FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT

802.11 A/G HALF SIZE MINI PCI WLAN MODULE

MODEL NUMBER: PA3459U-1MPC; PA3461U/E-1MPC (FOR OPTION)

FCC ID: CJ6UPA3459WL

REPORT NUMBER: 05U3390-1

ISSUE DATE: MAY 25, 2005

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

Prepared by
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Revision History

Rev.	Revisions	Revised By

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1. ATTESTATION OF TEST RESULTS

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

EUT DESCRIPTION: 802.11A/G HALF SIZE MINI-PCI WLAN MODULE

MODEL: PA3459U-1MPC

MODEL (FOR OPTION): PA3461U/E-1MPC

SERIAL NUMBER: 1152T000018

DATE TESTED: MAY 09 - 19, 2005

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

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

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

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

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

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

3. FACILITIES AND ACCREDITATION

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

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

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. MEASUREMENT UNCERTAINTY

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

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

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11a/b/g transceiver Module.

The radio module is manufactured by ATHEROS COMMUNICATIONS.

The EUT module is installed and tested inside the Firebolt Laptop.

5.2. MAXIMUM OUTPUT POWER

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

2400 to 2483.5 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
2412 - 2462	802.11b	21.01	126.18
2412 - 2462	802.11g	23.06	202.30

5725 to 5850 MHz Authorized Band

Frequency Range (MHz)	Mode	Output Power (dBm)	Output Power (mW)
5745 - 5825	802.11a	22.47	176.60

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes four PIFA Film type antennas; each has a maximum gain as follows:

PIFA type antennas:
1. HTL017 - 4.24 dBi at 2.4GHz without cable loss;
2. HTL017 - 4.12 dBi at 5.8GHz without cable loss;
3. HTL004 - 4.18 dBi at 2.4GHz without cable loss;
4. TIAN01 - 4.66 dBi at 5.24GHz without cable loss.

The HTL017 antenna, which has the highest gain of 2.4GHz and 5.8GHz bands; also the TIAN01 antenna, which has the highest gain of 5.2GHz bands, so both antennas represent the worst-case scenario.

5.4. MANUFACTURER'S DESCRIPTION OF MODEL DIFFERENCES

The two modules are identical and only differ in model number.

5.5. SOFTWARE AND FIRMWARE

The test firmware was installed in the EUT during testing.

The test utility software used during testing was art program "ART_V52build58_all".

5.6. WORST-CASE CONFIGURATION AND MODE

The worst-case channel is determined as the channel with the highest average output power. The highest measured average output powers were at 2412 MHz for b/g mode, 5320 MHz for a mode (UNII), and 5745 MHz for a mode (DTS). The EUT is tested at mobile and portable of two different configurations.

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Toshiba	PPM20U-AAAA8	Z3044588-JU	DoC
AC Adapater	Toshiba	ADP-80RH	148162	DoC

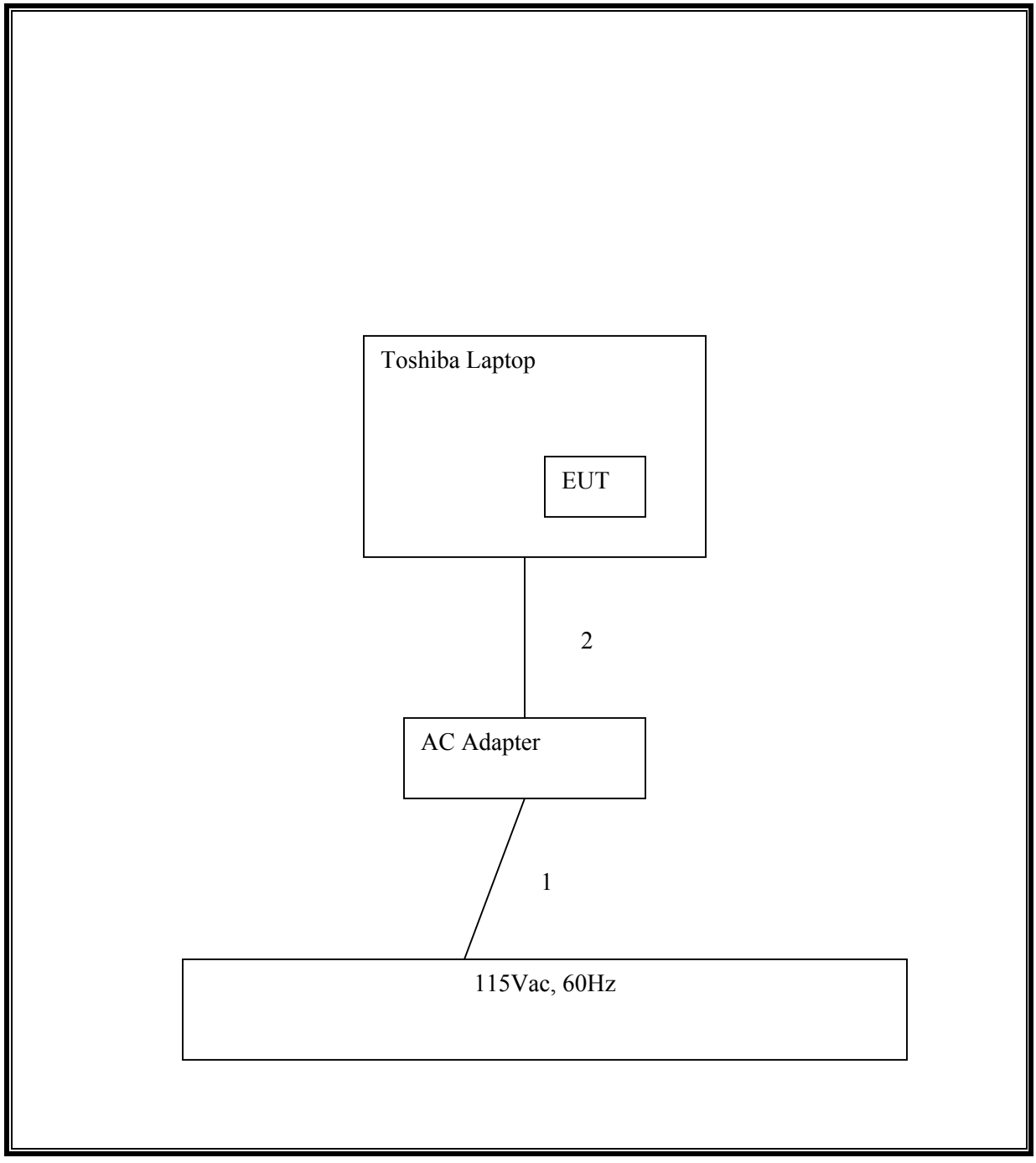
I/O CABLES

I/O CABLE LIST						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length**	**Remarks**
1	AC	1	US 115V	Un-shielded	2m	No
2	DC	1	DC	Un-shielded	1m	No

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



6. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Serial Number**	**Cal Due**
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2005
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	8379443	10/21/2005
Spectrum Analyzer	HP	E4446A	US42510266	8/25/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3117	29310	9/12/2005
4.0 High Pass Filter	Micro Tronics	HPM13351	1	CNR
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	8/17/2005
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	2238	9/12/2005
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/12/2005
EMI Receiver, 9 kHz ~ 2.9 GHz	HP	8542E	3942A00286	3/6/2006
RF Filter Section	HP	85420E	3705A00256	3/6/2006
Peak Power Meter	Agilent	E4416A	GB41291160	2/9/06
Peak / Average Power Sensor	Agilent	E9327A	US40440755	2/10/06
Preamplifier, 1 ~ 26.5 GHz	HP	8449B	3008A00369	8/17/05
Antenna, Horn 18 ~ 26 GHz	ARA	SWH-28	1007	9/12/05
7.6 High Pass Filter	Micro Tronics	HPM13195	2	CNR

7. LIMITS AND RESULTS

7.1. CHANNEL TESTS FOR THE 2400 TO 2483.5 MHz BAND

7.1.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

No non-compliance noted:

802.11b Mode

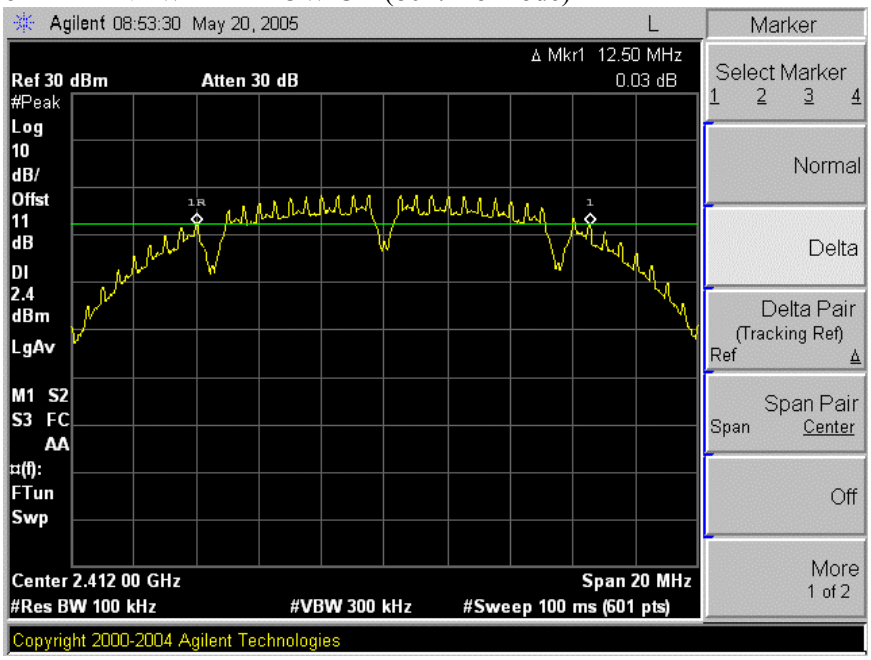
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	12500	500	12000
Middle	2437	12500	500	12000
High	2462	12500	500	12000

802.11g Mode

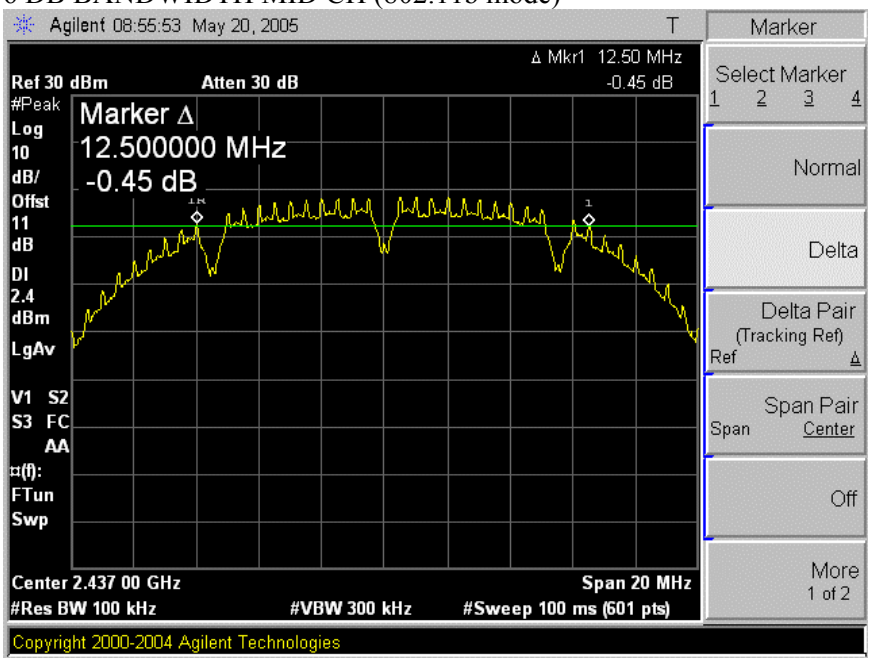
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	16370	500	15870
Middle	2437	16400	500	15900
High	2462	16370	500	15870

6 DB BANDWIDTH (802.11b MODE)

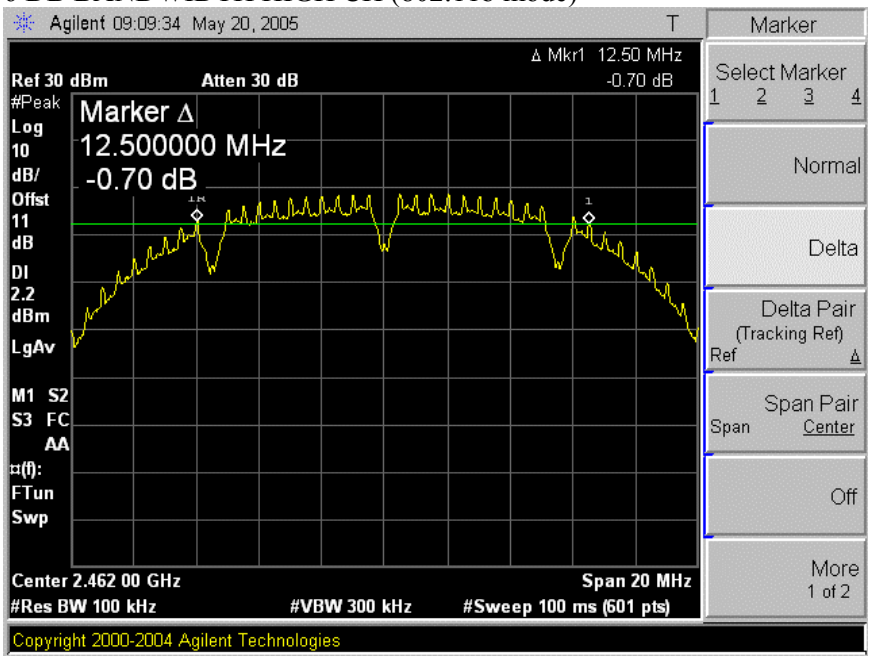
6 DB BANDWIDTH LOW CH (802.11b mode)



6 DB BANDWIDTH MID CH (802.11b mode)

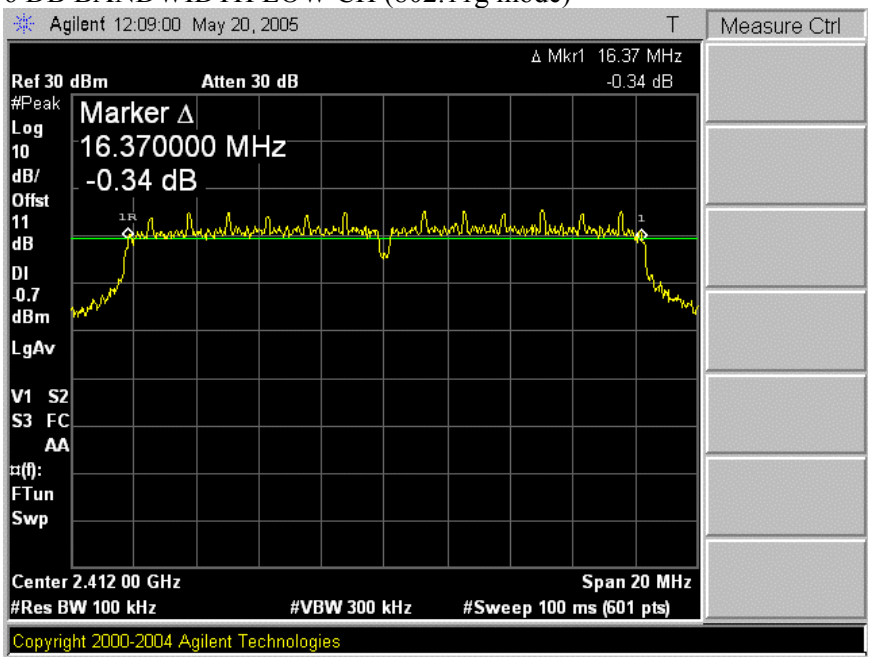


6 DB BANDWIDTH HIGH CH (802.11b mode)

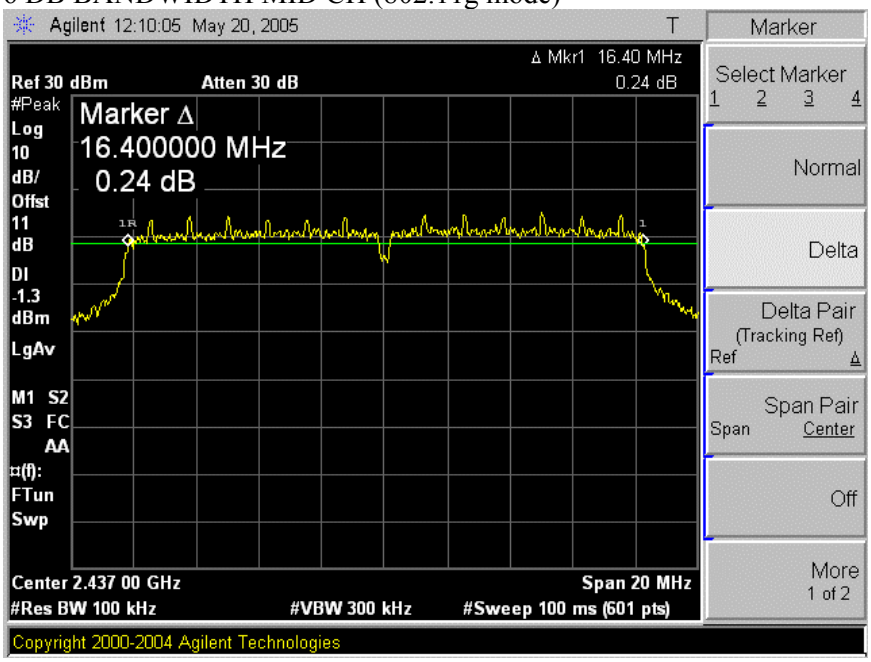


6 DB BANDWIDTH (802.11g MODE)

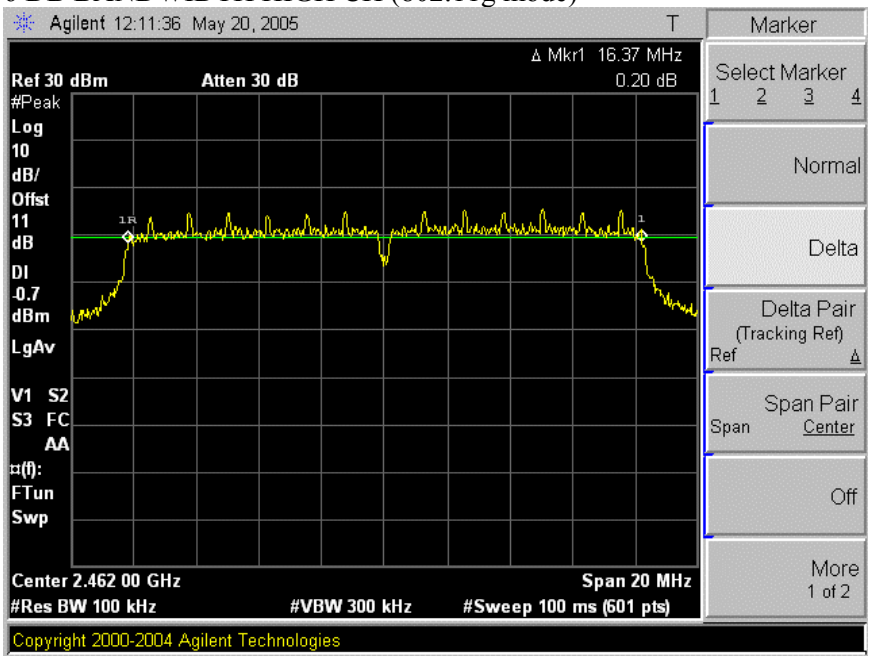
6 DB BANDWIDTH LOW CH (802.11g mode)



6 DB BANDWIDTH MID CH (802.11g mode)



6 DB BANDWIDTH HIGH CH (802.11g mode)



7.1.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

802.11b Mode

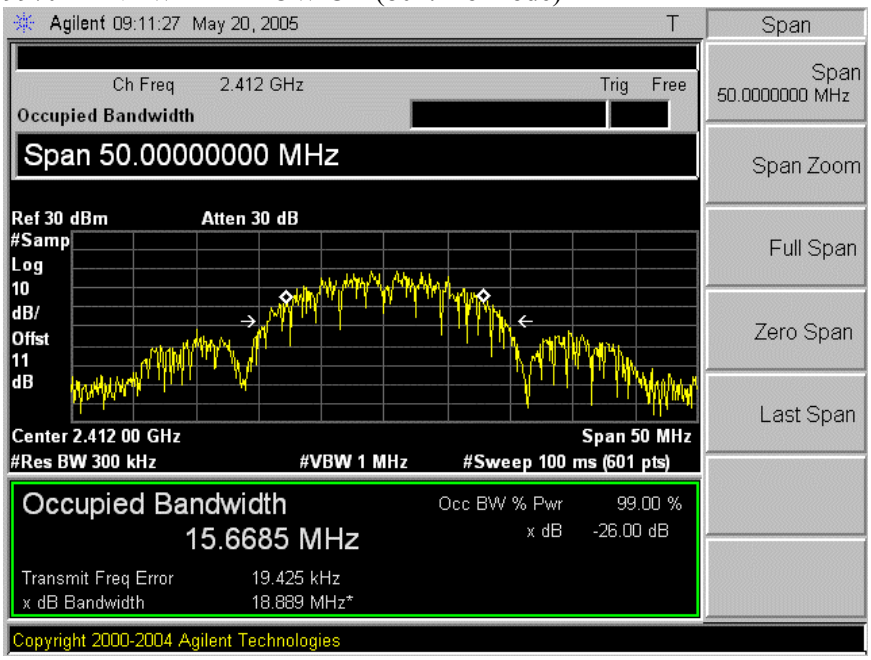
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	15.6685
Middle	2437	15.6483
High	2462	15.641

802.11g Mode

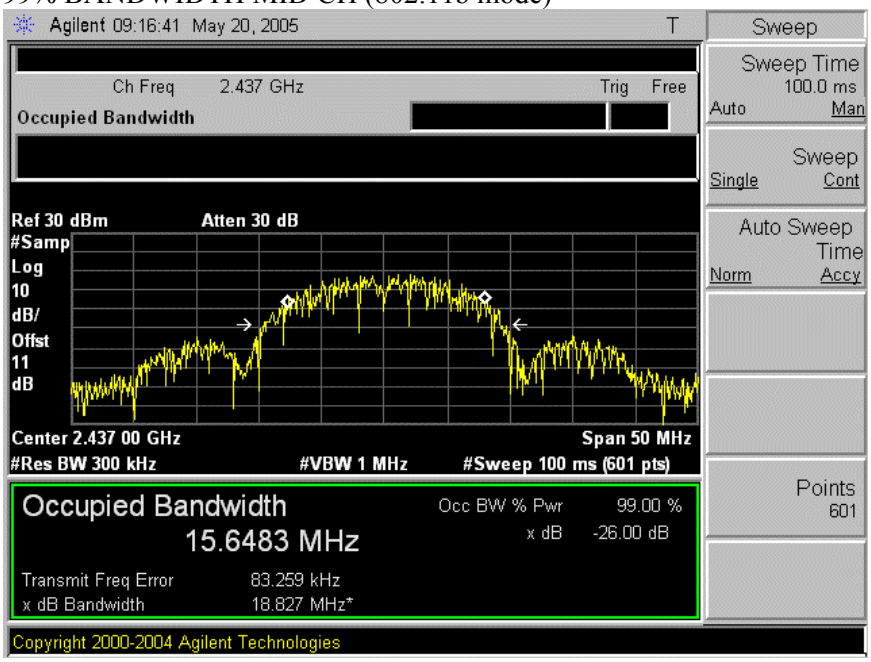
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2412	16.5573
Middle	2437	16.5223
High	2462	16.5477

99% BANDWIDTH (802.11b MODE)

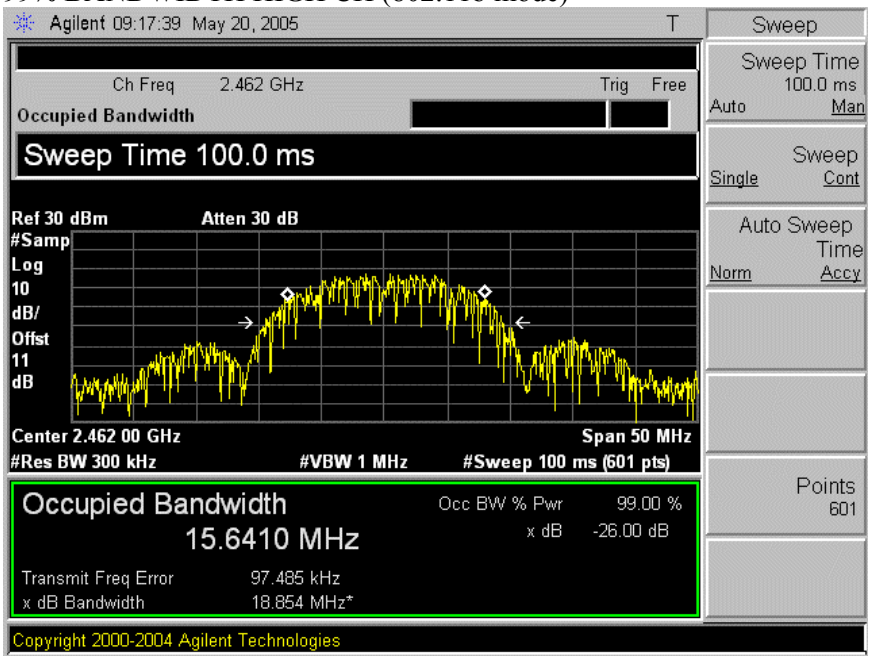
99% BANDWIDTH LOW CH (802.11b mode)



99% BANDWIDTH MID CH (802.11b mode)

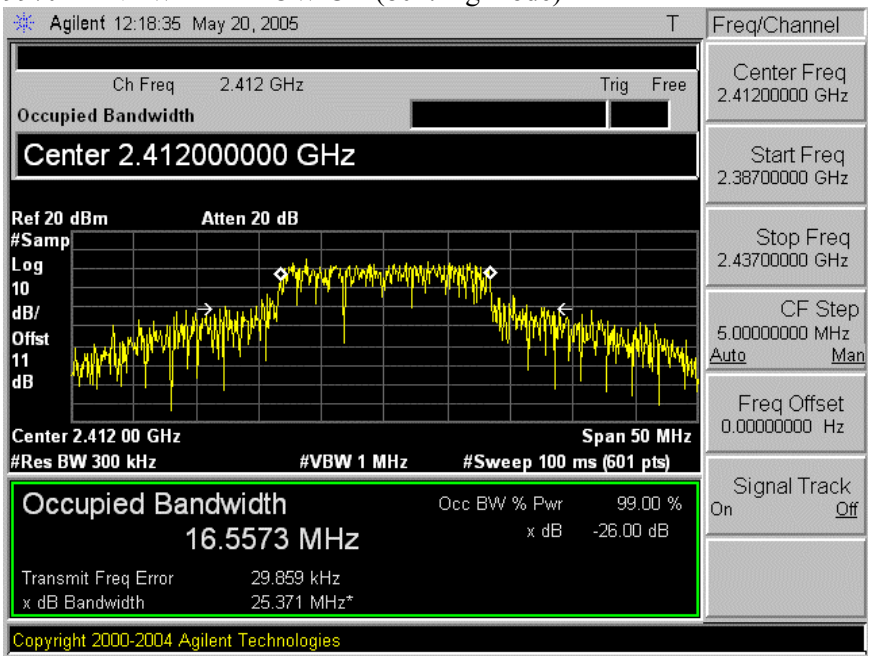


99% BANDWIDTH HIGH CH (802.11b mode)

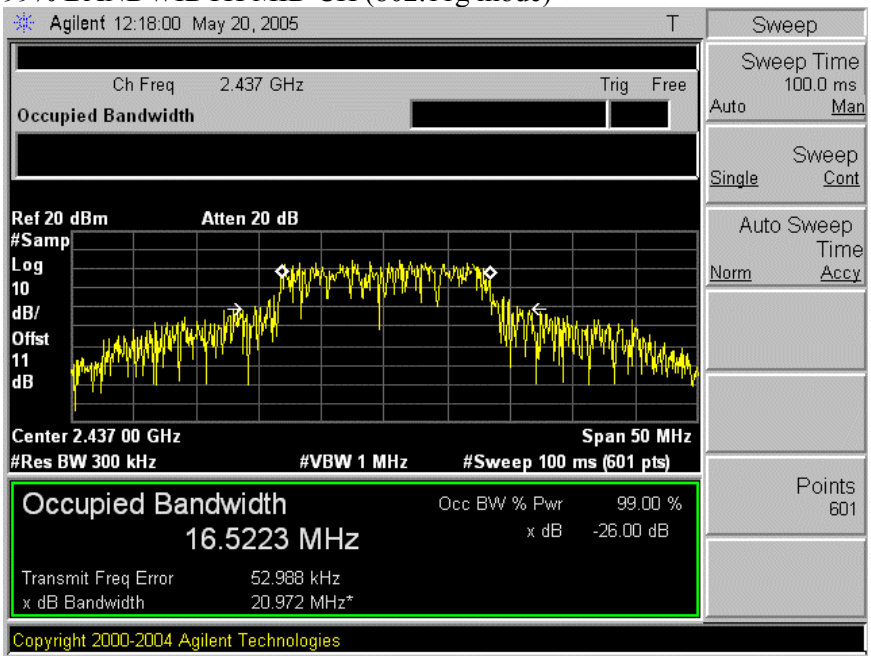


99% BANDWIDTH (802.11g MODE)

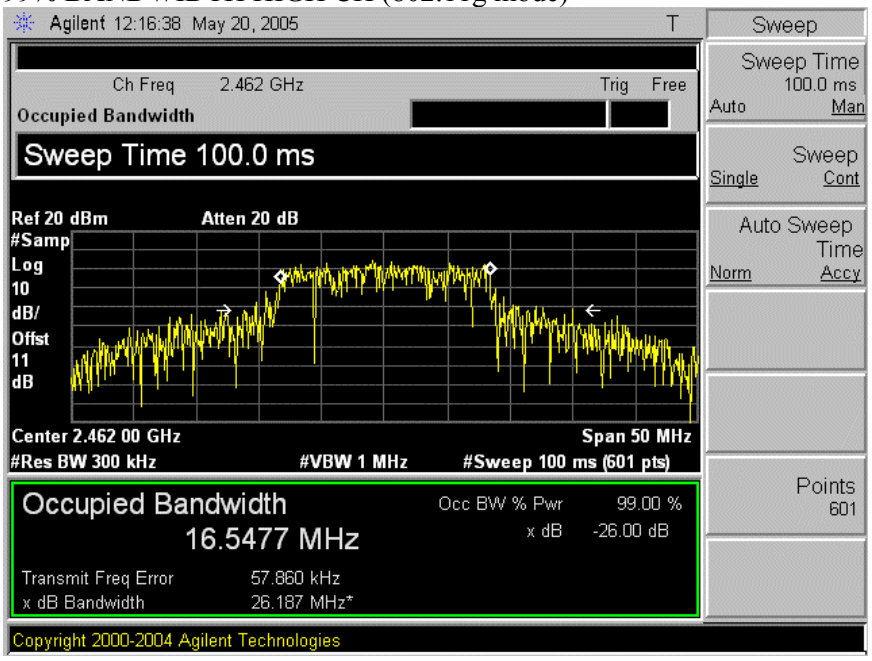
99% BANDWIDTH LOW CH (802.11g mode)



99% BANDWIDTH MID CH (802.11g mode)



99% BANDWIDTH HIGH CH (802.11g mode)



7.1.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

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

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

§15.247 (b) (4) Except as shown in paragraphs (b)(4) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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

TEST PROCEDURE

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

RESULTS

The maximum antenna gain is 4.24 dBi for other than fixed, or point-to-point operation, therefore the limit is 30 dBm.

No non-compliance noted:

802.11b Mode

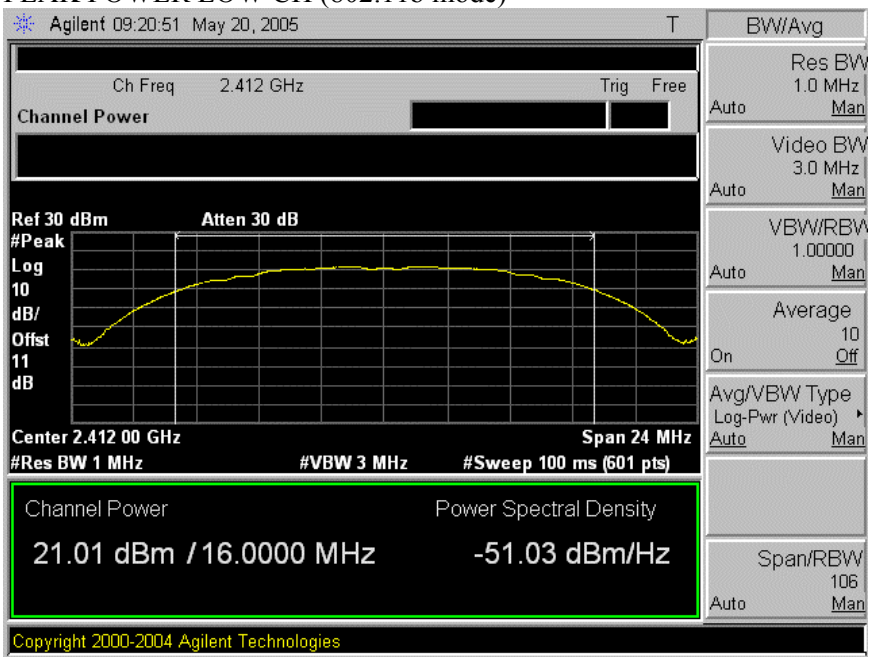
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	21.01	30	-8.99
Middle	2437	20.98	30	-9.02
High	2462	20.98	30	-9.02

802.11g Mode

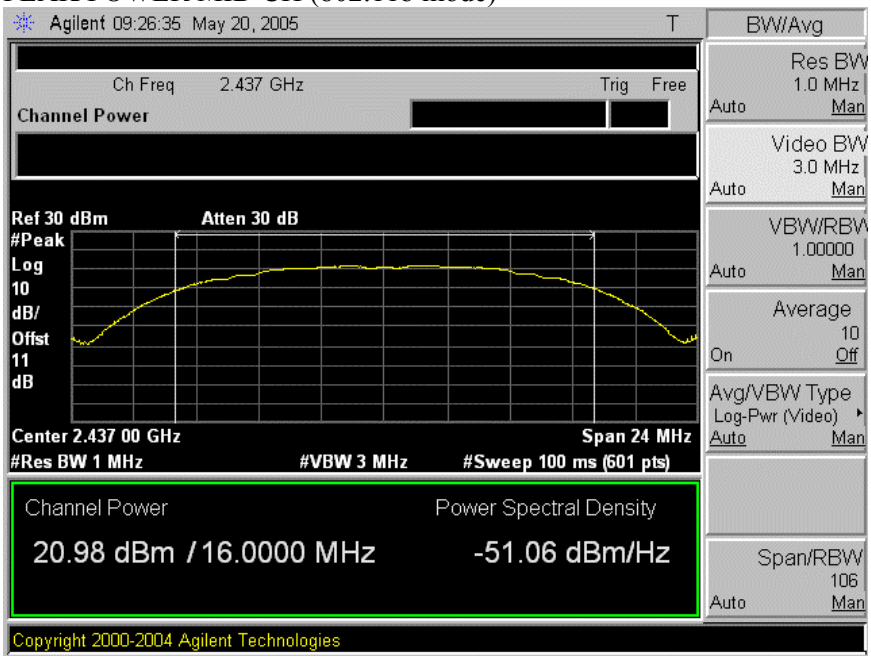
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	23.06	30	-6.94
Middle	2437	22.89	30	-7.11
High	2462	22.95	30	-7.05

OUTPUT POWER (802.11b MODE)

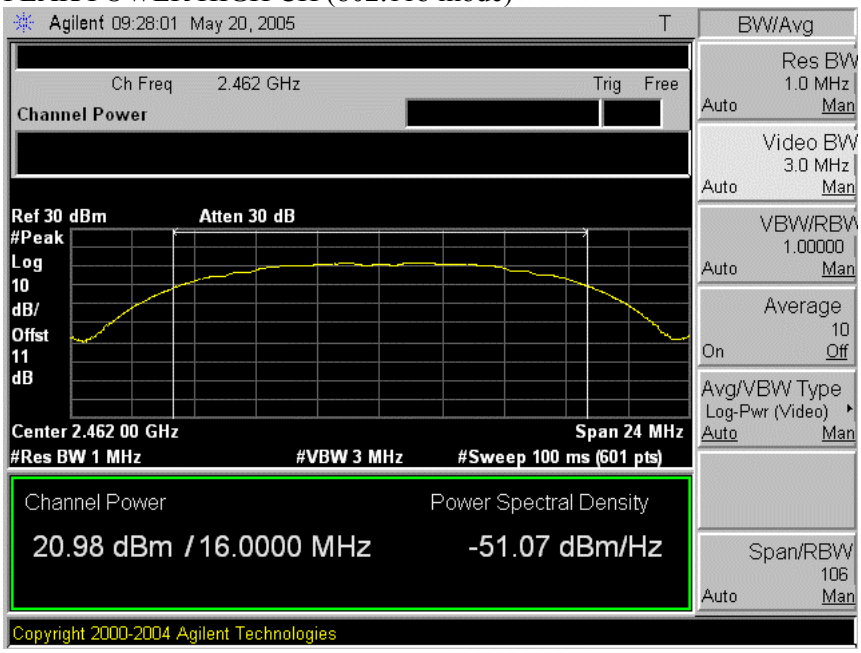
PEAK POWER LOW CH (802.11b mode)



PEAK POWER MID CH (802.11b mode)

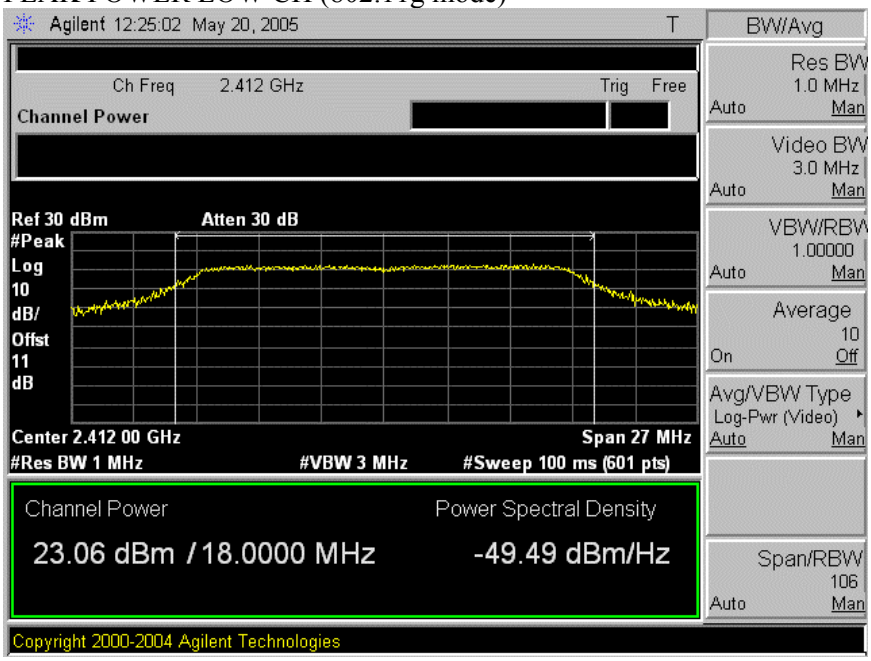


PEAK POWER HIGH CH (802.11b mode)

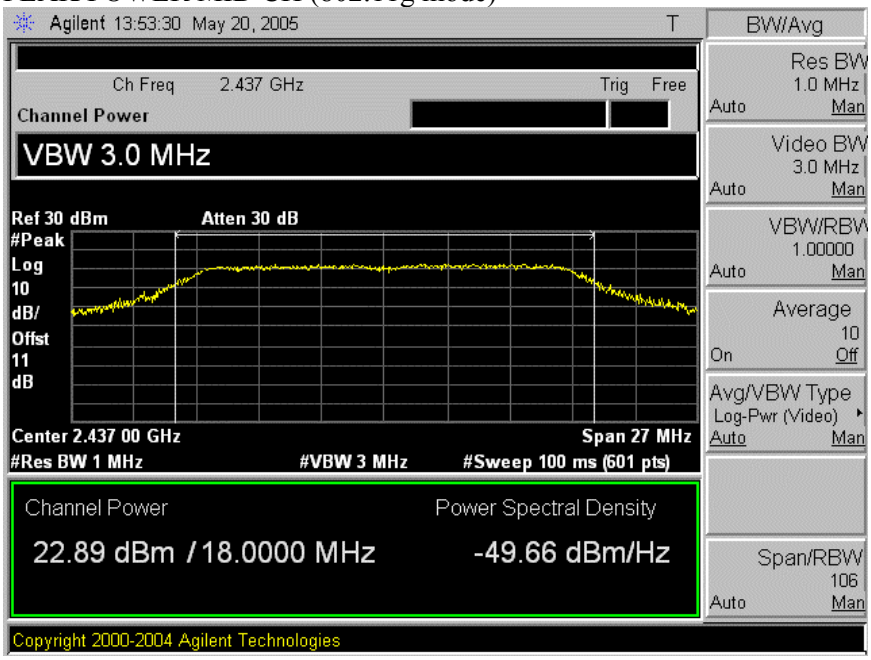


OUTPUT POWER (802.11g MODE)

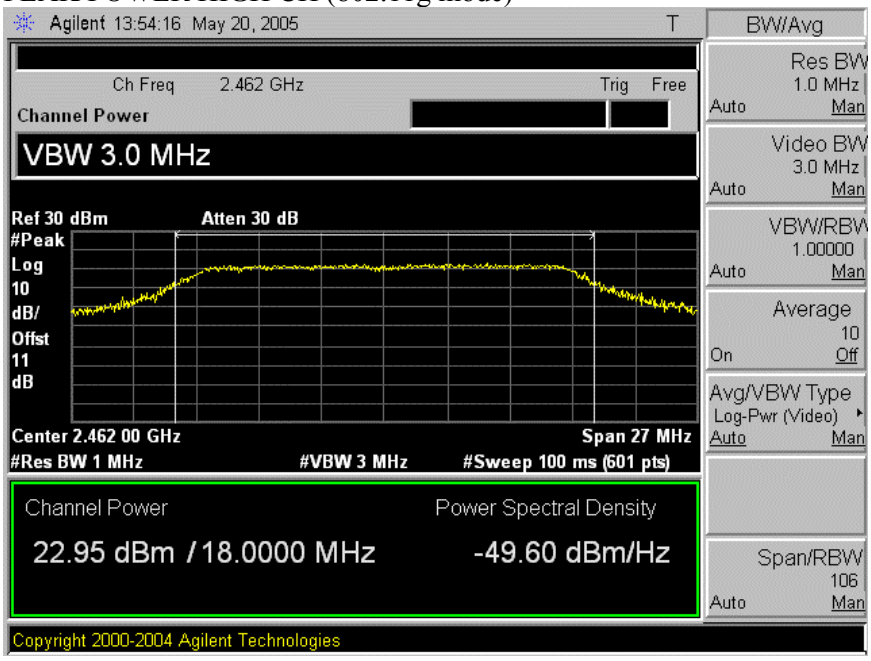
PEAK POWER LOW CH (802.11g mode)



PEAK POWER MID CH (802.11g mode)



PEAK POWER HIGH CH (802.11g mode)



7.1.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500	.....	.....	f/300	6
1500–100,000	.....	.....	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500	.....	.....	f/1500	30
1500–100,000	.....	.....	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E \wedge 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 \wedge ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11b	1.0	21.01	4.24	5.16
802.11g	1.0	23.06	4.24	6.54

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.1.5. 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 dB (including 10 dB pad and 1.0 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	18.25
Middle	2437	18.00
High	2462	18.13

802.11g Mode

Channel	Frequency (MHz)	Power (dBm)
Low	2412	16.06
Middle	2437	16.24
High	2462	15.90

7.1.6. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

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

RESULTS

No non-compliance noted:

802.11b Mode

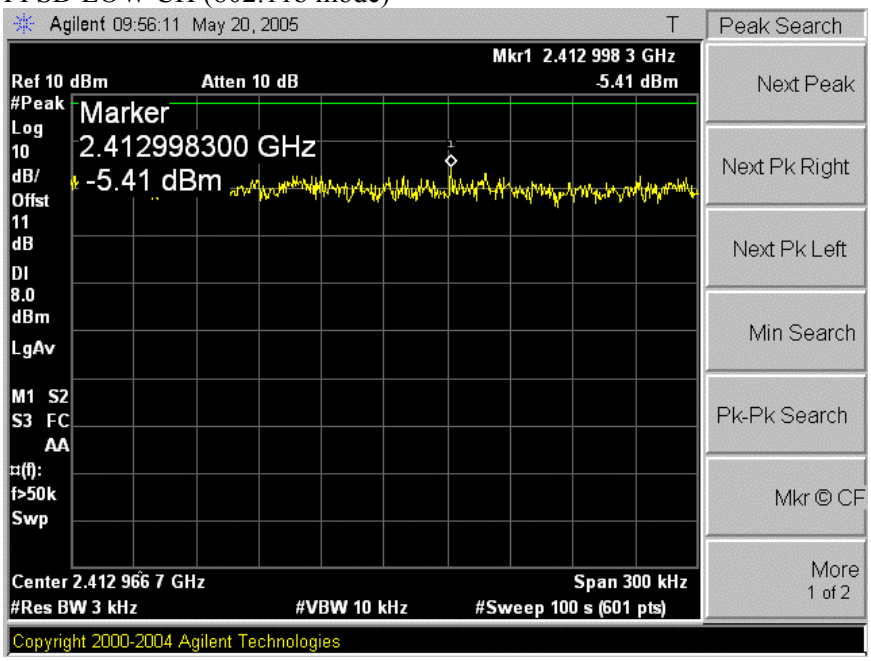
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-5.41	8	-13.41
Middle	2437	-5.54	8	-13.54
High	2462	-4.41	8	-12.41

802.11g Mode

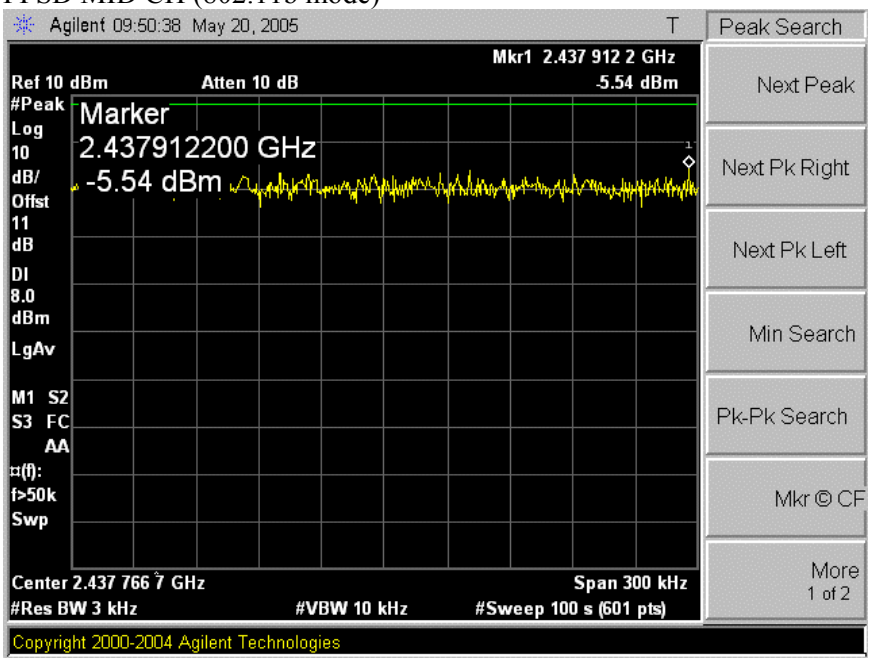
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-8.83	8	-16.83
Middle	2437	-7.99	8	-15.99
High	2462	-8.08	8	-16.08

PEAK POWER SPECTRAL DENSITY (802.11b MODE)

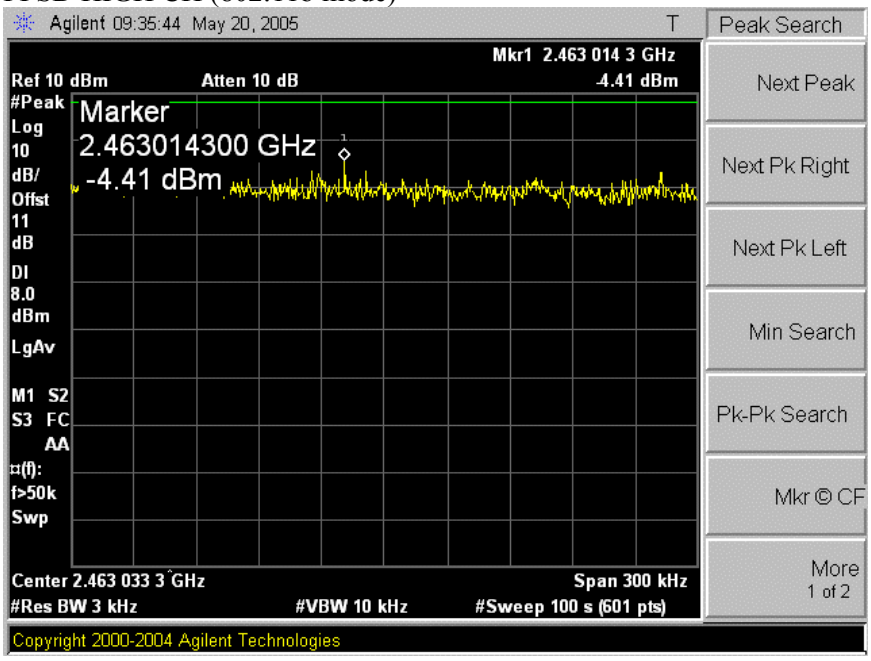
PPSD LOW CH (802.11b mode)



PPSD MID CH (802.11b mode)

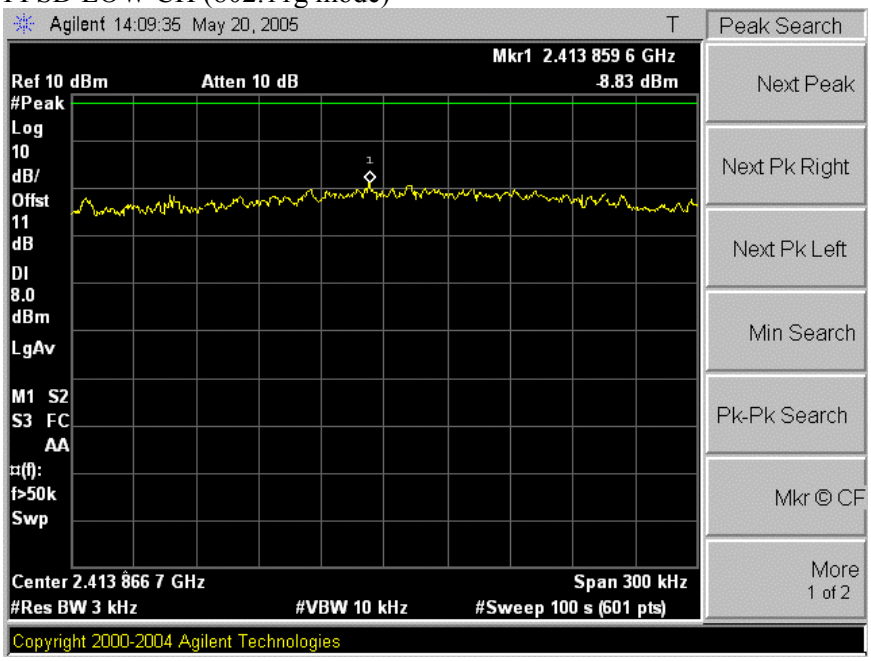


PPSD HIGH CH (802.11b mode)

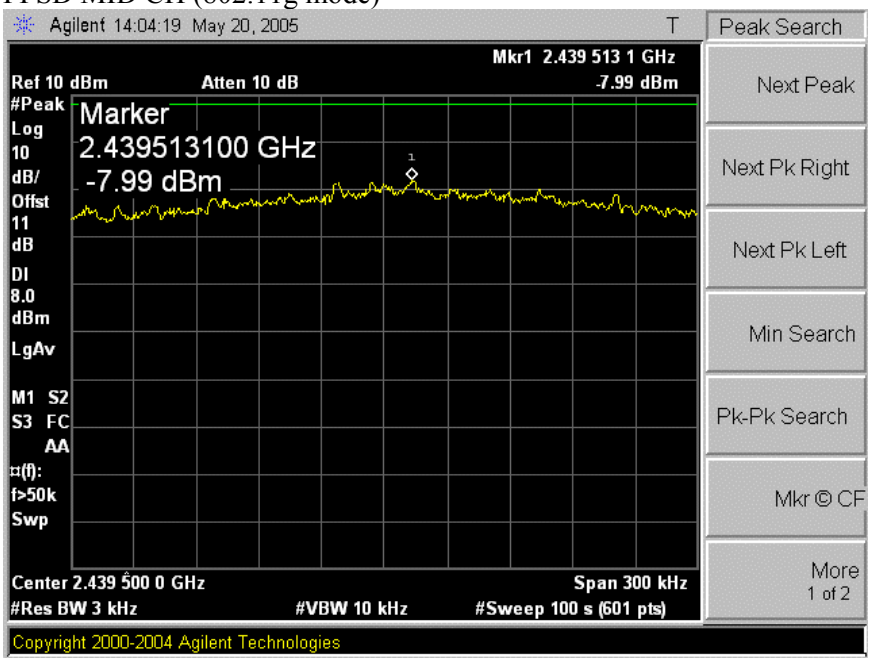


PEAK POWER SPECTRAL DENSITY (802.11g MODE)

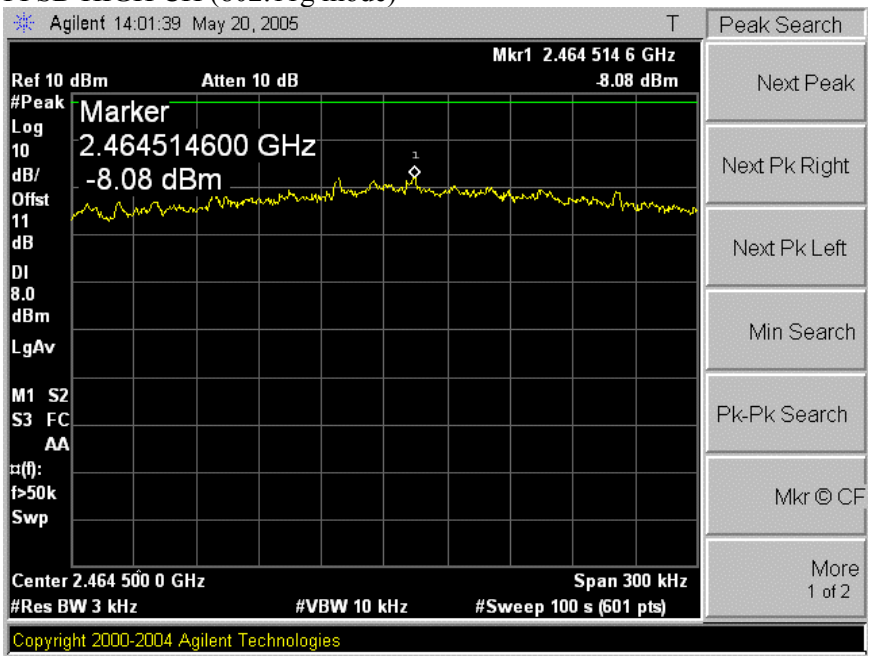
PPSD LOW CH (802.11g mode)



PPSD MID CH (802.11g mode)



PPSD HIGH CH (802.11g mode)



7.1.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

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

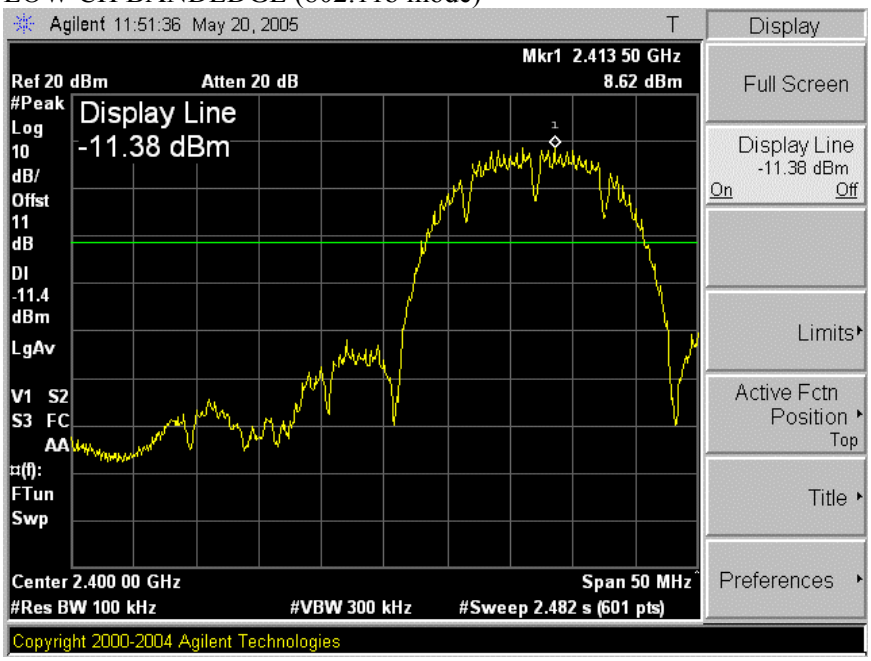
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

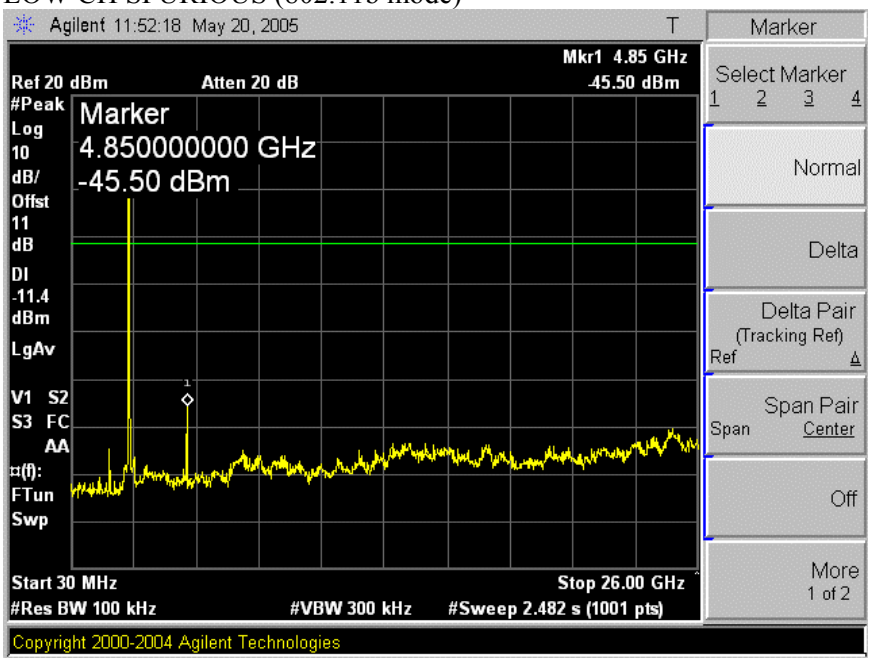
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)

LOW CH BANDEDGE (802.11b mode)

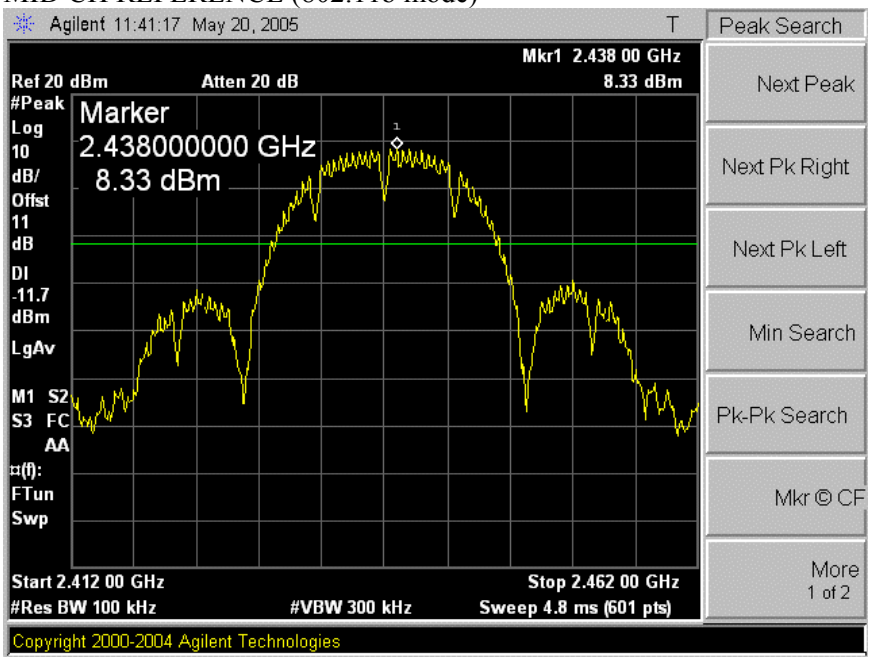


LOW CH SPURIOUS (802.11b mode)

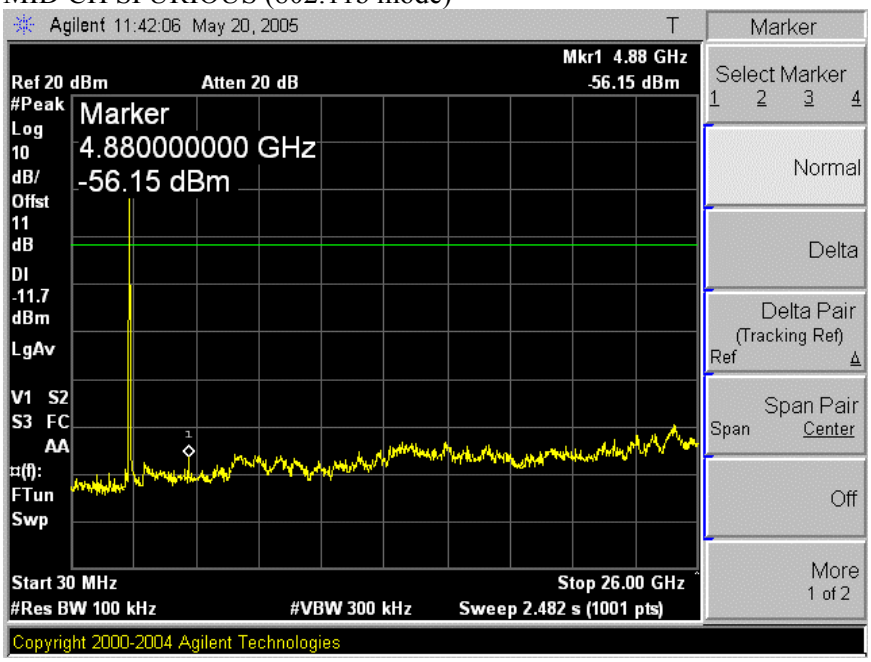


SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)

MID CH REFERENCE (802.11b mode)



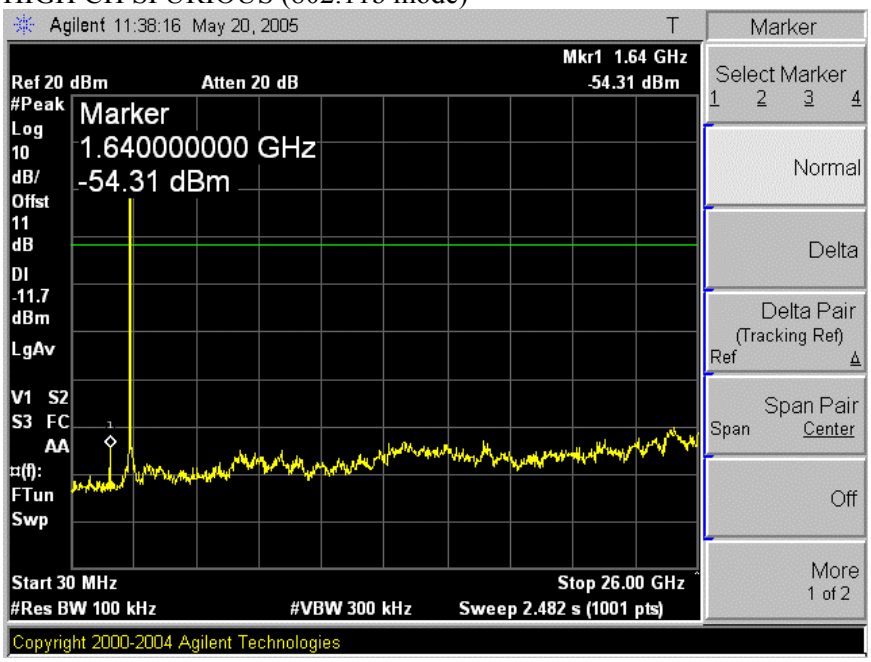
MID CH SPURIOUS (802.11b mode)



SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)

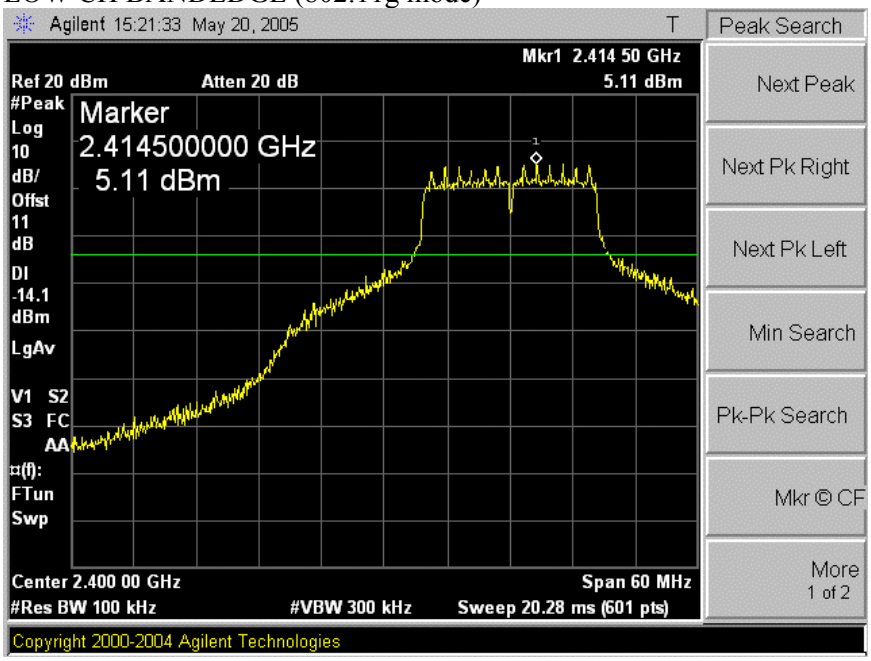
HIGH CH BANDEDGE (802.11b mode)

HIGH CH SPURIOUS (802.11b mode)

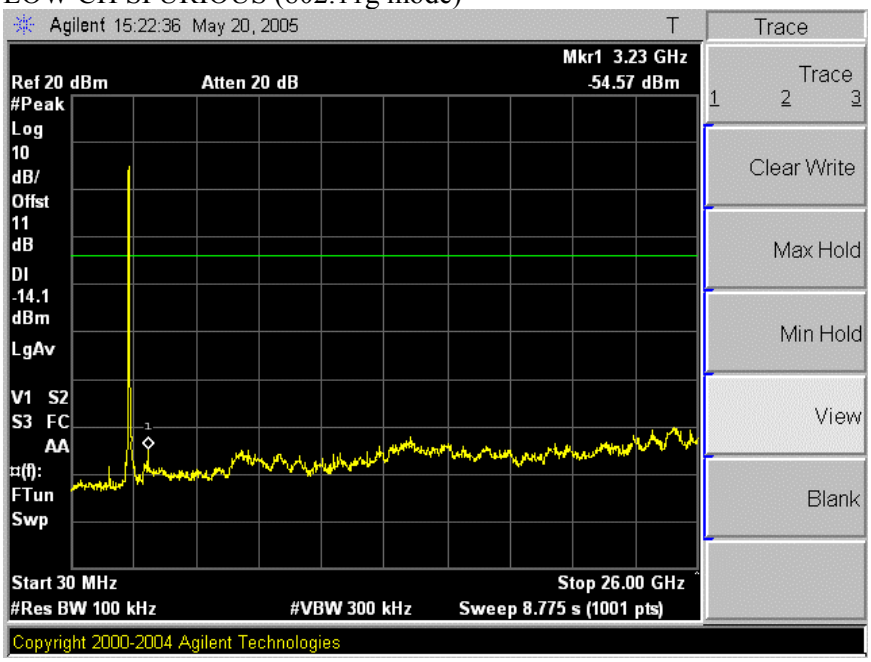


SPURIOUS EMISSIONS, LOW CHANNEL (802.11g MODE)

LOW CH BANDEDGE (802.11g mode)

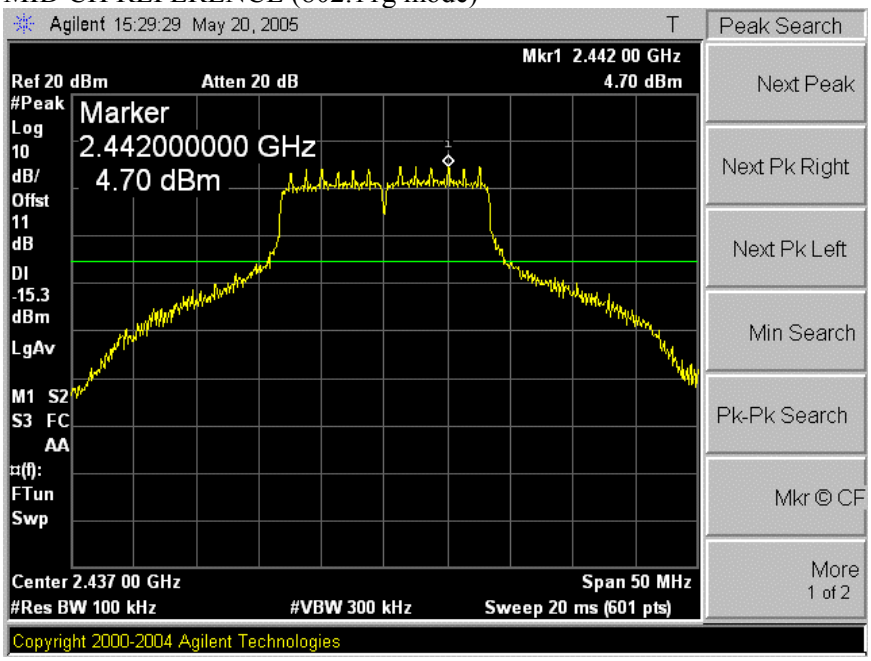


LOW CH SPURIOUS (802.11g mode)

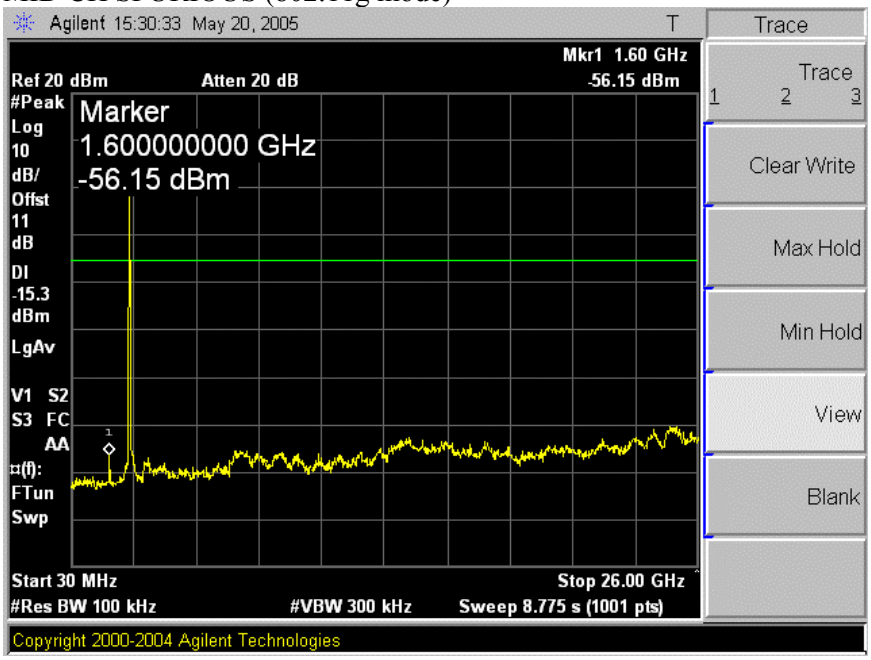


SPURIOUS EMISSIONS, MID CHANNEL (802.11g MODE)

MID CH REFERENCE (802.11g mode)

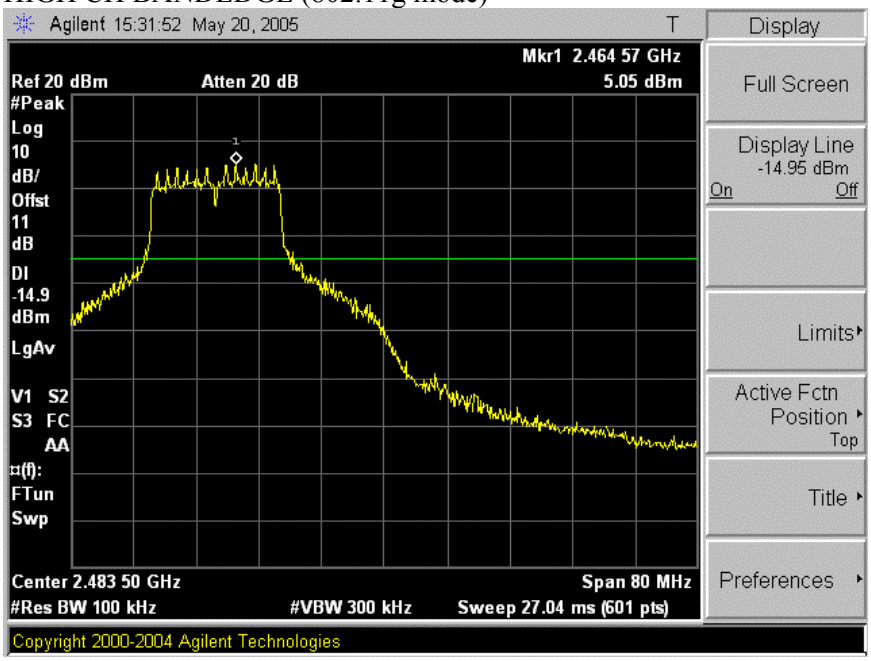


MID CH SPURIOUS (802.11g mode)

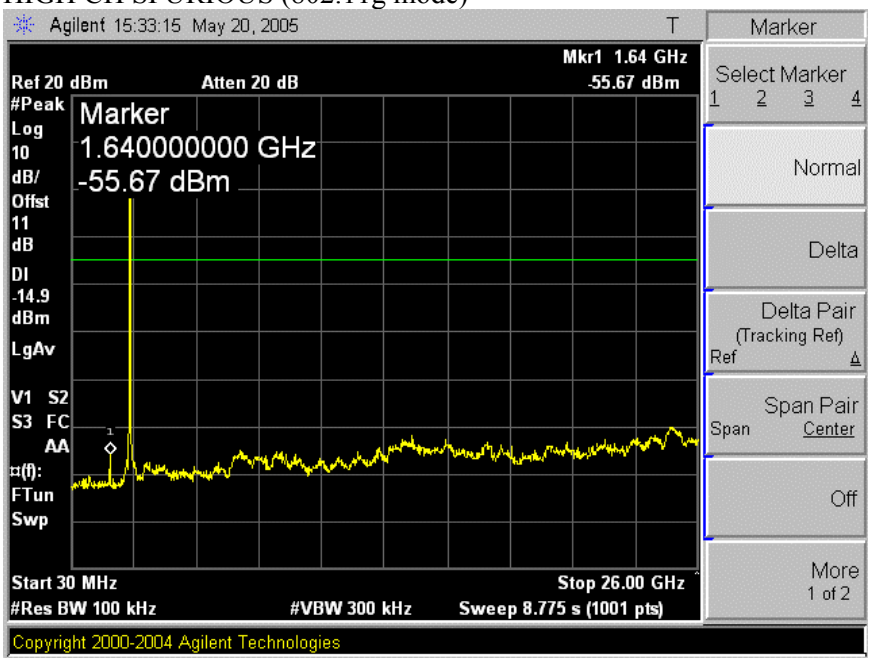


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11g MODE)

HIGH CH BANDEDGE (802.11g mode)



HIGH CH SPURIOUS (802.11g mode)



7.2. CHANNEL TESTS FOR THE 5725 TO 5850 MHz BAND

7.2.1. 6 dB BANDWIDTH

LIMIT

§15.247 (a) (2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is set to 100 kHz and the VBW is set to 300 kHz. The sweep time is coupled.

RESULTS

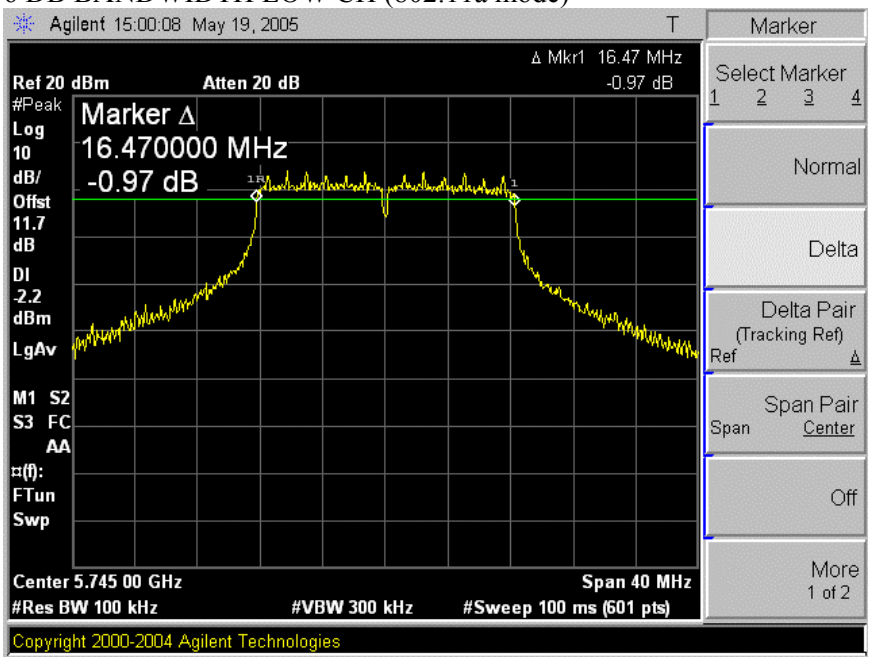
No non-compliance noted:

802.11a Mode

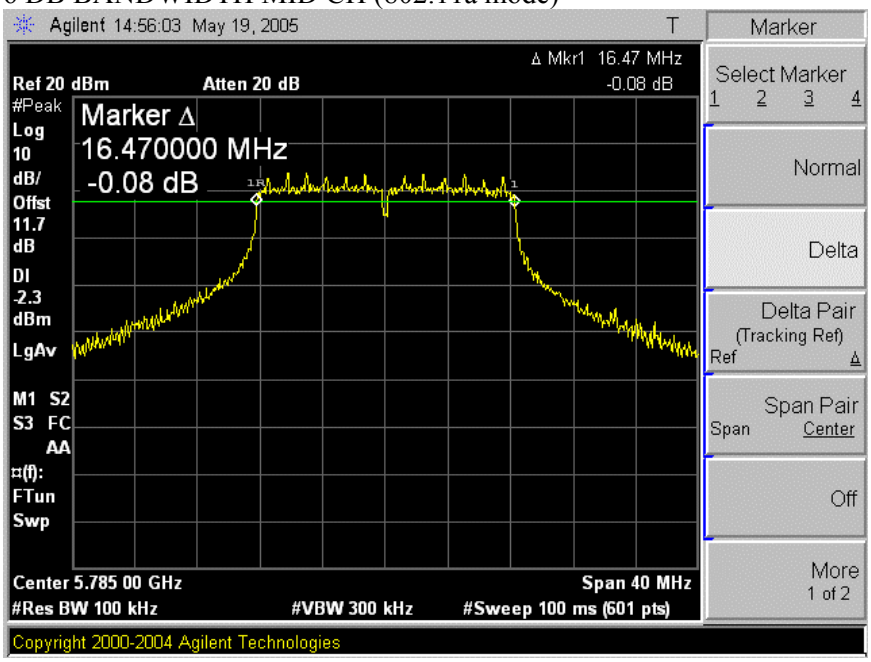
Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	5745	16470	500	15970
Middle	5785	16470	500	15970
High	5825	16470	500	15970

6 DB BANDWIDTH (802.11a MODE)

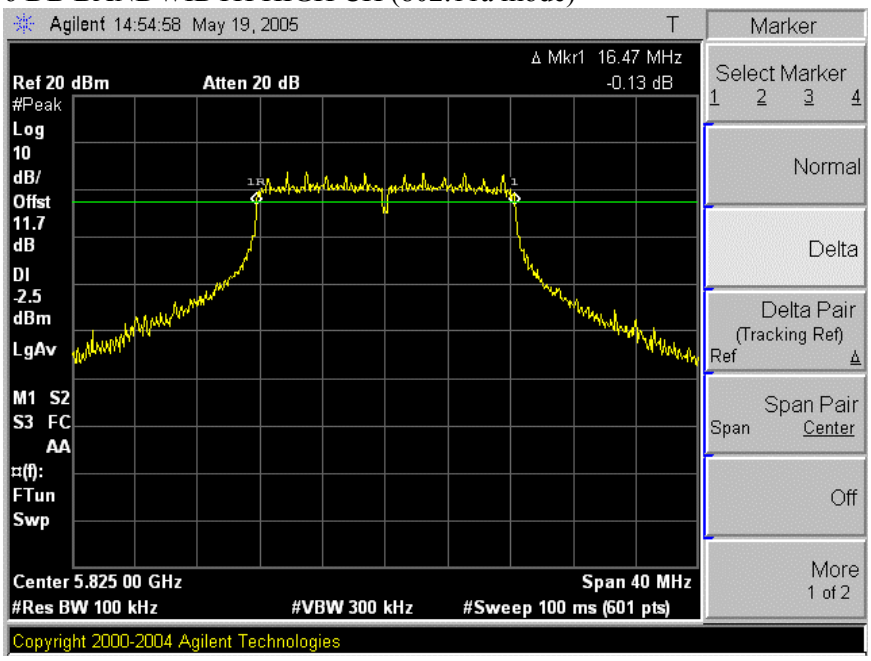
6 DB BANDWIDTH LOW CH (802.11a mode)



6 DB BANDWIDTH MID CH (802.11a mode)



6 DB BANDWIDTH HIGH CH (802.11a mode)



7.2.2. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

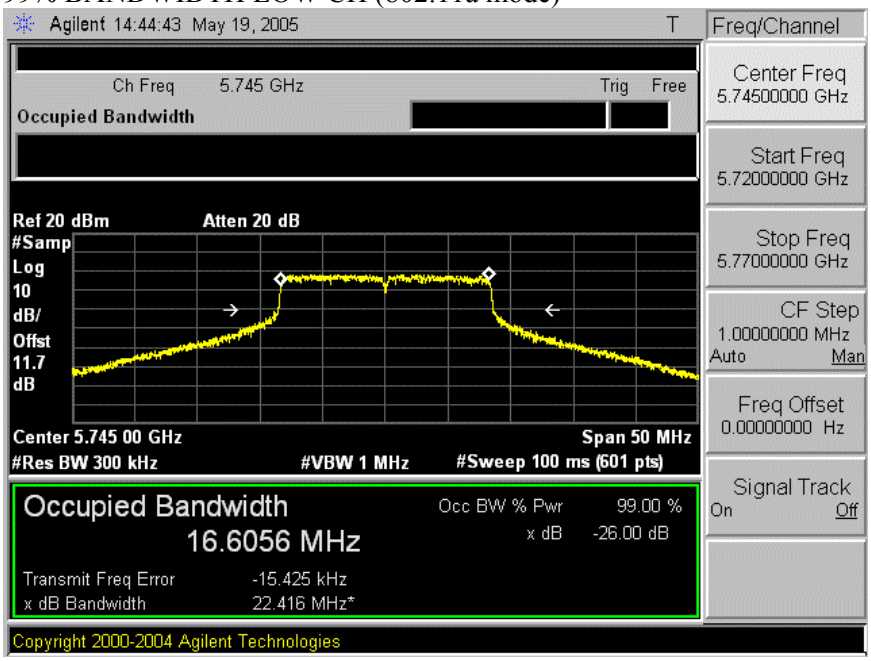
No non-compliance noted:

802.11a Mode

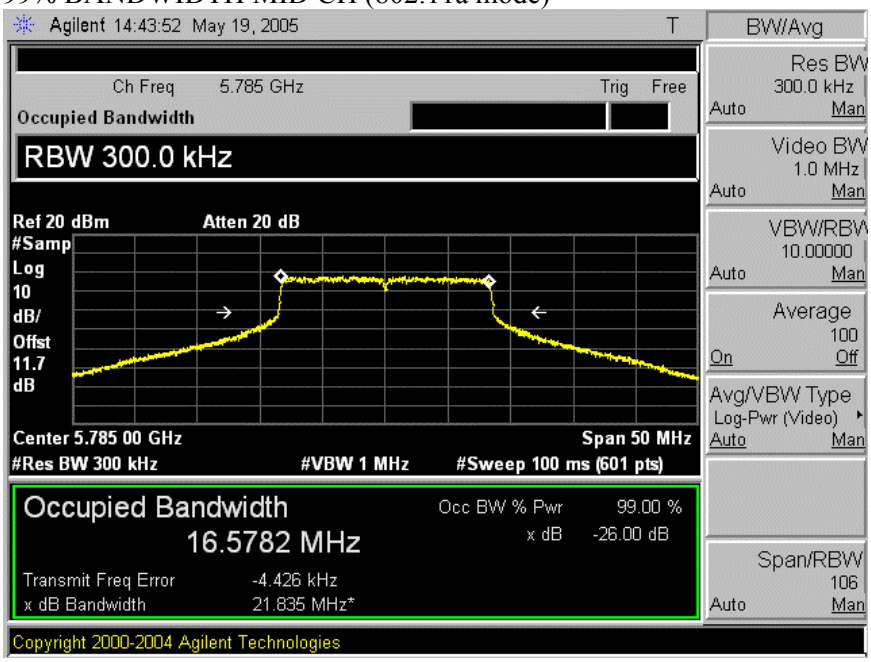
Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	5745	16.6056
Middle	5785	16.5782
High	5825	16.503

99% BANDWIDTH (802.11a MODE)

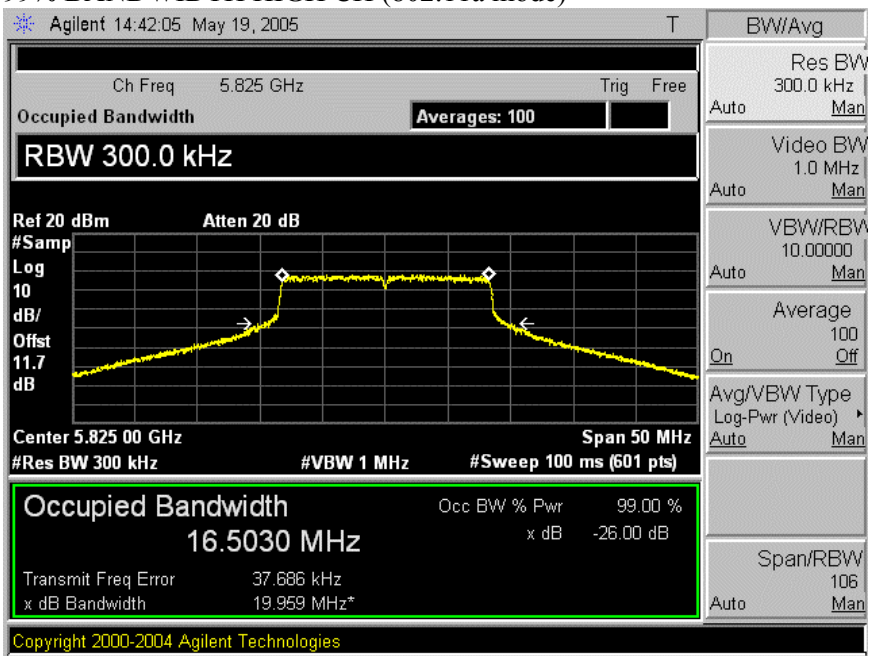
99% BANDWIDTH LOW CH (802.11a mode)



99% BANDWIDTH MID CH (802.11a mode)



99% BANDWIDTH HIGH CH (802.11a mode)



7.2.3. PEAK OUTPUT POWER

PEAK POWER LIMIT

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

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

§15.247 (b) (4) Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

§15.247 (b) (4) (ii) Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

TEST PROCEDURE

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

RESULTS

The maximum antenna gain is 4.12 dBi for other than fixed, or point-to-point operation, therefore the limit is 30 dBm.

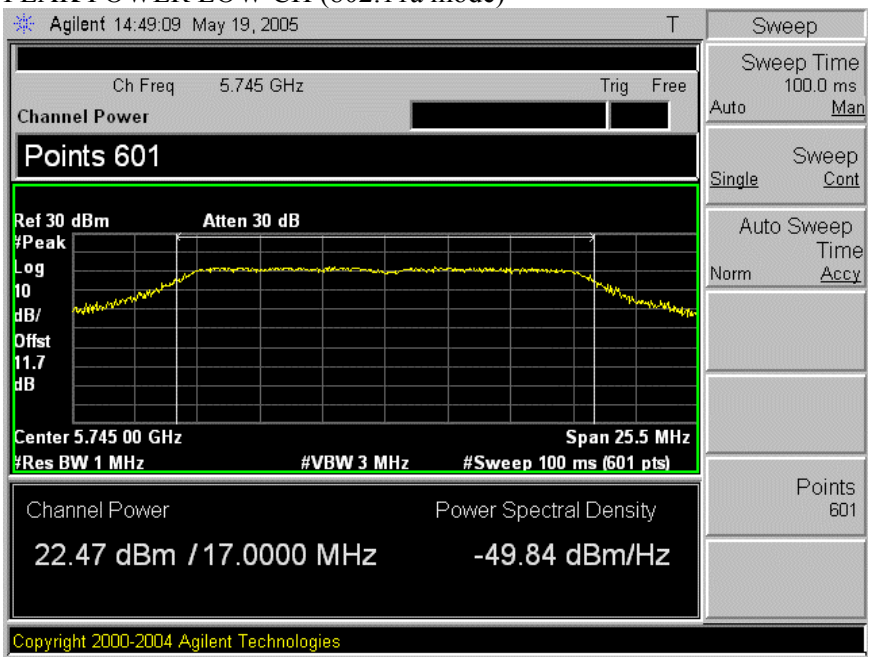
No non-compliance noted:

802.11a Mode

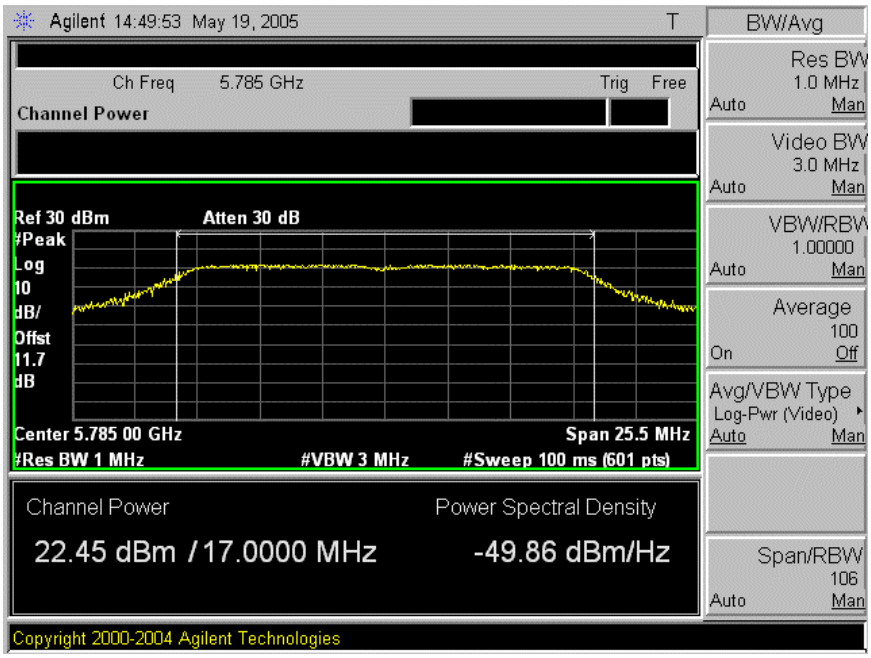
Channel	Frequency (MHz)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	5745	22.47	30	-7.53
Middle	5785	22.45	30	-7.55
High	5825	22.45	30	-7.55

OUTPUT POWER (802.11a MODE)

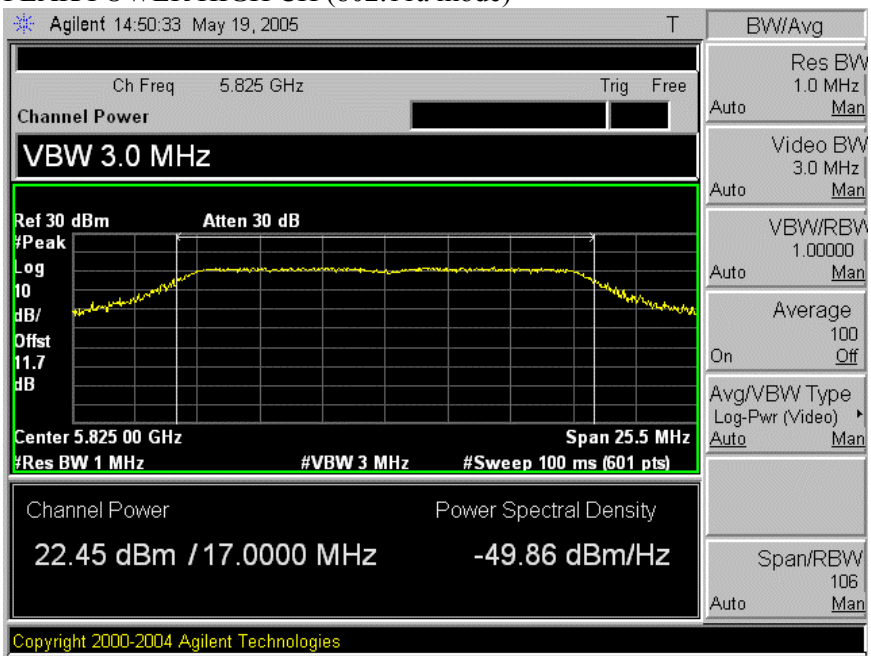
PEAK POWER LOW CH (802.11a mode)



PEAK POWER MID CH (802.11a mode)



PEAK POWER HIGH CH (802.11a mode)



7.2.4. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f^2)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f^2)	30

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

CALCULATIONS

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E ^ 2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10 ^ ((P + G) / 20) / \sqrt{S}$ Equation (1)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.

LIMITS

From §1.1310 Table 1 (B), S = 1.0 mW/cm^2

RESULTS

No non-compliance noted:

Mode	Power Density Limit (mW/cm^2)	Output Power (dBm)	Antenna Gain (dBi)	MPE Distance (cm)
802.11a	1.0	22.47	4.12	6.02

NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

7.2.5. 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 11.7 dB (including 10 dB pad and 1.7dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11a Mode

Channel	Frequency (MHz)	Average Power (dBm)
Low	5745	15.15
Middle	5785	15.24
High	5825	15.20

7.2.6. PEAK POWER SPECTRAL DENSITY

LIMIT

§15.247 (d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

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

RESULTS

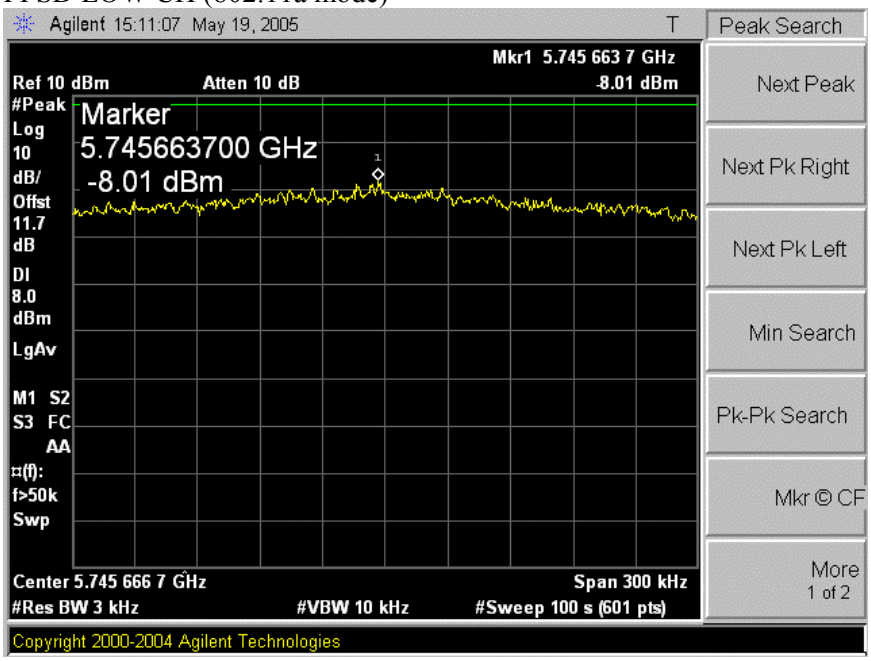
No non-compliance noted:

802.11a Mode

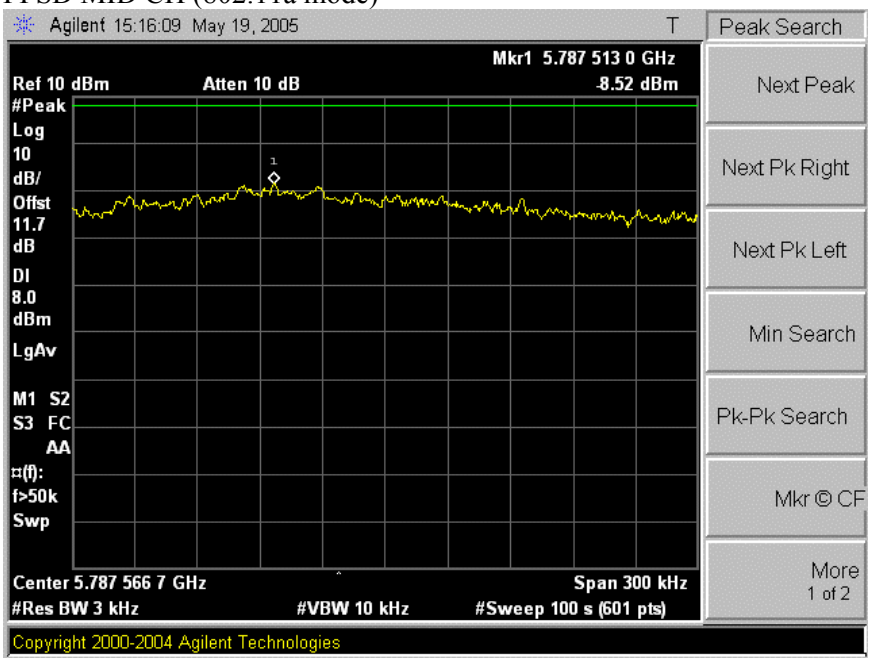
Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	5745	-8.01	8	-16.01
Middle	5785	-8.52	8	-16.52
High	5825	-9.75	8	-17.75

PEAK POWER SPECTRAL DENSITY (802.11a MODE)

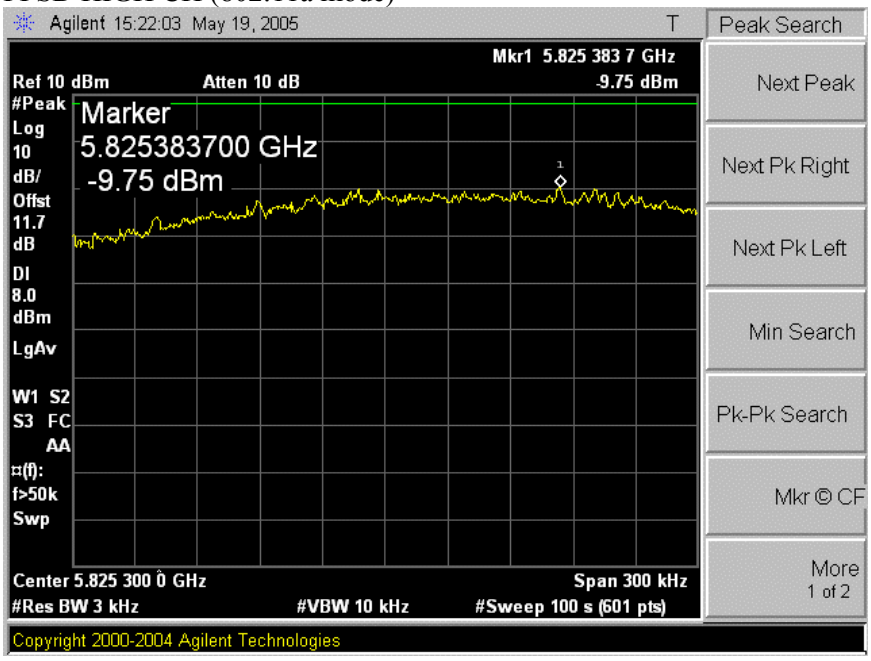
PPSD LOW CH (802.11a mode)



PPSD MID CH (802.11a mode)



PPSD HIGH CH (802.11a mode)



7.2.7. CONDUCTED SPURIOUS EMISSIONS

LIMITS

§15.247 (c) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in§15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

TEST PROCEDURE

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

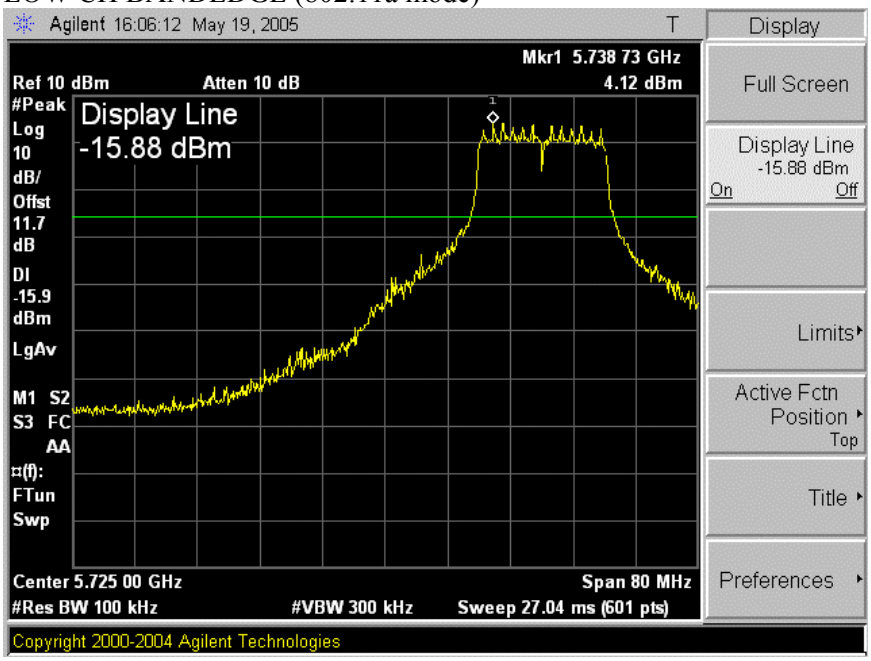
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

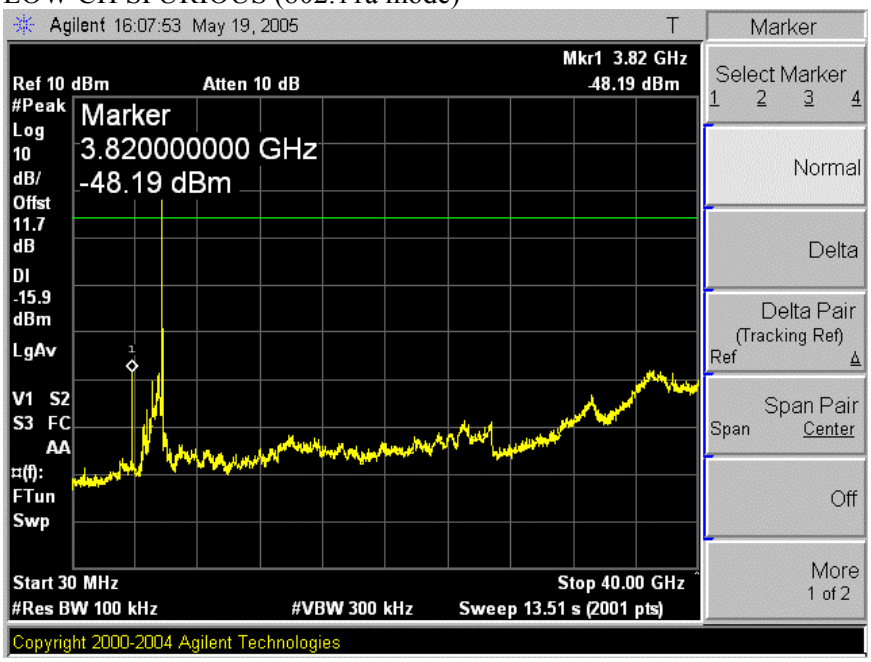
No non-compliance noted:

SPURIOUS EMISSIONS, LOW CHANNEL (802.11a MODE)

LOW CH BANDEDGE (802.11a mode)

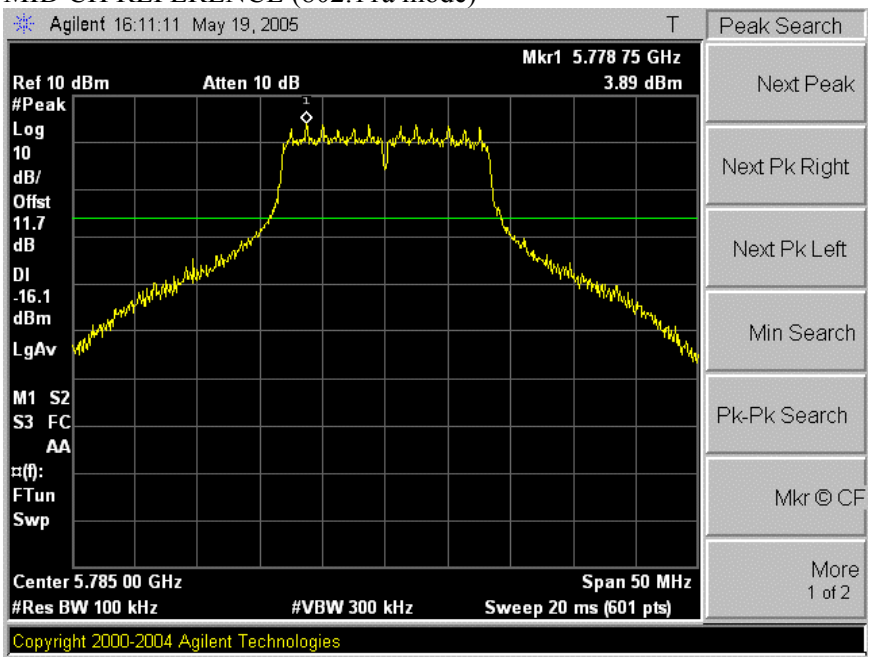


LOW CH SPURIOUS (802.11a mode)

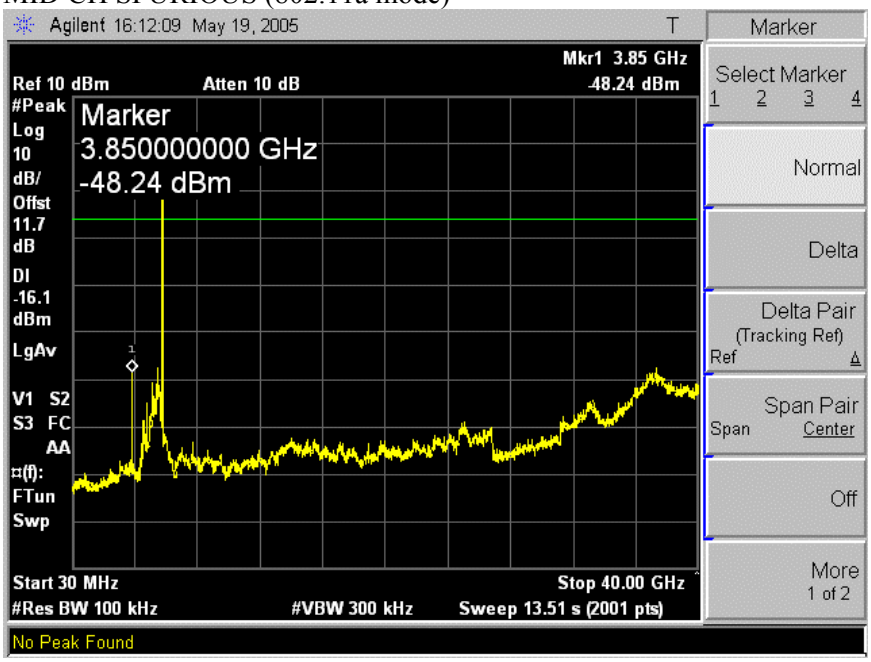


SPURIOUS EMISSIONS, MID CHANNEL (802.11a MODE)

MID CH REFERENCE (802.11a mode)

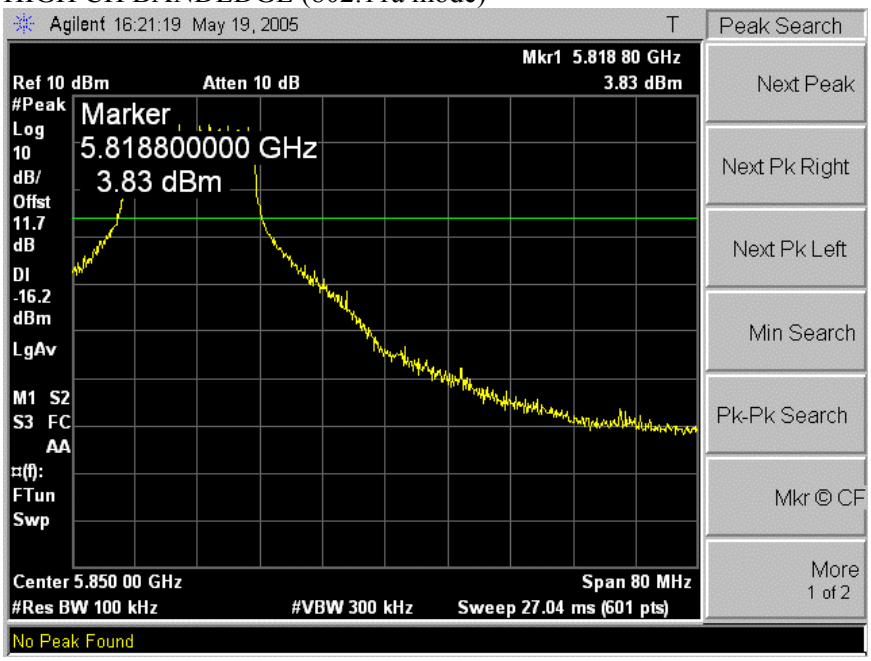


MID CH SPURIOUS (802.11a mode)

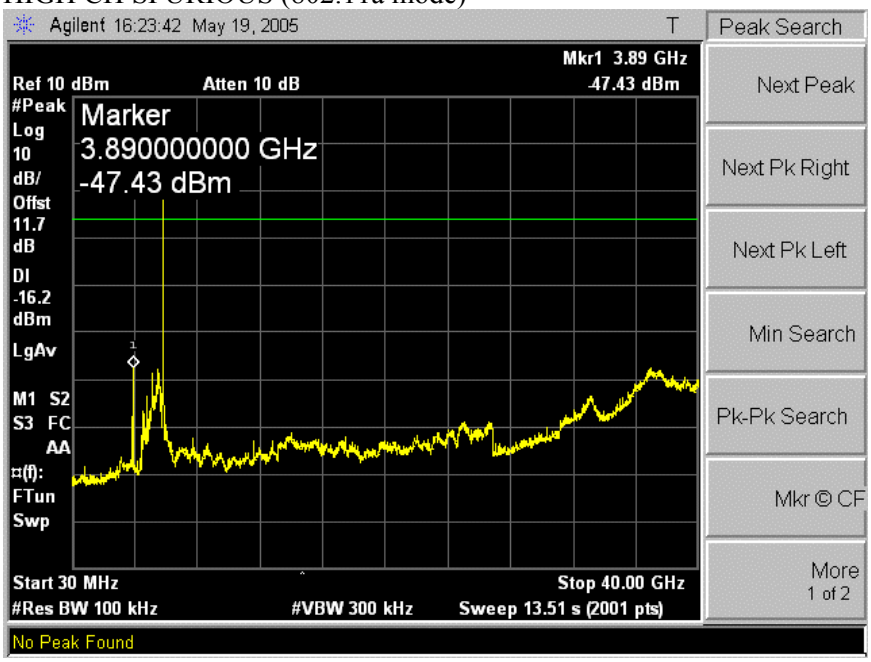


SPURIOUS EMISSIONS, HIGH CHANNEL (802.11a MODE)

HIGH CH BANDEDGE (802.11a mode)



HIGH CH SPURIOUS (802.11a mode)



7.3. RADIATED EMISSIONS

7.3.1. TRANSMITTER RADIATED SPURIOUS EMISSIONS

LIMITS

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

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[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 in the 2.4 GHz band.

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

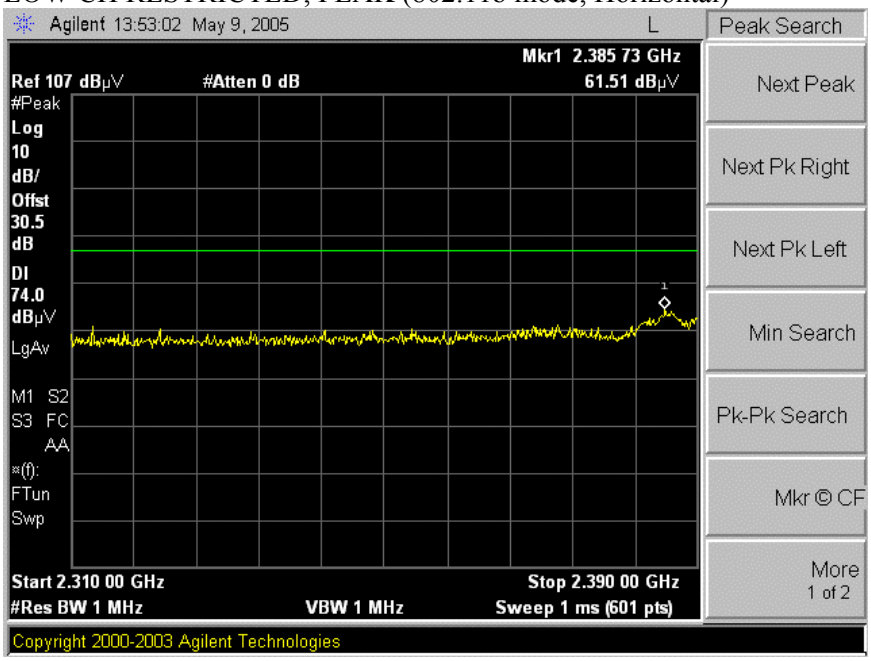
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

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

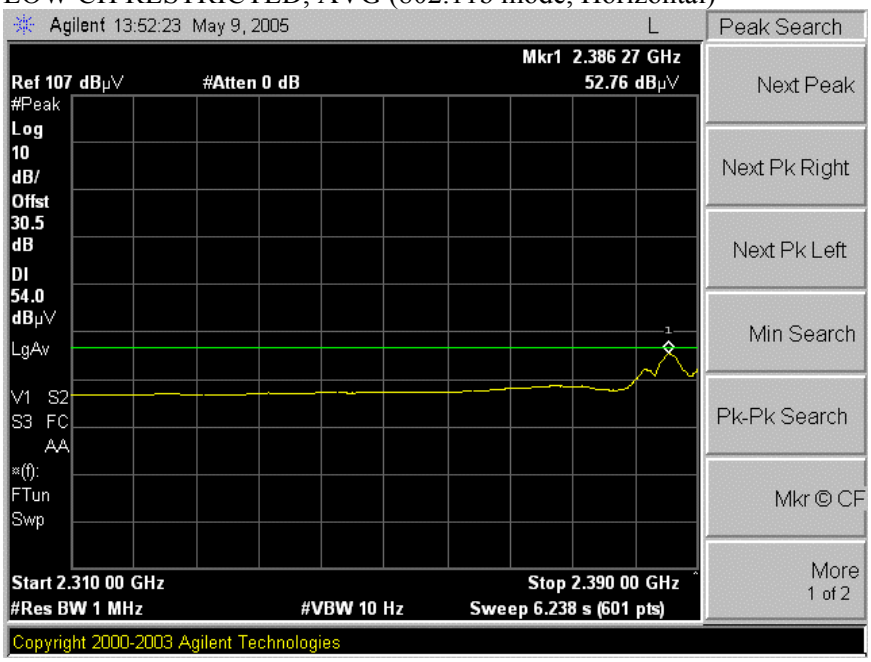
MOBILE CONFIGURATION

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Horizontal)

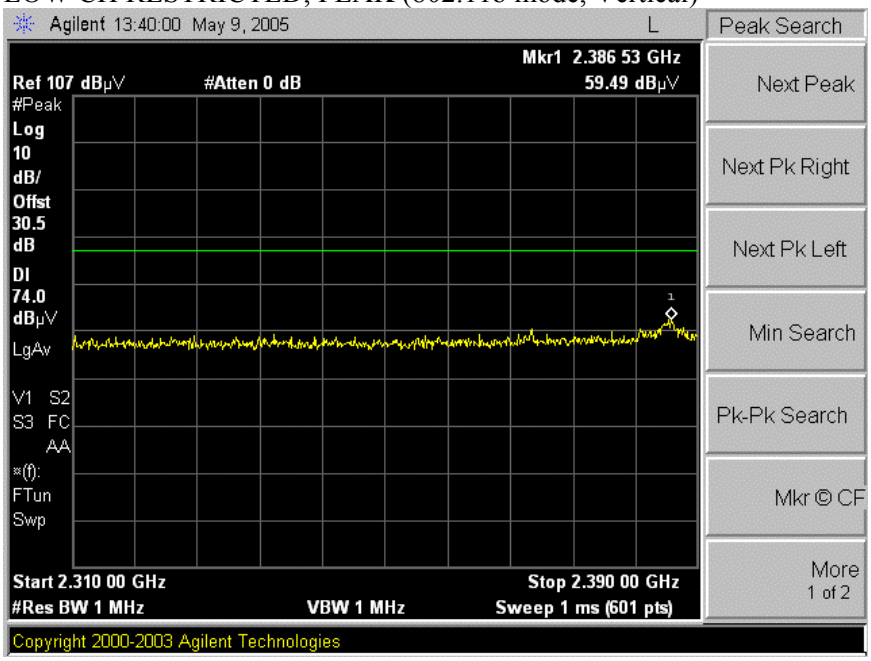


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

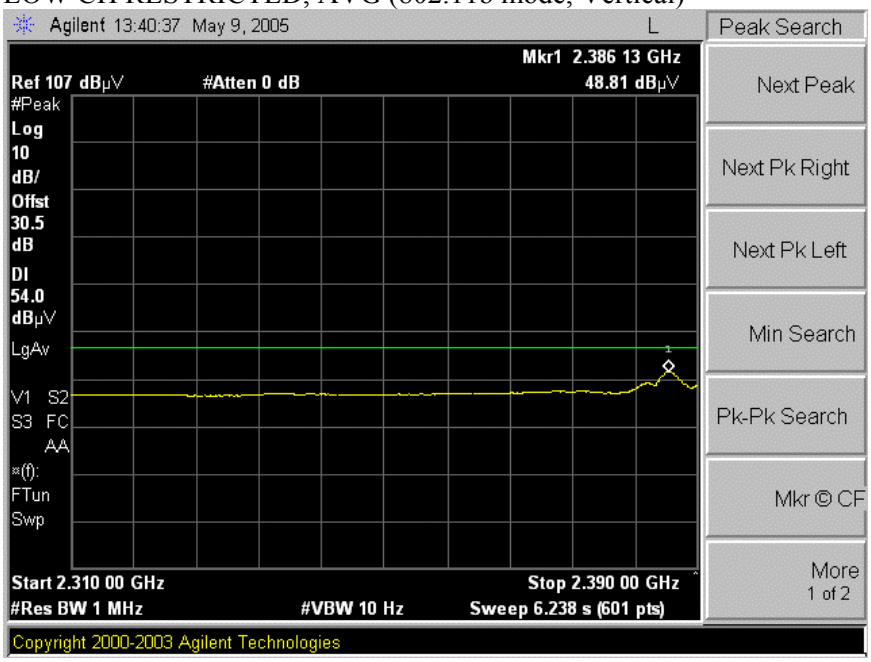


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Vertical)

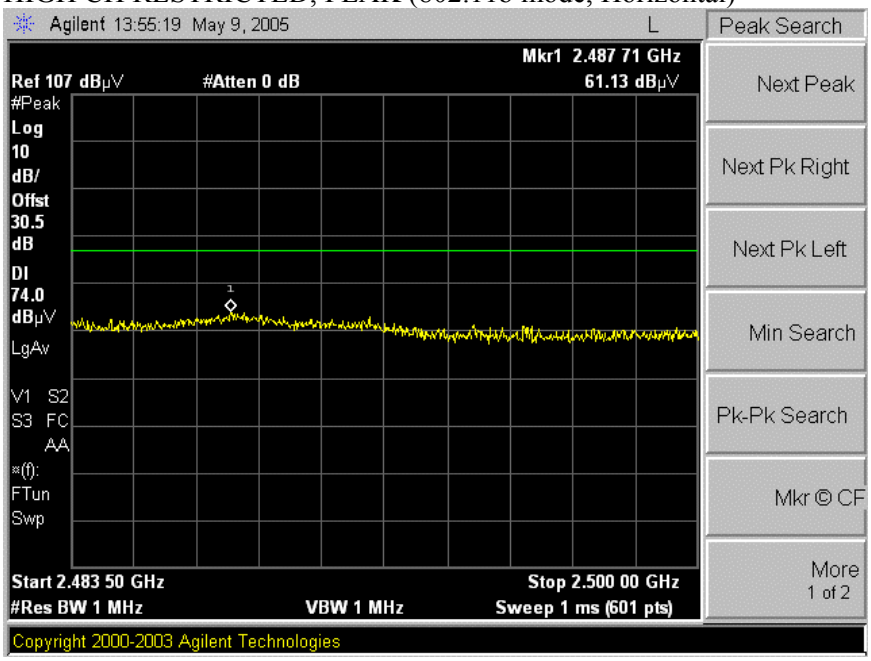


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

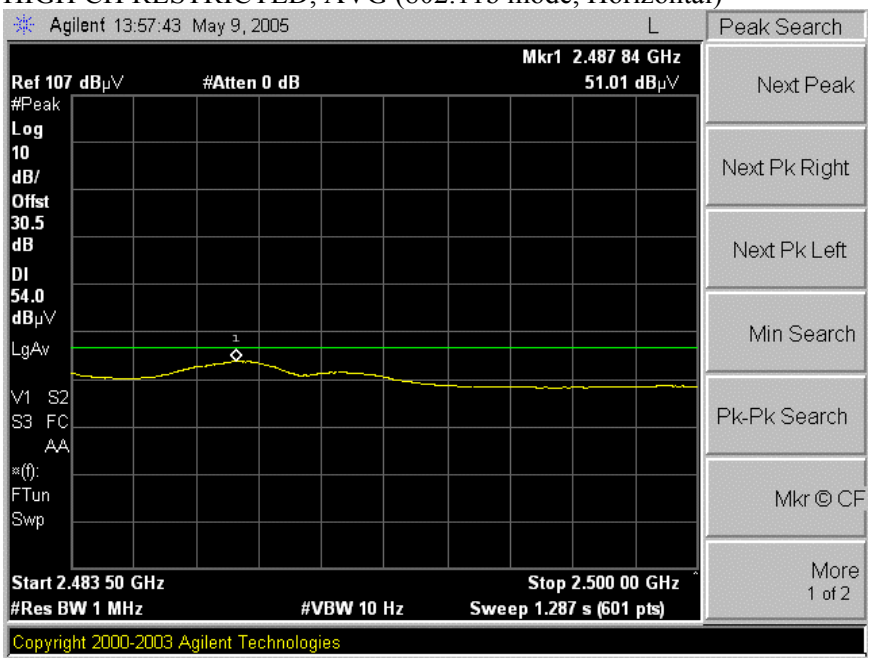


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Horizontal)

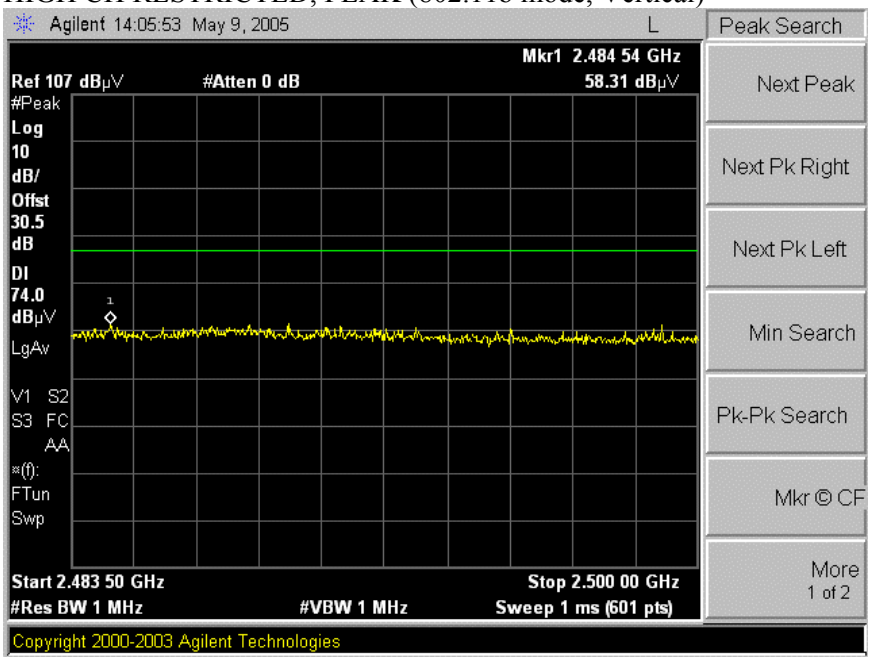


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

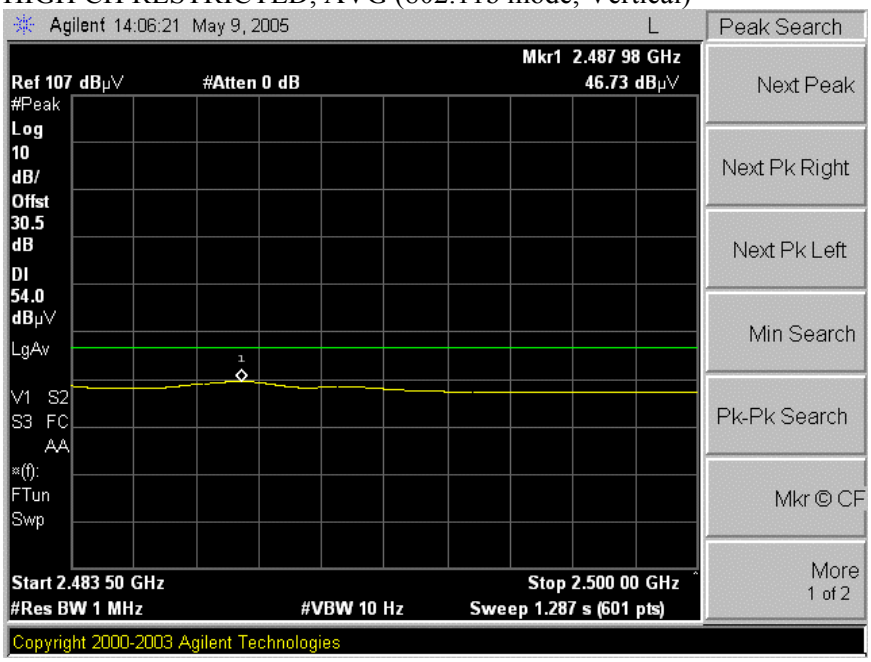


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

5/109/2005 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Chin Pang
Project #:05U3390-1
Company:Toshiba
EUT Descrip.:80.11 a/b/g MB62HL Half Size Moni-PCI WLAN Module (No Turbo Mode)
EUT M/N:PA-3459U-1MPC
Test Target:FCC 15.247, with HTL017 antenna Mobile Config using Firebolt Laptop
Mode Oper:TX, b mode
Average Power Meter: Low = 18.25 dBm, Mid = 18 dBm, High =18.13dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T86 Miteq 924341			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

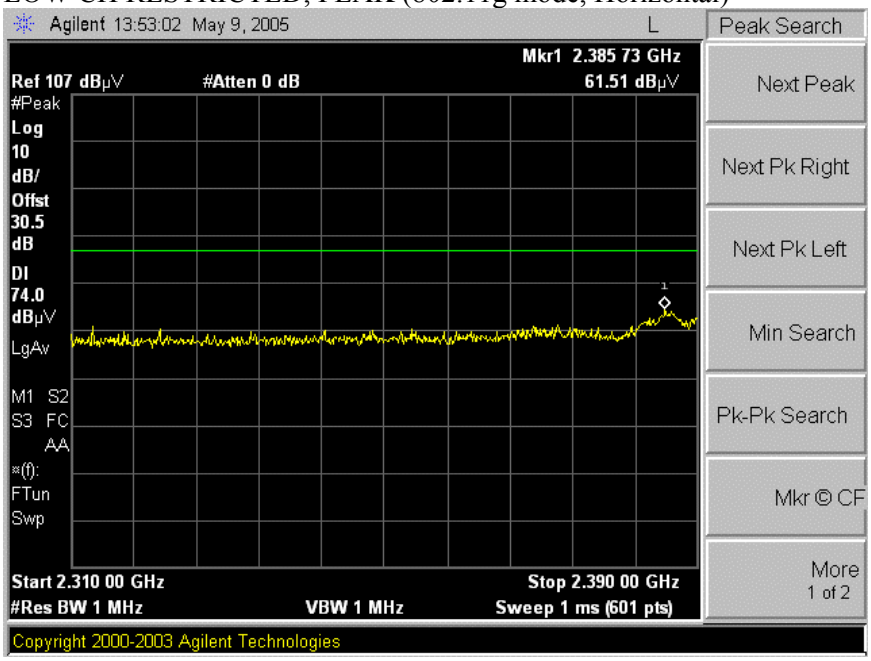
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
low ch															
4.824	3.0	56.0	53.0	33.6	4.1	-44.0	0.0	0.6	50.3	47.3	74	54	-23.7	-6.7	V
4.824	3.0	55.4	52.0	33.6	4.1	-44.0	0.0	0.6	49.7	46.3	74	54	-24.3	-7.7	H
mid ch															
4.874	3.0	57.8	54.8	33.7	4.1	-44.1	0.0	0.6	52.1	49.1	74	54	-21.9	-4.9	V
7.311	3.0	52.5	39.4	36.2	5.4	-44.7	0.0	0.6	50.0	36.9	74	54	-24.0	-17.1	V
4.874	3.0	60.0	58.1	33.7	4.1	-44.1	0.0	0.6	54.3	52.3	74	54	-19.7	-1.7	H
7.311	3.0	53.0	39.0	36.2	5.4	-44.7	0.0	0.6	50.5	36.5	74	54	-23.5	-17.5	H
high ch															
4.924	3.0	58.0	56.0	33.7	4.1	-44.2	0.0	0.6	52.3	50.3	74	54	-21.7	-3.7	V
7.386	3.0	52.5	38.3	36.2	5.4	-44.7	0.0	0.6	50.1	35.9	74	54	-23.9	-18.1	V
4.924	3.0	59.8	57.0	33.7	4.1	-44.2	0.0	0.6	54.1	51.3	74	54	-19.9	-2.7	H
7.386	3.0	54.3	39.4	36.2	5.4	-44.7	0.0	0.6	51.9	37.0	74	54	-22.1	-17.0	H

Note: No other emissions were detected above the system noise floor.

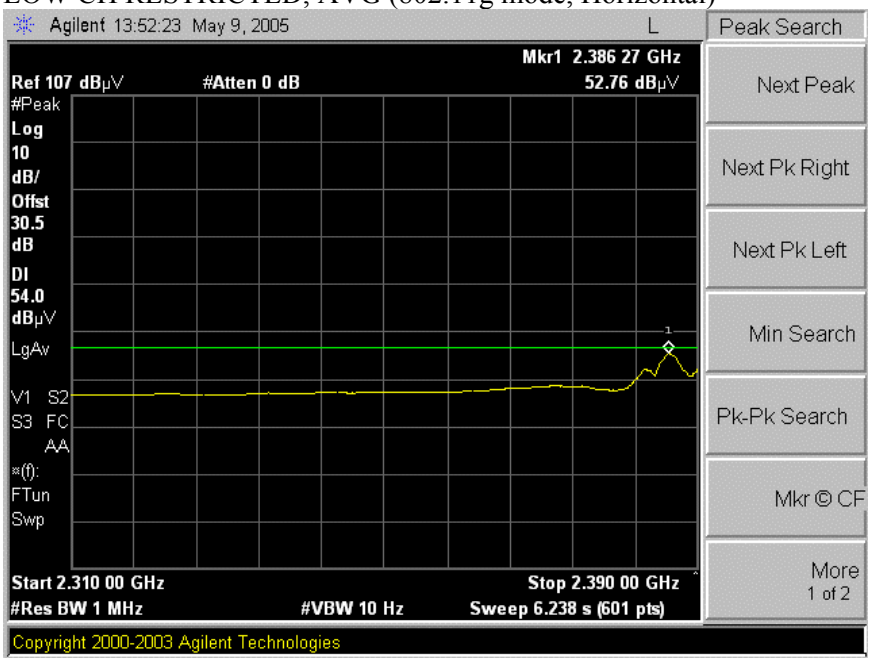
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Horizontal)

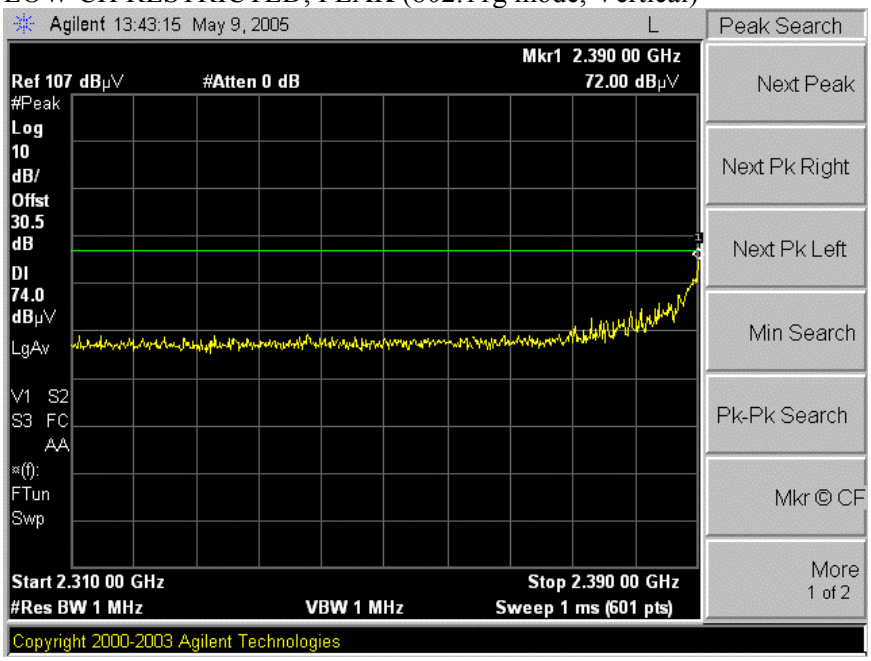


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

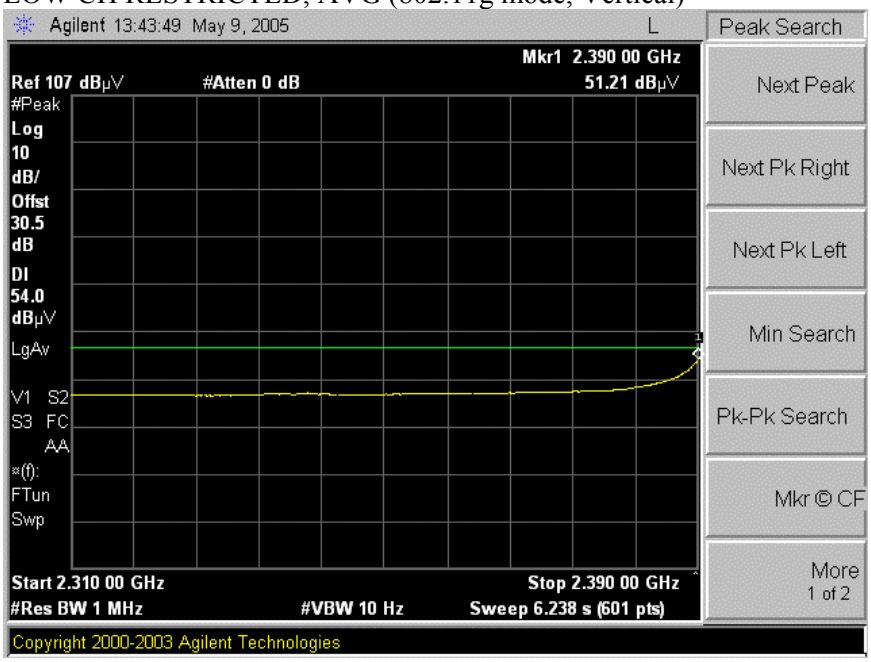


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)

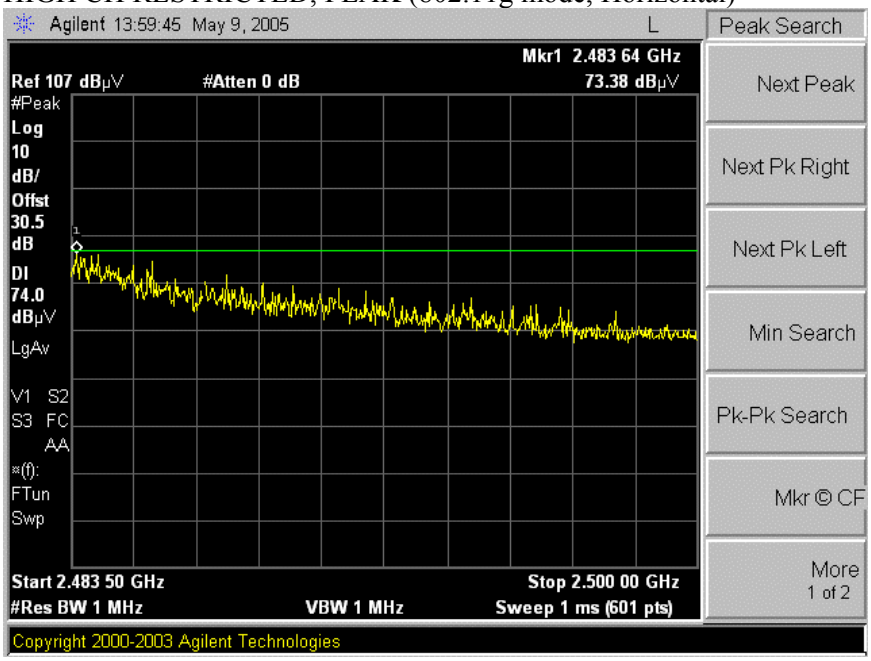


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

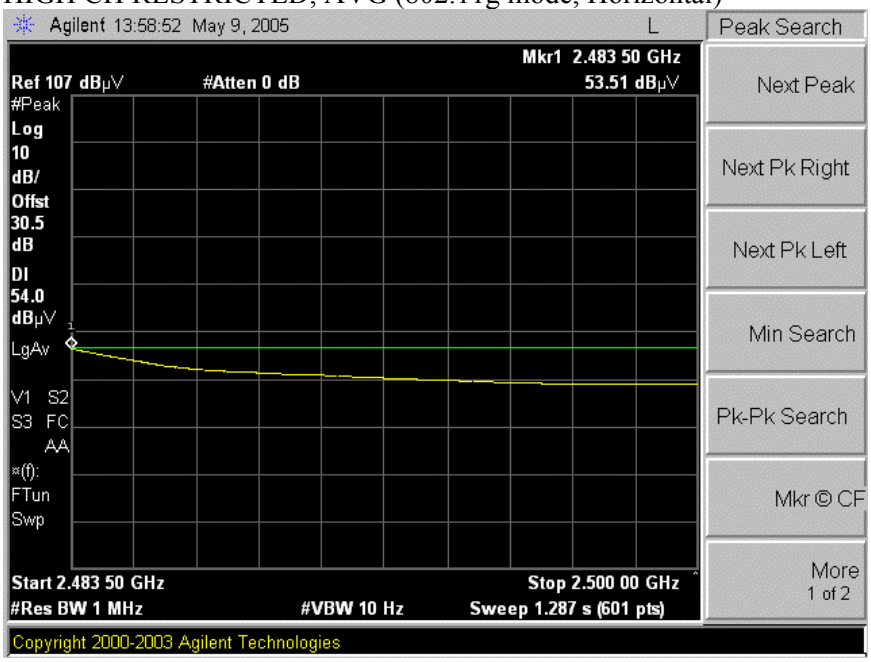


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

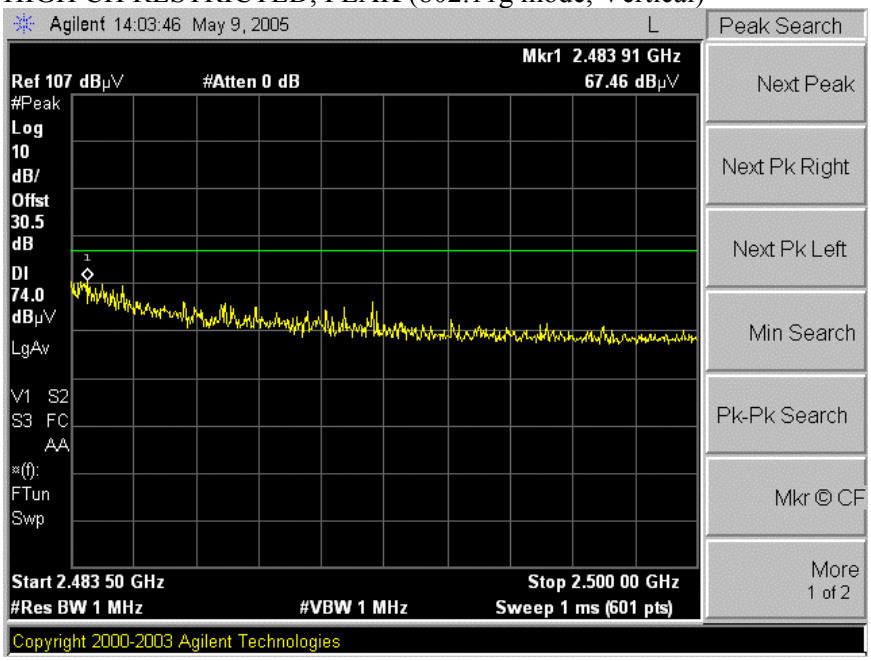


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

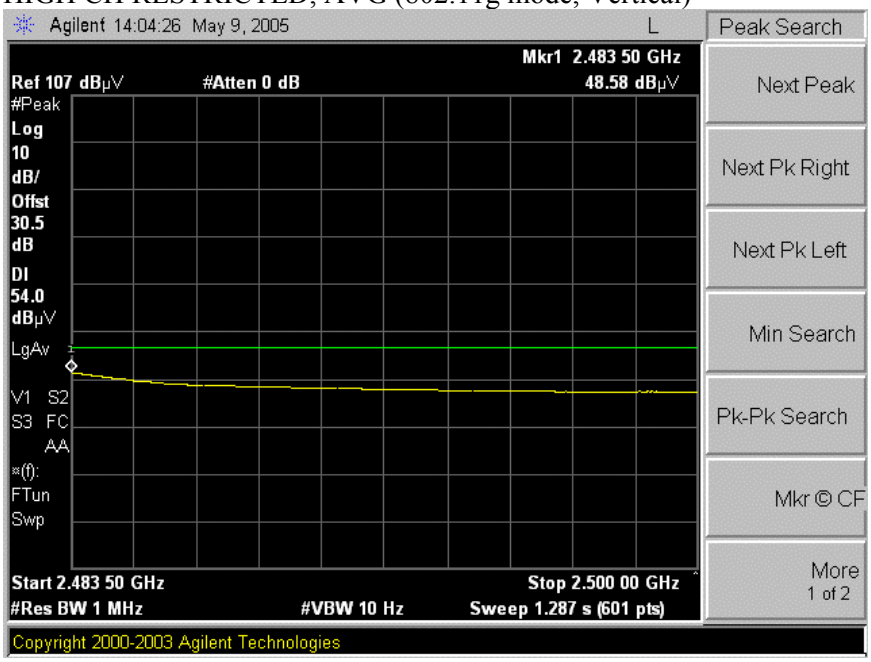


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

05/09/05 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Chin Pang
Project #:05U3390-1
Company:Toshiba
EUT Descrip.:80.11 a/b/g MB62HL Half Size Moni-PCI WLAN Module (No Turbo Mode)
EUT M/N:PA-3459U-1MPC
Test Target:FCC 15.247, with HTL017 antenna Mobile Config using Firebolt Laptop
Mode Oper:TX, g mode
Average Power Meter: Low = 16.06 dBm, Mid = 16.24 dBm, High = 15.9 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

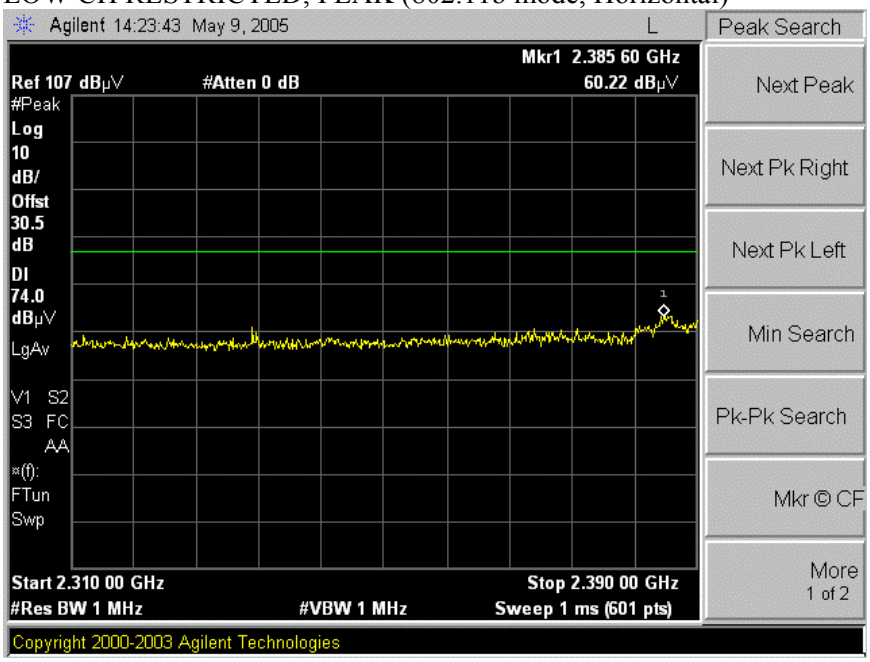
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
low ch															
4.824	3.0	53.2	39.5	33.6	4.1	-39.6	0.0	0.6	51.9	38.2	74	54	-22.1	-15.8	V
4.824	3.0	54.6	40.0	33.6	4.1	-39.6	0.0	0.6	53.3	38.7	74	54	-20.7	-15.3	H
mid ch															
4.874	3.0	56.0	43.4	33.7	4.1	-39.6	0.0	0.6	54.7	42.1	74	54	-19.3	-11.9	V
7.311	3.0	52.2	37.7	36.2	5.4	-40.3	0.0	0.6	54.0	39.5	74	54	-20.0	-14.5	V
4.874	3.0	57.8	46.0	33.7	4.1	-39.6	0.0	0.6	56.5	44.7	74	54	-17.5	-9.3	H
7.311	3.0	54.2	40.0	36.2	5.4	-40.3	0.0	0.6	56.0	41.8	74	54	-18.0	-12.2	H
high ch															
4.924	3.0	55.5	40.6	33.7	4.1	-39.7	0.0	0.6	54.3	39.4	74	54	-19.7	-14.6	V
7.386	3.0	52.6	38.0	36.2	5.4	-40.3	0.0	0.6	54.6	40.0	74	54	-19.4	-14.0	V
4.924	3.0	56.8	41.5	33.7	4.1	-39.7	0.0	0.6	55.6	40.3	74	54	-18.4	-13.7	H
7.386	3.0	53.0	38.4	36.2	5.4	-40.3	0.0	0.6	55.0	40.4	74	54	-19.0	-13.6	H
Note: No other emissions were detected above the system noise floor.															

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

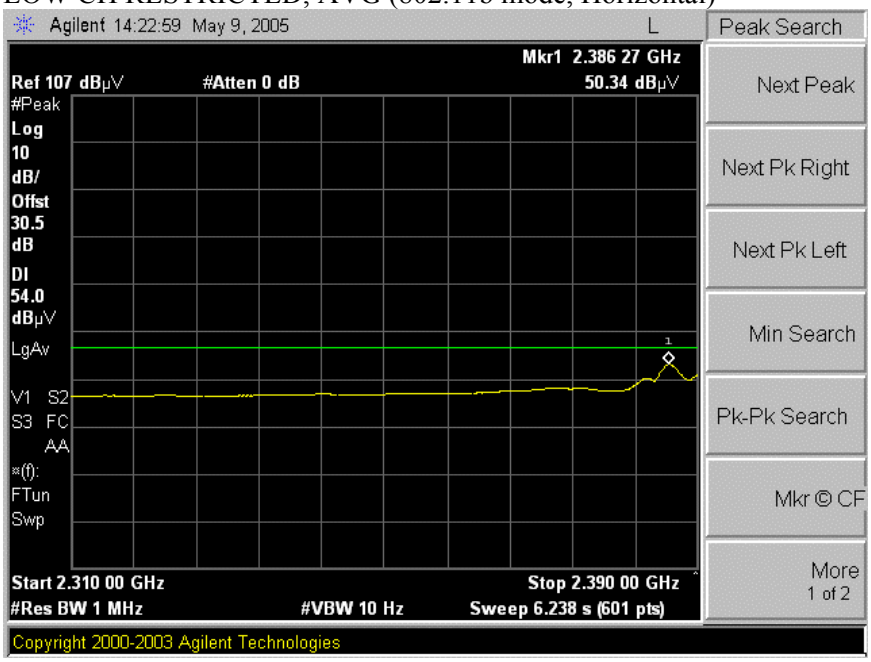
PORTABLE CONFIGURATION

RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Horizontal)

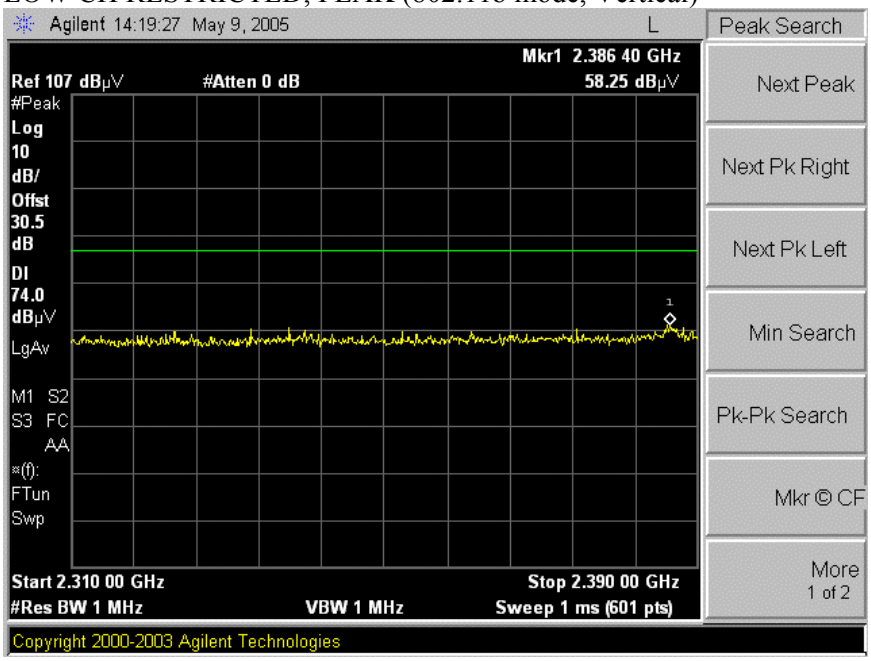


LOW CH RESTRICTED, AVG (802.11b mode, Horizontal)

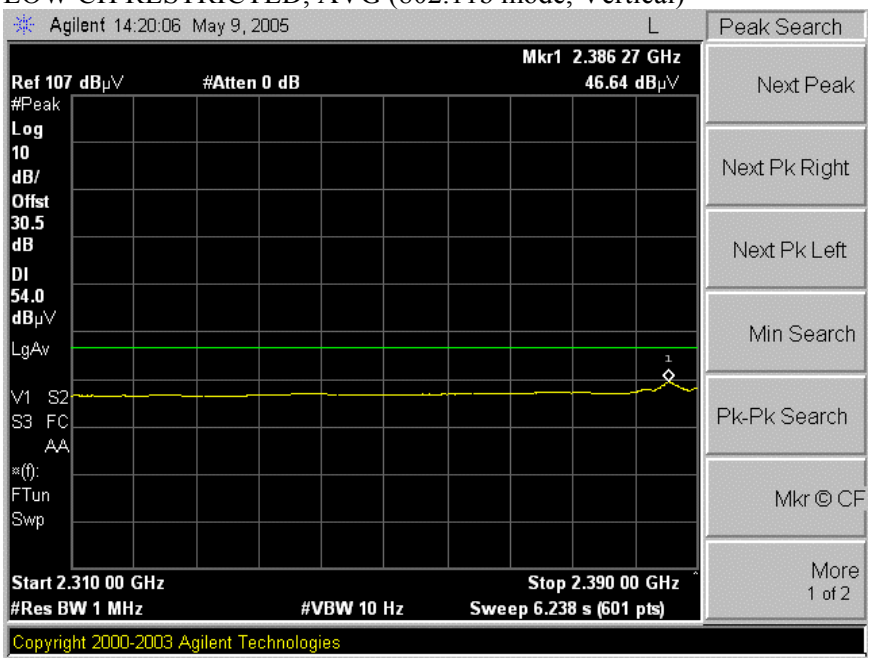


RESTRICTED BANDEDGE (b MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11b mode, Vertical)

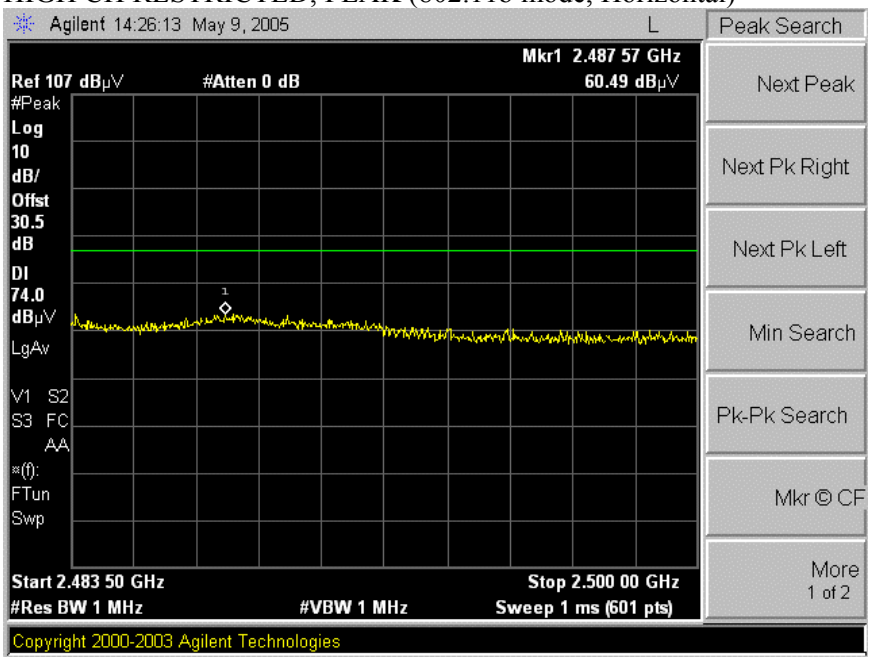


LOW CH RESTRICTED, AVG (802.11b mode, Vertical)

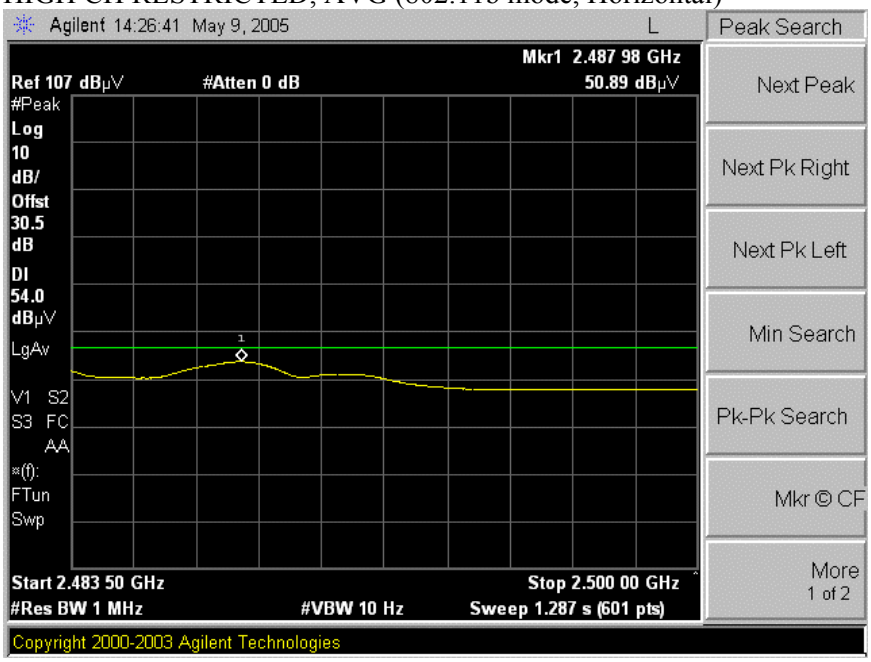


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Horizontal)

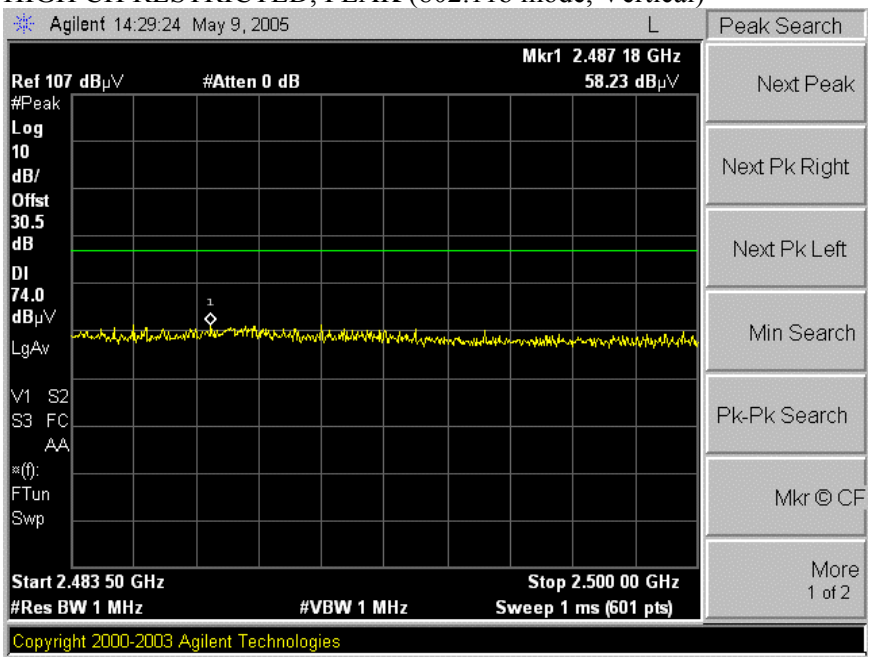


HIGH CH RESTRICTED, AVG (802.11b mode, Horizontal)

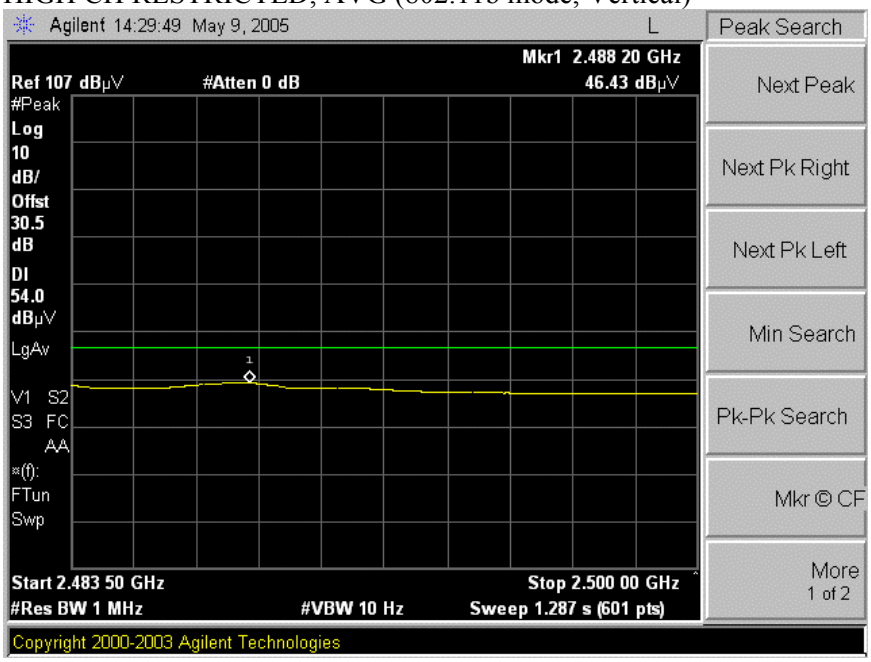


RESTRICTED BANDEDGE (b MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11b mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11b mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (b MODE)

05/09/05 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Chin Pang
Project #:05U3390-1
Company:Toshiba
EUT Descrip.:80.11 a/b/g MB62HL Half Size Moni-PCI WLAN Module (No Turbo Mode)
EUT M/N:PA-3459U-1MPC
Test Target:FCC 15.247, with HTL017 antenna Portable Config using Firebolt Laptop
Mode Oper:TX, b mode
Average Power Meter: Low = 18.25 dBm, Mid = 18 dBm, High = 18.13 dBm
WORST CASE (Z Position)
Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

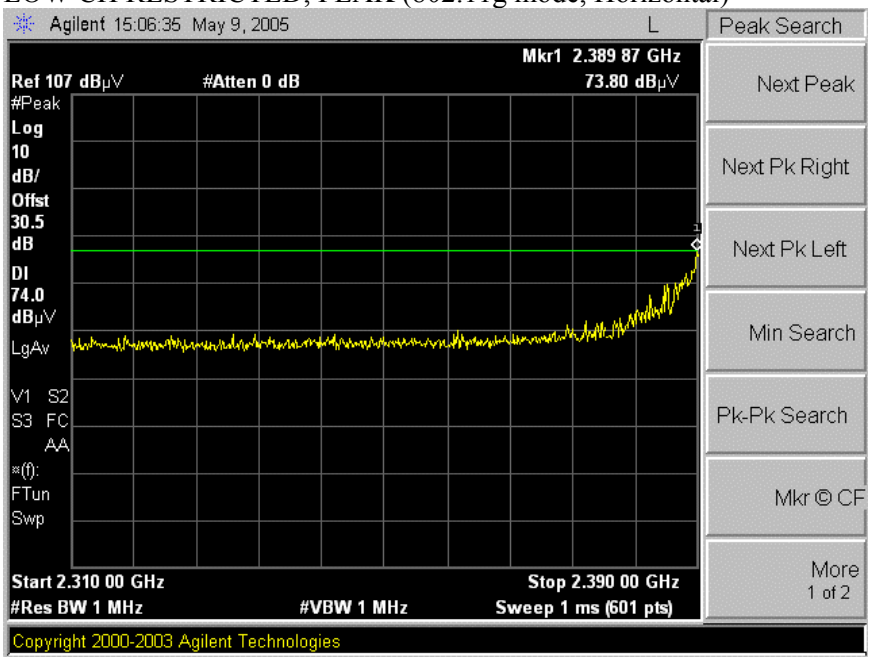
f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
low ch															
4.824	3.0	58.0	53.5	33.6	4.1	-39.6	0.0	0.6	56.7	52.2	74	54	-17.3	-1.8	V
4.824	3.0	57.2	55.0	33.6	4.1	-39.6	0.0	0.6	55.9	53.7	74	54	-18.1	-0.3	H
mid ch															
4.874	3.0	56.0	53.2	33.7	4.1	-39.6	0.0	0.6	54.7	51.9	74	54	-19.3	-2.1	V
7.311	3.0	53.0	39.7	36.2	5.4	-40.3	0.0	0.6	54.8	41.5	74	54	-19.2	-12.5	V
4.874	3.0	54.0	51.6	33.7	4.1	-39.6	0.0	0.6	52.7	50.3	74	54	-21.3	-3.7	H
7.311	3.0	51.4	38.5	36.2	5.4	-40.3	0.0	0.6	53.2	40.3	74	54	-20.8	-13.7	H
high ch															
4.924	3.0	56.0	51.0	33.7	4.1	-39.7	0.0	0.6	54.8	49.8	74	54	-19.2	-4.2	V
7.386	3.0	51.7	38.0	36.2	5.4	-40.3	0.0	0.6	53.7	40.0	74	54	-20.3	-14.0	V
4.924	3.0	57.3	52.0	33.7	4.1	-39.7	0.0	0.6	56.1	50.8	74	54	-17.9	-3.2	H
7.386	3.0	52.0	39.0	36.2	5.4	-40.3	0.0	0.6	54.0	41.0	74	54	-20.0	-13.0	H

Note: No other emissions were detected above the system noise floor.

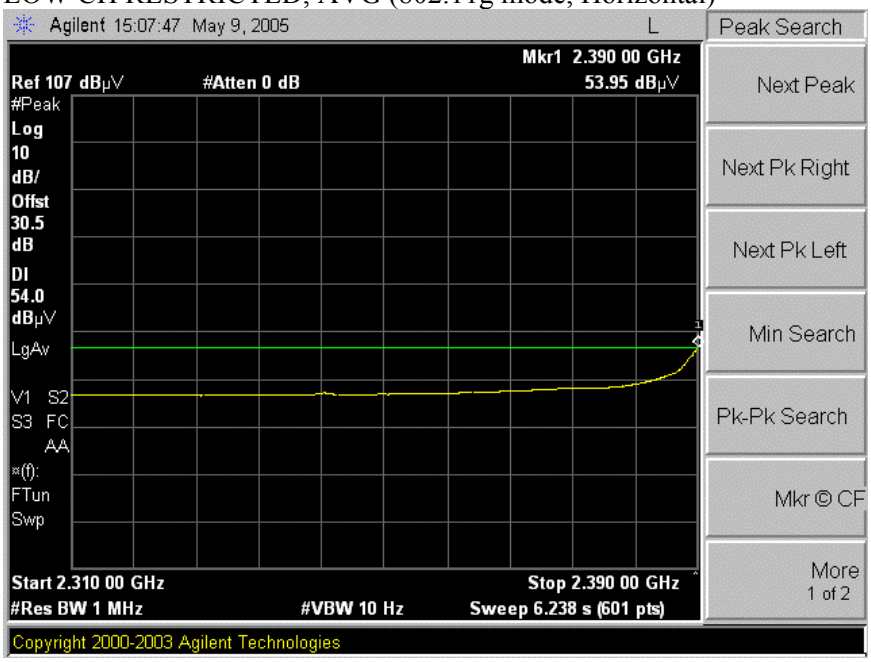
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, HORIZONTAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Horizontal)

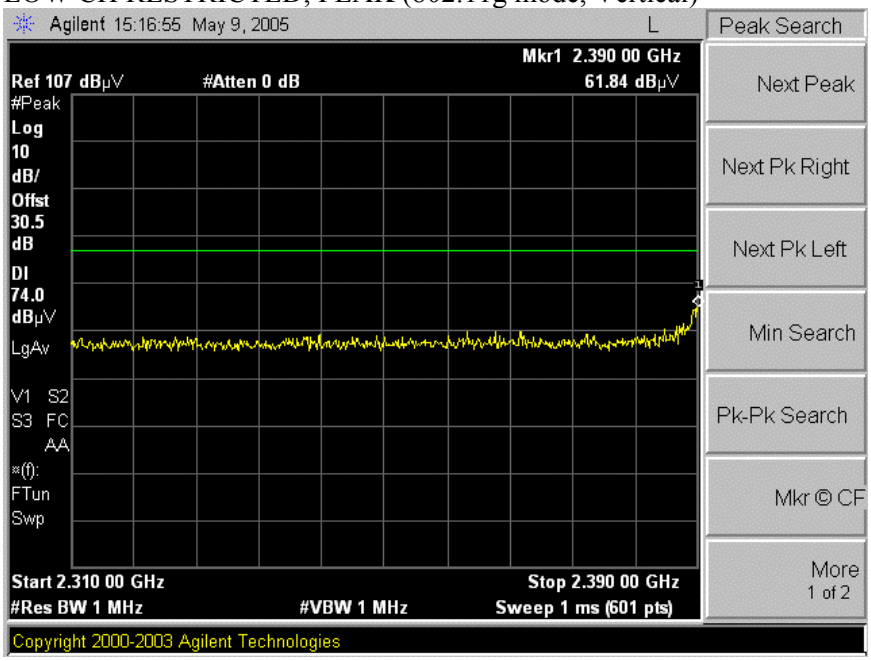


LOW CH RESTRICTED, AVG (802.11g mode, Horizontal)

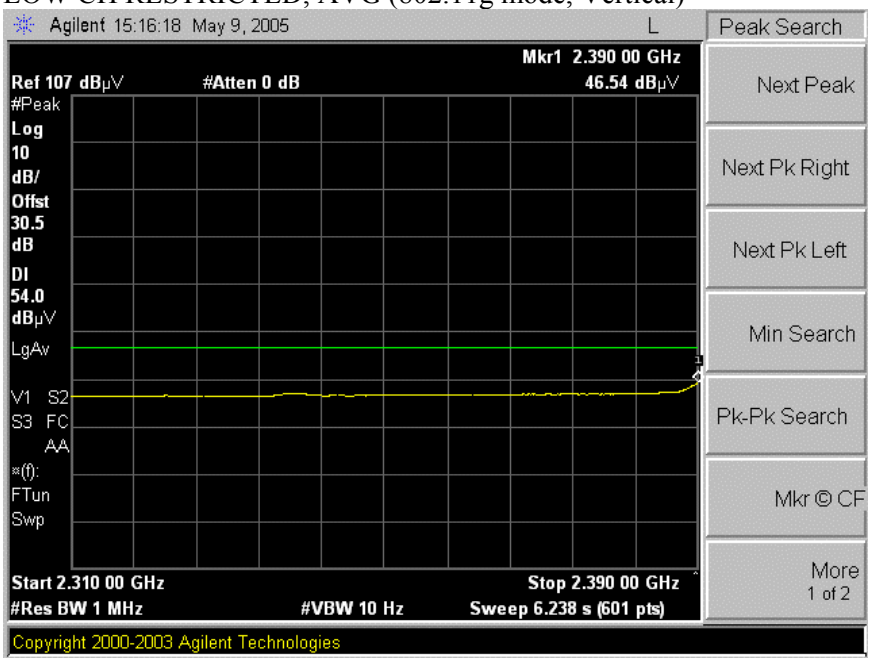


RESTRICTED BANDEDGE (g MODE, LOW CHANNEL, VERTICAL)

LOW CH RESTRICTED, PEAK (802.11g mode, Vertical)

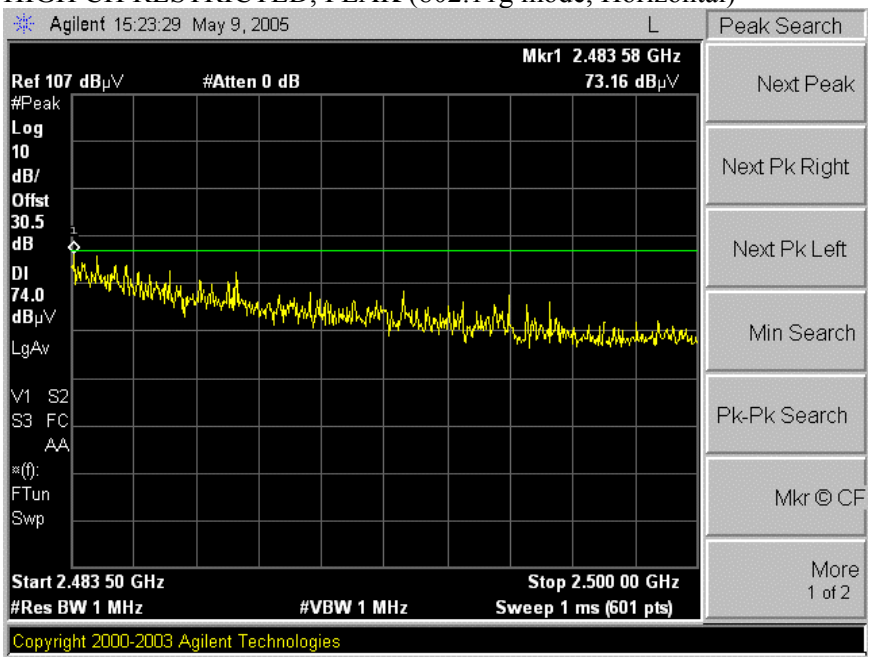


LOW CH RESTRICTED, AVG (802.11g mode, Vertical)

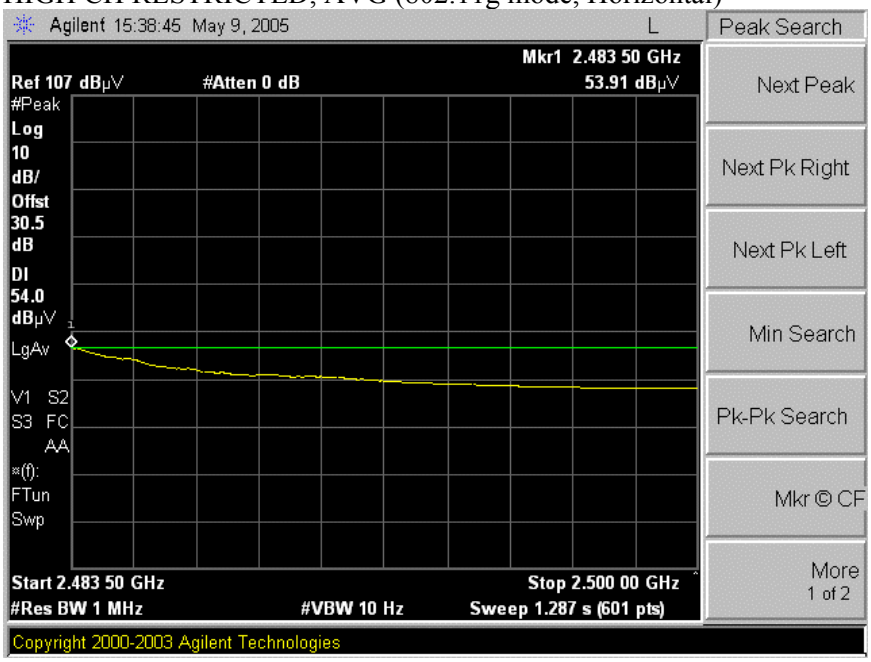


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, HORIZONTAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Horizontal)

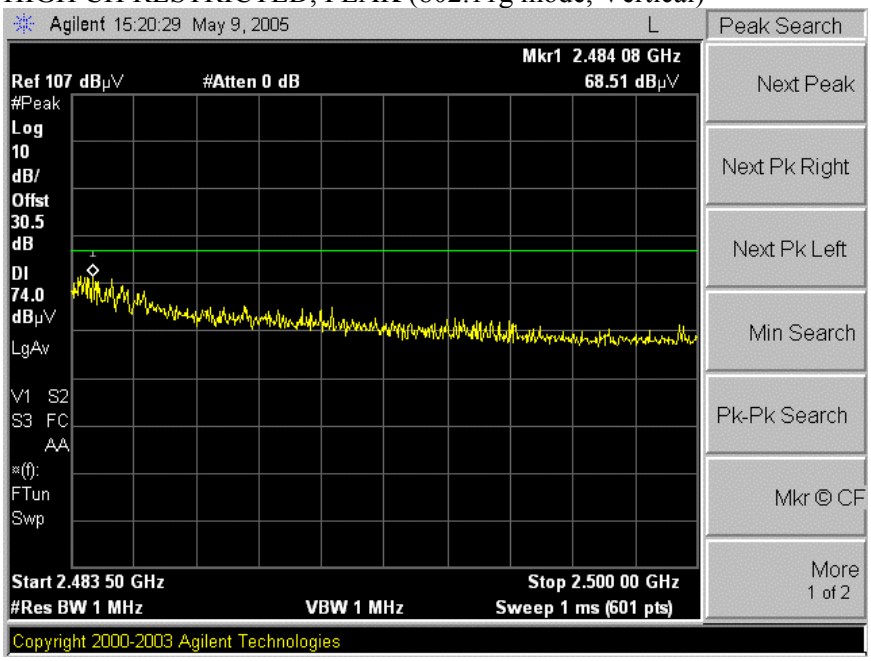


HIGH CH RESTRICTED, AVG (802.11g mode, Horizontal)

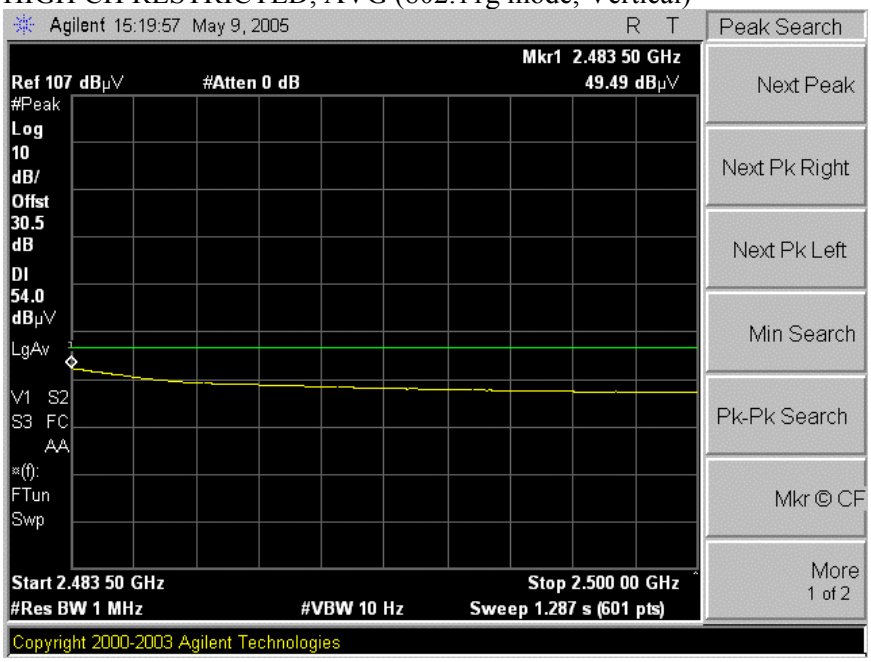


RESTRICTED BANDEDGE (g MODE, HIGH CHANNEL, VERTICAL)

HIGH CH RESTRICTED, PEAK (802.11g mode, Vertical)



HIGH CH RESTRICTED, AVG (802.11g mode, Vertical)



HARMONICS AND SPURIOUS EMISSIONS (g MODE)

05/09/05 **High Frequency Measurement**

Compliance Certification Services, Morgan Hill Open Field Site

Test Engr:Chin Pang
Project #:05U3390-1
Company:Toshiba
EUT Descrip.:80.11 a/b/g MB62HL Half Size Moni-PCI WLAN Module (No Turbo Mode)
EUT M/N:PA-3459U-1MPC
Test Target:FCC 15.247, with HTL017 antenna Mobile Config using Firebolt Laptop
Mode Oper:TX, g mode
Average Power Meter: Low = 16.06 dBm, Mid = 16.24 dBm, High = 15.9 dBm
WORST CASE (Z Position)
Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T60; S/N: 2238 @3m	T87 Miteq 924342			FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
		4_Thanh	12_Neelesh	HPF_4.0GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
low ch															
4.824	3.0	54.0	40.0	33.6	4.1	-39.6	0.0	0.6	52.7	38.7	74	54	-21.3	-15.3	V
4.824	3.0	55.2	42.5	33.6	4.1	-39.6	0.0	0.6	53.9	41.2	74	54	-20.1	-12.8	H
mid ch															
4.874	3.0	56.0	43.4	33.7	4.1	-39.6	0.0	0.6	54.7	42.1	74	54	-19.3	-11.9	V
7.311	3.0	52.2	37.7	36.2	5.4	-40.3	0.0	0.6	54.0	39.5	74	54	-20.0	-14.5	V
4.874	3.0	57.8	46.0	33.7	4.1	-39.6	0.0	0.6	56.5	44.7	74	54	-17.5	-9.3	H
7.311	3.0	54.2	40.0	36.2	5.4	-40.3	0.0	0.6	56.0	41.8	74	54	-18.0	-12.2	H
high ch															
4.924	3.0	55.7	40.4	33.7	4.1	-39.7	0.0	0.6	54.5	39.2	74	54	-19.5	-14.8	V
7.386	3.0	52.0	37.8	36.2	5.4	-40.3	0.0	0.6	54.0	39.8	74	54	-20.0	-14.2	V
4.924	3.0	55.0	41.0	33.7	4.1	-39.7	0.0	0.6	53.8	39.8	74	54	-20.2	-14.2	H
7.386	3.0	52.4	38.0	36.2	5.4	-40.3	0.0	0.6	54.4	40.0	74	54	-19.6	-14.0	H

Note: No other emissions were detected above the system noise floor.

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

7.3.3. TRANSMITTER ABOVE 1 GHz FOR 5725 TO 5850 MHz BAND

MOBILE CONFIGURATION

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

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

Test Engr: David Garcia
Project #: 05U3390
Company: Toshiba America Information Systems, Inc.
EUT Descrip.: 802.11 a/b/g MB62HL Half size Mini-PCI WLAN Module
EUT M/N: PA-3459U-1MPC
Test Target: FCC 15.247
Mode Oper: 5.8 GHz Band Transmitting, Mobile Configuration
Average Power Meter: Low = 15.01dBm, Mid = 15.2 dBm, High = 15.36 dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @1m	T86 Miteq 924341		T39; ARA 18-26GHz; S/N:1013	FCC 15.205

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_David		4_David	12_Yan	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
5745 Channel															
11.490	3.0	47.8	36.0	38.5	9.1	-42.7	0.0	0.7	53.5	41.7	74	54	-20.5	-12.3	V
5785 Channel															
11.570	3.0	47.9	35.8	38.5	9.2	-42.7	0.0	0.7	53.6	41.5	74	54	-20.4	-12.5	V
5825 Channel															
11.650	3.0	48.0	35.9	38.5	9.2	-42.8	0.0	0.7	53.7	41.6	74	54	-20.3	-12.4	V
5745 Channel															
11.490	3.0	47.9	36.1	38.5	9.1	-42.7	0.0	0.7	53.6	41.8	74	54	-20.4	-12.2	H
5785 Channel															
11.570	3.0	47.8	35.9	38.5	9.2	-42.7	0.0	0.7	53.5	41.6	74	54	-20.5	-12.4	H
5825 Channel															
11.650	3.0	47.0	35.9	38.5	9.2	-42.8	0.0	0.7	52.7	41.6	74	54	-21.3	-12.4	H
Note: No other emssions were detected above the system noise floor															

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

PORTABLE CONFIGURATION (WORST CASE)

HARMONICS AND SPURIOUS EMISSIONS (802.11a MODE)

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

Test Engr: David Garcia
Project #: 05U3390
Company: Toshiba America Information Systems, Inc.
EUT Descrip.: 802.11 a/b/g MB62HL Half size Mini-PCI WLAN Module
EUT M/N: PA-3459U-1MPC
Test Target: FCC 15.247
Mode Oper: 5.8 GHz Band Transmitting, X Position, Portable Configuration
Average Power Meter: Low = 15.01 dBm, Mid = 15.2 dBm, High = 1536.dBm

Test Equipment:

EMCO Horn 1-18GHz	Pre-amplifer 1-26GHz	Pre-amplifer 26-40GHz	Horn > 18GHz	Limit
T120; S/N: 29310 @1m	T86 Miteq 924341		T39; ARA 18-26GHz; S/N:1013	FCC 15.209

Hi Frequency Cables

2 foot cable	3 foot cable	4 foot cable	12 foot cable	HPF	Reject Filter
2_David		4_David	12_Yan	HPF_7.6GHz	

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
X POSITION															
5745 Channel															
11.490	3.0	47.5	33.5	38.5	9.1	-42.7	0.0	0.7	53.2	39.2	74	54	-20.8	-14.8	V
17.235	3.0	47.7	35.0	42.0	10.4	-45.2	0.0	0.6	55.5	42.8	74	54	-18.5	-11.2	V
5785 Channel															
11.570	3.0	47.1	33.6	38.5	9.2	-42.7	0.0	0.7	52.8	39.3	74	54	-21.2	-14.7	V
17.355	3.0	47.6	34.9	42.1	10.4	-45.1	0.0	0.6	55.6	42.9	74	54	-18.4	-11.1	V
5825 Channel															
11.650	3.0	46.8	33.7	38.5	9.2	-42.8	0.0	0.7	52.5	39.4	74	54	-21.5	-14.6	V
17.475	3.0	47.4	34.7	42.2	10.4	-45.0	0.0	0.6	55.6	42.9	74	54	-18.4	-11.1	V
5745 Channel															
11.490	3.0	47.8	34.0	38.5	9.1	-42.7	0.0	0.7	53.5	39.7	74	54	-20.5	-14.3	H
17.235	3.0	48.6	36.2	42.0	10.4	-45.2	0.0	0.6	56.4	44.0	74	54	-17.6	-10.0	H
5785 Channel															
11.570	3.0	47.0	33.7	38.5	9.2	-42.7	0.0	0.7	52.7	39.4	74	54	-21.3	-14.6	H
17.355	3.0	48.9	36.8	42.1	10.4	-45.1	0.0	0.6	56.9	44.8	74	54	-17.1	-9.2	H
5825 Channel															
11.650	3.0	46.9	33.6	38.5	9.2	-42.8	0.0	0.7	52.6	39.3	74	54	-21.4	-14.7	H
17.475	3.0	47.3	35.2	42.2	10.4	-45.0	0.0	0.6	55.5	43.4	74	54	-18.5	-10.6	H
Note: No other emissions were detected above the system noise floor.															

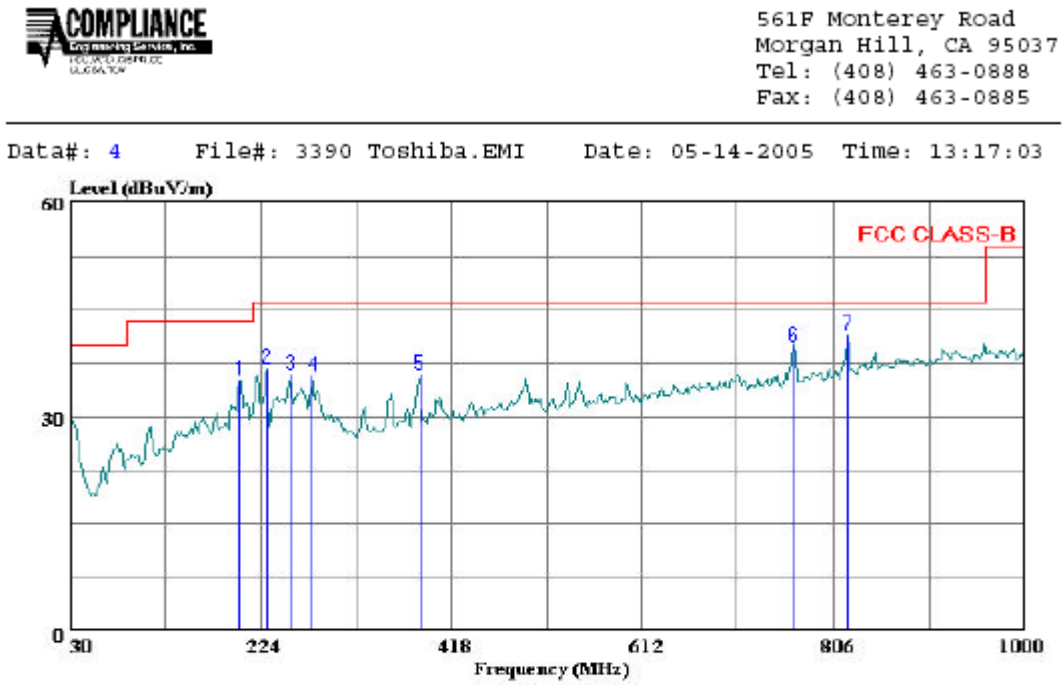
f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field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

7.2.5 WORST-CASE RADIATED EMISSIONS BELOW 1 GHz

MOBILE CONFIGURATION

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

HORIZONTAL PLOT



HORIZONTAL DATA

Page: 1

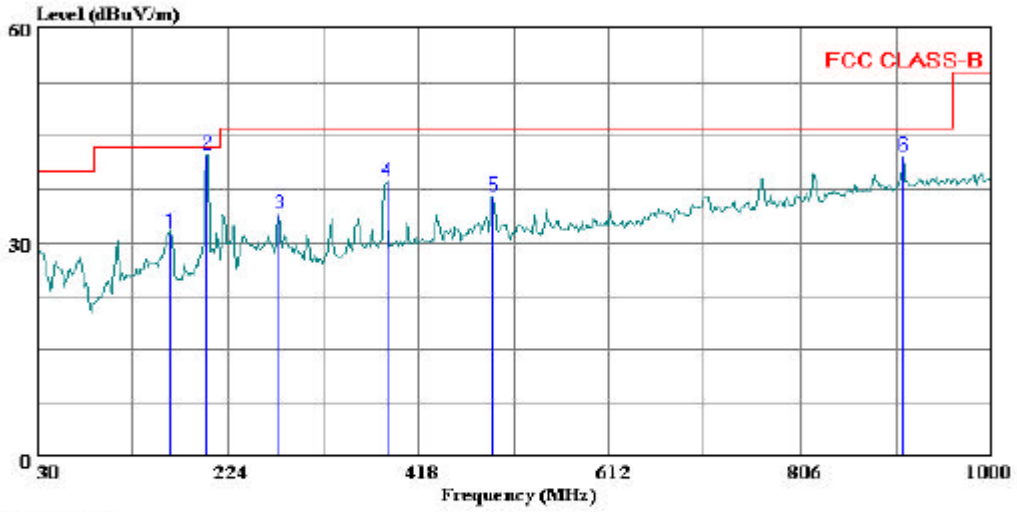
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	202.660	20.87	14.22	35.08	43.50	-8.42	Peak
2	230.790	23.65	13.08	36.73	46.00	-9.27	Peak
3	255.040	21.79	14.09	35.88	46.00	-10.12	Peak
4	276.380	20.94	14.85	35.79	46.00	-10.21	Peak
5	385.990	18.13	17.73	35.86	46.00	-10.14	Peak
6	765.260	15.68	24.09	39.77	46.00	-6.23	Peak
7	819.580	16.69	24.84	41.53	46.00	-4.47	Peak

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

VERTICAL PLOT

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

Data#: 2 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:13:10



(Audix ATC)
Trace: 1 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B (Mobile Configuration)
Mode of Operation: TX (Mid Ch), b mode

VERTICAL DATA

Page: 1

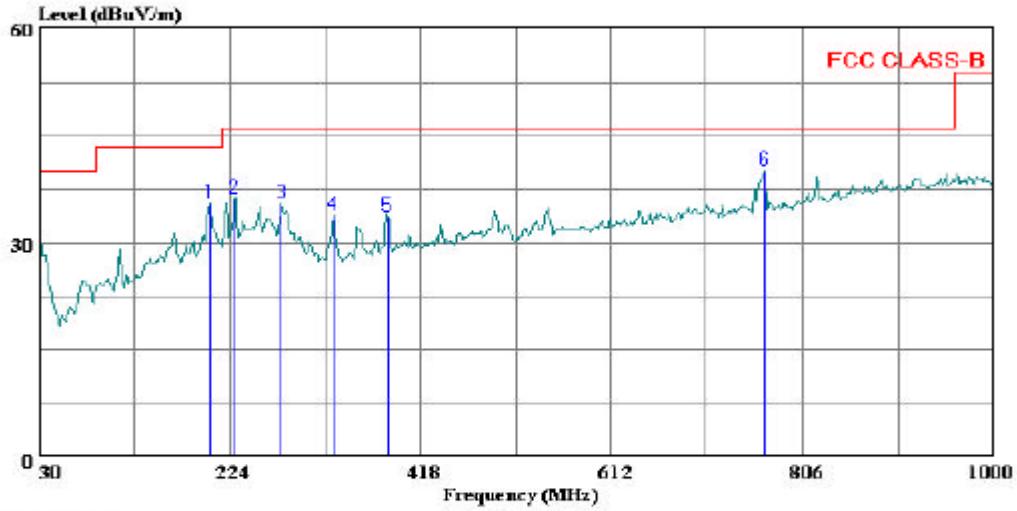
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	165.800	17.76	13.57	31.33	43.50	-12.17	Peak
2	202.660	28.18	14.22	42.40	43.50	-1.10	Peak
3	276.380	19.24	14.85	34.09	46.00	-11.91	Peak
4	385.990	20.95	17.73	38.68	46.00	-7.32	Peak
5	494.630	16.46	20.14	36.60	46.00	-9.40	Peak
6	909.790	16.07	26.01	42.08	46.00	-3.92	Peak

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

HORIZONTAL PLOT

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

Data#: 6 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:20:02



(Audix ATC)
Trace: 5 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B (Mobile Configuration)
Mode of Operation: TX (Mid Ch), g mode

HORIZONTAL DATA

Page: 1

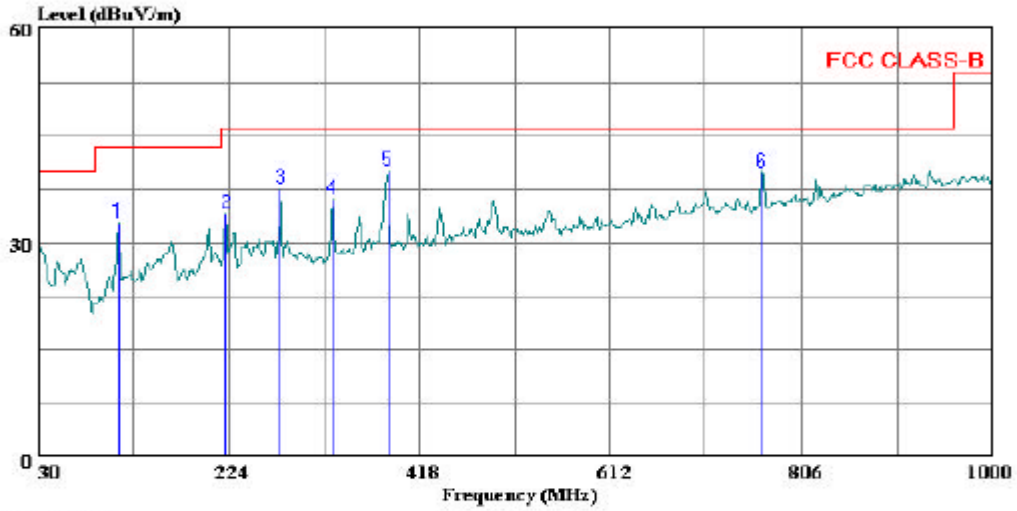
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	203.630	21.52	14.01	35.53	43.50	-7.97	Peak
2	228.850	23.22	12.98	36.20	46.00	-9.80	Peak
3	276.380	20.70	14.85	35.55	46.00	-10.45	Peak
4	329.730	17.45	16.44	33.89	46.00	-12.11	Peak
5	385.020	16.00	17.71	33.71	46.00	-12.29	Peak
6	766.230	16.06	24.09	40.15	46.00	-5.85	Peak

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

VERTICAL PLOT

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

Data#: 8 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:22:56



(Audix ATC)
Trace: 7 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B (Mobile Configuration)
Mode of Operation: TX (Mid Ch), g mode

VERTICAL DATA

Page: 1

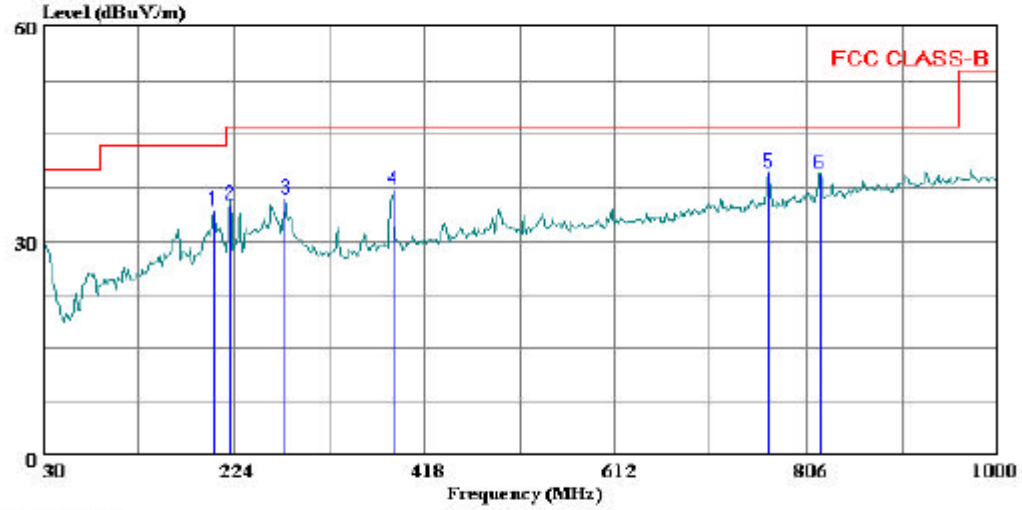
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	111.480	18.91	13.82	32.73	43.50	-10.77	Peak
2	221.090	21.40	12.67	34.07	46.00	-11.93	Peak
3	276.380	22.66	14.85	37.51	46.00	-8.49	Peak
4	329.730	19.66	16.44	36.10	46.00	-9.90	Peak
5	385.990	22.45	17.73	40.18	46.00	-5.82	Peak
6	765.260	15.86	24.09	39.95	46.00	-6.05	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL, A MODE @ 5.8GHZ BAND)

HORIZONTAL PLOT

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

Data#: 15 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:37:18



(Audix ATC)
Trace: 14 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B(Mobile Configuration)
Mode of Operation: TX (Mid Ch), a mode, 5.8GHz Band

HORIZONTAL DATA

Page: 1

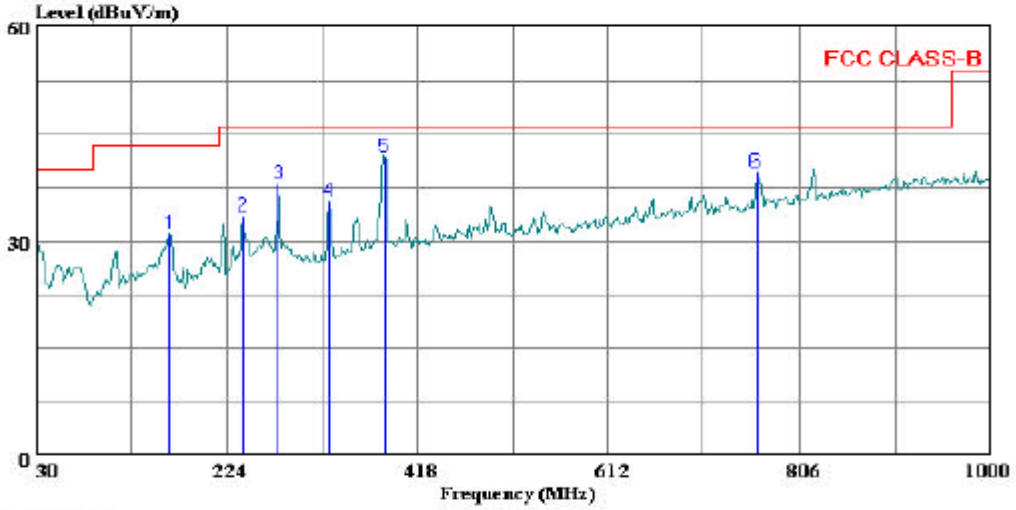
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	203.630	20.20	14.01	34.21	43.50	-9.29	Peak
2	220.120	22.52	12.60	35.12	46.00	-10.88	Peak
3	276.380	21.15	14.85	36.00	46.00	-10.00	Peak
4	385.990	19.52	17.73	37.25	46.00	-8.75	Peak
5	766.230	15.65	24.09	39.74	46.00	-6.26	Peak
6	818.610	14.61	24.83	39.44	46.00	-6.56	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL, A MODE @ 5.8GHZ BAND)

VERTICAL PLOT

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

Data#: 17 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:39:35



(Audix ATC)
Trace: 16 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B (Mobile Configuration)
Mode of Operation: TX (Mid Ch), a mode, 5.8GHz Band

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	165.800	17.33	13.57	30.90	43.50	-12.60	Peak
2	240.490	19.88	13.54	33.42	46.00	-12.58	Peak
3	276.380	23.12	14.85	37.97	46.00	-8.03	Peak
4	327.790	19.18	16.35	35.53	46.00	-10.47	Peak
5	385.020	24.06	17.71	41.77	46.00	-4.23	Peak
6	761.380	15.70	24.02	39.72	46.00	-6.28	Peak

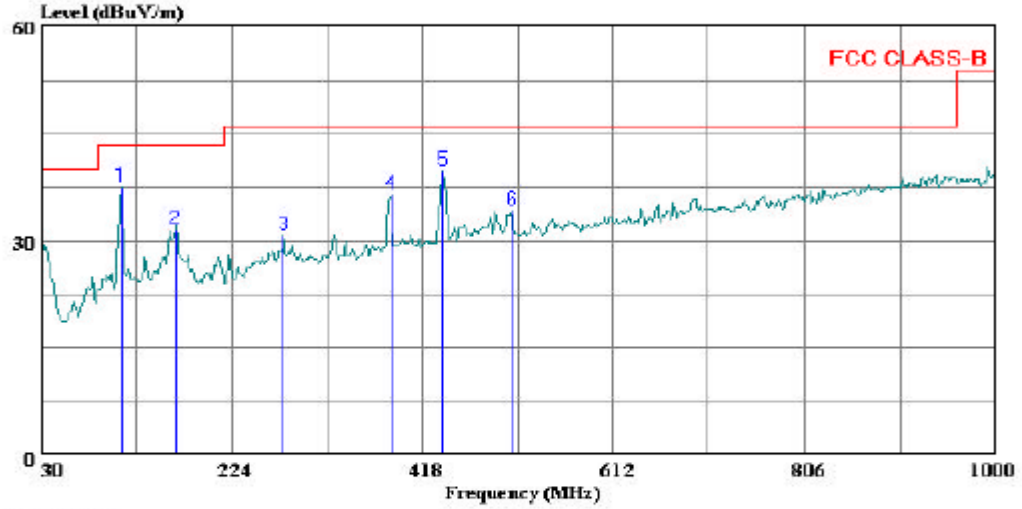
PORTABLE CONFIGURATION

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

HORIZONTAL PLOT

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

Data#: 49 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 14:32:25



(Audix ATC)
Trace: 48 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), B mode
: Portable Config, Y position

HORIZONTAL DATA

Page: 1

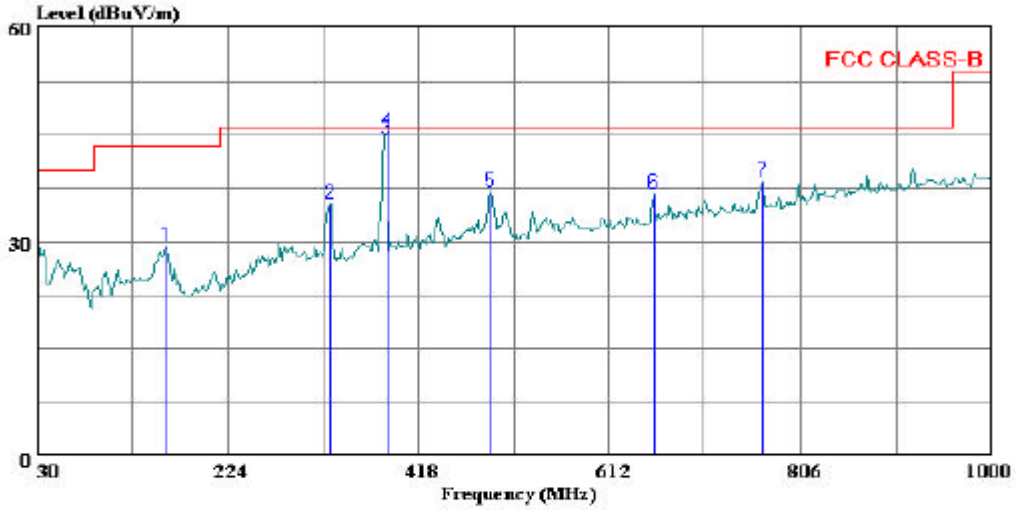
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	111.480	23.75	13.82	37.57	43.50	-5.93	Peak
2	166.770	18.02	13.53	31.55	43.50	-11.95	Peak
3	276.380	15.86	14.85	30.71	46.00	-15.29	Peak
4	385.990	18.84	17.73	36.57	46.00	-9.43	Peak
5	439.340	20.96	18.96	39.92	46.00	-6.08	Peak
6	509.180	13.85	20.36	34.21	46.00	-11.79	Peak

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

VERTICAL PLOT

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

Data#: 53 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 14:35:59



(Audix ATC)
Trace: 50 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), B mode
: Portable Config, Y position

VERTICAL DATA

Page: 1

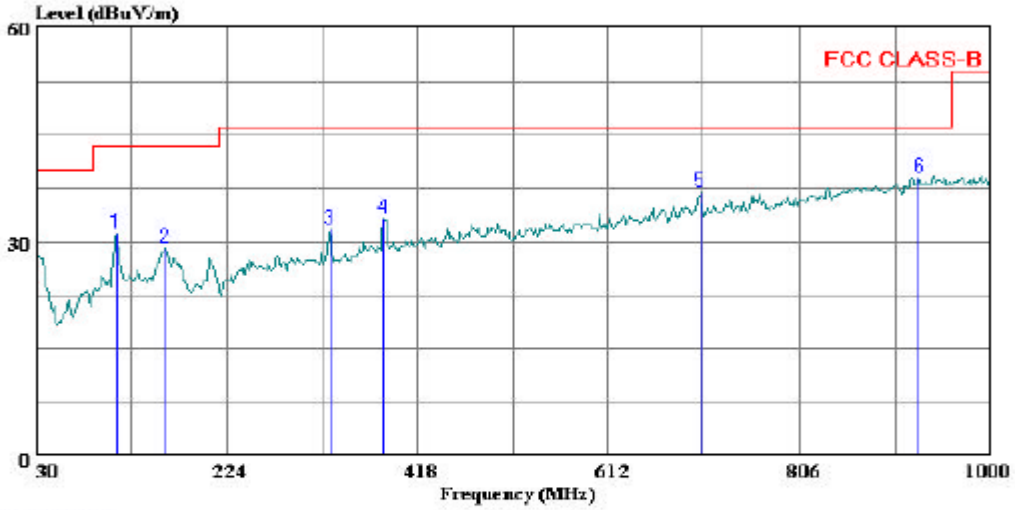
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	161.920	15.47	13.73	29.20	43.50	-14.30	Peak
2	328.760	18.95	16.39	35.34	46.00	-10.66	Peak
3	385.990	26.78	17.73	44.51	46.00	-1.49	QP
4	385.990	27.85	17.73	45.58	46.00	-0.42	Peak
5	491.720	16.92	20.10	37.01	46.00	-8.99	Peak
6	657.590	14.26	22.46	36.72	46.00	-9.28	Peak
7	766.230	14.24	24.09	38.33	46.00	-7.67	Peak

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

HORIZONTAL PLOT

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

Data#: 65 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 15:00:02



(Audix ATC)
Trace: 64 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), G mode
: Portable Config, Y position

HORIZONTAL DATA

Page: 1

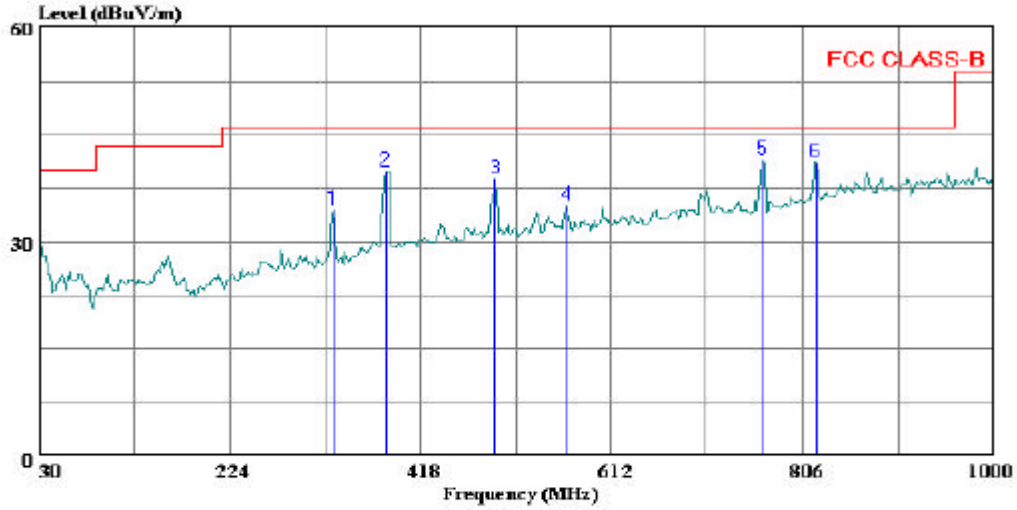
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	111.480	17.39	13.82	31.21	43.50	-12.29	Peak
2	161.920	15.32	13.73	29.05	43.50	-14.45	Peak
3	329.730	15.42	16.44	31.86	46.00	-14.14	Peak
4	383.080	15.62	17.69	33.31	46.00	-12.69	Peak
5	706.090	13.86	23.17	37.03	46.00	-8.97	Peak
6	926.280	12.82	26.23	39.05	46.00	-6.95	Peak

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

VERTICAL PLOT

COMPLIANCE Engineering Services, Inc.
561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 63 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 14:57:49



(Audix ATC)
Trace: 62 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), G mode
: Portable Config, Y position

VERTICAL DATA

Page: 1

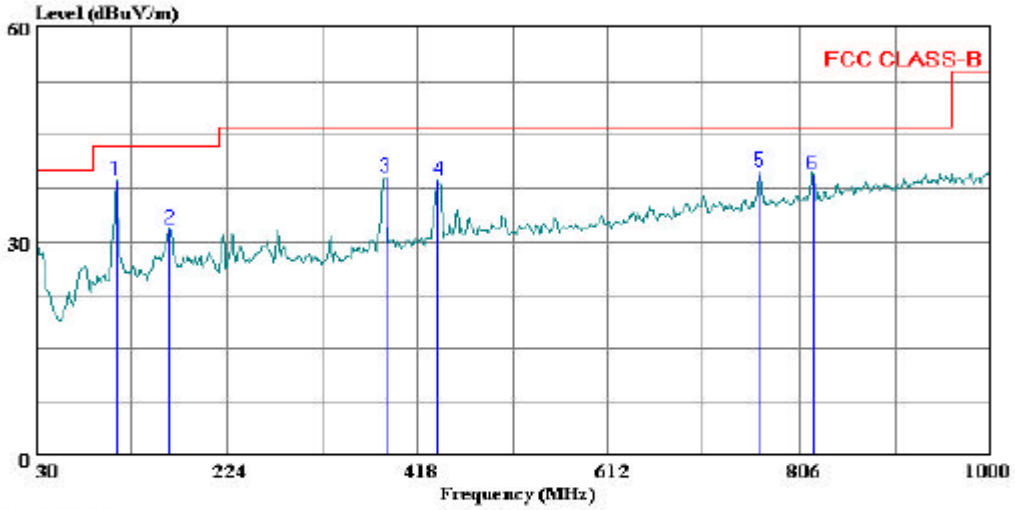
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	329.730	18.10	16.44	34.54	46.00	-11.46	Peak
2	383.080	22.11	17.69	39.80	46.00	-6.20	Peak
3	494.630	18.67	20.14	38.81	46.00	-7.19	Peak
4	567.380	14.04	21.12	35.16	46.00	-10.84	Peak
5	764.290	17.49	24.09	41.58	46.00	-4.42	Peak
6	818.610	16.34	24.83	41.17	46.00	-4.83	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL, A MODE @ 5.8GHZ BAND)

HORIZONTAL PLOT

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

Data#: 29 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:57:00



(Audix ATC)
Trace: 28 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), a mode, 5.8GHz Band
: Portable Config, Y position

HORIZONTAL DATA

Page: 1

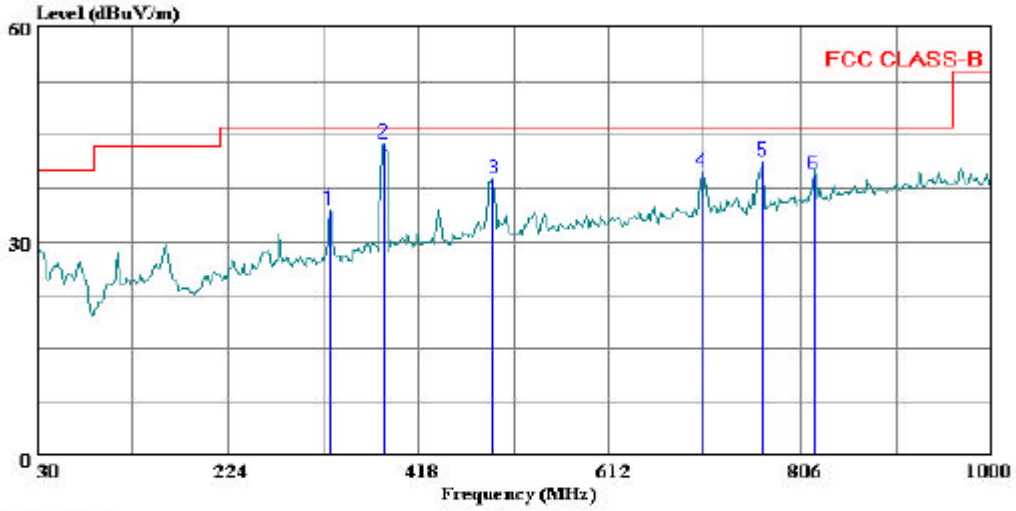
	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	111.480	24.79	13.82	38.61	43.50	-4.89	Peak
2	165.800	18.20	13.57	31.77	43.50	-11.73	Peak
3	385.990	21.23	17.73	38.96	46.00	-7.04	Peak
4	439.340	19.62	18.96	38.58	46.00	-7.42	Peak
5	764.290	15.84	24.09	39.93	46.00	-6.07	Peak
6	818.610	14.52	24.83	39.35	46.00	-6.65	Peak

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, VERTICAL A MODE @ 5.8GHZ BAND)

VERTICAL PLOT

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

Data#: 27 File#: 3390 Toshiba.EMI Date: 05-14-2005 Time: 13:53:43



(Audix ATC)
Trace: 26 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 05U3390-1
Company: : Toshiba
EUT: : 802.11a/b/g MB62HL, Half Size Mini-PCI
: WLAN Module
Model No. : PA-3459U-1MPC
Configuration : EUT/Toshiba Laptop
Target of Test : FCC CLASS B
Mode of Operation: TX (Mid Ch), a mode, 5.8GHz Band
: Portable Config, Y position

VERTICAL DATA

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	327.790	18.10	16.35	34.45	46.00	-11.55	Peak
2	383.080	26.12	17.69	43.81	46.00	-2.19	Peak
3	494.630	18.67	20.14	38.81	46.00	-7.19	Peak
4	706.090	16.60	23.17	39.77	46.00	-6.23	Peak
5	766.230	17.20	24.09	41.29	46.00	-4.71	Peak
6	818.610	14.54	24.83	39.37	46.00	-6.63	Peak

7.4. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

g-Mode (Worst Case)

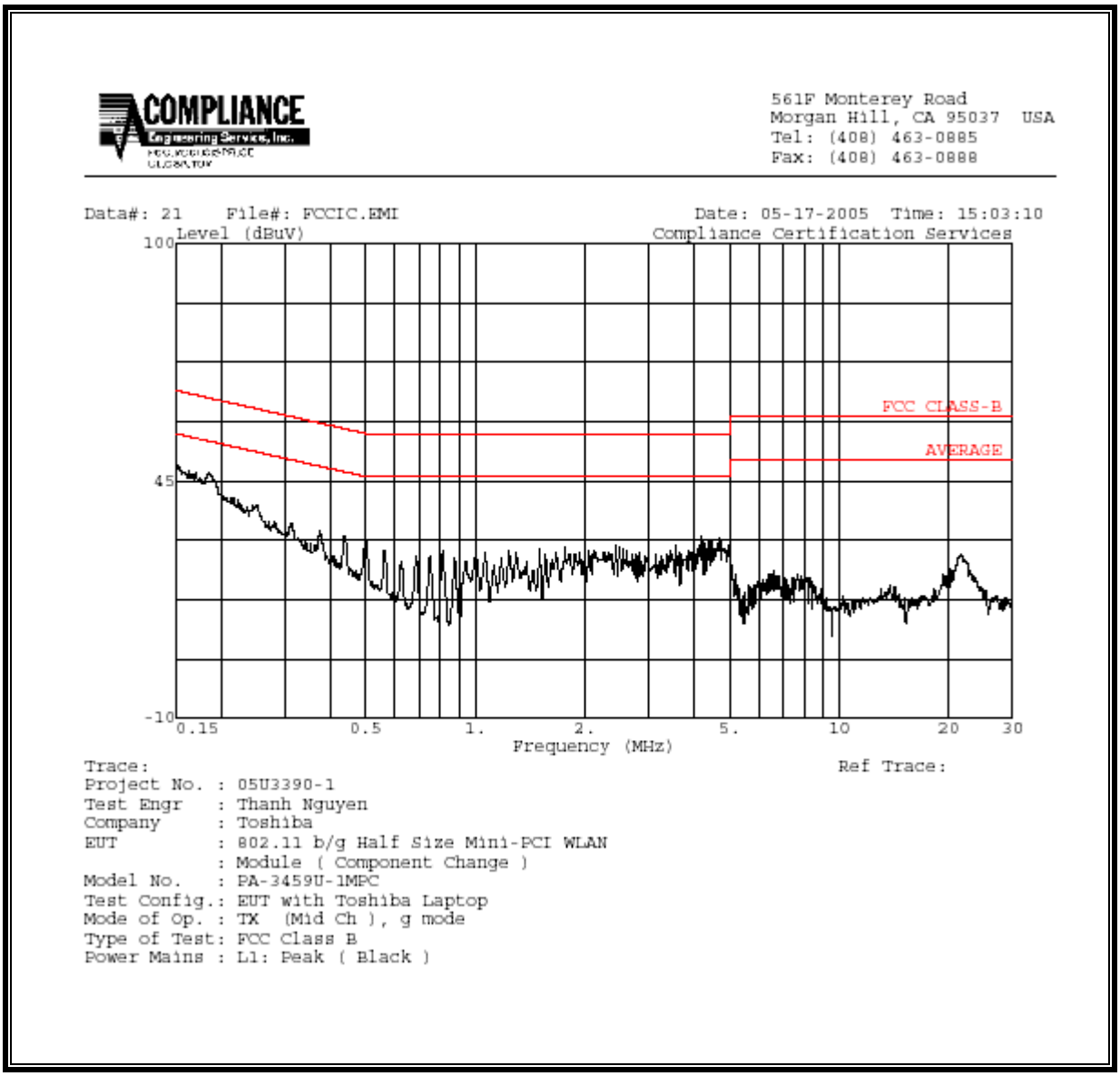
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.15	48.74	--	--	0.00	66.00	56.00	-17.26	-7.26	L1
4.67	31.72	--	--	0.00	56.00	46.00	-24.28	-14.28	L1
21.49	27.44	--	--	0.00	60.00	50.00	-32.56	-22.56	L1
0.15	47.68	--	--	0.00	66.00	56.00	-18.32	-8.32	L2
4.01	29.96	--	--	0.00	56.00	46.00	-26.04	-16.04	L2
19.43	32.22	--	--	0.00	60.00	50.00	-27.78	-17.78	L2
6 Worst Data									

a-Mode, 5.8GHz Band

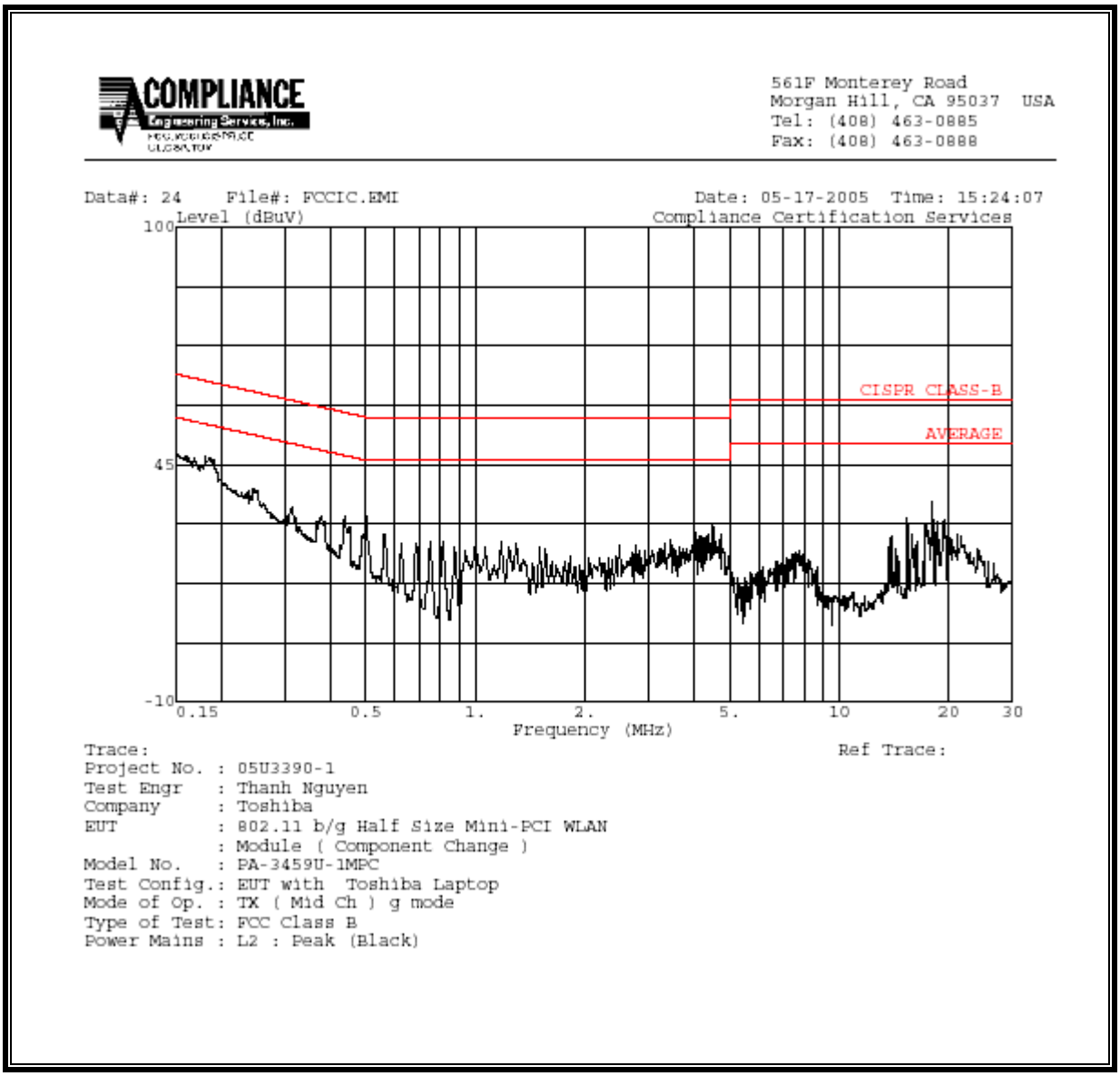
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.18	46.58	--	--	0.00	64.30	54.30	-17.72	-7.72	L1
4.18	32.06	--	--	0.00	56.00	46.00	-23.94	-13.94	L1
21.60	27.86	--	--	0.00	60.00	50.00	-32.14	-22.14	L1
0.18	46.94	--	--	0.00	64.44	54.44	-17.50	-7.50	L2
4.50	31.20	--	--	0.00	56.00	46.00	-24.80	-14.80	L2
18.04	36.34	--	--	0.00	60.00	50.00	-23.66	-13.66	L2
6 Worst Data									

g-Mode (Worst Case)

LINE 1 RESULTS



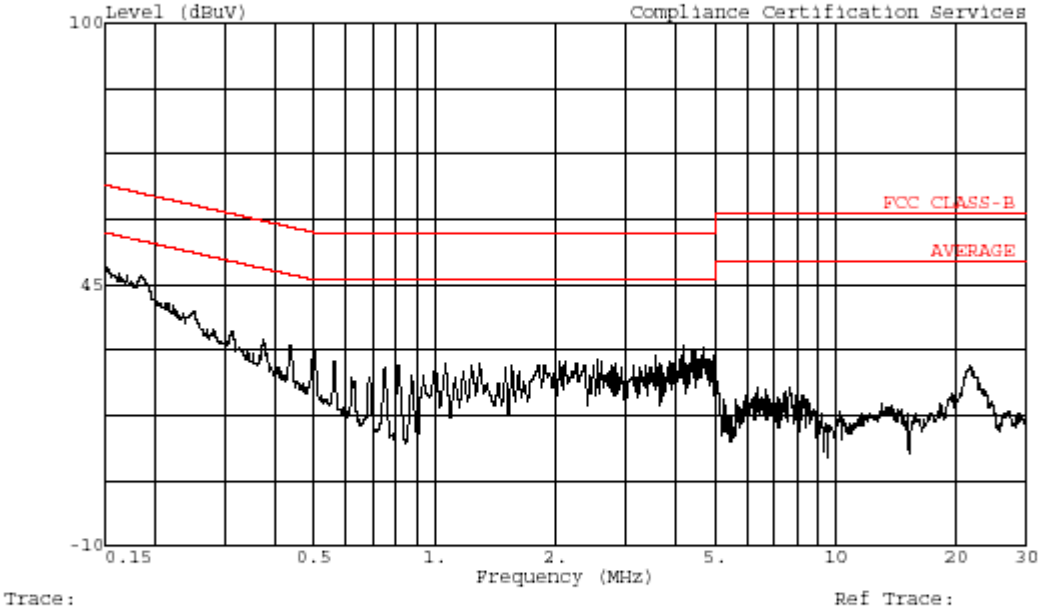
LINE 2 RESULTS



a-mode, 5.8GHz Band

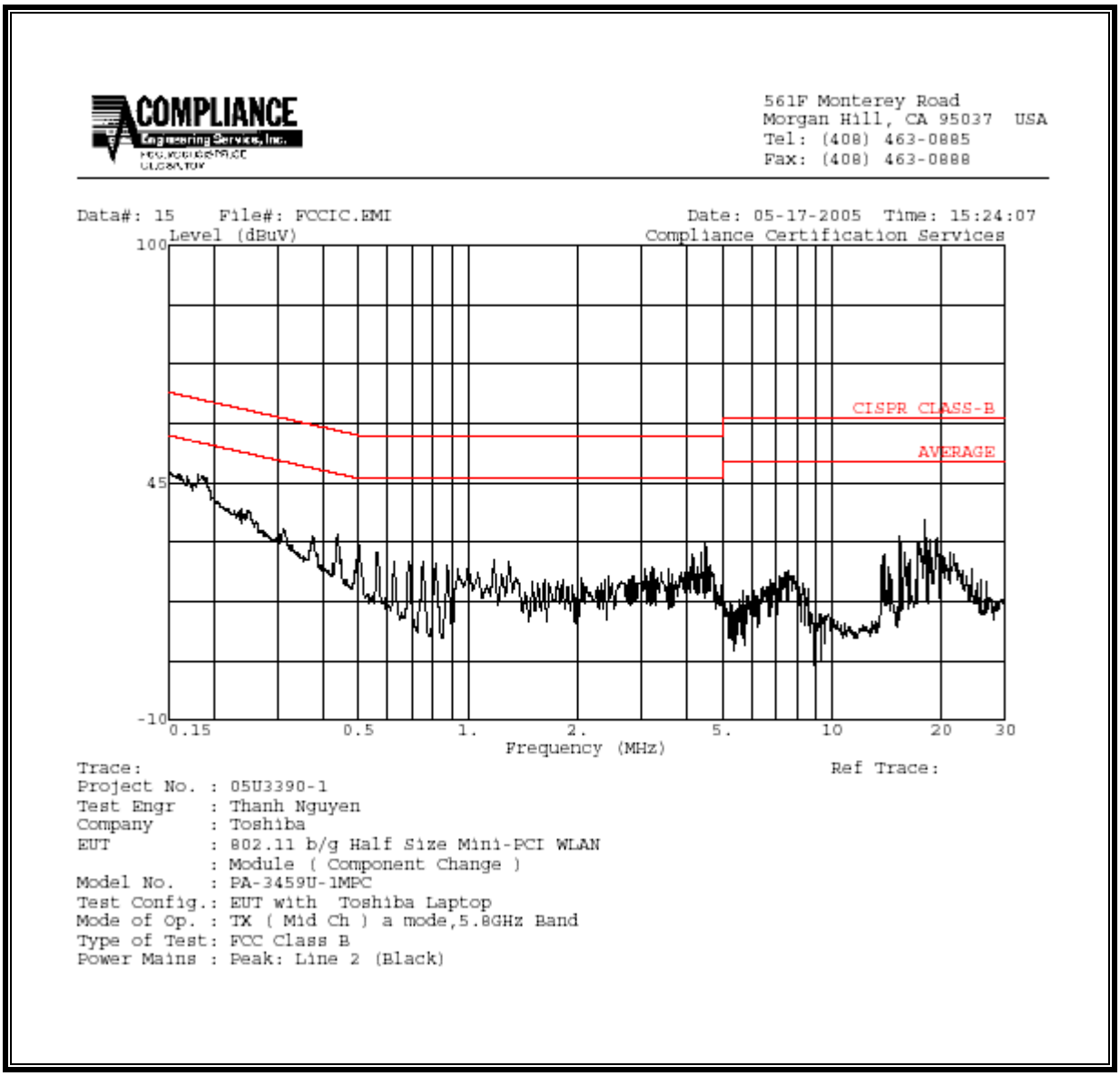
LINE 1 RESULTS

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



Trace: Ref Trace:
Project No. : 05U3390-1
Test Engr : Thanh Nguyen
Company : Toshiba
EUT : 802.11 b/g Half Size Mini-PCI WLAN
: Module (Component Change)
Model No. : PA-3459U-1MPC
Test Config.: EUT with Toshiba Laptop
Mode of Op. : TX (Mid Ch) a mode, 5.8GHz Band
Type of Test: FCC Class B
Power Mains : Peak: Line 1,(Black)

LINE 2 RESULTS



(Please be noted that Pages 156 thru 166 have been extracted as Setup Photos, this is the end of body of the report).