

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: MCLT60H563

July 9, 2002

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Bluetooth and 802.11b Combo Module
Test Engineer: Benjamin Jing	
Report No.: R0206174	
Test Date: June 24, 2002	
Reviewed By: Jeff Lee	
Prepared By: Bay Area Compliance Laboratory Corporation 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164	

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TABLE OF CONTENTS

1 - GENERAL INFORMATION.....4

1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)4

1.2 OBJECTIVE5

1.3 RELATED SUBMITTAL(S)/GRANT(S).....5

1.4 TEST METHODOLOGY5

1.5 TEST FACILITY6

1.6 TEST EQUIPMENT LIST6

1.7 HOST SYSTEM CONFIGURATION LIST AND DETAILS7

1.8 SUPPORT EQUIPMENT LIST AND DETAILS7

1.9 EXTERNAL I/O CABLING LIST AND DETAILS7

2 - SYSTEM TEST CONFIGURATION.....8

2.1 JUSTIFICATION8

2.2 EUT EXERCISE SOFTWARE8

2.3 SPECIAL ACCESSORIES8

2.4 SCHEMATICS / BLOCK DIAGRAM8

2.5 EQUIPMENT MODIFICATIONS8

2.6 CONFIGURATION OF TEST SYSTEM.....9

2.7 TEST SETUP BLOCK DIAGRAM9

3 - SUMMARY OF TEST RESULTS.....10

4 - MAXIMUM PEAK OUTPUT POWER.....11

4.1 STANDARD APPLICABLE11

4.2 MEASUREMENT PROCEDURE.....11

4.3 TEST EQUIPMENT11

4.4 MEASUREMENT RESULT11

4.5 PLOT OF MAXIMUM PEAK OUTPUT POWER.....11

5 - CHANNEL BANDWIDTH12

5.1 STANDARD APPLICABLE12

5.2 MEASUREMENT PROCEDURE.....12

5.3 MEASUREMENT RESULT12

5.4 PLOT OF CHANNEL BANDWIDTH12

6 - NUMBER OF HOPPING FREQUENCY USED13

6.1 STANDARD APPLICABLE13

6.2 MEASUREMENT PROCEDURE.....13

6.3 MEASUREMENT PROCEDURE.....13

6.4 PLOTS OF NUMBER OF HOPPING FREQUENCY13

7 - HOPPING CHANNEL SEPARATION14

7.1 STANDARD APPLICABLE14

7.2 MEASUREMENT PROCEDURE.....14

7.3 MEASUREMENT RESULTS.....14

7.4 PLOTS OF HOPPING CHANNEL SEPARATION14

8 - 100 KHZ BANDWIDTH OF BAND EDGES15

8.1 STANDARD APPLICABLE15

8.2 MEASUREMENT PROCEDURE.....15

8.3 MEASUREMENT RESULTS.....15

8.4 PLOTS OF 100KHZ BANDWIDTH OF BAND EDGE15

9 - DWELL TIME16

9.1 STANDARD APPLICABLE16

9.2 MEASUREMENT PROCEDURE.....16

9.3 MEASUREMENT RESULTS.....16

9.4 PLOTS OF DWELL TIME16

10 - SPURIOUS EMISSION.....17
 10.1 STANDARD APPLICABLE 17
 10.2 MEASUREMENT PROCEDURE..... 17
 10.3 MEASUREMENT RESULTS..... 17

11 - PEAK POWER SPECTRAL DENSITY18
 11.1 STANDARD APPLICABLE 18
 11.2 MEASUREMENT PROCEDURE..... 18
 11.3 MEASUREMENT RESULTS..... 18

12 - RADIATED EMISSION.....19
 12.1 MEASUREMENT UNCERTAINTY 19
 12.2 TEST SETUP..... 19
 12.3 SPECTRUM ANALYZER SETUP 19
 12.4 TEST PROCEDURE 20
 12.5 CORRECTED AMPLITUDE & MARGIN CALCULATION 20
 12.6 SUMMARY OF TEST RESULTS 21
 12.7 RADIATED EMISSION TEST DATA..... 22

13 - CONDUCTED EMISSION30
 13.1 MEASUREMENT UNCERTAINTY 30
 13.2 TEST SETUP..... 30
 13.3 SPECTRUM ANALYZER SETUP 30
 13.4 TEST PROCEDURE 30
 13.5 SUMMARY OF TEST RESULTS 31
 13.6 CONDUCTED EMISSIONS TEST DATA 31
 13.7 PLOT OF CONDUCTED EMISSIONS TEST DATA 31

14 - ANTENNA REQUIREMENT.....32

15 - RF EXPOSURE.....33

EXHIBIT A - FCC ID LABEL INFORMATION34

EXHIBIT B - TEST SETUP PHOTOGRAPHS35

EXHIBIT C - EUT EXTERNAL PHOTOGRAPHS.....36

EXHIBIT D - EUT INTERNAL PHOTOGRAPHS.....37

EXHIBIT E - BLOCK DIAGRAM.....38

EXHIBIT F - SCHEMATICS.....39

EXHIBIT G - OPERATIONAL DESCRIPTION40

EXHIBIT H - USERS MANUAL.....41

1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Applicant:	AMBIT Microsystems Corporation
Product:	Bluetooth and 802.11b Combo Module
Model Name:	T60H563
Dimension:	2.4”L x 1.7” M
FCC ID:	MCLT60H563
Peak Output Power:	Bluetooth: 3.33dBm (2.15mW) 802.11b: 12.14dBm (16.37mW)
Frequency Range:	2.4 ~2.483GHz
Power Supply:	Fed by Notebook
Applicable Standard:	FCC Part 15.247

KT1, KT3, KT5, KT6 and KT7 were the different laptop notebook used during the final testing. The detailed model names listed below:

- *KT1 (Tornado 3.0), HP Omnibook XE4000 Series, HP Pavilion ZE4000 Series, Pavilion XT Series, Regulatory model number: CRVSA-02T1-60*
- *KT3 (Tornado 2.0), HP Omnibook XE4000 Series, HP Pavilion ZE4000 Series, Pavilion XT Series Regulatory model number: CRVSA-02T1-75*
- *KT5 (Tornado 4.0), HP Omnibook XE4000 Series, HP Pavilion ZE4000 Series, Pavilion XT Series Regulatory model number: CRVSA-02T1-75*
- *KT6 (Tornado 5.0), HP Omnibook XE4000 Series, HP Pavilion ZE5000 Series, Pavilion XT Series Regulatory model number: CRVSA-02T1-90*
- *KT7, HP Omnibook XE4000 Series, HP Pavilion ZE4000, Pavilion XT Series Regulatory model number: CRVSA-02T1-75*

In the report there will be separate test data for these two groups as applicable.

** The test data was good for test sample only. It may have deviation for other product 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 C108.8 & RSS-210 rules for the bluetooth transmitter:

- Maximum Peak Output Power
- Hopping Channel Separation
- Number of Hopping Frequency Used
- 20 dB Bandwidth
- Dwell Time on Each Channel
- 100 kHz Bandwidth of Band Edge
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement
- RF Exposure Limit

The objective of the manufacturer is to demonstrate compliance with C108.8 & RSS-210 rules for the 802.11b transmitter:

- Maximum Peak Output Power
- 20 dB Bandwidth
- 100 kHz Bandwidth of Band Edge
- Peak Power Density
- Conducted Emission
- Spurious Emission
- Radiated Emission
- Antenna Requirement
- RF Exposure Limit

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, 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, 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 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: 2002, and AS/NZS CISPR 22: 2002: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List

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
Intel	Motherboard	None	None	DoC
Samsung	LCD	LIN141XF	None	DoC
SONY	3.5" Floppy Drive	MPF920-F	None	DoC
Liteon	Power Supply	PA-1750-11	21104338CB	DoC
Toshiba	Hard Drive	None	None	DoC
QSI	CD-Rom	SCR-242	None	DoC

1.8 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
HP	Notebook PC	KT1	ZE4000 Series	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/Laptop	Modem
Shielded Printer Cable	2.0	Parallel Port/Laptop	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.

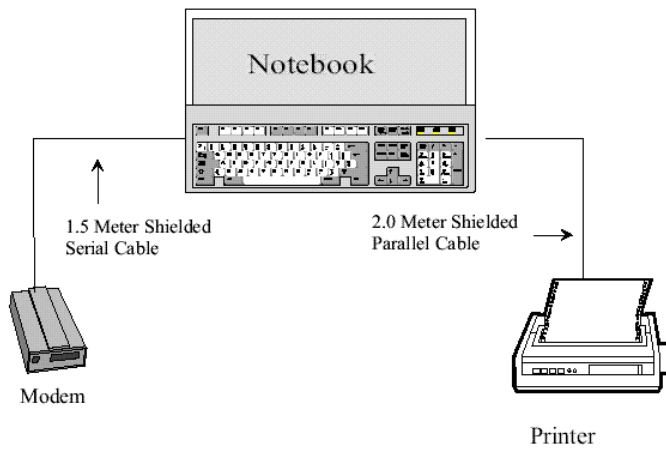
2.4 Schematics / Block Diagram

Please refer to Exhibit D.

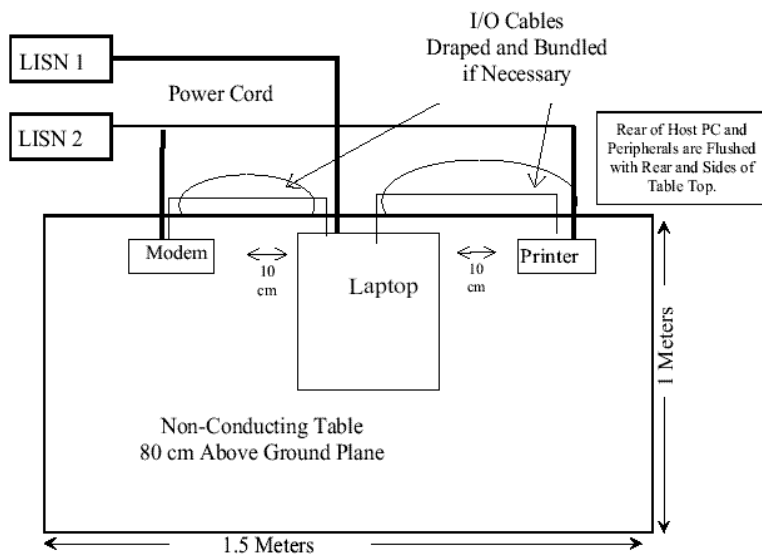
2.5 Equipment Modifications

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
General Requirements			
§ 2.1091	RF Safety Requirements	Compliant	Section 16 Exhibit H
§15.203	Antenna Requirement	Compliant	Section 14 Appendix I
§15.207 (a)	Conducted Emission	Compliant	Section 13
Bluetooth Transmitter			
§ 15.205	Restricted Bands	Compliant	Section 10
§15.247 (a) (1) (i)	Number of Hopping Frequencies Used	Compliant	Section 6 Appendix C
§15.209 (a)	Radiated Emission	Compliant	Section 12
§15.209 (f)	Spurious Emission	Compliant	Section 10 Appendix G
§15.247 (a) (1)	Hopping Channel Separation	Compliant	Section 7 Appendix D
§15.247 (a) (1) (i)	Dwell Time of Each Frequency within a 10 Second Period	Compliant	Section 9 Appendix F
§15.247 (a) (1) (ii)	20dB Bandwidth	Compliant	Section 5 Appendix B
§15.247 (b) (2)	Maximum Peak Output Power	Compliant	Section 4 Appendix A
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant	Section 8 Appendix E
§ 15.247 (g)	Full and complete compliance with applicable requirements for FHSS. Compliance with the definition of frequency hopping system, distribute transmission over minimum number of hopping channel	Compliant	Exhibit G Exhibit H
§ 15.247 (h)	Limitation on avoidance on hopping on occupied channel	Compliant	Exhibit G Exhibit H
802.11b Transmitter			
§15.209 (a)	Radiated Emission	Compliant	Section 12
§15.209 (f)	Spurious Emission	Compliant	Section 10 Appendix G
§15.247 (a) (2)	6 dB Bandwidth	Compliant	Section 5 Appendix B
§15.247 (b) (2)	Maximum Peak Output Power	Compliant	Section 4 Appendix A
§ 15.247 (c)	100 kHz Bandwidth of Frequency Band Edge	Compliant	Section 8 Appendix E
§15.247 (d)	Peak Power Spectral Density	Compliant	Section 11 Appendix H

4 - MAXIMUM PEAK OUTPUT POWER

4.1 Standard Applicable

According to §15.247(b) (1), for frequency hopping systems in the 2400-2483.5MHz band employing at least 75 hopping channels, and all direct sequence systems, the maximum peak output power of the transmitter 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 spectrum analyzer (power meter).

4.3 Test Equipment

Manufacturer	Model No.	Serial No.	Calibration Due Date
Agilent	E4419B	GB40202891	4/8/03
Agilent	E4412A	US38486529	4/8/03

4.4 Measurement Result

Antenna	Frequency	Output Power in dBm	Output Power in mW	Standard	Result
Bluetooth Transmitter					
Master	Low	3.17	2.07	≤ 1W	Compliant
Master	Middle	3.17	2.07	≤ 1W	Compliant
Master	High	3.00	2.00	≤ 1W	Compliant
Accessory	Low	3.17	2.07	≤ 1W	Compliant
Accessory	Middle	3.33	2.15	≤ 1W	Compliant
Accessory	High	3.17	2.07	≤ 1W	Compliant
802.11b Transmitter					
Left	Low	11.05	12.74	≤ 1W	Compliant
Left	Middle	11.40	13.80	≤ 1W	Compliant
Left	High	11.21	13.21	≤ 1W	Compliant
Right	Low	12.14	16.37	≤ 1W	Compliant
Right	Middle	12.08	16.14	≤ 1W	Compliant
Right	High	11.58	14.39	≤ 1W	Compliant

4.5 Plot of Maximum Peak Output Power

Refer to Appendix A.

5 - CHANNEL BANDWIDTH

5.1 Standard Applicable

According to §15.247(a)(1)(ii), the maximum 20dB bandwidth of the hopping channel is 1MHz.

According to §15.247(a)(2), for direct sequence systems, 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 Measurement Result

Antenna	Frequency	Measurement	Standard	Result
20 dB Bandwidth of Bluetooth Transmitter				
Master	Low	658kHz	≤ 1MHz	Compliant
Master	Middle	617kHz	≤ 1MHz	Compliant
Master	High	658kHz	≤ 1MHz	Compliant
Accessory	Low	650kHz	≤ 1MHz	Compliant
Accessory	Middle	642kHz	≤ 1MHz	Compliant
Accessory	High	658kHz	≤ 1MHz	Compliant
6dB Bandwidth of 802.11b Transmitter				
Left	Low	10.33MHz	≥ 500kHz	Compliant
Left	Middle	10.42MHz	≥ 500kHz	Compliant
Left	High	10.33MHz	≥ 500kHz	Compliant
Right	Low	10.17MHz	≥ 500kHz	Compliant
Right	Middle	10.25MHz	≥ 500kHz	Compliant
Right	High	10.08MHz	≥ 500kHz	Compliant

5.4 Plot of Channel Bandwidth

Please refer to Appendix B.

6 - NUMBER OF HOPPING FREQUENCY USED

6.1 Standard Applicable

According to §15.247(a)(1)(ii), frequency hopping systems operating in the 2400-2483.5Mhz band shall use at least 75 hopping frequencies.

6.2 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 hopping 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.

6.3 Measurement Procedure

Antenna	Measurement	Standard	Result
Master	79	75	Compliant
Accessory	79	75	Compliant

6.4 Plots of Number of Hopping Frequency

Please refer to the attached plots.

7 - HOPPING CHANNEL SEPARATION

7.1 Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

7.2 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 it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max-Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function, and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

7.3 Measurement Results

Antenna	Frequency	Measurement (kHz)	20dB Bandwidth (kHz)*	Result
Bluetooth Transmitter				
Master	Low	673	658	Compliant
Master	Middle	680	617	Compliant
Master	High	677	658	Compliant
Accessory	Low	670	650	Compliant
Accessory	Middle	680	642	Compliant
Accessory	High	673	658	Compliant

* The measured 20dB bandwidth was greater than 25kHz. So it was used as the factor to evaluate hopping channel separation.

7.4 Plots of Hopping Channel Separation

Please refer to Appendix D.

8 - 100 KHZ BANDWIDTH OF BAND EDGES

8.1 Standard Applicable

According to §15.247(c), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in §15.209(a) is not required.

8.2 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 300 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.

8.3 Measurement Results

Antenna	Frequency	Measurement	Standard	Result
Bluetooth Transmitter				
Master	Low	48.50	≥ 20dB	Compliant
Master	High	56.17	≥ 20dB	Compliant
Accessory	Low	50.33	≥ 20dB	Compliant
Accessory	High	55.83	≥ 20dB	Compliant
802.11b Transmitter				
Left	Low	40.17	≥ 20dB	Compliant
Left	High	53.17	≥ 20dB	Compliant
Right	Low	50.66	≥ 20dB	Compliant
Right	High	45.33	≥ 20dB	Compliant

8.4 Plots of 100kHz Bandwidth of Band Edge

Please refer to Appendix E.

9 - DWELL TIME

9.1 Standard Applicable

According to §15.247 (a)(1)(ii), for frequency hopping system operating in the 2400-2483.5MHz band, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

9.2 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 zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

9.3 Measurement Results

Sample calculation: In normal operation, there are 5 transmissions per 500mS. Therefore, the dwell time for each channel is:

Low Channel: $5 \times 0.425 \times 0.06 = 0.1275 \text{ s} < 0.4 \text{ s}$

Antenna	Frequency (MHz)	Measurement	Standard (seconds)	Result
Bluetooth Transmitter				
Master	Low	0.128	< 0.4	Compliant
Master	Middle	0.125	< 0.4	Compliant
Master	High	0.120	< 0.4	Compliant
Accessory	Low	0.125	< 0.4	Compliant
Accessory	Middle	0.030	< 0.4	Compliant
Accessory	High	0.120	< 0.4	Compliant

9.4 Plots of Dwell Time

Please refer to Appendix F.

10 - SPURIOUS EMISSION

10.1 Standard Applicable

According to §15.209 (f) and §15.33(a), in some cases the emissions from an intentional radiator must be measured to beyond the tenth harmonic of the highest fundamental frequency designed to be emitted by the intentional radiator because of the incorporation of a digital device. If measurements above the tenth harmonic are so required, the radiated emissions above the tenth harmonic shall comply with the general radiated emission limits applicable to the incorporated digital device, as shown in §15.109 and as based on the frequency of the emission being measured, or, except for emissions contained in the restricted frequency bands shown in §15.205, the limit on spurious emissions specified for the intentional radiator, whichever is the higher limit.

10.2 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.

10.3 Measurement Results

Please refer to Appendix G.

11 - PEAK POWER SPECTRAL DENSITY

11.1 Standard Applicable

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

11.2 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 zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Repeat above procedures until all frequencies measured were complete.

11.3 Measurement Results

Please refer to Appendix H.

12 - RADIATED EMISSION

12.1 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 ± 4.0 dB.

12.2 Test 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 was connected with 120Vac/60Hz power source.

12.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25000 MHz.

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

Start Frequency	30 MHz
Stop Frequency	25000 MHz
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

12.4 Test Procedure

For the radiated emissions test, both the laptop and all peripheral power cords were connected to the AC floor outlet since the power supply used in the laptop 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 $-4 \text{ dB}\mu\text{V}$ of specification limits), and are distinguished with a "Qp" in the data table.

12.5 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:

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

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

12.6 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:

Bluetooth Transmitter, KT1, Left Antenna, 30 to 25000MHz, 3 meters

-7.4 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-9.1 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-11.0 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

Bluetooth Transmitter, KT1, Right Antenna, 30 to 25000MHz, 3 meters

-7.4 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-7.0 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-9.9 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

Bluetooth, KT6, Left Antenna, 30 to 25000MHz, 3 meters

-7.4 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-9.1 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-11.0 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

Bluetooth Transmitter, KT6, Right Antenna, 30 to 25000MHz, 3 meters

-7.2 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-6.9 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-9.8 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

802.11b Transmitter, KT1, Left Antenna, 30 to 25000MHz, 3 meters

-7.2 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-7.5 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-10.1 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

802.11b Transmitter, KT1, Right Antenna, 30 to 25000MHz, 3 meters

-5.1 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-5.4 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-7.4 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

802.11b Transmitter, KT6, Left Antenna, 30 to 25000MHz, 3 meters

-7.4 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-7.0 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-10.2 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

802.11b Transmitter, KT6, Right Antenna, 30 to 25000MHz, 3 meters

-5.0 dB μ V at 4824.00 MHz (Avg.) in the Vertical polarization at Low Channel
-6.2 dB μ V at 4884 MHz (Avg.) in the Vertical polarization at Middle Channel
-7.5 dB μ V at 4944.00 MHz (Avg.) in the Vertical polarization at High Channel

12.7 Radiated Emission Test Data

Bluetooth Transmitter, KT1 Notebook, Left Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C		
	Ampl. dB μ V/m	Direction Degree		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	Mode
Low Channel											
4824.00	39.2	110	1.0	V	32.5	4.9	30.0	46.6	54	-7.4	AVG
7236.00	33.7	260	1.5	V	35.1	5.6	30.0	44.4	54	-9.6	AVG
4824.00	32.5	120	1.2	H	32.5	4.9	30.0	39.9	54	-14.1	AVG
7236.00	28.4	290	1.5	H	35.1	5.6	30.0	39.1	54	-14.9	AVG
257.03	32.4	220	1.2	V	13.1	3.0	25.0	23.5	46	-22.5	/
257.03	31.1	210	1.5	H	13.1	3.0	25.0	22.2	46	-23.8	/
245.35	31.6	45	1.5	V	12.6	2.3	25.0	21.5	46	-24.5	/
245.35	30.3	0	1.2	H	12.6	2.3	25.0	20.2	46	-25.8	/
Middle Channel											
4884.00	37.5	45	1.2	V	32.5	4.9	30.0	44.9	54	-9.1	AVG
4884.00	36.0	0	1.5	H	32.5	4.9	30.0	43.4	54	-10.6	AVG
7326.00	31.8	220	1.2	V	35.1	5.6	30.0	42.5	54	-11.5	AVG
7326.00	27.2	250	1.0	H	35.1	5.6	30.0	37.9	54	-16.1	AVG
351.17	31.5	60	1.2	V	15.5	4.3	25.0	26.3	46	-19.7	/
226.54	33.1	150	1.2	V	12.1	3.9	25.0	24.1	46	-21.9	/
226.54	32.4	180	1.0	H	12.1	3.9	25.0	23.4	46	-22.6	/
351.17	30.6	80	1.0	H	15.5	4.3	30.0	20.4	46	-25.6	/
High Channel											
4944.00	35.6	0	1.2	V	32.5	4.9	30.0	43.0	54	-11.0	AVG
7416.00	30.9	270	1.2	V	35.1	5.6	30.0	41.6	54	-12.4	AVG
4944.00	33.4	45	1.0	H	32.5	4.9	30.0	40.8	54	-13.2	AVG
7416.00	28.70	310	1.5	H	35.1	5.6	30.0	39.4	54	-14.6	AVG
213.62	32.5	170	1.2	V	12.5	4.7	25.0	24.7	43.5	-18.8	/
213.62	30.40	150	1.5	H	12.5	4.7	25.0	22.6	43.5	-20.9	/
332.57	31.2	200	1.0	V	15.0	2.6	25.0	23.8	46	-22.2	/
332.57	29.3	210	1.2	H	15.0	2.6	25.0	21.9	46	-24.1	/

Bluetooth, KT1 Notebook, Right Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBµV/m	Direction Degree		Polar H/V	Antenna dBµV/m	Cable Loss dBµV/m	Amp. dB	Corr. Ampl. dBµV/m	Limit dBµV/m	Margin dB	Mode	
Low Channel												
4824.00	39.2	90	1.0	V	32.5	4.9	30.0	46.6	54	-7.4	AVG	
4824.00	35.5	110	1.2	H	32.5	4.9	30.0	42.9	54	-11.1	AVG	
7236.00	31.2	180	1.0	V	35.1	5.6	31.0	40.9	54	-13.1	AVG	
7236.00	27.9	160	1.5	H	35.1	5.6	32.0	36.6	54	-17.4	AVG	
257.03	33.1	270	1.2	V	13.1	3.0	25.0	24.2	46	-21.8	/	
257.03	32.7	230	1.5	H	13.1	3.0	25.0	23.8	46	-22.2	/	
245.35	31.4	0	1.5	V	12.6	2.3	25.0	21.3	46	-24.7	/	
245.35	30.6	30	1.2	H	12.6	2.3	25.0	20.5	46	-25.5	/	
Middle Channel												
4884.00	39.6	0	1.2	V	32.5	4.9	30.0	47.0	54	-7.0	AVG	
4884.00	36.2	30	1.5	H	32.5	4.9	30.0	43.6	54	-10.4	AVG	
7326.00	29.4	0	1.5	V	35.1	5.6	31.0	39.1	54	-14.9	AVG	
7326.00	27.1	45	1.5	H	35.1	5.6	32.0	35.8	54	-18.2	AVG	
351.17	31.7	90	1.2	V	15.5	4.3	25.0	26.5	46	-19.5	/	
226.54	33.2	150	1.5	V	12.1	3.9	25.0	24.2	46	-21.8	/	
226.54	32.7	170	1.2	H	12.1	3.9	25.0	23.7	46	-22.3	/	
351.17	30.4	60	1.0	H	15.5	4.3	30.0	20.2	46	-25.8	/	
High Channel												
4944.00	36.7	45	1.2	V	32.5	4.9	30.0	44.1	54	-9.9	AVG	
4944.00	35.4	45	1.5	H	32.5	4.9	30.0	42.8	54	-11.2	AVG	
7416.00	31.5	150	1.2	V	35.1	5.6	31.0	41.2	54	-12.8	AVG	
7416.00	28.4	270	1.2	H	35.1	5.6	32.0	37.1	54	-16.9	AVG	
213.62	32.6	60	1.0	V	12.5	4.7	25.0	24.8	43.5	-18.7	/	
213.62	31.30	90	1.2	H	12.5	4.7	25.0	23.5	43.5	-20.0	/	
332.57	30.4	170	1.0	V	15.0	2.6	25.0	23.0	46	-23.0	/	
332.57	29.7	210	1.2	H	15.0	2.6	25.0	22.3	46	-23.7	/	

Bluetooth, KT6 Notebook, Left Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBµV/m	Direction Degree		Polar H/V	Antenna dBµV/m	Cable Loss dBµV/m	Amp. dB	Corr. Ampl. dBµV/m	Limit dBµV/m	Margin dB	Mode	
Low Channel												
4824.00	39.2	110	1.0	V	32.5	4.9	30.0	46.6	54	-7.4	AVG	
7236.00	33.7	260	1.5	V	35.1	5.6	30.0	44.4	54	-9.6	AVG	
4824.00	32.5	120	1.2	H	32.5	4.9	30.0	39.9	54	-14.1	AVG	
7236.00	28.4	290	1.5	H	35.1	5.6	30.0	39.1	54	-14.9	AVG	
257.03	32.4	220	1.2	V	13.1	3.0	25.0	23.5	46	-22.5	/	
257.03	31.1	210	1.5	H	13.1	3.0	25.0	22.2	46	-23.8	/	
245.35	31.6	45	1.5	V	12.6	2.3	25.0	21.5	46	-24.5	/	
245.35	30.3	0	1.2	H	12.6	2.3	25.0	20.2	46	-25.8	/	
Middle Channel												
4884.00	37.5	45	1.2	V	32.5	4.9	30.0	44.9	54	-9.1	AVG	
4884.00	36.0	0	1.5	H	32.5	4.9	30.0	43.4	54	-10.6	AVG	
7326.00	31.8	220	1.2	V	35.1	5.6	30.0	42.5	54	-11.5	AVG	
7326.00	27.2	250	1.0	H	35.1	5.6	30.0	37.9	54	-16.1	AVG	
351.17	31.5	60	1.2	V	15.5	4.3	25.0	26.3	46	-19.7	/	
226.54	33.1	150	1.2	V	12.1	3.9	25.0	24.1	46	-21.9	/	
226.54	32.4	180	1.0	H	12.1	3.9	25.0	23.4	46	-22.6	/	
351.17	30.6	80	1.0	H	15.5	4.3	30.0	20.4	46	-25.6	/	
High Channel												
4944.00	35.6	0	1.2	V	32.5	4.9	30.0	43.0	54	-11.0	AVG	
7416.00	30.9	270	1.2	V	35.1	5.6	30.0	41.6	54	-12.4	AVG	
4944.00	33.4	45	1.0	H	32.5	4.9	30.0	40.8	54	-13.2	AVG	
7416	28.70	310	1.5	H	35.1	5.6	30.0	39.4	54	-14.6	AVG	
213.62	32.5	170	1.2	V	12.5	4.7	25.0	24.7	43.5	-18.8	/	
213.62	30.40	150	1.5	H	12.5	4.7	25.0	22.6	43.5	-20.9	/	
332.57	31.2	200	1.0	V	15.0	2.6	25.0	23.8	46	-22.2	/	
332.57	29.3	210	1.2	H	15.0	2.6	25.0	21.9	46	-24.1	/	

Bluetooth, KT6 Notebook, Right Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBµV/m	Direction Degree		Polar H/V	Antenna dBµV/m	Cable Loss dBµV/m	Amp. dB	Corr. Ampl. dBµV/m	Limit dBµV/m	Margin dB	Mode	
Low Channel												
4824.00	39.4	90	1.0	V	32.5	4.9	30.0	46.8	54	-7.2	AVG	
7236.00	32.6	180	1.0	V	35.1	5.6	30.0	43.3	54	-10.7	AVG	
4824.00	35.4	110	1.2	H	32.5	4.9	30.0	42.8	54	-11.2	AVG	
7236.00	29.2	210	1.2	H	35.1	5.6	30.0	39.9	54	-14.1	AVG	
257.03	33.4	270	1.2	V	13.1	3.0	25.0	24.5	46	-21.5	/	
257.03	32.8	230	1.5	H	13.1	3.0	25.0	23.9	46	-22.1	/	
245.35	31.7	0	1.5	V	12.6	2.3	25.0	21.6	46	-24.4	/	
245.35	30.5	30	1.2	H	12.6	2.3	25.0	20.4	46	-25.6	/	
Middle Channel												
4884.00	39.7	0	1.2	V	32.5	4.9	30.0	47.1	54	-6.9	AVG	
7326.00	33.1	45	1.2	V	35.1	5.6	30.0	43.8	54	-10.2	AVG	
4884.00	36.4	30	1.5	H	32.5	4.9	30.0	43.8	54	-10.2	AVG	
7326.00	28.9	60	1.0	H	35.1	5.6	30.0	39.6	54	-14.4	AVG	
351.17	31.2	90	1.2	V	15.5	4.3	25.0	26.0	46	-20.0	/	
226.54	33.1	150	1.5	V	12.1	3.9	25.0	24.1	46	-21.9	/	
226.54	32.8	170	1.2	H	12.1	3.9	25.0	23.8	46	-22.2	/	
351.17	30.5	60	1.0	H	15.5	4.3	30.0	20.3	46	-25.7	/	
High Channel												
4944.00	36.8	45	1.2	V	32.5	4.9	30.0	44.2	54	-9.8	AVG	
4944.00	35.5	45	1.5	H	32.5	4.9	30.0	42.9	54	-11.1	AVG	
7416.00	30.7	270	1.2	V	35.1	5.6	30.0	41.4	54	-12.6	AVG	
7416.00	28.50	230	1.2	H	35.1	5.6	30.0	39.2	54	-14.8	AVG	
213.62	32.9	60	1.0	V	12.5	4.7	25.0	25.1	43.5	-18.4	/	
213.62	31.40	90	1.2	H	12.5	4.7	25.0	23.6	43.5	-19.9	/	
332.57	30.6	170	1.0	V	15.0	2.6	25.0	23.2	46	-22.8	/	
332.57	29.5	210	1.2	H	15.0	2.6	25.0	22.1	46	-23.9	/	

802.11b, KT1 Notebook, Left Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBμV/m	Direction Degree		Polar H/V	Antenna dBμV/m	Cable Loss dBμV/m	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Mode	
Low Channel												
4824.00	39.4	300	1.5	V	32.5	4.9	30.0	46.8	54	-7.2	AVG	
7236.00	33.5	150	1.5	V	35.1	5.6	30.0	44.2	54	-9.8	AVG	
7236.00	32.7	180	1.2	H	35.1	5.6	30.0	43.4	54	-10.6	AVG	
4824.00	34.7	280	1.2	H	32.5	4.9	30.0	42.1	54	-11.9	AVG	
257.03	33.1	250	1.5	V	13.1	3.0	25.0	24.2	46	-21.8	/	
245.35	31.5	40	1.2	V	12.6	2.3	25.0	21.4	46	-24.6	/	
245.35	30.6	45	1.2	H	12.6	2.3	25.0	20.5	46	-25.5	/	
257.03	29.4	270	1.2	H	13.1	3.0	25.0	20.5	46	-25.5	/	
Middle Channel												
4884.00	39.1	90	1.5	V	32.5	4.9	30.0	46.5	54	-7.5	AVG	
7326.00	34.9	45	1.2	V	35.1	5.6	30.0	45.6	54	-8.4	AVG	
7326.00	34.3	45	1.2	H	35.1	5.6	30.0	45.0	54	-9.0	AVG	
4884.00	35.3	45	1.5	H	32.5	4.9	30.0	42.7	54	-11.3	AVG	
351.17	33.8	90	1.2	V	15.5	4.3	25.0	28.6	46	-17.4	/	
226.54	32.5	160	1.5	V	12.1	3.9	25.0	23.5	46	-22.5	/	
226.54	31.6	180	1.5	H	12.1	3.9	25.0	22.6	46	-23.4	/	
351.17	30.2	110	1.2	H	15.5	4.3	30.0	20.0	46	-26.0	/	
High Channel												
4944.00	36.5	250	1.2	V	32.5	4.9	30.0	43.9	54	-10.1	AVG	
7416.00	32.3	120	1.2	H	35.1	5.6	30.0	43.0	54	-11.0	AVG	
7416.00	31.6	180	1.0	V	35.1	5.6	30.0	42.3	54	-11.7	AVG	
4944.00	33.2	190	1.5	H	32.5	4.9	30.0	40.6	54	-13.4	AVG	
213.62	30.9	60	1.0	V	12.5	4.7	25.0	23.1	43.5	-20.4	/	
213.62	29.70	30	1.2	H	12.5	4.7	25.0	21.9	43.5	-21.6	/	
332.57	30.3	180	1.0	V	15.0	2.6	25.0	22.9	46	-23.1	/	
332.57	28.4	220	1.2	H	15.0	2.6	25.0	21.0	46	-25.0	/	

802.11b, KT1 Notebook, Right Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBµV/m	Direction Degree		Polar H/V	Antenna dBµV/m	Cable Loss dBµV/m	Amp. dB	Corr. Ampl. dBµV/m	Limit dBµV/m	Margin dB	Mode	
Low Channel												
4824.00	41.5	310	1.5	V	32.5	4.9	30.0	48.9	54	-5.1	AVG	
7236.00	33.8	270	1.0	V	35.1	5.6	30.0	44.5	54	-9.5	AVG	
7236.00	32.0	145	1.2	H	35.1	5.6	30.0	42.7	54	-11.3	AVG	
4824.00	35.2	290	1.5	H	32.5	4.9	30.0	42.6	54	-11.4	AVG	
257.03	33.4	210	1.5	V	13.1	3.0	25.0	24.5	46	-21.5	/	
257.03	32.8	270	1.5	H	13.1	3.0	25.0	23.9	46	-22.1	/	
245.35	31.7	40	1.2	V	12.6	2.3	25.0	21.6	46	-24.4	/	
245.35	30.5	0	1.2	H	12.6	2.3	25.0	20.4	46	-25.6	/	
Middle Channel												
4884.00	41.2	90	1.5	V	32.5	4.9	30.0	48.6	54	-5.4	AVG	
7326.00	37.6	180	1.5	V	35.1	5.6	30.0	48.3	54	-5.7	AVG	
7326.00	35.7	120	1.2	H	35.1	5.6	30.0	46.4	54	-7.6	AVG	
4884.00	36.4	30	1.5	H	32.5	4.9	30.0	43.8	54	-10.2	AVG	
351.17	33.9	90	1.2	V	15.5	4.3	25.0	28.7	46	-17.3	/	
226.54	34.1	160	1.5	V	12.1	3.9	25.0	25.1	46	-20.9	/	
226.54	32.5	180	1.5	H	12.1	3.9	25.0	23.5	46	-22.5	/	
351.17	30.2	110	1.2	H	15.5	4.3	30.0	20.0	46	-26.0	/	
High Channel												
4944.00	39.2	270	1.2	V	32.5	4.9	30.0	46.6	54	-7.4	AVG	
7416.00	33.8	120	1.5	V	35.1	5.6	30.0	44.5	54	-9.5	AVG	
7416.00	32.7	45	1.2	H	35.1	5.6	30.0	43.4	54	-10.6	AVG	
4944.00	35.5	220	1.5	H	32.5	4.9	30.0	42.9	54	-11.1	AVG	
213.62	32.9	60	1.0	V	12.5	4.7	25.0	25.1	43.5	-18.4	/	
213.62	31.40	90	1.2	H	12.5	4.7	25.0	23.6	43.5	-19.9	/	
332.57	30.6	170	1.0	V	15.0	2.6	25.0	23.2	46	-22.8	/	
332.57	29.5	210	1.2	H	15.0	2.6	25.0	22.1	46	-23.9	/	

802.11b, KT6 Notebook, Left Antenna

Indicated			Table	Antenna		Correction Factor			FCC 15 Subpart C		
Frequency	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	39.2	320	1.2	V	32.5	4.9	30.0	46.6	54	-7.4	AVG
7236.00	33.7	240	1.5	V	35.1	5.6	30.0	44.4	54	-9.6	AVG
7236.00	32.6	180	1.0	H	35.1	5.6	30.0	43.3	54	-10.7	AVG
4824.00	34.8	260	1.2	H	32.5	4.9	30.0	42.2	54	-11.8	AVG
257.03	33.6	210	1.5	V	13.1	3.0	25.0	24.7	46	-21.3	/
245.35	31.4	90	1.2	V	12.6	2.3	25.0	21.3	46	-24.7	/
245.35	30.5	45	1.5	H	12.6	2.3	25.0	20.4	46	-25.6	/
257.03	29.1	230	1.2	H	13.1	3.0	25.0	20.2	46	-25.8	/
Middle Channel											
4884.00	39.6	60	1.5	V	32.5	4.9	30.0	47.0	54	-7.0	AVG
7326.00	35.3	150	1.2	V	35.1	5.6	30.0	46.0	54	-8.0	AVG
7326.00	32.8	260	1.0	H	35.1	5.6	30.0	43.5	54	-10.5	AVG
4884.00	35.2	90	1.5	H	32.5	4.9	30.0	42.6	54	-11.4	AVG
351.17	33.7	130	1.0	V	15.5	4.3	25.0	28.5	46	-17.5	/
226.54	32.3	160	1.2	V	12.1	3.9	25.0	23.3	46	-22.7	/
226.54	31.4	170	1.5	H	12.1	3.9	25.0	22.4	46	-23.6	/
351.17	30.1	110	1.2	H	15.5	4.3	30.0	19.9	46	-26.1	/
High Channel											
4944.00	36.4	270	1.2	V	32.5	4.9	30.0	43.8	54	-10.2	AVG
7416.00	31.8	150	1.0	H	35.1	5.6	30.0	42.5	54	-11.5	AVG
7416.00	31.3	180	1.5	V	35.1	5.6	30.0	42.0	54	-12.0	AVG
4944.00	32.7	210	1.0	H	32.5	4.9	30.0	40.1	54	-13.9	AVG
213.62	30.8	180	1.2	V	12.5	4.7	25.0	23.0	43.5	-20.5	/
213.62	29.60	150	1.0	H	12.5	4.7	25.0	21.8	43.5	-21.7	/
332.57	30.2	110	1.0	V	15.0	2.6	25.0	22.8	46	-23.2	/
332.57	28.5	90	1.2	H	15.0	2.6	25.0	21.1	46	-24.9	/

802.11b, KT6 Notebook, Right Antenna

Frequency MHz	Indicated		Table Height Meter	Antenna		Correction Factor			FCC 15 Subpart C			
	Ampl. dBμV/m	Direction Degree		Polar H/V	Antenna dBμV/m	Cable Loss dBμV/m	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB	Mode	
Low Channel												
4824.00	41.6	330	1.5	V	32.5	4.9	30.0	49.0	54	-5.0	AVG	
7236.00	34.8	150	1.2	H	35.1	5.6	30.0	45.5	54	-8.5	AVG	
7236.00	34.5	180	1.0	V	35.1	5.6	30.0	45.2	54	-8.8	AVG	
4824.00	35.1	270	1.5	H	32.5	4.9	30.0	42.5	54	-11.5	AVG	
257.03	32.3	250	1.5	V	13.1	3.0	25.0	23.4	46	-22.6	/	
257.03	31.7	270	1.2	H	13.1	3.0	25.0	22.8	46	-23.2	/	
245.35	31.6	30	1.5	V	12.6	2.3	25.0	21.5	46	-24.5	/	
245.35	30.4	0	1.2	H	12.6	2.3	25.0	20.3	46	-25.7	/	
Middle Channel												
4884.00	40.4	60	1.5	V	32.5	4.9	30.0	47.8	54	-6.2	AVG	
7326.00	36.1	45	1.0	H	35.1	5.6	30.0	46.8	54	-7.2	AVG	
7326.00	34.2	110	1.2	V	35.1	5.6	30.0	44.9	54	-9.1	AVG	
4884.00	35.9	45	1.5	H	32.5	4.9	30.0	43.3	54	-10.7	AVG	
351.17	31.8	80	1.2	V	15.5	4.3	25.0	26.6	46	-19.4	/	
226.54	34.3	160	1.5	V	12.1	3.9	25.0	25.3	46	-20.7	/	
226.54	32.6	190	1.5	H	12.1	3.9	25.0	23.6	46	-22.4	/	
351.17	29.7	110	1.2	H	15.5	4.3	30.0	19.5	46	-26.5	/	
High Channel												
4944.00	39.1	210	1.5	V	32.5	4.9	30.0	46.5	54	-7.5	AVG	
7416.00	34.8	120	1.2	V	35.1	5.6	30.0	45.5	54	-8.5	AVG	
7416.00	33.7	270	1.5	H	35.1	5.6	30.0	44.4	54	-9.6	AVG	
4944.00	35.6	240	1.5	H	32.5	4.9	30.0	43.0	54	-11.0	AVG	
213.62	32.7	90	1.0	V	12.5	4.7	25.0	24.9	43.5	-18.6	/	
213.62	31.20	90	1.0	H	12.5	4.7	25.0	23.4	43.5	-20.1	/	
332.57	30.7	170	1.0	V	15.0	2.6	25.0	23.3	46	-22.7	/	
332.57	29.6	180	1.2	H	15.0	2.6	25.0	22.2	46	-23.8	/	

* There was no apparent emission after the third harmonics.

13 - CONDUCTED EMISSION

13.1 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 BAEL is ± 2.4 dB.

13.2 Test Setup

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 was connected with 120Vac/60Hz power source.

13.3 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

13.4 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 dB μ V of specification limits). Quasi-peak readings are distinguished with a "Qp".

13.5 Summary of Test Results

According to the data in section 12.6, the EUT complied with the FCC Conducted margin for a Class B device, with the *worst* margin reading of:

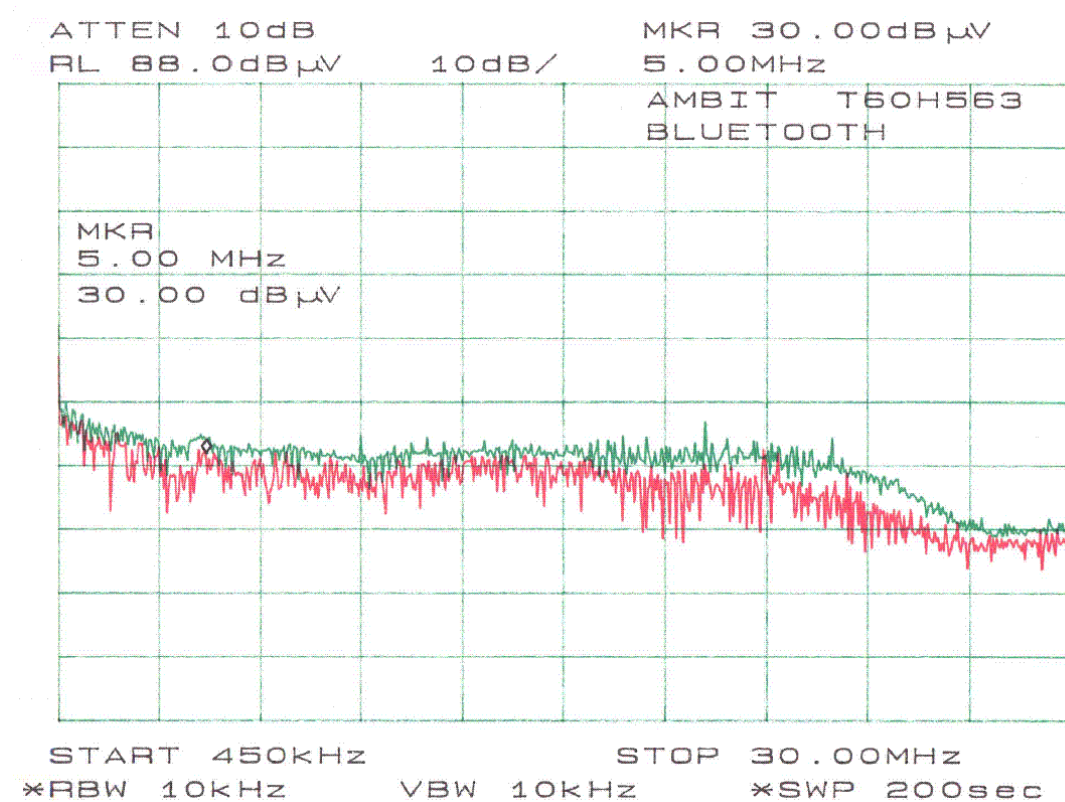
-12.3 dB μ V at 0.620 MHz in the Line mode

13.6 Conducted Emissions Test Data

LINE CONDUCTED EMISSIONS				FCC CLASS B	
Frequency MHz	Amplitude dB μ V	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dB μ V	Margin dB
0.620	35.7	QP	Line	48	-12.3
19.360	35.4	QP	Line	48	-12.6
0.550	34.3	QP	Neutral	48	-13.7
1.240	33.5	QP	Neutral	48	-14.5
1.450	32.6	QP	Line	48	-15.4
21.109	31.6	QP	Neutral	48	-16.4

13.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data is presented in the following page as reference.



14 - ANTENNA REQUIREMENT

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.

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

Please refer to Appendix I for detailed antenna information used by the EUT.

15 - 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 Permissible 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: 12.14 (dBm)

Maximum peak output power at antenna input terminal: 16.37(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/cm²)

Power density at predication frequency: 0.005 (mW/cm²)

Maximum allowable antenna gain: 306.9(dBm)

Maximum allowable antenna gain: 24.9(dBi)

Measurement Result

The predicted power density level at 20 cm is 0.005mW/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.

EXHIBIT A - FCC ID LABEL INFORMATION

EXHIBIT B - TEST SETUP PHOTOGRAPHS

EXHIBIT C - EUT EXTERNAL PHOTOGRAPHS

EXHIBIT D - EUT INTERNAL PHOTOGRAPHS

EXHIBIT E - BLOCK DIAGRAM

EXHIBIT F - SCHEMATICS

EXHIBIT G - OPERATIONAL DESCRIPTION

EXHIBIT H - USERS MANUAL
