



## Test Report

Product Name	USB Wireless Dongle
Model No.	TWLR2
FCC ID	M35TWLR2

Applicant	UC-Logic Technology Corp.
Address	2F-9, No. 14, Lane 609, Sec. 5, Chung Hsing Rd., San-Chung City, Taipei Hsien, Taiwan, R.O.C.

Date of Receipt	Dec. 23, 2009
Issued Date	Feb. 12, 2010
Report No.	09C418R-RFUSP44V01-A
Report Version	V1.0

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: Feb. 12, 2010

Report No.: 09C418R-RFUSP44V01-A



Product Name	USB Wireless Dongle
Applicant	UC-Logic Technology Corp.
Address	2F-9, No. 14, Lane 609, Sec. 5, Chung Hsing Rd., San-Chung City, Taipei Hsien, Taiwan, R.O.C.
Manufacturer	UC-Logic Technology Corp.
Model No.	TWLR2
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	AC 120V/60Hz
Trade Name	UC-Logic
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2008 ANSI C63.4: 2003
Test Result	Complied



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Documented By :

A handwritten signature in blue ink that appears to read "Rita Huang".

(Engineering Adm. Specialist /  
Rita Huang)

Tested By :

A handwritten signature in blue ink that appears to read "Henk Huang".

(Engineer / Henk Huang)



0914

Approved By :

A handwritten signature in black ink that appears to read "Vincent Lin".

(Manager / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	USB Wireless Dongle
Trade Name	UC-Logic
Model No.	TWLR2
FCC ID	M35TWLR2
Frequency Range	2402~2479MHz
Channel Control	Auto
Channel Separation	1MHz
Antenna Type	Printed on PCB
Channel Number	78
Type of Modulation	MSK

### Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	UC-Logic Technology Corp.	N/A	4.71dBi for 2.4GHz

Note: The antenna of EUT is conform to FCC 15.203

### Frequency of Each Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 1:	2402 MHz	Channel 22:	2423 MHz	Channel 43:	2444 MHz	Channel 64:	2465 MHz
Channel 2:	2403 MHz	Channel 23:	2424 MHz	Channel 44:	2445 MHz	Channel 65:	2466 MHz
Channel 3:	2404 MHz	Channel 24:	2425 MHz	Channel 45:	2446 MHz	Channel 66:	2467 MHz
Channel 4:	2405 MHz	Channel 25:	2426 MHz	Channel 46:	2447 MHz	Channel 67:	2468 MHz
Channel 5:	2406 MHz	Channel 26:	2427 MHz	Channel 47:	2448 MHz	Channel 68:	2469 MHz
Channel 6:	2407 MHz	Channel 27:	2428 MHz	Channel 48:	2449 MHz	Channel 69:	2470 MHz
Channel 7:	2408 MHz	Channel 28:	2429 MHz	Channel 49:	2450 MHz	Channel 70:	2471 MHz
Channel 8:	2409 MHz	Channel 29:	2430 MHz	Channel 50:	2451 MHz	Channel 71:	2472 MHz
Channel 9:	2410 MHz	Channel 30:	2431 MHz	Channel 51:	2452 MHz	Channel 72:	2473 MHz
Channel 10:	2411 MHz	Channel 31:	2432 MHz	Channel 52:	2453 MHz	Channel 73:	2474 MHz
Channel 11:	2412 MHz	Channel 32:	2433 MHz	Channel 53:	2454 MHz	Channel 74:	2475 MHz
Channel 12:	2413 MHz	Channel 33:	2434 MHz	Channel 54:	2455 MHz	Channel 75:	2476 MHz
Channel 13:	2414 MHz	Channel 34:	2435 MHz	Channel 55:	2456 MHz	Channel 76:	2477 MHz
Channel 14:	2415 MHz	Channel 35:	2436 MHz	Channel 56:	2457 MHz	Channel 77:	2478 MHz
Channel 15:	2416 MHz	Channel 36:	2437 MHz	Channel 57:	2458 MHz	Channel 78:	2479 MHz
Channel 16:	2417 MHz	Channel 37:	2438 MHz	Channel 58:	2459 MHz		
Channel 17:	2418 MHz	Channel 38:	2439 MHz	Channel 59:	2460 MHz		
Channel 18:	2419 MHz	Channel 39:	2440 MHz	Channel 60:	2461 MHz		
Channel 19:	2420 MHz	Channel 40:	2441 MHz	Channel 61:	2462 MHz		
Channel 20:	2421 MHz	Channel 41:	2442 MHz	Channel 62:	2463 MHz		
Channel 21:	2422 MHz	Channel 42:	2443 MHz	Channel 63:	2464 MHz		

**Note:**

1. The EUT is a USB Wireless Dongle with a built-in 2.4GHz transceiver.
2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
3. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.249 for spread spectrum devices.
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 USB Wireless Dongle built-in 2.4GHz transceiver. The operation frequency is from 2402 MHz to 2479MHz with MSK modulation. The signal will be transmitted through 2.4 GHz RF signal from the Printed on PCB antenna. DC 5V (Power by USB) shall be provided for EUT operation.

Test Mode	Mode 1: Transmit
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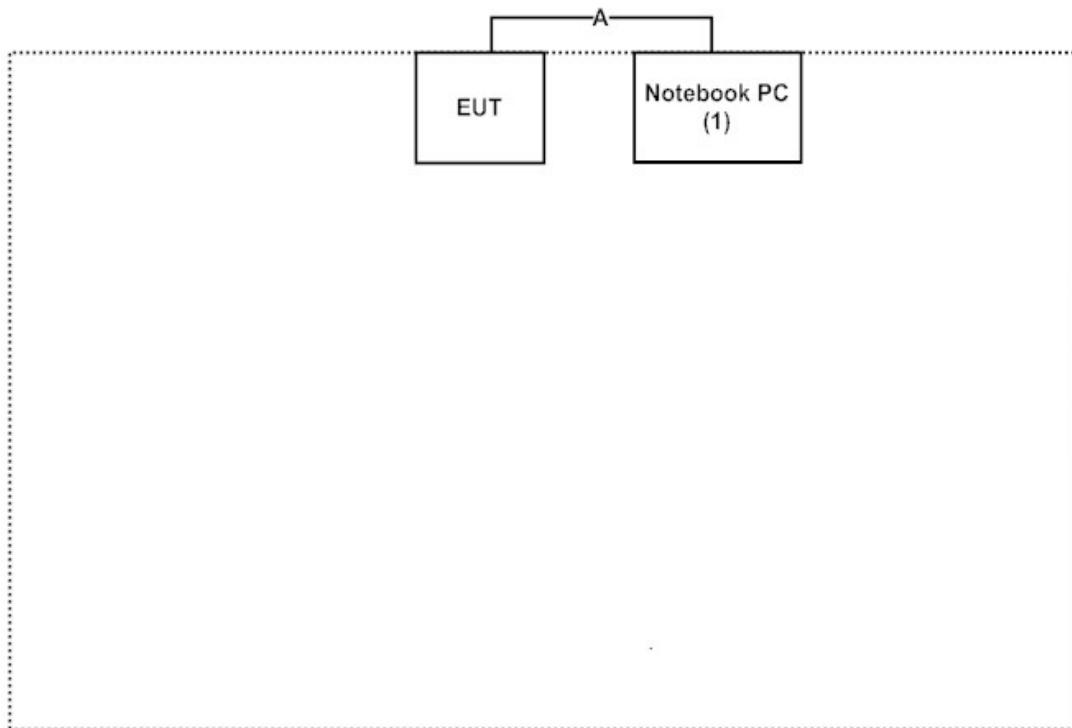
### 1.3. Tested System Details

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.	Power Cord
(1) Notebook PC	DELL	PPT	N/A	Non-Shielded, 0.8m

Signal Cable Type	Signal cable Description
A	USB Cable

### 1.4. Configuration of Test System



### 1.5. EUT Exercise Software

- (1) Setup the EUT as shown in section 1.4
- (2) Provide the DC Power via USB cable by Notebook, start continuous transmit.
- (3) 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	50-65
Barometric pressure (mbar)	860-1060	950-1000

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : <http://tw.quietek.com/tw/emc/accreditations/accreditations.htm>

The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site : <http://www.quietek.com/>

Site Description: File on  
Federal Communications Commission  
FCC Engineering Laboratory  
7435 Oakland Mills Road  
Columbia, MD 21046  
Registration Number: 92195



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

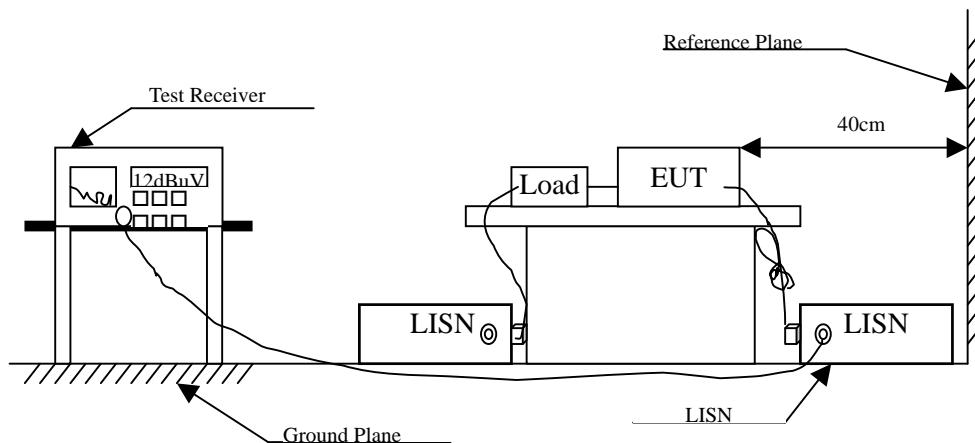
### 2.1. Test Equipment

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, 2009	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2009	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2009	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2009	
5	No.1 Shielded Room				N/A

Note: All instruments 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 : USB Wireless Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 1  
 Test Mode : Mode 1: Transmit (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
<b>Line 1</b>					
<b>Quasi-Peak</b>					
0.212	9.828	38.630	48.458	-15.771	64.229
0.349	9.827	28.050	37.877	-22.437	60.314
0.927	9.830	21.870	31.700	-24.300	56.000
4.451	9.870	25.950	35.820	-20.180	56.000
8.529	9.910	26.970	36.880	-23.120	60.000
25.138	10.240	28.450	38.690	-21.310	60.000
<b>Average</b>					
0.212	9.828	22.680	32.508	-21.721	54.229
0.349	9.827	15.060	24.887	-25.427	50.314
0.927	9.830	11.360	21.190	-24.810	46.000
4.451	9.870	18.210	28.080	-17.920	46.000
8.529	9.910	19.890	29.800	-20.200	50.000
25.138	10.240	22.370	32.610	-17.390	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 : USB Wireless Dongle  
 Test Item : Conducted Emission Test  
 Power Line : Line 2  
 Test Mode : Mode 1: Transmit (2441MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV	dB	dBuV
<b>Line 2</b>					
<b>Quasi-Peak</b>					
0.212	9.860	36.950	46.810	-17.419	64.229
0.349	9.847	27.410	37.257	-23.057	60.314
0.775	9.830	18.670	28.500	-27.500	56.000
3.318	9.860	25.930	35.790	-20.210	56.000
8.517	9.917	27.350	37.267	-22.733	60.000
26.013	10.300	27.960	38.260	-21.740	60.000
<b>Average</b>					
0.212	9.860	20.380	30.240	-23.989	54.229
0.349	9.847	14.660	24.507	-25.807	50.314
0.775	9.830	6.440	16.270	-29.730	46.000
3.318	9.860	14.820	24.680	-21.320	46.000
8.517	9.917	20.380	30.297	-19.703	50.000
26.013	10.300	21.960	32.260	-17.740	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. Radiated Emission

#### 3.1. Test Equipment

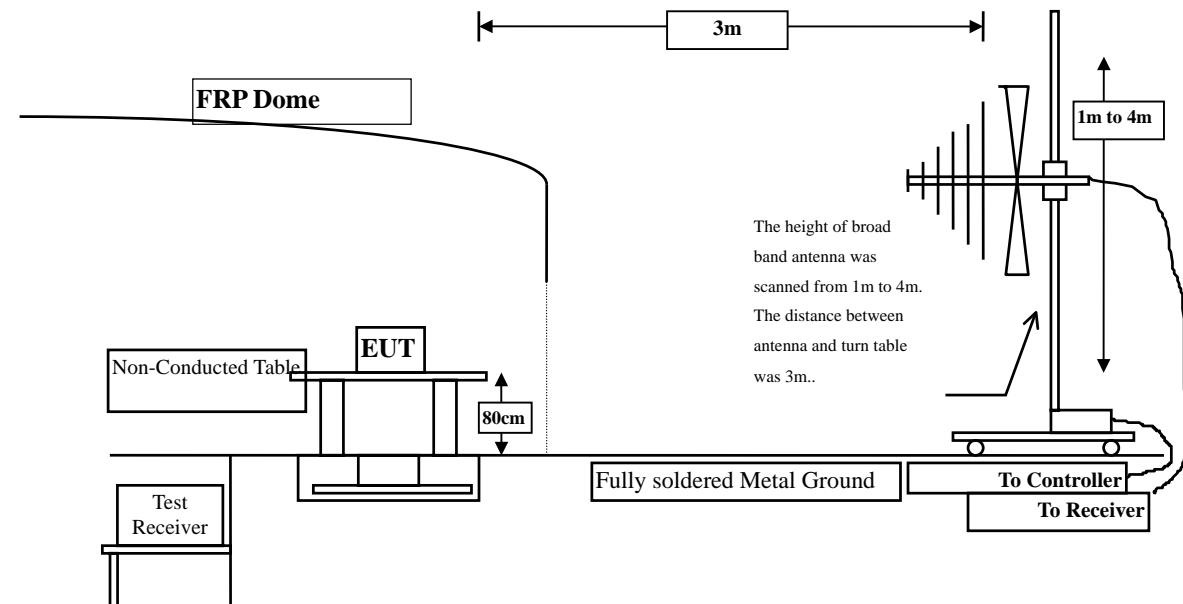
The following test equipment are used during the radiated emission test:

Test Site	Equipment		Manufacturer	Model No./Serial No.	Last Cal.
☒Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X	Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X	Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X	Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

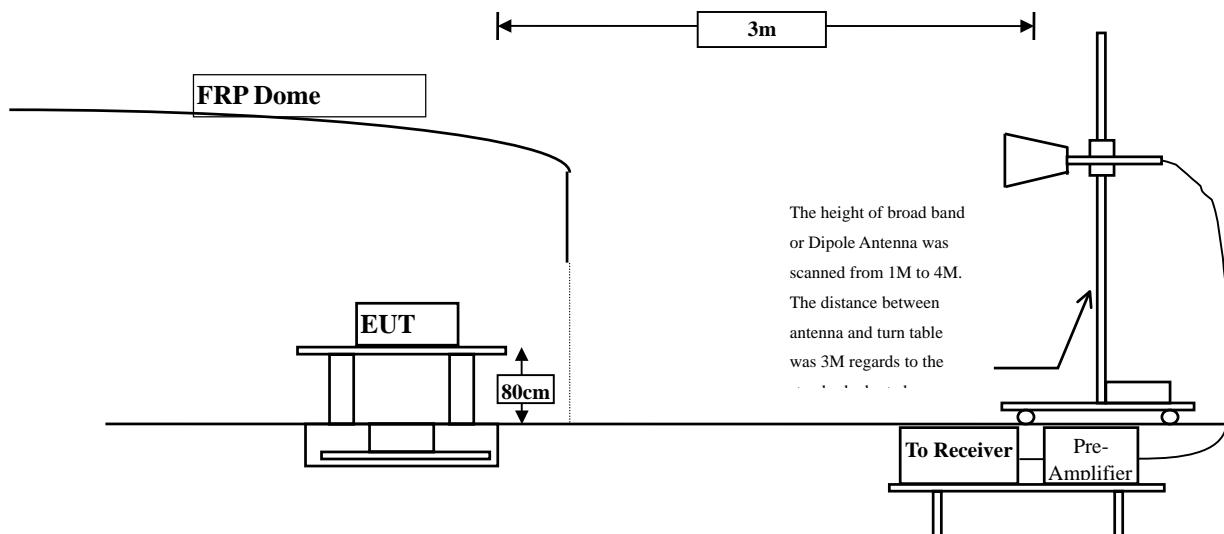
Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.  
2. The test instruments marked with “X” are used to measure the final test results.

### 3.2. Test Setup

#### Radiated Emission Below 1GHz



#### Radiated Emission Above 1GHz



### 3.3. 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(a) 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: E field strength (dBuV/m) = 20 log E field strength (uV/m)

### 3.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Oct 2002 KDB558074 for compliance to FCC 47CFR 15.249 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 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 is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2003 on radiated measurement.

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

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The worst radiated emission is measured on the Final Measurement.

The measurement frequency range from 30MHz - 10th Harmonic of fundamental was investigated.

---

### 3.5. Uncertainty

± 3.9 dB above 1GHz

± 3.8 dB below 1GHz

### 3.6. Test Result of Radiated Emission

Product : USB Wireless Dongle  
Test Item : Fundamental Radiated Emission  
Test Site : No.3OATS  
Test Mode : Mode 1: Transmit (X-Line)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2402.000	36.191	61.110	97.301	-16.699	114.000
2441.000	36.381	60.040	96.421	-17.579	114.000
2479.000	36.669	60.170	96.839	-17.161	114.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
2402.000	35.410	62.160	97.570	-16.430	114.000
2441.000	36.381	61.630	98.011	-15.989	114.000
2479.000	36.349	61.650	97.999	-16.001	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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.

**Average Detector:**

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
------------------	-------------------------------	------------------------------------	--------------------------------	--------------	-----------------

**Horizontal**
**Average Detector:**

2402	97.301	-20.000	77.301	-16.699	94.000
2441	96.421	-20.000	76.421	-17.579	94.000
2479	96.839	-20.000	76.839	-17.161	94.000

**Vertical**
**Average Detector:**

2402	97.570	-20.000	77.570	-16.430	94.000
2441	98.011	-20.000	78.011	-15.989	94.000
2479	97.999	-20.000	77.999	-16.001	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : USB Wireless Dongle  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit (Y-Line)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2402.000	36.191	60.150	96.341	-17.659	114.000
2441.000	36.381	59.220	95.601	-18.399	114.000
2479.000	36.669	59.090	95.759	-18.241	114.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
2402.000	35.410	61.980	97.390	-16.610	114.000
2441.000	35.815	60.700	96.515	-17.485	114.000
2479.000	36.349	60.820	97.169	-16.831	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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.

**Average Detector:**

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Average Detector:</b>					
2402	96.341	-20.000	76.341	-17.659	94.000
2441	95.601	-20.000	75.601	-18.399	94.000
2479	95.759	-20.000	75.759	-18.241	94.000
<b>Vertical</b>					
<b>Average Detector:</b>					
2402	97.390	-20.000	77.390	-16.610	94.000
2441	96.515	-20.000	76.515	-17.485	94.000
2479	97.169	-20.000	77.169	-16.831	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : USB Wireless Dongle  
 Test Item : Fundamental Radiated Emission  
 Test Site : No.3OATS  
 Test Mode : Mode 1: Transmit (Z-Line)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
2402.000	36.191	58.700	94.891	-19.109	114.000
2441.000	36.381	57.740	94.121	-19.879	114.000
2479.000	36.669	57.210	93.879	-20.121	114.000
<b>Vertical</b>					
<b>Peak Detector:</b>					
2402.000	35.410	58.240	93.650	-20.350	114.000
2441.000	36.381	57.390	93.771	-20.229	114.000
2479.000	36.349	56.540	92.889	-21.111	114.000

Note:

1. Measurement Level = Reading Level + Correct Factor.
2. Correct Factor = Antenna Factor + Cable Loss – PreAMP.
3. 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.

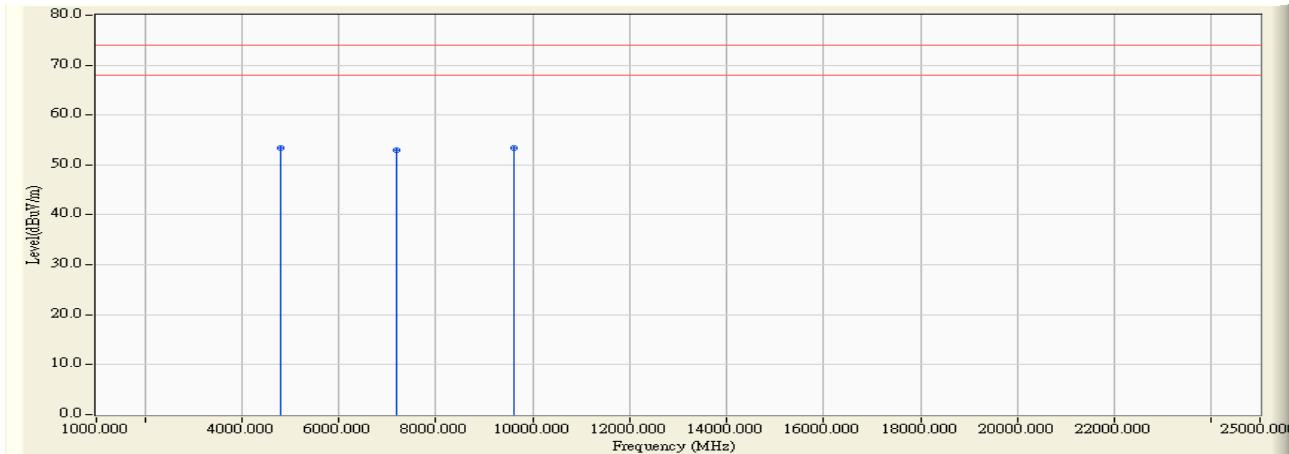
**Average Detector:**

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Average Detector:</b>					
2402	94.891	-20.000	74.891	-19.109	94.000
2441	94.121	-20.000	74.121	-19.879	94.000
2479	93.879	-20.000	73.879	-20.121	94.000
<b>Vertical</b>					
<b>Average Detector:</b>					
2402	93.650	-20.000	73.650	-20.350	94.000
2441	93.771	-20.000	73.771	-20.229	94.000
2479	92.889	-20.000	72.889	-21.111	94.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2402MHz)



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

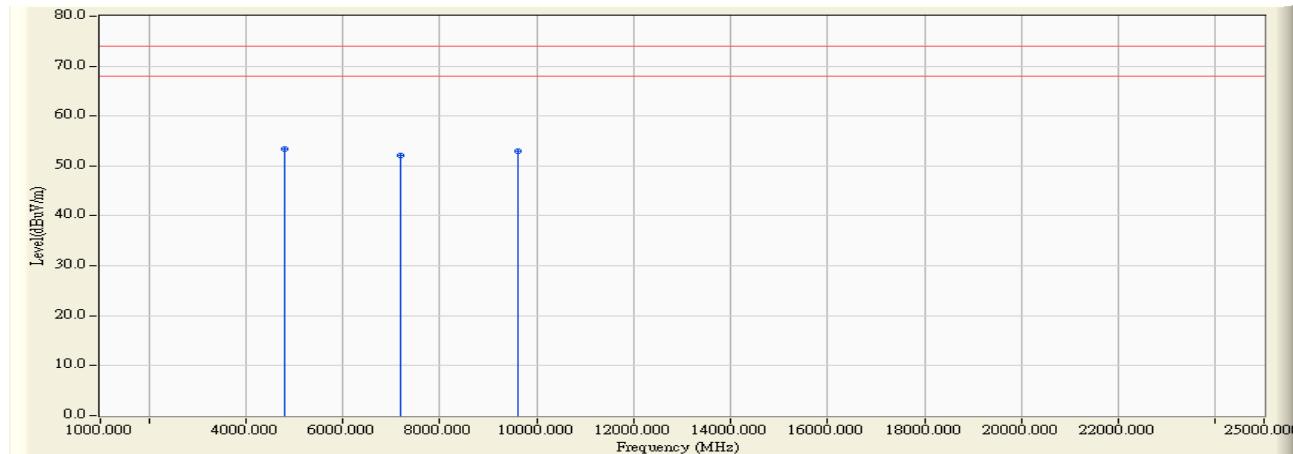
#### Peak Detector:

4804.000	9.612	43.870	53.482	-20.518	74.000
7206.000	14.293	38.640	52.932	-21.068	74.000
9608.000	19.660	33.650	53.310	-20.690	74.000

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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2402MHz)



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

### Vertical

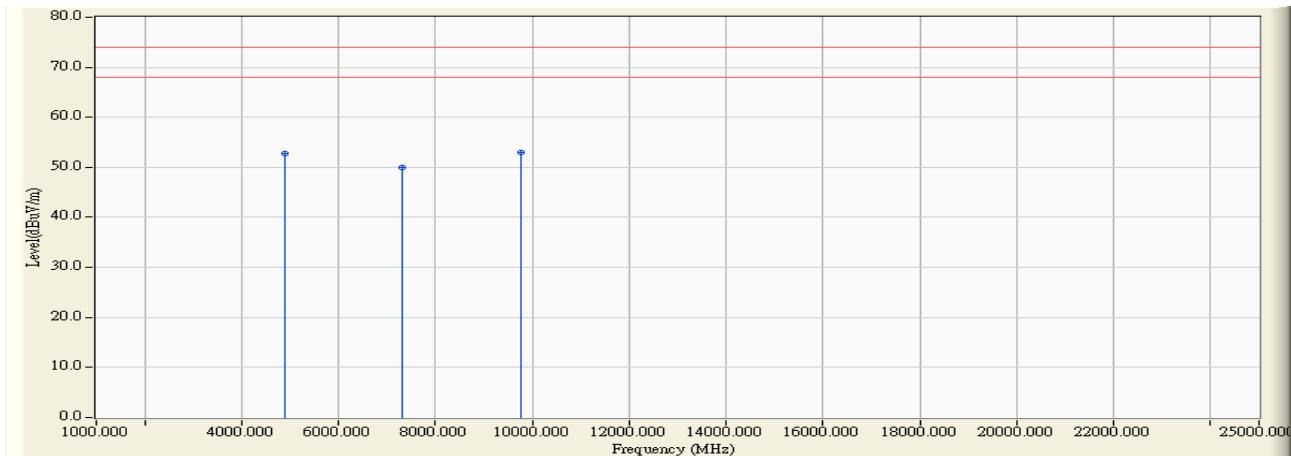
#### Peak Detector:

4804.000	8.330	45.040	53.370	-20.630	74.000
7206.000	15.409	36.750	52.159	-21.841	74.000
9608.000	18.870	34.200	53.070	-20.930	74.000

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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2441 MHz)



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

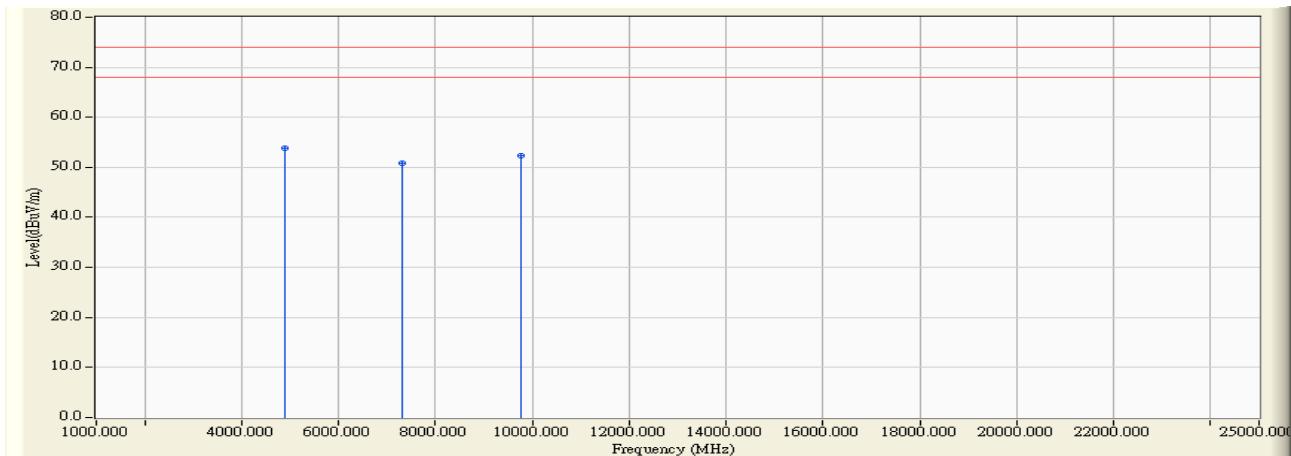
#### Peak Detector:

4882.000	9.489	43.210	52.699	-21.301	74.000
7323.000	14.568	35.450	50.018	-23.982	74.000
9764.000	20.055	33.010	53.065	-20.935	74.000

#### 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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2441MHz)



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

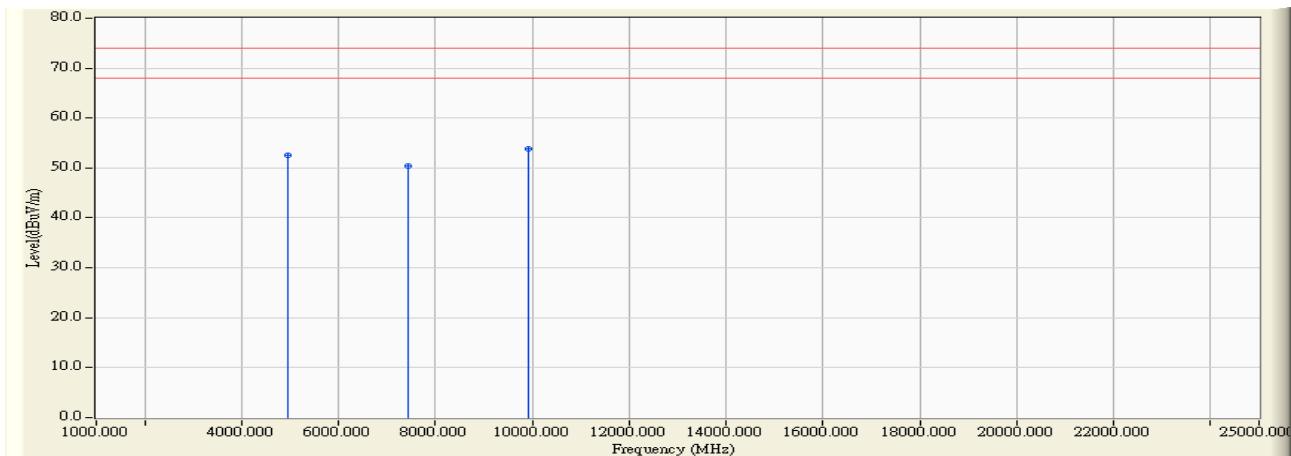
#### Peak Detector:

4882.000	8.979	44.960	53.939	-20.061	74.000
7323.000	15.262	35.510	50.772	-23.228	74.000
9764.000	19.255	33.060	52.315	-21.685	74.000

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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2479 MHz)

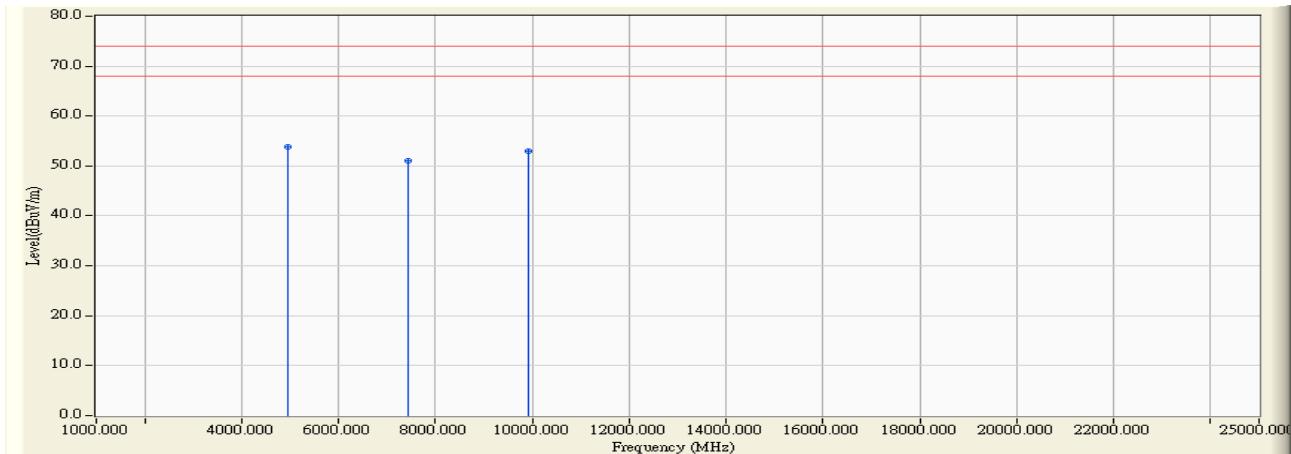


Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Horizontal</b>					
<b>Peak Detector:</b>					
4958.000	9.421	43.210	52.631	-21.369	74.000
7437.000	15.001	35.490	50.491	-23.509	74.000
9916.000	19.756	34.040	53.796	-20.204	74.000

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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : Harmonic Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2479 MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
<b>Vertical</b>					
<b>Peak Detector:</b>					
4958.000	9.699	44.230	53.929	-20.071	74.000
7437.000	15.378	35.610	50.988	-23.012	74.000
9916.000	18.901	34.010	52.911	-21.089	74.000

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. Emission Level = Reading Level + Correct Factor.
4. 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.
5. The emission levels of other frequencies are very lower than the limit and not show in test report.

Product : USB Wireless Dongle  
 Test Item : General Radiated Emission Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit (2441 MHz)

Frequency	Correct Factor	Reading Level	Measurement Level	Margin	Limit
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
<b>Horizontal</b>					
95.960	-8.102	40.466	32.364	-11.136	43.500
191.020	-10.541	50.107	39.566	-3.934	43.500
396.660	-2.837	40.029	37.191	-8.809	46.000
565.440	1.097	27.799	28.896	-17.104	46.000
745.860	2.793	26.211	29.005	-16.995	46.000
932.100	6.430	23.003	29.433	-16.567	46.000
<b>Vertical</b>					
105.660	-0.627	38.026	37.400	-6.100	43.500
191.020	-10.921	50.415	39.494	-4.006	43.500
398.600	-5.201	32.967	27.766	-18.234	46.000
532.460	-1.092	28.389	27.297	-18.703	46.000
796.300	2.453	25.841	28.294	-17.706	46.000
967.020	7.541	26.653	34.194	-19.806	54.000

**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.

## 4. Band Edge

### 4.1. Test Equipment

#### RF Conducted Measurement

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
2. The test instruments marked with “X” are used to measure the final test results.

#### RF Radiated Measurement:

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

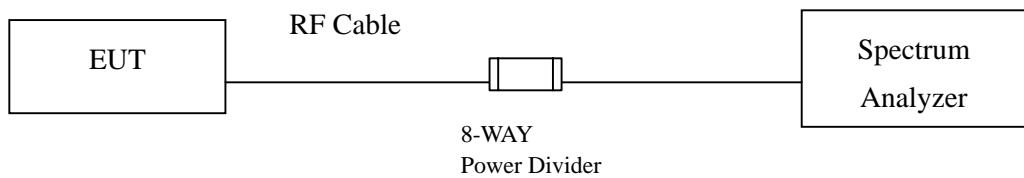
Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2009
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2009
	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2009
	X Pre-Amplifier	Agilent	8447D/2944A09549	Sep., 2009
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2009
	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2009
	X Coaxial Cable	QuieTek	QTK-CABLE/ CAB5	Feb., 2010
	X Controller	QuieTek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

Note:

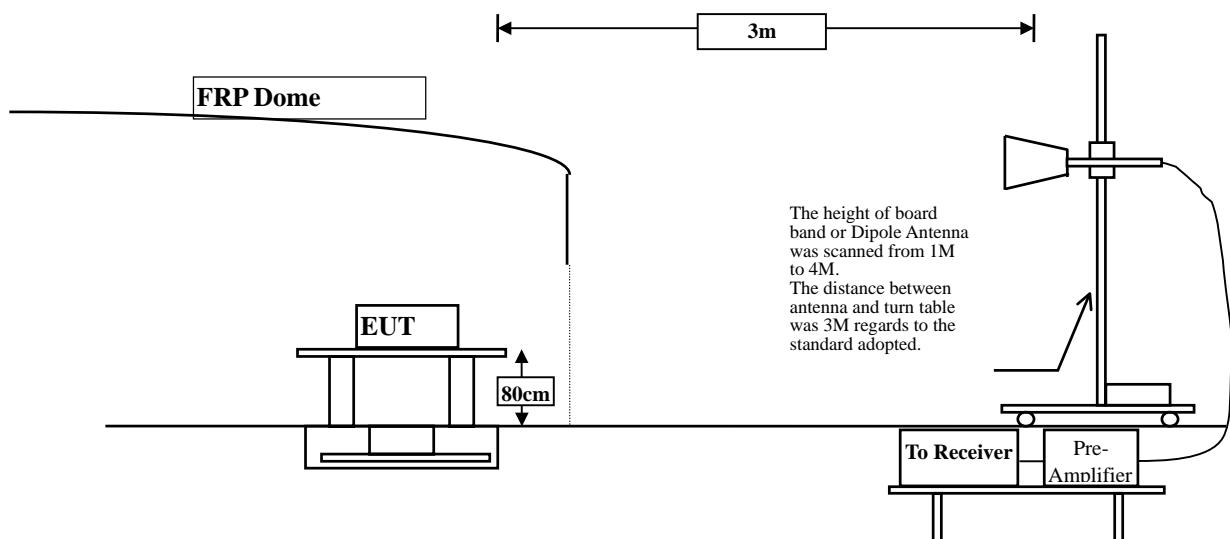
1. All equipments are calibrated every one year.
2. The test equipments marked by “X” are used to measure the final test results.

## 4.2. Test Setup

### RF Conducted Measurement



### RF Radiated Measurement:



### **4.3. Limits**

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)).

### **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 bandwidth setting below 1GHz and above 1GHz on the field strength meter is 120 kHz and 1MHz, respectively.

### **4.5. Uncertainty**

Conducted is  $\pm$  1.27 dB

Radiated is  $\pm$  3.9 dB

#### 4.6. Test Result of Band Edge

Product : USB Wireless Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

#### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dBuV]	Emission Level [dBuV/m]	Detector
Horizontal	2402	36.191	61.11	97.301	Peak
Vertical	2402	35.410	62.16	97.570	Peak

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

#### Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2400	97.301	28.766	68.535	Peak
Vertical	2400	97.570	28.766	68.804	Peak

#### Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$

F = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

**Average Detector:**

Frequency	Peak Measurement	Duty Cycle	Measurement	Margin	Limit	Result
MHz	dBuV/m	Factor	Level	dB	dBuV/m	Pass

**Horizontal**
**Average Detector:**

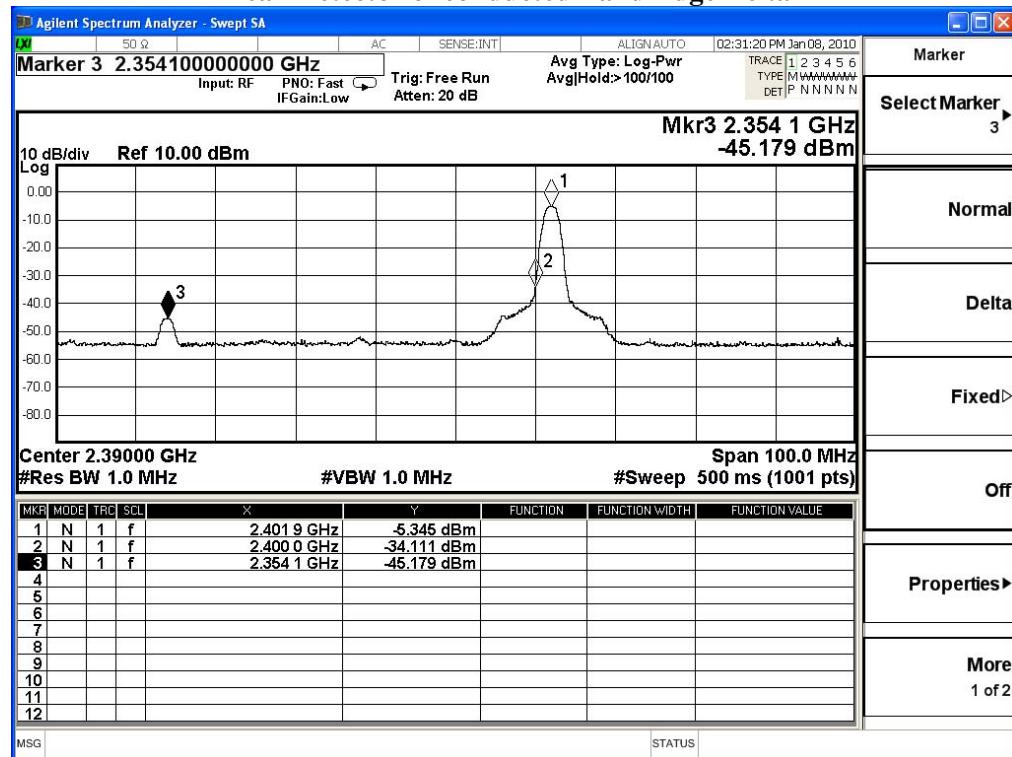
2400	68.535	-20.000	48.535	-5.465	54.000	Pass
------	--------	---------	--------	--------	--------	------

**Vertical**
**Average Detector:**

2400	68.804	-20.000	48.804	-5.196	54.000	Pass
------	--------	---------	--------	--------	--------	------

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle
2. The Duty Cycle is refer to section 5.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

**Peak Detector of conducted Band Edge Delta**


Product : USB Wireless Dongle  
 Test Item : Band Edge Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit

### Fundamental Filed Strength

Antenna Pole	Frequency [MHz]	Correction Factor [dB/m]	Reading Level [dB(uV)]	Emission Level [dB(uV/m)]	Detector
Horizontal	2479	36.669	60.17	96.839	Peak
Vertical	2479	36.349	61.65	97.999	Peak

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

### Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	$\Delta$ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	96.839	39.571	57.268	Peak
Vertical	2483.5	97.999	39.571	58.428	Peak

#### Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength =  $F - \Delta$

$F$  = Fundamental field Strength (Peak or Average)

$\Delta$  = Conducted Band Edge Delta (Peak or Average)

**Average Detector:**

Frequency	Peak Measurement	Duty Cycle	Measurement	Margin	Limit	Result
MHz	dBuV/m	Factor	Level	dB	dBuV/m	Pass

**Horizontal**
**Average Detector:**

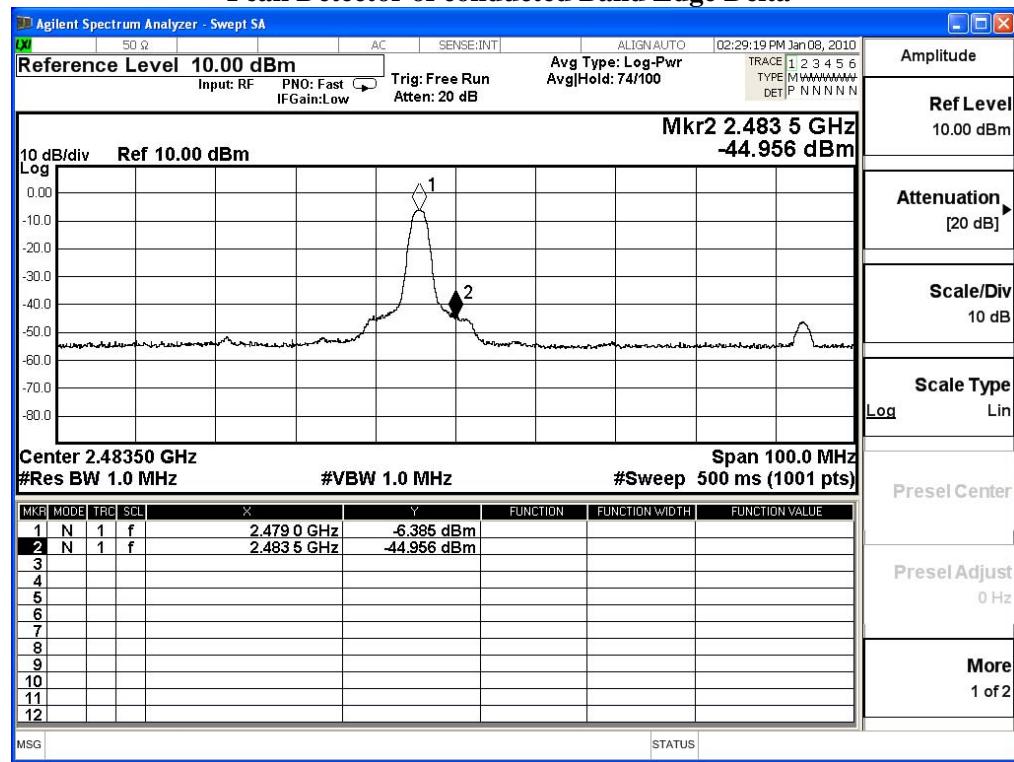
2483.5	57.268	-20.000	37.268	-16.732	54.000	Pass
--------	--------	---------	--------	---------	--------	------

**Vertical**
**Average Detector:**

2483.5	58.428	-20.000	38.428	-15.572	54.000	Pass
--------	--------	---------	--------	---------	--------	------

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle
2. The Duty Cycle is refer to section 5.
3. If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

**Peak Detector of conducted Band Edge Delta**


## 5. Duty Cycle

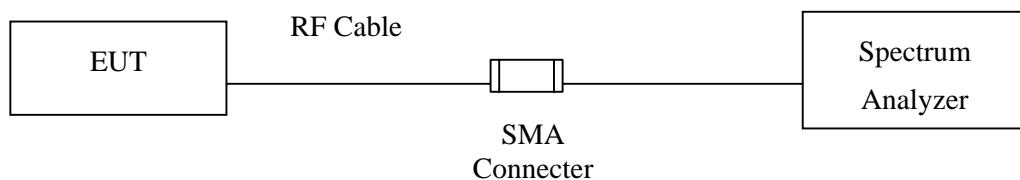
### 5.1. Test Equipment

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

Equipment	Manufacturer	Model No./Serial No.	Last Cal.
Spectrum Analyzer	R&S	FSP40 / 100170	Jun, 2009
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2009
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2009

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

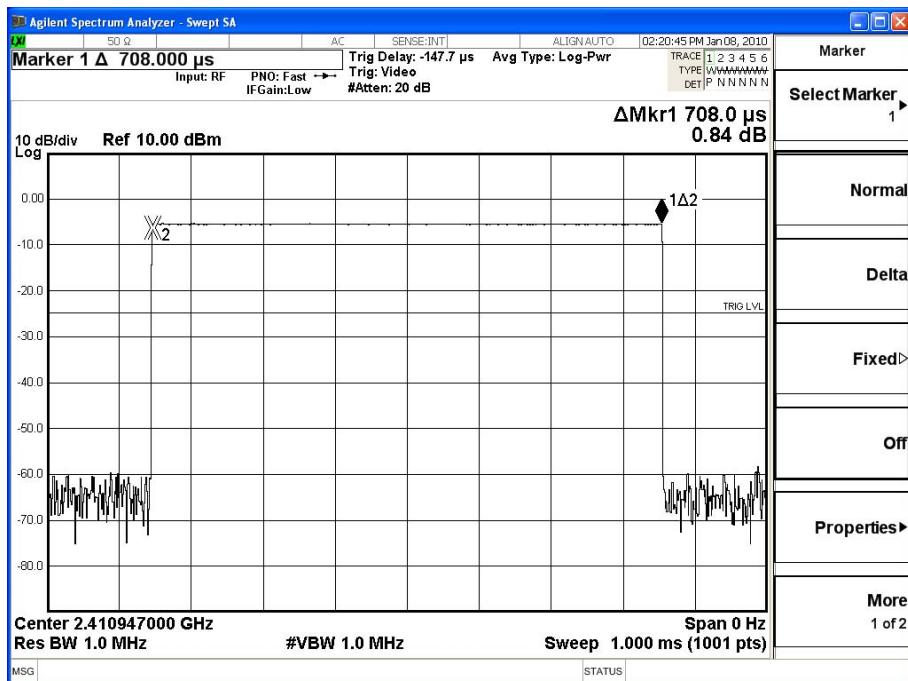
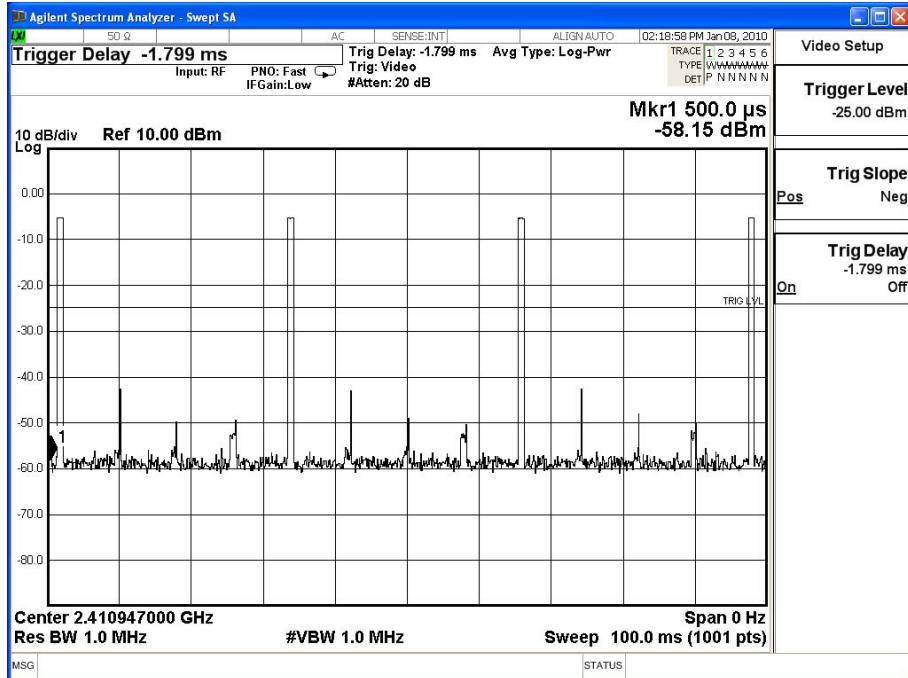


### 5.3. Uncertainty

± 150Hz

## 5.4. Test Result of Duty Cycle

Product : USB Wireless Dongle  
 Test Item : Duty Cycle Data  
 Test Site : No.3 OATS  
 Test Mode : Mode 1: Transmit



Time on of 100ms=  $708\mu\text{s} \times 13 = 9.204 \text{ ms}$

Duty Cycle=  $9.204\text{ms} / 100\text{ms} = 0.09204$

Duty Cycle correction factor=  $20 \log 0.09204 = -20.720 \text{ dB}$

<b>Duty Cycle correction factor</b>	<b>-20.000</b>	<b>dB</b>
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Remark:

If Duty Cycle is smaller than -20dB,based on FCC part15 the duty cycle correction factor is -20dB for calculating average emission.

**6. EMI Reduction Method During Compliance Testing**

No modification was made during testing.

Attachment 1: EUT Test Photographs

## Attachment 2: EUT Detailed Photographs