



**FCC CFR47 PART 15 SUBPART E
CERTIFICATION**

TEST REPORT

FOR

MINI PCI 802.11 A/B/G TRANSCEIVER

MODEL NUMBER: PA3374U-1MPC

FCC ID: CJ6UPA3374WL

REPORT NUMBER: 04U2470-2

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Prepared for

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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: Mini PCI 802.11 a/b/g transceiver

MODEL: PA3374U-1MPC

DATE TESTED: FEBRUARY 24 – APRIL 1, 2004

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART E	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 5.2 GHz band is applicable to this report; other bands of operation (2.4 and 5.8 GHz) are documented in a separate report.

Approved & Released For CCS By:

Tested By:



MIKE HECKROTTE
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EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is an 802.11a/b/g transceiver Mini PCI card installed in Toshiba Tablet, including co-location with the Toshiba PA3232U-1BTM Bluetooth radio card.

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

Frequency Band (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5180 - 5250	802.11a	14.83	30.41
5200 - 5250	802.11a Turbo	16.64	46.13
5250 - 5320	802.11a	17.98	62.81
5250 - 5290	802.11a Turbo	17.27	53.33

The radio utilizes two film antennas for diversity (main and auxiliary).

The Tyco model TIAN01 has a maximum gain of 4.66 dBi in the 5.2 GHz band.

The HTL017 has a lower gain in the 5.2 GHz band, compared to the TIAN001.

Two TIAN001 antennas were utilized during final compliance tests in the 5.2 GHz band.

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 C63.4/2001, 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
Spectrum Analyzer	Agilent	E4446A	MY43360112	1/13/2005
Peak Power Meter	Agilent	E4416A	GB41291160	11/7/2004
Peak / Average Power Sensor	Agilent	E9327A	US40440755	11/7/2004
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	2/4/2005
Antenna, Horn 18 ~ 26 GHz	ARA	SWH-28	1007	2/24/2005
Antenna, Horn 26 ~ 40 GHz	ARA	MWH-2640/B	1029	12/3/2004
PreAmplifier 1-26GHz	MITEQ	NSP2600-SP	924341	4/25/2004
PreAmplifier 26-40 GHz	MITEQ	NSP4000-SP2	924343	6/1/2004
7.6GHz High Pass Filter	Micro-tronics	HPM13195	SN-002	N/A
4.0GHz High Pass Filter	Micro-tronics	HPM13351	SN-001	N/A
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	11/20/2004
RF Filter Section	HP	85420E	3705A00256	11/20/2004
Antenna, Bicon/Log, 30 ~ 2000 MHz	Sunol Sciences	JB1	A121003	12/22/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	10/13/2004
Line Filter	Lindgren	LMF-3489	497	CNR
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/13/2004
Pulse Generator	Agilent	81101A	DE38900835	2/13/2005
Signal Generator	HP	83732B	US34490599	7/7/2005

6. SETUP OF EQUIPMENT UNDER TEST

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	Serial Number	FCC ID
LAPTOP	TOSHIBA	PPM20U-AAAA	Z3044588JU	DOC
AC ADAPTER	TOSHIBA	ADP-60RHA	G71C0002S110	DOC

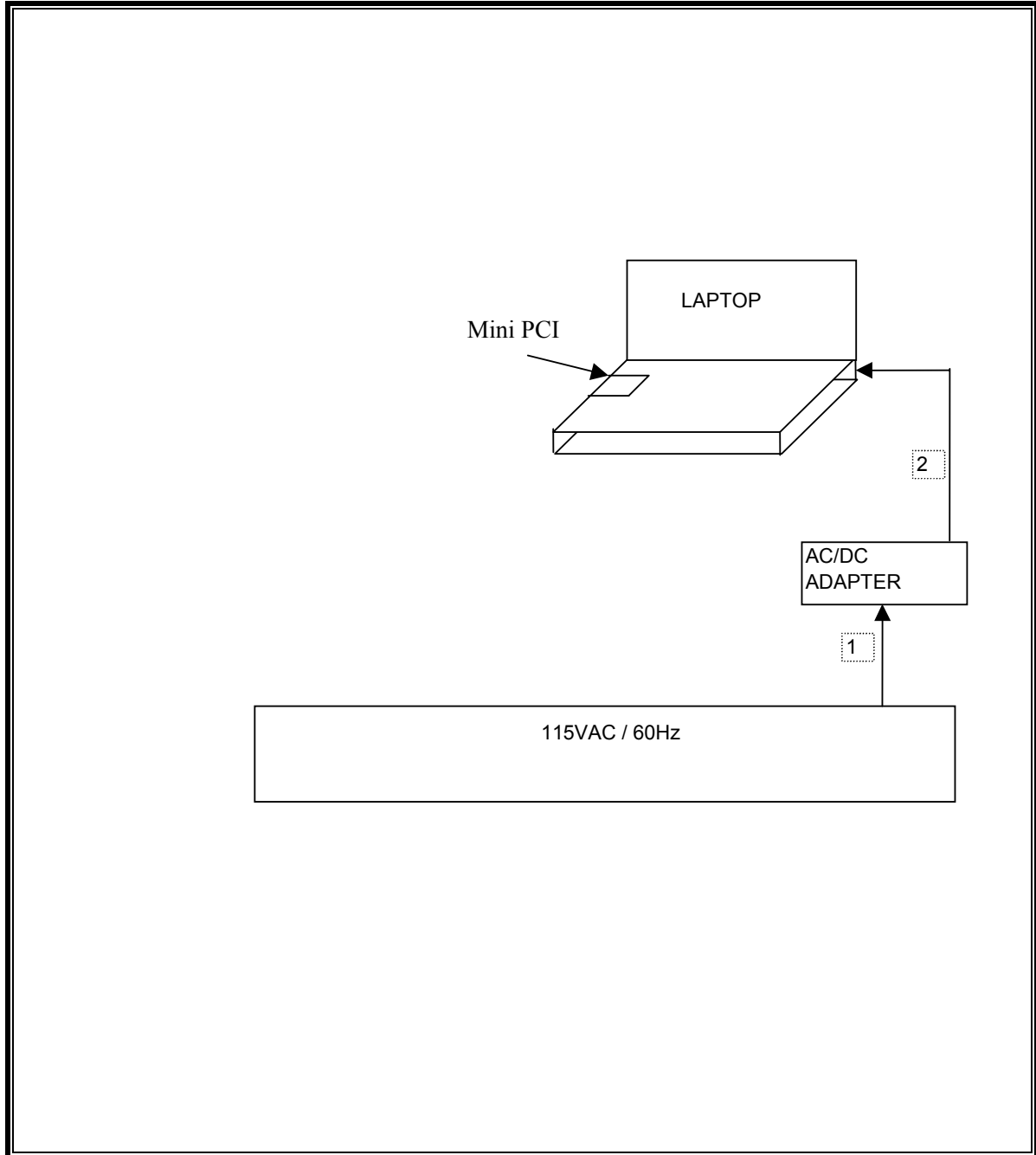
I/O CABLES

I/O CABLE LIST						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	2	US115	UNSHIELDED	2m	NO
2	DC	1	DC	UNSHIELDED	2m	NO

TEST SETUP

The EUT is installed in a host laptop computer via a cardbus-to-miniPCI adapter / extension board during conducted antenna port tests. The EUT is installed in a host laptop computer for radiated emission tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. EMISSION BANDWIDTH

LIMIT

§15.403 (c) Emission bandwidth. For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolutions bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 1% to 3% of the 26 dB bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled.

RESULTS

No non-compliance noted:

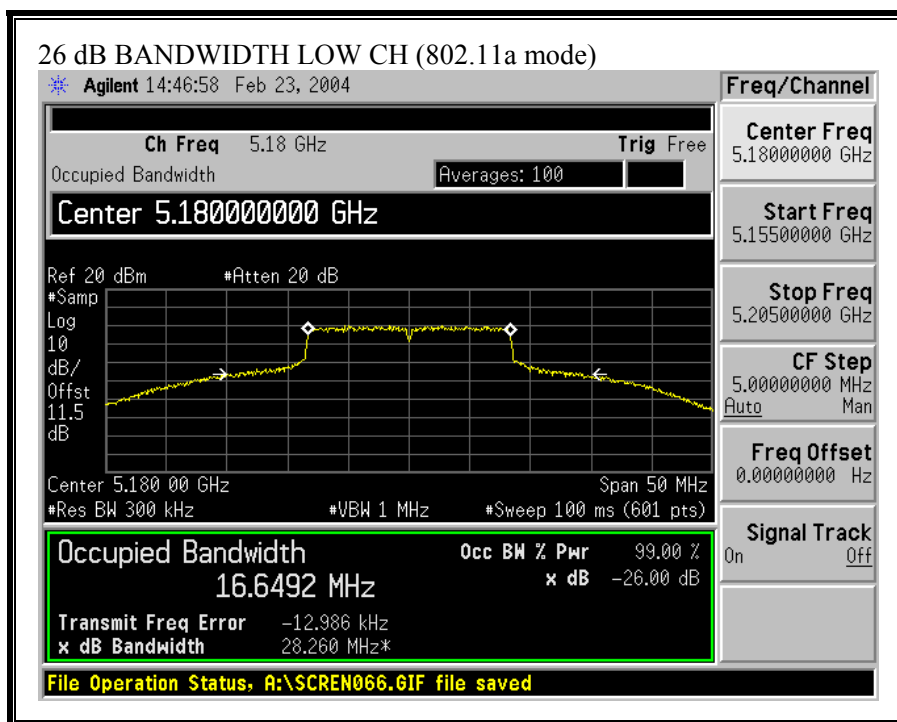
802.11a Mode

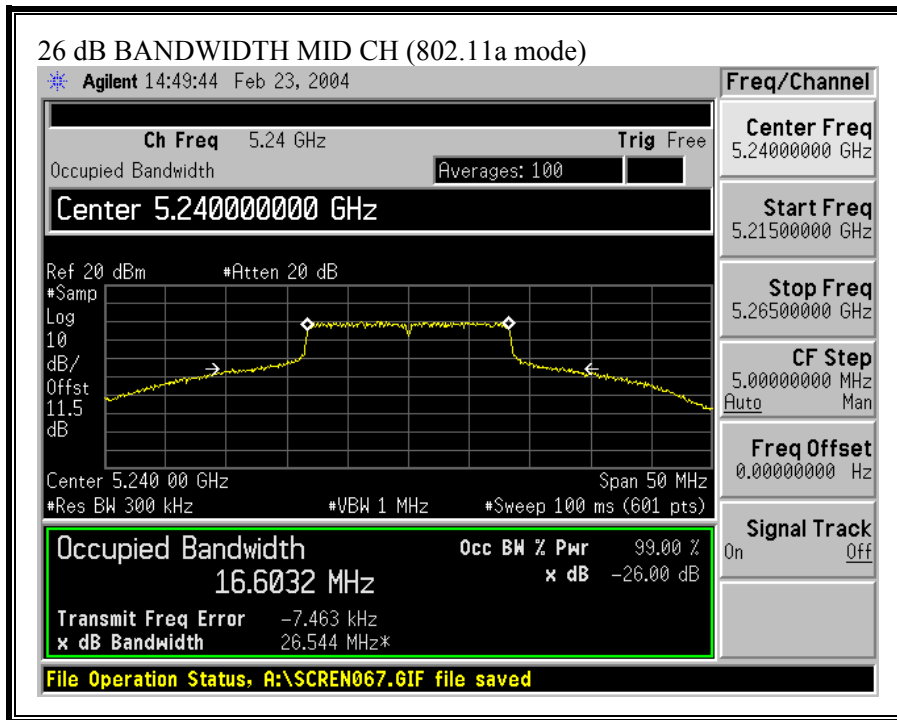
Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5180	28.26	14.51
Middle	5240	26.54	14.24
Middle	5260	24.29	13.85
High	5320	22.94	13.61

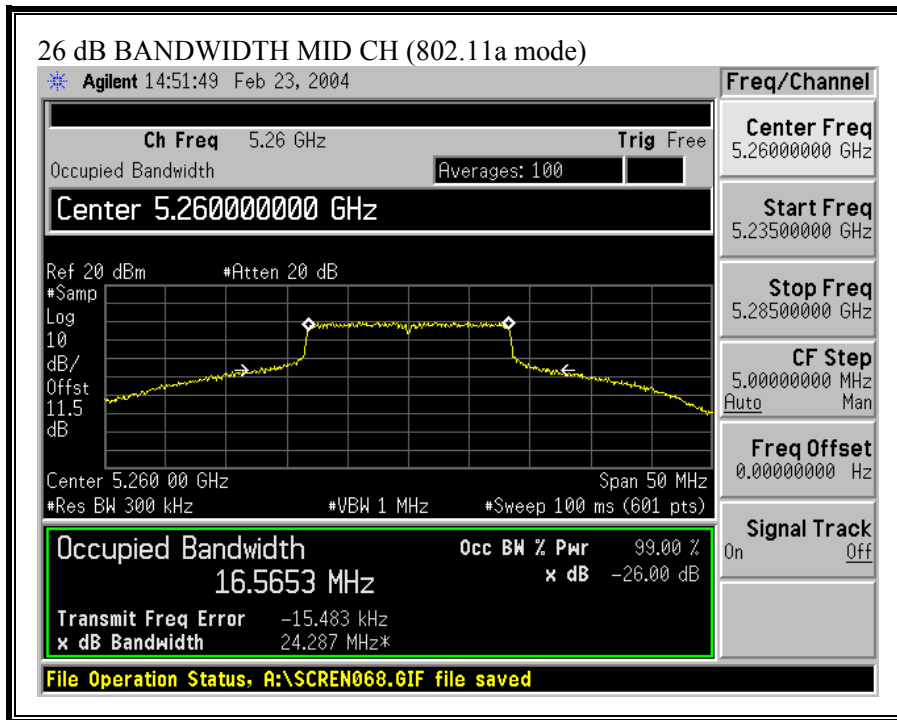
802.11a Turbo Mode

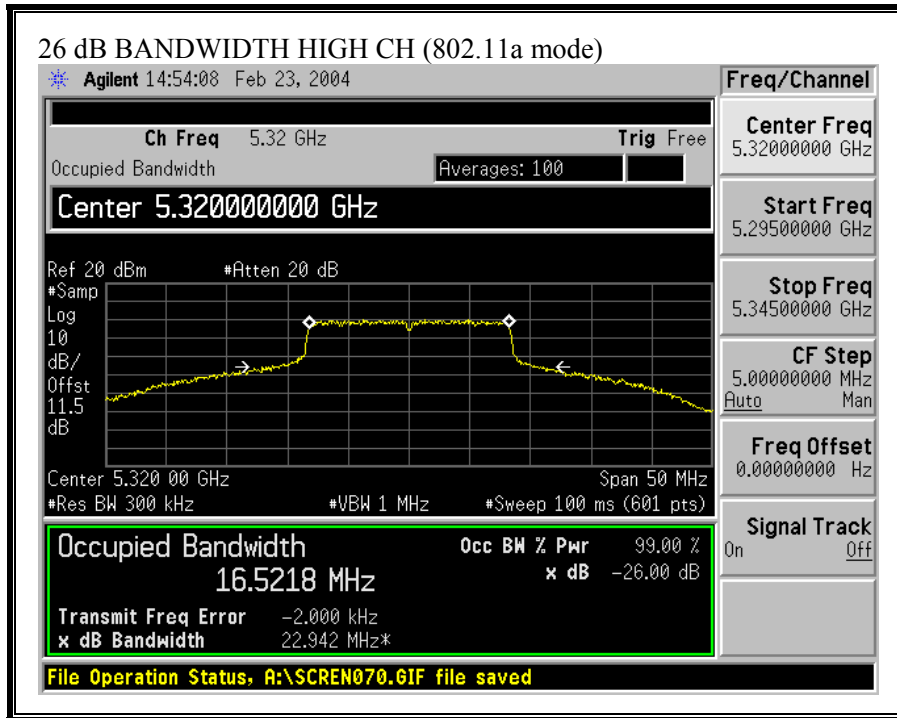
Channel	Frequency (MHz)	B (MHz)	10 Log B (dB)
Low	5200	55.67	17.46
Middle	5250	52.08	17.17
High	5290	46.30	16.66

26 dB EMISSION BANDWIDTH (802.11a MODE)

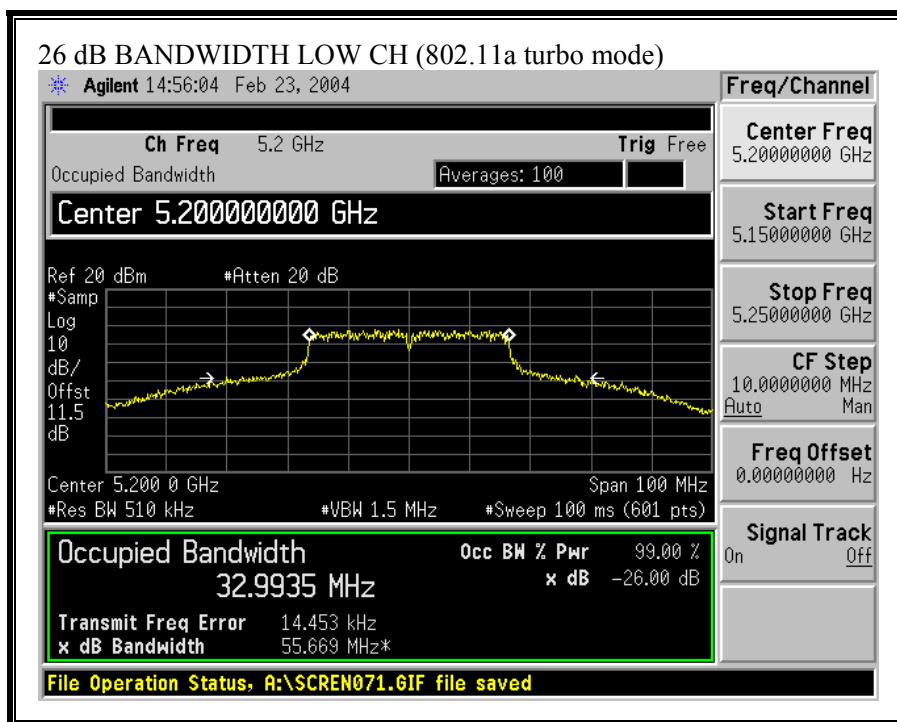


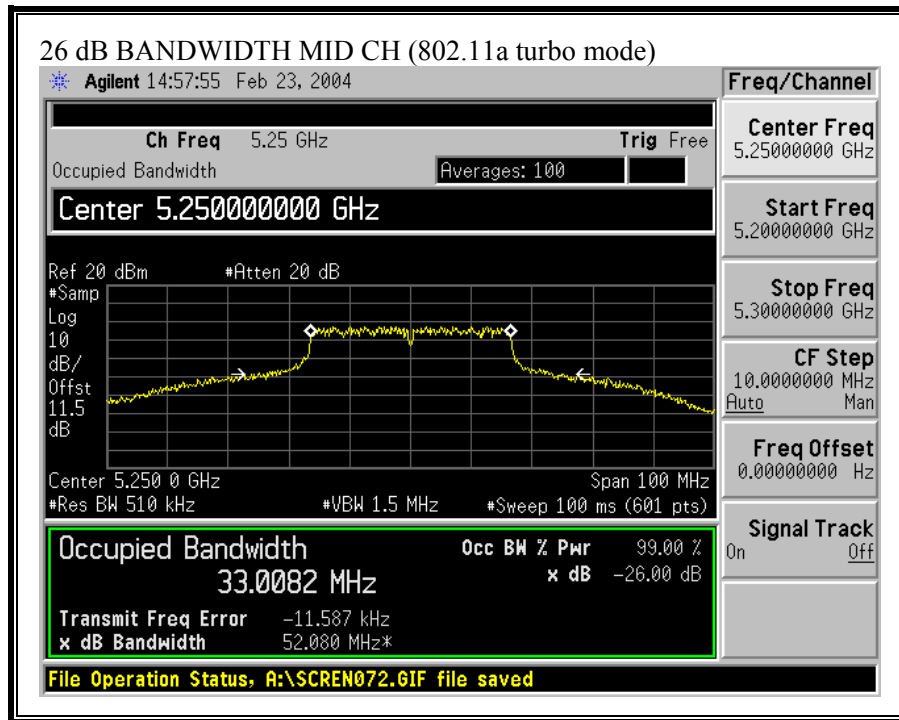


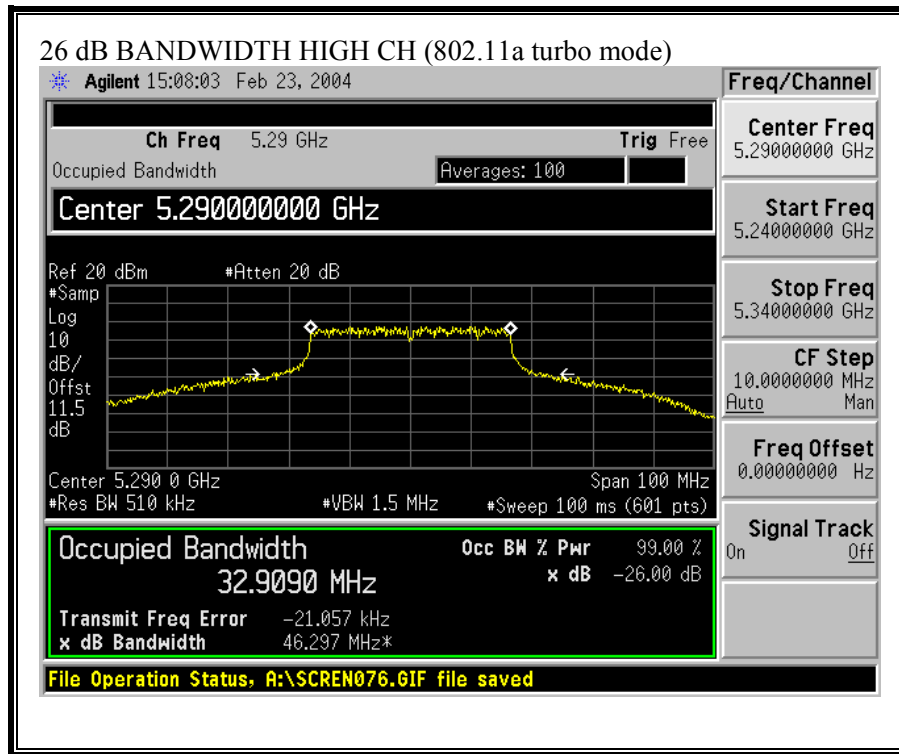




26 dB EMISSION BANDWIDTH (802.11a TURBO MODE)







7.2. PEAK POWER

LIMIT

§15.407 (a) (2) For the 5.25–5.35 GHz band, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EIRP LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

The transmitter output operates continuously therefore Method # 1 is used.

LIMITS AND RESULTS

No non-compliance noted:

Limit in 5150 to 5250 MHz Band

Mode	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	4 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
802.11a	5180	17	28.26	18.51	4.66	17.00
802.11a	5240	17	26.54	18.24	4.66	17.00
Turbo	5200	17	55.67	21.46	4.66	17.00
Turbo	5250	17	52.08	21.17	4.66	17.00

Limit in 5250 to 5350 MHz Band

Mode	Frequency (MHz)	Fixed Limit (dBm)	B (MHz)	11 + 10 Log B Limit (dBm)	Antenna Gain (dBi)	Limit (dBm)
802.11a	5260	24	24.29	24.85	4.66	24.00
802.11a	5320	24	22.94	24.61	4.66	24.00
Turbo	5290	24	46.3	27.66	4.66	24.00

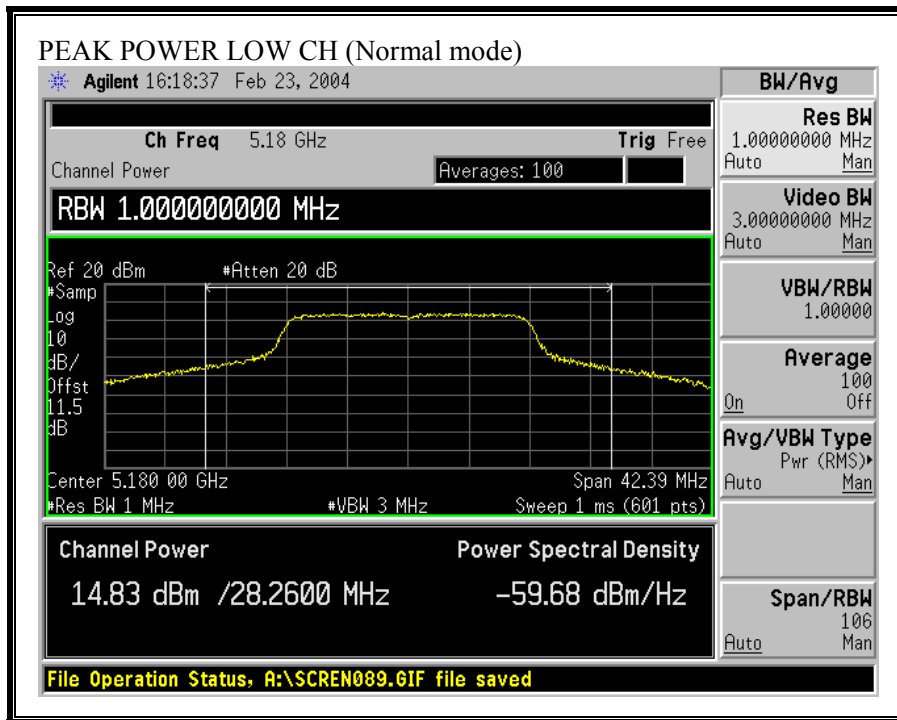
802.11a mode Results

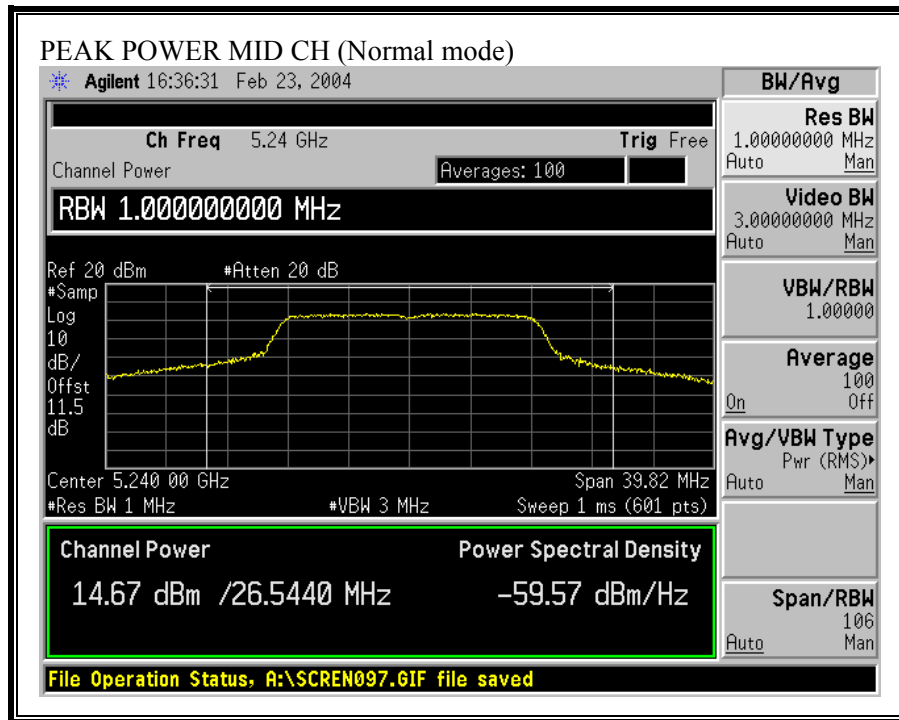
Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5180	14.83	17.00	-2.17
Middle	5240	14.67	17.00	-2.33
Middle	5260	17.66	24.00	-6.34
High	5320	17.98	24.00	-6.02

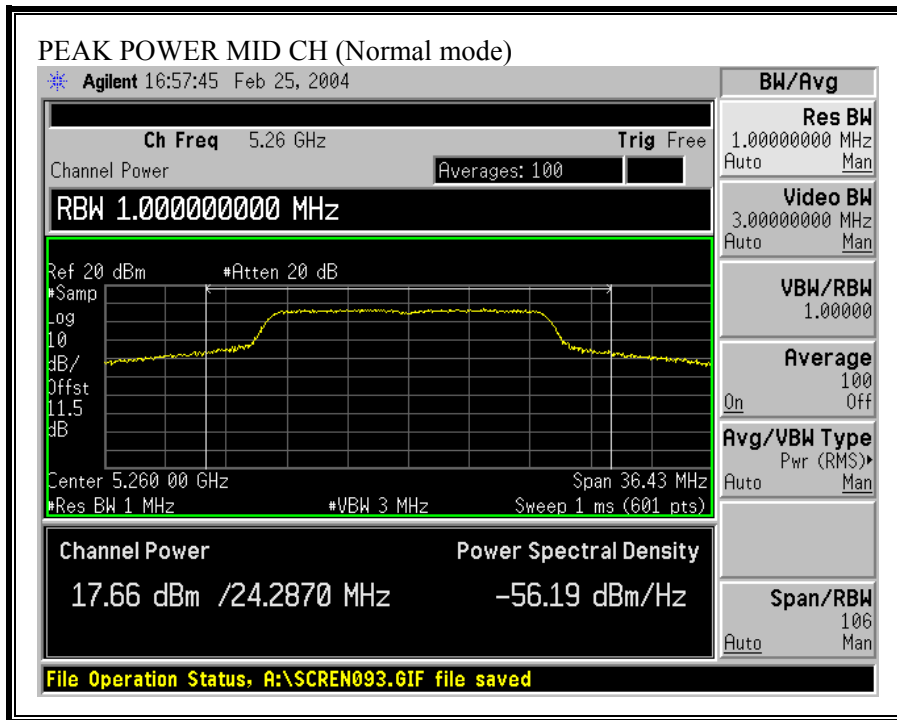
802.11a Turbo mode Results

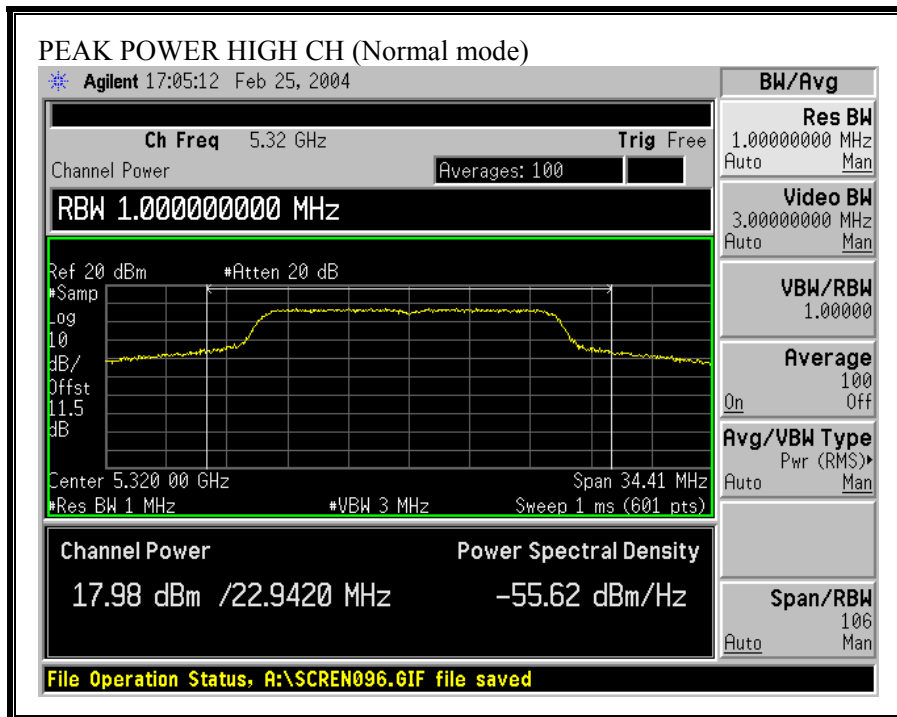
Channel	Frequency (MHz)	Power (dBm)	Limit (dBm)	Margin (dB)
Low	5200	16.64	17.00	-0.36
Middle	5250	16.81	17.00	-0.19
High	5290	17.27	24.00	-6.73

PEAK POWER (NORMAL MODE)

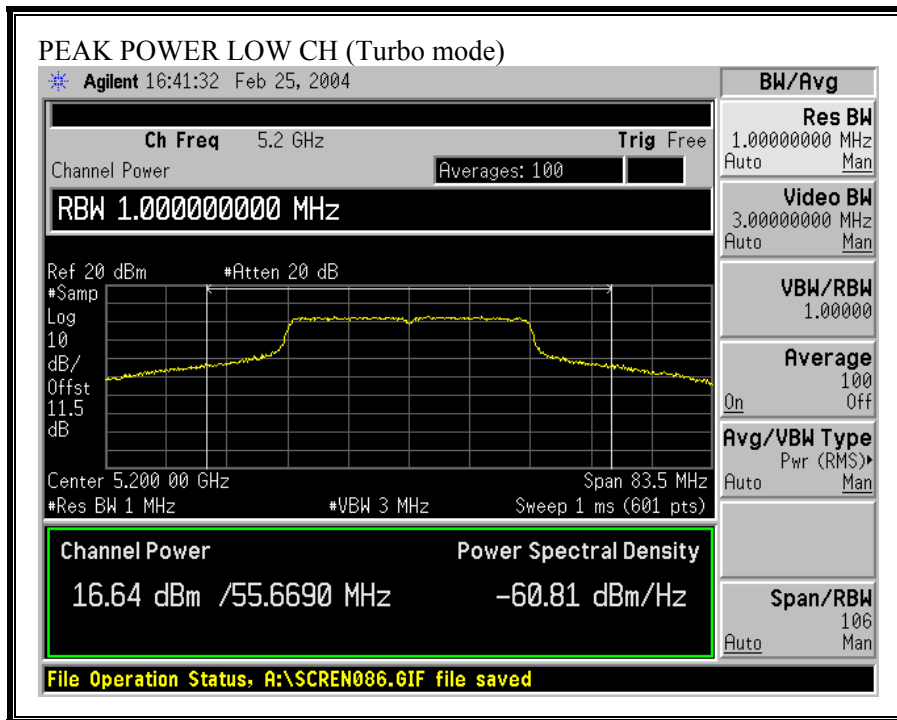


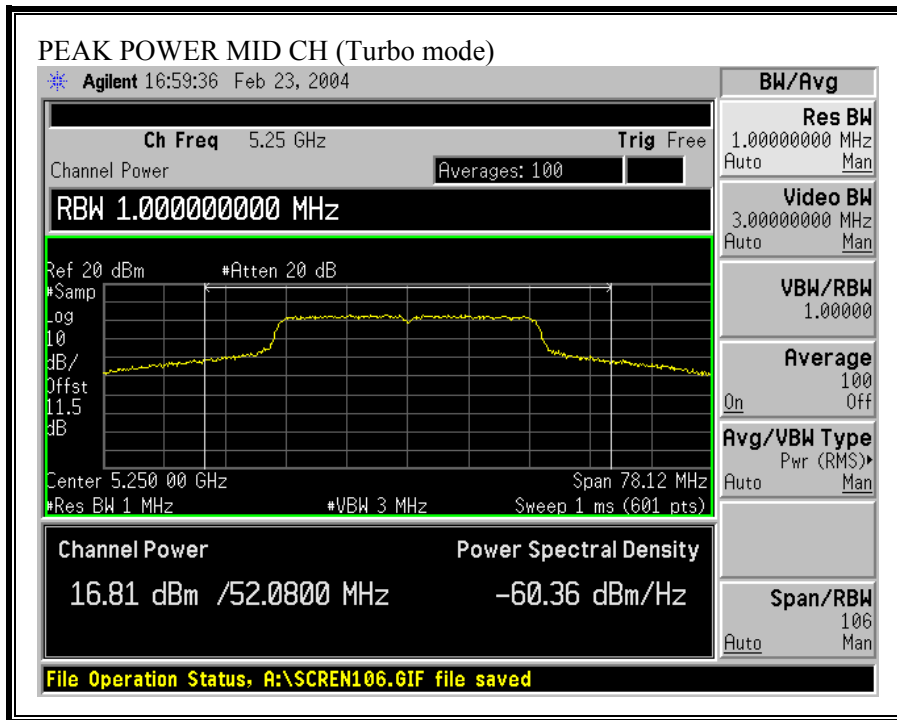


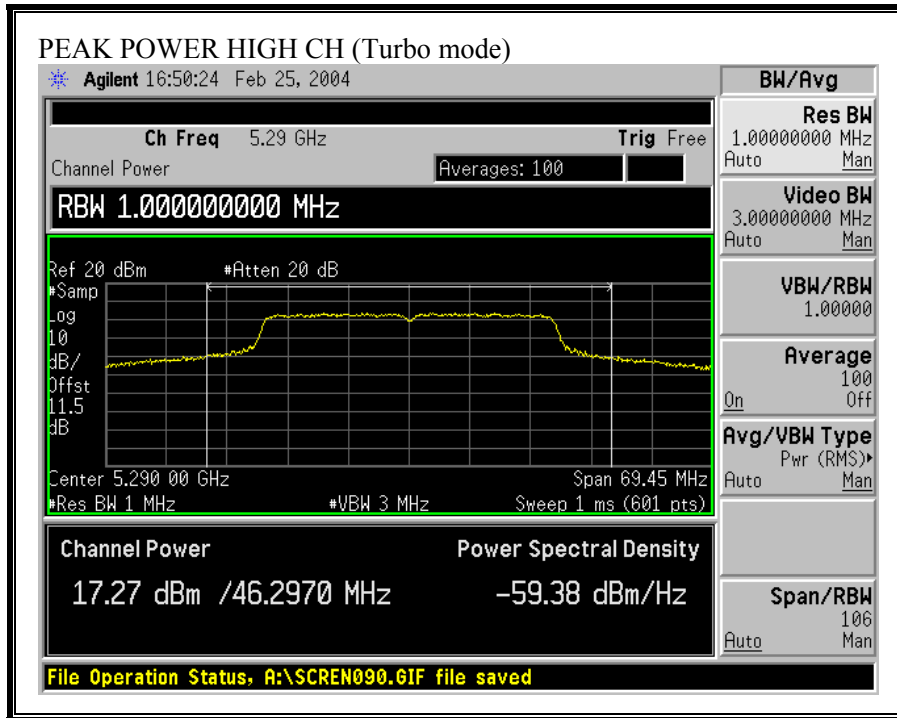




PEAK POWER (TURBO MODE)







7.3. AVERAGE POWER

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.6 dB (including 10 dB pad and 1.6 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Normal Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5180	15.20
Middle	5240	14.80
Middle	5260	17.10
High	5320	17.10

802.11a Turbo Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5200	16.20
Middle	5250	17.20
High	5290	16.80

7.4. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.407 (a) (2) For the 5.25–5.35 GHz band, the peak transmit power over the frequency band of operation shall not exceed the lesser of 250 mW (24 dBm) or $11 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The maximum antenna gains are 4.66dBi for 5.2GHz band and 4.86dBi for 5.5GHz band, therefore there is no reduction due to antenna gain.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002. PPSD method #2 was used.

RESULTS

No non-compliance noted:

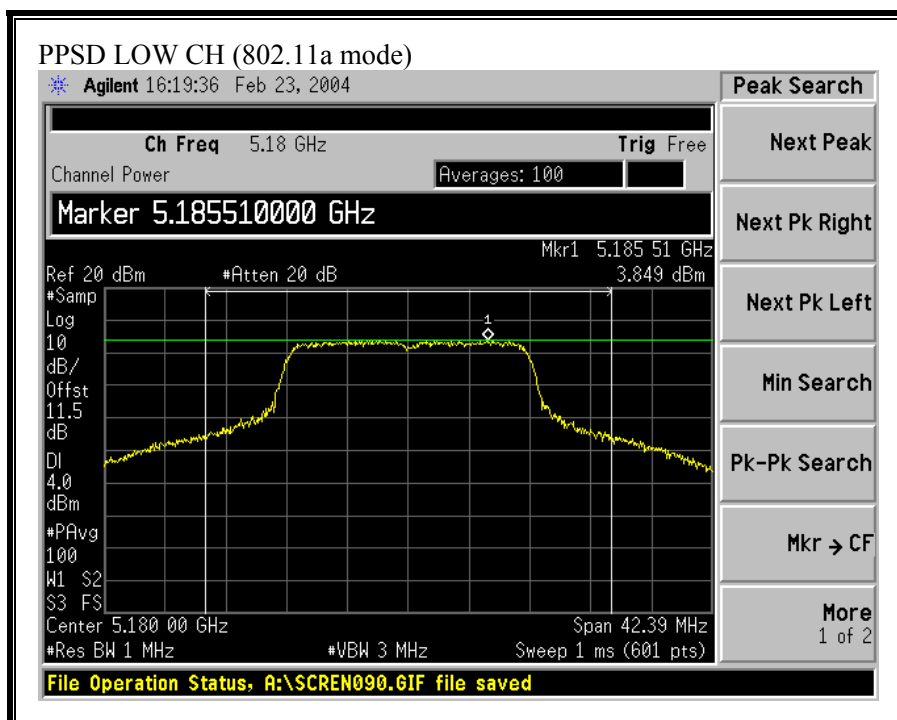
802.11a Normal Mode

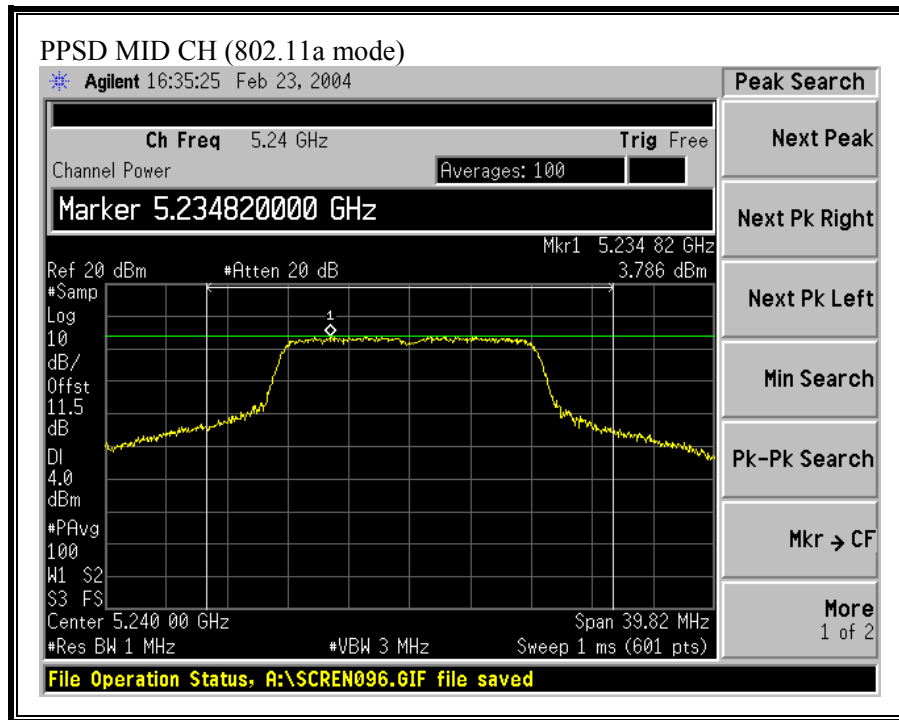
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5180	3.85	4.00	-0.15
Middle	5240	3.79	4.00	-0.21
Middle	5260	7.15	11.00	-3.85
High	5320	7.13	11.00	-3.87

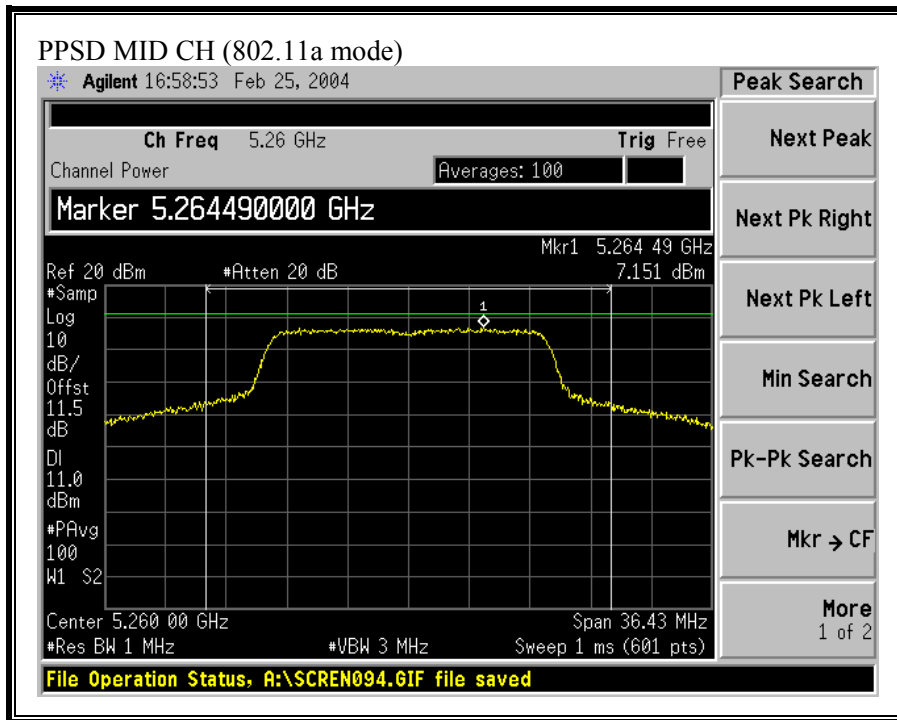
802.11a Turbo Mode

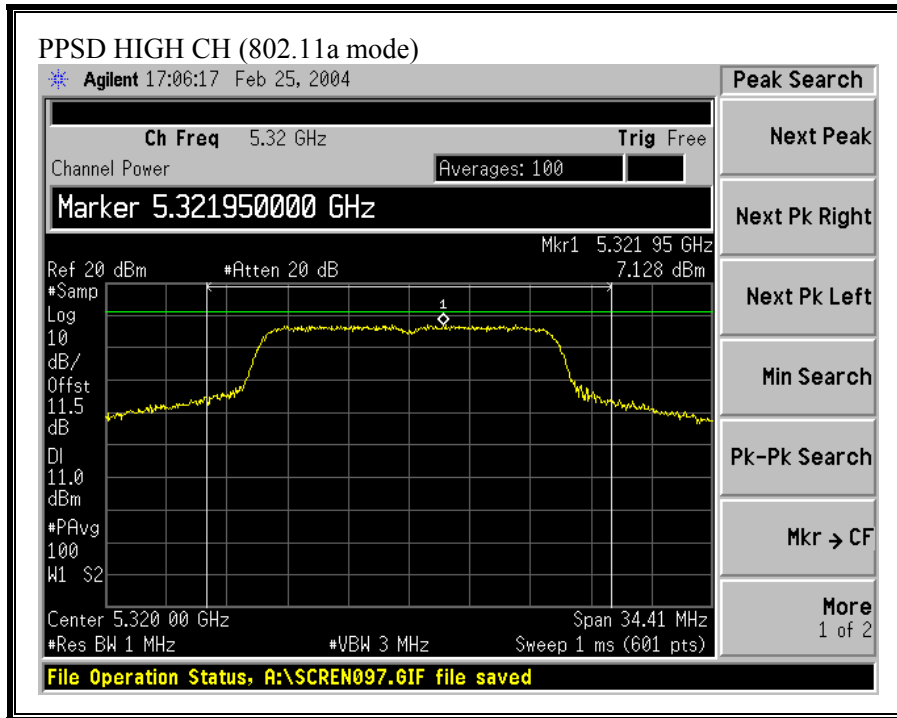
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5200	2.89	4.00	-1.11
Middle	5250	3.05	4.00	-0.95
High	5290	3.74	11.00	-7.26

PEAK POWER SPECTRAL DENSITY (802.11a MODE)

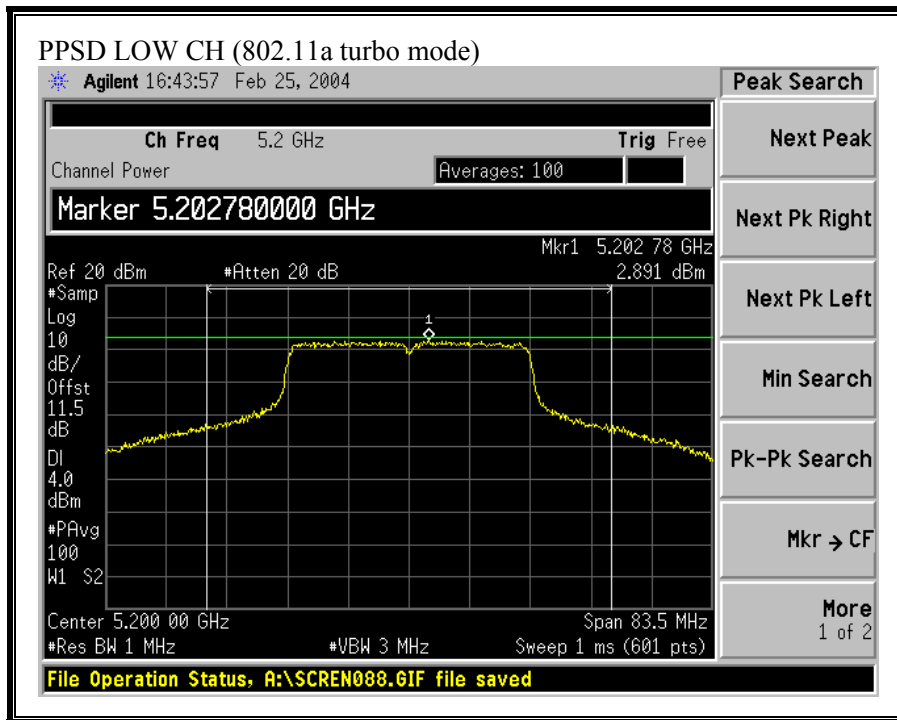


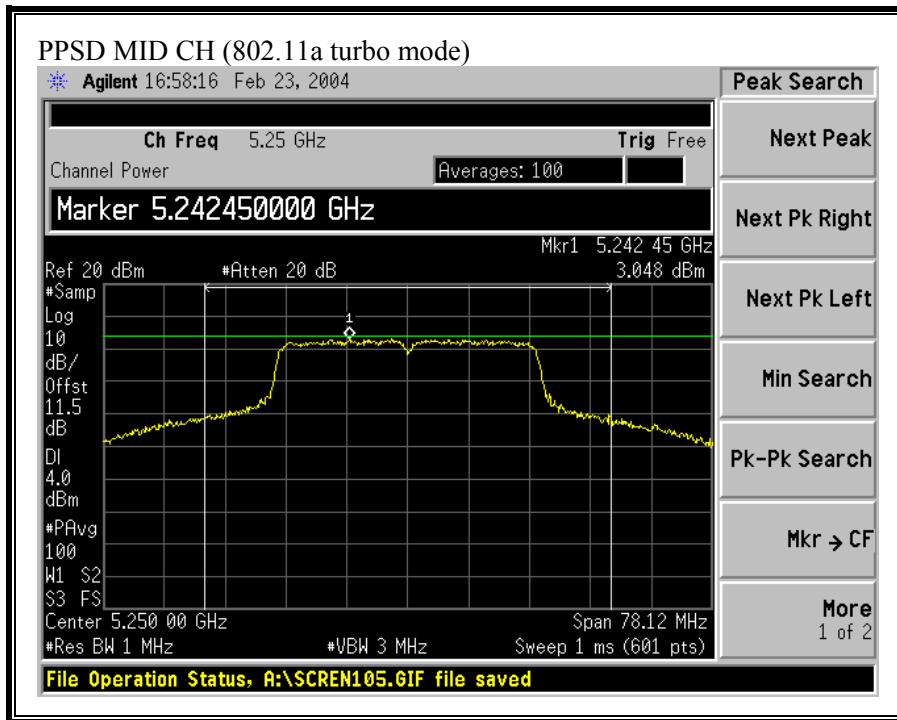


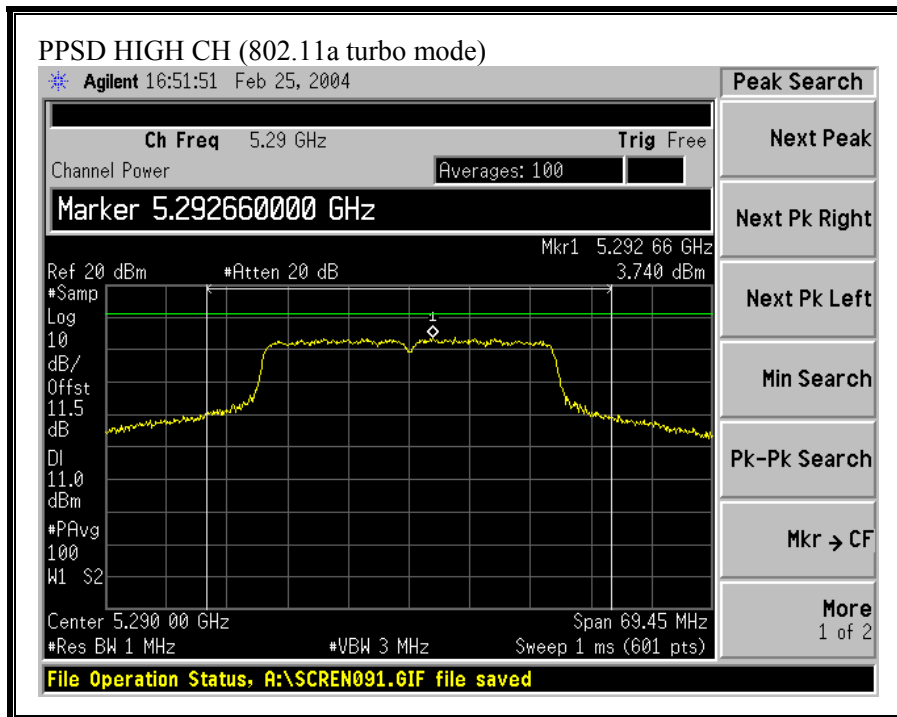




PEAK POWER SPECTRAL DENSITY (802.11a TURBO MODE)







7.5. PEAK EXCURSION

LIMIT

§15.407 (a) (6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

TEST PROCEDURE

The test is performed in accordance with FCC Public Notice: APPENDIX A Guidelines for Assessing Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E, August 2002.

Since Method # 1 was used for peak power measurements, Method # 1 settings are used for the second PPSD trace.

RESULTS

No non-compliance noted:

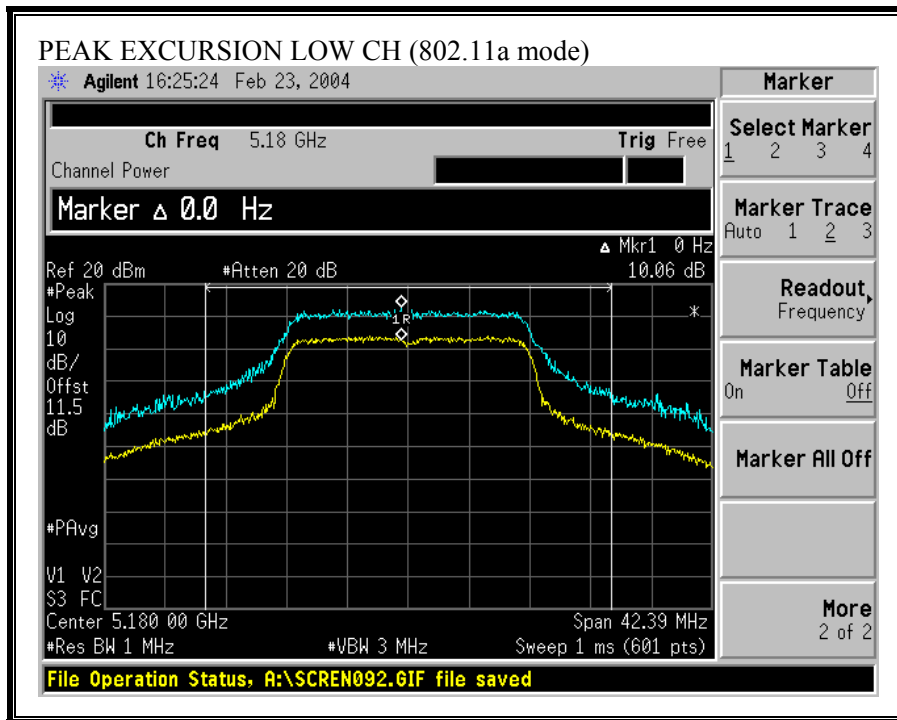
802.11a Normal Mode

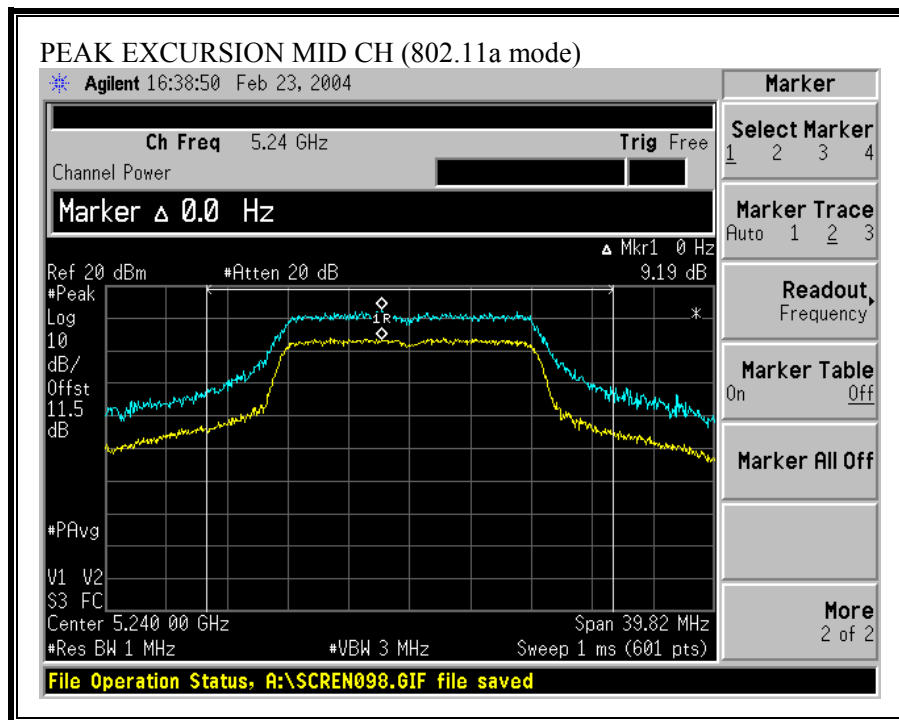
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5180	10.06	13	-2.94
Middle	5240	9.19	13	-3.81
Middle	5260	9.18	13	-3.82
High	5320	8.92	13	-4.08

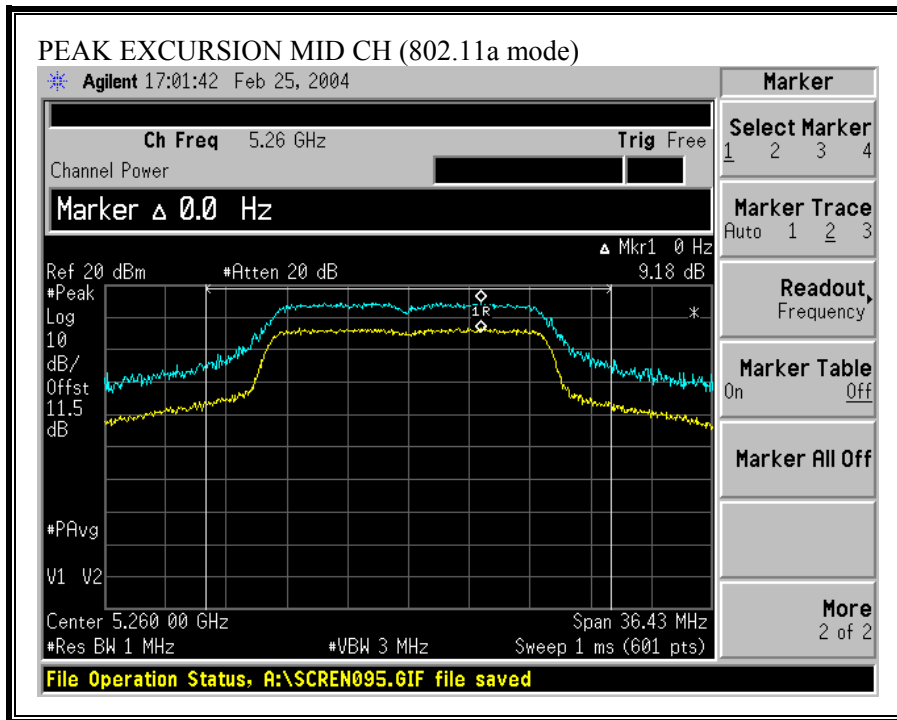
802.11a Turbo Mode

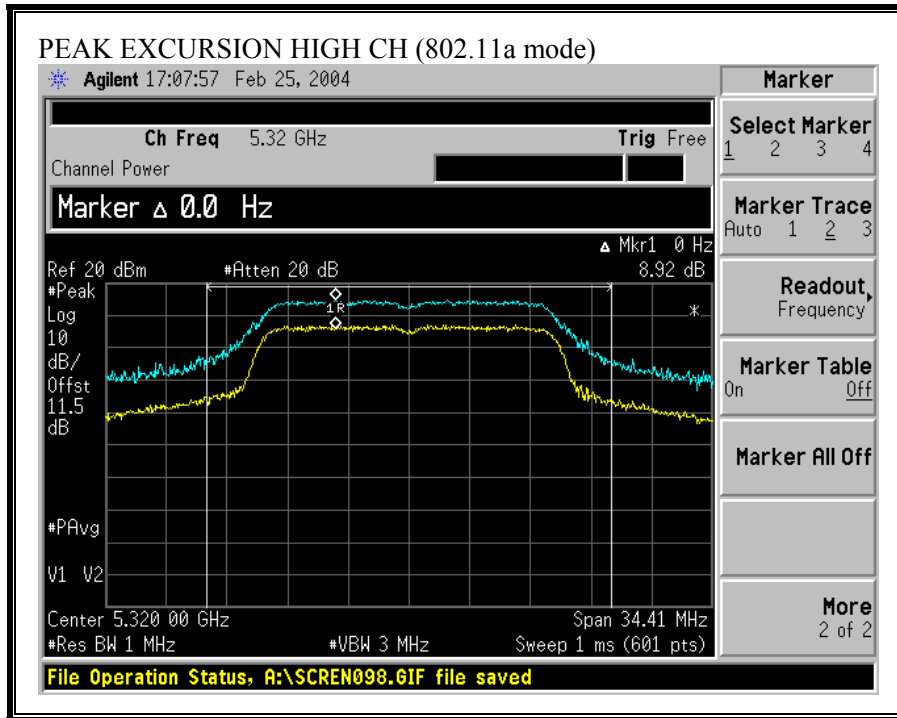
Channel	Frequency (MHz)	Peak Excursion (dB)	Limit (dB)	Margin (dB)
Low	5200	8.26	13	-4.74
Middle	5250	8.67	13	-4.33
High	5290	7.89	13	-5.11

PEAK EXCURSION (802.11a MODE)

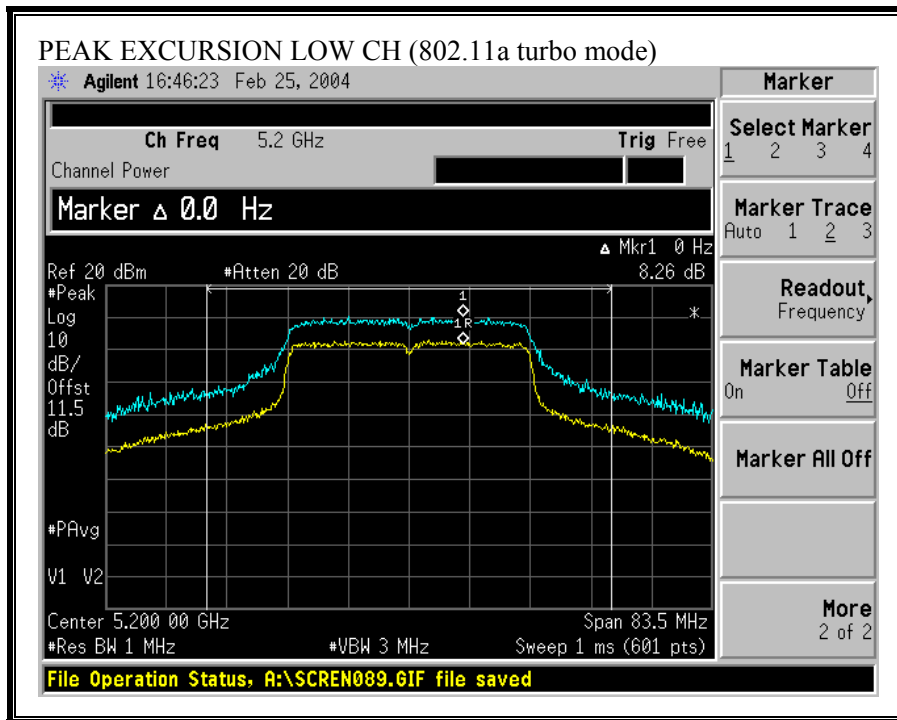


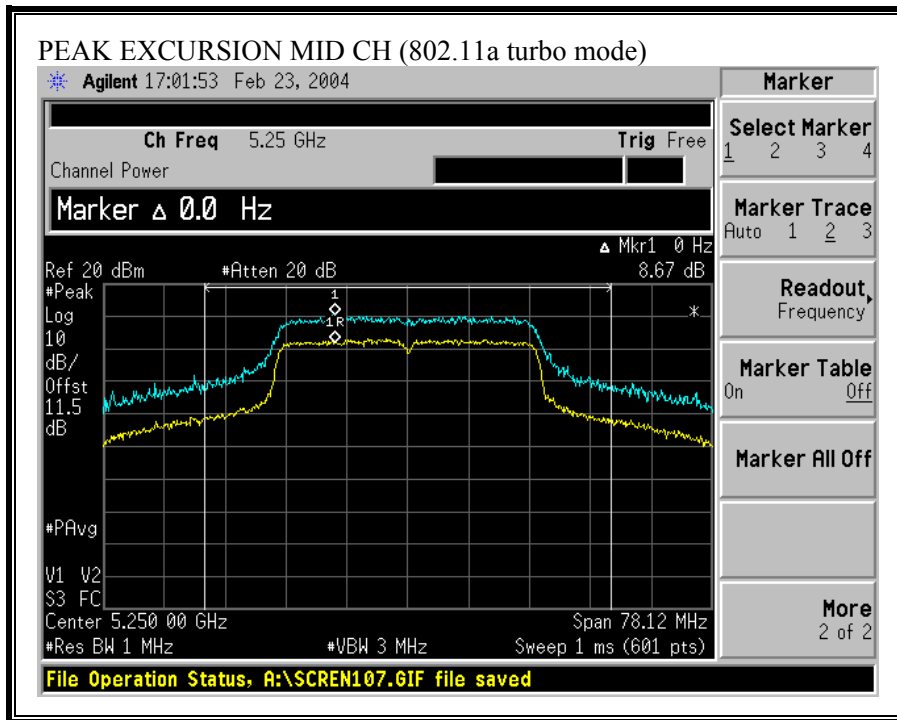


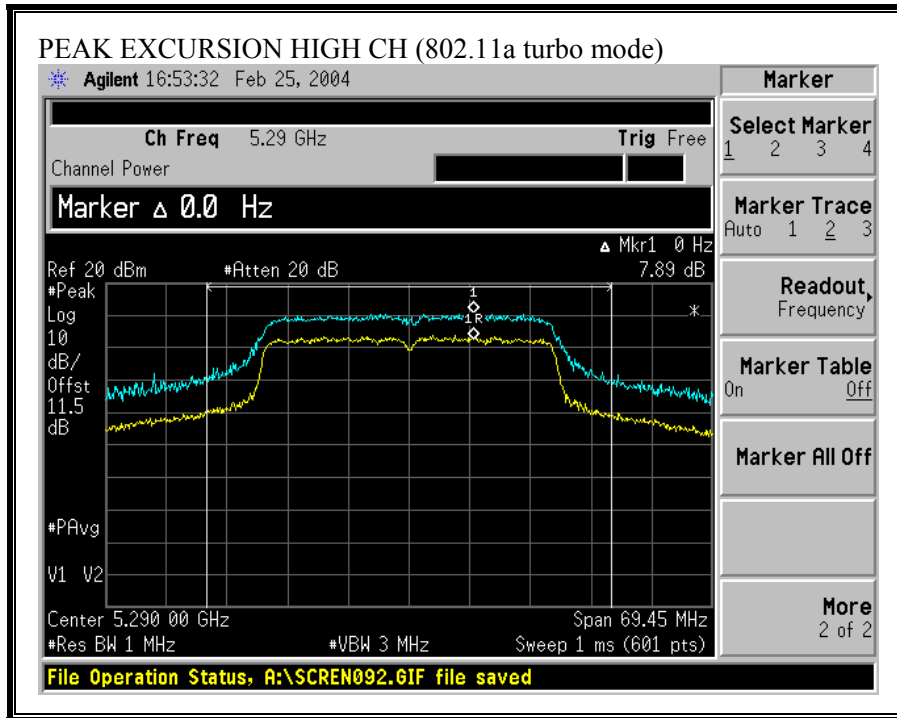




PEAK EXCURSION (802.11a TURBO MODE)







7.6. CONDUCTED SPUROUS EMISSIONS

LIMITS

§15.407 (b) (3) For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27 dBm / MHz.

TEST PROCEDURE

Conducted RF measurements of the transmitter output are made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

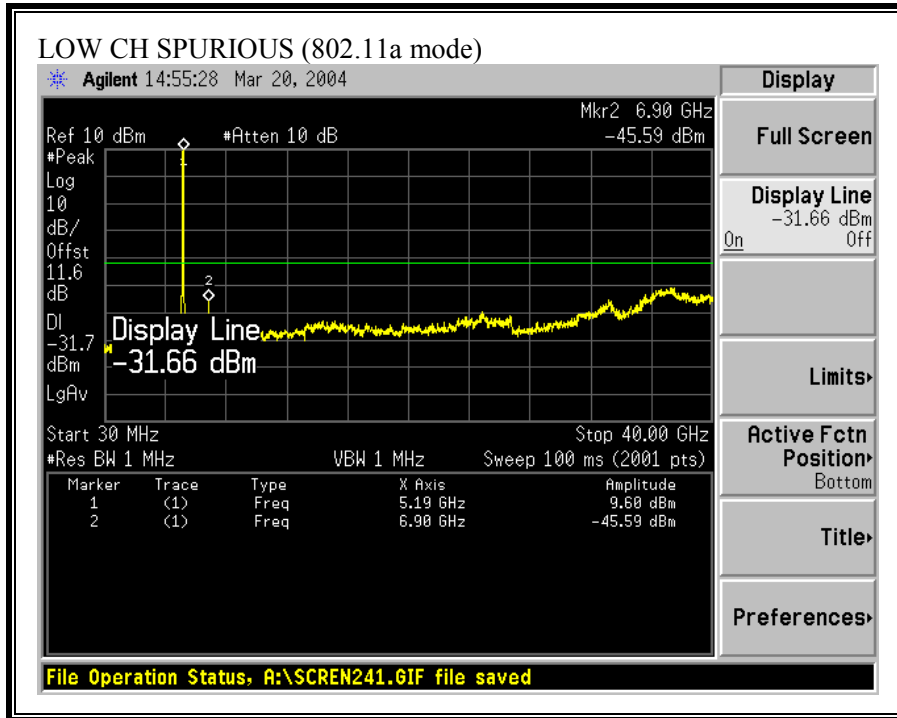
The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz. The video bandwidth is set to 1 MHz. Peak detection measurements are compared to the average EIRP limit, adjusted for the maximum antenna gain. If necessary, additional average detection measurements are made.

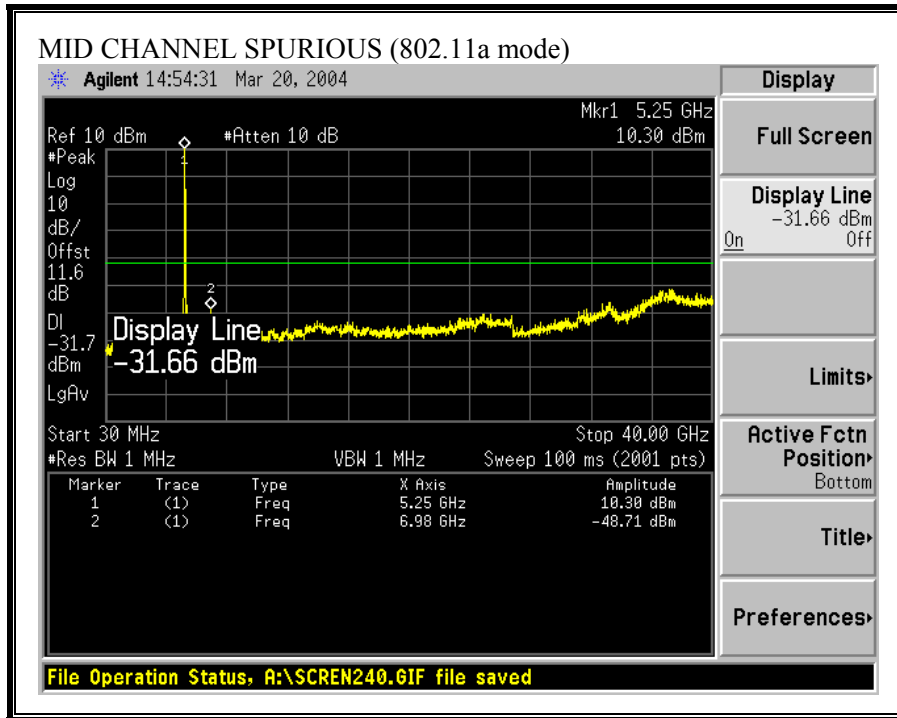
Measurements are made over the 30 MHz to 40 GHz range with the transmitter set to the lowest, middle, and highest channels.

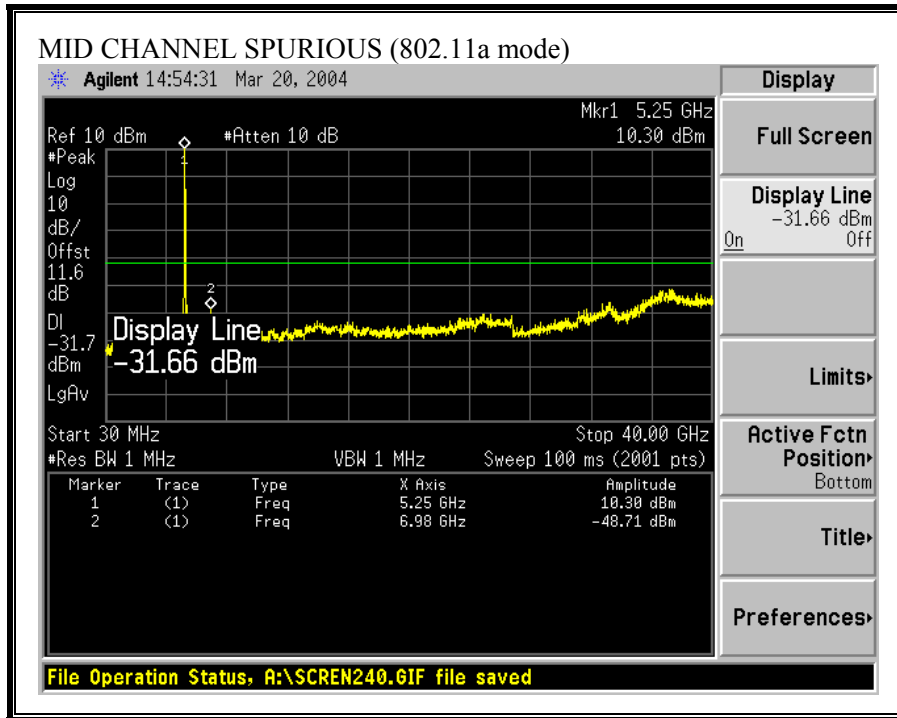
RESULTS

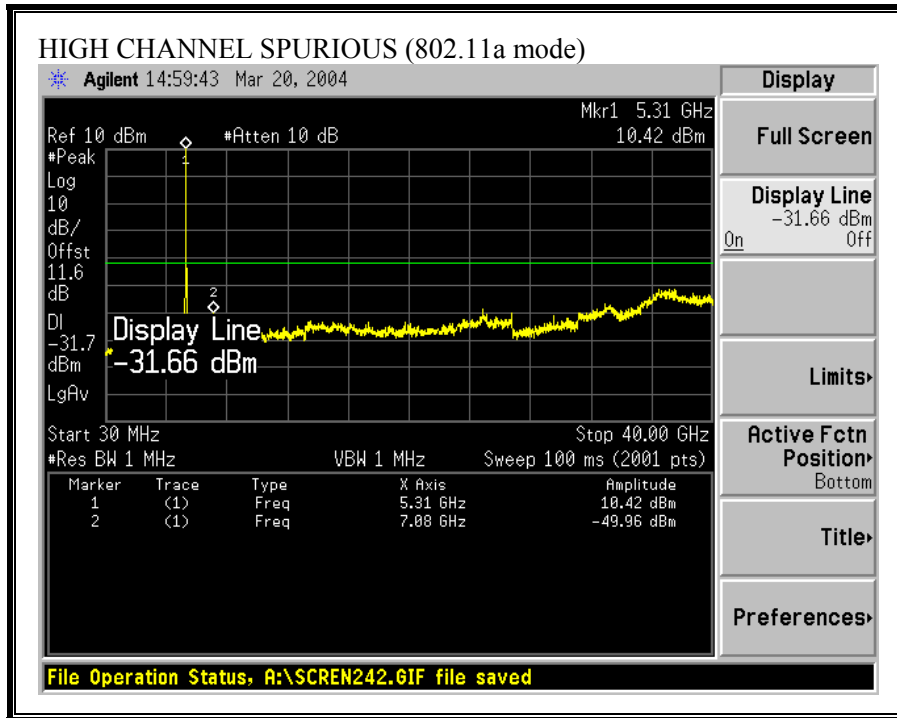
No non-compliance noted:

SPURIOUS EMISSIONS (802.11a MODE)

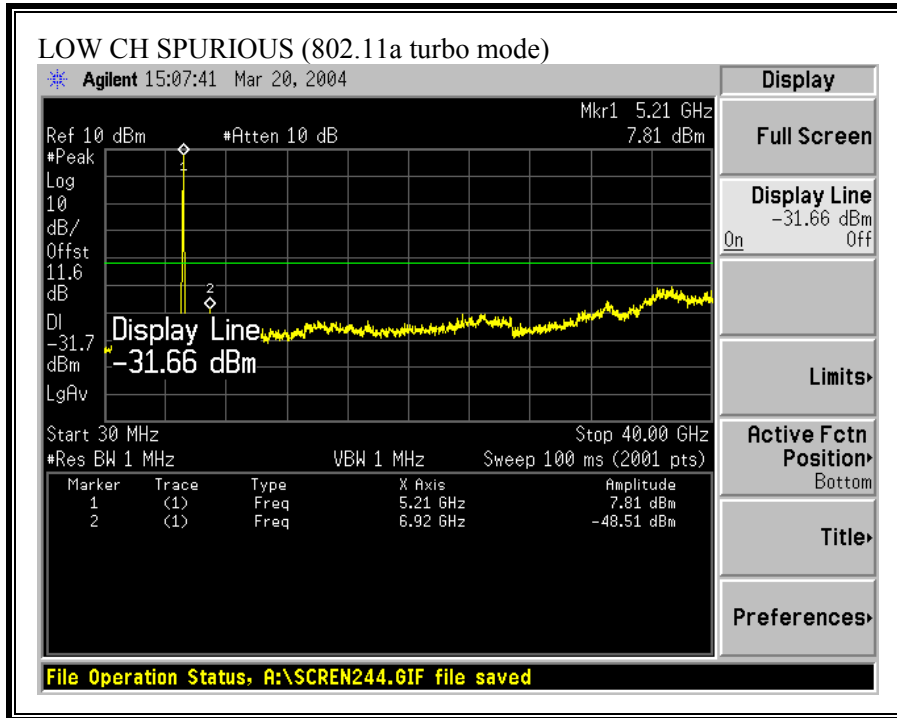


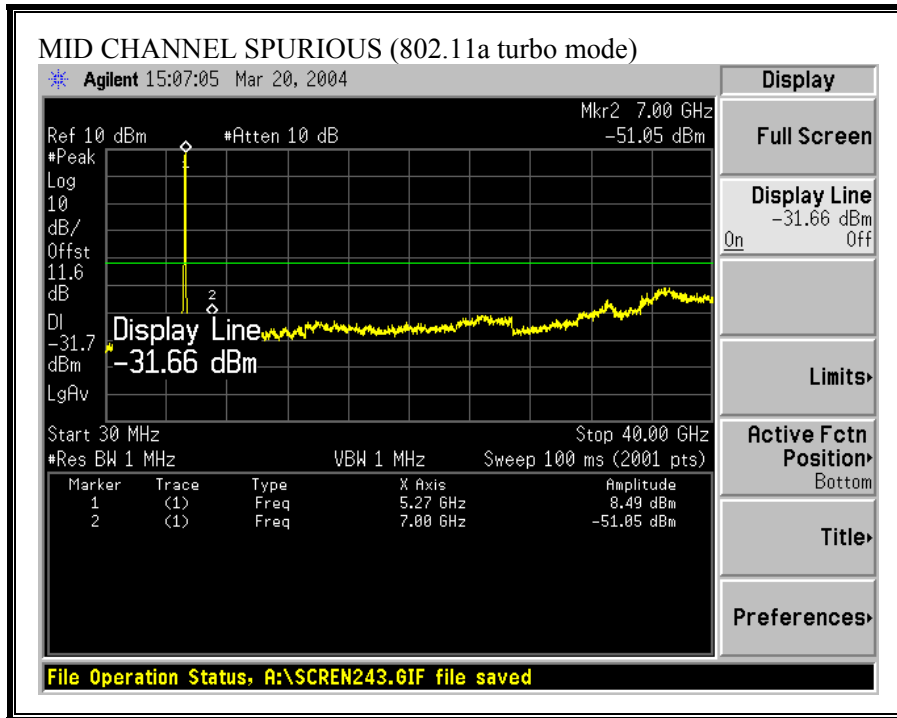


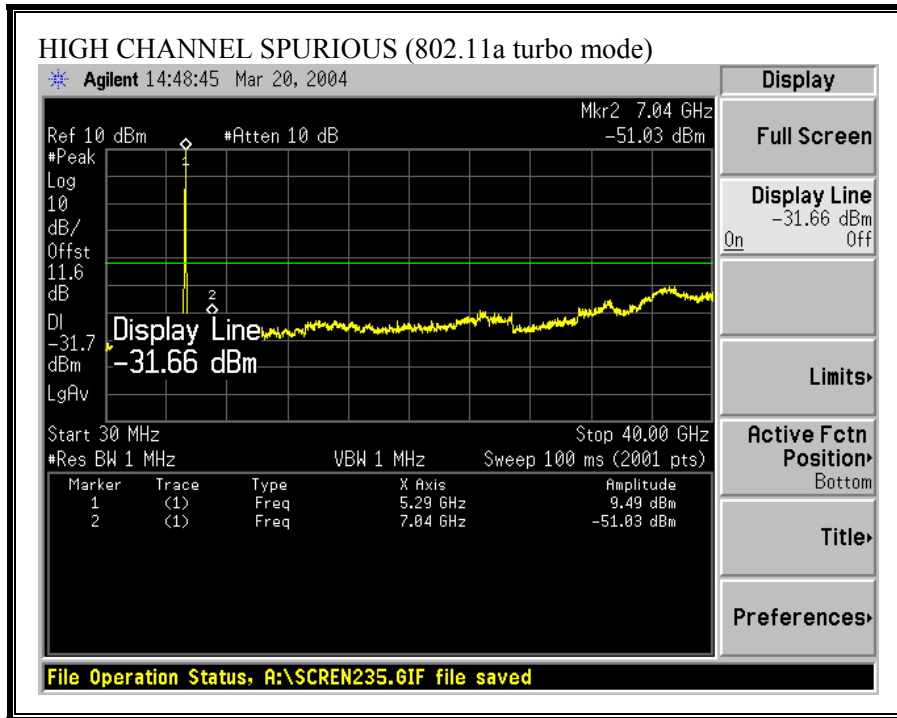




SPURIOUS EMISSIONS (802.11a TURBO MODE)







7.7. RADIATED EMISSIONS

7.7.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

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

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

² Above 38.6

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

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

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

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

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

TEST PROCEDURE

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

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

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

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

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.

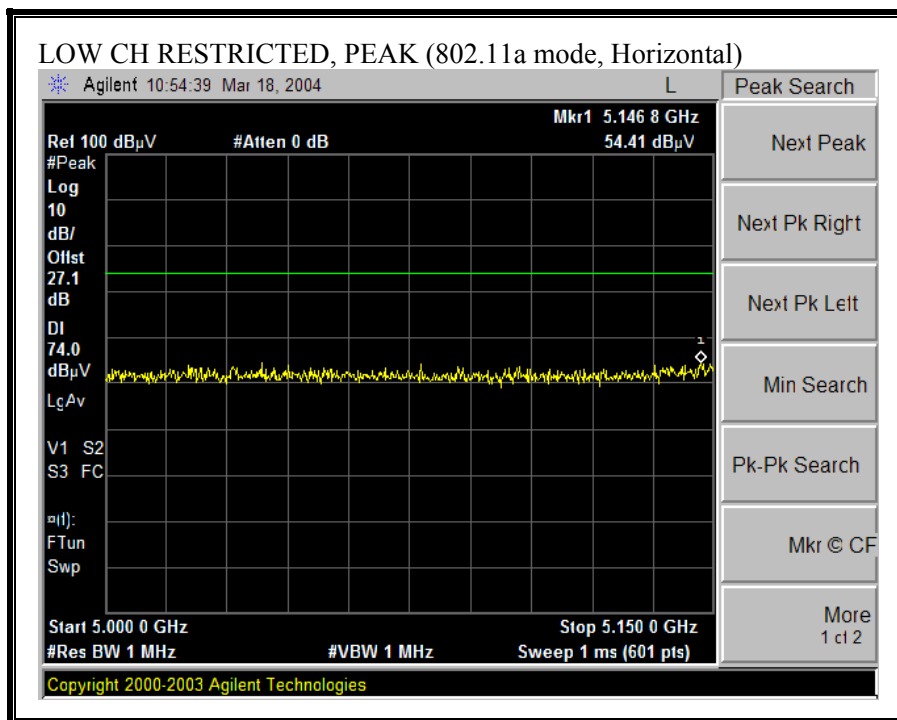
For measurements above 1 GHz, the EUT were tested with both laptop and portable position. For the portable position, the worst case were investigated between X, Y, and Z axis. The tests were performed at the worst-case position.

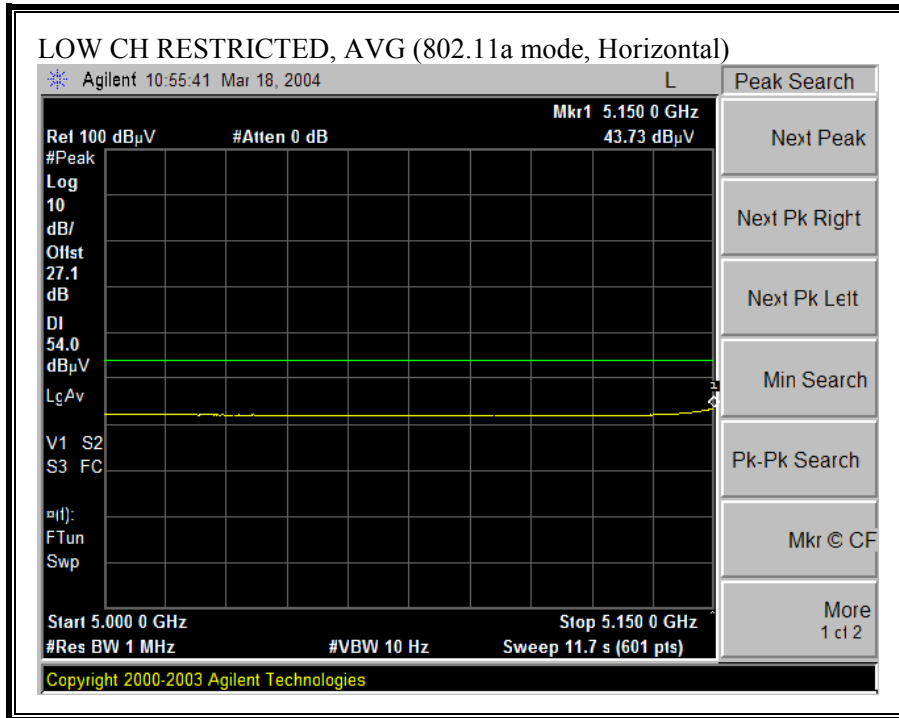
RESULTS

No non-compliance noted:

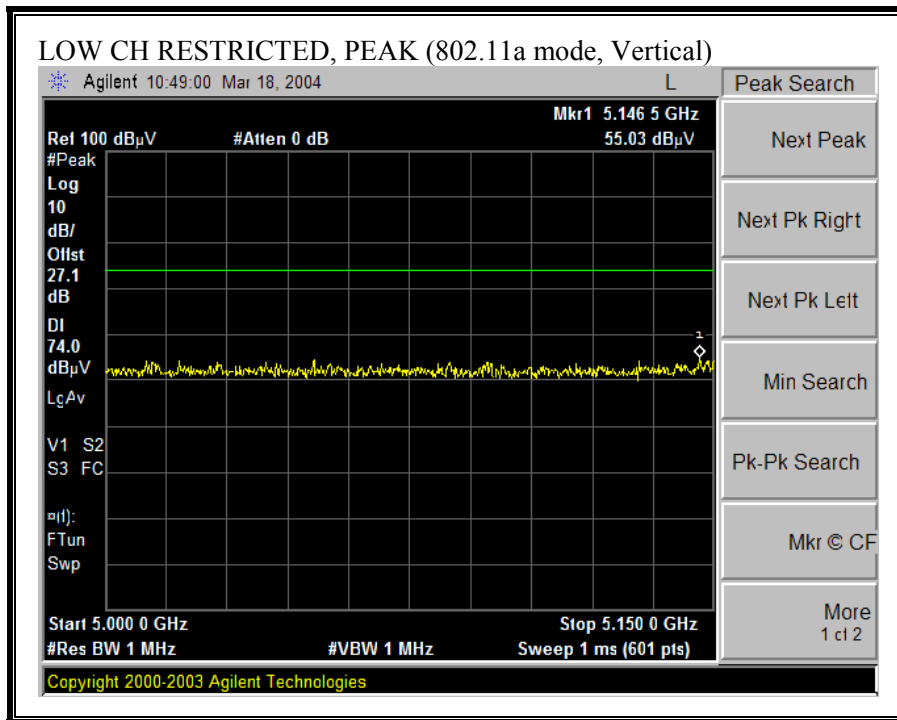
7.7.2. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ WITH HIGHEST GAIN ANTENNA (TIAN01), MOBILE LAPTOP CONFIGURATION

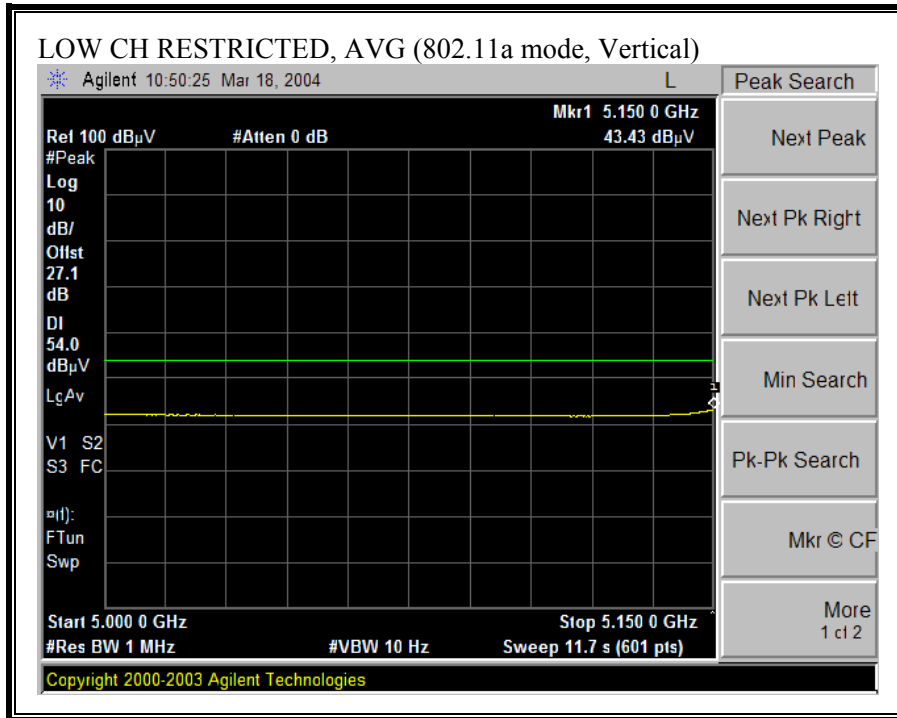
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)



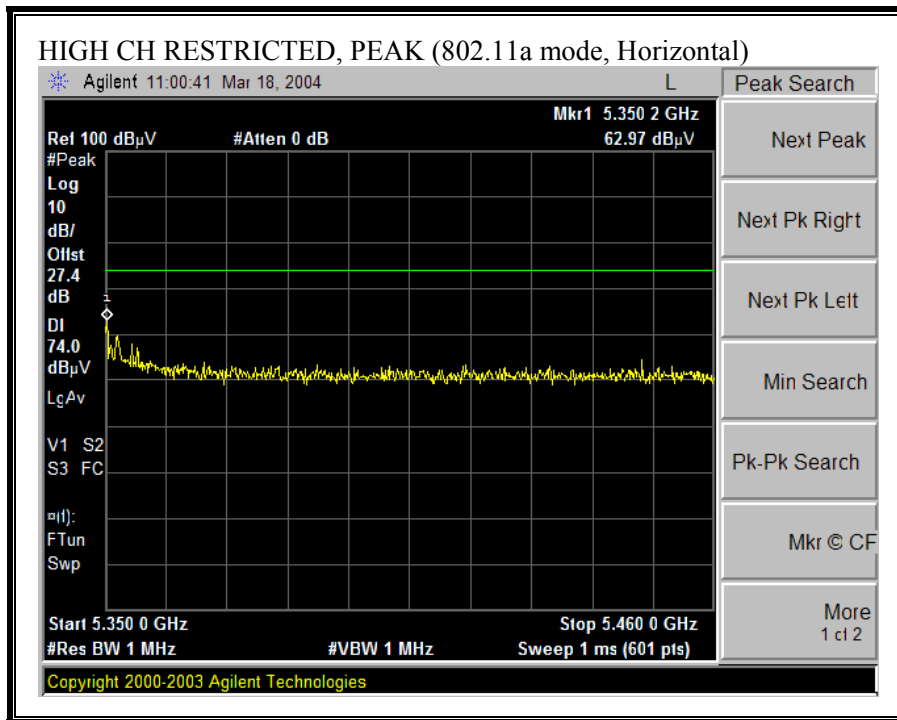


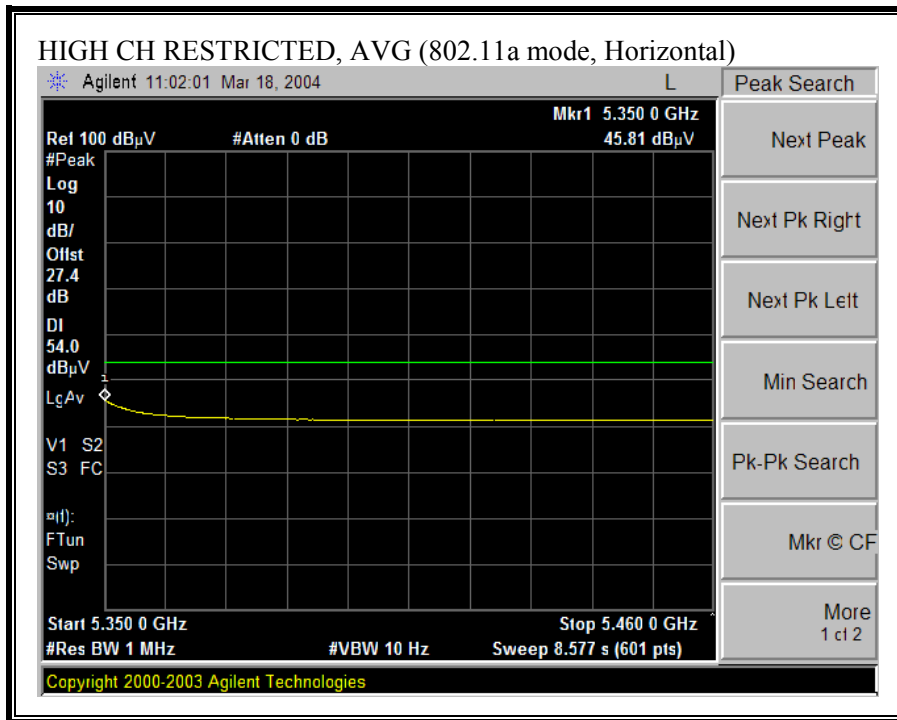
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)



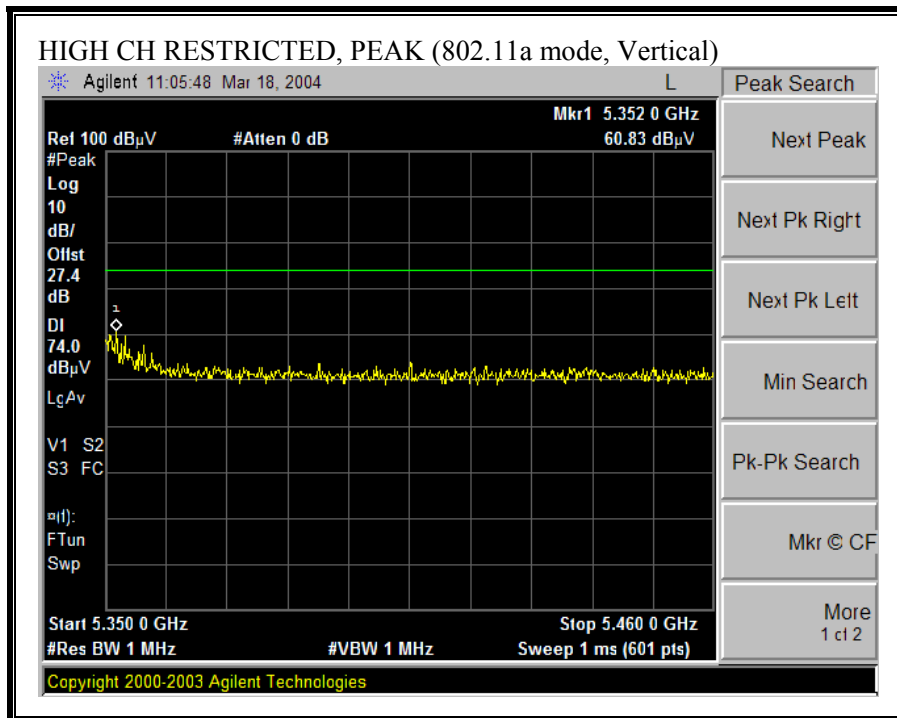


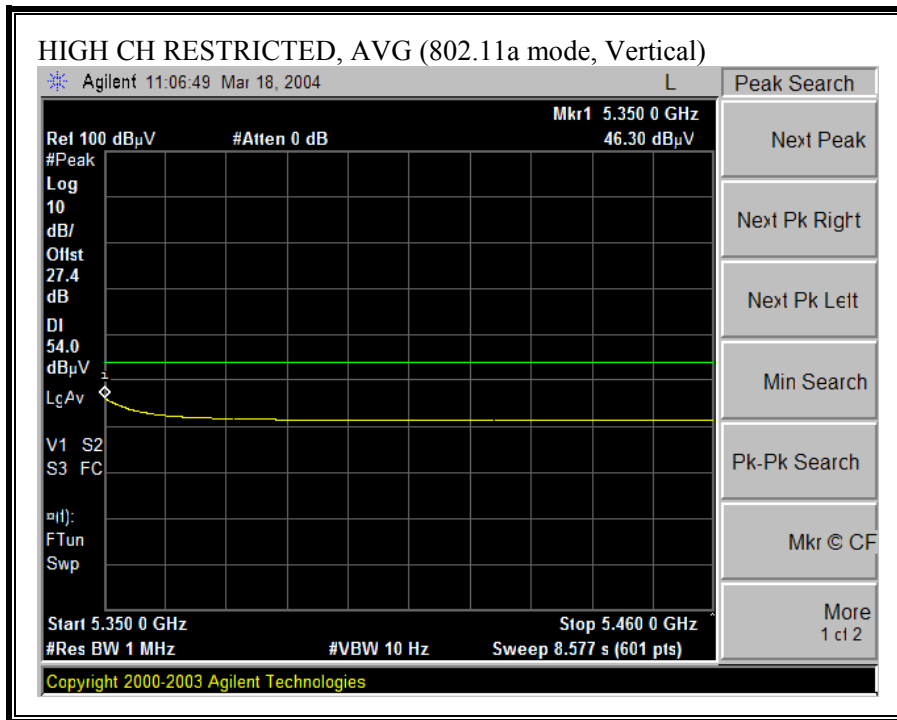
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

03/18/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2470
Company: Toshiba
EUT Descrip.: Wireless mini PCI card
EUT M/N: MB44
Test Target: Harmonics of 5.2 GHz channels
Mode Oper: laptop position, transmit mode. TIAN antenna installed.

Test Equipment:

EMCO Horn 1-18GHz T60; S/N: 2238 @3m	Spectrum Analyzer Agilent E4446A Analyzer	Pre-amplifier 1-26GHz T63 Miteq 646456	Pre-amplifier 26-40GHz	Horn > 18GHz T117; ARA 18-26GHz; S/N:1013
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Hi Frequency Cables
 (2 ft) (2.0 ft) (3 ft) (12 ft)

Limit: FCC 15.205

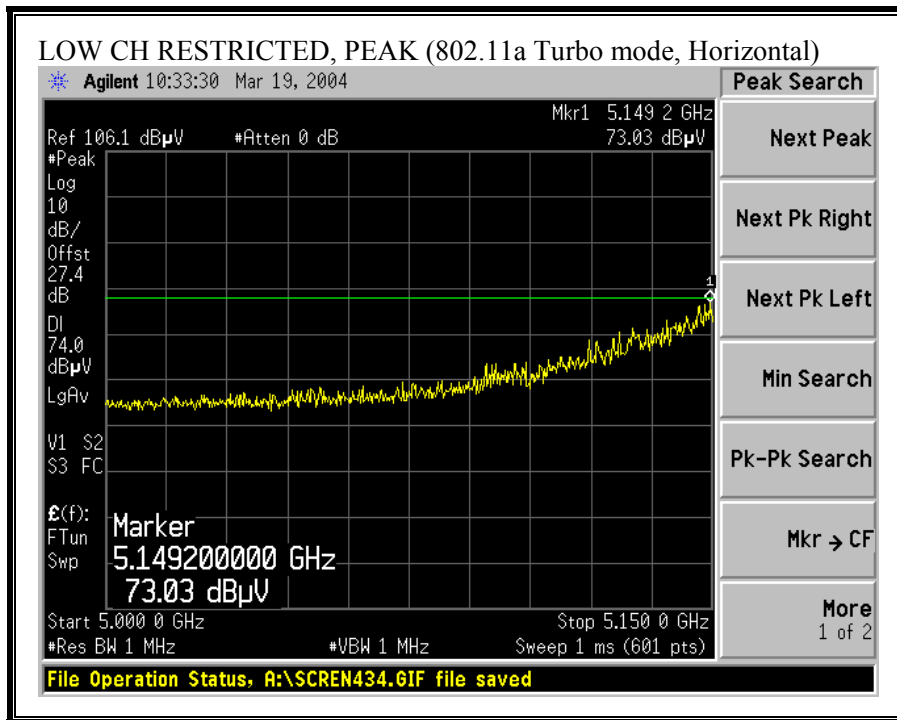
Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

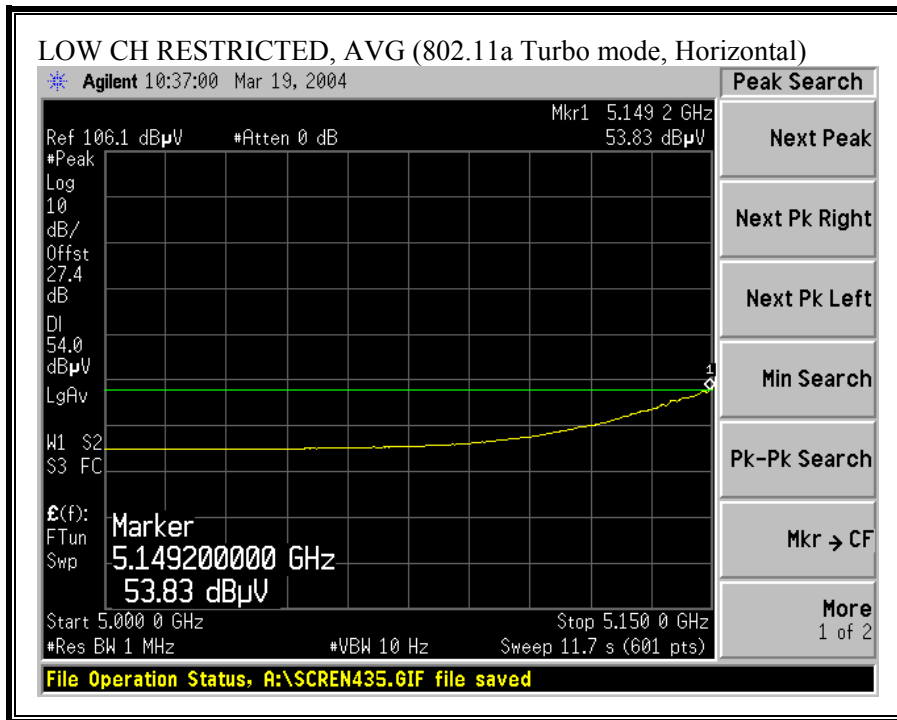
Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

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
11a 5180 Channel															
15.540	9.8	47.0	35.8	39.4	5.8	-40.0	0.0	1.0	53.0	41.8	74.0	54.0	-21.0	-12.2	V
15.540	9.8	45.2	34.3	39.4	5.8	-40.0	0.0	1.0	51.2	40.3	74.0	54.0	-22.8	-13.7	H
20.720	3.3	45.1	34.5	33.7	7.0	-38.3	-9.5	1.0	39.0	28.4	74.0	54.0	-35.0	-25.6	V
20.720	3.3	51.3	39.3	33.7	7.0	-38.3	-9.5	1.0	45.2	33.2	74.0	54.0	-28.8	-20.8	H
11a 5240 Channel															
15.780	9.8	46.8	35.5	38.7	5.8	-40.0	0.0	1.0	52.3	41.0	74.0	54.0	-21.7	-13.0	V
15.780	9.8	44.6	33.2	38.7	5.8	-40.0	0.0	1.0	50.1	38.7	74.0	54.0	-23.9	-15.3	H
20.960	3.3	49.2	38.5	33.8	7.0	-38.1	-9.5	1.0	43.4	32.7	74.0	54.0	-30.6	-21.3	V
20.960	3.3	54.4	42.1	33.8	7.0	-38.1	-9.5	1.0	48.6	36.3	74.0	54.0	-25.4	-17.7	H
11a 5260 Channel															
15.780	9.8	47.9	37.5	38.7	5.8	-40.0	0.0	1.0	53.4	43.0	74.0	54.0	-20.6	-11.0	V
15.780	9.8	47.1	36.0	38.7	5.8	-40.0	0.0	1.0	52.6	41.5	74.0	54.0	-21.4	-12.5	H
21.040	3.3	51.1	39.0	33.8	7.0	-38.2	-9.5	1.0	45.3	33.2	74.0	54.0	-28.7	-20.8	V
21.040	3.3	53.4	42.4	33.8	7.0	-38.2	-9.5	1.0	47.6	36.6	74.0	54.0	-26.4	-17.4	H
11a 5320 Channel															
10.640	9.8	44.7	33.6	38.2	4.5	-33.5	0.0	1.0	54.9	43.8	74.0	54.0	-19.1	-10.2	V
15.960	9.8	49.6	38.6	38.3	5.9	-40.0	0.0	1.0	54.7	43.7	74.0	54.0	-19.3	-10.3	V
10.640	9.8	44.9	33.0	38.2	4.5	-33.5	0.0	1.0	55.1	43.2	74.0	54.0	-18.9	-10.8	H
15.960	9.8	48.0	36.4	38.3	5.9	-40.0	0.0	1.0	53.1	41.5	74.0	54.0	-20.9	-12.5	H

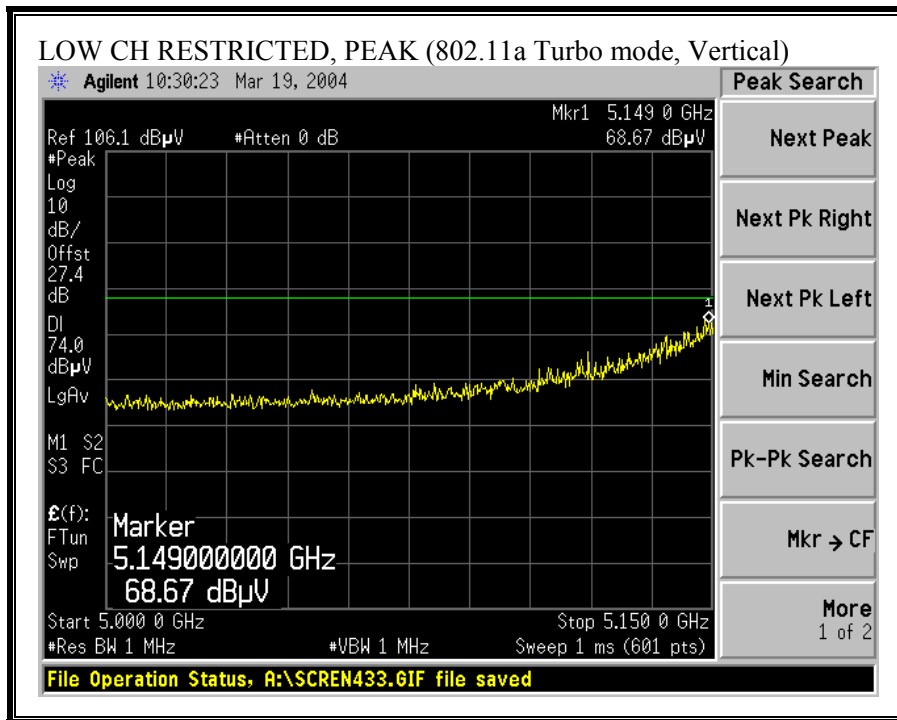
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

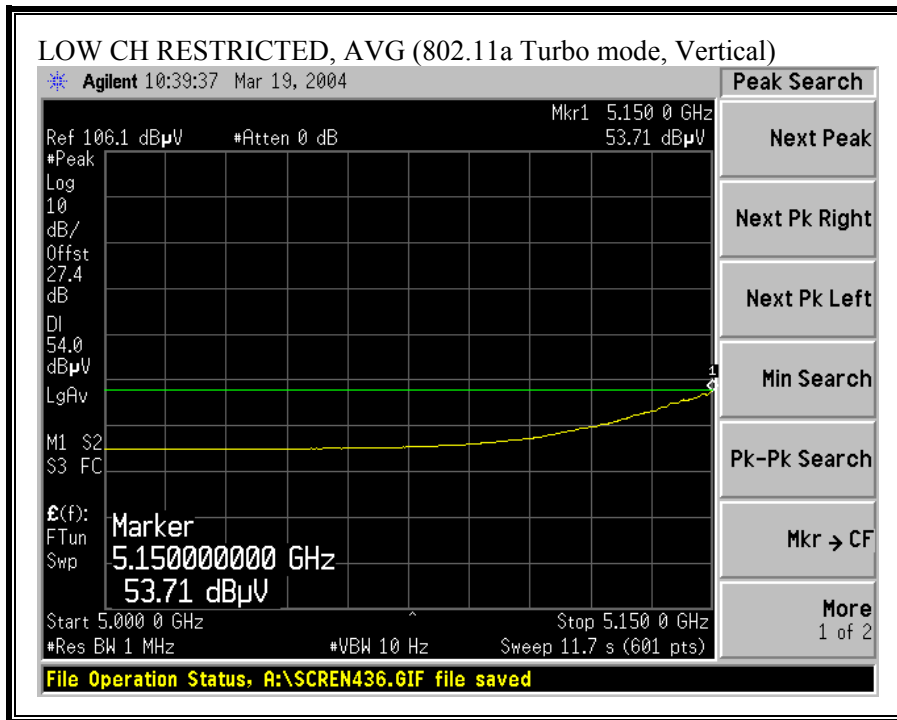
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, HORIZONTAL)



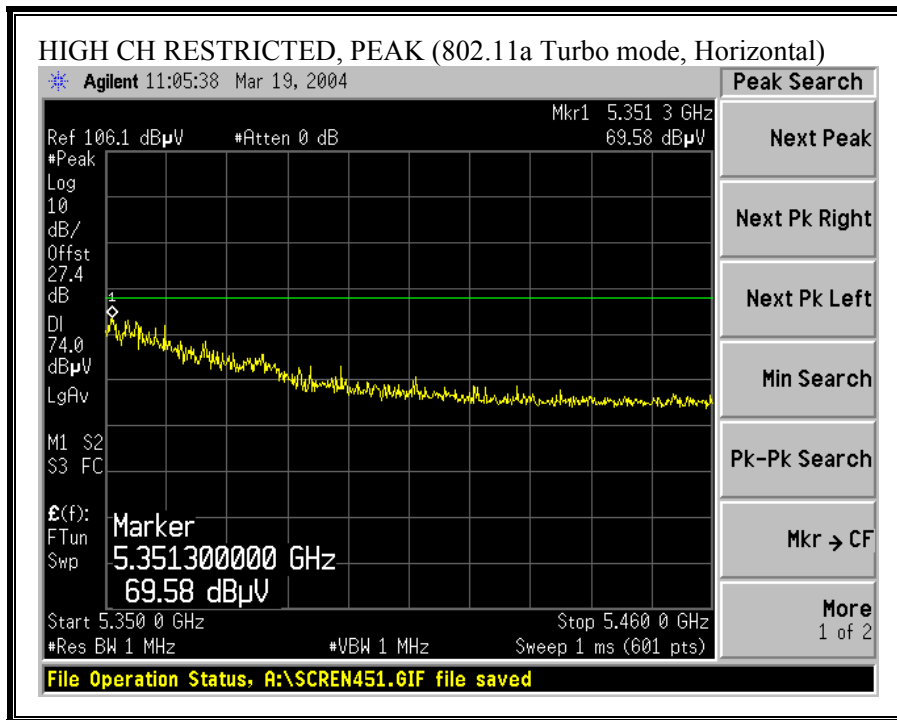


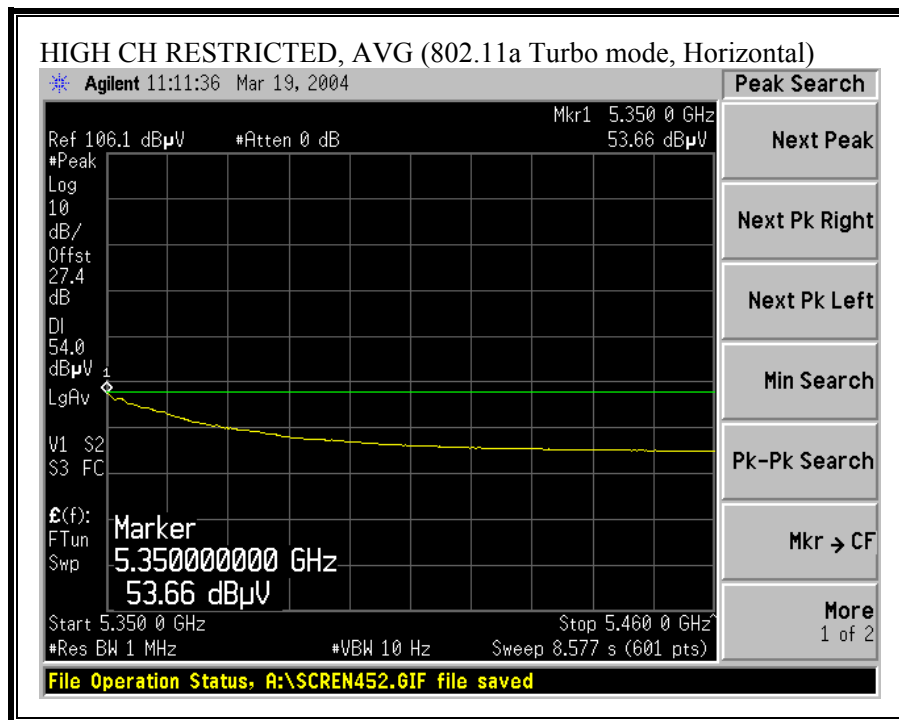
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, VERTICAL)



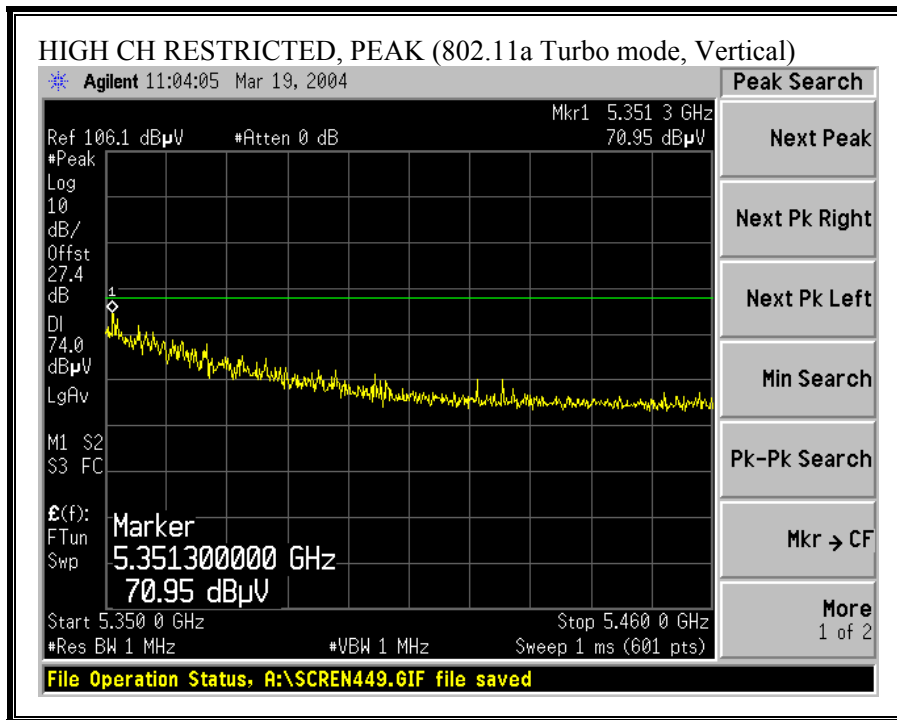


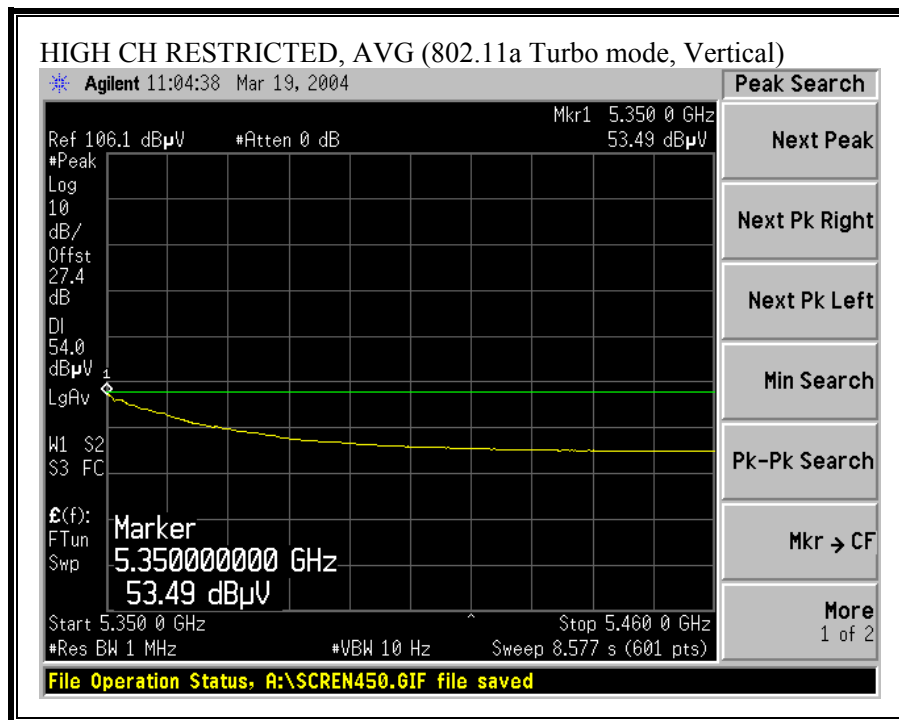
RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS 802.11a (TURBO MODE)

03/18/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2470
Company: Toshiba
EUT Descrip.: Wireless mini PCI card
EUT M/N: MB44
Test Target: Harmonics of 5.2 GHz channels; Turbo Mode
Mode Oper: laptop position, transmit mode. TIAN antenna installed.

Test Equipment:

EMCO Horn 1-18GHz: T60; S/N: 2238 @3m
 Spectrum Analyzer: Agilent E4446A Analyzer
 Pre-amplifier 1-26GHz: T63 Miteq 646456
 Pre-amplifier 26-40GHz: T88 Miteq 16-40GHz
 Horn > 18GHz: T117; ARA 18-26GHz; S/N:1013

Hi Frequency Cables: (2 ft) (2.0 ft) (3 ft) (12 ft)

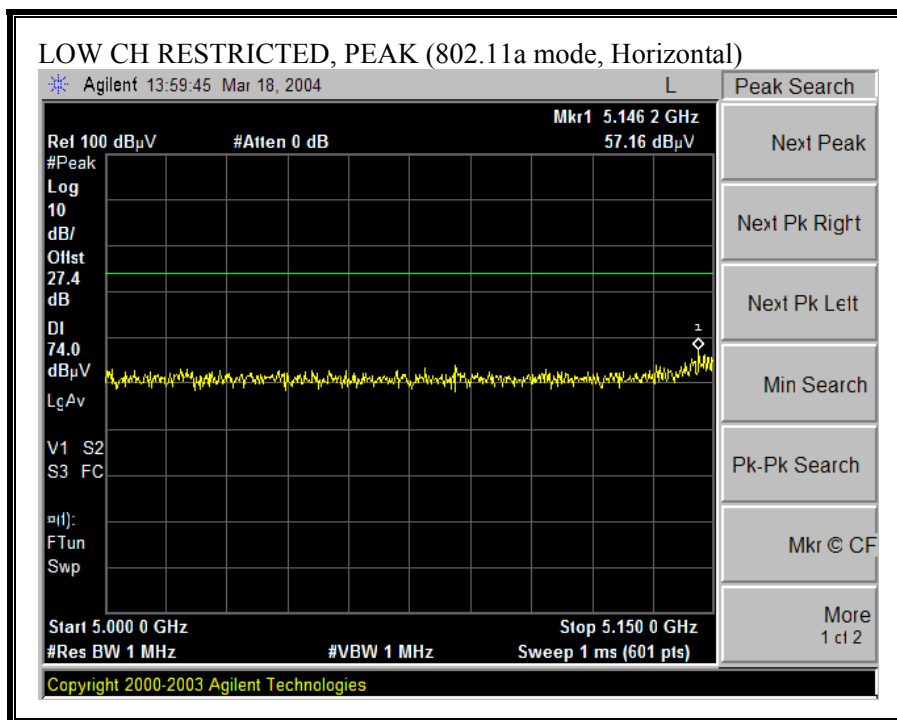
Limit:
 Peak Measurements: 1 MHz Resolution Bandwidth, 1MHz Video Bandwidth
 Average Measurements: 1 MHz Resolution Bandwidth, 10Hz Video Bandwidth

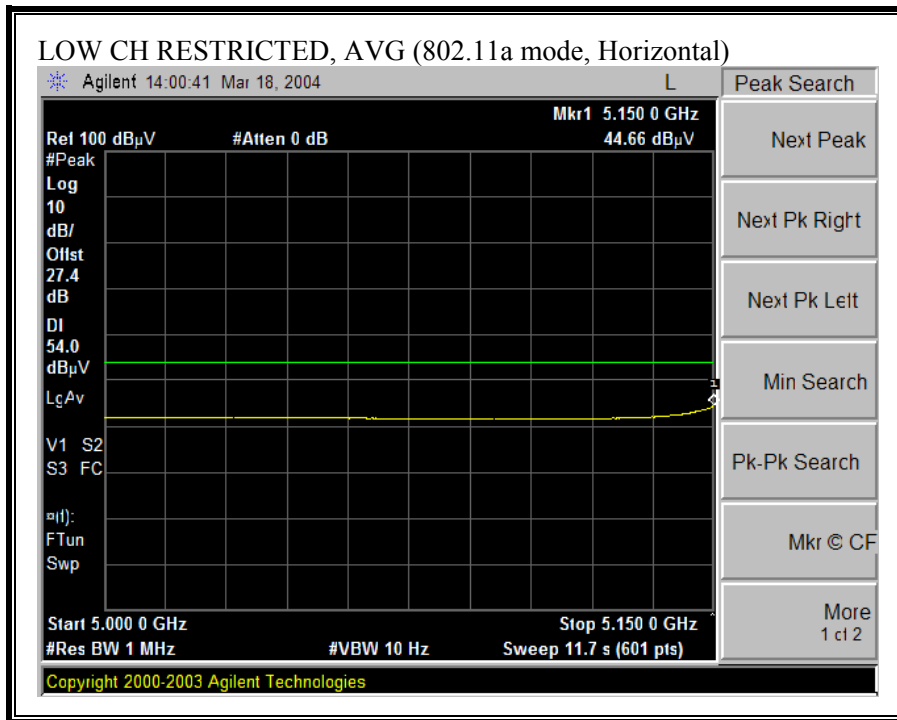
f GHz	Dist feet	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes
11a 5200 Channel, turbo mode															
15.600	9.8	45.8	34.4	39.2	5.8	-40.0	0.0	1.0	51.7	40.3	74.0	54.0	-22.3	-13.7	V
15.600	9.8	44.7	33.4	39.2	5.8	-40.0	0.0	1.0	50.6	39.3	74.0	54.0	-23.4	-14.7	H
20.800	3.3	46.0	35.0	33.8	7.0	-38.2	-9.5	1.0	40.0	29.0	74.0	54.0	-34.0	-25.0	V
20.800	3.3	52.0	39.9	33.8	7.0	-38.2	-9.5	1.0	46.0	33.9	74.0	54.0	-28.0	-20.1	H
11a 5250 Channel, turbo mode															
15.750	9.8	47.5	37.1	38.8	5.8	-40.0	0.0	1.0	53.1	42.7	74.0	54.0	-20.9	-11.3	V
15.750	9.8	44.9	34.1	38.8	5.8	-40.0	0.0	1.0	50.5	39.7	74.0	54.0	-23.5	-14.3	H
21.000	3.3	46.7	35.6	33.8	7.0	-38.1	-9.5	1.0	41.0	29.9	74.0	54.0	-33.0	-24.1	H
21.000	3.3	52.6	40.5	33.8	7.0	-38.1	-9.5	1.0	46.9	34.8	74.0	54.0	-27.1	-19.2	H
11a 5290 Channel, turbo mode															
15.870	9.8	48.6	37.5	38.5	5.9	-40.0	0.0	1.0	53.9	42.8	74.0	54.0	-20.1	-11.2	V
15.870	9.8	45.4	34.9	38.5	5.9	-40.0	0.0	1.0	50.7	40.2	74.0	54.0	-23.3	-13.8	H
21.160	3.3	45.2	34.0	33.7	7.1	-38.3	-9.5	1.0	39.2	28.0	74.0	54.0	-34.8	-26.0	V
21.160	3.3	47.7	35.6	33.7	7.1	-38.3	-9.5	1.0	41.7	29.6	74.0	54.0	-32.3	-24.4	H

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

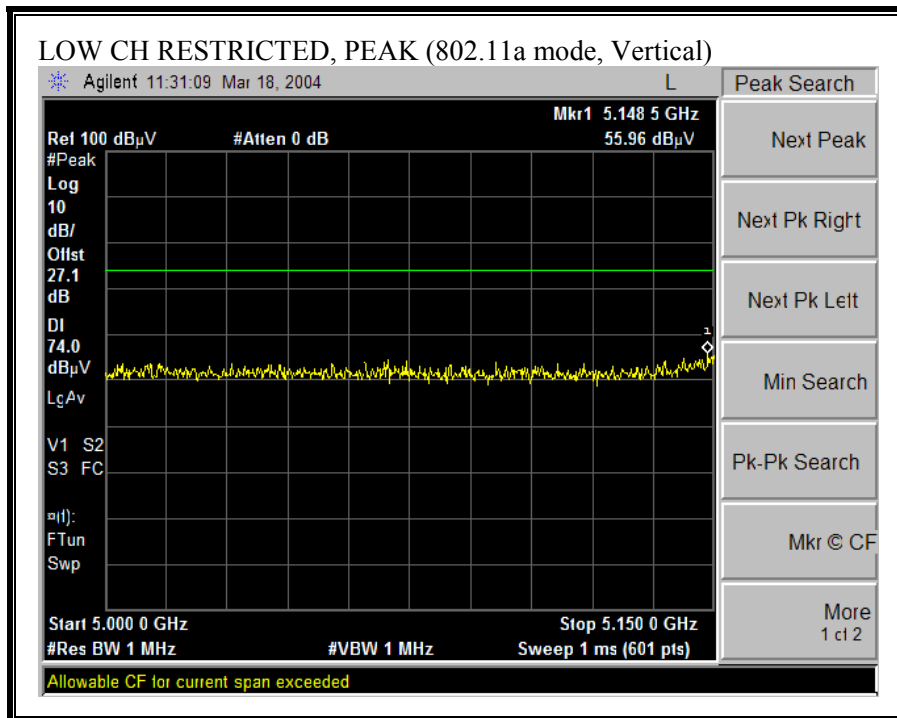
7.7.3. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ WITH HIGHEST GAIN ANTENNA (TIAN01), PORTABLE TABLET CONFIGURATION

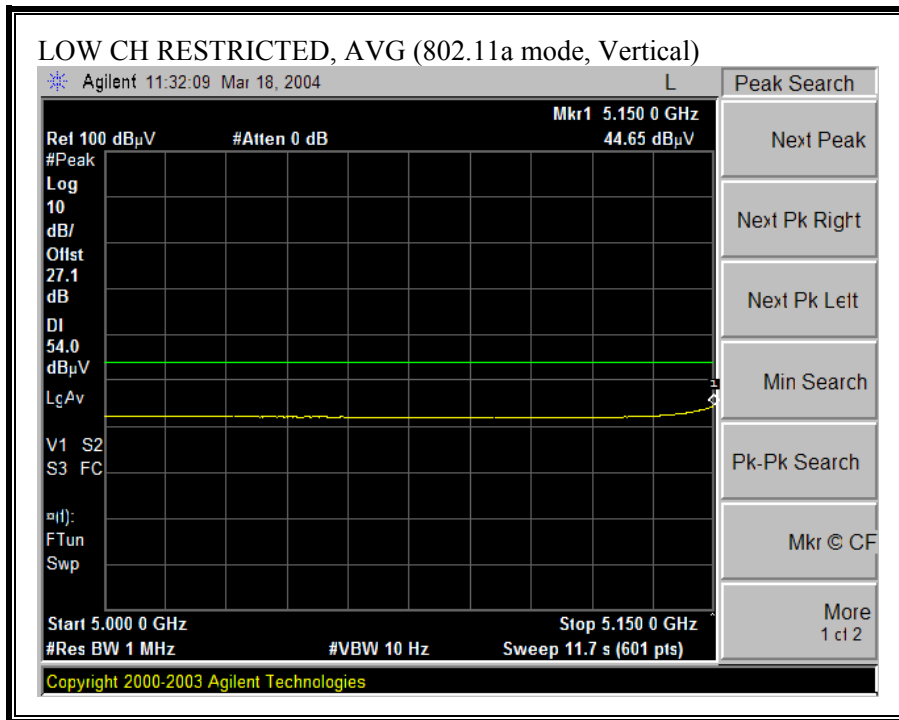
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)



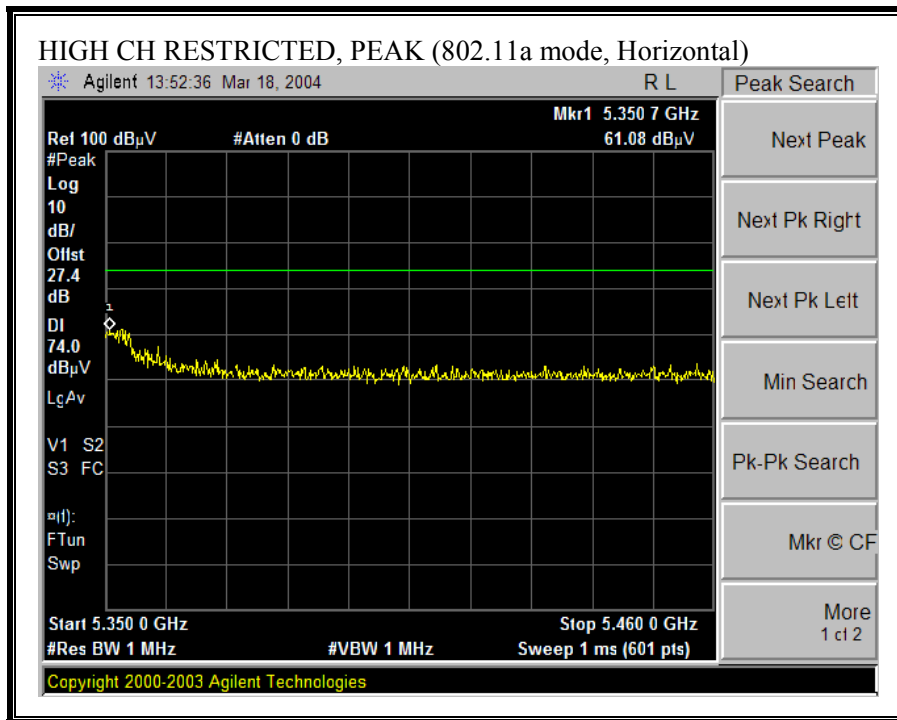


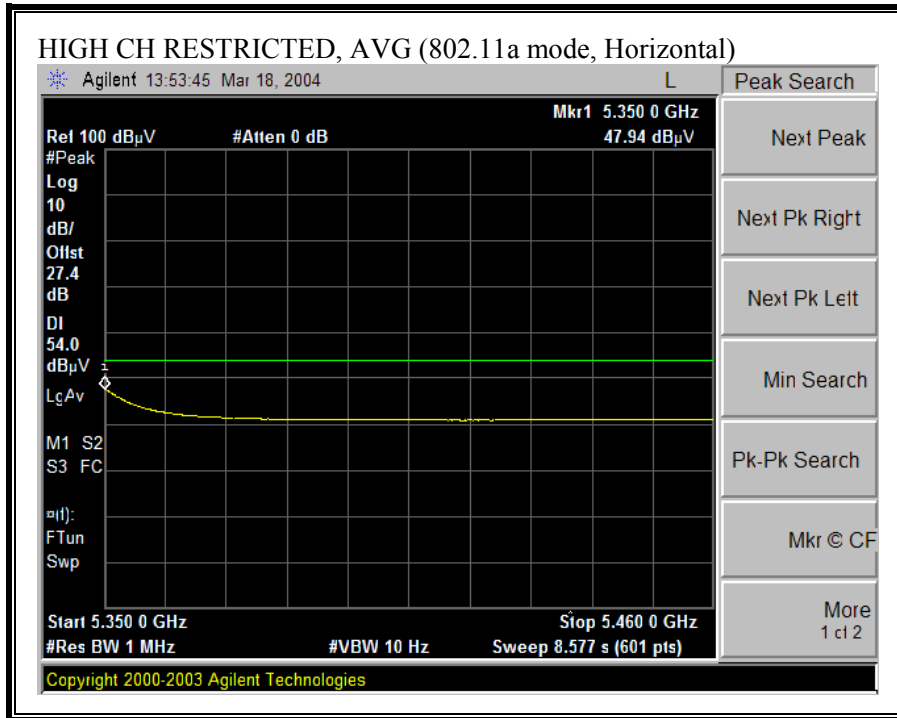
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)



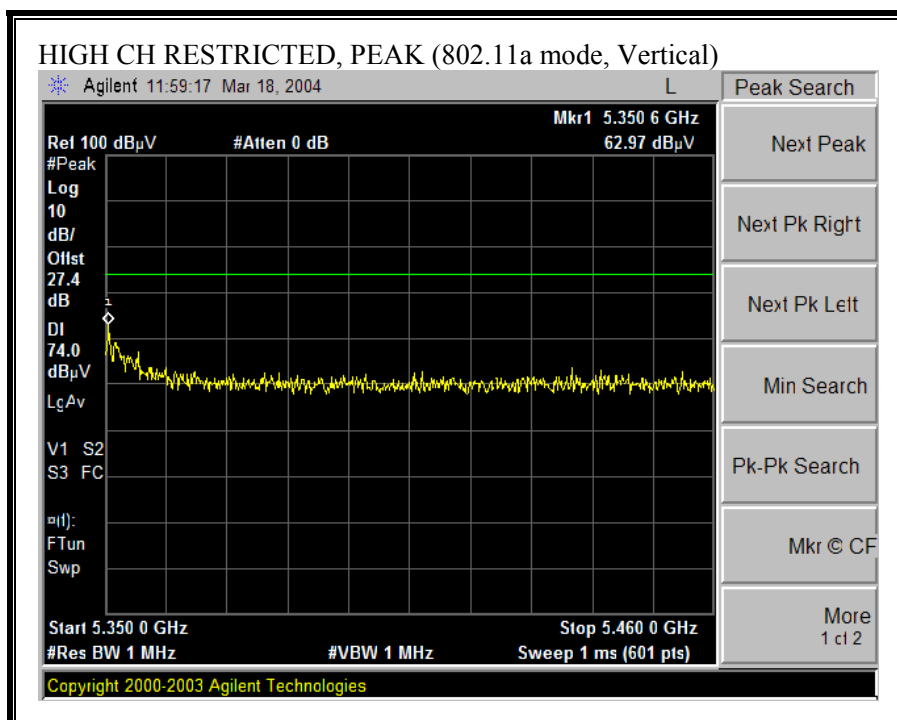


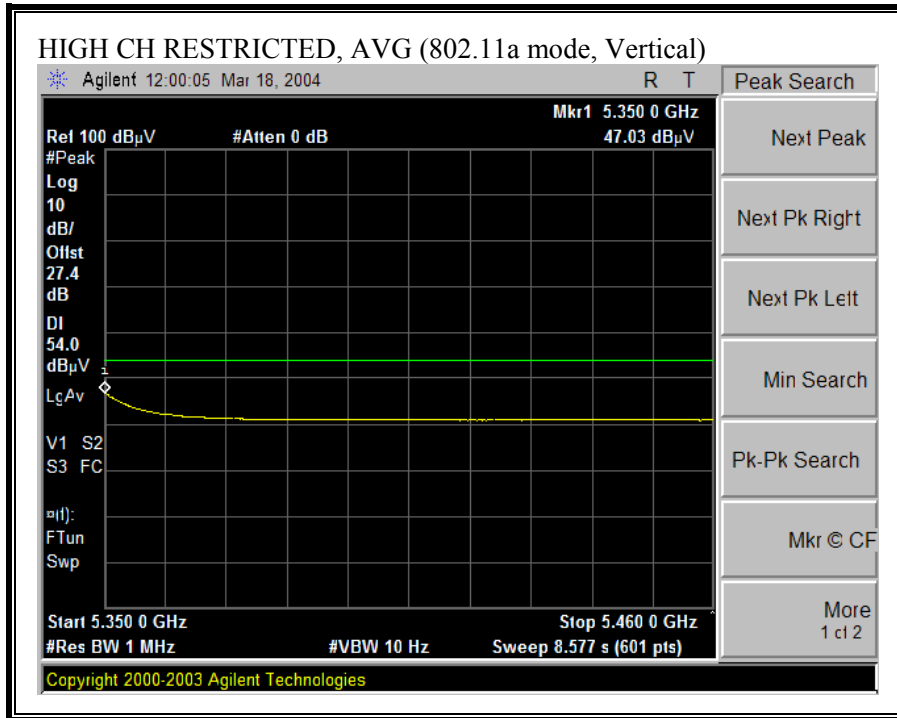
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

03/19/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2470
Company: Toshiba
EUT Descrip.: Wireless mini PCI card
EUT M/N: MB44
Test Target: Harmonics of 5.2 GHz channels
Mode Oper: portable worst case position, transmit mode. TIAN antenna installed.

Test Equipment:

EMCO Horn 1-18GHz
 T60; S/N: 2238 @3m

Spectrum Analyzer
 Agilent E4446A Analyzer

Pre-amplifier 1-26GHz
 T63 Miteq 646456

Pre-amplifier 26-40GHz

Horn > 18GHz

Hi Frequency Cables
 (2 ft) (2.0 ft) (3 ft) (12 ft)

Limit
 FCC 15.205

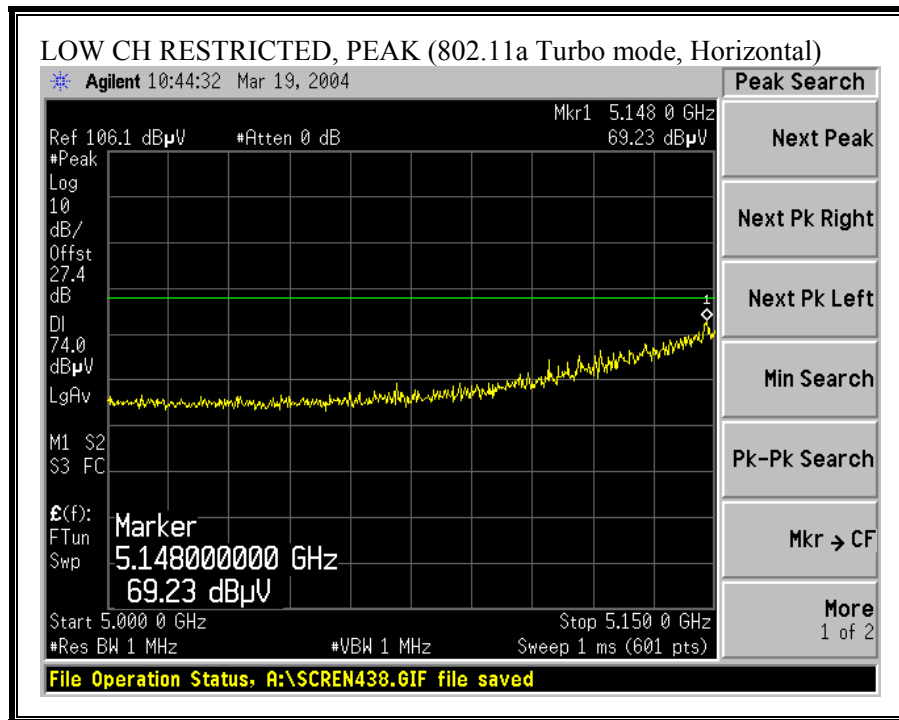
Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

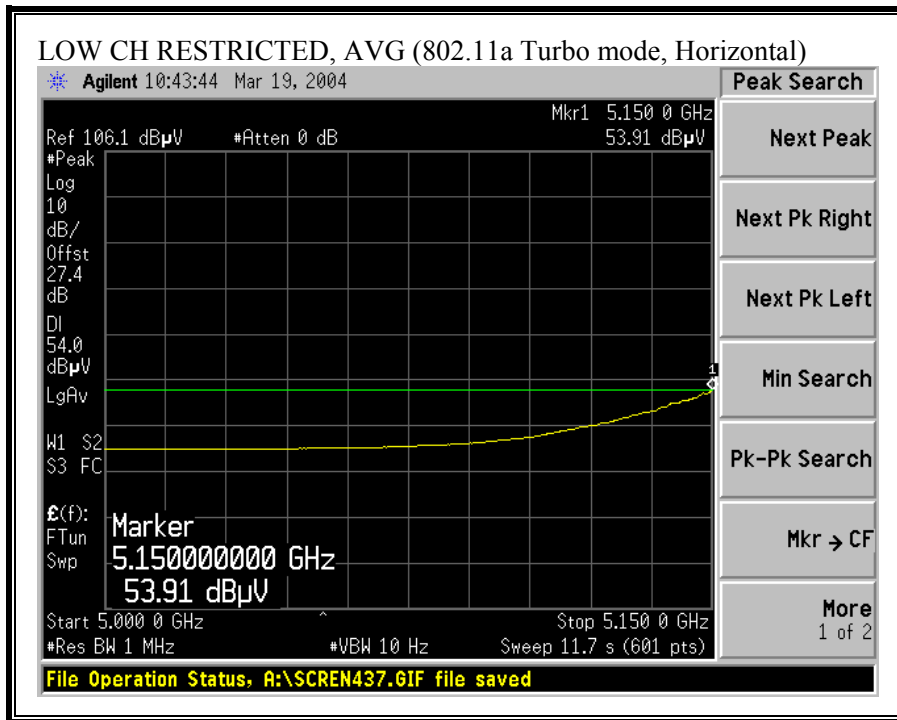
Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

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
11a 5180 Channel															
15.540	9.8	48.6	36.8	39.4	5.8	-40.0	0.0	1.0	54.6	42.8	74.0	54.0	-19.4	-11.2	V
15.540	9.8	47.1	38.2	39.4	5.8	-40.0	0.0	1.0	53.1	44.2	74.0	54.0	-20.9	-9.8	H
11a 5240 Channel															
15.720	9.8	49.1	37.2	38.9	5.8	-40.0	0.0	1.0	54.7	42.8	74.0	54.0	-19.3	-11.2	V
15.720	9.8	48.2	37.4	38.9	5.8	-40.0	0.0	1.0	53.8	43.0	74.0	54.0	-20.2	-11.0	H
11a 5260 Channel															
15.780	9.8	49.2	37.2	38.7	5.8	-40.0	0.0	1.0	54.7	42.7	74.0	54.0	-19.3	-11.3	V
15.780	9.8	48.0	36.6	38.7	5.8	-40.0	0.0	1.0	53.5	42.1	74.0	54.0	-20.5	-11.9	H
11a 5320 Channel															
10.640	9.8	48.5	36.6	38.2	4.5	-33.5	0.0	1.0	58.7	46.8	74.0	54.0	-15.3	-7.2	V
15.960	9.8	48.9	37.8	38.3	5.9	-40.0	0.0	1.0	54.0	42.9	74.0	54.0	-20.0	-11.1	V
10.640	9.8	47.6	35.6	38.2	4.5	-33.5	0.0	1.0	57.8	45.8	74.0	54.0	-16.2	-8.2	H
15.960	9.8	47.0	36.5	38.3	5.9	-40.0	0.0	1.0	52.1	41.6	74.0	54.0	-21.9	-12.4	H
								1.0							H
								1.0							H

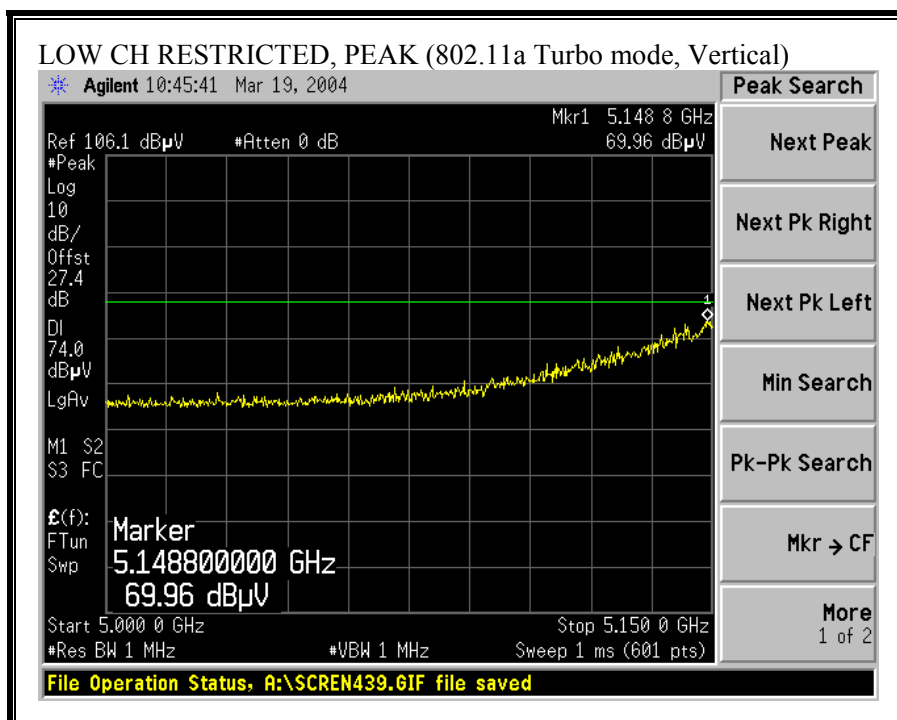
f Measurement Frequency
 Dist Distance to Antenna
 Read Analyzer Reading
 AF Antenna Factor
 CL Cable Loss
 Amp Preamp Gain
 D Corr Distance Correct to 3 meters
 Avg Average Field Strength @ 3 m
 Peak Calculated Peak Field Strength
 HPF High Pass Filter
 Avg Lim Average Field Strength Limit
 Pk Lim Peak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

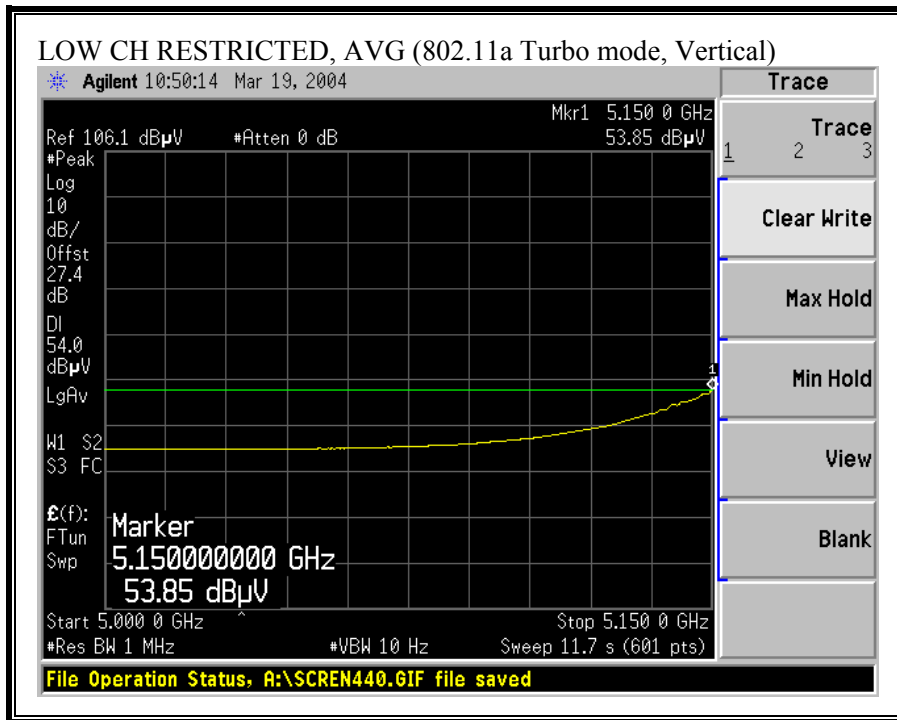
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, HORIZONTAL)



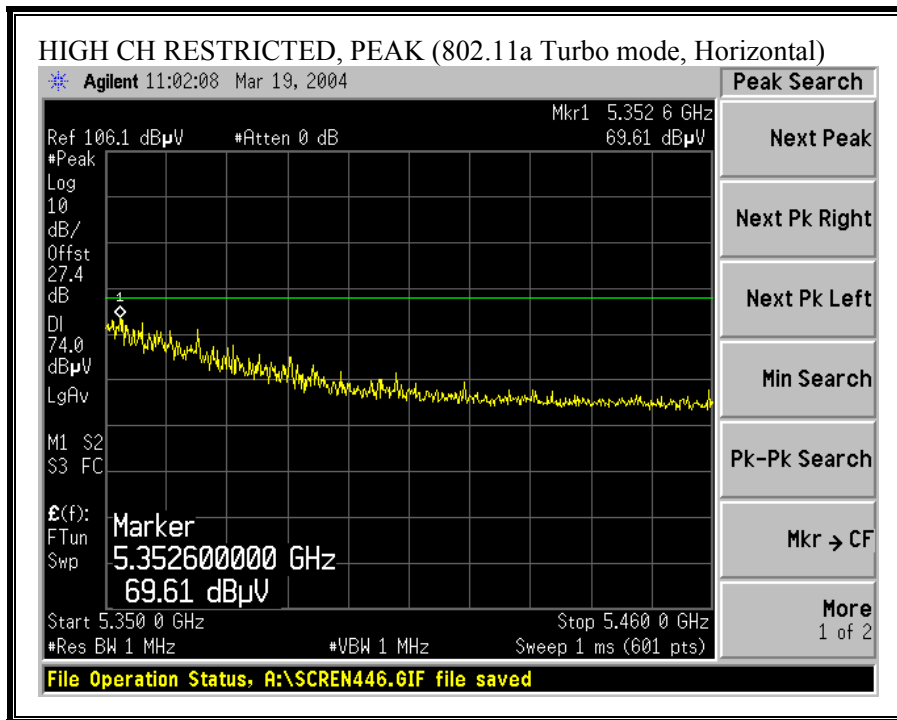


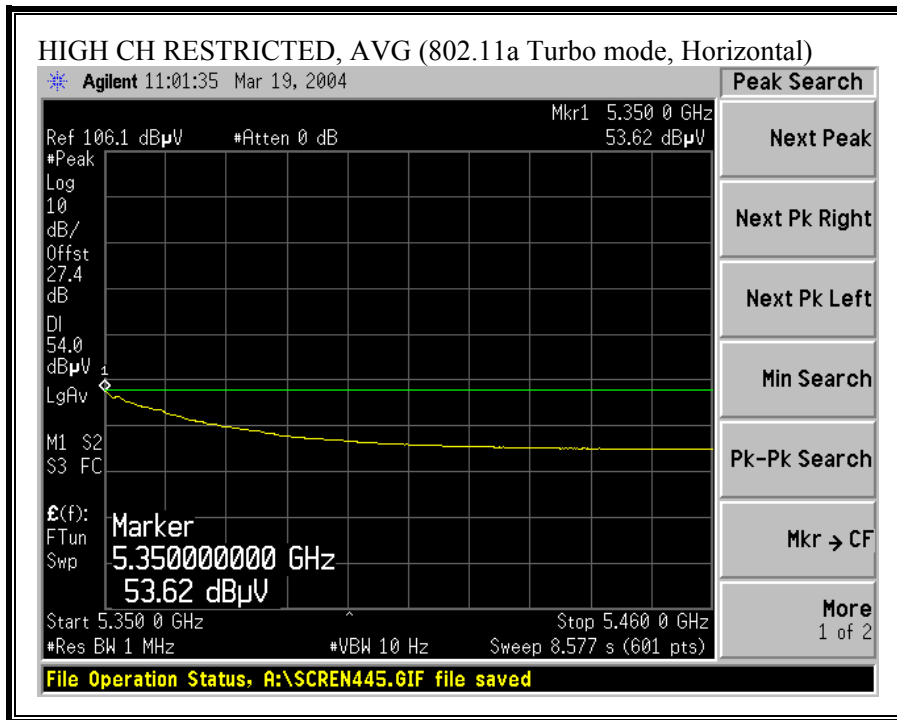
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, VERTICAL)



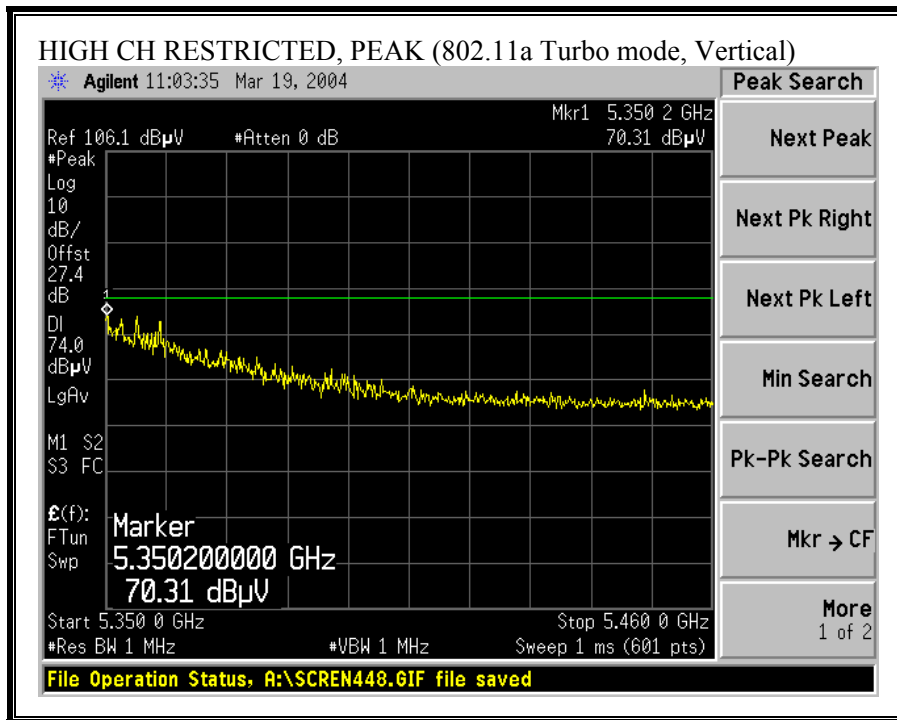


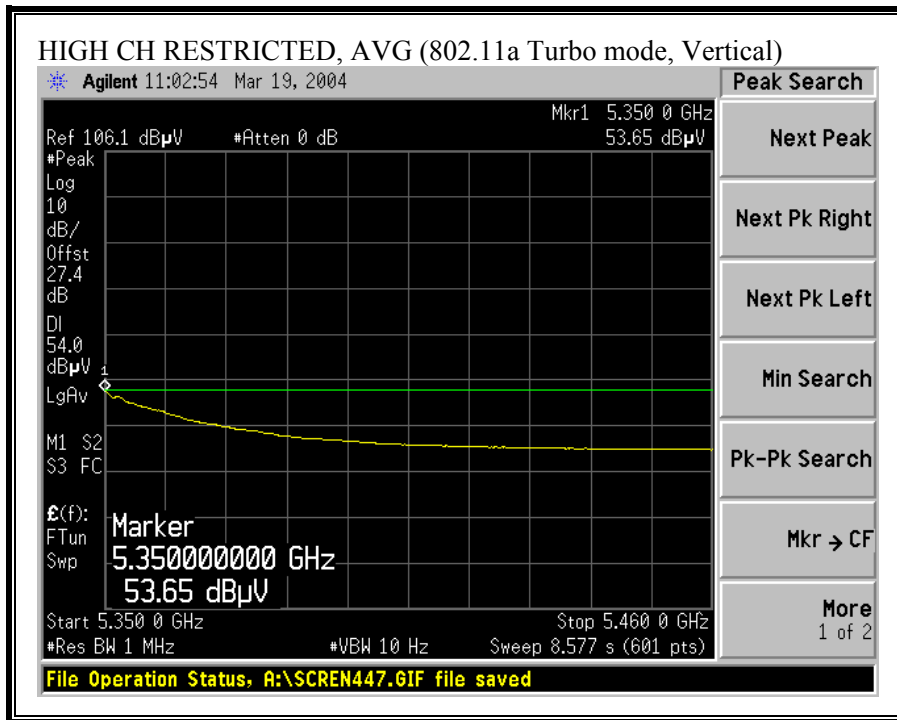
RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS 802.11a (TURBO MODE)

03/19/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2470
Company: Toshiba
EUT Descrip.: Wireless mini PCI card
EUT M/N: MB44
Test Target: Harmonics of 5.2 GHz channels
Mode Oper: portable worst case position, transmit mode. TIAN antenna installed.

Test Equipment:

EMCO Horn 1-18GHz T60; S/N: 2238 @3m	Spectrum Analyzer Agilent E4446A Analyzer	Pre-amplifier 1-26GHz T63 Miteq 646456	Pre-amplifier 26-40GHz	Horn > 18GHz
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Hi Frequency Cables
 (2 ft) (2.0 ft) (3 ft) (12 ft)

Limit: FCC 15.205

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
11a 5200 Channel, Turbo mode															
15.600	9.8	48.7	36.8	39.2	5.8	-40.0	0.0	1.0	54.6	42.7	74.0	54.0	-19.4	-11.3	V
15.600	9.8	47.4	35.4	39.2	5.8	-40.0	0.0	1.0	53.3	41.3	74.0	54.0	-20.7	-12.7	H
11a 5250 Channel, Turbo mode															
15.750	9.8	49.3	37.3	38.8	5.8	-40.0	0.0	1.0	54.9	42.9	74.0	54.0	-19.1	-11.1	V
15.750	9.8	48.5	36.0	38.8	5.8	-40.0	0.0	1.0	54.1	41.6	74.0	54.0	-19.9	-12.4	H
11a 5290 Channel, Turbo mode															
15.870	9.8	49.4	37.2	38.5	5.9	-40.0	0.0	1.0	54.7	42.5	74.0	54.0	-19.3	-11.5	V
15.870	9.8	48.7	36.3	38.5	5.9	-40.0	0.0	1.0	54.0	41.6	74.0	54.0	-20.0	-12.4	H
															H
															H

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

7.7.4. CO-LOCATED TRANSMITTER RADIATED EMISSIONS

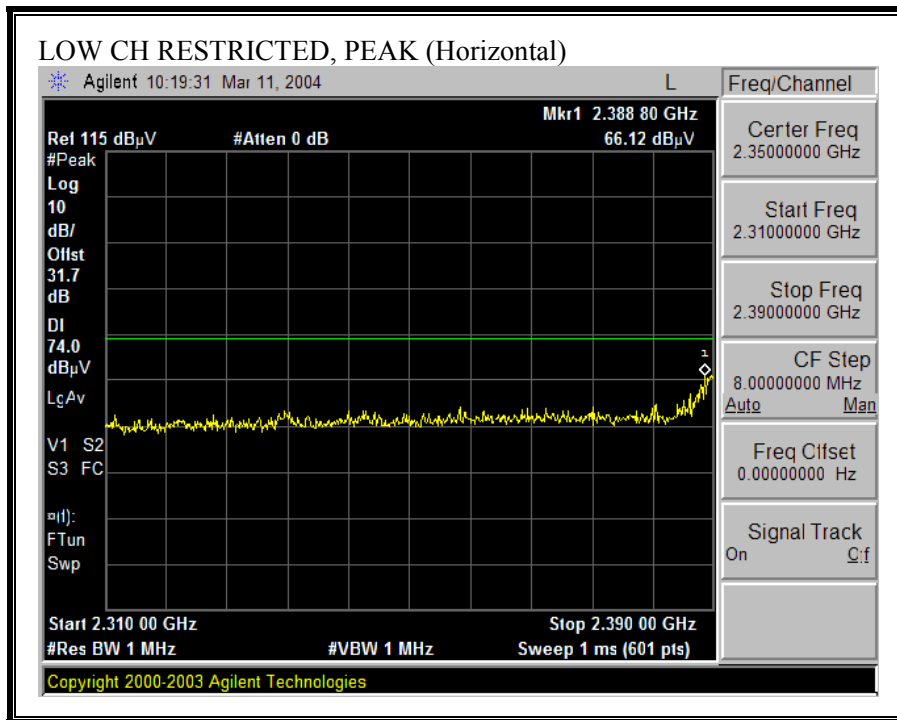
SUPPLEMENTAL TEST PROCEDURE

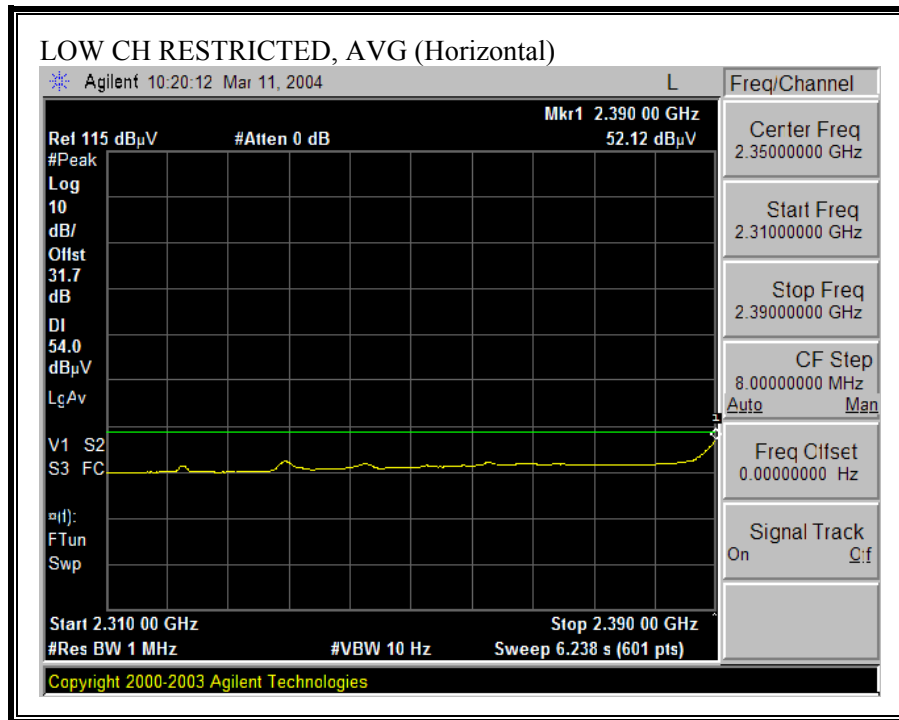
The EUT is placed on a non-conducting table 80 cm above the ground plane. The dominant transmitter is set to the worst case channel. The spurious emissions performance of the dominant transmitter is investigated as the settings of the non-dominant transmitter are varied. Worst case results are reported.

RESULTS

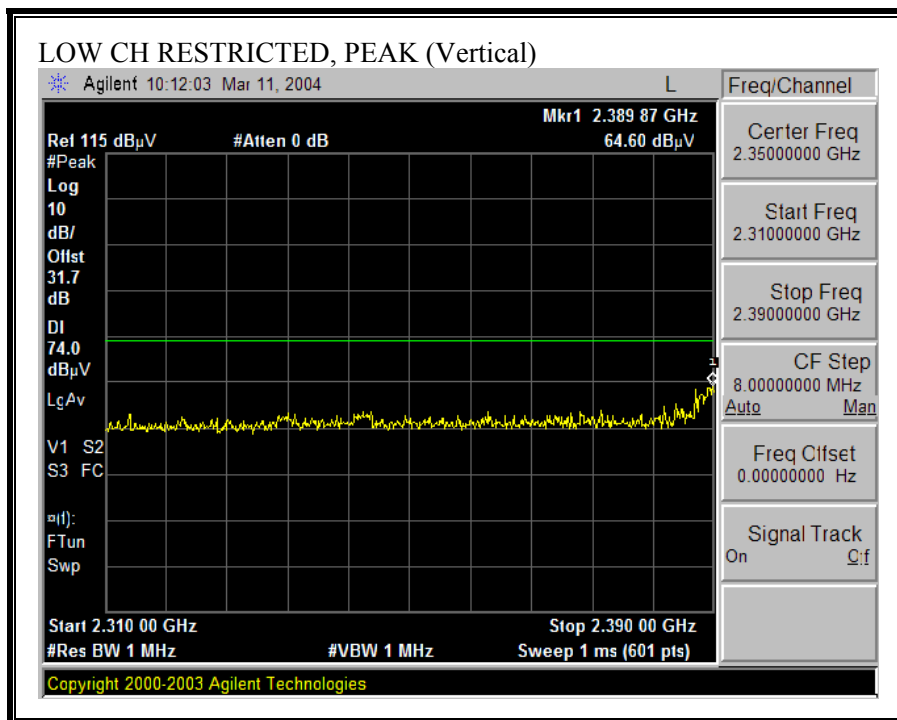
No non-compliance noted:

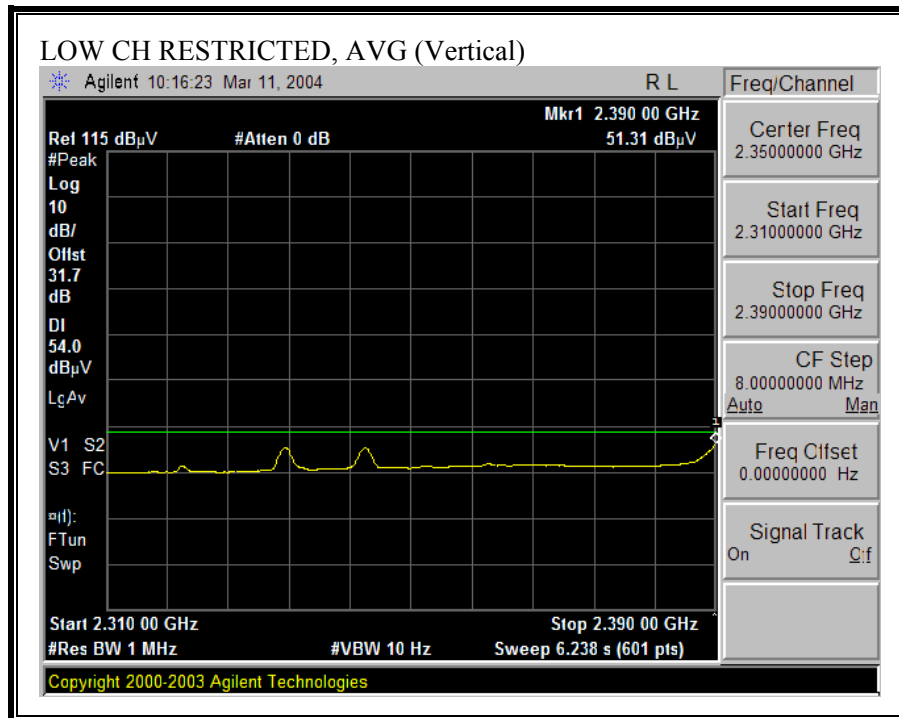
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



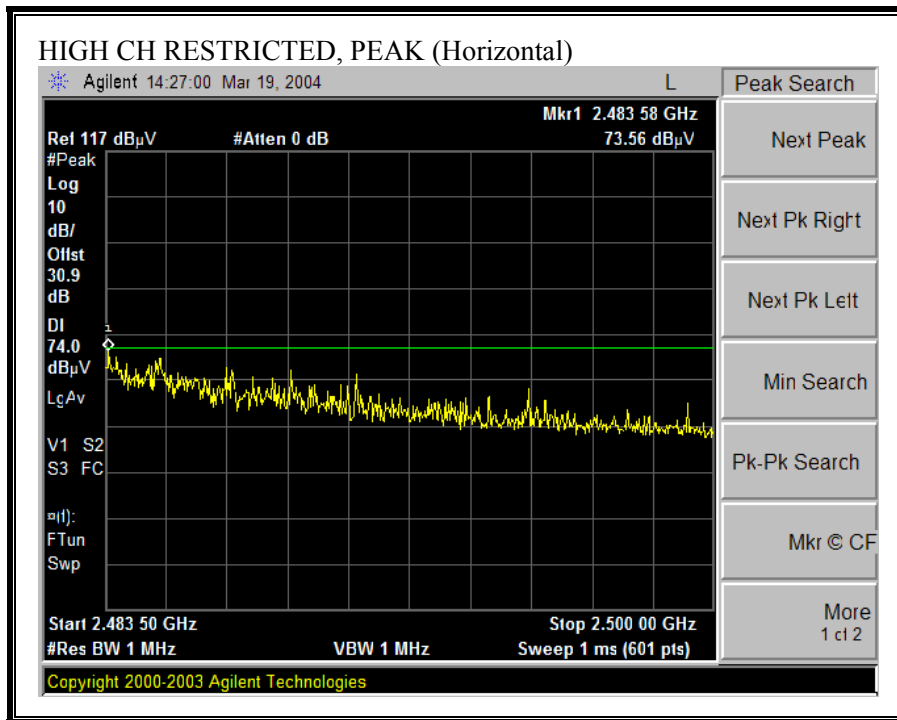


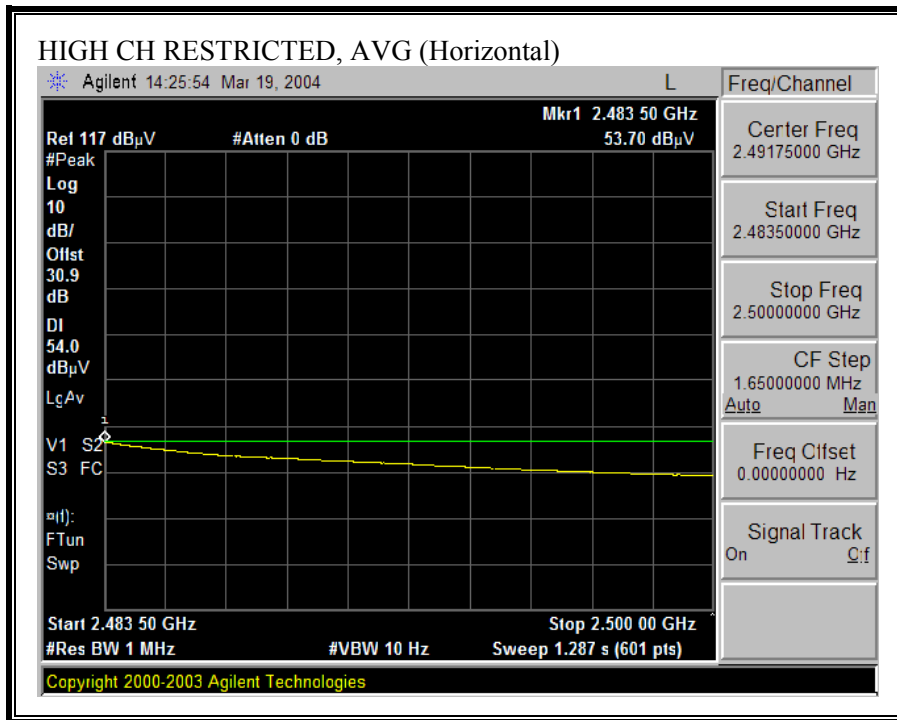
WORST-CASE RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



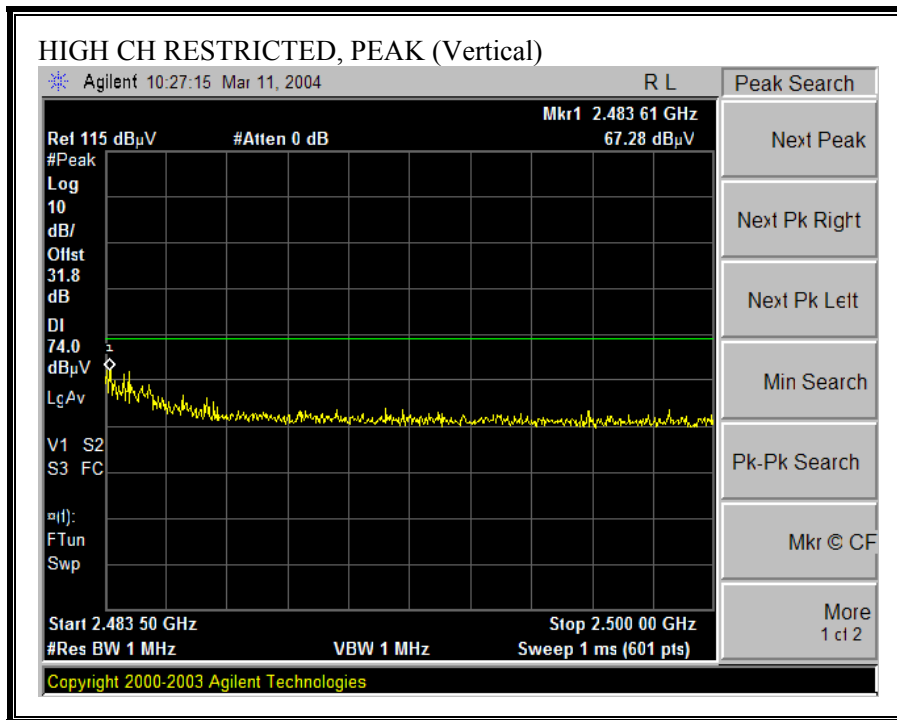


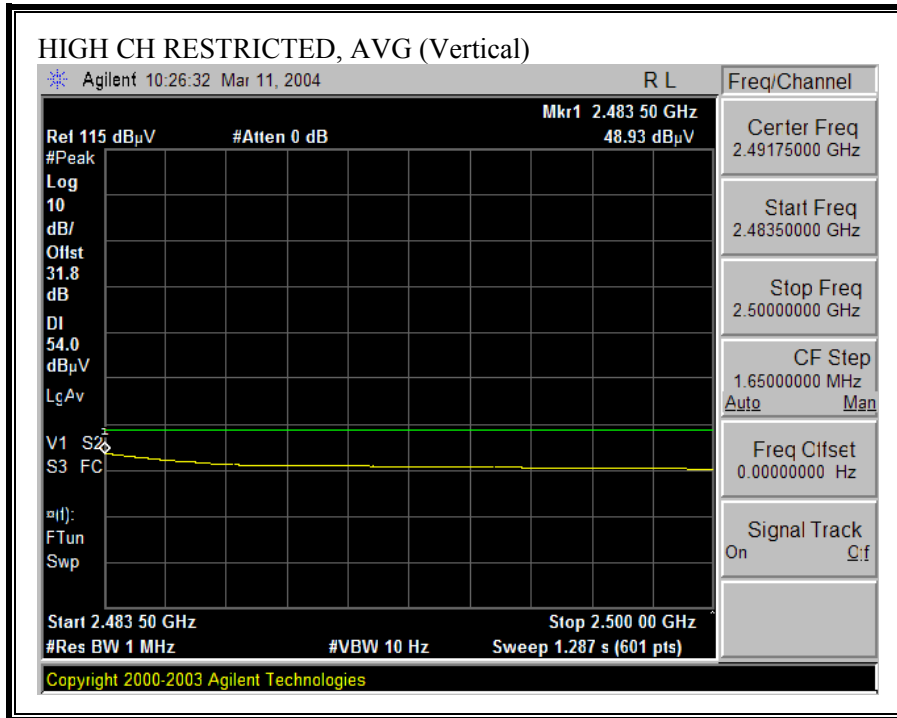
WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)





WORST-CASE RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)





WORST-CASE HARMONICS AND SPURIOUS EMISSIONS

03/12/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: VIEN TRAN
 Project #: 04U2470-1
 Company: TOSHIBA
 EUT Descrip.: MB44 IN NOTEBOOK PC
 EUT M/N: MB44
 Test Target: 15.247_CO-LOCATION_HARMONIC & SPUR
 Mode Oper: Tx_11g_MODE (2.4GHz)_HI CH

Test Equipment:

EMCO Horn 1-18GHz T60; S/N: 2238 @3m	Spectrum Analyzer Agilent E4446A Analyzer	Pre-amplifier 1-26GHz T63 Miteq 646456	Pre-amplifier 26-40GHz	Horn > 18GHz
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Hi Frequency Cables
 (2 ft) (2 ~ 3 ft) (4 ~ 6 ft) (12 ft)

Limit
 FCC 15.209

Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

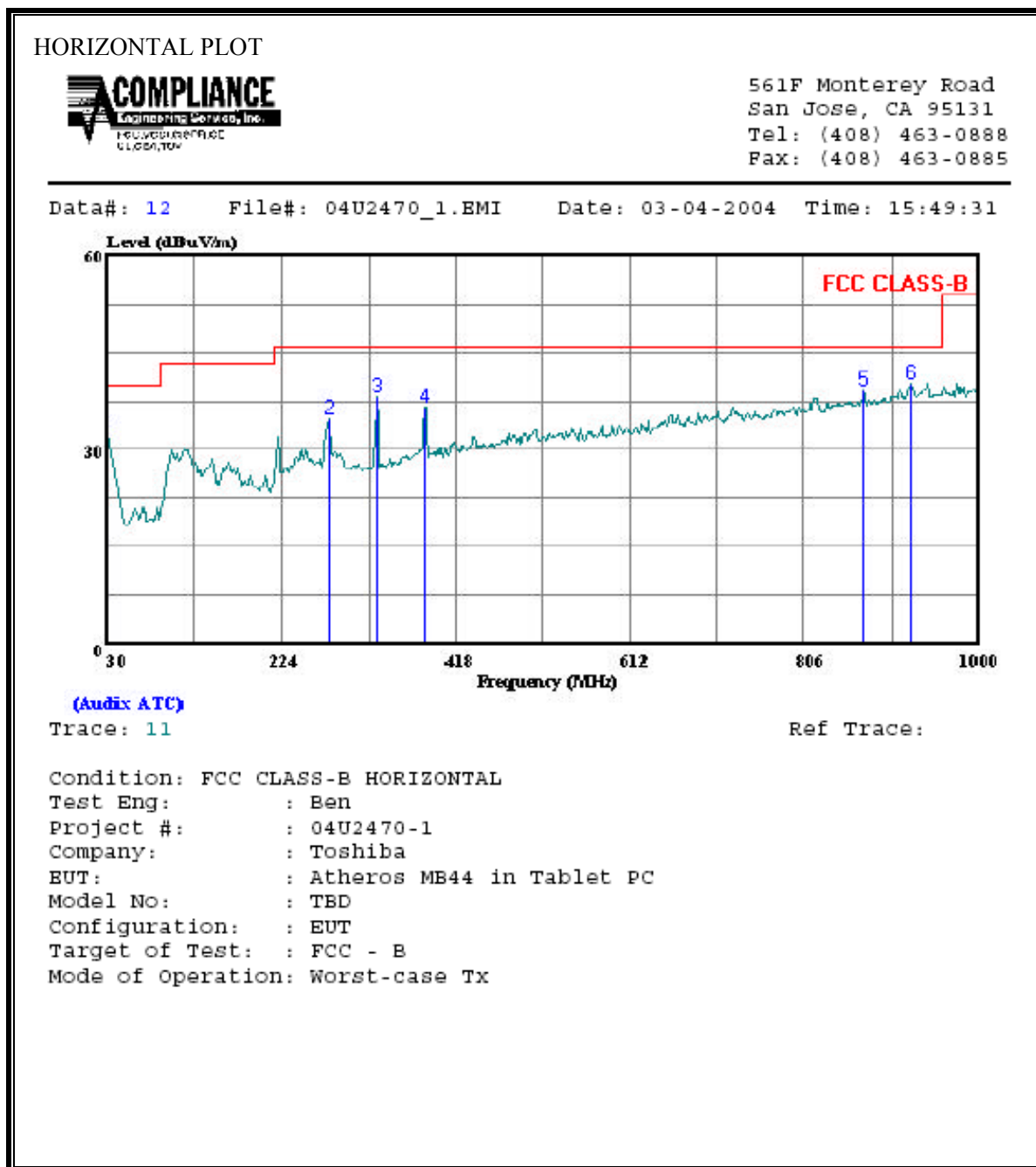
Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

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
HI CH 2462MHZ															
4.924	9.8	51.3	41.8	33.2	2.9	-35.3	0.0	1.0	53.0	43.5	74.0	54.0	-21.0	-10.5	V
7.386	9.8	56.6	44.0	36.3	3.9	-34.5	0.0	1.0	63.2	50.6	74.0	54.0	-10.8	-3.4	V
4.924	9.8	46.9	35.3	33.2	2.9	-35.3	0.0	1.0	48.6	37.0	74.0	54.0	-25.4	-17.0	H
7.386	9.8	51.9	38.8	36.3	3.9	-34.5	0.0	1.0	58.5	45.4	74.0	54.0	-15.5	-8.6	H

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

7.7.5. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

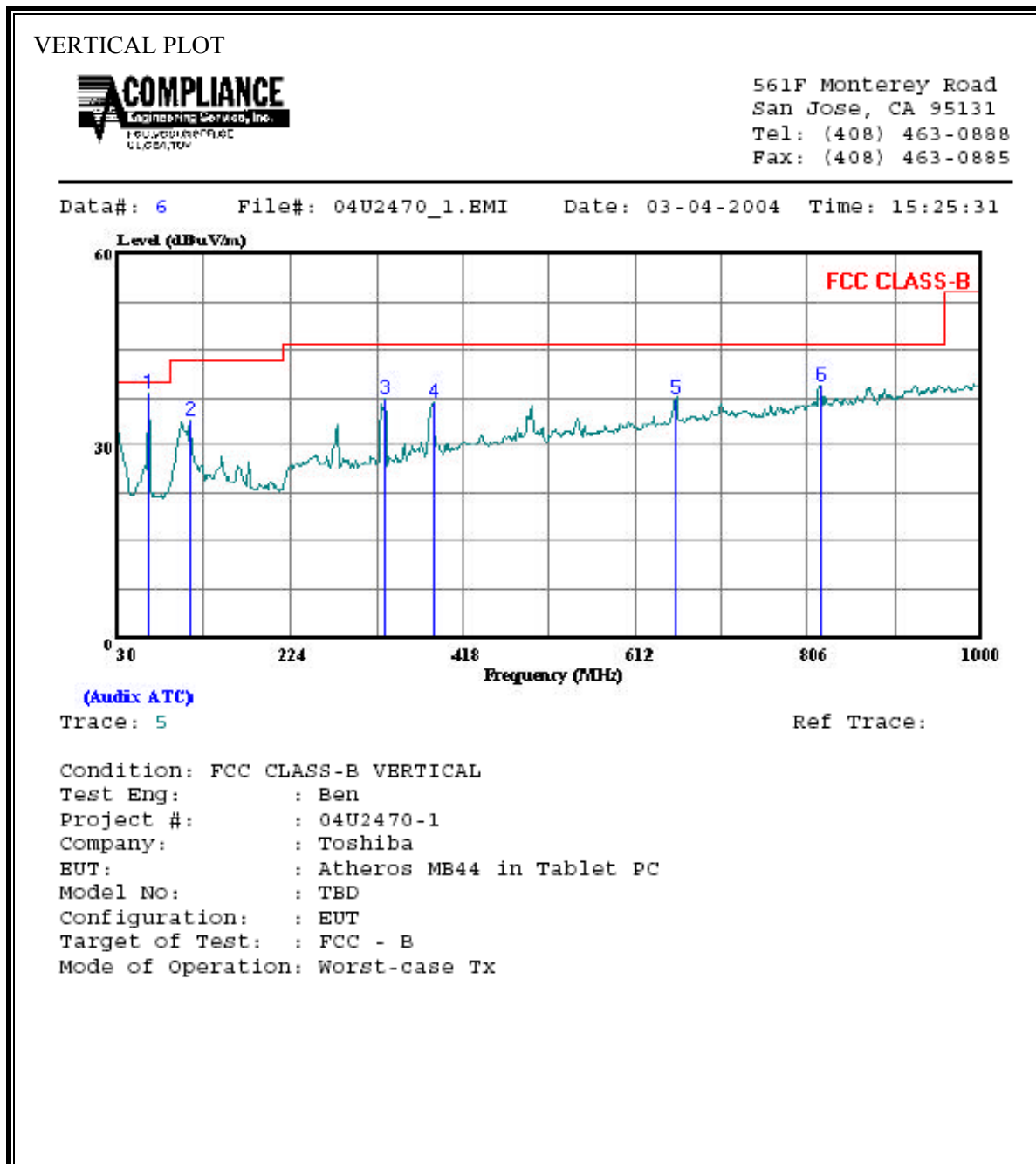
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	30.000	Peak	9.24	22.95	32.19	40.00	-7.81
2	276.380	Peak	19.51	15.37	34.88	46.00	-11.13
3	329.730	Peak	21.64	16.44	38.08	46.00	-7.92
4	385.020	Peak	18.82	17.85	36.66	46.00	-9.34
5	872.930	Peak	13.57	25.65	39.22	46.00	-6.78
6	924.340	Peak	13.41	26.74	40.15	46.00	-5.85

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



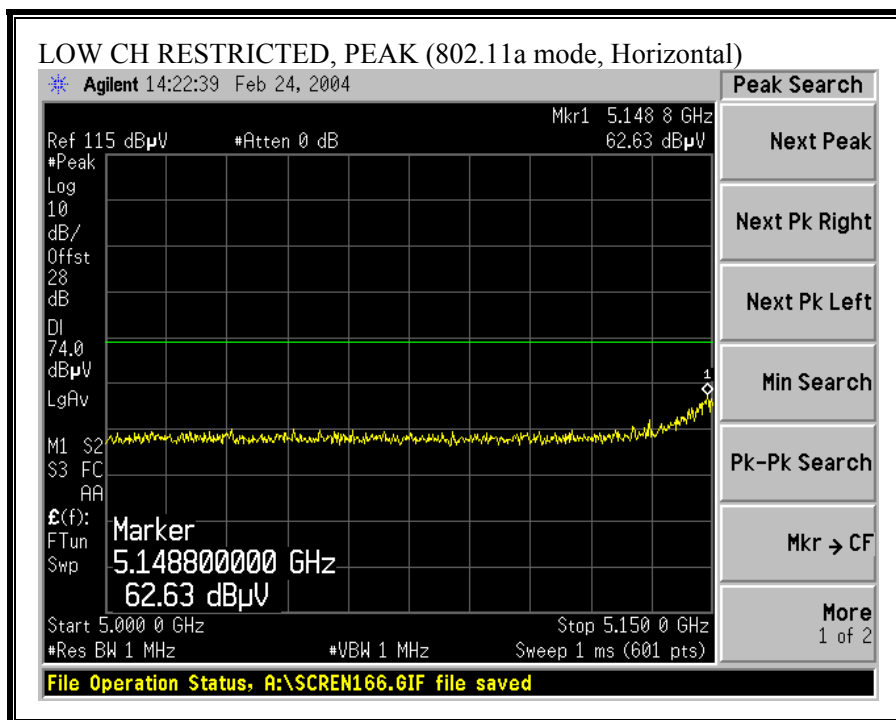
VERTICAL DATA

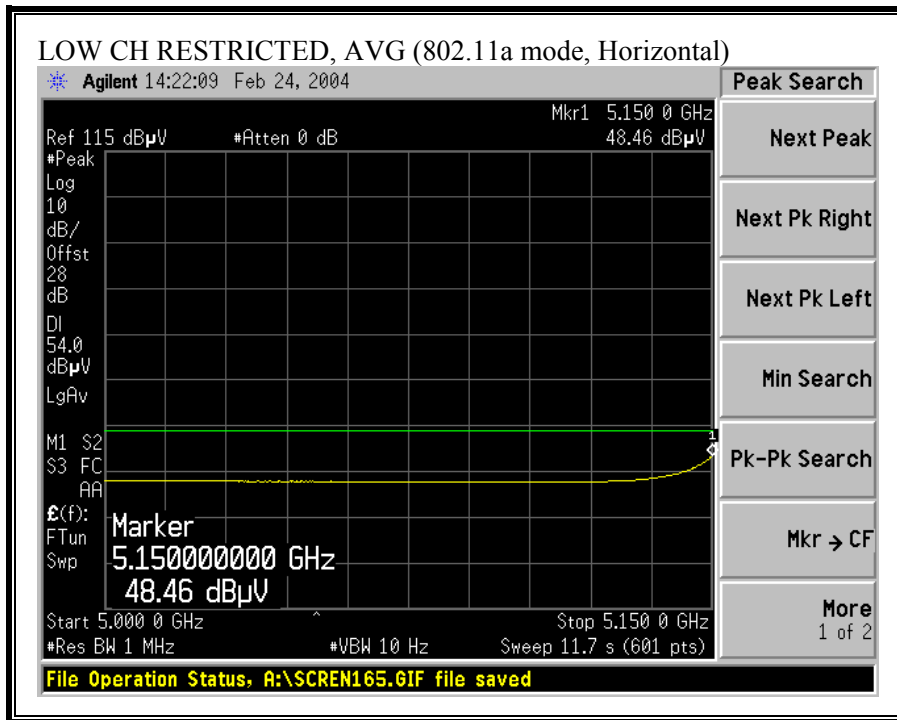
	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	65.890	Peak	28.84	9.29	38.13	40.00	-1.87
2	111.480	Peak	20.29	13.73	34.02	43.50	-9.48
3	329.730	Peak	20.85	16.44	37.29	46.00	-8.71
4	385.990	Peak	19.11	17.87	36.98	46.00	-9.02
5	656.620	Peak	14.51	22.97	37.48	46.00	-8.52
6	819.580	Peak	14.26	25.19	39.45	46.00	-6.55

7.8. STAND-ALONE CONFIGURATION RADIATED EMISSIONS

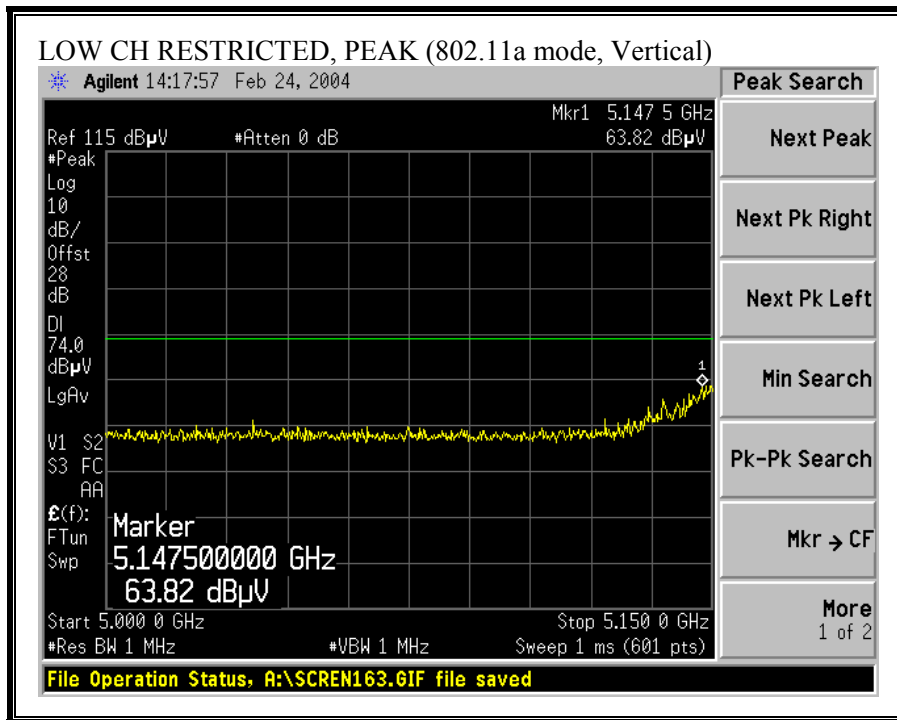
7.8.1. TRANSMITTER RADIATED EMISSIONS ABOVE 1 GHZ

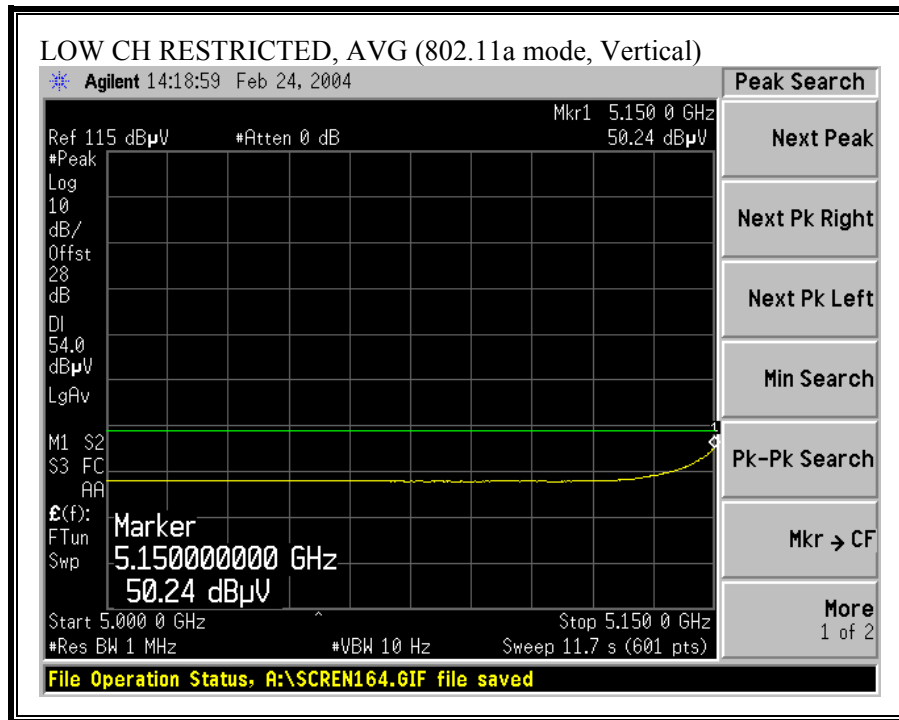
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, HORIZONTAL)



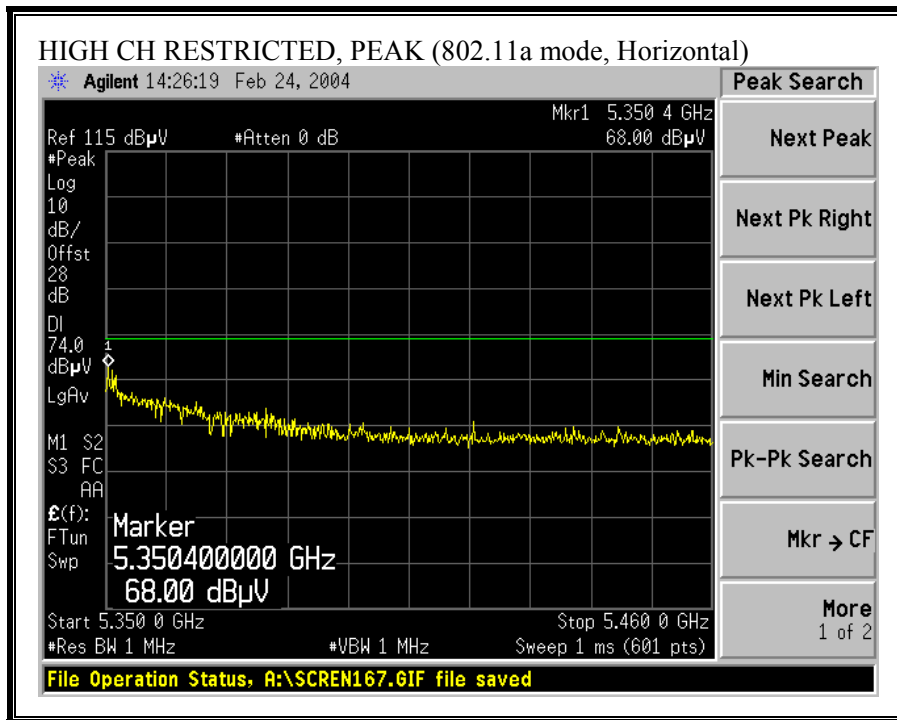


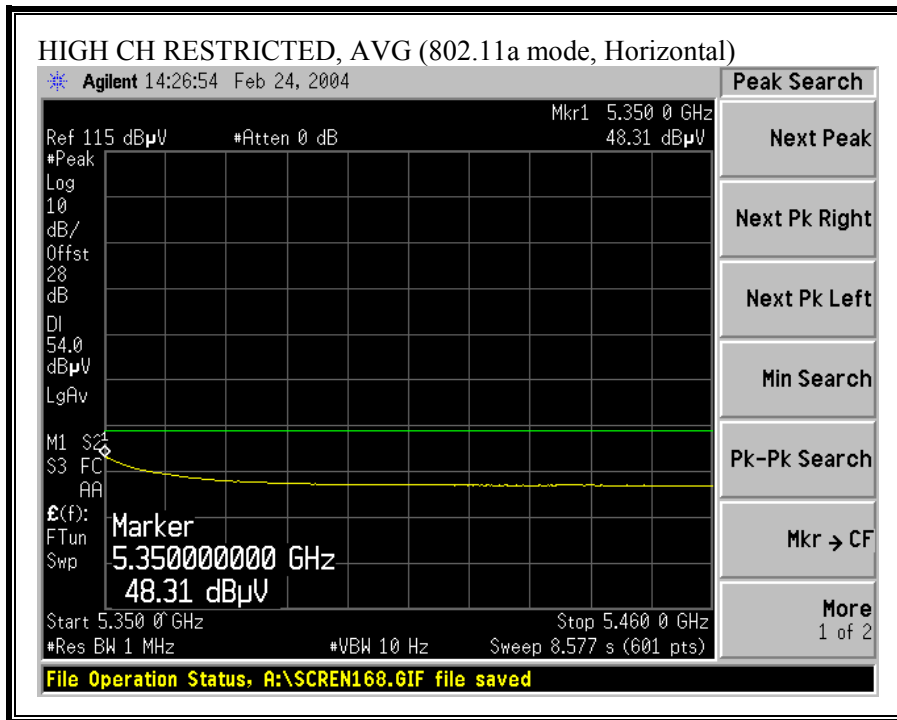
RESTRICTED BANDEDGE (802.11a MODE, LOW CHANNEL, VERTICAL)



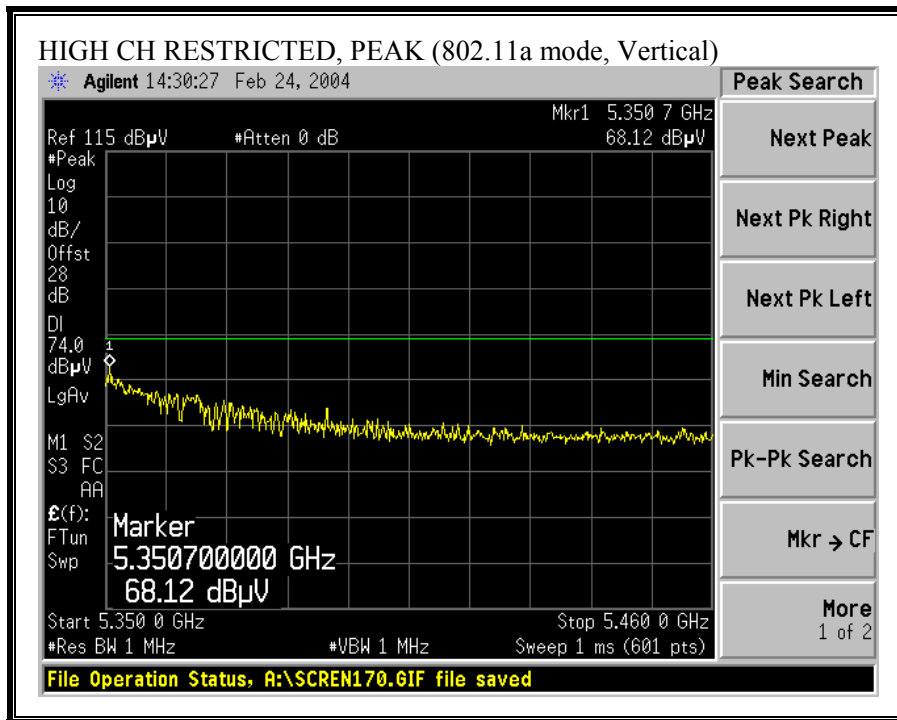


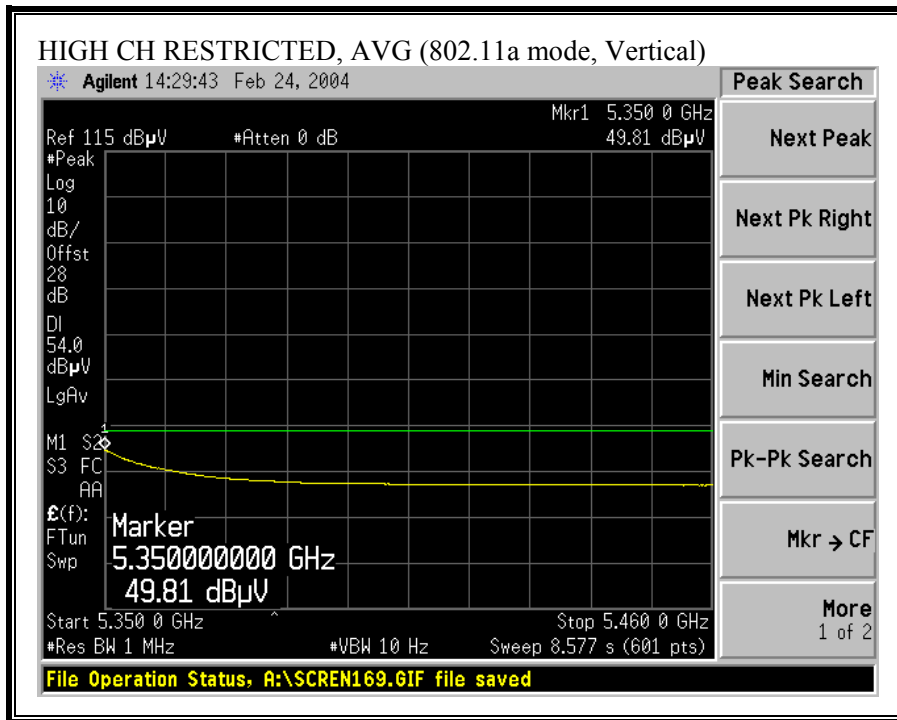
RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

03/11/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2552
Company: Atheros
EUT Descrip.: Mini PCI card module
EUT M/N: MB44 #3323
Test Target: 5.3 GHz band w/TIAN antenna
Mode Oper: transmitting, L,M,H

Test Equipment:

EMCO Horn 1-18GHz T73; S/N: 6717 @3m	Spectrum Analyzer Agilent E4446A Analyzer	Pre-amplifier 1-26GHz T87 Miteq 924342	Pre-amplifier 26-40GHz	Horn > 18GHz
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Hi Frequency Cables
 (2 ft) (2.0 ft) (3 ft) (12 ft)

Limit: FCC 15.205

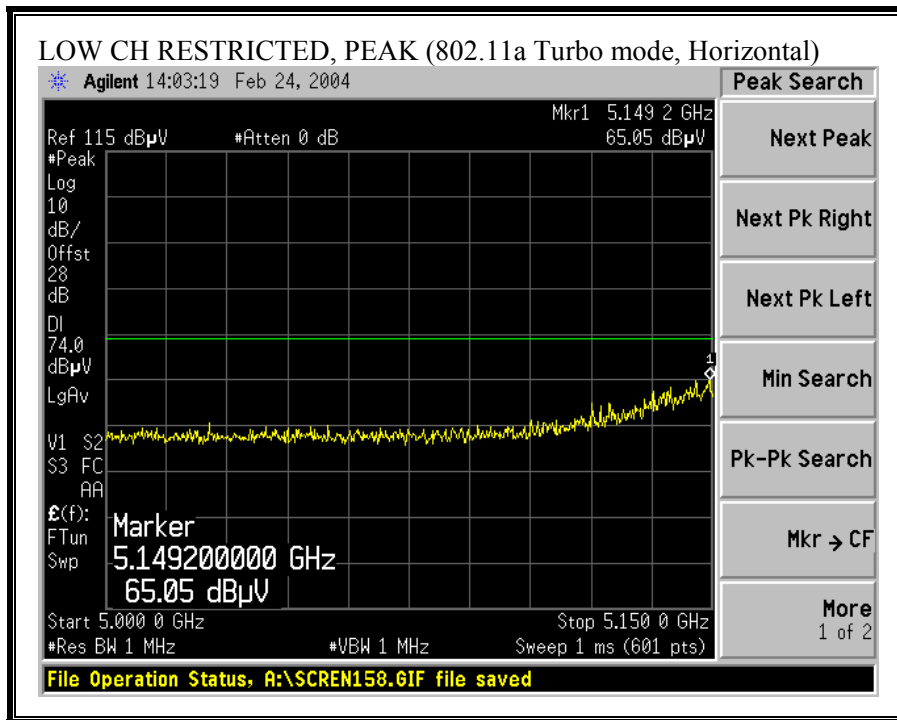
Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

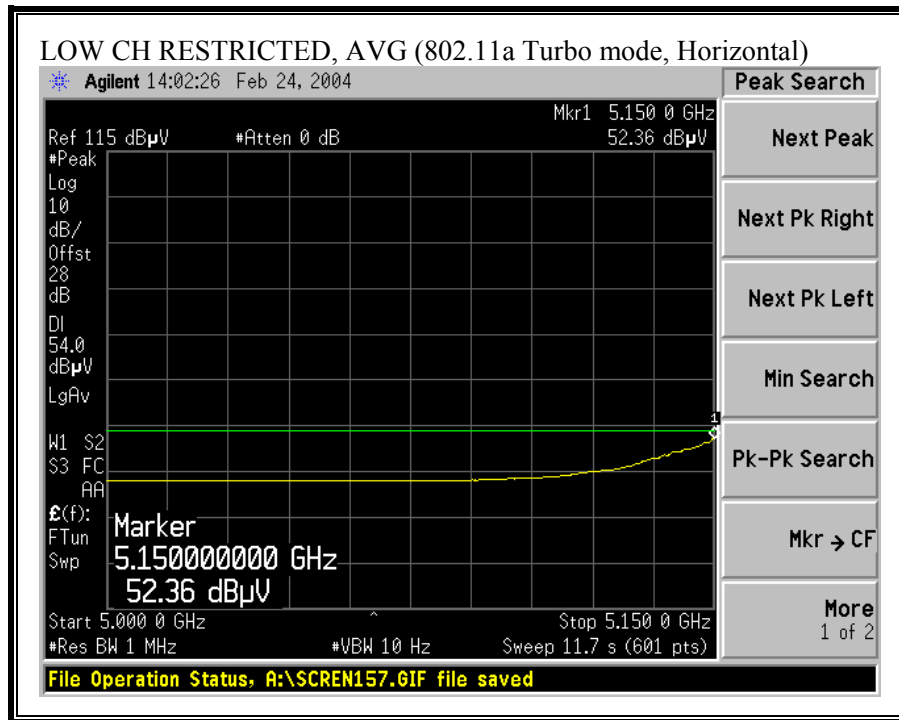
Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

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
11a 5180 Channel															
15.540	9.8	57.5	45.4	39.2	5.8	-45.5	0.0	1.0	57.9	45.8	74.0	54.0	-16.1	-8.2	V
15.540	9.8	53.1	42.0	39.2	5.8	-45.5	0.0	1.0	53.5	42.4	74.0	54.0	-20.5	-11.6	H
11a 5240 Channel															
15.720	9.8	60.2	48.3	38.8	5.8	-45.6	0.0	1.0	60.2	48.3	74.0	54.0	-13.8	-5.7	V
15.720	9.8	55.3	42.9	38.8	5.8	-45.6	0.0	1.0	55.3	42.9	74.0	54.0	-18.7	-11.1	H
11a 5260 Channel															
15.780	9.8	63.5	51.7	38.6	5.8	-45.6	0.0	1.0	63.3	51.5	74.0	54.0	-10.7	-2.5	V
15.780	9.8	55.0	44.0	38.6	5.8	-45.6	0.0	1.0	54.8	43.8	74.0	54.0	-19.2	-10.2	H
11a 5320 Channel															
10.640	9.8	59.4	47.7	38.3	4.5	-41.3	0.0	1.0	61.9	50.2	74.0	54.0	-12.1	-3.8	V
10.640	9.8	51.3	40.1	38.3	4.5	-41.3	0.0	1.0	53.8	42.6	74.0	54.0	-20.2	-11.4	H
15.960	9.8	65.2	53.2	38.2	5.9	-45.7	0.0	1.0	64.6	52.6	74.0	54.0	-9.4	-1.4	V
15.960	9.8	59.9	47.1	38.2	5.9	-45.7	0.0	1.0	59.3	46.5	74.0	54.0	-14.7	-7.5	H

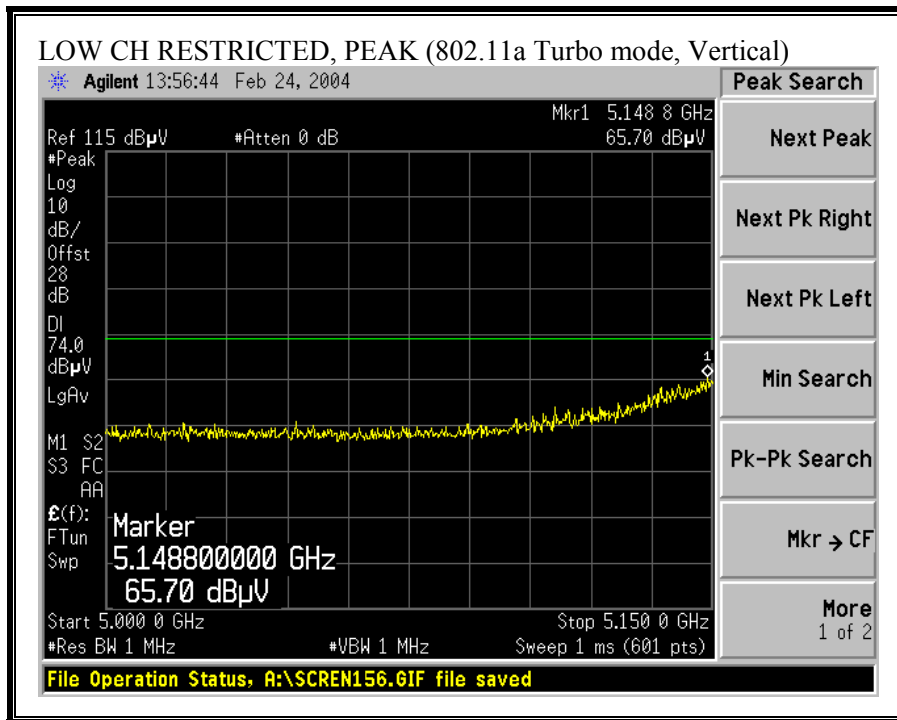
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

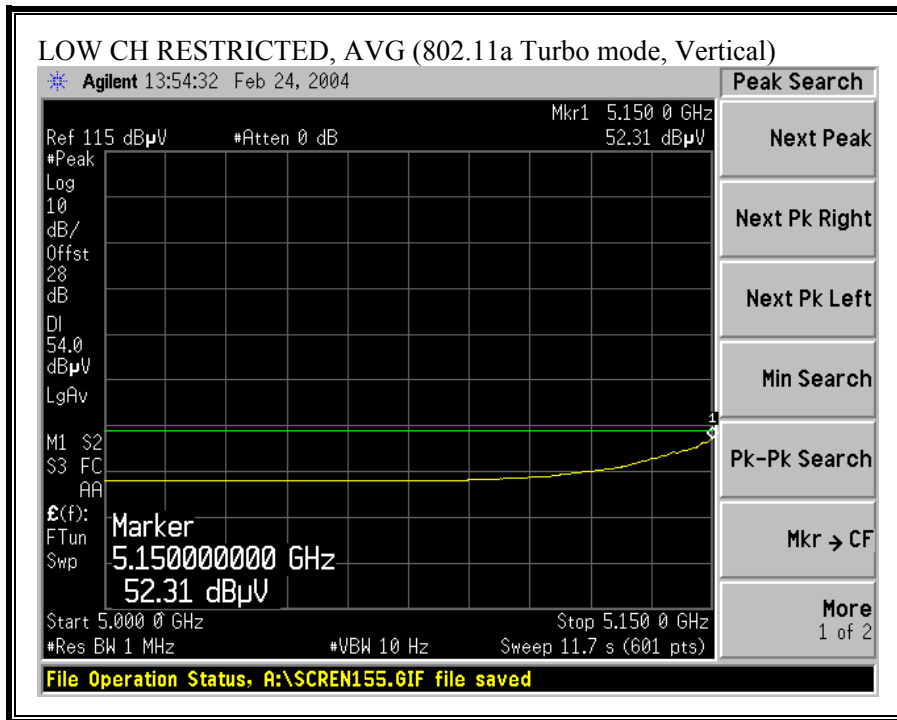
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, HORIZONTAL)



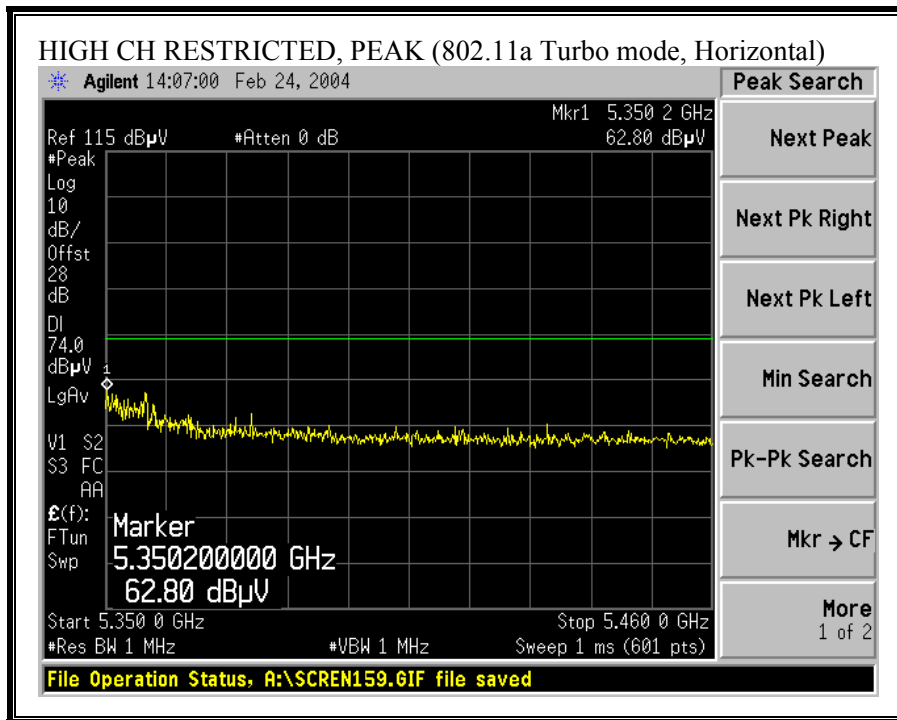


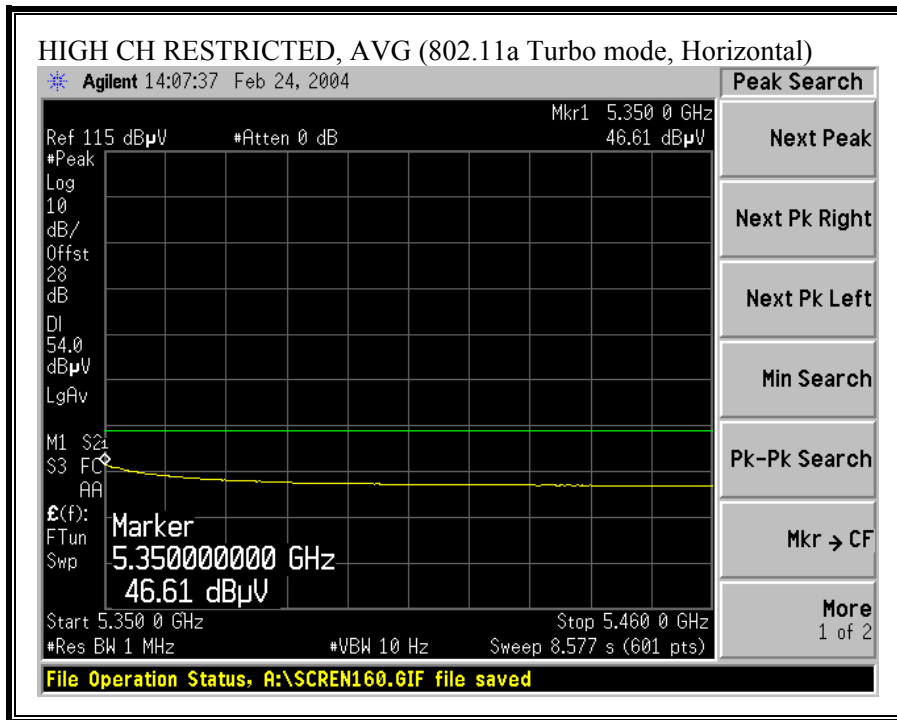
RESTRICTED BANDEDGE (802.11a TURBO MODE, LOW CHANNEL, VERTICAL)



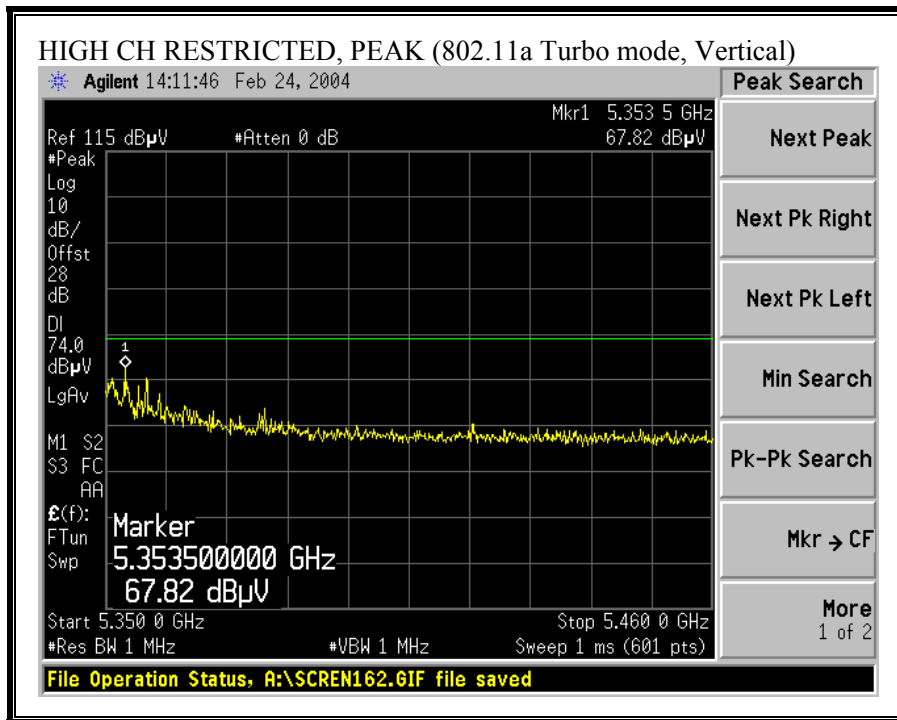


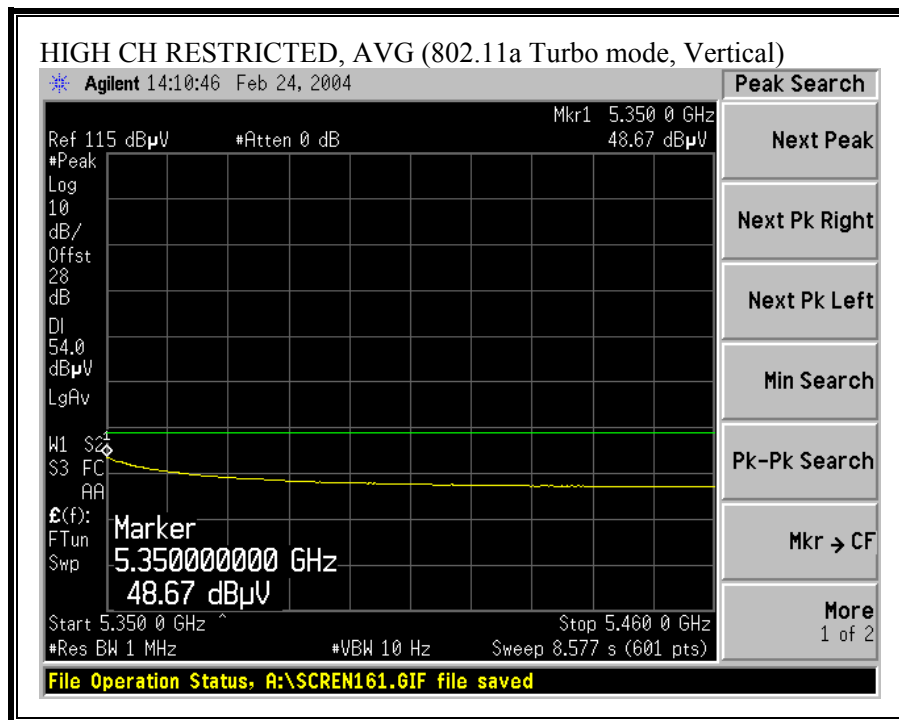
RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, HORIZONTAL)





RESTRICTED BANDEDGE (802.11a TURBO MODE, HIGH CHANNEL, VERTICAL)





HARMONICS AND SPURIOUS EMISSIONS 802.11a (TURBO MODE)

03/11/04 **High Frequency Measurement**
 Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: David Garcia
Project #: 04U2552
Company: Atheros
EUT Descrip.: Mini PCI card module
EUT M/N: MB44 #3323
Test Target: 5.3 GHz band w/TIAN antenna
Mode Oper: transmitting, turbo mode.

Test Equipment:

EMCO Horn 1-18GHz	Spectrum Analyzer	Pre-amplifier 1-26GHz	Pre-amplifier 26-40GHz	Horn > 18GHz
T73; S/N: 6717 @3m	Agilent E4446A Analyzer	T87 Miteq 924342		

Hi Frequency Cables
 (2 ft) (2.0 ft) (3 ft) (12 ft)

Limit: FCC 15.205

Peak Measurements:
 1 MHz Resolution Bandwidth
 1MHz Video Bandwidth

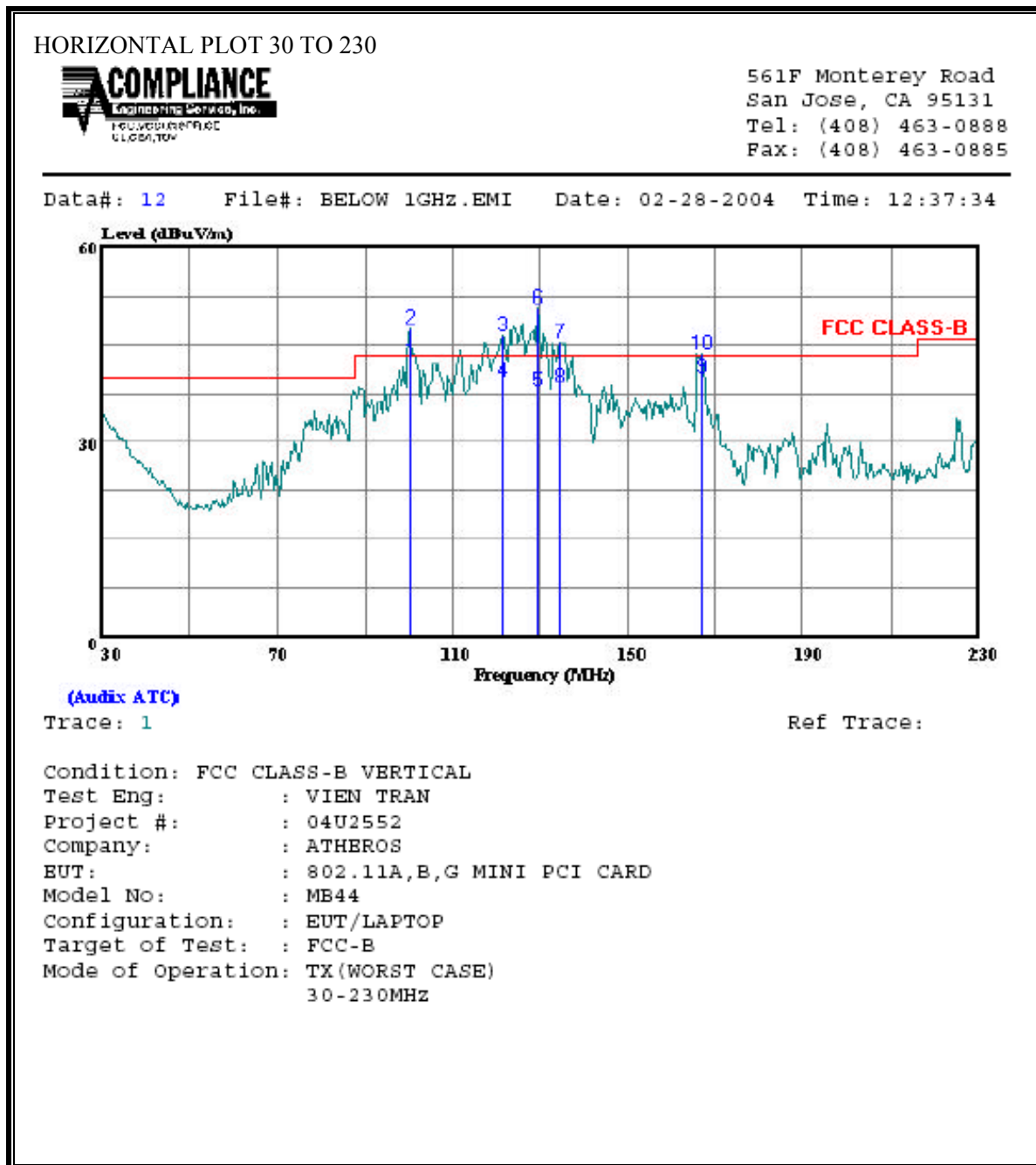
Average Measurements:
 1 MHz Resolution Bandwidth
 10Hz Video Bandwidth

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
LOW															
15.600	9.8	59.5	46.7	39.1	5.8	-45.5	0.0	1.0	59.8	47.0	74.0	54.0	-14.2	-7.0	V
15.600	9.8	53.8	41.5	39.1	5.8	-45.5	0.0	1.0	54.1	41.8	74.0	54.0	-19.9	-12.2	H
MID															
15.750	9.8	60.7	49.4	38.7	5.8	-45.6	0.0	1.0	60.6	49.3	74.0	54.0	-13.4	-4.7	V
15.750	9.8	56.6	44.0	38.7	5.8	-45.6	0.0	1.0	56.5	43.9	74.0	54.0	-17.5	-10.1	H
HIGH															
15.870	9.8	63.0	50.2	38.4	5.9	-45.6	0.0	1.0	62.6	49.8	74.0	54.0	-11.4	-4.2	V
15.870	9.8	58.1	46.3	38.4	5.9	-45.6	0.0	1.0	57.7	45.9	74.0	54.0	-16.3	-8.1	H

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

7.8.2. WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

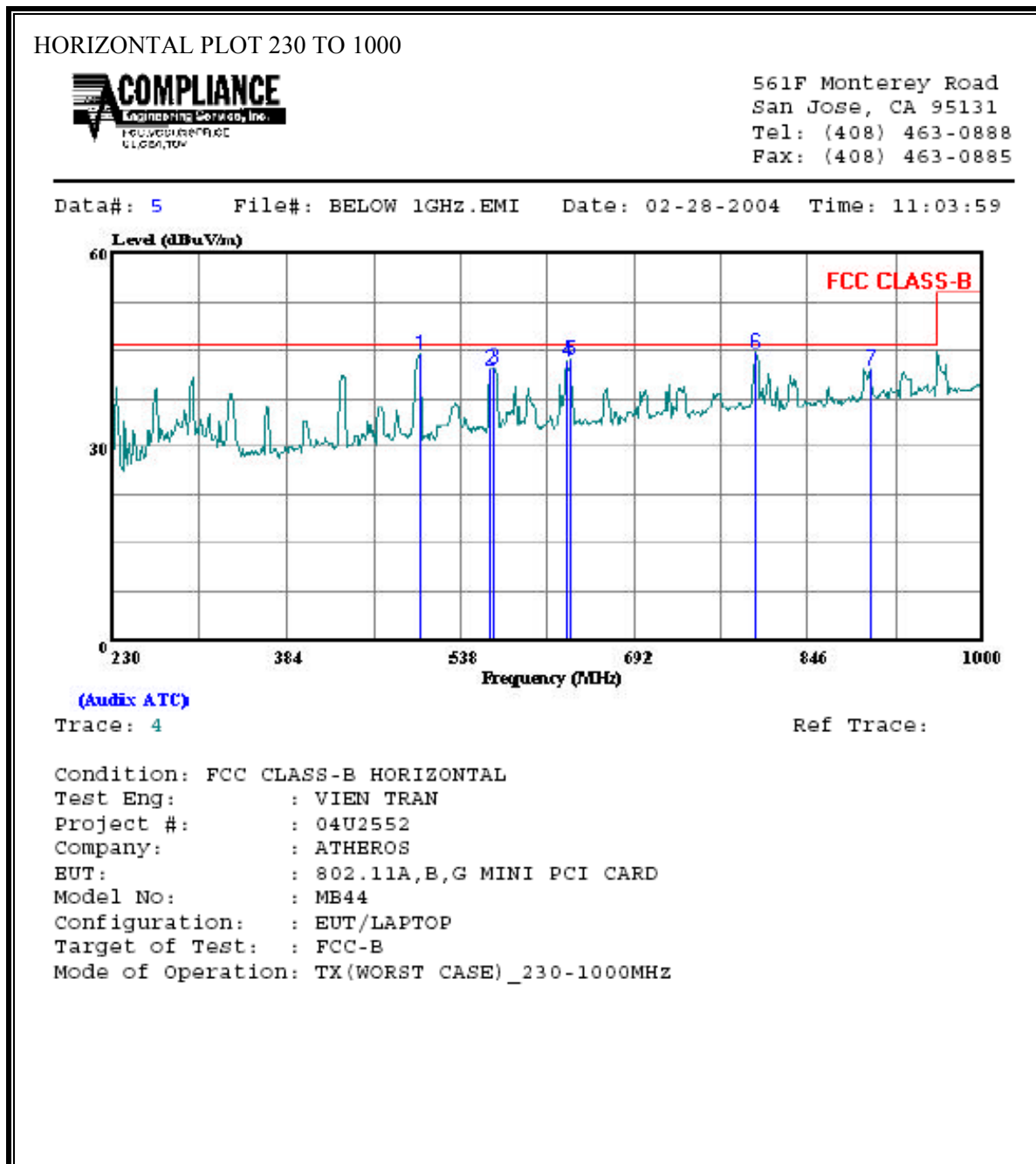
SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA 30 TO 230

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	100.400	QP	31.80	10.59	42.39	43.50	-1.11
2 *	100.400	Peak	37.04	10.59	47.63	43.50	4.13
3 *	121.400	Peak	31.30	15.09	46.39	43.50	2.89
4	121.400	QP	24.50	15.09	39.59	43.50	-3.92
5	129.400	QP	22.40	15.55	37.95	43.50	-5.55
6 *	129.400	Peak	35.01	15.54	50.55	43.50	7.05
7 *	134.400	Peak	29.94	15.43	45.37	43.50	1.87
8	134.400	QP	23.00	15.43	38.43	43.50	-5.07
9	166.800	QP	26.40	13.62	40.02	43.50	-3.48
10 *	166.800	Peak	29.95	13.61	43.56	43.50	0.06

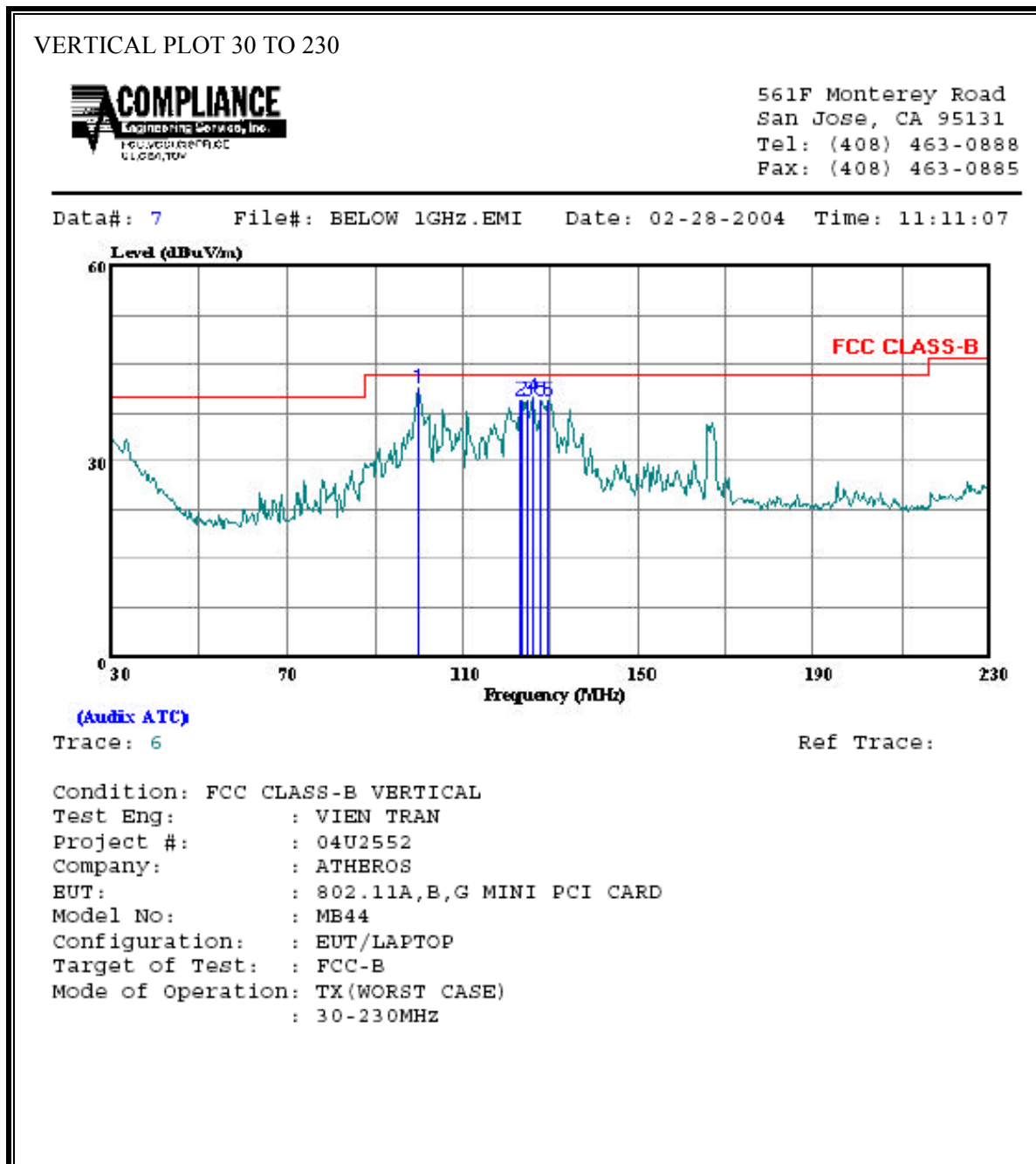
SPURIOUS EMISSIONS 230 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)



HORIZONTAL DATA 230 TO 1000

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	502.580	Peak	23.67	20.63	44.30	46.00	-1.70
2	564.180	Peak	20.76	21.44	42.20	46.00	-3.80
3	568.030	Peak	20.78	21.59	42.37	46.00	-3.63
4	631.940	Peak	20.87	22.41	43.28	46.00	-2.72
5	635.790	Peak	21.00	22.53	43.53	46.00	-2.47
6	799.030	Peak	19.70	25.01	44.71	46.00	-1.29
7	901.440	Peak	15.98	26.20	42.18	46.00	-3.83

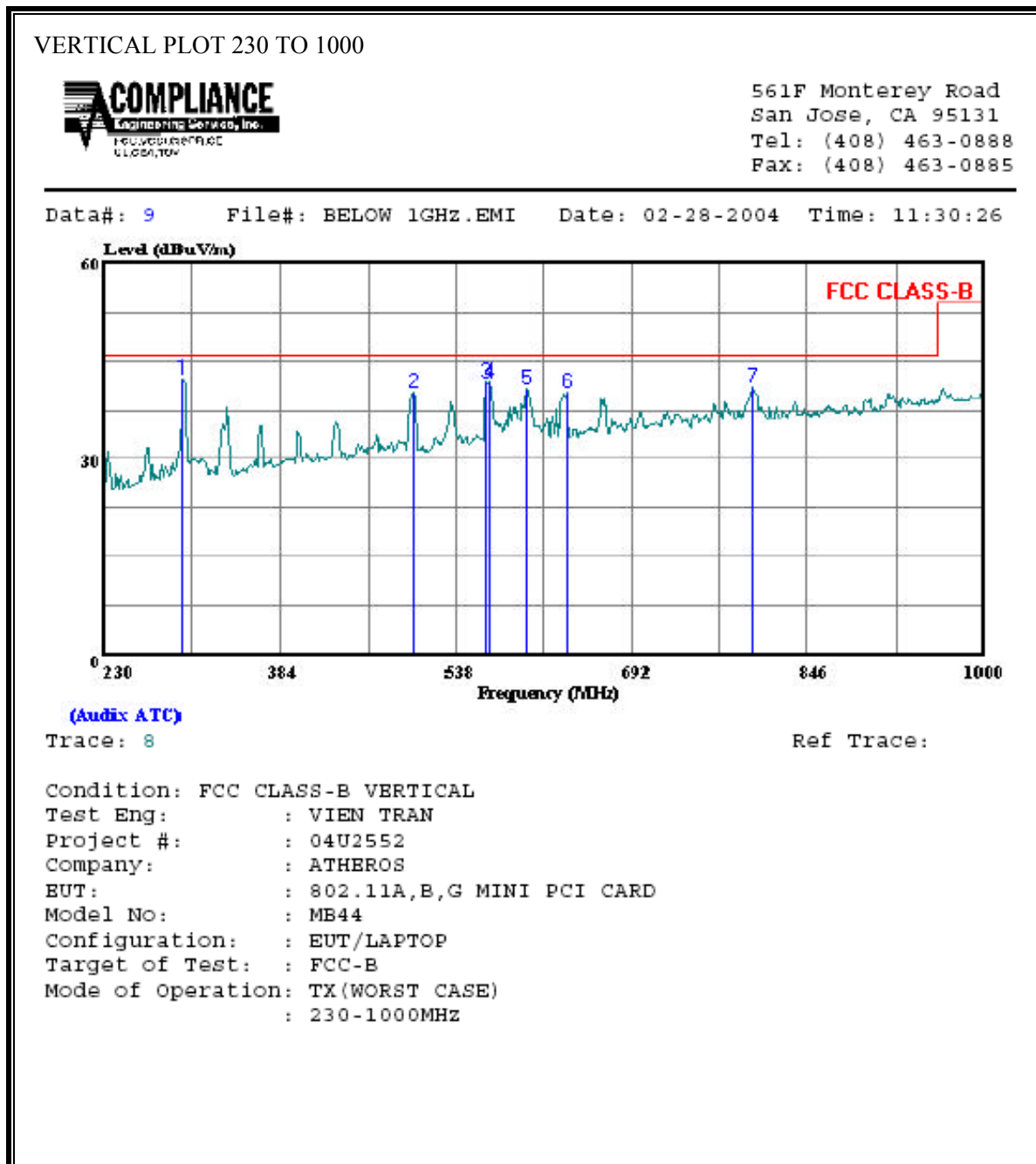
SPURIOUS EMISSIONS 30 TO 230 MHz (WORST-CASE CONFIGURATION, VERTICAL)



VERTICAL DATA 30 TO 230

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	99.800	Peak	30.76	10.41	41.17	43.50	-2.33
2	123.400	Peak	24.24	15.31	39.55	43.50	-3.95
3	124.400	Peak	24.01	15.41	39.42	43.50	-4.08
4	125.800	Peak	24.63	15.48	40.11	43.50	-3.39
5	127.800	Peak	24.07	15.51	39.58	43.50	-3.92
6	129.400	Peak	23.92	15.54	39.46	43.50	-4.04

SPURIOUS EMISSIONS 230 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL)



VERTICAL DATA 230 TO 1000

	Freq	Remark	Read Level	Factor	Level	Limit Line	Over Limit
	MHz		dBuV	dB	dBuV/m	dBuV/m	dB
1	298.530	Peak	26.42	15.91	42.33	46.00	-3.68
2	501.040	Peak	19.72	20.61	40.32	46.00	-5.68
3	564.180	Peak	20.41	21.44	41.85	46.00	-4.15
4	568.030	Peak	20.22	21.59	41.81	46.00	-4.19
5	598.830	Peak	18.84	21.93	40.77	46.00	-5.24
6	635.790	Peak	17.84	22.53	40.37	46.00	-5.63
7	797.490	Peak	15.96	24.99	40.95	46.00	-5.05

7.9. 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.

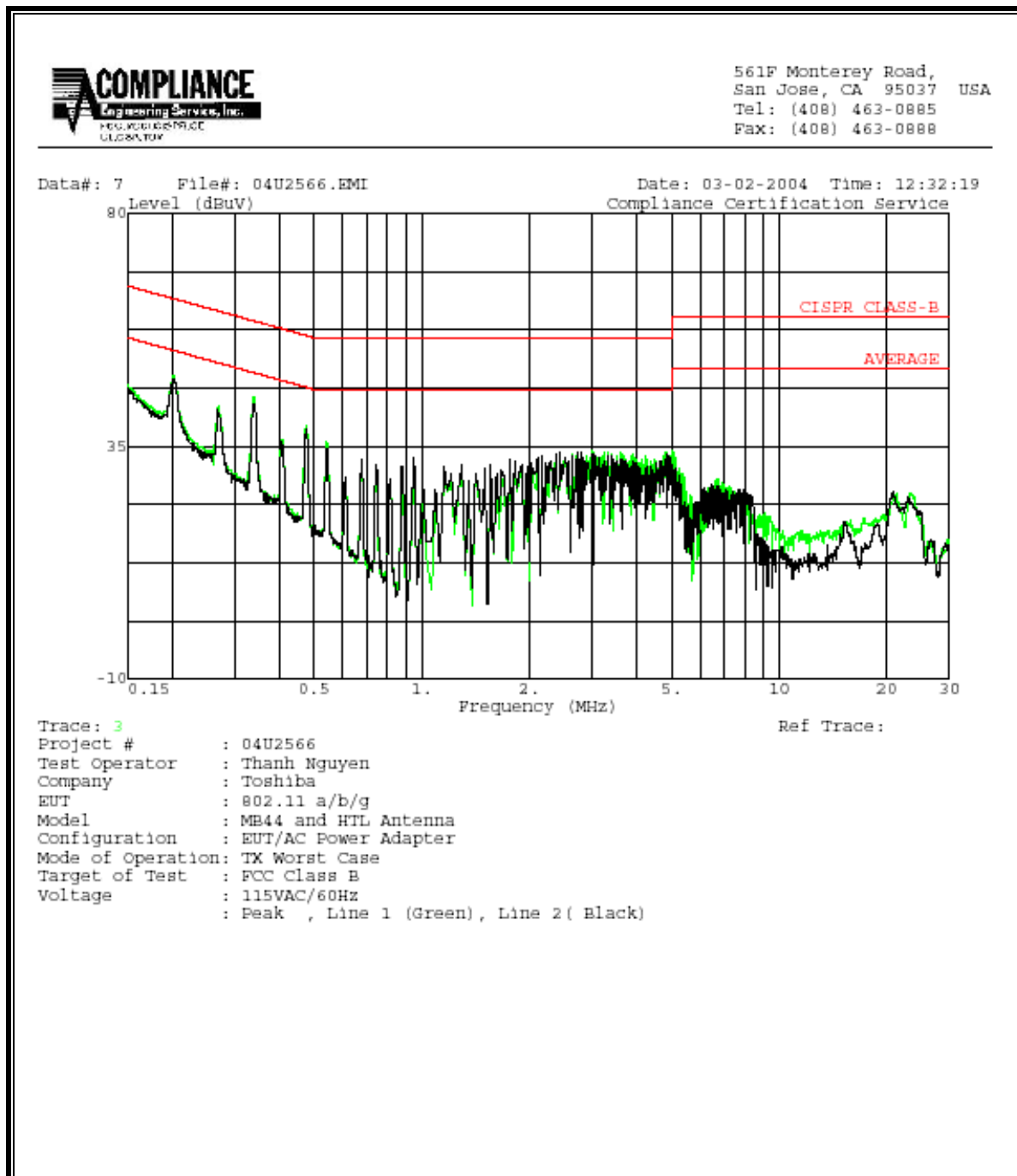
RESULTS

No non-compliance noted:

6 WORST EMISSIONS

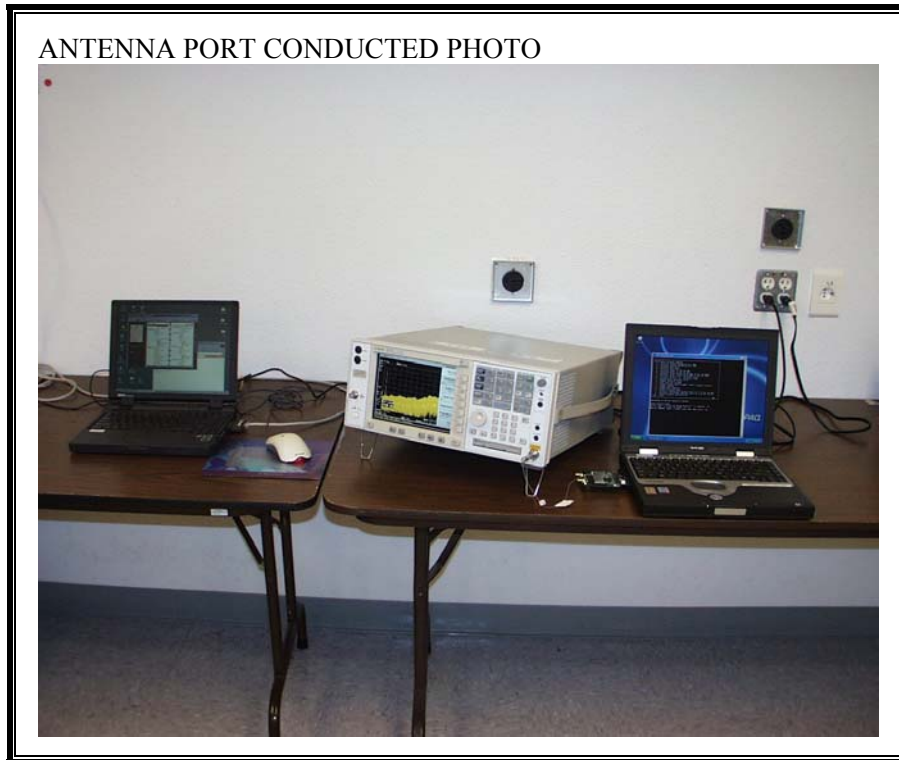
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq. (MHz)	Reading			Class (dB)	Limit		Margin		Remark L1 / L2
	PK (dBuV)	QP (dBuV)	AV (dBuV)		QP	AV	QP (dB)	AV (dB)	
0.34	44.66	--	--	0.00	60.60	50.60	-15.94	-5.94	L1
0.20	48.66	--	--	0.00	64.51	54.51	-15.85	-5.85	L1
4.82	33.94	--	--	0.00	56.00	46.00	-22.06	-12.06	L1
0.34	43.20	--	--	0.00	60.60	50.60	-17.40	-7.40	L2
0.20	47.86	--	--	0.00	64.51	54.51	-16.65	-6.65	L2
4.87	33.60	--	--	0.00	56.00	46.00	-22.40	-12.40	L2
6 Worst Data									

LINE 1 AND LINE 2 RESULTS

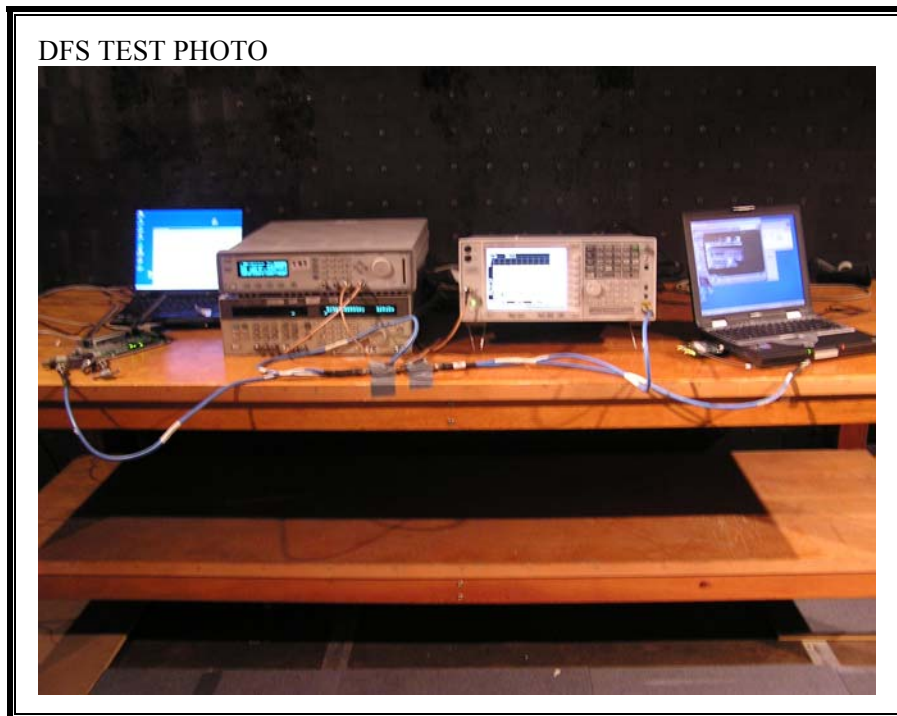


8. SETUP PHOTOS

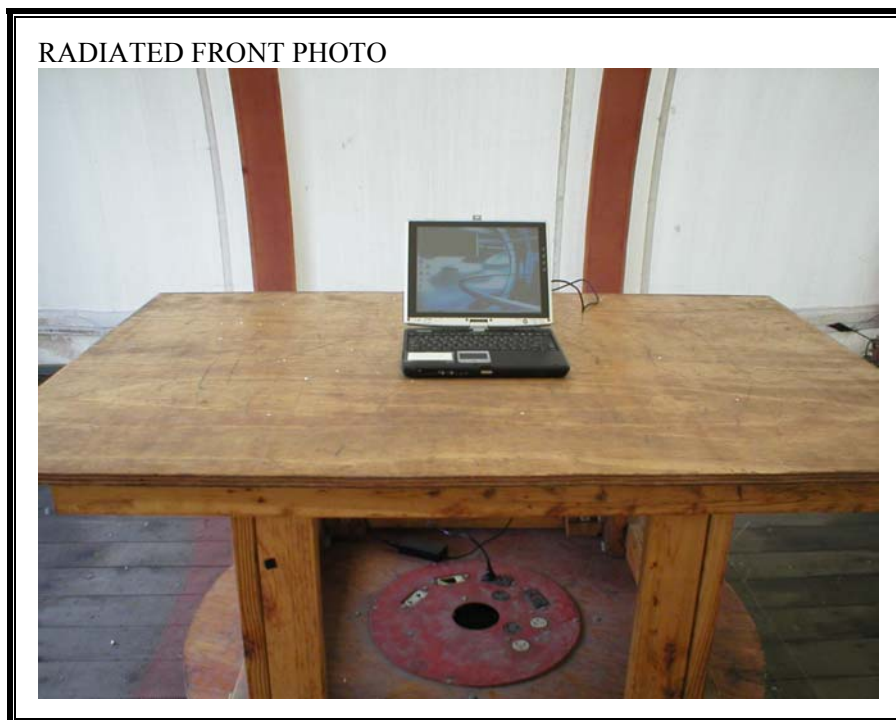
ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



DFS MEASUREMENT SETUP



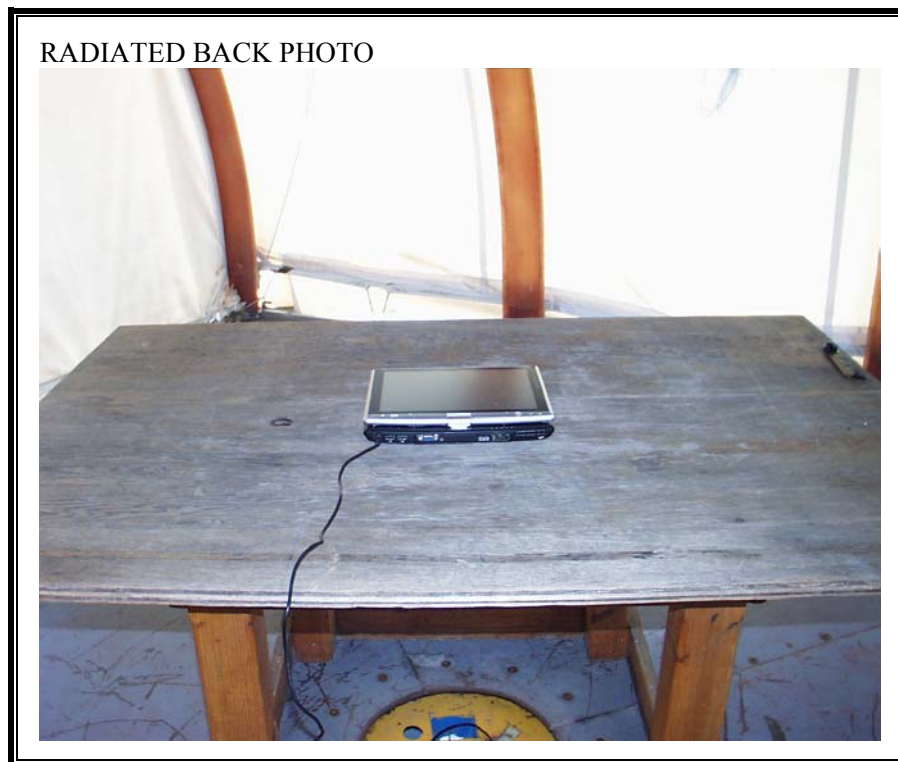
RADIATED RF MEASUREMENT SETUP WITH MOBILE LAPTOP POSITION



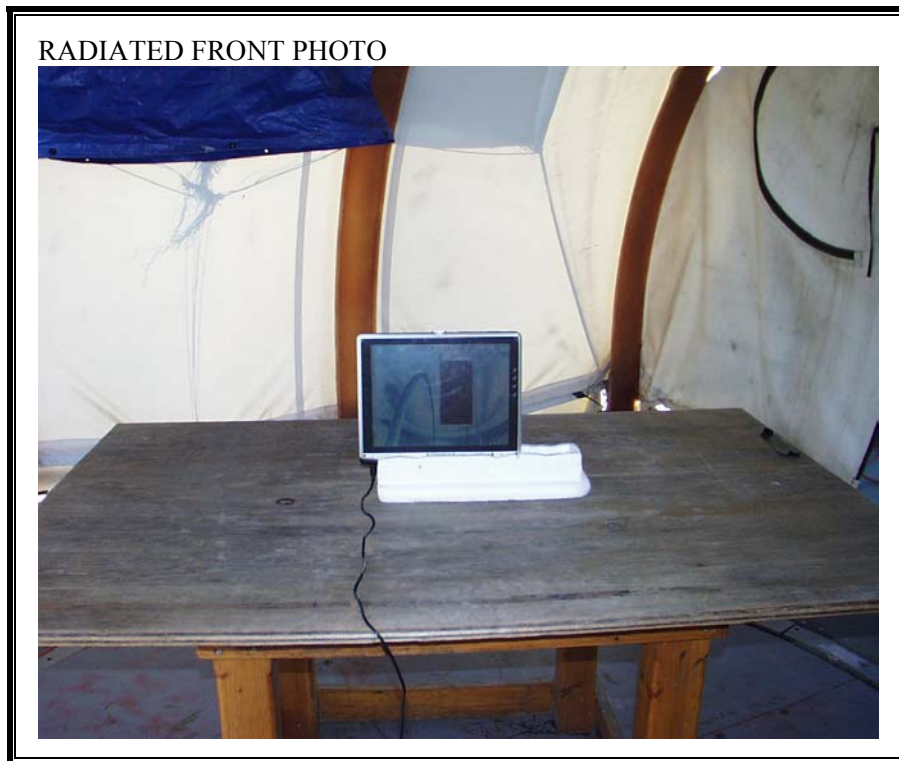


RADIATED RF MEASUREMENT SETUP WITH PORTABLE, X AXIS POSITION





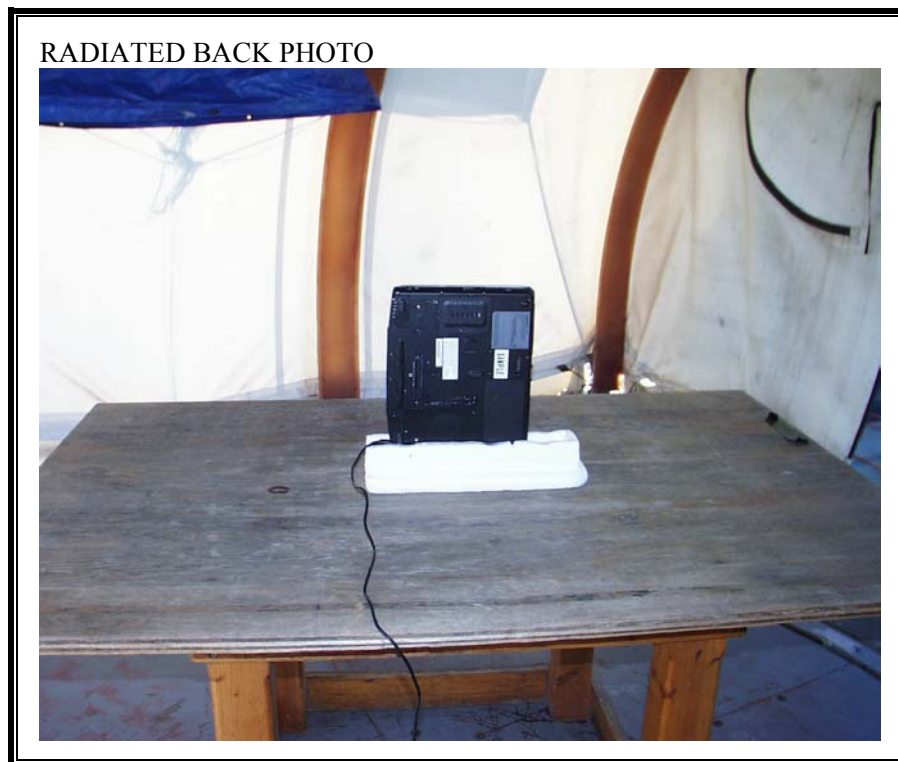
RADIATED RF MEASUREMENT SETUP WITH PORTABLE, Y AXIS POSITION



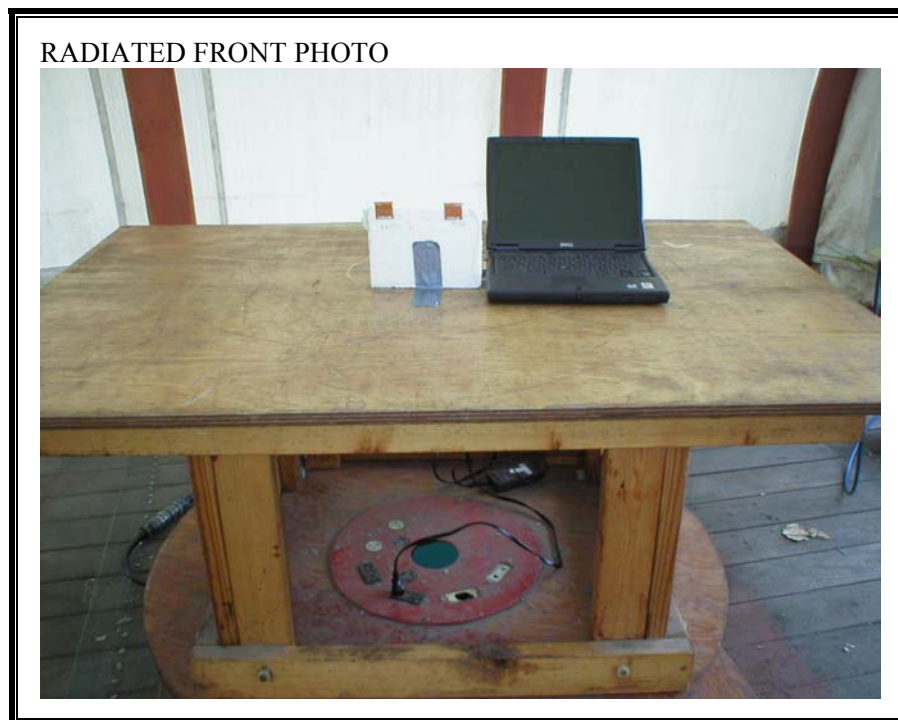


RADIATED RF MEASUREMENT SETUP WITH PORTABLE, Z AXIS POSITION





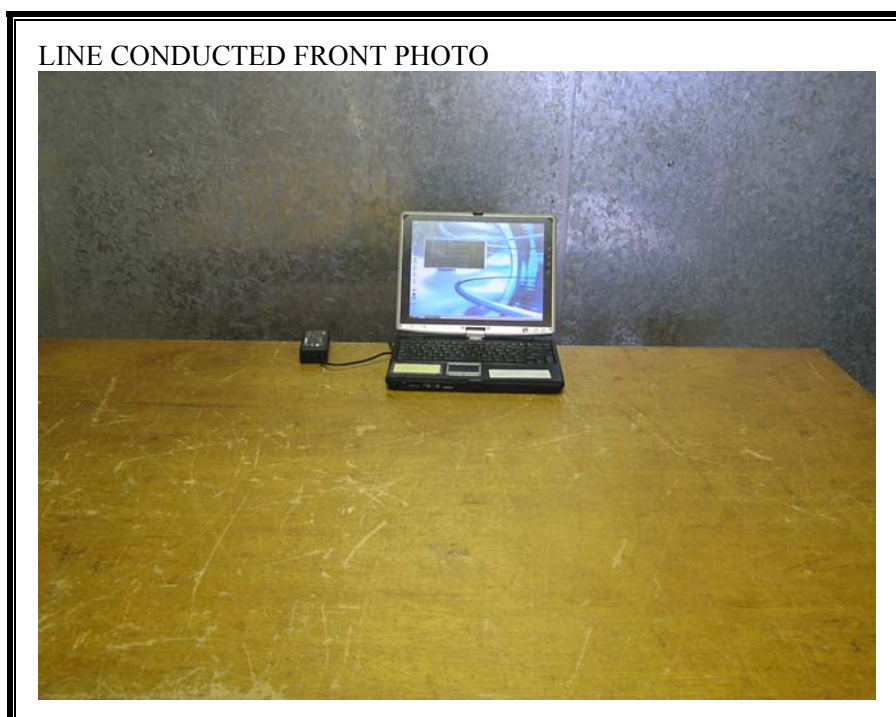
STAND-ALONE RADIATED EMISSION SETUP

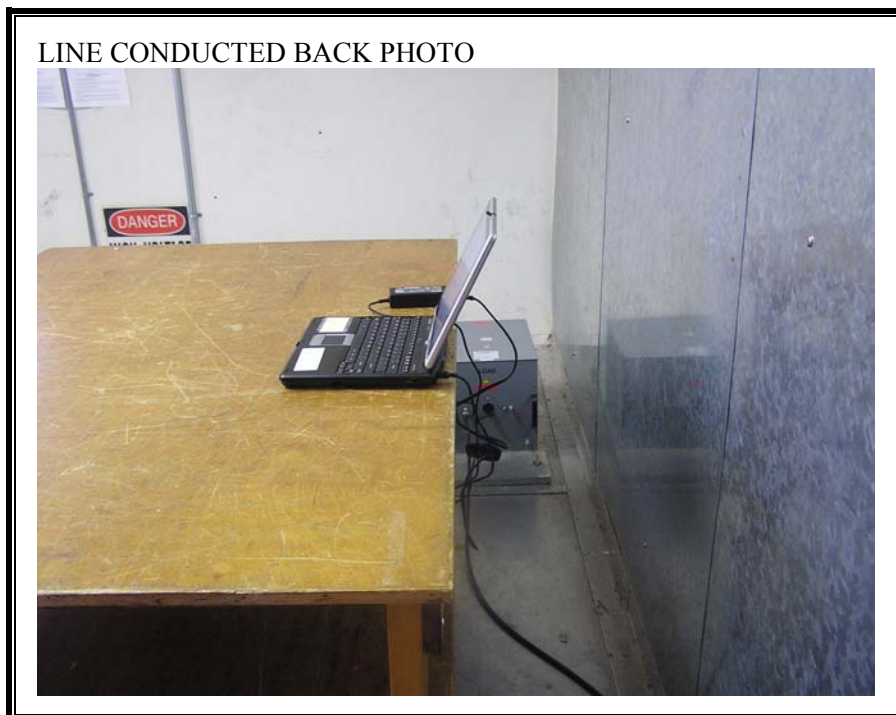


RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP





END OF REPORT