

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR LOW-POWER, NON-LICENSED TRANSMITTER

Test Report No. : E072R-049

AGR No : A068A-013R

Applicant : IVCOM CO., LTD.

Address : 604 HBI B/D Hanyang Univ., 1271, Sa 1-dong, Sangrok-gu, Ansan-si, Gyeonggi-do,
426-791, Korea

Manufacturer : IVCOM CO., LTD.

Address : 604 HBI B/D Hanyang Univ., 1271, Sa 1-dong, Sangrok-gu, Ansan-si, Gyeonggi-do,
426-791, Korea

Type of Equipment : Presentation Space Mouse

FCC ID. : U3YPSM

Model Name : PSM-T

Serial number : None

Total page of Report : 17 pages (including this page)

Date of Incoming : January 22, 2007

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SUMMARY

The equipment complies with the regulation; **FCC Part 15 Subpart C Section 15.249.**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

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EMC-003(Rev.0)

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1. VERIFICATION OF COMPLIANCE

APPLICANT : IVCOM CO., LTD.
 ADDRESS : 604 HBI B/D Hanyang Univ., 1271, Sa 1-dong, Sangrok-gu, Ansan-si, Gyeonggi-do,
 426-791, Korea
 CONTACT PERSON : Mr. Jihun, Park / Manager
 TELEPHONE NO : +82-31-400-3797
 FCC ID : U3YPSM
 MODEL NAME : PSM-T
 BRAND NAME : Presentation Space Mouse
 SERIAL NUMBER : N/A
 DATE : February 28, 2007

EQUIPMENT CLASS	DDX - Part 15 Low Power Communication Device Transmitter
KIND OF EQUIPMENT	Presentation Space Mouse
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2003
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C Section 15.249
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER(S) OPEN AREA TEST SITE

- . The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.249 (a)	Field Strength of Emission	Met the Limit / PASS
15.249 (c)	Measurement distance	Met the Requirement / PASS
15.249 (d)	Emissions Radiated Outside of the Specified Frequency Band	Met the Limit / PASS
15.249 (e)	Radiated Emissions above 1000MHz	Met the Limit / PASS
15.209	Radiated Emission Limits, General Requirement	Met the Limit / PASS
15.207	Conducted Limits	Not Applicable (See Note)
15.203	Antenna Requirement	Met the Requirement / PASS

Note. The Equipment under Test shall be operated by DC 3V (Two DC 1.5V Batteries).

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 2.1.

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.4: 2003 at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The Electromagnetic compatibility measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyeonggi-Do, 464-08,0 Korea. Description details of test facilities were submitted to the Federal Communications Commission on August 30, 2005 (Registration Number: 92819 and 340658), accredited by KOLAS (Korea Laboratory Accreditation Scheme, No: 85) and approved by TUV, DNV and MIC (Ministry of Information and Communications in Korea) according to the requirement of ISO17025.

3. GENERAL INFORMATION

3.1 Product Description

The IVCOM CO., LTD., Model: PSM-T (referred to as the EUT in this report) is a Presentation Space Mouse. The EUT has function for Remote controller, Laser Pointer, and a mouse and an associated receiver is manufactured by IVCOM CO., LTD., Model No: PSM-R000 with DoC application. The associated receiver shall be issued another test report number. Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	Portable Device
OPERATING FREQUENCY	2430 ~2460 MHz
RATED RF OUTPUT POWER	0dBm
RF DATA RATE	250kbps
USED RF CHIEF	Nordic, nRF2402
ANTENNA	Inserted into the main board (Pattern Antenna)
CHANNEL	31 Channels
MODULATION	GFSK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	16 MHz
NUMBER OF LAYER	2 Layers
POWER REQUIREMENT	DC 3V from a battery
EXTERNAL CONNECTOR	None

3.2 Model Differences

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	IVCOM CO., LTD.	N/A	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested: None

5.3 Mode of operation during the test

To get a maximum radiated emission from the EUT, the button on the EUT was continuously pressed to transmit the signal.

To activate continuous transmission, place a small plastic block between rubber band and the push button on the EUT.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

5.4 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by battery.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2003 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. Final radiated emission tests were conducted at 3meter open area test site.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is a pattern antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the power of the EUT is supplied from a DC battery.	

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Stand-by mode	
Continuous Transmitting mode	X

7. RADIATED EMISSION TEST, GENERAL REQUIREMENT

7.1 Test set-up

The radiated emissions measurements were on the 3 meters, open-field test site. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30MHz to 1000MHz was scanned and emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in height between 1.0 and 4.0 meters in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

7.2 Measurement uncertainty

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1000 MHz : ± 3.80 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95% with the coverage factor, k=2.

7.3 Test equipment used

	Model Number	Manufacturer	Description	Serial Number	Last Cal.
■ -	ESVS10	Rohde & Schwarz	EMI Test Receiver	827864/005	Dec. 20, 2006
■ -	85685A	Hewlett-Packard	RF Preselector	3107A01268	June 20, 2006
■ -	8564E	Hewlett-Packard	Spectrum Analyzer	3650A00756	June 22, 2006
■ -	83051A	Hewlett-Packard	Microwave Preamplifier	3950M00201	June 23, 2006
■ -	MA240	HD GmbH	Antenna Master	N/A	N/A
■ -	HD100	HD GmbH	Position Controller	N/A	N/A
■ -	DS420S	HD GmbH	Turn Table	N/A	N/A
■ -	VHA9103	Schwarzbeck	Biconical Antenna	91031852	Feb 13, 2006
■ -	9108-A(494)	Schwarzbeck	Log Periodic Antenna	62281001	Feb 13, 2006
■ -	BBHA9120D	Schwarzbeck	Horn Antenna	BBHA9120D294	July 03, 2006

All test equipment used is calibrated on a regular basis.

7.4 Final Result of Measurement

7.4.1 Field Strength of the Fundamental Frequency

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 48 % Temperature: 10°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)
 Result : PASSED BY -20.70 dB at 2430.00 MHz

EUT : Presentation Space Mouse Date: January 29, 2007
 Operating Condition : TX mode
 Distance : 3 meters

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBuV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	2430.00	48.40	Peak	H	27.28	1.50	77.18	113.98	-36.80
		42.17	Average	H			70.95	93.98	-23.03
		52.20	Peak	V			80.98	113.98	-33.00
		44.50	Average	V			73.28	93.98	-20.70
Middle	2445.00	47.50	Peak	H	27.32	1.50	76.32	113.98	-37.66
		41.67	Average	H			70.49	93.98	-23.49
		50.92	Peak	V			79.74	113.98	-34.24
		43.33	Average	V			72.15	93.98	-21.83
High	2460.00	47.33	Peak	H	27.37	1.50	76.20	113.98	-37.78
		41.50	Average	H			70.37	93.98	-23.61
		49.67	Peak	V			78.54	113.98	-35.44
		42.50	Average	V			71.37	93.98	-22.61

*Remark: To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes.

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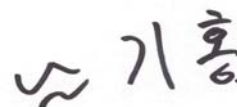
Tested by: Ki-Hong, Nam / Test Engineer

7.4.2 Emissions Conducted Outside of the Specified Frequency Bands

Humidity Level : 48 % Temperature: 10°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)
 Result : PASS

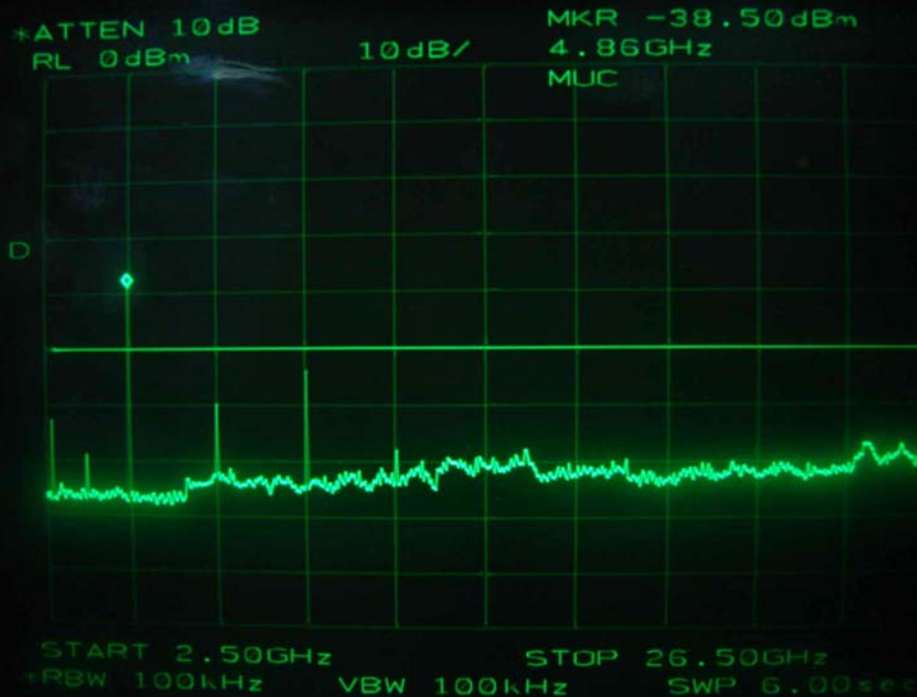
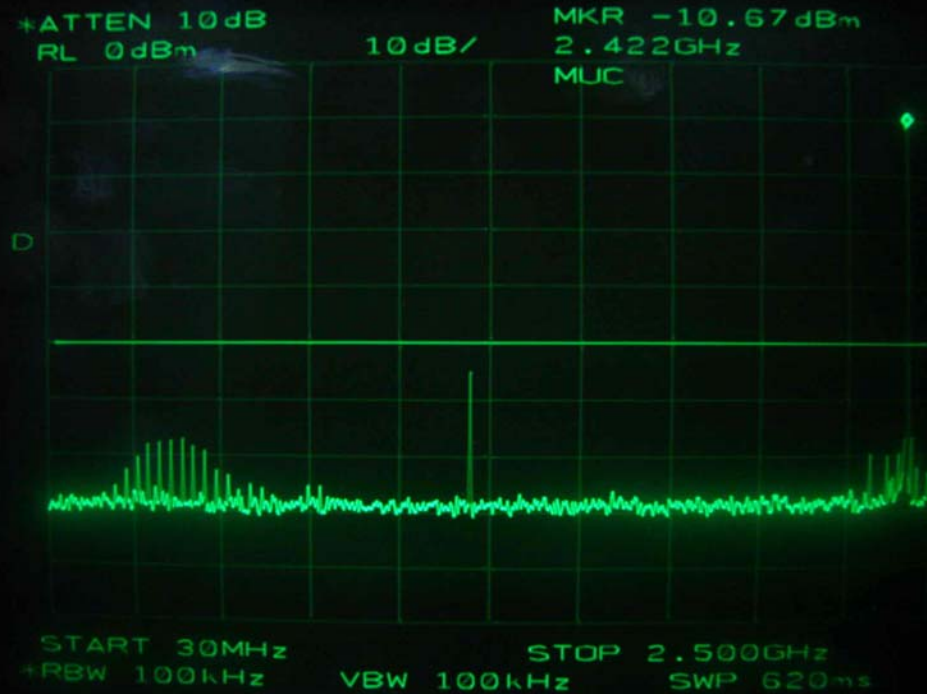
EUT : Presentation Space Mouse Date: January 29, 2007
 Operating Condition : TX mode
 Distance : 3 meters

Channel	Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
	Carrier Freq. (MHz)	Amplitude (dBuV)	Detect Mode	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Low	Spurious frequencies except harmonics have margin more than 50dB, and were scanned up to 26.5 GHz. See next page for graph data, which was obtained by conducted measurement.								
Middle									
High									

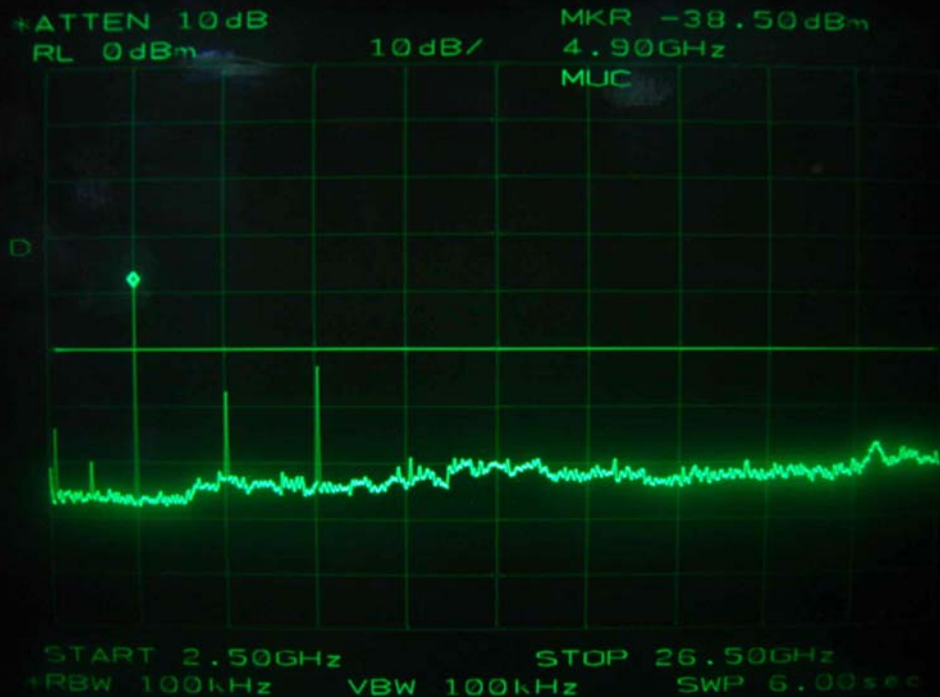
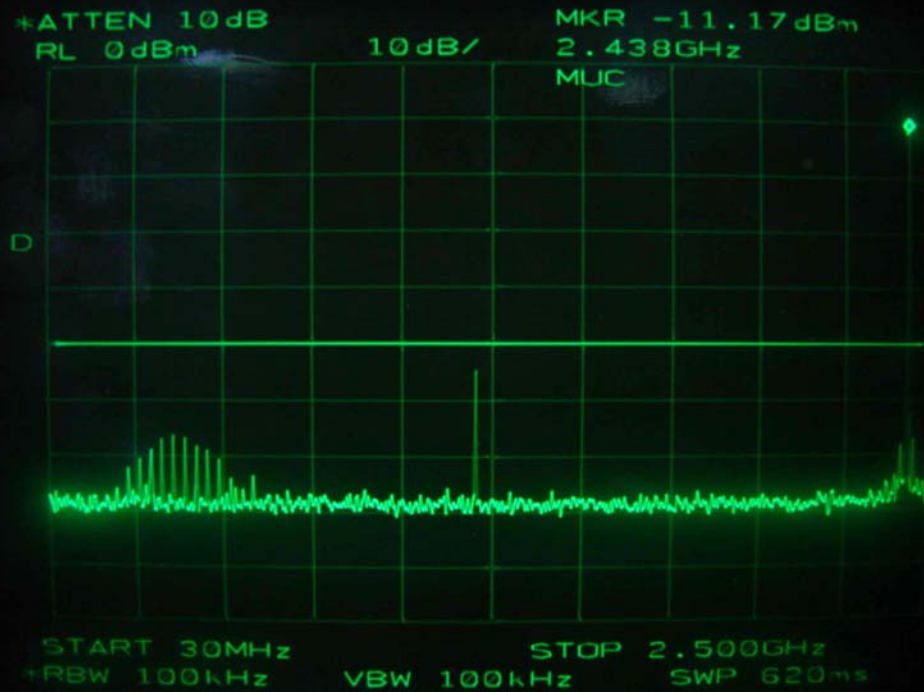


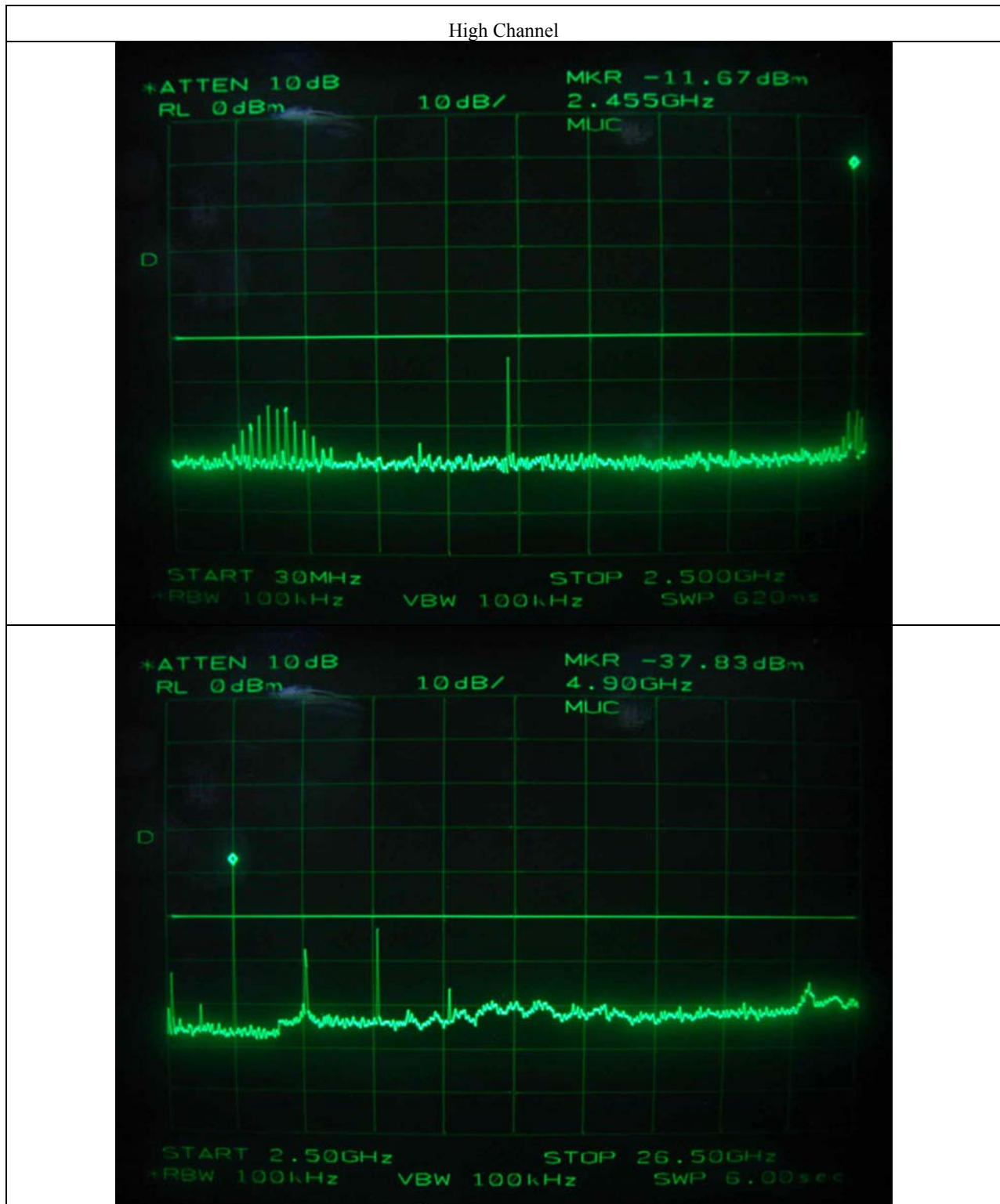
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Low Channel



Middle Channel





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7.4.3 Emissions Radiated Outside of the Specified Frequency Bands

7.4.3.1 Test Data for Spurious except for Harmonic above 1000MHz

Humidity Level : 48 % Temperature: 10 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)
 Result : PASSED BY -12.30 dB at 2465.30 under low channel

EUT : Presentation Space Mouse Date: January 29, 2007
 Operating Condition : TX mode
 Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel										
1215.08*	40.10	Peak	H	24.52	1.33	25.60	N/A	40.35	73.98	-33.63
	35.25	Average	H					35.50	53.98	-18.48
	39.30	Peak	V					39.55	73.98	-34.43
	34.17	Average	V					34.42	53.98	-19.56
2645.30*	42.17	Peak	H	27.95	1.50	25.60	N/A	46.02	73.98	-27.96
	37.83	Average	H					41.68	53.98	-12.30
	40.50	Peak	V					44.35	73.98	-29.63
	35.67	Average	V					39.52	53.98	-14.46
Test Data for Middle Channel										
1215.08*	39.83	Peak	H	24.52	1.33	25.60	N/A	40.08	73.98	-33.90
	34.67	Average	H					34.92	53.98	-19.06
	39.50	Peak	V					39.75	73.98	-34.23
	33.83	Average	V					34.08	53.98	-19.90
2465.30*	41.92	Peak	H	27.95	1.50	25.60	N/A	45.77	73.98	-28.21
	37.50	Average	H					41.35	53.98	-12.63
	40.33	Peak	V					44.18	73.98	-29.80
	35.83	Average	V					39.68	53.98	-14.30

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

Test Data for High Channel										
1215.08*	40.33	Peak	H	24.52	1.33	25.60	N/A	40.58	73.98	-33.40
	35.67	Average	H					35.92	53.98	-18.06
	39.50	Peak	V					39.75	73.98	-34.23
	34.67	Average	V					34.92	53.98	-19.06
2645.30*	40.95	Peak	H	27.95	1.50	25.60	N/A	44.80	73.98	-29.18
	37.33	Average	H					41.18	53.98	-12.80
	39.97	Peak	V					43.82	73.98	-30.16
	35.83	Average	V					39.68	53.98	-14.30

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band

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Tested by: Ki-Hong, Nam / Test Engineer

7.4.3.2 Test Data for Harmonic

Humidity Level : 48 %

Temperature: 10°C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(a)

Result : PASSED BY -6.94dB at 4860.00 MHz

EUT : Presentation Space Mouse

Date: January 29, 2007

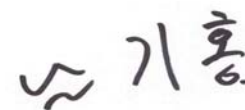
Operating Condition : TX mode

Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor	Cable Loss	Amp Gain	Dist. Factor	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Test Data for Low Channel										
4860*	45.27	Peak	H	31.68	3.36	25.50	N/A	54.81	73.98	-19.17
	37.50	Average	H					47.04	53.98	-6.94
	44.33	Peak	V					53.87	73.98	-20.11
	36.27	Average	V					45.81	53.98	-8.17
Other frequencies were not found up to 26.5GHz.										
Test Data for Middle Channel										
4890*	43.50	Peak	H	31.73	3.39	25.50	N/A	53.12	73.98	-20.86
	35.67	Average	H					45.29	53.98	-8.69
	42.50	Peak	V					52.12	73.98	-21.86
	34.83	Average	V					44.45	53.98	-9.53
Other frequencies were not found up to 26.5GHz.										
Test Data for High Channel										
4920*	42.92	Peak	H	31.78	3.42	25.50	N/A	52.62	73.98	-21.36
	35.00	Average	H					44.70	53.98	-9.28
	41.33	Peak	V					51.03	73.98	-22.95
	34.17	Average	V					43.87	53.98	-10.11
Other frequencies were not found up to 26.5GHz.										

Tabulated test data for Restricted Band

Remark: "H": Horizontal, "V": Vertical, "*" Frequency fall in restricted band



Tested by: Ki-Hong, Nam / Test Engineer

7.4.3.3 Test Data for Spurious except for Harmonic below 1000MHzHumidity Level : 48 %Temperature: 10°CLimits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.249(d)Result : PASS

EUT : Presentation Space Mouse

Date: January 29, 2007

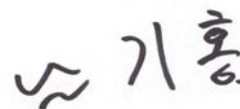
Operating Condition : TX mode

Distance : 3 meters

Frequency (MHz)	Reading (dBuV)	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
It was not observed any emissions from the EUT.							

Tabulated test data for Radiated Electromagnetic Field

Remark: "H": Horizontal, "V": Vertical



Tested by: Ki-Hong, Nam / Test Engineer