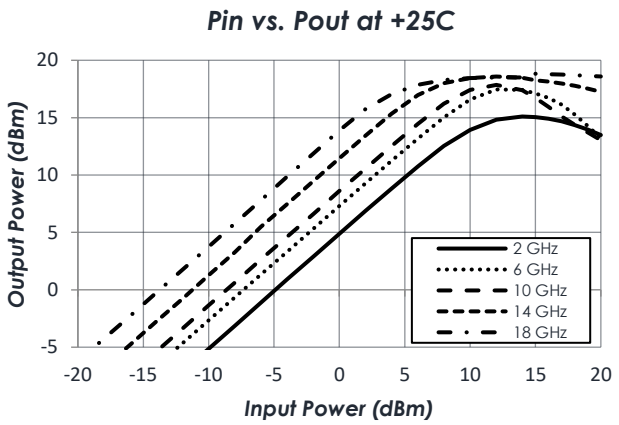
Power Saturation



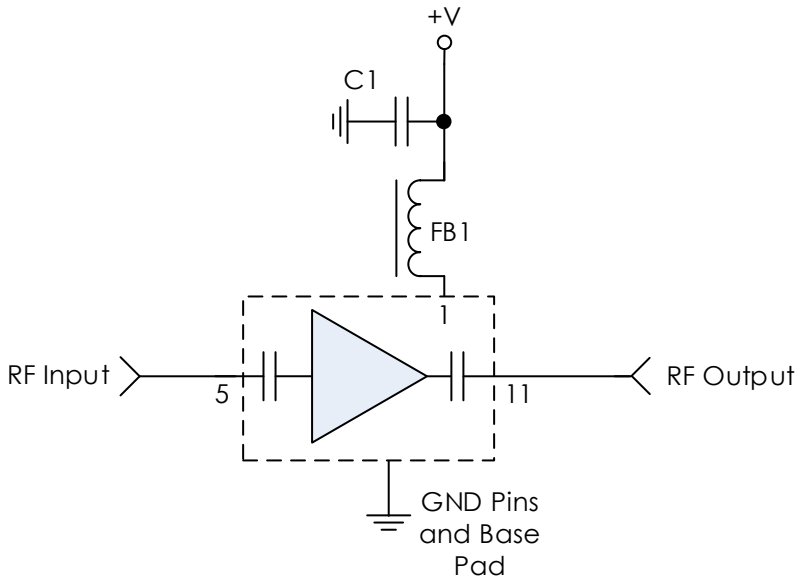
OIP3 Test Conditions: Two -15dBm tones at input with 10 MHz spacing.

TYPICAL PERFORMANCE (CONTINUED)

(VDD = +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. FB1 and C1 are required for proper operation of the AM1110.
    a. AM1110 **must** see a large-valued inductor or ferrite bead at pin 1 before a shunt capacitor is to be placed for power line filtering.
    b. If a capacitor is placed at pin 1 before FB1, AM1110 will not operate as shown in Typical Performance section.

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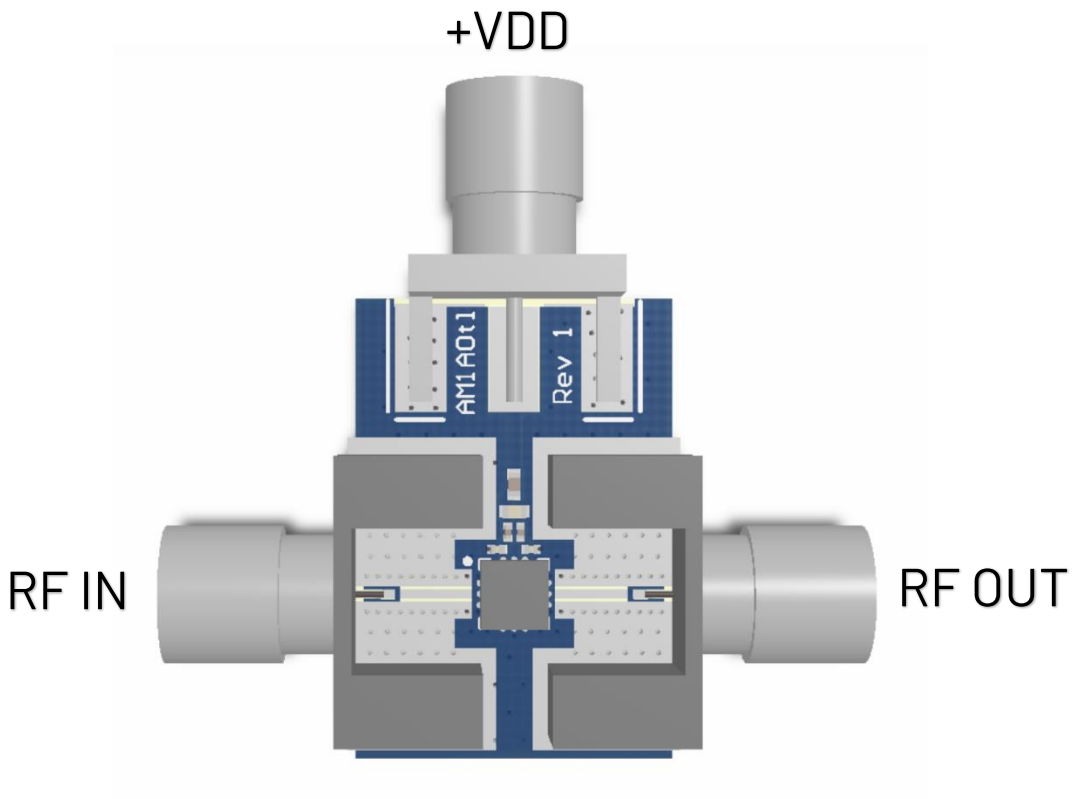
EVALUATION PC BOARD



Note: Not all components shown may be installed.

RELATED PARTS

Part Number		Description
AM1053	5 GHz to 20 GHz	Gain Block
AM1070	DC to 18 GHz	Broadband Gain Block
AM1071	DC to 18 GHz	Broadband Gain Block
AM1100	2 GHz to 16.5 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: 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)

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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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