FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

FOR

MOBILE INTERNET LOCATION MGR

MODEL NUMBER: iWM3140

FCC ID: PDC-FWM314XSM

REPORT NUMBER: 05U3362-1B

ISSUE DATE: JUNE 10, 2005

Prepared for
AT ROAD, INC.
47071 BAYSIDE PKWY
FREMONT, CA 94538, USA

Prepared by
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Revision History

Rev.	Revisions	Revised By
B	Removed Co-Located Spurious Emissions Section	Thu
	Added Co-Located Maximum Permissible Exposure	Thu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: AT ROAD, INC.
47071 BAYSIDE PKWY
FREMONT, CA. 94538, USA

EUT DESCRIPTION: Mobile Internet Location MGR

MODEL: iWM3140

SERIAL NUMBER: 0503310396

DATE TESTED: May 15 - 16, 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:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
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 iWM3140 Internet Location Manager combines GPS with an EVDO wireless data modem to provide Mobile Resource Management information. The iWM3140 uses CDMA 1xEV-DO Wireless Module that supports 3G Digital Cellular Standard and CDMA 1xRTT as well. iWM3140 also provides 802.11b connectivity between the field tech vehicle and any other 802.11b/g enabled peripheral (2.4GHz Direct Spread Spectrum 802.11b Access Point mode interoperable with WiFi/WECA clients).

The Cellular / PCS radio module is manufactured by Sierra Wireless EM5625 and WLAN radio module is manufactured by Z-Com Inc.

5.2. ADDITIONAL TESTING

The EUT WLAN module has already been tested & reported according to FCC procedures and methods, so only additional tests were conducted as follows:

1. RF conducted output power, power spectral density, 99% bandwidth and MPE calculation: all re-measured and verified.

2. Radiated emissions: all radiated emissions tests were performed and documented under this report because a higher gain of antenna is used.

5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum conducted output power as follows. Note that peak power is specified for 6.2.2(o):

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	18.15	65.31

Note: We tested and verified that the EUT WLAN Module has the same output power as reported under Z-Com FCC report No.: RF900628R02, which used old method with RBW=VBW=3MHz, and we set it to the new method with channel integration output power measurement as indicated in this report.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a dipole antenna with a maximum gain of 1.7 dBi.

5.5. SOFTWARE AND FIRMWARE

The EUT is running with Hyper Terminal program from the host support equipment.

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 2462 MHz.

The worst-case data rate for this channel is determined to be 11 Mb/s, based on previous experience with 802.11b WLAN product design architectures.

Thus all emissions tests were made in the 802.11b mode, 2462 MHz, 11 Mb/s.

5.7. MODIFICATIONS

Adding a round cable snap-its ferrite (Manufacturer: Fair-Rite Products Corp., Part #: 0444173551) to the DC power wires with two turns.

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
LAPTOP	HP	ZE44200	CN25110353	DOC
AC/DC ADAPTER	HP	PA2450U	N/A	N/A
DC POWER SUPPLY	KRM	AEEC-350	N/A	N/A

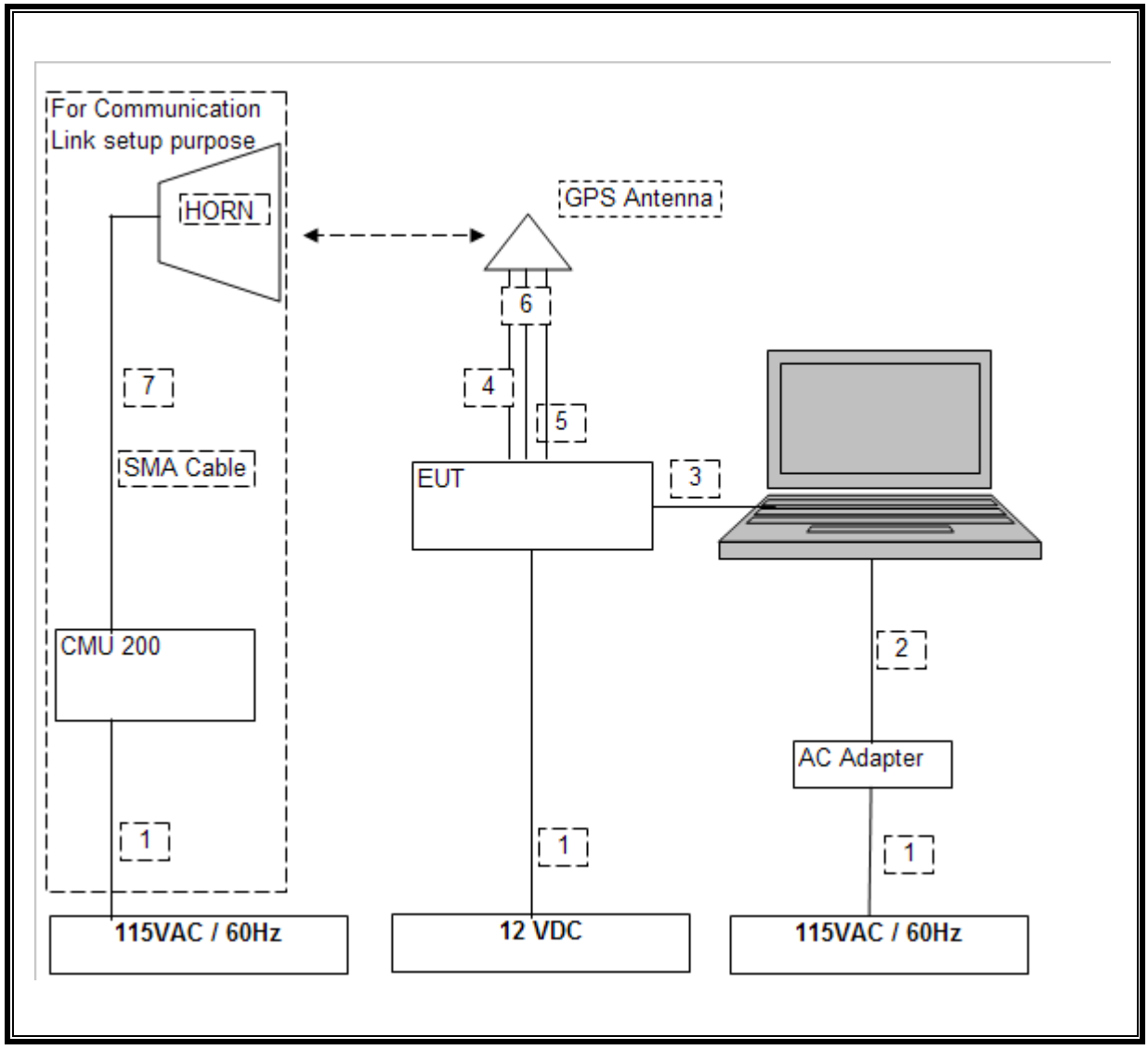
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	3	US 115V	Un-shielded	1.5m	No
2	DC	1	DC	Un-shielded	1.5m	No
3	Serial	1	DB9	Shielded	1m	Yes
4	GPS	1	SMA	Shielded	5m	Yes
5	WLAN	1	SMA	Shielded	5m	Yes
6	GPS	1	TNC	Shielded	5m	Yes
7	SMA	1	SMA	Shielded	.5m	No

TEST SETUP

The EUT is a stand-alone unit. Test software from the laptop exercises the EUT via serial cable.

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**
Communication Tester	R & S	CMU 200	838114/032	12/01/2005
Peak Power Meter	Agilent	E4416A	GB41291160	02/09/2006
Peak / Average Power Sensor	Agilent	E9327A	US40440755	02/10/2006
Spectrum Analyzer	Agilent	E4446A	MY43360112	01/13/2006
Antenna, Log Periodic 200 ~ 1000 MHz	EMCO	3146	9107-3163	03/08/2006
Antenna, Biconical	Eaton	94455-1	1214	03/08/2006
SA Display Section 2	HP	85662A	2816A16696	05/24/2006
Quasi-Peak Adaptor	HP	85650A	2811A01155	05/24/2006
SA RF Section, 1.5 GHz	HP	85680B	2814A04227	2/22/06

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

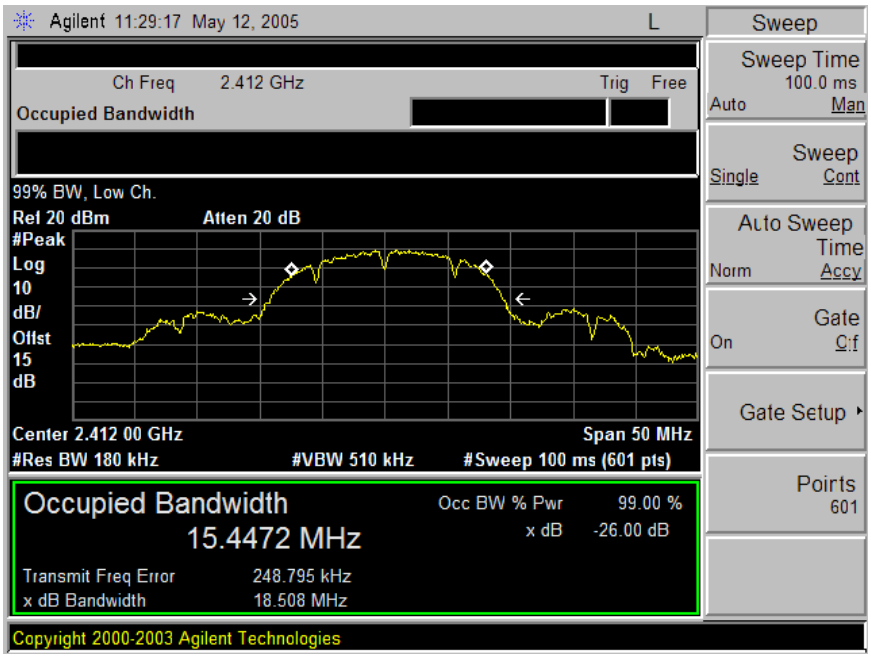
RESULTS

No non-compliance noted:

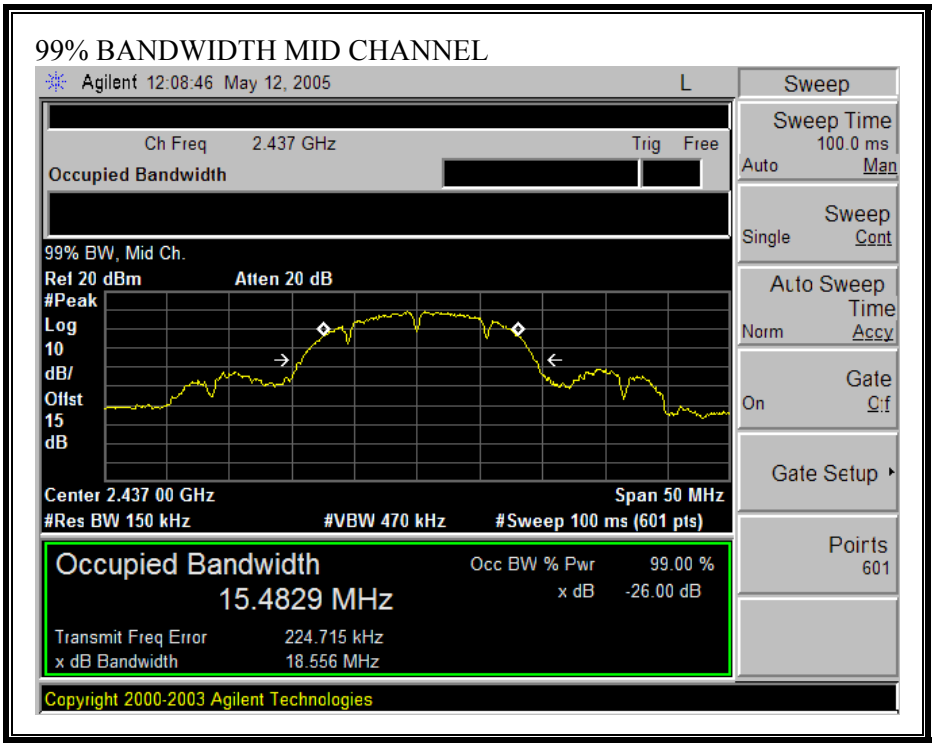
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	15.4472
Middle	2441	15.4829
High	2480	15.4737

99% BANDWIDTH

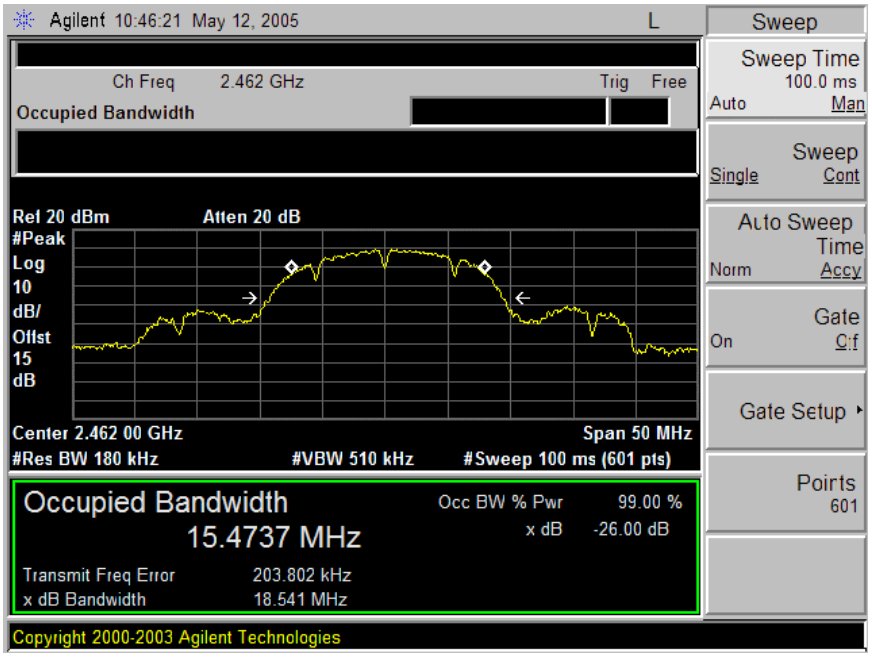
99% BANDWIDTH LOW CHANNEL



99% BANDWIDTH MID CHANNEL



99% BANDWIDTH HIGH CHANNEL



7.1.2. 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) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz , and 5725-5850 MHz bands: 1 watt.

§15.247 (b) (4) Except as shown in paragraphs (b)(4) (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.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer and the analyzer's internal channel power integration function is used to integrate the power over a bandwidth greater than or equal to the 99% bandwidth.

RESULTS

RESULTS

The maximum dipole antenna gain is 1.7 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

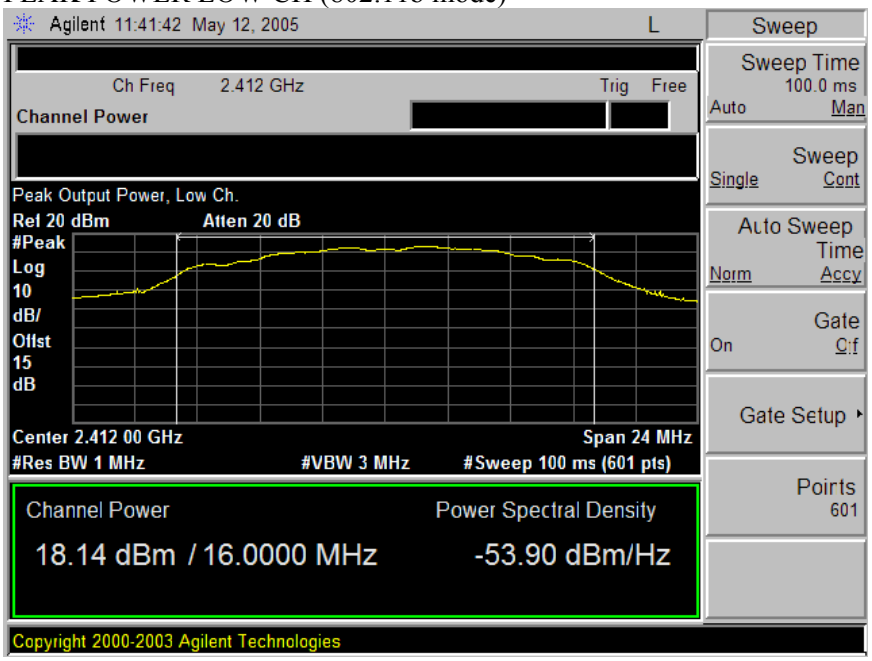
No non-compliance noted:

802.11b Mode

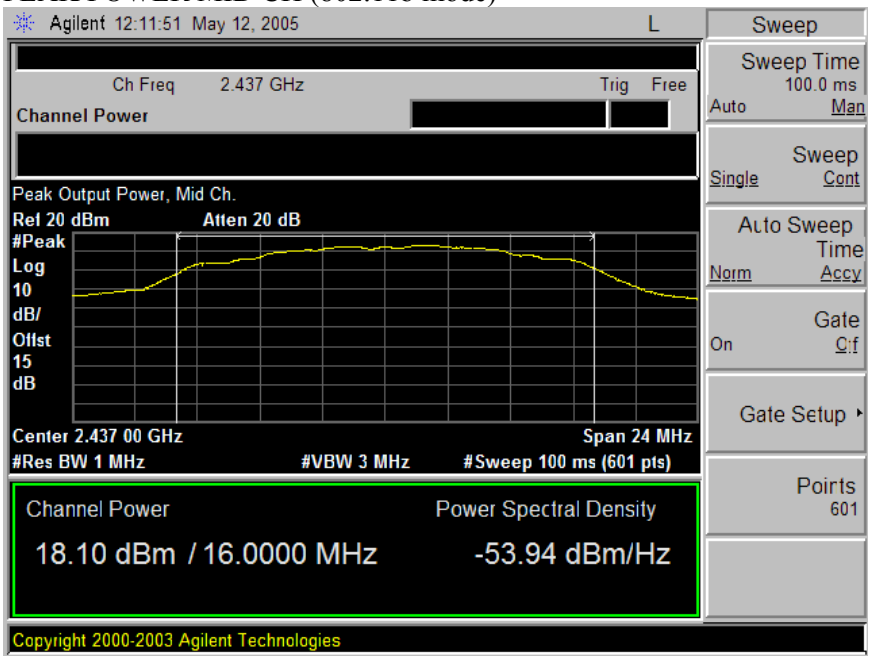
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.14	30	-11.86
Middle	2437	18.10	30	-11.90
High	2462	18.15	30	-11.85

OUTPUT POWER (802.11b MODE)

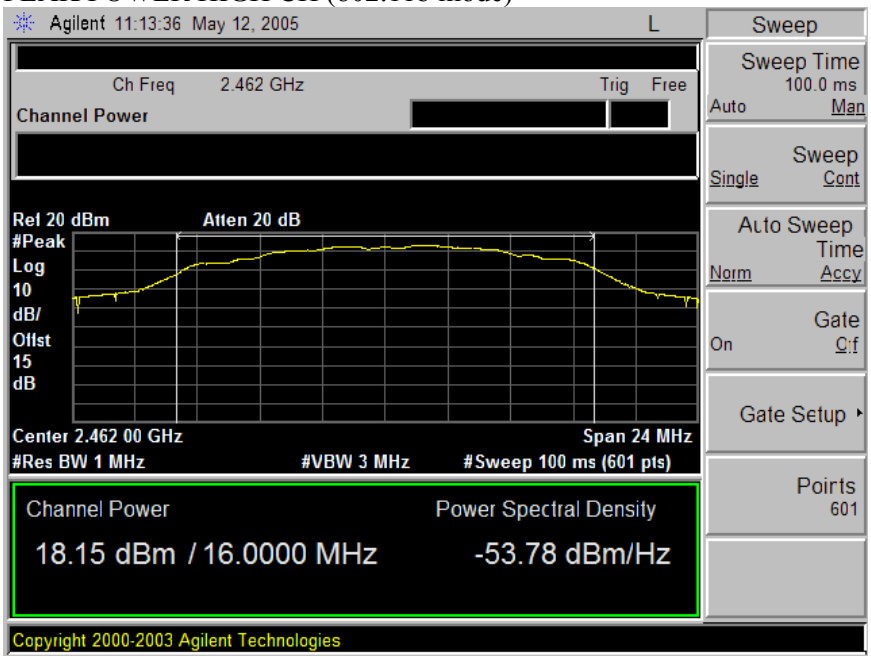
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)



PEAK POWER HIGH CH (802.11b mode)



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 (mW) = P (W) / 1000 and
d (cm) =100 * d (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/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

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

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

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

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	18.15	1.70	2.77

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.

7.1.4. CO-LOCATED 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

$S = E \wedge 2 / 3770$

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 (mW) = P (W) / 1000 and
d (cm) =100 * d (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/cm^2

For multiple colocated transmitters operating simultaneously the total power density can be calculated by summing the Power * Gain product of each transmitter.

yields

$d = 0.282 * \sqrt{((P1 * G1) + (P2 * G2) + ... + (Pn * Pn)) / S)}$ Equation (1)

where

d = distance in cm
Px = Power of transmitter x in mW
Gx = Numeric gain of antenna x
S = Power Density in mW/cm^2

In the table below, Power and Gain are entered in units of dBm and dBi respectively, then these are converted to their linear forms prior to the summation function.

The conversions from the logarithmic form of power and gain are made using:

P (mW) = 10 ^ (P (dBm) / 10) and Equation (2)

G (numeric) = 10 ^ (G (dBi) / 10) Equation (3)

Equations (1), (2) and (3) and the measured peak powers are used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

No non-compliance noted:

CELLULAR & WLAN

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
FCC 22		28.99	-0.25	
802.11b		18.15	1.70	
Combined	2.75			4.94

PCS & WLAN

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
FCC 24		28.60	1.70	
802.11b		18.15	1.70	
Combined	5.0			4.31

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.

7.1.5. 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 15 dB (including 10 dB pad and 5 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	13.27
Middle	2437	13.85
High	2462	13.22

7.2. RADIATED EMISSIONS FOR THE 2400 TO 2483.5 MHz BAND

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.

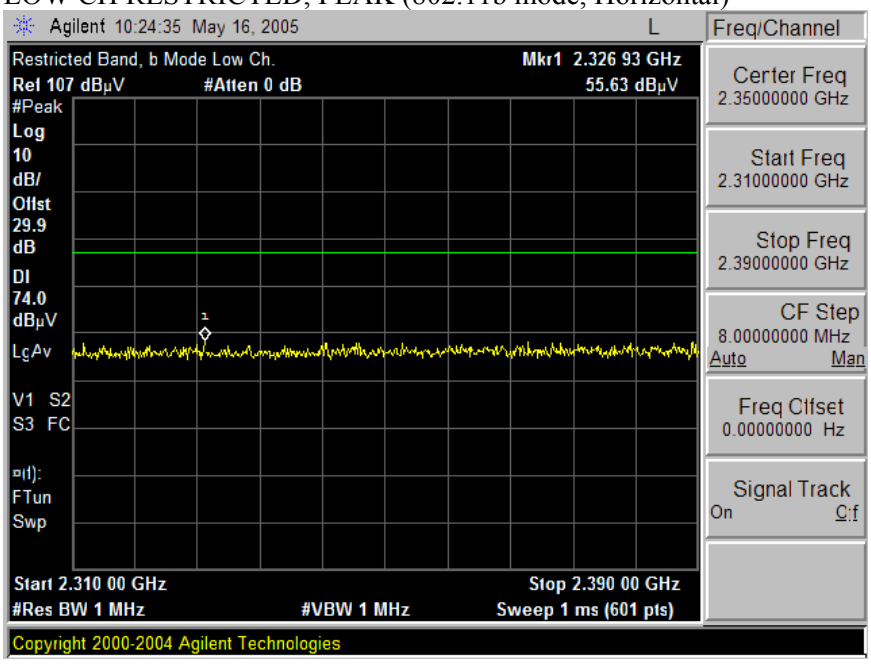
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

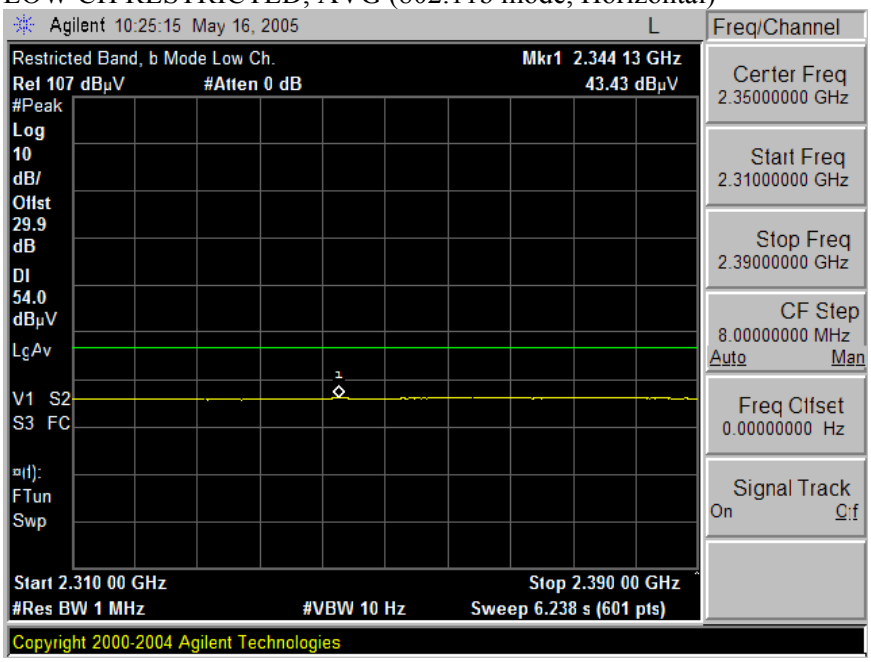
7.2.2. TRANSMITTER ABOVE 1 GHz

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Horizontal)

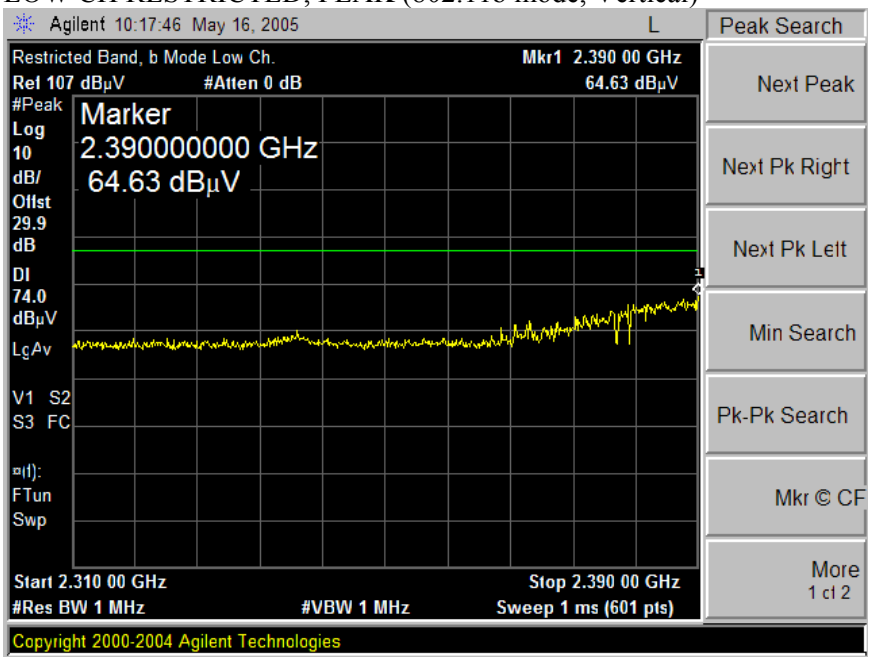


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

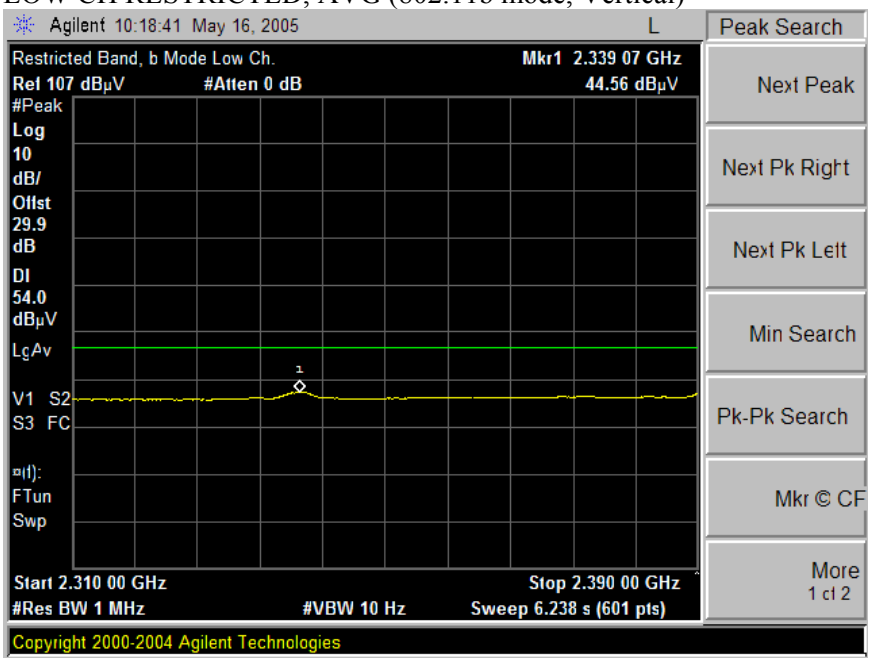


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Vertical)

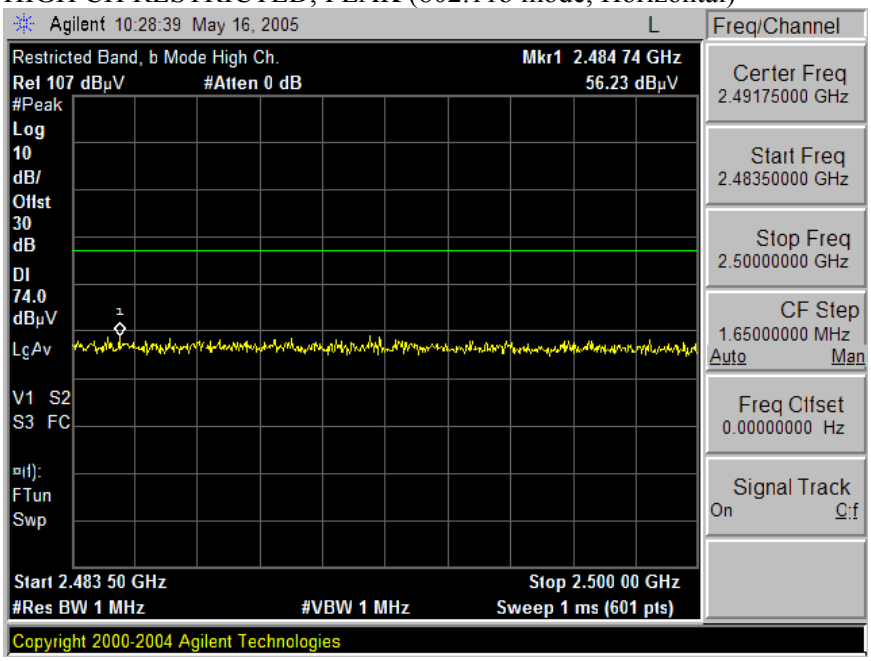


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

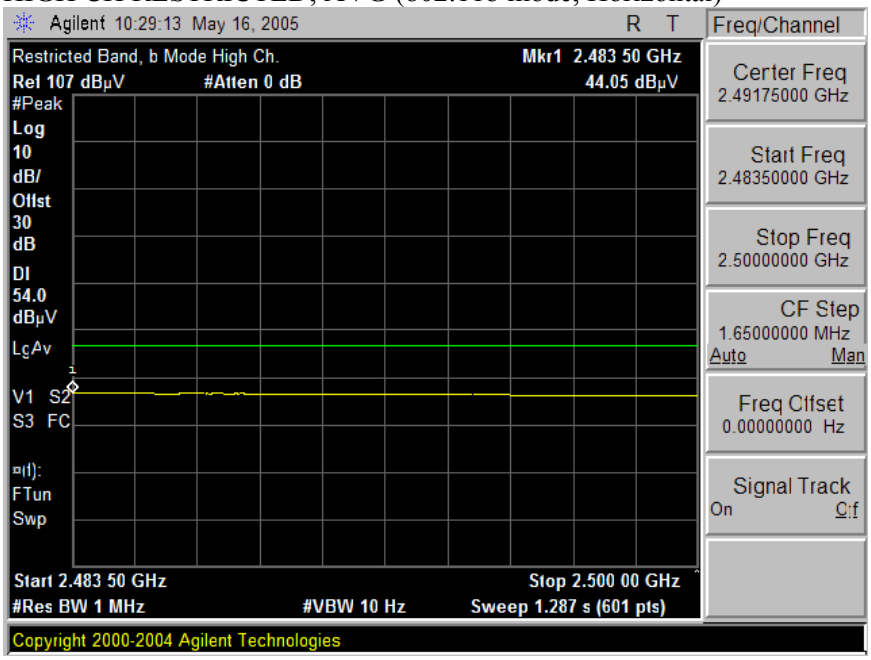


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Horizontal)

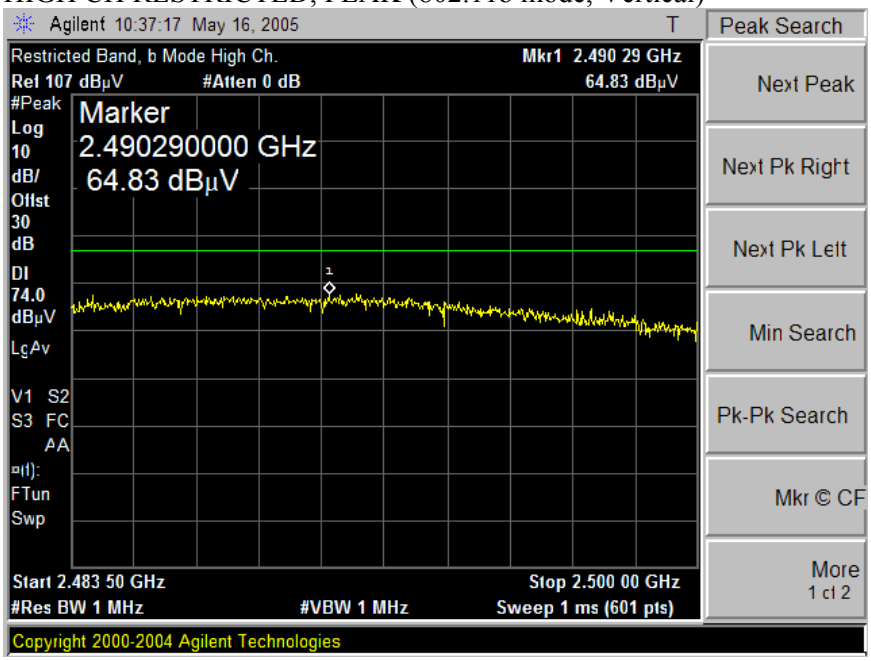


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

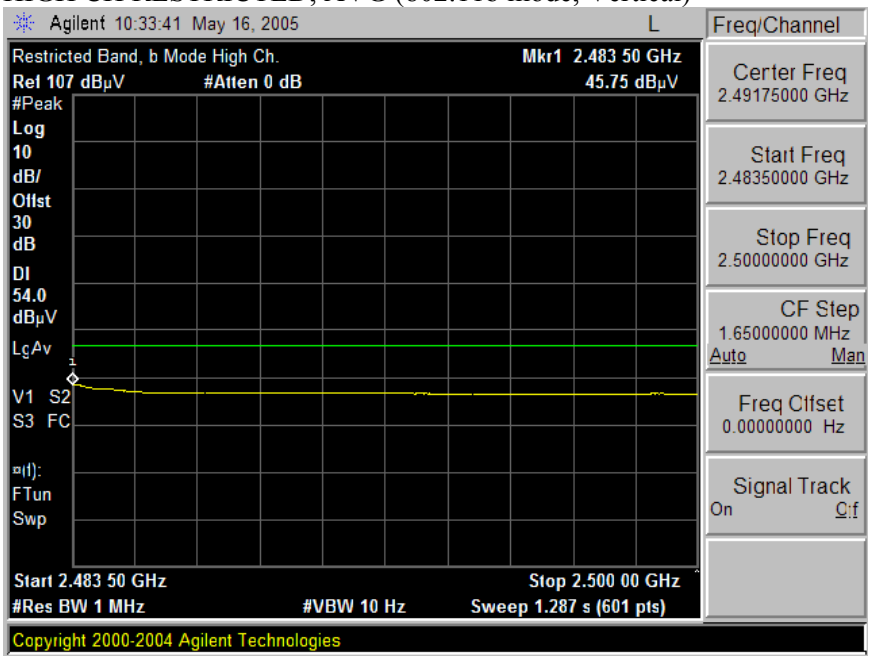


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

05/16/05 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
Project #: 05U3362-1
Company: @ ROAD
EUT Descrip.: MOBILE INTERNET LOCATION MGR WITH GPS, 3G CELL, CDMA
EUT M/N: IWM3140 MOBILE HOT SPOT
Test Target: FCC 15.247
Mode Oper: TX WLAN LOW, MID, HI CHANNELS _ HARMONIC SPUR

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T34 HP 8449B			FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Vien	12_Vien	HPF_4.0GHz	R_001

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	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH															
4.824	3.0	42.5	31.0	33.6	3.4	-33.6	0.0	0.6	46.6	35.1	74	54	-27.4	-18.9	V
7.236	3.0	43.8	32.3	36.1	3.9	-33.3	0.0	0.6	51.1	39.7	74	54	-22.9	-14.3	V, NOISE FLOOR
4.824	3.0	43.5	32.2	33.6	3.4	-33.6	0.0	0.6	47.6	36.3	74	54	-26.4	-17.7	H
7.236	3.0	44.0	32.0	36.1	3.9	-33.3	0.0	0.6	51.4	39.4	74	54	-22.6	-14.6	H, NOISE FLOOR
MID CH															
4.874	3.0	43.7	31.1	33.7	3.4	-33.5	0.0	0.6	47.9	35.3	74	54	-26.1	-18.7	V
7.311	3.0	42.8	31.0	36.2	3.9	-33.3	0.0	0.6	50.2	38.4	74	54	-23.8	-15.6	V, NOISE FLOOR
4.874	3.0	43.7	31.0	33.7	3.4	-33.5	0.0	0.6	47.9	35.2	74	54	-26.1	-18.8	V
7.311	3.0	43.8	31.6	36.2	3.9	-33.3	0.0	0.6	51.2	39.0	74	54	-22.8	-15.0	H, NOISE FLOOR
HI CH															
4.924	3.0	43.7	31.3	33.7	3.5	-33.5	0.0	0.6	48.0	35.6	74	54	-26.0	-18.4	V
7.386	3.0	43.9	31.9	36.2	3.9	-33.3	0.0	0.6	51.4	39.4	74	54	-22.6	-14.6	V, NOISE FLOOR
4.924	3.0	43.7	30.9	33.7	3.5	-33.5	0.0	0.6	48.0	35.2	74	54	-26.0	-18.8	V
7.386	3.0	44.6	31.7	36.2	3.9	-33.3	0.0	0.6	52.1	39.2	74	54	-21.9	-14.8	H, NOISE FLOOR
	NO OTHER EMISSIONS WERE DETECTED ABOVE NOISE FLOOR AFTER 3RD HARMONIC.														

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, HORIZONTAL)

COMPLIANCE Certification Services
FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 05U3362-1
Report #: 05U3362-1
Date& Time: 05/16/05 5:16 PM
Test Engr: VIEN TRAN

Company: @ ROAD
EUT Description: MOBILE INTERNET LOCATION MGR
Test Configuration : EUT & GPS ANTENNA
Type of Test: FCC CLASS B
Mode of Operation: TX

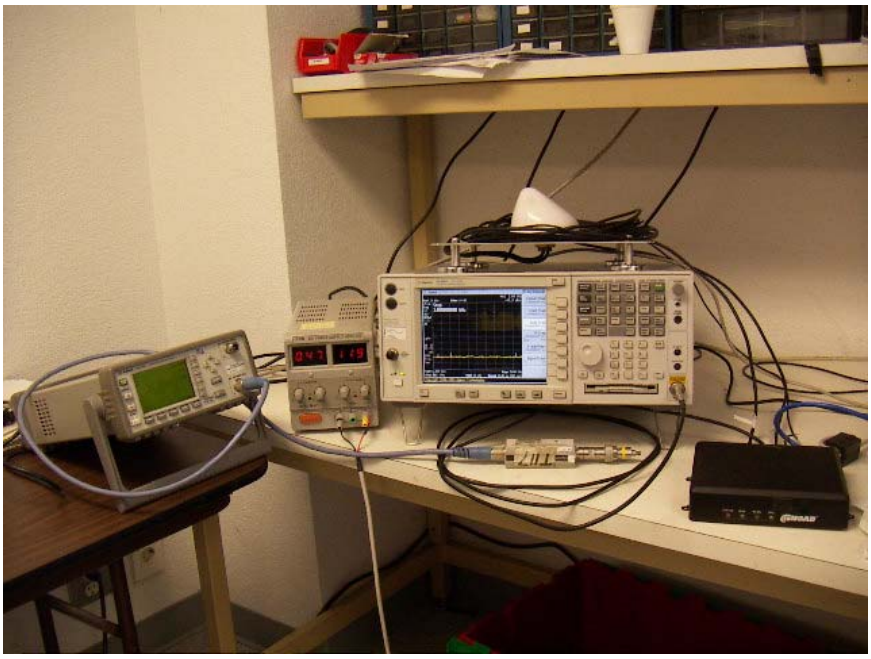
(•) A-Site ( ) B-Site ( ) C-Site ( ) F-Site [6 Worst Data] [Descending]

Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
200.10	58.50	12.03	1.88	27.20	45.21	43.50	1.71	3mH	0.00	1.00	P
200.10	56.50	12.03	1.88	27.20	43.21	43.50	-0.29	3mH	0.00	1.00	Q
400.00	51.80	15.92	2.83	27.48	43.07	46.00	-2.93	3mH	0.00	1.00	P
600.00	48.00	19.36	3.63	28.38	42.61	46.00	-3.39	3mH	0.00	1.00	P
800.00	45.50	21.70	4.27	27.84	43.63	46.00	-2.37	3mH	0.00	1.00	P
200.10	56.30	12.03	1.88	27.20	43.01	43.50	-0.49	3mV	0.00	1.00	P
200.10	54.20	12.03	1.88	27.20	40.91	43.50	-2.59	3mV	0.00	1.00	Q
Total # of Data: 7											

8. SETUP PHOTOS

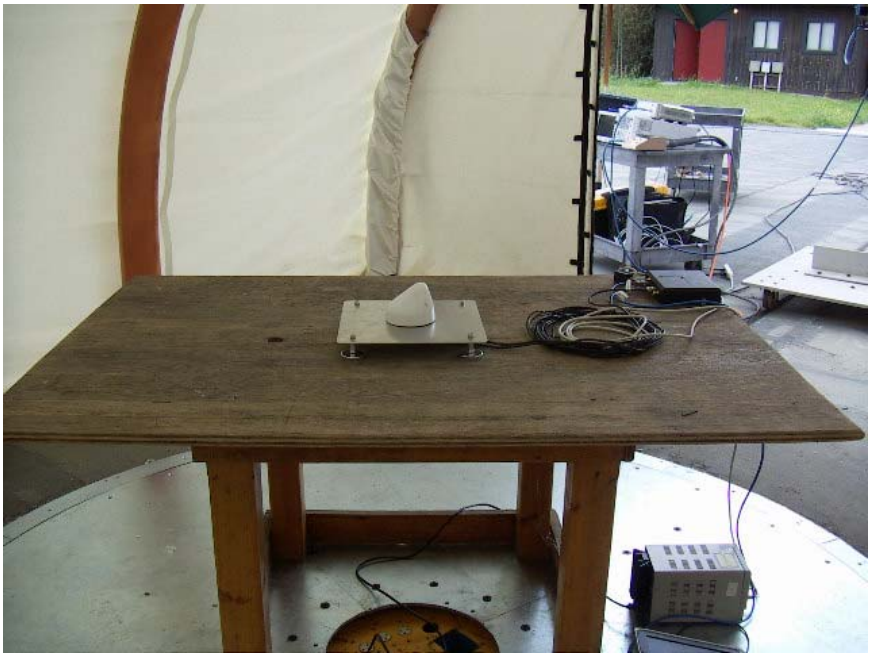
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

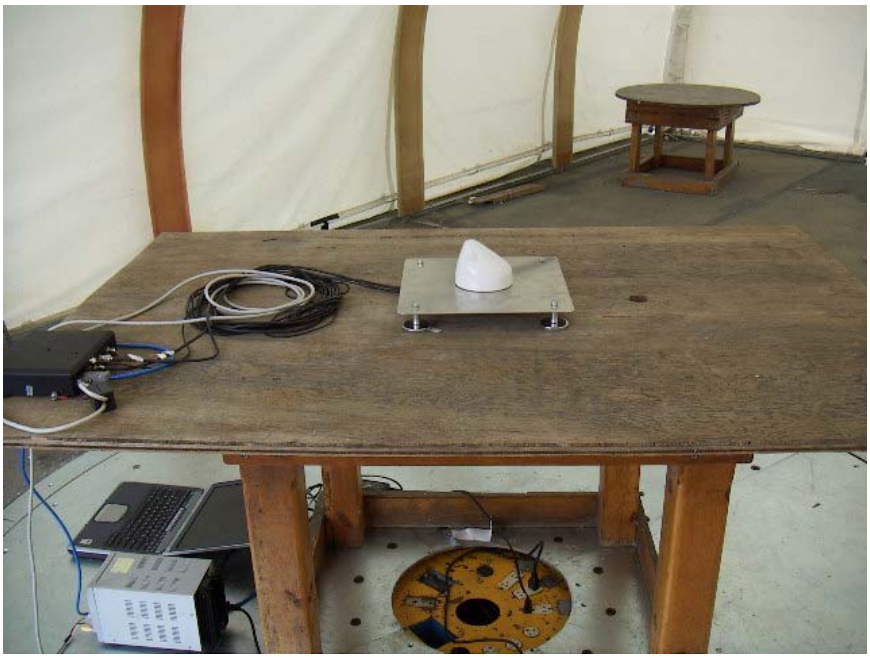


RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



END OF REPORT