VeGA
Variable Gain Amplifier

Ordering Information

SKU	Description	UPC
100826	Variable Gain Amplifier	0616469146670

Description

A high-quality and high-performance variable gain amplifier designed to provide the user with a control for the level of amplification to achieve the best signal to noise ratio (SNR). The device can be used for software defined radio (SDR) applications.

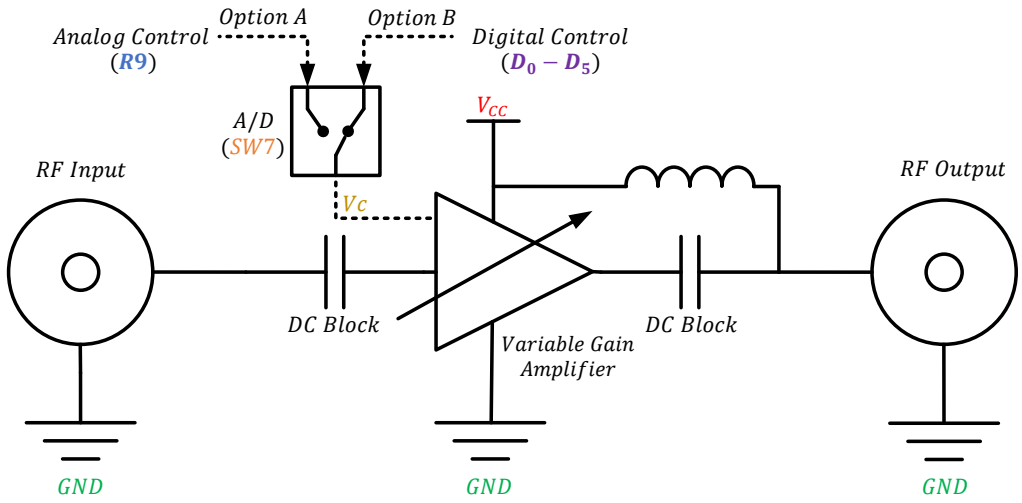
Features

- Adjustable gain
- 46 dB maximum gain
- Low noise figure
- Two options to control the gain using SW7
- A 50Ω RF gain block
- USB and Bias Tee power

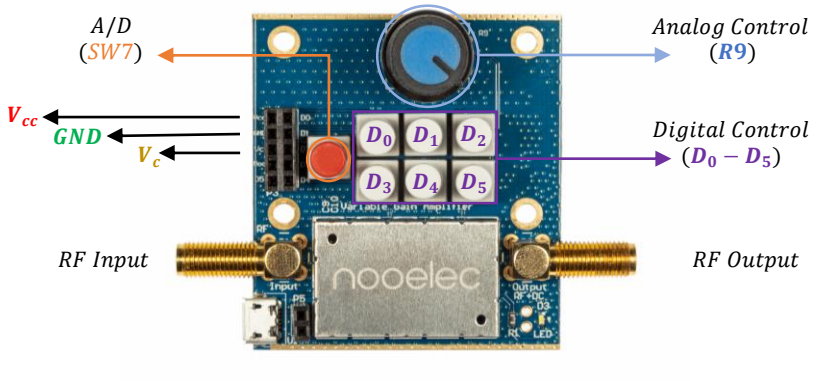
Applications

- Software defined radio
- General purpose amplification
- Low noise applications
- High dynamic range applications
- Wideband reception

Simplified Schematic

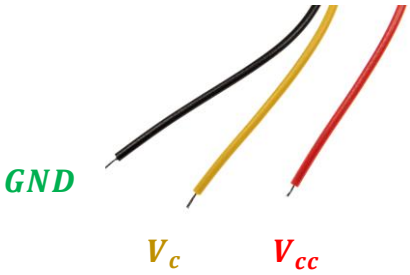


Pin Configuration and Functions



* The Variable Gain Amplifier allows for 3 different power options (USB, Pin Header and Bias-Tee). At any given time not more than one option should be used.

Voltmeter Pinout



Pin	Function	Type	Description
V_{cc}	Bias Voltage	Output	+3.3 Volts output pin to power the voltmeter
GND	Common Ground	-	RF and DC reference voltage
V_c	Control Voltage	Output	The voltage value that will determine the level of amplification

Switches Pinout

Pin	Function	Type	Description
D_0	Digit 0	Output	Voltage value of switch 1 (SW1)
D_1	Digit 1	Output	Voltage value of switch 2 (SW2)
D_2	Digit 2	Output	Voltage value of switch 3 (SW3)
D_3	Digit 3	Output	Voltage value of switch 4 (SW4)
D_4	Digit 4	Output	Voltage value of switch 5 (SW5)
D_5	Digit 5	Output	Voltage value of switch 6 (SW6)

** The voltage value of the switch is GND (0 Volts) when not pressed and V_{cc} (3.3 Volts) when pressed.

Recommended Operating Conditions

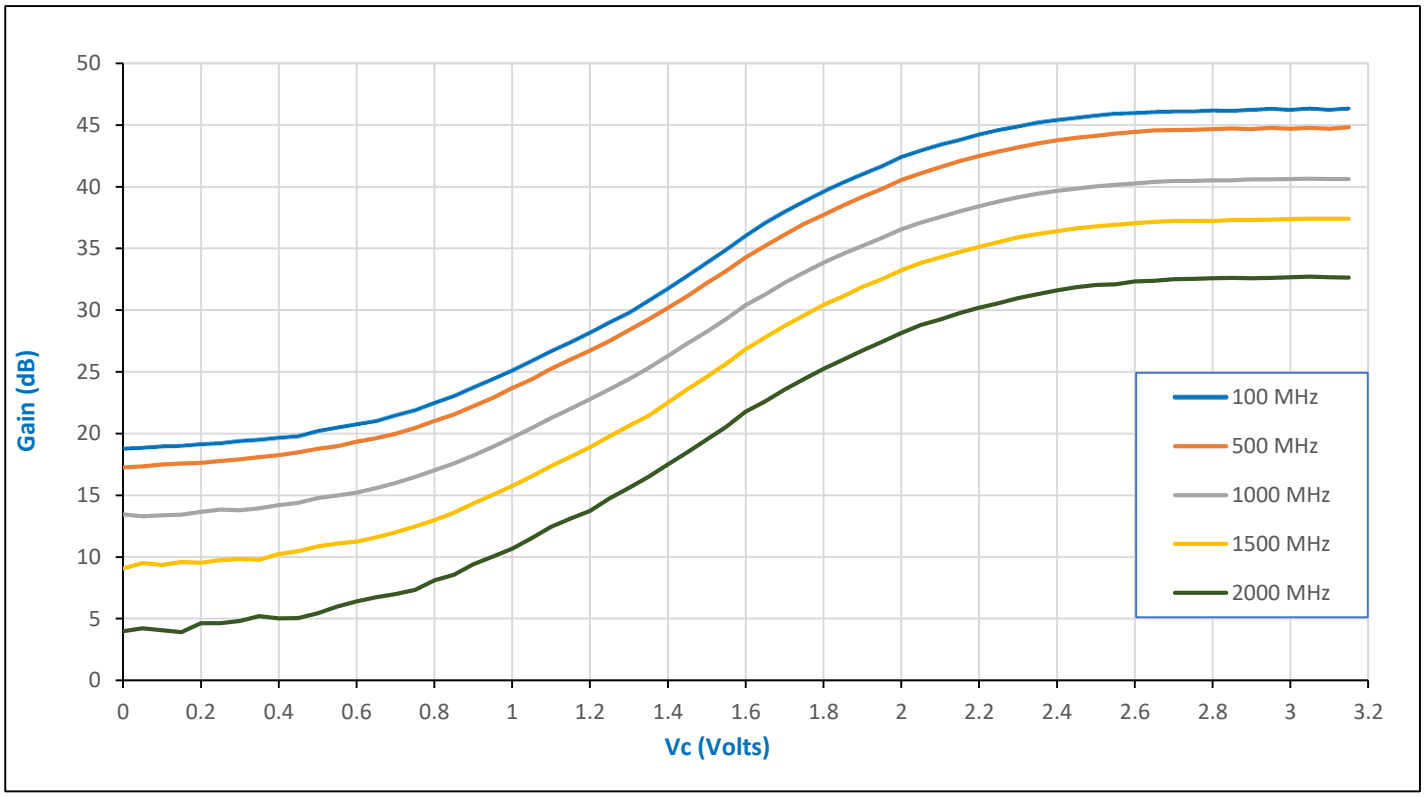
Parameter	Symbol	Min	Typical	Max	Unit
Input Voltage	V_{USB}	3.3	5	5.5	Volts
Input Power	P_{in}	-	-	0	dBm
Vc Voltage	V_{ctrl}	GND	-	V_{cc}	Volts

Electrical Specifications

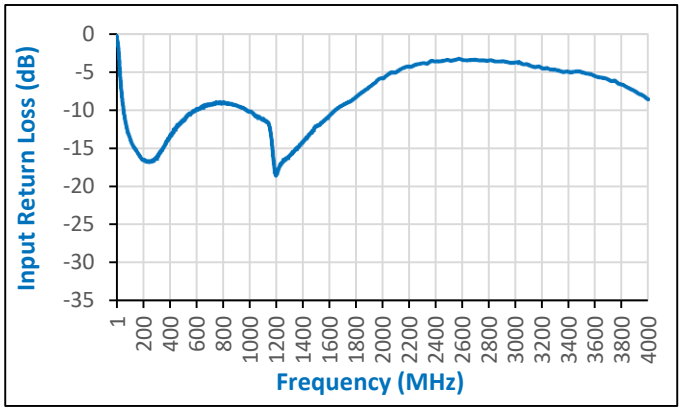
Test conditions unless otherwise specified: 50 Ohm system.

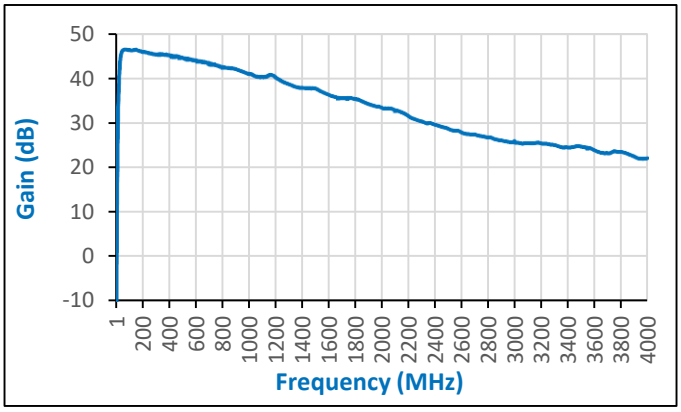
Parameter	Symbol	Min	Typical	Max	Unit
Frequency Range	$f_L - f_H$	30	-	4000	MHz
Center Frequency	f_o	-	1985	-	MHz
Gain at Vc = 3.3 V	S21	22	-	46	dB
Gain at Vc = 0.0 V	S21	-3	-	20	dB
Input Return Loss @ 1GHz	S11	-	-10	-	dB
Output Return Loss @ 1GHz	S22	-	-10	-	dB
Output P1dB	OP1dB	-	23	-	dBm
Total Noise Figure @ 1 GHz	NF	0.8	1.1	1.5	dB
Noise Temperature	T_n	59	84	120	K
Supply Current	I_{supply}	240	260	280	mA

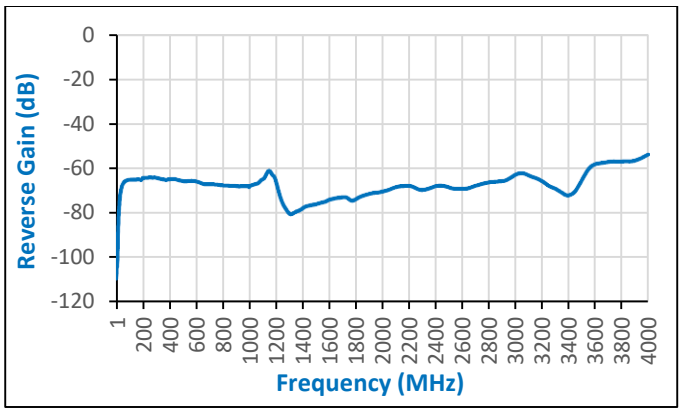
Gain vs Vc

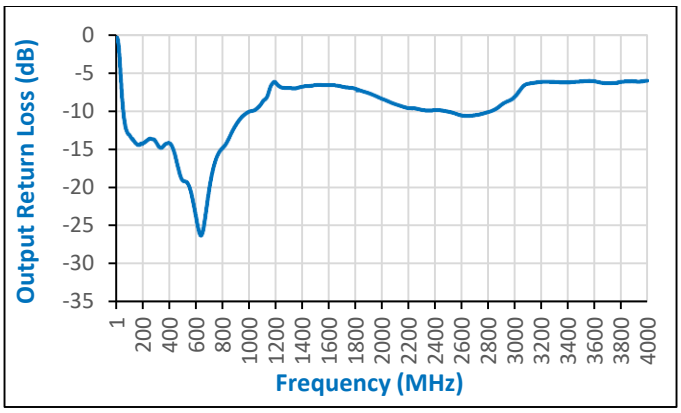


Maximum Gain [Vc = 3.3 V] - Electrical Characteristics Plots (1 MHz to 4000 MHz)

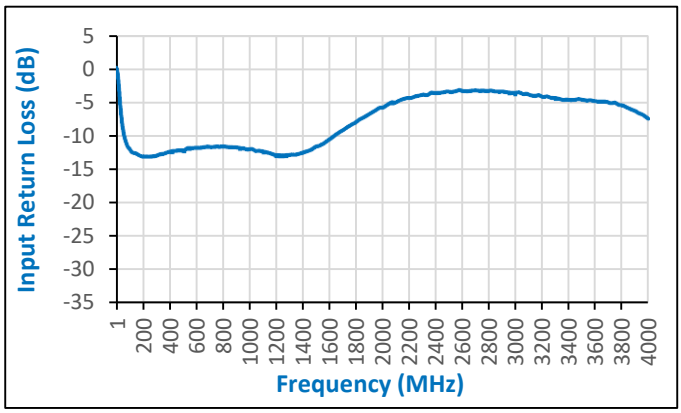


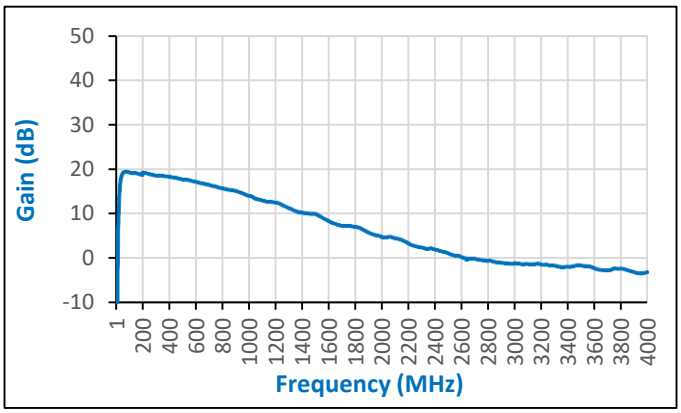


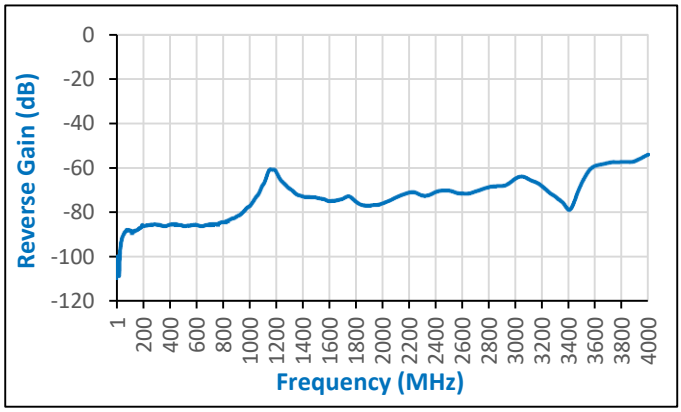


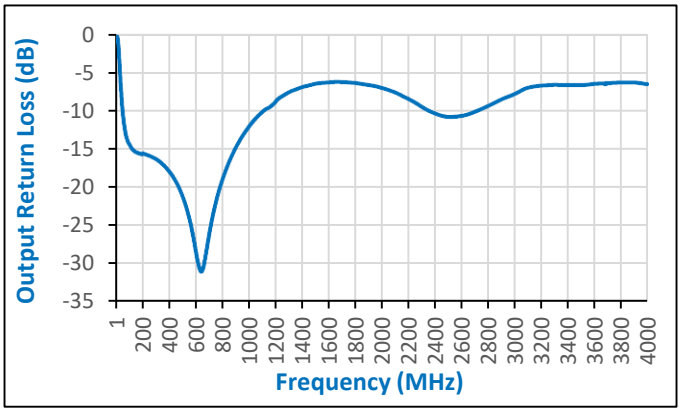


Minimum Gain [Vc = 0.0 V] - Electrical Characteristics Plots (1 MHz to 4000 MHz)









Calculating Vc Value

Option	Function	Type	Description
Option A	A/D Switch (SW7) not pressed	Analog Control By $R9$	$0.1\,Volts < V_c < 3.2\,Volts$
Option B	A/D Switch (SW7) pressed	Digital Control By $D_0 - D_5$	$V_c = 1.60 * D_5 + 0.80 * D_4 + 0.40 * D_3 + 0.20 * D_2 + 0.10 * D_1 + 0.05 * D_0$

Example Calculation:
If **Option 2** is enabled by pressing the A/D switch (SW7) and D_5, D_1 and D_0 pressed while D_4, D_3 and D_2 are not pressed then:

$D_5 = D_1 = D_0 = 1$
$D_4 = D_3 = D_2 = 0$
$V_c = 1.60 * D_5 + 0.80 * D_4 + 0.40 * D_3 + 0.20 * D_2 + 0.10 * D_1 + 0.05 * D_0$
$V_c = 1.60 * 1 + 0.80 * 0 + 0.40 * 0 + 0.20 * 0 + 0.10 * 1 + 0.05 * 1$
$V_c = 1.60 + 0 + 0 + 0 + 0.10 + 0.05$
$V_c = 1.75\ Volts$

Physical Specifications

Parameter	Value	Unit
Length	75 (2.95)	Millimeter (Inch)
Width	55 (2.17)	Millimeter (Inch)
Height	20 (0.79)	Millimeter (Inch)
Weight	23.4 (0.05)	Gram (Pound)

Accessories and Related Products

Nooelec NESDR SMArTee v2	SMA Attenuator Kit – 1dB to 42dB	Flamingo FM - Broadcast FM Bandstop Filter
SKU: 100777	**SKU**: 100815	**SKU**: 100780