



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 E (Section 15.407) & 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_NII_BT

Tested for: Fujitsu Australia Ltd.

Issue Date: 10th July 2007

EMC Technologies Pty Ltd reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. EMC Technologies Pty Ltd shall have no liability for any deductions, inferences or generalisations drawn by the client or others from EMC Technologies Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Technologies Pty Ltd.



The tests, calibrations or measurements covered by this document have been performed in accordance with NATA requirements (FCC Part 15 unintentional and intentional emitters in the frequency range 9 kHz to 18 GHz) which include the requirements of ISO/IEC 17025 and are traceable to national standards of measurement. This document shall not be reproduced, except in full. The certificate on page 3 may be reproduced in full.

NATA Accredited Laboratory Number: 5292

EMI TEST REPORT FOR CERTIFICATION
to
FCC PART 15 Subpart E (Section 15.407) & RSS-210
EMC Technologies Report No. M070613_Cert_AR5BXB6_NII_BT
Issue Date: 10th July 2007

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 | UNCERTAINTIES |
| 16.0 | APPENDICES |
| APPENDIX A: MEASUREMENT INSTRUMENTATION DETAILS | |
| APPENDIX B: REPORT PHOTOGRAPHS | |
| APPENDIX C: OPERATIONAL 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 | |
| APPENDIX M: PEAK EXCURSION PLOTS | |
| Attachment 1: RF Exposure Information | |
| Attachment 2: FCC DOC for LifeBook T Series | |
| Attachment 3: FCC Part 15B Test Report (Report: FG07-087EAL) | |
| Attachment 4: Dynamic Frequency Selection Results | |
| FCC 15.247 (DTS) RESULTS - WLAN | |
| Refer to Report No: M070613_Cert_AR5BXB6_DTS_BT | |
| FCC 15.247 (DTS) RESULTS – Bluetooth | |
| Refer to Report No: M070613_Cert_EYTF3CSFT_WLAN | |



**EMI TEST REPORT FOR CERTIFICATION to
FCC PART 15 Subpart E (Section 15.407) & RSS-210
Report No. M070613_Cert_AR5BXB6_NII_BT**

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 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: 21st June to 8th July 2007

Senior Test Engineer:

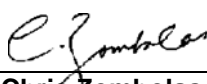


**Chieu Huynh - B.Eng (Hons) Electronics/ Communications
Lee Hopkins**

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 E (Section 15.407) & 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.

The U-NII results for configuration IEEE 802.11a are reported in this test report.

The DTS and DSS (Bluetooth) results are reported separately.

Refer to EMC Technologies' test report: M070613_Cert_AR5BXB6_DTS_BT (DTS) 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 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 Issue 7 and RSS-Gen Clauses | Test Performed | Result |
|--------------------------------|---|---------------------------------|------------------------------------|
| 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 |
| 15.407 (a)(1) (a)(2) | Annex A9.2 | Peak Transmit Power | Complies |
| 15.407 (a)(5) | Annex A9.2 | Peak Power Spectral Density | Complies |
| 15.407 (a)(6) | | Peak Excursion | Complies |
| 15.407 (b) | Annex A9.3 | Undesirable Emission | Complies |
| 15.407 (c) | Annex A9.5 (4) | Discontinue Transmission | Complies |
| 15.407 (d) | | Reserved | - |
| 15.407 (e) | Annex 9 | Restricted to Indoor Operations | Complies |
| 15.407 (f) | RSS-Gen (5.5) | Radio Frequency Hazard | Complies |
| 15.407 (g) | Annex A9.5 (5) | Frequency Stability | Complies |
| 15.407 (h) | Annex A9.2 | Transmit Power Control | Not Applicable E.I.R.P < 500 mW |
| 15.407 (h) | Annex A9.4 | Dynamic Frequency Selection | Complies |

1.1.2 FCC Subpart C, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M070613_Cert_AR5BxB6_DTS_BT

1.1.3 FCC Subpart C, Section 15.247 – Bluetooth

Refer to EMC Technologies Report No: M070613_Cert_EYTF3CSFT_WLAN

1.1 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(Notel) | 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 DTS submission (M070613_Cert_AR5BXB6_DTS_BT)



This Laboratory is accredited by the National Association of Testing Authorities, Australia. The tests reported herein have been performed in accordance with its terms of accreditation for FCC Part 15. This document shall not be reproduced, except in full.

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 (A²LA).

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 15.407 (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: FG07-087EAL)

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: 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:

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

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 dBuV/m @ 3m). However, the 74 dBuV/m @ 3m and 54 dBuV/m @ 3m limits are applied for emissions fall in the restricted bands.

Testing was performed while both the WLAN transmitter and Bluetooth transmitter continuously operated. Emissions related to the WLAN transmitter (5.15 – 5.35 GHz and 5.47 – 5.725 GHz) is reported below. Emissions in the frequency band 2.4 – 2.4835 GHz and 5.725 – 5.850 GHz, refer to M070613_Cert_AR5BXB6_DTS_BT. Emissions related to the Bluetooth transmitter, refer to M070613_Cert_EYTF3CSFT_WLAN.

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps). No significant differences in emissions were observed. Final testing was performed while the transmitter continuously operated with the data rate of 6 Mbps.

Channel 36 - 5180 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5180 | 106.7 | 94.8 | - | - | - |
| 10360 | 58.4 | 45.7 | 68.3 | - | Complies |
| 15540 | 55.1 | 41.9 | 74.0 | 54.0 | Complies |
| 5150 | 60.3 | 48.2 | 74.0 | 54.0 | Complies |

Channel 52 - 5260 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5260 | 106.6 | 95.1 | - | - | - |
| 10520 | 61.8 | 48.6 | 68.3 | - | Complies |
| 15780 | 56.3 | 42.5 | 74.0 | 54.0 | Complies |

Channel 64 - 5320 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5320 | 106.9 | 95.8 | - | - | - |
| 10640 | 59.2 | 46.2 | 74.0 | 54.0 | Complies |
| 15960 | 57.0 | 43.1 | 74.0 | 54.0 | Complies |
| 5350 | 60.4 | 48.9 | 74.0 | 54.0 | Complies |

Channel 100 - 5500 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5500 | 107.4 | 96.9 | - | - | - |
| 11000 | 59.9 | 45.8 | 74.0 | 54.0 | Complies |
| 5470 | 64.5 | 50.3 | 68.3 | - | Complies |

Channel 120 - 5600 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5600 | 107.0 | 96.6 | - | - | - |
| 11200 | 60.6 | 45.4 | 74.0 | 54.0 | Complies |

Channel 140 - 5700 MHz

| Frequency MHz | Peak Detector dBuV | Average Detector dBuV | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|--------------------|-----------------------|-------------------|----------------------|----------|
| 5700 | 108.1 | 97.4 | - | - | - |
| 11400 | 64.1 | 48.8 | 74.0 | 54.0 | Complies |
| 5725 | 68.3 | 53.9 | 68.3 | - | Complies |

Result: Harmonics were recorded up to 40 GHz. Other harmonics and spurious were low and confirmed with both RBW and VBW reduced. Emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 0 dB. The measurement uncertainty was ± 4.1 dB.

4.3.2 Both WLAN and Bluetooth Transmitters Transmitting

Result: IM spurious emissions were recorded up to 40 GHz. Emissions complied with the FCC limits of sections 15.209 and 15.407.

4.3.3 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).

4.3.4 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

| Frequency MHz | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------------|----------------------|-------------------------|-------------------|----------------------|----------|
| 5150 | 60.3 | 48.2 | 74.0 | 54.0 | Complies |
| 5350 | 60.4 | 48.9 | 74.0 | 54.0 | Complies |
| 5470 | 64.5 | 50.3 | 68.3 | - | Complies |
| 5725 | 68.3 | 53.9 | 68.3 | - | Complies |

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

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 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 μ S at 108 Mbps and 360 μ S at 54 Mbps.

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).

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 | 16.5 | 17 | 44.7 | 50 | Complies |
| 5260 | Normal | 16.8 | 24 | 47.9 | 250 | Complies |
| 5320 | Normal | 16.9 | 24 | 49.0 | 250 | Complies |
| 5500 | Normal | 16.8 | 24 | 47.9 | 250 | Complies |
| 5600 | Normal | 16.6 | 24 | 45.7 | 250 | Complies |
| 5700 | Normal | 17.0 | 24 | 50.0 | 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).

| Frequency MHz | Operating Mode | Bandwidth MHz | 26 dB Bandwidth Plots |
|---------------|----------------|---------------|-----------------------|
| 5180 | Normal | 24.5 | Appendix J |
| 5260 | Normal | 24.4 | Appendix J |
| 5320 | Normal | 24.5 | Appendix J |
| 5500 | Normal | 24.4 | Appendix J |
| 5600 | Normal | 24.0 | Appendix J |
| 5700 | Normal | 24.1 | Appendix J |

7.0 PEAK POWER SPECTRAL DENSITY

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).

| Frequency MHz | Operating Mode | Spectral Density dBm | Limit dBm | Result | Spectral Density plots |
|---------------|----------------|----------------------|-----------|----------|------------------------|
| 5180 | Normal | 2.8 | 4 | Complies | Appendix L |
| 5260 | Normal | 3.4 | 11 | Complies | Appendix L |
| 5320 | Normal | 3.1 | 11 | Complies | Appendix L |
| 5500 | Normal | 3.5 | 11 | Complies | Appendix L |
| 5600 | Normal | 3.6 | 11 | Complies | Appendix L |
| 5700 | Normal | 3.9 | 11 | Complies | Appendix L |

8.0 PEAK EXCURSION

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 M |
| 5260 | Normal | 9.6 | 13.0 | Complies | Appendix M |
| 5320 | Normal | 9.6 | 13.0 | Complies | Appendix M |
| 5500 | Normal | 8.7 | 13.0 | Complies | Appendix M |
| 5600 | Normal | 9.5 | 13.0 | Complies | Appendix M |
| 5700 | Normal | 8.7 | 13.0 | Complies | Appendix M |

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 $\pm 15\%$. 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).

| Frequency MHz | Operating Mode | Maximum Frequency Deviation kHz | Maximum Deviation % | $\pm 0.02\%$ Limit kHz | Result |
|---------------|----------------|---------------------------------|---------------------|------------------------|----------|
| 5180 | Normal | 149 | 0.003 | 1036 | Complies |
| 5260 | Normal | 124 | 0.003 | 1052 | Complies |
| 5320 | Normal | 126 | 0.003 | 1064 | Complies |
| 5500 | Normal | 150 | 0.003 | 1100 | Complies |
| 5600 | Normal | 118 | 0.003 | 1120 | Complies |
| 5700 | Normal | 162 | 0.003 | 1140 | Complies |

The worst case transmitter frequency stability was ± 4 ppm. As per RSS 210 Annex A9.5(e) the frequency stability limit was ± 10 ppm. Therefore, the EUT was complied with RSS 210 Annex A9.5(e).

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 & 5.725 - 5.825 GHz bands. 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.

Operation using 40 MHz channels is disabled in this device via factory programmed EEPROM settings that cannot be accessed or changed by end users.

Complied – refer to attachment 4, CCS test report number: 06U10337-2, Revision B

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 2400 - 2483.5 MHz, 5.150 – 5.350 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).

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.



13.0 ANTENNA REQUIREMENT

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

14.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: 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 E -Section 15.407 (5.15-5.35 GHz band).

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.

Results were as follows:

FCC Subpart E, Section 15.407

| FCC Part 15, Subpart E Clauses | Industry Canada RSS-210 Issue 7 and RSS-Gen Clauses | Test Performed | Result |
|--------------------------------|---|---------------------------------|---|
| 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 |
| 15.407 (a)(1) (a)(2) | Annex A9.2 | Peak Transmit Power | Complies |
| 15.407 (a)(5) | Annex A9.2 | Peak Power Spectral Density | Complies |
| 15.407 (a)(6) | | Peak Excursion | Complies |
| 15.407 (b) | Annex A9.3 | Undesirable Emission | Complies |
| 15.407 (c) | Annex A9.5 (4) | Discontinue Transmission | Complies |
| 15.407 (d) | | Reserved | - |
| 15.407 (e) | Annex 9 | Restricted to Indoor Operations | Complies |
| 15.407 (f) | RSS-Gen (5.5) | Radio Frequency Hazard | Complies |
| 15.407 (g) | Annex A9.5 (5) | Frequency Stability | Complies |
| 15.407 (h) | Annex A9.2 | Transmit Power Control | Not Applicable E.I.R.P < 500 mW |
| 15.407 (h) | Annex A9.4 | Dynamic Frequency Selection | Complies |

FCC Subpart E, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M070613_Cert_AR5BXB6_DTS_BT

FCC Subpart C, Section 15.247 – Bluetooth

Refer to EMC Technologies Report No: M070613_Cert_EYTF3CSFT_WLAN

15.0 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%.

16.0 APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENTATION DETAILS

APPENDIX B: REPORT PHOTOGRAPHS

APPENDIX C: OPERATIONAL 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

APPENDIX M: PEAK EXCURSION PLOTS

Attachment 1: RF Exposure Information

Attachment 2: FCC DOC for LifeBook T Series

Attachment 3: FCC Part 15B Test Report (Report: FG07-087EAL)

Attachment 4: Dynamic Frequency Selection Results

