AM1070 – Amplifier

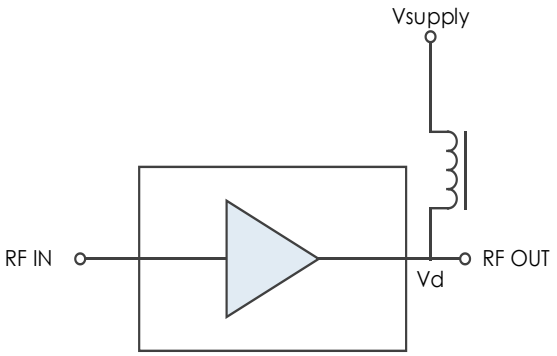
DC to 18 GHz Gain Block

The AM1070 is a DC-coupled broadband gain block covering up to 18 GHz. The device exhibits high third order intercept performance, excellent gain stability over the operating temperature range, and a gain flatness within +/- 1 dB of nominal gain useful in many broadband applications. With internal 50Ω matching and packaged in either a 3mm QFN or a 1.3mm x 2mm DFN, the AM1070 represents a compact total PCB footprint.

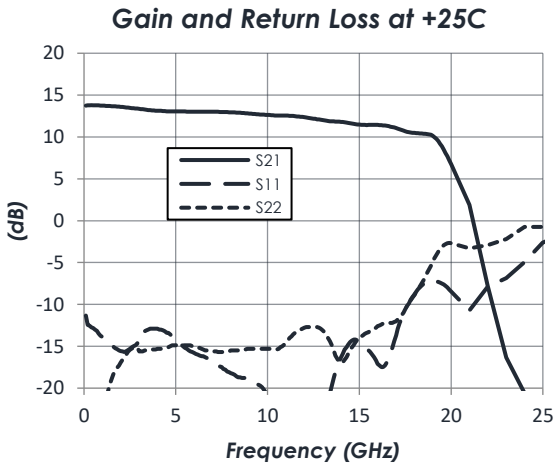
FEATURES

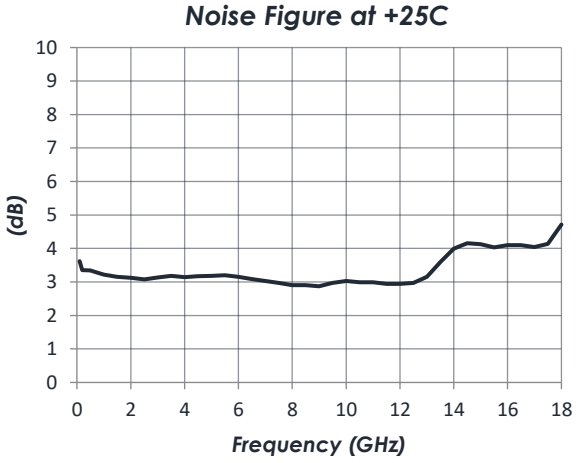
- 12 dB Gain
- 3.0 dB Noise Figure
- +27 dBm OIP3
- +15 dBm P1dB
- +3.3V, 60mA Supply
- 3mm QFN or 1.3mm x 2mm DFN
- -40C to +85C Operation

FUNCTIONAL DIAGRAM



CHARACTERISTIC PERFORMANCE





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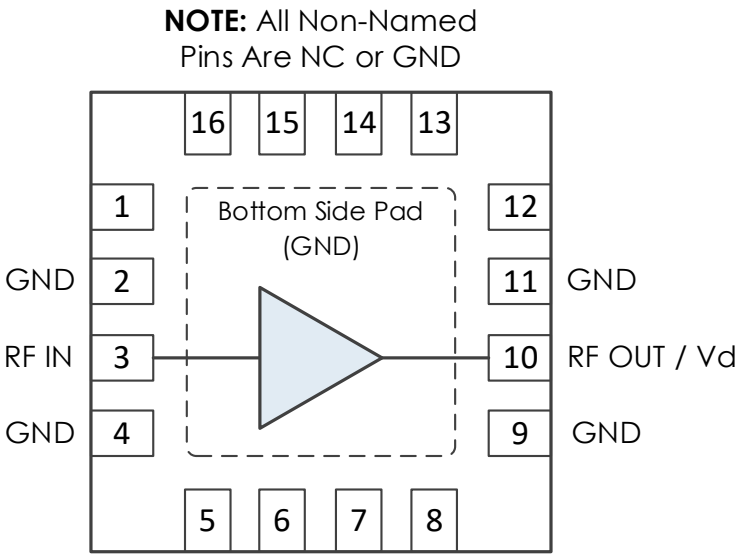
REVISION HISTORY

Date	Revision	Notes
February 23, 2017	1	Initial Release
April 9, 2024	2	Updated to latest datasheet format. More comprehensive data added. Added pinout and evaluation board image for AM1070-2
November 7, 2024	3	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS

3mm QFN

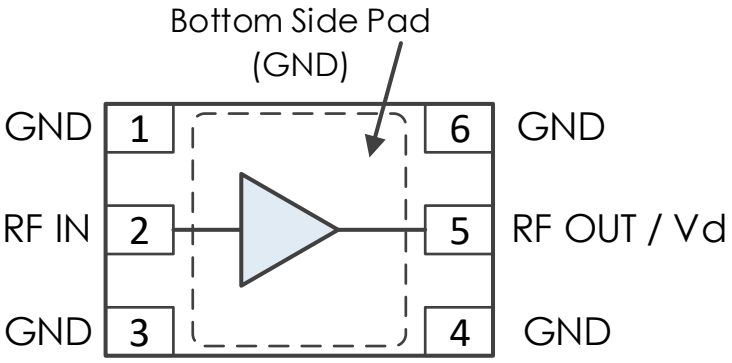


Pin	Name	Function
1	NC	Not Connected*
2	GND	Ground – Common
3	RF In	RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
4	GND	Ground – Common
5 – 8	NC	Not Connected*
9	GND	Ground – Common
10	RF Out / Vd	RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required.
11	GND	Ground – Common
12 - 16	NC	Not Connected*
Bottom Pad	GND	Ground – Common

***Note:** NC pins may be left floating or grounded. Grounding these pins is recommended.

PIN LAYOUT AND DEFINITIONS (CONTINUED)

1.3mm x 2mm DFN



Pin	Name	Function
1	GND	Ground - Common
2	RF In	RF Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
3,4	GND	Ground - Common
5	RF Out, Vd	RF Output and DC Power Input – 50 Ohms – DC Coupled. External DC Blocking Capacitor Required
6	GND	Ground - Common
Case GND	GND	Ground - Common

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+6.0 V
RF Input Power		+13 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. Devices subjected to conditions outside of what is recommended for extended periods may affect device reliability.

Handling Information

	Min.	Max.
Storage Temperature Range (Recommended)	-50 C	+125 C
Moisture Sensitivity Level for AM1070-1	MSL 1	
Moisture Sensitivity Level for AM1070-2	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	+3.3 V	+3.6 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})	99.6

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage		+3.0 V	+3.3 V	+3.6 V
DC Device Voltage, Vd		+2.7 V	+3.1 V	+3.3 V
DC Device Current, Id	Vd = +3.1 V	45 mA	60 mA	75 mA
Power Dissipated	Vd = +3.1 V	0.12 W	0.19 W	0.25 W

RF Performance

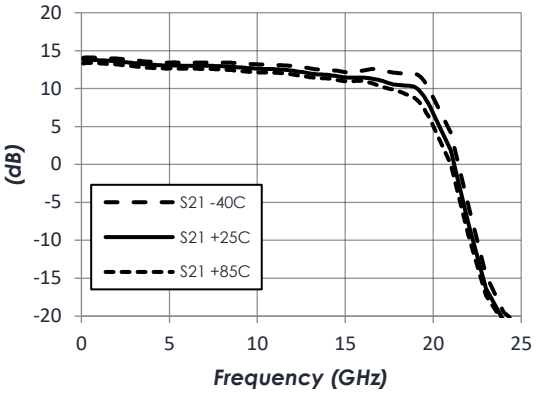
(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		DC		18 GHz
Gain			12 dB	
Return Loss			15 dB	
Output IP3			+27 dBm	
Output P1dB			+15 dBm	
Noise Figure			3.0 dB	

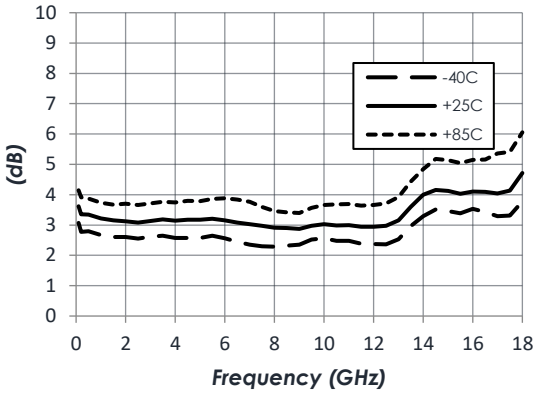
PERFORMANCE

(at Vd = 3.1V, Id = 60 mA, continued)

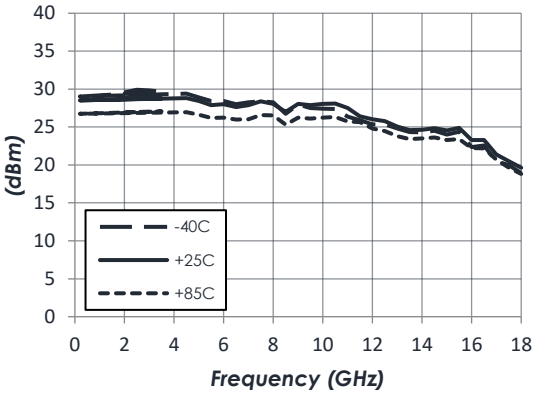
Gain vs Temperature



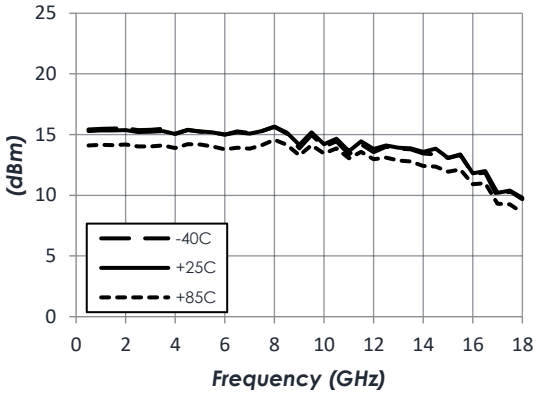
Noise Figure vs Temperature



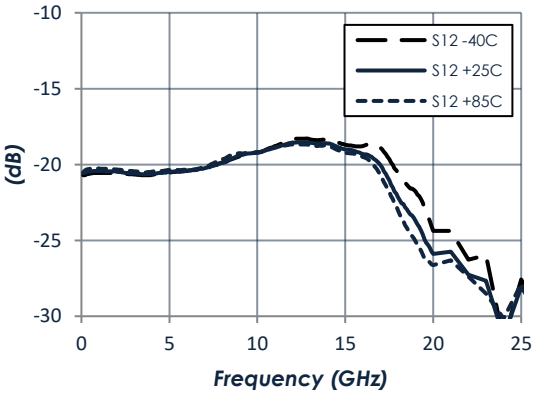
Output IP3 vs Temperature



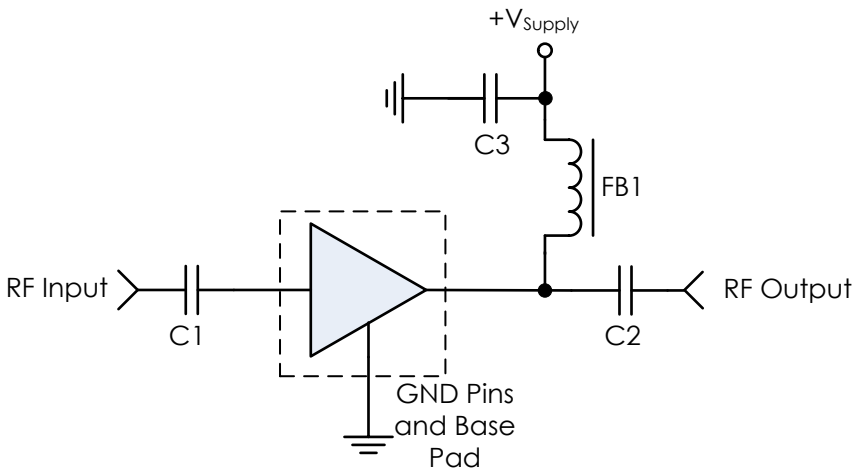
P1dB vs Temperature



Reverse Isolation vs Temperature



TYPICAL APPLICATION



Recommended Component List (or Equivalent)

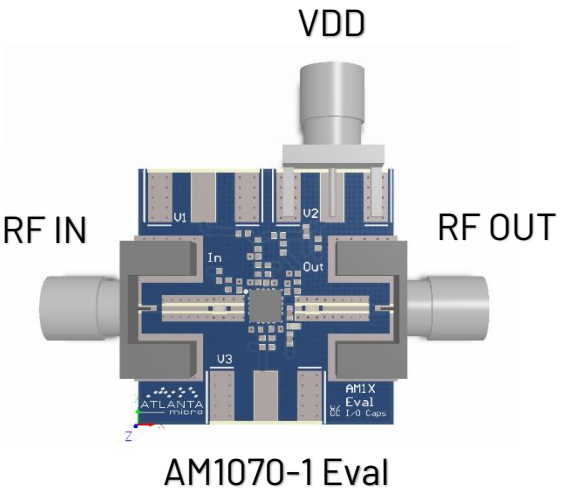
Part	Value	Part Number	Manufacturer
C1, C2	0.1uF	0402BB104KW160	Passives Plus
C3	0.1uF	GRM155R71C104KA88	Murata
FB1	-	MMZ1005A222E	TDK

Notes:

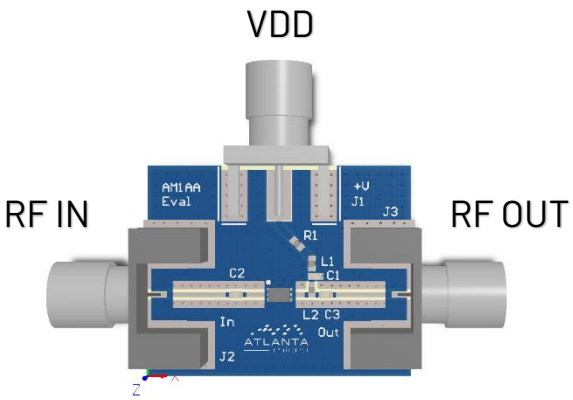
1. NC pins may be floating or grounded. Grounding these pins is recommended.
2. DC blocking capacitors should be high-performance, low-loss capacitors for optimum performance.

EVALUATION PC BOARD

(Not all components shown will necessarily be installed.)



AM1070-1 Eval



AM1070-2 Eval

PART ORDERING DETAILS

Description	Part Number
3mm 16 Lead QFN	AM1070-1
1.3mm x 2mm 6 Lead DFN	AM1070-2
AM1070-1 Evaluation Board	AM1070-1 Eval
AM1070-2 Evaluation Board	AM1070-2 Eval

RELATED PARTS

Part Number		Description
AM1071	DC to 18 GHz	+5.0V Gain Block
AM1102	DC to 22 GHz	Broadband Low Noise Amplifier
AM1063-1	DC to 10 GHz	Gain Block
AM1063-2	DC to 10 GHz	Miniature Gain Block
AM1163-1	DC to 10 GHz	Low Noise Amplifier
AM1163-2	DC to 10 GHz	Miniature Low Noise Amplifier
AM1053	5 GHz to 20 GHz	Gain Block / Driver Amplifier
AM1082	5 GHz to 17 GHz	Gain Block / Driver 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 (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.

Corporate Headquarters

50 Minuteman Road
Andover, MA 01810 USA
+1 978.967.1401 tel
+1 866.627.6951 tel
+1 978.256.3599 fax

International Headquarters
Mercury International

Avenue Eugène-Lance, 38
PO Box 584
CH-1212 Grand-Lancy 1
Geneva, Switzerland
+41 22 884 5100 tel

Learn more
Visit: mrcy.com
For pricing details, contact: MMICsales@mrcy.com
For technical details, contact: MMICsupport@mrcy.com