FCC CFR47 PART 15 SUBPART E
CERTIFICATION TEST REPORT
FOR

W5 ACCESS POINT

MODEL NUMBER: AP-1NB4

FCC ID: VJ5-AP1NB

REPORT NUMBER: 07U11457-1, REVISION A

ISSUE DATE: JANUARY 24, 2008

Prepared for

W5 NETWORKS
48389 FREMONT BLVD.
FREMONT, CA 94538, U.S.A.

Prepared by

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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	12/18/07	Initial Issue	T. Chan
A	01/24/08	Modified model and FCC ID	T. Hong

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	W5 NETWORKS
	48389 FREMONT BLVD.
	FREMONT, CA 94538, U.S.A.
EUT DESCRIPTION:	W5 ACCESS POINT
MODEL:	AP-1NB4
SERIAL NUMBER:	W5N-APB3-5
DATE TESTED:	NOVEMBER 19 AND 28, 2007

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	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:

CHIN PANG
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, FCC CFR 47 Part 15, FCC MO&O 06-96.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

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
Radiated Emission, Above 2000 MHz	+/- 4.3 dB
Power Line Conducted Emission	+/- 2.9 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an Access Point and UWB Receiver.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5725 - 5825	TX	21.07	127.94

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Patch antenna with a maximum gain of 6 dBi.

5.4. SOFTWARE AND FIRMWARE

The firmware is ap_top_virtex5.bit, and the software version is 33.0.3.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	IBM	ThinkPad T43	L3-A4466	DoC
DC Power Supply	Xantrex	XDL-35-5TP	J00233938	NA
AC Adapter	IBM	08K8208	11S08K8208Z1Z9MA573584	DoC

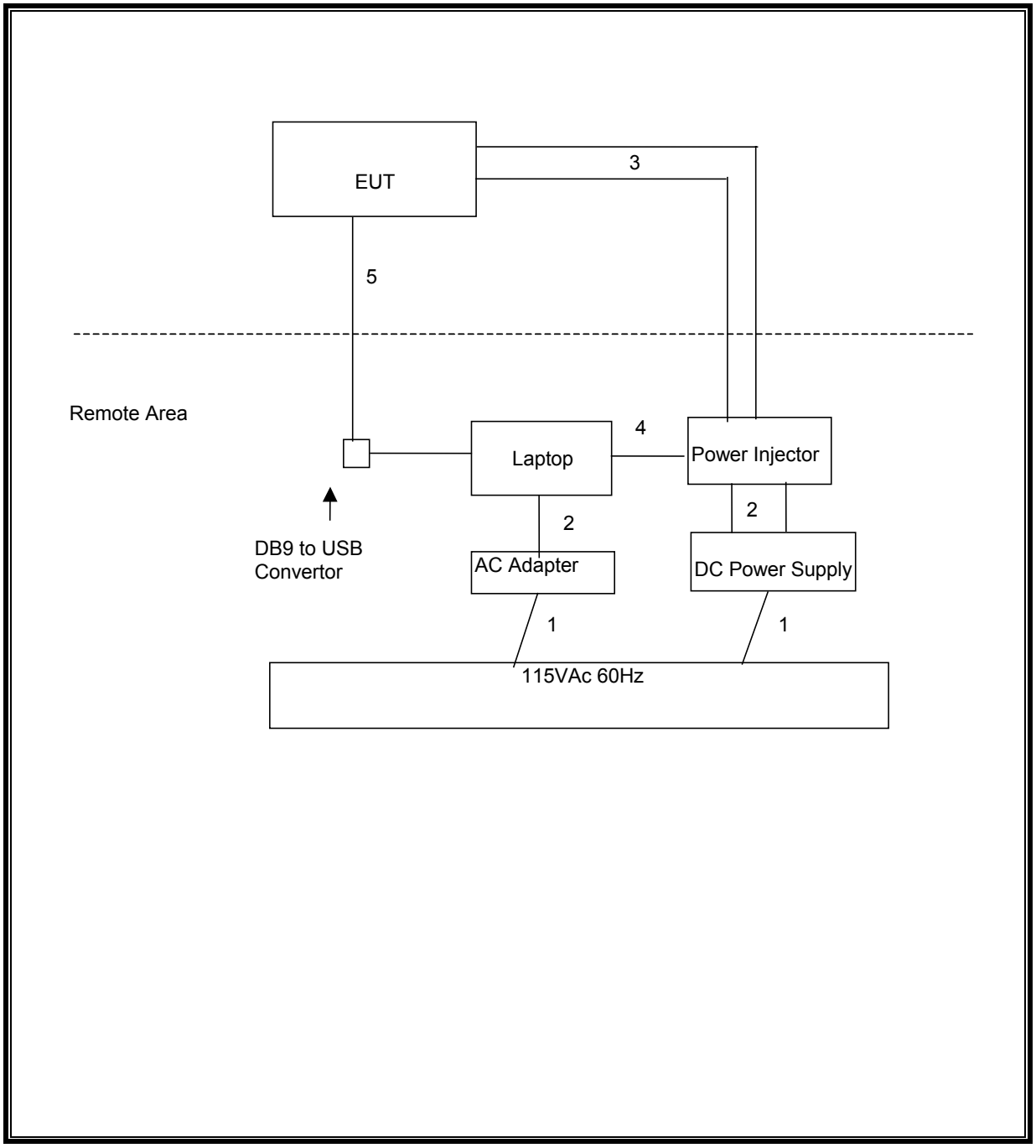
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	2	US 115V	Un-shielded	2m	No
2	DC	1	DC	Un-shielded	2m	No
3	Ethernet	2	RJ45	Un-shielded	1m	Yes
4	Ethernet	1	RJ45	Un-shielded	2m	Yes
5	DB9	1	USB	Un-shielded	2M	YES

TEST SETUP

The EUT was tested as a standalone device.

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**	**Asset**	**Cal Date**	**Cal Due**
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01063	10/3/2006	9/27/2008
Antenna, Horn, 18 GHz	EMCO	3115	C00872	4/15/2007	4/15/2008
Spectrum Analyzer Display	Agilent / HP	85662A	N02480	5/4/2006	4/7/2008
Antenna, Biconical	Eaton	94455-1	NA	3/11/2007	3/11/2008
SA RF Section, 1.5 GHz	Agilent / HP	85680B	N02455	4/4/2006	1/7/2008
Preamp, 1000MHz	Sonoma	310N	NA	NA	1/20/2008
Antenna, Bilog, 2 GHz	Sunol Sciences	JB1	C01016	NA	9/28/2008
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	10/16/2006	1/27/2008
LISN, 30 MHz	FCC	LISN-50/250-25-2	N02625	9/15/2006	12/15/2007

7. ANTENNA PORT TEST RESULTS

7.1. 26 dB and 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

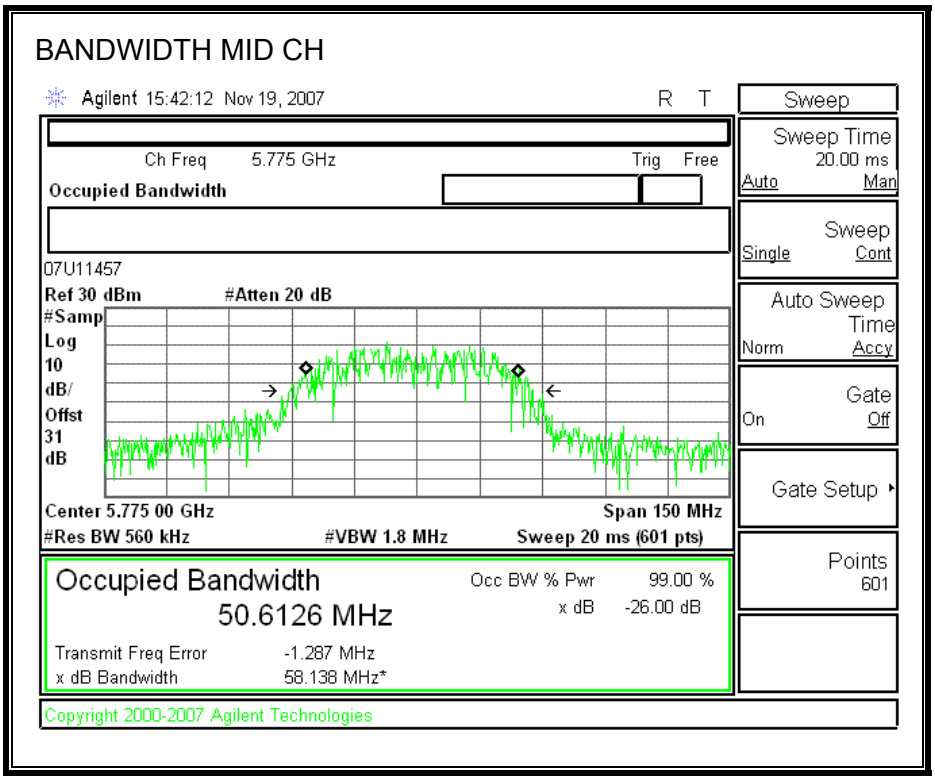
TEST PROCEDURE

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

RESULTS

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Bandwidth (MHz)
Fix	5775	58.138	50.6126

26 dB and 99% BANDWIDTH



7.2. OUTPUT POWER

LIMITS

FCC §15.407 (a) (3)

For the 5.725 – 5.825 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 1 W or 17 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

RESULTS

Limit

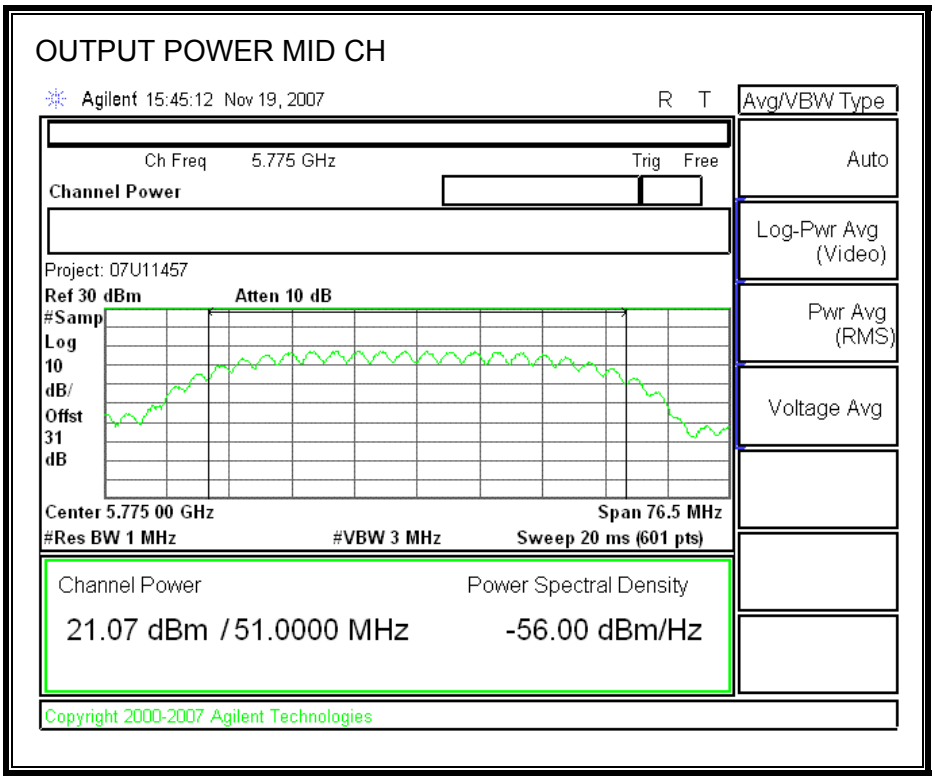
Channel	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	17 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
Fix	5775	30	58.138	34.64	6.00	30.00

.

Results

Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Fix	5775	21.07	30.00	-8.93

OUTPUT POWER



7.3. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 31 dB (including 30 dB pad and 1dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Power (dBm)
Fix	5775	17.35

7.4. PEAK POWER SPECTRAL DENSITY

LIMITS

FCC §15.407 (a) (3)

For the 5.725 – 5.825 GHz band, the peak power spectral density shall not exceed 17 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 11 dBm.

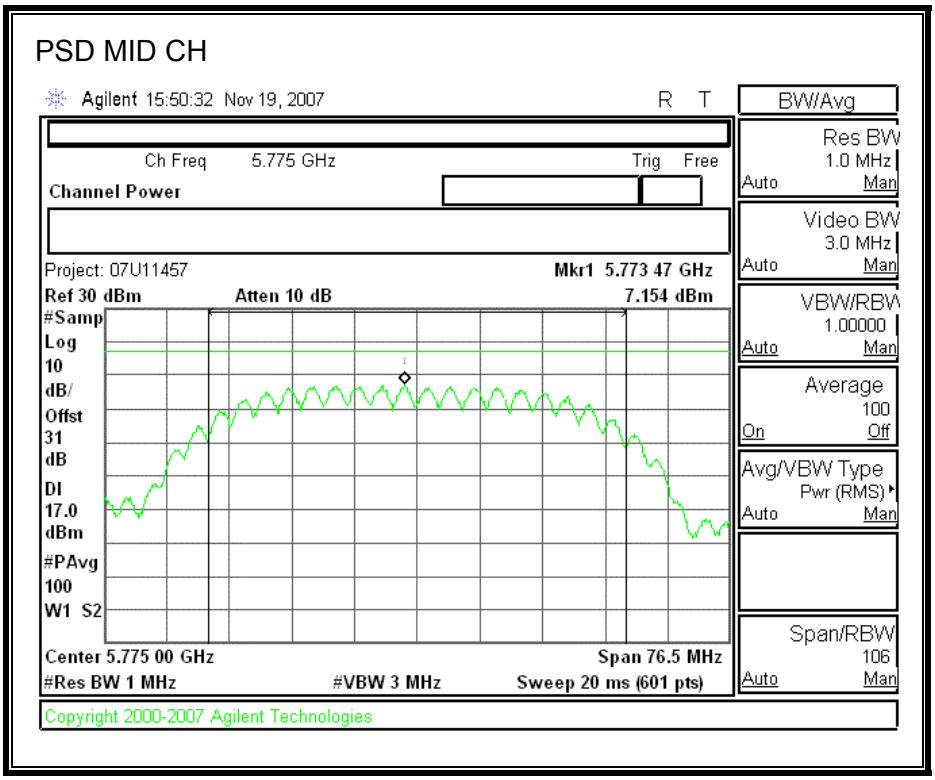
TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Fix	5775	7.15	17	-9.85

POWER SPECTRAL DENSITY



7.5. PEAK EXCURSION

LIMITS

FCC §15.407 (a) (6)

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

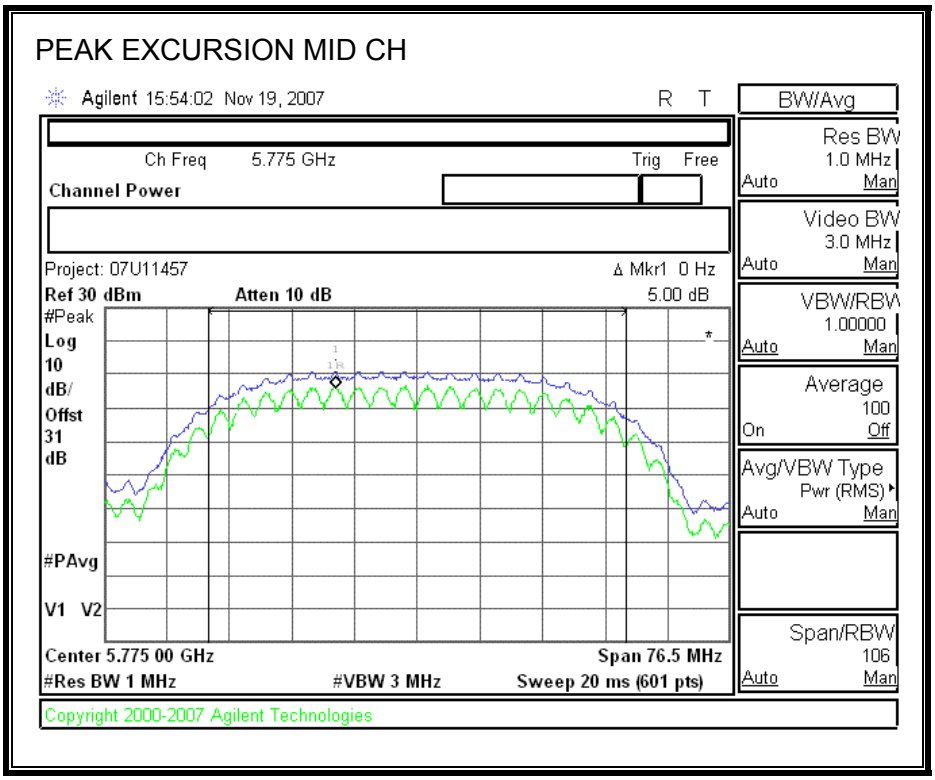
The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Fix	5775	5.00	13	-8.00

PEAK EXCURSION



7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.407 (b) (4)

For transmitters operating in the 5.725–5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of –17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of –27 dBm/MHz.

TEST PROCEDURE

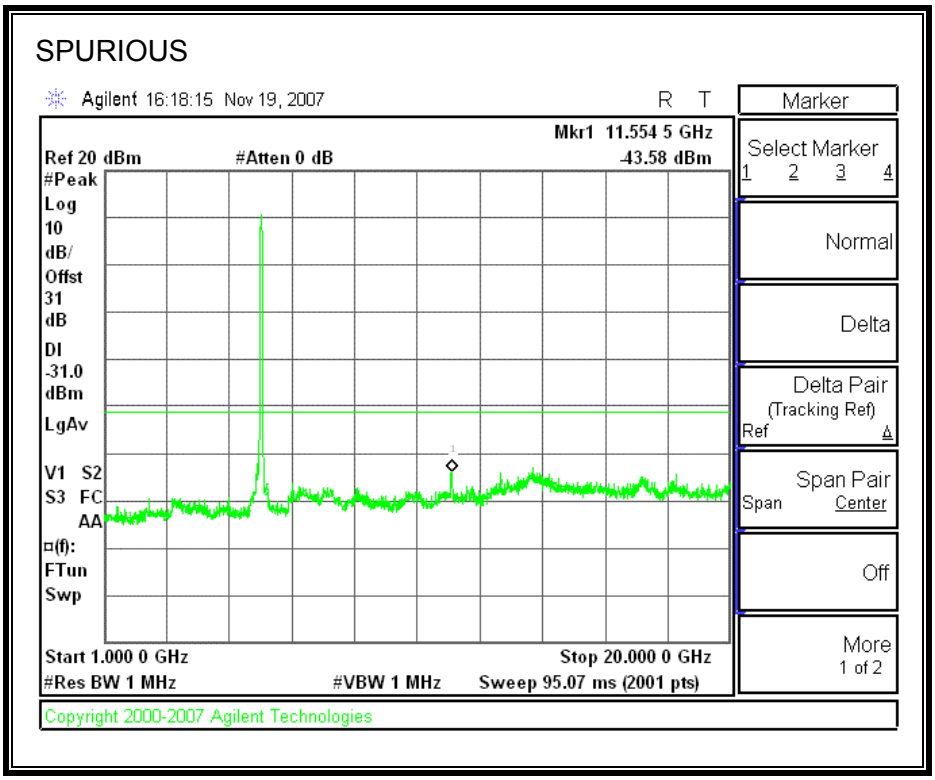
Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

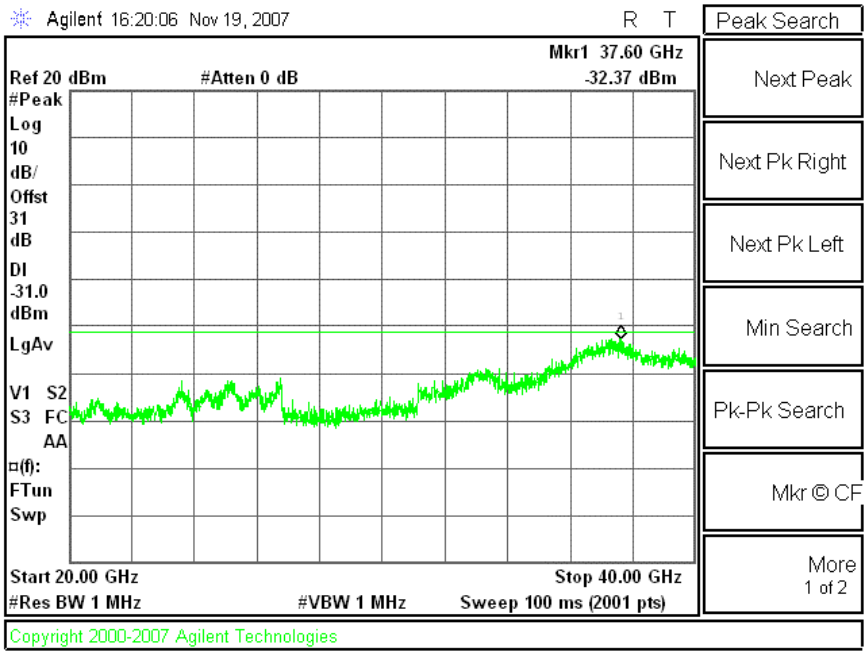
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

RESULTS

SPURIOUS EMISSIONS



SPURIOUS



8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

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.

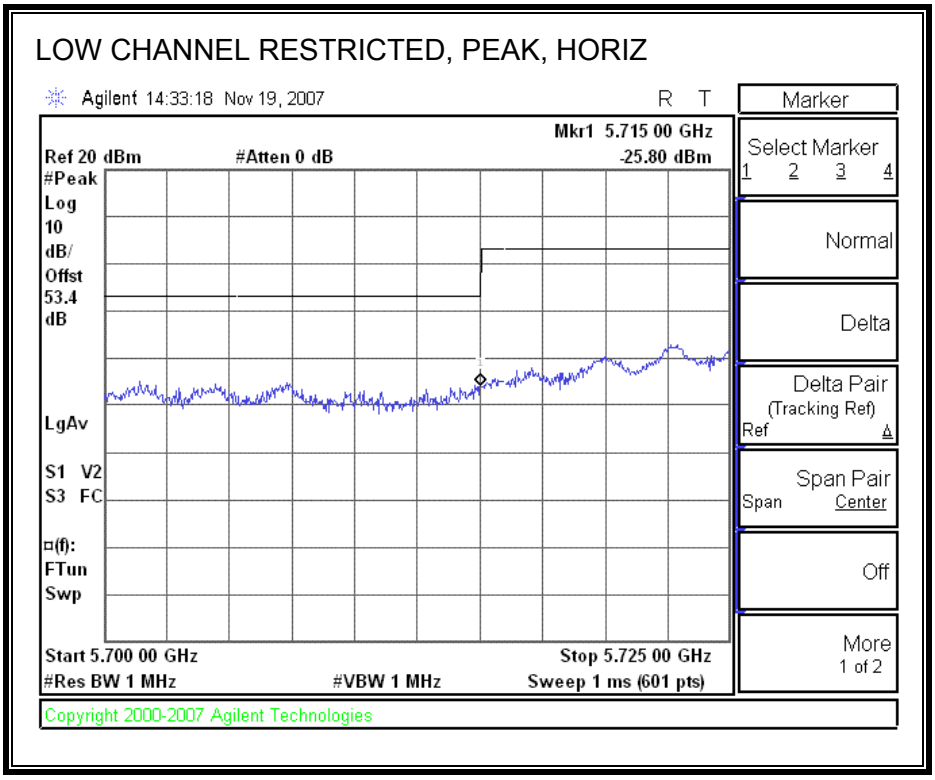
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the 5.775GHz band channel.

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

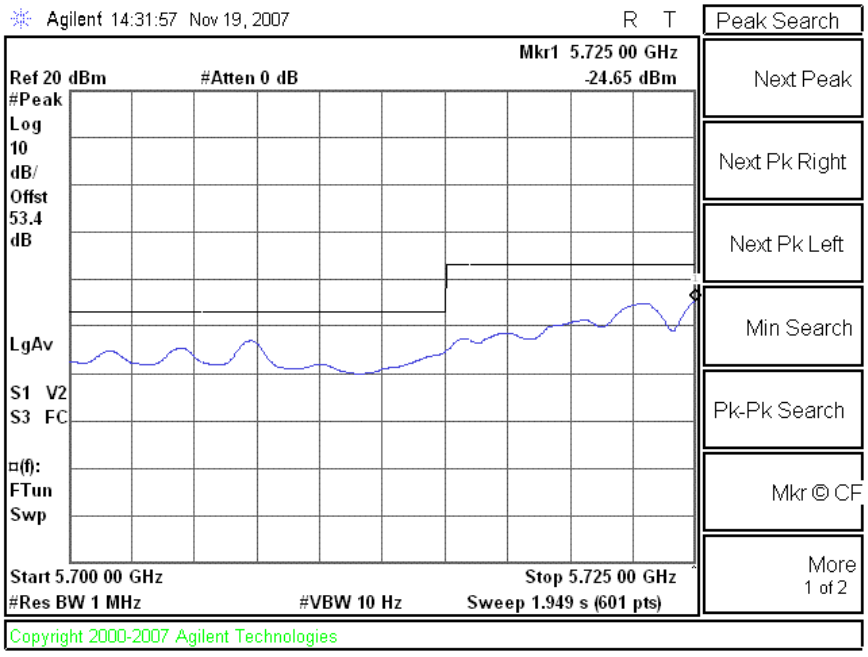
from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

8.1.1. TRANSMITTER ABOVE 1 GHz

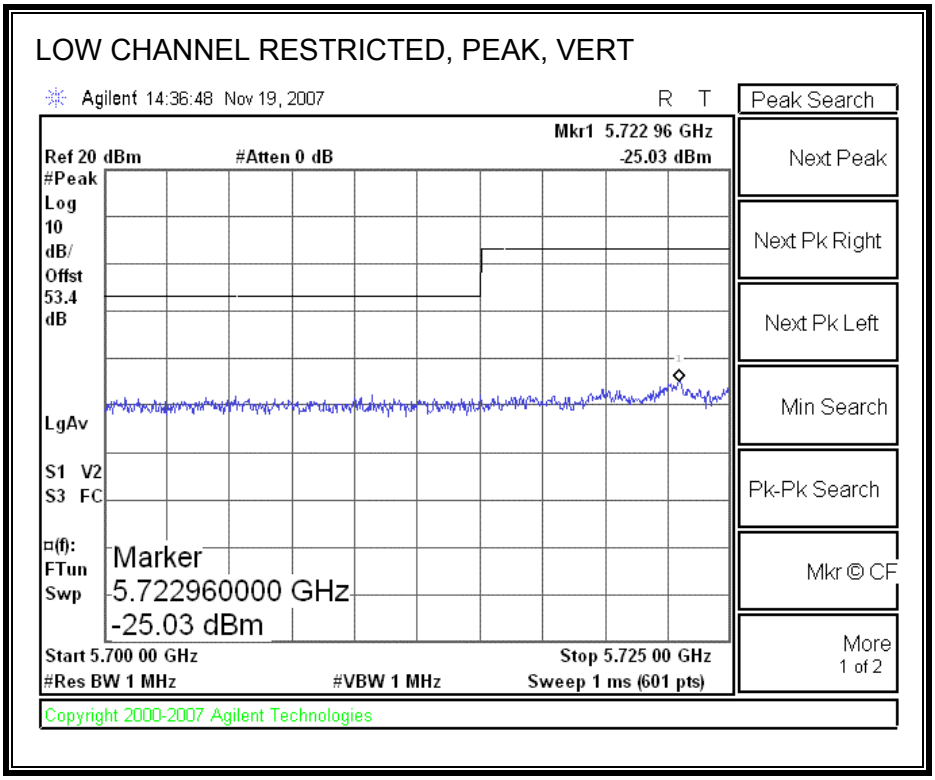
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



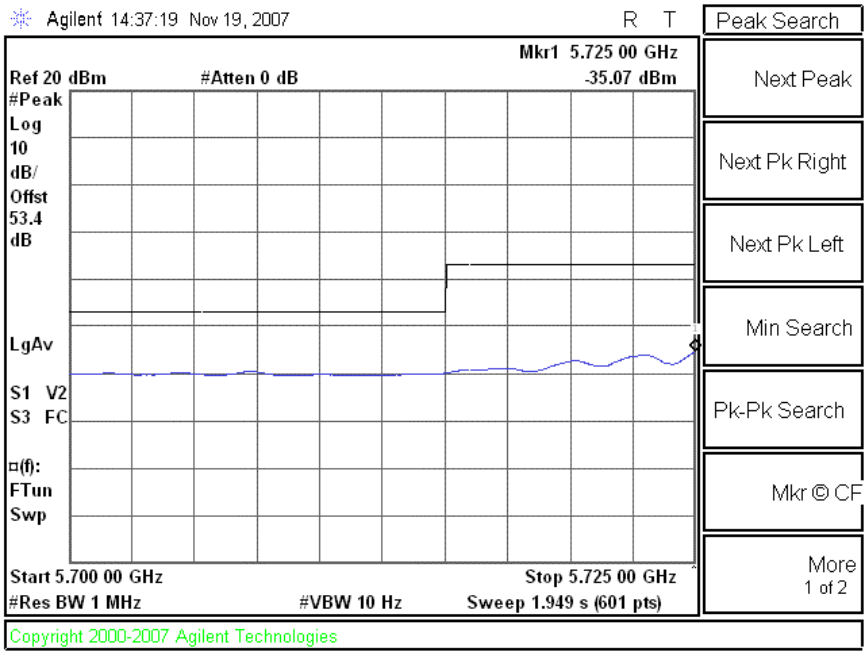
LOW CHANNEL RESTRICTED, AVG, HORIZ



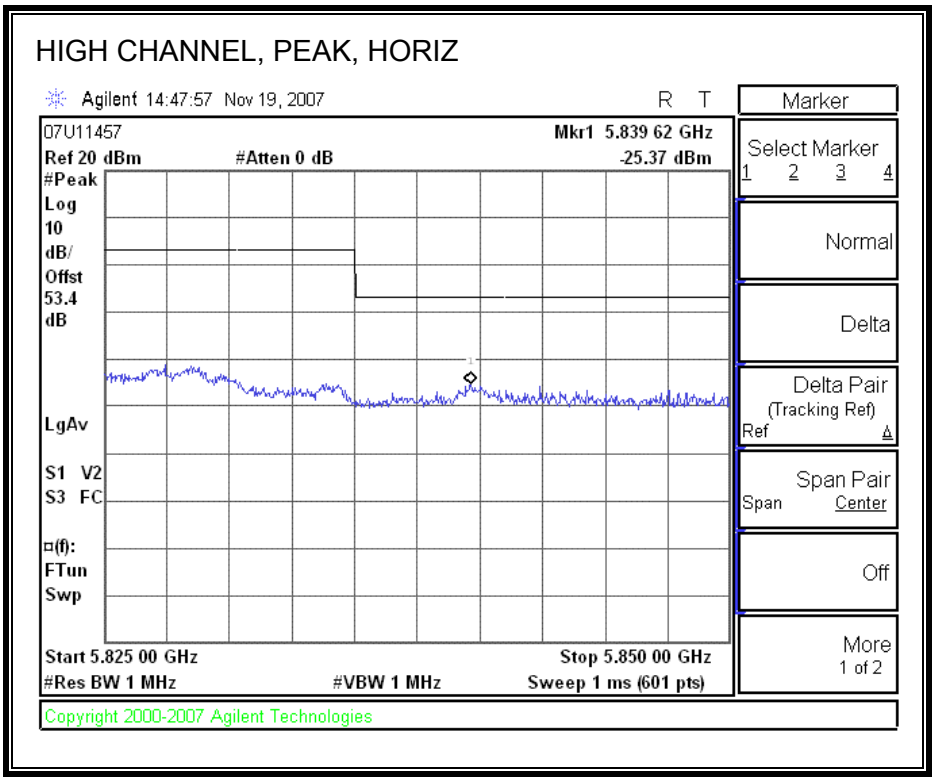
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



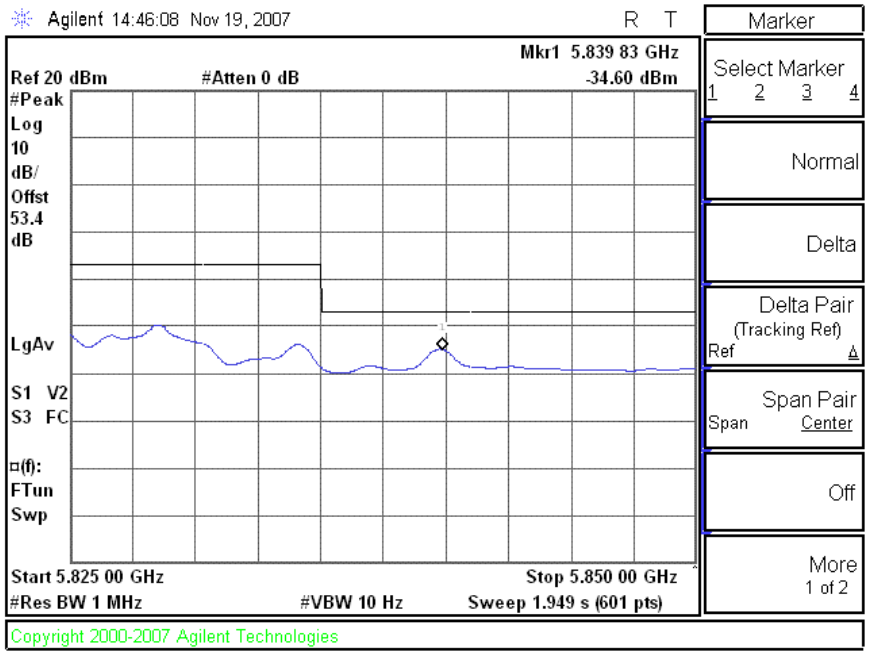
LOW CHANNEL RESTRICTED, AVG, VERT



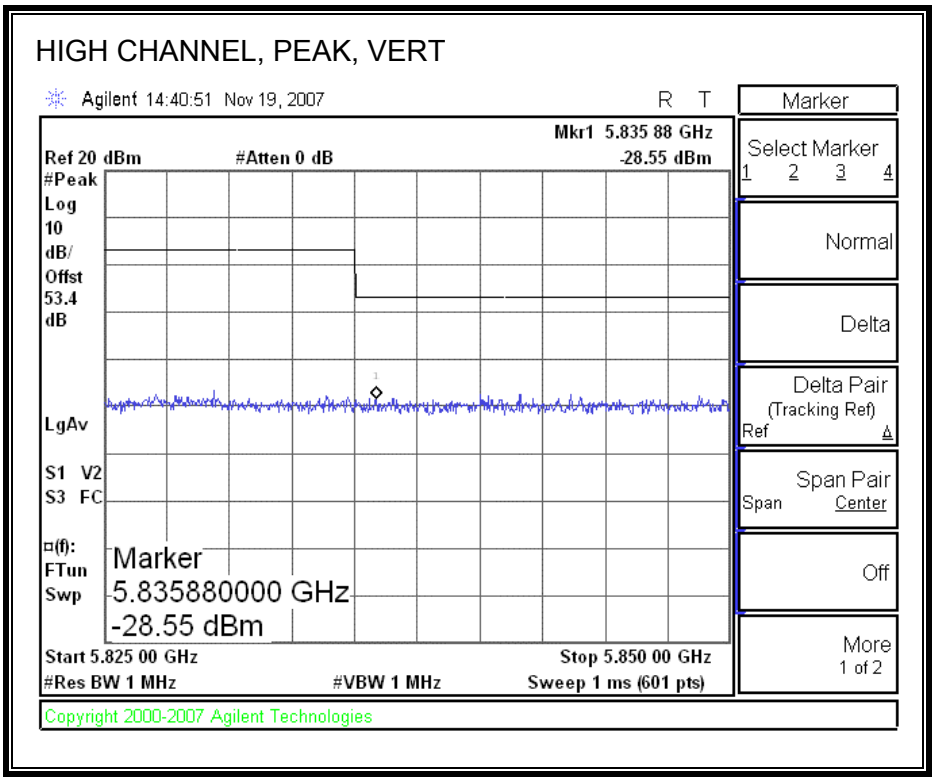
AUTHORIZED BANDEDGE (HIGH CHANNEL, HORIZONTAL)



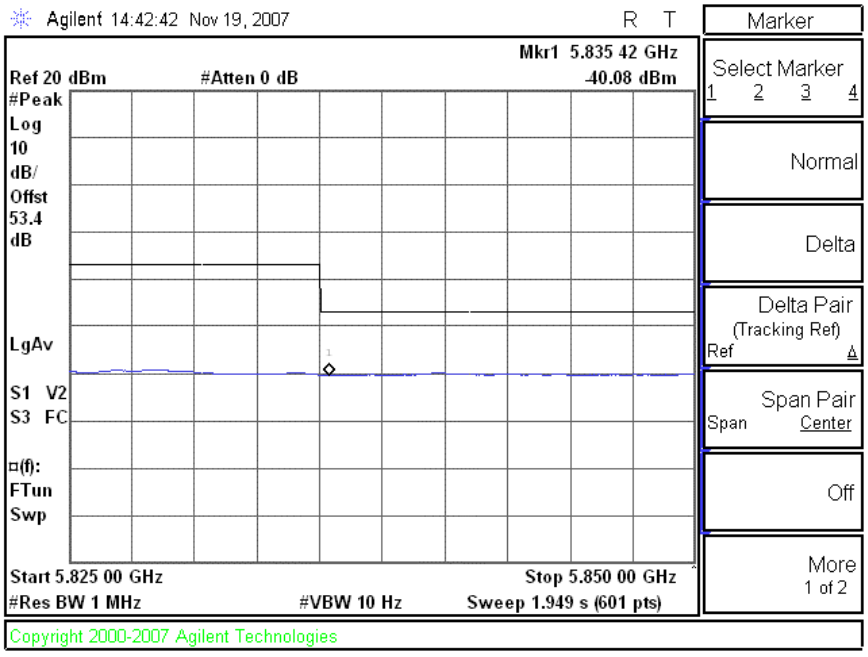
HIGH CHANNEL, AVG, HORIZ



AUTHORIZED BANDEDGE (HIGH CHANNEL, VERTICAL)



HIGH CHANNEL, AVG, VERT



HARMONICS AND SPURIOUS EMISSIONS

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: W5 Networks
Project #: 07U11457-1
Date: 11/19/2007
Test Engineer: Chin Pang
Configuration: EUT Only
Mode: TX

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T145 Agilent 3008A005(	T88 Miteq 26-40GHz	T39; ARA 18-26GHz; S/N:1013	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		A-5m Chamber	HPF_7.6GHz	

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)
5775MHz															
11.550	3.0	46.0	36.5	37.4	11.7	-33.0	0.0	0.7	62.7	53.2	74	54	-11.3	-0.8	V
17.311	3.0	34.3	23.0	42.0	13.3	-32.0	0.0	0.6	58.2	46.9	74	54	-15.8	-7.1	V
11.550	3.0	43.5	34.4	37.4	11.7	-33.0	0.0	0.7	60.2	51.1	74	54	-13.8	-2.9	H
17.311	3.0	33.5	22.8	42.0	13.3	-32.0	0.0	0.6	57.4	46.7	74	54	-16.6	-7.3	H

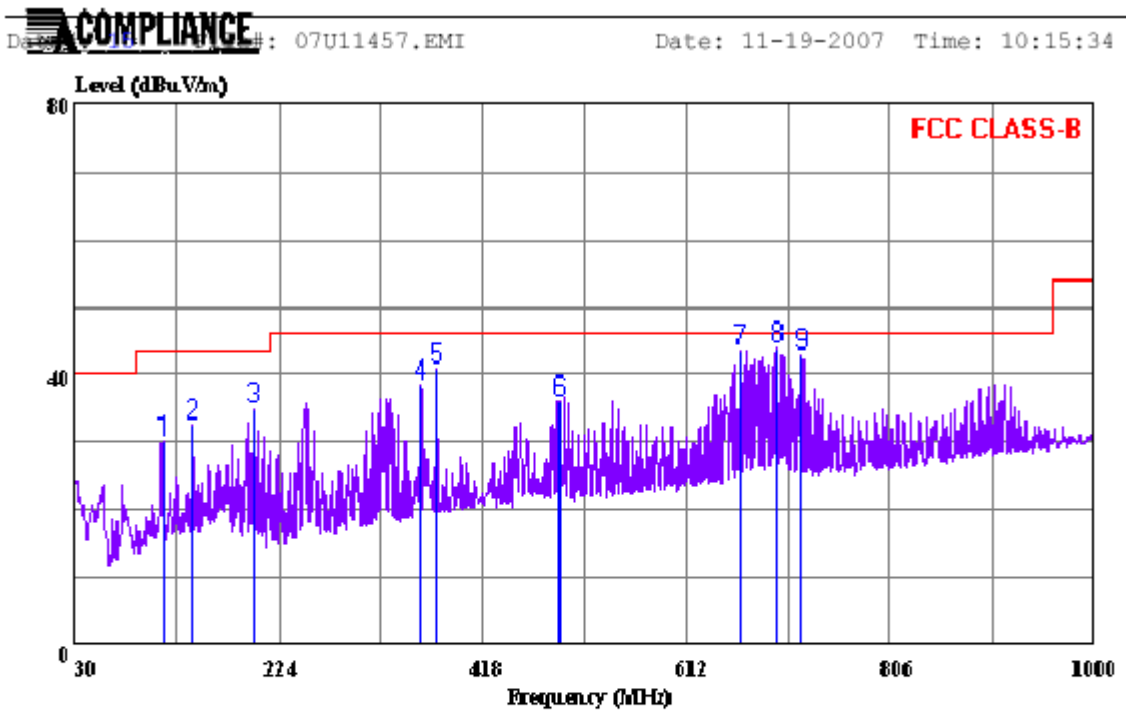
Rev. 4.12.7
Note: No other emissions were detected above the system noise floor.

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		

8.1.2. WORST-CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



Trace: 14 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Engineer: : Chin Pang
Company: : W5 Networks
Project #: : 07U11457
Test Configuration:: EUT only
: AP
Mode of operation: : Normal
Test Target: : FCC Class B

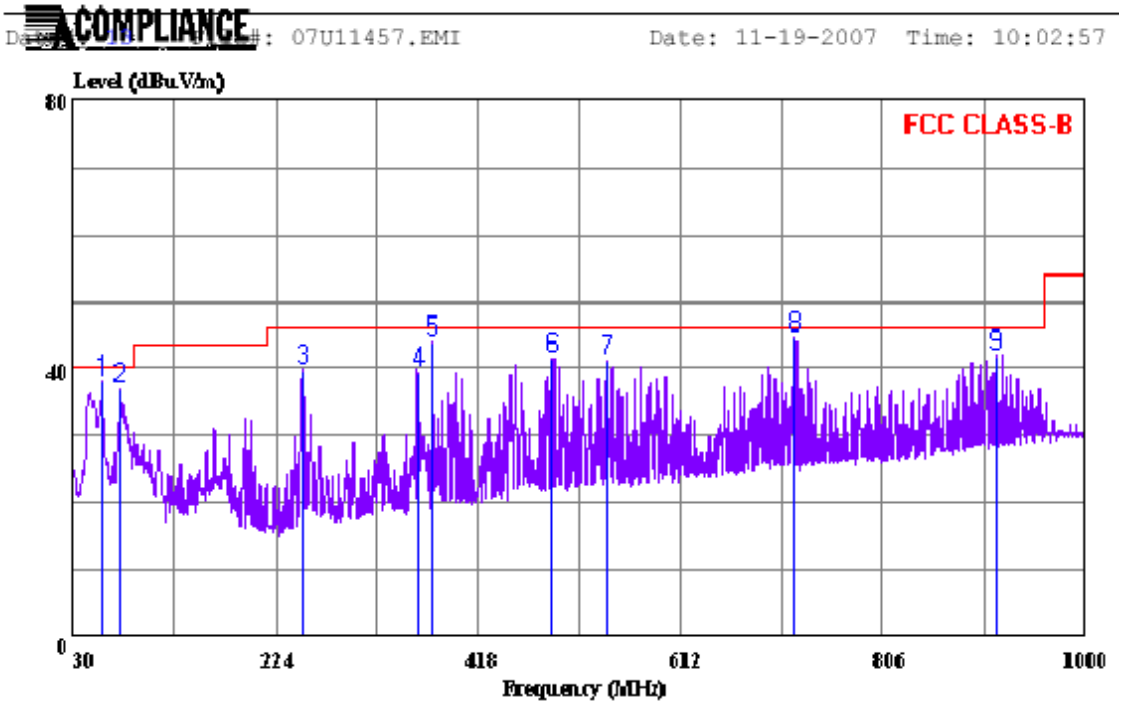
HORIZONTAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Probe Factor
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		dB
1	113.420	48.10	-17.99	30.11	43.50	-13.39	Peak	12.65
2	141.550	49.50	-16.84	32.66	43.50	-10.84	Peak	13.64
3	198.780	52.10	-17.19	34.91	43.50	-8.59	Peak	13.02
4	359.800	53.00	-14.42	38.58	46.00	-7.42	Peak	15.21
5	374.350	55.00	-14.03	40.97	46.00	-5.03	Peak	15.50
6	490.750	47.40	-11.51	35.89	46.00	-10.11	Peak	17.82
7	662.440	52.50	-8.93	43.57	46.00	-2.43	Peak	20.10
8	699.300	52.30	-8.44	43.86	46.00	-2.14	Peak	20.55
9	721.610	51.10	-8.15	42.95	46.00	-3.05	Peak	20.82

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



Trace: 12 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Engineer: : Chin Pang
Company: : W5 Netwqorks
Project #: : 07U11457
Test Configuration:: EUT only
: AP
Mode of operation: : Normal
Test Target: : FCC Class B

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Probe Factor
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		dB
1	57.160	61.06	-22.94	38.12	40.00	-1.88	Peak	8.13
2	74.620	59.80	-22.66	37.14	40.00	-2.86	Peak	8.21
3	249.220	57.70	-17.72	39.98	46.00	-6.02	Peak	12.18
4	360.770	53.90	-14.39	39.51	46.00	-6.49	Peak	15.23
5	374.350	58.00	-14.03	43.97	46.00	-2.03	Peak	15.50
6	489.780	53.10	-11.55	41.55	46.00	-4.45	Peak	17.81
7	541.190	51.80	-10.67	41.13	46.00	-4.87	Peak	18.55
8	721.610	52.80	-8.15	44.65	46.00	-1.35	Peak	20.82
9	914.640	46.70	-4.78	41.93	46.00	-4.08	Peak	22.89

9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

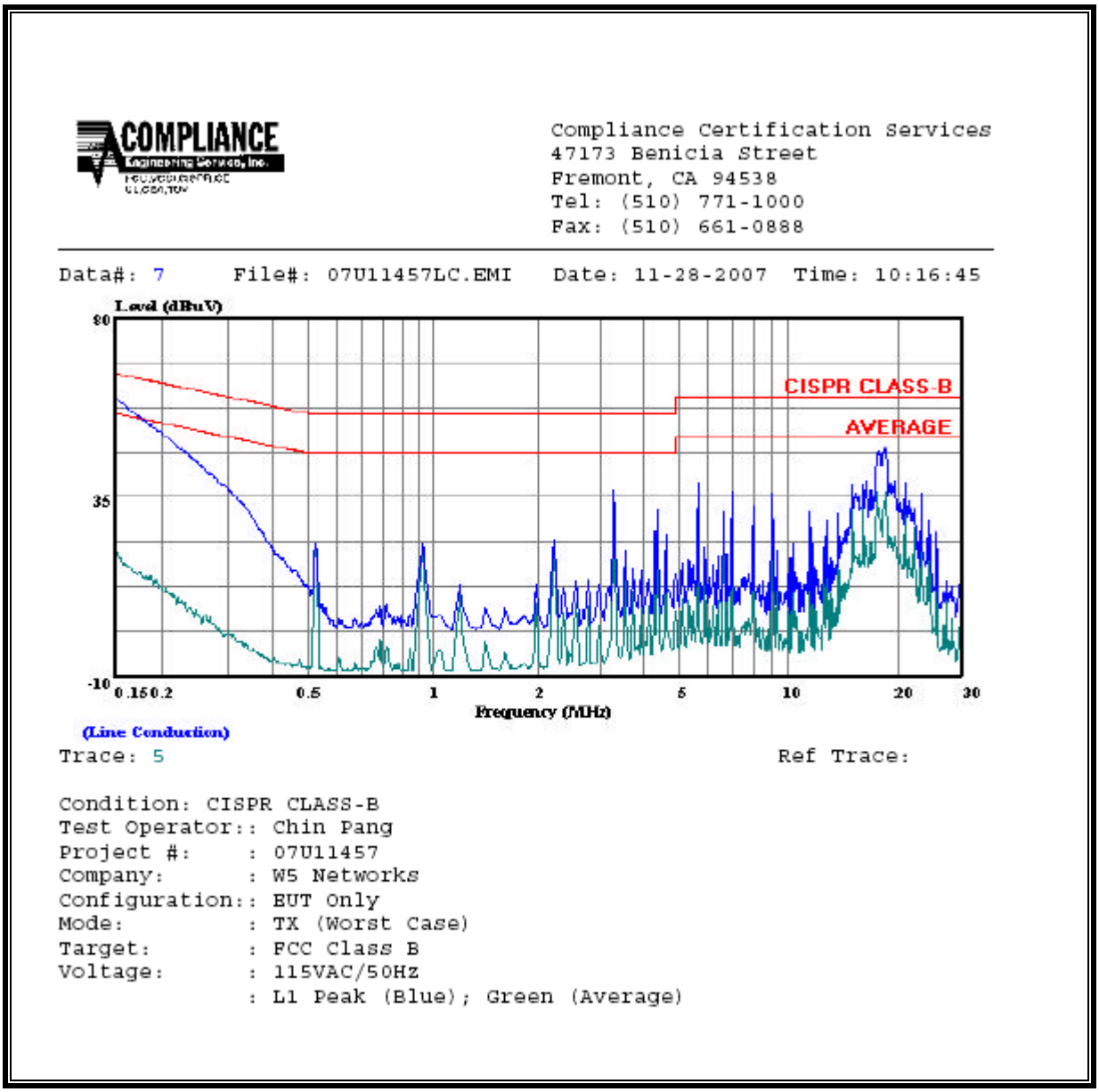
Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

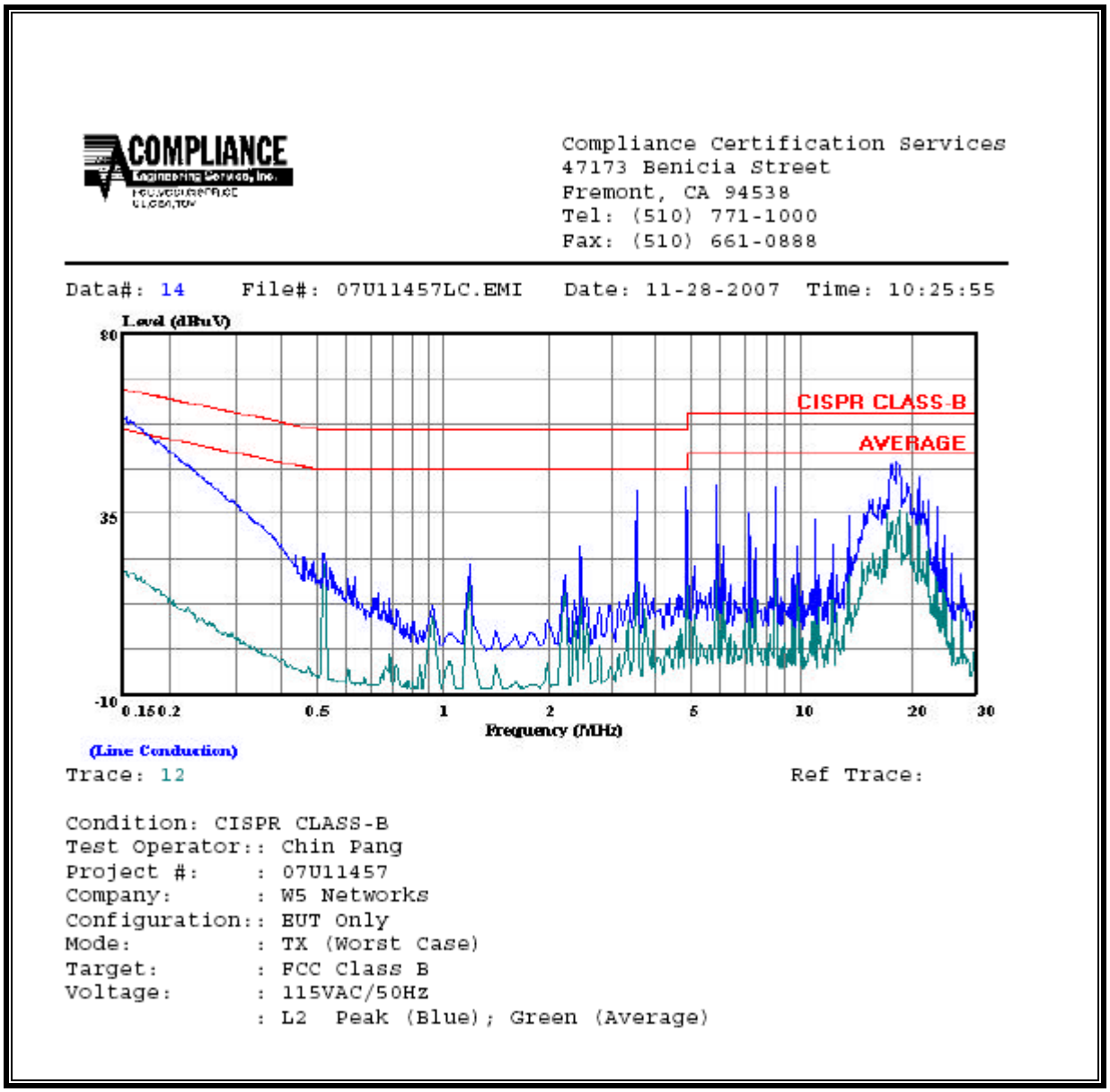
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit		Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	60.02	--	21.03	0.00	66.00	56.00	-5.98	-34.97	L1
3.38	36.88	--	36.24	0.00	56.00	46.00	-19.12	-9.76	L1
18.52	47.46	--	36.31	0.00	60.00	50.00	-12.54	-13.69	L1
0.15	59.70	--	20.67	0.00	66.00	56.00	-6.30	-35.33	L2
4.97	41.70	--	41.31	0.00	56.00	46.00	-14.30	-4.69	L2
18.23	48.00	--	39.82	0.00	60.00	50.00	-12.00	-10.18	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS



10. MAXIMUM PERMISSIBLE EXPOSURE

FCC RULES

§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, rearranging the terms to express the distance as a function of the remaining variables, changing to units of Power to mW and Distance to cm, and substituting the logarithmic form of power and gain yields:

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm^2

Rearranging terms to calculate the power density at a specific distance yields

$S = 0.0795 * 10 ^ ((P + G) / 10) / (d^2)$

The power density in units of mW/cm^2 is converted to units of W/m^2 by multiplying by a factor of 10.

LIMITS

From FCC §1.1310 Table 1 (B), the maximum value of S = 1.0 mW/cm^2

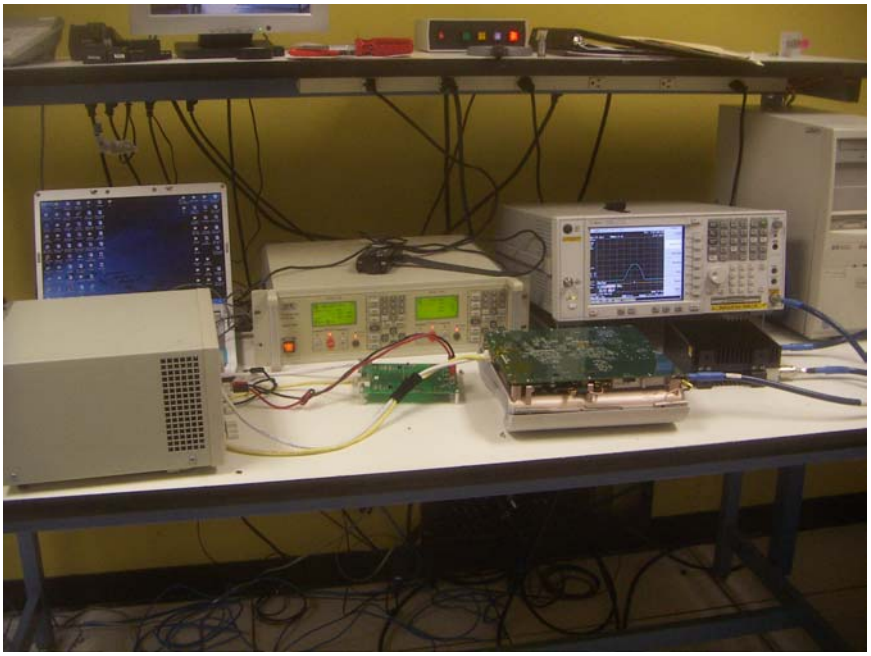
RESULTS

Mode	Band	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	FCC Power Density (mW/cm^2)
TX	5 GHz	20.0	21.07	6.00	0.10

11. SETUP PHOTOS

RF CONDUCTED PORT

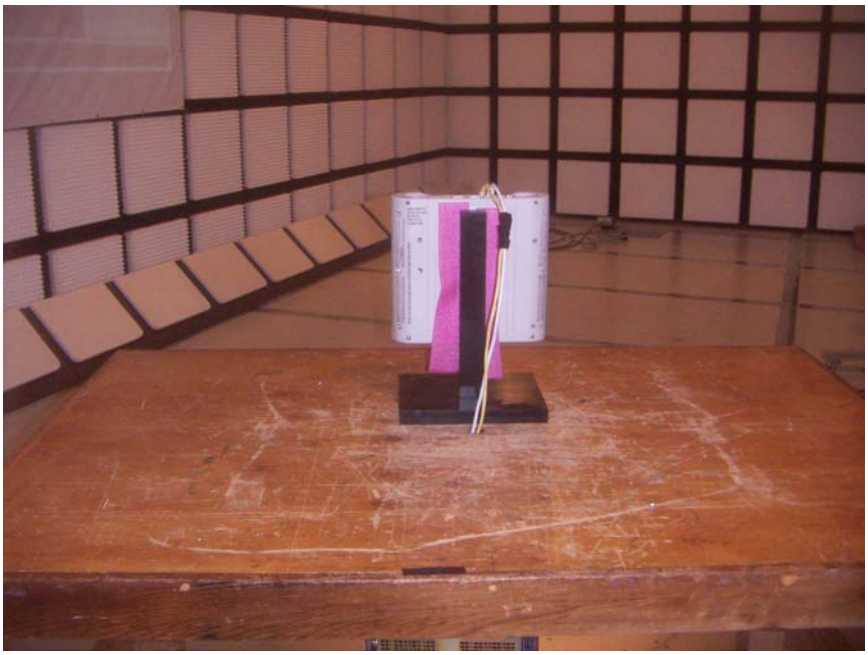
RF CONDUCTED PORT



RADIATED EMISSION

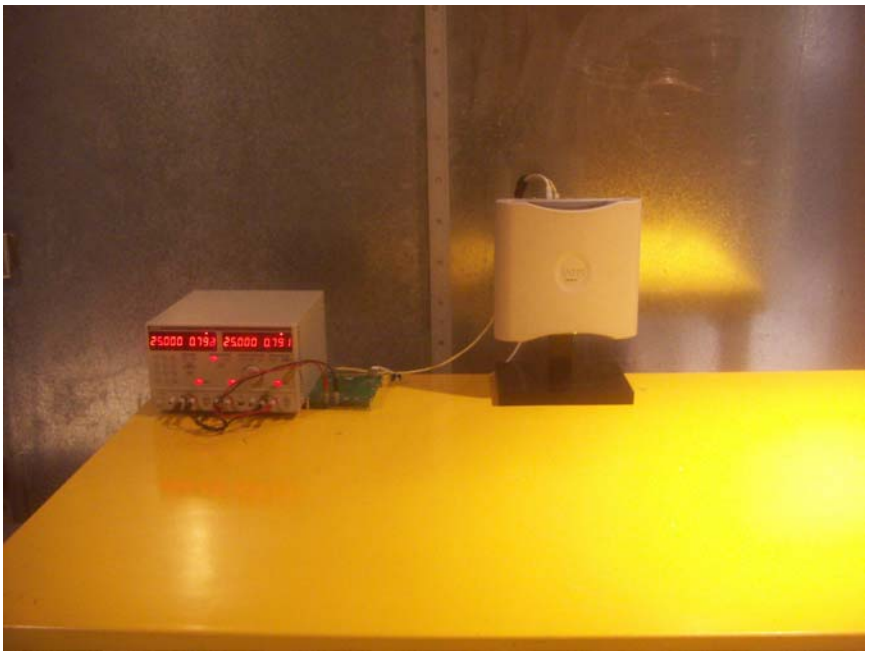
RADIATED EMISSIONS (FRONT)

RADIATED EMISSIONS (BACK)

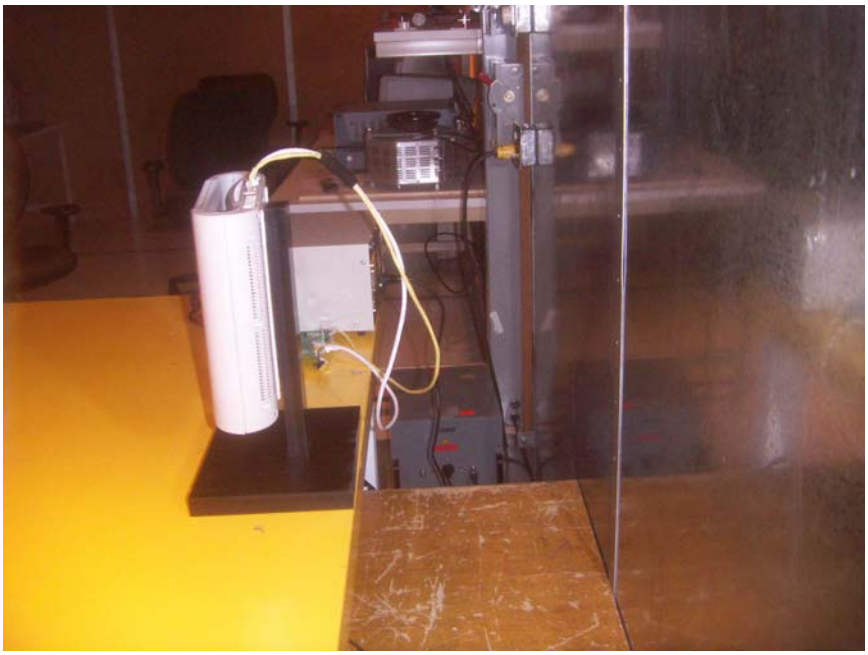


AC MAINS LINE CONDUCTED EMISSION

LINE CONDUCTED EMISSION (FRONT)



LINE CONDUCTED EMISSION (BACK)



END OF REPORT