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

**FCC ID:** EJE-WB0063  
**Industry Canada ID:** 337J-WB0063

**Test Sample:** LifeBook T Series  
**Model:** T2020

**Radio Modules:** 533AN\_HMW INTEL Shirley Peak 3x3 Half Mini-PCI  
WLAN Module & EYTF3CSFS Bluetooth Module

**Report Number** M080643\_Cert\_533AN\_HMW\_NII\_BT

**Issue Date:** 14<sup>th</sup> August 2008

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**CONTENTS**

- 1.0 INTRODUCTION**
- 2.0 GENERAL INFORMATION**

**FCC 15.407 (U-NII) RESULTS**

- 3.0 CONDUCTED EMI MEASUREMENTS**
- 4.0 RADIATED EMI MEASUREMENTS**
- 5.0 PEAK OUTPUT POWER**
- 6.0 CHANNEL BANDWIDTH**
- 7.0 PEAK POWER SPECTRAL DENSITY**
- 8.0 PEAK EXCURSION**
- 9.0 FREQUENCY STABILITY**
- 10.0 DYNAMIC FREQUENCY SELECTION**
- 11.0 DISCONTINUE TRANSMISSION**
- 12.0 RADIO FREQUENCY EXPOSURE**
- 13.0 ANTENNA REQUIREMENT**
- 14.0 COMPLIANCE STATEMENT**
- 15.0 MEASUREMENT UNCERTAINTIES**
- 16.0 TEST REPORT APPENDICES**

**APPENDIX A: MEASUREMENT INSTRUMENT DETAILS**

**APPENDIX B: PHOTOGRAPHS**

**APPENDIX C: OPERATIONAL DESCRIPTION**

**APPENDIX D: BLOCK DIAGRAM**

**APPENDIX E: ANTENNA INFORMATION**

**APPENDIX F: SCHEMATIC**

**APPENDIX G: FCC LABELLING DETAILS**

**APPENDIX H: USER MANUAL**

**Attachment 1: RF Exposure Information**

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

**Attachment 3: FCC Part 15B Test Report**

**Attachment 4: FCC Part 15.407 Test Report**

**Attachment 5: FCC Part 15.407 DFS Test Report**

**FCC 15.247 (DTS) RESULTS - WLAN**

**Refer to Report No: M080643\_Cert\_533AN\_HMW\_DTS\_BT**

**FCC 15.247 (DSS) RESULTS - BT**

**Refer to Report No: M080643\_Cert\_EYTF3CSFS\_533AN\_HMW**



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

**Report No. M080643\_Cert\_533AN\_HMW\_NII\_BT**

**Test Sample:** LifeBook T Series  
**Model:** T2020  
**Radio Modules:** Shirley Peak 3x3 Half Mini-PCI WLAN Module, Model: 533AN\_HMW (Intel Corp.)  
Bluetooth Module, Model: EYTF3CSFS (TAIYO YUDEN)

**FCC ID:** EJE-WB0063  
**Industry Canada ID:** 337J-WB0063  
**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

**Test Standards:** FCC Part 15 – Radio Frequency Devices (July 2008)  
FCC Part 15, Subpart E – Unlicensed National Information, Infrastructure Devices  
FCC Part 15.407, General Technical Requirements  
ANSI C63.4 – 2003  
OET Bulletin No. 65  
  
RSS-210 Issue 7 Low Power Licence-Exempt RadioCommunication Devices  
Annex 9: Local Area Network Devices  
  
RSS-102 Issue 1 (Provisional), Evaluation Procedure for Mobile and Portable Radio Transmitters with respect to Health Canada's Safety Code 6 for Exposure of Humans to Radio Frequency Fields

**Test Dates:** 9<sup>th</sup> to 15<sup>th</sup> July 2008

**Senior Engineer:**   
**Chieu Huynh - B.Eng (Hons) Electronics  
Lee Hopkins**

**Attestation:** *I hereby certify that the device(s) described herein were tested as described in this report and that the data included is that which was obtained during such testing.*

**Authorised Signatory:**   
**Chieu Huynh  
Senior EMC Engineer  
EMC Technologies Pty Ltd**



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

### 1.0 INTRODUCTION

EMI testing was performed on the Fujitsu notebook PC, Model: T2020 with INTEL Mini-PCI Wireless LAN Module (Shirley Peak 802.11a/b/g/n 3x3), Model: 533AN\_HMW & TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFS.

The Shirley Peak 3x3 WLAN module was originally certified by INTEL as a modular approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH). 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 533AN\_HMW 3x3 WLAN supports IEEE 802.11b, IEEE 802.11g, IEEE 802.11a and IEEE 802.11n (DTS & U-NII) configurations.

NII results for configurations IEEE 802.11a and IEEE 802.11n are reported in this test report.

The DTS and DSS results are reported separately.

Refer to EMC Technologies' test report: M080643\_Cert\_533AN\_HMW\_DTS\_BT (DTS).

Refer to EMC Technologies' test report: M080643\_Cert\_EYTF3CSFS\_533AN\_HMW (DSS)

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

|                                |                                                                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 47 CFR, Part 15,<br>Subpart E: | Unlicensed National Information Infrastructure Devices (U-NII) operating in the 5.15-5.35 GHz, 5.47-5.725 GHz and 5.725-5.825 GHz frequency bands |
| Section 15.203:                | Antenna requirements                                                                                                                              |
| Section 15.205:                | Restricted bands of operation                                                                                                                     |
| Section 15.207:                | Conducted Emission Limits                                                                                                                         |
| Section 15.209:                | Radiated Emission Limits (General requirements)                                                                                                   |
| Section 15.407:                | General Technical Requirements                                                                                                                    |

The results and technical details of the test sample are detailed in this report. The test sample **complied** with the requirements of 47 CFR, Part 15 Subpart E - Section 15.407.

The test sample also complied with the Industry Canada RSS-210 issue 7 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 9 and the RF exposure requirements of RSS-102.

The measurement procedure used was in accordance with ANSI C63.4-2003 and OET Bulletin No. 65. The instrumentation conformed to the requirements of ANSI C63.2-1996.



## 1.1 Summary of Results

### 1.1.1 FCC Subpart E, Section 15.407

| FCC Part 15, Subpart E Clauses | Industry Canada RSS-210 Clauses | Test Performed                  | Result                             |
|--------------------------------|---------------------------------|---------------------------------|------------------------------------|
| 15.203                         | 5.5                             | Antenna Requirement             | Complies                           |
| 15.205                         | 6.3                             | Operation in Restricted Band    | Complies                           |
| 15.207                         | 6.6                             | Conducted Emissions             | Note 1                             |
| 15.209                         | 6.3                             | Radiated Emissions              | Complies                           |
| 15.407 (a)(1)<br>(a)(2)        | Annex A9.2                      | Peak Transmit Power             | Note 2                             |
| 15.407 (a)(5)                  | Annex A9.2                      | Peak Power Spectral Density     | Note 2                             |
| 15.407 (a)(6)                  |                                 | Peak Excursion                  | Note 2                             |
| 15.407 (b)                     | Annex A9.3                      | Undesirable Emission            | Complies                           |
| 15.407 (c)                     | Annex A9.5(4)                   | Discontinue Transmission        | Complies                           |
| 15.407 (d)                     |                                 | Reserved                        | -                                  |
| 15.407 (e)                     | 2.2 (Table 1)                   | Restricted to Indoor Operations | Complies                           |
| 15.407 (f)                     | RSS-Gen (5.5)                   | Radio Frequency Hazard          | Complies                           |
| 15.407 (g)                     | Annex A9.5(5)                   | Frequency Stability             | Note 2                             |
| 15.407 (h)                     |                                 | Transmit Power Control          | Not Applicable<br>E.I.R.P < 500 mW |
| 15.407 (h)                     | Annex A9.4                      | Dynamic Frequency Selection     | Note 3                             |

**Note 1:** Refer to Attachment 3, FCC Part 15B test report

**Note 2:** Refer to Attachment 4, FCC 15.407 test report

**Note 3:** Refer to Attachment 5, FCC 15.407 DFS test report

### 1.1.2 FCC Subpart C, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M080643\_Cert\_533AN\_HMW\_DTS\_BT

### 1.1.3 FCC Subpart C, Section 15.247 - BT

Refer to EMC Technologies' test report: M080643\_Cert\_EYTF3CSFS\_533AN\_HMW

## 1.2 Modifications by EMC Technologies

No modifications were required.



## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 EUT (WLAN) Details

|                               |                                                                                                                                                                                                                                                                             |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Transmitter:</b>           | Half Mini-Card Wireless LAN Module                                                                                                                                                                                                                                          |
| <b>Wireless Module:</b>       | Shirley Peak 3x3 (11a/b/g/n)                                                                                                                                                                                                                                                |
| <b>Model Number:</b>          | 533AN_HMW                                                                                                                                                                                                                                                                   |
| <b>Manufacturer:</b>          | Intel Corporation                                                                                                                                                                                                                                                           |
| <b>Modulation Type:</b>       | Direct Sequence Spread Spectrum (DSSS for 802.11b)<br>Orthogonal Frequency Division Multiplexing (OFDM for 802.11a/g/n)                                                                                                                                                     |
| <b>2.4 GHz (802.11b/g/n):</b> | DBPSK, DQPSK, CCK, 16QAM and 64QAM                                                                                                                                                                                                                                          |
| <b>5 GHz (802.11a/n):</b>     | BPSK, QPSK, 16QAM and 64QAM                                                                                                                                                                                                                                                 |
| <b>Maximum Data Rate:</b>     | 802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps<br>802.11n = 450 Mbps                                                                                                                                                                                                        |
| <b>Frequency Ranges:</b>      | 2.412 – 2.462 GHz for 11b/g/n<br>5.18 - 5.32 GHz, 5.5 – 5.7 GHz and 5.745 - 5.825 GHz for 11a/n                                                                                                                                                                             |
| <b>Number of Channels:</b>    | 11 channels for 11b/g/n<br>24 channels for 11a/n with 20 MHz bandwidth<br>18 channels for 11n with 40 MHz bandwidth                                                                                                                                                         |
| <b>Antenna Types:</b>         | Yokowa Monopole (1 <sup>st</sup> , 2 <sup>nd</sup> ), Nissei Electric Inverted F Antenna (3 <sup>rd</sup> )<br>Model: refer to WLAN antenna data<br>Location: Top edge of LCD screen (1 <sup>st</sup> , 2 <sup>nd</sup> ), Left upper edge of LCD screen (3 <sup>rd</sup> ) |
| <b>Antenna gain:</b>          | Max antenna gain is less than 6 dBi.<br>Refer antenna data provided separately                                                                                                                                                                                              |
| <b>Power Supply:</b>          | 3.3 VDC from PCI bus                                                                                                                                                                                                                                                        |



**Channels Tested and Output power setting:**

| Modes                              | Channels           | Frequency MHz       | Average Output Power (dBm) |
|------------------------------------|--------------------|---------------------|----------------------------|
| <b>802.11b/g</b>                   | 1*                 | 2412                | 12.5                       |
|                                    | 6*                 | 2437                | 16.5                       |
|                                    | 11*                | 2462                | 11.5                       |
| <b>802.11a</b>                     | 36, 40 and 48**    | 5180, 5200 and 5240 | 16.5                       |
|                                    | 52, 60 and 64**    | 5260, 5300 and 5320 |                            |
|                                    | 100, 120 and 140** | 5500, 5600 and 5700 |                            |
|                                    | 149, 157 and 165*  | 5745, 5785 and 5825 |                            |
| <b>802.11n<br/>20MHz Bandwidth</b> | 1*                 | 2412                | 12.5                       |
|                                    | 6*                 | 2437                | 16.5                       |
|                                    | 11*                | 2462                | 11.5                       |
|                                    | 36, 40 and 48**    | 5180, 5200 and 5240 | 16.5                       |
|                                    | 52, 60 and 64**    | 5260, 5300 and 5320 |                            |
|                                    | 100, 120 and 140** | 5500, 5600 and 5700 |                            |
|                                    | 149, 157 and 165*  | 5745, 5785 and 5825 |                            |
| <b>802.11n<br/>40MHz Bandwidth</b> | 3*                 | 2422                | 12.5                       |
|                                    | 6*                 | 2437                | 16.5                       |
|                                    | 9*                 | 2452                | 13.5                       |
|                                    | 38**               | 5190                | 13.5                       |
|                                    | 54**               | 5270                | 16.5                       |
|                                    | 62**               | 5310                | 14.0                       |
|                                    | 102**              | 5510                | 15.5                       |
|                                    | 118 and 134**      | 5590 and 5670       | 16.5                       |
|                                    | 151 and 159*       | 5755 and 5795       |                            |

\*\*Channels tested and reported in this report

\*Channels tested and reported in the DTS submission (M080643\_Cert\_533AN\_HMW\_DTS\_BT)

The 533AN\_HMW is capable of using multiple antennas transmitting simultaneously (MCS8 mode is for any two antennas or MCS16 mode is for all three antennas). In MCS8 mode the power level is 3dB lower (50%) and in MCS16 mode the power is 5 dB lower for each antenna port than if a single antenna was transmitting.

## 2.2 EUT (Bluetooth) Details

|                              |                                                                                                                  |
|------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Transmitter:</b>          | Bluetooth                                                                                                        |
| <b>Model Number:</b>         | EYTF3CSFS                                                                                                        |
| <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>        | Monopole CP331590                                                                                                |
| <b>Antenna gain:</b>         | Location: Right palm rest area<br>Max antenna gain is less than 6 dBi.<br>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 |
|----------------|-----------------|---------------------------------|
| <b>1*</b>      | <b>2402</b>     | Power (Ext, Int) = 0, 96        |
| 2              | 2403            |                                 |
| 3              | 2404            |                                 |
| .              | .               |                                 |
| .              | .               |                                 |
| .              | .               |                                 |
| 39             | 2440            |                                 |
| <b>40*</b>     | <b>2441</b>     |                                 |
| 41             | 2442            |                                 |
| .              | .               |                                 |
| .              | .               |                                 |
| .              | .               |                                 |
| 77             | 2478            |                                 |
| 78             | 2479            |                                 |
| <b>79*</b>     | <b>2480</b>     |                                 |

\*Channels tested and reported in The DSS submission (M080643\_Cert\_EYTF3CSFS\_533AN\_HMW)

## 2.3 EUT (Notebook PC) Details

|                               |                                                    |
|-------------------------------|----------------------------------------------------|
| <b>EUT:</b>                   | LifeBook T series                                  |
| <b>Model Name:</b>            | T2020                                              |
| <b>Serial Number:</b>         | Pre-production Sample                              |
| <b>Manufacturer:</b>          | FUJITSU LIMITED                                    |
| <b>CPU Type and Speed:</b>    | Core2 Duo SU9400 1.40GHz                           |
| <b>LCD:</b>                   | 12.1" WXGA                                         |
| <b>Wired LAN:</b>             | Marvell 88E8057 : 10 Base-T/100 Base-TX/1000Base-T |
| <b>Modem:</b>                 | Agere MDC1.5 modem Model: D40                      |
| <b>Port Replicator Model:</b> | FPCPR87                                            |
| <b>AC Adapter Model:</b>      | SED80N2-16.0(Sanken)                               |
| <b>Voltage:</b>               | 16V                                                |
| <b>Current Specs:</b>         | 3.75A                                              |
| <b>Watts:</b>                 | 60W                                                |

## 2.4 Test Configuration

The Intel WLAN test software "CRTU" was used to transmit continuously during the tests.

Conducted tests were performed at the WLAN Antenna ports.

Radiated harmonics and spurious emissions were performed while the transmitter transmits continuously.

## 2.5 Support Equipment

Refer to Attachment 3 – FCC Part 15B Test Report

## 2.6 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.



## 2.7 Test Facility

### 2.7.1 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 antenna ports were performed at EMC Technologies' laboratory in Keilor Park, 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 3569B-1.**

### 2.7.2 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).

## 2.8 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

## 2.9 Ambients at OATS

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



## FCC 15.407 (U-NII) RESULTS

### 3.0 CONDUCTED EMISSION MEASUREMENTS

Refer to attachment 3 – FCC Part 15B test report

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

### 4.0 RADIATED EMISSION MEASUREMENTS

#### 4.1 Test Procedure

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

Radiated emission measurements were performed to the limits as per section 15.209 and 15.407. The measurements were made at the open area test site. All measurements above 1 GHz were made over a distance of 3 and 1 metres.

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.

The measurement of emissions above 1000 MHz was measured using a following setting:

Peak measurements setting: RBW = VBW = 1 MHz

Average measurements setting: RBW = 1 MHz and VBW = 10 Hz

The receiver bandwidth was set to 6 dB.

The EUT was slowly rotated with the Peak Detector set to Max-Hold. This was performed for two antenna heights. When an emission was located, it was positively identified and its maximum level found by rotating the automated turntable, and by varying the antenna height. Each significant peak was investigated with the Peak/Average Detectors. The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

#### 4.2 Calculation of field strength

The field strength was calculated automatically by the software using all the pre-stored calibration data. The method of calculation is shown below:

**E = V + AF - G + L** Where:

**E** = Radiated Field Strength in dBμV/m.

**V** = EMI Receiver Voltage in dBμV. (measured value)

**AF** = Antenna Factor in dB(m<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 dBμV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB. The resulting Field Strength is therefore as follows:

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



### 4.3 Results - Out of Band Emissions (Spurious and Harmonics)

This transmitter module was originally tested and certified by the manufacturer as a stand-alone module outside a laptop (host) with higher gain antennas. Refer to manufacturer's original test report (Attachment 4) for full results showing compliance with the spurious and harmonics limits. The required configurations for harmonics and spurious measurement were determined by the worst case data rates and antenna chains results provided in the manufacturer's original report.

#### 4.3.1 Frequency Band: 1 – 40 GHz

The peak limits for undesirable emission outside of the restricted bands are –27 dBm (68.3 dBuV/m @ 3m). The 74 dBuV/m @ 3m and 54 dBuV/m @ 3m limits are applied for emissions fall in the restricted bands.

Testing was performed while the WLAN transmitter continuously operated. Harmonics related to the WLAN transmitter operated in the frequency bands 5.15 – 5.35 GHz and 5.47 – 5.725 GHz are reported below. Harmonics in the frequency bands 2.4 – 2.4835 GHz and 5.725 – 5.850 GHz, refer to M080643\_Cert\_533AN\_HMW\_DTS\_BT.

#### Configuration 802.11a and 802.11n

Measurements were performed with EUT operating in the worst case mode of single antenna transmitting and the data rate at 6Mbps or MCS0. For multiple antennas transmitting modes like MCS8 (two antennas transmitting), the power level is 3 dB lower (50%) or MCS16 (three antennas transmitting), the power level is 5 dB lower with respect to single antenna mode.

Harmonics were measured for channels where the RF output power was highest.

Initial investigations were performed with all data rates: (6 Mbps to 54 Mbps and MCS0 to MCS7). Final testing was performed while the transmitter continuously operated in the worst case condition.

#### Channel 36 - 5180 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     | 5180                                                   | 105.7                | 94.8                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than Channel 48 (5240 MHz) |                      |                         |                   |                      |          |
|         |            | 5150                                                   | 65.9                 | 48.8                    | 74.0              | 54.0                 | Complies |
| 802.11n | MCS0       | 5180                                                   | 105.6                | 94.9                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than 6 Mbps                |                      |                         |                   |                      |          |
|         |            | 5150                                                   | 65.7                 | 49.5                    | 74.0              | 54.0                 | Complies |

#### Channel 40 - 5200 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     | 5200                                                    | 105.6                | 94.6                    | -                 | -                    | -      |
|         |            | Harmonics are same or lower than Channel 48 (5240 MHz)  |                      |                         |                   |                      |        |
| 802.11n | MCS0       | Fundamental and Harmonics are same or lower than 6 Mbps |                      |                         |                   |                      |        |



**Channel 48 - 5240 MHz, Tx BW = 20 MHz**

| Channel 40 5240 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     | 5240                                                    | 105.6                | 94.5                    | -                 | -                    | -        |
|                                     |            | 11000                                                   | 56.8                 | 43.0                    | 74.0              | 54.0                 | Complies |
|                                     |            |                                                         |                      |                         |                   |                      |          |
| 802.11n                             | MCS0       | Fundamental and Harmonics are same or lower than 6 Mbps |                      |                         |                   |                      |          |

**Channel 52 - 5260 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     | 5260                                                    | 105.2                | 94.4                    | -                 | -                    | -      |
|         |            | Harmonics are same or lower than Channel 48 (5240 MHz)  |                      |                         |                   |                      |        |
|         |            |                                                         |                      |                         |                   |                      |        |
| 802.11n | MCS0       | Fundamental and Harmonics are same or lower than 6 Mbps |                      |                         |                   |                      |        |

**Channel 60 - 5300 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     | 5300                                                    | 105.0                | 93.9                    | -                 | -                    | -      |
|         |            | Harmonics are same or lower than Channel 48 (5240 MHz)  |                      |                         |                   |                      |        |
|         |            |                                                         |                      |                         |                   |                      |        |
| 802.11n | MCS0       | Fundamental and Harmonics are same or lower than 6 Mbps |                      |                         |                   |                      |        |

**Channel 64 - 5320 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     | 5320                                                   | 105.4                | 94.1                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than Channel 48 (5240 MHz) |                      |                         |                   |                      |          |
|         |            | 5350                                                   | 67.8                 | 49.5                    | 74.0              | 54.0                 | Complies |
|         |            |                                                        |                      |                         |                   |                      |          |
| 802.11n | MCS0       | 5320                                                   | 105.5                | 94.0                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than 6 Mbps                |                      |                         |                   |                      |          |
|         |            | 5350                                                   | 68.8                 | 49.7                    | 74.0              | 54.0                 | Complies |

**Channel 100 - 5500 MHz, Tx BW = 20 MHz**

| Channel 200 5500 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     | 5500                                    | 103.4                | 91.8                    | -                 | -                    | -        |
|                                   |            | 11000                                   | 55.0                 | 40.6                    | 74.0              | 54.0                 | Complies |
|                                   |            | 5460                                    | 64.4                 | 50.0                    | 74.0              | 54.0                 | Complies |
|                                   |            |                                         |                      |                         |                   |                      |          |
| 802.11n                           | MCS0       | 5500                                    | 103.9                | 92.5                    | -                 | -                    | -        |
|                                   |            | Harmonics are same or lower than 6 Mbps |                      |                         |                   |                      |          |
|                                   |            | 5460                                    | 65.7                 | 50.8                    | 74.0              | 54.0                 | Complies |

**Channel 120 - 5600 MHz, Tx BW = 20 MHz**

| Channel 120 5500 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     | 5600                                                    | 102.8                | 91.8                    | -                 | -                    | -      |
|                                      |            | Harmonics are same or lower than Channel 100 (5500 MHz) |                      |                         |                   |                      |        |
|                                      |            |                                                         |                      |                         |                   |                      |        |
| 802.11n                              | MCS0       | 5600                                                    | 102.9                | 92.0                    | -                 | -                    | -      |
|                                      |            | Harmonics are similar to 6 Mbps                         |                      |                         |                   |                      |        |

**Channel 140 - 5700 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     | 5700                            | 103.7                | 92.4                    | -                 | -                    | -        |
|         |            | 11400                           | 56.4                 | 42.0                    | 74.0              | 54.0                 | Complies |
|         |            | 17100*                          | 60.6                 | 45.0                    | 78.8              | -                    | Complies |
|         |            | 5725                            | 64.7                 | 50.2                    | 83.7              | 72.4                 | Complies |
|         |            |                                 |                      |                         |                   |                      |          |
| 802.11n | MCS0       | 5700                            | 103.5                | 92.4                    | -                 | -                    | -        |
|         |            | Harmonics are similar to 6 Mbps |                      |                         |                   |                      |          |
|         |            | 5725                            | 65.0                 | 50.1                    | 83.5              | 72.4                 | Complies |

\*Measurement was performed at 1 m distance.

**Channel 38 - 5190 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result   |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|----------|
| 802.11n | MCS0       | 5190                                                  | 101.3                | 90.7                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |          |
|         |            | 5150                                                  | 68.8                 | 51.6                    | 74.0              | 54.0                 | Complies |

**Channel 54 - 5270 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|--------|
| 802.11n | MCS0       | 5270                                                  | 104.5                | 93.0                    | -                 | -                    | -      |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |        |

**Channel 62 - 5310 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result   |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|----------|
| 802.11n | MCS0       | 5310                                                  | 101.9                | 90.8                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |          |
|         |            | 5350                                                  | 69.7                 | 52.2                    | 74.0              | 54.0                 | Complies |

**Channel 102 - 5510 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result   |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|----------|
| 802.11n | MCS0       | 5510                                                  | 102.4                | 91.1                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |          |
|         |            | 5460                                                  | 64.6                 | 49.0                    | 74.0              | 54.0                 | Complies |

**Channel 118 - 5590 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|--------|
| 802.11n | MCS0       | 5590                                                  | 102.6                | 91.2                    | -                 | -                    | -      |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |        |

**Channel 134 - 5670 MHz, Tx BW = 40 MHz**

| Modes   | Data Rates | Frequency MHz                                         | Peak Detector dBuV/m | Average Detector dBuV/m | Peak Limit dBuV/m | Average Limit dBuV/m | Result   |
|---------|------------|-------------------------------------------------------|----------------------|-------------------------|-------------------|----------------------|----------|
| 802.11n | MCS0       | 5670                                                  | 103.0                | 91.7                    | -                 | -                    | -        |
|         |            | Harmonics are same or lower than the 20 MHz bandwidth |                      |                         |                   |                      |          |
|         |            | 5725                                                  | 64.5                 | 50.2                    | 83.0              | 71.7                 | Complies |

**Result:** Harmonics and spurious emissions were recorded up to 40 GHz. Harmonics were low and confirmed with both RBW and VBW reduced. Emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 1.8 dB.

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

Refer to attachment 3 – FCC Part 15B test report

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

#### **4.3.3 RF Conducted Measurements at the antenna terminal**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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

#### **4.3.4 Radiated Band Edge Measurements**

Complied (refer to section 4.3 – radiated emissions).



## **5.0 PEAK OUTPUT POWER - Section 15.407(a)**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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

## **6.0 CHANNEL BANDWIDTH**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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

## **7.0 PEAK POWER SPECTRAL DENSITY**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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

## **8.0 PEAK EXCURSION**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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

## **9.0 FREQUENCY STABILITY**

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 4, FCC 15.407 test report number: INTEL-080318F Rev A2.

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



## 10.0 DYNAMIC FREQUENCY SELECTION

The EUT is a Client Device without Radar Interference Detection Function.

Ad-hoc operation (not under control of a Master Device) is supported in the 2.4 GHz & 5.15 - 5.25 GHz bands only. This Ad-hoc capability is limited in hardware via factory programmed EEPROM settings that cannot be accessed or changed by end users. The Ad-hoc supported channels of operation cannot be modified – regardless of which client utility or operating system control is used.

Refer to original approval under FCC ID: PD9533ANH (Canada ID: 1000M-533ANH) certified by INTEL.

Refer to attachment 5, FCC 15.407 DFS test report: R71236 Rev 3 dated May 19 2008

Testing was performed by Elliott Laboratories, Inc CA, USA accredited by A2LA (Certificate Number: 2016.01)

## 11.0 DISCONTINUE TRANSMISSION

Data Transmission is always initiated by software, which is then passed down through the MAC, through the digital and analog baseband, finally to the RF chip. Several special packets (ACKs, CTS, PSpoll, etc) are initiated by the MAC. These are the only ways the digital baseband portion will turn on the RF transmitter, which then turns off at the end of the packet. Therefore, the transmitter will be ON only while one of the four mentioned packets is being transmitted.

## 12.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

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

Spread spectrum transmitters operating in the 5.15 – 5.35 GHz and 5.47 – 5.725 GHz are required to be operated in a manner that ensures that the public is not exposed to RF energy levels in accordance with CFR 47, Section 1.1307(b)(1).

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 M080644\_Cert\_533AN\_HMW\_SAR\_2.4 (2.4 GHz) and M080644\_Cert\_533AN\_HMW\_SAR\_5.6 (5.18 – 5.825 GHz). SAR values of 0.527 mW/g (DTS) and 1.05 mW/g (NII) were measured which complied with the FCC human exposure requirements of 47 CFR 2.1093 (d).

## 13.0 ANTENNA REQUIREMENT

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



## 14.0 COMPLIANCE STATEMENT

The Fujitsu notebook PC, Model: T2020 with INTEL Mini-PCI Wireless LAN Module (Shirley Peak 802.11a/b/g/n 3x3), Model: 533AN\_HMW & TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFS, **complied** with the requirements of 47 CFR, Part 15 Subpart E -Section 15.407 (5.15-5.35 GHz and 5.47 – 5.725 GHz bands).

The test sample also complied with the Industry Canada RSS-210 issue 7 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 9 Local Area Network Devices requirements and the RF exposure requirements of RSS-102.

Results were as follows:

### FCC Subpart E, Section 15.407

| FCC Part 15, Subpart E Clauses | Industry Canada RSS-210 Clauses | Test Performed                  | Result                                    |
|--------------------------------|---------------------------------|---------------------------------|-------------------------------------------|
| 15.203                         | 5.5                             | Antenna Requirement             | <b>Complies</b>                           |
| 15.205                         | 6.3                             | Operation in Restricted Band    | <b>Complies</b>                           |
| 15.207                         | 6.6                             | Conducted Emissions             | <b>Note 1</b>                             |
| 15.209                         | 6.3                             | Radiated Emissions              | <b>Complies</b>                           |
| 15.407 (a)(1)<br>(a)(2)        | Annex A9.2                      | Peak Transmit Power             | <b>Note 2</b>                             |
| 15.407 (a)(5)                  | Annex A9.2                      | Peak Power Spectral Density     | <b>Note 2</b>                             |
| 15.407 (a)(6)                  |                                 | Peak Excursion                  | <b>Note 2</b>                             |
| 15.407 (b)                     | Annex A9.3                      | Undesirable Emission            | <b>Complies</b>                           |
| 15.407 (c)                     | Annex A9.5(4)                   | Discontinue Transmission        | <b>Complies</b>                           |
| 15.407 (d)                     |                                 | Reserved                        | -                                         |
| 15.407 (e)                     | 2.2 (Table 1)                   | Restricted to Indoor Operations | <b>Complies</b>                           |
| 15.407 (f)                     | RSS-Gen (5.5)                   | Radio Frequency Hazard          | <b>Complies</b>                           |
| 15.407 (g)                     | Annex A9.5(5)                   | Frequency Stability             | <b>Note 2</b>                             |
| 15.407 (h)                     |                                 | Transmit Power Control          | <b>Not Applicable</b><br>E.I.R.P < 500 mW |
| 15.407 (h)                     | Annex A9.4                      | Dynamic Frequency Selection     | <b>Note 3</b>                             |

**Note 1:** Refer to Attachment 3, FCC Part 15B test report

**Note 2:** Refer to Attachment 4, FCC 15.407 test report

**Note 3:** Refer to Attachment 5, FCC 15.407 DFS test report

### FCC Subpart E, Section 15.247 - WLAN

Refer to EMC Technologies Report No: M080643\_Cert\_533AN\_HMW\_DTS\_BT

### FCC Subpart C, Section 15.247 - BT

Refer to EMC Technologies' test report: M080643\_Cert\_EYTF3CSFS\_533AN\_HMW



## 15.0 MEASUREMENT UNCERTAINTIES

EMC Technologies has evaluated the equipment and the methods used to perform the emissions testing. The estimated measurement uncertainties for emissions tests shown within this report are as follows:

|                             |                     |         |
|-----------------------------|---------------------|---------|
| <b>Conducted Emissions:</b> | 9 kHz to 30 MHz     | ±3.2 dB |
| <b>Radiated Emissions:</b>  | 30 MHz to 300 MHz   | ±5.1 dB |
|                             | 300 MHz to 1000 MHz | ±4.7 dB |
|                             | 1 GHz to 18 GHz     | ±4.6 dB |

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

## 16.0 TEST REPORT APPENDICES

**APPENDIX A: MEASUREMENT INSTRUMENT DETAILS**

**APPENDIX B: PHOTOGRAPHS**

**APPENDIX C: OPERATIONAL DESCRIPTION**

**APPENDIX D: BLOCK DIAGRAM**

**APPENDIX E: ANTENNA INFORMATION**

**APPENDIX F: SCHEMATIC**

**APPENDIX G: FCC LABELLING DETAILS**

**APPENDIX H: USER MANUAL**

**Attachment 1: RF Exposure Information**

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

**Attachment 3: FCC Part 15B Test Report**

**Attachment 4: FCC Part 15.407 Test Report**

**Attachment 5: FCC Part 15.407 DFS Test Report**

