

AM1081-2 – Amplifier

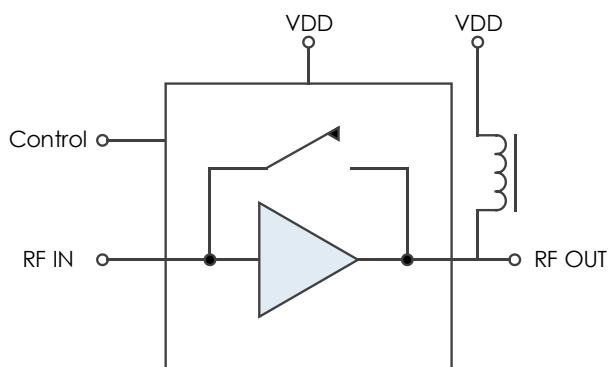
DC to 8 GHz Bypassable

The **AM1081-2** is a **high dynamic range bypassable DC-coupled amplifier covering up to 8 GHz**. The device exhibits low bypass insertion loss and a moderate positive gain-slope, providing frequency equalization useful in many broadband applications. Packaged in a 3mm QFN or a shielded module with internal 50 Ω matching and requiring a single positive control voltage, the AM1081-2 represents a dramatic size reduction over a discrete implementation of a bypassable amplifier.

FEATURES

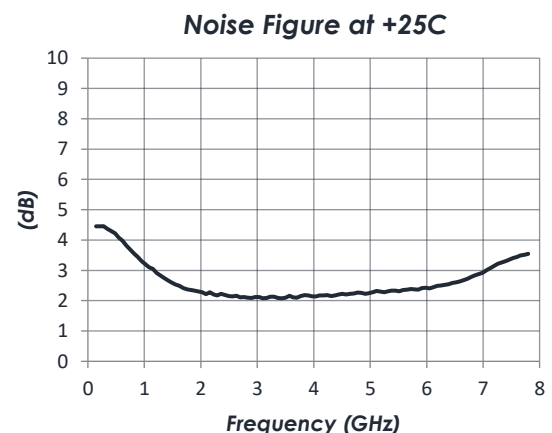
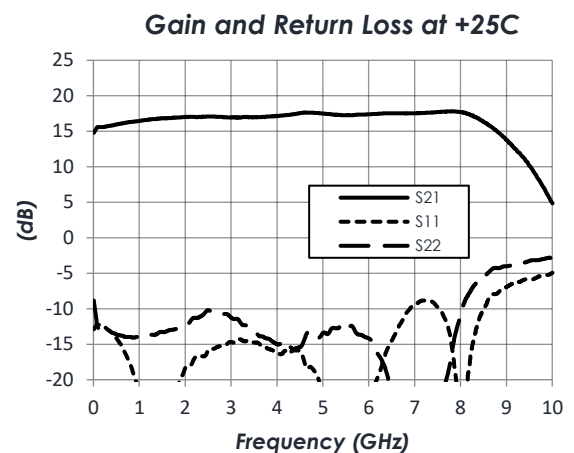
- 17 dB Gain
- 2.5 dB Noise Figure
- +35 dBm OIP3
- +20 dBm P1dB
- +20 dBm PSat
- 1.25 dB Bypass Insertion Loss
- +5.0V, 83/1 mA (Gain/Bypass)
- +3.0V to +5.0V Supply Range
- +3.3V or +5V Logic Compatible
- 3mm QFN Package

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE

Data shown for Configuration A. See *Typical Application* section for more information.)



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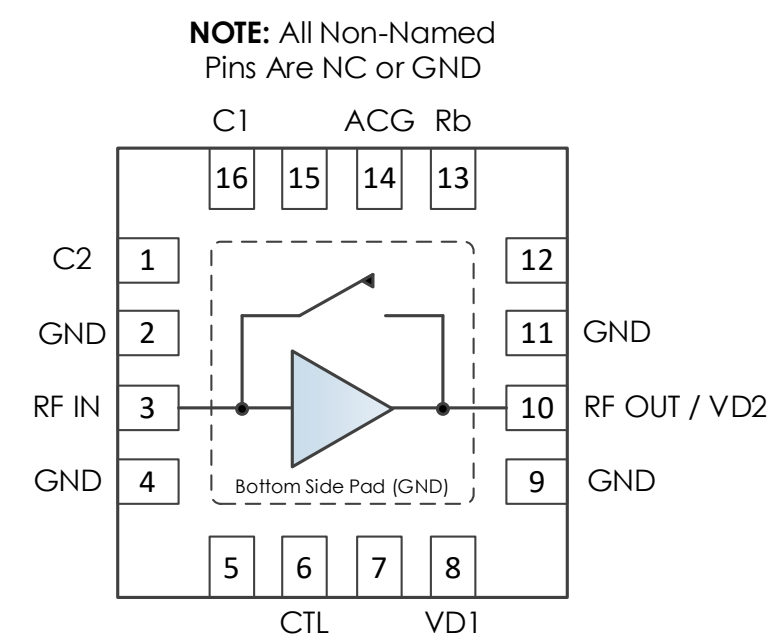
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REVISION HISTORY

Date	Revision	Notes
June 28, 2021	1	Initial Release
July 15, 2022	2	Typical Application Drawing Corrected.
November 7, 2024	3	Changed to Mercury branding. R1 in Typical Application corrected.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	C2	External Capacitor Connection 2
2	GND	Ground - Common
3	RF IN	RF Input - 50 ohms - DC Coupled, External DC Block Required
4	GND	Ground - Common
5	NC	Not Connected *
6	CTL	Bypass/Amplifier Mode Control
7	NC	Not Connected *
8	VD1	DC Power Input
9	GND	Ground - Common
10	RF OUT/VD2	RF Output and DC Power Input - 50 Ohms - DC Coupled, External DC Block Required
11	GND	Ground - Common
12	NC	Not Connected *
13	Rb	Config A: Do Not Connect (Floating) Config B: Ground
14	ACG	AC Ground
15	NC	Not Connected *
16	C1	External Capacitor Connection 1
Bottom Pad	GND	Ground - Common

*NC pins may be grounded or left open

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	0.0 V	+6.0 V
RF Input Power		+20 dBm
Operating Junction Temperature	-40 C	+150 C
Storage Temperature Range	-50 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	+4.7 V	+5.2 V
Operating Case Temperature	-40 C		+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

Thermal Resistance (°C / W)	
Junction to Case Thermal Resistance (θ_{JC})	49.5

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Config	Testing Conditions	Min	Typ	Max
DC Supply Voltage	A		+3.0 V	+5.0 V	+5.2 V
	B		+4.7 V	+5.0 V	+5.2 V
DC Supply Current	A	VDD = +5.0 V		81 mA	
	B	VDD = +5.0 V		53 mA	
	A	VDD = +3.3 V		43 mA	
Power Dissipated	A	VDD = +5.0 V		0.41 W	
	B	VDD = +5.0 V		0.27 W	
	A	VDD = +3.3 V		0.14 W	
Logic Level Low	A, B		-0.1 V		+0.4 V
Logic Level High	A, B		+2.2 V		+VDD
Control Current	A, B	CTL = +3.3V		115 μ A	
	A, B	CTL = +5.0V		200 μ A	

RF Performance

(T = 25 °C unless otherwise specified)

Param	Config	Testing Conditions	Min	Typical	Max
Frequency Range			DC		8 GHz
Gain	A	VDD = +5.0 V		17 dB	
	B	VDD = +5.0 V		17 dB	
	A	VDD = +3.3 V		16.5 dB	
Return Loss	A	VDD = +5.0 V		17 dB	
	B	VDD = +5.0 V		16.5 dB	
Bypass Insertion Loss	A, B	VDD = +5.0 V		2 dB	
Output IP3	A	VDD = +5.0 V		+35 dBm	
	B	VDD = +5.0 V		+32 dBm	
Output P1dB	A	VDD = +5.0 V		+19 dBm	
	B	VDD = +5.0 V		+17 dBm	
Noise Figure	A	VDD = +5.0 V		2.6 dB	
	B	VDD = +5.0 V		2.6 dB	

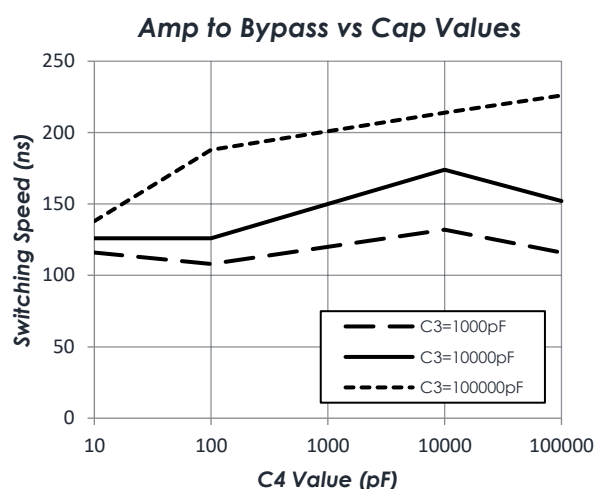
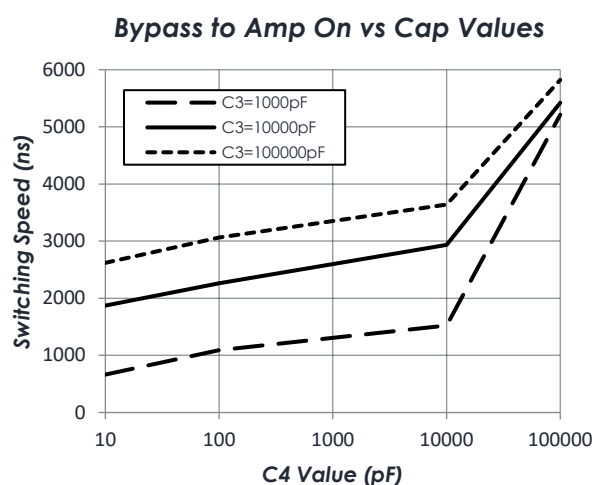
State Table

CTL	Amplifier
High	Enabled
Low	Bypassed

Timing Characteristics

(T = 25 °C, VDD = +3.3V, CTL = 0.0V / +3.3V)

Switching Time	Minimum	Typical ²	Maximum
Amp On → Amp Bypass	125 ns	175 ns	300 ns
Amp Bypass → Amp On	700 ns	3.8 μ s	7.0 μ s

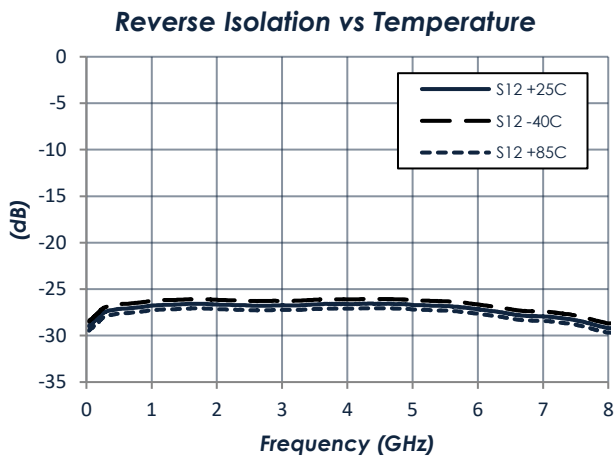
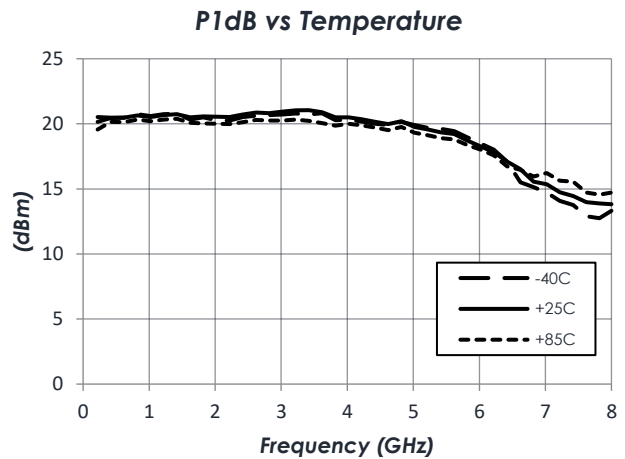
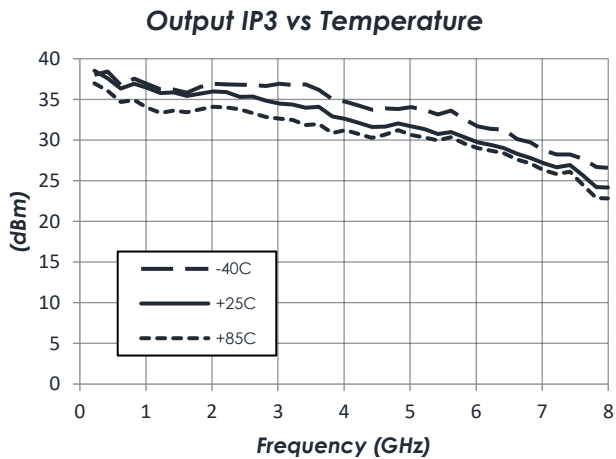
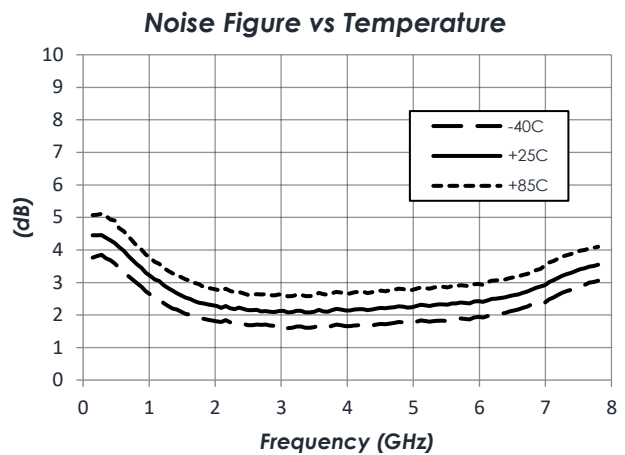
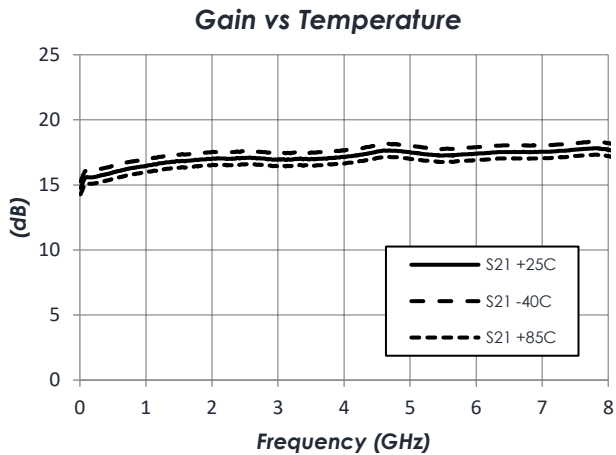


*Notes:

1. Switching speeds measured as 50% trigger to 10%/90% RF respectively.
2. Typical measurements reflect switching speeds of amp as configured in Typical Application section.
3. To change times, alter value of C3 and C4 (see Typical Application section).

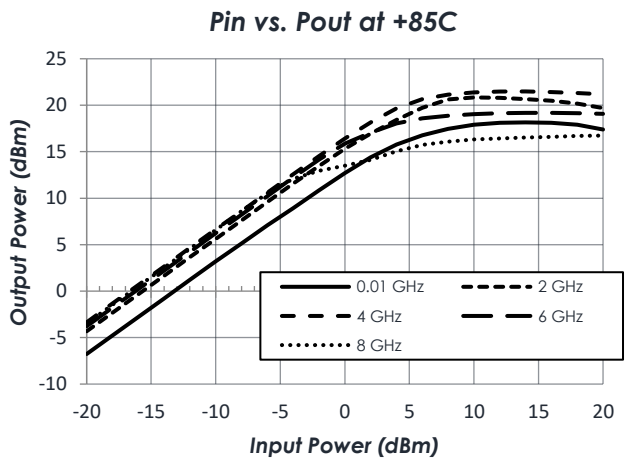
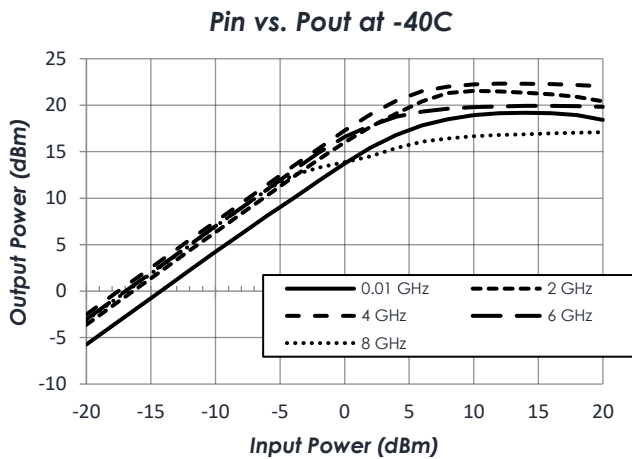
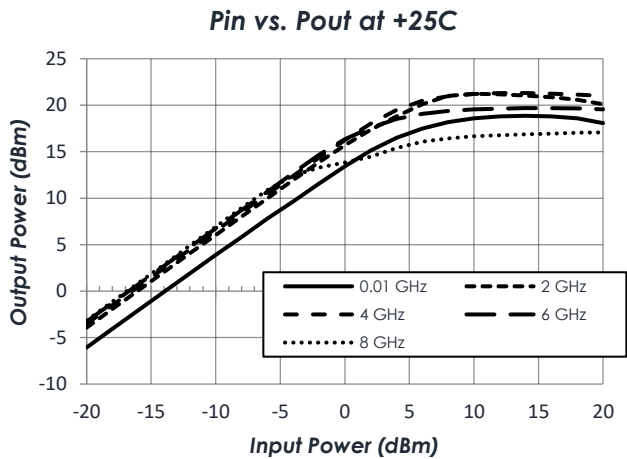
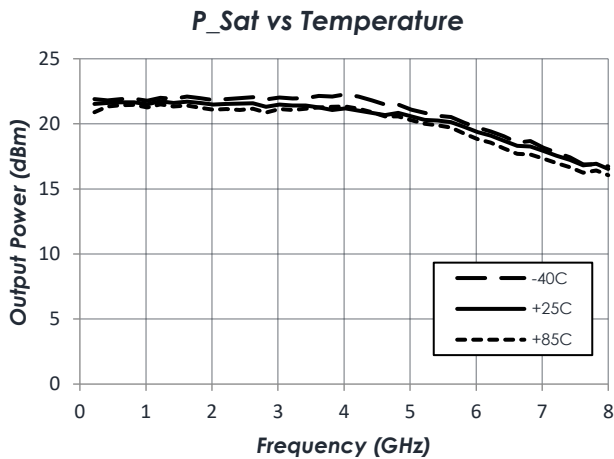
TYPICAL PERFORMANCE - CONFIGURATION A

(Amplifier Enabled, VDD = +5.0 V, ID = 81mA)

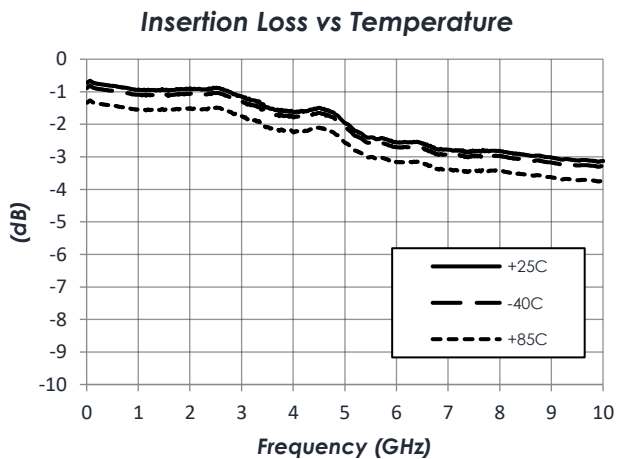
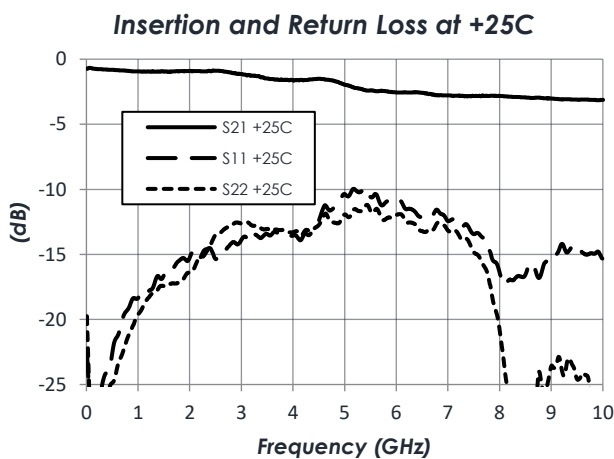


TYPICAL PERFORMANCE - CONFIGURATION A (CONTINUED)

(Amplifier Enabled, VDD = +5.0 V, ID = 81mA)



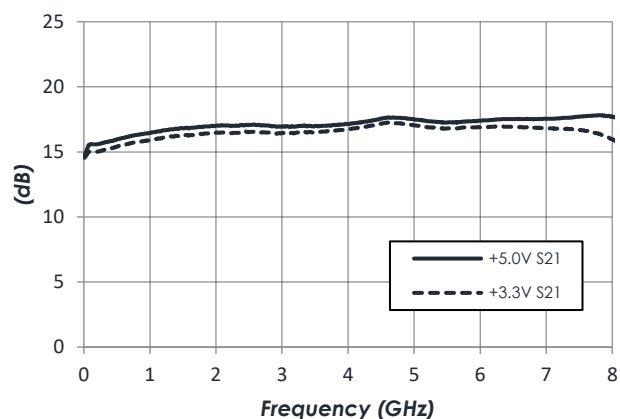
(Amplifier Bypass, VDD = +5.0 V, ID = 1mA, Performance same as Configuration B)



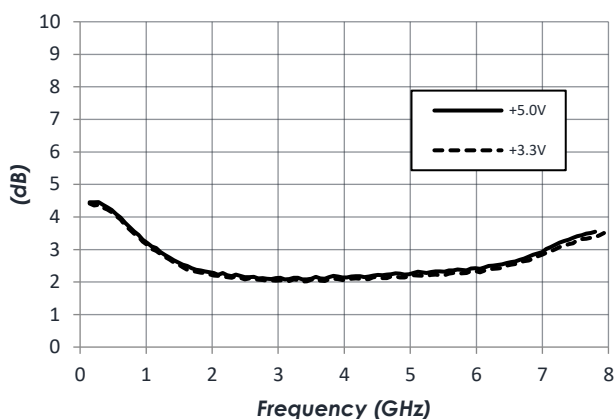
TYPICAL PERFORMANCE - CONFIGURATION A (CONTINUED)

(T = 25 °C, Amplifier Enabled unless otherwise specified)

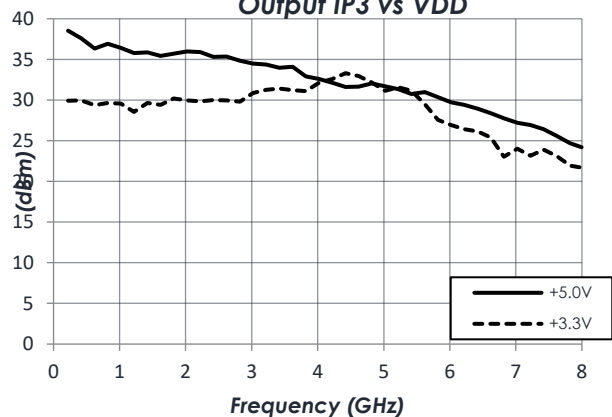
Gain vs VDD



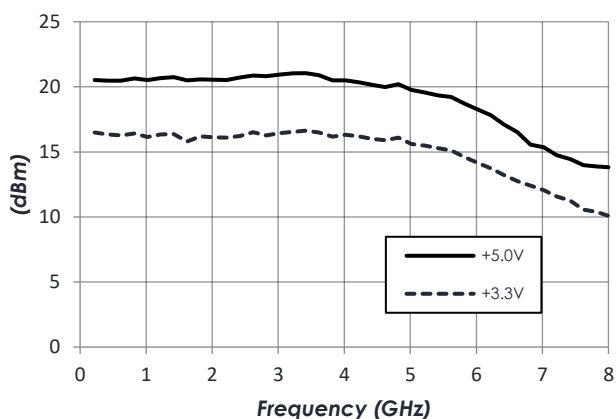
Noise Figure vs VDD



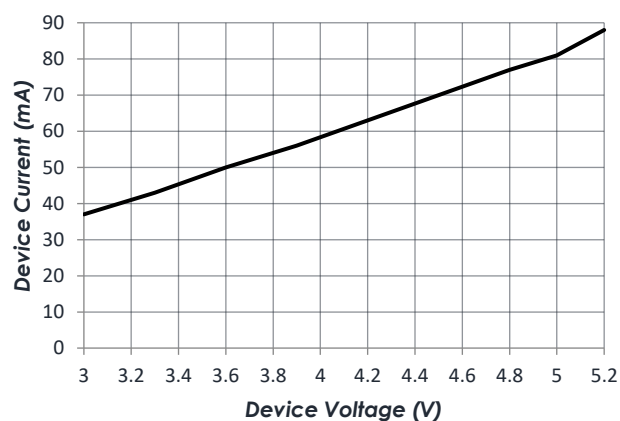
Output IP3 vs VDD



P1dB vs VDD

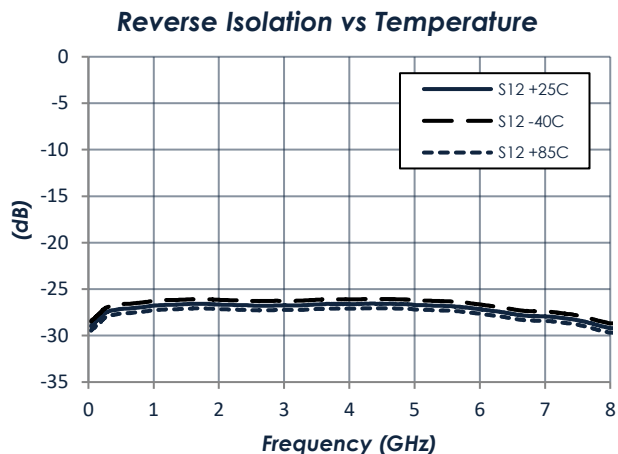
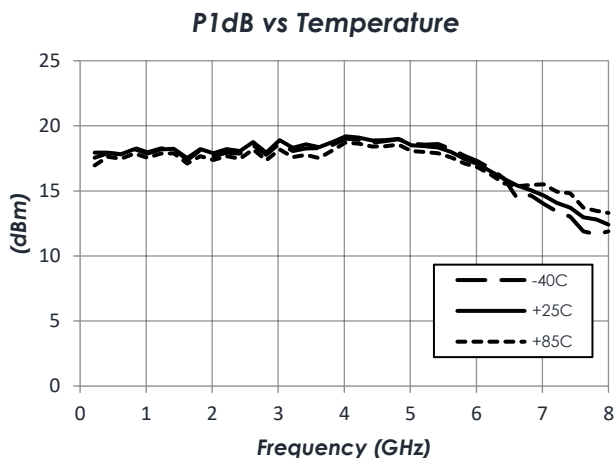
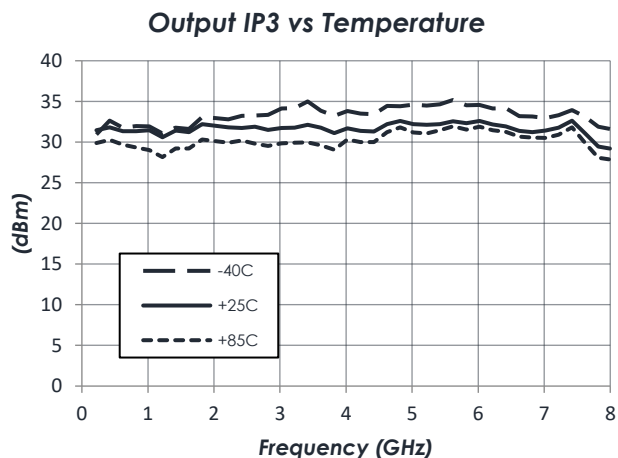
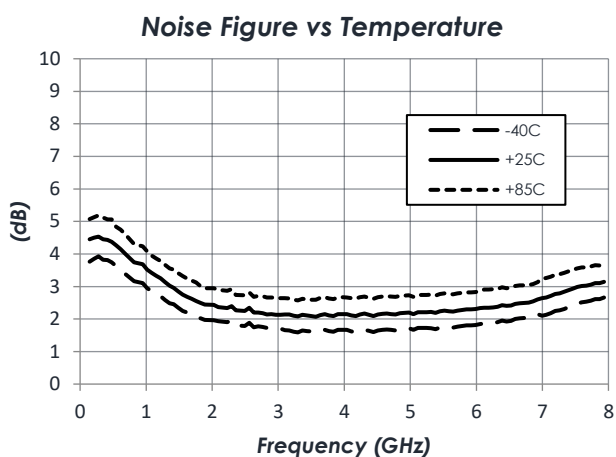
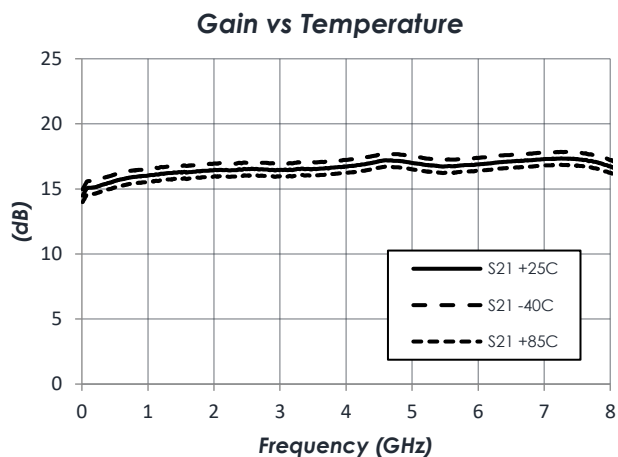


ID vs. VD2



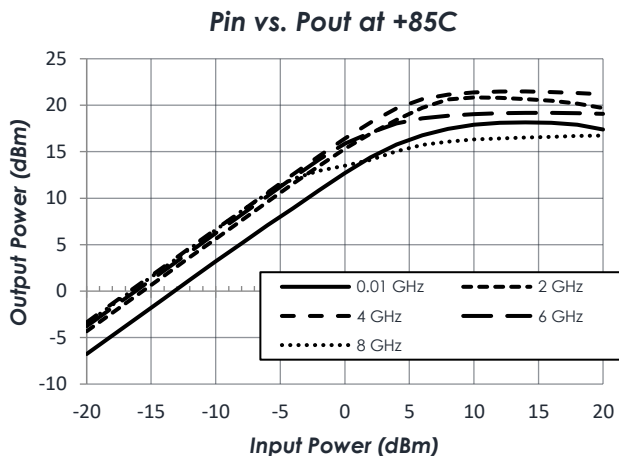
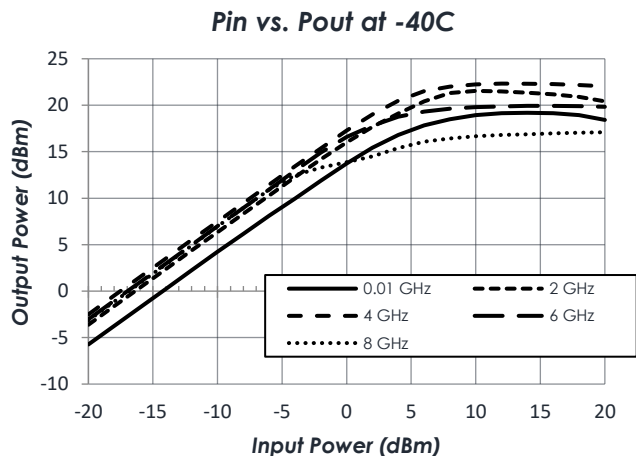
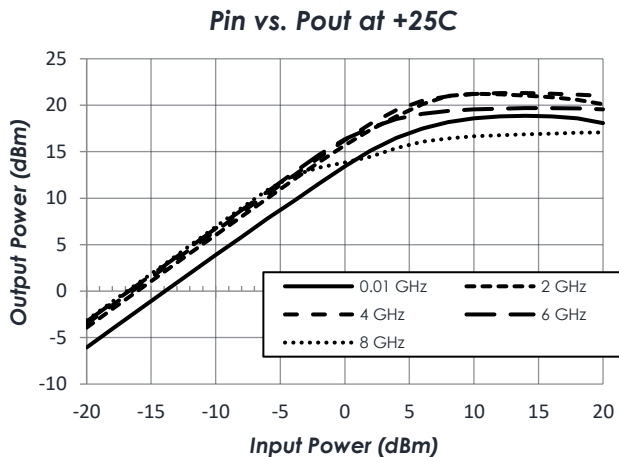
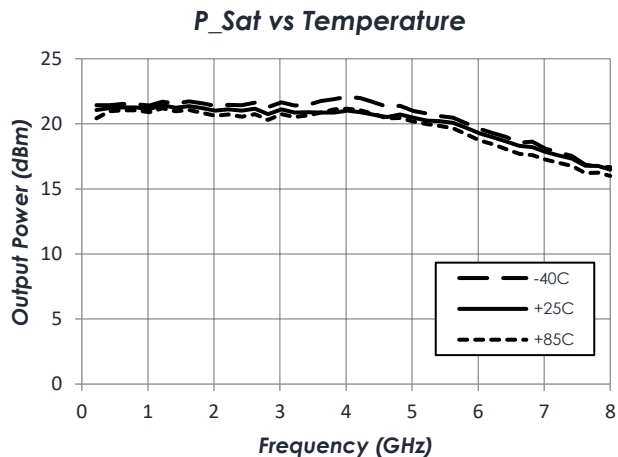
TYPICAL PERFORMANCE - CONFIGURATION B

(Amplifier Enabled, VDD = +5.0 V, ID = 53mA)

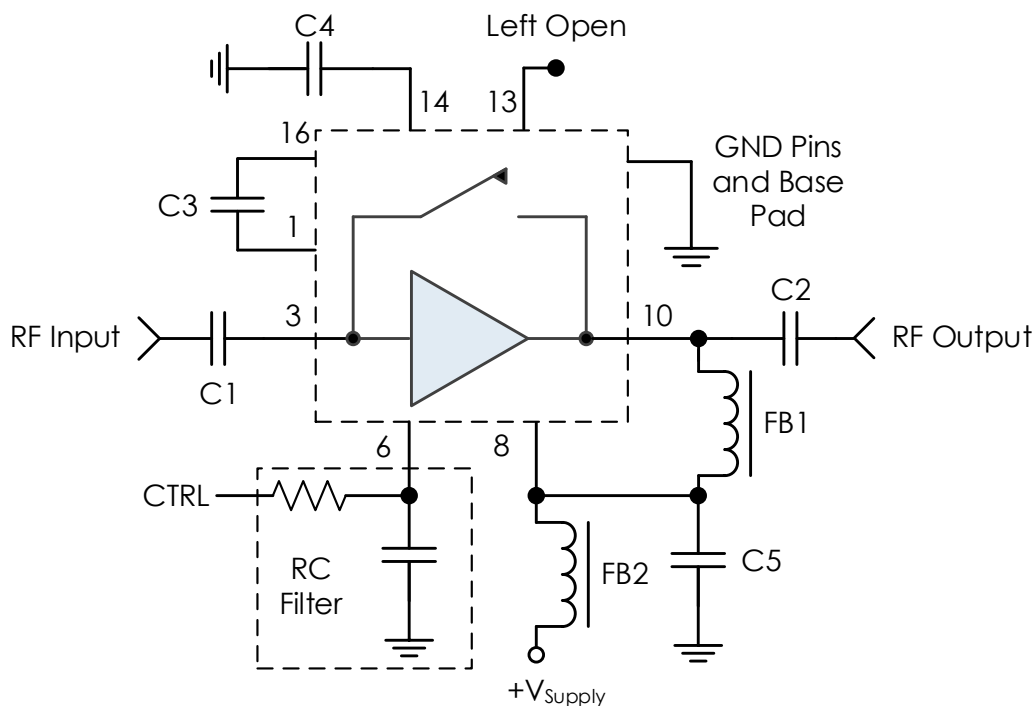


TYPICAL PERFORMANCE - CONFIGURATION B (CONTINUED)

(Amplifier Enabled, VDD = +5.0 V, ID = 53mA)



TYPICAL APPLICATION - CONFIGURATION A



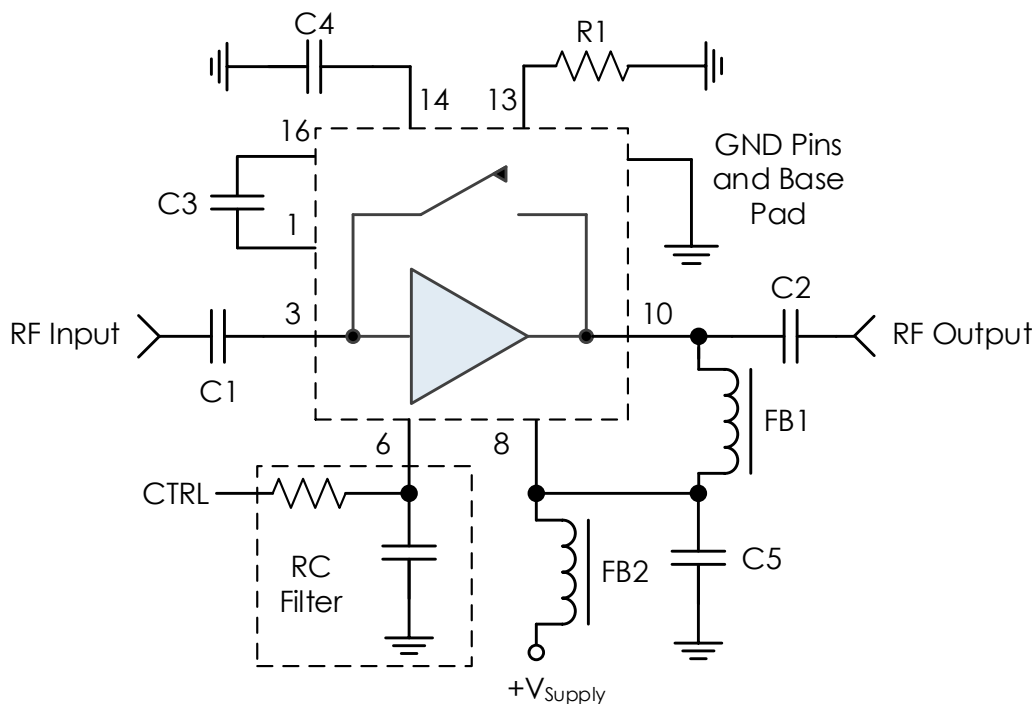
RECOMMENDED COMPONENT LIST (OR EQUIVALENT):

Part	Value	Part Number	Manufacturer
C1, C2, C3	0.1 μ F	0201BB104KW250	Passives Plus
C4	10,000 pF	GRM033R61E103KA12D	Murata
C5	0.1 μ F	GCM155R71H104KE02J	Murata
FB1, FB2	-	MMZ1005A222E	TDK
R1	DNI	Do Not Install	-

Notes:

1. DC blocking capacitors C1 - C3 should be high performance, low-loss, broadband capacitors for optimum performance.
2. Select control line RC filter values based on desired logic source decoupling and switching speed.
3. C3 and C4 should be placed as close to the AM1081-2 as possible to minimize PCB trace lengths. A 0201 package size is recommended to minimize stray PCB pad capacitance to ground.

TYPICAL APPLICATION - CONFIGURATION B



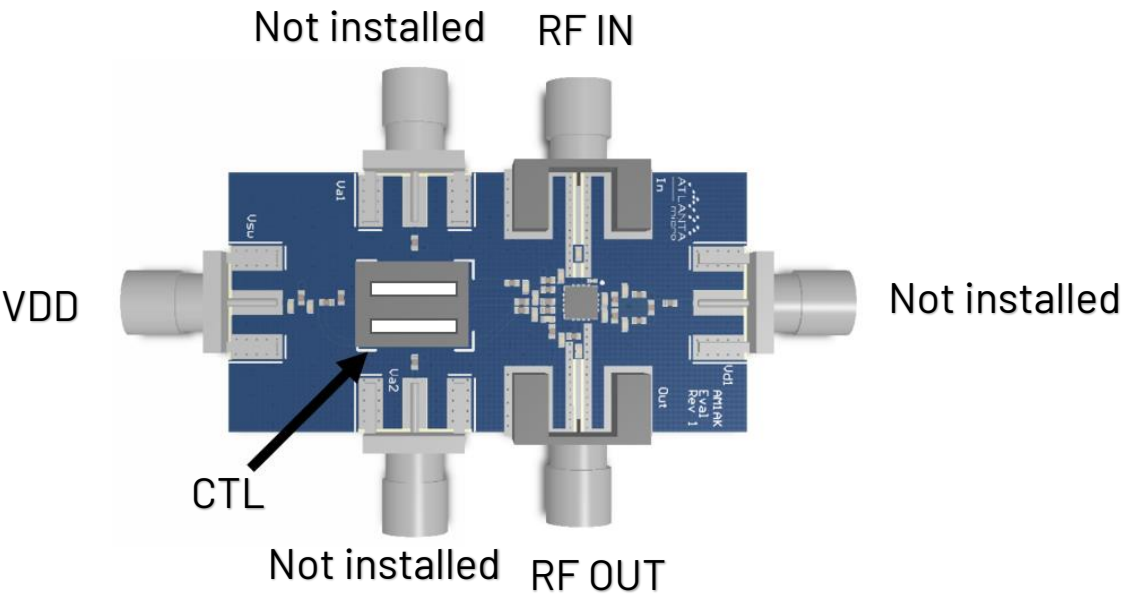
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C1, C2, C3	0.1 μ F	0201BB104KW250	Passives Plus
C4	10,000 pF	GRM033R61E103KA12D	Murata
C5	0.1 μ F	GCM155R71H104KE02J	Murata
FB1, FB2	-	MMZ1005A222E	TDK
R1	0	CRCW04020000Z0ED	Vishay

Notes:

1. DC blocking capacitors C1 - C3 should be high performance, low-loss, broadband capacitors for optimum performance.
2. Select control line RC filter values based on desired logic source decoupling and switching speed.
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EVALUATION PC BOARD



PART ORDERING DETAILS

Part Number		Description
AM1081	4mm 24 Lead QFN	
AM1081-2	3mm 16 Lead QFN	
AM1081 Eval	AM1081 Evaluation Board	
AM1081-2 Eval	AM1081-2 Evaluation Board	
AM1081-M	AM1081 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
AM1065	DC to 8 GHz	Bypassable Gain Block
AM1065-2	DC to 8 GHz	Miniature Bypassable Gain Block
AM1081	DC to 8 GHz	Bypassable Gain Block (Higher IP3)
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
AM1067	5 GHz to 20 GHz	Bypassable Gain Block
AM1073	DC to 8 GHz	Bidirectional / Bypassable Gain Block
AM1075	5 GHz to 26.5 GHz	Bypassable Gain Block

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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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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