

# FC

## Test Report

Product Name	2.4GHz WIRELESS TRANSMITTER
Model No.	JW-01-T
FCC ID.	VH7-JW01T

Applicant	JETVOX ACOUSTIC CORP.
Address	No.22, Dalin Rd., Taoyuan City, Taoyuan County 330. Taiwan (R.O.C.)

Date of Receipt	July 16, 2007
Issued Date	July 23, 2007
Report No.	077224R-RFUSP06V01

The Test Results relate only to the samples tested.  
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This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

# Test Report Certification

Issued Date: July 23, 2007

Report No.: 077224R-RFUSP06V01



Product Name	2.4GHz WIRELESS TRANSMITTER
Applicant	JETVOX ACOUSTIC CORP.
Address	No.22, Dalin Rd., Taoyuan City, Taoyuan County 330. Taiwan (R.O.C.)
Manufacturer	JETVOX ACOUSTIC CORP.
Model No.	JW-01-T
FCC ID.	VH7-JW01T
Rated Voltage	AC 120V/60Hz
Working Voltage	AC 120V/60Hz
Trade Name	JVOX
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2006 ANSI C63.4: 2003
Test Result	Complied



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Documented By : Genie Chang

( Engineering Adm. Specialist/

Genie Chang )



Tested By : Tim Sung

( Senior Engineer / Dino Chen )



0914

Approved By : Gene Chang

( President / Gene Chang )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	2.4GHz WIRELESS TRANSMITTER
Trade Name	JVOX
FCC ID.	VH7-JW01T
Model No.	JW-01-T
Frequency Range	2404 – 2478MHz
Type of Modulation	FHSS
Channel Number	38
Channel Control	Auto
Antenna Type	Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”
Power Adapter	MFR: AK, M/N: AK01G-0500100U Input: 100-240V, 50-60Hz 0.2A Output: 5V –1A Cable Out: Non-Shielded, 1.5m

#### Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	GLD	GSL-IA01-IC1-A08	Dipole	2dBi for 2.4 GHz

#### Frequency of Each Channel:

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2404 MHz	Channel 02:	2406 MHz	Channel 03:	2408 MHz	Channel 04:	2410 MHz
Channel 05:	2412 MHz	Channel 06:	2414 MHz	Channel 07:	2416 MHz	Channel 08:	2418 MHz
Channel 09:	2420 MHz	Channel 10:	2422 MHz	Channel 11:	2424 MHz	Channel 12:	2426 MHz
Channel 13:	2428 MHz	Channel 14:	2430 MHz	Channel 15:	2432 MHz	Channel 16:	2434 MHz
Channel 17:	2436 MHz	Channel 18:	2438 MHz	*Channel 19:	2440 MHz	Channel 20:	2442 MHz
Channel 21:	2444 MHz	Channel 22:	2446 MHz	Channel 23:	2448 MHz	Channel 24:	2450 MHz
Channel 25:	2452 MHz	Channel 26:	2454 MHz	Channel 27:	2456 MHz	Channel 28:	2458 MHz
Channel 29:	2460 MHz	Channel 30:	2462 MHz	Channel 31:	2464 MHz	Channel 32:	2466 MHz
Channel 33:	2468 MHz	Channel 34:	2470 MHz	Channel 35:	2472 MHz	Channel 36:	2474 MHz
Channel 37:	2476 MHz	Channel 38:	2478 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 38 channels and over the minimum number of hopping channels (15 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.

\*What is available is 2441MHz from the RF Engineer sample from the customer, and that does not comply with Channel 19 in this report, which is 2440MHz.

Note:

1. The EUT is a 2.4GHz WIRELESS TRANSMITTER 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. Quietek verified constructions and functions, which are shown in the test report, in typical operation.
5. 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 a 2.4GHz WIRELESS TRANSMITTER with a built-in 2.4GHz transceiver. It supports 38 channels in 2404-2478MHz. The signals are modulated by FHSS.

The EUT use antenna type is a Dipole antenna.

Support stereo audio RCA, S/P DIF coaxial, optical, and USB audio inputs.

The EUT provides wireless technology that revolutionizes personal connectivity.

Test Mode	Mode 1: Transmitter
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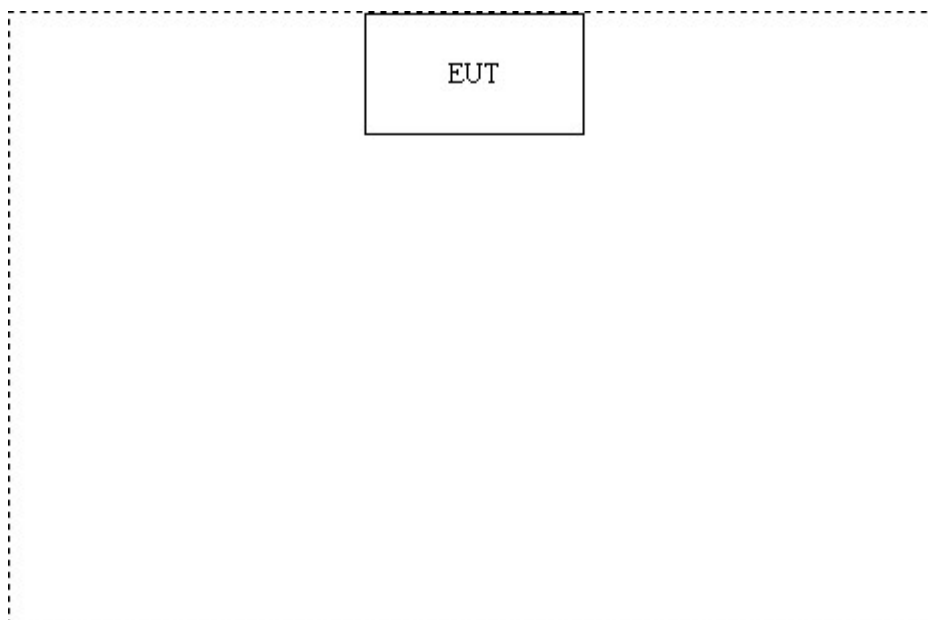
### 1.3. Test System Details

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.	FCC ID	Power Cord
(1)	N/A	N/A	N/A	N/A	N/A	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)	EUT into a RF test mode.
(2)	Selection test mode via DIP SW
(3)	Configure the test channel and the packet type.
(4)	Press to start the continuous transmission/receiving.
(5)	Setup the EUT as shown in section 1.3.
(6)	Verify that the EUT works correctly.



## 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



Accreditation on NVLAP  
NVLAP Lab Code: 200533-0



Site Name: Quietek Corporation  
Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,  
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E-Mail : [service@quietek.com](mailto:service@quietek.com)



FCC Accreditation Number: TW1014

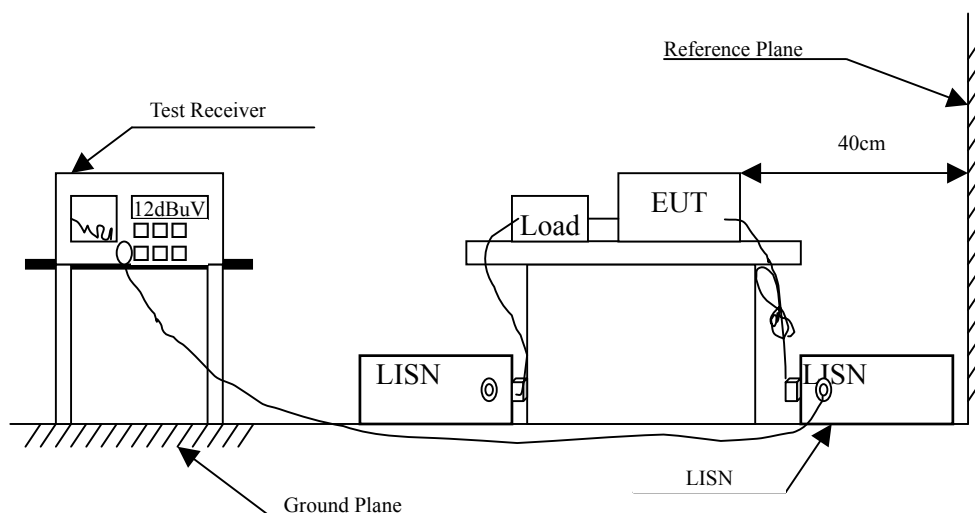
## 2. Conducted Emission

### 2.1. Test Equipment

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	EMI Test Receiver	R&S	ESCS 30/100367	Aug., 2006	
2	LISN	R&S	ESH3-Z5/836679/023	July, 2007	EUT
3	LISN	R&S	ESH3-Z5/836679/017	Feb., 2007	Peripherals
4	Pulse Limiter	R&S	ESH3-Z2/357.8810.52	Sep., 2006	
5	No.7 Shielded Room			N/A	

Note: All equipments are calibrated every one year.

### 2.2. Test Setup



### 2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit		
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 : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmitter (Channel 19)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
<b>LINE 1</b>					
<b>Quasi-Peak</b>					
0.190	0.202	34.640	34.842	-30.015	64.857
0.244	0.203	34.610	34.813	-28.501	63.314
0.314	0.214	43.290	43.504	-17.810	61.314
0.642	0.219	34.410	34.629	-21.371	56.000
0.951	0.232	33.250	33.482	-22.518	56.000
1.830	0.264	31.320	31.584	-24.416	56.000
<b>Average</b>					
0.190	0.202	24.140	24.342	-30.515	54.857
0.244	0.203	24.380	24.583	-28.731	53.314
0.314	0.214	33.430	33.644	-17.670	51.314
0.642	0.219	23.170	23.389	-22.611	46.000
0.951	0.232	23.270	23.502	-22.498	46.000
1.830	0.264	21.240	21.504	-24.496	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 : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmitter (Channel 19)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
<b>LINE 2</b>					
<b>Quasi-Peak</b>					
0.224	0.202	27.950	28.152	-35.734	63.886
0.314	0.214	36.840	37.054	-24.260	61.314
0.611	0.218	29.250	29.468	-26.532	56.000
0.912	0.232	28.880	29.112	-26.888	56.000
1.740	0.263	26.520	26.783	-29.217	56.000
3.197	0.322	24.290	24.612	-31.388	56.000
<b>Average</b>					
0.224	0.202	16.260	16.462	-37.424	53.886
0.314	0.214	25.080	25.294	-26.020	51.314
0.611	0.218	16.760	16.978	-29.022	46.000
0.912	0.232	16.000	16.232	-29.768	46.000
1.740	0.263	14.460	14.723	-31.277	46.000
3.197	0.322	12.900	13.222	-32.778	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.

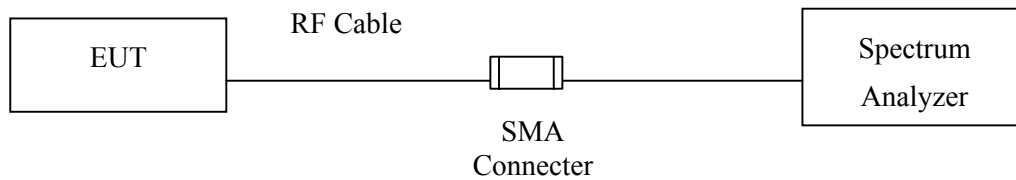
### 3. Peak Power Output

#### 3.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov., 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

All other Frequency hopping system in the 2400-2483.5MHz band: 0.125W

#### 3.4. Uncertainty

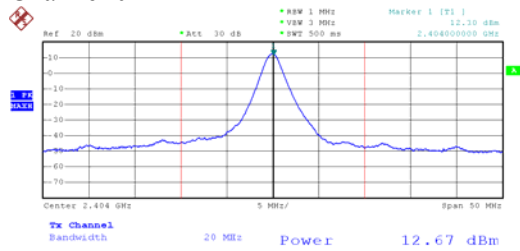
$\pm 1.27$  dB

### 3.5. Test Result of Peak Power Output

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Peak Power Output  
 Test Site : CTR1  
 Test Mode : Mode 1: Transmitter

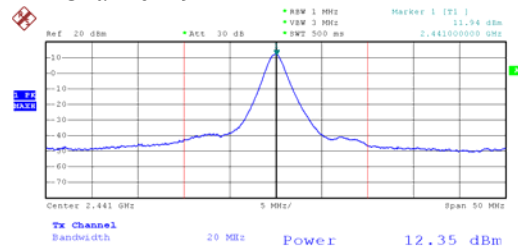
Channel No.	Frequency (MHz)	Measurement	Required Limit	Result
Channel 01	2404.00	12.67dBm	0.125Watt= 20.97dBm	Pass
Channel 19	2440.00	12.35dBm	0.125Watt= 20.97dBm	Pass
Channel 38	2478.00	11.90dBm	0.125Watt= 20.97dBm	Pass

Channel 01



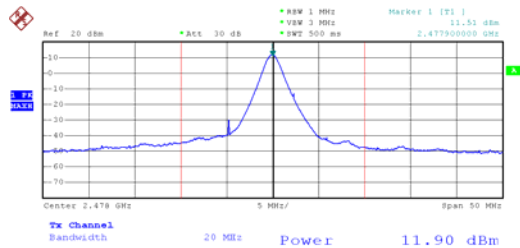
PN1  
 Date: 19.JUL.2007 21:28:36

Channel 19



PN1  
 Date: 19.JUL.2007 21:28:15

Channel 38



PN1  
 Date: 19.JUL.2007 21:29:01

## 4. Radiated Emission

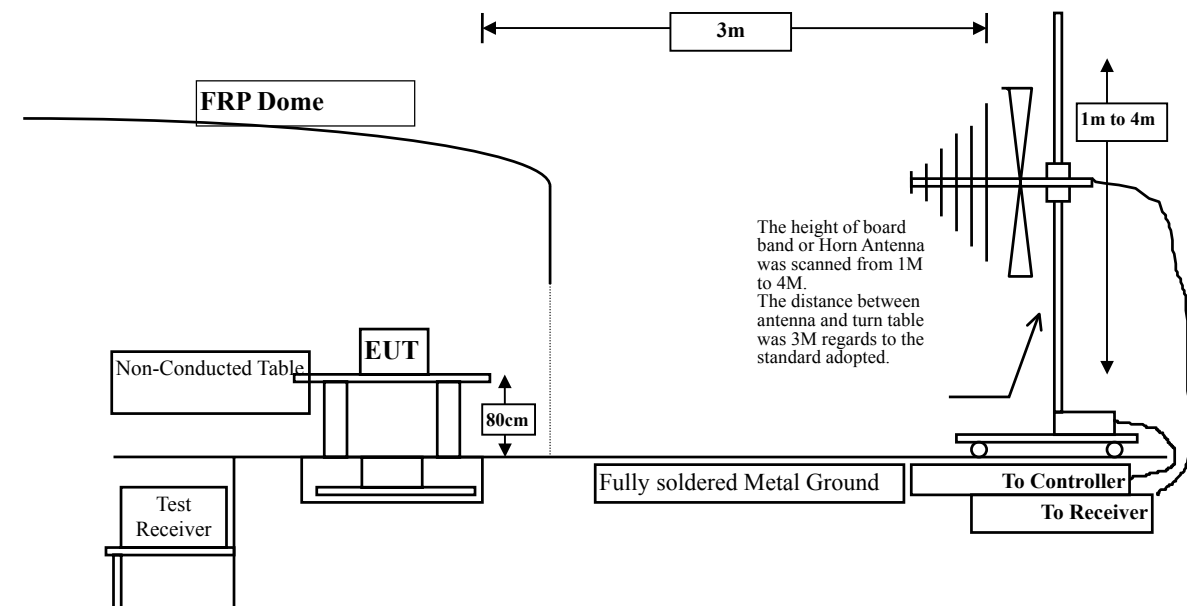
### 4.1. Test Equipment

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
<input type="checkbox"/> Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	May, 2007
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2007
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2007
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2006
<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., 2006
		Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2007
<input checked="" type="checkbox"/> Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
	X	Spectrum Analyzer	Agilent	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

- 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.

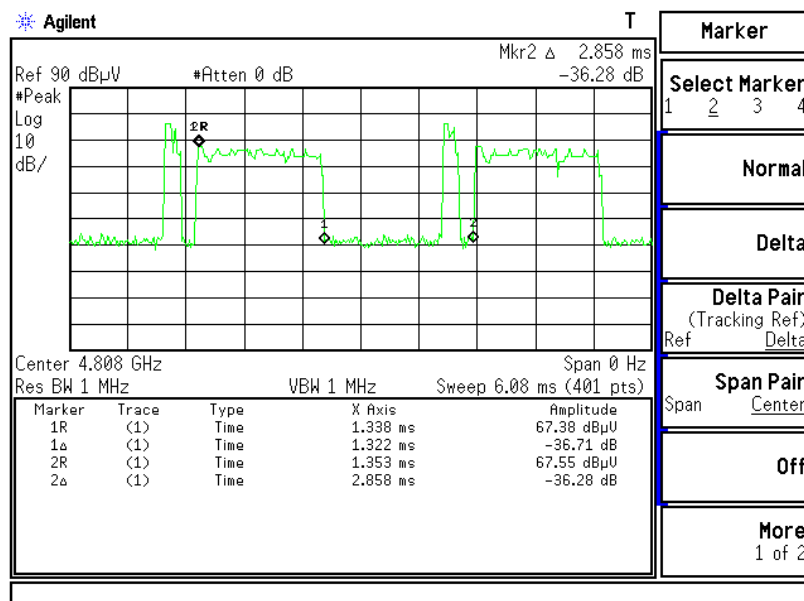
The bandwidth below 1GHz setting on the field strength meter is 120 kHz, above 1GHz are 1 MHz.

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

The average value of the radiated emission is calculated according to the following table from FCC15.35(c).

Average Value= PK+20\*log(duty cycle)

20\*log(duty cycle)=20\*log(1.322ms/2.858ms)= -6.696638dB



This value is used when measuring average field strength above 1 GHz with Peak Detector function employed on spectrum analyzer.

#### 4.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

#### 4.6. Test Result of Radiated Emission

Product : 2.4GHz WIRELESS TRANSMITTER  
Test Item : Harmonic Radiated Emission  
Test Site : No.3 OATS  
Test Mode : Mode 1: Transmitter (Channel 01)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4808.000	3.675	49.891	53.565	-20.435	74.000
7211.875	9.373	43.844	53.216	-20.784	74.000
9615.750	11.836	38.437	50.274	-23.726	74.000
<b>Average Detector:</b>					
4808.000			46.869	-7.131	54.000
7211.875			46.520	-7.480	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4808.000	3.675	53.302	56.976	-17.024	74.000
7212.000	9.373	46.646	56.018	-17.982	74.000
9616.000	11.836	37.816	49.652	-24.348	74.000
<b>Average Detector:</b>					
4808.000			50.280	-3.720	54.000
7212.000			49.322	-4.678	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) : PK+20\*log(duty cycle)=PK-6.696638dB °
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 : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 19)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4882.000	3.921	50.139	54.060	-19.940	74.000
7323.000	9.657	43.683	53.340	-20.660	74.000
9764.000	11.798	38.092	49.890	-24.110	74.000
<b>Average Detector:</b>					
4882.000			47.364	-6.636	54.000
7323.000			46.644	-7.356	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4882.000	3.921	52.969	56.890	-17.110	74.000
7323.000	9.657	45.813	55.470	-18.530	74.000
9764.000	11.798	37.582	49.380	-24.620	74.000
<b>Average Detector:</b>					
4882.000			50.194	-3.806	54.000
7323.000			48.774	-5.226	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) : PK+20\*log(duty cycle)=PK-6.696638dB ◦
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 : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Harmonic Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 38)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4956.000	4.182	49.948	54.130	-19.870	74.000
7434.000	9.939	43.301	53.240	-20.760	74.000
9912.000	11.853	37.827	49.680	-24.320	74.000
<b>Average Detector:</b>					
4956.000			47.434	-6.566	54.000
7434.000			46.544	-7.456	54.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
4956.000	4.182	52.378	56.560	-17.440	74.000
7434.000	9.939	45.421	55.360	-18.640	74.000
9912.000	11.853	37.097	48.950	-25.050	74.000
<b>Average Detector:</b>					
4956.000			49.864	-4.136	54.000
7434.000			48.664	-5.336	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) : PK+20\*log(duty cycle)=PK-6.696638dB °
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 : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : General Radiated Emission  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 19)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
287.050	13.473	21.095	34.568	-11.432	46.000
381.625	15.715	25.766	41.481	-4.519	46.000
478.625	18.930	19.918	38.848	-7.152	46.000
575.625	19.517	17.026	36.543	-9.457	46.000
670.200	20.634	16.897	37.531	-8.469	46.000
859.350	22.396	14.806	37.202	-8.798	46.000
<b>Vertical</b>					
287.050	13.637	17.271	30.908	-15.092	46.000
384.050	16.822	21.728	38.550	-7.450	46.000
478.625	18.643	16.602	35.245	-10.755	46.000
575.625	21.418	11.847	33.265	-12.735	46.000
670.200	20.024	12.639	32.663	-13.337	46.000
956.350	23.291	12.231	35.522	-10.478	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

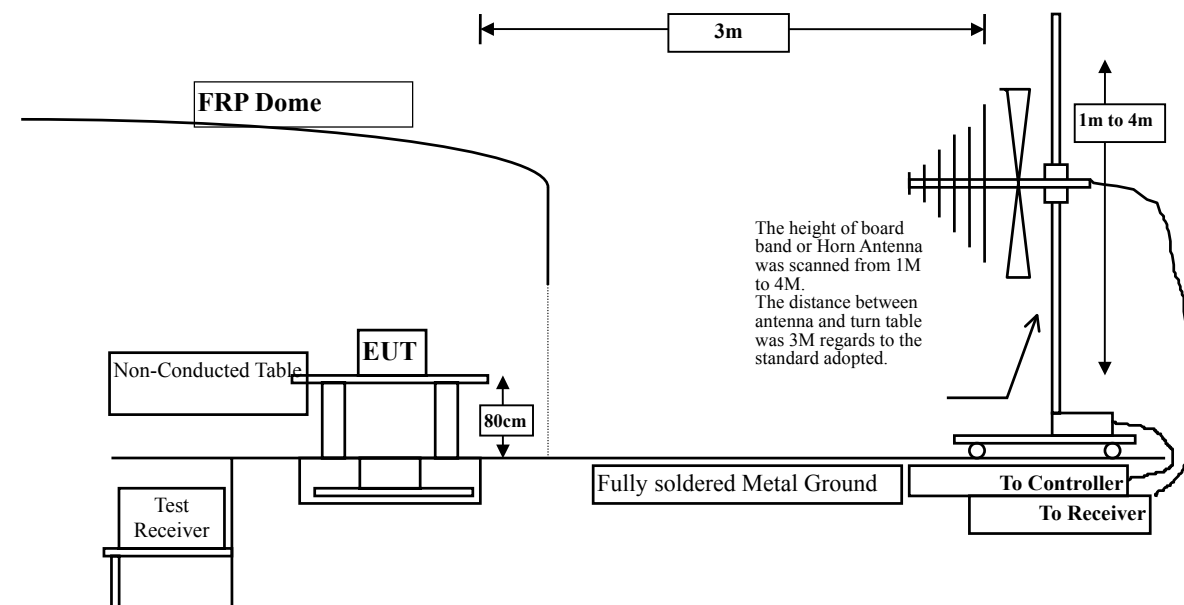
OATS No.3

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2007
X	Spectrum Analyzer	Agilent	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

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.

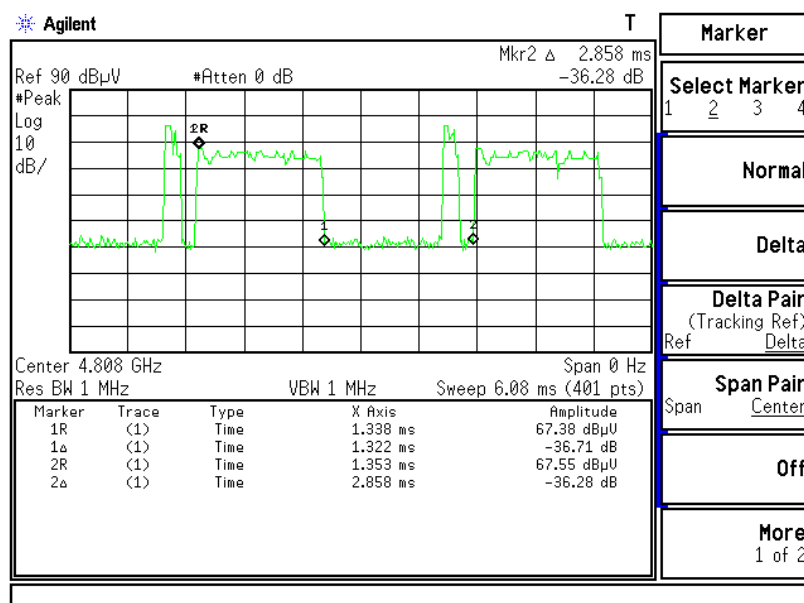
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

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. The average value of the radiated emission is calculated according to the following table from FCC15.35(c).

Average Value= PK+20\*log(duty cycle)

20\*log(duty cycle)=20\*log(1.322ms/2.858ms)= -6.696638dB





### 5.5. Uncertainty

$\pm 3.9$  dB above 1GHz

$\pm 3.8$  dB below 1GHz

## 5.6. Test Result of Band Edge

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 01)

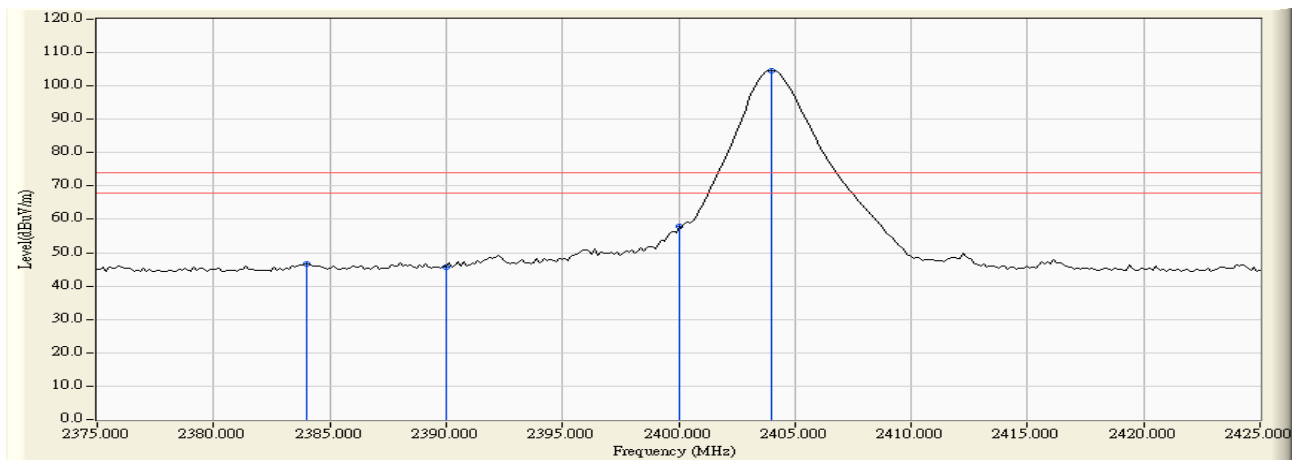
### RF Radiated Measurement:

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
01	<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
01(Peak)	2384.000	-2.407	49.181	46.774	74.00	54.00	Pass
01(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 01: Horizontal (Peak)**



Note:

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

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 01)

**RF Radiated Measurement:**

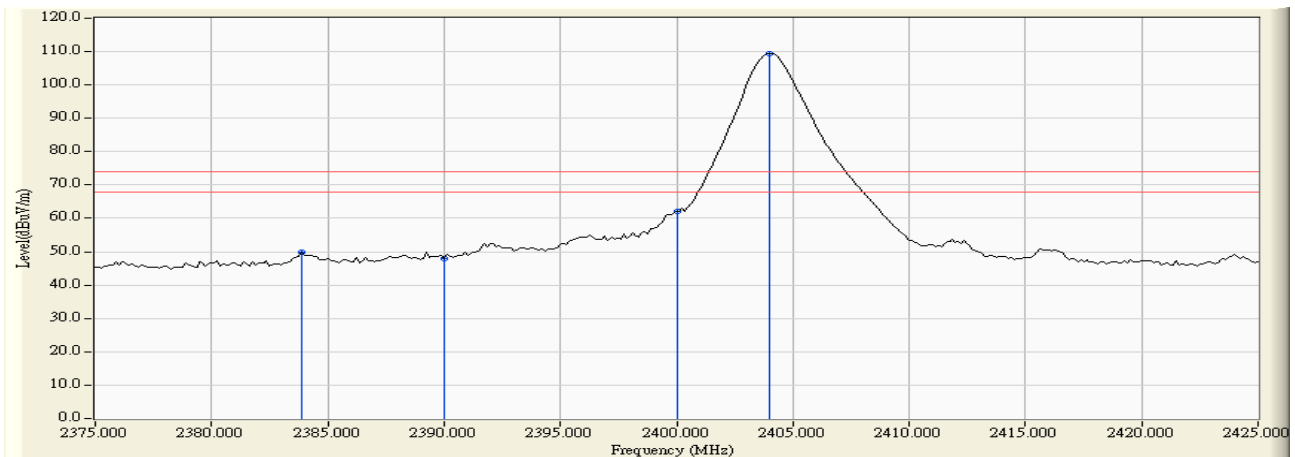
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
01	<2400	>20	Pass

**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
01(Peak)	2383.875	-2.407	52.121	49.714	74.00	54.00	Pass
01(Avg)	--	--	--	--	74.00	54.00	Pass

**Figure Channel 01:**

**Vertical (Peak)**



Note:

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

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 38)

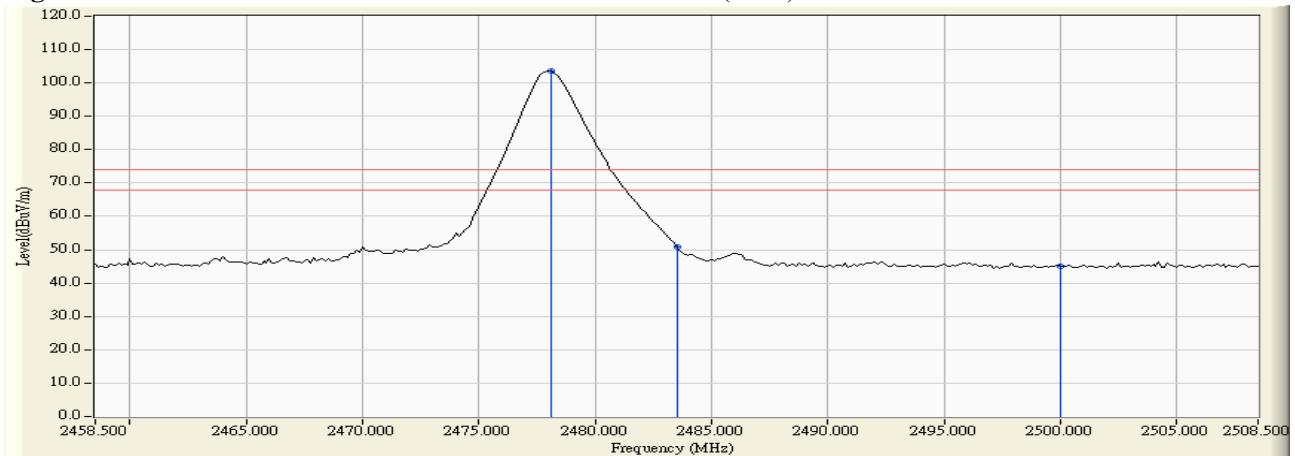
**RF Radiated Measurement:**

Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
38	>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
38(Peak)	2483.500	-1.937	52.801	50.864	74.00	54.00	Pass
38(Avg)					74.00	54.00	Pass

**Figure Channel 38: Horizontal (Peak)**



Note:

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

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Band Edge  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 38)

**RF Radiated Measurement:**

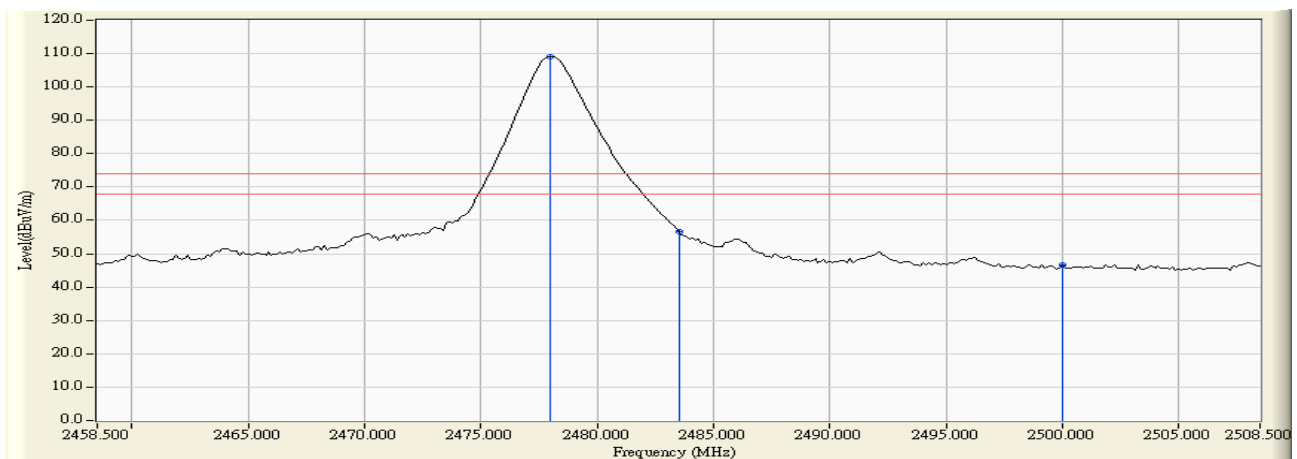
Channel No.	Frequency (MHz)	Required Limit (dBc)	Result
38	>2483.5	>20	Pass

**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
38(Peak)	2483.500	-1.937	58.588	56.651	74.00	54.00	Pass
38(Avg)	2483.500			49.955	74.00	54.00	Pass

**Figure Channel 38:**

**Vertical (Peak)**



Note:

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

AVG Value= PK+20\*log(duty cycle)

20\*log(duty cycle)=20\*log(1.322ms/2.858ms)= -6.696638dB

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.

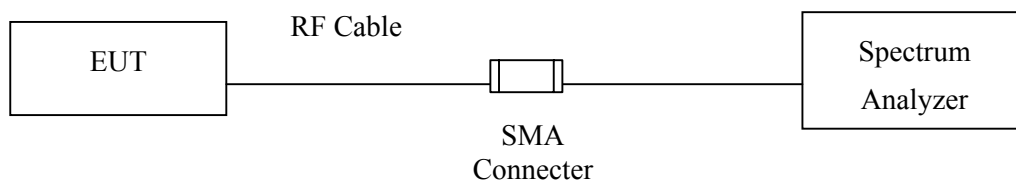
## 6. Channel Number

### 6.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov., 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 in the 2400 - 2483.5 MHz band shall use at least 15 non-overlapping channels.

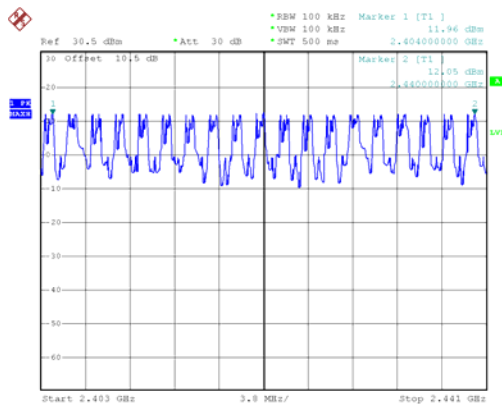
### 6.4. Uncertainty

N/A

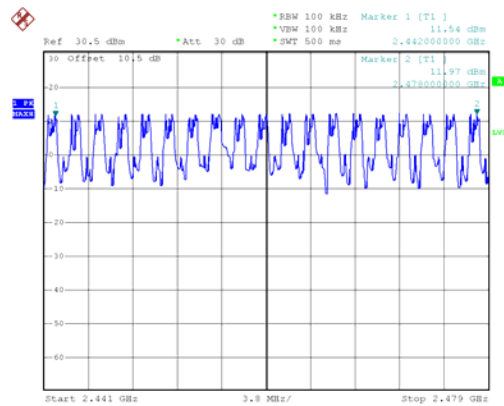
## 6.5. Test Result of Channel Number

Product : 2.4GHz WIRELESS TRANSMITTER  
 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
2404 - 2478	38	>15	Pass



PN1  
 Date: 19.JUL.2007 20:29:19



PN1  
 Date: 19.JUL.2007 20:35:33

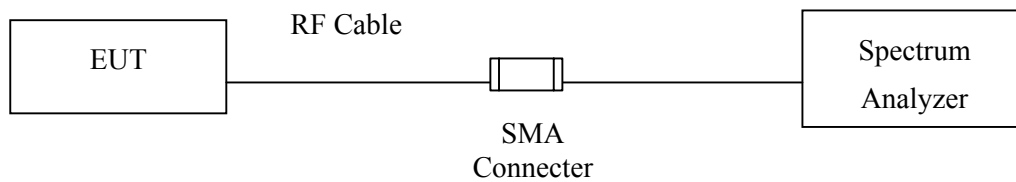
## 7. Channel Separation

### 7.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov., 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.

### 7.4. Uncertainty

$\pm 150\text{Hz}$

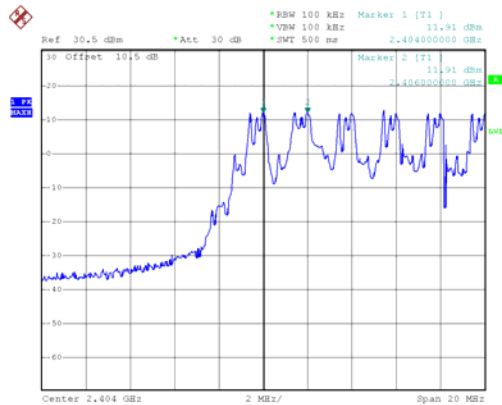


## 7.5. Test Result of Channel Separation

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Channel Separation  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter

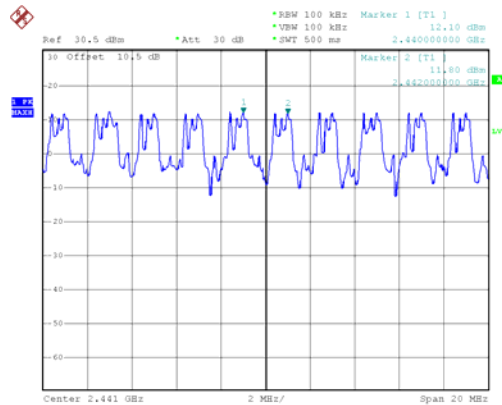
Frequency (MHz)	Measurement Level (MHz)	Required Limit	Result
2404	2.00	>25 kHz or 2/3 * 20 dB BW	Pass
2440	2.00	>25 kHz or 2/3 * 20 dB BW	Pass
2478	2.00	>25 kHz or 2/3 * 20 dB BW	Pass

Channel 01-02



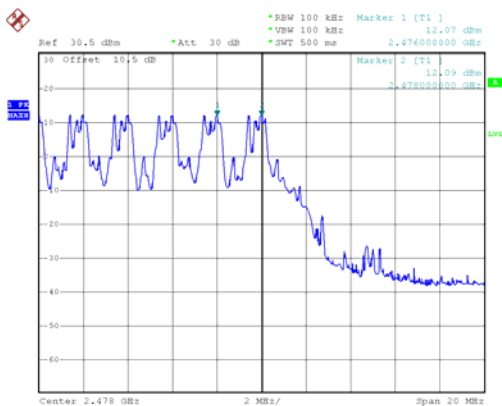
PN1  
 Date: 19.JUL.2007 20:06:25

Channel 19-20



PN1  
 Date: 19.JUL.2007 20:12:29

Channel 37-38



PN1  
 Date: 19.JUL.2007 20:22:41

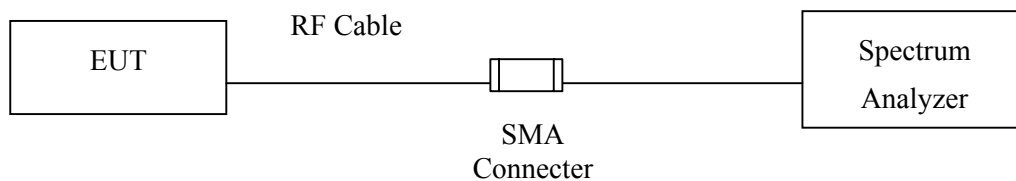
## 8. Dwell Time

### 8.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov., 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

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### 8.4. Uncertainty

± 25msec

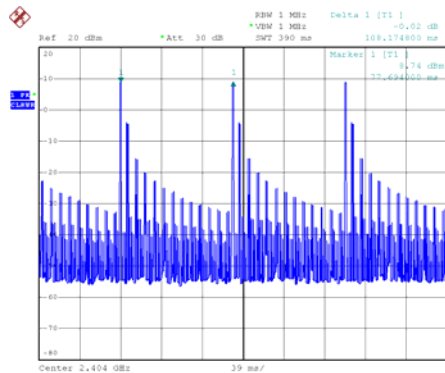
## 8.5. Test Result of Dwell Time

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Dwell Time  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (Channel 01,19,38)

Channel No.	Frequency (MHz)	Time Interval between hops (ms)	Transmission Time (us)	Dwell Time (ms)	Limit (ms)	Result
01	2404	108.175	1314.8	184.747	400	Pass
19	2440	107.595	1314.4	185.686	400	Pass
38	2478	107.469	1310.4	185.338	400	Pass

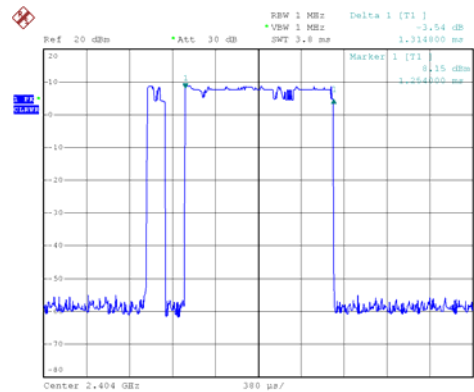
Note: Dwell Time = 38 \* 400ms / Time Interval Between Hops \* Transmission Time / 1000

CH 2404MHz Time Interval between hops



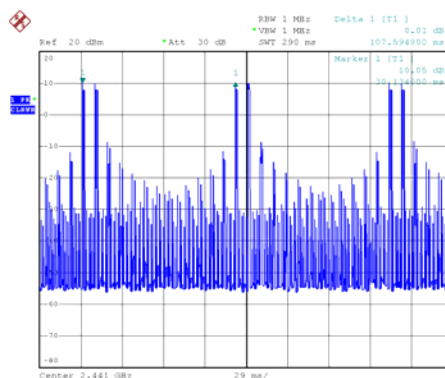
PN1  
 Date: 20.JUL.2007 10:03:32

Transmission Time



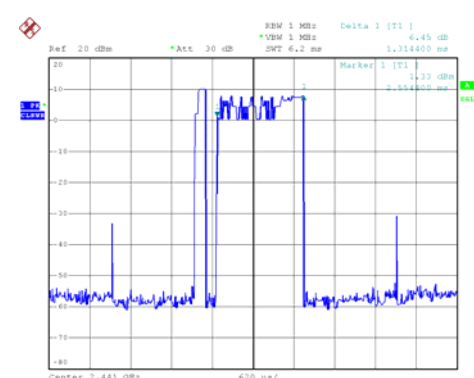
PN1  
 Date: 20.JUL.2007 10:01:39

CH 2440MHz Time Interval between hops



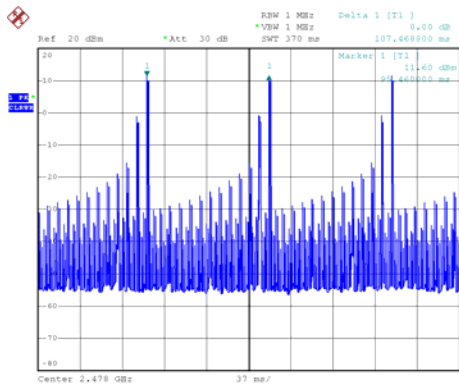
PN1  
 Date: 20.JUL.2007 10:05:06

Transmission Time



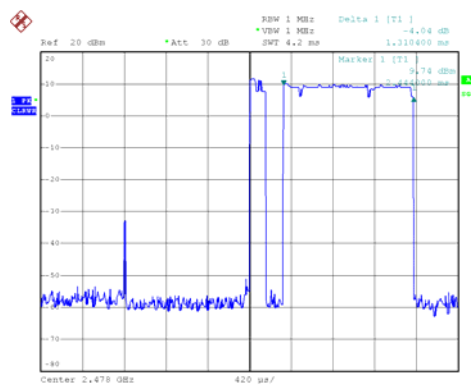
PN1  
 Date: 20.JUL.2007 10:06:33

## CH 2478MHz Time Interval between hops



PN1  
Date: 20.JUL.2007 10:08:47

## Transmission Time



PN1  
Date: 20.JUL.2007 10:13:35

## 9. Occupied Bandwidth

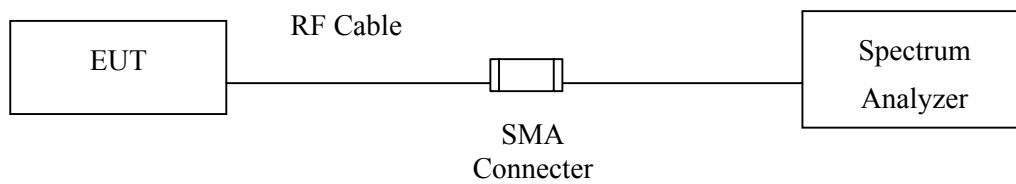
### 9.1. Test Equipment

	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
X	Spectrum Analyzer	R & S	FSP40 / 100170	Nov., 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

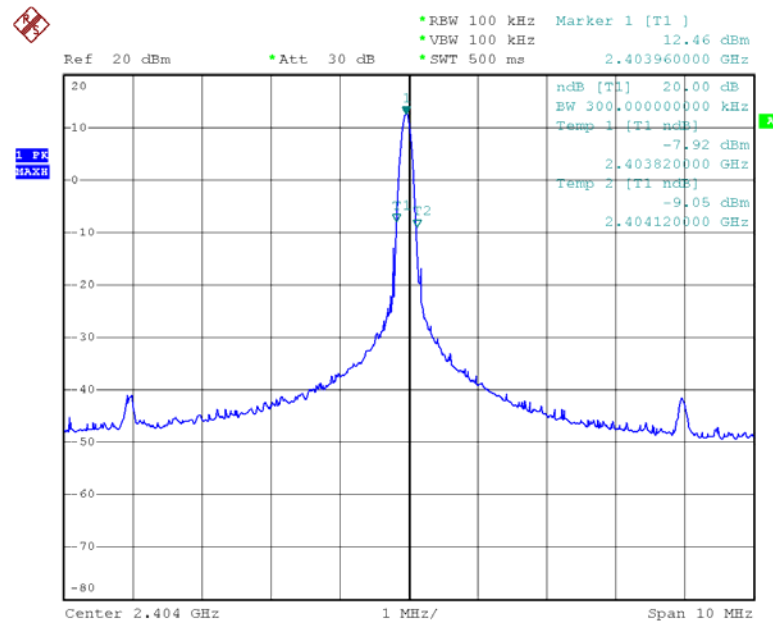
$\pm 150\text{Hz}$

## 9.5. Test Result of Occupied Bandwidth

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2404MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
01	2404	300	--	N/A

Figure Channel 01:



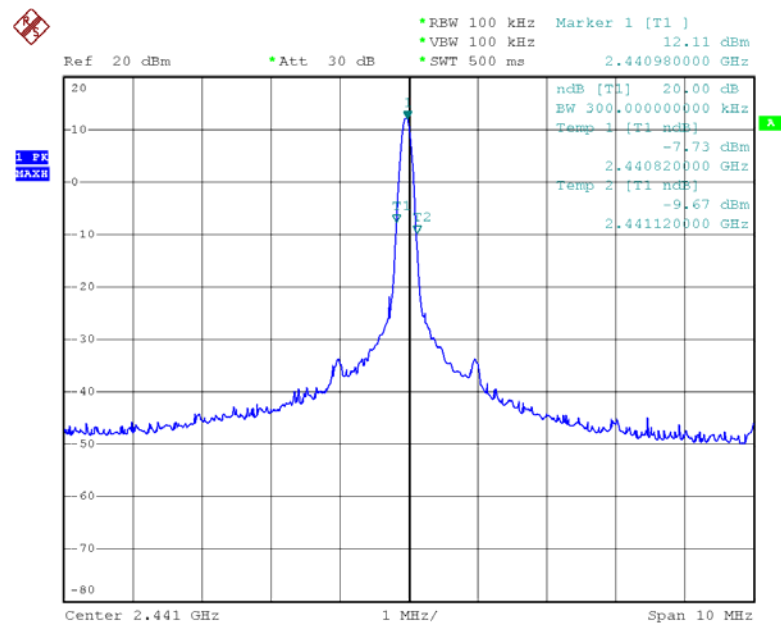
PN1

Date: 19.JUL.2007 21:30:19

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2440MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
19	2440	300	--	N/A

Figure Channel 19:



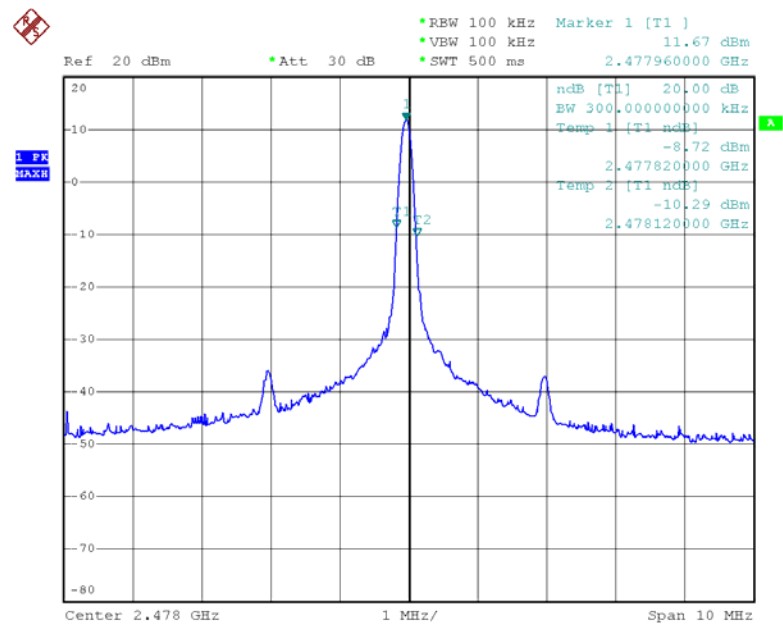
PN1

Date: 19.JUL.2007 21:30:54

Product : 2.4GHz WIRELESS TRANSMITTER  
 Test Item : Occupied Bandwidth Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmitter (2478MHz)

Channel No.	Frequency (MHz)	Measurement Level (kHz)	Required Limit (kHz)	Result
38	2478	300	--	N/A

Figure Channel 38:



PN1

Date: 19.JUL.2007 21:31:32



## **10. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

## Attachment 1: EUT Test Photographs

## Attachment 2: EUT Detailed Photographs