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**EMI TEST REPORT FOR CERTIFICATION  
to  
FCC PART 24(E) – Broadband PCS and  
FCC PART 22(H) – Cellular Radiotelephone Service  
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:** U1010 LifeBook

**Report Number:** M071019\_Cert\_MC8781\_C2PC

**Issue Date:** 19<sup>th</sup> November 2007

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

**EMC Technologies Report No. M071019\_Cert\_MC8781\_C2PC**

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

**Report No. M071019\_Cert\_MC8781\_C2PC**

**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:** U1010 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

**Test Dates:** 23<sup>rd</sup> October to 12<sup>th</sup> November 2007

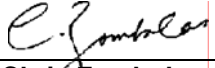
**Senior Test Engineer:**

  
\_\_\_\_\_  
**Chieu Huynh - B.Eng (Hons) Electronics/ Communications**  
**Lee Hopkins**  
**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:**

  
\_\_\_\_\_  
**Chris Zombolas**  
**Technical Director**  
**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**  
**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: U1010. 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.

The UMTS module was originally certified by Sierra Wireless INC as a modular approval under FCC ID: N7NMC8781 (Canada ID: 2417C-MC8781). The intention of this application is to re-certify the MC8781 module as a **Class II Permissive Change**. The UMTS modules are installed in a controlled environment at the Fujitsu notebook production/assembly factory.

The other transmitters installed in the U1010 notebook are Atheros WLAN module, model: AR5XB6 and TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT. These Radio modules have already been recently certified by Fujitsu under the FCC ID: EJE-WB0053 (IC: 337J-WB0053).

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	Test Performed	Result
24.232	22.913	Power Limits	<b>Complies (1)*</b>
24.235	22.355	Frequency Stability	<b>Complies (1)*</b>
24.238	22.917	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 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

**MC8780 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 3.65 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

**Host:** LifeBook U series  
**Model Name:** U1010  
**Serial Number:** Pre-production Sample  
**Manufacturer:** FUJITSU LIMITED

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**CPU Type and Speed:** Intel processor A110 800MHz  
**LCD:** 5.6"WSVGA  
**Wired LAN:** Realtek 8101L : 10 Base-T/100 Base-TX  
**Modem:** None  
**Port Replicator Model:** FPCPR76

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

### 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 4161**.

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

Complied – refer to attachment 1 (Sierra Wireless FCC Part 22 and 24 Test Report).

### 4.0 OUT of BAND EMISSIONS (Spurious and Harmonics)

#### 4.1 Test Procedure

Measurements were made at the open area test site (OATS). The EUT was set up on the table top (placed on turntable) of total height 80 cm above the ground plane, and operated as described in section 2 of this report.

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.

The resolution bandwidth of 1 MHz and the video bandwidth of 1 MHz were utilised

The receiver bandwidth was set to 6 dB.

All measurements above 1 GHz were initially made over a distance of 3 metres. This was decreased to 1.0 metre as the emission levels from the device were very low.

#### 4.2 Radiated Emissions Results

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.

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.

##### 4.2.1 Frequency Band: 1 – 20 GHz

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

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 GPRS****Low Channel – 824.2 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
824.20	Vertical	30.7	38.5	Pass
1648.4	Vertical	-34.2	-13	Pass
2472.6	Vertical	-43.8	-13	Pass
3296.8	Vertical	-54.7	-13	Pass
4121.0	Horizontal	-46.2	-13	Pass
824.0 Band Edge	Vertical	-15.6	-13	Pass

**Middle Channel – 836.6 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
836.6	Vertical	29.6	38.5	Pass
1673.2	Horizontal	-32.4	-13	Pass
2509.8	Vertical	-43.5	-13	Pass
3346.4	Vertical	-54.9	-13	Pass
4183.0	Horizontal	-47.7	-13	Pass

**High Channel – 848.8 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
848.8	Vertical	30.2	38.5	Pass
1697.6	Vertical	-32.0	-13	Pass
2546.4	Vertical	-45.6	-13	Pass
3395.2	Vertical	-55.4	-13	Pass
4244	Horizontal	-47.1	-13	Pass
849.0 Band Edge	Horizontal	-16.0	-13	Pass

**4.2.1.2 850 MHz EGPRS****Low Channel – 824.2 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
824.20	Vertical	28.6	38.5	Pass
1648.4	Vertical	-36.5	-13	Pass
2472.6	Vertical	-46.1	-13	Pass
824.0 Band Edge	Vertical	-18.8	-13	Pass

**Middle Channel – 836.6 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
836.6	Vertical	28.8	38.5	Pass
1673.2	Horizontal	-36.2	-13	Pass
2509.8	Vertical	-46.2	-13	Pass

**High Channel – 848.8 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
848.8	Vertical	27.9	38.5	Pass
1697.6	Vertical	-35.8	-13	Pass
2546.4	Vertical	-46.6	-13	Pass
849.0 Band Edge	Horizontal	-19.2	-13	Pass

**4.2.1.3 850 MHz WCDMA****Low Channel – 826.4 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
826.4	Vertical	22.7	38.5	Pass
1652.8	Vertical	-45.1	-13	Pass
2479.2	Vertical	-56.2	-13	Pass
824.0 Band Edge	Vertical	-28.5	-13	Pass

**Middle Channel – 836.4 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
836.4	Vertical	22.3	38.5	Pass
1672.8	Horizontal	-44.5	-13	Pass
2509.8	Horizontal	-56.8	-13	Pass

**High Channel – 846.6 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
846.6	Vertical	23.0	38.5	Pass
1693.2	Vertical	-44.7	-13	Pass
2539.8	Vertical	-55.3	-13	Pass
849.0 Band Edge	Horizontal	-29.6	-13	Pass

**4.2.1.4 850 MHz HSDPA****Low Channel – 826.4 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
826.4	Vertical	22.3	38.5	Pass
1652.8	Vertical	-47.8	-13	Pass
824.0 Band Edge	Vertical	-26.7	-13	Pass

**Middle Channel – 836.4 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
836.4	Vertical	21.8	38.5	Pass
1672.8	Horizontal	-46.4	-13	Pass

**High Channel – 846.6 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
846.6	Vertical	22.1	38.5	Pass
1693.2	Vertical	-46.3	-13	Pass
849.0 Band Edge	Horizontal	-27.4	-13	Pass

**4.2.1.5 1900 MHz GPRS****Low Channel – 1850.2 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1850.2	Vertical	27.8	33.0	Pass
3700.4	Vertical	-45.1	-13	Pass
9251.0	Horizontal	-44.4	-13	Pass
1850 Band Edge	Horizontal	-17.8	-13	Pass

**Middle Channel – 1880 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1880	Vertical	28.3	33.0	Pass
3760	Vertical	-45.8	-13	Pass
9400	Horizontal	-43.5	-13	Pass

**High Channel – 1909.8 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1909.8	Vertical	29.0	33.0	Pass
3819.6	Vertical	-43.6	-13	Pass
9549.0	Horizontal	-42.8	-13	Pass
1910 Band Edge	Horizontal	-18.4	-13	Pass

**4.2.1.6 1900 MHz EGPRS****Low Channel – 1850.2 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1850.2	Vertical	26.4	33.0	Pass
3700.4	Vertical	-45.5	-13	Pass
9251.0	Horizontal	-44.8	-13	Pass
1850 Band Edge	Horizontal	-20.2	-13	Pass

**Middle Channel – 1880 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1880	Vertical	27.5	33.0	Pass
3760	Vertical	-45.8	-13	Pass
9400	Horizontal	-43.7	-13	Pass

**High Channel – 1909.8 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1909.8	Vertical	27.8	33.0	Pass
3819.6	Vertical	-45.1	-13	Pass
9549.0	Horizontal	-43.9	-13	Pass
1910 Band Edge	Horizontal	-20.4	-13	Pass

**4.2.1.7 1900 MHz WCDMA****Low Channel – 1852.4 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1852.4	Vertical	23.8	33.0	Pass
3704.8	Horizontal	-53.4	-13	Pass
1850 Band Edge	Horizontal	-26.3	-13	Pass

**Middle Channel – 1880 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1880	Horizontal	24.3	33.0	Pass
3760	Horizontal	-50.7	-13	Pass

**High Channel – 1907.6 MHz**

Frequency MHz	Antenna Polarization	Level dBm	Limit dBm	Result
1907.6	Vertical	24.8	33.0	Pass
3815.2	Horizontal	-52.2	-13	Pass
1910 Band Edge	Horizontal	-26.0	-13	Pass

**4.2.1.8 1900 MHz HSDPA**

The relative ERP/EIRP levels measured during manufacturer's original testing indicate that the fundamental and harmonics/spurious levels in this mode are predominantly same or lower than in above tested modes. Hence this particular mode was not re-tested.

#### 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.

Testing was performed at 3m distance. The resolution bandwidth of 1 MHz and the video bandwidth of 1 MHz were utilised.

No spurious emissions were recorded within 30 dB of the FCC limit (the limit is -13dBm). Refer to Appendix F (graphs 3 to 4) for plots.

**Result:** Complies.

#### 4.2.3 UMTS, WLAN and Bluetooth Transmitters Transmitting

**Result:** IM emissions were recorded up to 40 GHz. Emissions complied with the FCC limits.

#### 4.3 Band Edge Measurements

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.

Complied – refer to attachment 1 (Sierra Wireless FCC Part 22 and 24 Test Report).

#### 4.4 Antenna Conducted RF Measurements

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.

Complied – refer to attachment 1 (Sierra Wireless FCC Part 22 and 24 Test Report).

#### 5.0 FREQUENCY STABILITY

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.

Complied – refer to attachment 1 (Sierra Wireless FCC Part 22 and 24 Test Report).

#### 6.0 CHANNEL BANDWIDTH

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.

Complied – refer to attachment 1 (Sierra Wireless FCC Part 22 and 24 Test Report).

## 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:

$$VEMI = VRx + LBPF$$

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 > 10 dB. Refer to Appendix F (graphs 1 & 2) for plots.

**Result:** Complies

## 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 antennas location: Left (main) and right (aux) edge of LCD screen and projected distance of greater than 20cm from user torso.

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	Frequency GHz	Peak Power dBm	Antenna Gain (dBi)	Power Density @ 20 cm mW/cm <sup>2</sup>	MPE Limit mW/cm <sup>2</sup>
UMTS	0.85	31.9	0.48	<b>0.345</b>	0.55
	1.9	28.8	3.65	0.169	1.0
*WLAN (802.11abg)	2.4	17.9	-2.5	0.01	1.0
	5.0	17.1	2.18	<b>0.02</b>	1.0
*BT	2.4	3.9	-3.0	<b>0.003</b>	1.0
Sum of Worst Case Power Densities of Co-located Transmitters				0.368	1.0

\*The second and third transmitters in the U1010 notebook are Atheros WLAN module, model: AR5XB6 and TAIYO YUDEN Bluetooth Module, Model: EYTF3CSFT. These modules have been recently certified by Fujitsu under the FCC ID: EJE-WB0053 (IC: 337J-WB0053).

**Results:** Calculations show that the Radio devices 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: U1010, **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.

Results were as follows:

FCC Part 24 Subpart E Clauses	FCC Part 22 Subpart H Clauses	Test Performed	Result
24.232	22.913	Power Limits	<b>Complies (1)*</b>
24.235	22.355	Frequency Stability	<b>Complies (1)*</b>
24.238	22.917	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