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Global Product Certification
EMC-EMF Safety Approvals

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

FCC ID: EJE-WB0088
Industry Canada ID: 337J-WB0088

Test Sample: Convertible Tablet Computer
Model: T904

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

Report Number: M131103_FCC_7260HMW_DSS

Issue Date: 2 December 2013

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Test Sample:	Portable Convertible Tablet Computer
Model:	T904
Radio Module:	Intel Centrino Advanced-N Wilkins Peak 7260HMW
FCC ID:	EJE-WB0088
Industry Canada ID:	337J-WB0088
Equipment Type:	Intentional Radiator (Transceiver)
Manufacturer (Host):	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:	22 November to 2 December 2013
Test Engineer:	**Matt Grimwood**
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**

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

1.0 INTRODUCTION

EMI testing was performed on the Fujitsu Portable Convertible Tablet Computer, Model: T904 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 certify the Fujitsu Portable Convertible Tablet Computer, Model: T904 incorporating the Intel Centrino Advanced-N 7260 (Wilkins Peak2 802.11a/b/g/n + BT), Model: 7260HMW radio module.

As requested by the customer only those requirements deemed likely to be affected by the host tablet are reported herein.

Refer to the modular test report 30867RRF.001 from AT4 Wireless, S.A. with FCC registration number 905266 and Canadian Certification reference number IC 4621A-1 for results of tests that the tablet was deemed to have negligible effect. Original test reports are submitted with this application.

1.1 Summary of Results

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**
15.209	RSS-Gen (6)	Radiated Emissions	**Complies**
15.247 (a)(2)	A8.1 (b) (d)	Channel Bandwidth	**Note 1**
15.247 (b)(3)	A8.4	Peak Output Power	**Note 1**
15.247 (c)	RSS-Gen (7.1.4)	Antenna Gain > 6 dBi	**Not Applicable.** (Gain < 6 dBi)
15.247 (d)	A8.5	Out of Band Emissions	**Complies**
15.247 (e)	A8.2 (b)	Peak Power Spectral Density	**Note 1**
15.247 (f)	A8.3	Hybrid Systems (Note 3)	**Not Applicable.** (not a hybrid system)
15.247 (g)	A8.1	Frequency Hopping	**Note 1** (Bluetooth)
15.247 (h)	A8.1	Frequency Hopping	**Note 1** (Bluetooth)
15.247 (i)	RSS-Gen (5.5)	Radio Frequency Hazard	**Complies**

Note 1: Refer to the radio module report.

The sample **complied** with the requirements of 47 CFR, Part 15 Subpart C - Section 15.247.

The sample **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.

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:	Chain B = -0.14 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 Convertible Tablet Computer
***Model Name:**	T904
Serial Number:	Pre-production Sample
Manufacturer:	FUJITSU LIMITED
CPU Type and Speed:	Core i7 3.3GHz
LCD:	13.3”QHD(2560x1440) : LQ133T1JW17
Graphics Chip:	None
Wired LAN:	Intel I218LM : 10 Base-T, 100 Base-TX, 1000Base-T
Modem:	None
Port Replicator Model:	FPCPR245
AC Adapter Model:	Green IT AC adaptor P/N CP483452-01
Voltage out:	19 V
Current out:	4.22A
Watts:	80W
Alternative Adapters:	90W: A13-090P1A(Chicony), A13-090P2A(Chicony)
(Not tested)	ADP-90BE A(Delta), ADP-90BE B(Delta)
	80W: ADP-80SB A(Delta), ADP-80SB B(Delta)
	65W: ADP-65MD A(Delta), ADP-65MD B(Delta),
	ADP-65YH A(Delta), ADP-65YH B(Delta),
	ADP-65JH AB(Delta), A11-065N5A(Chicony)

2.3 Test Configuration

The Intel WLAN test software “DRTU” was used to control the transmitter module enabling it to transmit continuously and with selected channels, modulation and data rates.

Radiated harmonics and spurious emission measurements were performed while the transmitter operated at maximum duty cycle.

Power is provided via a Green IT AC adaptor P/N CP483452-01.

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 is 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 is accredited by Industry Canada for the performance of radiated measurements in accordance with RSS 212, Issue 1 (Provisional) - **Industry Canada number 3569B.**

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 (A^2LA).

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 Liberty Laboratories in the USA and the working antennas (biconical 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

3.1 Test Procedure

The arrangement specified in ANSI C63.4-2009 was adhered to for the conducted EMI measurements. The EUT was placed in the RF screened enclosure and a CISPR EMI Receiver as defined in ANSI C63.2-2009 was used to perform the measurements.

The EMI Receiver was operated under program control using the Max-Hold function and automatic frequency scanning, measurement and data logging techniques. The specified 0.15 MHz to 30 MHz frequency range was sub-divided into sub-ranges to ensure that all short duration peaks were captured.

3.2 Peak Maximising Procedure

The various operating modes of the system were investigated, the transmit mode of the radio module did not produce any significant emissions. The test was performed with the module transmitting at the highest power: 802.11b Channel 11/ 2417MHz.

For each of the sub-ranges, the EMI receiver was set to continuous scan with the Peak detector set to Max-Hold mode. The Quasi-Peak detector and the Average detector were then invoked to measure the actual Quasi-Peak and Average level of the most significant peaks, which were detected.

3.3 Calculation of Voltage Levels

The voltage levels were automatically measured in software and compared to the test limit. The method of calculation was as follows:

VEMI = VRx + LBPF

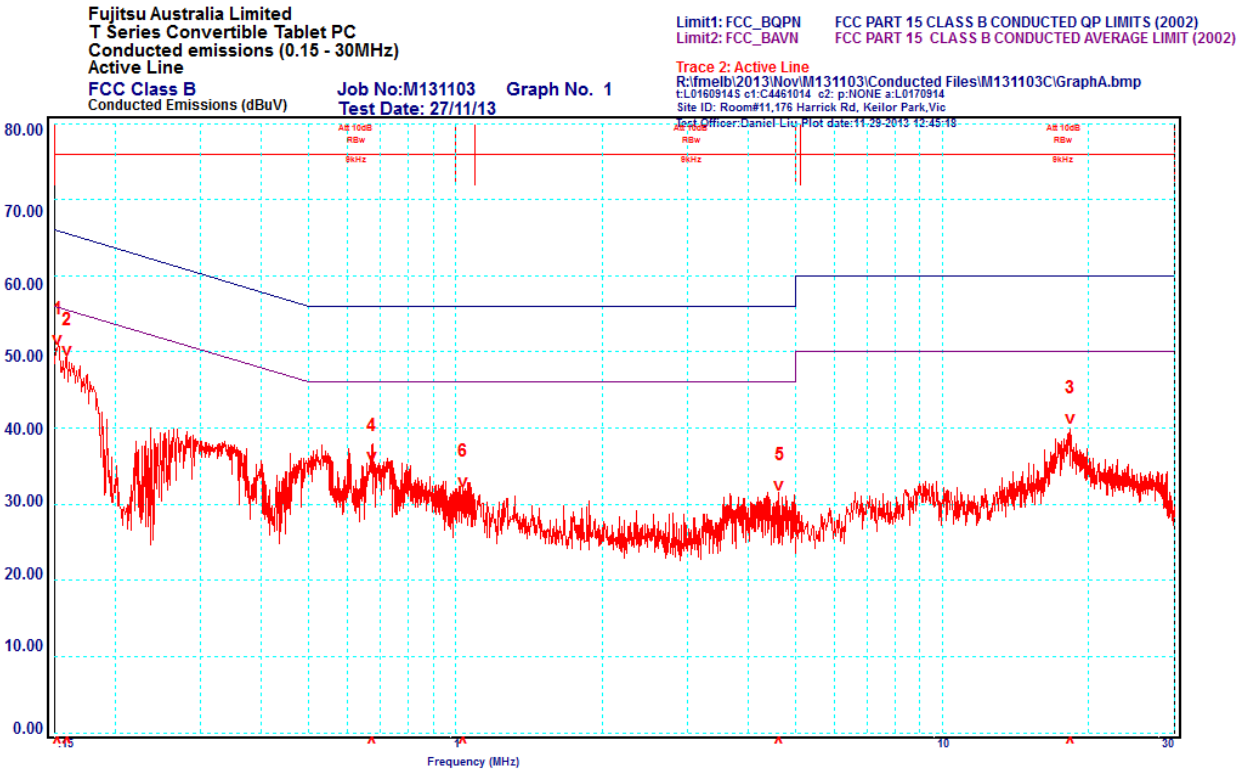
Where:
VEMI = the Measured EMI voltage in dBµV to be compared to the limit.
VRx = the Voltage in dBµV read directly at the EMI receiver.
LBPF = the insertion loss in dB of the cables and the Limiter and Pass Filter.

3.4 Plotting of Conducted Emission Measurement Data

The measurement data pertaining to each frequency sub-range were concatenated to form a single graph of (peak) amplitude versus frequency. This was performed for both Active and Neutral lines and the composite graph was subsequently plotted. A list of the highest relevant peaks and the respective Quasi-Peak and Average values were also plotted on the graph.

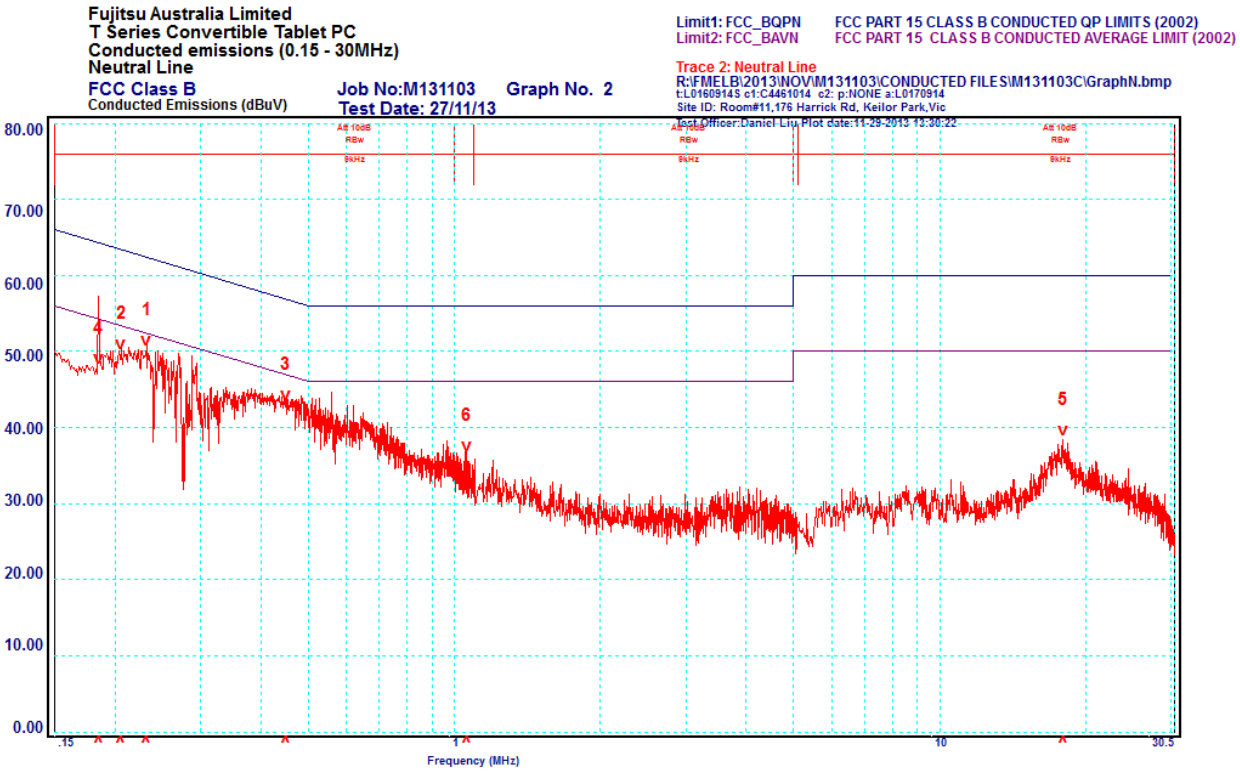
3.5 Results of Conducted Emission Measurement

Active Line



Frequency MHz	Line	Measured QP Level dBµV	QP Limit dBµV	ΔQP ±dB	Measured AV Level dBµV	AV Limit dBµV	ΔAV ±dB
0.153	Active	47.9	65.8	-17.9	32.7	55.8	-23.1
0.160	Active	46.4	65.5	-19.1	30.9	55.5	-24.6
18.31	Active	35.0	60.0	-25.0	29.2	50.0	-20.8
0.673	Active	29.7	56.0	-26.3	27.2	46.0	-18.8
4.624	Active	26.4	56.0	-29.6	21.2	46.0	-24.8
1.037	Active	25.0	56.0	-31.0	16.4	46.0	-29.6

Neutral Line



Frequency MHz	Line	Measured QP Level dBµV	QP Limit dBµV	ΔQP ±dB	Measured AV Level dBµV	AV Limit dBµV	ΔAV ±dB
0.233	Neutral	45.5	62.4	-16.9	30.9	52.4	-21.5
0.206	Neutral	46.2	63.4	-17.2	30.3	53.4	-23.1
0.450	Neutral	39.7	56.9	-17.2	28.2	46.9	-18.7
0.185	Neutral	44.8	64.2	-19.4	29.5	54.2	-24.7
17.98	Neutral	33.5	60.0	-26.5	27.9	50.0	-22.1
1.062	Neutral	28.9	56.0	-27.1	19.7	46.0	-26.3

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 and 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^{-1}). (stored as a data array)
G = Preamplifier Gain in dB. (stored as a data array)
L = Cable loss in dB. (stored as a data array of Insertion Loss versus frequency)

- **Example Field Strength Calculation**

Assuming a receiver reading of 34.0 dBµV is obtained at 90 MHz, the Antenna Factor at that frequency is 9.2 dB. The cable loss is 1.9 dB while the preamplifier gain is 20 dB. The resulting Field Strength is therefore as follows:

34.0 + 9.2 + 1.9 - 20 = 25.1 dBµV/m

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.

To ensure the transmitter module installed in the T904 Tablet is still in compliance, verification tests were performed at selected transmit frequencies for harmonics and spurious emissions.

Initial investigations were performed with all data rates. Final testing was performed while the transmitter continuously operated in the worst case condition.

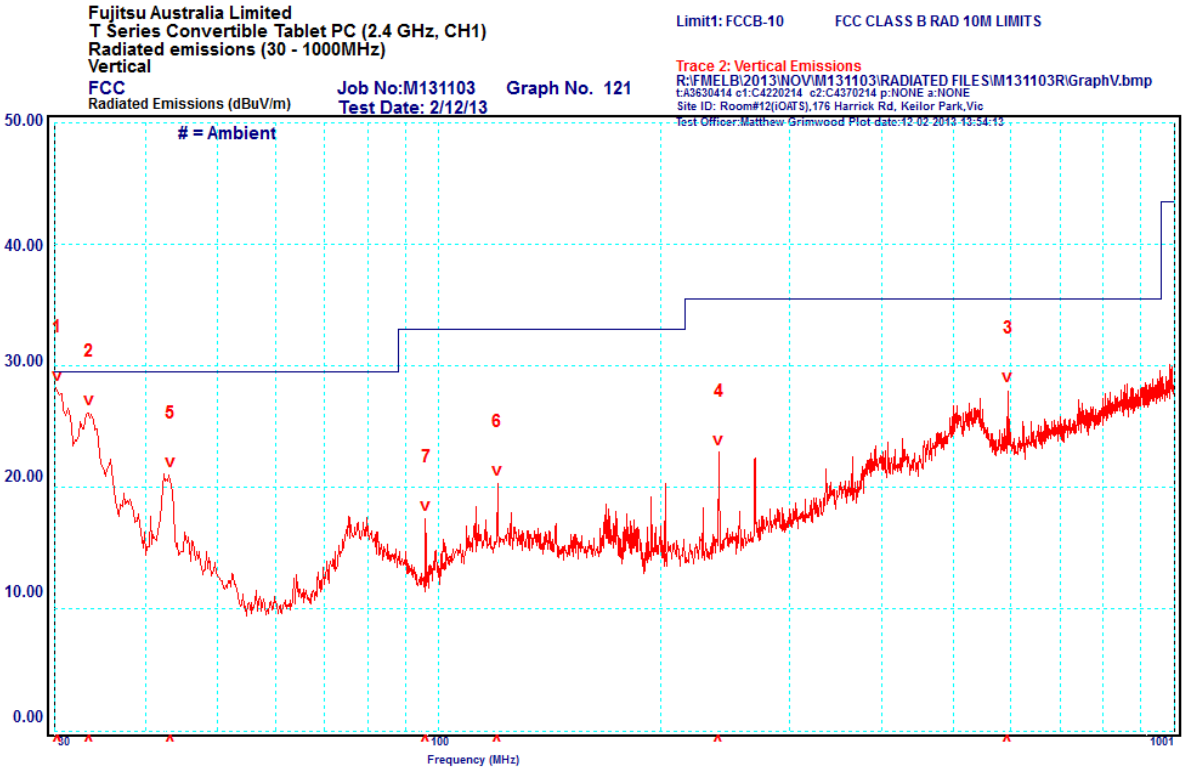
Refer to Intel radio module test report (FCC 15C) for full results showing compliance with the spurious and harmonics limits.

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."

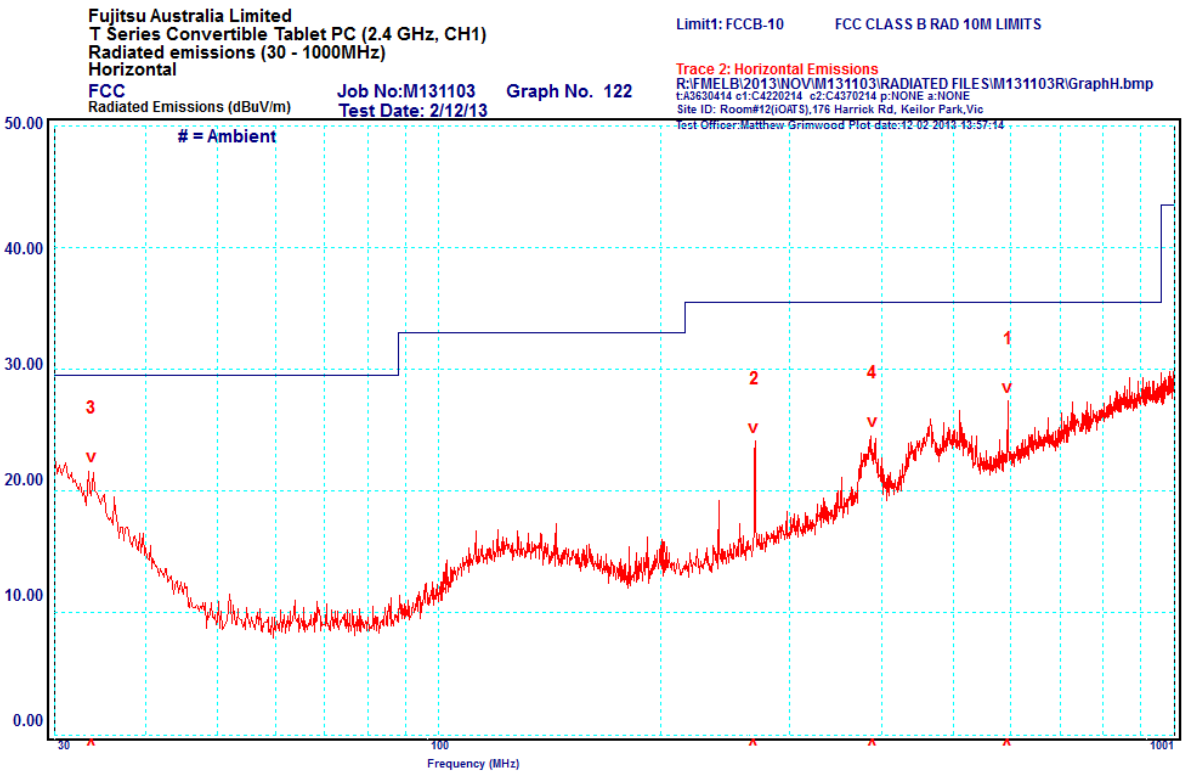
It was decided to perform the test with the module drawing the most power so the 2.4GHz channel with the highest output power was chosen. The measurements were made at a distance of 10 metres.

Vertical Emissions:



Peak	Frequency MHz	Polarisation	Quasi Peak dBµV/m	Limit dBµV/m	Margin dB
1	30.33	Vertical	24.4	29.5	-5.1
2	33.45	Vertical	21.3	29.5	-8.2
3	593.99	Vertical	25.6	35.5	-9.9
4	240.01	Vertical	22.3	35.5	-13.2
5	43.16	Vertical	14.0	29.5	-15.5
6	119.99	Vertical	17.1	33.0	-15.9
7	96.01	Vertical	12.4	33.0	-20.6

Horizontal Emissions:



Peak	Frequency MHz	Polarisation	Quasi Peak dBµV/m	Limit dBµV/m	Margin dB
1	594.04	Horizontal	22.1	35.5	-13.4
2	268.42	Horizontal	20.5	35.5	-15.0
3	33.71	Horizontal	13.1	29.5	-16.4
4	388.95	Horizontal	18.4	35.5	-17.1

4.3.2 Frequency Band: 1 – 25 GHz

The 74 dBµV/m @ 3m and 54 dBµV/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

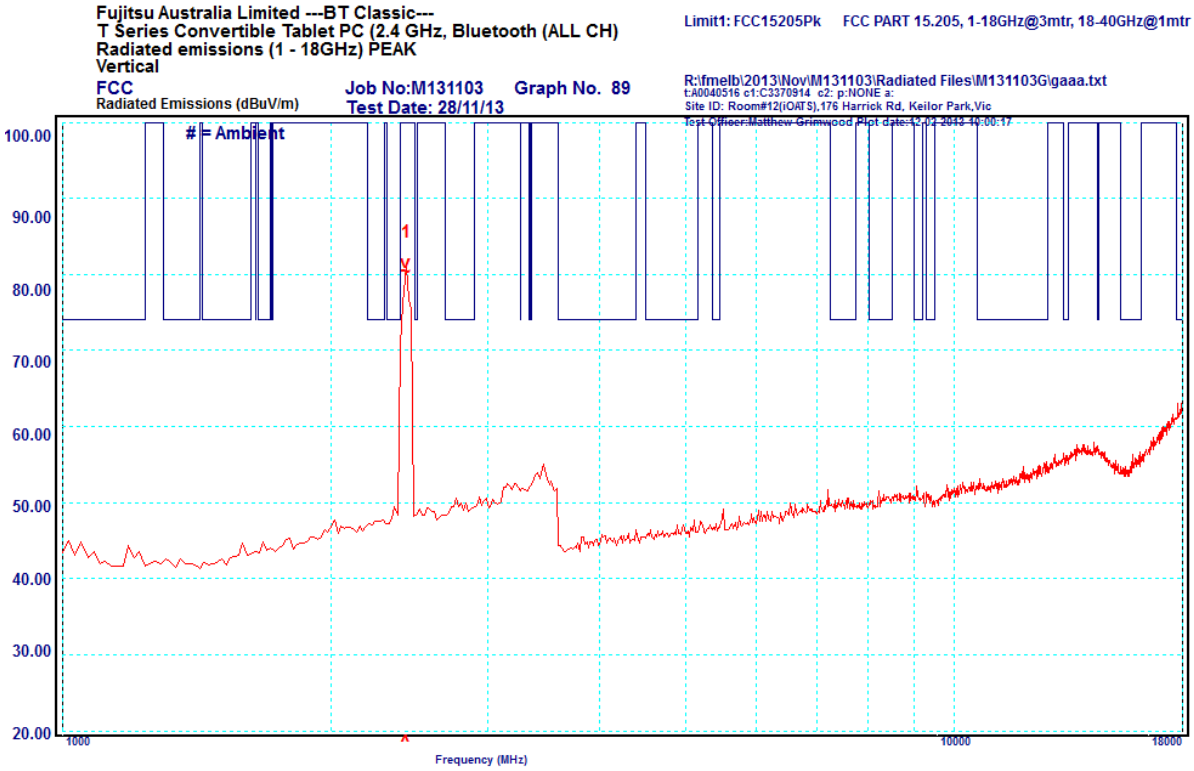
Considering the following factors as a rationale, only the mid channel was tested:

- The maximum output power is 6dBm.
- Intel's modular test report shows no conducted spurious emissions near the limit.
- The Bluetooth antenna gain for this host is -0.14dBi

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
2440	Transmit Frequency				
4880	NF = 46.0	NF = 38.0	74	54	Complied
7320	NF = 50.0	NF = 42.0	74	54	Complied
12200	NF = 55.0	NF = 45.0	74	54	Complied

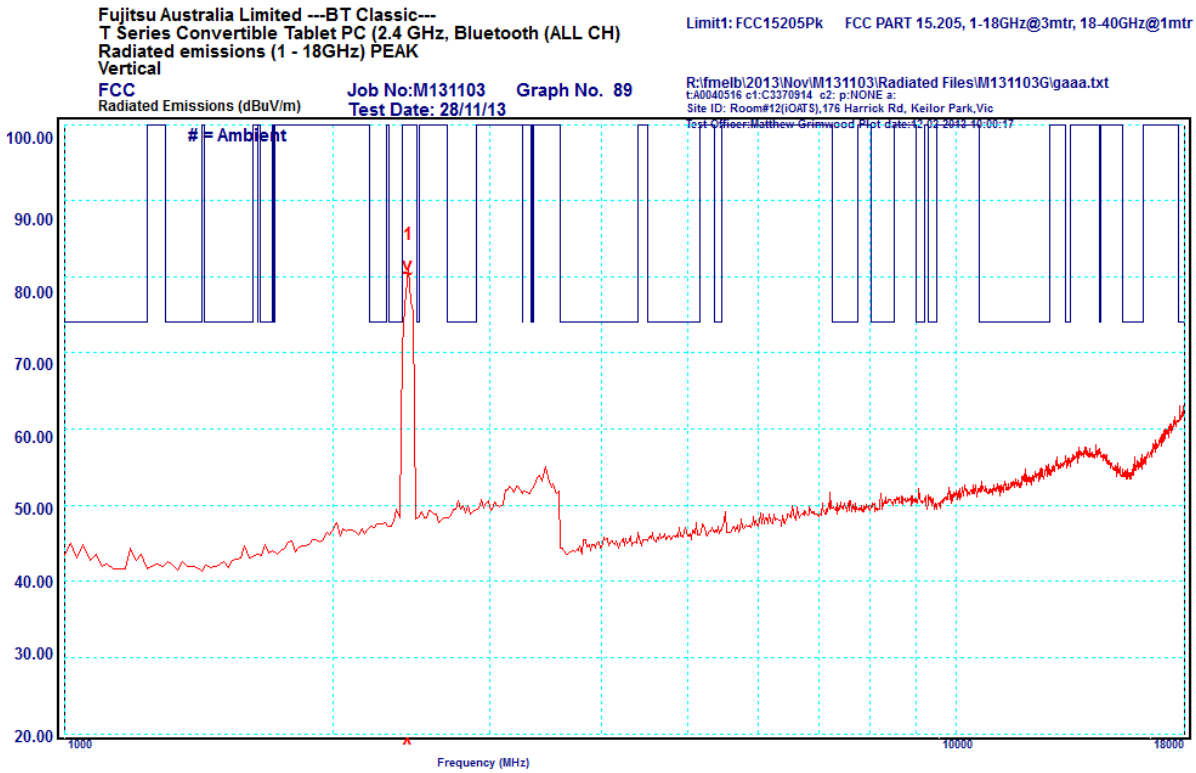
NF = instrumentation noise floor

Peak emissions (1MHz RBW, 1MHz VBW), 1GHz to 18GHz



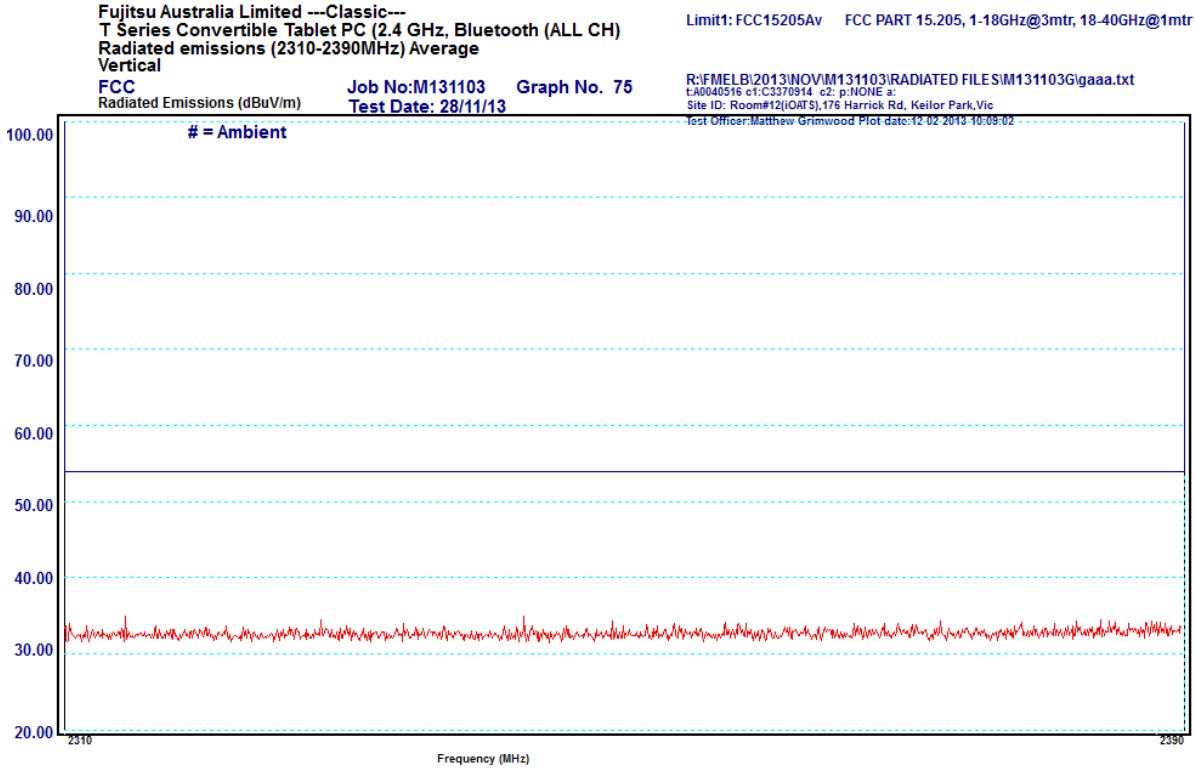
Result: Harmonics and spurious emissions were recorded up to 25 GHz. Other emissions were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247.

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

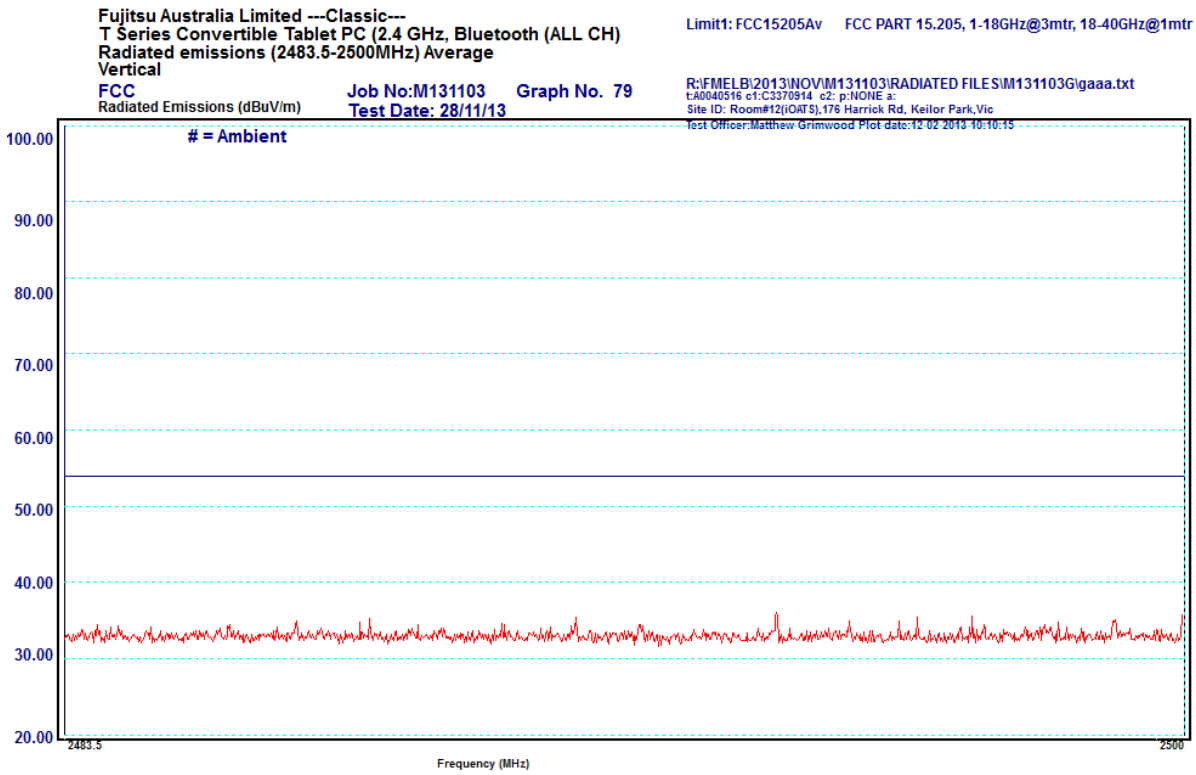


Result: Harmonics and spurious emissions were recorded up to 25 GHz. Other emissions were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.247.

2310-2390MHz Restricted Band



2483.5-2500MHz Restricted Band



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 M131103_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 Tablet PC Fujitsu LifeBook T Series, Model: T904 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%.

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