

### **Maximum Equivalent Isotropically Radiated Power**

The system Hyundai Alabama seeks to operate re-radiates the GPS L1 (1575.42 MHz) signal. Calculations are performed based on Section 8.3.28 of the NTIA regulations,<sup>1</sup> wherein item 6 states “the maximum equivalent isotropically radiated power must be such that the calculated emissions are no greater than -140 dBm/24 MHz at a distance of 100 feet (30 meters) from the building where the test is being conducted.” Additionally, building attenuation has been ignored. This calculation shows that the re-radiated signal strength is in compliance with NTIA requirements.

$$(1) P_{sig} = P_{Rec} + G_{rant} + G_{amp} - L_1 + G_{rramp} + G_{rrant} - L_s + 2.148$$

**Where:**  $P_{sig}$  = Re-radiated signal strength 100ft outside the building (EIRP)  
 $P_{Rec}$  = Received power from GPS satellites (L1) = -130 dBm  
 $G_{rant}$  = Roof active antenna, GPS Source PN: L1A, antenna gain = 3.0 dBi  
 $G_{amp}$  = Roof active antenna amplifier gain = 32 dB  
 $L_1$  = Coaxial cable attenuation, roof antenna to re-radiating amplifier  
= 9.9 dB/100 ft x 0.5 (50ft cable length, LMR240, Altelicon PN: CA-240)  
= 5.0 dB  
 $G_{rramp}$  = Re-radiating amplifier, GPS Source, PN: A11-A28, gain = 28dB  
 $G_{rrant}$  = Re-radiating antenna, GPS Source, PN: L1P antenna gain = 3.0 dBi  
 $L_s$  = Free space loss  
2.148 = conversion from ERP to EIRP

$$(2) L_s = 36.6 + 20\text{Log}_{10}((D/5280)*1575)$$

**Where:**

D = Distance (d) from antenna to outer wall in feet + 100  
= 150ft + 100ft  
= 250ft

Inserting the values for D into equation (2) yields

$$L_s = 36.6 + 20\text{Log}_{10}((250/5280)*1575) \\ = -74.05 \text{ dB}$$

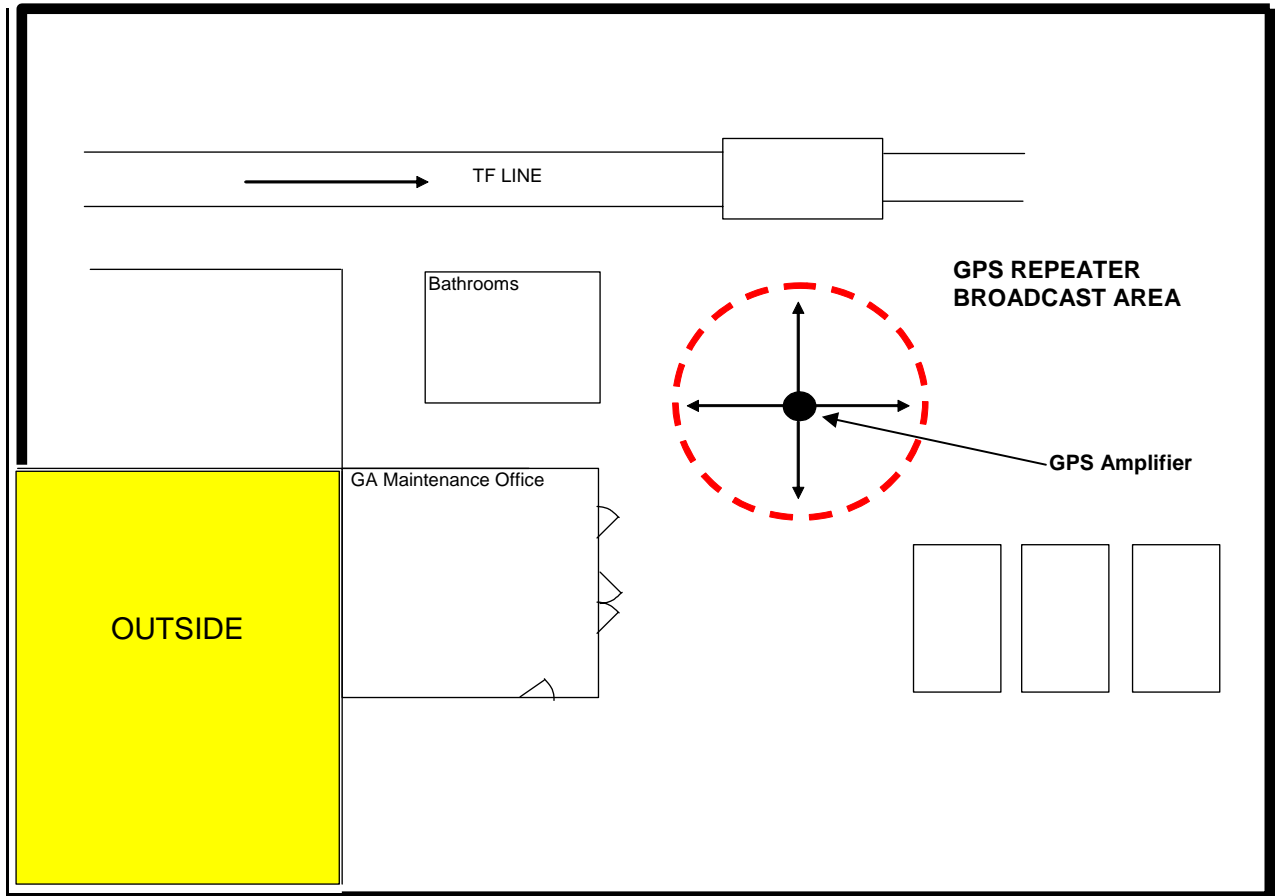
Inserting these values into equation (1) yields

$$P_{sig} (\text{EIRP}) = -130 + 3.0 + 32 - 5.0 + 28.0 + 3.0 - 74.05 + 2.147 \\ = -140.9 \text{ dBm}$$

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<sup>1</sup> See *Manual of Regulations and Procedures for Federal Radio Frequency Management* § 8.3.28(6) (rev. Sept. 2006).

### Diagram of the Hyundai Alabama Electrical Repair Facility



The GPS Amplifier will be located 150 feet from the nearest outside wall of the facility.