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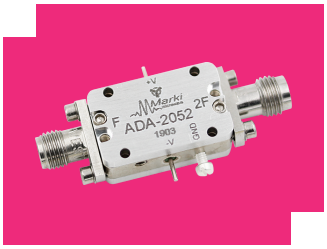
ADA-2052

Amplifier/Doubler/Amplifier

DEVICE OVERVIEW

General Description

The ADA-2052 can be used as a frequency extender to enhance the frequency range of a <26 GHz synthesizer up to 52 GHz. Useful for lab testing, test and measurement, and prototype systems. It consists of an input buffer ADM-5974CH amplifier, MMD 2060HCH doubler, and output buffer AMM 6702CH amplifier to provide a +16 dBm output (suitable for driving most mixers) from a -6 to +2 dBm input.



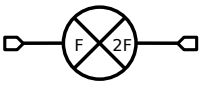
Features

- Input Frequency Range 10.5 – 26 GHz
- Output Frequency Range 21 - 52 GHz
- Input Power -6 to +2 dBm
- Output Power +16 dBm
- 1F Harmonic suppression 30 dBc
- 3F Harmonic suppression 26 dBc

Applications

N/A

Functional Block Diagram



Part Ordering Options

Part Number	Description	Connectors	Green Status	Product Lifecycle	Export Classification
ADA-2052	Amplifier/Doubler/Amplifier	Standard	REACH RoHS	Released	EAR99

Table Of Contents

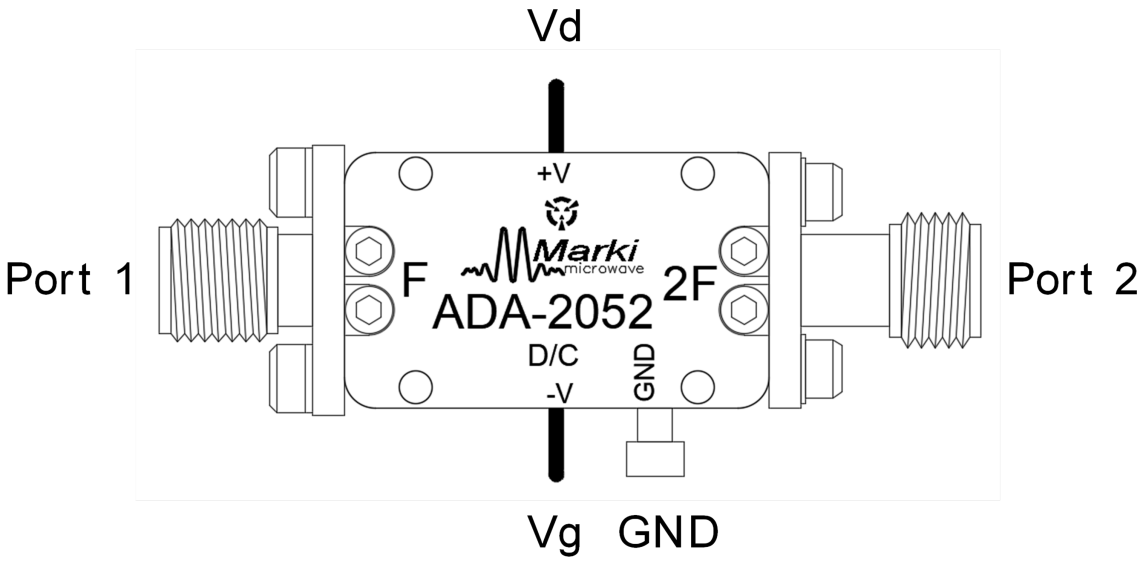
Revision History

Revision Code	Revision Date	Comment
-	2019-02-01	Datasheet Initial Release
A	2020-01-01	Added Sequencing Requirements
B	2020-06-01	Updated Outline Drawing and Port Diagram
C	2020-08-01	Updated Chipset Information
D	2022-08-01	Updated Frequency Coverage
E	2026-02-13	MTTF Table Added.

Port Configuration and Functions

Port Diagram

A top-down view of the ADA-2052 outline drawing is shown below.



Port Functions

Port	Function	Connector Type	Description	DC Equivalent Circuit
GND	Ground	-	Ground path is provided through the metal housing and outer ground lug.	
Port 1	Input	SMAF	This pin is DC open and matched to 50 Ω at frequency range 10.5 - 26 GHz.	
Port 2	Output	1.85F	This pin is DC open and matched to 50 Ω at frequency range 21 – 52 GHz.	
Vd	Positive bias	-	Drain bias port must be connected to a 3.5 – 5.0 Volt power supply.	
Vg	Negative bias	-	Gate control for the amplifier must be connected to a -0.5 to -0.6 Volt power supply.	CAP2

Specifications

Absolute Maximum Ratings

The Absolute Maximum Ratings indicate limits beyond which damage may occur to the device. If these limits are exceeded, the device may be inoperable or have a reduced lifetime.

Parameter	Maximum Rating	Unit
Maximum Operating Temperature	85	°C
Maximum Storage Temperature	150	°C
Minimum Operating Temperature	-55	°C
Minimum Storage Temperature	-65	°C
Negative Bias Current	2	mA
Negative Bias Voltage	-2	V
Positive Bias Current	550	mA
Positive Bias Voltage	5	V
Power Dissipation	2.5	W
RF Input Power	20	dBm

FIT and MTTF Table

T (°C)	λ (TIF)	MTTF (hr)	MTTF (yr)
105	2,441.45	4.10E+05	47
85	310.48	3.22E+06	368
55	8.79	1.14E+08	12,992
25	0.12	8.24E+09	941,063

Package Information

Parameter	Details	Rating
ESD	250 to < 500 Volts	HBM Class 1A
Dimensions	-	21.84 x 13.21 mm

Recommended Operating Conditions

Parameter	Min	Nominal	Max	Unit
Gate Bias DC Voltage (Vg)	-0.6	-0.5	-	V
Positive DC Voltage (Vd)	3.5	5	-	V

Sequencing Requirements

Turn-on Procedure:
1) Apply -0.6V to Vg
2) Apply Vd

Turn-off Procedure:
1) Turn off Vd
2) Turn off Vg

Electrical Specifications

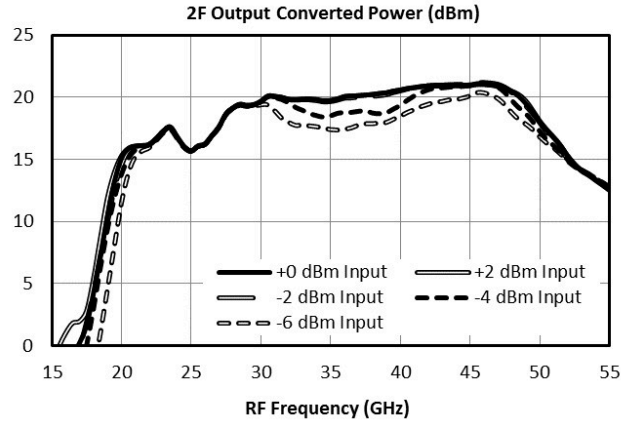
The electrical specifications apply at TA=+25°C in a 50Ω system. Suppression is relative to doubled output power. Isolation is defined as relative to the fundamental input power.

Parameter	Test Conditions	Minimum Frequency (GHz)	Maximum Frequency (GHz)	Min	Typ	Max	Unit
Current Consumption [1]	Vd: +4V	-	-	-	400	-	mA
Current Consumption [2]	Vg: -0.5V	-	-	-	0	-	mA
Input Power	Input = 10.5 - 26.0 GHz	-	-	-6	0	-	dBm
Output Converted Power, 2F (out)	Output = 21.0 - 52.0 GHz	-	-	14	16	-	dBm
Suppression, 1F	Output = 10.5 - 26.0 GHz	-	-	-	30	-	dBc
Suppression, 3F	Output = 31.5 - 60.0 GHz	-	-	-	26	-	dBc
Input Frequency Range	-	-	-	10.5	-	26	GHz
Output Frequency Range	-	-	-	21	-	52	GHz

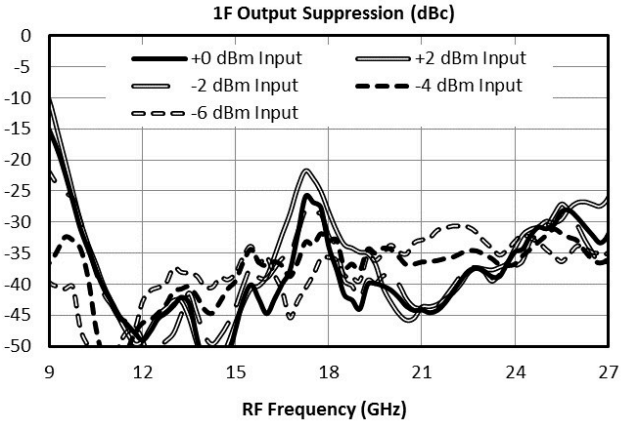
[1] It is required that the negative bias be applied before or concurrent with the positive bias. The higher input power the better 2F output power and the worse 1F suppression will be, (see plot 2F Output Converted Power).
[2] It is required that the negative bias be applied before or concurrent with the positive bias.

Typical Performance Plots

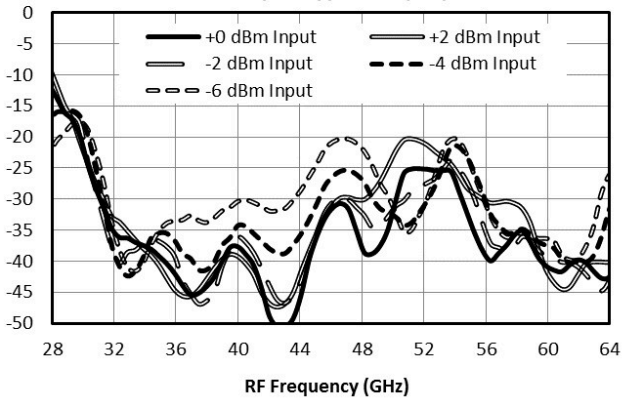
2F Output Converted Power (dBm)



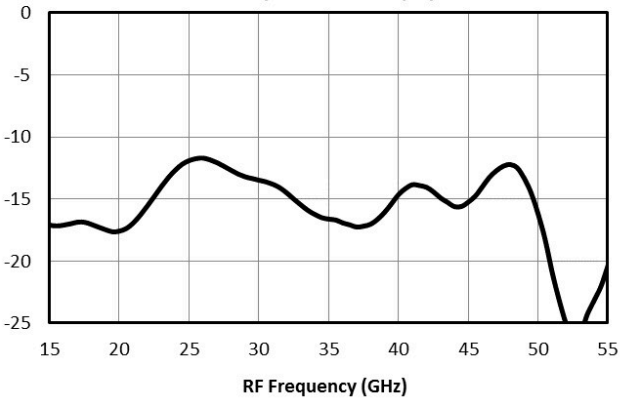
1F Output Suppression (dBc)



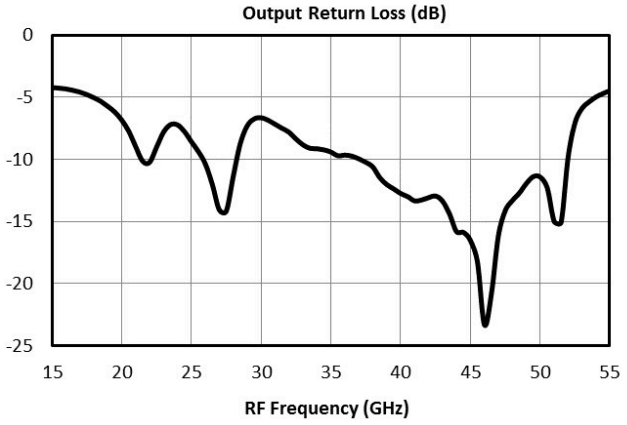
3F Output Suppression (dBc)



Input Return Loss (dB)



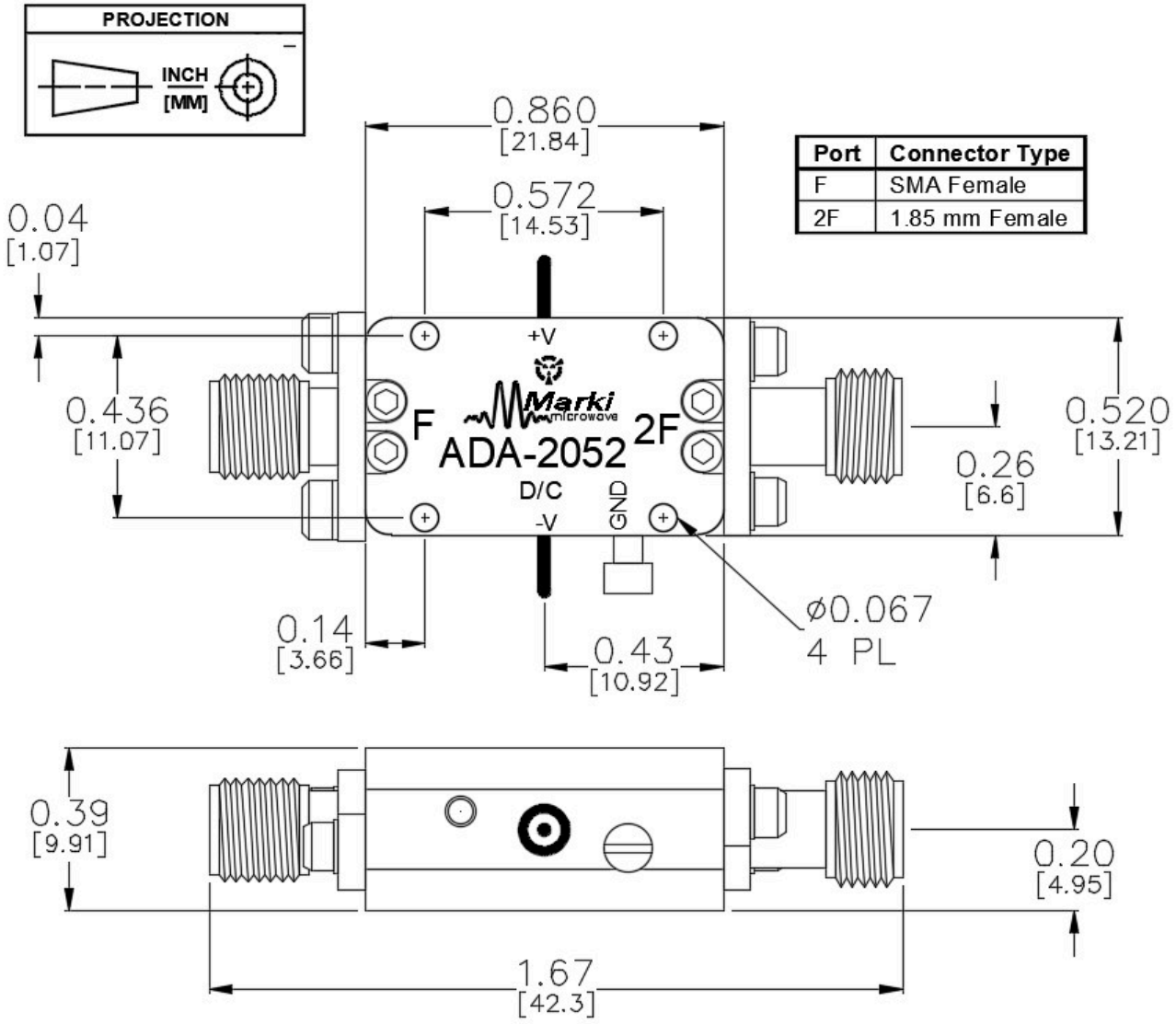
Output Return Loss (dB)



Mechanical Data

Outline Drawing

Download : Outline 2D Drawing | Outline 3D Drawing | Outline 3D STP



Port	Connector Type
F	SMA Female
2F	1.85 mm Female

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