



**EMC Technologies Pty Ltd**  
ABN 82 057 105 549  
176 Harrick Road  
Keilor Park Victoria Australia 3042

Ph: + 613 9365 1000  
Fax: + 613 9331 7455  
email: melb@emctech.com.au

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

FCC ID: PPD-AR5BHB116  
Industry Canada ID: 4104A-AR5BHB116

**Radio Module:** Atheros 802.11agbn AR5BHB116 WLAN Module

**Host Notebook:** Portable PC LifeBook T Series  
**Model Number:** T731 / TH701

**Report Number:** M110359\_FCC\_AR5BHB116\_C2PC\_NII

**Issue Date:** 5<sup>th</sup> May 2011

EMC Technologies Pty Ltd reports apply only to the specific samples tested under stated test conditions. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. EMC Technologies Pty Ltd shall have no liability for any deductions, inferences or generalisations drawn by the client or others from EMC Technologies Pty Ltd issued reports. This report shall not be used to claim, constitute or imply product endorsement by EMC Technologies Pty Ltd.

This document must not be copied or reproduced, except in full without the written permission of the Manager, EMC Technologies Pty Ltd. The certificate of pg 3 may be reproduced in full.  
[www.emctech.com.au](http://www.emctech.com.au)

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

**EMC Technologies Report No. M110359\_FCC\_AR5BHB116\_C2PC\_NII**

**Issue Date: 5<sup>th</sup> May 2011**

**CONTENTS**

<b>1.0</b>	<b>INTRODUCTION</b>
<b>2.0</b>	<b>GENERAL INFORMATION</b>
<b>FCC 15.407 (U-NII) RESULTS</b>	
<b>3.0</b>	<b>CONDUCTED EMI MEASUREMENTS</b>
<b>4.0</b>	<b>RADIATED EMI MEASUREMENTS</b>
<b>5.0</b>	<b>PEAK OUTPUT POWER</b>
<b>6.0</b>	<b>CHANNEL BANDWIDTH</b>
<b>7.0</b>	<b>PEAK POWER SPECTRAL DENSITY</b>
<b>8.0</b>	<b>PEAK EXCURSION</b>
<b>9.0</b>	<b>FREQUENCY STABILITY</b>
<b>10.0</b>	<b>DYNAMIC FREQUENCY SELECTION</b>
<b>11.0</b>	<b>DISCONTINUE TRANSMISSION</b>
<b>12.0</b>	<b>RADIO FREQUENCY EXPOSURE</b>
<b>13.0</b>	<b>ANTENNA REQUIREMENT</b>
<b>14.0</b>	<b>COMPLIANCE STATEMENT</b>
<b>15.0</b>	<b>MEASUREMENT UNCERTAINTIES</b>
<b>16.0</b>	<b>TEST REPORT APPENDICES</b>

**MEASUREMENT INSTRUMENT DETAILS**

**PHOTOGRAPHS**

**ANTENNA INFORMATION**

**FCC LABELLING DETAILS**

**USER MANUAL**

**RF Exposure Information**

**FCC DOC for LifeBook T Series**

**FCC Part 15B Test Report**

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

**Report No. M110359\_FCC\_AR5BHB116\_C2PC\_NII**

**Radio Module:** Atheros 802.11agbn AR5BHB116 WLAN Module  
**Manufacturer:** Atheros Communications Inc

**FCC ID:** PPD-AR5BHB116  
**Industry Canada ID:** 4104A-AR5BHB116  
**Equipment Type:** Intentional Radiator (Transceiver)

**Host Notebook:** T731 / TH701 Portable LifeBook  
**Manufacturer:** 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 (October 2009)  
FCC Part 15, Subpart E – Unlicensed National Information, Infrastructure  
Devices  
FCC Part 15.407, General Technical Requirements  
ANSI C63.4 – 2003

RSS-210 Issue 8 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:** 31<sup>st</sup> March to 4<sup>th</sup> April 2011

**Test Engineer:** **Chieu Huynh - B.Eng (Hons) Electronics**

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



**Authorised Signatory:** **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**  
**Class II Permissive Change**

**1.0 INTRODUCTION**

EMI testing was performed on the Atheros Half Mini-PCI Wireless LAN Module (HB116 802.11a/b/g/n 2x2), Model: AR5BHB116 installed in Portable PC Fujitsu LifeBook T Series, Model numbers: T731 / TH701.

The AR5BHB116 (HB116 802.11a/b/g/n 2x2) WLAN transmitter installed in the T731 / TH701 notebook is an Atheros Half Mini-PCI Wireless LAN Module. This module was originally certified by Atheros Communications as a modular approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116).

The other transmitter installed in the T731 / TH701 LifeBook is Broadcom Bluetooth Module, Model: BCM92070MD\_REF6. The Bluetooth module was originally certified by Broadcom as a modular approval under FCC ID: QDS-BRCM1043 (Canada ID: 4324A-BRCM1043). This Bluetooth preapproved module, is not co-located as the WLAN and Bluetooth antennas are >5cms apart. RF exposure and labeling will be addressed by Fujitsu according to FCC multi-transmitter and modular procedures.

There are two variants of the Portable PC, Fujitsu LifeBook T Series, Model: T731 / TH701 covered in this report. One that is equipped with the modular certified low power Bluetooth transmitter with built-in antenna and one variant that does not contain Bluetooth transmitter or Bluetooth antenna. Testing was conducted on the sample that is equipped with the Bluetooth transmitter and Bluetooth antenna.

The intention of this Class II Permissive Change application is to certify AR5BHB116 Atheros module installed in Portable PC Fujitsu LifeBook T Series, Model: T731 / TH701. 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 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 8 - 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.

The measurement procedure used was in accordance with ANSI C63.4-2003. The instrumentation conformed to the requirements of ANSI C63.2-1996.

## 1.1 Summary of Results

### 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) (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> E.I.R.P < 500 mW
15.407 (h)	Annex A9.4	Dynamic Frequency Selection	<b>Note 3</b>

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

**Note 2:** Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116)

**Note 3:** Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116)

## 1.2 Modifications by EMC Technologies

No modifications were required.

## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 EUT (WLAN) Details

**Transmitter:** Half Mini-Card Wireless LAN Module  
**Wireless Module:** HB116 (11a/b/g/n)  
**Model Number:** AR5BHB116  
**Manufacturer:** Atheros Communication Inc,  
**Maximum Data Rate:** 802.11b = 11Mbps, 802.11g and 802.11a = 54Mbps  
 802.11n = 300 Mbps  
**Frequency Ranges:** 2.412 –2.462 GHz for 11b/g/n  
 5.18 - 5.32 GHz, 5.5 – 5.7 GHz and 5.745 - 5.825 GHz for 11a/n  
**Number of Channels:** 11 channels for 11b/g/n  
 24 channels for 11a/n with 20 MHz bandwidth  
 18 channels for 11n with 40 MHz bandwidth  
**Antenna Types:** Nissei Inverted F (1<sup>st</sup>, 2<sup>nd</sup>)  
**Antenna gain:** Max antenna gain is less than 6 dBi.  
 Refer antenna data provided separately  
**Power Supply:** 3.3 VDC from PCI bus

#### Channels and Output Powers:

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tx BW (MHz)	Average Power Target (dBm)	
					Tx A	Tx B
802.11a	36	5180	6	-	12.0	12.0
	40	5200				
	44	5220				
	48	5240				
	52	5260				
	56	5280				
	60	5300			13.5	13.5
	64	5320				
	100	5500				
	104	5520				
	108	5540				
	112	5560				
	116	5580			15.0	15.0
	120	5600				
	124	5620				
	128	5640				
	132	5660				
	136	5680				
140	5700	16.5	16.5			
149	5745					
153	5765					
157	5785					
161	5805					
165	5825					
802.11b	1	2412	1	-	16.5	16.5
	6	2437				
	11	2462				
802.11g	1	2412	6	-	10.5	10.5
	2	2417			16.5	16.5
	6	2437				
	10	2457				
	11	2462	10.0	10.0		

Mode	Channel	Frequency (MHz)	Data Rate (Mbps)	Tx BW (MHz)	Average Power Target (dBm)																																														
					Tx A	Tx B																																													
802.11n	1	2412	HT0	20	11.0	11.0																																													
	2	2417			20	13.0	13.0																																												
	6	2437						20	10.0	10.0																																									
	10	2457									20	12.0	12.0																																						
	11	2462												20	12.5	12.5																																			
	36	5180															20	13.0	13.0																																
	40	5200																		20	13.5	13.5																													
	44	5220																					20	15.0	15.0																										
	48	5240																								20	14.5	14.5																							
	52	5260																											20	9.5	9.5																				
	56	5280																														20	13.0	13.0																	
	60	5300																																	20	9.5	9.5														
	64	5320																																				20	11.0	11.0											
	100	5500																																							20	13.5	13.5								
	104	5520																																										20	12.0	12.0					
	108	5540																																													20	8.5	8.5		
	112	5560																																																20	14.0
	116	5580		40 Wide	14.0	14.0																																													
	120	5600					40 Wide	15.5	15.5																																										
	124	5620								40 Wide	15.0	15.0																																							
	128	5640											40 Wide	9.5	9.5																																				
	132	5660														40 Wide	11.0	11.0																																	
	136	5680																	40 Wide	13.5	13.5																														
	140	5700																				40 Wide	12.0	12.0																											
	149	5745																							40 Wide	8.5	8.5																								
	153	5765																										40 Wide	13.0	13.0																					
	157	5785																													40 Wide	9.5	9.5																		
	161	5805																																40 Wide	11.0	11.0															
	165	5825																																			40 Wide	13.5	13.5												
	3F	2422																																						40 Wide	12.0	12.0									
	4F	2427																																									40 Wide	8.5	8.5						
	5F	2432																																												40 Wide	13.0	13.0			
	6F	2437																																															40 Wide	9.5	9.5
	7F	2442																																																	
8F	2447	40 Wide	13.0	13.0																																															
9F	2452				40 Wide	11.0	11.0																																												
38	5190							40 Wide	13.5	13.5																																									
46	5230										40 Wide	12.0	12.0																																						
54	5270													40 Wide	8.5	8.5																																			
62	5310																40 Wide	14.0	14.0																																
102	5510																			40 Wide	15.5	15.5																													
110	5550																						40 Wide	15.0	15.0																										
118	5590																									40 Wide	9.5	9.5																							
126	5630																												40 Wide	11.0	11.0																				
134	5670																															40 Wide	13.5	13.5																	
151	5755																																		40 Wide	12.0	12.0														
159	5795																																					40 Wide	8.5	8.5											

The AR5BHB116 is capable of using multiple antennas transmitting simultaneously (two antennas). In any two antennas transmitting, the power level is 3 dB lower (50%) for each antenna port than if a single antenna was transmitting.

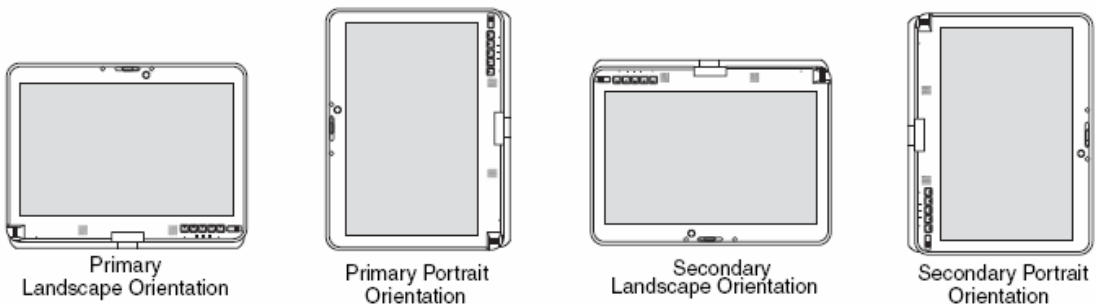
## 2.2 Host (Notebook PC) Details

**NoteBook PC:** Portable PC LifeBook T series  
**\*Model Name:** T731 / TH701  
**Serial Number:** Pre-production Sample  
**Manufacturer:** FUJITSU LIMITED

**CPU Type and Speed:** Core i7-2620M 2.7GHz  
**LCD:** 12.1" WXGA (1280x800 : HV121WX6-100  
**Wired LAN:** Intel 82579LM : 10 Base-T/100 Base-TX/1000Base-T  
**Modem:** Agere MDC1.5 modem Model: D40  
**Port Replicator Model:** FPCPR105

**AC Adapter Model:** 80W: ADP-80NB A (Delta), SEE100P2-19.0 (Sanken),  
PJW1942N (Tamura), PJW1942NA (Tamura)  
**Voltage:** 19 V  
**Current Specs:** 4.22A  
**Watts:** 80W

\*The model numbers shown T731 and TH701 are for the same product. The difference between T731 and TH701 is color and target market. The T731 is for commercial market. The TH701 is for consumer market.



## 2.3 Test Configuration

The Atheros WLAN test software "ART2" was used to transmit continuously during the tests.

Conducted tests were performed at the WLAN Antenna ports.

Radiated tests were performed for measuring the harmonics and spurious from the transmitters.

Power is provided via an AC adaptor. Testing was performed at a voltage of 120VAC at 50Hz.

## 2.4 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.



## 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](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).

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

## FCC 15.407 (U-NII) RESULTS

### 3.0 CONDUCTED EMISSION MEASUREMENTS

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

### 4.0 RADIATED SPURIOUS 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. 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. Each significant peak was investigated with the Peak/Average Detectors. The measurement data for each frequency range was corrected for cable losses, antenna factors and preamplifier gain. This process was performed for both horizontal and vertical antenna polarisations.

#### 4.2 Calculation of field strength

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

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

**E** = Radiated Field Strength in dB $\mu$ V/m.

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

**AF** = Antenna Factor in dB(m<sup>-1</sup>). (stored as a data array)

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

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

- **Example Field Strength Calculation**

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

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

### 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 FCC 15.407 (FCC ID: PPD-AR5BHB116) test report for full results showing compliance with the spurious and harmonics limits. However, to ensure the transmitter module install in T731 / TH701 LifeBook is still in compliance, verification tests were performed at the worst case (frequencies with higher average output power) or selected 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.

All orientations were investigated and tested. Worst results were reported below.

#### 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. The limits are adjusted by 10.5 dB when measurements perform at a distance of 1m.

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 M110359\_FCC\_AR5BHB116\_C2PC\_DTS.

Measurements were performed with the EUT operating in the worst case mode of single antenna transmitting. For multiple antennas transmitting like two antennas transmitting, the power level is 3 dB lower (50%) with respect to single antenna mode.

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

##### 4.3.1.1 Configuration 802.11a

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5180	Transmit Frequency				
10360	56.8	41.4	74.0	54.0	Complied

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5320	Transmit Frequency				
10640	60.3	45.1	74.0	54.0	Complied

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5580	Transmit Frequency				
11160	58.5	43.6	74.0	54.0	Complied

**Result:** Harmonic was recorded up to 40 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 8.9 dB.

**4.3.1.2 Configuration 802.11n – Tx BW = 20 MHz**

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5240	Transmit Frequency				
10480	56.5	41.3	74.0	54.0	Complied

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5300	Transmit Frequency				
10600	59.4	44.3	74.0	54.0	Complied

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5500	Transmit Frequency				
11000	58.2	43.2	74.0	54.0	Complied

**Result:** Harmonic was recorded up to 40 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 9.7 dB.

**4.3.1.3 Configuration 802.11n – Tx BW = 40 MHz**

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5230	Transmit Frequency				
10460	56.1	39.4	74.0	54.0	Complied

Frequency MHz	Peak Detector dBuV/m	Average Detector dBuV/m	Peak Limit dBuV/m	Average Limit dBuV/m	Result
5670	Transmit Frequency				
11340	58.2	41.0	74.0	54.0	Complied

**Result:** Harmonic was recorded up to 40 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emissions complied with the FCC limits of sections 15.209 and 15.407 by a margin of 13.0 dB.

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

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

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

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

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

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

## **6.0 CHANNEL BANDWIDTH**

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

## **7.0 PEAK POWER SPECTRAL DENSITY**

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

## **8.0 PEAK EXCURSION**

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

## **9.0 FREQUENCY STABILITY**

Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

## **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: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116) certified by Atheros.

Testing was performed by Sporton International Inc, Taiwan (Testing Laboratory: 1190).

### **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 M110362\_FCC\_AR5BHB116\_SAR\_2.4 (2.4 GHz) and M110362\_FCC\_AR5BHB116\_SAR\_5.6 (5.18 – 5.825 GHz). SAR values of 1.41 mW/g (5GHz) and 0.805 mW/g (2.4GHz) 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 Atheros Half Mini-PCI Wireless LAN Module (HB116 802.11a/b/g/n 2x2), Model: AR5BHB116 installed in Portable PC Fujitsu notebook PC, Model: T731 TH701, **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 8 - 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) (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> E.I.R.P < 500 mW
15.407 (h)	Annex A9.4	Dynamic Frequency Selection	<b>Note 3</b>

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

**Note 2:** Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116)

**Note 3:** Refer to original approval under FCC ID: PPD-AR5BHB116 (Canada ID: 4104A-AR5BHB116)

## 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

### MEASUREMENT INSTRUMENT DETAILS

PHOTOGRAPHS

ANTENNA INFORMATION

FCC LABELLING DETAILS

USER MANUAL

RF Exposure Information

FCC DOC for LifeBook T Series

FCC Part 15B Test Report