



**FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT**

FOR

POCKET PC PHONE

MODEL NUMBER: HSTNH-H06C

FCC ID: NM8HHH06C

REPORT NUMBER: 04T3106-1

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Prepared for
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Revision History

<u>Rev.</u>	<u>Revisions</u>	<u>Revised By</u>
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TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS.....	4
2. TEST METHODOLOGY	5
3. FACILITIES AND ACCREDITATION	5
4. CALIBRATION AND UNCERTAINTY.....	5
4.1. MEASURING INSTRUMENT CALIBRATION.....	5
4.2. MEASUREMENT UNCERTAINTY.....	5
5. EQUIPMENT UNDER TEST.....	Error! Bookmark not defined.
5.1. DESCRIPTION OF EUT	6
5.2. MAXIMUM OUTPUT POWER	6
5.3. DESCRIPTION OF AVAILABLE ANTENNAS.....	6
5.4. SOFTWARE AND FIRMWARE	6
5.5. WORST-CASE CONFIGURATION AND MODE.....	7
5.6. DESCRIPTION OF TEST SETUP	7
6. TEST AND MEASUREMENT EQUIPMENT	11
7. LIMITS AND RESULTS	12
7.1. ANTENNA PORT CHANNEL TESTS	12
7.1.1. 20 dB BANDWIDTH	12
7.1.2. HOPPING FREQUENCY SEPARATION.....	16
7.1.3. NUMBER OF HOPPING CHANNELS.....	18
7.1.4. AVERAGE TIME OF OCCUPANCY	23
7.1.5. PEAK OUTPUT POWER	30
7.1.6. MAXIMUM PERMISSIBLE EXPOSURE.....	31
7.1.7. AVERAGE POWER.....	34
7.1.8. PEAK POWER SPECTRAL DENSITY	35
7.1.9. CONDUCTED SPURIOUS EMISSIONS.....	39
7.2. CO-LOCATED MAXIMUM PERMISSIBLE EXPOSURE.....	48
7.3. RADIATED EMISSIONS.....	51
7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS	51
7.3.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ	54
7.3.3. CO-LOCATED TRANSMITTER RADIATED EMISSIONS	63
7.3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz.....	72
7.4. POWERLINE CONDUCTED EMISSIONS	80
8. SETUP PHOTOS	91

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HIGH TECH COMPUTER, CORP.
1F, 6-3, BAU-CHIAN RD., HSINTIEN
TAIPEI, 231 TAIWAN

EUT DESCRIPTION: POCKET PC PHONE

MODEL: HSTNH-H06C

SERIAL NUMBER: 71

DATE TESTED: December 15 - 30, 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: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:



THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:



VIEN TRAN
EMC TECHCIAN
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver with all auxiliary equipment as described below.

Auxiliary Equipment	Brand	Model No.
Li-Ion Rechargeable Battery	HP	HSTNH-D06B
AC Adaptor	Hi Pro	HP-AC010L63
AC adaptor	Delta	EADP-10BB
USB Cradle	HP	HSTNH-F02X
Earphone	Merry	EMC147-008
Y cable	HP	N/A
DC Connector	HP	N/A

The model number was changed after testing commenced. All data in this report is applicable to the model number documented in Section 1 above.

5.2. MAXIMUM OUTPUT POWER

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2480	1.09	1.29

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

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a Chip Antenna, with a maximum gain of 0 dBi.

5.4. SOFTWARE AND FIRMWARE

The test software utility and SIM card installed in the EUT during testing.

5.5. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2402 MHz.

5.6. DESCRIPTION OF TEST SETUP

SETUP FOR RF WIRELESS TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
N/A				

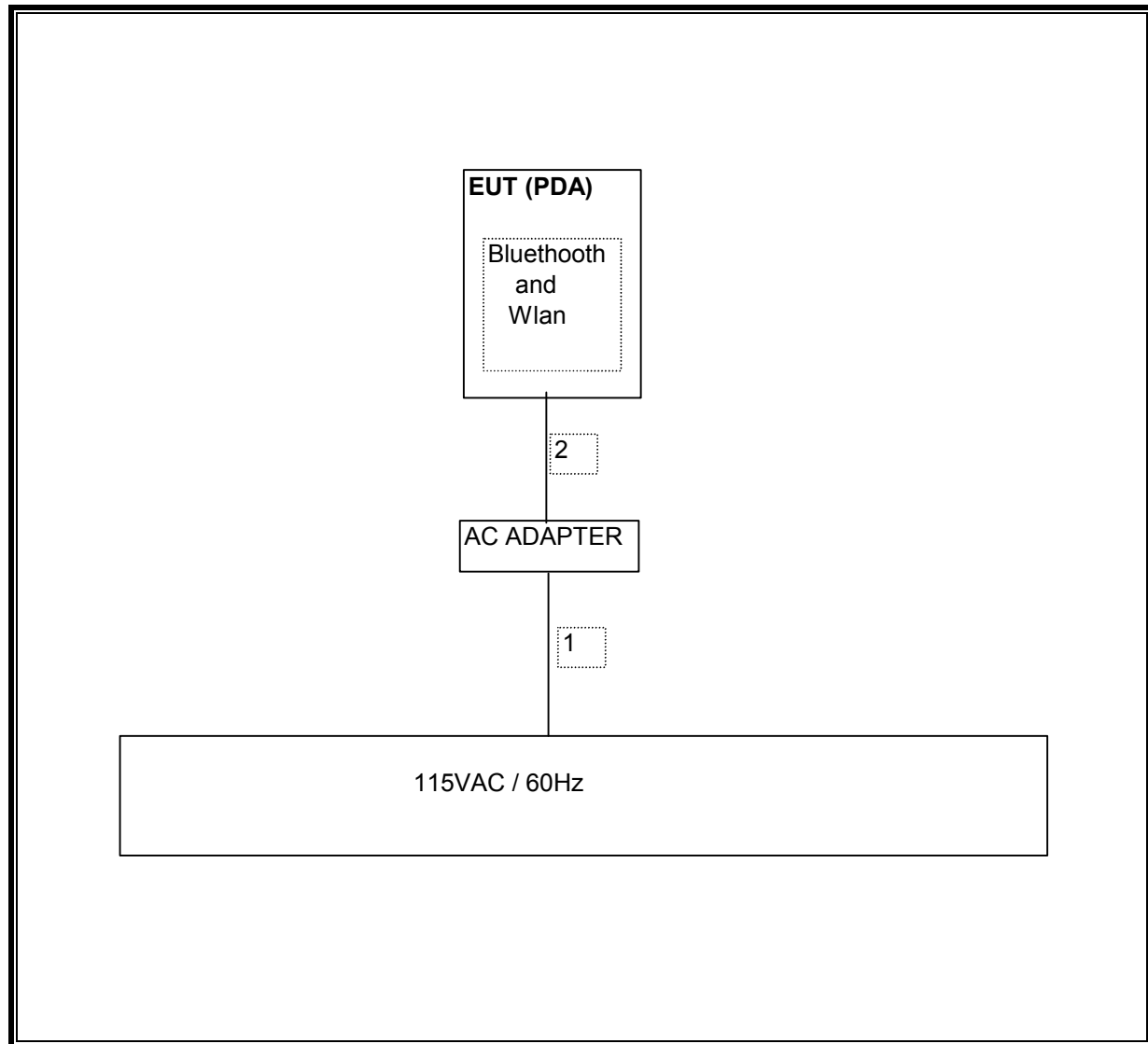
I/O CABLES

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

TEST SETUP

The EUT is a PDA unit and operates either standalone or connected to a PC via a cradle to USB port or USB interface cable. Test software exercised the EUT.

SETUP DIAGRAM FOR TESTS



SETUP FOR DIGITAL DEVICE TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Mouse	HP	M-S34	LZA81054997	DZL211029
Keyboard	HP	SK-2502	HR805273662	GYUR41SK
Modem	ACEEX	1414	9013540	IFAXDM1415
Printer	HP	2225C	2930S52614	DSI6XU2225
PC	HP	Vectra VL400 MT	US03763261	DoC
Cradle	HP	HSTNH-F02X	E89760AZDQV3VO	NA
Monitor	LTX	1451C	Z80-54704540	DBC1451C

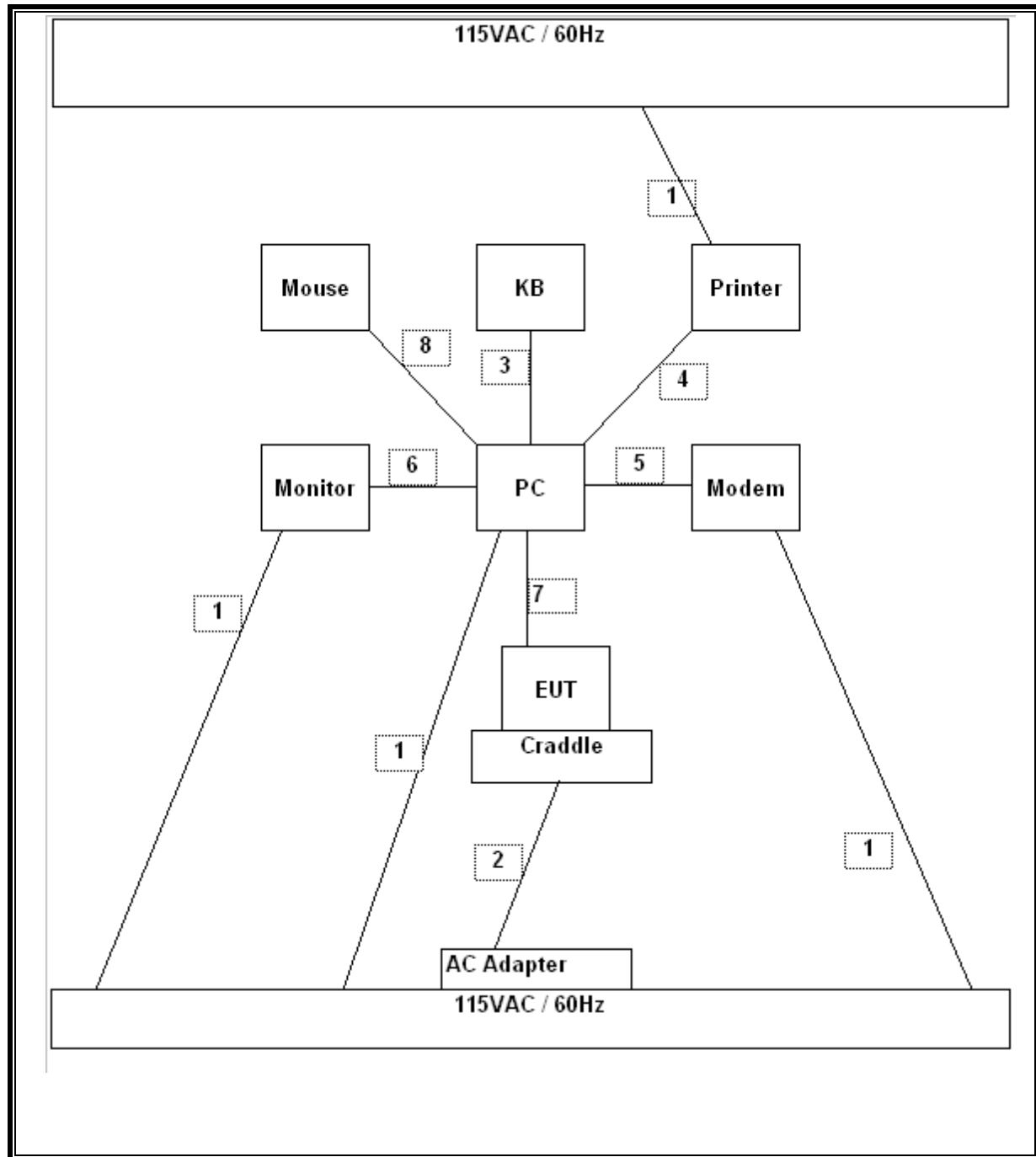
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	4	US115V	Un-shielded	2m	N/A
2	Mouse	1	PS/2	Un-shielded	2m	N/A
3	KB	1	PS/2	Shielded	2m	N/A
4	Paralled	1	DB25	Shielded	2m	N/A
5	Serial	1	DB9	Shielded	1m	N/A
6	Video	1	DB15	Shielded	2m	One Torroid on each end
7	USB	1	USB	Un-shielded	2m	Connect EUT to PC

TEST SETUP

The EUT is installed in the cradle. The cradle is connected to a laptop computer system with minimum configuration during the tests. Test software exercised and linked with the EUT.

SETUP DIAGRAM FOR DIGITAL DEVICE TESTS (WORST CASE)



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Power Meter	HP	436A	2709A29209	7/15/2005
Oscilloscope, 100MHz 4Ch.	HP	54601A	3106A00123	11/6/05
Signal Generator, 2 ~ 40 GHz	R & S	SMP04	DE 34210	5/25/05
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	29800	4/26/05
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/4/05
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/05
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	10/13/05
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/05
Line Filter	Lindgren	LMF-3489	497	CNR
Spectrum Analyzer	Agilent	E4446A	US42070220	1/13/05
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/25/05
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	9001-3245	2/4/05
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/21/05
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/05
Power Meter	HP	436A	2709A29209	7/15/2005
Oscilloscope, 100MHz 4Ch.	HP	54601A	3106A00123	11/6/05
Microwave Detector 0.01 ~ 50 GHz	Agilent	8474C	2905A04047	11/7/05
RF Filter Section	HP	85420E	3705A00256	11/21/05

7. LIMITS AND RESULTS

7.1. ANTENNA PORT CHANNEL TESTS

7.1.1. 20 dB BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

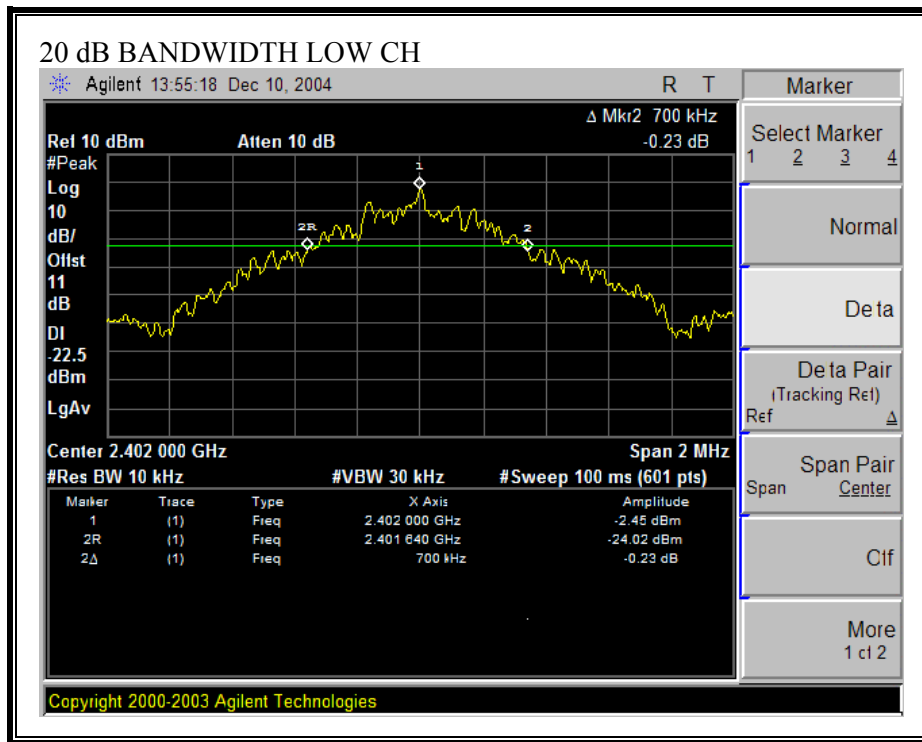
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

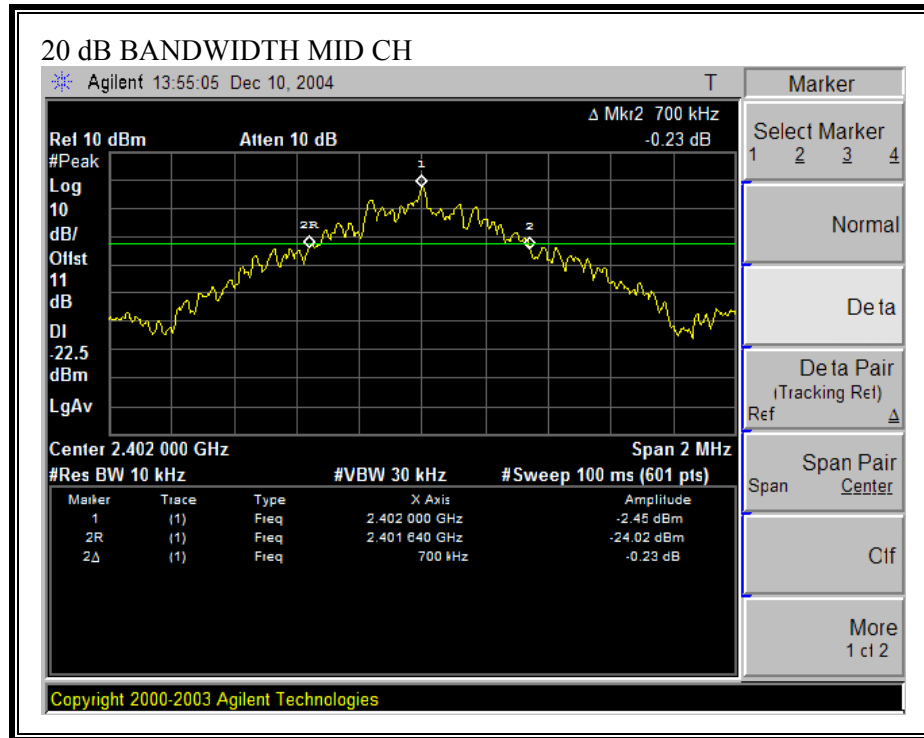
RESULTS

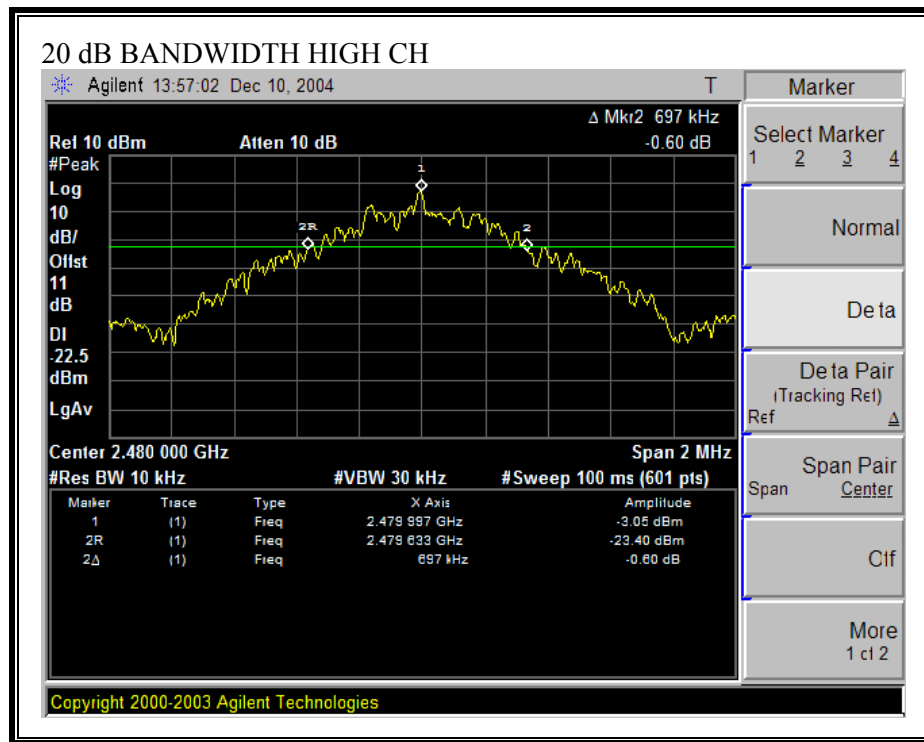
No non-compliance noted:

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	700
Middle	2441	700
High	2480	697

20 dB BANDWIDTH







7.1.2. 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 hopping channel, whichever is greater.

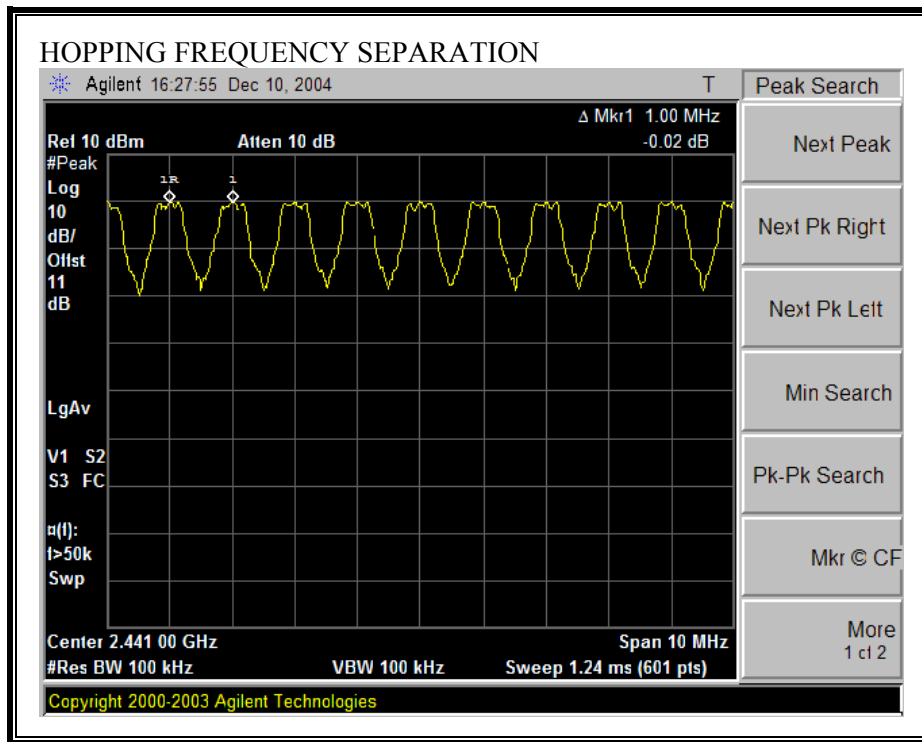
TEST PROCEDURE

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:

HOPPING FREQUENCY SEPARATION



7.1.3. 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

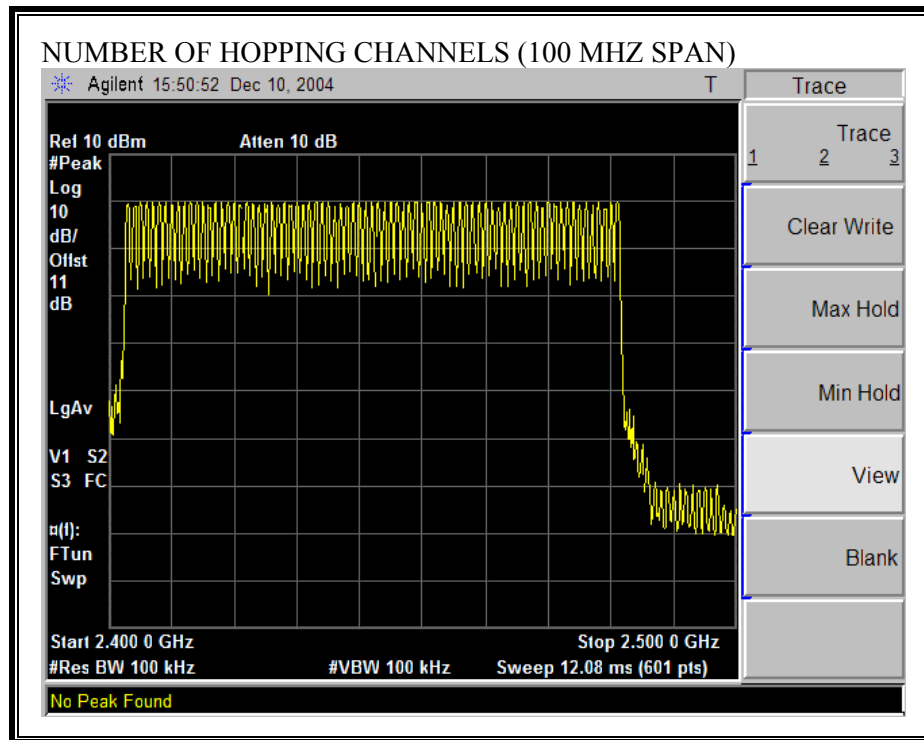
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

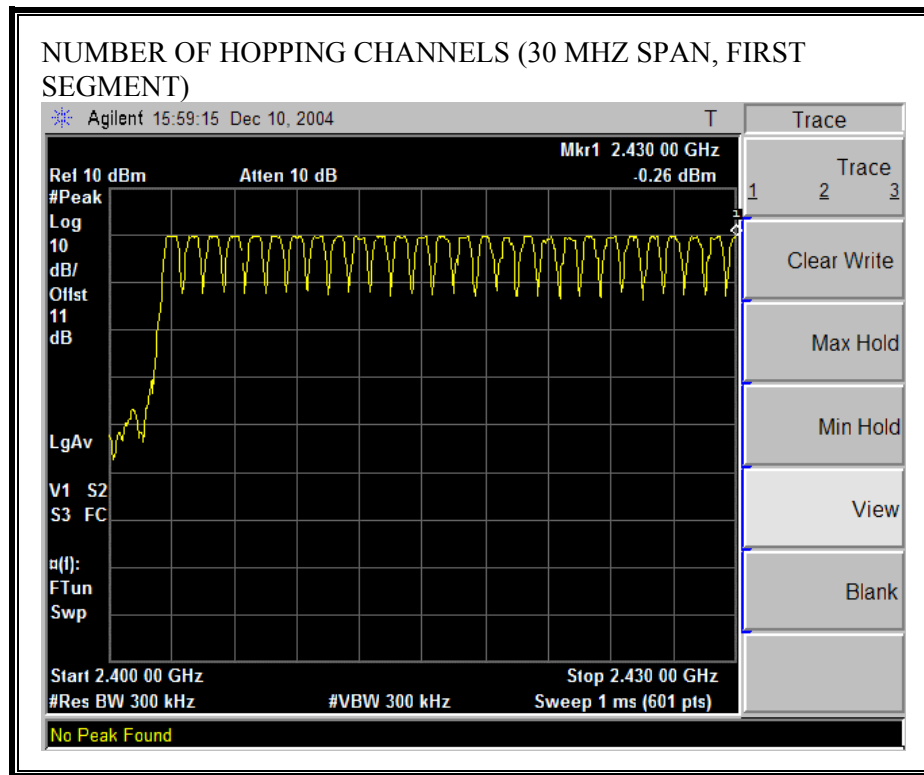
RESULTS

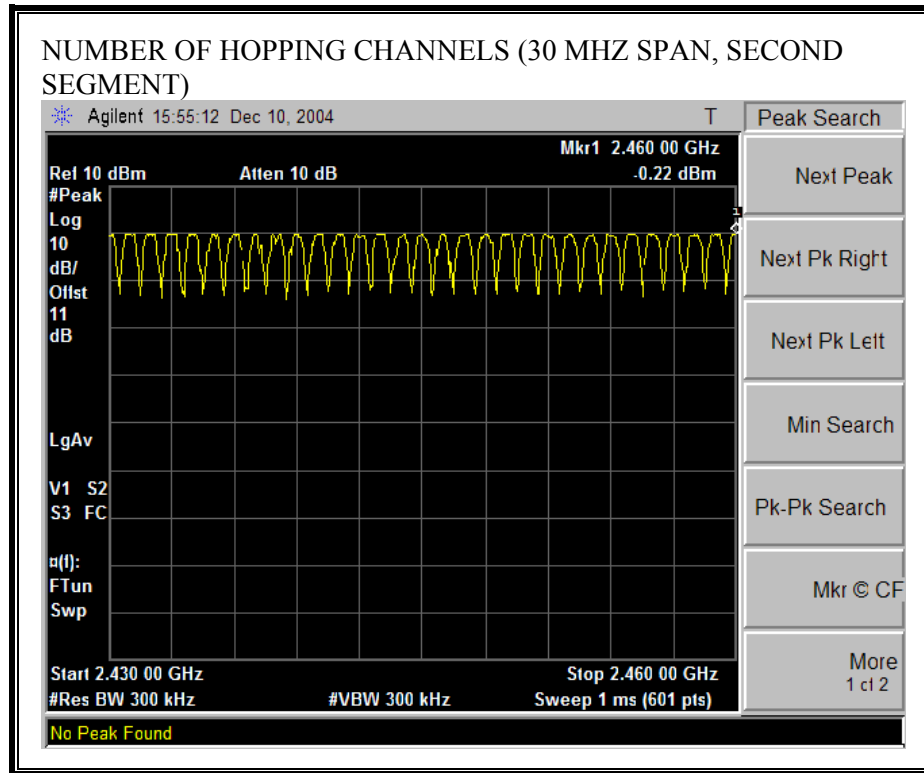
No non-compliance noted:

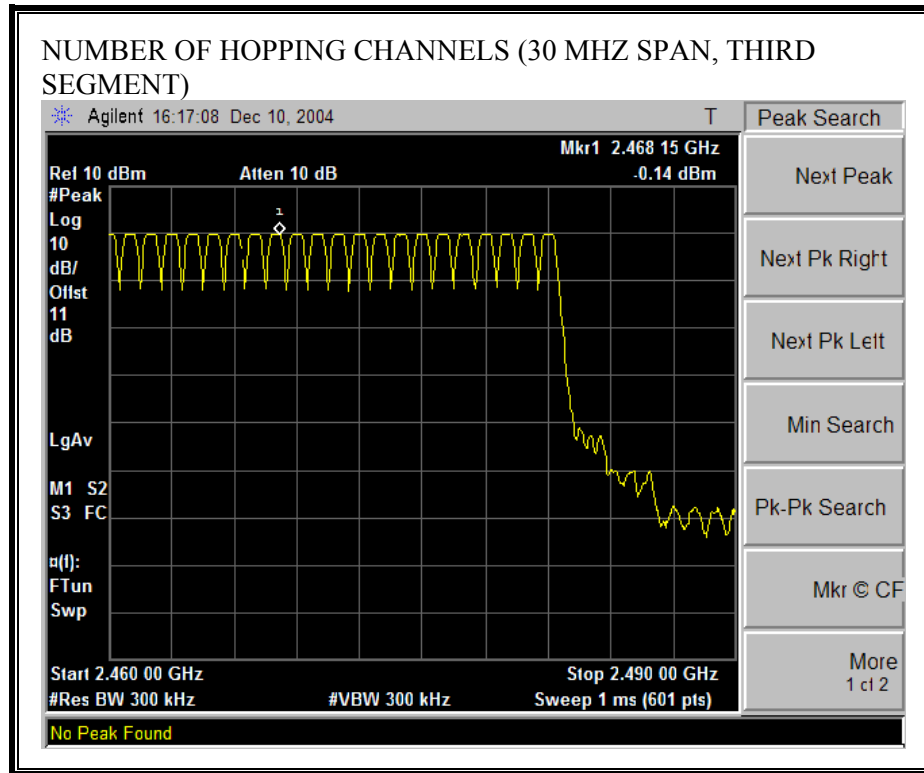
79 Channels observed.

NUMBER OF HOPPING CHANNELS









7.1.4. 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.

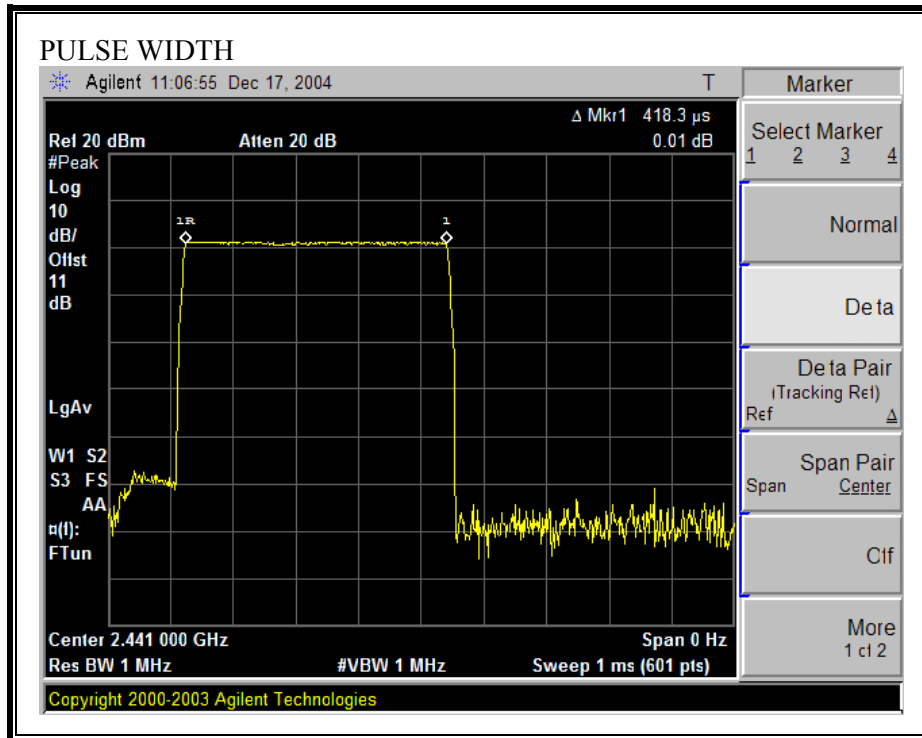
RESULTS

No non-compliance noted:

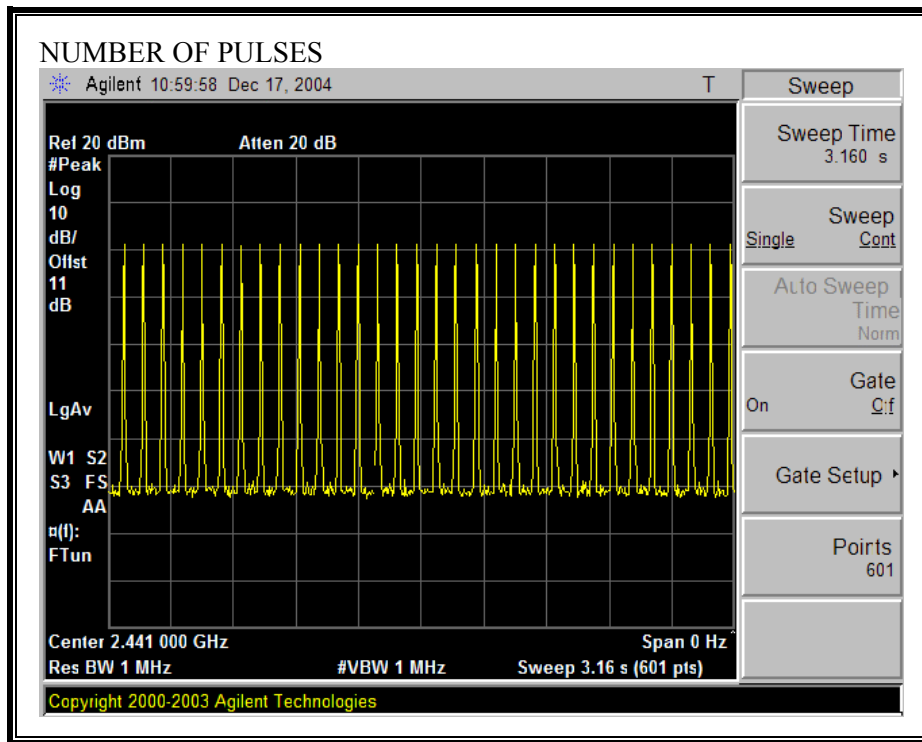
DH Packet	Pulse Width (msec)	Number of Pulses in 3.16 seconds	Average Time of Occupancy (sec)	Limit (sec)	Margin (sec)
1	0.4183	32	0.134	0.4	0.266
3	1.667	16	0.267	0.4	0.133
5	2.925	11	0.322	0.4	0.078

DH1 PACKET

PULSE WIDTH

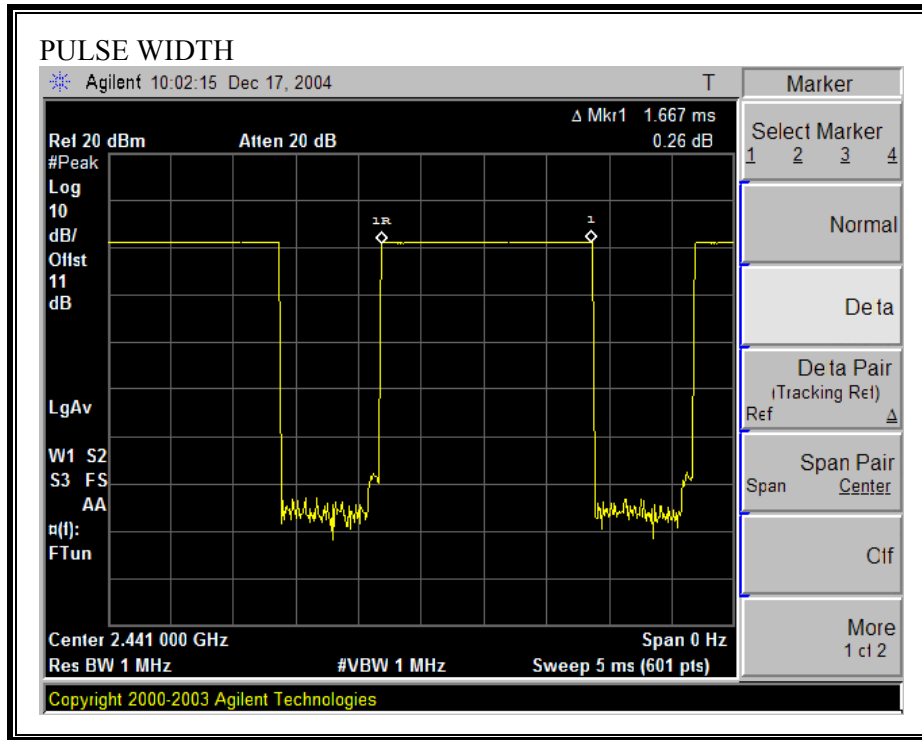


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

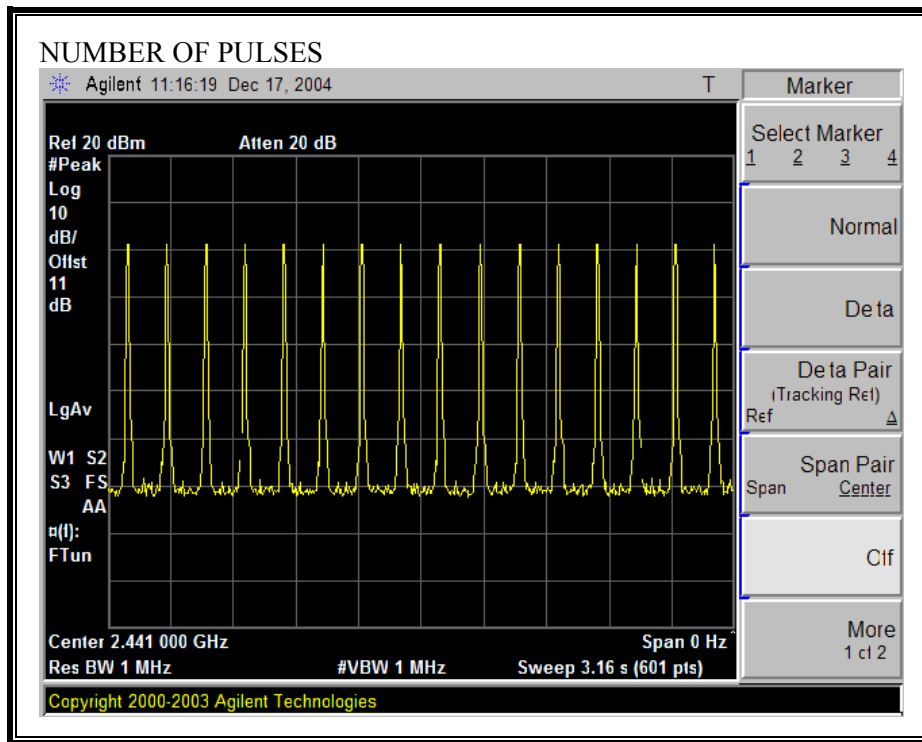


DH3 PACKET

PULSE WIDTH

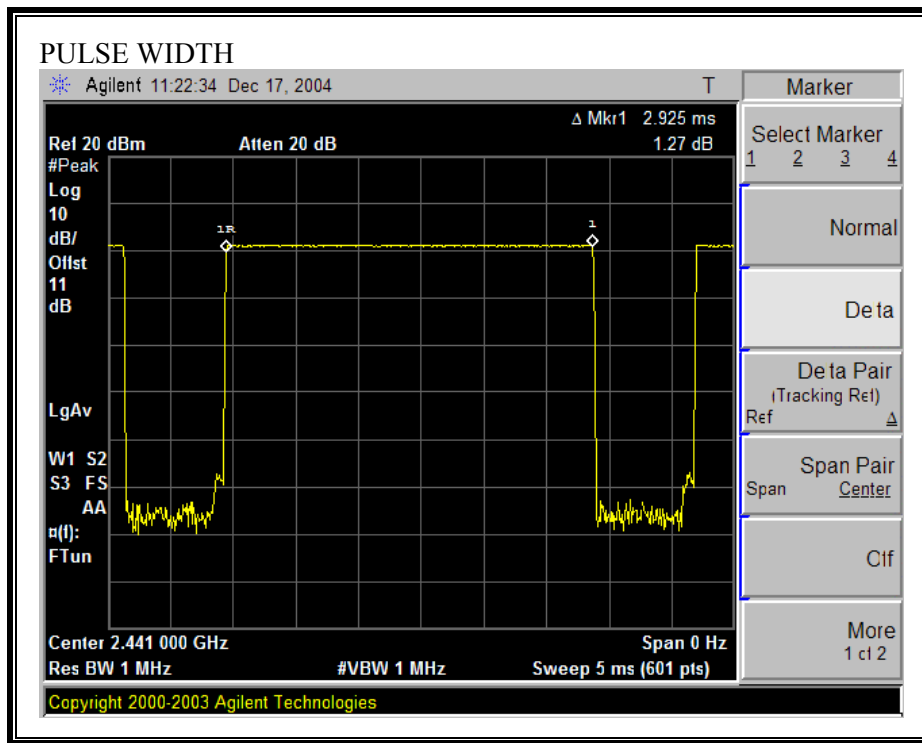


NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD

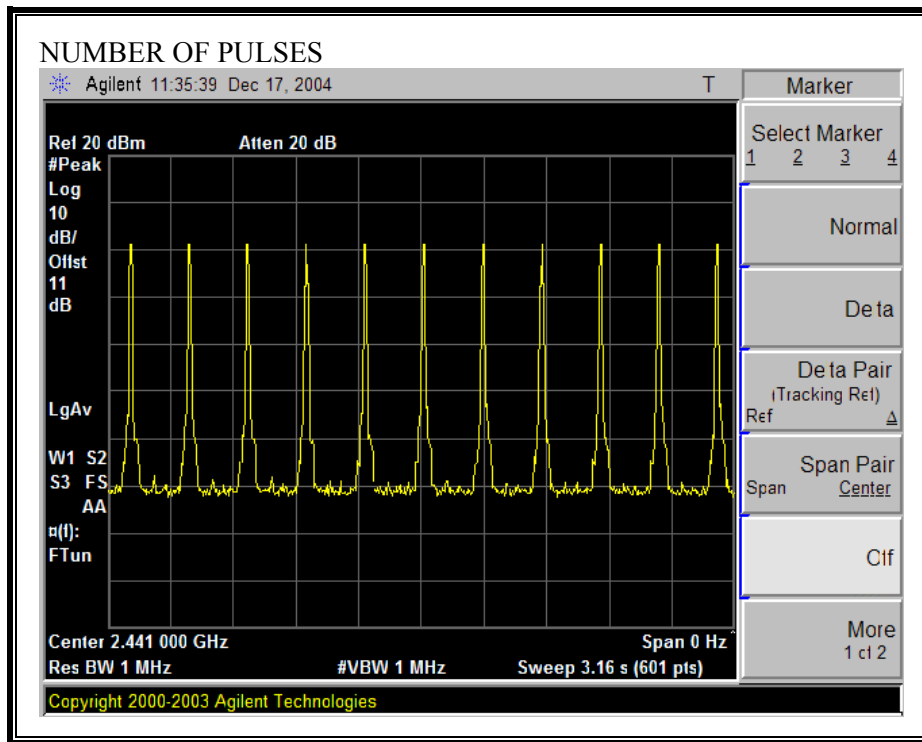


DH5 PACKET

PULSE WIDTH



NUMBER OF PULSES IN 3.16 SECOND OBSERVATION PERIOD



7.1.5. 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) (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 0 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

The transmitter output is connected to a Peak Power Meter.

RESULTS

No non-compliance noted:

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	1.02	30	-28.98
Middle	2441	0.87	30	-29.13
High	2480	1.09	30	-28.91

7.1.6. 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:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

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/cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW/cm²

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

LIMITS

From §1.1310 Table 1 (B), $S = 1.0 \text{ mW/cm}^2$

RESULTS

No non-compliance noted:

Power Density Limit (mW/cm²)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
1.0	1.23	0.00	0.32

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.

7.1.7. 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 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency (MHz)	Average Power (dBm)
Low	2402	-3.93
Middle	2441	-4.00
High	2480	-3.75

7.1.8. 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

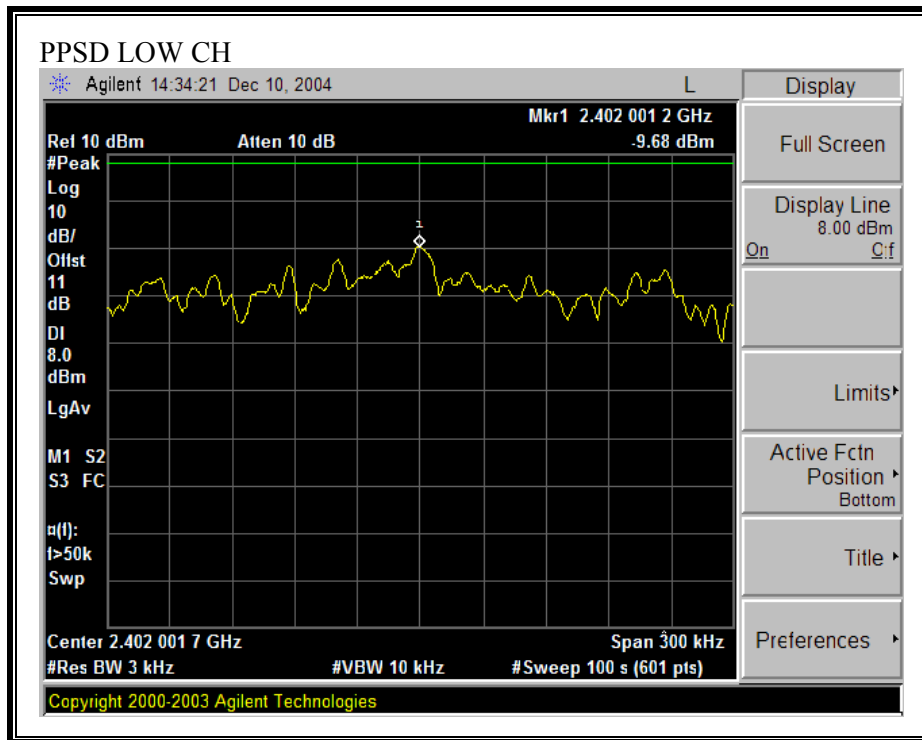
The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz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

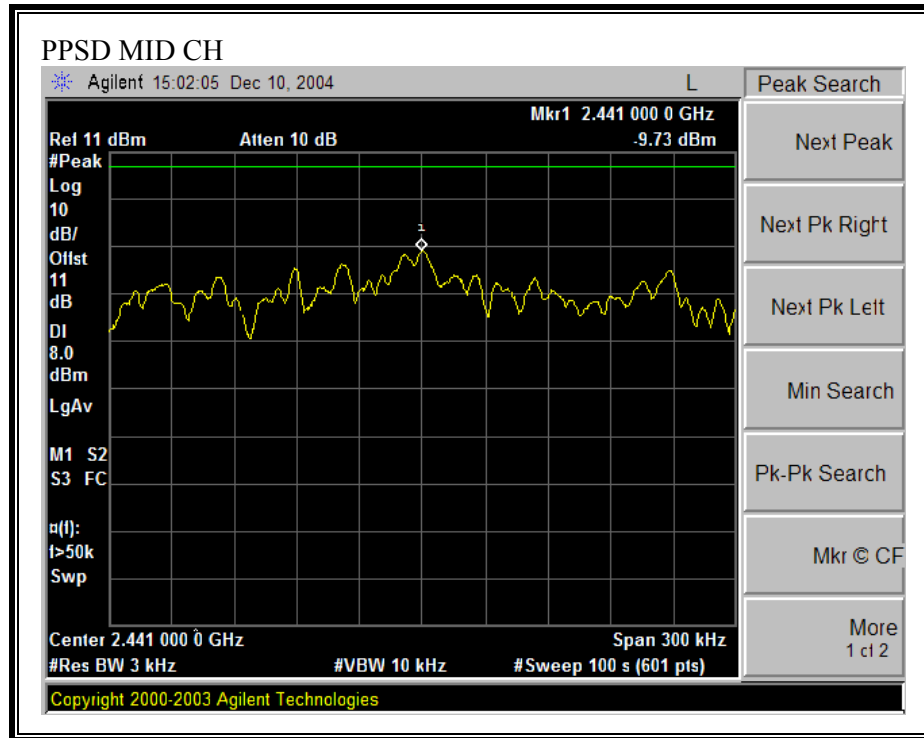
RESULTS

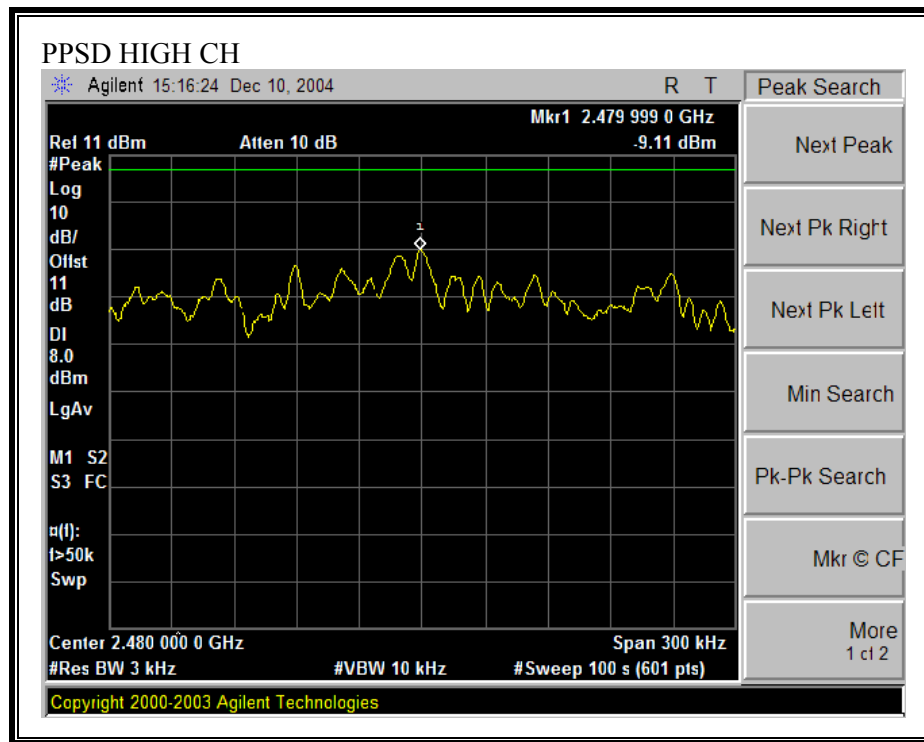
No non-compliance noted:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-9.68	8	-17.68
Middle	2441	-9.73	8	-17.73
High	2480	-9.11	8	-17.11

PEAK POWER SPECTRAL DENSITY







7.1.9. 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

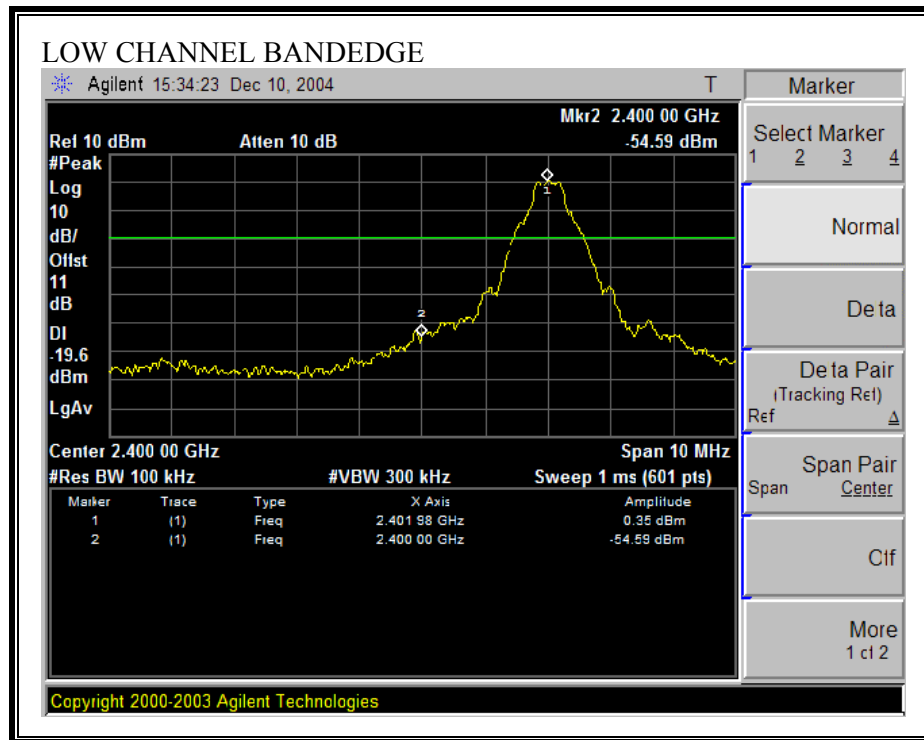
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

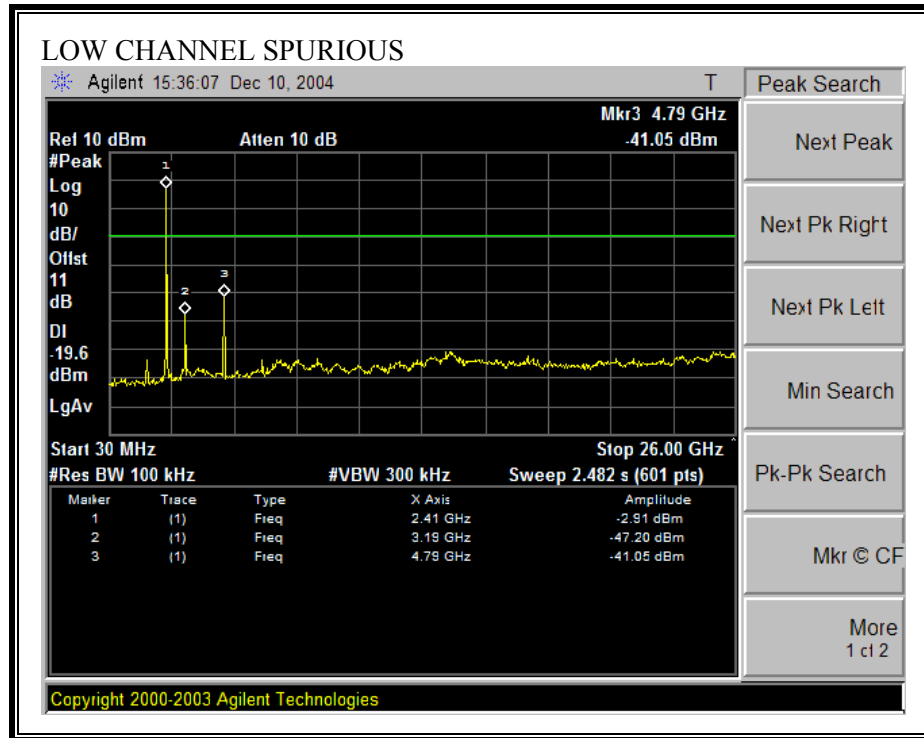
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

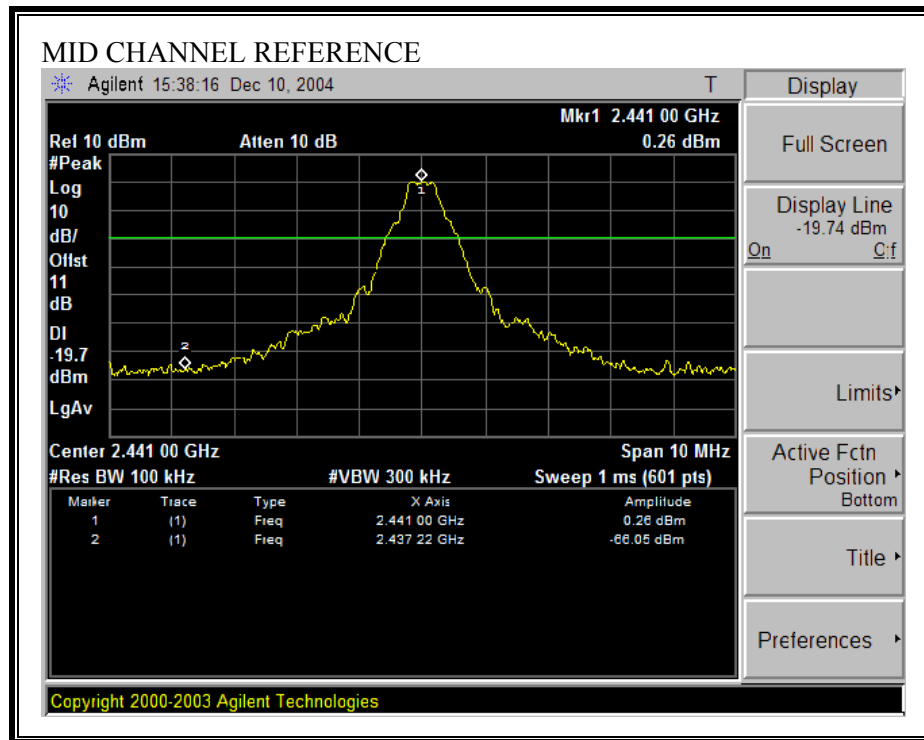
No non-compliance noted:

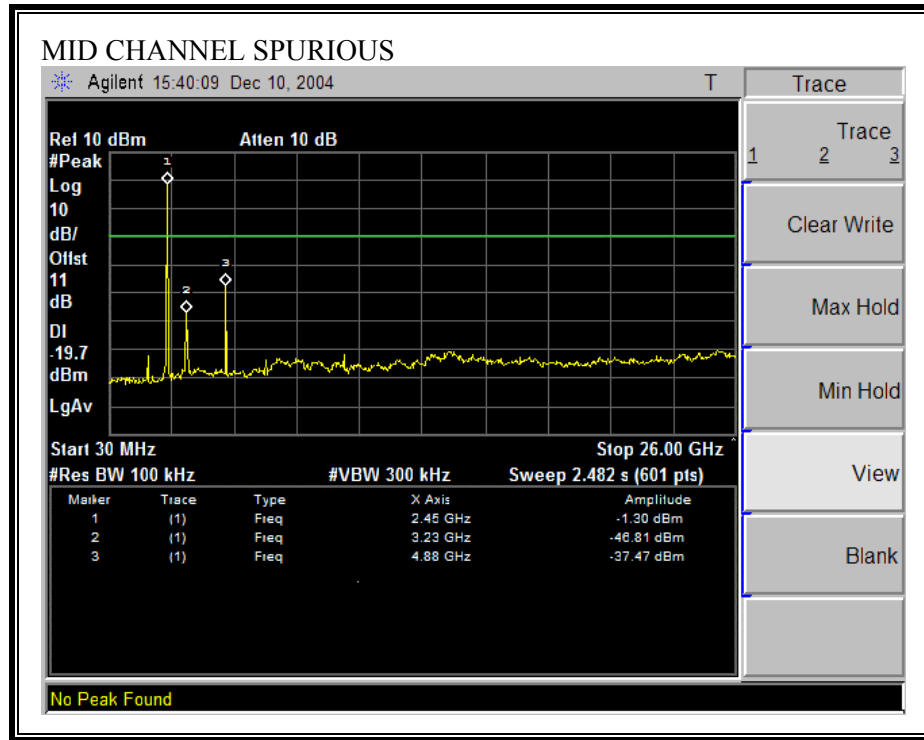
SPURIOUS EMISSIONS, LOW CHANNEL



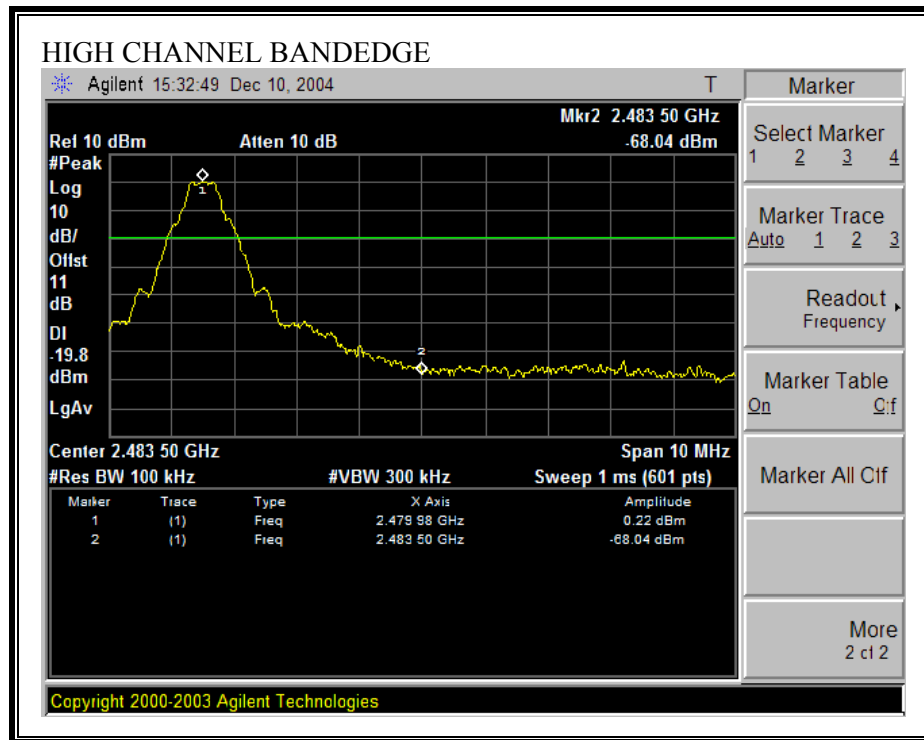


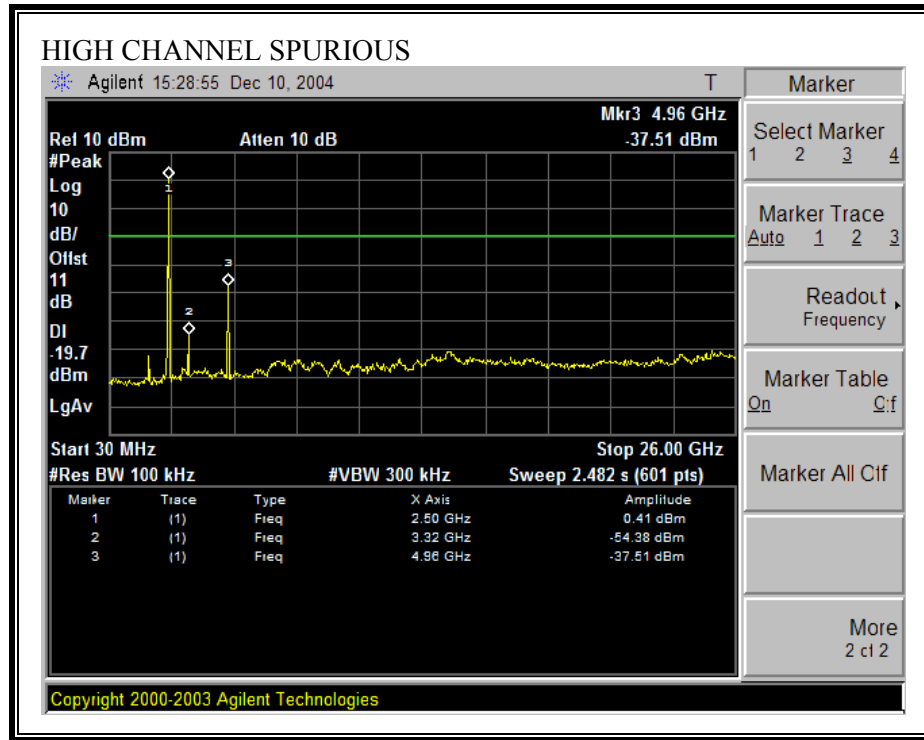
SPURIOUS EMISSIONS, MID CHANNEL



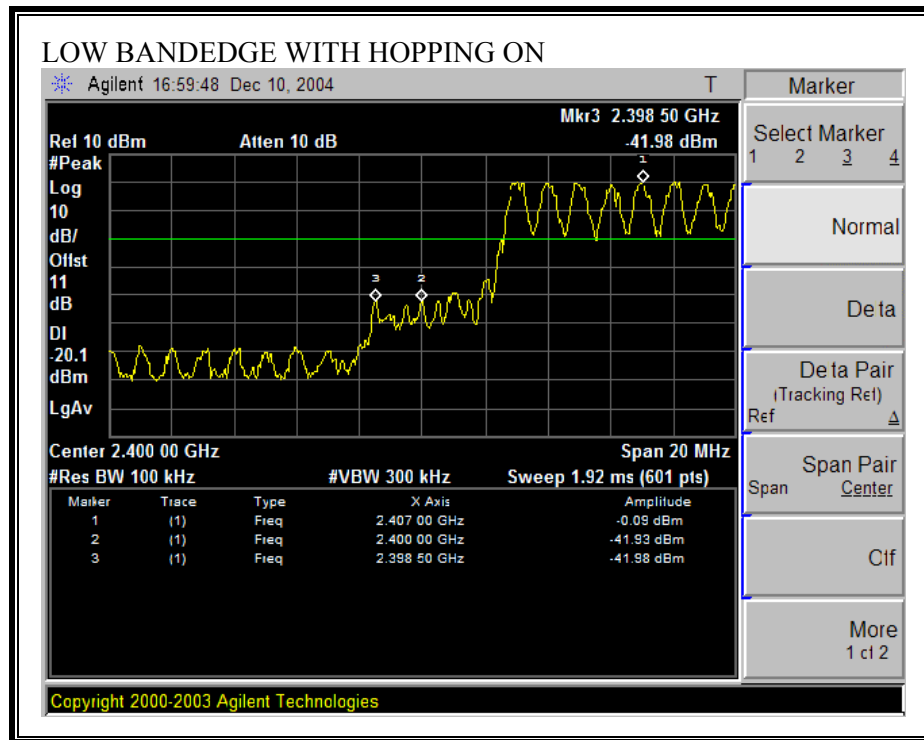


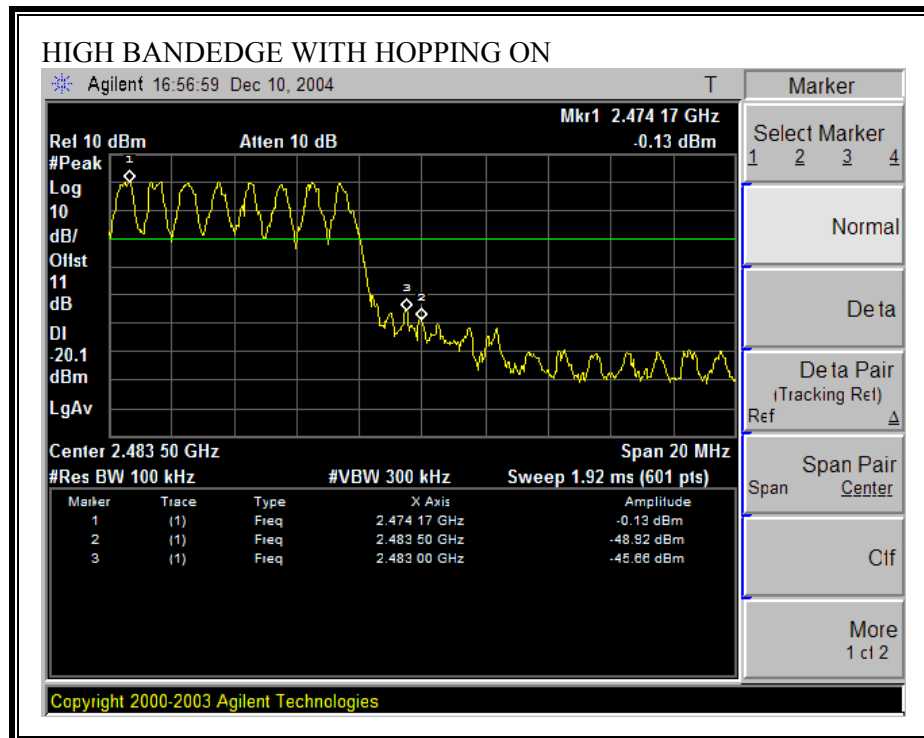
SPURIOUS EMISSIONS, HIGH CHANNEL





SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON





7.2. CO-LOCATED 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:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

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/cm²

For multiple colocated transmitters operating simultaneously the total power density can be calculated by summing the Power * Gain product of each transmitter.

yields

$$d = 0.282 * \sqrt{((P1 * G1) + (P2 * G2) + ... + (Pn * Gn)) / S}$$

Equation (1)

where

d = distance in cm

Px = Power of transmitter x in mW

Gx = Numeric gain of antenna x

S = Power Density in mW/cm²

In the table below, Power and Gain are entered in units of dBm and dBi respectively, then these are converted to their linear forms prior to the summation function.

The conversions from the logarithmic form of power and gain are made using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and} \quad \text{Equation (2)}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)} \quad \text{Equation (3)}$$

Equations (1), (2) and (3) and the measured peak powers are used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), $S = 1.0 \text{ mW/cm}^2$

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm ²)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
Bluetooth				
802.11g				
Combined	1.0			0.40

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.

7.3. RADIATED EMISSIONS

7.3.1. 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 in the 2.4 GHz band.

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

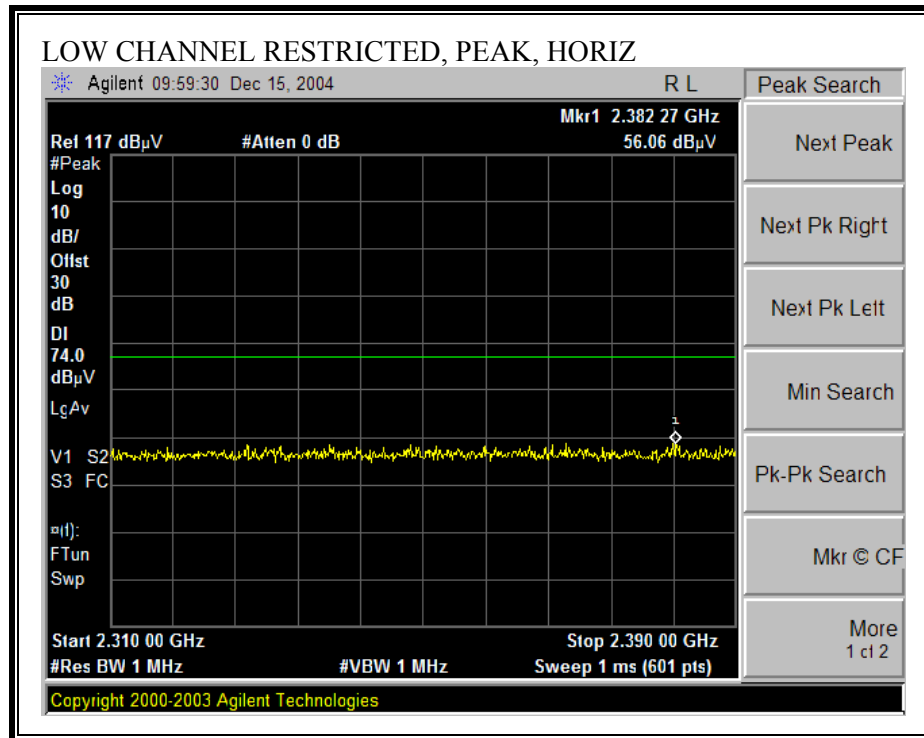
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

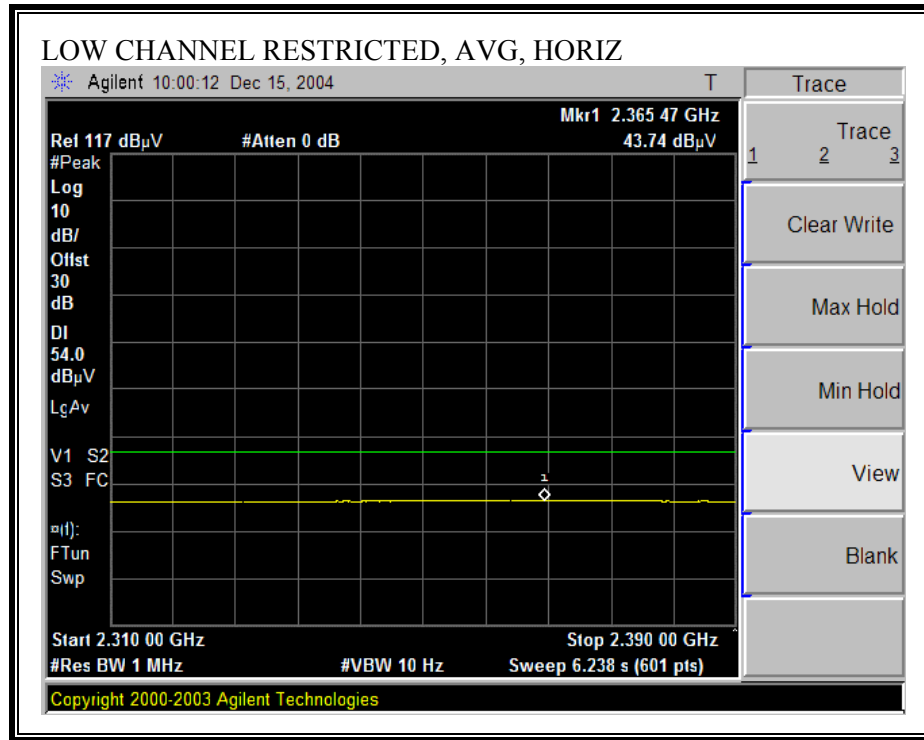
SUPPLEMENTAL TEST PROCEDURE FOR CO-LOCATED TRANSMITTERS

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. The spectrum is searched for intermodulation products. Worst-case results are reported.

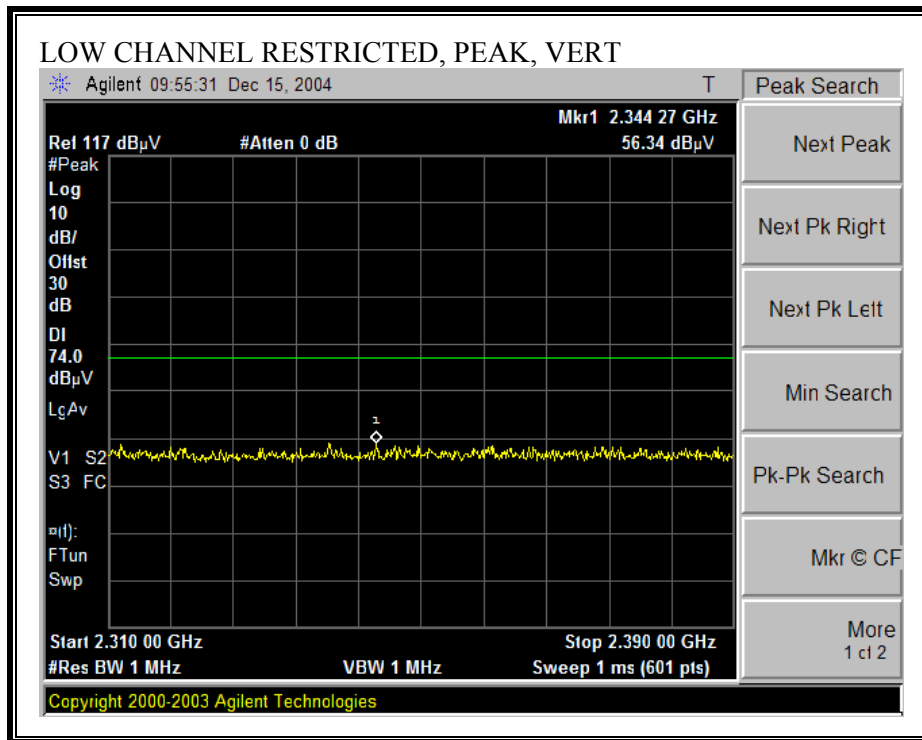
7.3.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

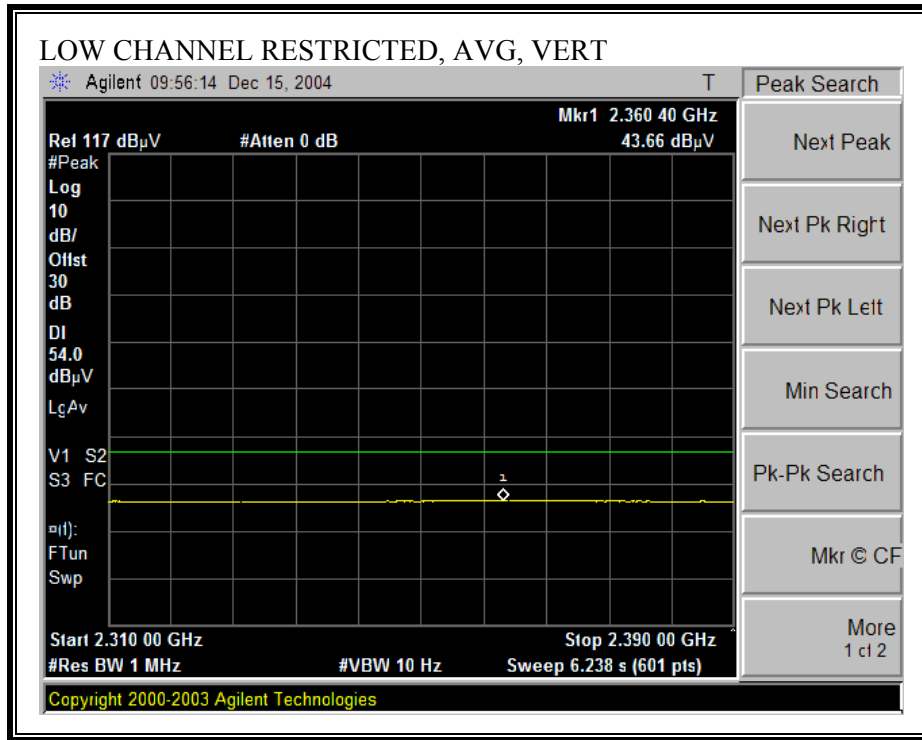
RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



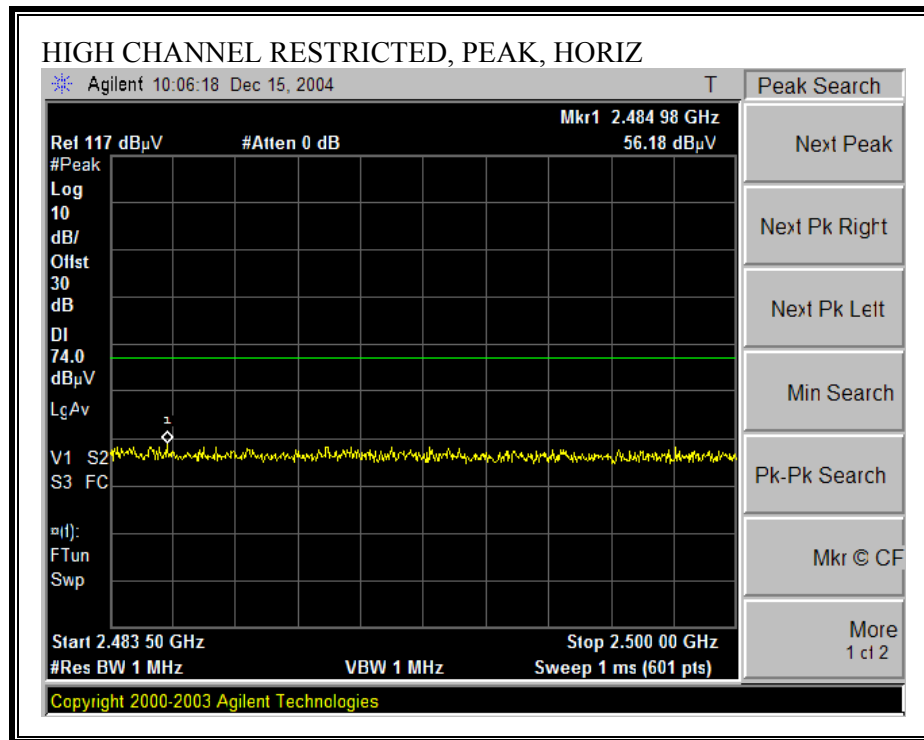


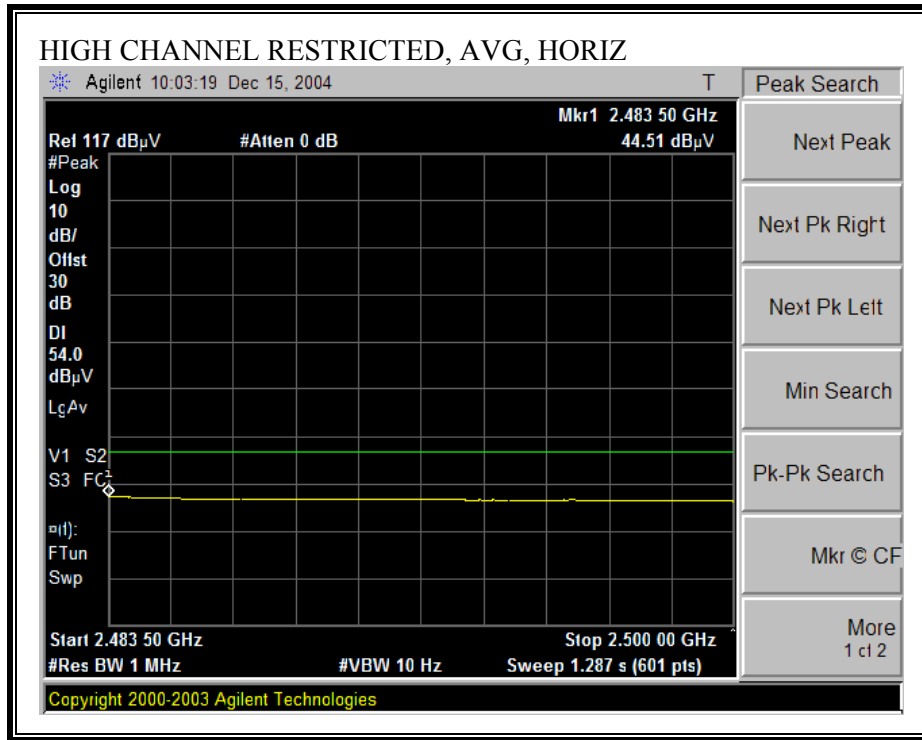
RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



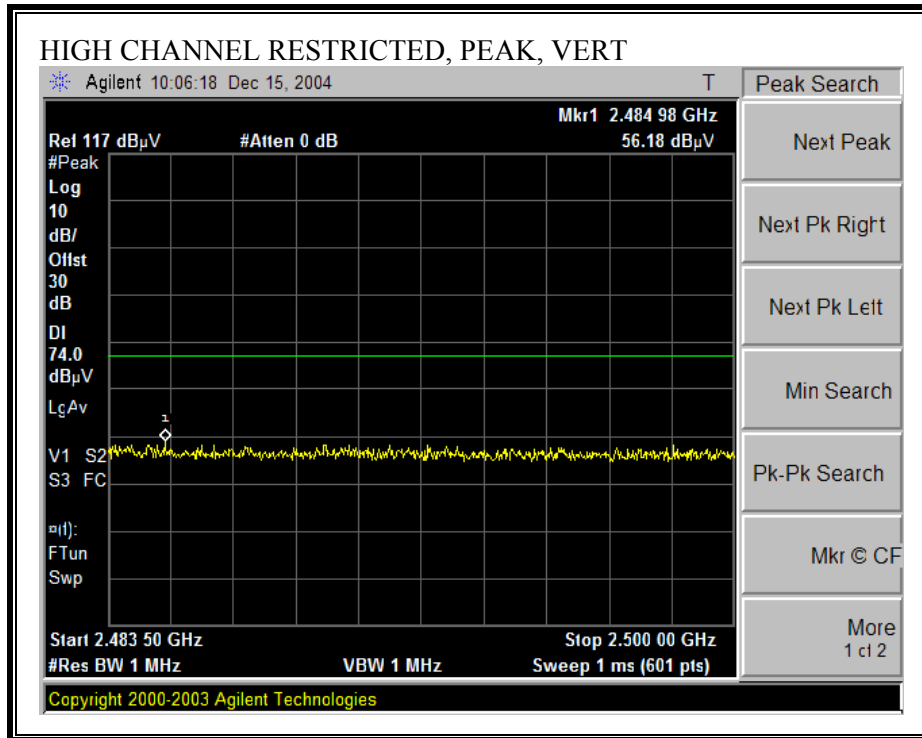


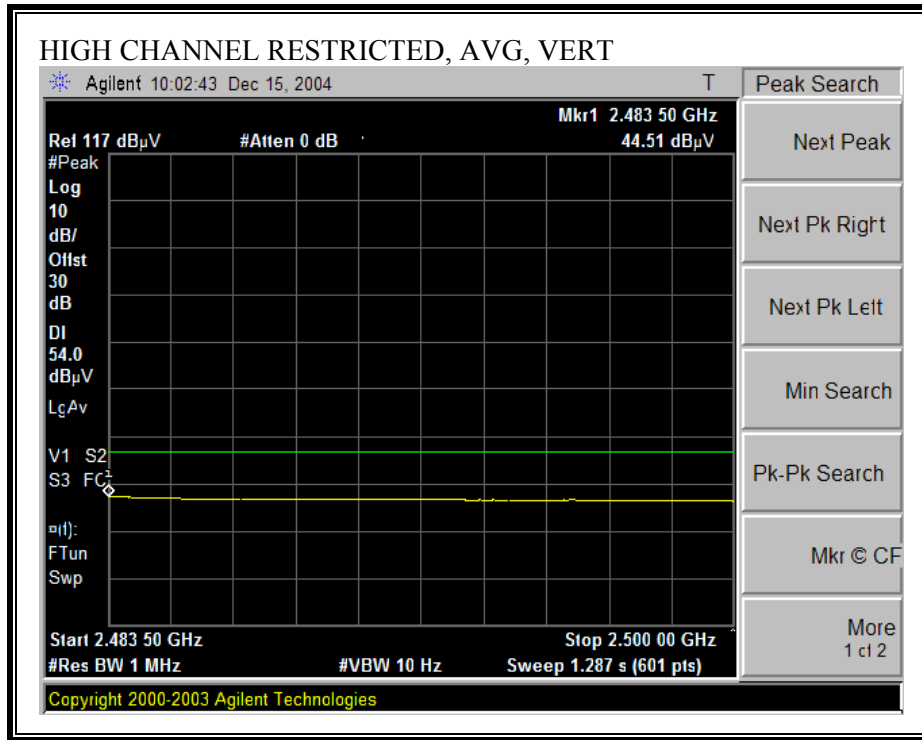
RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS

12/15/04 High Frequency Measurement															
Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr: VIEN TRAN															
Project #: 04T3107-2															
Company: HIGH TECH COMPUTER															
EUT Descr.: PDA WITH BLUETOOTH															
EUT M/N: HSTNH-H06C															
Test Target: 15.247															
Mode Oper: TX															
Test Equipment:															
EMCO Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn >18GHz									
T60; S/N: 2238 @3m		T63 Miteq 646456													
Hi Frequency Cables								HPF		Reject Filter		Peak Measurements			
2 foot cable								HPF_4.0GHz				RBW=VBW=1MHz			
2_Vien												Average Measurements			
3 foot cable												RBW=1MHz ; VBW=10Hz			
4 foot cable															
12 foot cable															
12_Vien															
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Filt dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
LOW CH 2402MHz															
4.804	3.0	61.1	41.9	33.0	3.1	-35.5	0.0	0.6	62.2	43.0	74	54	-11.8	-11.0	V
7.200	3.0	47.3	34.4	35.8	3.7	-34.9	0.0	0.6	52.5	39.6	74	54	-21.5	-14.4	V
4.804	3.0	55.4	40.6	33.0	3.1	-35.5	0.0	0.6	56.5	41.7	74	54	-17.5	-12.3	H
7.200	3.0	37.3	33.8	35.8	3.7	-34.9	0.0	0.6	42.5	39.0	74	54	-31.5	-15.0	H
MID CH 2442MHz															
4.882	3.0	63.0	43.0	33.0	3.1	-35.5	0.0	0.6	64.2	44.2	74	54	-9.8	-9.8	V
7.323	3.0	46.9	33.5	35.9	3.7	-34.8	0.0	0.6	52.4	39.0	74	54	-21.6	-15.0	V
4.882	3.0	60.9	42.7	33.0	3.1	-35.5	0.0	0.6	62.1	43.9	74	54	-11.9	-10.1	H
7.323	3.0	43.5	32.0	35.9	3.7	-34.8	0.0	0.6	49.0	37.5	74	54	-25.0	-16.5	H
HI CH 2480MHz															
4.960	3.0	60.0	42.6	33.0	3.1	-35.5	0.0	0.6	61.3	43.9	74	54	-12.7	-10.1	V
7.440	3.0	46.8	33.0	36.1	3.8	-34.7	0.0	0.6	52.6	38.8	74	54	-21.4	-15.2	V
4.960	3.0	57.5	41.0	33.0	3.1	-35.5	0.0	0.6	58.8	42.3	74	54	-15.2	-11.7	H
7.440	3.0	48.0	32.6	36.1	3.8	-34.7	0.0	0.6	53.8	38.4	74	54	-20.2	-15.6	H
f Measurement Frequency															
Dist Distance to Antenna															
Read Analyzer Reading															
AF Antenna Factor															
CL Cable Loss															
Amp Preamp Gain															
D Corr Distance Correct to 3 meters															
Avg Average Field Strength @ 3 m															
Peak Calculated Peak Field Strength															
HPF High Pass Filter															
Avg Lim Average Field Strength Limit															
Pk Lim Peak Field Strength Limit															
Avg Mar Margin vs. Average Limit															
Pk Mar Margin vs. Peak Limit															

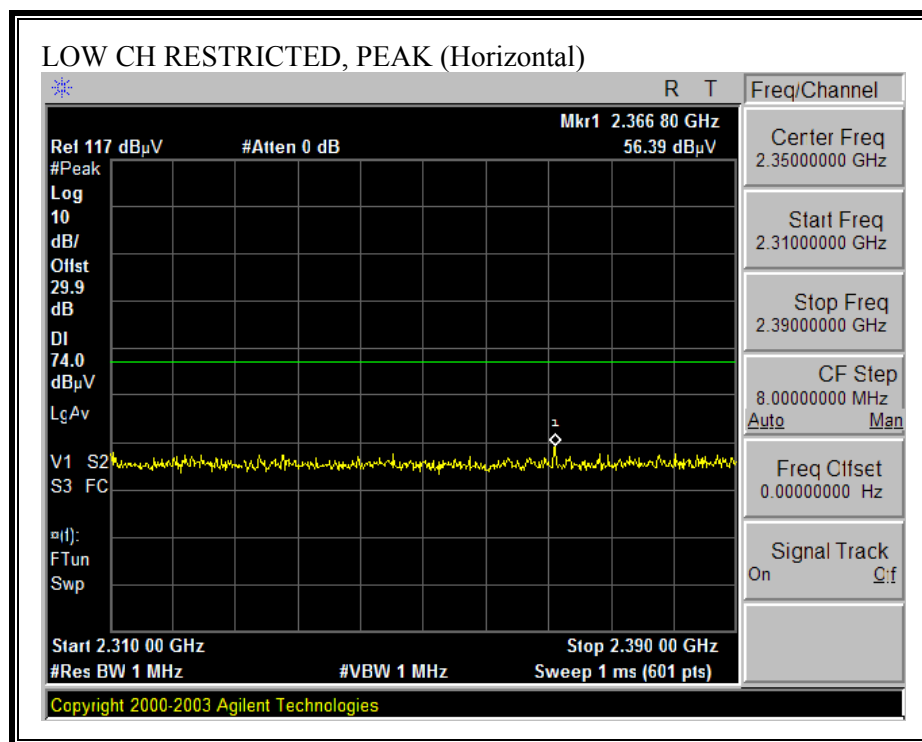
7.3.3. CO-LOCATED TRANSMITTER RADIATED EMISSIONS

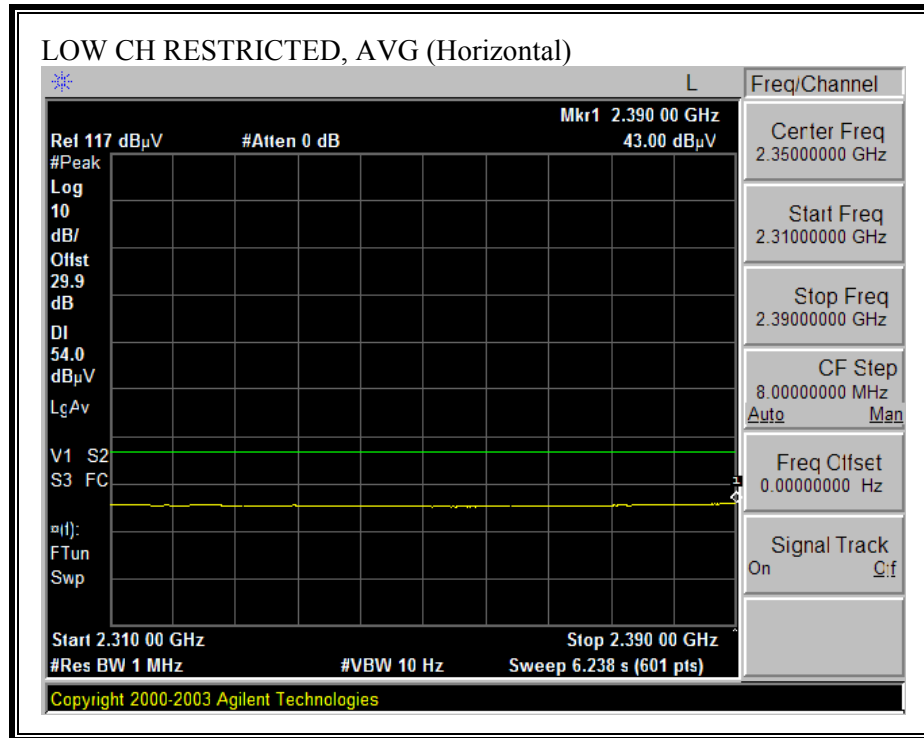
RESULTS

No non-compliance noted:

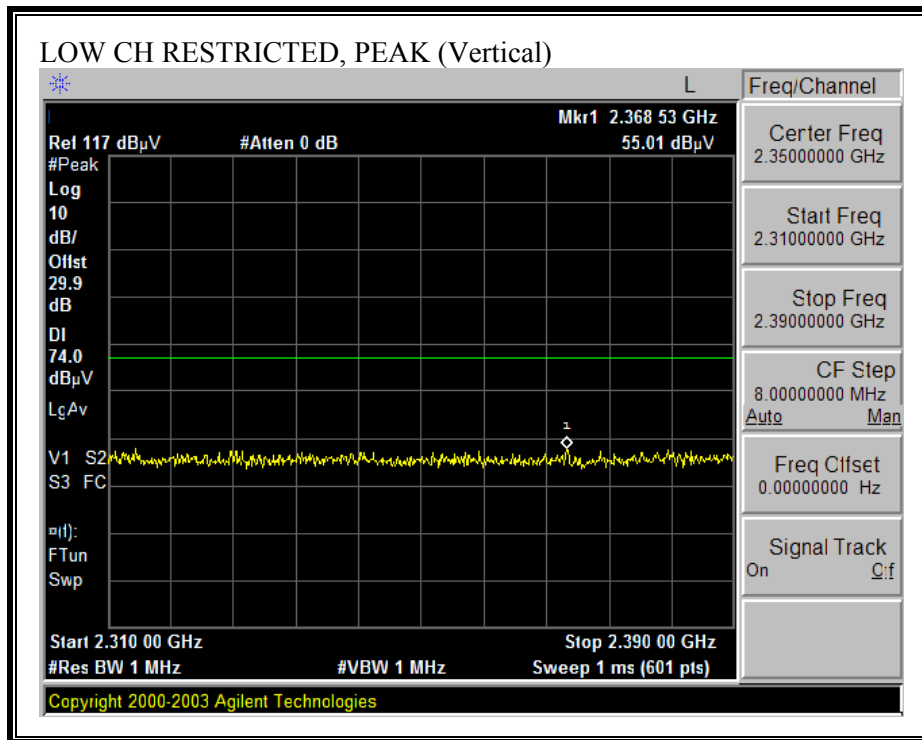
The dominant transmitter is the Bluetooth.

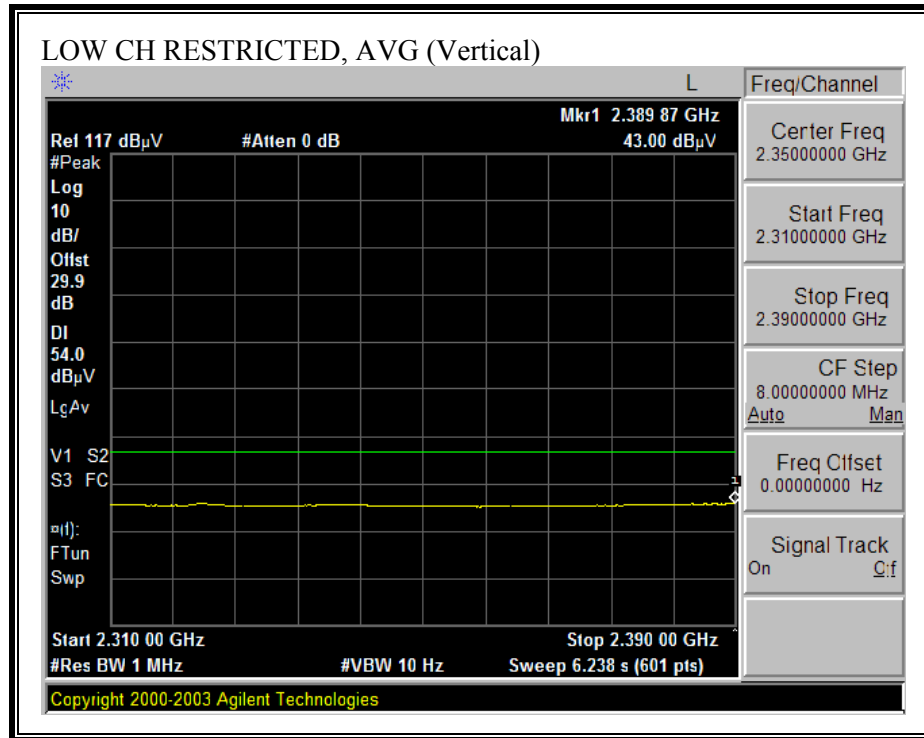
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



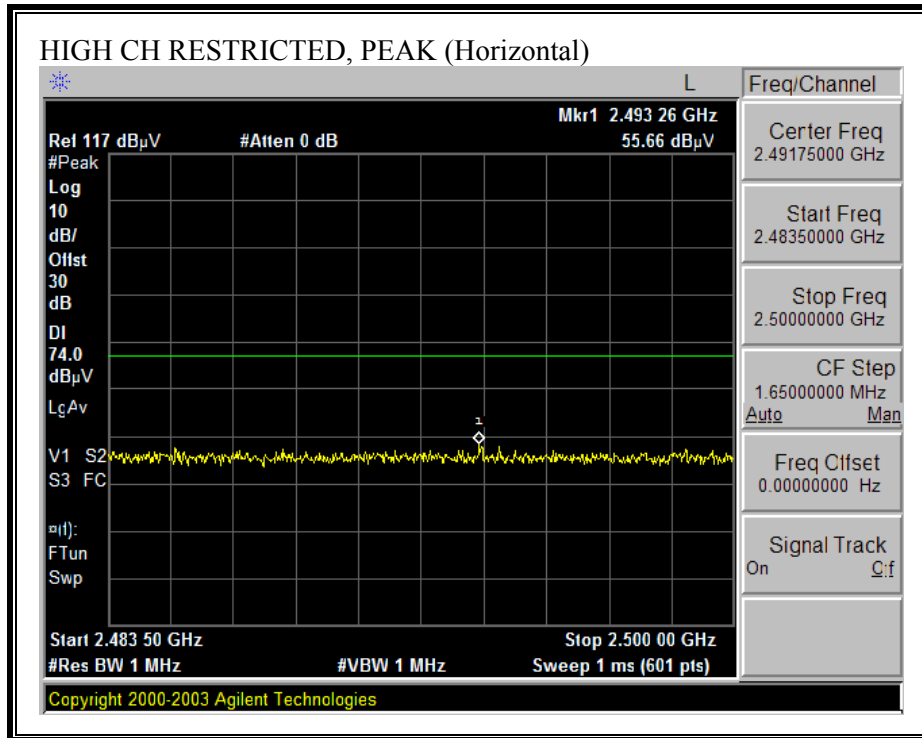


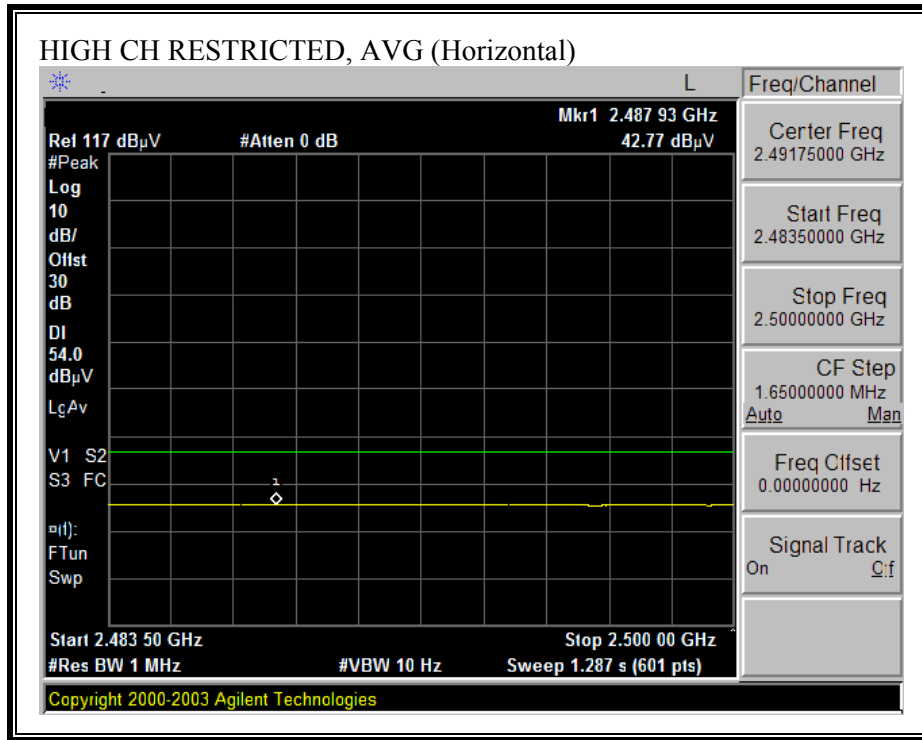
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



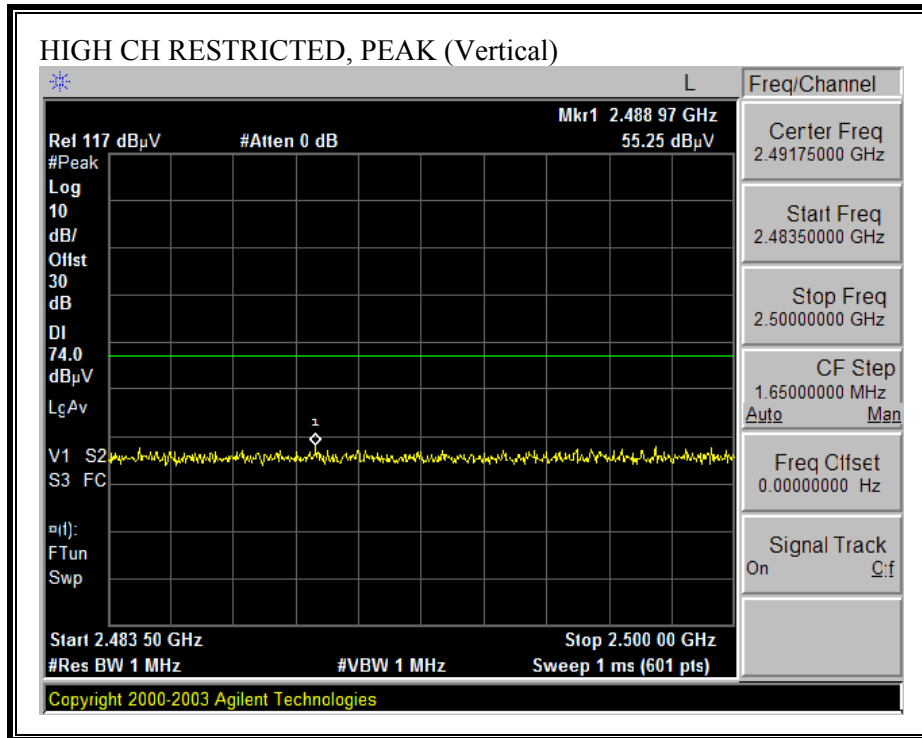


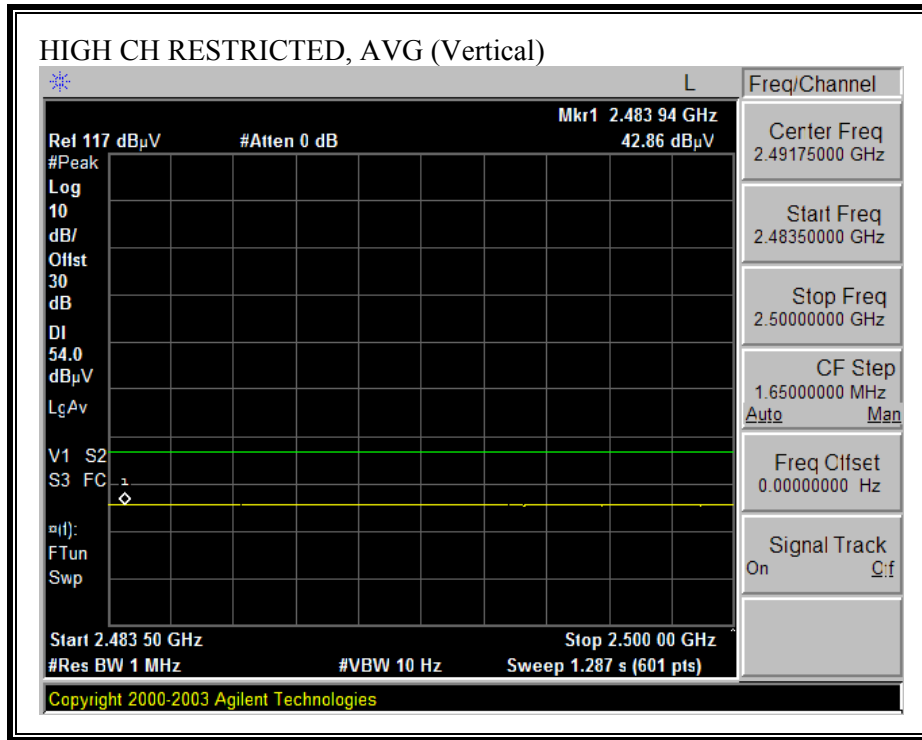
WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

12/21/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																
Test Engr: Vien Tran Project #: 04T3106-3 Company: HIGH TECH COMPUTER EUT Descr.: PDA WITH BLUETOOTH EUT M/N: HSTNH-H06C Test Target: FCC 15.247 Mode Oper: Dominant Bluetooth_ Tx at worst channel & GSM TX for Non-dominant channel																
Test Equipment:																
EMCO Horn 1-18GHz T60; S/N: 2238 @3m		Pre-amplifier 1-26GHz T63 Miteq 646456		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit FCC 15.247								
Hi Frequency Cables				HPF		Reject Filter		Peak Measurements RBW=VBW=1MHz								
2 foot cable		3 foot cable		4 foot cable		12 foot cable		HPF_40GHz		Reject Filter		Average Measurements RBW=1MHz ; VBW=10Hz				
3_Chin						12_Hitesh										
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fldr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)	
MID CH 2442MHz																
4.882	3.0	60.8	42.4	33.0	4.1	-35.5	0.0	0.6	63.1	44.7	74	54	-10.9	-9.3	V	
7.323	3.0	47.2	33.1	35.9	5.9	-34.8	0.0	0.6	54.9	40.8	74	54	-19.1	-13.2	V	
4.882	3.0	58.5	40.3	33.0	4.1	-35.5	0.0	0.6	60.8	42.6	74	54	-13.2	-11.4	H	
7.323	3.0	45.7	32.7	35.9	5.9	-34.8	0.0	0.6	53.4	40.4	74	54	-20.6	-13.6	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									

7.3.4. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

RF WIRELESS TEST AT TX MODE:

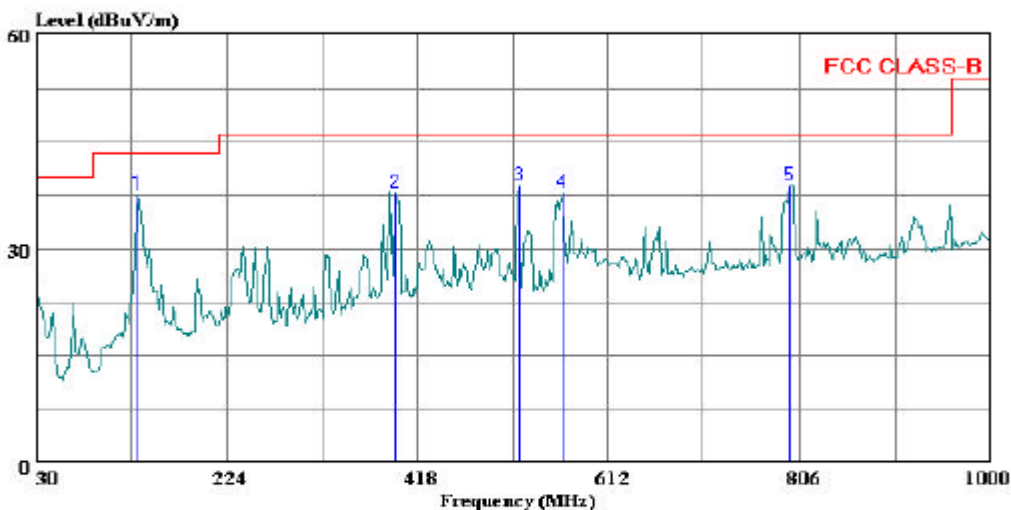
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

Data#: 39 File#: 3106 htc.emi Date: 12-10-2004 Time: 16:35:52



(Auxiliary ATC)

Trace: 38

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL

Test Operator: : Chin Pang

Project #: : 04U3106-1

Company: : High Tech Computer, Corp

EUT: : 850/900/1800/1900MHz Edge/GPRS/GSM

: Phone with Bluetooth

Model No: : HSTNH-H06C

Configuration: : EUT/ Cradle/Laptop

Target of Test: : FCC Class B

Mode of Operation: TX Mode

HORIZONTAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	133.790	48.82	-11.27	37.55	43.50	-5.95	Peak
2	395.690	46.49	-8.74	37.75	46.00	-8.25	Peak
3	521.790	45.57	-6.71	38.86	46.00	-7.14	Peak
4	565.440	43.79	-6.05	37.74	46.00	-8.26	Peak
5	795.330	41.29	-2.48	38.81	46.00	-7.19	Peak

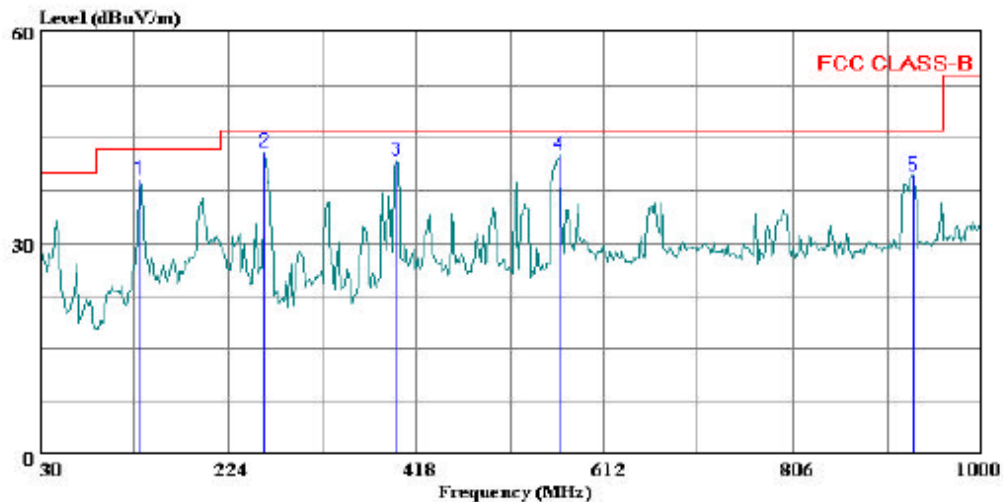
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



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

Data#: 37 File#: 3106 htc.emi Date: 12-10-2004 Time: 16:32:42



(Aux ATC)

Trace: 36

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3106-1
Company: : High Tech Computer, Corp
EUT: : 850/900/1800/1900MHz Edge/GPRS/GSM
: Phone with Bluetooth
Model No: : HSTNH-H06C
Configuration: : EUT/ Cradle/Laptop
Target of Test: : FCC Class B
Mode of Operation: TX Mode

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	133.790	50.31	-11.27	39.04	43.50	-4.46	Peak
2	261.830	54.53	-11.57	42.96	46.00	-3.04	Peak
3	397.630	50.39	-8.72	41.67	46.00	-4.33	Peak
4	565.440	48.59	-6.05	42.54	46.00	-3.46	Peak
5	929.190	39.99	-0.23	39.76	46.00	-6.24	Peak

DIGITAL MODE WITH MINIMUM COFIGURATION:

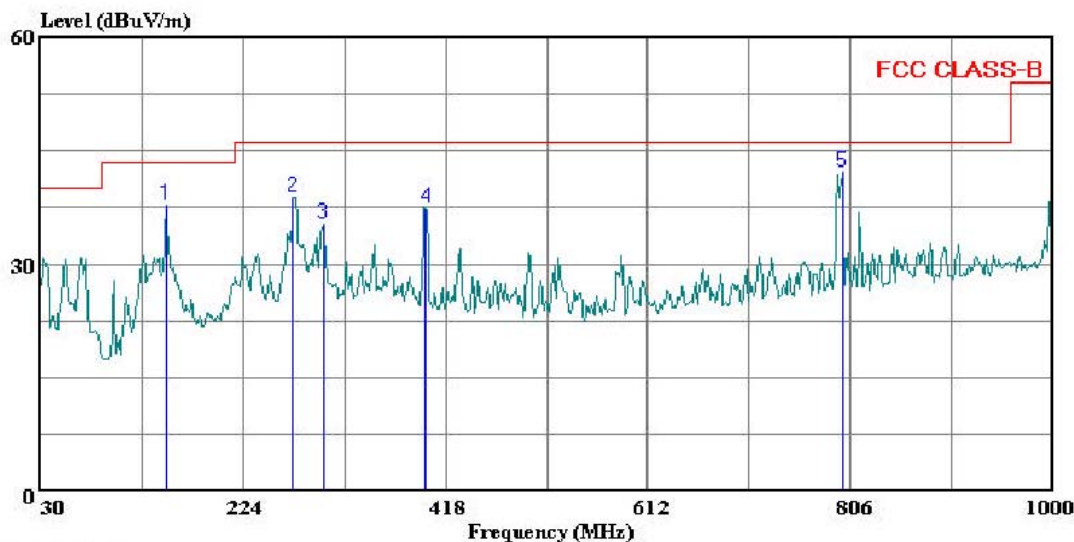
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



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

Data#: 41 File#: 3106 htc.emi Date: 12-15-2004 Time: 15:16:51



(Audix ATC)

Trace: 40

Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 04U3106-1
Company: : High Tech Computer, Corp
EUT: : 850/900/1800/1900MHz Edge/GPRS/GSM
: Phone with Bluetooth
Model No: : HSTNH-H06C
Configuration: : EUT/ Cradle/PC/Monitor/Modem
Target of Test: : FCC Class B
Mode of Operation: Linking to PC

HORIZONTAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	150.280	50.20	-12.45	37.75	43.50	-5.75	Peak
2	271.530	49.90	-11.00	38.90	46.00	-7.10	Peak
3	300.630	45.56	-10.30	35.26	46.00	-10.74	Peak
4	398.600	46.07	-8.71	37.36	46.00	-8.64	Peak
5	798.240	44.47	-2.38	42.09	46.00	-3.91	Peak

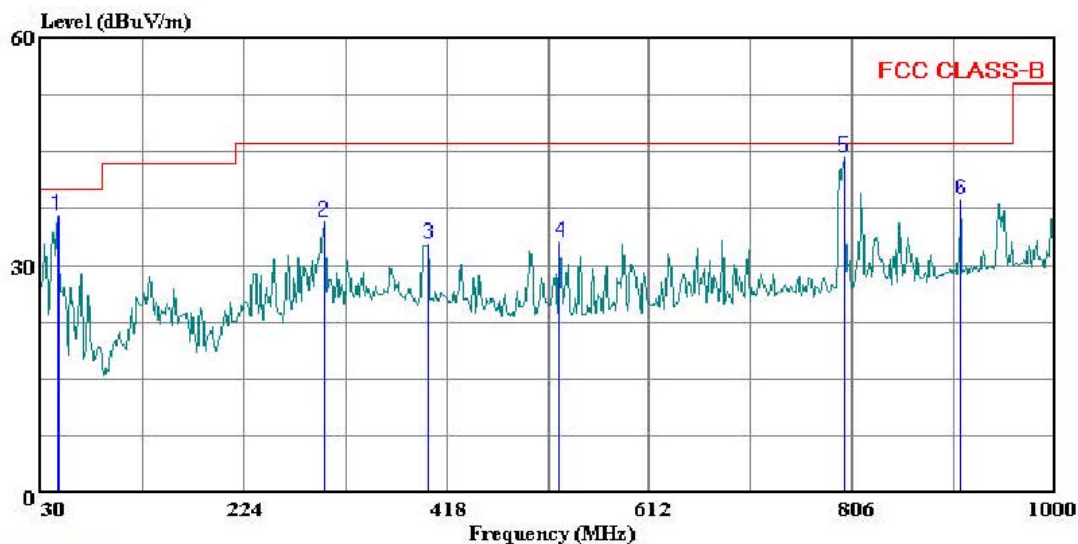
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)

VERTICAL PLOT



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

Data#: 45 File#: 3106 htc.emi Date: 12-15-2004 Time: 15:41:35



(Audix.ATC)

Trace: 44

Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3106-1
Company: : High Tech Computer, Corp
EUT: : 850/900/1800/1900MHz Edge/GPRS/GSM
: Phone with Bluetooth
Model No: : HSTNH-H06C
Configuration: : EUT/ Cradle/PC/Monitor/Modem
Target of Test: : FCC Class B
Mode of Operation: Linking to PC

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	46.490	51.37	-14.80	36.57	40.00	-3.43	Peak
2	300.630	46.07	-10.30	35.77	46.00	-10.23	Peak
3	400.540	41.39	-8.67	32.72	46.00	-13.28	Peak
4	526.640	39.53	-6.57	32.96	46.00	-13.04	Peak
5	798.240	46.70	-2.38	44.32	46.00	-1.68	Peak
6	909.790	39.17	-0.60	38.57	46.00	-7.43	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

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

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

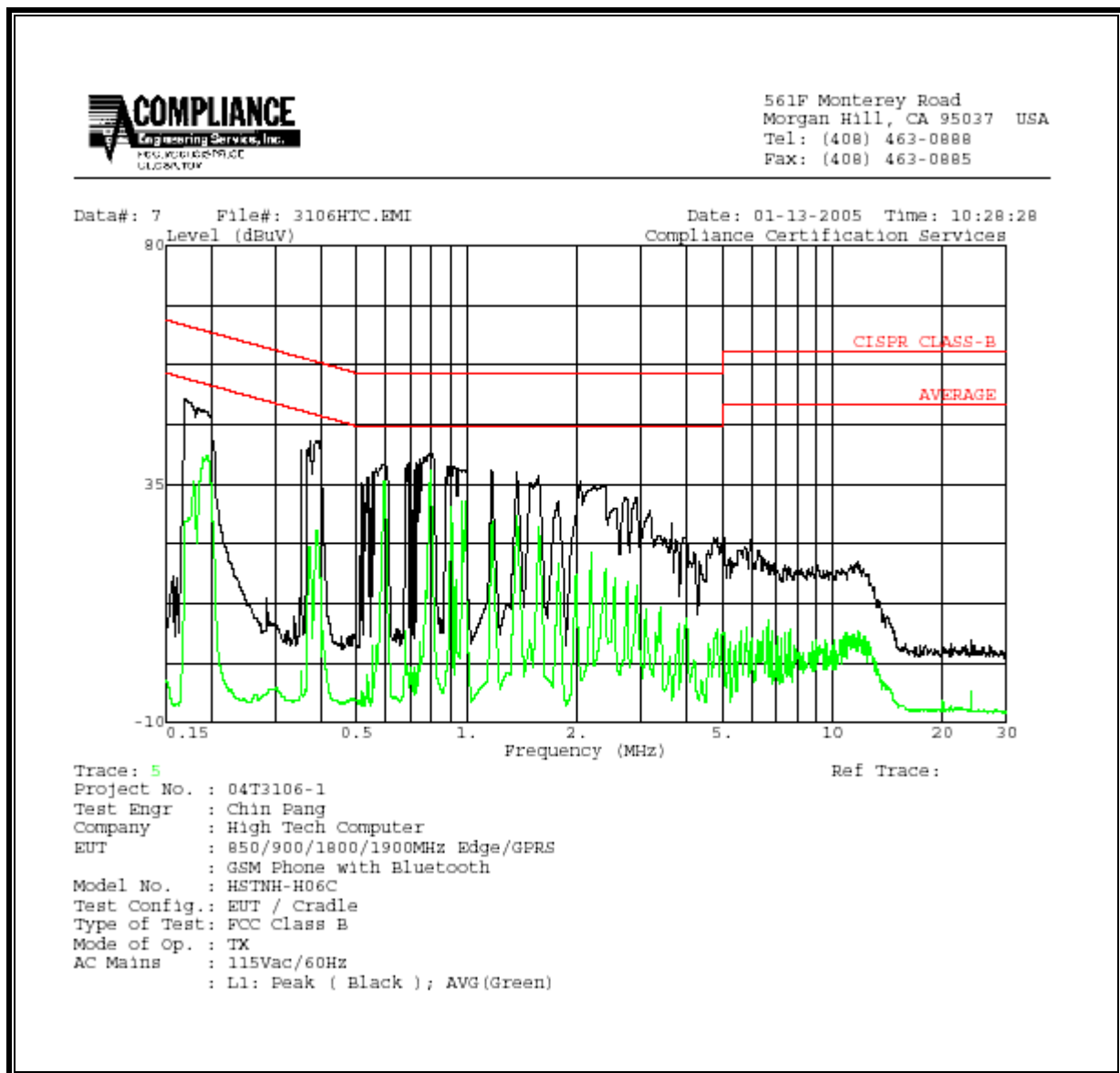
No non-compliance noted:

TX MODE AT WORST CASE:

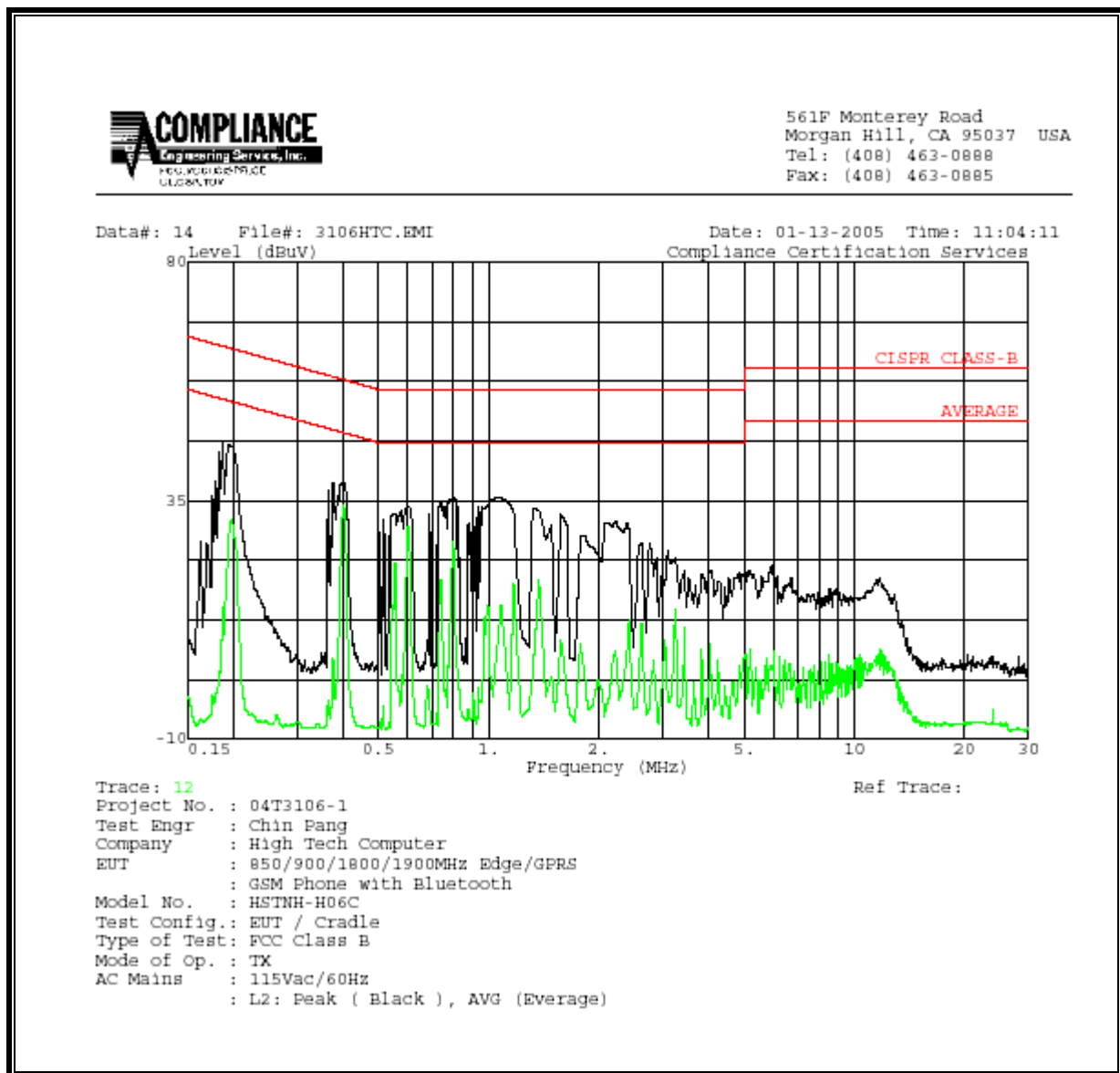
6 WORST EMISSIONS:

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
0.17	50.87	--	--	0.00	64.96	54.96	-14.09	-4.09	L1
0.39	43.08	--	--	0.00	58.09	48.09	-15.01	-5.01	L1
0.80	40.73	--	--	0.00	56.00	46.00	-15.27	-5.27	L1
0.20	45.36	--	--	0.00	63.69	53.69	-18.33	-8.33	L2
0.40	38.38	--	--	0.00	57.90	47.90	-19.52	-9.52	L2
1.07	35.60	--	--	0.00	56.00	46.00	-20.40	-10.40	L2
6 Worst Data									

LINE 1 RESULT



LINE 2 RESULT



DIGITAL MODE:

Hi Pro Power Supply:

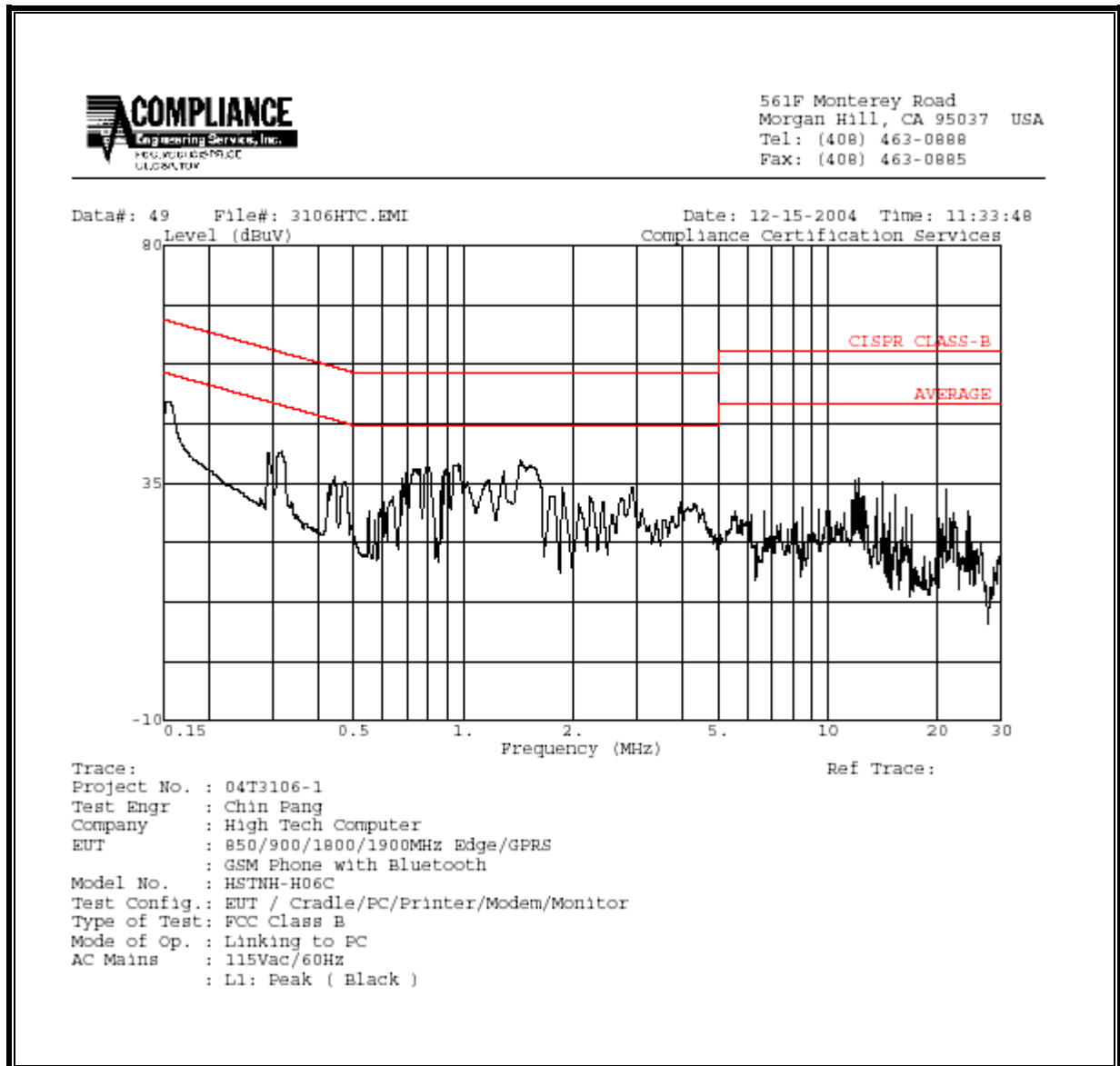
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.16	50.32	--	--	0.00	65.62	55.62	-15.30	-5.30	L1
0.80	38.10	--	--	0.00	56.00	46.00	-17.90	-7.90	L1
1.43	39.26	--	--	0.00	56.00	46.00	-16.74	-6.74	L1
0.17	47.20	--	--	0.00	65.21	55.21	-18.01	-8.01	L2
0.34	43.48	--	--	0.00	59.28	49.28	-15.80	-5.80	L2
1.03	41.30	--	--	0.00	56.00	46.00	-14.70	-4.70	L2
6 Worst Data									

Delta Power Supply:

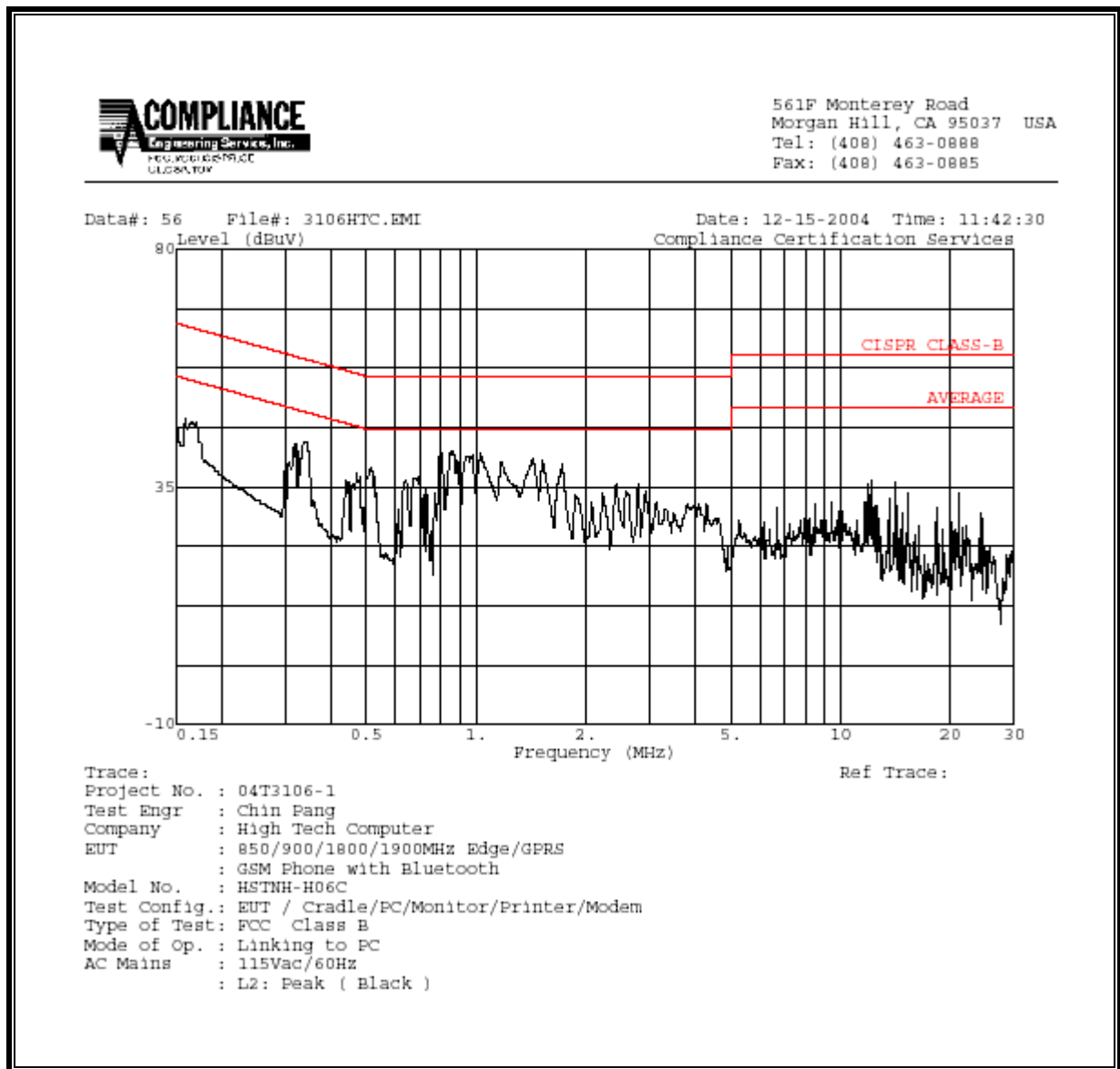
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.44	41.90	--	--	0.00	57.06	47.06	-15.16	-5.16	L1
0.19	42.90	--	--	0.00	63.91	53.91	-21.01	-11.01	L1
1.56	39.64	--	--	0.00	56.00	46.00	-16.36	-6.36	L1
0.47	44.88	--	--	0.00	56.44	46.44	-11.56	-1.56	L2
1.56	42.16	--	--	0.00	56.00	46.00	-13.84	-3.84	L2
0.23	41.78	--	--	0.00	62.31	52.31	-20.53	-10.53	L2
6 Worst Data									

Hi Pro Power Supply:

LINE 1 RESULT

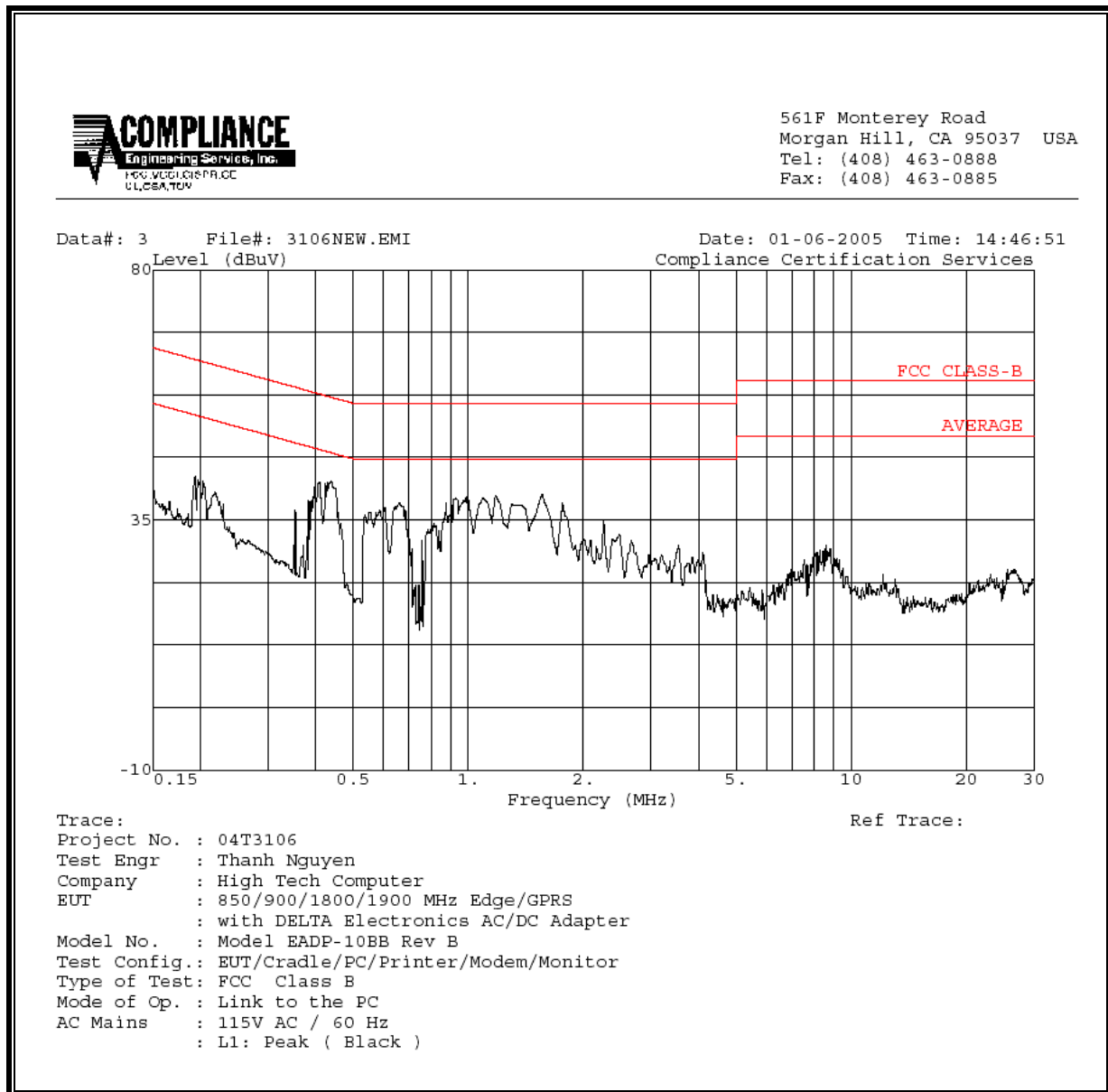


LINE 2 RESULT

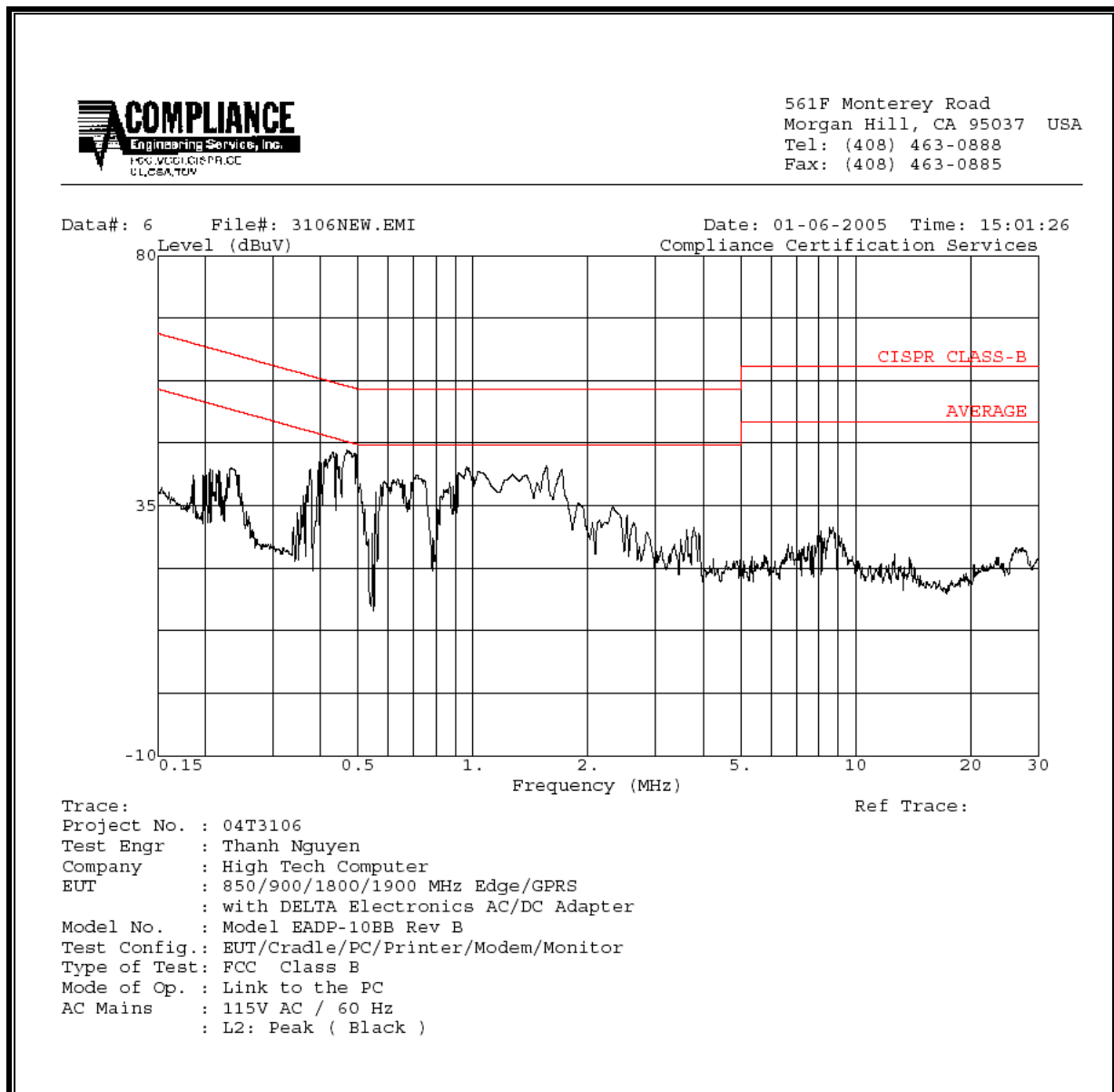


Delta Power Supply:

LINE 1 RESULTS



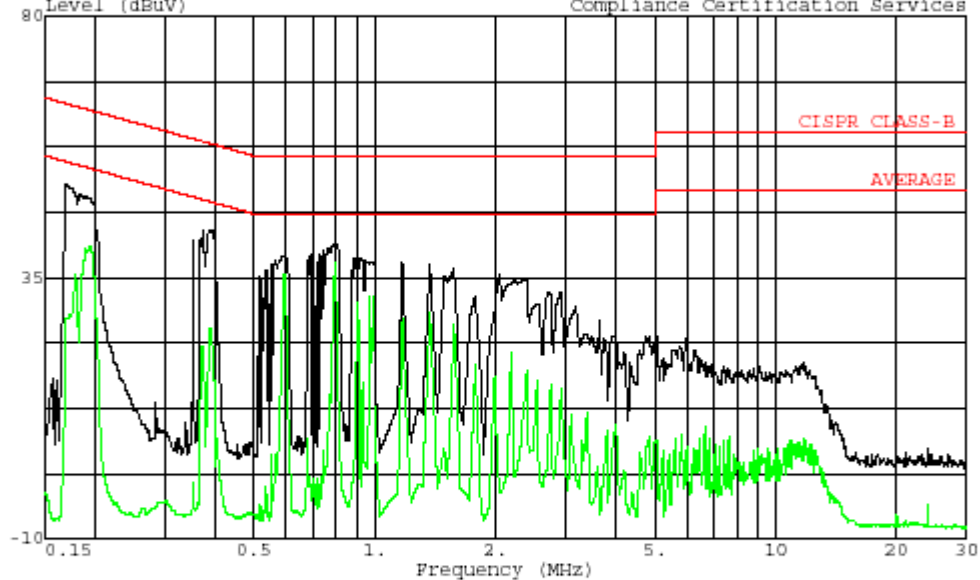
LINE 2 RESULTS





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Data#: 7 File#: 3106HTC.EMI Date: 01-13-2005 Time: 10:28:28
Level (dBuV) Compliance Certification Services



Trace: 5
Project No. : 04T3106-1
Test Engr : Chin Pang
Company : High Tech Computer
EUT : 850/900/1800/1900MHz Edge/GPRS
Model No. : HSTNH-H06C
Test Config.: EUT / Cradle
Type of Test: FCC Class B
Mode of Op. : TX
AC Mains : 115Vac/60Hz
L1: Peak (Black); AVG (Green)

Ref Trace:

LINE 2 RESULTS

