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

FCC ID: EJE-WB0059  
Industry Canada ID: 337J-WB0059

Test Sample: LifeBook T Series  
Model: T1010

Radio Modules: AR5BHB92 Atheros 2x2 Half Mini-PCI WLAN Module  
& EYSMJCS Bluetooth Module

Report Number M080414\_Cert\_AR5BHB92\_NII\_BT

Issue Date: 7<sup>th</sup> June 2008

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**CONTENTS**

**1.0 INTRODUCTION  
2.0 GENERAL INFORMATION**

**FCC 15.407 (U-NII) RESULTS**

- 3.0 CONDUCTED EMI MEASUREMENTS**
- 4.0 RADIATED EMI MEASUREMENTS**
- 5.0 PEAK OUTPUT POWER**
- 6.0 CHANNEL BANDWIDTH**
- 7.0 PEAK POWER SPECTRAL DENSITY**
- 8.0 PEAK EXCURSION**
- 9.0 FREQUENCY STABILITY**
- 10.0 DYNAMIC FREQUENCY SELECTION**
- 11.0 DISCONTINUE TRANSMISSION**
- 12.0 RADIO FREQUENCY EXPOSURE**
- 13.0 ANTENNA REQUIREMENT**
- 14.0 COMPLIANCE STATEMENT**
- 15.0 MEASUREMENT UNCERTAINTIES**
- 16.0 TEST REPORT APPENDICES**

**APPENDIX A: MEASUREMENT INSTRUMENT DETAILS**

**APPENDIX B: PHOTOGRAPHS**

**APPENDIX C: FUNCTIONAL DESCRIPTION**

**APPENDIX D: BLOCK DIAGRAM**

**APPENDIX E: ANTENNA INFORMATION**

**APPENDIX F: FCC LABELLING DETAILS**

**APPENDIX G: USER MANUAL**

**Attachment 1: RF Exposure Information**

**Attachment 2: FCC DOC for LifeBook T Series**

**Attachment 3: FCC Part 15B Test Report (Report: FG08-052EAL)**

**Attachment 4: Part 15.407 Test Report (Report: 08U11571-2B) PART 1**

**Attachment 5: Part 15.407 Test Report (Report: 08U11571-2B) PART 2**

**FCC 15.247 (DTS) RESULTS - WLAN**

**Refer to Report No: M080414\_Cert\_AR5BHB92\_DTS\_BT**



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**to**  
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**Report No. M080414\_Cert\_AR5BHB92\_NII\_BT**

**Test Sample:** LifeBook T Series  
**Model:** T1010  
**Radio Modules:** HB92 2x2 Half Mini-PCI WLAN Module, Model: AR5BHB92(Atheros Communications)  
Bluetooth Module, Model: EYSMJCS (TAIYO YUDEN)

**FCC ID:** EJE-WB0059  
**Industry Canada ID:** 337J-WB0059  
**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

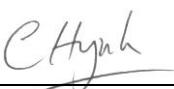
**Test Standards:** FCC Part 15 – Radio Frequency Devices (September 2007)  
FCC Part 15, Subpart E – Unlicensed National Information, Infrastructure Devices  
FCC Part 15.407, General Technical Requirements  
ANSI C63.4 – 2003  
OET Bulletin No. 65

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:** 5<sup>th</sup> April to 18 May 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**



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

## 1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: T1010 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). Under the following conditions, the Bluetooth modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory, without further testing required: (1) The Bluetooth radio is a low power device with a Peak Output Power of less than 5 mW and (2) The spacing between Bluetooth antenna and other transmitting antennas are greater than 5 cm apart.

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 802.11b, IEEE 802.11g, IEEE 802.11a and IEEE 802.11n are reported in this test report.

The DTS results are reported separately.

Refer to EMC Technologies' test report: M080414\_Cert\_AR5BHB92\_DTS\_BT (DTS).

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

**Note 1:** Refer to Attachment 3, FCC Part 15B test report: FG08-052EAL dated May 15 2008

**Note 2:** Refer to Attachment 4, FCC 15.407 test report: 08U11571-1 dated March 20 2008

**Note 3:** Refer to Attachment 5, FCC 15.407 test report: 08U11571-2B dated March 20 2008

### 1.1.2 FCC Subpart C, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M080414\_Cert\_AR5BHB92\_DTS\_BT

## 1.2 Modifications by EMC Technologies

No modifications were required.



## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 EUT (WLAN) Details

<b>Transmitter:</b>	Half Mini-Card Wireless LAN Module
<b>Wireless Module:</b>	HB92 (11a/b/g/n)
<b>Model Number:</b>	AR5BHB92
<b>Manufacturer:</b>	Atheros Communication Inc,
<b>Modulation Type:</b>	Direct Sequence Spread Spectrum (DSSS for 802.11b) Orthogonal Frequency Division Multiplexing (OFDM for 802.11a/g/n)
<b>2.4 GHz (802.11b/g/n):</b>	DBPSK, DQPSK, CCK, 16QAM and 64QAM
<b>5 GHz (802.11a/n):</b>	BPSK, QPSK, 16QAM and 64QAM
<b>Maximum Data Rate:</b>	802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps 802.11n = 300 Mbps
<b>Frequency Ranges:</b>	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
<b>Number of Channels:</b>	11 channels for 11b/g/n 24 channels for 11a/n with 20 MHz bandwidth 18 channels for 11n with 40 MHz bandwidth
<b>Antenna Types:</b>	Tx: Nissei Electric Inverted F Antenna Model: CP405102 and CP405101 Location: Top edge of LCD screen
<b>Antenna gain:</b>	Max antenna gain is less than 6 dBi. Refer antenna data provided separately
<b>Power Supply:</b>	3.3 VDC from PCI bus

#### Channels Tested and Output power setting:

Modes	Channels	Frequency MHz	Average Output Power (dBm)
<b>802.11b/g</b>	1, 6 and 11*	2412, 2437 and 2462	14.0
<b>802.11a</b>	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	
<b>802.11n 20MHz Bandwidth</b>	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	
	3*	2422	12.0
<b>802.11n 40MHz Bandwidth</b>	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 (M080414\_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 (Notebook PC) Details

<b>EUT:</b>	LifeBook T series
<b>Model Name:</b>	T1010
<b>Serial Number:</b>	Pre-production Sample
<b>Manufacturer:</b>	FUJITSU LIMITED
<b>CPU Type and Speed:</b>	Core2 Duo T9600 2.8GHz
<b>LCD:</b>	13.3"WXGA (LED: T5010, CCFL: T1010)
<b>Wired LAN:</b>	Intel 82567LM : 10 Base-T/100 Base-TX/1000Base-T(T5010) Marvell 88E8055 : 10 Base-T/100 Base-TX/1000Base-T(T1010)
<b>Modem:</b>	Agere MDC1.5 modem Model: D40
<b>Port Replicator Model:</b>	FPCPR85
<b>AC Adapter Model:</b>	SEC100P2-19.0(Sanken) / SEC100P3-19.0(Sanken, 3pin) / ADP-80NB A(Delta) / SED100P2-19.0(Sanken)
<b>Voltage:</b>	19 V
<b>Current Specs:</b>	4.22A
<b>Watts:</b>	80W

## 2.3 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.

## 2.4 Technical Description

Refer to Appendix C for details

## 2.5 Block Diagram

Refer to Appendix D - Block Diagram

## 2.6 Support Equipment

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG08-052EAL)

## 2.7 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.



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## 2.8 Test Facility

### 2.8.1 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.**

### 2.8.2 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](http://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<sup>2</sup>LA).

## 2.9 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

## 2.10 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: FG08-052EAL)

### 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.

The EUT was set up on the table top (placed on turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The test frequency range was sub-divided into smaller bands with sufficient frequency resolution to permit reliable display and identification of possible EMI peaks while also permitting fast frequency scan times. 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: FG08-052EAL).

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 dB $\mu$ V/m.

**V** = EMI Receiver Voltage in dB $\mu$ V. (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 dB $\mu$ V 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:

$$34.0 + 9.2 + 1.9 - 20 = 25.1 \text{ dB}\mu\text{V/m}$$

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

### 4.3.1 Frequency Band: 1 – 40 GHz

All measurements above 1 GHz were initially made over a distance of 3 metres. This was decreased to 1.0 metre as the emission levels from the device were very low.

The peak limits for undesirable emission outside of the restricted bands are –27 dBm (68.3 dB $\mu$ V/m @ 3m). The 74 dB $\mu$ V/m @ 3m and 54 dB $\mu$ V/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 M080414\_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 dB $\mu$ V/m	Average Detector dB $\mu$ V/m	Peak Limit dB $\mu$ V/m	Average Limit dB $\mu$ V/m	Result
802.11a	6 Mbps	5180	96.6	86.4	-	-	-
		5150	50.0	35.1	74.0	54.0	Complies
802.11n	MCS0	5180	96.7	86.3	-	-	-
		5150	51.0	35.3	74.0	54.0	Complies
802.11n	MCS8	5180	96.0	85.1	-	-	-
		5150	50.0	35.0	74.0	54.0	Complies

#### Channel 40 - 5200 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dB $\mu$ V/m	Average Detector dB $\mu$ V/m	Peak Limit dB $\mu$ V/m	Average Limit dB $\mu$ V/m	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5200	101.3	89.2	-	-	-
		10400	50.7	37.3	68.3	-	Complies
		15600	56.8	42.2	74.0	54.0	Complies
802.11n	MCS0	5200	101.0	88.7	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					
802.11n	MCS8	5200	100.1	86.4	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					



**Channel 48 - 5240 MHz, Tx BW = 20 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5240	100.7	89.1	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS0	5240	100.4	89.0	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5240	100.0	86.7	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					

**Channel 52 - 5260 MHz, Tx BW = 20 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5260	100.3	88.9	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS0	5260	99.8	88.3	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5260	99.1	86.5	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					

**Channel 60 - 5300 MHz, Tx BW = 20 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5300	98.9	88.0	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS0	5300	98.7	88.2	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5300	98.4	86.6	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					



**Channel 64 - 5320 MHz, Tx BW = 20 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5320	98.6	87.9	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
		5350	51.5	36.2	74.0	54.0	Complies
802.11n	MCS0	5320	98.9	88.3	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					
802.11n	MCS8	5320	98.8	87.4	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					

**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	100.5	90.4	-	-	-
		5470	60.0	40.9	68.3	-	Complies
802.11n	MCS0	5500	101.0	94.9	-	-	-
		5470	63.4	43.8	68.3	-	Complies
802.11n	MCS8	5500	100.7	90.0	-	-	-
		5470	61.1	41.9	68.3	-	Complies

**Channel 120 - 5600 MHz, Tx BW = 20 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5600	99.7	89.0	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS0	5600	100.1	89.7	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5600	100.0	89.5	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					



## Channel 140 - 5700 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11a	6 Mbps	5700	98.3	88.4	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
		5725	61.4	43.2	68.0	-	Complies
802.11n	MCS0	5700	89.7	88.7	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					
802.11n	MCS8	5700	98.6	87.1	-	-	-
		Others harmonics and spurious emissions results are similar to the 6 Mbps data rates.					

## Channel 38 - 5190 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5190	94.9	84.6	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
		5150	62.5	46.9	74.0	54.0	Complies
802.11n	MCS8	5190	93.8	82.8	-	-	-
		Others harmonics and spurious emissions results are lower than to the MCS0 data rates.					

## Channel 54 - 5270 MHz, Tx BW = 40 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5270	97.6	85.8	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
		5270	98.0	83.1	-	-	-
802.11n	MCS8	Others harmonics and spurious emissions results are similar to the MCS0 Mbps data rates.					



**Channel 62 - 5310 MHz, Tx BW = 40 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5310	96.3	84.7	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5350	62.1	48.5	74.0	54.0	Complies
		5310	95.1	83.4	-	-	-
		Others harmonics and spurious emissions results are lower than to the MCS0 data rates.					

**Channel 102 - 5510 MHz, Tx BW = 40 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5510	92.5	81.5	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5470	63.7	49.4	68.3	-	Complies
		5510	92.0	81.1	-	-	-
		Others harmonics and spurious emissions results are lower than to the MCS0 data rates.					

**Channel 118 - 5590 MHz, Tx BW = 40 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5590	91.3	80.0	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5590	90.8	79.2	-	-	-
		Others harmonics and spurious emissions results are similar to the MCS0 Mbps data rates.					



**Channel 134 - 5670 MHz, Tx BW = 40 MHz**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit	Average Limit	Result
					dBuV/m	dBuV/m	
802.11n	MCS0	5670	93.1	81.9	-	-	-
		Others harmonics and spurious emissions results are similar to channel 40.					
802.11n	MCS8	5670	92.0	80.2	-	-	-
		Others harmonics and spurious emissions results are lower than to the MCS0 data rates.					

**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 5.5 dB.

**4.3.2 Frequency Band: 30 - 1000 MHz**

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

Results: Complied - refer to attachment 3 – FCC Part 15B test report number: FG08-052EAL dated: May 15 2008.

**4.3.3 RF Conducted Measurements at the antenna terminal**

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.

**4.3.4 Radiated Band Edge Measurements**

Complied (refer to section 4.3 – radiated emissions).



## 5.0 PEAK OUTPUT POWER - Section 15.407(a)

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.

## 6.0 CHANNEL BANDWIDTH

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.

## 7.0 PEAK POWER SPECTRAL DENSITY

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.

## 8.0 PEAK EXCURSION

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.

## 9.0 FREQUENCY STABILITY

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

Results: Complied – refer to attachment 4, FCC 15.407 test report number: 08U11571-1 dated March 20 2008 with FCC ID: PPD-AR5BHB92.

## 10.0 DYNAMIC FREQUENCY SELECTION

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

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

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.

Results: Complied – refer to attachment 5, FCC 15.407 test report number: 08U11571-2B dated March 20 2008 with FCC ID: PPD-AR5BHB92.



## 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 this section and also section 2.1093 this device has been defined as a portable device.

SAR testing was performed in accordance with OET Bulletin 65 and reported under EMC Technologies reports M080405\_Cert\_AR5BHB92\_SAR\_2.4 (2.4 GHz) and M080405\_Cert\_AR5BHB92\_SAR\_5.6 (5.18 – 5.825 GHz). SAR value of 0.144 mW/g is measured which complies with the FCC human exposure requirements of 47 CFR 2.1093 (d).

## 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.



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## 14.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: T1010 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
<b>15.203</b>	5.5	Antenna Requirement	<b>Complies</b>
<b>15.205</b>	6.3	Operation in Restricted Band	<b>Complies</b>
<b>15.207</b>	6.6	Conducted Emissions	<b>Note 1</b>
<b>15.209</b>	6.3	Radiated Emissions	<b>Complies</b>
<b>15.407 (a)(1) (a)(2)</b>	Annex A9.2	Peak Transmit Power	<b>Note 2</b>
<b>15.407 (a)(5)</b>	Annex A9.2	Peak Power Spectral Density	<b>Note 2</b>
<b>15.407 (a)(6)</b>		Peak Excursion	<b>Note 2</b>
<b>15.407 (b)</b>	Annex A9.3	Undesirable Emission	<b>Complies</b>
<b>15.407 (c)</b>	Annex A9.5(4)	Discontinue Transmission	<b>Complies</b>
<b>15.407 (d)</b>		Reserved	-
<b>15.407 (e)</b>	2.2 (Table 1)	Restricted to Indoor Operations	<b>Complies</b>
<b>15.407 (f)</b>	RSS-Gen (5.5)	Radio Frequency Hazard	<b>Complies</b>
<b>15.407 (g)</b>	Annex A9.5(5)	Frequency Stability	<b>Note 2</b>
<b>15.407 (h)</b>		Transmit Power Control	<b>Not Applicable</b> E.I.R.P < 500 mW
<b>15.407 (h)</b>	Annex A9.4	Dynamic Frequency Selection	<b>Note 3</b>

**Note 1:** Refer to Attachment 3, FCC Part 15B test report: FG08-052EAL dated May 15 2008

**Note 2:** Refer to Attachment 4, FCC 15.407 test report: 08U11571-2B dated March 20 2008

**Note 3:** Refer to Attachment 5, FCC 15.407 test report: 08U11571-2B dated March 20 2008

### FCC Subpart E, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M080414\_Cert\_AR5BHB92\_DTS\_BT



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## 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:

<b>Conducted Emissions:</b>	9 kHz to 30 MHz	±3.2 dB
<b>Radiated Emissions:</b>	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: FUNCTIONAL DESCRIPTION**

**APPENDIX D: BLOCK DIAGRAM**

**APPENDIX E: ANTENNA INFORMATION**

**APPENDIX F: FCC LABELLING DETAILS**

**APPENDIX G: USER MANUAL**

**Attachment 1: RF Exposure Information**

**Attachment 2: FCC DOC for LifeBook T Series**

**Attachment 3: FCC Part 15B Test Report (Report: FG08-052EAL)**

**Attachment 4: Part 15.407 Test Report (Report: 08U11571-2B) PART 1**

**Attachment 5: Part 15.407 Test Report (Report: 08U11571-2B) PART 2**



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