AM1067 – Amplifier

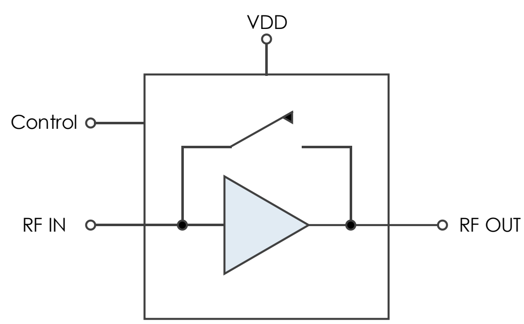
5 GHz to 20 GHz Bypassable

The AM1067 is a high dynamic range bypassable amplifier covering 5 GHz to 20 GHz frequency range. The device exhibits high gain, low bypass insertion loss, and a moderate positive gain-slope providing frequency equalization useful in many broadband applications. Packaged in a 4mm QFN with internal 50Ω matching and requiring a single positive control voltage, the AM1067 represents a dramatic size reduction over a discrete implementation of a bypassable amplifier.

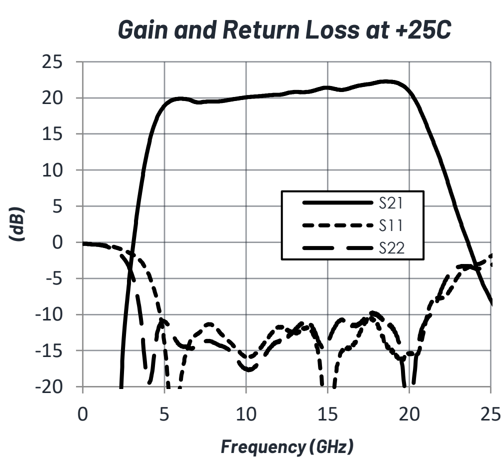
FEATURES

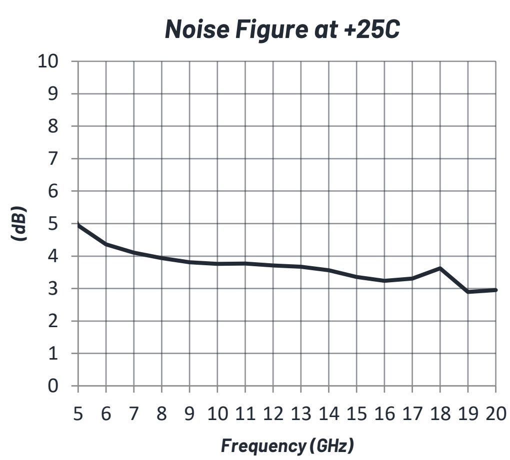
- 20 dB Gain
- 1.9 dB Bypass Insertion Loss
- 3.5 dB Noise Figure
- +27 dBm OIP3
- +14 dBm P1dB
- +16 dBm PSat
- +3.3V, 96/1 mA (Gain/Bypass) Supply
- +3.3V Logic
- 4mm QFN Package
- Unconditionally Stable

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE





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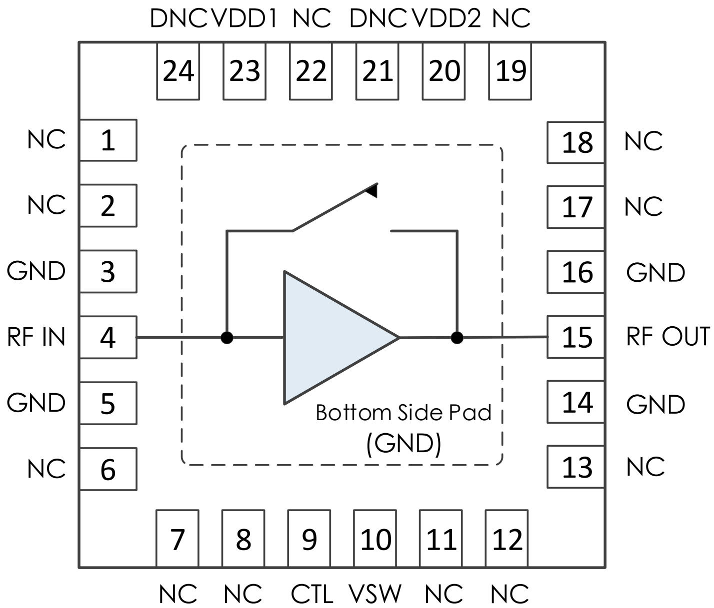
REVISION HISTORY

Date	Revision	Notes
August 5, 2016	1	Initial Release
December 20, 2016	2	Additional Specifications Added.
January 16, 2017	3	Evaluation Board Image Added.
March 15, 2017	4	Formatting Changes.
March 29, 2017	5	Additional Specifications Added.
June 10, 2019	6	Updated to latest datasheet format.
May 15, 2020	7	Package information moved to main product page
November 7, 2024	8	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1, 2	NC	Not Connected *
3	GND	Ground - Common
4	RF IN	RF Input - 50 ohms - DC Coupled, External DC Block Required
5	GND	Ground - Common
6-8	NC	Not Connected *
9	CTL	Bypass/Amplifier Mode Control
10	VSW	DC Power Input
11-13	NC	Not Connected *
14	GND	Ground - Common
15	RF OUT	RF Output - 50 ohms - DC Coupled, External DC Block Required
16	GND	Ground - Common
17-19	NC	Not Connected *
20	VDD2	DC Power Input
21	DNC	Do Not Connect
22	NC	Not Connected *
23	VDD1	DC Power Input
24	DNC	Do Not Connect
Bottom Pad	GND	Ground - Common

* NC pins may be grounded or left open.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	0.0 V	+3.6 V
RF Input Power (Amplifier Mode)		+15 dBm
RF Input Power (Bypass Mode)		+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. Devices subjected to conditions outside of what is recommended for extended periods may affect device reliability.

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	+2.7 V	+3.3 V	+3.5 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})	107

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+2.7 V	+3.3 V	+3.5 V
DC Supply Current	VDD1=VDD2= VSW = +3.3 V	88 mA	96 mA	104 mA
Power Dissipated	VDD1=VDD2= VSW = +3.3 V	0.29 W	0.32 W	0.35 W
Logic Level Low		-0.1 V		+0.4 V
Logic Level High		+2.0 V		+3.3 V

Timing Characteristics

Switching Time	Minimum	Typical	Maximum
Amp On → Amp Bypass)		20 ns	
Amp Bypass → Amp On)		100 ns	

Note: Switching speed defined as 50% control to 10%/90% RF. Measurements made with no control line filtering.

State Table

CTL	Amplifier
High	Enabled
Low	Bypassed

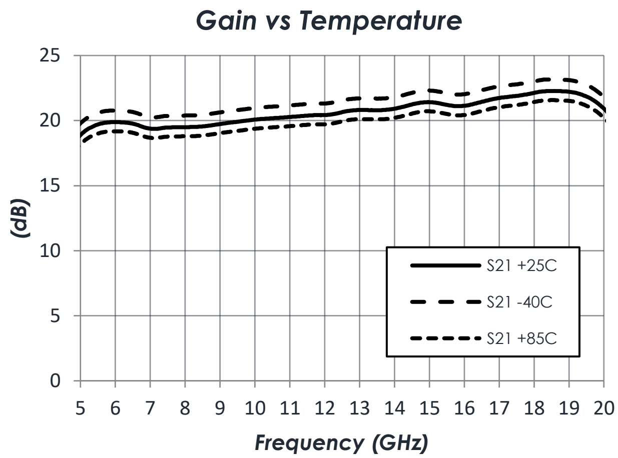
RF Performance

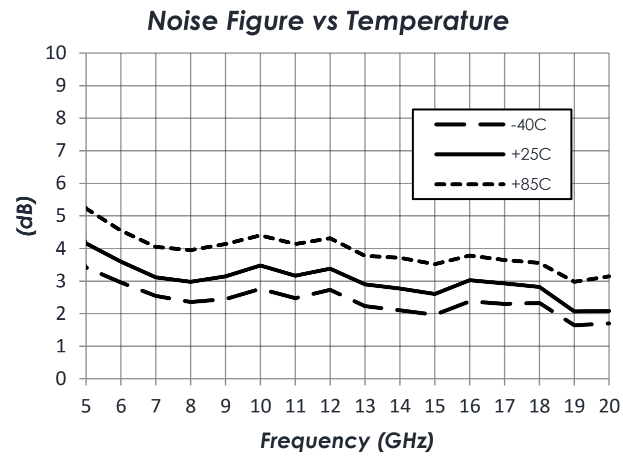
(T = 25 °C, VDD = VDD1 = VDD2 = VSW = +3.3 V unless otherwise specified)

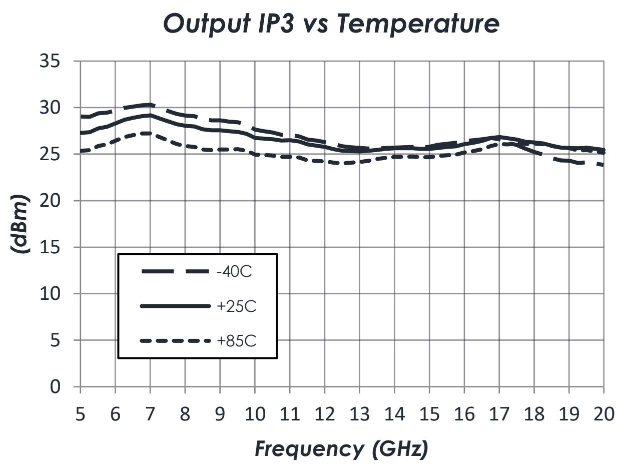
Param	Testing Conditions	Min	Typical	Max
Frequency Range		5 GHz		20 GHz
Gain			20 dB	
Return Loss			15 dB	
Bypass Insertion Loss			1.9 dB	
Reverse Isolation			40 dB	
Output IP3	Amplifier Mode		+27 dBm	
Output P1dB	Amplifier Mode		+14 dBm	
Output Power Saturation	Amplifier Mode		+16 dBm	
Input IP3	Bypass Mode	+28 dBm	+40 dBm	
Input P1dB	Bypass Mode	+15 dBm	+20 dBm	
Noise Figure			3.5 dB	

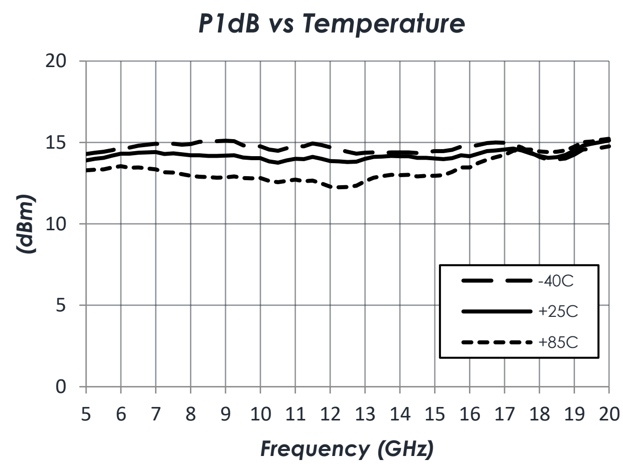
TYPICAL PERFORMANCE

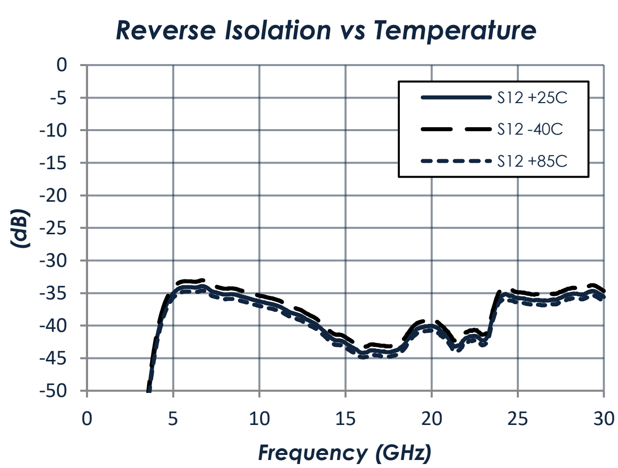
(Amplifier Enabled, VDD = VDD1 = VDD2 = VSW = +3.3 V, ID* = 87 mA)

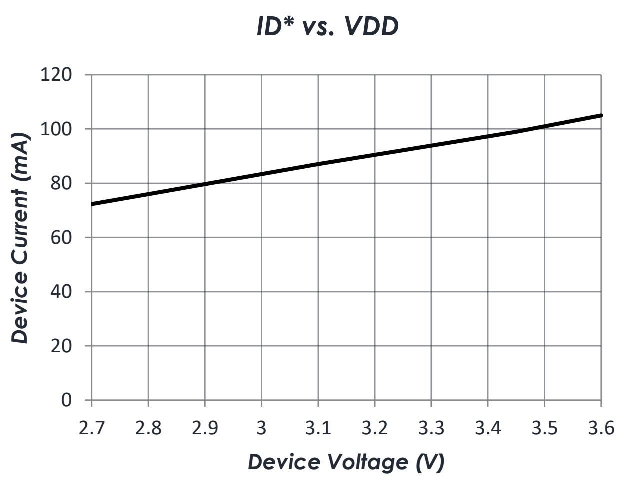










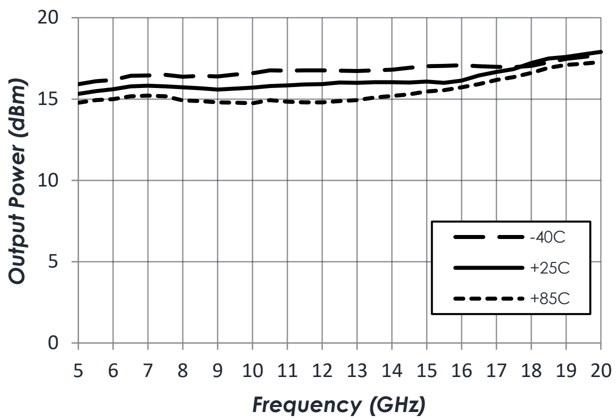


*Note: ID = ID2 + IDSW

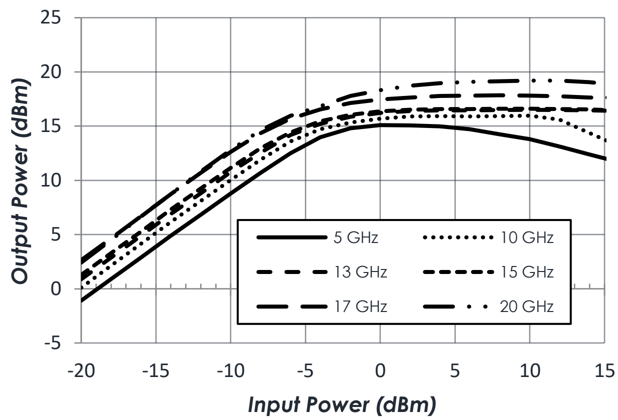
TYPICAL PERFORMANCE (CONTINUED)

(Amplifier Enabled, VDD = VDD1 = VDD2 = VSW = +3.3 V, ID* = 87 mA)

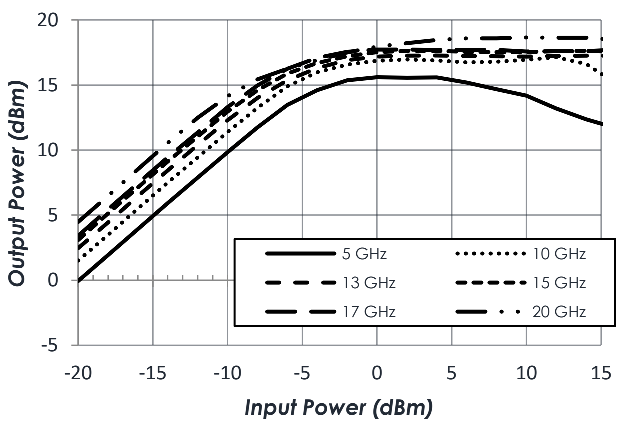
P_Sat vs Temperature



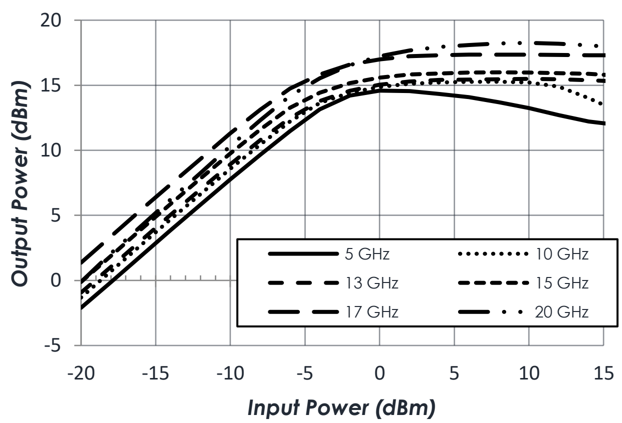
Pin vs. Pout at +25C



Pin vs. Pout at -40C

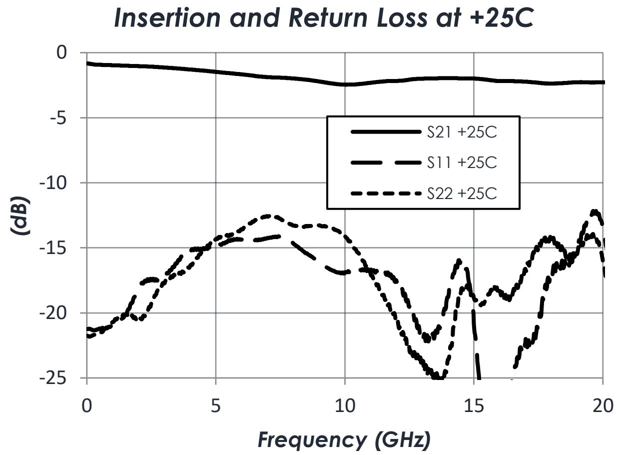


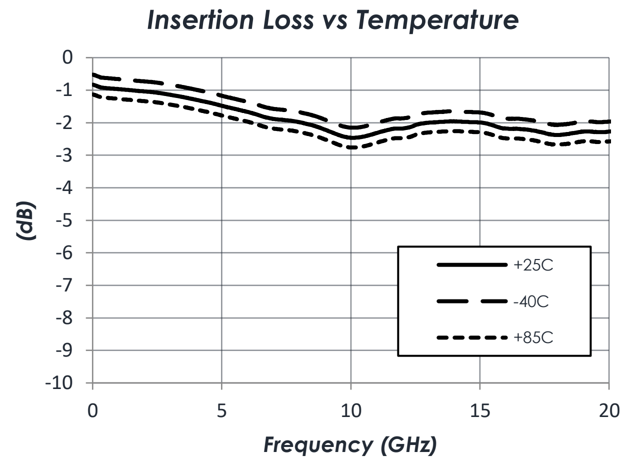
Pin vs. Pout at +85C



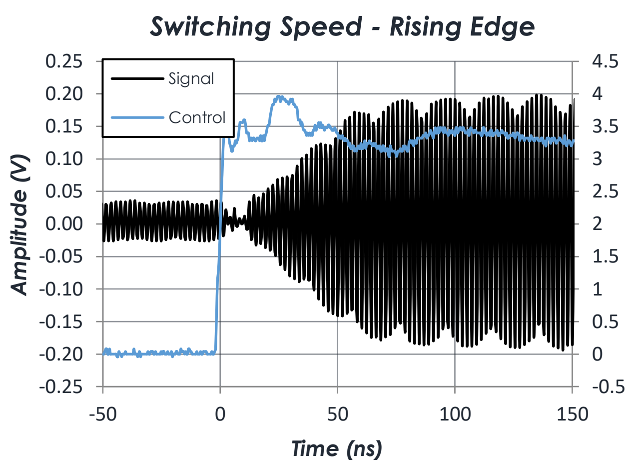
TYPICAL PERFORMANCE (CONTINUED)

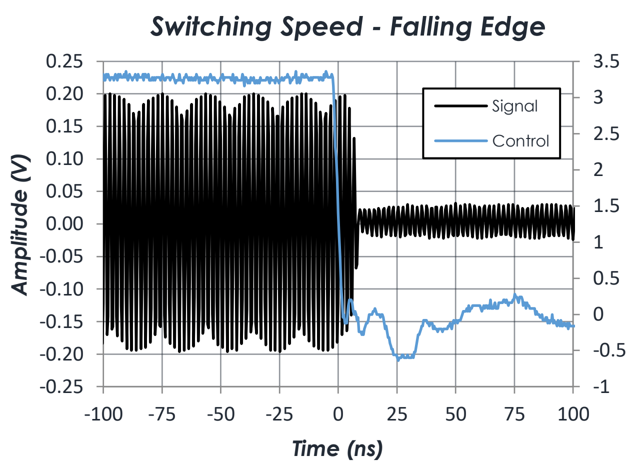
(Amplifier Bypass, VDD = VDD1 = VDD2 = VSW = +3.3 V, ID = 1mA)



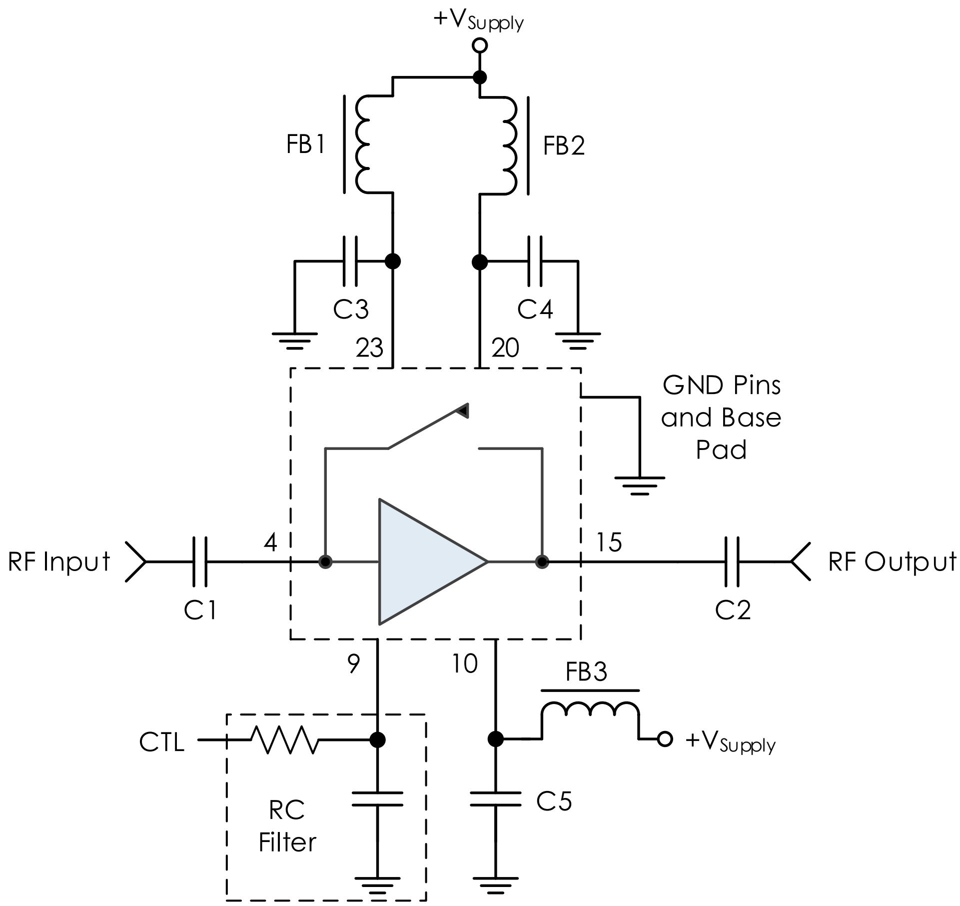


(VDD = VDD1 = VDD2 = VSW = 0.0V / +3.3 V, ID = 1mA / 87 mA, f = 10 GHz)





TYPICAL APPLICATION



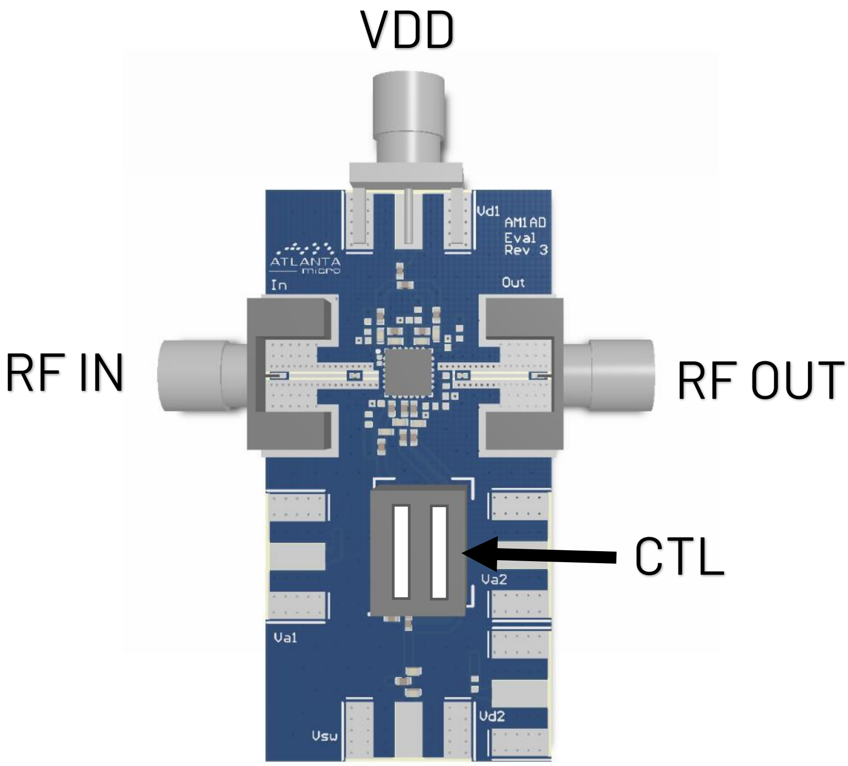
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 µF	0402BB104KW160	Passives Plus
C3 - C5	0.1 µF	GRM155R71C104KA88	Murata
FB1 - FB3	-	MMZ1005A222E	TDK

Notes:

1. DC blocking capacitors 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. NC pins are recommended to be grounded.

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
AM1065	DC to 8 GHz	Bypassable Gain Block
AM1073	DC to 8 GHz	Bidirectional / Bypassable Gain Block
AM1075	5 GHz to 26.5 GHz	Bypassable Gain Block
AM1077	5 GHz to 20 GHz	Bypassable Gain Block w/ Isolation State
AM1081	DC to 8 GHz	Bypassable Gain Block
AM1053	5 GHz to 20 GHz	Gain Block
AM1070	DC to 18 GHz	+3.3V Broadband Gain Block
AM1071	DC to 18 GHz	+5.0V Broadband 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-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).

Conflict Materials: Mercury does not knowingly use materials that are sourced from the Democratic Republic of Congo (DRC) or any other known conflict regions. Mercury's supply chain is comprised of sources that are both environmentally and socially responsible. We periodically review this requirement with our vendors to ensure continued compliance.

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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