

InHand Electronics, Inc.

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Responsive to NTIA Manual

8.3.28 Use of Fixed Devices That Re-Radiate Signals Received From the Global Positioning System

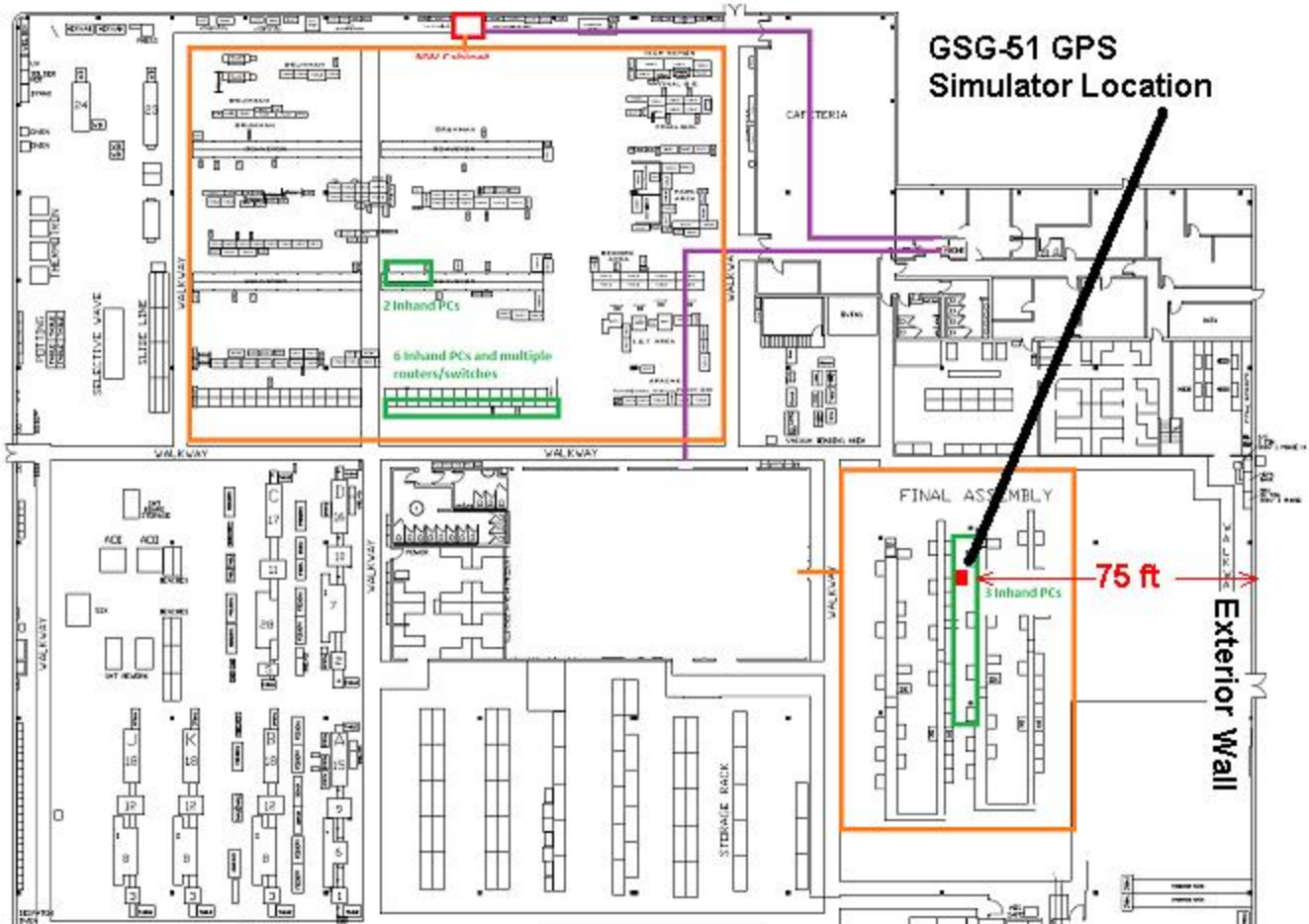
a. Individual authorization is for indoor use only, and is required for each device at a specific site.

[As per our application the site location is defined as: 7505 Technology Drive, Melbourne FL 32904.](#)

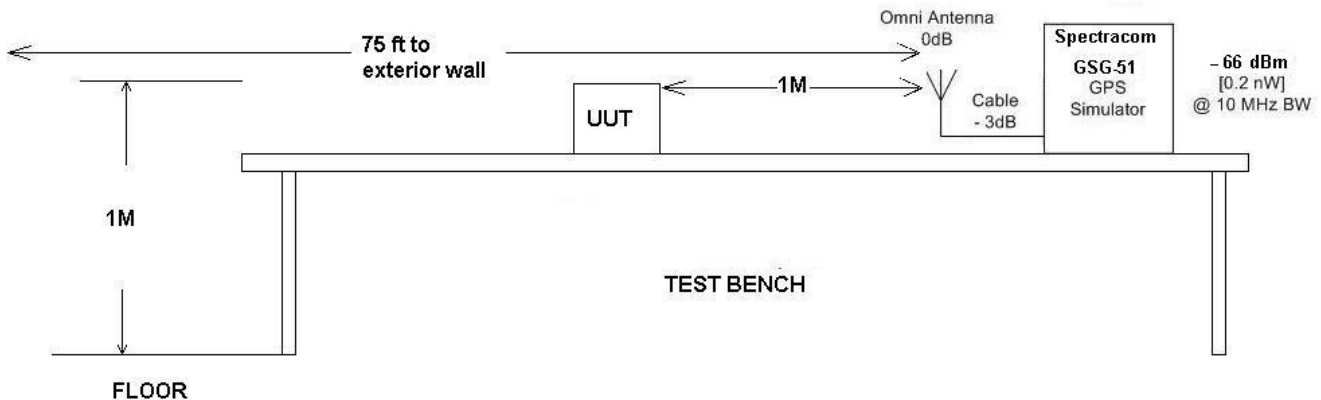
b. Applications for frequency assignment should be applied for as an XT station class with a note indicating the device is to be used as an "Experimental RNSS Test Equipment for the purpose of testing GPS receivers" and describing how the device will be used.

[InHand Electronics, Inc is a manufacturer of handheld devices for Consumer, Aerospace and Defense, Healthcare, Transportation, Industrial Control and other applications. Several of our products contain a GPS receiver. To test our equipment - including GPS receivers and their antennas - in our production test facility, it is desirable to radiate a simulated GPS signal at low power over a short distance. See the diagram below for details.](#)

Production Test Facility Floorplan



GPS RECEIVER TEST SETUP



c. Approved applications for frequency assignment will be entered in the GMF.

OK

d. The maximum length of the assignment will be two years, with possible renewal

The application is for a 24 month period.

e. The area of potential interference to GPS reception (e.g., military or contractor facility) has to be under the control of the user.

The test and verification equipment at our contract production facility is installed and maintained by Inhand Electronics. The GSG-51 GPS simulator front panel will be locked to prevent any operations other than the preset test function.

f. 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.)

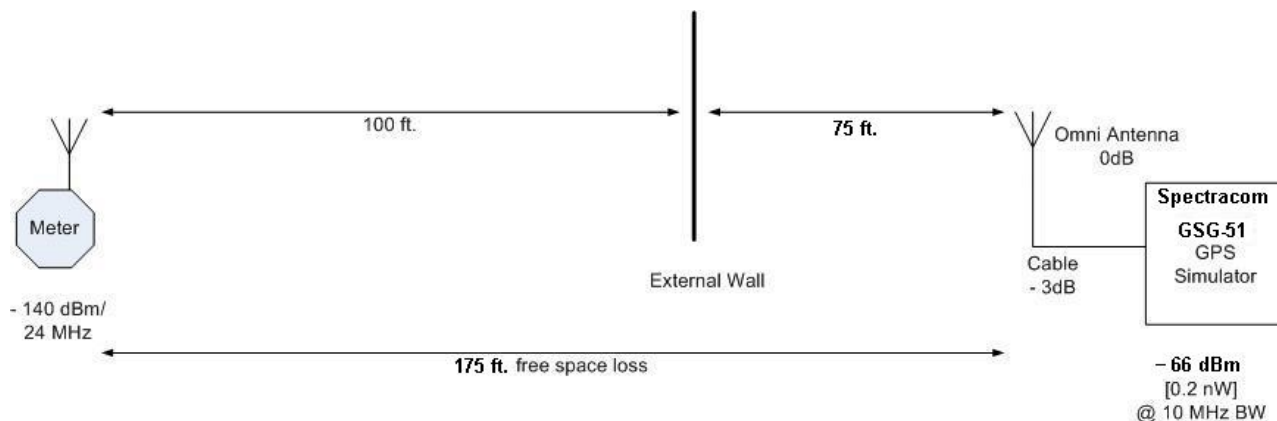
Power Level Considerations:

The NTIA restricts the maximum signal level to -140 dBm (24 MHz BW) as received from an isotropic antenna at a distance of 100 feet from the building where the test is being conducted.

Antenna distance to nearest exterior wall: 75 ft.

Antenna gain: 0 dB (omni antenna)

Cable loss, antenna to GSG simulator: 3 dB (3 ft RG-58 plus connector loss)



Using the free space loss calculation for radio propagation:

$$\text{Loss (dB)} = 20 \log_{10} (4\pi * \text{Distance} / \lambda)$$

Where λ = wavelength: @ 1575 MHz = 19 cm = 0.62 ft

Distance = 175 ft total => 75 ft from antenna exterior wall + 100 ft to restricted perimeter

$$\text{Loss} = 71 \text{ dB} = 20 \log_{10} (4\pi * 175/0.62)$$

Transmit Power -66 dBm

Cable Loss -3 dB

Transmit Antenna Gain 0 dB

Free space loss: 175 ft -71 dB

Receive Antenna Gain 0 dB

-140 dBm

Using the free space calculation is a worst case scenario as the wall and any other obstructions will likely reduce the signal even more. Therefore, setting the power output of the GSG-51 Simulator = -66 dBm or less will guarantee compliance.

Reference: http://en.wikipedia.org/wiki/Path_loss

g. GPS users in the area of potential interference to GPS reception must be notified that GPS information may be impacted for periods of time.

The Assembly Method Specification (AMS) for all devices requiring this GPS test equipment will include notification of GPS signal impact. Signs will be posted in the test area notifying that a "GPS simulator is in use and the GPS information you receive may be in error."

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

The exclusive use case for this installation is to test our embedded devices' GPS receivers and their antennas.

i. A "Stop Buzzer" point of contact for the authorized device must be identified and available at all times during GPS re-radiator operations.

The designated points-of-contact to terminate transmissions if interference occurs are Mark Price at (240-558-2014 x203) and Wilfredo Negrete (240-558-2014 x231)