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

FCC ID: EJE-WB0046  
Industry Canada ID: 337J-WB0046

Test Sample: LifeBook P Series  
Model: P7230

Radio Modules: 4965AGN Kedron INTEL Mini-PCI WLAN Module  
& EYTF3CSFT Bluetooth Module

Report Number: M070228\_Cert\_4965AGN\_DTS\_BT

Tested for: Fujitsu Australia Ltd.

Issue Date: 14<sup>th</sup> May 2007

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NATA Accredited Laboratory Number: 5292

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Refer to Report No: M070228\_Cert\_4965AGN\_NII\_BT

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Refer to Report No: M070228\_Cert\_EYTF3CSFT\_WLAN

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**Report Number:** M070228\_Cert\_4965AGN\_DTS\_BT

**Test Sample:** LifeBook P Series  
**Model:** P7230  
**Radio Modules:** Kedron INTEL Mini-PCI WLAN Module, Model: 4965AGN (Intel Corp.)  
 Bluetooth Module, Model: EYTF3CSFT (TAIYO YUDEN)

**FCC ID:** EJE-WB0046  
**Industry Canada ID:** 337J-WB0046  
**Equipment Type:** Intentional Radiator (Transceiver)

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

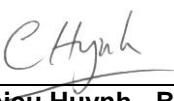
**Tested for:** Fujitsu Australia Ltd

**Test Standards:** FCC Part 15 – Radio Frequency Devices (August 2006)  
 FCC Part 15 Subpart C - Intentional Radiators  
 Section 15.247: 2400 – 2483.5 MHz & 5725 – 5850 MHz Operation Bands  
 ANSI C63.4 – 2003  
 OET Bulletin No. 65

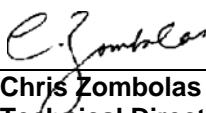
RSS-210 Issue 6 Low Power Licence-Exempt RadioCommunication Devices:  
 6.2.2 (o) 2400 – 2483.5 MHz & 5725 – 5850 MHz Spread Spectrum

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:** 14<sup>th</sup> March to 11<sup>th</sup> May 2007

**Senior Test Engineer:**   
 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



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

## 1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: P7230 with INTEL Mini-PCI Wireless LAN Module (Kedron 802.11a/b/g/n), Model: 4965AGN & TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT.

The Kedron WLAN module was originally certified by INTEL as a modular approval under FCC ID: PD94965AGN (Canada ID: 1000M-4965AGN). 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 Kedron WLAN supports IEEE 802.11b, IEEE 802.11g, IEEE 802.11a and IEEE 802.11n (DTS & U-NII) configurations. Tests were performed in all configurations and also on the Bluetooth.

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

The U-NII and DSS (Bluetooth) results are reported separately.

Refer to EMC Technologies' test report: M070228\_Cert\_4965AGN\_NII\_BT (U-NII) and M070228\_Cert\_EYTF3CSFT\_WLAN (Bluetooth).

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

47 CFR, Part 15, Subpart C:	Rules for intentional radiators (particularly section 15.247)
Section 15.203:	Antenna requirements
Section 15.205:	Restricted bands of operation
Section 15.207:	Conducted Emission Limits
Section 15.209:	Radiated Emission Limits (General requirements)
Section 15.247:	Operation in the bands 902-928 MHz, 2400-2483.5 MHz, 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.

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.



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## 1.1 Summary of Results

### 1.1.1 FCC Subpart C, Section 15.247

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Clauses	Test Performed	Results
<b>15.203</b>	5.5	Antenna Requirement	<b>Complies</b>
<b>15.205</b>	6.3	Operation in Restricted Band	<b>Complies</b>
<b>15.207</b>	6.6	Conducted Emissions	<b>Complies</b>
<b>15.209</b>	6.3	Radiated Emissions	<b>Complies</b>
<b>15.247 (a)(2)</b>	6.2.2(o)(iv)	Channel Bandwidth	<b>Complies</b>
<b>15.247 (b)(3)</b>	6.2.2(o)(b)	Peak Output Power	<b>Complies</b>
<b>15.247 (c)</b>		Antenna Gain > 6 dBi	<b>Not Applicable.</b> Antenna gain < 6 dBi
<b>15.247 (d)</b>	6.2.2(o)(e1)	Out of Band Emissions	<b>Complies</b>
<b>15.247 (e)</b>	6.2.2(o)(iv)	Peak Power Spectral Density	<b>Complies</b>
<b>15.247 (f)</b>		*Hybrid Systems	<b>Not Applicable.</b> EUT does not employ a hybrid system
<b>15.247 (g)</b>		Frequency Hopping	<b>Not Applicable.</b> EUT is not a frequency hopping
<b>15.247 (h)</b>		Frequency Hopping	<b>Not Applicable.</b> EUT is not a frequency hopping
<b>15.247 (i)</b>		Radio Frequency Hazard	<b>Complies</b>

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

### 1.1.2 FCC Subpart E, Section 15.407 - WLAN

Refer to EMC Technologies Report No: M070228\_Cert\_4965AGN\_NII\_BT

### 1.1.3 FCC Subpart C, Section 15.247 – Bluetooth

Refer to EMC Technologies Report No: M070228\_Cert\_EYTF3CSFT\_WLAN

## 1.2 Modifications by EMC Technologies

No modifications were required.



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## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 EUT (WLAN) Details

<b>Transmitter:</b>	Mini-Card Wireless LAN Module
<b>Wireless Module:</b>	Kedron (802.11a/b/g/n)
<b>Model Number:</b>	4965AGN
<b>Manufacturer:</b>	Intel Corporation
<b>Modulation Type:</b>	Direct Sequence Spread Spectrum (DSSS for 802.11b) Orthogonal Frequency Division Multiplexing (OFDM for 802.11g) Orthogonal Frequency Division Multiplexing (OFDM for 802.11a) Orthogonal Frequency Division Multiplexing (OFDM for 802.11n) DBPSK, DQPSK, CCK, 16QAM and 64QAM
<b>2.4 GHz (802.11b/g/n):</b>	BPSK, QPSK, 16QAM and 64QAM
<b>5 GHz (802.11a/n):</b>	802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps
<b>Maximum Data Rate:</b>	802.11n = 300 Mbps
<b>Frequency Ranges:</b>	2.412 – 2.462 GHz for 11b/g/n 5.18 - 5.32 GHz and 5.745 - 5.825 GHz for 11a/n
<b>Number of Channels:</b>	11 channels for 11b/g/n 13 channels for 11a/n with 20 MHz bandwidth 6 channels for 11n with 40 MHz bandwidth
<b>Antenna Types:</b>	Tx: Nissei Electric Inverted F Antenna Model: CP313544-01 (Main: Right), CP313545-01 (Aux: Left) Location: Top edge of LCD screen Rx: Nissei Electric Inverted F Antenna, Model: CP313546-01
<b>Antenna gain:</b>	Max antenna gain is less than 6 dBi. Refer antenna data provided separately
<b>Power Supply:</b>	3.3 VDC from PCI bus

#### Channels Tested and Output power setting:

Channel and Mode	Frequency MHz	Average Output Power dBm
<b>802.11b/g/n mode</b>		
*Channels 1, 6 and 11	2412, 2437 and 2462	15.5
<b>802.11a/n mode with 20MHz Bandwidth</b>		
**Channels 36	5180	16.5
**Channels 48	5240	16.5
**Channels 64	5320	16.5
*Channels 149	5745	17.5
*Channels 157	5785	17.5
*Channels 165	5825	17.5
<b>802.11n mode with 40MHz Bandwidth</b>		
**Channels 38	5190	14.5
**Channels 46	5230	16.5
**Channels 62	5310	15.5
*Channels 151	5755	17.5
*Channels 159	5795	17.5

\*Channels tested and reported in this report

\*\*Channels tested and reported in the U-NII submission (M070228\_Cert\_4965AGN\_NII\_BT)



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## 2.2 EUT (Bluetooth) Details

<b>Transmitter:</b>	Bluetooth
<b>Model Number:</b>	EYTF3CS FT
<b>Manufacturer:</b>	TAIYO YUDEN
<b>Network Standard:</b>	Bluetooth™ RF Test Specification
<b>Modulation Type:</b>	Frequency Hopping Spread Spectrum (FHSS)
<b>Frequency Range:</b>	2402 MHz to 2480 MHz
<b>Number of Channels:</b>	79
<b>Carrier Spacing:</b>	1.0 MHz
<b>Antenna Types:</b>	Nissei Electric Inverted F Antenna, Model: CP115428
<b>Antenna gain:</b>	Location: Right palm rest area Max antenna gain is less than 6 dBi. Refer antenna data provided separately
<b>Max. Output Power:</b>	4 dBm
<b>Reference Oscillator:</b>	16 MHz (Built-in)
<b>Power Supply:</b>	3.3 VDC from host.

### Frequency allocation:

Channel Number	Frequency (MHz)	Bluetooth Utility power setting
1*	<b>2402</b>	Power (Ext, Int) = 0, 96
2	2403	
-	-	
39	2440	
<b>40*</b>	<b>2441</b>	
41	2442	
-	-	
78	2479	
<b>79*</b>	<b>2480</b>	

\*Channels tested and reported in the Bluetooth submission (M070228\_Cert\_EYTF3CSFT\_WLAN)

## 2.3 EUT (Notebook PC) Details

<b>EUT:</b>	LifeBook P series
<b>Model Name:</b>	P7230
<b>Serial Number:</b>	Pre-production Sample
<b>Manufacturer:</b>	FUJITSU LIMITED
<b>CPU Type and Speed:</b>	Core Duo U2500 1.2GHz
<b>LCD</b>	10.6"WXGA
<b>Wired LAN:</b>	Marvell 88E8055 : 10 Base-T/100 Base-TX/1000Base-T
<b>Modem:</b>	Agere MDC1.5 modem Model: D40
<b>Port Replicator Model:</b>	FPCPR72
<b>AC Adapter Model:</b>	60W:SEC80N2-16.0(Sanken)
<b>Voltage:</b>	16 V
<b>Current Specs:</b>	3.75A
<b>Watts:</b>	60W



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## 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 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: FG06-142EAL-2)

## 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.**



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## 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](http://www.nata.asn.au)  
It also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

NATA is the Australian national laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A<sup>2</sup>LA).

## 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.



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## FCC 15.247 (DTS) RESULTS

### 3.0 CONDUCTED EMISSION MEASUREMENTS

Testing was performed in accordance with the requirements of FCC Part 15.207  
Refer to Attachment 3 – FCC Part 15B Test Report (Report: FG06-142EAL-2)

### 4.0 SPURIOUS EMISSION MEASUREMENTS

#### 4.1 Test Procedure

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

Radiated emission measurements were performed to the limits as per section 15.209. The measurements were made at the open area test site.

The EUT was set up on the table top (placed on turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report. The test frequency range was subdivided 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: FG06-142EAL-2).

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 dB $\mu$ V/m.

**V** = EMI Receiver Voltage in dB $\mu$ V. (measured value)

**AF** = Antenna Factor in dB(m<sup>-1</sup>). (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 dB $\mu$ V 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)  $\pm$  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 74 dB $\mu$ V/m @ 3m and 54 dB $\mu$ V/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. Harmonics related to the WLAN transmitter (2.4 – 2.4835 GHz and 5.725 – 5.850 GHz) is reported below. Harmonics in the frequency band (5.15 – 5.35 GHz), refer to M070228\_Cert\_4965AGN\_NII\_BT. Harmonics related to the Bluetooth transmitter refer to M070228\_Cert\_EYTF3CSFT\_WLAN.

#### 4.3.1.1 Configuration 802.11b

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

#### Channel 1 - 2412 MHz

Frequency MHz	Peak Detector dB $\mu$ V/m	Average Detector dB $\mu$ V/m	Peak Limit dB $\mu$ V/m	Average Limit dB $\mu$ V/m	Result
2412	103.7	99.8	-	-	-
4824	56.3	46.6	74.0	54.0	Complies
2104	49.5	45.4	83.7	79.8	Complies
2784	47.4	41.2	74.0	54.0	Complies
3464	47.1	41.9	83.7	79.8	Complies
2390	55.7	45.1	74.0	54.0	Complies

#### Channel 6 - 2437 MHz

Frequency MHz	Peak Detector dB $\mu$ V/m	Average Detector dB $\mu$ V/m	Peak Limit dB $\mu$ V/m	Average Limit dB $\mu$ V/m	Result
2437	102.6	99.3	-	-	-
4874	56.0	47.3	74.0	54.0	Complies
2154	52.8	49.7	82.6	79.3	Complies
2834	47.3	40.0	74.0	54.0	Complies
3514	47.5	41.6	82.6	79.3	Complies

#### Channel 11 - 2462 MHz

Frequency MHz	Peak Detector dB $\mu$ V/m	Average Detector dB $\mu$ V/m	Peak Limit dB $\mu$ V/m	Average Limit dB $\mu$ V/m	Result
2462	104.1	99.7	-	-	-
4924	54.9	45.6	74.0	54.0	Complies
2204	53.4	49.8	74.0	54.0	Complies
2884	46.5	39.7	74.0	54.0	Complies
3564	46.8	41.0	84.1	79.7	Complies
2483.5	55.2	44.4	74.0	54.0	Complies



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**Result:** Harmonic and spurious emissions were recorded up to 25 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247 by a margin of 4.2 dB. The measurement uncertainty for radiated emissions in this band was  $\pm 4.1$  dB.

#### 4.3.1.2 Configuration 802.11g and 802.11n

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps, HT0 to HT7 and HT8 to HT15). No significant in emissions were observed. Final testing was performed while the transmitter continuously operated.

##### Channel 1 - 2412 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11g	6 Mbps	2412	106.4	92.6	-	-	-
		2784	48.8	44.1	74.0	54.0	Complies
		3464	47.3	40.8	86.4	72.6	Complies
		2104	43.2	32.4	86.4	72.6	Complies
		2390	73.1	52.9	74.0	54.0	Complies
802.11n	HT0	2412	106.5	92.3	-	-	-
		2784	48.6	44.2	74.0	54.0	Complies
		3464	47.3	40.7	86.5	72.3	Complies
		2104	42.8	32.0	86.5	72.3	Complies
		2390	73.7	53.8	74.0	54.0	Complies
802.11n	HT8	2412	104.1	88.7	-	-	-
		2784	47.4	42.6	74.0	54.0	Complies
		3464	46.2	39.0	84.1	68.7	Complies
		2104	42.7	32.2	84.1	68.7	Complies
		2390	71.4	51.1	74.0	54.0	Complies

##### Channel 6 - 2437 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11g	6 Mbps	2437	106.2	93.1	-	-	-
		2834	47.8	43.2	74.0	54.0	Complies
		3514	47.1	39.5	86.2	73.1	Complies
		2154	47.0	37.4	86.2	73.1	Complies
802.11n	HT0	2437	105.9	92.5	-	-	-
		2834	47.5	43.0	74.0	54.0	Complies
		3514	46.6	39.1	85.9	72.5	Complies
		2154	46.8	37.5	85.9	72.5	Complies
802.11n	HT8	2437	103.9	89.3	-	-	-
		2834	46.1	42.4	74.0	54.0	Complies
		3514	45.5	37.7	83.9	69.3	Complies
		2154	48.3	37.2	83.9	69.3	Complies



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## Channel 11 - 2462 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11g	6 Mbps	2462	105.0	91.1	-	-	-
		2884	44.4	39.9	74.0	54.0	Complies
		3564	46.7	37.4	85.0	71.1	Complies
		2204	51.0	42.8	74.0	54.0	Complies
		2483.5	70.0	50.3	74.0	54.0	Complies
802.11n	HT0	2462	105.7	91.0	-	-	-
		2884	44.8	40.3	74.0	54.0	Complies
		3564	46.5	37.5	85.7	71.0	Complies
		2204	51.2	42.9	74.0	54.0	Complies
		2483.5	69.8	51.2	74.0	54.0	Complies
802.11n	HT8	2462	103.3	87.2	-	-	-
		2884	43.3	38.6	74.0	54.0	Complies
		3564	44.6	35.8	83.3	67.2	Complies
		2204	50.7	40.5	74.0	54.0	Complies
		2483.5	68.5	48.1	74.0	54.0	Complies

**Result:** Spurious emissions were recorded up to 25 GHz. Harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247 by a margin of 0.2 dB. The measurement uncertainty for radiated emissions in this band was  $\pm 4.1$  dB.



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#### 4.3.1.3 Configuration 802.11a and 802.11n

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps, HT0 to HT7 and HT8 to HT15). No significant in emissions were observed. Final testing was performed while the transmitter continuously operated.

##### Channel 149 - 5745 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5745	108.2	96.1	-	-	-
		11490	56.9	43.8	74.0	54.0	Complies
		17235	64.6	49.1	88.2	76.1	Complies
		7660	49.6	38.4	74.0	54.0	Complies
		5725	80.7	60.1	88.2	76.1	Complies
802.11n	HT0	5745	108.0	94.6	-	-	-
		11490	56.7	43.7	74.0	54.0	Complies
		17235	63.8	49.5	88.0	74.6	Complies
		7660	49.8	38.7	74.0	54.0	Complies
		5725	79.3	58.8	88.0	74.6	Complies
802.11n	HT8	5745	106.6	89.8	-	-	-
		11490	58.1	43.2	74.0	54.0	Complies
		17235	62.3	48.0	86.6	69.8	Complies
		7660	49.2	37.4	74.0	54.0	Complies
		5725	77.5	56.2	86.6	69.8	Complies

##### Channel 157 - 5785 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5785	107.9	95.4	-	-	-
		11570	57.1	44.4	74.0	54.0	Complies
		17355	69.4	51.6	87.9	75.4	Complies
		7713.4	48.8	36.5	74.0	54.0	Complies
802.11n	HT0	5785	107.8	95.6	-	-	-
		11570	56.8	44.0	74.0	54.0	Complies
		17355	67.3	51.4	87.8	75.6	Complies
		7713.4	48.6	36.4	74.0	54.0	Complies
802.11n	HT8	5785	106.3	90.4	-	-	-
		11570	57.7	43.6	74.0	54.0	Complies
		17355	66.4	50.1	86.3	70.4	Complies
		7713.4	48.7	37.0	74.0	54.0	Complies



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## Channel 165 - 5825 MHz, Tx BW = 20 MHz

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11a	6 Mbps	5825	108.5	95.5	-	-	-
		11650	57.8	44.7	74.0	54.0	Complies
		17475	66.6	51.0	88.5	75.5	Complies
		7766.7	48.7	37.1	88.5	75.5	Complies
		5850	76.2	55.6	88.5	75.5	Complies
802.11n	HT0	5825	108.9	95.7	-	-	-
		11650	54.7	44.8	74.0	54.0	Complies
		17475	66.2	51.7	88.9	75.7	Complies
		7766.7	48.9	37.3	88.9	75.7	Complies
		5850	76.6	55.3	88.9	75.7	Complies
802.11n	HT8	5825	106.6	90.3	-	-	-
		11650	56.7	43.2	74.0	54.0	Complies
		17475	65.6	50.0	86.6	70.3	Complies
		7766.7	46.8	36.5	86.6	70.3	Complies
		5850	73.4	51.9	86.6	70.3	Complies

## Channel 151 - 5755 MHz, Tx BW = 40 MHz (Wide)

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	HT0	5755	107.7	92.8	-	-	-
		11510	54.7	42.1	74.0	54.0	Complies
		17265	65.0	50.2	87.7	72.8	Complies
		7673.4	48.1	36.9	74.0	54.0	Complies
		5725	75.6	59.8	87.7	72.8	Complies
802.11n	HT8	5755	105.4	86.7	-	-	-
		11510	58.0	44.3	74.0	54.0	Complies
		17265	64.7	48.9	85.4	66.7	Complies
		7673.4	48.6	36.5	74.0	54.0	Complies
		5725	80.2	61.1	85.4	66.7	Complies



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**Channel 159 - 5795 MHz, Tx BW = 40 MHz (Wide)**

Modes	Data Rates	Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
802.11n	HT0	5795	106.5	91.4	-	-	-
		11590	54.8	42.0	74.0	54.0	Complies
		17385	66.1	51.4	86.5	71.4	Complies
		7726.7	47.0	35.7	74.0	54.0	Complies
		5850	71.6	57.8	86.5	71.4	Complies
802.11n	HT8	5795	104.6	86.0	-	-	-
		11590	57.7	43.0	74.0	54.0	Complies
		17385	64.5	49.2	84.6	66.0	Complies
		7726.7	48.0	36.1	74.0	54.0	Complies
		5850	69.6	55.7	84.6	66.0	Complies

**Result:** Harmonic and spurious emissions were recorded up to 40 GHz. Other harmonics were low and confirmed with both RBW and VBW reduced. Emissions complied with the FCC limits of section 15.209 and 15.247 by a margin of 5.2 dB. The measurement uncertainty for radiated emissions in this band was  $\pm 4.1$  dB.

#### 4.3.1.4 Both WLAN and Bluetooth Transmitters Transmitting

**Result:** IM spurious emissions were recorded up to 40 GHz. Emissions complied with the FCC limits of section 15.209 and 15.247. The measurement uncertainty for radiated emissions in this band was  $\pm 4.1$  dB.

#### 4.3.2 Frequency Band: 30 - 1000 MHz

Testing was performed by Fujitsu General EMC Laboratory, JAPAN accredited by NVLAP (Lab Code: 200373-0).

Results: Complied - refer to Attachment 3 – FCC Part 15B Test Report (Report: FG06-142EAL-2).

#### 4.3.3 RF Conducted Measurements at the Antenna Terminal

Testing was performed by Aegis Labs Inc. CA, USA accredited by A2LA (Certificate Number: 1111.01)

Results: Complied – refer to attachment 4, Aegis test report number: INTEL-060907F with FCC ID: PD94965AGN.

#### 4.3.4 Band Edge Measurements

Complied (refer to section 4.3 – radiated emissions).



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

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

Measurements were performed while the WLAN transmitter continuously transmitted.

The maximum antenna gains were less than 6 dBi.

The peak output power measurement was performed using the integration method as per test method # 3 of DA 02-2138. The resolution bandwidth of 1 MHz was used. The video bandwidth of 30 kHz was used ( $VBW \geq 1/T$ , where  $T$  (worst case) = 88  $\mu$ s).

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.

The EUT is capable of using two antennas transmitting simultaneously (HT8 DATA mode) the power level is 3dB lower (50%) than if a single antenna was transmitting.

### 5.1 Configuration 802.11a and 802.11n

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps, HT0 to HT7 and HT8 to HT15). Peak power with lowest data rates (6 Mbps, HT0 and HT8) was observed to be slightly worst. Final testing was performed while the transmitter continuously operated on the lowest data rates.

Modes	Data Rates	Frequency MHz	P dBm	Limit dBm	P mW	Limit mW	Result
Tx BW = 20 MHz							
802.11a	6 Mbps	5745	18.3	30	67.6	1000	Complies
		5785	18.1	30	64.6	1000	Complies
		5825	18.7	30	74.1	1000	Complies
802.11n	HT0	5745	18.2	30	66.1	1000	Complies
		5785	18.8	30	75.9	1000	Complies
		5825	18.6	30	72.5	1000	Complies
802.11n	HT8	5745	15.5	30	35.5	1000	Complies
		5785	15.4	30	34.7	1000	Complies
		5825	15.2	30	33.1	1000	Complies
Tx BW = 40 MHz (Wide)							
802.11n	HT0	5755	18.8	30	75.9	1000	Complies
		5795	18.5	30	70.8	1000	Complies
802.11n	HT8	5755	15.6	30	36.3	1000	Complies
		5795	15.4	30	34.7	1000	Complies

### 5.2 Configuration 802.11b

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

Frequency MHz	P dBm	Limit dBm	P mW	Limit mW	Result
2412	16.1	30	40.7	1000	Complies
2437	16.5	30	44.7	1000	Complies
2462	16.2	30	41.7	1000	Complies



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### 5.3 Configuration 802.11g and 802.11n

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps, HT0 to HT7 and HT8 to HT15). Peak power with lowest data rates (6 Mbps, HT0 and HT8) was observed to be slightly worst. Final testing was performed while the transmitter continuously operated on the lowest data rates.

Modes	Data Rates	Frequency MHz	P dBm	Limit dBm	P mW	Limit mW	Result
802.11a	6 Mbps	2412	16.0	30	39.8	1000	Complies
		2437	16.4	30	43.7	1000	Complies
		2462	16.3	30	42.7	1000	Complies
802.11n	HT0	2412	16.5	30	44.7	1000	Complies
		2437	16.7	30	46.8	1000	Complies
		2462	16.1	30	40.7	1000	Complies
802.11n	HT8	2412	14.1	30	25.7	1000	Complies
		2437	13.2	30	20.9	1000	Complies
		2462	13.3	30	21.4	1000	Complies

### 6.0 CHANNEL BANDWIDTH

Testing was performed by Aegis Labs Inc. CA, USA accredited by A2LA (Certificate Number: 1111.01)

Results: Complied – refer to attachment 4, Aegis test report number: INTEL-060907F with FCC ID: PD94965AGN.

### 7.0 PEAK POWER SPECTRAL DENSITY

Testing was performed by Aegis Labs Inc. CA, USA accredited by A2LA (Certificate Number: 1111.01)

Results: Complied – refer to attachment 4, Aegis test report number: INTEL-060907F with FCC ID: PD94965AGN.

### 8.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

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

Spread spectrum transmitters operating in the 2400 - 2483.5 MHz and 5725 – 5850 MHz bands are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

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

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

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

In accordance with this section and also section 2.1093 this device has been defined as a portable device.

SAR testing was performed in accordance with OET Bulletin 65 and reported under EMC Technologies reports M070235\_Cert\_4965AGN\_SAR\_2.4 and M070235\_Cert\_4965AGN\_SAR\_5.6. The highest SAR value is 0.04 mW/g which complies with the FCC human exposure requirements of 47 CFR 2.1093 (d).



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## 9.0 ANTENNA REQUIREMENT

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

## 10.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: P7230 with INTEL Mini-PCI Wireless LAN Module ((Kedron 802.11a/b/g/n), Model: 4965AGN and Bluetooth Module, Model: EYTF3CSFT, tested on behalf of Fujitsu Australia Ltd, **complied** with the requirements of 47 CFR, Part 15 Subpart C - Rules for Radio Frequency Devices (intentional radiators), Section 15.247 - Operation in the frequency band 2400 - 2483.5 MHz and 5725 – 5850 MHz.

The test sample also complied with the Industry Canada RSS-210 issue 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	Results
<b>15.203</b>	5.5	Antenna Requirement	<b>Complies</b>
<b>15.205</b>	6.3	Operation in Restricted Band	<b>Complies</b>
<b>15.207</b>	6.6	Conducted Emissions	<b>Complies</b>
<b>15.209</b>	6.3	Radiated Emissions	<b>Complies</b>
<b>15.247 (a)(2)</b>	6.2.2(o)(iv)	Channel Bandwidth	<b>Complies</b>
<b>15.247 (b)(3)</b>	6.2.2(o)(b)	Peak Output Power	<b>Complies</b>
<b>15.247 (c)</b>		Antenna Gain > 6 dBi	<b>Not Applicable.</b> Antenna gain < 6 dBi
<b>15.247 (d)</b>	6.2.2(o)(e1)	Out of Band Emissions	<b>Complies</b>
<b>15.247 (e)</b>	6.2.2(o)(iv)	Peak Power Spectral Density	<b>Complies</b>
<b>15.247 (f)</b>		*Hybrid Systems	<b>Not Applicable.</b> EUT does not employ a hybrid system
<b>15.247 (g)</b>		Frequency Hopping	<b>Not Applicable.</b> EUT is not a frequency hopping
<b>15.247 (h)</b>		Frequency Hopping	<b>Not Applicable.</b> EUT is not a frequency hopping
<b>15.247 (i)</b>		Radio Frequency Hazard	<b>Complies</b>

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

### FCC Subpart E, Section 15.407 - WLAN

Refer to EMC Technologies Report No: M070228\_Cert\_4965AGN\_NII\_BT

### FCC Subpart C, Section 15.247 – Bluetooth

Refer to EMC Technologies Report No: M070228\_Cert\_EYTF3CSFT\_WLAN



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## TEST REPORT APPENDICES

**APPENDIX A: MEASUREMENT INSTRUMENT DETAILS**

**APPENDIX B: PHOTOGRAPHS**

**APPENDIX C: FUNCTIONAL DESCRIPTION**

**APPENDIX D: BLOCK DIAGRAM**

**APPENDIX E: SCHEMATICS**

**APPENDIX F: ANTENNA INFORMATION**

**APPENDIX G: SPECIFICATIONS**

**APPENDIX H: FCC LABELLING DETAILS**

**APPENDIX I: USER MANUAL**

**Attachment 1: RF Exposure Information**

**Attachment 2: FCC DOC for LifeBook P Series**

**Attachment 3: FCC Part 15B Test Report (Report: FG06-142EAL-2)**

**Attachment 4: INTEL Part 15.247 Test Report (Report: INTEL-060907F)**



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