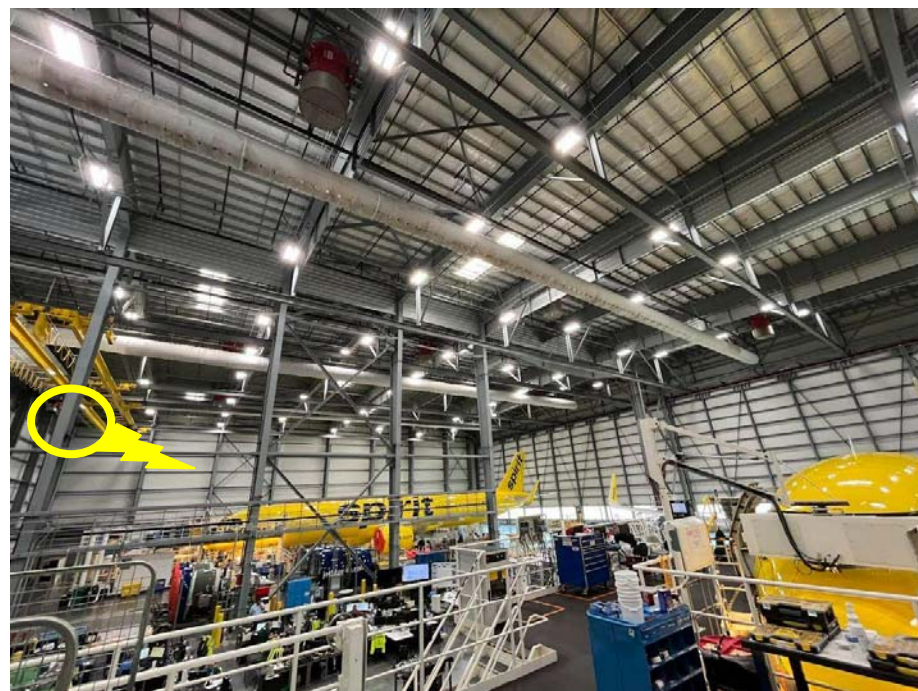
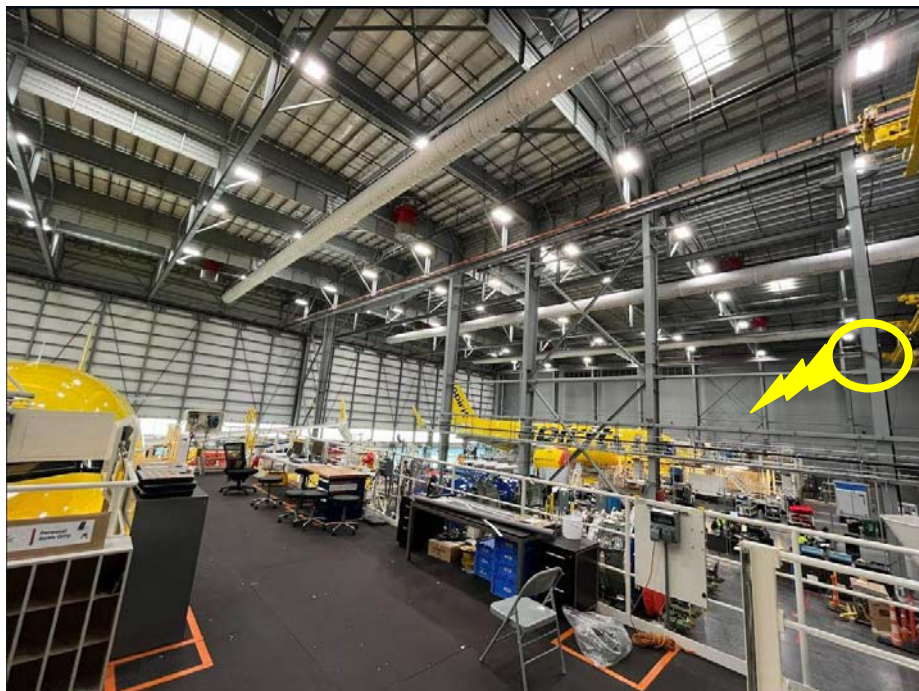
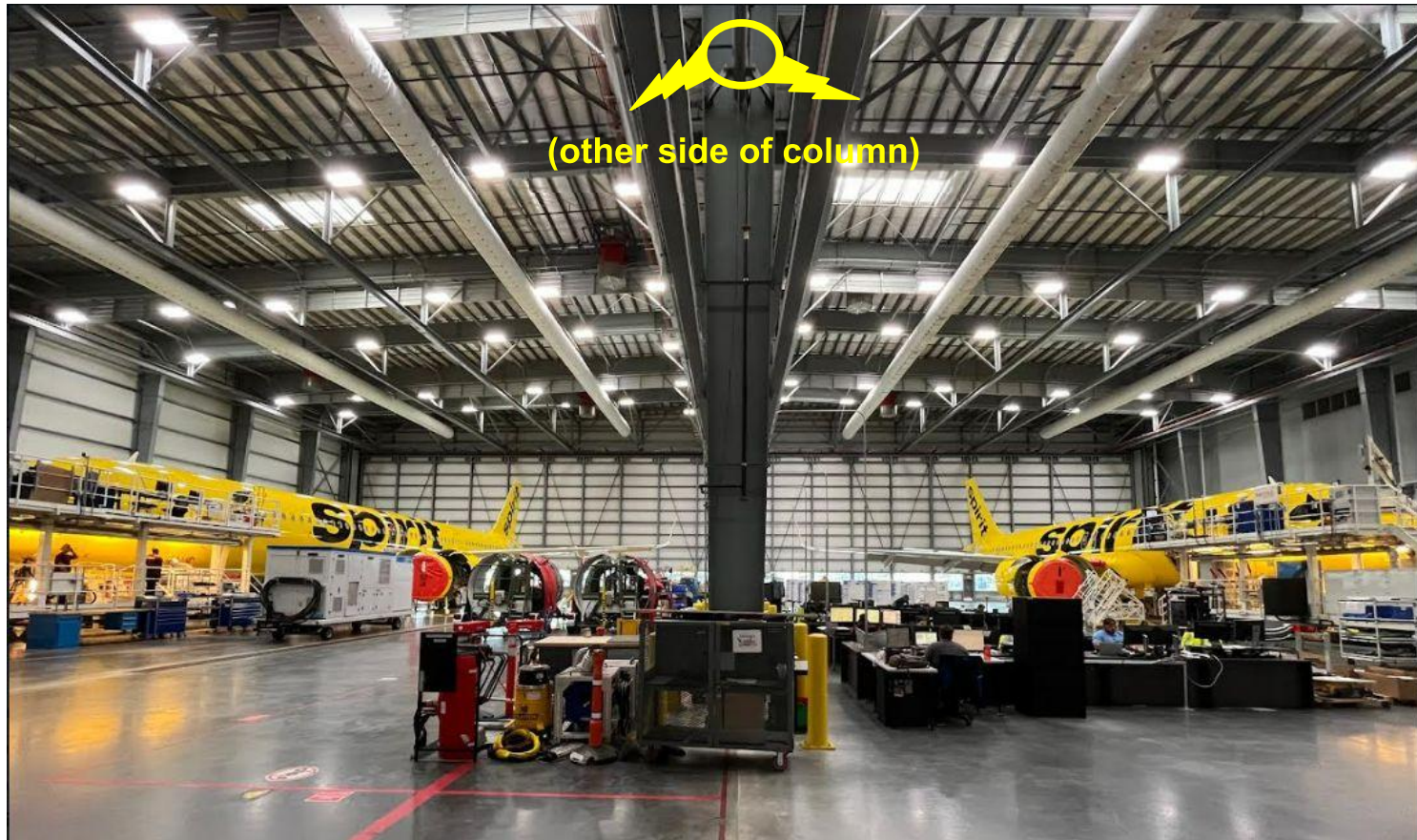


GPS Repeater Installation

Airbus U.S. Manufacturing Facility (Mobile, AL USA)
Bay 3 and Bay 4, 26 October 2023



GPS Repeater (Bay 3/4) Installation Location



GPS Repeater (Bay 3/4) Installation Location



- Junction box with amplified splitter
- Coax cable utilized to move the antennas closer to the a/c between Bay 3 / 4
- Repeater antennas mounted higher in elevation than both a/c GPS antennas
- Only 2 repeater antennas connected, 181 ft from the outside wall of the hangar

The purpose is to perform GPS ground tests inside the hangar.

Chapter 4 MMR-GPS TEST

On a MCDU set:

- DATA
- GPS MONITOR

Make sure that these GPS-1 and GPS-2 data are shown:

- LAT/LONG coordinates
- TTRK:..... "- - - . -"
- GPS ALT:..... xxxxx
- GS:..... x (approximately 0)
- MERIT:....."XXXM" or "XXXFT"
- MOD/SAT:..... NAV/x (x = number of satellites)*

*If the A/C is equipped with SBAS and the signal coverage is sufficient, SBAS can be displayed instead of NAV.

On the Capt. and F/O NDs check:

- GPS PRIMARY indicated

On the board clock:

- Change the time (clear deviation from the current time)
- Change the date (clear deviation from the current date)

On the board clock:

- Set the GPS/INT/SET switch to GPS
- Make sure that the current time is shown
- Make sure that the current date is shown

Valid data indicated
MODE = NAV or SBAS

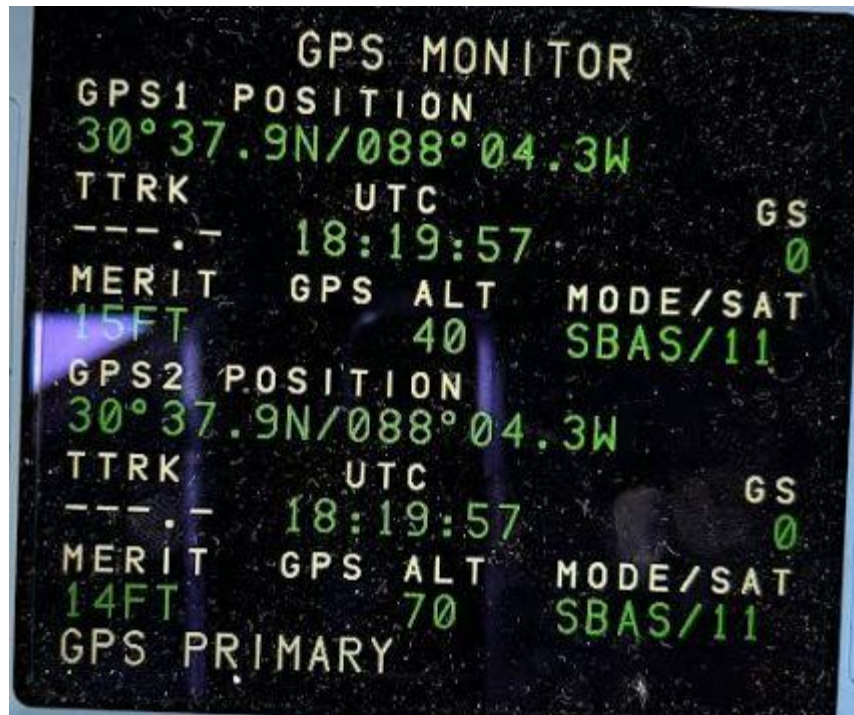
GPS PRIMARY

Clock Updates

22-Aug, MSN 11554 (Spirit A320), Outside

Honeywell

iMMR P/N
69002602-0201
SW P/N
HNR522602000505



Flight Line Dock 7, Local Time 13:19 - 13:30

GPS PRIMARY

GPS1 MODE initially NAV, then SBAS

GPS1 Position Data valid

GPS2 MODE initially NAV, then SBAS

GPS2 Position Data valid

Very stable behavior outside



GPS Kit - Technical Info

The United States Federal Communications Commission (FCC) and National Telecommunications and Information Administration (NTIA) require a license to re-radiate signals received from the GPS. Reference the NTIA "Red Book" Chapter 8.3.28, "Use of Fixed Devices That Re-Radiate Signals Received From the GPS".

<https://ntia.gov/publications/redbook-manual>

Step 1: Register an account with the FCC to obtain a FCC Registration Number (FRN).

<https://apps.fcc.gov/cores/userLogin.do>

Step 2: Submit a Form 442 initial application for an Experimental License for each device that will be used. Once awarded, licenses are valid for 2 years and require renewal (Form 405).

<https://apps.fcc.gov/oetcf/els/forms/442Entry.cfm>

On this page, there is a [link](#) for "How to file Conventional 442 License?"

Step 3: Enter Technical Data related to Antenna Application



Commission Registration System (CORES)



National Telecommunications and Information Administration
United States Department of Commerce

The use is limited to activity for the purpose of testing RNSS equipment/systems.

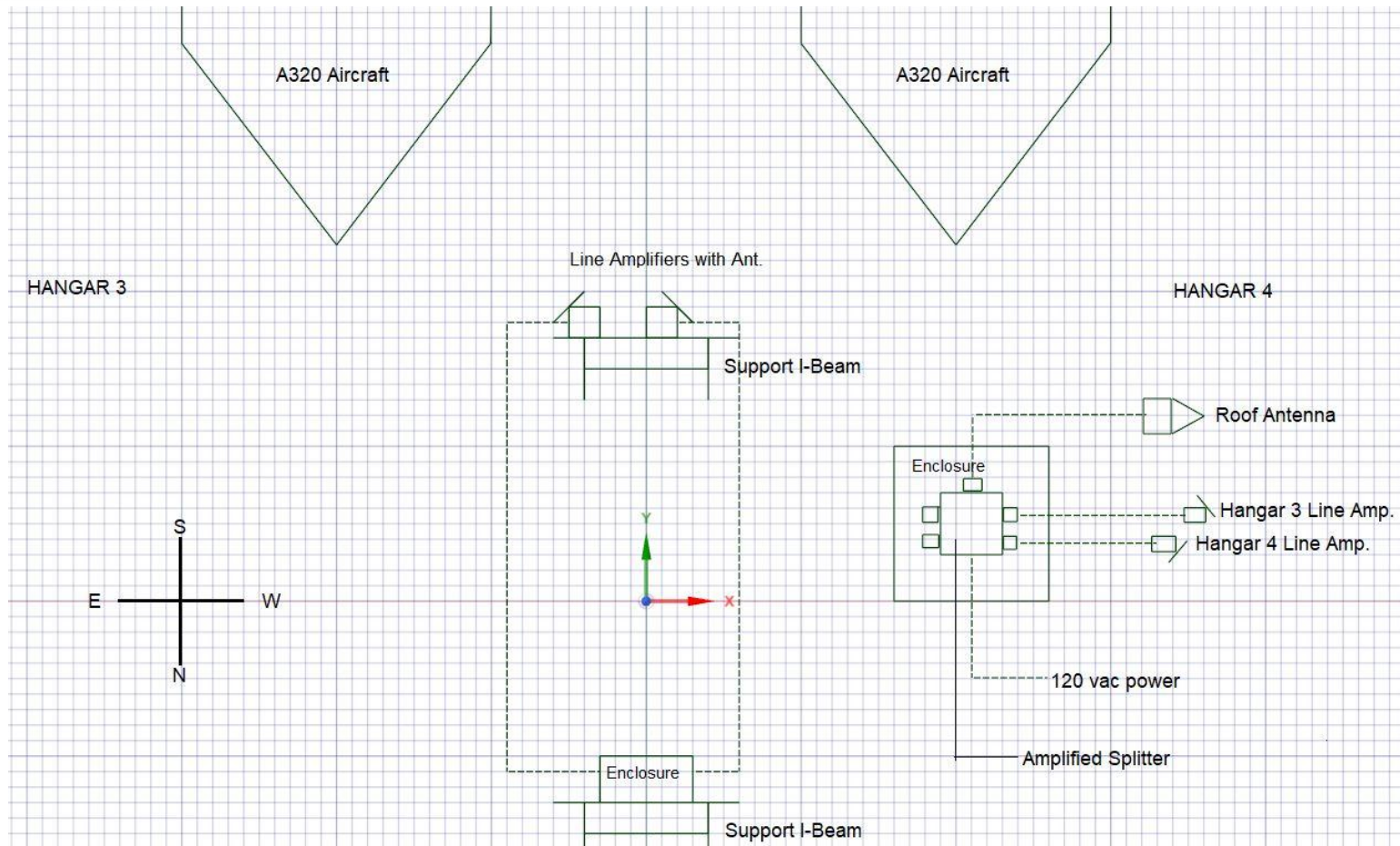
An FCC Experimental Broadcast license is required to operate this device, with the following exceptions:

- Device is operated in a shielded environment, such as an anechoic chamber.
- Device is operated in conjunction with a reradiating hood.
- Device is operated by federal or DoD personnel with the approval of the local spectrum manager.

[CLICK HERE FOR ASSISTANCE CALCULATING YOUR RE-RADIATING KIT LINK BUDGET AND APPLYING FOR YOUR EXPERIMENTAL LICENSE.](#)



GPS Kit - Technical Info





GPS Kit - Technical Info

L1GPSA-N

<https://www.gpsnetworking.com/products/l1gpsa-n>

L1 GPS Active Antenna
GPS L1 = 1575 MHz
+38 dB Gain via internal LNA

Provides re-radiated GPS L1 signals indoors. The L1GPSA-N is a 38dB gain GPS antenna designed for the L1 carrier frequency. Designed for timing and synchronization applications, the L1GPSA-N maintains excellent performance under severe environmental conditions (rain, snow etc.). It also features high gain, low noise figure and a low operating current.

- Roof antenna (+38 dB) installed on top of Hangar Roof with no interferences by ABM.
- 150ft cable (LMR-400, -9dB) between roof antenna and amplified splitter (+3 dB)
- Enclosure box 11x15x8" installed on northeast support I-Beam approx. 25ft above floor.
- 50ft cable (LMR-400, -3dB) to extended line amplifier (+30 dB) and antennas (+4 dB) to second support I-Beam approx. 45ft away from enclosure box. GPS amplified splitter is powered by a 120vac.





GPS Kit - Technical Info

<https://www.gpsnetworking.com/product-categories/standard-splitters>

NHIAPDCS1X4 = Networked Hi-Isolated Amplified DC Thru Splitter 1x4

"We could swap the splitter out for one with our high isolation option which by default has about 3 dB of gain. This will still give you a workable signal throughout your space and the ports on our high isolated devices do not need to be loaded for consistent performance."

Tim Waite

GPS Networking, Inc.
373 E Industrial Blvd
Pueblo West, CO 81007
(719)-595-9880





GPS Kit - Technical Info

<https://www.gpsnetworking.com/products/la30rpdn>

LA30RPDC = Line Amplifier 30dB Regulated Pass DC (Qty 2)

This Line Amplifier 30dB Regulated Pass DC (LA30RPDC) is an active one input, one output amplifier optimized for GPS applications. This equipment accepts signals covering all major GNSS constellations with excellent gain flatness. In the standard configuration, the J1 port accepts DC voltage from a connected GPS receiver. This voltage is regulated and used to power the internal amplifiers while unregulated voltage is passed through the antenna port to power a connected active antenna or other upstream devices.

LA30RPDC





GPS Kit - Technical Info

<https://www.gpsnetworking.com/products/l1rrkpa-s>

L1RRKPA-S = L1 Band GPS Passive Antenna (Qty 2)

+4dB Gain

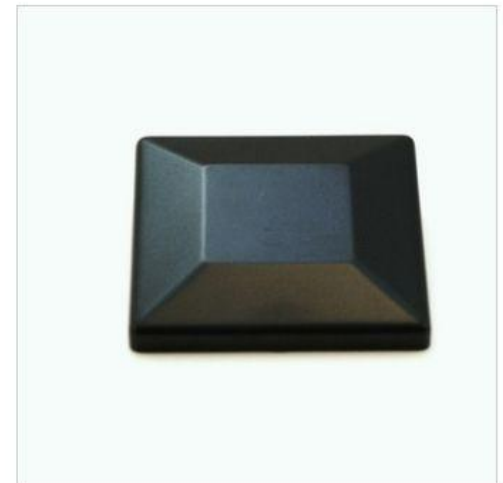
Invoiced to Airbus as p/n PA175

Re-radiate the L1 signal indoors for GPS product testing.



Model No. PA175

L1RRKPA-S



Questions?

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L1GPSA-N



L1 GPS Active Antenna Technical Product Data

Features

- High Gain Amplified Roof Antenna
 - Provides 38 dB gain via internal LNA.
- Low Noise Figure
 - 1.8dB typical
- Low Operating Current
 - 20mA typical
- Enhanced immunity to lightning surge
 - IEC61000-4-5 Level 4 (4000V) prevents antenna failure caused by induced lightning.
- Optional L1RAMB Mount with Base and Pole available separately



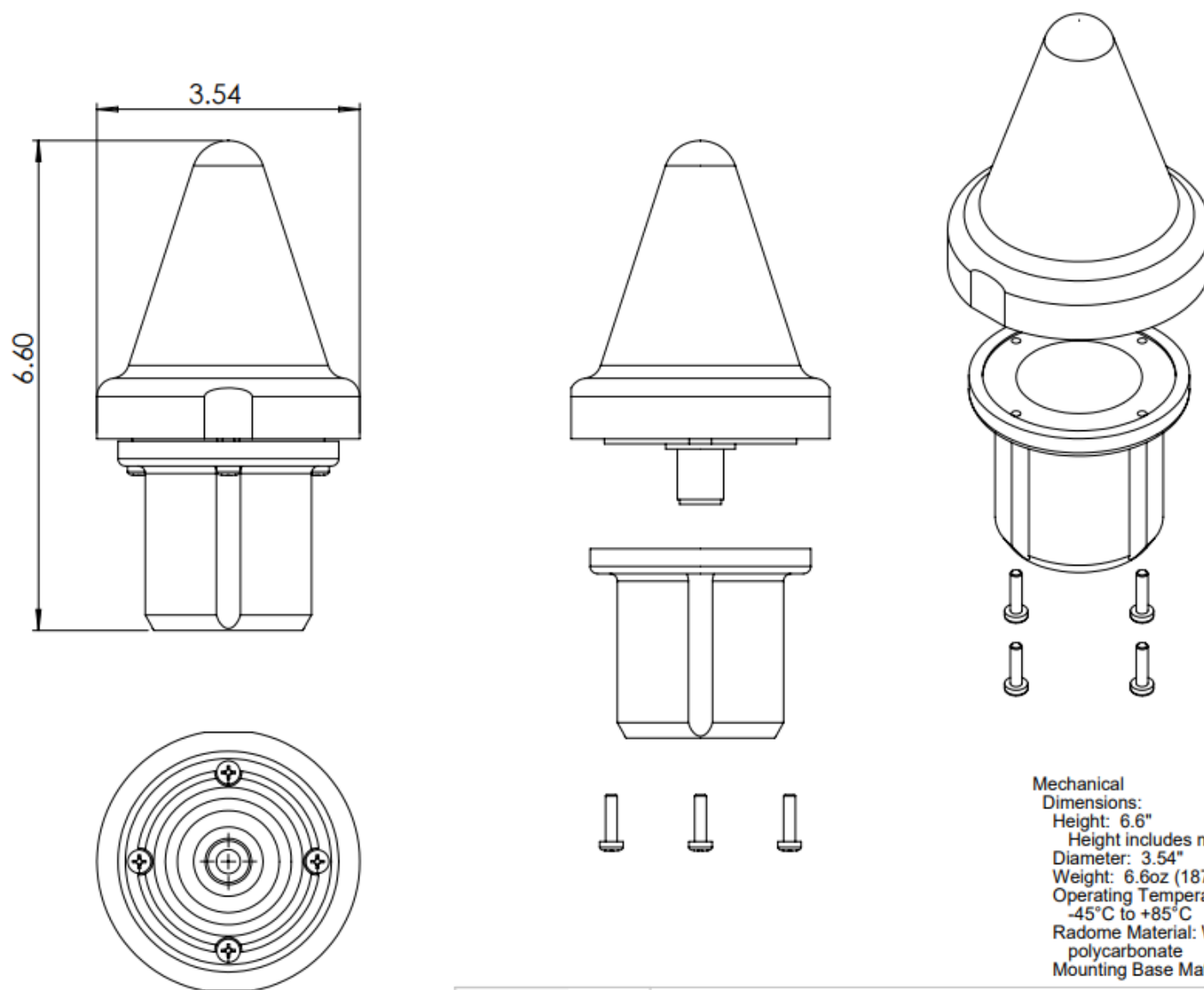
Description

The L1GPSA-N is a 38dB gain GPS antenna designed for the L1 carrier frequency. Designed for timing and synchronization applications, the L1GPSA-N maintains excellent performance under severe environmental conditions (rain, snow etc.). It also features high gain, low noise figure and a low operating current. With convenient mounting options, the L1GPSA-N is an excellent choice for ensuring a strong reliable L1 GPS signal.

Roof Antenna Electrical Specifications, TA=25°C

Parameter	Notes	Min	Typ	Max	Unit
Frequency	Receives and amplifies GPS L1 frequency.		1.575		GHz
Gain	The relative increase in signal power provided by the internal LNA.		38		dB
Bandwidth	Passband centers at GPS L1 frequency.		10		MHz
Filtering	Out of band rejection +/-50MHz from GPS L1 frequency.		-60		dB
Noise Figure	The increase in noise power relative to an ideal amplifier.		1.8		dB
Output SWR	Output Standing Wave Ratio: S22 at L1.			1.5:1	-
Characteristic Impedance	Output port matched to 50Ω.		50		Ω
Req. DC Input V.	Operating Voltage Range.	4.5	5	5.5	VDC
Current Draw	Typical current consumption.		20	27	mA
Polarization					
Right Hand Circular Polarization					
Connector Options	Connector Style	Charge			
	Type N-female	No Charge			

Mechanical



Female N connector required, use adapter for mating



L1GPSA-N

L1 GPS Active Antenna

Tolerances:
X ± 0.030
XX ± 0.015
XXX ± 0.005
Angle ± 1°

04-14-2021

MM

Scale: 1:2

Rev: 1

Sheet 1 of 1

Units are inches and degrees

LA30RPDC



GPS 30 dB Line Amplifier Technical Product Data

Features

- High Output Gain
 - 30 dB gain is typical across all operating frequencies.
- Customizable Fixed Output Gain
 - Customizable gain from 1 dB to 30 dB
- Wide Accepted Frequency Range
 - Accepts signals from the entire L-Band, covering all major GNSS constellations.



Description

This **Line Amplifier 30dB Regulated Pass DC (LA30RPDC)** is an active one input, one output amplifier optimized for GPS applications. This equipment accepts signals covering all major GNSS constellations with excellent gain flatness. In the standard configuration, the J1 port accepts DC voltage from a connected GPS receiver. This voltage is regulated and used to power the internal amplifiers while unregulated voltage is passed through the antenna port to power a connected active antenna or other upstream devices.

In the Networked (Externally Powered) configuration, the output (**J1**) is DC Blocked, and a customer-defined output voltage is provided via the antenna port. Custom gain, DC power, and connector configurations are available upon request.

Use Cases

- As an in-line amplifier to negate the insertion loss of a long cable run.
- To add amplification to a signal provided by a passive antenna.
- As an amplifier in a re-radiating system.
- In combination with one of our splitter devices to create a GPS distribution network.

LA30RPDC



Electrical Specifications, TA=25°C

General Specification

Parameter	Notes	Min	Typ	Max	Unit
Frequency Range	Covers all major GNSS constellations.	1.1		1.7	GHz
Characteristic Impedance	Input and output ports matched to 50Ω.		50		Ω
Req. DC Input V.	Operating Voltage Range.	3.3		15	VDC
Current Draw	Typical current consumption.		36	40	mA

GPS L1 & L2 RF Specification ⁽¹⁾

Parameter	Notes	Min	Typ	Max	Unit
Gain	The relative increase in signal power provided by the amplifier.	29	30	31	dB
Input SWR	Input Standing Wave Ratio: S11			2.0:1	-
Output SWR	Output Standing Wave Ratio: S22			1.8:1	-
Noise Figure	The increase in noise power relative to an ideal amplifier.		L1:2.0 L2:4.25		dB
Band Gain Flatness	The difference in loss or gain between the L1 and L2 frequencies.		0.5	1.0	dB
Group Delay	The transmit time for the signal passing through the device.		L1:1.5 L2:2.1		ns
Reverse Isolation	Attenuation applied signals traveling backwards through the amplifier: S12.		L1: -55 L2: -60		dB
Input P1dB	The 1dB compression point.		L1: -21.5 L2: -23.0		dBm
3rd Order Intercept	Third-order intercept point at L1.		-14		dBm

(1): Performance may be slightly reduced around GPS L5. If working on sensitive L5 applications, please request performance data.

External Power Options (Networked Option)		
Source Voltage Options	Voltage Input	Style
	110VAC	Transformer (ITA Type A Wall Mount)
	220VAC	Transformer (ITA Type C Wall Mount)
	240VAC (United Kingdom)	Transformer (ITA Type G Wall Mount)
	Customer Supplied DC 9-32 VDC	MIL-DTL-5015 10SL Two-Pin DC Connector (Includes Mate)
Output Voltage Options ⁽²⁾	DC Voltage Out	Max Current out For Corresponding Vout
	3.3 V	110mA
	5V	130mA
	9V	140mA
	12V	180mA
	15V	220mA
	Custom	Custom
Standard DC Configuration without External Power Option		
All Ports Pass DC		
Standard DC Configuration with any External Power Option (AC/DC or Military DC)		
J1 Port DC Blocked with 200Ω load standard		
Antenna Port is DC Pass		
Connector Options	Connector Style	Charge
	Type N-female	No Charge
	Type SMA-female	No Charge
	Type TNC-female	No Charge
	Type BNC-female	No Charge
	Other	Contact GPS Networking

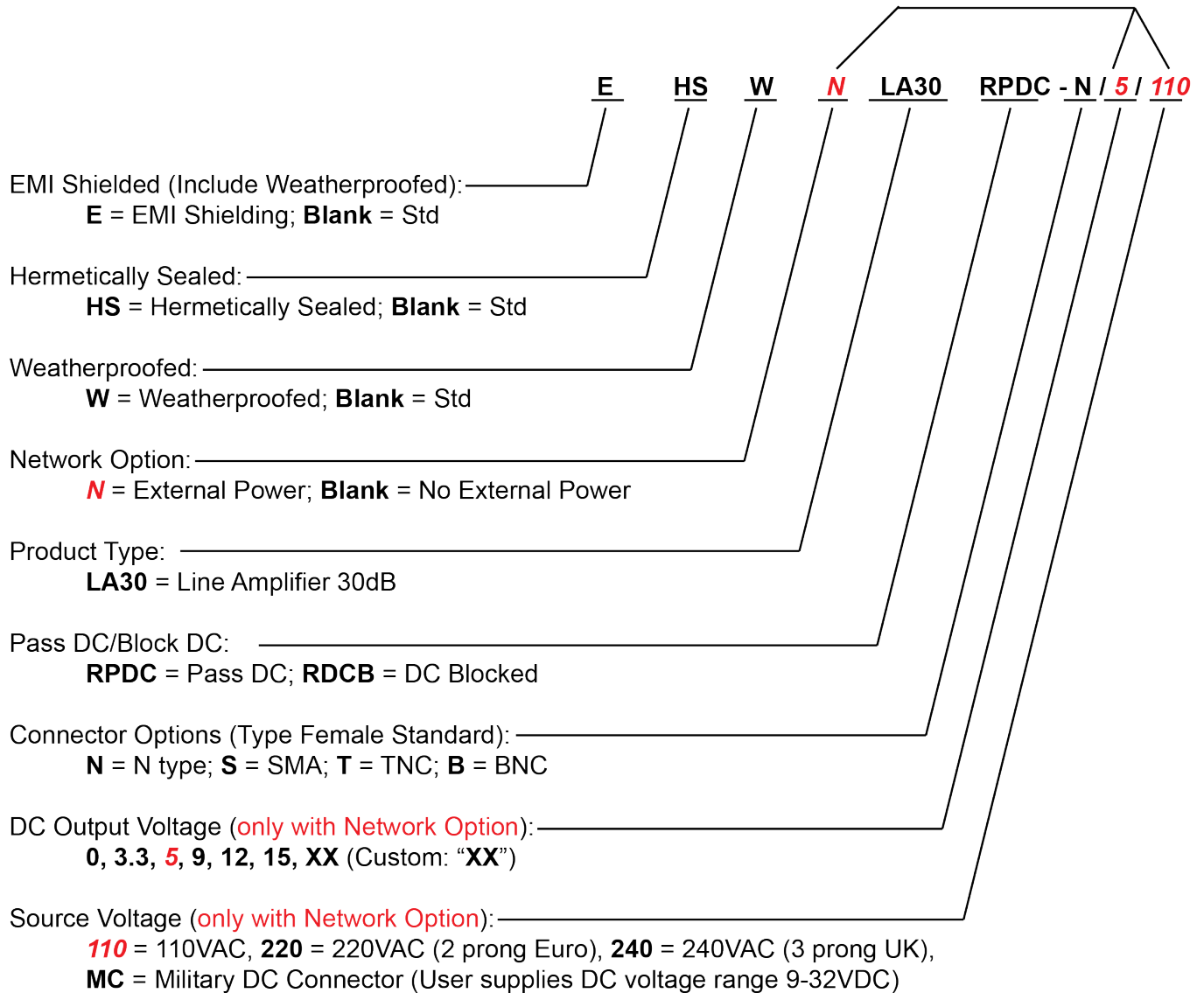
(2): With Network Option, any RF port (input or output) can be specified to Pass DC or Block DC

LA30RPDC



Part Number Configuration

*Network Option (External Power Supply)
Requires 'N', Output Voltage and Power Type*



(Military DC Mating Connector is included standard with the MC power option).

When no external power supply option (AC or DC) is selected, Output 1/J1 is Pass DC Standard.
When external power supply option is selected, all outputs are DC blocked standard.

Contact GPS Networking Technical Support at 1-800-463-3063 or salestech@gpsnetworking.com for any questions regarding non-standard configurations and corresponding part numbers.

LA30RPDC



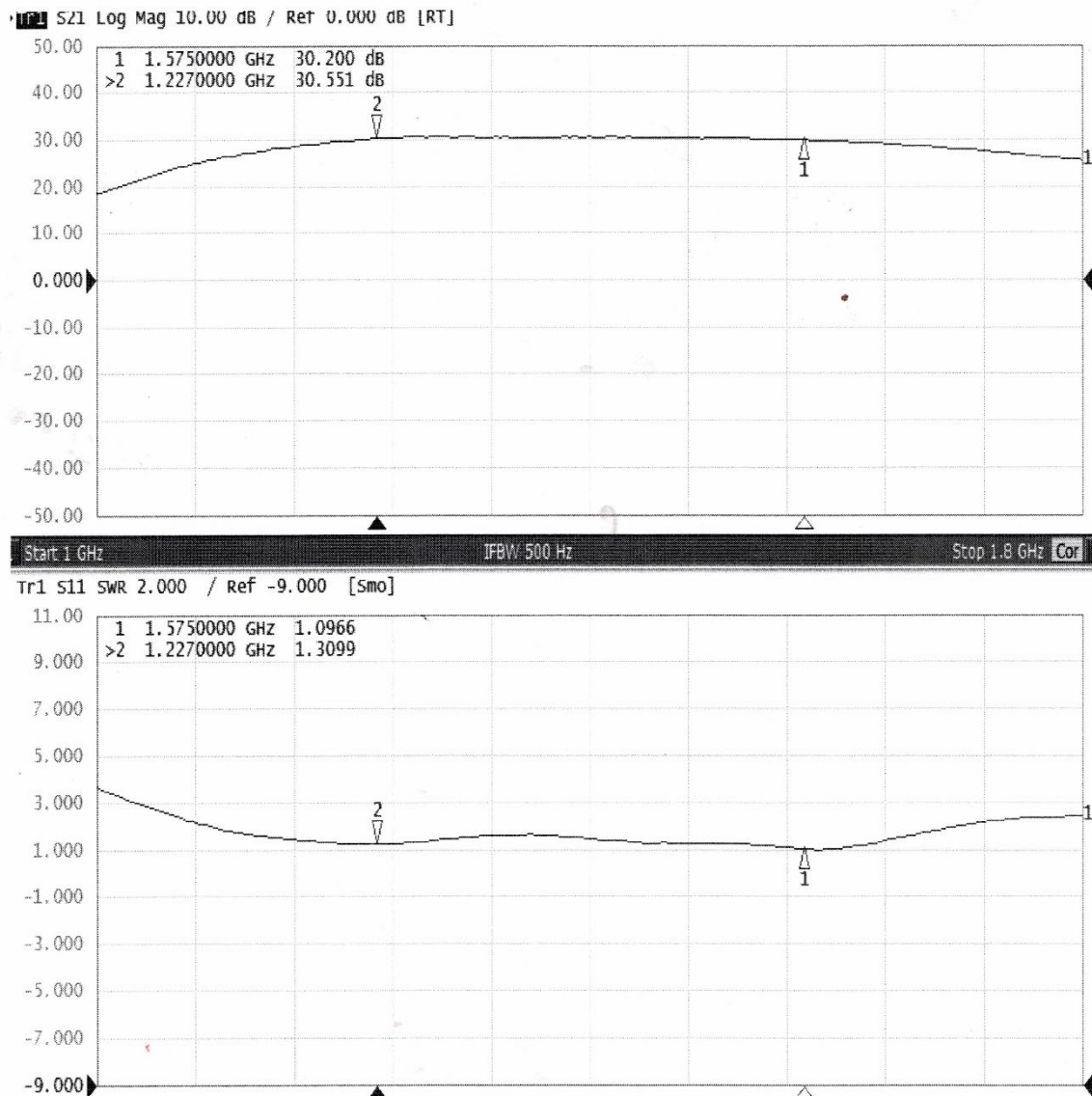
Performance

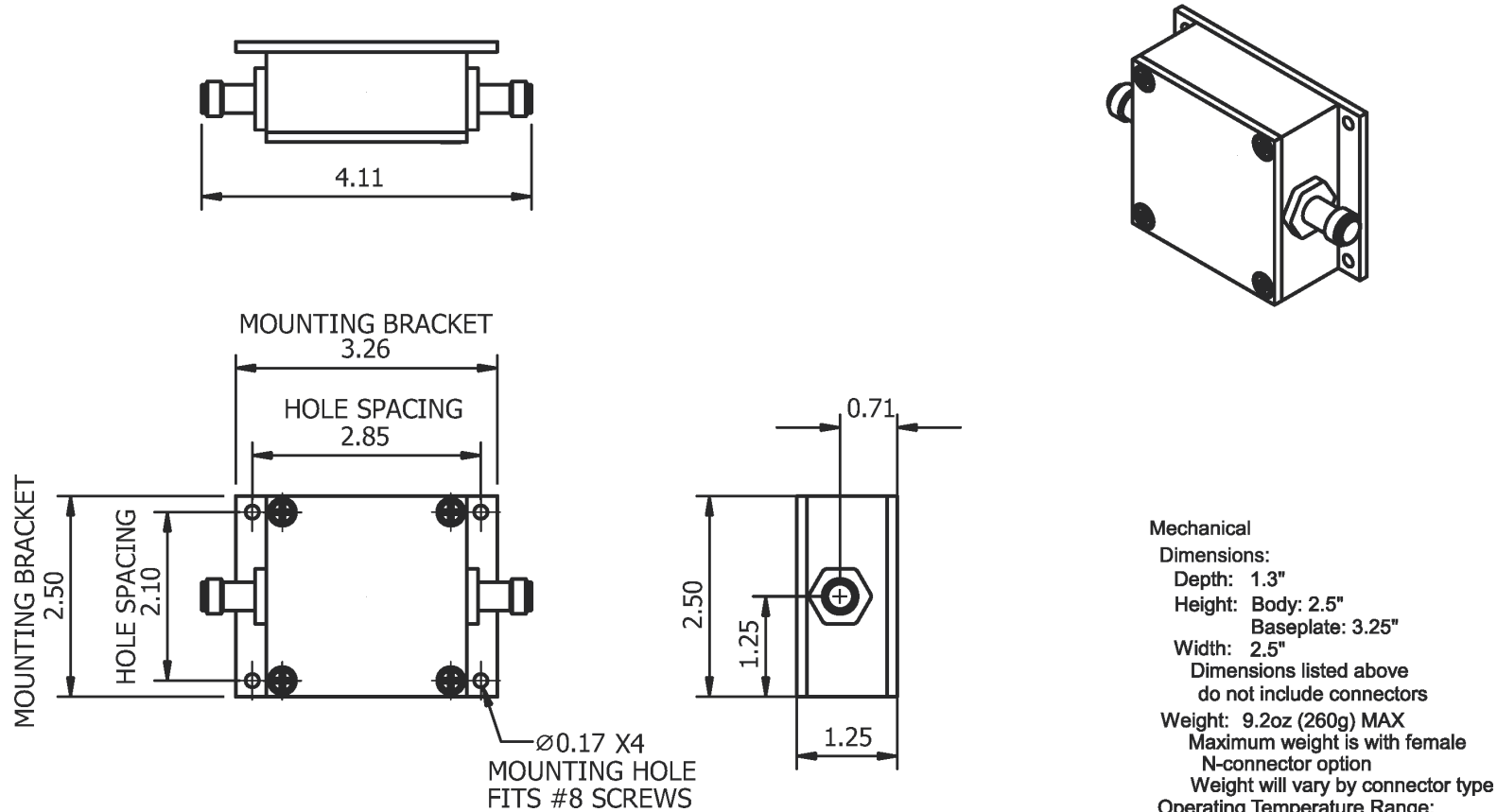
LA30RPDC (Standard Gain)

Each LA30RPDC ships with a test sheet that verifies critical performance characteristics, such as gain, input VSWR, and amplitude balance; a typical VNA test sheet is shown below.



Test Data





Dimensions:
 Depth: 1.3"
 Height: Body: 2.5"
 Baseplate: 3.25"
 Width: 2.5"
 Dimensions listed above
 do not include connectors
 Weight: 9.2oz (260g) MAX
 Maximum weight is with female
 N-connector option
 Weight will vary by connector type
 Operating Temperature Range:
 -57°C to +87°C
 Housing and Baseplate Finish:
 Electroless Nickel Plated
 (MIL-C-26074C, Class 1
 0.0001-0.0003 MAX)
 Lid Finish: Anodize, Type II,
 Class 2, Black, per MIL-A-8625

Female TNC connectors shown, other options available
EMI shielding may increase dimension by 0.02 inches per axis



Line Amplifier 30dB Gain

Tolerances:
X \pm 0.030
XX \pm 0.015
XXX \pm 0.005
Angle \pm 1°

NW

Scale: 1:2

Sheet 1 of 1

Units are inches and degrees

Contact us at salestech@gpsnetworking.com for 3D models or CAD drawings.

L1RRKPA-S



L1 GPS Passive Antenna Technical Product Data

Features

- Low Input SWR
 - 1.5:1
- Peak Gain
 - 4dBic
- Right Hand Circular Polarization



Description

The L1RRKPA-S is an SMA-female L1-only GPS passive antenna with 4dBic peak gain.

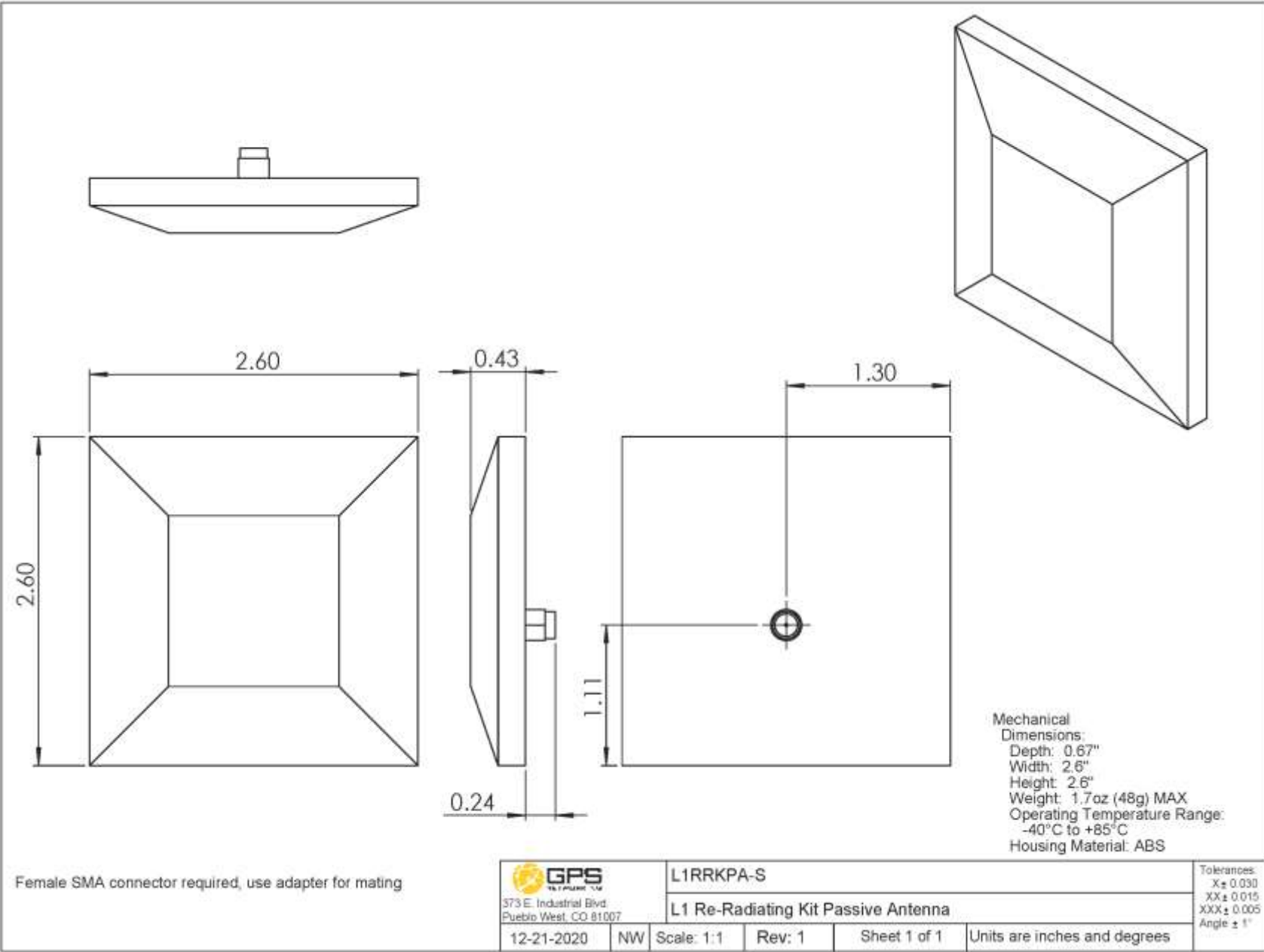
Use Cases

- Re-radiate the L1 signal indoors for GPS product testing.
- Saves time and money by keeping aircraft hangared during navigation system maintenance.
- In combination with one of our splitter devices to create a GPS distribution network.

Re-Radiating Antenna Electrical Specifications, TA=25°C

Parameter	Notes	Min	Typ	Max	Unit
Frequency	Re-Radiates GPS L1 frequency.	1.572	1.575	1.578	GHz
Axial Ratio	Ratio between the major and minor axes of the polarization ellipse.			3	dB
Peak Gain	The Increase in signal power relative to an isotropic antenna source.			4	dBic
Bandwidth	Passband centers at GPS L1 frequency.	20			MHz
Input SWR	Input Standing Wave Ratio: S11 at L1.			1.5:1	-
Characteristic Impedance	Input port matched to 50Ω.		50		Ω
Polarization					
Right Hand Circular Polarization					
Connector Options	Connector Style	Charge			
	Type SMA-female	No Charge			

Mechanical



Contact us at salestech@gpsnetworking.com for 3D models or CAD drawings.