



**FCC CFR47 CERTIFICATION
CLASS II PERMISSIVE CHANGE
TEST REPORT**

FOR

2.4 & 5 GHz 802.11 MINICARD

MODEL NUMBER: AR5BXB72

FCC ID: PPD-AR5BXB72-L

REPORT NUMBER: 06U10634-1

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Prepared for

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Prepared by

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NVLAP[®]

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Revision History

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: Atheros Communications, Inc.
5480 Great America Parkway
Santa Clara, CA 95054, USA

EUT DESCRIPTION: 2.4 & 5 GHz 802.11 Minicard

MODEL: AR5BXB72

DATE TESTED: October 02 - 10, 2006

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:

Tested By:



EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

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 AR5BXB72 is designed for 802.11a/b/g/n applications using the AR541X/51XX chipset. It has three receive chains and two transmit chains, implemented with two outside chains (Chain 0 and 2) as Tx/Rx and the middle chain (chain 1) as Rx only.

5.2. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

Both models AR5BXB72 and AR5BXB72-L are identical product and same hardware configuration, it just for the marketing purpose only.

5.3. CLASS II PERMISSIVE CHANGE DESCRIPTION

Installed 2.4 & 5 GHz 802.11 Minicard (WLAN FCC ID: PPD-AR5BXB72-L) in tablet laptop (LENOVO ThinkPad X60 Tablet_1.0 SIV A).

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a set of three identical PIFA antennas with maximum gain is 1.52 dBi in the 2.4 GHz band and 2.13 dBi in the 5.8 GHz band

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed in the host support equipment during testing was AR5002, ANWI Diagnostic Kernel Drive.

The test utility software used during testing was Art Software Revision 4 Build # 7 Art 11n.

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case data rates are determined to be as follows for each mode, based on the investigations by measuring the average power, peak power and PPSD across all the data rates, bandwidths, modulations and spatial stream modes.

Thus all emissions tests were made with following data rates:

- 802.11b mode, 20 MHz Channel Bandwidth, 1 Mb/s, CCK Modulation, Spatial Stream 1.
- 802.11g mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream
- 802.11a mode, 20 MHz Channel Bandwidth, 9 Mb/s, OFDM Modulation, Spatial Stream
- 802.11n HT20 mode, 20 MHz Channel Bandwidth, MCS0, 6.5 Mb/s, OFDM Modulation, Spatial Stream 1.
- 802.11n HT40 mode, 40 MHz Channel Bandwidth, MCS0, 13.5 Mb/s, OFDM Modulation, Spatial Stream 1.

The worst-case configuration for tests below 1 GHz is the mode and channel with the highest power: 802.11b mode, mid channel.

The portable configuration at Z-Axis has the worst field strength emissions for both portable & mobile configurations. So, all radiated emissions tests were performed at Z-axis portable configuration.

Baseline testing demonstrated that the Power Spectral Density as measured through a combiner with both chains operating simultaneously is less than the sum of the Power Spectral Density of each individual chain when added linearly.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	Lenovo	ThinkPad X60 Tablet 1.0 SIV B	91B52	N/A
Laptop	Lenovo	ThinkPad X60 Tablet 1.0 SIV A	91A14	N/A

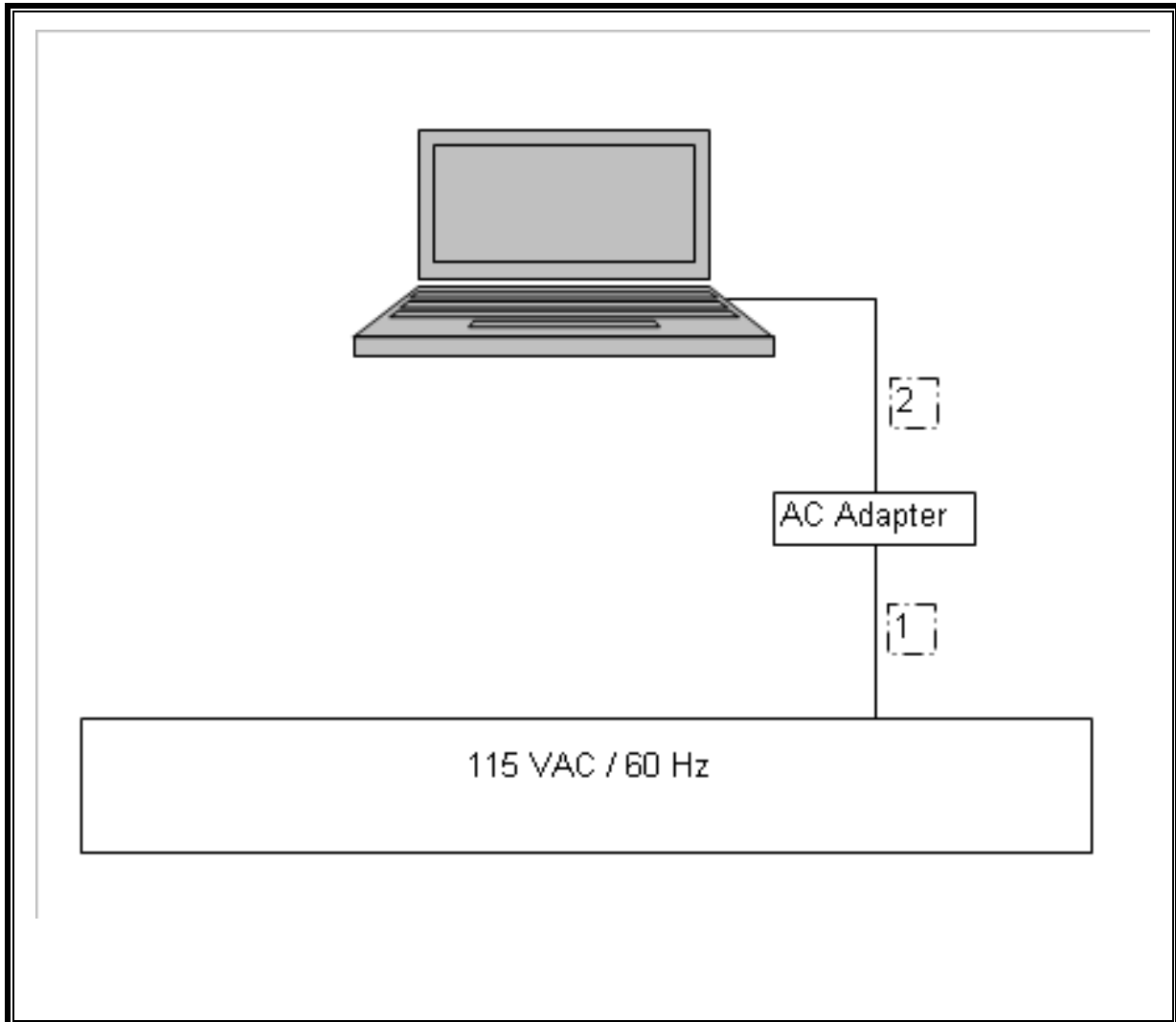
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Shielded	.50m	No
2	DC	2	DC	Shielded	1.0m	Ferrite on laptop's end

TEST SETUP

The EUT is installed in the host laptop computer during the tests. 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
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent / HP	E4446A	MY43360112	5/3/2007
Antenna, Horn 1 ~ 18 GHz	ETS	3117	29310	4/22/2007
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-SP	924342	9/2/2007
EMI Receiver, 9 kHz ~ 2.9 GHz	Agilent / HP	8542E	3942A00286	2/4/2007
RF Filter Section	Agilent / HP	85420E	3705A00256	2/4/2007
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	9/3/2007
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	8/30/2007
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2007
EMI Test Receiver	R & S	ESHS 20	827129/006	11/3/2006

7. LIMITS AND RESULTS

7.1. RADIATED EMISSIONS

7.1.1. 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	Field Strength	Measurement Distance
-----------	----------------	----------------------

(MHz)	(microvolts/meter)	(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.

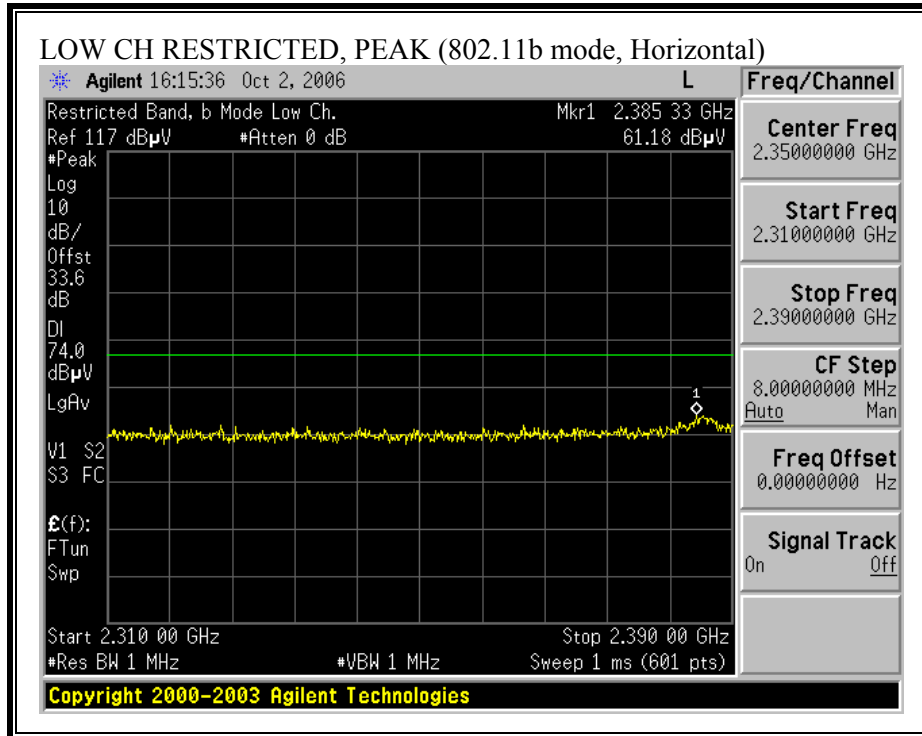
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

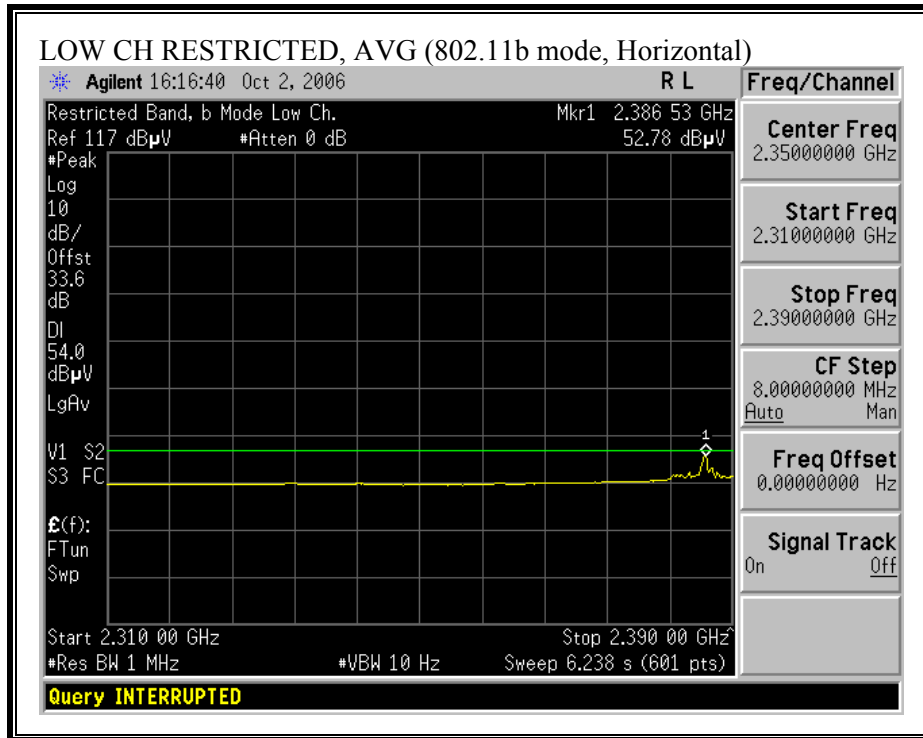
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

7.1.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

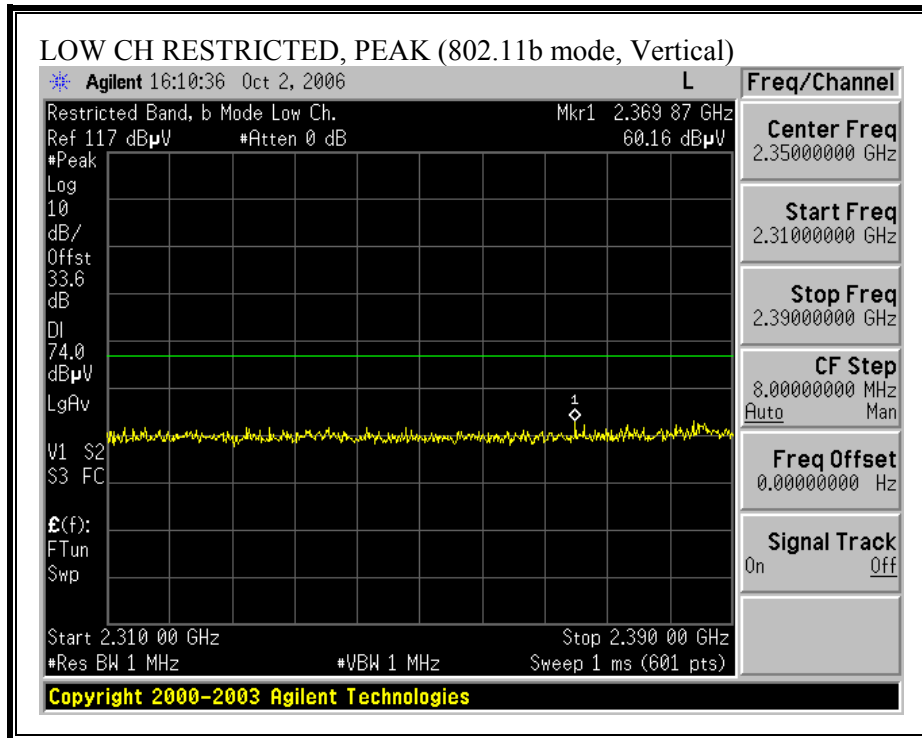
11b

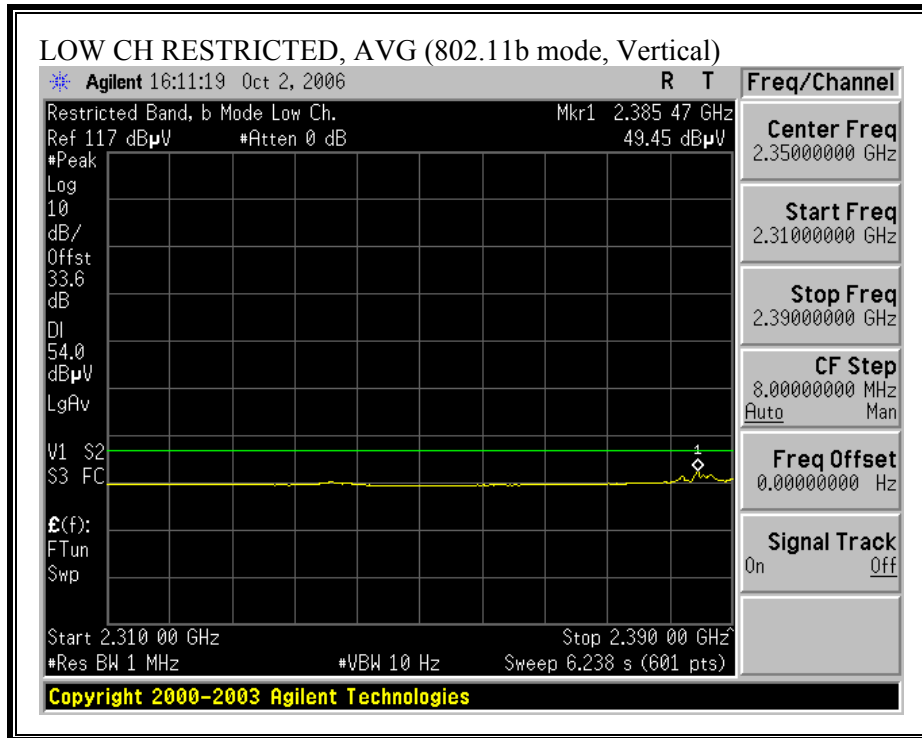
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



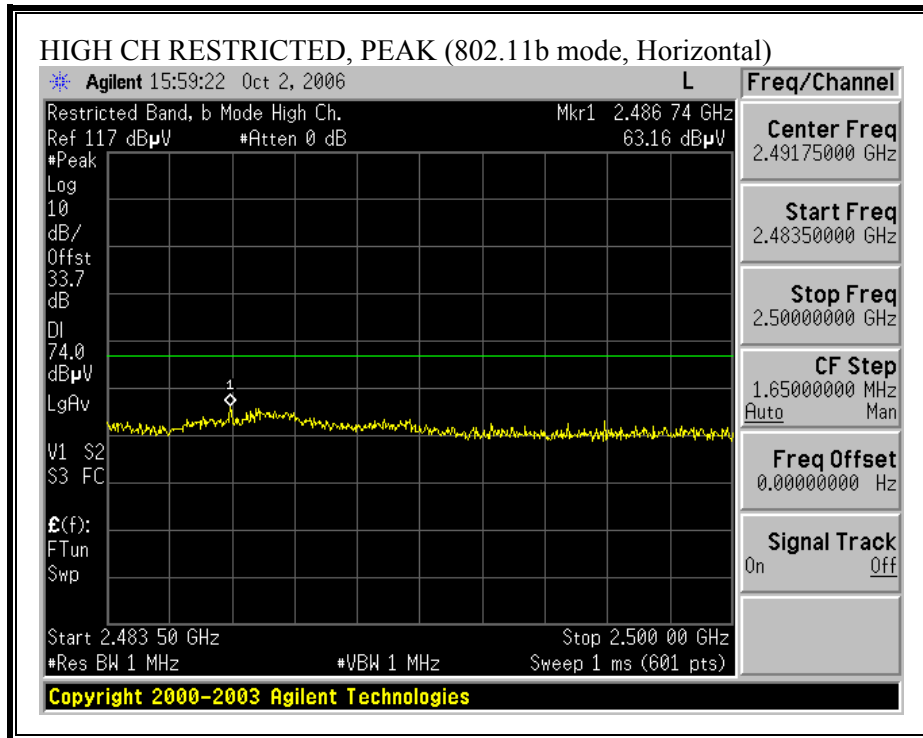


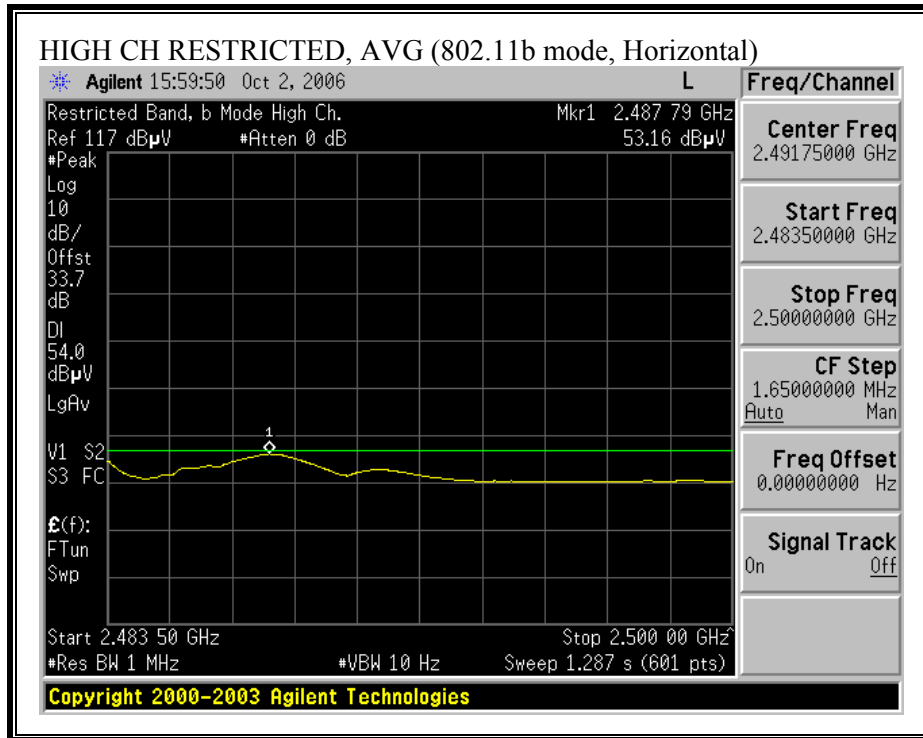
RESTRICTED BANDEGE (b MODE, LOW CHANNEL, VERTICAL)



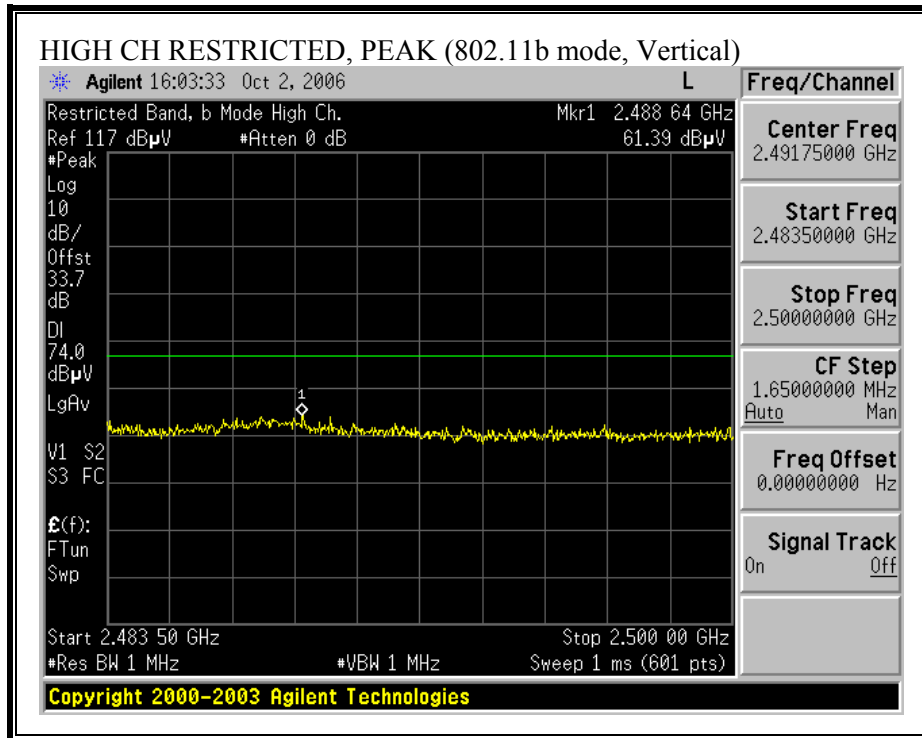


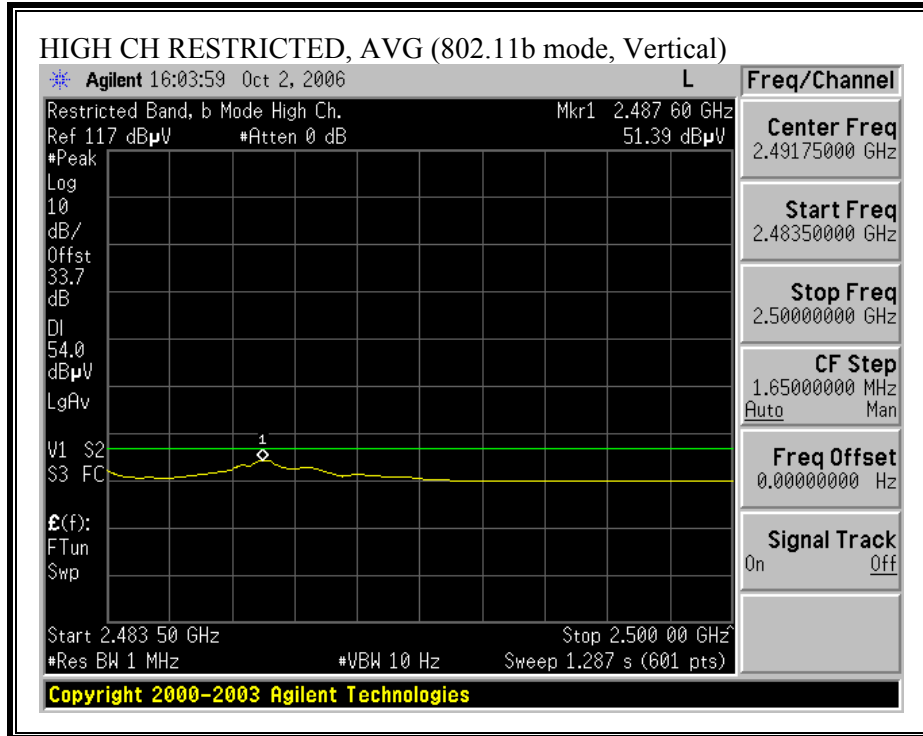
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (b MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/03/06
 Test Engineer: Vien Tran
 Configuration: EUT only
 Mode: Tx 11b

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

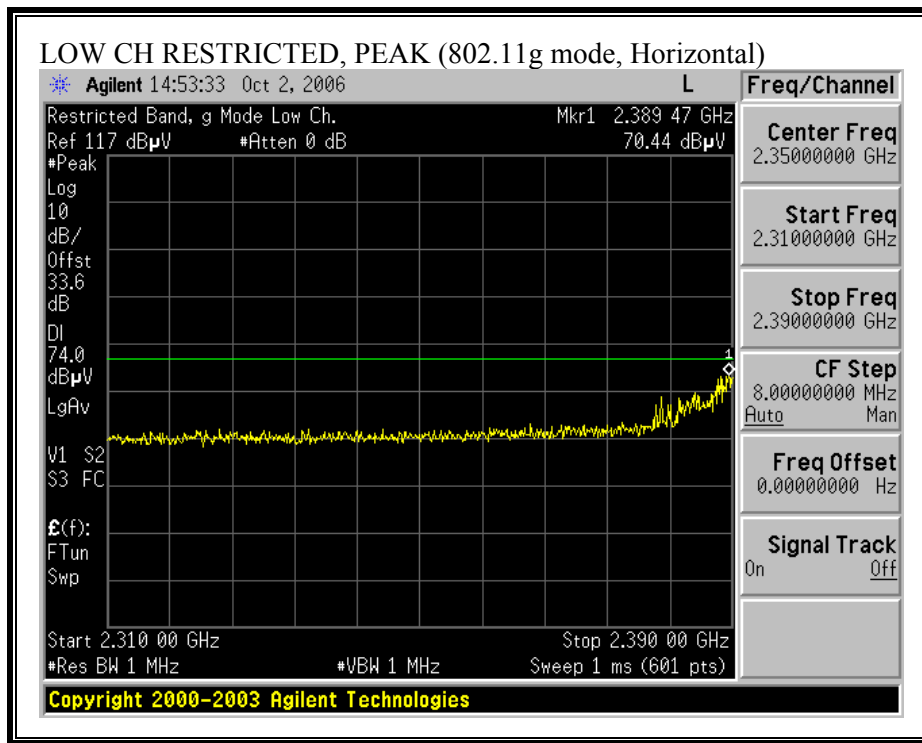
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		Average Measurements RBW=1MHz ; VBW=10Hz

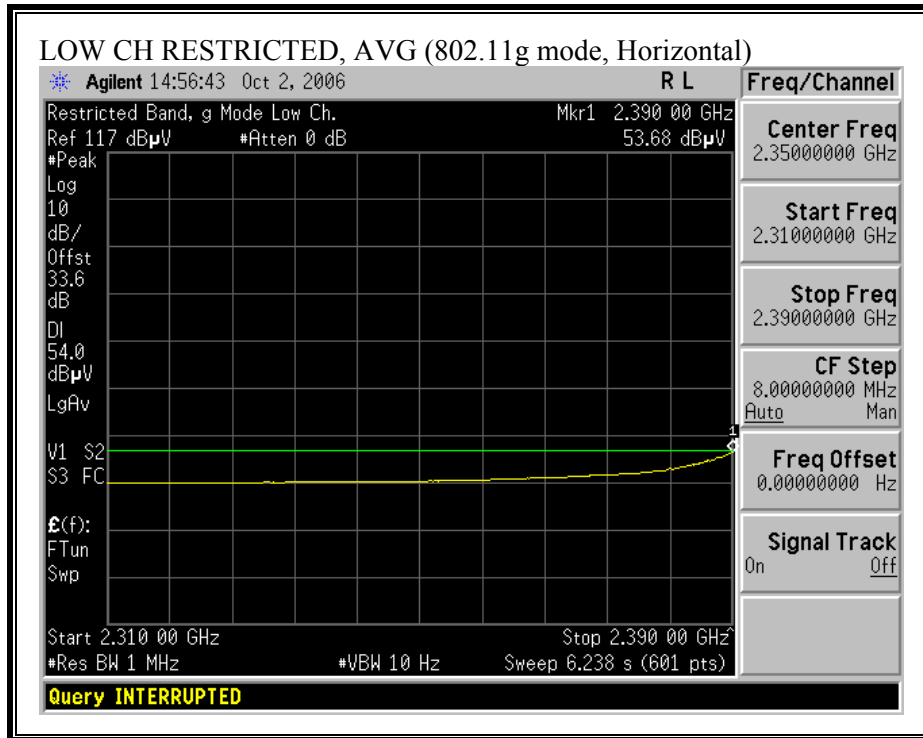
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH. 2412 MHz															
4.824	3.0	57.7	52.4	33.7	2.9	-45.3	0.0	0.6	49.6	44.4	74	54	-24.4	-9.6	H
12.060	3.0	48.5	36.9	37.7	4.8	-40.0	0.0	0.9	51.9	40.3	74	54	-22.1	-13.7	H
4.824	3.0	57.0	52.8	33.7	2.9	-45.3	0.0	0.6	48.9	44.7	74	54	-25.1	-9.3	V
12.060	3.0	47.7	36.3	37.7	4.8	-40.0	0.0	0.9	51.1	39.7	74	54	-22.9	-14.3	V
MID CH. 2437 MHz															
4.874	3.0	56.2	51.3	33.7	3.0	-45.3	0.0	0.6	48.2	43.3	74	54	-25.8	-10.7	H
7.311	3.0	50.3	39.4	35.2	4.2	-43.2	0.0	0.6	47.1	36.2	74	54	-26.9	-17.8	H
12.185	3.0	49.0	37.3	37.7	4.9	-40.1	0.0	0.9	52.4	40.7	74	54	-21.6	-13.3	H
4.874	3.0	55.6	48.6	33.7	3.0	-45.3	0.0	0.6	47.6	40.6	74	54	-26.4	-13.4	V
7.311	3.0	50.0	38.9	35.2	4.2	-43.2	0.0	0.6	46.8	35.7	74	54	-27.2	-18.3	V
12.185	3.0	48.4	37.4	37.7	4.9	-40.1	0.0	0.9	51.8	40.8	74	54	-22.2	-13.2	V
HIGH CH. 2462 MHz															
4.924	3.0	54.7	49.4	33.8	3.1	-45.4	0.0	0.6	46.8	41.5	74	54	-27.2	-12.5	H
7.386	3.0	51.0	38.9	35.2	4.2	-43.1	0.0	0.6	47.9	35.8	74	54	-26.1	-18.2	H
12.310	3.0	48.6	37.3	37.6	4.9	-40.2	0.0	0.9	51.9	40.6	74	54	-22.1	-13.4	H
4.924	3.0	54.5	47.8	33.8	3.1	-45.4	0.0	0.6	46.6	39.9	74	54	-27.4	-14.1	V
7.386	3.0	50.8	38.9	35.2	4.2	-43.1	0.0	0.6	47.7	35.8	74	54	-26.3	-18.2	V
12.310	3.0	49.3	37.3	37.6	4.9	-40.2	0.0	0.9	52.6	40.6	74	54	-21.4	-13.4	V
No other emissions were detected above 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		

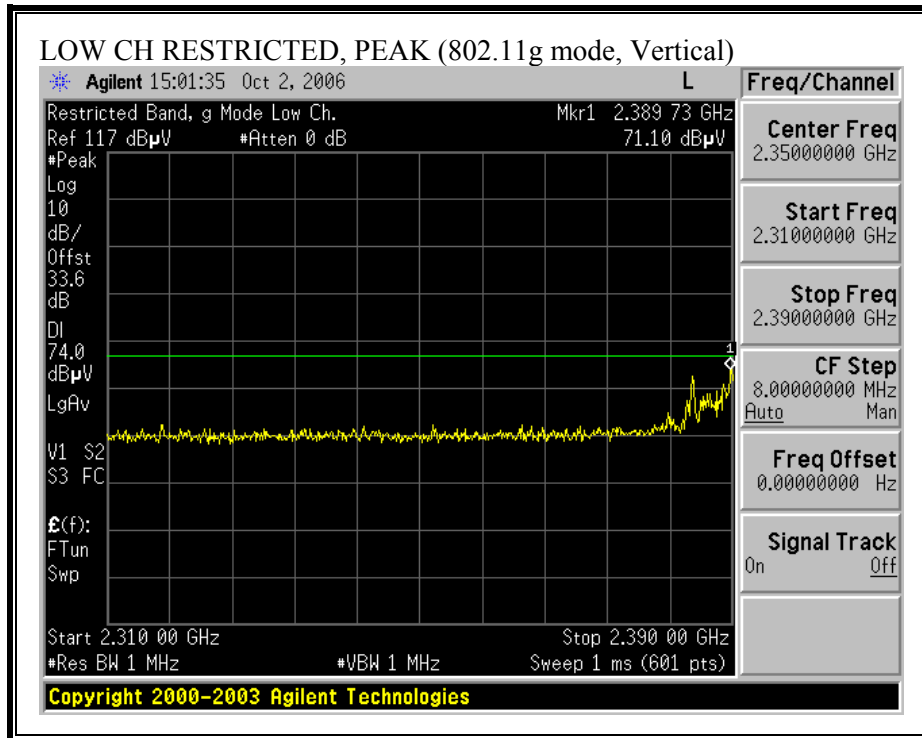
11g

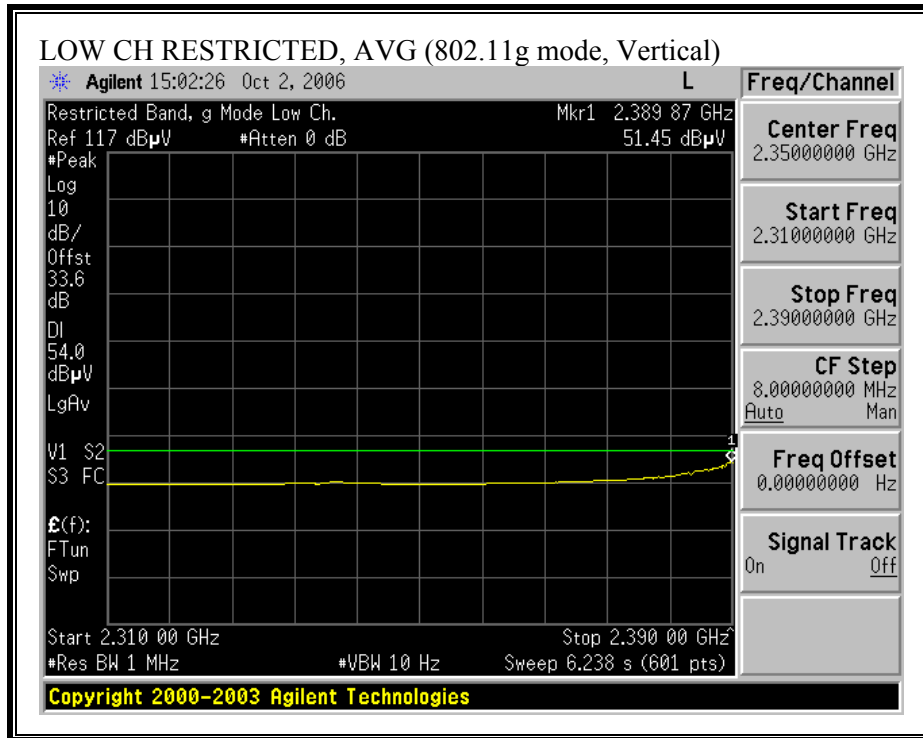
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



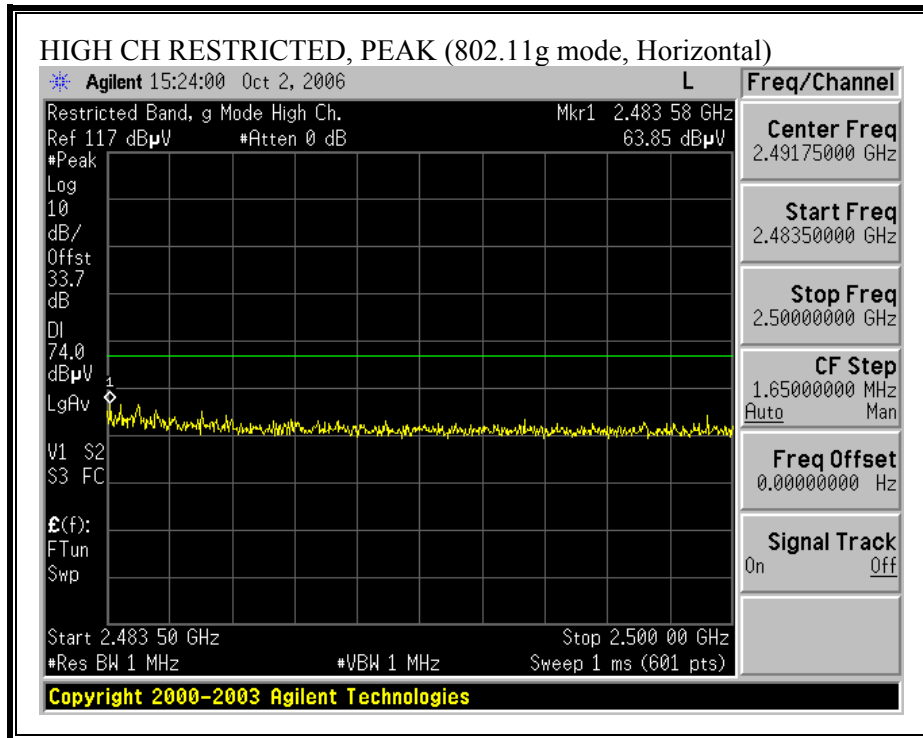


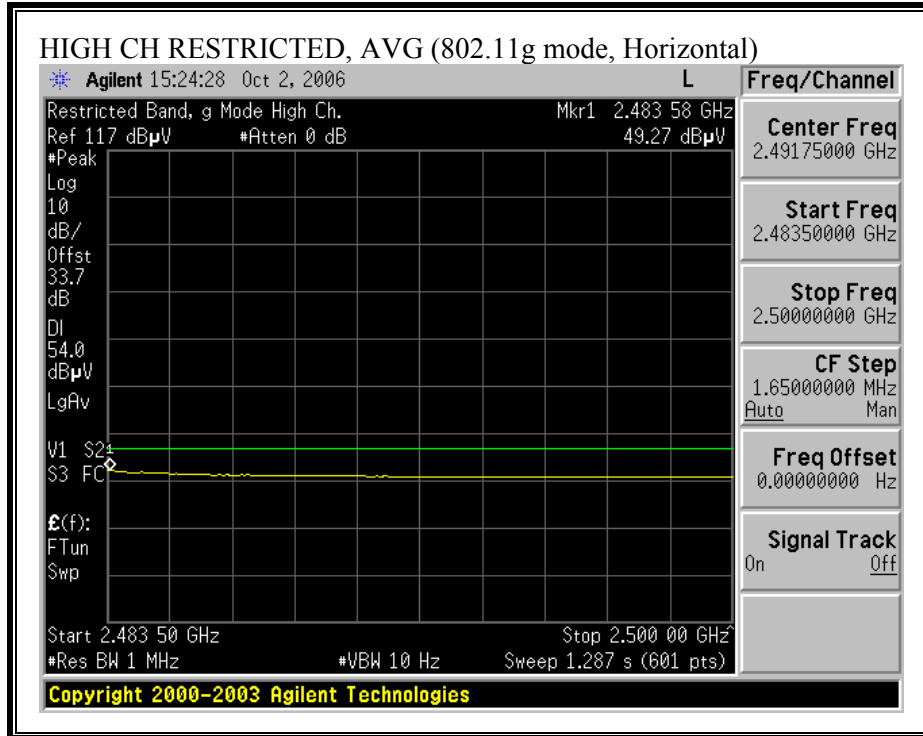
RESTRICTED BANDEGE (g MODE, LOW CHANNEL, VERTICAL)



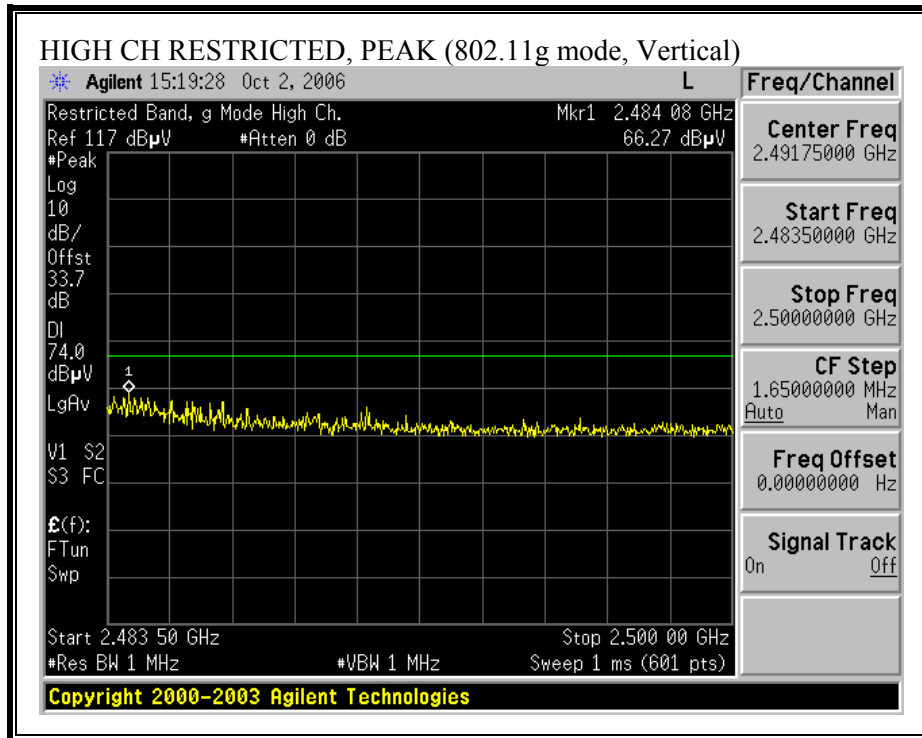


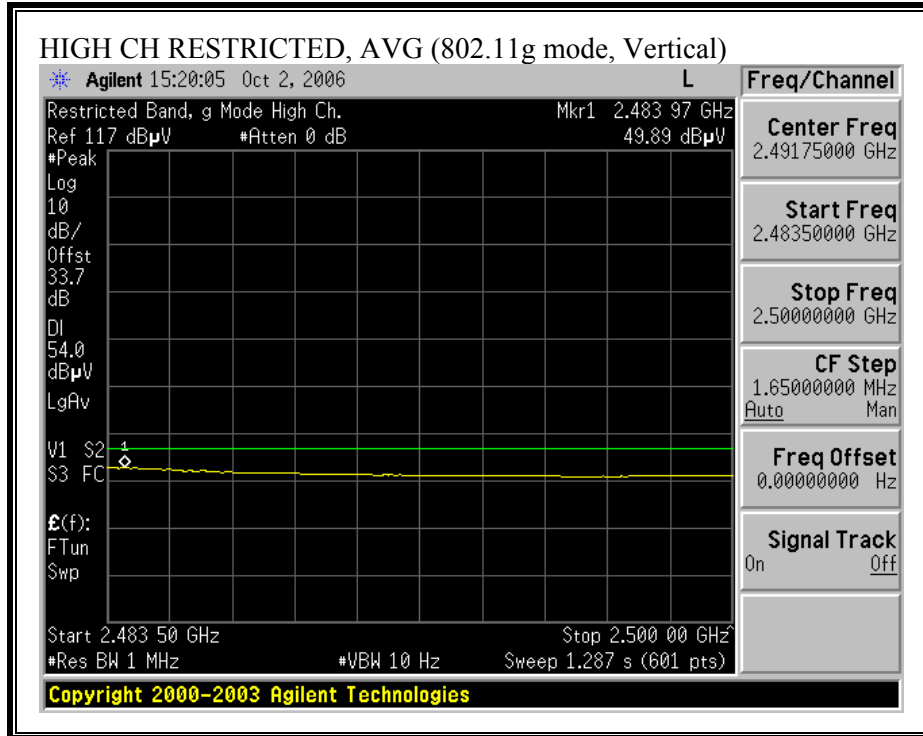
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (g MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/03/06
 Test Engineer: Vien Tran
 Configuration: EUT only
 Mode: Tx 11g

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

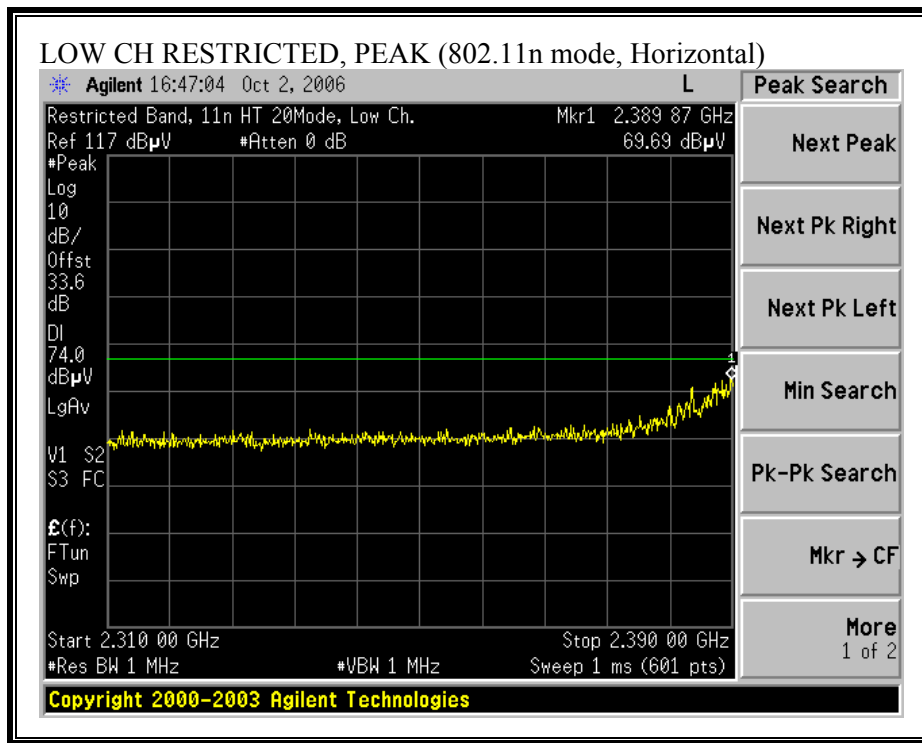
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		Average Measurements RBW=1MHz; VBW=10Hz

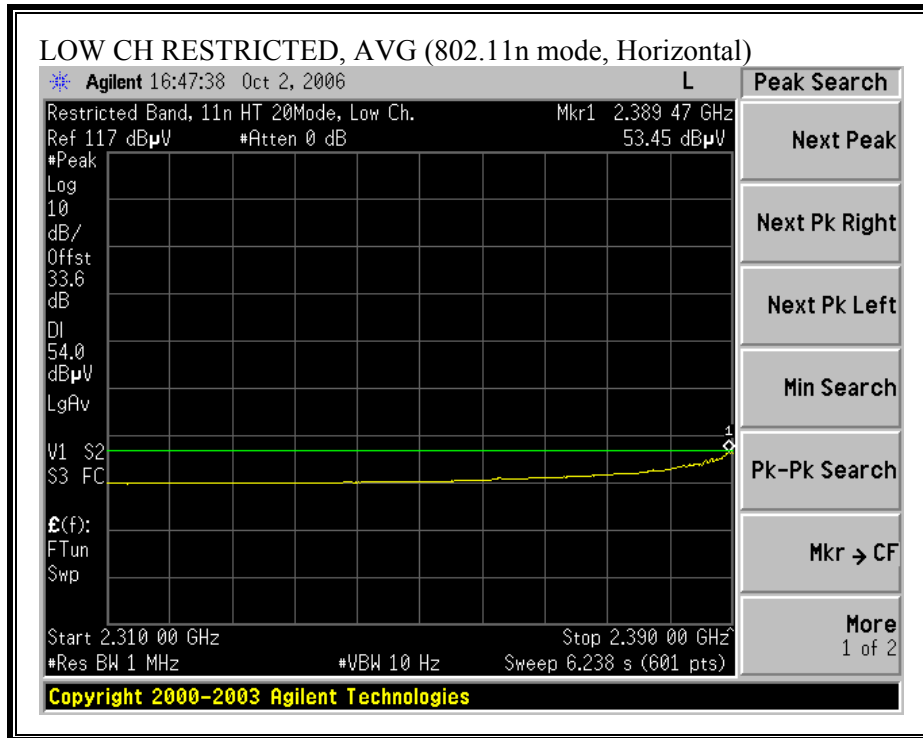
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH. 2412 MHz															
4.824	3.0	51.3	39.2	33.7	2.9	-45.3	0.0	0.6	43.2	31.1	74	54	-30.8	-22.9	H
12.060	3.0	52.3	39.2	37.7	4.8	-40.0	0.0	0.9	55.7	42.6	74	54	-18.3	-11.4	H
4.824	3.0	51.3	41.6	33.7	2.9	-45.3	0.0	0.6	43.2	33.5	74	54	-30.8	-20.5	V
12.060	3.0	52.1	39.2	37.7	4.8	-40.0	0.0	0.9	55.5	42.6	74	54	-18.5	-11.4	V
MID CH. 2437 MHz															
4.874	3.0	54.9	43.9	33.7	3.0	-45.3	0.0	0.6	46.9	35.9	74	54	-27.1	-18.1	H
7.311	3.0	52.8	41.1	35.2	4.2	-43.2	0.0	0.6	49.6	37.9	74	54	-24.4	-16.1	H
12.185	3.0	48.8	37.4	37.7	4.9	-40.1	0.0	0.9	52.2	40.8	74	54	-21.8	-13.2	H
4.874	3.0	52.8	41.5	33.7	3.0	-45.3	0.0	0.6	44.8	33.5	74	54	-29.2	-20.5	V
7.311	3.0	53.6	42.2	35.2	4.2	-43.2	0.0	0.6	50.4	39.0	74	54	-23.6	-15.0	V
12.185	3.0	49.4	37.5	37.7	4.9	-40.1	0.0	0.9	52.8	40.9	74	54	-21.2	-13.1	V
HIGH CH. 2462 MHz															
4.924	3.0	51.3	39.2	33.8	3.1	-45.4	0.0	0.6	43.4	31.3	74	54	-30.6	-22.7	H
7.386	3.0	51.5	38.9	35.2	4.2	-43.1	0.0	0.6	48.4	35.8	74	54	-25.6	-18.2	H
12.310	3.0	49.7	37.5	37.6	4.9	-40.2	0.0	0.9	53.0	40.8	74	54	-21.0	-13.2	H
4.924	3.0	51.9	39.8	33.8	3.1	-45.4	0.0	0.6	44.0	31.9	74	54	-30.0	-22.1	V
7.386	3.0	50.8	38.7	35.2	4.2	-43.1	0.0	0.6	47.7	35.6	74	54	-26.3	-18.4	V
12.310	3.0	49.7	37.5	37.6	4.9	-40.2	0.0	0.9	53.0	40.8	74	54	-21.0	-13.2	V
No other emissions were detected above 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		

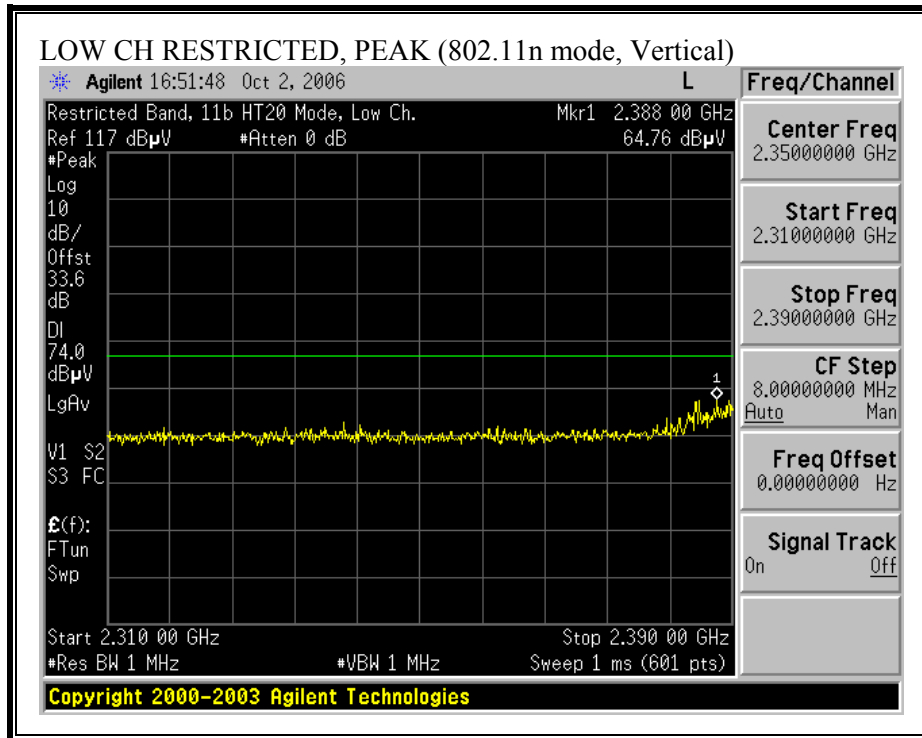
11n HT20

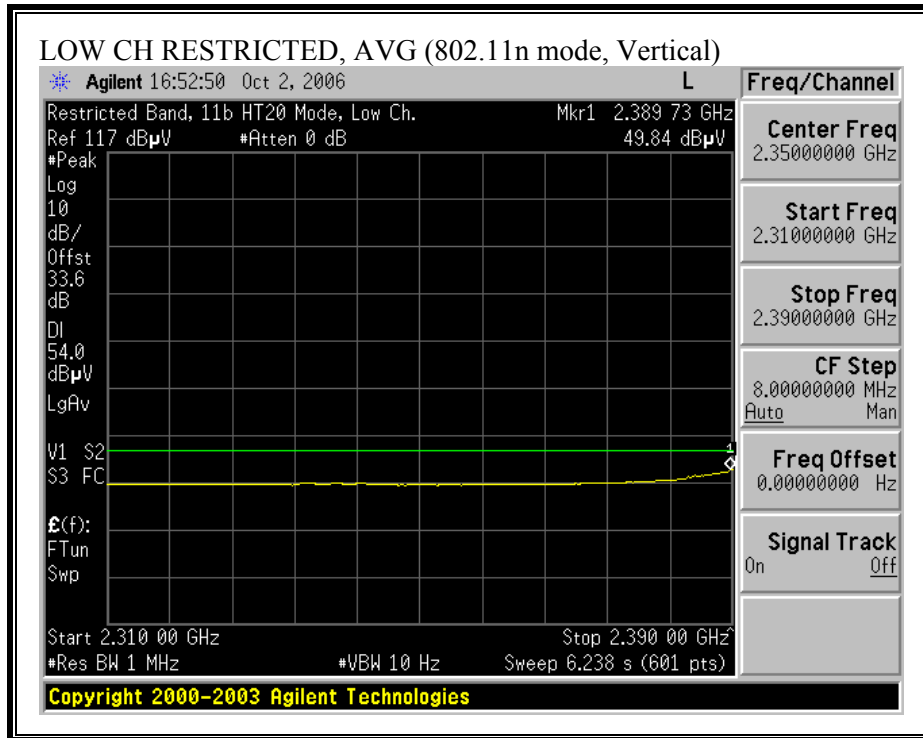
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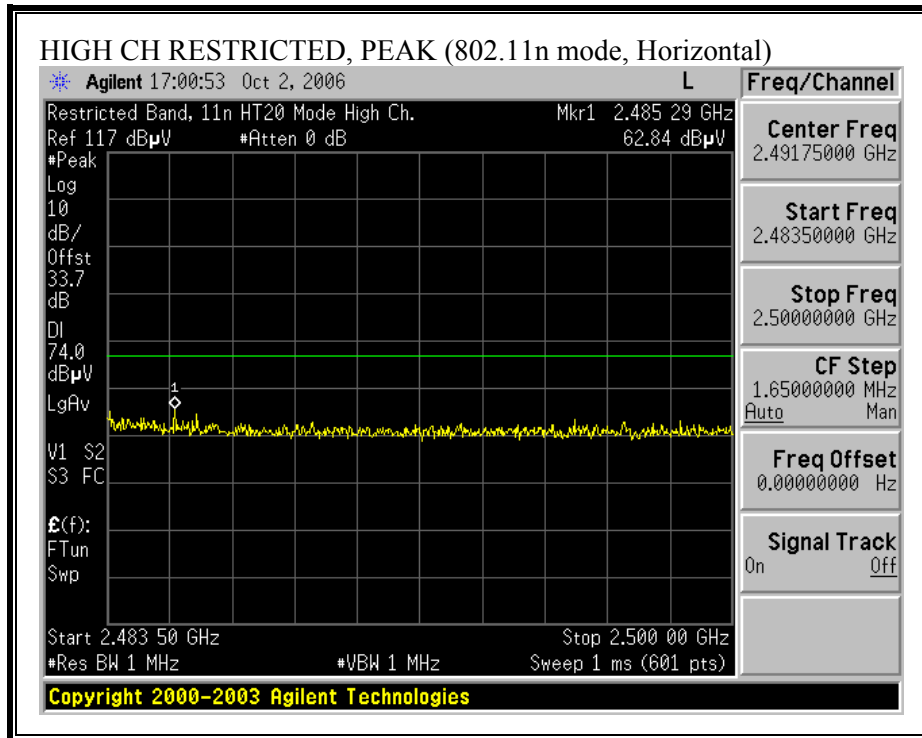


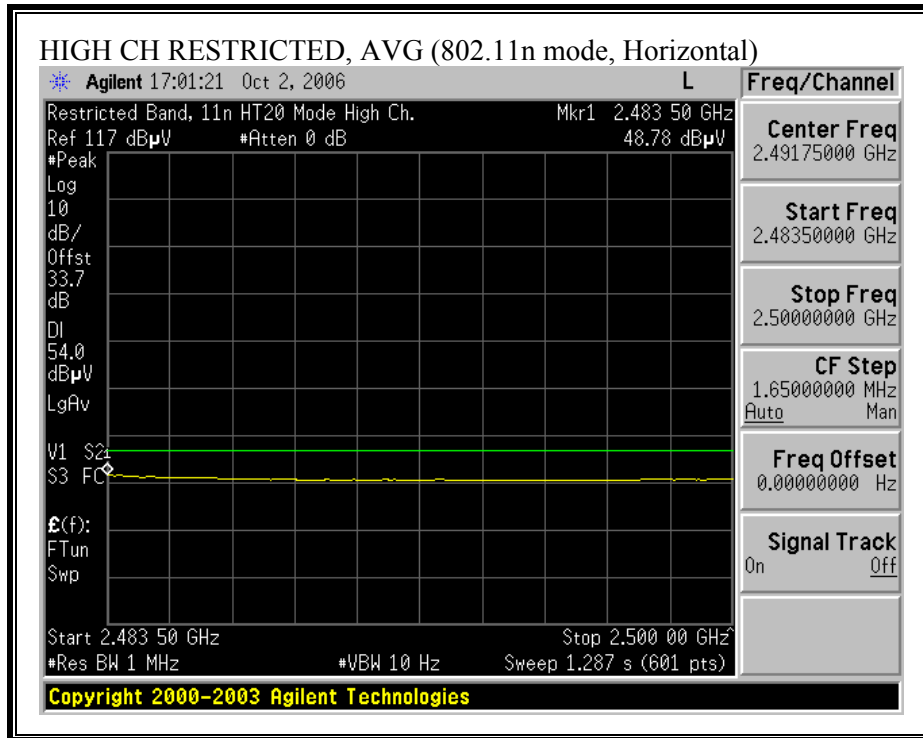
RESTRICTED BANDEDGE (n HT20 MODE, LOW CHANNEL, VERTICAL)



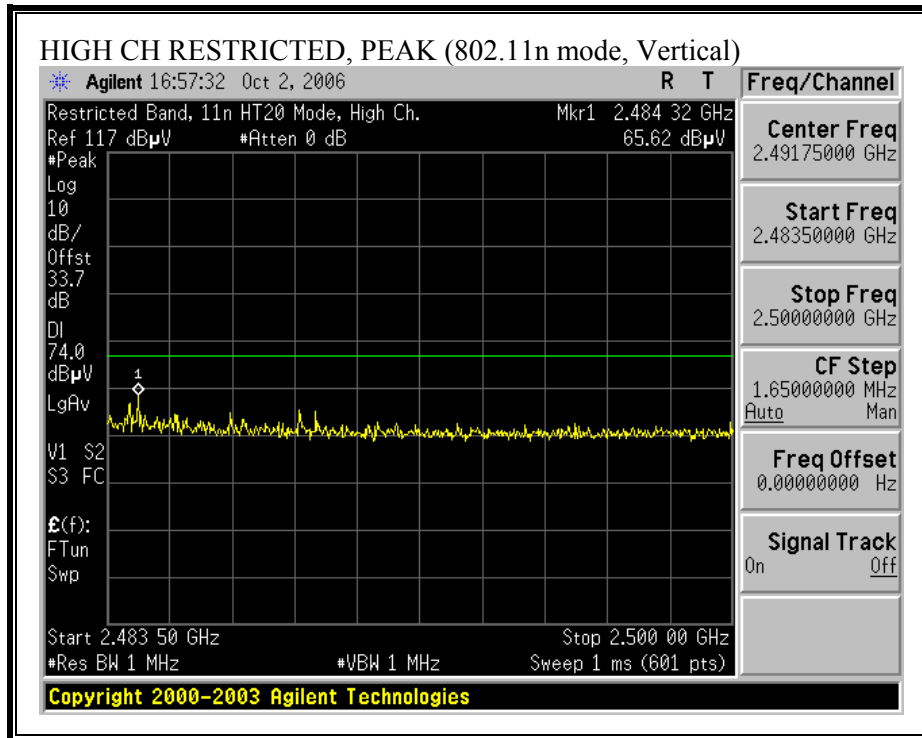


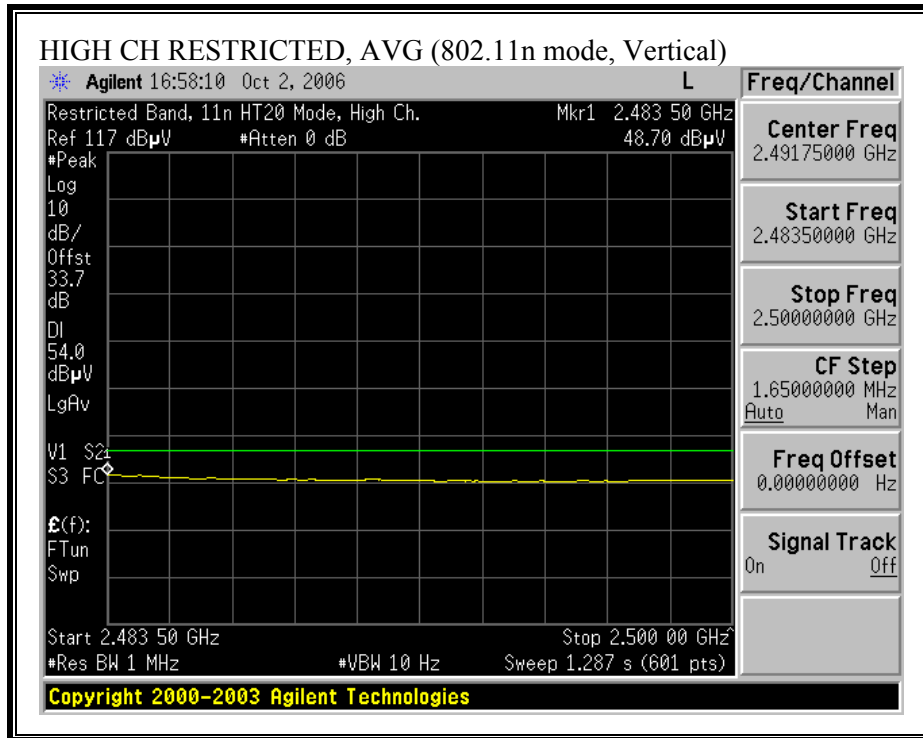
RESTRICTED BANDEDGE (n HT20 MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (11n HT20 MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (11n HT 20 MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/03/06
 Test Engineer: Vien Tran
 Configuration: EUT only
 Mode: Tx 11n HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

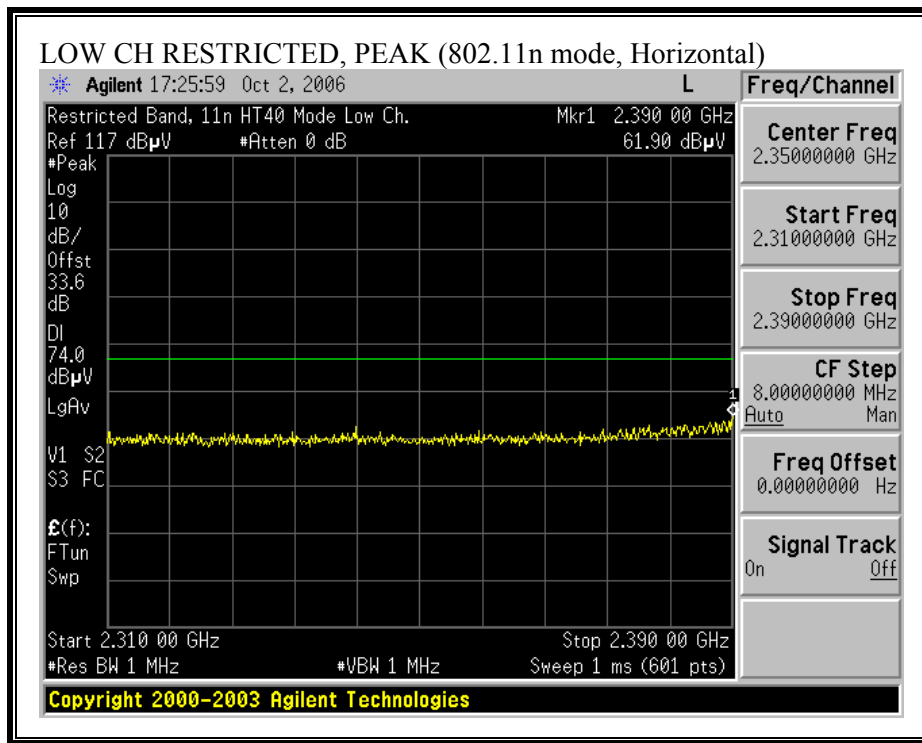
2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		Average Measurements RBW=1MHz; VBW=10Hz

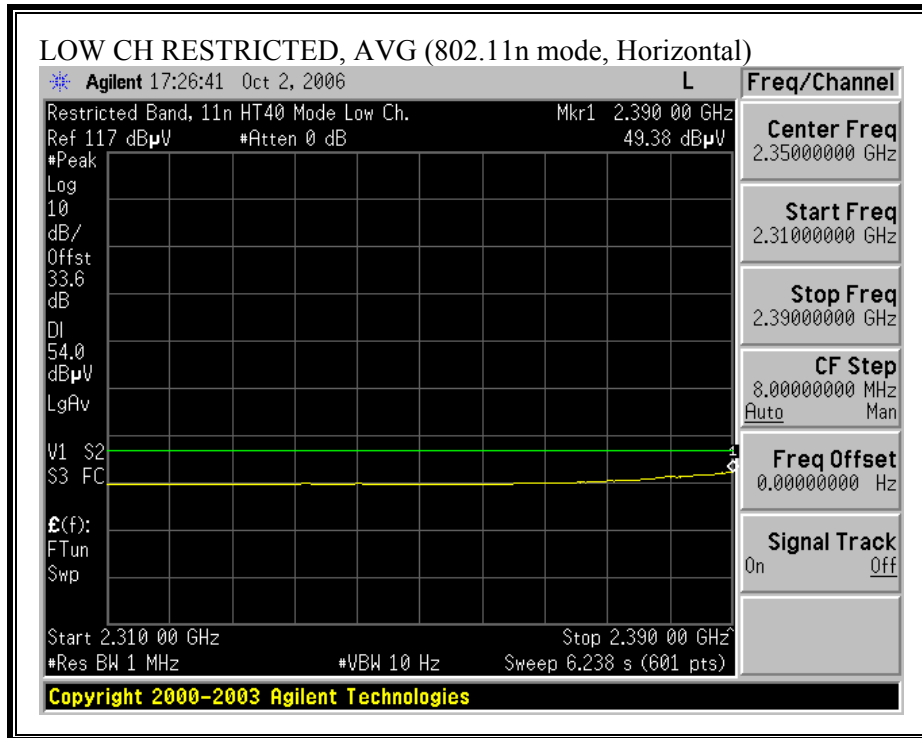
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltn dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH. 2412 MHz															
4.824	3.0	51.1	39.0	33.7	2.9	-45.3	0.0	0.6	43.0	30.9	74	54	-31.0	-23.1	H
12.060	3.0	49.3	37.3	37.7	4.8	-40.0	0.0	0.9	52.7	40.7	74	54	-21.3	-13.3	H
4.824	3.0	51.8	39.0	33.7	2.9	-45.3	0.0	0.6	43.7	30.9	74	54	-30.3	-23.1	V
12.060	3.0	49.5	37.3	37.7	4.8	-40.0	0.0	0.9	52.9	40.7	74	54	-21.1	-13.3	V
MID CH. 2437 MHz															
4.874	3.0	54.2	42.0	33.7	3.0	-45.3	0.0	0.6	46.2	34.0	74	54	-27.8	-20.0	H
7.311	3.0	51.1	38.9	35.2	4.2	-43.2	0.0	0.6	47.9	35.7	74	54	-26.1	-18.3	H
12.185	3.0	49.8	37.7	37.7	4.9	-40.1	0.0	0.9	53.2	41.1	74	54	-20.8	-12.9	H
4.874	3.0	51.2	39.2	33.7	3.0	-45.3	0.0	0.6	43.2	31.2	74	54	-30.8	-22.8	V
7.311	3.0	51.9	39.0	35.2	4.2	-43.2	0.0	0.6	48.7	35.8	74	54	-25.3	-18.2	V
12.185	3.0	49.4	37.7	37.7	4.9	-40.1	0.0	0.9	52.8	41.1	74	54	-21.2	-12.9	V
HIGH CH. 2462 MHz															
4.924	3.0	52.0	39.3	33.8	3.1	-45.4	0.0	0.6	44.1	31.4	74	54	-29.9	-22.6	H
7.386	3.0	51.4	38.8	35.2	4.2	-43.1	0.0	0.6	48.3	35.7	74	54	-25.7	-18.3	H
12.310	3.0	49.4	37.4	37.6	4.9	-40.2	0.0	0.9	52.7	40.7	74	54	-21.3	-13.3	H
4.924	3.0	51.5	39.5	33.8	3.1	-45.4	0.0	0.6	43.6	31.6	74	54	-30.4	-22.4	V
7.386	3.0	50.9	38.9	35.2	4.2	-43.1	0.0	0.6	47.8	35.8	74	54	-26.2	-18.2	V
12.310	3.0	49.6	37.5	37.6	4.9	-40.2	0.0	0.9	52.9	40.8	74	54	-21.1	-13.2	V
No other emissions were detected above 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		

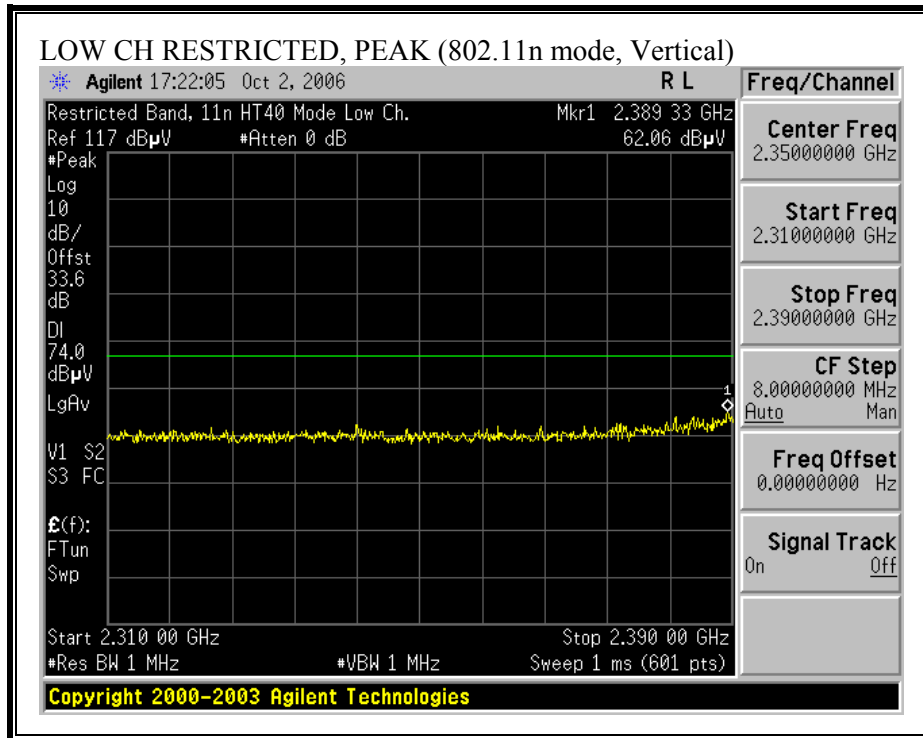
11n HT40

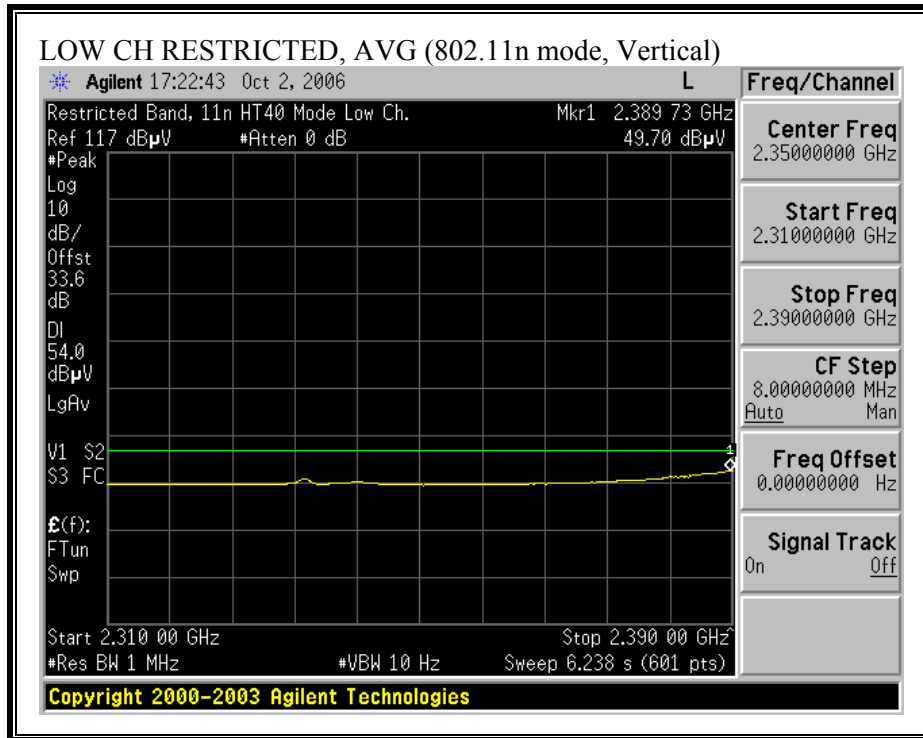
RESTRICTED BANDEDGE (n HT40 MODE, LOW CHANNEL, HORIZONTAL)



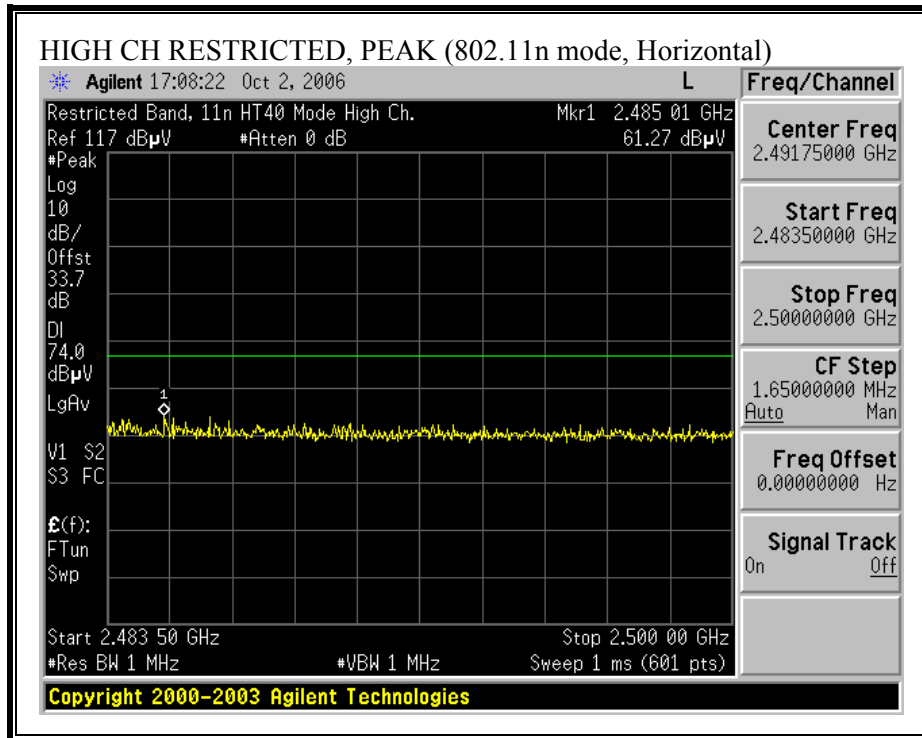


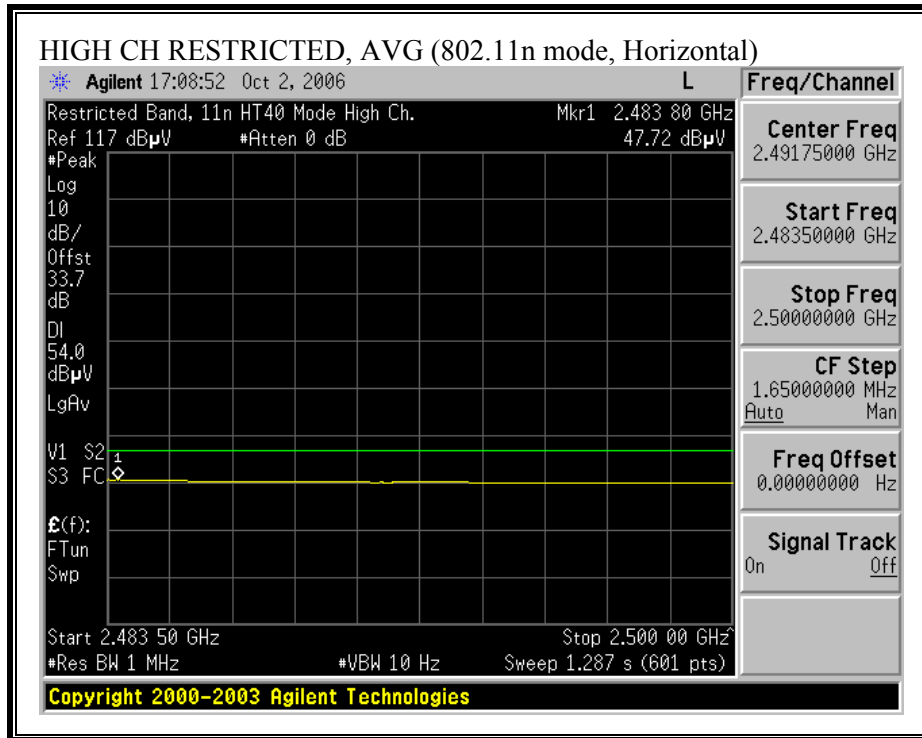
RESTRICTED BANDEDGE (n HT40 MODE, LOW CHANNEL, VERTICAL)



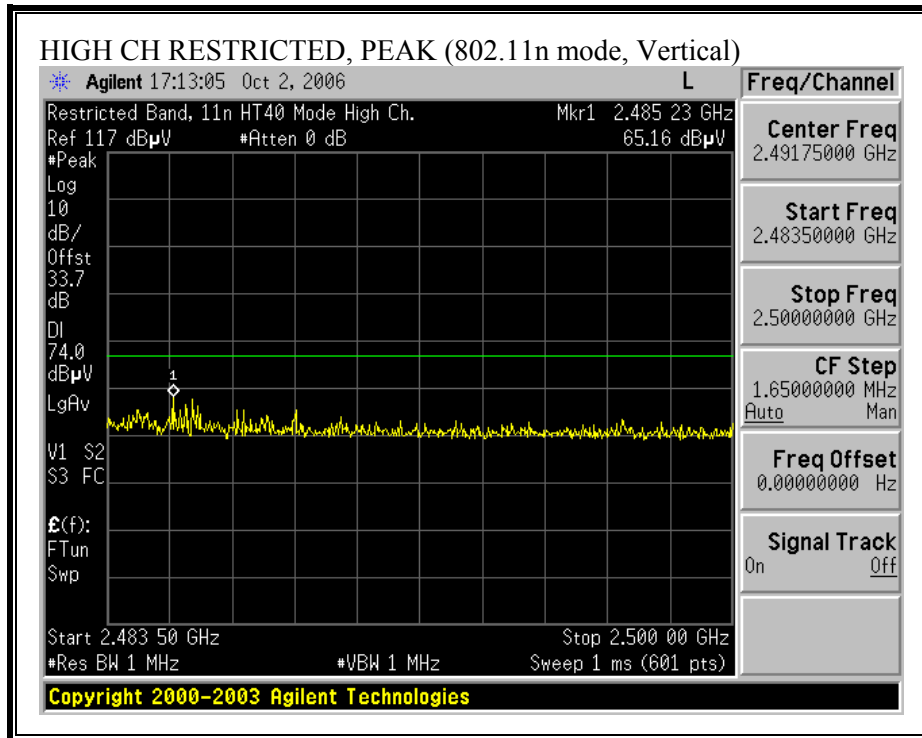


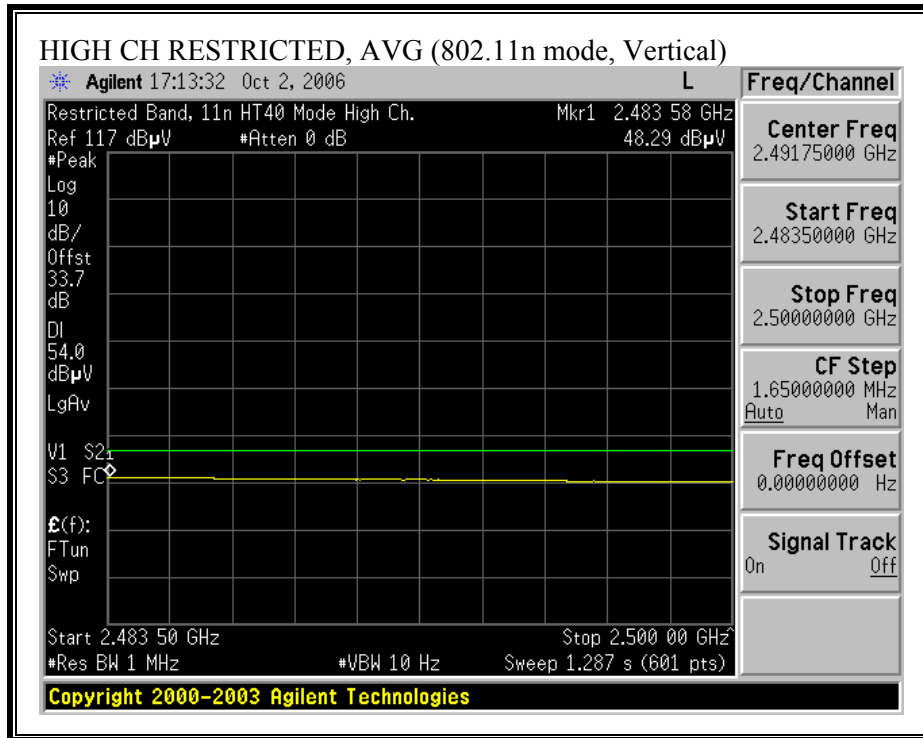
RESTRICTED BANDEDGE (n HT40 MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEGE (11n HT40 MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (11n HT 40 MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/04/06
 Test Engineer: Chien Ho
 Configuration: EUT only
 Mode: Tx 2.4 GHz 11n HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements REW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_4.0GHz		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	Filt 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 2422 MHz															
4.844	3.0	51.1	39.1	33.7	3.0	-45.3	0.0	0.6	43.1	31.1	74	54	-30.9	-22.9	H
7.266	3.0	52.3	39.2	35.2	4.2	-43.3	0.0	0.6	49.0	35.9	74	54	-25.0	-18.1	H
12.110	3.0	49.9	37.7	37.7	4.9	-40.1	0.0	0.9	53.3	41.1	74	54	-20.7	-12.9	H
4.844	3.0	51.4	39.2	33.7	3.0	-45.3	0.0	0.6	43.4	31.2	74	54	-30.6	-22.8	V
7.266	3.0	51.4	39.1	35.2	4.2	-43.3	0.0	0.6	48.1	35.8	74	54	-25.9	-18.2	V
12.110	3.0	50.0	37.2	37.7	4.9	-40.1	0.0	0.9	53.4	40.6	74	54	-20.6	-13.4	V
MID CH 2437 MHz															
4.874	3.0	52.8	40.1	33.7	3.0	-45.3	0.0	0.6	44.8	32.1	74	54	-29.2	-21.9	H
7.311	3.0	51.5	38.9	35.2	4.2	-43.2	0.0	0.6	48.3	35.7	74	54	-25.7	-18.3	H
12.185	3.0	51.1	37.9	37.7	4.9	-40.1	0.0	0.9	54.5	41.3	74	54	-19.5	-12.7	H
4.874	3.0	52.1	39.6	33.7	3.0	-45.3	0.0	0.6	44.1	31.6	74	54	-29.9	-22.4	V
7.311	3.0	51.9	39.0	35.2	4.2	-43.2	0.0	0.6	48.7	35.8	74	54	-25.3	-18.2	V
12.185	3.0	50.6	37.8	37.7	4.9	-40.1	0.0	0.9	54.0	41.2	74	54	-20.0	-12.8	V
HIGH CH 2452 MHz															
4.904	3.0	51.2	39.2	33.8	3.0	-45.3	0.0	0.6	43.3	31.3	74	54	-30.7	-22.7	H
7.356	3.0	51.3	38.8	35.2	4.2	-43.1	0.0	0.6	48.2	35.7	74	54	-25.8	-18.3	H
12.260	3.0	50.2	37.4	37.6	4.9	-40.1	0.0	0.9	53.5	40.7	74	54	-20.5	-13.3	H
4.904	3.0	52.4	39.2	33.8	3.0	-45.3	0.0	0.6	44.5	31.3	74	54	-29.5	-22.7	V
7.356	3.0	51.4	38.8	35.2	4.2	-43.1	0.0	0.6	48.3	35.7	74	54	-25.7	-18.3	V
12.260	3.0	49.3	37.4	37.6	4.9	-40.1	0.0	0.9	52.6	40.7	74	54	-21.4	-13.3	V
No other emissions were detected above 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		

7.1.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

11a

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

High Frequency Measurement
 Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/04/06
 Test Engineer: Chien Ho
 Configuration: EUT only
 Mode: Tx 5.8 GHz 11a

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_7.6GHz		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	Filtr 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 5745 MHz															
11.490	3.0	49.6	36.4	37.6	4.8	-39.8	0.0	0.7	52.9	39.7	74	54	-21.1	-14.3	H
11.490	3.0	50.6	37.2	37.6	4.8	-39.8	0.0	0.7	53.9	40.5	74	54	-20.1	-13.5	V
MID CH 5785 MHz															
11.570	3.0	50.3	38.6	37.6	4.8	-39.8	0.0	0.7	53.6	41.9	74	54	-20.4	-12.1	H
11.570	3.0	49.7	36.8	37.6	4.8	-39.8	0.0	0.7	53.0	40.1	74	54	-21.0	-13.9	V
HIGH CH 5825 MHz															
11.650	3.0	49.2	37.8	37.7	4.8	-39.8	0.0	0.7	52.5	41.1	74	54	-21.5	-12.9	H
11.650	3.0	48.8	37.4	37.7	4.8	-39.8	0.0	0.7	52.1	40.7	74	54	-21.9	-13.3	V
No other emissions were detected above 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		

11n HT20

HARMONICS AND SPURIOUS EMISSIONS (802.11n HT20 MODE)

High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/04/06
 Test Engineer: Chien Ho
 Configuration: EUT only
 Mode: Tx 5.8 GHz 11n HT20

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz Average Measurements RBW=1MHz ; VBW=10Hz
	Vien 187215002	Vien 197209005	HPF_7.6GHz		

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr 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 5745 MHz															
11.490	3.0	52.5	40.1	37.6	4.8	-39.8	0.0	0.7	55.8	43.4	74	54	-18.2	-10.6	H
11.490	3.0	48.8	37.1	37.6	4.8	-39.8	0.0	0.7	52.1	40.4	74	54	-21.9	-13.6	V
MID CH 5785 MHz															
11.570	3.0	49.1	38.4	37.6	4.8	-39.8	0.0	0.7	52.4	41.7	74	54	-21.6	-12.3	H
11.570	3.0	51.4	39.4	37.6	4.8	-39.8	0.0	0.7	54.7	42.7	74	54	-19.3	-11.3	V
HIGH CH 5825 MHz															
11.650	3.0	51.0	37.8	37.7	4.8	-39.8	0.0	0.7	54.3	41.1	74	54	-19.7	-12.9	H
11.650	3.0	50.1	37.2	37.7	4.8	-39.8	0.0	0.7	53.4	40.5	74	54	-20.6	-13.5	V
No other emissions were detected above 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		

11n HT40

HARMONICS AND SPURIOUS EMISSIONS (802.11n HT40 MODE)

High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Company: Production Development Lab., Lenovo (Japan) Ltd
 Project #: 06U10634
 Date: 10/04/06
 Test Engineer: Chien Ho
 Configuration: EUT only
 Mode: Tx 5.8 GHz 11n HT40

Test Equipment:

Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz
	Vien 187215002	Vien 197209005	HPF_7.6GHz		Average Measurements RBW=1MHz ; VBW=10Hz

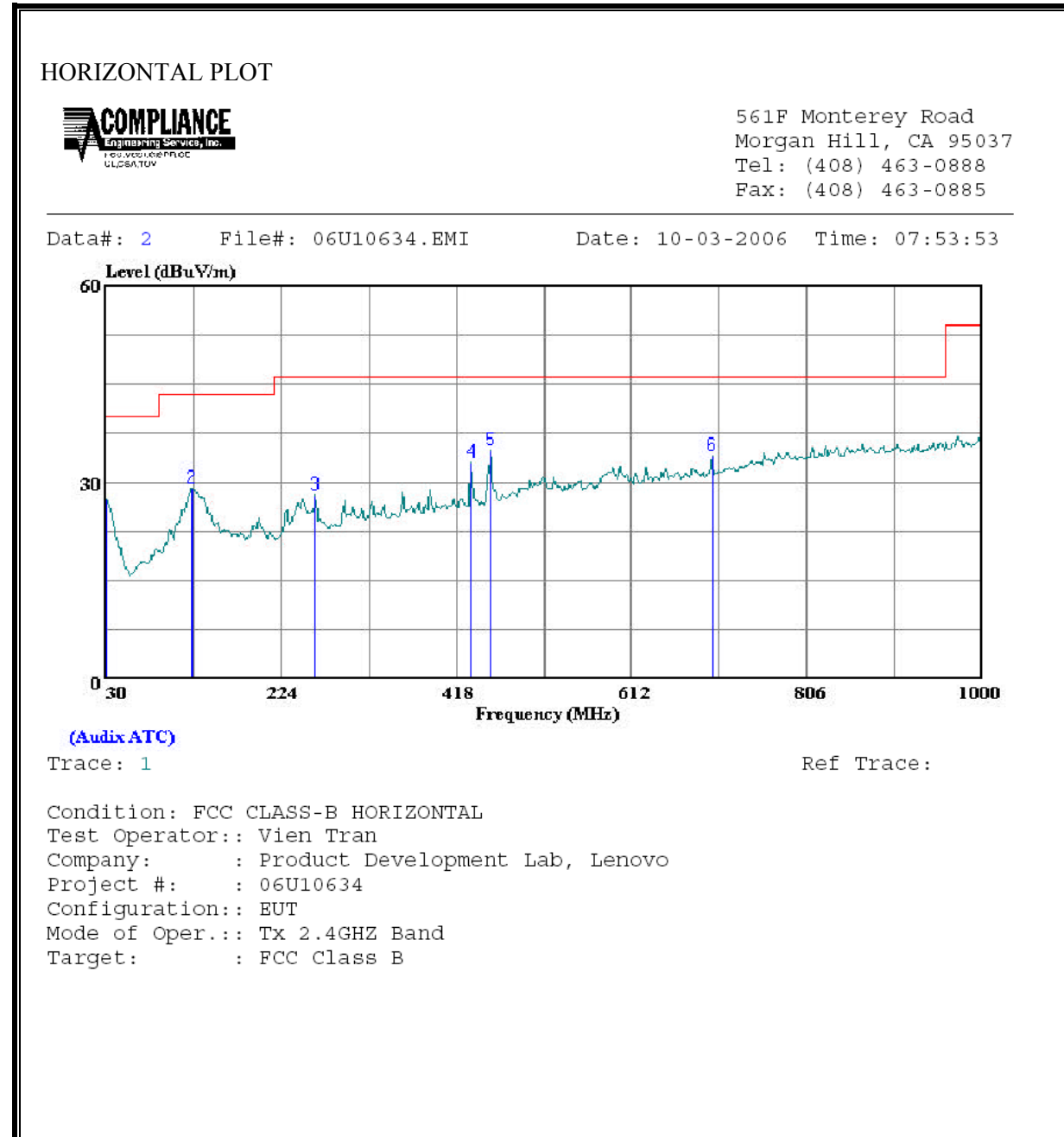
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filtr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH 5755 MHz															
11.510	3.0	49.7	37.0	37.6	4.8	-39.8	0.0	0.7	53.0	40.3	74	54	-21.0	-13.7	H
11.510	3.0	49.0	36.9	37.6	4.8	-39.8	0.0	0.7	52.3	40.2	74	54	-21.7	-13.8	V
MID CH 5785 MHz															
11.570	3.0	49.5	37.1	37.6	4.8	-39.8	0.0	0.7	52.8	40.4	74	54	-21.2	-13.6	H
11.570	3.0	48.8	37.0	37.6	4.8	-39.8	0.0	0.7	52.1	40.3	74	54	-21.9	-13.7	V
HIGH CH 5815 MHz															
11.630	3.0	49.4	37.0	37.7	4.8	-39.8	0.0	0.7	52.7	40.3	74	54	-21.3	-13.7	H
11.630	3.0	49.6	37.1	37.7	4.8	-39.8	0.0	0.7	52.9	40.4	74	54	-21.1	-13.6	V
No other emissions were detected above 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		

7.1.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

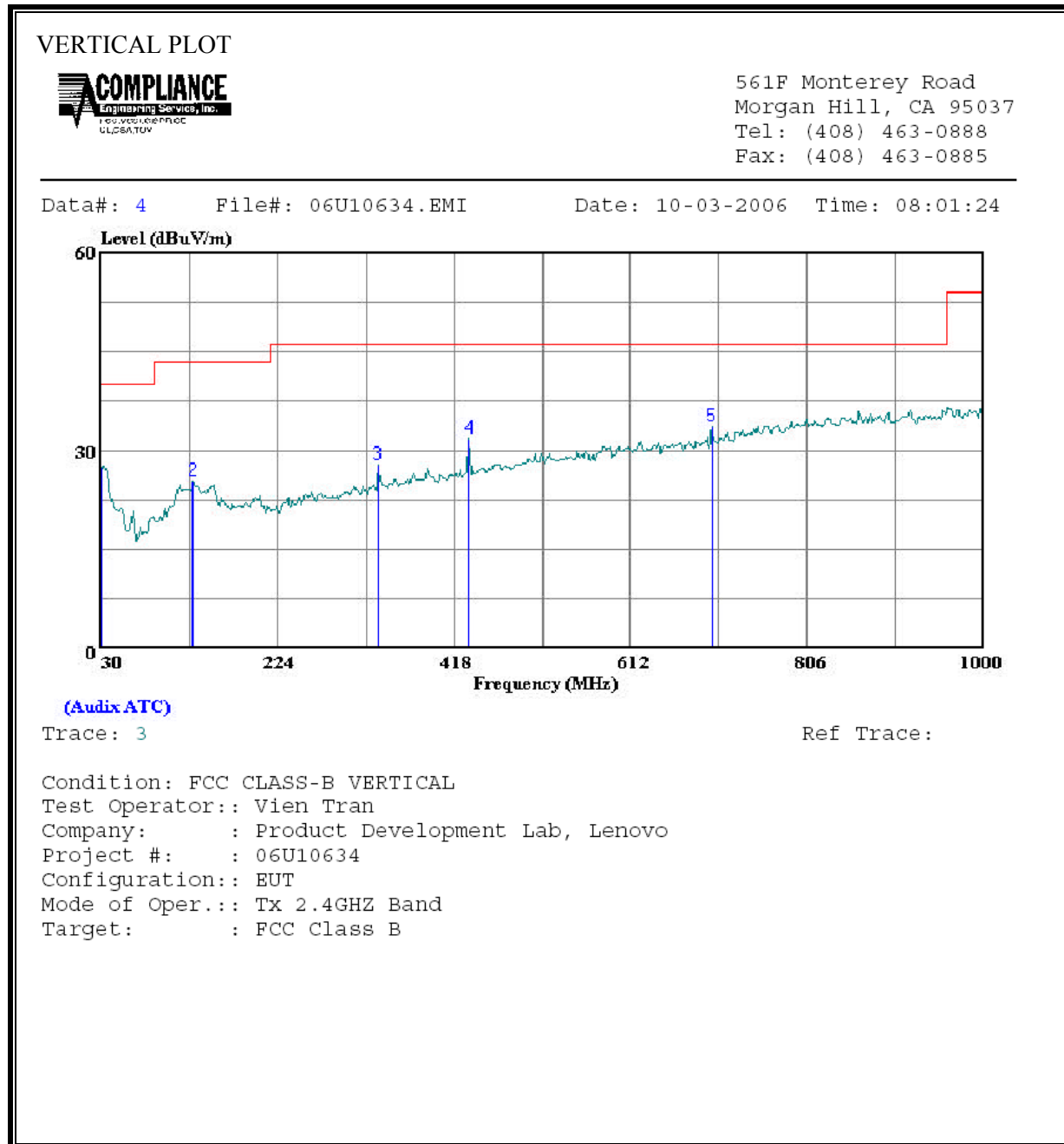
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

2.4 GHz BAND



HORIZONTAL DATA							
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	6.87	20.45	27.32	40.00	-12.68	Peak
2	125.060	13.83	15.26	29.09	43.50	-14.42	Peak
3	261.830	13.77	14.35	28.12	46.00	-17.89	Peak
4	434.490	14.27	18.84	33.11	46.00	-12.89	Peak
5	455.830	15.65	19.33	34.98	46.00	-11.02	Peak
6	701.240	11.01	23.09	34.10	46.00	-11.90	Peak

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

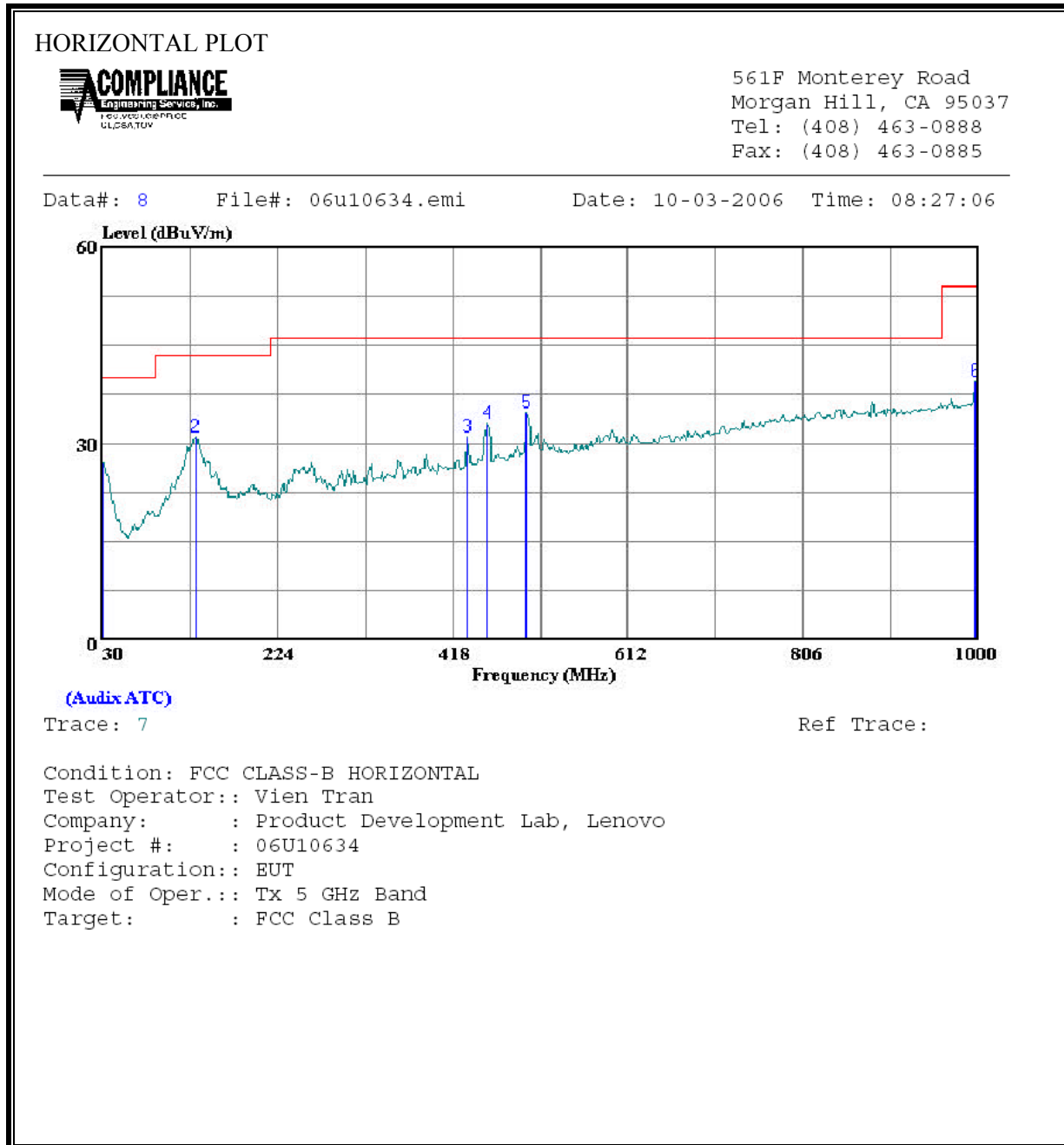


VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	7.05	20.45	27.50	40.00	-12.50	Peak
2	130.880	10.17	15.09	25.26	43.50	-18.24	Peak
3	334.580	11.21	16.53	27.74	46.00	-18.26	Peak
4	434.490	12.85	18.84	31.69	46.00	-14.31	Peak
5	701.240	10.50	23.09	33.59	46.00	-12.41	Peak

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

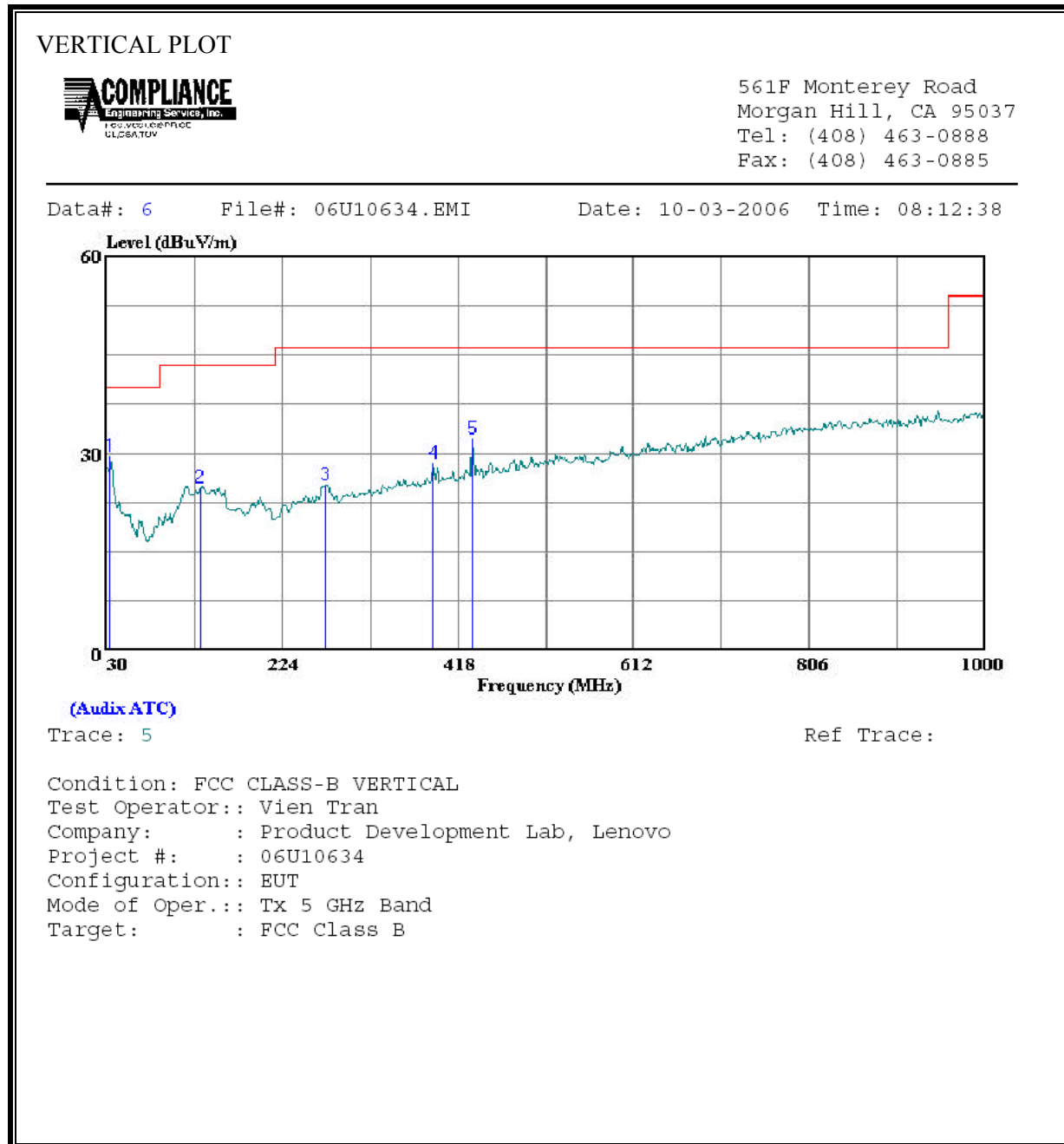
5 GHz BAND



HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	6.54	20.45	26.99	40.00	-13.01	Peak
2	133.790	15.94	15.02	30.96	43.50	-12.54	Peak
3	434.490	12.12	18.84	30.96	46.00	-15.04	Peak
4	455.830	13.77	19.33	33.10	46.00	-12.90	Peak
5	499.480	14.43	20.22	34.65	46.00	-11.35	Peak
6	997.090	12.60	26.91	39.51	54.00	-14.49	Peak

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



VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHZ	dBuV	dB	dBuV/m	dBuV/m	dB	
1	33.880	10.41	19.05	29.46	40.00	-10.54	Peak
2	133.790	9.68	15.02	24.70	43.50	-18.80	Peak
3	271.530	10.45	14.65	25.10	46.00	-20.90	Peak
4	390.840	10.60	17.83	28.43	46.00	-17.57	Peak
5	434.490	13.25	18.84	32.09	46.00	-13.91	Peak

7.2. 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 μ H/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

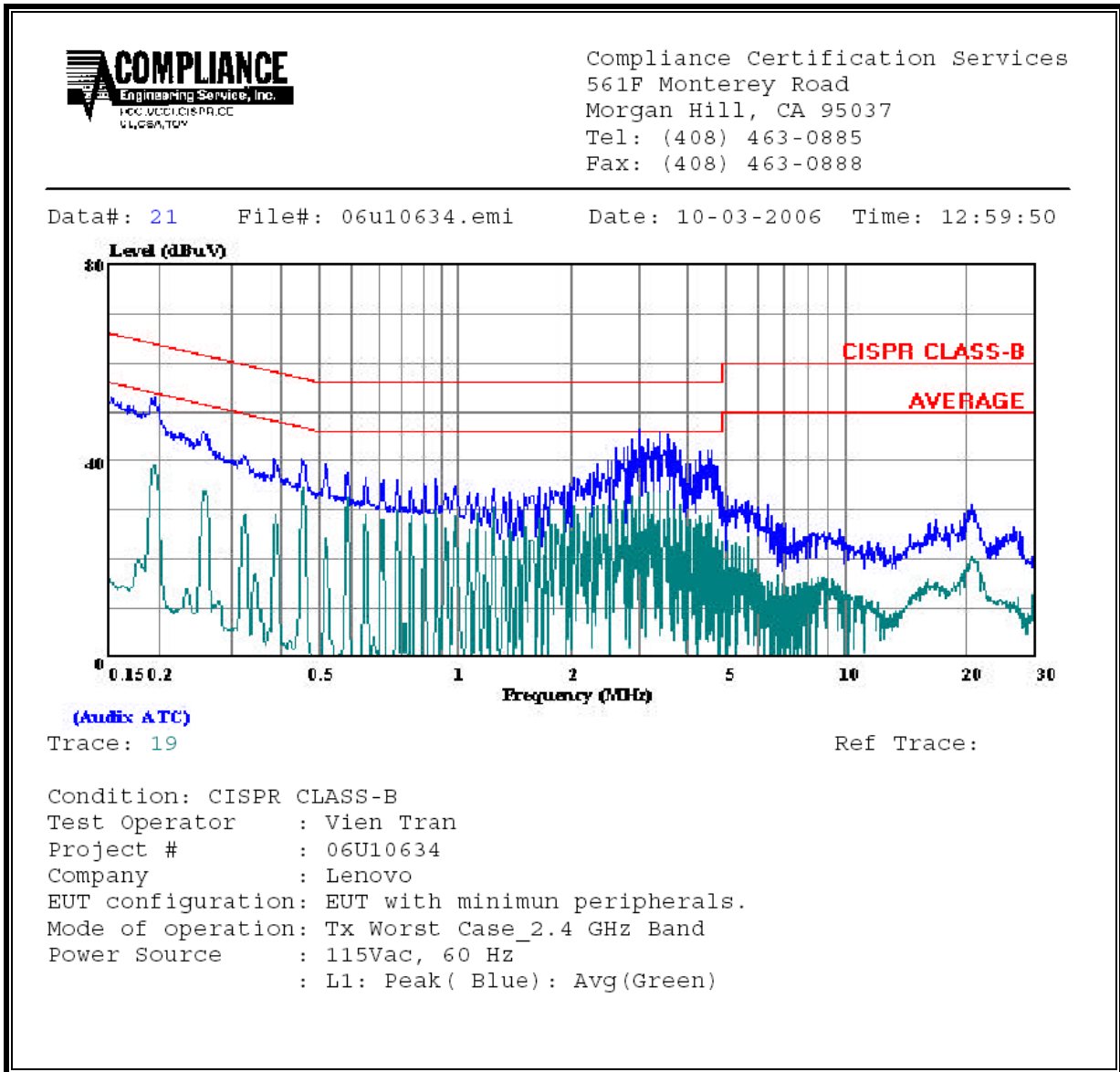
No non-compliance noted:

2.4 GHz BAND

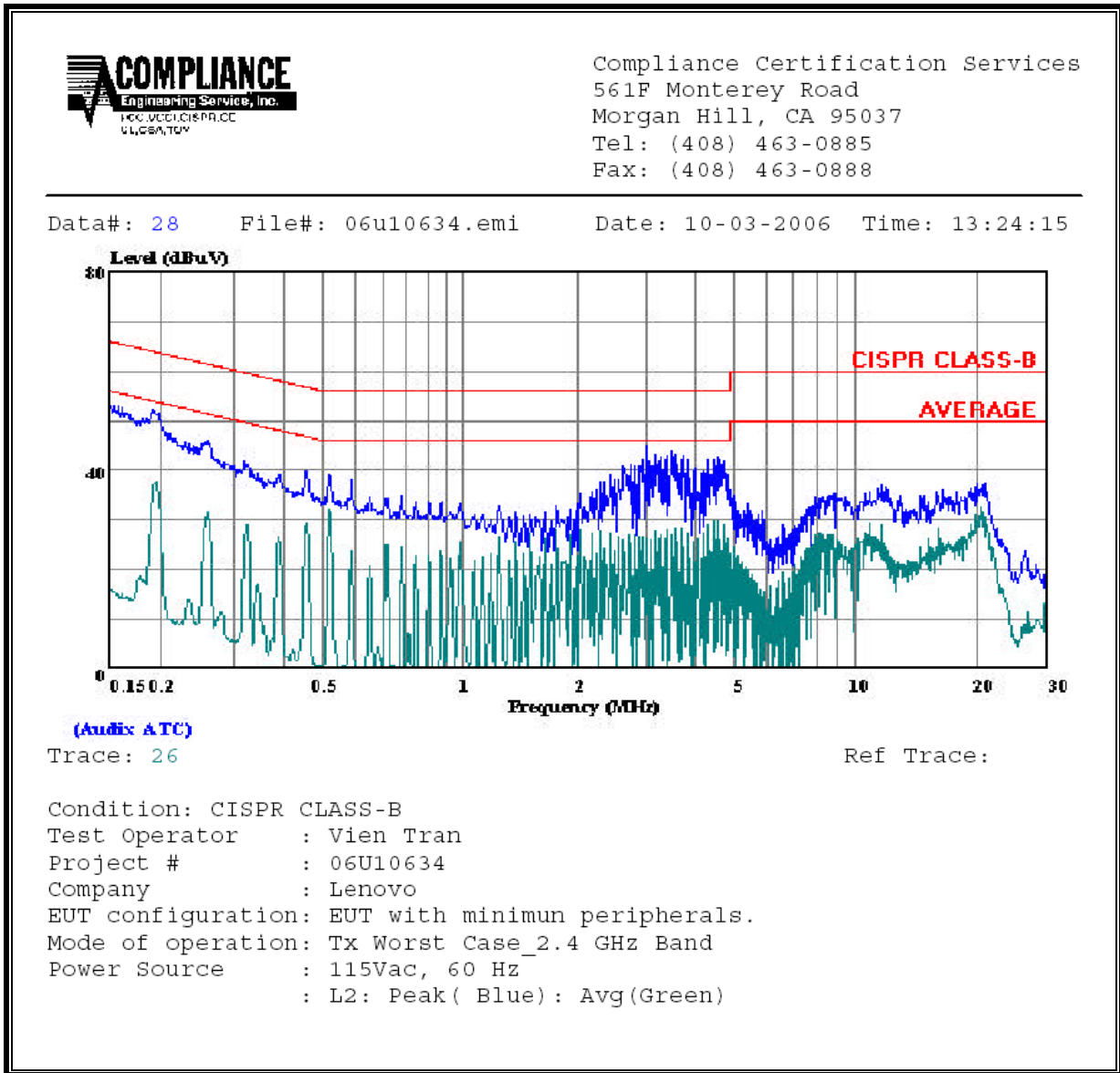
6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	52.86	--	39.28	0.00	64.04	54.04	-11.18	-14.76	L1
0.45	40.40	--	34.72	0.00	56.88	46.88	-16.48	-12.16	L1
3.51	46.08	--	37.87	0.00	56.00	46.00	-9.92	-8.13	L1
0.19	51.64	--	37.35	0.00	64.04	54.04	-12.40	-16.69	L2
0.45	39.70	--	30.41	0.00	56.88	46.88	-17.18	-16.47	L2
3.51	45.10	--	29.91	0.00	56.00	46.00	-10.90	-16.09	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS

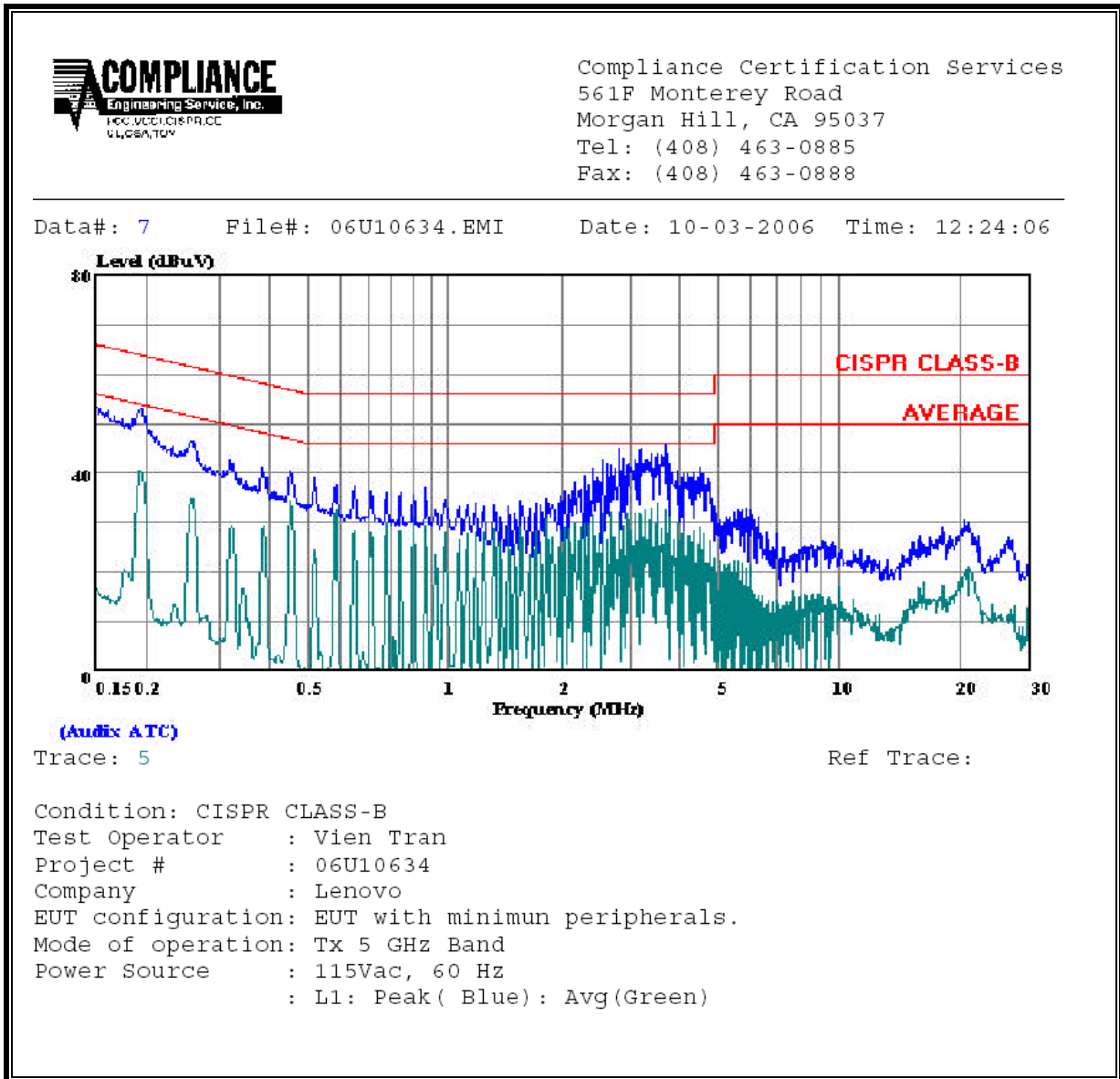


5 GHz BAND

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	52.93	--	40.69	0.00	63.91	53.91	-10.98	-13.22	L1
0.26	46.36	--	34.85	0.00	61.46	51.46	-15.10	-16.61	L1
3.76	45.68	--	34.40	0.00	56.00	46.00	-10.32	-11.60	L1
0.19	52.06	--	37.41	0.00	63.91	53.91	-11.85	-16.50	L2
0.26	46.04	--	32.20	0.00	61.46	51.46	-15.42	-19.26	L2
3.24	43.98	--	32.12	0.00	56.00	46.00	-12.02	-13.88	L2
6 Worst Data									

LINE 1 RESULTS



LINE 2 RESULTS

