

FCC Test Report

Product Name	ASUS WT425 Wireless Optical Mouse-Dongle
Model No.	WT425D
FCC ID	UC3WT425D

Applicant	Intech Electronics Corp.
Address	Hail B3, Yuan-Hu Industry Park, Golf Blvd., Taiwan City China

Date of Receipt	Jan. 05, 2015
Issued Date	Feb. 05, 2015
Report No.	1510122R-RFUSP15V00-A
Report Version	V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of QuieTek Corporation.

Test Report

Issued Date: Feb. 05, 2015

Report No.: 1510122R-RFUSP15V00-A



Product Name	ASUS WT425 Wireless Optical Mouse-Dongle
Applicant	Intech Electronics Corp.
Address	Hail B3, Yuan-Hu Industry Park, Golf Blvd., Taiwan City China
Manufacturer	Intech Electronics Corp.
Model No.	WT425D
EUT Rated Voltage	DC 5V (Power by USB)
EUT Test Voltage	DC 5V (Power by USB)
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2013 ANSI C63.4: 2014, ANSI C63.10: 2013
Test Result	Complied

Documented By :

Leven Huang

(Senior Adm. Specialist / Leven Huang)

Tested By :

Benjamin Pan

(Engineer / Benjamin Pan)

Approved By :

Vincent Lin

(Director / Vincent Lin)

TABLE OF CONTENTS

Description	Page
1. GENERAL INFORMATION	4
1.1. EUT Description.....	4
1.2. Operational Description	6
1.3. Tested System Details.....	7
1.4. Configuration of Test System.....	7
1.5. EUT Exercise Software	8
1.6. Test Facility	9
2. Conducted Emission.....	10
2.1. Test Equipment.....	10
2.2. Test Setup	10
2.3. Limits	11
2.4. Test Procedure	11
2.5. Uncertainty	11
2.6. Test Result of Conducted Emission.....	12
3. Radiated Emission.....	14
3.1. Test Equipment.....	14
3.2. Test Setup	15
3.3. Limits	16
3.4. Test Procedure	17
3.5. Uncertainty	17
3.6. Test Result of Radiated Emission.....	18
4. Band Edge	37
4.1. Test Equipment.....	37
4.2. Test Setup	38
4.3. Limits	39
4.4. Test Procedure	39
4.5. Uncertainty	39
4.6. Test Result of Band Edge	40
5. Duty Cycle.....	48
5.1. Test Equipment.....	48
5.2. Test Setup	48
5.3. Uncertainty	48
5.4. Test Result of Duty Cycle.....	49
6. EMI Reduction Method During Compliance Testing	50

Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	ASUS WT425 Wireless Optical Mouse-Dongle
Trade Name	ASUS
Model No.	WT425D
FCC ID	UC3WT425D
Frequency Range	2402~2480MHz
Channel Number	16
Type of Modulation	GFSK
Channel Control	Auto
Antenna Type	PCB Antenna
Antenna Gain	Refer to the table “Antenna List”

Antenna List

No.	Manufacturer	Part No.	Peak Gain
1	ASUS	N/A	2.1dBi 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:	2402 MHz	Channel 02:	2426 MHz	Channel 03:	2441 MHz	Channel 04:	2463 MHz
Channel 05:	2407 MHz	Channel 06:	2422 MHz	Channel 07:	2445MHz	Channel 08:	2466 MHz
Channel 09:	2414 MHz	Channel 10:	2436 MHz	Channel 11:	2459MHz	Channel 12:	2473 MHz
Channel 13:	2419 MHz	Channel 14:	2439 MHz	Channel 15:	2453 MHz	Channel 16:	2480 MHz

Note:

1. The EUT is a ASUS WT425 Wireless Optical Mouse-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. 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

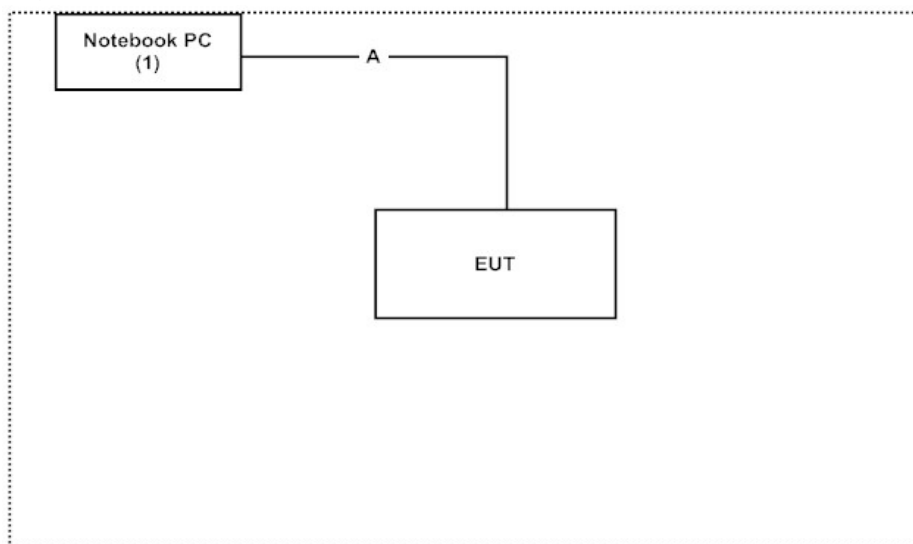
The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Notebook PC	DELL	PP18L	36119001664	Non-Shielded, 0.8m

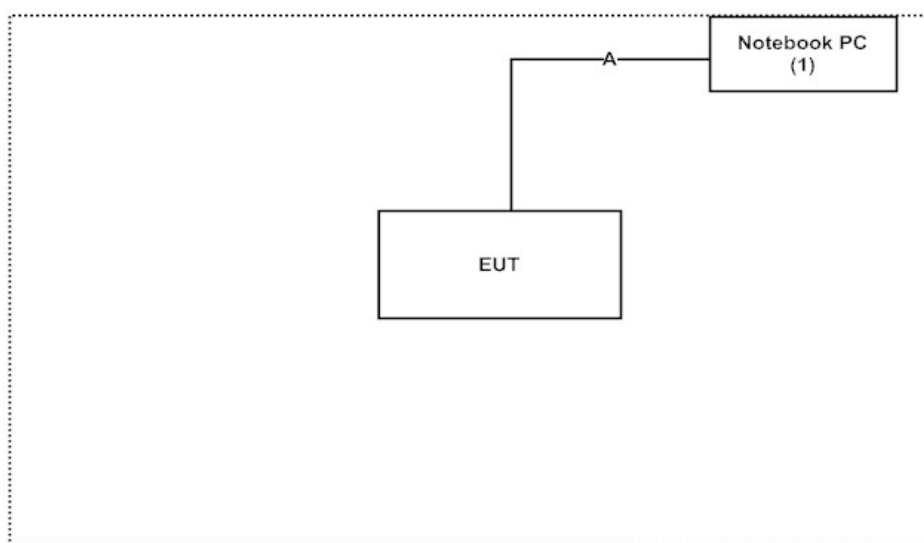
Signal Cable Type		Signal cable Description
A	USB Cable	Shielded, 2m

1.4. Configuration of Test System

CE, RF



RE



1.5. EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4.
- (2) Execute “VD 5.5” 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

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

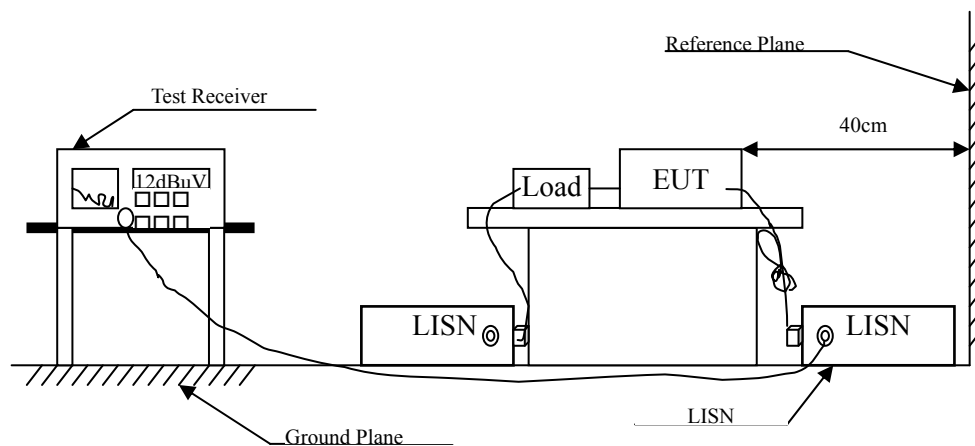
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2014	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2015	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2015	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2014	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2015	
	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: 2014 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 : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Conducted Emission Test
 Power Line : Line 1
 Test Mode : Mode 1: Transmit (2441MHz)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV	Margin dB	Limit dBuV
LINE 1					
Quasi-Peak					
0.166	9.657	42.670	52.326	-13.217	65.543
0.189	9.650	40.690	50.340	-14.546	64.886
0.259	9.654	19.610	29.264	-33.622	62.886
0.576	9.671	27.270	36.941	-19.059	56.000
0.752	9.681	24.320	34.001	-21.999	56.000
20.709	10.184	24.290	34.474	-25.526	60.000
Average					
0.166	9.657	22.960	32.616	-22.927	55.543
0.189	9.650	19.740	29.390	-25.496	54.886
0.259	9.654	9.240	18.894	-33.992	52.886
0.576	9.671	17.130	26.801	-19.199	46.000
0.752	9.681	6.550	16.231	-29.769	46.000
20.709	10.184	16.560	26.744	-23.256	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 : ASUS WT425 Wireless Optical Mouse-Dongle
Test Item : Conducted Emission Test
Power Line : Line 2
Test Mode : Mode 1: Transmit (2441MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV	dB	dBuV
LINE 2					
Quasi-Peak					
0.173	9.659	41.990	51.649	-13.694	65.343
0.259	9.664	33.180	42.844	-20.042	62.886
0.322	9.657	30.180	39.837	-21.249	61.086
0.521	9.668	20.940	30.608	-25.392	56.000
0.689	9.677	25.030	34.707	-21.293	56.000
4.459	9.851	23.030	32.881	-23.119	56.000
Average					
0.173	9.659	21.770	31.429	-23.914	55.343
0.259	9.664	13.760	23.424	-29.462	52.886
0.322	9.657	12.260	21.917	-29.169	51.086
0.521	9.668	2.140	11.808	-34.192	46.000
0.689	9.677	9.280	18.957	-27.043	46.000
4.459	9.851	16.560	26.411	-19.589	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. Radiated Emission

3.1. Test Equipment

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

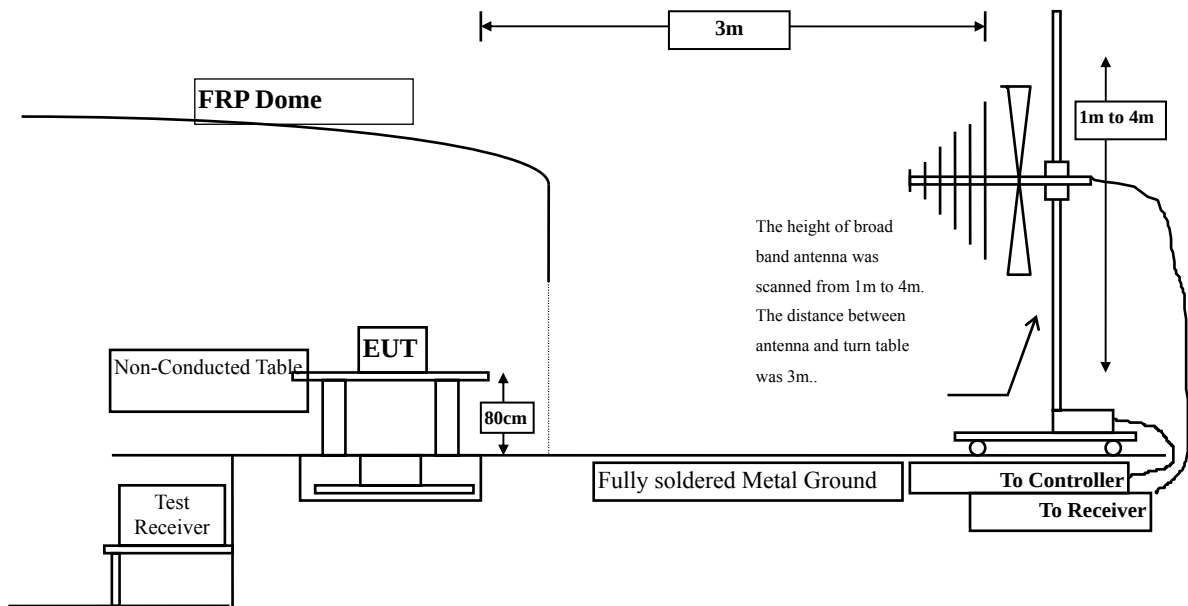
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X	Magnetic Loop Antenna	Teseq	HLA6121/ 37133	Sep, 2014
	X	Bilog Antenna	Schaffner Chase	CBL6112B/ 2707	Jun, 2014
	X	EMI Test Receiver	R&S	ESCS 30/838251/ 001	Jun, 2014
	X	Coaxial Cable	QTK(Arnist)	RG 214/ LC003-RG	Jun, 2014
	X	Coaxial signal switch	Arnist	MP59B/ 6200798682	Jun, 2014

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2014
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

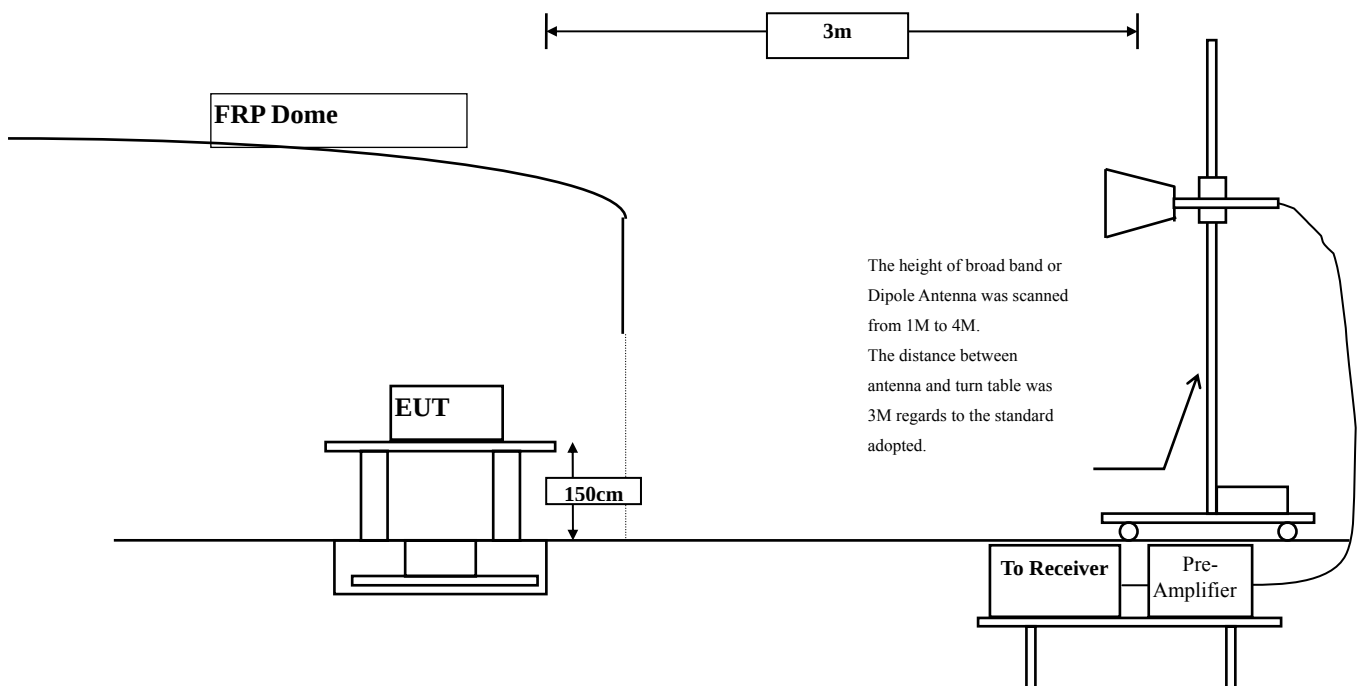
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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	Field strength (microvolts/meter)	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

3.4. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.249 requirements.

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 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 C63.10: 2013 on radiated measurement.

The resolution bandwidth below 30MHz setting on the field strength meter is 9kHz and 30MHz~1GHz is 120kHz and above 1GHz is 1MHz.

Radiated emission measurements below 30MHz are made using Loop Antenna and 30MHz~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 in the Open Area Test Site on the Final Measurement.

The measurement frequency range from 9kHz - 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 : ASUS WT425 Wireless Optical Mouse-Dongle
 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:					
2402.000	33.755	51.390	85.144	-28.856	114.000
2441.000	33.840	50.710	84.550	-29.450	114.000
2480.000	33.941	48.400	82.341	-31.659	114.000
Vertical					
Peak Detector:					
2402.000	32.241	49.710	81.951	-32.049	114.000
2441.000	32.380	49.690	82.070	-31.930	114.000
2480.000	32.568	48.300	80.868	-33.132	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: (X-Axis:)

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
2402.000	85.144	-33.979	51.165	-42.835	94.000
2441.000	84.550	-33.979	50.571	-43.429	94.000
2480.000	82.341	-33.979	48.362	-45.638	94.000
Vertical					
Average Detector:					
2402.000	81.951	-33.979	47.972	-46.028	94.000
2441.000	82.070	-33.979	48.091	-45.909	94.000
2480.000	80.868	-33.979	46.889	-47.111	94.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 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:					
2402.000	33.755	53.320	87.074	-26.926	114.000
2441.000	33.840	50.160	84.000	-30.000	114.000
2480.000	33.941	51.400	85.341	-28.659	114.000
Vertical					
Peak Detector:					
2402.000	32.241	46.450	78.691	-35.309	114.000
2441.000	32.380	44.580	76.960	-37.040	114.000
2480.000	32.568	45.520	78.088	-35.912	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: (Y-Axis:)

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
2402.000	87.074	-33.979	53.095	-40.905	94.000
2441.000	84.000	-33.979	50.021	-43.979	94.000
2480.000	85.341	-33.979	51.362	-42.638	94.000
Vertical					
Average Detector:					
2402.000	78.691	-33.979	44.712	-49.288	94.000
2441.000	76.960	-33.979	42.981	-51.019	94.000
2480.000	78.088	-33.979	44.109	-49.891	94.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 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:					
2402.000	33.755	50.310	84.064	-29.936	114.000
2441.000	33.840	50.840	84.680	-29.320	114.000
2480.000	33.941	49.090	83.031	-30.969	114.000
Vertical					
Peak Detector:					
2402.000	32.241	46.170	78.411	-35.589	114.000
2441.000	32.380	45.030	77.410	-36.590	114.000
2480.000	32.568	43.210	75.778	-38.222	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.

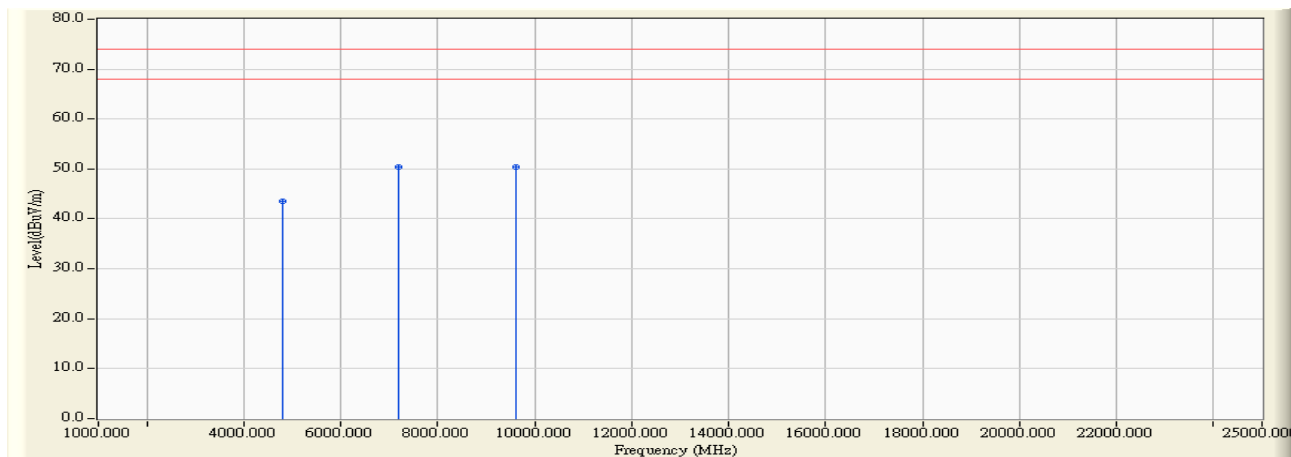
Average Detector: (Z-Axis:)

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
2402.000	84.064	-33.979	50.085	-43.915	94.000
2441.000	84.680	-33.979	50.701	-43.299	94.000
2480.000	83.031	-33.979	49.052	-44.948	94.000
Vertical					
Average Detector:					
2402.000	78.411	-33.979	44.432	-49.568	94.000
2441.000	77.410	-33.979	43.431	-50.569	94.000
2480.000	75.778	-33.979	41.799	-52.201	94.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-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	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4804.000	2.511	40.960	43.470	-30.530	74.000
7206.000	9.511	40.900	50.411	-23.589	74.000
9608.000	10.394	39.910	50.304	-23.696	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.

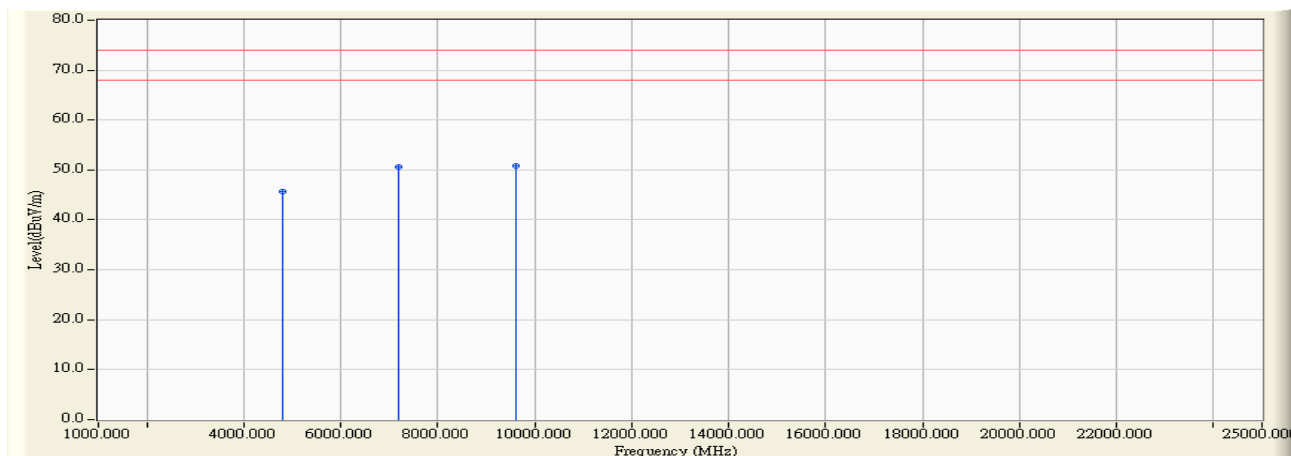
Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
4804.000	43.470	-33.979	9.491	-44.509	54.000
7206.000	50.411	-33.979	16.432	-37.568	54.000
9608.000	50.304	-33.979	16.325	-37.675	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-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	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4804.000	2.923	42.790	45.712	-28.288	74.000
7206.000	9.988	40.530	50.519	-23.481	74.000
9608.000	10.847	40.020	50.867	-23.133	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.

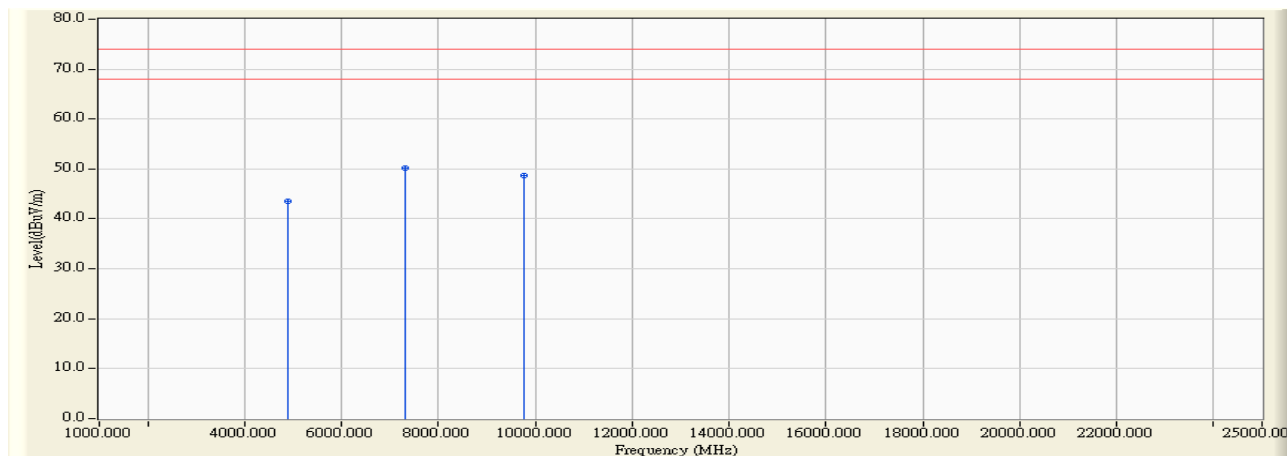
Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Vertical					
Average Detector:					
4804.000	45.712	-33.979	11.733	-42.267	54.000
7206.000	50.519	-33.979	16.540	-37.460	54.000
9608.000	50.867	-33.979	16.888	-37.112	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2441 MHz)



Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level	Db	dBuV/m
	Db	dBuV	dBuV/m		
Horizontal					
Peak Detector:					
4882.000	2.025	41.500	43.525	-30.475	74.000
7323.000	9.762	40.500	50.261	-23.739	74.000
9764.000	9.682	38.970	48.651	-25.349	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.

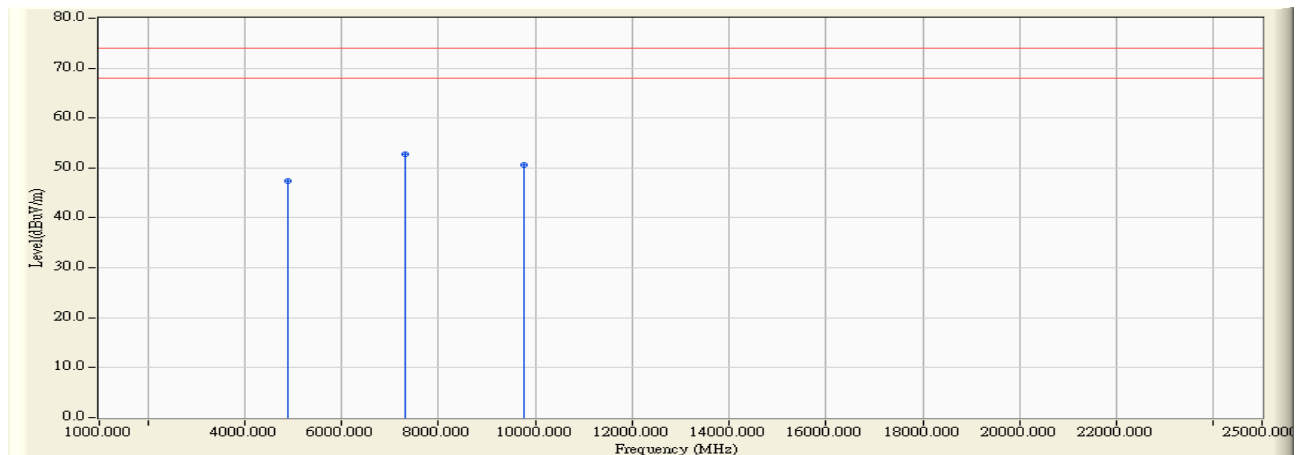
Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
4882.000	43.525	-33.979	9.546	-44.454	54.000
7323.000	50.261	-33.979	16.282	-37.718	54.000
9764.000	48.651	-33.979	14.672	-39.328	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2441MHz)



Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	Db	dBuV	dBuV/m	Db	dBuV/m
Vertical					
Peak Detector:					
4882.000	2.488	44.990	47.478	-26.522	74.000
7323.000	10.375	42.360	52.734	-21.266	74.000
9764.000	10.315	40.360	50.675	-23.325	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.

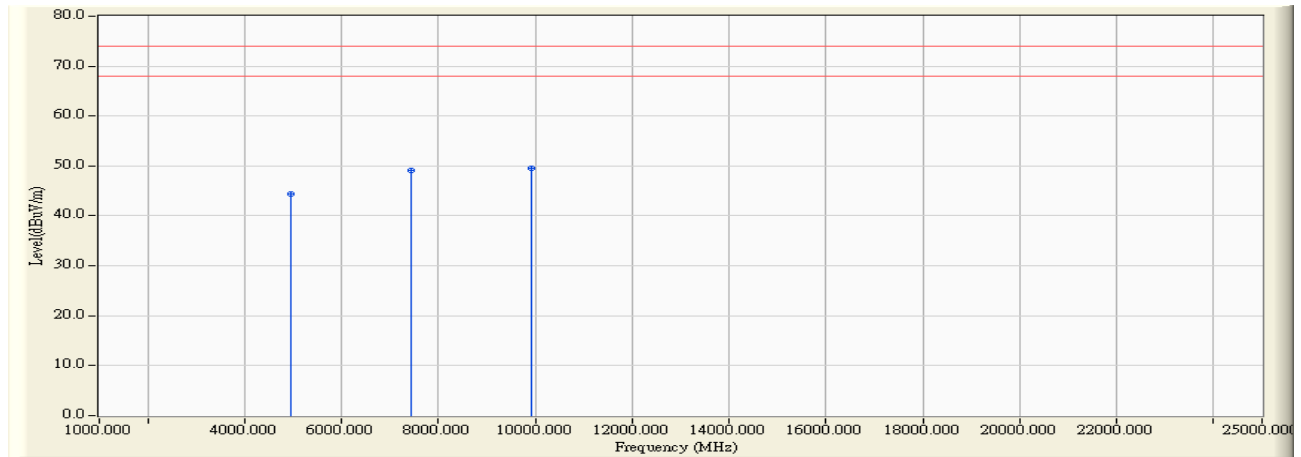
Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Vertical					
Average Detector:					
4882.000	47.478	-33.979	13.499	-40.501	54.000
7323.000	52.734	-33.979	18.755	-35.245	54.000
9764.000	50.675	-33.979	16.696	-37.304	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz)



Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.582	41.780	44.362	-29.638	74.000
7440.000	10.555	38.570	49.125	-24.875	74.000
9920.000	10.206	39.270	49.476	-24.524	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.

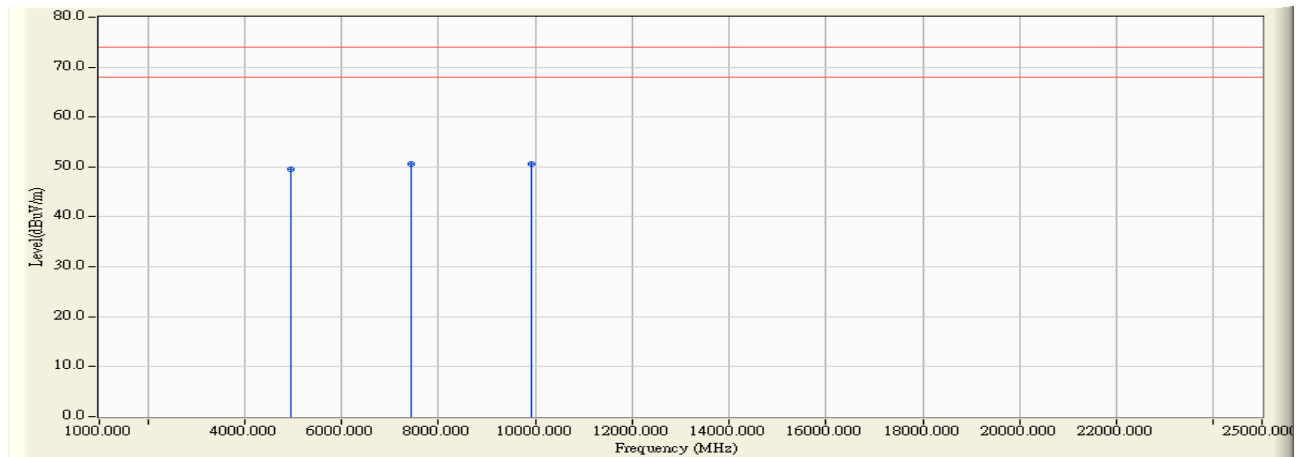
Average Detector:

Frequency	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Horizontal					
Average Detector:					
4960.000	44.362	-33.979	10.383	-43.617	54.000
7440.000	49.125	-33.979	15.146	-38.854	54.000
9920.000	49.476	-33.979	15.497	-38.503	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480MHz)



Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Vertical					
Peak Detector:					
4960.000	3.398	46.040	49.439	-24.561	74.000
7440.000	11.214	39.340	50.554	-23.446	74.000
9920.000	11.245	39.340	50.585	-23.415	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	Peak	Duty Cycle	Measurement	Margin	Limit
MHz	Measurement	Correct Factor	Level		
	dBuV/m	dB	dBuV/m	dB	dBuV/m
Vertical					
Average Detector:					
4960.000	49.439	-33.979	15.460	-38.540	54.000
7440.000	50.554	-33.979	16.575	-37.425	54.000
9920.000	50.585	-33.979	16.606	-37.394	54.000

Note:

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

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2441 MHz)

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
142.520	-7.627	39.113	31.486	-12.014	43.500
289.960	-5.470	40.091	34.621	-11.379	46.000
482.020	1.664	30.548	32.212	-13.788	46.000
610.060	3.657	30.696	34.353	-11.647	46.000
709.000	3.624	31.547	35.171	-10.829	46.000
961.200	6.810	27.251	34.061	-19.939	54.000
Vertical					
192.960	-5.655	38.115	32.460	-11.040	43.500
289.960	-5.550	39.151	33.601	-12.399	46.000
388.900	-0.726	29.022	28.296	-17.704	46.000
596.480	0.907	27.973	28.880	-17.120	46.000
780.780	2.769	29.495	32.264	-13.736	46.000
967.020	3.889	24.796	28.685	-25.315	54.000

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, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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:

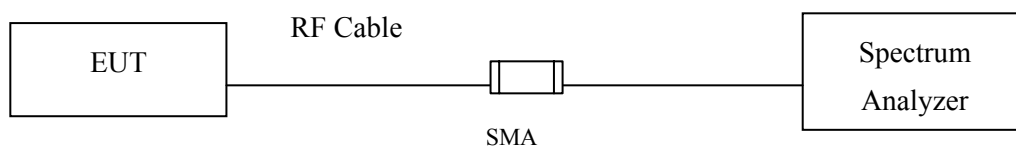
Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ CB # 8	X	Spectrum Analyzer	R&S	FSP40/ 100339	Oct, 2014
	X	Horn Antenna	ETS-Lindgren	3117/ 35205	Mar, 2014
	X	Horn Antenna	Schwarzbeck	BBHA9170/209	Jan, 2015
	X	Horn Antenna	TRC	AH-0801/95051	Aug, 2014
	X	Pre-Amplifier	EMCI	EMC012630SE/980210	Jan, 2015
	X	Pre-Amplifier	MITEQ	JS41-001040000-58-5P/153945	Jul, 2014
	X	Pre-Amplifier	NARDA	DBL-1840N506/013	Jul, 2014

Note:

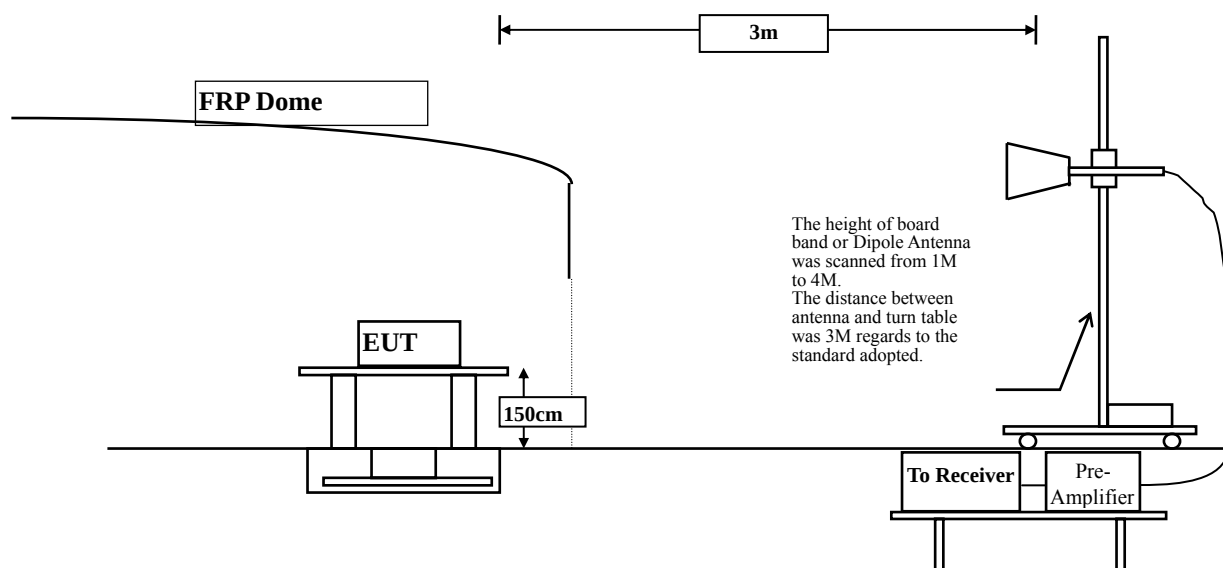
1. All equipments are calibrated every one year.
2. The test equipments marked by “X” are used to measure the final test results.

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

Measuring the frequency range below 1GHz, the EUT is placed on a turn table which is 0.8 meter above ground, when measuring the frequency range above 1GHz, the EUT is placed on a turn table which is 1.5 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 C63.10: 2013 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

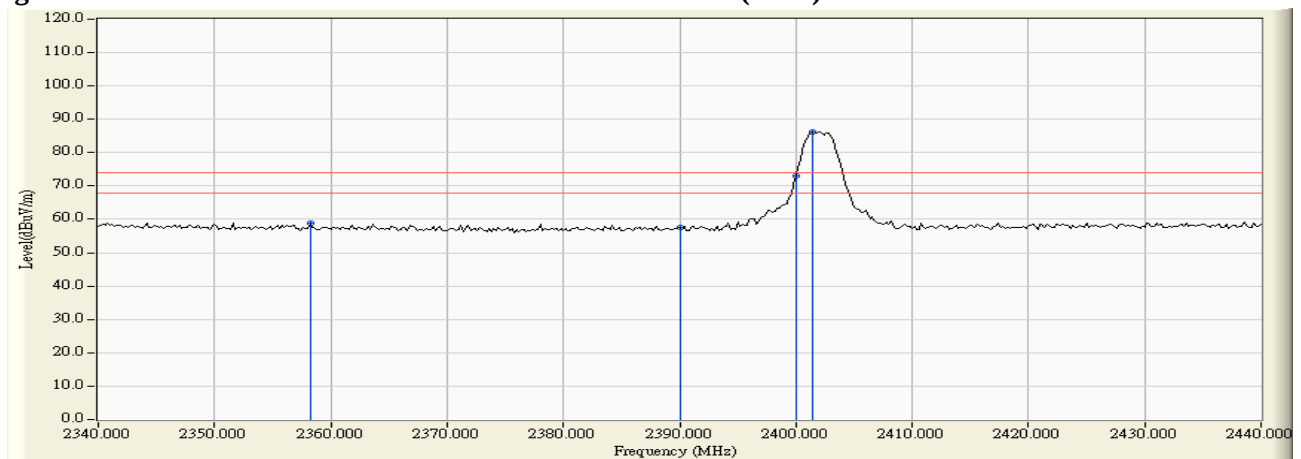
Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2358.200	33.717	25.297	59.014	74.00	54.00	Pass
01 (Peak)	2390.000	33.739	23.739	57.478	74.00	54.00	Pass
01 (Peak)	2400.000	33.752	39.283	73.034	--	--	--
01 (Peak)	2401.400	33.754	52.432	86.186	--	--	--

Figure Channel 01:

Horizontal (Peak)



Note:

1. All readings 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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Horizontal						
Average Detector:						
2358.200	59.014	-33.979	25.035	-28.965	54.000	Pass
2390.000	57.478	-33.979	23.499	-30.501	54.000	Pass
2400.000	73.034	-33.979	39.055	-14.945	54.000	Pass

Note:

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

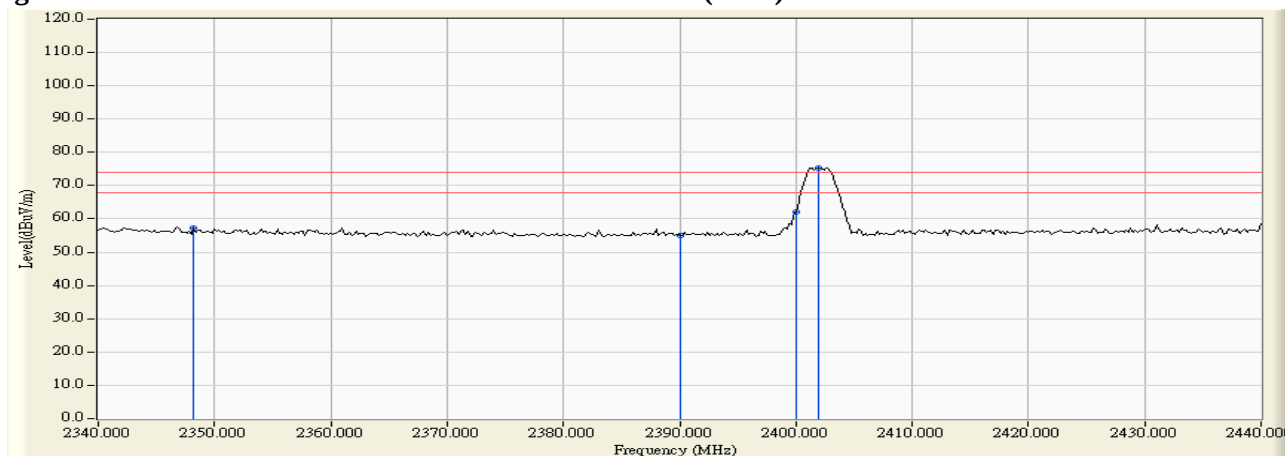
Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
01 (Peak)	2348.200	32.581	24.786	57.367	74.00	54.00	Pass
01 (Peak)	2390.000	32.267	22.853	55.120	74.00	54.00	Pass
01 (Peak)	2400.000	32.241	29.829	62.070	--	--	--
01 (Peak)	2402.000	32.241	43.092	75.333	--	--	--

Figure Channel 01:

Vertical (Peak)



Note:

1. All readings 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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:

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

Vertical

Average Detector:

2348.200	57.367	-33.979	23.388	-30.612	54.000	Pass
2390.000	55.12	-33.979	21.141	-32.859	54.000	Pass
2400.000	62.07	-33.979	28.091	-25.909	54.000	Pass

Note:

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

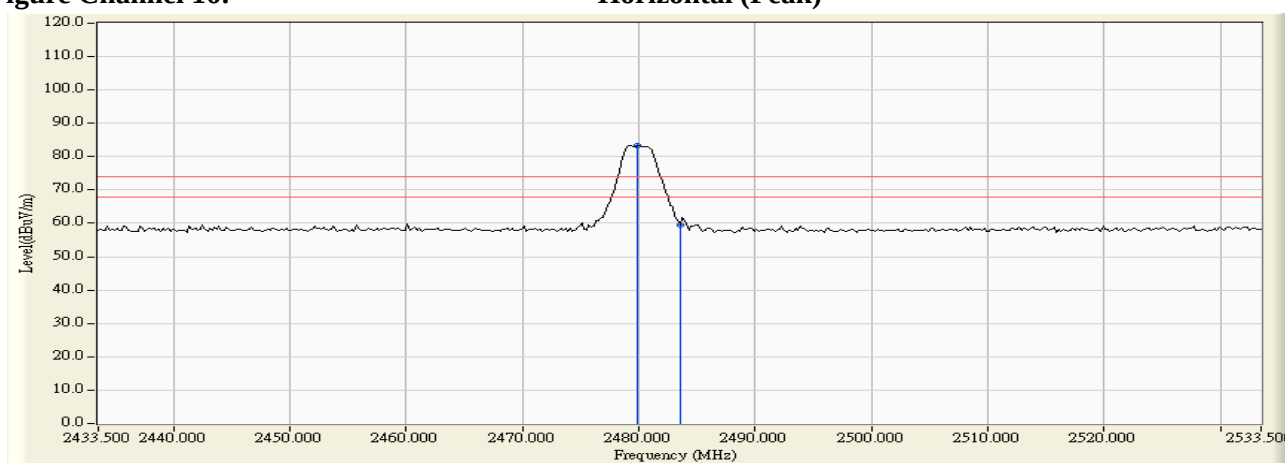
Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
16 (Peak)	2479.900	33.941	49.288	83.228	--	--	--
16 (Peak)	2483.500	33.951	25.688	59.638	74.00	54.00	Pass

Figure Channel 16:

Horizontal (Peak)



Note:

1. All readings 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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Horizontal						
Average Detector:						
2483.500	59.638	-33.979	25.659	-28.341	54.000	Pass

Note:

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

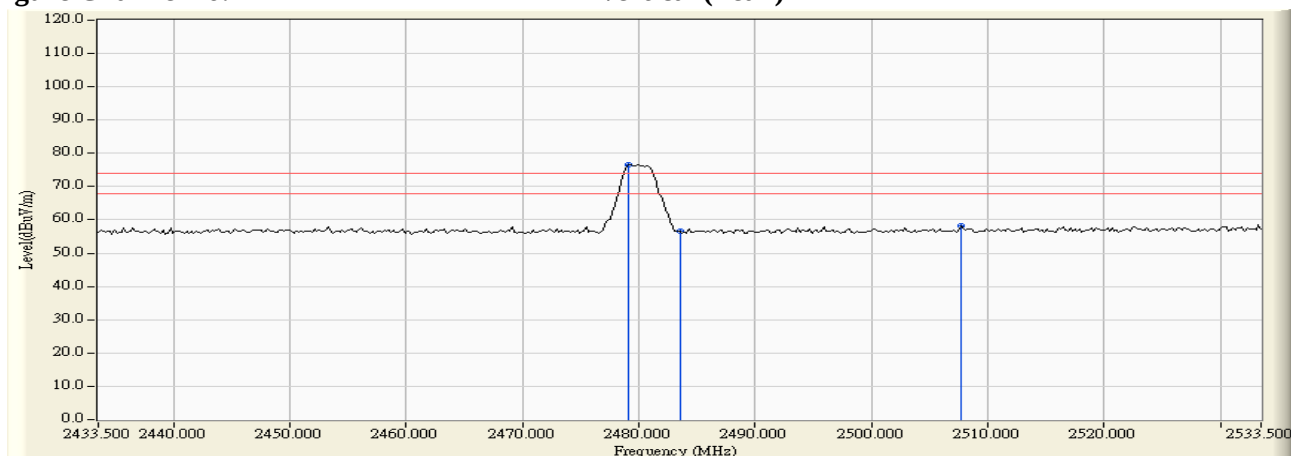
Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBμV)	Emission Level (dBμV/m)	Peak Limit (dBμV/m)	Average Limit (dBμV/m)	Result
16 (Peak)	2479.100	32.563	44.031	76.595	--	--	--
16 (Peak)	2483.500	32.586	23.880	56.465	74.00	54.00	Pass
16 (Peak)	2507.700	32.703	25.669	58.371	74.00	54.00	Pass

Figure Channel 16:

Vertical (Peak)



Note:

1. All readings 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. “ * ”, means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.

Average Detector:						
Frequency	Peak	Duty Cycle	Measurement	Margin	Limit	Result
MHz	Measurement	Factor	Level			Pass
	dBμV/m	dB	dBμV/m	dB	dBμV/m	
Vertical						
Average Detector:						
2483.500	56.465	-33.979	22.486	-31.514	54.000	Pass
2507.700	58.371	-33.979	24.392	-29.608	54.000	Pass

Note:

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

5. Duty Cycle

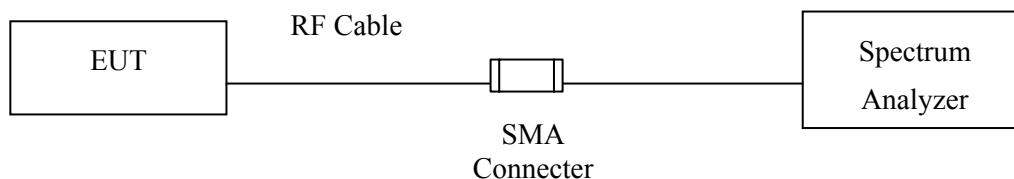
5.1. Test Equipment

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, 2014
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2014
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2014

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

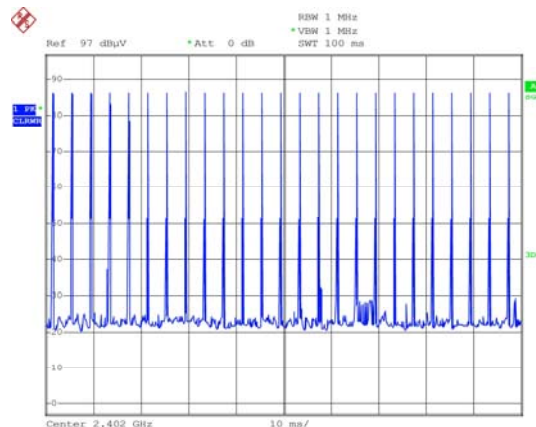


5.3. Uncertainty

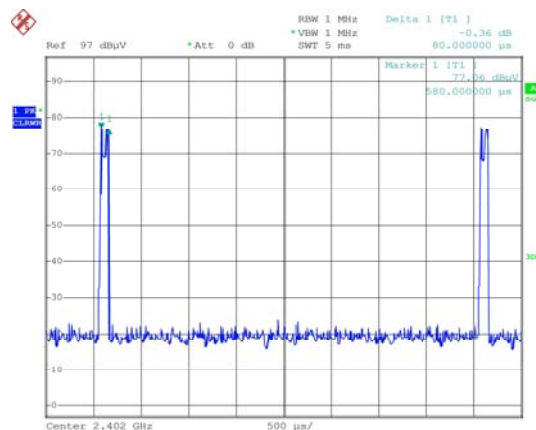
$\pm 150\text{Hz}$

5.4. Test Result of Duty Cycle

Product : ASUS WT425 Wireless Optical Mouse-Dongle
 Test Item : Duty Cycle Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit



Date: 14.JAN.2015 08:04:21



Date: 14.JAN.2015 08:29:39

Time on of 100ms= 0.08ms*25=2.000ms

Duty Cycle= 2.000ms / 100ms= 0.02

Duty Cycle correction factor= 20 LOG 0.02= -33.979 dB

Duty Cycle correction factor	-33.979	dB
------------------------------	---------	----

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.