

MRO Hangar

One Simple, Low Cost Solution

It is harder than ever to perform MRO operations efficiently and effectively. MRO is a complex process and a single activity can impact each subsequent activity, creating costly delays. Implementing simple solutions help MRO organizations become more efficient and effective. One simple solution is MRO Hangar.



Benefits

- Cost Savings - Labor
- Cost Savings - Time
- Cost Savings - Utilities
- Improved Work Environment

Features

- Easy, Intuitive Interface
- BIT Detection
- Antenna Monitoring
- Exact GPS Signal Control
- Safe and Easy to Use

Base System

Signal Controller
(GLI-METRO™)

Active GPS Antenna

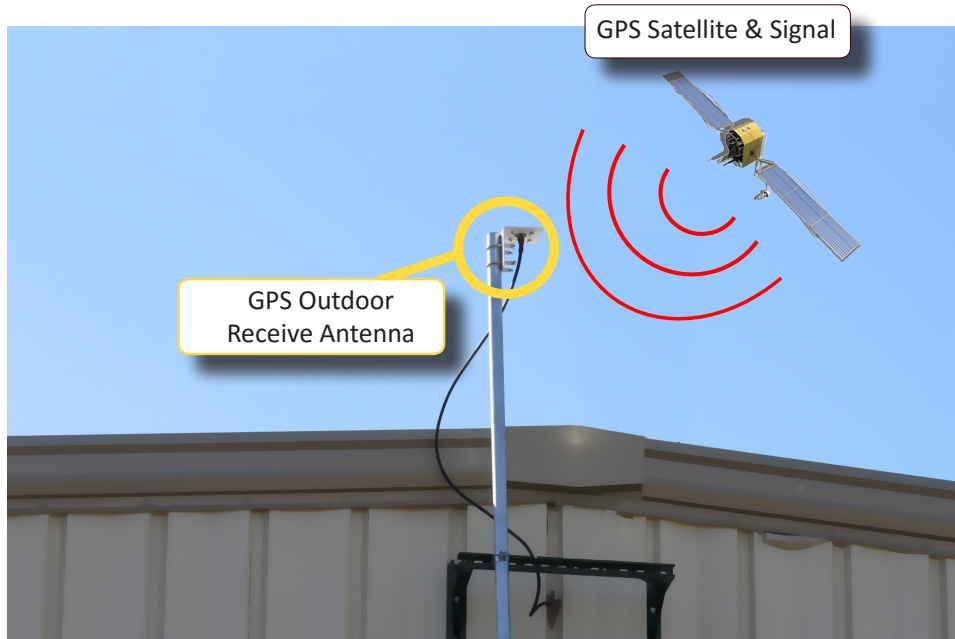
Passive GPS Antenna

Lightning Protection

RF Coax Cabling

Mounting Equipment

Signal Controller (GLI-METRO)



Sample Illustration of MRO Hangar Solution

Signal Controller (GLI-METRO)

WHERE IT ALL STARTS

The centerpiece of the MRO Hangar solution is the GPS signal controller (GLI-METRO). It receives the GPS signal, conditions the signal and then gives the user the ability to precisely control the output level of the signal.

When used in conjunction with active and passive GPS antenna(s), GLI-METRO will pass GPS signals inside a building, hangar or any structure where signal is not accessible. A maintenance technician can easily control the signal output level.

AUTOMATIC SIGNAL LEVEL CONTROL

GLI-METRO employs an automatic control to maintain the set output signal level, regardless of the uncertain loss or gain in the receive antenna cable network.

Derived from high performance systems for military applications, this device allows precise determination over effective radiated power (ERP) levels, regardless of the uncertain loss or gain in the receive antenna cable network. It will automatically condition the signal and prevent changes in performance.



Signal Controller (GLI-METRO)

BUILT-IN TROUBLESHOOTING

The GLI-METRO will identify and isolate the following:

- Oscillation condition
- Internal component failure
- High gain
- Less than four satellites
- Low gain
- No satellites with adequate signal
- Short/Open circuit

(Call for complete list of conditions.)

REPEATER NOTICE: Due to current regulatory considerations, GPS Repeater kits are only available for sale to: International Customers (outside the U.S.), agencies of the US Federal Government, parties operating under the direction of the US Federal Government, or parties that have received an STA or Experimental License under part 5 of the FCC rules, or parties that will be operating GPS Repeaters in a shielded room.

Signal Controller (GLI-METRO)

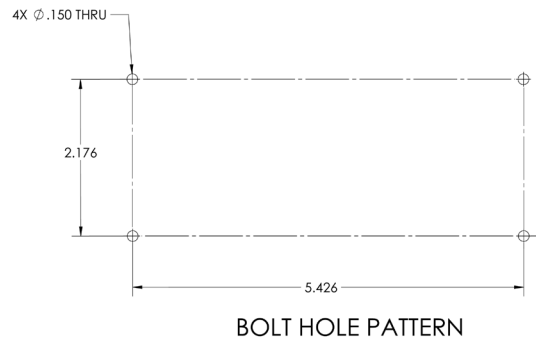
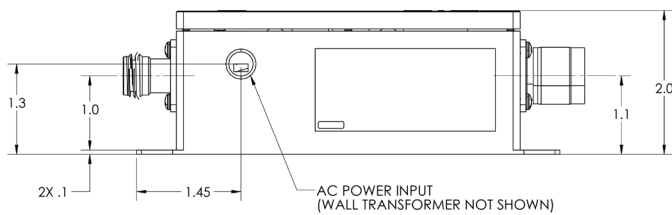
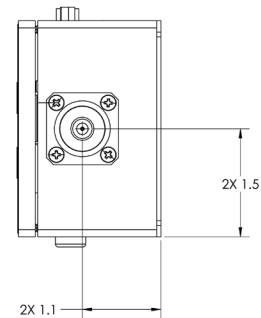
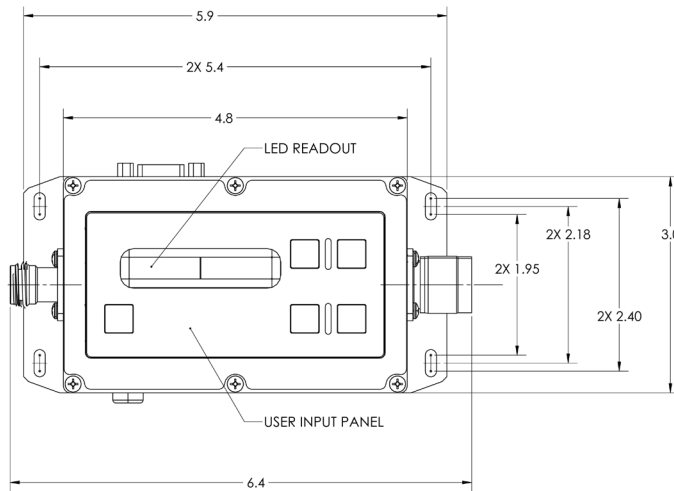
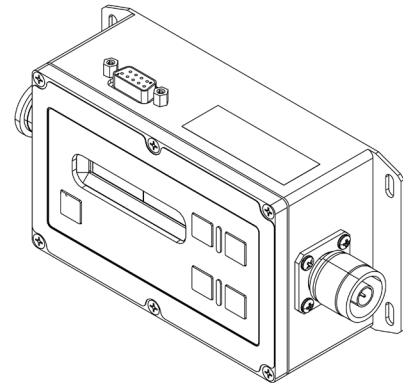
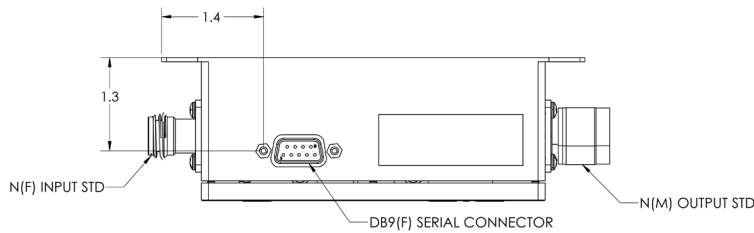
Electrical	Typical
Input/Output Impedance	50 Ω
SWR all ports (typical)	
Input	2:1
Output	2:1
Bandwidth	
L1	1574.42 \pm 15 MHz
Gain (Nominal)	33dB
Range	0 - 55 dB
Gain Flatness	<3 dB
Noise Figure	<3 dB
AC Input Level	110 VAC 230 VAC UK 230 VAC European
DC Input Level	12VDC min.
Active Antenna Output Power Supply	Output 6.8V

Physical Specifications
Output Ports: 1
RF Connectors: N-type
Dimensions (including RF connectors) 3" (76mm) x 6.4" (162.6mm)
Weight: 1.2 lb / 544.3 g
Operating Temperature: -40°C to +85°C

Options
Waterproof
Other Bandwidths Available: GPS L1/L2 GPS L1+GLONASS L1 GPS L1/L2+GLONASS L1/L2
Power Always On or Power On/Off

Signal Controller (GLI-METRO)

Physical Specifications



GPS Active Antenna (L1A)

GPS ACTIVE ANTENNA

The signal controller receives the GPS signal from an active antenna. The antenna is placed outside the hangar within line of site of the sky.

DESCRIPTION

The L1A is a high performance L1 GPS active antenna with low noise and excellent gain. The product functions over the entire operational voltage and temperature range at a minimal current draw. The product includes high frequency selectivity to avoid interference with nearby transmitters.



GPS Active Antenna (L1A)

FEATURES

Outstanding Noise Figure < 1dB
Excellent Typical Gain of 33dB
Tiny Current Draw <20mA

Electrical Specifications

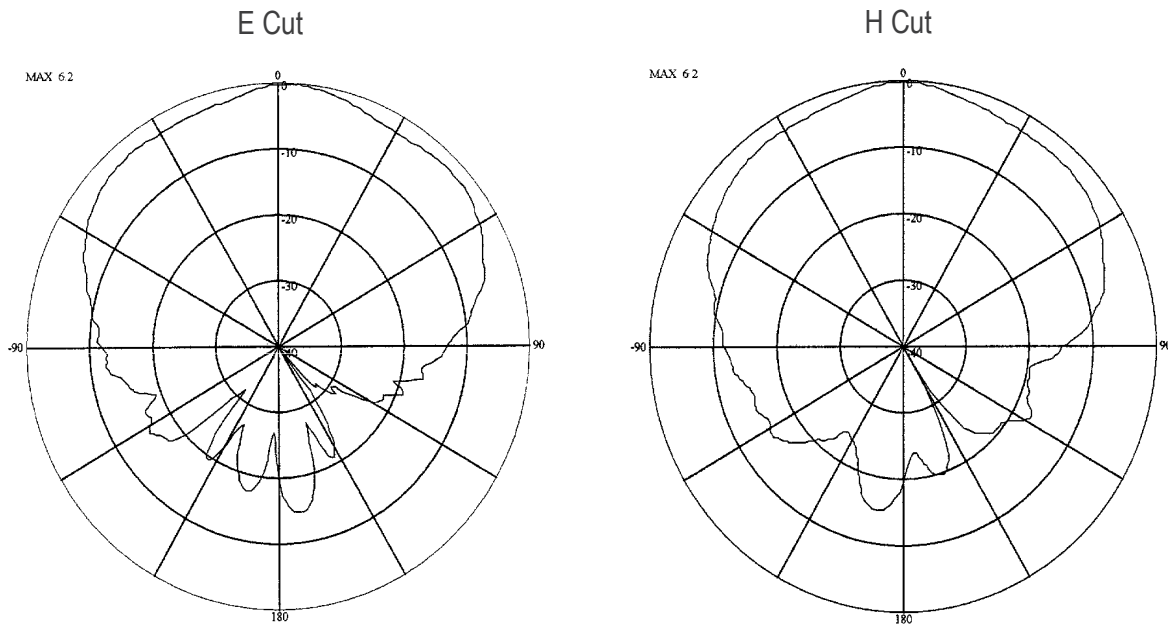
Parameter		Conditions	Min	Typ	Max	Units
Frequency Range * (Passband)		Ant: output, VDC=3V to 16V, Output=50Ω	1570	1575	1580	MHz
Out Impedence				50		Ω
Gain	Element	Ant Element		3	3.5	dBiC
	LNA	LNA, VDC = 3V to 16V, Output = 50Ω	32	33	35	dB
Output SWR		VDC = 3V to 16V, Output = 50Ω			2.5:1	---
Noise Figure		VDC = 3V to 16V, Output = 50Ω		.8	1	dB
Required DC Inut Voltage		DC Input on RF Output Center Conductor	3		16	VDC
LNA Current		Output = 50Ω, 5V		17	20	mA
Rejection	±50MHz>24db	Ant: Output, VDC = 3V to 16V, Output = 50Ω	-22	-24	-25	dB
	±100MHz>35dB		-34	-35	-37	
Polarization		Right Hand Circular				

*Other Frequencies Available: GPS L1/L2, GPS L1/GLONASS L1, GPS L1/L2+GLONASS L1/L2

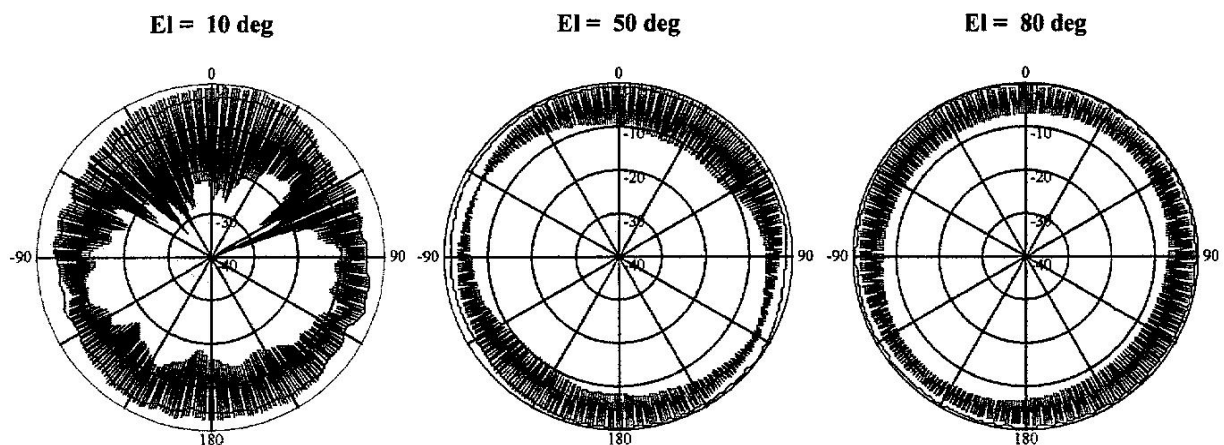
Performance Data

Far Field Patterns - 1575MHz

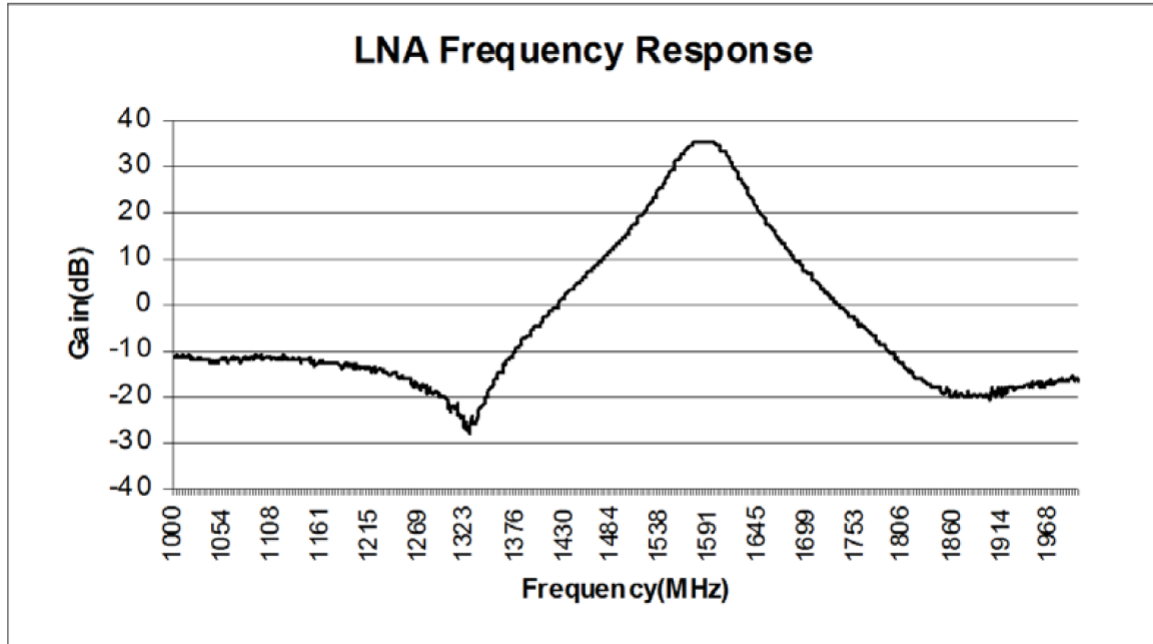
Far Field Plots Rotating Linear



Far Field Plots Azimuth Cuts



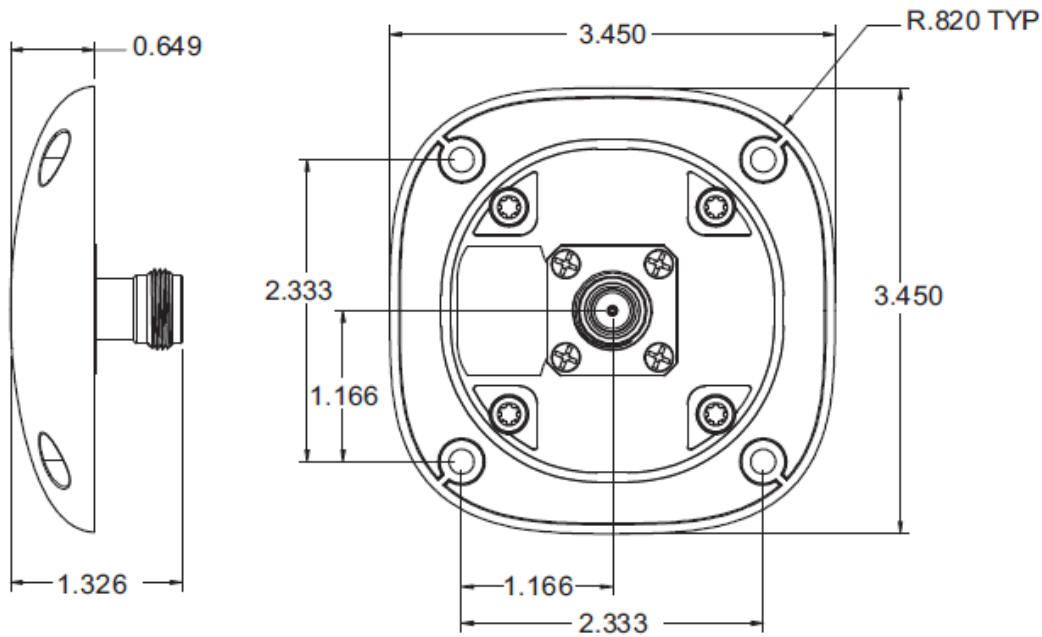
Performance Data



Note: Frequency selectivity of antenna element adds additional out of band rejection.

Physical Specifications

Parameter	
Dimensions:	3.45" (87.63mm) x 3.45" (87.63mm) x 1.33" (33.78mm)
Weight:	.25lbs (113.4 g)
Connector:	N(f)
Operating Temperature:	-40°C to 85°C



GPS Passive Antenna (L1P)

GPS Passive Antenna

The signal controller passes the conditioned GPS signal to the passive antenna at a controlled power level. In turn, the passive antenna conveys the controlled signal into the hangar wirelessly. The antenna is directly connected to the Signal Controller (GLI-METRO).



GPS Passive Antenna (L1P)

DESCRIPTION

The L1P is a passive L1 GPS antenna. The product functions over the entire operational voltage and temperature range at a minimal current draw.

FEATURES

- Excellent Typical Gain of 3dBiC
- Tiny Current Draw <20mA

Electrical Specifications

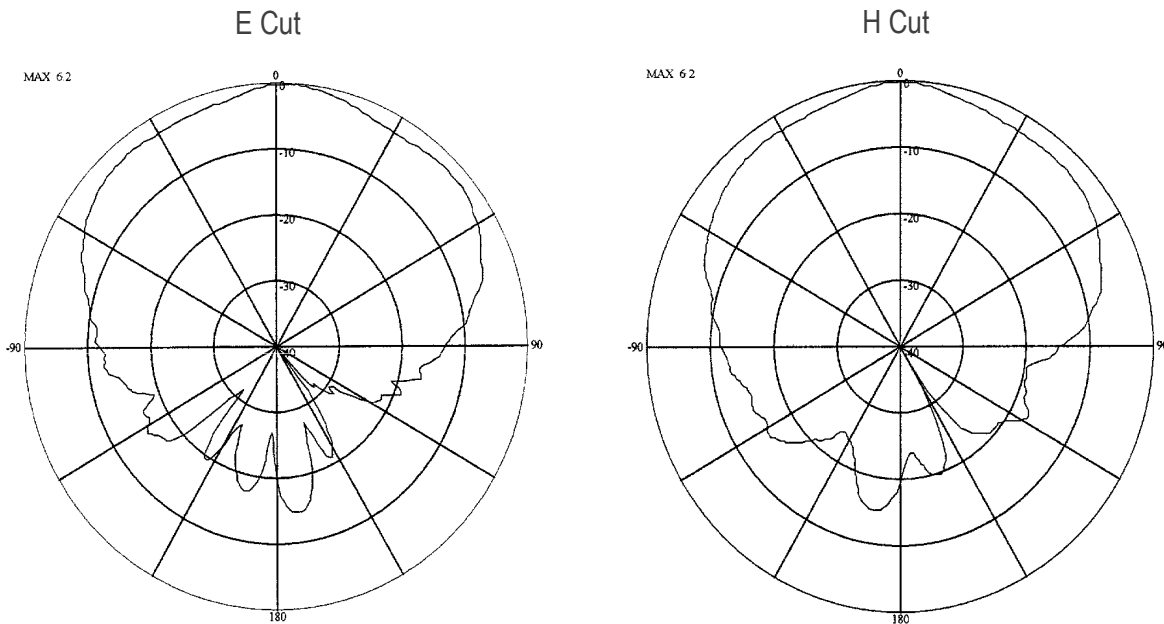
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range (Passband)**	Output=50Ω	1570	1575	1580	MHz
Out Impedence			50		Ω
Gain	Output = 50Ω	2.5	2.8	3	dBiC
Output SWR	Output = 50Ω			2.5:1	---
Polarization	Right Hand Circular				

**Other Frequencies Available: GPS L1/L2, GPS L1/GLONASS L1, GPS L1/L2+GLONASS L1/L2

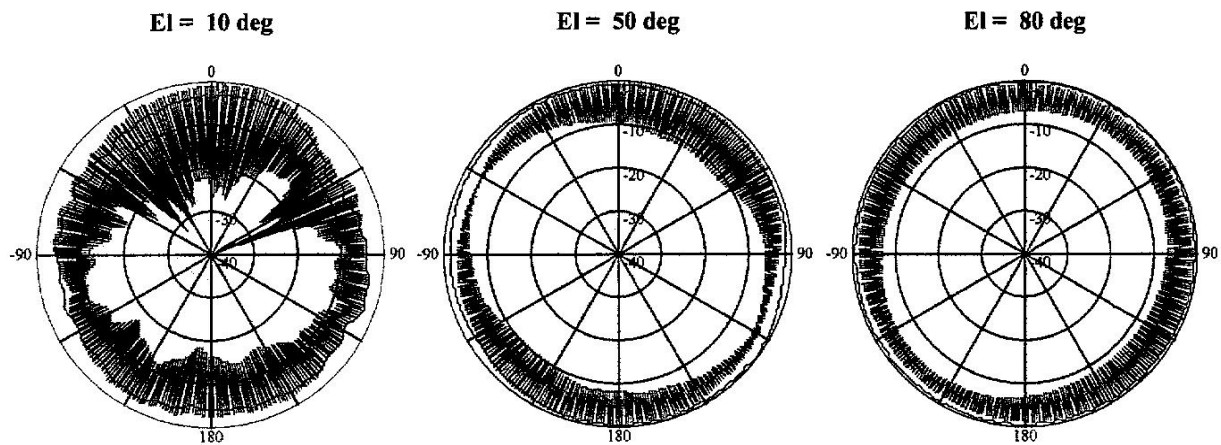
Performance Data

Far Field Patterns - 1575MHz

Far Field Plots Rotating Linear



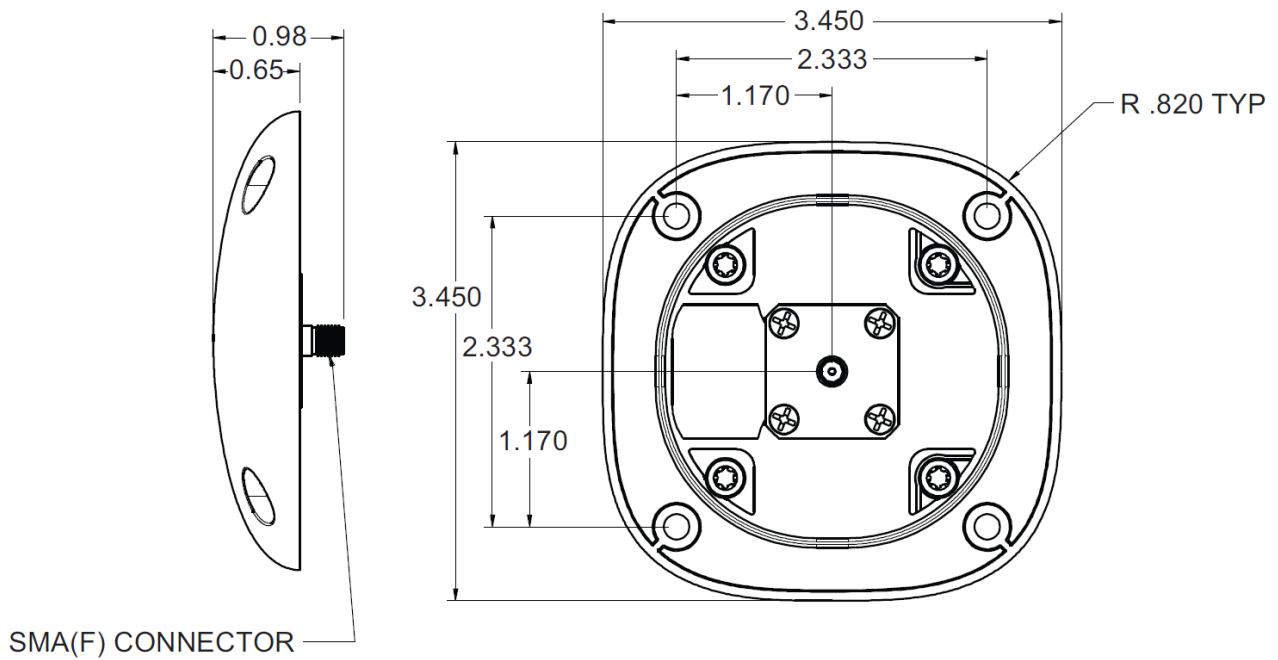
Far Field Plots Azimuth Cuts



GPS Passive Antenna (L1P)

Physical Specifications

Parameter	
Dimensions:	3.45" (87.63mm) x 3.45" (87.63mm) x .98" (24.89mm)
Weight:	.25lbs (113.4 g)
Connector:	SMA(f)
Operating Temperature:	-40°C to 85°C



Cabling & Mounting Hardware

<p>Cables</p> <p>The signal controller (GLI-METRO) is connected to the GPS receive antenna using coax cable. MRO Hangar ships with standard RF coax cable, the length and type being defined by the size of the hangar.</p> <p>Many MRO-HANGAR installations have unique cabling requirements. Depending on the available infrastructure, the antenna may be a substantial distance from the signal controller. A site survey may be suggested if there are any questions about placement, type and length of cable.</p>	
<p>Pole Mount</p> <p>The active antenna is shipped with a pole mount bracket which works well with many types of poles that may already be part of the building's roof.</p>	
<p>Gimbal Mount</p> <p>The signal controller (GLI-METRO) will ship attached to a gimbal mount. The gimbal mount is a pivoted support that allows the rotation of the GLI-METRO. With this mount, the GLI-METRO can be positioned exactly where it will be most effective.</p>	

Surge Suppressor (CO-PRO)

DGXZ+15NFNF-A~ Tower Top Electronics and GPS Protector

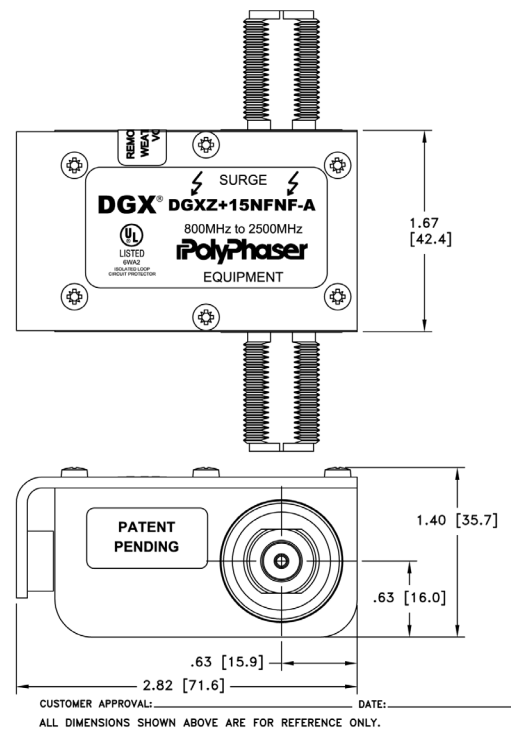
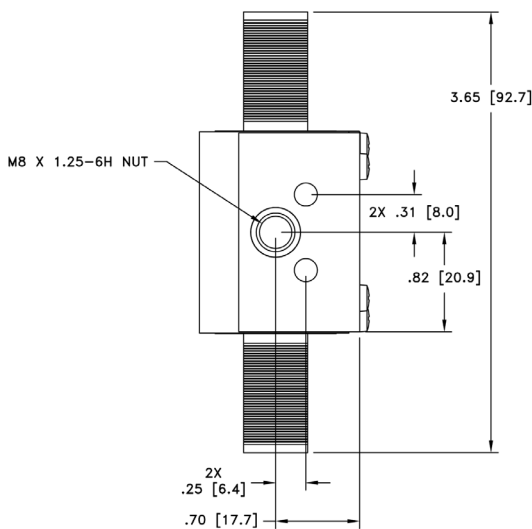
Patented DC Pass coaxial protector for tower top electronics. The industry's best RF performance with low throughput energy and multi-strike capability. The DGX includes both bulkhead and flange mounting options on the body making it versatile and easy to install. The GX Series is multi-strike capable, fully weatherized and provides the industry's lowest throughput energy.



Surge Suppressor (CO-PRO)

KEY SPECIFICATIONS

Parameter	
Frequency Range	800 - 2500 MHz
Unit Impedence	50 Ω
Insertion Loss	0.1 dB
RF Power (Watts)	2.25 Watts

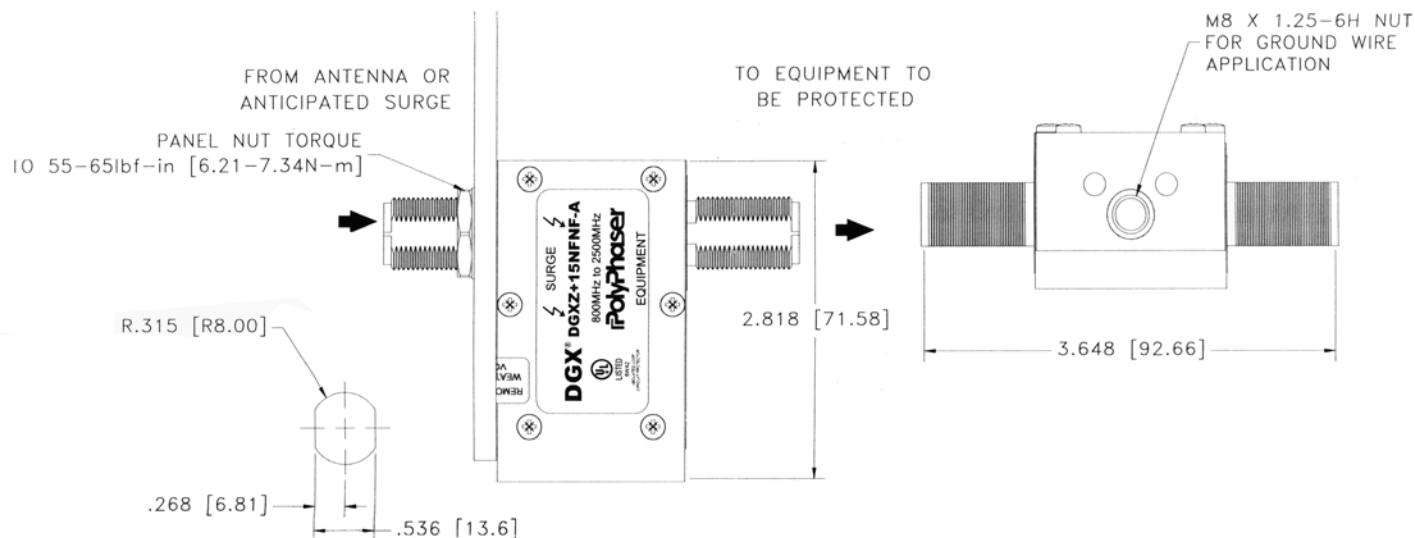


IMPULSE SUPPRESSOR INSTALLATION

PLEASE READ **DANGER** SHEET BEFORE INSTALLING

DGXZ+15NFNF-A

The DGXZ+15NFNF-A is used as a transmit and/or receive unit with dc voltage up to 15Vdc to power up a receive only Preamp generally located near the top of the tower at the antenna. Maximum average RF power use is 300 watts. Connect this unit in the direction it is labeled. The dc circuit has spike protection to suppress spikes over +16.5V to the dc Power Supply. This DGXZ+15NFNF-A is capable of 20,000 Amp maximum surges and has a frequency range of 800MHz to 2.5GHz.



These commodities or technology are exported from the U.S. in accordance with the Export Administration Regulations. Diversion contrary to U.S. law prohibited.

IT IS VERY IMPORTANT THIS UNIT BE GROUNDED TO A LOW IMPEDANCE (LOW R AND LOW L) GROUND SYSTEM IN ORDER TO WORK PROPERLY. When attaching grounding stud (M8), use maximum of 88.5 lbf-in. [10 N-m] of torque. "N" mating connector torque is 15-20 lbf-in. [1.70-2.26 N-m]. We strongly recommend this ground be interconnected to the tower ground and power ground to form one system. To minimize the "in-air" interconnect inductance to the ground system since skin effect is present, use as straight and as large a surface area strap as possible. Keep bends to 8.0" [203.2mm] radius or larger.

The transmission line is only one means of having damaging impulse energy enter your equipment. We strongly recommend power line and telephone line protectors be used on the equipment.

LIMITED TEN YEAR WARRANTY

ENG-F-016 Rev. E 05/03

PolyPhaser Corporation warrants this product to meet or exceed the published specifications of the time of manufacturing and to be free of manufacturing defects for a ten year period after proven date of purchase. PolyPhaser Corporation makes no claims, nor extends any warranty to include an "IMPLIED WARRANTY OF MERCHANTABILITY OR IMPLIED WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE". PolyPhaser Corporation assumes no responsibility for personal injury, property damage, and any other losses. This warranty is limited to the repair, replacement or refund of purchased price of this product only and it will be PolyPhaser Corporation's decision as to whether this unit is defective and as to which of the above mentioned actions will be taken. PolyPhaser Corporation extends no obligation to update or modify any of its existing products as newly developed products are marketed.

Products may be covered under the following U.S. Patents: 5,986,869 6,061,223 6,115,227 6,236,551 6,243,247 other U.S. and Foreign Patents Pending

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Operational Safety Features of the MRO HANGAR

1. Operator Controlled EIRP:

Operator controlled Effective Isotropic Radiated Power (EIRP) feature. This enables the retransmitted GPS signal level to be set by the operator during installation. When configured for optimal performance, the retransmitted signal visible outside of the hangar will be significantly lower than inside the hangar. Other aircraft or GPS equipment in the area will receive the retransmitted signal at many dB below the level at which they receive the native signals.

2. Automatic Gain (EIRP) Control:

Once the system EIRP level has been set and locked by the installer (note that the Signal Controller (GLI-METRO) has the ability to lock the Operator Level Control to prevent unauthorized adjustment of the installer defined level), the GLI-METRO has an internal automatic gain control that will offset any variations in the system due to antenna variations, cable losses, extreme weather or system variations that result from temperature fluctuations. This is critical to ensure that the intended and verified retransmitted signal level is maintained regardless of variations in the operational environment.

3. Oscillation Detection & Mitigation:

GLI-METRO provides signal coverage in the hangar by receiving the native GPS signals, amplifying them, and then re-transmitting them on the same frequency. If the system malfunctions, or if the system is improperly installed, it is possible for the system to oscillate. The GLI-METRO includes a very important safety feature that prevents this scenario from occurring. It closely monitors the retransmitted signal. If the conditions necessary for oscillation becomes evident, the GLI-METRO will display a fault condition. It will then immediately reduce the system gain until the condition is eliminated (even below the operator set level). If the GLI-METRO reduces the signal level to the lowest setting and the condition persists, it will shut down the transmission altogether and set an additional fault code. The GLI-METRO will detect and mitigate an oscillation condition before any oscillation can form that would interfere with the operation of other GPS/Avionics systems.



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About GPS Source, Inc.

Since 2000, GPS Source has been developing solutions for the Global Navigation Satellite System (GNSS). This includes GPS & GLONASS Retransmission and Signal Distribution Systems. GPS Source, Inc. is an expert in GNSS retransmission and has established itself as an industry leader in developing safe, controlled solutions for GNSS and RF distribution.