



**FCC CFR47 PART 15 SUBPART C
CERTIFICATION
TEST REPORT**

FOR

802.11b WLAN MINI PCI MODULE

MODEL NUMBER: PA3231U-1MPC

BRAND NAME: TOSHIBA

FCC ID: CJ6UPA3231WL

REPORT NUMBER: 03U1874-1

ISSUE DATE: JUNE 03, 2003

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

Prepared by
**COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888**

TABLE OF CONTENTS

1. TEST RESULT CERTIFICATION	3
2. EUT DESCRIPTION	4
3. TEST METHODOLOGY	5
4. FACILITIES AND ACCREDITATION	5
4.1. <i>FACILITIES AND EQUIPMENT</i>	<i>5</i>
4.2. <i>TABLE OF ACCREDITATIONS AND LISTINGS</i>	<i>6</i>
5. CALIBRATION AND UNCERTAINTY	7
5.1. <i>MEASURING INSTRUMENT CALIBRATION</i>	<i>7</i>
5.2. <i>MEASUREMENT UNCERTAINTY</i>	<i>7</i>
5.3. <i>TEST AND MEASUREMENT EQUIPMENT</i>	<i>8</i>
6. SETUP OF EQUIPMENT UNDER TEST	9
7. APPLICABLE LIMITS AND TEST RESULTS	11
7.1. <i>6 dB BANDWIDTH</i>	<i>11</i>
7.2. <i>OUTPUT POWER</i>	<i>15</i>
7.3. <i>MAXIMUM PERMISSIBLE EXPOSURE</i>	<i>17</i>
7.4. <i>PEAK POWER SPECTRAL DENSITY</i>	<i>19</i>
7.5. <i>CONDUCTED SPURIOUS EMISSIONS</i>	<i>23</i>
7.6. <i>RADIATED EMISSIONS</i>	<i>30</i>
7.7. <i>CO-LOCATED WLAN AND BLUETOOTH OPERATING SIMULTANEOUSLY</i>	<i>43</i>
7.8. <i>POWERLINE CONDUCTED EMISSIONS</i>	<i>44</i>
8. SETUP PHOTOS	47

1. TEST RESULT CERTIFICATION

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

EUT DESCRIPTION: 802.11b WLAN MINI PCI MODULE

MODEL: PA3231U-1MPC

DATE TESTED: JUNE 3, 2003

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

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

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

Tested By:



MIKE HECKROTTE
CHIEF ENGINEER
COMPLIANCE CERTIFICATION SERVICES



CHIN PANG
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The EUT is an 802.11b transceiver module, with an option of collocation with a Bluetooth transceiver module, FCC ID: CJ6UPA3232BT.

The EUT has a output power of 19.64 dBm (92 mW) and highest antenna gain of 4.8 dBi in the 2400 - 2483.5 MHz band.

Antennas filed under this application:

Hitachi, Dual Band film Antenna HTL008, 4.8dBi
Hitachi, Wide Band film Antenna HTL012, 4.1dBi
Hitachi, Film antenna, HTL004, -0.3dBi

3. TEST METHODOLOGY

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







4. FACILITIES AND ACCREDITATION

4.1. FACILITIES AND EQUIPMENT

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

4.2. TABLE OF ACCREDITATIONS AND LISTINGS

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	 R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	 ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	 ELA-171
Taiwan	BSMI	CNS 13438	 SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	 IC2324 A,B,C, and F

5. CALIBRATION AND UNCERTAINTY

5.1. MEASURING INSTRUMENT CALIBRATION

The measurement instruments utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer's recommendations, and are traceable to national standards.

5.2. MEASUREMENT UNCERTAINTY

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

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

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

5.3. TEST AND MEASUREMENT EQUIPMENT

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

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Antenna, Horn 1 ~ 18 GHz	EMCO	3115	6717	2/04/2004
Preamplifier, 1 ~ 26 GHz	Miteq	NSP10023988	646456	4/05/2004
EMI Test Receiver	R & S	ESHS 20	827129/006	4/18/2004
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/2003
LISN, 10 kHz ~ 30 MHz	Solar	8012-50-R-24-BNC	837990	9/6/2003
Spectrum Analyzer	HP	8593EM	3710A00205	6/11/2003
High Pass Filter 4.57GHz	FSY Microwave	FM-4570-9SS	3	N.C.R
2.4-2.5GHz Reject Filter	MicroTronic	BRM50702	002	N.C.R
Antenna, Bilog	Chase	CBL6112B	2586	3/6/04
ERM-P Series Power Meter	Agilent	E4416A	GB41291160	8/9/2003
Peak / Average Power Sensor	Agilent	E9327A	US40440755	9/5/2003

6. SETUP OF EQUIPMENT UNDER TEST

SETUP INFORMATION FOR TRANSMITTER TESTS

SUPPORT EQUIPMENT

PERIPHERAL SUPPORT EQUIPMENT LIST				
Device Type	Manufacturer	Model	Serial Number	FCC ID
Laptop	Toshiba	Satellite 1715CDS	9014892CU	DoC
AC Adapter	Lishin International	LSE9802A2060	010810241A1	N/A
USB Drive	Toshiba	PA3109U	2382975660	DoC

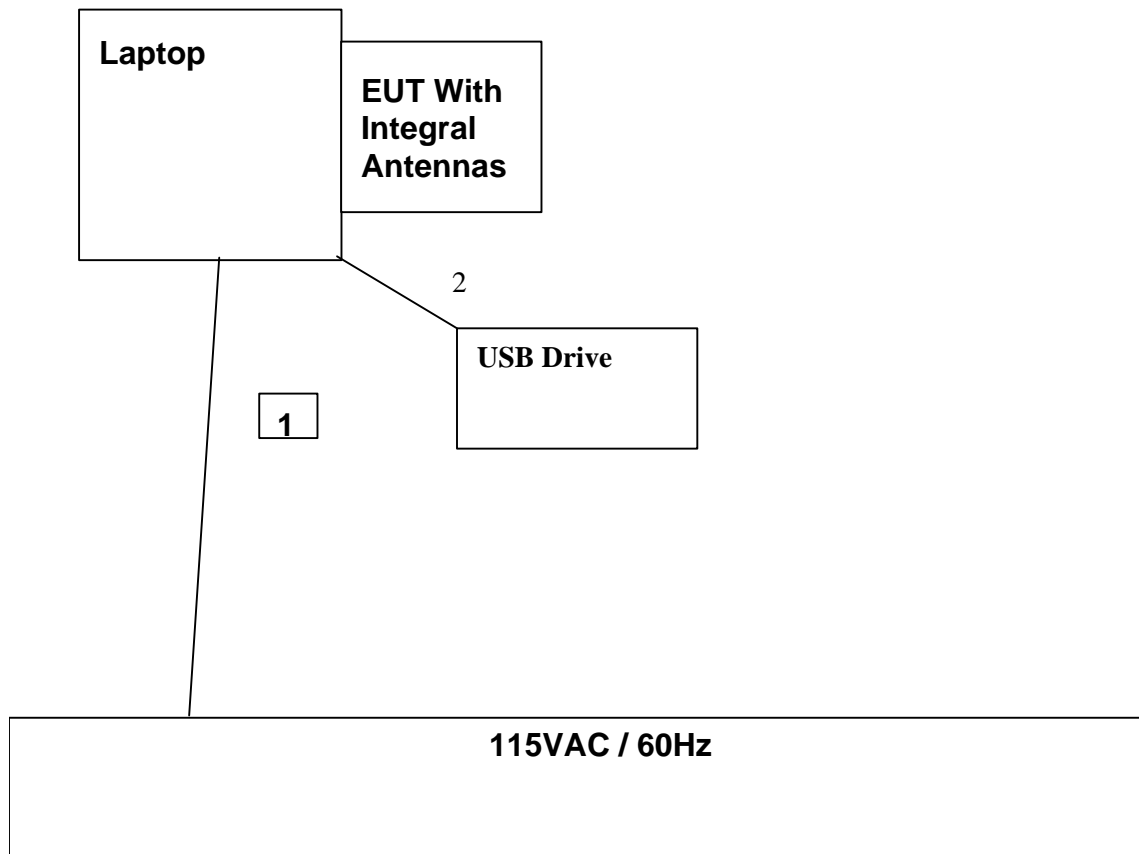
I/O CABLES

Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length	Remarks
1	AC	1	US115	Un-shielded	2 m	Laptop cable is integrated with AC Adapter
2	USB	1	USB	Un-shielded	0.3m	NA

TEST SETUP

The EUT is installed in the laptop computer via a PCMCIA extender card.

SETUP DIAGRAM FOR TRANSMITTER TESTS



7. APPLICABLE LIMITS AND TEST RESULTS

7.1. 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 100 kHz. The sweep time is coupled.

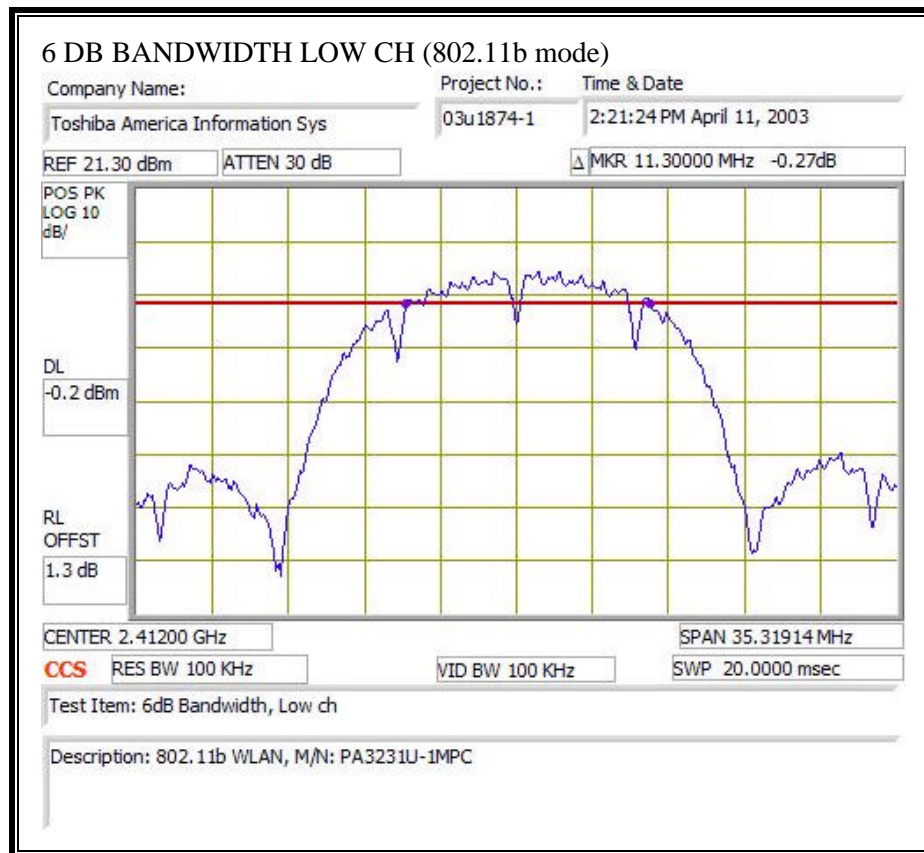
RESULTS

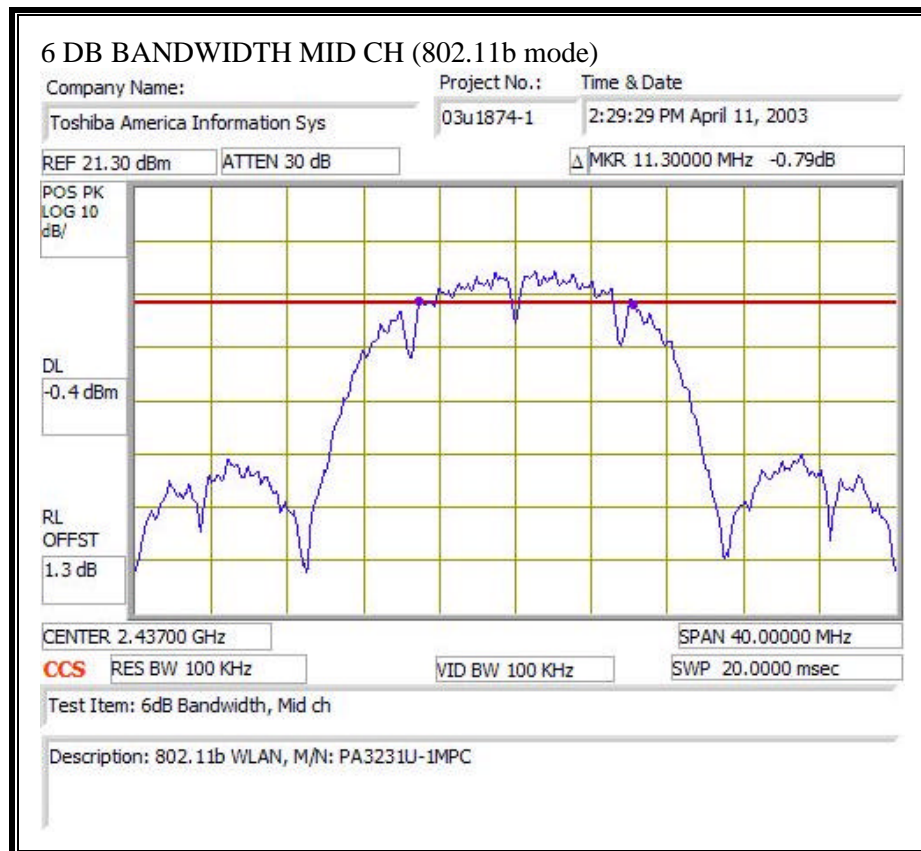
No non-compliance noted:

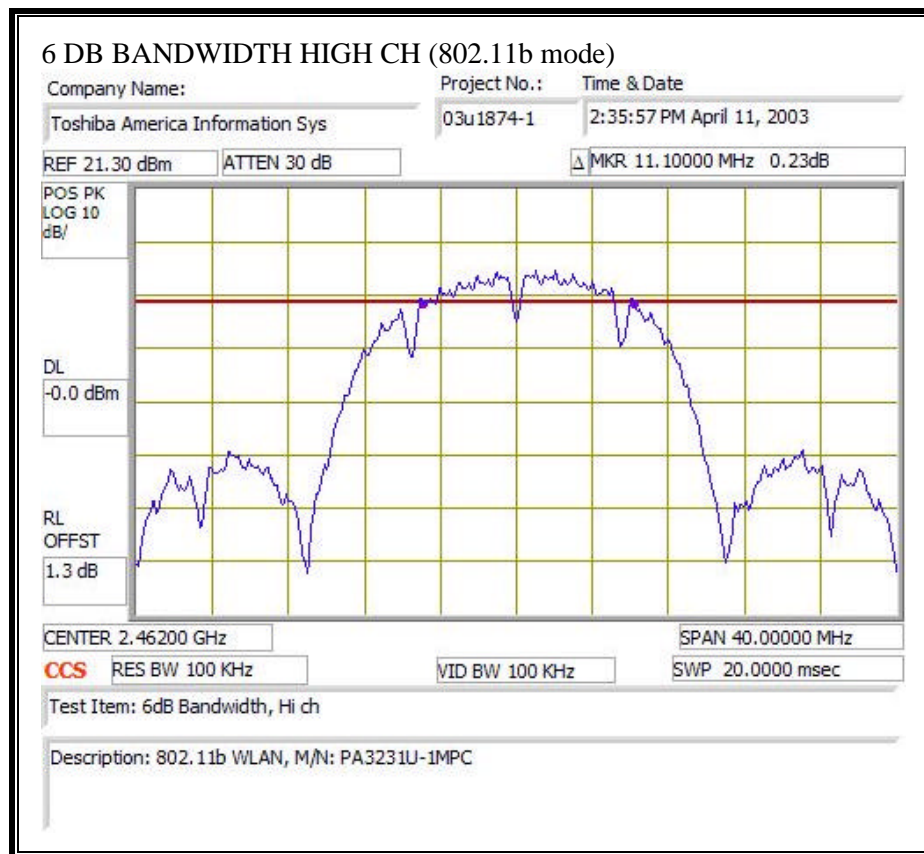
802.11b Mode

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Margin (kHz)
Low	2412	11300	500	10800
Middle	2437	11300	500	10800
High	2462	11100	500	10600

6 DB BANDWIDTH (802.11b MODE)







7.2. 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.

The maximum antenna gain is 4.8 dBi, therefore the limit is 30 dBm.

AVERAGE POWER LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter. The power meter is set to simultaneously read peak power and average power.

RESULTS

No non-compliance noted:

The cable assembly insertion loss of 11.2 dB (including 10 dB pad and 1.2 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

802.11b Mode

Channel	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)	Limit (dBm)	Margin (dB)
Low	2412	18.05	19.64	30	-10.36
Middle	2437	17.80	19.35	30	-10.65
High	2462	17.82	19.28	30	-10.72

7.3. MAXIMUM PERMISSIBLE EXPOSURE

LIMITS

§15.247 (b) (5) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

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 mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

yields

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

$$d = 0.282 * \sqrt{(P * G / S)}$$

where

d = distance in cm

P = Power in mW

G = Numeric antenna gain

S = Power Density in mW / cm²

Substituting the logarithmic form of power and gain using:

$$P \text{ (mW)} = 10^{(P \text{ (dBm)} / 10)} \text{ and}$$

$$G \text{ (numeric)} = 10^{(G \text{ (dBi)} / 10)}$$

yields

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

where

d = MPE distance in cm

P = Power in dBm

G = Antenna Gain in dBi

S = Power Density Limit in mW / cm²

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

LIMITS

S = 1.0 mW / cm² from 1.1310 Table 1

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	19.64	4.80	4.70

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.

7.4. 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 \geq 3KHz, 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.

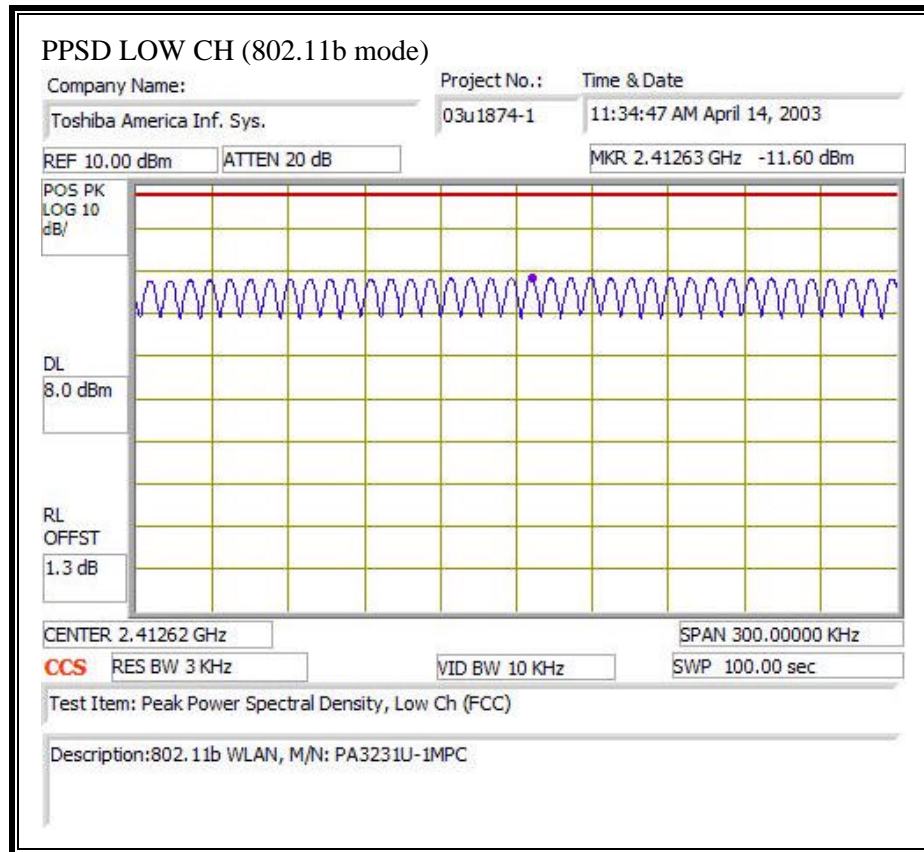
RESULTS

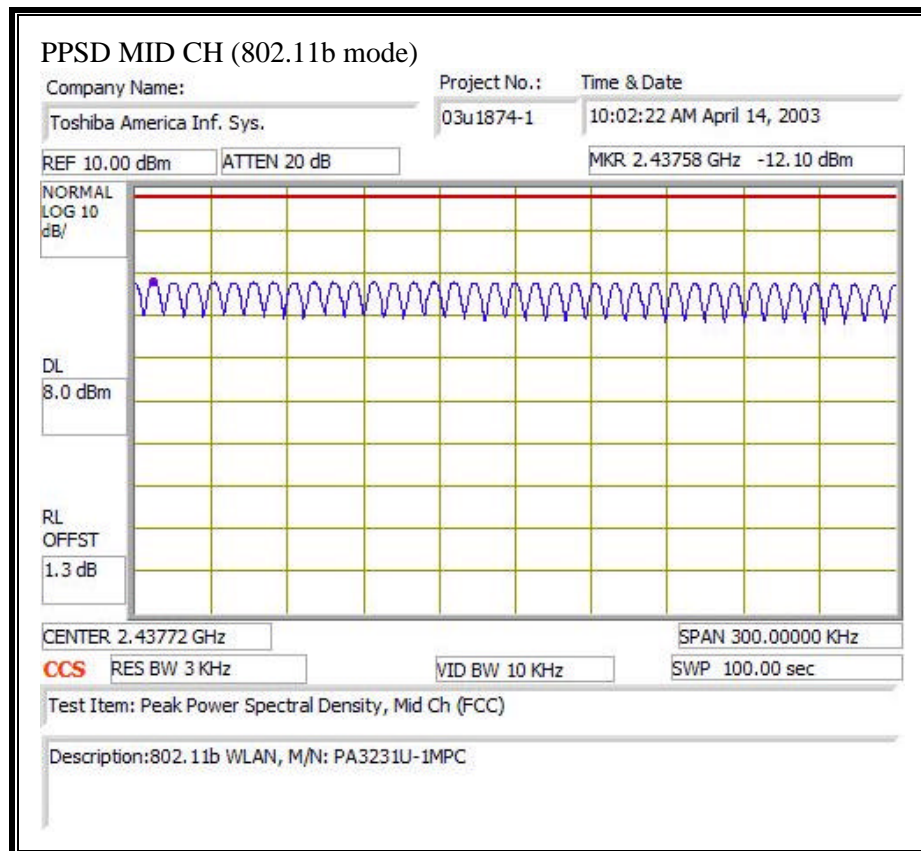
No non-compliance noted:

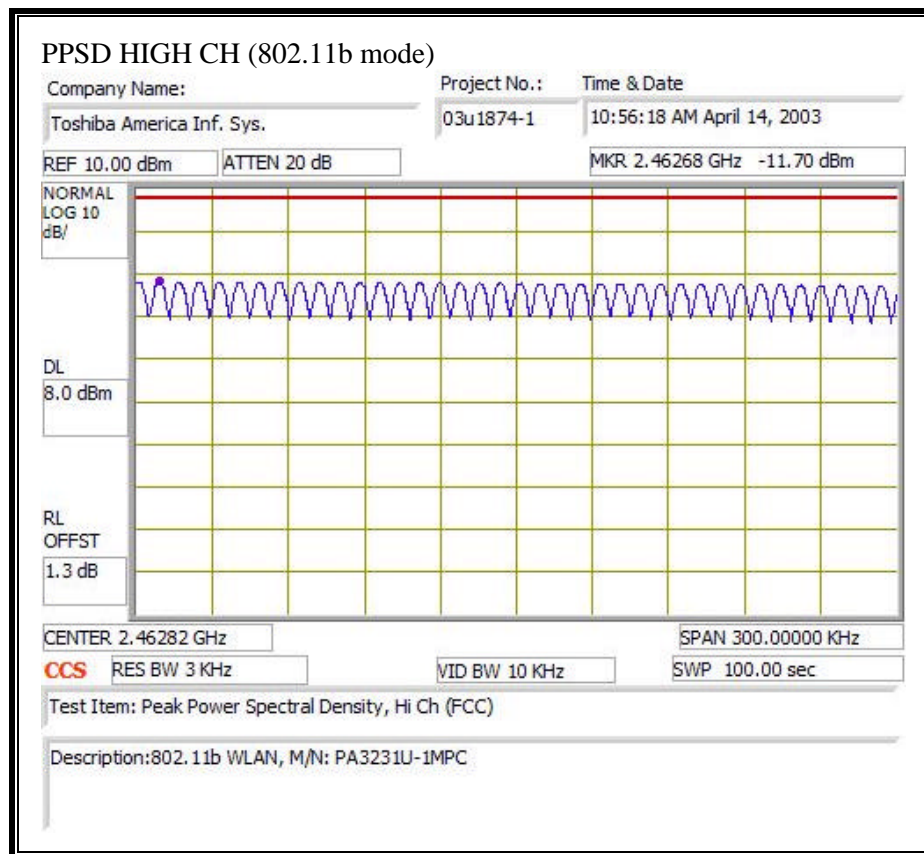
802.11b Mode

Channel	Frequency (MHz)	PPSD (dBm)	Limit (dBm)	Margin (dB)
Low	2412	-11.60	8	-19.60
Middle	2437	-12.10	8	-20.10
High	2462	-11.70	8	-19.70

PEAK POWER SPECTRAL DENSITY (802.11b MODE)







7.5. 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

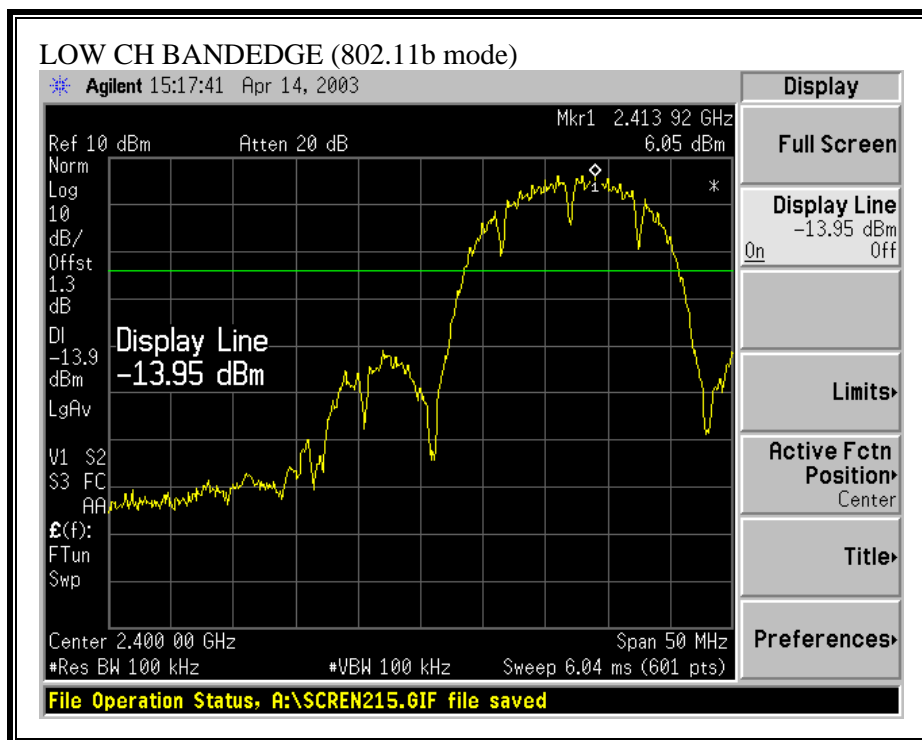
The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 100 kHz.

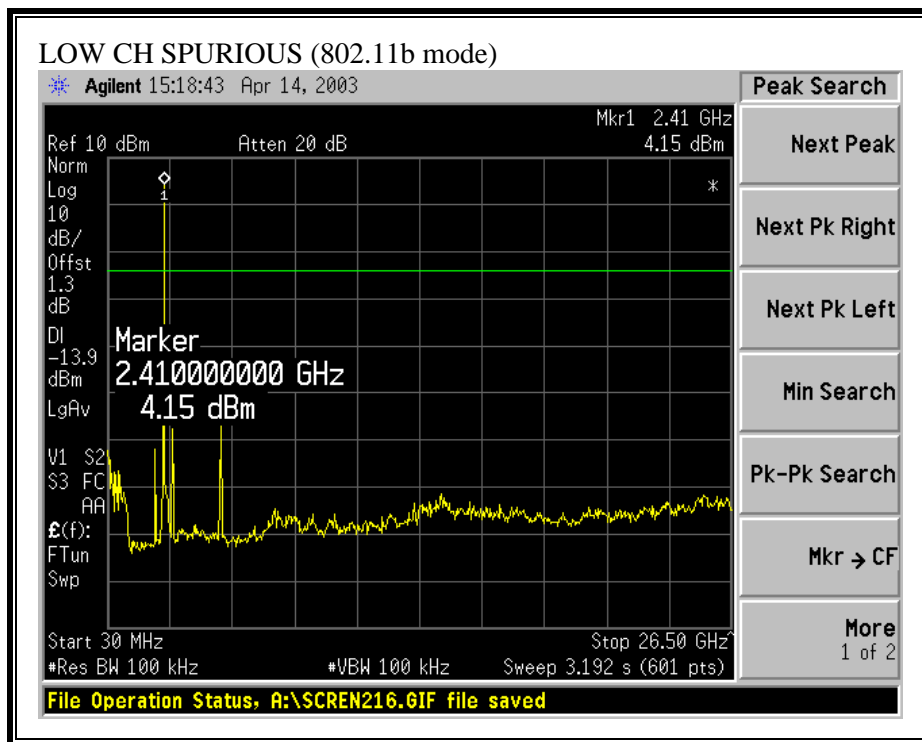
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

RESULTS

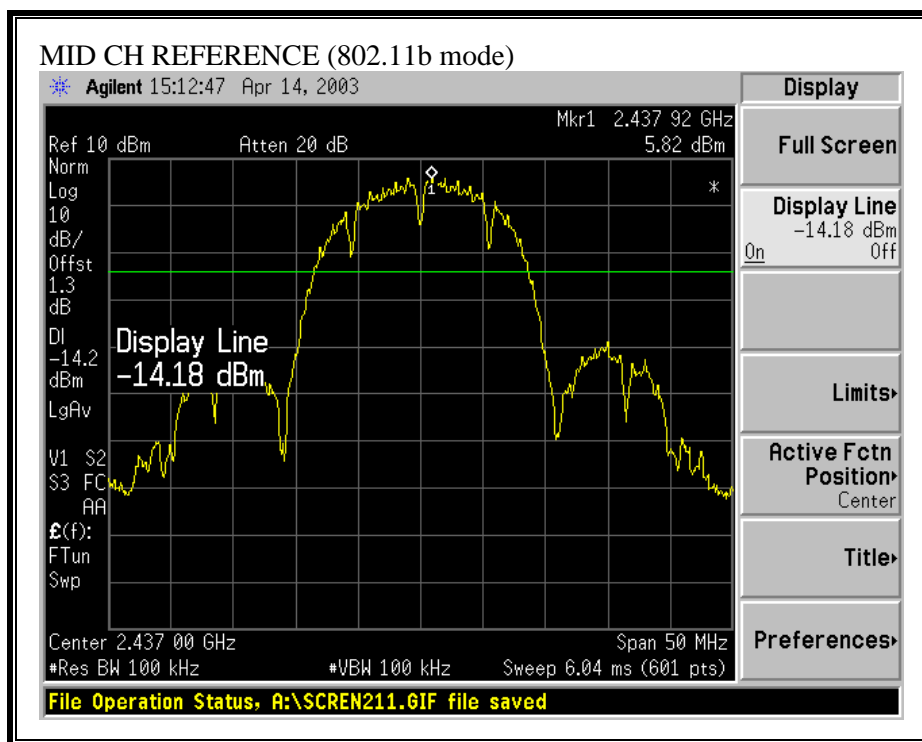
No non-compliance noted:

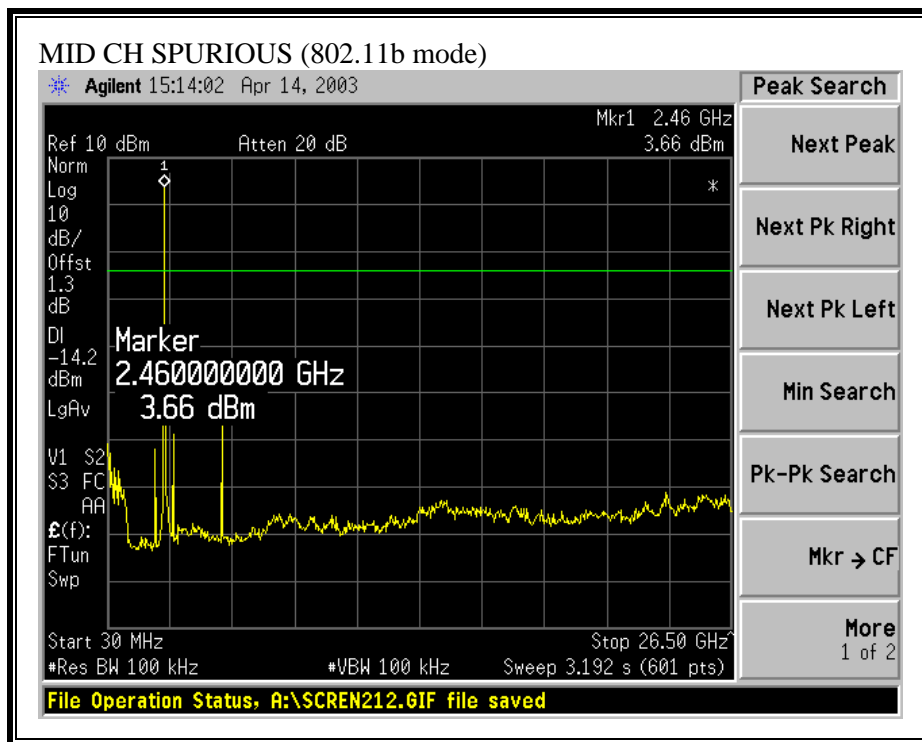
SPURIOUS EMISSIONS, LOW CHANNEL (802.11b MODE)



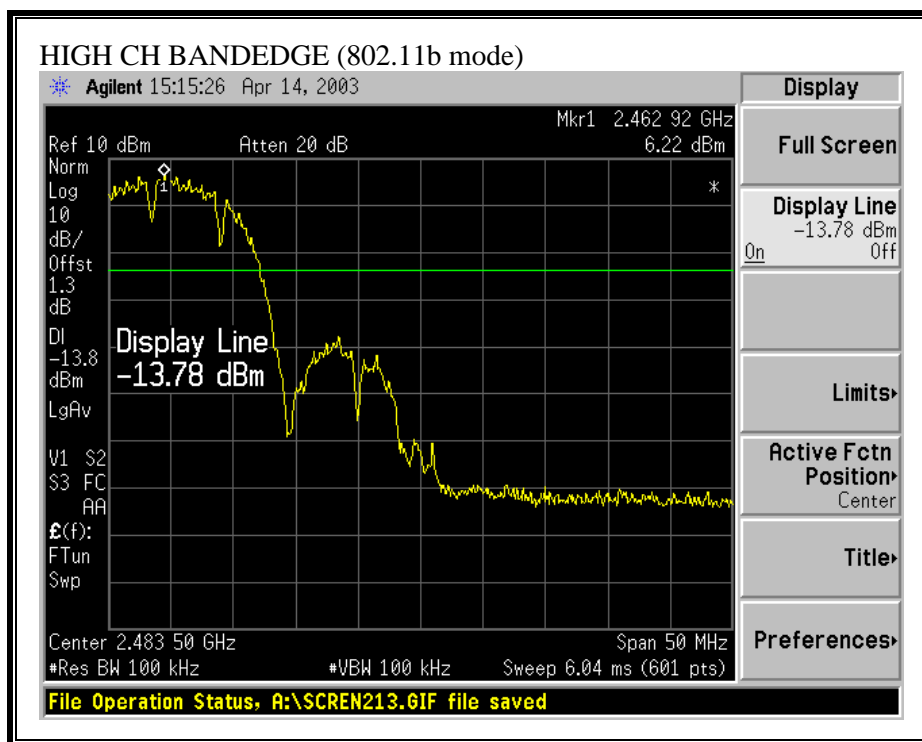


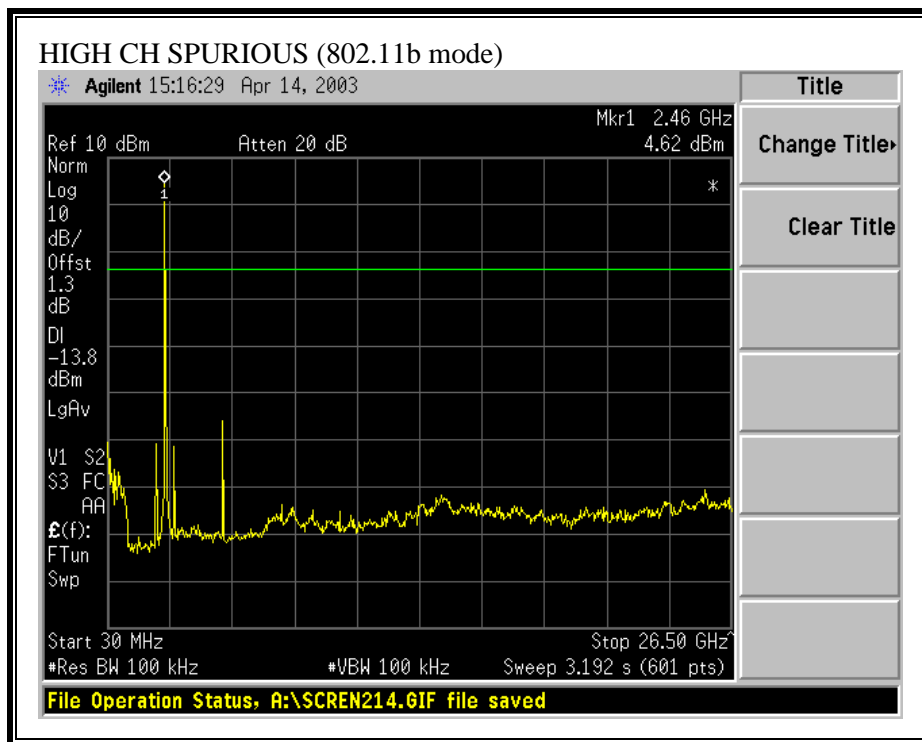
SPURIOUS EMISSIONS, MID CHANNEL (802.11b MODE)





SPURIOUS EMISSIONS, HIGH CHANNEL (802.11b MODE)





7.6. RADIATED 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.

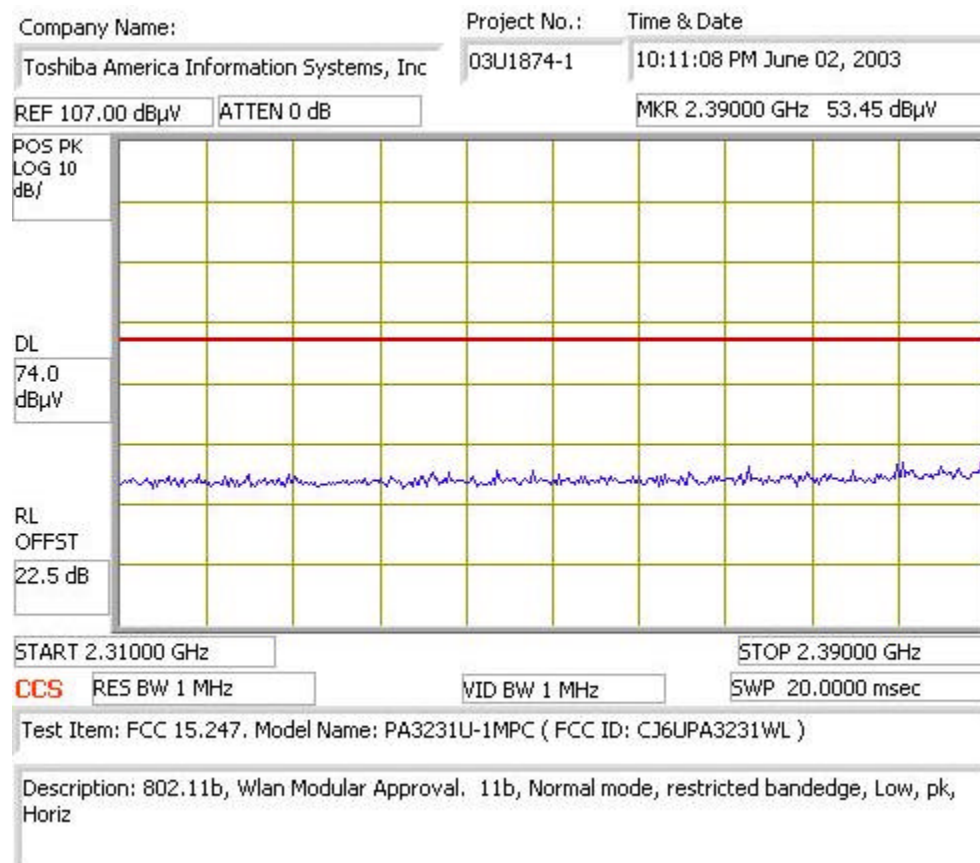
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

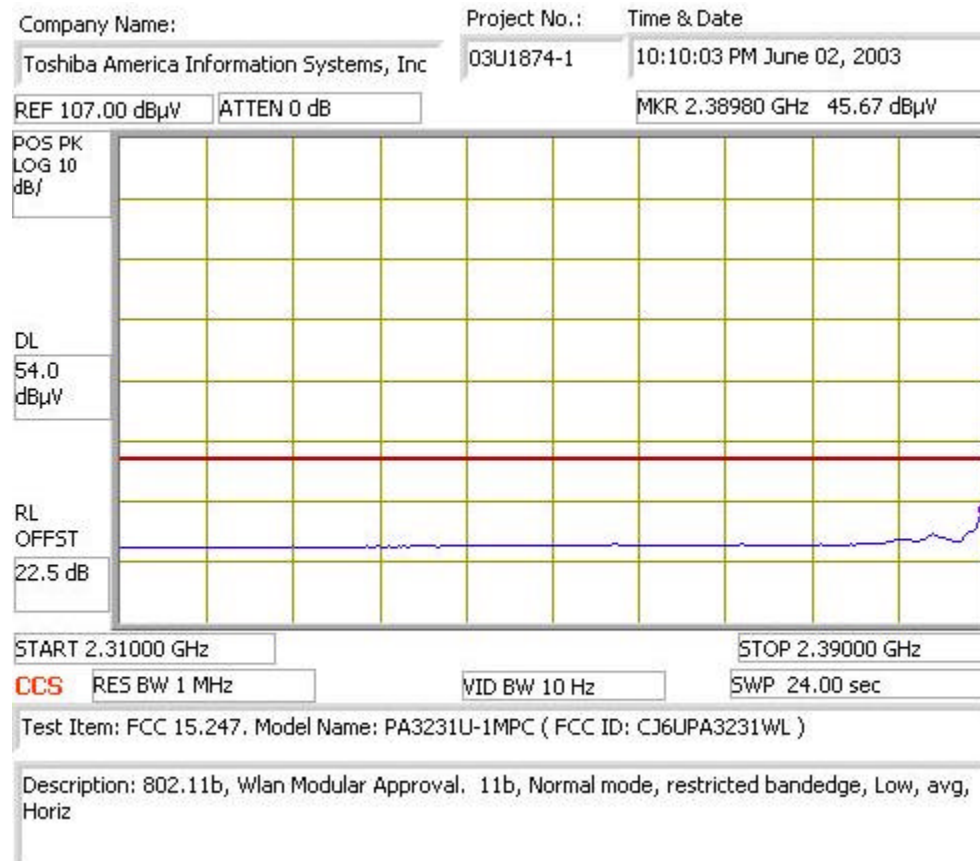
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

RESULTS

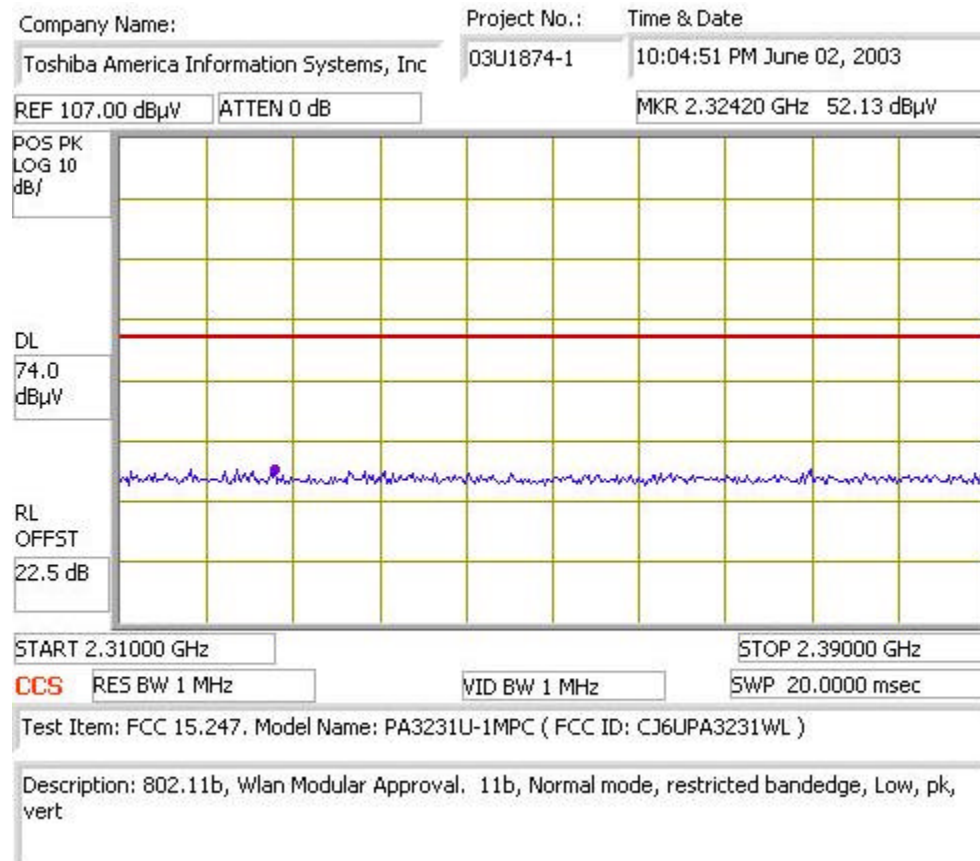
No non-compliance noted:

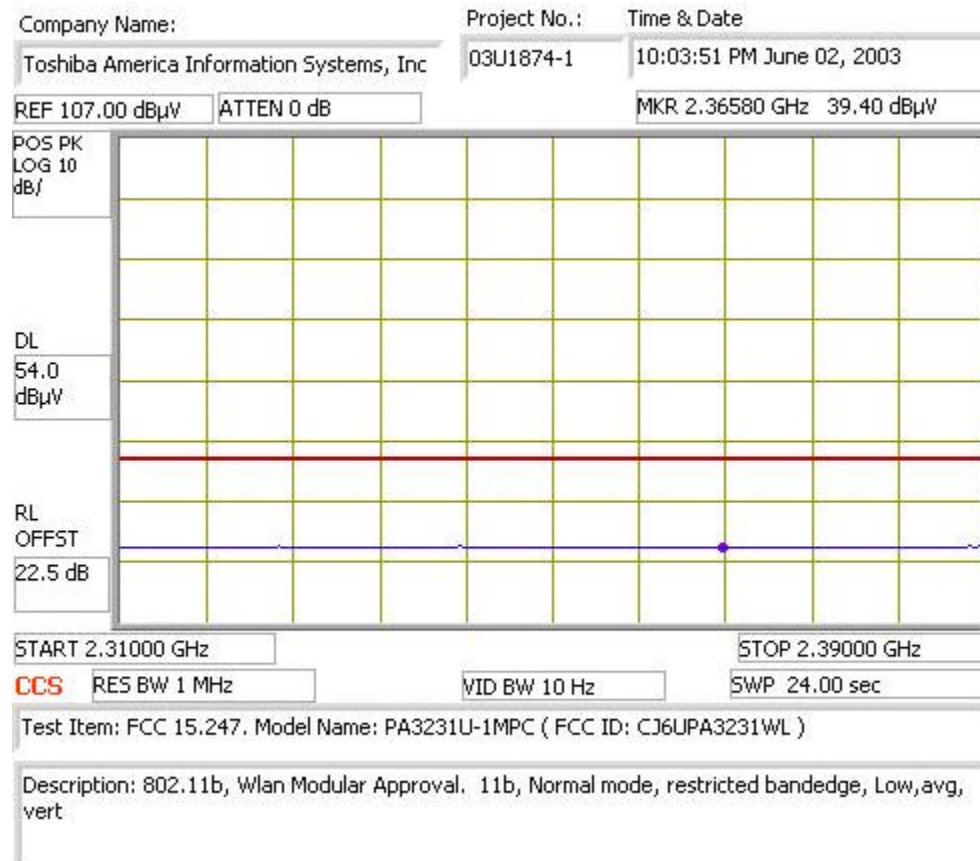
RESTRICTED BANDEDGE HORIZ (b MODE, LOW CHANNEL)



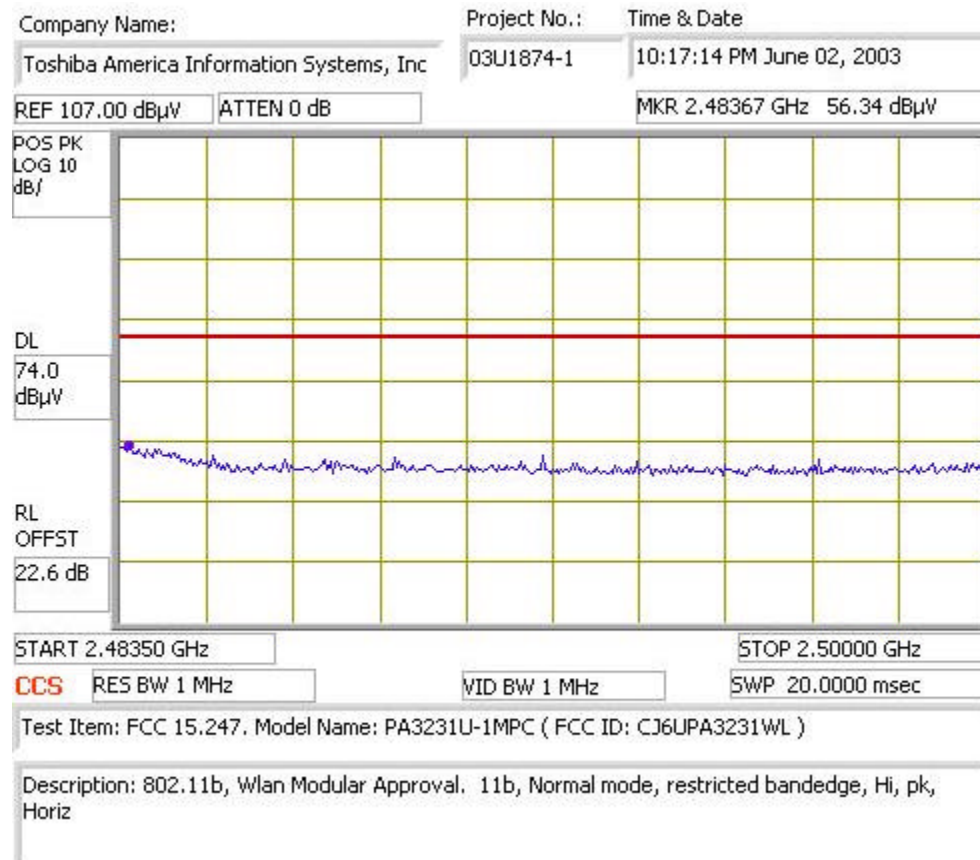


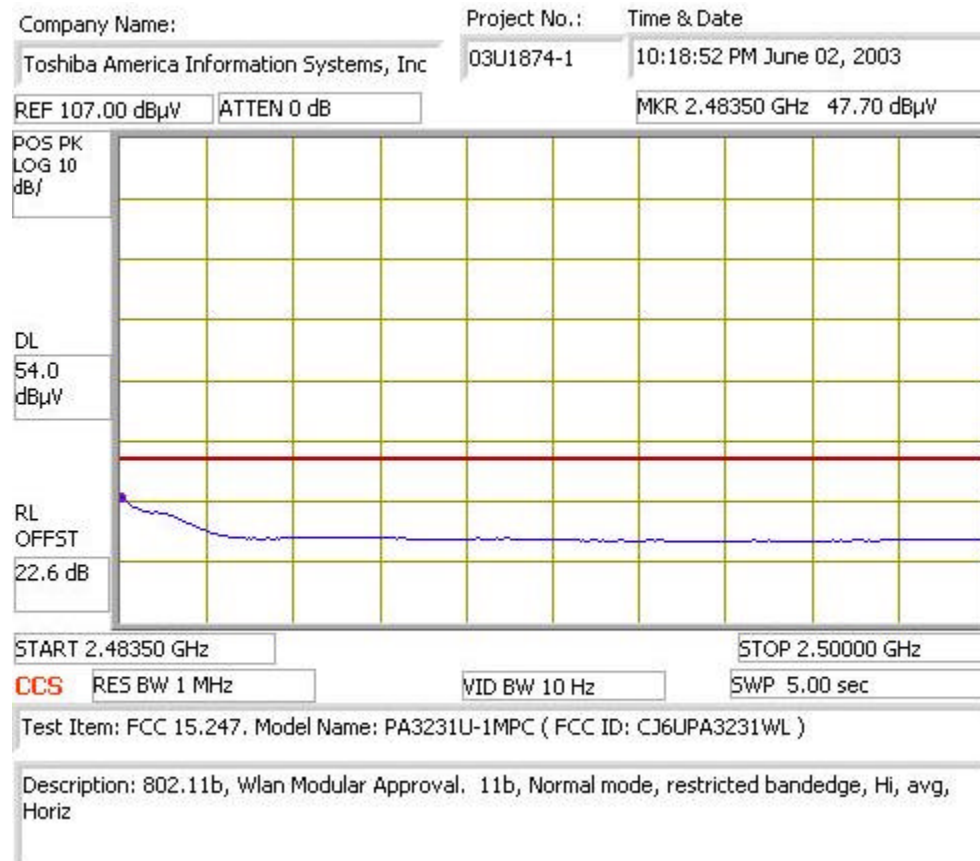
BAND EDGE RADIATED EMISSIONS (LOW CHANNEL, VERTICAL POLARIZATION)



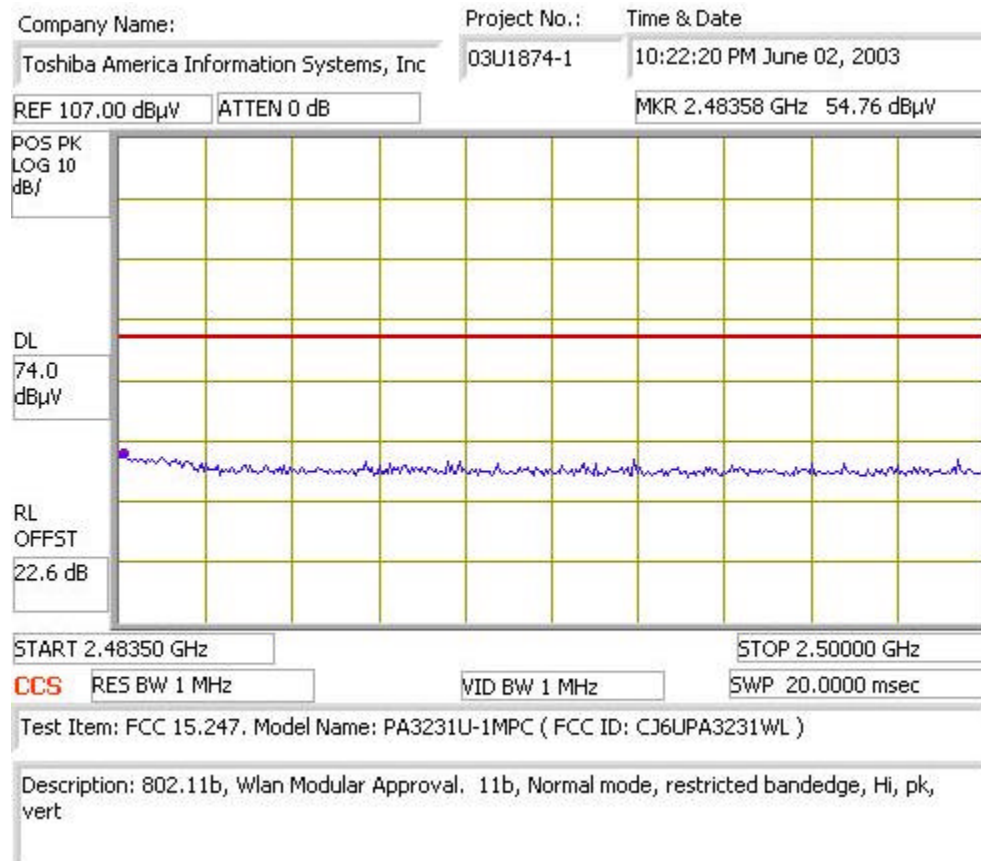


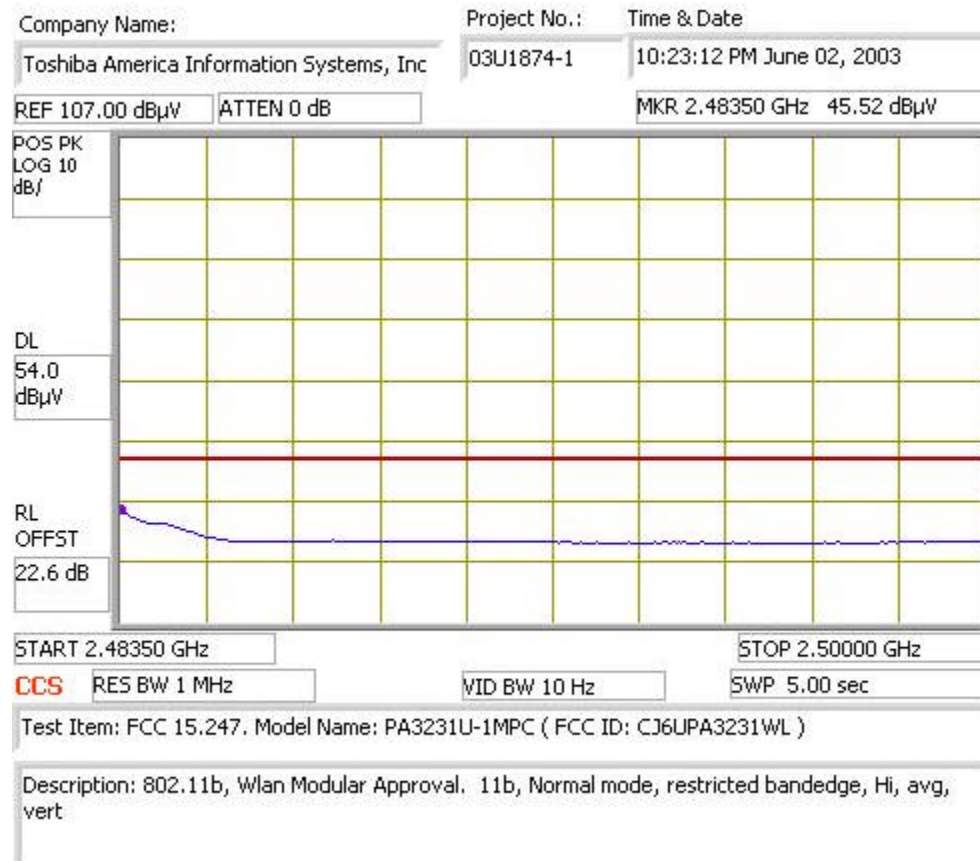
BAND EDGE RADIATED EMISSIONS (HIGH CHANNEL, HORIZONTAL POLARIZATION)





BAND EDGE RADIATED EMISSIONS (HIGH CHANNEL, VERTICAL POLARIZATION)





Harmonic And Spurious Radiated Emissions (2.4GHz Band)

06/03/03 High Frequency Measurement Compliance Certification Services, Morgan Hill Open Field Site															
Test Engr: Chin Pang Project #: 03U1874-1 Company: Toshiba America Information Inc. EUT Descrip.: 802.11 b WLAN Modular Approval (w/option of c0-location with CSR BT: CJ6UPA323BT) EUT M/N: PA3231U-1MPC (FCC ID: CJ6UPA3231WL) Test Target: FCC 15.247 Mode Oper: Tx															
Test Equipment:															
EMCO Horn 1-18GHz T73; S/N: 6717 @3m		Pre-amplifier 1-26GHz T86 Miteq 924341		Spectrum Analyzer HP 8593EM Analyzer		Horn > 18GHz									
Hi Frequency Cables <input type="checkbox"/> (2 ft) <input checked="" type="checkbox"/> (2 ~ 3 ft) <input type="checkbox"/> (4 ~ 6 ft) <input checked="" type="checkbox"/> (12 ft)								Peak Measurements: 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
Transmitting at Low Ch															
4.824	9.8	58.0	55.0	33.4	3.9	-45.6	0.0	1.0	50.7	47.7	74.0	54.0	-23.3	-6.3	V
4.824	9.8	57.3	54.4	33.4	3.9	-45.6	0.0	1.0	50.0	47.1	74.0	54.0	-24.0	-6.9	H
Transmitting at Mid Ch															
4.874	9.8	59.7	55.9	33.4	4.0	-45.6	0.0	1.0	52.4	48.6	74.0	54.0	-21.6	-5.4	V
4.874	9.8	60.8	57.9	33.4	4.0	-45.6	0.0	1.0	53.6	50.6	74.0	54.0	-20.4	-3.4	H
7.311	9.8	52.0	42.5	35.8	5.2	-46.6	0.0	1.0	47.4	37.9	74.0	54.0	-26.6	-16.1	V
7.311	9.8	51.6	42.0	35.8	5.2	-46.6	0.0	1.0	47.0	37.4	74.0	54.0	-27.0	-16.6	H
Transmitting at Hi Ch															
4.924	9.8	60.5	57.0	33.5	4.0	-45.7	0.0	1.0	53.3	49.8	74.0	54.0	-20.7	-4.2	V
4.924	9.8	59.3	56.7	33.5	4.0	-45.7	0.0	1.0	52.1	49.5	74.0	54.0	-21.9	-4.5	H
7.386	9.8	53.3	43.5	36.0	5.2	-46.5	0.0	1.0	48.9	39.1	74.0	54.0	-25.1	-14.9	V
7.386	9.8	52.3	42.7	36.0	5.2	-46.5	0.0	1.0	47.9	38.3	74.0	54.0	-26.1	-15.7	H
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										

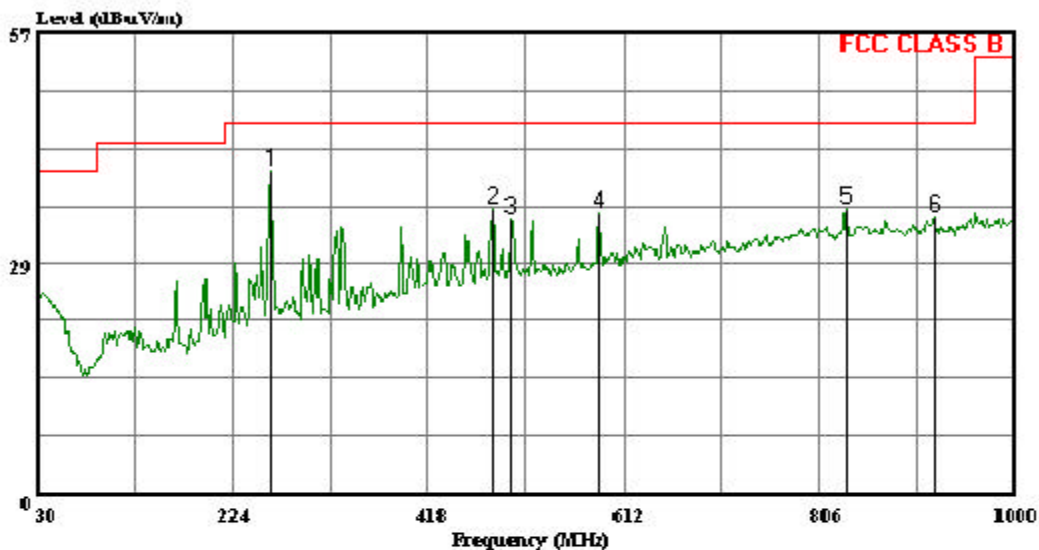
WORST-CASE EMISSIONS 30 TO 1000 MHz



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

Data#: 2 File#: test1.EMI

Date: 06-05-2003 Time: 20:59:09



(Auxin ATC)

Trace: 1

Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 HORIZONTAL
Company : Toshiba America Information, Inc.
EUT Description : 802.11b WLAN modular approval
Model Number : PA3231U-IMPC
Test Configuration: EUT
Test Target : FCC Class B
Mode of Operation: TX
Project No : 03U1874-1
Tester : Chin Pang

Page: 1

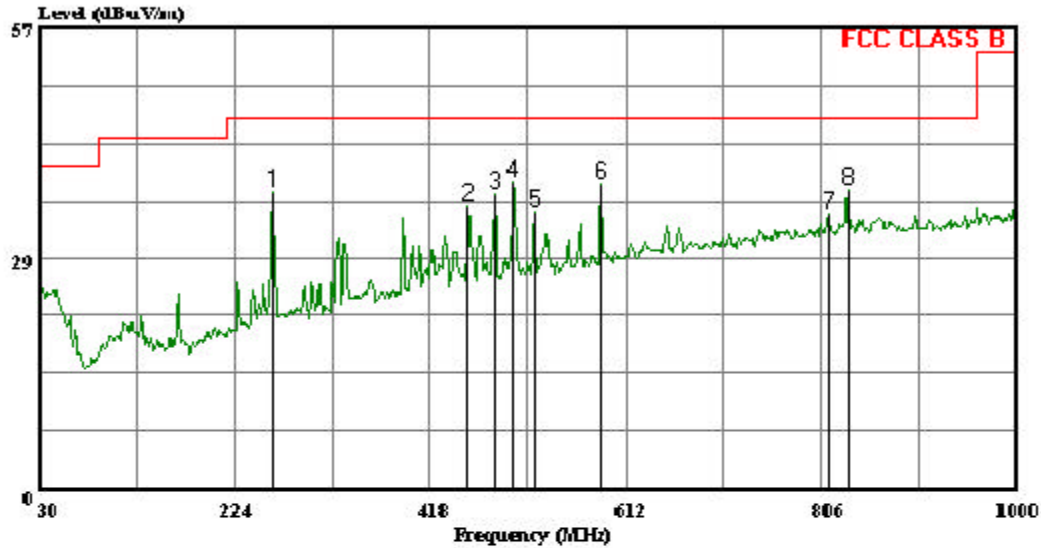
		Read	Probe	Cable	Preamp		Limit	Over	
	Freq	Level	Factor	Loss	Factor	Level	Line	Limit	Remark
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB	
1	261.838	26.60	11.84	1.59	0.00	40.03	46.00	-5.97	Peak
2	482.998	16.71	16.22	2.31	0.00	35.24	46.00	-10.76	Peak
3	499.480	15.29	16.53	2.29	0.00	34.11	46.00	-11.89	Peak
4	586.788	14.63	17.55	2.50	0.00	34.68	46.00	-11.32	Peak
5	832.198	12.18	20.06	3.10	0.00	35.34	46.00	-10.66	Peak
6	919.490	10.31	20.71	3.23	0.00	34.25	46.00	-11.75	Peak



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

Data#: 4 File#: test1.EMI

Date: 06-05-2003 Time: 21:03:16



(Auxiliary ATC)

Trace: 3

Ref Trace:

Condition: FCC CLASS B 3m CHAMBER 030306 1185 VERTICAL
Company : Toshiba America Information, Inc.
EUT Description : 802.11b WLAN modular approval
Model Number : PA3231U-1MPC
Test Configuration: EUT
Test Target : FCC Class B
Mode of Operation: Tx
Project No : 03U1874-1
Tester : Chin Pang

Page: 1

	Freq	Read		Probe		Cable Preamp		Limit	Over	Remark
		Level	Factor	Loss Factor	Level	Level	Line			
	MHz	dBuV	dB	dB	dB	dBuV/m	dBuV/m	dB		
1	261.830	23.42	11.84	1.59	0.00	36.85	46.00	-9.15	Peak	
2	455.030	17.12	15.67	2.20	0.00	34.99	46.00	-11.01	Peak	
3	482.990	17.90	16.22	2.31	0.00	36.43	46.00	-9.57	Peak	
4	499.480	19.21	16.53	2.29	0.00	38.03	46.00	-7.97	Peak	
5	521.790	15.24	16.81	2.31	0.00	34.36	46.00	-11.64	Peak	
6	586.780	17.62	17.55	2.50	0.00	37.67	46.00	-8.33	Peak	
7	812.790	11.11	19.91	3.01	0.00	34.03	46.00	-11.97	Peak	
8	832.190	13.76	20.06	3.10	0.00	36.92	46.00	-9.08	Peak	

7.7. CO-LOCATED WLAN AND BLUETOOTH OPERATING SIMULTANEOUSLY

WORST CASE ADJACENT RESTRICTED BAND EMISSIONS

Freq (GHz)	Note	BT Off (dBuV/m)	Delta (dB)	BT On (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2.390	Horiz Peak	53.45	0.21	53.66	74	-20.34
2.3898	Horiz Avg	45.67	0.04	45.71	54	-8.29
2.48367	Horiz Peak	56.34	0.45	56.79	74	-17.21
2.4835	Horiz Avg	47.7	0.24	47.94	54	-6.06

WORST CASE HARMONICS AND SPURIOUS EMISSIONS

Freq (GHz)	Note	BT Off (dBuV/m)	Delta (dB)	BT On (dBuV/m)	Limit (dBuV/m)	Margin (dB)
4.874	Horiz Peak	53.6	-0.5	53.1	74	-20.9
4.874	Horiz Avg	50.6	-0.5	50.1	54	-3.9
4.874	Vert Peak	52.4	-0.4	52.0	74	-22.0
4.874	Vert Avg	48.6	0.6	49.2	54	-4.8
7.311	Horiz Peak	47.0	-0.5	46.5	74	-27.5
7.311	Horiz Avg	37.4	0.3	36.7	54	-17.3
7.311	Vert Peak	47.4	0.4	47.8	74	-26.2
7.311	Vert Avg	37.9	0.5	38.4	54	-15.6

7.8. POWERLINE CONDUCTED EMISSIONS

LIMIT

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

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

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

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

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

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

RESULTS

No non-compliance noted:

6 WORST EMISSIONS

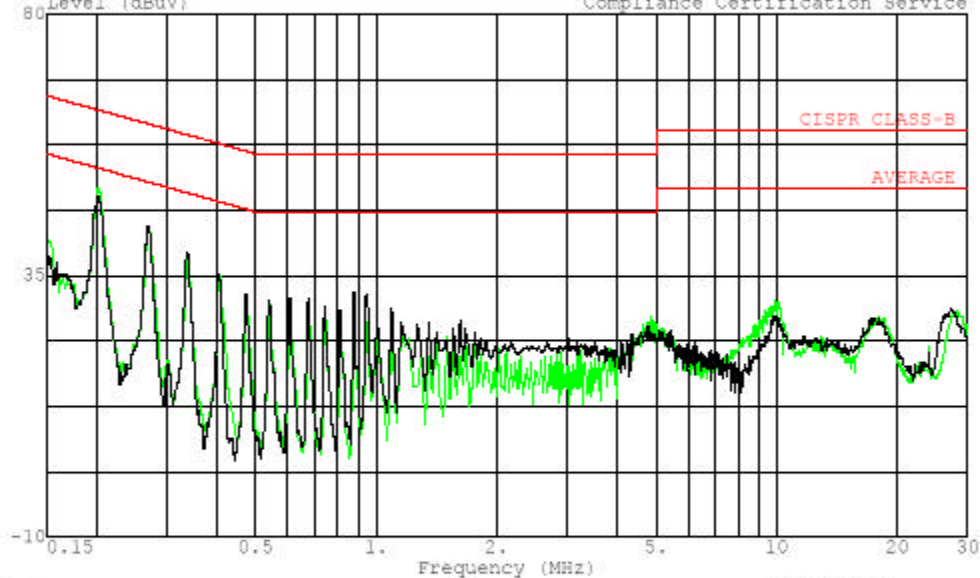
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN_B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.20	49.94	--	--	0.00	64.51	54.51	-14.57	-4.57	L1
0.27	43.79	--	--	0.00	62.49	52.49	-18.70	-8.70	L1
10.07	32.24	--	--	0.00	60.00	50.00	-27.76	-17.76	L1
0.21	49.18	--	--	0.00	64.43	54.43	-15.25	-5.25	L2
0.27	43.26	--	--	0.00	62.57	52.57	-19.31	-9.31	L2
27.27	30.45	--	--	0.00	60.00	50.00	-29.55	-19.55	L2
6 Worst Data									

LINE 1 & 2 RESULTS



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

Data#: 7 File#: 1874LC.EMI Date: 06-03-2003 Time: 18:11:58
Level (dBuV) Compliance Certification Service

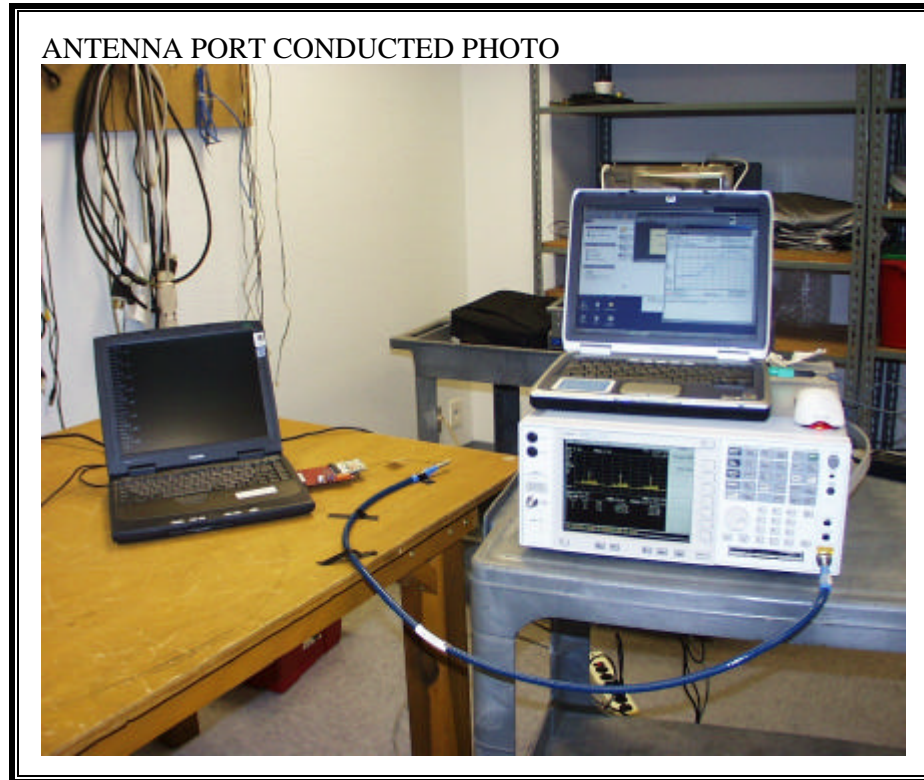


Trace: 3
Project # : 03U1874-1
Test Engineer : Chin Pang
Company : Toshiba America Information, Inc.
EUT : 802.11b WLAN modular approval | w/option
: of co-location with CSR BT |
Model : PA3231U-1PMC
Configuration : EUT/USB Drive
Target of Test: EN55022, Class B
: 115Vac, 60Hz
: L1: Peak | Green |, L2: Peak | Black |

Ref Trace:

8. SETUP PHOTOS

ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



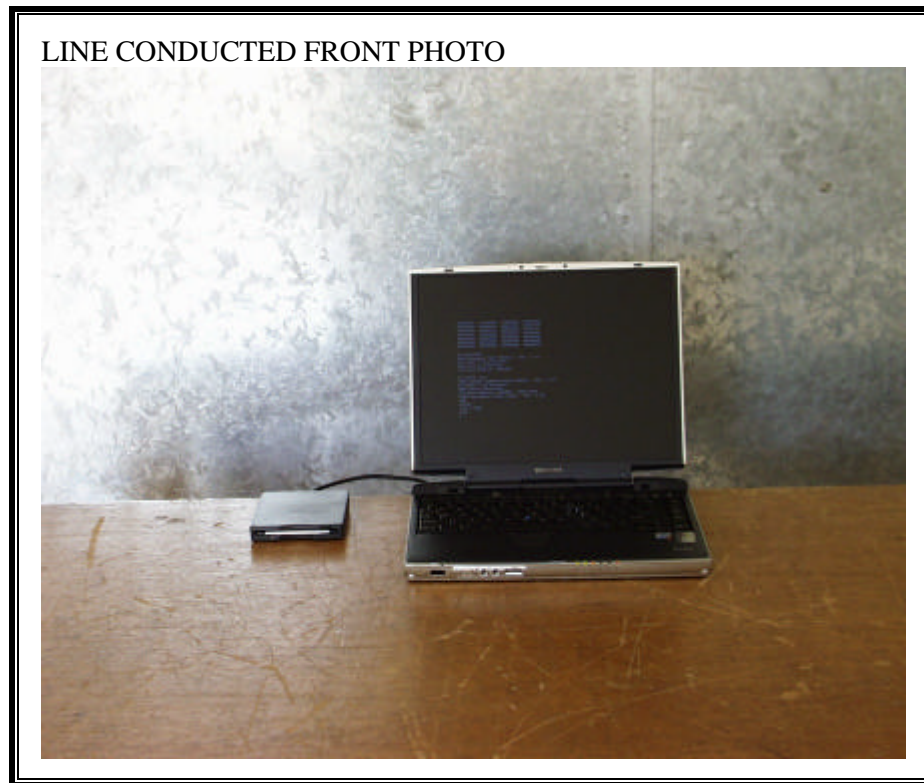
RADIATED RF MEASUREMENT SETUP



RADIATED BACK PHOTO



POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



LINE CONDUCTED BACK PHOTO



END OF REPORT