FCC CFR47 PART 15 SUBPART C CERTIFICATION

TEST REPORT

FOR

WIRELESS POCKET PC

MODEL NUMBER: HSTNH-H02C

FCC ID: NM8ROADSTER

REPORT NUMBER: 04I2727-1

ISSUE DATE: MAY 28, 2004

Prepared for
HIGH TECH COMPUTER
1F, 6-3, BAU-CHIAN ROAD,
HSIN-TEIN, TAIPEI
TAIWAN, R.O.C.

Prepared by
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1. TEST RESULT CERTIFICATION

COMPANY NAME: HIGH TECH COMPUTER
1F, 6-3, BAU-CHIAN ROAD,
HSIN-TEIN, TAIPEI
TAIWAN, R.O.C.

EUT DESCRIPTION: WIRELESS POCKET PC

MODEL: HSTNH-H02C

DATE TESTED: MAY 13-24, 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:

NEELESH RAJ
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

DAVID GARCIA
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is a Wireless Pocket PC transceiver operating in the 2400-2483.5 MHz band. The EUT is a hybrid system with Wlan (802.11b) and Bluetooth, which can operate simultaneously

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

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	17.78	59.98
2402 - 2480	BLUETOOTH	2.78	1.90

The radio utilizes a iPAQX BT/WLAN Antenna, with a maximum peak gain of 2.0 dBi in the Wlan mode and a maximum peak gain of 0.0 dBi in the Bluetooth mode.

EUT ACCESSORIES

Equipment Description	Model
Phihong Adapter	PSC10A-050
Delta Adapter	ADP-10SB
Cradle	HSTNH-F02X
Battery	HSTNH-M02B-SL
Extended Battery	HSTNH-M02B-HC

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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LAB CODE:200065-0

No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government.

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**
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/04
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	10/13/04
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/04
Line Filter	Lindgren	LMF-3489	497	CNR
30MHz---- 2Ghz Bilog	Sunol Sciences	JB1 Antenna	A121003	12/22/04
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/04
RF Filter Section	HP	85420E	3705A00256	11/21/04
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/05
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	2/4/05
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924341	4/25/05
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	4/25/05
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/05
Peak / Average Power Sensor	Agilent	E9327A	US40440755	11/7/04
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/04
Spectrum Analyzer	HP	E4446A	US42510266	7/23/04
Spectrum Analyzer	Agilent	E4446A	MY43360112	1/13/05

6. SETUP OF EQUIPMENT UNDER TEST

SETUP FOR RF TESTS CONFIG#1

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC ADAPTER	DELTA	ADP-10SB	AMW0409078958	N/A

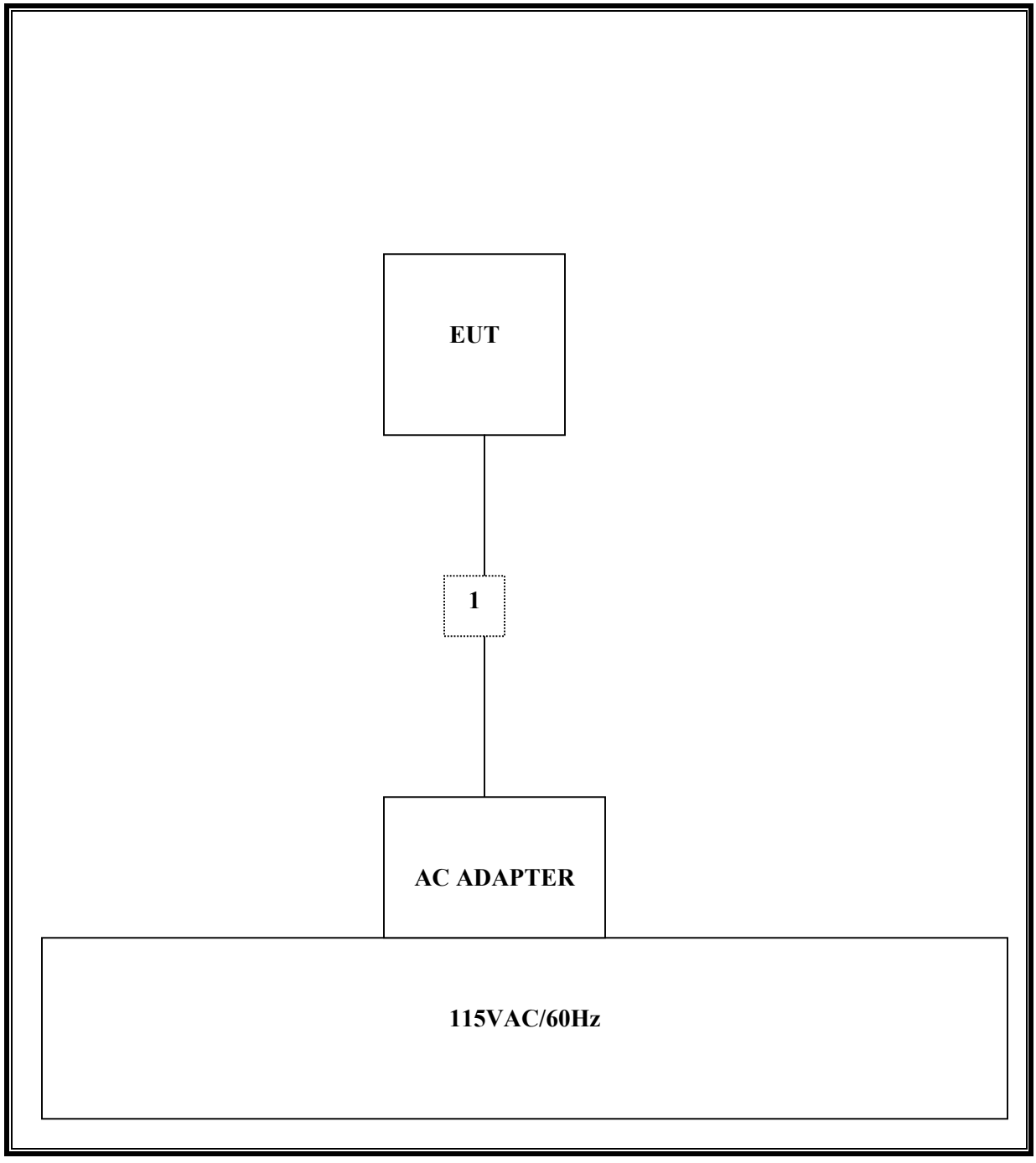
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	DC	1	DC	UNSHIELDED	1.80M	N/A

TEST SETUP

The EUT was set in continuous transmit mode. X, Y and Z positions were tested and “X” position was found to be worst case in WLAN and “Y” position was found to be worst case in the Bluetooth.

SETUP DIAGRAM FOR TESTS RF



SETUP FOR DIGITAL DEVICE TESTS CONFIG#2

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
CRADLE	HP	HSTNH-FO2X	N/A	N/A
HEADPHONES	N/A	N/A	N/A	N/A
MODEM	ACEEX	1414	9013538	IFAXDM1414
PRINTER	HP	N/A	N/A	N/A
LAPTOP	DELL	PP01L	N/A	DoC
AC ADAPTER	DELL	ADP-70EB	N/A	N/A
AC ADAPTER	PHIHONG	PSC10A-050	N/A	N/A

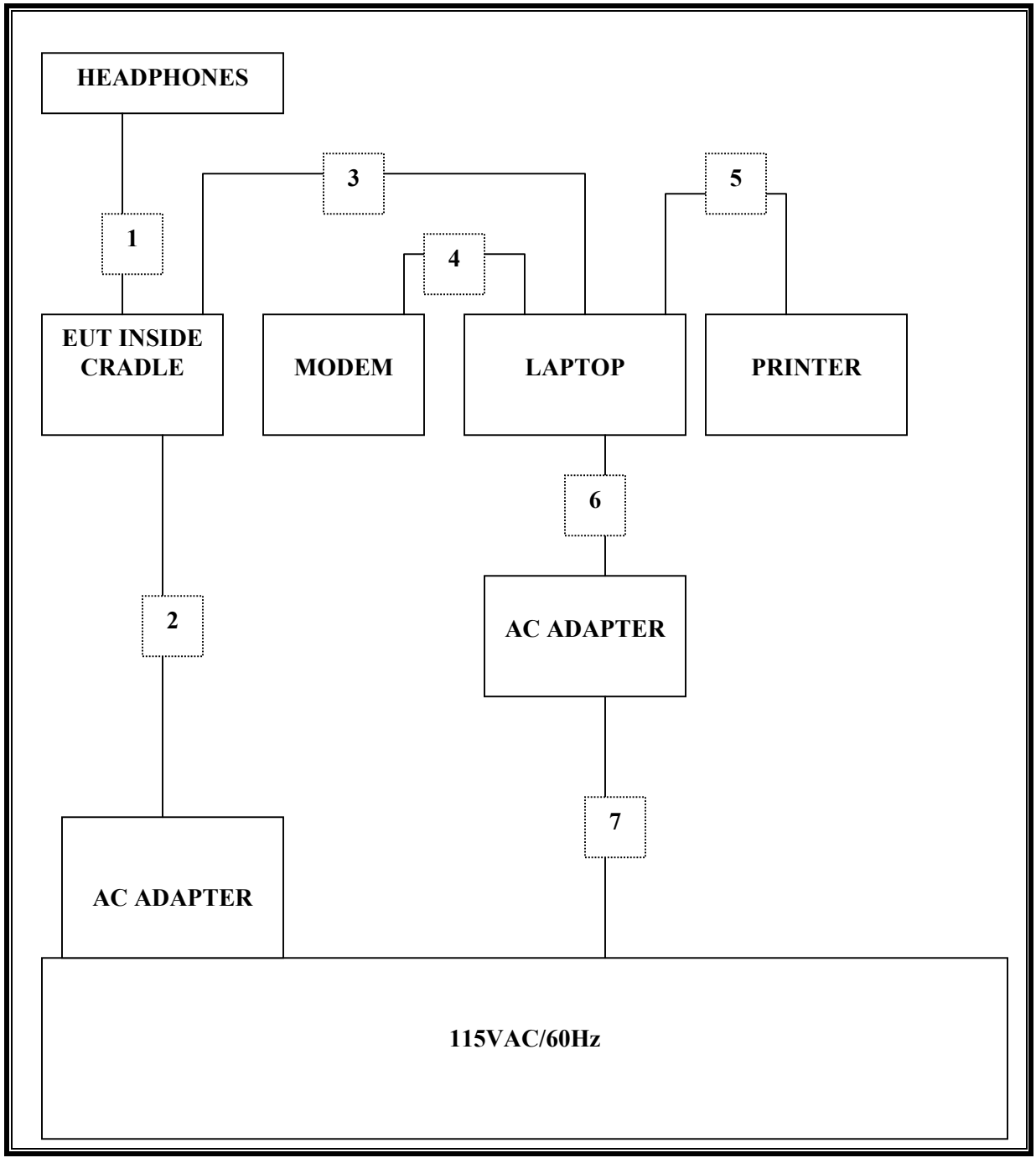
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AUDIO	1	1/8" STEREO	UNSHIELDED	1M	N/A
2	DC	1	DC	UNSHIELDED	1.80M	N/A
3	USB	1	USB	SHIELDED	0.9M	N/A
4	SERIAL	1	DB-9	SHIELDED	1.86M	N/A
5	PARALLEL	1	DB-25	SHIELDED	1.86M	FERRITE PRINTER END
6	DC	1	DC	UNSHIELDED	1.86M	N/A
7	AC	1	AC	UNSHIELDED	1.86M	N/A

TEST SETUP

EUT was sitting inside the cradle. During the testing process the EUT was connected to the laptop via its USB cable and was sending “H’s: to the screen and sending “H’s” to the laptop.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



SETUP FOR DIGITAL DEVICE TESTS CONFIG#3

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
HEADPHONES	N/A	N/A	N/A	N/A
MODEM	ACEEX	1414	9013538	IFAXDM1414
PRINTER	HP	N/A	N/A	N/A
LAPTOP	DELL	PP01L	N/A	DoC
AC ADAPTER	DELL	ADP-70EB	N/A	N/A
AC ADAPTER	DELTA	ADP-10SB	AMW0409078958	N/A

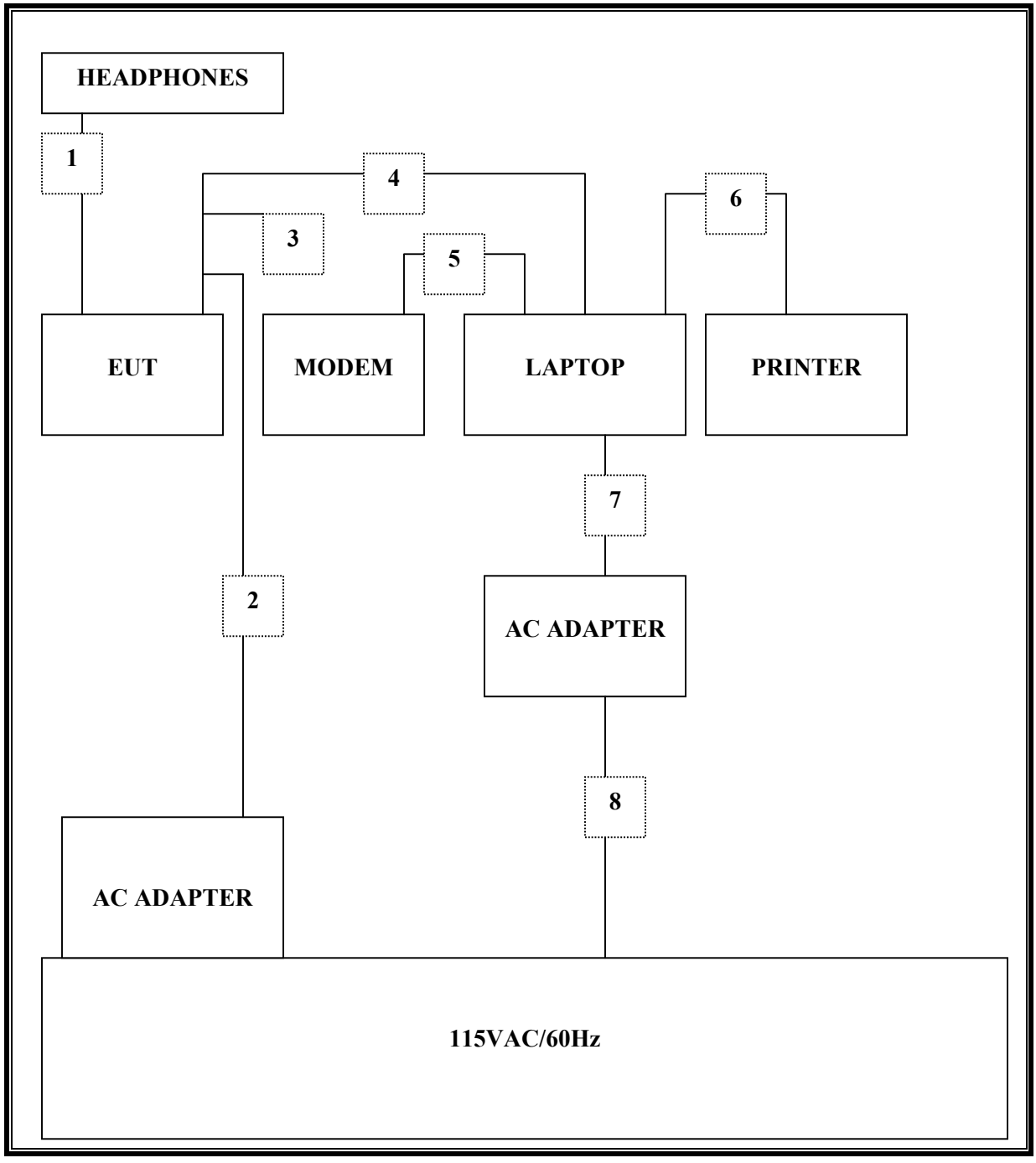
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AUDIO	1	1/8" STEREO	UNSHIELDED	1M	N/A
2	DC	1	DC	UNSHIELDED	1.80M	N/A
3	SERIAL	1	DB-9	SHIELDED	1.3M	UNTERMINATED
4	USB	1	USB	SHIELDED	1.3M	N/A
5	SERIAL	1	DB-9	SHIELDED	1.86M	N/A
6	PARALLEL	1	DB-25	SHIELDED	1.86M	FERRITE PRINTER END
7	DC	1	DC	UNSHIELDED	1.86M	N/A
8	AC	1	AC	UNSHIELDED	1.86M	N/A

TEST SETUP

During the testing process the EUT was connected to the laptop via its USB cable (worst case) and was sending “H’s: to the screen and sending “H’s” to the laptop.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

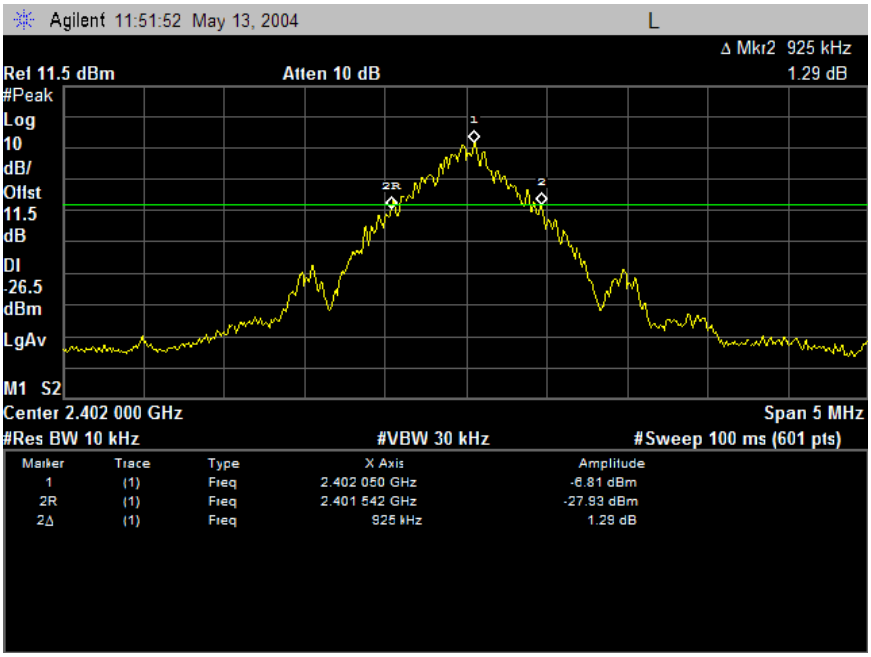
No non-compliance noted:

BLUETOOTH

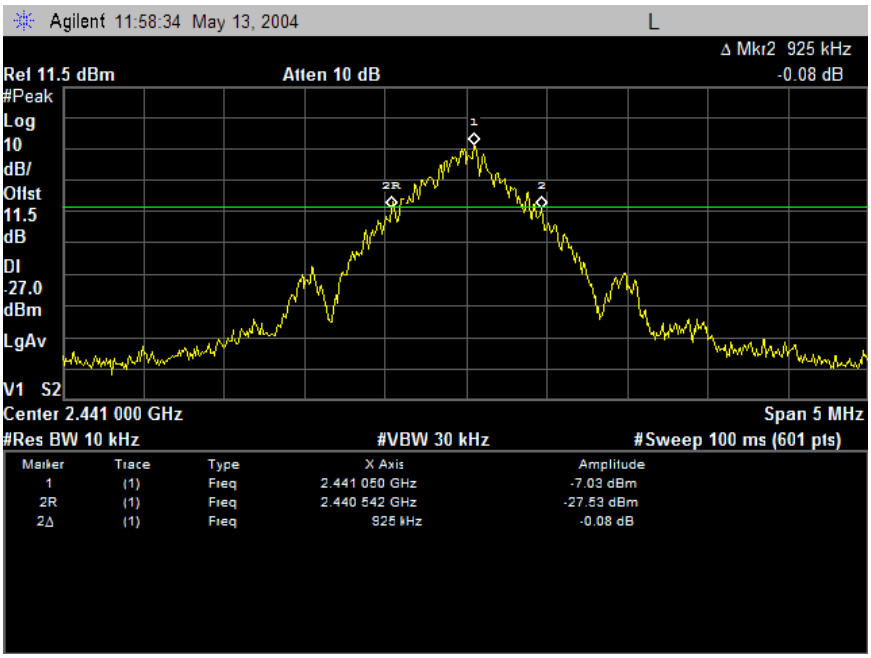
Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	925
Middle	2441	925
High	2480	942

20 dB BANDWIDTH

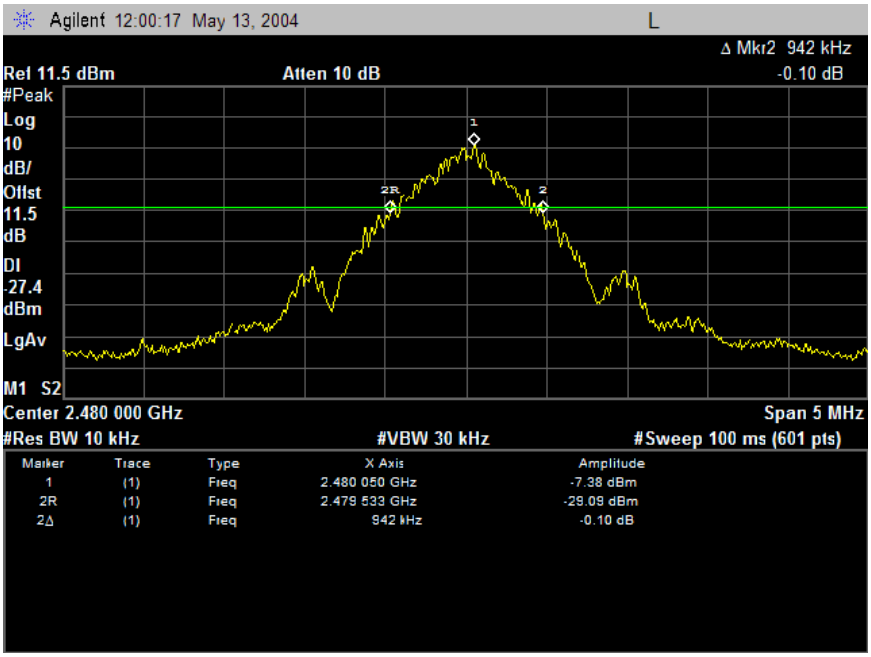
20 dB BANDWIDTH LOW CH



20 dB BANDWIDTH MID CH



20 dB BANDWIDTH HIGH CH



7.2. NUMBER OF HOPPING CHANNELS

LIMIT

§15.247 (a) (1) (iii) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

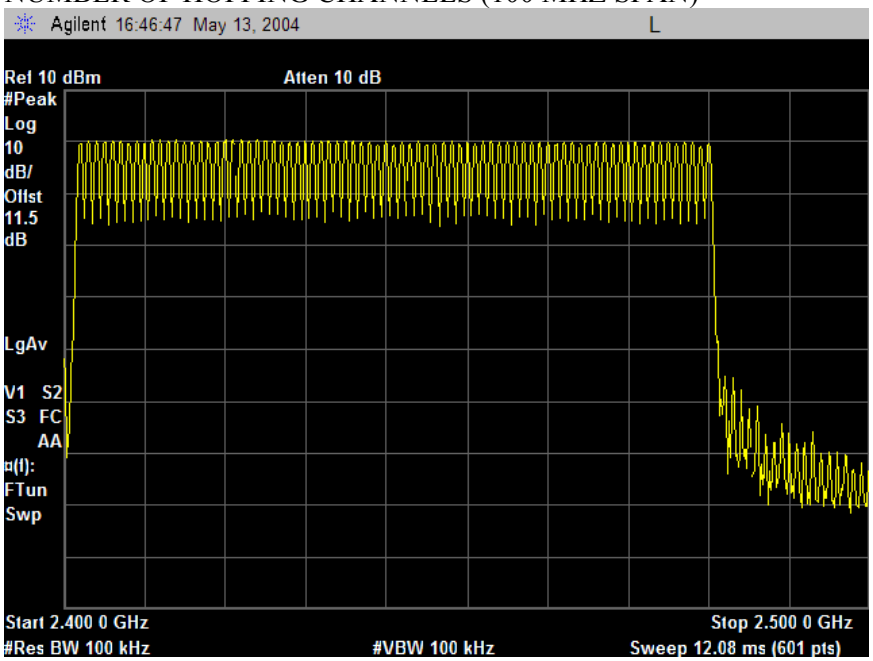
RESULTS

No non-compliance noted:

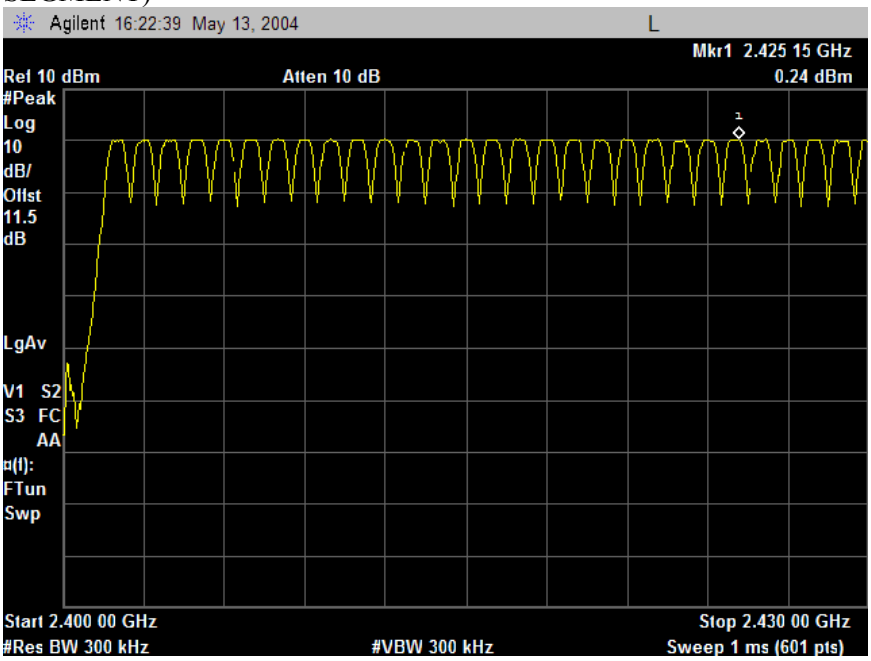
79 Channels observed.

NUMBER OF HOPPING CHANNELS

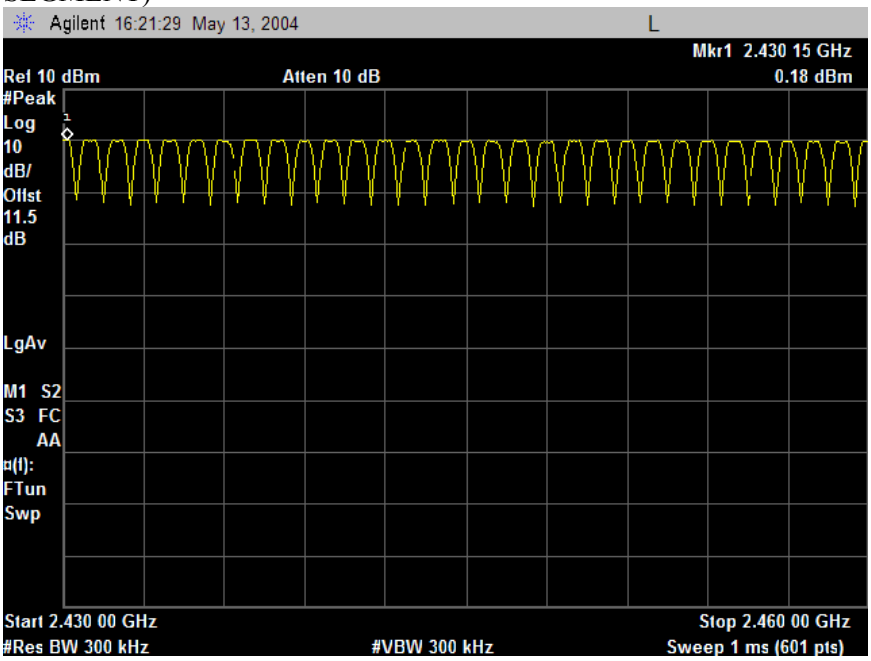
NUMBER OF HOPPING CHANNELS (100 MHZ SPAN)



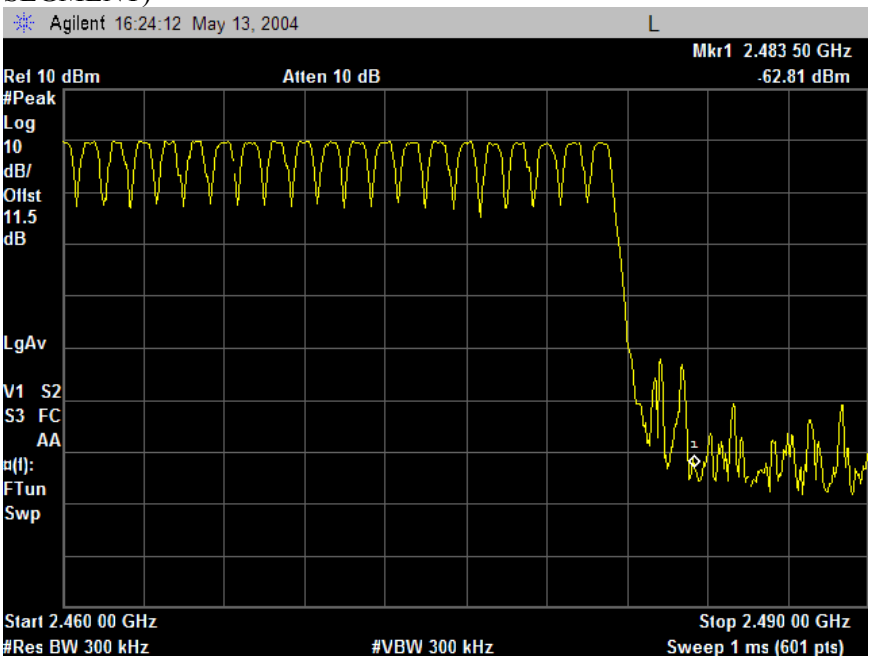
NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, FIRST SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, SECOND SEGMENT)



NUMBER OF HOPPING CHANNELS (30 MHZ SPAN, THIRD SEGMENT)



7.3. HOPPING FREQUENCY SEPARATION

LIMIT

§15.247 (a) (1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hoping channel, whichever is greater.

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

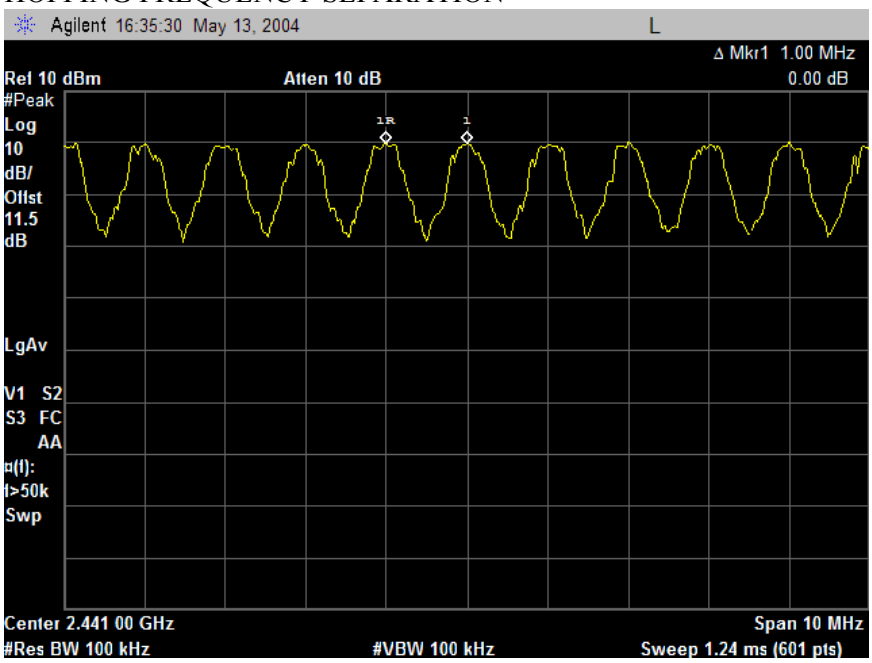
No non-compliance noted:

BLUETOOTH

Separation (MHz)	Limit (MHz)	Margin (dB)
1	0.942	0.058

HOPPING FREQUENCY SEPARATION

HOPPING FREQUENCY SEPARATION



7.4. AVERAGE TIME OF OCCUPANCY

LIMIT

§15.247 (a) (1) (iii) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a 3.16 second scan, to enable resolution of each occurrence.

The average time of occupancy in the specified 31.6 second period (79 channels * 0.4 s) is equal to 10 * (# of pulses in 3.16 s) * pulse width.

RESULTS

No non-compliance noted:

PULSE WIDTH= 2.925ms (DH5)

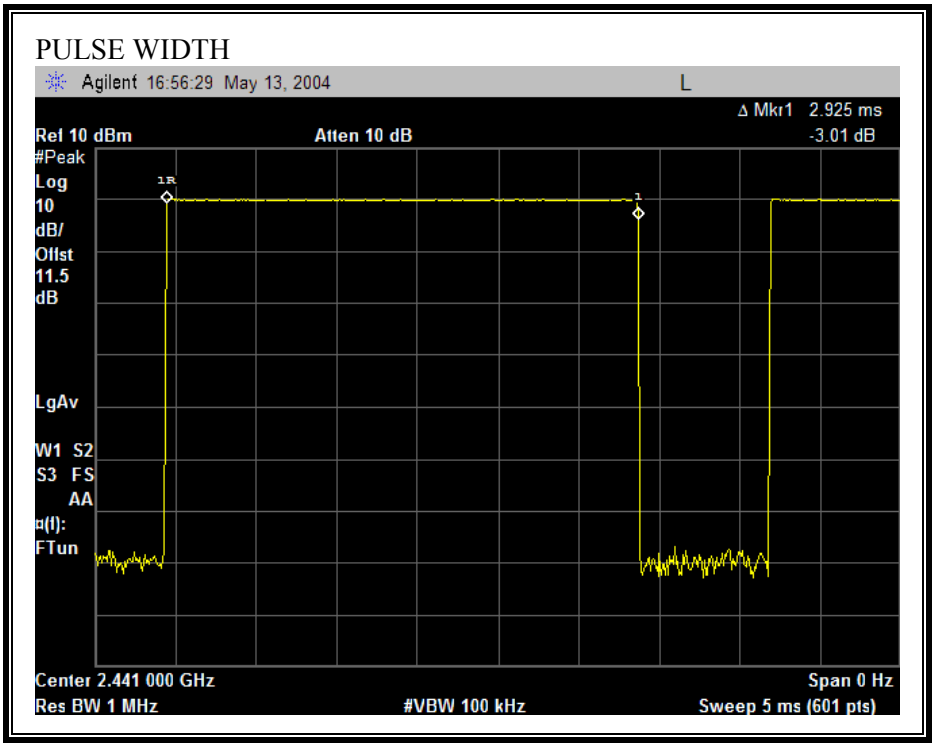
OCCURANCE IN 3.16sec= 9

OCCURANCE IN 31.6sec= 9 x 10 = 90

AVERAGE TIME OF OCCUPANCY= 2.925ms x 90 = 263.25ms

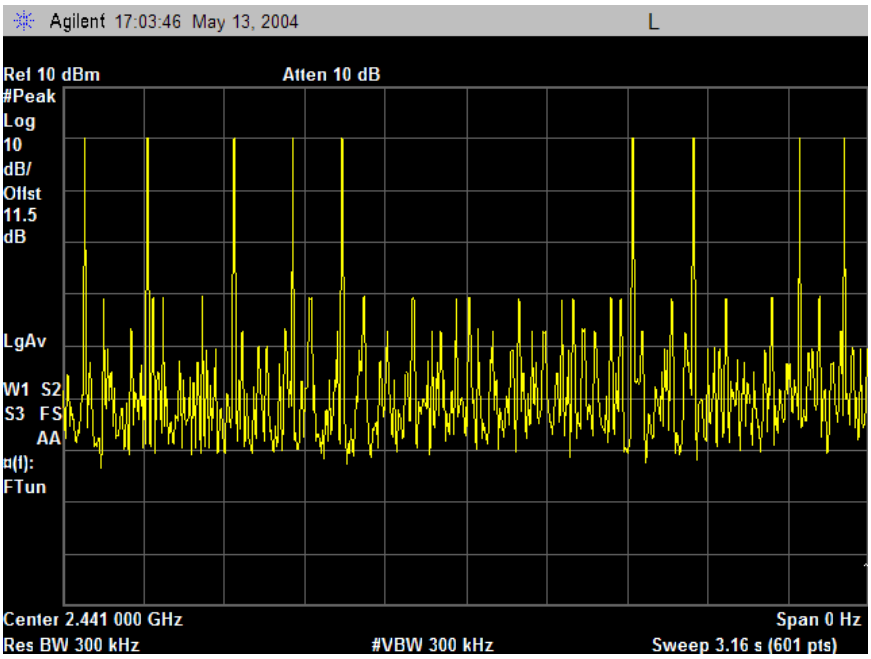
Average time of Occupancy (seconds)	Limit (seconds)	Margin (seconds)
0.26325	0.400	0.13675

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

NUMBER OF PULSES



7.5. 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 300 kHz. The sweep time is coupled.

RESULTS

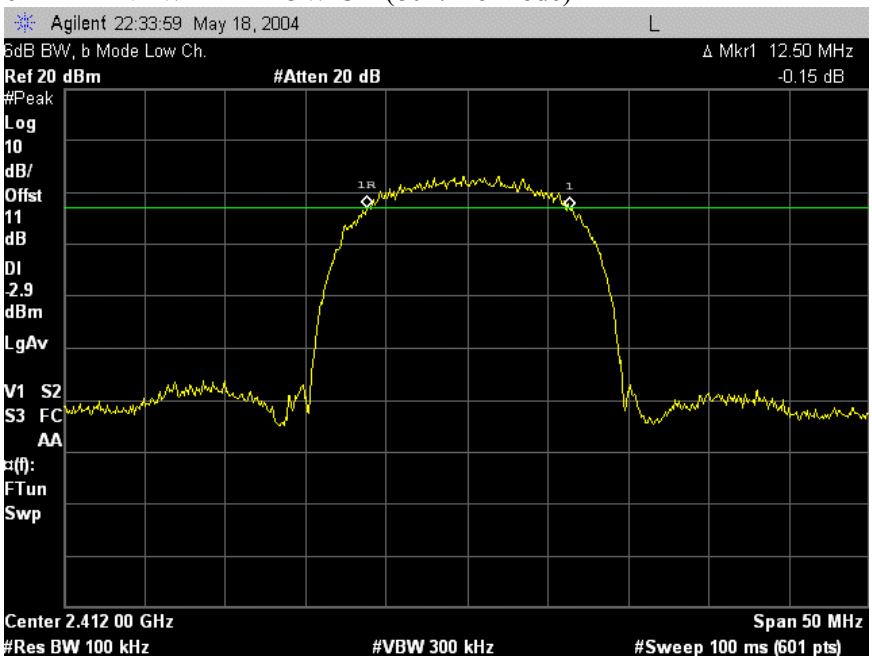
No non-compliance noted:

802.11b Mode

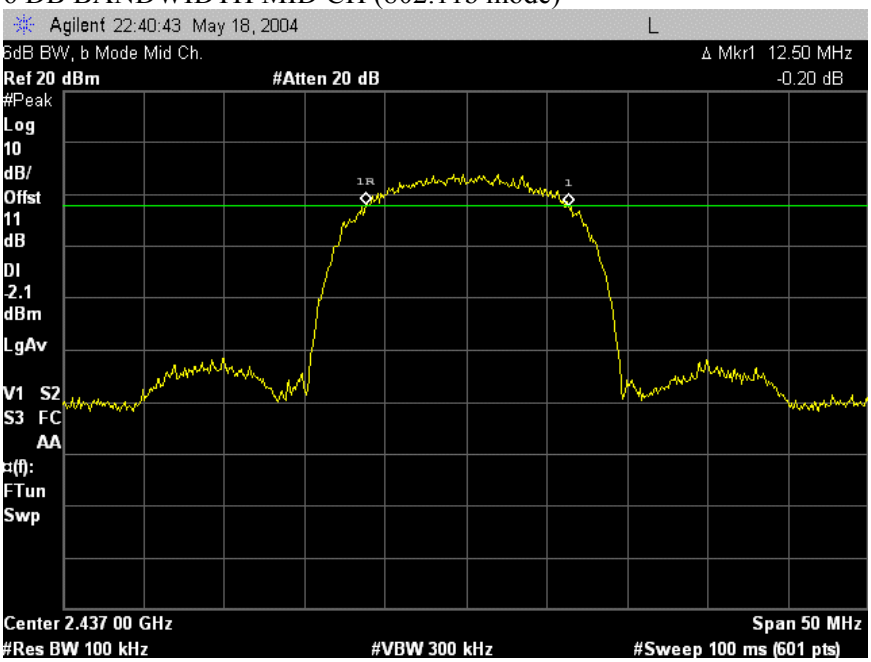
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	12500	500	12000
Middle	2437	12500	500	12000
High	2462	12420	500	11920

6 DB BANDWIDTH (802.11b MODE)

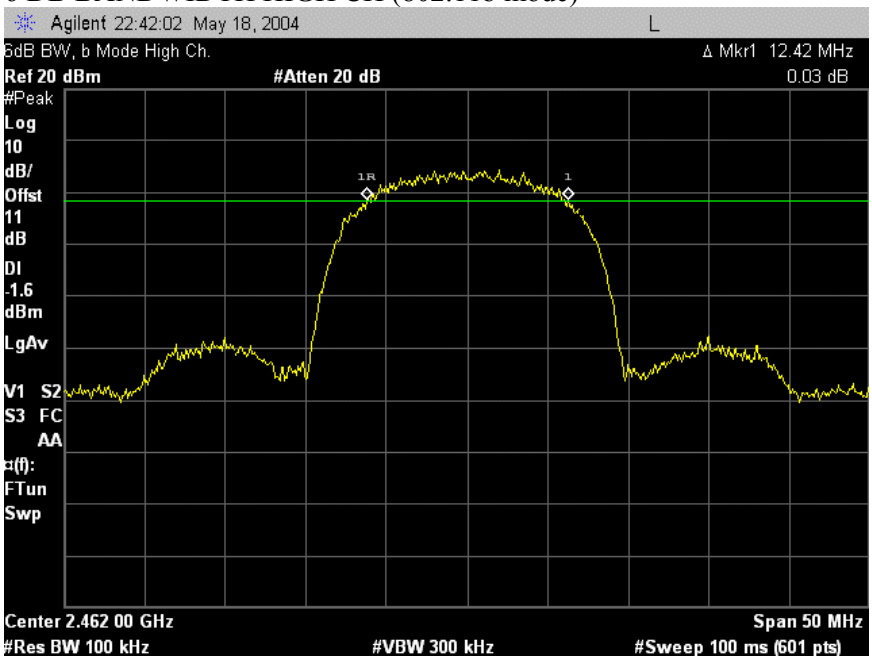
6 DB BANDWIDTH LOW CH (802.11b mode)



6 DB BANDWIDTH MID CH (802.11b mode)



6 DB BANDWIDTH HIGH CH (802.11b mode)



7.6. 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

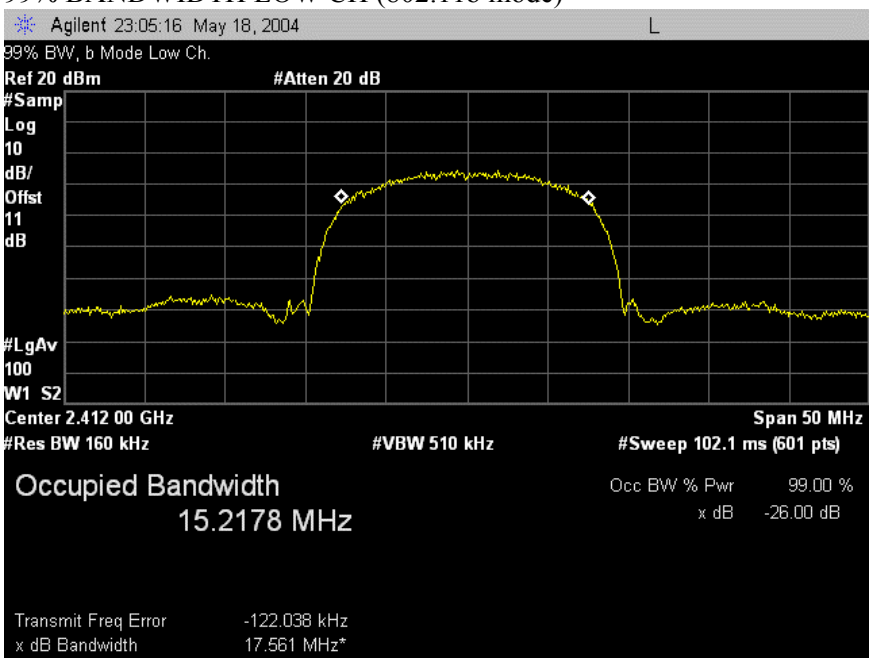
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.2178
Middle	2437	15.2371
High	2462	15.2246

Bluetooth Mode

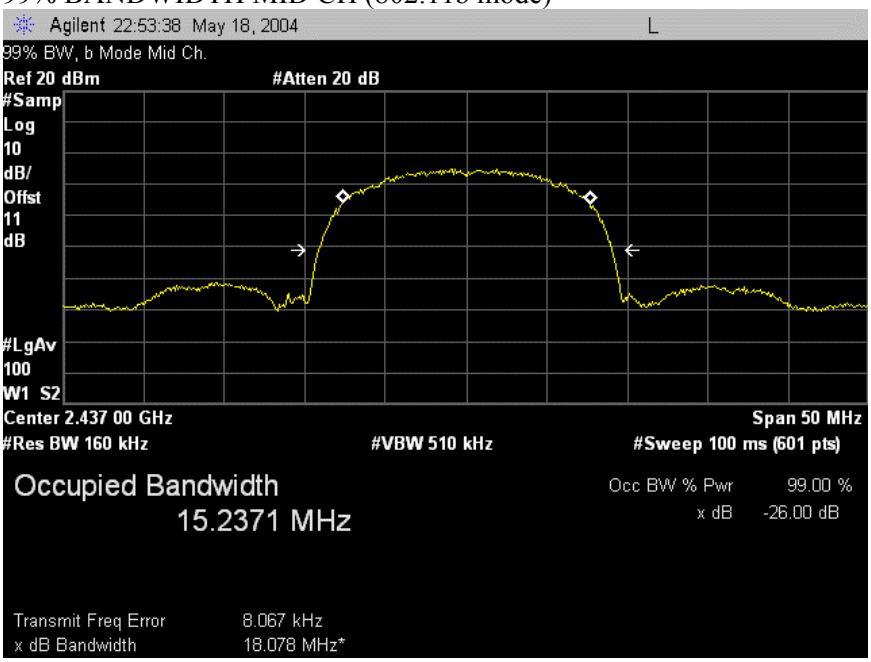
Channel	Frequency (MHz)	99% Bandwidth (KHz)
Low	2402	868.1159
Middle	2441	877.8627
High	2480	878.9039

99% BANDWIDTH (802.11b MODE)

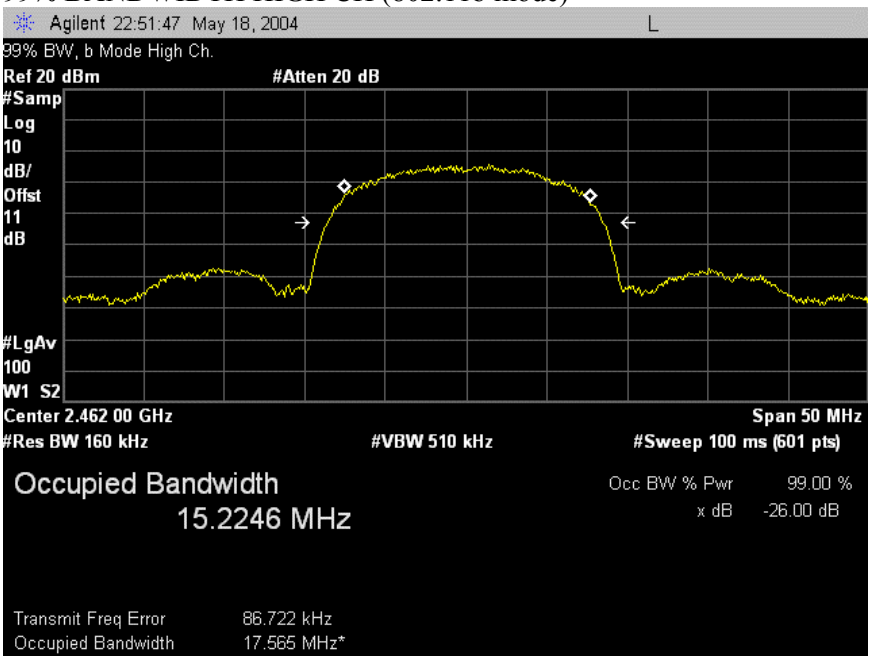
99% BANDWIDTH LOW CH (802.11b mode)



99% BANDWIDTH MID CH (802.11b mode)

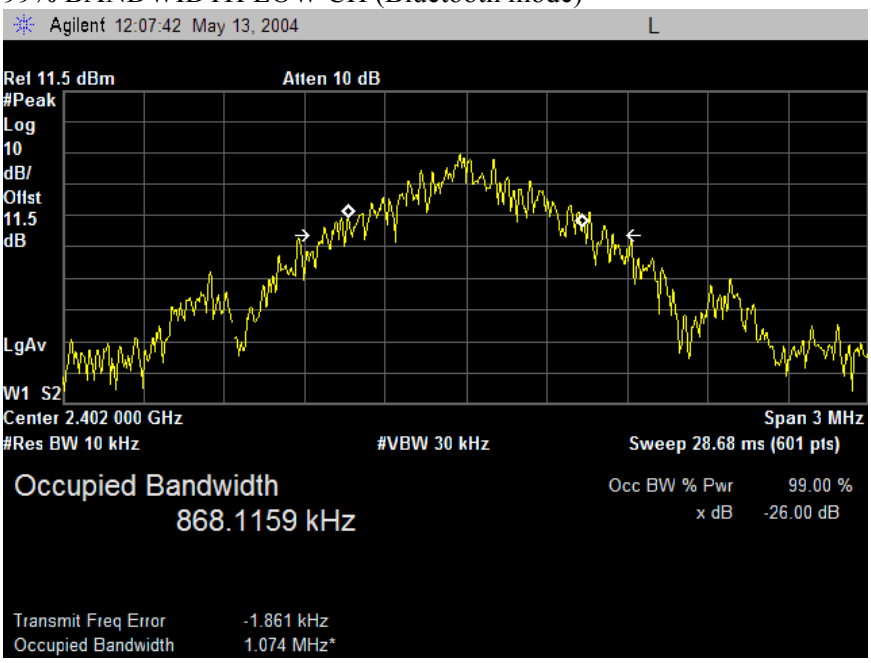


99% BANDWIDTH HIGH CH (802.11b mode)



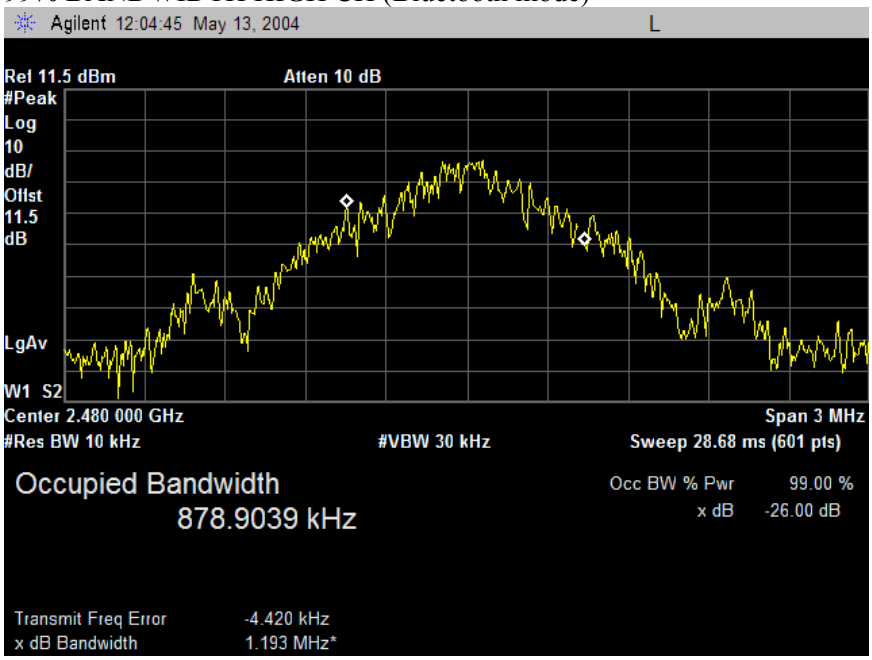
99% BANDWIDTH (BLUETOOTH MODE)

99% BANDWIDTH LOW CH (Bluetooth mode)



99% BANDWIDTH MID CH (Bluetooth mode)

99% BANDWIDTH HIGH CH (Bluetooth mode)



7.7. 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) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt.

§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 2.0 dBi (WLAN), therefore the limit is 30 dBm.

The maximum antenna gain is 0.0 dBi (BLUETOOTH), therefore the limit is 30 dBm.

TEST PROCEDURE (WLAN)

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.

TEST PROCEDURE (BLUETOOTH)

The transmitter output is connected to a spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

RESULTS

No non-compliance noted:

802.11b Mode

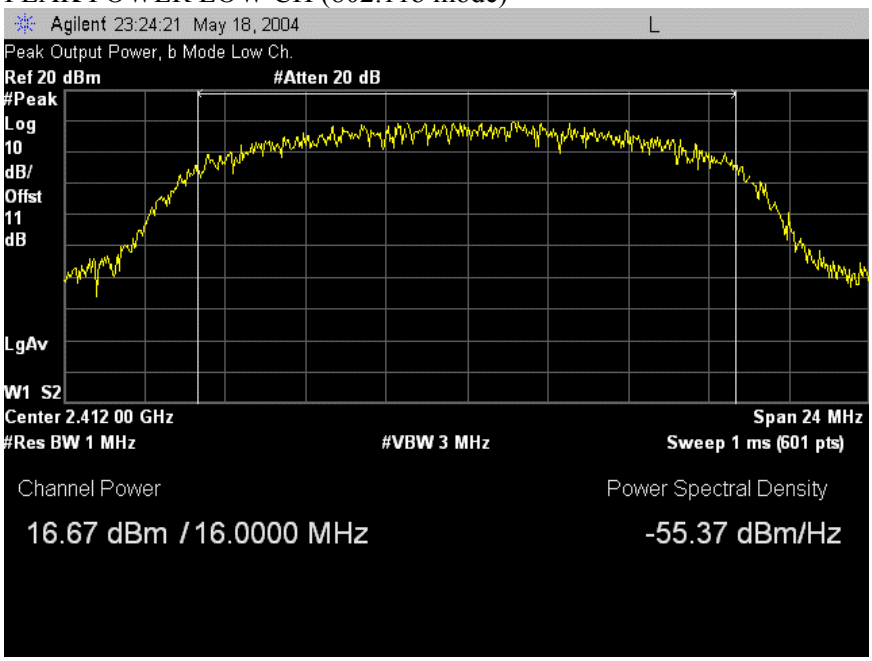
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	16.67	30	-13.33
Middle	2437	17.28	30	-12.72
High	2462	17.78	30	-12.22

Bluetooth

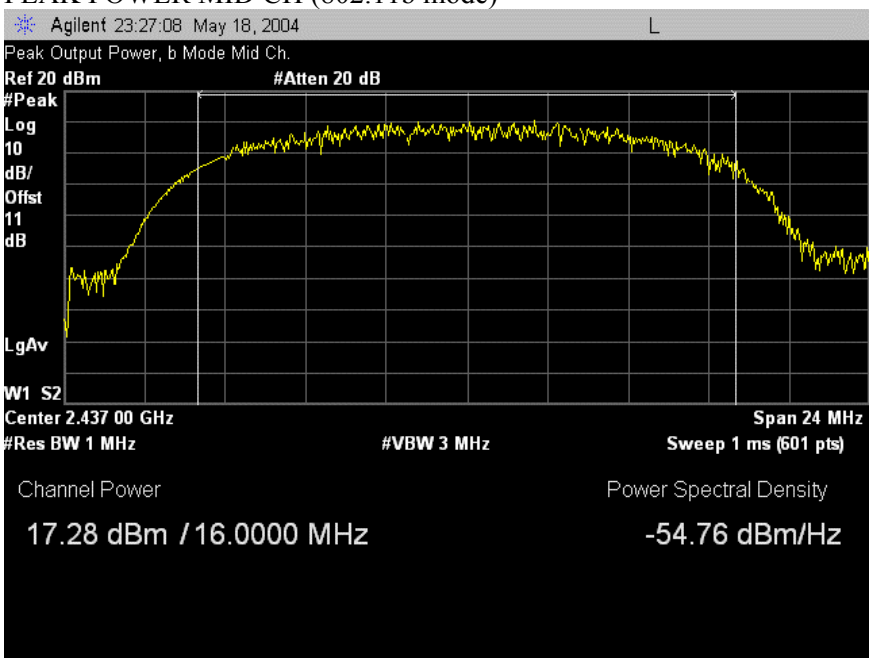
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.77	30	-27.23
Middle	2441	2.78	30	-27.22
High	2480	2.42	30	-27.58

OUTPUT POWER (802.11b MODE)

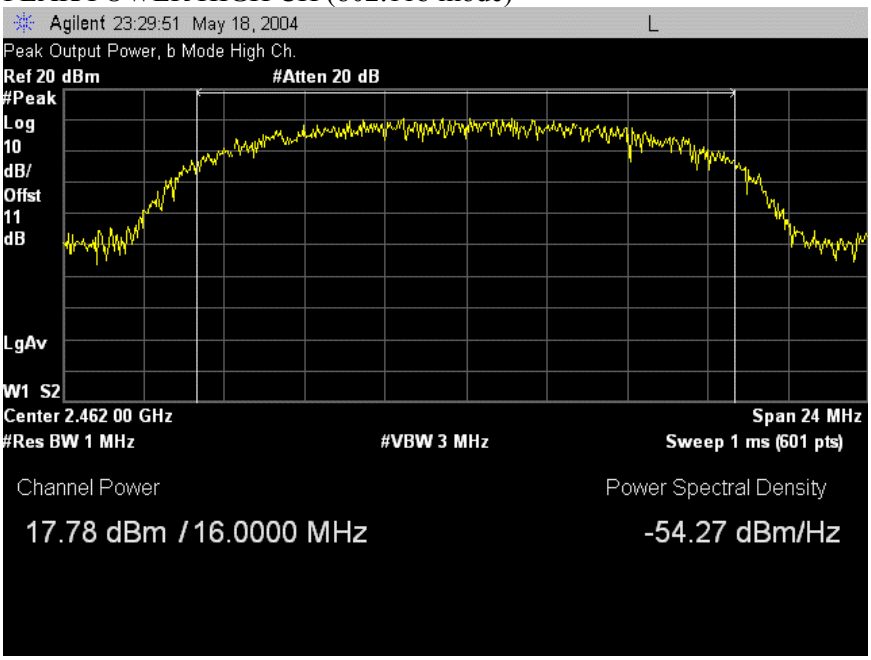
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)

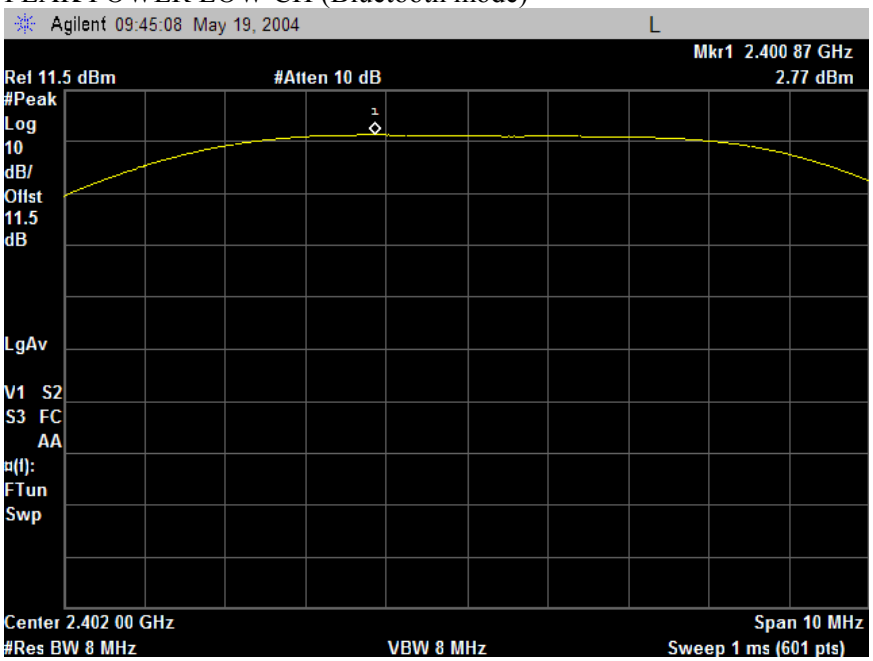


PEAK POWER HIGH CH (802.11b mode)

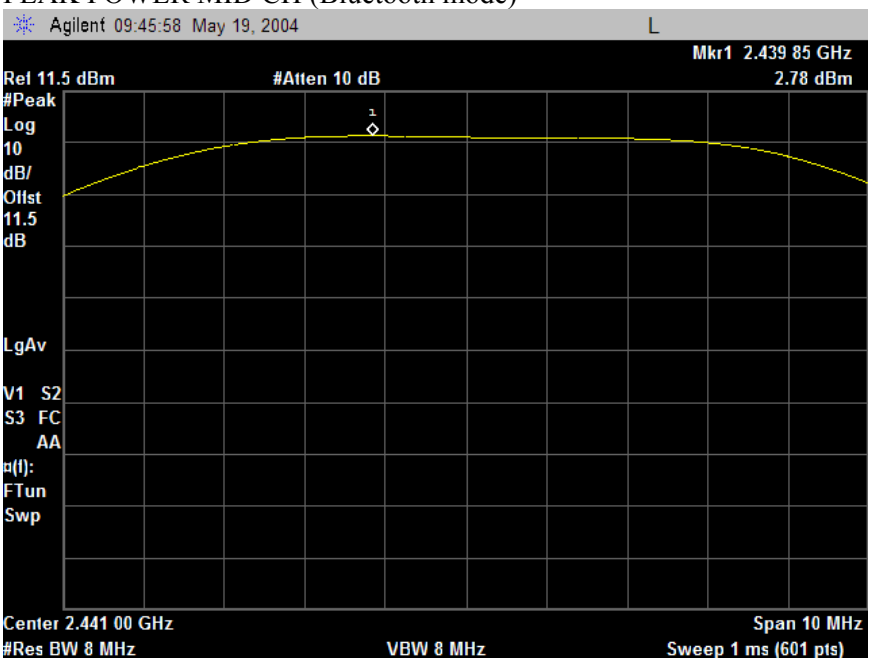


OUTPUT POWER (BLUETOOTH MODE)

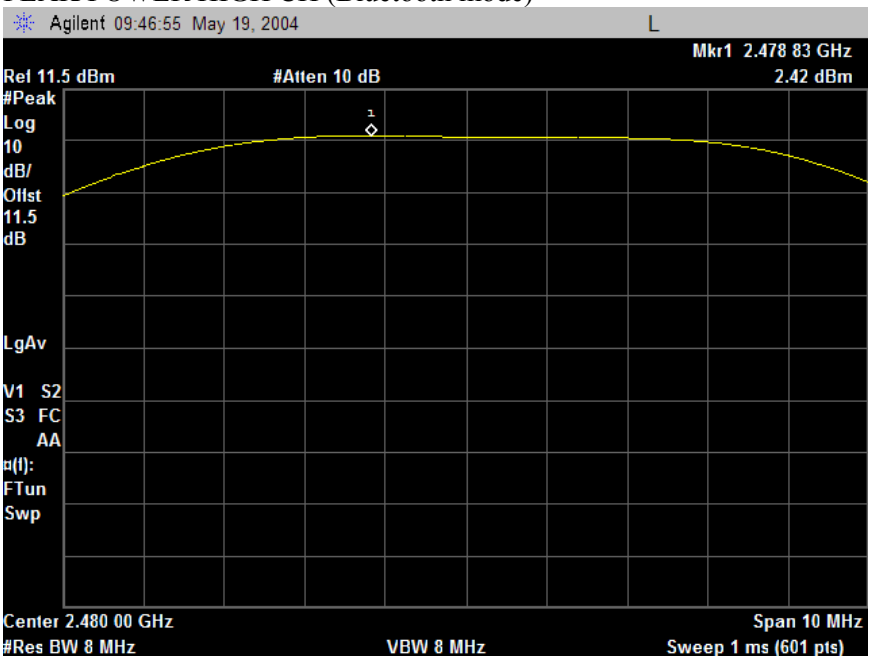
PEAK POWER LOW CH (Bluetooth mode)



PEAK POWER MID CH (Bluetooth mode)



PEAK POWER HIGH CH (Bluetooth mode)



7.8. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*($900/f^2$)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*($180/f^2$)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

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

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

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

yields

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

where

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

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

LIMITS

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

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	17.78	2.00	2.75
BLUETOOTH	1.0	2.78	0.00	0.39

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.

7.9. 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 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	12.85
Middle	2437	13.73
High	2462	13.99

BLUETOOTH

Channel	Frequency (MHz)	Power (dBm)
Low	2402	2.39
Middle	2441	2.32
High	2480	1.93

7.10. 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.

§15.247 (f) The digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section.

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

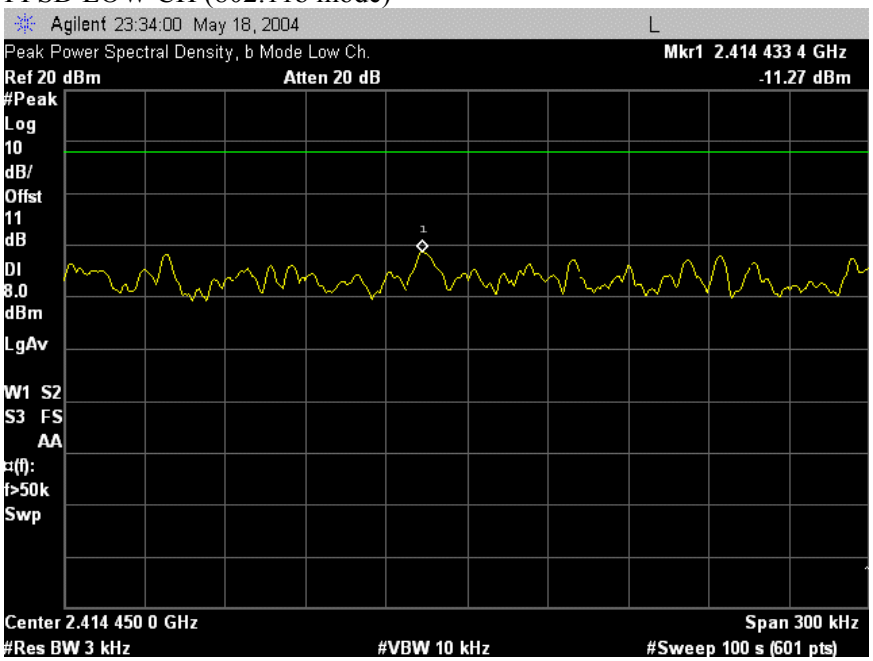
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.27	8	-19.27
Middle	2437	-10.46	8	-18.46
High	2462	-10.26	8	-18.26

BLUETOOTH

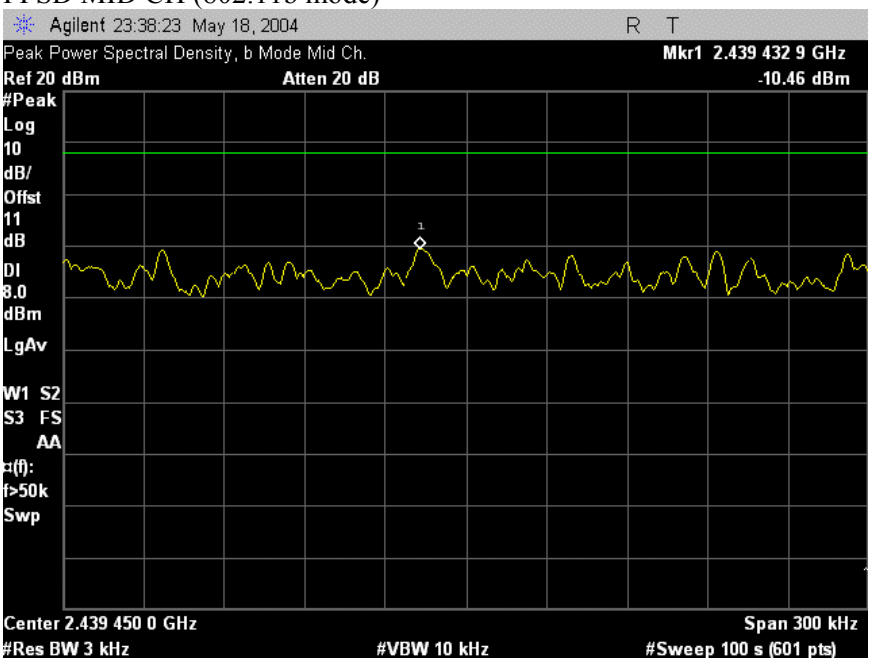
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-10.88	8	-18.88
Middle	2441	-11.13	8	-19.13
High	2480	-11.28	8	-19.28

PEAK POWER SPECTRAL DENSITY (802.11b MODE)

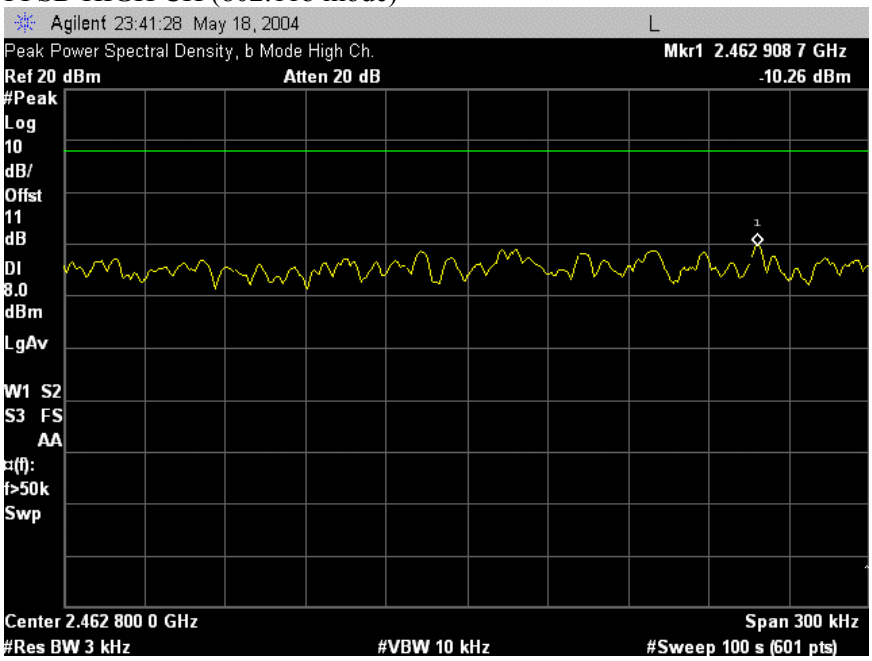
PPSD LOW CH (802.11b mode)



PPSD MID CH (802.11b mode)

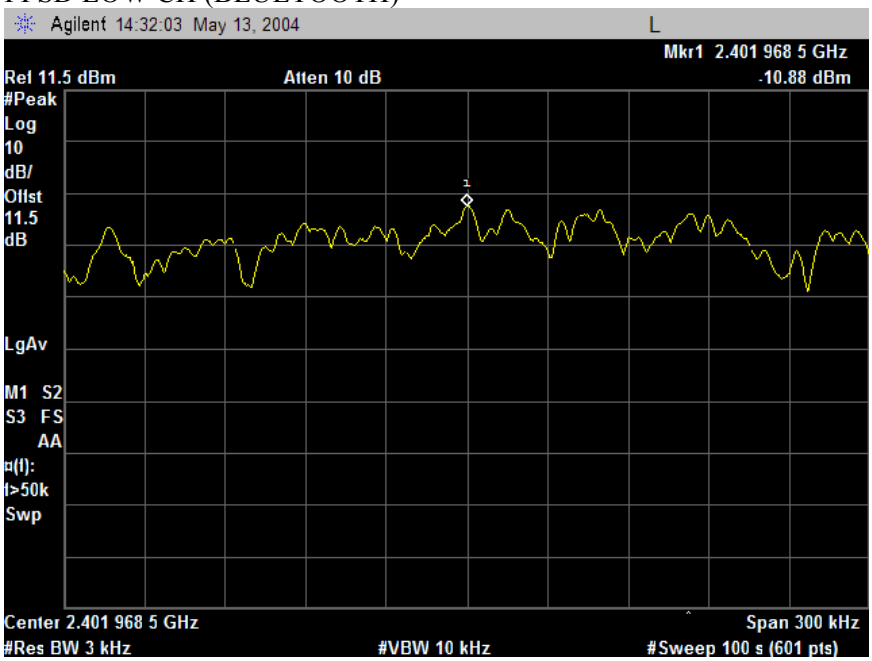


PPSD HIGH CH (802.11b mode)

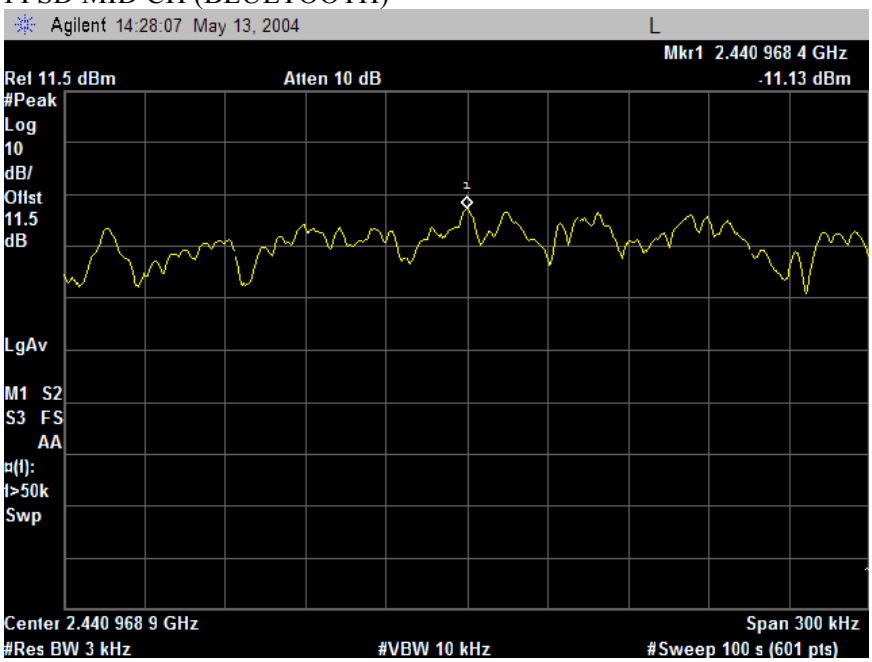


PEAK POWER SPECTRAL DENSITY (BLUETOOTH)

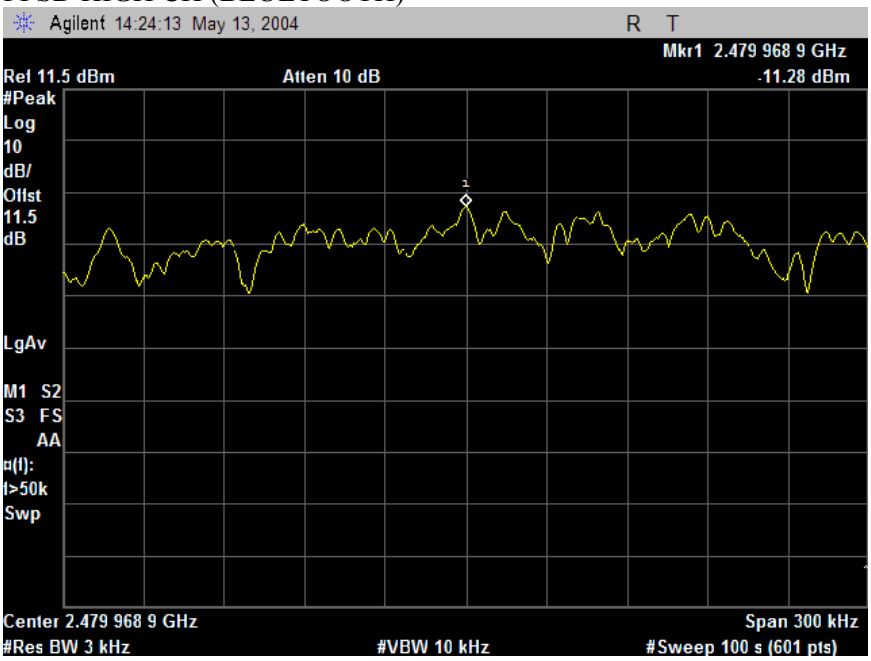
PPSD LOW CH (BLUETOOTH)



PPSD MID CH (BLUETOOTH)



PPSD HIGH CH (BLUETOOTH)



7.11. 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 300 kHz.

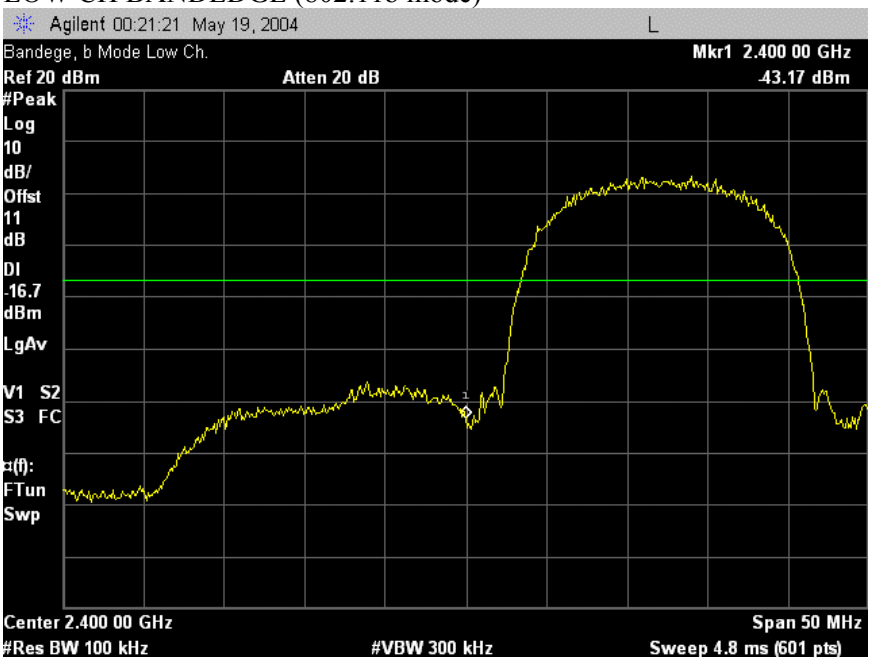
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

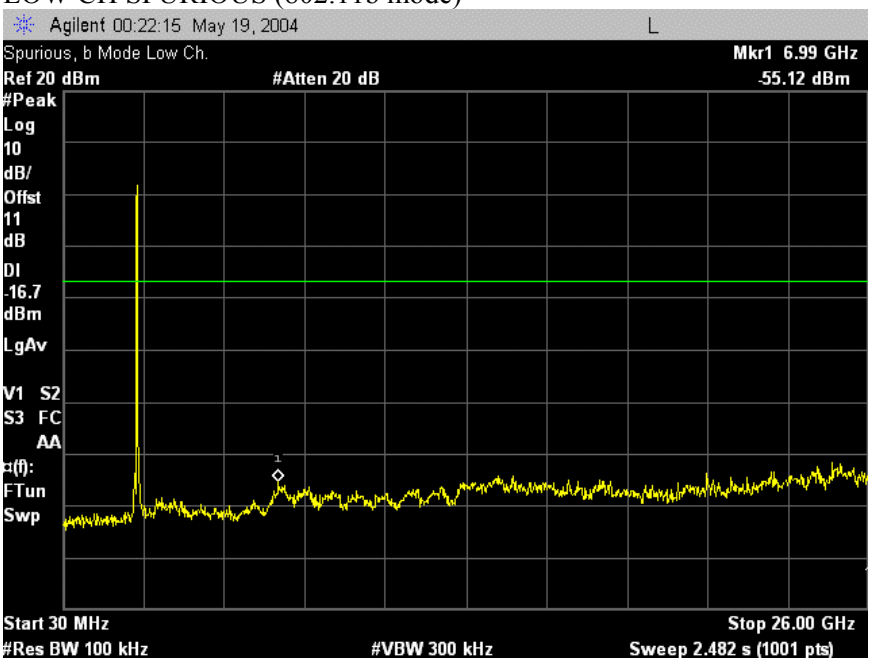
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)

LOW CH BANDEDGE (802.11b mode)

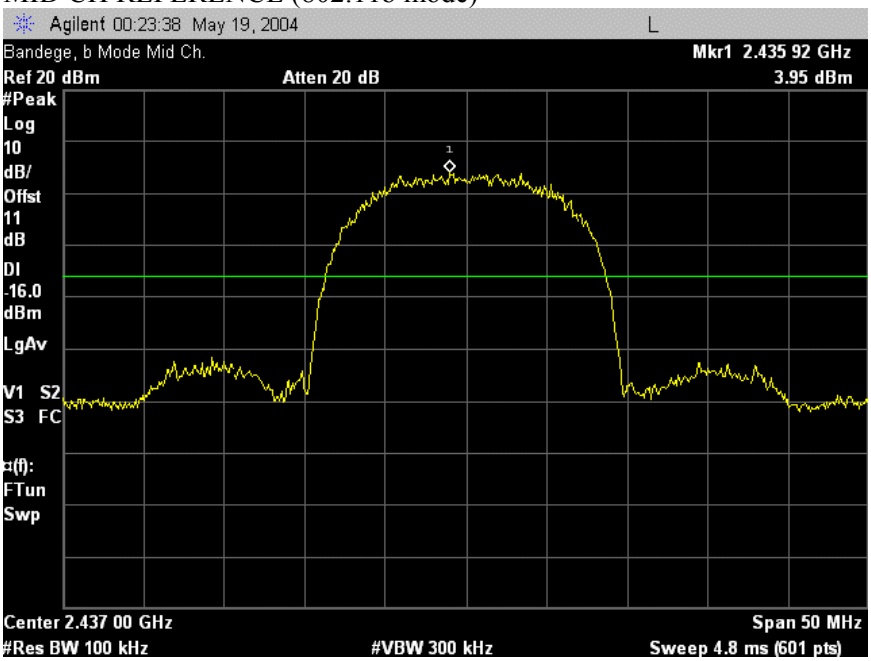


LOW CH SPURIOUS (802.11b mode)

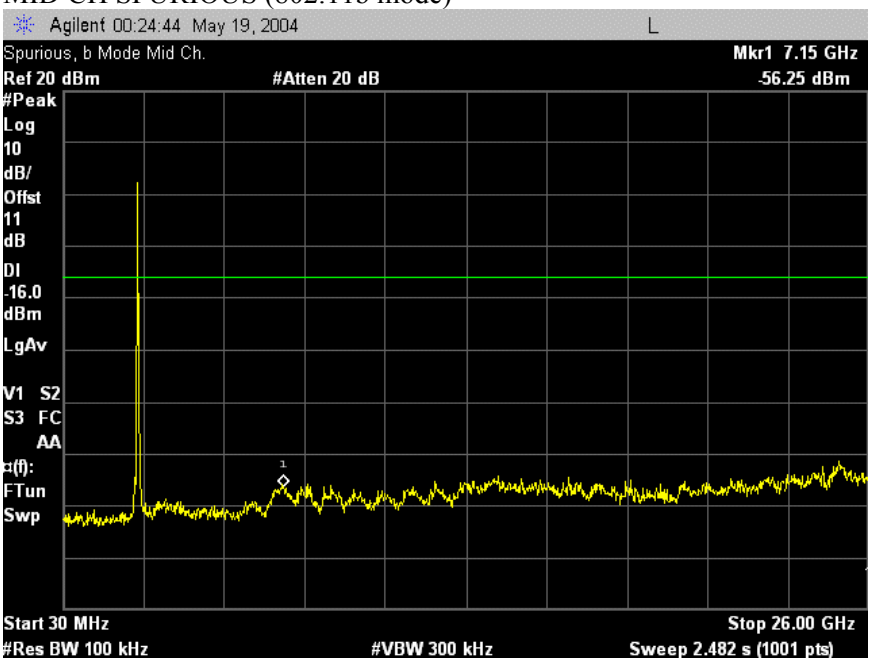


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)

MID CH REFERENCE (802.11b mode)



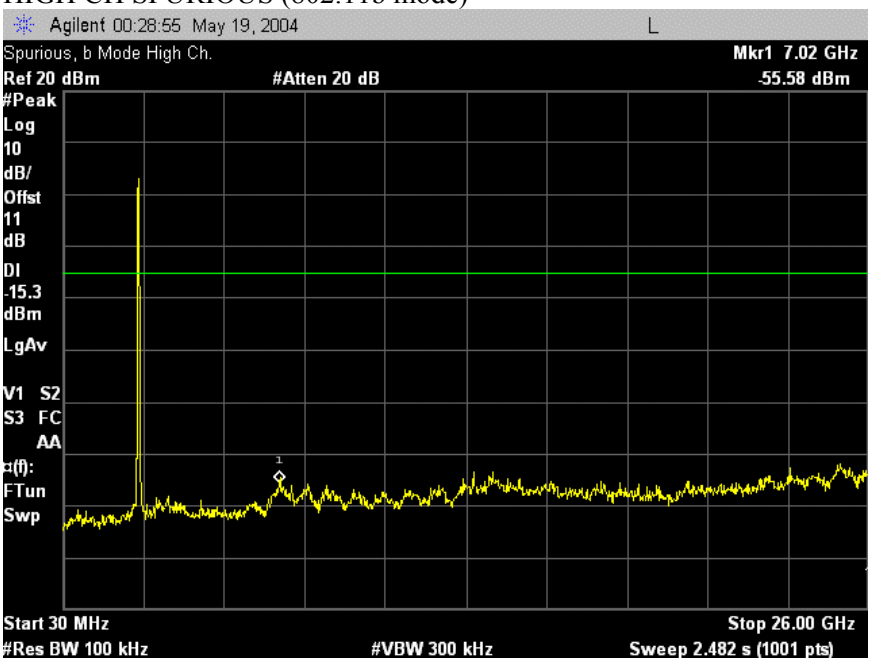
MID CH SPURIOUS (802.11b mode)



SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)

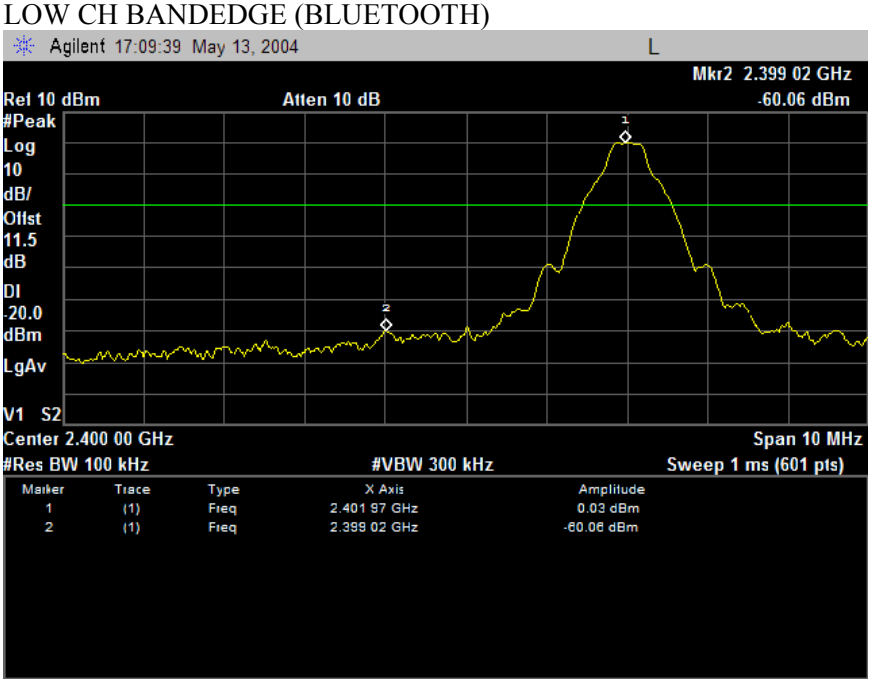
HIGH CH BANDEDGE (802.11b mode)

HIGH CH SPURIOUS (802.11b mode)

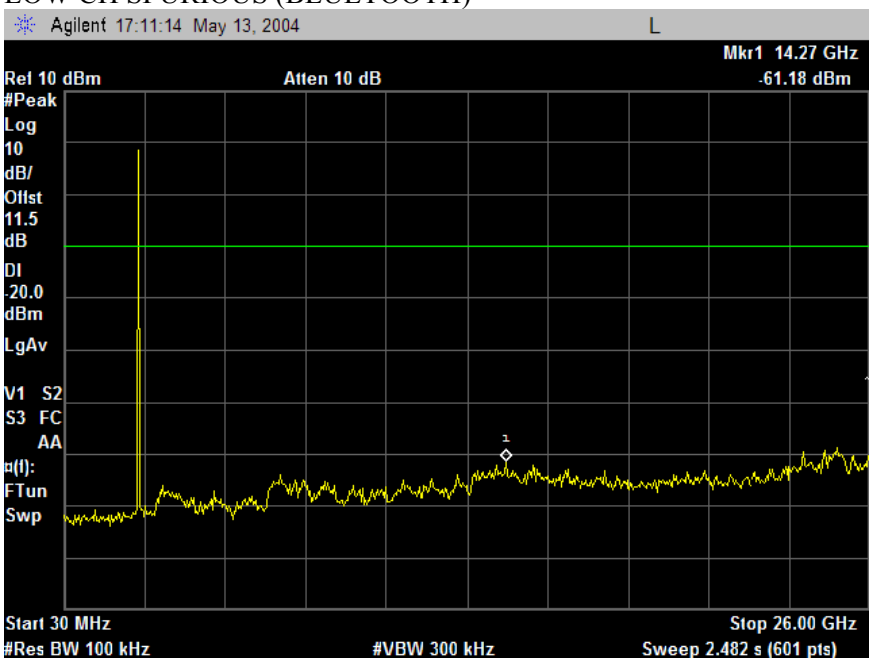


SPURIOUS EMISSIONS, LOW CHANNEL (BLUETOOTH)

LOW CH BANDEDGE (BLUETOOTH)



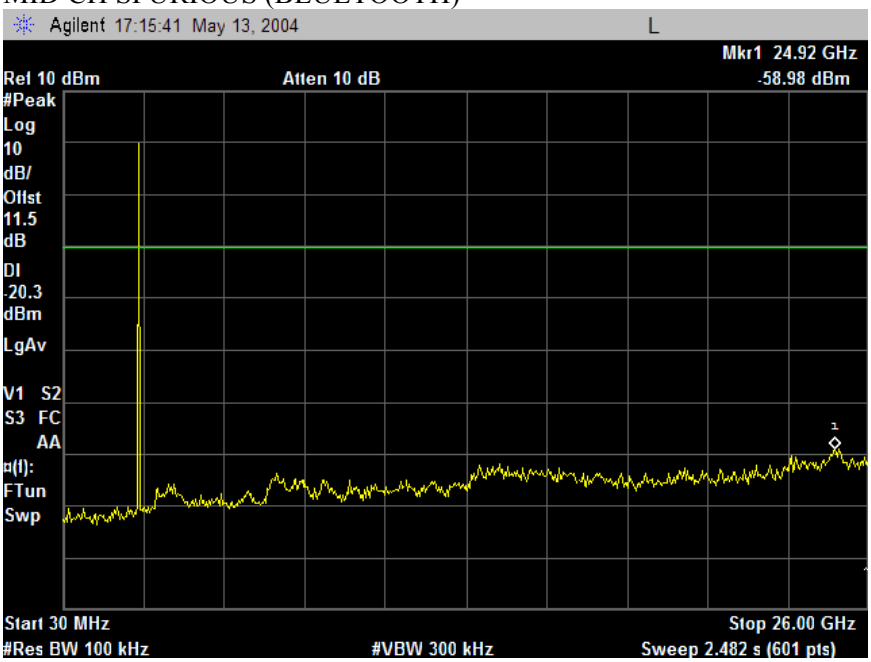
LOW CH SPURIOUS (BLUETOOTH)



SPURIOUS EMISSIONS, MID CHANNEL (BLUETOOTH)

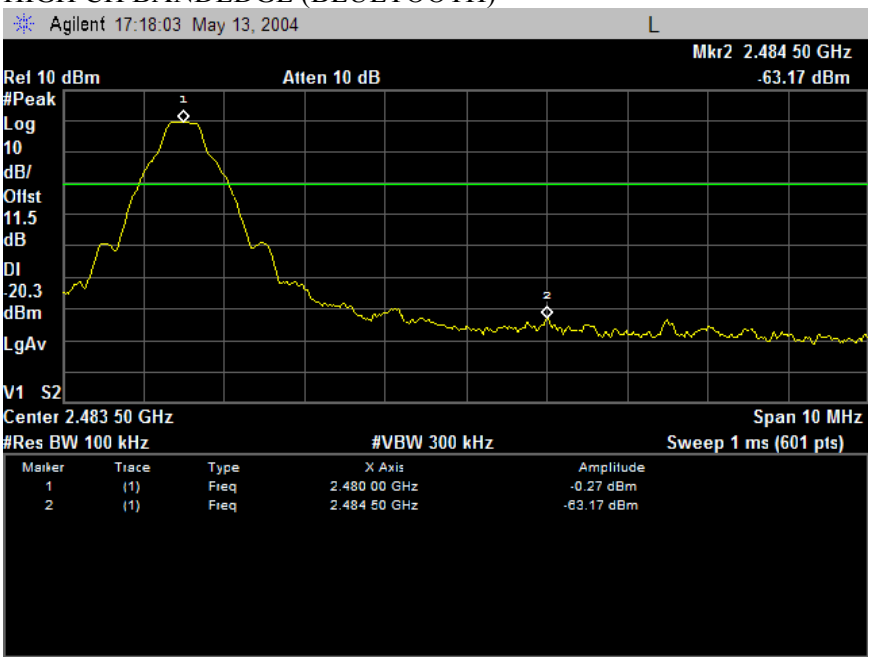
MID CH REFERENCE (BLUETOOTH)

MID CH SPURIOUS (BLUETOOTH)



SPURIOUS EMISSIONS, HIGH CHANNEL (BLUETOOTH)

HIGH CH BANDEDGE (BLUETOOTH)



HIGH CH SPURIOUS (BLUETOOTH)

7.12. RADIATED EMISSIONS

7.12.1. 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:

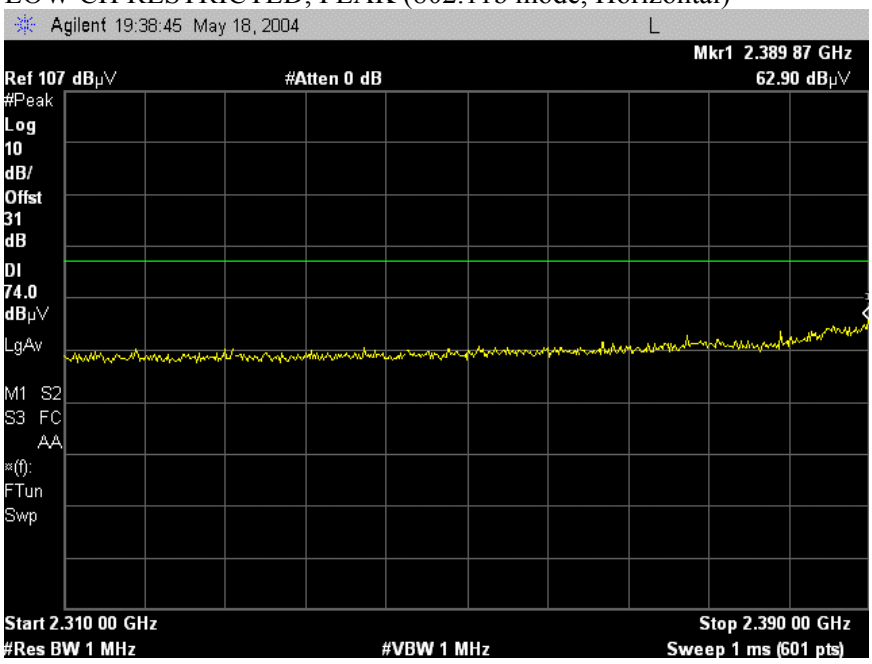
7.12.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ (PORTABLE CONFIGURATION)

CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

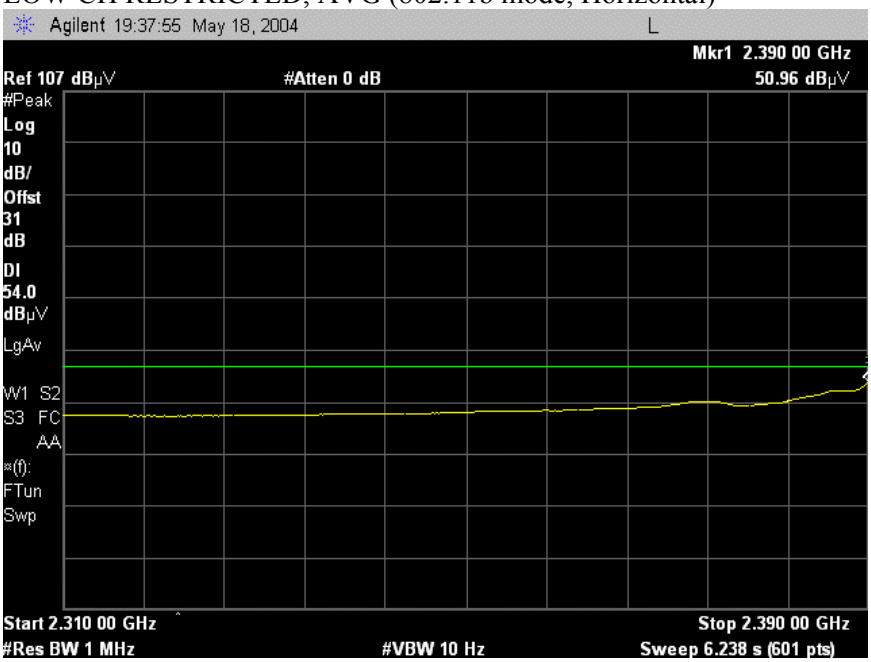
The reference level offset is equal to the test antenna gain + the test cable loss (29.1dBi + 1.9 dBm = 31dB)

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

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

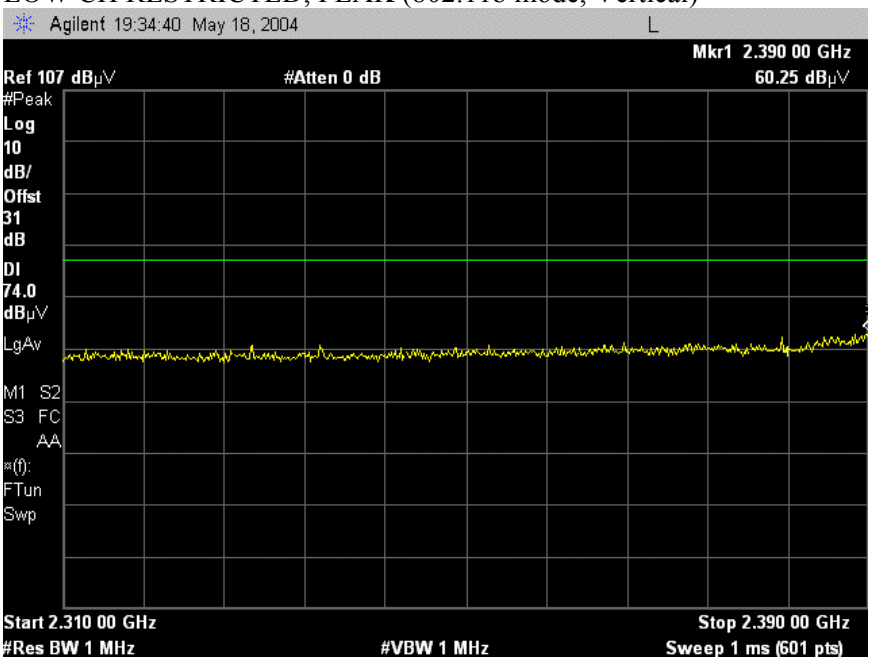


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

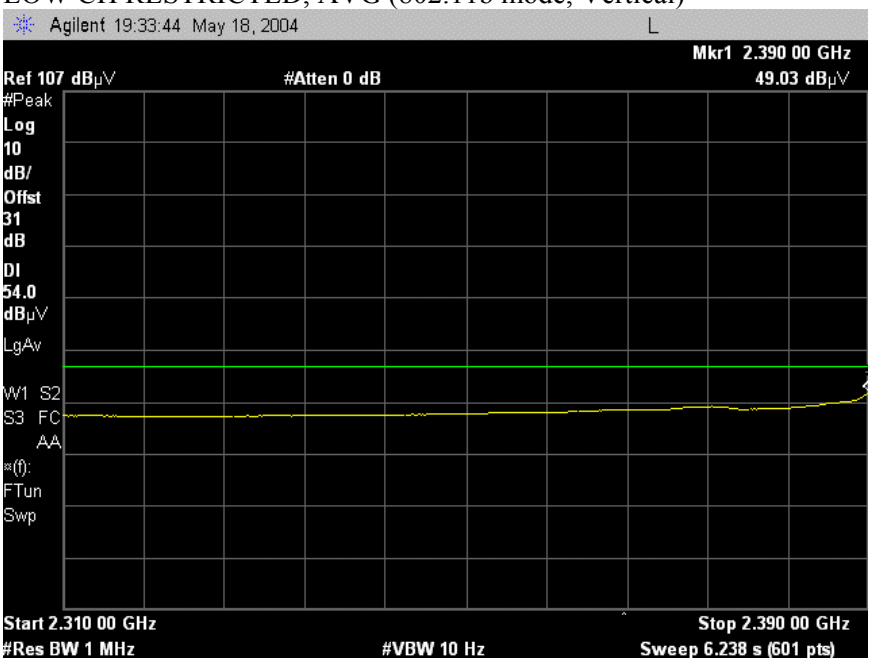


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

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

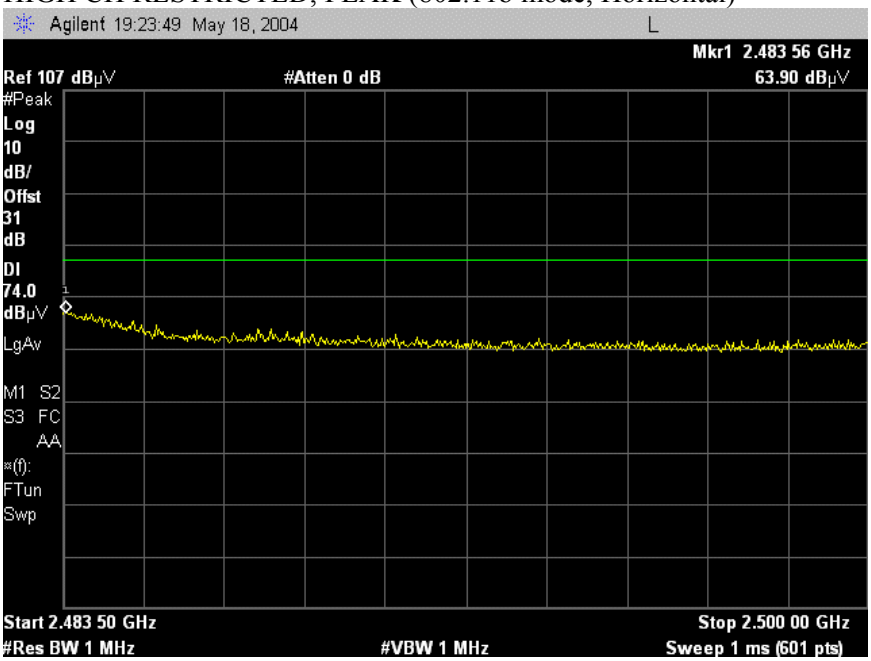


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

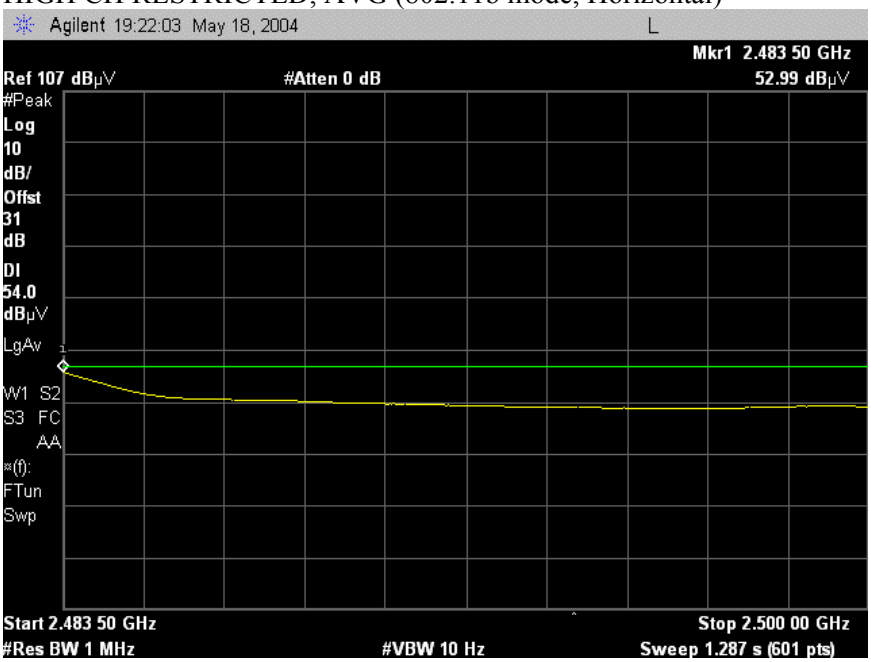


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

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

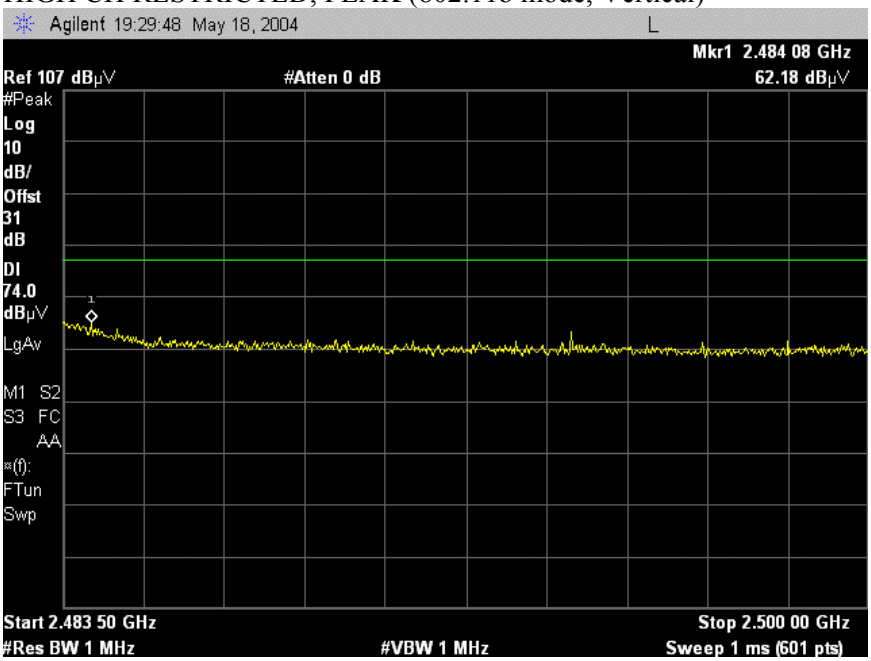


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

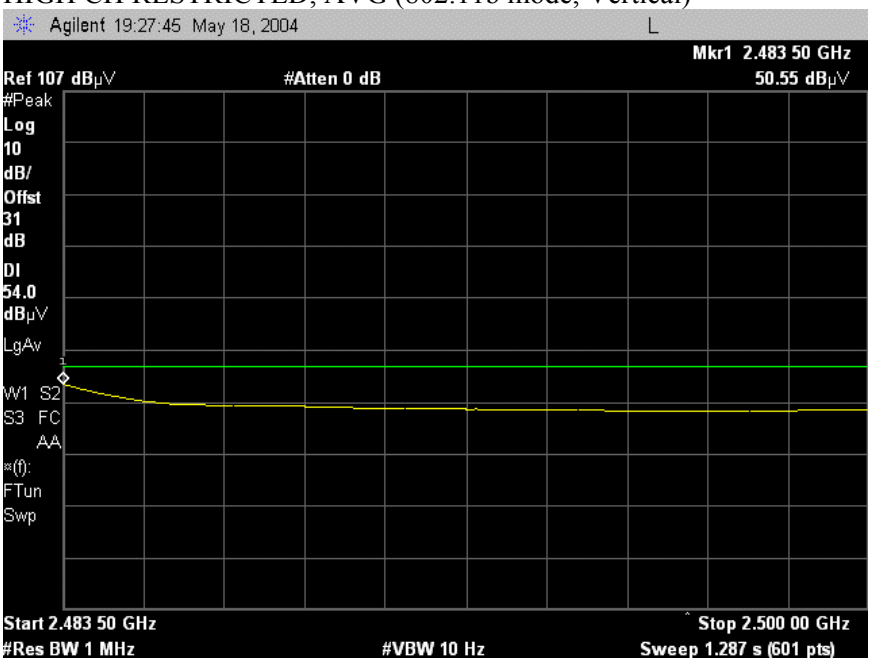


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

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



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



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

05/18/04 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 04T2727-1
Company: High Tech Computer Corp.
EUT Descrip.: PDA with Bluetooth and WLAN 2.4GHz 802.11b Capability
EUT M/N: H8TNH-H02C
Test Target: FCC 15.247
Mode Oper: TX

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	T87 Miteq 924342		

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

Limit: FCC 15.205

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
Transmitting at low channel, 2412MHz															
4.824	9.8	55.2	41.4	33.4	3.0	-44.7	0.0	1.0	47.8	34.0	74.0	54.0	-26.2	-20.0	V
4.824	9.8	52.7	40.6	33.4	3.0	-44.7	0.0	1.0	45.3	33.2	74.0	54.0	-28.7	-20.8	H
Transmitting at mid channel, 2437MHz															
4.874	9.8	56.6	43.0	33.4	3.0	-44.7	0.0	1.0	49.3	35.7	74.0	54.0	-24.7	-18.3	V
4.874	9.8	52.4	40.5	33.4	3.0	-44.7	0.0	1.0	45.1	33.2	74.0	54.0	-28.9	-20.8	H
Transmitting at high channel, 2462MHz															
4.924	9.8	56.6	43.0	33.5	3.0	-44.8	0.0	1.0	49.3	35.7	74.0	54.0	-24.7	-18.3	V
4.924	9.8	52.0	40.3	33.5	3.0	-44.8	0.0	1.0	44.7	33.0	74.0	54.0	-29.3	-21.0	H

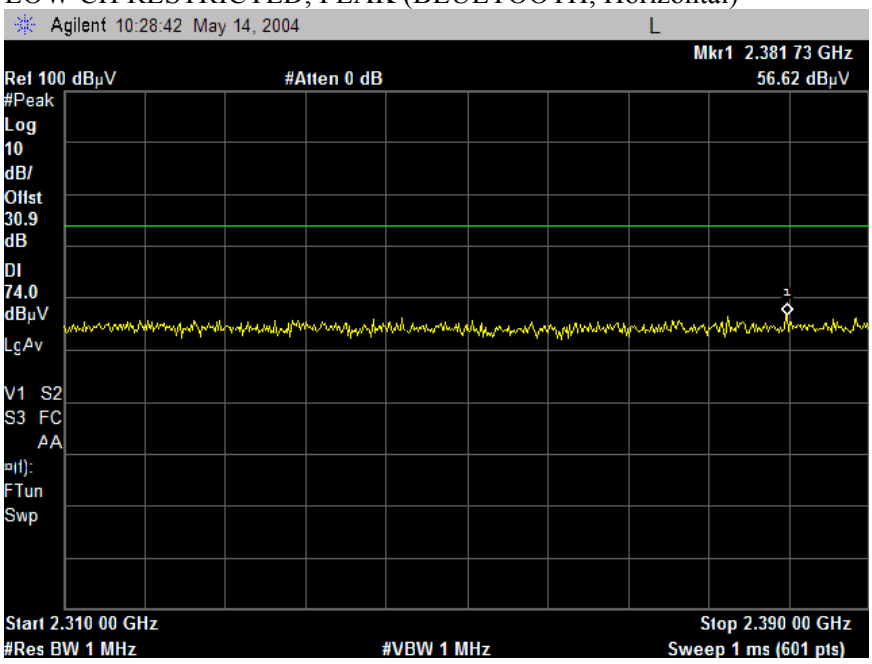
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

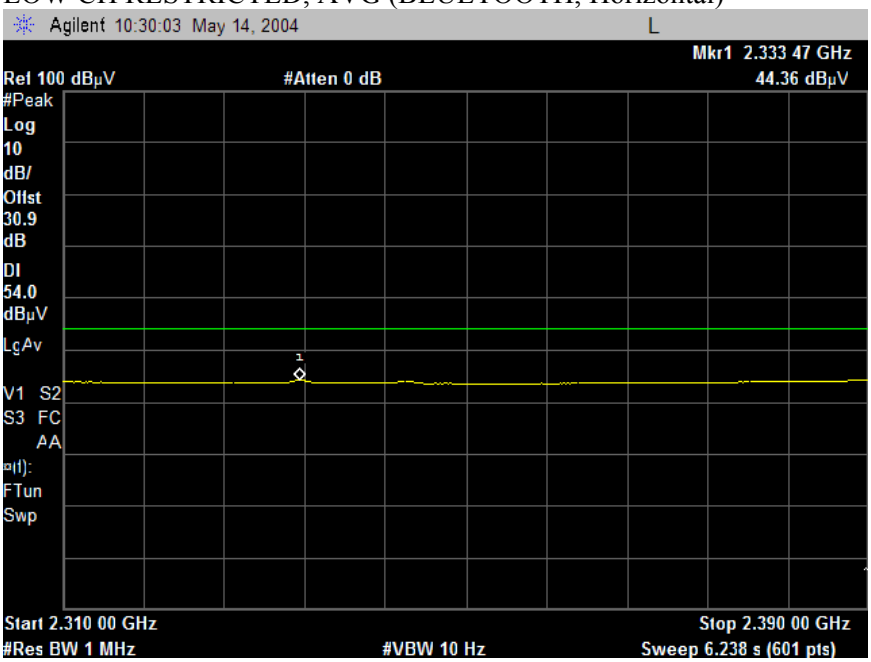
The reference level offset is equal to the test antenna gain + the test cable loss (29.3dBi + 1.6 dBm = 30.9dB)

RESTRICTED BANDEDGE (BLUETOOTH, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (BLUETOOTH, Horizontal)

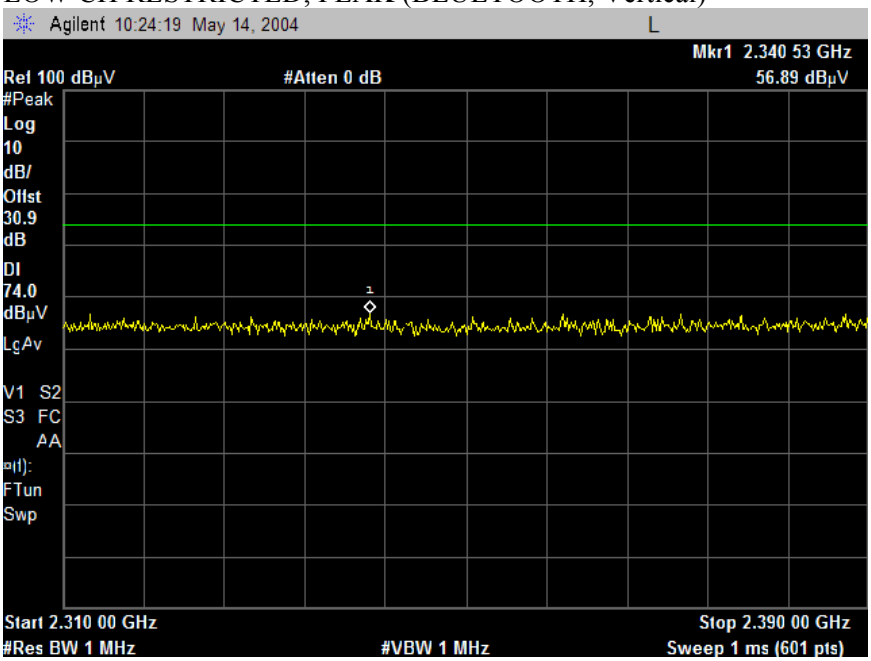


LOW CH RESTRICTED, AVG (BLUETOOTH, Horizontal)

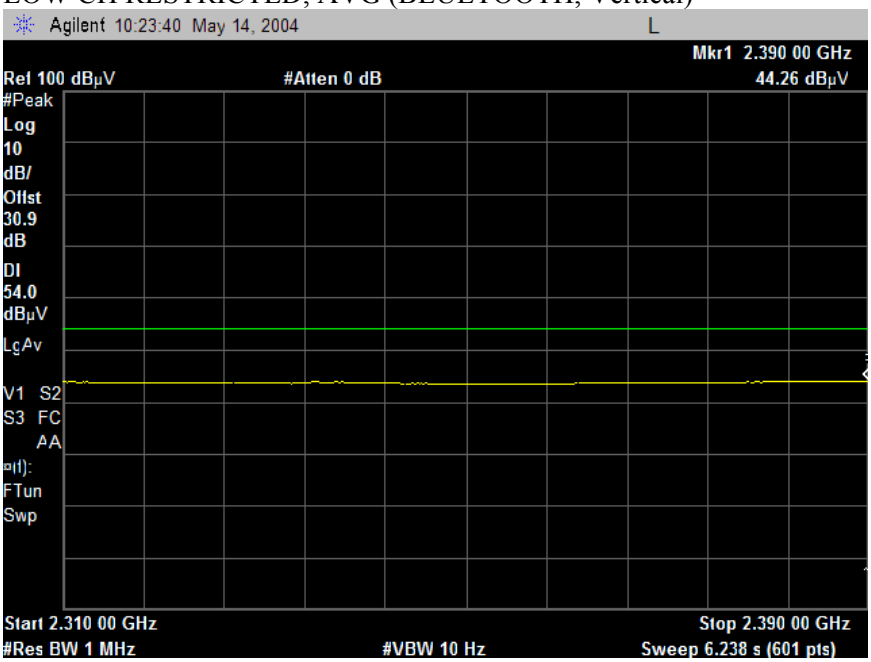


RESTRICTED BANDEDGE (BLUETOOTH, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (BLUETOOTH, Vertical)

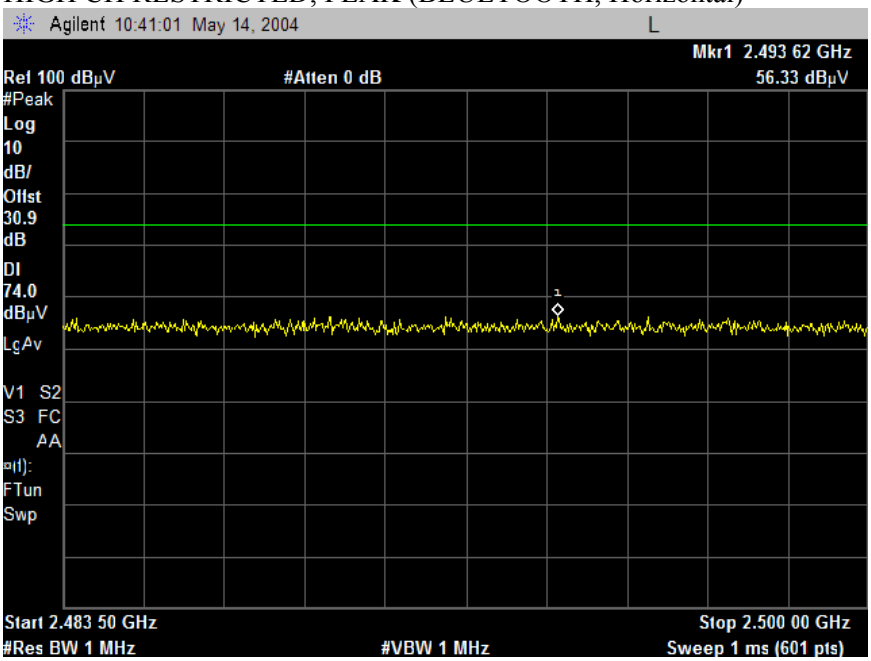


LOW CH RESTRICTED, AVG (BLUETOOTH, Vertical)

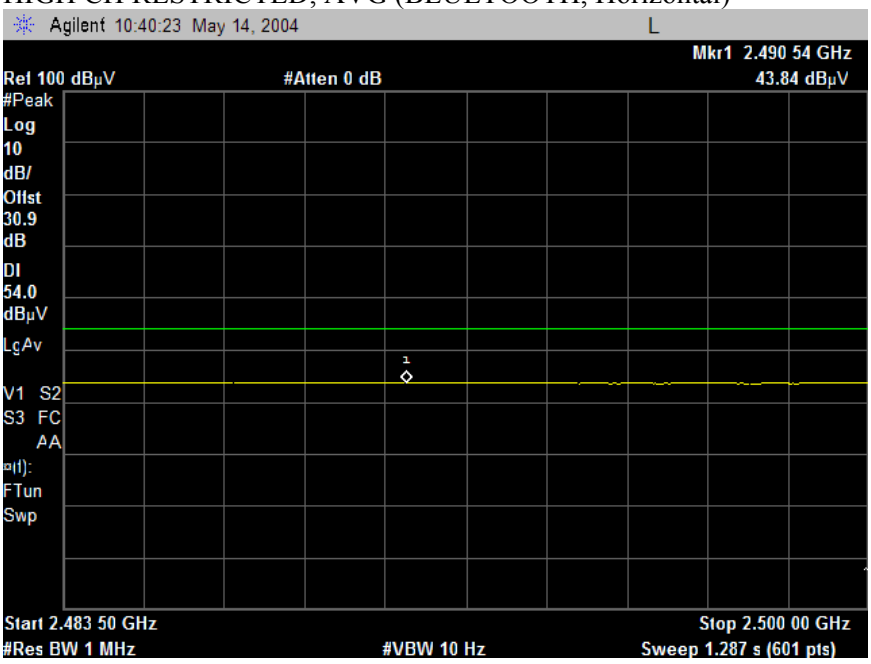


RESTRICTED BANDEDGE (BLUETOOTH, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (BLUETOOTH, Horizontal)

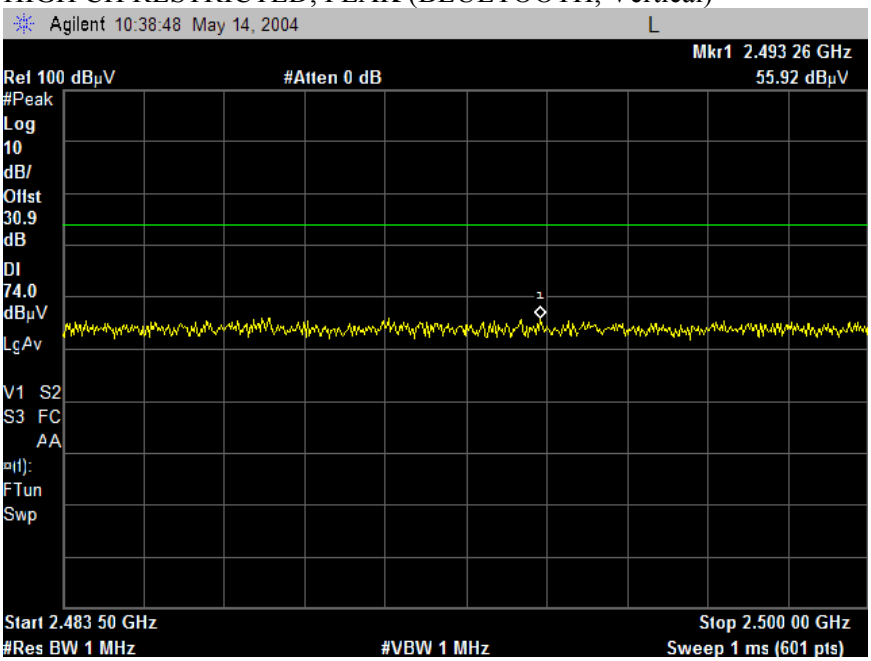


HIGH CH RESTRICTED, AVG (BLUETOOTH, Horizontal)

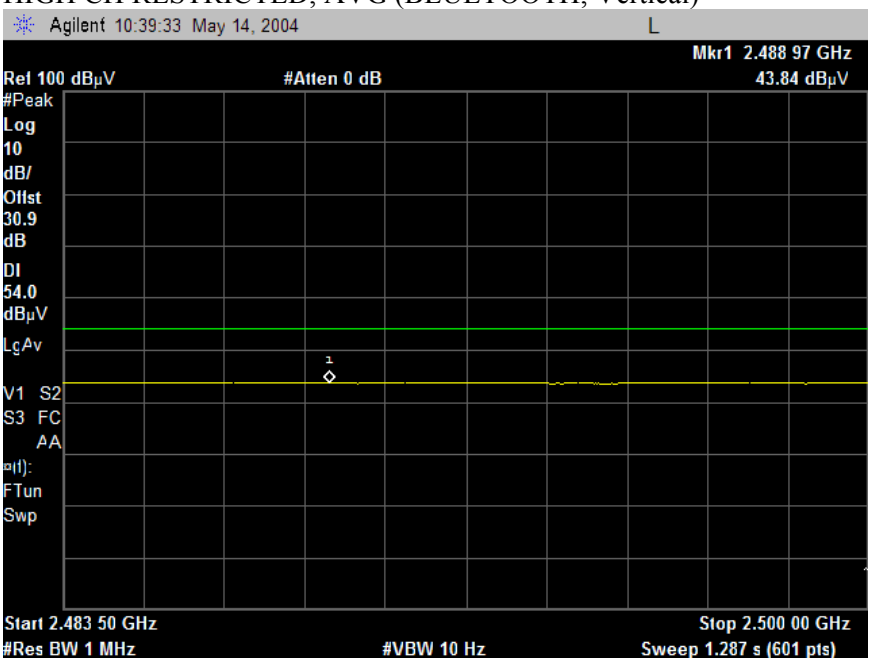


RESTRICTED BANDEDGE (BLUETOOTH, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (BLUETOOTH, Vertical)



HIGH CH RESTRICTED, AVG (BLUETOOTH, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (BLUETOOTH)

05/14/04 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04T2727
Company: High Tech Computer Corp.
EUT Descrip.: PDA with Bluetooth and 802.11b WLAN
EUT M/N: HSTNH-H02C
Test Target: 15
Mode Oper: Bluetooth, Worst case position

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz
T59; S/N: 3245 @3m	Agilent E4446A Analyzer	T86 Miteq 924341		

Hi Frequency Cables: ☑ (2 ft) ☐ (2.0 ft) ☐ (3 ft) ☑ (12 ft)

Limit: FCC 15.205

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
2.402 Channel															
4.804	9.8	60.1	55.1	33.1	2.9	-45.0	0.0	1.0	52.0	47.0	74.0	54.0	-22.0	-7.0	V
4.804	9.8	61.7	58.2	33.1	2.9	-45.0	0.0	1.0	53.6	50.1	74.0	54.0	-20.4	-3.9	H
2.441 Channel															
4.882	9.8	51.5	41.6	33.1	2.9	-45.1	0.0	1.0	43.4	33.5	74.0	54.0	-30.6	-20.5	V
7.323	9.8	41.0	38.3	36.0	3.7	-45.3	0.0	1.0	36.3	33.6	74.0	54.0	-37.7	-20.4	V
4.882	9.8	53.7	45.4	33.1	2.9	-45.1	0.0	1.0	45.6	37.3	74.0	54.0	-28.4	-16.7	H
7.323	9.8	51.2	42.1	36.0	3.7	-45.3	0.0	1.0	46.5	37.4	74.0	54.0	-27.5	-16.6	H
2480 Channel															
4.960	9.8	55.4	46.4	33.2	2.9	-45.2	0.0	1.0	47.3	38.3	74.0	54.0	-26.7	-15.7	V
12.400	9.8	55.4	45.0	39.6	5.0	-44.1	0.0	1.0	56.8	46.4	74.0	54.0	-17.2	-7.6	V
4.960	9.8	56.5	47.1	33.2	2.9	-45.2	0.0	1.0	48.4	39.0	74.0	54.0	-25.6	-15.0	V
12.400	9.8	56.3	46.5	39.6	5.0	-44.1	0.0	1.0	57.7	47.9	74.0	54.0	-16.3	-6.1	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		

7.12.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

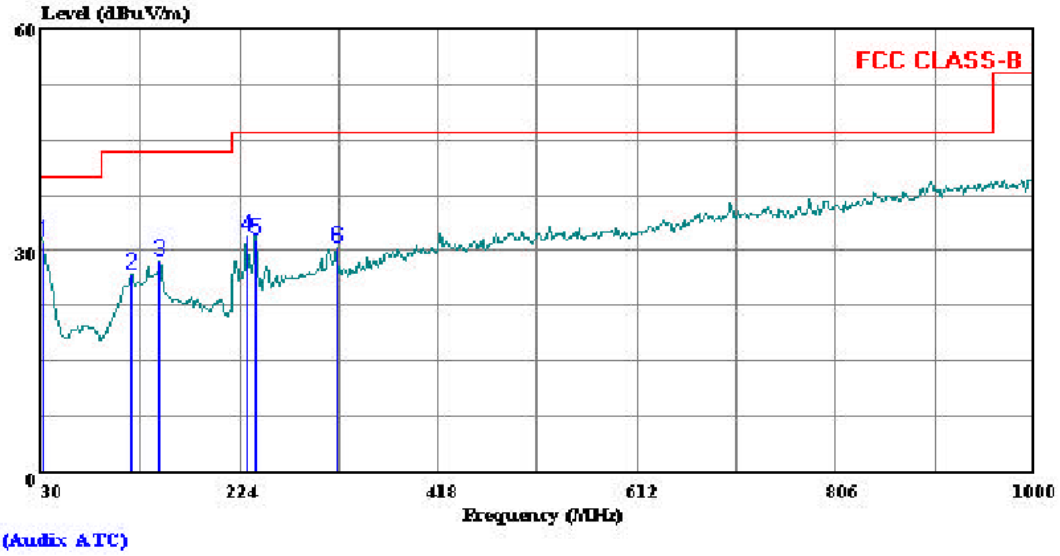
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

(802.11b)

HORIZONTAL PLOT

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

Data#: 2 File#: HTC_WLAN.EMI Date: 05-18-2004 Time: 20:48:00



HORIZONTAL DATA

Condition: FCC CLASS-B
Test Operator: : Chin Pang
Project #: : 04T2727-1
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model No: : HSTNH-H02C
Configuration: : EUT
Target of Test: : FCC CLASS B
Mode of Operation: TX, WORST CASE

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	31.940	Peak	9.21	22.06	31.27	40.00	-8.73
2	118.270	Peak	11.91	14.75	26.66	43.50	-16.84
3	145.430	Peak	13.75	14.72	28.46	43.50	-15.04
4	230.790	Peak	18.63	13.30	31.93	46.00	-14.07
5	239.520	Peak	17.85	13.67	31.52	46.00	-14.48
6	318.090	Peak	14.03	16.24	30.27	46.00	-15.73

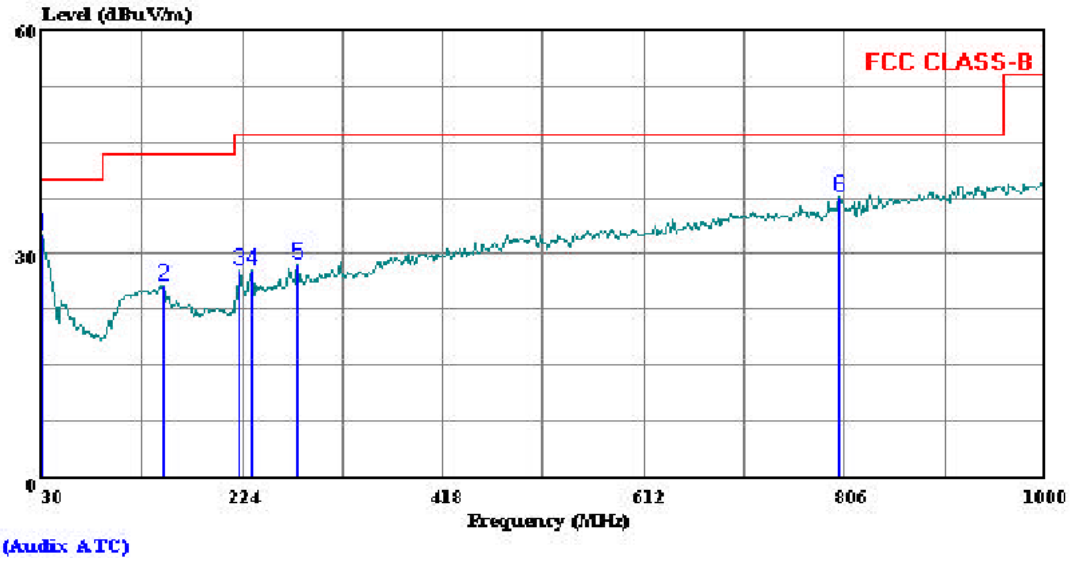
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

(802.11b)

VERTICAL PLOT

561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: HTC_WLAN.EMI Date: 05-18-2004 Time: 20:53:57



VERTICAL DATA

Condition: FCC CLASS-B
Test Operator: : Chin Pang
Project #: : 04T2727-1
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model No: : HSTNH-H02C
Configuration: : EUT
Target of Test: : FCC CLASS B
Mode of Operation: TX, WORST CASE

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.970	Peak	9.57	22.95	32.52	40.00	-7.49
2	147.370	Peak	11.06	14.57	25.63	43.50	-17.87
3	221.090	Peak	14.68	13.00	27.68	46.00	-18.32
4	232.730	Peak	14.36	13.39	27.75	46.00	-18.25
5	276.380	Peak	13.30	15.37	28.67	46.00	-17.34
6	800.180	Peak	12.53	25.02	37.55	46.00	-8.45

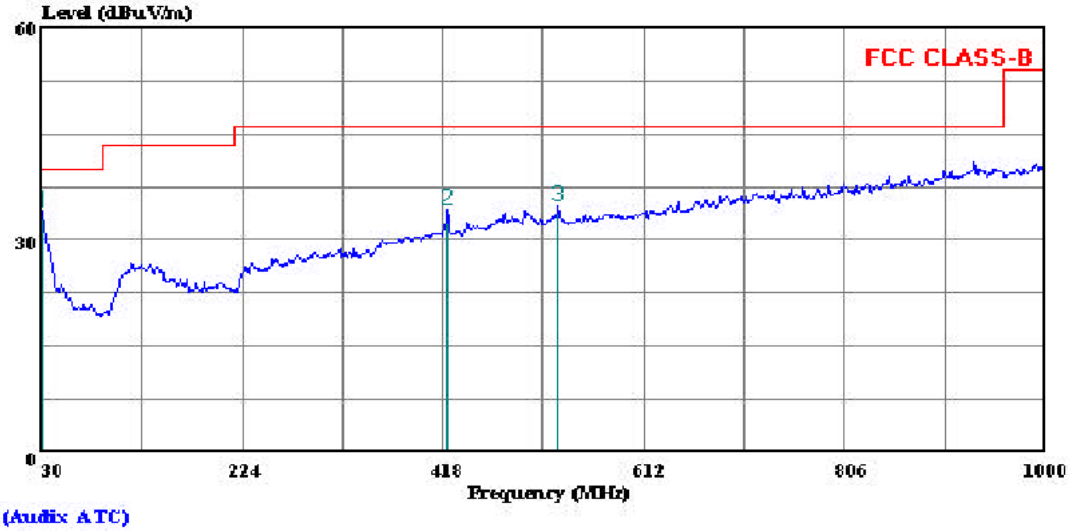
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

(BLUETOOTH)

HORIZONTAL PLOT

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

Data#: 1 File#: 04T2727 Bluetooth.EMI
Date: 05-15-2004 Time: 10:10:54



HORIZONTAL DATA

Condition: FCC CLASS-B
Test Operator: : David Garcia
Project #: : 04T2727
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and 802.11b WLAN
Model No: : HSTNH-H02C
Configuration: : EUT, HORIZONTAL
Target of Test: : FCC CLASS B
Mode of Operation: Tx at MID Channel, Bluetooth

Page: 2

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.000	Peak	11.05	22.95	34.00	40.00	-6.00
2	421.880	Peak	15.44	18.75	34.19	46.00	-11.81
3	528.580	Peak	13.91	20.98	34.89	46.00	-11.11

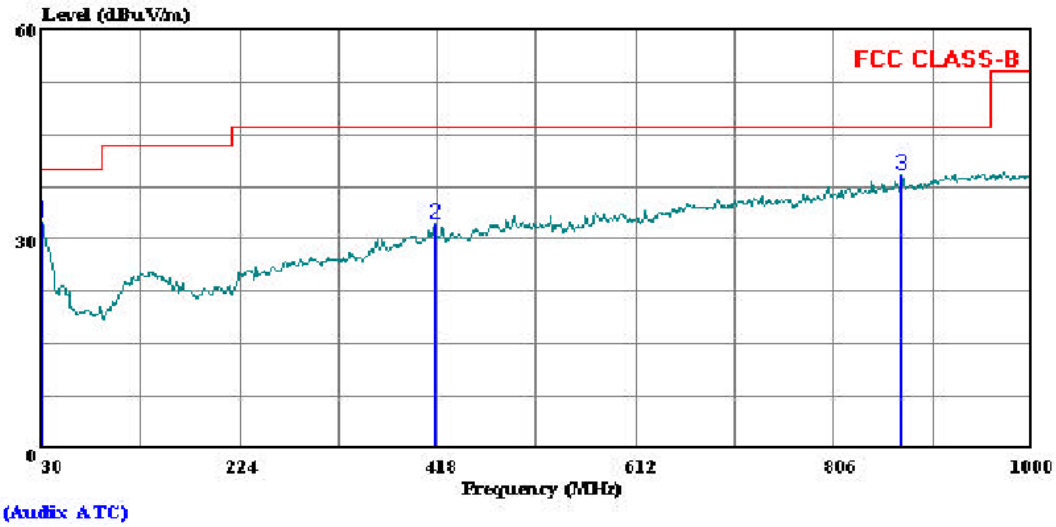
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

(BLUETOOTH)

VERTICAL PLOT

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

Data#: 2 File#: 04T2727 Bluetooth.EMI
Date: 05-15-2004 Time: 10:27:40



VERTICAL DATA

Condition: FCC CLASS-B
Test Operator: : David Garcia
Project #: : 04T2727
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and 802.11b WLAN
Model No: : HSTNH-H02C
Configuration: : EUT, Vertical
Target of Test: : FCC CLASS B
Mode of Operation: Tx at MID Channel, Bluetoothl

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.970	Peak	9.65	22.95	32.60	40.00	-7.40
2	415.090	Peak	13.50	18.60	32.10	46.00	-13.90
3	872.930	Peak	13.69	25.65	39.34	46.00	-6.66

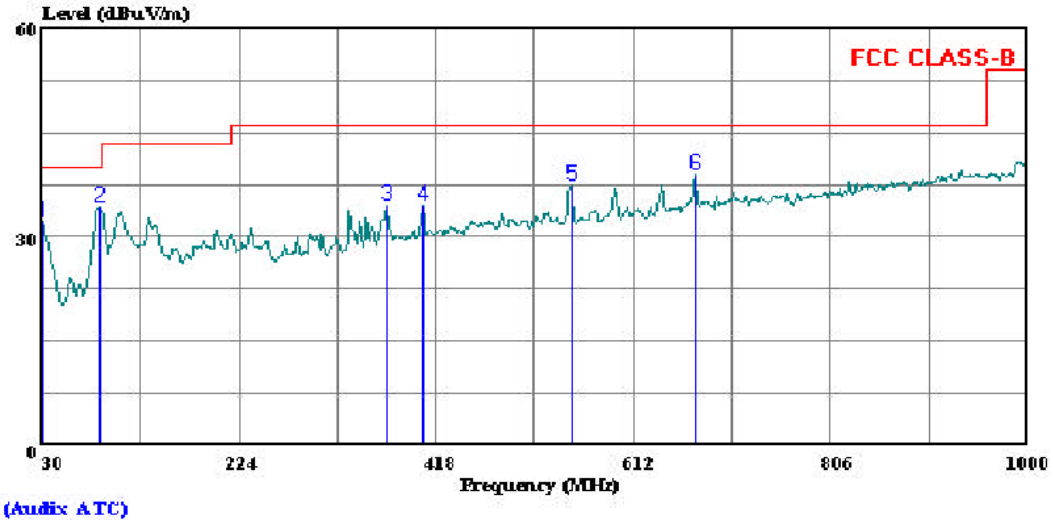
DIGITAL EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

(CONFIG 2)

HORIZONTAL PLOT

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

Data#: 12 File#: 04T2727 Bluetooth.EMI
Date: 05-15-2004 Time: 11:56:45



HORIZONTAL DATA

Condition: FCC CLASS-B
Test Operator: : David Garcia
Project #: : 04T2727
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and 802.11b WLAN
Model No: : HSTNH-H02C
Configuration: : EUT, Horizontal
Target of Test: : FCC CLASS B
Mode of Operation: Printing H's, Digital configuration

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.000	Peak	9.32	22.95	32.27	40.00	-7.73
2	87.230	Peak	25.20	9.00	34.20	40.00	-5.80
3	368.530	Peak	17.13	17.43	34.56	46.00	-11.44
4	405.390	Peak	16.19	18.32	34.51	46.00	-11.49
5	550.890	Peak	16.39	20.95	37.34	46.00	-8.66
6	672.140	Peak	15.54	23.31	38.85	46.00	-7.15

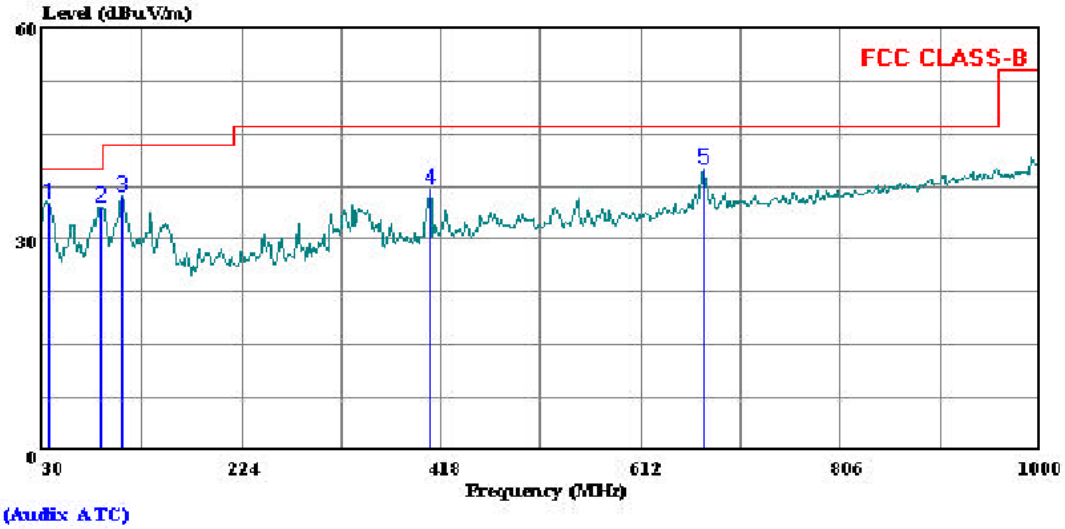
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

(CONFIG 2)

VERTICAL PLOT

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

Data#: 10 File#: 04T2727 Bluetooth.EMI
Date: 05-15-2004 Time: 11:50:09



VERTICAL DATA

Condition: FCC CLASS-B
Test Operator: : David Garcia
Project #: : 04T2727
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and 802.11b WLAN
Model No: : HSTNH-H02C
Configuration: : EUT, Vertical
Target of Test: : FCC CLASS B
Mode of Operation: Printing H's, Digital configuration

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	35.820	Peak	15.10	19.99	35.09	40.00	-4.91
2	87.230	Peak	25.53	9.00	34.53	40.00	-5.47
3	106.630	Peak	23.51	12.57	36.08	43.50	-7.42
4	407.330	Peak	18.85	18.39	37.24	46.00	-8.76
5	672.140	Peak	16.64	23.31	39.95	46.00	-6.05

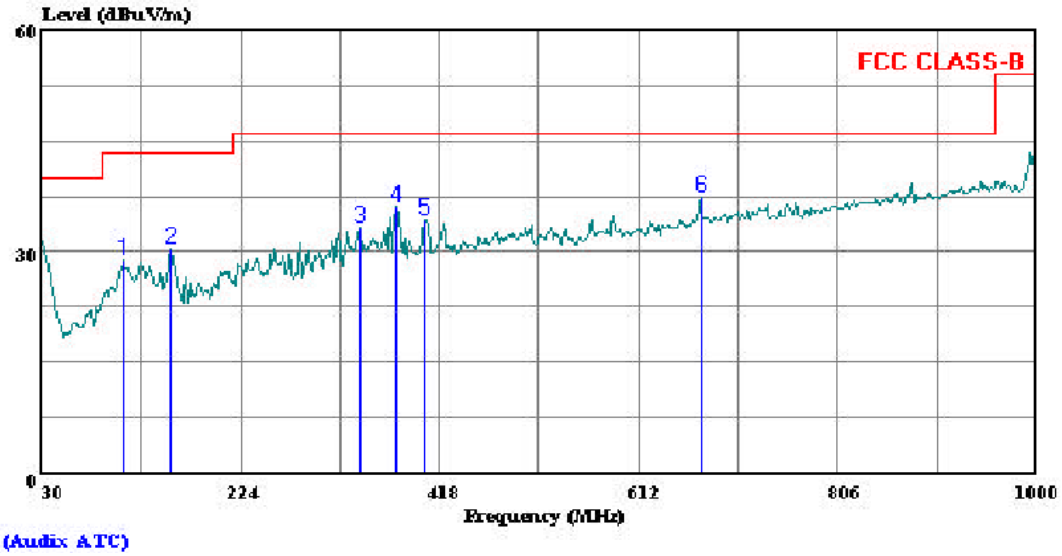
DIGITAL EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

(CONFIG 3)

HORIZONTAL PLOT

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

Data#: 14 File#: Htc_wlan.emi Date: 05-21-2004 Time: 20:09:20



HORIZONTAL DATA

Condition: FCC CLASS-B
Test Operator: : Chin Pang
Project #: : 04T2727-1
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model No: : HSTNH-H02C
Configuration: : EUT/Laptop/Printer/Headphone/Delta PS
Target of Test: : FCC CLASS B
Mode of Operation: printing H's

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	109.540	Peak	15.46	13.29	28.75	43.50	-14.75
2	155.130	Peak	16.44	14.03	30.47	43.50	-13.03
3	339.430	Peak	16.58	16.66	33.24	46.00	-12.76
4	376.290	Peak	18.56	17.64	36.20	46.00	-9.80
5	402.480	Peak	16.04	18.26	34.30	46.00	-11.70
6	672.140	Peak	14.15	23.31	37.46	46.00	-8.54

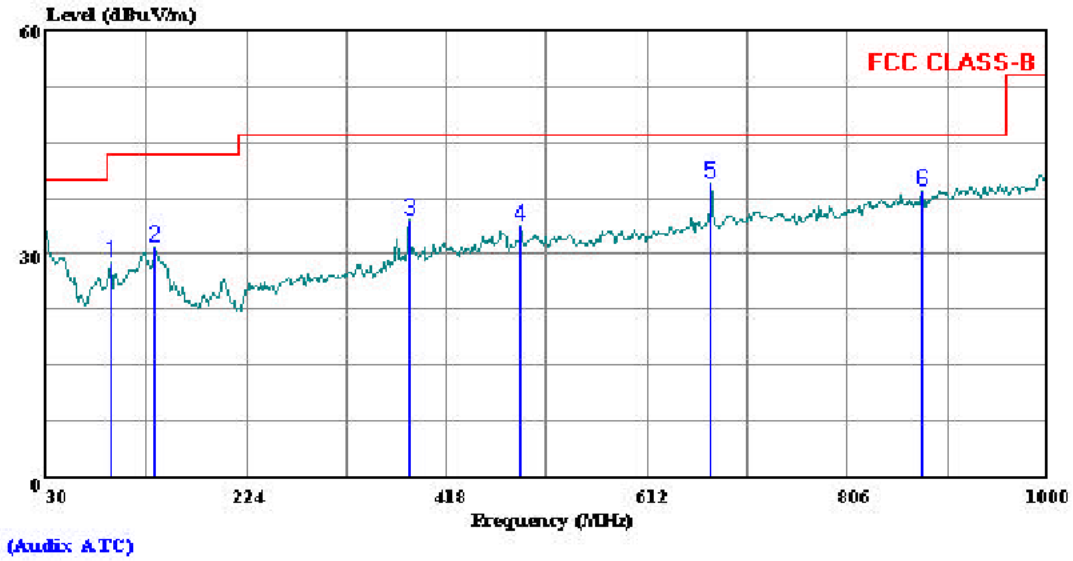
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

(CONFIG 3)

VERTICAL PLOT

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

Data#: 16 File#: Htc_wlan.emi Date: 05-21-2004 Time: 20:11:50



VERTICAL DATA

Condition: FCC CLASS-B
Test Operator: : Chin Pang
Project #: : 04T2727-1
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model No: : HSTNH-H02C
Configuration: : EUT/Laptop/Printer/Headphone/Delta PS
Target of Test: : FCC CLASS B
Mode of Operation: printing H's

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	92.080	Peak	19.88	9.08	28.96	43.50	-14.54
2	135.730	Peak	15.55	15.39	30.94	43.50	-12.56
3	381.140	Peak	16.70	17.73	34.43	46.00	-11.57
4	489.780	Peak	13.34	20.42	33.76	46.00	-12.24
5	674.080	Peak	16.04	23.33	39.37	46.00	-6.63
6	877.780	Peak	12.61	25.74	38.35	46.00	-7.65

7.13. 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

(802.11b TRANSMITTING)

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
0.23	44.58	--	--	0.00	63.66	53.66	-19.08	-9.08	L1
1.90	41.15	--	--	0.00	56.00	46.00	-14.85	-4.85	L1
5.48	41.38	--	--	0.00	60.00	50.00	-18.62	-8.62	L1
0.22	46.22	--	--	0.00	64.00	54.00	-17.78	-7.78	L2
0.62	38.50	--	--	0.00	56.00	46.00	-17.50	-7.50	L2
5.74	42.24	--	--	0.00	60.00	50.00	-17.76	-7.76	L2
6 Worst Data WLAN									

(BLUETOOTH TRANSMITTING)

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
0.24	45.26	--	--	0.00	63.57	53.57	-18.31	-8.31	L1
1.86	40.62	--	--	0.00	56.00	46.00	-15.38	-5.38	L1
5.71	41.50	--	--	0.00	60.00	50.00	-18.50	-8.50	L1
0.22	45.76	--	--	0.00	63.97	53.97	-18.21	-8.21	L2
1.86	40.51	--	--	0.00	56.00	46.00	-15.49	-5.49	L2
5.77	41.92	--	--	0.00	60.00	50.00	-18.08	-8.08	L2
6 Worst Data Bluetooth									

CONFIG#2 (H's)

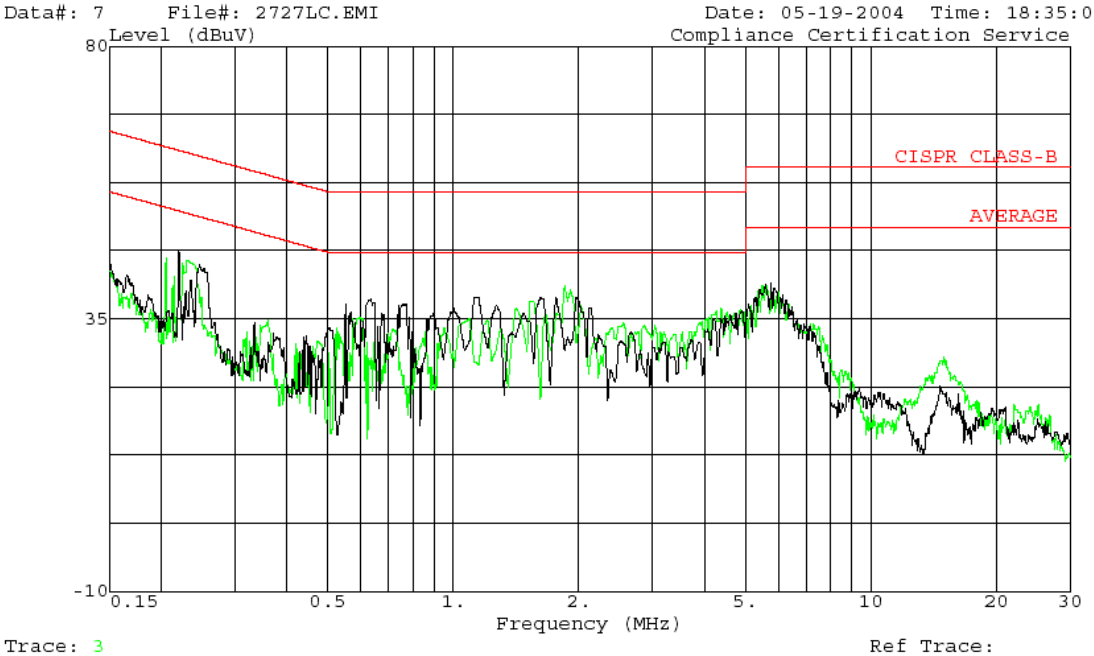
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.39	43.78	--	33.01	0.00	59.17	49.17	-15.39	-16.16	L1
0.90	44.72	--	32.58	0.00	56.00	46.00	-11.28	-13.42	L1
4.29	46.72	--	35.96	0.00	56.00	46.00	-9.28	-10.04	L1
0.54	45.30	--	36.16	0.00	56.00	46.00	-10.70	-9.84	L2
0.89	47.10	--	35.03	0.00	56.00	46.00	-8.90	-10.97	L2
4.09	48.48	--	37.64	0.00	56.00	46.00	-7.52	-8.36	L2
6 Worst Data H-pattern									

CONFIG#3 (H's)

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	50.32	--	--	0.00	64.23	54.23	-13.91	-3.91	L1
0.60	41.46	--	--	0.00	56.00	46.00	-14.54	-4.54	L1
5.74	41.14	--	--	0.00	60.00	50.00	-18.86	-8.86	L1
0.23	47.02	--	--	0.00	63.66	53.66	-16.64	-6.64	L2
0.67	41.96	--	--	0.00	56.00	46.00	-14.04	-4.04	L2
5.53	42.24	--	--	0.00	60.00	50.00	-17.76	-7.76	L2
6 Worst Data H-Pattern,									

LINE 1 & LINE 2 RESULTS (802.11b TRANSMITTING)

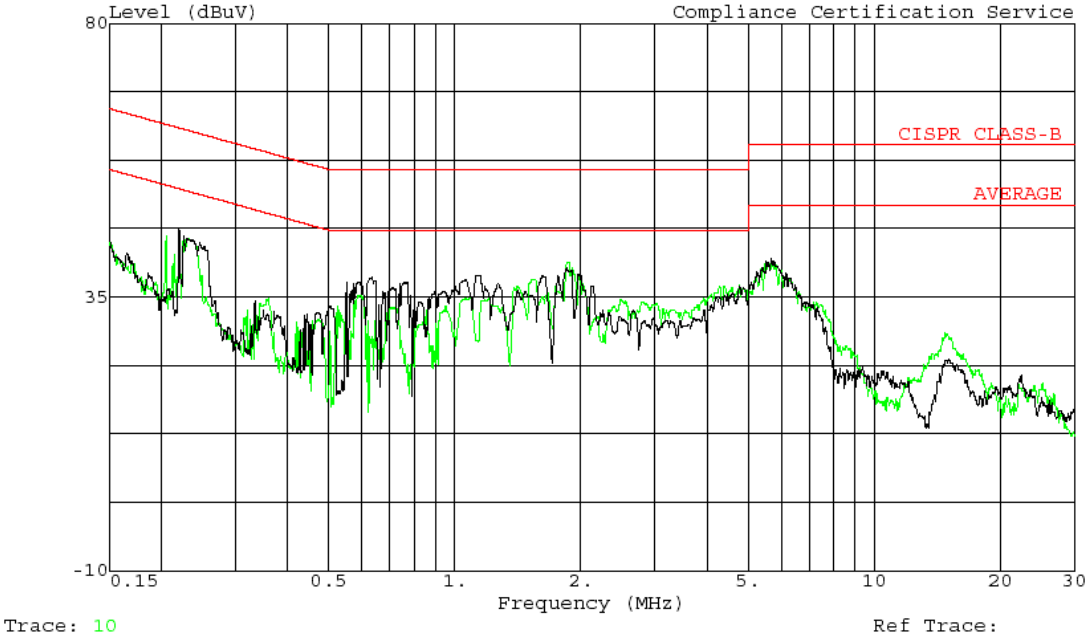
COMPLIANCE Engineering Services, Inc.
561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888



Trace: 3 Ref Trace:
Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT only
Mode of Operation: WLAN, Tx (Worst Case)
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L1: Peak (Green), L2: Peak (Black)

LINE 1 & LINE 2 RESULTS (BLUETOOTH TRANSMITTING)

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

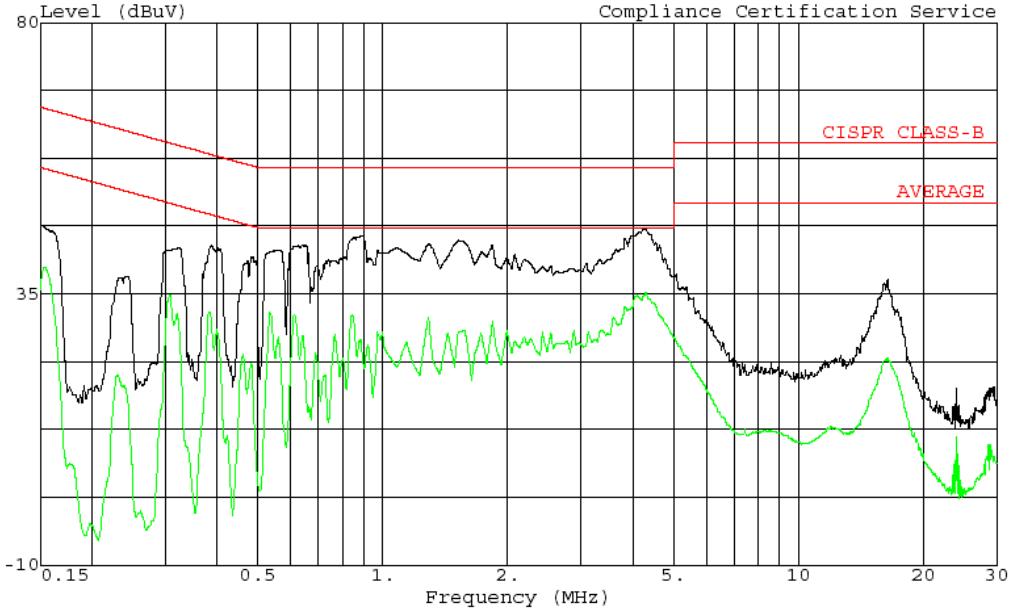


Trace: 10 Ref Trace:
Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT only
Mode of Operation: Bluetooth, Tx (Worst Case)
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L1: Peak (Green), L2: Peak (Black)

LINE 1 RESULTS (CONFIG#2 H's)

561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 21 File#: 2727LC.EMI Date: 05-19-2004 Time: 19:47:37



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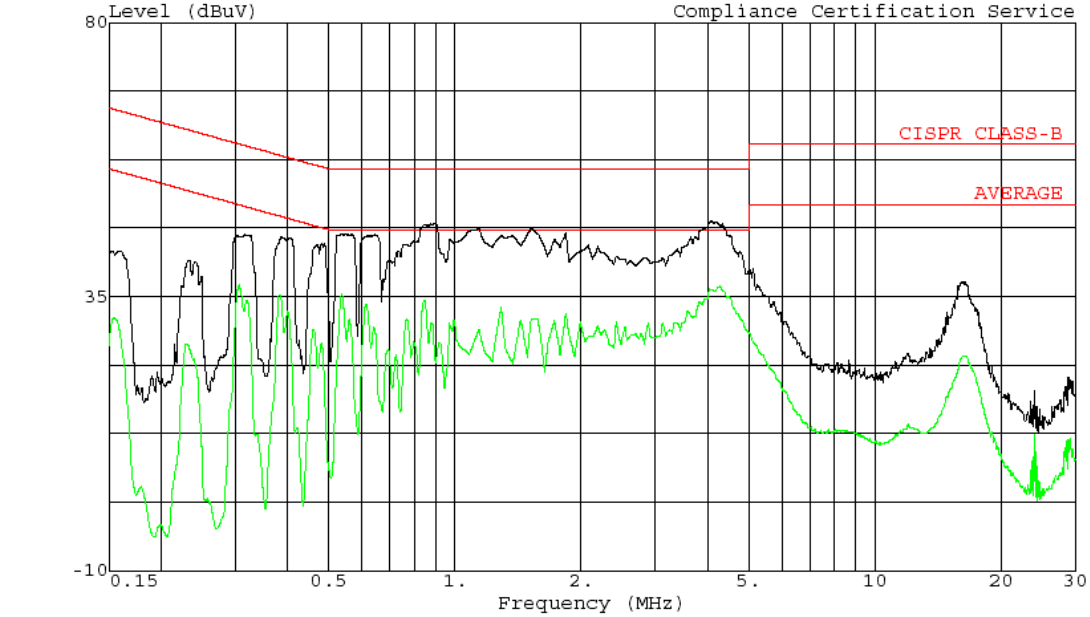
Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT /Laptop/Printer/Modem/Headphone
Mode of Operation: H-Pattern
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L1: Peak (Black), Avg (Green)

LINE 2 RESULTS (CONFIG#2 H's)

561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 28 File#: 2727LC.EMI Date: 05-19-2004 Time: 19:55:44



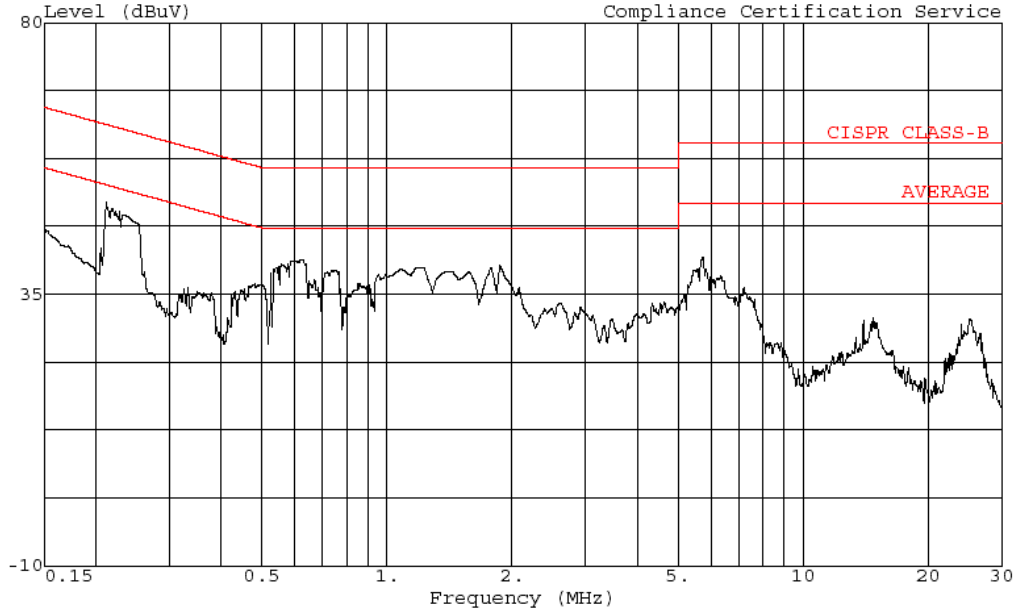
Trace: 26 Ref Trace:

Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT /Laptop/Printer/Modem/Headphone
Mode of Operation: H-Pattern
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L2: Peak (Black), Avg (Green)

LINE 1 RESULTS (CONFIG#3 H's)

561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 41 File#: 2727LC.EMI Date: 05-21-2004 Time: 18:31:46



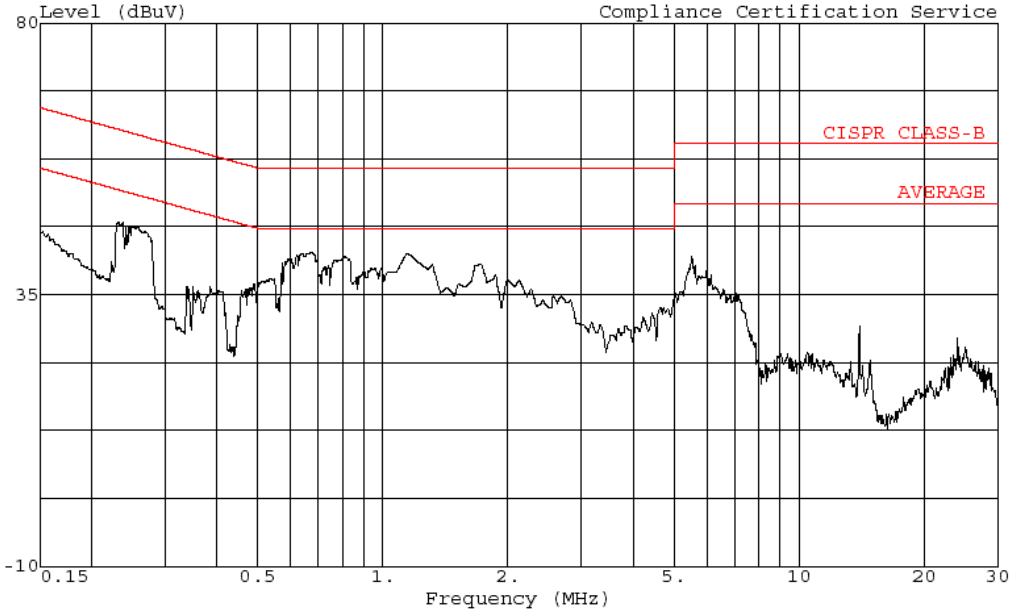
Trace: Ref Trace:

Project #	: 04t2727-1
Test Operator	: Chin Pang
Company	: High Tech Computer Corp
EUT	: PDA with Bluetooth and WLAN 2.4GHz
	: 802.11b capability
Model	: HSTNH-H02C
Configuration	: EUT/Laptop/Printer/Headphone /Delta P/S
Mode of Operation	: H-Pattern
Target of Test	: FCC Class B
Voltage	: 115 VAC / 60 Hz
	: L1: Peak (Black)
	:

LINE 2 RESULTS (CONFIG#3 H's)

COMPLIANCE Engineering Service, Inc.
561F Monterey Road,
Morgan Hill, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 48 File#: 2727LC.EMI Date: 05-21-2004 Time: 18:49:23



Trace: Ref Trace:

Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT/Laptop/Printer/Headphone/Delta P/S
Mode of Operation: H-Pattern
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L2: Peak (Black)
:

8. CO-LOCATED TRANSMITTER EMISSIONS

SUPPLEMENTAL TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied for radiated emissions. For AC line conduction the dominant transmitter and the non-dominant transmitter is set to the worst case channel. Worst case results are reported.

RESULTS

No non-compliance noted:

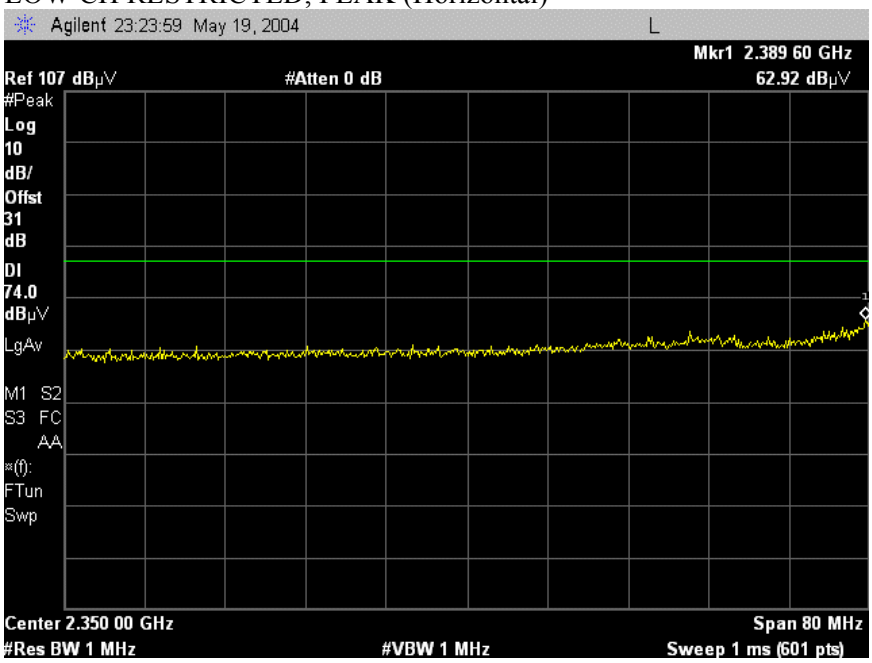
WLAN was found to be the dominant transmitter.

CORRECTION FACTOR FOR RESTRICTED BANDEDGE MEASUREMENTS

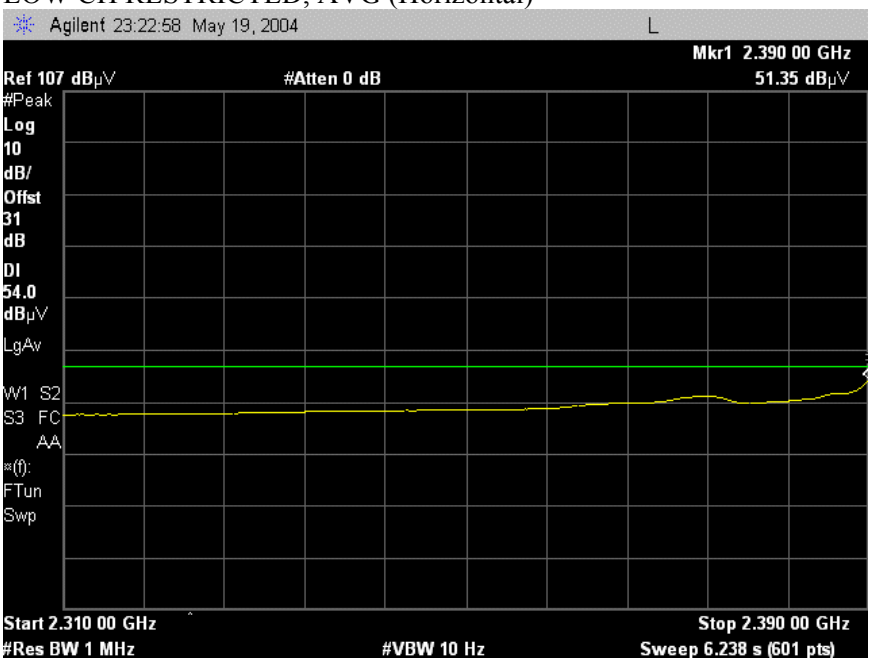
The reference level offset is equal to the test antenna gain + the test cable loss (29.1dBi + 1.9 dBm = 31dB)

WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL) (CO-LOCATION)

LOW CH RESTRICTED, PEAK (Horizontal)

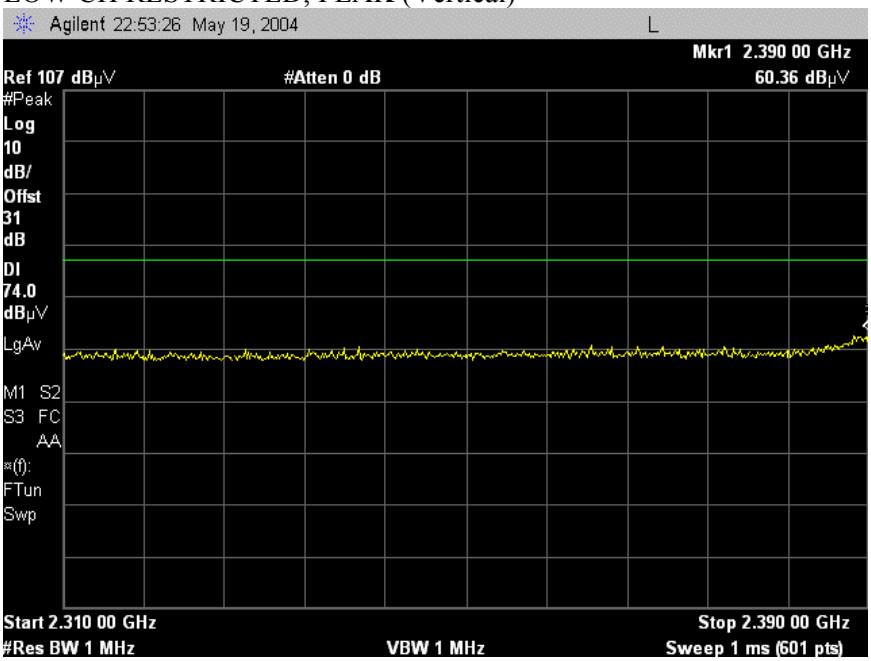


LOW CH RESTRICTED, AVG (Horizontal)

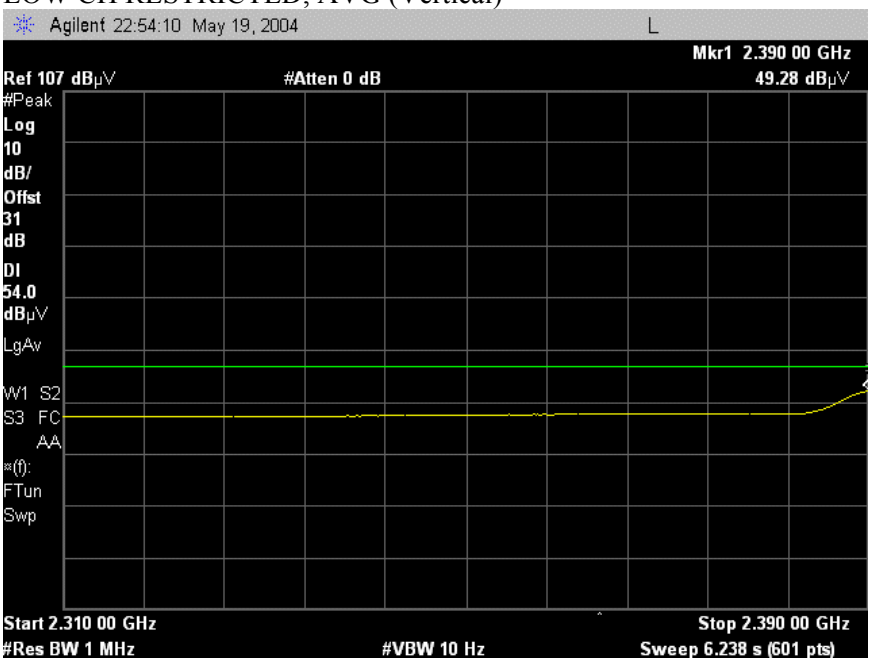


WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL) (CO-LOCATION)

LOW CH RESTRICTED, PEAK (Vertical)

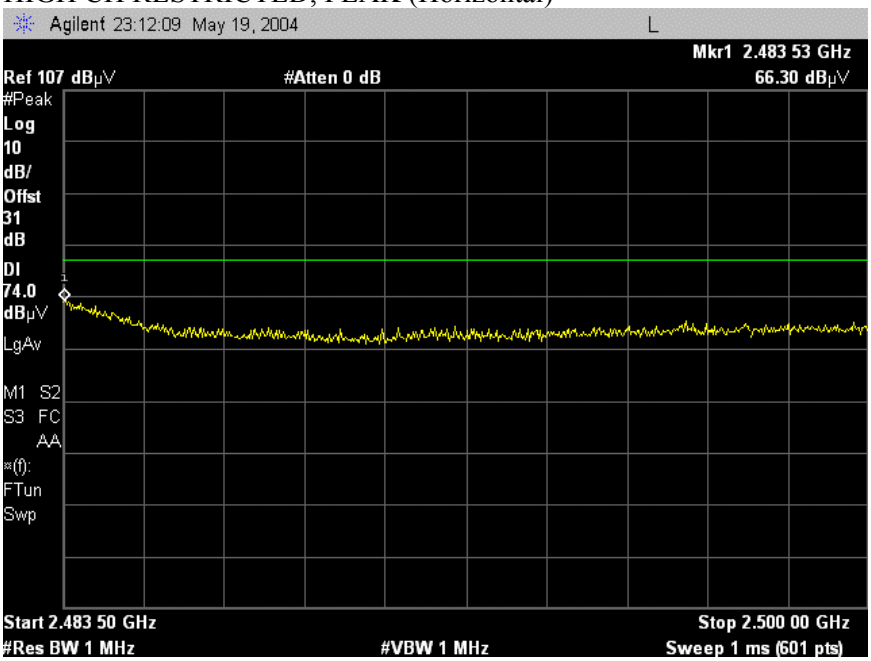


LOW CH RESTRICTED, AVG (Vertical)

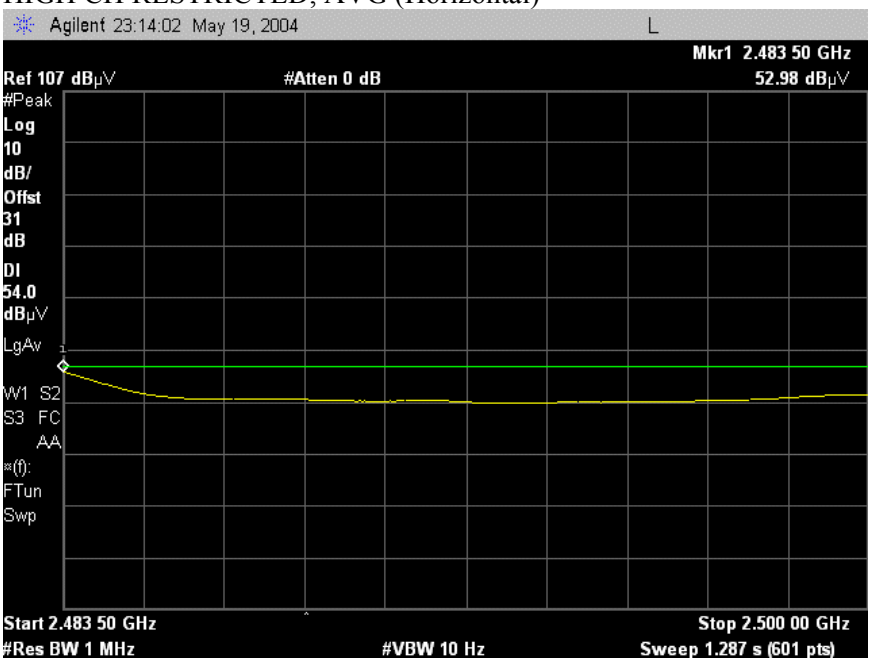


WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL) (CO-LOCATION)

HIGH CH RESTRICTED, PEAK (Horizontal)

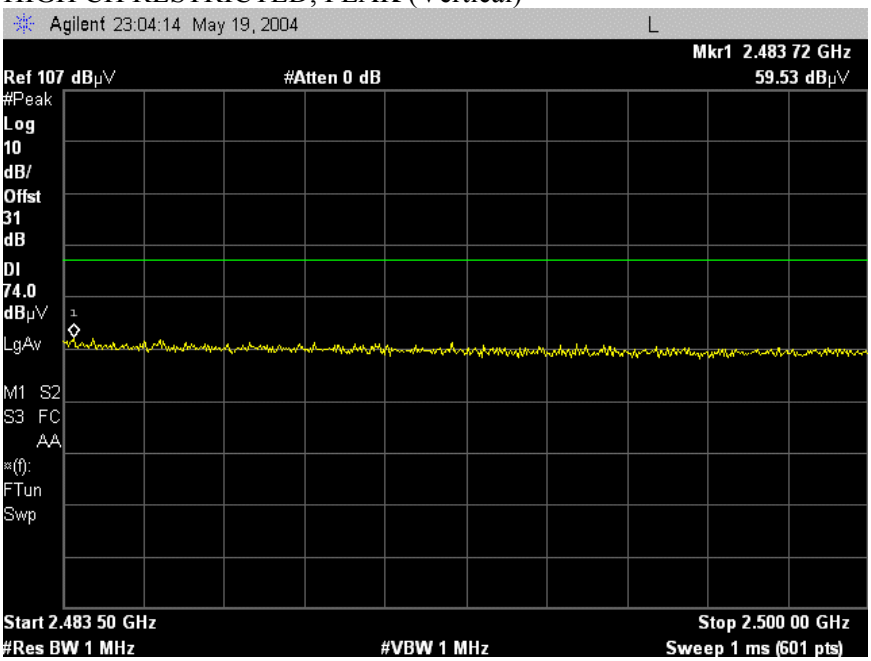


HIGH CH RESTRICTED, AVG (Horizontal)

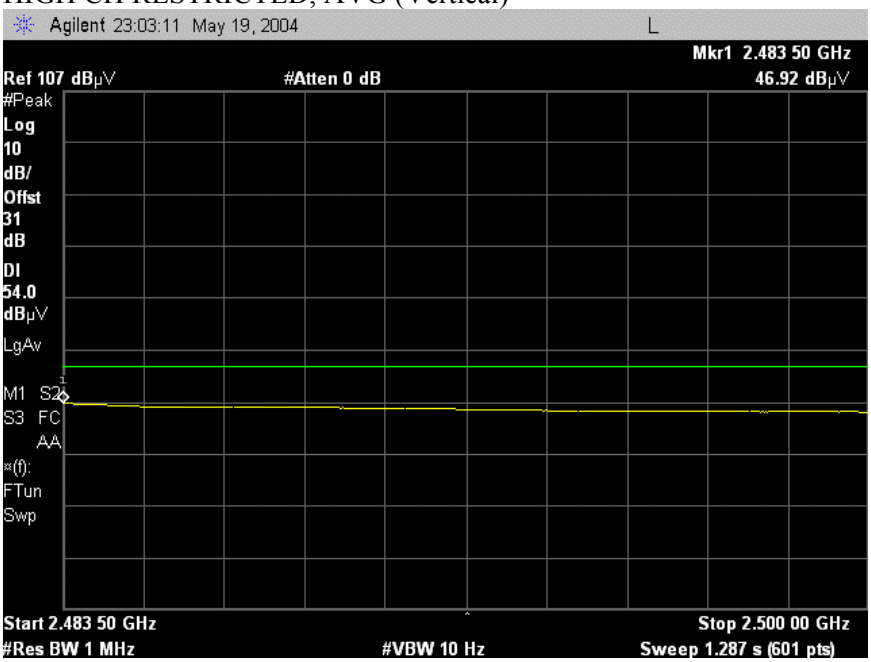


WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL) (CO-LOCATION)

HIGH CH RESTRICTED, PEAK (Vertical)



HIGH CH RESTRICTED, AVG (Vertical)



WORST-CASE HARMONICS AND SPURIOUS EMISSIONS ABOVE 1GHz (CO-LOCATION)

05/19/04 High Frequency Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: Chin Pang
Project #: 04T2727-1
Company: High Tech Computer Corp.
EUT Descrip.: PDA with Bluetooth and WLAN 2.4GHz 802.11b Capability
EUT M/N: H8TNH-H02C
Test Target: FCC 15.247
Mode Oper: TX co-lo

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	T87 Miteq 924342		

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

Limit: FCC 15.205

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
Transmitting at low channel, 2412MHz															
4.824	9.8	55.3	42.0	33.4	3.0	-44.7	0.0	1.0	47.9	34.6	74.0	54.0	-26.1	-19.4	V
4.824	9.8	52.6	41.0	33.4	3.0	-44.7	0.0	1.0	45.2	33.6	74.0	54.0	-28.8	-20.4	H
Transmitting at mid channel, 2437MHz															
4.874	9.8	56.5	42.9	33.4	3.0	-44.7	0.0	1.0	49.2	35.6	74.0	54.0	-24.8	-18.4	V
4.874	9.8	52.3	40.3	33.4	3.0	-44.7	0.0	1.0	45.0	33.0	74.0	54.0	-29.0	-21.0	H
Transmitting at high channel, 2462MHz															
4.924	9.8	56.6	42.9	33.5	3.0	-44.8	0.0	1.0	49.3	35.6	74.0	54.0	-24.7	-18.4	V
4.924	9.8	52.4	41.0	33.5	3.0	-44.8	0.0	1.0	45.1	33.7	74.0	54.0	-28.9	-20.3	H

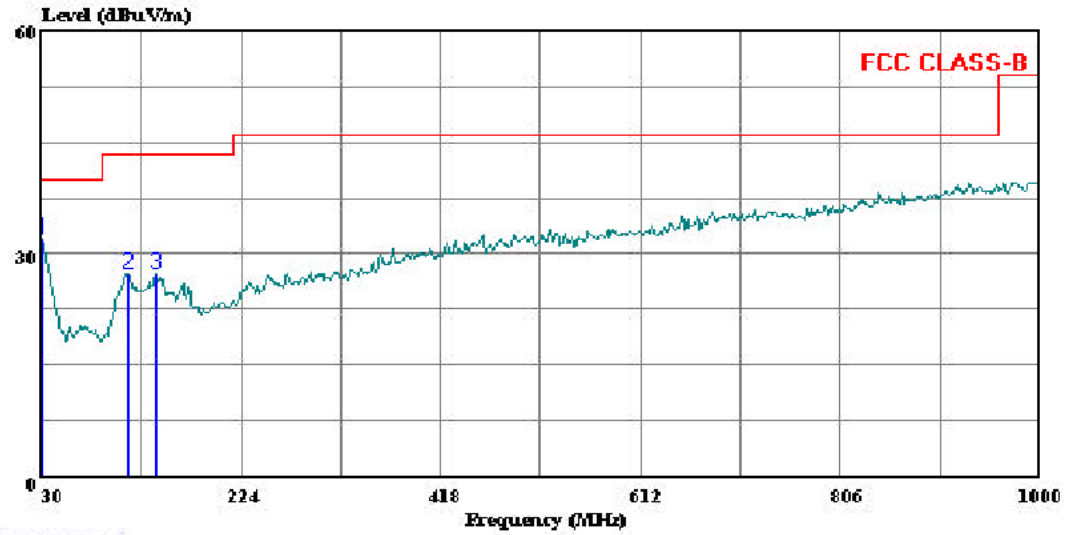
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

WORST-CASE HARMONICS AND SPURIOUS EMISSIONS 30-1000MHz (CO-LOCATION)

HORIZONTAL PLOT

561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 8 File#: Htc_wlan.emi Date: 05-19-2004 Time: 00:30:09



(Audix ATC)

HORIZONTAL DATA

Condition: FCC CLASS-B horizontal
Test Operator: : Neelesh Raj
Project #: : 04T2727-1
Company: : High Tech Computer Corp.
EUT: : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model No: : HSTNH-H02C
Configuration: : EUT
Target of Test: : FCC CLASS B
Mode of Operation: tx bluetooth(worst case),
: tx wlan (worst case)
: co-location

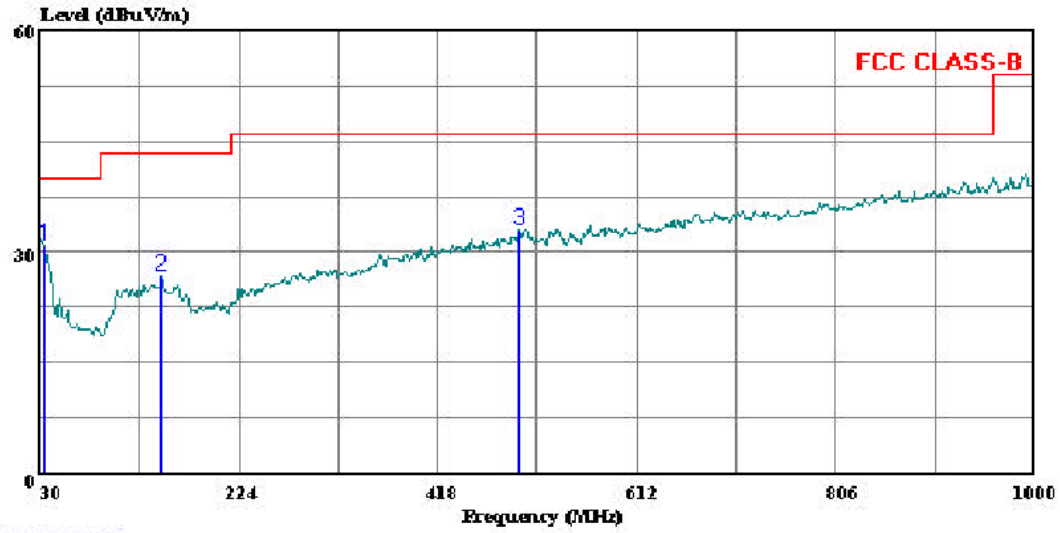
Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.000	Peak	9.01	22.95	31.96	40.00	-8.04
2	113.420	Peak	13.18	14.07	27.25	43.50	-16.25
3	140.580	Peak	11.97	15.23	27.20	43.50	-16.30

VERTICAL PLOT

561F Monterey Road
San Jose, CA 95131
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 6 File#: Htc_wlan.emi Date: 05-19-2004 Time: 00:24:30



VERTICAL DATA

```
Condition: FCC CLASS-B vertical
Test Operator:    : Neelesh Raj
Project #:        : 04T2727-1
Company:          : High Tech Computer Corp.
EUT:              : PDA with Bluetooth and WLAN 2.4GHz
                  : 802.11b capability
Model No:         : HSTNH-H02C
Configuration:    : EUT
Target of Test:   : FCC CLASS B
Mode of Operation: tx bluetooth(worst case),
                  : tx wlan (worst case)
                  : co-location
```

Page: 1

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	33.880	Peak	10.19	20.70	30.89	40.00	-9.11
2	148.340	Peak	12.24	14.54	26.78	43.50	-16.72
3	497.540	Peak	12.31	20.55	32.86	46.00	-13.14

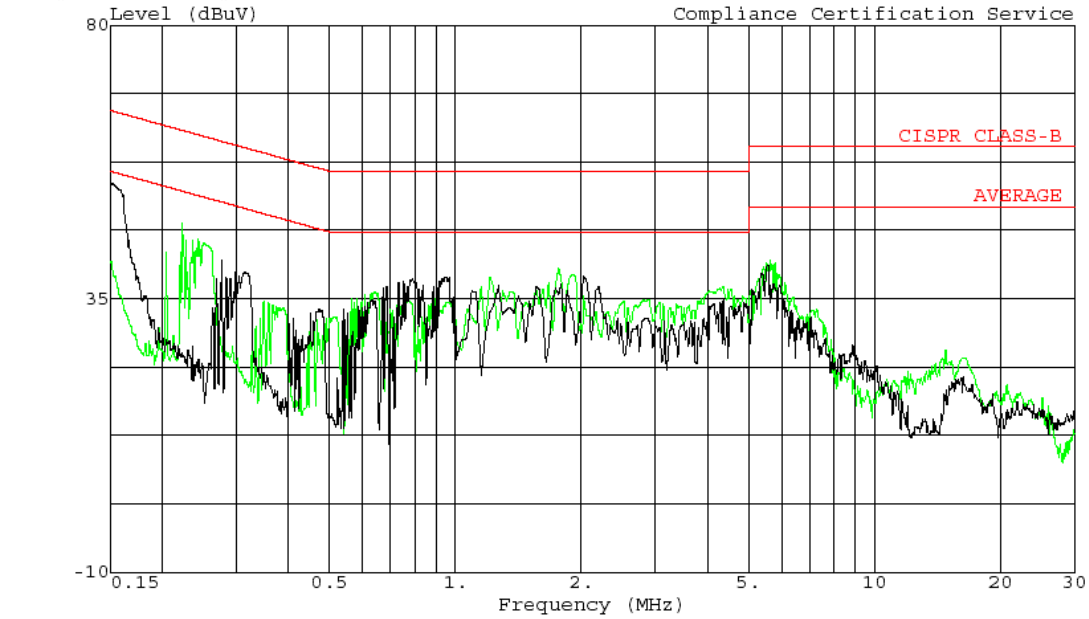
AC LINE CONDUCTION (CO-LOCATION)

6 WORST DATA

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
0.22	47.46	--	--	0.00	63.91	53.91	-16.45	-6.45	L1
1.76	40.06	--	--	0.00	56.00	46.00	-15.94	-5.94	L1
5.65	41.42	--	--	0.00	60.00	50.00	-18.58	-8.58	L1
0.15	54.00	--	--	0.00	65.97	55.97	-11.97	-1.97	L2
0.95	38.60	--	--	0.00	56.00	46.00	-17.40	-7.40	L2
5.59	40.50	--	--	0.00	60.00	50.00	-19.50	-9.50	L2
6 Worst Data Co-Location									

LINE 1 AND LINE 2 RESULTS (CO-LOCATION)

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



Trace: 31 Ref Trace:
Project # : 04t2727-1
Test Operator : Chin Pang
Company : High Tech Computer Corp
EUT : PDA with Bluetooth and WLAN 2.4GHz
: 802.11b capability
Model : HSTNH-H02C
Configuration : EUT Only (DELTA)
Mode of Operation: Bluetooth & WLAN Co-location
Target of Test : FCC Class B
Voltage : 115 VAC / 60 Hz
: L1: Peak (Green), L2: Peak (Black)