

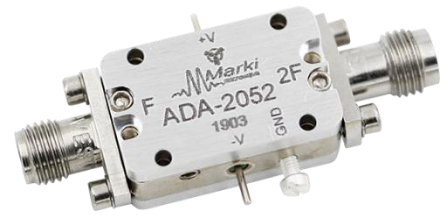
# AMPLIFIER/DOUBLER/AMPLIFIER

# ADA-2052

## 1. Device Overview

### 1.1 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 amplifier, doubler, and output buffer amplifier to provide a +16 dBm output (suitable for driving most mixers) from a -6 to +2 dBm input.

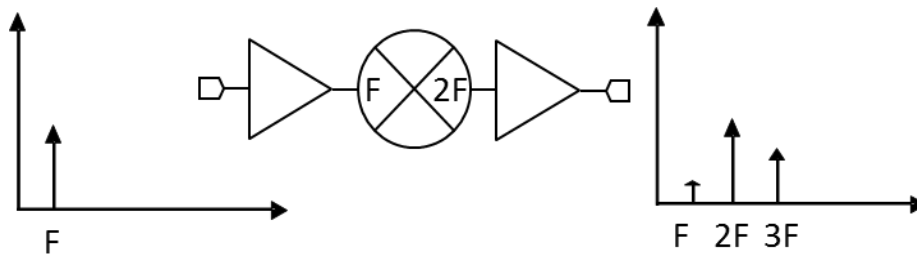


Module

### 1.2 Electrical Summary

Parameter	Typical	Unit
Input Frequency Range	10 – 26	GHz
Output Frequency Range	20 - 52	GHz
Input Power	-6 to +2	dBm
Output Power	+16	dBm
1F Harmonic suppression	30	dBc
3F Harmonic suppression	26	dBc

### 1.3 Functional Block Diagram



### 1.4 Part Ordering Options<sup>1</sup>

Part Number	Description	Green Status	Product Lifecycle	Export Classification
ADA-2052	Connectorized module	RoHS	Active	EAR99

<sup>1</sup> Refer to our [website](#) for a list of definitions for terminology presented in this table.

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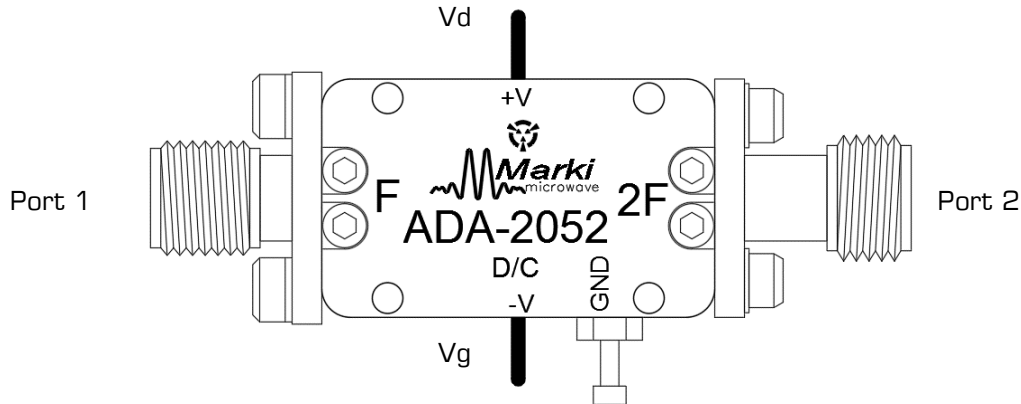
## Revision History

Revision Code	Revision Date	Comment
-	February 2019	Datasheet Initial Release
A	January, 2020	Added Sequencing Requirements

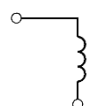
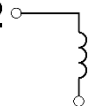
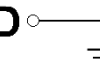
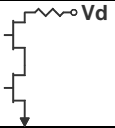
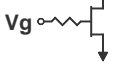
## 2. Port Configurations and Functions

### 2.1 Port Diagram

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



### 2.2 Port Functions

Port	Function	Description	Equivalent Circuit
Port 1	Input	This pin is DC open and matched to 50 $\Omega$ at frequency range 10 - 26 GHz	<b>P1</b> 
Port 2	Output	This pin is DC open and matched to 50 $\Omega$ at frequency range 20 – 52 GHz	<b>P2</b> 
GND	Ground	Ground path is provided through the metal housing and outer ground lug.	<b>GND</b> 
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.	

### 3. Specifications

#### 3.1 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.

Absolute Maximum Ratings	
Parameter	Maximum Rating
Positive Bias Voltage	5 V
Positive Bias Current	550 mA
Negative Bias Voltage	-2 V
Negative Bias Current	2 mA
RF Input Power	+20 dBm
Power Dissipation	2.5 W
ESD (Human Body Model)	Class 1A
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

#### 3.2 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

#### 3.3 Electrical Specifications

The electrical specifications apply at  $T_A = +25^\circ\text{C}$  in a  $50\Omega$  system.

Parameter	INPUT (GHz)	OUTPUT (GHz)	Min	Typ.	Max
Input (dBm) F(in)	10.0 – 26.0		-6	0	
Output Converted Power (dBm) 2F(out)		20.0 – 52.0	+14	+16	
Suppressions (dBc) F(in) Fundamental 3F(out) Third Harmonic		10.0 - 26.0 30.0 - 60.0		30 26	
Bias Requirements (mA) <sup>1</sup> Vd: +4.0 Volts DC <sup>2</sup> Vg: -0.6 Volts DC				400 0	

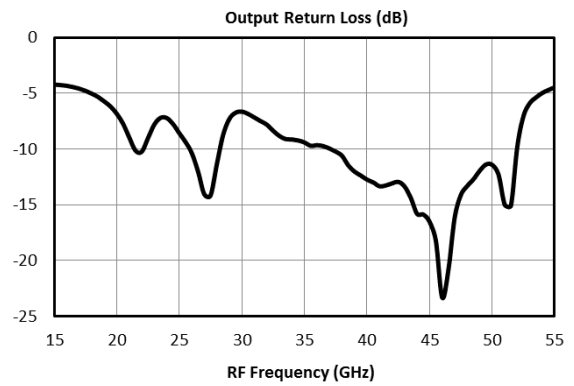
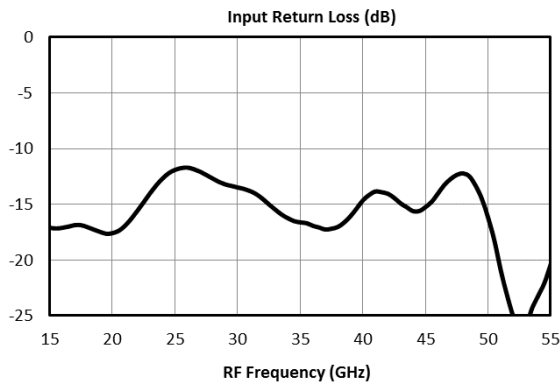
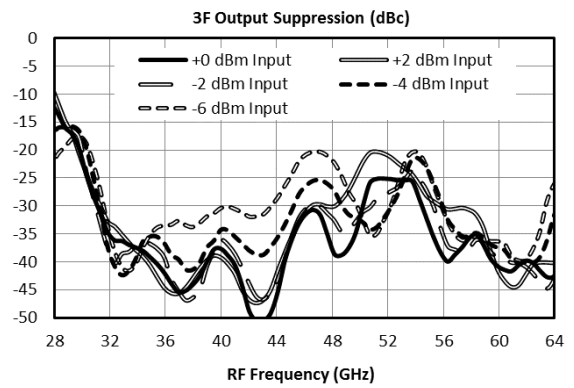
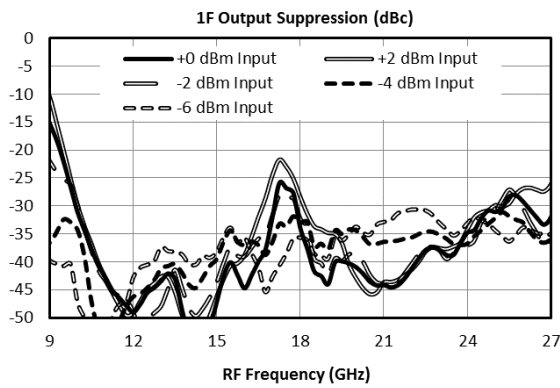
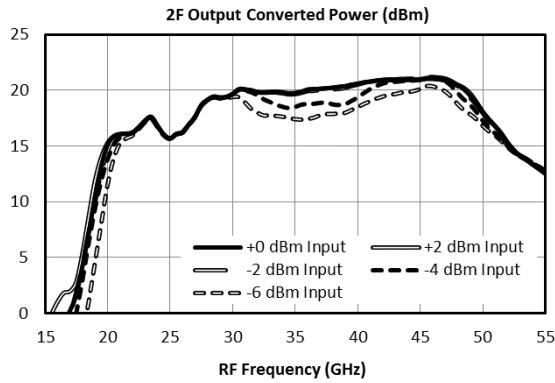
Suppression is relative to doubled output power. Isolation is defined as relative to the fundamental input power.

<sup>1</sup>It is required that the negative bias be applied before or concurrent with the positive bias. Contact [support@markimicrowave.com](mailto:support@markimicrowave.com) for alternate bias options.

<sup>2</sup>The higher input power the better 2F output power and the worse 1F suppression will be, (see plot **2F Output Converted Power**)

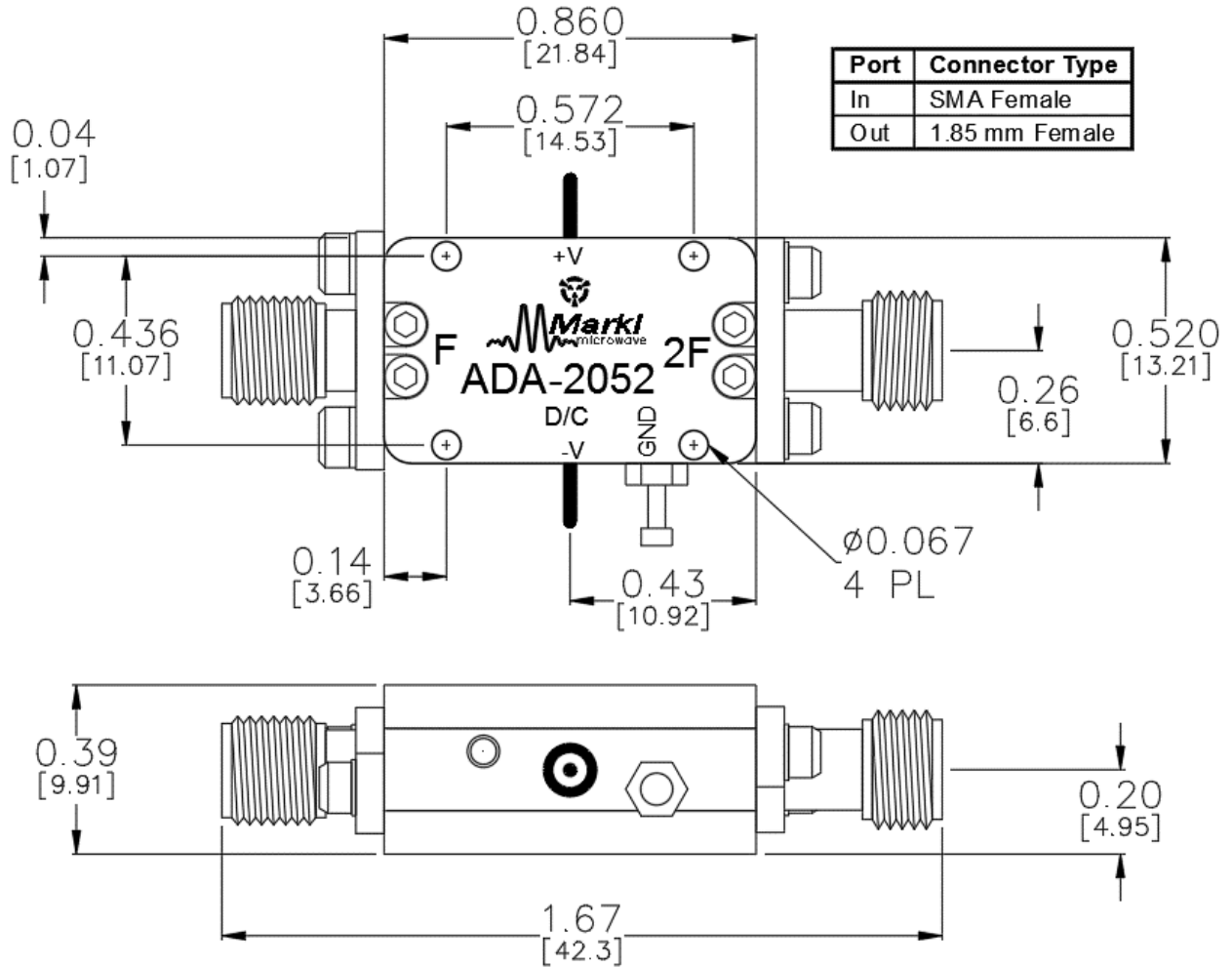
<sup>3</sup>Suppression and current consumption will vary with bias voltage. Optimal performance is at approximately +4.0 V / -0.6 V.

### 3.4 Typical Performance Plots



## 4. Mechanical Data

### 4.1 Outline Drawing



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