



**FCC CFR47 PART 15 SUBPART C
CERTIFICATION
CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

RF BASESTATION

MODEL NUMBER: B551

FCC ID: JWSB551

REPORT NUMBER: 05U3381-1B

ISSUE DATE: JULY 13, 2005

Prepared for
**WORTH DATA INCORPORATED
623 SWIFT STREET
SANTA CRUZ, CALIFORNIA 95060, U.S.A**

Prepared by
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NVLAP[®]
LAB CODE:200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
A		Initial Issue	YZ
B	<u>7/13/05</u>	Corrected error in section 7.2.2	YZ
		Corrected error in section 7.2.3	YZ
		Added MPE section as 7.1.3	YZ

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: WORTH DATA, INC.
623 SWIFT ST.
SANTA CRUZ, CA 95060 U.S.A

EUT DESCRIPTION: RF BASE STATION

MODEL: B551

SERIAL NUMBER: 00001

DATE TESTED: JUNE 7, 2005

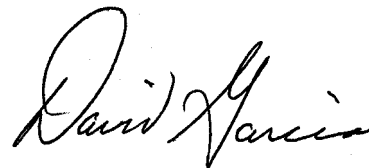
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

Tested By:



YAN ZHENG
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

DAVID GARCIA
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <http://www.ccsemc.com>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a RF base station operating in the 902-928 MHz band with 25 channels.

The radio module is manufactured by Worth Data, Inc..

5.2. REASON FOR CLASS II PERMISSIVE CHANGE

The reason for class II permissive change is to add three antennas, which are 9.5dBi patch antenna, 9dBi yagi antenna, and 6dBi omni antenna.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power and ERP as follows:

Base Unit

Channel	Frequency (MHz)	Power (dBm)	Power (mW)
Low	903	21.63	145.5
Middle	915	21.60	144.5
High	927	21.55	142.9

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes three additional antennas:

1. Patch antenna with a maximum gain of 9.5dBi.
2. Yagi antenna with a maximum gain of 9dBi.
3. Omni antenna with a maximum gain of 6dBi.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Worthdata, rev. PIC0A and BSU1012B.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 903MHz.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID
AC Adapter	Worth Data	AUT-05-1600	N/A	CNR

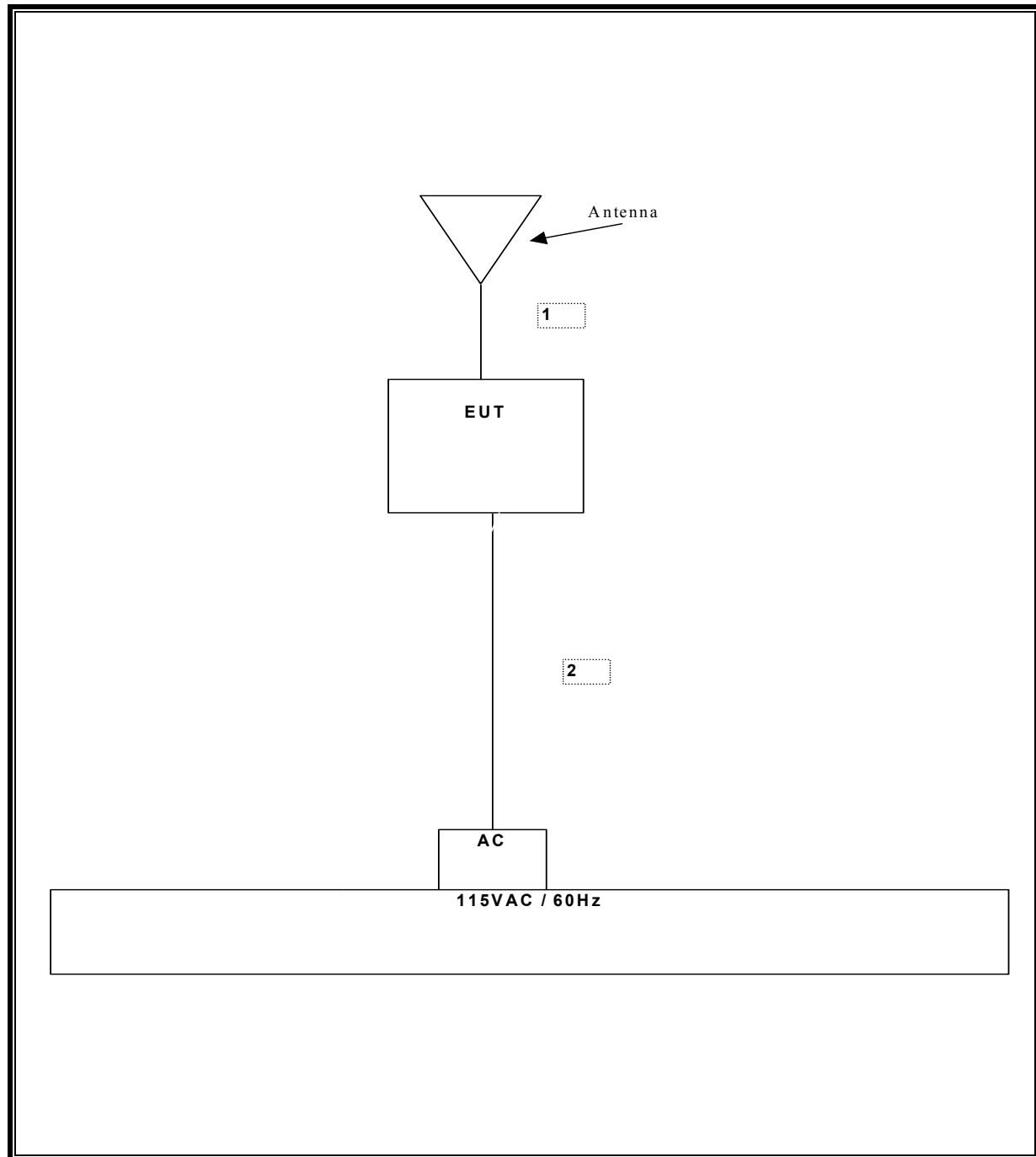
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	SMA	1	Reverse SMA	Shielded	1 m	
2	DC	1	1/8"	Unshielded	1.5m	

TEST SETUP

The EUT is installed as a stand-alone device during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
EMI Test Receiver	R & S	ESIB40	4/24/2174	5/9/2006
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	6/12/05
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A121003	3/3/06
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/29/06
RF Filter Section	HP	85420E	3705A00256	3/29/06
Site A Preamplifier, 1300MHz	HP	8447D	2944A06833	8/17/05
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/05
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/06
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/06
1.5 GHz High Pass Filter	MicroTronics	HPM 13193	2688	CNR

7. LIMITS AND RESULTS

7.1. ANTENNA PORT CHANNEL TESTS

7.1.1. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

§15.247 (b) (2) For frequency hopping systems operating in the 902-928 MHz band , employing at least 50 hopping channels: 1 watt; and
employing less than 50 hopping channels, but at least 25 hopping channels: 0.25 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 9.5dBi, the cable loss is 1.7dB; the actual gain with cable loss is 7.8dBi, therefore the limit is 22.2dBm.

TEST PROCEDURE

The cable assembly insertion loss of 20 dB (including 20 dB pad) was entered as an offset in the power meter to allow for direct reading of power.

RESULTS

No non-compliance noted:

Base Unit

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	903	21.63	22.2	-0.57
Middle	915	21.60	22.2	-0.60
High	927	21.55	22.2	-0.65

7.1.2. AVERAGE POWER

AVERAGE POWER LIMIT

None: for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 20 dB (including 20 dB pad) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	903	21.54
Middle	915	21.50
High	927	21.47

7.1.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$$E = \sqrt{(30 * P * G) / d}$$

and

$$S = E^2 / 3770$$

where

E = Field Strength in Volts/meter

P = Power in Watts

G = Numeric antenna gain

d = Distance in meters

S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$$d = \sqrt{((30 * P * G) / (3770 * S))}$$

Changing to units of Power to mW and Distance to cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

$$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$$

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

$$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S} \quad \text{Equation (1)}$$

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), $S = 1.0 \text{ mW/cm}^2$

RESULTS

No non-compliance noted:

Power Density Limit (mW/cm²)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
1.0	21.63	9.50	10.16

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

§15.205 (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

7.2.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

HARMONICS AND SPURIOUS EMISSIONS, PATCH ANTENNA

06/09/05 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																
Test Engr:		David Garcia														
Project #:		05U3381-1														
Company:		Worth Data														
EUT Descrip.:		900 MHz SS Base Station, w/Patch Antenna, Mini Circuits SLP-1200 filter installed														
EUT M/N:		B551														
Test Target:		FCC 15.247														
Mode Oper:		Transmitting, Patch Antenna														
Average Power Meter:		Low = xx dBm, Mid = xx dBm, High = xx dBm														
Test Equipment:																
EMCO Horn 1-18GHz T60; S/N: 2238 @3m				Pre-amplifier 1-26GHz T34 HP 8449B				Pre-amplifier 26-40GHz				Horn > 18GHz				
Hi Frequency Cables																
2 foot cable 2_David		3 foot cable		4 foot cable 4_David		12 foot cable 12_Yan		HPF HPF_1.5GHz		Reject Filter		Peak Measurements RBW=VBW=1MHz				
Average Measurements RBW=1MHz ; VBW=10Hz																
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fitr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
903 MHz Low Channel																
1.806	3.0	47.7	38.9	27.2	3.1	-36.6	0.0	0.3	41.8	33.0	74	54	-32.2	-21.0	V	
2.709	3.0	46.0	39.3	29.2	4.0	-35.1	0.0	0.6	44.7	38.0	74	54	-29.3	-16.0	V	
1.806	3.0	47.0	37.1	27.2	3.1	-36.6	0.0	0.3	41.1	31.2	74	54	-32.9	-22.8	H	
2.709	3.0	45.9	37.3	29.2	4.0	-35.1	0.0	0.6	44.6	36.0	74	54	-29.4	-18.0	H	
915 MHz Mid Channel																
1.830	3.0	48.3	40.3	27.3	3.1	-36.5	0.0	0.3	42.5	34.5	74	54	-31.5	-19.5	V	
2.745	3.0	46.3	38.2	29.3	4.0	-35.0	0.0	0.6	45.2	37.1	74	54	-28.8	-16.9	V	
3.660	3.0	42.5	30.5	31.8	4.7	-34.1	0.0	0.6	45.4	33.4	74	54	-28.6	-20.6	V	
1.830	3.0	46.2	36.5	27.3	3.1	-36.5	0.0	0.3	40.4	30.7	74	54	-33.6	-23.3	H	
2.745	3.0	46.9	36.6	29.3	4.0	-35.0	0.0	0.6	45.8	35.5	74	54	-28.2	-18.5	H	
927 MHz High Channel																
1.854	3.0	48.5	40.4	27.4	3.2	-36.5	0.0	0.3	42.9	34.8	74	54	-31.1	-19.2	V	
2.781	3.0	46.7	35.1	29.5	4.0	-35.0	0.0	0.6	45.8	34.2	74	54	-28.2	-19.8	V	
1.854	3.0	46.6	34.6	27.4	3.2	-36.5	0.0	0.3	41.0	29.0	74	54	-33.0	-25.0	H	
2.781	3.0	46.0	34.9	29.5	4.0	-35.0	0.0	0.6	45.1	34.0	74	54	-28.9	-20.0	H	
No further emissions were detected above the noise floor of the test receiver.																
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit			
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit			
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit			
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit			
CL	Cable Loss					HPF	High Pass Filter									

HARMONICS AND SPURIOUS EMISSIONS, OMNI ANTENNA

06/09/05 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr: David Garcia Project #: 05U3381-1 Company: Worth Data EUT Descrip.: 900 MHz SS Base Station, w/Omni Antenna, Mini Circuits SLP-1200 filter installed EUT M/N: B551 Test Target: FCC 15.247 Mode Oper: Transmitting, OMNI Antenna Average Power Meter: Low = xx dBm, Mid = xx dBm, High = xx dBm															
Test Equipment:															
EMCO Horn 1-18GHz T60; S/N: 2238 @3m		Pre-amplifier 1-26GHz T34 HP 8449B		Pre-amplifier 26-40GHz		Horn > 18GHz									
Hi Frequency Cables								HPF HPF_1.5GHz		Reject Filter		Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz			
2 foot cable 2_David		3 foot cable		4 foot cable 4_David		12 foot cable 12_Yan									
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
903 MHz Low Channel															
1.806	3.0	46.8	38.0	27.2	3.1	-36.6	0.0	0.3	40.9	32.1	74	54	-33.1	-21.9	V
2.709	3.0	45.7	37.9	29.2	4.0	-35.1	0.0	0.6	44.4	36.6	74	54	-29.6	-17.4	V
1.806	3.0	46.0	35.3	27.2	3.1	-36.6	0.0	0.3	40.1	29.4	74	54	-33.9	-24.6	H
2.709	3.0	45.5	38.7	29.2	4.0	-35.1	0.0	0.6	44.2	37.4	74	54	-29.8	-16.6	H
915 MHz Mid Channel															
1.830	3.0	47.5	39.4	27.3	3.1	-36.5	0.0	0.3	41.7	33.6	74	54	-32.3	-20.4	V
2.745	3.0	46.2	39.3	29.3	4.0	-35.0	0.0	0.6	45.1	38.2	74	54	-28.9	-15.8	V
1.830	3.0	45.8	33.8	27.3	3.1	-36.5	0.0	0.3	40.0	28.0	74	54	-34.0	-26.0	H
2.745	3.0	44.6	35.0	29.3	4.0	-35.0	0.0	0.6	43.5	33.9	74	54	-30.5	-20.1	H
927 MHz High Channel															
1.854	3.0	48.3	40.6	27.4	3.2	-36.5	0.0	0.3	42.7	35.0	74	54	-31.3	-19.0	V
2.781	3.0	46.5	39.4	29.5	4.0	-35.0	0.0	0.6	45.6	38.5	74	54	-28.4	-15.5	V
1.854	3.0	46.6	33.8	27.4	3.2	-36.5	0.0	0.3	41.0	28.2	74	54	-33.0	-25.8	H
2.781	3.0	44.0	33.9	29.5	4.0	-35.0	0.0	0.6	43.1	33.0	74	54	-30.9	-21.0	H
No further emissions were detected above the noise floor of the test receiver.															
f	Measurement Frequency			Amp	Preamp Gain			Avg Lim	Average Field Strength Limit						
Dist	Distance to Antenna			D Corr	Distance Correct to 3 meters			Pk Lim	Peak Field Strength Limit						
Read	Analyzer Reading			Avg	Average Field Strength @ 3 m			Avg Mar	Margin vs. Average Limit						
AF	Antenna Factor			Peak	Calculated Peak Field Strength			Pk Mar	Margin vs. Peak Limit						
CL	Cable Loss			HPF	High Pass Filter										

HARMONICS AND SPURIOUS EMISSIONS, YAGI ANTENNA

06/09/05 High Frequency Measurement															
Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr:		David Garcia													
Project #:		05U3381-1													
Company:		Worth Data													
EUT Descrip.:		900 MHz SS Base Station, w/Yagi Antenna, Mini Circuits SLP-1200 filter installed													
EUT M/N:		B551													
Test Target:		FCC 15.247													
Mode Oper:		Transmitting, Yagi Antenna													
Average Power Meter:		Low = xx dBm, Mid = xx dBm, High = xx dBm													
Test Equipment:															
EMCO Horn 1-18GHz				Pre-amplifier 1-26GHz				Pre-amplifier 26-40GHz				Horn > 18GHz			
T60; S/N: 2238 @3m				T34 HP 8449B											
Hi Frequency Cables															
2 foot cable		3 foot cable		4 foot cable		12 foot cable		HPF		Reject Filter		Peak Measurements			
2_David				4_David		12_Yan		HPF_1.5GHz				RBW=VBW=1MHz			
Average Measurements															
RBW=1MHz ; VBW=10Hz															
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
903 MHz Low Channel															
1.806	3.0	47.5	38.8	27.2	3.1	-36.6	0.0	0.3	41.6	32.9	74	54	-32.4	-21.1	V
2.709	3.0	48.9	45.3	29.2	4.0	-35.1	0.0	0.6	47.6	44.0	74	54	-26.4	-10.0	V
3.612	3.0	43.8	32.1	31.7	4.6	-34.2	0.0	0.6	46.5	34.8	74	54	-27.5	-19.2	V
1.806	3.0	46.7	36.3	27.2	3.1	-36.6	0.0	0.3	40.8	30.4	74	54	-33.2	-23.6	H
2.709	3.0	49.6	45.3	29.2	4.0	-35.1	0.0	0.6	48.3	44.0	74	54	-25.7	-10.0	H
3.612	3.0	43.0	31.2	31.7	4.6	-34.2	0.0	0.6	45.7	33.9	74	54	-28.3	-20.1	H
915 MHz Mid Channel															
1.830	3.0	46.8	39.5	27.3	3.1	-36.5	0.0	0.3	41.0	33.7	74	54	-33.0	-20.3	V
2.745	3.0	48.0	43.4	29.3	4.0	-35.0	0.0	0.6	46.9	42.3	74	54	-27.1	-11.7	V
3.660	3.0	43.2	32.3	31.8	4.7	-34.1	0.0	0.6	46.1	35.2	74	54	-27.9	-18.8	V
1.830	3.0	45.0	33.7	27.3	3.1	-36.5	0.0	0.3	39.2	27.9	74	54	-34.8	-26.1	H
2.745	3.0	46.6	33.2	29.3	4.0	-35.0	0.0	0.6	45.5	32.1	74	54	-28.5	-21.9	H
3.660	3.0	43.8	33.5	31.8	4.7	-34.1	0.0	0.6	46.7	36.4	74	54	-27.3	-17.6	H
927 MHz High Channel															
1.854	3.0	47.4	39.0	27.4	3.2	-36.5	0.0	0.3	41.8	33.4	74	54	-32.2	-20.6	V
2.781	3.0	46.5	40.3	29.5	4.0	-35.0	0.0	0.6	45.6	39.4	74	54	-28.4	-14.6	V
3.708	3.0	42.0	30.4	31.9	4.7	-34.1	0.0	0.6	45.1	33.5	74	54	-28.9	-20.5	V
1.854	3.0	46.8	35.6	27.4	3.2	-36.5	0.0	0.3	41.2	30.0	74	54	-32.8	-24.0	H
2.781	3.0	45.7	39.4	29.5	4.0	-35.0	0.0	0.6	44.8	38.5	74	54	-29.2	-15.5	H
3.708	3.0	42.0	30.4	31.9	4.7	-34.1	0.0	0.6	45.1	33.5	74	54	-28.9	-20.5	H
No further emissions were detected above the noise floor of the test receiver.															
f	Measurement Frequency					Amp	Preamp Gain					Avg Lim	Average Field Strength Limit		
Dist	Distance to Antenna					D Corr	Distance Correct to 3 meters					Pk Lim	Peak Field Strength Limit		
Read	Analyzer Reading					Avg	Average Field Strength @ 3 m					Avg Mar	Margin vs. Average Limit		
AF	Antenna Factor					Peak	Calculated Peak Field Strength					Pk Mar	Margin vs. Peak Limit		
CL	Cable Loss					HPF	High Pass Filter								

7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION WITH PATCH ANTENNA)

HORIZONTAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 12 File#: 05u3381.emi Date: 06-09-2005 Time: 13:41:11
Audix ATC

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Patch Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	115.360	35.84	-12.65	23.19	43.50	-20.31	Peak
2	162.000	30.10	-13.32	16.78	43.50	-26.72	Peak
3	206.880	32.66	-13.24	19.42	43.50	-24.08	Peak
4	594.960	24.01	-6.60	17.41	46.00	-28.59	Peak
5	873.920	19.52	-1.76	17.76	46.00	-28.24	Peak

VERTICAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 10 File#: 05u3381.emi Date: 06-09-2005 Time: 13:38:23
Audix ATC

Condition: FCC CLASS-B VERTICAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Patch Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	36.160	41.76	-9.13	32.63	40.00	-7.37	Peak
2	42.320	43.08	-13.14	29.94	40.00	-10.06	Peak
3	115.360	39.72	-12.65	27.07	43.50	-16.43	Peak
4	205.120	37.48	-13.05	24.43	43.50	-19.07	Peak
5	476.160	26.45	-8.00	18.45	46.00	-27.55	Peak
6	873.920	20.68	-1.76	18.92	46.00	-27.08	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION WITH OMNI ANTENNA)

HORIZONTAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 8 File#: 05u3381.emi Date: 06-09-2005 Time: 13:28:43
Audix ATC

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Omni Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

	Freq	Read		Level	Limit	Over	
		Level	Factor		Line	Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	59.920	34.61	-18.77	15.84	40.00	-24.16	Peak
2	99.520	32.81	-16.03	16.78	43.50	-26.72	Peak
3	115.360	32.89	-12.65	20.24	43.50	-23.26	Peak
4	209.520	28.76	-13.63	15.13	43.50	-28.37	Peak
5	480.560	23.53	-7.97	15.56	46.00	-30.44	Peak
6	873.920	19.32	-1.76	17.56	46.00	-28.44	Peak

VERTICAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: 05u3381.emi Date: 06-09-2005 Time: 13:19:07
Audix ATC

Condition: FCC CLASS-B VERTICAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Omni Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	46.25	-7.09	39.16	40.00	-0.84	Peak
2	62.560	57.15	-18.55	38.60	40.00	-1.40	Peak
3	99.520	46.54	-16.03	30.51	43.50	-12.99	Peak
4	115.360	40.54	-12.65	27.89	43.50	-15.61	Peak
5	194.560	39.32	-13.37	25.95	43.50	-17.55	Peak
6	594.960	24.65	-6.60	18.05	46.00	-27.95	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION WITH YAGI ANTENNA)

HORIZONTAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 16 File#: 05u3381.emi Date: 06-09-2005 Time: 13:53:23
Audix ATC

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Yagi Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	81.920	45.64	-18.57	27.08	40.00	-12.92	Peak
2	102.160	46.40	-15.63	30.77	43.50	-12.74	Peak
3	115.360	41.28	-12.65	28.63	43.50	-14.87	Peak
4	194.560	38.74	-13.37	25.37	43.50	-18.13	Peak
5	524.560	31.35	-7.31	24.04	46.00	-21.96	Peak
6	878.320	21.23	-1.74	19.49	46.00	-26.51	Peak

VERTICAL DATA



561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 14 File#: 05u3381.emi Date: 06-09-2005 Time: 13:49:34
Audix ATC

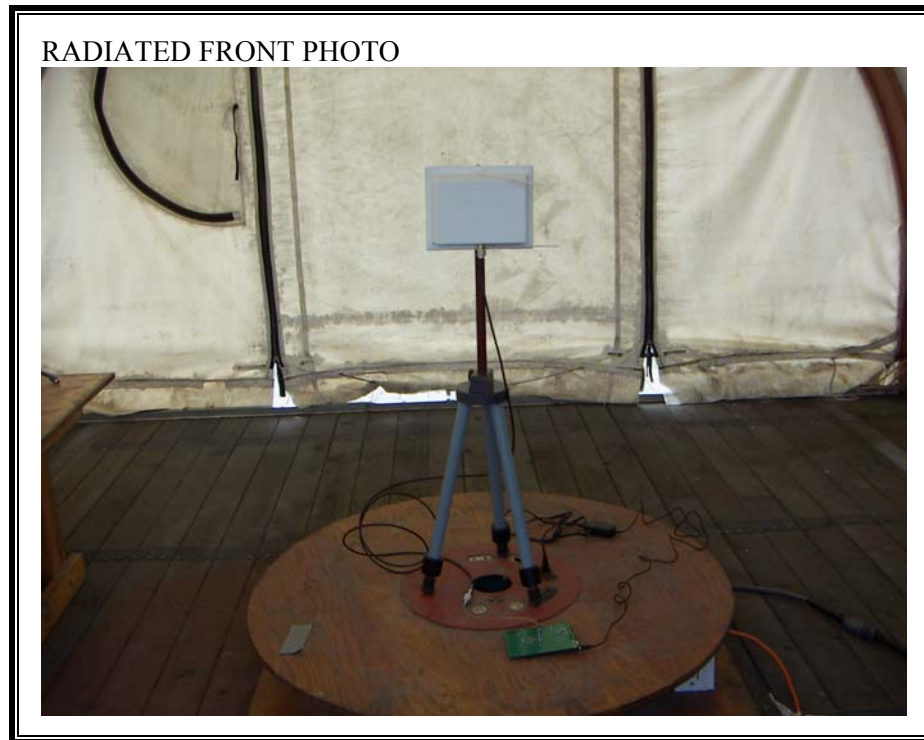
Condition: FCC CLASS-B VERTICAL
Test Operator: : David Garcia
Project #: : 05U3381-1
Company: : Worth Data Inc.
EUT: : 900 MHz SS Base Station
Model No. : B551
Configuration : EUT, Yagi Antenna
Target of Test : FCC 15.209
Mode of Operation: TX, 915 MHz Channel

Page: 1

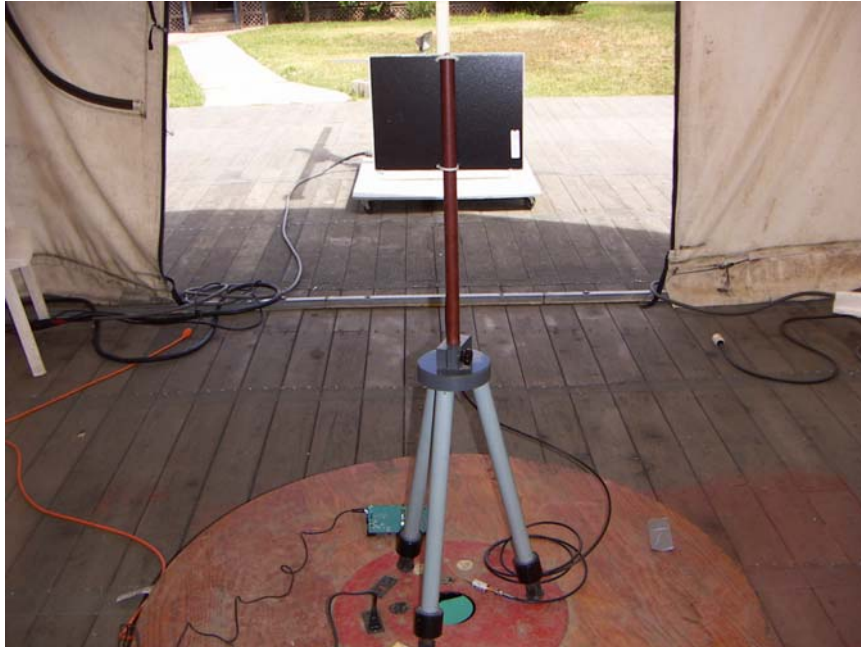
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	31.760	40.04	-7.54	32.50	40.00	-7.50	Peak
2	99.520	45.38	-16.03	29.35	43.50	-14.15	Peak
3	115.360	40.26	-12.65	27.61	43.50	-15.89	Peak
4	132.960	37.63	-12.04	25.59	43.50	-17.91	Peak
5	169.920	38.38	-13.65	24.73	43.50	-18.77	Peak
6	220.960	37.99	-14.18	23.81	46.00	-22.19	Peak
7	895.920	20.44	-1.58	18.86	46.00	-27.14	Peak

8. SETUP PHOTOS

RADIATED RF MEASUREMENT SETUP, PATCH ANTENNA



RADIATED BACK PHOTO



RADIATED RF MEASUREMENT SETUP, OMNI ANTENNA

RADIATED FRONT PHOTO

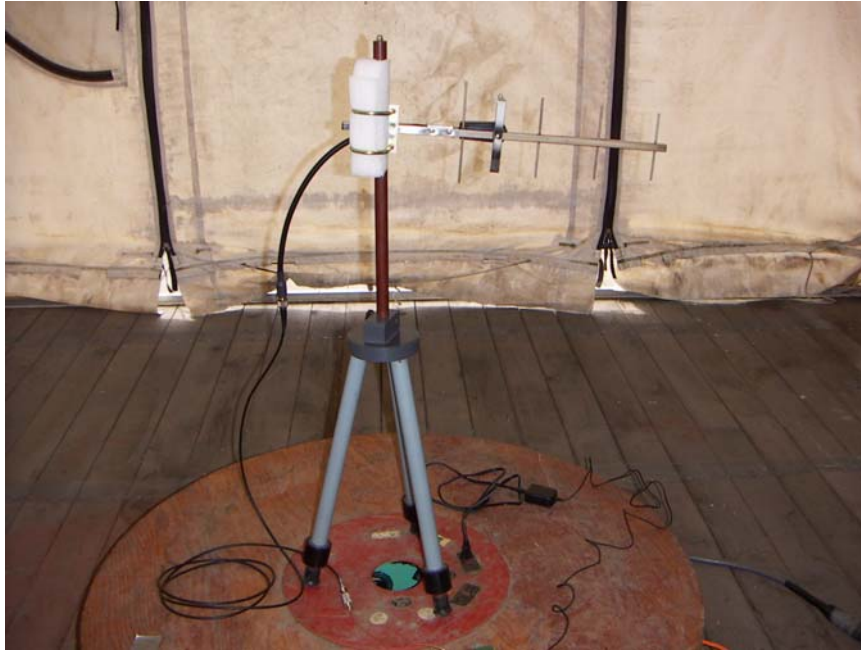


RADIATED BACK PHOTO

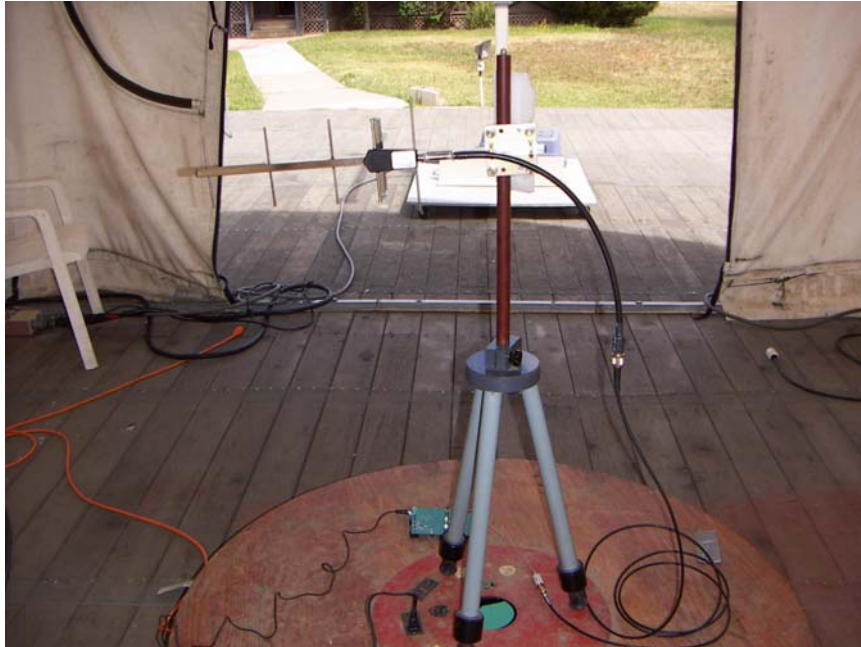


RADIATED RF MEASUREMENT SETUP, YAGI ANTENNA

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



END OF REPORT