New Calculation of Compliance with NTIA Guidelines:

Power Level Considerations:

The NTIA restricts the maximum signal level to -140 dBm as received from an isotropic antenna at a distance of 100 feet from the building where the test is being conducted. Therefore, the maximum power level output from the GPS Source GLI-Metro RK GPS repeater will need to be limited to conform to this regulation.

Calculations do not take into account any building attenuation:

GPS Average Received Signal Power in North America: -130 dBm

Receive Antenna gain: 35 dB
Antenna Cable Insertion Loss to the repeater: -12dB (100 ft. of LMR-240 cable at 1575 Mhz + Connector loss)

Repeater Amplifier Gain: 30dB
Repeater Antenna Gain (best case): 3dB

Antenna distance to nearest exterior wall: 10 ft.

Using the free space radiation propagation loss calculation:

Where:
Loss (dB) = 20 log10 (4π * Distance / λ)

Where:
λ = wavelength: @ 1575 MHz= 19 cm = 0.62 ft
Where:
Distance = 110 ft. total = 10 ft. from antenna exterior wall + 100 ft. restricted perimeter

Therefore:
Free Space Loss = 20 log10 (4π * 110/0.62) = -66dB

Effective Isotropic Radiated Power at the Antenna = GPS Received Signal Power + Receive Antenna Gain + Cable Loss + Repeater Amplifier Gain + Repeater Antenna Gain =
-130dB + 35dB + (-12dB) + 30dB + 3dB = -74dB

So calculating the Repeated Signal Power @ 110 feet:

GPS Received Signal Power + Receive Antenna Gain + Cable Loss + Repeater Amplifier Gain + Repeater Antenna Gain + Free Space Loss (@110 ft) =

-130 dBm + 35dB + (-12dB) + 30dB + 3dB + (– 66dB) = -140dBm

Therefore, setting the repeater amplifier gain of the GLI-Metro RK to 30dB will result in a signal level that will be -140dBm at 110 feet from the antenna.