



**FCC CFR47 PART 15 SUBPART C  
CERTIFICATION**

**CLASS II PERMISSIVE CHANGE**

**TEST REPORT**

**FOR**

**802.11a/b/g MINI PCI TYPE 3A CARD**

**MODEL NUMBER: WM3A2915ABG**

**FCC ID: E2K5HCKT**

**REPORT NUMBER: 04U3016-1**

**ISSUE DATE: OCTOBER 14, 2004**

*Prepared for*  
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Revision History

Rev.	Revisions	Revised By
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## 1. TEST RESULT DECLARATION

**COMPANY NAME:** DELL COMPUTER CORPORATION  
ONE DELL WAY  
ROUND ROCK, TX 78682, USA

**EUT DESCRIPTION:** 802.11a/b/g MINI PCI TYPE 3A CARD

**MODEL:** WM3A2915ABG

**DATE TESTED:** OCTOBER 5 – 11, 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:



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YAN ZHENG  
EMC SUPERVISOR  
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Tested By:



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THANH NGUYEN & HITACHI H. SOLANKI  
EMC ENGINEER  
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## 2. EUT DESCRIPTION

The EUT is an 802.11a/b/g Mini PCI type 3A card installed in DELL Gilbert platform with Wistron Triple-Band antenna and DELL Gilbert platform with Hitachi Monopole antenna.

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	19.40	87.10
2412 - 2462	802.11g	24.39	274.79

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	21.20	131.83

### **DELL GILBERT LAPTOP WITH WISTRON ANTENNA**

The radio utilizes two identical internal PIFA antennas for diversity. The Wistron antenna (model DC330014500) has a maximum gain of 2.61 dBi in the 2.4 GHz band and 2.37 dBi in the 5.8 GHz band.

### **DELL GILBERT LAPTOP WITH HITACHI ANTENNA**

The radio utilizes two identical internal Monopole antennas for diversity. The Hitachi antenna (model HFT17-DL03) has a maximum gain of 1.5 dBi in the 2.4 GHz band and 5.1 dBi in the 5.8 GHz band.

### 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>.



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
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-44	646456	8/17/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	9/12/2005
Spectrum Analyzer 20 Hz ~ 44 GHz	Agilent	E4446A	US42070220	4/1/2005
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/2004
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/13/2004
AC Power Source, 10KVA	ACS	AFC-10K-AFC-2	J1568	CNR
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/21/2004
RF Filter Section	HP	85420E	3705A00256	11/21/2004

## 6. SETUP OF EQUIPMENT UNDER TEST

### SUPPORT EQUIPMENT

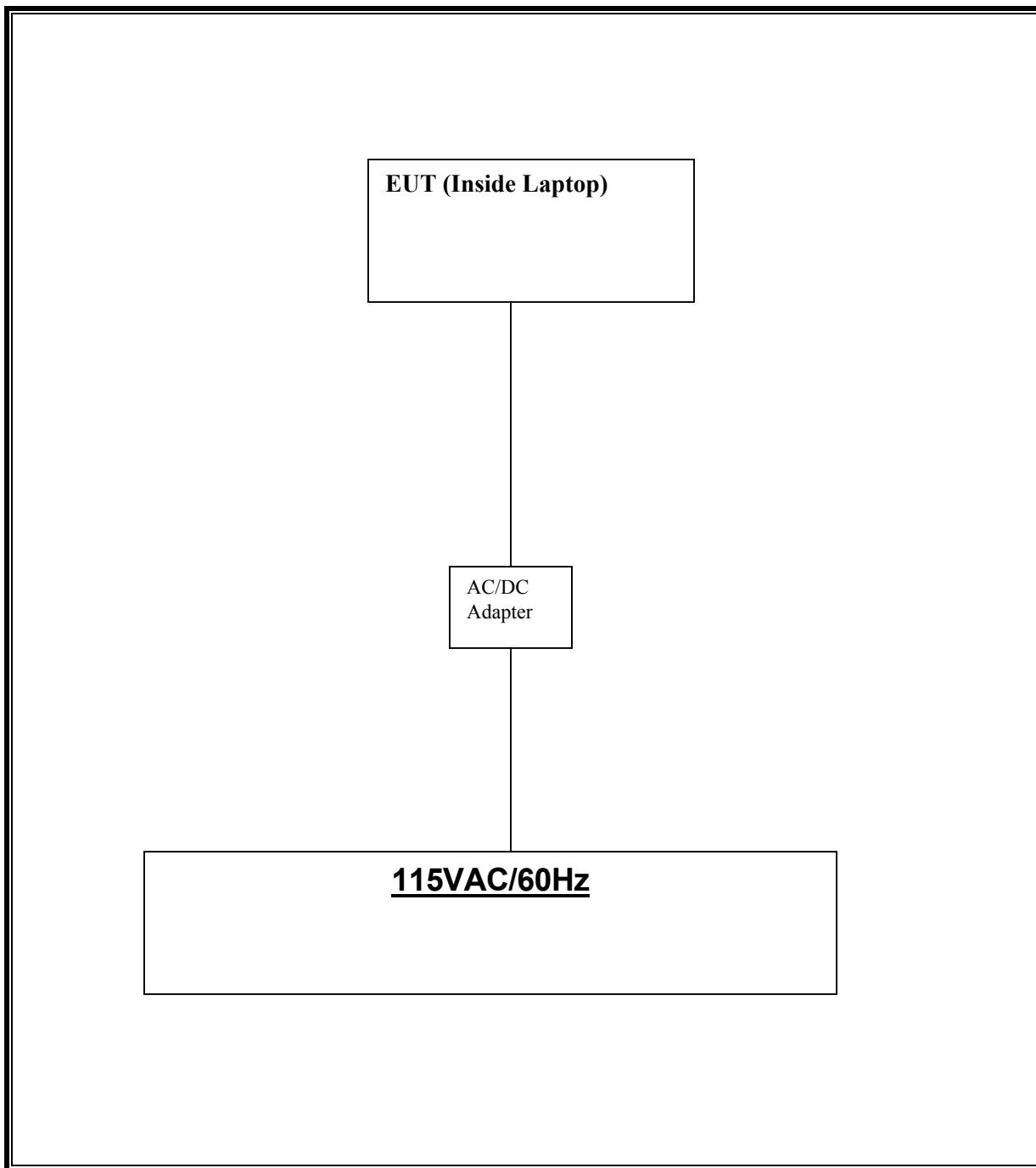
<b>PERIPHERAL SUPPORT EQUIPMENT LIST</b>					
<b>Description</b>	<b>Manufacturer</b>	<b>Model</b>	<b>Serial Number</b>	<b>FCC</b>	<b>NOTES</b>
LAPTOP	DELL	INSPIRON 9200	GIL056P2		with WNC-X02; #56
LAPTOP	DELL	INSPIRON 9200	GIL057P2		with HITACHIX02; #57
AC ADAPTER	DELL	PA-1900-02D	1B35	N/A	FOR LAPTOP#56
AC ADAPTER	DELL	PA-1900-02D	1AC8	N/A	FOR LAPTOP#57

### I/O CABLES

<b>I/O CABLE LIST</b>						
<b>Cable No.</b>	<b>Port</b>	<b># of Identical Ports</b>	<b>Connector Type</b>	<b>Cable Type</b>	<b>Cable Length</b>	<b>Remarks</b>
1	AC	1	USA115V	Unsheilded	1m	
2	DC	1	DC	Unsheilded	1.5m	Ferrite at EUT

### TEST SETUP

The EUT is installed in a host laptop computer. And the test software exercised the radio card



## 7. APPLICABLE LIMITS AND TEST RESULTS

### 7.1. CHANNEL TESTS

#### 7.1.1. PEAK OUTPUT POWER

##### PEAK POWER LIMIT

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

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

§15.247 (b) (4) Except as shown in paragraphs (b)(4) (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.

§15.247 (b) (4) (i) Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

##### TEST PROCEDURE

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

## RESULTS

The maximum antenna gain for 802.11b/g operation is 2.61 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

The maximum antenna gain for 802.11a operation is 5.1 dBi for other than fixed, point-to-point operations, therefore the limit is 30 dBm.

No non-compliance noted:

### 802.11b Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	17.65	30	-12.35
Middle	2437	19.02	30	-10.98
High	2462	19.4	30	-10.60

### 802.11g Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	24.39	30	-5.61
Middle	2437	24.36	30	-5.64
High	2462	23.94	30	-6.06

### 802.11a Mode

Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	21.2	30	-8.80
Middle	5785	20.56	30	-9.44
High	5825	20.65	30	-9.35

## 7.1.2. 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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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/cm<sup>2</sup>

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/cm<sup>2</sup>

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<sup>2</sup>

**RESULTS**

No non-compliance noted:

Wistron Antenna

Mode	Power Density Limit (mW/cm <sup>2</sup> )	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	19.40	2.61	3.55
802.11g	1.0	24.39	2.61	6.31
802.11a	1.0	21.20	2.37	4.25

Hitachi Antenna

Mode	Power Density Limit (mW/cm <sup>2</sup> )	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	19.40	1.50	3.13
802.11g	1.0	24.39	1.50	5.56
802.11a	1.0	21.20	5.10	5.82

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.

## 7.2. 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.

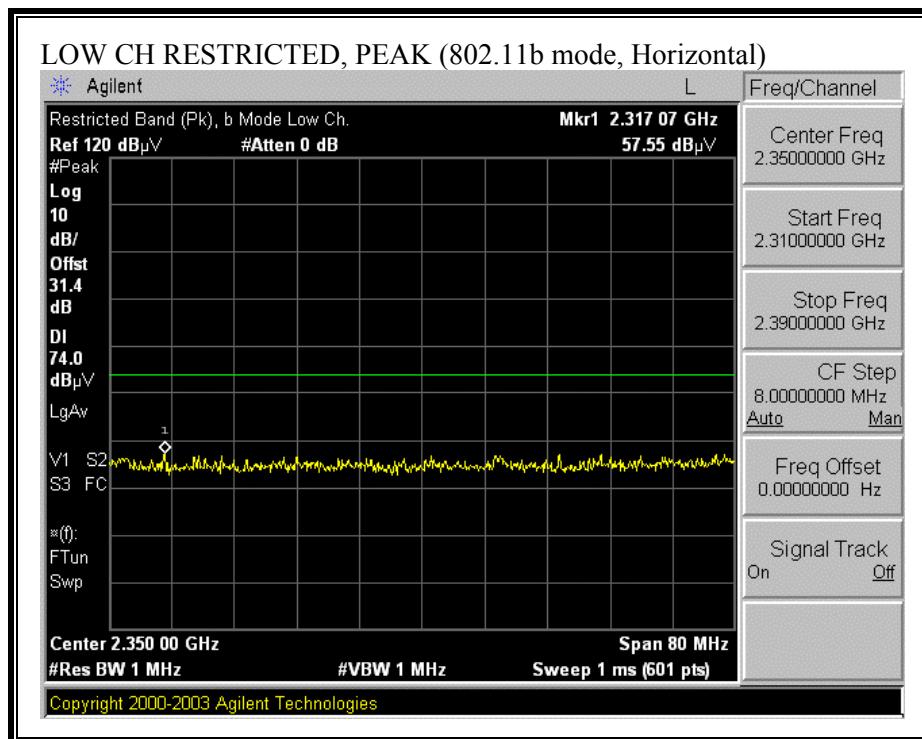
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

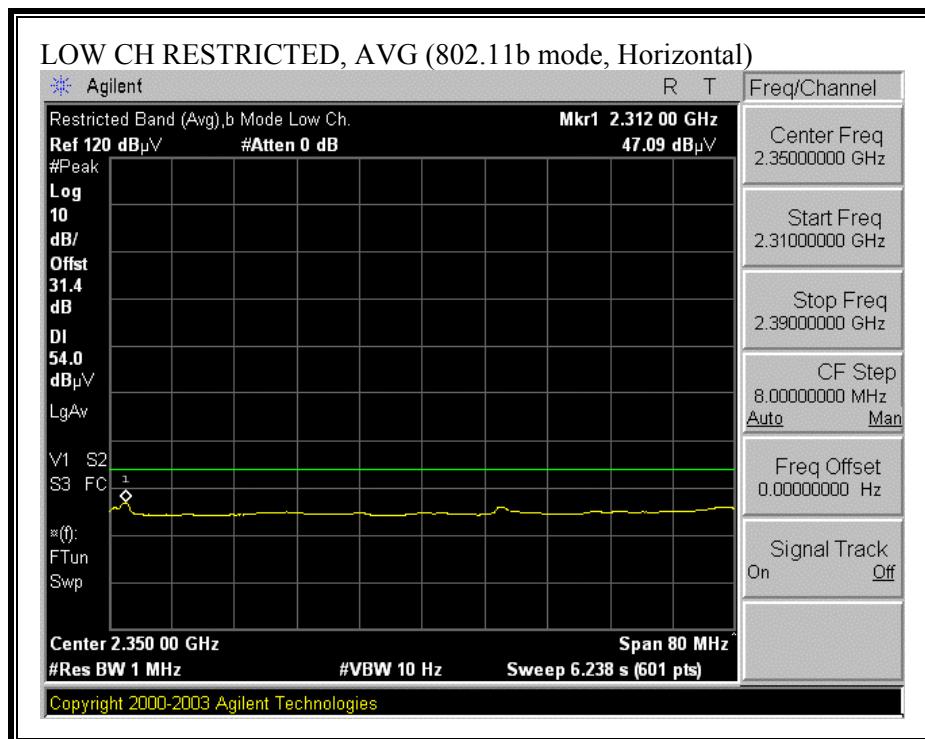
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

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.

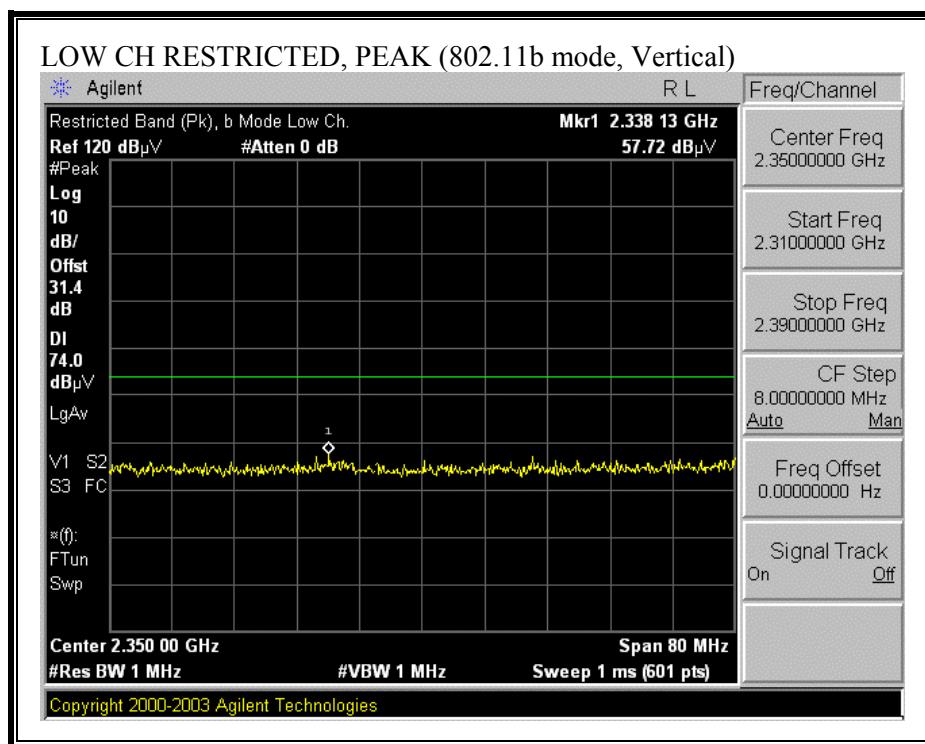
## 7.2.2. TRANSMITTER ABOVE 1GHz FOR 2400 TO 2483.5 MHz BAND WITH HITACHI ANTENNA

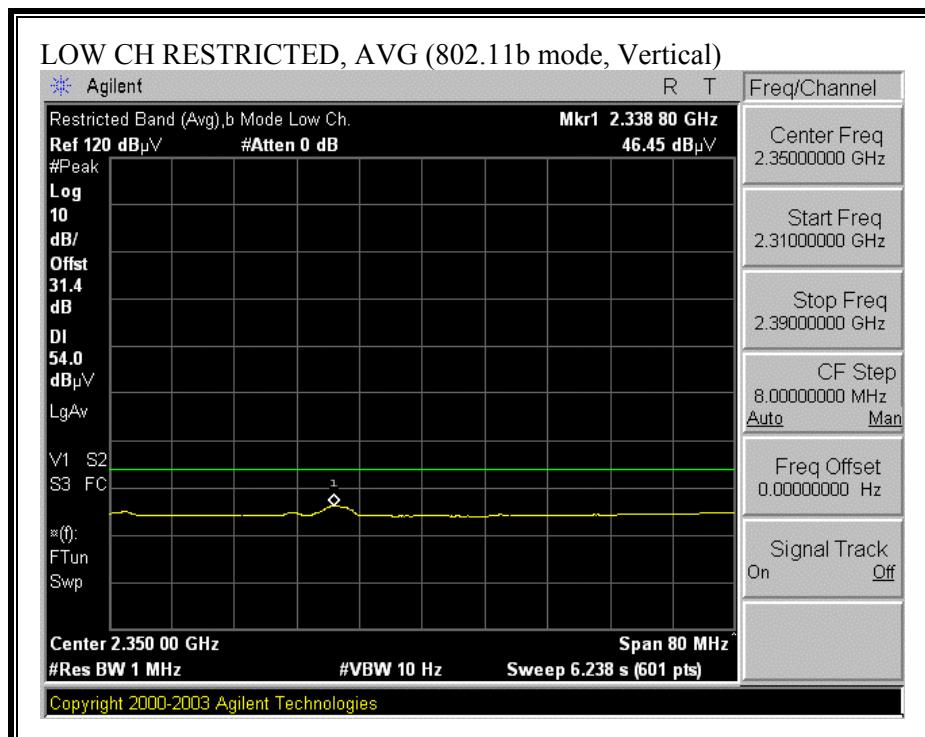
### RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



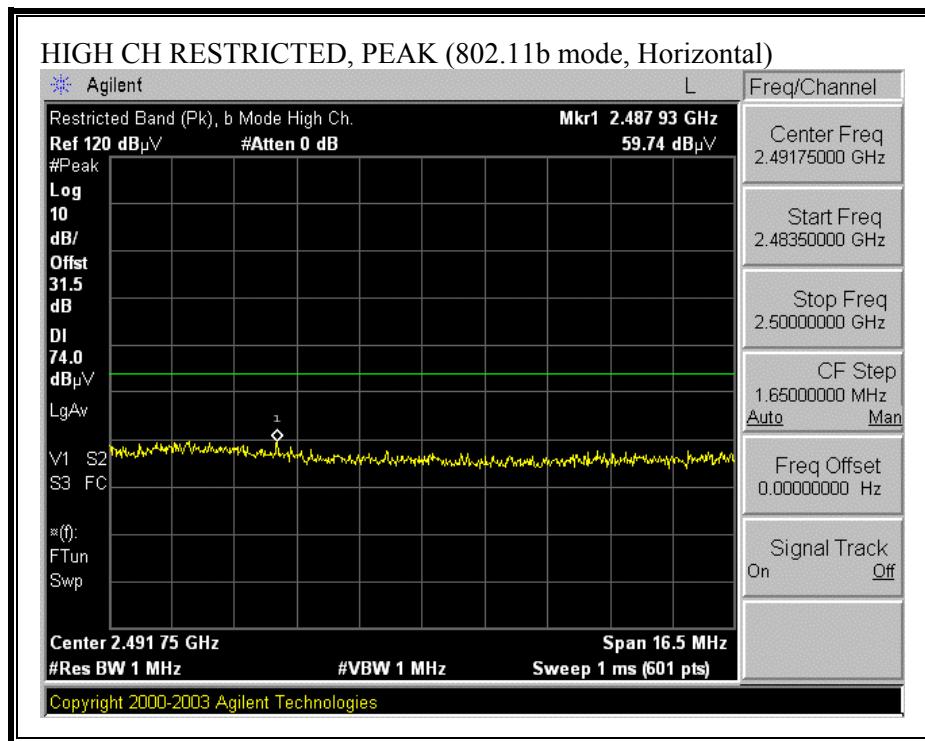


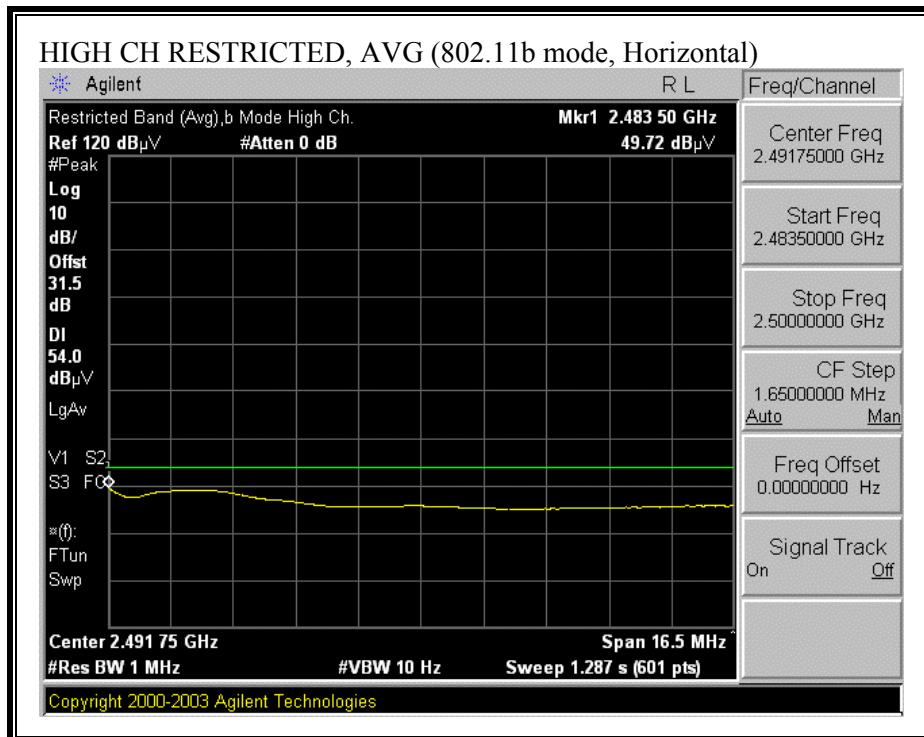
**RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)**



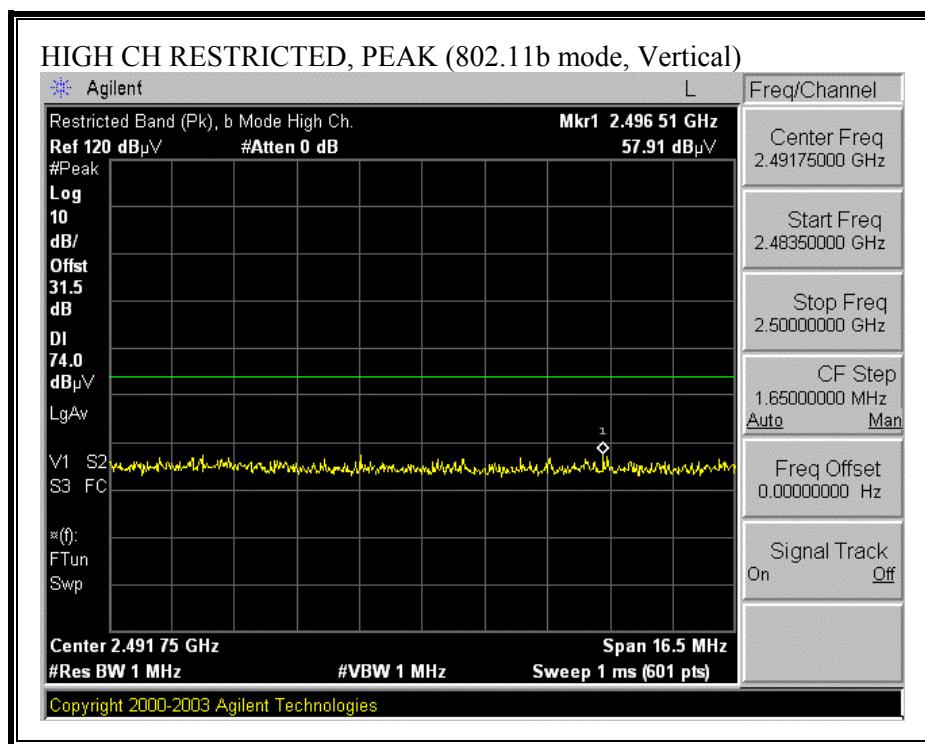


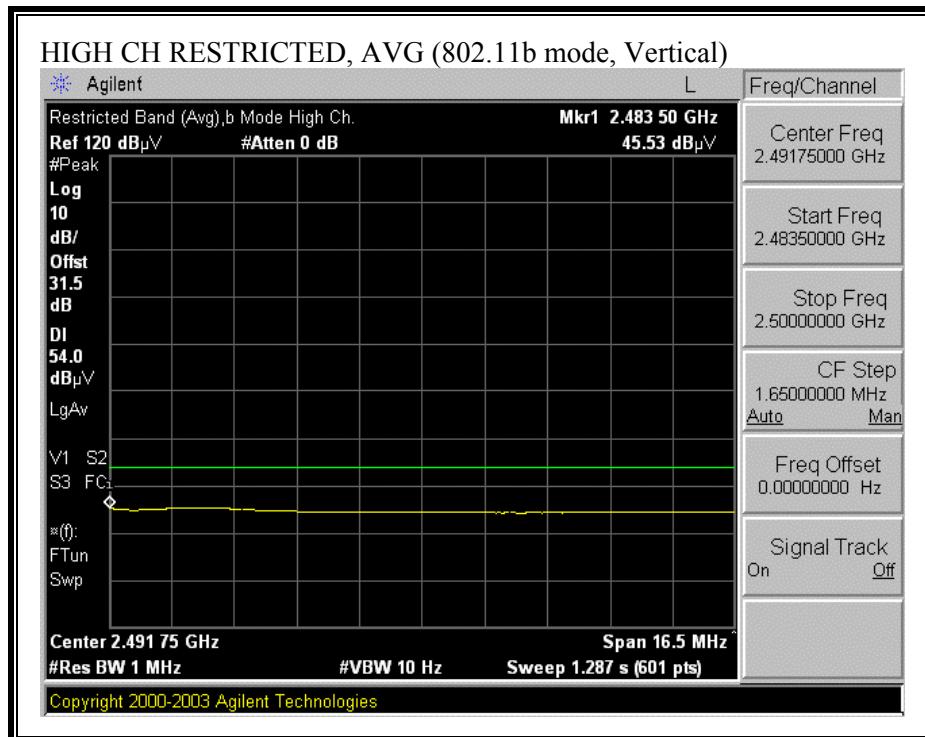
**RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)**





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



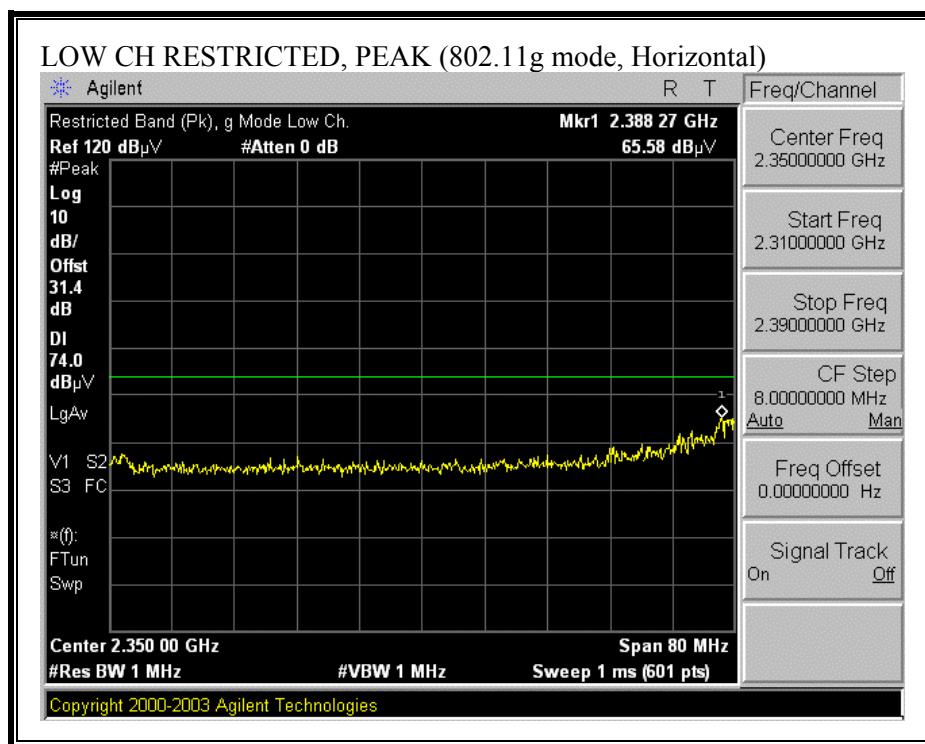


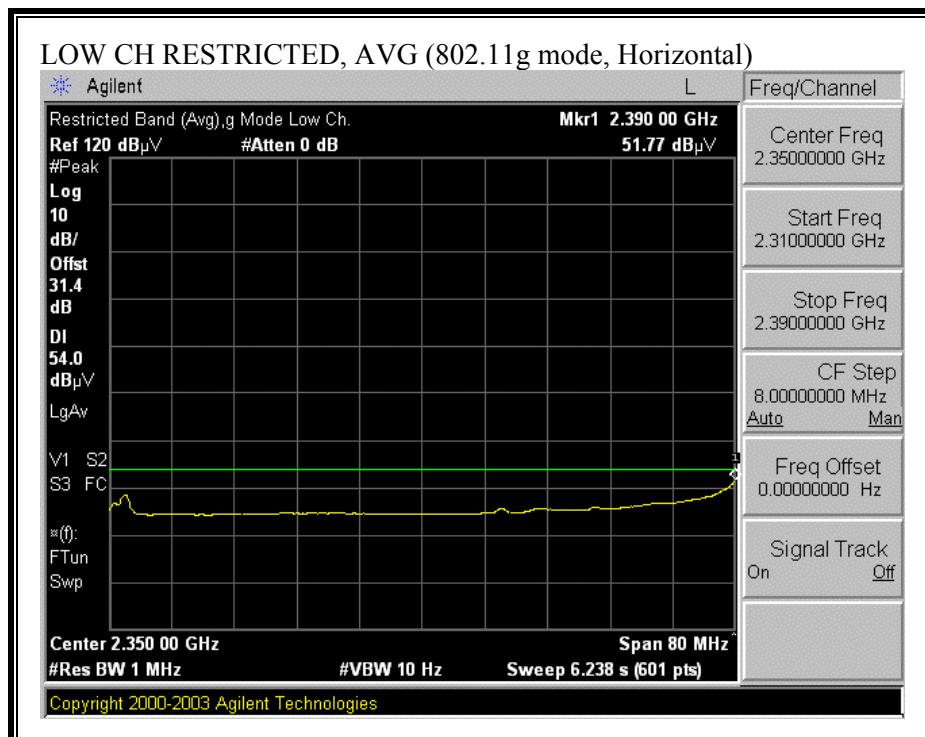
## HARMONICS AND SPURIOUS EMISSIONS (b MODE)

10/05/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr: Thanh Nguyen Project #: 04U3016-1 Company: INTEL Corporation EUT Descrip.: 802.11a/b/g Mini PCI type 3B Card, FCC ID#E2K5HCKT. EUT M/N: Test Target: FCC Part 15/247 Mode Oper: Tx b Mode															
Test Equipment:															
EMCO Horn 1-18GHz			Pre-amplifier 1-26GHz			Pre-amplifier 26-40GHz			Horn > 18GHz			Limit			
T60; S/N: 2238 @3m			T63 Miteq 646456									FCC 15.209			
Hi Frequency Cables 2 foot cable      3 foot cable      4 foot cable      12 foot cable 4_Thanh      12_Thanh															
									HPF			Reject Filter			
									HPF_4.0GHz			R_001			
Peak Measurements RBW=VBW=1MHz															
Average Measurements RBW=1MHz, VBW=10Hz															
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr 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 Channel															
Harmonics															
4.824	3.0	48.9	34.4	33.0	3.6	-35.5	0.0	0.6	50.6	36.1	74	54	-23.4	-17.9	V
4.824	3.0	47.0	40.6	33.0	3.6	-35.5	0.0	0.6	48.7	42.3	74	54	-25.3	-11.7	H
No harmonic emission above 2nd harmonic															
Spurious emissions															
1.330	3.0	60.1	40.1	25.0	1.8	-36.8	0.0	0.0	50.1	30.1	74	54	-23.9	-23.9	V
1.330	3.0	57.8	35.7	25.0	1.8	-36.8	0.0	0.0	47.8	25.8	74	54	-26.2	-28.2	H
1.856	3.0	52.4	36.2	27.2	2.1	-36.6	0.0	0.0	45.0	28.8	74	54	-29.0	-25.2	H
MID Channel															
Harmonics															
4.874	3.0	46.2	33.3	33.0	3.7	-35.5	0.0	0.6	47.9	35.0	74	54	-26.1	-19.0	V
4.874	3.0	46.7	33.2	33.0	3.7	-35.5	0.0	0.6	48.4	35.0	74	54	-25.6	-19.0	H
No harmonic emission above 2nd harmonic															
Spurious emissions															
1.331	3.0	62.8	40.0	25.0	1.8	-36.8	0.0	0.0	52.8	30.0	74	54	-21.2	-24.0	H
1.455	3.0	61.0	39.6	25.5	1.8	-36.7	0.0	0.0	51.6	30.2	74	54	-22.4	-23.8	H
1.558	3.0	60.5	38.6	26.0	1.9	-36.7	0.0	0.0	51.6	29.7	74	54	-22.4	-24.3	H
1.572	3.0	61.3	38.2	26.0	1.9	-36.7	0.0	0.0	52.5	29.4	74	54	-21.5	-24.6	V
HIGH Channel															
Harmonics															
4.924	3.0	46.6	33.9	33.0	3.7	-35.5	0.0	0.6	48.4	35.7	74	54	-25.6	-18.3	V
4.924	3.0	46.5	36.3	33.0	3.7	-35.5	0.0	0.6	48.4	38.1	74	54	-25.6	-15.9	H
No harmonic emission above 2nd harmonic															
Spurious emissions															
1.330	3.0	62.0	40.0	25.0	1.8	-36.8	0.0	0.0	52.0	30.0	74	54	-22.0	-24.0	H
1.572	3.0	56.0	36.7	26.0	1.9	-36.7	0.0	0.0	47.3	28.0	74	54	-26.7	-26.0	H
1.330	3.0	58.7	36.4	25.0	1.8	-36.8	0.0	0.0	48.7	26.4	74	54	-25.3	-27.6	V
1.557	3.0	55.0	36.7	26.0	1.9	-36.7	0.0	0.0	46.2	27.8	74	54	-27.8	-26.2	V
1.856	3.0	55.4	36.0	27.2	2.1	-36.6	0.0	0.0	48.1	28.6	74	54	-25.9	-25.4	V
1.456	3.0	54.2	35.8	25.5	1.8	-36.7	0.0	0.0	44.8	26.4	74	54	-29.2	-27.6	V

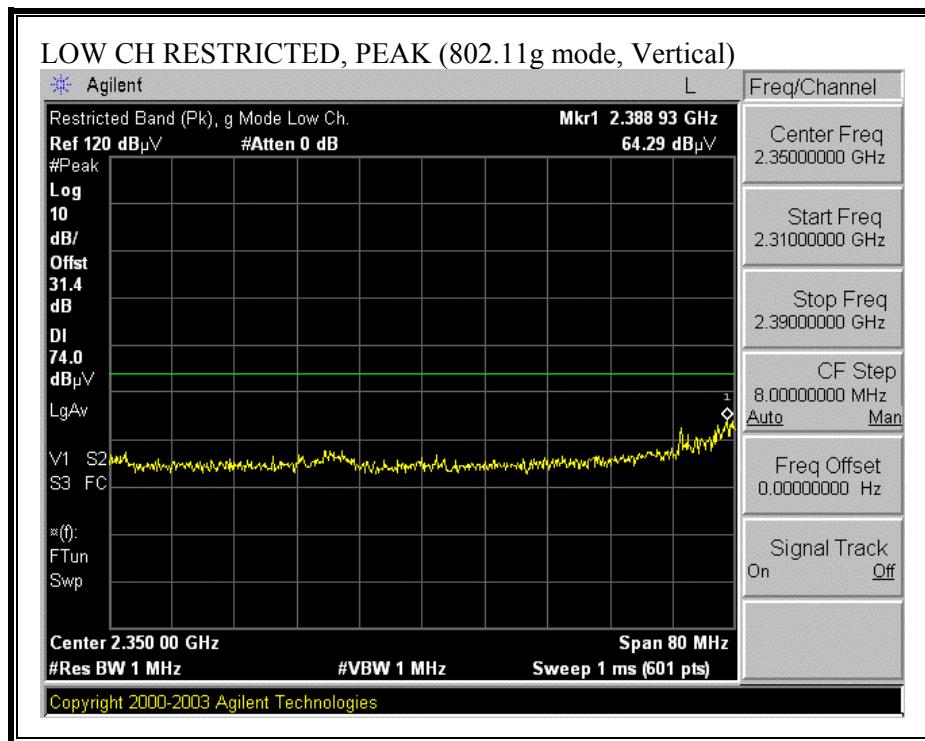
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 Read Analyzer Reading  
 AF Antenna Factor  
 CL Cable Loss  
 Amp Preamp Gain  
 D Corr Distance Correct to 3 meters  
 Avg Average Field Strength @ 3 m  
 Peak Calculated Peak Field Strength  
 HPF High Pass Filter  
 Avg Lim Average Field Strength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

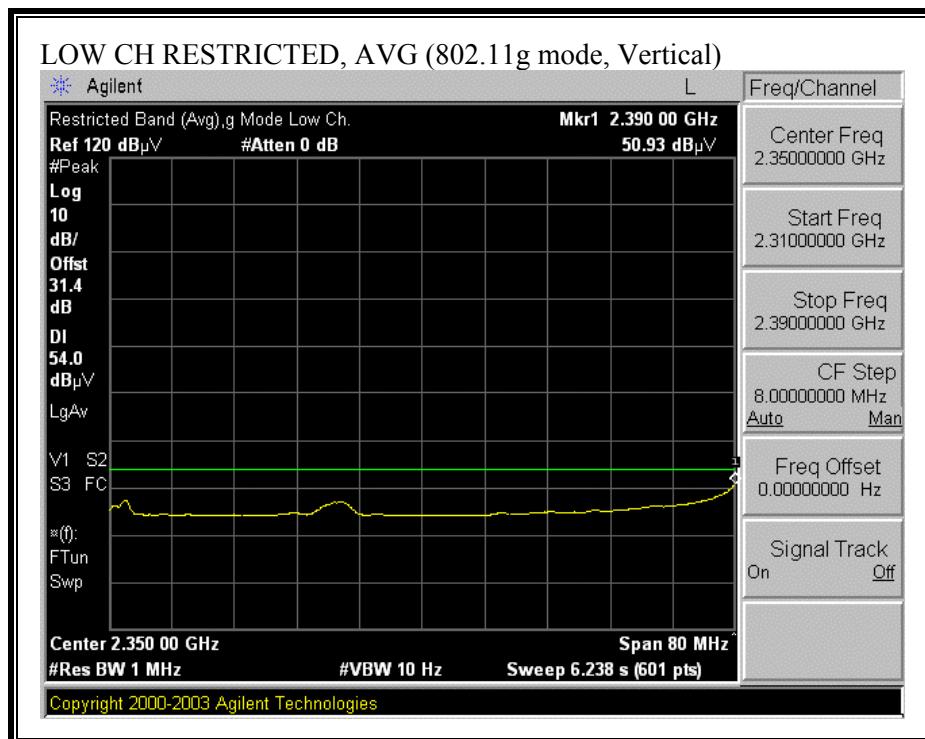
**RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)**



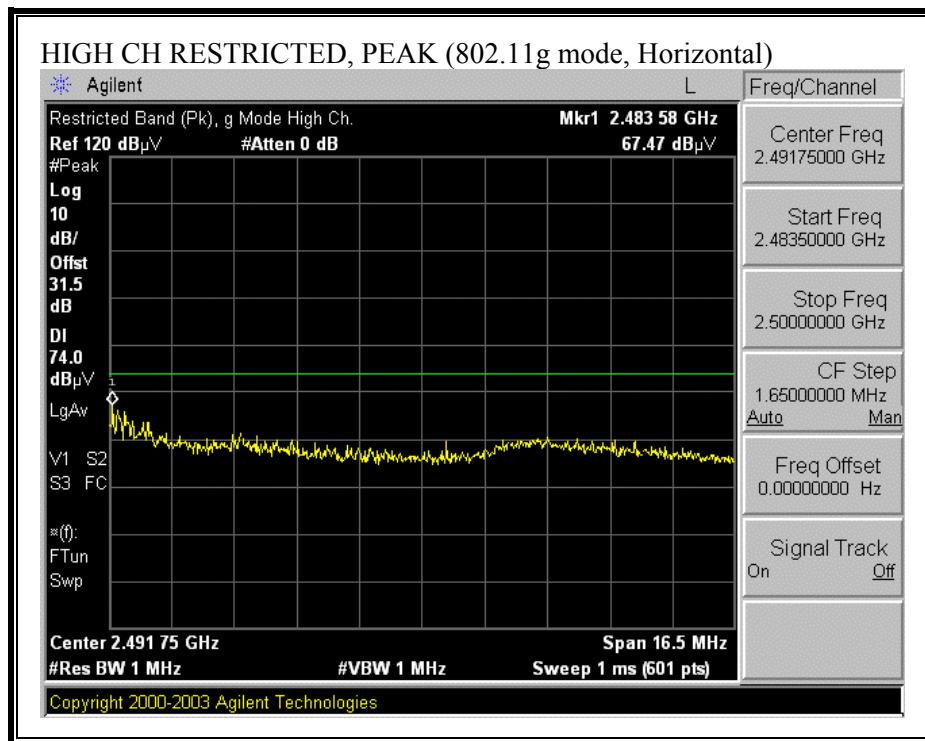


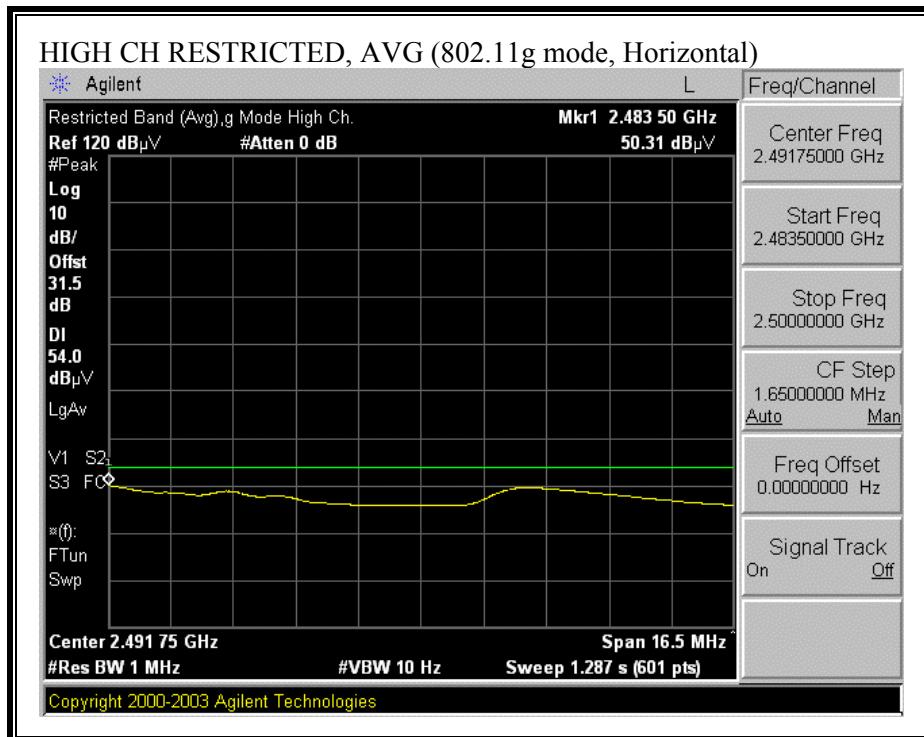
**RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)**



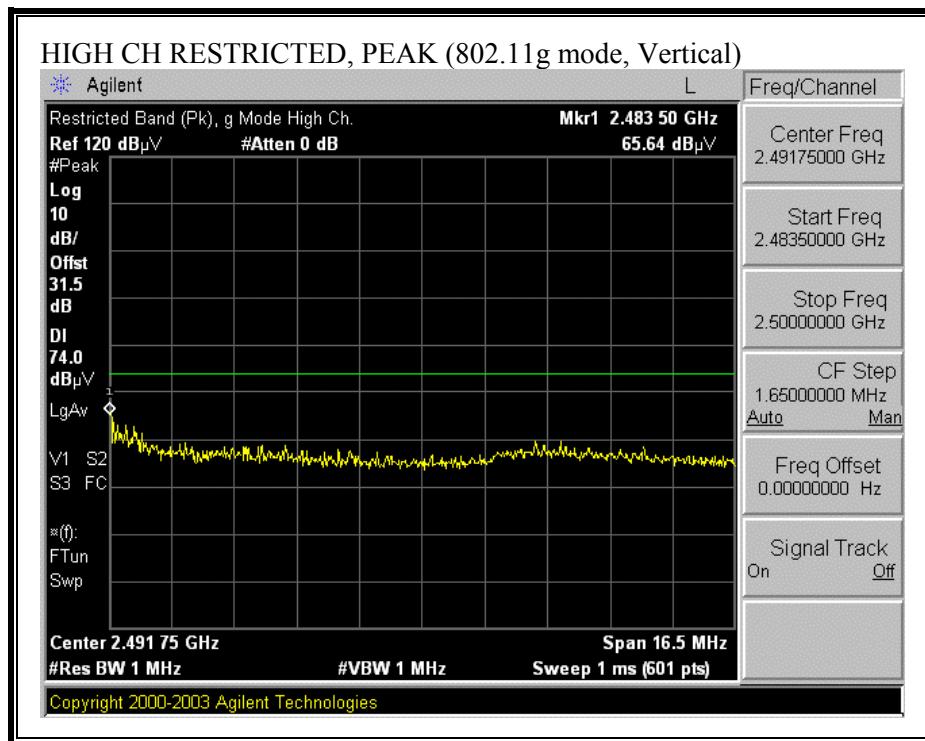


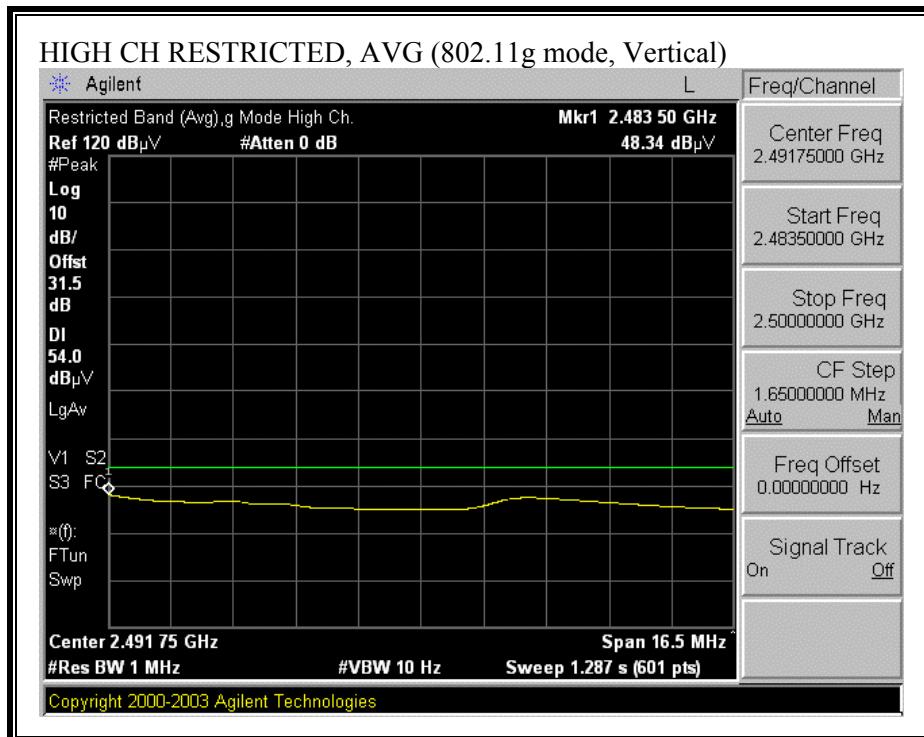
**RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)**





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





## HARMONICS AND SPURIOUS EMISSIONS (g MODE)

10/05/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Test Engr: Thanh Nguyen Project #: 04U3016-1 Company: INTEL Corporation EUT Descrip.: 802.11a/b/g Mini PCI type 3B Card, FCC ID#E2K5HCKT. EUT M/N: Test Target: FCC Part 15/247 Mode Oper: Tx g Mode																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
<b>Test Equipment:</b> <table border="1"> <tr> <td>EMCO Horn 1-18GHz</td> <td>Pre-amplifier 1-26GHz</td> <td>Pre-amplifier 26-40GHz</td> <td colspan="3">Horn &gt; 18GHz</td> <td>Limit</td> </tr> <tr> <td>T60; S/N: 2238 @3m</td> <td>T63 Miteq 646456</td> <td></td> <td colspan="3"></td> <td>FCC 15.209</td> </tr> <tr> <td colspan="6">Hi Frequency Cables</td> <td>Peak Measurements</td> </tr> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>4 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> <td>RBW=VBW=1MHz</td> </tr> <tr> <td></td> <td></td> <td>4_Thanh</td> <td>12_Thanh</td> <td>HPF_4.0GHz</td> <td>R_001</td> <td>Average Measurements</td> </tr> <tr> <td colspan="15">RBW=1MHz ; VBW=10Hz</td> </tr> </table>															EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz			Limit	T60; S/N: 2238 @3m	T63 Miteq 646456					FCC 15.209	Hi Frequency Cables						Peak Measurements	2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	RBW=VBW=1MHz			4_Thanh	12_Thanh	HPF_4.0GHz	R_001	Average Measurements	RBW=1MHz ; VBW=10Hz																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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<tr> <td colspan="15"><b>Spurious emissions</b></td> </tr> <tr> <td>1.330</td> <td>3.0</td> <td>60.1</td> <td>40.1</td> <td>25.0</td> <td>1.8</td> <td>-36.8</td> <td>0.0</td> <td>0.0</td> <td>50.1</td> <td>30.1</td> <td>74</td> <td>54</td> <td>-23.9</td> <td>-23.9</td> <td>V</td> </tr> <tr> <td>1.330</td> <td>3.0</td> <td>57.8</td> <td>35.7</td> <td>25.0</td> <td>1.8</td> <td>-36.8</td> <td>0.0</td> <td>0.0</td> <td>47.8</td> <td>25.8</td> <td>74</td> <td>54</td> <td>-26.2</td> <td>-28.2</td> <td>H</td> </tr> <tr> <td>1.856</td> <td>3.0</td> <td>52.4</td> <td>36.2</td> <td>27.2</td> <td>2.1</td> <td>-36.6</td> <td>0.0</td> <td>0.0</td> <td>45.0</td> <td>28.8</td> <td>74</td> <td>54</td> <td>-29.0</td> <td>-25.2</td> <td>H</td> </tr> <tr> <td colspan="15"><b>MID Channel</b></td> </tr> <tr> <td colspan="15"><b>Harmonics</b></td> </tr> <tr> <td>4.874</td> <td>3.0</td> <td>46.2</td> <td>33.3</td> <td>33.0</td> <td>3.7</td> <td>-35.5</td> <td>0.0</td> <td>0.6</td> <td>47.9</td> 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4.824	3.0	47.0	40.6	33.0	3.6	-35.5	0.0	0.6	48.7	42.3	74	54	-25.3	-11.7	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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1.330	3.0	60.1	40.1	25.0	1.8	-36.8	0.0	0.0	50.1	30.1	74	54	-23.9	-23.9	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.330	3.0	57.8	35.7	25.0	1.8	-36.8	0.0	0.0	47.8	25.8	74	54	-26.2	-28.2	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.856	3.0	52.4	36.2	27.2	2.1	-36.6	0.0	0.0	45.0	28.8	74	54	-29.0	-25.2	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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4.874	3.0	46.2	33.3	33.0	3.7	-35.5	0.0	0.6	47.9	35.0	74	54	-26.1	-19.0	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
4.874	3.0	46.7	33.2	33.0	3.7	-35.5	0.0	0.6	48.4	35.0	74	54	-25.6	-19.0	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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1.331	3.0	62.8	40.0	25.0	1.8	-36.8	0.0	0.0	52.8	30.0	74	54	-21.2	-24.0	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.455	3.0	61.0	39.6	25.5	1.8	-36.7	0.0	0.0	51.6	30.2	74	54	-22.4	-23.8	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.558	3.0	60.5	38.6	26.0	1.9	-36.7	0.0	0.0	51.6	29.7	74	54	-22.4	-24.3	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.572	3.0	61.3	38.2	26.0	1.9	-36.7	0.0	0.0	52.5	29.4	74	54	-21.5	-24.6	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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4.924	3.0	46.3	33.5	33.0	3.7	-35.5	0.0	0.6	48.1	35.3	74	54	-25.9	-18.7	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
4.924	3.0	55.6	40.4	33.0	3.7	-35.5	0.0	0.6	57.4	42.2	74	54	-16.6	-11.8	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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1.330	3.0	62.0	40.0	25.0	1.8	-36.8	0.0	0.0	52.0	30.0	74	54	-22.0	-24.0	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.572	3.0	56.0	36.7	26.0	1.9	-36.7	0.0	0.0	47.3	28.0	74	54	-26.7	-26.0	H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.330	3.0	58.7	36.4	25.0	1.8	-36.8	0.0	0.0	48.7	26.4	74	54	-25.3	-27.6	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.557	3.0	55.0	36.7	26.0	1.9	-36.7	0.0	0.0	46.2	27.8	74	54	-27.8	-26.2	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.856	3.0	55.4	36.0	27.2	2.1	-36.6	0.0	0.0	48.1	28.6	74	54	-25.9	-25.4	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
1.456	3.0	54.2	35.8	25.5	1.8	-36.7	0.0	0.0	44.8	26.4	74	54	-29.2	-27.6	V																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		

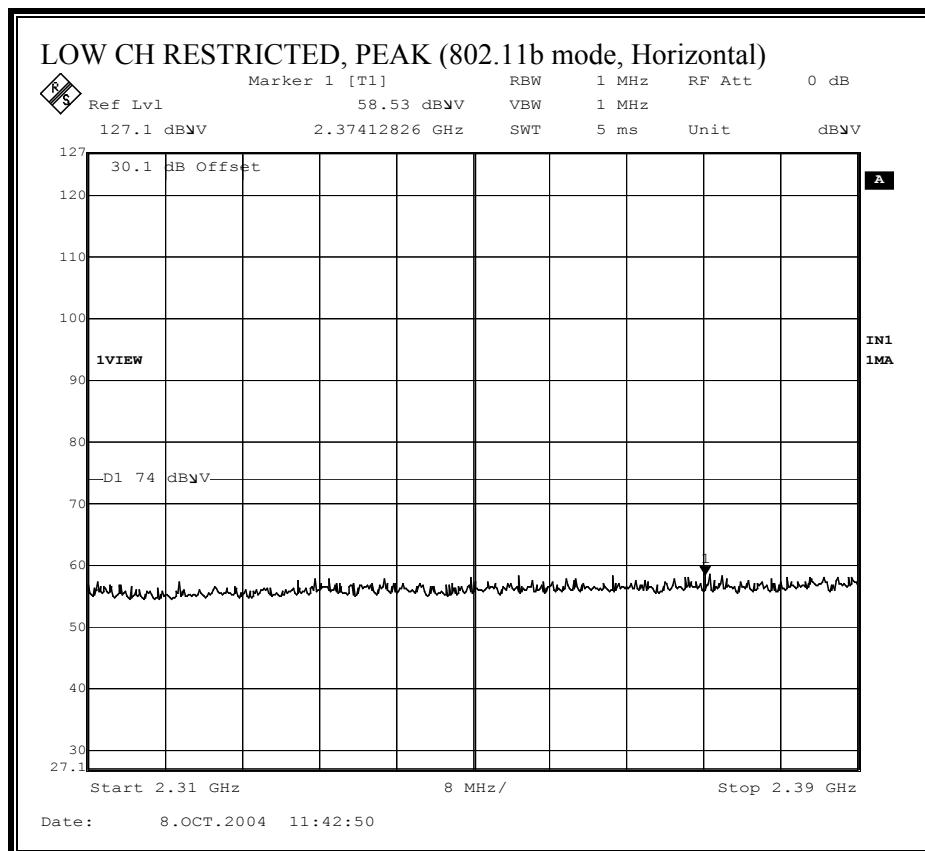
### 7.2.3. TRANSMITTER ABOVE 1GHz FOR 5725 TO 5850 MHz BAND WITH HITACHI ANTENNA

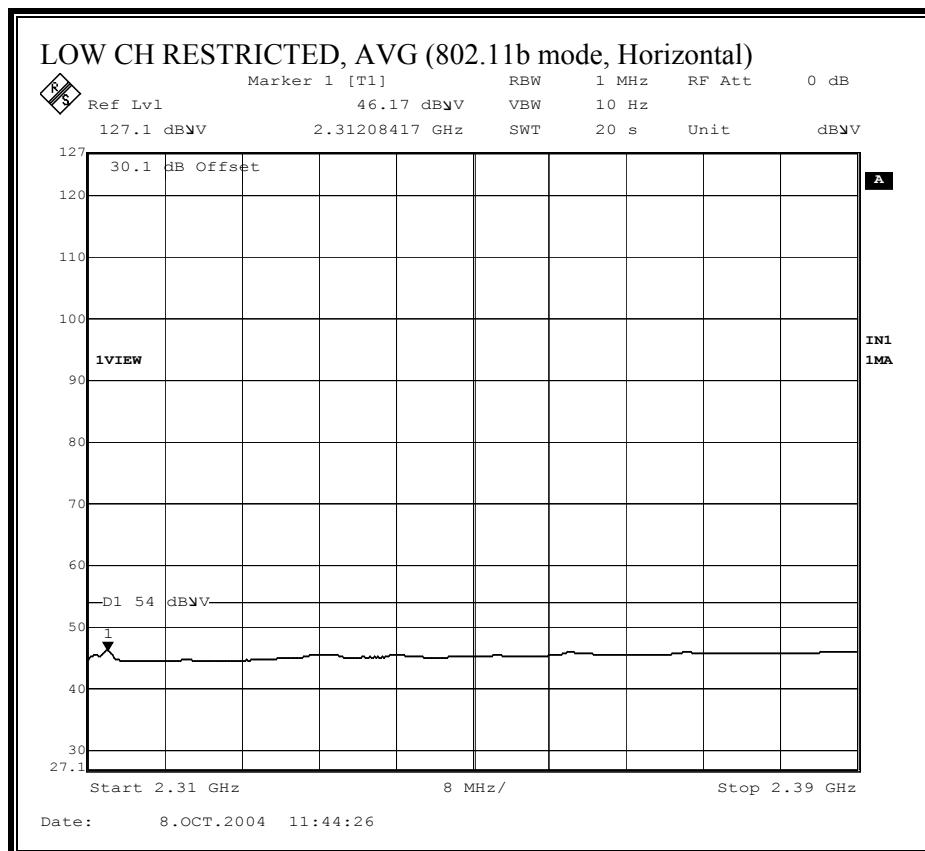
#### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

10/05/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																																																									
Test Engr: Thanh Nguyen Project #: 04U3016-1 Company: INTEL Corporation EUT Descrip.: 802.11a/b/g Mini PCI type 3B Card, FCC ID#E2K5HCKT. EUT M/N: Test Target: FCC Part 15/247 Mode Oper: Tx a Mode																																																									
<b>Test Equipment:</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">EMCO Horn 1-18GHz</td> <td style="width: 20%;">Pre-amplifier 1-26GHz</td> <td style="width: 20%;">Pre-amplifier 26-40GHz</td> <td colspan="4" style="width: 40%;">Horn &gt; 18GHz</td> <td style="width: 10%;">Limit</td> </tr> <tr> <td>T60; S/N: 2238 @3m</td> <td>T63 Miteq 646456</td> <td></td> <td colspan="4"></td> <td>FCC 15.209</td> </tr> <tr> <td colspan="6">Hi Frequency Cables</td> <td colspan="3">Peak Measurements</td> </tr> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>4 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> <td colspan="3">RBW=VBW=1MHz</td> </tr> <tr> <td></td> <td></td> <td>4_Thanh</td> <td>12_Thanh</td> <td>HPF_7.6GHz</td> <td></td> <td colspan="3"></td> </tr> </table>															EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz				Limit	T60; S/N: 2238 @3m	T63 Miteq 646456						FCC 15.209	Hi Frequency Cables						Peak Measurements			2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	RBW=VBW=1MHz					4_Thanh	12_Thanh	HPF_7.6GHz				
EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz				Limit																																																		
T60; S/N: 2238 @3m	T63 Miteq 646456						FCC 15.209																																																		
Hi Frequency Cables						Peak Measurements																																																			
2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	RBW=VBW=1MHz																																																			
		4_Thanh	12_Thanh	HPF_7.6GHz																																																					
<b>Peak Measurements</b> RBW=VBW=1MHz																																																									
<b>Average Measurements</b> RBW=1MHz ; VBW=10Hz																																																									
f GHz	Dist (m)	Read Pk dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr 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 Channel</b>																																																									
<b>Harmonics</b>																																																									
11.490	3.0	47.2	34.0	38.1	6.7	-34.3	0.0	0.7	58.4	45.2	74	54	-15.6	8.8	V																																										
11.490	3.0	47.0	36.2	38.1	6.7	-34.3	0.0	0.7	58.2	47.4	74	54	-15.8	6.6	H																																										
No harmonic emission above 2nd harmonic																																																									
<b>Spurious emissions</b>																																																									
1.330	3.0	58.9	39.8	25.0	1.8	-36.8	0.0	0.0	48.9	29.8	74	54	-25.1	-24.2	V																																										
1.330	3.0	56.8	38.8	25.0	1.8	-36.8	0.0	0.0	46.8	28.8	74	54	-27.2	-25.2	H																																										
1.578	3.0	58.6	38.3	26.0	1.9	-36.7	0.0	0.0	49.9	29.6	74	54	-24.1	-24.4	V																																										
1.560	3.0	58.9	39.6	26.0	1.9	-36.7	0.0	0.0	50.0	30.8	74	54	-24.0	-23.2	H																																										
<b>MID Channel</b>																																																									
<b>Harmonics</b>																																																									
11.551	3.0	46.7	33.2	38.1	6.7	-34.4	0.0	0.7	57.8	44.4	74	54	-16.2	9.6	V																																										
11.551	3.0	46.9	34.7	38.1	6.7	-34.4	0.0	0.7	58.0	45.9	74	54	-16.0	8.1	H																																										
No harmonic emission above 2nd harmonic																																																									
<b>Spurious emissions</b>																																																									
1.331	3.0	61.7	41.5	25.0	1.8	-36.8	0.0	0.0	51.7	31.5	74	54	-22.3	-22.5	H																																										
1.455	3.0	60.4	40.8	25.5	1.8	-36.7	0.0	0.0	51.0	31.4	74	54	-23.0	-22.6	H																																										
1.580	3.0	61.3	39.6	26.0	1.9	-36.7	0.0	0.0	52.6	30.9	74	54	-21.4	-23.1	V																																										
1.330	3.0	58.6	38.6	25.0	1.8	-36.8	0.0	0.0	48.6	28.6	74	54	-25.4	-25.4	V																																										
<b>HIGH Channel</b>																																																									
<b>Harmonics</b>																																																									
11.650	3.0	46.6	33.8	38.2	6.7	-34.5	0.0	0.7	57.8	45.0	74	54	-16.2	9.0	V																																										
11.650	3.0	45.8	33.9	38.2	6.7	-34.5	0.0	0.7	57.0	45.0	74	54	-17.0	9.0	H																																										
No harmonic emission above 2nd harmonic																																																									
<b>Spurious emissions</b>																																																									
1.330	3.0	63.4	42.3	25.0	1.8	-36.8	0.0	0.0	53.4	32.3	74	54	-20.6	-21.7	H																																										
1.572	3.0	53.7	36.7	26.0	1.9	-36.7	0.0	0.0	44.9	28.0	74	54	-29.1	-26.0	H																																										
1.330	3.0	58.7	39.8	25.0	1.8	-36.8	0.0	0.0	48.7	29.8	74	54	-25.3	-24.2	V																																										
1.572	3.0	56.9	37.1	26.0	1.9	-36.7	0.0	0.0	48.2	28.3	74	54	-25.8	-25.7	V																																										
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																																															

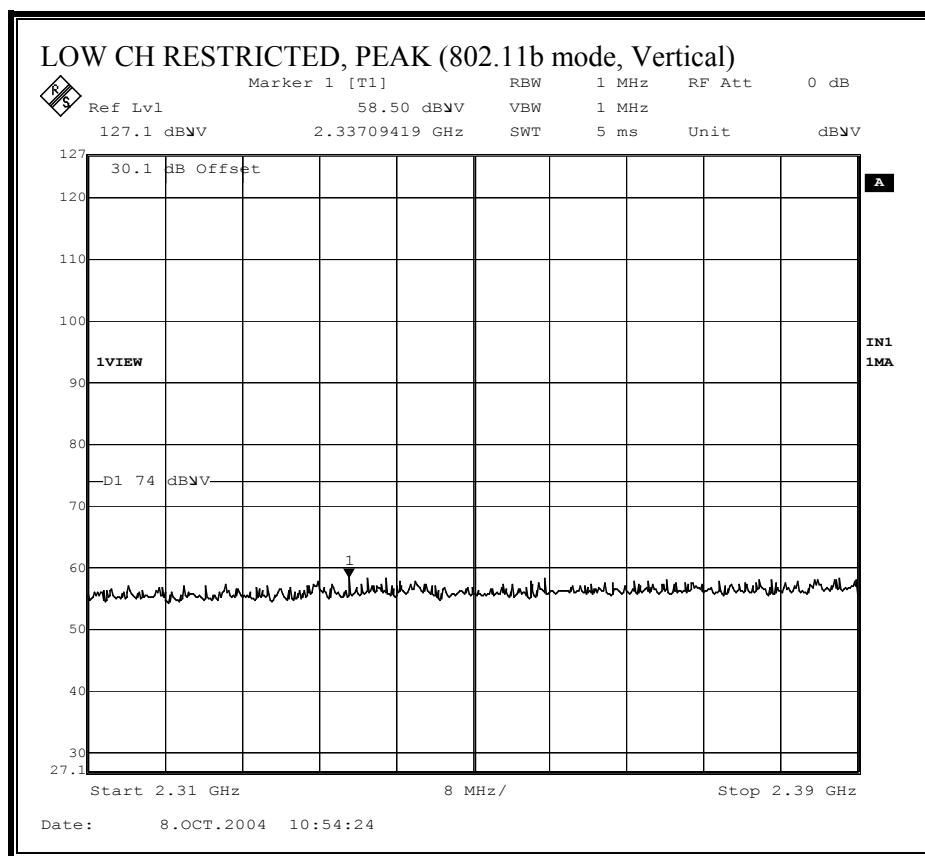
### 7.2.4. TRANSMITTER ABOVE 1GHz FOR 2400 TO 2483.5 MHz BAND WITH WISTRON ANTENNA

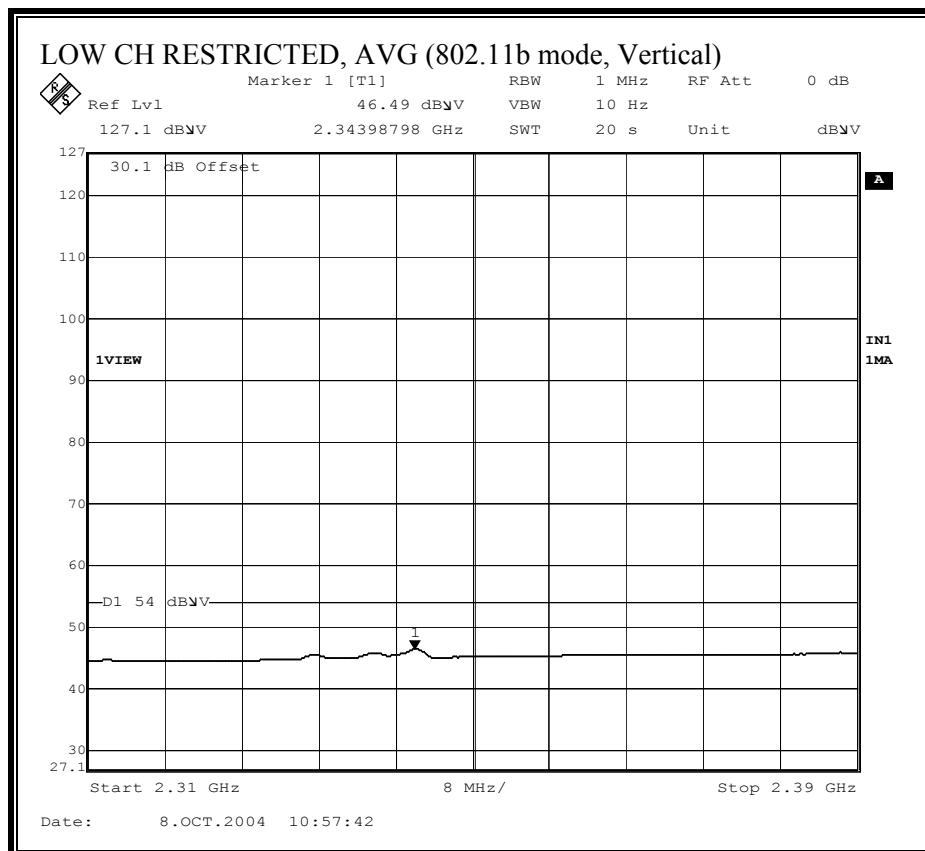
#### RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



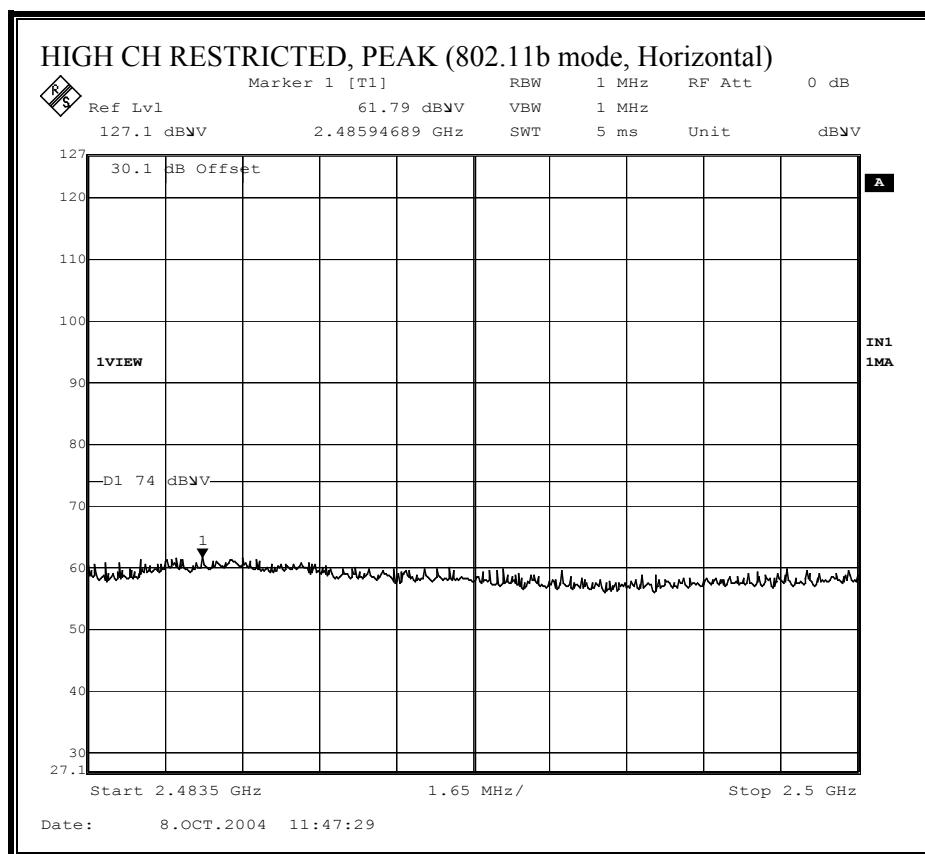


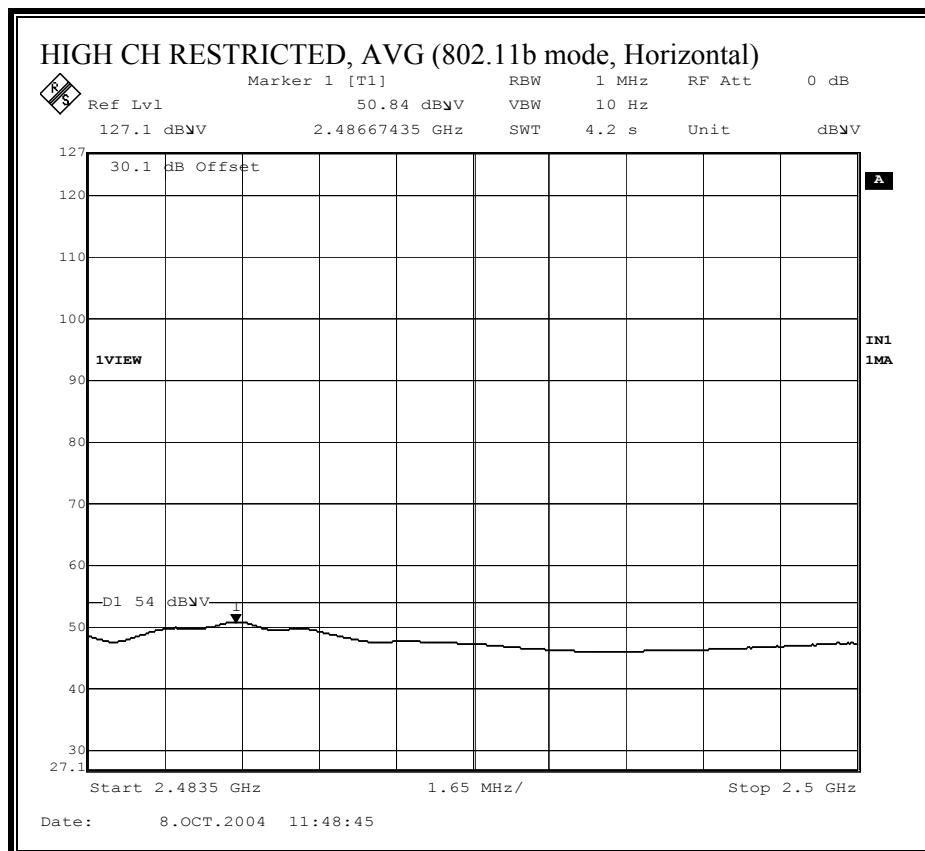
**RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)**



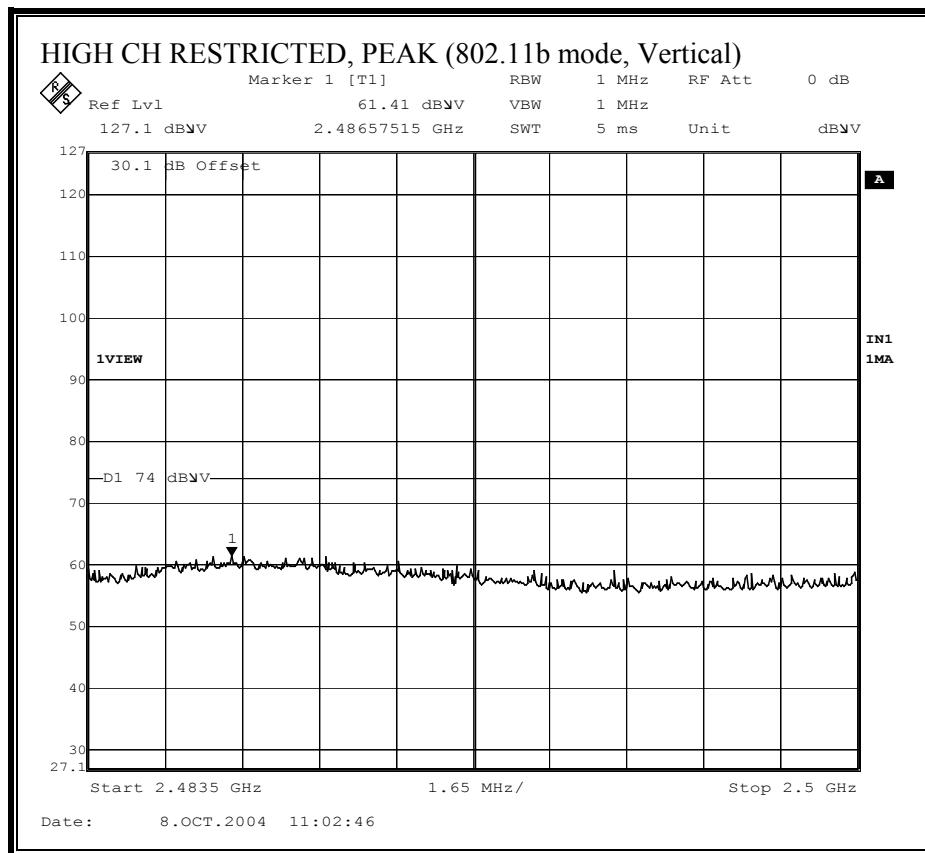


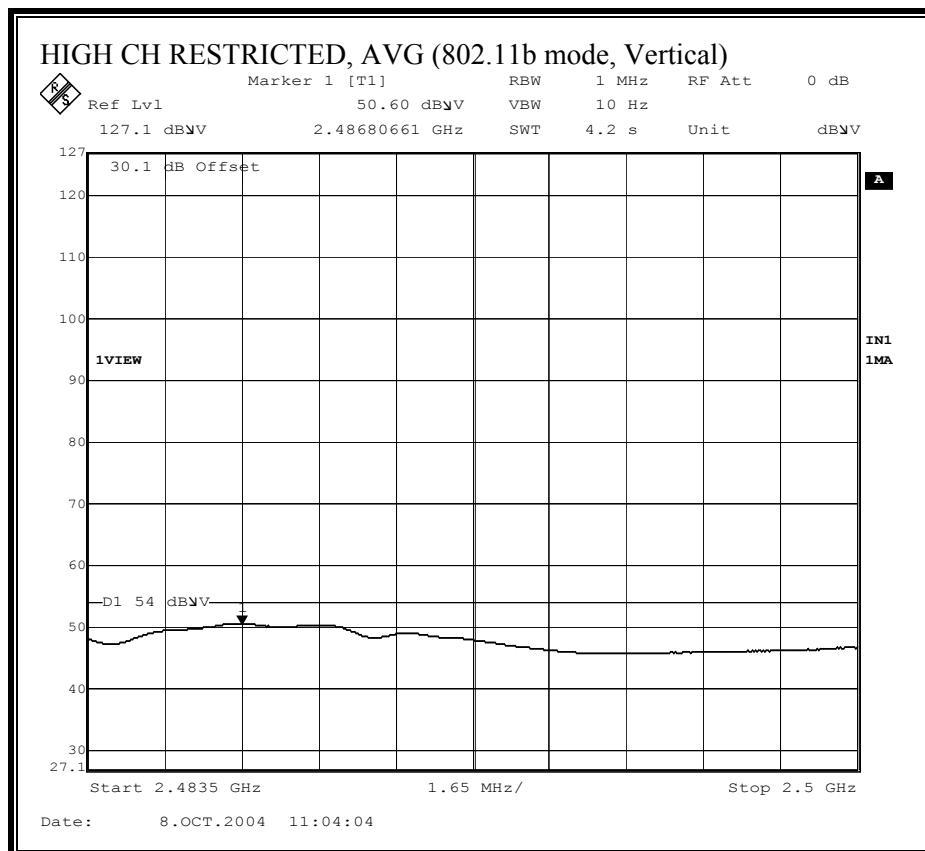
**RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)**





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

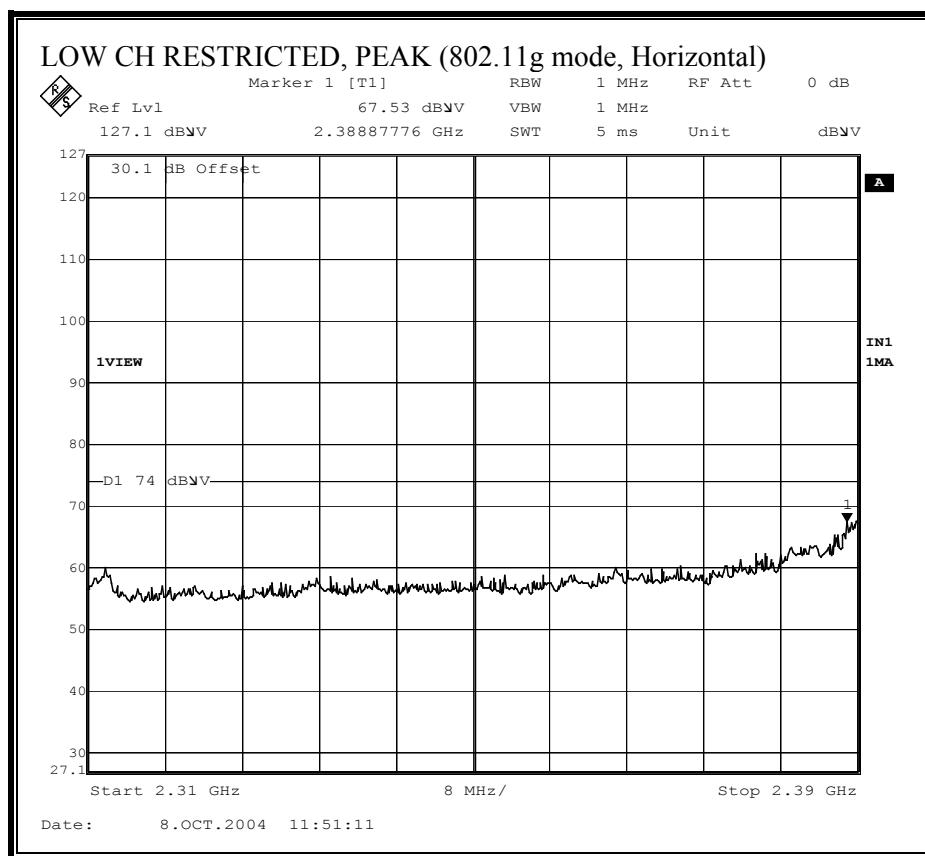


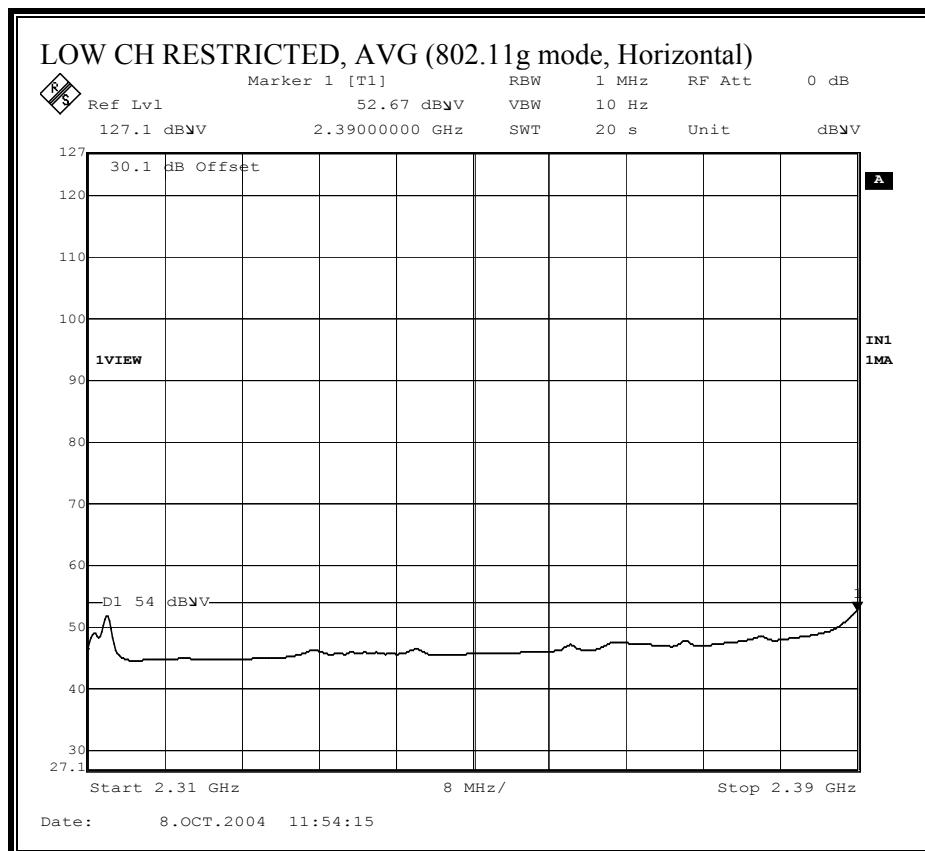


## HARMONICS AND SPURIOUS EMISSIONS (b MODE)

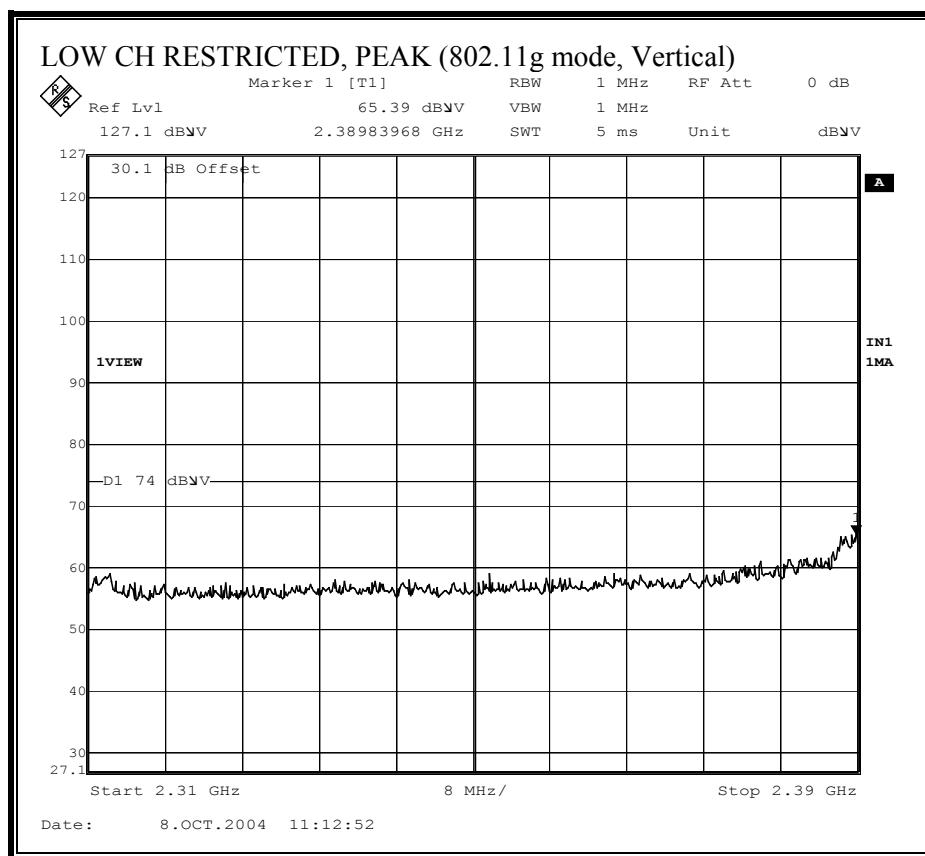
10/08/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																																												
<b>Test Engr:</b> Hitesh H. Solanki <b>Project #:</b> 04U3016-1 <b>Company:</b> INTEL (RF) <b>EUT Descrip.:</b> 802.11 a/b/g Mini PCI Type 3B Card <b>EUT M/N:</b> <b>Test Target:</b> FCC 15.247 <b>Mode Oper:</b> Tx Continuously, b mode																																												
<b>Test Equipment:</b>																																												
EMCO Horn 1-18GHz		Pre-amplifier 1-26GHz		Pre-amplifier 26-40GHz		Horn > 18GHz		Limit																																				
T60; S/N: 2238 @3m		T34 HP 8449B						FCC 15.209																																				
<b>Hi Frequency Cables</b> <table border="1"> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>4 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> <td colspan="9">Peak Measurements RBW=VBW=1MHz</td> </tr> <tr> <td>2_Chin</td> <td></td> <td></td> <td>12_Hitesh</td> <td>HPF_1.5GHz</td> <td>R_002</td> <td colspan="9">Average Measurements RBW=1MHz ; VBW=10Hz</td> </tr> </table>															2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz									2_Chin			12_Hitesh	HPF_1.5GHz	R_002	Average Measurements RBW=1MHz ; VBW=10Hz								
2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz																																						
2_Chin			12_Hitesh	HPF_1.5GHz	R_002	Average Measurements RBW=1MHz ; VBW=10Hz																																						
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr 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 CHANNEL</b>																																												
1.559	3.0	57.5	37.8	26.0	2.0	-37.4	0.0	0.2	48.3	28.6	74	54	-25.7	-25.4	H																													
6.432	3.0	44.4	32.6	34.8	5.1	-34.1	0.0	0.5	50.8	39.0	74	54	-23.2	-15.0	H																													
<b>MIDDLE CHANNEL</b>																																												
1.559	3.0	57.9	37.8	26.0	2.0	-37.4	0.0	0.2	48.7	28.6	74	54	-25.3	-25.4	H																													
4.875	3.0	49.6	45.8	33.0	4.1	-34.2	0.0	0.6	53.1	49.3	74	54	-20.9	-4.7	H																													
<b>HIGH CHANNEL</b>																																												
1.863	3.0	48.0	33.9	27.2	2.2	-37.0	0.0	0.3	40.8	26.6	74	54	-33.2	-27.4	H																													
1.571	3.0	55.4	36.9	26.0	2.0	-37.4	0.0	0.2	46.3	27.8	74	54	-27.7	-26.2	H																													
4.925	3.0	54.5	37.9	33.0	4.1	-34.2	0.0	0.6	58.1	41.5	74	54	-15.9	-12.5	H																													
<b>LOW CHANNEL</b>																																												
1.863	3.0	48.0	34.2	27.2	2.2	-37.0	0.0	0.3	40.8	26.9	74	54	-33.2	-27.1	V																													
1.573	3.0	56.7	37.6	26.0	2.0	-37.3	0.0	0.2	47.6	28.5	74	54	-26.4	-25.5	V																													
6.431	3.0	47.5	44.1	34.8	5.1	-34.1	0.0	0.5	53.9	50.5	74	54	-20.1	-3.5	V																													
<b>MIDDLE CHANNEL</b>																																												
1.560	3.0	55.9	37.0	26.0	2.0	-37.4	0.0	0.2	46.7	27.8	74	54	-27.3	-26.2	V																													
2.070	3.0	50.4	32.8	27.8	2.3	-36.7	0.0	0.4	44.2	26.6	74	54	-29.8	-27.4	V																													
4.876	3.0	51.6	49.1	33.0	4.1	-34.2	0.0	0.6	55.1	52.6	74	54	-18.9	-1.4	V																													
<b>HIGH CHANNEL</b>																																												
1.558	3.0	56.8	36.9	26.0	2.0	-37.4	0.0	0.2	47.6	27.7	74	54	-26.4	-26.3	V																													
2.102	3.0	49.9	33.4	27.9	2.3	-36.7	0.0	0.4	43.8	27.4	74	54	-30.2	-26.6	V																													
4.923	3.0	52.3	49.9	33.0	4.1	-34.2	0.0	0.6	55.9	53.4	74	54	-18.1	-0.6	V																													
6.565	3.0	49.3	45.9	35.0	5.2	-34.0	0.0	0.5	56.1	52.6	74	54	-17.9	-1.4	V																													
<b>NOTE: EMISSIONS ON ALL OTHER FREQUENCIES WERE FOUND TO BE VERY CLOSE TO THE NOISE FLOOR</b>																																												
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																																							

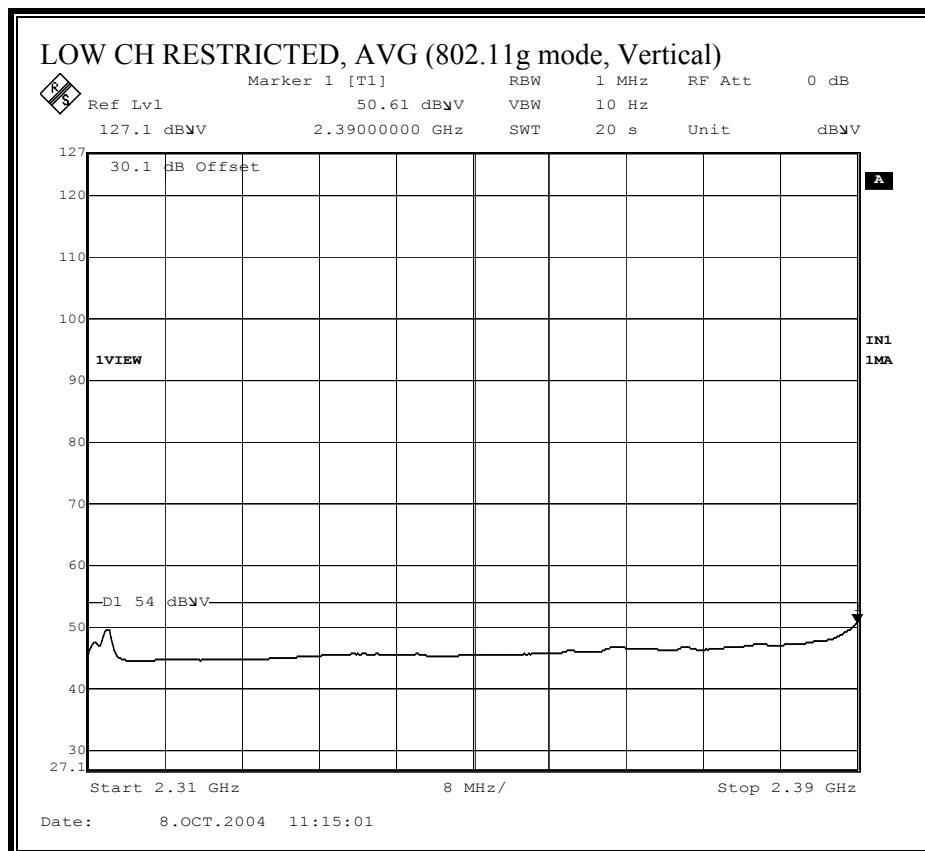
**RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)**



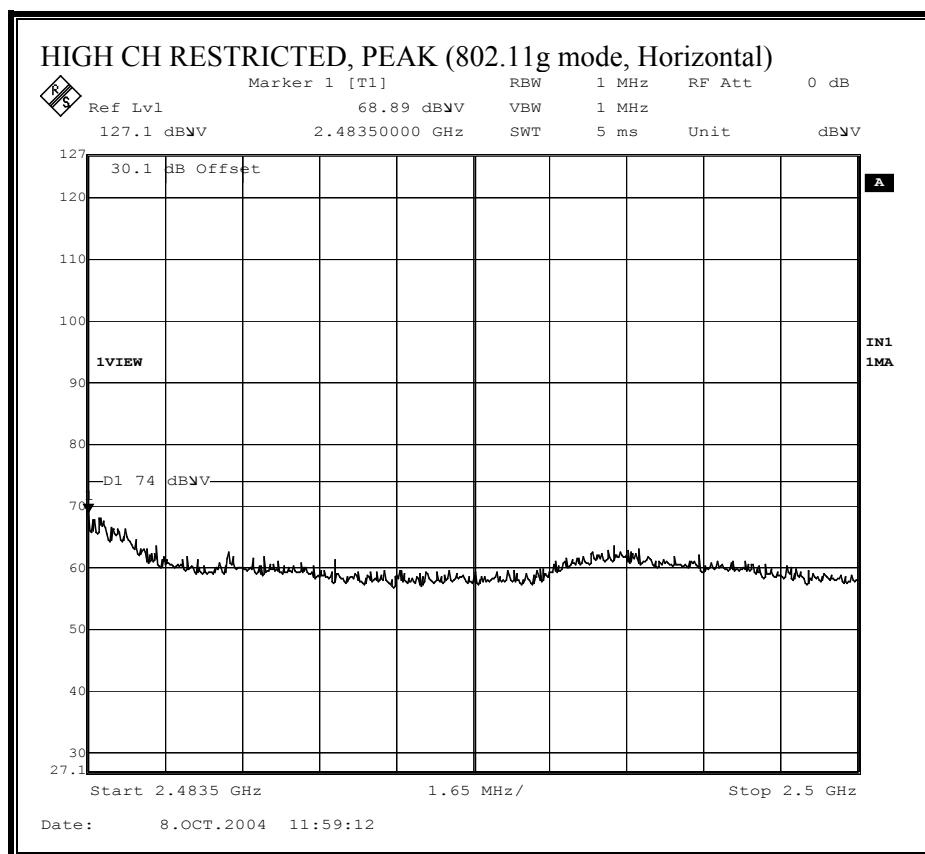


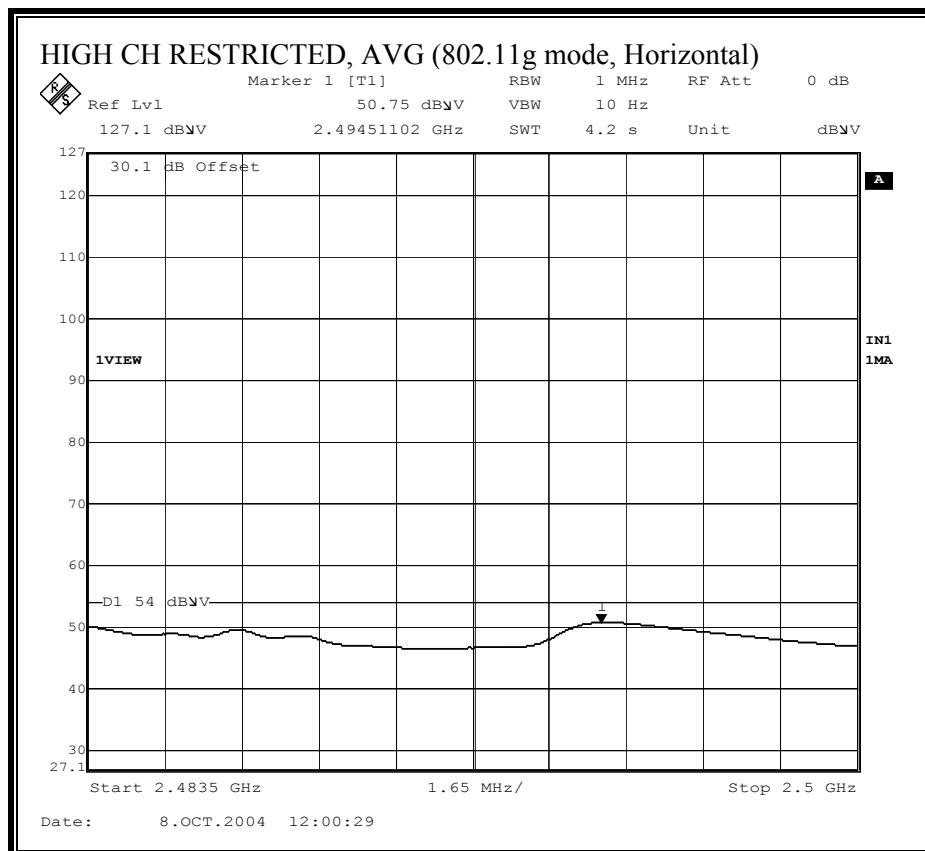
**RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)**



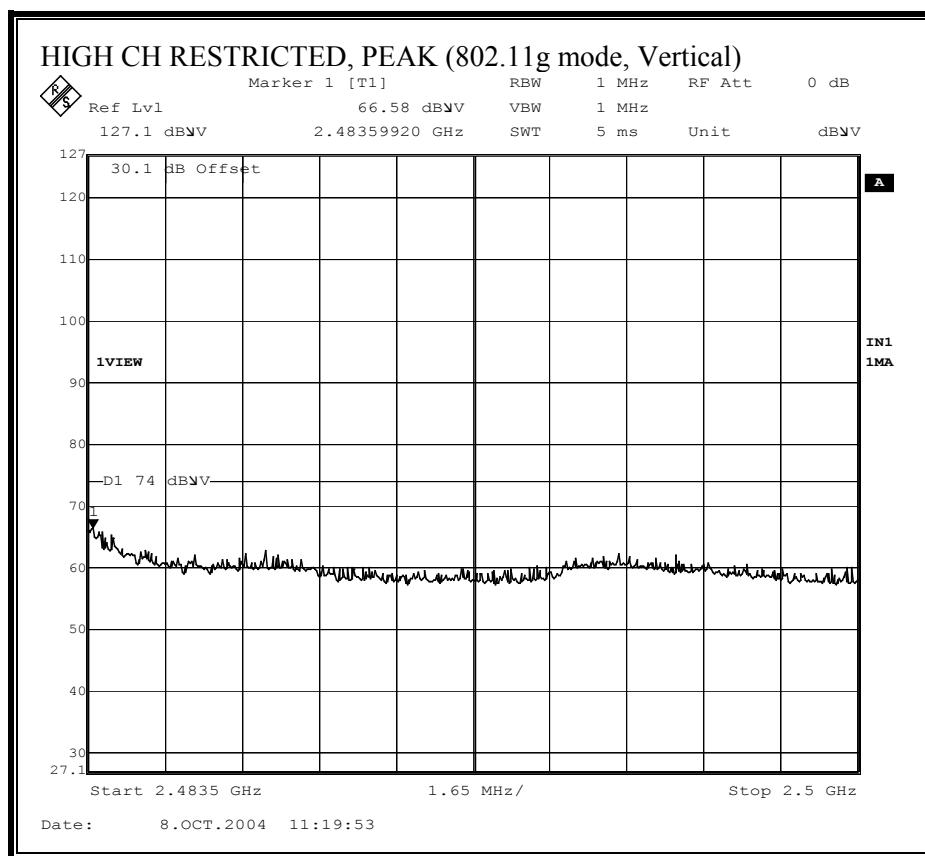


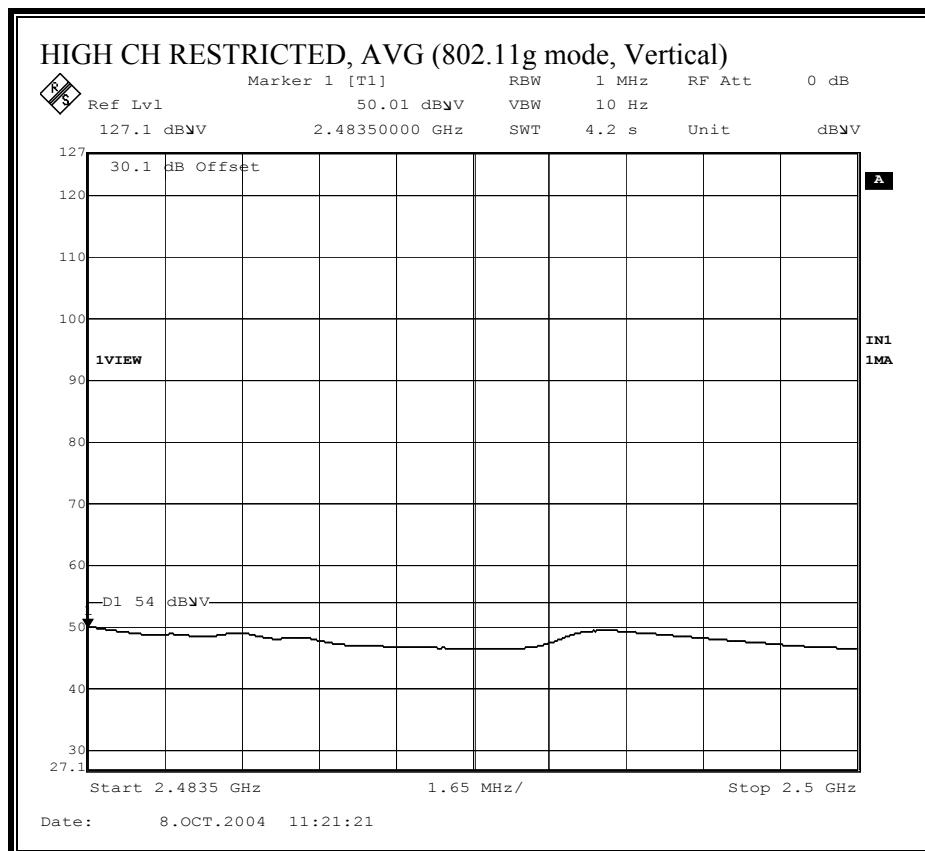
**RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)**





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



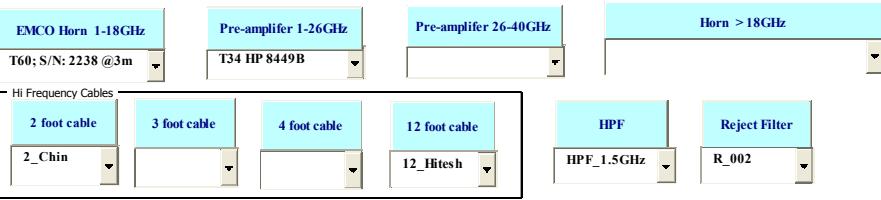


## HARMONICS AND SPURIOUS EMISSIONS (g MODE)

10/08/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																																																							
<b>Test Engr:</b> Hitesh H. Solanki <b>Project #:</b> 04U3016-1 <b>Company:</b> INTEL (RF) <b>EUT Descrip.:</b> 802.11 a/b/g Mini PCI Type 3B Card <b>EUT M/N:</b> <b>Test Target:</b> FCC 15.247 <b>Mode Oper:</b> Tx Continuously, g mode																																																							
<b>Test Equipment:</b> <table border="1"> <tr> <td>EMCO Horn 1-18 GHz</td> <td>Pre-amplifier 1-26 GHz</td> <td>Pre-amplifier 26-40 GHz</td> <td colspan="3">Horn &gt; 18GHz</td> <td>Limit</td> </tr> <tr> <td>T60; S/N: 2238 @3m</td> <td>T34 HP 8449B</td> <td></td> <td></td> <td></td> <td></td> <td>FCC 15.209</td> </tr> <tr> <td colspan="6">Hi Frequency Cables</td> <td>Peak Measurements</td> </tr> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>4 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> <td>RBW=VBW=1MHz</td> </tr> <tr> <td>2_Chin</td> <td></td> <td></td> <td>12_Hitesh</td> <td>HPF_1.5GHz</td> <td>R_002</td> <td>Average Measurements</td> </tr> <tr> <td colspan="6"></td> <td>RBW=1MHz ; VBW=10Hz</td> </tr> </table>														EMCO Horn 1-18 GHz	Pre-amplifier 1-26 GHz	Pre-amplifier 26-40 GHz	Horn > 18GHz			Limit	T60; S/N: 2238 @3m	T34 HP 8449B					FCC 15.209	Hi Frequency Cables						Peak Measurements	2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	RBW=VBW=1MHz	2_Chin			12_Hitesh	HPF_1.5GHz	R_002	Average Measurements							RBW=1MHz ; VBW=10Hz
EMCO Horn 1-18 GHz	Pre-amplifier 1-26 GHz	Pre-amplifier 26-40 GHz	Horn > 18GHz			Limit																																																	
T60; S/N: 2238 @3m	T34 HP 8449B					FCC 15.209																																																	
Hi Frequency Cables						Peak Measurements																																																	
2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	RBW=VBW=1MHz																																																	
2_Chin			12_Hitesh	HPF_1.5GHz	R_002	Average Measurements																																																	
						RBW=1MHz ; VBW=10Hz																																																	
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr 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 CHANNEL</b>																																																							
1.567	3.0	54.9	35.5	26.0	2.0	-37.4	0.0	0.2	45.7	26.3	74	54	-28.3	-27.7	H																																								
6.432	3.0	47.2	43.3	34.8	5.1	-34.1	0.0	0.5	53.7	49.7	74	54	-20.3	-4.3	H																																								
2.100	3.0	50.0	32.9	27.9	2.3	-36.7	0.0	0.4	43.9	26.8	74	54	-30.1	-27.2	H																																								
<b>MIDDLE CHANNEL</b>																																																							
1.579	3.0	52.6	35.8	26.0	2.0	-37.3	0.0	0.2	43.5	26.7	74	54	-30.5	-27.3	H																																								
4.881	3.0	52.1	38.6	33.0	4.1	-34.2	0.0	0.6	55.6	42.1	74	54	-18.4	-11.9	H																																								
6.498	3.0	46.8	41.9	34.9	5.2	-34.0	0.0	0.5	53.4	48.5	74	54	-20.6	-5.5	H																																								
<b>HIGH CHANNEL</b>																																																							
1.559	3.0	57.4	37.4	26.0	2.0	-37.4	0.0	0.2	48.2	28.2	74	54	-25.8	-25.8	H																																								
1.454	3.0	48.1	34.1	25.5	1.9	-37.5	0.0	0.2	38.2	24.2	74	54	-35.8	-29.8	H																																								
2.106	3.0	50.4	32.4	27.9	2.3	-36.7	0.0	0.4	44.4	26.4	74	54	-29.6	-27.6	H																																								
4.926	3.0	50.5	37.7	33.0	4.1	-34.2	0.0	0.6	54.0	41.2	74	54	-20.0	-12.8	H																																								
<b>LOW CHANNEL</b>																																																							
1.578	3.0	56.9	37.6	26.0	2.0	-37.3	0.0	0.2	47.8	28.5	74	54	-26.2	-25.5	V																																								
6.432	3.0	49.1	45.6	34.8	5.1	-34.1	0.0	0.5	55.5	52.1	74	54	-18.5	-1.9	V																																								
2.088	3.0	49.3	32.6	27.8	2.3	-36.7	0.0	0.4	43.2	26.5	74	54	-30.8	-27.5	V																																								
<b>MIDDLE CHANNEL</b>																																																							
1.572	3.0	56.6	37.3	26.0	2.0	-37.4	0.0	0.2	47.4	28.1	74	54	-26.6	-25.9	V																																								
4.877	3.0	51.0	36.7	33.0	4.1	-34.2	0.0	0.6	54.5	40.2	74	54	-19.5	-13.8	V																																								
6.498	3.0	48.7	45.8	34.9	5.2	-34.0	0.0	0.5	55.3	52.4	74	54	-18.7	-1.6	V																																								
<b>HIGH CHANNEL</b>																																																							
1.571	3.0	57.6	37.9	26.0	2.0	-37.4	0.0	0.2	48.4	28.8	74	54	-25.6	-25.2	V																																								
2.096	3.0	51.0	33.1	27.8	2.3	-36.7	0.0	0.4	44.9	27.0	74	54	-29.1	-27.0	V																																								
4.928	3.0	51.6	39.4	33.0	4.1	-34.2	0.0	0.6	55.2	43.0	74	54	-18.8	-11.0	V																																								
6.565	3.0	47.9	44.7	35.0	5.2	-34.0	0.0	0.5	54.6	51.4	74	54	-19.4	-2.6	V																																								
<b>NOTE: EMISSIONS ON ALL OTHER FREQUENCIES WERE FOUND TO BE VERY CLOSE TO THE NOISE FLOOR</b>																																																							
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																																																						

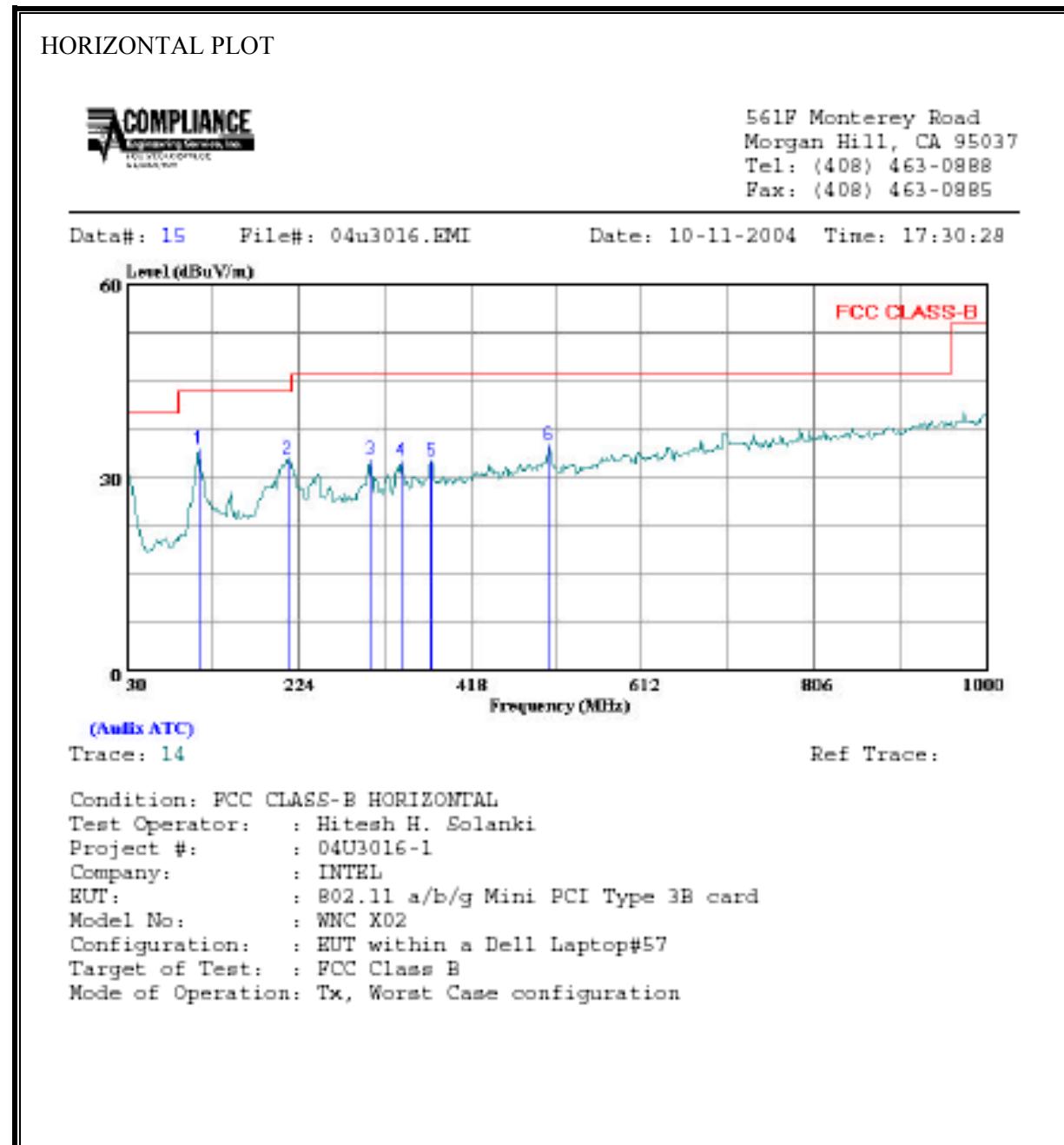
## 7.2.5. TRANSMITTER ABOVE 1GHz FOR 5725 TO 5850 MHz BAND WITH WISTRON ANTENNA

### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

10/08/04 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																										
Test Engr: Hitesh H. Solanki Project #: 04U3016-1 Company: INTEL (RP) EUT Descrip.: 802.11 a/b/g Mini PCI Type 3B Card EUT M/N: Test Target: FCC 15.247 Mode Oper: Tx Continuously, a mode (5.8 GHz band)																										
Test Equipment: 																										
Hi Frequency Cables <table border="1"> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>4 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> </tr> <tr> <td>2_Chin</td> <td></td> <td></td> <td>12_Hitesh</td> <td>HPF_1.5GHz</td> <td>R_002</td> </tr> </table>															2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter	2_Chin			12_Hitesh	HPF_1.5GHz	R_002
2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter																					
2_Chin			12_Hitesh	HPF_1.5GHz	R_002																					
Peak Measurements RBW=VBW=1MHz																										
Average Measurements RBW=1MHz; VBW=10Hz																										
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr 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 CHANNEL</b>																										
1.560	3.0	55.0	37.8	26.0	2.0	-37.4	0.0	0.2	45.8	28.6	74	54	-28.2	-25.4	H											
7.689	3.0	52.5	39.5	36.4	5.9	-33.6	0.0	0.7	61.9	48.9	74	54	-12.1	-5.1	H											
3.804	3.0	51.2	39.3	32.2	3.4	-34.5	0.0	0.6	52.9	40.9	74	54	-21.1	-13.1	H											
<b>MIDDLE CHANNEL</b>																										
1.560	3.0	55.6	37.2	26.0	2.0	-37.4	0.0	0.2	46.4	28.0	74	54	-27.6	-26.0	H											
9.677	3.0	59.7	40.5	38.2	7.0	-34.2	0.0	0.7	71.4	52.2	74	54	-2.6	-1.8	H											
7.731	3.0	57.4	42.9	36.5	5.9	-33.6	0.0	0.7	66.9	52.4	74	54	-7.1	-1.6	H											
<b>HIGH CHANNEL</b>																										
1.561	3.0	56.4	37.2	26.0	2.0	-37.4	0.0	0.2	47.2	28.0	74	54	-26.8	-26.0	H											
7.769	3.0	53.2	41.1	36.5	5.9	-33.5	0.0	0.7	62.8	50.7	74	54	-11.2	-3.3	H											
															H											
<b>LOW CHANNEL</b>																										
1.575	3.0	56.7	36.8	26.0	2.0	-37.3	0.0	0.2	47.5	27.7	74	54	-26.5	-26.3	V											
3.795	3.0	50.6	34.7	32.2	3.4	-34.5	0.0	0.6	52.2	36.3	74	54	-21.8	-17.7	V											
7.689	3.0	52.6	33.7	36.4	5.9	-33.6	0.0	0.7	62.0	43.1	74	54	-12.0	-10.9	V											
<b>MIDDLE CHANNEL</b>																										
1.571	3.0	56.2	37.9	26.0	2.0	-37.4	0.0	0.2	47.1	28.8	74	54	-26.9	-25.2	V											
7.731	3.0	55.1	36.1	36.5	5.9	-33.6	0.0	0.7	64.6	45.6	74	54	-9.4	-8.4	V											
9.681	3.0	51.1	32.5	38.2	7.0	-34.2	0.0	0.7	62.8	44.2	74	54	-11.2	-9.8	V											
<b>HIGH CHANNEL</b>																										
1.581	3.0	53.8	35.5	26.1	2.0	-37.3	0.0	0.2	44.7	26.4	74	54	-29.3	-27.6	V											
2.090	3.0	48.0	32.7	27.8	2.3	-36.7	0.0	0.4	41.9	26.6	74	54	-32.1	-27.4	V											
7.770	3.0	55.0	36.1	36.5	5.9	-33.5	0.0	0.7	64.6	45.7	74	54	-9.4	-8.3	V											
<b>NOTE: EMISSIONS ON ALL OTHER FREQUENCIES WERE FOUND TO BE VEY CLOSE TO THE NOISE FLOOR</b>																										
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																					

## 7.2.6. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH HITACHI ANTENNA

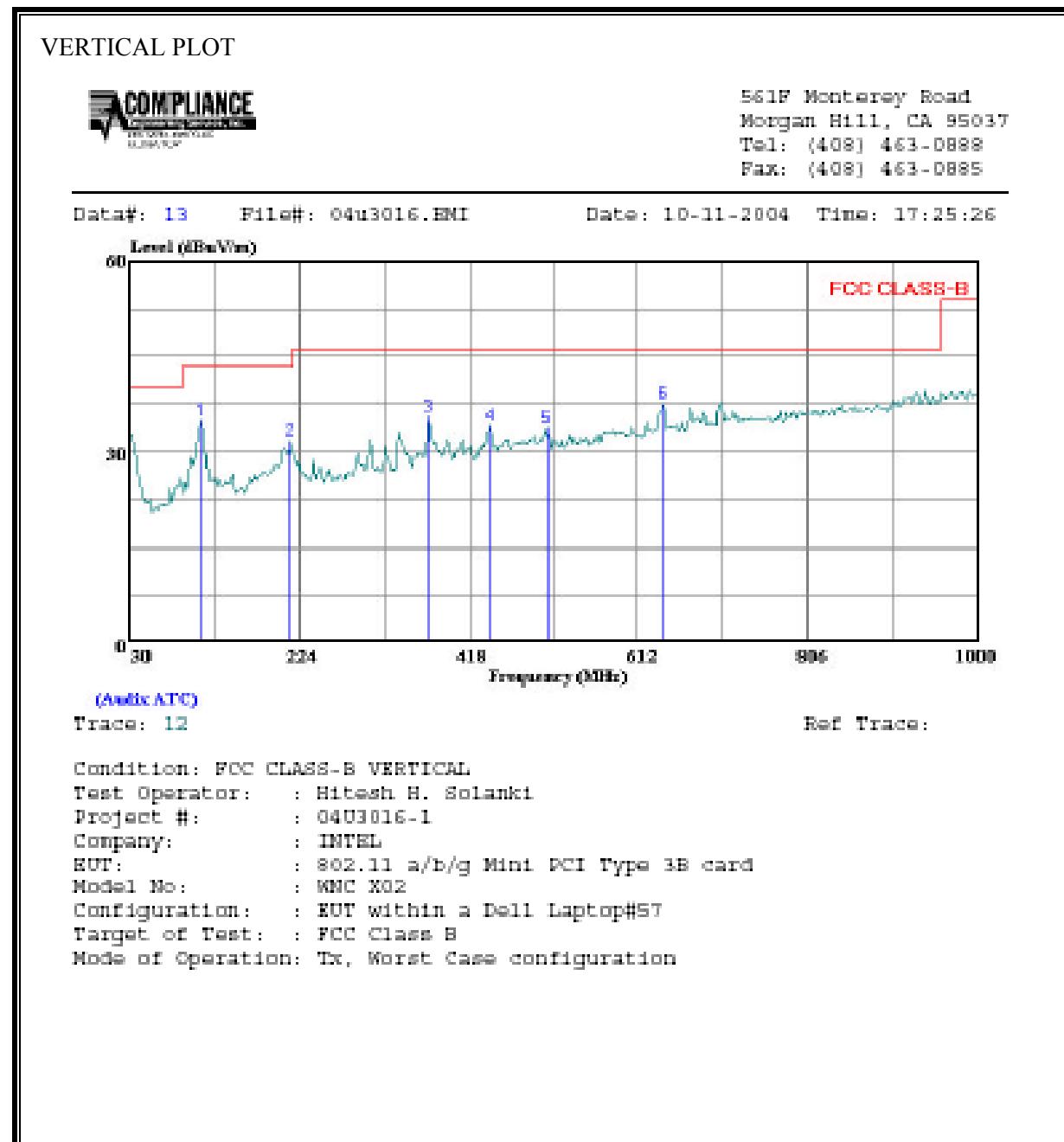
### SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA

Freq	Remark	Read			Limit	Over
		Level	Factor	Level	Line	Limit
MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	111.480 Peak	20.31	14.10	34.41	43.50	-9.09
2	212.360 Peak	19.66	13.22	32.88	43.50	-10.62
3	305.480 Peak	16.35	16.40	32.75	46.00	-13.25
4	339.430 Peak	15.67	17.03	32.70	46.00	-13.30
5	373.380 Peak	14.76	17.92	32.68	46.00	-13.32
6	507.240 Peak	14.02	21.07	35.09	46.00	-10.91

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

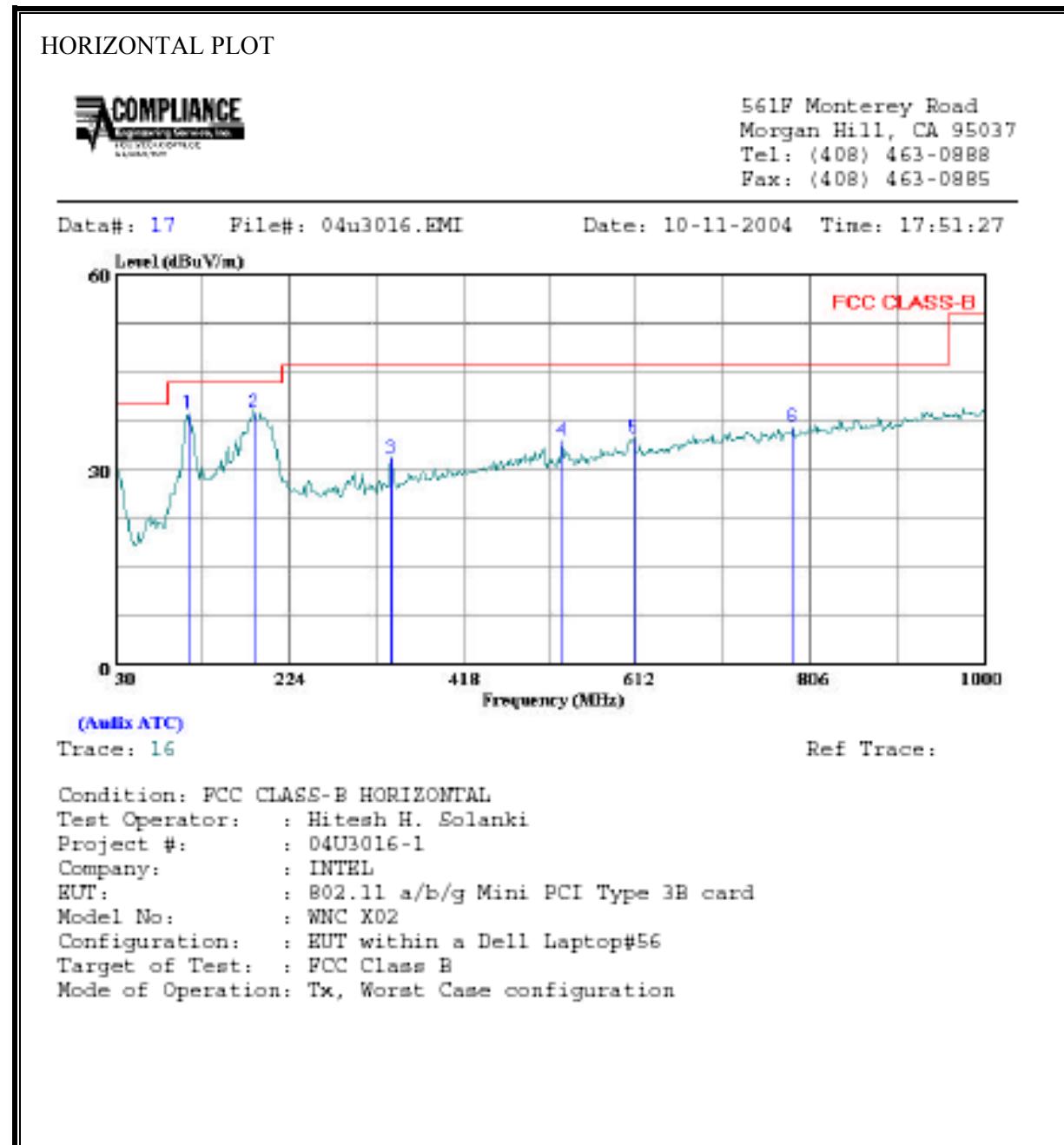


VERTICAL DATA

Freq	Remark	Read		Level	Line	Over	Limit
		MHz	dBuV	Factor	dB	dBuV/m	dBuV/m
1	111.480	Peak	20.73	14.10	34.83	43.50	-8.67
2	213.330	Peak	18.36	13.22	31.58	43.50	-11.92
3	371.440	Peak	17.62	17.87	35.49	46.00	-10.51
4	441.280	Peak	14.46	19.61	34.07	46.00	-11.93
5	507.240	Peak	12.64	21.07	33.71	46.00	-12.29
6	640.130	Peak	14.45	23.08	37.53	46.00	-8.47

## 7.2.7. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz WITH WISTRON ANTENNA

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



HORIZONTAL DATA

Freq	Remark	Read		Limit		Over Line Limit
		Level	Factor	Level	Line	
MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	111.480	Peak	24.50	14.10	38.60	43.50 -4.90
2	185.200	Peak	25.60	13.32	38.92	43.50 -4.59
3	337.490	Peak	14.72	16.98	31.70	46.00 -14.30
4	528.580	Peak	13.17	21.35	34.52	46.00 -11.49
5	609.090	Peak	12.49	22.41	34.90	46.00 -11.10
6	785.630	Peak	11.35	25.10	36.45	46.00 -9.55

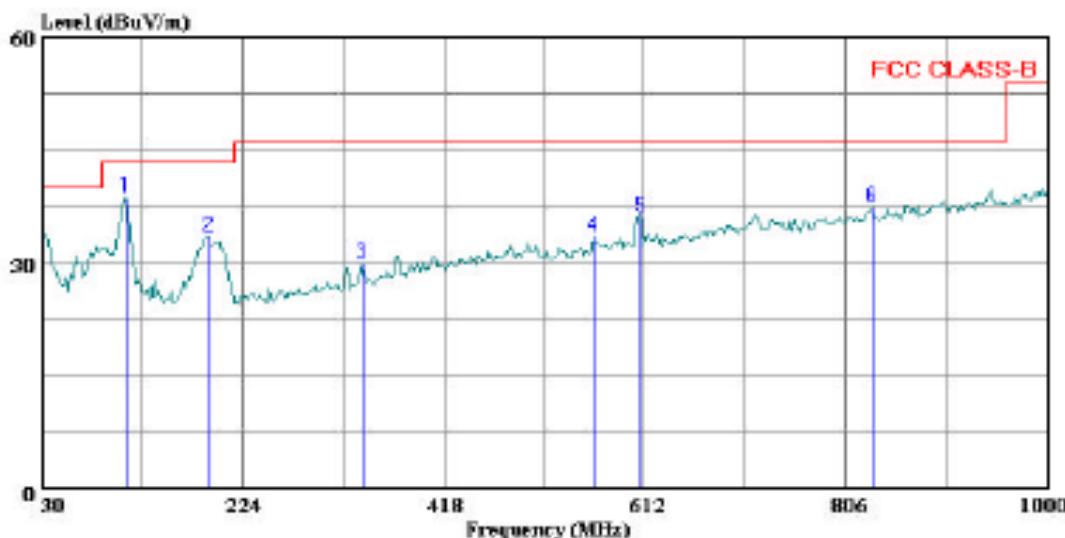
**SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)**

VERTICAL PLOT



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

Data#: 19 File#: 04u3016.EMI Date: 10-11-2004 Time: 17:54:44



(Audit ATC)

Trace: 18

Ref Trace:

Condition: FCC CLASS-B VERTICAL  
Test Operator: : Hitesh H. Solanki  
Project #: : 04U3016-1  
Company: : INTEL  
EUT: : 802.11 a/b/g Mini PCI Type 3B card  
Model No: : WNC X02  
Configuration: : EUT within a Dell Laptop#56  
Target of Test: : FCC Class B  
Mode of Operation: Tx, Worst Case configuration

VERTICAL DATA

Freq	Remark	Read		Limit		Over Line Limit
		Level	Factor	Level	dBuV/m	
MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	111.480 Peak	24.59	14.10	38.69	43.50	-4.81
2	191.990 Peak	19.93	13.47	33.40	43.50	-10.10
3	339.430 Peak	12.87	17.03	29.90	46.00	-16.10
4	562.530 Peak	11.64	21.75	33.39	46.00	-12.61
5	608.120 Peak	13.75	22.39	36.14	46.00	-9.86
6	832.190 Peak	11.64	25.72	37.36	46.00	-8.64

### 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**

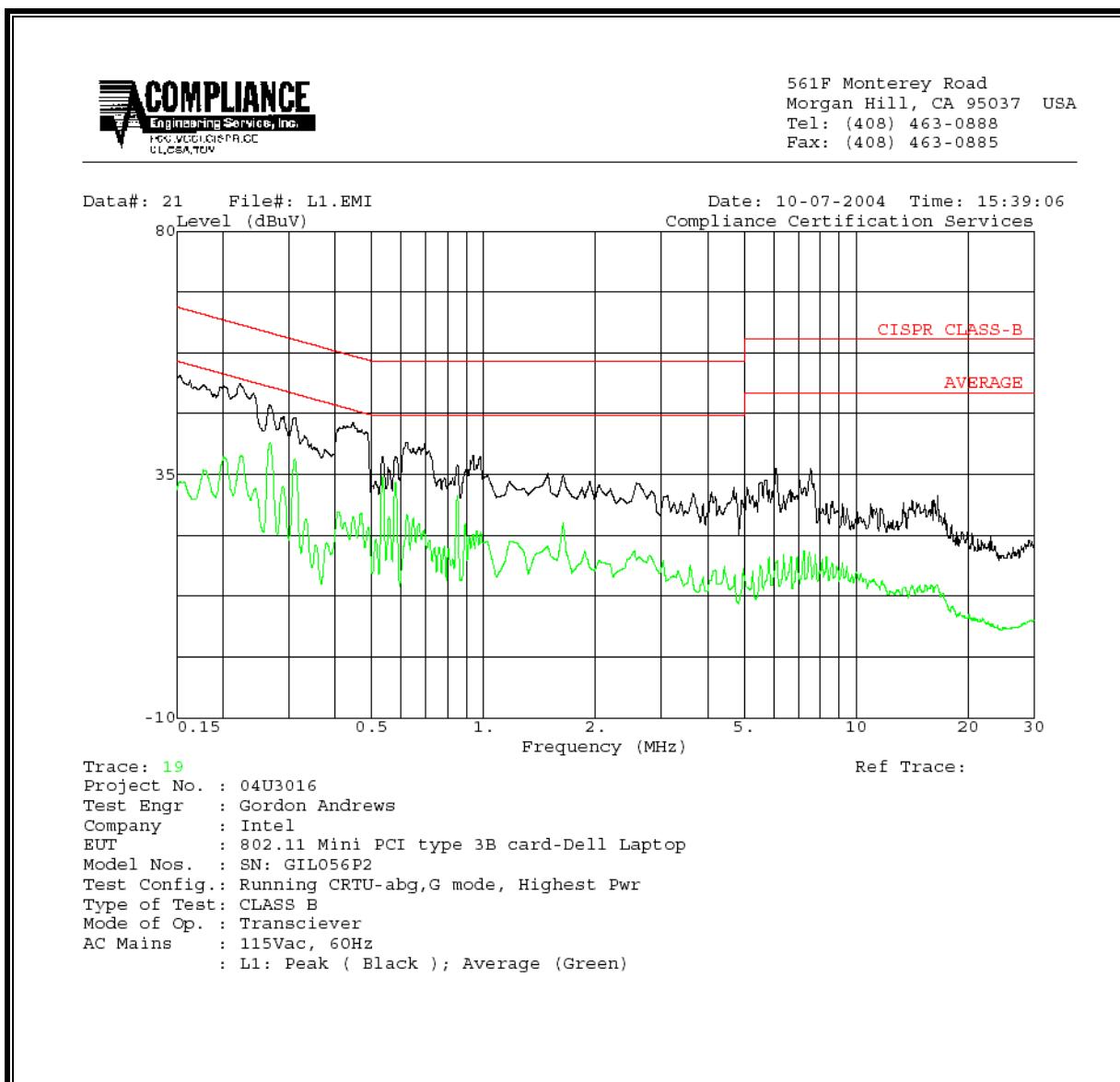
### WNC ANTENNA

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit QP	EN_B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.22	51.60	--	39.50	0.00	63.89	53.89	-12.29	-14.39	L1
0.45	46.50	--	27.30	0.00	57.51	47.51	-11.01	-20.21	L1
0.62	44.10	--	28.30	0.00	56.00	46.00	-11.90	-17.70	L1
0.22	51.70	--	39.50	0.00	63.91	53.91	-12.21	-14.41	L2
0.45	46.40	--	27.30	0.00	57.51	47.51	-11.11	-20.21	L2
0.62	44.10	--	28.30	0.00	56.00	46.00	-11.90	-17.70	L2
6 Worst Data									

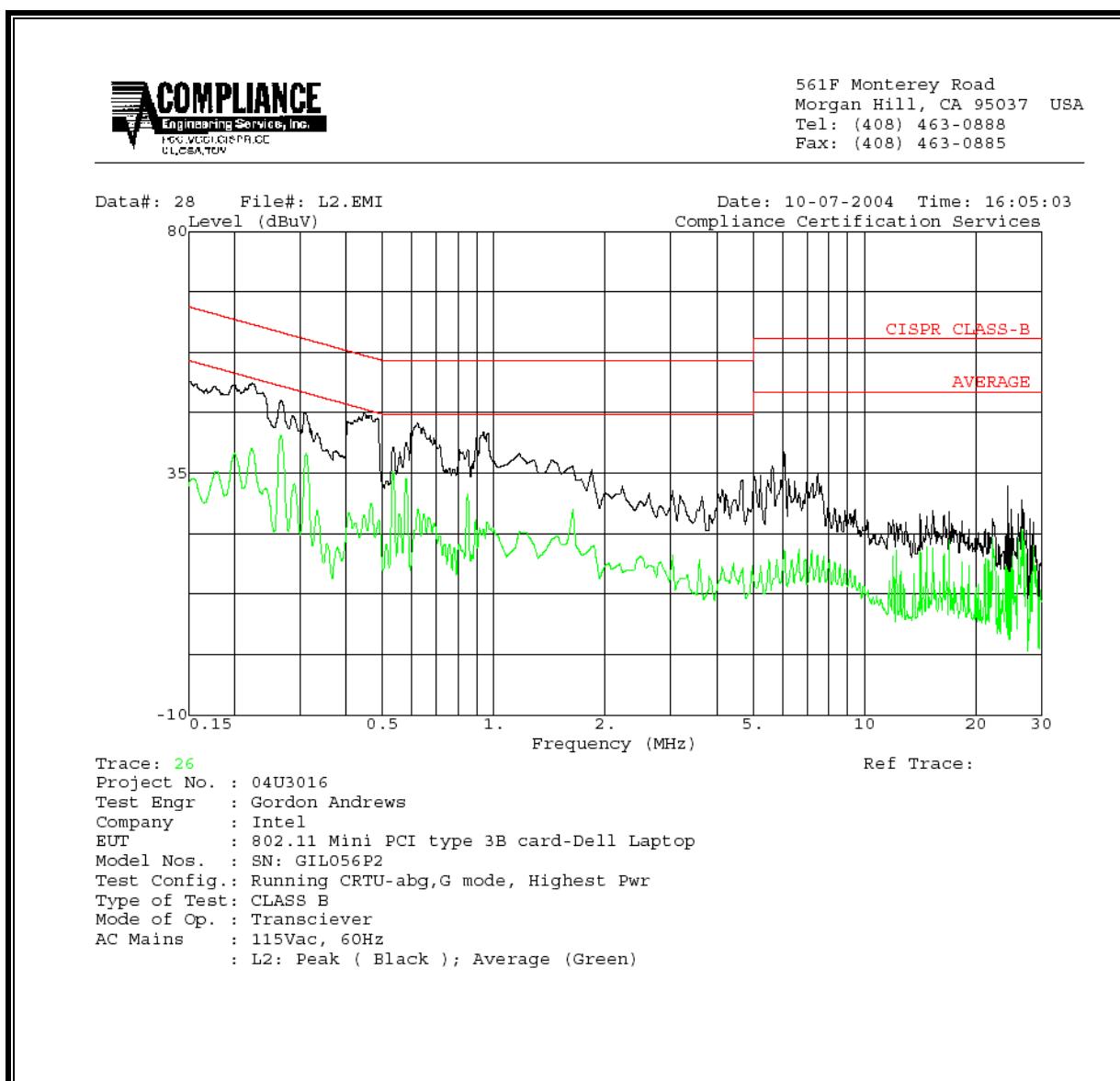
### HITACHI ANTENNA

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit QP	EN_B AV	Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.15	55.40	--	41.50	0.00	65.91	55.91	-10.51	-14.41	L1
0.35	46.60	--	38.10	0.00	60.34	50.34	-13.74	-12.24	L1
0.57	44.10	--	32.50	0.00	56.00	46.00	-11.90	-13.50	L1
0.23	50.80	--	39.60	0.00	63.80	53.80	-13.00	-14.20	L2
0.46	45.30	--	27.30	0.00	57.17	47.17	-11.87	-19.87	L2
0.56	46.00	--	34.00	0.00	56.00	46.00	-10.00	-12.00	L2
6 Worst Data									

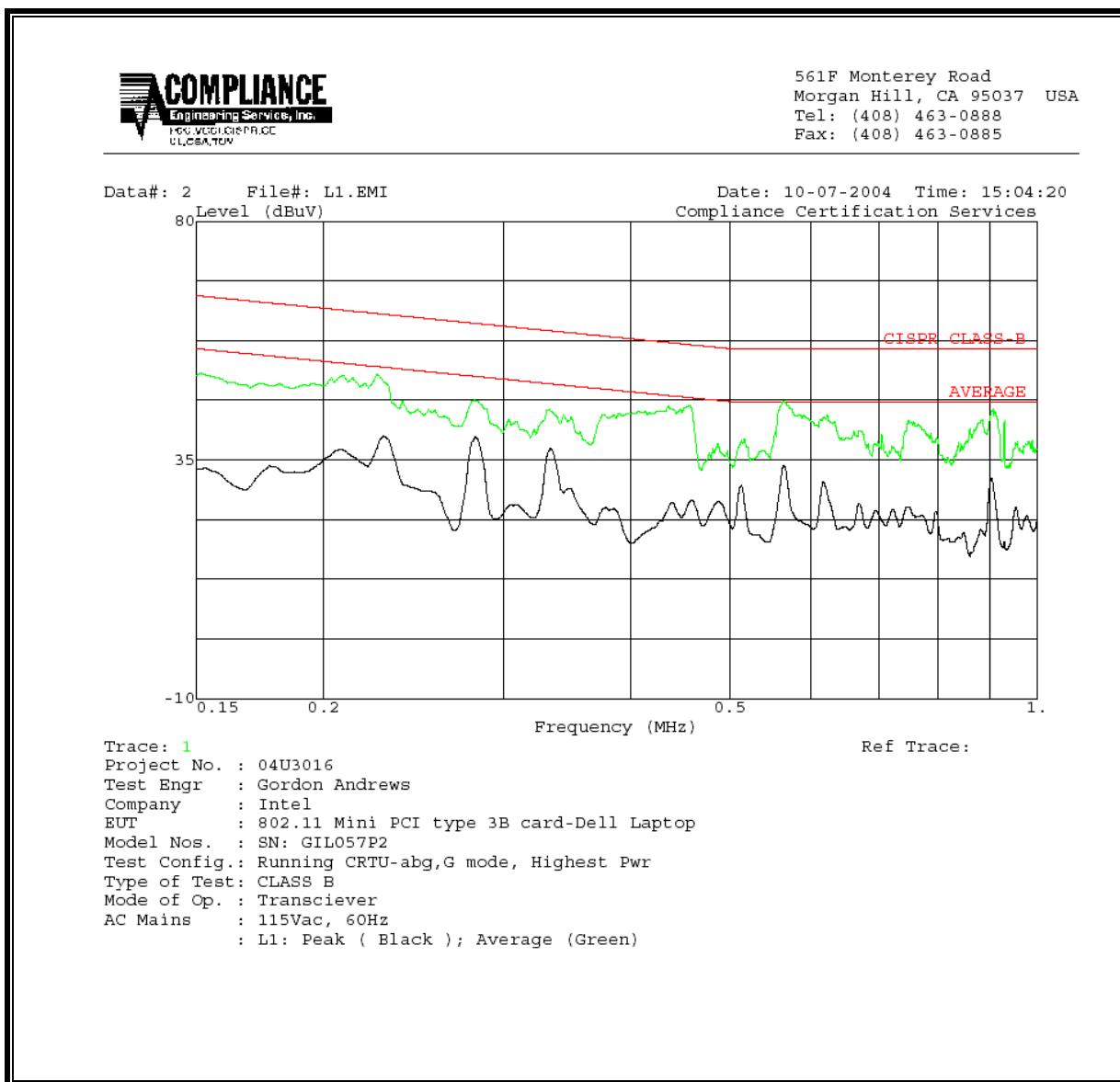
**LINE 1 RESULTS (WNC ANTENNA)**



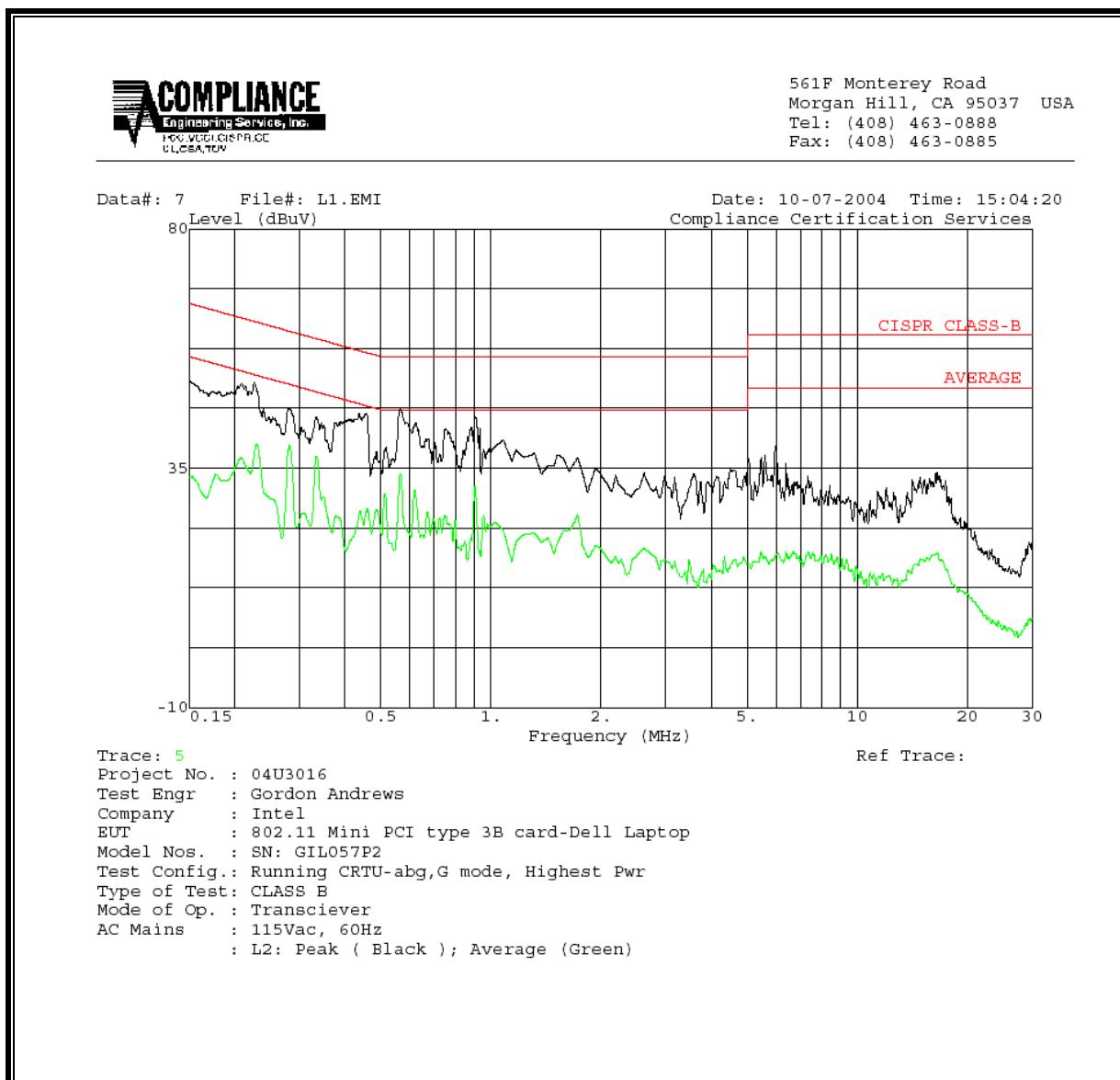
**LINE 2 RESULTS (WNC ANTENNA)**



**LINE 1 RESULTS (HITACHI ANTENNA)**

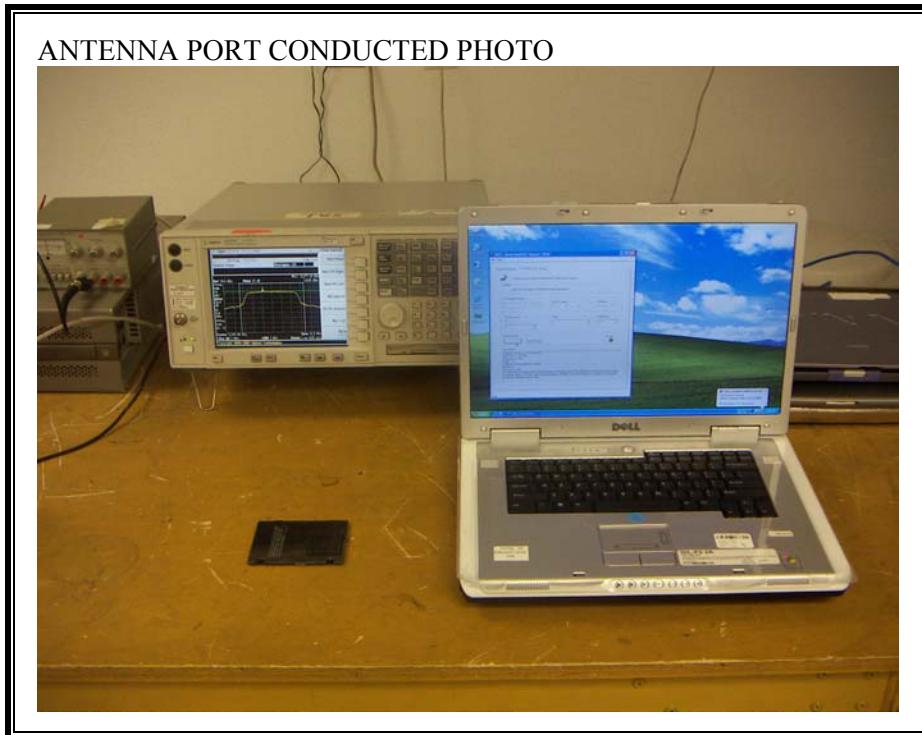


**LINE 2 RESULTS (HITACHI ANTENNA)**

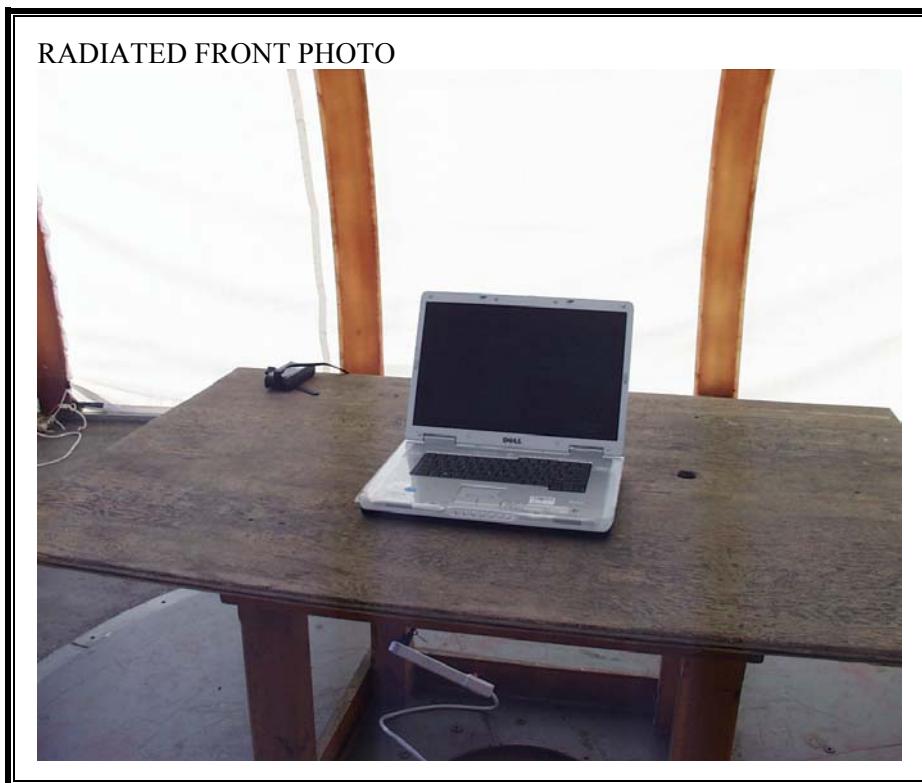


## 8. SETUP PHOTO

### ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



**RADIATED RF MEASUREMENT SETUP**



RADIATED BACK PHOTO



**POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP**

LINE CONDUCTED FRONT PHOTO



LINE CONDUCTED BACK PHOTO



**END OF REPORT**