

## **TEST REPORT**

**PRODUCT NAME** : RF liquid optical mouse

**MODEL NO.** : MOW-509

**FCC ID** : US3MOW-509

**APPLICANT** : Vsong Electronics Co., Ltd.  
2/F, B2 Block, BaoSheng Industry Park, Baoyuan  
Road, Xixiang Town, Baoan District, Shenzhen  
City, Guangdong Province, P.R.China

**REGULATION** : CFR 47, Part 15.227 Subpart C

**TEST SITE** : SHENZHEN EMTEK CO., LTD.

**TEST ENGINEER** : Andy Wang

**TEST DATE** : December 01-05, 2006

**ISSUED DATE** : December 06, 2006

**REPORT NO.** : SUTF0612046

## **DECLARATION**

WE HEREBY VERIFY THAT:

The E. U. T. listed below has been completed RFI testing by UNITECH at the test site of SHENZHEN EMTEK CO LTD and Compliance Certification Services (ShenZhen) Inc. And the Interference emissions can pass **FCC CLASS B** limitations.

The test configurations and the facility comply with the radiated and AC line conducted test site criteria in **ANSI C63.4-2003**.

Any data in this RFI report is "reference" only.

<b>APPLICANT</b>	<b>: <u>Vsong Electronics Co., Ltd.</u></b>
<b>PRODUCT NAME</b>	<b>: <u>RF liquid optical mouse</u></b>
<b>MODEL NO.</b>	<b>: <u>MOW-509</u></b>
<b>FCC ID</b>	<b>: <u>US3MOW-509</u></b>



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Jimmy Jiang / Manager

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## **1. GENERAL**

### **1.1. General Information:**

Applicant : Vsong Electronics Co., Ltd.  
2/F, B2 Block, BaoSheng Industry Park, Baoyuan Road,  
Xixiang Town, Baoan District, Shenzhen City,  
Guangdong Province, P.R.China

Manufacturer : Vsong Electronics Co., Ltd.  
2/F, B2 Block, BaoSheng Industry Park, Baoyuan Road,  
Xixiang Town, Baoan District, Shenzhen City,  
Guangdong Province, P.R.China

Measurement Procedure: **ANSI C63, 4 - 2003**

Tested For Compliance With: Title 47 of CFR Part **15.227**,  
Subpart C

### **1.2. Place Of Measurement**

#### **TEST LABORATORY(1)**

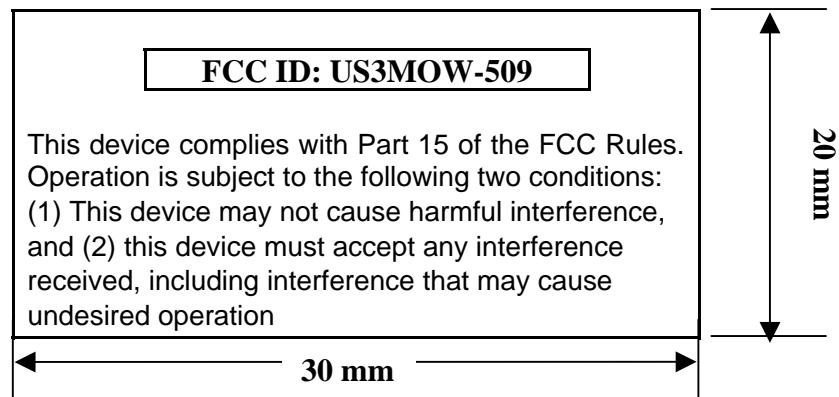
Test Firm : SHENZHEN EMTEK CO., LTD.  
Certificated by FCC, Registration no.: 709623  
Test Site : Bldg. 69, Majialong Industrial Zone, Nanshan District,  
Shenzhen, Guangdong, China  
Tel : +86-755-26954280  
Fax : +86-755-26954282

#### **TEST LABORATORY(2)**

Test Firm : Compliance Certification Services (ShenZhen) Inc.  
Certificated by FCC, Registration no.: 101879  
Test Site : No.5, Jinao Industrial Park, No.35 Jukeng Rd.,  
Dashuikeng Village, Guanlan Town, Baoan District,  
Shenzhen, China.  
Tel : +86-755-28055000  
Fax : +86-755-28055221

### 1.3.Labeling Requirement

A FCC ID label shall be permanently attached and conspicuously located on the equipment:



## 1.4. Information To The User

The following FCC statement should be declared in a conspicuous location in the user's guide.

### Federal Communications Commission (FCC) Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and uses and radiates radio frequency energy and, if not installed and used in accordance with the instruction, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio /TV technician for help.

Warning: A shielded-type power cord is required in order to meet FCC emission limits and also to prevent interference to the nearby radio and television reception. It is essential that only the supplied power cord be used.

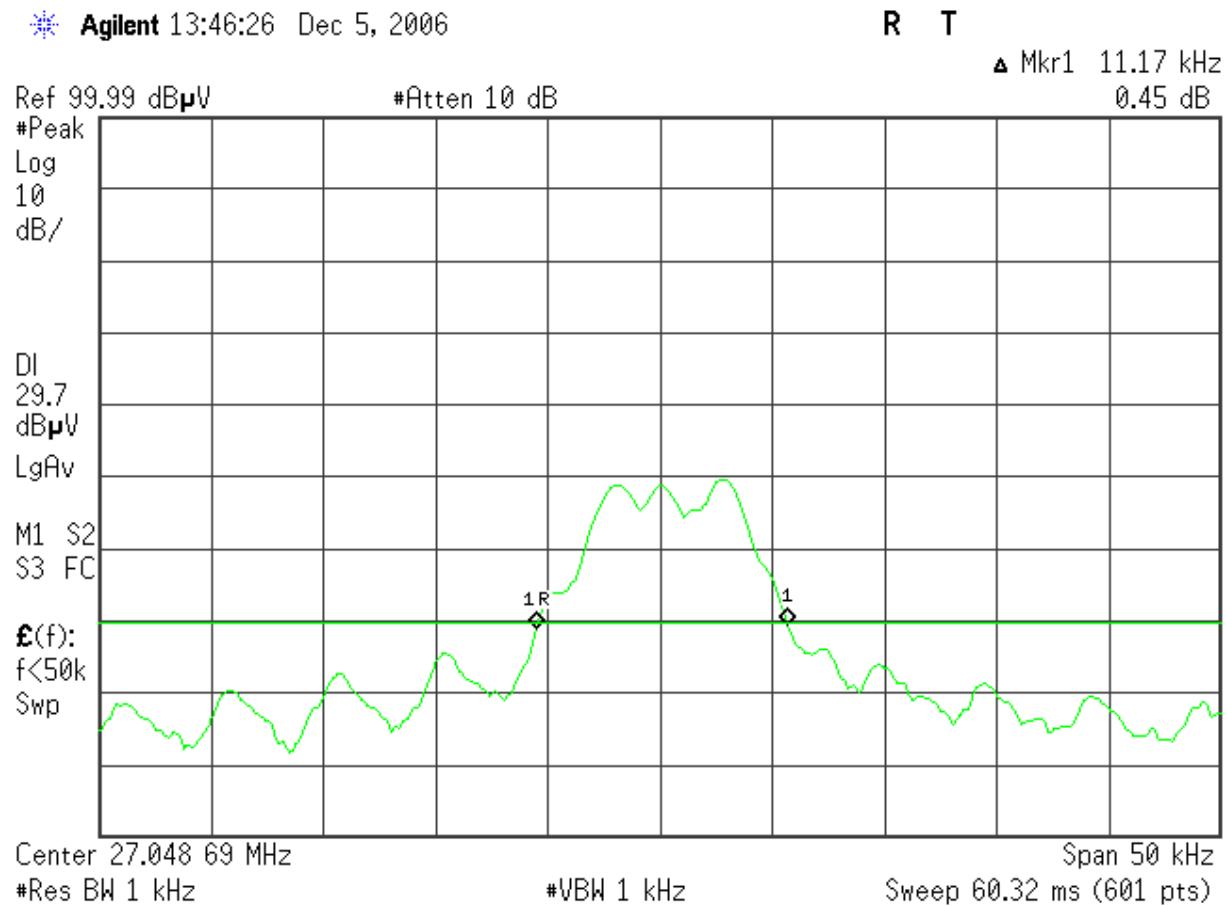
Use only shielded cables to connect I/O devices to this equipment.

You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

## 2. BANDWIDTH TEST

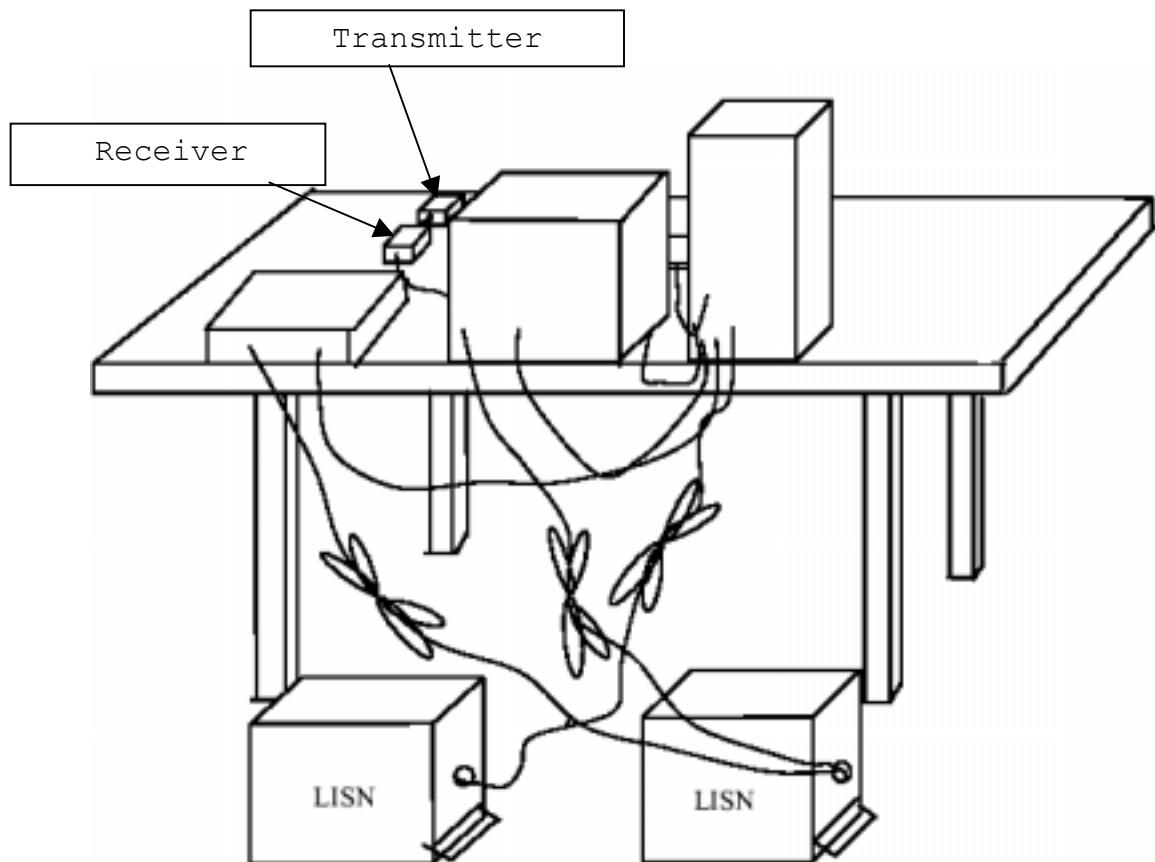
Record the respond of frequency waveform when the EUT was working.

### Test Result



### **3. CONDUCTED EMISSION TEST**

#### **3.1. General Setup Of The Test Facilities**



### **3.2. Test Procedures**

The system was setup as described above, with the EMI diagnostic software.

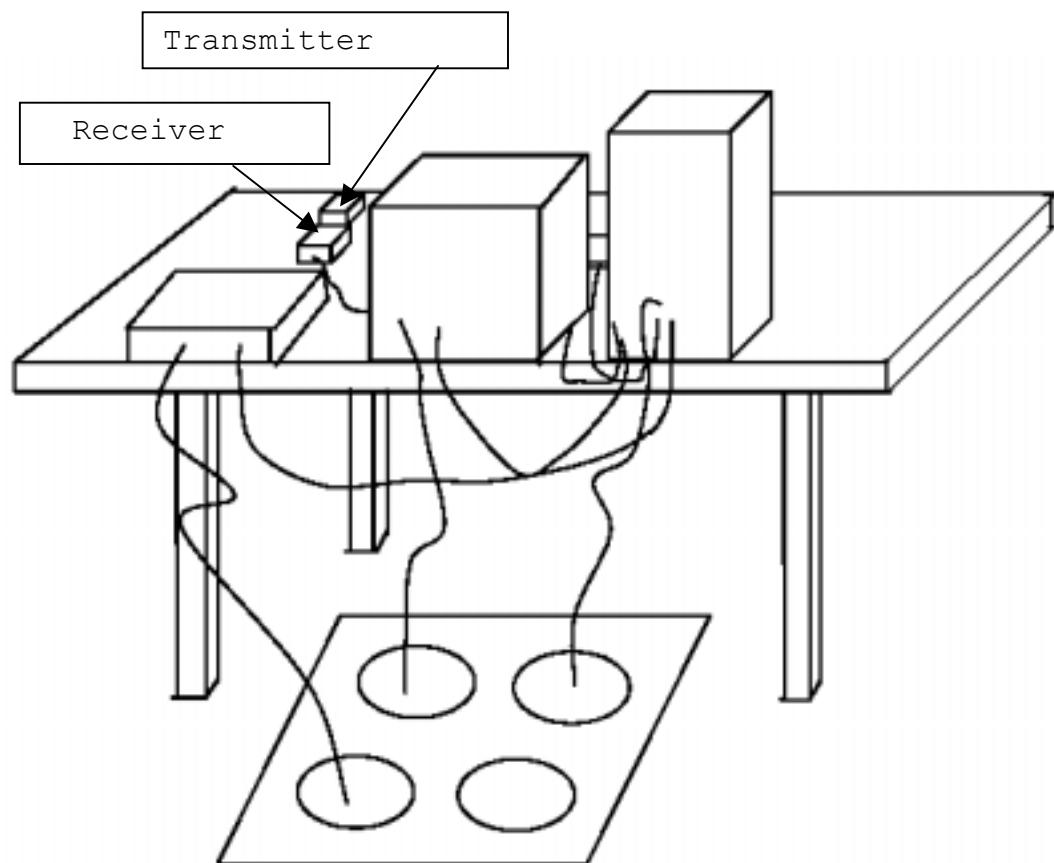
Both the line of power cord, hot and neutral, were run with the EMI test software.

To get the maximum power line conducted emission, we changed the configuration by varying the monitor power cord fed from floor outlet and from the outlet on the power supply of this computer.

The highest emissions were recorded in the RFI test report.

## 4. RADIATED EMISSION TEST

### 4.1. General Setup Of The Test Facilities



## 4.2. Test Procedures

According to **ANSI STANDARD C63.4-2003** and the Rules **FCC Part 15.227**. The EUT and supporting equipments were setup with the EMI diagnostic software.

The EUT was placed on the turned table 0.8 meter above ground. The turned table can rotate 360 degrees to determine the position of the maximum emission level.

- a.** Setting up the EUT under normally position, and scanning it from 27.035MHz to 27.055MHz, then recording the maximum noises. Both horizontal and vertical antennas are measured from 1 meter height to 4 meter height, and turn table rotate 360 degrees. **All measurements below 30 MHz were taken using an EMC Test Systems Passive Loop Antenna (9 KHz - 30 MHz).**
- b.** Setting up the EUT under normally position, and scanning it from 30MHz to 1000 MHz, then recording those narrow band noises that cannot be 6 dBuV below lower bound or not enough margin than the limit. Both horizontal and vertical antennas are measured from 1 meter height to 4 meter height, and turn table rotate 360 degrees.
- c.** Fixing the EUT rear face to antenna and antenna 1 meter height. We adjusted I/O cables to find the highest coupling noise and moved the height of antenna from 1 to 4 meters, then rotated the turntable simultaneously.
- d.** Checking following step b. all points which were recorded in step a.
- e.** Changing the peripherals position, and routine steps a. b. c.

The highest emissions were recorded in RFI test report.

## 5. DESCRIPTION FOR EUT TESTING

### CONFIGURATION

#### **\*\* TEST PROCEDURE - - - -**

(A) The application equipment is RF liquid optical mouse, FCC ID: US3MOW-509, the components of EUT are one remote mouse transmitter and one receiver connected to PC with USB interface, the transmitting frequency is one channel available 27.045 MHz, operation temperature 0~40 . The specification detail description listed as following table:

Parameter	Description
1. Hardware resolution	800dpi
2. Channel	1 Channel
3. Operation frequency	27.045MHz
4. Operation range	1.2 m
5. Operation temperature	0 - 40
6. Storage temperature	-20 --+45
7. Operation voltage & current (Transmitter)	Voltage: 3.4V~3.7V Current: ≤30 mA
8. Operation voltage & current (Receiver)	Voltage: 4.5V~5.2V Current: ≤30 mA ≤250 mA (when charging)
9. Controller power saving mode	When the mouse can't move, the current will be 15 mA at most, and will be 5 mA in the waiting mode.
10. Battey	550 mAh of Li-ion charging battery

(B) One PC system and EUT were setup on the turned table. The receiver of EUT connected to PC with USB interface, the transmitter mouse was also located on turntable due to its transmitting limits within 3 meter. Concern of the power source of the transmitter is one DC 3.7V battery, the conducted emission test only tested with receiver. There are three modes: "transmitter on", "transmitter off", and "receiver only" in one channel (27.045MHz). The worst case testing data was recorded and provided in this report.

## **6. SUPPORTING DEVICES TO TEST**

### **1. Personal Computer (PC)**

**FCC ID:** Declaration of Conformity (DoC)  
**Manufacturer:** HEWLETT PACKARD  
**Model Number:** Vectra VL420 MT  
**Power Supply:** Switching  
**S/N:** CN15100363

### **2. LCD (MON15")**

**FCC ID:** ARSCM350S  
**Manufacturer:** HEWLETT PACKARD  
**Model Number:** D8897  
**Power Supply:** Switching  
**S/N:** CN15034038

### **3. Keyboard (KBS PS/2)**

**FCC ID:** Declaration of Conformity (DoC)  
**Manufacturer:** HEWLETT PACKARD  
**Model Number:** SK-2502C  
**Power Supply:** +5V DC from PS/2 of PC  
**Power Cord:** N/A  
**S/N:** C0111141546

### **4. Printer**

**FCC ID:** Declaration of Conformity (DoC)  
**Manufacturer:** HEWLETT PACKARD  
**Model Number:** C89520  
**S/N:** CN25S182N6

### **EQUIPMENT UNDER TEST - RF liquid optical mouse**

**Manufacturer:** Vsong Electronics Co., Ltd  
**Model Number:** MOW-509  
**Data Cable:** N / A  
**FCC ID:** US3MOW-509

## **7. TEST CONFIGURATION**

### **7.1. Conducted Emission Test**

(1) Conducted emission detector function:

The frequency spectrum from 0.15 MHz to 30 MHz and its Quasi-Peak Value are investigated.

Resolution BW: 9 KHz Video BW: 30 KHz

(2) EUT setup description

The transmitter was connected to the receiver with cable that was used for charging.

### **7.2. Radiated Emission Test**

(1) Radiated emission detector function:

The frequency spectrum below 30 MHz and its Average Value are investigated. ***All measurements below 30 MHz were taken using an EMC Test Systems Passive Loop Antenna (9 KHz – 30 MHz).***

Resolution BW: 1 KHz Video BW: 1 KHz

(2) Radiated emission detector function:

The frequency spectrum from 30 MHz to 1000 MHz and its Quasi-Peak Value are investigated.

Resolution BW: 120 KHz Video BW: 300 KHz

(3) EUT setup description

Every mode as following was tested:

1. Transmitter emission level (TX ON);
2. Transmitter emission level (TX OFF);
3. When the transmitter was charging emission level (TX CHARING).

Both PC systems were enabled by "H" characters pattern.

### 7.3. Conducted Emission Test Photo and Data

#### (1) Conducted Emission Test Photo (TX Charging)

(Front View)



(Rear View)



**(2) Conducted Emission Test Data(TX Charging)****Note: Neutral Line Test**

Frequency (MHz)	QP (dBuV)	Limit (dBuV)	Margin (dB)	AV (dBuV)	Limit (dBuV)	Margin (dB)
0.220	37.10	62.82	-25.72	34.50	52.82	-18.32
0.355	33.70	58.84	-25.14	30.20	48.84	-18.64
0.640	35.20	56.00	-20.80	30.90	46.00	-15.10
0.735	35.20	56.00	-20.80	30.70	46.00	-15.30
14.670	34.50	60.00	-25.50	28.50	50.00	-21.50
25.000	35.80	60.00	-24.20	34.20	50.00	-15.80

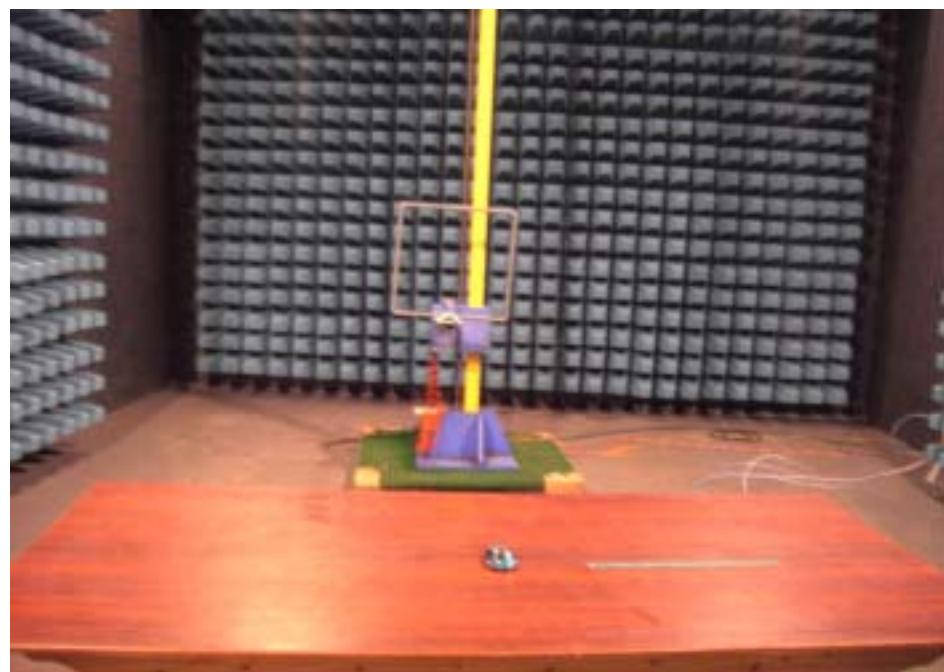
**Note: Hot Line Test**

Frequency (MHz)	QP (dBuV)	Limit (dBuV)	Margin (dB)	AV (dBuV)	Limit (dBuV)	Margin (dB)
0.165	41.10	65.21	-24.11	34.20	55.21	-21.01
0.220	41.70	62.82	-21.12	36.50	52.82	-16.32
0.545	36.50	56.00	-19.50	30.3	46.00	-15.7
0.875	37.00	56.00	-19.00	30.5	46.00	-15.5
14.350	36.20	60.00	-23.80	31.5	50.00	-18.5
25.200	35.10	60.00	-24.90	34.2	50.00	-15.8

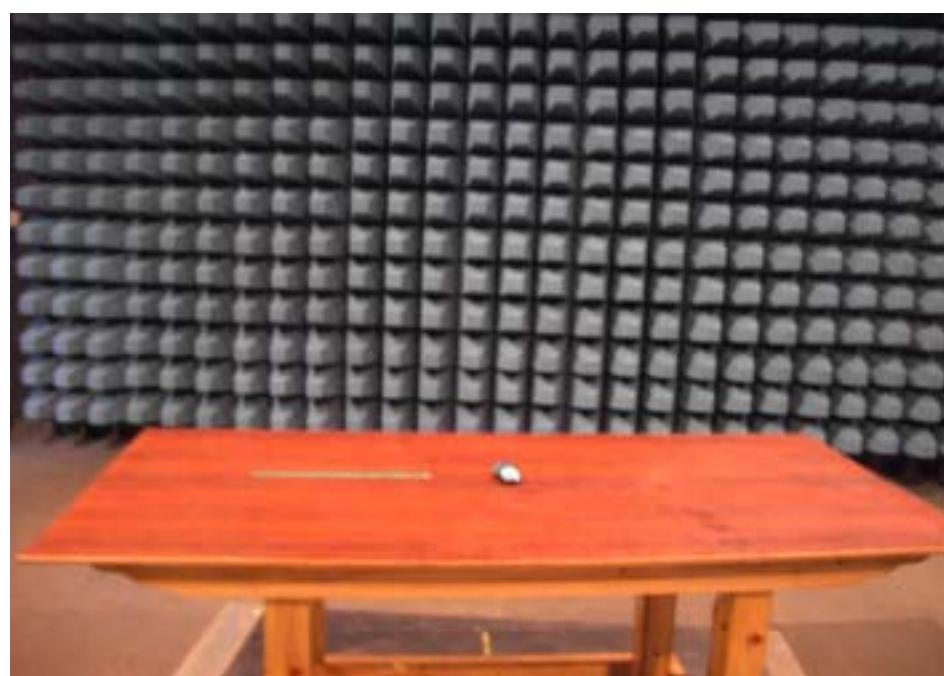
## 7.4. Radiated Emission Test Photos and Data

### (1) Radiated Emission Test Photo (TX ON, Below 30 MHz)

(Front View)



(Rear View)



**(2) Radiated Emission Test Data (TX ON, Below 30 MHz)**

**Antenna Polarization: Vertical; Test Distance: 3 m**  
**RBW = 1 KHz    VBW = 1 KHz**

Frequency (MHz)	Antenna Polarization	Peak Level (dB)	Peak Read (dBuV)	Over Limit (dBuV)	Peak Limit Value (dBuV)	Amp Factor (dB)
27.047	Vertical	64.32	41.68	-35.68	100.00	22.64
Frequency (MHz)	Antenna Polarization	Avg Level (dB)	Avg Read (dBuV)	Over Limit (dBuV)	Avg Limit Value (dBuV)	Amp Factor (dB)
27.047	Vertical	63.15	40.51	-16.85	80.00	22.64

**Antenna Polarization: Horizontal; Test Distance: 3 m**  
**RBW = 1 KHz    VBW = 1 KHz**

Frequency (MHz)	Antenna Polarization	Peak Level (dB)	Peak Read (dBuV)	Over Limit (dBuV)	Peak Limit Value (dBuV)	Amp Factor (dB)
27.047	Horizontal	60.38	37.74	-39.62	100.00	22.64
Frequency (MHz)	Antenna Polarization	Avg Level (dB)	Avg Read (dBuV)	Over Limit (dBuV)	Avg Limit Value (dBuV)	Amp Factor (dB)
27.047	Horizontal	59.15	36.51	-20.85	80.00	22.64

**Note:**

1. Level = Read Level + Amp Factor
2. Over Limit = Level - Limit Value.

**(3) Radiated Emission Test Photo (TX ON, 30-1000 MHz)**

**(Front View)**



**(Rear View)**



**(4) Radiated Emission Test Data (TX ON, 30-1000MHz)****Antenna Polarization: Vertical; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Read Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
54.090	32.520	19.100	-7.840	40.000	13.020	0.400	0.000
81.135	23.176	13.800	-16.824	40.000	8.919	0.457	0.000
108.180	26.404	13.700	-17.096	43.500	12.304	0.400	0.000
135.225	28.373	18.900	-15.127	43.500	8.873	0.600	0.000
162.270	22.712	13.300	-20.788	43.500	8.812	0.600	0.000
189.315	23.691	10.800	-19.809	43.500	12.291	0.600	0.000
216.360	26.498	14.000	-19.502	46.000	11.898	0.600	0.000
243.405	24.591	11.700	-21.409	46.000	12.091	0.800	0.000
270.450	24.677	11.500	-21.323	46.000	12.377	0.800	0.000
297.495	24.415	10.600	-21.585	46.000	13.015	0.800	0.000
324.540	26.003	11.400	-19.997	46.000	13.803	0.800	0.000
351.585	26.777	11.000	-19.223	46.000	14.977	0.800	0.000
<b>435.460</b>	<b>42.700</b>	<b>24.900</b>	<b>-3.300</b>	<b>46.000</b>	<b>16.600</b>	<b>1.200</b>	<b>0.000</b>
724.520	38.590	15.400	-7.140	46.000	21.990	1.200	0.000

**Antenna Polarization: Horizontal; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Read Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
54.090	28.320	14.900	-11.680	40.000	13.020	0.400	0.000
81.135	22.476	13.100	-17.524	40.000	8.919	0.457	0.000
108.135	24.468	12.000	-19.032	43.500	12.068	0.400	0.000
135.225	28.837	19.500	-14.663	43.500	8.737	0.600	0.000
162.270	27.688	18.300	-15.812	43.500	8.788	0.600	0.000
189.315	30.335	19.500	-13.165	43.500	10.235	0.600	0.000
216.360	27.441	15.700	-18.559	46.000	11.141	0.600	0.000
243.405	32.340	18.900	-13.660	46.000	12.640	0.800	0.000
351.585	36.310	20.600	-9.690	46.000	14.910	0.800	0.000
378.585	37.786	20.600	-8.214	46.000	16.186	1.000	0.000
<b>540.900</b>	<b>37.931</b>	<b>18.100</b>	<b>-8.069</b>	<b>46.000</b>	<b>18.691</b>	<b>1.140</b>	<b>0.000</b>

**Note:**

1. Level = Read Level + Probe Factor + Cable Loss - Preamp Factor
2. Over Limit = Level - Limit Value.

**(5) Radiated Emission Test Photo (TX OFF)**

**(Front View)**



**(Rear View)**



**(6) Radiated Emission Test Data (TX OFF)****Antenna Polarization: Vertical; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Reading Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
47.460	31.660	17.780	-8.340	40.000	13.480	0.400	0.000
134.760	26.740	17.200	-16.760	43.500	8.940	0.600	0.000
171.620	27.360	17.380	-16.140	43.500	9.380	0.600	0.000
204.600	28.560	15.300	-14.940	43.500	12.460	0.800	0.000
435.460	35.530	17.730	-10.470	46.000	16.600	1.200	0.000
<b>538.280</b>	<b>38.110</b>	<b>18.490</b>	<b>-7.890</b>	<b>46.000</b>	<b>18.620</b>	<b>1.000</b>	<b>0.000</b>
573.200	34.420	14.660	-11.580	46.000	18.560	1.200	0.000
734.220	36.820	13.880	-9.180	46.000	21.740	1.200	0.000

**Antenna Polarization: Horizontal; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Read Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
82.380	23.820	14.080	-16.180	40.000	9.340	0.400	0.000
134.760	29.120	19.730	-14.380	43.500	8.790	0.600	0.000
169.680	31.950	22.190	-11.550	43.500	9.160	0.600	0.000
204.600	34.950	23.200	-8.550	43.500	10.950	0.800	0.000
237.580	32.740	19.610	-13.260	46.000	12.330	0.800	0.000
272.500	30.500	16.330	-15.500	46.000	13.370	0.800	0.000
338.460	32.390	16.480	-13.610	46.000	14.910	1.000	0.000
369.500	30.090	13.570	-15.910	46.000	15.520	1.000	0.000
435.460	36.640	17.810	-9.360	46.000	17.630	1.200	0.000
<b>540.220</b>	<b>38.980</b>	<b>19.310</b>	<b>-7.020</b>	<b>46.000</b>	<b>18.670</b>	<b>1.000</b>	<b>0.000</b>

**Note:**

1. Level = Read Level + Probe Factor + Cable Loss - Preamp Factor
2. Over Limit = Level - Limit Value.

**(7) Radiated Emission Test Photo (TX Charging)**

**(Front View)**



**(Rear View)**



**(8) Radiated Emission Test Data (TX Charging)****Antenna Polarization: Vertical; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Read Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
136.700	30.870	21.800	-12.630	43.500	8.670	0.400	0.000
171.620	30.130	20.150	-13.370	43.500	9.380	0.600	0.000
204.600	29.630	16.370	-13.870	43.500	12.460	0.800	0.000
237.580	28.930	14.850	-17.070	46.000	13.280	0.800	0.000
338.460	29.220	14.130	-16.780	46.000	14.090	1.000	0.000
435.460	37.960	20.160	-8.040	46.000	16.600	1.200	0.000
<b>534.400</b>	<b>39.600</b>	<b>20.090</b>	<b>-6.400</b>	<b>46.000</b>	<b>18.510</b>	<b>1.000</b>	<b>0.000</b>
571.260	35.360	15.650	-10.640	46.000	18.510	1.200	0.000

**Antenna Polarization: Horizontal; Test Distance: 3 m**

Frequency (MHz)	Level (dB)	Read Level (dBuV)	Over Limit (dBuV)	Limit (dBuV)	Probe Factor (dB/m)	Cable Loss (dB)	Amp Factor (dB)
74.620	25.760	15.850	-14.240	40.000	9.510	0.400	0.000
134.760	31.270	21.880	-12.230	43.500	8.790	0.600	0.000
171.620	29.720	19.860	-13.780	43.500	9.260	0.600	0.000
196.840	29.080	17.600	-14.420	43.500	10.680	0.800	0.000
204.600	28.740	16.990	-14.760	43.500	10.950	0.800	0.000
437.400	36.540	17.830	-9.460	46.000	17.710	1.000	0.000
<b>540.220</b>	<b>40.240</b>	<b>20.570</b>	<b>-5.760</b>	<b>46.000</b>	<b>18.670</b>	<b>1.000</b>	<b>0.000</b>
573.200	35.510	15.750	-10.490	46.000	18.560	1.200	0.000

**Note:**

1. Level = Read Level + Probe Factor + Cable Loss - Preamp Factor
2. Over Limit = Level - Limit Value.

## 8. APPENDIX

### A. Photos of EUT Appearance

General Appearance of EUT (M/N: MOW-509, Front View)



General Appearance of EUT (M/N: MOW-509, Rear View)



## B. List of Test Equipment

### For Conducted Emission Test (In Shielding Room)

Item	Equipment	Manufacturer	Model No	Cal. Interval
1.	Test Receiver	Rohde & Schwarz	ESCS30	1 Year
2.	L.I.S.N.#1	Rohde & Schwarz	ESH2-Z5	1 Year
3.	L.I.S.N.#2	Rohde & Schwarz	ESH3-Z6	1 Year
4.	L.I.S.N.#3	Kyoritsu	KNW-407	1 Year
5.	Terminator	EMCO	50Ω	1 Year
6.	Terminator	EMCO	50Ω	1 Year
7.	RF Cable	FUJIKURA	RG-55/U	1/2 Year
8.	Passive Probe	Rohde & Schwarz	ESH-Z3	1 Year
9.	Coaxial Switch	Anritsu	MP59B	1/2 Year

### (1) For Radiated Emission Test (30M~1GHZ) (3m Semi-Anechoic Chamber)

Item	Equipment	Manufacturer	Model No.	Cal. Interval
1.	EMI Receiver	HP	85422E	1 Year
2.	EMI Receiver	Rohde & Schwarz	ESVS20	1 Year
3.	Amplifier	HP	8447D	1/2 Year
4.	Bilog Antenna	Chase	CBL6112A	1 Year
5.	Computer	N/A	N/A	N/A
6.	Printer	NEC	P3800	N/A
7.	RF Cable	MIYAZAKI	5D-2W	1/2 Year
8.	RF Cable	MIYAZAKI	5D-2W	1/2 Year
9.	RF Cable	FUJIKURA	RG-55/U	1/2 Year
10.	RF Cable	FUJIKURA	RG-55/U	1/2 Year
11.	Coaxial Switch	Anritsu	MP59B	1/2 Year

### (2) For Radiated Emission Test (Below 30M)

Item	Equipment	Manufacturer	Model No.	Cal. Interval
1.	Spectrum Analyzer	Agilent	E4446A	1 Year
2.	Loop Antenna	A.R.A	PLA-1030/B	1 Year
3.	Power Amplifier	Advantest	BB525C	1 Year
4.	EMI Test Receiver	HP	8546A	1 Year
5.	Amplifier	HP	8447D	1 Year
6.	Antenna	EMCO	3142	1 Year
7.	Cable	Time Microwave	LMR-400	1 Year