

# NuWaves

## RF Solutions

### NuPower™ 15D05A-C01-S01 Broadband Solid State Power Amplifier

20 Watts CW  
800 MHz to 2500 MHz



P/N: NW-PA-15D05A-C01-S01

**The NuPower™ 15D05A-C01-S01 is a small, highly efficient, connectorized solid state power amplifier that delivers over 20 watts of RF power to extend the operational range of data links and transmitters.**

The NuPower 15D05A-C01-S01 accepts a nominal 0 dBm (1 mW) RF input and provides 44 dB of gain from 800 MHz to 2500 MHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, NuPower 15D05A-C01-S01's 42% power efficiency at rated power 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 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

- >20 Watts RF Output Power
- 800 MHz to 2500 MHz
- 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™ 15D05A-C01-S01 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		2500	MHz	
RF Output Power	$P_{SAT}$	20	33		W	800 MHz - 2500 MHz, 0 dBm input
Output Power @ 1dB Compression	P1dB		31		dBm	800 MHz
			31			1600 MHz
			33			2500 MHz
Small Signal Gain	G		54		dB	800 MHz, @ -35 dBm input
			51			1700 MHz, @ -35 dBm input
			49			2500 MHz, @ -35 dBm input
Small Signal Gain Flatness	$\Delta G$		5.2		dB	Pin = -35 dBm
Input VSWR	VSWR		2:1			
Nominal Input Drive Level	$P_{IN}$		0		dBm	
Operating Voltage	VDC	27	28	32	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	$I_{DD}$		2.7		A	Pin = 0 dBm
Module Efficiency			42		%	Pin = 0 dBm, +28 V
Switching Speed	$TX_{ON/OFF}$			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	800 MHz
			41			1600 MHz
			44			2500 MHz
Harmonics	2nd		-25		dBc	
	3rd		-20			
Output Mismatch (No Damage)				10:1	$\Psi$	No damage at all phase angles

# NuPower™ 15D05A-C01-S01 Power Amplifier

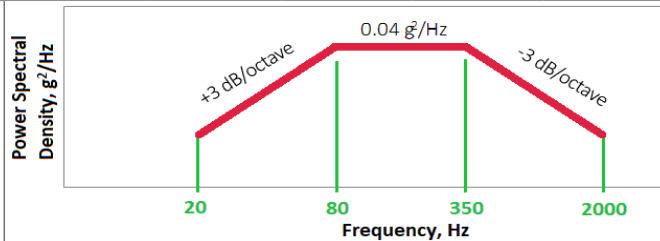
## Specifications (cont.)

### 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

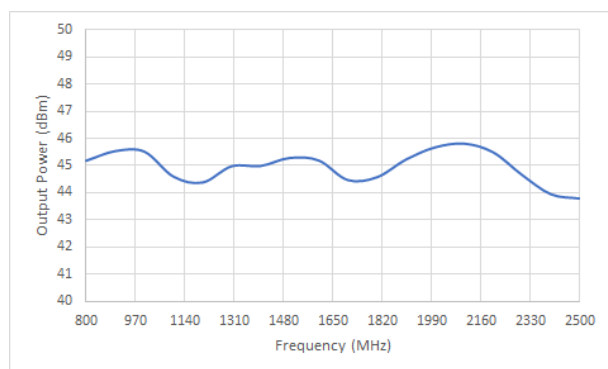
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	$T_A$	-40		+55	°C
Operating Temperature (baseplate)	$T_C$	-40		+85	°C
Storage Temperature	$T_{STG}$	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration / Shock Profile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



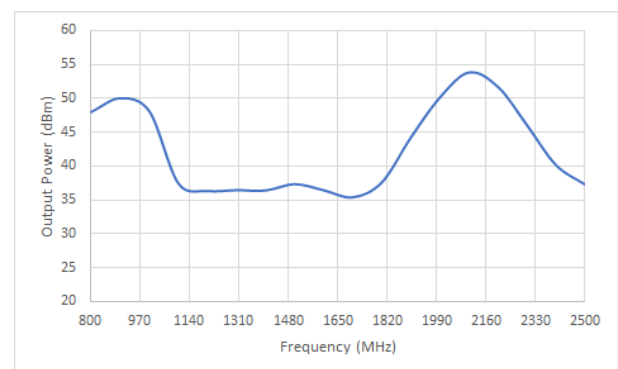
## Performance Plots

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

Output Power [0 dBm Input Power]



Efficiency [0 dBm Input Power]

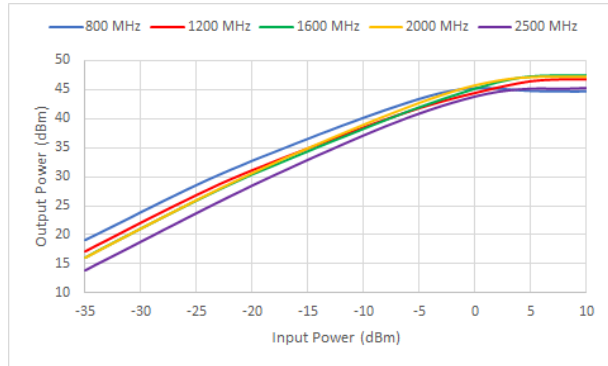


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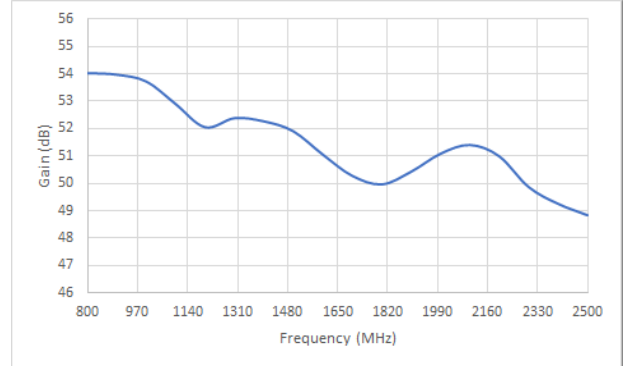
## Performance Plots (cont.)

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

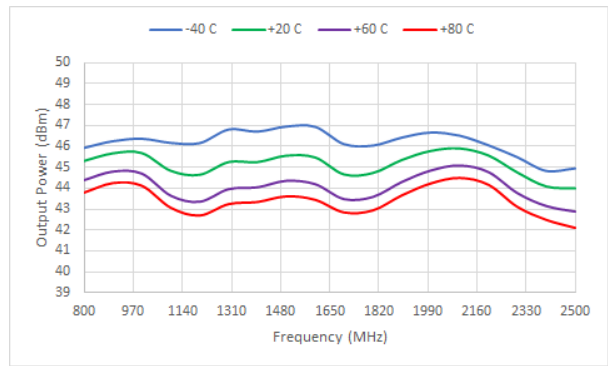
### Output Power vs. Input Power



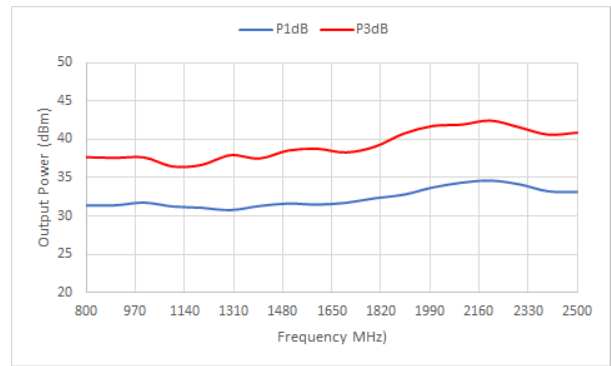
### Small Signal Gain [-35 dBm Input Power]



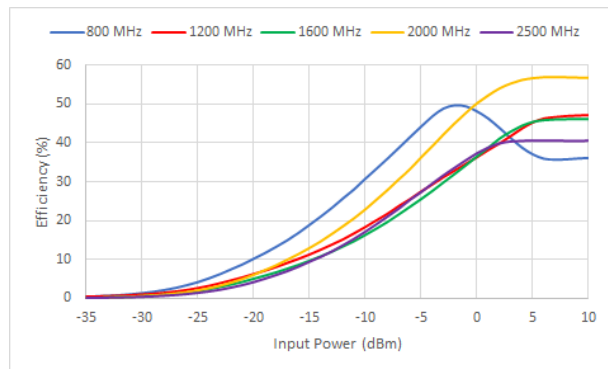
### Output Power vs. Temperature [Baseplate]



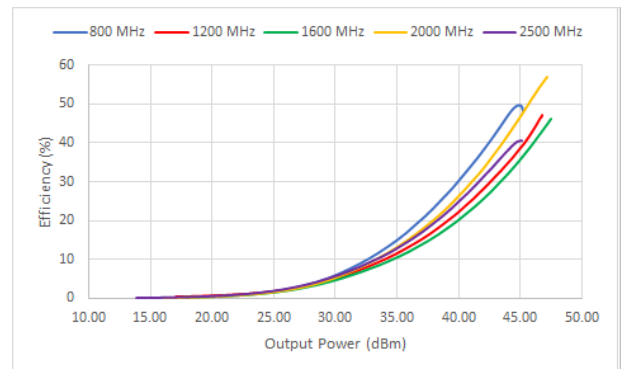
### P1dB & P3dB



### Efficiency vs. Input Power



### Efficiency vs. Output Power

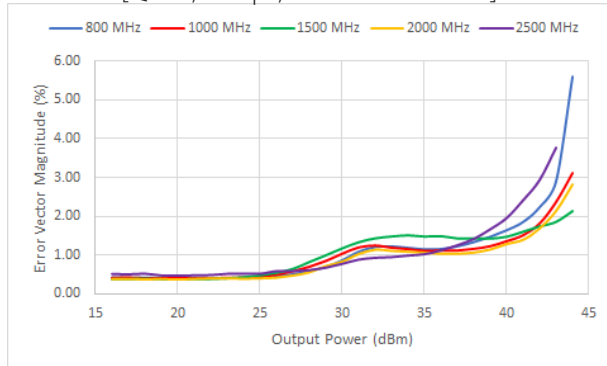


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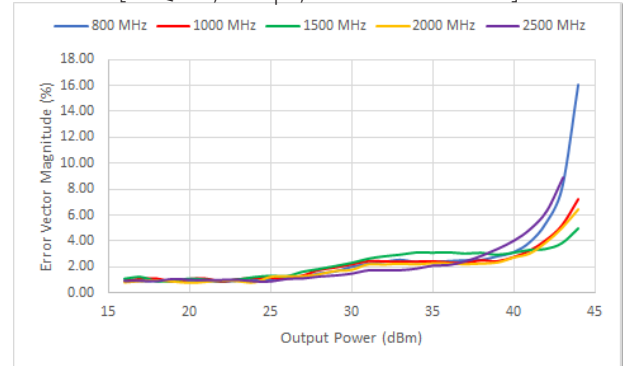
## Performance Plots (cont.)

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

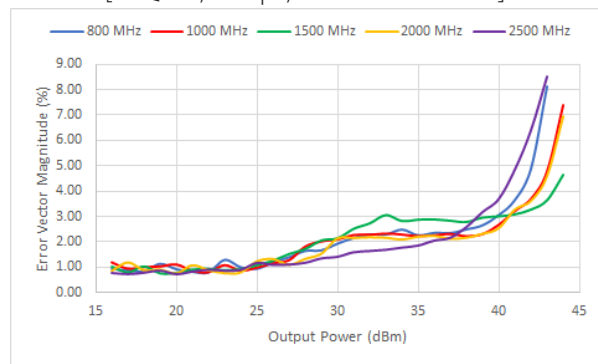
Error Vector Magnitude vs. Output Power  
[QPSK, 1Msps, 35% Roll Off Rate]



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



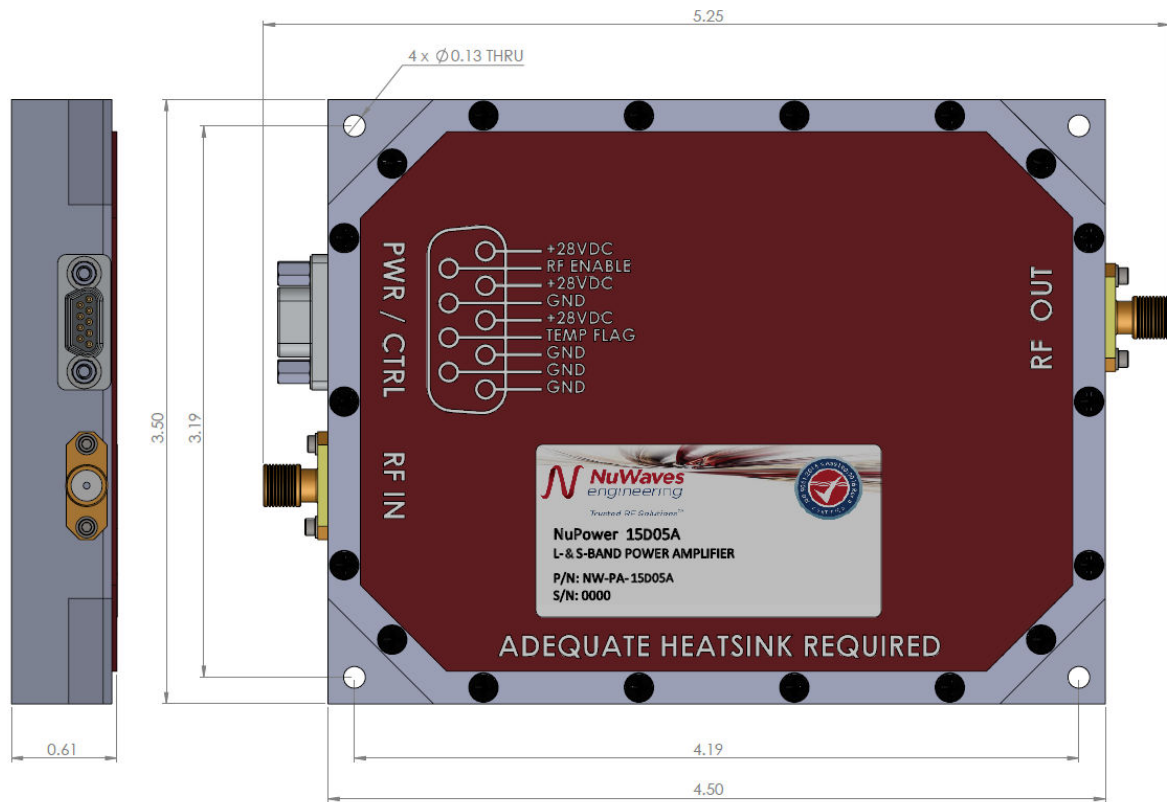
Error Vector Magnitude vs. Output Power  
[64QAM, 5Msps, 10% Roll Off Rate]



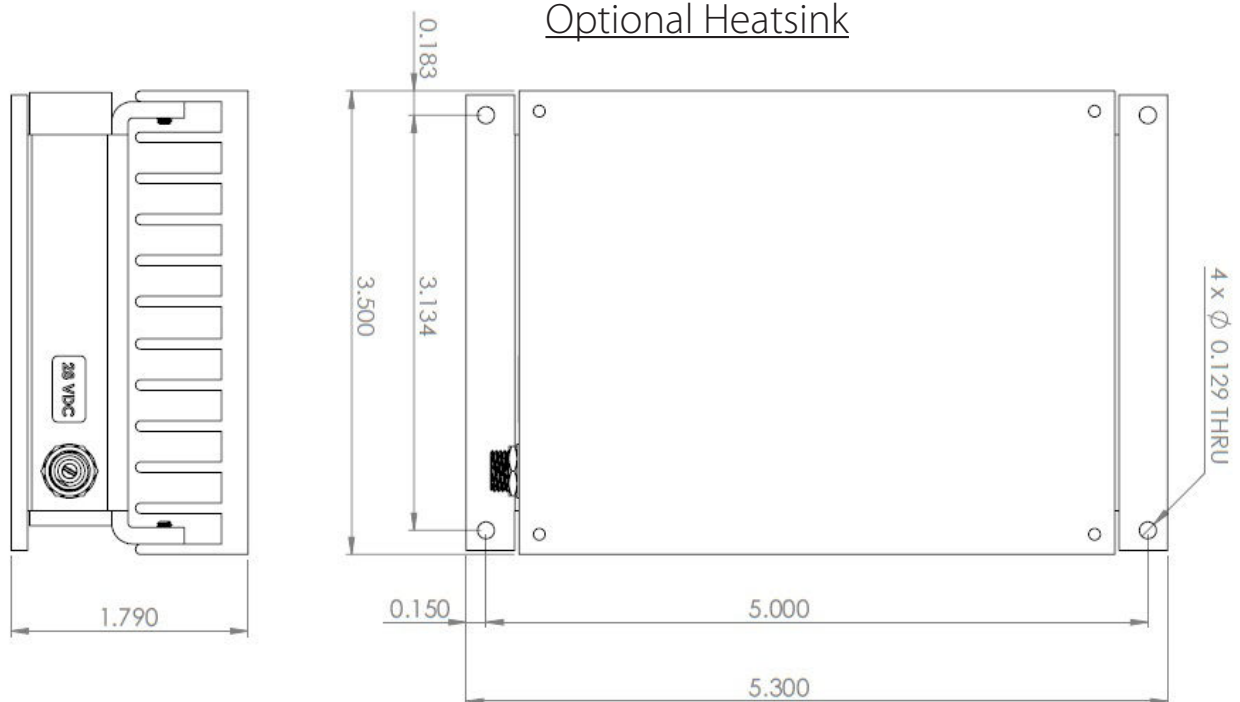
# NuPower™ 15D05A-C01-S01 Power Amplifier

## Mechanical Outlines

### PA Module

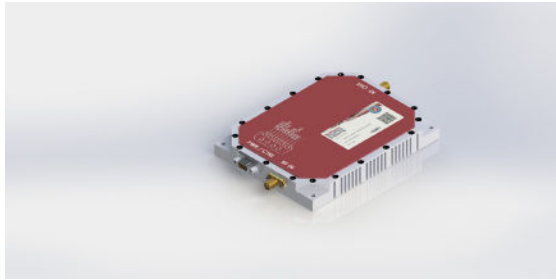


### Optional Heatsink

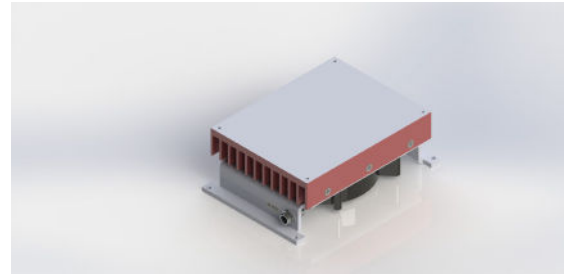


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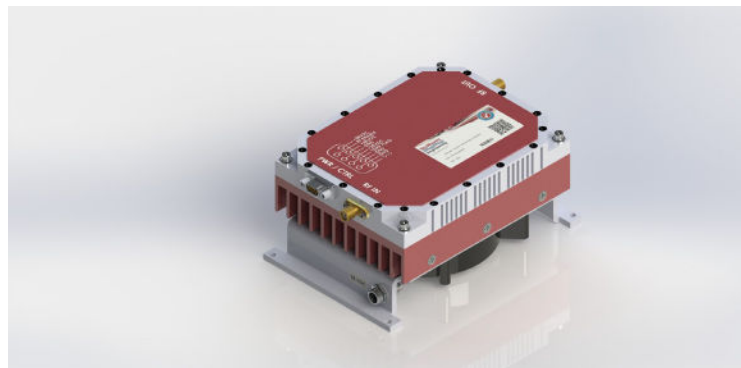
## PA Module and Accessory Images



PA Module



Optional Fan-Cooled Heatsink



PA Module w/ Fan-Cooled Heatsink

## Accessory Part Numbers - Sold Separately

## Pinout

Part Number	Description
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

Function	Pin	Input/Output
DC Power (+28 Volts)	3, 4, 5	Input
Ground	1, 2, 6, 8	Input
Over Temperature Flag (Low = temperature fault)	7*	Output
RF Enable (GND to enable)	9	Input

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



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