FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

FOR

WIRELESS TABLET

MODEL NUMBER: PC5NR3-XXXXXXXXX

FCC ID: Q9Z-PC5NR3-J1

REPORT NUMBER: 04U2611-1

ISSUE DATE: APRIL 15, 2004

Prepared for
HITACHI KEIYO ENGINEERING AND SYSTEMS, LTD
7CHOME-1-1 HIGASHINARASHINO
NARASHINO-SHI, CHIBA-KEN
JAPAN, 275-0001

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: HITACHI KEIYO ENGINEERING AND SYSTEMS, LTD
7CHOME-1-1 HIGASHINARASHINO
NARASHINO-SHI, CHIBA-KEN
JAPAN, 275-0001

EUT DESCRIPTION: WIRELESS TABLET

MODEL: PC5NR3-XXXXXXXXX

DATE TESTED: APRIL 6 – 14, 2004

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: This document reports conditions under which testing was conducted and results of tests performed. 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.

Approved & Released For CCS By:

MIKE HECKROTTE
ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

Tested By:

VIEN TRAN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is an 802.11b Mini PCI transceiver module installed in a Hitachi Tablet computer.

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

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	25.44	349.95

The radio utilizes two internal antennas for diversity, each with a maximum gain of 1.6 dBi.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/2001, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. 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.

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5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. 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%.

5.3. 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 Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004
RF Filter Section	HP	85420E	3705A00256	11/21/04
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	12/22/04
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/04
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/04
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	10/13/04
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/13/04
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/04
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	1/13/05
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/05
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	4/25/04

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC ADAPTER	NKEN ELECTRON	N/A	4/24/2858	DoC
KEY BOARD	HITACHI	FK88579-052	PZ000007	DoC
CRADLE	HITACHI	PC-AU3220	N/A	DoC
TABLET	HITACHI	PC-5NR3-J9A44J011	90043	Q9ZPC5NR3-J

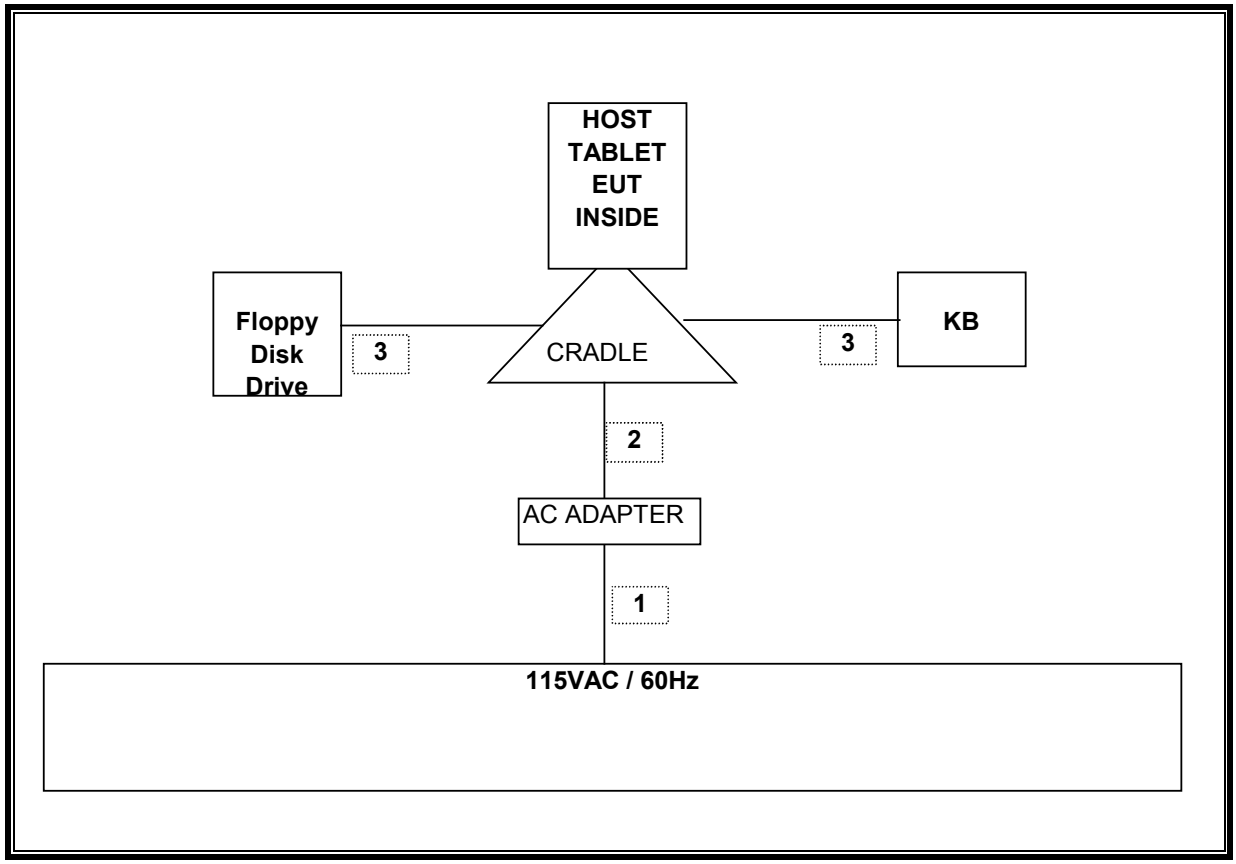
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US115V	Un-Shielded	2m	
2	DC	1	DC	Shielded	1m	Ferrite on cradle side
3	USB	2	USB	Shielded	2m	

TEST SETUP

The EUT is installed in a host tablet computer. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



SETUP FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC ADAPTER	SANKEN ELECTRONICS	N/A	4/24/2858	DoC
SPEAKER PHONE	N/A	N/A	N/A	N/A
HEAD PHONE	SONY	N/A	PNX03-46340	DoC
FLOPPY DISK DRIVE	TEAC	FD-05PUB	1517602	DoC
KEY BOARD	HITACHI	FK88579-052	PZ000007	DoC
MOUSE	MICROSOFT	N/A	N/A	DoC
CRADLE	HITACHI	PC-AU3220	N/A	DoC
TABLET	HITACHI	PC-5NR3-J9A44J011	90043	Q9ZPC5NR3-J

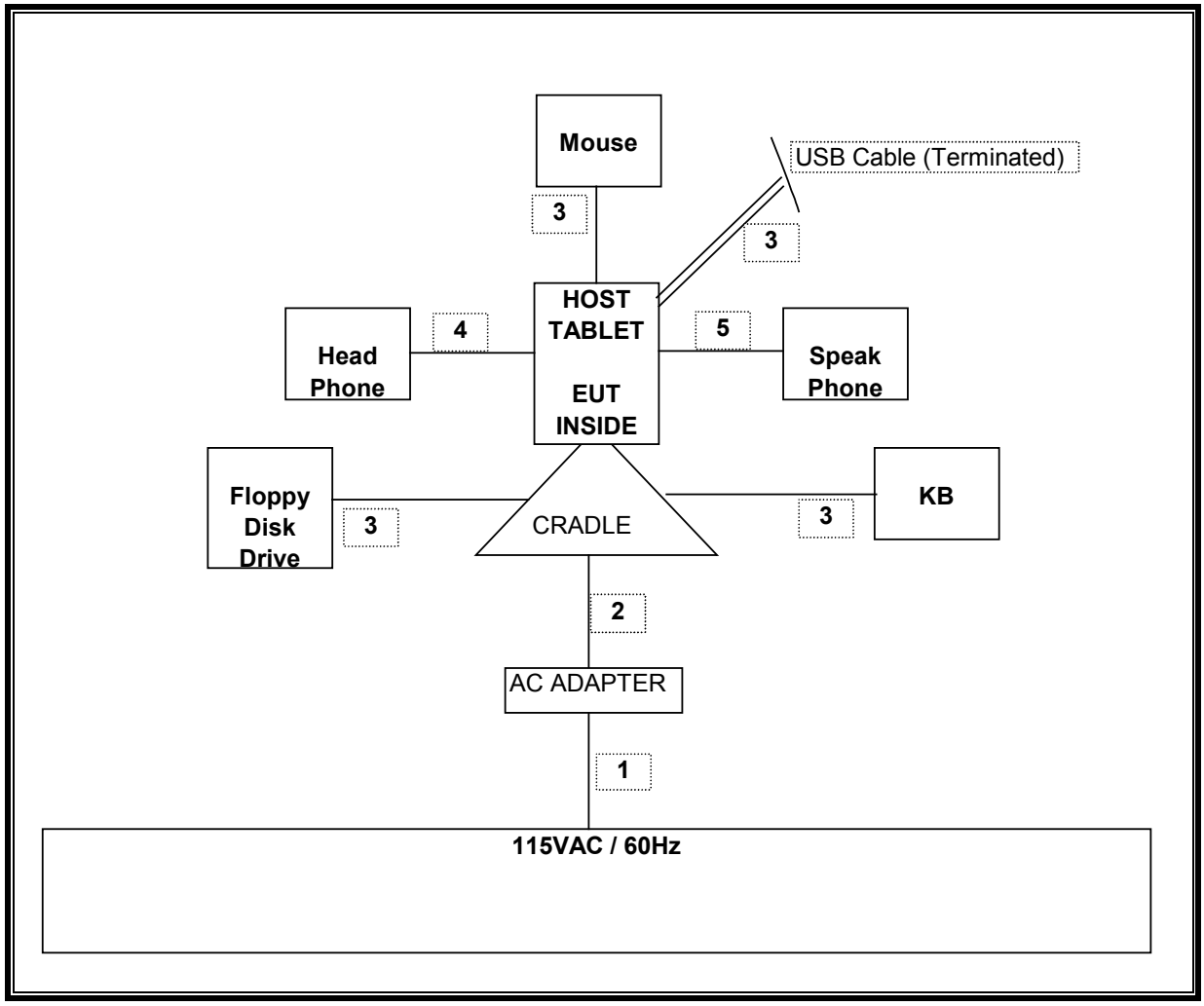
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US115V	Un-Shielded	2m	
2	DC	1	DC	Shielded	1m	Ferrite on cradle side
3	USB	4	USB	Shielded	2m	
4	Speaker	1	DIN	Un-Shielded	2m	
5	Head Phone	1	DIN	Un-Shielded	1m	

TEST SETUP

The EUT is installed in a host tablet compute. Test software exercised the radio card.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 100 kHz. The sweep time is coupled.

RESULTS

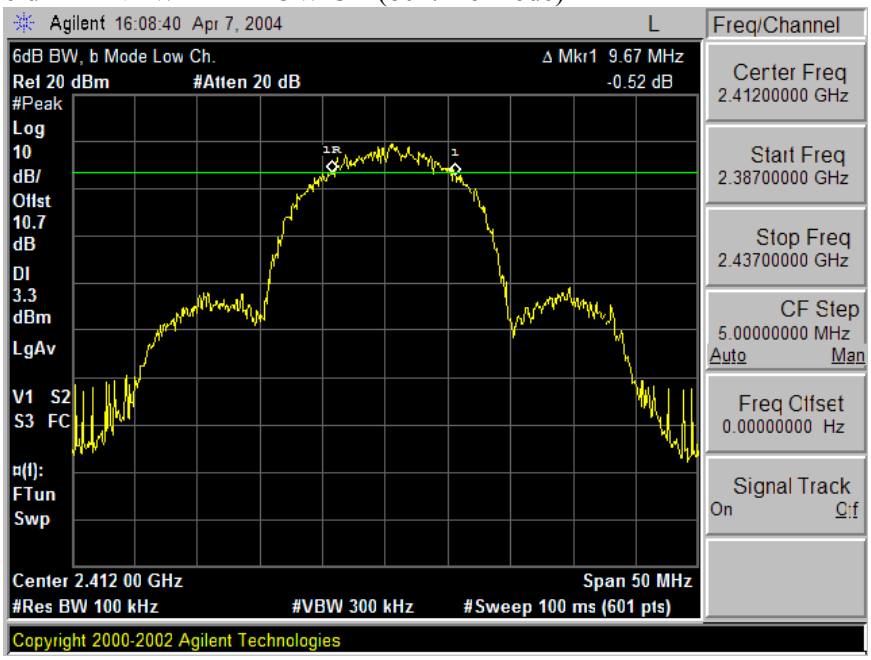
No non-compliance noted:

802.11b Mode

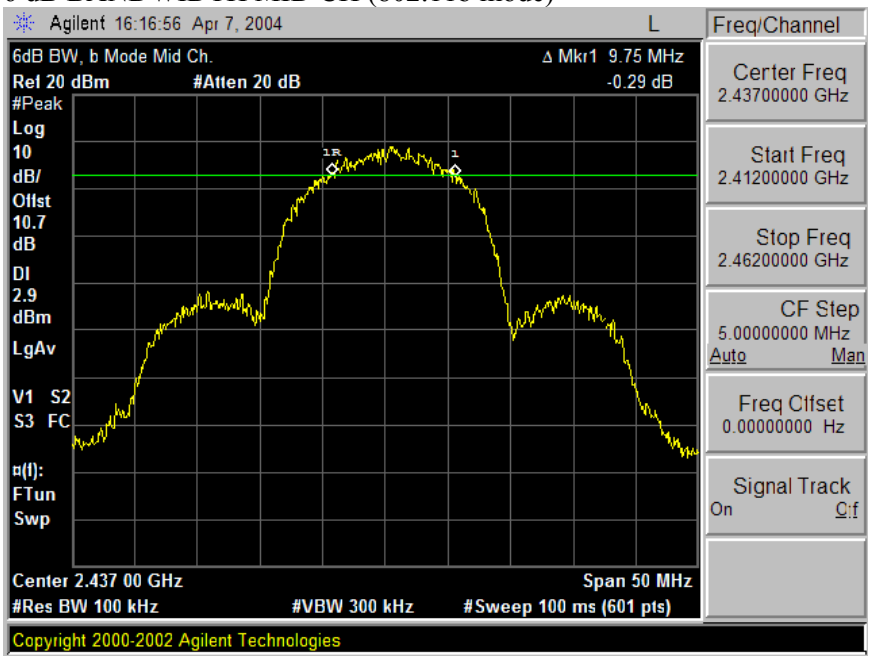
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	9667	500	9167
Middle	2437	9750	500	9250
High	2462	9750	500	9250

6 DB BANDWIDTH (802.11b MODE)

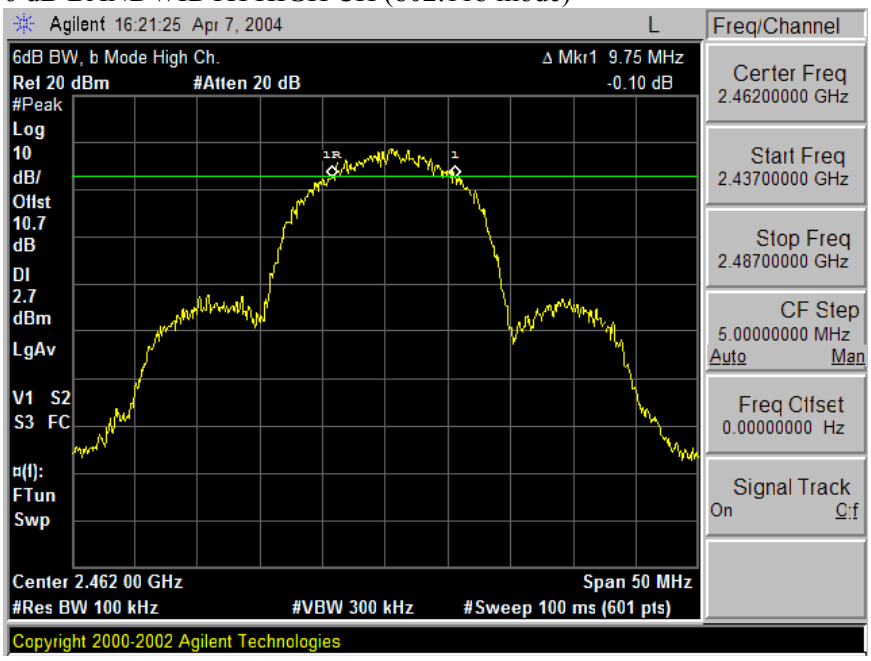
6 dB BANDWIDTH LOW CH (802.11b mode)



6 dB BANDWIDTH MID CH (802.11b mode)



6 dB BANDWIDTH HIGH CH (802.11b mode)



7.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

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

RESULTS

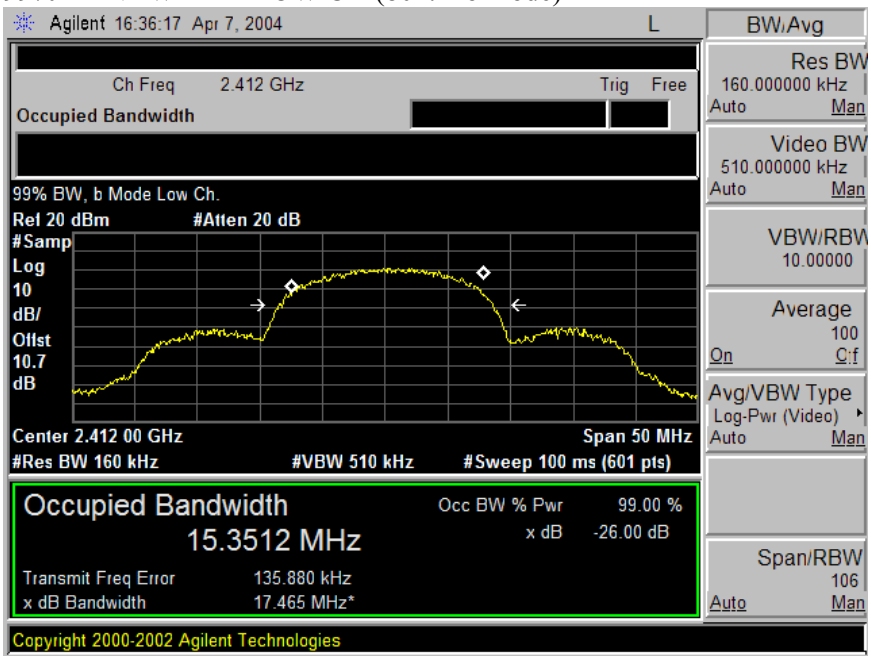
No non-compliance noted:

802.11b Mode

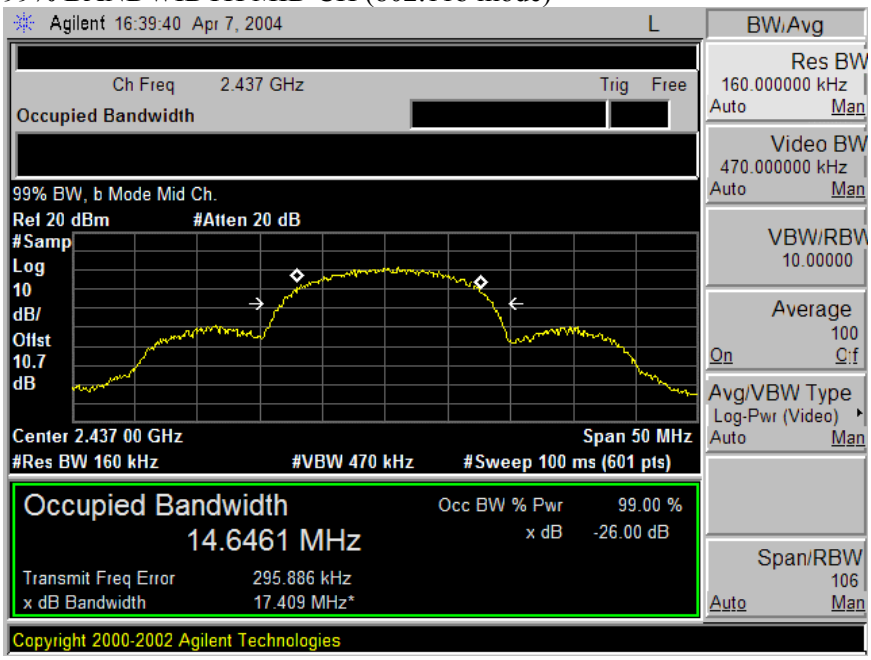
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.351
Middle	2437	14.646
High	2462	14.759

99% BANDWIDTH (802.11b MODE)

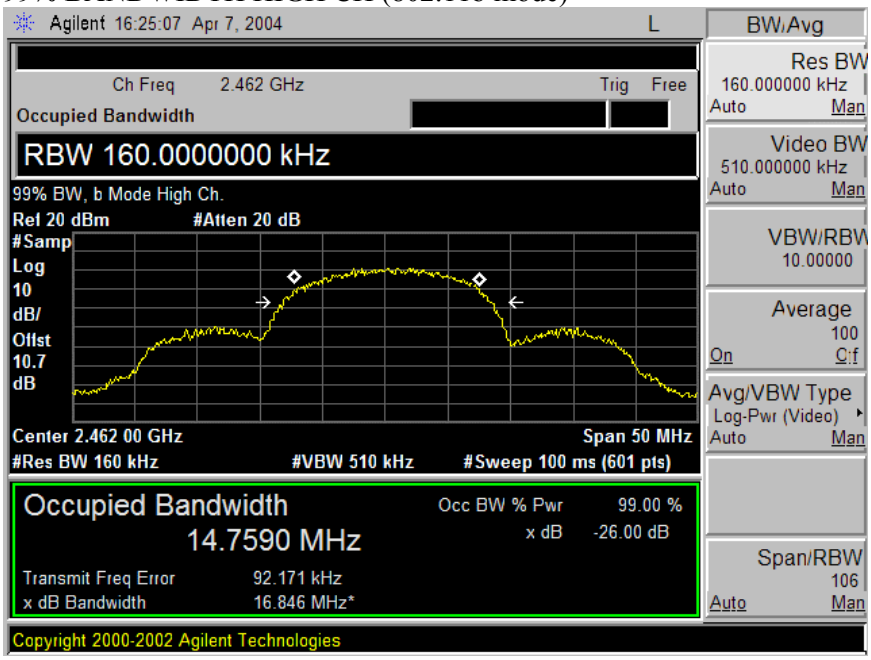
99% BANDWIDTH LOW CH (802.11b mode)



99% BANDWIDTH MID CH (802.11b mode)



99% BANDWIDTH HIGH CH (802.11b mode)



7.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

§15.247 (b) The maximum peak output power of the intentional radiator shall not exceed the following:

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

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gain is 1.6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

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

RESULTS

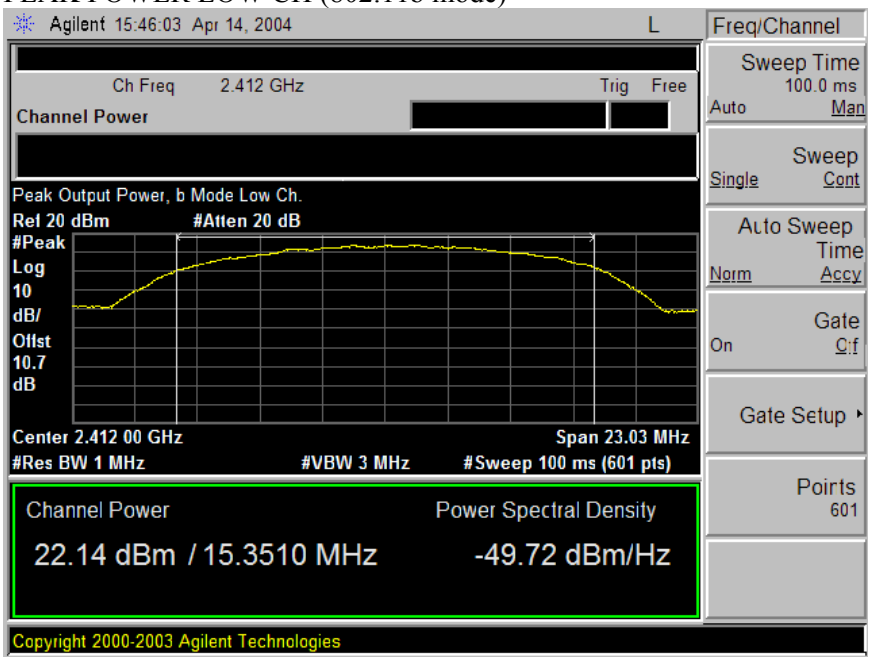
No non-compliance noted:

802.11b Mode

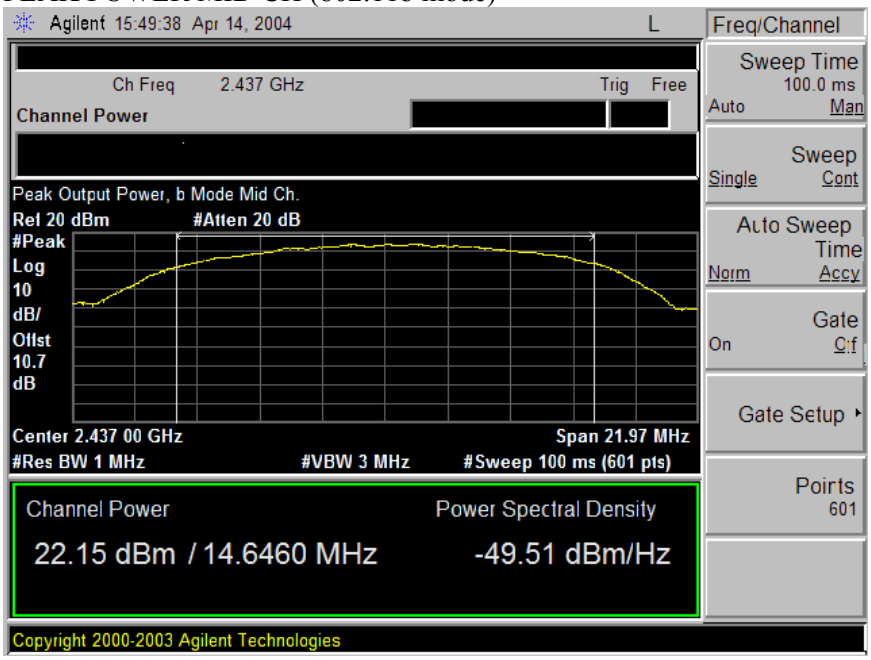
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	22.14	30	-7.86
Middle	2437	22.15	30	-7.85
High	2462	21.85	30	-8.15

OUTPUT POWER (802.11b MODE)

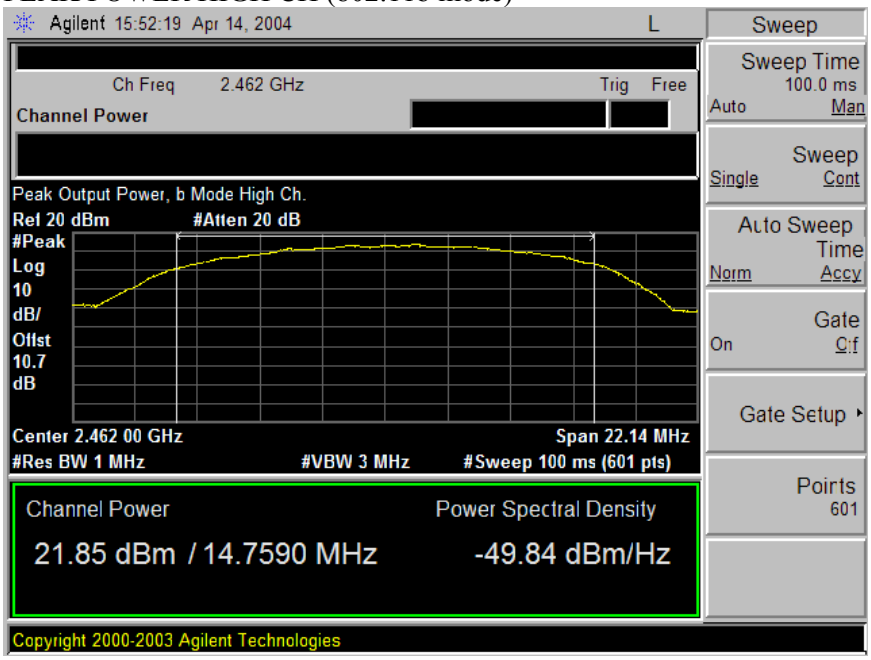
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)



PEAK POWER HIGH CH (802.11b mode)



7.4. 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 10.7 dB (including 10 dB pad and 0.7 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	2412	19.30
Middle	2437	19.30
High	2462	18.85

7.5. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz band.

RESULTS

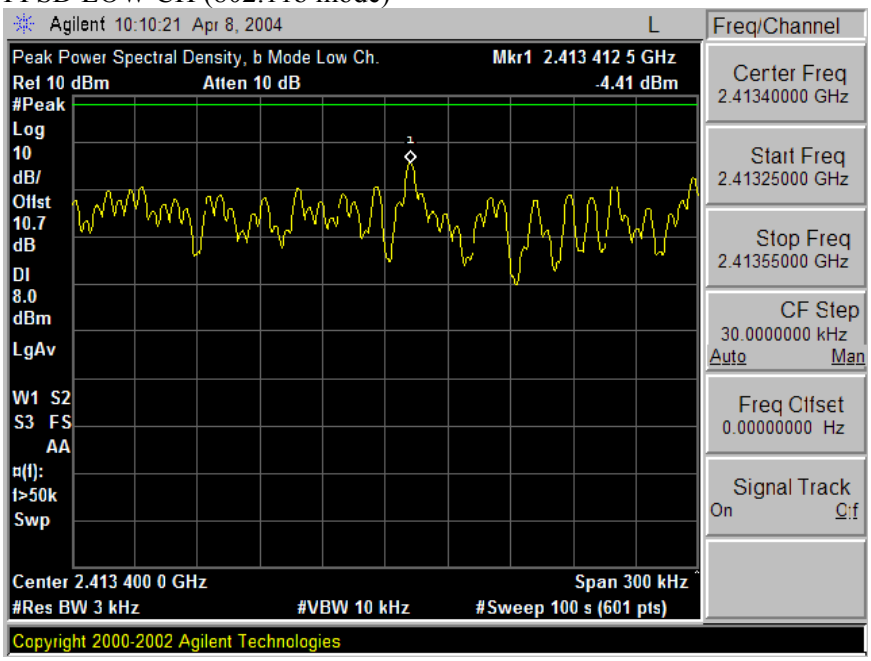
No non-compliance noted:

802.11b Mode

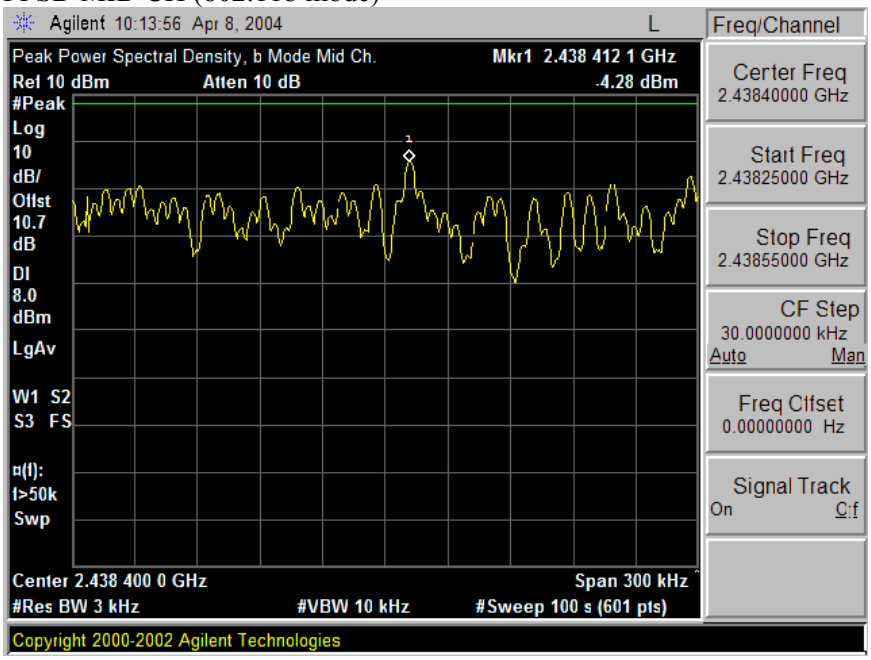
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-4.41	8	-12.41
Middle	2437	-4.20	8	-12.20
High	2462	-4.70	8	-12.70

PEAK POWER SPECTRAL DENSITY (802.11b MODE)

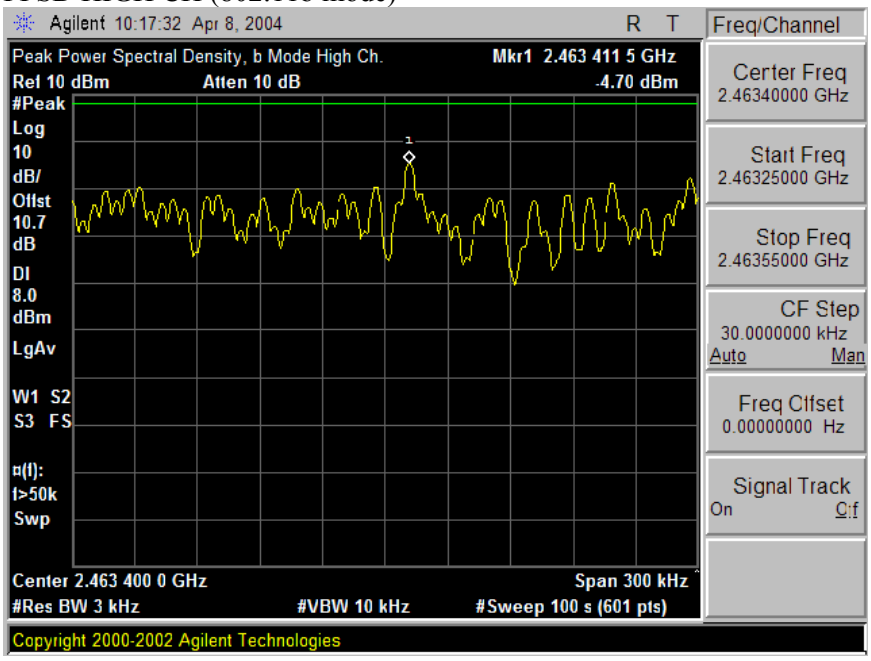
PPSD LOW CH (802.11b mode)



PPSD MID CH (802.11b mode)



PPSD HIGH CH (802.11b mode)



7.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

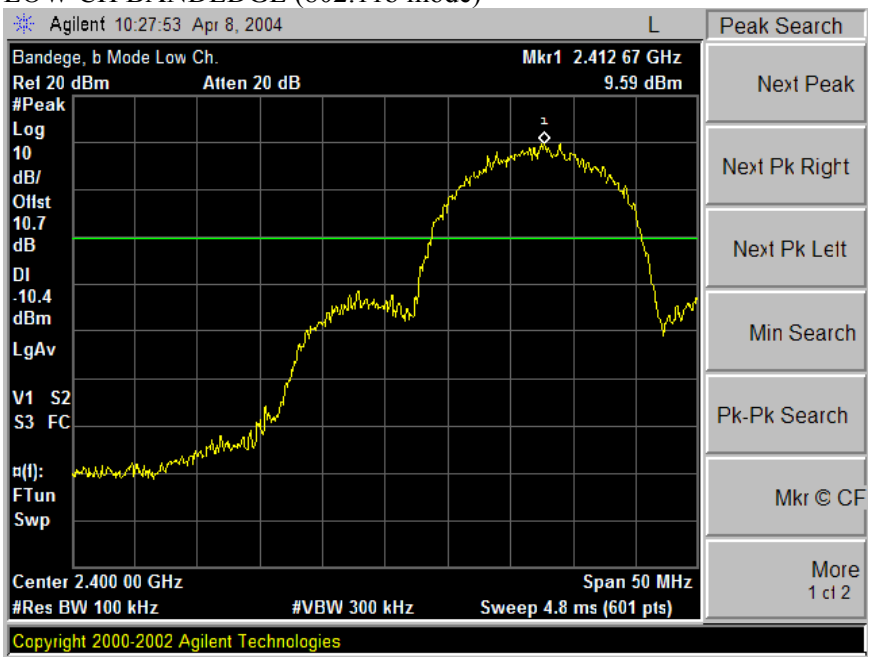
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

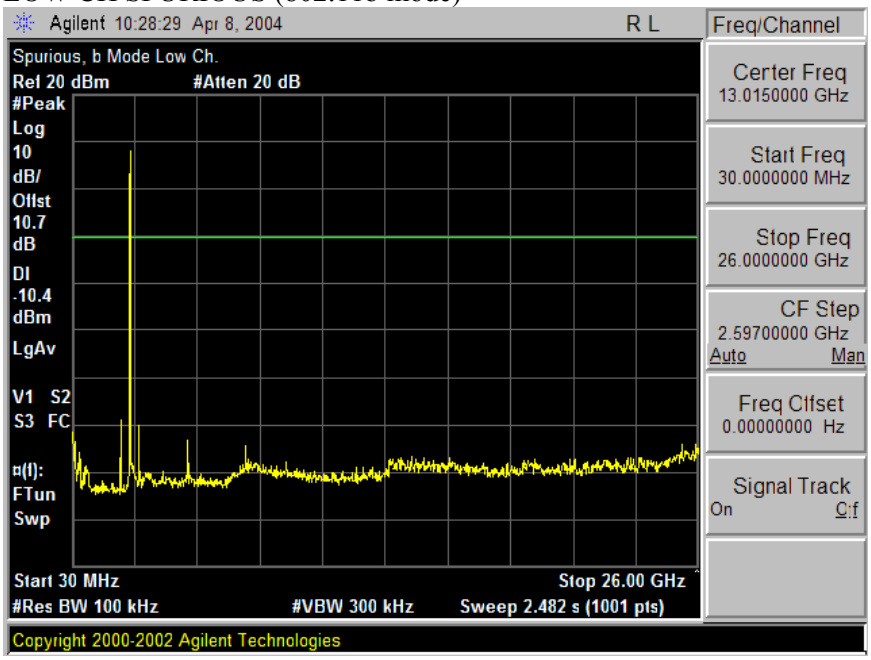
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)

LOW CH BANDEDGE (802.11b mode)

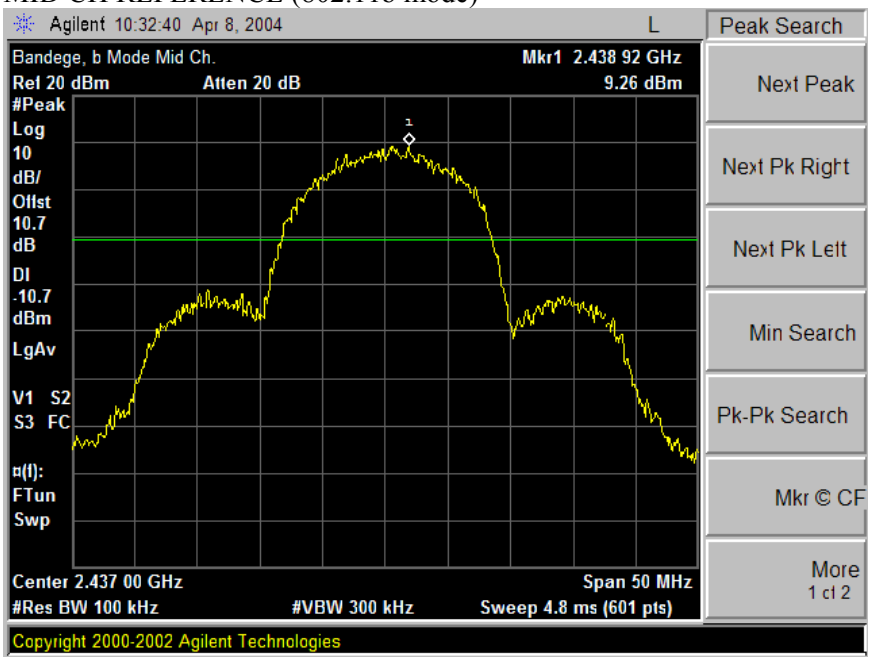


LOW CH SPURIOUS (802.11b mode)

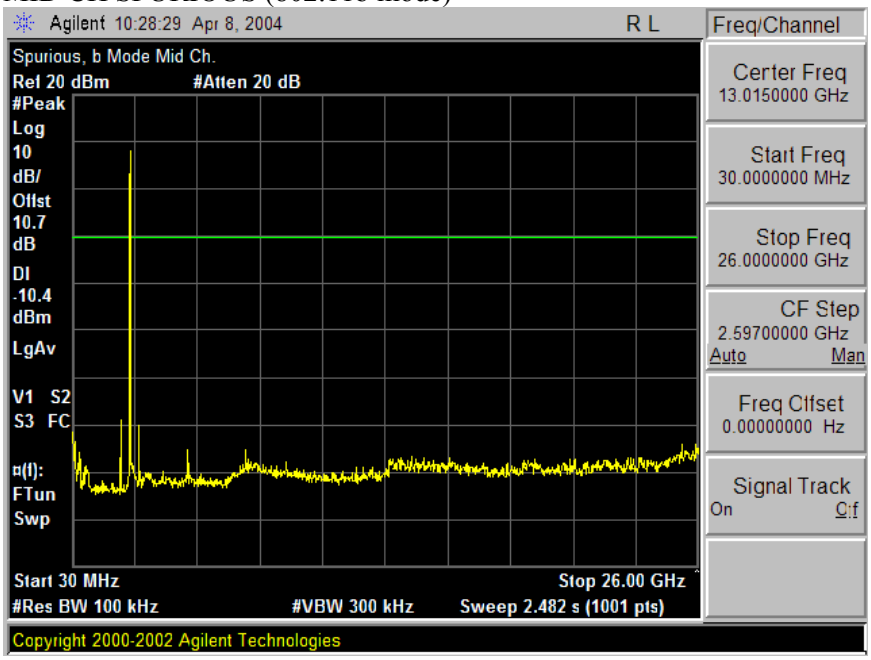


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)

MID CH REFERENCE (802.11b mode)

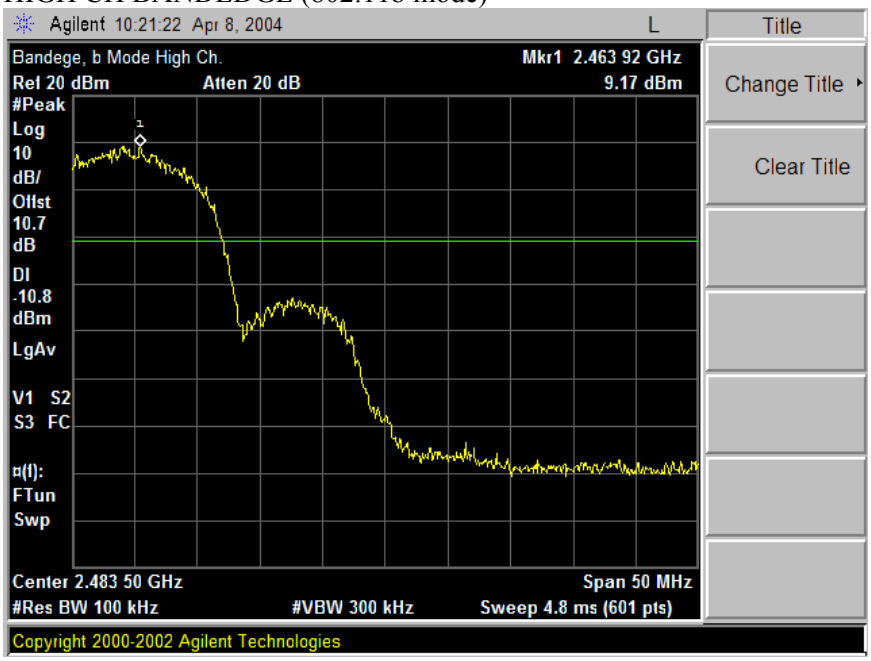


MID CH SPURIOUS (802.11b mode)

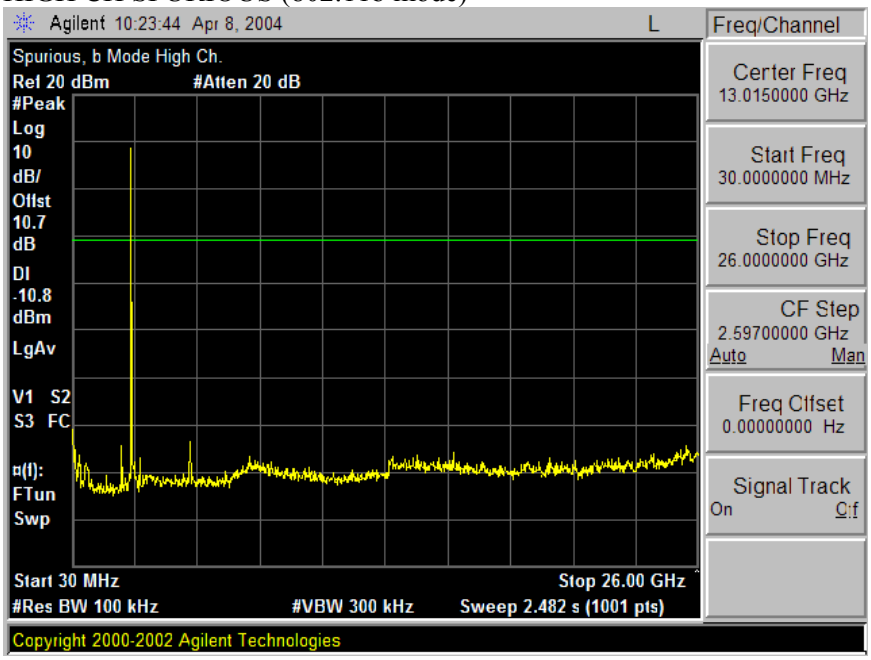


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)

HIGH CH BANDEDGE (802.11b mode)



HIGH CH SPURIOUS (802.11b mode)



7.7. RADIATED EMISSIONS

7.7.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

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

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

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

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

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

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

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

TEST PROCEDURE

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

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

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

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

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.

RESULTS

No non-compliance noted:

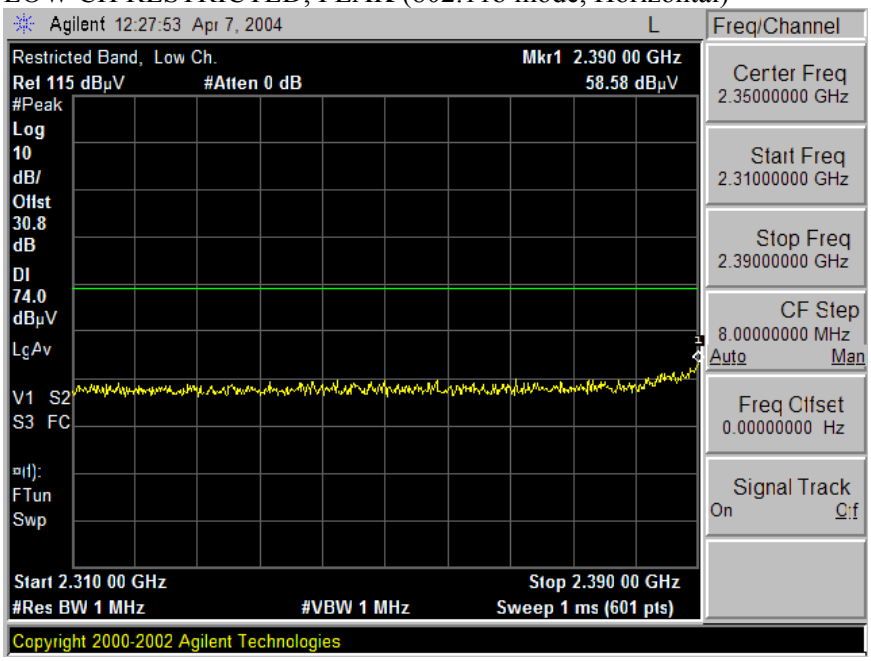
7.7.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

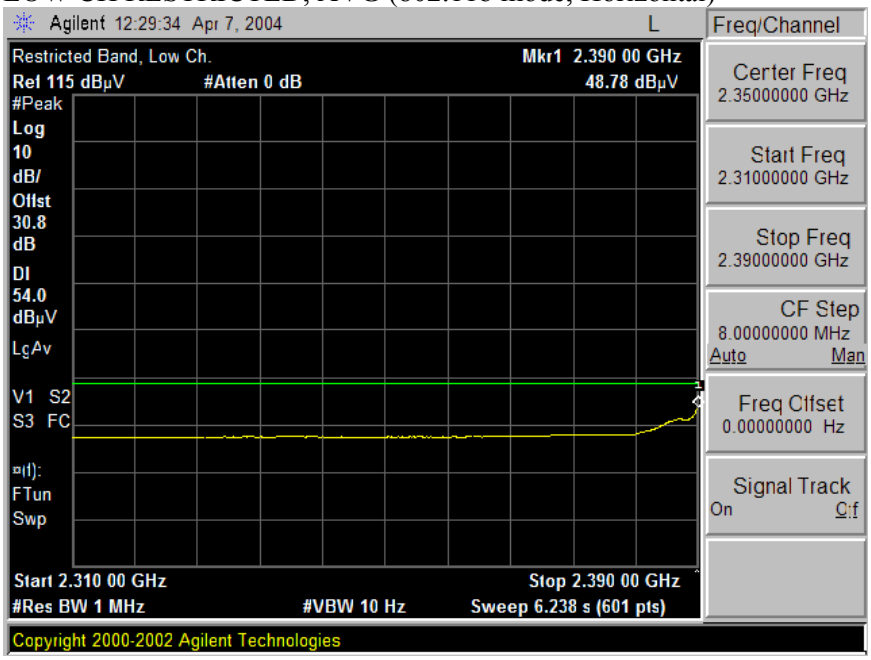
The reference level offset is equal to the test antenna gain + the test cable loss (29.2 dB/m + 1.6dB = 30.8 dB)

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

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

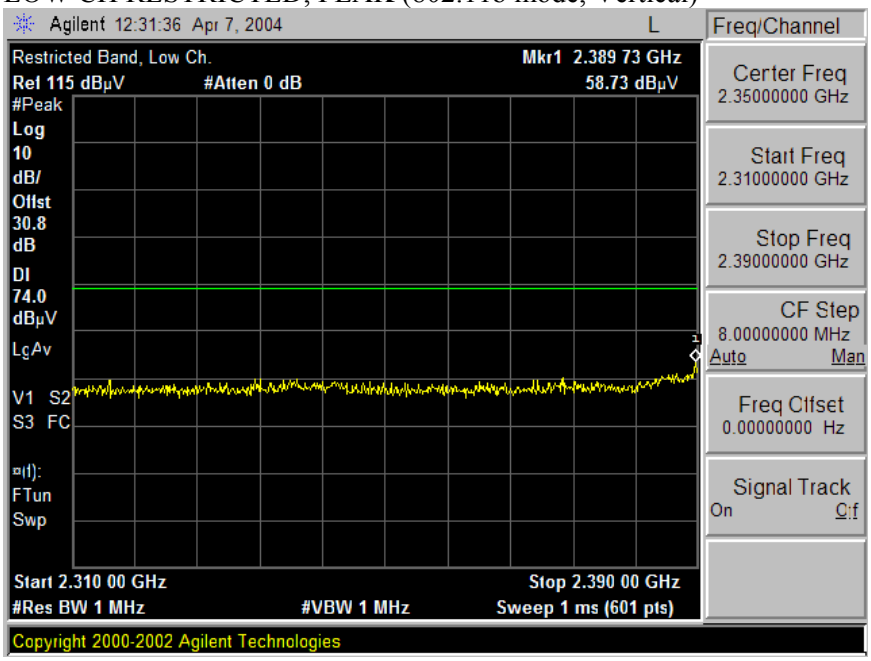


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

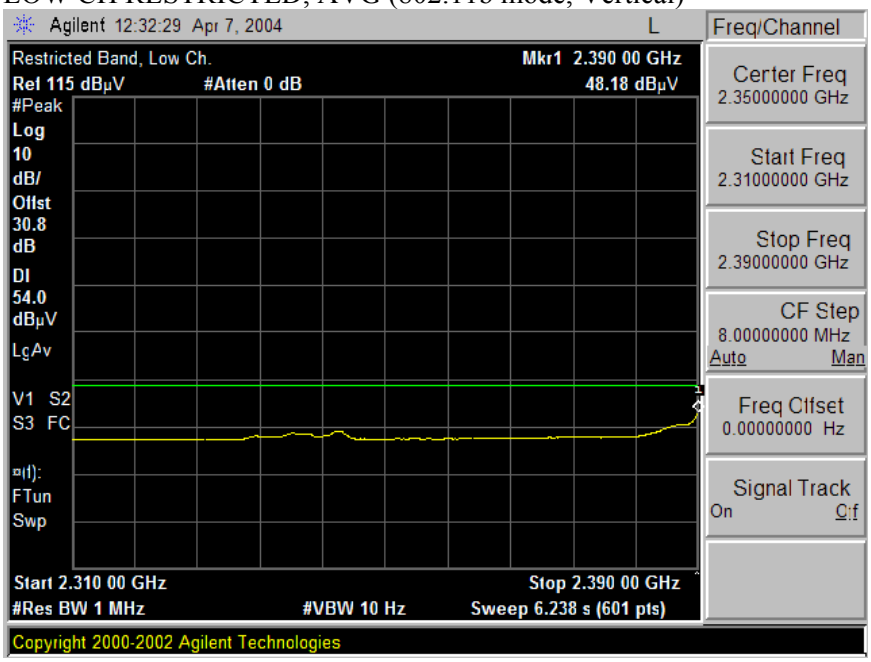


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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



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

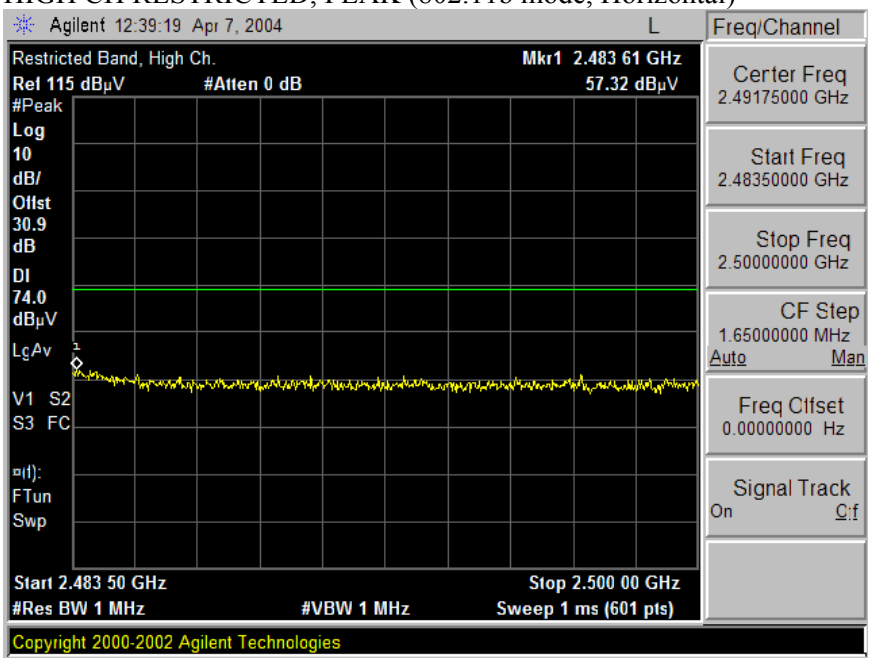


CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

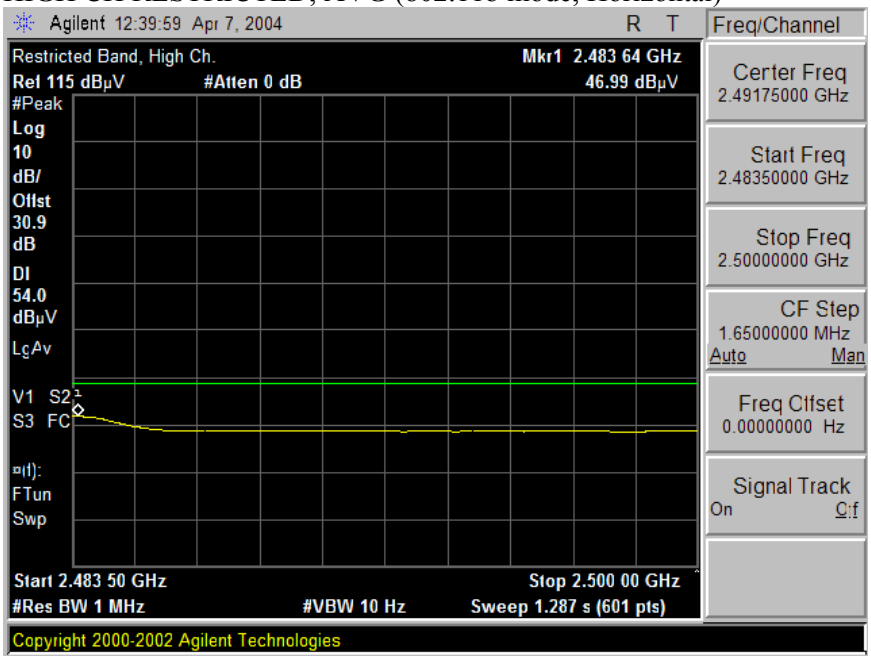
The reference level offset is equal to the test antenna gain + the test cable loss (29.2 dB/m + 1.7 dB = 30.9 dB)

RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

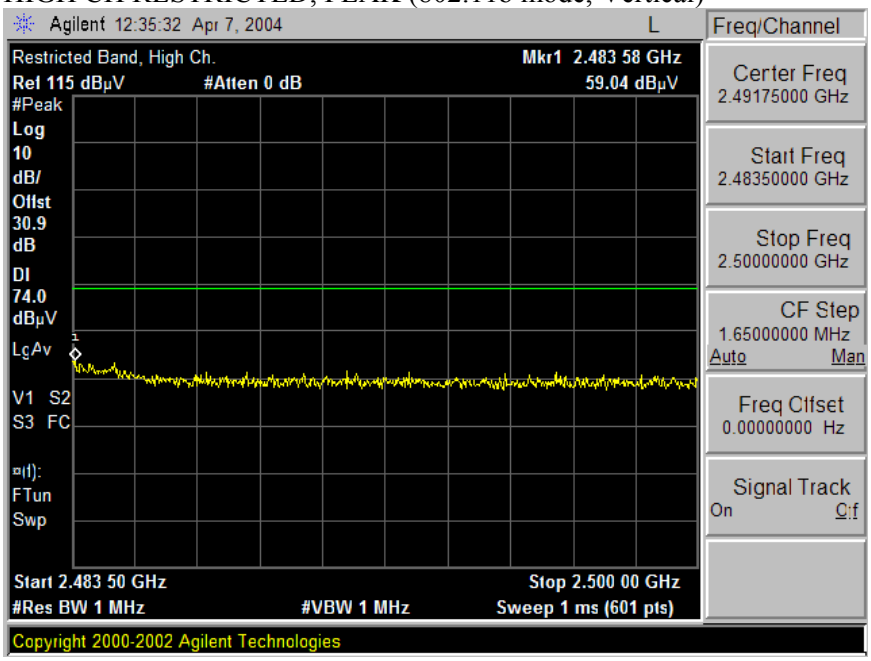


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

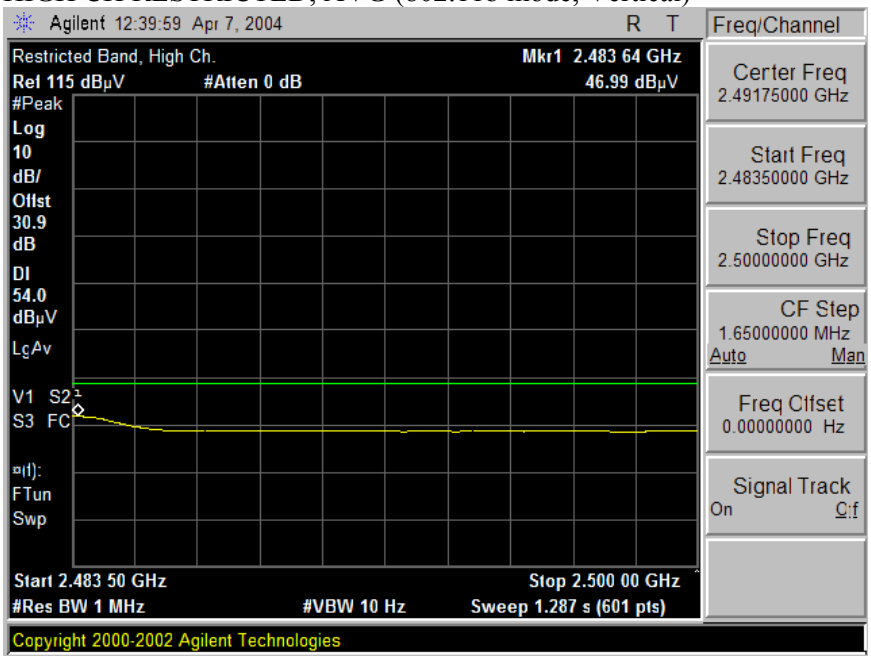


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

04/07/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIRN TRAN
Project #: 04U2611-1
Company: HITACHI
EUT Descrip.: IEEE 802.11b WIRELESS TABLET
EUT M/N: VISIONPLATE
Test Target: FCC 15.247
Mode Oper: TX_ 2.4GHz BAND_100mW_20dBm_HARMONIC & SPUR

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T86 Miteq 924341		

Hi Frequency Cables: ☑ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Limit: FCC 15.209

Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth
Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
LOW CH 2412MHz_100mW(20dBm)															
4.824	9.8	58.5	46.9	33.4	2.9	-45.0	0.0	1.0	50.6	39.1	74.0	54.0	-23.4	-14.9	V
12.060	9.8	53.3	40.9	39.2	6.2	-43.6	0.0	1.0	56.0	43.6	74.0	54.0	-18.0	-10.4	V
4.824	9.8	57.2	45.3	33.4	2.9	-45.0	0.0	1.0	49.4	37.5	74.0	54.0	-24.6	-16.5	H
12.060	9.8	55.1	41.7	39.2	6.2	-43.6	0.0	1.0	57.8	44.4	74.0	54.0	-16.2	-9.6	H
MID CH 2437MHz_100mW(20dBm)															
4.874	9.8	60.6	47.5	33.4	2.9	-45.1	0.0	1.0	52.8	39.7	74.0	54.0	-21.2	-14.3	V
7.311	9.8	57.8	46.0	35.8	3.8	-45.3	0.0	1.0	53.0	41.2	74.0	54.0	-21.0	-12.8	V
12.185	9.8	54.0	41.7	39.2	6.2	-43.8	0.0	1.0	56.6	44.3	74.0	54.0	-17.4	-9.7	V
4.874	9.8	56.9	45.5	33.4	2.9	-45.1	0.0	1.0	49.1	37.7	74.0	54.0	-24.9	-16.3	H
7.311	9.8	58.7	46.8	35.8	3.8	-45.3	0.0	1.0	53.9	42.0	74.0	54.0	-20.1	-12.0	H
12.185	9.8	53.0	41.9	39.2	6.2	-43.8	0.0	1.0	55.6	44.5	74.0	54.0	-18.4	-9.5	H
HI CH 2462MHz_100mW(20dBm)															
4.924	9.8	63.0	50.9	33.5	2.9	-45.1	0.0	1.0	55.2	43.1	74.0	54.0	-18.8	-10.9	V
7.386	9.8	57.8	46.5	36.0	3.9	-45.3	0.0	1.0	53.3	42.0	74.0	54.0	-20.7	-12.0	V
12.310	9.8	53.0	43.0	39.2	6.2	-44.0	0.0	1.0	55.4	45.4	74.0	54.0	-18.6	-8.6	V
4.924	9.8	64.0	52.4	33.5	2.9	-45.1	0.0	1.0	56.2	44.7	74.0	54.0	-17.8	-9.3	H
7.386	9.8	57.0	45.1	36.0	3.9	-45.3	0.0	1.0	52.5	40.6	74.0	54.0	-21.5	-13.4	H
12.310	9.8	52.0	43.0	39.2	6.2	-44.0	0.0	1.0	54.4	45.4	74.0	54.0	-19.6	-8.6	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		

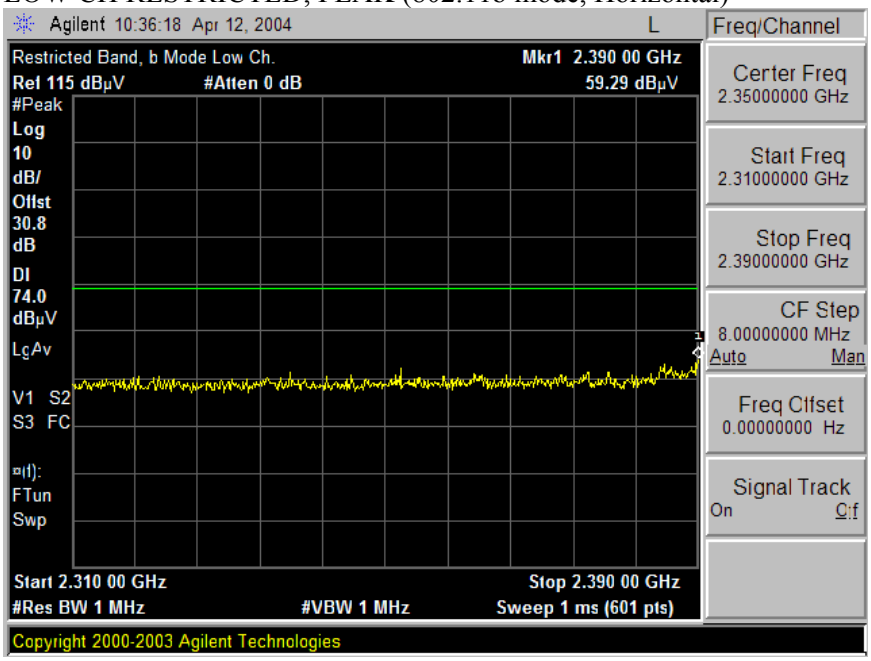
7.7.3. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ (PORTABLE CONFIGURATION)

CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

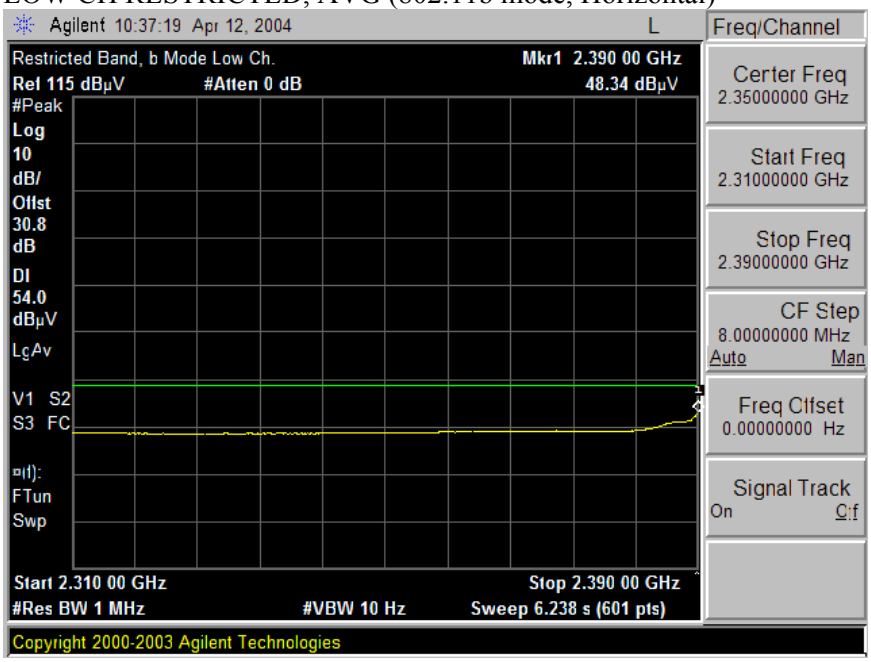
The reference level offset is equal to the test antenna gain + the test cable loss (29.2 dB/m + 1.6 dB = 30.8 dB)

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL-WORST CASE: EUT AT Z POSITION)

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



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

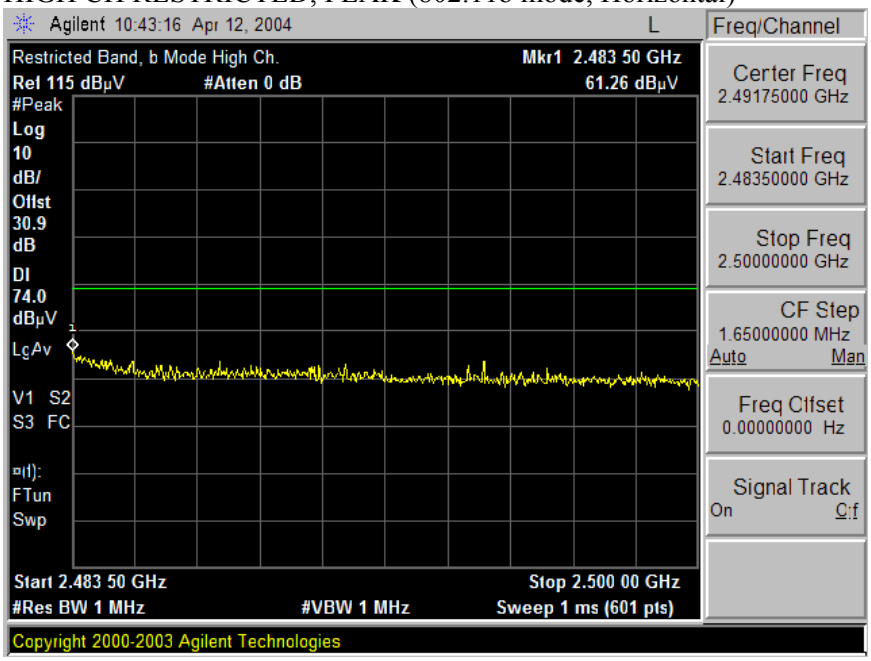


CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

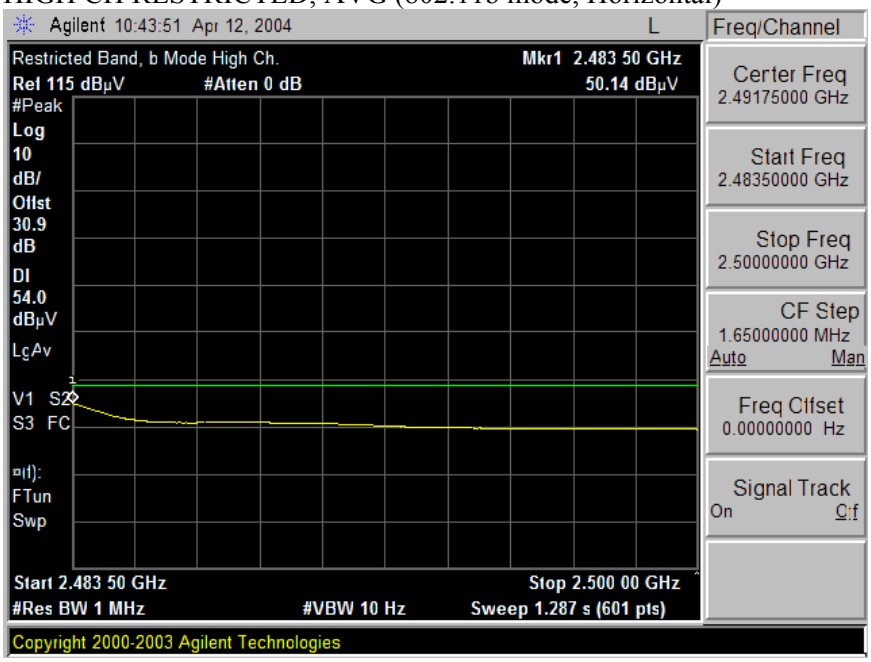
The reference level offset is equal to the test antenna gain + the test cable loss (29.2 dB/m + 1.6 dB = 30.8 dB)

RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL-WORST CASE: EUT AT Z POSITION)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

04/12/04 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIRN TRAN
Project #: 04U2611-1
Company: HITACHI
EUT Descrip.: IEEE 802.11b WIRELESS TABLET
EUT M/N: VISIONPLATE
Test Target: FCC 15.247
Mode Oper: TX_ 2.4GHz BAND_100mW_20dBm_HARMONIC & SPUR_WORST CASE: TABLET AT Z POSITION

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T86 Miteq 924341		

Hi Frequency Cables: ☑ (2 ft) ☐ (2 ~ 3 ft) ☐ (4 ~ 6 ft) ☑ (12 ft)

Limit: FCC 15.209

Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth

Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
LOW CH 2412MHz_100mW(20dBm)															
4.824	9.8	54.0	42.0	33.4	2.9	-45.0	0.0	1.0	46.2	34.2	74.0	54.0	-27.8	-19.8	V
12.060	9.8	53.3	40.9	39.2	6.2	-43.6	0.0	1.0	56.0	43.6	74.0	54.0	-18.0	-10.4	V
4.824	9.8	53.4	42.6	33.4	2.9	-45.0	0.0	1.0	45.6	34.8	74.0	54.0	-28.4	-19.2	H
12.060	9.8	48.0	37.0	39.2	6.2	-43.6	0.0	1.0	50.7	39.7	74.0	54.0	-23.3	-14.3	H
MID CH 2437MHz_100mW(20dBm)															
4.874	9.8	55.5	43.2	33.4	2.9	-45.1	0.0	1.0	47.7	35.4	74.0	54.0	-26.3	-18.6	V
7.311	9.8	50.6	39.0	35.8	3.8	-45.3	0.0	1.0	45.8	34.2	74.0	54.0	-28.2	-19.8	V
12.185	9.8	49.0	36.9	39.2	6.2	-43.8	0.0	1.0	51.6	39.5	74.0	54.0	-22.4	-14.5	V
4.874	9.8	54.5	43.5	33.4	2.9	-45.1	0.0	1.0	46.7	35.7	74.0	54.0	-27.3	-18.3	H
7.311	9.8	52.8	40.7	35.8	3.8	-45.3	0.0	1.0	48.0	35.9	74.0	54.0	-26.0	-18.1	H
12.185	9.8	49.0	38.3	39.2	6.2	-43.8	0.0	1.0	51.6	40.9	74.0	54.0	-22.4	-13.1	H
HI CH 2462MHz_100mW(20dBm)															
4.924	9.8	57.4	47.2	33.5	2.9	-45.1	0.0	1.0	49.6	39.4	74.0	54.0	-24.4	-14.6	V
7.386	9.8	52.6	42.2	36.0	3.9	-45.3	0.0	1.0	48.1	37.7	74.0	54.0	-25.9	-16.3	V
12.310	9.8	47.8	36.3	39.2	6.2	-44.0	0.0	1.0	50.2	38.7	74.0	54.0	-23.8	-15.3	V
4.924	9.8	58.6	46.6	33.5	2.9	-45.1	0.0	1.0	50.8	38.8	74.0	54.0	-23.2	-15.2	H
7.386	9.8	51.0	39.5	36.0	3.9	-45.3	0.0	1.0	46.5	35.0	74.0	54.0	-27.5	-19.0	H
12.310	9.8	48.5	36.6	39.2	6.2	-44.0	0.0	1.0	50.9	39.0	74.0	54.0	-23.1	-15.0	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		

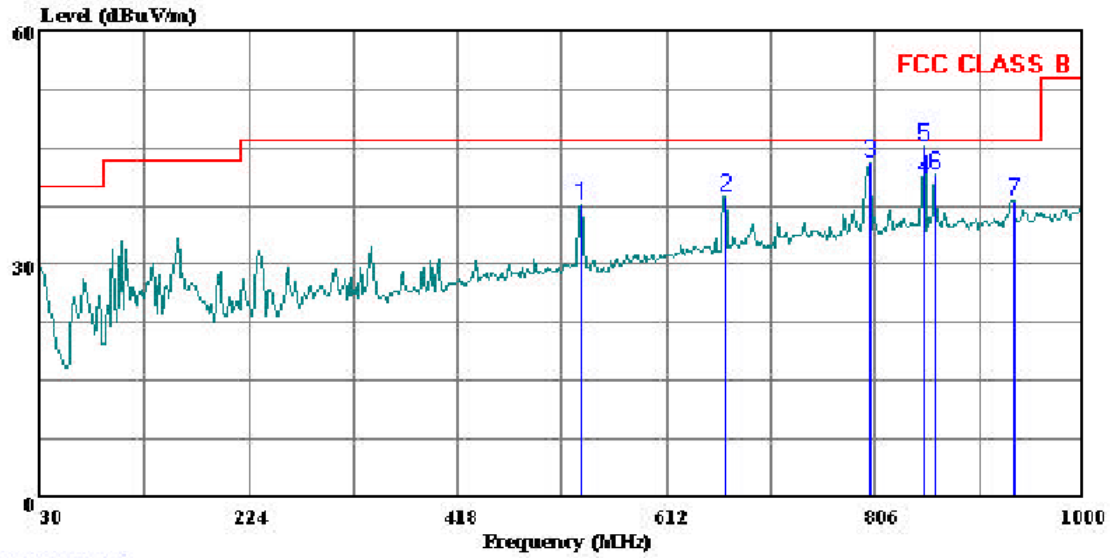
7.7.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

HORIZONTAL PLOT

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: FCC B FILE.EMI Date: 04-08-2004 Time: 12:13:34



(Audix ATC)

Trace: 1 Ref Trace:

Condition: FCC CLASS B HORIZONTAL
Test Operator: : VIEN TRAN
Project #: : 04U2611-1
Company: : HITACHI
EUT: : IEEE 802.11b WIRELESS
Model No: : VISIONPLATE
Configuration: : EUT with USB MOUSE, KB,USB FLOPPY DRIVE,
: SPEAKER, HEADPHONE, AC ADPATER
Target of Test: : FCC Class B
Mode of Operation: TX WORST CASE

HORIZONTAL DATA

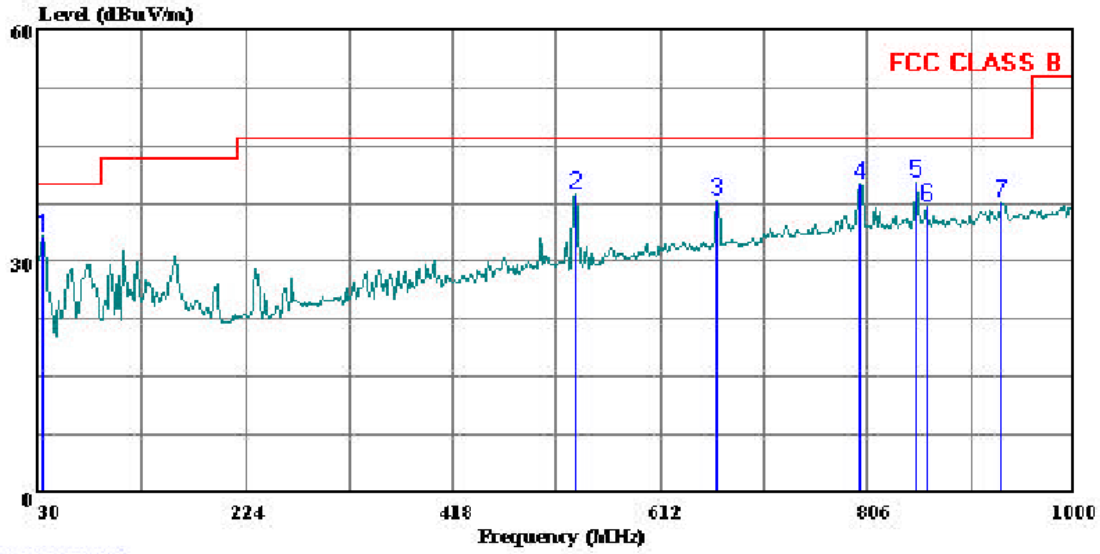
	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	533.430	Peak	16.57	21.01	37.58	46.00	-8.42
2	667.290	Peak	15.41	23.21	38.62	46.00	-7.38
3	800.180	Peak	18.01	25.02	43.03	46.00	-2.97
4	851.590	QP	15.61	25.52	41.13	46.00	-4.87
5	851.590	Peak	19.61	25.52	45.13	46.00	-0.87
6	861.290	Peak	16.14	25.53	41.67	46.00	-4.33
7	934.040	Peak	11.47	26.81	38.28	46.00	-7.72

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

VERTICAL PLOT

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 6 File#: FCC B FILE.EMI Date: 04-08-2004 Time: 12:32:19



(Audix ATC)

Trace: 5 Ref Trace:

Condition: FCC CLASS B VERTICAL
Test Operator: : VIEN TRAN
Project #: : 04U2611-1
Company: : HITACHI
EUT: : IEEE 802.11b WIRELESS
Model No: : VISIONPLATE
Configuration: : EUT with USB MOUSE, KB,USB FLOPPY DRIVE,
: SPEAKER, HEADPHONE, AC ADPATER
Target of Test: : FCC Class B
Mode of Operation: TX WORST CASE

VERTICAL DATA

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	33.880	Peak	12.54	20.70	33.24	40.00	-6.76
2	533.430	Peak	17.63	21.01	38.64	46.00	-7.36
3	664.380	Peak	14.69	23.15	37.84	46.00	-8.16
4	798.240	Peak	14.95	25.01	39.96	46.00	-6.04
5	851.590	Peak	14.77	25.52	40.29	46.00	-5.71
6	861.290	Peak	11.72	25.53	37.25	46.00	-8.75
7	931.130	Peak	10.96	26.79	37.75	46.00	-8.25

7.8. 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:

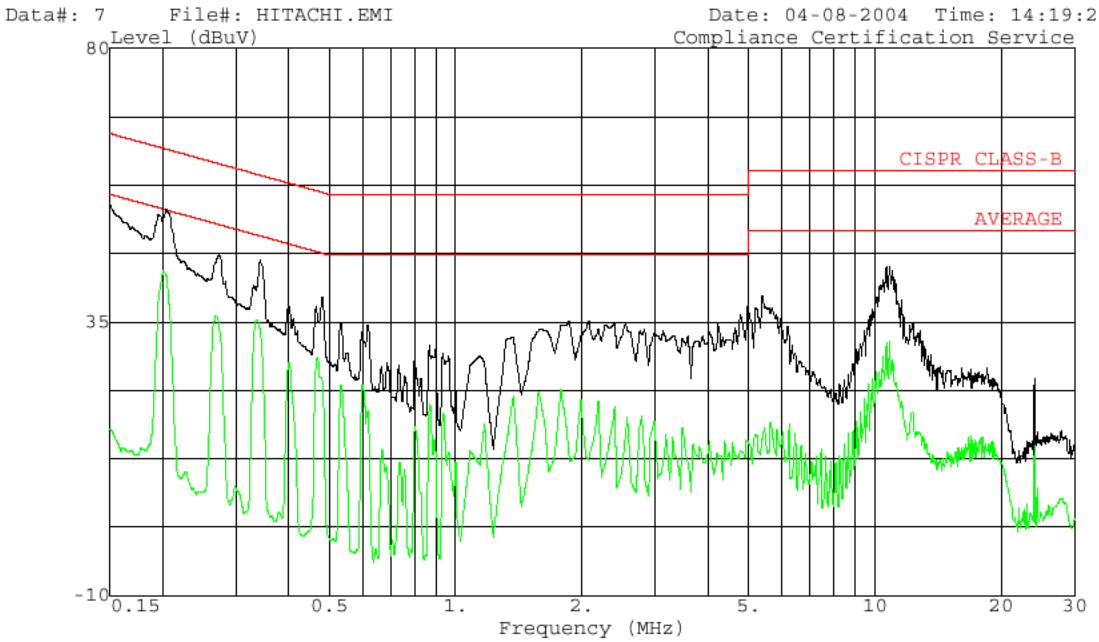
6 WORST EMISSIONS

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	53.36	--	43.73	0.00	64.43	54.43	-11.07	-10.70	L1
1.86	35.90	--	25.17	0.00	56.00	46.00	-20.10	-20.83	L1
10.63	45.22	--	31.94	0.00	60.00	50.00	-14.78	-18.06	L1
0.21	52.98	--	44.46	0.00	64.43	54.43	-11.45	-9.97	L2
0.52	37.93	--	31.20	0.00	56.00	46.00	-18.07	-14.80	L2
10.90	42.44	--	25.40	0.00	60.00	50.00	-17.56	-24.60	L2
6 Worst Data									

LINE 1 RESULT

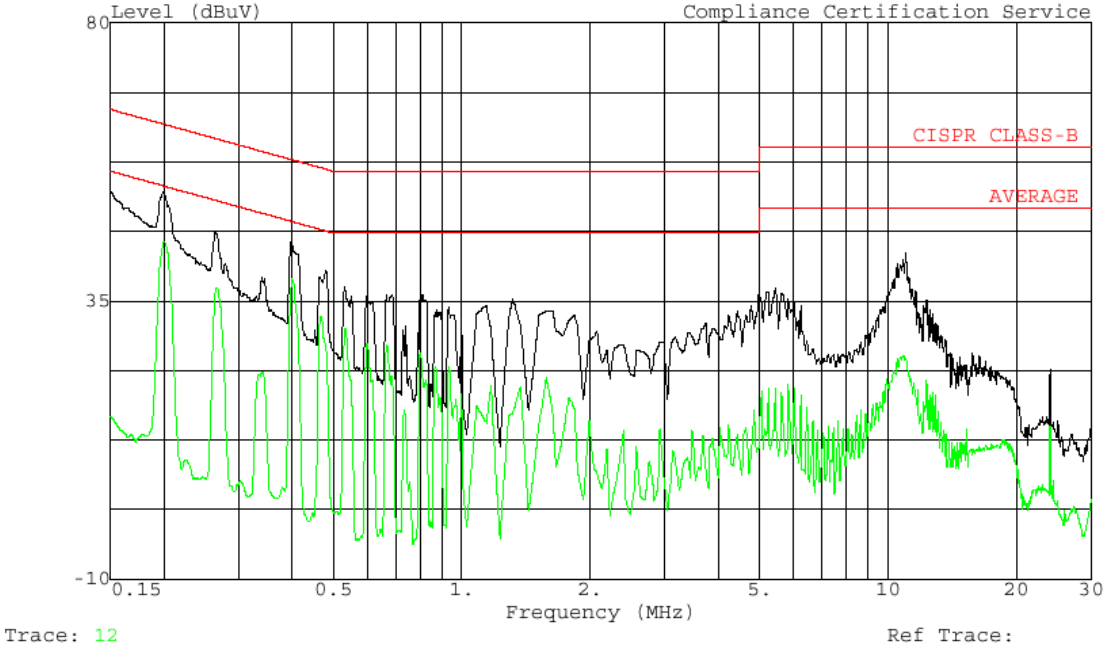
COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



Trace: 5 Ref Trace:
Project # : 04U2611-1
Test Operator : VIEN TRAN
Company : HITACHI
EUT : 1EEE 802.11b WIRELESS TABLET
Model : VISIONPLATE
Configuration : EUT and Floppy drive, Mouse, KB,
: Speaker phone, Head phone
Mode of Operation: Tx WORST CASE
Target of Test : FCC CLASS B
Voltage : 115Vac, 60Hz.
: Line1: Peak(Black), Average(Green)

LINE 2 RESULTS

COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



Trace: 12 Ref Trace:
Project # : 04U2611-1
Test Operator : VIEN TRAN
Company : HITACHI
EUT : 1EEE 802.11b WIRELESS TABLET
Model : VISIONPLATE
Configuration : EUT and Floppy drive, Mouse, KB,
: Speaker phone, Head phone
Mode of Operation: Tx WORST CASE
Target of Test : FCC CLASS B
Voltage : 115Vac, 60Hz.
: Line2: Peak(Black), Average(Green)

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP

ANTENNA PORT CONDUCTED PHOTO

RADIATED RF MEASUREMENT SETUP

RADIATED FRONT PHOTO

RADIATED BACK PHOTO

RADIATED RF MEASUREMENT SETUP-PORTABLE CONFIGURATION (EUT AT Z POSITION)

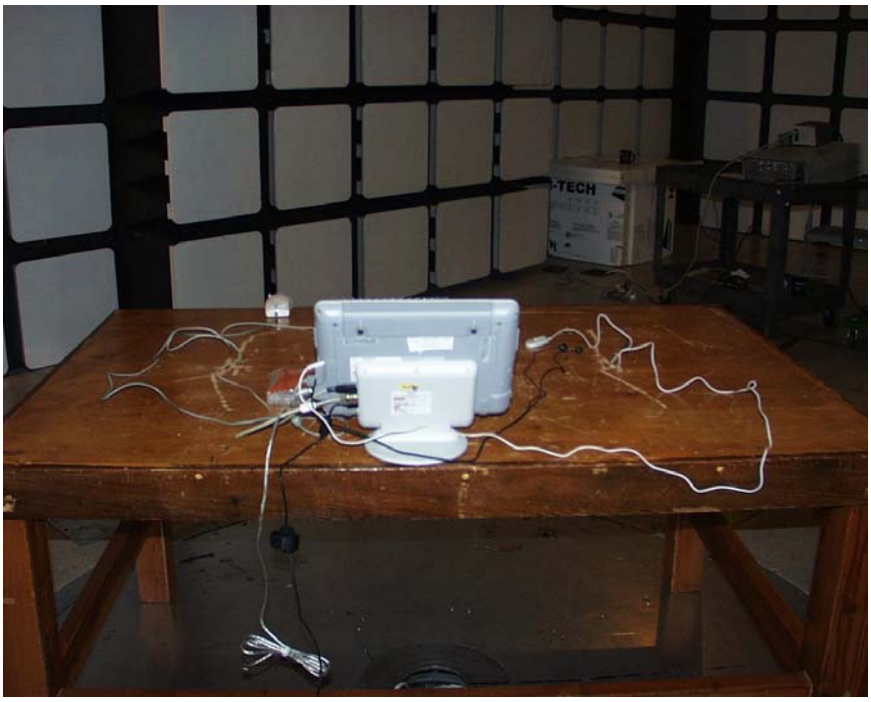
RADIATED FRONT PHOTO

RADIATED BACK PHOTO

DIGITAL DEVICE RADIATED EMISSIONS SETUP

DIGITAL DEVICE FRONT PHOTO

DIGITAL DEVICE BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP

LINE CONDUCTED FRONT PHOTO

LINE CONDUCTED BACK PHOTO

END OF REPORT