



# Test Report

Product Name	Bluetooth 2.0 USB Adapter, Class II
Model No.	GBU221
FCC ID.	QLEGBU221W6

Applicant	IOGEAR, Inc.
Address	23 Hubble, Irvine, CA 92618, USA

Date of Receipt	Jun. 19, 2006
Issued Date	Dec. 29, 2006
Report No.	06CL090-RF-US-P06V01

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: Dec. 29, 2006

Report No.: 06CL090-RF-US-P06V01



Product Name	Bluetooth 2.0 USB Adapter, Class II
Applicant	IOGEAR, Inc.
Address	23 Hubble, Irvine, CA 92618, USA
Manufacturer	GOOD WAY TECHNOLOGY CO., LTD.
Model No.	GBU221
FCC ID.	QLEGBU221W6
Rated Voltage	AC 120V/60Hz
Working Voltage	DC 5V (via USB)
Trade Name	IOGEAR
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2005 ANSI C63.4: 2003 CISPR 22: 2005
Test Result	Complied



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Documented By : Michelle Lin  
( Michelle Lin )



Tested By : Tim Sung  
( Tim Sung )

Approved By : George Chen  
( George Chen )



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

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Bluetooth 2.0 USB Adapter, Class II
Trade Name	IOGEAR
FCC ID.	QLEGBU221W6
Model No.	GBU221
Frequency Range	2402 - 2480MHz
Channel Number	79
Type of Modulation	FHSS
Antenna Type	Printed
Channel Control	Auto
Antenna Gain	-2.56dBi

#### 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. The EUT is Bluetooth 2.0 USB Adapter, Class II with a built-in 2.4GHz transceiver.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.247 for spread spectrum devices.
3. Regarding to the operation frequency band, the lowest, middle, and highest frequency are selected to perform the test.
4. This report is copy QTK NO: 066L149-RF-US-P06V01 merely to change Applicant, Product Name, Model and Trade Name.
5. Quietek verified constructions and functions, which are shown in the test report, in typical operation.

## 1.2. Operational Description

The EUT is a Bluetooth 2.0 USB Adapter, Class II with a built-in 2.4GHz transceiver. The signals are modulated by frequency hopping spread spectrum. The number of channels is 79 in 2402-2480MHz.

The EUT 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
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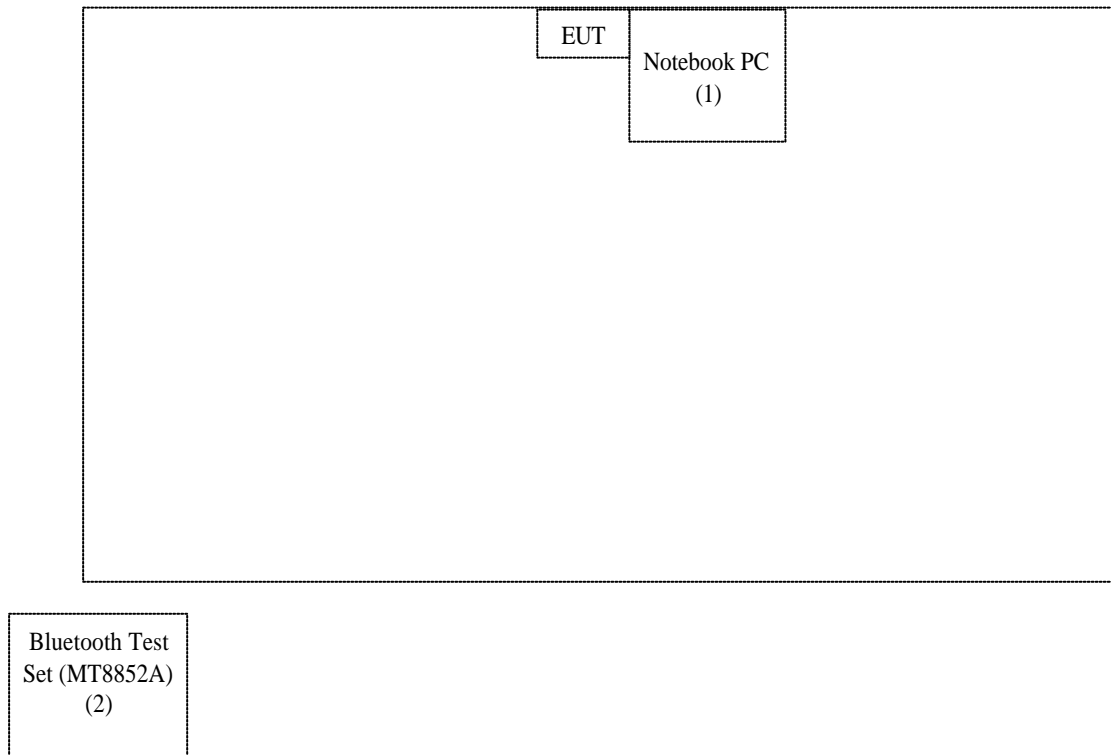
### 1.3. Test System Details

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.	Power Cord
(1)	Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m
(2)	Bluetooth Test Set (MT8852A)	ANRITSU	MT8852A	6K00003057	N/A

Signal Cable Type	Signal cable Description
A. N/A	N/A

### 1.4. Configuration of Test System





## 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute the bluetool program on the notebook.
- (3) Associate the EUT and the Bluetooth test set.
- (4) Configure the test channel and the packet type in the Bluetooth test set.
- (5) Press “Loop” to start the continuous transmission.
- (6) Verify the EUT operation properly.

**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: Federal Communications Commission  
 FCC Engineering Laboratory  
 7435 Oakland Mills Road  
 Columbia, MD 21046  
 Reference 31040/SIT1300F2  
 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)



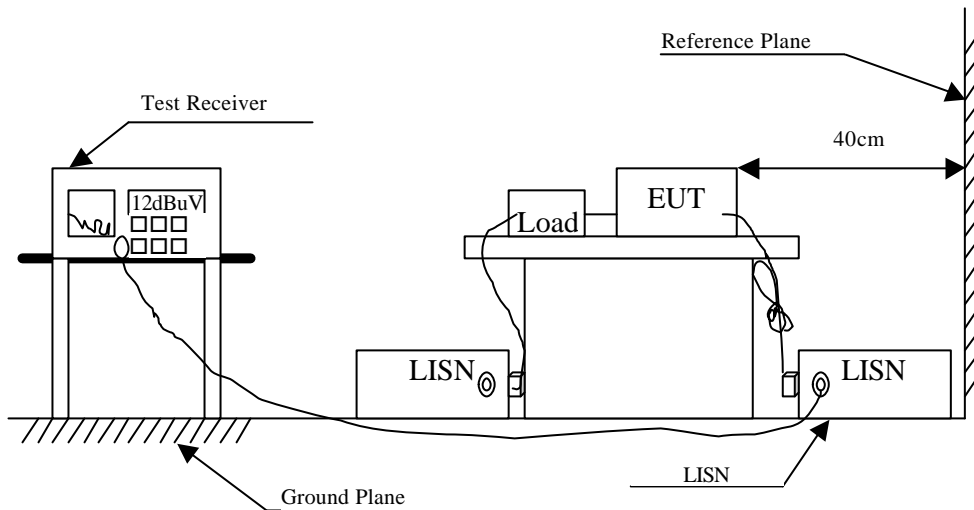
## 2. Conducted Emission

### 2.1. Test Equipment

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	EMI Test Receiver	R&S	ESCS 30/100367	Aug., 2005	
2	LISN	R&S	ESH3-Z5/836679/023	July, 2006	EUT
3	LISN	R&S	ESH3-Z5/836679/017	Feb., 2006	Peripherals
4	Pulse Limiter	R&S	ESH3-Z2/357.8810.52	Sep., 2005	
5	No.7 Shielded Room			N/A	

Note: All equipments 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 refers 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 all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

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

**2.5. Uncertainty**

± 2.26 dB

## 2.6. Test Result of Conducted Emission

Product : Bluetooth 2.0 USB Adapter, Class II  
 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>Quasi-Peak</b>					
0.177	0.749	46.880	47.629	-17.600	65.229
0.193	0.698	44.200	44.898	-19.873	64.771
0.228	0.450	41.980	42.430	-21.341	63.771
0.259	0.324	34.600	34.924	-27.962	62.886
0.318	0.300	35.220	35.520	-25.680	61.200
1.466	0.330	31.380	31.710	-24.290	56.000
<b>Average</b>					
0.177	0.749	33.200	33.949	-21.280	55.229
0.193	0.698	32.690	33.388	-21.383	54.771
0.228	0.450	25.390	25.840	-27.931	53.771
0.259	0.324	17.710	18.034	-34.852	52.886
0.318	0.300	19.370	19.670	-31.530	51.200
1.466	0.330	22.480	22.810	-23.190	46.000

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 : Bluetooth 2.0 USB Adapter, Class II  
 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>Quasi-Peak</b>					
0.166	0.300	46.520	46.820	-18.723	65.543
0.205	0.300	42.540	42.840	-21.589	64.429
0.279	0.300	36.540	36.840	-25.474	62.314
0.330	0.300	28.640	28.940	-31.917	60.857
0.388	0.310	34.540	34.850	-24.350	59.200
1.693	0.340	31.080	31.420	-24.580	56.000
<b>Average</b>					
0.166	0.300	31.290	31.590	-23.953	55.543
0.205	0.300	31.160	31.460	-22.969	54.429
0.279	0.300	25.200	25.500	-26.814	52.314
0.330	0.300	14.840	15.140	-35.717	50.857
0.388	0.310	24.020	24.330	-24.870	49.200
1.693	0.340	22.000	22.340	-23.660	46.000

Note:

1. All reading levels are quasi-peak and average value.
2. "■" means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

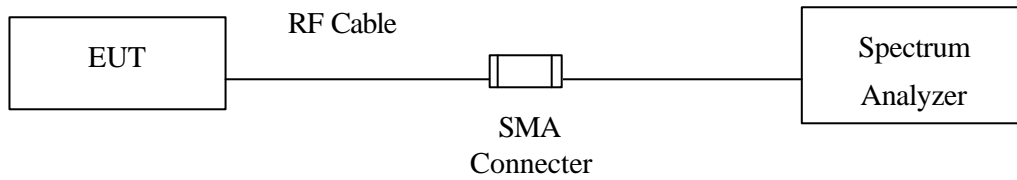
### 3. Peak Power Output

#### 3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

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

#### 3.2. Test Setup



#### 3.3. Limit

The maximum peak power shall be less 1Watt.

#### 3.4. Uncertainty

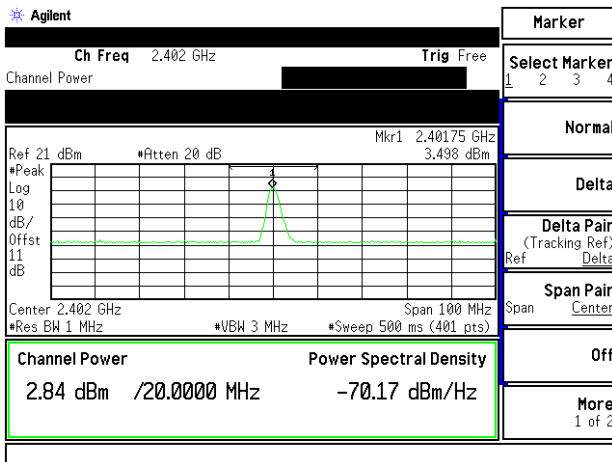
± 1.27 dB

### 3.5. Test Result of Peak Power Output

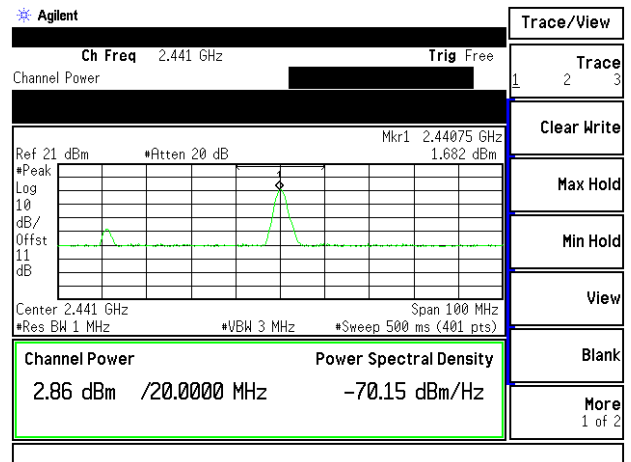
Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Peak Power Output  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 00	2402.00	2.84dBm	1 Watt= 30 dBm	Pass
Channel 39	2441.00	2.86dBm	1 Watt= 30 dBm	Pass
Channel 78	2480.00	2.40dBm	1 Watt= 30 dBm	Pass

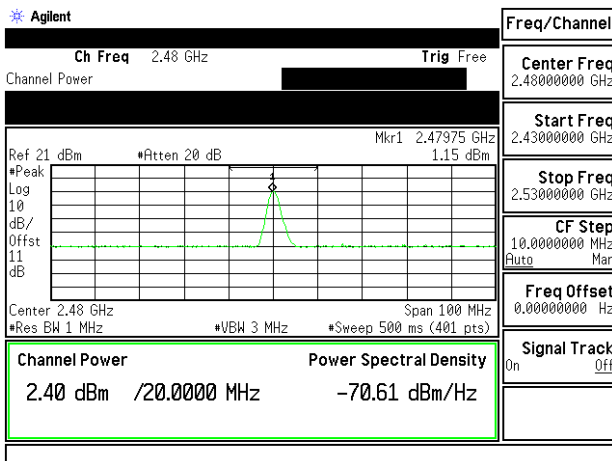
Channel 00



Channel 39



Channel 78





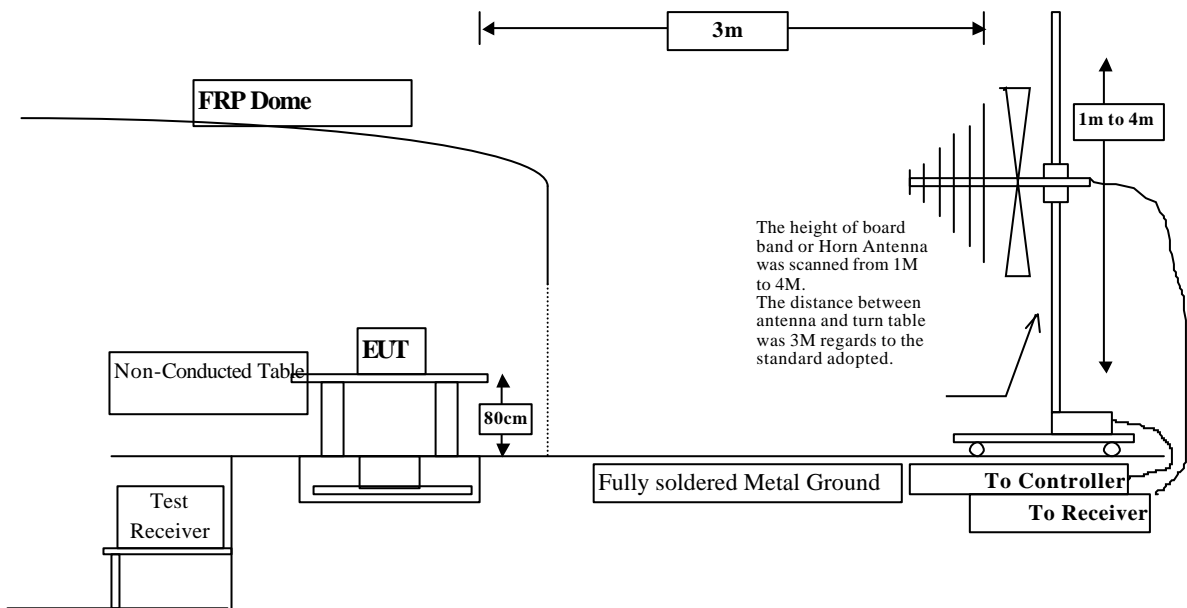
## 4. Radiated Emission

### 4.1. Test Equipment

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	May, 2006
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2006
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2006
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2005
<input type="checkbox"/> Site # 2		Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2006
		Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2006
		Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2006
		Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2006
		Horn Antenna	ETS	3115 / 0005-6160	Sep., 2005
		Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2006
<input checked="" type="checkbox"/> Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2006
	X	Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	X	Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2006
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P	May, 2006

- Note: 1. All equipments are calibrated every one year.  
 2. Test equipments 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 ANSI C63.4: 2003 on radiated measurement.

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 : Bluetooth 2.0 USB Adapter, Class II  
 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
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4804.250	3.055	59.066	62.120	-11.880	74.000
7206.250	8.534	41.833	50.367	-23.633	74.000
9608.250	10.883	41.881	52.764	-21.236	74.000
<b>Average Detector:</b>					
4804.000	3.054	32.625	35.679	-18.321	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4803.750	3.053	53.103	56.156	-17.844	74.000
7205.750	8.532	42.585	51.117	-22.883	74.000
9607.750	10.883	41.342	52.225	-21.775	74.000
<b>Average Detector:</b>					
4803.750	3.053	32.480	35.533	-18.467	54.000

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
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 : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Harmonic 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>					
<b>Peak Detector:</b>					
4881.750	3.291	54.810	58.100	-15.900	74.000
7322.750	8.821	41.620	50.440	-23.560	74.000
9763.750	10.966	40.804	51.770	-22.230	74.000
<b>Average Detector:</b>					
4881.750	3.291	31.855	35.145	-18.855	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4881.750	3.291	52.646	55.936	-18.064	74.000
7322.750	8.821	41.458	50.278	-23.722	74.000
9763.750	10.966	40.989	51.955	-22.045	74.000
<b>Average Detector:</b>					
4881.750	3.291	31.961	35.251	-18.749	54.000

Note:

1. The reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
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 : Bluetooth 2.0 USB Adapter, Class II  
 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
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4959.750	3.543	54.177	57.719	-16.281	74.000
7439.750	9.105	41.235	50.340	-23.660	74.000
9919.750	11.057	41.901	52.957	-21.043	74.000
<b>Average Detector:</b>					
4959.750	3.543	31.267	34.809	-19.191	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4959.750	3.543	51.552	55.094	-18.906	74.000
7439.750	9.105	42.546	51.651	-22.349	74.000
9919.750	11.057	41.703	52.759	-21.241	74.000
<b>Average Detector:</b>					
4959.750	3.543	31.336	34.878	-19.122	54.000

Note:

1. Reading levels below 1GHz and above 1GHz are quasi-peak values and peak/average values, respectively.
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 : Bluetooth 2.0 USB Adapter, Class II  
 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>					
199.988	9.716	19.737	29.453	-14.047	43.500
299.990	14.109	27.849	41.958	-4.042	46.000
499.980	18.292	22.810	41.102	-4.898	46.000
566.648	19.156	14.039	33.195	-12.805	46.000
633.312	20.865	13.838	34.703	-11.297	46.000
833.312	21.826	15.485	37.312	-8.688	46.000
<b>Vertical</b>					
169.033	9.754	21.231	30.985	-12.515	43.500
233.322	11.440	25.011	36.451	-9.549	46.000
299.987	13.721	28.767	42.488	-3.512	46.000
499.893	18.397	21.507	39.904	-6.096	46.000
527.982	18.932	20.812	39.744	-6.256	46.000
633.312	20.781	15.173	35.954	-10.046	46.000

Note:

1. The reading levels below 1GHz are quasi-peak values.
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

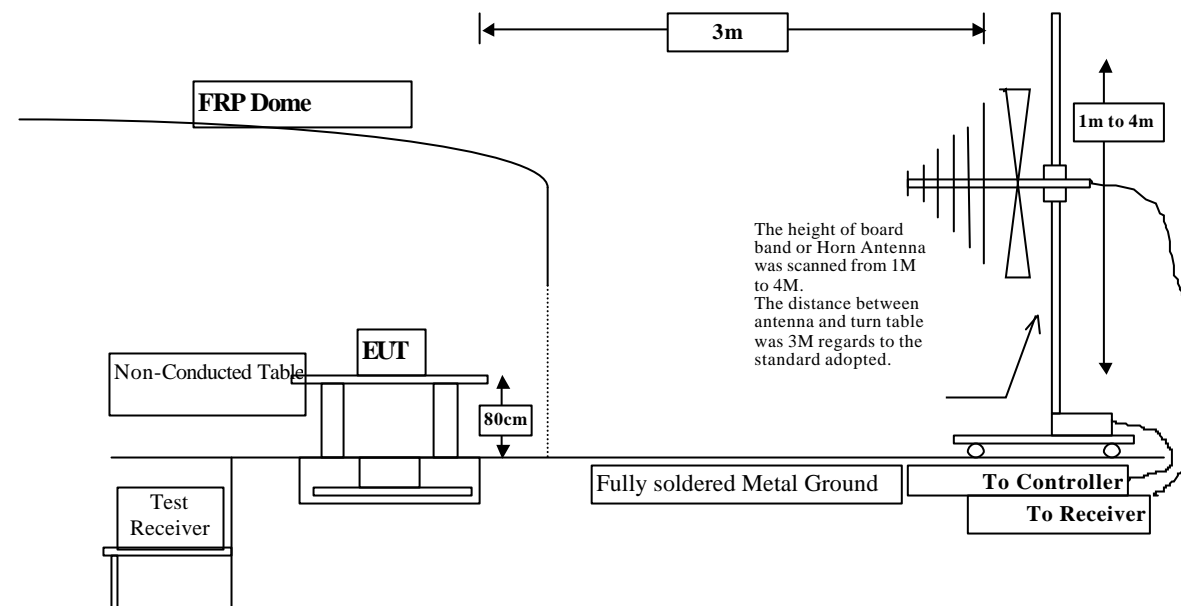
	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2006
X	Spectrum Analyzer	Advantest	R3162 / 100803480	May, 2006
X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
X	Horn Antenna	Schwarzbeck	9120D / 305, 306	July, 2006
X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006
X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P	May, 2006

OATS No.3

- Note:
1. All equipments are calibrated every one year.
  2. The test equipments 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 ANSI C63.4:2003 on radiated measurement.

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 : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00)

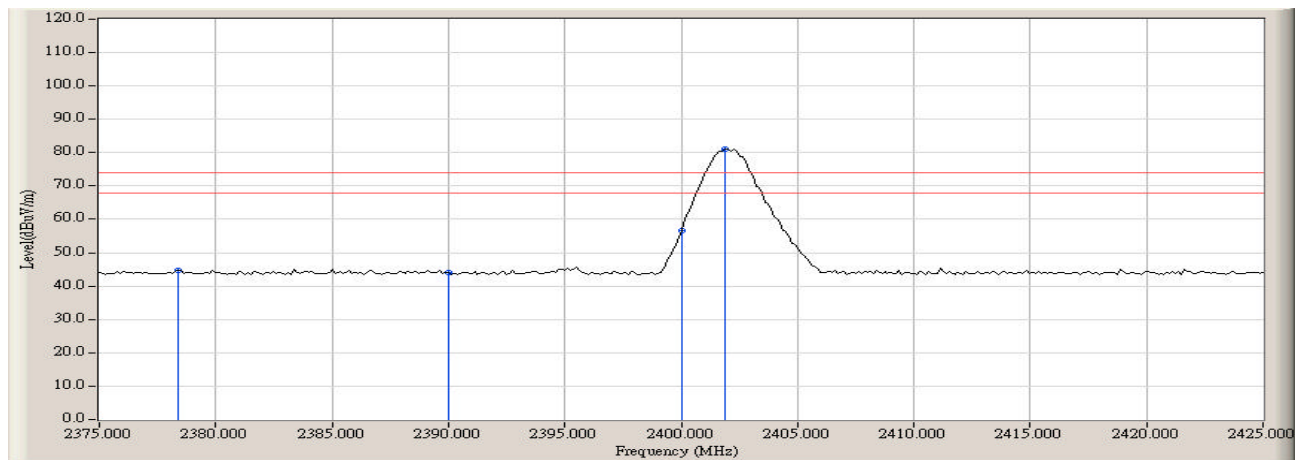
**RF Radiated Measurement:**

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

**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2378.375	-2.933	47.744	44.810	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 00:** (Horizontal)



Note:

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

Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00)

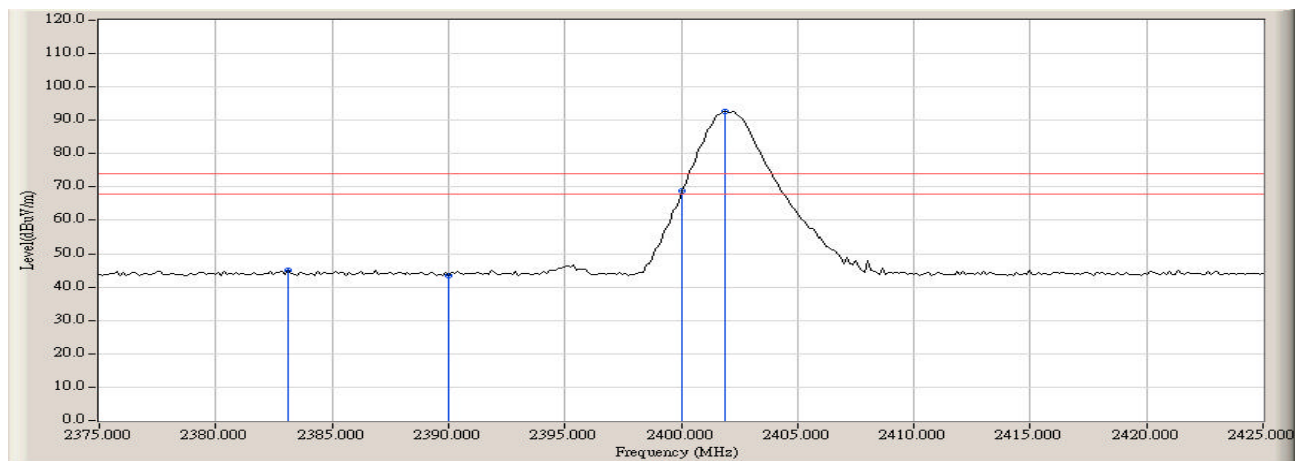
**RF Radiated Measurement:**

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

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2383.125	-2.914	47.806	44.892	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 00:** (Vertical)



Note:

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

Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 78)

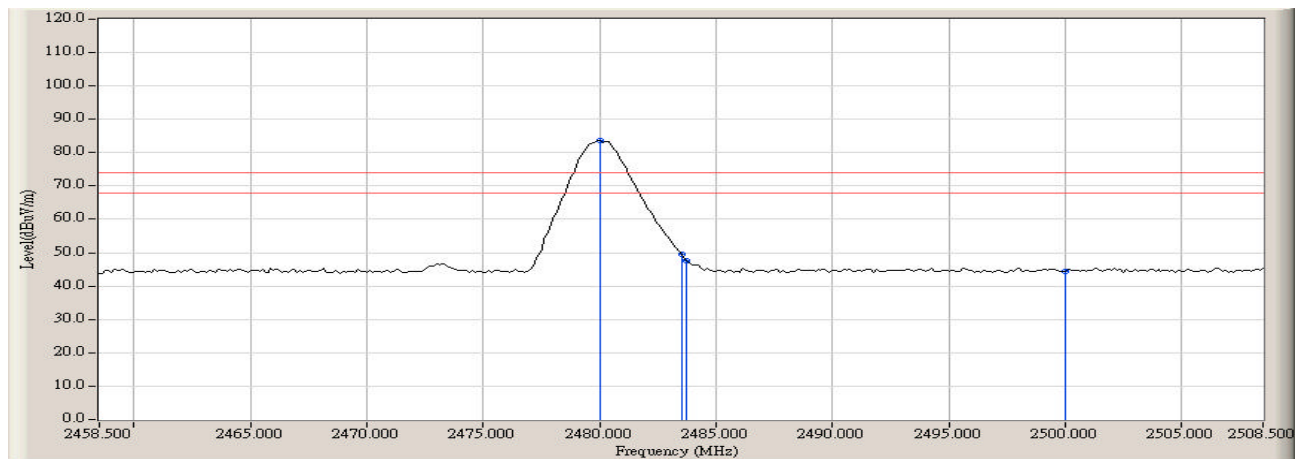
**RF Radiated Measurement:**

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

**RF Radiated Measurement (Horizontal):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2483.750	-2.441	50.136	47.695	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 78:** (Horizontal)



Note:

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

Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 78)

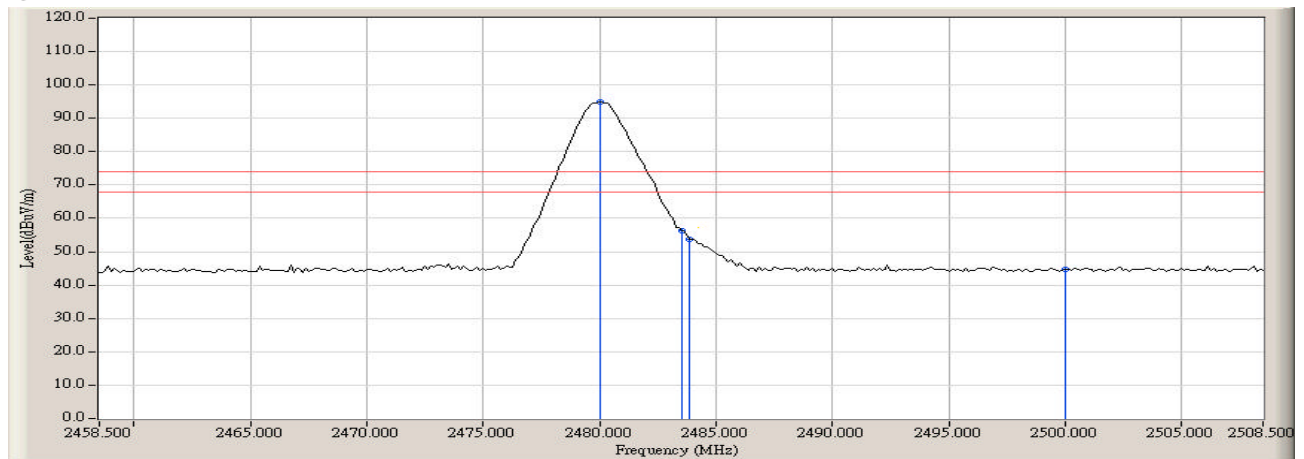
**RF Radiated Measurement:**

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

**RF Radiated Measurement (Vertical):**

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
00(Peak)	2483.875	-2.440	56.267	53.827	74.00	54.00	Pass
00(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 78:** (Vertical)



Note:

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

Note: 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.

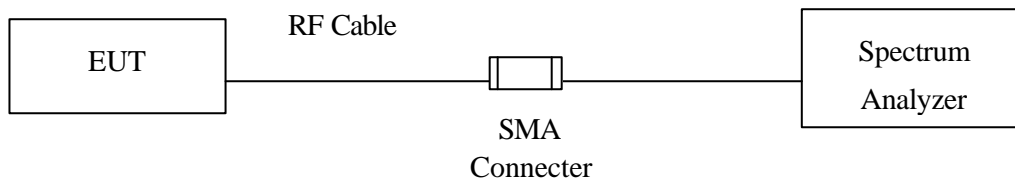
**6. Channel Number**

**6.1. Test Equipment**

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipments are calibrated every one year.  
 2. The test equipments 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.

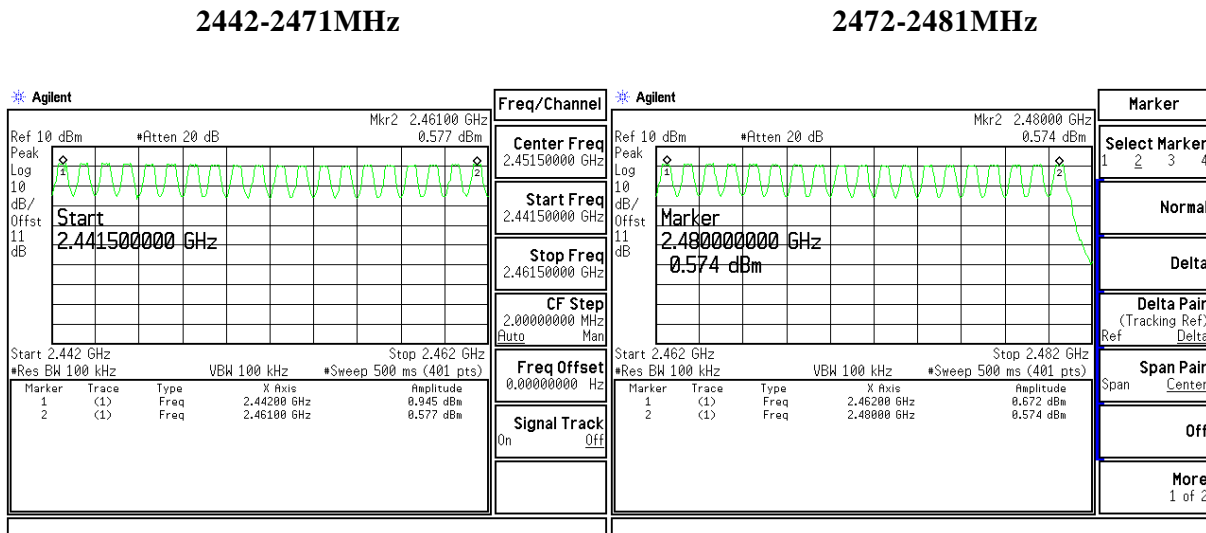
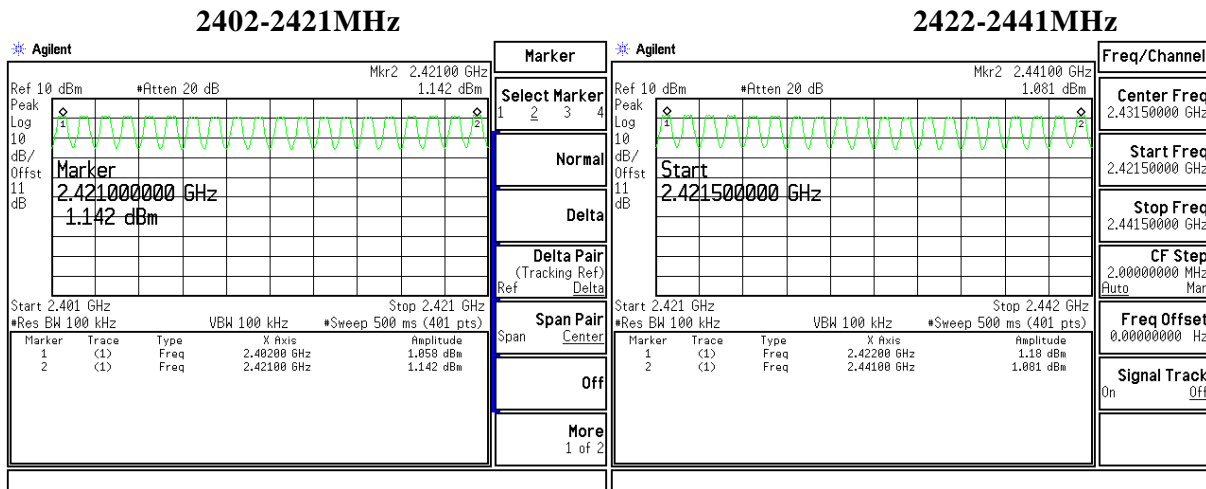
**6.4. Uncertainty**

N/A

### 6.5. Test Result of Channel Number

Product : Bluetooth 2.0 USB Adapter, Class II  
 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



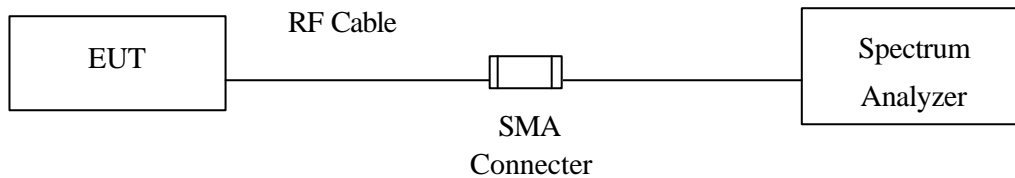
## 7. Channel Separation

### 7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipments are calibrated every one year.  
 2. The test instruments marked 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. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

### 7.4. Uncertainty

± 150Hz

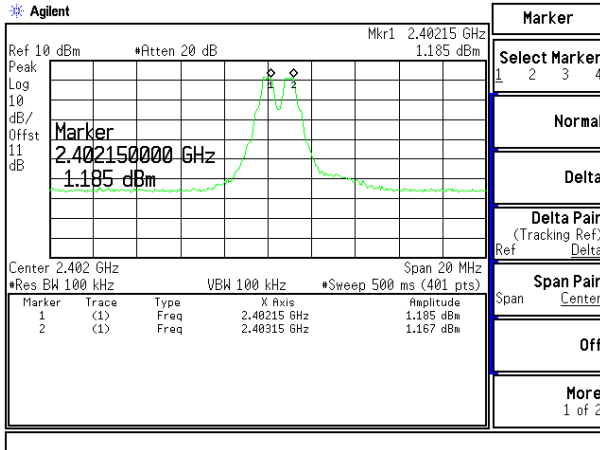


### 7.5. Test Result of Channel Separation

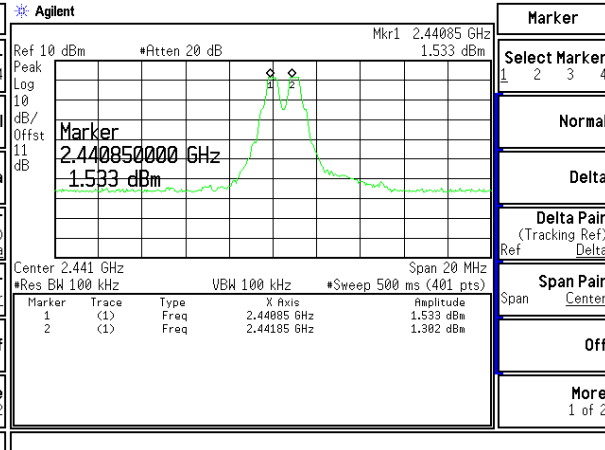
Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Channel Separation  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

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

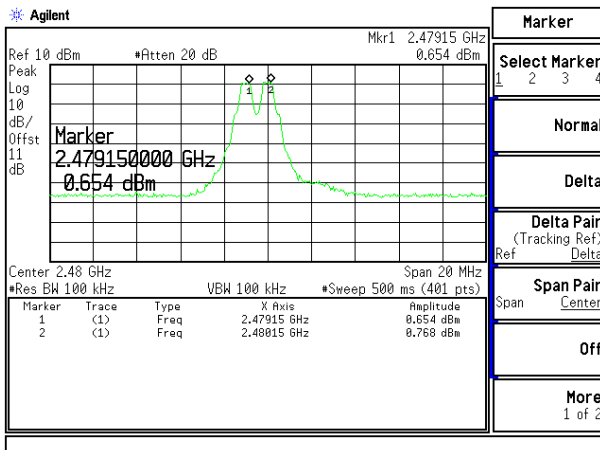
Channel 00 2402MHz



Channel 39 2441MHz



Channel 78 2480 MHz



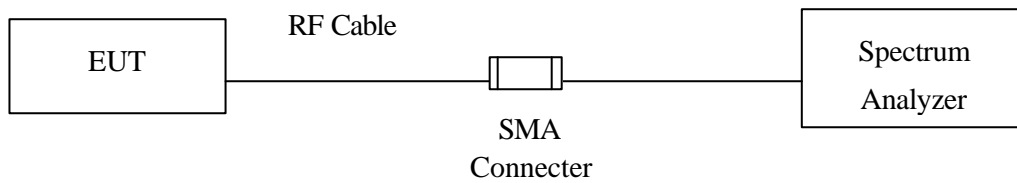
**8. Dwell Time**

**8.1. Test Equipment**

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All equipments are calibrated every one year.  
 2. The test equipments marked “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**

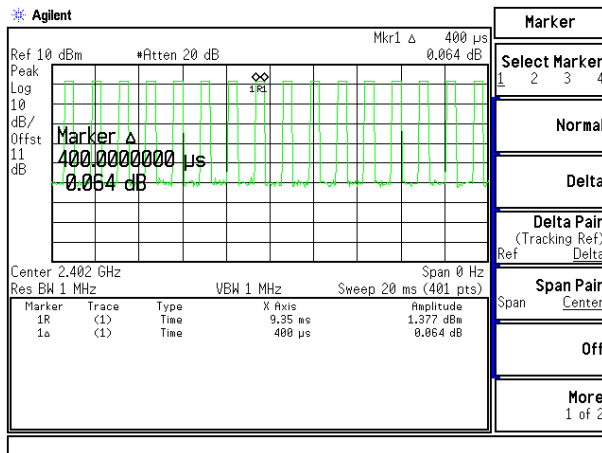
± 25msec

### 8.5. Test Result of Dwell Time

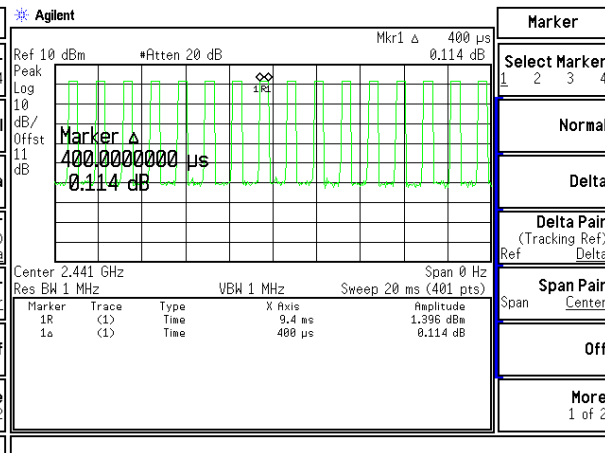
Product : Bluetooth 2.0 USB Adapter, Class II  
 Test Item : Dwell Time  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 00,39,78 –DH1)

Channel (MHz)	Measurement Level (ms)	Required Limit (sec.)	Result
CH 00 2402	128	< 0.4	Pass
CH 39 2441	128	< 0.4	Pass
CH 78 2480	128	< 0.4	Pass

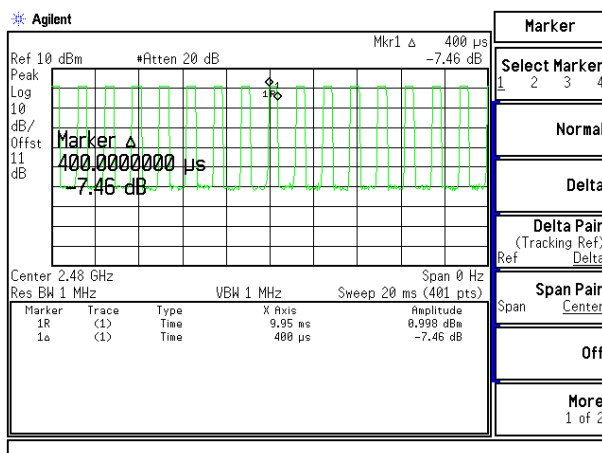
CH 00 2402MHz



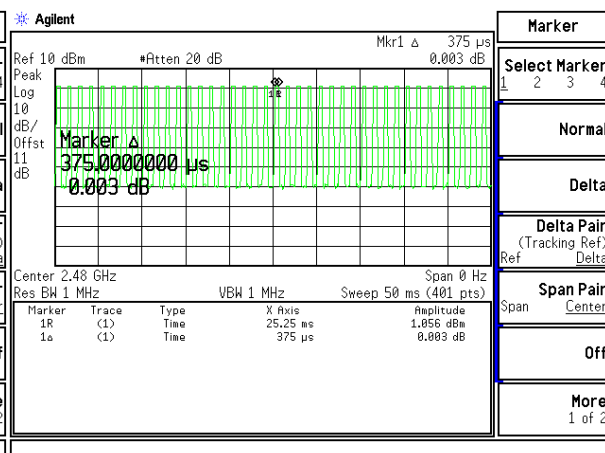
CH 39 2441MHz



CH 78 2480MHz



Total



Note: Dwell time = time slot length \* hop rate / number of hopping channels \* period

#### Occupancy Time of Frequency Hopping System

Test Time Period:  $0.4 * 79 = 31.6\text{sec}$ , Hopping Times Within 1sec:  $40/50\text{msec} = 0.8\text{ hops/msec}$ .

A) 2402MHz The Maximum Occupancy Time Within 31.6sec:  $400 \mu\text{s} * 800 / 79 * 31.6 = 128\text{msec}$ .

B) 2441MHz The Maximum Occupancy Time Within 31.6sec:  $400 \mu\text{s} * 800 / 79 * 31.6 = 128\text{msec}$ .

C) 2480MHz The Maximum Occupancy Time Within 31.6sec:  $400 \mu\text{s} * 800 / 79 * 31.6 = 128\text{msec}$ .

Test Result: The average occupancy times of the highest, middle and lowest channel are less than 0.4sec, and thus complies the standard.

PS: (1) From Bluetooth Specification, It Hops 1640 Times in 1sec. The Average Occupancy Time of Each 79 Channels is  $1600/79$  Times, Therefore, We Calculate The Maximum Occupancy Time (worst care) As Below:

A) 2402Mhz The Occupancy Time of Each Pulse is 0.4msec, The Maximum Occupancy Time within 31.6sec is  $0.4\text{msec} * 1640/79 * 31.6 = 289.056\text{msec}$

B) 2441MHz The Occupancy Time of Each Pulse is 0.4msec, The Maximum Occupancy Time within 31.6sec is  $0.4\text{msec} * 1640/79 * 31.6 = 289.056\text{msec}$

C) 2480MHz The Occupancy Time of Each Pulse is 0.4msec, The Maximum Occupancy Time within 31.6sec is  $0.4\text{msec} * 1640/79 * 31.6 = 289.056\text{msec}$

Test Result: The average occupancy times of the highest, middle and lowest channel are less than 0.4sec, and thus complies the standard.

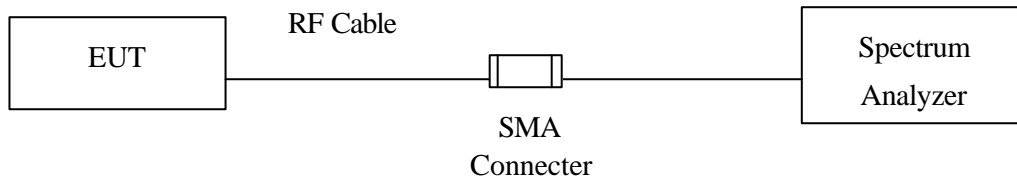
**9. Occupied Bandwidth**

**9.1. Test Equipment**

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

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

**9.2. Test Setup**



**9.3. Limits**

N/A

**9.4. Uncertainty**

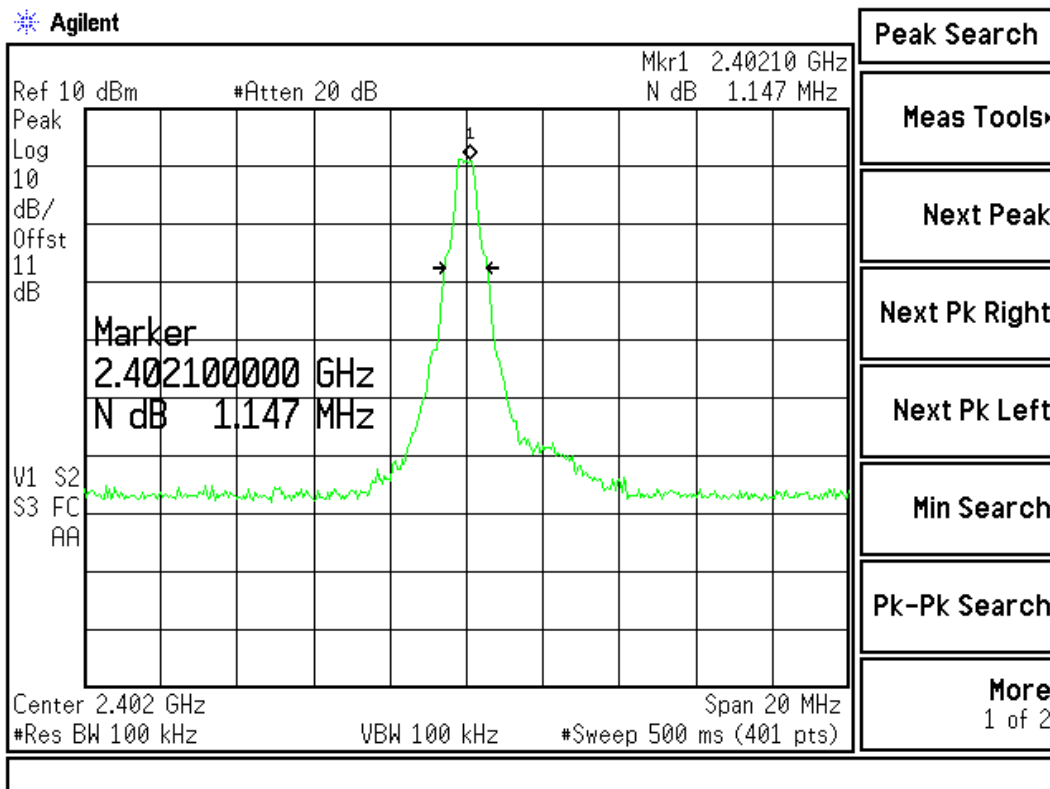
± 150Hz

### 9.5. Test Result of Occupied Bandwidth

Product : Bluetooth 2.0 USB Adapter, Class II  
 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	1147	--	N/A

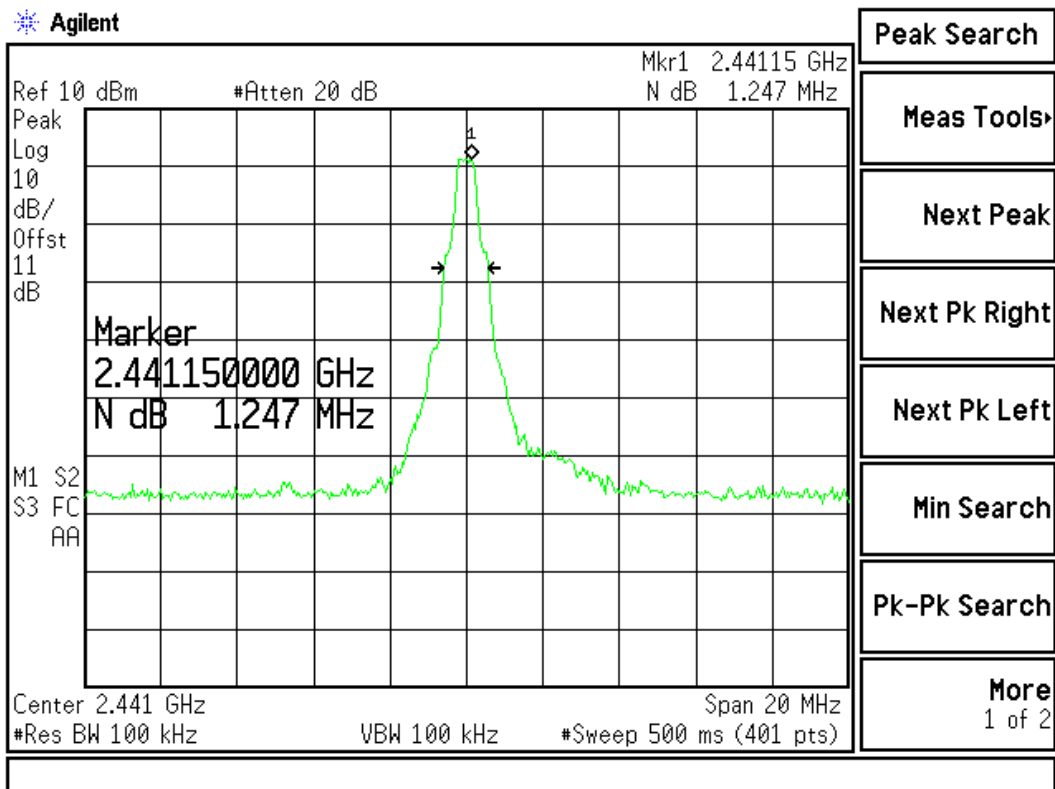
Figure Channel 00:



Product : Bluetooth 2.0 USB Adapter, Class II  
 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	1247	--	N/A

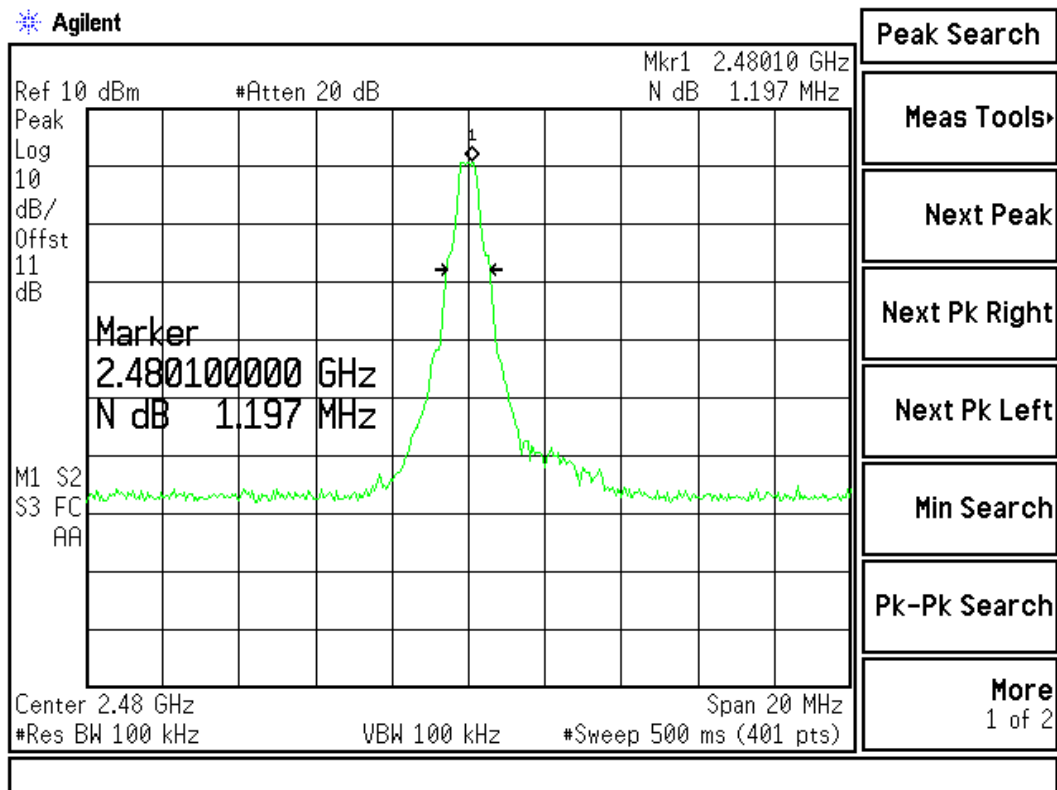
**Figure Channel 39:**



Product : Bluetooth 2.0 USB Adapter, Class II  
 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	1197	--	N/A

Figure Channel 78:





## 10. EMI Reduction Method During Compliance Testing

No modification was made during testing.