

**USER MANUAL
HIGH INTERCEPT
LOW NOISE AMPLIFIER
(HILNA™)
MODEL NUMBER: HILNA LS-C026**



RF, Wireless, and Embedded Systems Engineering



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1 HILNA™ PRODUCT LINE OVERVIEW

NuWaves' HILNA family of amplifiers is designed to achieve high RF gain while maintaining extremely low noise, and high third-order intercept point across a wide band. HILNA's robust power supply also operates over a very broad range easily allowing the unit to be integrated into systems without regard to power supply precision.

1.1 HILNA™ PRODUCT LINE HIGHLIGHTS

- High Performance - Noise, Gain, Intercept, Dynamic Range: Unique combination of extremely low noise, high gain, high output intercept, and wide band frequency coverage.
- Enclosures:
 - HILNA V1, HILNA G2V1, HILNA GPS, HILNA HF, and HILNA CF are housed in a black or silver anodized extruded aluminum enclosure with mounting flanges.
 - μ HILNA is housed in a miniature sleek black anodized milled aluminum enclosure.
 - HILNA LS is housed in a black anodized milled aluminum enclosure with mounting holes incorporated into the chassis
 - HILNA CX is housed in a nickel plated rugged aluminum enclosure with mounting holes incorporated into the chassis.
 - HILNA LS-C026 is housed in a hermetically sealed enclosure.
- Completely Characterized: The HILNA family of low noise amplifiers has been completely characterized over temperature, voltage, and frequency. The amplifiers are robust, offering significant value for the OEM user or the Systems Integrator.
- User Friendly: Reverse-voltage protection and regulator thermal shutdown provide defenses against user interface issues.
- High Reliability: NuWaves' selection of conservatively rated components provides high reliability delivering high Mean Time Between Failure (MTBF) numbers. Each HILNA is inspected to IPC-A-610 Class II quality standards.
- ESD Protection: The HILNA Amplifiers are suitable for many types of applications where ESD susceptibility is prominent. The amplifiers are designed to withstand up to 1000 V utilizing ESD waveforms described in IEC 61000 4-2.
- Applications: IF or RF Buffer Amplifier ▪ Overcome Systematic RF Losses ▪ Increase Antenna Signal Levels ▪ Military Radios ▪ RF Wideband Front-Ends ▪ RF Pre-Amp ▪ Final Stage Amplifier for Low-Level Repeaters ▪ Long Cable Runs to Antenna ▪ Ultra Low Noise Applications ▪ LNA for Cellular Base Station ▪ High Linearity Systems ▪ General Purpose Amplification
 - High Performance Receivers ▪ High Power Drive Signals for Increased Dynamic Range

- High Reliability RF Amplifier Applications ▪ Base Station Applications ▪ VHF/UHF Amplification ▪ Final PA for Low-Power Applications ▪ Low-Noise Transmit Driver ▪ Fixed Wireless ▪ Mobile Infrastructure ▪ Industrial Scientific Medical Band Applications
- Users: ▪Engineering and Scientific Laboratories ▪ Test and Measurement Facilities ▪ OEMs of RF High End Systems ▪ Research Laboratories ▪ Communications Engineering Firms ▪ RF System Integrators ▪ Test Ranges ▪ Universities ▪ Antenna Design Facilities ▪ Field Service Technicians ▪ Aerospace and Defense Systems ▪ Radio and TV Engineers ▪ Amateur Radio ▪ Scientific and Consulting Agencies ▪ Radio and Wireless Communication Services ▪ Precision Equipment Repair Organizations ▪ Professional and Technical Service Institutions ▪ Military Radio & Communication Facilities product models

2 HILNA™ LS-C026 OVERVIEW

NuWaves' HILNA™ LS-C026 is a low noise amplifier covering L-band, and designed to achieve high gain while maintaining low noise and a high third-order intercept point.

This high-performance module delivers +21 dB of gain over the range of 1.4 GHz to 1.9 GHz with a noise figure of less than 2 dB and OIP3 of +30 dBm. The HILNA LS's small form factor (3.2 in³) makes it ideal for small communication system installations, co-located to the antenna.

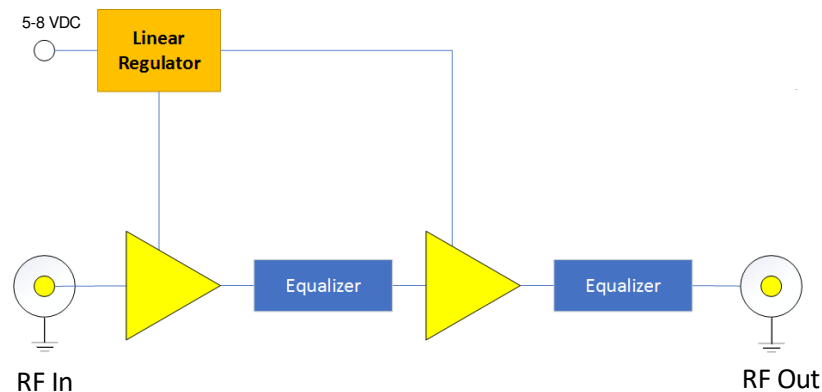


Figure 1: HILNA LS-C026 Functional Diagram

2.1 HILNA LS-C026 ELECTRICAL DATA

Table 1: HILNA LS Absolute Maximum Rating

Operating Voltage	+8 VDC
RF P _{in}	+20 dBm
Operating Temperature	+85 °C
Storage Temperature	+85 °C

Table 2: HILNA LS-C026 Power Specifications

		Min	Typ	Max
Operating Voltage	VDC	+5	+6	+8
Current Consumption	mA	250	275	300

Table 3: HILNA LS RF Specifications

PARAMETER	UNIT	HILNA LS		
		Min	Typ	Max
Frequency Range	MHz	1400		1900
Gain	dB		21	
Noise Figure	dB	1.4	1.6	2.0
OIP3	dBm		+30	
P1dB	dBm	16	17	18
VSWR In			1.4:1	
VSWR Out			1.5:1	
Reverse Isolation	dB		40	

2.3 HILNA LS-C026 MECHANICAL SPECIFICATIONS

Figure 2: HILNA LS-C026 Mechanical Outline

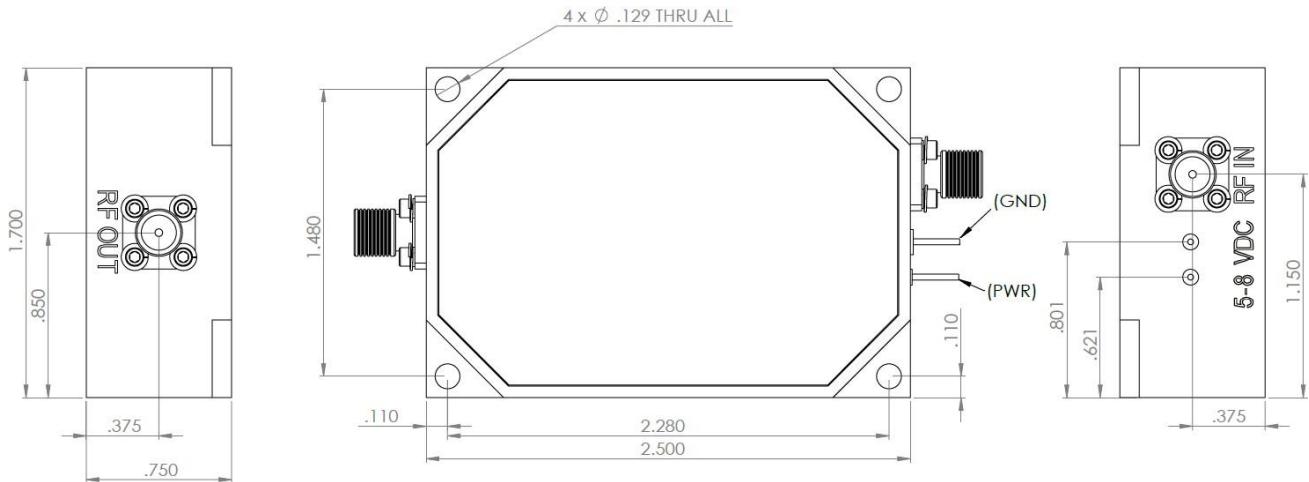


Table 4: HILNA LS-C026 Mechanical Specifications

RF Bulkhead Connector	SMA female
RF Input and Output Mating Connector	SMA female
DC Power Connector	Feed Through Pins
Dimensions (L x W x H)	2.50" x 1.7" x 0.75"
Weight	3.00 oz.

3 INSTALLING, CONNECTING, AND USING THE HILNA AMPLIFIER

HILNA amplifiers have been designed to be highly reliable under the specified operating conditions. The following installation and interfacing guidelines should be followed to prevent damage to the RF module.

Caution: The HILNA amplifier contains components that are sensitive to Electro-Static Discharge (ESD). The use of wrist strap, mats, and ground straps should be adhered to during the installation process.



3.1 CABLING

The HILNA LS-C026 is equipped with high-performance RF connectors. Gold plated SMA-type receptacles are used because they perform very well across the usable frequency range of the unit. For optimal performance, a high-quality 50 Ω coaxial cable with SMA-type connectors should be used to interface with the amplifier.

Caution: Due to the wideband nature of the unit, installation should not be attempted on a tower with transmit antennas without adequate filtering in place.

If cables with the SMA-type connectors are not available, high quality adaptors are available for most coaxial connector types.

3.2 POWER SUPPLY

The HILNA contains internal linear voltage regulators. These regulators protect the circuitry from voltage variations at the input and allow for the wide operating voltage. The power connector for the units are power and ground feed through pins. The only restrictions on the power source for the unit are:

- Capable of sourcing 300mA of current
- Capable of sourcing +5 VDC to +8 VDC

Car batteries (through a cigarette lighter adaptor), laboratory DC power supplies, or wall transformers are suitable power sources as long as the superimposed ripple is low in amplitude.

3.3 CONNECTIONS

Caution: Do not apply RF to the unit until after all cable connections are made and power has been applied.

Making the connections from the HILNA LS-C026 is easily accomplished:

1. Connect the "RF OUT" connector on the unit to a 50 Ω coaxial cable
2. Connect the RF Source to the RF In Connector with a second 50 Ω coaxial cable.
3. Connect the positive side of the power supply to the power pin and ground to the negative side of the power supply. Power is now ready to be applied to the unit.
4. Apply power to the unit.
5. Apply RF to the input cable assembly.

Powering down the unit is done by reversing this procedure.

Connection Summary:

- Connect the RF Output to a good load. The characteristic impedance is 50 Ω .
- Apply DC (+6 VDC Typical) at the power connector.
- Connect an RF source to the RF Input connector.



Caution: Excess drive levels at the input to the amplifier can permanently damage the unit. Under no circumstance should the RF Input level exceed +20 dBm.

3.4 ENVIRONMENTAL SPECIFICATIONS

The HILNA LS-C026 units are hermetically sealed.

4 GETTING HELP - APPLICATIONS ENGINEERING

NuWaves RF Solutions offers technical support for basic configuration and troubleshooting, Monday through Friday, 8 a.m. to 5 p.m. Eastern Time.

Technical Assistance, Application Engineering, and Sales:

Phone: (513) 360-0800

Email: sales@nuwaves.com

NuWaves Home Page: <http://www.nuwaves.com>

Product Warranty:

https://nuwaves.com//srv/htdocs/wp-content/uploads/NuWaves_Warranty_Repair-1.pdf

4.1 GENERAL INFORMATION

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