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**EMI TEST REPORT FOR CERTIFICATION to  
FCC PART 24(E) – Broadband PCS and  
FCC PART 22(H) – Cellular Radiotelephone Service  
RSS-132 and RSS-133  
Class II Permissive Change**

**FCC ID:** N7NMC8781-F  
**Industry Canada ID:** 2417C-MC8781

**Transmitter:** Sierra Wireless Mini-Card UMTS Module  
**UMTS Features:** EGPRS, GPRS, UMTS and HSDPA and HSUPA  
**Model:** MC8781

**Host Notebook:** U2010 LifeBook

**Report Number:** M080613\_Cert\_MC8781\_C2PC\_2

**Issue Date:** 28<sup>th</sup> November 2008

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to  
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**FCC PART 22 Subpart H - Cellular Radiotelephone Service**  
**RSS-132 and RSS-133**  
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**EMI TEST REPORT FOR CERTIFICATION to  
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FCC PART 22 Subpart H - Cellular Radiotelephone Service  
RSS-132 and RSS-133  
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**Report No. M080613\_Cert\_MC8781\_C2PC\_2**


**Transmitter:** Sierra Wireless Mini-Card UMTS Module  
**UMTS Features:** EGPRS, GPRS, UMTS and HSDPA and HSUPA  
**Model:** MC8781  
**Manufacturer:** Sierra Wireless INC

**FCC ID:** N7NMC8781-F  
**Industry Canada ID:** 2417C-MC8781  
**Equipment Type:** Intentional Radiator (Transceiver)


**Host NoteBook:** U2010 LifeBook  
**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 24 Subpart E – Broadband PCS  
FCC Part 22 Subpart H - Cellular Radiotelephone Service  
ANSI/TIA/EIA-603  
ANSI C63.4 – 2003  
OET Bulletin No. 65  
RSS-132 – Cellular Telephones  
RSS-133 – 2 GHz Personal Communications Services  
RSP-100 – Radio Equipment Certification Procedure  
RSS-102 - 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:** 18<sup>th</sup> June to 8<sup>th</sup> July 2008

**Senior Test Engineer:**   
\_\_\_\_\_  
**Chieu Huynh - B.Eng (Hons) Electronics/ Communications  
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 24 Subpart E – Broadband PCS and**  
**FCC PART 22 Subpart H - Cellular Radiotelephone Service**  
**RSS-132 and RSS-133**  
**Class II Permissive Change**

## 1.0 INTRODUCTION

EMI testing was performed on the Sierra Wireless Mini-Card UMTS Module, model: MC8781 installed in Fujitsu notebook PC, Model: U2010. The test results and procedures were performed in accordance with the following Federal Communications Commission (FCC) standards/regulations. The test sample **complied** with the requirements of 47 CFR, Part 24 Subpart E – Broadband PCS and Part 22 Subpart H - Cellular Radiotelephone Service. The test sample also complied with the Industry Canada RSS-132 and RSS-133 and the RF exposure requirements of RSS-102.

The MC8781 UMTS module was certified by Sierra Wireless INC as a modular approval under FCC ID: N7NMC8781-F (Canada ID: 2417C-MC8781).

The other transmitters installed in the U2010 notebook are AR5BHB92 Atheros WLAN module and EYSMJCS TAIYO YUDEN Bluetooth Module.

AR5BHB92 and EYSMJCS modules have already been recently certified by Fujitsu under the FCC ID: EJE-WB0073 (IC: 337J-WB0073).

AR5BHB92 module has already been recently certified by Fujitsu under the FCC ID: EJE-WL0014 (IC: 337J-WL0014).

The intention of this Class II Permissive Change application is to enable the certified MC8781 Sierra Wireless UMTS module to be co-located with WLAN and/ or BT modules. Independent antennas are used for each of the Radio modules and simultaneous transmission is possible. The transmitter 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:

## 1.1 Summary of Results

FCC Part 24 Subpart E Clauses	FCC Part 22 Subpart H Clauses	IC RSS-132 Clauses	IC RSS-133 Clauses	Test Performed	Result
24.232	22.913	4.4	6.4	Power Limits	<b>Complies (1)*</b>
24.235	22.355	4.3	6.3	Frequency Stability	<b>Complies (1)*</b>
24.238	22.917	4.5.1	6.5.1	Emission Limits	<b>Complies</b>

(1)\* Refer to the manufacturer's (Sierra Wireless) FCC Part 22 and 24 test report. Report dated: 18, April 2007, tested by Sierra Wireless INC, Canada.

The measurement procedure used was in accordance with ANSI/TIA/EIA-603, ANSI C63.4-2003, RSP-100 and OET Bulletin No. 65. The instrumentation conformed to the requirements of ANSI C63.2-1996.

## 1.2 Modifications by EMC Technologies

No modifications were required.

## 2.0 GENERAL INFORMATION

(Information supplied by the Client)

### 2.1 Transmitter (UMTS) Details

**MC8781 Transmitter:** Mini-Card UMTS Module  
**Wireless Module:** UMTS  
**Model Number:** MC8781  
**Manufacturer:** Sierra Wireless, Inc.

**GSM Frequency Bands:** 850 / 900 / 1800 / 1900 MHz  
**UMTS Frequency Bands:** Band I (2100MHz) / Band II (1900MHz) / Band V (850MHz)

**Features:** EGPRS, GPRS, UMTS and HSDPA and HSUPA  
**Antenna Type:** Nissei Electric  
**Antenna Gain:** Max peak gain -1.53 dBi  
**Output Power:** **GPRS:** 850 MHz = 33 dBm and 1900 MHz = 30 dBm  
**EGPRS:** 850 MHz = 27 dBm and 1900 MHz = 26 dBm  
**UMTS:** 850 MHz and 1900 MHz bands = 24 dBm

### 2.2 Host (Notebook PC) Details

**EUT:** LifeBook U series  
**Model Name:** U2010  
**Serial Number:** Pre-production Sample  
**Manufacturer:** FUJITSU LIMITED

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**CPU Type and Speed:** Intel(R) Atom(TM) processor Z530 (1.60 GHz)  
**LCD:** 5.6" WXGA  
**Wired LAN:** Realtek 8101L : 10 Base-T/100 Base-TX  
**Modem:** Non  
**Port Replicator Model:** FPCPR86

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**AC Adapter Model:** 40W: SEB55N2-16.0  
60W: SED80N2-16.0  
**Voltage:** 16 V  
**Current Specs:** 2.5A / 3.75A  
**Watts:** 40W / 60W

### 2.3 Operational Description

The Windows HyperTerminal program and the 3G Watcher were used to establish a connection between the EUT and the Communication test set.

### 2.4 Test Configuration

Radiated Measurements - The CMU200 Rohde & Schwarz Universal Radio Communication Tester and a dipole antenna were used to establish a connection. The EUT was transmitted continuously during all tests.

Testing was performed in the two operating frequency ranges: 824.0 – 849 MHz and 1850 – 1910 MHz. The transmitter continuously transmitted at maximum output power on a low, middle and high frequency channel for each band.

The UMTS module supports GPRS, EGPRS, WCDMA and HSDPA mode. All four modes were tested and are reported.

The following CMU 200 settings were used to establish a connection:

- (a) Network Support: GPRS and EGPRS  
Service Selection: Test Mode A  
Main Service: Packet Data
  
- (b) Network Support: WCDMA and HSDPA  
Band Select: Operating Band II (1900 MHz) and V (850 MHz)  
Dedicated Channel: RMC

### 2.5 Support Equipment

Rohde & Schwarz Universal Radio Communication Tester, Model: CMU200.  
Rohde & Schwarz Signal Generator, Model: SMR40  
Refer to Appendix A for measurement instruments used.

### 2.6 Test Procedure

Emissions measurements were performed in accordance with the procedures of ANSI/TIA/EIA-603 and ANSI C63.4-2003. Radiated emissions tests were performed at a distance of 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 Lerderberg Gorge, near the township of Bacchus Marsh in Victoria, Australia. Conducted measurements at an 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.

## RESULTS

### 3.0 PEAK POWER OUTPUT MEASUREMENTS

Refer to original approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781) certified by Sierra Wireless.

Refer to attachment 1, FCC Part 22 and 24 test report dated April 18 2007

Testing was performed by Sierra Wireless INC, Canada.

### 4.0 EIPR and OUT of BAND EMISSIONS (Fundamental & Spurious/ Harmonics)

#### 4.1 Test Procedure

Testing was performed in accordance with the requirements of FCC Part 24.238 and FCC Part 22.917(a).

As per 24.238(a) – The limits of any emissions outside the frequency band shall be attenuated by at least  $43 + 10\log(P)$  dB, where P is the measured transmitter output power.

The measurements were made at the open area test site at a distance of 3 metres.

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. This process was performed for both horizontal and vertical antenna polarisations.

A substitution measurement was used to measure the fundamental and harmonics. The EUT was replaced with a calibrated horn antenna (above 1 GHz) and calibrated dipole antenna (below 1 GHz) that was connected to a calibrated signal generator. The output level of the signal generator was adjusted until the same level on the spectrum analyser observed. The level of the signal generator output in dBm less any loss/gain due to the coax cable and the antenna.



## 4.2 Radiated Emissions Results

### 4.2.1 Frequency Band: 1 – 20 GHz

Calibrated EMCO 3115, EMCO 3116 and ETS Standard Horn antennas were used for measurements between 1 to 20 GHz.

The resolution bandwidth of 1 MHz and the video bandwidth of 1 MHz were utilised. Except, band-edge measurement the resolution bandwidth and the video bandwidth is 10 kHz.

Testing was performed while transmitter continuously transmitted on a low, middle and high frequency channel. Worst case levels of harmonics are reported.

#### 4.2.1.1 850 MHz GSM

##### Low Channel – 824.2 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	824.20	Horizontal	30.0	38.5	Pass
	1648.4	Vertical	-29.4	-13	Pass
	2472.6	Vertical	-33.5	-13	Pass
	3296.8	Vertical	-50.9	-13	Pass
	4121.0	Horizontal	-39.5	-13	Pass
	824.0 Band Edge	Horizontal	-15.2	-13	Pass
EGPRS	824.20	Horizontal	28.9	38.5	Pass
	Harmonics are lower than in GPRS mode				
	824.0 Band Edge	Horizontal	-19.1	-13	Pass

##### Middle Channel – 836.6 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	836.6	Horizontal	30.2	38.5	Pass
	1673.2	Vertical	-29.3	-13	Pass
	2509.8	Vertical	-34.2	-13	Pass
	3346.4	Vertical	-51.9	-13	Pass
	4183.0	Horizontal	-39.1	-13	Pass
EGPRS	836.6	Horizontal	29.2	38.5	Pass
	Harmonics are lower than in GPRS mode				

##### High Channel – 848.8 MHz

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	848.8	Horizontal	30.5	38.5	Pass
	1697.6	Vertical	-28.1	-13	Pass
	2546.4	Vertical	-33.2	-13	Pass
	3395.2	Vertical	-53.4	-13	Pass
	4244	Horizontal	-41.6	-13	Pass
	849.0 Band Edge	Horizontal	-16.8	-13	Pass
EGPRS	848.8	Horizontal	29.8	38.5	Pass
	Harmonics are lower than in GPRS mode				
	849.0 Band Edge	Horizontal	-18.4	-13	Pass

**4.2.1.2 850 MHz UMTS****Low Channel – 826.4 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	826.4	Vertical	20.5	38.5	Pass
	1652.8	Vertical	-39.3	-13	Pass
	824.0 Band Edge	Vertical	-30.1	-13	Pass
HSDPA	826.4	Vertical	20.9	38.5	Pass
	Harmonics are same as in WCDMA mode				
	824.0 Band Edge	Vertical	-30.0	-13	Pass

**Middle Channel – 836.4 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	836.4	Vertical	21.1	38.5	Pass
	1672.8	Vertical	-39.2	-13	Pass
HSDPA	836.4	Vertical	21.2	38.5	Pass
	Harmonics are same as in WCDMA mode				

**High Channel – 846.6 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	846.6	Vertical	21.0	38.5	Pass
	1693.2	Vertical	-39.2	-13	Pass
	849.0 Band Edge	Vertical	-32.6	-13	Pass
HSDPA	846.6	Vertical	21.6	38.5	Pass
	Harmonics are same as in WCDMA mode				
	849.0 Band Edge	Vertical	-31.2	-13	Pass

**4.2.1.3 1900 MHz GSM****Low Channel – 1850.2 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1850.2	Horizontal	28.1	33.0	Pass
	3700.4	Vertical	-42.0	-13	Pass
	5550.6	Vertical	-41.3	-13	Pass
	7400.8	Vertical	-32.7	-13	Pass
	9251.0	Horizontal	-32.9	-13	Pass
	11101.2	Vertical	-31.2	-13	Pass
	12951.4	Horizontal	-37.1	-13	Pass
	1850 Band Edge	Horizontal	-15.7	-13	Pass
EGPRS	1850.2	Horizontal	27.0	33.0	Pass
	Harmonics are lower than in GPRS mode				
	1850 Band Edge	Horizontal	-21.1	-13	Pass

**Middle Channel – 1880 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1880	Horizontal	27.7	33.0	Pass
	3760	Vertical	-39.1	-13	Pass
	5640	Vertical	-38.6	-13	Pass
	7520	Vertical	-32.2	-13	Pass
	9400	Horizontal	-30.0	-13	Pass
	11280	Vertical	-28.5	-13	Pass
	13160	Horizontal	-35.4	-13	Pass
EGPRS	1800	Horizontal	26.3	33.0	Pass
	Harmonics are lower than in GPRS mode				

**High Channel – 1909.8 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
GPRS	1909.8	Horizontal	27.0	33.0	Pass
	3819.6	Vertical	-39.8	-13	Pass
	5729.4	Vertical	-34.1	-13	Pass
	7639.2	Vertical	-35.4	-13	Pass
	9549.0	Horizontal	-29.3	-13	Pass
	11458.8	Vertical	-29.2	-13	Pass
	13368.6	Horizontal	-33.6	-13	Pass
	1910 Band Edge	Horizontal	-17.5	-13	Pass
EGPRS	1909.8	Horizontal	-25.6	33.0	Pass
	Harmonics are lower than in GPRS mode				
	1910 Band Edge	Horizontal	-23.9	-13	Pass

**4.2.1.4 1900 MHz UMTS****Low Channel – 1852.4 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1852.4	Horizontal	23.8	33.0	Pass
	3704.8	Horizontal	-48.6	-13	Pass
	5557.2	Horizontal	-44.0	-13	Pass
	7409.6	Horizontal	-42.1	-13	Pass
	9262	Horizontal	-37.7	-13	Pass
	11114.4	Horizontal	-41.2	-13	Pass
	1850 Band Edge	Horizontal	-30.2	-13	Pass
HSDPA	1852.4	Horizontal	23.8	33.0	Pass
	Harmonics are same as in WCDMA mode				
	1850 Band Edge	Horizontal	-30.0	-13	Pass

**Middle Channel – 1880 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1880	Horizontal	23.4	33.0	Pass
	3760	Horizontal	-39.7	-13	Pass
	5640	Horizontal	-41.2	-13	Pass
	7520	Horizontal	-42.0	-13	Pass
	9400	Horizontal	-35.3	-13	Pass
	11280	Horizontal	-41.5	-13	Pass
HSDPA	1800	Horizontal	22.9	33.0	Pass
	Harmonics are same as in WCDMA mode				

**High Channel – 1907.6 MHz**

Modes	Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
WCDMA	1907.6	Horizontal	23.1	33.0	Pass
	3815.2	Horizontal	-29.4	-13	Pass
	5722.8	Horizontal	-39.7	-13	Pass
	7630.4	Horizontal	-42.8	-13	Pass
	9538	Horizontal	-36.3	-13	Pass
	11445.6	Horizontal	-42.4	-13	Pass
	1910 Band Edge	Horizontal	-32.6	-13	Pass
HSDPA	1907.6	Horizontal	22.6	33.0	Pass
	Harmonics are same as in WCDMA mode				
	1910 Band Edge	Horizontal	-34.0	-13	Pass

Harmonic and spurious emissions were recorded up to 20 GHz. Other harmonics were confirmed low with both RBW and VBW reduced. The worst case emission (band-edge) complied with the FCC limits (the limit is -13dBm) by a margin of 2.2 dB.

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

A calibrated Biconical antenna was used for measurements between 30 MHz to 232 MHz and a calibrated Logperiodic antenna used for measurements between 230 MHz to 1000 MHz.

The resolution bandwidth of 120 kHz and the video bandwidth of 300 kHz were utilised.

The worst case emission complied with the FCC limits (the limit is -13dBm) by a margin of greater than 30 dB. Refer to Appendix F (graphs 3 and 4) for plots. Transmitting frequency level (highest peak), refer to section 4.2.1.

#### **4.3 Band Edge Measurements**

Refer to original approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781) certified by Sierra Wireless.

Refer to attachment 1, FCC Part 22 and 24 test report dated April 18 2007

Testing was performed by Sierra Wireless INC, Canada.

#### **4.4 Antenna Conducted RF Measurements**

Refer to original approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781) certified by Sierra Wireless.

Refer to attachment 1, FCC Part 22 and 24 test report dated April 18 2007

Testing was performed by Sierra Wireless INC, Canada.

#### **5.0 FREQUENCY STABILITY**

Refer to original approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781) certified by Sierra Wireless.

Refer to attachment 1, FCC Part 22 and 24 test report dated April 18 2007

Testing was performed by Sierra Wireless INC, Canada.

#### **6.0 CHANNEL BANDWIDTH**

Refer to original approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781) certified by Sierra Wireless.

Refer to attachment 1, FCC Part 22 and 24 test report dated April 18 2007

Testing was performed by Sierra Wireless INC, Canada.

## 7.0 CONDUCTED EMISSION MEASUREMENTS

### 7.1 Test Procedure

The arrangement specified in ANSI/TIA/EIA-603 and ANSI C63.4-2003 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 C63.2-1996 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.

### 7.2 Peak Maximising Procedure

The various operating modes of the system were investigated. 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.

### 7.3 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:

$$\mathbf{VEMI} = \mathbf{VRx} + \mathbf{LBPF}$$

Where:

- VEMI** = the Measured EMI voltage in dB $\mu$ V to be compared to the limit.
- VRx** = the Voltage in dB $\mu$ V read directly at the EMI receiver.
- LBPF** = the loss in dB of the cables and the Limiter and Pass Filter.

### 7.4 Plotting of Conducted Emission Measurement Data

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

### 7.5 Results of Conducted Emission Measurements (AC Mains Ports)

The worst case conducted EMI complied with both quasi peak and average limits by margins of greater than 10 dB. Refer to Appendix F (graphs 1 and 2) for plots.

## 8.0 RADIO FREQUENCY EXPOSURE (HAZARD) INFORMATION

The Personal Communications Services operating in the 824 – 849 MHz and 1850 - 1910 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).

The intention of this Class II Permissive Change application is to enable the certified MC8781 Sierra Wireless UMTS module (FCC ID: N7NMC8781-F (IC ID: 2417C-MC8781)) to be co-located with WLAN and/ or BT modules. Independent antennas are used for each of the Radio modules and simultaneous transmission is possible.

SAR is not required as the EUT is hand held only portable device in accordance with section 7 of KDB 447498.

In accordance with Section 1.1310, the Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure of 1.0 has been applied, i.e 1mW/cm<sup>2</sup>.

Friis transmission formula:  $P_d = (P \cdot G) / (4 \cdot \pi \cdot r^2)$

where:  $P_d$  = power density (mW/cm<sup>2</sup>)

$P$  = power input to the antenna (mW)

$G$  = antenna gain (numeric)

$r$  = distance to the center of radiation of the antenna (cm)

The MPE calculations shown below are for the UMTS, \*WLAN and \*BT modules.

Transmitter Modules	FCC ID	Frequency GHz	Peak Power dBm	Antenna Type	Antenna Gain (dBi)	Power Density @ 20 cm mW/cm <sup>2</sup>	MPE Limit mW/cm <sup>2</sup>
UMTS	N7NMC8781-F	0.85	31.9	Nissei Electric	-2.22	<b>0.185</b>	0.55
		1.9	28.8		-1.53	0.107	1.0
*WLAN (802.11abg)	EJE-WB0073	2.4	29.6	Inverted-F	1.94	0.284	1.0
		5.0	29.85		1.96	<b>0.302</b>	1.0
*BT		2.4	1.0	Taiyo Yuden	2.0	<b>0.001</b>	1.0
Sum of Worst Case Power Densities of Co-located Transmitters						0.488	1.0

The AR5BHB92 Atheros WLAN module and EYSMJCS TAIYO YUDEN Bluetooth Module have been recently certified by Fujitsu under the FCC ID: EJE-WB0073 (IC ID: 337J-WB0073).

The MPE calculations shown below are for the UMTS and \*WLAN modules.

Transmitter Modules	FCC ID	Frequency GHz	Peak Power dBm	Antenna Type	Antenna Gain (dBi)	Power Density @ 20 cm mW/cm <sup>2</sup>	MPE Limit mW/cm <sup>2</sup>
UMTS	N7NMC8781-F	0.85	31.9	Nissei Electric	-2.22	<b>0.185</b>	0.55
		1.9	28.8		-1.53	0.107	1.0
*WLAN (802.11abg)	EJE-WL0014	2.4	29.6	Inverted-F	1.94	0.284	1.0
		5.0	29.85		1.96	<b>0.302</b>	1.0
Sum of Worst Case Power Densities of Co-located Transmitters						0.487	1.0

The AR5BHB92 Atheros WLAN module has been recently certified by Fujitsu under the FCC ID: EJE-WL0014 (IC ID: 337J-WL0014).

**Conclusions:** Calculations show that the radio modules with described antennas complied with Maximum Permissible Exposure (MPE) limit for the General Population/Uncontrolled Exposure.

## 9.0 COMPLIANCE STATEMENT

The UMTS module, model: MC8781 installed in Fujitsu notebook PC, Model: U2010, **complied** with the requirements of 47 CFR, Part 24 Subpart E – Broadband PCS and Part 22 Subpart H - Cellular Radiotelephone Service. The test sample also complied with the Industry Canada RSS-132 and RSS-133 and the RF exposure requirements of RSS-102.

Results were as follows:

FCC Part 24 Subpart E Clauses	FCC Part 22 Subpart H Clauses	IC RSS-132 Clauses	IC RSS-133 Clauses	Test Performed	Result
24.232	22.913	4.4	6.4	Power Limits	<b>Complies (1)*</b>
24.235	22.355	4.3	6.3	Frequency Stability	<b>Complies (1)*</b>
24.238	22.917	4.5.1	6.5.1	Emission Limits	<b>Complies</b>

(1)\* Refer to the manufacturer's (Sierra Wireless) FCC Part 22 and 24 test report. Report dated: 18, April 2007, tested by Sierra Wireless INC, Canada.

## 10.0 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%.

## 11.0 APPENDICES

- APPENDIX A: MEASUREMENT INSTRUMENT DETAILS
- APPENDIX B: PHOTOGRAPHS
- APPENDIX C: ANTENNA INFORMATION
- APPENDIX D: FCC LABELLING DETAILS
- APPENDIX E: USER MANUAL
- APPENDIX F: CONDUCTED AND RADIATED EMISSIONS PLOTS

Attachment 1: Sierra Wireless FCC Part 22 and 24 Test Report