EMC Technologies Pty Ltd
ABN 82 057 105 549
176 Harrick Road
Keilor Park Victoria Australia 3042

Ph: + 613 9365 1000
Fax: + 613 9331 7455
email: melb@emctech.com.au

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.247) & RSS-210

FCC ID:	EJE-WB0051
Industry Canada ID:	337J-WB0051
Test Sample:	LifeBook T Series
Model:	T2010
Radio Modules:	AR5BXB6 XB62 Atheros Mini-PCI WLAN Module & EYTF3CSFT Bluetooth Module
Report Number:	M070613_Cert_AR5BXB6_DTS_BT
Tested for:	Fujitsu Australia Ltd.
Issue Date:	10th July 2007

NATA Accredited Laboratory Number: 5292

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Test Sample:	LifeBook T Series
Model:	T2010
Radio Modules:	XB62 Mini-PCI WLAN Module, Model: AR5BXB6 (Atheros Communications.) Bluetooth Module, Model: EYTF3CSFT (TAIYO YUDEN)
FCC ID:	EJE-WB0051
Industry Canada ID:	337J-WB0051
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
Tested for:	Fujitsu Australia Ltd
Test Standards:	FCC Part 15 – Radio Frequency Devices (August 2006) FCC Part 15 Subpart C - Intentional Radiators Section 15.247: 2400 – 2483.5 MHz & 5725 – 5850 MHz Operation Bands ANSI C63.4 – 2003 OET Bulletin No. 65 RSS-210 Issue 7 Low Power Licence-Exempt RadioCommunication Devices Annex 8: 2400–2483.5 MHz & 5725–5850 MHz Operation Bands 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:	21st June to 8th July 2007

Senior Test Engineer:

Chieu Huynh - B.Eng (Hons) Electronics/ Communications
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:

Chris Zombolas
Technical Director
EMC Technologies Pty Ltd

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart C (Section 15.247) & RSS-210

1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: T2010 with Atheros Mini-PCI Wireless LAN Module (XB62 11a+b/g), Model: AR5BXB6 & TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT.

The XB62 WLAN module was originally certified by Atheros as a modular approval under FCC ID: PPD-AR5BXB6-M (Canada ID: 4104A-AR5BXB6). 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: RYYEYTF3CSFT (Canada ID: 4389AEYTF3CSFT). The Radio modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

The XB62 WLAN supports IEEE 802.11b, IEEE 802.11g and IEEE 802.11a (DTS & U-NII) configurations. Tests were performed in all configurations and also on the Bluetooth.

DTS results for configurations IEEE 802.11b, IEEE 802.11g and IEEE 802.11a are reported in this test report.

The U-NII and DSS (Bluetooth) results are reported separately.
Refer to EMC Technologies' test report: M070613_Cert_AR5BXB6_NII_BT (U-NII) and M070613_Cert_EYTF3CSFT_WLAN (Bluetooth).

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

47 CFR, Part 15, Subpart C:	Rules for intentional radiators (particularly section 15.247)
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 15.247:	Operation in the bands 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz

The test sample **complied** with the requirements of 47 CFR, Part 15 Subpart C - Section 15.247.

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 8 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 C, Section 15.247

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Issue 7 and RSS-Gen Clauses	Test Performed	Results
15.203	RSS-Gen (7.1.4)	Antenna Requirement	**Complies**
15.205	2.2 (Table 1)	Operation in Restricted Band	**Complies**
15.207	RSS-Gen (7.2.2)	Conducted Emissions	**Complies**
15.209	RSS-Gen (6)	Radiated Emissions	**Complies**
15.247 (a)(2)	A8.1 (b) (d)	Channel Bandwidth	**Complies**
15.247 (b)(3)	A8.4	Peak Output Power	**Complies**
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	**Not Applicable.** Antenna gain < 6 dBi
15.247 (d)	A8.5	Out of Band Emissions	**Complies**
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	**Complies**
15.247 (f)	A8.3	*Hybrid Systems	**Not Applicable.** EUT does not employ a hybrid system
15.247 (g)	A8.1	Frequency Hopping	**Not Applicable.** EUT does not employ frequency hopping
15.247 (h)	A8.1	Frequency Hopping	**Not Applicable.** EUT does not employ frequency hopping
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	**Complies**

*Hybrid systems are those that employ a combination of both frequency hopping and digital modulations technique.

1.1.2 FCC Subpart E, Section 15.407 - WLAN

Refer to EMC Technologies Report No: M070613_Cert_AR5BXB6_NII_BT

1.1.3 FCC Subpart C, Section 15.247 – Bluetooth

Refer to EMC Technologies Report No: M070613_Cert_EYTF3CSFT_WLAN

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:	Mini-Card Wireless LAN Module
Wireless Module:	XB62 (11a+b/g)
Model Number:	AR5BXB6
Manufacturer:	Atheros
Modulation Type:	Direct Sequence Spread Spectrum (DSSS for 802.11b) Orthogonal Frequency Division Multiplexing (OFDM for 802.11a/g)
802.11a/g:	BPSK – 6Mbps, 9Mbps QPSK – 12Mbps, 18Mbps 16QAM – 24Mbps, 36Mbps 64QAM – 48Mbps, 54Mbps Turbo mode: 12 Mbps - 108 Mbps
802.11b:	DBPSK – 1Mbps DQPSK – 2Mbps CCK – 5.5Mbps, 11Mbps
Frequency Range:	2.4 –2483.5 GHz for 11b/g 5.15 - 5.35 GHz, 5.47 – 5.725 GHz and 5.725 - 5.850 GHz for 11a
Antenna Types:	Tx: Yokowo Monopole Antenna Model: CP338043 (T1: Right), CP338042 (T2: Left) Location: Top edge of LCD screen
Antenna gain:	Max antenna gain is less than 6 dBi.
Power Supply:	3.3 VDC from PCI bus

Frequency Allocation Table:

Band	Channel	Lower Freq.	Upper Freq.	WWF1	WWF2	JPF4	KRF1
802.11b/g	1-11	2.412GHz	2.462GHz	X	X	X	X
802.11b/g	12-13	2.467GHz	2.472GHz		X	X	X
802.11a	36-48	5.150GHz	5.250GHz	X	X	X(Note1)	X
802.11a	52-64	5.250GHz	5.350GHz	X	X	X	X
802.11a	100-140	5.470GHz	5.725GHz	X	X		X
802.11a	149-165	5.725GHz	5.850GHz	X	X		X

Note 1: Odd channel support

Channels Tested and Output power setting:

Channel and Mode:	Output Power setting (average, dBm)
802.11b mode	
*Channel 1, 6 and 11	17 (1 Mbps to 11 Mbps)
802.11g mode	
*Channel 1, 6 and 11	16 (6 Mbps to 48 Mbps)
*Channel 1, 6 and 11	15 (54 Mbps)
802.11a mode	
**Channel 36, 52, 64, 100, 120 and 140	16 (6 Mbps to 36 Mbps)
**Channel 36, 52, 64, 100, 120 and 140	14 (48 Mbps)
**Channel 36, 52, 64, 100, 120 and 140	13 (54 Mbps)
*Channels 149, 152, 157, 160 and 165	16 (6 Mbps to 36 Mbps)
*Channels 149, 152, 157, 160 and 165	14 (48 Mbps)
*Channels 149, 152, 157, 160 and 165	11 (54 Mbps)

*Channels tested and reported in this report

**Channels tested and reported in the U-NII submission (M070613_Cert_AR5BXB6_NII_BT)

2.2 EUT (Bluetooth) Details

Transmitter:	Bluetooth
Model Number:	EYTF3CS FT
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:	Taiyo Yuden Monopole Antenna, Model: CP331590 Location: Right palm rest area
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	
-	-	
39	2440	
40*	**2441**	
41	2442	
-	-	
78	2479	
79*	**2480**	

*Channels tested and reported in the Bluetooth submission (M070613_Cert_EYTF3CSFT_WLAN)

2.3 EUT (Notebook PC) Details

EUT:	LifeBook T series
Model Name:	T2010
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Core2 Duo U7600 1.2GHz/ U7500 1.06GHz
LCD	12.1”WXGA
Wired LAN:	Marvell 88E8055 : 10 Base-T/100 Base-TX/1000Base-T
Modem:	Agere MDC1.5 modem Model: D40
Port Replicator Model:	FPCPR77/ FPCPR79/ FPCPR80
AC Adapter Model:	60W:SEC80N2-16.0 (Sanken)
Voltage:	16 V
Current Specs:	3.75A
Watts:	60W

2.4 Operational Description

The Atheros WLAN test software "ART" was used to transmit continuously during the tests. For Spurious and Harmonics tests both radio modules (WLAN and Bluetooth) were simultaneously transmitting.

2.5 Test Configuration

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

2.6 Technical Specifications

Refer to Appendix G for details

2.7 Block Diagram

Refer to Appendix D - Block Diagram

2.8 Support Equipment

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG07-087EAL).

2.9 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.

2.10 Test Facility

2.10.1 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 Tullamarine, 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 4161.

2.10.2 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).

2.11 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

2.12 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 15.247 (DTS) 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: FG07-087EAL).

4.0 SPURIOUS EMISSION MEASUREMENTS

4.1 Test Procedure

Testing was performed in accordance with the requirements of FCC Part 15.247(d).

Radiated emission measurements were performed to the limits as per section 15.209. 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: FG07-087EAL).

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 Radiated 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 74 dBμV/m @ 3m and 54 dBμV/m @ 3m limits are applied for emissions fall in the restricted bands. The limits for emission outside the restricted band are 20 dB below the fundamental field strength.

Testing was performed while both the WLAN transmitter and Bluetooth transmitter continuously operated. Emissions related to the WLAN transmitter (2.4 – 2.4835 GHz and 5.725 – 5.850 GHz) is reported below. Emissions in the frequency band (5.15 – 5.35 GHz and 5.47 – 5.725 GHz), refer to M070613_Cert_AR5BXB6_NII_BT. Emissions related to the Bluetooth transmitter refer to M070613_Cert_EYTF3CSFT_WLAN.

4.3.1.1 Configuration 802.11b

Initial investigations were performed with all data rates: (1 Mbps to 11 Mbps). Peak measurements with 11 Mbps were observed to be worst. However, average measurements are worst with 1 Mbps. Final testing was performed while the transmitter continuously operated with the data rate of 1 Mbps.

Channel 1 - 2412 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2412	105.3	101.9	-	-	-
4824	53.3	49.6	74.0	54.0	Complies
7236	45.6	34.7	74.0	54.0	Complies
2390	57.7	52.2	74.0	54.0	Complies

Channel 6 - 2437 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2437	106.7	103.2	-	-	-
4874	56.1	52.4	74.0	54.0	Complies
7311	49.6	39.8	74.0	54.0	Complies

Channel 11 - 2462 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2462	107.2	103.7	-	-	-
4924	56.8	53.7	74.0	54.0	Complies
7386	50.3	41.6	74.0	54.0	Complies
2483.5*	68.5	63.5	84.5	64.5	Complies

*Measurement was performed at 1 m distance and the limits were corrected accordingly.

Result: Harmonic emissions were recorded up to 25 GHz. Other harmonics and spurious were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247 by a margin of 1.0 dB.

4.3.1.2 Configuration 802.11g

Initial investigations were performed with all data rates: (6 Mbps to 108 Mbps). No significant in emissions were observed. Final testing was performed while the transmitter continuously operated with the data rate of 6 Mbps (normal mode) and 12 Mbps (turbo mode).

Channel 1 - 2412 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2412	105.7	96.1	-	-	-
4824	48.5	35.8	74.0	54.0	Complies
7236	45.5	33.7	74.0	54.0	Complies
2390	68.8	53.1	74.0	54.0	Complies

Channel 6 - 2437 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2437	107.2	97.3	-	-	-
4874	51.1	37.2	74.0	54.0	Complies
7311	49.4	35.6	74.0	54.0	Complies

Channel 11 - 2462 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2462	106.6	96.8	-	-	-
4924	51.8	37.1	74.0	54.0	Complies
7386	48.7	35.4	74.0	54.0	Complies
2483.5*	82.4	63.8	84.5	64.5	Complies

*Measurement was performed at 1 m distance and the limits were corrected accordingly.

Channel 6 TURBO - 2437 MHz

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2437	104.4	94.9	-	-	-
4874	49.6	36.0	74.0	54.0	Complies

Result: Harmonic emissions were recorded up to 25 GHz. Other harmonics and spurious were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247 by a margin of 0.7 dB.

4.3.1.3 Configuration 802.11a

Initial investigations were performed with all data rates: (6 Mbps to 108 Mbps). No significant in emissions were observed. Final testing was performed while the transmitter continuously operated with the data rate of 6 Mbps (normal mode) and 12 Mbps (turbo mode).

Channel 149 - 5745 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5745	108.3	97.3	-	-	-
11490	67.4	51.2	74.0	54.0	Complies
5725	80.2	61.8	88.3	77.3	Complies

Channel 157 - 5785 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5785	108.0	97.1	-	-	-
11570	65.9	50.6	74.0	54.0	Complies

Channel 165 - 5825 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5825	107.6	97.0	-	-	-
11650	68.5	52.8	74.0	54.0	Complies
5850	71.9	57.6	87.6	77.0	Complies

Channel 152 TURBO - 5760 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5760	104.3	94.4	-	-	-
11520	64.5	47.8	74.0	54.0	Complies
5725	73.1	59.7	84.3	74.4	Complies

Channel 160 TURBO - 5800 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5800	104.0	94.1	-	-	-
11600	63.4	47.9	74.0	54.0	Complies
5850	69.1	55.2	84.0	74.1	Complies

Result: Harmonics were recorded up to 40 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions were complied with the FCC limits in sections 15.209 and 15.247 by a margin of 1.2 dB.

4.3.1.4 Both WLAN and Bluetooth Transmitters Transmitting

Result: IM spurious emissions were recorded up to 40 GHz. Emissions complied with the FCC limits of section 15.209 and 15.247.

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 (Report: FG07-087EAL).

4.3.3 RF Conducted Measurements at the Antenna Terminal

In the 100 kHz bandwidth within the operating band, the highest emissions (spurious/harmonics) level that is produced by the intentional radiator shall be at least 20 dB below.

The transmitter output was connected to the spectrum analyser in peak hold mode.

The resolution bandwidth of 300 kHz and the video bandwidth of 300 kHz were utilised.

D1 line indicates the 20 dB limit below the highest level of the transmitter

Configuration 802.11a (5.725 – 5.850 GHz)
Refer to Appendix K1 for Harmonics plots

Configuration 802.11b
Refer to Appendix K2 for Harmonics plots

Configuration 802.11g
Refer to Appendix K3 for Harmonics plots

Results: Complied.

4.3.4 Band Edge Measurements

Configuration 802.11b

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2390	57.7	52.2	74.0	54.0	Complies
2483.5*	68.5	63.5	84.5	64.5	Complies

*Measurement was performed at 1 m distance and the limits were corrected accordingly.

Configuration 802.11g

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2390	68.8	53.1	74.0	54.0	Complies
2483.5*	82.4	63.8	84.5	64.5	Complies

*Measurement was performed at 1 m distance and the limits were corrected accordingly.

Configuration 802.11a

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5725	80.2	61.8	88.3	77.3	Complies
5850	69.1	55.2	84.0	74.1	Complies

Results: Complied (as per section 4.3.1 – radiated emissions).

5.0 PEAK OUTPUT POWER - Section 15.247 (b)(3)

Testing was performed in accordance with the requirements of FCC Part 15.247(b)(3).

Measurements were performed while the WLAN transmitter continuously transmitted.

The maximum antenna gains were less than 6 dBi.

The peak output power measurement was performed using an integration method as per test method # 3 of DA 02-2138. The resolution bandwidth of 1 MHz was used. The video bandwidth (VBW) of 30 kHz was used.

VBW $\geq$ 1/T, where T (worst case) = 180 μS at 108 Mbps for 802.11a and 802.11g.
= 360 μS at 54 Mbps for 802.11a and 802.11g.
= 1890 μS at 11 Mbps for 802.11b.

Variation by +/- 15% of the supply voltage, in accordance with Section 15.31(e), to the computer power supply did not vary the output power observed.

5.1 Configuration 802.11a

Initial investigations were performed with all data rates: (6 Mbps to 108 Mbps). Peak output power with 24 Mbps was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the data rate of 24 Mbps (normal mode) and 48 Mbps (turbo mode).

Frequency MHz	Operating Mode	Power dBm	Limit dBm	Power mW	Limit mW	Result
5745	Normal	16.5	30	44.7	1000	Complies
5760	Turbo	16.6	30	45.7	1000	Complies
5785	Normal	16.8	30	47.9	1000	Complies
5800	Turbo	17.0	30	50.0	1000	Complies
5825	Normal	16.9	30	49.0	1000	Complies

5.2 Configuration 802.11b

Initial investigations were performed with all data rates: (1 Mbps to 11 Mbps). Peak output power with 11 Mbps was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the data rate of 11 Mbps.

Frequency MHz	Operating Mode	Power dBm	Limit dBm	Power mW	Limit mW	Result
2412	Normal	17.3	30	53.7	1000	Complies
2437	Normal	17.0	30	50.0	1000	Complies
2462	Normal	17.6	30	57.5	1000	Complies

5.3 Configuration 802.11g

Initial investigations were performed with all data rates: (6 Mbps to 108 Mbps). Peak output power with 24 Mbps was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the data rate of 24 Mbps (normal mode) and 48 Mbps (turbo mode).

Frequency MHz	Operating Mode	Power dBm	Limit dBm	Power mW	Limit mW	Result
2412	Normal	16.2	30	41.7	1000	Complies
2437	Normal	16.4	30	43.7	1000	Complies
2437	Turbo	16.5	30	44.7	1000	Complies
2462	Normal	16.7	30	46.8	1000	Complies

6.0 CHANNEL BANDWIDTH

Testing was performed in accordance with the requirements of FCC Part 15.247(a)(2)

In the bands 2400 - 2483.5 MHz and 5725 - 5850 MHz, the minimum 6 dB bandwidth was at least 500 kHz. The 6 dB bandwidth was measured while the transmitter continuously transmitted.

The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised

The minimum 6 dB bandwidth is at least 500 kHz

6.1 Configuration 802.11a

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). No significant differences in bandwidth were observed. Final testing was performed while the transmitter continuously operated with the modulation rate of 54 Mbps (normal mode) and 108 Mbps (turbo mode).

Frequency MHz	Operating Mode	Bandwidth MHz	Result	6 dB Bandwidth Plots
5745	Normal	16.6	Complies	Appendix J1
5760	Turbo	33.1	Complies	Appendix J1
5785	Normal	16.6	Complies	Appendix J1
5800	Turbo	33.1	Complies	Appendix J1
5825	Normal	16.6	Complies	Appendix J1

6.2 Configuration 802.11b

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). No significant differences in bandwidth were observed. Final testing was performed while the transmitter continuously operating with the modulation rate of 11 Mbps (CCK).

Frequency MHz	Operating Mode	Bandwidth MHz	Result	6 dB Bandwidth Plots
2412.0	Normal	11.5	Complies	Appendix J2
2437.0	Normal	11.3	Complies	Appendix J2
2462.0	Normal	11.2	Complies	Appendix J2

6.3 Configuration 802.11g

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM).). No significant differences in bandwidth were observed. Final testing was performed while the transmitter continuously operated with the modulation rate of 54 Mbps (normal mode) and 108 Mbps (turbo mode).

Frequency MHz	Operating Mode	Bandwidth MHz	Result	6 dB Bandwidth Plots
2412	Normal	16.6	Complies	Appendix J3
2437	Normal	16.6	Complies	Appendix J3
2437	Turbo	33.0	Complies	Appendix J3
2462	Normal	16.6	Complies	Appendix J3

7.0 PEAK POWER SPECTRAL DENSITY

Testing was performed accordance with the requirements of FCC Part 15.247(e)

The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

The resolution bandwidth of 3 kHz and the video bandwidth of 30 kHz were utilised

The specification limit is 8 dBm in any 3 kHz band during a continuous transmission.

7.1 Configuration 802.11a

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). Peak power spectral density with BPSK modulation was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the modulation rate of 6 Mbps (normal mode) and 12 Mbps (turbo mode).

Frequency MHz	Operating Mode	Level dBm	Limit dBm	Result	Spectral Density plots
5745	Normal	-8.5	8.0	Complies	Appendix L1
5760	Turbo	-11.5	8.0	Complies	Appendix L1
5785	Normal	-8.2	8.0	Complies	Appendix L1
5800	Turbo	-8.1	8.0	Complies	Appendix L1
5825	Normal	-8.6	8.0	Complies	Appendix L1

7.2 Configuration 802.11b

Initial investigations were performed with three modulation types: (DBPSK, DQPSK and CCK). Peak power spectral density with CCK modulation (rate = 11 Mbps) was observed to be slightly worst. Final testing was performed while the transmitter continuously operating with the modulation rate of 11 Mbps (CCK).

Frequency MHz	Operating Mode	Level dBm	Limit dBm	Result	Spectral Density plots
2412.0	Normal	-3.2	8.0	Complies	Appendix L2
2437.0	Normal	-4.5	8.0	Complies	Appendix L2
2462.0	Normal	-2.6	8.0	Complies	Appendix L2

7.3 Configuration 802.11g

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). No significant differences in peak power spectral density were observed. Final testing was performed while the transmitter continuously operated with the modulation rate of 54 Mbps (normal mode) and 108 Mbps (turbo mode).

Frequency MHz	Operating Mode	Level dBm	Limit dBm	Result	Spectral Density plots
2412.0	Normal	-5.0	8.0	Complies	Appendix L3
2437.0	Normal	-1.6	8.0	Complies	Appendix L3
2437.0	Turbo	-6.3	8.0	Complies	Appendix L3
2462.0	Normal	-1.1	8.0	Complies	Appendix L3

8.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

Testing was performed in accordance with the requirements of FCC Part 15.247(i)

Spread spectrum transmitters operating in the 2400 - 2483.5 MHz and 5725 – 5850 MHz bands 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).

Transmitter # 1 (WLAN): The antennas location: Top edge of LCD screen and projected distance of less than 20cm from user.

Transmitter # 2 (Bluetooth): The antenna location: Right palm rest area and projected distance of less than 20cm from user.

The separation distance between the WLAN and BT antennas is less than 20cm. Therefore, they are co-located transmitters. Testing was performed with both WLAN and BT transmitters transmitting continuously.

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. The highest SAR value measured 1.59 mW/g and complies with the FCC human exposure requirements of 47 CFR 2.1093 (d). Refer to EMC Technologies reports M070614_Cert_AR5BXB6_SAR_2.4 and M070614_Cert_AR5BXB6_SAR_5.6.

9.0 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.

10.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: T2010 with Atheros Mini-PCI Wireless LAN Module (XB62 11a+b/g), Model: AR5BXB6 and Bluetooth Module, Model: EYTF3CSFT, tested on behalf of Fujitsu Australia Ltd, **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators), Section 15.247 - Operation in the frequency band 2400 - 2483.5 MHz and 5725 – 5850 MHz.

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 8 and the RF exposure requirements of RSS-102.

Results were as follows:

FCC Subpart C, Section 15.247

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Issue 7 and RSS-Gen Clauses	Test Performed	Results
15.203	RSS-Gen (7.1.4)	Antenna Requirement	**Complies**
15.205	2.2 (Table 1)	Operation in Restricted Band	**Complies**
15.207	RSS-Gen (7.2.2)	Conducted Emissions	**Complies**
15.209	RSS-Gen (6)	Radiated Emissions	**Complies**
15.247 (a)(2)	A8.1 (b) (d)	Channel Bandwidth	**Complies**
15.247 (b)(3)	A8.4	Peak Output Power	**Complies**
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	**Not Applicable.** Antenna gain < 6 dBi
15.247 (d)	A8.5	Out of Band Emissions	**Complies**
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	**Complies**
15.247 (f)	A8.3	*Hybrid Systems	**Not Applicable.** EUT does not employ a hybrid system
15.247 (g)	A8.1	Frequency Hopping	**Not Applicable.** EUT does not employ frequency hopping
15.247 (h)	A8.1	Frequency Hopping	**Not Applicable.** EUT does not employ frequency hopping
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	**Complies**

*Hybrid systems are those that employ a combination of both frequency hopping and digital modulations technique.

FCC Subpart E, Section 15.407 - WLAN
Refer to EMC Technologies Report No: M070613_Cert_AR5BXB6_NII_BT

FCC Subpart C, Section 15.247 – Bluetooth
Refer to EMC Technologies Report No: M070613_Cert_EYTF3CSFT_WLAN

11.0 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:

Radiated Emissions:	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%.

12.0 APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
APPENDIX B: PHOTOGRAPHS
APPENDIX C: FUNCTIONAL DESCRIPTION
APPENDIX D: BLOCK DIAGRAM
APPENDIX E: SCHEMATICS
APPENDIX F: ANTENNA INFORMATION
APPENDIX G: SPECIFICATIONS
APPENDIX H: FCC LABELLING DETAILS
APPENDIX I: USER MANUAL
APPENDIX J: CHANNEL BANDWIDTH PLOTS
APPENDIX K: HARMONICS PLOTS
APPENDIX L: PEAK POWER SPECTRAL DENSITY PLOTS

Attachment 1: RF Exposure Information
Attachment 2: FCC DOC for LifeBook T Series
Attachment 3: FCC Part 15B Test Report (Report: FG07-087EAL)