



**FCC CFR47 PART 15 SUBPART C  
CLASS II PERMISSIVE CHANGE**

**FOR**

**WIRELESS LAN MINI-PCI EXPRESS, 802.11a/b/g**

**MODEL NUMBER: PA3489U-1MPC, PA3441U-1MPC**

**FCC ID: CJ6UPA3489WL**

**REPORT NUMBER: 05U3857-1**

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## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** TOSHIBA CORPORATION  
 DIGITAL MEDIA NETWORK COMPANY  
 2-9 SUEHIRO-CHO, OME  
 TOKYO, 198-8710, JAPAN

**EUT DESCRIPTION:** WIRELESS LAN MINI-PCI EXPRESS, 802.11a/b/g

**MODEL:** CJ6UPA3489WL, PA3441U-1MPC

**SERIAL NUMBER:** 05B-012

**DATE TESTED:** DECEMBER 01 to 08, 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:




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THU CHAN  
 EMC SUPERVISOR  
 COMPLIANCE CERTIFICATION SERVICES

Tested By:




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VIEN TRAN  
 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 an 802.11a/b/g transceiver WLAN transceiver.

### 5.2. CLASS II PERMISSIVE CHANGE DESCRIPTION

The major change filed under this application is as follows:

Change #1: The approved module is being used in a different host;

Change #2: Additional antennas of the same type as tested under original grant are used

### 5.3. MAXIMUM OUTPUT POWER

The transmitter has a maximum average 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	18.25	66.83
2412 - 2462	802.11g	17.66	58.34

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	17.40	54.95

## **5.4. DESCRIPTION OF AVAILABLE ANTENNAS**

The radio utilizes two PIFA antennas for diversity which manufactured by Hitachi Cable, P/N HTL017, each with a maximum gain of -1.36dBi at 2400-2500 MHz band and 1.97dBi at 5275-5850 MHz band.

## **5.5. SOFTWARE AND FIRMWARE**

The EUT driver software installed in the host support equipment during testing was Intel(R)PRO/Wireless 3945ABG Network Connection rev. xVT #3.

The test utility software used during testing was CRTU, rev. 4.0.18.0000.

## **5.6. 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 2437 MHz for 11b and g modes, and 5785 for 11a mode.

The worst-case data rate for this channel is determined to be 1 Mb/s for 11b mode, 6 Mb/s for 11g mode and 6 Mb/s for 11a mode, based on previous experience with 802.11abg WLAN product design architectures.

Thus all emissions tests were made in the 802.11b mode, 2437 MHz, 1 Mb/s, 802.11g mode, 2437 MHz, 6 Mb/s, and 802.11a mode, 5785 MHz, 6 Mb/s.

## 5.7. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

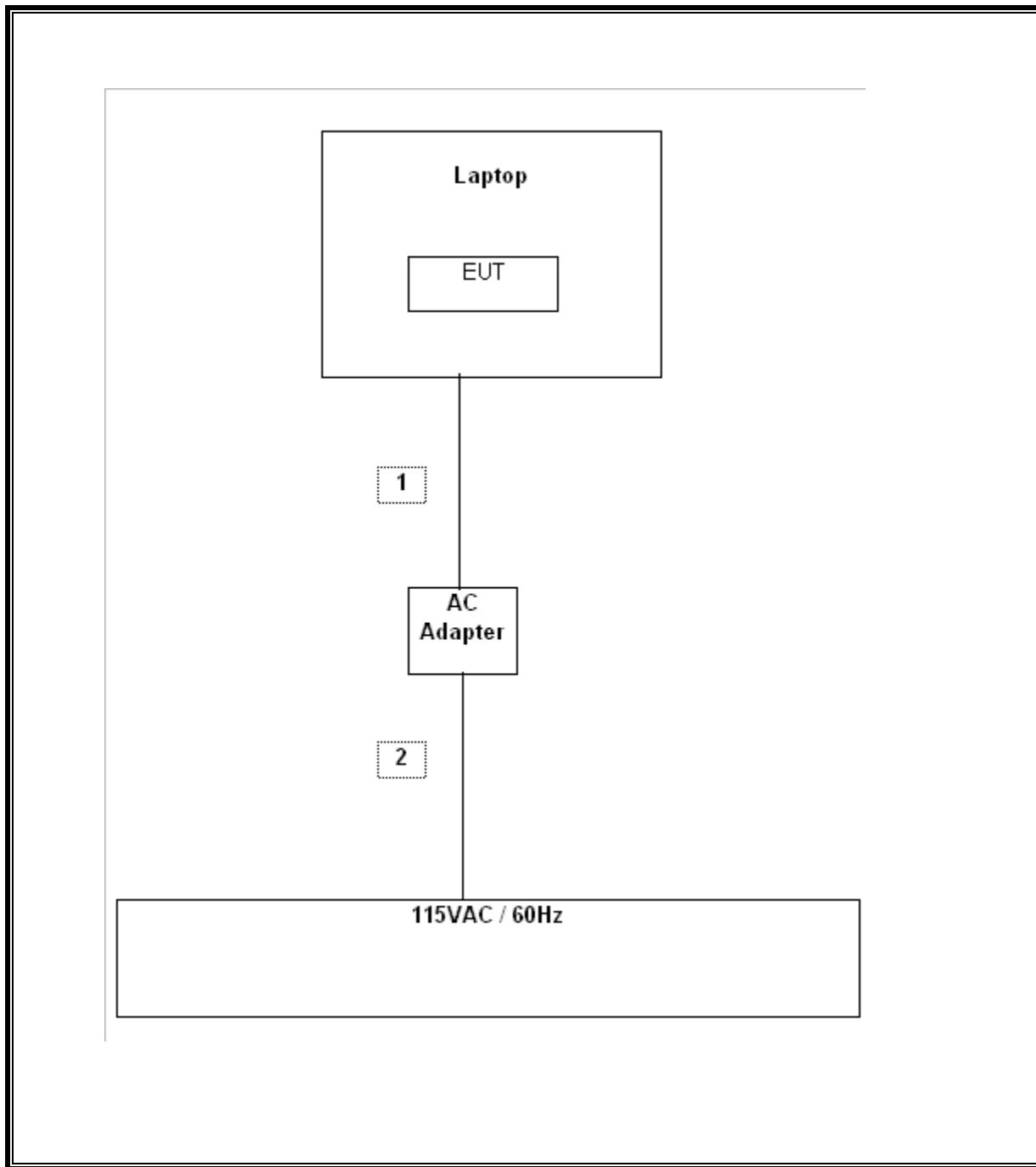
PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Aspen 10	CS-B	05B-012	DoC
AC Adapter	HP	ADP75HB	MVT0243196915	DoC

### I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115V	Shielded	2.0m	
2	DC	1	DC	Shielded	1.7m	

### TEST SETUP

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

**SETUP DIAGRAM**

## 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
Spectrum Analyzer 3 Hz ~ 44 GHz	Agilent	E4446A	MY43360112	03/28/2006
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	04/22/2006
Preamplifier, 1 ~ 26 GHz	Miteq	NSP2600-SP	924342	09/02/2006
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	08/30/2006
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	08/30/2006
EMI Test Receiver	R & S	ESHS 20	827129/006	06/03/2006
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	03/29/2006
RF Filter Section	HP	85420E	3705A00256	03/29/2006
Antenna, Bilog 30 MHz ~ 2 Ghz	Sunol Sciences	JB1	A121003	03/03/2006

## 7. LIMITS AND RESULTS

### 7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

#### 7.1.1. 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:

##### 802.11b Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.97
Middle	2437	18.25
High	2462	17.85

##### 802.11g Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.51
Middle	2437	17.66
High	2462	15.47

## 7.2. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

### 7.2.1. 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:

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5745	17.10
Middle	5785	17.40
High	5825	17.38

## 7.3. RADIATED EMISSIONS

### 7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

#### LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<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.

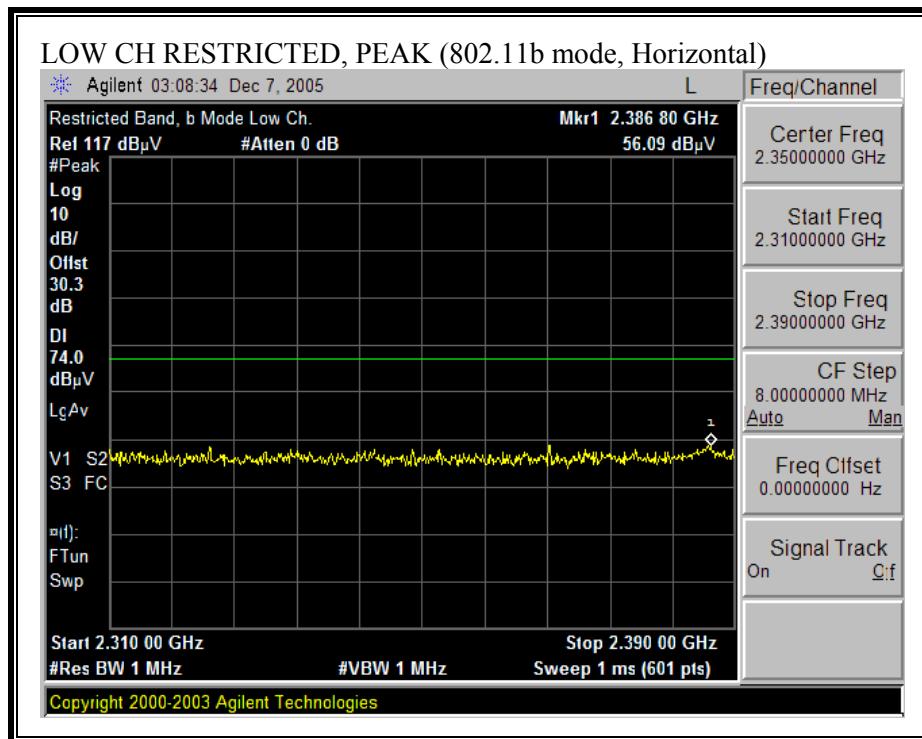
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

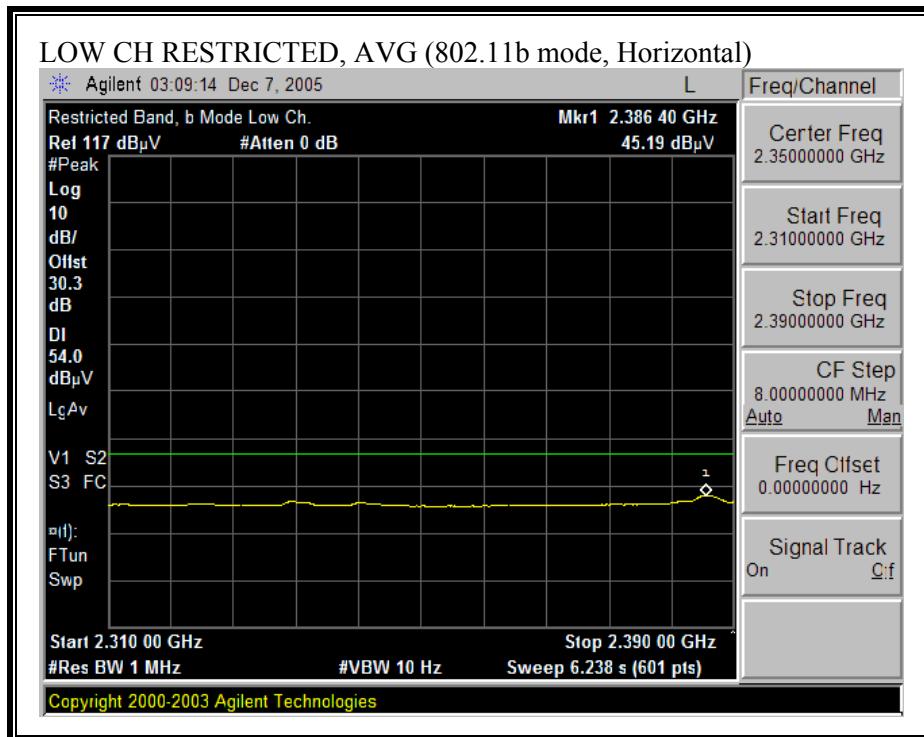
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each 5 GHz band.

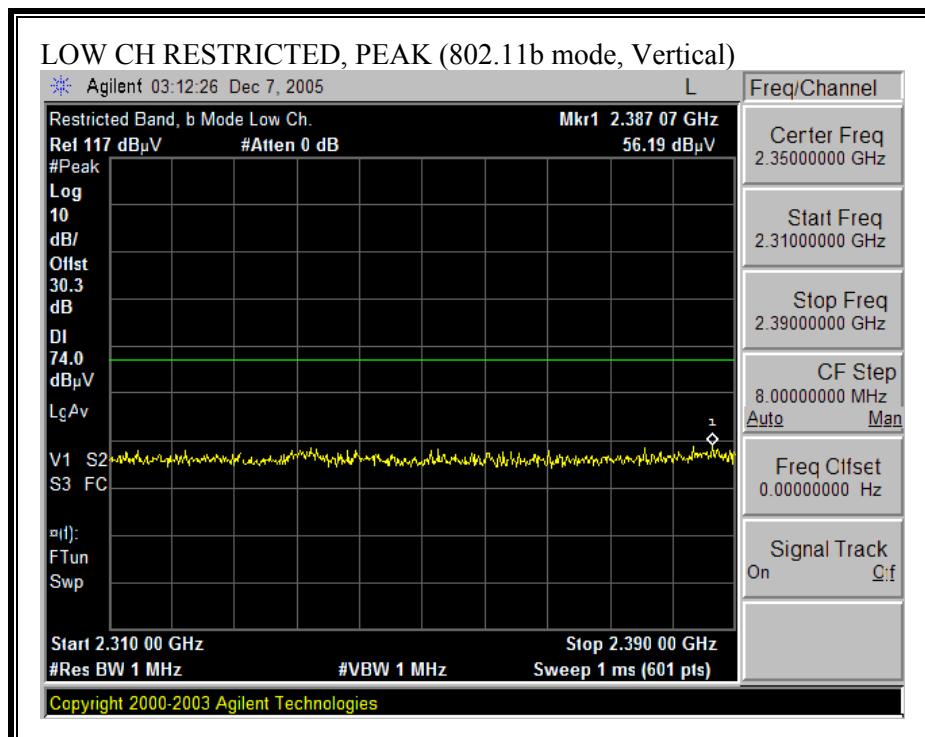
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

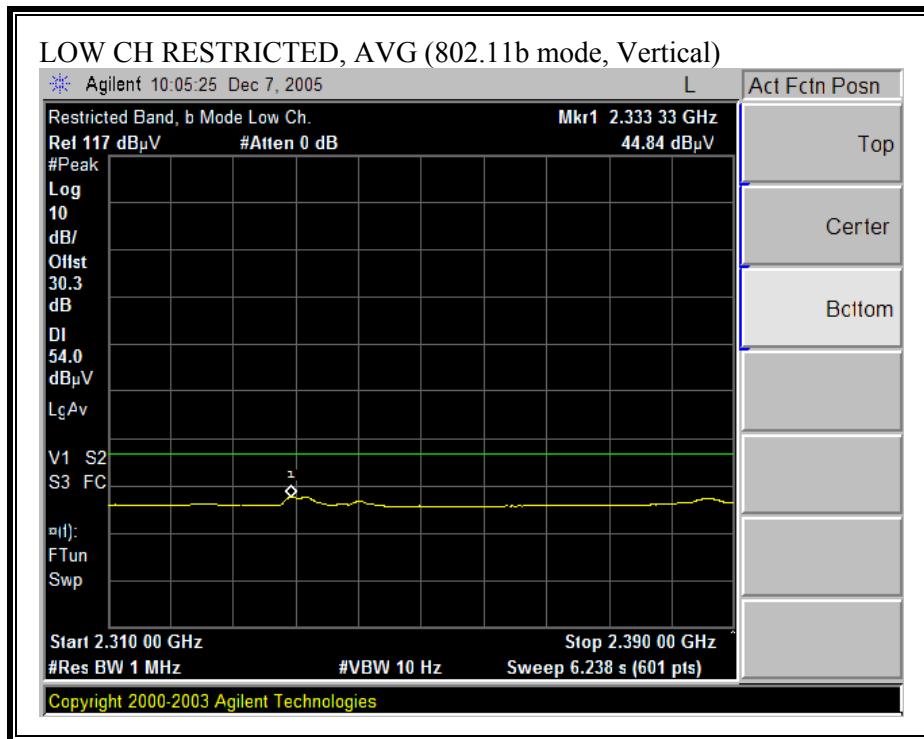
### 7.3.2. TRANSMITTER ABOVE 1 GHz FOR 2400 TO 2483.5 MHz BAND

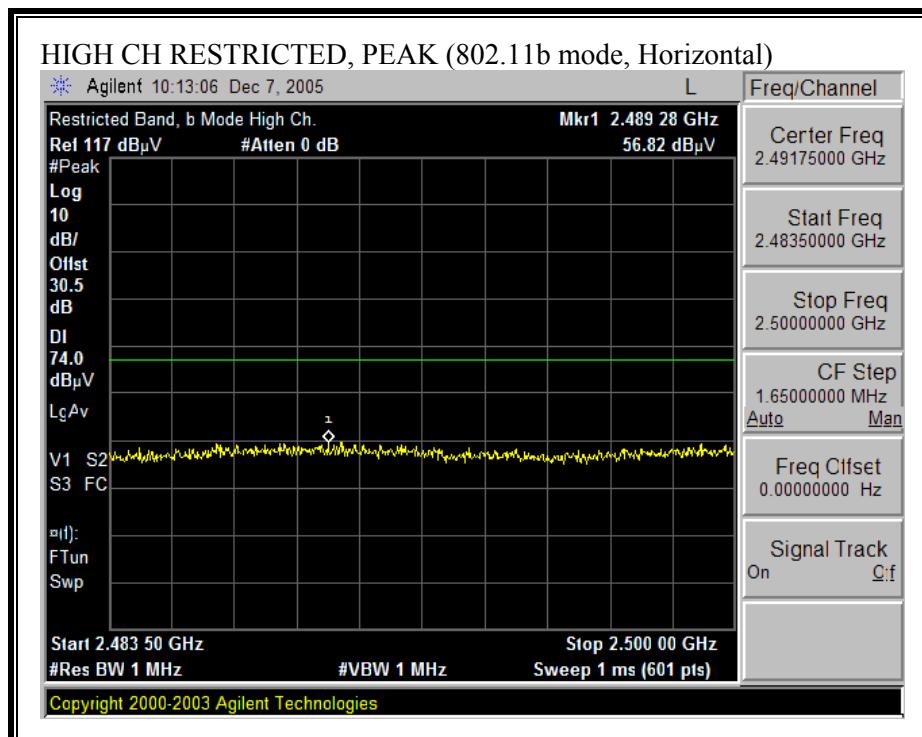
#### RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

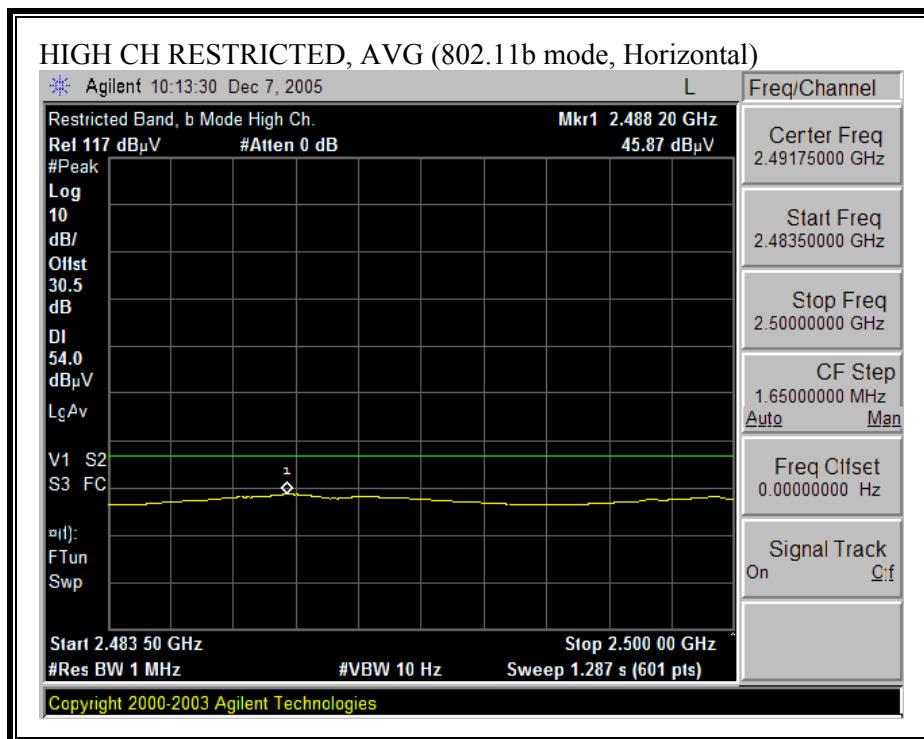


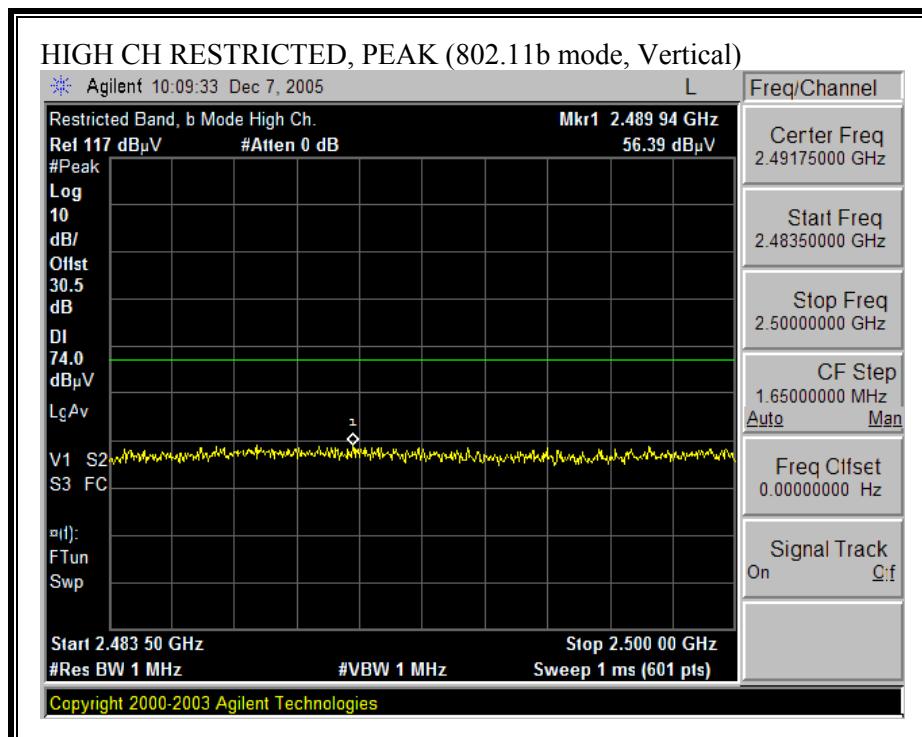


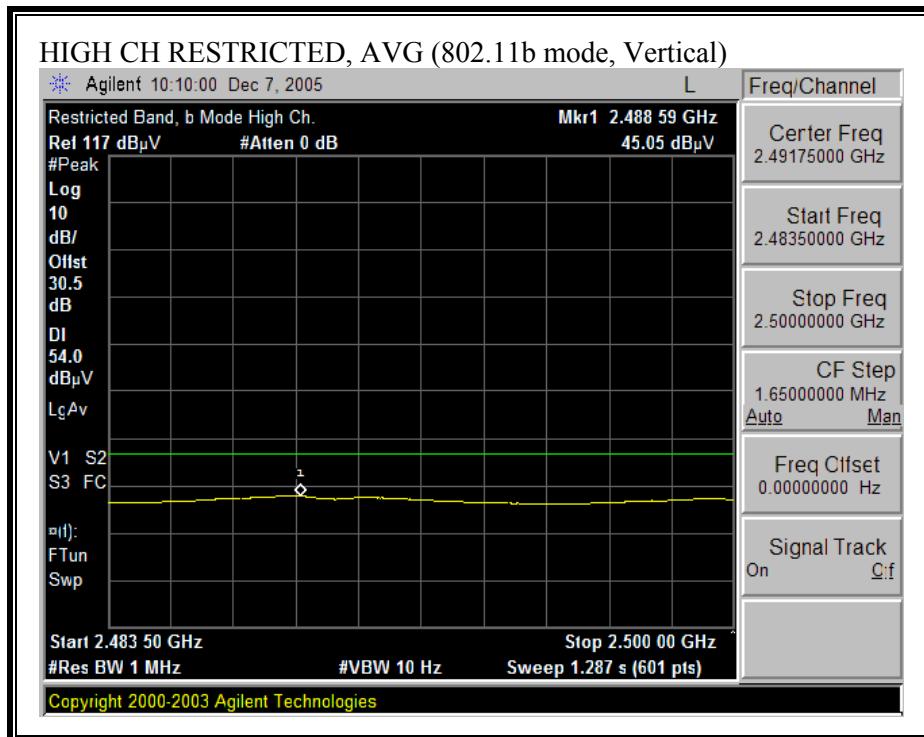
**RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)**



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

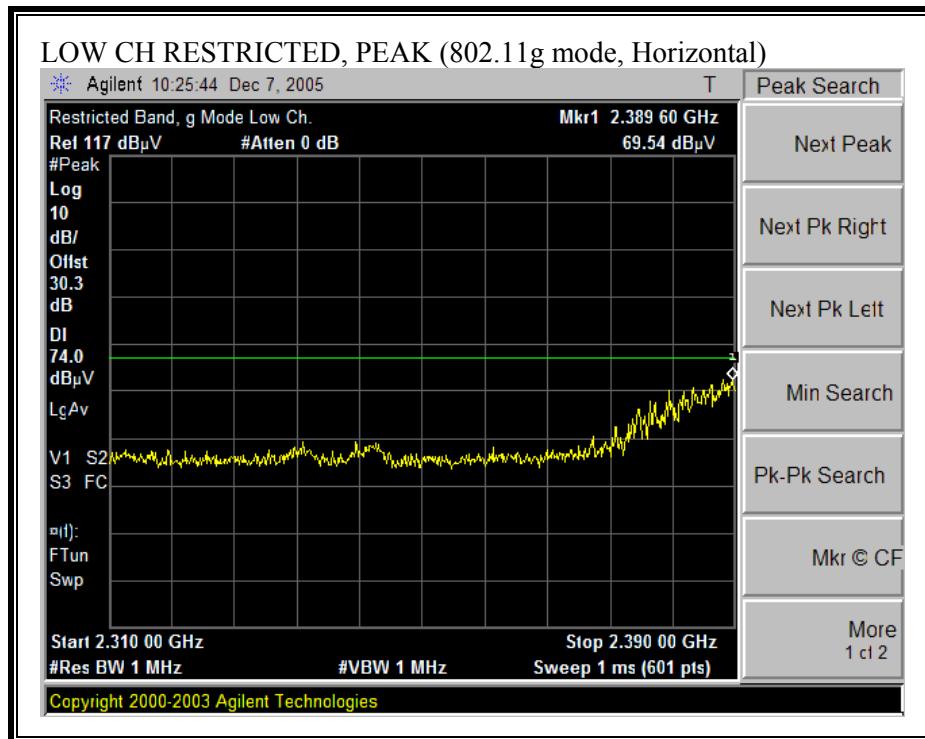


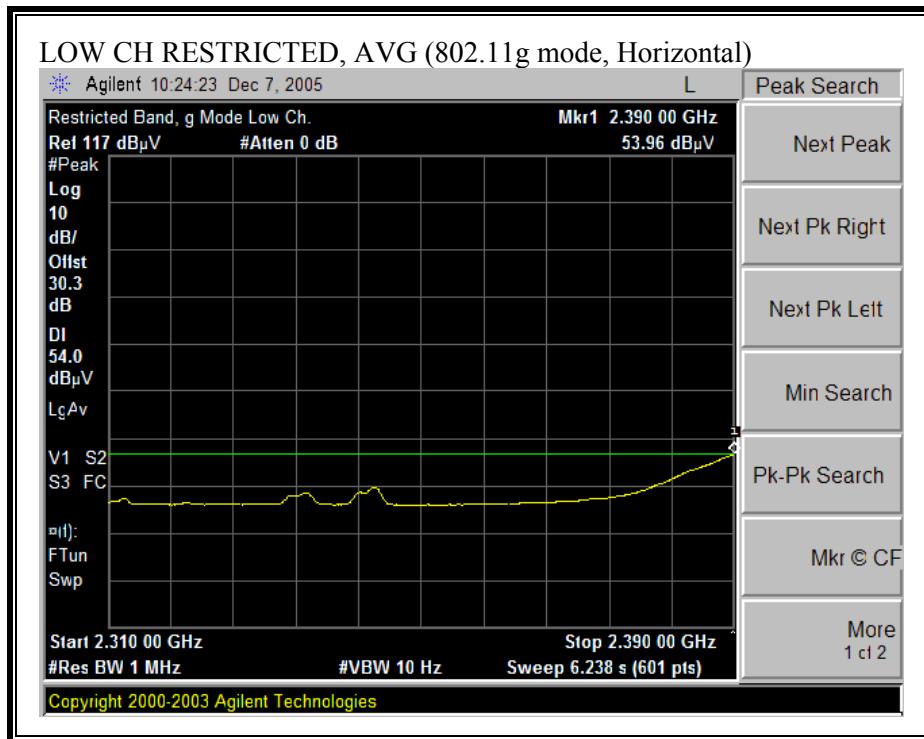
**RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)**

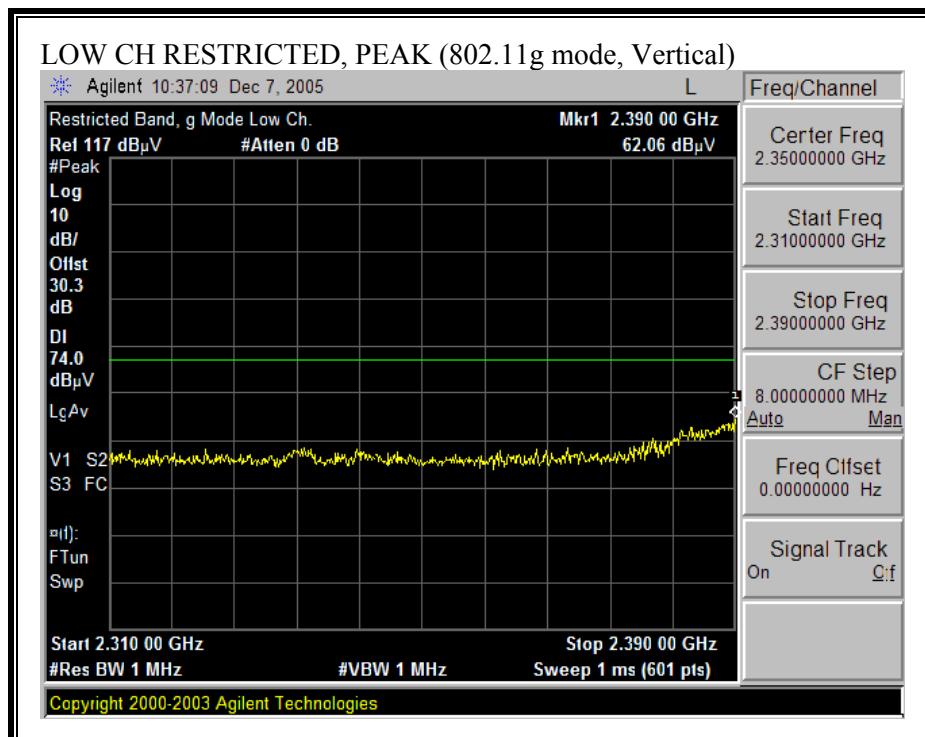


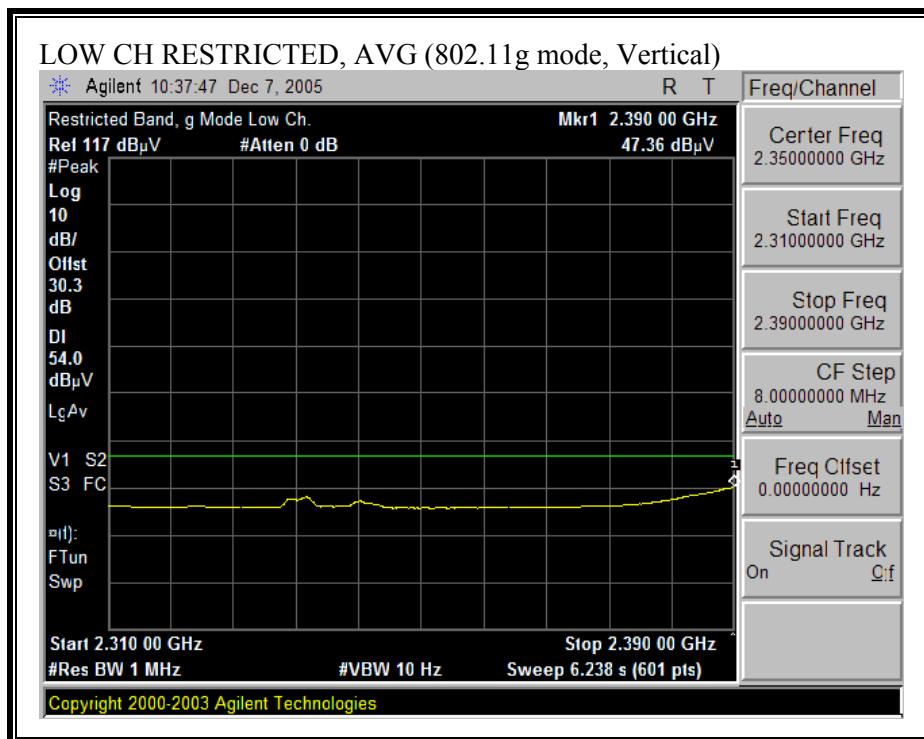
**HARMONICS AND SPURIOUS EMISSIONS (b MODE)**

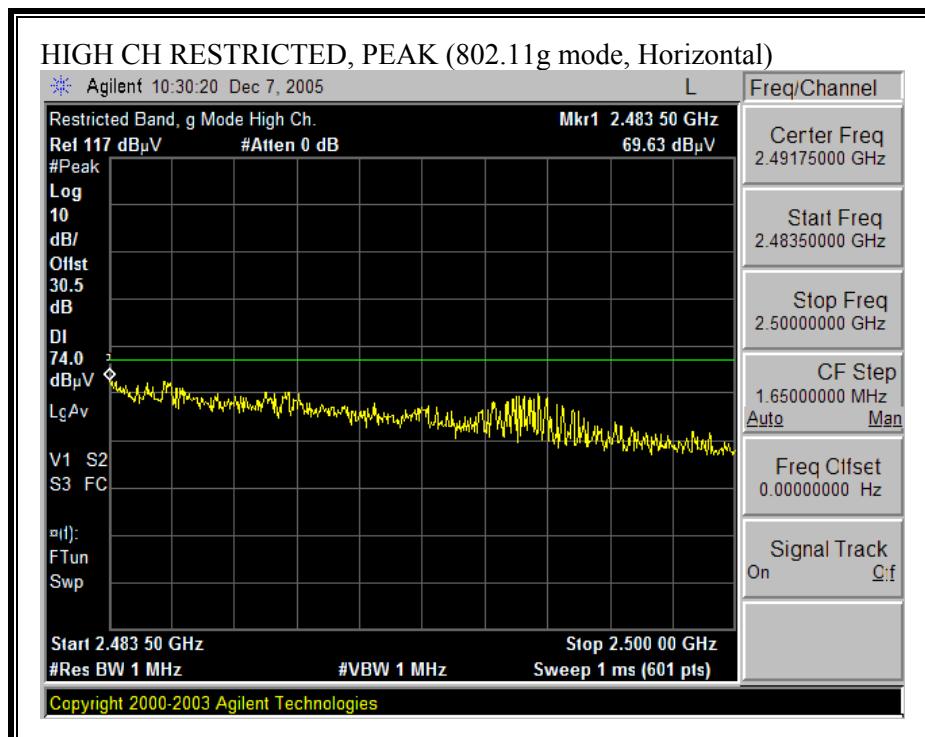
12/08/05 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site																																																																																																																																																																																																																																																																																																																											
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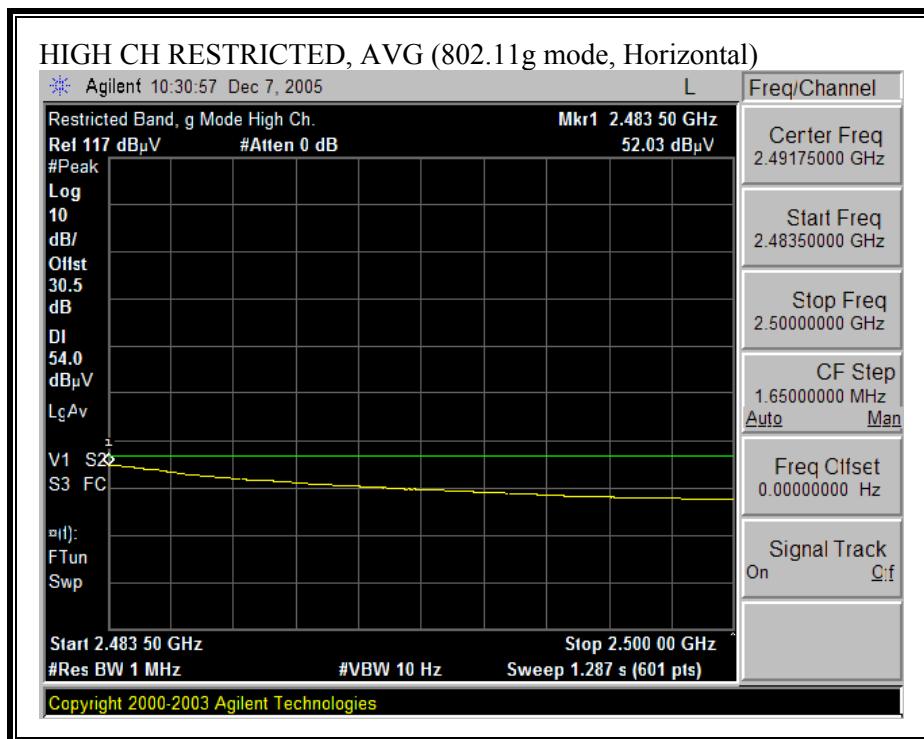
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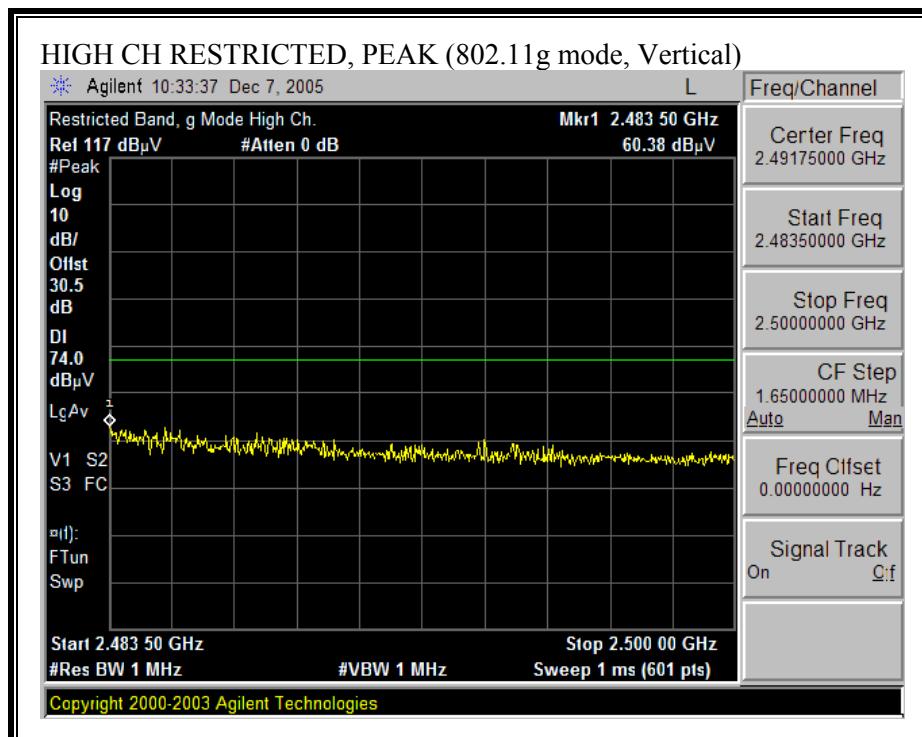


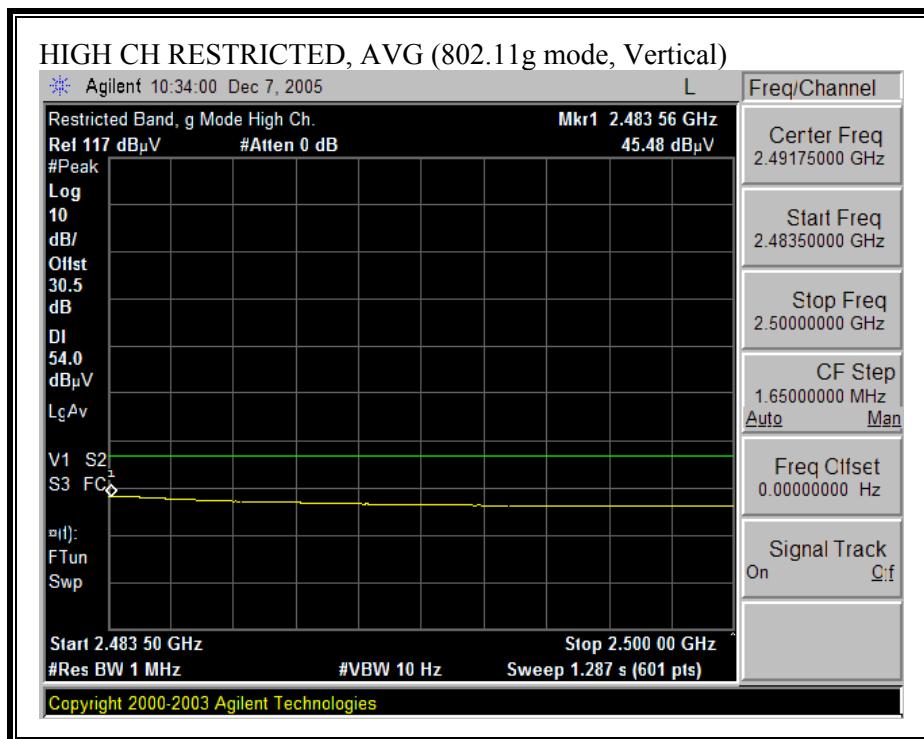
**RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)**



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



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



**HARMONICS AND SPURIOUS EMISSIONS (g MODE)**

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S/N: 2238 @3m	T144 Miteq 3008A00931					FCC 15.205	Hi Frequency Cables							2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	Peak Measurements RBW=VBW=1MHz			Vien 187215002	Vien 197209005	HPF_7.6GHz		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 CH, 2412 MHz															4.824	3.0	46.4	32.0	33.6	2.9	-36.5	0.0	0.0	46.5	32.1	74	54	-27.5	-21.9	H	4.824	3.0	44.8	32.5	33.6	2.9	-36.5	0.0	0.0	44.9	32.6	74	54	-29.1	-21.4	V	MID CH, 2437 MHz															4.874	3.0	44.8	32.8	33.7	3.0	-36.5	0.0	0.0	45.0	33.0	74	54	-29.0	-21.0	H	7.311	3.0	43.3	33.1	36.2	4.2	-36.2	0.0	0.6	48.1	37.9	74	54	-25.9	-16.1	H	4.874	3.0	44.1	32.0	33.7	3.0	-36.5	0.0	0.0	44.3	32.2	74	54	-29.7	-21.8	V	7.311	3.0	42.8	33.1	36.2	4.2	-36.2	0.0	0.6	47.6	37.9	74	54	-26.4	-16.1	V	HIGH CH, 2462 MHz															4.924	3.0	44.9	33.1	33.7	3.1	-36.5	0.0	0.0	45.2	33.4	74	54	-28.8	-20.6	H	7.386	3.0	44.3	32.3	36.2	4.2	-36.2	0.0	0.6	49.1	37.1	74	54	-24.9	-16.9	H	4.924	3.0	44.3	32.1	33.7	3.1	-36.5	0.0	0.0	44.6	32.4	74	54	-29.4	-21.6	V	7.386	3.0	43.4	32.3	36.2	4.2	-36.2	0.0	0.6	48.2	37.1	74	54	-25.8	-16.9	V	No other emissions were detected above system noise floor															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		
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### 7.3.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

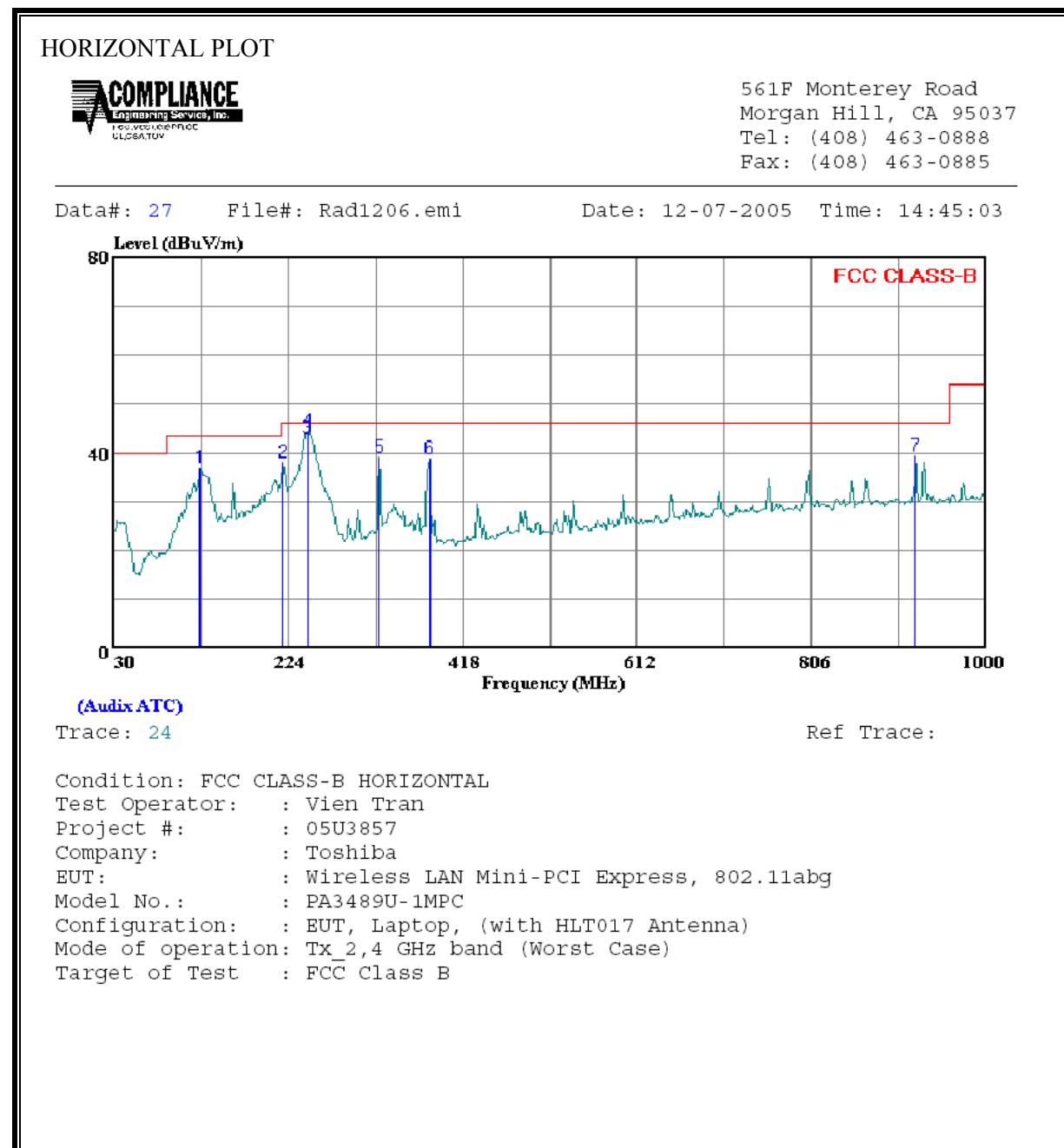
#### HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

12/02/05 <b>High Frequency Measurement</b> Compliance Certification Services, Morgan Hill Open Field Site																																																																																																																																																																																																																																																																						
Test Engr: Vien Tran Project #: 05U3857 Company: Toshiba EUT Descrip.: 802.11abg Wireless LAN Mini-PCI Express EUT M/N: PA3489U-1MPC Test Target: FCC 15.247 Mode Oper: Tx 11a_5.8 GHz Mode _Low, Mid & Hi channels_ with HTL017 Antenna_EUT AT X POSITION (Worst Case) Average Power Meter: Low = 17.10 dBm, Mid = 17.40 dBm, High = 17.38 dBm																																																																																																																																																																																																																																																																						
<b>Test Equipment:</b> <table border="1"> <tr> <td>Horn 1-18GHz</td> <td>Pre-amplifier 1-26GHz</td> <td>Pre-amplifier 26-40GHz</td> <td colspan="4">Horn &gt; 18GHz</td> <td>Limit</td> </tr> <tr> <td>T60; S/N: 2238 @3m</td> <td>T87 Miteq 924342</td> <td></td> <td colspan="4"></td> <td>FCC 15.205</td> </tr> <tr> <td colspan="15">Hi Frequency Cables</td> </tr> <tr> <td>2 foot cable</td> <td>3 foot cable</td> <td>12 foot cable</td> <td>HPF</td> <td>Reject Filter</td> <td colspan="9"> <b>Peak Measurements</b>            RBW=VBW=1MHz  <b>Average Measurements</b>            RBW=1MHz ; VBW=10Hz         </td> </tr> <tr> <td>f</td> <td>Dist</td> <td>Read Pk</td> <td>Read Avg.</td> <td>AF</td> <td>CL</td> <td>Amp</td> <td>D Corr</td> <td>Fltr</td> <td>Peak</td> <td>Avg</td> <td>Pk Lim</td> <td>Avg Lim</td> <td>Pk Mar</td> <td>Avg Mar</td> <td>Notes</td> </tr> <tr> <td>GHz</td> <td>(m)</td> <td>dBuV</td> <td>dBuV</td> <td>dB/m</td> <td>dB</td> <td>dB</td> <td>dB</td> <td>dB</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dBuV/m</td> <td>dB</td> <td>dB</td> <td>(V/H)</td> </tr> <tr> <td colspan="15">LOW CH, 5745 MHz</td> </tr> <tr> <td>11.490</td> <td>3.0</td> <td>52.2</td> <td>39.7</td> <td>38.2</td> <td>4.8</td> <td>-39.8</td> <td>0.0</td> <td>0.7</td> <td>56.1</td> <td>43.6</td> <td>74</td> <td>54</td> <td>-17.9</td> <td>-10.4</td> <td>H</td> </tr> <tr> <td>11.490</td> <td>3.0</td> <td>57.5</td> <td>43.9</td> <td>38.2</td> <td>4.8</td> <td>-39.8</td> <td>0.0</td> <td>0.7</td> <td>61.4</td> <td>47.8</td> <td>74</td> <td>54</td> <td>-12.6</td> <td>-6.2</td> <td>V</td> </tr> <tr> <td colspan="15">MID CH, 5785 MHz</td> </tr> <tr> <td>11.570</td> <td>3.0</td> <td>56.5</td> <td>43.3</td> <td>38.2</td> <td>4.8</td> <td>-39.8</td> <td>0.0</td> <td>0.7</td> <td>60.4</td> <td>47.2</td> <td>74</td> <td>54</td> <td>-13.6</td> <td>-6.8</td> <td>H</td> </tr> <tr> <td>11.570</td> <td>3.0</td> <td>59.4</td> <td>44.2</td> <td>38.2</td> <td>4.8</td> <td>-39.8</td> <td>0.0</td> <td>0.7</td> <td>63.3</td> <td>48.1</td> <td>74</td> <td>54</td> <td>-10.7</td> <td>-5.9</td> <td>V</td> </tr> <tr> <td colspan="15">HI CH, 5825 MHz</td> </tr> <tr> <td>11.730</td> <td>3.0</td> <td>56.8</td> <td>43.6</td> <td>38.3</td> <td>4.8</td> <td>-39.9</td> <td>0.0</td> <td>0.7</td> <td>60.7</td> <td>47.5</td> <td>74</td> <td>54</td> <td>-13.3</td> <td>-6.5</td> <td>H</td> </tr> <tr> <td>11.730</td> <td>3.0</td> <td>59.9</td> <td>45.4</td> <td>38.3</td> <td>4.8</td> <td>-39.9</td> <td>0.0</td> <td>0.7</td> <td>63.8</td> <td>49.3</td> <td>74</td> <td>54</td> <td>-10.2</td> <td>-4.7</td> <td>V</td> </tr> <tr> <td colspan="15">No other emissions were detected above system noise floor</td> </tr> <tr> <td colspan="5">           f Measurement Frequency            Dist Distance to Antenna            Read Analyzer Reading            AF Antenna Factor            CL Cable Loss         </td> <td colspan="5">           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         </td> <td colspan="5">           Avg Lim Average Field Strength Limit            Pk Lim Peak Field Strength Limit            Avg Mar Margin vs. Average Limit            Pk Mar Margin vs. Peak Limit         </td> </tr> </table>															Horn 1-18GHz	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz				Limit	T60; S/N: 2238 @3m	T87 Miteq 924342						FCC 15.205	Hi Frequency Cables															2 foot cable	3 foot cable	12 foot cable	HPF	Reject Filter	<b>Peak Measurements</b> RBW=VBW=1MHz <b>Average Measurements</b> RBW=1MHz ; VBW=10Hz									f	Dist	Read Pk	Read Avg.	AF	CL	Amp	D Corr	Fltr	Peak	Avg	Pk Lim	Avg Lim	Pk Mar	Avg Mar	Notes	GHz	(m)	dBuV	dBuV	dB/m	dB	dB	dB	dB	dBuV/m	dBuV/m	dBuV/m	dBuV/m	dB	dB	(V/H)	LOW CH, 5745 MHz															11.490	3.0	52.2	39.7	38.2	4.8	-39.8	0.0	0.7	56.1	43.6	74	54	-17.9	-10.4	H	11.490	3.0	57.5	43.9	38.2	4.8	-39.8	0.0	0.7	61.4	47.8	74	54	-12.6	-6.2	V	MID CH, 5785 MHz															11.570	3.0	56.5	43.3	38.2	4.8	-39.8	0.0	0.7	60.4	47.2	74	54	-13.6	-6.8	H	11.570	3.0	59.4	44.2	38.2	4.8	-39.8	0.0	0.7	63.3	48.1	74	54	-10.7	-5.9	V	HI CH, 5825 MHz															11.730	3.0	56.8	43.6	38.3	4.8	-39.9	0.0	0.7	60.7	47.5	74	54	-13.3	-6.5	H	11.730	3.0	59.9	45.4	38.3	4.8	-39.9	0.0	0.7	63.8	49.3	74	54	-10.2	-4.7	V	No other emissions were detected above system noise floor															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				
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### 7.3.4. TRANSMITTER BELOW 1 GHz FOR 2400 TO 2483.5 MHz BAND

#### 2.4 GHz BAND

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



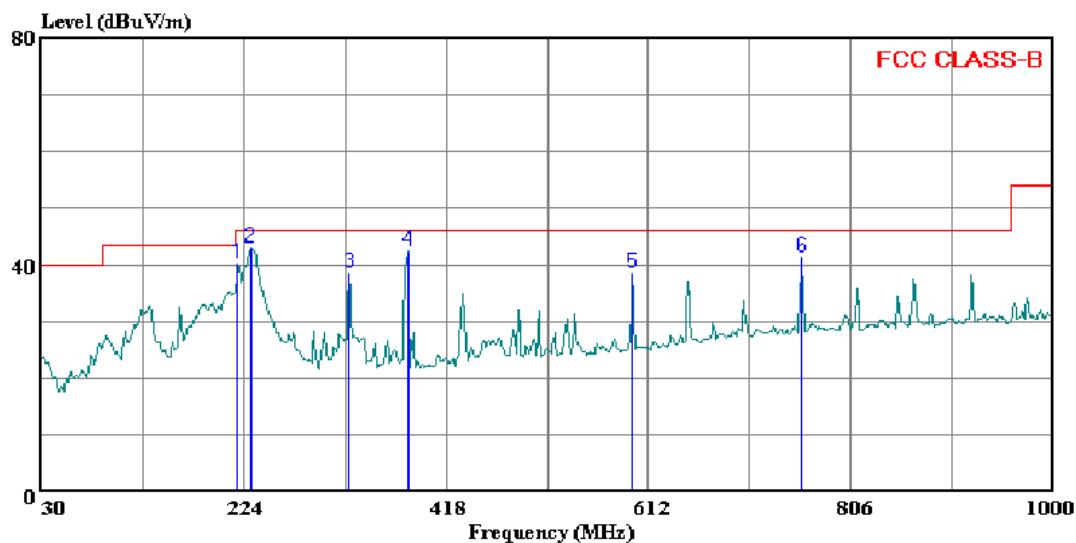
## HORIZONTAL DATA

Freq	Read		Level	Limit	Over	Over
	Level	Factor				
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB
1	126.030	49.48	-12.54	36.94	43.50	-6.56 Peak
2	218.180	53.06	-15.13	37.93	46.00	-8.07 Peak
3	245.340	56.88	-13.86	43.02	46.00	-2.98 QP
4	245.340	58.06	-13.86	44.20	46.00	-1.80 Peak
5	324.880	50.25	-11.18	39.07	46.00	-6.93 Peak
6	381.140	48.55	-9.91	38.64	46.00	-7.36 Peak
7	921.430	40.05	-0.79	39.26	46.00	-6.74 Peak

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

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

Data#: 23 File#: Rad1206.emi Date: 12-07-2005 Time: 14:16:35



(Audix ATC)

Trace: 22

Ref Trace:

Condition: FCC CLASS-B VERTICAL  
Test Operator: : Vien Tran  
Project #: : 05U3857  
Company: : Toshiba  
EUT: : Wireless LAN Mini-PCI Express, 802.11abg  
Model No.: : PA3489U-1MPC  
Configuration: : EUT, Laptop, (with HLT017 Antenna)  
Mode of operation: Tx\_2,4 GHz band (Worst Case)  
Target of Test : FCC Class B

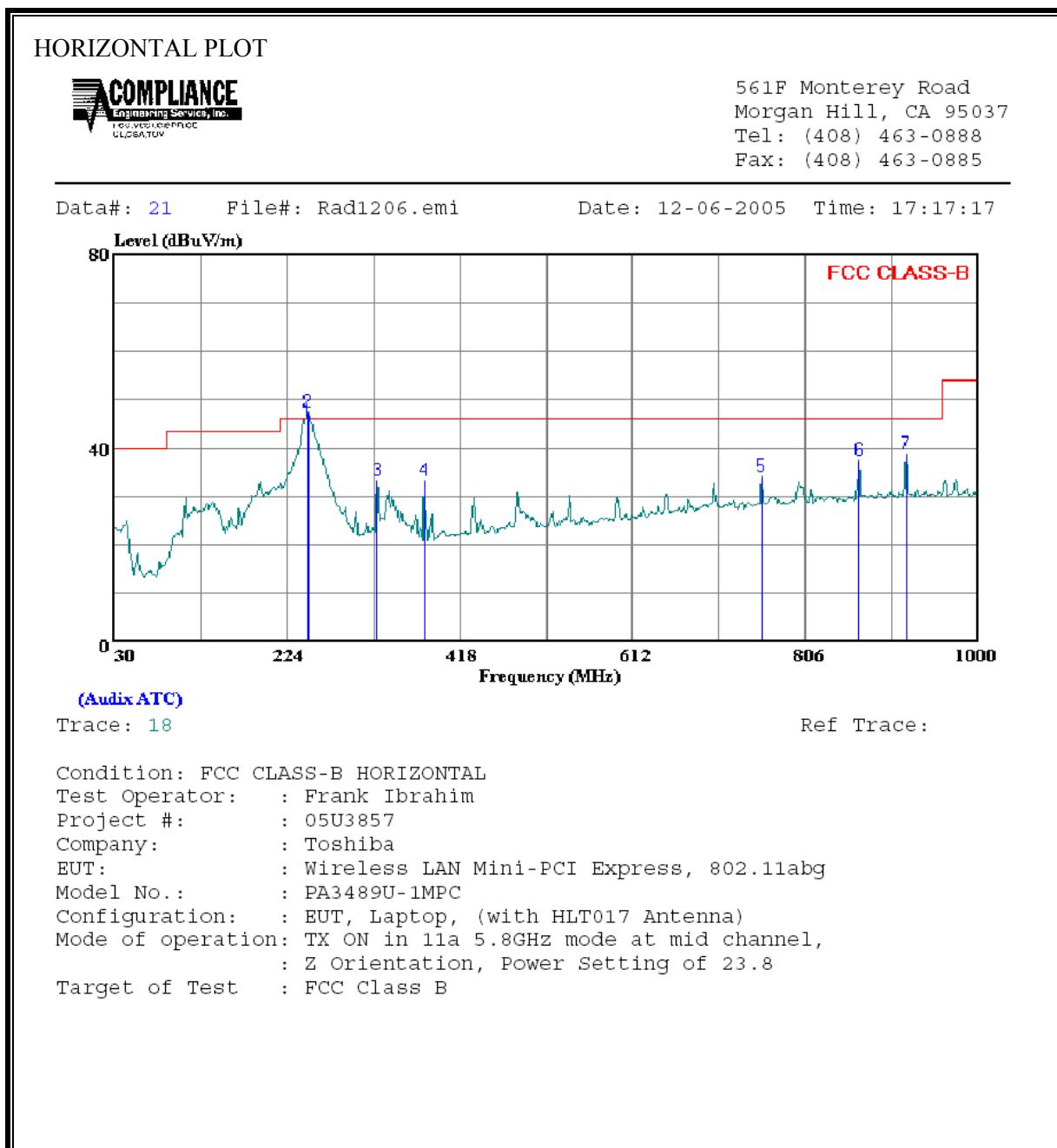
## VERTICAL DATA

Freq	Read		Level	Limit	Over		Remark
	Level	Factor			dBuV/m	dBuV/m	
	MHz	dBuV					
1	218.180	55.38	-15.13	40.25	46.00	-5.75	Peak
2	230.790	57.48	-14.56	42.92	46.00	-3.08	Peak
3	324.880	49.64	-11.18	38.46	46.00	-7.54	Peak
4	381.140	52.30	-9.91	42.39	46.00	-3.61	Peak
5	596.480	44.07	-5.54	38.53	46.00	-7.47	Peak
6	759.440	43.63	-2.43	41.20	46.00	-4.80	Peak

### 7.3.5. TRANSMITTER BELOW 1 GHZ FOR 5725 TO 5850 MHz BAND

## 5.8 GHz BAND

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



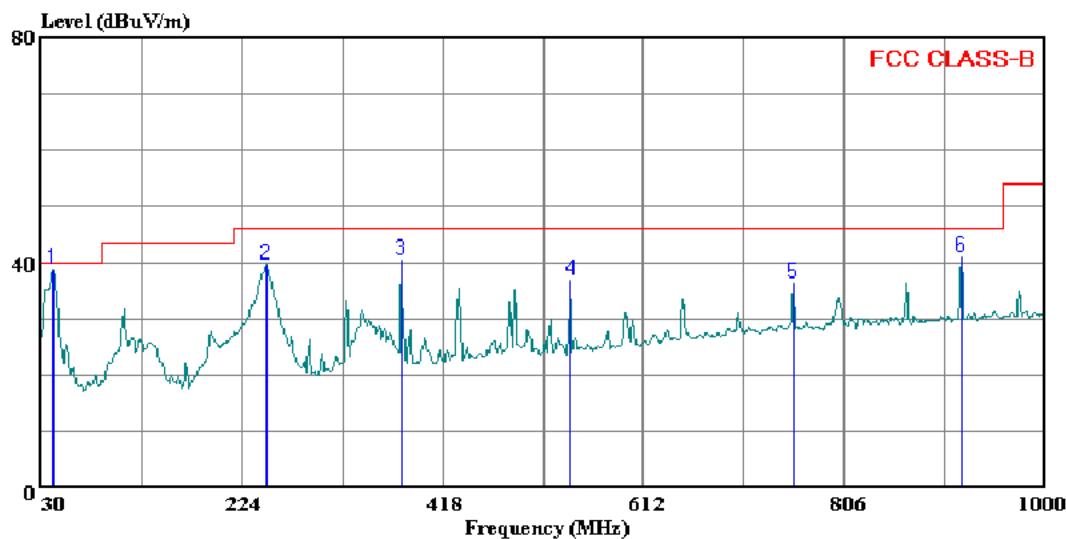
## HORIZONTAL DATA

Freq	MHz	Read		Level	Limit Line	Over Limit	Remark
		Level	Factor				
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	247.280	59.10	-13.80	45.30	46.00	-0.70	QP
2 *	247.280	61.18	-13.84	47.33	46.00	1.33	Peak
3	324.880	44.53	-11.18	33.35	46.00	-12.65	Peak
4	378.230	43.30	-10.00	33.30	46.00	-12.70	Peak
5	756.530	36.45	-2.47	33.98	46.00	-12.02	Peak
6	866.140	38.57	-1.25	37.32	46.00	-8.68	Peak
7	919.490	39.46	-0.83	38.63	46.00	-7.37	Peak

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

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

Data#: 17 File#: Rad1206.emi Date: 12-06-2005 Time: 17:04:42



Condition: FCC CLASS-B VERTICAL  
 Test Operator: : Frank Ibrahim  
 Project #: : 05U3857  
 Company: : Toshiba  
 EUT: : Wireless LAN Mini-PCI Express, 802.11abg  
 Model No.: : PA3489U-1MPC  
 Configuration: : EUT, Laptop, (with HLT017 Antenna)  
 Mode of operation: TX ON in 11a 5.8GHz mode at mid channel,  
                   : X Orientation, Power Setting of 23.8  
 Target of Test : FCC Class B

## VERTICAL DATA

Freq	Read		Level	Limit	Over	Limit	Remark
	Level	Factor					
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	41.640	51.87	-13.02	38.85	40.00	-1.15	Peak
2	247.280	53.36	-13.84	39.51	46.00	-6.49	Peak
3	378.230	50.50	-10.00	40.50	46.00	-5.50	Peak
4	541.190	43.49	-6.54	36.95	46.00	-9.05	Peak
5	756.530	38.67	-2.47	36.20	46.00	-9.80	Peak
6	919.490	41.87	-0.83	41.04	46.00	-4.96	Peak

## 7.4. POWERLINE CONDUCTED EMISSIONS

### LIMIT

§15.207 (a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50  $\mu$ 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.

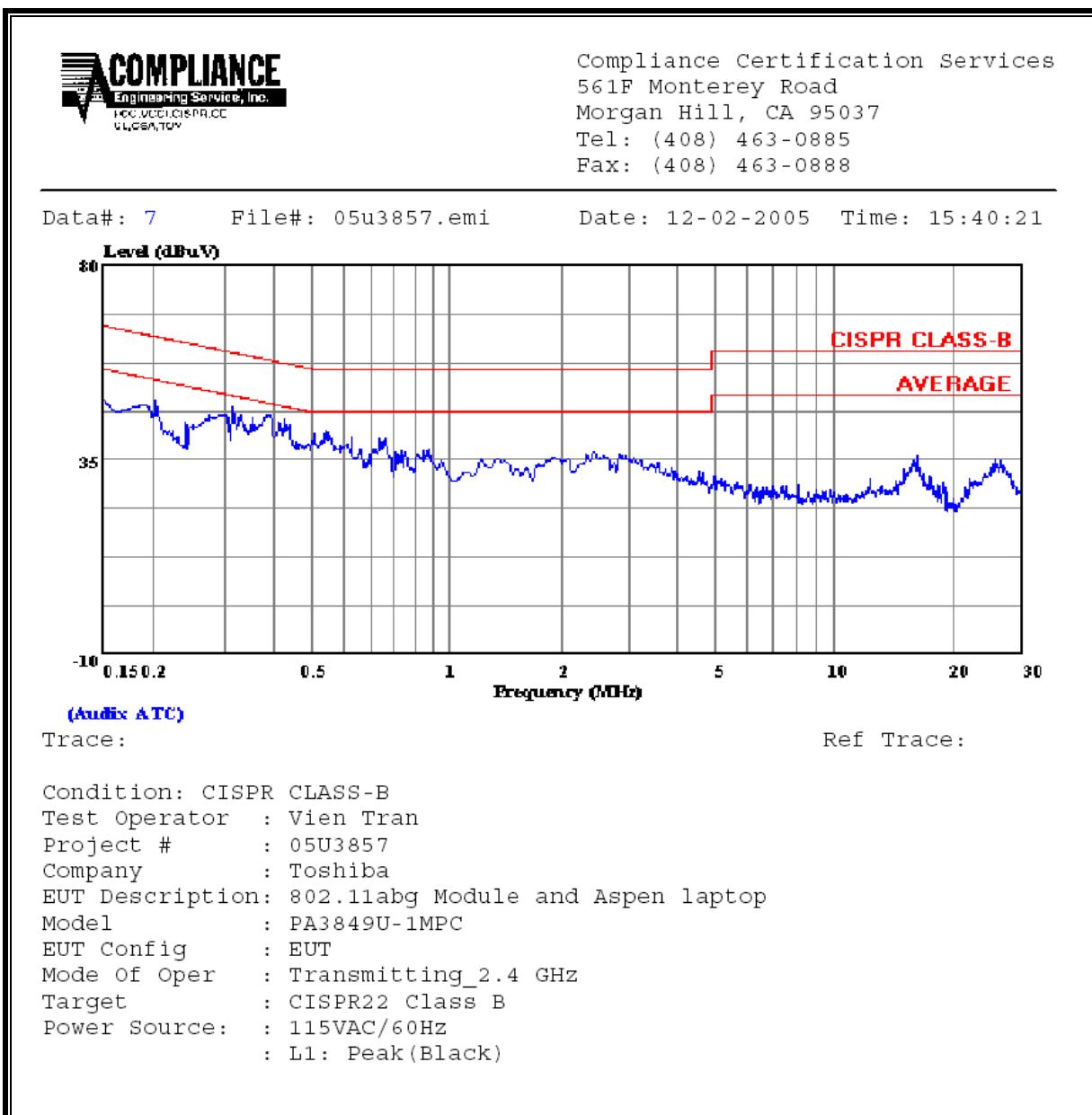
Line conducted data is recorded for both NEUTRAL and HOT lines.

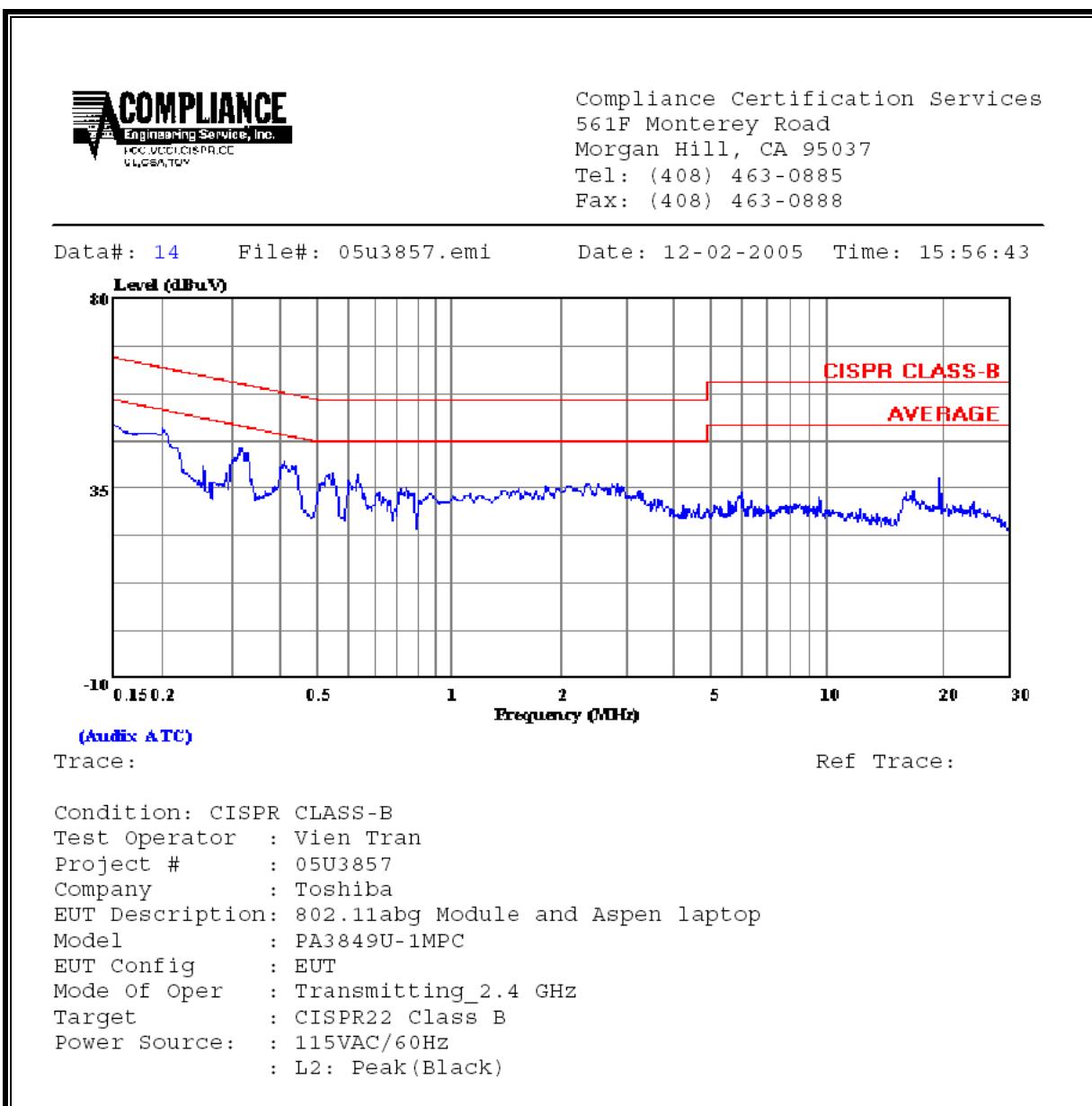
### RESULTS

No non-compliance noted:

**2.4 GHz BAND****6 WORST EMISSIONS**

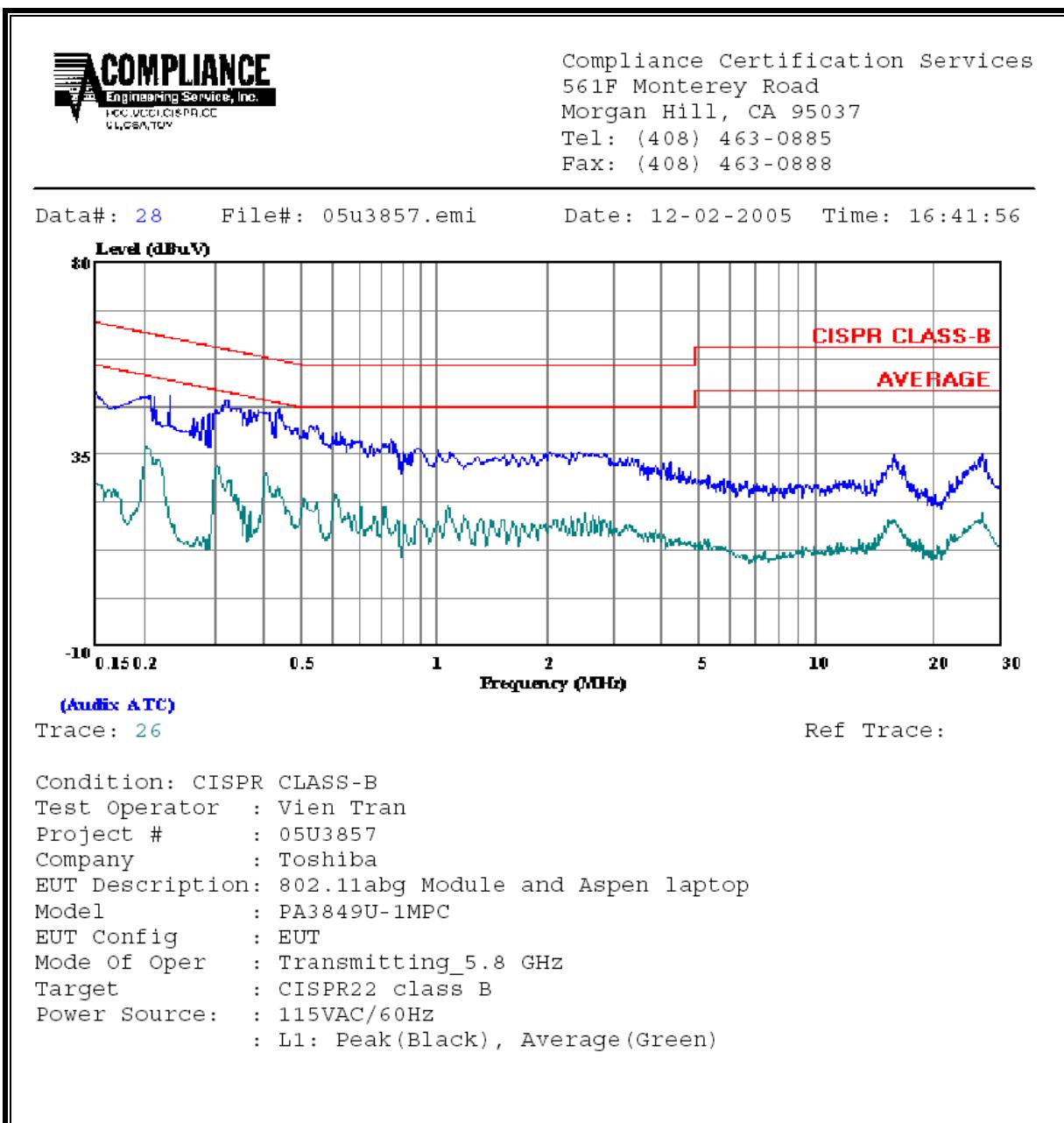
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Closs (dB)	Limit QP	FCC B AV	Margin		Remark
	PK (dBuV)	QP (dBuV)	AV (dBuV)				QP (dB)	AV (dB)	
0.32	46.92	--	--	0.00	59.79	49.79	-12.87	-2.87	L1
0.39	45.22	--	--	0.00	58.13	48.13	-12.91	-2.91	L1
0.55	41.56	--	--	0.00	56.00	46.00	-14.44	-4.44	L1
0.32	44.74	--	--	0.00	59.79	49.79	-15.05	-5.05	L2
0.39	40.74	--	--	0.00	58.13	48.13	-17.39	-7.39	L2
0.55	38.84	--	--	0.00	56.00	46.00	-17.16	-7.16	L2
6 Worst Data									

**LINE 1 RESULTS**

**LINE 2 RESULTS**

**5.8 GHz BAND****6 WORST EMISSIONS**

CONDUCTED EMISSIONS DATA (115VAC 60Hz)										
Freq. (MHz)	Reading			Closs (dB)	Limit	FCC B		Margin		Remark
	PK (dBuV)	QP (dBuV)	AV (dBuV)			QP	AV	QP (dB)	AV (dB)	
0.32	47.54	--	32.51	0.00	59.79	49.79	-12.25	-17.28	L1	
0.44	45.67	--	29.09	0.00	57.16	47.16	-11.49	-18.07	L1	
0.61	41.58	--	24.91	0.00	56.00	46.00	-14.42	-21.09	L1	
0.32	43.84	--	32.20	0.00	59.79	49.79	-15.95	-17.59	L2	
0.44	41.34	--	30.21	0.00	57.16	47.16	-15.82	-16.95	L2	
0.55	38.30	--	23.72	0.00	56.00	46.00	-17.70	-22.28	L2	
6 Worst Data										

**LINE 1 RESULTS**

**LINE 2 RESULTS**