FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

AMBIT Microsystems Corporation

4-1, Ming Shen Street, Tu Chen Industrial District.
Tu Chen, Taipei Hsien 236, Taiwan, R.O.C.

FCC ID: MCLT60H42400

July 12, 2002

This Report Concerns:	**Equipment Type:**
☒ Modificationl Report	MiniPCI IIIB Wireless LAN Card

Test Engineer:	Jeff Lee
Report No.:	R0206242-8
Test Date:	July 3, 2002
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *AMBIT Microsystems Corporation*'s Model: *T60H424* or the "EUT" as referred to in this report is a MINIPCI IIIB Wireless LAN Card.

The EUT is complied with IEEE 80211b 11 Mbps Standard. The WLAN application is implemented via a RF module. This RF module is developed for Wireless LAN application complied with IEEE 802.11b 11Mbps standard in ISM band. It can be used to provide a variety of low-cost wireless network interfaces to build your wireless connection via simply SMT procedure to speed the time to market. Three Intersil's chips are implemented in the RF module including ISL3985, HFA3783.

The EUT has the following functions:

- Compatible with IEEE 802.11b high rate standard to provide wireless Ethernet speeds of 11Mbps data rate
- Dynamic data rate switching with 11, 5.5, 2, and 1 Mbps
- Allows auto fallback data rate for optimized reliability, throughput and transmission range
- Supports wireless data encryption with 64/128-bit WEP standard for security
- Dual diversity antenna connectors supported for the multi-path environment
- Drivers supports Windows 95, 98, 98SE, NT, ME, 2000, Win XP.

He manufacture did not modify the EUT. But per its customer's request, the manufacturer installed the EUT in the Sony laptop. Four sets of antennas as listed hereinafter were tested separately for the Sony laptop during the final test configuration:

- Antenna Type A, L0 & R0
- Antenna Type B, L1 & R1
- Antenna Type C, C1 & C2
- Sharp Antenna

The application of different antennas will affect the radio frequency and RF output power. The test report covers the parameters likely to be affected by the above description.

** The test data in this test report was good for the test sample only. It may have deviation for other test samples.*

1.2 Objective

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

The objective of the manufacturer is to demonstrate compliance with FCC rules for Output Power, Antenna Requirement, RF Exposure Limit, Conducted and Spurious Radiated Emission.

1.3 Related Submittal(s)/Grant(s)

The device has been originally approved on 4/15/02.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, 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 Corporation. 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 Bay Area Compliance Laboratory Corporation 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 Bay Area Compliance Laboratory Corporation 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 C63.4-2000.

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, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/02
HP	Spectrum Analyzer	8593B	2919A00242	12/20/02
HP	Amplifier	8349B	2644A02662	12/20/02
HP	Quasi-Peak Adapter	85650A	917059	12/6/02
HP	Amplifier	8447E	1937A01046	12/6/02
A.H. System	Horn Antenna	SAS0200/571	261	12/27/02
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/02
Com-Power	Biconical Antenna	AB-100	14012	11/2/02
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/02
Com-Power	LISN	LI-200	12208	12/20/02
Com-Power	LISN	LI-200	12005	12/20/02
BACL	Data Entry Software	DES1	0001	12/20/02

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Sony	Motherboard	None	None	DoC
Samsung	LCD	LIN141XF	None	DoC
SONY	3.5” Floppy Drive	MPF920-F	None	DoC
Sony	Power Adapter	PCGA-AC19V4	003A0000372	DoC
Toshiba	Hard Drive	None	None	DoC
LG	CD-Rom	LG-242	None	DoC

1.8 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
SONY	Notebook PC	IRX-2230 JA	2230DVT10000136	DoC
Citizen	Printer	LSP-10	5047999-82	DLK66TLSP-10
EVERX	Modem	EV-945	N/A	E3E5UVEV-945

1.9 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Serial Cable	1.5	Serial Port/Host	Modem
Shielded Printer Cable	2.0	Parallel Port/Host	Printer

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing in a typical fashion (as a normally used by a typical user).

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 in a manner similar to a typical use. The test software, terminal.exe, provided by the customer, is started the Windows 98 terminal program under the Windows 98 operating system. Once loaded, the program sequentially exercises each system component.

The sequence used is as follows:

1. Lines of Hs scroll across the notebook monitor.
2. The modem(s) receives Hs.
3. The printer output Hs.

This process is continuous throughout all tests.

2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied by INMAC and their respective support equipment manufacturers. The host pc and other peripherals featured shielded metal connectors.

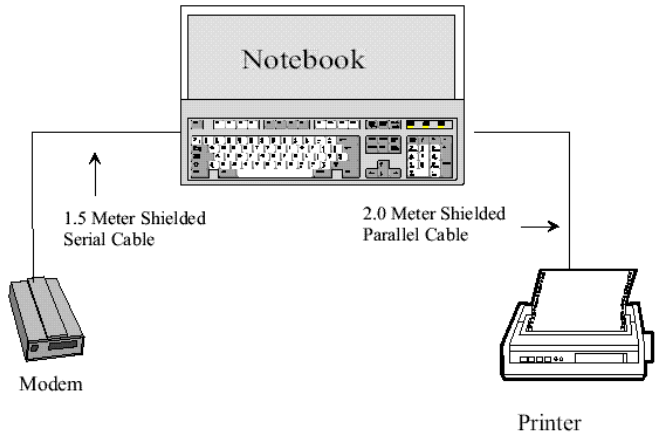
2.4 Schematics / Block Diagram

No difference from the original ones.

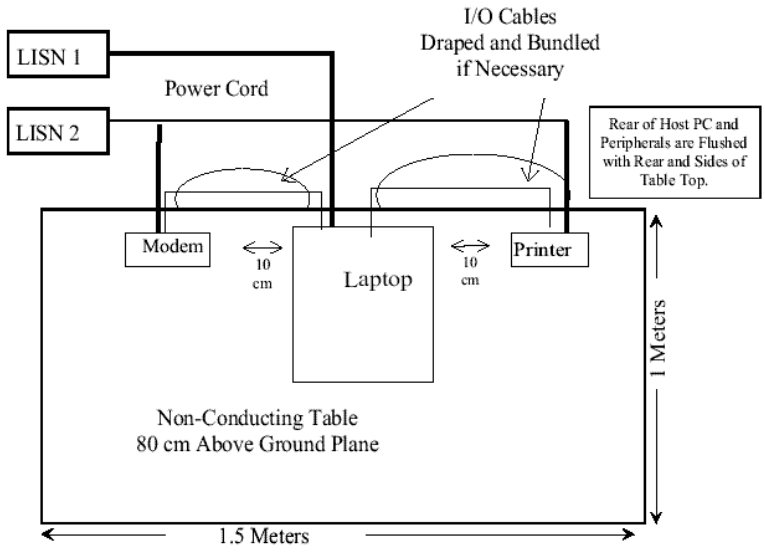
2.5 Equipment Modifications

No modifications were made by BACL Corporation to ensure the EUT to comply with the applicable limits and requirements.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	Reference
§ 15.205	Restricted Bands	Compliant	Section 5
§ 2.1091 §15.247 (b) (4)	RF Safety Requirements	Compliant	Section 8
§15.203	Antenna Requirement	Compliant	Section 7
§15.207 (a)	Conducted Emission	Compliant	Section 6
§15.209 (a)	Radiated Emission	Compliant	Section 5
§15.247 (b) (2)	Peak Output Power	Compliant	Section 4

Compliance Statement:

Bay Area Compliance Laboratory States that according to test result recorded in this type approval test report, the device was found still compliant with the suitable and applicable standards and limits. Please see Exhibit D - Block diagram / Schematics for further investigation.

4 - PEAK OUTPUT POWER MEASUREMENT

4.1 Standard Applicable

According to §15.247(b) (2), for all direct sequence systems, the maximum peak output power of the intentional radiator shall not exceed 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 power meter.

4.3 Measurement Result

Please refer to the attached pictures for more information.

Frequency	Output Power in dBm	Output Power in mW	Standard	Result
Type A, L0				
Low	13.69	23.39	≤ 1W	Compliant
Middle	13.67	23.28	≤ 1W	Compliant
High	13.64	23.12	≤ 1W	Compliant
Type A, R0				
Low	13.74	23.66	≤ 1W	Compliant
Middle	13.71	23.50	≤ 1W	Compliant
High	13.68	23.33	≤ 1W	Compliant
Type B, L1				
Low	13.62	23.01	≤ 1W	Compliant
Middle	13.60	22.91	≤ 1W	Compliant
High	13.56	22.70	≤ 1W	Compliant
Type B, R1				
Low	13.72	23.55	≤ 1W	Compliant
Middle	13.96	24.89	≤ 1W	Compliant
High	13.94	24.77	≤ 1W	Compliant
Type C, C2				
Low	13.60	22.91	≤ 1W	Compliant
Middle	13.57	22.75	≤ 1W	Compliant
High	13.54	22.59	≤ 1W	Compliant
Type C, C2				
Low	13.91	24.60	≤ 1W	Compliant
Middle	13.90	24.55	≤ 1W	Compliant
High	13.67	23.28	≤ 1W	Compliant
Sharp, Left				
Low	13.52	22.49	≤ 1W	Compliant
Middle	13.49	22.34	≤ 1W	Compliant
High	13.48	22.28	≤ 1W	Compliant
Sharp, Right				
Low	13.66	23.23	≤ 1W	Compliant
Middle	13.66	23.23	≤ 1W	Compliant
High	13.90	24.55	≤ 1W	Compliant

4.4 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
Agilent	E4419b	GB40202891	4/8/03
Agilent	E4412a	US38486529	4/8/03

Type A, L0


Agilent
13.69dBm
CHANNEL


Agilent
13.67dBm
CHANNEL


Agilent
13.64dBm
CHANNEL

Type A, R0

Type B, L1

Type B, R1

Type C, C1

Type C, C2

Sharp Antenna, Left

Sharp Antenna, Right

5 - RADIATED EMISSION

5.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. 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.

5.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2000. The specification used was the FCC 15 Subpart C limits.

The EUT was installed in the laptop. The laptop notebook was placed on the center of the back edge on the test table. The modem was placed on the one side of the laptop while the printer was on the other side. The rear of the laptop and peripherals were placed flushed with the rear of the tabletop.

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.

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

5.3 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:

Start Frequency	30 MHz
Stop Frequency	25GHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

5.4 Test Procedure

For the radiated emissions test, the Host PC system and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is 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.

5.5 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

5.6 Summary of Test Results

According to the data in section 11.7, 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:

Type A Antenna, 30 to 25000MHz, 3 meters

-2.5 (AVG) dBμV at 4824.00 MHz in the Vertical polarization, Low Channel
-1.3 (AVG) dBμV at 4884.00 MHz in the Vertical polarization, Mid Channel
-4.3 (AVG) dBμV at 4944.00 MHz in the Vertical polarization, High Channel

Type B Antenna, 30 to 25000MHz, 3 meters

-10.1 (AVG) dBμV at 4824.00 MHz in the Vertical polarization, Low Channel
-8.6 (AVG) dBμV at 4884.00 MHz in the Vertical polarization, Mid Channel
-11.3 (AVG) dBμV at 4944.00 MHz in the Vertical polarization, High Channel

Type C Antenna, 30 to 25000MHz, 3 meters

-11.2 (AVG) dBμV at 4824.00 MHz in the Vertical polarization, Low Channel
-10.2 (AVG) dBμV at 4884.00 MHz in the Vertical polarization, Mid Channel
-12.5 (AVG) dBμV at 4944.00 MHz in the Vertical polarization, High Channel

Sharp Antenna, 30 to 25000MHz, 3 meters

-1.0 (AVG) dBμV at 4824.00 MHz in the Vertical polarization, Low Channel
-1.7 (AVG) dBμV at 4884.00 MHz in the Vertical polarization, Mid Channel
-1.6 (AVG) dBμV at 4944.00 MHz in the Vertical polarization, High Channel

Type A, 30 to 25000MHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
4824.00	44.1	180	1.2	V	32.5	4.9	30.0	51.5	54	-2.5	AVG
4824.00	37.6	270	1.0	H	32.5	4.9	30.0	45.0	54	-9.0	AVG
264.07	48.5	135	1.2	H	13.3	4.9	25.0	41.7	46	-4.3	/
791.99	39.7	180	1.4	H	23.0	3.7	25.0	41.4	46	-4.6	/
527.99	40.7	90	1.0	H	19.8	2.9	25.0	38.4	46	-7.6	/
44.06	42.9	270	1.8	V	12.1	0.7	25.0	30.7	40	-9.3	/
308.00	41.8	135	1.0	H	15.1	4.6	25.0	36.5	46	-9.5	/
131.99	42.7	135	1.2	V	12.6	2.0	25.0	32.3	43.5	-11.2	/
Middle Channel											
4884.00	45.3	270	1.2	V	32.5	4.9	30.0	52.7	54	-1.3	AVG
4874.00	35.7	45	1.5	H	32.5	4.9	30.0	43.1	54	-10.9	AVG
264.07	48.5	135	1.2	H	13.3	4.9	25.0	41.7	46	-4.3	/
791.99	39.7	180	1.4	H	23.0	3.7	25.0	41.4	46	-4.6	/
527.99	40.7	90	1.0	H	19.8	2.9	25.0	38.4	46	-7.6	/
44.06	42.9	270	1.8	V	12.1	0.7	25.0	30.7	40	-9.3	/
308.00	41.8	135	1.0	H	15.1	4.6	25.0	36.5	46	-9.5	/
131.99	42.7	135	1.2	V	12.6	2.0	25.0	32.3	43.5	-11.2	/
High Channel											
4944.00	42.3	180	1.0	V	32.5	4.9	30.0	49.7	54	-4.3	AVG
4944.00	29.3	225	1.2	H	32.5	4.9	30.0	36.7	54	-17.3	AVG
264.07	48.5	135	1.2	H	13.3	4.9	25.0	41.7	46	-4.3	/
791.99	39.7	180	1.4	H	23.0	3.7	25.0	41.4	46	-4.6	/
527.99	40.7	90	1.0	H	19.8	2.9	25.0	38.4	46	-7.6	/
44.06	42.9	270	1.8	V	12.1	0.7	25.0	30.7	40	-9.3	/
308.00	41.8	135	1.0	H	15.1	4.6	25.0	36.5	46	-9.5	/
131.99	42.7	135	1.2	V	12.6	2.0	25.0	32.3	43.5	-11.2	/

* There was no apparent emission after 2nd harmonics.

Type B, 30 to 25000MHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
4824.00	36.5	0	1.0	V	32.5	4.9	30.0	43.9	54	-10.1	AVG
4824.00	30.4	45	1.0	H	32.5	4.9	30.0	37.8	54	-16.2	AVG
264.03	48.8	135	1.3	H	13.3	4.9	25.0	42.0	46	-4.0	/
572.00	38.4	135	1.8	H	20.1	3.4	25.0	36.9	46	-9.1	/
43.98	43.1	135	1.2	V	12.1	0.7	25.0	30.9	40	-9.1	/
307.99	42.0	90	1.2	H	15.1	4.6	25.0	36.7	46	-9.3	/
132.00	42.6	270	1.2	V	12.6	2.0	25.0	32.2	43.5	-11.3	/
439.99	36.4	270	1.6	H	17.5	2.9	25.0	31.8	46	-14.2	/
Middle Channel											
4884.00	38.0	225	1.6	H	32.5	4.9	30.0	45.4	54	-8.6	AVG
4884.00	36.2	360	1.7	V	32.5	4.9	30.0	43.6	54	-10.4	AVG
264.03	48.8	135	1.3	H	13.3	4.9	25.0	42.0	46	-4.0	/
572.00	38.4	135	1.8	H	20.1	3.4	25.0	36.9	46	-9.1	/
43.98	43.1	135	1.2	V	12.1	0.7	25.0	30.9	40	-9.1	/
307.99	42.0	90	1.2	H	15.1	4.6	25.0	36.7	46	-9.3	/
132.00	42.6	270	1.2	V	12.6	2.0	25.0	32.2	43.5	-11.3	/
439.99	36.4	270	1.6	H	17.5	2.9	25.0	31.8	46	-14.2	/
High Channel											
4944.00	35.3	180	1.6	V	32.5	4.9	30.0	42.7	54	-11.3	AVG
4944.00	30.3	90	1.6	H	32.5	4.9	30.0	37.7	54	-16.3	AVG
264.03	48.8	135	1.3	H	13.3	4.9	25.0	42.0	46	-4.0	/
572.00	38.4	135	1.8	H	20.1	3.4	25.0	36.9	46	-9.1	/
43.98	43.1	135	1.2	V	12.1	0.7	25.0	30.9	40	-9.1	/
307.99	42.0	90	1.2	H	15.1	4.6	25.0	36.7	46	-9.3	/
132.00	42.6	270	1.2	V	12.6	2.0	25.0	32.2	43.5	-11.3	/
439.99	36.4	270	1.6	H	17.5	2.9	25.0	31.8	46	-14.2	/

* There was no apparent emission after 2nd harmonics.

Type C, 30 to 25000MHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
4824.00	35.4	90	1.6	V	32.5	4.9	30.0	42.8	54	-11.2	AVG
4824.00	30.2	45	1.5	H	32.5	4.9	30.0	37.6	54	-16.4	AVG
44.00	44.7	45	1.0	V	12.1	0.7	25.0	32.5	40	-7.5	/
264.02	45.0	45	1.3	H	13.3	4.9	25.0	38.2	46	-7.8	/
352.02	42.1	315	1.5	H	15.5	4.3	25.0	36.9	46	-9.1	/
308.02	41.9	225	1.8	H	15.1	4.6	25.0	36.6	46	-9.4	/
835.99	32.9	315	1.0	H	22.6	2.5	25.0	33.0	46	-13.0	/
132.00	40.0	180	1.3	V	12.6	2.0	25.0	29.6	43.5	-13.9	/
Middle Channel											
4884.00	36.4	180	1.5	V	32.5	4.9	30.0	43.8	54	-10.2	AVG
4884.00	31.9	45	1.2	H	32.5	4.9	30.0	39.3	54	-14.7	AVG
44.00	44.7	45	1.0	V	12.1	0.7	25.0	32.5	40	-7.5	/
264.02	45.0	45	1.3	H	13.3	4.9	25.0	38.2	46	-7.8	/
352.02	42.1	315	1.5	H	15.5	4.3	25.0	36.9	46	-9.1	/
308.02	41.9	225	1.8	H	15.1	4.6	25.0	36.6	46	-9.4	/
835.99	32.9	315	1.0	H	22.6	2.5	25.0	33.0	46	-13.0	/
132.00	40.0	180	1.3	V	12.6	2.0	25.0	29.6	43.5	-13.9	/
High Channel											
4944.00	34.1	0	1.5	V	32.5	4.9	30.0	41.5	54	-12.5	AVG
4944.00	30.2	225	1.5	H	32.5	4.9	30.0	37.6	54	-16.4	AVG
44.00	44.7	45	1.0	V	12.1	0.7	25.0	32.5	40	-7.5	/
264.02	45.0	45	1.3	H	13.3	4.9	25.0	38.2	46	-7.8	/
352.02	42.1	315	1.5	H	15.5	4.3	25.0	36.9	46	-9.1	/
308.02	41.9	225	1.8	H	15.1	4.6	25.0	36.6	46	-9.4	/
835.99	32.9	315	1.0	H	22.6	2.5	25.0	33.0	46	-13.0	/
132.00	40.0	180	1.3	V	12.6	2.0	25.0	29.6	43.5	-13.9	/

* There was no apparent emission after 2nd harmonics.

Sharp Antenna, 30 to 25000MHz, 3 meters

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Freqency	Ampl.	Direction	Height	Polar	Antenna	Cable Loss	Amp.	Corr. Ampl.	Limit	Margin	Mode
MHz	dBμV/m	Degree	Meter	H/V	dBμV/m	dBμV/m	dB	dBμV/m	dBμV/m	dB	
Low Channel											
4824.00	45.6	135	1.5	V	32.5	4.9	30.0	53.0	54	-1.0	AVG
4824.00	40.5	180	1.0	H	32.5	4.9	30.0	47.9	54	-6.1	AVG
924.01	39.8	45	1.2	H	24.7	4.4	25.0	43.9	46	-2.1	/
44.02	45.5	225	1.2	V	12.1	0.7	25.0	33.3	40	-6.7	/
351.99	43.8	135	1.5	H	15.5	4.3	25.0	38.6	46	-7.4	/
264.08	44.8	90	1.5	H	13.3	4.9	25.0	38.0	46	-8.0	/
572.00	35.3	135	1.3	H	20.1	3.4	25.0	33.8	46	-12.2	/
132.01	39.3	135	1.5	V	12.6	2.0	25.0	28.9	43.5	-14.6	/
Middle Channel											
4884.00	44.9	135	1.0	V	32.5	4.9	30.0	52.3	54	-1.7	AVG
4874.00	42.6	270	1.4	H	32.5	4.9	30.0	50.0	54	-4.0	AVG
924.01	39.8	45	1.2	H	24.7	4.4	25.0	43.9	46	-2.1	/
44.02	45.5	225	1.2	V	12.1	0.7	25.0	33.3	40	-6.7	/
351.99	43.8	135	1.5	H	15.5	4.3	25.0	38.6	46	-7.4	/
264.08	44.8	90	1.5	H	13.3	4.9	25.0	38.0	46	-8.0	/
572.00	35.3	135	1.3	H	20.1	3.4	25.0	33.8	46	-12.2	/
132.01	39.3	135	1.5	V	12.6	2.0	25.0	28.9	43.5	-14.6	/
High Channel											
4974.00	45.0	135	1.5	V	32.5	4.9	30.0	52.4	54	-1.6	AVG
4974.00	44.5	90	1.2	H	32.5	4.9	30.0	51.9	54	-2.1	AVG
924.01	39.8	45	1.2	H	24.7	4.4	25.0	43.9	46	-2.1	/
44.02	45.5	225	1.2	V	12.1	0.7	25.0	33.3	40	-6.7	/
351.99	43.8	135	1.5	H	15.5	4.3	25.0	38.6	46	-7.4	/
264.08	44.8	90	1.5	H	13.3	4.9	25.0	38.0	46	-8.0	/
572.00	35.3	135	1.3	H	20.1	3.4	25.0	33.8	46	-12.2	/
132.01	39.3	135	1.5	V	12.6	2.0	25.0	28.9	43.5	-14.6	/

* There was no apparent emission after 2nd harmonics.

6 - CONDUCTED EMISSION

6.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. 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.

6.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4-2000 measurement procedure. The specification used was FCC 15 Subpart C limits.

The EUT was installed in the laptop. The laptop notebook was placed on the center of the back edge on the test table. The modem was placed on the one side of the laptop while the printer was on the other side. The rear of the laptop and peripherals were placed flushed with the rear of the tabletop.

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.

The host PC system was connected with 110 Vac/60Hz power source.

6.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conduction test:

Start Frequency	450 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

6.4 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 dBμV of specification limits). Quasi-peak readings are distinguished with a "**Qp**".

6.5 Summary of Test Results

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

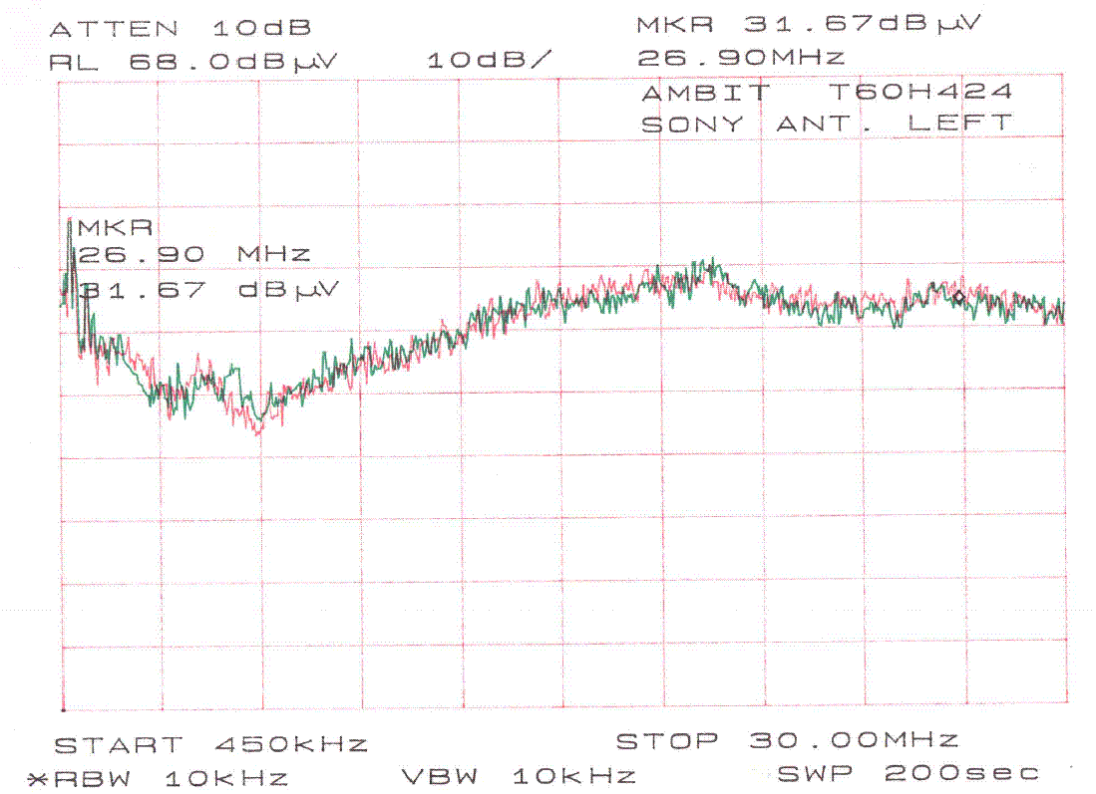
-2.7 dBμV at 0.694 MHz in the Neutral mode, 450kHz~30MHz

6.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dBμV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBμV	Margin dB
0.694	45.3	QP	Neutral	48	-2.7
0.587	43.6	QP	Line	48	-4.4
19.710	39.4	QP	Neutral	48	-8.6
20.120	38.1	QP	Line	48	-9.9
26.700	37.7	QP	Neutral	48	-10.3
27.150	36.9	QP	Line	48	-11.1

6.7 Plot of Conducted Emissions Test Data

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



7 - ANTENNA REQUIREMENT

7.1 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.

7.2 Antenna Connected Construction

The directional gain of antenna used for transmitting is 2 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see Exhibit C for details.

8 - 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 Maximum Permissive Exposure (MPE)

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
1500-15000	/	/	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: 13.96 (dBm)
Maximum peak output power at antenna input terminal: 24.89 (mW)
Antenna Gain (typical): 2 (dBi)
Maximum antenna gain: 1.58 (numeric)
Prediction distance: 20 (cm)
Predication frequency: 2400 (MHz)
MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm^2)
Power density at predication frequency: 0.008 (mW/cm^2)
Maximum allowable antenna gain: 201.86 (dBm)
Maximum allowable antenna gain: 23.05 (dBi)

Test Result

The predicted power density level at 20 cm is 0.008mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2400 MHz.

This radio is intended to be installed in laptop PC only and is thus classed as mobile equipment.