FCC CFR47 PART 15 SUBPART E
CLASS II PERMISSIVE CHANGE
CERTIFICATION TEST REPORT
FOR

802.11 a/b/g MODULE

MODEL NUMBER: AR5BXB6

FCC ID: PPD-AR5BXB6

REPORT NUMBER: 07U11171-1

ISSUE DATE: JULY 4, 2007

Prepared for
ATHEROS COMMUNICATION, INC.
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054, U.S.A.

Prepared by
COMPLIANCE CERTIFICATION SERVICES
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/04/07	Initial Issue	T. Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: ATHEROS COMMUNICATION, INC.
5480 GREAT AMERICA PARKWAY
SANTA CLARA, CA 95054, USA

EUT DESCRIPTION: 802.11a/b/g MODULE

MODEL: AR5BXB6

SERIAL NUMBER: 0014A45548E8

DATE TESTED: JUNE 30-JULY 2, 2007

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

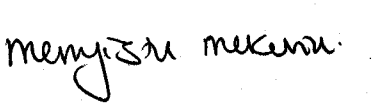
Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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:



MENGISTU MEKURIA
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 and FCC 06-96 APPENDIX "COMPLIANCE MEASUREMENT PROCEDURES FOR UNLICENSED-NATIONAL INFORMATION INFRASTRUCTURE DEVCIES OPERATING IN THE 5250-5350 MHz AND 5470-5725 MHz BANDS INCORPORATING DYNAMIC FREQUENCY SELECTION".

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g transceiver module that is installed inside Lenovo ThinkPad X60 Tablet and ThinkPad X61 Tablet.

The radio module is manufactured by Atheros Communications, Inc.

5.2. MAXIMUM OUTPUT POWER

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

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)	Antenna Port
5500 - 5700	802.11a	18.11	64.71	Main Antenna-2
5501 - 5700	802.11a	18.20	66.07	Auxilary Antenna

5.3. CLASS II PERMISSIVE CHANGE DESCRIPTION

The major change filed under this permissive change is addition of Portable condition in 5470-5725MHz band pursuant to FCC CFR 47 Section 2.1093.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes two integrated antennas (main and auxiliary) for diversity, each with a maximum gain of 2.97 and 2.72 dBi respectively.

Certification is for all three antennas (Main-1, Main-2, and Aux), but testing was only performed on the Main-2 and Aux antennas. The Main-1 antenna was not tested because it has a lower gain than the Main-2 and Aux antennas.

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was AR5002 Anwi Diagnostic Kernel Driver.

The test utility software used during testing was ART, rev. 5.3 Build 38.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power and the possible position of the host laptop. The highest measured output power for laptop model X61T was at 5600 MHz at Y-position. On the other hand, the highest measured output power for laptop model X60T was at 5500 MHz at Y-position.

The worst-case data rate for this channel is determined to be 6 Mb/s, based on previous experience with Atheros WLAN product design architectures.

Thus all emissions tests were made in accordance with the above investigation.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Description	Manufacturer	Model	Serial Number	FCC ID
LAPTOP PC	LENOVO	X61	LV-00470 07/01	DOC
AC/DC CONVERTER	LENOVO	92P1156	11S92P1156Z1ZBGF6CKH5T	DOC
LAPTOP PC	LENOVO	X60	LV-00161 06/12	DOC
AC/DC CONVERTER	LENOVO	92P1160	11S92P1160Z1ZBGH6C6KK0	DOC

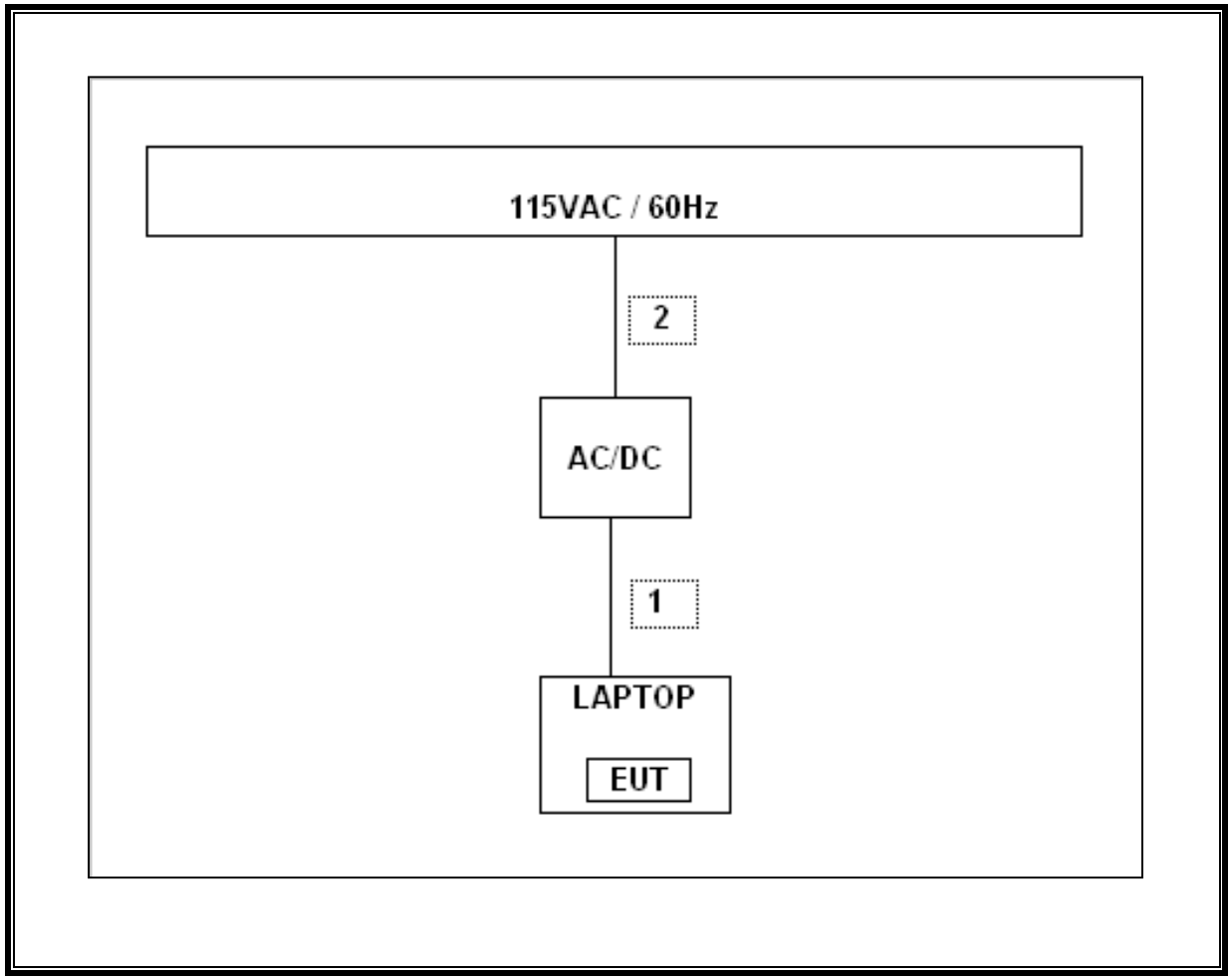
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US 115V	Un-shielded	1m	N/A
2	DC	1	DC	Un-shielded	2m	FERITTE AT ONE END

TEST SETUP

The EUT is installed inside a host laptop computer. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Test Receiver	R & S	ESHS 20	827129/006	01/27/08
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	09/15/07
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	09/15/07
RF Filter Section	HP	85420E	3705A00256	06/12/08
5.47-5.725GHz Reject Filter	Micro-Tronics	BRC13191	1	CNR
Preamplifier 1-26.5 GHz	HP	8449B	3008A00931	08/01/07
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	04/15/08
Preamplifier	HP	8447D	1937A02062	05/09/08
Antenna, Bilog 30MHz ~ 2Ghz	Sunol Sciences	JB1	A0022704	08/13/07
7.6 GHz Highpass Filter	Micro-Tronics	HPM13195	1	CNR
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	US42070220	11/26/07
Antenna, Horn 18 ~ 26 GHz	ARA	SWH-28	1007	08/06/07
PreAmplifier 26-40 GHz	Miteq	NSP4000-SP2	924343	08/24/07
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	06/12/08
Preamp 30-1000MHz	Sonoma	310N	185623	01/20/08
Antenna, Bilog 30 MHz ~ 2 GHz	Sunol Sciences	JB1	A121003	08/13/07
Quasi-Peak Adaptor	Agilent / HP	85650A	3145A01654	01/21/08
SA RF Section, 1.5 GHz	Agilent / HP	85680B	2814A04227	01/07/08
SA Display Section 2	Agilent / HP	85662A	2816A16696	04/07/08
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	04/15/08
Preamplifier, 1 ~ 26.5 GHz	Agilent / HP	8449B	3008A00561	10/03/07
Preamplifier, 26 ~ 40 GHz	Miteq	NSP4000-SP2	924343	08/24/07
Antenna, Horn 18 ~ 26 GHz	ARA	MWH-1826/B	1049	08/06/07
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	04/11/08
Spectrum Analyzer	Agilent	E4446A	MY45300064	12/18/07
7.6 GHz High Pass Filter	Micro-Tronics	HPM13195	2	CNR
Power Meter	Agilent / HP	438B	3125U09516	06/02/08
Power Sensor 10MHz - 18GHz	Agilent / HP	8481A	2237A31744	04/30/08

7. LIMITS AND RESULTS

7.1.1. 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 11.4 dB (including 10 dB pad and 1.4 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Mode Main Antenna-2

Channel	Frequency (MHz)	Average Power (dBm)
Low	5500	17.82
Mid	5600	18.11
High	5700	18.04

802.11a Mode Auxilary Antenna

Channel	Frequency (MHz)	Average Power (dBm)
Low	5500	18.20
Middle	5600	17.88
High	5700	18.09

7.1.2. 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

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

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

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

LIMITS

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

RESULTS

No non-compliance noted:

Mode	MPE Distance (cm)	Output Power (dBm)	Antenna Gain (dBi)	Power Density (mW/cm^2)	Antenna Port
802.11a	20.0	18.11	2.97	0.03	Main Antenna-2
802.11a	20.0	18.20	2.78	0.02	Auxilary Antenna

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

7.2. RADIATED EMISSIONS

7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

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

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2] Above 38.6

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

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

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

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

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

TEST PROCEDURE

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

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

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

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

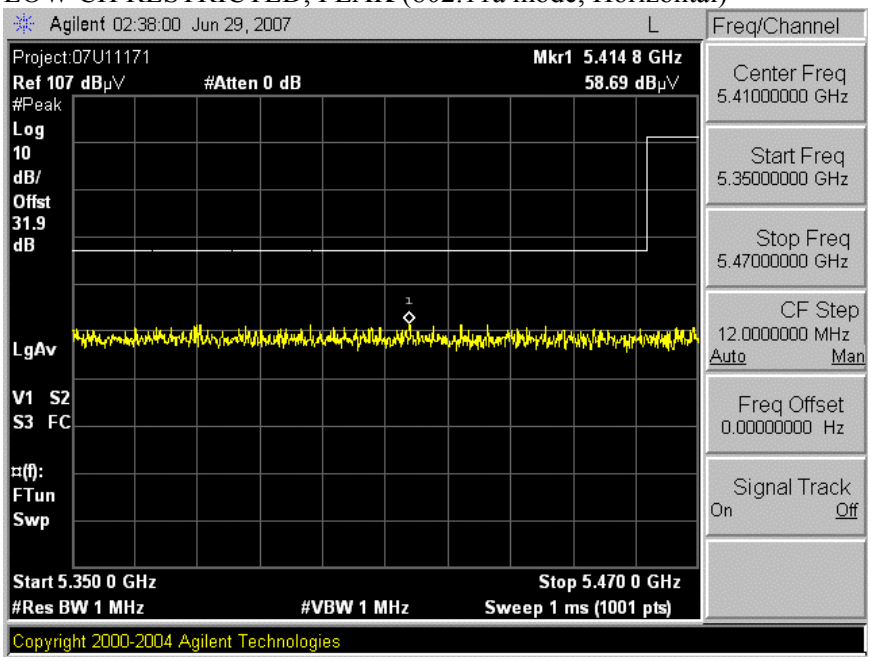
7.3. CHANNEL TESTS FOR THE 5470 TO 5725 MHz BAND

7.3.1. TRANSMITTER ABOVE 1 GHZ FOR 5470 TO 5725 MHz BAND

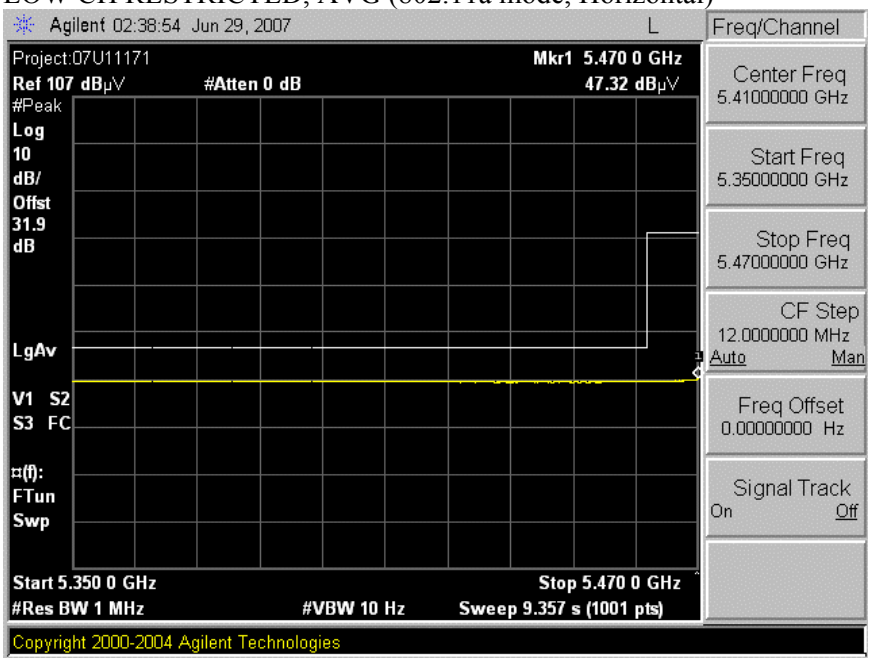
MAIN ANTENNA-2

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

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

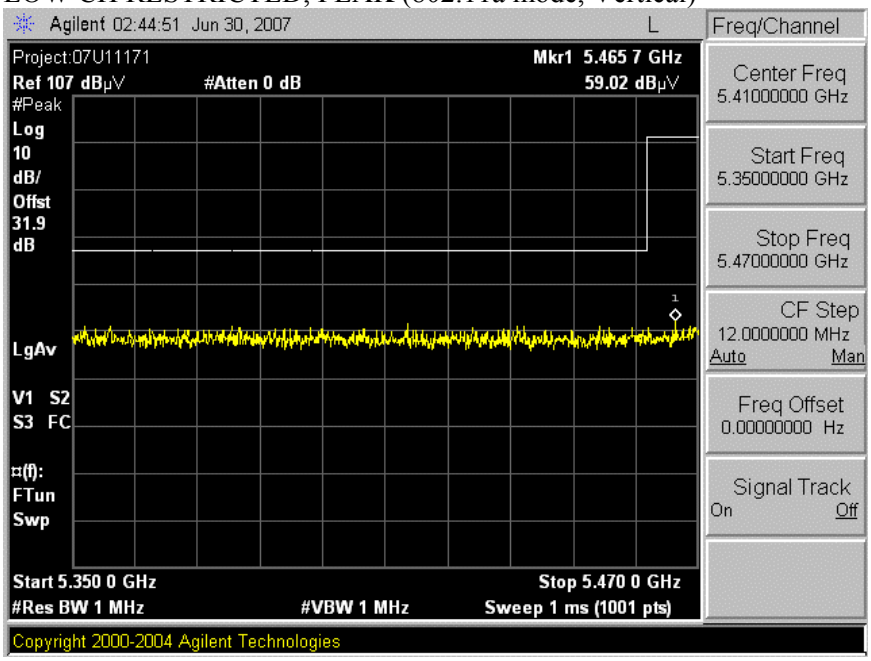


LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)

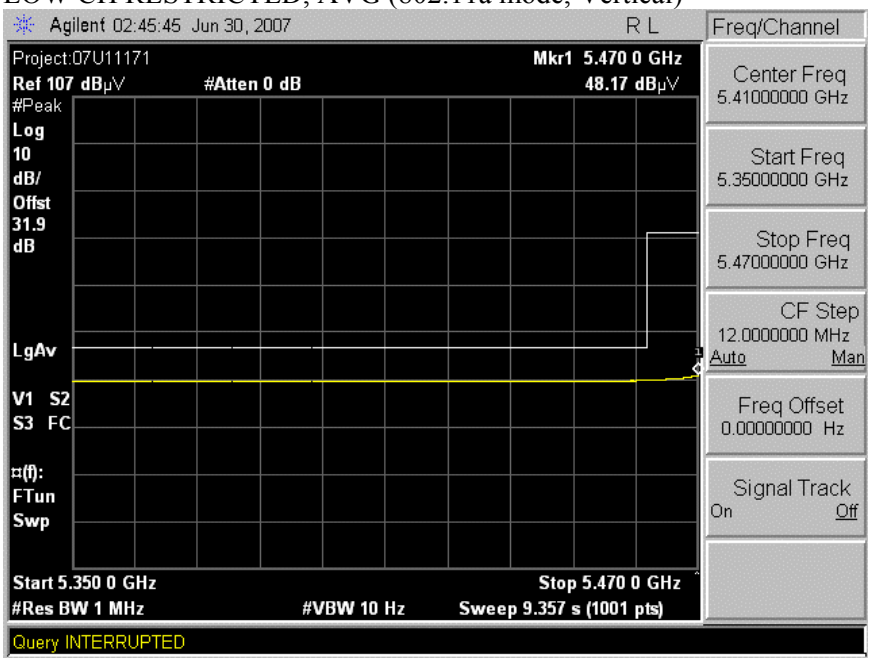


RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

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

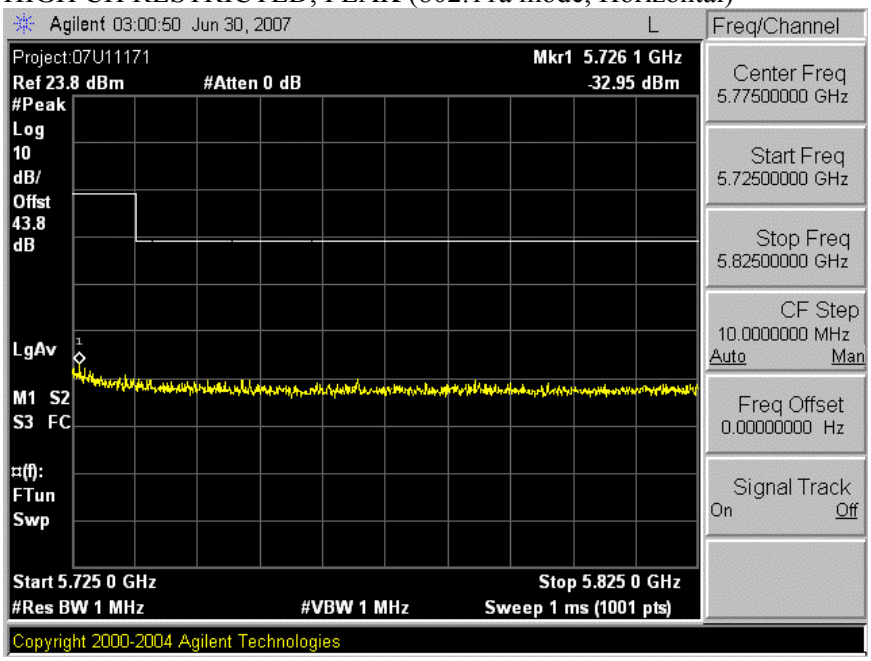


LOW CH RESTRICTED, AVG (802.11a mode, Vertical)

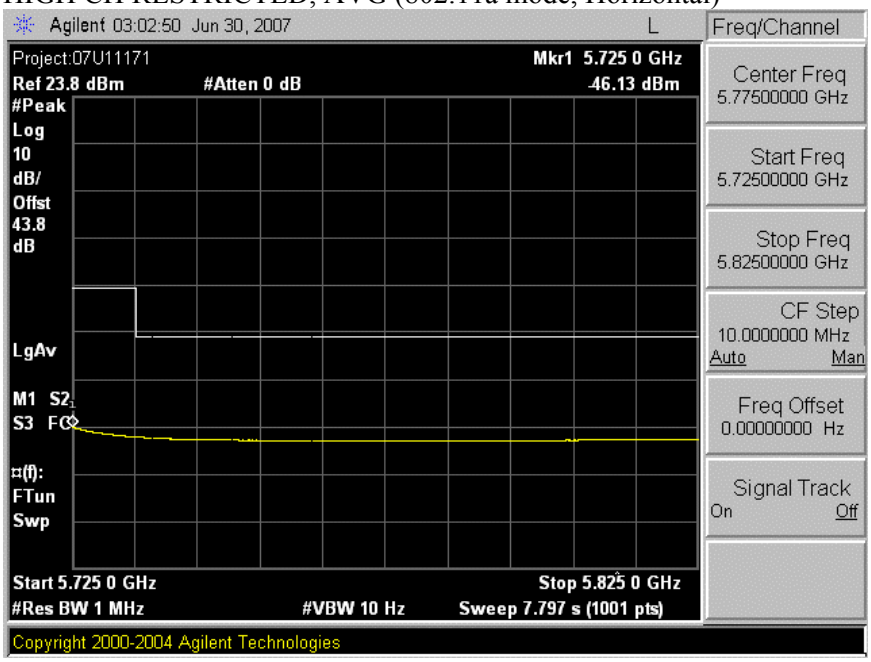


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

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

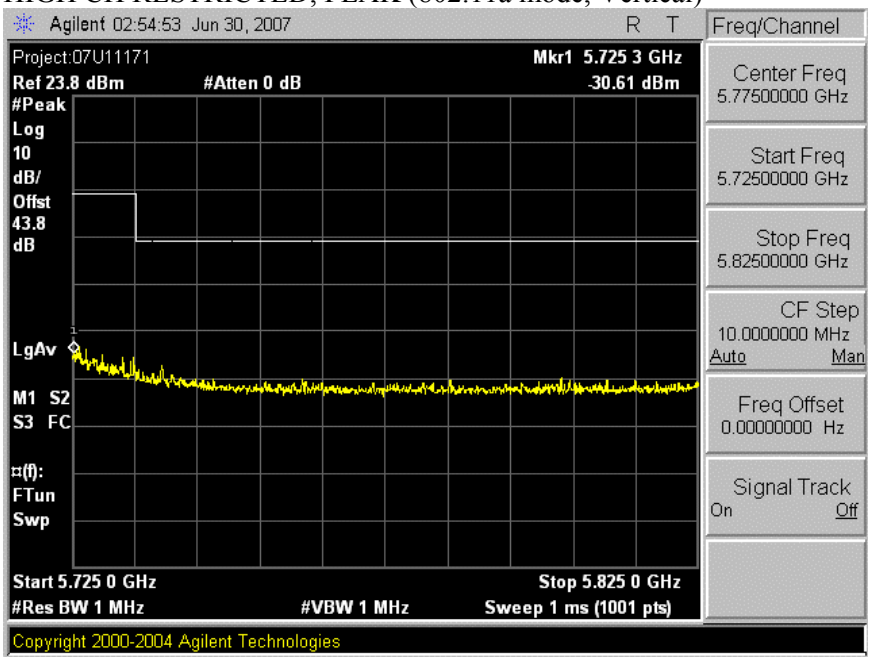


HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)

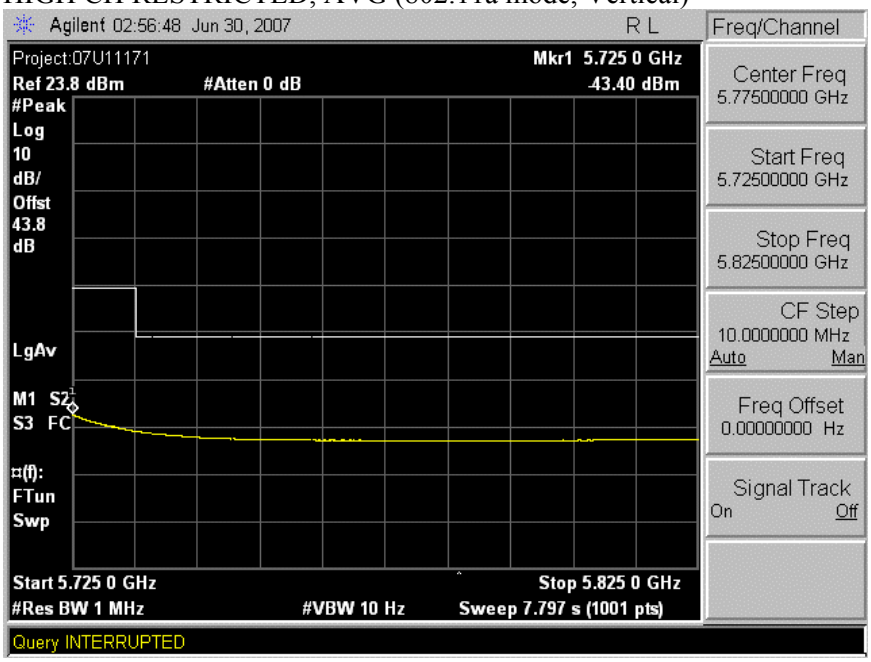


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company: ATHEROS
Project #: 07U11171
Date: 6/30/2007
Test Engineer: MENGISTU MEKURIA
Configuration: EUT ALONE (X61)
Mode: TX MODE

Test Equipment:

Horn 1-18GHz: T60; S/N: 2238 @3m
Pre-amplifer 1-: T144 Miteq 3008A00931
Pre-amplifer 26-: T88 Miteq 26-40GHz
Horn > 18GHz: T125; ARA 18-26GHz; S/N:1007

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

Peak Measurements
RBW=VBW=1MHz
Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	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 (5.5GHz)															
1.000	3.0	59.6	42.9	25.4	3.0	-39.5	0.0	0.0	48.5	31.8	74	54	-25.5	-22.2	V
1.360	3.0	49.5	34.1	26.3	3.5	-39.0	0.0	0.0	40.3	24.9	74	54	-33.7	-29.1	V
1.592	3.0	65.9	43.8	26.9	3.8	-38.6	0.0	0.0	57.9	35.8	74	54	-16.1	-18.2	V
1.664	3.0	51.9	33.8	27.1	3.9	-38.5	0.0	0.0	44.3	26.2	74	54	-29.7	-27.8	V
1.990	3.0	57.1	35.3	27.9	4.3	-38.1	0.0	0.0	51.2	29.4	74	54	-22.8	-24.6	V
11.000	3.0	41.8	28.8	37.3	11.1	-36.3	0.0	0.7	54.7	41.6	74	54	-19.3	-12.4	V
1.000	3.0	61.0	40.1	25.4	3.0	-39.5	0.0	0.0	50.0	29.0	74	54	-24.0	-25.0	H
1.595	3.0	62.1	36.1	26.9	3.8	-38.6	0.0	0.0	54.1	28.1	74	54	-19.9	-25.9	H
1.664	3.0	52.2	33.9	27.1	3.9	-38.5	0.0	0.0	44.6	26.3	74	54	-29.4	-27.7	H
1.995	3.0	54.4	33.4	27.9	4.3	-38.1	0.0	0.0	48.5	27.6	74	54	-25.5	-26.4	H
2.492	3.0	50.0	33.0	28.8	4.9	-37.5	0.0	0.0	46.3	29.2	74	54	-27.7	-24.8	H
2.987	3.0	49.5	30.6	30.4	5.3	-37.4	0.0	0.0	47.9	29.0	74	54	-26.1	-25.0	H
11.000	3.0	42.1	30.2	37.3	11.1	-36.3	0.0	0.7	55.0	43.1	74	54	-19.0	-10.9	H
Mid CH (5.6GHz)															
11.200	3.0	41.9	29.0	37.3	11.3	-36.1	0.0	0.7	55.2	42.3	74	54	-18.8	-11.7	V
11.200	3.0	42.5	30.3	37.3	11.3	-36.1	0.0	0.7	55.8	43.6	74	54	-18.2	-10.4	H
Mid CH (5.7GHz)															
11.400	3.0	41.7	28.2	37.4	11.5	-35.9	0.0	0.7	55.4	41.9	74	54	-18.6	-12.1	V
11.400	3.0	42.1	30.3	37.4	11.5	-35.9	0.0	0.7	55.8	44.0	74	54	-18.2	-10.0	H

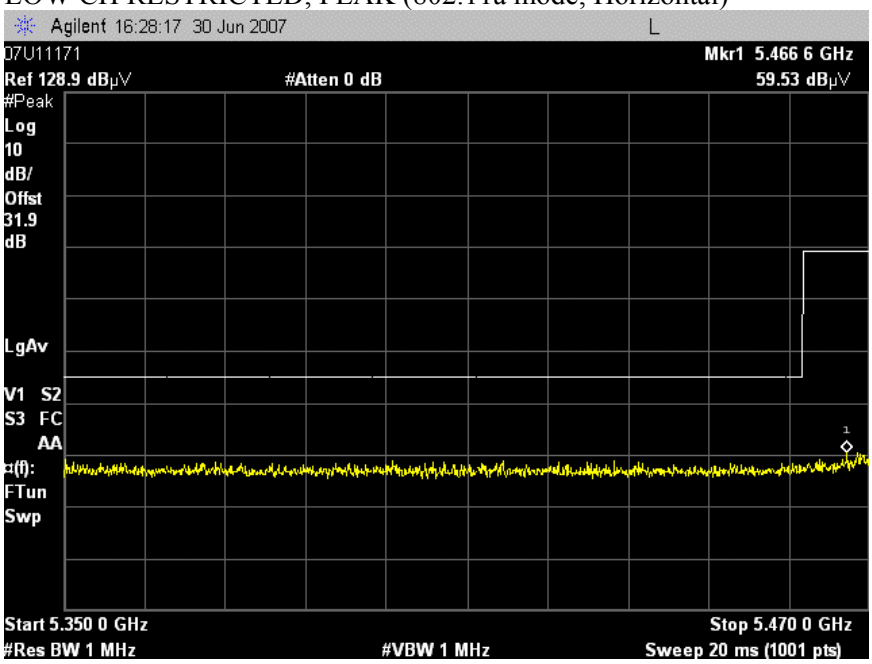
Rev. 4.12.7

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		

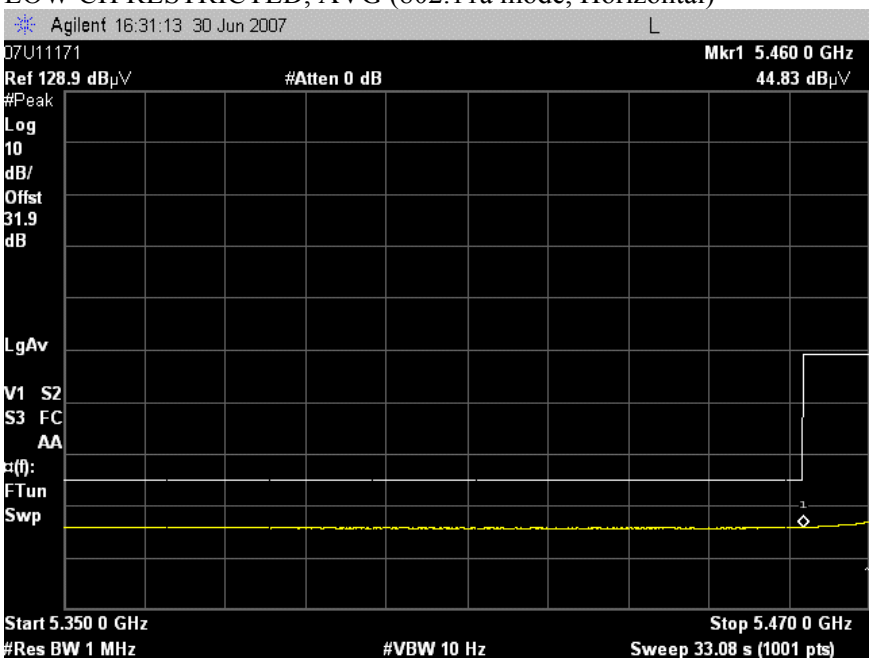
AUXILARY ANTENNA

RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)

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

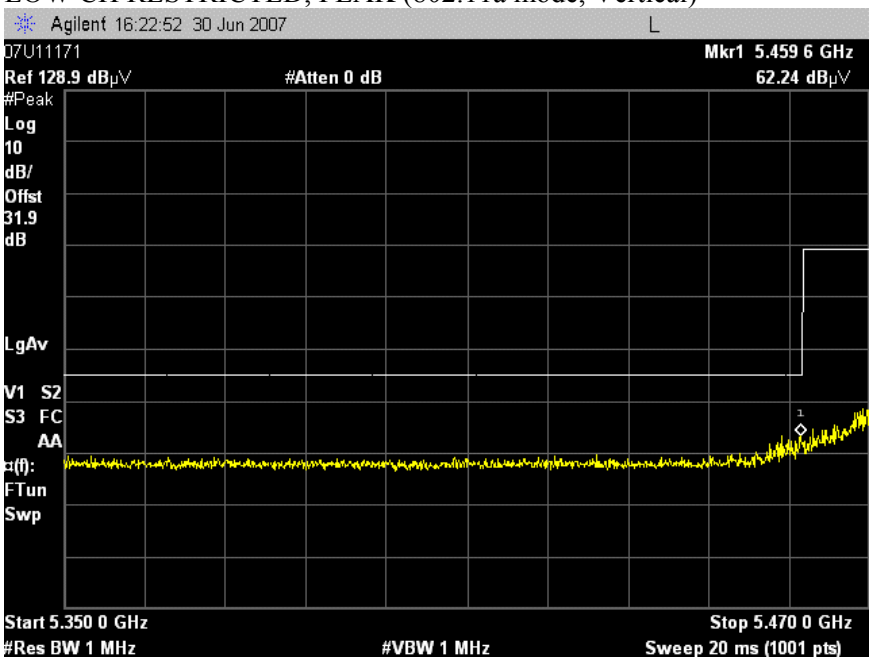


LOW CH RESTRICTED, AVG (802.11a mode, Horizontal)



RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)

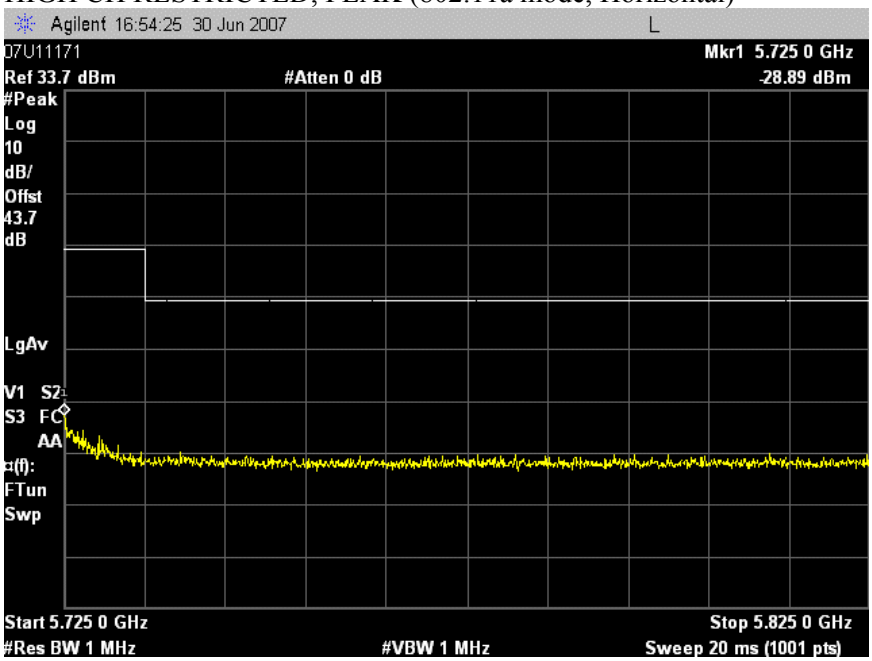
LOW CH RESTRICTED, PEAK (802.11a mode, Vertical)



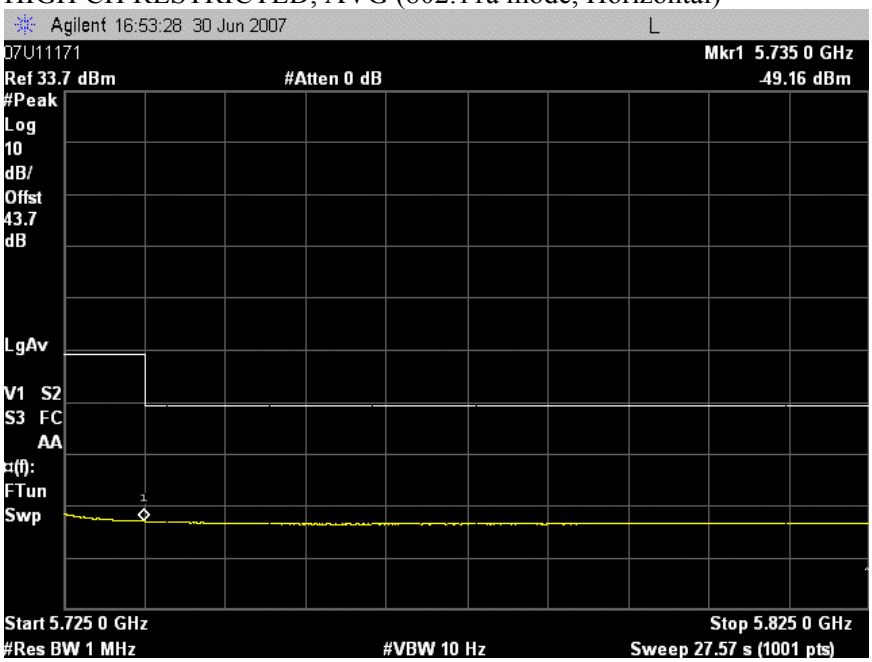
LOW CH RESTRICTED, AVG (802.11a mode, Vertical)

RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)

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

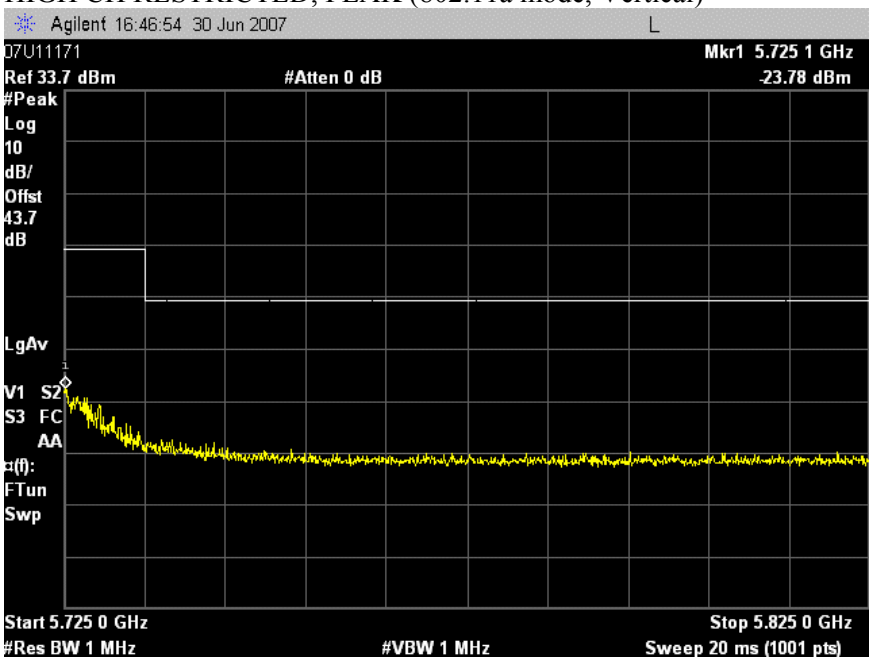


HIGH CH RESTRICTED, AVG (802.11a mode, Horizontal)

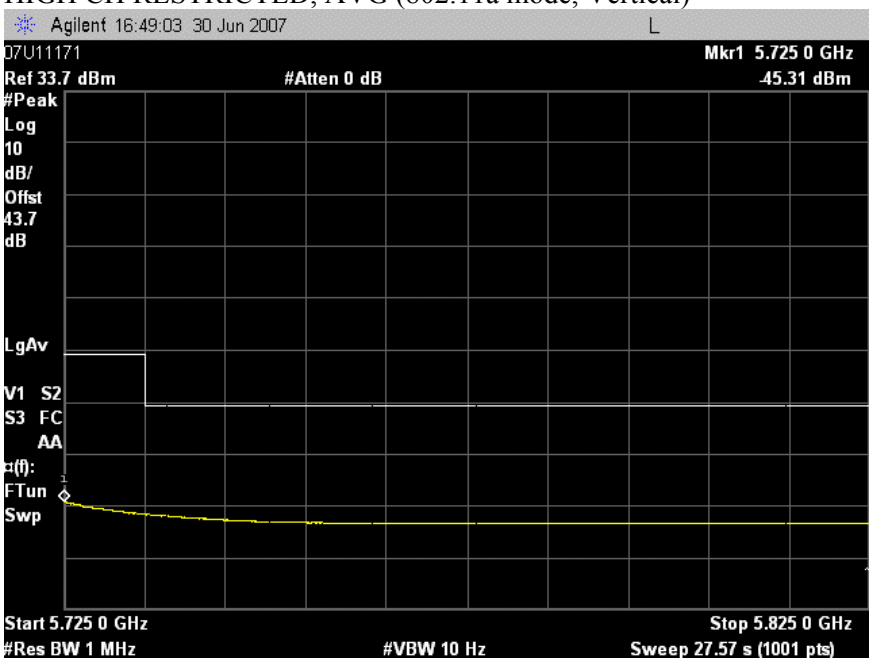


RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
Compliance Certification Services, Fremont 5m Chamber

Company:	Atheros
Project #:	07U11171
Date:	06/30/07
Test Engineer:	Frank Ibrahim
Configuration:	EUT installed inside a host Laptop PC.
Mode:	Transmitting at target power.
S/N:	LV-00161
Conducted AV Power:	18.2 dBm for LowCH, 17.88 dBm for MidCH, and 18.09 dBm for HighCH

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-	Pre-amplifer 26-	Horn > 18GHz
T73; S/N: 6717 @3m	T145 Agilent	T88 Miteq 26-40GHz	T89; ARA 18-26GHz; S/N:1049

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter
		B-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)
Low Channel (5.5 GHz)															
1.000	3.0	52.84	36.22	23.8	3.2	-36.2	0.0	0.0	43.72	27.10	74	54	-30.28	-26.90	V
1.300	3.0	52.96	49.62	24.9	3.6	-35.9	0.0	0.0	45.54	42.20	74	54	-28.46	-11.80	V
1.665	3.0	57.15	32.39	26.2	4.1	-35.6	0.0	0.0	51.80	27.04	74	54	-22.20	-26.96	V
2.493	3.0	46.25	29.95	28.6	5.1	-35.1	0.0	0.0	44.83	28.53	74	54	-29.17	-25.47	V
11.000	3.0	37.91	24.59	37.2	11.3	-33.8	0.0	0.7	53.47	40.15	74	54	-20.53	-13.85	V
1.000	3.0	55.61	35.34	23.8	3.2	-36.2	0.0	0.0	46.49	26.22	74	54	-27.51	-27.78	H
1.327	3.0	56.81	32.64	25.0	3.7	-35.9	0.0	0.0	49.55	25.38	74	54	-24.45	-28.62	H
1.662	3.0	60.63	33.46	26.2	4.1	-35.6	0.0	0.0	55.27	28.10	74	54	-18.73	-25.90	H
2.325	3.0	48.76	29.11	28.1	5.0	-35.1	0.0	0.0	46.71	27.06	74	54	-27.29	-26.94	H
2.496	3.0	52.00	32.52	28.6	5.1	-35.1	0.0	0.0	50.59	31.11	74	54	-23.41	-22.89	H
11.000	3.0	39.49	26.38	37.2	11.3	-33.8	0.0	0.7	55.05	41.94	74	54	-18.95	-12.06	H
Mid Channel (5.6 GHz)															
11.200	3.0	35.74	22.54	37.3	11.5	-33.5	0.0	0.7	51.85	38.65	74	54	-22.15	-15.35	V
11.200	3.0	37.38	23.74	37.3	11.5	-33.5	0.0	0.7	53.49	39.85	74	54	-20.51	-14.15	H
High Channel (5.7 GHz)															
11.400	3.0	40.12	27.34	37.4	11.8	-33.2	0.0	0.7	56.78	44.00	74	54	-17.22	-10.00	V
11.400	3.0	39.86	27.04	37.4	11.8	-33.2	0.0	0.7	56.52	43.70	74	54	-17.48	-10.30	H

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		

Note: EUT was scanned from 1 GHz to 40 GHz, no other emissions from the EUT were detected above the system noise floor.

7.3.2. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

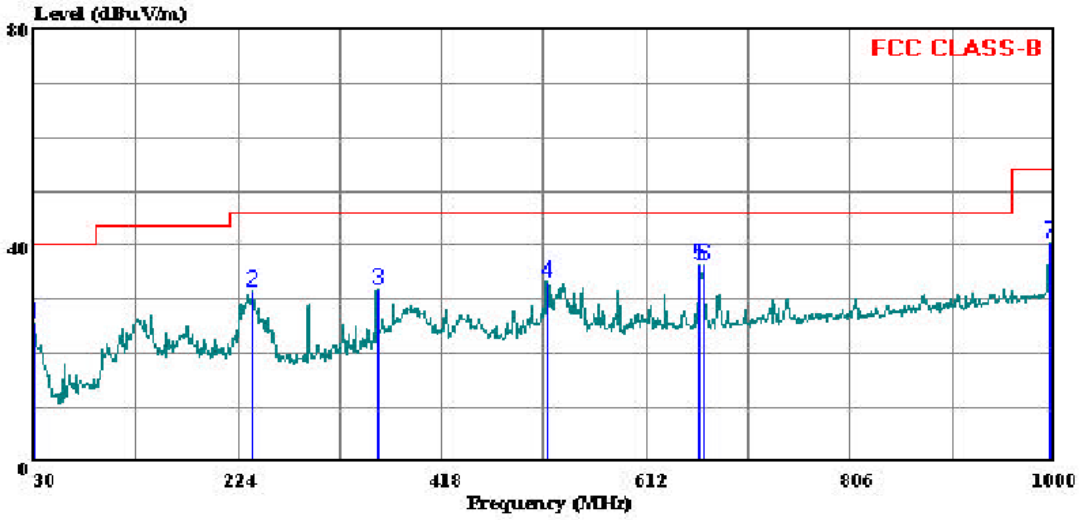
MAIN ANTENNA-2

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

HORIZONTAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 4 File#: 07U11171emi.EMI Date: 07-02-2007 Time: 18:38:48



Trace: 3 Ref Trace:

Condition: FCC CLASS-B 3m B-5M CHAMBER 012007 HORIZONTAL
Engineer : Mengistu Mekuria
Company : Atheros
Project #: 07U11171
Test Configuration:: EUT installed in a host Laptop, and
: using Main antenna as Tx ant.
Mode of operation: : Transmitting in 11a mode, @ Low channel
Test Target: : FCC Class B

HORIZONTAL DATA

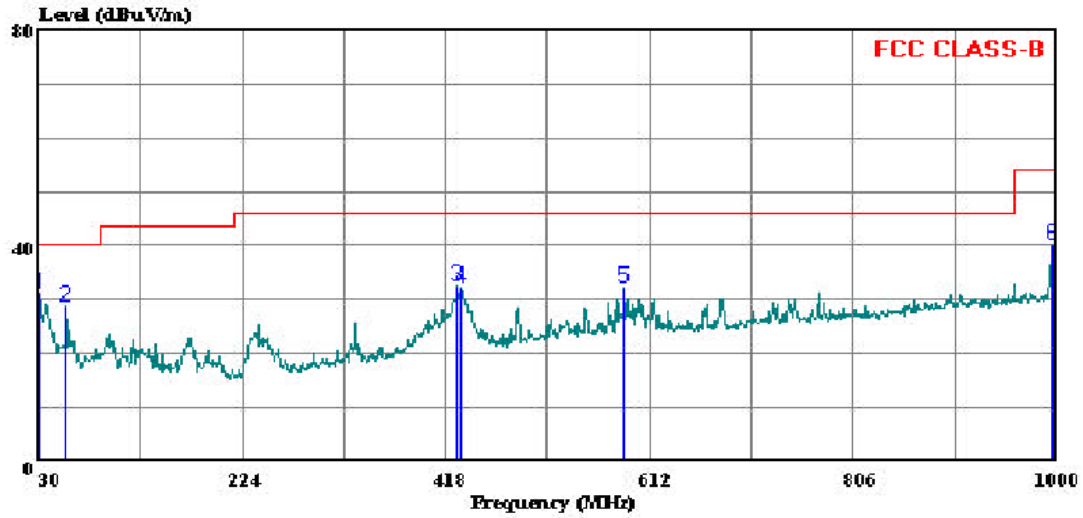
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	34.60	-9.13	25.47	40.00	-14.53	Peak
2	236.610	49.80	-18.22	31.58	46.00	-14.42	Peak
3	356.890	46.10	-14.24	31.86	46.00	-14.14	Peak
4	518.880	44.30	-11.01	33.29	46.00	-12.71	Peak
5	663.410	45.40	-9.01	36.39	46.00	-9.61	Peak
6	666.320	45.20	-8.94	36.26	46.00	-9.74	Peak
7	996.120	43.50	-2.91	40.59	54.00	-13.41	Peak

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

VERTICAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 2 File#: 07U11171emi.EMI Date: 07-02-2007 Time: 18:27:10



Trace: 1 Ref Trace:

Condition: FCC CLASS-B 3m B-5M CHAMBER 012007 VERTICAL
Engineer : Mengistu Mekuria
Company : Atheros
Project #: 07U11171
Test Configuration:: EUT installed in a host Laptop, and
: using Main antenna as Tx ant.
Mode of operation: : Transmitting in 11a mode, @ Low channel
Test Target: : FCC Class B

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	40.20	-9.13	31.07	40.00	-8.93	Peak
2	55.220	51.60	-22.83	28.77	40.00	-11.23	Peak
3	428.670	45.30	-12.77	32.53	46.00	-13.47	Peak
4	431.580	44.90	-12.59	32.31	46.00	-13.69	Peak
5	587.750	42.20	-10.08	32.12	46.00	-13.88	Peak
6	996.120	43.10	-2.91	40.19	54.00	-13.81	Peak

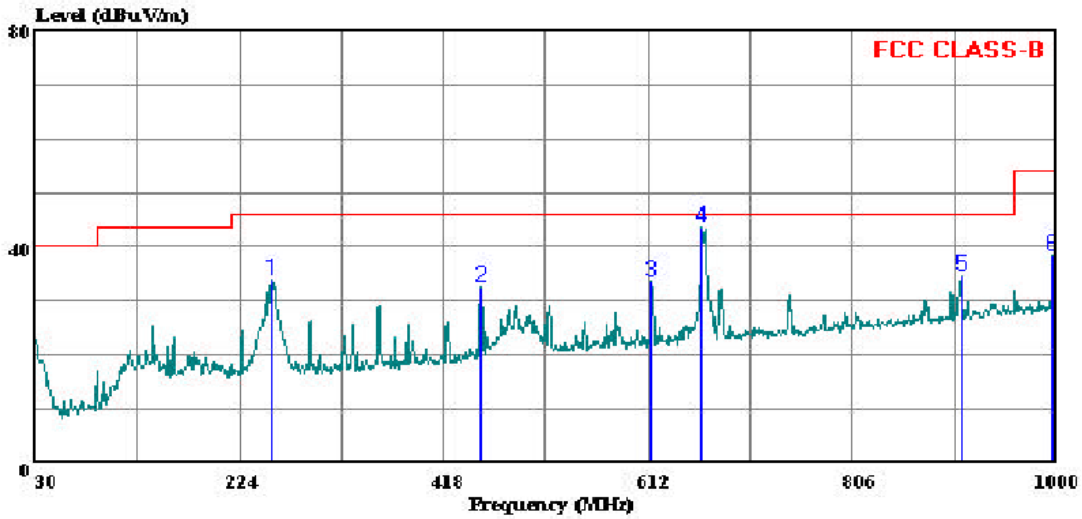
AUXILARY ANTENNA

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

HORIZONTAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 2 File#: rad 0630.EMI Date: 06-30-2007 Time: 18:39:29



Trace: 1 Ref Trace:

Condition: FCC CLASS-B 3m B-5M CHAMBER 012007 HORIZONTAL
Engineer: : Frank Ibrahim
Company: : Atheros
Project #: : 07U11171
Test Configuration:: EUT installed in a host Laptop PC, and
: using Aux antenna as transmitting ant.
Mode of operation: : Transmitting in 11a mode, @ high channel
Test Target: : FCC Class B
S/N: : LV-00161

HORIZONTAL DATA

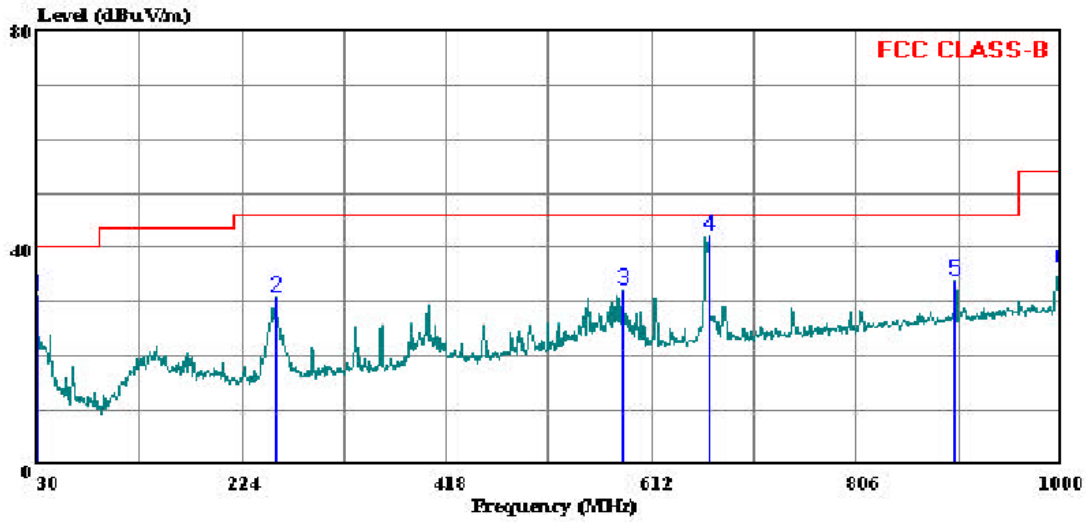
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	255.040	51.40	-17.54	33.86	46.00	-12.14	Peak
2	452.920	44.90	-12.22	32.68	46.00	-13.32	Peak
3	614.910	43.10	-9.64	33.46	46.00	-12.54	Peak
4	663.410	52.60	-9.01	43.59	46.00	-2.41	Peak
5	909.790	39.20	-4.72	34.48	46.00	-11.52	Peak
6	996.120	41.50	-2.91	38.59	54.00	-15.41	Peak

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

VERTICAL PLOT

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 4 File#: rad 0630.EMI Date: 06-30-2007 Time: 18:50:29



Trace: 3 Ref Trace:

Condition: FCC CLASS-B 3m B-5M CHAMBER 012007 VERTICAL
Engineer : Frank Ibrahim
Company : Atheros
Project #: 07U11171
Test Configuration:: EUT installed in a host Laptop PC, and
: using Aux antenna as transmitting ant.
Mode of operation: : Transmitting in 11a mode, @ high channel
Test Target: : FCC Class B
S/N: : LV-00161

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	40.20	-9.13	31.07	40.00	-8.93	Peak
2	256.010	48.30	-17.53	30.77	46.00	-15.23	Peak
3	584.840	42.40	-10.08	32.32	46.00	-13.68	Peak
4	666.320	51.20	-8.94	42.26	46.00	-3.74	Peak
5	900.090	38.80	-4.77	34.03	46.00	-11.97	Peak
6	999.030	38.80	-2.91	35.89	54.00	-18.11	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal.

The lower limit applies at the boundary between the frequency ranges.

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 resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

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

RESULTS

No non-compliance noted:

6 WORST EMISSIONS

MAIN ANTENNA-2

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	50.02	--	37.48	0.00	63.45	53.45	-13.43	-15.97	L1
0.48	40.14	--	28.98	0.00	56.36	46.36	-16.22	-17.38	L1
5.08	40.68	--	31.68	0.00	60.00	50.00	-19.32	-18.32	L1
0.21	50.30	--	33.80	0.00	63.41	53.41	-13.11	-19.61	L2
0.48	38.48	--	30.42	0.00	56.32	46.32	-17.84	-15.90	L2
5.17	42.44	--	32.07	0.00	60.00	50.00	-17.56	-17.93	L2
6 Worst Data									

AUXILARY ANTENNA

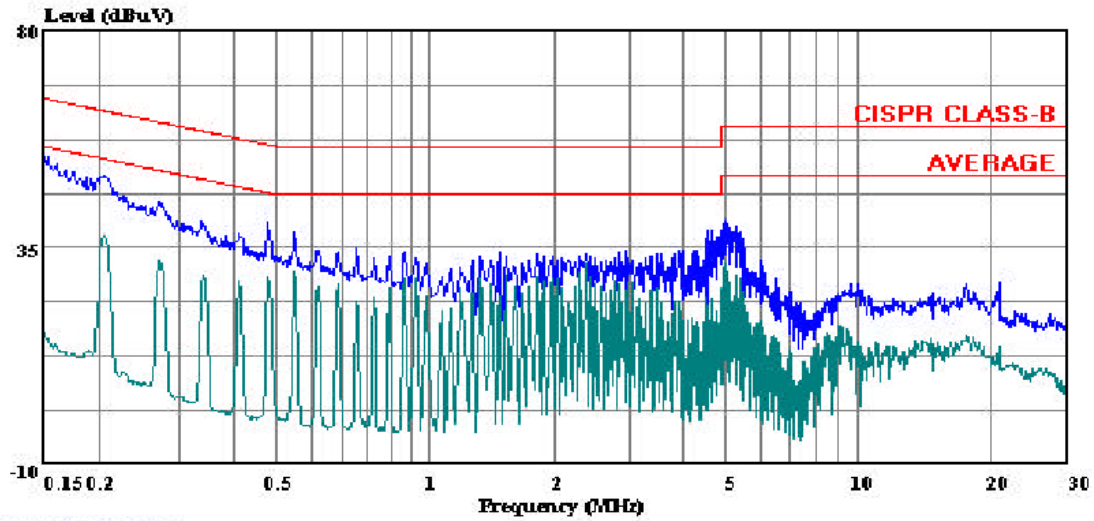
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.21	54.94	--	39.17	0.00	63.28	53.28	-8.34	-14.11	L1
0.26	48.37	--	35.64	0.00	61.46	51.46	-13.09	-15.82	L1
13.84	41.28	--	28.04	0.00	60.00	50.00	-18.72	-21.96	L1
0.19	51.76	--	36.98	0.00	64.17	54.17	-12.41	-17.19	L2
0.25	45.04	--	33.51	0.00	61.79	51.79	-16.75	-18.28	L2
14.52	40.90	--	27.14	0.00	60.00	50.00	-19.10	-22.86	L2
6 Worst Data									

MAIN ANTENNA-2

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 14 File#: 07U11171 LC.EMI Date: 07-02-2007 Time: 19:15:06



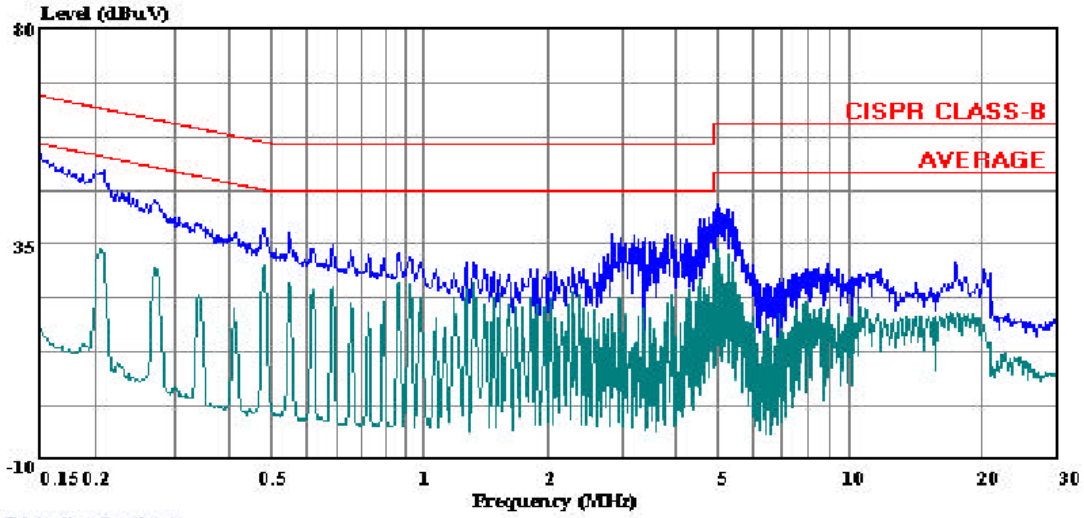
Trace: 12 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 07U11171
Company: : Atheros
Configuration:: EUT Instolled inside Host Laptop (X61)
Mode: : Tx Mode @ Mid Ch
Target: : FCC CLASS B
Voltage: : 115VAC/60Hz
: L1:Peak(Blue), Avg(Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 7 File#: 07U11171 LC.EMI Date: 07-02-2007 Time: 18:57:12



(Line Conduction)

Trace: 5 Ref Trace:

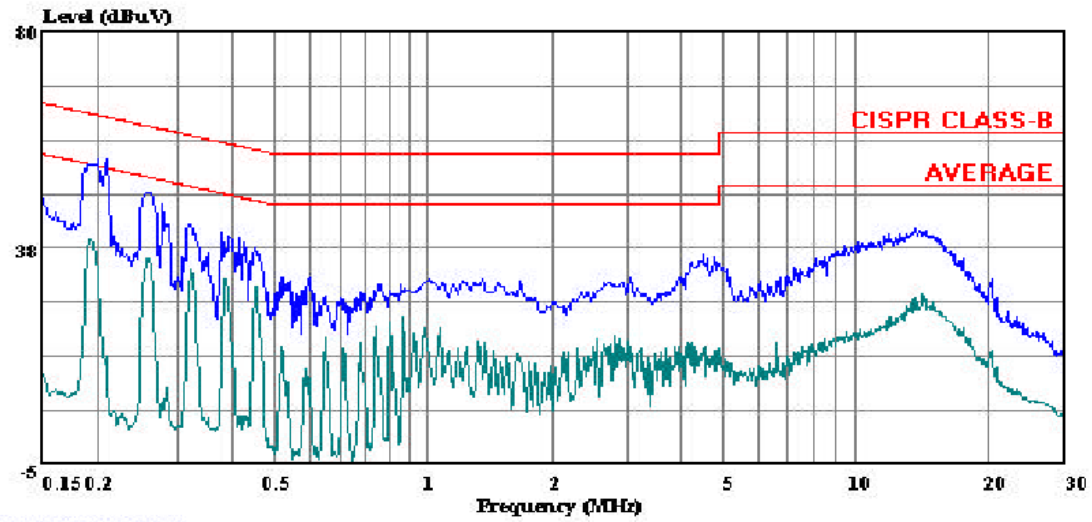
Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 07U11171
Company: : Atheros
Configuration:: EUT Instolled inside Host Laptop (X61)
Mode: : Tx Mode @ Mid Ch
Target: : FCC CLASS B
Voltage: : 115VAC/60Hz
: L2:Peak(Blue), Avg(Green)

AUXILARY ANTENNA

LINE 1 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 21 File#: 07U11171 LC.EMI Date: 07-02-2007 Time: 22:42:48



(Line Conduction)

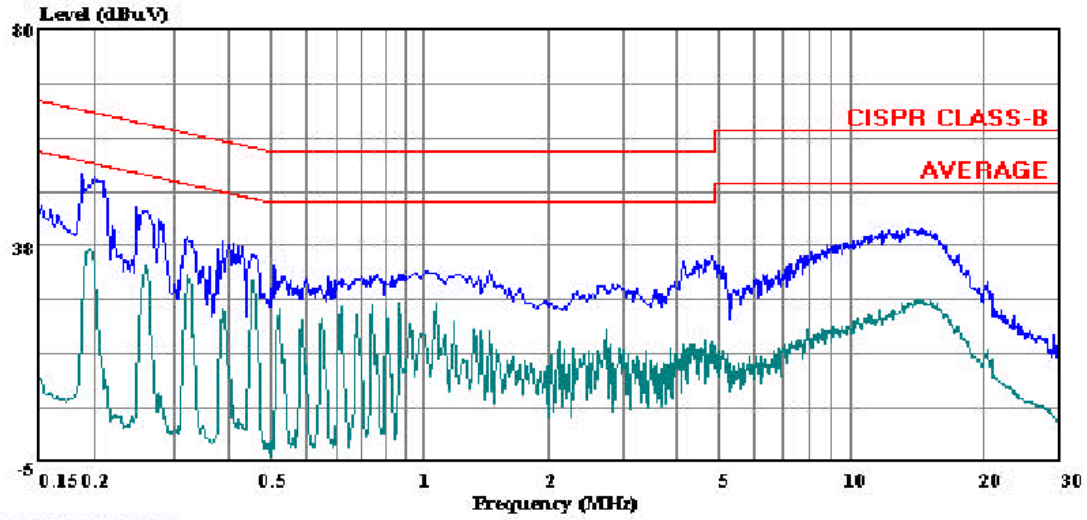
Trace: 19 Ref Trace:

Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 07U11171
Company: : Atheros
Configuration:: EUT Instolled inside Host Laptop (X60)
Mode: : Tx Mode @ Mid Ch
Target: : FCC CLASS B
Voltage: : 115VAC/60Hz
: L1:Peak(Blue), Avg(Green)

LINE 2 RESULTS

Compliance Certification Services
47173 Benicia Street
Fremont, CA 94538
Tel: (510) 771-1000
Fax: (510) 661-0888

Data#: 28 File#: 07U11171 LC.EMI Date: 07-02-2007 Time: 22:59:27



(Line Conduction)

Trace: 26 Ref Trace:

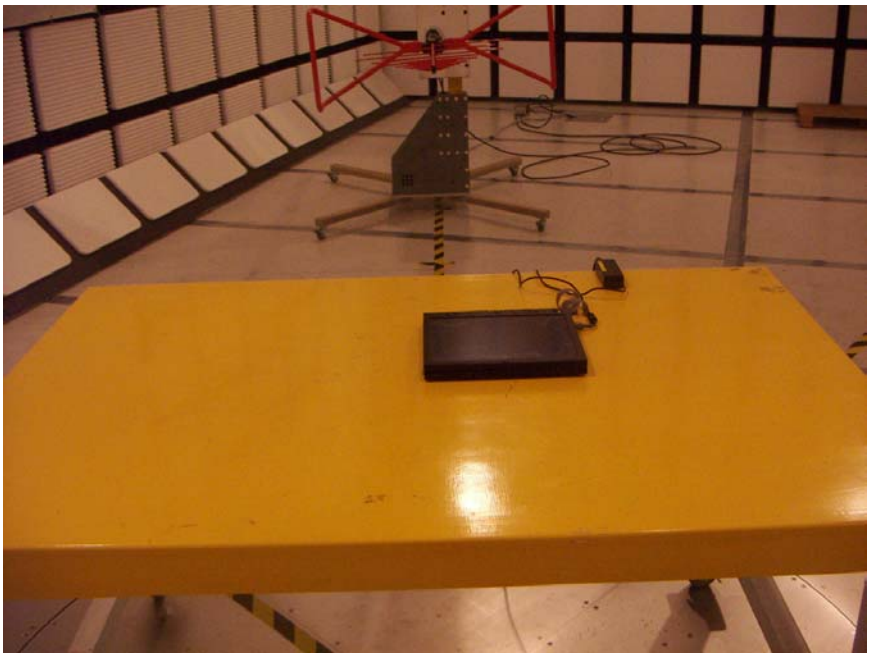
Condition: CISPR CLASS-B
Test Operator:: Mengistu Mekuria
Project #: : 07U11171
Company: : Atheros
Configuration:: EUT Instolled inside Host Laptop (X60)
Mode: : Tx Mode @ Mid Ch
Target: : FCC CLASS B
Voltage: : 115VAC/60Hz
: L2:Peak(Blue), Avg(Green)

8. SETUP PHOTOS

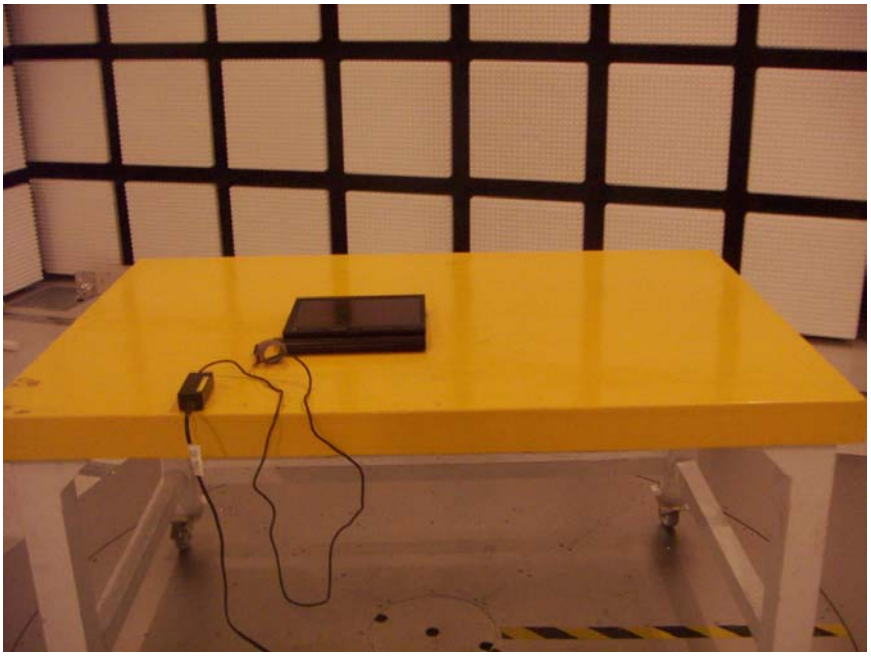
MAIN ANTENNA-2

RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

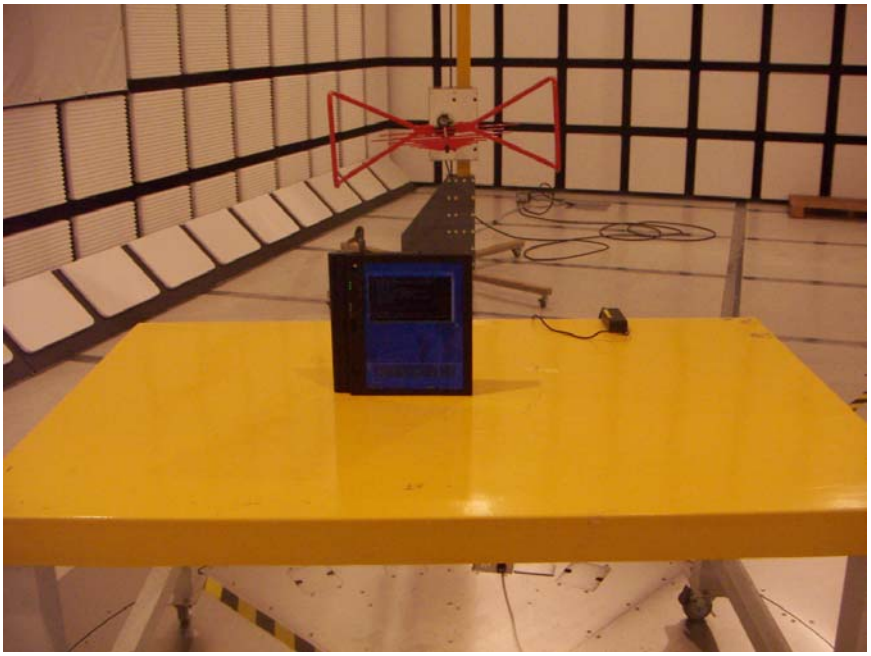
X-AXIS FRONT PHOTO



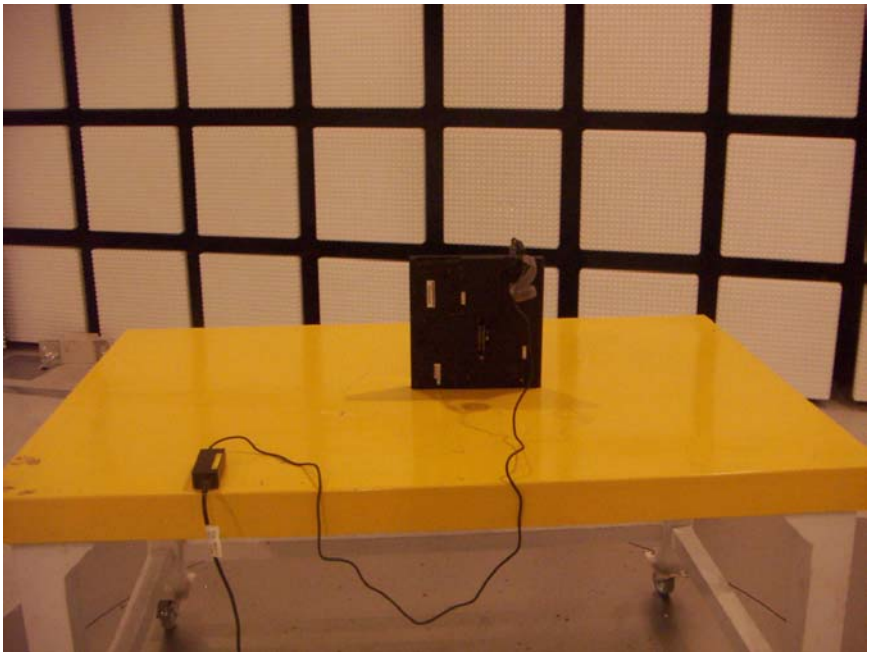
X-AXIS BACK PHOTO



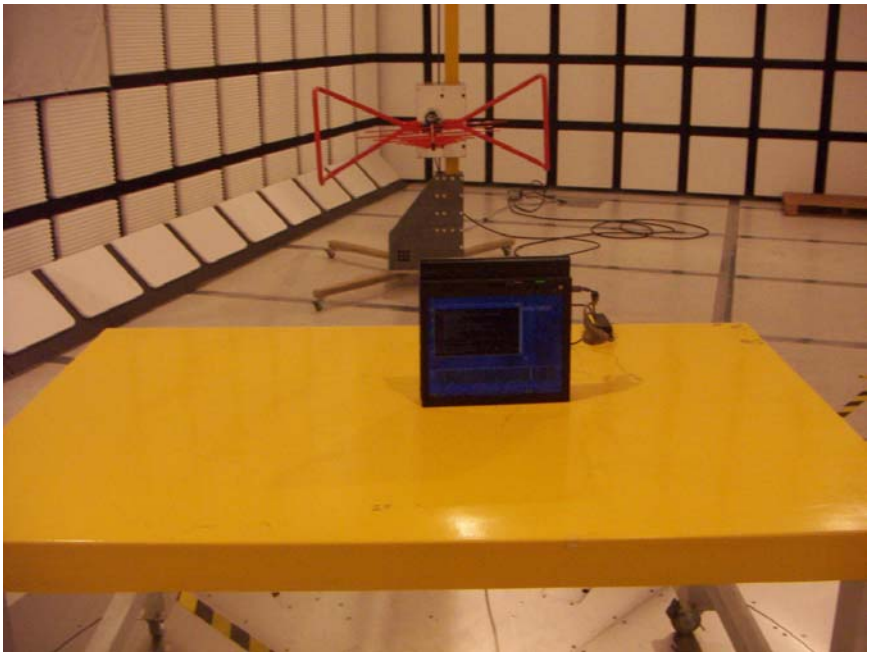
Y-AXIS FRONT PHOTO



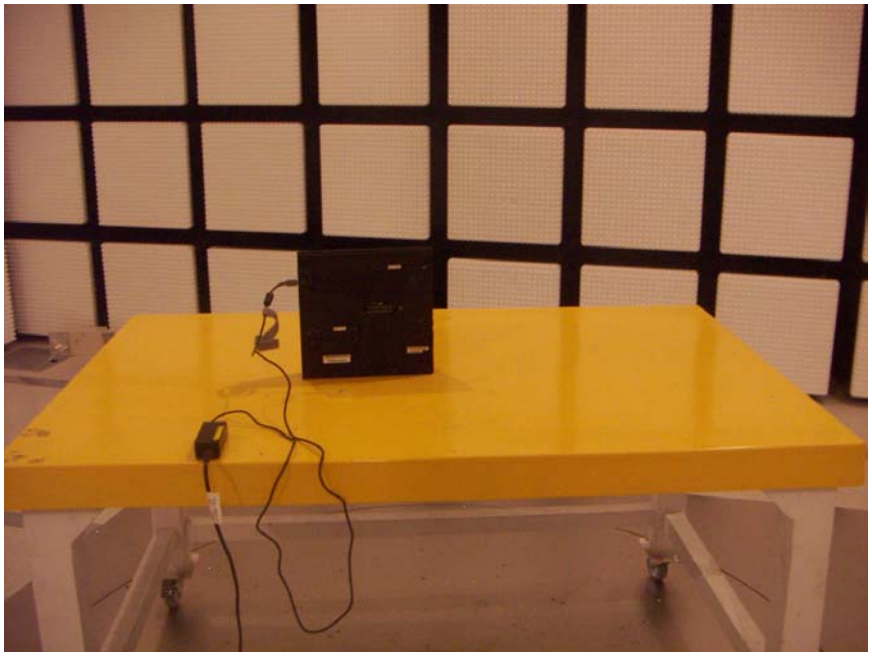
Y-AXIS BACK PHOTO



Z-AXIS FRONT PHOTO



Z-AXIS BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

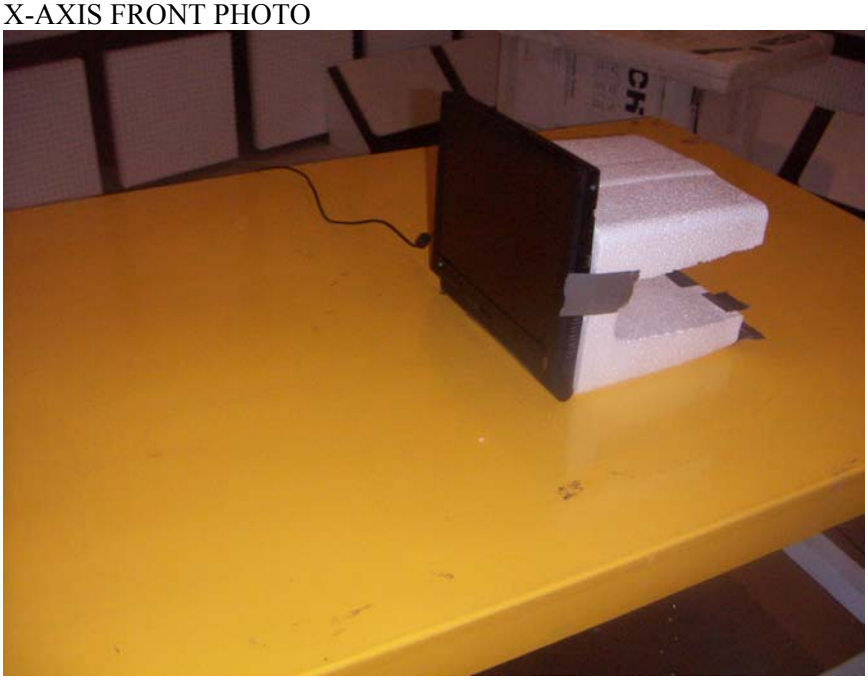
LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

AUXILARY ANTENNA

RADIATED RF MEASUREMENT SETUP FOR PORTABLE CONFIGURATION

X-AXIS FRONT PHOTO

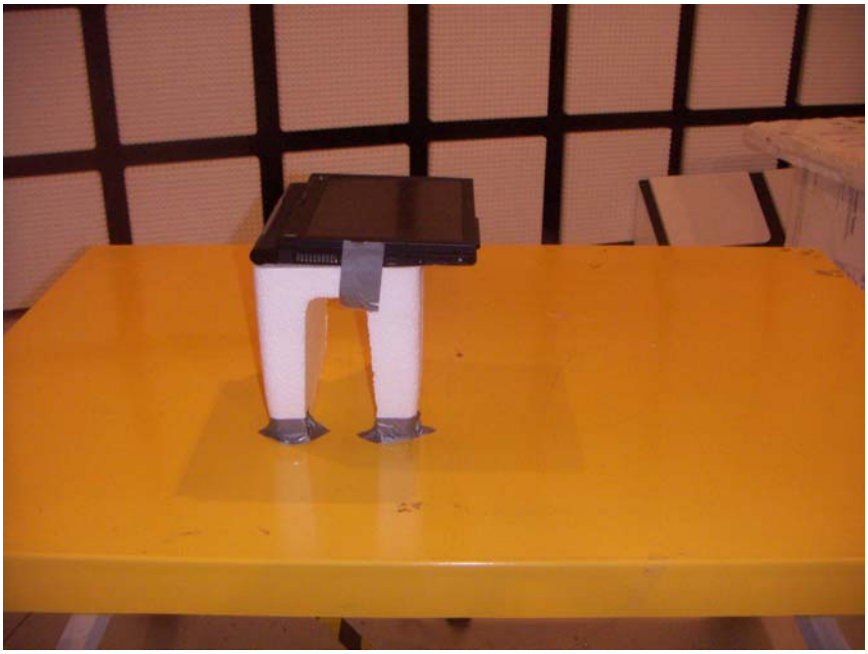


X-AXIS BACK PHOTO

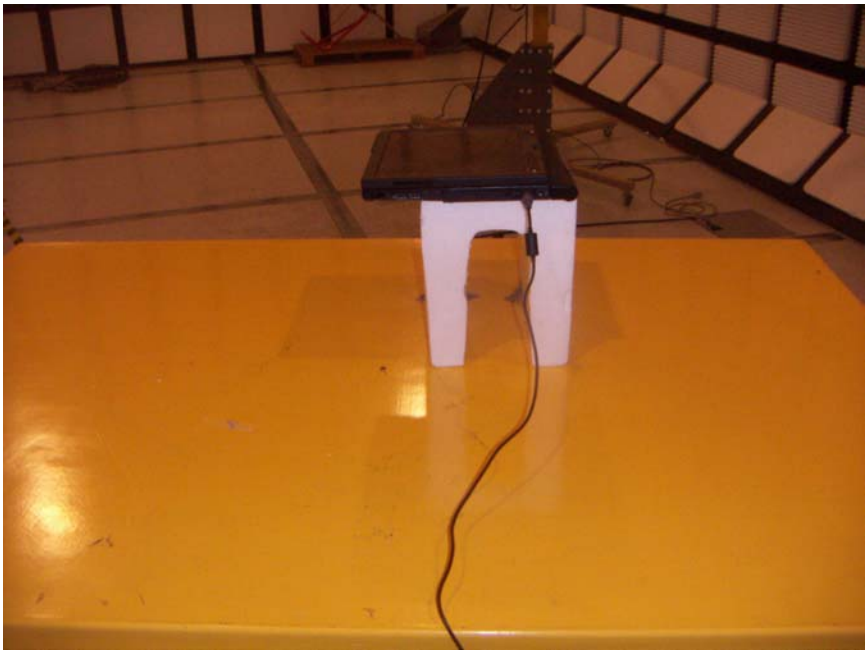
Y-AXIS FRONT PHOTO

Y-AXIS BACK PHOTO

Z-AXIS FRONT PHOTO

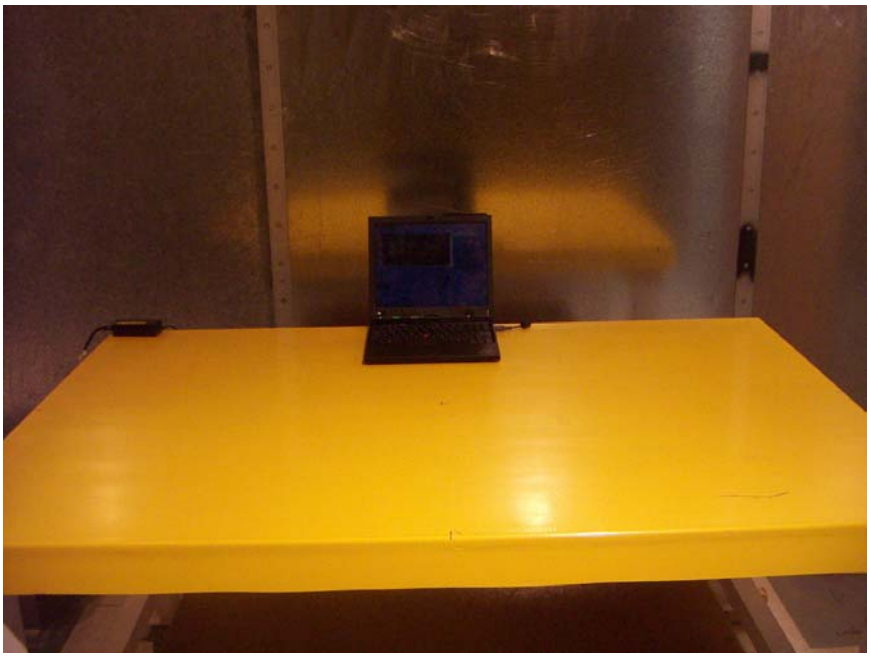


Z-AXIS BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO

END OF REPORT