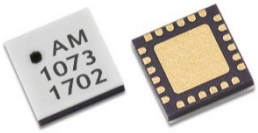
AM1073 – Amplifier

DC to 8 GHz Bidirectional/Bypassable

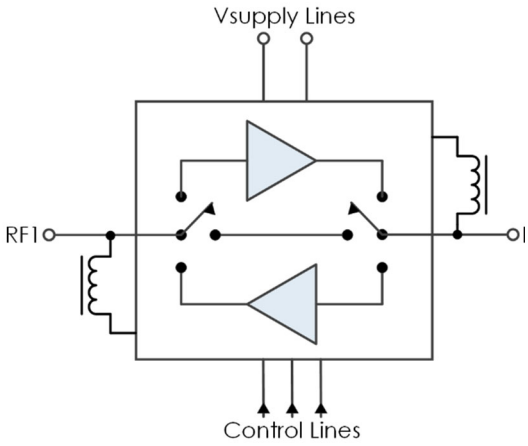


The AM1073 is a high dynamic range bidirectional and bypassable DC-coupled amplifier with a bandwidth of 8 GHz. The device is unconditionally stable and exhibits a low bypass mode insertion loss. The AM1073 performs well down to DC, and its low frequency performance is limited only by the frequency response of the input and output bias tees present in the application circuit. With internal 50 Ω matching and packaged in a 4 mm QFN, the AM1073 represents a dramatic size reduction over an equivalent discrete implementation.

FEATURES

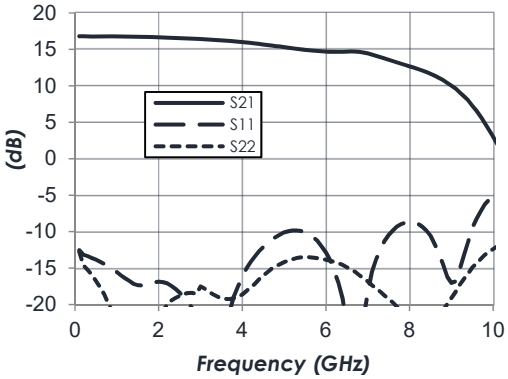
- 15 dB Gain
- 2.5 dB Noise Figure
- +27 dBm OIP3
- +14 dBm P1dB
- 1.5 dB Bypass Insertion Loss
- +3.3V, 55/1 mA (Gain/Bypass)
- 4mm QFN package
- -40C to +85C Operation

FUNCTIONAL DIAGRAM

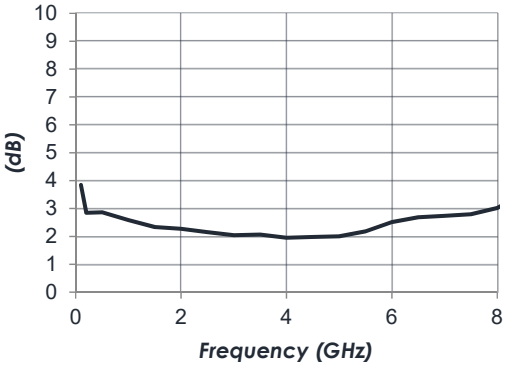


CHARACTERISTIC PERFORMANCE

Gain and Return Loss at +25C



Noise Figure



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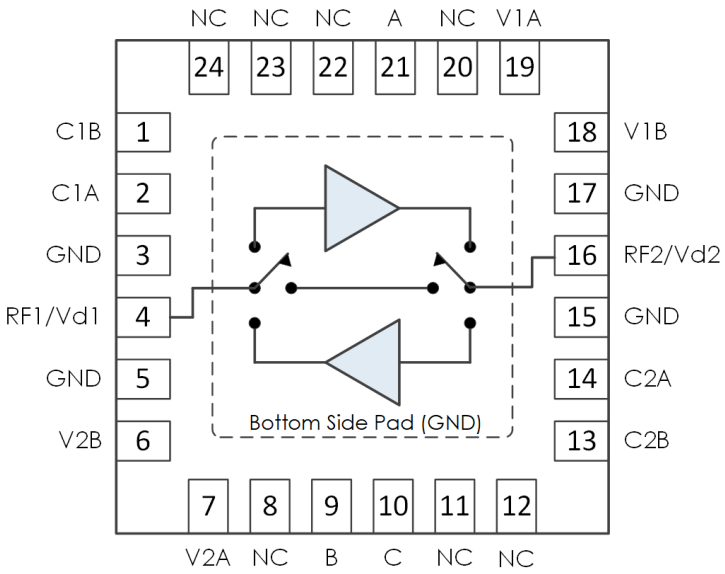
REVISION HISTORY

Date	Revision	Notes
April 2, 2021	4	Preliminary Release
June 16, 2023	5	Initial Release
June 17, 2024	6	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	C1B	C1 Connection B
2	C1A	C1 Connection A
3	GND	Ground – Common
4	RF1/Vd1	RF Port and DC Power Input – 50 ohms – DC Coupled, External DC Block and Bias Tee Required
5	GND	Ground – Common
6	V2B	DC Power Input
7	V2A	DC Power Input
8	NC	Not Connected
9	B	Control Line B
10	C	Control Line C
11, 12	NC	Not Connected
13	C2B	C2 Connection B
14	C2A	C2 Connection A
15	GND	Ground – Common
16	RF2/Vd2	RF Port and DC Power Input – 50 ohms – DC Coupled, External DC Block and Bias Tee Required
17	GND	Ground – Common
18	V1B	DC Power Input
19	V1A	DC Power Input
20	NC	Not Connected
21	A	Control Line A
22-24	NC	Not Connected

* NC pins may be grounded or left open.

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	0.0 V	+3.5 V
RF Input Power		+20 dBm
Storage Temperature Range	-50C	+125 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 1	

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})	227 C / W
Nominal Junction Temperature at +85C Ambient	126 C
Channel Temperature to Maintain 1 Million Hour MTTF	175 C

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max.
DC Device Voltage	Vsupply = 3.3 V		+2.7 V	
DC Device Current	Vsupply = 3.3 V	40 mA	55 mA	70 mA
Power Dissipated	Vsupply = 3.3 V	132 mW	182 mW	231 mW
Logic Level Low		-0.1 V		+0.4 V
Logic Level High		+2.2 V		+5.0 V

Amplifier Control

A	B	C	Amplifier
0	0	0	Isolation
1	0	0	Forward
0	1	0	Reverse
0	0	1	Bypass

Note: No more than one control line should be set high at any time.

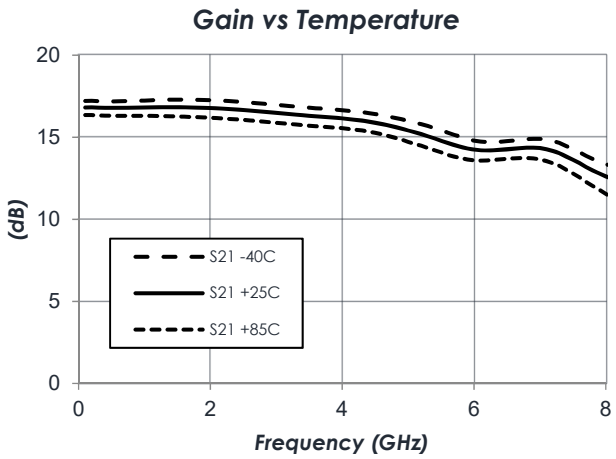
RF Performance

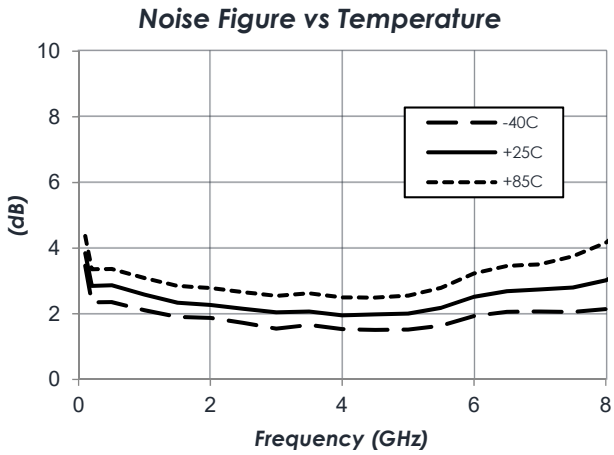
(T = 25 °C unless otherwise specified)

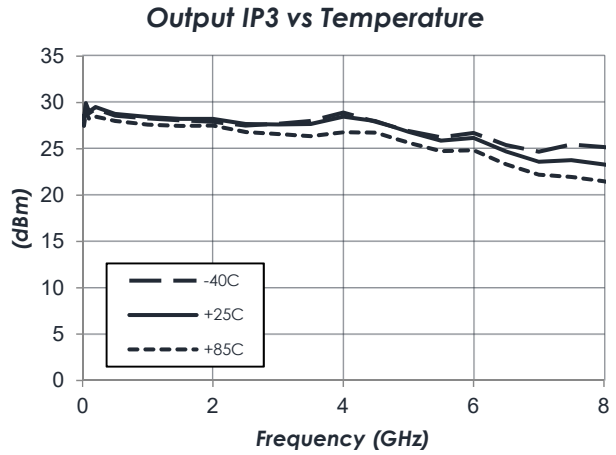
Param	Testing Conditions	Min	Typical	Max.
Frequency Range		DC		8 GHz
Gain	Vd1, Vd2 = 2.7 V		15 dB	
Return Loss	Vd1, Vd2 = 2.7 V		16 dB	
Bypass Insertion Loss	Vd1, Vd2 = 2.7 V		1.5 dB	
Output IP3	Vd1, Vd2 = 2.7 V		+27 dBm	
Output P1dB	Vd1, Vd2 = 2.7 V		+14 dBm	
Noise Figure	Vd1, Vd2 = 2.7 V		2.5 dB	
Frequency Range				

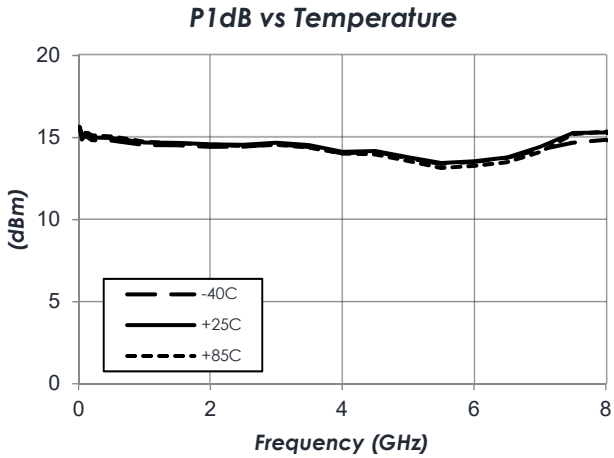
TYPICAL PERFORMANCE

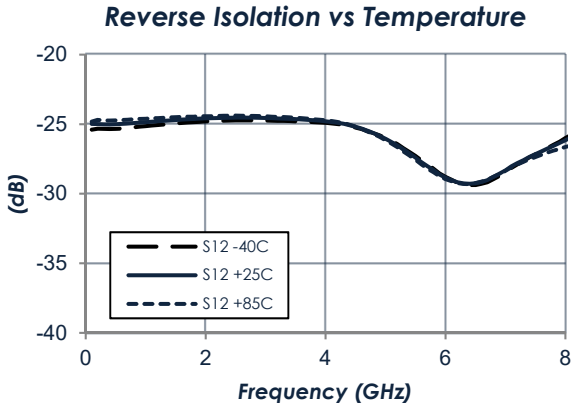
(Forward or Reverse Gain Mode, Vd = 2.7 V, Id = 55 mA)





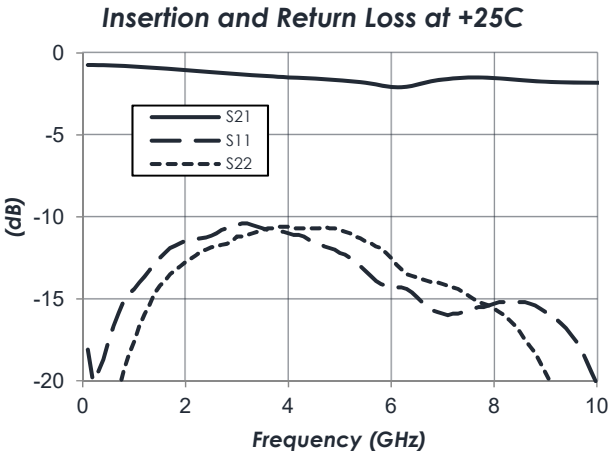


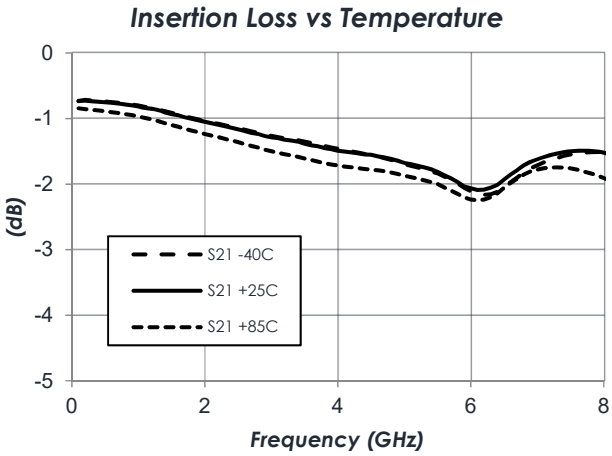




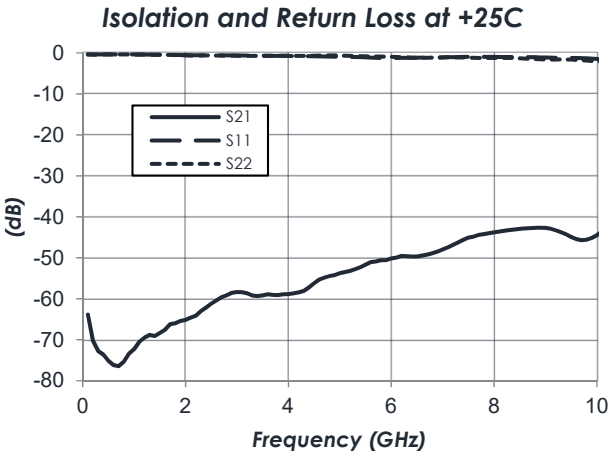
TYPICAL PERFORMANCE (continued)

(Bypass Mode, Vd = 2.7 V, Id = 55 mA)

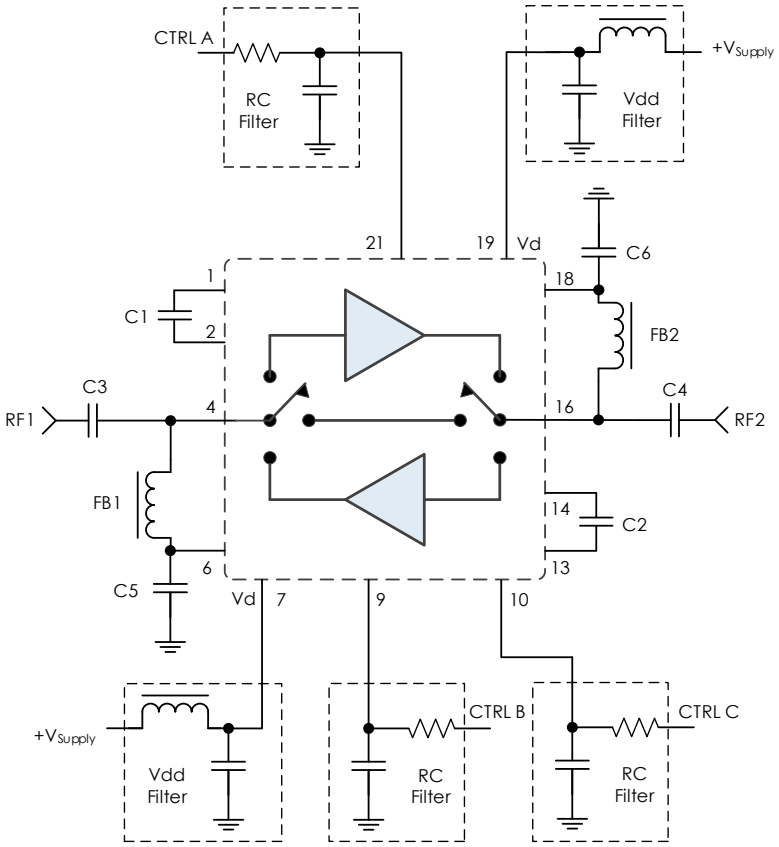




Isolation Mode, Vd = 2.7 V, Id = 1 mA)



TYPICAL APPLICATION



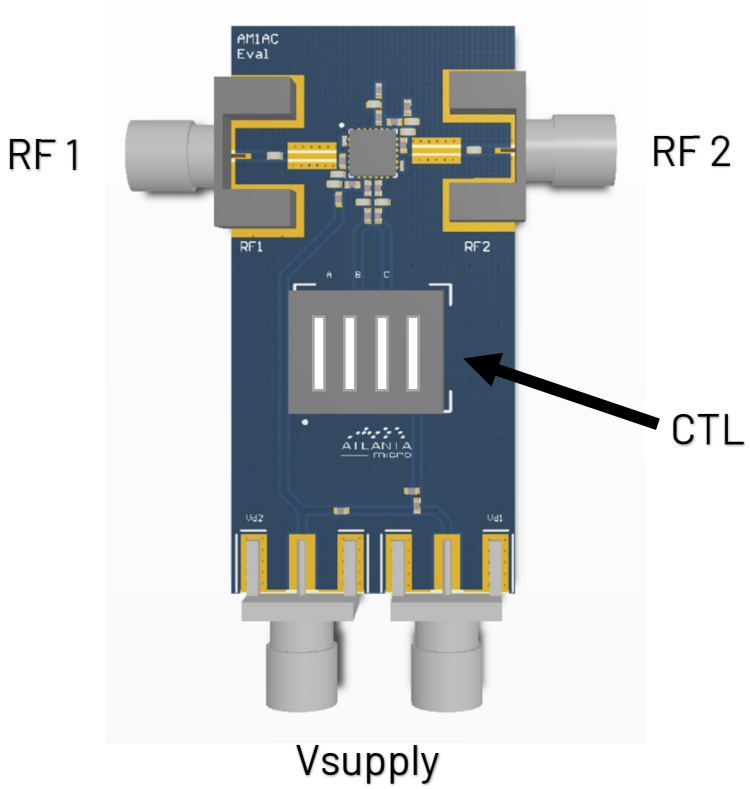
RECOMMENDED COMPONENT LIST (OR EQUIVALENT)

Part	Value	Part Number	Manufacturer
C1, C2	0.1uF	0201BB104KW250	Passives Plus
C3, C4	0.1uF	0402BB104KW500	Passives Plus
C5, C6	0.1uF	GRM155R71C104KA88	Murata
FB1, FB2	-	MMZ1005A222E	TDK

Notes:

1. Select control line RC filter values based on desired logic source decoupling and switching speed.
2. C3 and C4 should be placed as close to the AM1073 as possible to minimize PCB trace lengths. A 0201 package size is recommended to minimize stray PCB pad capacitance to ground.

EVALUATION PC BOARD



RELATED PARTS

Part Number		Description
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
AM1065	DC to 8 GHz	Bypassable Gain Block
AM1067	5 GHz to 20 GHz	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 (Higher IP3)

PARTS ORDERING DETAILS

Description	Part Number
4mm 24 Lead QFN	AM1073
AM1073 Evaluation Board	AM1073 Eval

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 (CrVl)	<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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