



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

FOR

802.11A/B/G MINI PCI CARD

MODEL NUMBER: PA3297U-1MPC

FCC ID: CJ6UPA3297WL

REPORT NUMBER: 03U2199-1

ISSUE DATE: OCTOBER 21, 2003

Prepared for

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

Prepared by

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1. TEST RESULT CERTIFICATION

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

EUT DESCRIPTION: 802.11A/B/G MINI PCI CARD

MODEL: PA3297U-1MPC

DATE TESTED: OCTOBER 16 - 21, 2003

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.

Note: The 2.4 GHz and 5.8 GHz bands are applicable to this report; another band of operation (5.2 GHz) is documented in a separate report.

Approved & Released For CCS By:

Tested By:



MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES

VIEN TRAN
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The Class II Permissive Change is to add portable operation in the Toshiba Tablet PC, model PPM20U-AAAA2, including co-location with the Toshiba PA3232U-1BTM Bluetooth radio card.

The 802.11a/b/g WLAN transmitter has a maximum peak conducted output power as follows:

Frequency Band (MHz)	Mode	Output Power (mW)	Output Power (dBm)
2412 - 2462	802.11b/g	183.00	22.62
5745 - 5825	802.11a	132.00	21.21

The WLAN radio utilizes two identical internal dipole antennas for diversity, with a maximum gain of 4.8 dBi.

The Bluetooth radio card has a modular approval, FCC ID: CJ6UPA3232BT. The Bluetooth radio utilizes a film antenna with a maximum gain of 1.22 dBi.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4/1992, FCC CFR 47 Part 2 and FCC CFR 47 Part 15.

4. FACILITIES AND ACCREDITATION

The open area test sites and conducted 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:

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 AND MEASUREMENT EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due Date
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2004
Spectrum Analyzer	AGILENT	E4446A	US42070220	1/13/04
Pre-amplifier	MITEQ	NSP2600-SP	924341	4/25/04
Horn Antenna	EMCO	3115	6717	2/04/04
Power Meter	AGILENT	E4416A	0841291160	11/07/04
Power Sensor	Agilent	E9327A	US40440755	11/07/04
Antenna, Biconical	Eaton	94455-1	1214	3/06/04
Antenna, Log Periodic	EMCO	3146	9107-3163	3/06/04
Preamplifier	Miteq	NSP10023988	646456	4/26/04
Band Reject 2.4GHz	Micro-Tronics	BRM50702	003	N.C.R.

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Toshiba	PPM20U-AAAA2	93010025	DoC
AC adapter	Toshiba	ADP-60RH A	0394336	DoC

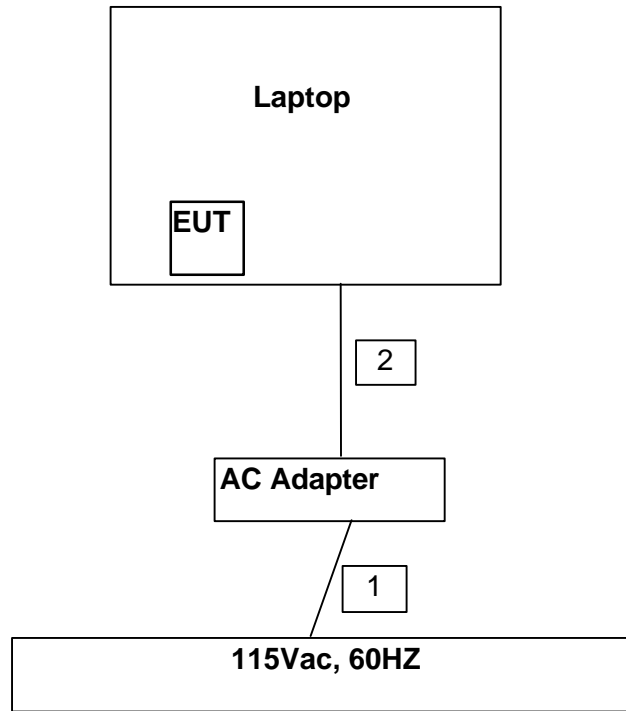
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Unshielded	1.8m	No
2	DC	1	DC Jack	Unshielded	1.8m	No

TEST SETUP

The EUT is installed in the host laptop.

SETUP DIAGRAM



7. APPLICABLE RULES AND TEST RESULTS

7.1. RADIATED EMISSIONS

7.1.1. TRANSMITTER SPURIOUS EMISSIONS

LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

§15.205 (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

§15.209 (a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 1 MHz for peak measurements and 10 Hz for average measurements.

The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels of 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 of the 5.8 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.

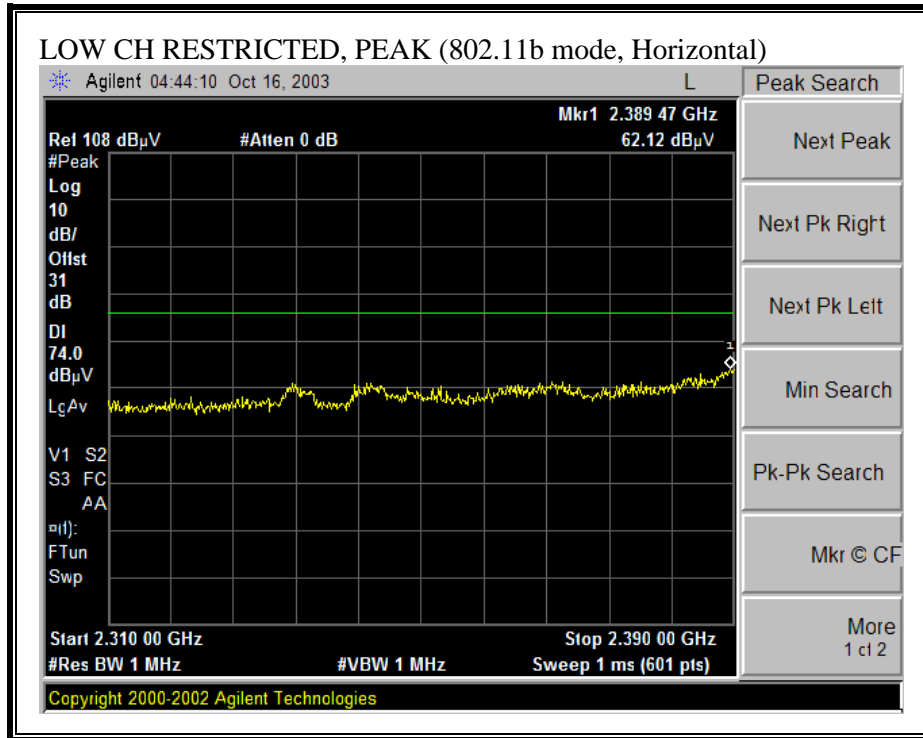
The configuration and orientation of the EUT was varied to determine the worst-case. The EUT was first configured as a typical laptop notebook PC resting on the turntable in a normal operating condition. It was then configured as a tablet PC, and evaluated in X, Y and Z orientations. The worst-case condition was observed with the EUT in the laptop configuration. Worst-case results are reported.

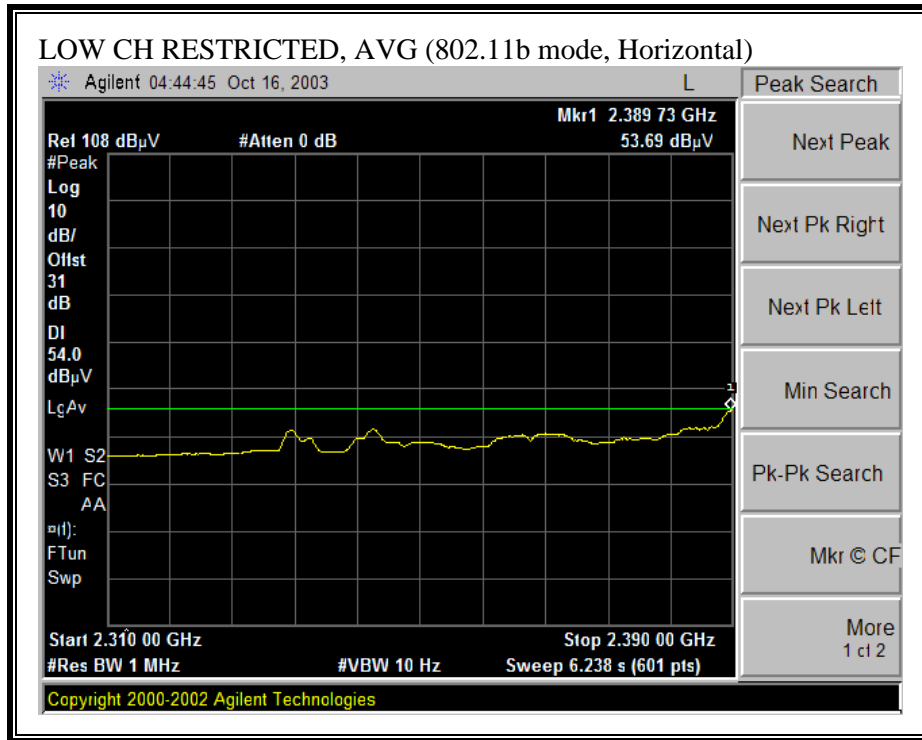
RESULTS

No non-compliance noted:

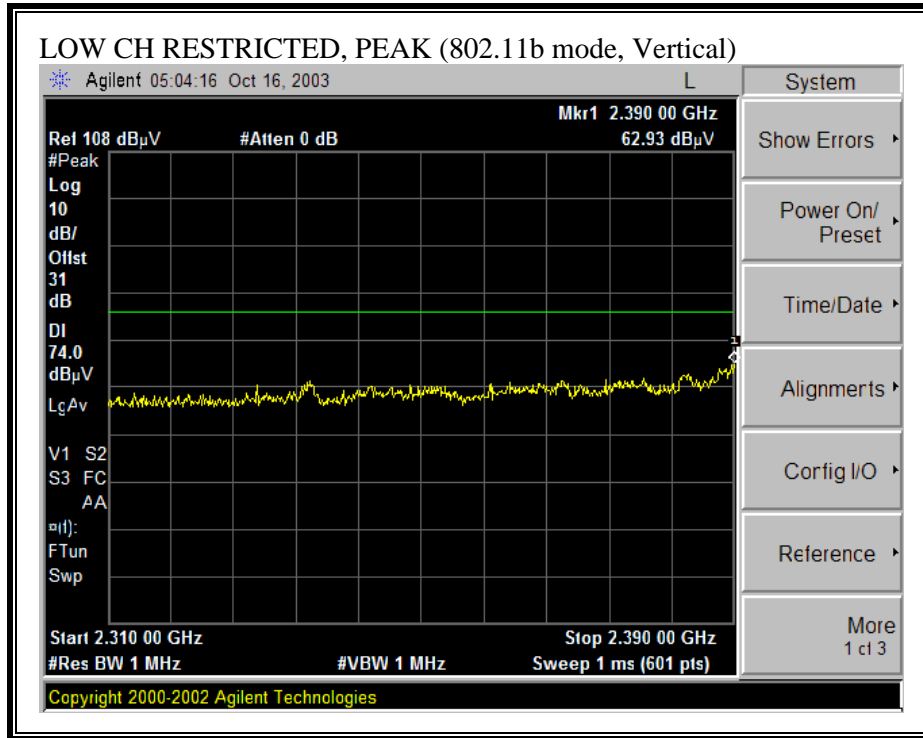
7.1.2. TRANSMITTER SPURIOUS EMISSIONS ABOVE 1 GHZ

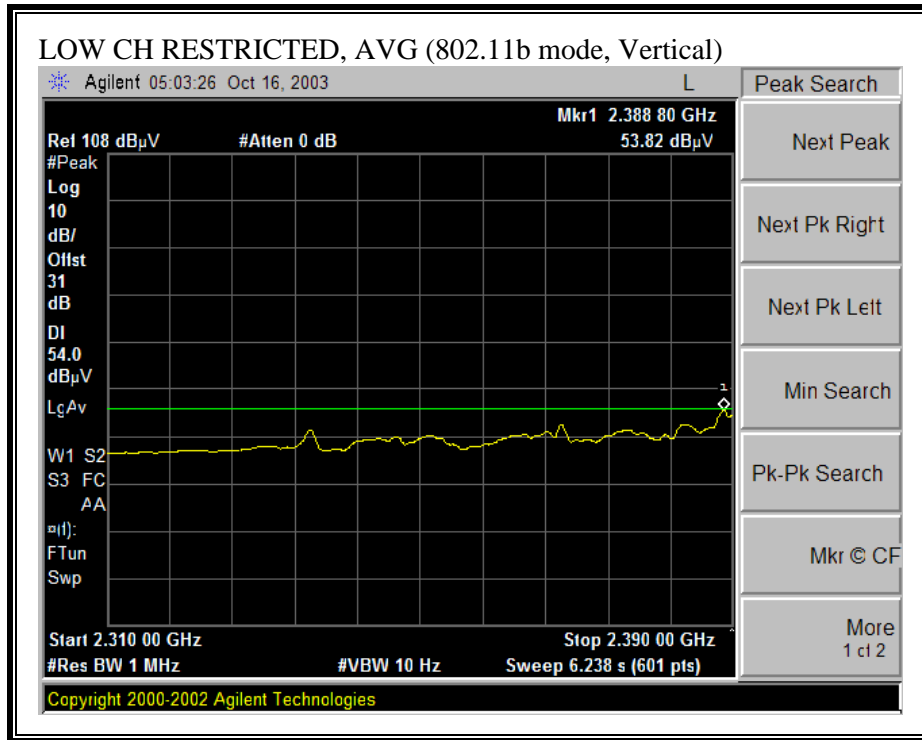
RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)



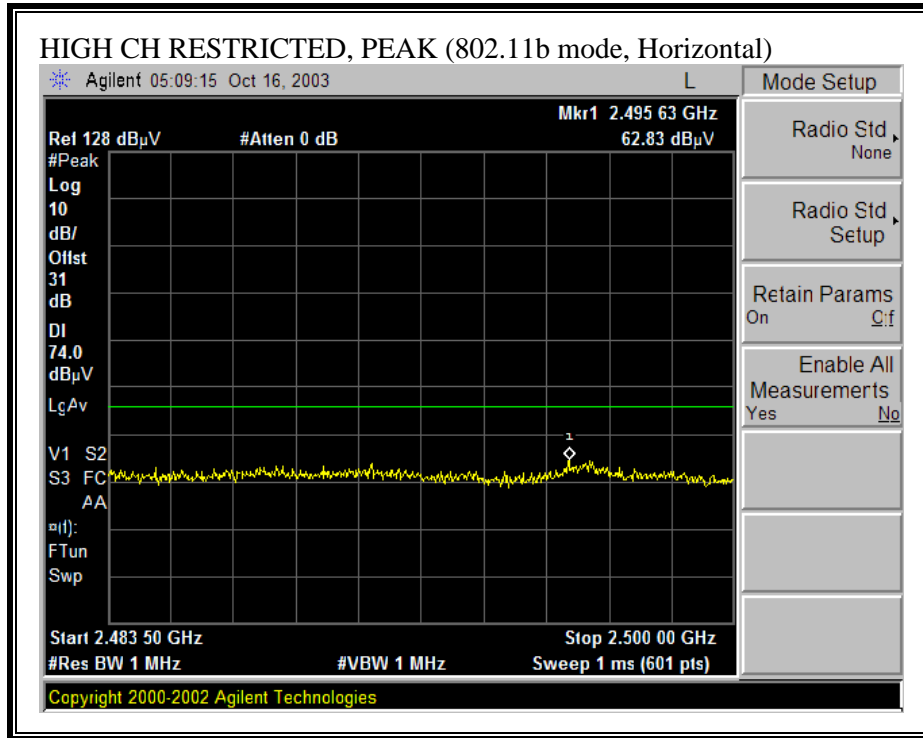


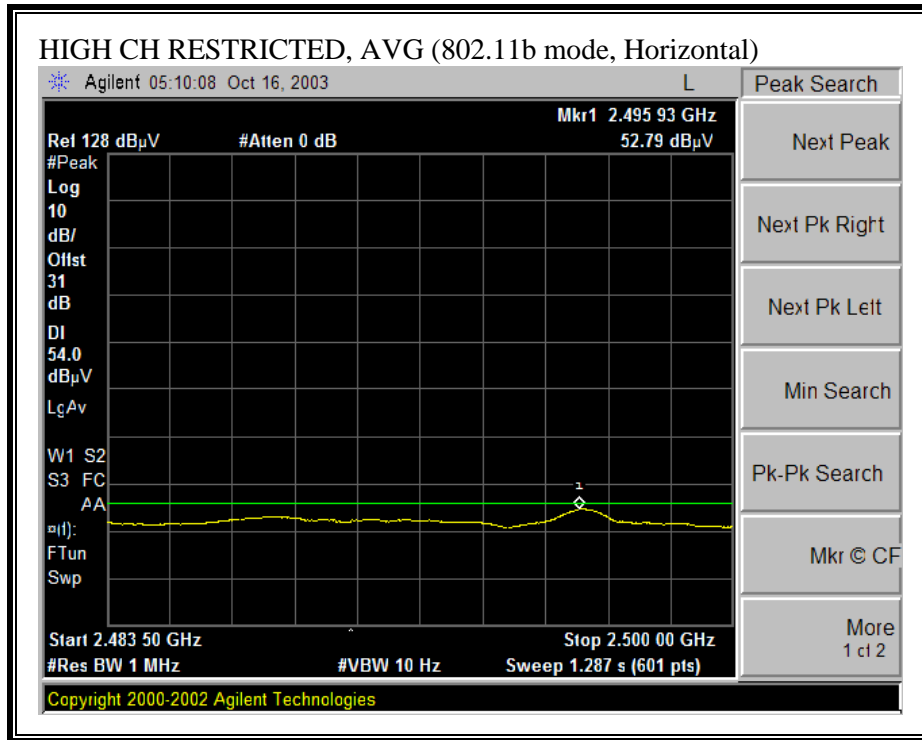
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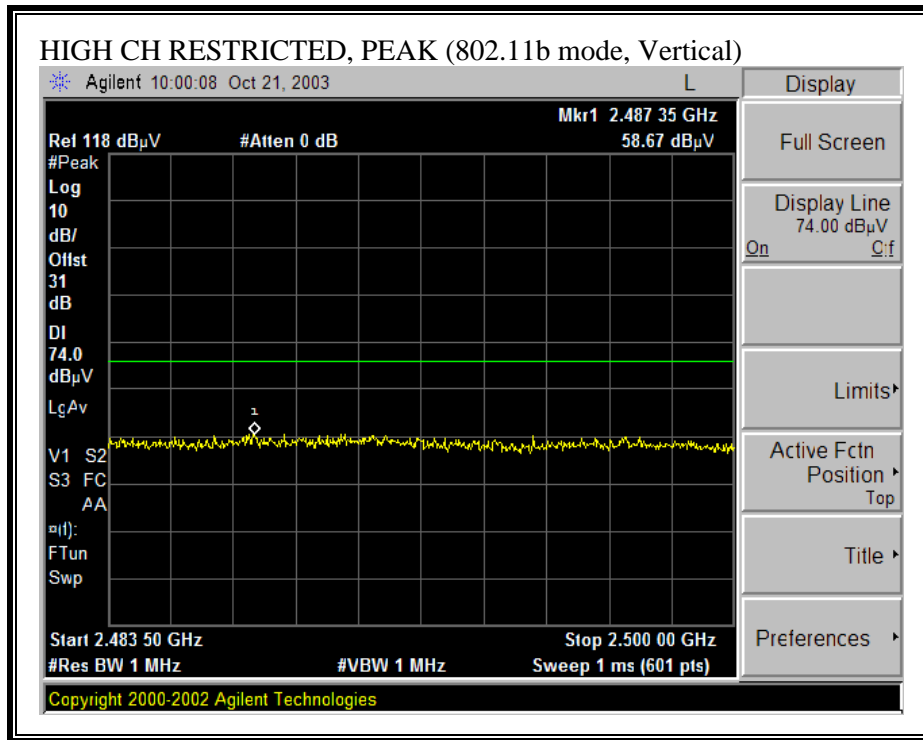


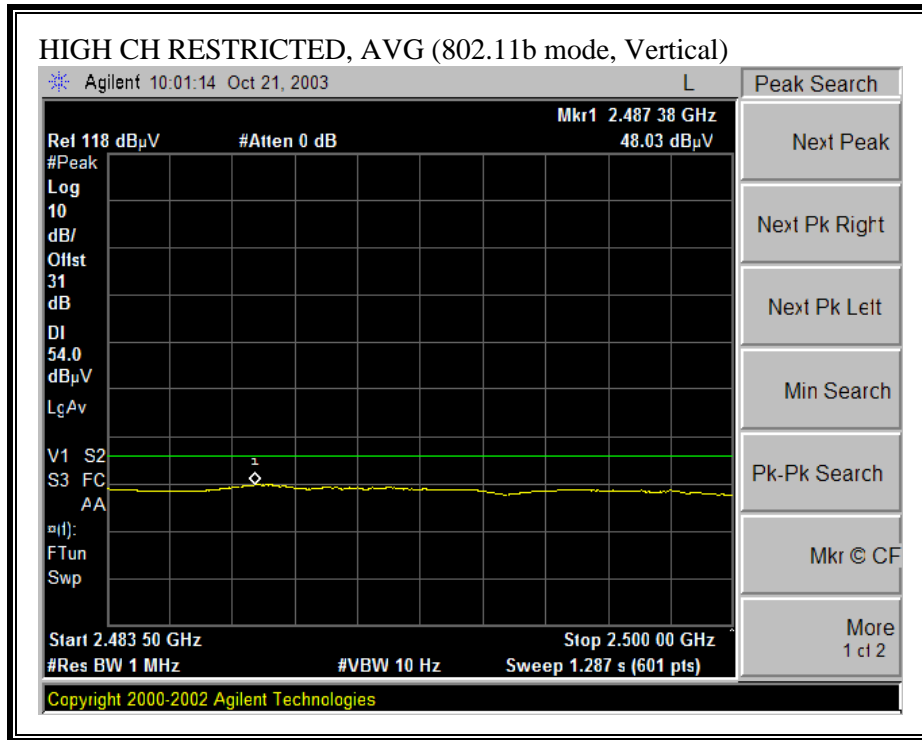
RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

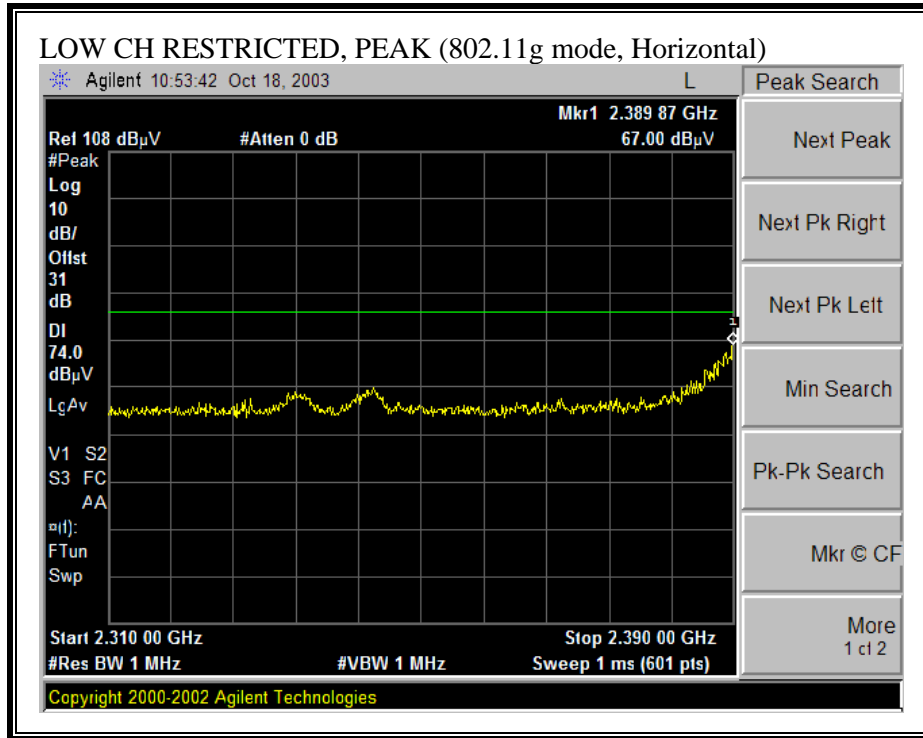


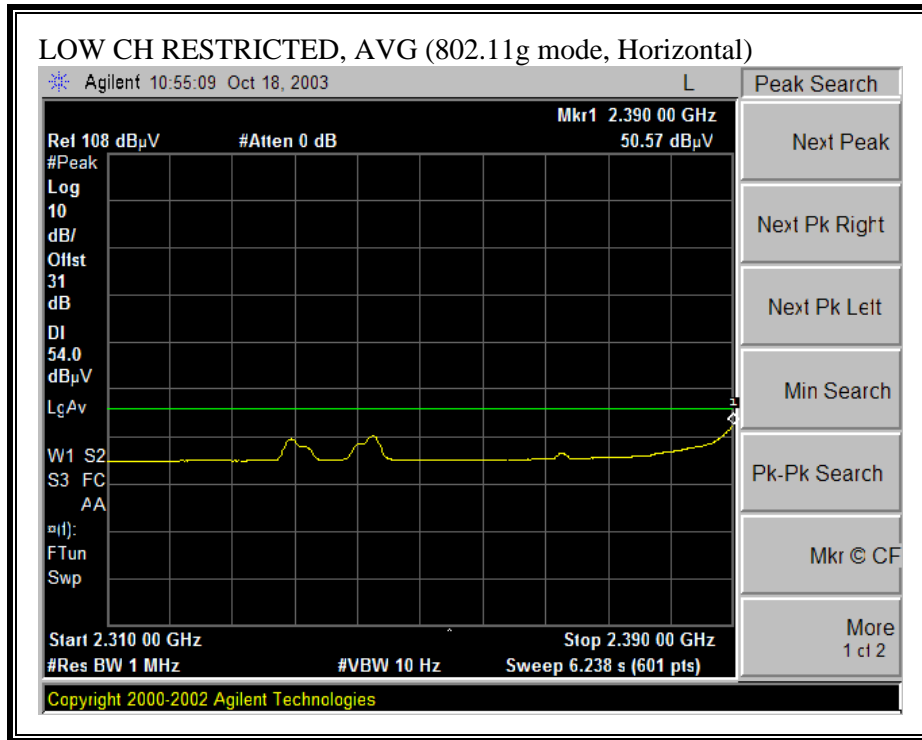


HARMONICS AND SPURIOUS EMISSIONS (b MODE)

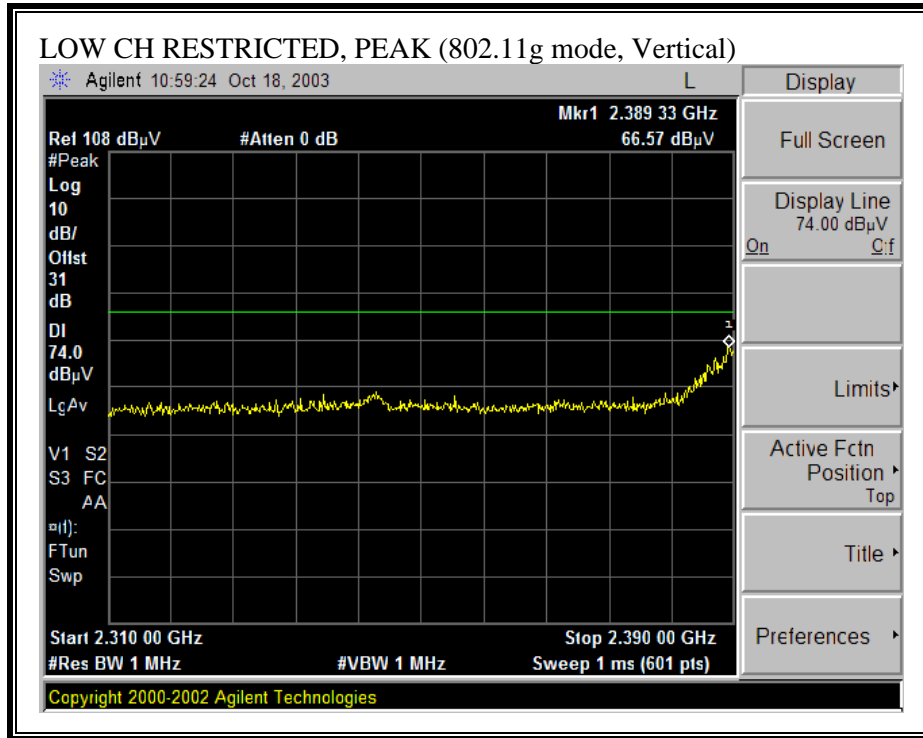
10/18/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: VIEN TRAN Project #: 03U2199 Company: TOSHIBA EUT Descrip.: 11A/B/G WLAN CARD EUT M/N: Test Target: FCC15.247_HARMONIC & SPUR Mode Oper: Tx Test Equipment: <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="border: 1px solid black; padding: 2px; width: 20%;">EMCO Horn 1-18GHz T60; S/N: 2238 @3m</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Pre-amplifier 1-26GHz T63 Miteq 646456</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Spectrum Analyzer Agilent E4446A Analyzer</div> <div style="border: 1px solid black; padding: 2px; width: 20%;">Horn > 18GHz</div> </div> <div style="margin-top: 10px;"> Hi Frequency Cables <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft) </div> <div style="margin-top: 10px; display: flex; justify-content: space-around;"> <div> Peak Measurements: 1 MHz Resolution Bandwidth 1MHz Video Bandwidth </div> <div> Average Measurements: 1 MHz Resolution Bandwidth 10Hz Video Bandwidth </div> </div>															
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11b LOW CH															
4.824	9.8	46.4	37.8	33.1	2.8	-35.3	0.0	1.0	47.9	39.3	74.0	54.0	-26.1	-14.7	H
4.824	9.8	47.4	39.4	33.1	2.8	-35.3	0.0	1.0	48.9	40.9	74.0	54.0	-25.1	-13.1	V
NO OTHER EMISSION FOUND AFTER 2ND HARMONIC ALL NOISE FLOOR															
11b MID CH															
4.874	9.8	48.4	42.0	33.1	2.8	-35.3	0.0	1.0	50.0	43.6	74.0	54.0	-24.0	-10.4	H
7.311	9.8	49.2	41.3	36.2	3.6	-34.6	0.0	1.0	55.4	47.5	74.0	54.0	-18.6	-6.5	H
12.185	9.8	44.0	31.9	39.4	4.8	-35.1	0.0	1.0	54.0	42.0	74.0	54.0	-20.0	-12.0	H
4.874	9.8	52.7	49.0	33.1	2.8	-35.3	0.0	1.0	54.3	50.6	74.0	54.0	-19.7	-3.4	V
7.311	9.8	51.5	45.5	36.2	3.6	-34.6	0.0	1.0	57.7	51.7	74.0	54.0	-16.3	-2.3	V
12.185	9.8	45.0	38.0	39.4	4.8	-35.1	0.0	1.0	55.0	48.0	74.0	54.0	-19.0	-6.0	V
NO OTHER EMISSION FOUND AFTER 5TH HARMONIC ALL NOISE FLOOR															
11b HI CH															
4.924	9.8	48.0	42.6	33.2	2.8	-35.3	0.0	1.0	49.6	44.2	74.0	54.0	-24.4	-9.8	H
7.386	9.8	46.7	37.0	36.3	3.6	-34.5	0.0	1.0	53.0	43.3	74.0	54.0	-21.0	-10.7	H
12.310	9.8	40.0	30.0	39.4	4.8	-35.3	0.0	1.0	49.9	39.9	74.0	54.0	-24.1	-14.1	H
4.924	9.8	50.7	45.2	33.2	2.8	-35.3	0.0	1.0	52.3	46.8	74.0	54.0	-21.7	-7.2	V
7.386	9.8	51.0	45.3	36.3	3.6	-34.5	0.0	1.0	57.3	51.6	74.0	54.0	-16.7	-2.4	V
12.310	9.8	45.0	32.0	39.4	4.8	-35.3	0.0	1.0	54.9	41.9	74.0	54.0	-19.1	-12.1	V
NO OTHER EMISSION FOUND AFTER 5TH HARMONIC ALL 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															

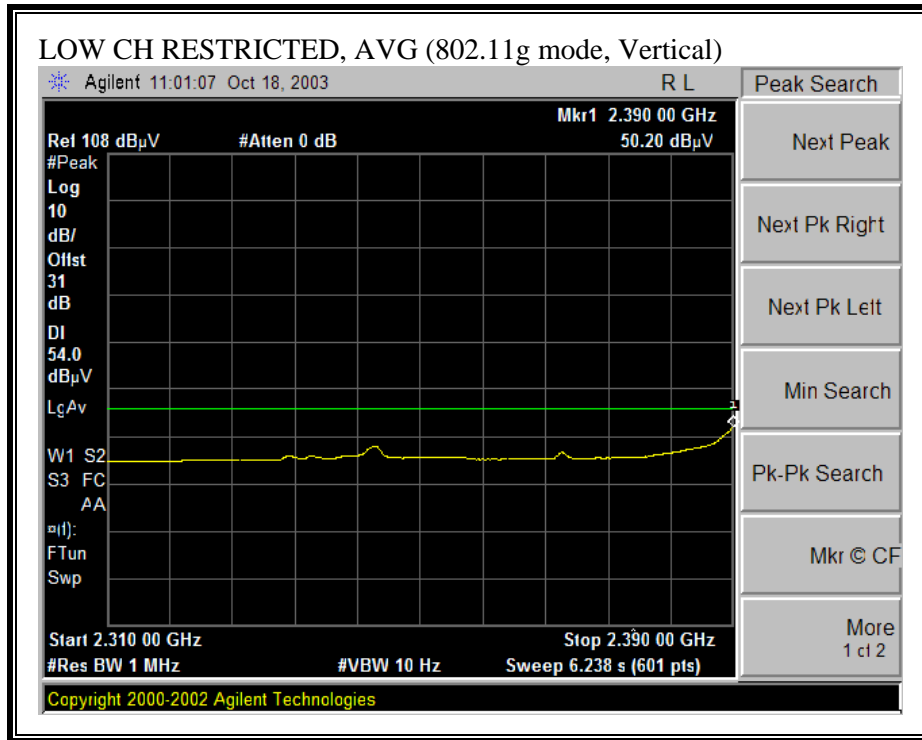
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)



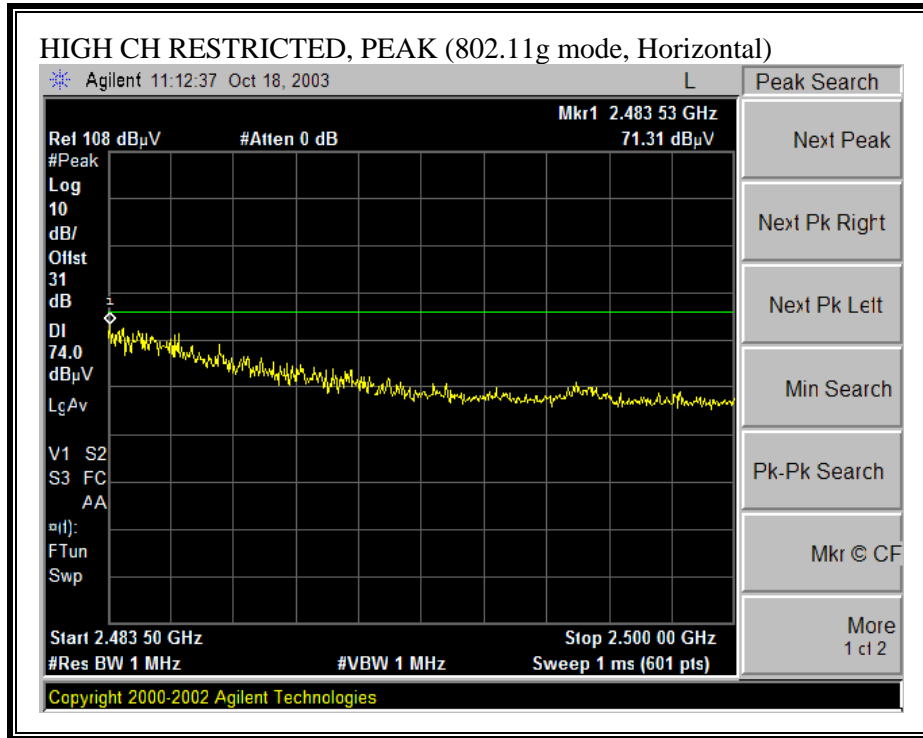


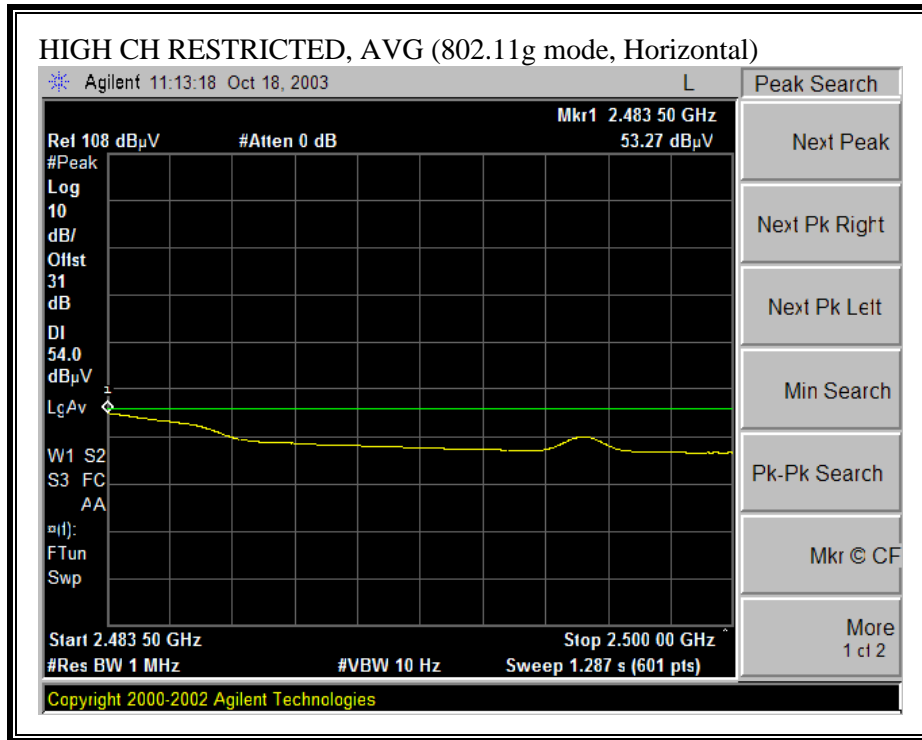
RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)



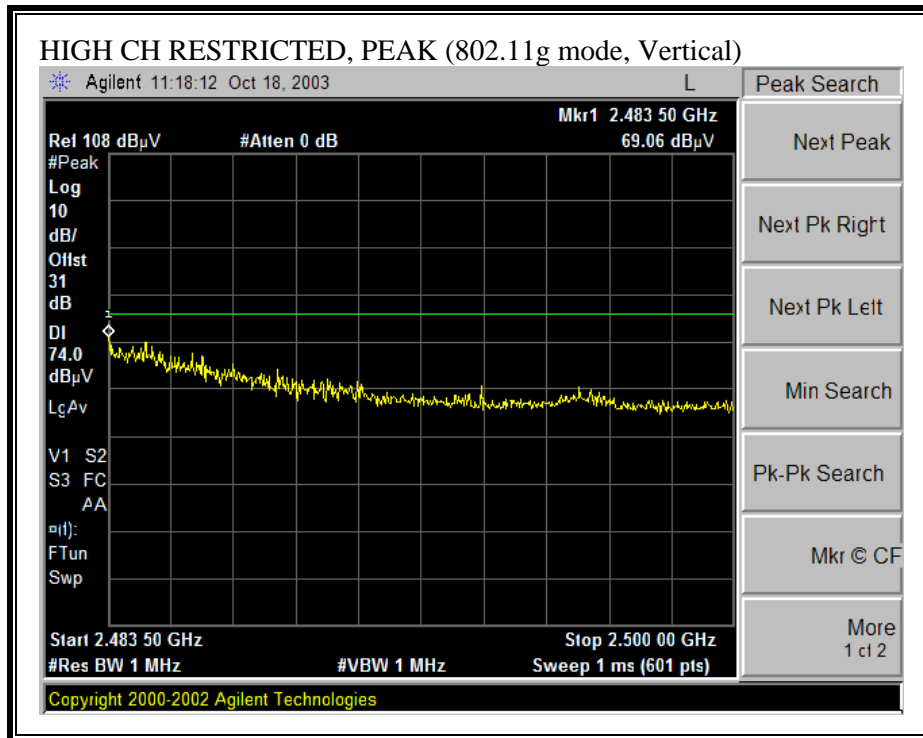


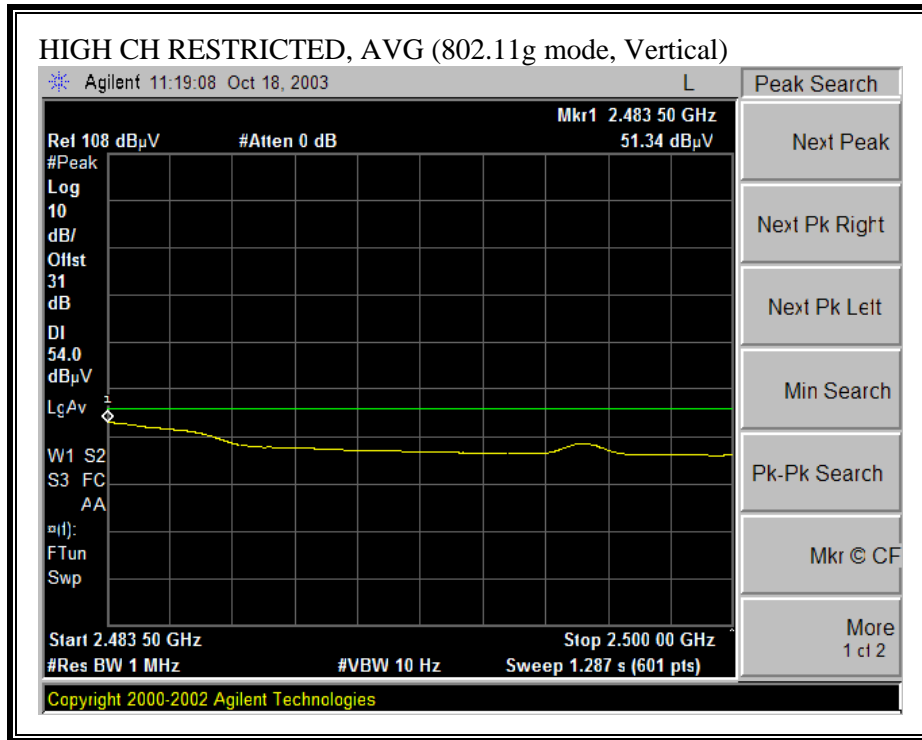
RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (g NORMAL MODE)

<p>10/18/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site</p> <p>Test Engr: VIEN TRAN Project #: 03U2199 Company: TOSHIBA EUT Descrip.: 11A/B/G WLAN CARD EUT M/N: Test Target: FCC15.247_HARMONIC & SPUR Mode Oper: Tx</p> <p>Test Equipment:</p> <table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 2px;">EMCO Horn 1-18GHz</td> <td style="border: 1px solid black; padding: 2px;">Pre-amplifier 1-26GHz</td> <td style="border: 1px solid black; padding: 2px;">Spectrum Analyzer</td> <td style="border: 1px solid black; padding: 2px;">Horn > 18GHz</td> </tr> <tr> <td style="border: 1px solid black; padding: 2px;">T60; S/N: 2238 @3m</td> <td style="border: 1px solid black; padding: 2px;">T63 Miteq 646456</td> <td style="border: 1px solid black; padding: 2px;">Agilent E4446A Analyzer</td> <td style="border: 1px solid black; padding: 2px;"></td> </tr> </table> <p>Hi Frequency Cables <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft)</p> <p>Peak Measurements: 1 MHz Resolution Bandwidth 1MHz Video Bandwidth</p> <p>Average Measurements: 1 MHz Resolution Bandwidth 10Hz Video Bandwidth</p>																EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Spectrum Analyzer	Horn > 18GHz	T60; S/N: 2238 @3m	T63 Miteq 646456	Agilent E4446A Analyzer																							
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f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes																														
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4.824	9.8	50.9	38.3	33.1	2.8	-35.3	0.0	1.0	52.4	39.8	74.0	54.0	-21.6	-14.2	V																														
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7.311	9.8	46.8	33.3	36.2	3.6	-34.6	0.0	1.0	53.0	39.5	74.0	54.0	-21.0	-14.5	H																														
12.185	9.8	42.4	32.2	39.4	4.8	-35.1	0.0	1.0	52.4	42.2	74.0	54.0	-21.6	-11.8	H																														
4.874	9.8	46.7	38.9	33.1	2.8	-35.3	0.0	1.0	48.3	40.5	74.0	54.0	-25.7	-13.5	V																														
7.311	9.8	48.8	36.6	36.2	3.6	-34.6	0.0	1.0	55.0	42.8	74.0	54.0	-19.0	-11.2	V																														
12.185	9.8	43.4	32.0	39.4	4.8	-35.1	0.0	1.0	53.4	42.0	74.0	54.0	-20.6	-12.0	V																														
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11g HI CH																																													
4.924	9.8	45.5	32.4	33.2	2.8	-35.3	0.0	1.0	47.1	34.0	74.0	54.0	-26.9	-20.0	H																														
7.386	9.8	47.0	34.5	36.3	3.6	-34.5	0.0	1.0	53.3	40.8	74.0	54.0	-20.7	-13.2	H																														
12.310	9.8	44.0	31.9	39.4	4.8	-35.3	0.0	1.0	53.9	41.8	74.0	54.0	-20.1	-12.2	H																														
4.924	9.8	46.8	34.6	33.2	2.8	-35.3	0.0	1.0	48.4	36.2	74.0	54.0	-25.6	-17.8	V																														
7.386	9.8	53.6	40.3	36.3	3.6	-34.5	0.0	1.0	59.9	46.6	74.0	54.0	-14.1	-7.4	V																														
12.310	9.8	43.0	31.0	39.4	4.8	-35.3	0.0	1.0	52.9	40.9	74.0	54.0	-21.1	-13.1	V																														
NO OTHER EMISSION FOUND AFTER 5TH HARMONIC ALL NOISE FLOOR																																													
<table style="width: 100%; border: none;"> <tr> <td>f</td> <td>Measurement Frequency</td> <td>Amp</td> <td>Preamp Gain</td> <td>Avg Lim</td> <td>Average Field Strength Limit</td> </tr> <tr> <td>Dist</td> <td>Distance to Antenna</td> <td>D Corr</td> <td>Distance Correct to 3 meters</td> <td>Pk Lim</td> <td>Peak Field Strength Limit</td> </tr> <tr> <td>Read</td> <td>Analyzer Reading</td> <td>Avg</td> <td>Average Field Strength @ 3 m</td> <td>Avg Mar</td> <td>Margin vs. Average Limit</td> </tr> <tr> <td>AF</td> <td>Antenna Factor</td> <td>Peak</td> <td>Calculated Peak Field Strength</td> <td>Pk Mar</td> <td>Margin vs. Peak Limit</td> </tr> <tr> <td>CL</td> <td>Cable Loss</td> <td>HPF</td> <td>High Pass Filter</td> <td></td> <td></td> </tr> </table>																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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CL	Cable Loss	HPF	High Pass Filter																																										

HARMONICS AND SPURIOUS EMISSIONS (g TURBO MODE)

10/18/03 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
 Project #: 03U2199
 Company: TOSHIBA
 EUT Descrip.: 11A/B/G WLAN CARD
 EUT M/N:
 Test Target: FCC15.247_HARMONIC & SPUR
 Mode Oper: Tx

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Spectrum Analyzer	Horn > 18GHz
T60; S/N: 2238 @3m	T63 Miteq 646456	Agilent E4446A Analyzer	

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

Peak Measurements: 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

Average Measurements: 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
4.874	9.8	44.7	31.5	33.1	2.8	-35.3	0.0	1.0	46.3	33.1	74.0	54.0	-27.7	-20.9	H
7.311	9.8	45.5	32.8	36.2	3.6	-34.6	0.0	1.0	51.7	39.0	74.0	54.0	-22.3	-15.0	H
12.185	9.8	42.0	31.9	39.4	4.8	-35.1	0.0	1.0	52.0	41.9	74.0	54.0	-22.0	-12.1	H
4.874	9.8	46.9	39.3	33.1	2.8	-35.3	0.0	1.0	48.5	40.9	74.0	54.0	-25.5	-13.1	V
7.311	9.8	47.5	35.9	36.2	3.6	-34.6	0.0	1.0	53.7	42.1	74.0	54.0	-20.3	-11.9	V
12.185	9.8	44.1	32.6	39.4	4.8	-35.1	0.0	1.0	54.1	42.6	74.0	54.0	-19.9	-11.4	V
NO OTHER EMISSION FOUND AFTER 5TH HARMONIC ALL 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

HARMONICS AND SPURIOUS EMISSIONS (a NORMAL MODE)

10/20/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: THANH NGUYEN Project #:03U2199 Company: TOSHIBA EUT Descrip.: 802.11 a/b/g Combo Module EUT M/N: PA3297U-1MPC (FCC ID : CJ6UPA3297WL) Test Target: FCC 15.205,207,209 Mode Oper: Tx L/M/H NORMAL 5.8GHz Band Test Equipment: <table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 2px;">EMCO Horn 1-18GHz T73; S/N: 6717 @3m</td> <td style="border: 1px solid black; padding: 2px;">Pre-amplifier 1-26GHz T86 Miteq 924341</td> <td style="border: 1px solid black; padding: 2px;">Spectrum Analyzer Agilent E4446A Analyzer</td> <td style="border: 1px solid black; padding: 2px;">Horn > 18GHz T87; ARA 18-26GHz; S/N:1049</td> </tr> </table> <p>Hi Frequency Cables: <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft)</p> <p>Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth</p>																EMCO Horn 1-18GHz T73; S/N: 6717 @3m	Pre-amplifier 1-26GHz T86 Miteq 924341	Spectrum Analyzer Agilent E4446A Analyzer	Horn > 18GHz T87; ARA 18-26GHz; S/N:1049
EMCO Horn 1-18GHz T73; S/N: 6717 @3m	Pre-amplifier 1-26GHz T86 Miteq 924341	Spectrum Analyzer Agilent E4446A Analyzer	Horn > 18GHz T87; ARA 18-26GHz; S/N:1049																
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes				
Tx at low channel 5745 MHz																			
11.490	9.8	43.4	35.8	38.8	5.4	-44.6	0.0	1.0	44.0	36.3	74.0	54.0	-30.0	-17.7	V Noise Floor				
17.235	9.8	48.6	38.6	41.5	7.0	-48.4	0.0	1.0	49.6	39.6	74.0	54.0	-24.4	-14.4	V Noise Floor				
11.490	9.8	45.4	35.9	38.8	5.4	-44.6	0.0	1.0	45.9	36.5	74.0	54.0	-28.1	-17.5	H /Noise Floor				
17.235	9.8	49.3	39.2	41.5	7.0	-48.4	0.0	1.0	50.3	40.2	74.0	54.0	-23.7	-13.8	H /Noise Floor				
No other emission was detected after 3rd Harmonic.																			
Tx at MID channel 5785 MHz																			
11.570	9.8	47.4	36.2	38.8	5.5	-44.7	0.0	1.0	48.0	38.3	74.0	54.0	-26.0	-15.7	H/Noise Floor				
17.355	9.8	47.1	37.8	42.2	7.0	-48.3	0.0	1.0	49.0	38.1	74.0	54.0	-25.0	-15.9	H/Noise Floor				
11.570	9.8	45.9	36.2	38.8	5.5	-44.7	0.0	1.0	46.4	38.7	74.0	54.0	-27.6	-15.3	V/Noise Floor				
17.355	9.8	48.8	38.1	42.2	7.0	-48.3	0.0	1.0	50.7	38.1	74.0	54.0	-23.3	-15.9	V/Noise Floor				
No other emission was detected after 3rd Harmonic.																			
Tx at High Channel 5825MHz																			
11.650	9.8	46.8	36.9	38.9	5.5	-44.8	0.0	1.0	47.3	37.4	74.0	54.0	-26.7	-16.6	V Noise Floor				
17.475	9.8	48.9	38.1	43.0	7.1	-48.2	0.0	1.0	51.7	40.9	74.0	54.0	-22.3	-13.1	V Noise Floor				
11.650	9.8	47.7	37.9	38.9	5.5	-44.8	0.0	1.0	48.2	38.4	74.0	54.0	-25.8	-15.6	H /Noise Floor				
17.475	9.8	48.8	34.4	43.0	7.1	-48.2	0.0	1.0	51.6	37.3	74.0	54.0	-22.4	-16.7	H /Noise Floor				
No other emission was detected after 3rd Harmonic.																			
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															

HARMONICS AND SPURIOUS EMISSIONS (a TURBO MODE)

10/20/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site Test Engr: THANH NGUYEN Project #:03U2199 Company: TOSHIBA EUT Descrip.: 802.11 a/b/g Combo Module EUT M/N: PA3297U-1MPC (FCC ID : CJ6UPA3297WL) Test Target: FCC 15.205,207,209 Mode Oper: Tx L/M/H TURBO 5.8GHz Band Test Equipment: <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="background-color: #e0f7fa;">EMCO Horn 1-18GHz</td> <td style="background-color: #e0f7fa;">Pre-amplifier 1-26GHz</td> <td style="background-color: #e0f7fa;">Spectrum Analyzer</td> <td style="background-color: #e0f7fa;">Horn > 18GHz</td> </tr> <tr> <td>T73; S/N: 6717 @3m</td> <td>T86 Miteq 924341</td> <td>Agilent E4446A Analyzer</td> <td>T87; ARA 18-26GHz; S/N:1049</td> </tr> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td colspan="4">Hi Frequency Cables</td> </tr> <tr> <td><input type="checkbox"/> (2 ft)</td> <td><input checked="" type="checkbox"/> (2 ~ 3 ft)</td> <td><input type="checkbox"/> (4 ~ 6 ft)</td> <td><input checked="" type="checkbox"/> (12 ft)</td> </tr> </table> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>Peak Measurements:</td> <td>Average Measurements:</td> </tr> <tr> <td>1 MHz Resolution Bandwidth</td> <td>1 MHz Resolution Bandwidth</td> </tr> <tr> <td>1MHz Video Bandwidth</td> <td>10Hz Video Bandwidth</td> </tr> </table>																	EMCO Horn 1-18GHz	Pre-amplifier 1-26GHz	Spectrum Analyzer	Horn > 18GHz	T73; S/N: 6717 @3m	T86 Miteq 924341	Agilent E4446A Analyzer	T87; ARA 18-26GHz; S/N:1049	Hi Frequency Cables				<input type="checkbox"/> (2 ft)	<input checked="" type="checkbox"/> (2 ~ 3 ft)	<input type="checkbox"/> (4 ~ 6 ft)	<input checked="" type="checkbox"/> (12 ft)	Peak Measurements:	Average Measurements:	1 MHz Resolution Bandwidth	1 MHz Resolution Bandwidth	1MHz Video Bandwidth	10Hz Video Bandwidth
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Peak Measurements:	Average Measurements:																																					
1 MHz Resolution Bandwidth	1 MHz Resolution Bandwidth																																					
1MHz Video Bandwidth	10Hz Video Bandwidth																																					
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes																							
Tx at low channel 5760 MHz																																						
11.520	9.8	47.9	37.0	38.8	5.4	-44.6	0.0	1.0	48.4	37.6	74.0	54.0	-25.6	-16.4	V Noise Floor																							
17.280	9.8	45.6	36.7	41.8	7.0	-48.4	0.0	1.0	47.0	38.0	74.0	54.0	-27.0	-16.0	V Noise Floor																							
11.520	9.8	47.7	36.6	38.8	5.4	-44.6	0.0	1.0	48.2	37.2	74.0	54.0	-25.8	-16.8	H /Noise Floor																							
17.280	9.8	48.6	37.6	41.8	7.0	-48.4	0.0	1.0	50.0	38.9	74.0	54.0	-24.0	-15.1	H /Noise Floor																							
No other emission was detected after 3rd Harmonic.																																						
Tx at MID channel 5800 MHz																																						
11.600	9.8	47.0	36.3	38.8	5.5	-44.7	0.0	1.0	47.5	36.8	74.0	54.0	-26.5	-17.2	H/Noise Floor																							
17.400	9.8	48.3	36.4	42.5	7.0	-48.2	0.0	1.0	50.6	38.6	74.0	54.0	-23.4	-15.4	H/Noise Floor																							
11.600	9.8	48.3	37.8	38.8	5.5	-44.7	0.0	1.0	48.9	38.4	74.0	54.0	-25.1	-15.6	V/Noise Floor																							
17.400	9.8	48.8	37.8	42.5	7.0	-48.2	0.0	1.0	51.1	38.6	74.0	54.0	-22.9	-15.4	V/Noise Floor																							
No other emission was detected after 3rd Harmonic.																																						
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																															

7.1.3. CO-LOCATED TRANSMITTER SPURIOUS EMISSIONS

SUPPLEMENTAL TEST PROCEDURE

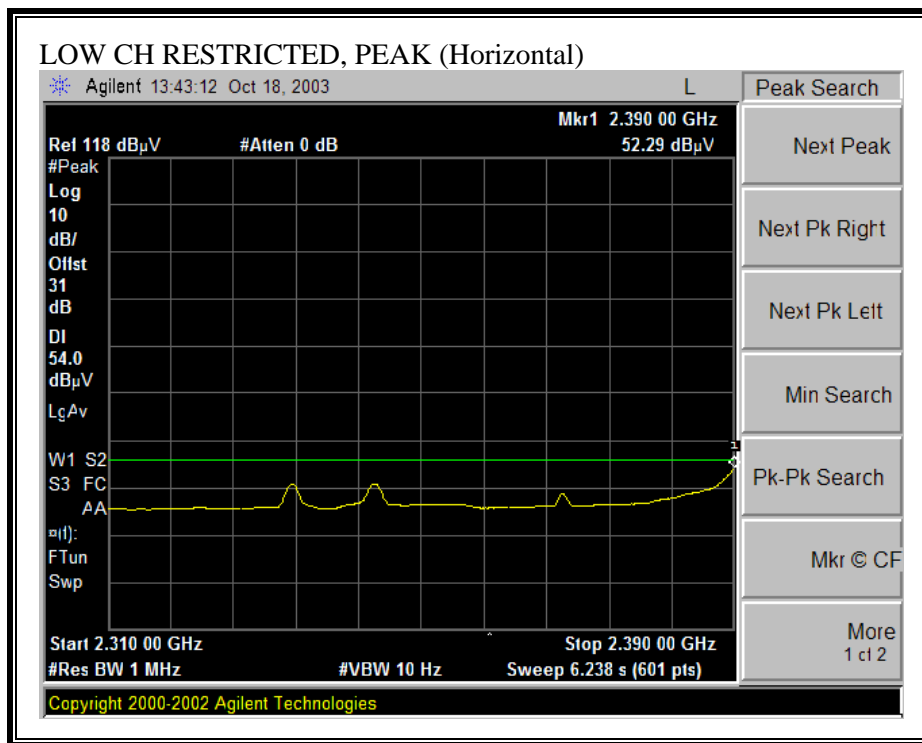
The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. Worst case results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

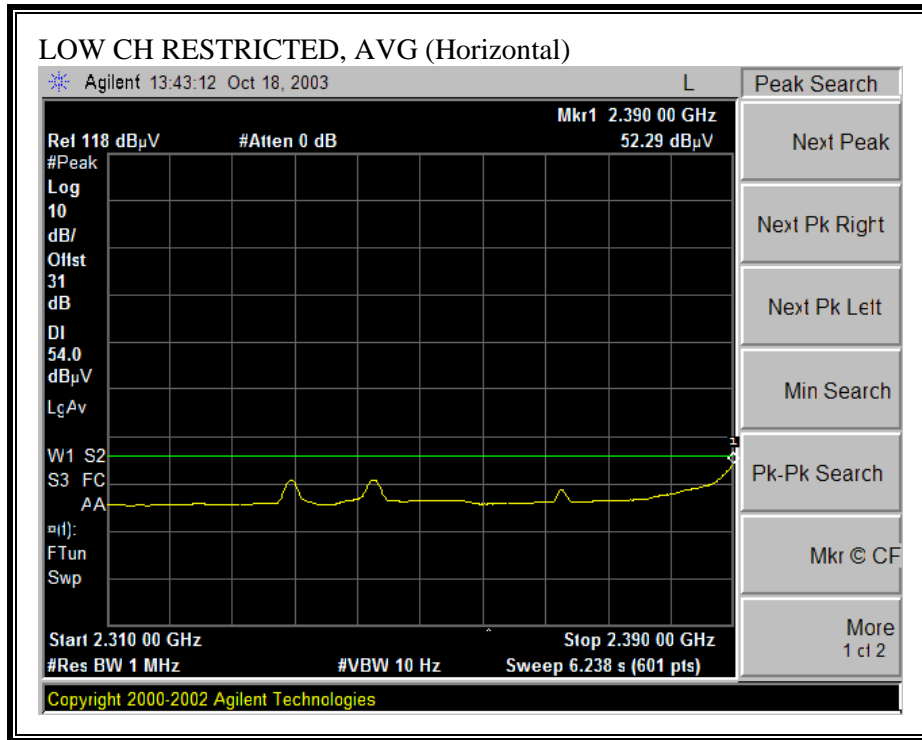
RESULTS

The 2.4 GHz transmitter is dominant.

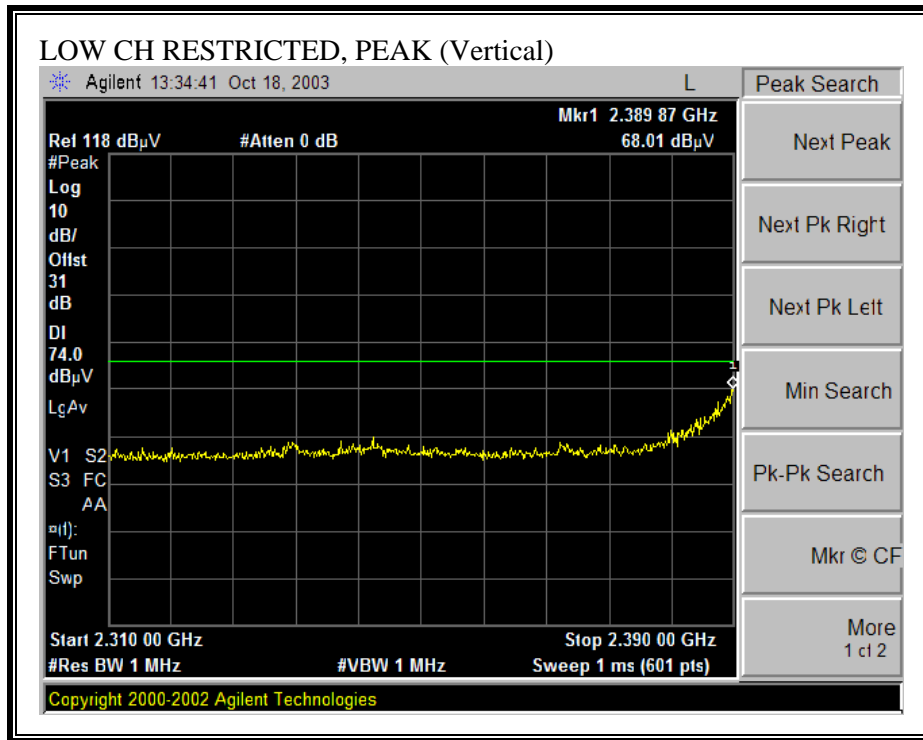
No non-compliance noted:

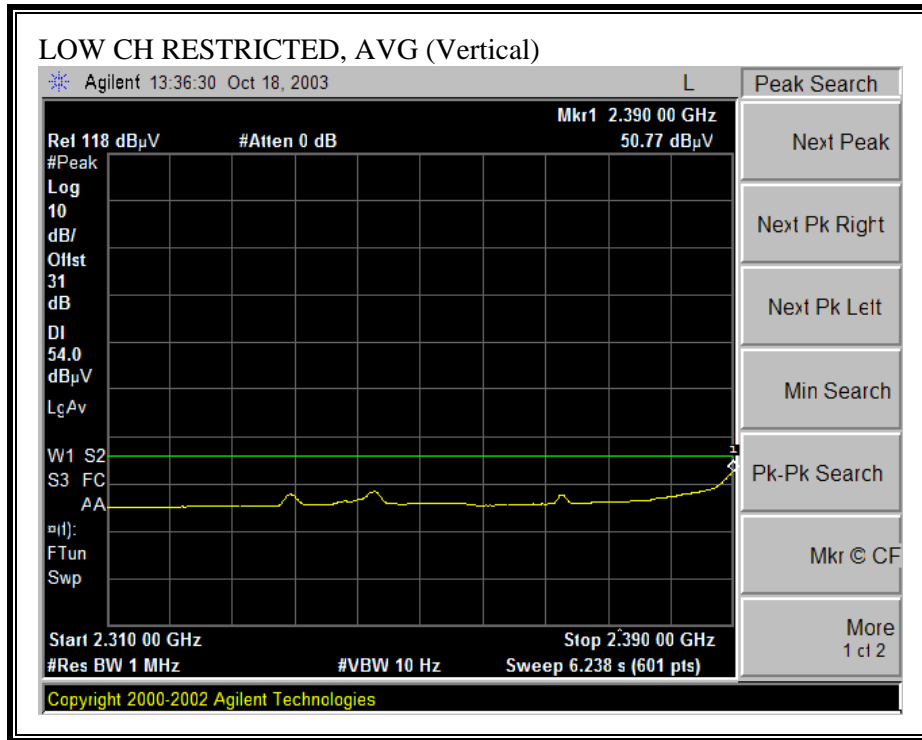
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



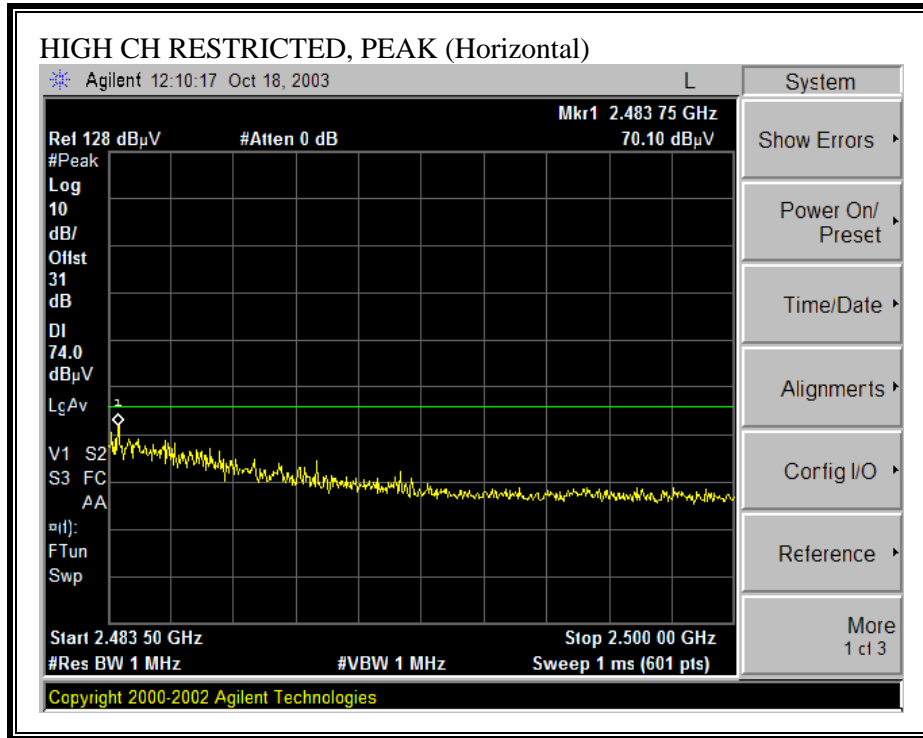


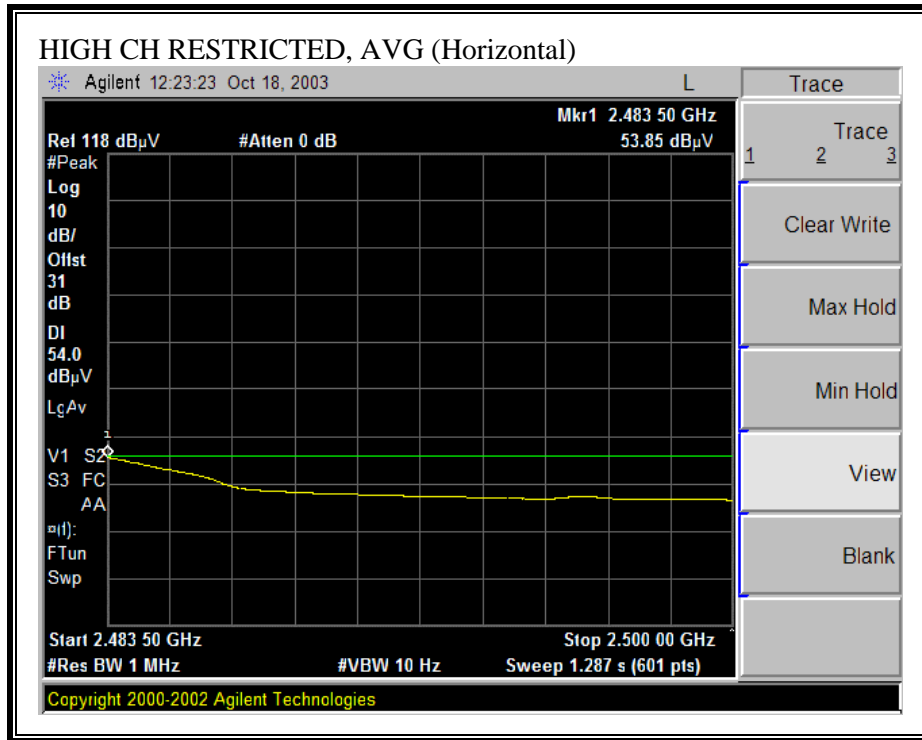
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



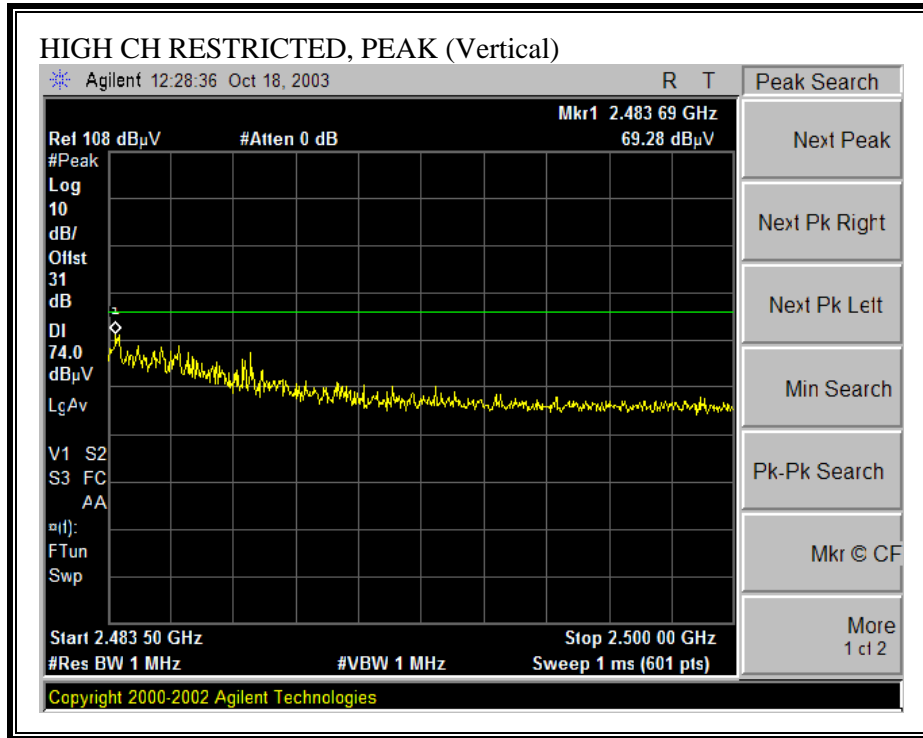


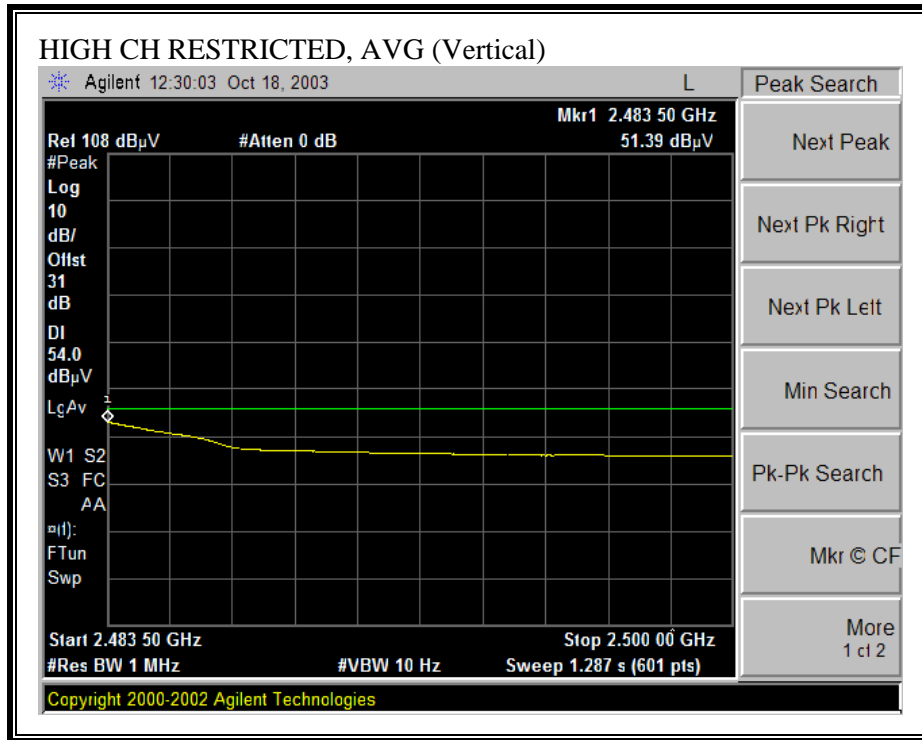
WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



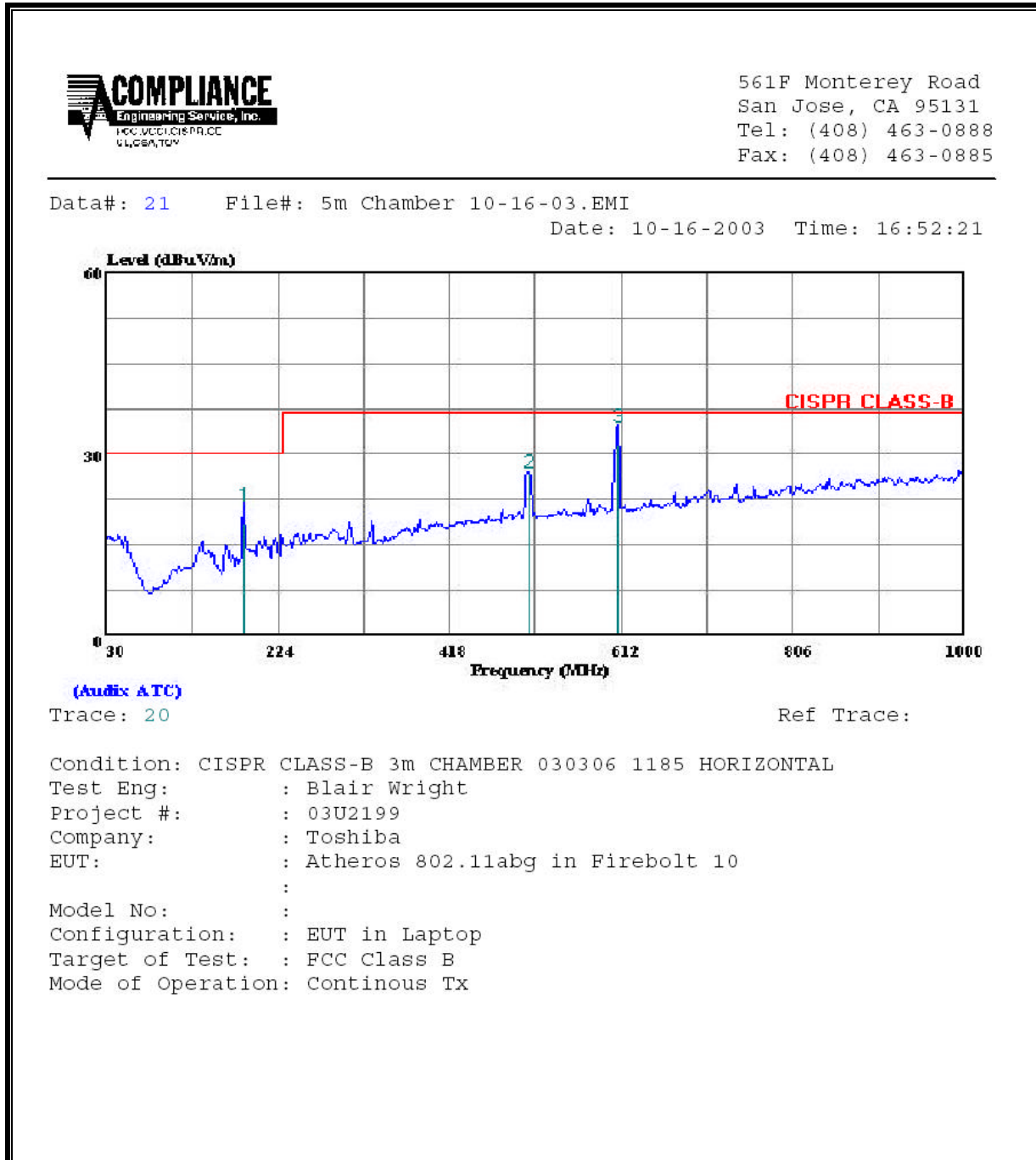


WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

<p>10/20/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site</p> <p>Test Engr: THANH NGUYEN Project #: 03U2199 Company: TOSHIBA AMERICA INFORMATION SYSTEMS, INC. EUT Descrip.: 802.11 a/b/g Combo Module(MB2lag In Firebolt 10, w/Colocation EUT M/N: PA3297U-1MPC (FCC ID: CJ6UPA3297WL) Test Target: FCC 15.247 Mode Oper: 2.4GHz. CO-LOCATED</p> <p>Test Equipment:</p> <table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 2px;">EMCO Horn 1-18GHz T73; S/N: 6717 @3m</td> <td style="border: 1px solid black; padding: 2px;">Pre-amplifier 1-26GHz T86 Miteq 924341</td> <td style="border: 1px solid black; padding: 2px;">Spectrum Analyzer Agilent E4446A Analyzer</td> <td style="border: 1px solid black; padding: 2px;">Horn > 18GHz T87; ARA 18-26GHz; S/N:1049</td> </tr> </table> <p>Hi Frequency Cables: <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft)</p> <p>Peak Measurements: 1 MHz Resolution Bandwidth 1MHz Video Bandwidth Average Measurements: 1 MHz Resolution Bandwidth 10Hz Video Bandwidth</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>f GHz</th> <th>Dist feet</th> <th>Read Pk dBuV</th> <th>Read Avg. dBuV</th> <th>AF dB/m</th> <th>CL dB</th> <th>Amp dB</th> <th>D Corr dB</th> <th>HPF</th> <th>Peak dBuV/m</th> <th>Avg dBuV/m</th> <th>Pk Lim dBuV/m</th> <th>Avg Lim dBuV/m</th> <th>Pk Mar dB</th> <th>Avg Mar dB</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td colspan="17">Tx at 2.4CO-LOCATED Harmonics and spurious Emissions.</td> </tr> <tr> <td>4.874</td> <td>9.8</td> <td>49.1</td> <td>37.8</td> <td>33.4</td> <td>3.2</td> <td>-45.6</td> <td>0.0</td> <td>1.0</td> <td>41.0</td> <td>29.7</td> <td>74.0</td> <td>54.0</td> <td>-33.0</td> <td>-24.3</td> <td>Noise floor</td> </tr> <tr> <td>7.311</td> <td>9.8</td> <td>50.3</td> <td>40.3</td> <td>35.8</td> <td>4.1</td> <td>-46.6</td> <td>0.0</td> <td>1.0</td> <td>44.6</td> <td>34.6</td> <td>74.0</td> <td>54.0</td> <td>-29.4</td> <td>-19.4</td> <td>V</td> </tr> <tr> <td>9.748</td> <td>9.8</td> <td>47.7</td> <td>36.3</td> <td>38.5</td> <td>4.9</td> <td>-45.1</td> <td>0.0</td> <td>1.0</td> <td>46.9</td> <td>35.5</td> <td>74.0</td> <td>54.0</td> <td>-27.1</td> <td>-18.5</td> <td>Noise floor</td> </tr> <tr> <td>4.874</td> <td>9.8</td> <td>47.0</td> <td>38.2</td> <td>33.4</td> <td>3.2</td> <td>-45.6</td> <td>0.0</td> <td>1.0</td> <td>38.9</td> <td>30.1</td> <td>74.0</td> <td>54.0</td> <td>-35.1</td> <td>-23.9</td> <td>Noise floor</td> </tr> <tr> <td>7.311</td> <td>9.8</td> <td>50.9</td> <td>41.0</td> <td>35.8</td> <td>4.1</td> <td>-46.6</td> <td>0.0</td> <td>1.0</td> <td>45.2</td> <td>35.3</td> <td>74.0</td> <td>54.0</td> <td>-28.8</td> <td>-18.7</td> <td>H</td> </tr> <tr> <td>9.748</td> <td>9.8</td> <td>44.7</td> <td>36.0</td> <td>38.5</td> <td>4.9</td> <td>-45.1</td> <td>0.0</td> <td>1.0</td> <td>43.9</td> <td>35.3</td> <td>74.0</td> <td>54.0</td> <td>-30.1</td> <td>-18.7</td> <td>Noise floor</td> </tr> <tr> <td colspan="17">No more Spurious emissions was detected above 3rd Harmonic for both V&H Antenna.</td> </tr> </tbody> </table> <p>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</p>																	EMCO Horn 1-18GHz T73; S/N: 6717 @3m	Pre-amplifier 1-26GHz T86 Miteq 924341	Spectrum Analyzer Agilent E4446A Analyzer	Horn > 18GHz T87; ARA 18-26GHz; S/N:1049	f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes	Tx at 2.4CO-LOCATED Harmonics and spurious Emissions.																	4.874	9.8	49.1	37.8	33.4	3.2	-45.6	0.0	1.0	41.0	29.7	74.0	54.0	-33.0	-24.3	Noise floor	7.311	9.8	50.3	40.3	35.8	4.1	-46.6	0.0	1.0	44.6	34.6	74.0	54.0	-29.4	-19.4	V	9.748	9.8	47.7	36.3	38.5	4.9	-45.1	0.0	1.0	46.9	35.5	74.0	54.0	-27.1	-18.5	Noise floor	4.874	9.8	47.0	38.2	33.4	3.2	-45.6	0.0	1.0	38.9	30.1	74.0	54.0	-35.1	-23.9	Noise floor	7.311	9.8	50.9	41.0	35.8	4.1	-46.6	0.0	1.0	45.2	35.3	74.0	54.0	-28.8	-18.7	H	9.748	9.8	44.7	36.0	38.5	4.9	-45.1	0.0	1.0	43.9	35.3	74.0	54.0	-30.1	-18.7	Noise floor	No more Spurious emissions was detected above 3rd Harmonic for both V&H Antenna.																
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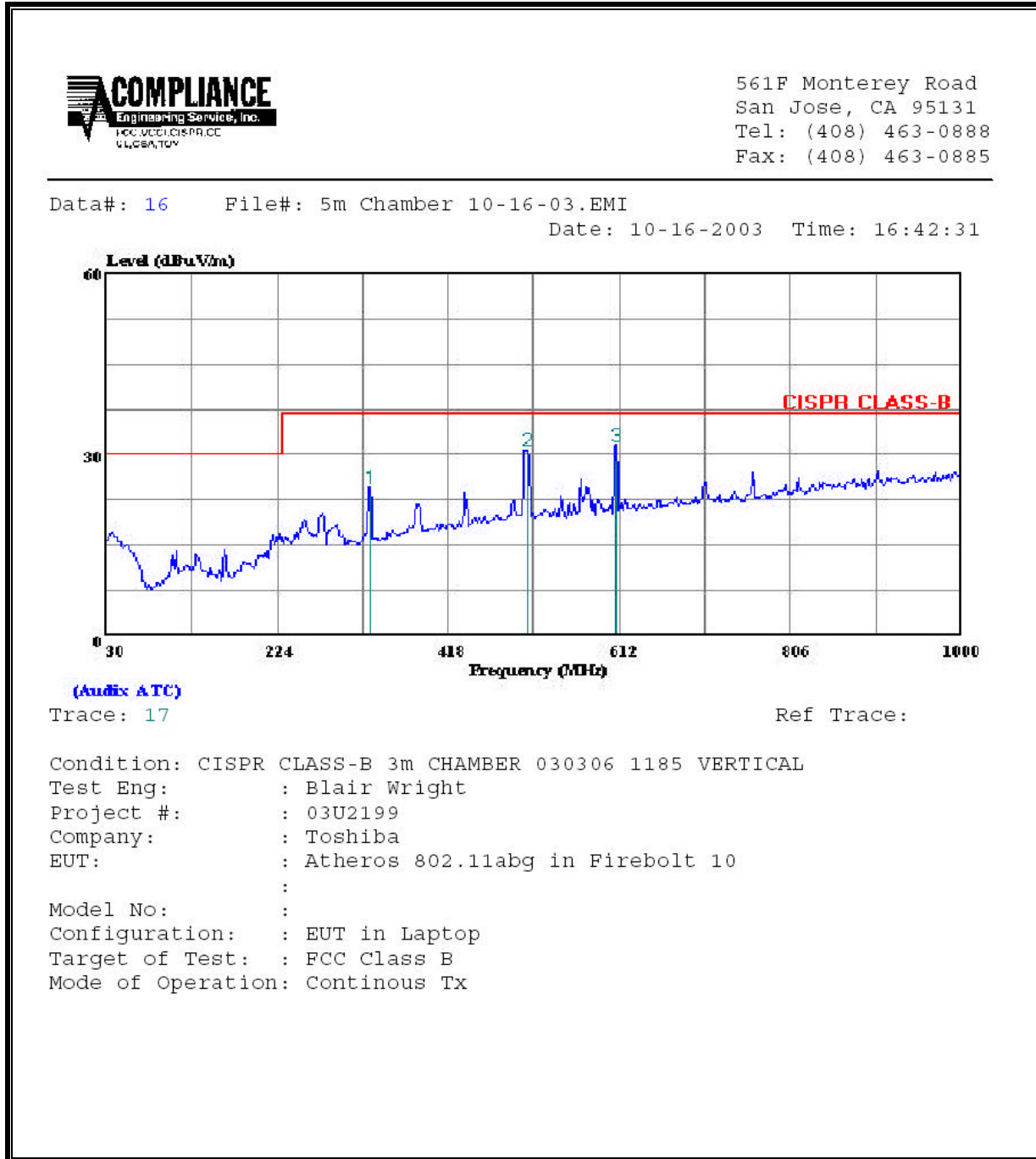
7.1.4. WORST-CASE SPURIOUS EMISSIONS BELOW 1 GHZ

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



	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
1	185.200	11.24	8.97	1.35	21.56	30.00	-8.44	Peak
2	507.240	8.13	16.63	2.31	27.07	37.00	-9.93	Peak
3	608.120	14.30	17.77	2.54	34.61	37.00	-2.39	Peak

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



	Freq	Read Level	Probe Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV/m	dBuV/m	dB	
1	329.730	9.80	12.85	1.83	24.48	37.00	-12.52	Peak
2	507.240	11.71	16.63	2.31	30.65	37.00	-6.35	Peak
3	608.120	11.19	17.77	2.54	31.50	37.00	-5.50	Peak

7.2. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

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

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

*Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

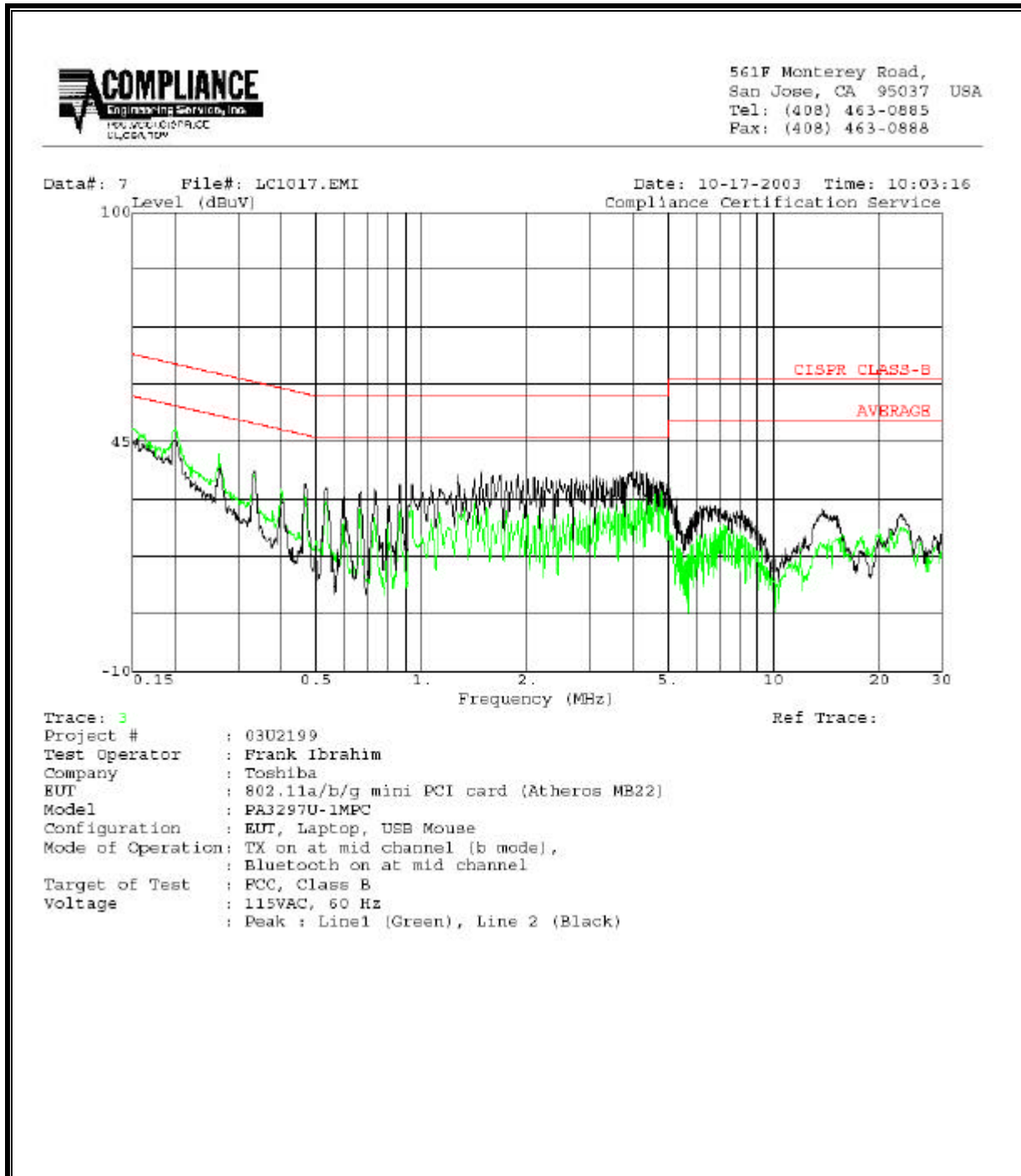
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	47.98	--	--	0.00	66.00	56.00	-18.02	-8.02	L1
0.20	47.98	--	--	0.00	64.60	54.60	-16.62	-6.62	L1
0.26	42.10	--	--	0.00	62.74	52.74	-20.64	-10.64	L1
0.15	47.14	--	--	0.00	66.00	56.00	-18.86	-8.86	L2
0.20	45.36	--	--	0.00	64.57	54.57	-19.21	-9.21	L2
0.27	38.74	--	--	0.00	62.69	52.69	-23.95	-13.95	L2
6 Worst Data									

LINE 1 AND LINE 2 RESULTS



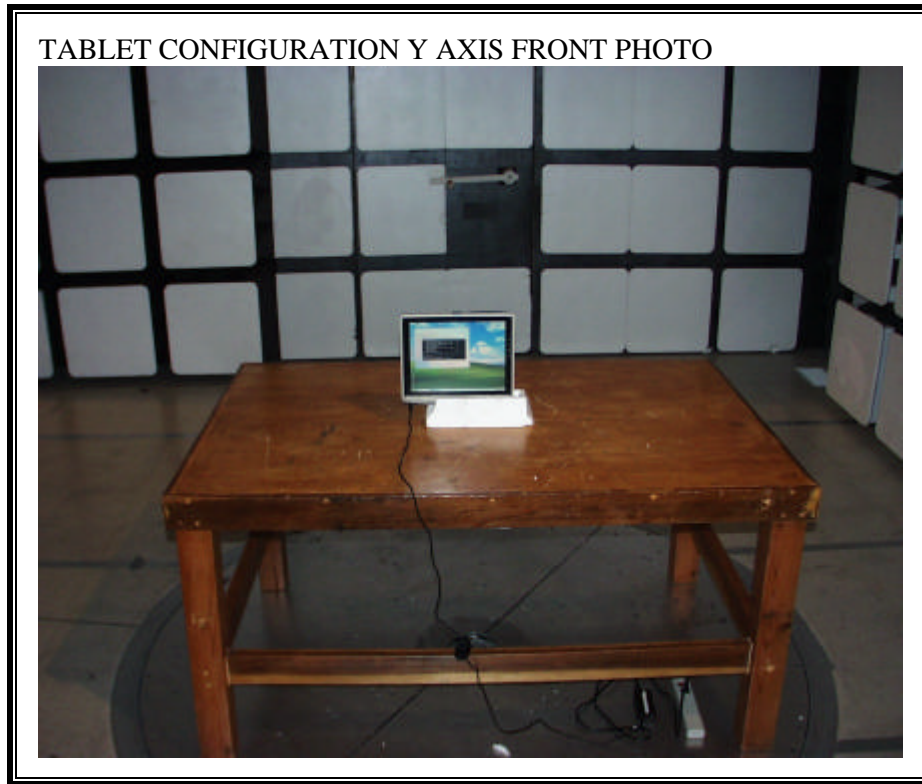
8. SETUP PHOTOS

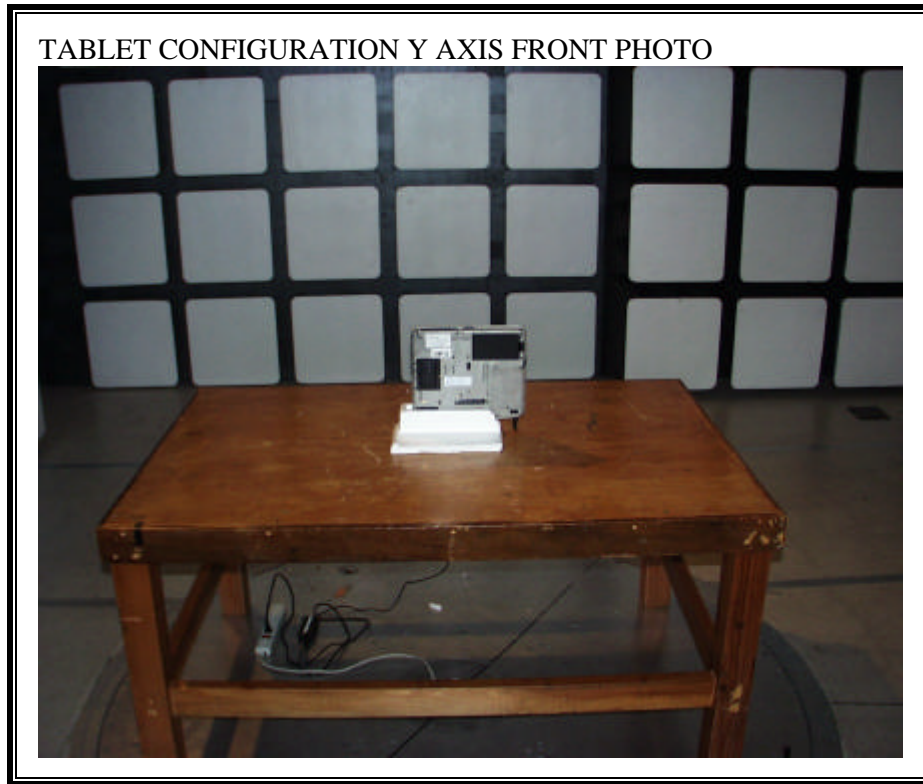
RADIATED RF MEASUREMENT SETUP

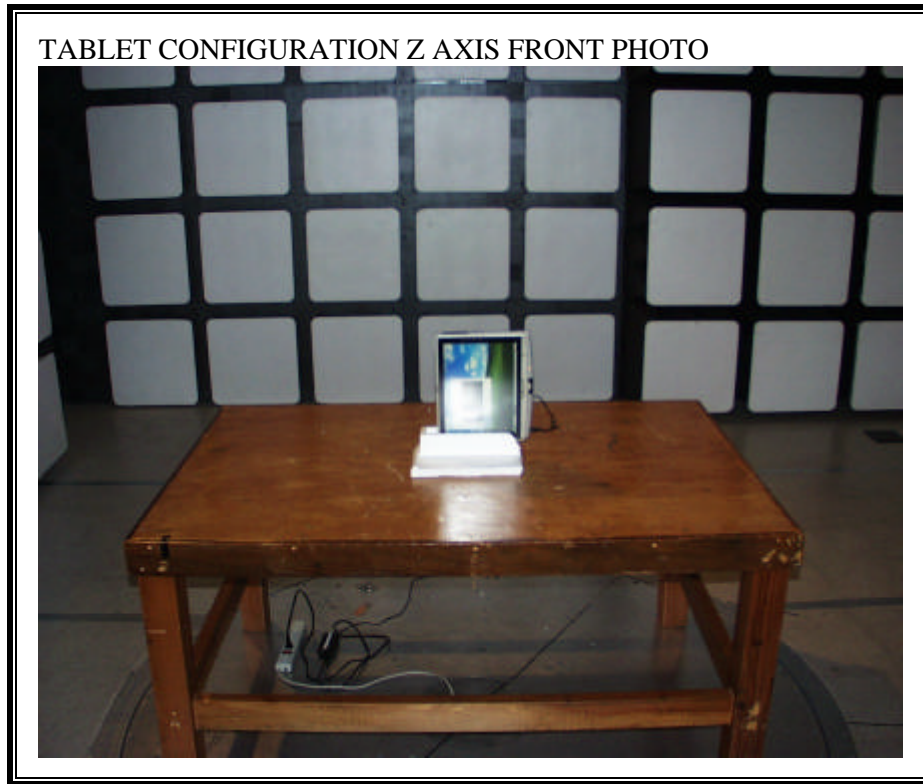


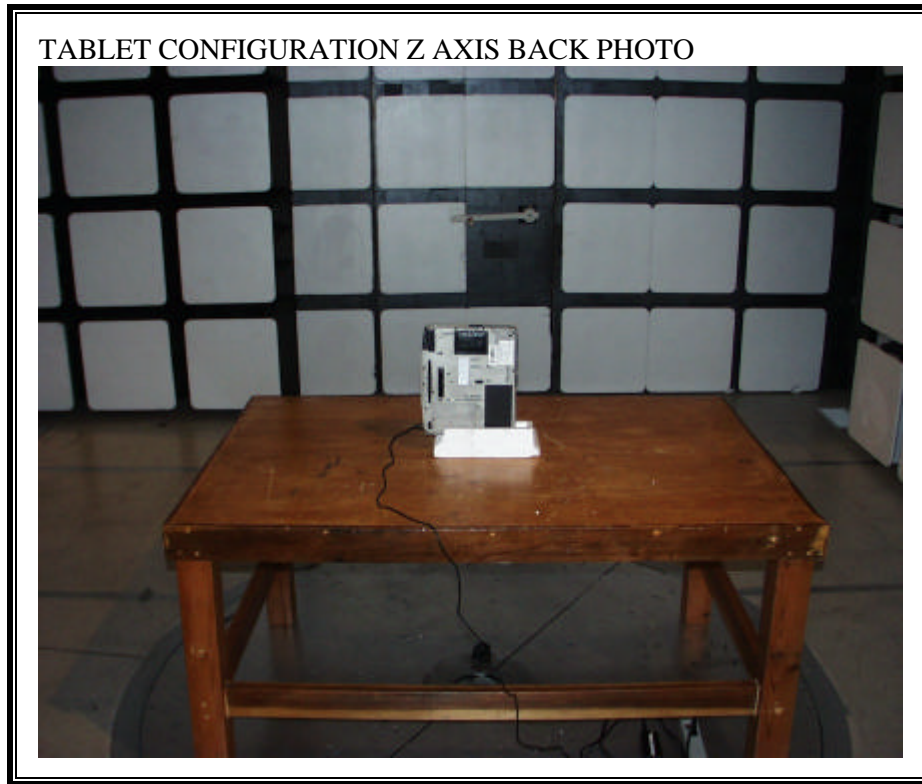




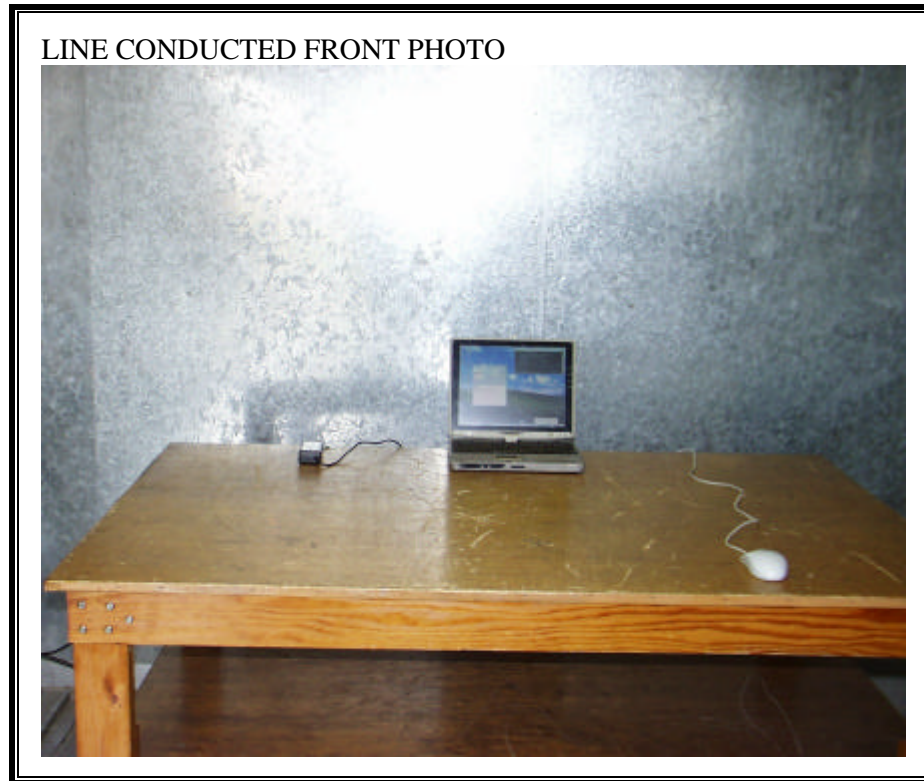








POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





END OF REPORT