

### **Exhibit #1 - Description**

The GPS re-radiating equipment will be installed and used in the JVCKenwood building residing at 1440 Corporate Drive Irving, TX 75038. These will be used to test JVCKenwood radio equipment and software/firmware.

## Exhibit #2 - Calculations Compliance with NTIA Guidelines

R&D Lab Calculations for L1			
GPS Roof to R&D Lab	Signal Level	Manufacturer	Part Number
GPS Roof Antenna Receive Power GPS Signal Input ( $P_{r,20}$ )	-130.00		
Roof Antenna L1L2-2GP Gain ( $G_{t,20}$ )	33.00	GPS Source	GNSS-3A-PM-NF
Roof Antenna Cable ( $L_{c,20}$ ) (10.2db/100ft)	-11.20	GPS Source	G-240-100ft-NM
R&D Lab Lightening Arrestor ( $L_{a,20}$ )	-0.10	GPS Source COPRO-Kit	GPS Source COPRO Surge Protector Kit, NF
R&D Lab GPS Splitter ( $G_{sp,20}$ )	0.00	GPS Source	S12-NF GPS Splitter, Standard, 1x2 N Type-F
R&D Lab GPS L1/L2 Repeater Amplifier variable gain ( $G_{amp,20}$ )	32.00	GPS Source	GPSRKL12G-V-P110/5-NF
R&D Lab GPS Source Repeater Kit, L12 + GLONASS ( $G_{rt,20}$ )	1.85	GPS Source	GPSRKL12G-V-P110/5-NF
Total R&D Lab system gain	55.55		
Effective Radiated power (EIRP), $GPS_{roof}$ Transmit Power (average receive power + total system gain)	-74.45		
Radiation point from wall = 30 feet			
R&D Lab GPS Re-radiator Signal Strength Calculation for L1			
100 feet free-space calculations from radiation point + distance from radiation point to wall		130.00	
1 mile		5280.00	
Frequency, MHz		1575.42	
Effective Radiated Power		-74.45	<-- By adding all orange cells together.
$20 * \text{Log}_{10}$ (freq in MHz) + $20 * \text{Log}_{10}$ (distance in miles) + 36.6dB = $L_{fs,20}$		-68.37	<-- By the formula to the left.
Free space calculation 130' from radiation point, ERIP @ 100' from bldg		-142.82	<-- By adding the previous two numbers together.

$P_{sig\_GPSroof-R\&DLab}(EIRP)$

$$P_{r,20} + G_{t,20} + L_{c,20} + L_{a,20} + G_{sp,20} + G_{amp,20} + G_{rt,20} + L_{fs,20}$$

$$= -130 + 33 - 11.2 - 0.1 + 0 + 32 + 1.85 - 68.37$$

$$= -142.82/24 \text{ MHz}$$

R&D Lab Calculations for L2

GPS Roof to R&D Lab	Signal Level	Manufacturer	Part Number
GPS Roof Antenna Receive Power GPS Signal Input ( $P_{r,20}$ )	-130.00		
Roof Antenna L1L2-2GP Gain ( $G_{t,20}$ )	33.00	GPS Source	GNSS-3A-PM-NF
Roof Antenna Cable ( $L_{c,20}$ ) (10.2db/100ft)	-11.20	GPS Source	G-240-100ft-NM
R&D Lab Lightening Arrestor ( $L_{a,20}$ )	-0.10	GPS Source COPRO-Kit	GPS Source COPRO Surge Protector Kit, NF
R&D Lab GPS Splitter ( $G_{sp,20}$ )	0.00	GPS Source	S12-NF GPS Splitter, Standard, 1x2 N Type-F
R&D Lab GPS L1/L2 Repeater Amplifier variable gain ( $G_{amp,20}$ )	32.00	GPS Source	GPSRKL12G-V-P110/5-NF
R&D Lab GPS Source Repeater Kit, L12 + GLONASS ( $G_{rt,20}$ )	1.85	GPS Source	GPSRKL12G-V-P110/5-NF
Total R&D Lab system gain	55.55		
Effective Radiated power (EIRP), $GPS_{roof}$ Transmit Power (average receive power + total system gain)	-74.45		
Radiation point from wall = 30 feet			
R&D Lab GPS Re-radiator Signal Strength Calculation for L2			
100 feet free-space calculations from radiation point + distance from radiation point to wall		130.00	
1 mile		5280.00	
Frequency, MHz		1227.60	
Effective Radiated Power		-74.45	<-- By adding all orange cells together.
$20 * \log_{10}$ (freq in MHz) + $20 * \log_{10}$ (distance in miles) + 36.6dB = $L_{fs,20}$		-66.21	<-- By the formula to the left.
Free space calculation 130' from radiation point, ERIP @ 100' from bldg		-140.66	<-- By adding the previous two numbers together.

$P_{sig\_GPSroof-R\&DLab}(EIRP)$   
 $P_{r,20} + G_{t,20} + L_{c,20} + L_{a,20} + G_{sp,20} + G_{amp,20} + G_{rt,20} + L_{fs,20}$   
 $= -130 + 33 - 11.2 - 0.1 + 0 + 32 + 1.85 - 66.21$   
 $= -140.66/24 \text{ MHz}$

JVCKenwood Cube Area Calculations for L1

GPS Roof to JVCKenwood Cube Area	Signal Level	Manufacturer	Part Number
GPS Roof Antenna Receive Power GPS Signal Input ( $P_{r,20}$ )	-130.00		
Roof Antenna L1L2-2GP Gain ( $G_{t,20}$ )	33.00	GPS Source	GNSS-3A-PM-NF
Roof Antenna Cable ( $L_{c,20}$ ) (10.2db/100ft)	-11.20	GPS Source	G-240-100ft-NM
R&D Lab Lightening Arrestor ( $L_{a,20}$ )	-0.10	GPS Source COPRO-Kit	GPS Source COPRO Surge Protector Kit, NF
R&D Lab GPS Splitter ( $G_{sp,20}$ )	0.00	GPS Source	S12-NF GPS Splitter, Standard, 1x2 N Type-F
R&D Lab GPS L1/L2 Repeater Amplifier variable gain ( $G_{amp,20}$ )	32.00	GPS Source	GPSRKL12G-V-P110/5-NF
R&D Lab GPS Source Repeater Kit, L12 + GLONASS ( $G_{rt,20}$ )	1.85	GPS Source	GPSRKL12G-V-P110/5-NF
Total R&D Lab system gain	55.55		
Effective Radiated power (EIRP), $GPS_{roof}$ Transmit Power (average receive power + total system gain)	-74.45		
Radiation point from wall = 50 feet			

JVCKenwood Cube Area GPS Re-radiator Signal Strength Calculation for L1		
100 feet free-space calculations from radiation point + distance from radiation point to wall	150.00	
1 mile	5280.00	
Frequency, MHz	1575.42	
Effective Radiated Power	-74.45	<-- By adding all orange cells together.
$20 * \text{Log}_{10}$ (freq in MHz) + $20 * \text{Log}_{10}$ (distance in miles) + 36.6dB = $L_{fs,20}$	-69.62	<-- By the formula to the left.
Free space calculation 130' from radiation point, ERIP @ 100' from bldg	-144.07	<-- By adding the previous two numbers together.

$P_{sig\_GPSroof-R\&DLab}(EIRP)$   
 $P_{r,20} + G_{t,20} + L_{c,20} + L_{a,20} + G_{sp,20} + G_{amp,20} + G_{rt,20} + L_{fs,20}$   
 $= -130 + 33 - 11.2 - 0.1 + 0 + 32 + 1.85 - 74.45$   
 $= -144.07/24 \text{ MHz}$

JVCKenwood Cube Area Calculations for L2

GPS Roof to JVCKenwood Cube Area	Signal Level	Manufacturer	Part Number
GPS Roof Antenna Receive Power GPS Signal Input ( $P_{r,20}$ )	-130.00		
Roof Antenna L1L2-2GP Gain ( $G_{t,20}$ )	33.00	GPS Source	GNSS-3A-PM-NF
Roof Antenna Cable ( $L_{c,20}$ ) (10.2db/100ft)	-11.20	GPS Source	G-240-100ft-NM
R&D Lab Lightening Arrestor ( $L_{a,20}$ )	-0.10	GPS Source COPRO-Kit	GPS Source COPRO Surge Protector Kit, NF
R&D Lab GPS Splitter ( $G_{sp,20}$ )	0.00	GPS Source	S12-NF GPS Splitter, Standard, 1x2 N Type-F
R&D Lab GPS L1/L2 Repeater Amplifier variable gain ( $G_{amp,20}$ )	32.00	GPS Source	GPSRKL12G-V-P110/5-NF
R&D Lab GPS Source Repeater Kit, L12 + GLONASS ( $G_{rt,20}$ )	1.85	GPS Source	GPSRKL12G-V-P110/5-NF
Total R&D Lab system gain	55.55		
Effective Radiated power (EIRP), $GPS_{roof}$ Transmit Power (average receive power + total system gain)	-74.45		
Radiation point from wall = 50 feet			

JVCKenwood Cube Area GPS Re-radiator Signal Strength Calculation for L2		
100 feet free-space calculations from radiation point + distance from radiation point to wall	150.00	
1 mile	5280.00	
Frequency, MHz	1227.60	
Effective Radiated Power	-74.45	<-- By adding all orange cells together.
$20 * \log_{10}$ (freq in MHz) + $20 * \log_{10}$ (distance in miles) + 36.6dB = $L_{fs,20}$	-67.45	<-- By the formula to the left.
Free space calculation 150' from radiation point, ERIP @ 100' from bldg	-141.90	<-- By adding the previous two numbers together.

$P_{sig\_GPSroof-R\&DLab}(EIRP)$   
 $P_{r,20} + G_{t,20} + L_{c,20} + L_{a,20} + G_{sp,20} + G_{amp,20} + G_{rt,20} + L_{fs,20}$   
 $= -130 + 33 - 11.2 - 0.1 + 0 + 32 + 1.85 - 67.45$   
 $= -141.90/24 \text{ MHz}$

### **Exhibit #3 - Building Drawing**

The below drawing shows the JVCKenwood second floor locations for the R&D lab and Cube area where the GPS re-radiators are located along with the broadcast angles. It also includes distances from the GPS re-radiators to the outside wall.

JYCKENWOOD 2<sup>ND</sup> FLOOR

