



Test Report

Product Name	USB wireless transmitter
Model No.	HS-W1 USB dongle
FCC ID	MSQ-HSW1USB

Applicant	ASUSTeK COMPUTER INC.
Address	No. 15, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.

Date of Receipt	Oct. 24, 2011
Issued Date	Nov. 11, 2011
Report No.	11A353R-RFUSP37V02
Report Version	V1.0

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: Nov. 11, 2011

Report No.: 11A353R-RFUSP37V02



Product Name	USB wireless transmitter	
Applicant	ASUSTeK COMPUTER INC.	
Address	No. 15, Li-Te Rd., Peitou, Taipei, Taiwan, R.O.C.	
Manufacturer	Merry Electronics (Shenzhen) CO., LTD.	
Model No.	HS-W1 USB dongle	
EUT Rated Voltage	DC 5V (Power by USB)	
EUT Test Voltage	AC 120V/ 60Hz	
Trade Name	ASUS	
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2010 ANSI C63.4: 2009	 NVLAP Lab Code: 200533-0
Test Result	Complied	

Test results relate only to the samples tested.

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

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

Documented By : Jinn Chen
(Senior Adm. Specialist / Jinn Chen)



Tested By : Henk Huang
(Assistant Engineer / Henk Huang)



Approved By : Vincent Lin
(Manager / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION.....	4
1.1. EUT Description.....	4
1.2. Operational Description	5
1.3. Tested System Details.....	6
1.4. Configuration of Test System.....	6
1.5. EUT Exercise Software	7
1.6. Test Facility	8
2. Conducted Emission.....	9
2.1. Test Equipment.....	9
2.2. Test Setup	9
2.3. Limits	10
2.4. Test Procedure	10
2.5. Uncertainty	10
2.6. Test Result of Conducted Emission.....	11
3. Radiated Emission.....	13
3.1. Test Equipment.....	13
3.2. Test Setup	14
3.3. Limits	15
3.4. Test Procedure	15
3.5. Uncertainty	16
3.6. Test Result of Radiated Emission.....	17
4. Band Edge	36
4.1. Test Equipment.....	36
4.2. Test Setup	37
4.3. Limits	38
4.4. Test Procedure	38
4.5. Uncertainty	38
4.6. Test Result of Band Edge	39
5. Duty Cycle.....	43
5.1. Test Equipment.....	43
5.2. Test Setup	43
5.3. Uncertainty	43
5.4. Test Result of Duty Cycle.....	44
6. EMI Reduction Method During Compliance Testing	46
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	USB wireless transmitter
Trade Name	ASUS
Model No.	HS-W1 USB dongle
FCC ID	MSQ-HSW1USB
Frequency Range	2404~2476MHz
Channel Control	Auto
Channel Separation	3MHz
Antenna Type	Printed on PCB
Channel Number	25
Type of Modulation	GFSK

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	MERRY	N/A	0.11dBi for 2.4 GHz

Note: The antenna of EUT is conform to FCC 15.203

Frequency of Each Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
Channel 01:	2404 MHz	Channel 02:	2407 MHz	Channel 03:	2410 MHz	Channel 04:	2413 MHz
Channel 05:	2416 MHz	Channel 06:	2419 MHz	Channel 07:	2422MHz	Channel 08:	2425 MHz
Channel 09:	2428 MHz	Channel 10:	2431 MHz	Channel 11:	2434MHz	Channel 12:	2437 MHz
Channel 13:	2440 MHz	Channel 14:	2443 MHz	Channel 15:	2446 MHz	Channel 16:	2449 MHz
Channel 17:	2452 MHz	Channel 18:	2455 MHz	Channel 19:	2458 MHz	Channel 20:	2461 MHz
Channel 21:	2464 MHz	Channel 22:	2467 MHz	Channel 23:	2470 MHz	Channel 24:	2473 MHz
Channel 25:	2476 MHz						

Note:

1. The EUT is a USB wireless transmitter 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. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.
4. 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.

Test Mode	Mode 1: Transmit
-----------	------------------

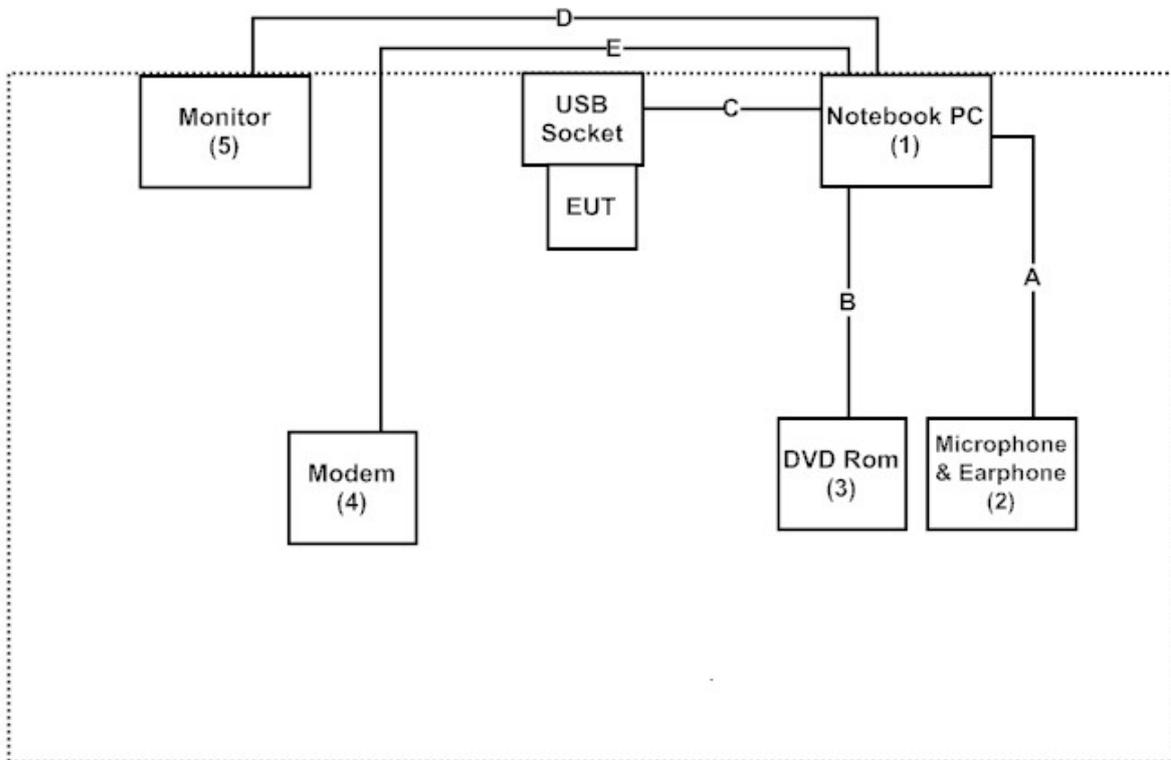
1.3. Tested System Details

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
2	Microphone & Earphone	Ergotech	ET-E201	N/A	N/A
3	DVD Rom	N/A	N/A	N/A	N/A
4	Modem	ACEEX	DM-1414	0102027558	Non-Shielded, 1.8m
5	Monitor	LG	W2261VT	907YHPB07296	Non-Shielded, 1.8m

Signal Cable Type	Signal cable Description
A	Microphone & Earphone Cable
B	USB Cable
C	USB Cable
D	VGA Cable
E	Modem Cable

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute “HyperTerminal.exe” on the Notebook.
- (3) Configure the test mode and the test channel.
- (4) Start the continuous Transmit.
- (5) Verify that the EUT works 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	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://www.quietek.com/tw/ctg/cts/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, Ruishukeng, Linkou Dist.,
 New Taipei City 24451,
 Taiwan, R.O.C
 TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789
 E-Mail : service@quietek.com

FCC Accreditation Number: TW1014



2. Conducted Emission

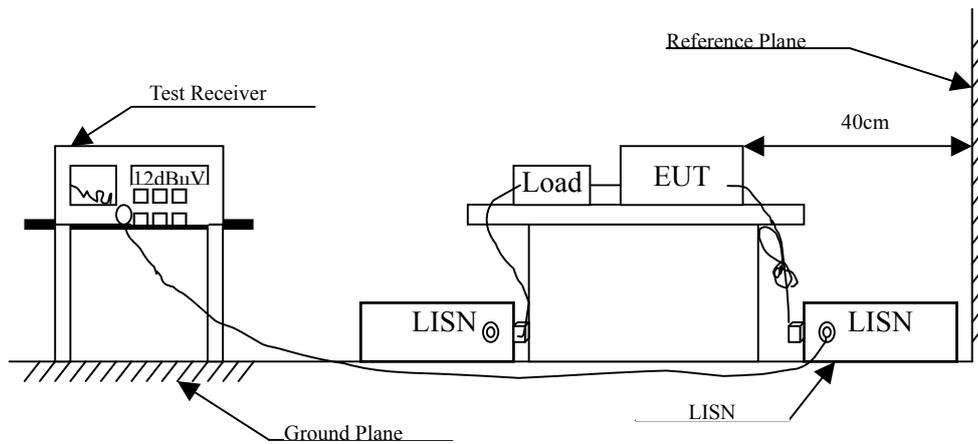
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2011	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2011	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2011	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2011	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2011	
	No.1 Shielded Room				

Note:

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

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: 2009 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 transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 1					
Quasi-Peak					
0.170	9.717	22.620	32.337	-33.092	65.429
0.193	9.701	15.060	24.761	-40.010	64.771
0.224	9.680	14.300	23.980	-39.906	63.886
0.670	9.650	16.940	26.590	-29.410	56.000
2.923	9.700	12.040	21.740	-34.260	56.000
17.127	9.900	18.220	28.120	-31.880	60.000
Average					
0.170	9.717	19.740	29.457	-25.972	55.429
0.193	9.701	-0.520	9.181	-45.590	54.771
0.224	9.680	-1.470	8.210	-45.676	53.886
0.670	9.650	13.750	23.400	-22.600	46.000
2.923	9.700	12.030	21.730	-24.270	46.000
17.127	9.900	7.950	17.850	-32.150	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 transmitter
 Test Item : Conducted Emission Test
 Power Line : Line 2
 Test Mode : Mode 1: Transmit

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
Line 2					
Quasi-Peak					
0.166	9.720	23.240	32.960	-32.583	65.543
0.201	9.696	16.540	26.236	-38.307	64.543
0.447	9.650	13.080	22.730	-34.784	57.514
0.588	9.650	19.180	28.830	-27.170	56.000
2.845	9.700	16.000	25.700	-30.300	56.000
22.658	10.150	19.400	29.550	-30.450	60.000
Average					
0.166	9.720	19.920	29.640	-25.903	55.543
0.201	9.696	-4.530	5.166	-49.377	54.543
0.447	9.650	3.780	13.430	-34.084	47.514
0.588	9.650	17.350	27.000	-19.000	46.000
2.845	9.700	11.750	21.450	-24.550	46.000
22.658	10.150	10.140	20.290	-29.710	50.000

Note:

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

3. Radiated Emission

3.1. Test Equipment

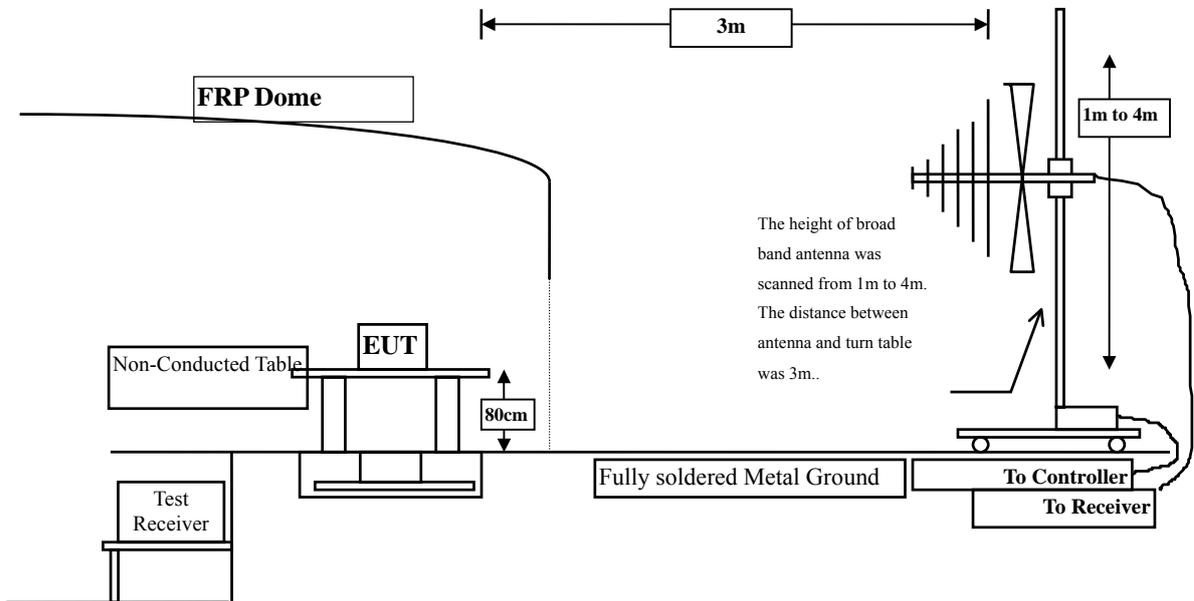
The following test equipment are used during the radiated emission test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	X	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2011
	X	Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X	Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2011
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	X	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X	Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X	Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X	Coaxial Switch	Anritsu	MP59B/6200265729	N/A

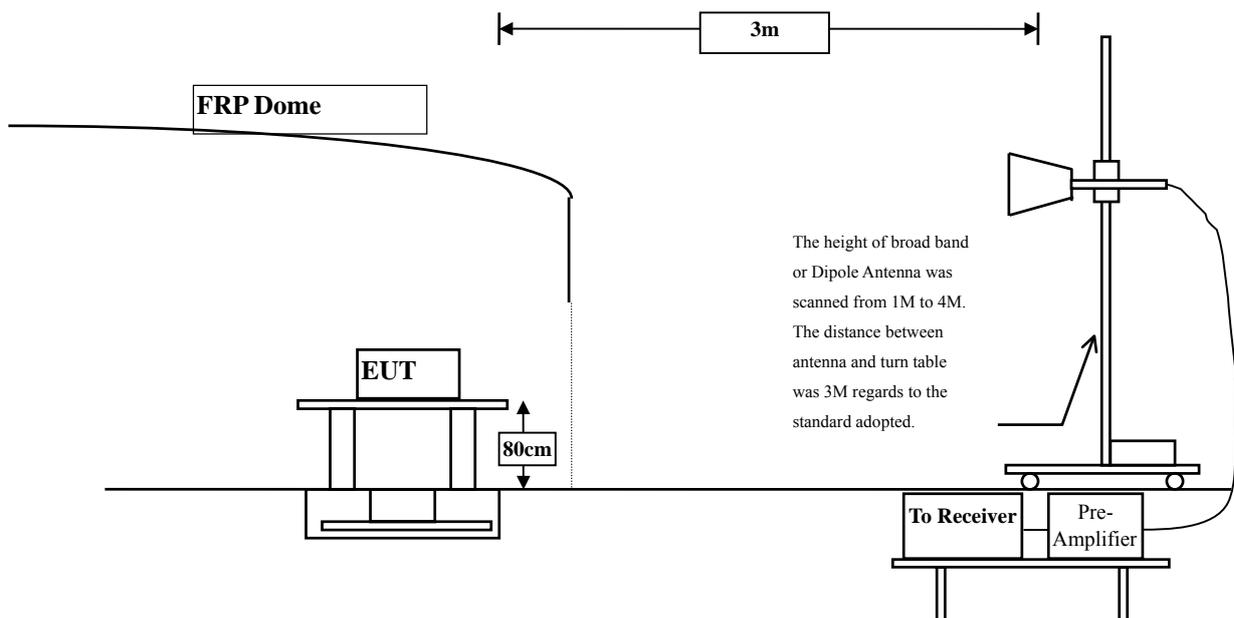
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

3.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.249 Limits				
Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m @3m)	(dBuV/m @3m)	(uV/m @3m)	(dBuV/m @3m)
902-928	50	94	500	54
2400-2483.5	50	94	500	54
5725-5875	50	94	500	54

- Remarks :
1. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
 2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

➤ General Radiated Emission Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB 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, 2009 and tested 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: 2009 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 transmitter
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2404.000	31.586	57.260	88.846	-25.154	114.000
2440.000	31.852	56.110	87.962	-26.038	114.000
2476.000	32.125	56.850	88.975	-25.025	114.000
Vertical					
Peak Detector:					
2404.000	30.923	63.200	94.123	-19.877	114.000
2440.000	31.139	61.830	92.969	-21.031	114.000
2476.000	31.384	61.050	92.435	-21.565	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:

2404.000	88.846	-8.716	80.130	-13.870	94.000
2440.000	87.962	-8.716	79.246	-14.754	94.000
2476.000	88.975	-8.716	80.259	-13.741	94.000

Vertical
Average Detector:

2404.000	94.123	-8.716	85.407	-8.593	94.000
2440.000	92.969	-8.716	84.253	-9.747	94.000
2476.000	92.435	-8.716	83.719	-10.281	94.000

Note:

1. $AVG\ Measurement = Peak\ Measurement + Duty\ Cycle\ Correct\ Factor$
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Y-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2404.000	31.586	61.450	93.036	-20.964	114.000
2440.000	31.852	60.640	92.492	-21.508	114.000
2476.000	32.125	60.020	92.145	-21.855	114.000
Vertical					
Peak Detector:					
2404.000	30.923	67.890	98.813	-15.187	114.000
2440.000	31.139	67.170	98.309	-15.691	114.000
2476.000	31.384	67.930	99.315	-14.685	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:

2404.000	93.036	-8.716	84.320	-9.680	94.000
2440.000	92.492	-8.716	83.776	-10.224	94.000
2476.000	92.145	-8.716	83.429	-10.571	94.000

Vertical
Average Detector:

2404.000	98.813	-8.716	90.097	-3.903	94.000
2440.000	98.309	-8.716	89.593	-4.407	94.000
2476.000	99.315	-8.716	90.599	-3.401	94.000

Note:

1. $AVG\ Measurement = Peak\ Measurement + Duty\ Cycle\ Correct\ Factor$
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Z-Axis)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2404.000	31.586	67.160	98.746	-15.254	114.000
2440.000	31.852	65.830	97.682	-16.318	114.000
2476.000	32.125	65.690	97.815	-16.185	114.000
Vertical					
Peak Detector:					
2404.000	30.923	63.570	94.493	-19.507	114.000
2440.000	31.139	63.680	94.819	-19.181	114.000
2476.000	31.384	64.890	96.275	-17.725	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:

2404.000	98.746	-8.716	90.030	-3.970	94.000
2440.000	97.682	-8.716	88.966	-5.034	94.000
2476.000	97.815	-8.716	89.099	-4.901	94.000

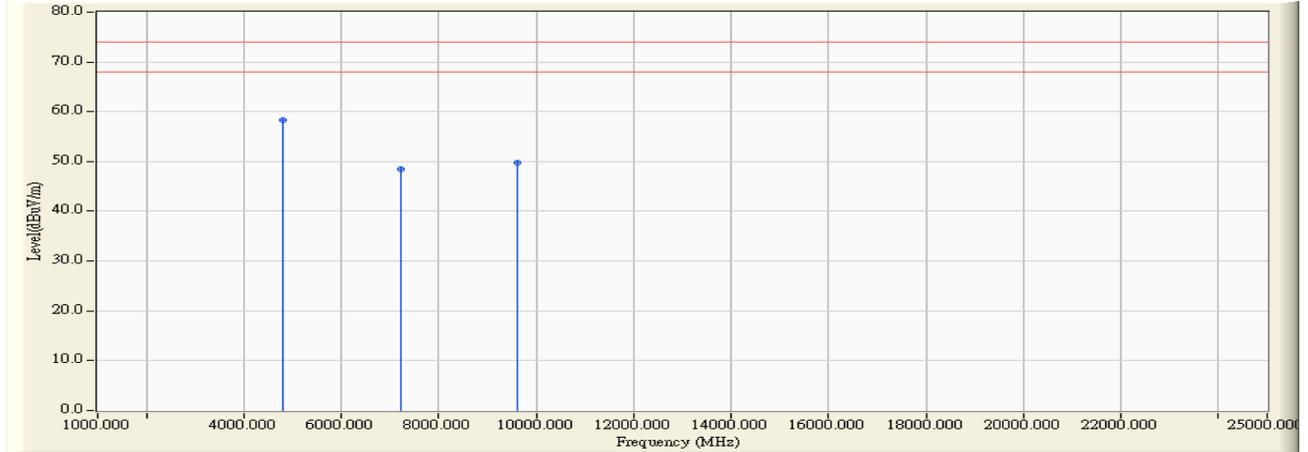
Vertical
Average Detector:

2404.000	94.493	-8.716	85.777	-8.223	94.000
2440.000	94.819	-8.716	86.103	-7.897	94.000
2476.000	96.275	-8.716	87.559	-6.441	94.000

Note:

1. $AVG\ Measurement = Peak\ Measurement + Duty\ Cycle\ Correct\ Factor$
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2404MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4808.000	0.546	57.890	58.436	-15.564	74.000
7212.000	7.445	41.040	48.484	-25.516	74.000
9616.000	8.320	41.370	49.690	-24.310	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

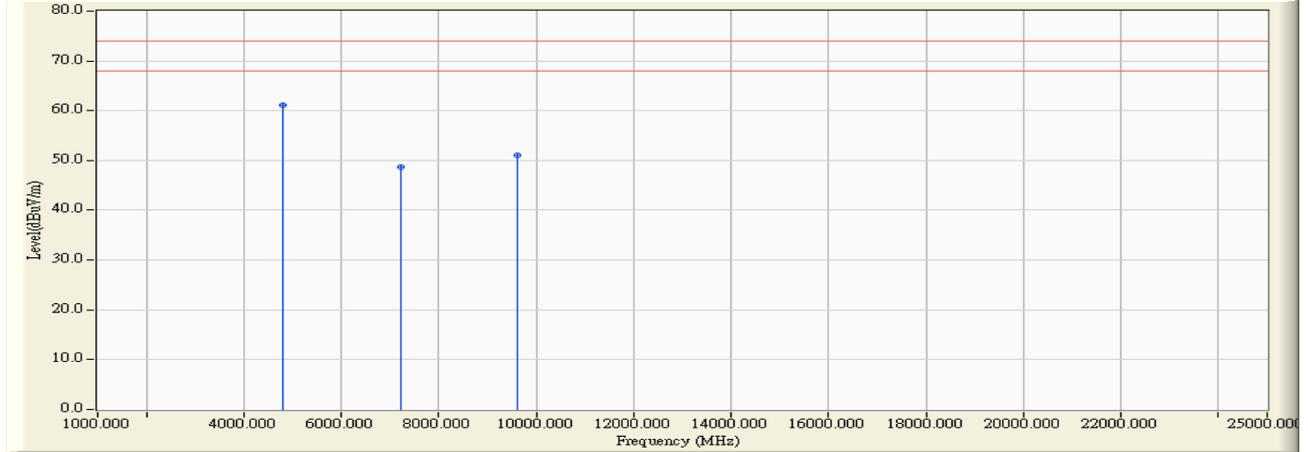
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4808.000	58.436	-8.716	49.720	-4.280	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2404MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4808.000	0.940	60.220	61.160	-12.840	74.000
7212.000	7.927	40.730	48.656	-25.344	74.000
9616.000	8.790	42.260	51.049	-22.951	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

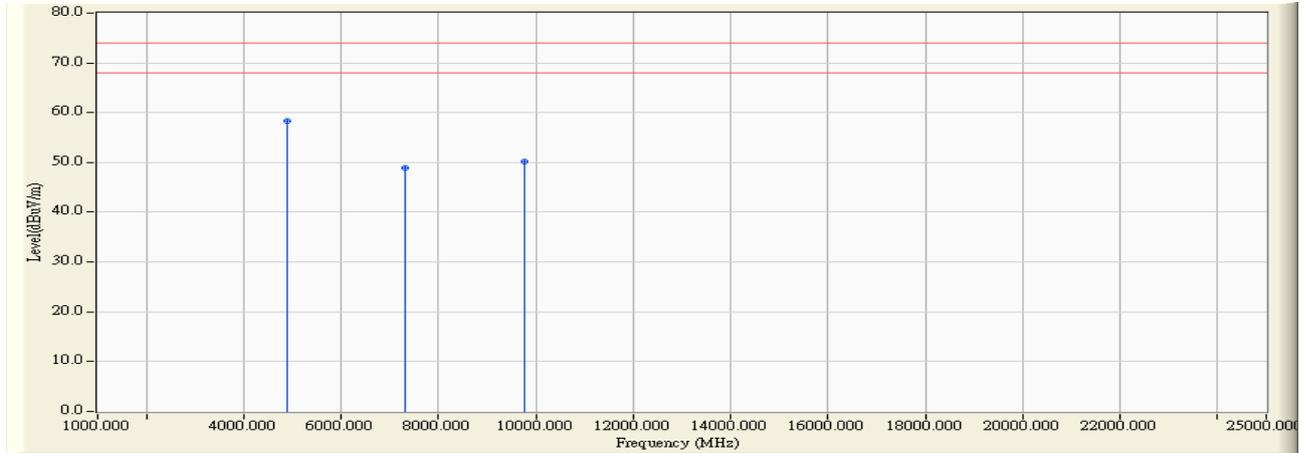
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4808.000	61.16	-8.716	52.444	-1.556	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Horizontal					
Peak Detector:					
4880.000	0.038	58.230	58.268	-15.732	74.000
7320.000	7.699	41.140	48.839	-25.161	74.000
9760.000	7.665	42.440	50.105	-23.895	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

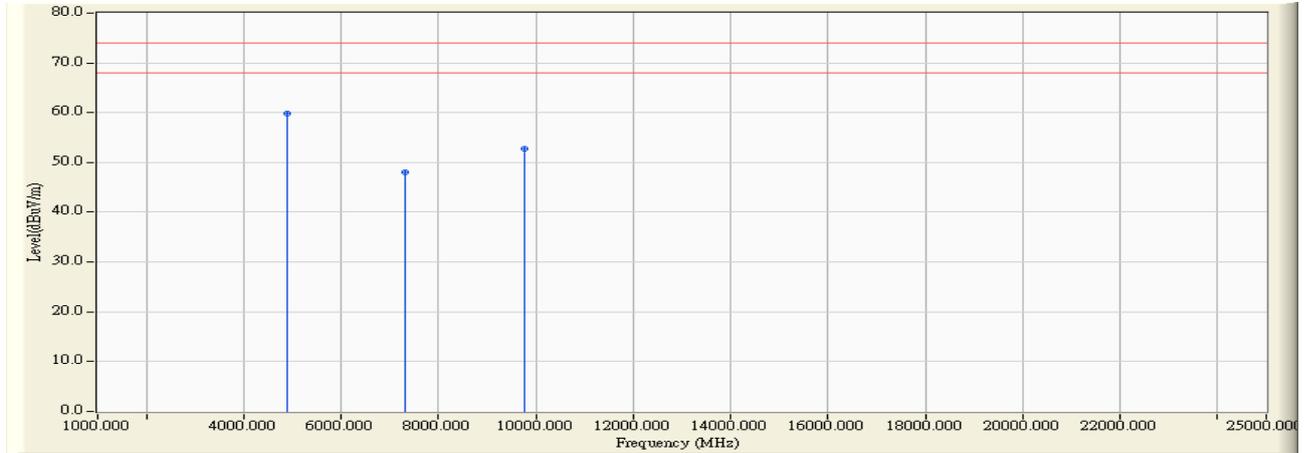
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4880.000	58.268	-8.716	49.552	-4.448	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Vertical					
Peak Detector:					
4880.000	0.499	59.280	59.779	-14.221	74.000
7320.000	8.303	39.820	48.123	-25.877	74.000
9760.000	8.299	44.380	52.680	-21.320	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

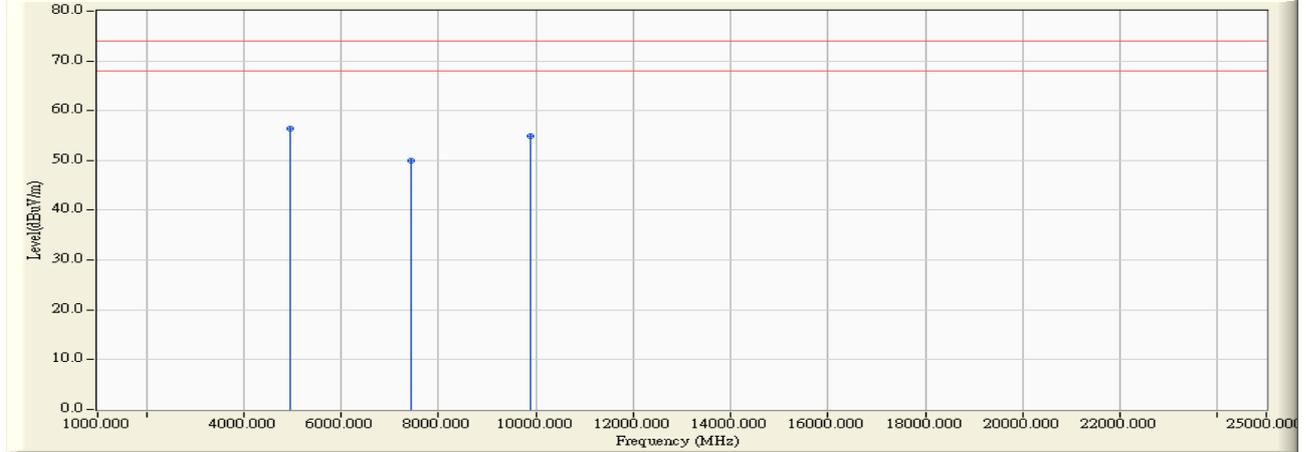
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4880.000	59.779	-8.716	51.063	-2.937	54.000

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2476 MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4952.000	0.503	55.970	56.473	-17.527	74.000
7428.000	8.508	41.450	49.958	-24.042	74.000
9904.000	8.175	46.740	54.914	-19.086	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

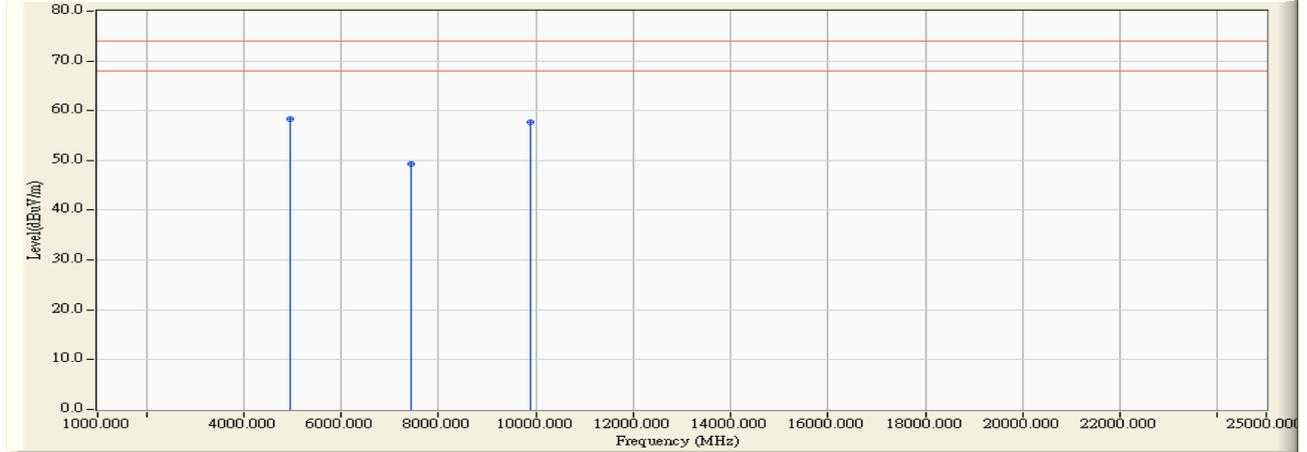
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4952	56.473	-8.716	47.757	-6.243	54.000
9904	54.914	-8.716	46.198	-7.802	54.000

Note:

1. $AVG \text{ Measurement} = \text{Peak Measurement} + \text{Duty Cycle Correct Factor}$
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2476MHz)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4952.000	1.275	57.170	58.444	-15.556	74.000
7428.000	9.224	40.150	49.374	-24.626	74.000
9904.000	9.221	48.560	57.780	-16.220	74.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test report.

Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4952	58.444	-8.716	49.728	-4.272	54.000
9904	57.780	-8.716	49.064	-4.936	54.000

Note:

1. $AVG\ Measurement = Peak\ Measurement + Duty\ Cycle\ Correct\ Factor$
2. The Duty Cycle is refer to section 5.

Product : USB wireless transmitter
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
466.500	3.156	37.395	40.551	-5.449	46.000
528.580	3.074	29.232	32.306	-13.694	46.000
666.320	1.879	33.387	35.266	-10.734	46.000
763.320	5.113	27.977	33.090	-12.910	46.000
840.920	6.064	26.059	32.123	-13.877	46.000
967.020	7.299	26.294	33.593	-20.407	54.000
Vertical					
400.540	-2.868	37.884	35.016	-10.984	46.000
522.760	1.116	28.846	29.962	-16.038	46.000
664.380	-0.978	36.130	35.152	-10.848	46.000
749.740	2.023	30.463	32.486	-13.514	46.000
809.880	3.026	31.024	34.050	-11.950	46.000
951.500	3.083	30.033	33.116	-12.884	46.000

Note:

1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. Measurement Level = Reading Level + Correct Factor.
5. Correct Factor = Antenna factor + Cable loss – Amplifier gain.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The emission levels of other frequencies are very lower than the limit and not show in test 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, 2011
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

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.

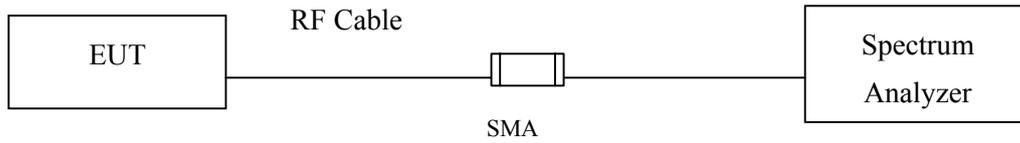
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2011
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2011
	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2011
	X Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2011
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2011
	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2011
	X Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2011
	X Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

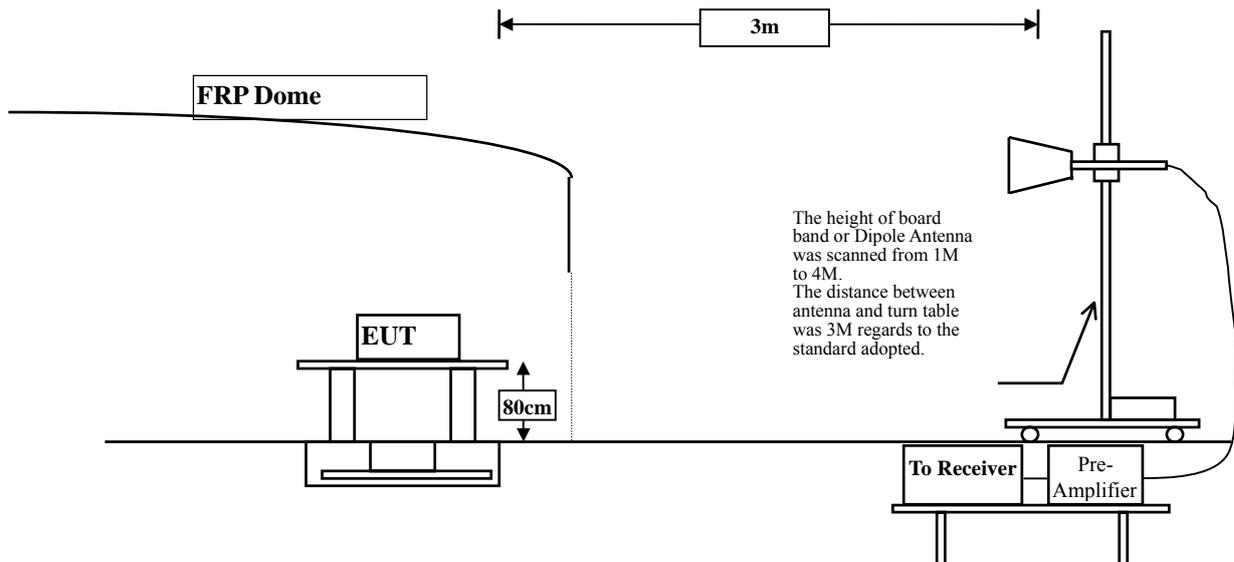
- Note:
1. All equipments are calibrated every one year.
 2. The test equipments marked by “X” are used to measure the final test results.

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 50 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: 2009 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 ± 1.27 dB

Radiated is ± 3.9 dB

4.6. Test Result of Band Edge

Product : USB wireless transmitter
 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	2404	31.586	61.45	93.036	Peak
Vertical	2404	30.923	67.89	98.813	Peak

Note: 1: Spectrum Analyzer setting:

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

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2400	93.036	43.25	49.786	Peak
Vertical	2400	98.813	43.25	55.563	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 - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Average Detector:

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

Vertical

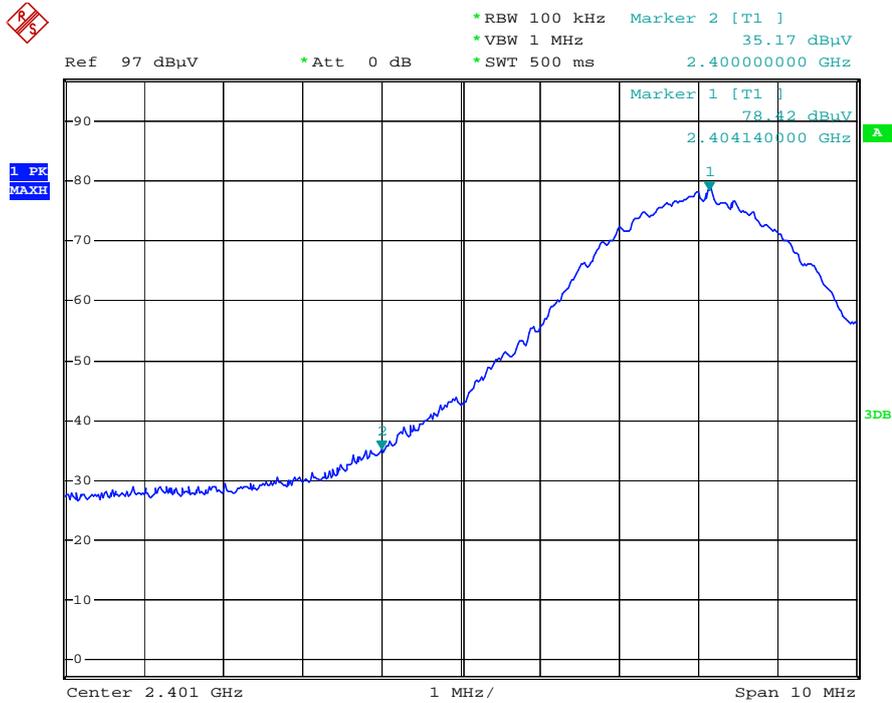
Average Detector:

2400	55.563	-8.716	46.847	-7.153	54.000	Pass
------	--------	--------	--------	--------	--------	------

Note:

1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Peak Detector of conducted Band Edge Delta



5190B-2

Date: 5.NOV.2011 08:46:07

Product : USB wireless transmitter
 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	2476	32.125	60.02	92.145	Peak
Vertical	2476	31.384	67.93	99.315	Peak

Note: 1:Spectrum Analyzer setting:

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

Band Edge Test Data

Antenna Pole	Test Frequency (MHz)	Fundamental (dBuV/m)	Δ (dB)	Band Edge Field Strength (dBuV/m)	Detector
Horizontal	2483.5	92.145	49.65	42.495	Peak
Vertical	2483.5	99.315	49.65	49.665	Peak

Note:

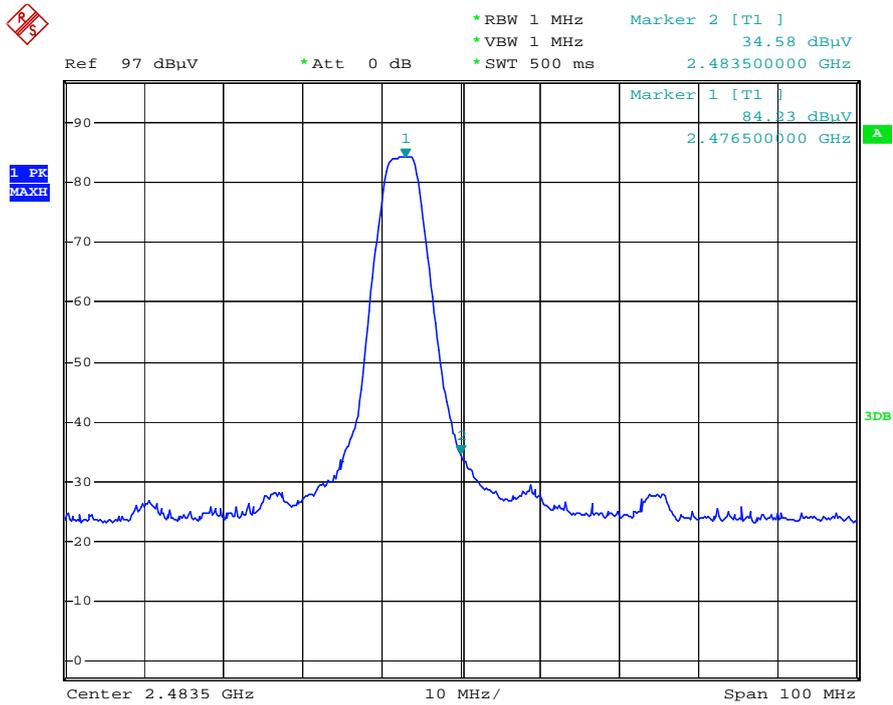
The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F - Δ

F = Fundamental field Strength (Peak or Average)

Δ = Conducted Band Edge Delta (Peak or Average)

Peak Detector of conducted Band Edge Delta



5190B-2

Date: 5.NOV.2011 08:48:40

5. Duty Cycle

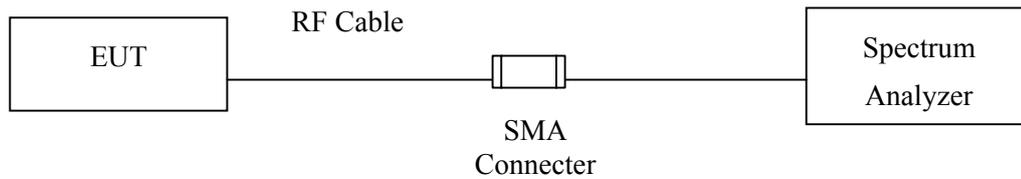
5.1. Test Equipment

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, 2011
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2011
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2011

- 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

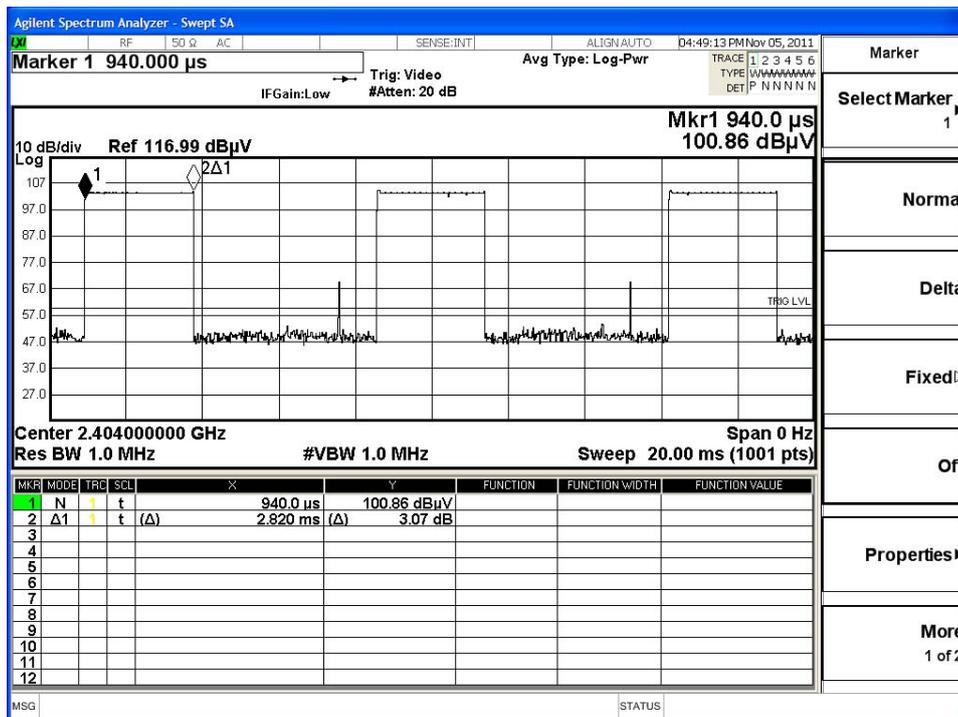
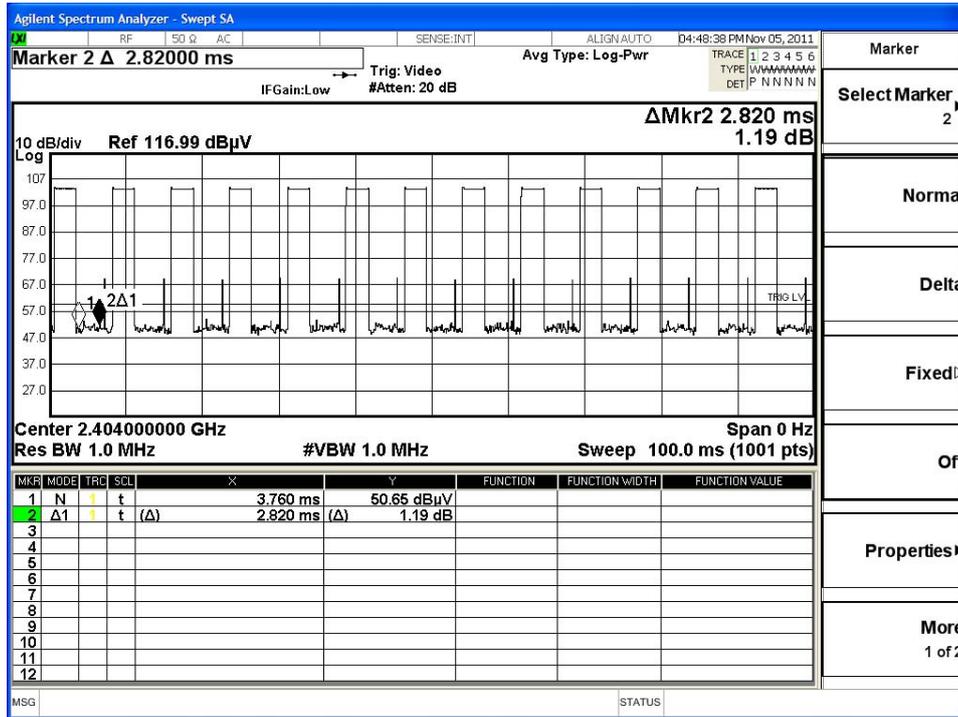


5.3. Uncertainty

± 150Hz

5.4. Test Result of Duty Cycle

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



Time on of 100ms= 2.82ms*13=36.66ms

Duty Cycle= 36.66ms / 100ms= 0.3666

Duty Cycle correction factor= 20 LOG 0.3666= -8.716 dB

Duty Cycle correction factor	-8.716	dB
-------------------------------------	---------------	-----------

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.