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: -130dB

Receive Antenna gain: 35 dB
Antenna Cable Insertion Loss to the repeater: -11.2dB (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 for isotropic antennas:

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 for isotropic antennas = 20 log10 (4π * 110/0.62) = 66dB

So calculating the Repeated Signal Power @ 110 feet:

Receive Ant Gain + Antenna Cable Insertion Loss + Repeater Amp Gain + Repeater Antenna Gain + Free Space Loss + Avg. Receive Power GPS for Isotropic Antennas must be <= 140dBm

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

Therefore, setting the power output of the GLI-Metro RK to -140 + 72 = -68 dBm or less will guarantee compliance.