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

FCC ID: EJE-WB0086
Industry Canada ID: 337J-WB0086

Test Sample: Lifebook T series
Model: T734, TH734

Radio Module: Intel Centrino Advanced-N Wilkins Peak 7260HMW

Report Number: M130811_FCC_7260HMW_DSS_rev2

Issue Date: 8th October 2013

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Test Sample: Portable PC LifeBook T Series
Model: T734, TH734
Radio Module: Intel Centrino Advanced-N Wilkins Peak 7260HMW

FCC ID: EJE-WB0086
Industry Canada ID: 337J-WB0086
Equipment Type: Intentional Radiator (Transceiver)

Manufacturer (LifeBook): Fujitsu Ltd
Address: 1-1 Kamikodanaka 4-Chome, Nakahara-Ku, Kawasaki, Japan

Test Standards: FCC Part 15 – Radio Frequency Devices (October 2009)
FCC Part 15 Subpart C - Intentional Radiators
Section 15.247: 2400 – 2483.5 MHz & 5725 – 5850 MHz Operation Bands
ANSI C63.4 – 2009

RSS-210 Issue 8 Low Power Licence-Exempt RadioCommunication
Devices Annex 8: 2400–2483.5 MHz & 5725–5850 MHz Operation Bands

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: 13 September 2013 to 18 September 2013

Test Engineer: Kevin Hansen

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:



Rob Weir
Facility Manager
EMC Technologies Pty Ltd

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1.0 INTRODUCTION

EMI testing was performed on the Portable PC Fujitsu LifeBook T Series, Model: T734, TH734 with Intel Centrino Advanced-N 7260 (Wilkins Peak2 802.11a/b/g/n + BT), Model: 7260HMW.

The 7260HMW WLAN module was originally certified by INTEL Corporation as a modular approval under FCC ID: PD97260H (Canada ID: 1000M-7260H).

The intention of this application is to FCC certify Intel Centrino Advanced-N 7260 (Wilkins Peak2 802.11a/b/g/n + BT), Model: 7260HMW installed in Portable PC Fujitsu LifeBook T Series, Model: T734, TH734. The Radio modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

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 8 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 8 and the RF exposure requirements of RSS-102.

The measurement procedure used was in accordance with ANSI C63.4-2009. The instrumentation conformed to the requirements of ANSI C63.2-2009.

1.1 Summary of Results

FCC Subpart C, Section 15.247

FCC Part 15 Subpart C Clauses	Industry Canada RSS-210 Issue 8 and RSS-Gen Clauses	Test Performed	Results
15.203	RSS-Gen (7.1.4)	Antenna Requirement	Complies
15.205	2.2 (Table 1)	Operation in Restricted Band	Complies
15.207	RSS-Gen (7.2.2)	Conducted Emissions	Complies, Note 1
15.209	RSS-Gen (6)	Radiated Emissions	Complies
15.247 (a)(2)	A8.1 (b) (d)	Channel Bandwidth	Note 2
15.247 (b)(3)	A8.4	Peak Output Power	Note 2
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	Not Applicable. Antenna gain < 6 dBi
15.247 (d)	A8.5	Out of Band Emissions	Complies
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	Not Applicable.
15.247 (f)	A8.3	Hybrid Systems (Note 3)	Not Applicable. EUT does not employ a hybrid system
15.247 (g)	A8.1	Frequency Hopping	Note 2
15.247 (h)	A8.1	Frequency Hopping	Note 2
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	Complies

Note 1: Refer to FCC Part 15B Test Report.

Note 2: Refer to the original module report for Intel.

Note 3: Hybrid systems are those that employ a combination of both frequency hopping and digital modulations technique.

1.2 Modifications by EMC Technologies

No modifications were required.

2.0 GENERAL INFORMATION

(Information supplied by the Client)

2.1 EUT (Blue Tooth) Details

Transmitter:	Half Mini-Card Wireless LAN Module
Wireless Module:	Intel Centrino Advanced-N 7260
Model Number:	7260HMW
Manufacturer:	Intel Corporation
Frequency Ranges:	2402 MHz to 2480 MHz
Number of Channels:	79
Carrier Spacing:	1.0 MHz
Antenna Types:	Nissei Inverted F PIFA Antenna
Antenna gain:	1.13 dBi (Max antenna gain is less than 6 dBi) Refer antenna data provided separately
Maximum Output Power:	6 dBm
Reference Oscillator:	16 MHz (built in)
Power Supply:	3.3VDC from host

2.2 EUT (Notebook PC) Details

NoteBook PC:	Portable PC LifeBook T series
*Model Name:	T734, TH734
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Core i7 2.9GHz
LCD:	12.5"HD+(1366x768) : LP125WH2
Wired LAN:	Intel I217LM : 10 Base-T/100 Base-TX/1000Base-T
Modem:	None
Port Replicator Model:	FPCPR132
AC Adapter Model:	PJW1942NA (Tamura)
Voltage out:	19 V
Current out:	4.22A
Watts:	80W

*The model numbers shown T734 and TH734 are for the same product. The difference between T734 and TH734 is color and target market.
The T734 is for commercial market.
The TH734 is for consumer market.

2.3 Test Configuration

The Intel test software "DRTU" was used to control the transmitter module enabling it to transmit continuously and with selected channels.

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

Power is provided via an AC adaptor.

2.4 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI C63.4-2009. Radiated emissions tests were performed at a distance of 1 and 3 metres from the EUT.

2.5 Test Facility

2.5.1 General

EMC Technologies Pty Ltd is listed by the FCC as a test laboratory able to perform compliance testing for the public. EMC Technologies is listed as an FCC part 47CFR2.948 test lab and may perform the testing required under Parts 15 and 18 – **FCC Registration Number 90560**

EMC Technologies Pty Ltd has also been accredited as a Conformity Assessment Body (CAB) by Australian Communications and Media Authority (ACMA) under the APECTEL MRA and is designated to perform compliance testing on equipment subject to Declaration of Conformity (DoC) and Certification under Parts 15 & 18 of the FCC Commission's rules – **Registration Number 494713 & Designation number AU0001.**

EMC Technologies has also been accepted by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional) - **Industry Canada number 3569B.**

Measurements were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

2.5.2 NATA Accreditation

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

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

The current full scope of accreditation can be found on the NATA website: www.nata.asn.au
It also includes a large number of emissions, immunity, SAR, EMR and Safety standards.

NATA is the Australian national laboratory accreditation body and has accredited EMC Technologies to operate to the IEC/ISO17025 requirements. A major requirement for accreditation is the assessment of the company and its personnel as being technically competent in testing to the standards. This requires fully documented test procedures, continued calibration of all equipment to the National Standard at the National Measurements Institute (NMI) and an internal quality system to ISO 9002. NATA has mutual recognition agreements with the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Association for Laboratory Accreditation (A²LA).

2.6 Test Equipment Calibration

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 (bi-conical and log-periodic) calibrated by EMC Technologies. The complete list of test equipment used for the measurements, including calibration dates and traceability is contained in Appendix A

FCC 15.247 (DSS) RESULTS

3.0 CONDUCTED EMISSION MEASUREMENTS

Testing was performed by Fujitsu General EMC Laboratory, JAPAN accredited by NVLAP (Lab Code: 200373-0). Report number FG13-092EAL (1/12), issued September 5, 2013.

4.0 RADIATED 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 and 15.247. 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 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. The procedure was repeated with the device orientated in three orthogonal axis to further maximise the emission. In this instance the device antennas are located in the swivel display, this was adjusted to give maximum emissions.

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 μ V/m.

V = EMI Receiver Voltage in dB μ V. (measured value)

AF = Antenna Factor in dB(m⁻¹). (stored as a data array)

G = Preamplifier Gain in dB. (stored as a data array)

L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

- **Example Field Strength Calculation**

Assuming a receiver reading of 34.0 dB μ 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:

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

4.3 Radiated 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 (FCC 15C) for full results showing compliance with the spurious and harmonics limits.

Intel's original report showed the conducted antenna port spurious emissions from the module passed the limit by a margin greater than the antenna gain (1.13dBi) of the host product.

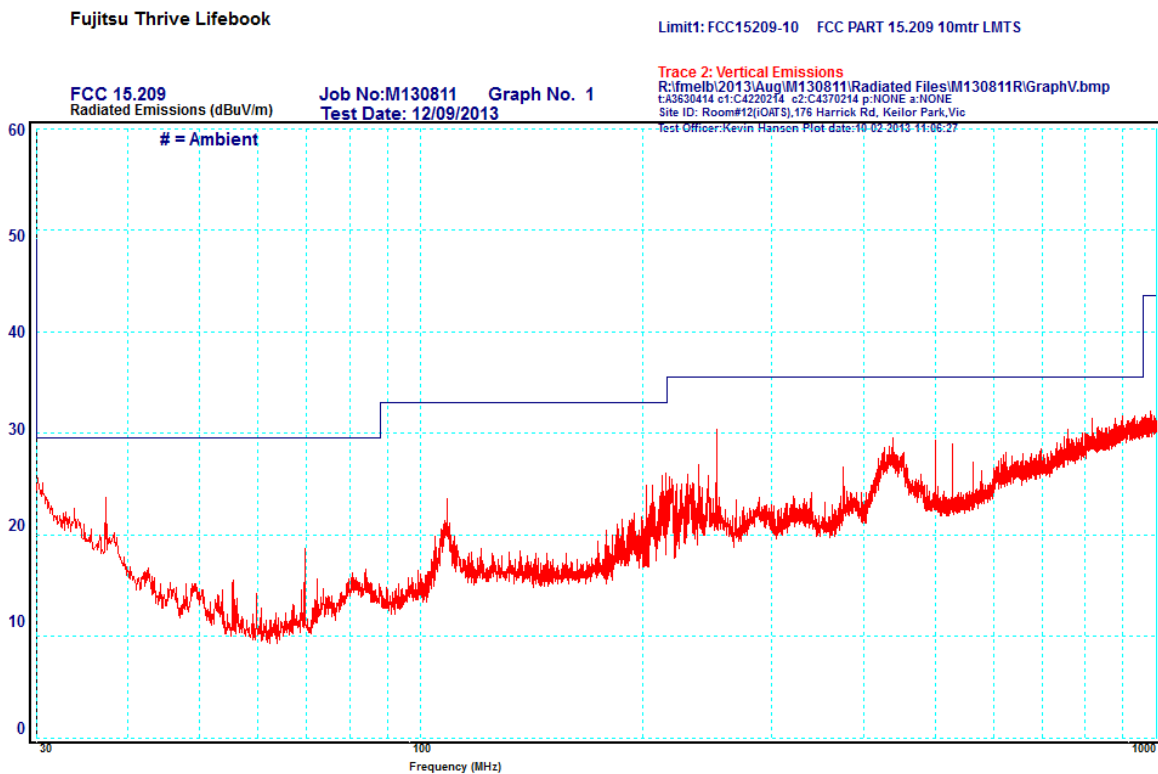
However, to ensure the transmitter module installed in the T734, TH734 LifeBook is still in compliance, verification tests were performed. Initial investigations were performed with all data rates. Final testing was performed while the transmitter continuously operated in the worst case condition.

4.3.1 Frequency Band: 30 - 1000 MHz

After some investigation no significant sub harmonics or emissions were detected. The Intel module report also noted that "The spurious emissions below 1 GHz do not depend on either the operating channel or the modulation mode selected in the EUT."

It was decided to perform the test with the module drawing the most power so the 2.4GHz channel with the highest output power was chosen. The measurements were made at a distance of 10 metres.

Vertical Emissions:

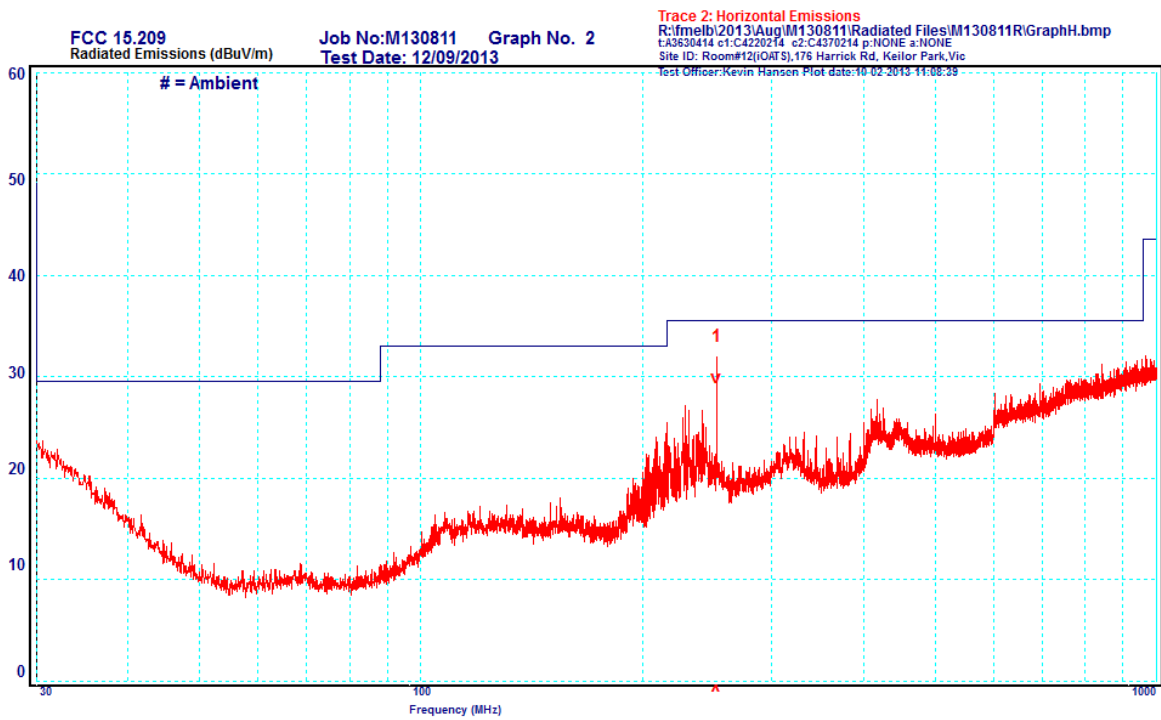


All peak measurements were below the FCC 15.209 limit.

Horizontal Emissions:

Fujitsu Thrive Lifebook

Limit1: FCC15209-10 FCC PART 15.209 10mtr LMTS



Peak	Frequency MHz	Polarisation	Quasi Peak dBµV/m	Limit dBµV/m	Margin dB
1	252.45	Horizontal	20.8	35.5	-14.7

4.3.2 Frequency Band: 1 – 25 GHz

The 74 dB μ V/m @ 3m and 54 dB μ V/m @ 3m limits are applied for emissions falling in the restricted bands. The limits for emissions outside the restricted band are 20 dB below the fundamental field strength. The limits are adjusted by 10.5 dB when measurements perform at a distance of 1m.

Testing was performed while the Bluetooth module continuously transmitting. Harmonics related to the Bluetooth transmitter operated in the frequency bands 2.4 – 2.4835 GHz are reported below.

4.3.2.1 Bluetooth

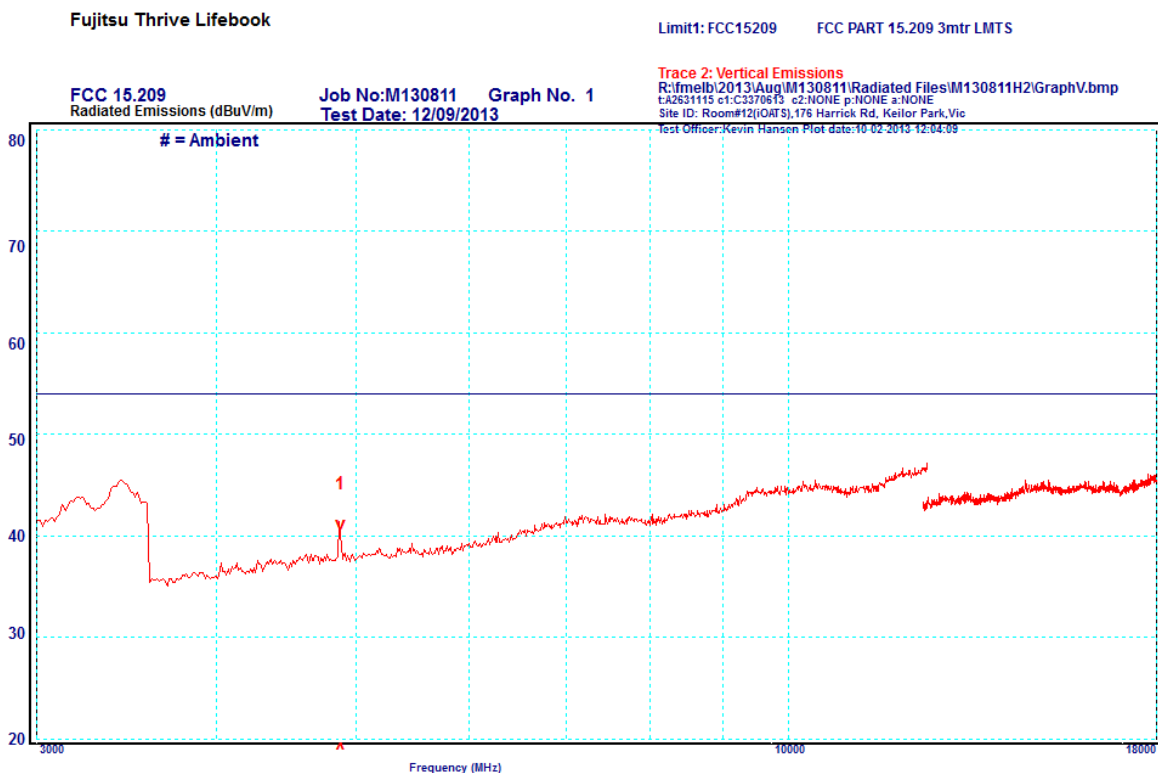
Considering the following factors as a rationale, only the mid channel was tested:

- The maximum output power is 6dBm.
- Intel’s modular test report shows no conducted spurious emissions near the limit.
- The antenna gain for this host is 1.13dBi

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2440	Transmit Frequency				
4880	48.0	41.0	74	54	Complied
7320	NF = 50.0	NF = 42.0	74	54	Complied
12200	NF = 55.0	NF = 45.0	74	54	Complied

NF = instrumentation noise floor

Average emissions (1MHz RBW, 10kHz VBW), 3GHz to 18GHz



Result: Harmonics and spurious emissions were recorded up to 25 GHz. Other emissions 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. The limits for restricted bands 2310MHz to 2390MHz and 2483.5MHz to 2500MHz were not exceeded when the Bluetooth was operating at the lowest and highest frequencies respectively.

4.3.3 RF Conducted Measurements at the Antenna Terminal (including Band Edge)

Refer to original Intel module test report (submitted). Testing was performed by AT4 Wireless, S.A. with FCC registration number 905266 and Canadian Certification reference number IC 4621A-1. Report 30867RRF.001.

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

Refer to original Intel module test report (submitted). Testing was performed by AT4 Wireless, S.A. with FCC registration number 905266 and Canadian Certification reference number IC 4621A-1. Report 30867RRF.001.

It was not deemed likely that the host equipment (antenna) will cause the output power to exceed the 1 watt limit.

6.0 CHANNEL BANDWIDTH

Refer to original Intel module test report (submitted). Testing was performed by AT4 Wireless, S.A. with FCC registration number 905266 and Canadian Certification reference number IC 4621A-1. Report 30867RRF.001.

It was not deemed likely that the host equipment will cause the 20 dB bandwidth parameters to change.

7.0 FREQUENCY HOPPING

Refer to original Intel module test report (submitted). Testing was performed by AT4 Wireless, S.A. with FCC registration number 905266 and Canadian Certification reference number IC 4621A-1. Report 30867RRF.001.

It was not deemed likely that the frequency hopping parameters will be affected by the host equipment.

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).

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

SAR testing exemption for the Bluetooth transmitter was reported under EMC Technologies reports M130809_FCC_7260HMW_SAR_2.4.

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 Portable PC Fujitsu LifeBook T Series, Model: T734, TH734 with Intel Centrino Advanced-N 7260 (Wilkins Peak2 802.11a/b/g/n), Model: 7260HMW, **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 .

The test sample also complied with the Industry Canada RSS-210 issue 8 - Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands): Category I Equipment, Annex 8 and the RF exposure requirements of RSS-102.

11.0 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:

Conducted Emissions:	9 kHz to 30 MHz	±3.2 dB
Radiated Emissions:	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%.

12.0 TEST REPORT APPENDICES

APPENDIX A: MEASUREMENT INSTRUMENT DETAILS

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Attachment – RF Exposure Information

Attachment – FCC DOC for LifeBook T Series

Attachment – Intel FCC Part 15C Test Report