

FCC PART 15



EMI MEASUREMENT AND TEST REPORT

For
Actiontec Electronics, Inc.

760 North Mary Ave.
Sunnyvale, CA 94086

FCC ID: LNQGT701

2003-12-29

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: USB/Ethernet DSL Modem, 54Mbps Wireless Gateway & 54Mbps Wireless Access Point- ITE
Test Engineer: Ming Jing / 	
Report No.: R0311181	
Test Date: 2003-11-19	
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	

Note: This test report is specially limited to the above client company and product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
TEST FACILITY	4
SUPPORT EQUIPMENT LIST AND DETAILS	5
EXTERNAL I/O CABLING LIST AND DETAILS	5
SYSTEM TEST CONFIGURATION.....	6
JUSTIFICATION	6
EUT EXERCISE SOFTWARE	6
SPECIAL ACCESSORIES	6
SCHEMATICS / BLOCK DIAGRAM	6
EQUIPMENT MODIFICATIONS	6
CONFIGURATION OF TEST SYSTEM	7
TEST SETUP BLOCK DIAGRAM	7
SUMMARY OF TEST RESULTS	8
§1.1307(B)(1) & §2.1093 - RF EXPOSURE.....	9
§15.203 - ANTENNA REQUIREMENT.....	10
STANDARD APPLICABLE	10
ANTENNA CONNECTED CONSTRUCTION	10
§15.207(A) - CONDUCTED EMISSIONS.....	11
MEASUREMENT UNCERTAINTY	11
EUT SETUP	11
SPECTRUM ANALYZER SETUP	11
TEST EQUIPMENT LIST AND DETAILS.....	11
TEST PROCEDURE	11
SUMMARY OF TEST RESULTS	12
CONDUCTED EMISSIONS TEST DATA	12
PLOT OF CONDUCTED EMISSIONS TEST DATA	12
§15.209(A) - SPURIOUS EMISSION	15
STANDARD APPLICABLE	15
MEASUREMENT PROCEDURE.....	15
EQUIPMENT LISTS	15
MEASUREMENT RESULT	16
§15.209(F) - SPURIOUS RADIATED EMISSION.....	23
MEASUREMENT UNCERTAINTY	23
EUT SETUP.....	24
SPECTRUM ANALYZER SETUP	24
TEST EQUIPMENT LIST AND DETAILS.....	24
TEST PROCEDURE	25
CORRECTED AMPLITUDE & MARGIN CALCULATION	25
SUMMARY OF TEST RESULTS	25
RADIATED EMISSION TEST RESULT	26
§15.247(A)(2) – 6 DB BANDWIDTH	31
STANDARD APPLICABLE	31
MEASUREMENT PROCEDURE.....	31
EQUIPMENT LISTS	31
MEASUREMENT RESULT	31
§15.247(B)(3) - PEAK OUTPUT POWER MEASUREMENT.....	36

STANDARD APPLICABLE	36
MEASUREMENT PROCEDURE.....	36
EQUIPMENT LISTS	36
MEASUREMENT RESULT	36
§15.247(C) - 100 KHZ BANDWIDTH OF BAND EDGES	40
STANDARD APPLICABLE	40
MEASUREMENT PROCEDURE.....	40
EQUIPMENT LISTS	40
MEASURE RESULTS	40
§15.247(D) - POWER SPECTRAL DENSITY	45
STANDARD APPLICABLE	45
MEASUREMENT PROCEDURE.....	45
EQUIPMENT LISTS	45
MEASUREMENT RESULTS.....	45

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Actiontec Electronics, Inc.* 's, model: *GT701*, or the "EUT" as referred to in this report is an USB/Ethernet DSL Modem, 54Mbps Wireless Access Point which is measured approximately 6.1"L x 4.5"W x 0.8"H, rated input voltage: AC 120 V/60Hz.

** The test data gathered are from a production sample, S/N: 1005, provided by the manufacturer.*

Objective

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

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

Related Submittal(s)/Grant(s)

No Related Submittals.

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.

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.

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.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	Notebook PC	ThinkPad 1171	N/A	N/A
HP	Printer	2225C	N/A	N/A
Arescom	Line Simulator	CDS6020	N/A	N/A
Panasonic	Phone Set	KX-T3175	N/A	N/A

External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
RJ-45 Cable	1.0	Network port / EUT	Ethernet port / Notebook PC
Cable	1.0	Printer port / Notebook PC	Printer
RJ-15 Cable	1.0	Line Port / EUT	Line Simulator
RF-15 Cable	1.0	Phone Port / EUT	Phone Set

SYSTEM TEST CONFIGURATION

Justification

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

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

EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the system components. The test software, provided by the customer, is started the Windows terminal program under the Windows 98/2000/ME/XP operating system.

Once loaded, set the Tx channel to low, mid and high for testing.

Special Accessories

As shown in following test block diagram, all interface cables used for compliance testing are shielded. The host PC and the peripherals featured shielded metal connectors.

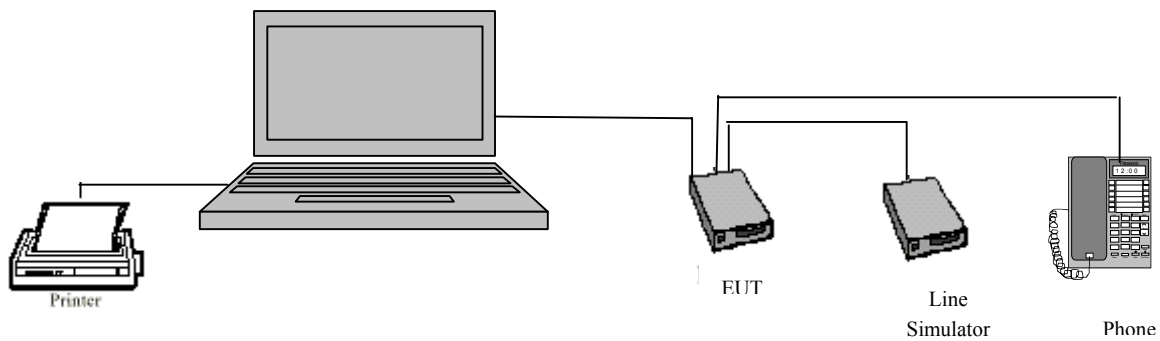
Schematics / Block Diagram

Please refer to Appendix A.

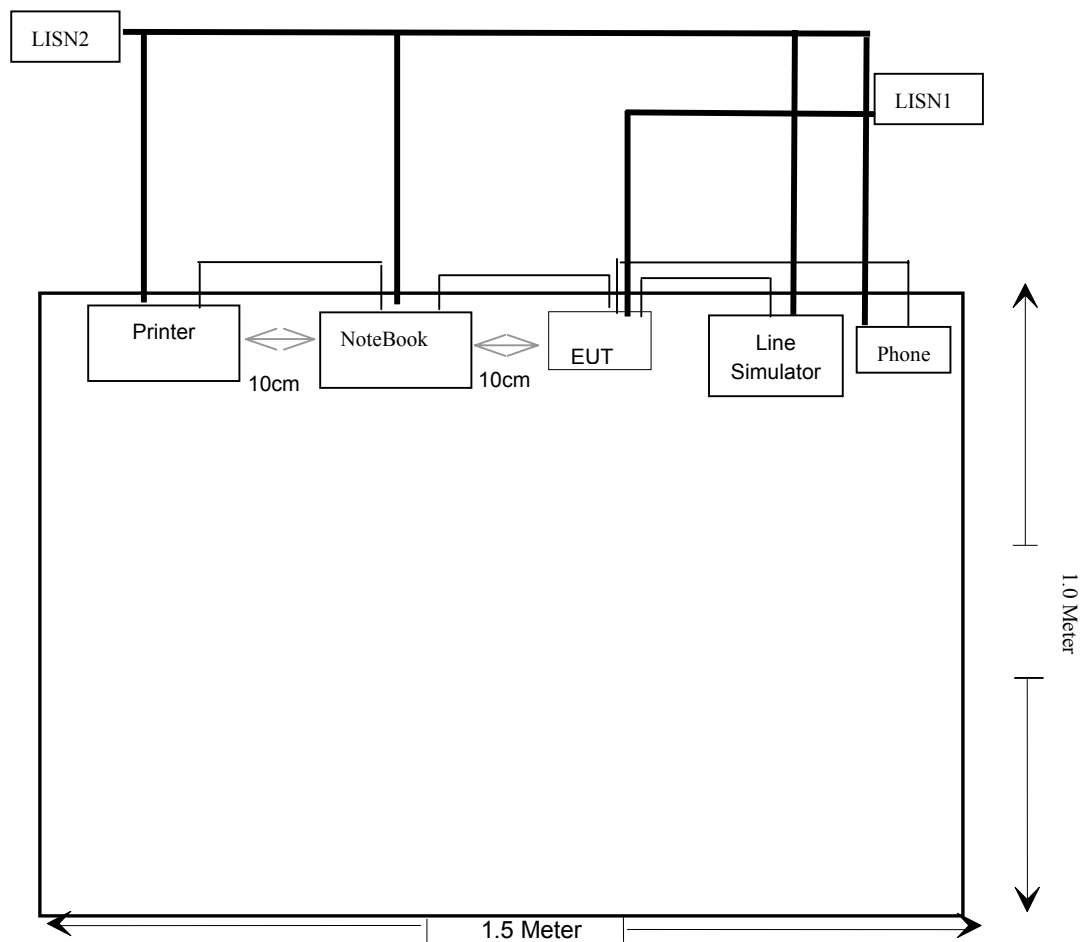
Equipment Modifications

No modifications were made to the EUT.

Configuration of Test System



Test Setup Block Diagram



SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 1005.

FCC RULES	DESCRIPTION OF TEST	RESULT
§2.1093	RF Exposure	Pass
§15.203	Antenna Requirement	Pass
§ 15.207 (a)	Conducted Emissions	Pass
§15.209 (a)	Spurious Emission	Pass
§15.209 (f)	Radiated Emission	Pass
§15.247 (a)(2),	6 dB Bandwidth	Pass
§15.247 (b)(3),	Maximum Peak Output Power	Pass
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Pass
§15.247 (d),	Peak Power Spectral Density	Pass

§1.1307(b)(1) & §2.1093 - RF EXPOSURE

According to §15.247(b)(4) and §1.1307(b)(1), 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 level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
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
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

MPE Prediction

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal: 15.7 (dBm)

Maximum peak output power at antenna input terminal: 37.15 (mW)

Prediction distance: 20 (cm)

Predication frequency: 2400 (MHz)

Antenna Gain (typical): 2.0 (dBi)

antenna gain: 1.58 (numeric)

Power density at predication frequency at 20 cm: 0.012(mW/cm²)

MPE limit for uncontrolled exposure at prediction frequency: 1.0 (mW/cm²)

Test Result

The EUT is a mobile device. The power density level at 20 cm is 0.012 mW/cm², which is below the uncontrolled exposure limit of 1.0mW/cm² at 2400 MHz.

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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.

Refer to statement below for compliance.

“The antenna for this device is an integral antenna that the end user cannot access. Furthermore the device is for outdoor use as detailed in the Users Manual and Operational Description”.

Antenna Connected Construction

The antenna connector is designed with permanent attachment and no consideration of replacement.

§15.207(a) - CONDUCTED EMISSIONS

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 ± 2.4 dB.

EUT Setup

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

The spacing between the peripherals was 10 centimeters.

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

Spectrum Analyzer Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30Mhz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Artificial LISN	ESH2-Z5	871884/039	2003-03-28
Rohde & Schwarz	EMI Test Receiver	ESCS30	100176	2003-05-06

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

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 was performed on the six (6) highest emissions of each modes tested to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dB μ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

Summary of Test Results

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

-12.6dB at 0.150 in the Line mode

Environmental Conditions

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

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
0.150	53.4	QP	Line	66	-12.6
0.150	51.9	QP	Neutral	66	-14.1
0.705	36.2	QP	Line	56	-19.8
0.870	29.6	QP	Neutral	56	-26.4
0.150	28.9	AVG	Line	56	-27.1
0.705	14.7	AVG	Line	46	-31.3
0.870	11.5	AVG	Neutral	46	-34.5
0.150	18.3	AVG	Neutral	56	-37.7
17.100	12.3	AVG	Neutral	50	-37.7
17.100	14.9	QP	Neutral	60	-45.1
17.100	13.5	QP	Line	60	-46.5
17.100	0.8	AVG	Line	50	-49.2

Plot of Conducted Emissions Test Data

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

Bay Area Compliance Laboratory Corp
Class B

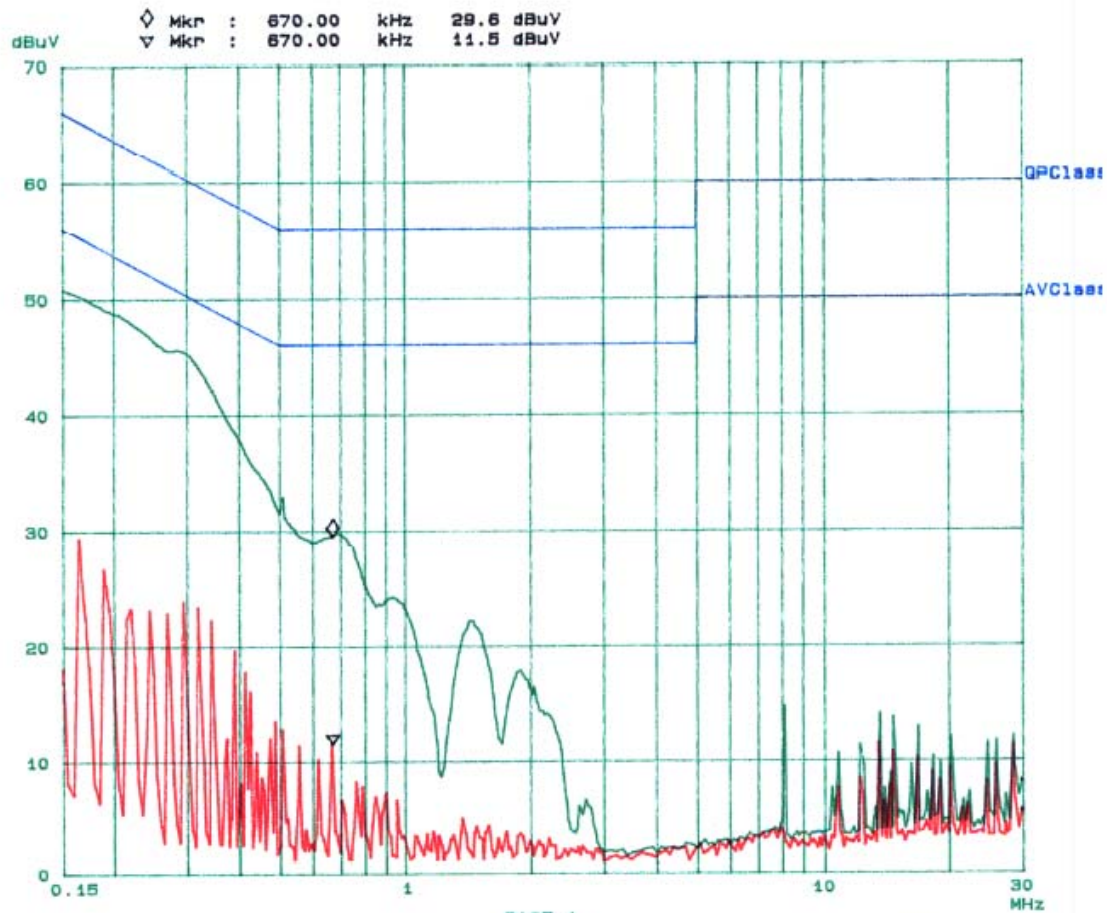
24. Nov 03 16:20

EUT: GT701
Manuf: Actiontec
Op Cond: Normal
Operator: Ming
Comment: N

Scan Settings (3 Ranges)

Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	1M	5k	9k	QP+AV	1ms	15dBLN	OFF
1M	3M	10k	9k	QP+AV	1ms	15dBLN	OFF
3M	30M	100k	9k	QP+AV	1ms	15dBLN	OFF

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



PAGE 1

Bay Area Compliance Laboratory Corp
Class B

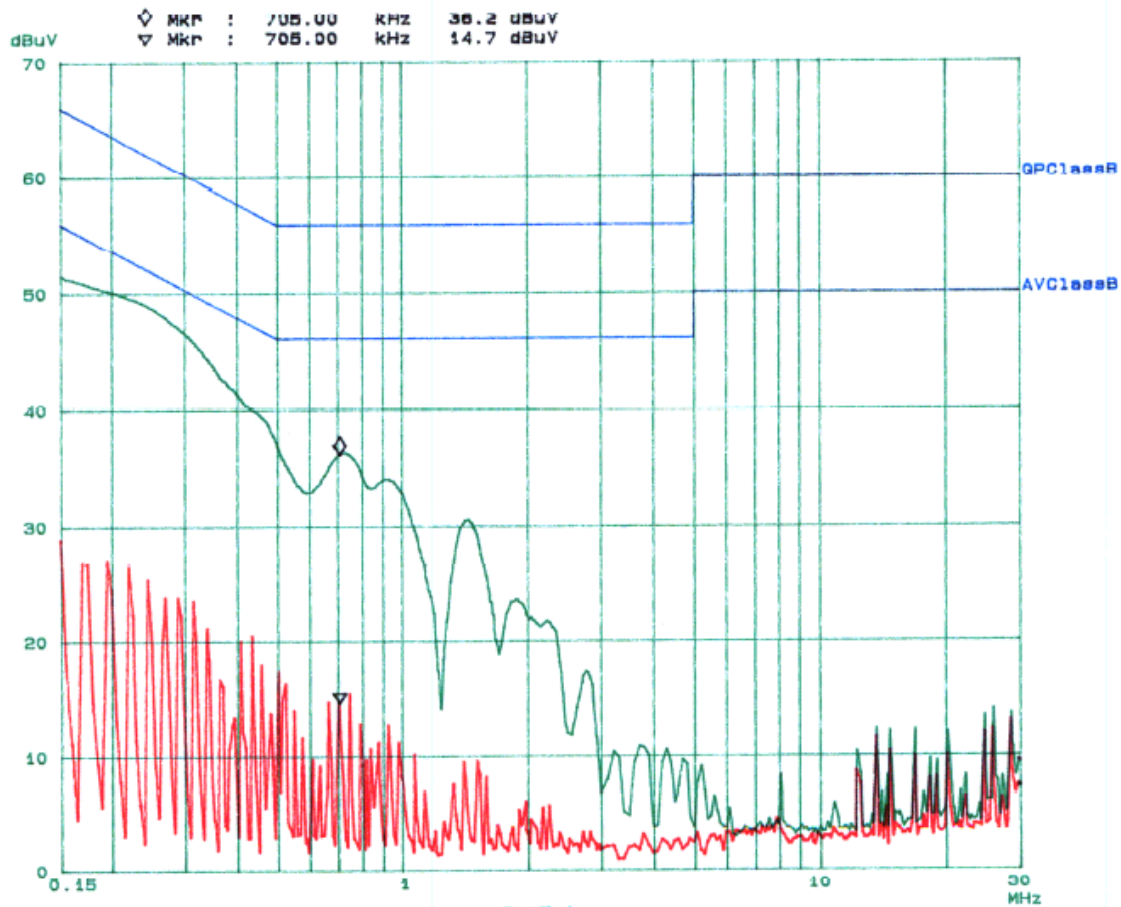
24, Nov 03 15:29

EUT: GT701
Manuf: Actiontec
Op Cond: Normal
Operator: Ming
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	1ms	15dB	OFF
1M	3M	10k	9k	QP+AV	1ms	15dB	OFF
3M	30M	100k	9k	QP+AV	1ms	15dB	OFF

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



PAGE 1

2003-11-24

§15.209(a) - SPURIOUS EMISSION

Standard Applicable

According to §15.209 (a), except as provided elsewhere in the subpart of 15.209, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Measurement	
	Field strength (microvolts/meter)	distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
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., §§ 15.231 and 15.241

Measurement Procedure

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4 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 the SA on Max-Hold Mode, and then keep the EUT in transmitting mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

Equipment Lists

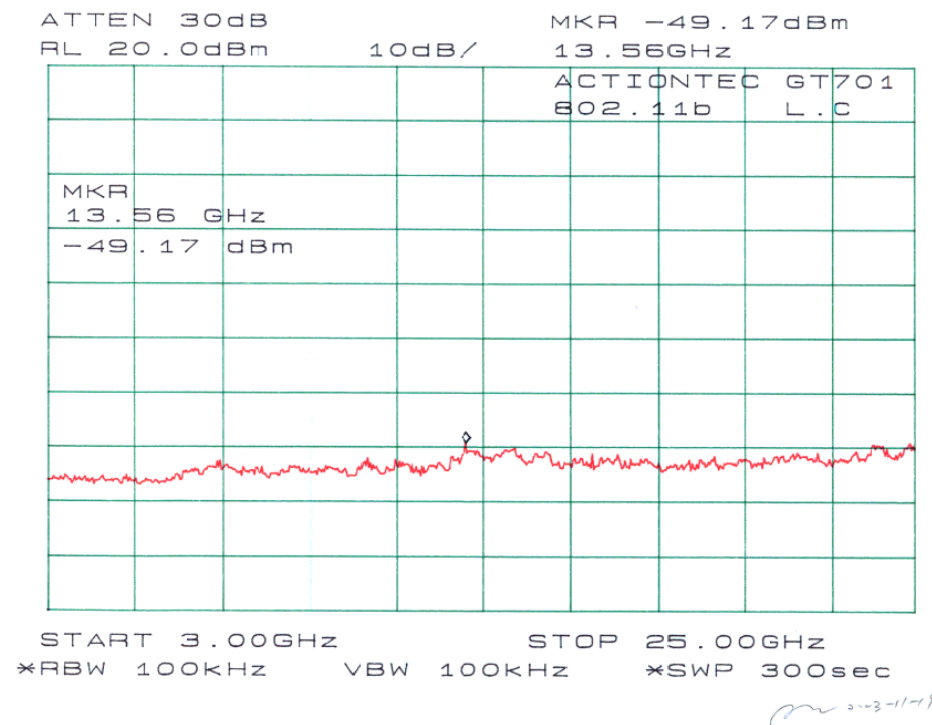
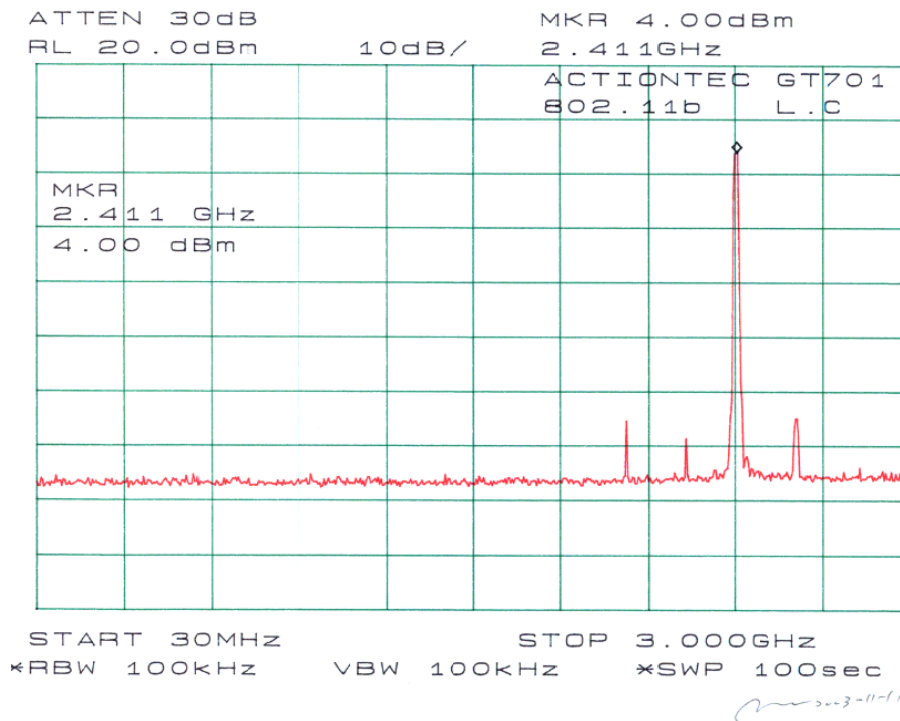
Manufacturer	Model No.	Description	Calibration Date
HP	8565EC	Spectrum Analyzer	2003-01-22

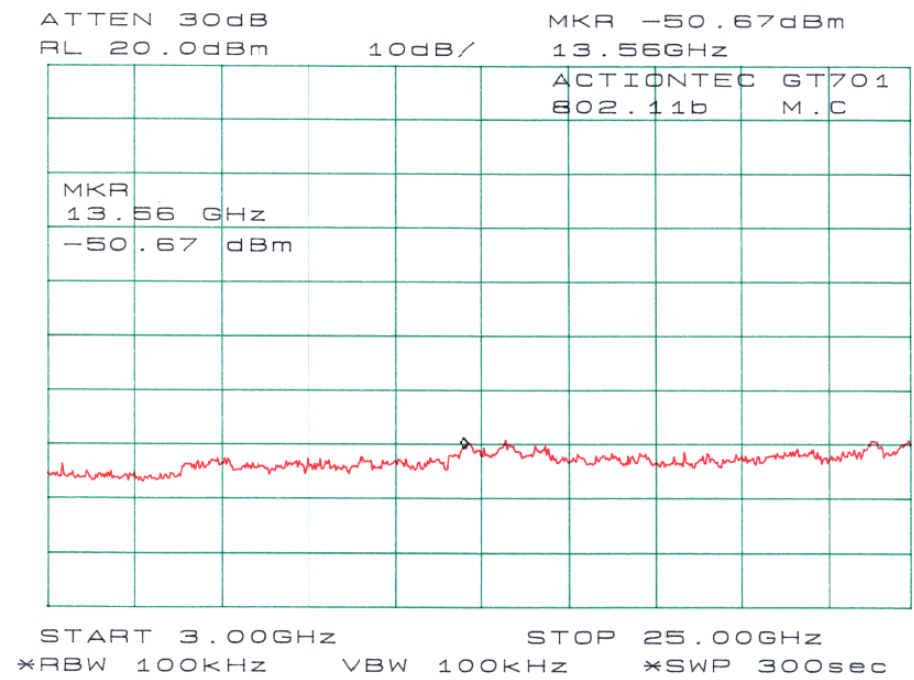
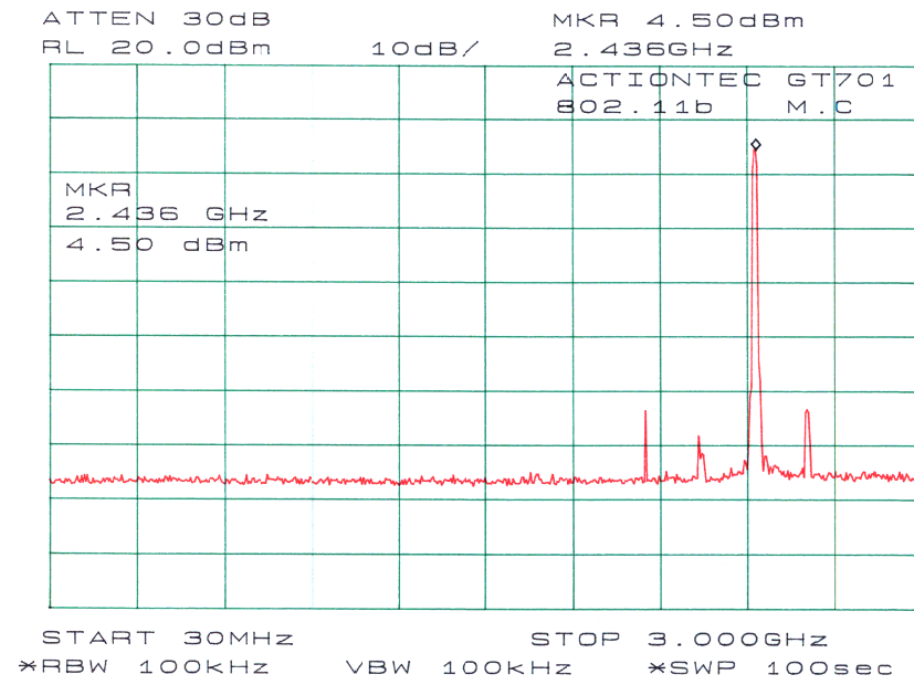
Measurement Result

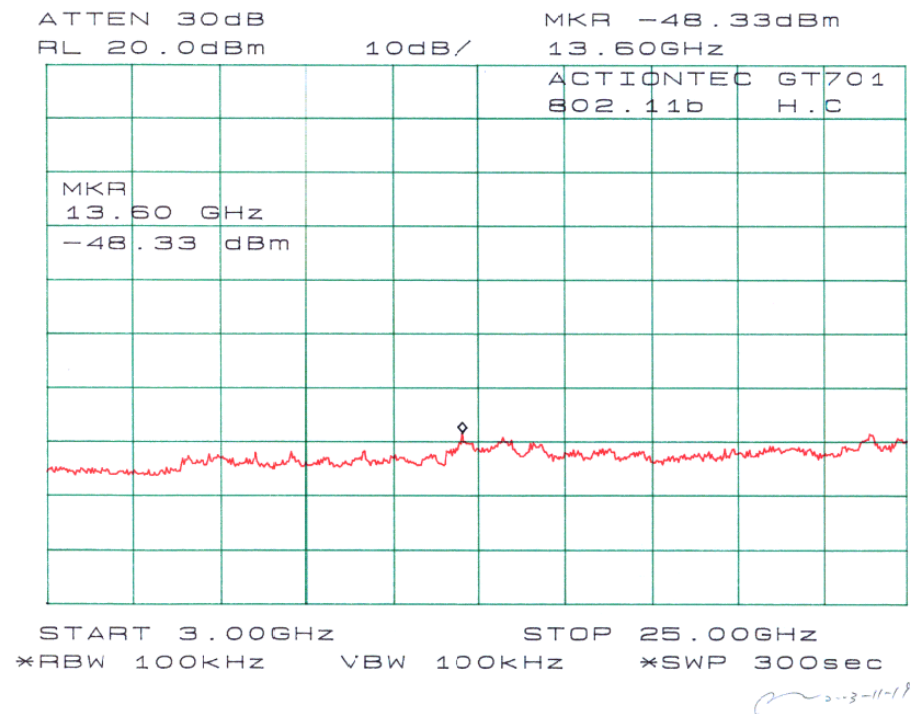
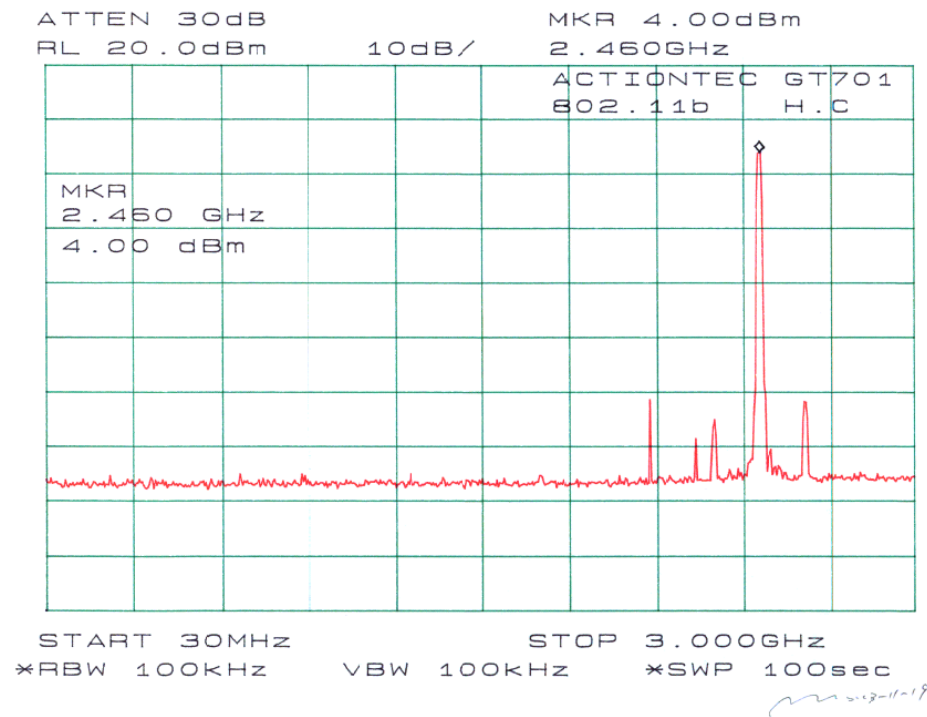
Please refer to following pages for plots of spurious emission.

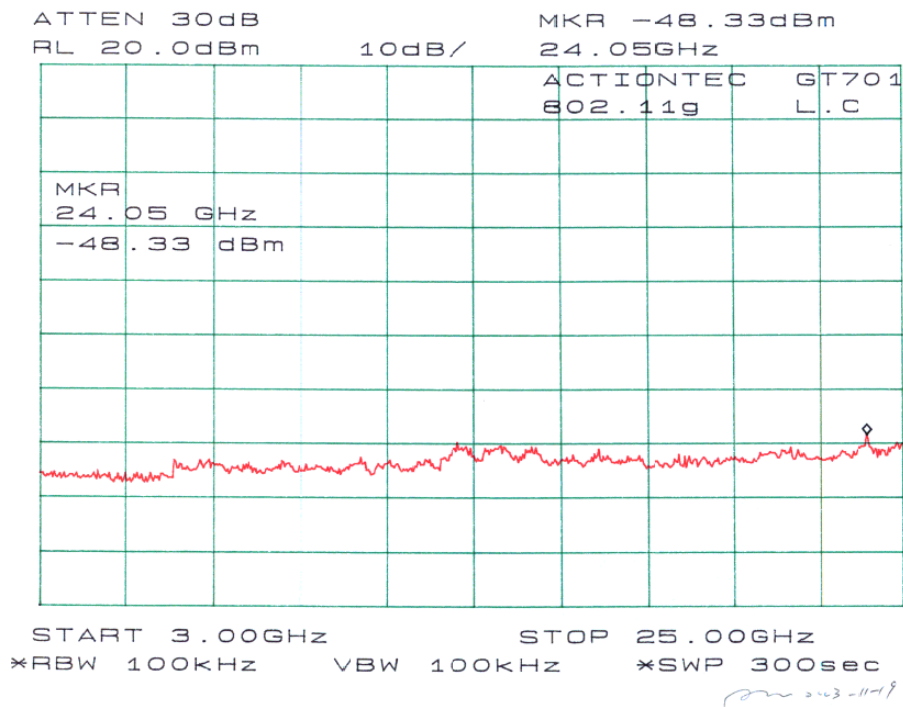
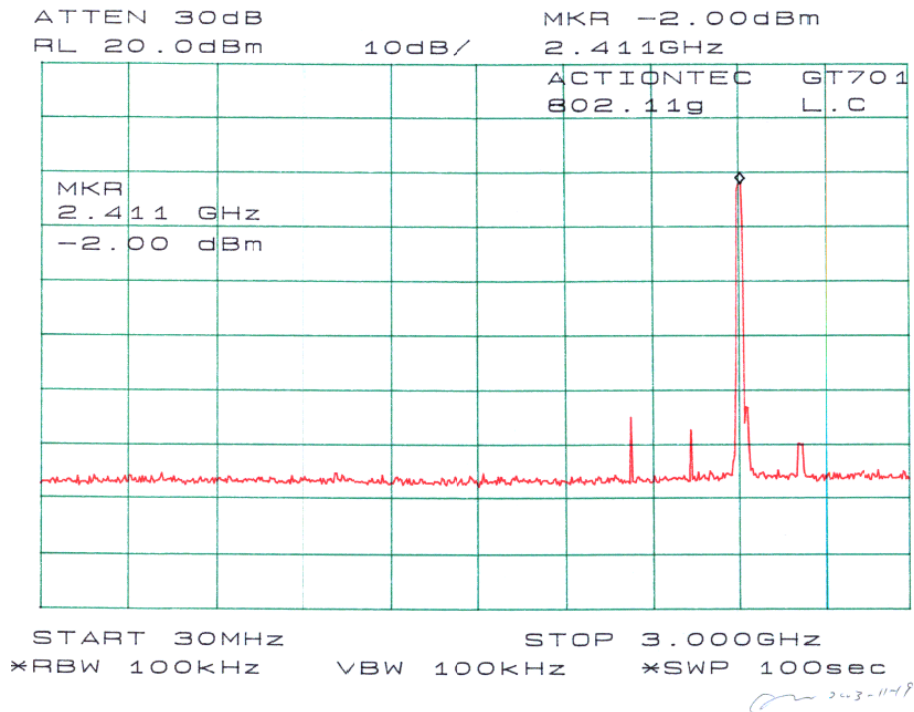
Environmental Conditions

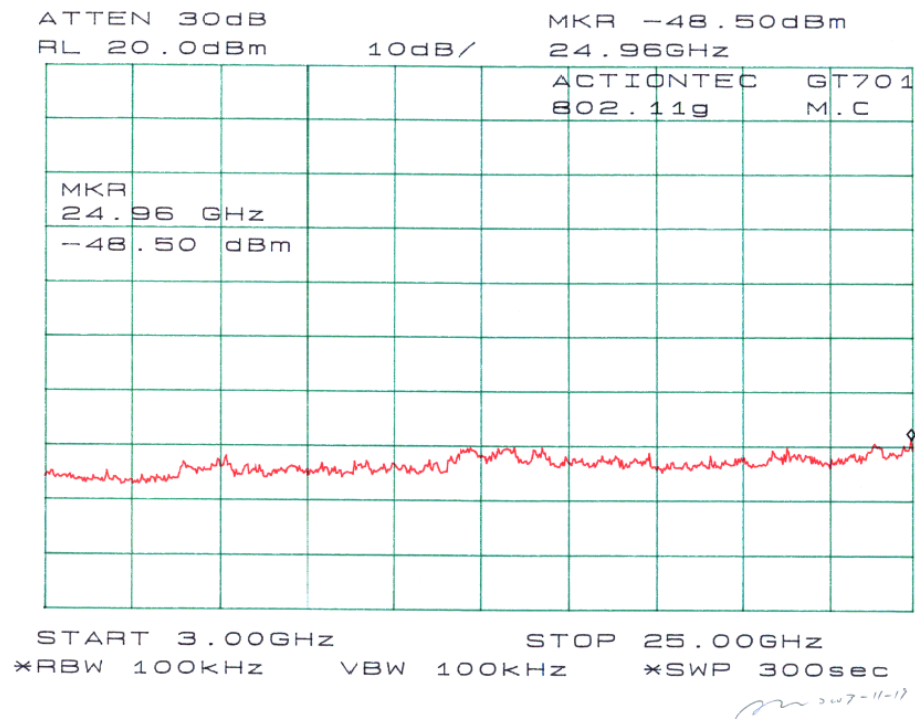
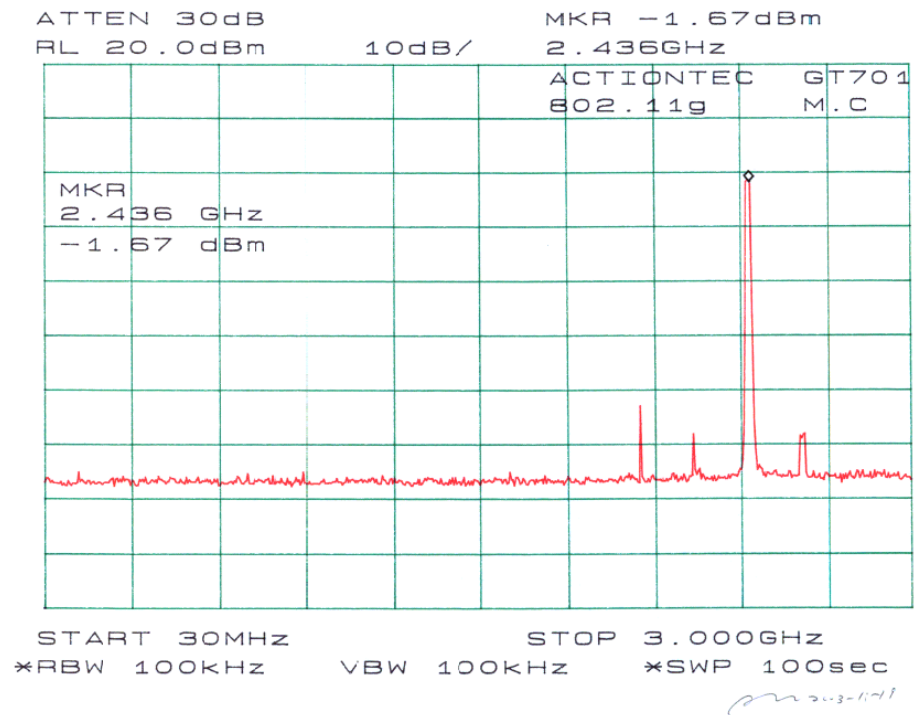
Temperature:	25° C
Relative Humidity:	52%
ATM Pressure:	1100 mbar

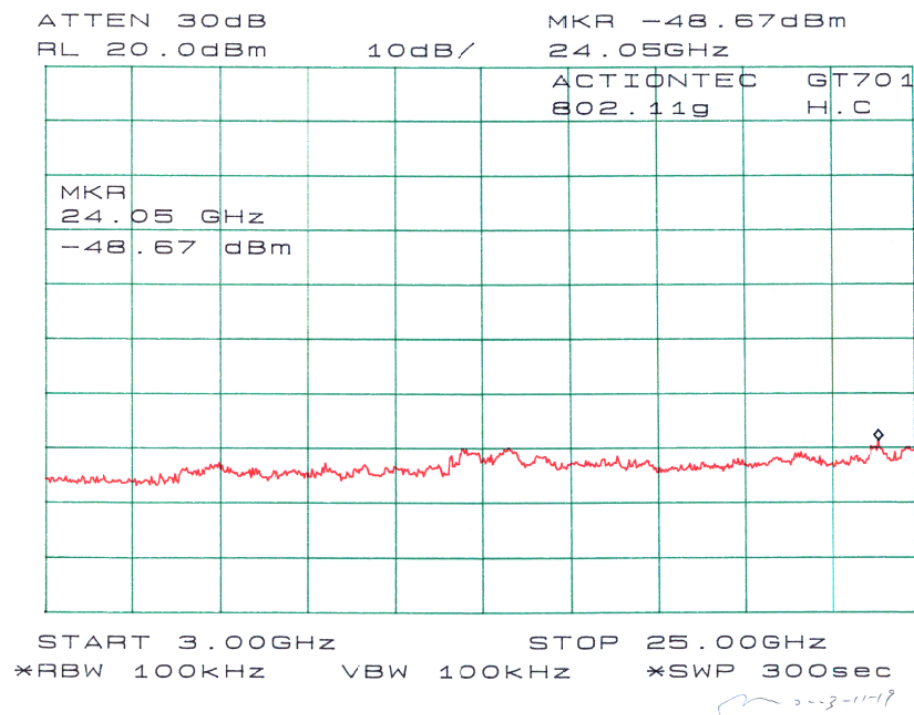
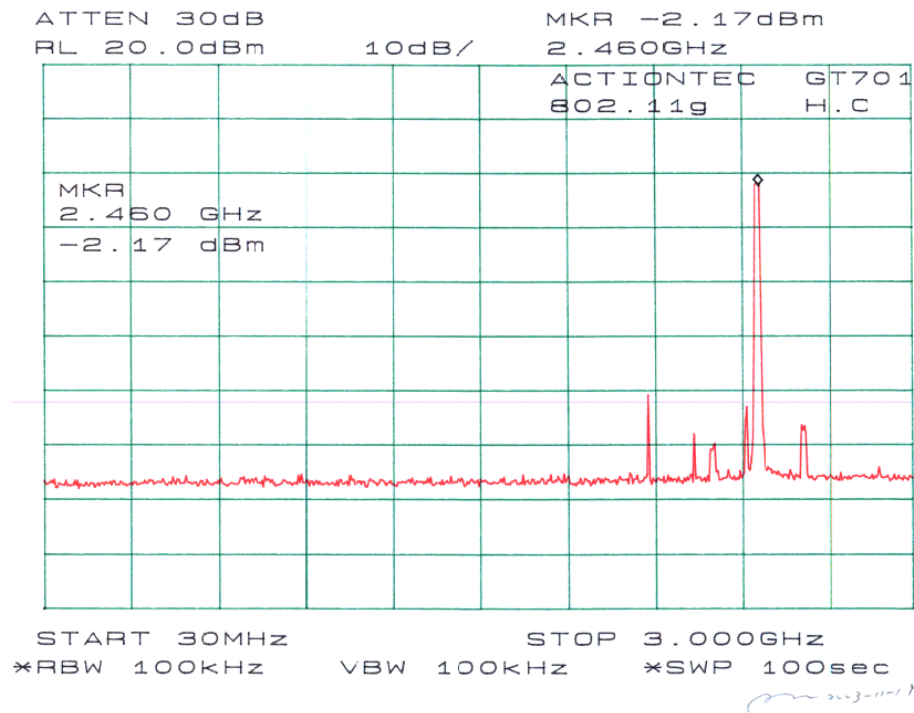
Plots of Spurious Emission for 802.11b (15.247)





Plots of Spurious Emission for 802.11g (15.247)





§15.209(f) - SPURIOUS RADIATED EMISSION

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 ± 4.0 dB.

According to §15.205, 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 – 12.57725	240 – 285	3345.8 – 3358	36.43 – 36.5
13.36 – 13.41	322 – 335.4	3600 – 4400	(²)

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

² Above 38.6

Except as provided in paragraph (d) and (e), the filed 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 1000MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, 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.

According to §15.209, the device shall meet radiated emission general requirements.

Except for Class A device, the filed strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (Microvolts/meter)	dB (dBμV/meter)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup accordance with the ANSI C63.4-2001. The specification used was the FCC 15.209 limits.

The spacing between the peripherals was 10 centimeters.

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

Spectrum Analyzer Setup

According to FCC Rules, 47 CFR, Section 15.33, the frequency was investigated from 30 to 1000 MHz.

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

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
HP	Spectrum Analyzer	8568B	2601A02165	2003-07-03
HP	Amplifier	8447E	2944A10187	2003-09-23
HP	Quasi-Peak Adapter	85650A	3019A05393	2003-06-13
EMCO	Biconical Antenna	3110B	9309-1165	2003-10-11
EMCO	Log Periodic Antenna	3146	2101	2003-10-11

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

Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

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

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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC 15.209 Limit}$$

Summary of Test Results

According to the data in section 12.7, 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:

Environmental Conditions

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

Test Data for 802.11b, 15.247

-14.655 dB at 7236.00 MHz in the **Vertical** polarization, Low Channel

-14.255 dB at 7311.00 MHz in the **Vertical** polarization, Middle Channel

-14.655 dB at 7386.00 MHz in the **Vertical** polarization, High Channel

-2.13 dB at 250.01 MHz in the **Vertical** polarization, Unwanted Emission

*Test Data for 802.11g, 15.247***-9.550 dB at 2400.00 MHz in the Vertical polarization, Low Channel****-12.155 dB at 7311.00 MHz in the Vertical polarization, Middle Channel****-12.555 dB at 7386.00 MHz in the Vertical polarization, High Channel****-2.33 dB at 250.01 MHz in the Vertical polarization, Unintentional Emission***Test Data for ADSL Modem, 15B***-2.07 dB at 250.00 MHz in the Vertical polarization****Radiated Emission Test Result****Final test data for 802.11b (15.247)**

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency	Ampl.	Comments	Angle	Height	Polar	Anten na	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/ m		Degree	Meter	H/ V	dBμV/ m	DB	DB	dBμV/m	dBμV/m	dB
Low Channel, 1-25GHz											
2412.00	111.5	FUND/PEAK	90	2.0	V	28.1	3.35	35.2	107.750		
2412.00	105.8	FUND/PEAK	300	1.2	H	28.1	3.35	35.2	102.050		
2412.00	102.3	FUND/AVE	90	2.0	V	28.1	3.35	35.2	98.550		
2412.00	96.4	FUND/AVE	300	1.2	H	28.1	3.35	35.2	92.650		
7236.00	32.1	AVE	200	1.2	V	35.1	5.645	33.5	39.345	54	-14.655
7236.00	31.7	AVE	0	1.3	H	35.1	5.645	33.5	38.945	54	-15.055
4824.00	31.9	AVE	160	1.1	V	32.5	4.91	33.0	36.310	54	-17.690
4824.00	30.4	AVE	0	1.5	H	32.5	4.91	33.0	34.810	54	-19.190
7236.00	45.5	PEAK	200	1.2	V	35.1	5.645	33.5	52.745	74	-21.255
7236.00	44.3	PEAK	0	1.3	H	35.1	5.645	33.5	51.545	74	-22.455
4824.00	44.2	PEAK	160	1.1	V	32.5	4.91	33.0	48.610	74	-25.390
4824.00	43.1	PEAK	0	1.5	H	32.5	4.91	33.0	47.510	74	-26.490

Final test data for 802.11b (15.247, Continued)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency	Ampl.	Comments	Angle	Height	Polar	Antenna	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m		Degree	Meter	H/V	dBμV/m	DB	DB	dBμV/m	dBμV/m	dB
Middle Channel, 1-25GHz											
2437.00	112.4	FUND/PEAK	180	1.5	V	28.1	3.35	35.2	108.650		
2437.00	101.7	FUND/PEAK	210	1.2	H	28.1	3.35	35.2	97.950		
2437.00	103.9	FUND/AVE	180	1.5	V	28.1	3.35	35.2	100.150		
2437.00	92.4	FUND/AVE	210	1.2	H	28.1	3.35	35.2	88.650		
7311.00	32.5	AVE	310	1.6	V	35.1	5.645	33.5	39.745	54	-14.255
7311.00	31.9	AVE	15	1.2	H	35.1	5.645	33.5	39.145	54	-14.855
4874.00	31.8	AVE	60	1.5	V	32.5	4.91	33.0	36.210	54	-17.790
4874.00	30.2	AVE	230	1.2	H	32.5	4.91	33.0	34.610	54	-19.390
7311.00	45.6	PEAK	310	1.6	V	35.1	5.645	33.5	52.845	74	-21.155
7311.00	44.7	PEAK	15	1.2	H	35.1	5.645	33.5	51.945	74	-22.055
4874.00	44.5	PEAK	60	1.5	V	32.5	4.91	33.0	48.910	74	-25.090
4874.00	43.7	PEAK	230	1.2	H	32.5	4.91	33.0	48.110	74	-25.890
High Channel, 1-25GHz											
2462.00	112.3	FUND/PEAK	270	1.8	V	28.1	3.350	35.2	108.550		
2462.00	103.5	FUND/PEAK	270	1.5	H	28.1	3.350	35.2	99.750		
2462.00	103.7	FUND/AVE	270	1.8	V	28.1	3.350	35.2	99.950		
2462.00	94.8	FUND/AVE	270	1.5	H	28.1	3.350	35.2	91.050		
7386.00	32.1	AVE	180	1.7	V	35.1	5.645	33.5	39.345	54	-14.655
7386.00	31.7	AVE	160	1.8	H	35.1	5.645	33.5	38.945	54	-15.055
4924.00	31.9	AVE	270	1.2	V	32.5	4.910	33.0	36.310	54	-17.690
4924.00	30.4	AVE	15	1.5	H	32.5	4.910	33.0	34.810	54	-19.190
7386.00	45.5	PEAK	180	1.7	V	35.1	5.645	33.5	52.745	74	-21.255
7386.00	44.3	PEAK	160	1.8	H	35.1	5.645	33.5	51.545	74	-22.455
4924.00	44.2	PEAK	270	1.2	V	32.5	4.910	33.0	48.610	74	-25.390
4924.00	43.1	PEAK	15	1.5	H	32.5	4.910	33.0	47.510	74	-26.490

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart B	
Frequency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB
250.01	53.4	0	1.5	V	13.30	2.17	25	43.87	46.0	-2.13
206.30	52.2	0	1.5	V	11.50	2.17	25	40.87	43.5	-2.63
200.05	51.3	150	1.2	H	11.50	2.17	25	39.97	43.5	-3.53
233.20	51.6	15	1.5	V	12.60	2.17	25	41.37	46.0	-4.63
318.75	48.2	180	1.5	V	15.10	2.33	25	40.63	46.0	-5.37
166.09	46.5	120	1.5	H	12.95	1.81	25	36.26	43.5	-7.24
110.86	47.3	90	1.5	V	11.30	1.54	25	35.14	43.5	-8.36

Final test data for 802.11g (15.247)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency	Ampl.	Comments	Angle	Height	Polar	Anten na	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/ m		Degree	Meter	H/ V	dBμV/ m	DB	DB	dBμV/m	dBμV/m	dB
Low Channel, 1-25GHz											
2412.00	106.3	FUND/PEAK	90	1.8	V	28.1	3.350	35.2	102.550		
2412.00	99.8	FUND/PEAK	270	1.4	H	28.1	3.350	35.2	96.050		
2412.00	91.2	FUND/AVE	90	1.8	V	28.1	3.350	35.2	87.450		
2412.00	85.3	FUND/AVE	270	1.4	H	28.1	3.350	35.2	81.550		
2400.00	80.5	EDGE/PEAK	310	2.0	V	28.1	3.350	35.2	76.750	86.3	-9.550
2400.00	72.6	EDGE/PEAK	30	1.0	H	28.1	3.350	35.2	68.850	79.8	-10.950
2400.00	52.2	EDGE/AVE	30	1.0	H	28.1	3.350	35.2	48.450	59.8	-11.350
7236.00	34.3	AVE	300	1.0	V	35.1	5.645	33.5	41.545	54.0	-12.455
2400.00	54.5	EDGE/AVE	310	2.0	V	28.1	3.350	35.2	50.750	66.3	-15.550
7236.00	30.5	AVE	240	1.5	H	35.1	5.645	33.5	37.745	54.0	-16.255
4824.00	31.7	AVE	150	1.6	V	32.5	4.910	33.0	36.110	54.0	-17.890
4824.00	30.4	AVE	90	1.5	H	32.5	4.910	33.0	34.810	54.0	-19.190
7236.00	46.1	PEAK	300	1.0	V	35.1	5.645	33.5	53.345	74.0	-20.655
7236.00	44.9	PEAK	240	1.5	H	35.1	5.645	33.5	52.145	74.0	-21.855
4824.00	44.3	PEAK	150	1.6	V	32.5	4.910	33.0	48.710	74.0	-25.290
4824.00	43.1	PEAK	90	1.5	H	32.5	4.910	33.0	47.510	74.0	-26.490
Middle Channel, 1-25GHz											
2437.00	107.3	FUND/PEAK	120	1.8	V	28.1	3.350	35.2	103.550		
2437.00	100.4	FUND/PEAK	180	1.6	H	28.1	3.350	35.2	96.650		
2437.00	92.2	FUND/AVE	120	1.8	V	28.1	3.350	35.2	88.450		
2437.00	86.3	FUND/AVE	180	1.6	H	28.1	3.350	35.2	82.550		
7311.00	34.6	AVE	180	2.0	V	35.1	5.645	33.5	41.845	54	-12.155
7311.00	30.7	AVE	150	1.8	H	35.1	5.645	33.5	37.945	54	-16.055
4874.00	31.6	AVE	270	1.4	V	32.5	4.910	33.0	36.010	54	-17.990
4874.00	30.2	AVE	90	1.5	H	32.5	4.910	33.0	34.610	54	-19.390
7311.00	46.7	PEAK	180	2.0	V	35.1	5.645	33.5	53.945	74	-20.055
7311.00	45.2	PEAK	150	1.8	H	35.1	5.645	33.5	52.445	74	-21.555
4874.00	43.5	PEAK	270	1.4	V	32.5	4.910	33.0	47.910	74	-26.090
4874.00	41.4	PEAK	90	1.5	H	32.5	4.910	33.0	45.810	74	-28.190

Final test data for 802.11g (15.247, Continued)

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dB μ V /m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dB μ V/m	Cable DB	Amp. DB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
High Channel, 1-25GHz											
2462.00	107.1	FUND/PEAK	270	1.8	V	28.1	3.350	35.2	103.350		
2462.00	100.2	FUND/PEAK	210	1.5	H	28.1	3.350	35.2	96.450		
2462.00	92.1	FUND/AVE	270	1.8	V	28.1	3.350	35.2	88.350		
2462.00	86.3	FUND/AVE	210	1.5	H	28.1	3.350	35.2	82.550		
7386.00	34.2	AVE	330	1.5	V	35.1	5.645	33.5	41.445	54	-12.555
7386.00	30.5	AVE	310	1.6	H	35.1	5.645	33.5	37.745	54	-16.255
4924.00	31.7	AVE	300	1.4	V	32.5	4.910	33.0	36.110	54	-17.890
4924.00	30.1	AVE	90	1.3	H	32.5	4.910	33.0	34.510	54	-19.490
7386.00	46.6	PEAK	330	1.5	V	35.1	5.645	33.5	53.845	74	-20.155
7386.00	44.9	PEAK	310	1.6	H	35.1	5.645	33.5	52.145	74	-21.855
4924.00	44.2	PEAK	300	1.4	V	32.5	4.910	33.0	48.610	74	-25.390
4924.00	40.9	PEAK	90	1.3	H	32.5	4.910	33.0	45.310	74	-28.690

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart B	
Frequency MHz	Ampl. dB μ V/m	Direction Degree	Height Meter	Polar H/V	Antenna dB μ V/m	Cable Loss dB μ V/m	Amp. dB	Corr. Ampl. dB μ V/m	Limit dB μ V/m	Margin dB
250.01	53.2	160	1.5	V	13.30	2.17	25	43.67	46.0	-2.33
233.20	51.9	250	1.6	V	12.60	2.17	25	41.67	46.0	-4.33
318.75	48.9	160	1.5	V	15.10	2.33	25	41.33	46.0	-4.67
206.30	52.1	320	1.5	V	11.50	2.17	25	40.77	46.0	-5.23
200.05	51.5	150	1.3	H	11.50	2.17	25	40.17	46.0	-5.83
166.09	46.8	60	1.5	H	12.95	1.81	25	36.56	43.5	-6.94
110.86	47.1	180	1.2	V	11.30	1.54	25	34.94	43.5	-8.56

Note:

FUND = Fundamental

AVG = average

Final test data for ADSL Modem (FCC15B)

Frequency MHz	Indicated		Table	Antenna		Correction Factor			FCC 15 Subpart B	
	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
250.00	58.69	0	1.2	V	11.70	1.14	27.6	43.93	46.0	-2.07
100.00	56.90	90	2	H	11.50	0.54	28.5	40.44	43.5	-3.06
375.00	53.50	200	2.5	H	14.90	2.24	27.9	42.74	46.0	-3.26
375.00	52.90	180	1.2	V	14.90	2.24	27.9	42.14	46.0	-3.86
100.00	53.10	30	1.2	V	11.50	0.54	28.5	36.64	43.5	-6.86
400.00	48.10	180	2.5	H	15.80	2.57	28.2	38.27	46.0	-7.73
400.00	47.00	30	1.2	V	15.80	2.57	28.2	37.17	46.0	-8.83
750.00	38.50	0	1.2	V	22.20	3.79	28.7	35.79	46.0	-10.21
75.00	47.80	270	2	H	9.50	0.98	28.6	29.68	40.0	-10.32
250.00	49.60	270	2.5	H	11.70	1.14	27.6	34.84	46.0	-11.16
125.00	47.60	160	1.2	V	12.30	0.59	28.3	32.19	43.5	-11.31
150.00	45.90	90	2	H	13.00	0.74	28.2	31.44	43.5	-12.06
150.00	44.30	0	1.2	V	13.00	0.74	28.2	29.84	43.5	-13.66
70.65	43.80	180	1.2	V	9.60	1.07	28.6	25.87	40.0	-14.13
300.00	43.90	180	1.2	V	13.90	1.33	27.3	31.83	46.0	-14.17
200.00	45.80	160	1.2	V	10.10	0.89	27.9	28.89	43.5	-14.61
125.00	43.70	180	2	H	12.30	0.59	28.3	28.29	43.5	-15.21