



Trusted RF Solutions™

## NuPower™ 12D05A L- & S-Band Solid State Power Amplifier

35 Watts CW @ 1.7 GHz to 2.1 GHz  
20 Watts CW @ 2.1 GHz to 2.4 GHz



P/N: NW-PA-12D05A

(Includes NW-PA-ACC-CB09MC interface cable)

**The NuPower™ 12D05A is a small, highly efficient, solid state power amplifier that provides 20 watts of RF power to boost performance of data links and transmitters.**

The NuPower 12D05A accepts a nominal 0 dBm (1 mW) RF input and provides 44 dB of gain from 1,700 to 2,400 MHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, the NuPower 12D05A's 40% power efficiency and <math><10\text{ in}^3</math> 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 and protection and can operate over a wide temperature range of  $-40\text{ }^{\circ}\text{C}$  to  $+85\text{ }^{\circ}\text{C}$  (baseplate).

**Extend your operational communication range with NuPower™ amplifiers from NuWaves Engineering.**

### Features

- 35 Watts RF Output Power
- 1,700 to 2,400 MHz
- Small Form Factor (4.50" x 3.50" x 0.61")
- High-Efficiency GaN Technology
- 0 dBm Nominal RF Input
- Over-Voltage Protection
- Reverse-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), Group 2 & 3
- Unmanned Ground Vehicles (UGV)
- Software Defined Radios

# NuPower™ 12D05A Power Amplifier

## Specifications

### Absolute Maximums

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	4.75	A
Max RF Input Power, $Z_L = 50 \Omega$	15	dBm
Max Operating Temperature (ambient)	55	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification
ECCN 5A991.G

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	1.7		2.4	GHz	
RF Output Power	$P_{SAT}$	20	35		W	1.7 GHz - 2.4 GHz, 0 dBm input
Output Power @ 1dB Compression	$P_{1dB}$		42		dBm	1.7 GHz
			45			2.1 GHz
			44			2.4 GHz
Small Signal Gain	G		54		dB	1.7 GHz, @ -30 dBm input
			54			2.1 GHz, @ -30 dBm input
			51			2.4 GHz, @ -30 dBm input
Small Signal Gain Flatness	$\Delta G$		3		dB	$P_{in} = -30$ dBm
Input VSWR	VSWR		2:1			
Nominal Input Drive Level	$P_{IN}$		0		dBm	
Operating Voltage	VDC	27	28	30	V	
Quiescent Current (RF Enable Off)	$I_{DQ}$		40		mA	
Quiescent Current (RF Enable On)	$I_{DQ}$		0.85		A	no RF applied
Operating Current	$I_{DD}$		3.6		A	$P_{in} = 0$ dBm
Module Efficiency			25		%	$P_{in} = 0$ dBm, +28 V
Switching Speed	$T_{XON/OFF}$			2	$\mu$ S	10% to 90%
Third Order Intercept Point (Two tone test at 1 MHz spacing, $P_{out} = 20$ dBm / tone)	OIP3		44		dBm	
Harmonics	2nd			-25	dBc	
	3rd			-25		
Output Mismatch (No Damage)				10:1		

# NuPower™ 12D05A Power Amplifier

## 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		

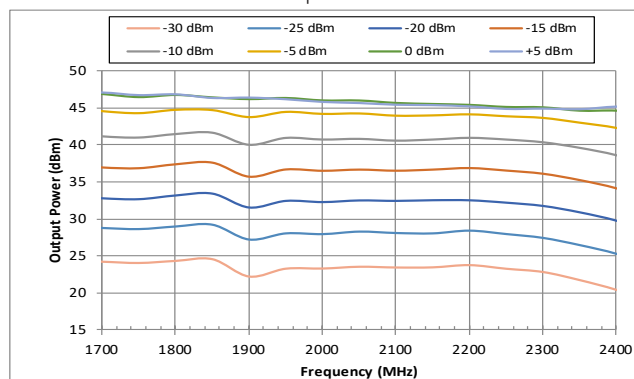
### Environmental Specifications

Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	$T_A$	-40		+55	°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)					

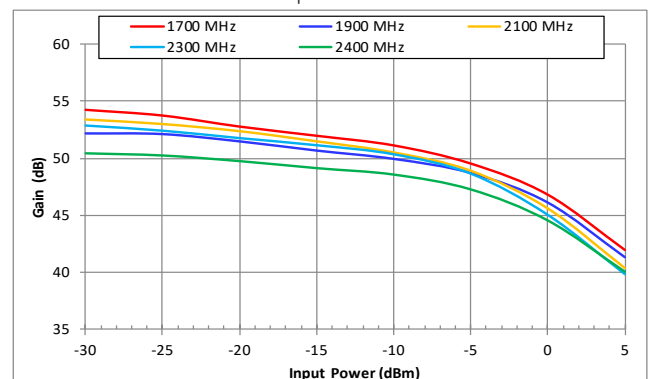
## Performance Plots

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

RF Output Power



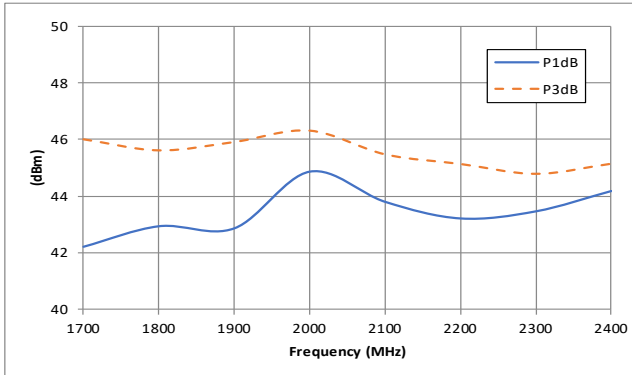
Gain vs. Input Power



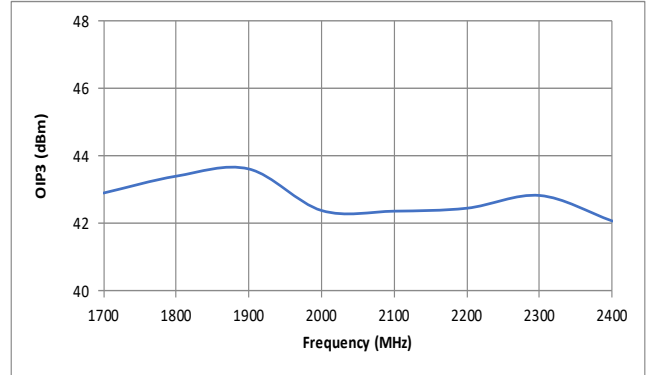
# NuPower™ 12D05A Power Amplifier

## Performance Plots (cont.)

P1dB & P3dB

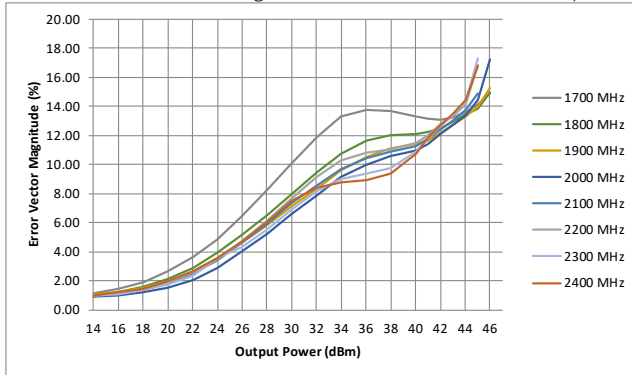


OIP3



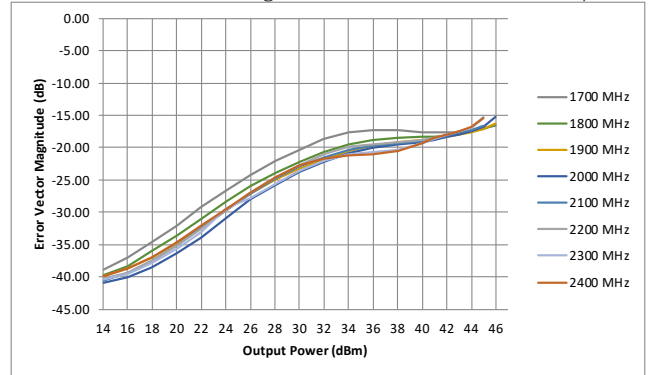
Error Vector Magnitude (%)

[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]

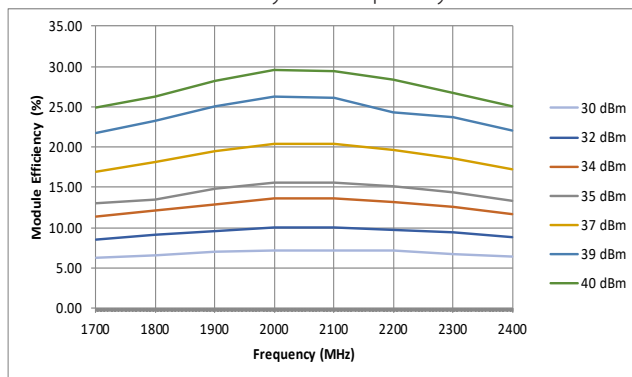


Error Vector Magnitude (dB)

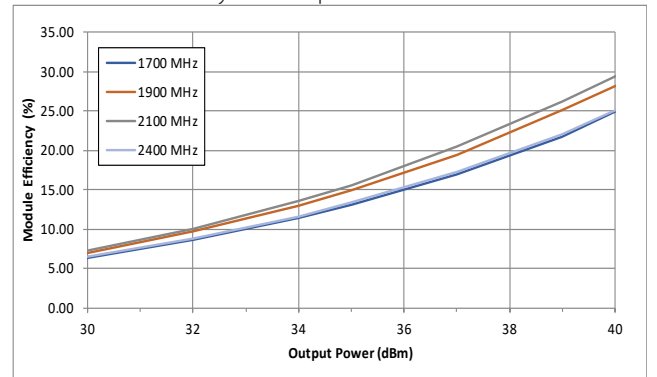
[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



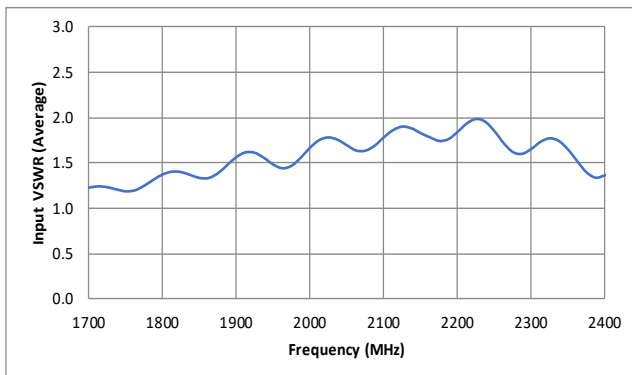
Efficiency vs. Frequency



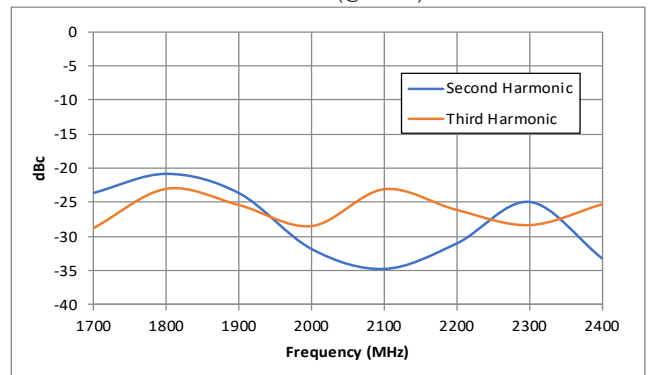
Efficiency vs. Output Power



VSWR

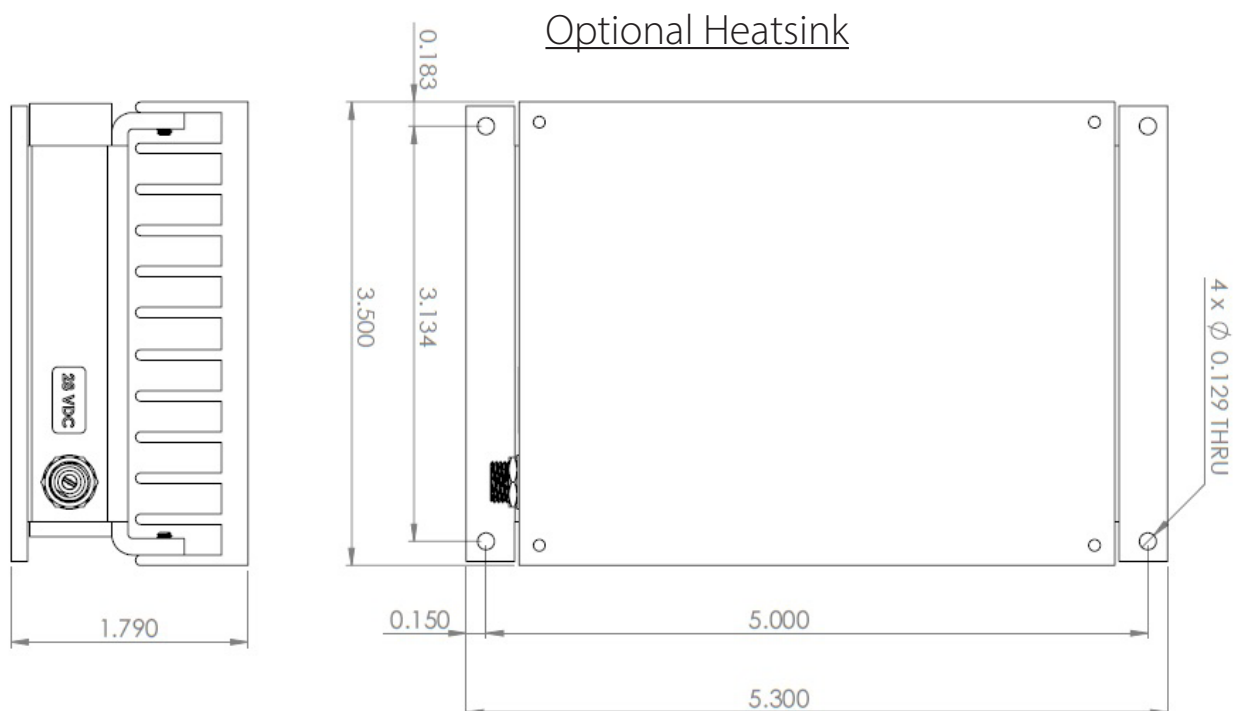
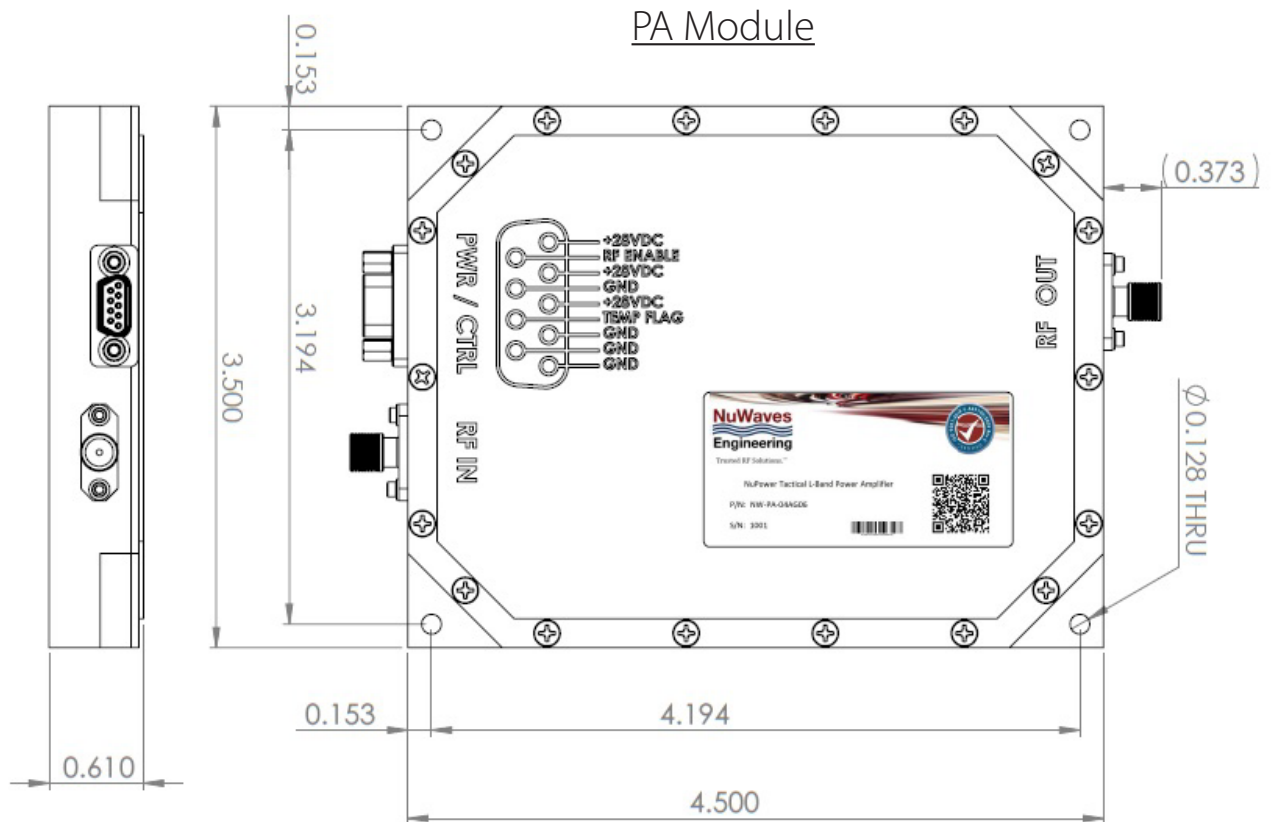


Harmonics (@ Psat)



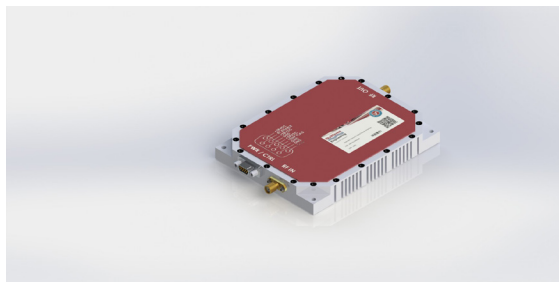
# NuPower™ 12D05A Power Amplifier

## Mechanical Outlines

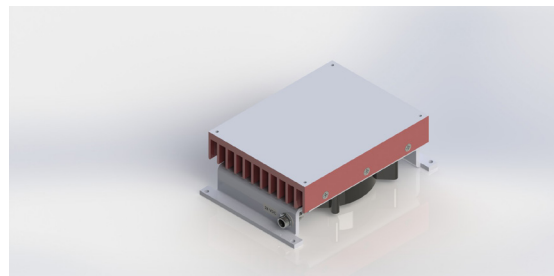


# NuPower™ 12D05A Power Amplifier

## PA Module and Accessory Images



PA Module



Optional Fan-Cooled Heatsink



PA Module w/ Fan-Cooled Heatsink

## Accessory Part Numbers

Part Number	Description
NW-PA-ACC-CB09MC	Standard Interface Cable Assembly - Flying Leads (included with module)
NW-PA-ACC-CT09MC	Upgraded Interface Cable Assembly - Banana Plug Termination
NW-PA-ACC-KT03	Accessory Kit, which includes Fan-Cooled Heatsink and Upgraded Interface Cable
NW-PA-ACC-HS05	Heatsink with Integrated Fan

## Pinout

Function	Pin
DC Power (+28 Volts)	3, 4, 5
Ground	1, 2, 6, 8
Over Temperature Flag (Low = temperature fault)	7
RF Enable (GND to enable)	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>

## Contact NuWaves



NuWaves Engineering  
132 Edison Drive  
Middletown, OH 45044

[www.nuwaves.com](http://www.nuwaves.com)  
[product.sales@nuwaves.com](mailto:product.sales@nuwaves.com)  
513.360.0800

  
Trusted RF Solutions™