

**YOUNG DESIGN, INC.  
FCC INFORMATION**

## **RF Measurement Report**

**Prepared by:**

### **National Certification Laboratory**

**8370 Court Avenue, Suite B-1  
Ellicott City, Maryland 21043  
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**In Support of:**

**FCC APPLICATION FOR CERTIFICATION**

**For:**

**Young Design, Inc.  
8000 Lee Highway  
Arlington, VA 22042**

**Model: Lucent Agere WaveLAN Card with AMP2440 Amplifier**

**FCCID: NM5-A2400S**

**Demonstration of Compliance with FCC Rules Part 15.247**

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**June 4, 2001**

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***NCL PROJ.# MICROHARD-576***

## **1.0 General Information:**

This report has been prepared on behalf of **Young Design, Inc.**, to support the attached Application for a Certification of a Part 15 Spread Spectrum Transmitter. The Equipment Under Test (EUT) was the **Model: Lucent/Agere WaveLAN Card with Model AMP2440-XXF Amplifier**. The EUT configuration consisted of an Omni directional antenna, one twelve volt AC-DC power supply, and 50 ohm low loss cable. The test results reported in this document relate only to the item that was tested.

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

### **1.1 Summary:**

The Young Design, Inc., **Lucent/Agere WaveLAN Card with Model AMP2440-XXF Amplifier**, and a suite of specific antennas complies with the FCC limits (15.247) for a Direct Sequence SST. Tests were performed on radio channels 1, 6, and 11. These are referred to in the report as the low, mid and high channels respectively.

### **1.2 Test Methodology:**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 1992. Radiated testing was performed at an antenna to EUT distance of three (3) meters.

### **1.3 Test Facility:**

The open area test site and conducted measurement facility used to collect the radiated data is located on the parking lot of National Certification Laboratory 8370 Court Avenue, Suite B-1, Ellicott City, Maryland 21043. This site has been fully described in a report dated May 26, 1993, submitted to and approved by the Federal Communications Commission to perform AC line conducted and radiated emissions testing.

## **2.0 Description of Equipment Under Test (EUT):**

The **Lucent Agere WaveLAN Card** is currently certified with FCCID: **IMRWLPCE24H**. Young Design, Inc. has not modified this product in any manner except for the addition of high gain antennas, and an external amplifier.

### **Professional Installation Requirement:**

The amplifier unit incorporates a standard N connector to the antenna, therefore requiring professional installation. The User Manual specifies that only trained certified technicians should install the **AMP2440-xxF Amplifier**. There are many technical steps needed to install an operating system as outlined in the manual. These include antenna support structure, site survey, antenna alignment, test, and troubleshoot. All systems sold to businesses are installed under the supervision of Young Design, Inc. Marketing is limited to sales by authorized dealers.

The EUT features:

### **Direct Sequence Spread Spectrum Modulation**

**24 dBm Peak RF Output**

**2412 to 2462 MHz Frequency Range**

**10 MHz, 6 dB Emission Bandwidth**

**11 Available Channels**

**5 MHz Channel Separation**

**11 Mbps Data Rate (Radio Link)**

## **2.1 EMI Countermeasure:**

The following modifications were made to the EUT, by the project engineer to assure compliance to specifications:

None.

## **3.0 Test Program:**

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

1. (15.247b) Peak RF output power.
2. (15.247a) 6 dB Emission Bandwidth.
3. (15.247c) RF Antenna Conducted output of harmonics and spurious out-of-band emissions.
4. (15.247c) Field Strength of harmonics and spurious out-of-band emissions.
5. (15.207) AC Power Line Conducted emissions.
6. (15.247c) Band Edge emissions.
7. (15.247d) Power Spectral Density.



#### **4.0 Test Configuration for Antenna Terminal Conducted:**

The PCM wireless LAN card was installed in a notebook computer for testing. A DOS program is used to control the transmitter. The external amplifier is connected in-line between the wireless LAN card and antenna via 50 feet of 3/8 inch low-loss cable. This has insertion loss of 3.3 dB at 2450 MHz. The Installation Manual will specify that the coax cable between the D.C. Injector and amplifier must have at least 3.3dB loss if other than 3/8 inch low-loss cable is used. The 50 foot cable is the minimum length of 3/8 inch cable to be supplied with the system.

RF power output measurements were taken with a Peak RF power meter at the amplifier antenna connector. RF antenna conducted output tests such as Bandwidth, Spurious/Harmonics, and Power Spectral Density were taken with the amplifier antenna connector feeding directly into the spectrum analyzer via external 30 dB attenuator. The analyzer's internal attenuator was adjusted to prevent overloading of the front end. All four data bit-rates were checked to determine if variations in Power, Bandwidth, Bandedge, and Power Spectral Density levels were measured. The worse-case data rate was 11 Mbps, thus charts and tables given in this report, reflect this mode.

Field strength measurements were taken both with the amplifier in-line, and subsequently with just the wireless LAN card feeding a grid dish, panel, or omni antenna aimed at the receiving antenna. Testing was performed using the highest gain antenna from each design family (grid, panel, omni) in order to cover the worst case range of combinations.

A list of all antennas and suggested cables that will be sold with the EUT is provided in Table 1.

#### **4.1 Peak Power Test Results:**

Limit: 1 watt (30 dBm)

Condition: Transmitter is set to a single 11 Mbps modulated channel at full power.  
Measurements taken at amplifier antenna connector.

Readings from Peak Power Meter:

WLAN Card w/ AMP @ 2412 MHz:	<b>23.9 dBm</b>
WLAN Card w/ AMP @ 2437 MHz:	<b>24.0 dBm</b>
WLAN Card w/ AMP @ 2462 MHz:	<b>23.8 dBm</b>

## **4.2 6 dB Emission Bandwidth Test Results:**

Minimum 6 dB BW: 0.500 MHz  
RBW Setting on S.A.: 100 kHz

Condition: Transmitter is set to a single 11 Mbps modulated channel at full power.  
Measurements taken at amplifier antenna connector.

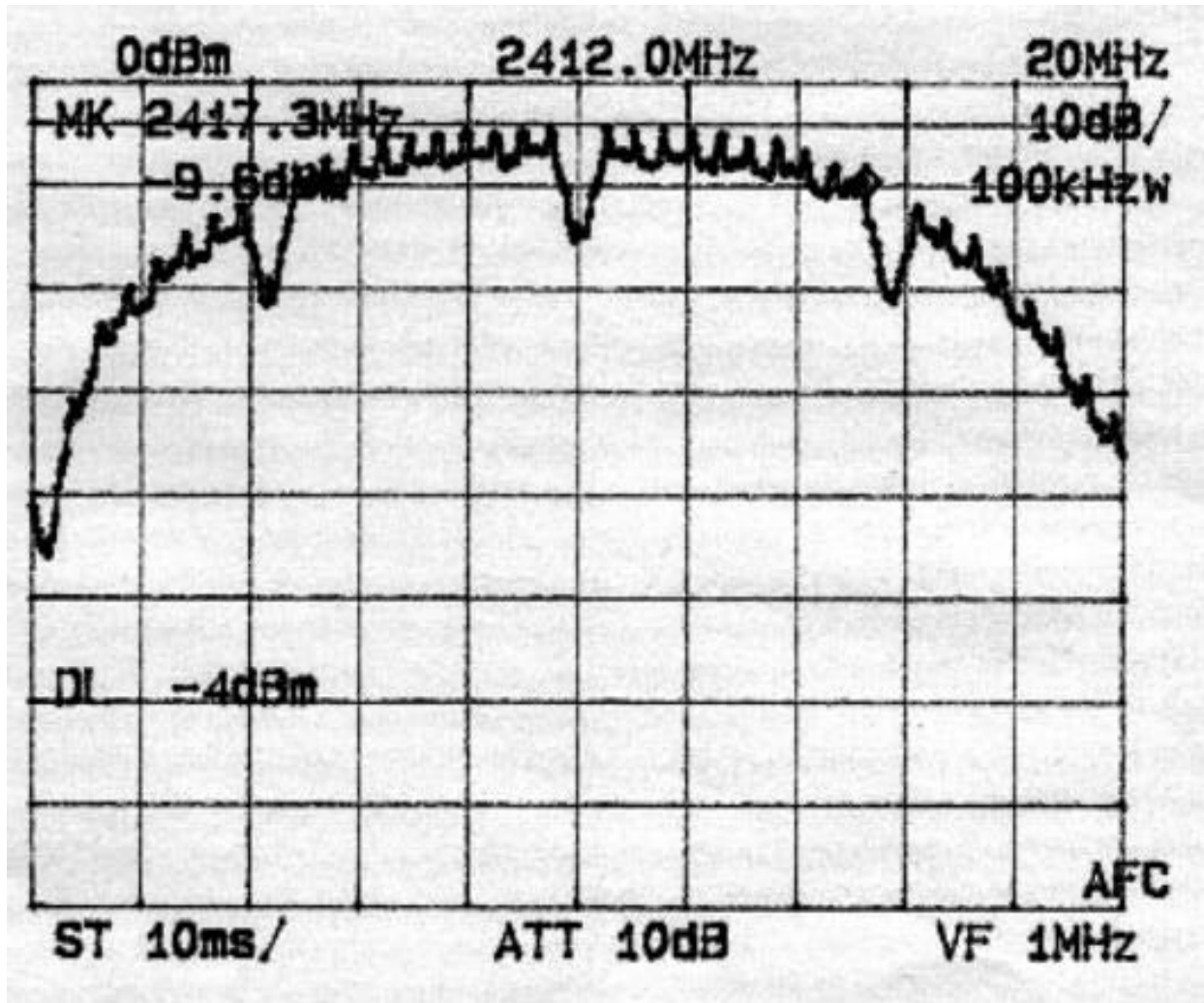
Readings from Spectrum Analyzer:

WLAN Card w/ AMP @ 2412 MHz:	<b>10.6 MHz</b>
WLAN Card w/ AMP @ 2437 MHz:	<b>10.6 MHz</b>
WLAN Card w/ AMP @ 2462 MHz:	<b>10.4 MHz</b>

**SEE FOLLOWING THREE (3) PLOTS OF MODULATED CARRIER**

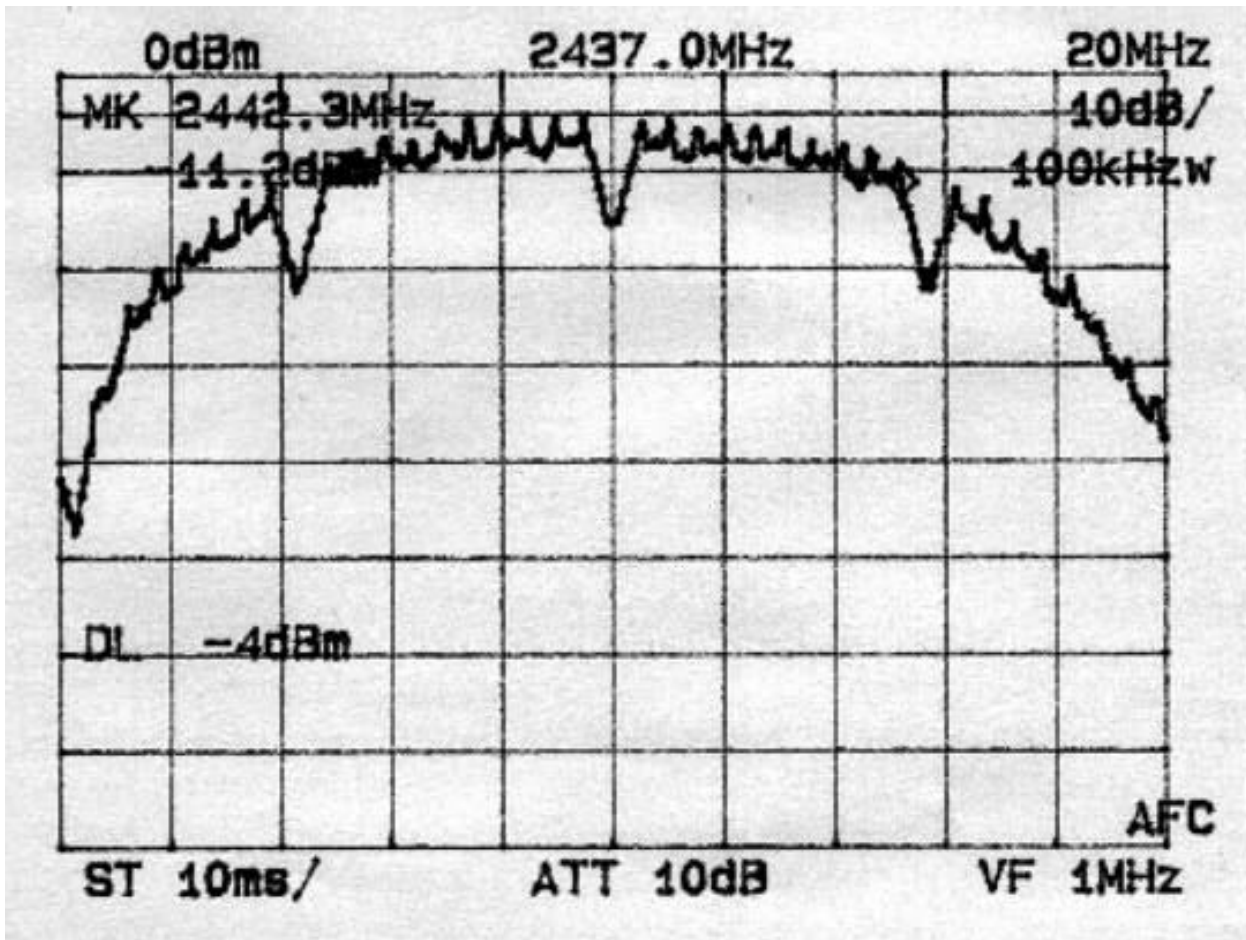
**4.2.1 6 dB Bandwidth Emissions (100 kHz Res. BW) Low Channel Bandwidth**  
**Plot:**

6 dB EMISSION BANDWIDTH – MODULATED CARRIER  
Low Channel



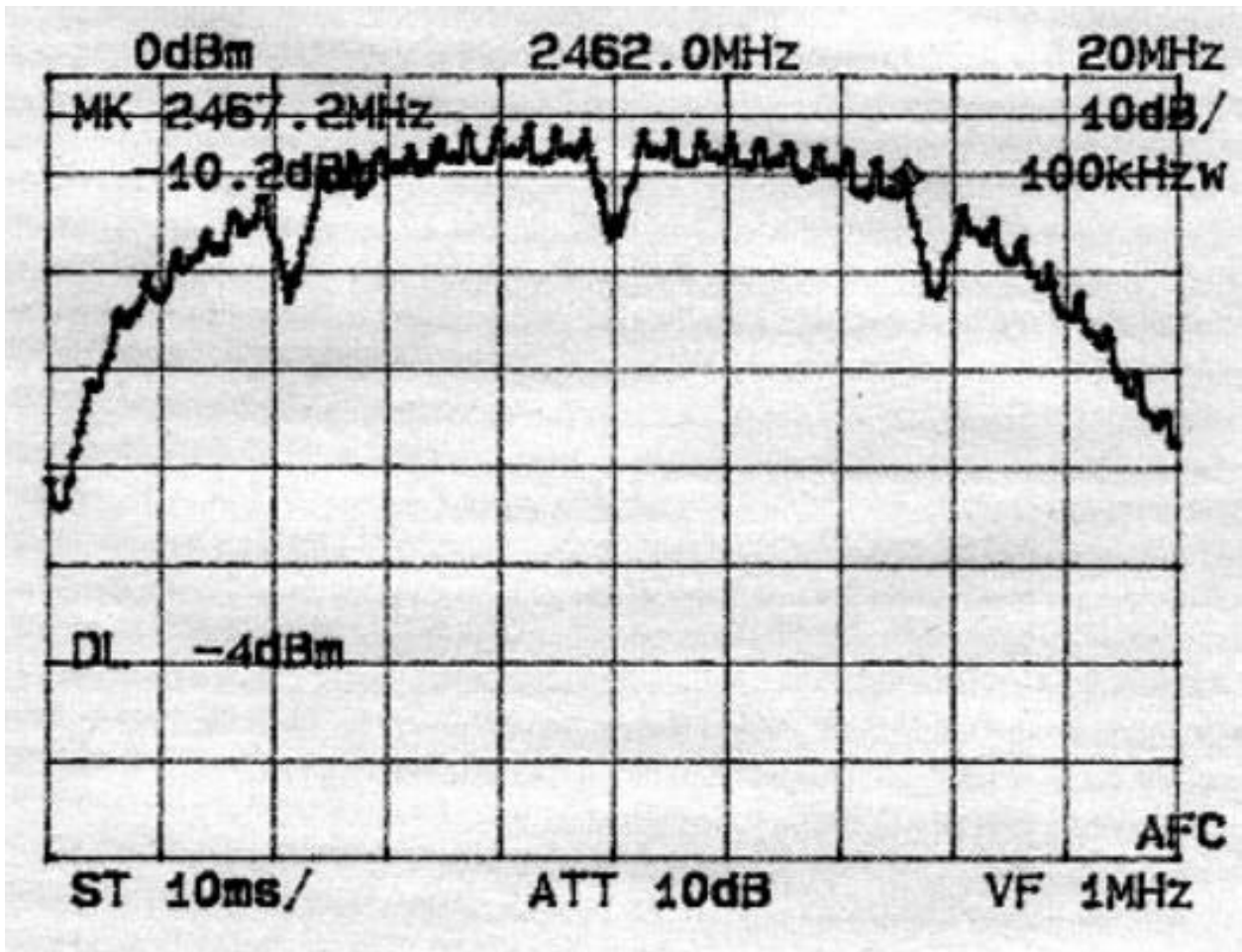
**4.2.2 6 dB Bandwidth Emissions (100 kHz Res. BW) Mid Channel Bandwidth Plot:**

6 dB EMISSION BANDWIDTH – MODULATED CARRIER  
Mid Channel



**4.2.3 6 dB Bandwidth Emissions (100 kHz Res. BW) High Channel Bandwidth Plot:**

6 dB EMISSION BANDWIDTH – MODULATED CARRIER  
High Channel



### **4.3 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 11 Mbps modulated channel at full power.  
Measurements 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 THREE (3) PLOTS & DATA TABLES**

**4.3.1 FCC Part 15.247(c) Conducted Spurious, 2412 MHz Frequency Of Carrier:**

**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**

<u>Component</u>	<u>Frequency (MHz)</u>	<u>Result (dBc)</u>
Harmonic	4824.00	-66.0
Harmonic	7236.00	-68.0
Harmonic	9648.00	-73.0
Harmonic	12060.00	-73.0
Harmonic	14472.00	-74.0
Harmonic	16884.00	-75.0
Harmonic	19296.00	-75.0
Harmonic	21708.00	-75.0
Harmonic	24120.00	-75.0



**4.3.2 FCC Part 15.247(c) Conducted Spurious, 2437 MHz Frequency of Carrier:**

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**

<u>Component</u>	<u>Frequency (MHz)</u>	<u>Result (dBc)</u>
Harmonic	4874.00	-64.0
Harmonic	7311.00	-69.0
Harmonic	9748.00	-73.0
Harmonic	12185.00	-73.0
Harmonic	14622.00	-74.0
Harmonic	17059.00	-74.0
Harmonic	19496.00	-75.0
Harmonic	21933.00	-75.0
Harmonic	24370.00	-75.0

**4.3.3 FCC Part 15.247(c) Conducted Spurious, 2462 MHz Frequency of Carrier:**

**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**

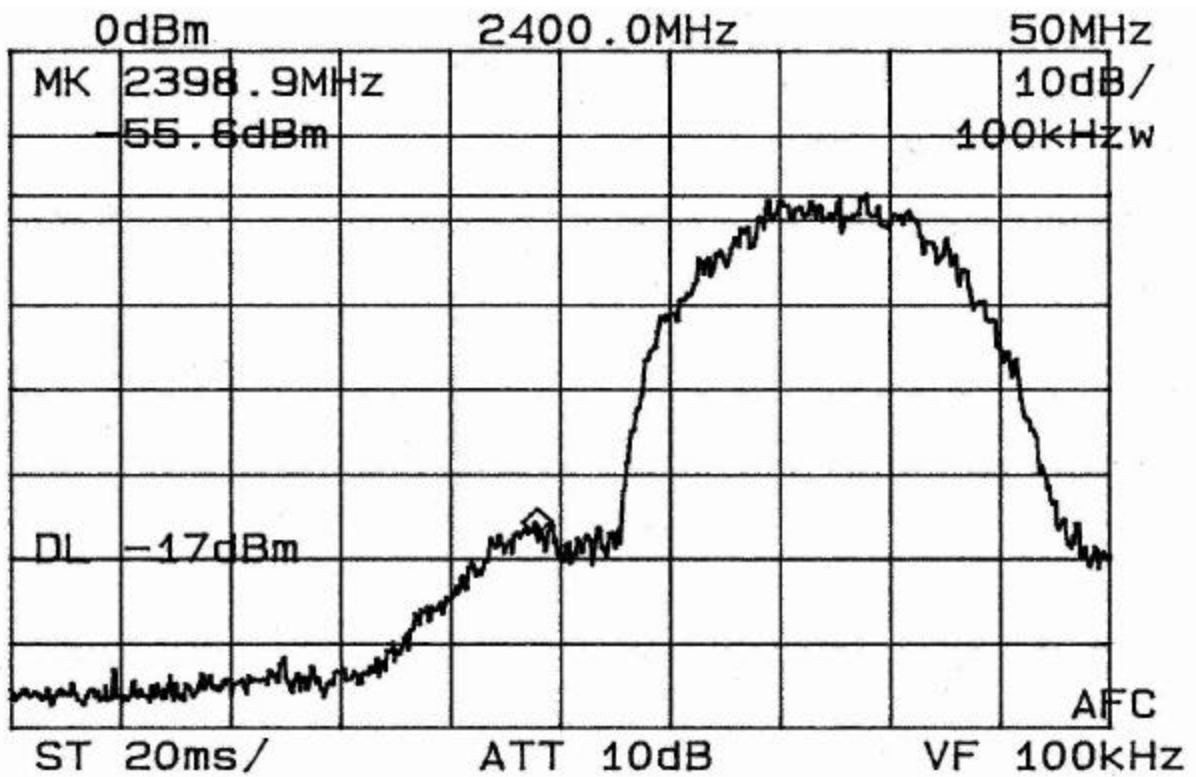
<u>Component</u>	<u>Frequency (MHz)</u>	<u>Result (dBc)</u>
Harmonic	4924.00	-65.0
Harmonic	7386.00	-67.0
Harmonic	9848.00	-73.0
Harmonic	12310.00	-73.0
Harmonic	14772.00	-74.0
Harmonic	17234.00	-74.0
Harmonic	19696.00	-74.0
Harmonic	22158.00	-75.0
Harmonic	24620.00	-75.0

**4.4 Conducted Bandedge Emissions Test Results:**

**4.4.1 Low Channel Conducted Bandedge Emissions Plot:**

CONDUCTED BAND EDGE EMISSIONS – MODULATED CARRIER (100 kHz RES. BW)

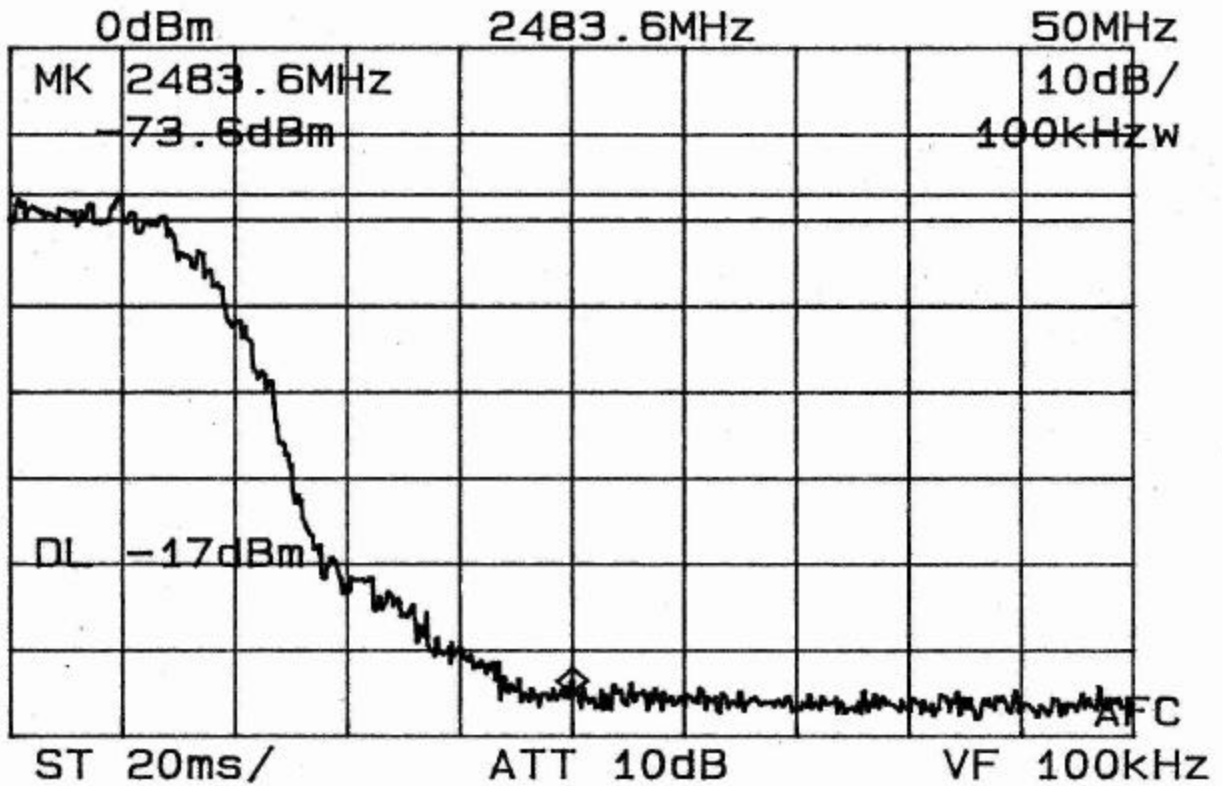
LOW CHANNEL



**4.4.2 High Channel Conducted Bandedge Emissions Plot:**

CONDUCTED BAND EDGE EMISSIONS – MODULATED CARRIER (100 kHz RES. BW)

HIGH CHANNEL



#### **4.5 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 set to a single 11 Mbps modulated channel at full power.  
Measurements taken at amplifier antenna connector.

Note: 30 dB front-end attenuator on analyzer

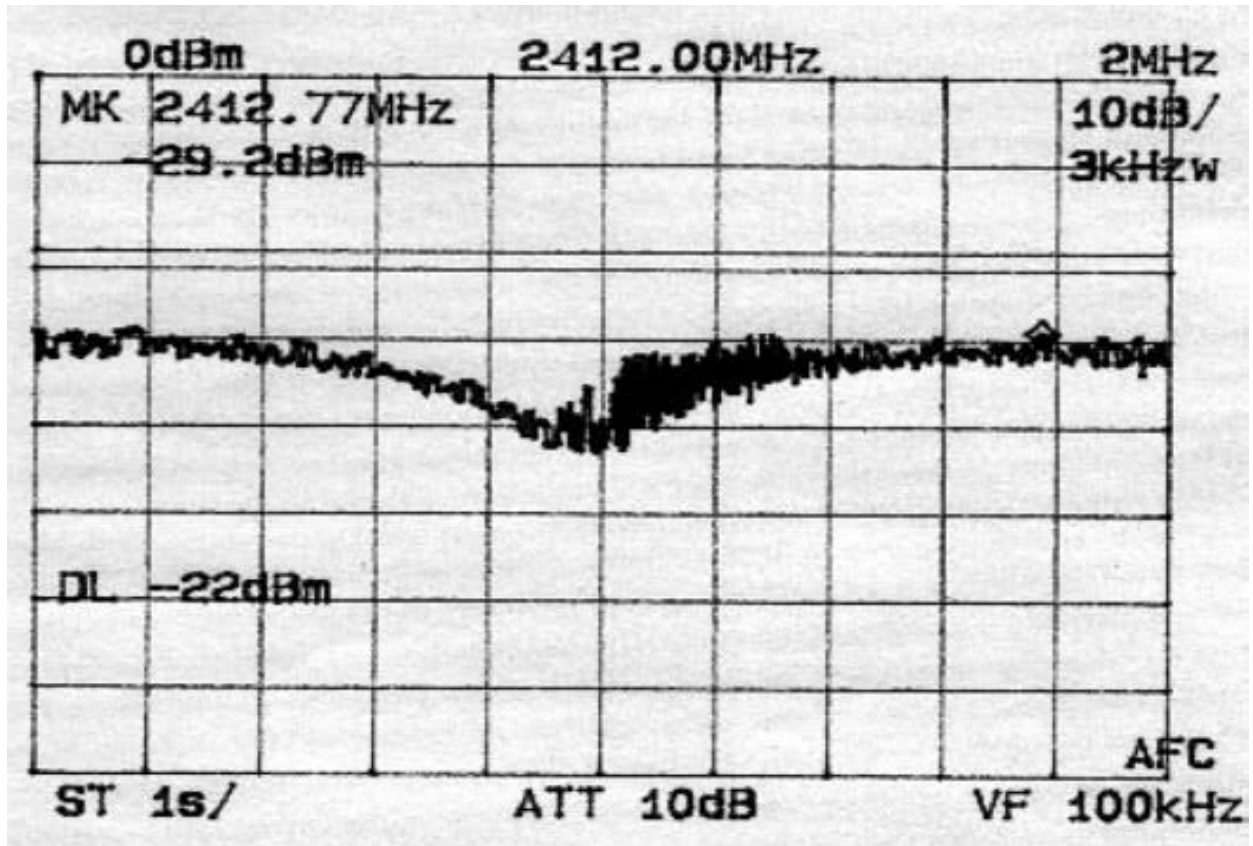
Readings from spectrum analyzer:

WLAN Card w/ AMP @ 2412 MHz: **0.8 dBm**

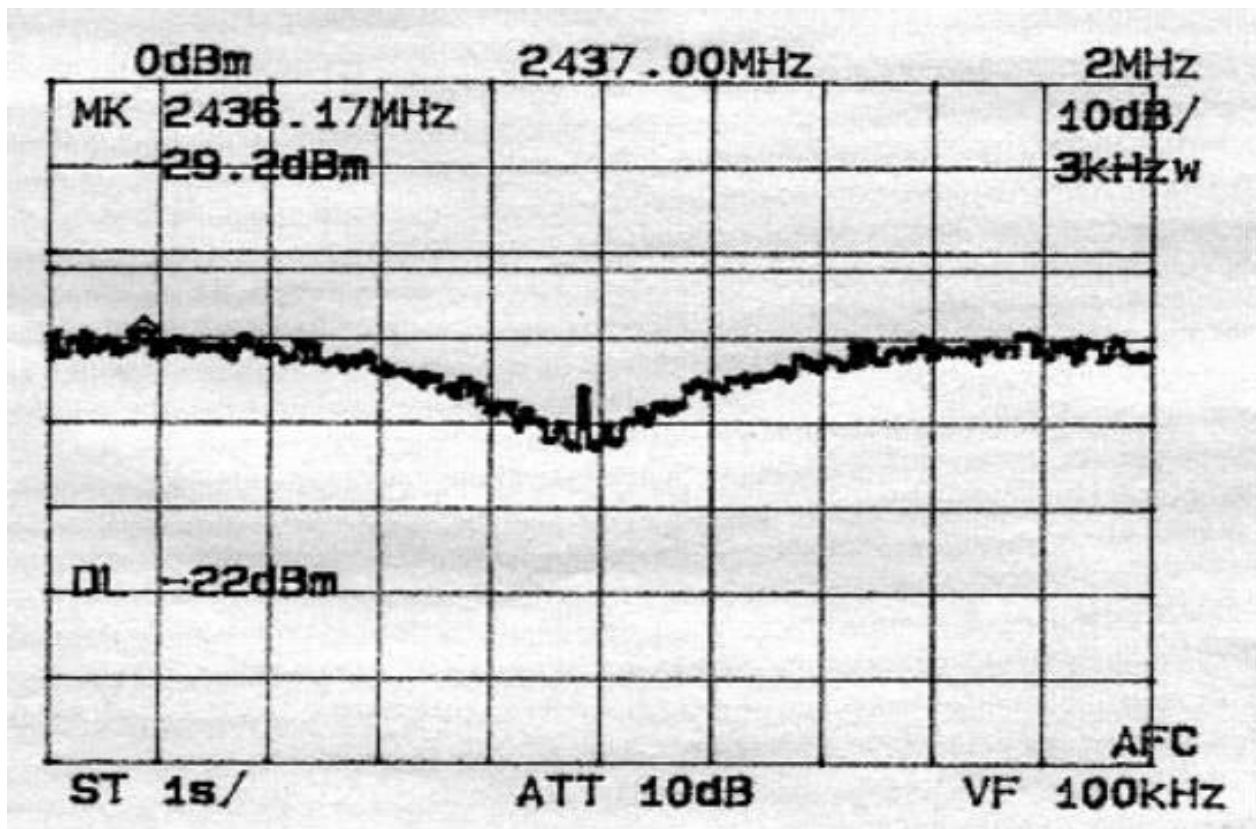
WLAN Card w/ AMP @ 2437 MHz: **0.8 dBm**

WLAN Card w/ AMP @ 2462 MHz: **0.0 dBm**

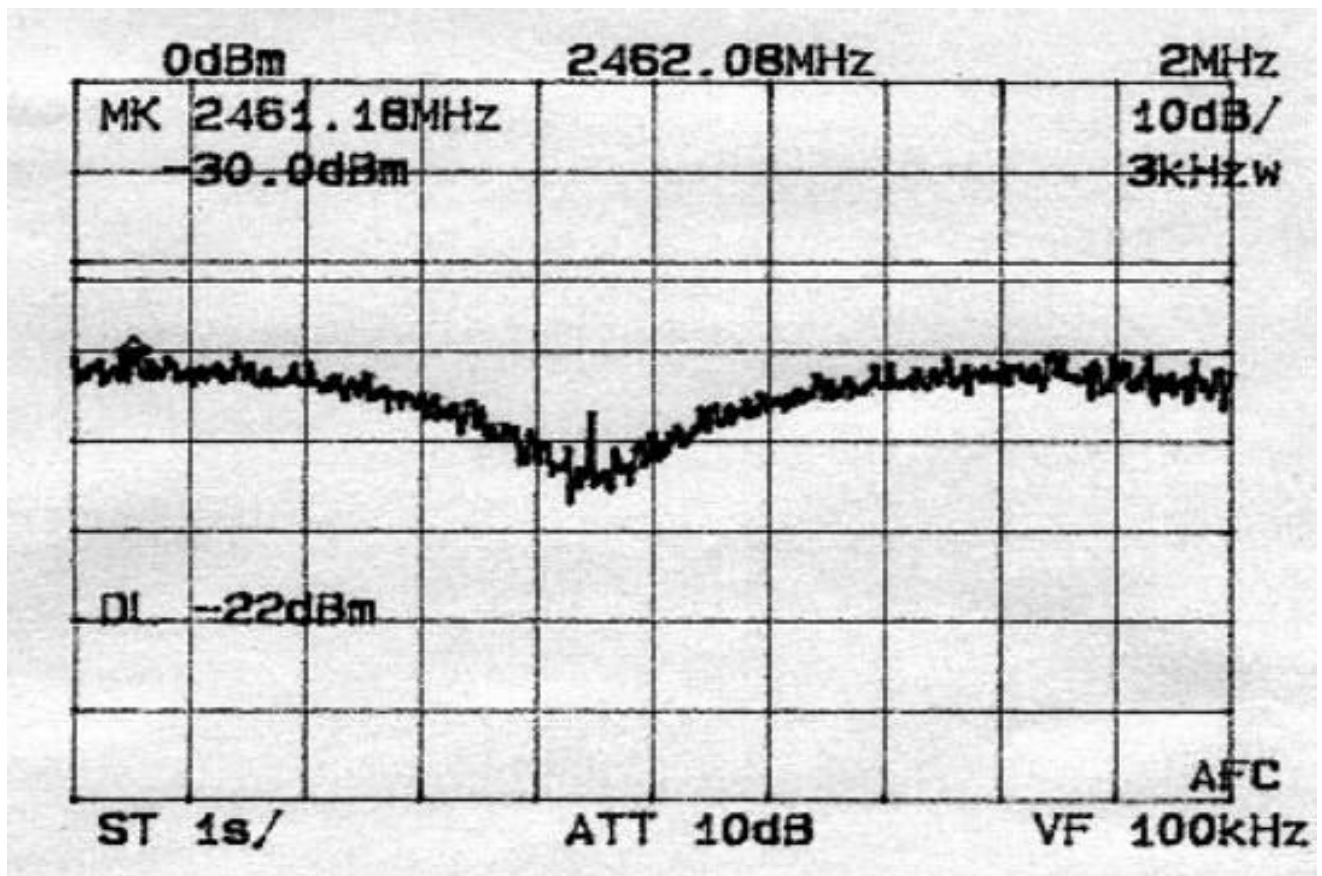
4.5.1 Power Spectral Density Low Channel Plot:



**4.5.1 Power Spectral Density Mid Channel Plot:**



4.5.3 Power Spectral Density High Channel Plot:

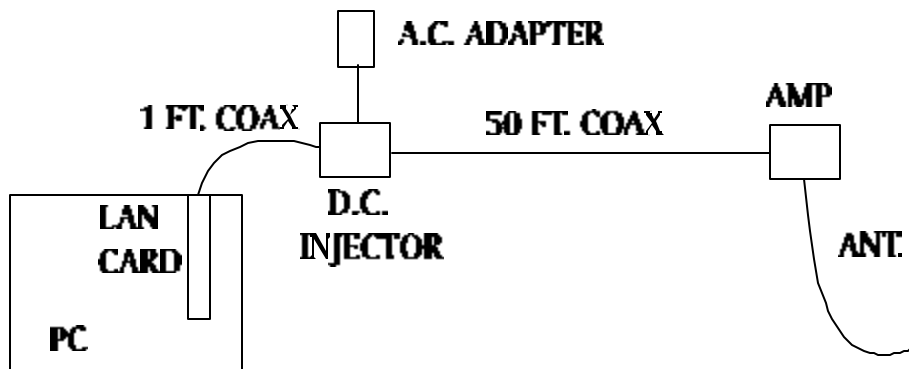




## 5.0 Test Configuration for Conducted and Radiated Emissions:

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:



## **6.0 A.C. Conducted Emissions Scheme:**

The EUT is placed on an 80 cm high 1 X 1.5 m non-conductive table. Power to the RF amplifier is provided through a Solar Corporation 50  $\Omega$  / 50 uH 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  $\Omega$  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.

**6.1 AC Conducted Emissions Data Table**

**FCC CLASS "B" CONDUCTED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE  
 W/ AMP 2440-RxF

MODE: TRANSMIT

LINE 1-Neutral: Quasi-Peak Level

FREQUENCY MHz	SPEC. Ana dBuV	Calc. Volt uV	FCC LIMIT uV	MARGIN dB	CONDITION
1.15	36.00	63.10	250.00	11.96	PASS
7.17	35.00	56.23	250.00	12.96	PASS
15.1	38.20	81.28	250.00	9.76	PASS
18.9	30.80	34.67	250.00	17.16	PASS

LINE 2-Phase: Quasi-Peak Level

FREQUENCY MHz	SPEC. Ana dBuV	Calc. Volt uV	FCC LIMIT uV	MARGIN dB	CONDITION
1.12	35.60	60.26	250.00	12.36	PASS
7.23	34.60	53.70	250.00	13.36	PASS
15.1	34.80	54.95	250.00	13.16	PASS
18.8	33.40	46.77	250.00	14.56	PASS
22.3	32.00	39.81	250.00	15.96	PASS

TEST ENGINEER:

Brian Haghtalab

## **7.0 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 the maximum emissions. The heights of the antennas are varied between 1 and 4 meters. Both the horizontal and vertical field components are measured.

The RF spectrum is searched from 30 MHz to 9.28 GHz.

The output from the antenna is connected to the input of the preamplifier. The pre-amp 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 frequency range of 1-9 GHz. A 10Hz video BW setting is used to average readings above 1 GHz when applicable. 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/m. This level is then compared to the FCC limit.

### **EXAMPLE**

<b>Spectrum Analyzer Voltage:</b>	<b>VdBmV</b>
<b>Composite Factor:</b>	<b>AF/CL dB/m</b>
<b>Electric Field:</b>	<b>E dBmV/m = V dBmV + AF/CL dB/m</b>
<b>Linear Conversion:</b>	<b>E mV/m = Antilog (E dBmV/m /20)</b>

## 7.1 12 dBi Omni Antenna, 2412 MHz, 250mW Radiated Emissions Data Table

### FCC RADIATED EMISSIONS DATA

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00		V	31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00		V	22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

Brian Hahtalab

**7.2 17 dBi Long Panel Antenna, 2412 MHz, 250mW, Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00		V	31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00		V	22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

Brian Hahtalab

**7.3 18 dBi Flat Panel Antenna, 2412 MHz, 250mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 18 dBi Flat Panel  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dBuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	25.00	40.00	25.00	0.00	40.00	54.00	14.00	PASS
14,472.00	H		19.00	43.00	25.00	0.00	37.00	54.00	17.00	PASS
19,296.00	H		20.00	36.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.4 24 dBi Grid Dish Antenna, 2412 MHz, 250mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		33.00	35.00	25.00	0.00	43.00	54.00	11.00	PASS
12,060.00		V	27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**



**7.5 12 dBi Wide Angle Antenna, 2412 MHz, 250mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Wide Angle  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Haachtalab**

**7.6 12 dBi A24SP12A Antenna, 2412 MHz, 250mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Wide Angle  
 FREQ.: 2412 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.7 12 dBi Omni Antenna, 2437 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,311.00	H		29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,496.00		V	20.00	36.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.8 17 dBi Long Panel Antenna, 2437 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 17 dBi Long Panel  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,311.00		V	30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,185.00		V	25.00	40.00	25.00	0.00	40.00	54.00	14.00	PASS
19,496.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.9 24 dBi Grid Dish Antenna, 2437 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
7,311.00	H		31.00	37.00	25.00	0.00	43.00	54.00	11.00	PASS
12,185.00		V	27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
19,496.00	H		20.00	36.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.10 18 dBi Flat Panel Antenna, 2437 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 18 dB Flat Panel  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,311.00	H		30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,185.00		V	29.00	40.00	25.00	0.00	44.00	54.00	10.00	PASS
19,496.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.11 12 dBi Wide Angle Antenna, 2437 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dB Wide Angle  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,311.00	H		31.00	37.00	25.00	0.00	43.00	54.00	11.00	PASS
12,185.00		V	27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
19,496.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.12 12 dBi A24SP12A Flat Panel Antenna, 2437 MHz, 250 mW Radiated Emissions  
 Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi A2.4SP12A Flat Panel  
 FREQ.: 2437 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dBuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
7,311.00		V	29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,496.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Haachtalab**



**7.13 12 dBi Omni Antenna, 2462 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	29.00	35.00	25.00	0.00	39.00	54.00	15.00	PASS
7,386.00		V	30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,310.00	H		27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
19,696.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS
22,158.00		V	18.00	37.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.14 17 dBi Long Panel Antenna, 2462 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 17 dBi Long Panel  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
7,386.00	H		30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,310.00	H		28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
19,696.00		V	20.00	36.00	25.00	0.00	31.00	54.00	23.00	PASS
22,158.00		V	19.00	37.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.15 24 dBi Grid Dish Antenna, 2462 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,386.00	H		31.00	37.00	25.00	0.00	43.00	54.00	11.00	PASS
12,310.00	H		26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,696.00		V	19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS
22,158.00		V	19.00	37.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.16 18 dBi Flat Panel Antenna, 2462 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 18 dBi Flat Panel  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,386.00		V	29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,310.00		V	28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
19,696.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00	H		22.00	37.00	25.00	0.00	34.00	54.00	20.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.17 12 dBi Wide Angle Antenna, 2462 MHz, 250 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi Wide Angle  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
7,386.00	H		30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,310.00		V	29.00	40.00	25.00	0.00	44.00	54.00	10.00	PASS
19,696.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS
22,158.00		V	19.00	37.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.18 12 dBi A24SP12A Flat Panel Antenna, 2462 MHz, 250 mW Radiated Emissions  
 Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 12 dBi A2.4SP12A Flat Panel  
 FREQ.: 2462 MHZ  
 POWER: 250 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,386.00	H		27.00	37.00	25.00	0.00	39.00	54.00	15.00	PASS
12,310.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,696.00	H		20.00	36.00	25.00	0.00	31.00	54.00	23.00	PASS
22,158.00	H		18.00	37.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.19 12 dBi Omni Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**7.20 17 dBi Long Panel Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 17 dBi Long  
 FREQ.: 2412  
 POWER: 22 mW

3 METER TEST Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00		V	28.00	35.00	25.00	0.00	38.00	54.00	16.00	PASS
12,060.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00		V	18.00	36.00	25.00	0.00	29.00	54.00	25.00	PASS

TEST ENGINEER:

**Brian Haghtalab**



**7.21 24 dBi Grid Dish Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2412 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
12,060.00		V	29.00	40.00	25.00	0.00	44.00	54.00	10.00	PASS
14,472.00	H		22.00	43.00	25.00	0.00	40.00	54.00	14.00	PASS
19,296.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.22 18 dBi Flat Panel Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 18 dBi Flat Panel  
 FREQ.: 2412 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
12,060.00		V	23.00	40.00	25.00	0.00	38.00	54.00	16.00	PASS
14,472.00	H		20.00	43.00	25.00	0.00	38.00	54.00	16.00	PASS
19,296.00	H		22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.23 18 dBi Wide Angle Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi Wide Angle  
 FREQ.: 2412 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
12,060.00		V	27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
14,472.00	H		22.00	43.00	25.00	0.00	40.00	54.00	14.00	PASS
19,296.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.24 12 dBi A24SP12A Flat Panel Antenna, 2412 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi A2.4SP12A Flat Panel  
 FREQ.: 2412 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,824.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
12,060.00		V	27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
14,472.00	H		22.00	43.00	25.00	0.00	40.00	54.00	14.00	PASS
19,296.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.25 12 dBi Omni Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,311.00	H		29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
19,496.00		V	22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.26 17 dBi Long Panel Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 17 dBi Long Panel  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,311.00		V	32.00	37.00	25.00	0.00	44.00	54.00	10.00	PASS
12,185.00		V	23.00	40.00	25.00	0.00	38.00	54.00	16.00	PASS
19,496.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.27 24 dBi Grid Dish Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,311.00	H		29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,496.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.28 18 dBi Flat Panel Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 18 dB Flat Panel  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,311.00	H		29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	25.00	40.00	25.00	0.00	40.00	54.00	14.00	PASS
19,496.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**



**7.29 12 dBi Wide Angle Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dB Wide Angle  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		33.00	35.00	25.00	0.00	43.00	54.00	11.00	PASS
7,311.00	H		30.00	37.00	25.00	0.00	42.00	54.00	12.00	PASS
12,185.00		V	26.00	40.00	25.00	0.00	41.00	54.00	13.00	PASS
19,496.00	H		22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.30 12 dBi A24SP12A Flat Panel Antenna, 2437 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi A2.4SP12A Flat Panel  
 FREQ.: 2437 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,874.00	H		30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,311.00		V	29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,185.00		V	28.00	40.00	25.00	0.00	43.00	54.00	11.00	PASS
19,496.00	H		22.00	36.00	25.00	0.00	33.00	54.00	21.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.31 12 dBi Omni Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCOENT AGERE WLAN  
 ANTENNA: 12 dBi Omni  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	31.00	35.00	25.00	0.00	41.00	54.00	13.00	PASS
7,386.00		V	27.00	37.00	25.00	0.00	39.00	54.00	15.00	PASS
12,310.00	H		23.00	40.00	25.00	0.00	38.00	54.00	16.00	PASS
19,696.00	H		19.00	36.00	25.00	0.00	30.00	54.00	24.00	PASS
22,158.00		V	20.00	37.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.32 17 dBi Long Panel Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 17 dBi Long Panel  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	29.00	35.00	25.00	0.00	39.00	54.00	15.00	PASS
7,386.00	H		29.00	37.00	25.00	0.00	41.00	54.00	13.00	PASS
12,310.00	H		27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
19,696.00		V	21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00		V	19.00	37.00	25.00	0.00	31.00	54.00	23.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.33 24 dBi Grid Dish Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 24 dBi Grid Dish  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,386.00	H		33.00	37.00	25.00	0.00	45.00	54.00	9.00	PASS
12,310.00	H		27.00	40.00	25.00	0.00	42.00	54.00	12.00	PASS
19,696.00		V	21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00		V	20.00	37.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.34 18 dBi Flat Panel Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 18 dBi Flat Panel  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	30.00	35.00	25.00	0.00	40.00	54.00	14.00	PASS
7,386.00		V	33.00	37.00	25.00	0.00	45.00	54.00	9.00	PASS
12,310.00		V	25.00	40.00	25.00	0.00	40.00	54.00	14.00	PASS
19,696.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00	H		20.00	37.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.35 12 dBi Wide Angle Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi Wide Angle  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00		V	32.00	35.00	25.00	0.00	42.00	54.00	12.00	PASS
7,386.00	H		28.00	37.00	25.00	0.00	40.00	54.00	14.00	PASS
12,310.00		V	25.00	40.00	25.00	0.00	40.00	54.00	14.00	PASS
19,696.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00		V	20.00	37.00	25.00	0.00	32.00	54.00	22.00	PASS

TEST ENGINEER:

**Brian Hahtalab**

**7.36 12 dBi A24SP12A Flat Panel Antenna, 2462 MHz, 22 mW Radiated Emissions Data Table**

**FCC RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE WLAN  
 ANTENNA: 12 dBi A2.4SP12A Flat Panel  
 FREQ.: 2462 MHZ  
 POWER: 22 mW

3 METER TEST      Detector - PEAK

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	Peak E-Field dbuV/m	Avrg. Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
4,924.00	H		33.00	35.00	25.00	0.00	43.00	54.00	11.00	PASS
7,386.00	H		28.00	37.00	25.00	0.00	40.00	54.00	14.00	PASS
12,310.00		V	24.00	40.00	25.00	0.00	39.00	54.00	15.00	PASS
19,696.00	H		21.00	36.00	25.00	0.00	32.00	54.00	22.00	PASS
22,158.00	H		18.00	37.00	25.00	0.00	30.00	54.00	24.00	PASS

TEST ENGINEER:

**Brian Haachtalab**



**7.37 24 dBi Grid Dish Antenna, 2483 MHz, 250 mW Bandedge Radiated Emissions Data Table**

**FCC BANDEDGE - RADIATED EMISSIONS DATA**

**CLIENT:** YOUNG DESIGN  
**EUT:** LUCENT AGERE W/ AMP 2440  
**ANTENNA:** 24 dBi GRID DISH  
**FREQ.:** 2483.5 MHZ  
**POWER:** 250 mW

**3 METER TEST PEAK DETECT DATE: 06/30/2001**

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	PEAK E-Field dbuV/m	PEAK Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
2,483.50	H		19.00	34.00	25.00	0.00	28.00	74.00	46.00	PASS
2,483.50		V	18.00	34.00	25.00	0.00	27.00	74.00	47.00	PASS

**TEST ENGINEER:**

Brian Haghtalab

**3 METER TEST AVERAGE DETECT DATE: 06/30/2001**

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	AVRG E-Field dbuV/m	AVRG Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
2,483.50	H		16.00	34.00	25.00	0.00	25.00	54.00	29.00	PASS
2,483.50		V	16.00	34.00	25.00	0.00	25.00	54.00	29.00	PASS

**7.38 24 dBi Grid Dish Antenna, 2390 MHz, 250 mW Bandedge Radiated Emissions Data Table**

**FCC BANDEDGE - RADIATED EMISSIONS DATA**

CLIENT: YOUNG DESIGN  
 EUT: LUCENT AGERE W/ AMP 2440  
 ANTENNA: 24 dBi GRID DISH  
 FREQ.: 2390 MHz  
 POWER: 250 mW

3 METER TEST PEAK DETECT DATE: 06/30/2001

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	PEAK E-Field dbuV/m	PEAK Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
2,390.00	H		19.00	34.00	25.00	0.00	28.00	74.00	46.00	PASS
2,390.00		V	18.00	34.00	25.00	0.00	27.00	74.00	47.00	PASS

TEST ENGINEER:

Brian Haghtalab

3 METER TEST AVERAGE DETECT DATE: 06/30/2001

FREQUENCY MHz	POLARITY		SPEC A dBuV	AF/CL dB/m	AMP Gain dB	Average Factor dB	AVRG E-Field dbuV/m	AVRG Limit dBuV/m	MARGIN dB	CONDITION
	H	V								
2,390.00	H		17.00	34.00	25.00	0.00	26.00	54.00	28.00	PASS
2,390.00		V	16.00	34.00	25.00	0.00	25.00	54.00	29.00	PASS

## **8.0 RF Exposure Statement:**

### **Notice in Installation Manual:**

## **FCC Radiation Exposure Statement**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment when installed as directed. This equipment should be installed and operated with fix-mounted antennas that are installed with a minimum of 2 meters of separation distance between the antenna and all persons' body during normal operation.

### **RF Exposure Calculations:**

The following information provides the **minimum** separation distance for the highest gain antenna provided with the **Lucent Agere WaveLAN Card with Model AMP2440-RxF Amplifier**, as calculated from **FCC OET 65 Appendix B, Table 1B** Guidelines for General Population/Uncontrolled Exposure. This calculation is based on the highest EIRP possible from the system, considering maximum power and antenna gain, and considering a 1.0 mW/cm<sup>2</sup> uncontrolled exposure limit. The Friss formula used was:

$$S = (P_o * G) / (4 * \pi * r^2) \quad \text{or} \quad r = \sqrt{(P_o * G) / (4 * \pi * S)}$$

**Where S = 1.0 mW/cm<sup>2</sup> for 2400 MHz**

**Where P<sub>o</sub> = 250 mW (Peak RF)**

**Where G = Isotropic antenna gain (numeric)**

**Where r = Minimum Safe Distance from antenna (cm)**

**For: 24 dBi Grid Dish Antenna - Lucent or YDI models ..... r = 71 cm**

**TABLE 1 – EUT ACCESSORIES**

**FCC ID#: NM5-A2400S**

FCC certified systems consist of:

- A2440-xxF amplifier, DC Injector and 12 VDC Power supply
- Lucent Agere WLAN card with the FCC ID#: IMRWLPCE24H
- Outdoor Antenna (Table A)
- Coax Cable (Table B)

**Table 1A**

**Authorized Antennas**

<b>Make/Model</b>	<b>Antenna Type</b>	<b>Antenna Gain (dBi)</b>	<b>EIRP (dBm)</b>
Lucent AOU24-DI-24	Grid Dish	24	48
YDI PT2424	Grid Dish	24	48
YDI PT2421	Grid Dish	21	45
YDI A2.45FP18	Flat Panel	18	42
YDI A2.45FP15	Flat Panel	15	39
YDI A2.45FP12	Flat Panel	12	36
YDI A2.45LP17	Long Panel	17	41
YDI A2.45LP14	Long Panel	14	38
YDI A2412	Omni	12	36
Lucent AOU24-OD-10	Omni	10	34
YDI A2410	Omni	10	34
YDI A2408	Omni	9	33
Lucent LXE 155845	Omni	6	30
Lucent AOU-WA-12-B	Wide Angle	12	24
Lucent AOU-WA-12-A	Wide Angle	12	24
YDI FP12A	Amplified Flat Panel	12	36
YDI FP18A	Amplified Flat Panel	18	42

### Notes:

1. MPE distance figures are based on a conservative “worse case” prediction, i.e. +24 dBm into antenna and using formula  $S=EIRP/(4\pi R^2)$  and no calculation for duty factor. In practice the minimum distance will be much shorter. (Ref. 2)
2. The minimum MPE distance has been calculated for the maximum allowed Power Density (S) limit of 1.0 mW/cm<sup>2</sup> in the Frequency range 1500-100,000 MHz for uncontrolled environments (Ref. 2).

### Reference:

1. FCC Part 15, sub-clause 15.247 (b) (4)
2. FCC OET Bulletin 65, Edition 97-01
3. FCC Supplement C to OET Bulletin 65, edition 97-01

**CAUTION:** If the power output of the amplifier exceeds +24 dBm or antennas in excess of 24 dBi gain are used, then the Effective Radiated Power limits specified in FCC rules 15.247(b)(3)(i) could be exceeded.

**Table 1B**  
**Authorized Cables with Minimum Lengths**

Cable Type	Minimum Length/Loss	Max Recommended Lengths
RG58/U LMR195	19 Feet/ 3.4 dB	40 Feet
LMR200	20 Feet/ 3.4 dB	50 Feet
LMR240	25 Feet/ 3.3 dB	65 Feet
LMR400	50 Feet/ 3.4 dB	110 Feet
LMR 500	60 Feet/ 3.5 dB	150 Feet
LMR 600	80 Feet/ 3.5 dB	180 Feet
LMR 900	120 Feet/ 3.5 dB	260 Feet
LMR1200	150 Feet/ 3.4 dB	350 Feet
LMR1700	200 Feet/ 3.4 dB	480 Feet

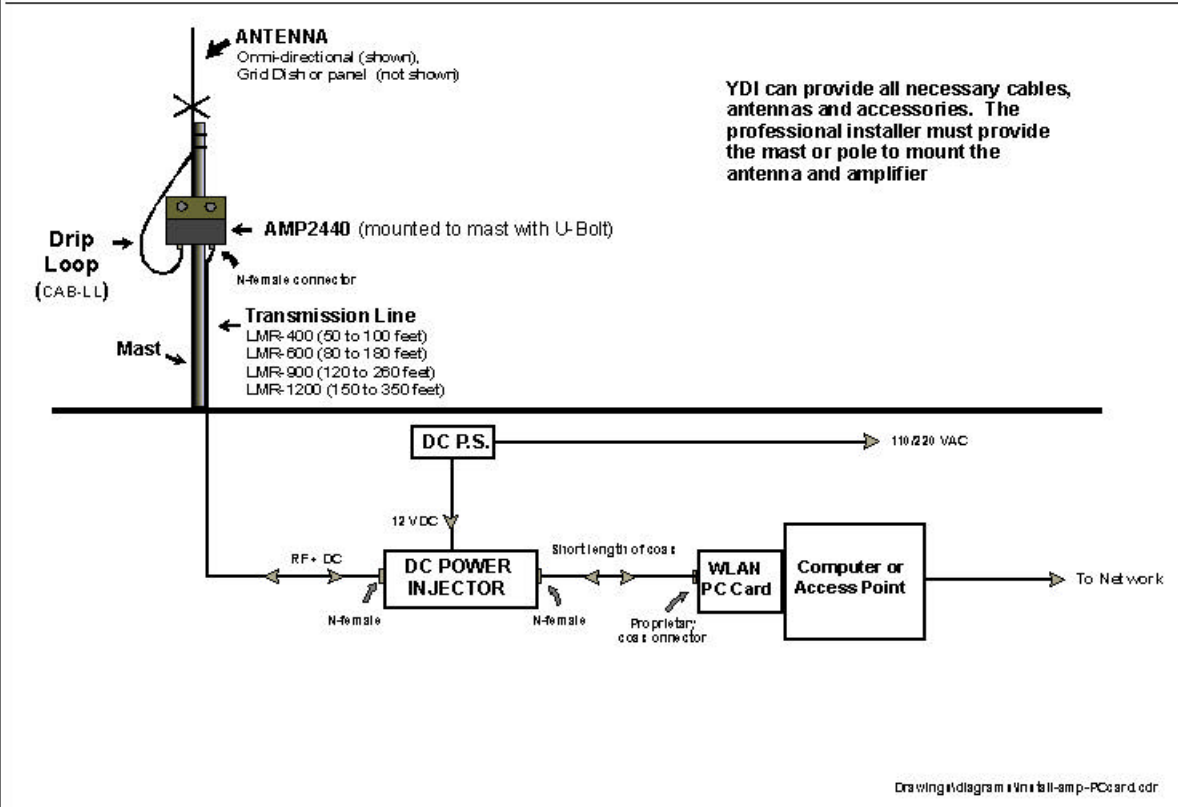
**NOTE:** This table is for reference only. In order to comply with FCC Part 15 Certification, the installer must insure that actual coax cable used between the DC injector and the amplifier has at least 3.3 dB of insertion loss.

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**TABLE 2  
 SUPPORT EQUIPMENT**

MANUFACTURER	FCC ID #	SERIAL #
Host PC: Panasonic Model CF35 Pen. Laptop		

**TYPICAL AMPLIFIER INSTALLATION DETAILS**



**TABLE 3  
 MEASUREMENT EQUIPMENT USED**

The following equipment is used to perform measurements:

EQUIPMENT	SERIAL #
HP 434A RF Peak Power Meter	1362016
EMCO Model 3110 Biconical Antenna	1619
Antenna Research MWH-1825B Horn Antenna	1005
EMCO Model 3115 Ridged Horn Antenna	3007
HP 8348A Pre-Amplifier	197-2564A
Solar 8012-50-R-24-BNC LISN	924867
Bird 8306-300-N-30dB Attenuator	29198391515
HP 14IT w/8555A Spectrum Analyzer	6-95-1124
Advanet Model R41131D Spectrum Analyzer	54378A
4 Meter Antenna Mast	
Motorized Turntable	
Heliac FSJ1-50A ¼" Superflex Coax Cable	



**EXHIBIT 1.1**  
**AC CONDUCTED EMISSIONS PHOTOGRAPHS**



**EXHIBIT 1.1**  
**AC CONDUCTED EMISSIONS PHOTOGRAPHS**



**EXHIBIT 1.2**  
**RADIATED EMISSIONS PHOTOGRAPHS**



**EXHIBIT 2**  
**SCHEMATICS**

**EXHIBIT 3**  
**USER'S MANUAL**