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

FCC ID:	EJE-WB0034
Industry Canada ID:	337J-WB0034
Test Sample:	LifeBook P Series
Model:	P7120D
Radio Modules:	UGXZ5-102A Bluetooth & WLL4070 Mini-PCI WLAN (Atheros 11a+b/g)
Report Number:	M050750_Cert_BT_WLL4070
Tested for:	Fujitsu Australia Ltd.
Issue Date:	30th August 2005

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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. M050750_Cert_BT_WLL4070

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

Report Number: M050750_Cert_BT_WLL4070

Test Sample: LifeBook P Series
Model: P7120D
Radio Modules: Bluetooth, Model: UGXZ5-102A (Fujitsu Ltd)
Mini-PCI WLAN, Model: WLL4070 (Askey Computer Corp.)

FCC ID: EJE-WB0034
Industry Canada ID: 337J-WB0034
Equipment Type: Intentional Radiator (Transceiver)

LifeBook Manufacturer: Fujitsu Ltd
Address: 1405, Ohamaru, Inagi-shi, Tokyo 206-8503, 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 5 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: 4th to 19th August 2005

Test Officers: **Chieu Huynh - B.Eng (Hons) Electronics**
Jorge Lara

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

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

1.0 INTRODUCTION

EMI testing was performed on test sample LifeBook P Series, Model: P7120D with Mini-PCI Wireless LAN Module (Atheros 11a+b/g), Model WLL4070 & Bluetooth, Model UGXZ5-102A.

The WLAN supports IEEE 802.11b, IEEE 802.11g and IEEE 802.11a (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 WLAN Atheros module are reported separately. Refer to EMC Technologies' test reports: M050750_Cert_WLL4070_DTS_BT (DTS) and M050750_Cert_WLL4070_NII_BT (U-NII).

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

1.1 Summary of Results

1.1.1 Bluetooth - 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**

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1.1.2 WLAN, Atheros: 802.11b, 802.11g and 802.11a (DTS) - 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)(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: M050750_Cert_WLL4070_DTS_BT

1.1.3 WLAN, Atheros: 802.11a (U-NII) - 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 No: M050750_Cert_WLL4070_NII_BT

*Refer to EMC Technologies' report M050751_Cert_WLL4070_SAR_2.4 and M050751_Cert_WLL4070_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 Product Details

Test Sample (LifeBook):	LifeBook P Series
Model Number:	P7120D
Serial Number:	Pre-production Sample
Manufacturer:	Fujitsu Ltd
CPU Type and Speed:	Pentium-M 1.2 GHz ULV Celeron-M 1.0 GHz ULV
LCD:	10.6" WXGA
Wired LAN:	Realtech RTL8100C : 10 Base-T/100 Base-TX
Modem:	Agere MDC 1.5, Model: AM2
Port Replicator Model:	FPCPR62
AC Adapter Model:	SEC80N2-16.0 (Sanken) / US25 (Eastern)
Voltage:	16 V
Current Specs:	3.75A
Watts:	60 W
Radio Modules:	Bluetooth and WLAN (Atheros 11a+b/g)
Bluetooth Model Number:	UGXZ5-102A
Bluetooth Manufacturer:	Fujitsu Ltd
WLAN Model Number:	WLL4070
WLAN Manufacturer:	Askey Computer Corp.
Interface Type:	Mini-PCI Wireless LAN Module
FCC ID:	EJE-WB0034
Industry Canada ID:	337J-WB0034
Equipment Type:	Intentional Radiator (Transceiver)

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2.2 Technical Specifications

2.2.1 Bluetooth Transmitter Specifications

Transmitter:	Bluetooth
Model Number:	UGXZ5-102A
Manufacturer:	Fujitsu Ltd.
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:	Yokowo Monopole Chip Antenna
Model:	YCE-5250
Location:	Right palm rest area
Antenna gain:	2.78 dBi
Max. Output Power:	12 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) = 180, 45
2	2403	
3	2404	
.	.	
.	.	
.	.	
39	2440	
40*	**2441**	
41	2442	
.	.	
.	.	
.	.	
77	2478	
78	2479	
79*	**2480**	

*Channels tested and reported in this report

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2.2.2 WLAN Transmitter Specifications

Transmitter:	Mini-PCI Wireless LAN Module
Wireless Module:	Atheros
Model Number:	WLL4070 (11a+b/g module)
Manufacturer:	Askey Computer Corp.
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	BPSK – 6Mbps, 9Mbps QPSK – 12Mbps, 18Mbps 16QAM – 24Mbps, 36Mbps 64QAM – 48Mbps, 54Mbps
802.11g	BPSK – 6Mbps, 9Mbps QPSK – 12Mbps, 18Mbps 16QAM – 24Mbps, 36Mbps 64QAM – 48Mbps, 54Mbps
802.11b	DBPSK – 1Mbps DQPSK – 2Mbps CCK – 5.5Mbps, 11Mbps
Maximum Data Rate:	802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps
Frequency Range:	2.4 –2483.5 GHz for 802.11b/g 5.15 - 5.35 GHz and 5.725 - 5.850 GHz for 802.11a
Antenna Types:	Nissei Electric Inverted-F
Models:	CP254654 (left) and CP254655 (right) Located on top edge of LCD screen
Antenna gain:	802.11b/g = 1.9 dBi 802.11a (5.15 – 5.35 GHz) = 1.23 dBi 802.11a (5.725 – 5.825 GHz) = 1.94 dBi
Power Supply:	3.3 VDC from PCI bus
Chipset Used:	Atheros AR5414, AR5413
Turbo Mode:	For 802.11g & 802.11a only
Data rate (Turbo):	12 Mbps to 108 Mbps

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Frequency allocation and maximum output power setting for 802.11b/g:

Channel Number	Frequency (MHz)	EUT Power level setting dBm	
		802.11b	802.11g
1	2412*	18	17
2	2417	18	17
3	2422	18	17
4	2427	18	17
5	2432	18	17
6	2437*	18	17
6 Turbo (802.11g only)	**2437***	**-**	**15**
7	2442	18	17
8	2447	18	17
9	2452	18	17
10	2457	18	17
11	2462*	18	17

*Channels tested and reported in the DTS submission (M050508_Cert_WLL4070_11abg_DTS_BT)

Frequency allocation and maximum output power setting for 802.11a:

Channel Number	Frequency (MHz)	Power level setting dBm
*Channels tested and reported in the DTS submission (M050750_Cert_WLL4070_DTS_BT)		
149	**5745***	**16**
152	***5760 Turbo**	**17**
153	5765	16
157	**5785***	**16**
160	***5800 Turbo**	**17**
161	5805	16
165	**5825***	**16**
*Channels tested and reported in the U-NII submission (M050750_Cert_WLL4070_NII_BT)		
36	**5180***	**14**
40	5200	14
42	***5210 Turbo**	**13**
44	5220	14
48	5240	14
50	***5250 Turbo**	**13**
52	**5260***	**17**
56	5280	17
58	***5290 Turbo**	**17**
60	5300	17
64	**5320***	**17**

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2.3 Operational Description

The EUT is a LifeBook P Series, Model: P7120D installed with a Mini-PCI Wireless LAN (WLAN) Module (Atheros 11a+b/g, Model WLL4070) & Bluetooth, Model UGXZ5-102A.

The same WLAN radio module and Bluetooth combination has been previously certified by Fujitsu under FCC ID: EJE-WB0029 and IC: 337J-WB0029 in a different host.

The intention of this application is to re-certify this WLAN and Bluetooth with a different antenna combination in host – LifeBook P Series, Model: P7120D.

2.4 Test Configuration

The Askey software and the BlueSuiteCasira software were used to set-up the WLAN module and Bluetooth devices respectively to continuously transmit during the tests. The LCD screen was observed for the transmitter status shown for the respective software.

Antenna

The Atheros (11a+b/g) WLAN, Model WLL4070 is configured with Nissei Electric Inverted-F Antenna, Models: CP254654 and CP254655. The ALPS Bluetooth device is configured with Yokowo Monopole Antenna, Model: YCE-5250. The installation of the OEM WLAN module, Bluetooth Device and the Antennas in Fujitsu LifeBook P Series, Model: P7120D is in a controlled environment. The installation is performed during the production/assembly process at the Fujitsu factory.

Refer to Appendix F – Antenna Information.

There are three antennas: WLAN antennas (x2) are located on the right hand side and left hand side on the top edge of the LCD screen. Bluetooth antenna is located on the right palm rest area.

Refer to photos in Appendix B3 for BT Antenna location.

AC Adapter

The AC adapter SEC80N2-16.0 was used for all the tests. Details of the AC adapter are supplied in section 2.1 of this report.

2.5 Block Diagram

Refer to Appendix D - Block Diagram

2.6 Support Equipment

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG05-073EAL)

2.7 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI C63.4-2003. Radiated emissions tests were performed at a distance of 1 and 3 metres from the EUT. OET Bulletin 65 dated June 2001 was used for reference.

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2.8 Test Facility

2.8.1 General

Radiated Emission measurements were performed at EMC Technologies open area test site (OATS) situated at Lerderderg Gorge, near the township of Bacchus Marsh in Victoria, Australia. Conducted measurements at an antenna ports were performed at EMC Technologies' laboratory in 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.

2.8.2 NATA Accreditation

EMC Technologies is accredited in Australia to test to the following standards by the National Association of Testing Authorities (NATA).

"FCC Part 15 unintentional and intentional emitters in the frequency range 9kHz to 18 GHz excluding TV receivers (15.117 and 15.119), TV interface devices (15.115), cable ready consumer electronic equipment (15.118), cable locating equipment (15.213) and unlicensed national information infrastructure devices (Sub part E)."

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au
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 (A^2LA).

2.9 Test Equipment Calibration

All measurement instrumentation and transducers were calibrated in accordance with the applicable standards by an independent NATA registered laboratory such as Agilent Technologies (Australia) Pty Ltd or the National Measurement 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

2.10 Ambients at OATS

The Open Area Test Site (OATS) is an area of low background ambient signals. No significant broadband ambients are present however commercial radio and TV signals exceed the limit in the FM radio, VHF and UHF television bands. Radiated prescan measurements were performed in the shielded enclosure to check for possible radiated emissions at the frequencies where the OATS ambient signals exceeded the test limit.

RESULTS
Bluetooth Module, Model UGXZ5-102A

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: FG05-073EAL)

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: FG05-073EAL).

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 dBµV/m

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

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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 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.

Testing was performed while both the Bluetooth transmitter and WLAN transmitter continuously operated. Harmonics related to the Bluetooth transmitter are reported below. Harmonics related to the WLAN transmitter, Refer to EMC Technologies' test reports: M050750_Cert_WLL4070_DTS_BT and M050750_Cert_WLL4070_NII_BT.

Measurements were made on a low (channel 1, 2402 MHz), middle (channel 40, 2441 MHz) and high (Channel 79, 2480 MHz) frequency channel.

When the EUT was operating at its highest channel (2480 MHz), the field strength at 2483.5 MHz was 51.2 dBμV/m peak & 38.6 dBμV/m average and was > 20 dB below the maximum field strength of the in-band carrier.

When the EUT was operating at its lowest channel (2402 MHz), the field strength at 2400 MHz was 79.1 dBμV/m peak & 49.4 dBμV/m average and was > 20 dB below the maximum field strength of the in-band carrier.

Channel 1 - 2402 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2402	Transmitter	Fundamental		-	-	
4804	56.3	42.6	Vert/Hort	74.0	54.0	Pass
7206	56.6	41.6	Vert/Hort	-	-	Pass
9608	48.1	39.5	Vert/Hort	-	-	Pass
12010	51	41	Vert/Hort	74.0	54.0	Pass
14412	55	46	Vert/Hort	-	-	Pass
16814	56	49	Vert/Hort	-	-	Pass
19216	65	52	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
21618	67	54	Vert/Hort	-	-	Pass
24020	68	55	Vert/Hort	-	-	Pass

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

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Channel 40 - 2441 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2441	Transmitter	Fundamental		-	-	
4882	54.7	41.4	Vert/Hort	74.0	54.0	Pass
7323	56.9	41.8	Vert/Hort	74.0	54.0	Pass
9764	49.2	39.4	Vert/Hort	-	-	Pass
12205	53.2	41.8	Vert/Hort	74.0	54.0	Pass
14646	55	46	Vert/Hort	-	-	Pass
17087	56	49	Vert/Hort	-	-	Pass
19528	65	52	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
21969	67	54	Vert/Hort	-	-	Pass
24410	68	55	Vert/Hort	-	-	Pass

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

Channel 79 - 2480 MHz

Frequency MHz	Level dBuV/m		Antenna Polarization	Peak Limit dBuV/m	Average Limit dBuV/m	Result
	Peak Detector	Average Detector				
2480	Transmitter	Fundamental		-	-	
4960	55.4	42.1	Vert/Hort	74.0	54.0	Pass
7440	56.8	41.9	Vert/Hort	74.0	54.0	Pass
9920	48.8	39.5	Vert/Hort	-	-	Pass
12400	51	41	Vert/Hort	74.0	54.0	Pass
14880	55	46	Vert/Hort	-	-	Pass
17360	56	49	Vert/Hort	-	-	Pass
19840	65	52	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
22320	67	54	Vert/Hort	84.0* (1m)	64.0* (1m)	Pass
24800	68	55	Vert/Hort	-	-	Pass

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

Result: Harmonics 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). Harmonics were complied with the FCC limits in sections 15.209 and 15.247 by a margin of 11.4 dB. The measurement uncertainty for radiated emissions in this band was ±4.1 dB.

4.3.3 Frequency Band: 30 - 1000 MHz

Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG05-073EAL).

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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.

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

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	11.9	30	15.5	1000	Appendix M
2441	11.7	30	14.8	1000	Appendix M
2480	11.9	30	15.5	1000	Appendix M

Result: Complies.

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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	Complies	Appendix J
2441	771	Complies	Appendix J
2480	771	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 411.9 uS. This measurement was made on a channel using a spectrum analyser with a 0 Hz span and a sweep time of 5 mS. 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 315 times in 31.6 seconds.

The transmitter therefore occupies in one channel for 315 x 411.9 uS = 0.130 seconds.

Result: Complies.

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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 on the right palm rest area and projected distance of less than 20cm from user.

The separation distance between the WLAN and BT antennas is greater than 20cm. Therefore, they are not co-located transmitters.

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 M050751_Cert_WLL4070_SAR_2.4 and M050751_Cert_WLL4070_SAR_5.2. The highest SAR value was less than 0.01mW/g which complies with the FCC human exposure requirements of 47 CFR 2.1093 (d).

Refer to EMC Technologies' report - M050751_Cert_WLL4070_SAR_2.4 and M050751_Cert_WLL4070_SAR_5.2 for details of SAR compliance.

Results: Complies

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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 LifeBook P Series, Model: P7120D with Mini-PCI Wireless LAN Module (Atheros 11a+b/g), Model WLL4070 & Bluetooth, Model UGXZ5-102A, 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 5 (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:

Bluetooth - 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 M050751_Cert_WLL4070_SAR_2.4 and M050751_Cert_WLL4070_SAR_5.2

The results for the WLAN Atheros module are reported separately.
Refer to EMC Technologies' test reports: M050750_Cert_WLL4070_DTS_BT (DTS) and M050750_Cert_WLL4070_NII_BT (U-NII).

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TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
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APPENDIX N: BLUETOOTH CHANNEL OCCUPANCY PLOTS

Attachment 1: RF Exposure Information
Attachment 2: FCC DOC for LifeBook P Series
Attachment 3: FCC Part 15B Test Report (Report: FG05-073EAL)

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