

NuWaves

RF Solutions

NuPower™ L60T01 Solid State Power Amplifier

60 Watts CW
960 MHz to 1390 MHz



P/N: NW-PA-L60T01

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

The NuPower™ L60T01 is a small, highly efficient, connectorized solid state power amplifier that delivers 60 watts (typ) of RF power to extend the operational range of airborne telemetry links and transmitters.

The NuPower L60T01 accepts a nominal 0 dBm (1 mW) RF input and provides 48 dB of gain from 960 MHz to 1390 MHz for continuous wave (CW) and near-constant envelope waveforms.

Based on the latest gallium nitride (GaN) technology, NuPower L60T01's 54% power efficiency at rated power and <10 in³ form factor make it ideal for size, weight, and power-constrained airborne 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 Engineering.

Features

- 60 Watts RF Output Power
- 960 MHz to 1390 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

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

NuPower™ L60T01 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)	55	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification
EAR99

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	960		1390	MHz	
RF Output Power	P_{SAT}	45	60		W	960 MHz - 1390 MHz, 0 dBm input
Output Power @ 1dB Compression	P_{1dB}		30		dBm	960 MHz
			31			1175 MHz
			32			1390 MHz
Small Signal Gain	G		57		dB	960 MHz, @ -35 dBm input
			56.6			1175 MHz, @ -35 dBm input
			55.6			1390 MHz, @ -35 dBm input
Small Signal Gain Flatness	ΔG		1.6		dB	$P_{in} = -35$ dBm
Input VSWR	VSWR		1.9:1			
Nominal Input Drive Level	P_{IN}		0		dBm	
Operating Voltage	VDC	27	28	30	V	
Quiescent Current (RF Enable Off)	I_{DQ}		100		mA	
Quiescent Current (RF Enable On)	I_{DQ}		0.85		A	no RF applied
Operating Current	I_{DD}		3.9		A	$P_{in} = 0$ dBm
Module Efficiency			54		%	$P_{in} = 0$ dBm, +28 V
Switching Speed	$T_{XON/OFF}$			2	μ s	10% to 90%
Third Order Intercept Point (Two tone test at 1 MHz spacing, $P_{out} = 20$ dBm / tone)	OIP3		42		dBm	960 MHz
			43			1175 MHz
			44			1390 MHz
Harmonics	2nd		-25		dBc	
	3rd		-20			
Output Mismatch (No Damage)				10:1	Ψ	no damage at all phase angles

NuPower™ L60T01 Power Amplifier

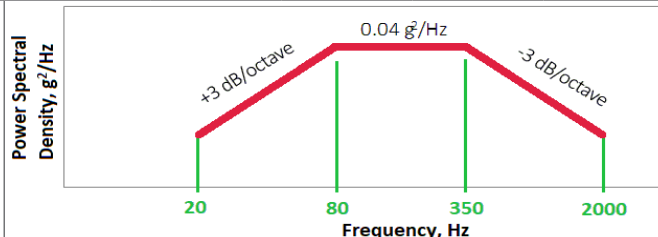
Specifications (cont.)

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

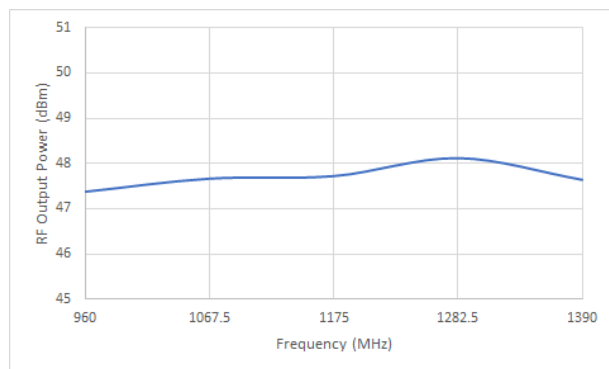
Parameter	Symbol	Min	Typ	Max	Unit
Operating Temperature (ambient)	T_A	-40		+55	°C
Operating Temperature (baseplate)	T_C	-40		+85	°C
Storage Temperature	T_{STG}	-55		+85	°C
Relative Humidity (non-condensing)	RH			95	%
Altitude MIL-STD-810F - Method 500.4	ALT			30,000	ft
Vibration (Random profile in x,y,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



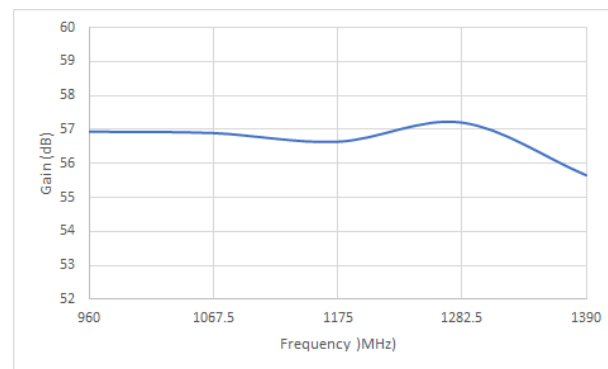
Performance Plots

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

Output Power [0dBm Input Power]



Small Signal Gain [-35dBm Input Power]

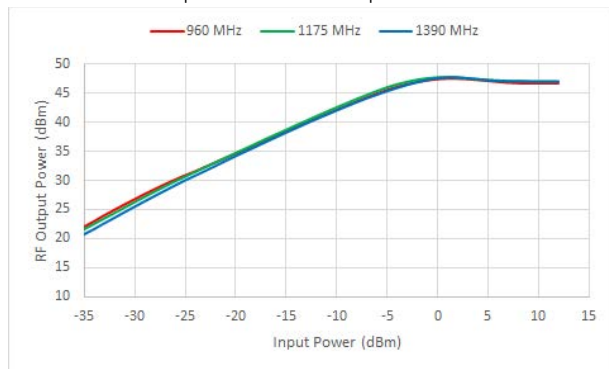


NuPower™ L60T01 Power Amplifier

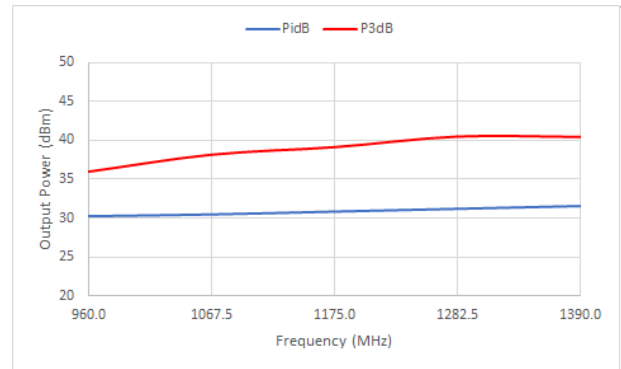
Performance Plots (con't)

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

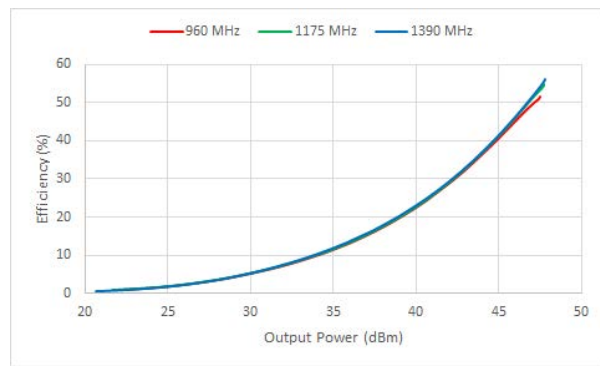
Output Power vs. Input Power



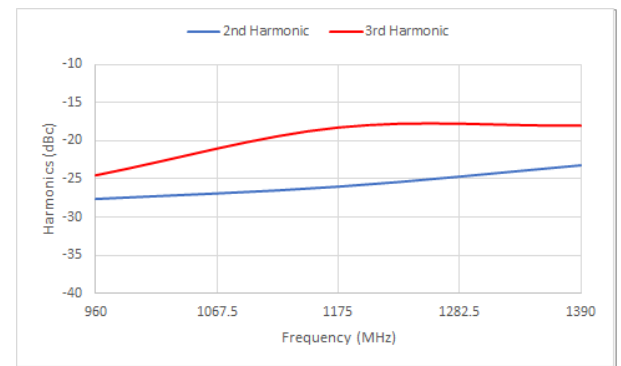
P1dB & P3dB



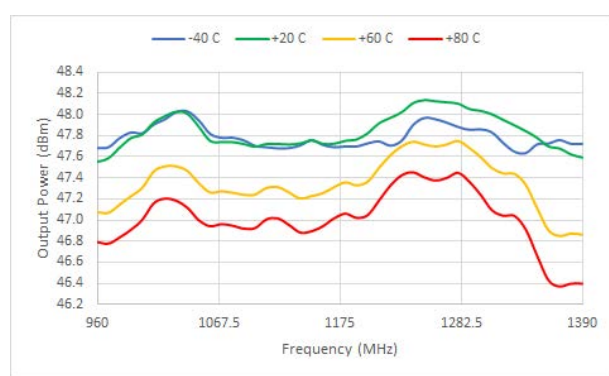
Efficiency vs. Output Power



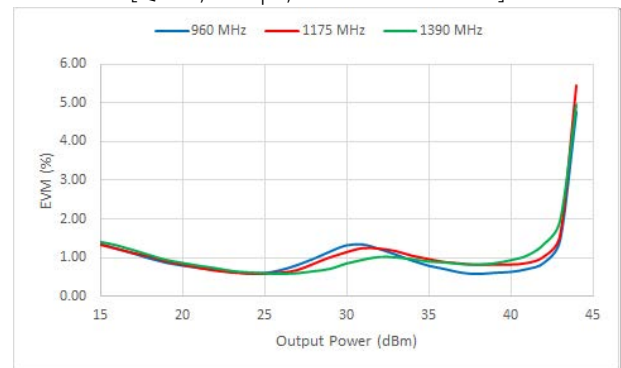
Harmonics [@Psat]



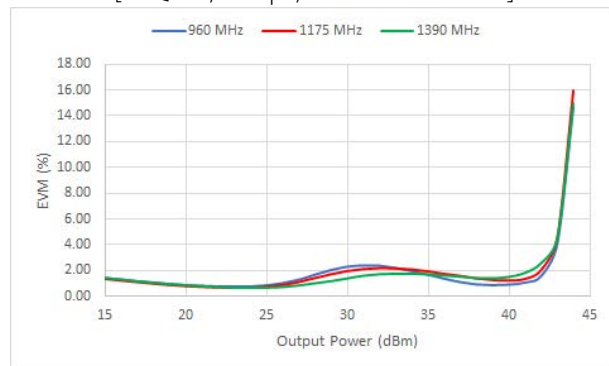
Output Power vs. Temperature [Baseplate]



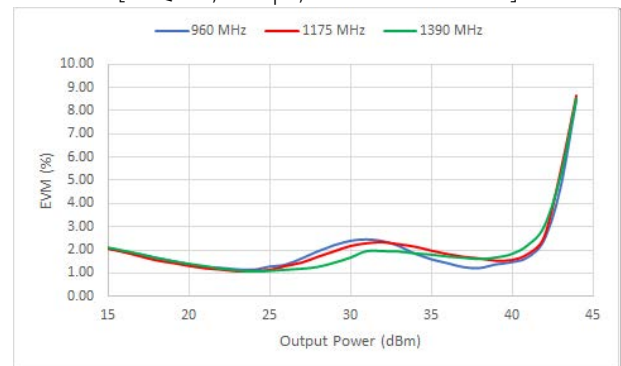
Error Vector Magnitude vs. Output Power
[QPSK, 1Msps, 35% Roll Off Rate]



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



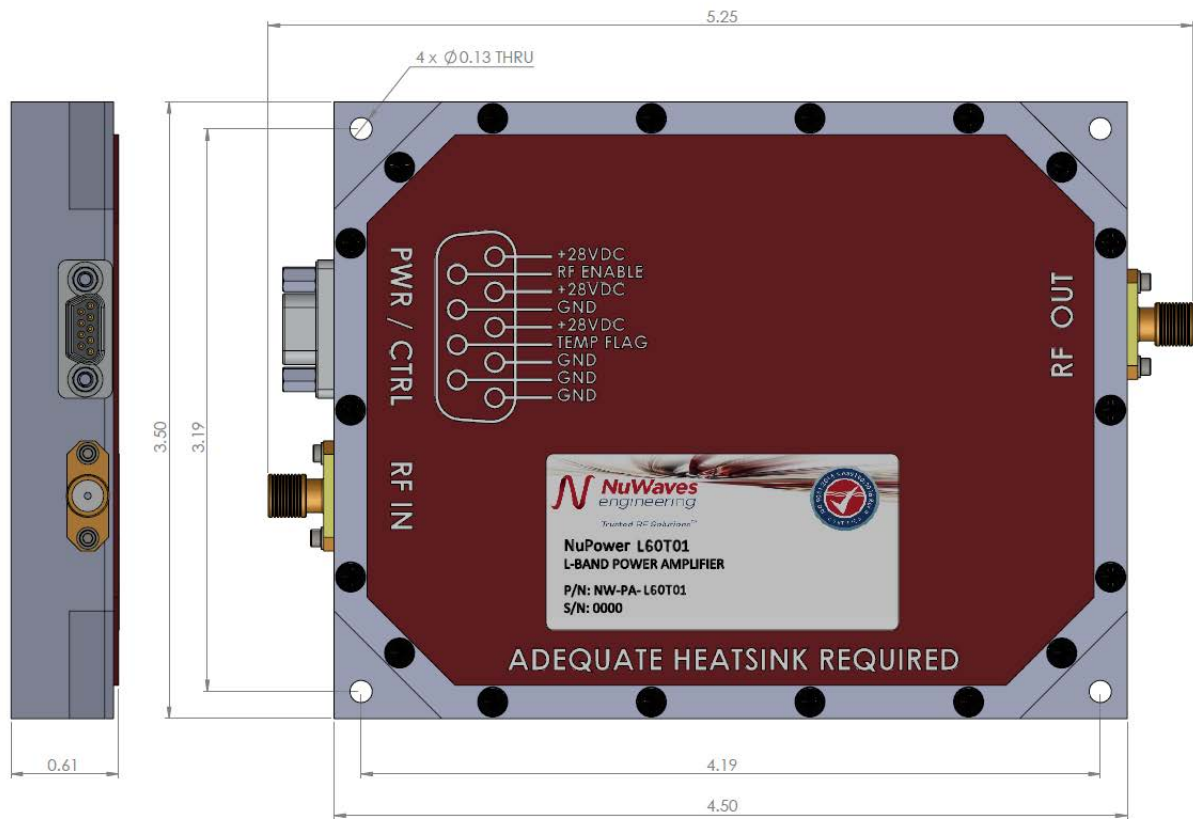
Error Vector Magnitude vs. Output Power
[64QAM, 5Msps, 10% Roll Off Rate]



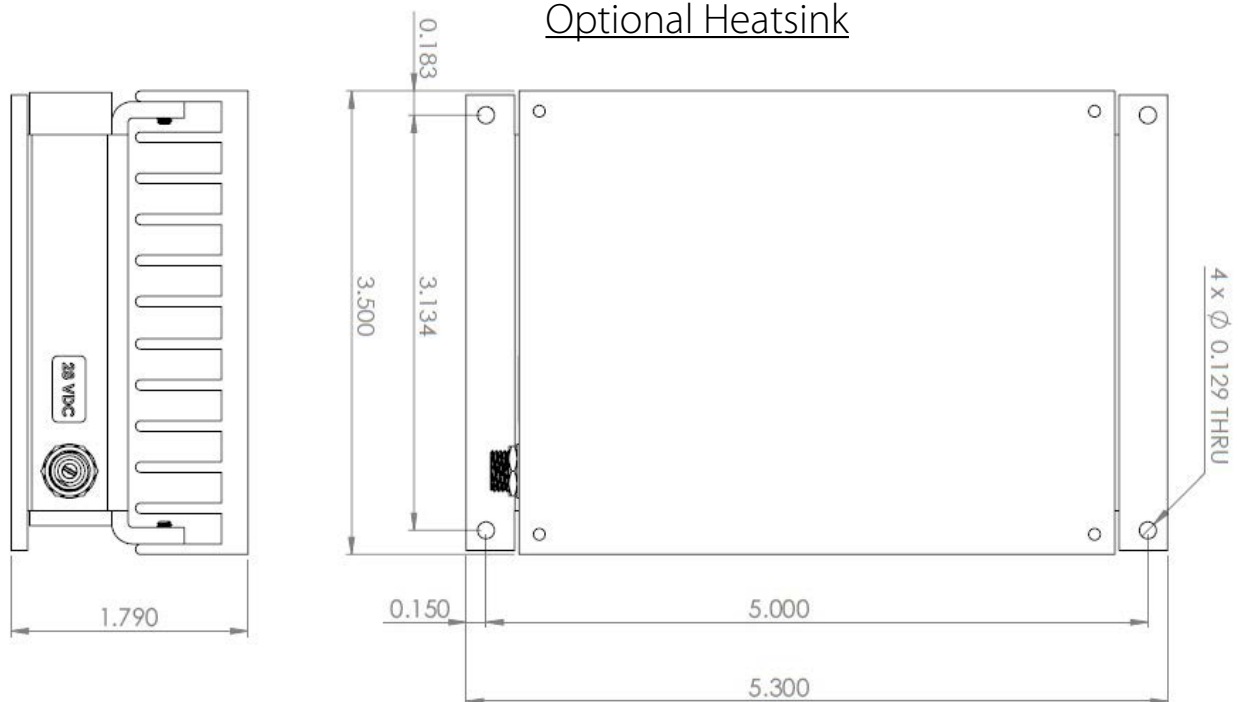
NuPower™ L60T01 Power Amplifier

Mechanical Outlines

PA Module

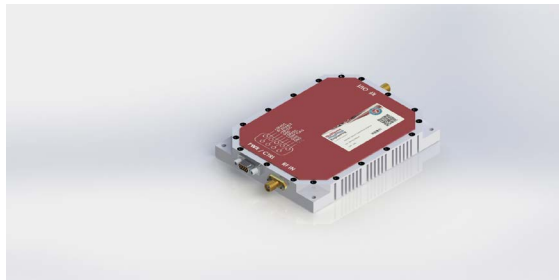


Optional Heatsink

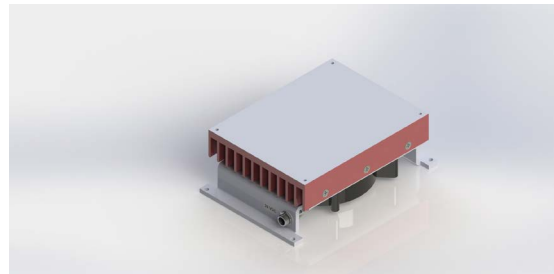


NuPower™ L60T01 Power Amplifier

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	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

*Temperature flag can be used to monitor thermal shutdown

*Do not connect Temperature Flag to DC Power (+28 volt 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



NuWaves RF Solutions
132 Edison Drive
Middletown, OH 45044

www.nuwaves.com
product.sales@nuwaves.com
513.360.0800

