FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

Aztech Systems Ltd.

31 Ubi Road 1, Aztech Building
Singapore, 408694

FCC ID: I38-NA8300-001

2003-11-04

This Report Concerns:	**Equipment Type:**
☒ Original Report	802.11b/g Wireless 4-Port Broadband Router

Test Engineer:	Ming Jing /
Report No.:	R0310152
Test Date:	2003-10-23
Reviewed By:	Ling Zhang /
Prepared By:	Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Aztech Systems Ltd.'s*, model: *NA8300,* or the "EUT" as referred to in this report is an 802.11b/g Wireless 4-Port Broadband Router which is measured approximately 7.0"L x 5.5"W x 4.0"H. The EUT is a Router integrated with an IEEE 802.11g wireless LAN Access Point. The router module performs DHCP and NAT functions. The Wireless LAN Access Point module conforms to the IEEE 802.11g specification where both "b" and "g" radio client are able to associate and operate simultaneously. PCs can also be connected via the 4 AutoMDI/MDIX switch 10/100 ports automatically recognizing cross or straight cables. The maximum wireless data rate is 108 Mbps at turbo mode. The built-in enhanced algorithm will automatically smart select the best possible antenna, transmission rate and association method to achieve superior range, throughput and roaming performance.

** The test data gathered are from production sample, serial number:setno02, provided by the manufacturer.*

1.2 Objective

This type approval report is prepared on behalf of *Aztech Systems Ltd.* in accordance with Part 2, Subpart J, Part 15, Subparts A and C of the Federal Communication Commissions rules.

The objective of the manufacturer is to determine compliance with FCC rules for Output Power, Antenna Requirements, 6 dB Bandwidth, power density, 100 kHz Bandwidth of Band Edges Measurement, Conducted and Spurious Radiated Emission.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2001, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz and FCC97114 for Direct Sequence SS.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.5 Test Facility

The Open Area Test site used by BACL to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2001.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The scope of the accreditation covers the FCC Method – 47 CFR Part – Digital Devices, CISPER 22: 1997: Electromagnetic Interference – Limits and Methods of Measurement of Information Technology Equipment test methods.

1.6 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
KDS	Monitor	KD-1731	0591107892	EVOKD-1731
Dell	Keyboard	SK-8100	CN-09C487-38840-22R-1274	DOC
Dell	Mouse	1.3APS/2Compatible	X06-08477	DOC
HP	ThinkJet	2225C+	2821S14783	DS16XU2225
Everex	Modem	EV-945	None	E3E5UVEV-945
Seanix	PC System	GA-8I875	None	DOC

1.7 Host Configuration Details

Manufacturer	Description	Model	Serial Number	FCC ID
ALPS	3.5”Floppy Drive	DF354N120F	6724990400	DOC
SY	Power Adaptor	SY-09100-GS	None	None
Maxtor	Hard Drive	6L040J2	None	DOC
LG	CD-ROM	CRD-8522B	104HB72155	DOC
GA	Motherboard	GA-K8VT800 Pro	N/A	DOC
Intel	CPU	P4 3GHz	N/A	DOC
Prolink	Video Card	MVGA-NVG31AL	None	DOC

1.8 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded KB Cable	1.6	KB/Host	Keyboard
Shielded Cable	1.5	Mouse Port/Host	Mouse
Shielded Serial Cable	1.5	Serial /Host	Modem
Shielded Printer Cable	1.5	Parallel/Host	HP Printer
Shielded Video Cable	1.8	VGA /Host	Monitor
Unshielded RJ45 Cable	1.5	RJ 45 Port/EUT	PC RJ45 Port/Host
Unshielded RJ 11 Cable	30	ADSL Port/EUT	Modem

1.9 Remote Support Equipment

Manufacturer	Description	Model	Serial Number	FCC ID
Arescom	Modem	CF506	B103103	DOC

1.10 Power Supply Information

Manufacturer	Description	Model	Serial Number	FCC ID
SY	Power Adaptor	SY-0901	None	None

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing according ANSI C63.4-2001.

The EUT was tested in the normal (native) operating mode to represent worst-case results during the final qualification test.

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components and provided by the manufacturer. The test software is started the Windows 2000 terminal program under the Windows 2000 operating system. Once loaded, the program sequentially exercises each system component, and the test icon appears in the PC screen. Select 802.11b or g, select channel to be tested, select the target power, click "C" for transmitting the RF power.

Repeat above steps for other channel to be tested.

2.3 Special Accessories

As shown in section 2.7, all interface cables used for compliance testing are shielded. The host pc and the peripherals featured shielded metal connectors.

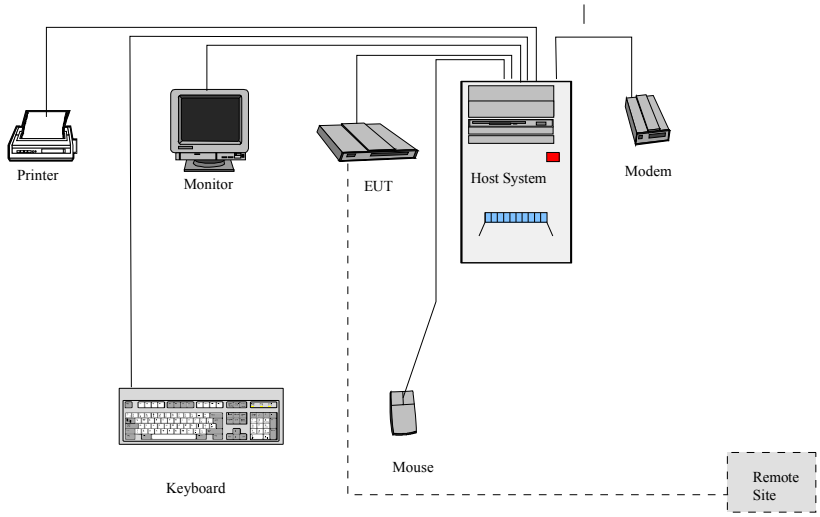
2.4 Schematics / Block Diagram

Please refer to Appendix A.

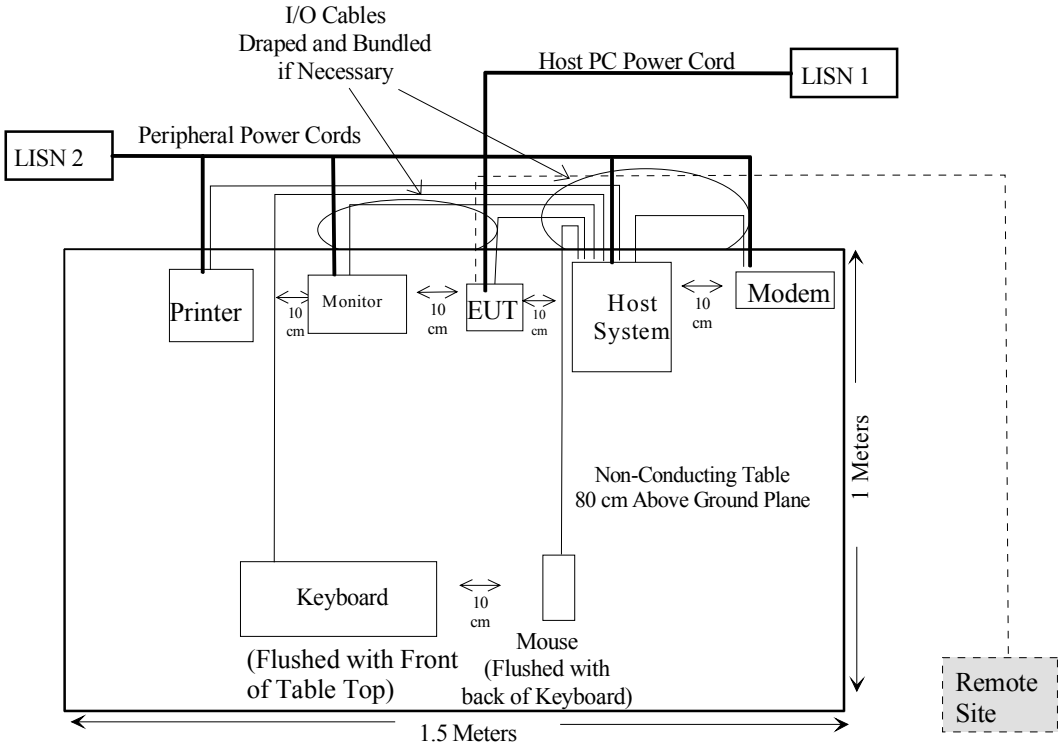
2.5 Equipment Modifications

No modifications were to the EUT.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	REFERENCE
§15.247 (b) (3)	Maximum Peak Output Power	Compliant	Section 4
§15.247 (a) (2)	6 dB Bandwidth	Compliant	Section 5
§15.247 (d)	Peak Power Spectral Density	Compliant	Section 6
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant	Section 7
§15.203	Antenna Requirement	Compliant	Section 8
§ 15.205	Restricted Bands	Compliant	Section 9
§15.209 (a)	Radiated Emission	Compliant	Section 9
§15.207 (a)	Conducted Emission	Compliant	Section 10

4 - CONDUCTED OUTPUT POWER MEASUREMENT

4.1 Standard Applicable

According to §15.247(b) (3), for systems using digital modulation in 2400-2483.5 MHz: 1 Watt

4.2 Measurement Procedure

1. Place the EUT on the turntable and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Spectrum Analyzer.
3. The peak power will be obtained by adding the bandwidth correction factor, 10log(BW 6dB / RBW) to the peak power reading at RBW = 2.0 MHz of the spectrum analyzer.

4.3 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

4.4 Environmental Conditions

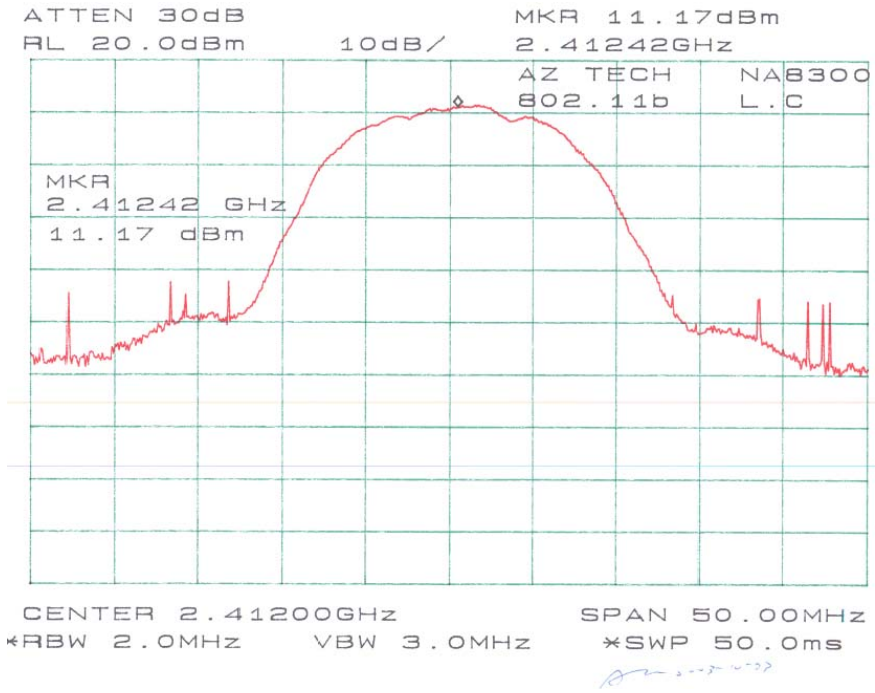
Temperature:	25° C
Relative Humidity:	52%
ATM Pressure:	1100 mbar

4.5 Measurement Result

	Channel	Frequency (MHz)	Peak Output Power (dBm)	Correction Factor (dBm)	Corrected Factor (dBm)	Output Power (W)	Standard (W)	Result
802.11b	Low (Ch.1)	2412	11.17	7.7	18.87	0.077	≤ 1 W	Compliant
	Mid. (Ch. 7)	2442	11.67	7.7	19.37	0.086	≤ 1 W	Compliant
	High (Ch. 11)	2462	11.33	7.7	19.03	0.080	≤ 1 W	Compliant
802.11g	Low (Ch.1, Normal)	2412	5.50	9.2	14.70	0.030	≤ 1 W	Compliant
	Low (Ch.3, Turbo)	2422	3.33	12.2	15.53	0.036	≤ 1 W	Compliant
	Mid. (Ch.7, Turbo)	2442	3.17	12.2	15.37	0.034	≤ 1 W	Compliant
	High (Ch.11, Normal)	2462	5.67	9.2	14.87	0.031	≤ 1 W	Compliant

Note:

802.11b: Correction Factor = 10 log (BW6dB/RBW) = 10 log (12/2.0) = 7.7 dBm
802.11g: 1) Normal Mode: Correction Factor = 10 log (BW6dB/RBW) = 10 log (16.7/2.0) = 9.2 dBm
2) Turbo Mode: Correction Factor = 10 log (BW6dB/RBW) = 10 log (33.3/2.0) = 12.2 dBm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NA8300
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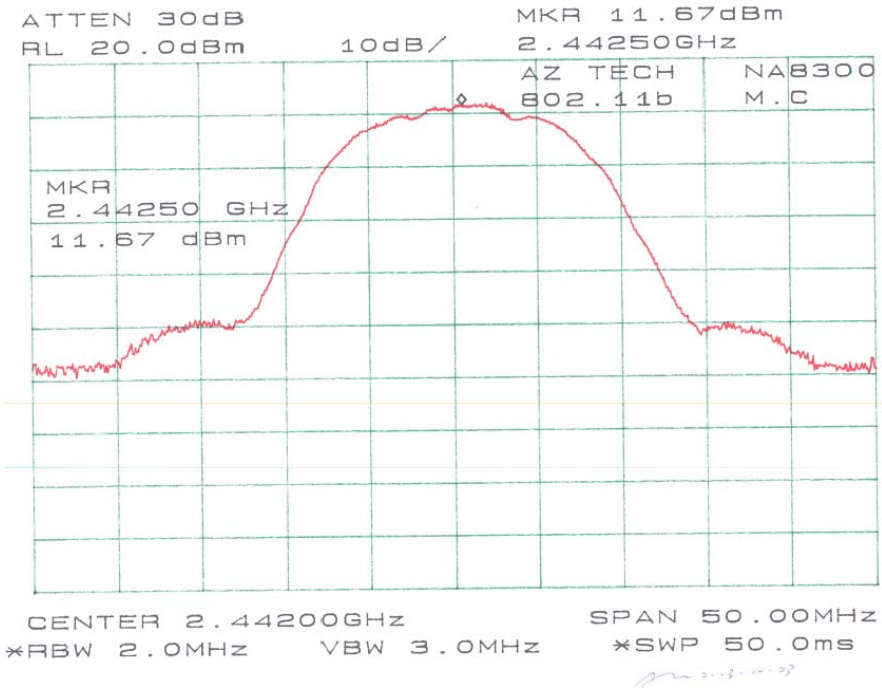
*RBW 2.0MHz
VBW 3.0MHz
*SWP 50.0ms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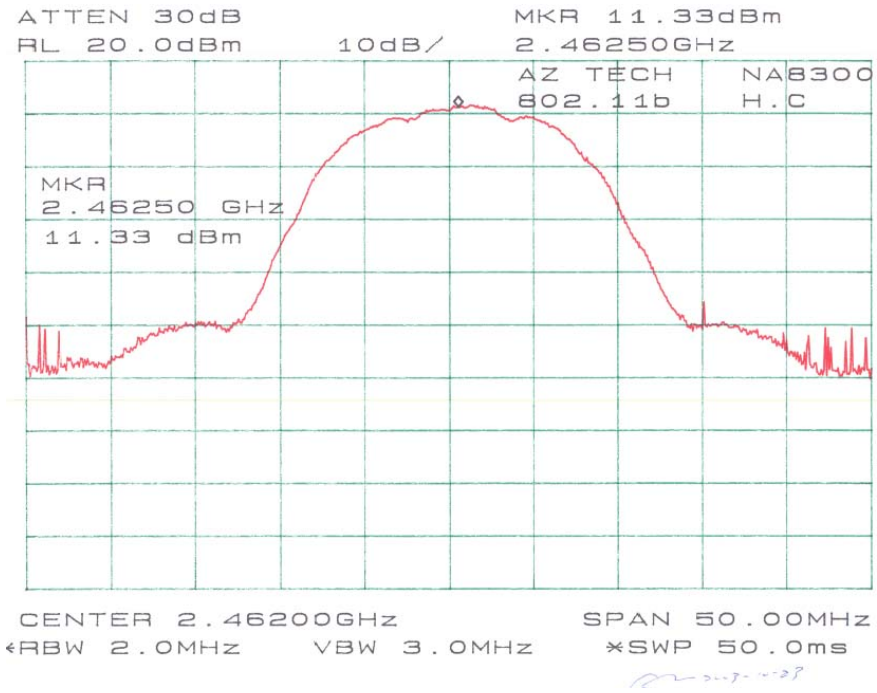
VBW 3.0MHz
*SWP 50.0ms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VBW 3.0MHz
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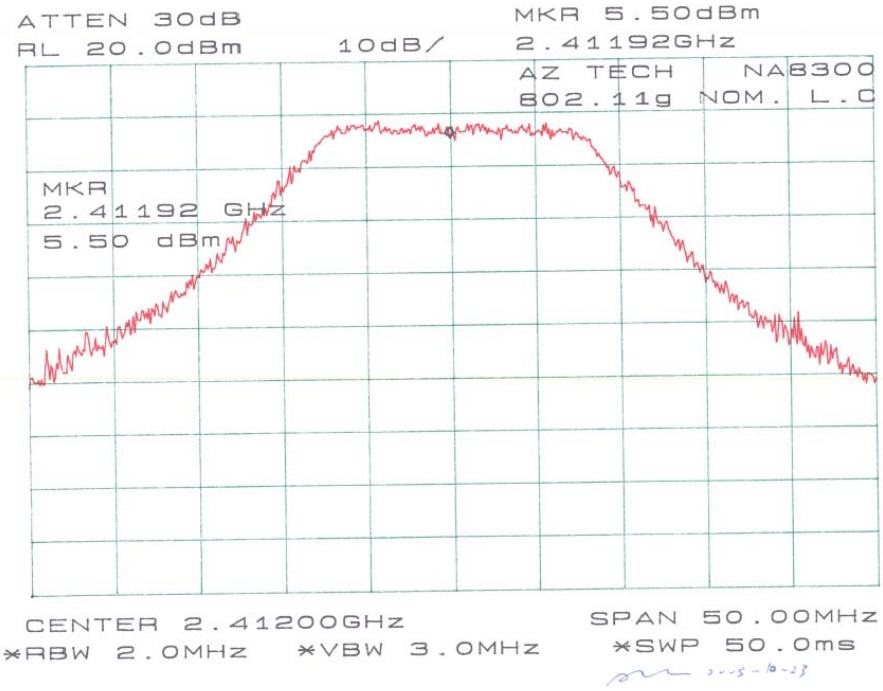
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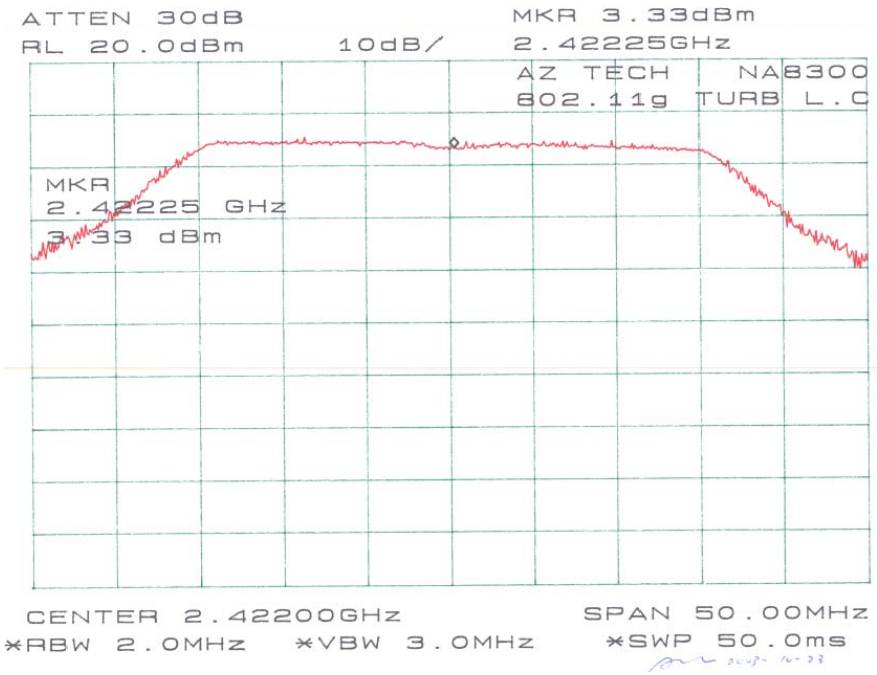
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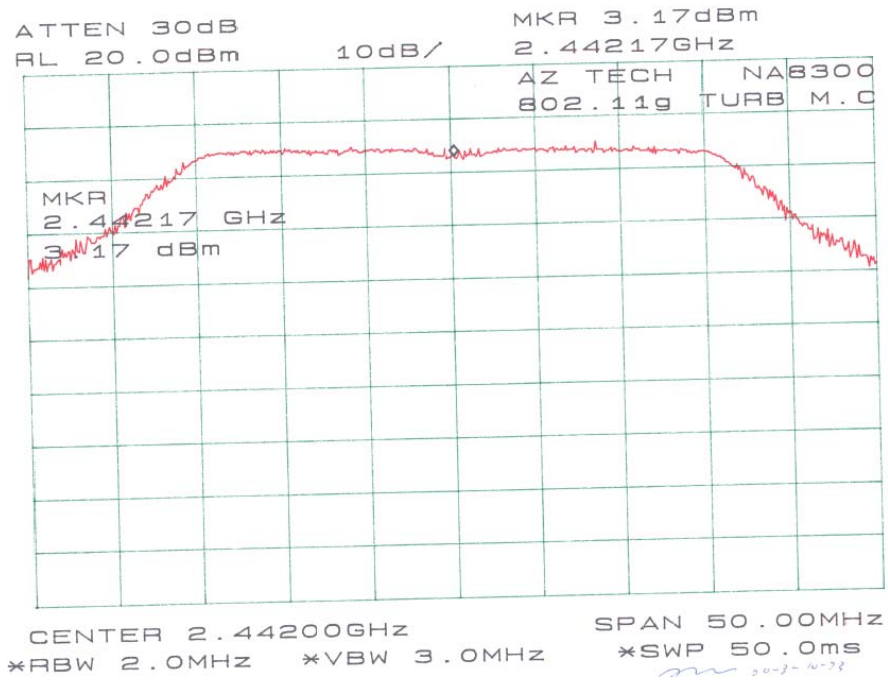
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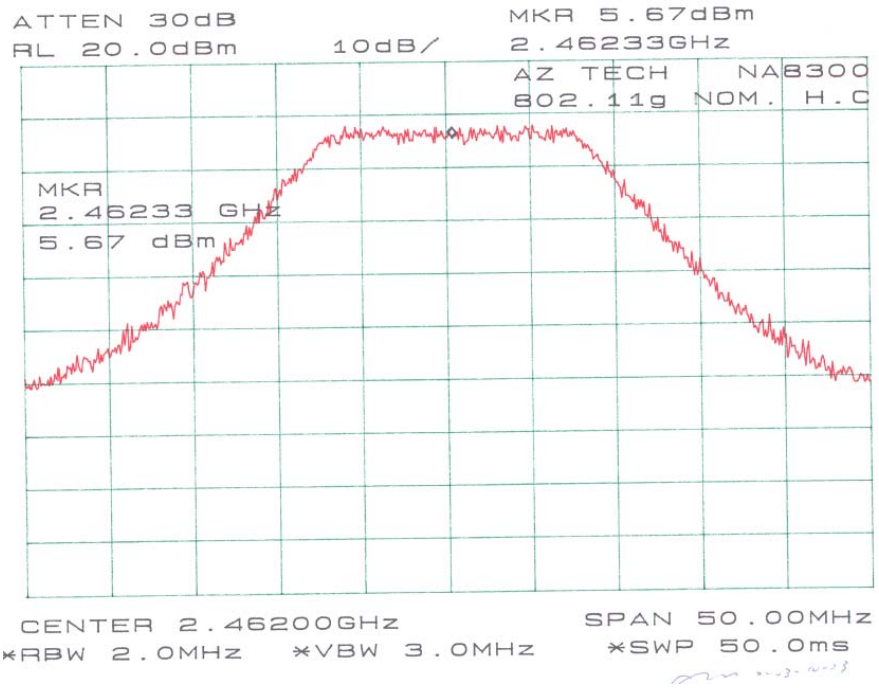
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2.46233 GHz
5.67 dBm
CENTER 2.46200GHz
SPAN 50.00MHz
*RBW 2.0MHz
*VBW 3.0MHz
*SWP 50.0ms

5 – 6 DB BANDWIDTH

5.1 Standard Applicable

According to §15.247(a)(2), for systems using digital modulation techniques operate in 2400 – 2483.5MHz, the minimum 6dB bandwidth shall be at least 500 kHz.

5.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 6 dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

5.3 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

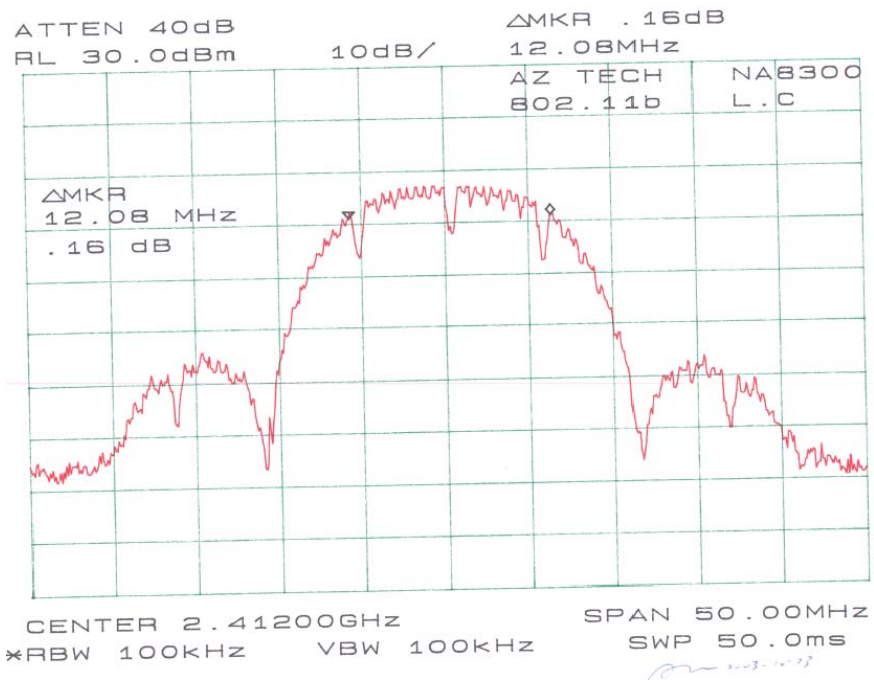
5.4 Environmental Conditions

Temperature:	25° C
Relative Humidity:	52%
ATM Pressure:	1100 mbar

5.5 Measurement Result

Please refer to following pages for plots of 6 dB Bandwidth.

	Mode	Frequency (MHz)	Measured (MHz)	Standard (kHz)	Result
802.11b		2412	12.08	≥ 500	Compliant
		2442	12.00	≥ 500	Compliant
		2462	12.08	≥ 500	Compliant
802.11g	Normal	2412	16.75	≥ 500	Compliant
	Turbo	2437	33.33	≥ 500	Compliant
	Normal	2462	16.75	≥ 500	Compliant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AZ TECH
802.11b
NA8300
L.C
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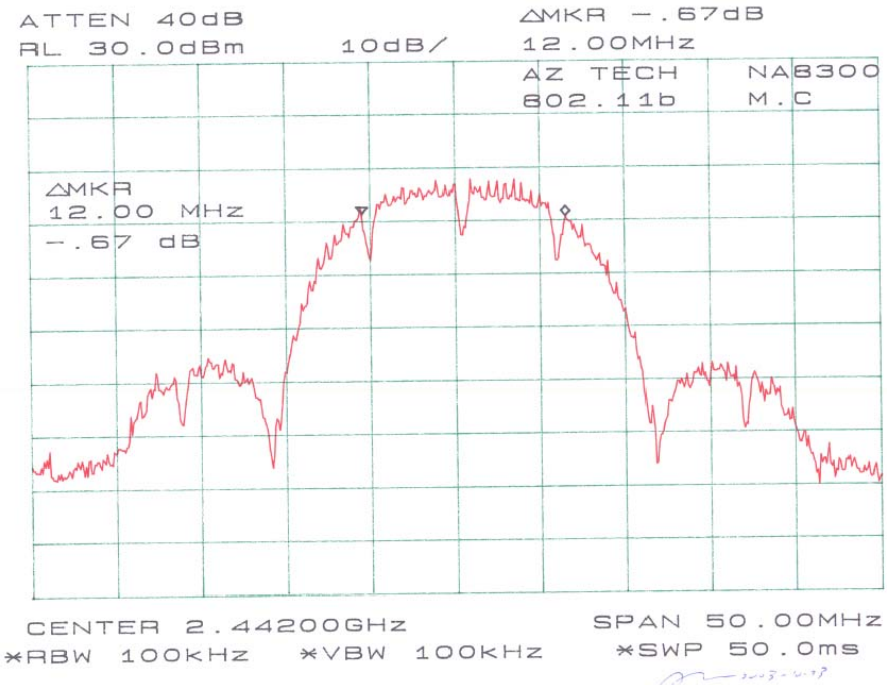
12.08 MHz
.16 dB
CENTER 2.41200GHz
*RBW 100kHz
VBW 100kHz
SPAN 50.00MHz
SWP 50.0ms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NA8300
M.C
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−.67 dB
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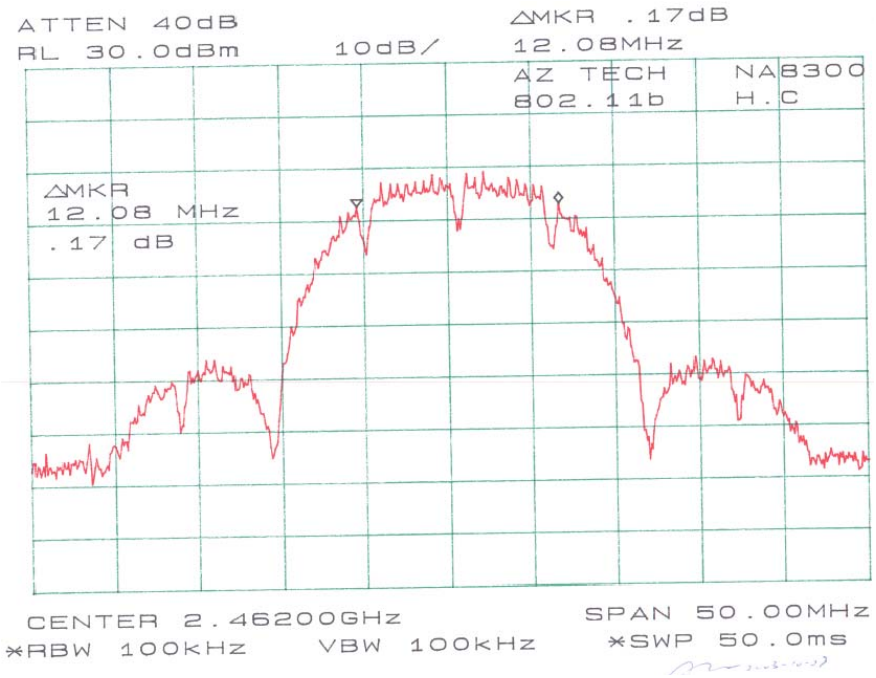
*VBW 100kHz
SPAN 50.00MHz
*SWP 50.0ms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.17 dB
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VBW 100kHz
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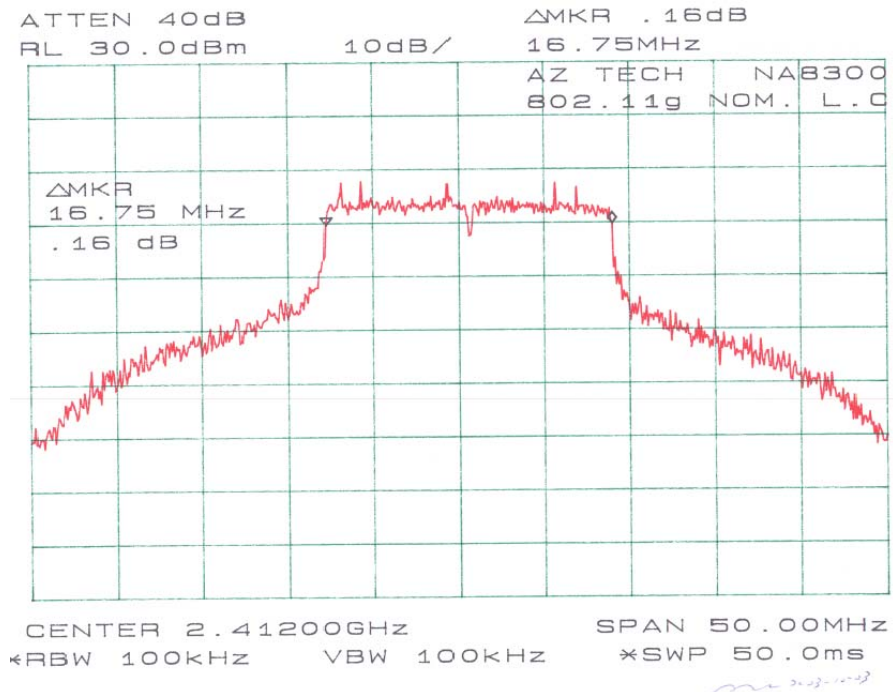
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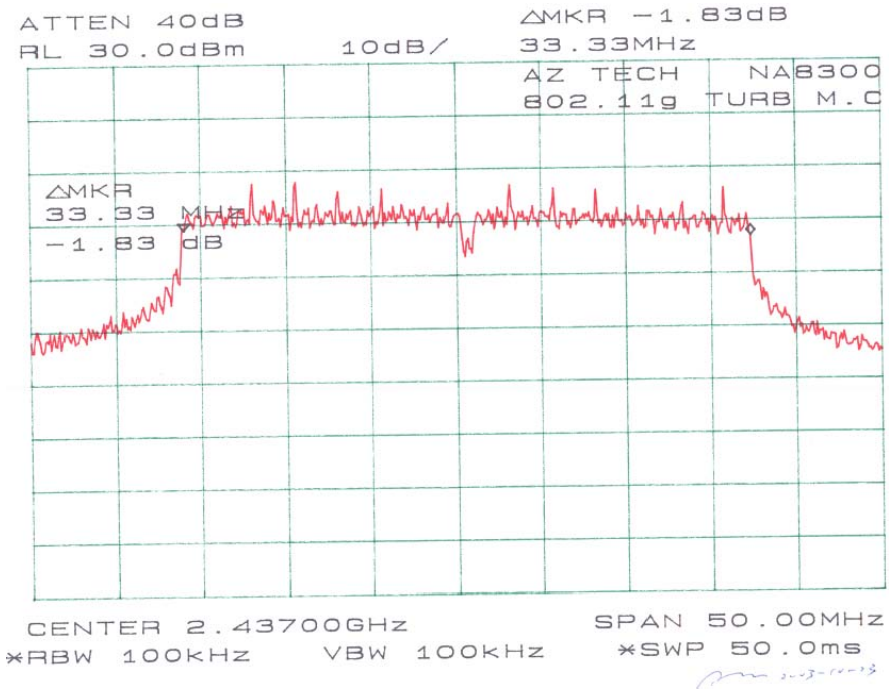
VBW 100kHz
*SWP 50.0ms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802.11g TURB M.C
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-1.83 dB
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VBW 100kHz
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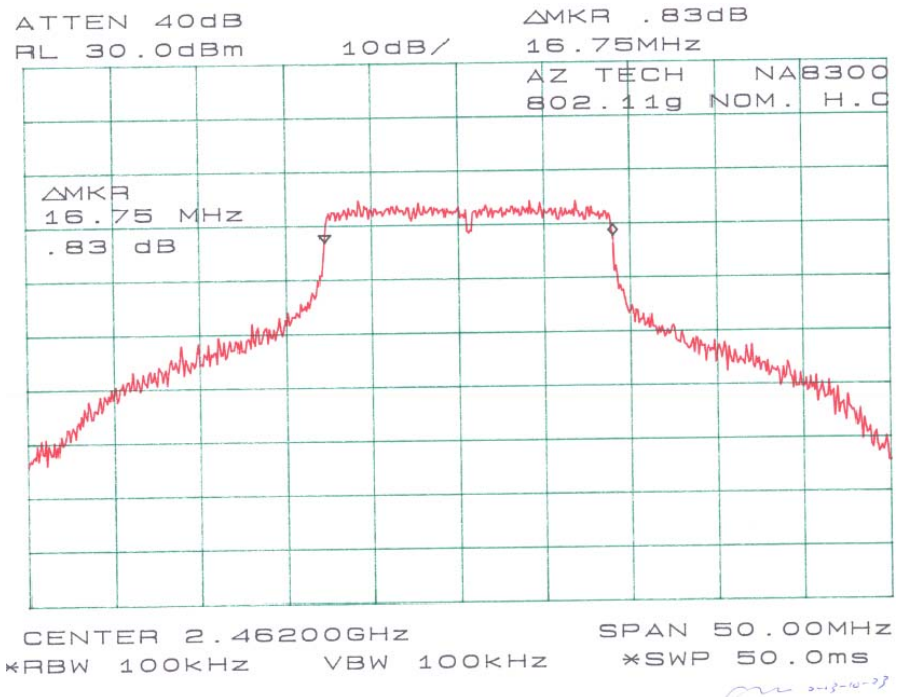
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VBW 100kHz
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6 - PEAK POWER SPECTRAL DENSITY

6.1 Standard Applicable

According to §15.247 (d), digitally modulated 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.

6.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to 6MHz span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

6.3 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

6.4 Environmental Conditions

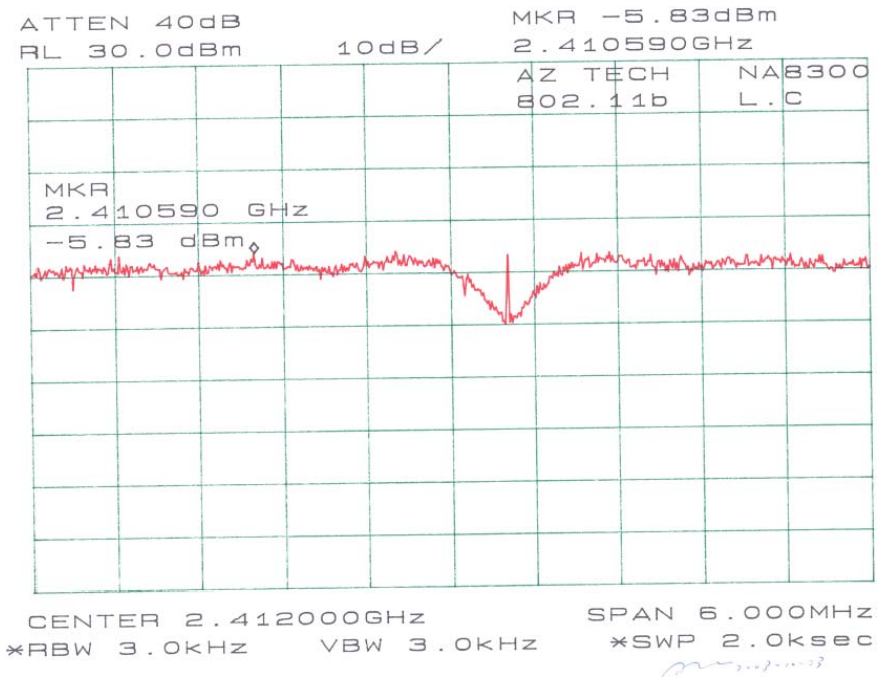
Temperature:	25° C
Relative Humidity:	52%
ATM Pressure:	1100 mbar

6.5 Measurement Results

	Frequency (MHz)	Peak Power Spectral Density	Standard (dBm)	Result
802.11b	2412	-5.83	≤ 8	Compliant
	2442	-3.67	≤ 8	Compliant
	2462	-4.33	≤ 8	Compliant
802.11g	2412	-5.67	≤ 8	Compliant
	2437	-7.33	≤ 8	Compliant
	2462	-7.33	≤ 8	Compliant

6.6 Measurement Result

Please refer to following pages for plots of peak power spectral density.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802.11b
NA8300
L.C
MKR
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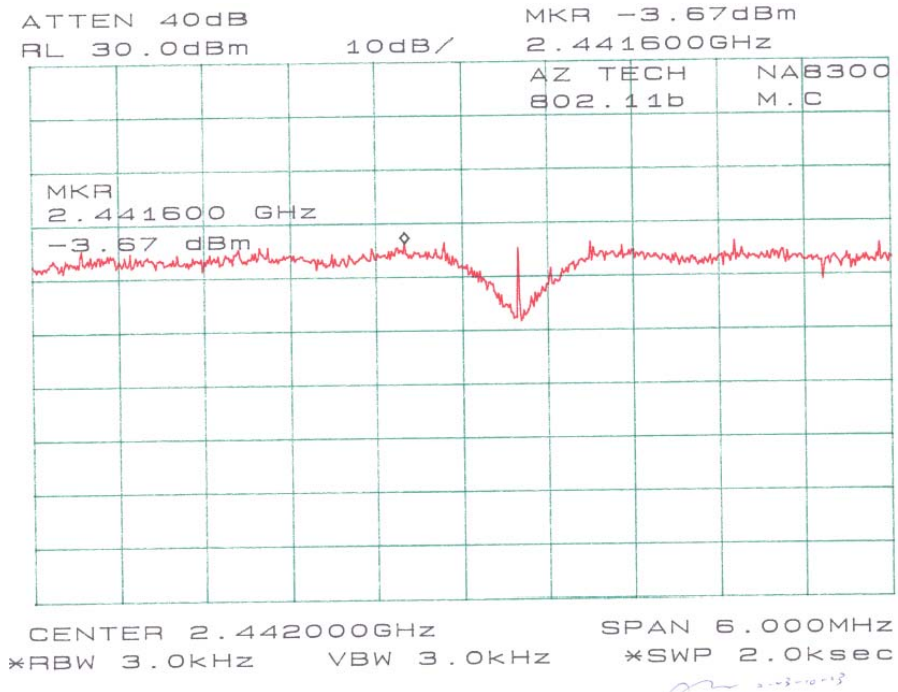
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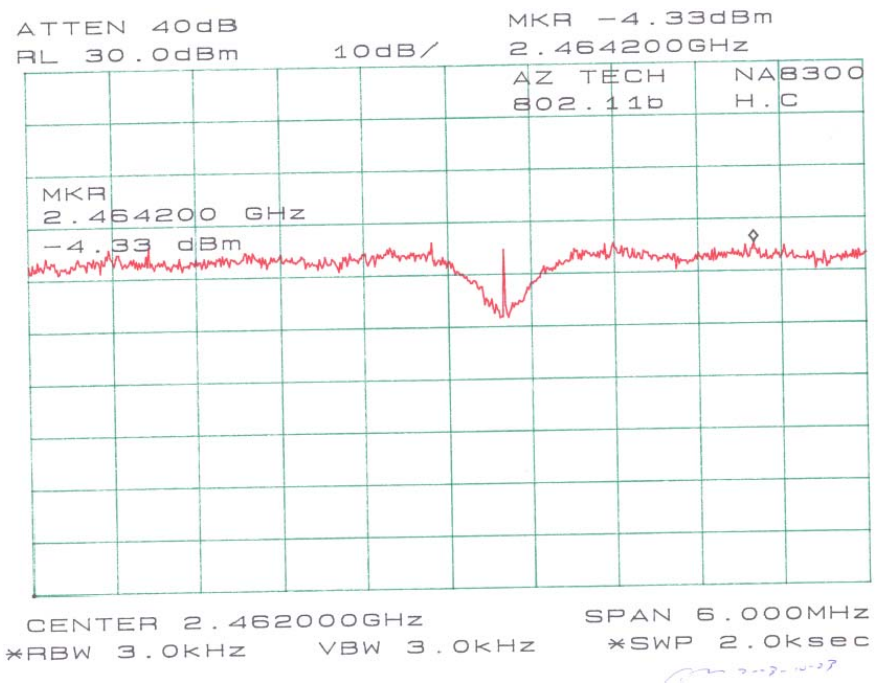
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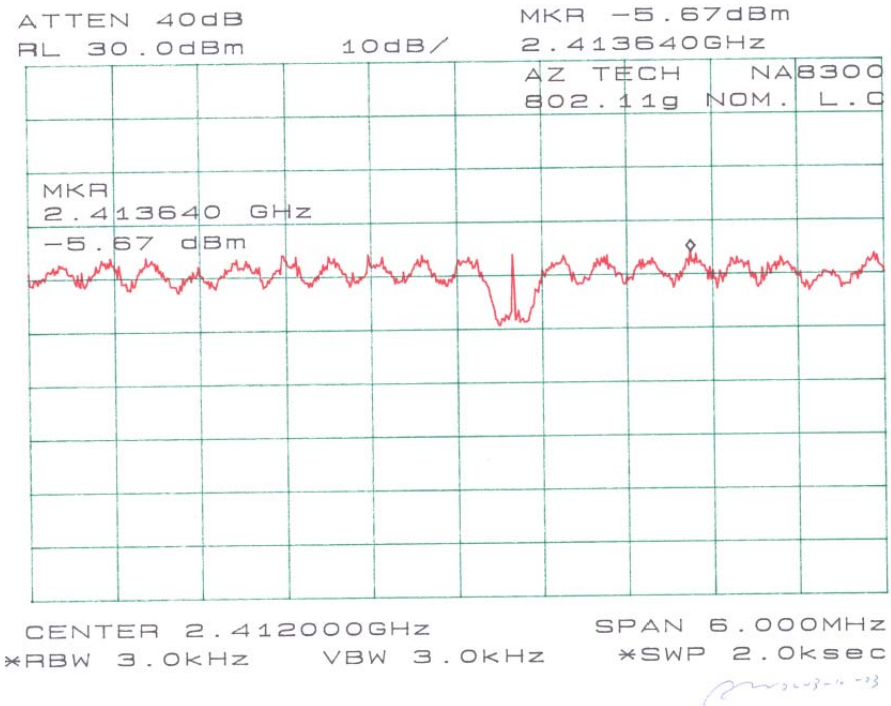
VBW 3.0kHz
*SWP 2.0ksec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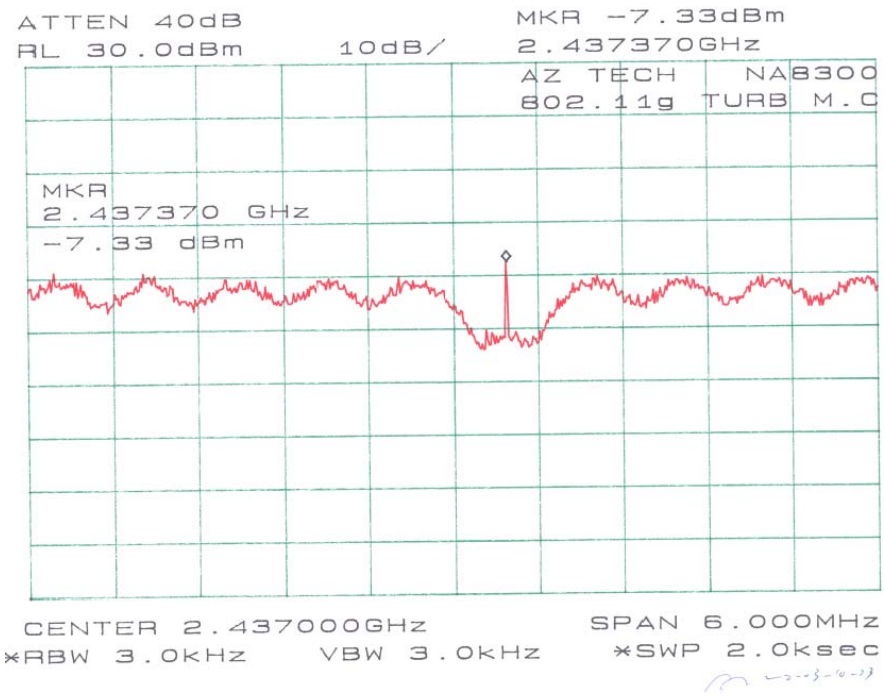
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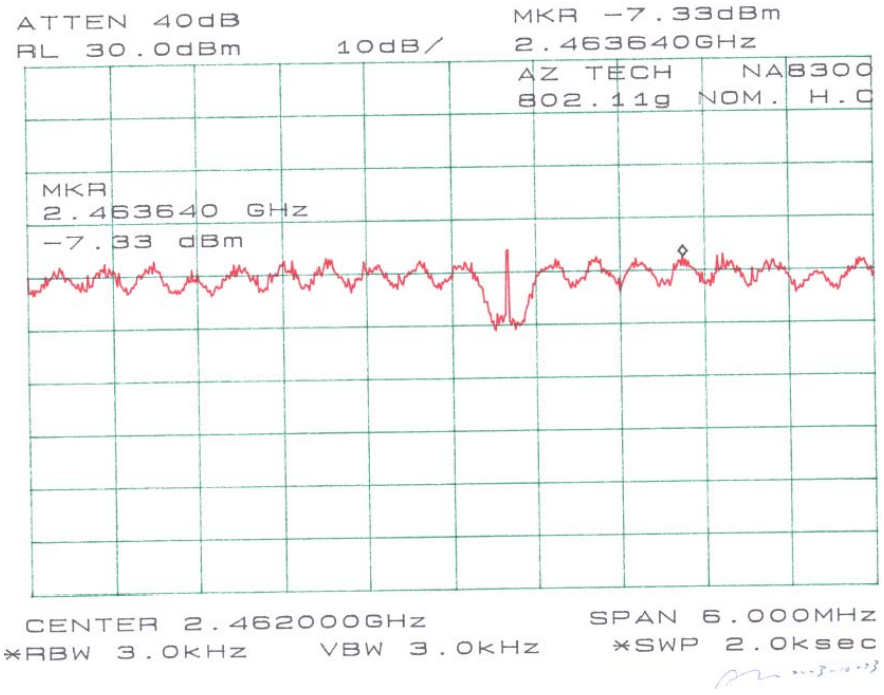
RL 30.0dBm
10dB/
MKR -7.33dBm
2.437370GHz
AZ TECH NA8300
802.11g TURB M.C
MKR
2.437370 GHz
-7.33 dBm
CENTER 2.437000GHz
SPAN 6.000MHz
*RBW 3.0kHz
VBW 3.0kHz
*SWP 2.0ksec


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -7.33dBm
2.463640GHz
AZ TECH NA8300
802.11g NOM. H.C
MKR
2.463640 GHz
-7.33 dBm
CENTER 2.462000GHz
SPAN 6.000MHz
*RBW 3.0kHz
VBW 3.0kHz
*SWP 2.0ksec

7 - 100 KHZ BANDWIDTH OF BAND EDGES

7.1 Standard Applicable

According to §15.247(c), in *any* 100 kHz bandwidth outside the frequency bands in which the spread spectrum or digital modulation 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. 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)).

7.2 Measurement Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

7.3 Test Equipment

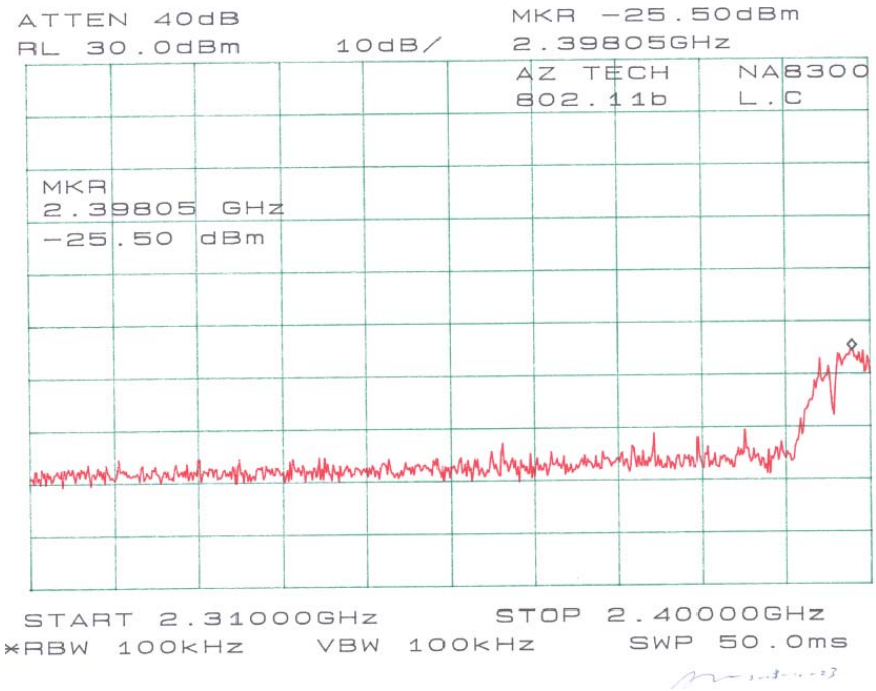
Manufacturer	Model No.	Serial No.	Calibration Due Date
HP	8564E	Spectrum Analyzer	2003-12-06

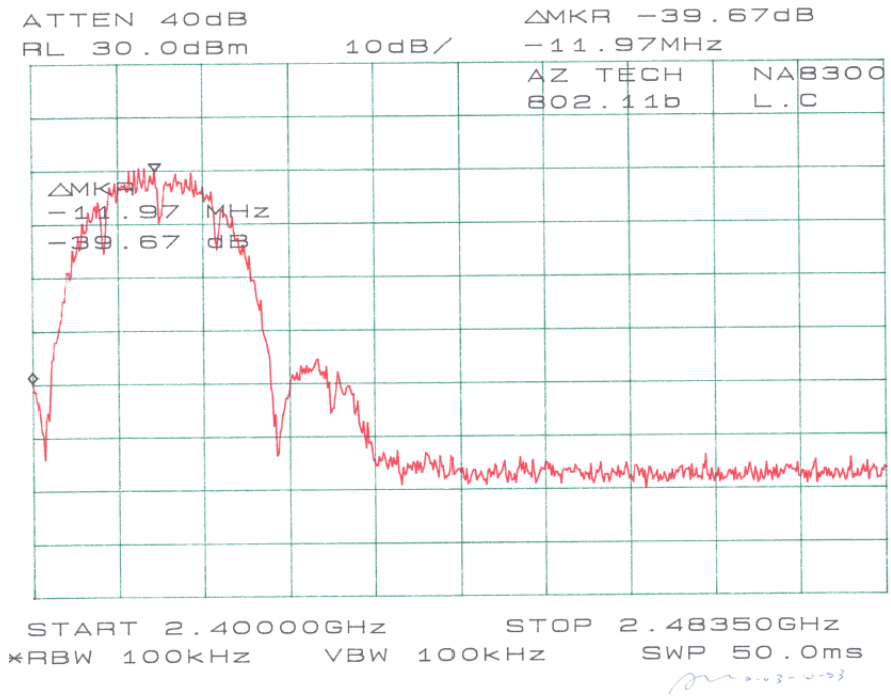
7.4 Environmental Conditions

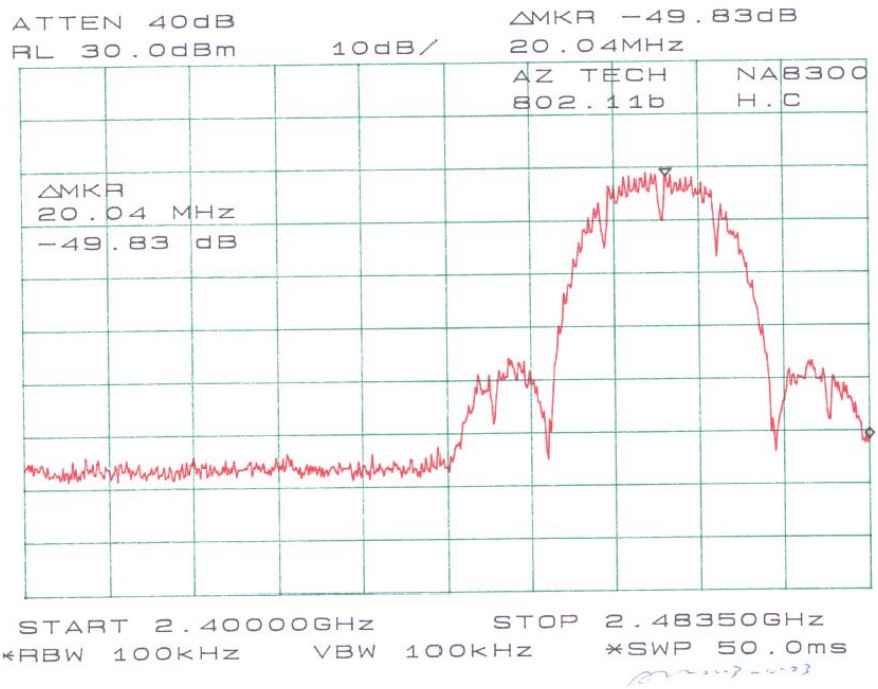
Temperature:	25° C
Relative Humidity:	52%
ATM Pressure:	1100 mbar

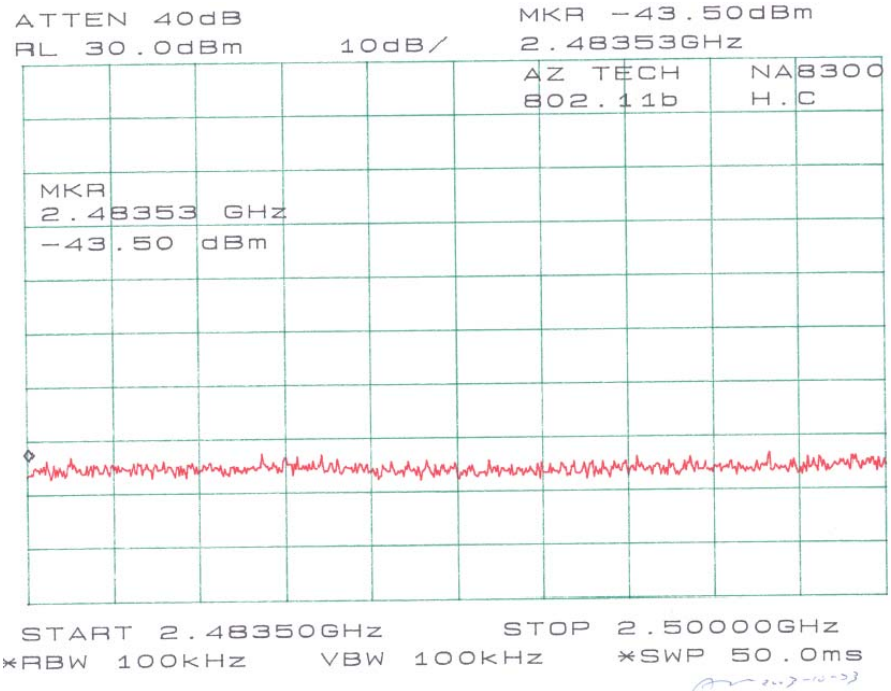
7.5 Measurement Result

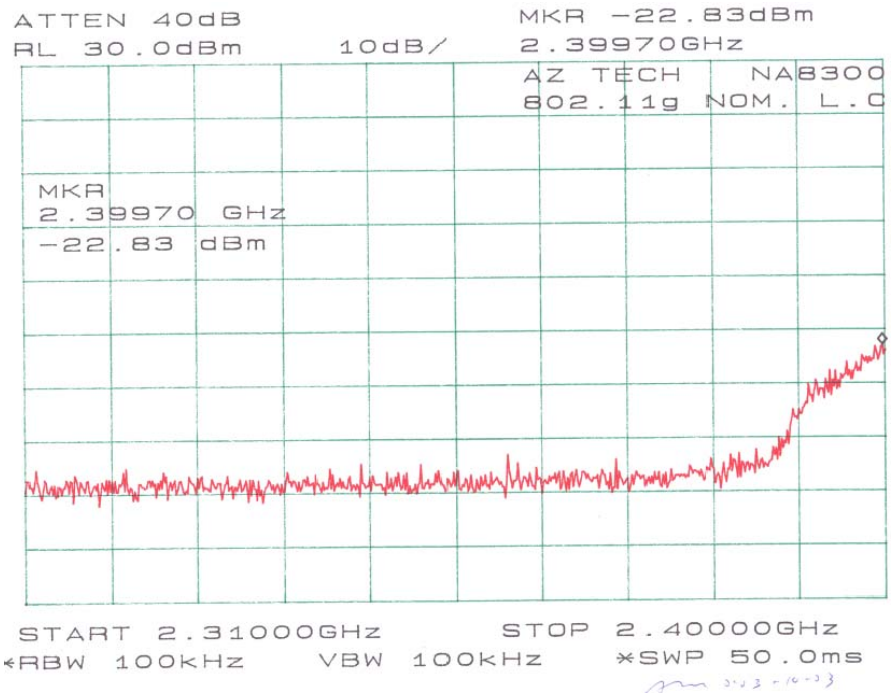
Please refer to following pages for plots of band edge.

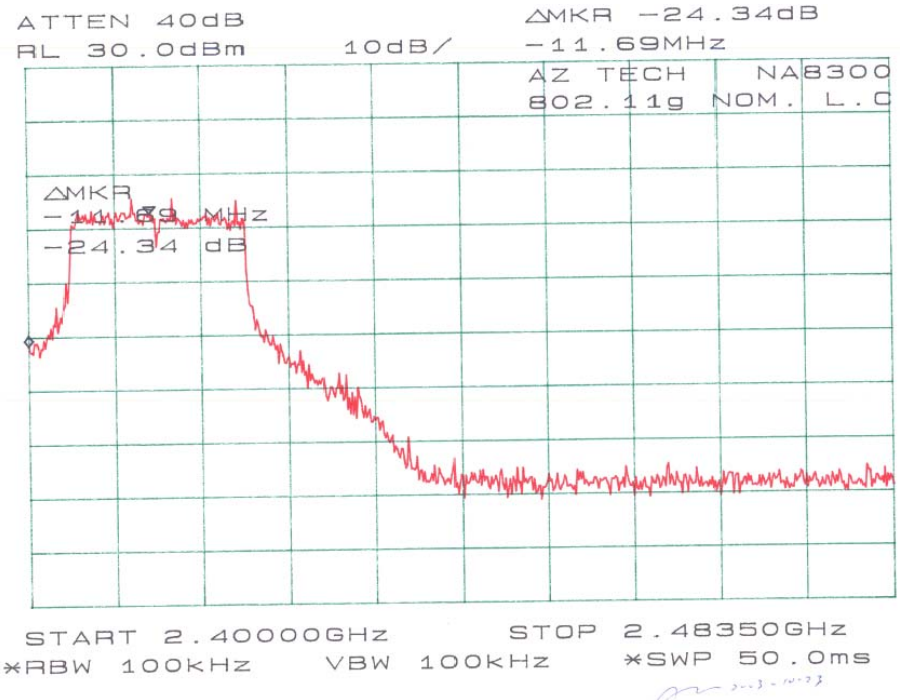

ATTEN 40dB
RL 30.0dBm
10dB/
MKR −25.50dBm
2.39805GHz
AZ TECH
802.11b
NA8300
L.C
MKR
2.39805 GHz
−25.50 dBm
START 2.31000GHz
STOP 2.40000GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

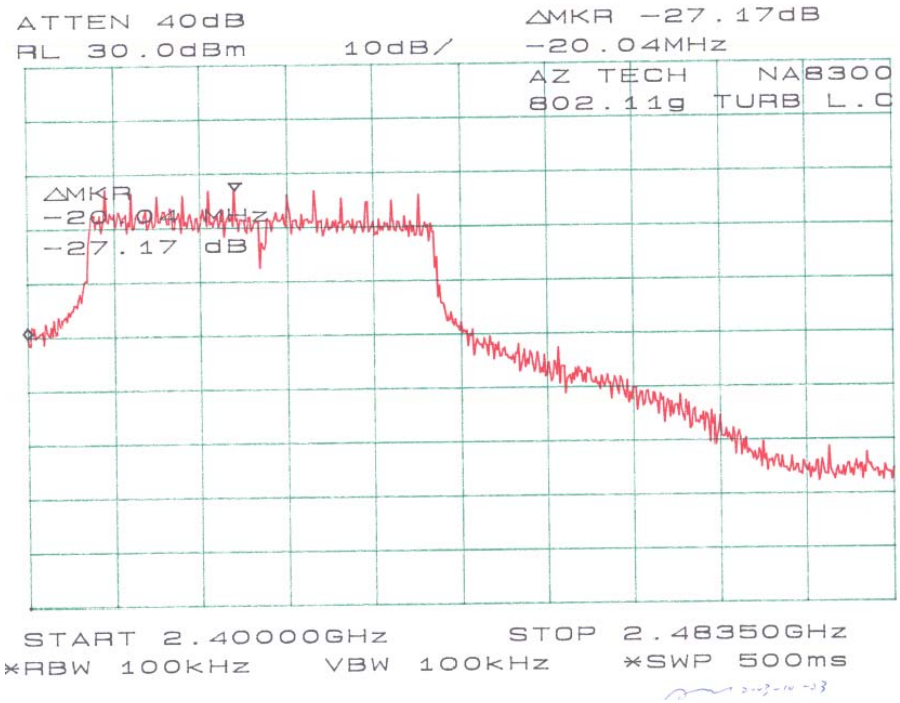

ATTEN 40dB
RL 30.0dBm
10dB/
△MKR −39.67dB
−11.97MHz
AZ TECH
802.11b
NA8300
L.C
△MKR
−11.97 MHz
−39.67 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
SWP 50.0ms

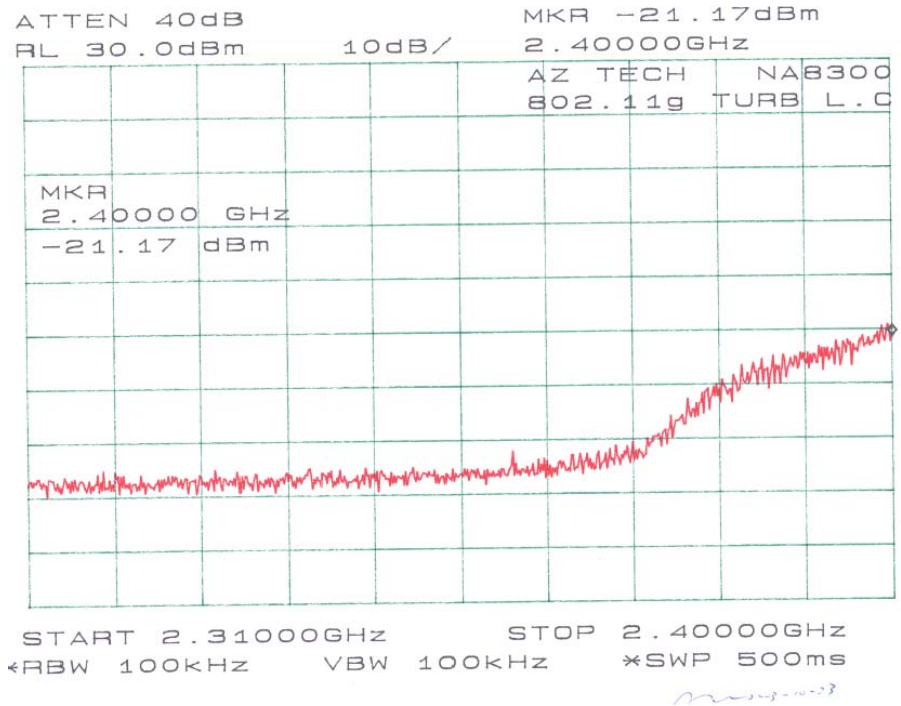

ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -49.83dB
20.04MHz
AZ TECH
802.11b
NA8300
H.C
ΔMKR
20.04 MHz
-49.83 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms

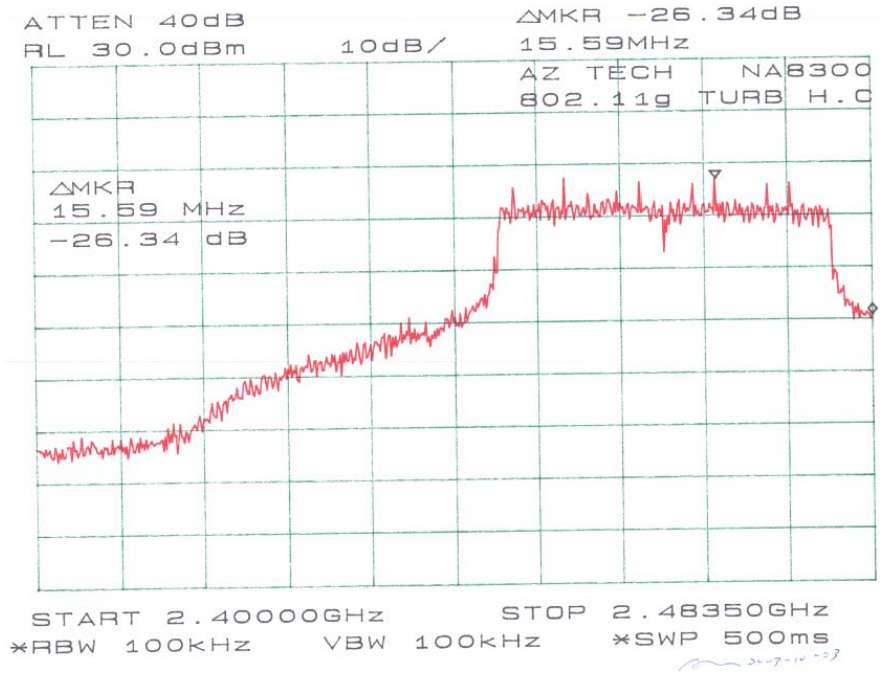

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -43.50dBm
2.48353GHz
AZ TECH
802.11b
NA8300
H.C
MKR
2.48353 GHz
-43.50 dBm
START 2.48350GHz
STOP 2.50000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms

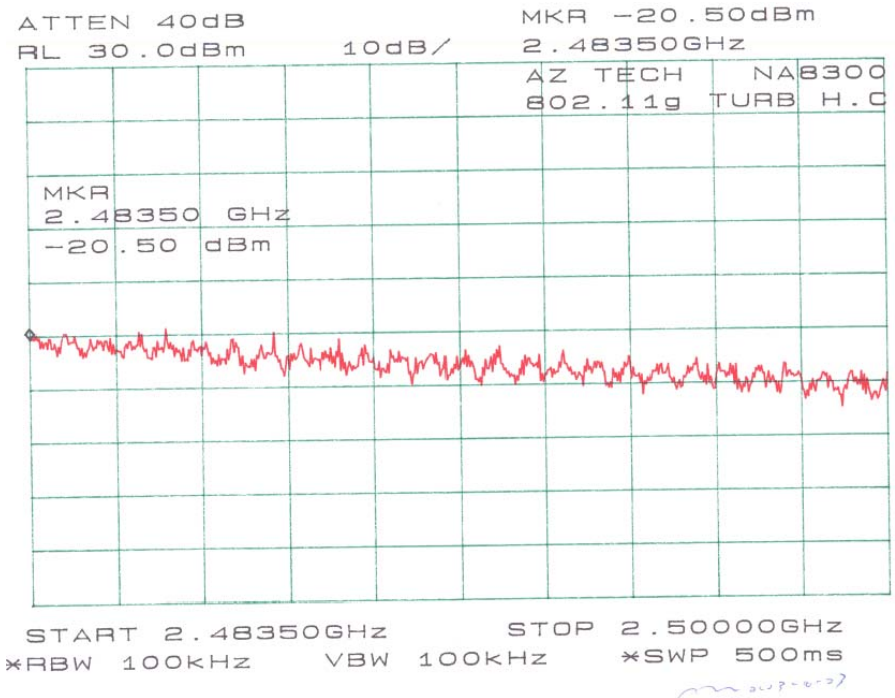

ATTEN 40dB
RL 30.0dBm
10dB/
MKR -22.83dBm
2.39970GHz
AZ TECH NA8300
802.11g NOM. L.C
MKR
2.39970 GHz
-22.83 dBm
START 2.31000GHz
STOP 2.40000GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -24.34dB
-11.69MHz
AZ TECH NA8300
802.11g NOM. L.C
ΔMKR
-24.34 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 50.0ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -27.17dB
-20.04MHz
AZ TECH NA8300
802.11g TURB L.C
ΔMKR
-20.04 MHz
-27.17 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 500ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -21.17dBm
2.40000GHz
AZ TECH NA8300
802.11g TURB L.C
MKR
2.40000 GHz
-21.17 dBm
START 2.31000GHz
STOP 2.40000GHz
*RBW 100kHz
VBW 100kHz
*SWP 500ms


ATTEN 40dB
RL 30.0dBm
10dB/
ΔMKR -26.34dB
15.59MHz
AZ TECH NA8300
802.11g TURB H.C
ΔMKR
15.59 MHz
-26.34 dB
START 2.40000GHz
STOP 2.48350GHz
*RBW 100kHz
VBW 100kHz
*SWP 500ms


ATTEN 40dB
RL 30.0dBm
10dB/
MKR -20.50dBm
2.48350GHz
AZ TECH NA8300
802.11g TURB H.C
MKR
2.48350 GHz
-20.50 dBm
START 2.48350GHz
STOP 2.50000GHz
*RBW 100kHz
VBW 100kHz
*SWP 500ms

8 - ANTENNA REQUIREMENT

8.1 Standard Applicable

For intentional device, according to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to § 15.247 (1), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.2 Antenna Connected Construction

The gain of antenna used for transmitting is 1.46 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement.

9 - SPURIOUS RADIATED EMISSION

9.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

9.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with ANSI C63.4-2001. The specification used was the FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle as required.

The host PC system was connected with 120Vac/60Hz power source.

9.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Frequency Range	***RBW***	***Video B/W***
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

9.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2601A02165	2004-01-07
HP	Amplifier	8447E	2944A10187	2004-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2004-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2004-10-11
EMCO	Log Periodic Antenna	3146	2101	2004-10-11

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

9.5 Test Procedure

For the radiated emissions test, the power cord of the host system and all support equipment were connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBμV of specification limits), and are distinguished with a "**Qp**" in the data table.

9.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Subpart C. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Subpart C Limit

9.7 Summary of Test Results

According to the data in section 10.8, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

For802.11b:

-1.5 dB at **7236.00 MHz** in the **Vertical** polarization, Low Channel

-1.6 dB at **7311.00 MHz** in the **Vertical** polarization, Middle Channel

-8.8 dB at **7386.00 MHz** in the **Vertical** polarization, High Channel

-4.9 dB at **350.90 MHz** in the **Vertical** polarization, Unintentional Emission

For 802.11g:

-0.3 dB at **2400.00 MHz** in the **Horizontal** polarization, Low Channel, Normal Mode

-4.1 dB at **7311.00 MHz** in the **Vertical** polarization, Middle Channel, Turbo Mode

-7.5 dB at **2483.50 MHz** in the **Vertical** polarization, High Channel, Turbo Mode

-4.4 dB at **350.90 MHz** in the **Vertical** polarization, Unintentional Emission

9.8 Radiated Emissions Test Data

9.8.1 Final test data for 802.11b, 1 – 25 GHz

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel											
2412.00	111.4	FUND/PEAK	100	2.5	V	28.1	3.4	35.2	107.7		
2412.00	103.1	FUND/PEAK	300	1.2	H	28.1	3.4	35.2	99.4		
2412.00	107.8	FUND/AVE	100	2.5	V	28.1	3.4	35.2	104.0		
2412.00	99.3	FUND/AVE	300	1.2	H	28.1	3.4	35.2	95.5		
7236.00	45.3	AVE	200	1.2	V	35.1	5.6	33.5	52.5	54.0	-1.5
4824.00	42.3	AVE	160	1.1	V	32.5	4.9	33.0	46.7	54.0	-7.3
7236.00	34.6	AVE	0	1.3	H	35.1	5.6	33.5	41.8	54.0	-12.2
7236.00	53.1	PEAK	200	1.2	V	35.1	5.6	33.5	60.3	74.0	-13.7
4824.00	35.4	AVE	0	1.5	H	32.5	4.9	33.0	39.8	54.0	-14.2
4824.00	48.3	PEAK	160	1.1	V	32.5	4.9	33.0	52.7	74.0	-21.3
7236.00	44.3	PEAK	0	1.3	H	35.1	5.6	33.5	51.5	74.0	-22.5
4824.00	45.2	PEAK	0	1.5	H	32.5	4.9	33.0	49.6	74.0	-24.4
Middle Channel											
2437.00	110.3	FUND/PEAK	180	1.5	V	28.1	3.4	35.2	106.6		
2437.00	103.5	FUND/PEAK	210	1.2	H	28.1	3.4	35.2	99.8		
2437.00	105.9	FUND/AVE	180	1.5	V	28.1	3.4	35.2	102.2		
2437.00	100.8	FUND/AVE	210	1.2	H	28.1	3.4	35.2	97.1		
7311.00	45.2	AVE	310	1.6	V	35.1	5.6	33.5	52.4	54.0	-1.6
4874.00	42.2	AVE	60	1.5	V	32.5	4.9	33.0	46.6	54.0	-7.4
7311.00	34.8	AVE	15	1.2	H	35.1	5.6	33.5	42.0	54.0	-12.0
7311.00	52.9	PEAK	310	1.6	V	35.1	5.6	33.5	60.1	74.0	-13.9
4874.00	35.6	AVE	230	1.2	H	32.5	4.9	33.0	40.0	54.0	-14.0
4874.00	48.1	PEAK	60	1.5	V	32.5	4.9	33.0	52.5	74.0	-21.5
7311.00	44.2	PEAK	15	1.2	H	35.1	5.6	33.5	51.4	74.0	-22.6
4874.00	45.3	PEAK	230	1.2	H	32.5	4.9	33.0	49.7	74.0	-24.3

9.8.1 Final test data for 802.11b, 1 – 25 GHz (Continued)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Channel											
2462.00	110.6	FUND/PEAK	270	1.8	V	28.1	3.4	35.2	106.9		
2462.00	103.9	FUND/PEAK	270	1.5	H	28.1	3.4	35.2	100.2		
2462.00	106.8	FUND/AVE	270	1.8	V	28.1	3.4	35.2	103.0		
2462.00	99.8	FUND/AVE	270	1.5	H	28.1	3.4	35.2	96.0		
7386.00	37.9	AVE	180	1.7	V	35.1	5.6	33.5	45.2	54.0	-8.8
7386.00	35.4	AVE	160	1.8	H	35.1	5.6	33.5	42.6	54.0	-11.4
4924.00	36.4	AVE	270	1.2	V	32.5	4.9	33.0	40.8	54.0	-13.2
4924.00	33.1	AVE	15	1.5	H	32.5	4.9	33.0	37.5	54.0	-16.5
7386.00	48.4	PEAK	180	1.7	V	35.1	5.6	33.5	55.7	74.0	-18.3
7386.00	45.1	PEAK	160	1.8	H	35.1	5.6	33.5	52.3	74.0	-21.7
4924.00	46.1	PEAK	270	1.2	V	32.5	4.9	33.0	50.5	74.0	-23.5
4924.00	42.8	PEAK	15	1.5	H	32.5	4.9	33.0	47.2	74.0	-26.8

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart B	
Frequency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dBμV/m	Cable Loss dBμV/m	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
350.90	48.3	180	1.5	V	15.5	2.3	25.0	41.1	46.0	-4.9
333.19	45.6	210	1.5	V	15.8	2.3	25.0	38.7	46.0	-7.3
161.00	46.1	180	1.2	V	12.9	1.8	25.0	35.8	43.5	-7.7
199.26	39.8	60	1.5	H	14.2	2.1	25.0	31.1	43.5	-12.4
300.04	41.9	310	1.5	V	14.4	2.3	25.0	33.6	46.0	-12.4
227.71	42.3	150	1.2	H	11.8	2.2	25.0	31.3	46.0	-14.7

Note:

AVG = average

9.8.2 Final test data for 802.11g, 1 – 25 GHz

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel, Normal Mode											
2412.00	113.2	FUND/PEAK	270	1.8	V	28.1	3.4	35.2	109.4		
2412.00	103.5	FUND/PEAK	270	1.4	H	28.1	3.4	35.2	99.8		
2412.00	101.8	FUND/AVE	270	1.8	V	28.1	3.4	35.2	98.1		
2412.00	92.3	FUND/AVE	270	1.4	H	28.1	3.4	35.2	88.6		
2400.00	83.2	EDGE/PEAK	30	1.0	H	28.1	3.4	35.2	79.5	79.8	-0.3
2400.00	89.7	EDGE/PEAK	300	2.0	V	28.1	3.4	35.2	85.9	89.4	-3.5
2400.00	67.5	EDGE/AVE	30	1.0	H	28.1	3.4	35.2	63.8	68.6	-4.9
7236.00	40.8	AVE	300	1.0	V	35.1	5.6	33.5	48.1	54.0	-5.9
7236.00	54.5	PEAK	300	1.0	V	35.1	5.6	33.5	61.7	74.0	-12.3
2400.00	69.0	EDGE/AVE	300	2.0	V	28.1	3.4	35.2	65.3	78.1	-12.9
7236.00	51.6	PEAK	240	1.5	H	35.1	5.6	33.5	58.8	74.0	-15.2
7236.00	30.2	AVE	240	1.5	H	35.1	5.6	33.5	37.4	54.0	-16.6
4824.00	31.8	AVE	150	1.6	V	32.5	4.9	33.0	36.2	54.0	-17.8
4824.00	30.7	AVE	90	1.5	H	32.5	4.9	33.0	35.1	54.0	-18.9
4824.00	44.7	PEAK	150	1.6	V	32.5	4.9	33.0	49.1	74.0	-24.9
4824.00	41.5	PEAK	90	1.5	H	32.5	4.9	33.0	45.9	74.0	-28.1
Middle Channel, Turbo Mode											
2437.00	110.1	FUND/PEAK	0	1.8	V	28.1	3.4	35.2	106.4		
2437.00	101.9	FUND/PEAK	0	1.6	H	28.1	3.4	35.2	98.2		
2437.00	101.2	FUND/AVE	0	1.8	V	28.1	3.4	35.2	97.5		
2437.00	92.8	FUND/AVE	0	1.6	H	28.1	3.4	35.2	89.1		
7311.00	42.7	AVE	180	2.0	V	35.1	5.6	33.5	49.9	54.0	-4.1
7311.00	37.8	AVE	150	1.8	H	35.1	5.6	33.5	45.0	54.0	-9.0
7311.00	53.6	PEAK	180	2.0	V	35.1	5.6	33.5	60.8	74.0	-13.2
4874.00	31.5	AVE	270	1.4	V	32.5	4.9	33.0	35.9	54.0	-18.1
7311.00	48.3	PEAK	150	1.8	H	35.1	5.6	33.5	55.5	74.0	-18.5
4874.00	30.2	AVE	90	1.5	H	32.5	4.9	33.0	34.6	54.0	-19.4
4874.00	43.6	PEAK	270	1.4	V	32.5	4.9	33.0	48.0	74.0	-26.0
4874.00	41.7	PEAK	90	1.5	H	32.5	4.9	33.0	46.1	74.0	-27.9

9.8.2 Final test data for 802.11g, 1 – 25 GHz (Continued)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Channel, Turbo Mode											
2462.00	110.8	FUND/PEAK	270	1.8	V	28.1	3.4	35.2	107.0		
2462.00	110.5	FUND/PEAK	210	1.5	H	28.1	3.4	35.2	106.8		
2462.00	99.8	FUND/AVE	270	1.8	V	28.1	3.4	35.2	96.0		
2462.00	99.4	FUND/AVE	210	1.5	H	28.1	3.4	35.2	95.7		
2483.50	83.3	EDGE/PEAK	150	1.4	V	28.1	3.4	35.2	79.5	87.0	-7.5
2483.50	79.6	EDGE/PEAK	100	1.2	H	28.1	3.4	35.2	75.9	87.0	-11.2
7386.00	34.6	AVE	330	1.5	V	35.1	5.6	33.5	41.8	54.0	-12.2
2483.50	67.1	EDGE/AVE	150	1.4	V	28.1	3.4	35.2	63.4	76.0	-12.7
2483.50	65.8	EDGE/AVE	100	1.2	H	28.1	3.4	35.2	62.1	76.0	-14.0
7386.00	30.0	AVE	310	1.6	H	35.1	5.6	33.5	37.2	54.0	-16.8
4924.00	31.8	AVE	300	1.4	V	32.5	4.9	33.0	36.2	54.0	-17.8
7386.00	47.8	PEAK	330	1.5	V	35.1	5.6	33.5	55.0	74.0	-19.0
4924.00	30.1	AVE	90	1.3	H	32.5	4.9	33.0	34.5	54.0	-19.5
7386.00	44.3	PEAK	310	1.6	H	35.1	5.6	33.5	51.5	74.0	-22.5
4924.00	44.4	PEAK	300	1.4	V	32.5	4.9	33.0	48.8	74.0	-25.2
4924.00	41.2	PEAK	90	1.3	H	32.5	4.9	33.0	45.6	74.0	-28.4

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart B	
Frequency MHz	Ampl. dBμV/m	Direction Degree	Height Meter	Polar H/V	Antenna dBμV/m	Cable Loss dBμV/m	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
350.90	48.8	160	1.5	V	15.5	2.3	25.0	41.6	46.0	-4.4
333.19	45.3	250	1.6	V	15.8	2.3	25.0	38.4	46.0	-7.6
161.00	45.9	180	1.3	V	12.9	1.8	25.0	35.6	43.5	-7.9
199.26	40.7	60	1.5	H	14.2	2.1	25.0	32.0	43.5	-11.5
300.04	41.6	320	1.5	V	14.4	2.3	25.0	33.3	46.0	-12.7
227.71	42.5	150	1.3	H	11.8	2.2	25.0	31.5	46.0	-14.5

Note:

AVG = average

10 - CONDUCTED EMISSIONS

10.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

10.2 EUT Setup

The measurement was performed in the shielded room, using the same setup per ANSI C63.4-2001 measurement procedure. The specification used was FCC 15 Subpart C limits.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along the edge of the test table and bundle as required.

The host PC system was connected with 120Vac/60Hz power source.

10.3 Spectrum Analyzer Setup

The spectrum analyzer was set to investigate the spectrum from 150 kHz to 30Mhz.

10.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2004-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2004-05-06

*** Statement of Traceability: BACL Corp.** certifies that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

10.5 Test Procedure

During the conducted emission test, the power cord of the host system was connected to the auxiliary outlet of the first LISN.

Maximizing procedure were performed on the six (6) highest emissions of the EUT.

All data was recorded in the peak detection mode, quasi-peak and average. Qusi-Peak readings are distinguished with an “QP”. Average readings are distinguished with an “Ave”.

10.6 Summary of Test Results

According to the data in section 11.7, the EUT complies with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

-7.9 dBμV at 20.010 MHz in the Line mode

10.7 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC PART 15 CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
20.010	42.1	AVG	Line	50	-7.9
20.000	41.9	AVG	Neutral	50	-8.1
0.150	52.6	QP	Line	66	-13.4
0.150	52.5	QP	Neutral	66	-13.5
7.450	40.6	QP	Line	56	-15.4
20.080	43.5	QP	Line	60	-16.5
20.000	43.1	QP	Neutral	60	-16.9
7.450	36.5	QP	Neutral	56	-19.5
7.450	25.8	AVG	Neutral	46	-20.2
7.450	23.4	AVG	Line	46	-22.6
0.150	23.1	AVG	Line	56	-32.9
0.150	22.8	AVG	Neutral	56	-33.2

10.8 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented hereinafter as reference.

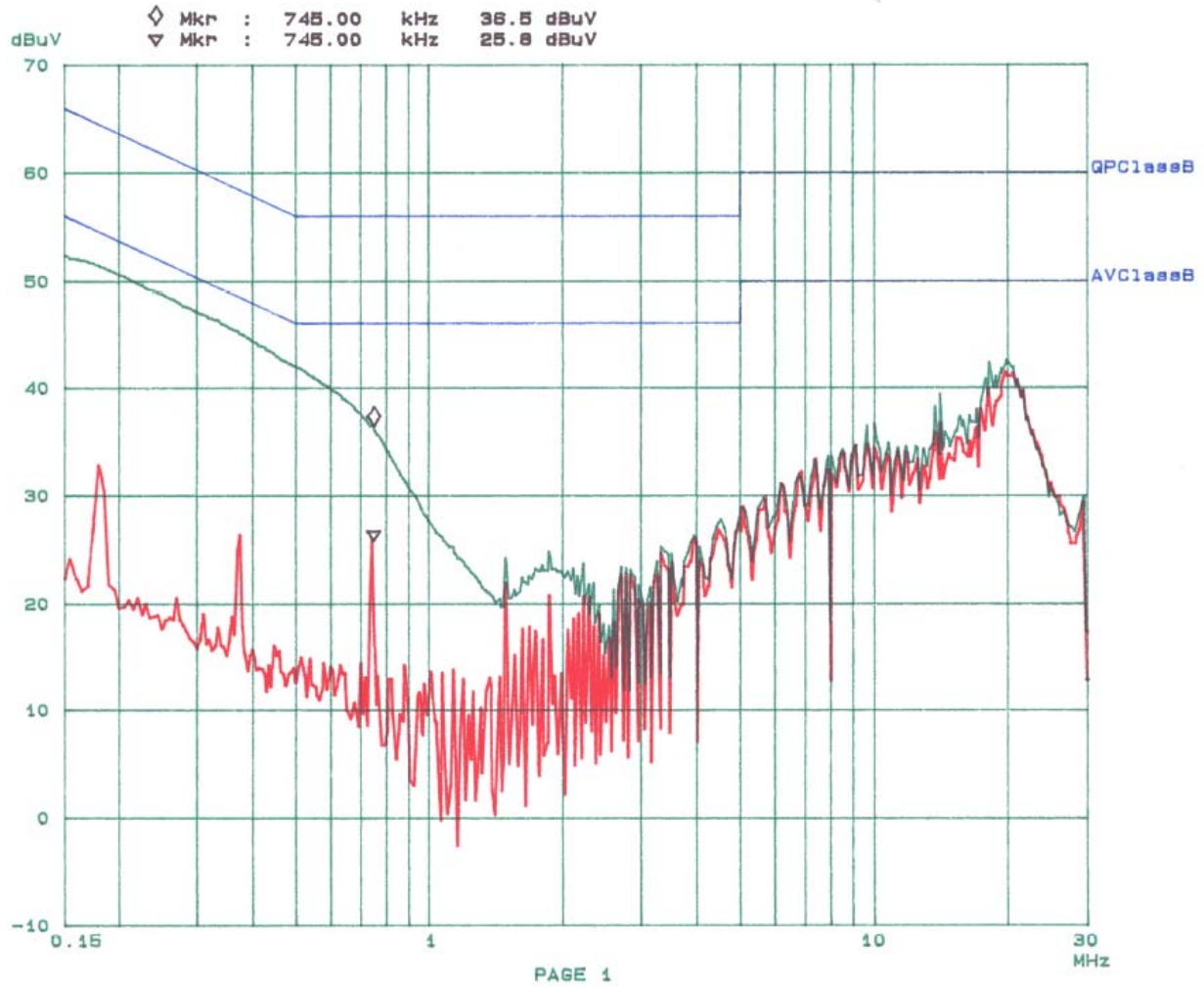
Bay Area Compliance Laboratory Corp 23. Oct 03 15:35
Class B

EUT: NA8300
Manuf: AZ Tech
Op Cond: Normal
Operator: Benjamin
Comment: N

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	10k	9k	QP+AV	1ms	10dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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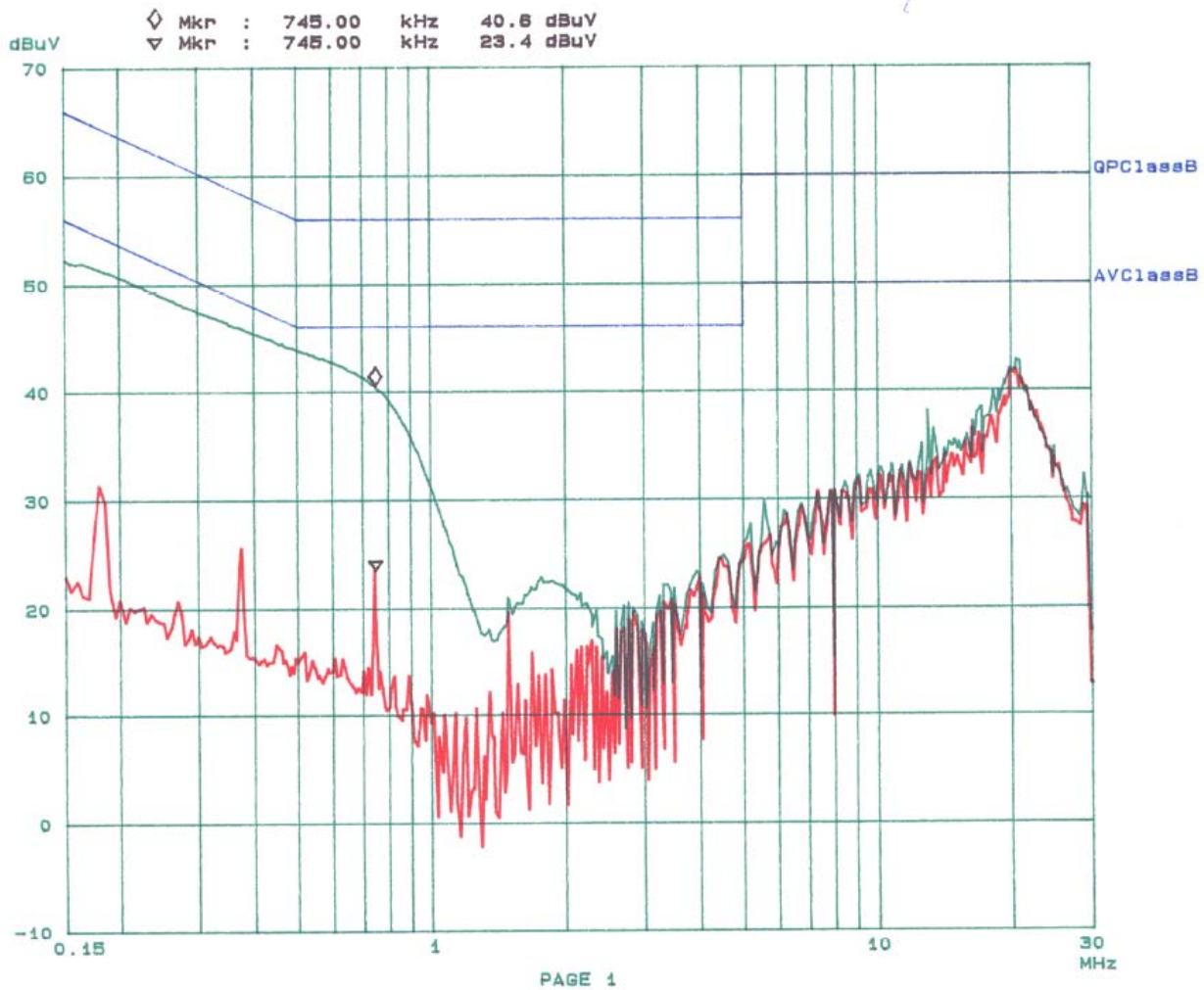
Bay Area Compliance Laboratory Corp 23. Oct 03 14:17
Class B

EUT: NA8300
Manuf: AZ Tech
Op Cond: Normal
Operator: Benjamin
Comment: L

Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	20ms	10dBLN	OFF
1M	5M	10k	9k	QP+AV	1ms	10dBLN	OFF
5M	30M	10k	9k	QP+AV	1ms	10dBLN	OFF

Final Measurement: x QP / + AV
Meas Time: 1 s
Subranges: 25
Acc Margin: 6dB



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