

FCC PART 15.227
EMI MEASUREMENT AND TEST REPORT

For

PEN LEADER INDUSTRIAL CO., LTD

RMA03, 14F, NO.29DONG DU RD, WORLD TRADE CENTRE EDIFICE, NINGBO, CHINA

FCC ID: SZ6DS-2009

February 3, 2005

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: Transmitter, Cordless Wheel Mouse
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Report No.: RSZ05012104	
Test Date: January 27, 2005 - February 2, 2005	
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Note: The test report is specially limited to the above company and the product model only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The PEN LEADER INDUSTRIAL CO., LTD's product, model number: DS-2009 or the "EUT" as referred to in this report is a Transmitter of Cordless Wheel Mouse Transmitter. The EUT is measured approximately 12cm L x 6.5cm W x 3.5cm H. rated input voltage: DC 3V battery.

** The test data gathered are from production sample, serial number: 2009050000001, provided by the manufacturer.*

Objective

This Type approval report is prepared on behalf of *PEN LEADER INDUSTRIAL CO., LTD* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules, sec 15.203, 15.205, 15.209 and sec 15.227.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to ANSI C63.4-2003.

Schematics and Block Diagram

Please refer to Appendix D.

Equipment Modifications

No modifications were made to the EUT.

Test Setup Configuration



Cordless Wheel Mouse Transmitter

SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 2009050000001.

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna requirement	Pass
§15.205	Restricted Band of operation	Pass
§15.209	Radiated Emission Limit	Pass
§15.227(a)	Field Strength	Pass
§15.227(b)	Band Edge	Pass

§15.203 - ANTENNA REQUIREMENT

Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

This product has a permanent antenna, fulfill the requirement of this section.

Test Result: Pass

§15.205, §15.209, §15.227(a) - RADIATED EMISSIONS TEST

Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is ± 4.0 dB.

The fundamental data was recorded in average detection mode: set the VBW AVE on, then record the data.

EUT Setup

The radiated emission tests were performed in the open area 3-meter chamber, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part 15 Subpart C section 15.227 limits.

EMI Test Receiver Setup

According to FCC Rules, 47 CFR 15.33, the EUT emissions were investigated from 27 to 1000 MHz.

During the radiated emission test, the EMI test Receiver was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30 MHz	10 kHz	10 kHz
30 – 1000 MHz	100 kHz	100 kHz
Above 1000 MHz	1 MHz	1 MHz

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Antenna	JB1	A040904-1	2004-4-19	2005-4-18
HP	Amplifier	HP8447K	2944A09295	2004-4-5	2005-4-4
THERMAX	Coaxial Cable	RGS-142	EC002	2004-11-20	2005-11-19
Rohde & Schwarz	EMI Test Receiver	ESCI	100035	2004-11-20	2005-11-19
Sunol Sciences	System Controller	SC99V	041304-1	2004-3-23	2005-3-22
TDK	RF Solution System Interface	S1-300	120004	2004-3-23	2005-3-22

* **Statement of Traceability:** BACL attests that all calibrations have been performed per the NVLAP requirements, traceable to NIST.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

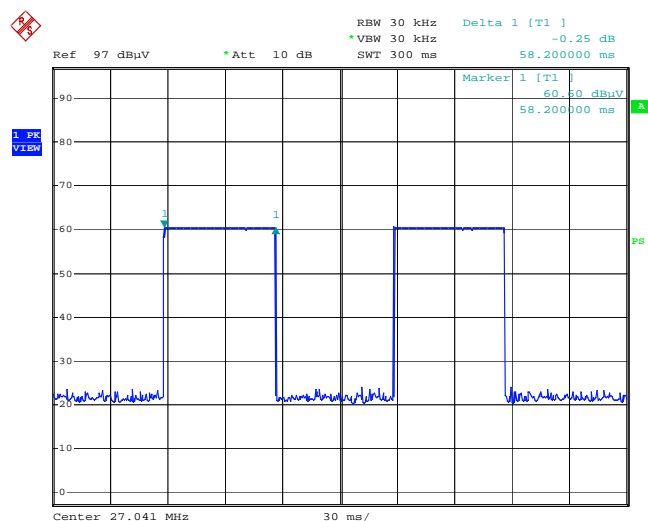
Test Data

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC PART 15.227&15.209		
Frequency	Ampl.	Angle	Height	Polar	Antenna	Cable	Amp.	Corr. Ampl.	Limit	Margin	Remark
MHz	dBμV/m	Degree	Meter	H/ V	dB/m	dB	dB	dBμV/m	dBμV/m	dB	
27.142	63.25	0	1.3	h	24.1	0.6	28.85	59.10	100	- 40.900	Fund(PK)
27.142	60.17	0	1.0	v	24.1	0.6	28.85	56.02	100	-43.980	Fund(PK)
27.142	58.45	0	1.3	h	24.1	0.6	28.85	54.30	80	- 25.700	Fund(AV)
27.142	56.21	0	1.0	v	24.1	0.6	28.85	52.06	80	- 27.940	Fund(AV)
53.280	49.33	45	1.0	h	10.5	0.7	26.24	34.30	40	-5.700	harmonics
80.440	50.93	45	1.0	h	9.6	0.9	26.03	35.40	40	-4.600	harmonics
243.410	52.18	60	1.0	h	11.3	1.3	24.94	39.80	46	-6.200	harmonics
270.560	51.22	45	1.2	h	11.7	1.4	24.70	39.60	46	-6.400	harmonics
297.720	49.78	180	1.2	h	12.6	1.6	24.64	39.30	46	-6.700	harmonics
53.280	49.75	45	1.0	v	10.5	0.7	26.24	34.70	40	-5.300	harmonics
80.440	45.89	60	1.2	v	9.6	0.9	26.03	30.30	40	-9.700	harmonics
270.560	48.26	270	1.0	v	11.7	1.4	24.70	36.70	46	-9.300	harmonics
460.680	46.69	45	1.2	v	17.1	2.3	25.73	40.40	46	-5.600	harmonics
487.840	47.12	90	1.2	v	17.9	2.3	25.82	41.50	46	-4.500	harmonics

Test Result: Pass

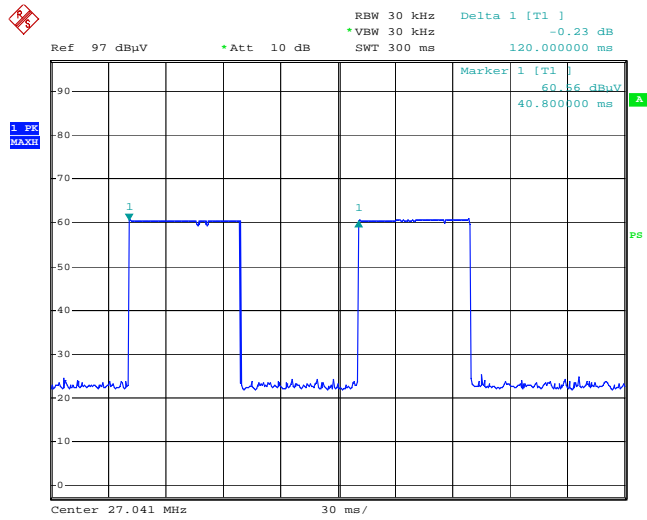
Duty cycle

The result has been complied with the 15.227, see the following plot:



Time

Date: 27.JAN.2005 20:08:14



Time

Date: 27.JAN.2005 20:10:09

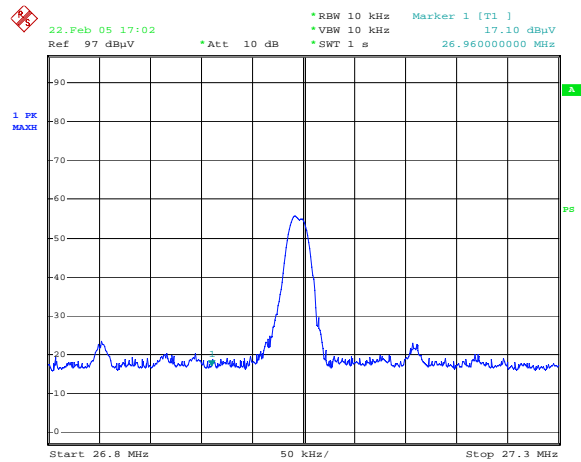
$$\begin{aligned}\text{Duty cycle} &= \text{TX On}/\text{TX Off} + \text{TX On} \\ &= 58.2/120 \\ &= 48.5\%\end{aligned}$$

§15.227(b) - Out of Band Emission

The result has been complied with the 15.227(b), see the following plot:

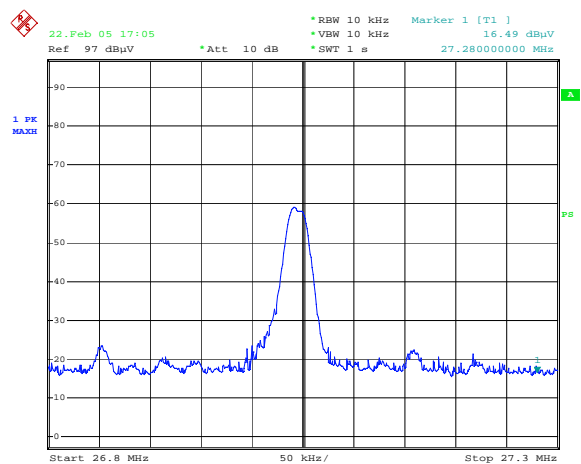
Frequency MHz	Emission dB μ V/m	Limit dB μ V/m
26.96	17.10	40
27.28	16.49	40

Test Result: Pass



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Date: 22.FEB.2005 17:02:26



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Date: 22.FEB.2005 17:05:38