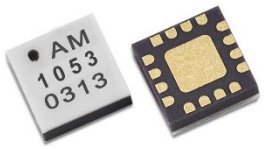
AM1053 – Amplifier

5 GHz to 20 GHz Gain Block

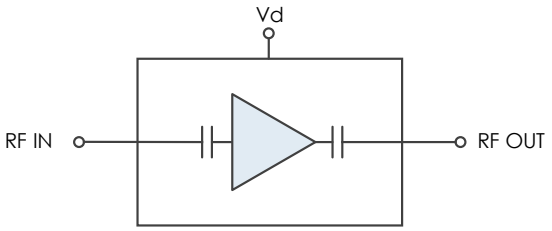


The AM1053 is a high dynamic range cascadable gain block covering the 5 GHz to 20 GHz frequency range. The device provides high gain and is capable of producing a +17 dBm output power with a single +3.3V supply, useful for many LO driver applications. The AM1053 exhibits a low noise figure, high third order intercept performance, and gain stability over the operating temperature range while offering internal 50Ω matching all packaged in a 3mm QFN or a shielded module.

FEATURES

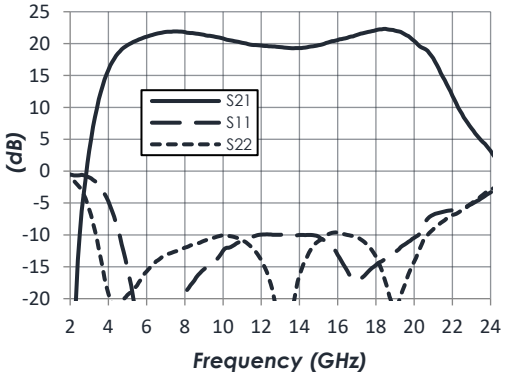
- 20 dB Gain TYP
- 2.5 dB Noise Figure
- +28 dBm OIP3
- +16 dBm P1dB
- +17 dBm Psat
- +3.3 V, 93 mA Supply
- 3mm QFN
- -40 C to +85 C Operation
- Unconditionally Stable
- No DC Blocking Caps Required

FUNCTIONAL DIAGRAM

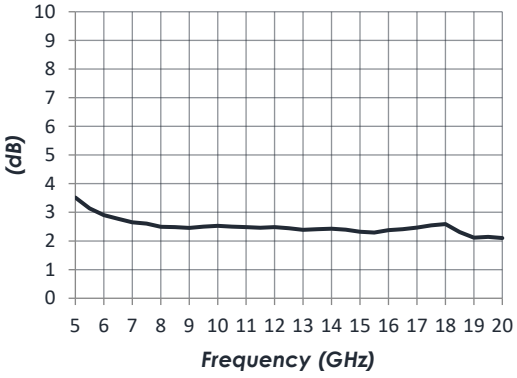


CHARACTERISTIC PERFORMANCE

Gain and Return Loss at +25C



Noise Figure at +25C



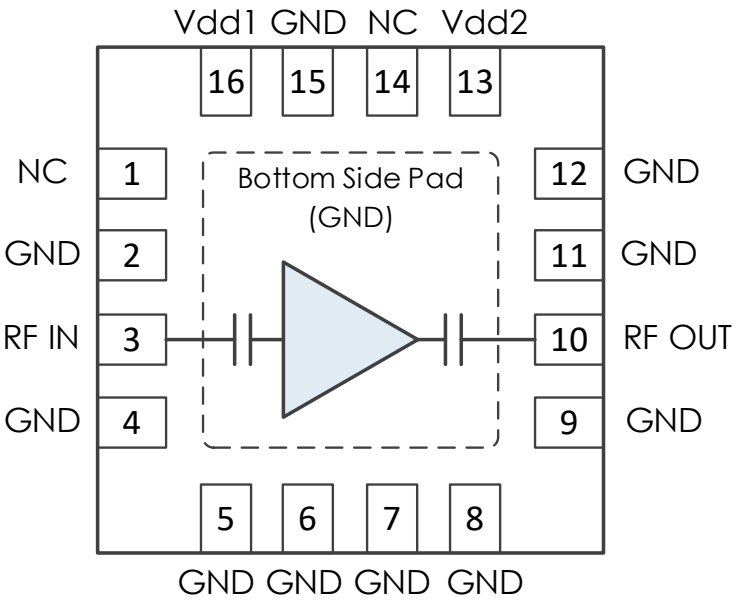
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REVISION HISTORY

Date	Revision	Notes
January 20, 2017	5	Office Location Updated
March 13, 2017	6	Formatting Corrected, Typical Application Updated.
May 22, 2019	7	Updated to Latest Datasheet Format. Various Plots Updated.
June 6, 2019	7A	Component Compliance Information Updated.
November 25, 2019	8	RF-Shielded Module Information Added, Part Ordering Details Added
May 15, 2020	9	Package and module information moved to main product page
November 7, 2024	10	Changed to Mercury branding. No content changes.

PIN LAYOUT AND DEFINITIONS



Pin	Name	Function
1	NC	Do Not Connect
2	GND	Ground - Common
3	RF In	RF Input – 50 Ohms – AC Coupled
4-9	GND	Ground - Common
10	RF Out	RF Output – 50 Ohms – AC Coupled
11, 12	GND	Ground - Common
13	VDD2	DC Power Input
14	NC	Do Not Connect
15	GND	Ground - Common
16	VDD1	DC Power Input
Case GND	GND	Ground - Common

SPECIFICATIONS

Absolute Maximum Ratings

	Minimum	Maximum
Supply Voltage	-0.3 V	+3.7 V
RF Input Power		+13 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. 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})	83.8

DC Electrical Characteristics

(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
DC Supply Voltage			+3.3 V	
DC Supply Current	VDD1 = VDD2 = +3.3 V	85 mA	93 mA	101 mA
Power Dissipated	VDD1 = VDD2 = +3.3 V	0.28 W	0.31 W	0.33 W

RF Performance

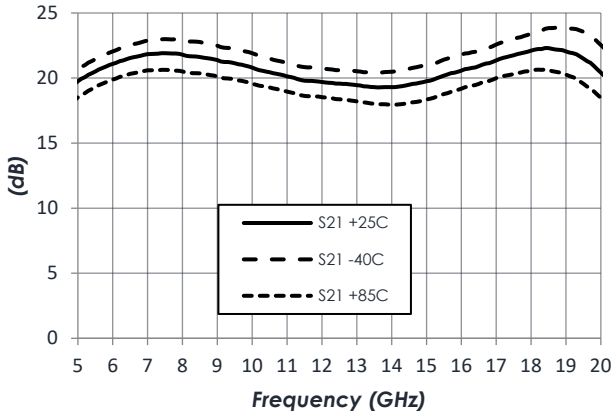
(T = 25 °C unless otherwise specified)

Param	Testing Conditions	Min	Typical	Max
Frequency Range		5 GHz		20 GHz
Gain	VDD1 = VDD2 = +3.3 V		20 dB	
Return Loss	VDD1 = VDD2 = +3.3 V		15 dB	
Reverse Isolation	VDD1 = VDD2 = +3.3 V		38 dB	
Output IP3	VDD1 = VDD2 = +3.3 V		+28 dBm	
Output P1dB	VDD1 = VDD2 = +3.3 V		+16 dBm	
Output Power Saturation	VDD1 = VDD2 = +3.3 V		+17 dBm	
Noise Figure	VDD1 = VDD2 = +3.3 V		2.5 dB	

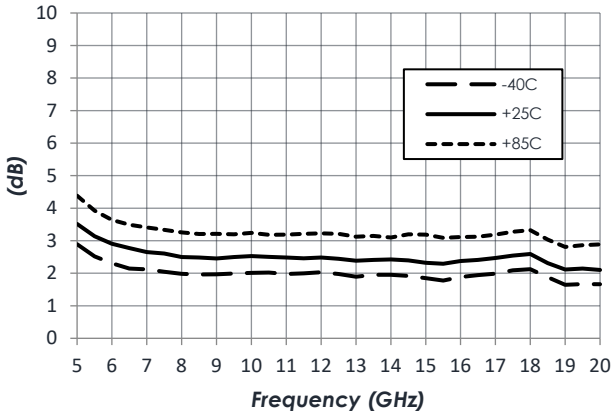
TYPICAL PERFORMANCE

(VDD1 = VDD2 = +3.3 V, ID1 = 31 mA, ID2 = 62 mA)

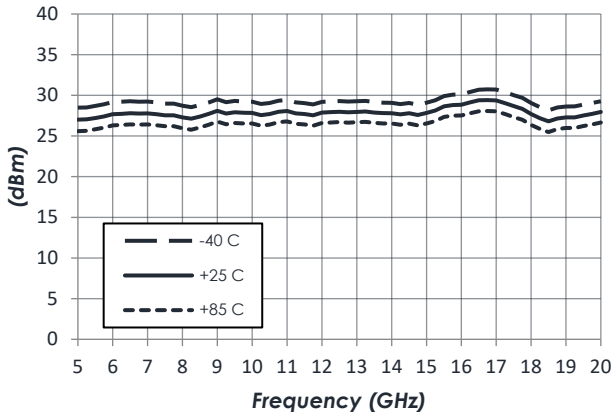
Gain vs Temperature



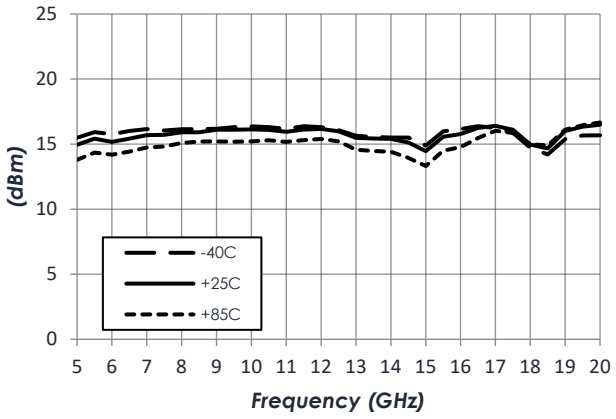
Noise Figure vs Temperature



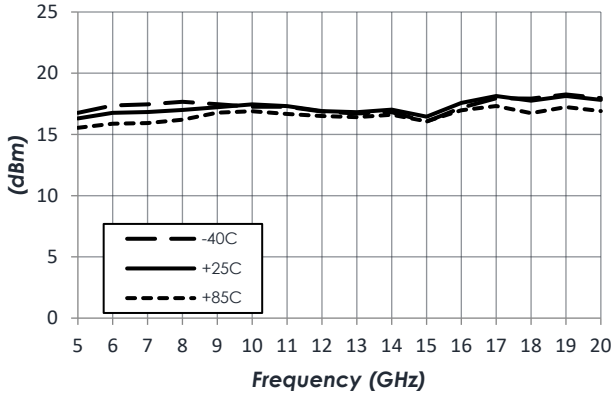
Output IP3 vs Temperature



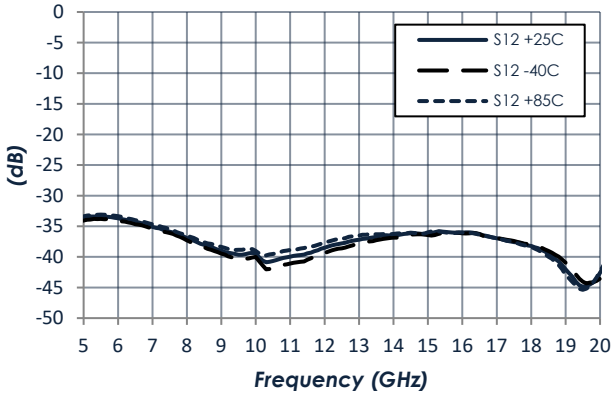
P1dB vs Temperature



Psat vs Temperature

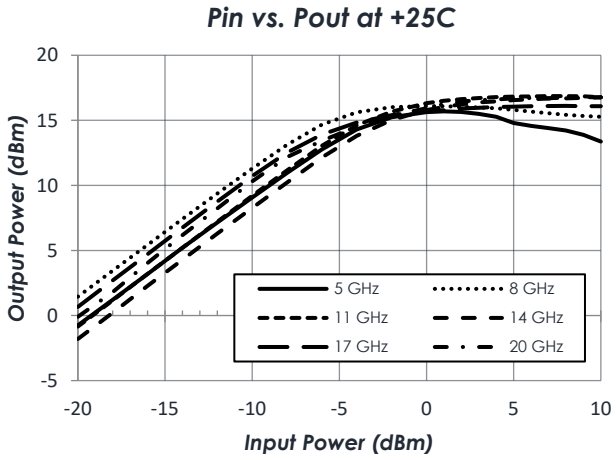


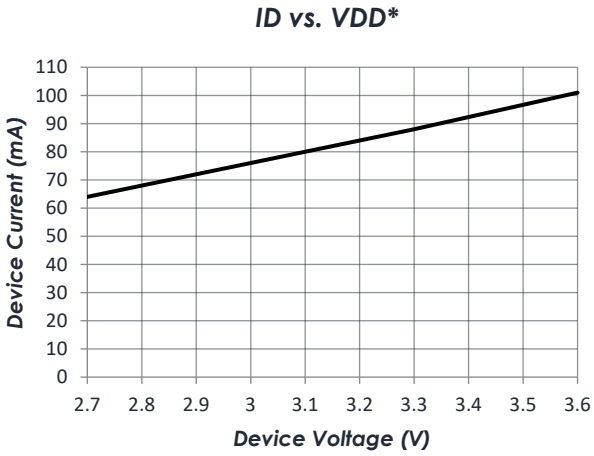
Reverse Isolation vs Temperature



TYPICAL PERFORMANCE (CONTINUED)

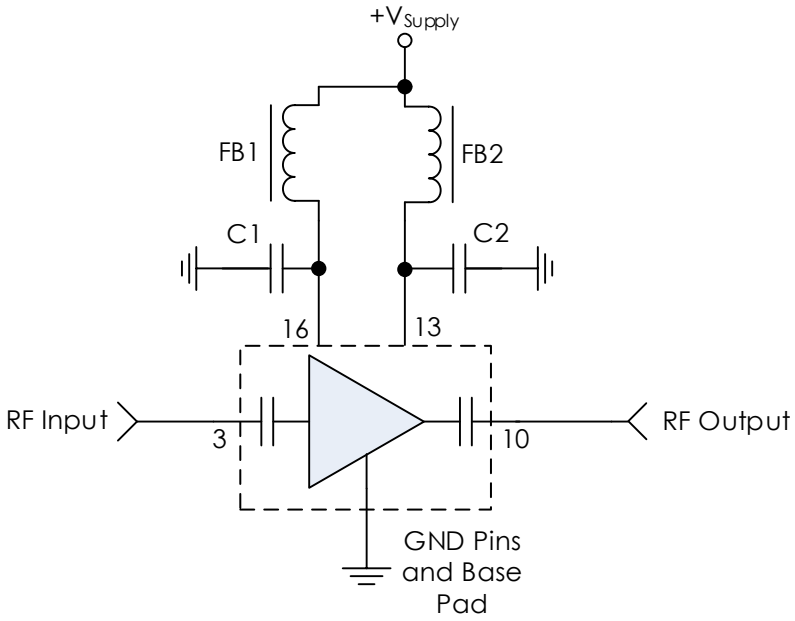
(VDD1 = VDD2 = +3.3 V, ID1 = 31 mA, ID2 = 62 mA)





***Note:** VDD = VDD1 = VDD2

TYPICAL APPLICATION



Recommended Component List (or Equivalent)

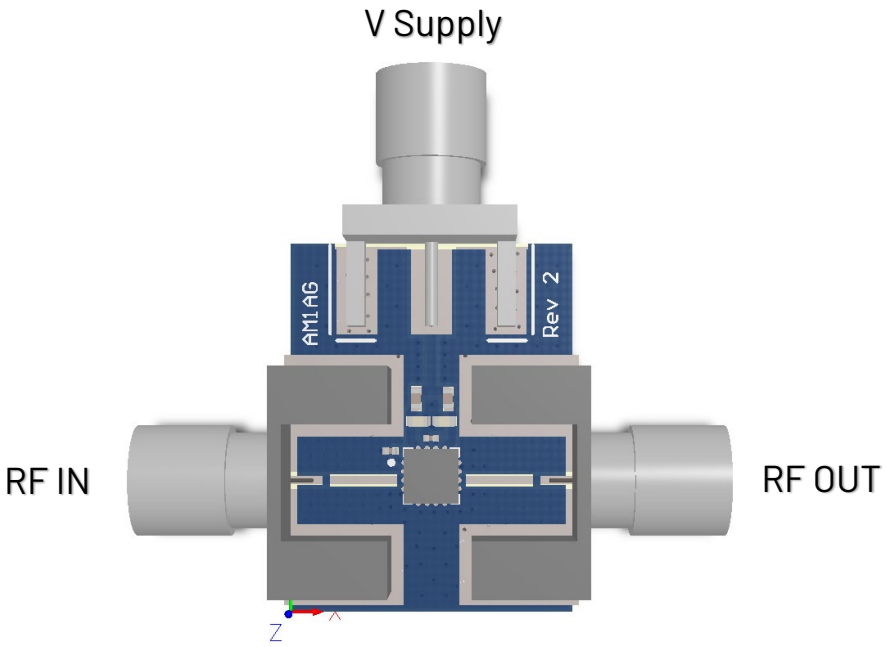
Part	Value	Part Number	Manufacturer
FB1, FB2	-	MMZ1005A222E	TDK
C1, C2	0.1µF	C1005X7R1H104K050BB	TDK

Note:

1. RF Input and RF Output pins are internally DC blocked.

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EVALUATION PC BOARD



Note: Some of the components shown may not be installed.

PARTS ORDERING DETAILS

Description	Part Number
3mm 16 Lead QFN	AM1053
AM1053 Evaluation Board	AM1053 Eval
AM1053 in 0.95" x 1.13" x 0.6" RF-Shielded Module with Integrated Bias Tee and Field Replaceable SMA Connectors	AM1053-M

RELATED PARTS

Part Number		Description
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
AM1064-1	DC to 8 GHz	Gain Block
AM1064-2	DC to 8 GHz	Miniature 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)

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