



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

**FOR**

**BLUETOOTH WIRELESS SENSOR**

**MODEL NUMBER: IW-4100**

**FCC ID: TDQI4100**

**REPORT NUMBER: 05U3476-1C**

**ISSUE DATE: AUGUST 4, 2005**

*Prepared for*

**PASCO**

**10101 FOOTHILLS BLVD.**

**ROSEVILLE, CA 95747**

**U.S.A.**

*Prepared by*

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**LAB CODE:200065-0**

Revision History

Rev.	Issue Date	Revisions	Revised By
A	6/29/05	Initial Issue	YZ
B	7/26/05	Removed MPE Calculations, corrected typo on p 23.	MH
	8/1/05	Changed Port 2 from Mic to Sensor Interface under the I/O Cables table on page 8.	D.Z.
C	8/4/05	Added Section 7.3 for LC test data	D.Z.

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** PASCO  
10101 FOOTHILLS BLVD.  
ROSEVILLE, CA 95747 U.S.A.

**EUT DESCRIPTION:** BLUETOOTH WIRELESS SENSOR INTERFACE

**MODEL:** IW-4100

**SERIAL NUMBER:** 53329

**DATE TESTED:** JUNE 9 – JUNE 10, 2005

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

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

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

Approved & Released For CCS By:

Tested By:



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YAN ZHENG  
EMC SUPERVISOR  
COMPLIANCE CERTIFICATION SERVICES

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WILLIAM ZHUANG  
EMC ENGINEER  
COMPLIANCE CERTIFICATION SERVICES

## 2. TEST METHODOLOGY

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

## 3. FACILITIES AND ACCREDITATION

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

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

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

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

### 4.2. MEASUREMENT UNCERTAINTY

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

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

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

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT is a Bluetooth transceiver sensor.

The radio module is manufactured by Orion Manufacturing.

### 5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Output Power (dBm)	Output Power (mW)
2402 - 2480	-2.75	0.53

### **5.3. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes an ANT-010-SMA-1 antenna, with a maximum gain of 0 dBi.

### **5.4. SOFTWARE AND FIRMWARE**

The firmware installed in the EUT during testing was BC02, rev. 706

The EUT driver software installed in the host support equipment during testing was CSR Bluetest.exe, rev. 8a

The test utility software used during testing was BC02, rev. 706

### **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 2441 MHz.

## 5.6. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Sony	PCGF390	3030373	DoC
Interface Board	customized	N/A	N/A	N/A
AC/DC Adaptor	Sony	PCGA-ACX1	N/A	N/A
AC/DC Adaptor		GT-A81051-0505UW2	N/A	N/A

### I/O CABLES

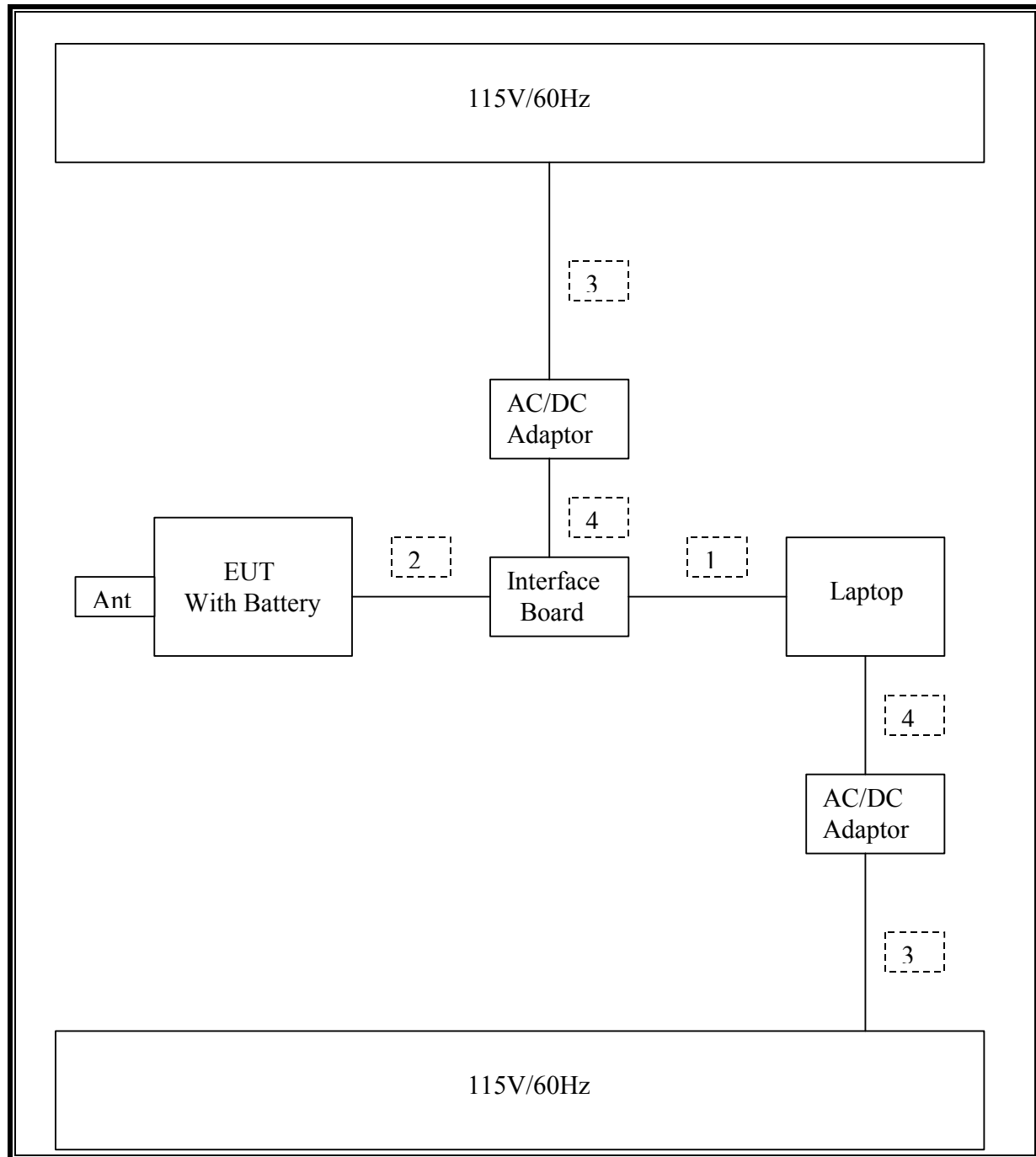
I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	Serial	1	DB9	Shielded	1m	N/A
2	Sensor Interface	1	N/A	Un-shielded	0.5m	N/A
3	AC	2	US 115V	Un-shielded	2m	N/A
4	DC	2	DC	Un-shielded	1m	N/A

### TEST SETUP

The EUT is connected to an interface board which is connected to a laptop computer during the tests. Test software exercised the radio card.



**SETUP DIAGRAM FOR TESTS**



## 6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	Cal Due
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2005
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2005
Spectrum Analyzer	HP	E4446A	US42510266	8/25/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29310	9/12/2005
4.0 High Pass Filter	Micro Tronics	HPM13351	1	CNR
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	8/17/2005
30MHz---- 2GHz	Sunol Sciences	JB1 Antenna	A121003	9/12/2005
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/6/2006
RF Filter Section	HP	85420E	3705A00256	3/6/2006
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/2006
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/2006
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/2005

## 7. LIMITS AND RESULTS

### 7.1. ANTENNA PORT CHANNEL TESTS

#### 7.1.1. 20 dB BANDWIDTH

##### LIMIT

None; for reporting purposes only.

##### TEST PROCEDURE

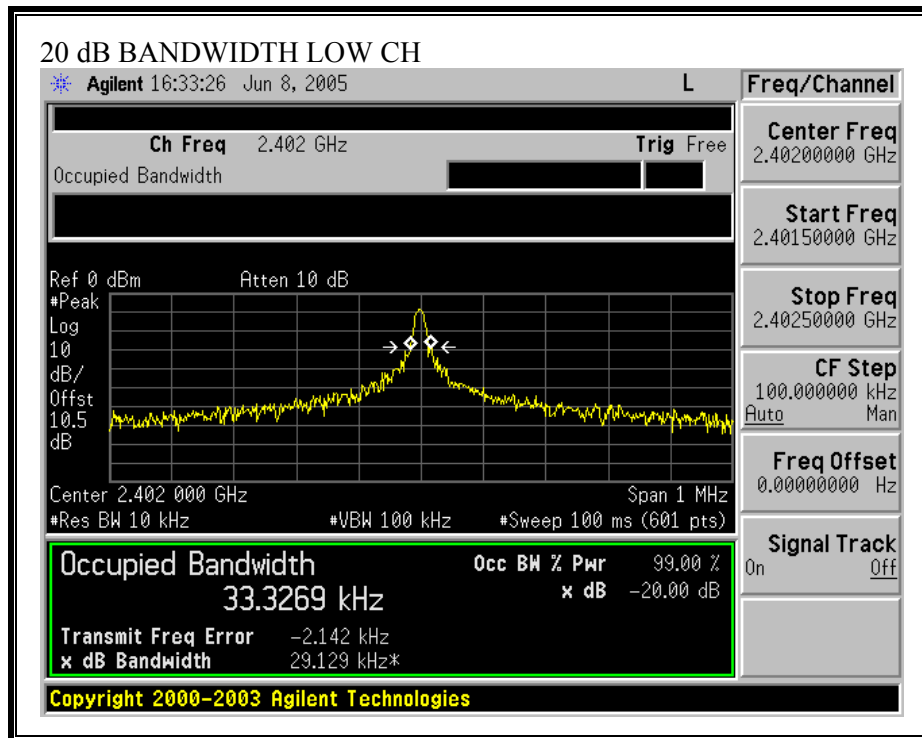
The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 20 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

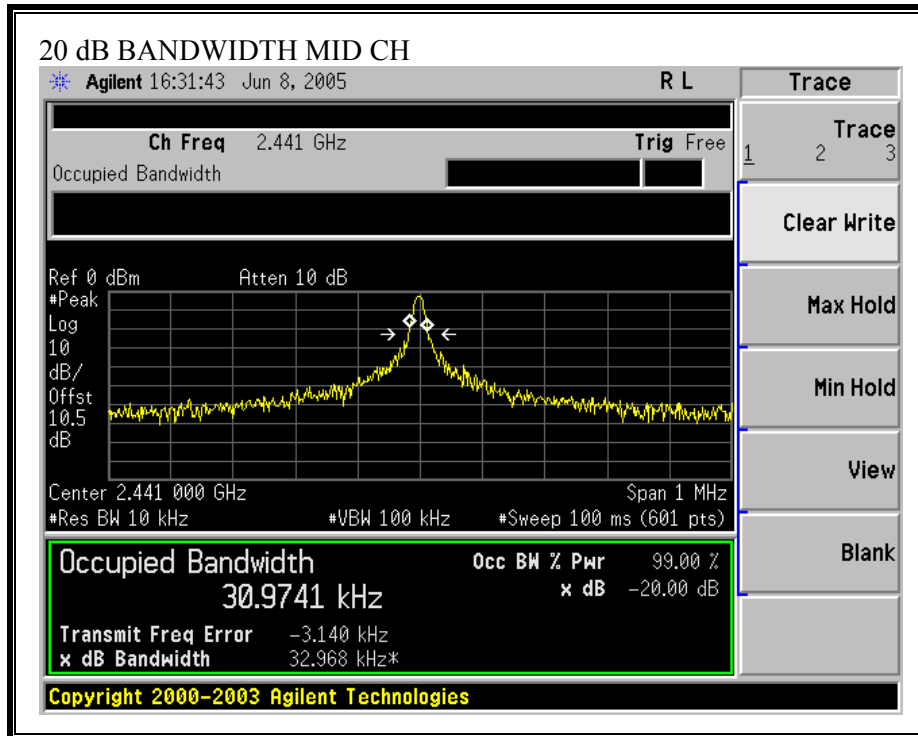
##### RESULTS

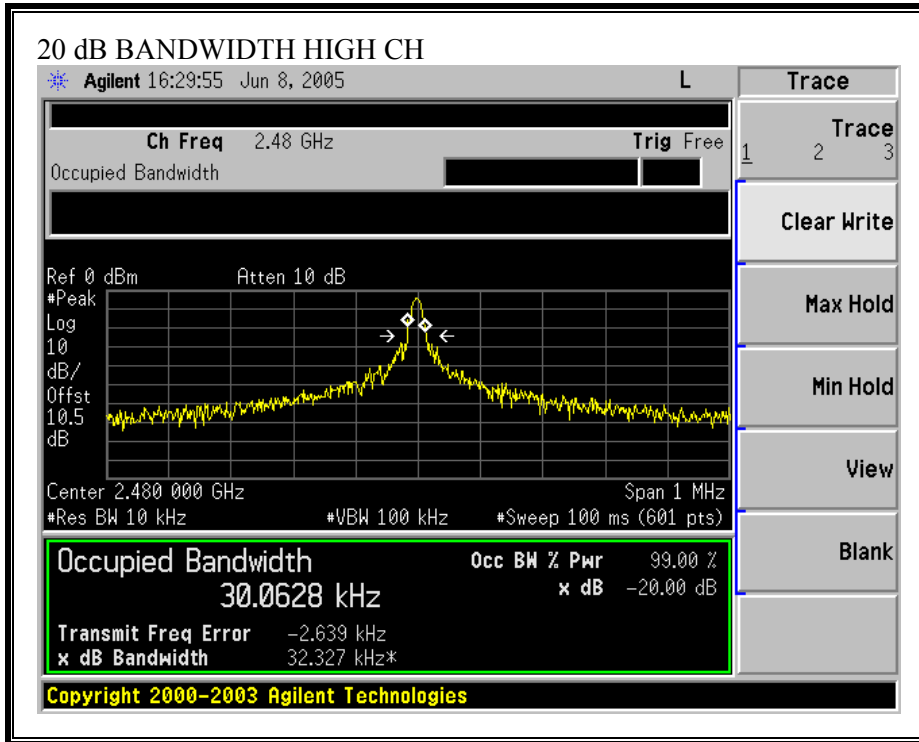
No non-compliance noted:

Channel	Frequency (MHz)	20 dB Bandwidth (kHz)
Low	2402	29.129
Middle	2441	32.968
High	2480	32.327

**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.

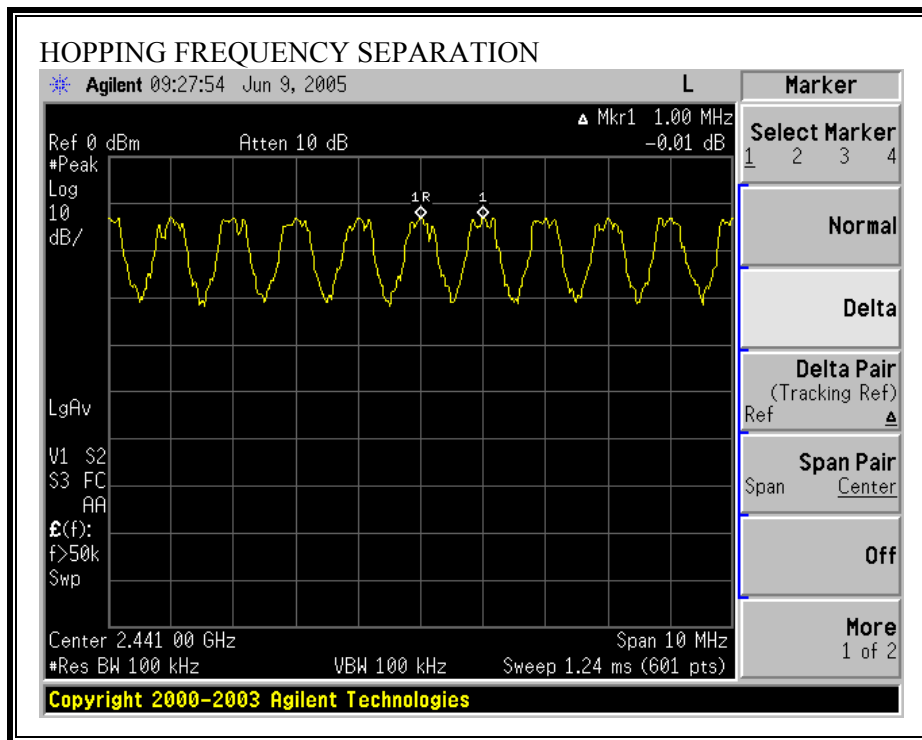
### **TEST PROCEDURE**

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**

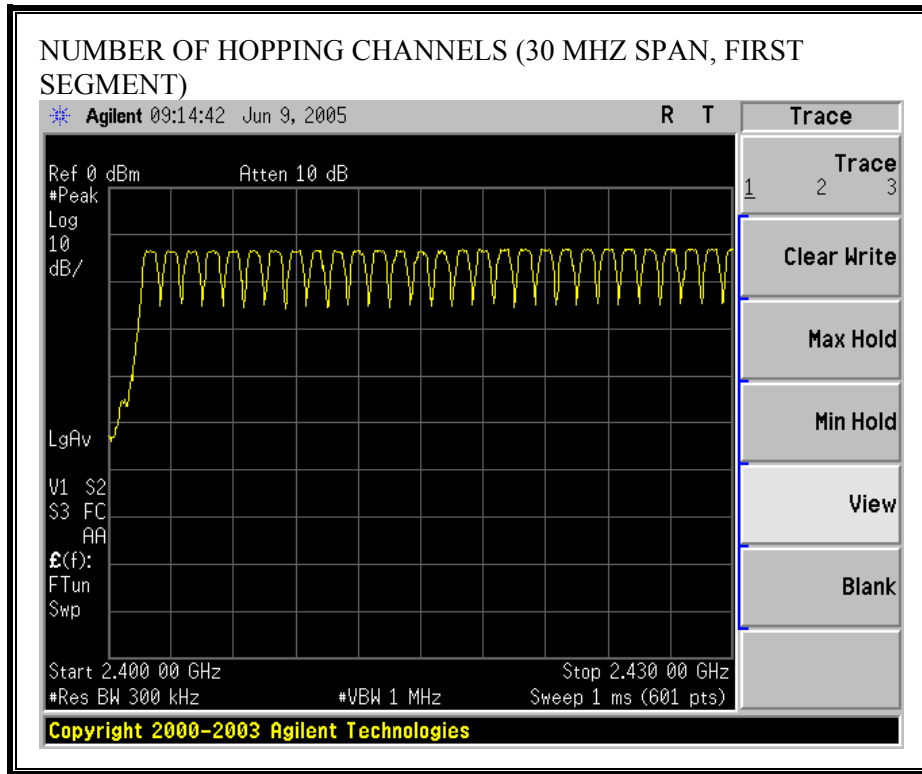
The transmitter output is connected to a spectrum analyzer. The span is set to cover the entire authorized band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1 % of the span. The analyzer is set to Max Hold.

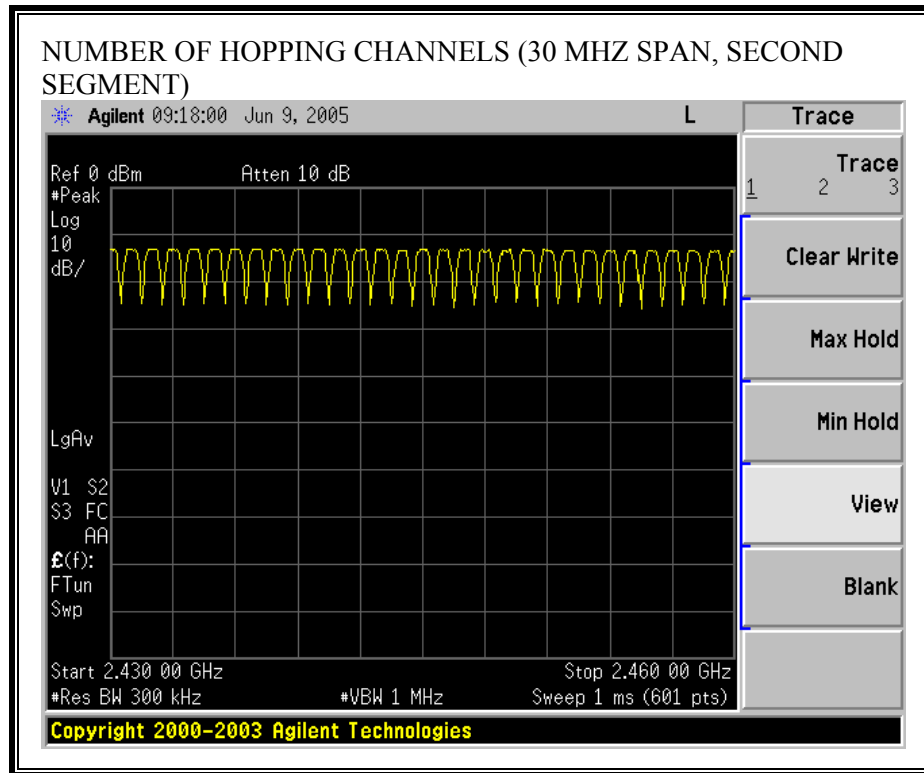
#### **RESULTS**

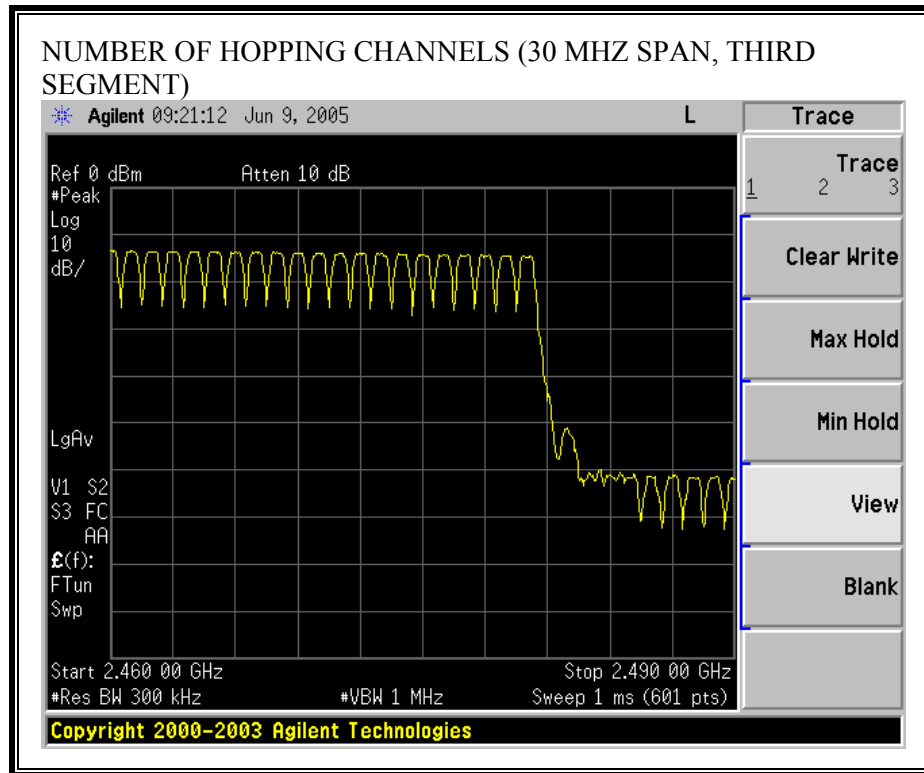
No non-compliance noted:

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**

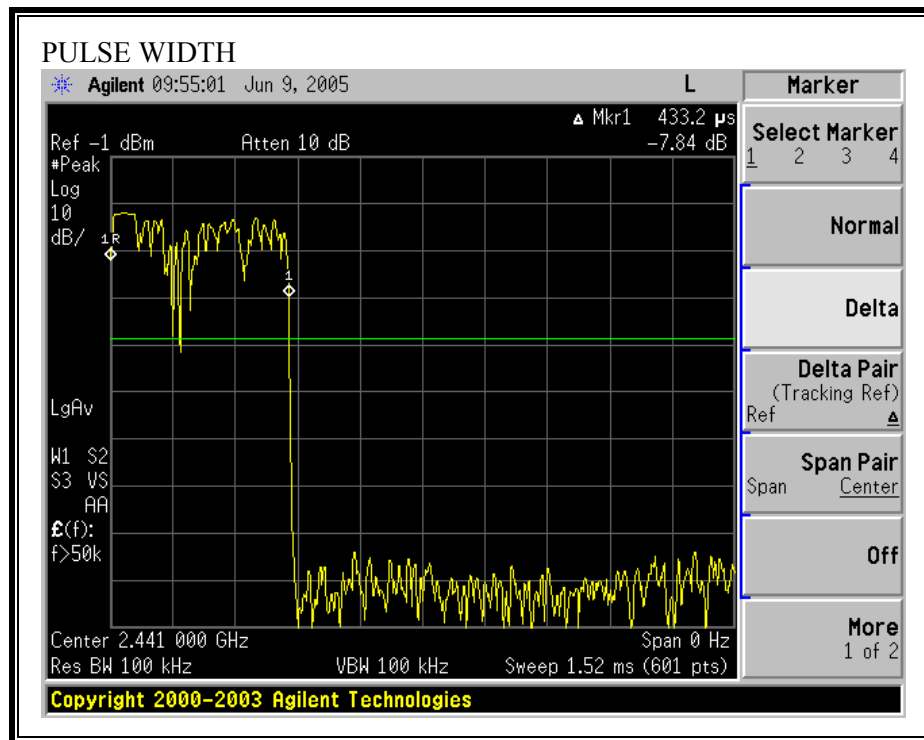
No non-compliance noted:

There are 31 pulses in 3s. The pulses width is 433,2us.

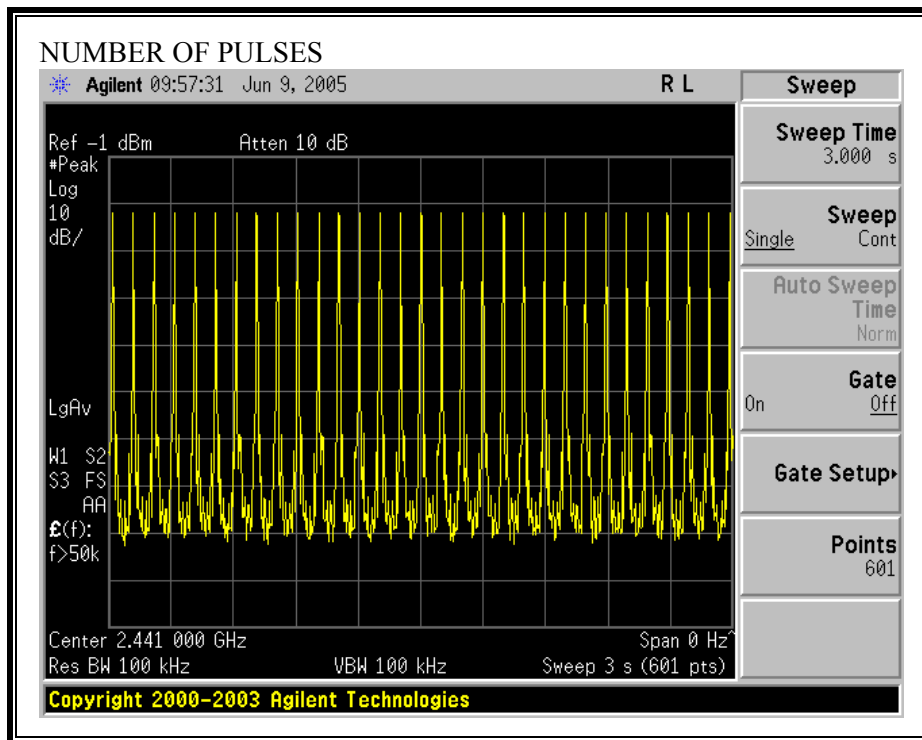
Therefore, the average time of occupancy is:

$$31.6/3*31*0.0004332 = 0.1414s$$

**PULSE WIDTH**



**NUMBER OF PULSES IN 3 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 spectrum analyzer and the analyzer bandwidth is set to a value greater than the 20 dB bandwidth of the EUT.

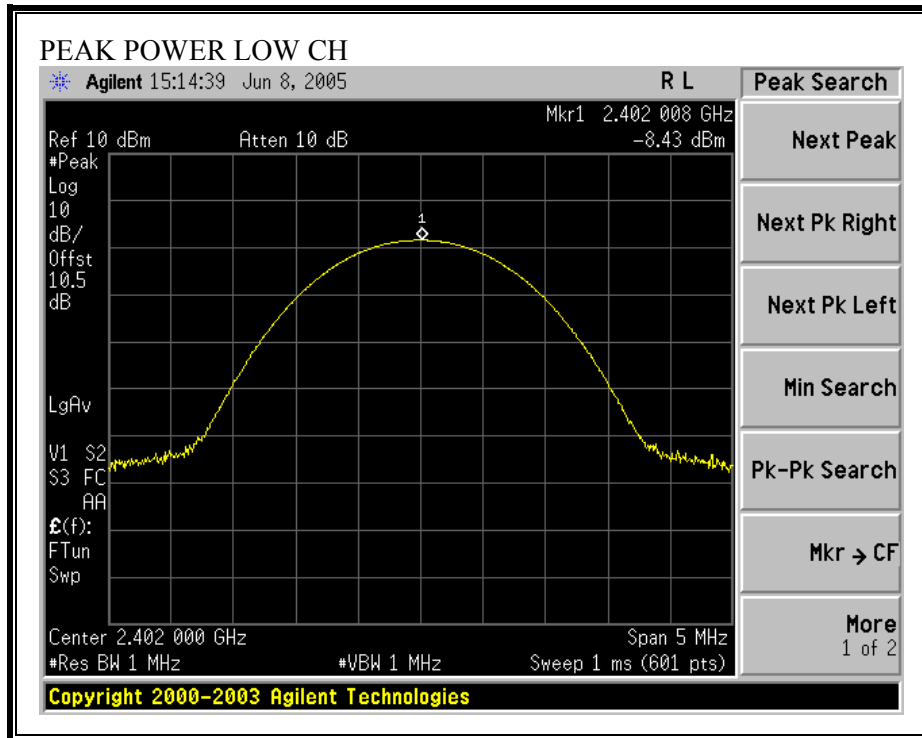
### RESULTS

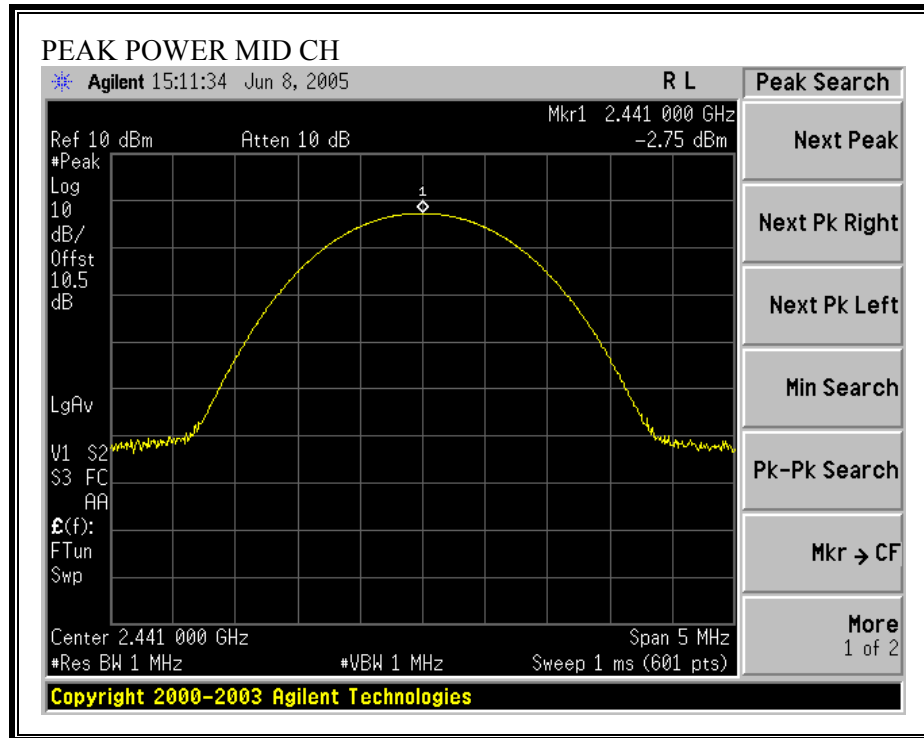
No non-compliance noted:

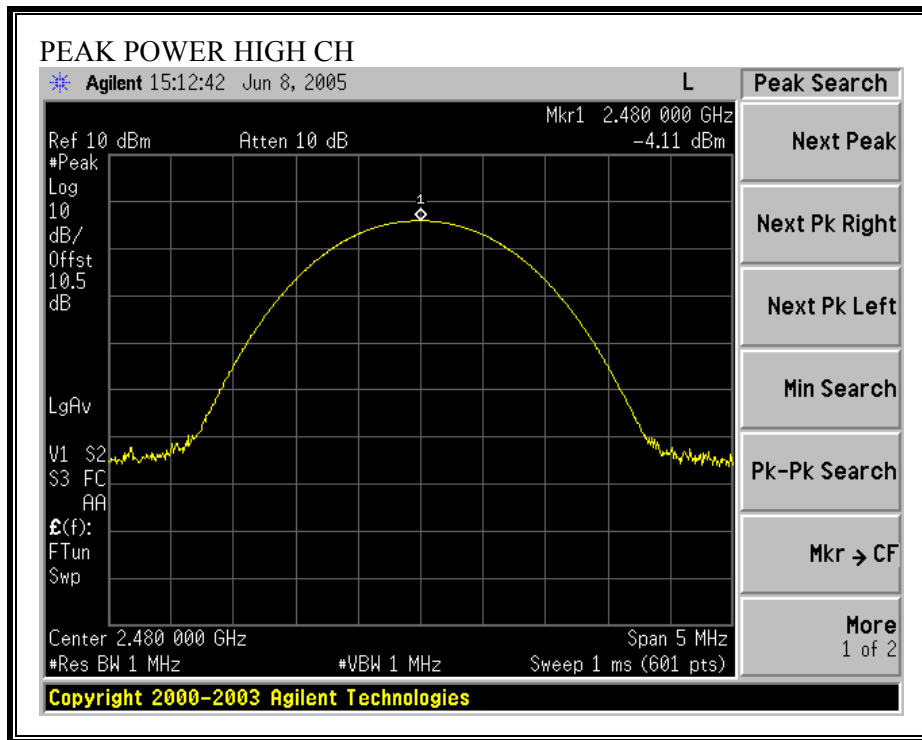
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-8.43	30	-38.43
Middle	2441	-2.75	30	-32.75
High	2480	-4.11	30	-34.11



**OUTPUT POWER**







### 7.1.6. 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 0.5 dB (including 0dB pad and 0.5 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	-8.68
Middle	2441	-3.08
High	2480	-4.48

### 7.1.7. 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

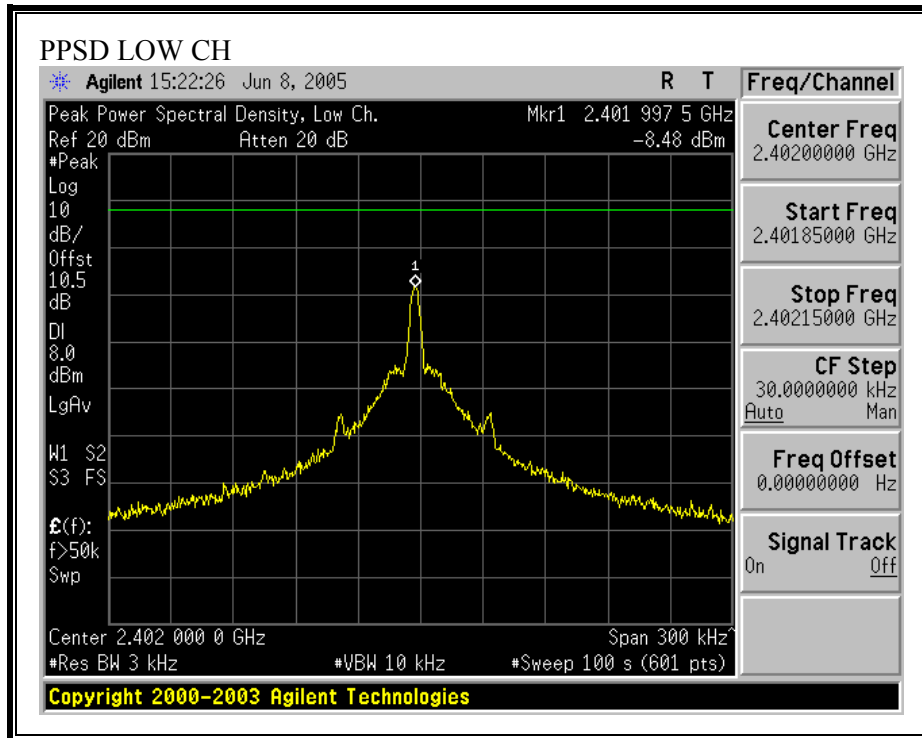
The transmitter output is connected to a spectrum analyzer, the maximum level in a 3 kHz bandwidth is measured with the spectrum analyzer using RBW = 3 kHz and VBW > 3 kHz, sweep time = span / 3 kHz, and video averaging is turned off. The PPSD is the highest level found across the emission in any 3 kHz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

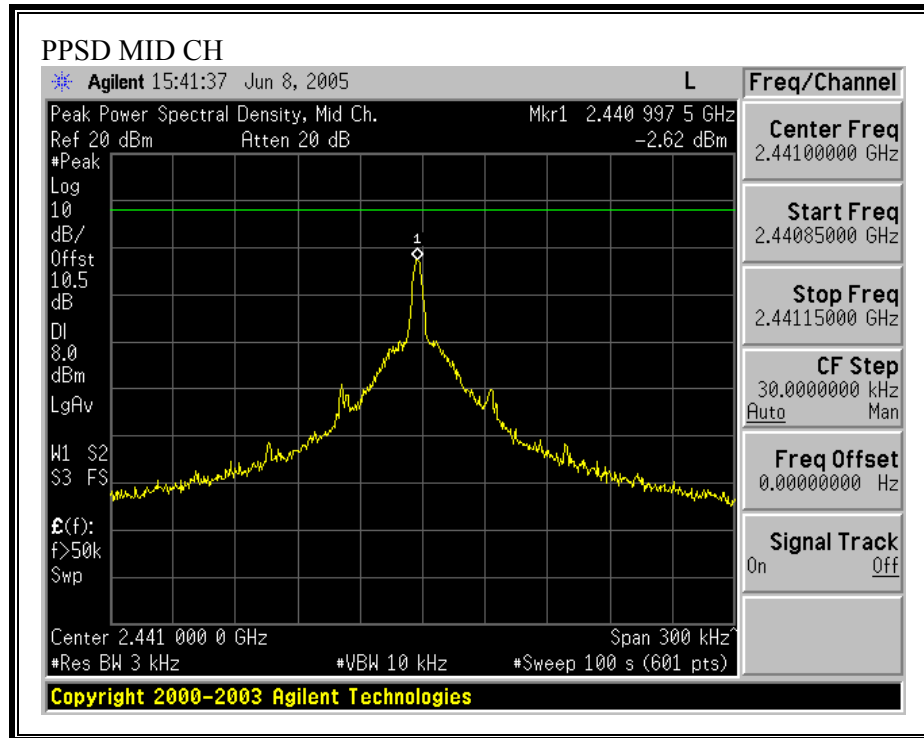
#### RESULTS

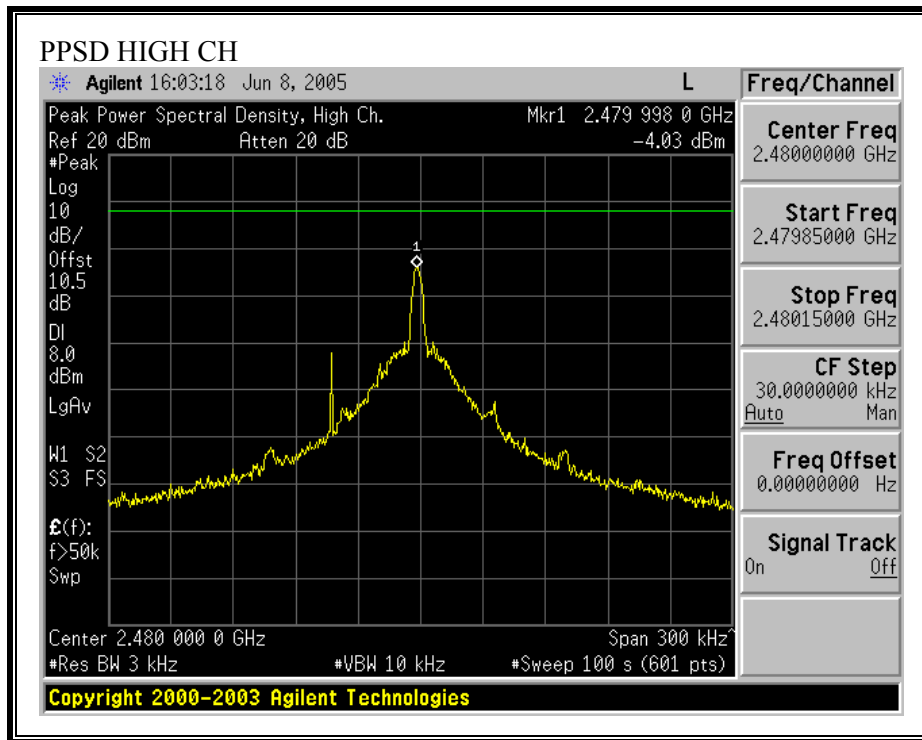
No non-compliance noted:

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-8.48	8	-16.48
Middle	2441	-2.62	8	-10.62
High	2480	-4.03	8	-12.03

**PEAK POWER SPECTRAL DENSITY**









## **7.1.8. 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**

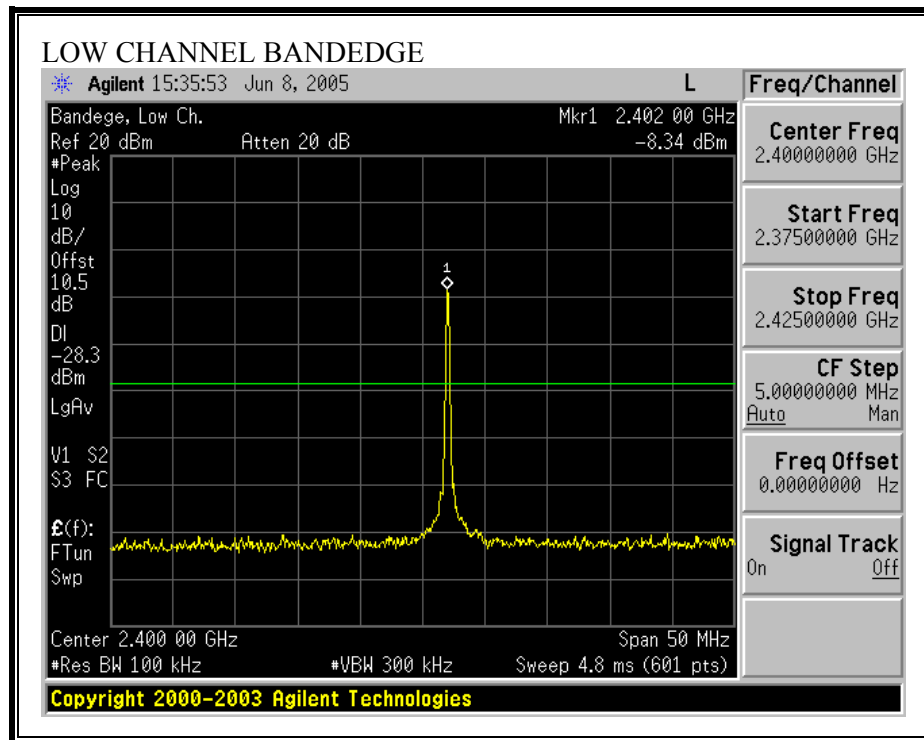
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

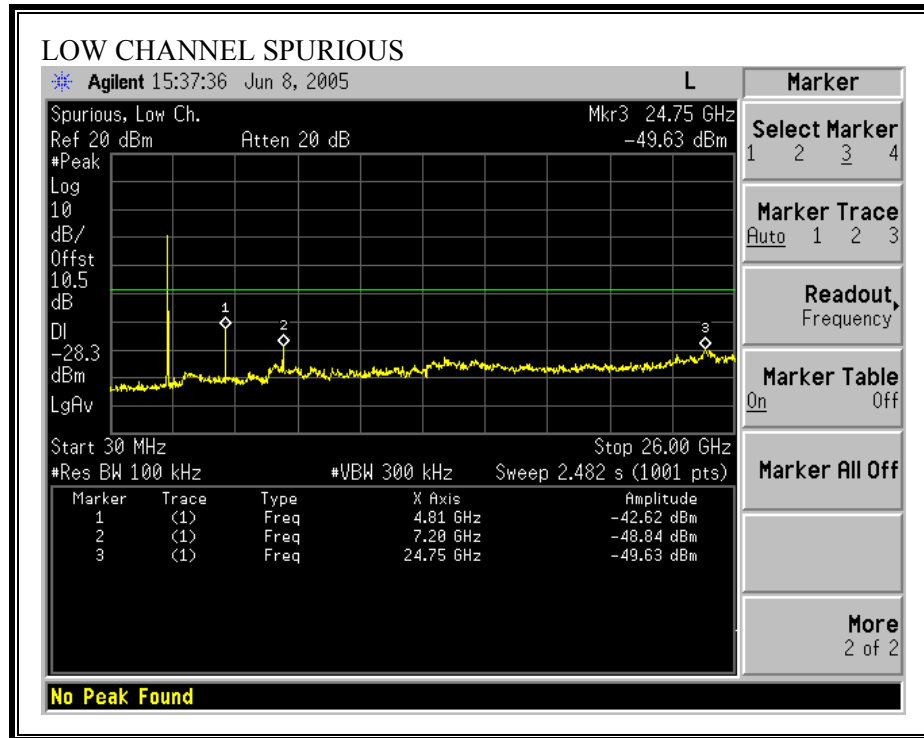
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

### **RESULTS**

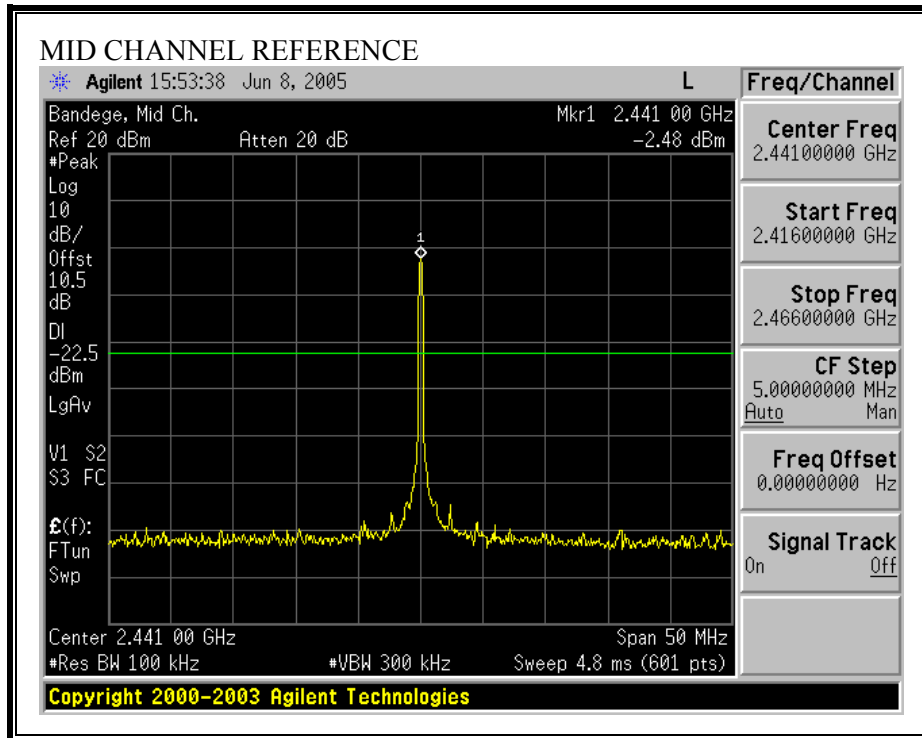
No non-compliance noted:

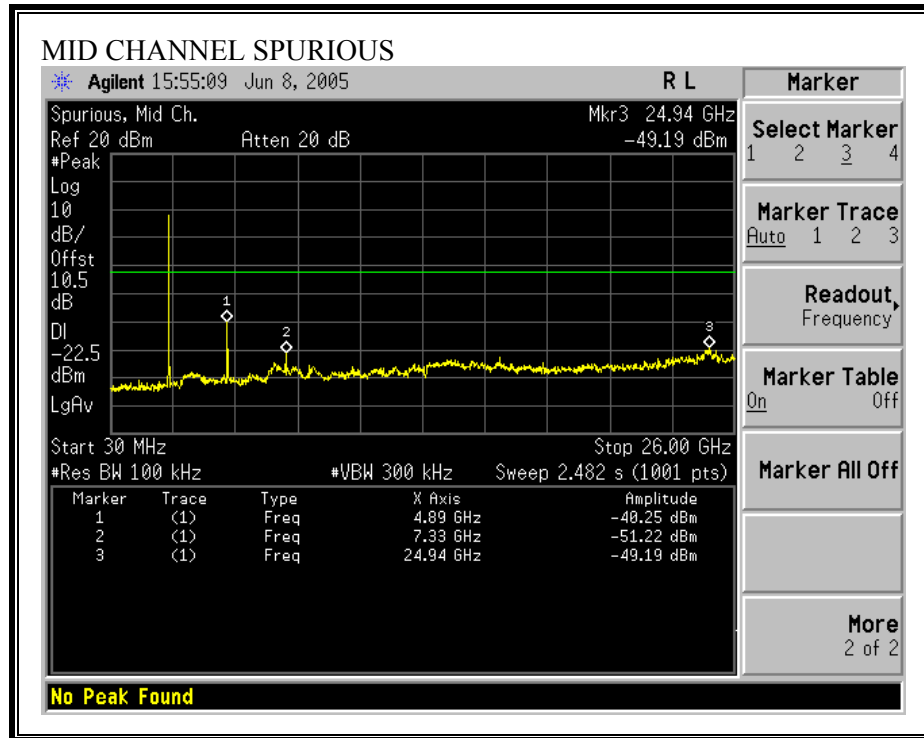
**SPURIOUS EMISSIONS, LOW CHANNEL**



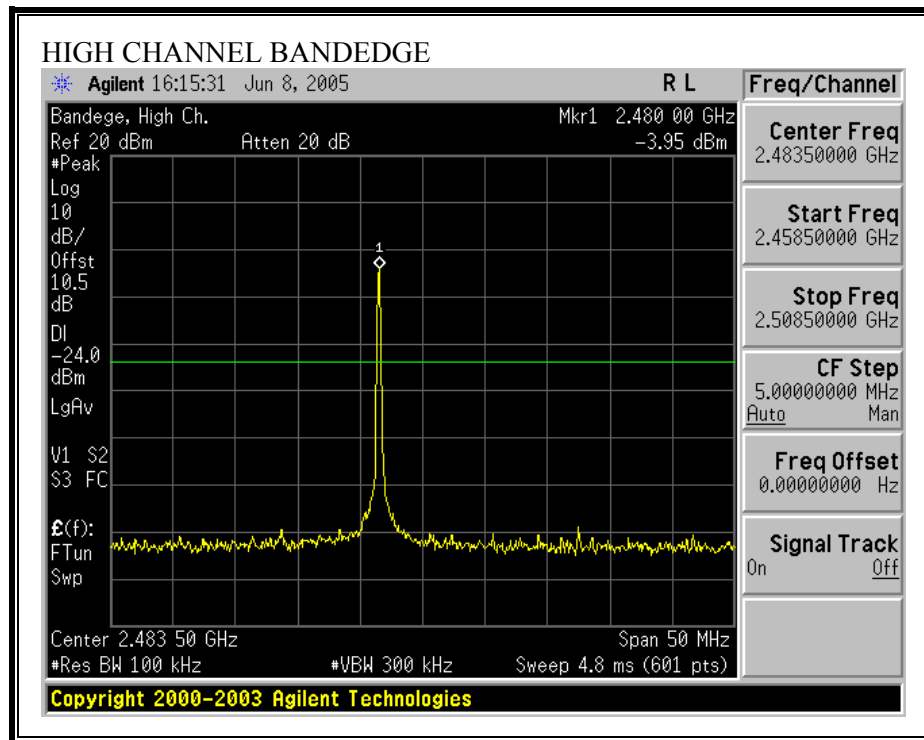


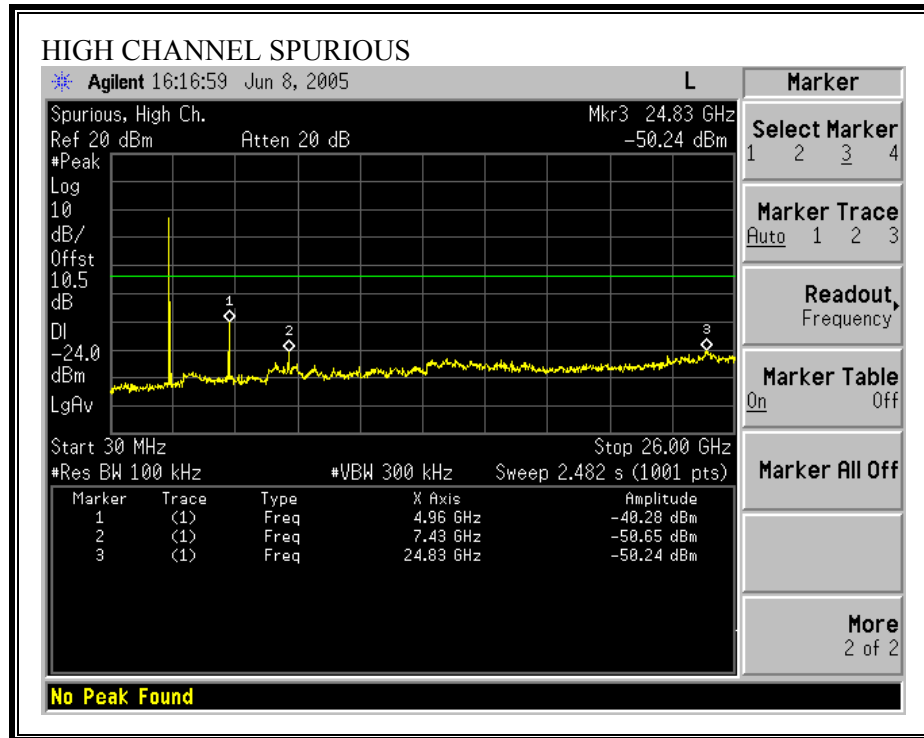
**SPURIOUS EMISSIONS, MID CHANNEL**



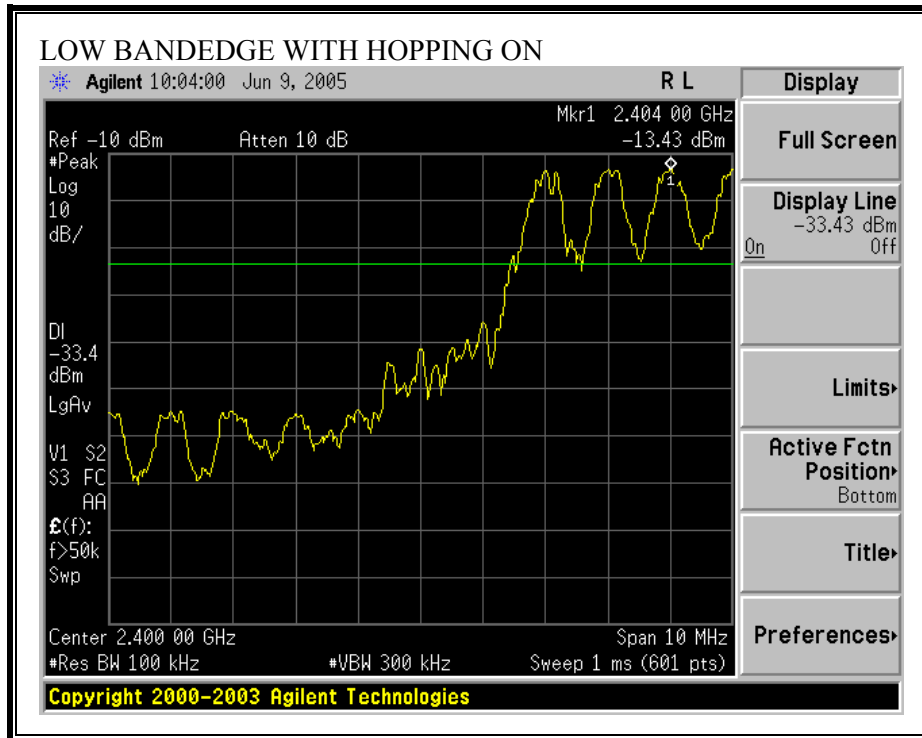


**SPURIOUS EMISSIONS, HIGH CHANNEL**

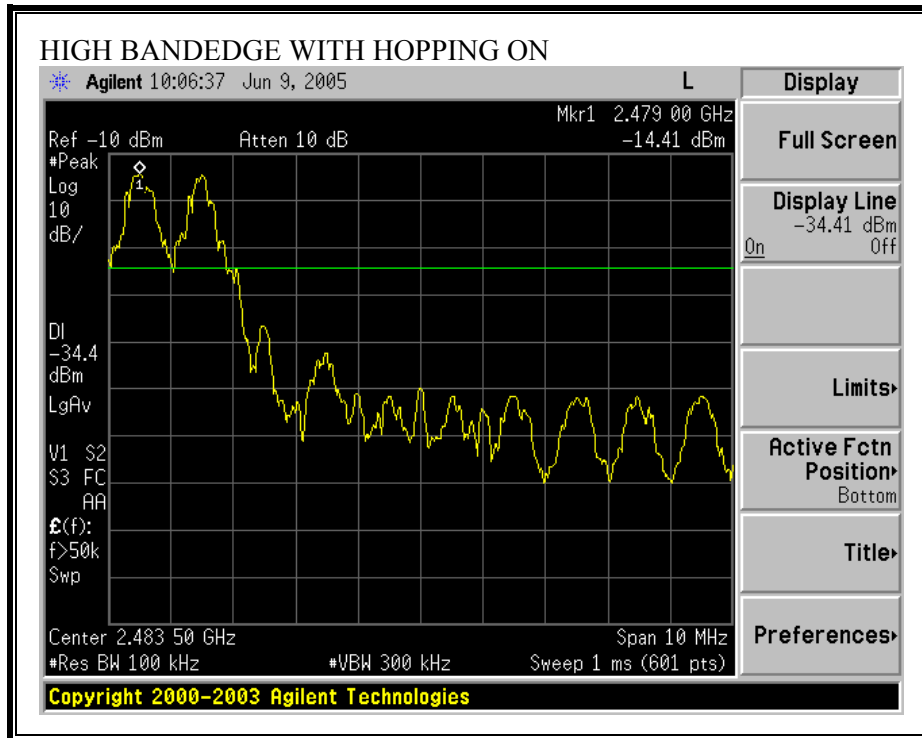




**SPURIOUS BANDEDGE EMISSIONS WITH HOPPING ON**







## 7.2. RADIATED EMISSIONS

### 7.2.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

#### LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 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	( <sup>2</sup> )
13.36 - 13.41			

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> 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.

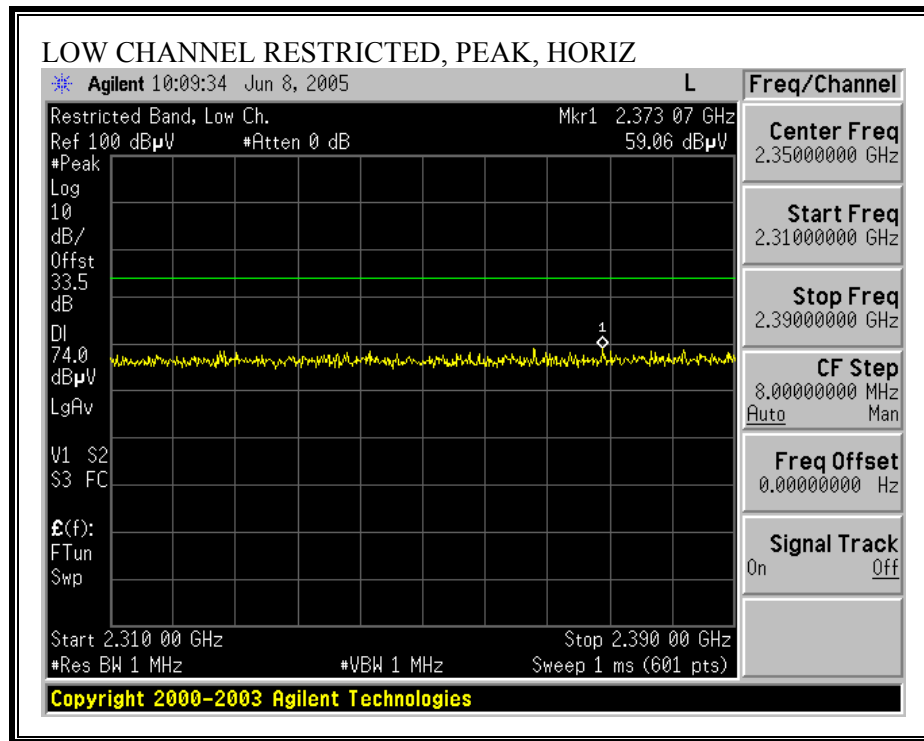
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

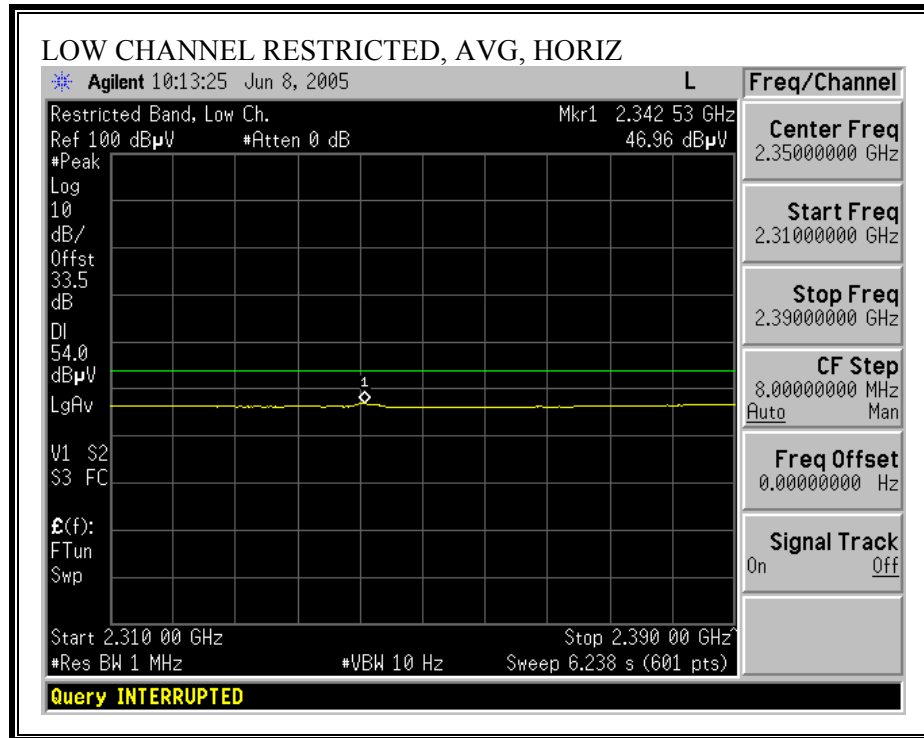
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

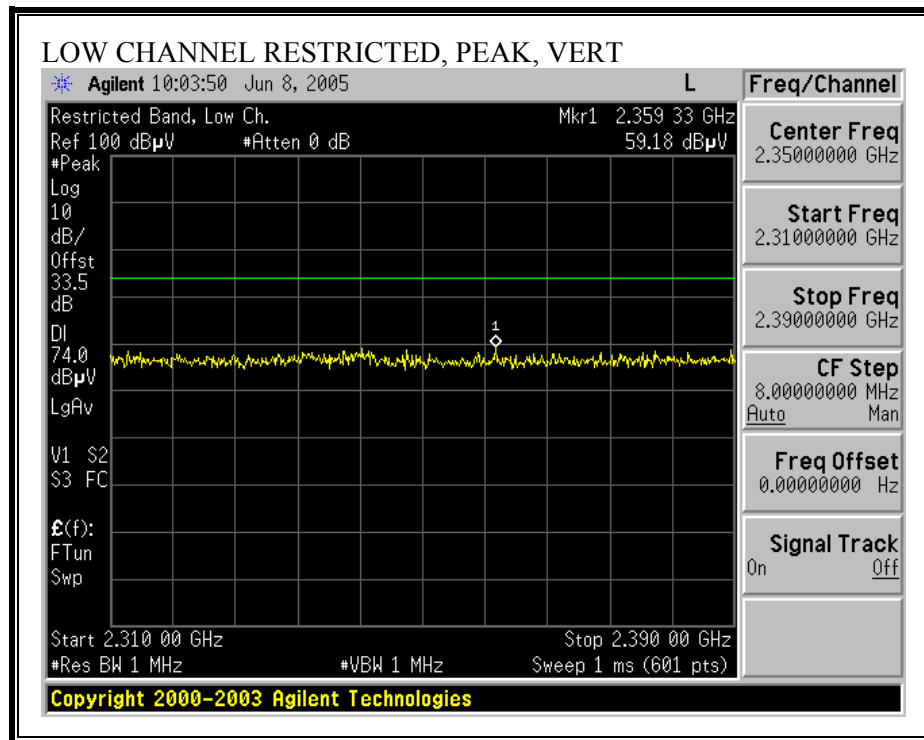
## 7.2.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

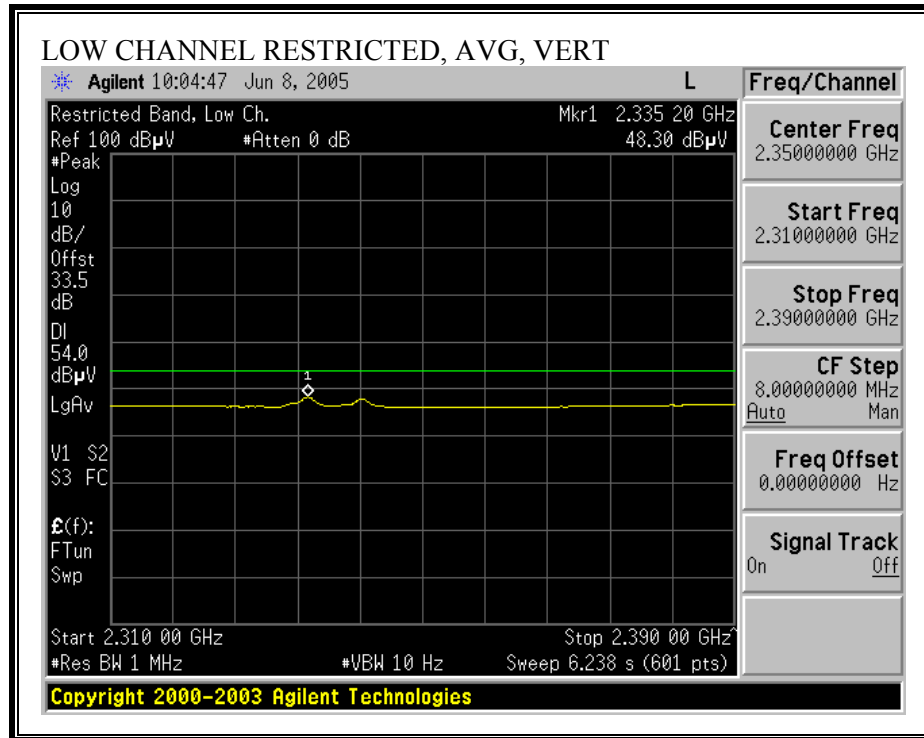
### RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)





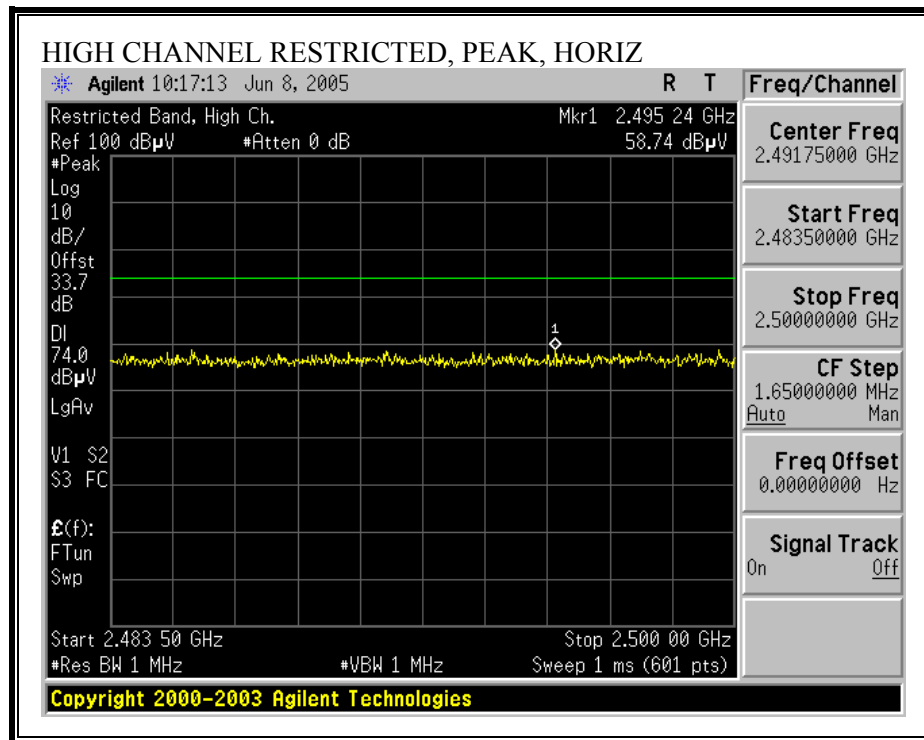
**RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)**

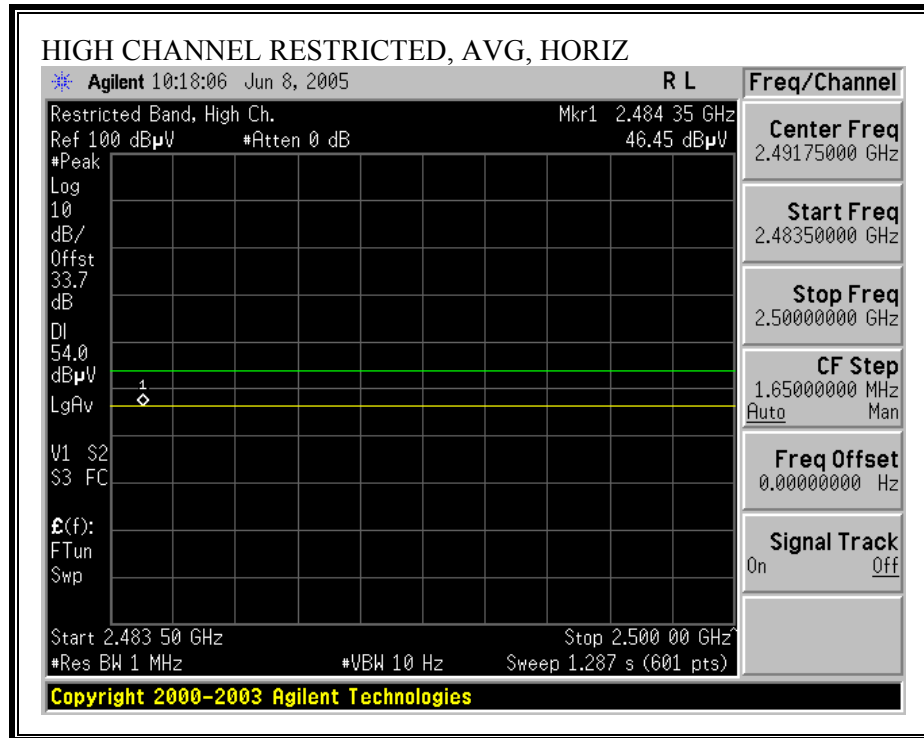




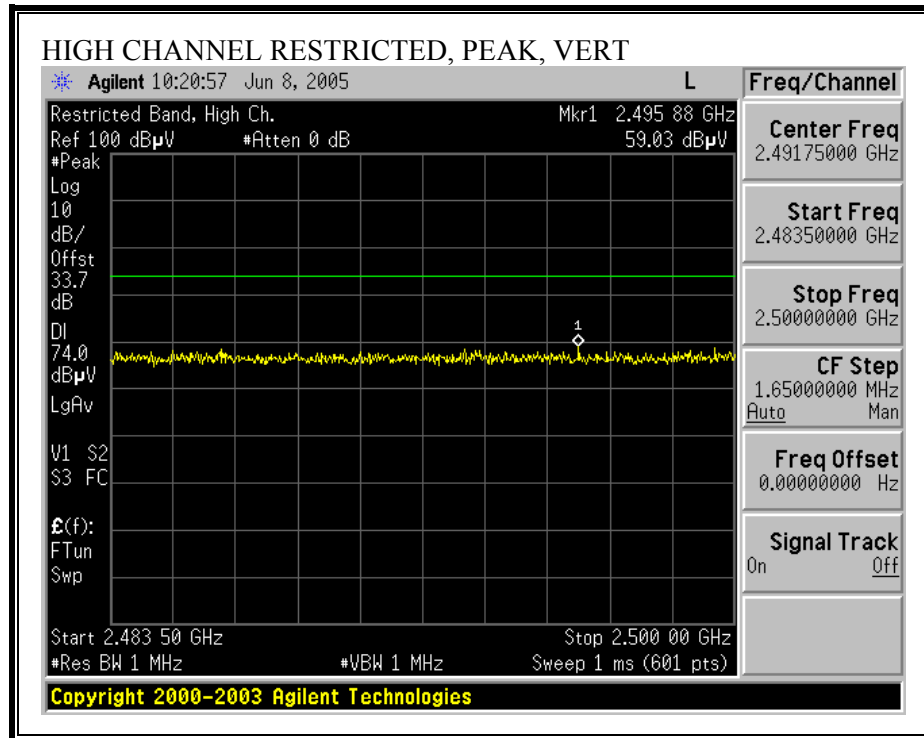


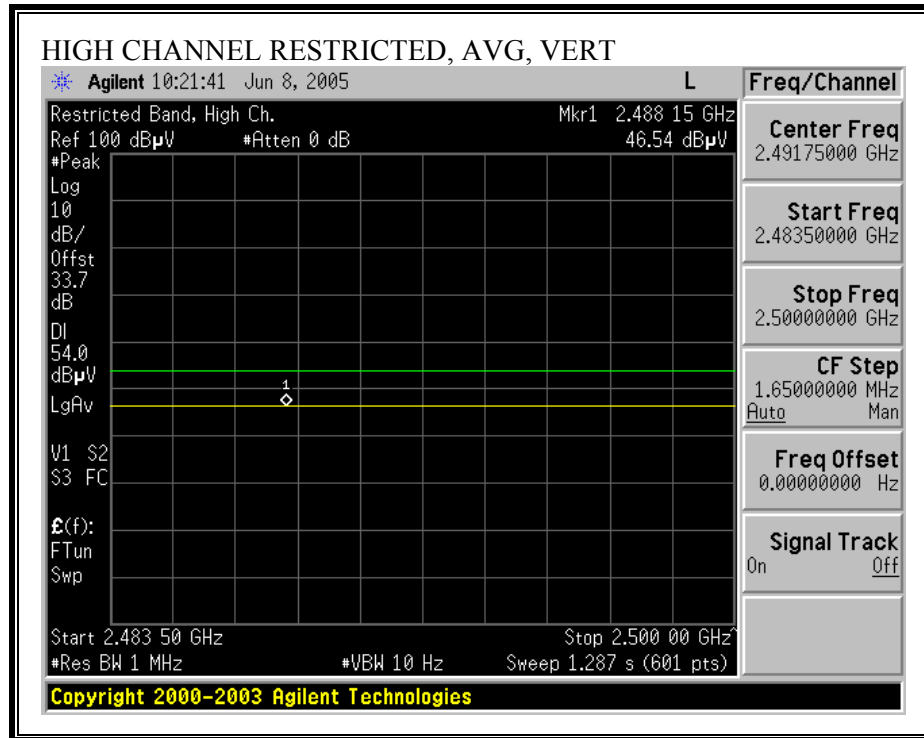
**RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)**





**RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)**





## HARMONICS AND SPURIOUS EMISSIONS

06/08/05 High Frequency Measurement

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: William Zhuang

Project #:

Company: PASCO

EUT Descrip.: Bluetooth Sensor Interface, Battery powered, (1) Antenna

EUT M/N: Imagiprobe Airlink

Test Target: FCC Part 15.247

Mode Oper: Tx On, Power level=30, without cover, antenna connected

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		

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)
<b>Low Ch. 2402MHz</b>															
4.804	3.0	55.8	53.5	34.0	3.2	-37.9	0.0	0.6	55.6	53.4	74.0	54.0	-18.4	-0.6	V
4.804	3.0	55.1	52.6	34.0	3.2	-37.9	0.0	0.6	55.0	52.5	74.0	54.0	-19.0	-1.5	H
7.206	3.0	45.3	33.2	35.6	3.9	-37.0	0.0	0.6	48.4	36.3	74.0	54.0	-25.6	-17.7	H
7.206	3.0	44.7	36.3	35.6	3.9	-37.0	0.0	0.6	47.8	39.5	74.0	54.0	-26.2	-14.5	V
<b>Mid Ch. 2441MHz</b>															
4.882	3.0	51.5	48.6	34.1	3.2	-37.9	0.0	0.6	51.5	48.6	74.0	54.0	-22.5	-5.4	V
4.882	3.0	51.1	47.9	34.1	3.2	-37.9	0.0	0.6	51.1	47.9	74.0	54.0	-22.9	-6.1	H
7.323	3.0	45.7	33.6	35.6	3.9	-36.9	0.0	0.6	49.0	36.9	74.0	54.0	-25.0	-17.1	H
7.323	3.0	44.5	33.1	35.6	3.9	-36.9	0.0	0.6	47.8	36.4	74.0	54.0	-26.2	-17.6	V
<b>High Ch. 2480MHz</b>															
4.960	3.0	49.6	45.7	34.1	3.3	-37.9	0.0	0.6	49.7	45.8	74.0	54.0	-24.3	-8.2	V
4.960	3.0	49.3	44.2	34.1	3.3	-37.9	0.0	0.6	49.5	44.4	74.0	54.0	-24.5	-9.6	H
7.440	3.0	43.7	31.6	35.7	4.0	-36.8	0.0	0.6	47.2	35.1	74.0	54.0	-26.8	-18.9	H
7.440	3.0	43.8	32.8	35.7	4.0	-36.8	0.0	0.6	47.3	36.3	74.0	54.0	-26.7	-17.7	V

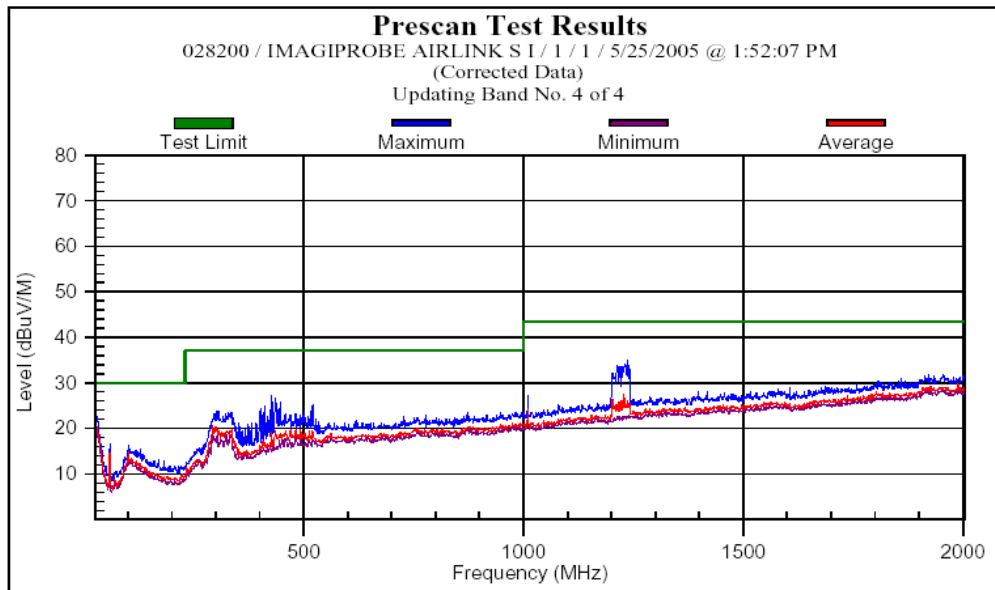
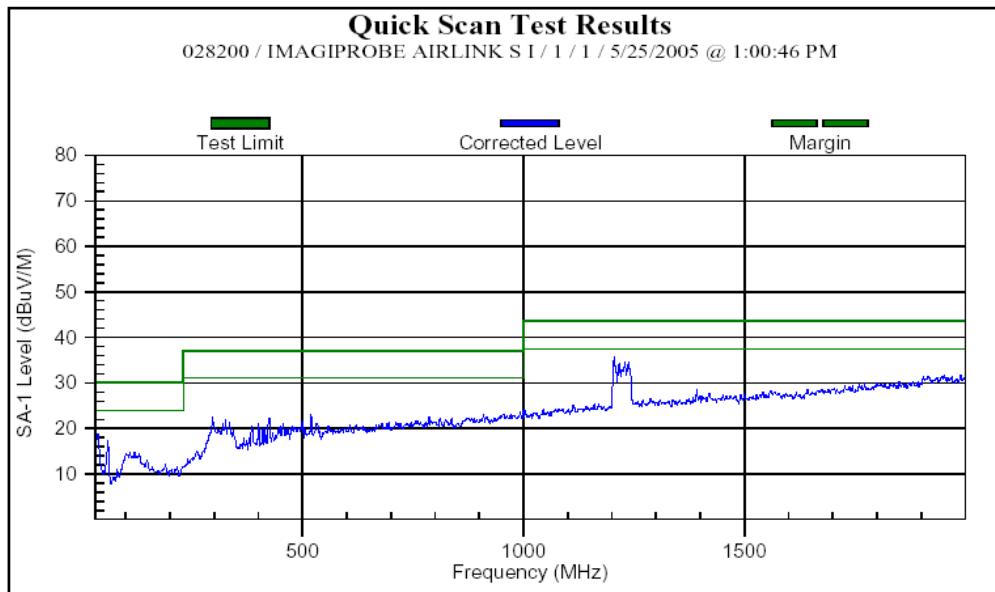
### 7.2.3. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

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

Note: 30 – 1000 MHz data is provided from H-P report, work order number 028200.

#### PLOTS

##### Data for: IMAGIPROBE AIRLINK S I, Unit: 1



## DATA

### Measured Data

Judgment: Passed by 10.2 dB

Frequency [MHz]	Polarity [V/H]	Receiver Reading* [dB(uV)]	Correction Factor** [dB/m]	Corrected Reading [dB(uV/m)]	Margin	10 Meter Limit [dB(uV/m)]
1225.13	H	50.7	-17.4	33.3(*Avg)	10.2	43.5
30.12	H	41.6	-27.0	14.6	15.4	30.0
1237.52	H	40.6	-17.4	23.2(*Avg)	20.3	43.5
1214.76	H	40.7	-17.6	23.1(*Avg)	20.4	43.5
1238.34	H	40.5	-17.4	23.1(*Avg)	20.4	43.5
432.07	H	42.8	-26.5	16.3	20.7	37.0

\* All readings less than 1000 MHz are quasi-peaked unless stated otherwise, using a QPA bandwidth of 120 kHz, with a 20 mS sweep time. All readings greater than 1000 MHz are averaged unless stated otherwise, using a bandwidth of 1 MHz, with a 20 mS sweep time.

### Greater than 1 GHz Peak Data

Judgement:

Passed – All frequencies above 1 GHz were observed in Peak mode and were at least 20dB below the legal limit.

\*Peak emissions greater than 1000 MHz are evaluated, using a bandwidth of 1 MHz, with a 20 mS sweep time.

\*\* Correction factor = Antenna factor + cable loss - amplifier gain

### 7.3. 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  $\mu$ 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

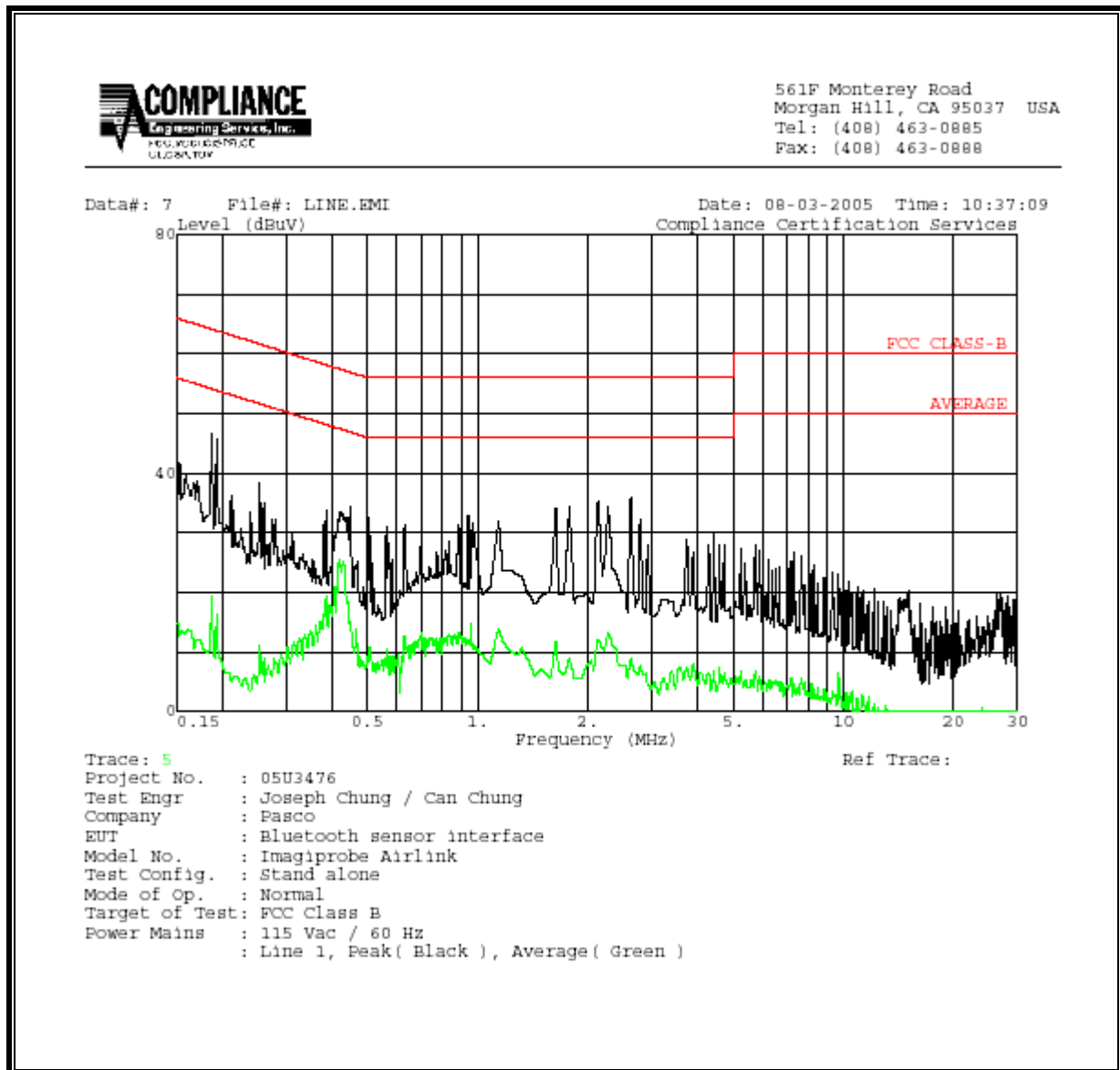
No non-compliance noted:



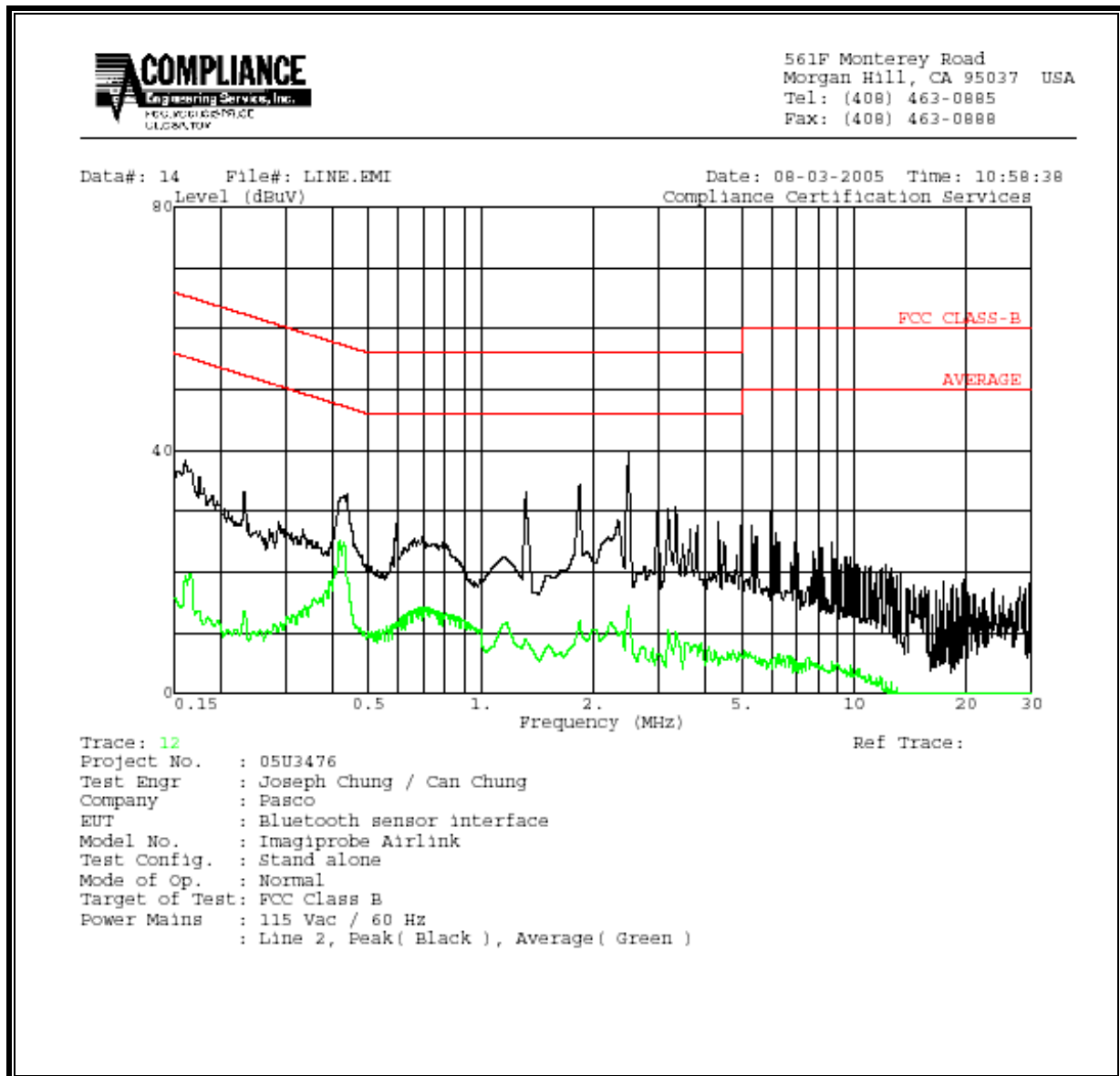
# **6 WORST EMISSIONS**

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	FCC B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.19	46.76	--	19.45	0.00	64.17	54.17	-17.41	-34.72	L1
0.42	33.46	--	25.56	0.00	57.47	47.47	-24.01	-21.91	L1
2.27	34.40	--	13.37	0.00	56.00	46.00	-21.60	-32.63	L1
0.17	38.42	--	19.73	0.00	65.21	55.21	-26.79	-35.48	L2
1.84	34.52	--	11.90	0.00	56.00	46.00	-21.48	-34.10	L2
2.49	39.86	--	14.35	0.00	56.00	46.00	-16.14	-31.65	L2
6 Worst Data									

**LINE 1 RESULT**

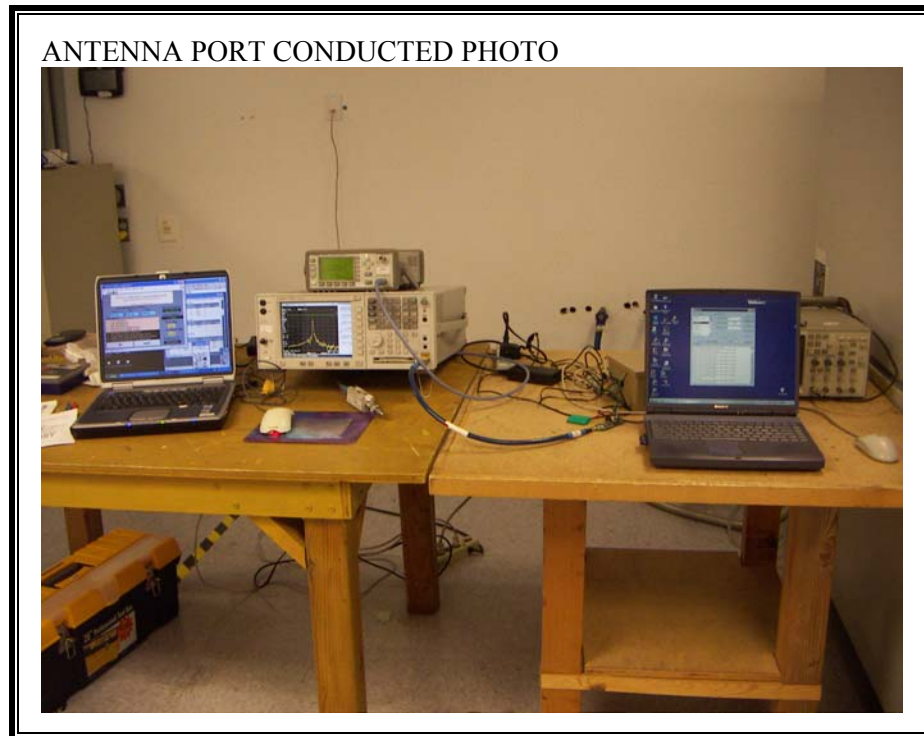


**LINE 2 RESULT**



## 8. SETUP PHOTOS

### ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



**RADIATED RF MEASUREMENT SETUP**

RADIATED FRONT PHOTO



RADIATED BACK PHOTO



**END OF REPORT**