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EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart E (Section 15.407) & RSS-210

FCC ID:	EJE-WB0073
Industry Canada ID:	337J-WB0073
Test Sample:	LifeBook U Series
Model:	U2010
Radio Modules:	AR5BHB92 Atheros 2x2 Half Mini-PCI WLAN Module & EYSMJCS Bluetooth Module
Report Number	M080613_Cert_AR5BHB92_NII_BT
Issue Date:	27th November 2008

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Test Sample:	LifeBook U Series
Model:	U2010
Radio Modules:	HB92 2x2 Half Mini-PCI WLAN Module, Model: AR5BHB92 (Atheros Communications) Bluetooth Module, Model: EYSMJCS (TAIYO YUDEN)
FCC ID:	EJE-WB0073
Industry Canada ID:	337J-WB0073
Equipment Type:	Intentional Radiator (Transceiver)
Manufacturer (LifeBook):	Fujitsu Ltd - Mobile Computing Division
Address:	1-1 Kamikodanaka 4-Chome, Nakahara-Ku, Kawasaki, Japan
Contact:	Mr. Tsuyoshi Uchihara
Test Standards:	FCC Part 15 – Radio Frequency Devices (September 2007) FCC Part 15, Subpart E – Unlicensed National Information, Infrastructure Devices FCC Part 15.407, General Technical Requirements ANSI C63.4 – 2003 OET Bulletin No. 65 RSS-210 Issue 7 Low Power Licence-Exempt RadioCommunication Devices Annex 9: Local Area Network Devices RSS-102 Issue 1 (Provisional), Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields
Test Dates:	6th June to 9th July 2008
Senior Engineer:	**Chieu Huynh - B.Eng (Hons) Electronics** **Lee Hopkins**
Attestation:	*I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*
Authorised Signatory:	**Chieu Huynh** **Senior EMC Engineer** **EMC Technologies Pty Ltd**

EMI TEST REPORT FOR CERTIFICATION
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1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: U2010 with Atheros Half Mini-PCI Wireless LAN Module (HB92 802.11a/b/g/n 2x2), Model: AR5BHB92 & TAIYO YUDEN Bluetooth Module, Model: EYSMJCS.

The HB92 2x2 WLAN module was originally certified by Atheros Communications as a modular approval under FCC ID: PPD-AR5BHB92-F (Canada ID: 4104A-AR5BHB92). The Radio modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

The Bluetooth module was originally certified by TAIYO YUDEN as a modular approval under FCC ID: RYYEYSMJCS (Canada ID: 4389B-EYSMJCS). The Radio modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

The HB92 2x2 WLAN supports IEEE 802.11b, IEEE 802.11g, IEEE 802.11a and IEEE 802.11n (DTS & U-NII) configurations.

NII results for configurations IEEE 802.11a and IEEE 802.11n are reported in this test report.

The DTS and DSS results are reported separately.
Refer to EMC Technologies' test report: M080613_Cert_AR5BHB92_DTS_BT (DTS)
Refer to EMC Technologies' test report: M080613_Cert_EYSMJCS_AR5BHB92

Test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations:

47 CFR, Part 15, Subpart E:	Unlicensed National Information Infrastructure Devices (U-NII) operating in the 5.15-5.35 GHz, 5.47-5.725 GHz and 5.725-5.825 GHz frequency bands
Section 15.203:	Antenna requirements
Section 15.205:	Restricted bands of operation
Section 15.207:	Conducted Emission Limits
Section 15.209:	Radiated Emission Limits (General requirements)
Section 15.407:	General Technical Requirements

The results and technical details of the test sample are detailed in this report. The test sample **complied** with the requirements of 47 CFR, Part 15 Subpart E - Section 15.407.

The test sample also complied with the Industry Canada RSS-210 issue 7 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 9 and the RF exposure requirements of RSS-102.

The measurement procedure used was in accordance with ANSI C63.4-2003 and OET Bulletin No. 65. The instrumentation conformed to the requirements of ANSI C63.2-1996.

1.1 Summary of Results

1.1.1 FCC Subpart E, Section 15.407

FCC Part 15, Subpart E Clauses	Industry Canada RSS-210 Clauses	Test Performed	Result
15.203	5.5	Antenna Requirement	**Complies**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Note 1**
15.209	6.3	Radiated Emissions	**Complies**
15.407 (a)(1) (a)(2)	Annex A9.2	Peak Transmit Power	**Note 2**
15.407 (a)(5)	Annex A9.2	Peak Power Spectral Density	**Note 2**
15.407 (a)(6)		Peak Excursion	**Note 2**
15.407 (b)	Annex A9.3	Undesirable Emission	**Complies**
15.407 (c)	Annex A9.5(4)	Discontinue Transmission	**Complies**
15.407 (d)		Reserved	**-**
15.407 (e)	2.2 (Table 1)	Restricted to Indoor Operations	**Complies**
15.407 (f)	RSS-Gen (5.5)	Radio Frequency Hazard	**Complies**
15.407 (g)	Annex A9.5(5)	Frequency Stability	**Note 2**
15.407 (h)		Transmit Power Control	**Not Applicable** E.I.R.P < 500 mW
15.407 (h)	Annex A9.4	Dynamic Frequency Selection	**Note 3**

Note 1: Refer to Attachment 3, FCC Part 15B test report: FG08-070EAL
Note 2: Refer to Attachment 4, FCC 15.407 test report: 08U11571-1
Note 3: Refer to Attachment 5, FCC 15.407 test report: 08U11571-2B

1.1.2 FCC Subpart C, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M080613_Cert_AR5BHB92_DTS_BT

1.1.3 FCC Subpart C, Section 15.247 - BT

Refer to EMC Technologies' test report: M080613_Cert_EYSMJCS_AR5BHB92

1.2 Modifications by EMC Technologies

No modifications were required.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT (WLAN) Details

Transmitter:	Half Mini-Card Wireless LAN Module
Wireless Module:	HB92 (11a/b/g/n)
Model Number:	AR5BHB92
Manufacturer:	Atheros Communication Inc,
Modulation Type:	Direct Sequence Spread Spectrum (DSSS for 802.11b) Orthogonal Frequency Division Multiplexing (OFDM for 802.11a/g/n)
2.4 GHz (802.11b/g/n):	DBPSK, DQPSK, CCK, 16QAM and 64QAM
5 GHz (802.11a/n):	BPSK, QPSK, 16QAM and 64QAM
Maximum Data Rate:	802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps 802.11n = 300 Mbps
Frequency Ranges:	2.412 –2.462 GHz for 11b/g/n 5.18 - 5.32 GHz, 5.5 – 5.7 GHz and 5.745 - 5.825 GHz for 11a/n
Number of Channels:	11 channels for 11b/g/n 24 channels for 11a/n with 20 MHz bandwidth 18 channels for 11n with 40 MHz bandwidth
Antenna Types:	Tx: Nissei Electric Inverted F Antenna Location: Top edge of LCD screen
Antenna gain:	Max antenna gain is less than 6 dBi. Refer antenna data provided separately
Power Supply:	3.3 VDC from PCI bus

Channels Tested and Output power setting:

Modes	Channels	Frequency MHz	Average Output Power (dBm)
802.11b/g	1, 6 and 11*	2412, 2437 and 2462	14.0
802.11a	36**	5180	8.5
	40 and 48**	5200 and 5240	13.0
	52, 60 and 64**	5260, 5300 and 5320	
	100, 120 and 140**	5500, 5600 and 5700	14.0
	149, 157 and 165*	5745, 5785 and 5825	
802.11n 20MHz Bandwidth	1 and 6*	2412 and 2437	14.0
	11*	2462	12.5
	36**	5180	10.0
	40 and 48**	5200 and 5240	13.5
	52, 60 and 64**	5260, 5300 and 5320	
	100, 120 and 140**	5500, 5600 and 5700	14.0
	149, 157 and 165*	5745, 5785 and 5825	
802.11n 40MHz Bandwidth	3*	2422	12.0
	6*	2437	14.0
	9*	2452	10.5
	38**	5190	12.5
	54 and 62**	5270 and 5310	14
	102, 118 and 134**	5510, 5590 and 5670	
	151 and 159*	5755 and 5795	

**Channels tested and reported in this report

*Channels tested and reported in the DTS submission (M080613_Cert_AR5BHB92_DTS_BT)

The AR5BHB92 is capable of using two antennas transmitting simultaneously (MCS8 DATA mode) the power level is 3dB lower (50%) than if a single antenna was transmitting.

2.2 EUT (Bluetooth) Details

Transmitter:	Bluetooth
Model Number:	EYSMJCS
Manufacturer:	TAIYO YUDEN
Network Standard:	Bluetooth™ RF Test Specification
Modulation Type:	Frequency Hopping Spread Spectrum (FHSS)
Frequency Range:	2402 MHz to 2480 MHz
Number of Channels:	79
Carrier Spacing:	1.0 MHz
Antenna Types:	Included BT module Location: left side of hinge
Antenna gain:	Max antenna gain is less than 6 dBi. Refer antenna data provided separately
Max. Output Power:	4 dBm
Reference Oscillator:	16 MHz (Built-in)
Power Supply:	3.3 VDC from host.

Frequency allocation:

Channel Number	Frequency (MHz)	Bluetooth Utility power setting
1*	**2402**	Power (Ext, Int) = 0, 96
2	2403	
3	2404	
.	.	
.	.	
.	.	
39	2440	
40*	**2441**	
41	2442	
.	.	
.	.	
.	.	
77	2478	
78	2479	
79*	**2480**	

*Channels tested and reported in The DSS submission (M080613_Cert_EYSMJCS_AR5BHB92)

2.3 EUT (Notebook PC) Details

EUT:	LifeBook U series
Model Name:	U2010
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Intel(R) Atom(TM) processor Z530 (1.60 GHz)
LCD:	5.6"WXGA
Wired LAN:	Realtek 8101L : 10 Base-T/100 Base-TX
Modem:	Non
Port Replicator Model:	FPCPR86
AC Adapter Model:	40W: SEB55N2-16.0 60W: SED80N2-16.0
Voltage:	16 V
Current Specs:	2.5A / 3.75A
Watts:	40W / 60W

2.4 Test Configuration

The Atheros WLAN test software "ART" was used to transmit continuously during the tests.

Conducted tests were performed at the WLAN Antenna ports.
Radiated tests were performed for measuring the harmonics and spurious from the transmitters.

2.5 Support Equipment

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG08-070EAL)

2.6 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI C63.4-2003. Radiated emissions tests were performed at a distance of 1 and 3 metres from the EUT. OET Bulletin 65 dated June 2001 was used for reference.

2.7 Test Facility

2.7.1 General

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderderg Gorge, near the township of Bacchus Marsh in Victoria, Australia. Conducted measurements at an antenna ports were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

The above test sites have been accepted for testing by the Federal Communications Commission (FCC) - **FCC Registration Number 90560**.
EMC Technologies open area test site (OATS) has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional).
Industry Canada File Number IC 3569B-1.

2.7.2 NATA Accreditation

EMC Technologies is accredited in Australia to test to the following standards by the National Association of Testing Authorities (NATA).

"FCC Part 15 unintentional and intentional emitters in the frequency range 9kHz to 18 GHz excluding TV receivers (15.117 and 15.119), TV interface devices (15.115), cable ready consumer electronic equipment (15.118), cable locating equipment (15.213) and unlicensed national information infrastructure devices (Sub part E)."

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au
It also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

NATA is the Australian national laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A^2LA).

2.8 Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement Institute (NMI). All equipment calibration is traceable to Australia national standards at the National Measurements Institute. The reference antenna calibration was performed by NMI and the working antennas (biconical and log-periodic) calibrated by the NATA approved procedures. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in Appendix A

2.9 Ambients at OATS

The Open Area Test Site (OATS) is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

FCC 15.407 (U-NII) RESULTS

3.0 CONDUCTED EMISSION MEASUREMENTS

Testing was performed in accordance with the requirements of FCC Part 15.207
Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG08-070EAL)

4.0 RADIATED EMISSION MEASUREMENTS

4.1 Test Procedure

Testing was performed in accordance with the requirements of FCC Part 15.407(b).

Radiated emission measurements were performed to the limits as per section 15.209 and 15.407. The measurements were made at the open area test site. All measurements above 1 GHz were made over a distance of 3 and 1 metres.

Calibrated EMCO 3115, EMCO 3116 and ETS standard gain horn antennas were used for measurements between 1 to 40 GHz.

The measurement of emissions between 30 - 1000 MHz, refer to Attachment 3 – FCC Part 15B Test Report (Report: FG08-070EAL).

The measurement of emissions above 1000 MHz was measured using a following setting:
Peak measurements setting: RBW = VBW = 1 MHz
Average measurements setting: RBW = 1 MHz and VBW = 10 Hz

The receiver bandwidth was set to 6 dB.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable, and by varying the antenna height. Each significant peak was investigated with the Peak/Average Detectors. The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

4.2 Calculation of field strength

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

E = V + AF - G + L Where:
E = Radiated Field Strength in dBµV/m.
V = EMI Receiver Voltage in dBµV. (measured value)
AF = Antenna Factor in dB(m^{-1}). (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

- **Example Field Strength Calculation**

Assuming a receiver reading of 34.0 dBµV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB. The resulting Field Strength is therefore as follows:

34.0 + 9.2 + 1.9 - 20 = 25.1 dBµV/m

4.3 Results - Out of Band Emissions (Spurious and Harmonics)

4.3.1 Frequency Band: 1 – 40 GHz

The peak limits for undesirable emission outside of the restricted bands are –27 dBm (68.3 dBuV/m @ 3m). The 74 dBμV/m @ 3m and 54 dBμV/m @ 3m limits are applied for emissions fall in the restricted bands.

Testing was performed while the WLAN transmitter continuously operated. Harmonics related to the WLAN transmitter operated in the frequency bands 5.15 – 5.35 GHz and 5.47 – 5.725 GHz are reported below. Harmonics in the frequency bands 2.4 – 2.4835 GHz and 5.725 – 5.850 GHz, refer to M080613_Cert_AR5BHB92_DTS_BT.

Configuration 802.11a and 802.11n

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps, MCS0 to MCS7 and MCS8 to MCS15). Final testing was performed while the transmitter continuously operated.

Channel 36 - 5180 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5180	98.3	87.6	-	-	-
		5150	59.8	46.0	74.0	54.0	Complies
802.11n	MCS0	5180	99.5	88.5	-	-	-
		5150	60.4	46.1	74.0	54.0	Complies
802.11n	MCS8	5180	98.2	85.4	-	-	-
		5150	59.7	45.9	74.0	54.0	Complies

Channel 40 - 5200 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5200	102.1	90.8	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS0	5200	102.7	91.5	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5200	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 48 - 5240 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5240	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS0	5240	102.4	91.3	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5240	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 52 - 5260 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5260	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS0	5260	102.0	91.1	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5260	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 60 - 5300 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5300	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS0	5300	102.5	91.2	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5300	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 64 - 5320 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5320	100.7	90.0	-	-	-
		Harmonics are same as MCS0					
		5350	61.2	47.8	74.0	54.0	Complies
802.11n	MCS0	5320	101.3	90.3	-	-	-
		10640*	56.0	41.6	84.5	64.5	Complies
		15960*	68.3	49.8	84.5	64.5	Complies
		5350	61.9	47.6	74.0	54.0	Complies
802.11n	MCS8	5320	101.1	87.9	-	-	-
		Harmonics are same or lower than the MCS0					
		5350	62.6	47.8	74.0	54.0	Complies

Channel 100 - 5500 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5500	103.3	91.2	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5470	64.2	49.0	74.0	54.0	Complies
802.11n	MCS0	5500	103.1	92.1	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5470	64.7	49.3	74.0	54.0	Complies
802.11n	MCS8	5500	103.2	90.0	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5470	61.5	48.6	74.0	54.0	Complies

Channel 120 - 5600 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5600	Fundamental is same as MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS0	5600	102.4	91.7	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5300	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 140 - 5700 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5700	102.1	91.5	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5725	63.2	49.1	68.3	-	Complies
802.11n	MCS0	5700	102.0	91.4	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5725	63.5	49.6	68.3	-	Complies
802.11n	MCS8	5700	101.2	88.4	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5725	61.4	48.1	68.3	-	Complies

Channel 38 - 5190 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5190	98.6	87.0	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5150	65.2	46.8	74.0	54.0	Complies
802.11n	MCS8	5190	97.7	85.9	-	-	-
		Harmonics and BE are same or lower than MCS0					

Channel 54 - 5270 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5270	100.8	88.1	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5270	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 62 - 5310 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5310	99.1	87.7	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5350	65.1	50.0	74.0	54.0	Complies
802.11n	MCS8	5310	97.6	84.5	-	-	-
		Harmonics and BE are same or lower than MCS0					

Channel 102 - 5510 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5510	100.9	88.8	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5470	68.2	53.0	68.3	-	Complies
802.11n	MCS8	5510	100.2	86.4	-	-	-
		Harmonics and BE are same or lower than MCS0					

Channel 118 - 5590 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5590	100.7	88.3	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
802.11n	MCS8	5590	Fundamental is lower than the MCS0				
		Harmonics are same or lower than channel 64 (5320 MHz)					

Channel 134 - 5670 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	MCS0	5670	100.0	88.1	-	-	-
		Harmonics are same or lower than channel 64 (5320 MHz)					
		5725	60.5	47.4	68.3	-	Complies
802.11n	MCS8	5670	99.3	86.0	-	-	-
		Harmonics and BE are same or lower than MCS0					

*Measurement was performed at 1 m distance.

Result: Harmonics and spurious emissions were recorded up to 40 GHz. Harmonics were low and confirmed with both RBW and VBW reduced. Emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 0.1 dB.

4.3.2 Frequency Band: 30 - 1000 MHz

Refer to attachment 3 – FCC Part 15B test report number: FG08-070EAL dated: May 29 2008.

Testing was performed by Fujitsu General EMC Laboratory, JAPAN accredited by NVLAP (Lab Code: 200373-0).

4.3.3 RF Conducted Measurements at the antenna terminal

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

4.3.4 Radiated Band Edge Measurements

Complied (refer to section 4.3 – radiated emissions).

5.0 PEAK OUTPUT POWER - Section 15.407(a)

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

6.0 CHANNEL BANDWIDTH

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

7.0 PEAK POWER SPECTRAL DENSITY

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

8.0 PEAK EXCURSION

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

9.0 FREQUENCY STABILITY

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

10.0 DYNAMIC FREQUENCY SELECTION

The EUT is a Client Device without Radar Interference Detection Function.

Ad-hoc operation (not under control of a Master Device) is supported in the 2.4 GHz & 5.15 - 5.25 GHz bands only. This Ad-hoc capability is limited in hardware via factory programmed EEPROM settings that cannot be accessed or changed by end users. The Ad-hoc supported channels of operation cannot be modified – regardless of which client utility or operating system control is used.

Refer to original approval under FCC ID: PPD-AR5BHB92 (Canada ID: 4104A-AR5BHB92) certified by Atheros.

Refer to attachment 5, FCC 15.407 test report number: 08U11571-2B dated March 20 2008

Testing was performed by Compliance Certification Services (CCS) CA, USA accredited by NVLAP (Lab Code: 200065-0).

11.0 DISCONTINUE TRANSMISSION

Data Transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, finally to the RF chip. Several special packets (ACKs, CTS, PSPoll, etc) are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which then turns off at the end of the packet. Therefore, the transmitter will be ON only while one of the four mentioned packets is being transmitted.

12.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

Testing was performed in accordance with the requirements of FCC Part 15.407(f)

Spread spectrum transmitters operating in the 5.15 – 5.35 GHz and 5.47 – 5.725 GHz are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

In accordance with Section 1.1310, the Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure of 1.0 has been applied, i.e 1mW/cm^2.

Friss transmission formula: $Pd = (P*G) / (4*\pi*r^2)$
where: Pd = power density (mW/cm^2)
P = power input to the antenna (mW)
G = antenna gain (numeric)
r = distance to the center of radiation of the antenna (cm)

The MPE calculations shown below are for the WLAN and BT modules.

Transmitter Modules	FCC ID	Frequency GHz	Peak Power dBm	Antenna Type	Antenna Gain (dBi)	Power Density @ 20 cm mW/cm^2	MPE Limit mW/cm^2
WLAN (802.11abgn)	EJE-WB0073	2.4	29.6	Inverted-F	1.94	0.284	1.0
		5.0	29.85		1.96	**0.302**	1.0
BT		2.4	1.0	Taiyo Yuden	2.0	**0.001**	1.0
Sum of Worst Case Power Densities of Co-located Transmitters						0.303	1.0

Calculations show that the radio modules with described antennas complied with Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure.

13.0 ANTENNA REQUIREMENT

This intentional radiator was designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

14.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: U2010 with Atheros Half Mini-PCI Wireless LAN Module (HB92 802.11a/b/g/n 2x2), Model: AR5BHB92 & TAIYO YUDEN Bluetooth Module, Model: EYSMJCS, **complied** with the requirements of 47 CFR, Part 15 Subpart E -Section 15.407 (5.15-5.35 GHz and 5.47 – 5.725 GHz bands).

The test sample also complied with the Industry Canada RSS-210 issue 7 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 9 Local Area Network Devices requirements and the RF exposure requirements of RSS-102.

Results were as follows:

FCC Subpart E, Section 15.407

FCC Part 15, Subpart E Clauses	Industry Canada RSS-210 Clauses	Test Performed	Result
15.203	5.5	Antenna Requirement	**Complies**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Note 1**
15.209	6.3	Radiated Emissions	**Complies**
15.407 (a)(1) (a)(2)	Annex A9.2	Peak Transmit Power	**Note 2**
15.407 (a)(5)	Annex A9.2	Peak Power Spectral Density	**Note 2**
15.407 (a)(6)		Peak Excursion	**Note 2**
15.407 (b)	Annex A9.3	Undesirable Emission	**Complies**
15.407 (c)	Annex A9.5(4)	Discontinue Transmission	**Complies**
15.407 (d)		Reserved	**-**
15.407 (e)	2.2 (Table 1)	Restricted to Indoor Operations	**Complies**
15.407 (f)	RSS-Gen (5.5)	Radio Frequency Hazard	**Complies**
15.407 (g)	Annex A9.5(5)	Frequency Stability	**Note 2**
15.407 (h)		Transmit Power Control	**Not Applicable** E.I.R.P < 500 mW
15.407 (h)	Annex A9.4	Dynamic Frequency Selection	**Note 3**

Note 1: Refer to Attachment 3, FCC Part 15B test report: FG08-070EAL
Note 2: Refer to Attachment 4, FCC 15.407 test report: 08U11571-2B
Note 3: Refer to Attachment 5, FCC 15.407 test report: 08U11571-2B

FCC Subpart E, Section 15.247 - WLAN
Refer to EMC Technologies Report No: M080613_Cert_AR5BHB92_DTS_BT

FCC Subpart C, Section 15.247 - BT
Refer to EMC Technologies' test report: M080613_Cert_EYSMJCS_AR5BHB92

15.0 MEASUREMENT UNCERTAINTIES

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	30 MHz to 300 MHz	±5.1 dB
	300 MHz to 1000 MHz	±4.7 dB
	1 GHz to 18 GHz	±4.6 dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

16.0 TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
APPENDIX B: PHOTOGRAPHS
APPENDIX C: TECHNICAL DESCRIPTION
APPENDIX D: BLOCK DIAGRAM
APPENDIX E: ANTENNA INFORMATION
APPENDIX F: SCHEMATICS
APPENDIX G: FCC LABELLING DETAILS
APPENDIX H: USER MANUAL

Attachment 1: RF Exposure Information
Attachment 2: FCC DOC for LifeBook U Series
Attachment 3: FCC Part 15B Test Report (Report: FG08-070EAL)
Attachment 4: Part 15.407 Test Report (Report: 08U11571-2B) PART 1
Attachment 5: Part 15.407 Test Report (Report: 08U11571-2B) PART 2