

# NuWaves

## RF Solutions

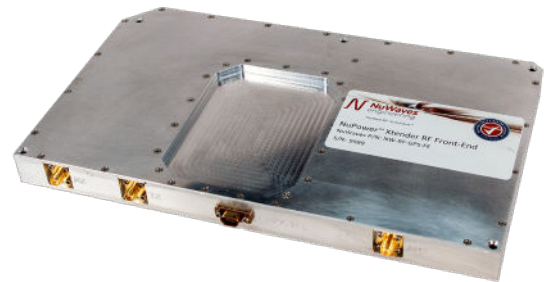
### GPS RF Front End

Transmit: 1626.5 to 1675 MHz

Receive: 1518 to 1559 MHz

20 Watts CW Transmit Power

47 dB Receive Gain



P/N: NW-RF-GPS-FE

**The NuWaves Satellite Terminal RF Front End is a highly efficient, high gain RF transmit/receive module that provides 20 watts of RF power to boost performance of data links.**

This high performance RF front end is a powerful combination of our NuPower 13G05A RF power amplifier, low noise figure LNAs, a high isolation diplexer between the transmit and receive paths, and band-reject filters. This module accepts a nominal 0 dBm (1 mW) RF input and provides 43 dB of gain from 1626.5 to 1675 MHz, and provides 47 dB of gain from 1518 to 1559 MHz. It supports both constant envelope and complex waveforms such as APSK, QAM, DVB-T, etc.

**Extend your operational communication range with a custom RF & Microwave Solution from NuWaves RF Solutions.**

#### Features

- 20 Watts RF Output Power
- 47 dB Receive Gain
- Transmit: 1626.5 to 1675 MHz
- Receive: 1518 to 1559 MHz
- High-Efficiency GaN Technology
- 0 dBm Nominal RF Input
- Over-Voltage Protection
- External Transmit 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

- RF Telemetry
- RF Communication Systems
- Unmanned Aircraft Systems (UAS)
- Unmanned Ground Vehicles (UGV)
- Satellite Terminals
- Software Defined Radios

# GPS RF Front End

## Specifications

### Absolute Maximums

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	4.75	A
Max RF Input Power, $Z_L = 50 \Omega$	12	dBm
Max Operating Temperature (ambient)	60	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C

Export Classification
EAR99

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Operating Frequency	BW	1626.5		1675	MHz	
Switching Speed	$T_{XON/OFF}$			2	$\mu$ S	10% control voltage to 90% output power
Operating Voltage	VDC	27	28	32	V	
Operating Current	$I_{DD}$		3.25		A	Pin = 0 dBm
Module Efficiency			35		%	CW, Pin = +5 dBm

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
RF Output Power	$P_{SAT}$	20			W	1626.5 to 1675 MHz Pin = 0 dBm
Output Power @ 1dB Compression	P1dB		33		dBm	1626.5 MHz
			31			1650.75 MHz
			30			1675 MHz
Small Signal Gain	G		57		dB	1626.5 MHz, Pin = -30 dBm
			57			1650.75 MHz, Pin = -30 dBm
			56			1675 MHz, Pin = -30 dBm
Small Signal Gain Flatness	$\Delta G$		2		dB	Pin = -30 dBm
Input VSWR	VSWR		1.5			
Nominal Input Drive Level	$P_{IN}$		0		dBm	
Quiescent Current	$I_{DQ}$		0.08		A	
Quiescent Bias Current	$I_{DQ}$		0.75		A	
Third Order Intercept Point (Two tone test at 1 MHz spacing, Pout = 20 dBm / tone)	OIP3		TBR		dBm	1626.5 MHz
			TBR			1650.75 MHz
			TBR			1675 MHz
Harmonics	2nd		-70		dBc	
	3rd		-45			
Output Mismatch (No Damage)				10:1		

# GPS RF Front End

## Specifications (cont.)

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

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Receive Gain	G		47		dB	1518 to 1559 MHz
Receive Gain Flatness	$\Delta G$		TBR		dB	Any 2 MHz
Receive Current	$I_{RX}$		80		mA	
Receive Noise Figure	NF		1.7			
Receive P1dB	P1dB				dBm	
Receive OIP <sup>3</sup>	OIP <sup>3</sup>				dBm	

## Mechanical Specifications

Parameter	Value	Unit	Limits
Dimensions	10.25" x 6.00 x 0.80	in	Max
Weight	47	oz	Max
RF Connectors, Input/Output	SMA Female		
Interface Connector	Micro-D, 9-pin Socket		

## 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					
Vibration Profile (Random profile in x,y, z axis, as per Figure for 15 minute duration in each axis)					

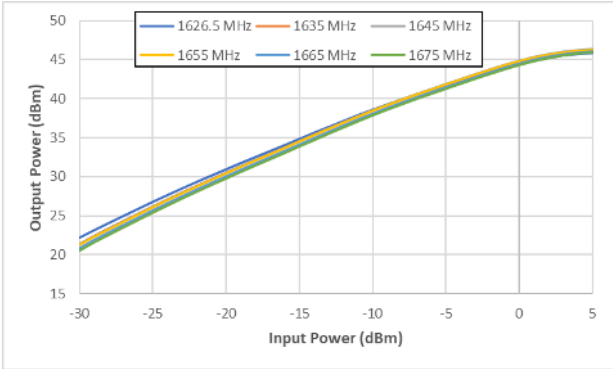
The graph shows a trapezoidal vibration profile. The y-axis is Power Spectral Density in  $g^2/Hz$  and the x-axis is Frequency in Hz. The profile starts at 20 Hz, rises with a slope of +3 dB/octave to 80 Hz, remains flat at 0.04  $g^2/Hz$  until 350 Hz, and then falls with a slope of -3 dB/octave to 2000 Hz.

# GPS RF Front End

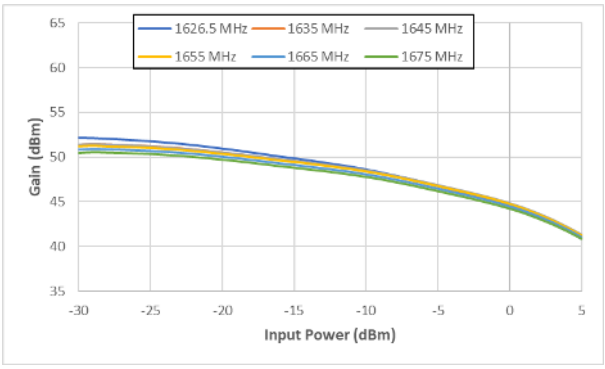
## Performance Plots

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

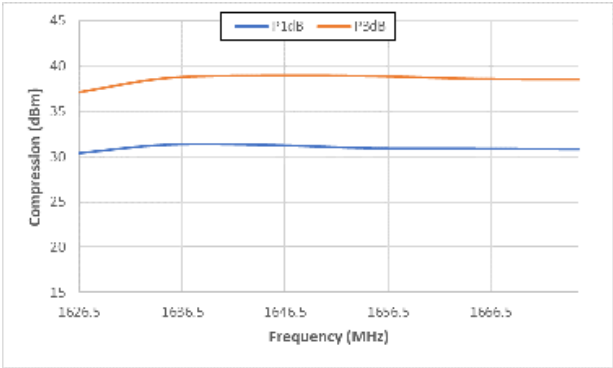
Transmit RF Output Power



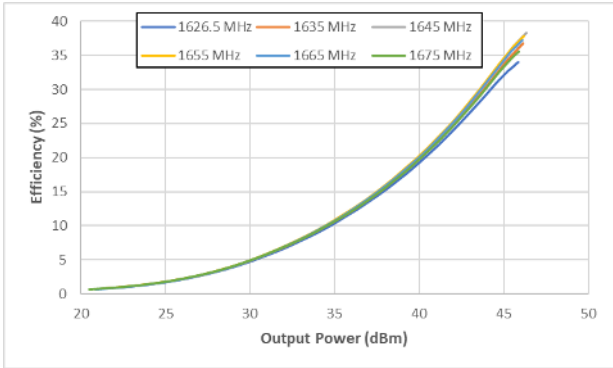
Transmit Gain



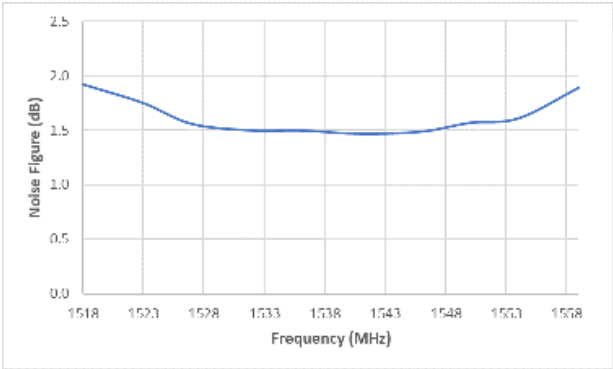
Transmit P1dB & P3dB



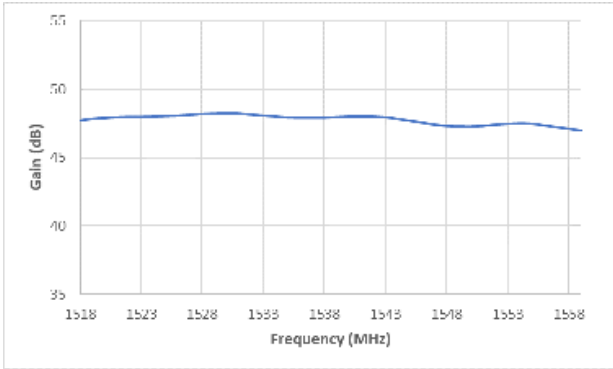
Transmit Efficiency



Receive Noise Figure

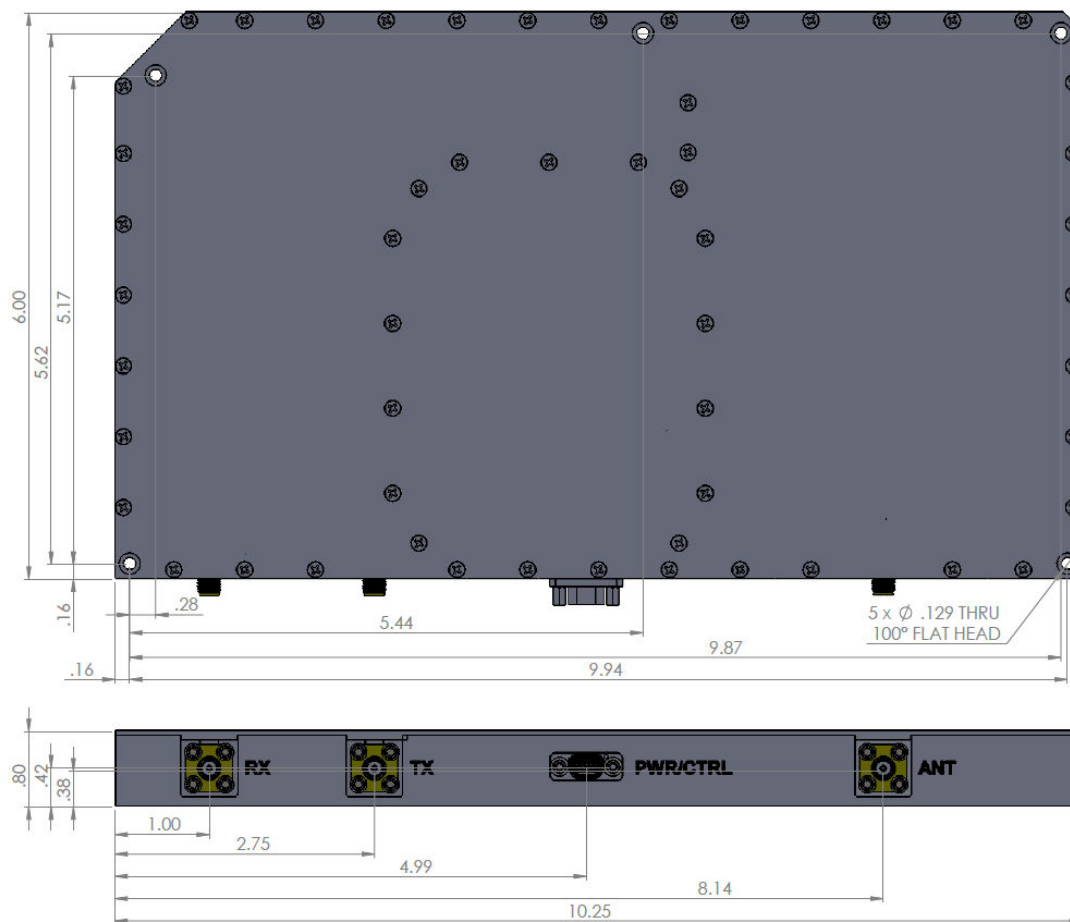


Receive Gain



# GPS RF Front End

## Mechanical Outline



## Accessory Part Numbers - Sold Separately

Part Number	Description
NW-PA-ACC-CB09MC	Standard Interface Cable Assembly - Flying Leads

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

