



## Test Report

Product Name	Ultra Mobile PC (UMPC)
Model No.	R2E
FCC ID.	MSQR2E

Applicant	ASUSTeK COMPUTER INC.
Address	4FL., No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Date of Receipt	July. 18, 2007
Issued Date	Oct. 12, 2007
Report No.	077261R-RFUSP06V01-A

The Test Results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of Quietek Corporation.

This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Issued Date: Oct. 12, 2007

Report No.: 077261R-RFUSP06V01-A



Product Name	Ultra Mobile PC (UMPC)
Applicant	ASUSTeK COMPUTER INC.
Address	4FL., No. 150, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	R2E
FCC ID.	MSQR2E
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 5V
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



The Test Results relate only to the samples tested.  
 The test report shall not be reproduced except in full without the written approval of Quietek Corporation.  
 This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Documented By : Leven Huang  
 ( Engineering Adm. Assistant /  
 Leven Huang )



Tested By : Dino Chen  
 ( Assistant Engineer / Dino Chen )

Approved By : Vincent Lin  
 ( Deputy Manager / Vincent Lin )



## TABLE OF CONTENTS

Description	Page
<b>1. GENERAL INFORMATION .....</b>	<b>5</b>
1.1. EUT Description.....	5
1.2. Operational Description.....	7
1.3. Tested System Details.....	8
1.4. Configuration of Tested System .....	8
1.5. EUT Exercise Software .....	8
1.6. Test Facility .....	9
<b>2. CONDUCTED EMISSION .....</b>	<b>10</b>
2.1. Test Equipment.....	10
2.2. Test Setup .....	10
2.3. Limits.....	11
2.4. Test Procedure .....	11
2.5. Uncertainty .....	11
2.6. Test Result of Conducted Emission.....	11
<b>3. PEAK POWER OUTPUT .....</b>	<b>14</b>
3.1. Test Equipment.....	14
3.2. Test Setup .....	14
3.3. Limits.....	14
3.4. Test Procedure .....	14
3.5. Uncertainty .....	14
3.6. Test Result of Peak Power Output.....	15
<b>4. RADIATED EMISSION .....</b>	<b>16</b>
4.1. Test Equipment.....	16
4.2. Test Setup .....	17
4.3. Limits.....	17
4.4. Test Procedure .....	18
4.5. Uncertainty .....	18
4.6. Test Result of Radiated Emission.....	19
<b>5. BAND EDGE .....</b>	<b>23</b>
5.1. Test Equipment.....	23
5.2. Test Setup .....	23
5.3. Limit .....	24
5.4. Test Procedure .....	24
5.5. Uncertainty .....	24
5.6. Test Result of Band Edge .....	25
<b>6. CHANNEL NUMBER.....</b>	<b>31</b>
6.1. Test Equipment.....	31
6.2. Test Setup .....	31
6.3. Limit .....	31
6.4. Uncertainty .....	31
6.5. Test Result of Channel Number.....	32

---

<b>7.</b>	<b>CHANNEL SEPARATION</b> .....	<b>34</b>
7.1.	Test Equipment.....	34
7.2.	Test Setup.....	34
7.3.	Limit.....	34
7.4.	Uncertainty.....	34
7.5.	Test Result of Channel Separation.....	35
<b>8.</b>	<b>DWELL TIME</b> .....	<b>36</b>
8.1.	Test Equipment.....	36
8.2.	Test Setup.....	36
8.3.	Limit.....	36
8.4.	Uncertainty.....	36
8.5.	Test Result of Dwell Time.....	37
<b>9.</b>	<b>OCCUPIED BANDWIDTH</b> .....	<b>39</b>
9.1.	Test Equipment.....	39
9.2.	Test Setup.....	39
9.3.	Limits.....	39
9.4.	Uncertainty.....	39
9.5.	Test Result of Occupied Bandwidth.....	40
<b>10.</b>	<b>EMI REDUCTION METHOD DURING COMPLIANCE TESTING</b> .....	<b>43</b>

Attachment 1: EUT Test Photographs  
Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Ultra Mobile PC (UMPC)
Trade Name	ASUS
FCC ID.	MSQR2E
Model No.	R2E
Frequency Range	2402 – 2480MHz
Channel Number	79
Type of Modulation	FHSS (GFSK)
Antenna Type	Chip Antenna
Antenna Connector Type	Solder On PCB
Channel Control	Auto
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: LI SHIN,M/N:0225A1236 Input: AC 100-240V, 50-60Hz,1.5A Output: DC 12V,3.0A Cable Out: Non-Shielded,1.75m,with one ferrite core bonded. Power Cord: Non-Shielded,1.8m

#### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	MAG LAYERS/ SMD Antenna	LTA-5824-2G4H2-A1	2.0 dBi for 2.4 GHz

## Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 00:	2402 MHz	Channel 20:	2422 MHz	Channel 40:	2442 MHz	Channel 60:	2462 MHz
Channel 01:	2403 MHz	Channel 21:	2423 MHz	Channel 41:	2443 MHz	Channel 61:	2463 MHz
Channel 02:	2404 MHz	Channel 22:	2424 MHz	Channel 42:	2444 MHz	Channel 62:	2464 MHz
Channel 03:	2405 MHz	Channel 23:	2425 MHz	Channel 43:	2445 MHz	Channel 63:	2465 MHz
Channel 04:	2406 MHz	Channel 24:	2426 MHz	Channel 44:	2446 MHz	Channel 64:	2466 MHz
Channel 05:	2407 MHz	Channel 25:	2427 MHz	Channel 45:	2447 MHz	Channel 65:	2467 MHz
Channel 06:	2408 MHz	Channel 26:	2428 MHz	Channel 46:	2448 MHz	Channel 66:	2468 MHz
Channel 07:	2409 MHz	Channel 27:	2429 MHz	Channel 47:	2449 MHz	Channel 67:	2469 MHz
Channel 08:	2410 MHz	Channel 28:	2430 MHz	Channel 48:	2450 MHz	Channel 68:	2470 MHz
Channel 09:	2411 MHz	Channel 29:	2431 MHz	Channel 49:	2451 MHz	Channel 69:	2471 MHz
Channel 10:	2412 MHz	Channel 30:	2432 MHz	Channel 50:	2452 MHz	Channel 70:	2472 MHz
Channel 11:	2413 MHz	Channel 31:	2433 MHz	Channel 51:	2453 MHz	Channel 71:	2473 MHz
Channel 12:	2414 MHz	Channel 32:	2434 MHz	Channel 52:	2454 MHz	Channel 72:	2474 MHz
Channel 13:	2415 MHz	Channel 33:	2435 MHz	Channel 53:	2455 MHz	Channel 73:	2475 MHz
Channel 14:	2416 MHz	Channel 34:	2436 MHz	Channel 54:	2456 MHz	Channel 74:	2476 MHz
Channel 15:	2417 MHz	Channel 35:	2437 MHz	Channel 55:	2457 MHz	Channel 75:	2477 MHz
Channel 16:	2418 MHz	Channel 36:	2438 MHz	Channel 56:	2458 MHz	Channel 76:	2478 MHz
Channel 17:	2419 MHz	Channel 37:	2439 MHz	Channel 57:	2459 MHz	Channel 77:	2479 MHz
Channel 18:	2420 MHz	Channel 38:	2440 MHz	Channel 58:	2460 MHz	Channel 78:	2480 MHz
Channel 19:	2421 MHz	Channel 39:	2441 MHz	Channel 59:	2461 MHz		

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals

Frequency hopping spread spectrum systems are not required to employ all available hopping channels during each transmission. The transmitter is presented with a continuous data stream. In addition, a system employing short transmission bursts must comply with the definition of a frequency hopping system and must distribute its 79 channels and over the minimum number of hopping channels (75 channels).

The incorporation of intelligence within a frequency hopping spread spectrum system that permits the system to recognize other users within the spectrum band so that it individually and independently chooses and adapts its hopsets to avoid hopping on occupied channels is permitted. The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

Note:

1. This device is Ultra Mobile PC (UMPC) with a built-in 2.4GHz WLAN and Bluetooth transceiver.
2. These tests were conducted on a sample for the purpose of demonstrating compliance of bluetooth transmitter with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
4. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

## 1.2. Operational Description

The EUT is an Ultra Mobile PC (UMPC) with a built-in 2.4GHz WLAN and Bluetooth transceiver. The number of the channels is 79 in 2402-2480MHz. The device adapts the frequency hopping spread spectrum modulation. The antenna is connector-type and provides diversity function to improve the receiving function.

This device provides wireless technology that revolutionizes personal connectivity. It is the solution for the seamless integration of Bluetooth technology into personal computer enabling short-range wireless connections between desktop/laptop computers, Bluetooth-enabled peripherals, and portable handheld devices.

Test Mode	Mode 1: Transmitter
-----------	---------------------

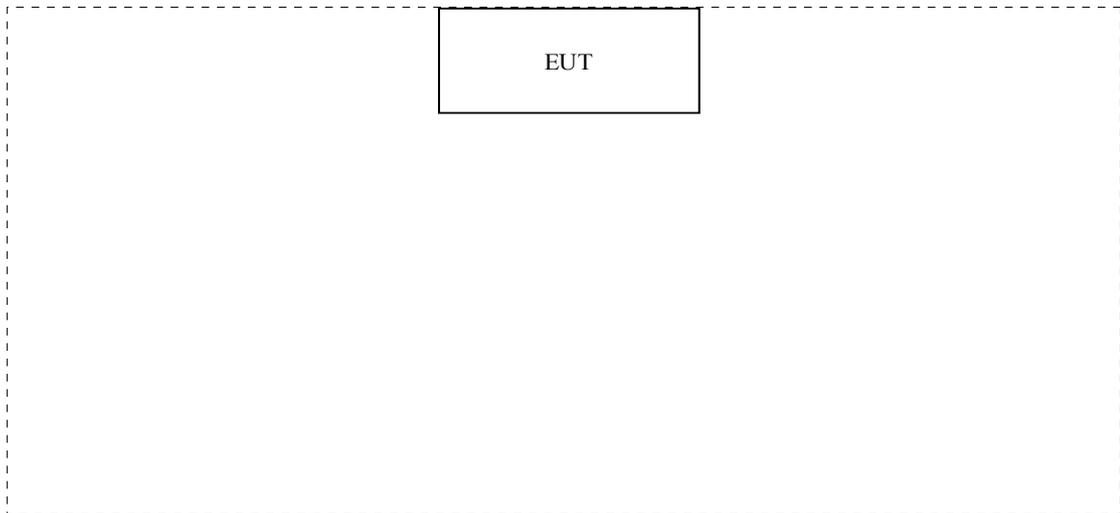
**1.3. Tested System Details**

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
N/A					

Signal Cable Type	Signal cable Description
N/A	

**1.4. Configuration of Tested System**



**1.5. EUT Exercise Software**

- 1 Setup the EUT and simulators as shown on 1.4.
- 2 Turn on the power of all equipment.
- 3 Messages will be transmitted and received through EUT.
- 4 Test is based on the mandatory continuous transmitter.
- 5 Repeat the above procedure (3) to (4).

**1.6. Test Facility**

Ambient conditions in the laboratory:

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	20-35
Humidity (%RH)	25-75	30-65
Barometric pressure (mbar)	860-1060	950-1000

Site Description: File on  
 Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2



Accreditation on NVLAP  
 NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation  
 Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
 Lin-Kou Shiang, Taipei,  
 Taiwan, R.O.C.  
 TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789  
 E-Mail : [service@quietek.com](mailto:service@quietek.com)



FCC Accreditation Number: TW1014

## 2. Conducted Emission

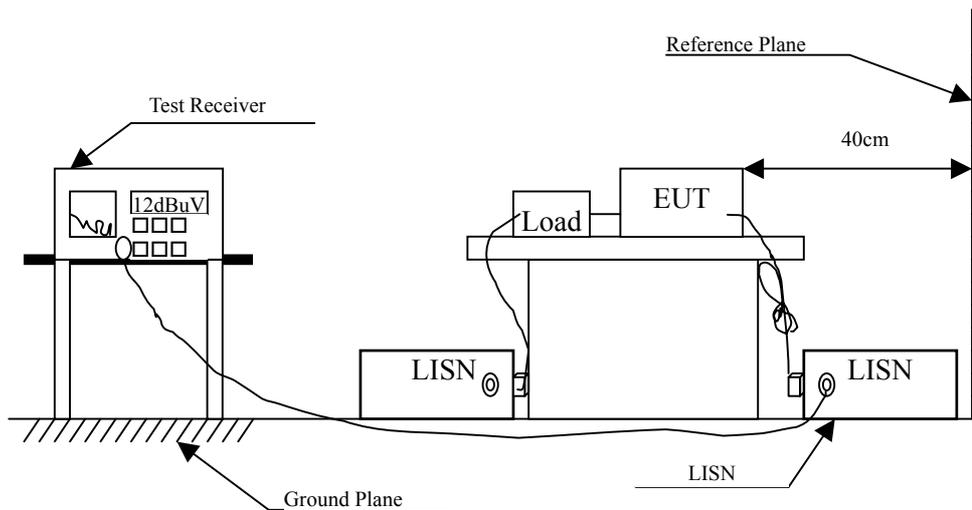
### 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2007	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2007	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2007	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2007	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

### 2.2. Test Setup



**2.3. Limits**

<b>FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit</b>		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

**2.4. Test Procedure**

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and the entire interface cables must be changed a cording to the EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

**2.5. Uncertainty**

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Ultra Mobile PC (UMPC)  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.220	0.505	45.340	45.845	-18.155	64.000
0.521	0.300	41.630	41.930	-14.070	56.000
0.732	0.310	49.990	50.300	-5.700	56.000
1.563	0.330	29.580	29.910	-26.090	56.000
5.345	0.440	28.660	29.100	-30.900	60.000
18.060	1.060	41.240	42.300	-17.700	60.000
<b>Average</b>					
0.220	0.505	24.950	25.455	-28.545	54.000
0.521	0.300	27.480	27.780	-18.220	46.000
0.732	0.310	41.610	41.920	-4.080	46.000
1.563	0.330	23.450	23.780	-22.220	46.000
5.345	0.440	26.210	26.650	-23.350	50.000
18.060	1.060	41.230	42.290	-7.710	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Product : Ultra Mobile PC (UMPC)  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.193	0.300	42.560	42.860	-21.911	64.771
0.330	0.300	32.180	32.480	-28.377	60.857
0.522	0.310	29.950	30.260	-25.740	56.000
0.783	0.320	32.090	32.410	-23.590	56.000
2.087	0.350	34.300	34.650	-21.350	56.000
18.064	0.900	41.100	42.000	-18.000	60.000
<b>Average</b>					
0.193	0.300	35.060	35.360	-19.411	54.771
0.330	0.300	26.000	26.300	-24.557	50.857
0.522	0.310	28.370	28.680	-17.320	46.000
0.783	0.320	29.980	30.300	-15.700	46.000
2.087	0.350	32.060	32.410	-13.590	46.000
18.064	0.900	41.090	41.990	-8.010	50.000

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

### 3. Peak Power Output

#### 3.1. Test Equipment

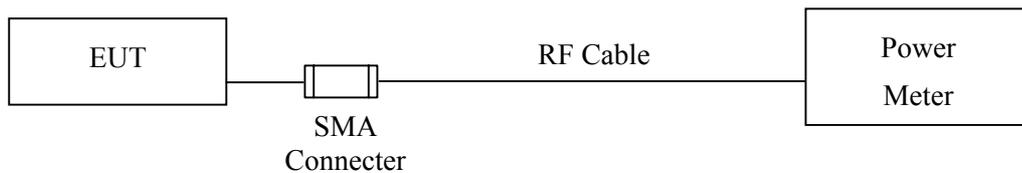
The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Power Meter	Anritsu	ML2495A/6K00003357	May, 2007
X Power Sensor	Anritsu	MA2491A/034457	May, 2007

Note: 1. All equipments are calibrated every one year.  
 2. The test instruments marked by “X” are used to measure the final test results.

#### 3.2. Test Setup

##### Conduction Power Measurement



#### 3.3. Limits

The maximum peak power shall be less 1 Watt.

#### 3.4. Test Procedure

- (1) The transmitter output was connected the Power Meter.
- (2) Select the middle channel of the operation band, and measure the peak output power value of each data rate.
- (3) Find out the worst-case data rate of previous procedure, and dependence on which data rate to measure the high and the low channel.
- (4) The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

#### 3.5. Uncertainty

± 1.27 dB

### 3.6. Test Result of Peak Power Output

Product : Ultra Mobile PC (UMPC)  
Test Item : Peak Power Output  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 00	2402.00	2.92 dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.00	3.16 dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.00	3.01 dBm	1 Watt= 30 dBm	Pass

#### 4. Radiated Emission

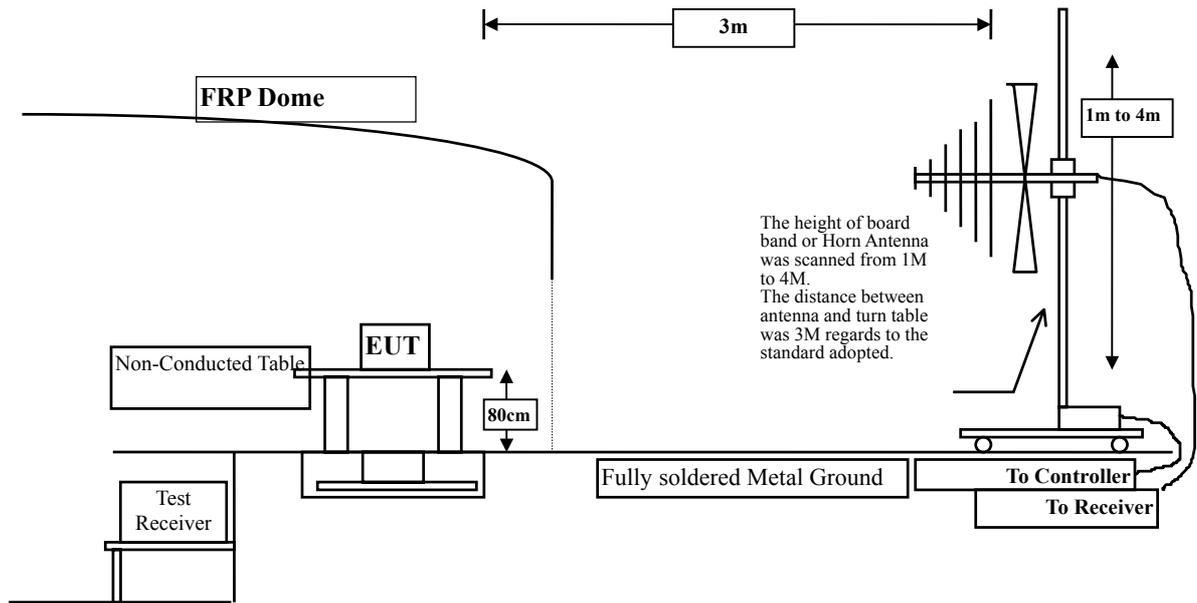
##### 4.1. Test Equipment

The following test equipments are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1	Test Receiver	R & S	ESVS 10 / 834468/003	May, 2007
	Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2007
	Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2007
<input type="checkbox"/> Site # 2	Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2007
	Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2007
	Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2007
	Horn Antenna	ETS	3115 / 0005-6160	Sep., 2007
	Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2007
<input checked="" type="checkbox"/> Site # 3	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
	Spectrum Analyzer	HP	E4407B / US39440758	May, 2007
	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by "X" are used to measure the final test results.

4.2. Test Setup



4.3. Limits

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209 Limits		
Frequency MHz	uV/m @3m	dBuV/m@3m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

- Remarks:
1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
  2. In the Above Table, the tighter limit applies at the band edges.
  3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

#### 4.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to the EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The additional latch filter below 1GHz was used to measure the level of harmonics radiated emission during field strength of harmonics measurement.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

The frequency range from 30MHz to 10th harmonics is checked.

#### 4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

#### 4.6. Test Result of Radiated Emission

Product : Ultra Mobile PC (UMPC)  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
------------------	-------------------------	--------------------------	--------------------------------	--------------	-----------------

##### Horizontal

##### Peak Detector:

4804.000	5.317	47.687	53.004	-20.996	74.000
7206.000	11.797	41.310	53.107	-20.893	74.000
9608.000	15.759	36.582	52.340	-21.660	74.000

##### Average Detector:

--

##### Vertical

##### Peak Detector:

4804.000	5.317	48.094	53.411	-20.589	74.000
7206.000	11.797	40.290	52.087	-21.913	74.000
9608.000	15.759	36.579	52.337	-21.663	74.000

##### Average Detector:

--

##### Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Ultra Mobile PC (UMPC)  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	dB	dBuV/m
	dB	dBuV	dBuV/m		

**Horizontal**
**Peak Detector:**

4882.000	5.486	46.587	52.074	-21.926	74.000
7323.000	12.064	40.430	52.494	-21.506	74.000
9764.000	16.105	36.558	52.664	-21.336	74.000

**Average Detector:**

--

**Vertical**
**Peak Detector:**

4882.000	5.486	47.514	53.001	-20.999	74.000
7323.000	12.064	40.830	52.894	-21.106	74.000
9764.000	16.105	36.367	52.473	-21.527	74.000

**Average Detector:**

--

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Ultra Mobile PC (UMPC)  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 78)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
------------------	-------------------------	--------------------------	--------------------------------	--------------	-----------------

**Horizontal**
**Peak Detector:**

4960.000	5.663	46.340	52.003	-21.997	74.000
7440.000	12.335	40.050	52.385	-21.615	74.000
9920.000	16.453	35.860	52.314	-21.686	74.000

**Average Detector:**

--

**Vertical**
**Peak Detector:**

4960.000	5.663	47.290	52.953	-21.047	74.000
7440.000	12.335	41.060	53.395	-20.605	74.000
9920.000	16.453	35.852	52.306	-21.694	74.000

**Average Detector:**

--

**Note:**

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Receiver setting (Peak Detector) : RBW:1MHz; VBW:1MHz; Span:100MHz ◦
3. Receiver setting (AVG Detector) : RBW:1MHz; VBW:30Hz; Span:20MHz ◦
4. Emission Level = Reading Level + Correct Factor.
5. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product : Ultra Mobile PC (UMPC)  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 39)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
300.200	-7.788	36.866	29.078	-16.922	46.000
422.665	-1.198	28.182	26.984	-19.016	46.000
566.513	2.630	26.813	29.444	-16.556	46.000
620.942	4.128	24.145	28.273	-17.727	46.000
723.968	3.390	23.448	26.838	-19.162	46.000
795.892	4.811	23.838	28.648	-17.352	46.000
<b>Vertical</b>					
239.940	-3.062	36.984	33.922	-12.078	46.000
323.527	-7.470	28.316	20.847	-25.153	46.000
432.385	-2.005	23.868	21.863	-24.137	46.000
527.635	-1.068	24.407	23.339	-22.661	46.000
617.054	1.079	26.075	27.154	-18.846	46.000
811.443	3.282	24.400	27.682	-18.318	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. "█" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.
4. The radiated emissions below 1GHz of the lowest, middle, highest frequency are pretested. Only the worst case is shown on the report.

## 5. Band Edge

### 5.1. Test Equipment

The following test equipments are used during the band edge tests:

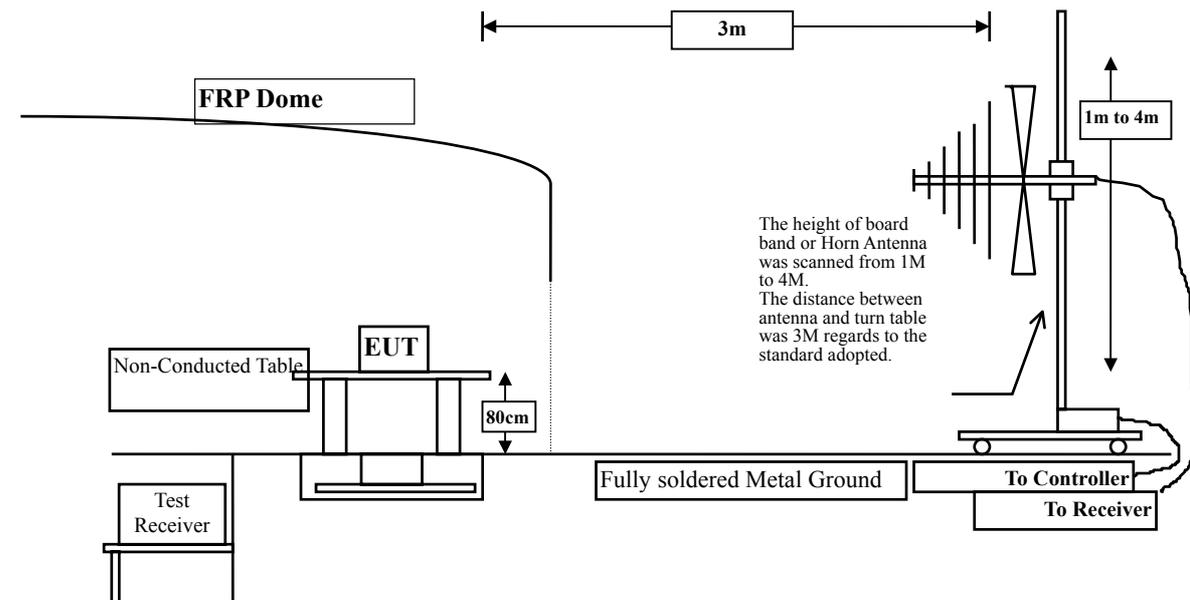
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786 / 004	May, 2007
X	Spectrum Analyzer	HP	E4407B / US39440758	May, 2007
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2007
X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2007
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-01 / 0001	July, 2007
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2007
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2007

Test Site Site 3

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

### 5.2. Test Setup

#### RF Radiated Measurement:



### 5.3. Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 5.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to the EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

### 5.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

**5.6. Test Result of Band Edge**

Product : Ultra Mobile PC (UMPC)  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00)

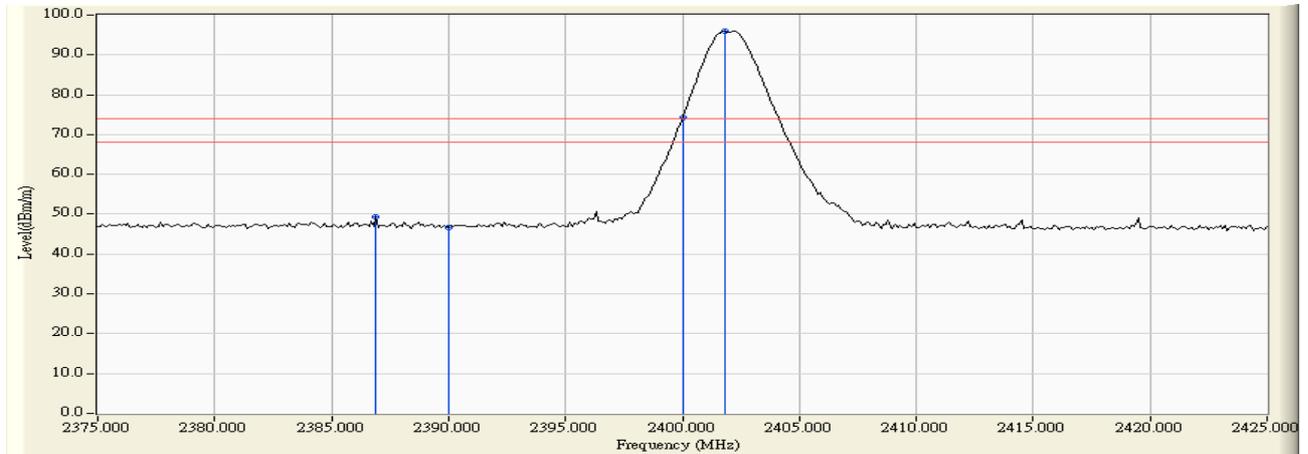
**RF Radiated Measurement:**

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00 (Horizontal)	<2400	>20	Pass

**RF Radiated Measurement (Horizontal):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2386.900	8.707	40.676	49.383	74.00	54.00	Pass
00 (Peak)	2390.000	8.684	37.896	46.581	74.00	54.00	Pass
00 (Peak)	2400.000	8.605	65.727	74.333	74.00	54.00	Pass
00 (Peak)	2401.800	8.590	87.284	95.874	74.00	54.00	Pass

**Figure Channel 00: Horizontal (Peak)**



Note: RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Ultra Mobile PC (UMPC)  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00)

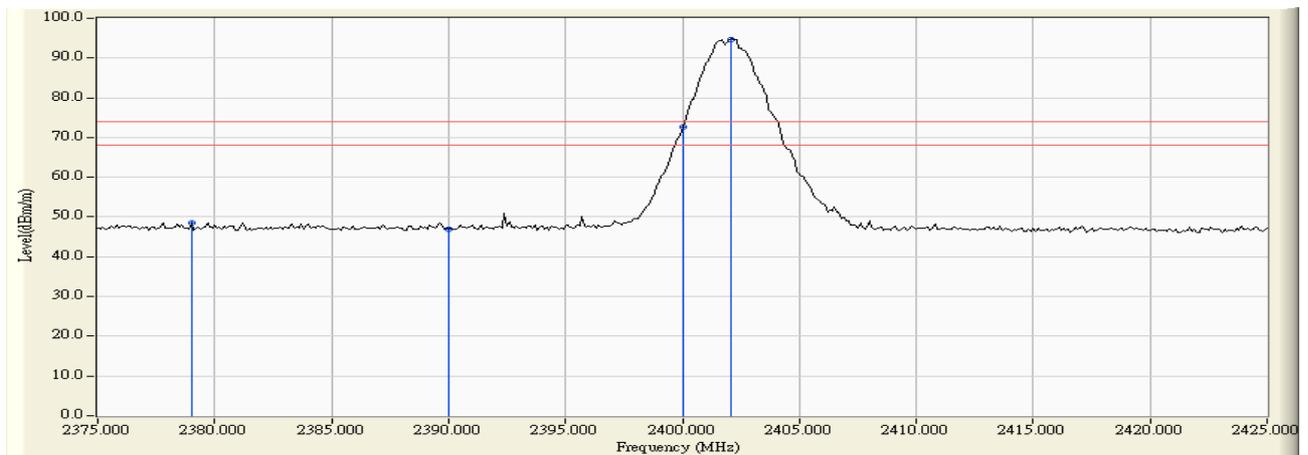
**RF Radiated Measurement:**

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
00 (Vertical)	<2400	>20	Pass

**RF Radiated Measurement (Vertical):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00 (Peak)	2379.000	8.905	39.655	48.560	74.00	54.00	Pass
00 (Peak)	2390.000	8.817	38.201	47.018	74.00	54.00	Pass
00 (Peak)	2400.000	8.735	63.891	72.627	74.00	54.00	Pass
00 (Peak)	2402.100	8.718	86.054	94.772	74.00	54.00	Pass

**Figure Channel 00: Vertical (Peak)**



Note: RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Product : Ultra Mobile PC (UMPC)  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 78)

**RF Radiated Measurement:**

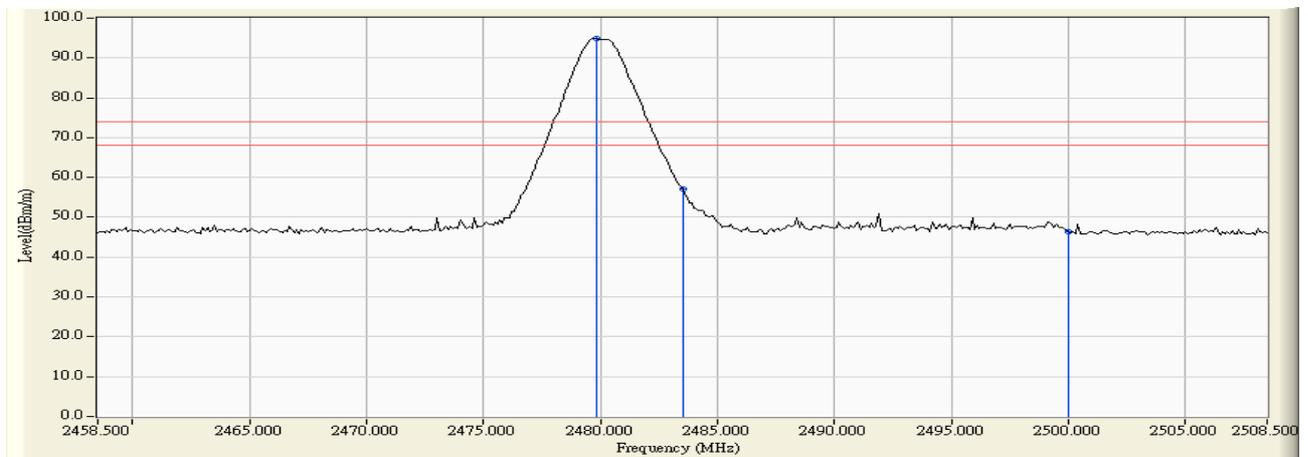
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78 (Horizontal)	>2483.5	>20	Pass

**RF Radiated Measurement (Horizontal):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2479.800	7.918	86.914	94.832	74.00	54.00	Pass
78(Peak)	2483.500	7.890	49.168	57.058	74.00	54.00	Pass
78(Peak)	2500.000	7.794	38.621	46.416	74.00	54.00	Pass
78(Average)	2483.500	-1.037	28.666	27.629	74.00	54.00	Pass

**Figure Channel 78:**

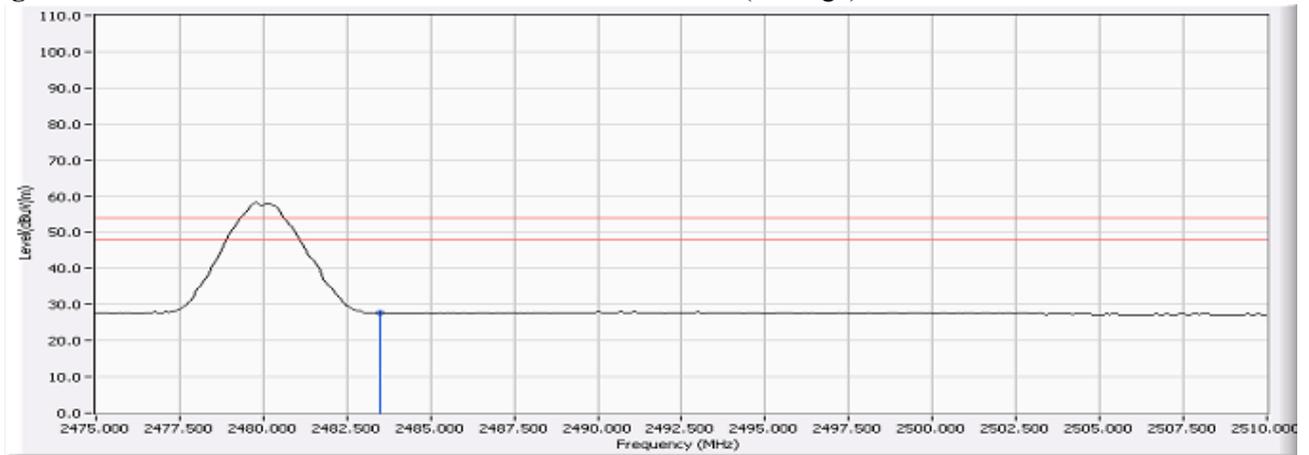
**Horizontal (Peak)**



Note: RBW=1MHz, VBW=1MHz, Sweep Time=500ms

Figure Channel 78:

Horizontal (Average)



Note:RBW=1MHz, VBW=30Hz, Sweep Time=500ms.

Product : Ultra Mobile PC (UMPC)  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 78)

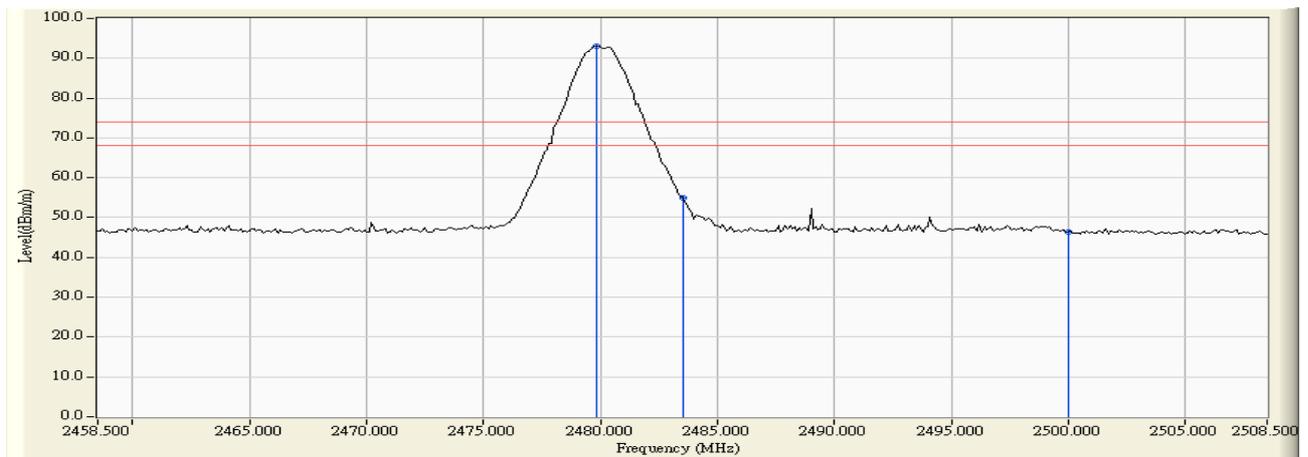
**RF Radiated Measurement:**

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
78 (Vertical)	>2483.5	>20	Pass

**RF Radiated Measurement (Vertical):**

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
78(Peak)	2479.800	8.047	84.943	92.990	74.00	54.00	Pass
78(Peak)	2483.500	8.018	46.937	54.954	74.00	54.00	Pass
78(Peak)	2500.000	7.919	38.453	46.373	74.00	54.00	Pass
78(Average)	2483.500	-1.037	28.570	27.533	74.00	54.00	Pass

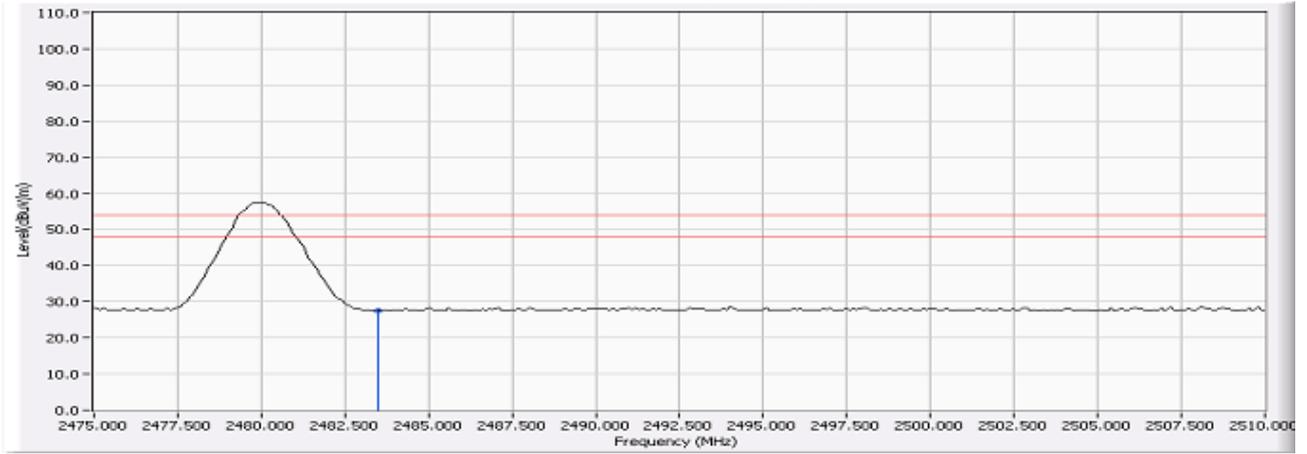
**Figure Channel 11: Vertical (Peak)**



Note: RBW=1MHz, VBW=1MHz, Sweep Time=500ms.

Figure Channel 78:

Vertical (Average)



Note:RBW=1MHz, VBW=30Hz, Sweep Time=500ms.

**6. Channel Number**

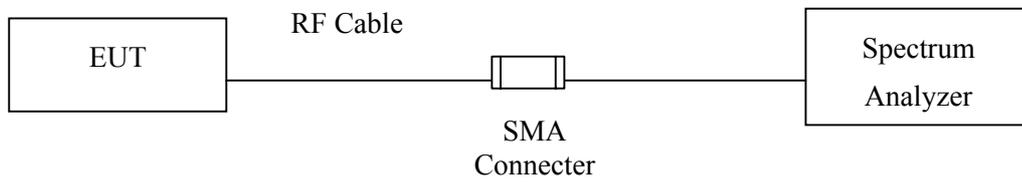
**6.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Advantest	R3162 / 120300652	June, 2007

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

**6.2. Test Setup**



**6.3. Limit**

Frequency hopping systems operating in the 2400-2483.5 MHz bands shall use at least 75 hopping frequencies.

**6.4. Uncertainty**

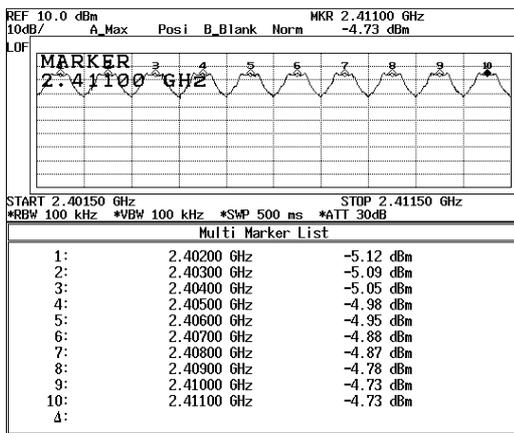
N/A

### 6.5. Test Result of Channel Number

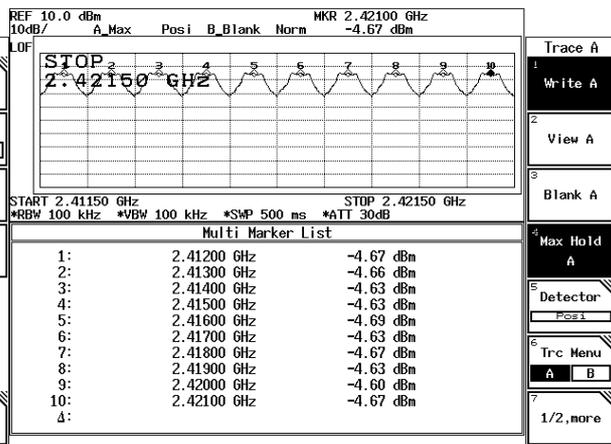
Product : Ultra Mobile PC (UMPC)  
 Test Item : Channel Number  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

Frequency Range (MHz)	Measurement (Hopping Channel)	Required Limit (Hopping Channel)	Result
2402 ~ 2480	79	>75	Pass

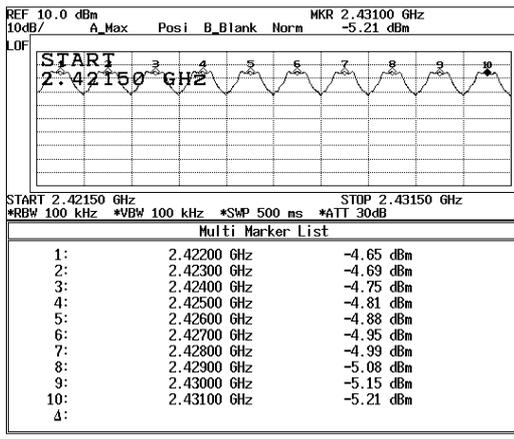
2402-2411MHz



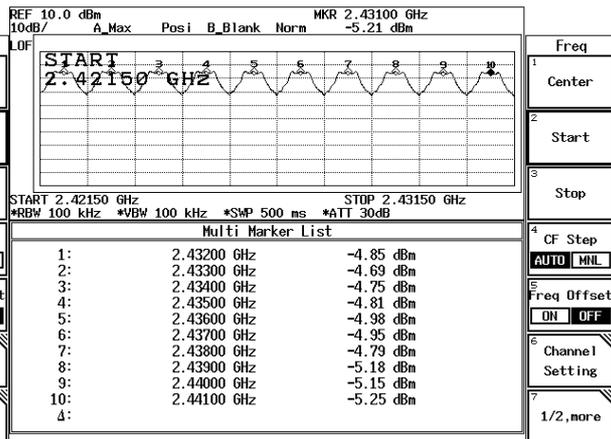
2412-2421MHz



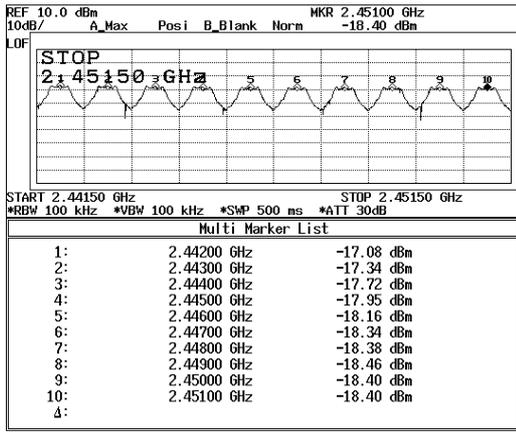
2422-2431MHz



2432-2441MHz



**2442-2451MHz**



Trace A

1 Write A

2 View A

3 Blank A

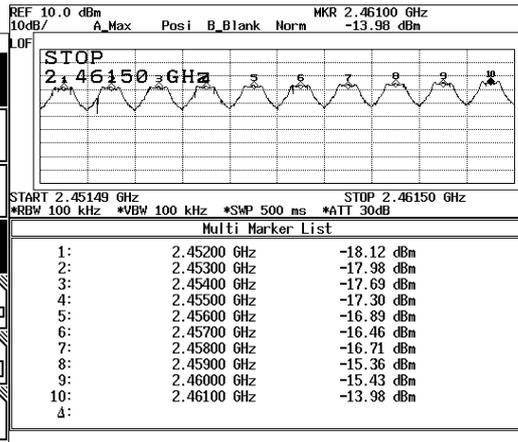
4 Max Hold A

5 Detector Pos1

6 Trc Menu A B

7 1/2, more

**2452-2461MHz**



Trace A

1 Write A

2 View A

3 Blank A

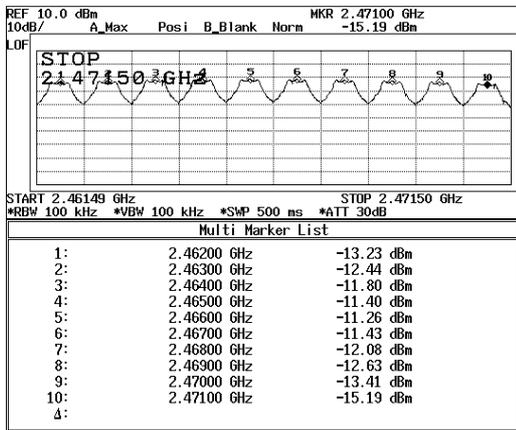
4 Max Hold A

5 Detector Pos1

6 Trc Menu A B

7 1/2, more

**2462-2471MHz**



Trace A

1 Write A

2 View A

3 Blank A

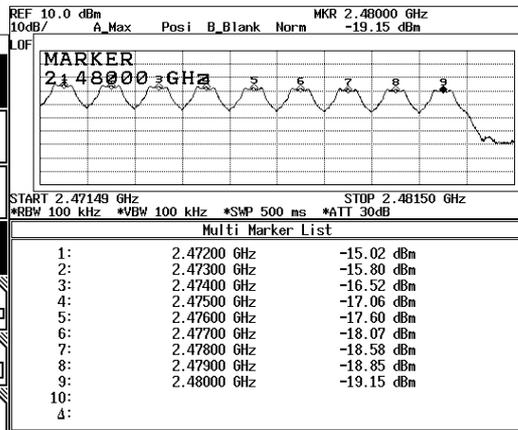
4 Max Hold A

5 Detector Pos1

6 Trc Menu A B

7 1/2, more

**2472-2480MHz**



MKR Setup

1 Marker No. S

2 Marker ON

3 Marker OFF

4 Active Marker

7 Reset Marker

**7. Channel Separation**

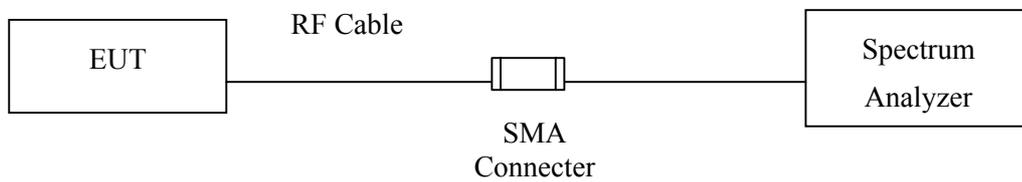
**7.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Advantest	R3162 / 120300652	June, 2007

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments mark by “X” are used to measure the final test results.

**7.2. Test Setup**



**7.3. Limit**

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

**7.4. Uncertainty**

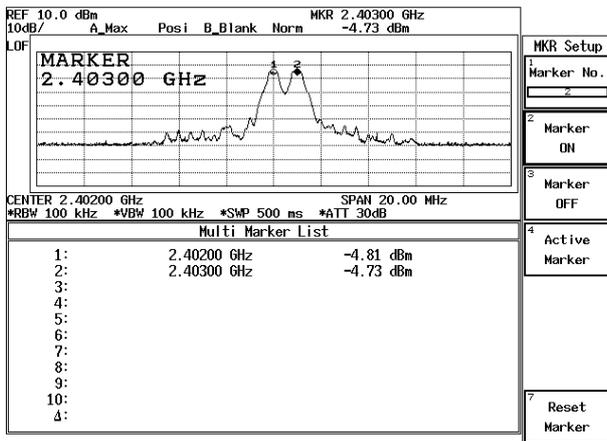
± 150Hz

### 7.5. Test Result of Channel Separation

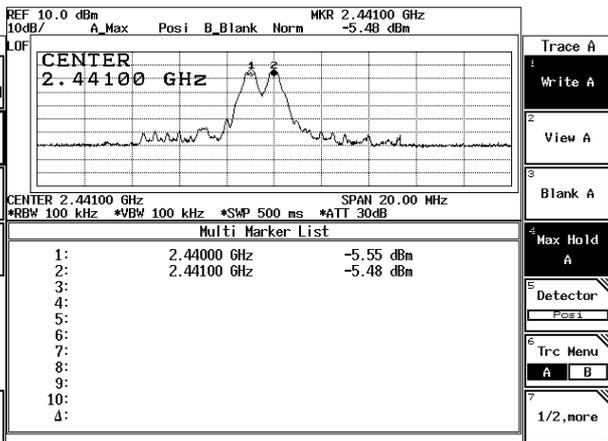
Product : Ultra Mobile PC (UMPC)  
 Test Item : Channel Separation  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

Frequency (MHz)	Measurement Level (MHz)	Required Limit	Result
2402	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2441	1.00	>25 kHz or 2/3 * 20 dB BW	Pass
2480	1.00	>25 kHz or 2/3 * 20 dB BW	Pass

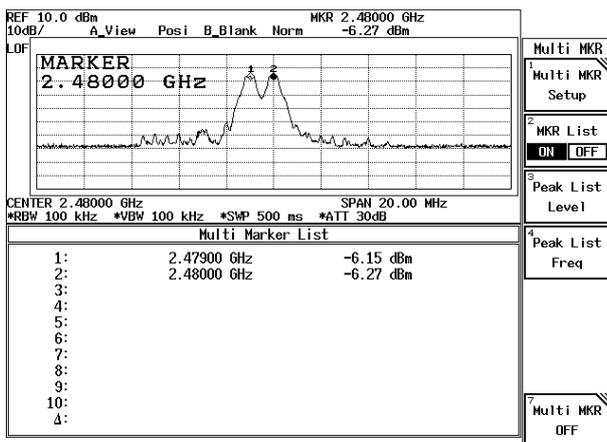
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz



**8. Dwell Time**

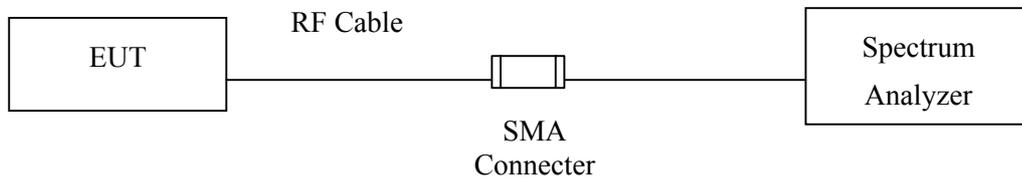
**8.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2007

- Note: 1. All equipments are calibrated every one year.  
 2. The test instruments marked by “X” are used to measure the final test results.

**8.2. Test Setup**



**8.3. Limit**

The dwell time shall be the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

**8.4. Uncertainty**

± 25msec

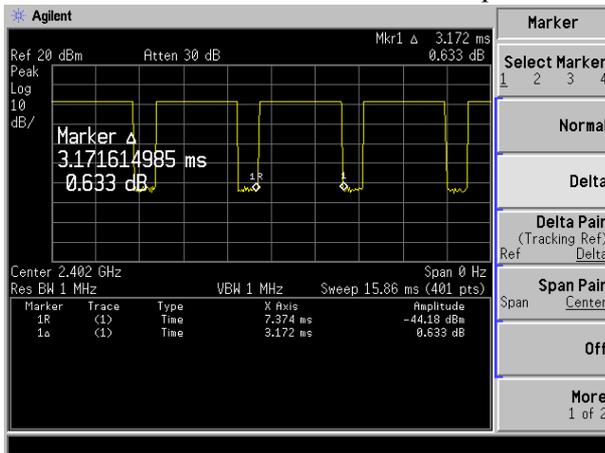
### 8.5. Test Result of Dwell Time

Product : Ultra Mobile PC (UMPC)  
 Test Item : Dwell Time  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00,39,78 –DH5)

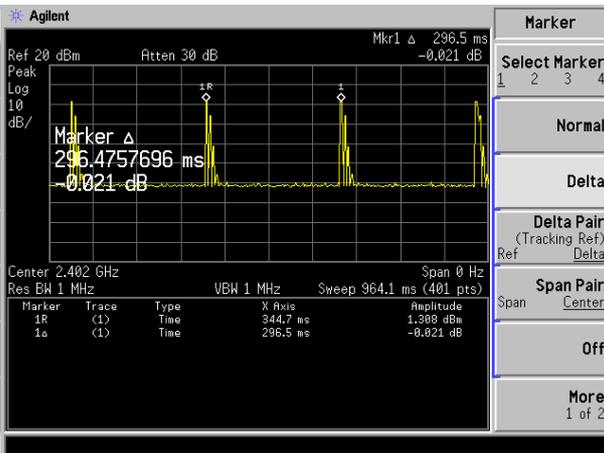
Channel No.	Frequency (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
00	2402	296.4757	3171.6	338.0464571	400	Pass
39	2441	296.4757	3131.9697	333.8224432	400	Pass
78	2480	301.2965	3092.324	324.323178	400	Pass

Note: Dwell Time = 79 \* 400 / Time Interval Between Hops \* Transmission Time / 1000

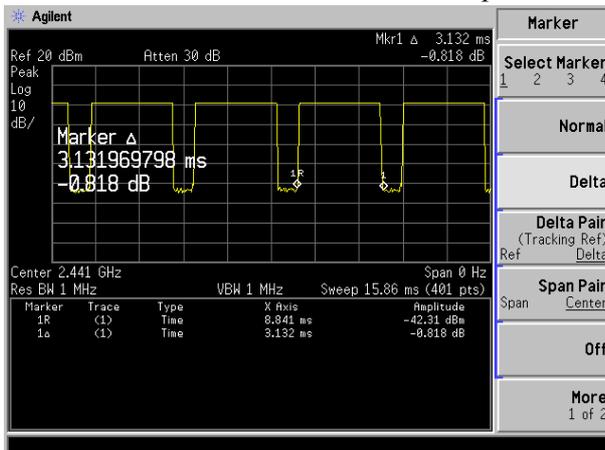
CH 2402MHz Time Interval between hops



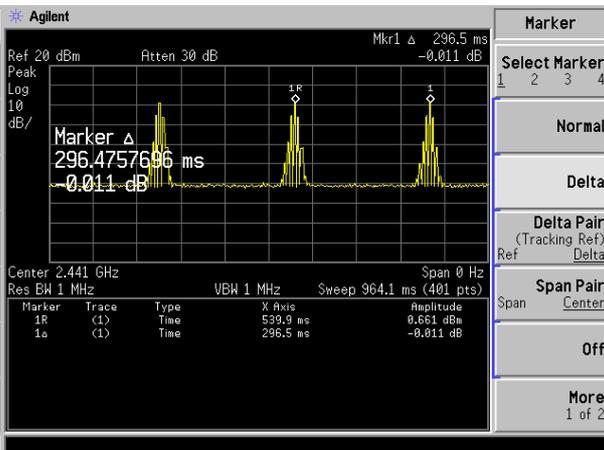
Transmission Time



CH 2441MHz Time Interval between hops

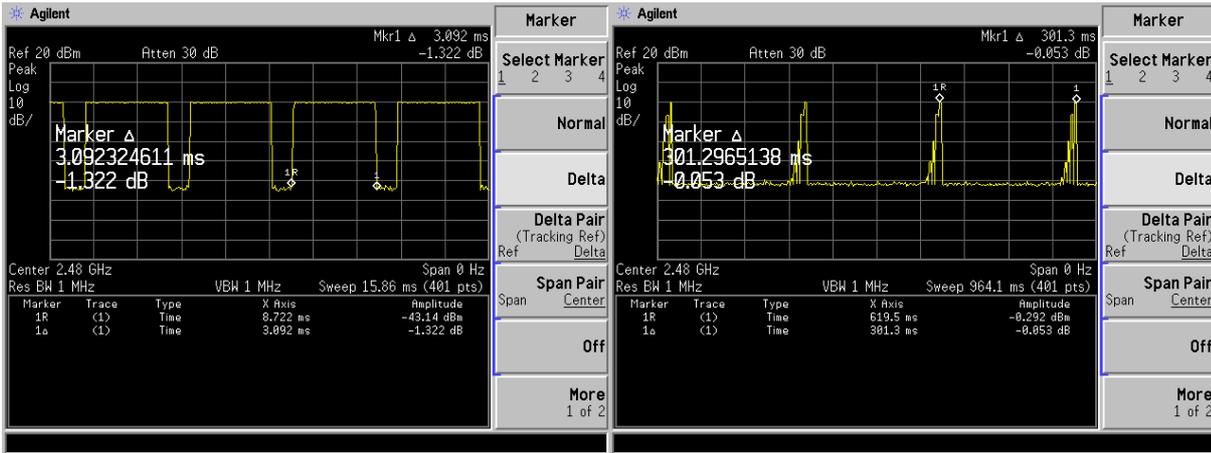


Transmission Time



CH 2480MHz Time Interval between hops

Transmission Time



Note: The dwell times of the packet type DH5 are tested.

**9. Occupied Bandwidth**

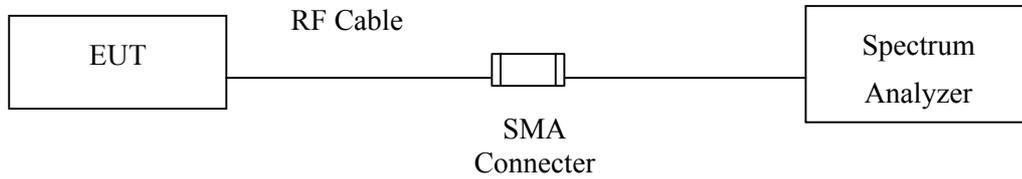
**9.1. Test Equipment**

The following test equipments are used during the radiated emission tests:

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X Spectrum Analyzer	Advantest	R3162 / 120300652	June, 2007

- Note:
1. All equipments are calibrated every one year.
  2. The test instruments marked by “X” are used to measure the final test results.

**9.2. Test Setup**



**9.3. Limits**

N/A

**9.4. Uncertainty**

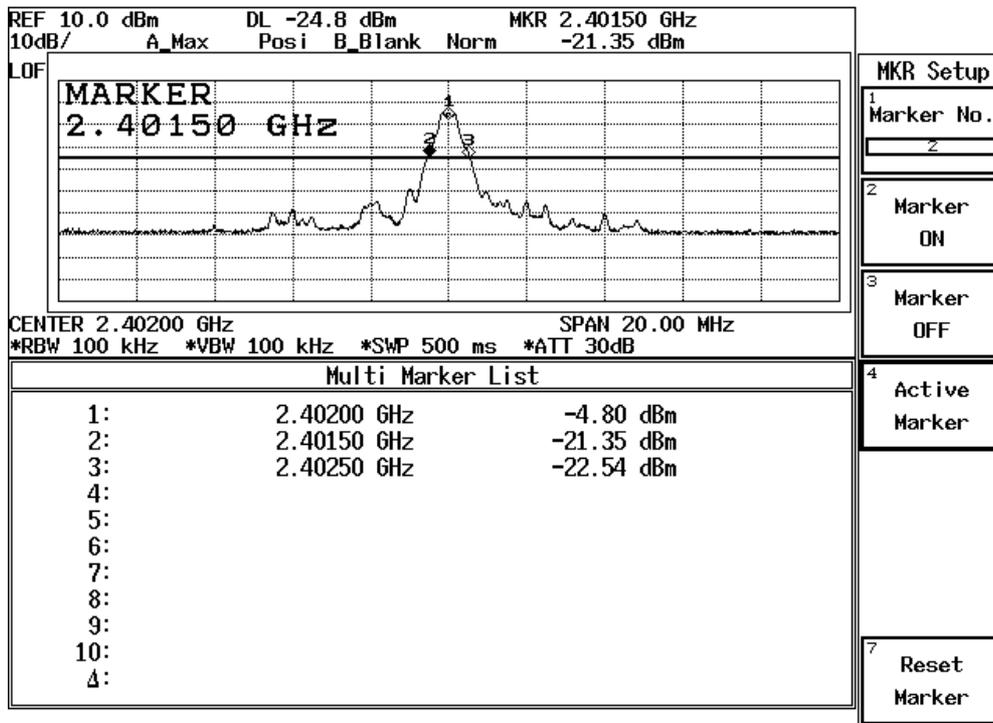
± 150Hz

9.5. Test Result of Occupied Bandwidth

Product : Ultra Mobile PC (UMPC)  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2402MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
00	2402	1000	--	NA

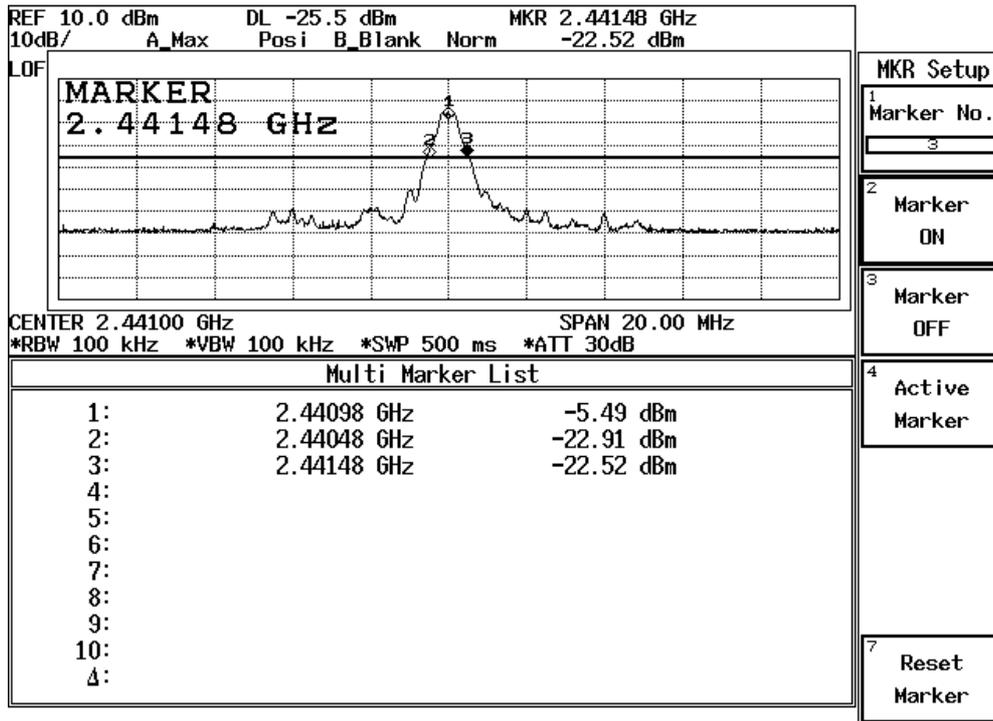
Figure Channel 00:



Product : Ultra Mobile PC (UMPC)  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2441MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
39	2441	1000	--	NA

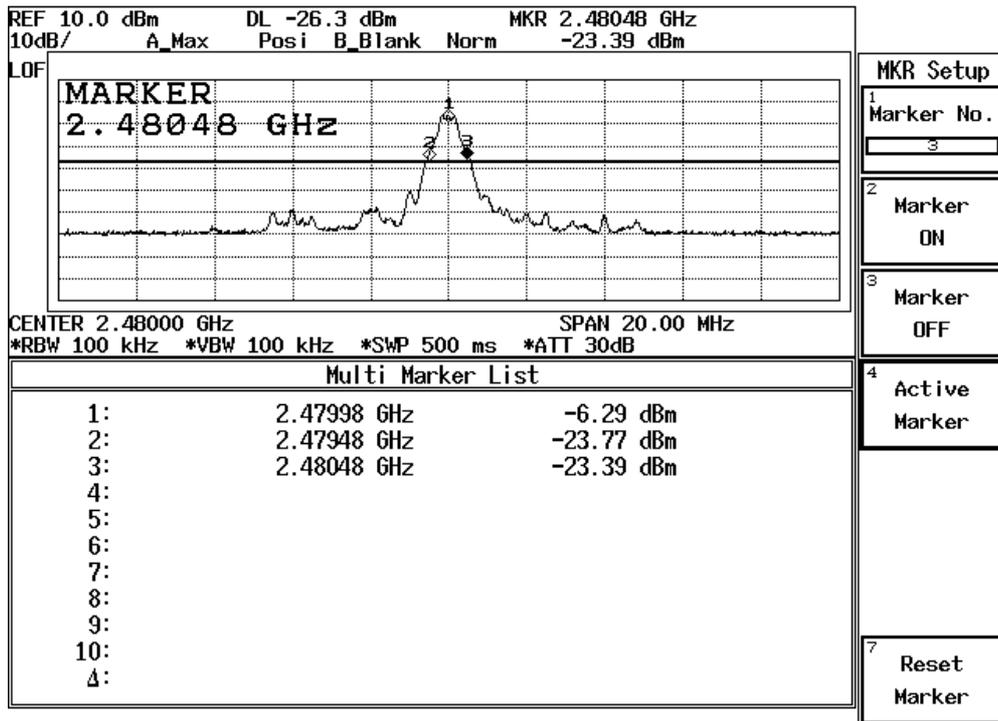
**Figure Channel 39:**



Product : Ultra Mobile PC (UMPC)  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2480MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
78	2480	1000	--	NA

**Figure Channel 78:**



## 10. EMI Reduction Method During Compliance Testing

No modification was made during testing.