

FCC Test Report

Product Name	Wireless Mouse
Model No.	WT710,WT720
FCC ID	MSQ-WT710

Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan

Date of Receipt	Apr. 09, 2013
Issued Date	May 09, 2013
Report No.	134195R-RFUSP44V01
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: May 09, 2013

Report No.: 134195R-RFUSP44V01



Product Name	Wireless Mouse
Applicant	ASUSTeK COMPUTER INC.
Address	4F, No. 150, Li-Te Rd., Peitou, Taipei, Taiwan
Manufacturer	ASUSTeK COMPUTER INC.
Model No.	WT710,WT720
EUT Rated Voltage	DC 1.5V(Power by battery)
EUT Test Voltage	DC 1.5V(Power by battery)
Trade Name	ASUS
Applicable Standard	FCC CFR Title 47 Part 15 Subpart C: 2012 ANSI C63.4: 2003, ANSI C63.10: 2009
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 : Nowal Kuo
(Engineer / Nowal Kuo)

Approved By : [Signature]
(Manager / 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	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.....	12
3.1. Test Equipment.....	12
3.2. Test Setup	13
3.3. Limits	14
3.4. Test Procedure	15
3.5. Uncertainty	15
3.6. Test Result of Radiated Emission.....	16
4. Band Edge	54
4.1. Test Equipment.....	54
4.2. Test Setup	55
4.3. Limits	56
4.4. Test Procedure	56
4.5. Uncertainty	56
4.6. Test Result of Band Edge	57
5. Duty Cycle.....	73
5.1. Test Equipment.....	73
5.2. Test Setup	73
5.3. Uncertainty	73
5.4. Test Result of Duty Cycle.....	74
6. EMI Reduction Method During Compliance Testing	76
Attachment 1: EUT Test Photographs	
Attachment 2: EUT Detailed Photographs	

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Wireless Mouse
Trade Name	ASUS
Model No.	WT710,WT720
FCC ID	MSQ-WT710
Frequency Range	2402~2480MHz
Channel Control	Auto
Channel Separation	1MHz
Antenna Type	Printed on PCB
Channel Number	79
Type of Modulation	GFSK
USB Mouse Dongle	ASUS, SD-9082
Power source	DC 1.5V by AA battery*2

Antenna List

No.	Manufacturer	Model No.	Peak Gain
1	ASUSTek COMPUTER INC.	N/A	1.42 dBi 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 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 79:	2480 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 Wireless Mouse 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.
5. The mouse operation with dongle, the dongle has been granted under the FCC ID: H4IDG9082

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

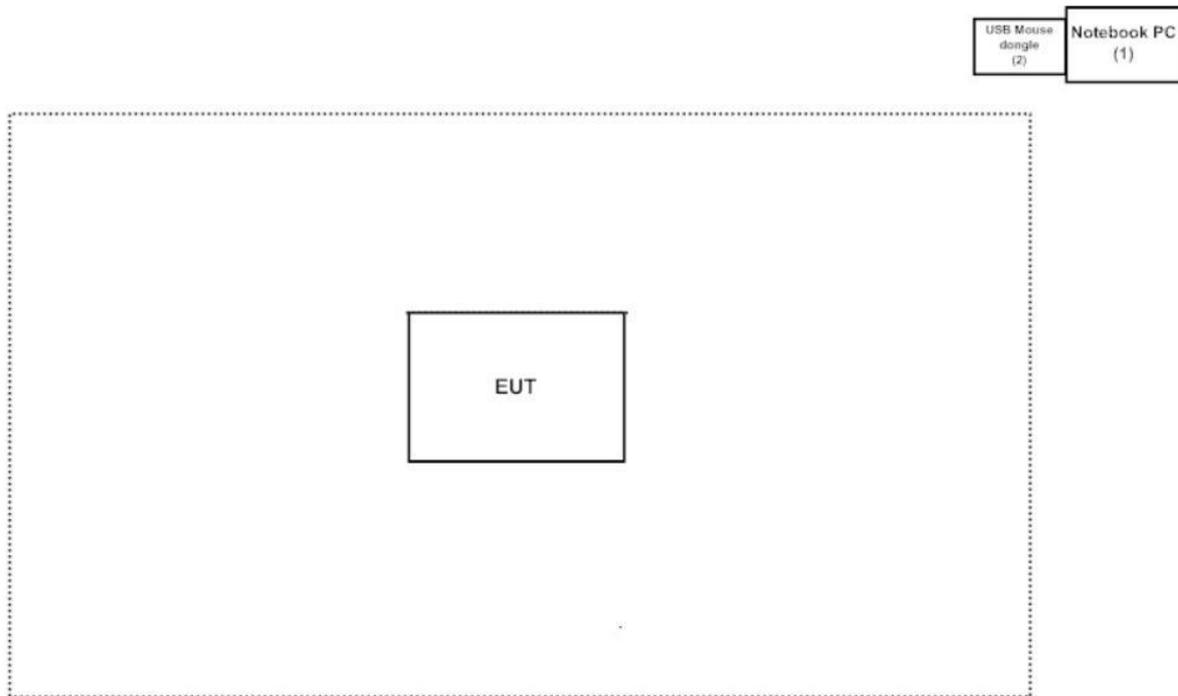
1.3. Tested System Details

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	USB Mouse dongle	ASUS	SD-9082	N/A	N/A

Signal Cable Type	Signal Cable Description
	N/A

1.4. Configuration of Test System



1.5. EUT Exercise Software

- (1) Setup the EUT as shown on 1.4
- (2) EUT test mode via USB Mouse dongle transmits wireless control signal.
- (3) Exercise Execute program “CookieRFtool V1.0” on the Notebook PC.
- (4) Configure the test mode, the test channel, and the data rate.
- (5) Start transmits continually.
- (6) 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

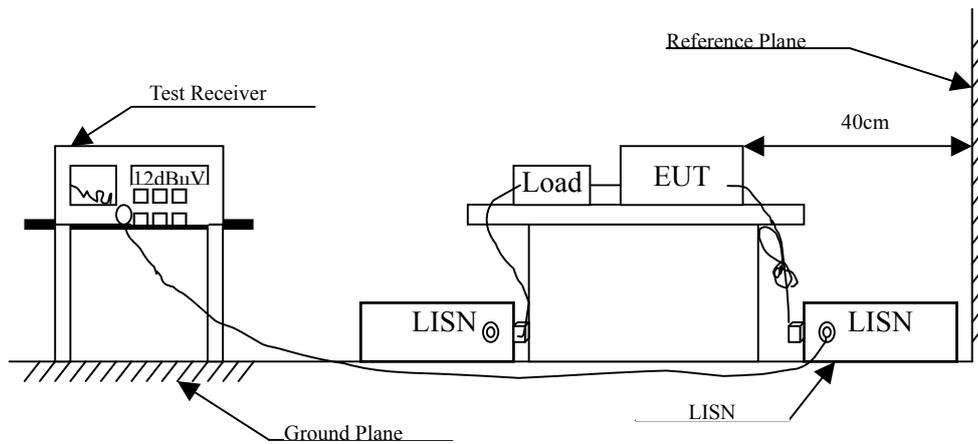
2.1. Test Equipment

	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.	Remark
X	Test Receiver	R & S	ESCS 30 / 825442/018	Sep., 2012	
X	Artificial Mains Network	R & S	ENV4200 / 848411/10	Feb., 2013	Peripherals
X	LISN	R & S	ESH3-Z5 / 825562/002	Feb., 2013	EUT
	DC LISN	Schwarzbeck	8226 / 176	Mar, 2013	EUT
X	Pulse Limiter	R & S	ESH3-Z2 / 357.8810.52	Feb., 2013	
	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 C63.10: 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

Owing to the DC operation of EUT, this test item is not performed.

3. Radiated Emission

3.1. Test Equipment

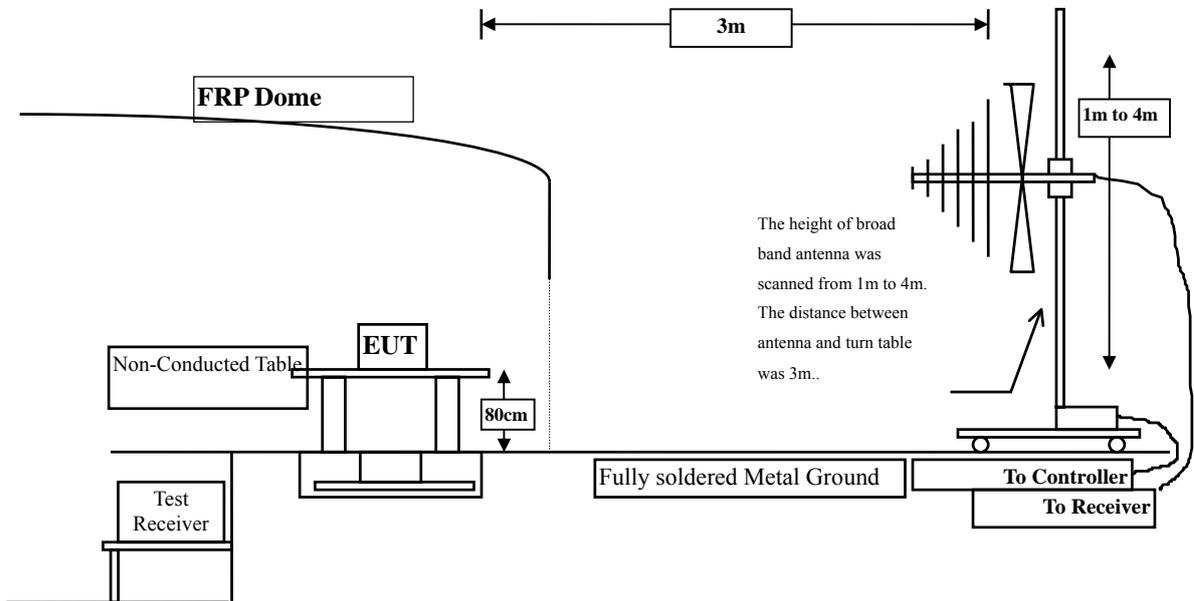
The following test equipment are used during the radiated emission test:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	X Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	X Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2013
	X Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X Pre-Amplifier	MITEQ	AMF-4D-180400-45-6P/ 925975	Mar, 2013
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	X Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

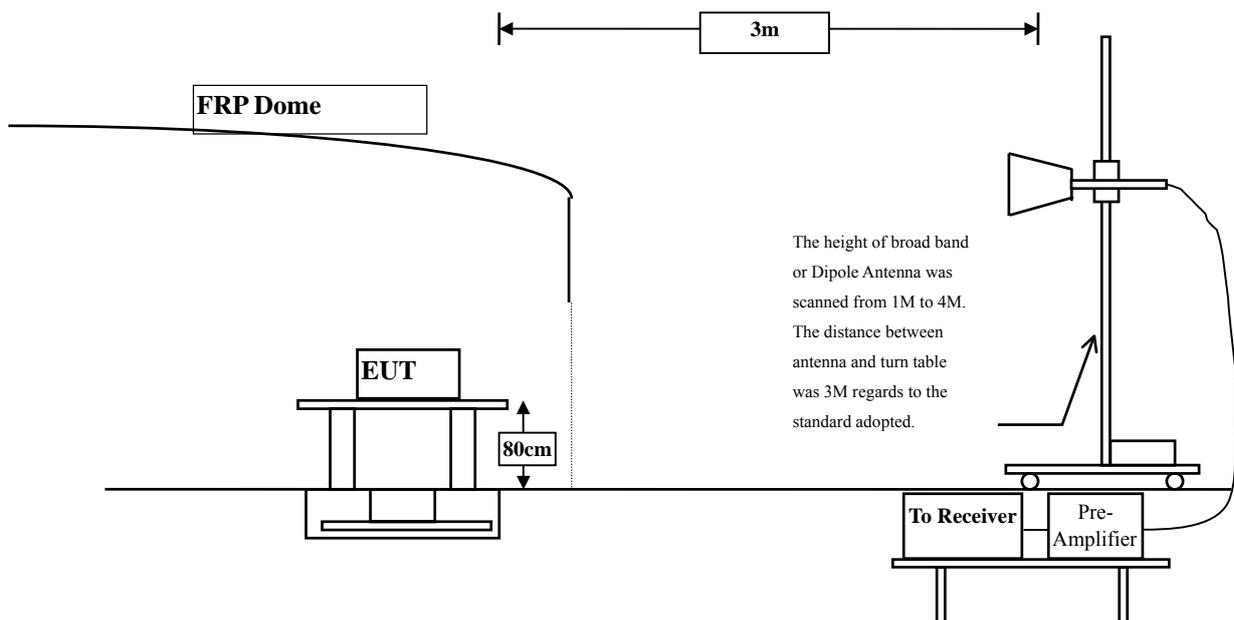
- Note:
1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
 2. The test instruments marked with "X" are used to measure the final test results.

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 C63.10: 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 C63.10: 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 : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X-Axis) – (Metal)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	33.755	55.300	89.054	-24.946	114.000
2440.000	33.838	55.150	88.988	-25.012	114.000
2480.000	33.941	55.460	89.401	-24.599	114.000
Vertical					
Peak Detector:					
2402.000	32.241	52.150	84.391	-29.609	114.000
2440.000	32.375	52.590	84.966	-29.034	114.000
2480.000	32.568	52.610	85.178	-28.822	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:

2402.000	89.054	-42.757	46.297	-47.703	94.000
2440.000	88.988	-42.757	46.231	-47.769	94.000
2480.000	89.401	-42.757	46.644	-47.356	94.000

Vertical
Average Detector:

2402.000	84.391	-42.757	41.634	-52.366	94.000
2440.000	84.966	-42.757	42.209	-51.791	94.000
2480.000	85.178	-42.757	42.421	-51.579	94.000

Note:

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

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Y-Axis) – (Metal)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	33.755	60.890	94.644	-19.356	114.000
2440.000	33.838	61.070	94.908	-19.092	114.000
2480.000	33.941	60.100	94.041	-19.959	114.000
Vertical					
Peak Detector:					
2402.000	32.241	57.990	90.231	-23.769	114.000
2440.000	32.375	58.590	90.966	-23.034	114.000
2480.000	32.568	57.420	89.988	-24.012	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:

2402.000	94.644	-42.757	51.887	-42.113	94.000
2440.000	94.908	-42.757	52.151	-41.849	94.000
2480.000	94.041	-42.757	51.284	-42.716	94.000

Vertical
Average Detector:

2402.000	90.231	-42.757	47.474	-46.526	94.000
2440.000	90.966	-42.757	48.209	-45.791	94.000
2480.000	89.988	-42.757	47.231	-46.769	94.000

Note:

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

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Z-Axis) – (Metal)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	33.755	60.010	93.764	-20.236	114.000
2440.000	33.838	60.250	94.088	-19.912	114.000
2480.000	33.941	60.310	94.251	-19.749	114.000
Vertical					
Peak Detector:					
2402.000	32.241	63.890	96.131	-17.869	114.000
2440.000	32.375	64.460	96.836	-17.164	114.000
2480.000	32.568	64.590	97.158	-16.842	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:

2402.000	93.764	-42.757	51.007	-42.993	94.000
2440.000	94.088	-42.757	51.331	-42.669	94.000
2480.000	94.251	-42.757	51.494	-42.506	94.000

Vertical
Average Detector:

2402.000	96.131	-42.757	53.374	-40.626	94.000
2440.000	96.836	-42.757	54.079	-39.921	94.000
2480.000	97.158	-42.757	54.401	-39.599	94.000

Note:

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

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (X-Axis) – (Plastic)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	56.100	87.674	-26.326	114.000
2440.000	31.852	57.550	89.402	-24.598	114.000
2480.000	32.155	57.490	89.646	-24.354	114.000
Vertical					
Peak Detector:					
2402.000	30.917	60.270	91.187	-22.813	114.000
2440.000	31.139	61.260	92.399	-21.601	114.000
2480.000	31.412	62.670	94.082	-19.918	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:

2402.000	87.674	-42.757	44.917	-49.083	94.000
2440.000	89.402	-42.757	46.645	-47.355	94.000
2480.000	89.646	-42.757	46.889	-47.111	94.000

Vertical
Average Detector:

2402.000	91.187	-42.757	48.430	-45.570	94.000
2440.000	92.399	-42.757	49.642	-44.358	94.000
2480.000	94.082	-42.757	51.325	-42.675	94.000

Note:

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

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Y-Axis) – (Plastic)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	59.920	91.494	-22.506	114.000
2440.000	31.852	60.750	92.602	-21.398	114.000
2480.000	32.155	62.810	94.966	-19.034	114.000
Vertical					
Peak Detector:					
2402.000	30.917	56.910	87.827	-26.173	114.000
2440.000	31.139	58.250	89.389	-24.611	114.000
2480.000	31.412	55.350	86.762	-27.238	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:

2402.000	91.494	-42.757	48.737	-45.263	94.000
2440.000	92.602	-42.757	49.845	-44.155	94.000
2480.000	94.966	-42.757	52.209	-41.791	94.000

Vertical
Average Detector:

2402.000	87.827	-42.757	45.070	-48.930	94.000
2440.000	89.389	-42.757	46.632	-47.368	94.000
2480.000	86.762	-42.757	44.005	-49.995	94.000

Note:

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

Product : Wireless Mouse
 Test Item : Fundamental Radiated Emission
 Test Site : No.3OATS
 Test Mode : Mode 1: Transmit (Z-Axis) – (Plastic)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
2402.000	31.573	53.110	84.684	-29.316	114.000
2440.000	31.852	55.690	87.542	-26.458	114.000
2480.000	32.155	54.600	86.756	-27.244	114.000
Vertical					
Peak Detector:					
2402.000	30.917	52.130	83.047	-30.953	114.000
2440.000	31.139	54.830	85.969	-28.031	114.000
2480.000	31.412	55.130	86.542	-27.458	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:

2402.000	84.684	-42.757	41.927	-52.073	94.000
2440.000	87.542	-42.757	44.785	-49.215	94.000
2480.000	86.756	-42.757	43.999	-50.001	94.000

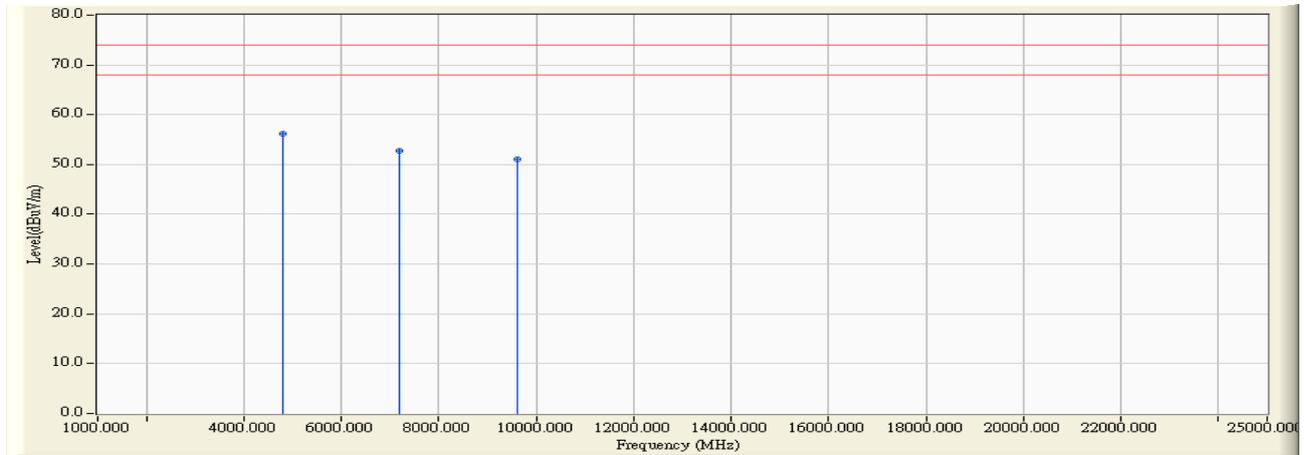
Vertical
Average Detector:

2402.000	83.047	-42.757	40.290	-53.710	94.000
2440.000	85.969	-42.757	43.212	-50.788	94.000
2480.000	86.542	-42.757	43.785	-50.215	94.000

Note:

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

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



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4804.000	3.327	52.800	56.127	-17.873	74.000
7206.000	10.136	42.560	52.696	-21.304	74.000
9608.000	13.706	37.290	50.996	-23.004	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.

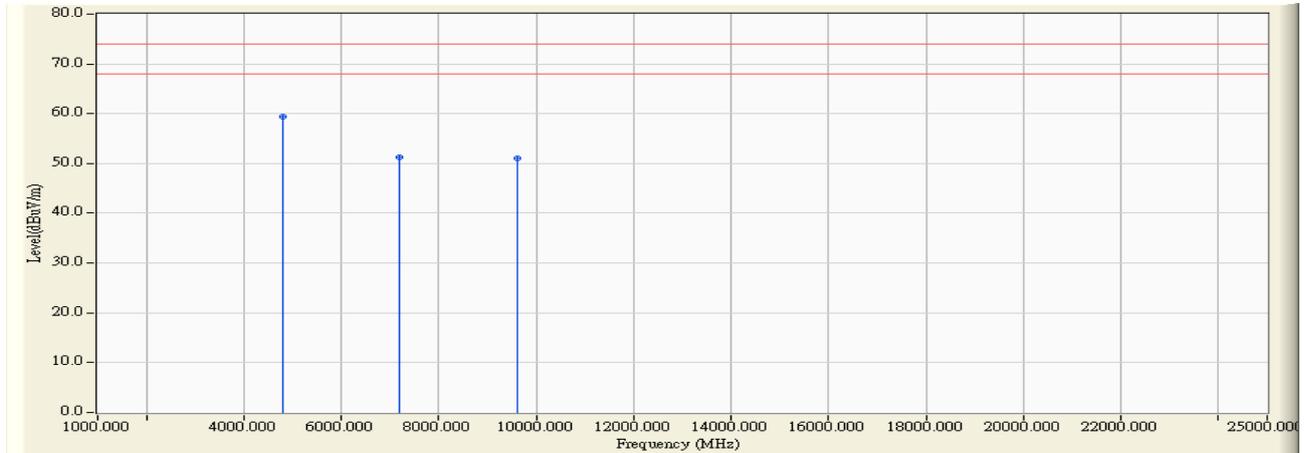
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4804	56.127	-42.757	13.370	-40.630	54.000

Note:

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

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



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4804.000	6.638	52.880	59.517	-14.483	74.000
7206.000	11.005	40.260	51.265	-22.735	74.000
9608.000	14.103	37.000	51.103	-22.897	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.

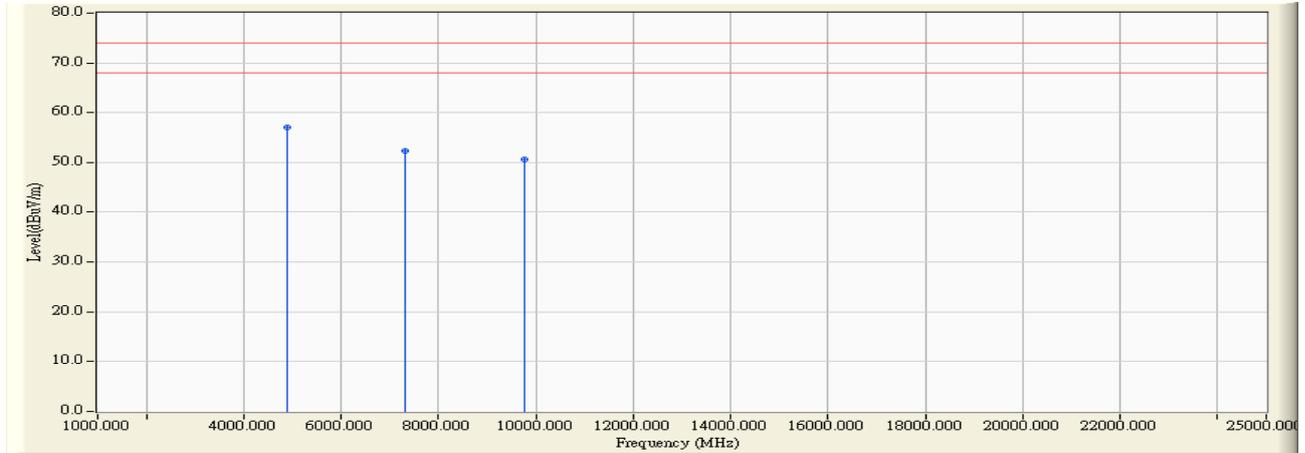
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4804	59.157	-42.757	16.400	-37.600	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz) – (Metal)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Horizontal					
Peak Detector:					
4880.000	3.010	54.050	57.060	-16.940	74.000
7320.000	11.833	40.426	52.260	-21.740	74.000
9760.000	12.580	37.929	50.510	-23.490	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.

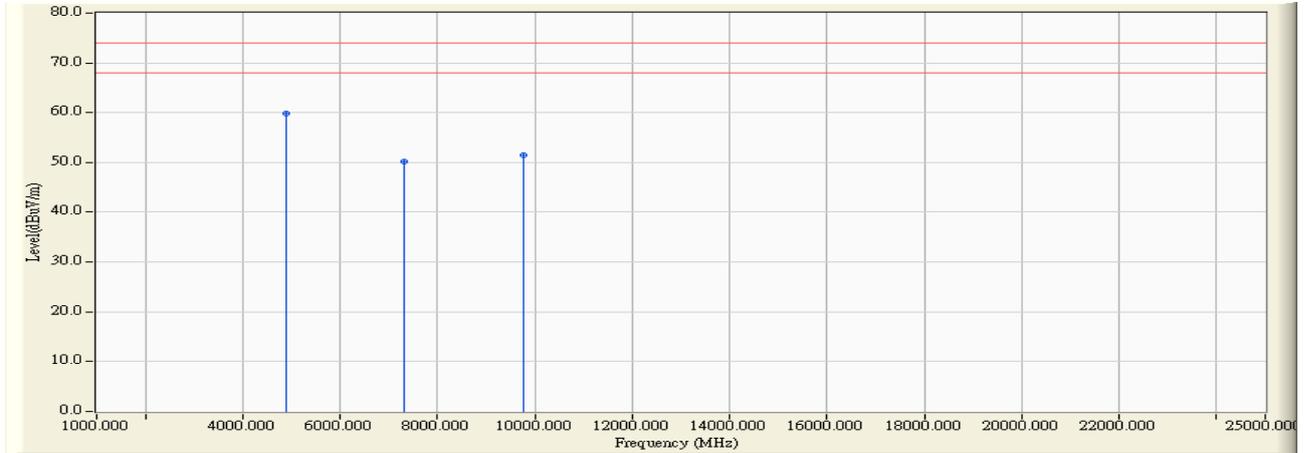
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4880	57.06	-42.757	14.303	-39.697	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz) – (Metal)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Vertical					
Peak Detector:					
4880.000	5.738	54.142	59.880	-14.120	74.000
7320.000	12.703	37.587	50.290	-23.710	74.000
9760.000	13.052	38.408	51.460	-22.540	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.

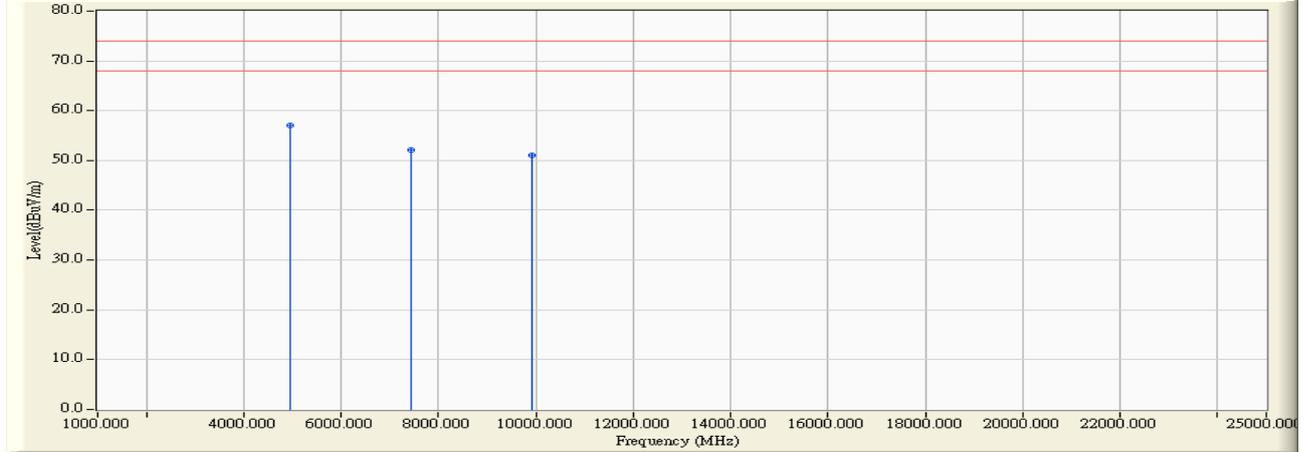
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4880	59.88	-42.757	17.123	-36.877	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Metal)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.760	54.270	57.030	-16.970	74.000
7440.000	12.567	39.514	52.080	-21.920	74.000
9920.000	13.456	37.604	51.060	-22.940	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.

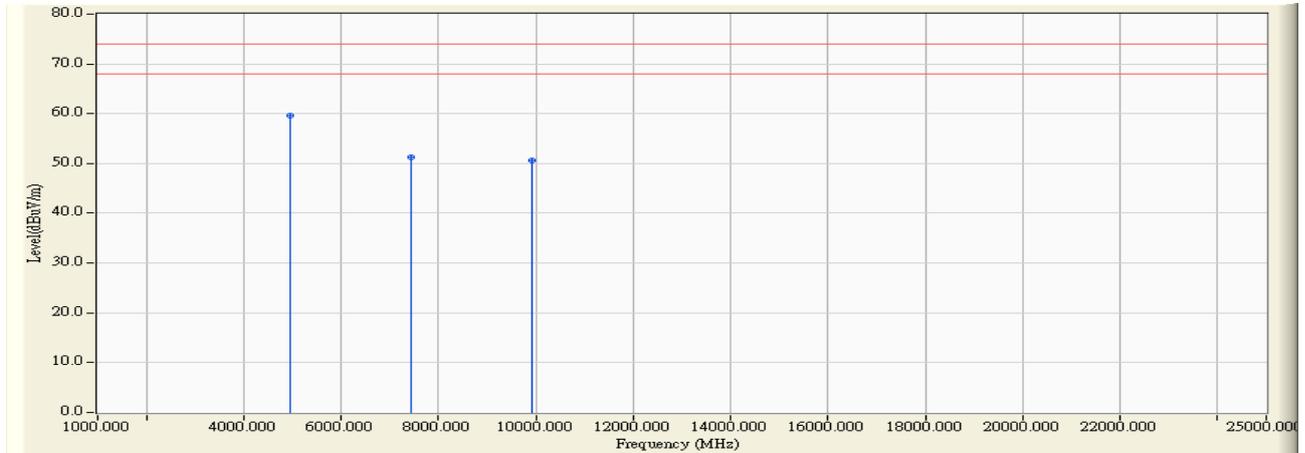
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4960	57.03	-42.757	14.273	-39.727	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480MHz) – (Metal)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4960.000	5.557	53.983	59.540	-14.460	74.000
7440.000	13.426	37.865	51.290	-22.710	74.000
9920.000	13.958	36.552	50.510	-23.490	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.

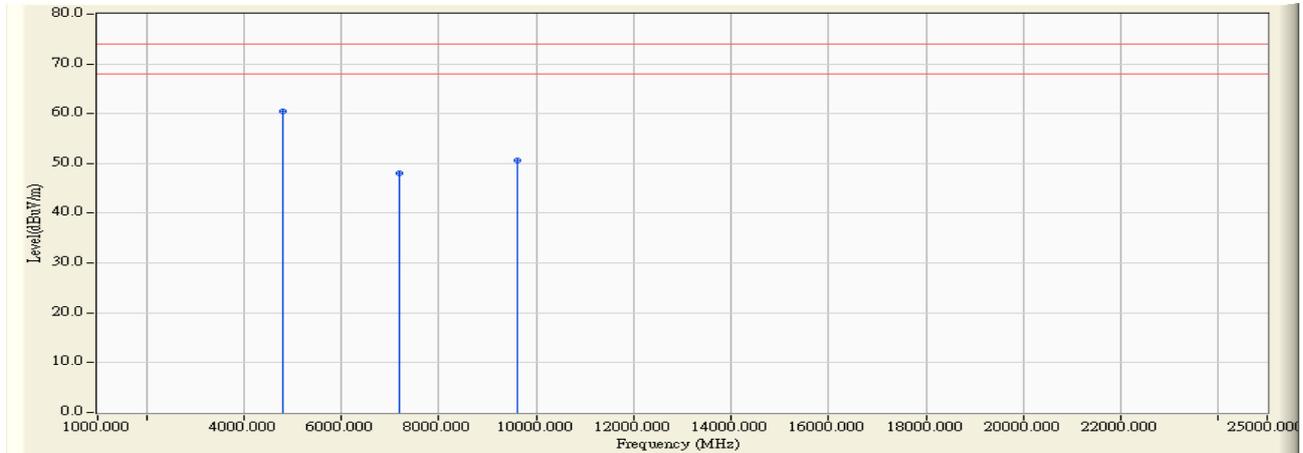
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4960	59.54	-42.757	16.783	-37.217	54.000

Note:

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

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



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4804.000	3.327	57.070	60.397	-13.603	74.000
7206.000	10.136	37.940	48.076	-25.924	74.000
9608.000	13.706	37.010	50.716	-23.284	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.

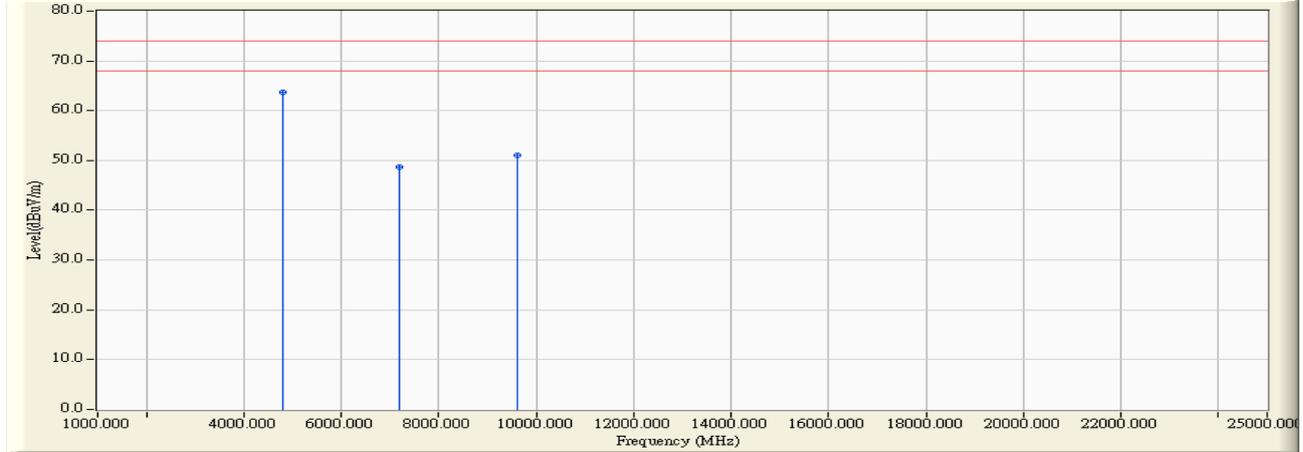
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4804	60.397	-42.757	17.640	-36.360	54.000

Note:

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

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



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4804.000	6.638	56.960	63.597	-10.403	74.000
7206.000	11.005	37.610	48.615	-25.385	74.000
9608.000	14.103	36.990	51.093	-22.907	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.

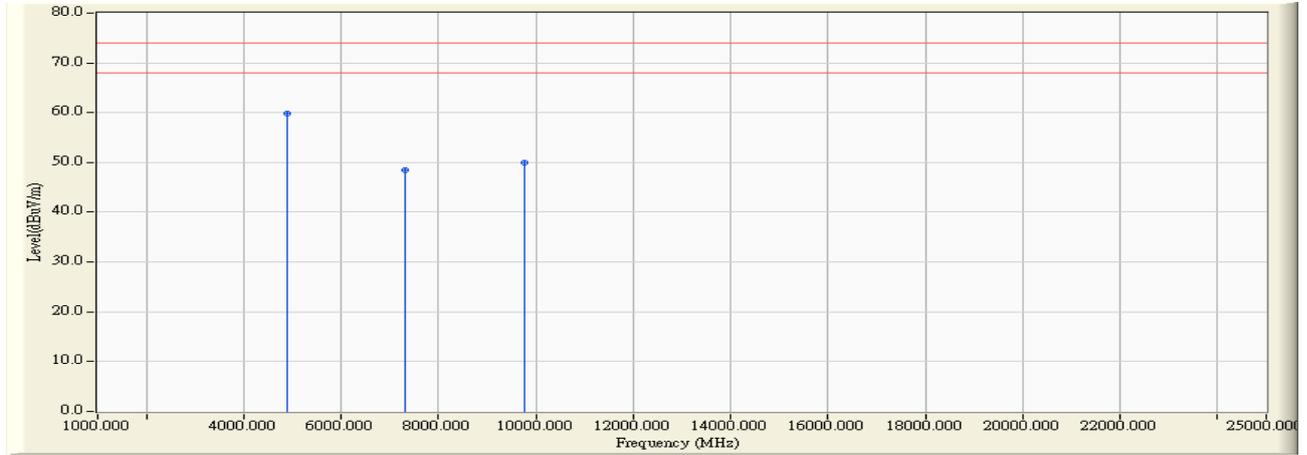
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4804	63.597	-42.757	20.840	-33.160	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz) – (Plastic)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Horizontal					
Peak Detector:					
4880.000	3.010	56.920	59.930	-14.070	74.000
7320.000	11.833	36.670	48.504	-25.496	74.000
9760.000	12.580	37.400	49.981	-24.019	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.

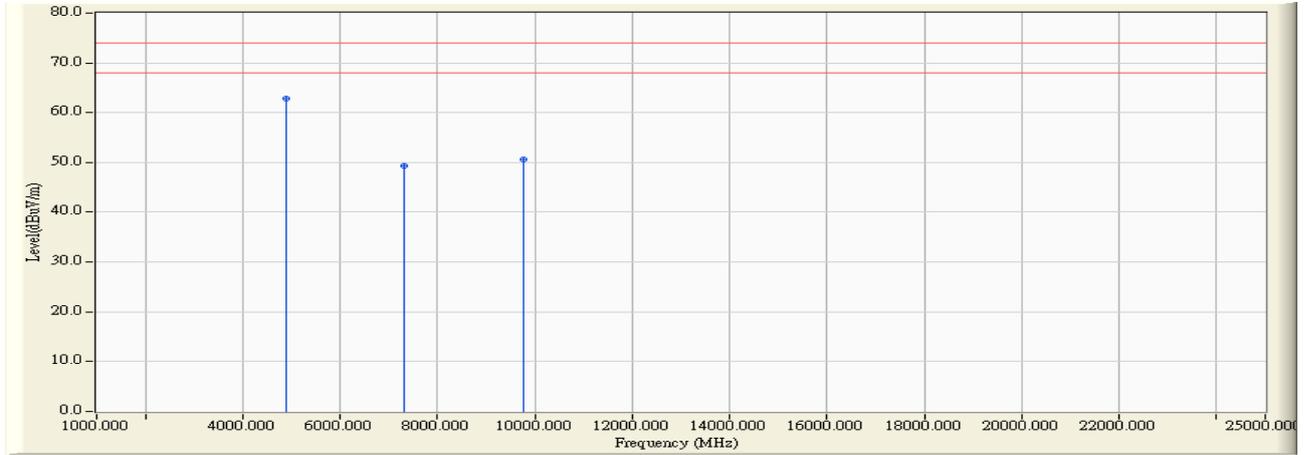
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4880	59.93	-42.757	17.173	-36.827	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440MHz) – (Plastic)



Frequency MHz	Correct Factor Db	Reading Level dBuV	Measurement Level dBuV/m	Margin Db	Limit dBuV/m
Vertical					
Peak Detector:					
4880.000	5.738	57.000	62.738	-11.262	74.000
7320.000	12.703	36.530	49.233	-24.767	74.000
9760.000	13.052	37.560	50.612	-23.388	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.

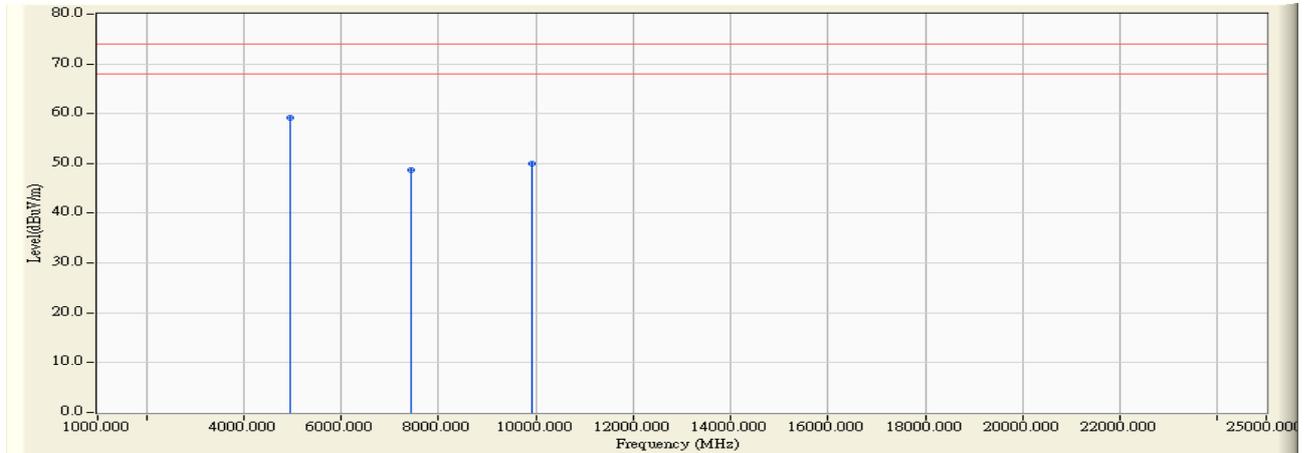
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Average Detector:					
4880	62.738	-42.757	19.981	-34.019	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Plastic)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Peak Detector:					
4960.000	2.760	56.460	59.220	-14.780	74.000
7440.000	12.567	36.220	48.786	-25.214	74.000
9920.000	13.456	36.560	50.016	-23.984	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.

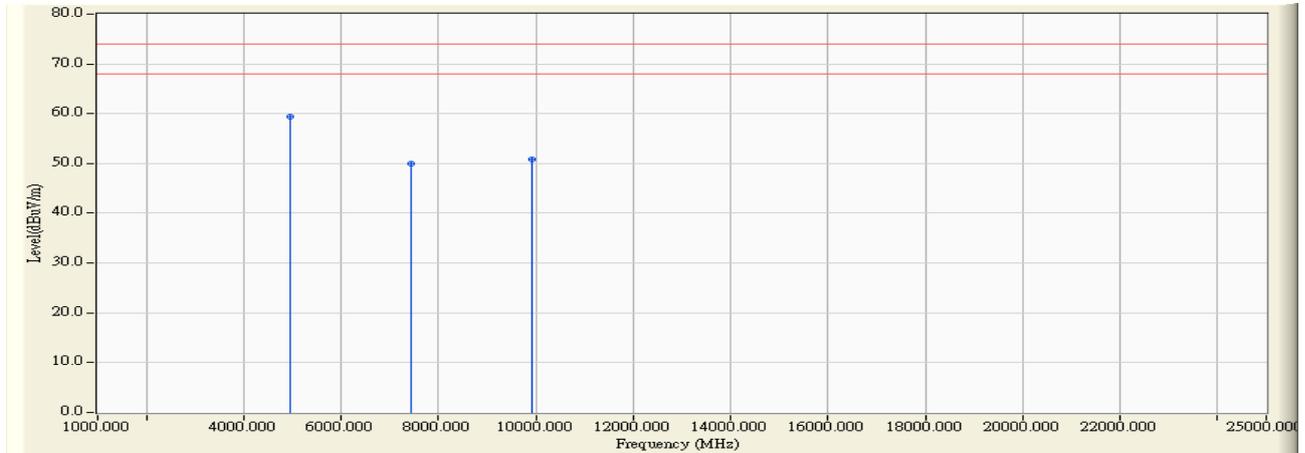
Average Detector:

Frequency MHz	Peak Measurement dBuV/m	Duty Cycle Correct Factor dB	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
Average Detector:					
4960	59.22	-42.757	16.463	-37.537	54.000

Note:

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

Product : Wireless Mouse
 Test Item : Harmonic Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480MHz) – (Plastic)



Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Peak Detector:					
4960.000	5.557	53.780	59.337	-14.663	74.000
7440.000	13.426	36.580	50.005	-23.995	74.000
9920.000	13.958	36.980	50.938	-23.062	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:					
4960	59.337	-42.757	16.580	-37.420	54.000

Note:

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

Product : Wireless Mouse
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz) – (Metal)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
458.740	0.833	24.144	24.977	-21.023	46.000
544.100	3.512	24.347	27.859	-18.141	46.000
644.980	1.552	28.596	30.148	-15.852	46.000
784.660	4.452	24.701	29.153	-16.847	46.000
856.440	6.382	22.849	29.231	-16.769	46.000
930.160	7.187	23.260	30.447	-15.553	46.000
Vertical					
105.660	-0.253	26.533	26.280	-17.220	43.500
344.280	-3.171	27.237	24.067	-21.933	46.000
709.000	0.058	26.476	26.534	-19.466	46.000
755.560	3.281	24.531	27.812	-18.188	46.000
844.800	3.181	22.859	26.040	-19.960	46.000
967.020	8.071	22.869	30.940	-23.060	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.

Product : Wireless Mouse
 Test Item : General Radiated Emission Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2440 MHz) – (Plastic)

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Horizontal					
352.040	-2.403	29.164	26.761	-19.239	46.000
515.000	1.610	24.431	26.041	-19.959	46.000
615.880	3.215	27.331	30.546	-15.454	46.000
646.920	1.793	29.478	31.271	-14.729	46.000
827.340	6.302	23.251	29.553	-16.447	46.000
928.220	6.893	24.624	31.517	-14.483	46.000
Vertical					
41.640	-1.809	30.837	29.028	-10.972	40.000
101.780	-0.021	25.058	25.036	-18.464	43.500
344.280	-3.171	27.251	24.081	-21.919	46.000
804.060	3.587	23.484	27.071	-18.929	46.000
885.540	2.552	23.288	25.840	-20.160	46.000
967.020	8.071	23.223	31.294	-22.706	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, 2012
	Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X	Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

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.

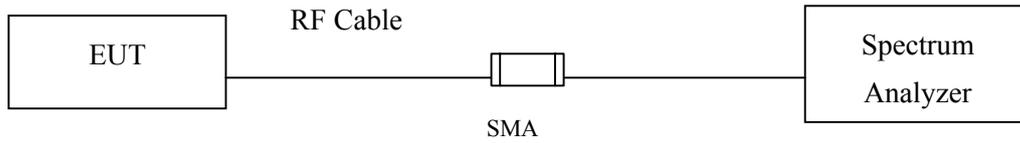
The following test equipments are used during the band edge tests:

Test Site	Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☒ Site # 3	Bilog Antenna	Schaffner Chase	CBL6112B/2673	Sep., 2012
	X Horn Antenna	Schwarzbeck	BBHA9120D/D305	Sep., 2012
	Horn Antenna	Schwarzbeck	BBHA9170/208	Jul., 2012
	X Pre-Amplifier	QTK	AP-180C / CHM_0906076	Sep., 2012
	X Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2013
	Test Receiver	R & S	ESCS 30/ 825442/018	Sep., 2012
	X Coaxial Cable	Quietek	QTK-CABLE/ CAB5	Feb., 2013
	X Controller	Quietek	QTK-CONTROLLER/ CTRL3	N/A
	X Coaxial Switch	Anritsu	MP59B/6200265729	N/A

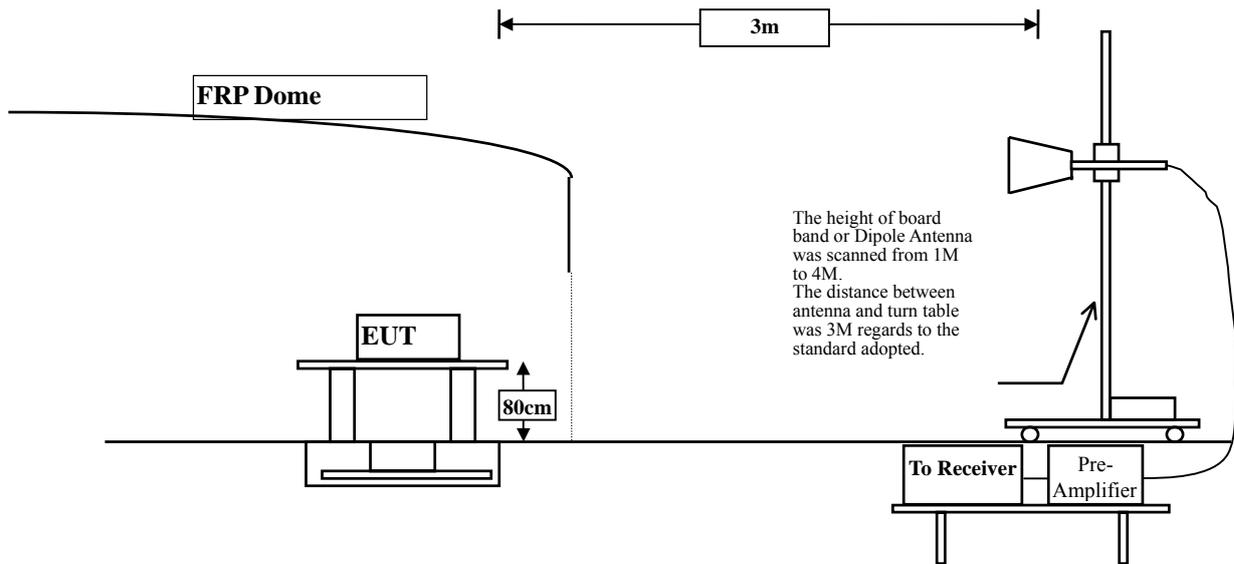
- Note:
1. All equipments are calibrated every one year.
 2. The test equipments marked by “X” are used to measure the final test results.

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 C63.10: 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

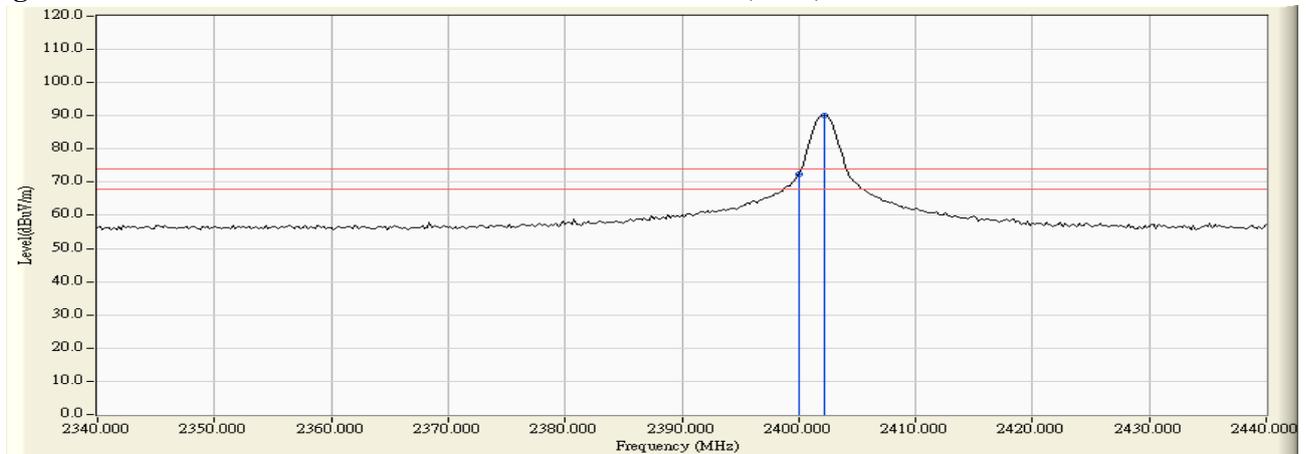
4.6. Test Result of Band Edge

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz) – (Metal)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2400.000	31.561	40.956	72.517	74.00	54.00	Pass
01 (Peak)	2402.200	31.574	58.517	90.092	--	--	Pass

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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Horizontal
Average Detector:

2400	72.517	-42.757	29.760	-24.240	54.000	Pass
------	--------	---------	--------	---------	--------	------

Note:

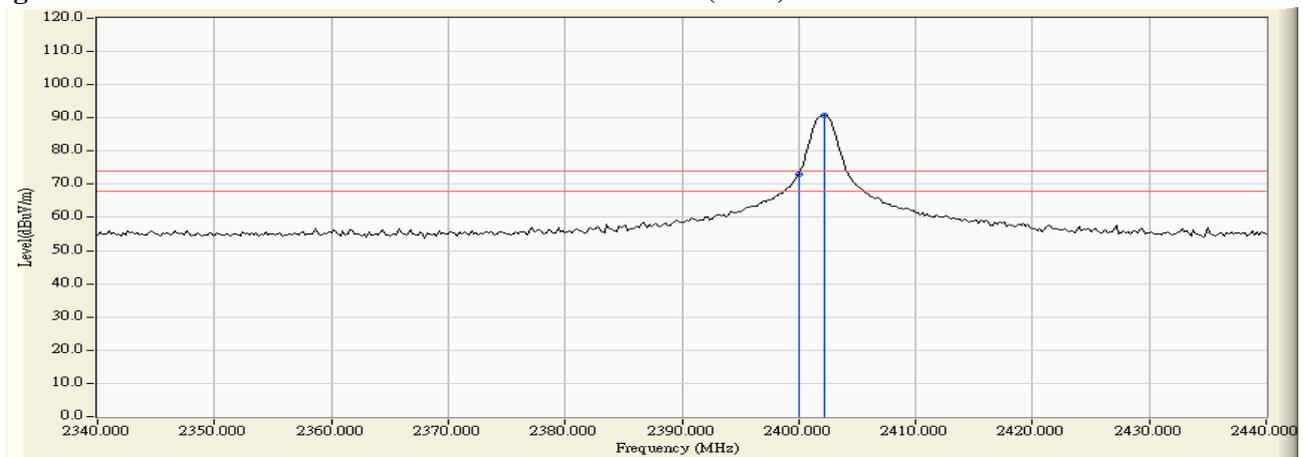
1. $AVG \text{ Measurement} = \text{Peak Measurement} + \text{Duty Cycle Correct Factor}$
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz) – (Metal)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2400.000	30.912	42.207	73.119	74.00	54.00	Pass
01 (Peak)	2402.200	30.917	59.916	90.834	--	--	Pass

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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Vertical
Average Detector:

2400	73.119	-42.757	30.362	-23.638	54.000	Pass
------	--------	---------	--------	---------	--------	------

Note:

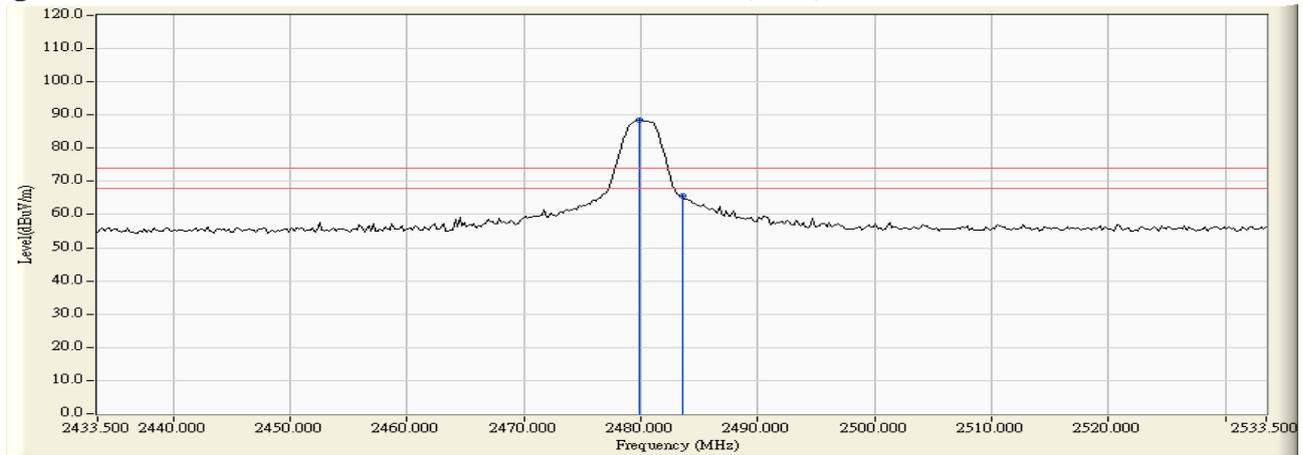
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Metal)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
79 (Peak)	2479.900	32.155	56.250	88.405	--	--	Pass
79 (Peak)	2483.500	32.182	33.472	65.654	74.00	54.00	Pass

Figure Channel 79: 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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Horizontal
Average Detector:

2483.5	65.654	-42.757	22.897	-31.103	54.000	Pass
--------	--------	---------	--------	---------	--------	------

Note:

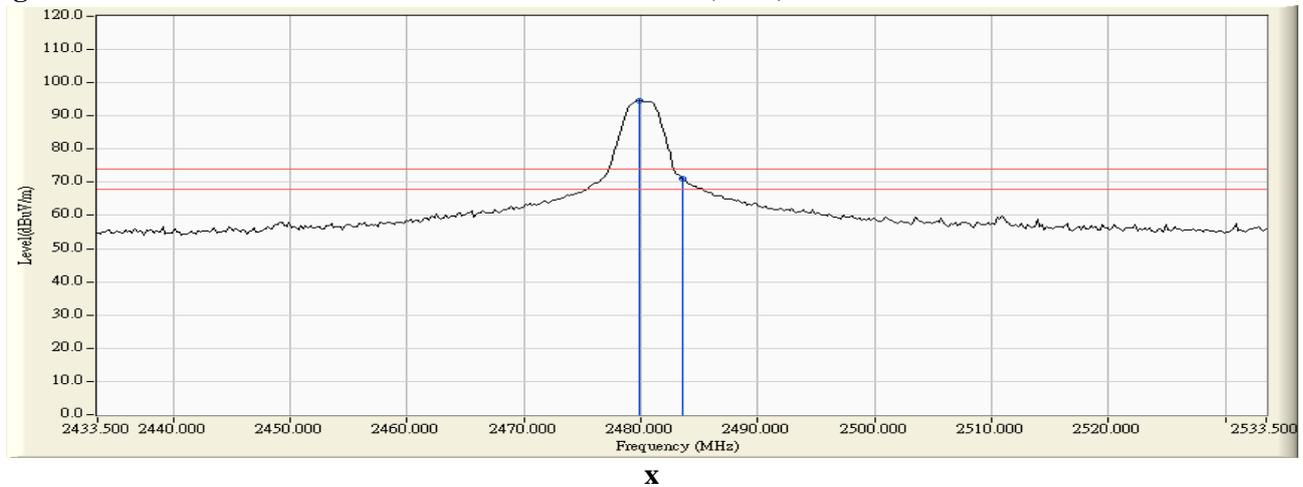
1. $AVG \text{ Measurement} = \text{Peak Measurement} + \text{Duty Cycle Correct Factor}$
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Metal)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
79 (Peak)	2479.900	31.411	63.131	94.542	--	--	Pass
79 (Peak)	2483.500	31.435	39.610	71.045	74.00	54.00	Pass

Figure Channel 79: 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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Vertical
Average Detector:

2483.5	71.045	-42.757	28.288	-25.712	54.000	Pass
--------	--------	---------	--------	---------	--------	------

Note:

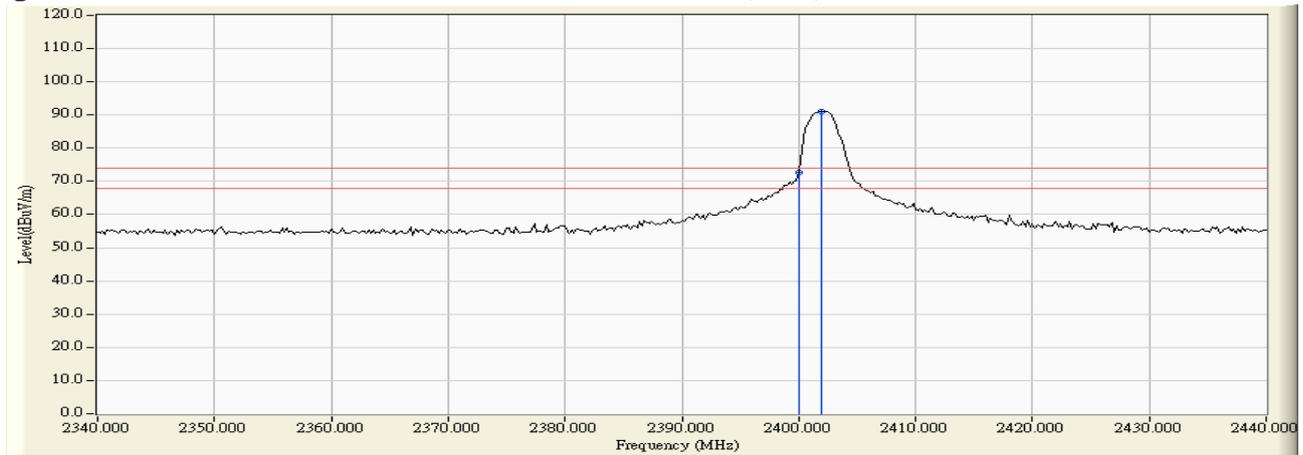
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz) – (Plastic)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2400.000	31.561	41.154	72.715	74.00	54.00	Pass
01 (Peak)	2402.000	31.573	59.530	91.104	--	--	Pass

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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Horizontal
Average Detector:

2400	72.715	-42.757	29.958	-24.042	54.000	Pass
------	--------	---------	--------	---------	--------	------

Note:

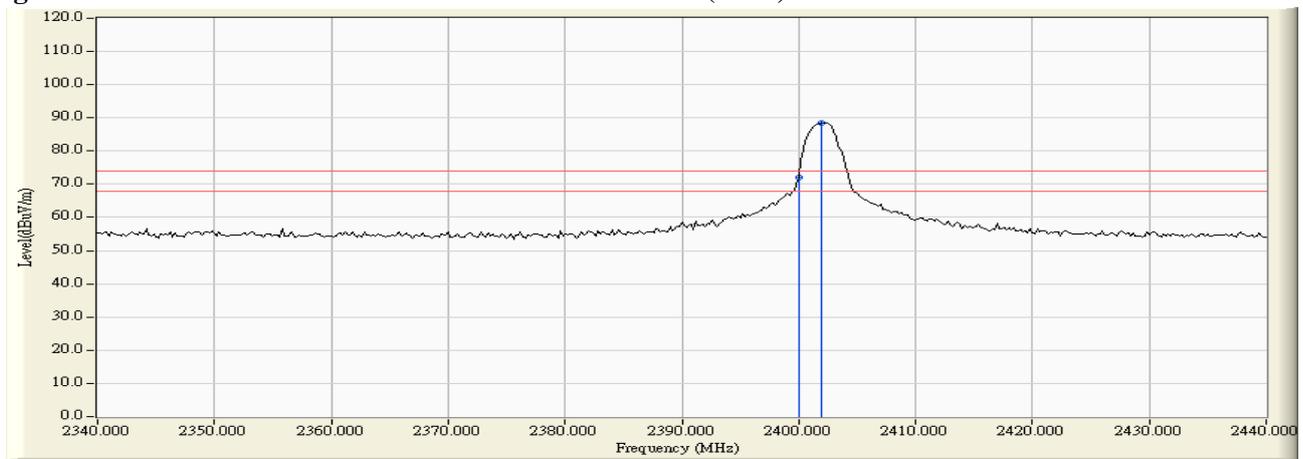
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2402 MHz) – (Plastic)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
01 (Peak)	2400.000	30.912	41.022	71.934	74.00	54.00	Pass
01 (Peak)	2402.000	30.917	57.442	88.359	--	--	Pass

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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Vertical
Average Detector:

2400	71.934	-42.757	29.177	-24.823	54.000	Pass
------	--------	---------	--------	---------	--------	------

Note:

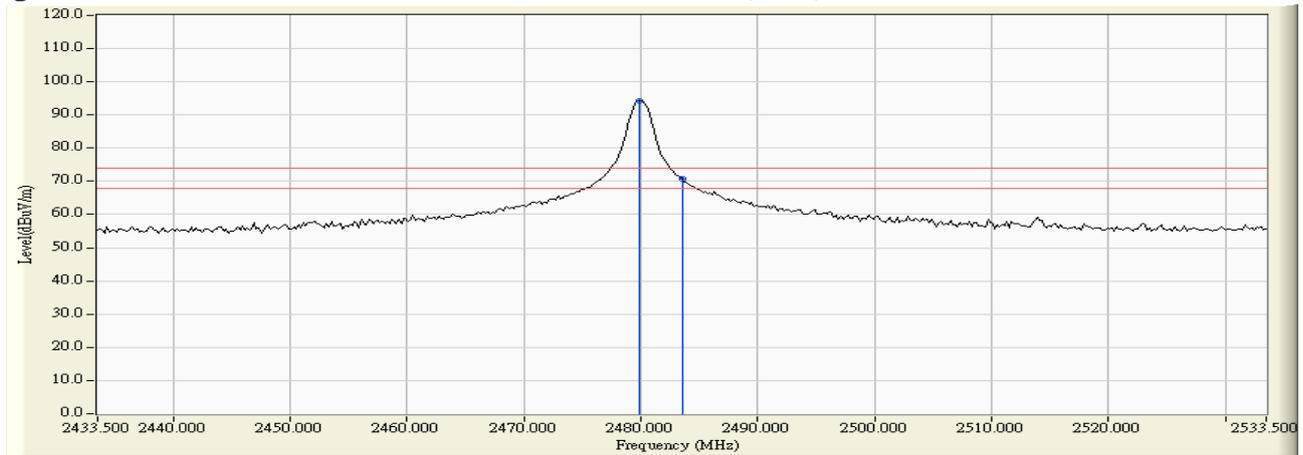
1. AVG Measurement=Peak Measurement + Duty Cycle Correct Factor
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Plastic)

RF Radiated Measurement (Horizontal):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
79 (Peak)	2479.900	32.155	62.165	94.320	--	--	Pass
79 (Peak)	2483.500	32.182	38.543	70.725	74.00	54.00	Pass

Figure Channel 79: 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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Horizontal
Average Detector:

2483.5	70.725	-42.757	27.968	-26.032	54.000	Pass
--------	--------	---------	--------	---------	--------	------

Note:

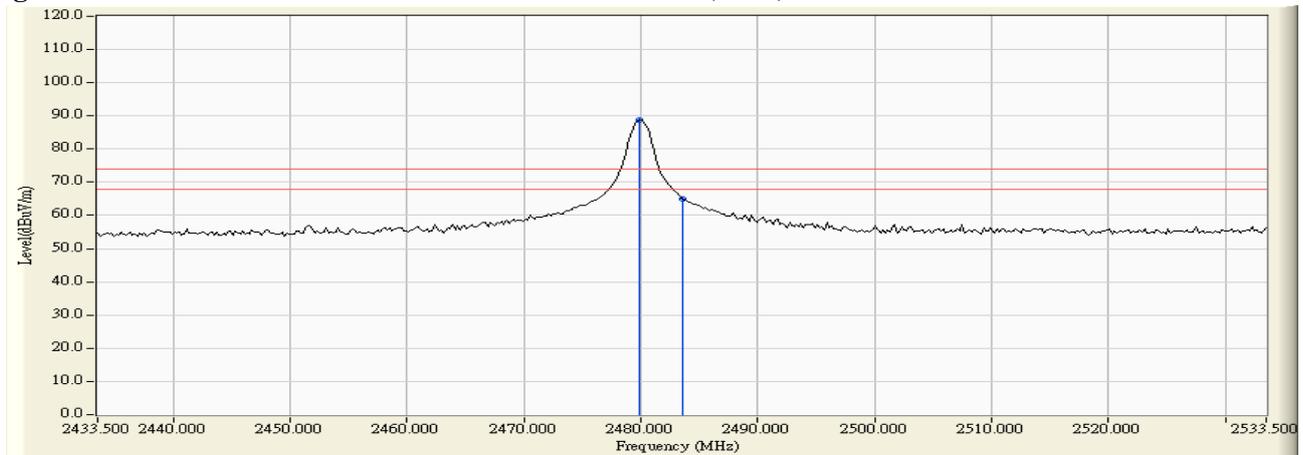
1. $AVG \text{ Measurement} = \text{Peak Measurement} + \text{Duty Cycle Correct Factor}$
2. The Duty Cycle is refer to section 5.

Product : Wireless Mouse
 Test Item : Band Edge Data
 Test Site : No.3 OATS
 Test Mode : Mode 1: Transmit (2480 MHz) – (Plastic)

RF Radiated Measurement (Vertical):

Channel No.	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Emission Level (dBuV/m)	Peak Limit (dBuV/m)	Average Limit (dBuV/m)	Result
79 (Peak)	2479.900	31.411	57.296	88.707	--	--	Pass
79 (Peak)	2483.500	31.435	33.706	65.141	74.00	54.00	Pass

Figure Channel 20: 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 MHz	Peak Measurement dB μ V/m	Duty Cycle Factor dB	Measurement Level dB μ V/m	Margin dB	Limit dB μ V/m	Result Pass
------------------	-------------------------------------	----------------------------	--------------------------------------	--------------	-----------------------	----------------

Vertical
Average Detector:

2483.5	65.141	-42.757	22.384	-31.616	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

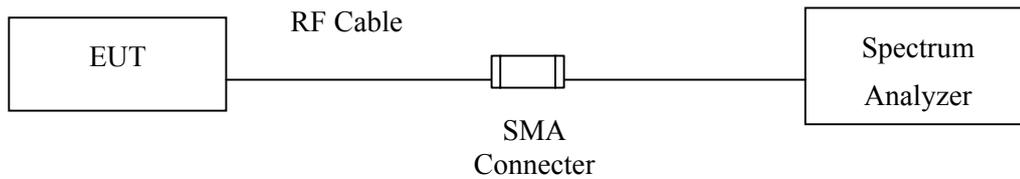
5.1. Test Equipment

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, 2012
Spectrum Analyzer	Agilent	E4407B / US39440758	Jun, 2012
X Spectrum Analyzer	Agilent	N9010A / MY48030495	Apr., 2013

- 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

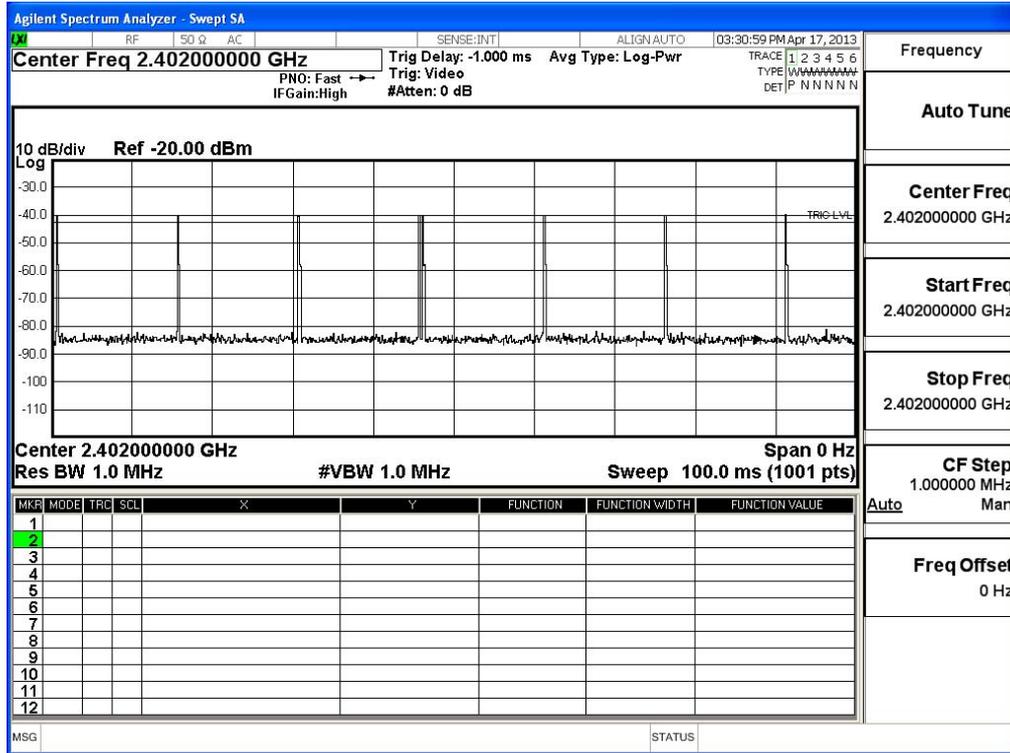


5.3. Uncertainty

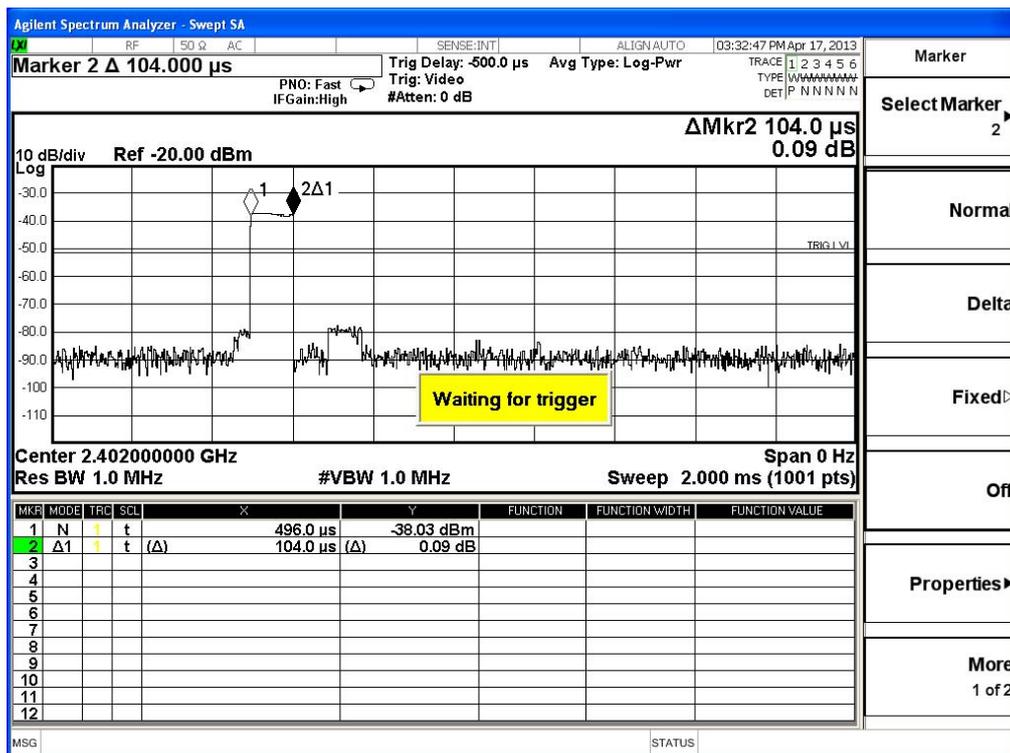
± 150Hz

5.4. Test Result of Duty Cycle

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



Frequency
Auto Tune
Center Freq 2.402000000 GHz
Start Freq 2.402000000 GHz
Stop Freq 2.402000000 GHz
CF Step 1.000000 MHz Auto Man
Freq Offset 0 Hz



Marker
Select Marker 2
Normal
Delta
Fixed
Off
Properties
More 1 of 2

Time on of 100ms= 0.104ms*7=0.728ms

Duty Cycle= 0.728ms / 100ms= 0.00728

Duty Cycle correction factor= 20 LOG 0.00728= -42.757dB

Duty Cycle correction factor	-42.757	dB
-------------------------------------	----------------	-----------

6. EMI Reduction Method During Compliance Testing

No modification was made during testing.