

### **Why an Experimental License is Necessary:**

The purpose of this application is to support temporary integration testing in preparation of a government/DoD sponsored exercises and demonstrations.

### **Operation Description:**

The system receives the GPS signals from a roof top antenna and re-transmits the signals inside the facility to allow production and flight test personnel to perform installation, testing and troubleshooting of GPS receive systems.

### **Technical Description**

This technical description shows compliance with all NTIA items in Chapter 8.3.28.

1. Individual authorization is for indoor use only, and is required for each device at a specific site. ***Operation will be conducted indoors. The device information is provided in application and specific site information provided below.***
2. Applications for frequency assignment should be applied for as an XT station class with a note indicating the device is to be used as an "Experimental RNSS Test Equipment for the purpose of testing GPS receivers" and describing how the device will be used. ***Description of operation provided in technical description and Liquid Robotics Inc. concurs to the XT station class.***
3. Approved applications for frequency assignment will be entered in the GMF. ***Liquid Robotics Inc. concurs.***
4. The maximum length of the assignment will be two years, with possible renewal. ***Liquid Robotics Inc. concurs.***
5. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user. ***The site is under Liquid Robotics Inc.'s control.***
6. The maximum equivalent isotropically radiated power (EIRP) must be such that the calculated emissions are no greater than -140 dBm/24 MHz as received by an isotropic antenna at a distance of 100 feet (30 meters) from the building where the test is being conducted. The calculations showing compliance with this requirement must be provided with the application for frequency assignment and should be based on free space propagation with no allowance for additional attenuation (e.g., building attenuation.) ***Link budgets provided below and meet specified levels. Calculations do not allow for building attenuation.***
7. GPS users in the area of potential interference to GPS reception must be notified that GPS information may be impacted for periods of time. ***GPS users in area will be notified.***
8. The use is limited to activity for the purpose of testing RNSS equipment/systems. ***Use will be limited to testing RNSS equipment.***
9. A "Stop Buzzer" point of contact for the authorized device must be identified and available at all times during GPS re-radiation operation of the device under any condition. ***Stop Buzzer information provided below.***

## Technical Description

System: GPS Source GPSRKL12

Frequency: L1 1575.42 MHz Emission: 24M0G1D

Effective Radiate Power: Maximum -76.88 dBm or 20.51162 Pico watts

Frequency: L2 1227.60 MHz Emission: 24M0G1D

Effective Radiate Power: Maximum -79.68 dBm or 10.7646 Pico watts

L1 Link Budget - L1 (1575.4 MHz)				
	<i>Link Budget Parameter</i>	<i>Value</i>	<i>Units</i>	<i>Comment</i>
	Receive Power on Earth	-130.00	dBm	
	Rx Antenna Gain	32.00	dB	Antcom G5Ant-2AT1
	Cable Loss	-1.30	dB	
	Lightning Protector	-1.00	dB	Estimate
	Connector Loss	-4.00	dB	
	Amplifier Gain	<b>30.00</b>	dB	GPS Source A11-M-V-P110/5-NF-NM
	Cable Loss	-1.58	dB	
	Connector Loss	-4.00	dB	
	Tx Antenna Gain	3.00	dB	GPS Source L1/L2-2GP
	Free Space Loss	-68.74	dB	136 Ft.
	<b>EIRP @ 100 FT</b>	<b>-145.62</b>	<b>dBm</b>	EIRP @ 100 FT from Building ( < -140 dBm)
	<b>Output PWR at Antenna</b>	<b>-76.88</b>	<b>dBm</b>	<b>0.0205 Nano-Watts or 20.51162 Pico-Watts</b>

L2Link Budget – L2 (1227.6 MHz)				
	<i>Link Budget Parameter</i>	<i>Value</i>	<i>Unit</i>	<i>Comment</i>
	Receive Power on Earth	-136.00	dBm	~ 6 dB less than L1
	Rx Antenna Gain	35.00	dB	Antcom G5Ant-2AT1
	Cable Loss	-1.30	dB	
	Lightning Protector	-1.00	dB	Estimate
	Connector Loss	-4.00	dB	
	Amplifier Gain	<b>30.00</b>	dB	GPS Source A11-M-V-P110/5-NF-NM
	Cable loss	-1.38	dB	
	Connector Loss	-4.00	dB	
	Tx Antenna Gain	3.00	dB	GPS Source L1/L2-2GP Antenna
	Free Space Loss	-66.57	dB	136 Ft.
	<b>EIRP @ 100 FT</b>	<b>-146.25</b>	<b>dB</b>	EIRP @ 100 FT from Building ( < -140 dBm)
	<b>Output PWR at Antenna</b>	<b>-79.68</b>	<b>dBm</b>	<b>0.01076 Nano-Watts or 10.7646 Pico-Watts</b>

Table (2) lists the locations/areas of operations, as well as the station class of the operation.

<b>City</b>	<b>State</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Station Type</b>
Kamuela	HI	20-2-17.3N	155-49-50.7W	Fixed

**Table 2 – Location Data**

**Stop Buzzer POCs:**

Jason Shively  
808-936-7600

Tony San Jose  
808-352-1640