MEASUREMENT/TECHNICAL REPORT

Van Koevering Company

Model (VIP 1300)

FCC ID: OP7VK-P1010-01

APPLICATION FOR CERTIFICATION

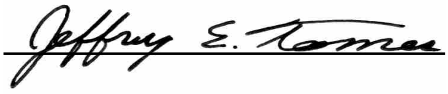
RF Emission Measurements Performed For Determination of Compliance with the US Code of Federal Regulations Title 47, Chapter I, FCC Part 15 Subpart B As Required for Certification for Unintentional Radiators

Issue Date: September 22, 1999

This report concerns: Original grant

Equipment type: Interactive Digital Piano
Transition Rules per 15.37 are not requested.

Report Prepared by:



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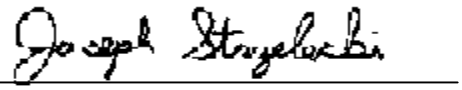

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1.0 General Information

1.1 Product Description

The Model VIP 1300 (referred to as the EUT in this report) is an interactive digital piano with a Pentium II Celeron, 333 MHz CPU. The system that measures (L)57 in X (W)22 in X (H)44 inches and weighs approximately 300 pounds. The system includes an LCD display, floppy disk drive, CD Rom, hard drive, and six speakers. The EUT has the following ports: 1 VGA, 3 MIDI, 1 parallel, 1 nine pin serial, 1 RJ-11, 1 MIDI controller, 1 pair of audio in and 1 pair audio out, 1 keyboard, 1 USB, 2 headphones, and 1 microphone. The EUT has an internal power supply. The Van Koevering Company manufactures the EUT.

1.2 Related Submittals

Van Koevering is not submitting any other submittals related to the EUT.

1.4 Tested System Details

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system which have grants, are:

Model & Serial Number	Manufacturer & FCC ID	Description	Cable Descriptions
(EUT) VIP 1300 S/N: None	Van Koevering OP7VK-P1010-01	interactive digital piano	-1.8 m, shielded, 3 wire Integral Power cord
M/N: Multisync 4FGe S/N: None	NEC A3DJC-1531VMA	VGA Monitor	-1.8 m, unshielded power cord –1.8 m, Integral Cable
M/N:RT6656TW S/N: 22Y39DM12912	Compaq AQ6-MTN4XZ15	Keyboard	-2 m, Integral Cable
M/N: M-M34 S/N: LCA55039367	Logitech DZL210365	Serial Mouse	-2 m, Integral Cable
M/N: X03-98121 S/N: 0078204-0000	Microsoft DOC	USB Mouse	-2 m, Integral Cable
M/N: K10156 S/N: XCW08392	Canon AZDK10156	Parallel Printer	-3 m, Supplied Parallel Cable K30080 AC/DC Brick
M/N: A-70B S/N: NONE	Audio Plus NONE	Dynamic Mic	-3 m, Integral Cable
M/N: CVP-1 S/N: NONE	Ensoniq NONE	CV Pedal	-2 m, Integral Cable
M/N: AMX-21 S/N: None	Optomus None	Amplified Speakers	-1.8 m, Integral Cable
M/N: TB49 S/N: 4243036	Fatar None	Electronic Music Keyboard	-1.8 m, MIDI Cable 1-YAC AC/DC Brick
M/N: M-GS64 S/N: ZH72720	Roland Crop. None	Sound Expander	-(2) 3m, RCA Cables (3) 2m MIDI Cables 1.8m unshielded power cord
M/N: N/A S/N: N/A	N/A	N/A	-22 m, RJ-11 Cable

1.5 Test Methodology

The test procedures used are in accordance with the ANSI document C63.4-1992, (July 17, 1992) "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters.

1.6 Test Facility

The open area test site used to collect the radiated data is located on 8625 Helmar Road in Newark, Illinois. The open field test site has a metal ground screen. Details of the site characteristics are on file with the FCC. Conducted emission measurements and preliminary radiated emission scans were performed in shielded enclosure “B” at Radiometrics' Romeoville, Illinois EMI test lab. These sites have been fully described in a report and accepted by the FCC in a letter dated October 1, 1996 (31040/SIT 1300F2).

Conducted emission measurements were performed using an Electrometrics Model FCC/VDE 50/2 Line Impedance Stabilization Network (LISN) as the pick-up device. This device is constructed in accordance with the circuit diagram provided in Figure 3 of ANSI document C63.4-1992.

1.7 Test Equipment

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. Below 1 GHz, when a radiated emission is detected approaching the specification limit, the measurement of the emission is repeated using a tuned dipole antenna with a Roberts Balun.

The radiated emission measurements were performed with a spectrum analyzer. The bandwidths of the spectrum analyzers are adjusted to the correct bandwidths as specified by the FCC Rules. The bandwidth used from 450 kHz to 30 MHz is 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. From 1 to 2 GHz a 1 MHz bandwidth is used. In order to increase the sensitivity of the spectrum analyzer, a preamplifier was used. The preamplifiers used had sufficient dynamic range that ensured that an overload condition was not present during the tests.

2.0 System Test Configuration

2.1 Test System and Justification

Wiring was consistent with manufacturer's recommendations. All peripherals and related cables were off the shelf products.

Even though the EUT has two sockets for headphones, the emissions were higher without them connected because the power amps do not turn on with the headphones plugged in.

Power was supplied at 115 VAC, 60 Hz single-phase.

2.2 EUT Exercise Software

The EUT exercise program used during radiated and conducted testing was contained on the hard drive of the EUT. The operating program is preloaded and proprietary. The software continuously monitored all I/O devices and was displaying a full spectrum of colors and text to the CRT and the VGA monitor. This program ran until it was manually stopped at the end of each test.

2.3 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

2.4 Equipment Modifications

The following modifications were made to the EUT by Radiometrics Midwest Corp. prior to the testing in order to achieve compliance with Class B limits.

1) Display Board

2) Removed C9.
3) 47pF cap on pin 44 of U1.
4) Lifted pin 15 of U18 and cut trace near J5.
5) Added a 33 ohm resistor and 47pF cap to line and rerouted trace with a Fair-Rite 251806S17Y0 in series to line 15 of U18.
6) Added a 1000pF cap to power side (right side) of L5.
7) Added Fair-Rite 2773037447 to pins 1 and 4 of J3.

8) Back Panel Board

9) Connected grounds of J1, J2 and J3 to mounting holes.
10) Connected negative side of C3 to mounting hole.
11) Connected pin 10 of J7 to mounting hole.

12) Front Panel Board

13) Connected ground plane to both mounting holes.
14) Cross Over Board
15) Added a 0.01Uf cap across C1, C2 and J1.

16) Power Amp Board

17) Made Ground plane continuos. (No sectioning).
18) Connected Ground plane to mounting holes.
19) Added 0.01 uF caps to J2, J3, J4 and J5.

20) Other Modifications

21) A Corcom line filter #PSOSXSS60 was added to the AC input.
22) DB 9 serial port from computer was filtered with 820pF of capacitance.
23) DB 25 parallel port from computer was filtered with 820pF of capacitance.
24) RCA cable shields were tied to connector shell.
25) The computer case was ground three times to the piano ground plane.

26) Ferrite Types:

Disc	Fair-Rite Part #
SM	2643164251
LG	2643164151
XL	0444176451

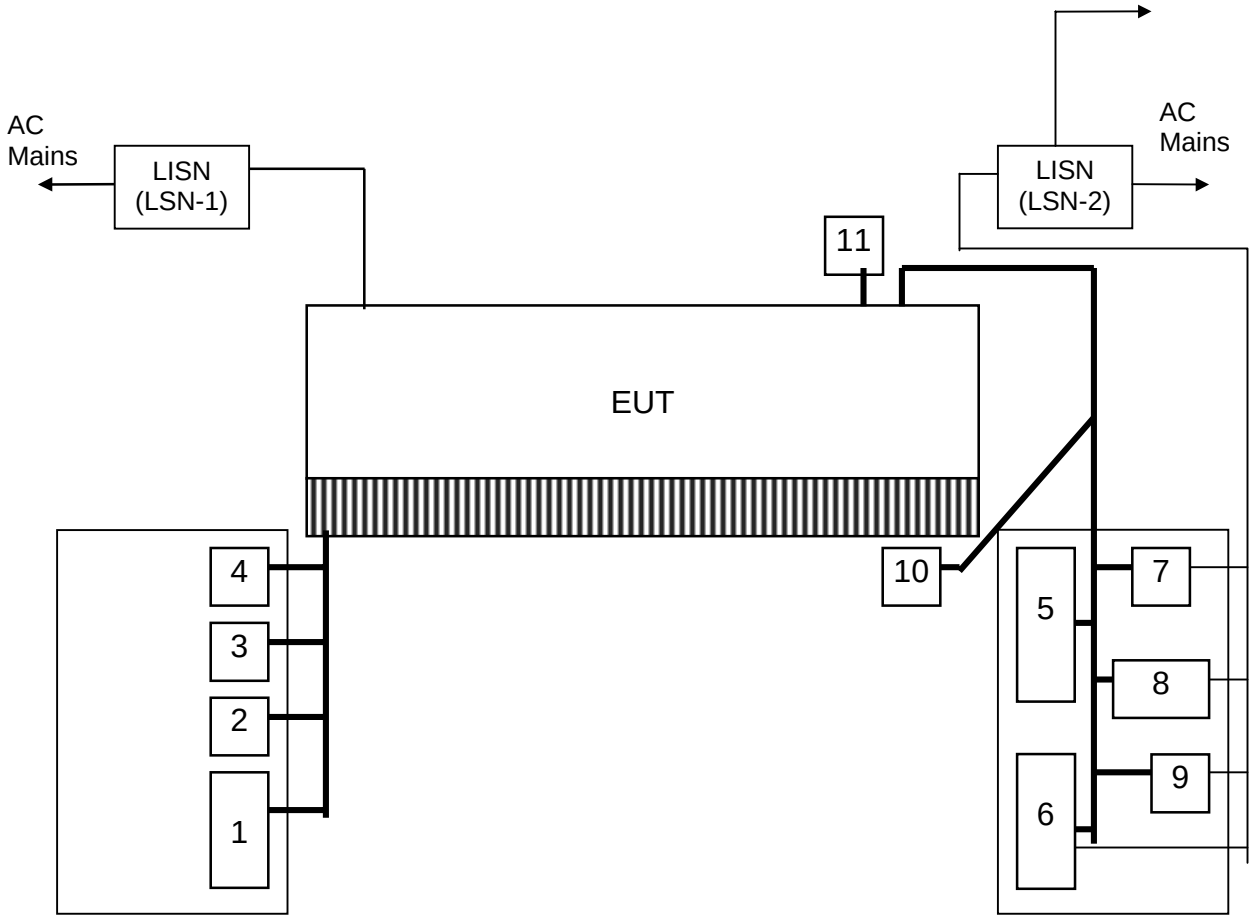
27) SM with 1 turn was put on the power sleep switch line.
28) SM was put on the power cord in the LCD display.
29) SM was put on the interconnecting VGA cable on the CPU side.
30) LG with 1 turn was put on the power cord going from the AC filter to the computer
31) LG with 1 turn was put on the Left & Right Out RCA Cables.
32) LG with 1 turn was put on the Midi Cable.
33) LG and XL around all cables going to the display.
34) XL on the CD drive cable.
35) XL on around all power cables going to the motherboard.
36) One Steward # 28S2001-000 was put around both keyboard cables.

Production units will have all of the above modifications made to them.

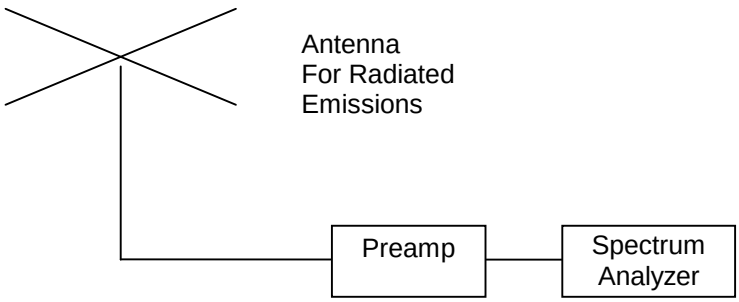
Figure 2.1 Configuration of Tested System

Conducted Emissions:
- LISN's at least 80 cm from EUT chassis
- Vertical conductive plane 40 cm from rear of table top
- EUT power cord bundled
- Test platform is not rotated

Radiated Emissions:
- LISN's not used
- AC outlet with low-pass filter at the base of the turntable
- No vertical conductive wall



1) Keyboard
2) Serial Mouse
3) USB Mouse
4) Microphone
5) Tone Generator
6) Sound Expander
7) Printer
8) VGA Monitor
9)External Speakers
10) Foot Pedal
11) RJ-11 Cable



Notes:
- Not to Scale
- Antenna height varied 1-4 mtrs
- Distance from antenna to tested system is 3 meters
- LISN=Line Impedance Stablization Network

3.0 Conducted Emission Data

The initial step in collecting conducted data is a spectrum analyzer peak scan and the plotting of the measurement range. Significant peaks are then marked as shown on the following table, and these signals are then measured with the quasi-peak detector. The following represents the worst case emissions from the EUT's power cord.

Model : VIP 1300
Test Date : September 12, 1999

Line Tested	Freq. MHz	Meter* Reading dBuV	Cable Loss dB	Strength of Signal dBuV	Limit dBuV	Margin Under Limit dB
AC Hot	0.56	33.3	0.1	33.4	48.0	14.6
AC Hot	0.62	33.1	0.1	33.2	48.0	14.8
AC Hot	10.88	43.2	0.4	43.6	48.0	4.4
Neutral	0.56	33.3	0.1	33.4	48.0	14.6
Neutral	0.62	33.8	0.1	33.9	48.0	14.1
Neutral	10.88	43.1	0.4	43.5	48.0	4.5

* All reading are quasi-peak with a 9 kHz bandwidth and no video filter.

Judgment: Passed by 4.4 dB

Test Personnel: Jeffrey E. Tomes
Senior EMC Technician

4.0 Radiated Emissions Data

The following table lists the highest measured emission frequencies, and measured levels and the Class B limit. A sample calculation is given in paragraph 4.1. . The analyzer readings are quasi-peak with a 120 kHz bandwidth and no video filter.

Model : VIP 1300
Serial Number : None
Test Date : September 12, 1999

Notes : Pol = Antenna Polarization; V = Vertical; H = Horizontal
BC = Biconical; LP = Log-Periodic; DP = Dipole
Corr. Factors = cable loss - preamp gain - distance factor.

Freq. MHz	Meter Reading dBuV	Antenna Factor dB	Antenna Pol/ Type	Corr. Factors dB	Field Strength of Signal dBuV/m	Limit Field Strength dBuV/m	Margin Under Limit dB
200.5	48.8	14.6	V/DP	-23.7	39.7	43.5	3.8
200.5	44.8	14.6	H/DP	-23.7	35.7	43.5	7.8
668.1	36.5	25.1	V/DP	-18.1	43.5	46.0	2.5
668.2	33.3	25.1	H/DP	-18.1	40.3	46.0	5.7
30.9	45.5	11.0	V/BC	-26.2	30.3	40.0	9.7
48.0	47.2	12.7	V/BC	-25.8	34.0	40.0	6.0
142.4	47.5	13.5	V/BC	-24.2	36.8	43.5	6.7
149.9	44.4	14.3	V/BC	-24.1	34.5	43.5	9.0
192.6	39.8	17.9	V/BC	-23.8	33.9	43.5	9.6
217.7	48.5	11.5	V/LP	-23.4	36.5	46.0	9.5
452.2	42.2	16.9	V/LP	-20.3	38.8	46.0	7.2
567.9	41.9	18.9	V/LP	-19.1	41.8	46.0	4.2
634.7	37.4	19.2	V/LP	-18.4	38.2	46.0	7.8
142.4	45.8	13.5	H/BC	-24.2	35.0	43.5	8.5
192.6	42.8	17.9	H/BC	-23.8	37.0	43.5	6.5
199.8	42.6	18.0	H/BC	-23.7	37.0	43.5	6.5
201.0	46.8	13.2	H/LP	-23.6	36.3	43.5	7.2
217.7	50.3	11.5	H/LP	-23.4	38.3	46.0	7.7
251.2	52.0	12.3	H/LP	-22.7	41.6	46.0	4.4
334.1	44.2	15.1	H/LP	-21.7	37.6	46.0	8.4
41.8	44.2	12.6	H/BC	-26.0	30.9	40.0	9.1
434.3	40.0	17.1	H/LP	-20.6	36.5	46.0	9.5
452.2	41.5	16.9	H/LP	-20.3	38.1	46.0	7.9
467.7	43.3	16.8	H/LP	-20.0	40.0	46.0	6.0

Judgment: Passed by 2.5 dB

Test Personnel: Jeffrey E Tomes
Senior EMC Technician

4.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain

Assume a receiver reading of 49.5 dBuV is obtained. The Antenna Factor of 8.1 and a Cable Factor of 1.7 is added. The Amplifier Gain of 23.3 dB is subtracted, giving a field strength of 36 dBuV/m. The 36 dBuV/m can be mathematically converted to its corresponding level in uV/m.

FS = 49.5 + 8.1 + 1.7 - 23.3 = 36.0 dBuV/m

Level in uV/m = Common Antilogarithm [(36 dBuV/m)/20] = 63.1 uV/m