

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT INTENTIONAL RADIATOR CERTIFICATION

Product Name : Wireless Mouse
Model Number : WMXXX Series
Trade Name : N/A
FCC ID : XSDWMXXX
Report Number : SZEE090911430901
Date : October 17, 2009

Standards	Results
<input checked="" type="checkbox"/> 47 CFR FCC Part 15 Subpart C 15.249	PASS

Prepared for:

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N/A means not applicable.

1. CERTIFICATION INFORMATION

Applicant & Address: Advanced Sun Wah Electronic Co., Ltd
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Kok, Kowloon,Hongkong,China
Advanced Sun Wah Electronic Co., Ltd

Manufacturer & Address: Unit 10,19F/,Kowloon Plaza, No.485 Castle Peak Road, Lai Chi
Kok, Kowloon,Hongkong,China

Type of Test: FCC Part 15 (Certification)

FCC ID: XSDWMXXX

Equipment Under Test: Wireless Mouse

Model Name: WMXXX(XXX stand for 000-999)

Test Model: WM113

Trade Name: N/A

Serial Number: Not Applicable

Technical Data: DC 3V

Date of test: September 21,2009 to October 17, 2009

Condition of Test Sample: Normal

The above equipment was tested by Centre Testing International for compliance with the requirements set forth in the FCC Rules and Regulations Part 15, Subpart C and the measurement procedure according to ANSI C63.4.
The test results of this report relate only to the tested sample identified in this report.

Prepared by :


Saky Yan

Reviewed by :


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Approved by :


Jim Zhang
Manager

Date

:

October 17, 2009

2. TEST SUMMARY

Clause	Test Item	Result
1	20dB Bandwidth	PASS
2	Bandedge Emission	PASS
3	Radiated Emission	PASS

3. MEASUREMENT UNCERTAINTY

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement items	Uncertainty
Maximum Peak Conducted Output Power	0.5 dB
Radiated Emissions / Bandedge Emission	3.4 dB

4. PRODUCT INFORMATION

Items	Description
Rating	DC 3V
Intentional Transceiver	Intentional Transceiver
Modulation	FSK
Frequency Range	2402 ~ 2480 MHz
Channel Number	79 (at intervals of 1MHz)
Antenna	Type: PCB Antenna
	Gain: 0dBi

The models of Wireless Mouse is WMXXX, all the models are identical except for the color, the appearance and the model name. And the test model is WM113, all the test results are applicable to the other models.

5. SYSTEM TEST CONFIGURATION

5.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. It was powered by 12V DC. Only the worst case data were recorded in this test report.

The signal is maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

5.2 EUT Exercising Software

There was no special software to exercise the device.

6. TABLE OF TEST MODE

Preliminary tests were performed the entire possible Configuration in different modulation type and different data rate according to the following table to find the worst cases. And only one group of the worst - case data for each test item is shown in the report.

Test Items	Test Mode	Modulation	Channel
20dB Bandwidth	Transmitting	FSK	1 / 79
Bandedge Emission	Transmitting	FSK	1 / 79
Radiated Emission	Transmitting	FSK	1 / 40 / 79

7. TEST EQUIPMENT LIST

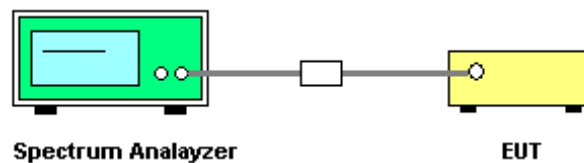
Equipment	Manufacturer	Model Number	Serial Number	Due Date
Receiver	R&S	ESCI	100435	08/25/2010
Spectrum Analyzer	Agilent	E4443A	MY45300910	08/25/2010
Biconilog Antenna	A.H.System	SAS-521-2	487	06/05/2010
Horn Antenna	ETS-LINDGREN	3117	00057407	06/27/2010
Loop Antenna	ETS-LINDGREN	6502	00071730	08/25/2010
3M Chamber & Accessories	ETS-LINDGREN	FACT-3	N/A	05/11/2010

8. 20DB BANDWIDTH MEASUREMENT

8.1. LIMITS

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

8.2. BLOCK DIAGRAM OF TEST SETUP

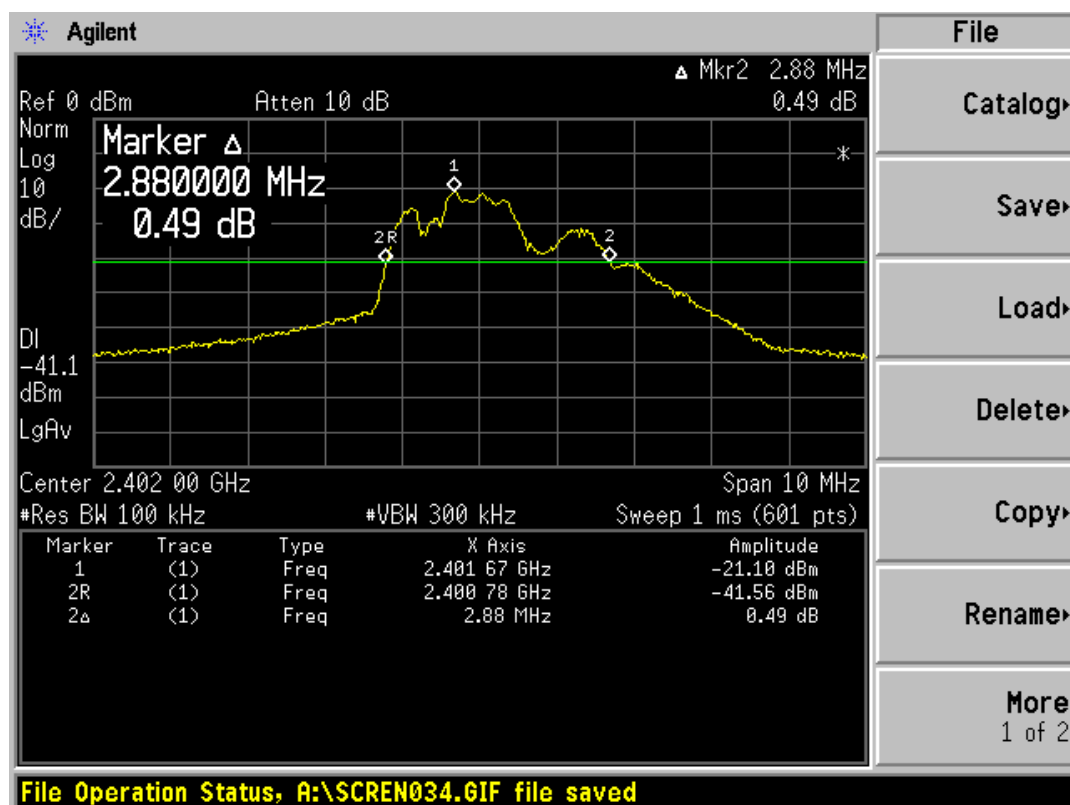


8.3. TEST PROCEDURE

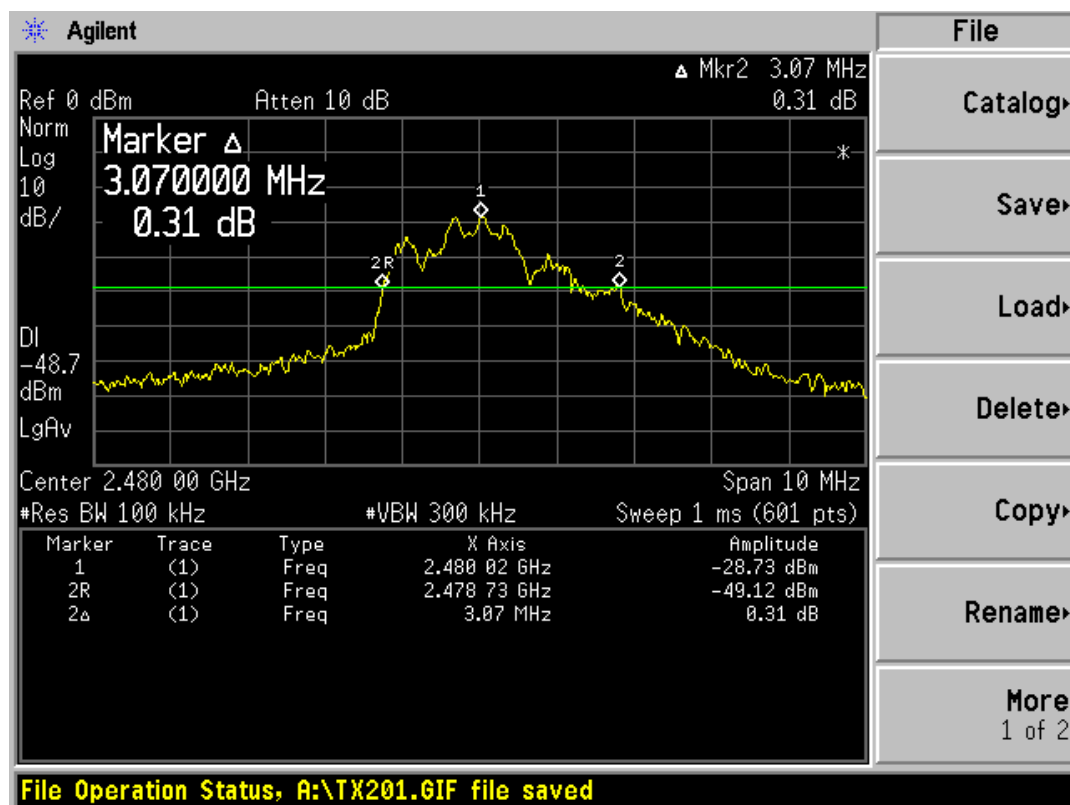
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level.
4. The 20dB bandwidth was determined from where the channel output spectrum intersected the display line.

8.4. TEST RESULT

Channel	Frequency (MHz)	20 dB BW (MHz)	Result
CH1	2402	2.88	3.0700 MHz
CH79	2480	3.07	



Channel 1_ 2402 MHz



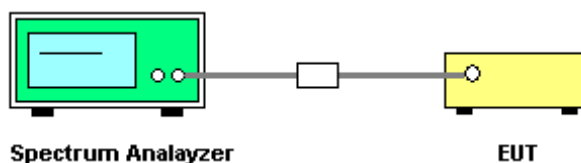
Channel 79_ 2480 MHz

9. BAND EDGE EMISSION MEASUREMENT

9.1. LIMITS

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

9.2. BLOCK DIAGRAM OF TEST SETUP

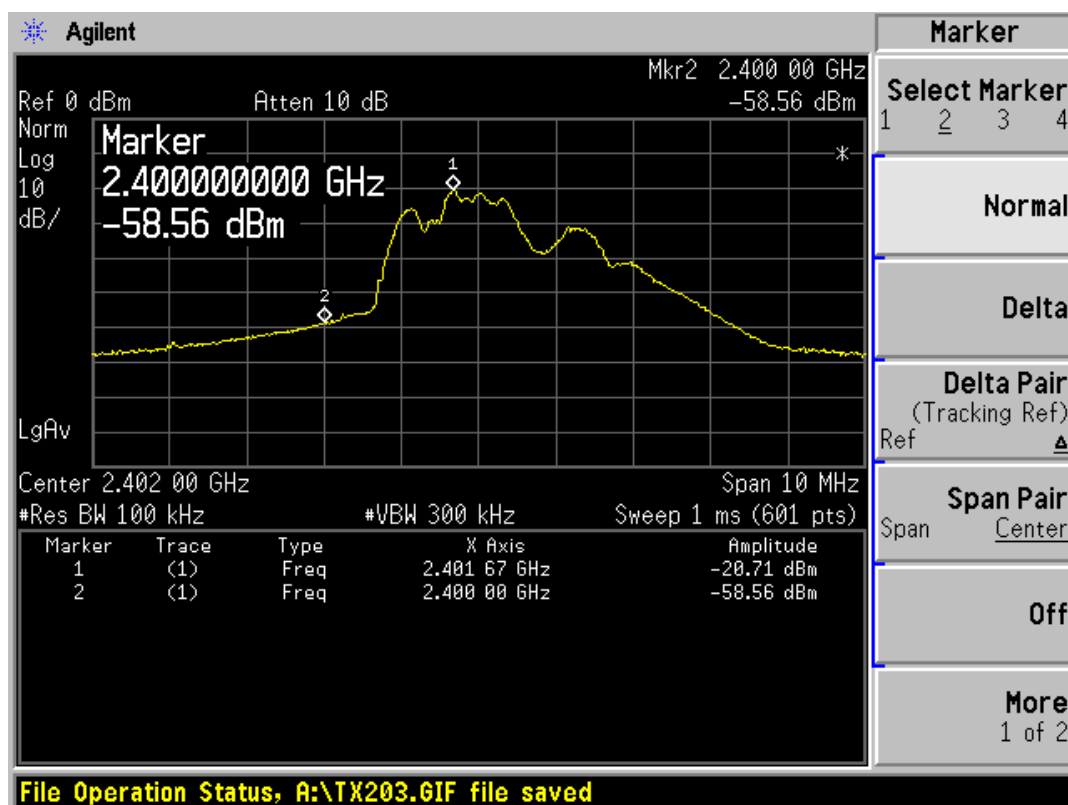


9.3. TEST PROCEDURE

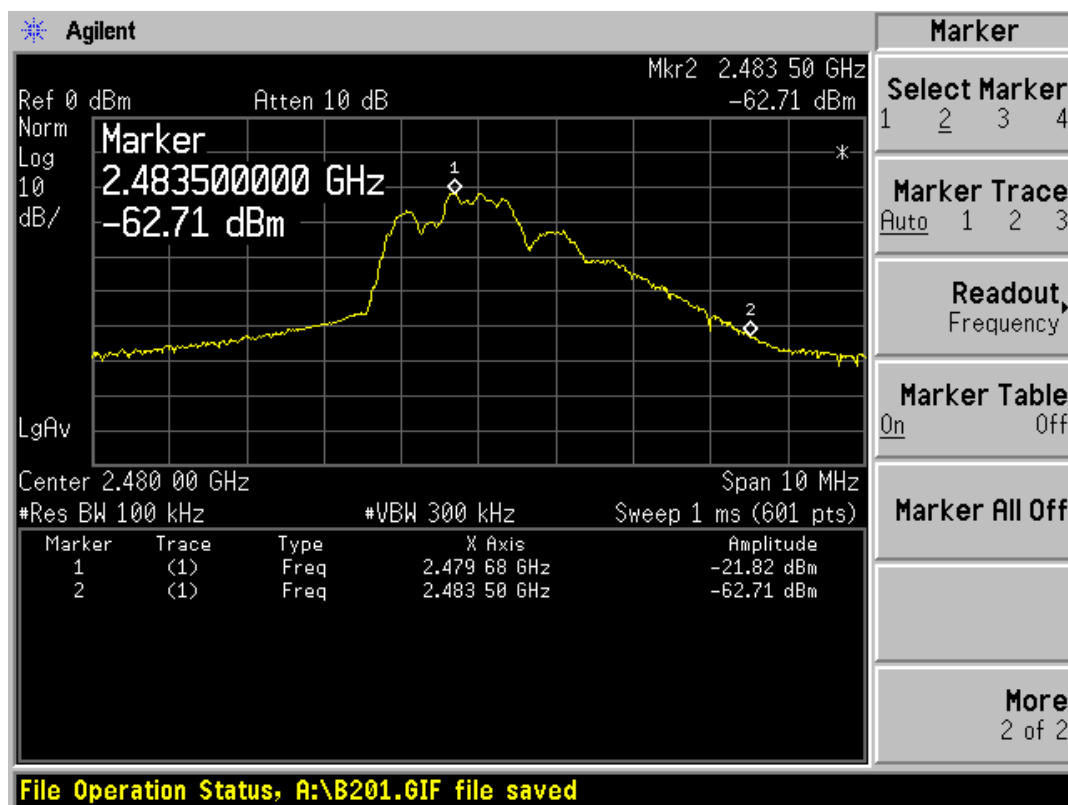
1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Set spectrum analyzer's RBW and VBW to applicable value with Peak in Max Hold.
3. Record the emission drops at the band-edge relative to the highest fundamental emission level.
4. Use the marker-delta method to determine band-edge compliance as required.

9.4. TEST RESULT

Channel_Freq. (MHz)	Fundamental Emission (dBμV/m)	delta	Final Emission (dBμV/m)	Limit (dBμV/m)	Result (Pass / Fail)
CH1_ 2402	85.38	-37.85	47.53	74 (PK)	Pass
CH1_ 2402	80.21	-37.85	42.36	54 (AV)	Pass
CH79_ 2480	85.69	-40.89	44.8	74 (PK)	Pass
CH79_ 2480	79.34	-40.89	38.45	54 (AV)	Pass



CH1_ 2402MHz



CH79_ 2480MHz

10. RADIATED EMISSIONS MEASUREMENT

10.1. LIMITS

intentional radiators operated within these frequency bands shall comply with the following:

Frequency (MHz)	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

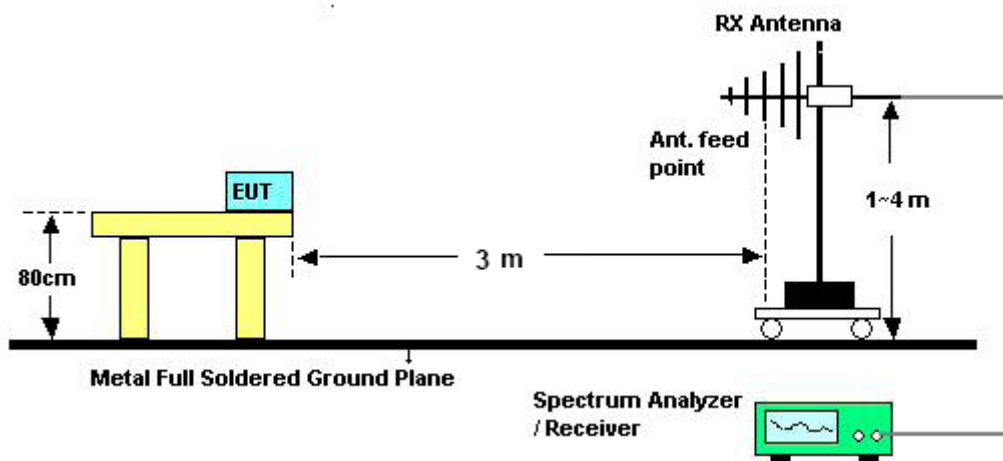
The field strength of any emissions, which appear outside of operating frequency band and restricted band specified on 15.205(a), shall not exceed the general radiated emission limits as below.

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

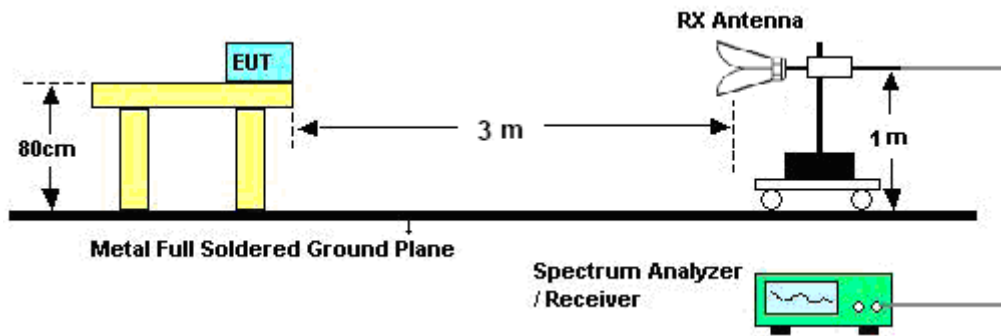
Note: the tighter limit applies at the band edges.

10.2. BLOCK DIAGRAM OF TEST SETUP

For radiated emissions from 30 - 1000MHz



For radiated emissions from 1GHz to 25GHz



10.3. TEST PROCEDURE

A. Above 30MHz

- The EUT was placed on the top of a turntable 0.8 meters above the ground in the chamber, 3 meters away from the antenna (wideband antenna), which was mounted on the top of a variable-height antenna tower. The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

B. Below 30MHz

- The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 1 meter away from the antenna (loop antenna). The maximum values of the field strength are recorded by adjusting the polarizations of the test antenna and rotating the turntable.
- For each suspected emission, the EUT was arranged to its worst case and then turn table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test frequency analyzer system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

10.4. TEST RESULT

Worst case-- Modulation Type: FSK Data Rate: 1Mbps

Note: Limit dBμV/m @1m = Limit dBμV/m @300m+ 90
 Limit dBμV/m @1m = Limit dBμV/m @30m + 50
 Limit dBμV/m @1m = Limit dBμV/m @3m +10

RE Test Result				
Frequency (MHz)	Detector (PK/QP/AV)	Final Emission (dBuV/m)	Limit (dBuV/m)	Result (P/F)
726.7833	QP	30.17	46	Pass
896.5333	QP	32.81	46	Pass
2402.0000	PK	85.38	---	Pass
2402.0000	AV	78.82	---	Pass
4804.0000	PK	57.46	74	Pass
4804.0000	AV	51.09	54	Pass
7206.0000	PK	43.94	74	Pass
7206.0000	AV	37.14	54	Pass
9608.0000	PK	45.64	74	Pass
9608.0000	AV	36.91	54	Pass

CH1 _ 2402MHz

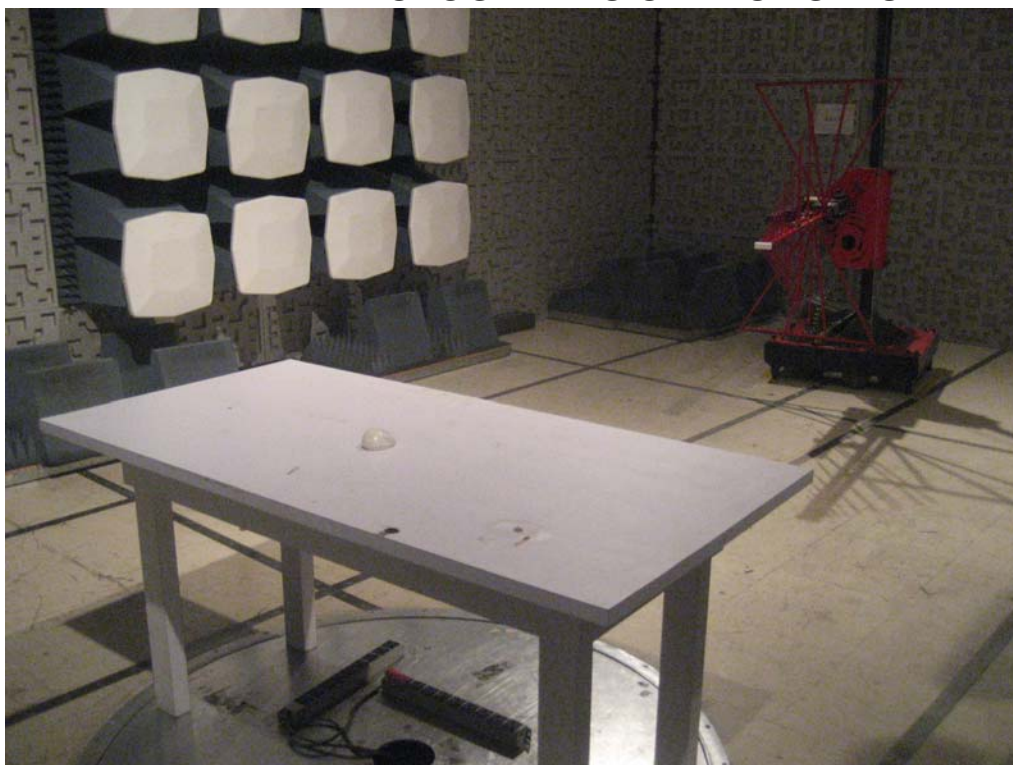
RE Test Result				
Frequency (MHz)	Detector (PK/QP/AV)	Final Emission (dBuV/m)	Limit (dBuV/m)	Result (P/F)
587.7500	QP	25.61	46	Pass
917.5500	QP	30.17	46	Pass
2440.0000	PK	86.54	---	Pass
2440.0000	AV	79.4	---	Pass
4880.0000	PK	57.21	74	Pass
4880.0000	AV	49.23	54	Pass
7320.0000	PK	44.29	74	Pass
7320.0000	AV	36.97	54	Pass
9760.0000	PK	43.14	74	Pass
9760.0000	AV	35.07	54	Pass

CH40 _ 2440MHz

RE Test Result				
Frequency (MHz)	Detector (PK/QP/AV)	Final Emission (dBuV/m)	Limit (dBuV/m)	Result (P/F)
476.2000	QP	25.61	46	Pass
752.6500	QP	30.17	46	Pass
2480.0000	PK	85.69	---	Pass
2480.0000	AV	56.29	---	Pass
4960.0000	PK	53.92	74	Pass
4960.0000	AV	24.52	54	Pass
7440.0000	PK	45.75	74	Pass
7440.0000	AV	16.35	54	Pass
9920.0000	PK	46.64	74	Pass
9920.0000	AV	17.24	54	Pass

CH79 _ 2480MHz

APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



TEST SETUP OF RADIATED EMISSION (30MHz-1GHz)



TEST SETUP OF RADIATED EMISSION (above 1GHz)

APPENDIX 2 EXTERNAL PHOTOGRAPHS OF EUT



Front View of EUT



Rear View of EUT

APPENDIX 3 INTERNAL PHOTOGRAPHS OF EUT



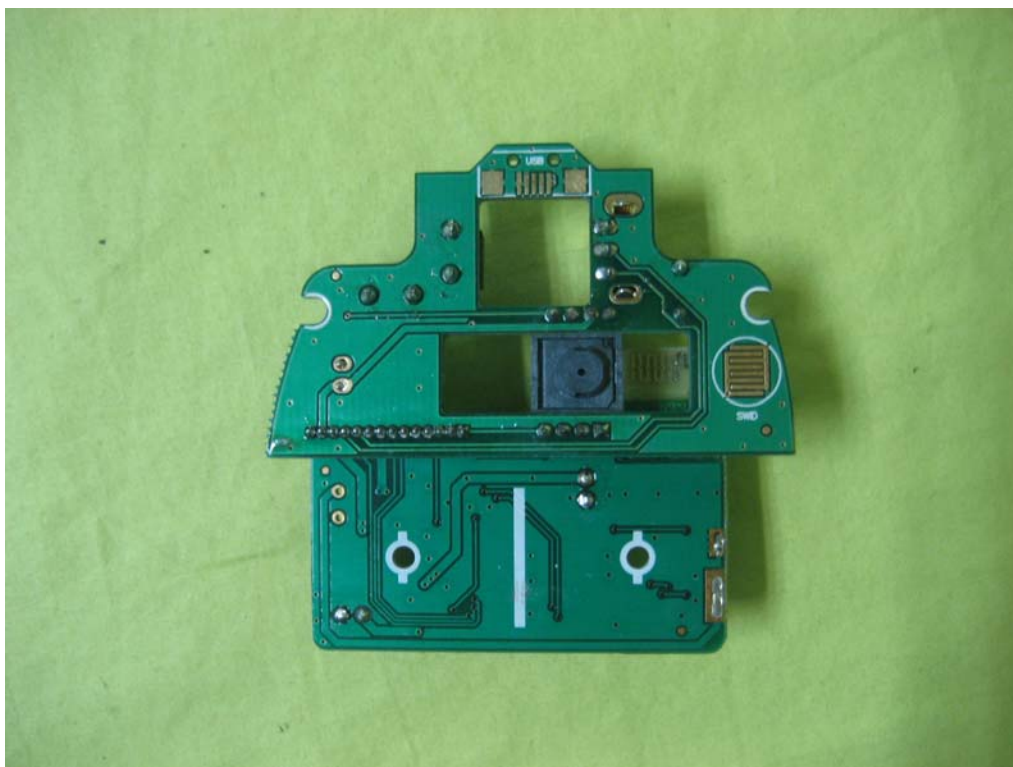
Uncovered View of EUT-1



Uncovered View of EUT-2



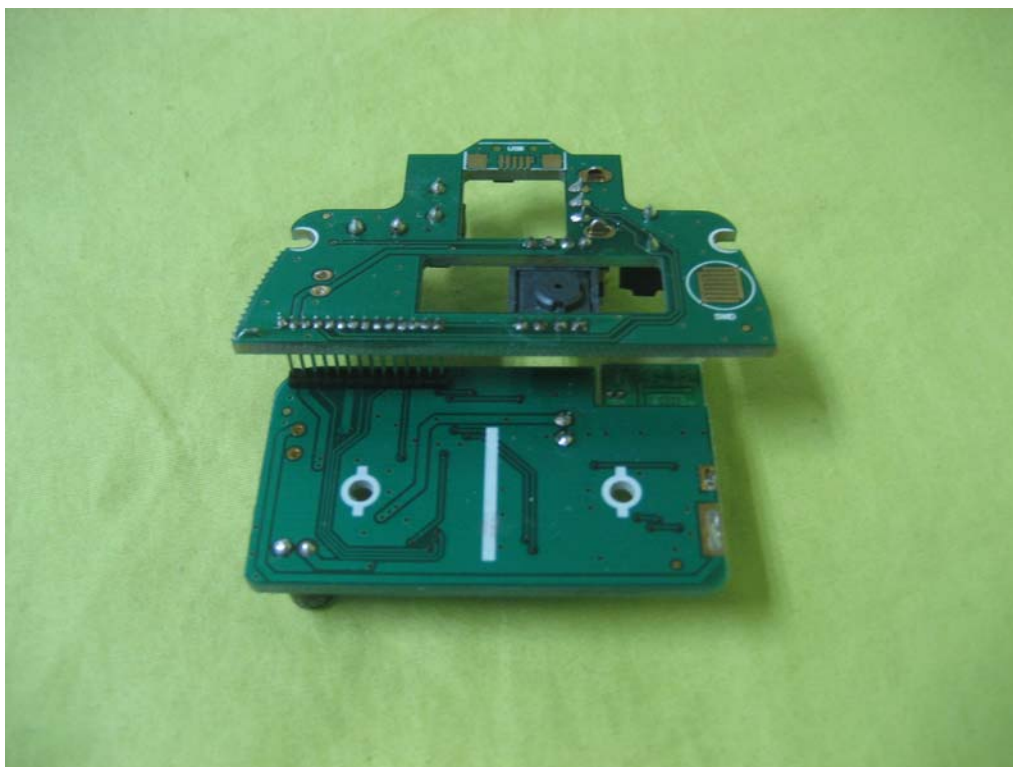
Top view of PCB1



Bottom view of PCB1



Front view of PCB1



Back view of PCB1

----- End of report -----