



EMC Technologies Pty Ltd

ABN 82 057 105 549

57 Assembly Drive

Tullamarine Victoria Australia 3043

Ph: + 613 9335 3333

Fax: + 613 9338 9260

email: melb@emctech.com.au

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

FCC ID: EJE-WB0038
Industry Canada ID: 337J-WB0038

Test Sample: LifeBook T Series
Model: T4210

Radio Modules: EYTF3CSFT Bluetooth Module &
WM3945ABG GOLAN INTEL Mini-PCI WLAN Module

Report Number: M060244_Cert_EYTF3CSFT_WLAN

Tested for: Fujitsu Australia Ltd.

Issue Date: 18th March 2006

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 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 C (Section 15.247) & RSS-210
EMC Technologies Report No. M060244_Cert_EYTF3CSFT_WLAN
Issue Date: 18th March 2006

CONTENTS

- 1.0 INTRODUCTION**
- 2.0 GENERAL INFORMATION**

RESULTS – Bluetooth, EYTF3CSFT

- 3.0 CONDUCTED EMI MEASUREMENTS**
- 4.0 SPURIOUS EMI MEASUREMENTS**
- 5.0 PEAK OUTPUT POWER**
- 6.0 CHANNEL BANDWIDTH & CHANNEL OCCUPANCY**
- 7.0 RADIO FREQUENCY EXPOSURE**
- 8.0 ANTENNA REQUIREMENT**
- 9.0 COMPLIANCE STATEMENT**

RESULTS – WLAN, WM3945ABG:

Refer to Report No: M060244_Cert_WM3945ABG_DTS_BT (802.11b/g and 802.11a (DTS))
Refer to Report No: M060244_Cert_WM3945ABG_NII_BT (802.11a (NII))

- APPENDIX A: MEASUREMENT INSTRUMENT DETAILS**
- APPENDIX B: REPORT PHOTOGRAPHS**
- APPENDIX C: FUNCTIONAL DESCRIPTION**
- APPENDIX D: BLOCK DIAGRAM**
- APPENDIX E: SCHEMATICS**
- APPENDIX F: ANTENNA DETAILS**
- 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 OUTPUT PLOTS**
- APPENDIX N: BLUETOOTH CHANNEL OCCUPANCY PLOTS**

Attachment 1: RF Exposure Information

Attachment 2: FCC DOC for LifeBook T Series

Attachment 3: FCC Part 15B Test Report (Report: FG06-027EFC)



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.

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

Report Number: M060244_Cert_EYTF3CSFT_WLAN

Test Sample: LifeBook T Series
Model: T4210
Radio Modules: Bluetooth Module, Model: EYTF3CSFT (TAIYO YUDEN)
GOLAN INTEL Mini-PCI WLAN Module, Model: WM3945ABG (Intel Corp.)

FCC ID: EJE-WB0038
Industry Canada ID: 337J-WB0038
Equipment Type: Intentional Radiator (Transceiver)

LifeBook Manufacturer: Fujitsu Ltd - Mobile Computing Division
Address: 1-1 Kamikodanaka 4-Chome, Nakahara-Ku, Kawasaki, Japan
Contact: Mr. Tsuyoshi Uchihara

Tested for: Fujitsu Australia Ltd

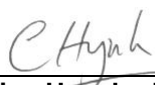
Test Standards: FCC Part 15, Subpart C – Intentional Radiators
FCC Part 15.247, 2400 – 2483.5 MHz Operation Band
ANSI C63.4 – 2003
OET Bulletin No. 65

RSS-210 Issue 6 Low Power Licence-Exempt RadioCommunication
Devices: 6.2.2 (o) 2400 – 2483.5 MHz Spread Spectrum

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: 27th February to 8th March 2006

Test Officer:

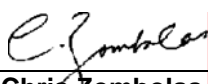


Chieu Huynh - B.Eng (Hons) Electronics

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:



Chris Zombolas
Technical Director
EMC Technologies Pty Ltd



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.

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: T4210 with TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT and INTEL Mini-PCI Wireless LAN Module (GOLAN 11a+b/g), Model: WM3945ABG.

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 GOLAN WLAN module was originally certified by INTEL as a modular approval under FCC ID: PD9WM3945ABG (Canada ID: 1000M-WM3945ABG). The Radio modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

The GOLAN 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 the Bluetooth are reported in this test report.

The results for the GOLAN WLAN module are reported separately. Refer to EMC Technologies' test reports: M060244_Cert_WM3945ABG_DTS_BT and M060244_Cert_WM3945ABG_NII_BT.

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, 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 6 (Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)) clause 6.2.2(o) and the RF exposure requirements of RSS-102.



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.

1.1 Summary of Results

1.1.1 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

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: M060244_Cert_WM3945ABG_DTS_BT

1.1.3 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

Refer to EMC Technologies Report No: M060244_Cert_WM3945ABG_NII_BT

*Refer to EMC Technologies' report M060245_Cert_WM3945ABG_SAR_2.4

**Refer to EMC Technologies' report M060245_Cert_WM3945ABG_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.



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.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 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 this report.

2.2 EUT (WLAN) Details

Transmitter:	Mini-PCI Wireless LAN Module
Wireless Module:	GOLAN (11a+b/g)
Model Number:	WM3945ABG
Manufacturer:	Intel Corporation
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
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
Number of Channels:	11 channels for 11b or 11g 13 channels 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:

				Americas	Europe	Japan	High Band
Band	Channel	Lower Frequency	Upper Frequency	SKU #1 MOW1	SKU #2 MOW2	SKU #3 Japan	SKU #4 ROW
802.11b/g	1-11	2.401 GHz	2.473 GHz	X	X	X	X
802.11b/g	12-13	2.467 GHz	2.483 GHz		X	X	X
802.11a	34-46	5.08 GHz	5.22 GHz		X	X	
802.11a	36-48	5.150 GHz	5.250 GHz	X	X		
802.11a	52-64	5.250 GHz	5.350 GHz	X	X		
802.11a	100-140	5.470 GHz	5.725 GHz		X		
802.11a	149-161	5.725 GHz	5.825 GHz	X			X
802.11a	165	5.815 GHz	5.835 GHz	X			X

Channels Tested and Output power setting:

Channel and Mode:	Output Power setting (average, dBm)
802.11b mode	
*Channels 1	16
*Channel 6 and 11	18
802.11g mode	
*Channel 1	16
*Channel 6	17
*Channel 11	15
802.11a mode	
**Channel 36	16
**Channels 52 and 64	17
*Channels 149, 157 and 165	17

*Channels tested and reported in the DTS submission (M060244_Cert_WM3945ABG_DTS_BT)

**Channels tested and reported in the U-NII submission (M060244_Cert_WM3945ABG_NII_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.

2.3 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 Intel 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 Bluetooth 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: 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 emission, 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 (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 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.



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.

RESULTS

Bluetooth Module, Model: EYTF3CSFT

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 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 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 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 software for cable losses automatically corrected the measurement data for each frequency range, 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:

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

Measurement uncertainty with a confidence interval of 95% is:

- Free radiation tests (1000 MHz – 18,000 MHz) ± 4.1 dB



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.

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

Testing was performed while both the WLAN transmitter and Bluetooth transmitter continuously operated. Harmonics related to the Bluetooth transmitter are reported below. Harmonics related to the WLAN transmitter refer to M060244_Cert_WM3945ABG_DTS_BT and M060244_Cert_WM3945ABG_NII_BT.

The EUT was operating at its highest channel (2480 MHz), the field strength at 2483.5 MHz was: 54.3 dB μ V/m peak and 40.8 dB μ V/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 (2402 MHz), the field strength at 2400 MHz was: 60.8 dB μ V/m peak and 45.6 dB μ V/m average.

The levels were > 20 dB below the maximum field strength of the in-band carrier.

Channel 1 - 2402 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2402	97.5	67.6	-	-	-
4804	56.7	44.3	74.0	54.0	Pass
7206	46	35	-	-	-
9608	49	38	-	-	-
12010	53	41	74.0	54.0	Pass
14412	57	45	-	-	-
16814	56	45	-	-	-
19216	65	52	84.0*	64.0*	Pass
21618	69	56	-	-	-
24020	69	56	-	-	-
1602	54.1	44.0	74.0	54.0	Pass
2405.5	54.4	39.5	-	-	-
3200	52.8	40.3	-	-	-

*Limits were corrected for 1 metre measurement.

Channel 40 - 2441 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2441	99.1	68.0	-	-	-
4882	56.3	44.6	74.0	54.0	Pass
7323	46	35	74.0	54.0	Pass
9764	49	38	-	-	-
12205	53	41	74.0	54.0	Pass
14646	57	45	-	-	-
17087	56	45	-	-	-
19528	65	52	84.0*	64.0*	Pass
21969	69	56	-	-	-
24410	69	56	-	-	-
1628	54.4	42.7	-	-	-
2445	50.3	37.5	-	-	-
3255	52.5	40.2	-	-	-

*Limits were corrected for 1 metre measurement.

Channel 79 - 2480 MHz

Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2480	98.2	68.2	-	-	-
4960	56.0	43.7	74.0	54.0	Pass
7440	46	35	74.0	54.0	Pass
9920	49	38	-	-	-
12400	53	41	74.0	54.0	Pass
14880	57	45	-	-	-
17360	56	45	-	-	-
19840	65	52	84.0*	64.0*	Pass
22320	69	56	-	-	-
24800	69	56	-	-	-
1618	54.6	42.1	-	-	-
2484	50.7	37.6	74.0	54.0	Pass
3306	50.8	38.4	-	-	-

*Limits were corrected for 1 metre measurement.

Result: 2nd harmonics and spurious emissions were recorded within the restricted bands of up to 25 GHz. Other harmonics were confirmed low 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 sections 15.209 and 15.247 by a margin of 9.4 dB. The measurement uncertainty for radiated emissions in this band was ± 4.1 dB.

4.3.2 Both WLAN and Bluetooth Transmitters Transmitting

802.11b and BT	Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2437 MHz & 2402 MHz	2472	54.5	40.8	-	-	-
2437 MHz & 2402 MHz	2367	51.3	38.1	74.0	54.0	Pass
2462 MHz & 2402 MHz	2521	53.6	39.3	-	-	-
2412 MHz & 2441 MHz	2383	58.7	45.0	74.0	54.0	Pass
2412 MHz & 2441 MHz	2471	53.0	41.2	-	-	-
2462 MHz & 2441 MHz	2421	53.8	41.9	-	-	-
2412 MHz & 2480 MHz	2344	55.2	41.1	74.0	54.0	Pass
2412 MHz & 2480 MHz	2547	52.5	40.1	-	-	-
2437 MHz & 2480 MHz	2393	54.6	42.4	-	-	-
2437 MHz & 2480 MHz	2525	53.4	41.6	-	-	-
2462 MHz & 2480 MHz	2498	54.1	42.3	74.0	54.0	Pass

802.11g and BT	Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2437 MHz & 2402 MHz	2367	51.3	38.1	74.0	54.0	Pass
2462 MHz & 2402 MHz	2342	52.6	38.8	74.0	54.0	Pass
2412 MHz & 2441 MHz	2471	56.0	44.2	-	-	-
2462 MHz & 2441 MHz	2421	55.8	43.9	-	-	-
2412 MHz & 2480 MHz	2547	57.5	46.1	-	-	-
2437 MHz & 2480 MHz	2525	58.4	46.6	-	-	-
2462 MHz & 2480 MHz	2500	58.9	47.3	74.0	54.0	Pass

802.11a and BT	Frequency MHz	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5745 MHz & 2402 MHz	3344	46.7	30.4	-	-	-
5785 MHz & 2402 MHz	3385	46.9	31.5	-	-	-
5825 MHz & 2402 MHz	3424	45.2	30.0	-	-	-
5745 MHz & 2441 MHz	3304	49.1	32.9	-	-	-
5785 MHz & 2441 MHz	3344	50.6	34.3	-	-	-
5825 MHz & 2441 MHz	3385	49.2	33.8	-	-	-
5745 MHz & 2480 MHz	3266	49.0	33.7	74.0	54.0	Pass
5785 MHz & 2480 MHz	3305	47.1	32.0	-	-	-
5825 MHz & 2480 MHz	3345	46.5	31.5	74.0	54.0	Pass

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	52.4	35.7	68.3	-	Pass
5260 MHz & 2402 MHz	2730	51.9	35.3	68.3	-	Pass
5320 MHz & 2402 MHz	2700	54.6	36.8	68.3	-	Pass
5180 MHz & 2441 MHz	2858	55.1	36.9	68.3	-	Pass
5260 MHz & 2441 MHz	2816	55.5	37.2	68.3	-	Pass
5320 MHz & 2441 MHz	2780	55.0	36.6	68.3	-	Pass
5180 MHz & 2480 MHz	2919	53.2	35.8	68.3	-	Pass
5260 MHz & 2480 MHz	2880	53.7	35.4	68.3	-	Pass
5320 MHz & 2480 MHz	2848	53.0	35.1	68.3	-	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

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 100 kHz and the video bandwidth of 300 kHz were utilised.

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

Refer to Appendix K for Harmonics plots

Result: Complies.

4.3.5 Band Edge Measurements

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.

Testing was performed while the transmitter continuously transmitted on a low (2402 MHz) and high frequency (2480 MHz) channel.

The transmitter output 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.

BE Frequency (MHz) within the restricted band	Peak Detector dBuV	Average Detector dBuV	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2390	42.1	Low	74.0	54.0	Pass
2483.5	52.6	Low	74.0	54.0	Pass

Refer to Appendix L for Band Edge plots

Result: Complies.



5.0 PEAK OUTPUT POWER - Section 15.247 (b)(1)

Testing was performed in accordance with the requirements of FCC Part 15.247(b)(1).

Measurements were performed while the Bluetooth transmitter continuously transmitted.

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

The resolution bandwidth of 1 MHz and the video bandwidth of 3 MHz were utilised.

Variation by +/- 15% of the supply voltage, in accordance with section 15.31(e), to the computer power supply power did not cause any variations to the RF output power.

Frequency MHz	Power dBm	Limit dBm	Power mW	Limit mW	Power Plots
2402	2.7	30	1.9	1000	Appendix M
2441	3.0	30	2.0	1000	Appendix M
2480	3.3	30	2.1	1000	Appendix M

Result: Complies.

6.0 CHANNEL BANDWIDTH & CHANNEL OCCUPANCY

Testing was carried out in accordance with the requirements of FCC Part 15.247(a)(1)(iii)

The EUT was a Frequency Hopping Spread Spectrum transmitter and operated as described in section 2 of this report.

6.1 Channel Bandwidth

In the band 2400 - 2483.5 MHz the hopping channel carrier frequencies separated by a minimum of 25kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

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

A resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised.

Frequency MHz	Bandwidth kHz	Result	20 dB Bandwidth Plots
2402	751.5	Complies	Appendix J
2441	756.5	Complies	Appendix J
2480	756.5	Complies	Appendix J

6.2 Channel Occupancy

79 channels were observed operating between 2400 to 2483.5 MHz. Refer to Appendix N for number of channel plot.

The channel separation of 1 MHz was recorded. Refer to Appendix N for number of channel separation plot.

The device was observed to have a dwell time of 420.8 uS. Refer to Appendix N for dwell time plot.

The specification allows for a dwell time not exceeding 0.4 seconds.

The maximum period is 79 channels x 0.4 seconds = 31.6 seconds.

During the test the transmitter was observed to activate on average 316 times in 31.6 seconds.

The transmitter therefore occupies in one channel for $316 \times 420.8 \text{ uS} = 0.133 \text{ seconds}$.

Result: Complies.

7.0 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 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 M060245_Cert_WM3945ABG_SAR_2.4 and M060245_Cert_WM3945ABG_SAR_5.2. The highest SAR value is 1.51 mW/g which complies with the FCC human exposure requirements of 47 CFR 2.1093 (d).



8.0 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.

9.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: T4210 with TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT and INTEL Mini-PCI Wireless LAN Module (GOLAN 11a+b/g), Model: WM3945ABG, tested on behalf of Fujitsu Australia Ltd, **comply** 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.

The test sample also complies with the Industry Canada RSS-210 issue 6 (Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands)) clause 6.2.2(o) 2400 – 2483.5 MHz Spread Spectrum requirements 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 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 M060245_Cert_WM3495ABG_SAR_2.4 and M060245_Cert_WM3945ABG_SAR_5.2

The results for the WLAN module are reported separately.

Refer to EMC Technologies' test reports: M060244_Cert_WM3945ABG_DTS_BT (DTS) and M060244_Cert_WM3945ABG_NII_BT (U-NII).



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.

TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
APPENDIX B: REPORT PHOTOGRAPHS
APPENDIX C: FUNCTIONAL DESCRIPTION
APPENDIX D: BLOCK DIAGRAM
APPENDIX E: SCHEMATICS
APPENDIX F: ANTENNA DETAILS
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 OUTPUT PLOTS
APPENDIX N: BLUETOOTH CHANNEL OCCUPANCY PLOTS

Attachment 1: RF Exposure Information

Attachment 2: FCC DOC for LifeBook T Series

Attachment 3: FCC Part 15B Test Report (Report: FG06-027EFC)



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.