

NuWaves

RF Solutions

NuPower™ 13G05A L-Band Solid State Power Amplifier

35 Watts CW
20 Watts Linear, 5% EVM @ 43 dBm
800 MHz to 2.0 GHz

P/N: NW-PA-13G05A



The NuPower™ 13G05A is a small, highly efficient, solid state power amplifier that provides 35 watts of RF power to boost performance of data links and transmitters.

The NuPower 13G05A Power Amplifier accepts a nominal 0 dBm (1 mW) RF input and provides 45 dB of gain from 800 MHz to 2000 MHz. This module handles both constant envelope and complex waveforms such as OFDM, QAM, DVB-T, etc.

Based on the latest gallium nitride (GaN) technology, the NuPower 13G05A's 45% (typ) power efficiency at rated power and 10^{-3} form factor make it ideal for size, weight, and power-constrained broadband RF telemetry, tactical communication systems, and electronic warfare systems.

NuPower PAs feature over-voltage protection and can operate over a wide temperature range of -40 °C to +85 °C (baseplate).

Extend your operational communication range with NuPower™ amplifiers from NuWaves RF Solutions.

Features

- 35 Watts RF Output Power (min)
- 800 MHz to 2.0 GHz
- Small Form Factor (4.50" x 3.50" x 0.61")
- High-Efficiency GaN Technology
- 0 dBm Nominal RF Input
- Over-Voltage Protection
- Logic On/Off Control

Benefits

- Extended Range
- Improved Link Margin
- Reduced load on DC power budget due to high efficiency operation
- Requires less volume on space-constrained platforms

Applications

- Broadband RF Telemetry
- RF Communication Systems
- Electronic Warfare - Airborne Electronic Attack
- Unmanned Aircraft Systems (UAS)
- Unmanned Ground Vehicles (UGV)
- Software Defined Radios

NuPower™ 13G05A Power Amplifier

Specifications

Absolute Maximums

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	4.5	A
Max RF Input Power, $Z_L = 50 \Omega$	12	dBm
Max Operating Temperature (ambient)	85	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification
EAR99

Electrical Specifications @ 28VDC, 25 °C, $Z_S=Z_L=50 \Omega$

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	800		2000	MHz	
RF Output Power	P_{SAT}	35	50		W	800 MHz - 2000 MHz, 0 dBm input
Output Power @ 1dB Compression	P_{1dB}		30		dBm	800 MHz
			31			1500 MHz
			31			2000 MHz
Small Signal Gain	G		55		dB	800 MHz, @ -40 dBm input
			55			1500 MHz, @ -40 dBm input
			53			2000 MHz, @ -40 dBm input
Small Signal Gain Flatness	ΔG		2.5		dB	$P_{in} = -40$ dBm
Input VSWR	VSWR		2.0			
Nominal Input Drive Level	P_{IN}		0		dBm	
Operating Voltage	VDC	27	28	30	V	
Quiescent Current (unbiased)	I_{DQ}		0.10		A	RF Enable Floating
Quiescent Current (biased)	I_{DQ}		0.65		A	RF Enable Low
Operating Current	I_{DD}		3		A	$P_{in} = 0$ dBm
Module Efficiency			45		%	$P_{in} = 0$ dBm, +28V
Switching Speed	$T_{XON/OFF}$		1	2	μ S	10% to 90%
Third Order Order Intercept Point (Two tone test at 1 MHz spacing, $P_{out} = 20$ dBm / tone)	OIP3		44		dBm	800 MHz
			42			1500 MHz
			44			2000 MHz
Harmonics	2nd		-25		dBc	
	3rd		-20			
Output Mismatch (No Damage)				10:1	Ψ	No Damage at All Phase Angles

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Specifications (cont.)

Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	4.5 x 3.5 x 0.61	in	Max
Weight	9	oz	Max
RF Connectors, Input/Output	SMA Female		
Interface Connector	Micro-D, 9-pin Socket		
Cooling	Adequate Heatsink Required		

Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T_A	-40		+60	°C
Operating Temperature (baseplate)	T_C	-40		+85	°C
Storage Temperature	T_{STG}	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration / Shock Profile (Random profile in x,y, z axis, as per Figure for 15 minute duration in each axis)					

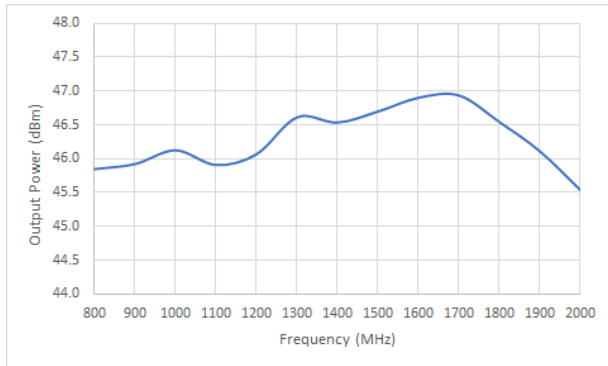
The graph shows the Power Spectral Density (PSD) profile for the amplifier. The y-axis is Power Spectral Density in g^2/Hz and the x-axis is Frequency in Hz. The profile is a trapezoid with a flat top at $0.04 g^2/Hz$ between 80 Hz and 350 Hz. The slope is +3 dB/octave from 20 Hz to 80 Hz and -3 dB/octave from 350 Hz to 2000 Hz.

NuPower™ 13G05A Power Amplifier

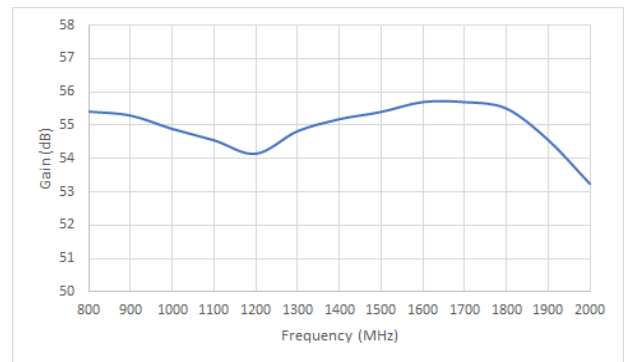
Performance Plots

Test Conditions: +28 VDC, +25 °C, $Z_S=Z_L=50 \Omega$

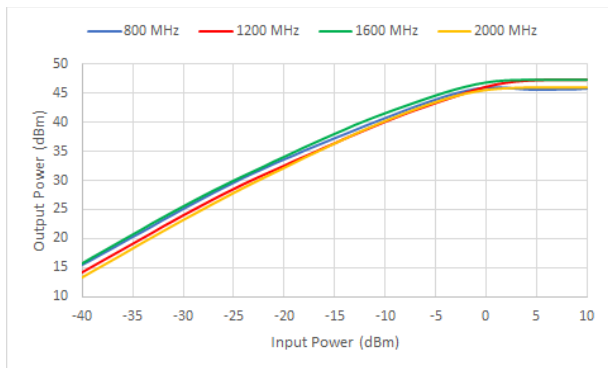
Output Power [0dBm Input Power]



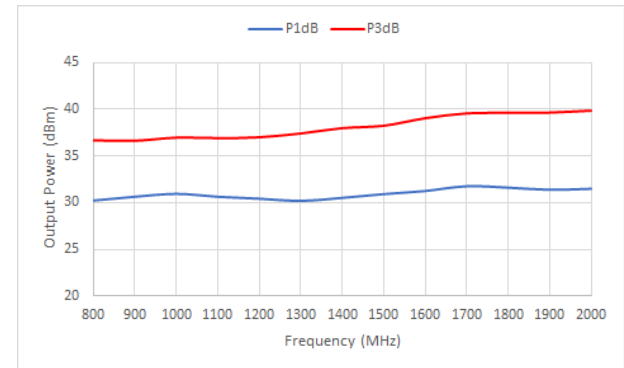
Small Signal Gain [-40dBm Input Power]



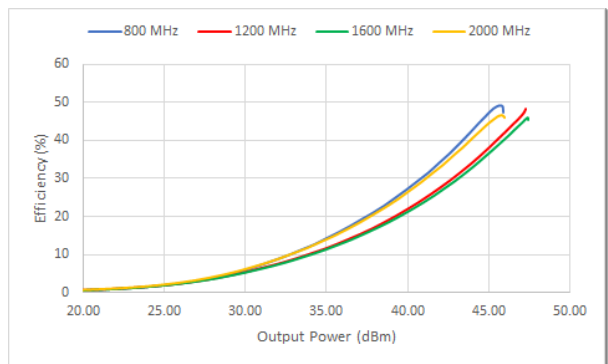
Output Power vs. Input Power



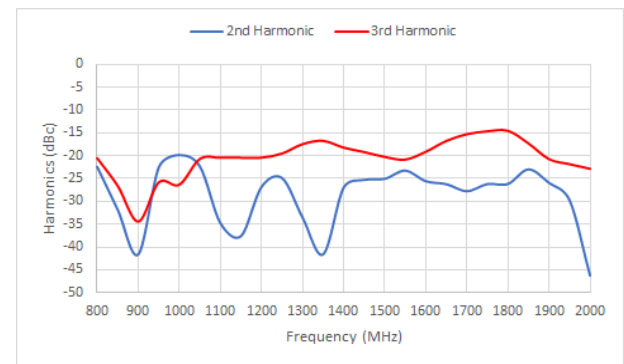
P1dB & P3dB



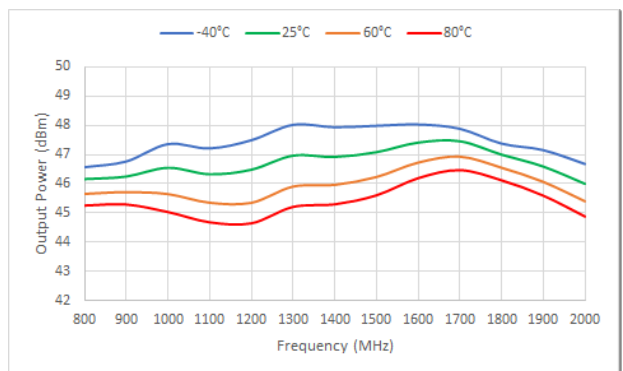
Efficiency vs. Output Power



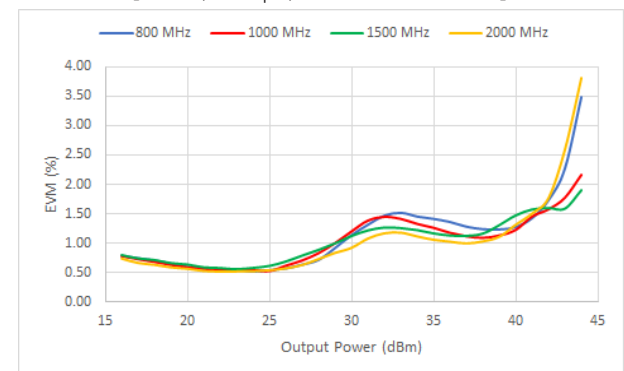
Harmonics [@P_{sat}]



Output Power vs. Temperature [Baseplate]



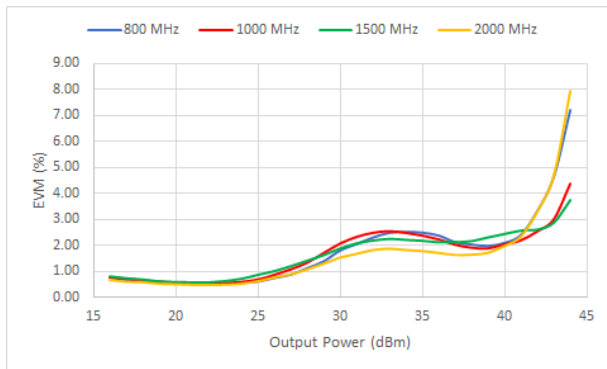
Error Vector Magnitude vs. Output Power [QPSK, 1Msps, 35% Roll Off Rate]



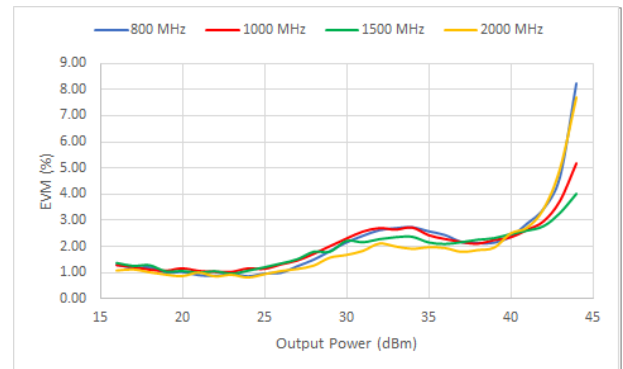
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Performance Plots (cont.)

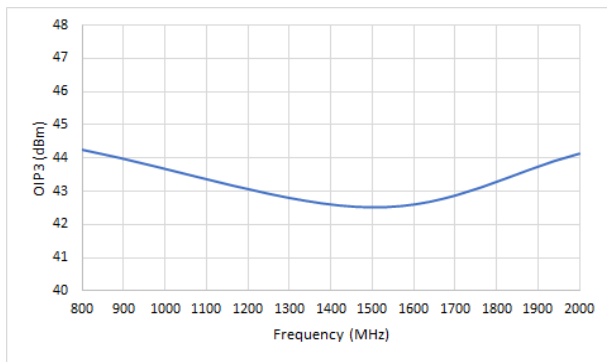
Error Vector Magnitude vs. Output Power
[16QAM, 2Msps, 35% Roll Off Rate]



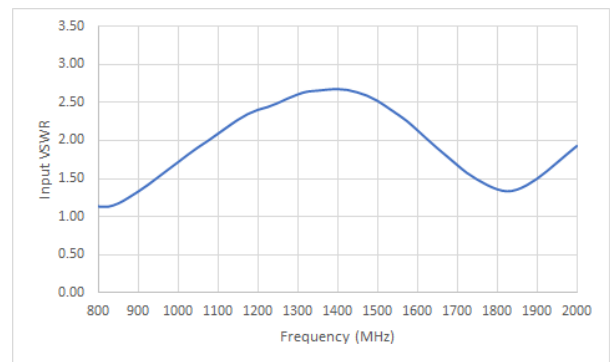
Error Vector Magnitude vs. Output Power
[64QAM, 5Msps, 10% Roll Off Rate]



OIP3 [20dBm per tone, 1MHz spacing]



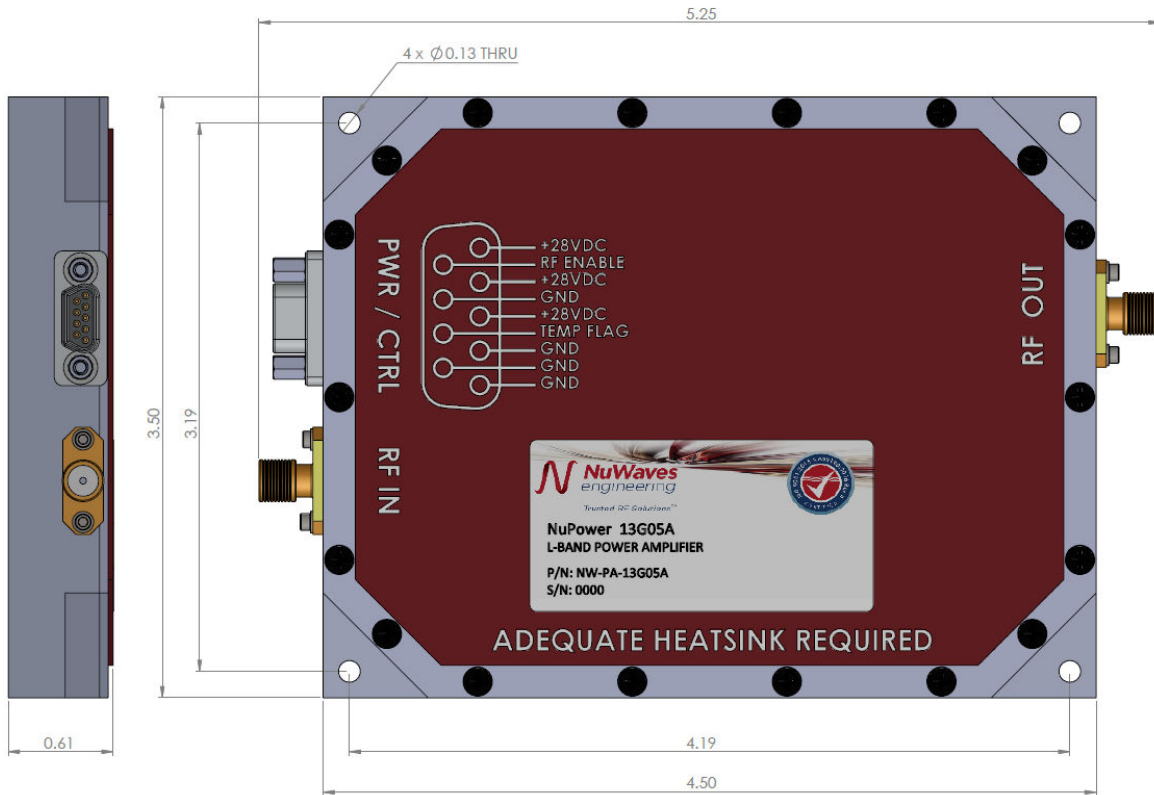
Input VSWR



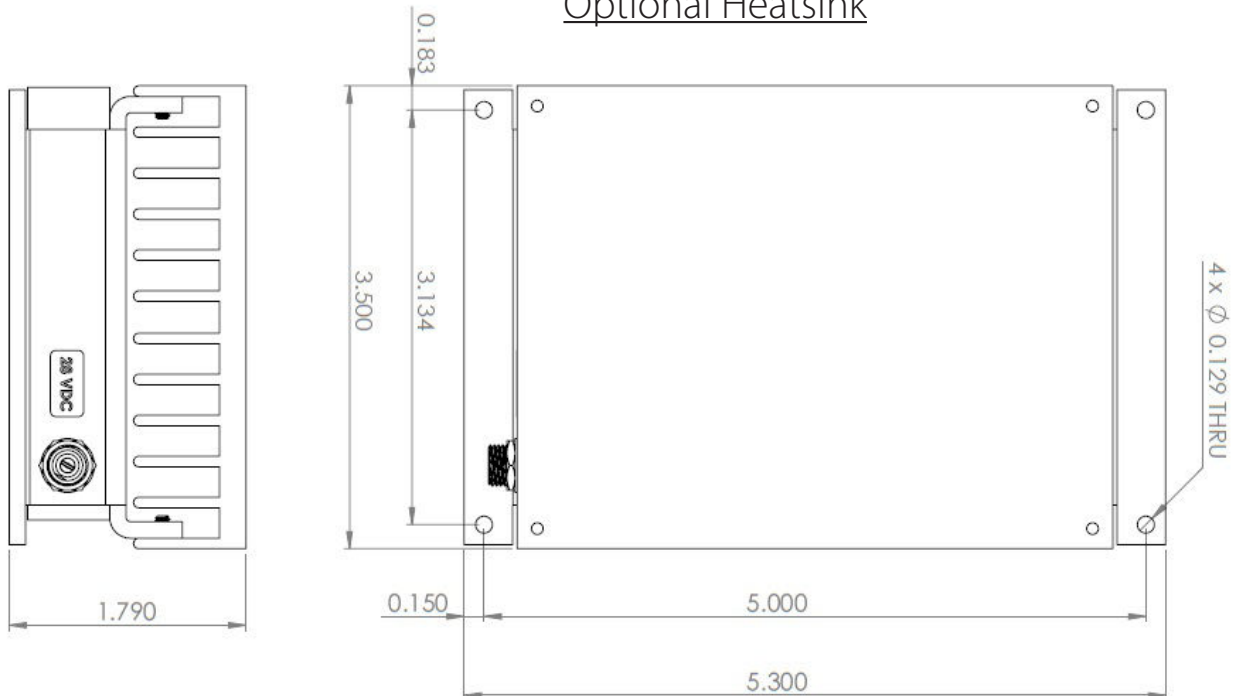
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Mechanical Outlines

PA Module

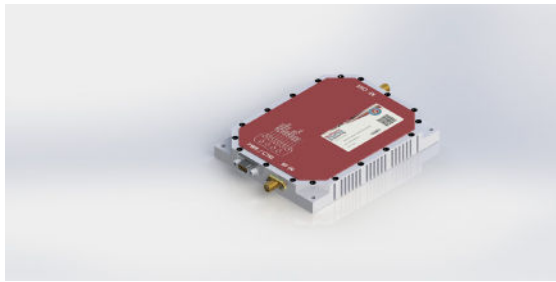


Optional Heatsink

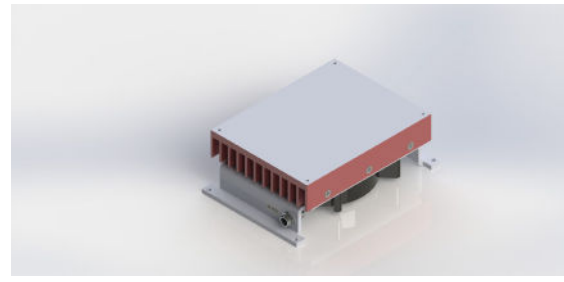


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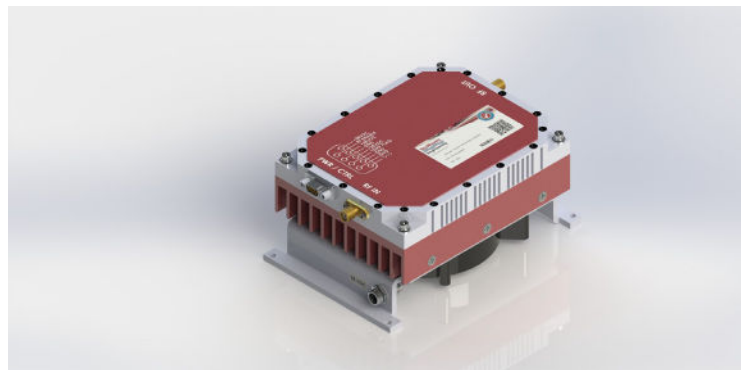
PA Module and Accessory Images



PA Module



Optional Fan-Cooled Heatsink



PA Module w/ Fan-Cooled Heatsink

Accessory Part Numbers - Sold Separately

Part Number	Description
NW-FL-05LPLE-2500-SFSF-M01	Harmonic Filter Module
NW-PA-ACC-CB09MC	Standard Interface Cable Assembly - Flying Leads
NW-PA-ACC-CT09MC	Upgraded Interface Cable Assembly - Banana Plug Termination
HTSK-02	Heatsink with Integrated Fan

Pinout

Function	I/O	Pin
DC Power (+28 Volts)	I	3, 4, 5
Ground	I	1, 2, 6, 8
Over Temperature Flag 0V = temperature fault +5V = no fault	O	7
RF Enable 0V or GND = RF ON +5V or NC = RF OFF	I	9

For information on product disposal (end-of-life), please refer to this document:
<https://nuwaves.com/wp-content/uploads/Product-Disposal-End-of-Life.pdf>

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