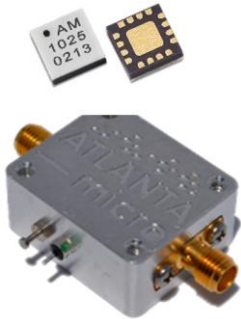


# AM1025B – Amplifier

## 20 MHz to 3.0 GHz Gain Block

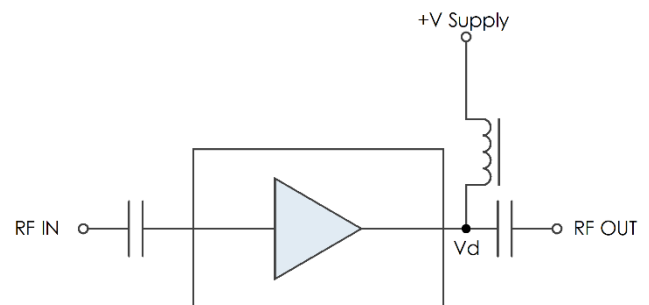


**AM1025B is a high dynamic range cascadable gain block covering the 20 MHz to 3.0 GHz frequency range.** The device exhibits high P1dB, high second and third order intercept performance, and low noise figure while also providing excellent gain stability over the operating temperature range. With internal 50Ω matching and packaged in a 3mm QFN or a shielded module, the AM1025B represents a compact total PCB footprint.

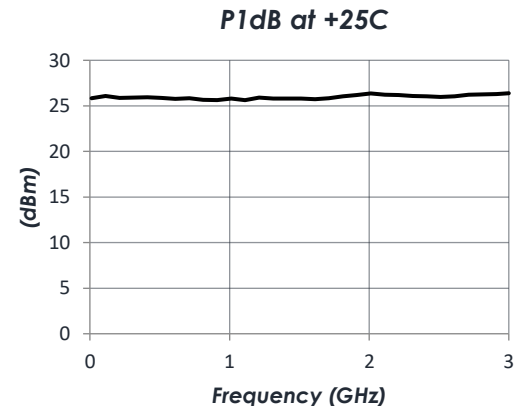
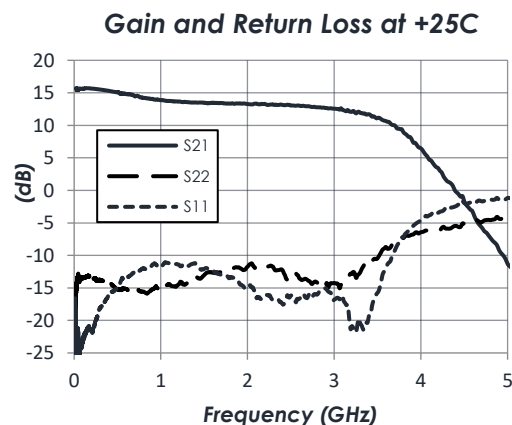
### FEATURES

- 13.5 dB Gain
- +70 dBm OIP2
- +40 dBm OIP3
- +26 dBm P1dB
- +27 dBm PSat
- 3.8 dB Noise Figure
- +5.0V to +8.0V Supply Range
- 3mm QFN Package
- -40C to +85C Operation
- Unconditionally Stable

### FUNCTIONAL DIAGRAM



### CHARACTERISTIC PERFORMANCE



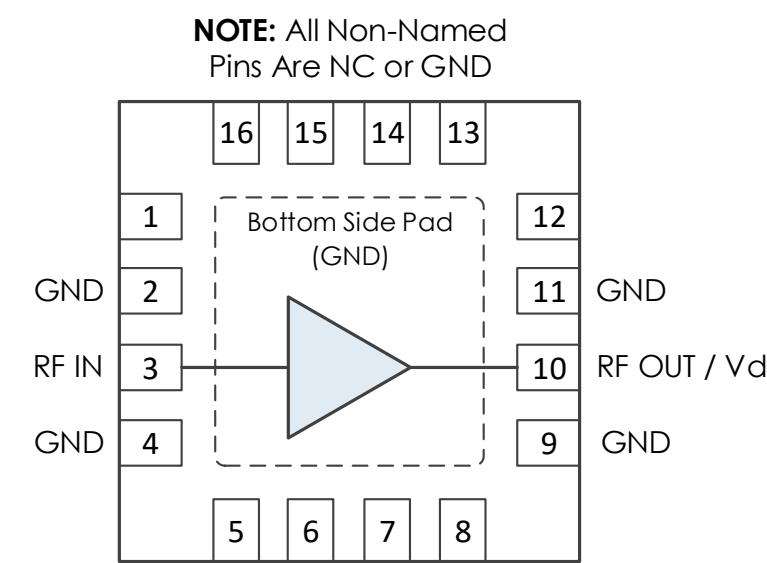
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## REVISION HISTORY

Date	Revision	Notes
November 28, 2018	0	Preliminary Release.
November 30, 2018	0A	Recommended Ferrite Bead Changed, Extra Notes Added in Typical Application.
December 7, 2018	0B	Noise Figure vs VDD Added.
December 10, 2018	1	Initial Release.
January 21, 2019	2	Performance Plots Updated. Recommended Operating Conditions Modified.
May 13, 2019	3	Various Plots Updated.
June 6, 2019	3A	Component Compliance Information Updated.
November 25, 2019	4	RF-Shielded Module Information Added, Part Ordering Details Added.
May 15, 2020	5	Package and module information moved to main product page.
October 17, 2024	6	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	NC	Not Connected *
2	GND	Ground - Common
3	RF IN	RF Input - 50 ohms - DC Coupled, External DC Block Required
4	GND	Ground - Common
5-8	NC	Not Connected *
9	GND	Ground - Common
10	RF OUT/Vd	RF Output and DC Power Input - 50 Ohms - DC Coupled, External DC Block Required
11	GND	Ground - Common
12-16	NC	Not Connected *
Bottom Pad	GND	Ground - Common

\* NC pins may be grounded or left open.

## SPECIFICATIONS

## Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+10.0 V
RF Input Power		+20 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-50C	+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	

## Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage	+5.0 V	+8.0 V	+8.0 V
Device Voltage	+4.7 V	+7.5 V	+8.0 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+145 C

## Thermal Information

Thermal Resistance (°C / W)	
Junction to Case Thermal Resistance ( $\theta_{JC}$ )	51.6



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		+5.0 V	+8.0 V	+8.0 V
DC Device Voltage (Vd)		+4.7 V	+7.5 V	+8.0 V
DC Device Current	V Supply = +5.0 V		70 mA	
	V Supply = +8.0 V		156 mA	
Power Dissipated by IC	V Supply = +5.0 V		350 mW	
	V Supply = +8.0 V		1.17 W	

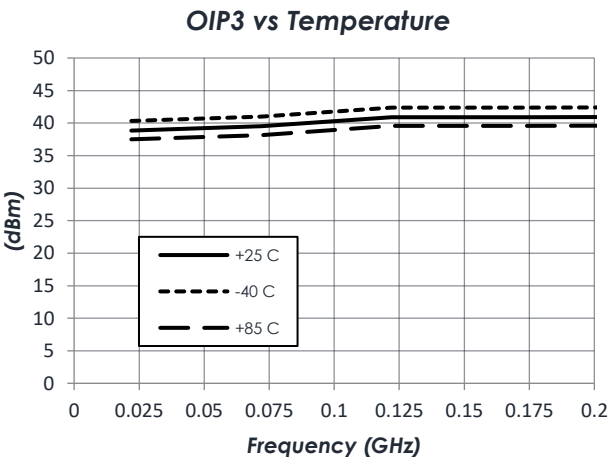
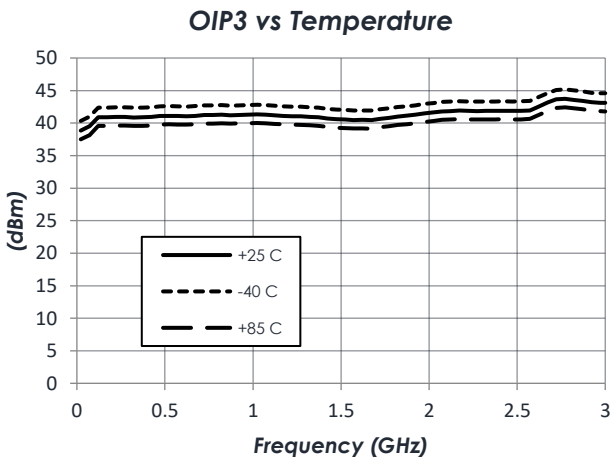
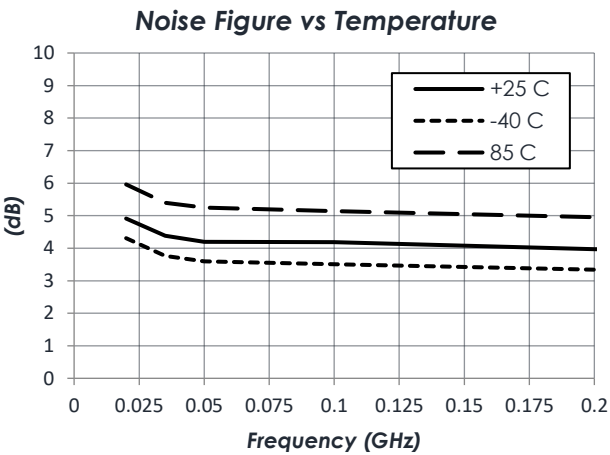
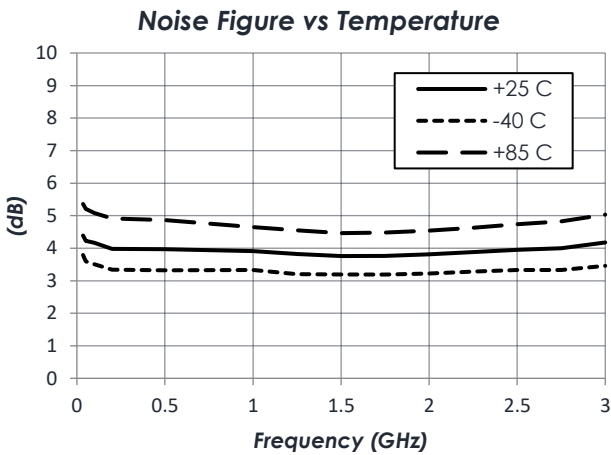
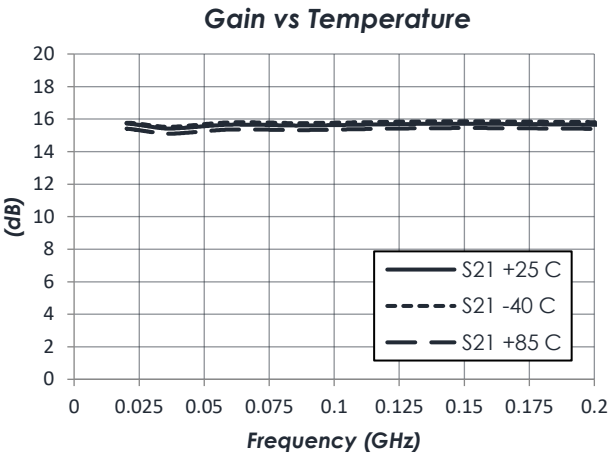
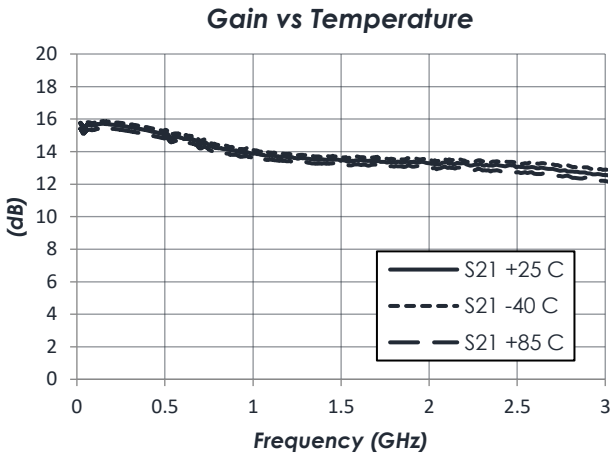
RF Performance

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		20 MHz		3.0 GHz
Gain	V Supply = +8.0 V		13.5 dB	
Return Loss	V Supply = +8.0 V		14 dB	
Reverse Isolation	V Supply = +8.0 V		22 dB	
Output IP3	V Supply = +8.0 V		+40 dBm	
Output IP2	V Supply = +8.0 V		+70 dBm	
Output P1dB	V Supply = +8.0 V		+26 dBm	
Output Power Saturation	V Supply = +8.0 V		+27 dBm	
Noise Figure	V Supply = +8.0 V		3.8 dB	

TYPICAL PERFORMANCE

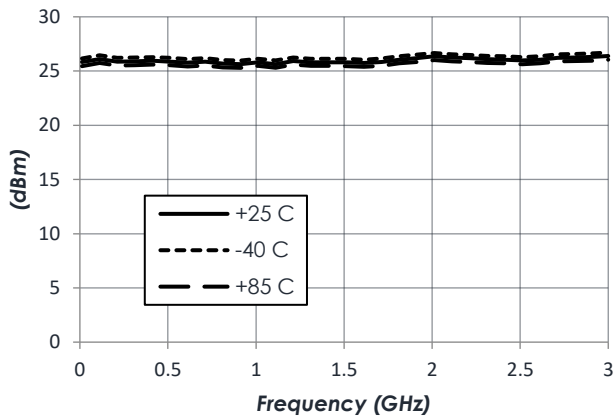
(V Supply = +8.0V, Device Voltage [Vd] = +7.5V, Id = 156 mA)



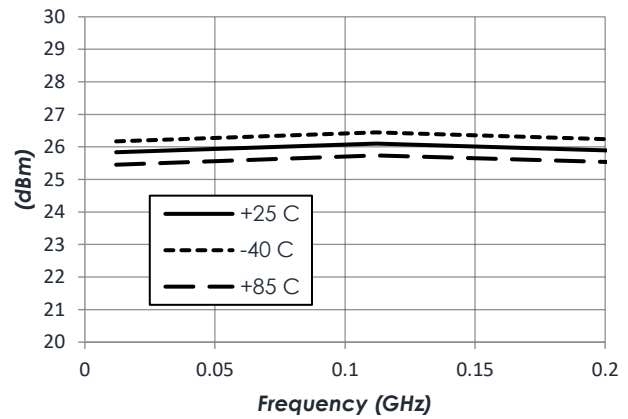
TYPICAL PERFORMANCE (CONTINUED)

(V Supply = +8.0V, Device Voltage [Vd] = +7.5V, Id = 156 mA)

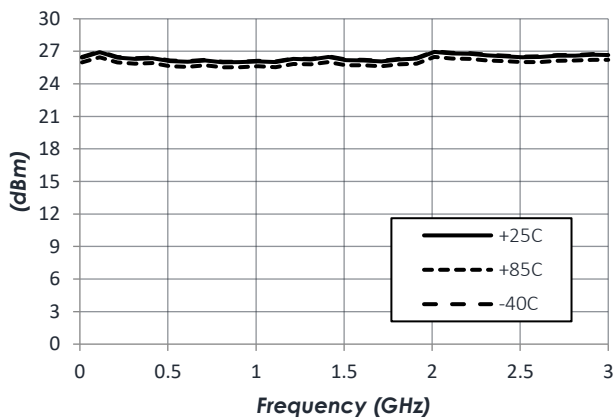
**P1dB vs Temperature**



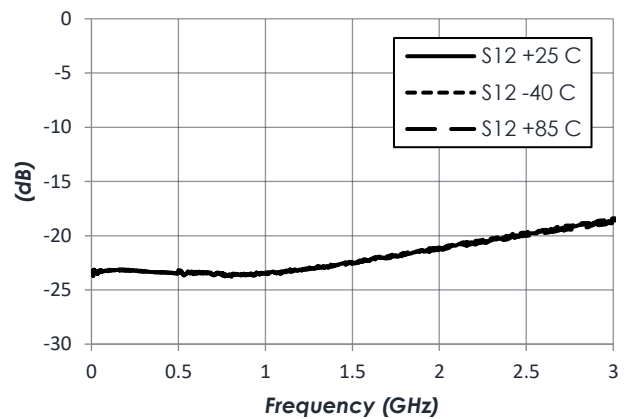
**P1dB vs Temperature**



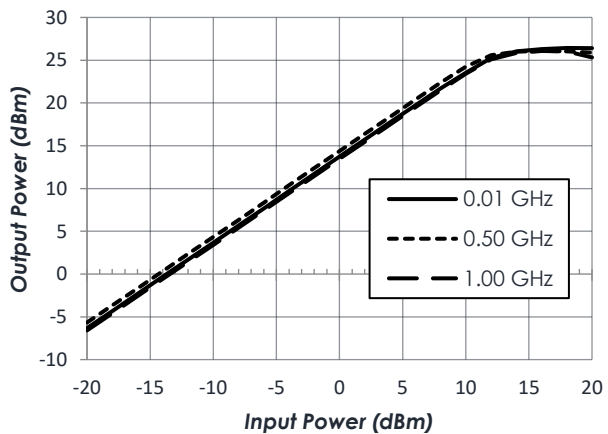
**Power Saturation vs Temperature**



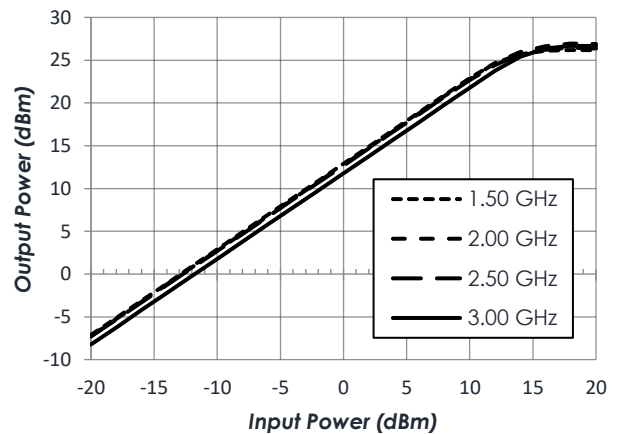
**Reverse Isolation vs Temperature**



**Pin vs. Pout at +25C**

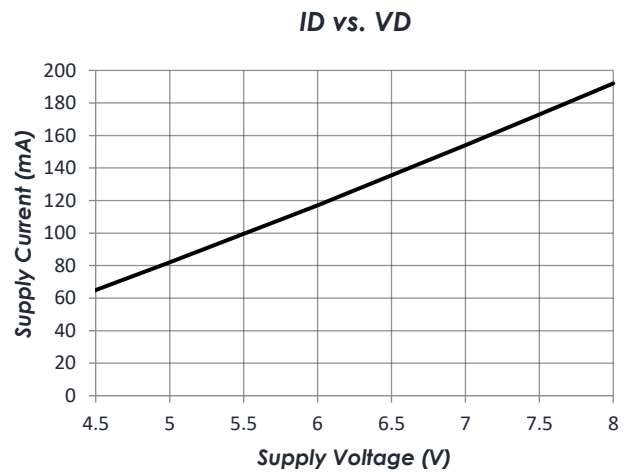
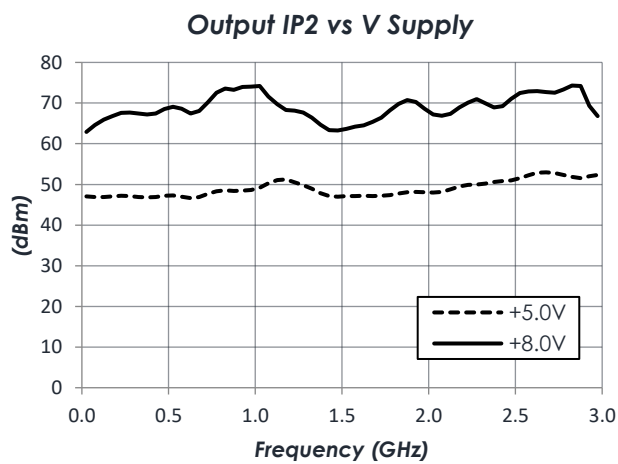
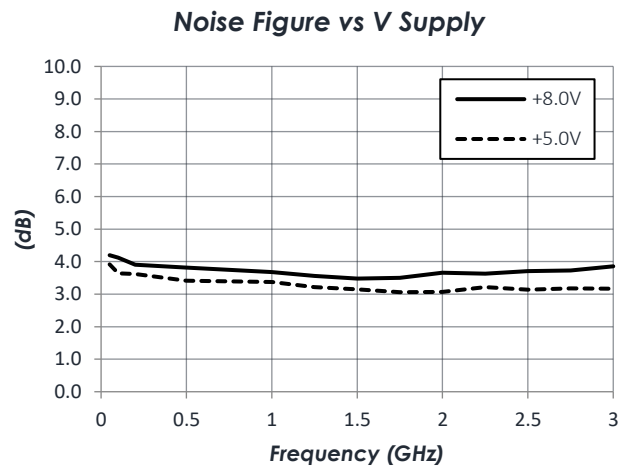
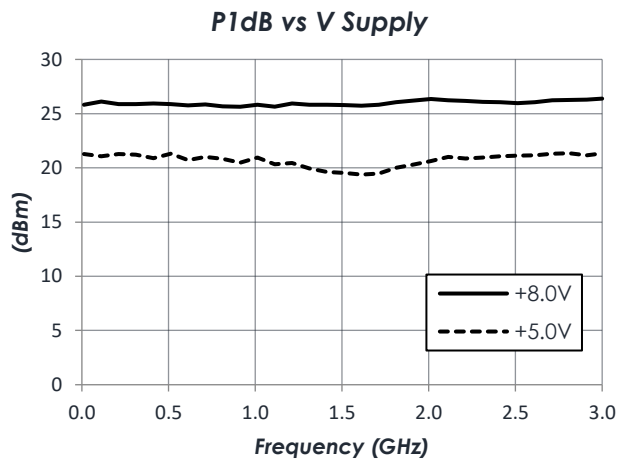
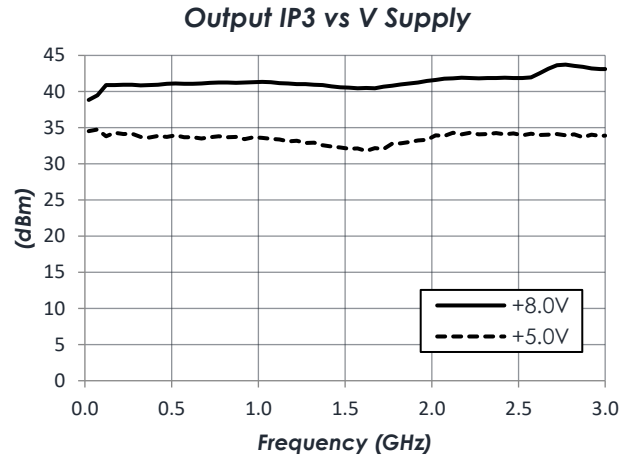
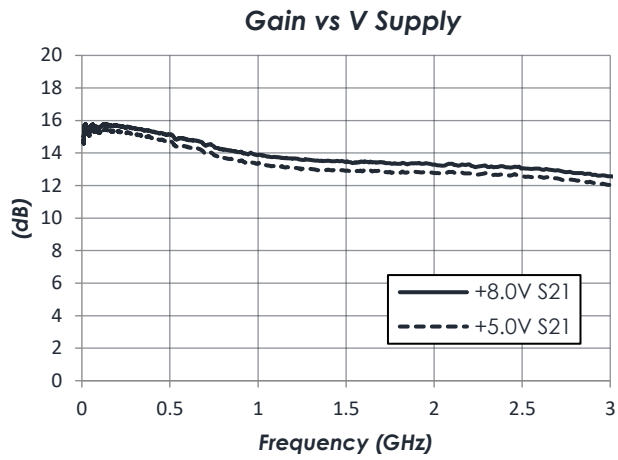


**Pin vs. Pout at +25C**



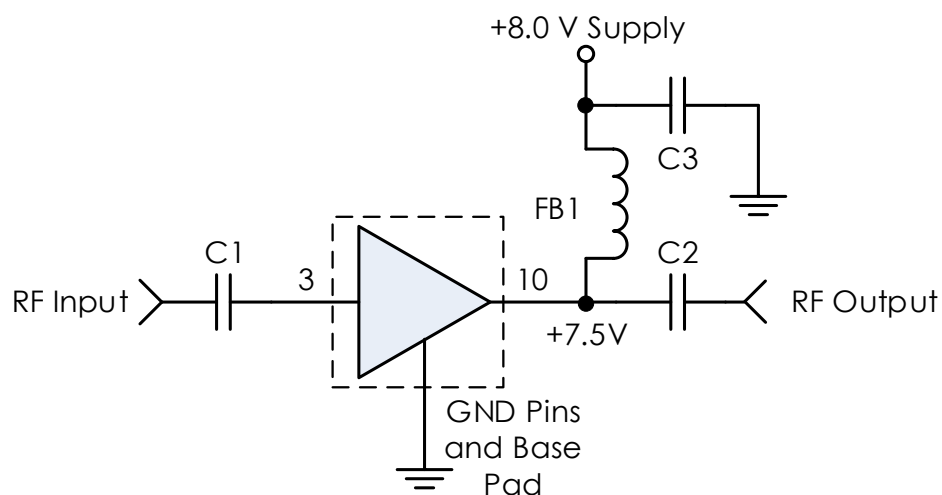
TYPICAL PERFORMANCE (CONTINUED)

(T = 25°C Unless Otherwise Specified)





## TYPICAL APPLICATION



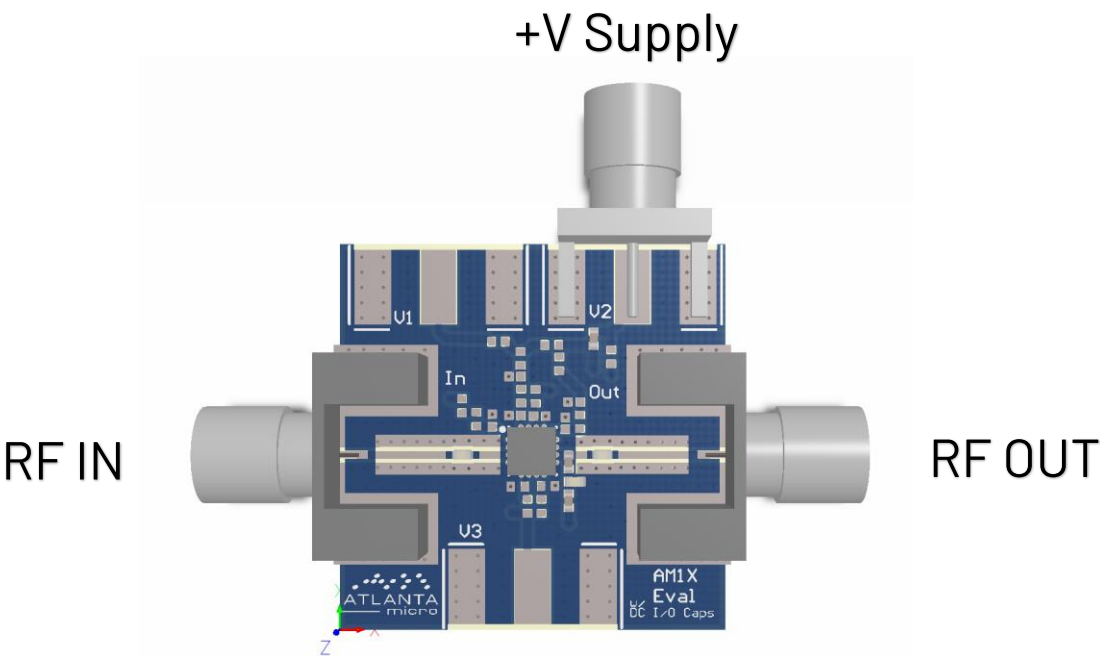
## Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 $\mu$ F	0402BB104KW160	Passives Plus
C3	0.1 $\mu$ F	GRM155R71C104KA88	Murata
FB1	-	BLM15HG102SN1D	Murata

## Notes:

1. NC pins may be grounded or left open.
2. External DC blocking capacitors and RF choke are required.
  - a. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.
  - b. Select values for the frequency range of interest.
3. No input or output matching is required.

EVALUATION PC BOARD



PART ORDERING DETAILS

Part Number		Description
AM1025B	3mm 16 Lead QFN	
AM1025B Eval	AM1025B Evaluation Board	
AM1025B-M	AM1025B in 0.95" x 1.13" x 0.6" RF-Shielded Module with Integrated Bias Tee and Field Replaceable SMA Connectors	

RELATED PARTS

Part Number		Description
AM1016B	20 MHz to 6 GHz	+3.3V Gain Block
AM1018B	20 MHz to 6 GHz	+5.0V Gain Block
AM1018C	20 MHz to 6 GHz	+5.0V Gain Block
AM1031C	20 MHz to 8 GHz	+3.3V Gain Block
AM1063-1	DC to 10 GHz	Gain Block
AM1063-2	DC to 10 GHz	Miniature Gain Block
AM1064-1	DC to 8 GHz	Gain Block
AM1064-2	DC to 8 GHz	Miniature Gain Block

## COMPONENT COMPLIANCE INFORMATION

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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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