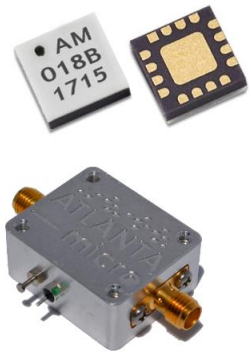
AM1018B – Amplifier

20 MHz to 6 GHz Gain Block

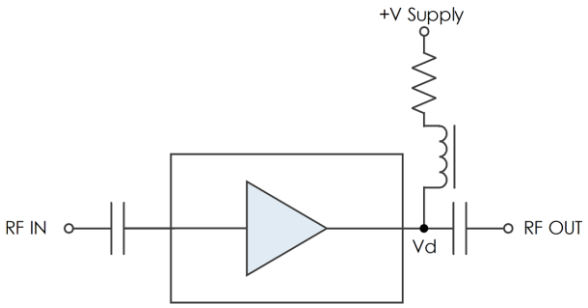


AM1018B is a high dynamic range cascadable gain block covering the 20 MHz to 6 GHz frequency range. It operates from a +5.0VDC supply and exhibits a flat frequency response and high third order intercept performance while also providing excellent gain stability over the operating temperature range. With internal 50Ω matching and packaged in a 3mm QFN or a shielded module, the AM1018B represents a compact total PCB footprint.

FEATURES

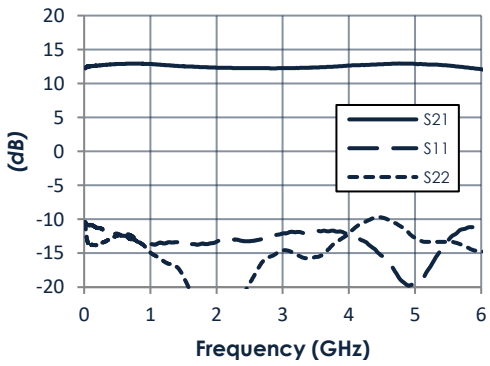
- 13 dB Gain
- 3.0 dB Noise Figure
- +35 dBm OIP3
- +22 dBm P1dB
- +5.0V, 115 mA
- 3mm QFN Package
- -40C to +85C Operation
- Unconditionally Stable

FUNCTIONAL DIAGRAM

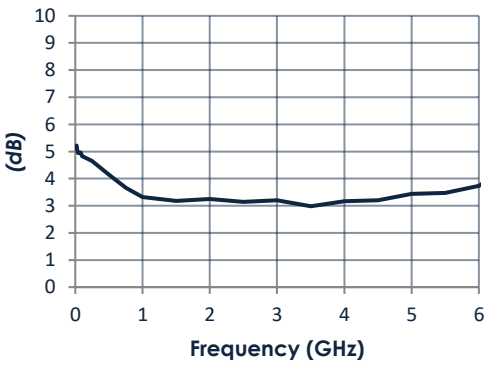


CHARACTERISTIC PERFORMANCE

Gain and Return Loss at +25C



Noise Figure at +25C



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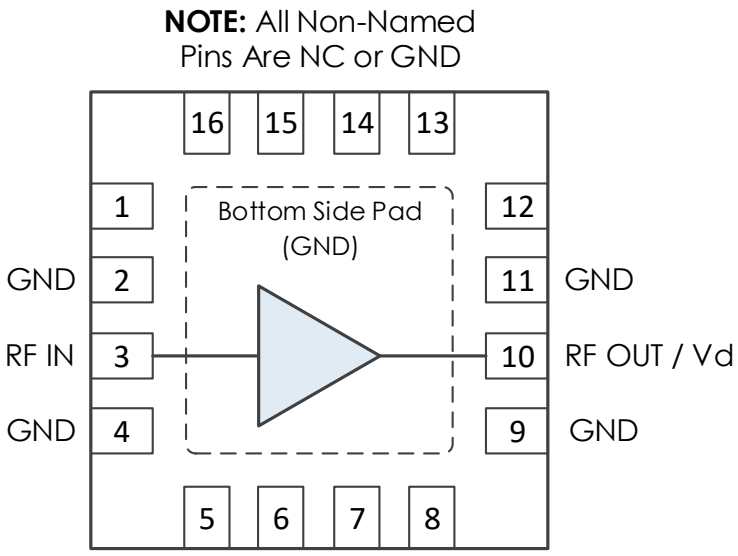
REVISION HISTORY

Date	Revision	Notes
August 28, 2017	1	Initial Release
September 11, 2017	2	Figures Updated.
April 17, 2019	3	Updated to Latest Datasheet Format. Noise Figure Corrected.
August 2, 2019	4	Min/Typ/Max Current Values Changed. RF-Shielded Module Information Added.
November 26, 2019	4A	Updated Description to include shielded module packaging
May 15, 2020	5	Package and module information moved to main product page
November 7, 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
Device Voltage, Vd	0.0 V	+4.2 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	

Mercury products are electrostatic sensitive.
Follow safe handling practices to avoid damage.

Recommended Operating Conditions

	Minimum	Typical	Maximum
Supply Voltage, Vsupply	+4.7 V	+5.0 V	+5.2 V
Device Voltage, Vd	+3.5 V	+3.8 V	+4.0 V
Operating Case Temperature	-40 C	+25 C	+85 C
Operating Junction Temperature	-40 C		+125 C

Thermal Information

	Thermal Resistance (°C / W)
Junction to Case Thermal Resistance (θ_{JC})	76.33

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Device Voltage, Vd	Vsupply = +5.0 V	+3.5 V	+3.8 V	+4.0 V
DC Supply Current	Vsupply = +5.0 V	105 mA	115 mA	125 mA
Power Dissipated	Vsupply = +5.0 V	0.40 W	0.46 W	0.50 W

RF Performance

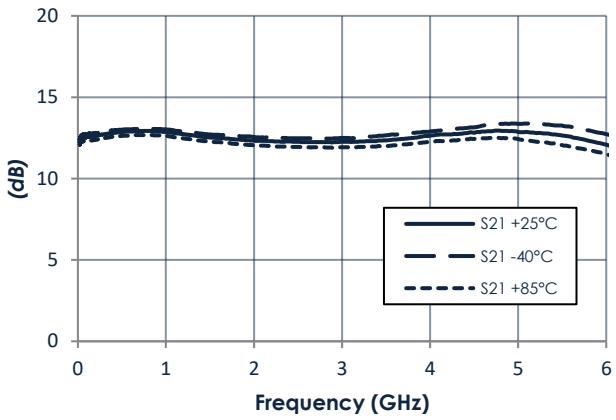
(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		20 MHz		6 GHz
Gain	f = 3 GHz		13 dB	
Output IP3	f = 3 GHz		+35 dBm	
Output P1dB	f = 3 GHz		+22 dBm	
Noise Figure	f = 3 GHz		3.0 dB	

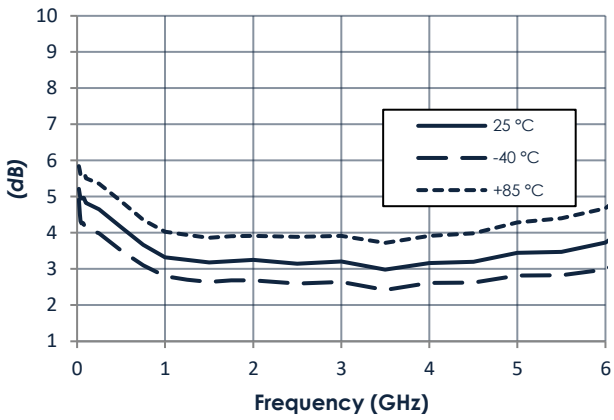
TYPICAL PERFORMANCE

(VD = +3.3 V, ID = 85 mA)

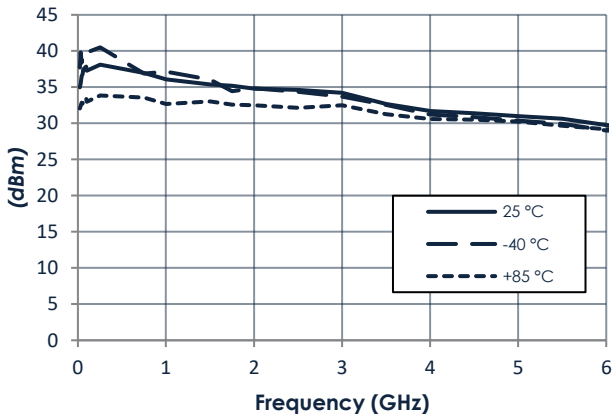
Gain vs Temperature



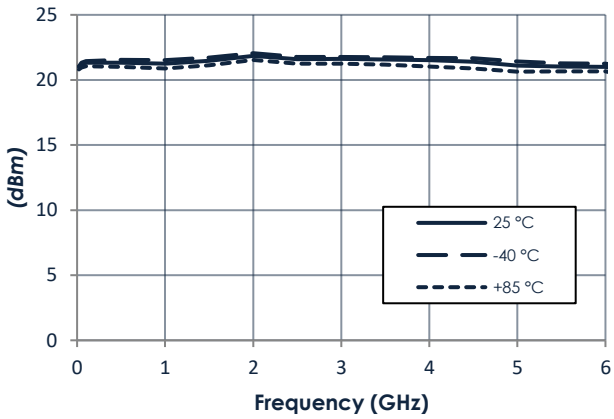
Noise Figure vs Temperature



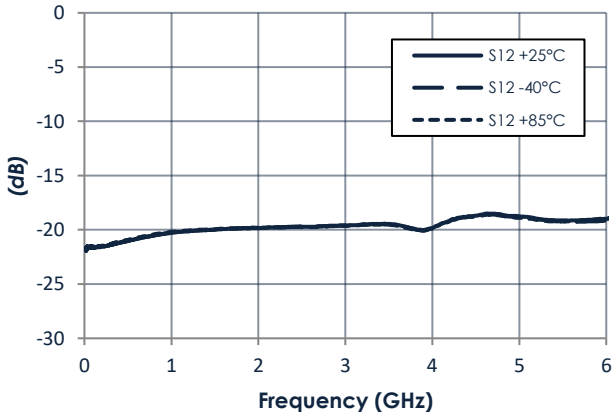
Output IP3 vs Temperature



P1dB vs Temperature

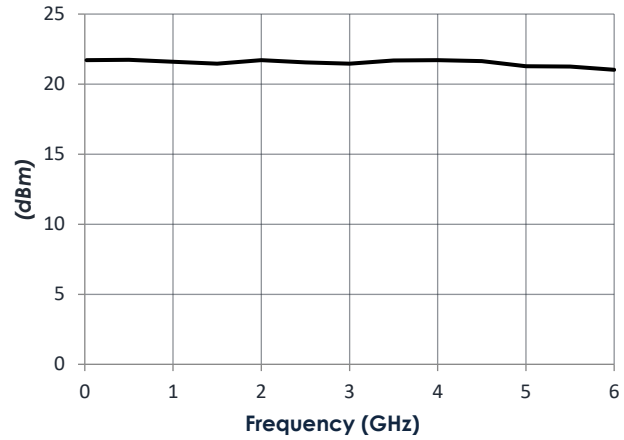


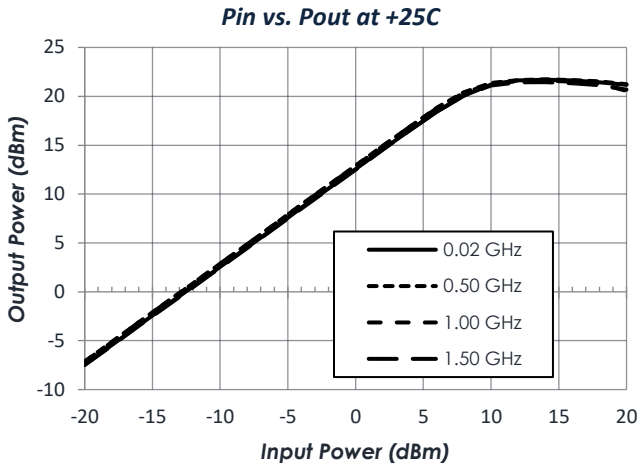
Reverse Isolation vs Temperature

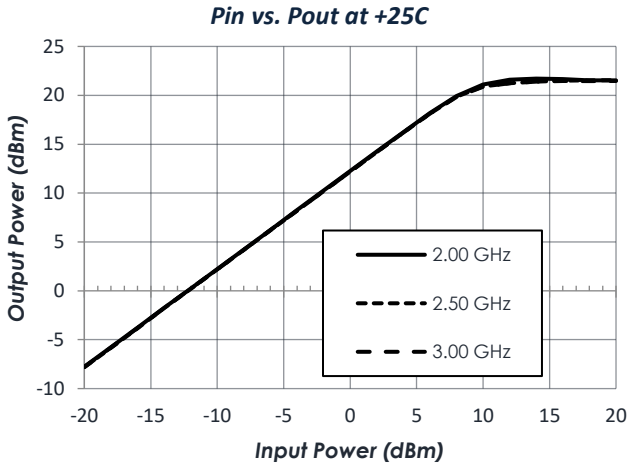


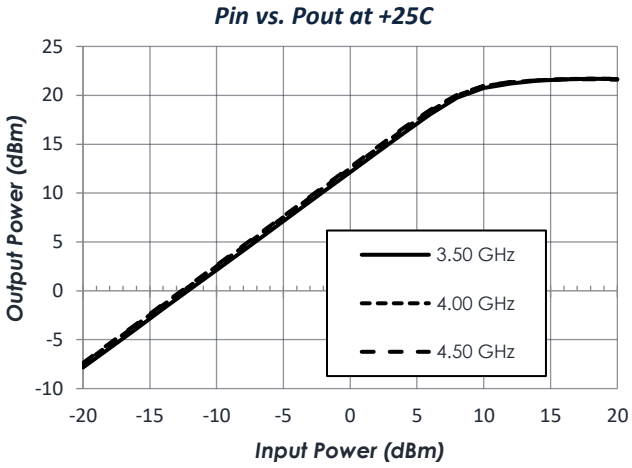
TYPICAL PERFORMANCE (CONTINUED)

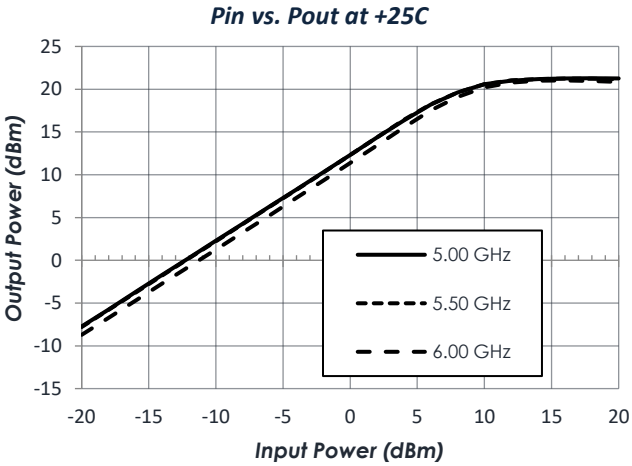
(VD = +3.3 V, ID = 85 mA)



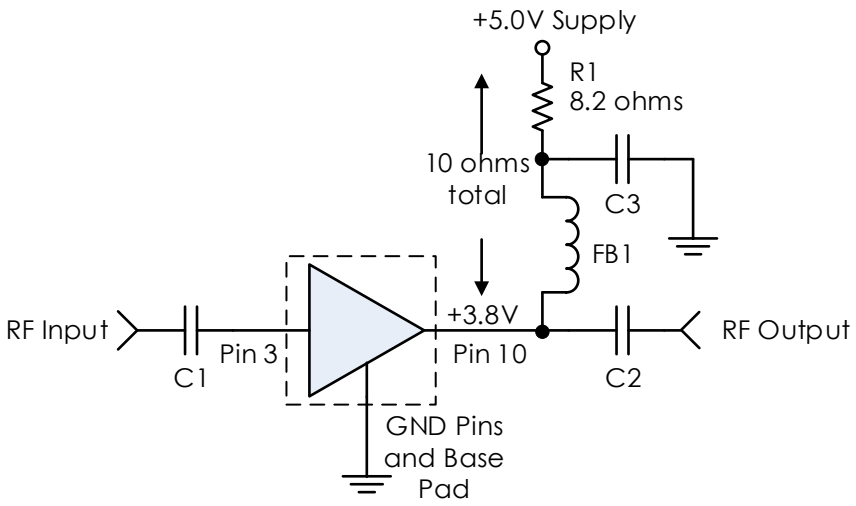








TYPICAL APPLICATION



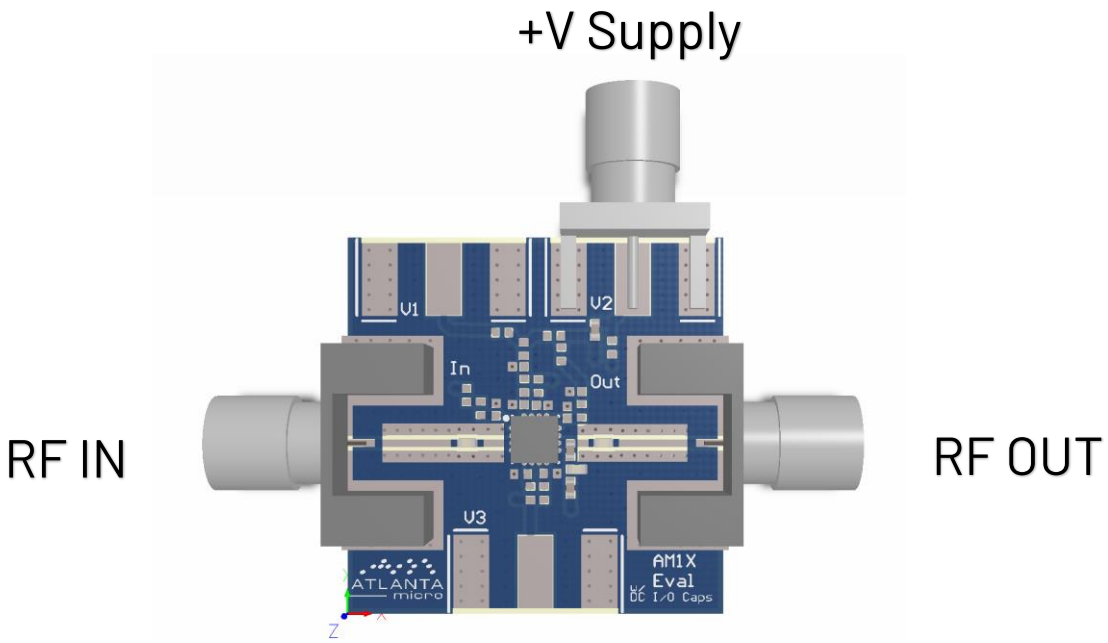
Recommended Component List (or Equivalent)

Part	Value	Part Number	Manufacturer
C1, C2	0.1 µF	0402BB104KW160	Passives Plus
C3	0.1 µF	GRM155R71C104KA88	Murata
FB1	-	MMZ1005A222E	TDK
R1	8.2 ohms	RL0510S-8R2-F	Susumu (1/6 W)

Notes:

1. Dropping resistor R1 is required.
2. NC pins may be grounded or left open.
3. DC blocking capacitors should be high performance, low-loss, broadband capacitors for optimum performance.

EVALUATION PC BOARD



PART ORDERING DETAILS

Part Number	Description
AM1018B	3mm 16 Lead QFN
AM1018B Eval	AM1018B Evaluation Board
AM1018B-M	AM1018B 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
AM1018A	20 MHz to 6 GHz	+3.3V Gain Block
AM1018C	20 MHz to 6 GHz	+5.0V Gain Block
AM1025B	20 MHz to 3 GHz	+8.0V Gain Block (High P1dB)
AM1031C	20 MHz to 8 GHz	+3.3V Gain Block
AM1063-1	DC to 10 GHz	Gain Block
AM1064-1	DC to 8 GHz	Gain Block
AM1085	DC to 6 GHz	+5.0V Gain Block
AM1090	DC to 6 GHz	+5.0V or +8.0V 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-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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