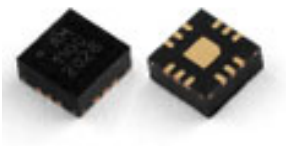
AM1101 – Bypassable Amplifier

2 GHz to 26.5 GHz Bypassable Gain Block

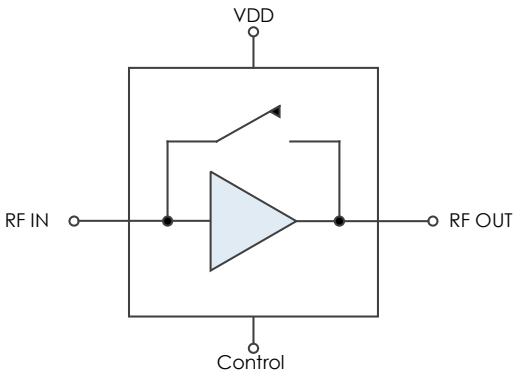


AM1101 is a wideband bypassable amplifier covering the 2 to 26.5 GHz frequency range. The device exhibits low noise figure and moderate gain across the entire frequency range while only drawing 100 mW of power. Packaged in a 3mm QFN with an integrated bypass path and internal 50 Ω matching, the AM1101 represents a dramatic size reduction when compared to discrete implementations of bypassable amplifiers.

FEATURES

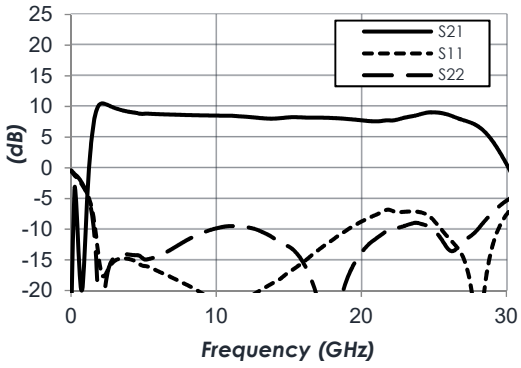
- 8 dB gain
- 3.5 dB Noise Figure
- +22 dBm OIP3
- +10 dBm P1dB
- 5 dB Insertion Loss Bypass Path
- +3.3V Supply
- 102 mW Power Consumption
- -40C to +85C Operation

FUNCTIONAL DIAGRAM

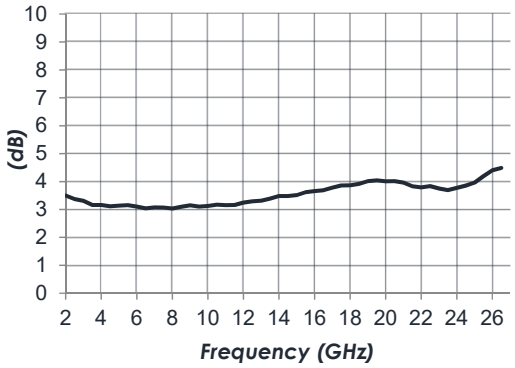


CHARACTERISTIC PERFORMANCE

Gain and Return Loss at +25C



Noise Figure at +25C



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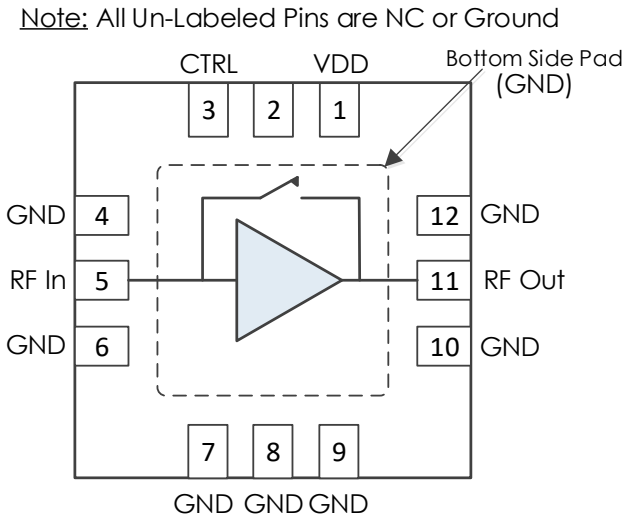
REVISION HISTORY

Date	Revision	Notes
June 12, 2020	1	Initial Release
March 9, 2021	2	Added Logic Voltage Levels and Picture
November 19, 2021	3	Added Bypass IIP3 and P1dB
June 20, 2024	4	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	VDD	DC Power Input
2	NC	No connect
3	CTRL	Bypass/Amplifier Mode Control
4	GND	Ground – Common
5	RF In	RF Input – 50 Ohms – DC Coupled. External DC blocking capacitor required
6-10	GND	Ground – Common
11	RF Out	RF Output – 50 Ohms – DC Coupled. External DC blocking capacitor required
12	GND	Ground – Common

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+3.5 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.

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage		+3.3 V	
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

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.

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage			+3.3 V	
DC Supply Current	Amplifier Enabled		31 mA	
	Amplifier Bypassed		1 mA	
Power Dissipated	Amplifier Enabled		102 mW	
	Amplifier Bypassed		3 mW	
Logic Level Low		-0.1 V		+0.4 V
Logic Level High		+2.2 V		+VDD
Control Current	CTL = +3.3V		125 µA	

Timing Characteristics

Switching Time	Minimum	Typical	Maximum
Switching Speed (Amp Bypass → Amp On)		70 ns	
Switching Speed (Amp On → Amp Bypass)		10 ns	

State Table

CTL	Amplifier
High	Enabled
Low	Bypassed

RF Performance

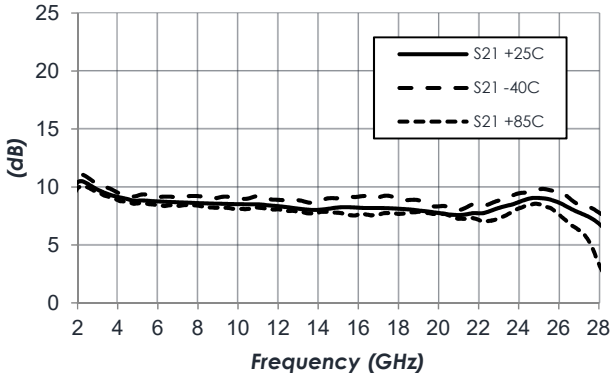
(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		2 GHz		26.5 GHz
Gain	f = 2 GHz		10 dB	
	f = 13 GHz		8 dB	
	f = 26.5 GHz		8 dB	
Return Loss	f = 13 GHz		-10 dB	
Output IP3	f = 2 GHz		+20 dBm	
	f = 13 GHz		+24 dBm	
	f = 26.5 GHz		+18 dBm	
Output P1dB	f = 2 GHz		+9 dBm	
	f = 13 GHz		+11 dBm	
	f = 26.5 GHz		+8 dBm	
Noise Figure	f = 13 GHz		3.5 dB	

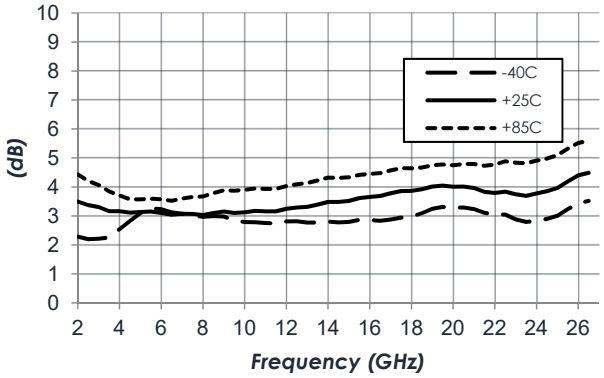
TYPICAL PERFORMANCE

(VDD = +3.3 V, Amplifier Enabled)

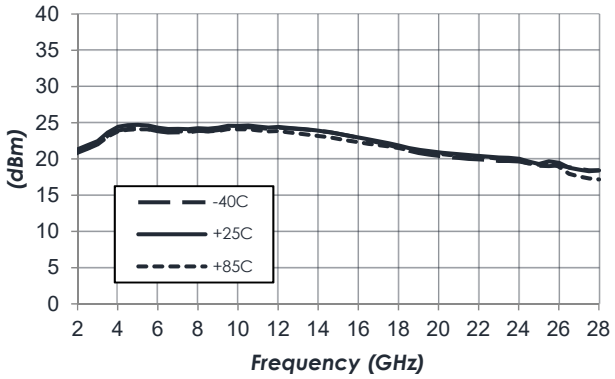
Gain vs Temperature



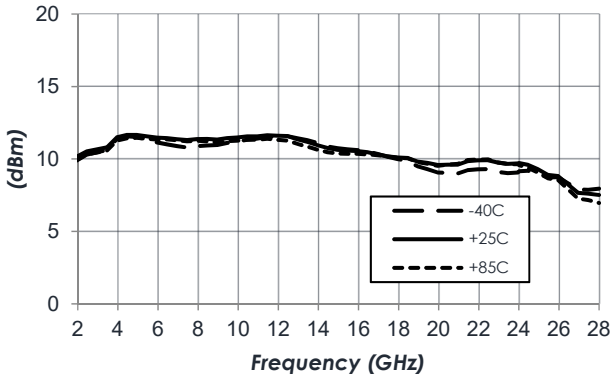
Noise Figure vs Temperature



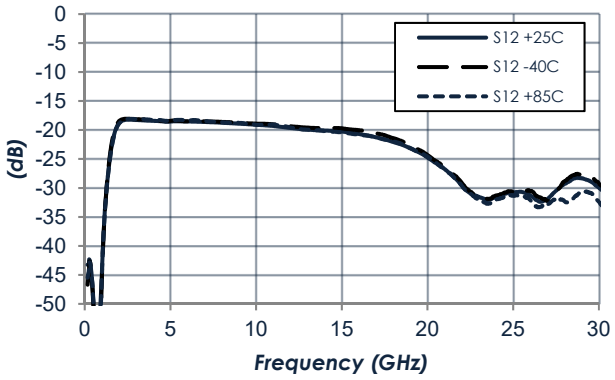
Output IP3 vs Temperature



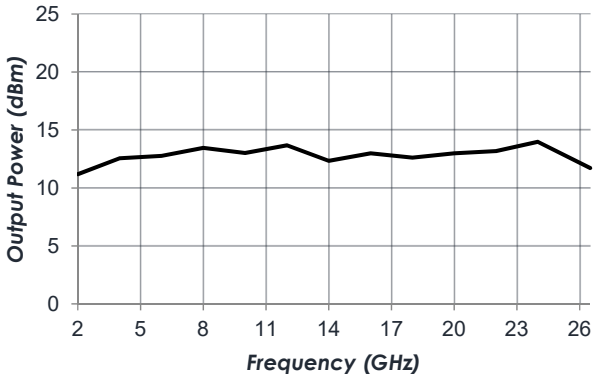
P1dB vs Temperature



Reverse Isolation vs Temperature



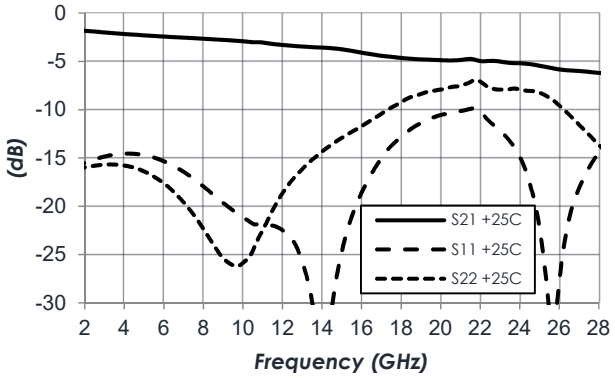
P_Sat at +25C



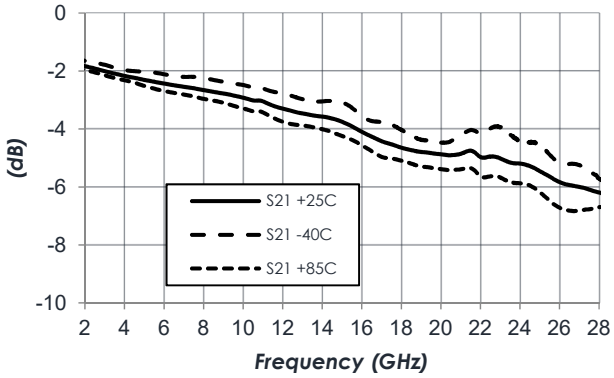
TYPICAL PERFORMANCE (CONTINUED)

(VDD= +3.3 V, Amplifier Bypassed)

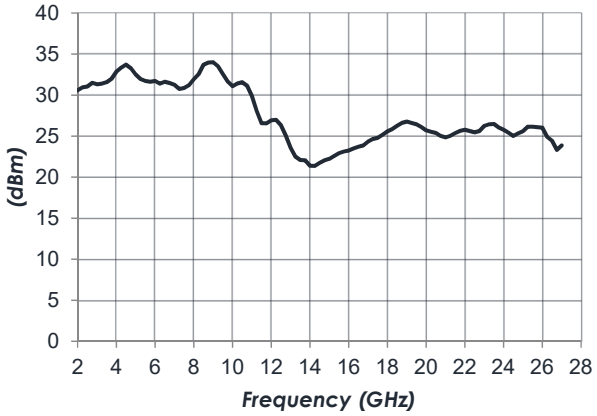
Insertion and Return Loss at +25C



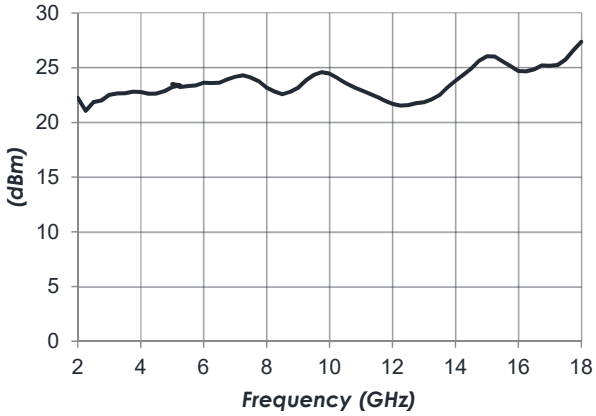
Insertion Loss vs. Tempereature



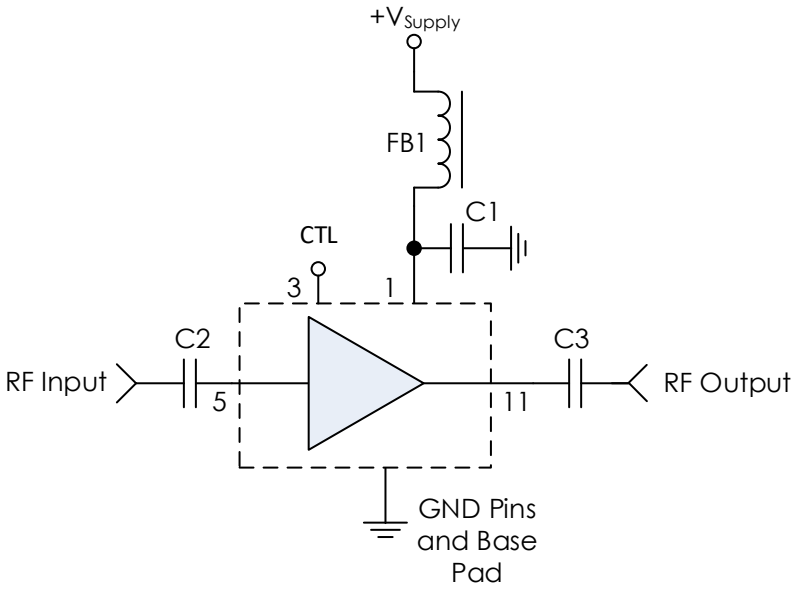
Input IP3



Input P1dB



TYPICAL APPLICATION



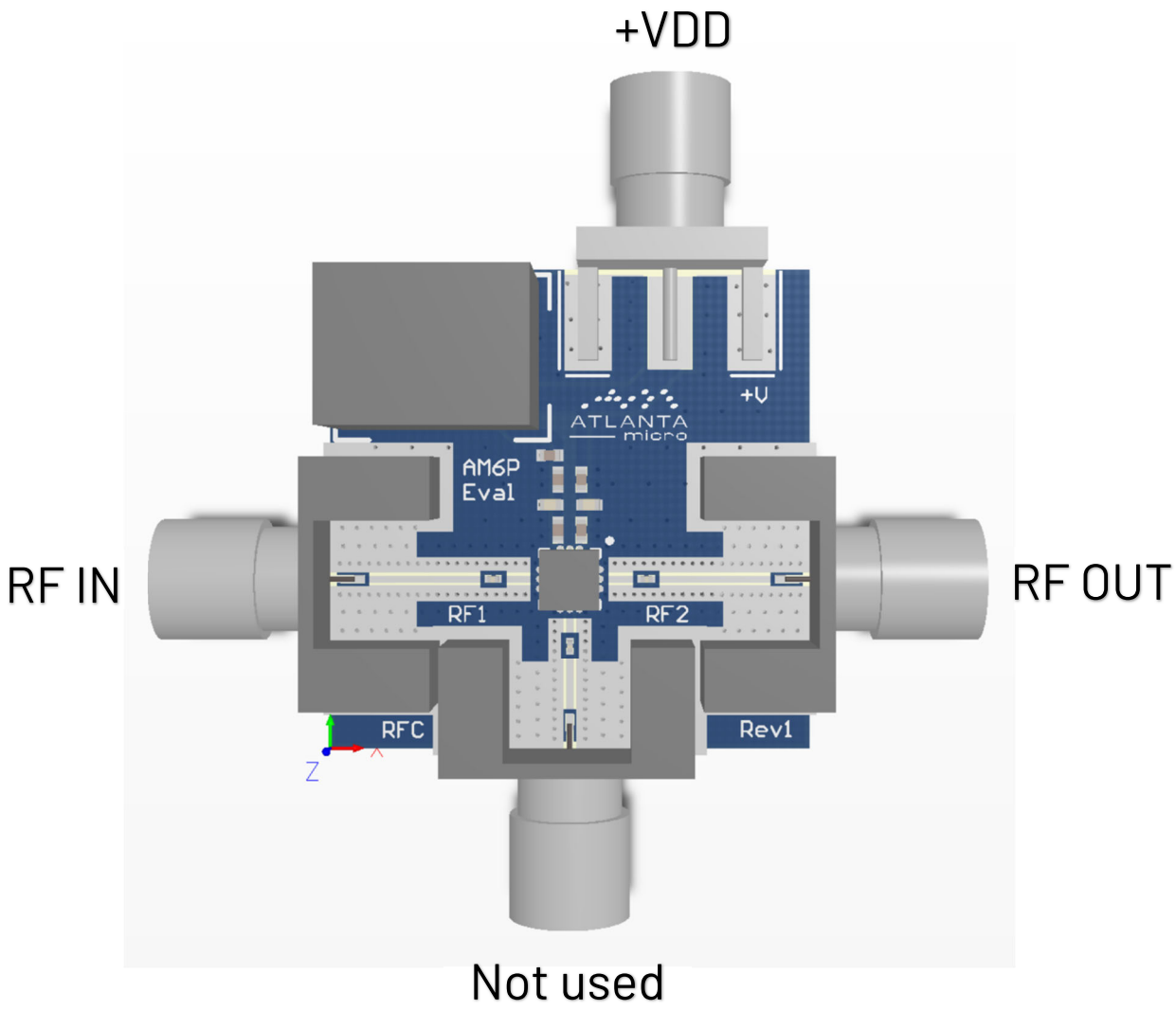
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1	0.1 µF	C1005X7R1H104K05BB	TDK
C2, C3	0.1 µF	0201BB104KW160	Passives Plus
FB1	-	MMZ1005A222E	TDK

Notes:

1. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
2. Control line filtered internally providing high frequency isolation.

EVALUATION PC BOARD



Note: Some items shown in the image above may not be installed on the evaluation board

RELATED PARTS

Part Number		Description
AM1067	5 GHz to 20 GHz	Bypassable Amplifier
AM1075	5 GHz to 26.5 GHz	Bypassable Amplifier
AM1100	2 GHz to 26.5 GHz	Low Noise Amplifier
AM1102	DC to 21 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)

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).

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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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