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

FCC ID:	EJE-WB0039
Industry Canada ID:	337J-WB0039
Test Sample:	LifeBook T Series
Model:	T4210
Radio Modules:	AR5BXB6 XB62 Atheros Mini-PCI WLAN Module & EYTF3CSFT Bluetooth Module
Report Number:	M060246_Cert_AR5BXB6_NII_BT
Tested for:	Fujitsu Australia Ltd.
Issue Date:	18th March 2006

NATA Accredited Laboratory Number:
5292

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EMC Technologies Report No. M060246_Cert_AR5BXB6_NII_BT

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CONTENTS

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Report Number: M060246_Cert_AR5BXB6_NII_BT

Test Sample: LifeBook T Series
Model: T4210
Radio Modules: XB62 Mini-PCI WLAN Module, Model: AR5BXB6 (Atheros)
Bluetooth Module, Model: EYTF3CSFT (TAIYO YUDEN)

FCC ID: EJE-WB0039
Industry Canada ID: 337J-WB0039
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, 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 5 and Issue 6 Low Power Licence-Exempt RadioCommunication Devices: 6.2.2 (q1) 5150 - 5350 MHz, 5470 – 5725 MHz & 5725-5825 MHz 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: 1st to 9th March 2006

Test Officer: C Huynh
Chieu Huynh - B.Eng (Hons) Electronics

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: C. Zombolas
Chris Zombolas
Technical Director
EMC Technologies Pty Ltd

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

1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: T4210 with Atheros Mini-PCI Wireless LAN Module (XB62 11a+b/g), Model: AR5BXB6 & TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT.

The Atheros 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 Atheros WLAN supports IEEE 802.11b, IEEE 802.11g and IEEE802.11a (DTS & U-NII) configurations. Tests were performed in all three configurations and also on the Bluetooth.

The results for configuration IEEE 802.11a (U-NII: 5.15 – 5.35 GHz) are reported in this test report.

The results for configurations IEEE 802.11b, IEEE 802.11g and IEEE802.11a (DTS: 5725 – 5850 MHz) and Bluetooth are reported separately.
Refer to EMC Technologies' test report: M060246_Cert_AR5BXB6_DTS_BT (DTS) and M060246_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 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 **complies** with the requirements of 47 CFR, Part 15 Subpart E - Section 15.407.

The test sample also complies with the Industry Canada RSS-210 Issue 5 for frequency band 5250 to 5350 MHz and Issue 6 for frequency band 5150 to 5250 MHz (Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)) clause 6.2.2(q1) requirements and the RF exposure requirements of RSS-102.

1.1 Summary of Results

1.1.1 FCC Subpart E, Section 15.407 - WLAN (802.11a)

FCC Part 15, Subpart E Clauses	Industry Canada RSS-210 Clauses	Test Performed	Result
15.203	5.5	Antenna Requirement	**Not Applicable**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Complies**
15.209	6.3	Radiated Emissions	**Complies**
15.407 (a)(1) (a)(2)	6.2.2(q1)	Peak Transmit Power	**Complies**
15.407 (a)(5)	6.2.2(q1)	Peak Power Spectral Density	**Complies**
15.407 (a)(6)		Peak Excursion	**Complies**
15.407 (b)	6.2.2(q1)	Undesirable Emission	**Complies**
15.407 (f)		Radio Frequency Hazard	****Complies with SAR requirements**
15.407 (g)	6.4	Frequency Stability	**Complies**

1.1.2 FCC Subpart C, Section 15.247 - WLAN (802.11b, 802.11g and 802.11a)

FCC Part 15, Subpart C Clauses	Industry Canada RSS-210 Clauses	Test Performed	Result
15.203	5.5	Antenna Requirement	**Not Applicable**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Complies**
15.209	6.3	Radiated Emissions	**Complies**
15.247 (a)(2)	6.2.2(o)(iv)	Channel Bandwidth	**Complies**
15.247 (b)(3)	6.2.2(o)(b)	Peak Output Power	**Complies**
15.247 (i)		Radio Frequency Hazard	***Complies with SAR requirements**
15.247 (d)	6.2.2(o)(e1)	Out of Band Emissions	**Complies**
15.247 (e)	6.2.2(o)(iv)	Peak Power Spectral Density	**Complies**

Refer to EMC Technologies Report No: M060246_Cert_AR5BXB6_DTS_BT

1.1.3 FCC Subpart C, Section 15.247 - Bluetooth

FCC Part 15, Subpart C Clauses	Industry Canada RSS-210 Clauses	Test Performed	Result
15.203	5.5	Antenna Requirement	**Not Applicable**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Complies**
15.209	6.3	Radiated Emissions	**Complies**
15.247 (a)(1)	6.2.2(o)(ii)	Channel Occupancy/Bandwidth	**Complies**
15.247 (b)(1)	6.2.2(o)(b)	Peak Output Power	**Complies**
15.247 (i)		Radio Frequency Hazard	***Complies with SAR requirements**
15.247 (d)	6.2.2(o)(e1)	Out of Band Emissions	**Complies**

Refer to EMC Technologies Report No: M060246_Cert_EYTF3CSFT_WLAN

*Refer to EMC Technologies' report M060247_Cert_AR5BXB6_SAR_2.4
**Refer to EMC Technologies' report M060247_Cert_AR5BXB6_SAR_5.2

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.

1.2 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 802.11g) Orthogonal Frequency Division Multiplexing (OFDM for 802.11a)
802.11a and 802.11g	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 and 5.725 - 5.850 GHz for 11a
Antenna Types:	Monopole Antenna - Model: DA120D-2454M-FJ01 Located on top edge of LCD screen
Antenna gain:	Refer antenna data provided separately
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
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, 42, 50, 52, 58 and 64	16 (6 Mbps to 36 Mbps)
**Channel 36, 42, 50, 52, 58 and 64	14 (48 Mbps)
**Channel 36, 42, 50, 52, 58 and 64	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 DTS submission (M060246_Cert_AR5BXB6_DTS_BT)

2.2 EUT (Bluetooth) Details

Transmitter:	Bluetooth Module
Model Number:	EYTF3CSFT
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
Interface Type:	USB
Antenna Types:	Monopole Antenna - Model: DA120D-2454M-FJ01 Located at the middle of top edge of LCD screen
Antenna gain:	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 Bluetooth submission (M060246_Cert_EYTF3CSFT_WLAN)

2.3 EUT (Notebook PC) Details

EUT:	LifeBook T series
Model Name:	T4210
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Yonah-DC 2.16GHz
LCD	12”SXGA+ / 12”XGA
Wired LAN:	Marvell 88E8055 : 10 Base-T/100 Base-TX/1000Base-T
Modem:	Agere MDC1.5 modem Model: D40
Port Replicator Model:	FPCPR61
AC Adapter Model:	80W: SEC100P2-19.0(Sanken)
Voltage:	19 V
Current Specs:	4.22A
Watts:	80W

2.4 Operational Description

The Atheros WLAN test software "CRTU" 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.

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.

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: FG06-027EFC)

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 Laboratory (NML) 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 Laboratory (NML). All equipment calibration is traceable to Australia national standards at the National Measurements Laboratory. The reference antenna calibration was performed by NML 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.

RESULTS
WLAN Module – AR5BXB6 (802.11a (NII))

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: FG06-027EFC)

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 EMI Receiver was operated under software control via the PC Controller through the IEEE.488 Interface Bus Card Adaptor. 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: FG06-027EFC).

The measurement of emissions above 1000 MHz, appearing in the restricted bands, was made using an average detector with a resolution bandwidth of 1.0 MHz.

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 Quasi-Peak/Average Detectors. The measurement data for each frequency range was automatically corrected by the software for cable losses, antenna factors and preamplifier gain and all data was then stored on disk in sequential data files. 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

Measurement uncertainty with a confidence interval of 95% is:
- Free radiation tests (1000 MHz – 18,000 MHz) ± 4.1 dB

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 54 dBμV/m limit at 3 metres has been converted to 64 dBμV/m at 1 metre using a factor of 20 dB per decade where emissions were located in the restricted bands.

The peak limits for undesirable emission outside of the restricted bands are –27 dBm (68.3 dBuV/m @ 3m).

Testing was performed while both the WLAN transmitter and Bluetooth transmitter continuously operated. Harmonics related to the WLAN transmitter (5.15 – 5.35 GHz) is reported below. Harmonics in the frequency band 2.4 – 2.4835 GHz and 5.725 – 5.850 GHz, refer to M060246_Cert_AR5BXB6_DTS_BT. Harmonics related to the Bluetooth transmitter, refer to M060246_Cert_EYTF3CSFT_WLAN.

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). Emissions with 16QAM modulation were observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the modulation rate of 24 Mbps (normal mode) and 48 Mbps (turbo mode).

Normal Mode:

The EUT was operating at its highest channel (5320 MHz), the field strength at 5350 MHz was:
73.6 dBμV/m peak and 57.9 dBμV/m average
The levels were > 20 dB below the maximum field strength of the in-band carrier.

The EUT was operating at its lowest channel (5180 MHz), the field strength at 5150 MHz was:
68.1 dBμV/m peak and 52.5 dBμV/m average
The levels were > 20 dB below the maximum field strength of the in-band carrier.

Turbo Mode:

The EUT was operating at its highest channel (5290 MHz), the field strength at 5350 MHz was:
71.7 dBμV/m peak and 57.2 dBμV/m average
The levels were > 20 dB below the maximum field strength of the in-band carrier.

The EUT was operating at its lowest channel (5210 MHz), the field strength at 5150 MHz was:
65.9 dBμV/m peak and 51.8 dBμV/m average
The levels were > 20 dB below the maximum field strength of the in-band carrier.

Channel 36 - 5180 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5180	**108.6**	**98.3**	-	-	-
10360	**56.7**	**44.3**	68.3	-	Pass
15540	**58.2**	**45.0**	74.0	54.0	Pass
20720	65	52	84.0*	64.0*	Pass
25900	69	56	78.3*	-	Pass
31080	80**	68	78.3*	-	Pass
36260	82**	71	78.3*	-	Pass
6907	**54.1**	**48.7**	68.3	-	Pass
5280	**53.8**	**45.4**	68.3	-	Pass
3453	**44.9**	**36.2**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Channel 52 - 5260 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5260	**109.2**	**99.8**	-	-	-
10520	**56.0**	**44.1**	68.3	-	Pass
15780	**57.9**	**44.8**	74.0	54.0	Pass
21040	65	52	84.0*	64.0*	Pass
26300	69	56	78.3*	-	Pass
31560	80	68**	84.0*	64.0*	Pass
36820	82**	71	78.3*	-	Pass
5360	**54.9**	**46.3**	74.0	54.0	Pass
7013	**50.3**	**45.6**	68.3	-	Pass
3506	**49.8**	**39.1**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Channel 64 - 5320 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5320	**108.8**	**97.4**	-	-	-
10640	**56.2**	**43.7**	74.0	54.0	Pass
15960	**57.6**	**44.5**	74.0	54.0	Pass
21280	65	52	84.0*	64.0*	Pass
26600	69	56	78.3*	-	Pass
31920	80**	68	78.3*	-	Pass
37240	82**	71	78.3*	-	Pass
7093	**49.9**	**45.3**	68.3	-	Pass
3547	**47.4**	**37.0**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Channel 42 - 5210 MHz - Turbo Mode

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5210	**106.3**	**94.8**	-	-	-
10420	**55.6**	**42.1**	68.3	-	Pass
15630	**55.7**	**43.0**	74.0	54.0	Pass
20840	65	52	84.0*	64.0*	Pass
26050	69	56	78.3*	-	Pass
31260	80	68**	84.0*	64.0*	Pass
36470	82	71**	84.0*	64.0*	Pass
6947	**53.4**	**47.7**	68.3	-	Pass
3473	**48.9**	**38.2**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Channel 50 - 5250 MHz - Turbo Mode

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5250	**106.5**	**95.9**	-	-	-
10500	**55.1**	**42.0**	68.3	-	Pass
15750	**55.5**	**43.4**	74.0	54.0	Pass
21000	65	52	84.0*	64.0*	Pass
26250	69	56	78.3*	-	Pass
31500	80	68**	84.0*	64.0*	Pass
36750	82**	71	78.3*	-	Pass
7000	**50.1**	**44.8**	68.3	-	Pass
3500	**50.8**	**41.0**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Channel 58 - 5290 MHz - Turbo Mode

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5290	**106.9**	**95.3**	-	-	-
10580	**55.4**	**41.8**	68.3	-	Pass
15870	**57.0**	**45.6**	74.0	54.0	Pass
21160	65	52	84.0*	64.0*	Pass
26450	69	56	78.3*	-	Pass
31740	80	68**	84.0*	64.0*	Pass
37030	82**	71	78.3*	-	Pass
7053	**49.5**	**43.3**	68.3	-	Pass
3527	**49.3**	**39.2**	68.3	-	Pass

*Limits were corrected for 1 metre measurement.
**Refer to results

Result: Harmonic and spurious emissions were recorded within the restricted bands of up to 40 GHz. Harmonics were low and confirmed with both RBW and VBW reduced (the peak and average levels listed in the above tables were noise floor readings). Emissions were complied with the FCC limits in section 15.209 and 15.407 by a margin of 7.7 dB. The measurement uncertainty for radiated emissions in this band was ±4.1 dB.

4.3.2 Both WLAN and Bluetooth Transmitters Transmitting

802.11a and BT	Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5180 MHz & 2402 MHz	2780	48.3	35.7	74.0	54.0	Pass
5260 MHz & 2402 MHz	2860	51.7	37.2	74.0	54.0	Pass
5320 MHz & 2402 MHz	2920	54.4	39.6	68.3	-	Pass
5180 MHz & 2441 MHz	2740	48.1	36.0	74.0	54.0	Pass
5260 MHz & 2441 MHz	2820	51.2	37.8	74.0	54.0	Pass
5320 MHz & 2441 MHz	2881	55.6	40.3	74.0	54.0	Pass
5180 MHz & 2480 MHz	2700	50.2	37.4	74.0	54.0	Pass
5260 MHz & 2480 MHz	2782	51.3	39.8	74.0	54.0	Pass
5320 MHz & 2480 MHz	2842	55.4	41.5	74.0	54.0	Pass
5210 MHz & 2402 MHz	2814	47.4	34.9	74.0	54.0	Pass
5250 MHz & 2402 MHz	2857	48.0	36.2	74.0	54.0	Pass
5290 MHz & 2402 MHz	2891	52.4	37.7	74.0	54.0	Pass
5210 MHz & 2441 MHz	2776	47.8	35.0	74.0	54.0	Pass
5250 MHz & 2441 MHz	2819	48.5	36.3	74.0	54.0	Pass
5290 MHz & 2441 MHz	2850	53.4	39.7	74.0	54.0	Pass
5210 MHz & 2480 MHz	2738	47.6	35.4	74.0	54.0	Pass
5250 MHz & 2480 MHz	2778	49.5	37.9	74.0	54.0	Pass
5290 MHz & 2480 MHz	2813	52.1	40.1	74.0	54.0	Pass

4.3.3 Frequency Band: 30 - 1000 MHz

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG06-027EFC).

4.3.4 RF Conducted Measurements at the antenna terminal

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

The resolution bandwidth of 300 kHz and the video bandwidth of 1000 kHz were utilised.

Refer to Appendix K for Harmonics plots.

D1 indicates the limit line for undesirable emission outside the operation frequency band.

Result: Complies.

4.3.5 Band Edge Measurements

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

The resolution bandwidth of 1000 kHz and the video bandwidth of 1000 kHz were utilised.

Testing was performed while transmitter continuously transmitted on a low and high frequency channel.

BE Frequency (MHz) within the restricted band	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5150	61.6	48.4	74.0	54.0	Pass
5350	62.9	49.3	74.0	54.0	Pass

Refer to Appendix L for Band Edge plots.

D1 indicates the limit line for undesirable emission outside the operation frequency band.

Result: Complies.

5.0 PEAK OUTPUT POWER - Section 15.407(a)

Testing was performed in accordance with the requirements of FCC Part 15.407(a)(1)(2)

Measurements were performed while the WLAN transmitter continuously transmitted.

The peak output power measurement was performed using the 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 and 360 μS at 54 Mbps.

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). Peak output power with 16QAM modulation was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the modulation rate of 24 Mbps (normal mode) and 48 Mbps (turbo mode).

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.

Frequency MHz	Operating Mode	Power dBm	Limit dBm	Power mW	Limit mW	Result
5180	Normal	16.8	17	47.9	50	Complies
5210	Turbo	17.0	17	50.0	50	Complies
5250	Turbo	16.7	17	46.8	50	Complies
5260	Normal	17.1	24	51.3	250	Complies
5290	Turbo	16.6	24	45.7	250	Complies
5320	Normal	16.9	24	49.0	250	Complies

6.0 CHANNEL BANDWIDTH

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

The 26 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 300 kHz and the video bandwidth of 1000 kHz were utilised

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	26 dB Bandwidth Plots
5180	Normal	24.5	Appendix J
5210	Turbo	41.5	Appendix J
5250	Turbo	41.3	Appendix J
5260	Normal	24.4	Appendix J
5290	Turbo	40.9	Appendix J
5320	Normal	24.5	Appendix J

7.0 PEAK POWER SPECTRAL DENSITY - Section 15.407 (a)

Testing was performed in accordance with the requirements of FCC Part 15.407(a)(5)

The peak power spectral density measurement was performed as per test method #2 of DA 02-2138. The resolution bandwidth of 1 MHz and the video bandwidth of 3 MHz were utilised.

Initial investigations were performed with four modulation types: (BPSK, QPSK, 16QAM and 64QAM). Peak power spectral density with 16QAM modulation was observed to be slightly worst. Final testing was performed while the transmitter continuously operated with the modulation rate of 24 Mbps (normal mode) and 48 Mbps (turbo mode).

Frequency MHz	Operating Mode	Spectral Density dBm	Limit dBm	Result	Spectral Density plots
5180	Normal	2.8	4	Complies	Appendix M
5210	Turbo	0.6	4	Complies	Appendix M
5250	Turbo	0.1	4	Complies	Appendix M
5260	Normal	3.4	11	Complies	Appendix M
5290	Turbo	-0.1	11	Complies	Appendix M
5320	Normal	3.1	11	Complies	Appendix M

8.0 PEAK EXCURSION - Section 15.407 (a)

Testing was performed in accordance with the requirements of FCC Part 15.407(a)(6)

The transmitter output was connected to the spectrum analyser with a span setting to capture the entire emission bandwidth of the signal.

The peak transmit power was measured over an interval of continuous transmission using a calibrated spectrum analyser with the resolution bandwidth of 1 MHz and the video bandwidth of 3 MHz for Trace 1 and video bandwidth of 30 kHz for Trace 2. The difference between Trace 1 and Trace 2 was recorded.

Frequency MHz	Operating Mode	Peak Power Excursion dB	Limit dB	Result	Peak Power Excursion Plots
5180	Normal	9.4	13.0	Complies	Appendix N
5210	Turbo	8.7	13.0	Complies	Appendix N
5250	Turbo	8.1	13.0	Complies	Appendix N
5260	Normal	9.6	13.0	Complies	Appendix N
5290	Turbo	8.6	13.0	Complies	Appendix N
5320	Normal	9.6	13.0	Complies	Appendix N

9.0 FREQUENCY STABILITY

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

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

The measurements were made at ambient room temperature and extreme (-20 to +55 ˚C) test conditions.

The AC supply voltage to the computer was varied by ±15%. This was observed to have no effect on the results obtained.

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	Maximum Frequency Deviation kHz	Maximum Deviation %	± 0.02 % Limit kHz	Result
5180	Normal	113	0.003	1036	Complies
5210	Turbo	107	0.003	1042	Complies
5250	Turbo	114	0.003	1050	Complies
5260	Normal	101	0.002	1052	Complies
5290	Turbo	120	0.003	1058	Complies
5320	Normal	135	0.003	1064	Complies

10.0 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 2400 - 2483.5 MHz and 5.150 – 5.350 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).

Transmitter # 1 (WLAN): The antennas are located on the top edge of LCD screen (left and right hand side) and projected distance of less than 20cm from user.

Transmitter # 2 (Bluetooth): The antenna is located at the middle of top edge of LCD screen 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 and reported under EMC Technologies reports M060247_Cert_AR5BXB6_SAR_2.4 and M060247_Cert_AR5BXB6_SAR_5.2. The highest SAR value is 1.59 mW/g which complies with the FCC human exposure requirements of 47 CFR 2.1093 (d).

11.0 ANTENNA REQUIREMENT

Testing to the requirements of FCC Part 15.203 was not applicable as this intentional radiator was designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

12.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: T4210 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, **comply** with the requirements of 47 CFR, Part 15 Subpart E -Section 15.407 (5.15 - 5.35 GHz).

The test sample also complies with the Industry Canada RSS-210 Issue 5 for frequency band 5250 to 5350 MHz and Issue 6 for frequency band 5150 to 5250 MHz (Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)) clause 6.2.2(q1) 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	**Not Applicable**
15.205	6.3	Operation in Restricted Band	**Complies**
15.207	6.6	Conducted Emissions	**Complies**
15.209	6.3	Radiated Emissions	**Complies**
15.407 (a)(1) (a)(2)	6.2.2(q1)	Peak Transmit Power	**Complies**
15.407 (a)(5)	6.2.2(q1)	Peak Power Spectral Density	**Complies**
15.407 (a)(6)		Peak Excursion	**Complies**
15.407 (b)	6.2.2(q1)	Undesirable Emission	**Complies**
15.407 (f)		Radio Frequency Hazard	***Complies with SAR requirements**
15.407 (g)	6.4	Frequency Stability	**Complies**

*Refer to EMC Technologies' report M060247_Cert_AR5BXB6_SAR_2.4 and M060247_Cert_ AR5BXB6_SAR_5.2

The results for IEEE 802.11a (U-NII) and Bluetooth are reported separately.
Refer to EMC Technologies' test report: M060246_Cert_AR5BXB6_DTS_BT (DTS) and M060246_Cert_EYTF3CSFT_WLAN (Bluetooth).

TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENTATION DETAILS
APPENDIX B: REPORT 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: BANDEDGE PLOTS
APPENDIX M: PEAK POWER SPECTRAL DENSITY PLOTS
APPENDIX N: PEAK EXCURSION PLOTS

Attachment 1: RF Exposure Information
Attachment 2: FCC DOC for LifeBook T Series
Attachment 3: FCC Part 15B Test Report (Report: FG06-027EFC)