RF Measurement Report

Prepared by:

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In Support of:

FCC APPLICATION FOR CERTIFICATION

for

Winncom Technologies, Inc.
30700 Carter Street, Suite A
Solon, OH 44139

Model: Lucent PC24E-00-FC WaveLAN with AMP250 Amplifier
FCC ID: OQCWAF24-1000L

Demonstration of Compliance with FCC Rules Part 15.247

January, 2001

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TABLES

EXHIBITS

1.0 Introduction

This report has been prepared on behalf of Winncom Technologies, Inc., to support the attached Application for Certification of a Part 15 Spread Spectrum Transmitter. The Equipment Under Test was the **Model Lucent PC24E-00-FC WaveLAN with AMP250 Amplifier.**

Radio-Noise Emissions tests were performed according to ***FCC Public Notice 54797, titled "Guidance on Measurements for Direct Sequence SST"***. The measuring equipment conforms to ANSI C63.2 Specifications for Electromagnetic Noise and Field Strength Instrumentation.

Testing was performed at National Certification Laboratory in Ellicott City, MD. Site description and site attenuation data have been placed on file with the FCC's Sampling and Measurements Branch. FCC acceptance was granted on May 26, 1993.

1.1 Summary

The Winncom Technologies, Inc. **Model Lucent PC24E-00-FC WaveLAN with AMP250 Amplifier** complies with the FCC limits (15.247) for a Direct Sequence SST.

2.0 Description of Equipment Under Test (EUT)

The Lucent PC24E-00-FC WaveLAN is actually the FCC Certified PCMCIA Model with FCC ID: IMRWLPC24. Winncom Technologies, Inc. has not modified this product in any manner except for the addition of high gain antennas, and an external amplifier.

The EUT Features:

Direct Sequence Spread Spectrum Transceiver
+ 24 dBm RF Output Max.
2412 to 2462 MHz Freq. Range
10 MHz 6 dB Emission Bandwidth
10 Available Channels
5 MHz Channel Separation
11 Mbps Data Rate (Radio Link)
Differential DPSK Modulation

3.0 Test Program

This report contains measurement charts and data as evidence for the following tests performed:

1. (15.247 b) Peak RF output power.
2. (15.247 d) Power Spectral Density (3kHz Bandwidth).
3. (15.247 c) Field strength of harmonics and spurious out-of-band emissions.
4. (15.247 c) RF Antenna Conducted of harmonics and spurious out-of-band emissions.
5. (15.247 a) 6 dB Emission Bandwidth.
6. (15.207) Power Line Conducted Emissions.

4.0 Test Configuration

The **Lucent PC24E-00-FC WaveLAN** was installed in a KDS Valient 5000 Laptop computer for testing. A Win98 Hyperterminal program is used to control the transmitter. The external amplifier is connected in-line between the wireless bridge and antenna via 10 feet of low loss cable. The 10 foot cable is the **minimum** length supplied with the system.

RF power output measurements were taken with an RF power meter at the amplifier output connecter after the 10 ft. cable. RF antenna conducted output tests such as Bandwidth, Spurious/Harmonics, and Power Spectral Density were taken with the amplifier ouput feeding directly into the spectrum analyzer via the 10 ft. cable. The analyzer's internal attenuator was adusted to prevent overloading of the front end.

Field strength measurements were taken with the amplifier in-line, and feeding a 7dBi omni, 12.5 dBi Omni, 13.5 dBi Yagi, and 24 dBi Grid Dish antennas.

PEAK POWER TEST RESULTS

Limit: 0.250 watts (24 dBm)

Condition: Transmitter is set to a single modulated channel.
Measurement taken at amplifier antenna connector.

Readings from RF Peak Power Meter:

EUT w/ 250 mW Amp 2412 MHz - +23.7 dBm

EUT w/ 250 mW Amp 2437 MHz - +24.0 dBm

EUT w/ 250 mW Amp 2462 MHz - +23.8 dBm

POWER SPECTRAL DENSITY

Limit: 8 dBm
Resolution Bandwidth: 3 kHz
Average Time Interval: 1 second/3 kHz

Actual Time Interval used
for testing: 1.5 seconds/3 kHz

Condition: Transmitter is modulated at 24 dBm RF power.
Measurement taken at amplifier antenna connector.

Readings from spectrum analyzer:

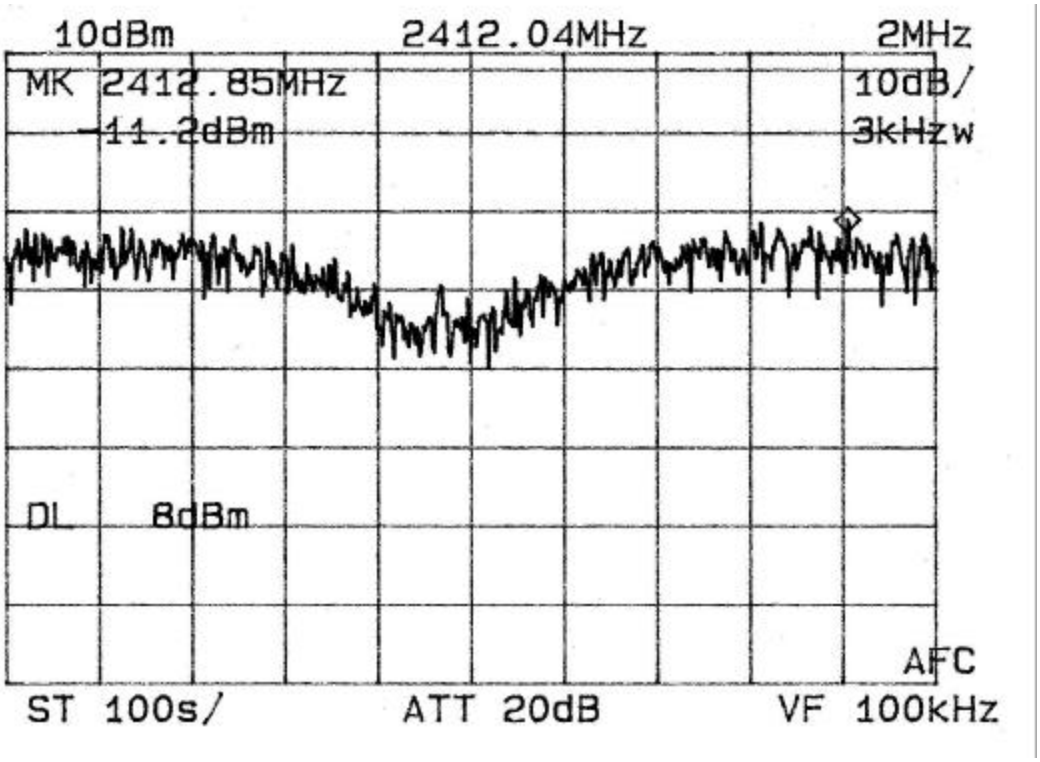
EUT w/ 250 mW Amp 2412 MHz - (-11.2 dBm)

EUT w/ 250 mW Amp 2437 MHz - (-12.8 dBm)

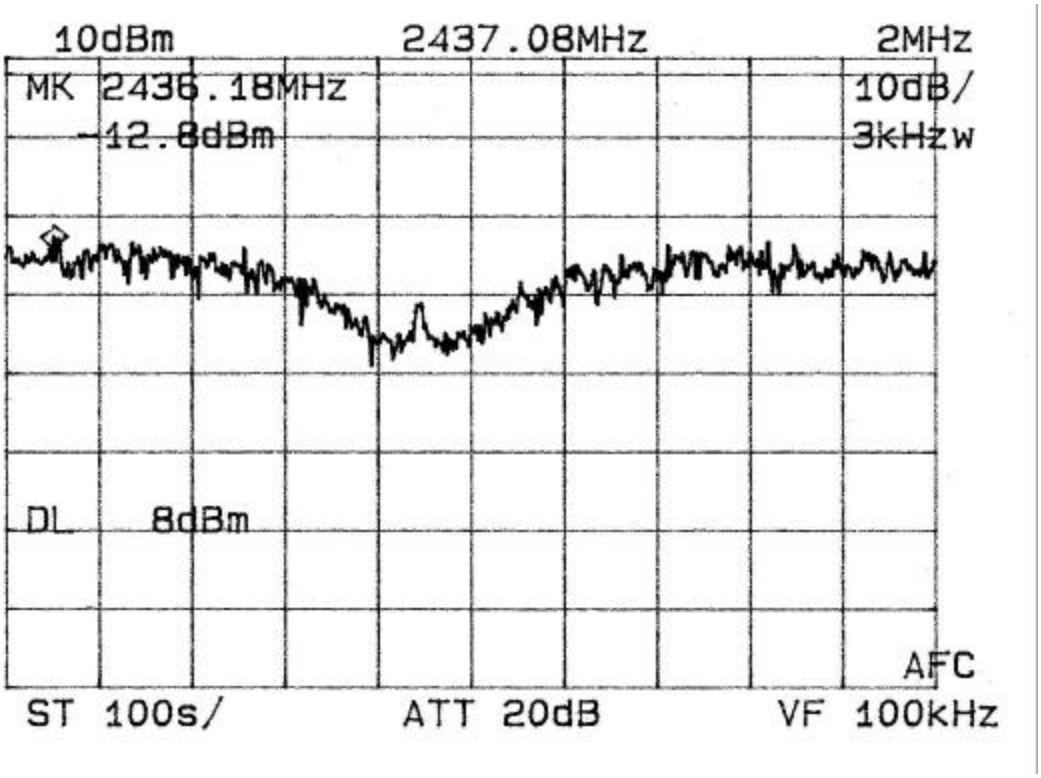
EUT w/ 250 mW Amp 2462 MHz - (-14.8 dBm)

SEE FOLLOWING 3 PLOTS

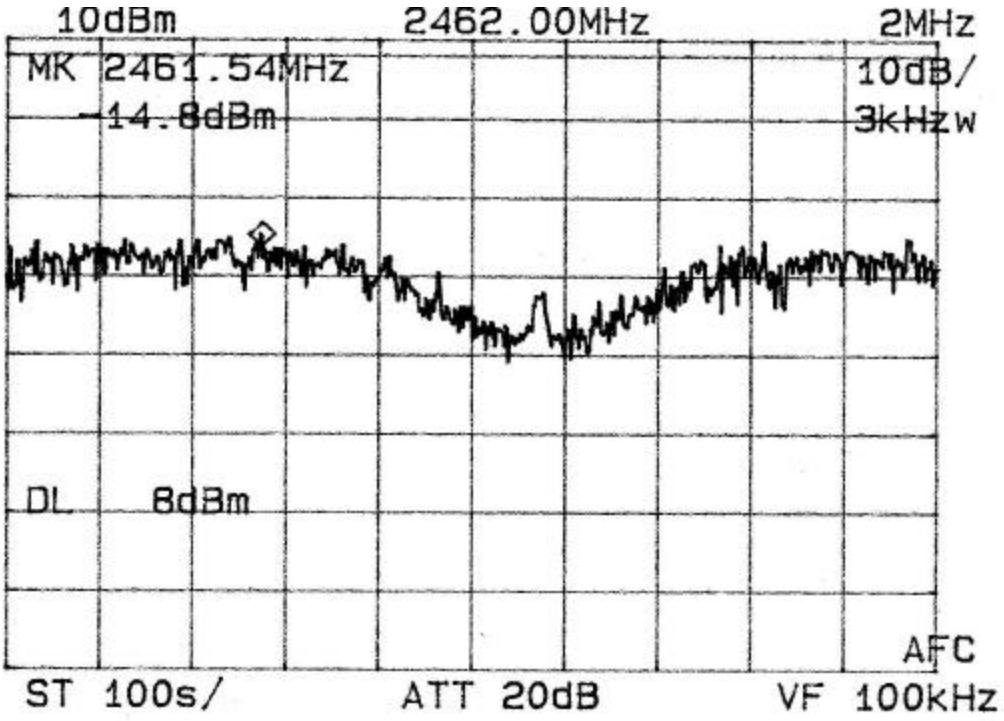
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



6 dB EMISSION BANDWIDTH

Minimum 6 dB BW: 0.5 MHz
RBW Setting on S.A.: 100 kHz

Condition: Transmitter is set to a single modulated channel.
Measurement taken at amplifier antenna connector.

Readings from spectrum analyzer:

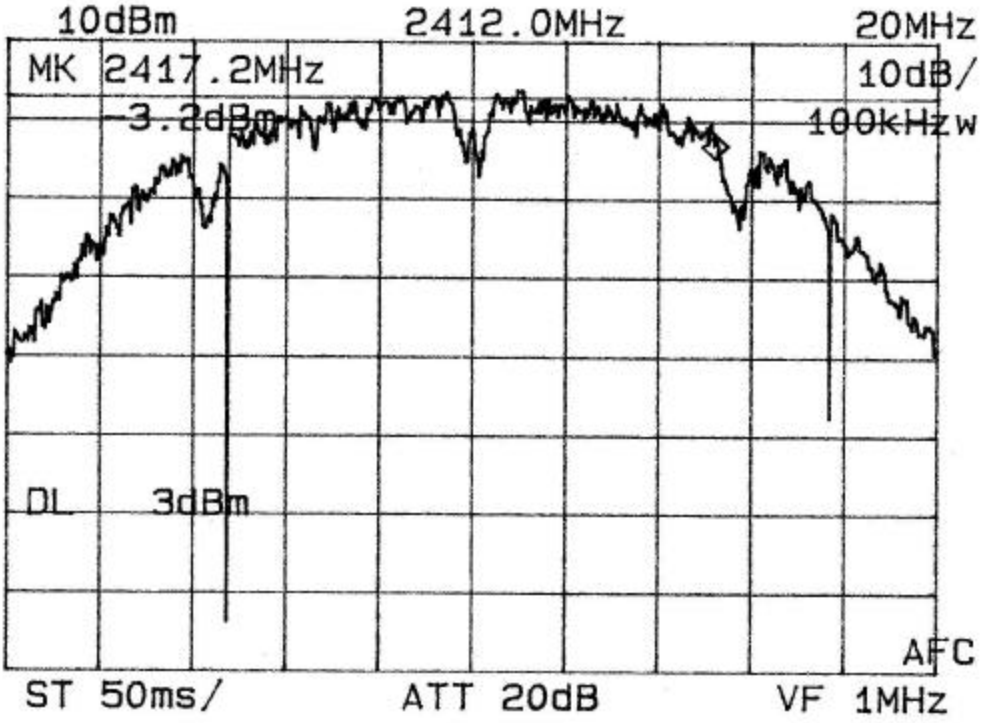
2412 MHz - 10.4 MHz Occupied BW

2437 MHz - 12.4 MHz Occupied BW

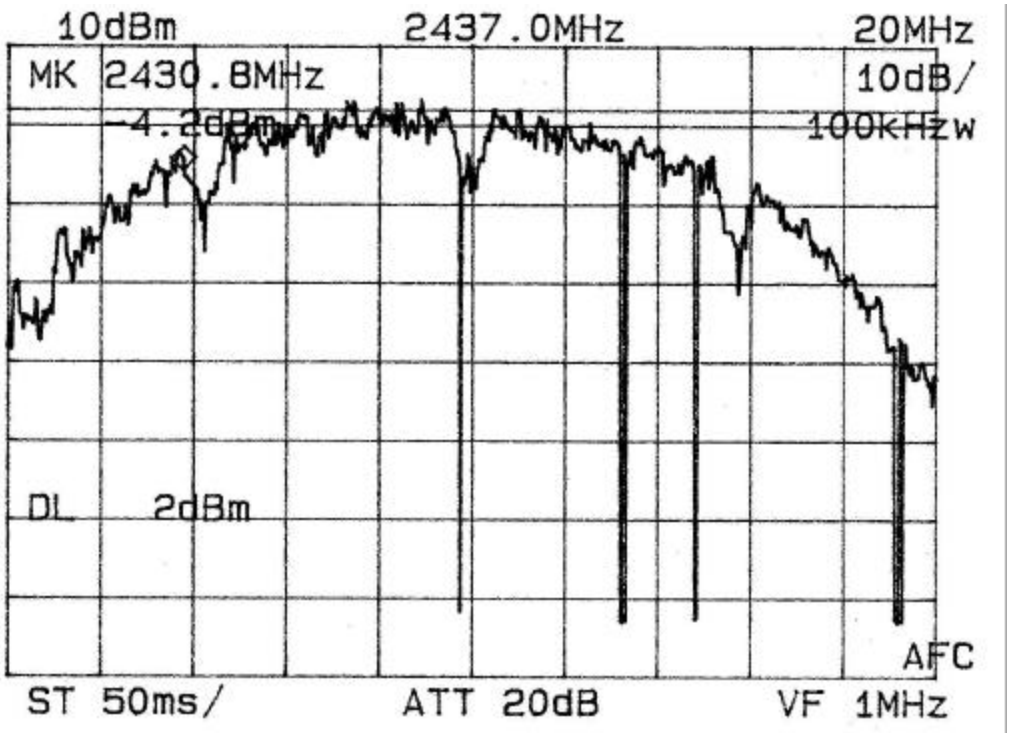
2462 MHz - 10.8 MHz Occupied BW

SEE FOLLOWING 3 PLOTS

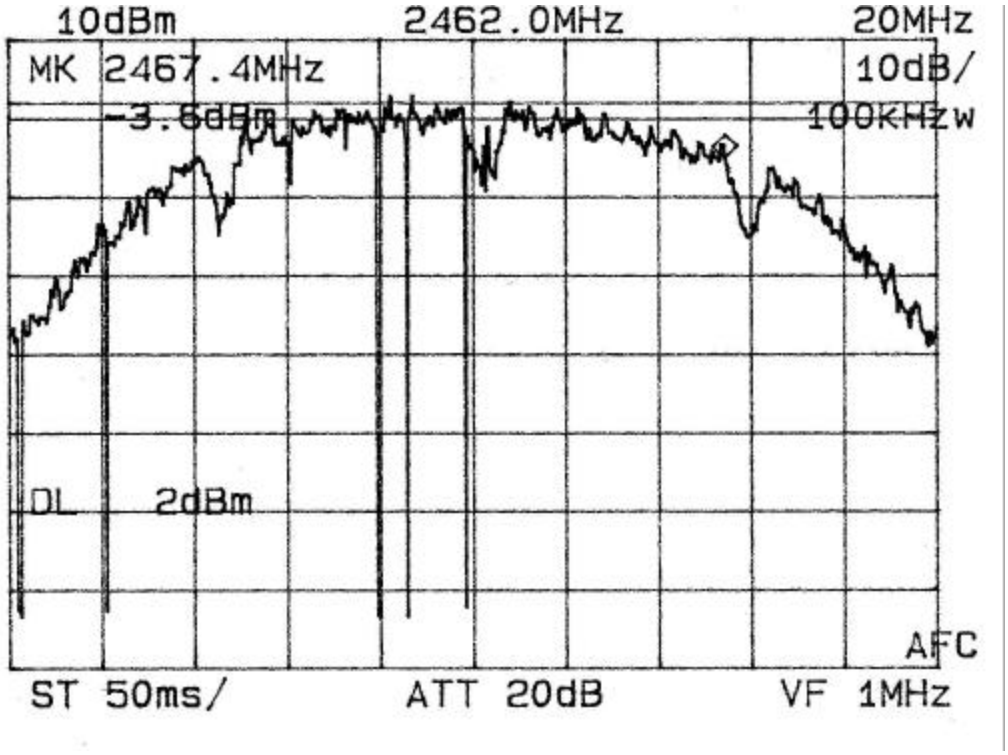
LOW CHANNEL



MID CHANNEL



HIGH CHANNEL



RF ANTENNA CONDUCTED SPURIOUS/HARMONICS EMISSIONS

Limit: 20 dB below Carrier Level Measured with 100 kHz RBW
RBW Setting on S.A.: 100 kHz

Condition: Transmitter is set to a single modulated channel.
RF power = 24 dBm
Measurement taken at amplifier antenna connector.

Three separate Measurements are performed to show harmonic and spurious emissions generated with the transmitter tuned to low, middle, and high parts of the spectral range.

SEE FOLLOWING 3 DATA TABLES

FCC PART 15.247(c) - CONDUCTED SPURIOUS EMISSIONS

Frequency of Carrier = 2412 MHz
Limit = 20 dBc

Condition: Transmitter is set to a single modulated channel.

TEST RESULTS

LIMIT: -20 dB FROM PEAK CARRIER

COMPONENT	FREQUENCY (MHZ)	RESULT (dB FROM PEAK)
HARMONIC	4824.00	- 43.0
HARMONIC	7236.00	- 48.0
HARMONIC	9648.00	- 57.0
HARMONIC	12060.00	- 65.0
HARMONIC	14472.00	- 66.0
HARMONIC	16884.00	- 71.0
HARMONIC	19296.00	- 72.0
HARMONIC	21708.00	- 74.0
HARMONIC	24120.00	- 77.0

FCC PART 15.247(c) - CONDUCTED SPURIOUS EMISSIONS

Frequency of Carrier = 2437 MHz
Limit = 20 dBc

Condition: Transmitter is set to a single modulated channel.

TEST RESULTS

LIMIT: -20 dB FROM PEAK CARRIER

COMPONENT	FREQUENCY (MHZ)	RESULT (dB FROM PEAK)
HARMONIC	4874.00	- 44.0
HARMONIC	7311.00	- 48.0
HARMONIC	9748.00	- 60.0
HARMONIC	12185.00	- 64.0
HARMONIC	14622.00	- 68.0
HARMONIC	17059.00	- 71.0
HARMONIC	19496.00	- 73.0
HARMONIC	21933.00	- 75.0
HARMONIC	24370.00	- 77.0

FCC PART 15.247(c) - CONDUCTED SPURIOUS EMISSIONS

Frequency of Carrier = 2462 MHz
Limit = 20 dBc

Condition: Transmitter is set to a single modulated channel.

TEST RESULTS

LIMIT: -20 dB FROM PEAK CARRIER

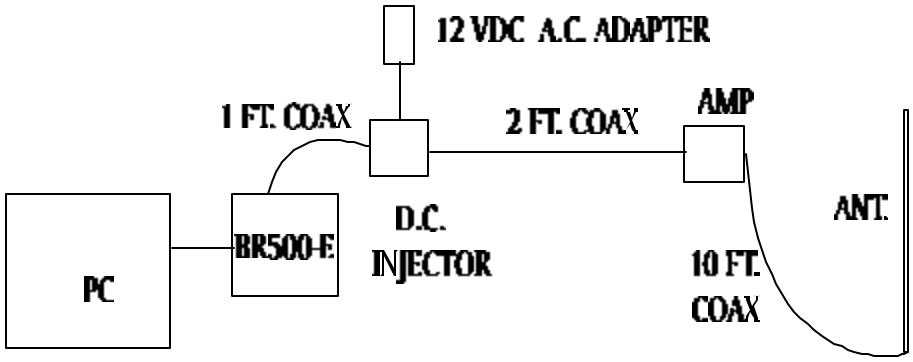
COMPONENT	FREQUENCY (MHZ)	RESULT (dB FROM PEAK)
HARMONIC	4924.00	- 45.0
HARMONIC	7386.00	- 49.0
HARMONIC	9848.00	- 58.0
HARMONIC	12310.00	- 68.0
HARMONIC	14772.00	- 68.0
HARMONIC	17234.00	- 72.0
HARMONIC	19696.00	- 75.0
HARMONIC	22158.00	- 77.0
HARMONIC	24620.00	- 77.0

4.0 Test Configuration

RADIATED EMISSIONS

The EUT was set up on the center of the test table, in a manner which follows the general guidelines of ANSI C63.4, Section 6 "**General Operating Conditions and Configurations**". Two sets of measurements were taken: First set with amplifier, second set without amplifier.

This is described below:



5.0 Conducted Emissions Scheme

The EUT is placed on an 80 cm high 1 X 1.5 m non-conductive table. Power to the RF modem is provided through a Solar Corporation 50 Ω/50 μH Line Impedance Stabilization Network bonded to a 2.2 X 2 meter horizontal ground plane, and a 2.2 X 2 meter vertical ground plane. The LISN has its AC input supplied from a filtered AC power source. A separate LISN provides AC power to the peripheral equipment. I/O cables are moved about to obtain maximum emissions.

The 50 Ω output of the LISN is connected to the input of the spectrum analyzer and emissions in the frequency range of 450 kHz to 30 MHz are searched. The detector function is set to quasi- peak and the resolution bandwidth is set at 9 kHz, with all post-detector filtering no less than 10 times the resolution bandwidth for final measurements. All emissions within 20 dB of the limit are recorded in the data tables.

FCC CLASS B CONDUCTED EMISSIONS DATA

CLIENT: Winncom Technologies, Inc.
EUT: Lucent PC24E-00-FC WITH AMP250

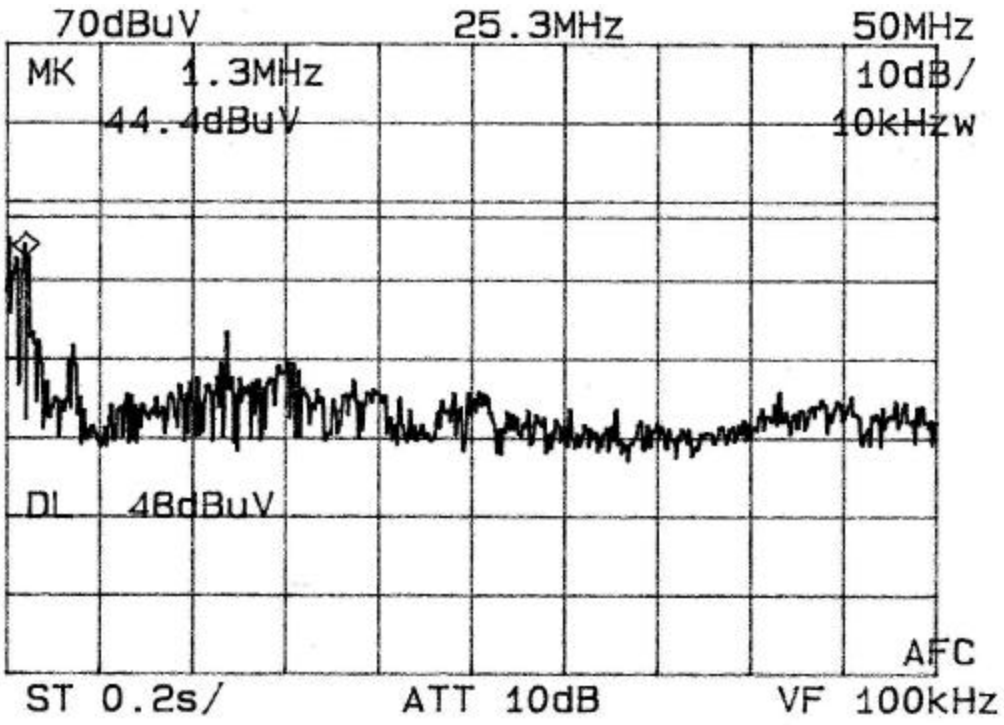
LINE 1 - NEUTRAL

FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
.854	42.6	135	250	-5.4
1.32	44.4	166	250	-3.6
3.82	31.6	38	250	-16.4
12.15	33.2	46	250	-14.8

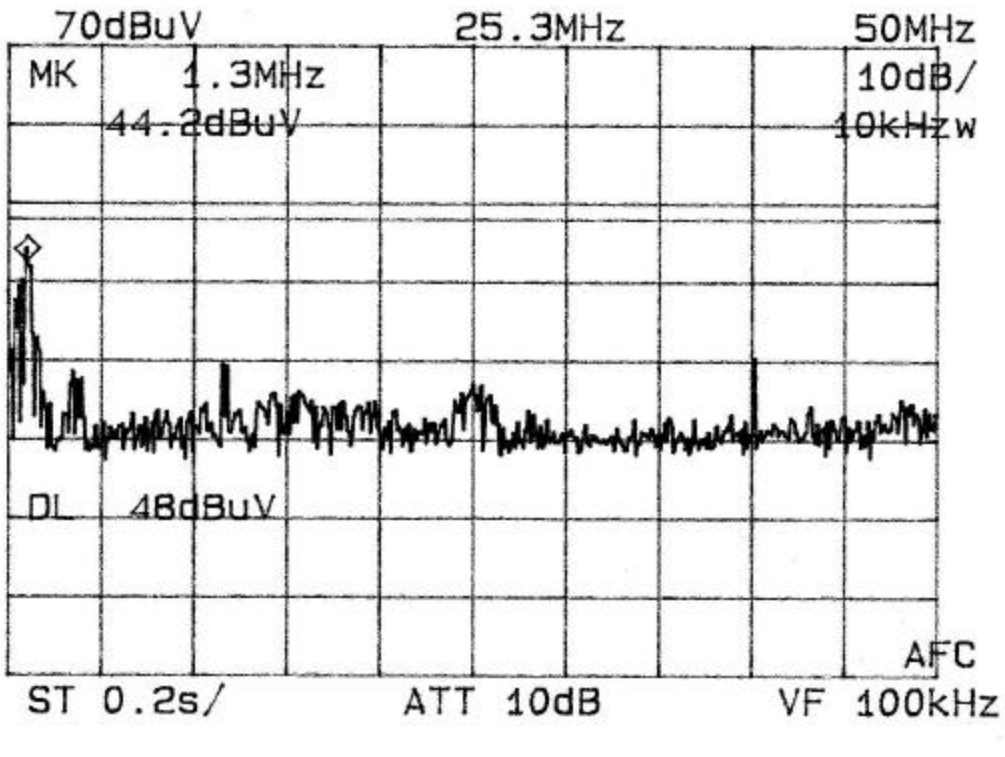
LINE 2 - PHASE

FREQ MHz	VOLTAGE dBuV	VOLTAGE uV	FCC LIMIT uV	MARGIN dB
.854	39.4	93	250	-8.6
1.32	44.2	162	250	-3.8
3.82	28.6	27	250	-19.4
11.96	29.4	30	250	-18.6

A.C. LINE-CONDUCTED - L1



A.C. LINE-CONDUCTED - L2



6.0 Radiated Emissions Scheme

The EUT is placed on an 80 cm high 1 X 1.5 meter non-conductive motorized turntable for radiated testing on the 3-meter open area test site. The emissions from the EUT are measured continuously at every azimuth by rotating the turntable. Guided horn and log periodic broadband antennas are mounted on an antenna mast to determine the height of maximum emissions. The height of the antenna is varied between 1 and 4 meters. Both the horizontal and vertical field components are measured.

The RF spectrum is searched from 30 MHz - 25.000 GHz.

The output from the antenna is connected to the input of the preamplifier. The preamp out is connected to the spectrum analyzer. The detector function is set to **Peak**. The resolution bandwidth of the spectrum analyzer is set at 120 kHz, for the frequency range of 30-1000 MHZ, and 1 MHz for the range of 1 GHz-25 GHz. A 10 Hz video BW setting is used to average readings above 1 GHz. All emissions within 20 dB of the limit are recorded in the data tables.

To convert the spectrum analyzer reading into a quantified E-field level to allow comparison with the FCC limits, it is necessary to account for various calibration factors. These factors include cable loss (CL) and antenna factors (AF). The AF/CL in dB/m is algebraically added to the Spectrum Analyzer Voltage in dbµV to obtain the Radiated Electric Field in dBµV/m. This level is then compared with the FCC limit.

Example:

Spectrum Analyzer Volt: VdBuV

Composite Factor: AF/CLdB/m

Electric Field: EdBµV/m = VdBµV + AF/CLdB/m
Linear Conversion: EuV/m = Antilog (EdBµV/m/20)

		FCC 15.209 RADIATED EMISSIONS DATA					
		FCC ID:	OQCWAF24-1000L				
CLIENT:		WINNCOM					
EUT:		PC24E w/ AMP250					
CARRIER:		2412 MHZ @ 250 mW					
ANTENNA		7 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	uV/m	uV/m
4824.00	V	19.0	35.0	-25	29.0	28.2	500.0
12060.00	V	17.0	40.0	-25	32.0	39.8	500.0
14472.00	H	15.0	43.0	-25	33.0	44.6	500.0
19296.00	H	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4824.00	V	40.0	35.0	-25	50.0	316.2	5000.0
12060.00	V	37.0	40.0	-25	52.0	398.1	5000.0
14472.00	H	30.0	43.0	-25	48.0	251.2	5000.0
19296.00	H	27.0	36.0	-25	38.0	79.4	5000.0

CARRIER:		2437 MHZ @ 250 mW					
ANTENNA:		7 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	20.0	35.0	-25	30.0	31.6	500.0
7311.00	V	19.0	37.0	-25	31.0	35.5	500.0
12185.00	H	15.0	40.0	-25	30.0	31.6	500.0
19496.00	V	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	40.0	35.0	-25	50.0	316.2	5000.0
7311.00	V	39.0	37.0	-25	50.0	316.2	5000.0
12185.00	H	32.0	40.0	-25	47.0	223.8	5000.0
19496.00	V	30.0	36.0	-25	41.0	112.2	5000.0

CARRIER:		2462 MHZ @ 250 mW					
ANTENNA:		7 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	19.0	35.0	-25	29.0	28.2	500.0
7386.00	H	20.0	37.0	-25	32.0	39.8	500.0
12310.00	H	15.0	40.0	-25	30.0	31.6	500.0
19696.00	H	15.0	36.0	-25	26.0	19.9	500.0
22152.00	V	15.0	37.0	-25	27.0	22.3	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	Db/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	38.0	35.0	-25	48.0	251.8	5000.0
7386.00	H	40.0	37.0	-25	52.0	398.1	5000.0
12310.00	H	31.0	40.0	-25	46.0	199.5	5000.0
19696.00	H	32.0	36.0	-25	43.0	141.2	5000.0
22152.00	V	28.0	37.0	-25	40.0	100.0	5000.0

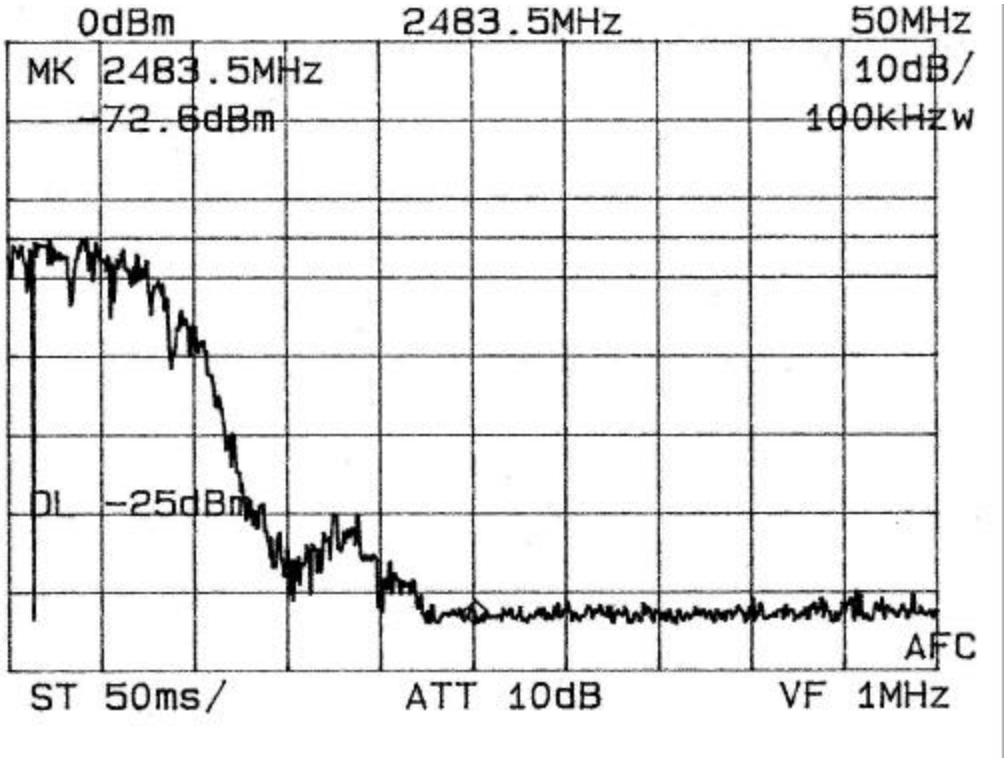
FCC 15.209 RADIATED EMISSIONS DATA

UPPER BAND EDGE

CARRIER : 2462 MHz @ 250 mW
ANTENNA: 7 dBi OMNI

		PEAK				AVRG	
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	LIMIT	MRGN
MHz	H/V	dBuV	dB/m	GAIN	dBuV/m	dBuV/m	dB
2483.5	H	27.0	34.0	-25	36.0	54.0	-18

CONDUCTED BAND EDGE OUTPUT



		FCC 15.209 RADIATED EMISSIONS DATA					
		FCC ID:	OQCWAF24-1000L				
CLIENT:		WINNCOM					
EUT:		PC24E w / AMP250					
CARRIER:		2412 MHZ @ 250 mW					
ANTENNA		12.5 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	uV/m	uV/m
4824.00	V	18.0	35.0	-25	28.0	25.1	500.0
12060.00	V	15.0	40.0	-25	30.0	31.6	500.0
14472.00	H	15.0	43.0	-25	33.0	44.6	500.0
19296.00	H	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4824.00	V	38.0	35.0	-25	48.0	251.2	5000.0
12060.00	V	35.0	40.0	-25	50.0	316.2	5000.0
14472.00	H	30.0	43.0	-25	48.0	251.2	5000.0
19296.00	H	27.0	36.0	-25	38.0	79.4	5000.0

CARRIER:		2437 MHZ @ 250 mW					
ANTENNA:		12.5 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	22.0	35.0	-25	32.0	39.8	500.0
7311.00	V	18.0	37.0	-25	30.0	31.6	500.0
12185.00	H	16.0	40.0	-25	31.0	35.5	500.0
19496.00	V	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	41.0	35.0	-25	51.0	354.8	5000.0
7311.00	V	37.0	37.0	-25	49.0	281.8	5000.0
12185.00	H	32.0	40.0	-25	47.0	223.8	5000.0
19496.00	V	30.0	36.0	-25	41.0	112.2	5000.0

CARRIER:		2462 MHZ @ 250 mW					
ANTENNA:		12.5 dBi OMNI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	21.0	35.0	-25	31.0	35.5	500.0
7386.00	H	18.0	37.0	-25	30.0	31.6	500.0
12310.00	H	15.0	40.0	-25	30.0	31.6	500.0
19696.00	H	15.0	36.0	-25	26.0	19.9	500.0
22152.00	V	15.0	37.0	-25	27.0	22.3	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	Db/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	42.0	35.0	-25	52.0	398.1	5000.0
7386.00	H	38.0	37.0	-25	50.0	316.2	5000.0
12310.00	H	32.0	40.0	-25	47.0	223.9	5000.0
19696.00	H	30.0	36.0	-25	41.0	112.2	5000.0
22152.00	V	28.0	37.0	-25	40.0	100.0	5000.0

FCC 15.209 RADIATED EMISSIONS DATA

UPPER BAND EDGE

CARRIER : 2462 MHz @ 250 mW
ANTENNA: 12.5 dBi OMNI

FREQ MHz	POL H/V	PEAK SPEC A dBuV	AF/CL dB/m	PREAMP GAIN	E-FIELD dBuV/m	AVRG LIMIT dBuV/m	MRGN dB
2483.5	H	29.0	34.0	-25	38.0	54.0	-16

		FCC 15.209 RADIATED EMISSIONS DATA					
		FCC ID:	OQCWAF24-1000L				
CLIENT:		WINNCOM					
EUT:		PC24E w/ AMP250					
CARRIER:		2412 MHZ @ 250 mW					
ANTENNA		13.5 dBi YAGI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	DB/m	GAIN	DbuV/m	uV/m	uV/m
4824.00	V	20.0	35.0	-25	30.0	31.6	500.0
12060.00	V	17.0	40.0	-25	32.0	39.8	500.0
14472.00	H	15.0	43.0	-25	33.0	44.6	500.0
19296.00	H	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4824.00	V	40.0	35.0	-25	50.0	316.2	5000.0
12060.00	V	35.0	40.0	-25	50.0	316.2	5000.0
14472.00	H	29.0	43.0	-25	47.0	223.8	5000.0
19296.00	H	25.0	36.0	-25	36.0	63.1	5000.0

CARRIER:		2437 MHZ @ 250 mW					
ANTENNA:		13.5 dBi YAGI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	21.0	35.0	-25	31.0	35.5	500.0
7311.00	V	17.0	37.0	-25	29.0	28.2	500.0
12185.00	H	15.0	40.0	-25	30.0	35.5	500.0
19496.00	V	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	41.0	35.0	-25	51.0	354.8	5000.0
7311.00	V	37.0	37.0	-25	49.0	281.8	5000.0
12185.00	H	32.0	40.0	-25	47.0	223.8	5000.0
19496.00	V	30.0	36.0	-25	41.0	112.2	5000.0

CARRIER:		2462 MHZ @ 250 mW					
ANTENNA:		13.5 dBi YAGI					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	20.0	35.0	-25	30.0	31.6	500.0
7386.00	H	18.0	37.0	-25	30.0	31.6	500.0
12310.00	H	16.0	40.0	-25	31.0	35.4	500.0
19696.00	H	15.0	36.0	-25	26.0	19.9	500.0
22152.00	V	15.0	37.0	-25	27.0	22.3	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	Db/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	41.0	35.0	-25	51.0	354.8	5000.0
7386.00	H	38.0	37.0	-25	50.0	316.2	5000.0
12310.00	H	33.0	40.0	-25	48.0	251.1	5000.0
19696.00	H	30.0	36.0	-25	41.0	112.2	5000.0
22152.00	V	28.0	37.0	-25	40.0	100.0	5000.0

FCC 15.209 RADIATED EMISSIONS DATA

UPPER BAND EDGE

CARRIER : 2462 MHz @ 250 mW
ANTENNA: 13.5 dBi YAGI

FREQ MHz	POL H/V	PEAK SPEC A dBuV	AF/CL dB/m	PREAMP GAIN	E-FIELD dBuV/m	AVRG LIMIT dBuV/m	MRGN dB
2483.5	H	29.0	34.0	-25	38.0	54.0	-16

		FCC 15.209 RADIATED EMISSIONS DATA					
		FCC ID:	OQCWAF24-1000L				
CLIENT:		WINNCOM					
EUT:		PC24E w/ AMP250					
CARRIER:		2412 MHZ @ 250 mW					
ANTENNA		24 dBi DISH					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DBuV	dB/m	GAIN	DbuV/m	uV/m	uV/m
4824.00	V	20.0	35.0	-25	30.0	31.6	500.0
12060.00	V	15.0	40.0	-25	30.0	31.6	500.0
14472.00	H	16.0	43.0	-25	34.0	50.1	500.0
19296.00	H	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4824.00	V	40.0	35.0	-25	50.0	316.2	5000.0
12060.00	V	35.0	40.0	-25	50.0	316.2	5000.0
14472.00	H	31.0	43.0	-25	49.0	281.8	5000.0
19296.00	H	27.0	36.0	-25	38.0	79.4	5000.0

CARRIER:		2437 MHZ @ 250 mW					
ANTENNA:		24 dBi DISH					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	dB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	20.0	35.0	-25	30.0	31.6	500.0
7311.00	V	19.0	37.0	-25	31.0	35.4	500.0
12185.00	H	17.0	40.0	-25	32.0	39.8	500.0
19496.00	V	15.0	36.0	-25	26.0	19.9	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	UV/m	uV/m
4874.00	H	42.0	35.0	-25	52.0	398.1	5000.0
7311.00	V	39.0	37.0	-25	51.0	354.8	5000.0
12185.00	H	34.0	40.0	-25	49.0	281.8	5000.0
19496.00	V	30.0	36.0	-25	41.0	112.2	5000.0

CARRIER:		2462 MHZ @ 250 mW					
ANTENNA:		24 dBi DISH					
		AVRG					AVRG
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	DB/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	21.0	35.0	-25	31.0	35.5	500.0
7386.00	H	18.0	37.0	-25	30.0	31.6	500.0
12310.00	H	17.0	40.0	-25	32.0	39.8	500.0
19696.00	H	16.0	36.0	-25	27.0	22.4	500.0
22152.00	V	15.0	37.0	-25	27.0	22.3	500.0
		PEAK					PEAK
FREQ	POL	SPEC A	AF/CL	PREAMP	E-FIELD	E-FIELD	LIMIT
MHz	H/V	DbuV	Db/m	GAIN	DbuV/m	uV/m	uV/m
4924.00	V	42.0	35.0	-25	52.0	398.1	5000.0
7386.00	H	39.0	37.0	-25	51.0	354.8	5000.0
12310.00	H	34.0	40.0	-25	49.0	281.8	5000.0
19696.00	H	32.0	36.0	-25	43.0	125.9	5000.0
22152.00	V	28.0	37.0	-25	40.0	100.0	5000.0

FCC 15.209 RADIATED EMISSIONS DATA

UPPER BAND EDGE

CARRIER : 2462 MHz @ 250 mW
ANTENNA: 24 dBi DISH

FREQ MHz	POL H/V	PEAK SPEC A dBuV	AF/CL dB/m	PREAMP GAIN	E-FIELD dBuV/m	AVRG LIMIT dBuV/m	MRGN dB
2483.5	H	28.0	34.0	-25	37.0	54.0	-17

Table 1

EUT Accessories

7 dBi Omni Antenna - Model WRO2400-70 - 2.4-2.5 GHz

12.5 dBi Omni Antenna - Model WRO2400-125 - 2.4-2.5 GHz

13.5 dBi Yagi Antenna - Model HGY15 - 2.4-2.5 GHz

24 dBi Grid Dish Antenna - Model WRO2400-24 - 2.4-2.5 GHz

Bidirectional amp module

D.C. power injector module

120 VAC adapter to 12 VDC

10 feet of low-loss flex coaxial cable used to connect the EUT to the antenna.

Table 2

Support Equipment

MANUFACTURER	FCC ID #	SERIAL #
COMPUTER KDS Valient 5000 LT	DoC Approval	VVM4423WIC-991

Table 3

Measurement Equipment Used

The following equipment is used to perform measurements:

HP 435A RF Peak Power Meter - Serial No. 1527AO284

EMCO Model 3110 Biconical Antenna - Serial No. 1619

Antenna Research MWH-1825B Horn Antenna - Serial No. 1005

EMCO Model 3115 Ridged Horn Antenna - Serial No. 3007

HP 8348A Preamplifier - Serial No. 197-2564A

Solar 8012-50-R-24-BNC LISN - Serial No. 924867

Bird 8306-300-N 30dB Attenuator - S/N: 29198391515

Tektronix R3272 Spectrum Analyzer - Serial No. 6-95-1124

4 Meter Antenna Mast

Motorized Turntable

Heliax FSJ1-50A 1/4" Superflex Coax Cable (12 Ft.)