

MMIC AMPLIFIER/DOUBLER/AMPLIFIER

ADA-0416

1. Device Overview

1.1 General Description

The ADA-0416 can be used as a frequency extender to enhance the frequency range of a <8 GHz synthesizer up to 16 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 0-6 dBm input. In addition to operation as a module, it is suitable as a reference design for prototyping using only commercially available surface mount products.

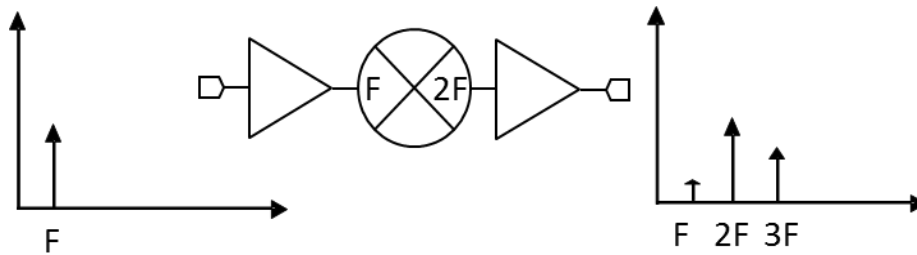


Module

1.2 Electrical Summary

Parameter	Typical	Unit
Input Frequency Range	2 - 8	GHz
Output Frequency Range	4 - 16	GHz
Input Power	0 to +6	dBm
Output Power	+13 to +16	dBm
1F Harmonic suppression	30	dBc
3F Harmonic suppression	26	dBc

1.3 Functional Block Diagram



1.4 Part Ordering Options¹

Part Number	Description	Green Status	Product Lifecycle	Export Classification
ADA-0416	Connectorized module	RoHS	Active	EAR99

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

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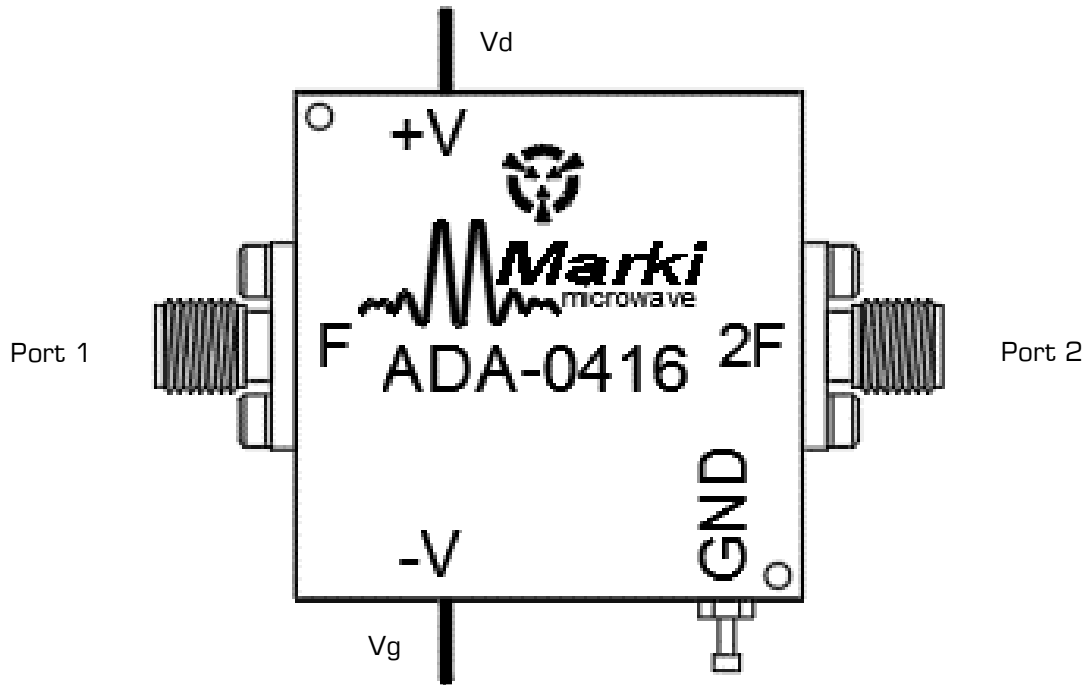
Revision History

Revision Code	Revision Date	Comment
-	December 2018	Datasheet Initial Release
A	December 2019	Modified bias current

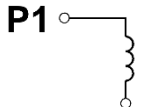
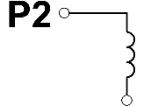
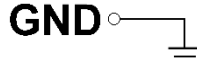
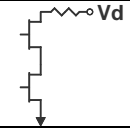
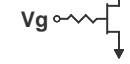
2. Port Configurations and Functions

2.1 Port Diagram

A top-down view of the ADA-0416 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 Ω .	P1 
Port 2	Output	This pin is DC open and matched to 50 Ω .	P2 
GND	Ground	Ground path is provided through the metal housing and outer ground lug.	GND 
Vd	Positive bias	Drain bias port.	
Vg	Negative bias	Gate control for the amplifier	

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	9 V
Positive Bias Current	550 mA
Negative Bias Voltage	-2 V
Negative Bias Current	10 mA
RF Input Power	+20 dBm
Power Dissipation	4 W
ESD (Human Body Model)	Class 1A
Operating Temperature	-55°C to +85°C
Storage Temperature	-65°C to +150°C

3.2 Electrical Specifications

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

Parameter	INPUT (GHz)	OUTPUT (GHz)	Min	Typ.	Max
Input (dBm) ² F(in)	2.0 - 8.0			0 - 6	
Output Converted Power (dBm) 2F(out)					
0 dBm Input Power		4.0 – 16.0	12	+13	
2 dBm Input Power				+14	
4 dBm Input Power				+15	
6 dBm Input Power				+16	
Suppressions (dBc)					
F(in) Fundamental		2.0 – 8.0		30	
3F(out) Third Harmonic		6.0 – 24.0		26	
Bias Requirements (mA) ¹					
Vd: +7 Volts DC				420	
Vg: -0.15 Volts DC ³				5	

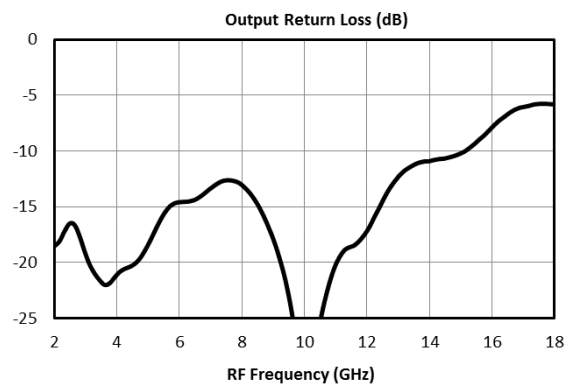
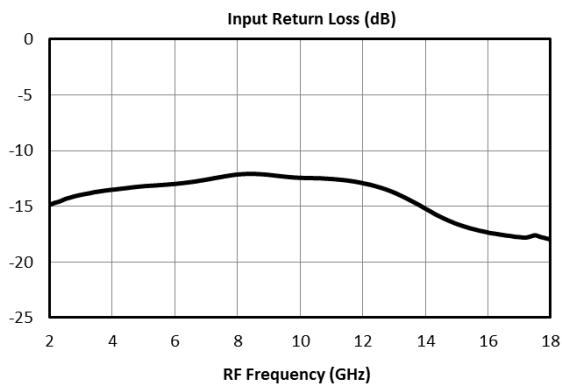
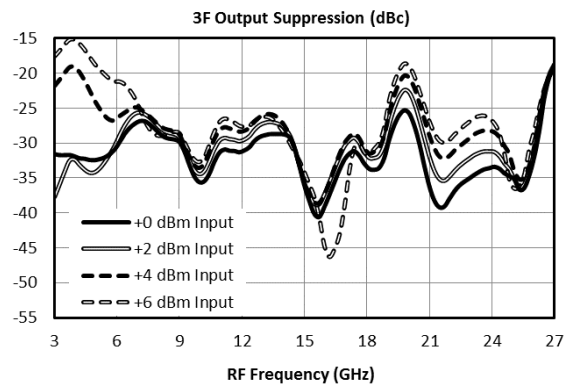
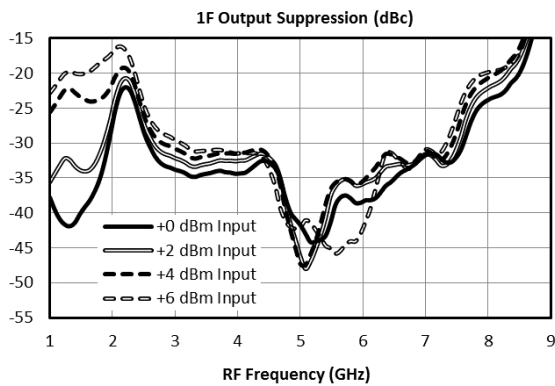
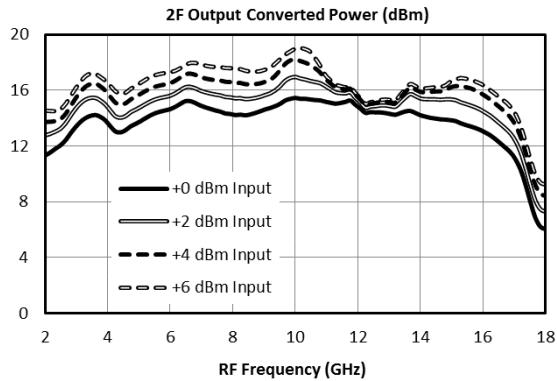
Suppression is relative to doubled output power. Isolation is defined as relative to the fundamental input power.

¹ The positive bias is from +3 to +7 Volts and the negative bias is from -0.25 to ground. The higher positive bias voltage, the better 2F output converted power will be, and the lower positive bias voltage, the better 1F, 3F harmonic suppression will be. Contact support@markimicrowave.com for alternate bias options.

² The higher input power the better 2F output power and the worse 1F/3F suppression will be, (see plot **2F Output Converted Power**)

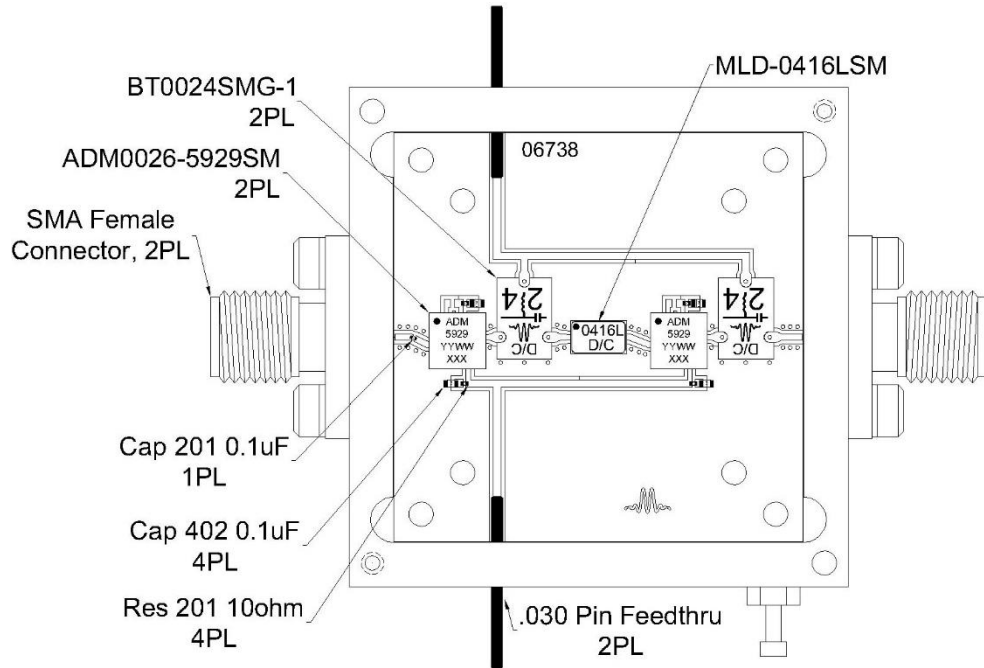
³ Suppression and current consumption will vary with negative bias voltage. Optimal performance is at approximately -0.15 V.

3.3 Typical Performance Plots

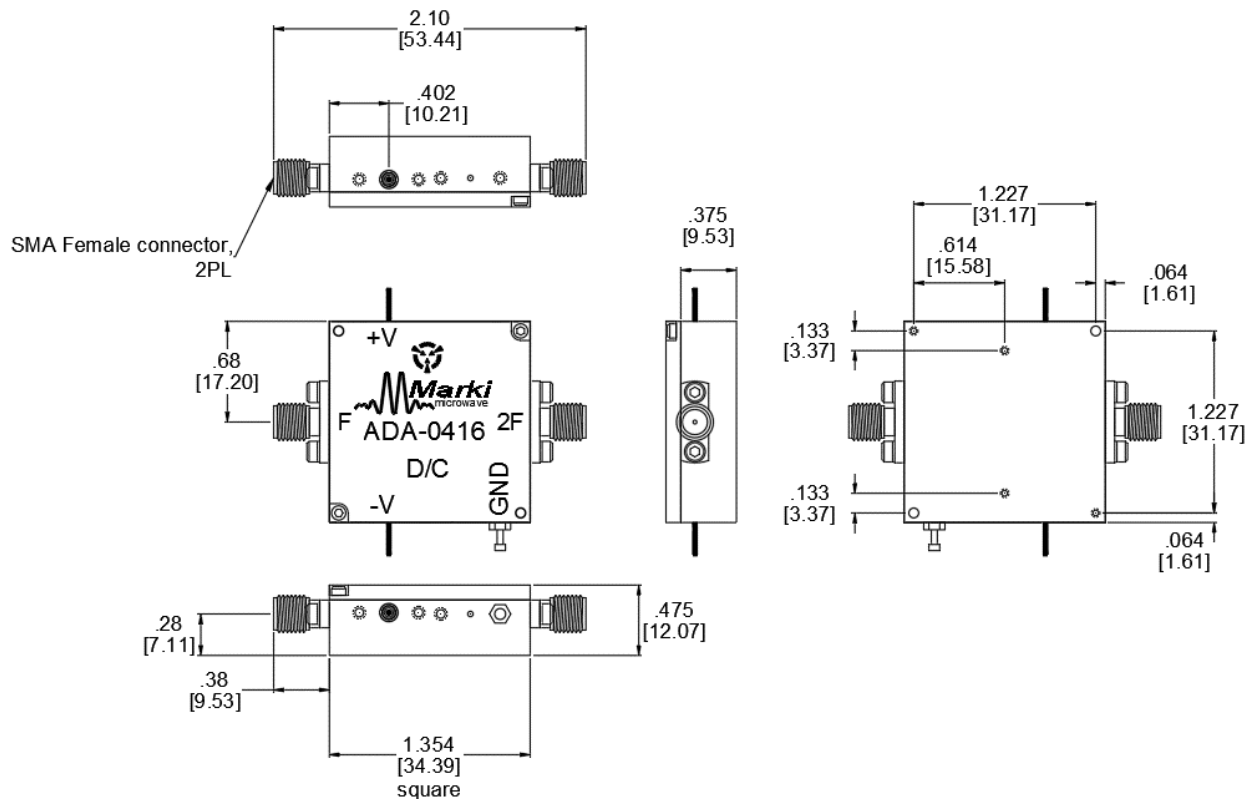


4. Mechanical Data

4.1 Assembly Drawing



4.2 Outline Drawing



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