FCC PART 15 CLASS B
EMI MEASUREMENT AND TEST REPORT

For

VORAXRD.COM

1050 East Duane Ave. Suite G
Sunnyvale, CA 94086

FCC ID: P7BVORAX5000

January 21, 2002

This Report Concerns:	Equipment Type:
☒ Original Report	PC System – ITE

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *VORAXRD.COM*'s product, Model: *Vorax 5000* or the "EUT" as referred to in this report is a PC System which measures 16.0"L x 7.0" W x 14.0H".

The EUT provides the following features:

- A-OPEN MX3SP P3 M/B MATX ALN
- INTEL P3-1GHZ PGA/133/256/BOX
- MICRON PC100 256M 32X64 SDRAM
- SONY FD 1.44 3.5"
- IBM IDE 40GB 100/7200/2MB HD
- SAMSUNG 52X IDE CDROM
- ATI RADEON SDR PCI 32 MB
- SIIG CYBERSERIAL DUAL PLUS PCI
- MINI TOWER MATX IN-V500
- ATX PS 300W FSP300-60MD
- EXTRA FAN FOR ATX CASE

Note: The test data was only good for the test sample. It may have deviation for other test sample.

1.2 Objective

This Declaration of Conformity report is prepared on behalf of *VORAXRD.COM* in accordance with Part 2, Subpart J, and Part 15, Subparts A and B of the Federal Communication Commissions rules and to ICES-003 of the Canadian Interference-Causing Equipment Regulations

The objective of the manufacturer is to demonstrate compliance with FCC Part 15 Class B limits for Information Technology Equipment.

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4 –1992, 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 10 Meters.

1.5 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

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 C63.4-1992.

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.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.6 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8568B	2610A02165	12/6/02
HP	Spectrum Analyzer	8593B	2919A00242	12/20/02
HP	Amplifier	8349B	2644A02662	12/20/02
HP	Quasi-Peak Adapter	85650A	917059	12/6/02
HP	Amplifier	8447E	1937A01046	12/6/02
A.H. System	Horn Antenna	SAS0200/571	261	12/27/02
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/02
Com-Power	Biconical Antenna	AB-100	14012	11/2/02
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/02
Com-Power	LISN	LI-200	12208	12/20/02
Com-Power	LISN	LI-200	12005	12/20/02
BACL	Data Entry Software	DES1	0001	12/20/02

***Statement of Traceability: Bay Area Compliance Laboratory Corp.** Certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.7 Equipment Under Test (EUT)

Manufacturer	Description	Model	Serial Number	FCC ID
VORAXRD.COM	PC System	Vorax 5000	None	P7BVORAX5000

1.8 EUT Configuration Details

Manufacturer	Description	Model	Serial Number	FCC ID
Aopen	Motherboard	Mx3sp	9188A01101139199 73KN75	DOC
Sony	Floppy Drive	66788203	MPF920-Z	NONE
Samsung	CD-ROM	SC-152	MCR6RCR407190	DOC
SPI	Power Supply	FSP235-60GT	W13293096	DOC
IBM	Hard Drive	DESKSTAR	TX0S4488	NONE
SIIG	Fast serial card	P004-63	SIIG J75010002118 JJ-P20212	DOC
ATI	VGA CARD	RAGE 6SDR 32MB	(01)0072741975704 0(21)1113200282	DOC
ATI	VGA CARD	RAGE 6SDR 32MB	(01)0072741975704 0(21)1113203045	DOC

1.9 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
COMPAQ	Keyboard	166516-001	B0B930B39FFA P3	AQ6-72BC15
COMPAQ	Mouse	M-S34	B04AB0H5BF84 4RG	DZL211029
Citizen	Printer	LSP-10	5047999-82	DLK66TLSP-10
EVEREX	Modem	EV-945	None	E3E5UVEV-945
NEC	Monitor	TFT8020	950EA34LA763	DOC
Kap'n Karaoke	Microphone	None	None	None
Passed	Speakers	SP-12N	None	None
Gravis	Joystick	Blackhawk	None	None

1.10 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded KB Cable	1.8	KB Serial Port/Host	Keyboard
Shielded Cable	1.8	Mouse Serial Port/Host	Mouse
Shielded Serial Cable	1.8	Serial Port/Host	EVEREX Modem
Shielded Printer Cable	2.0	Parallel Port/Host	Citizen Printer
Shielded Serial Cable x3	1.8	Serial Port/EUT	Terminator
Shielded VGA Cable	1.8	VGA Port/EUT	NEC Monitor
Shielded VGA Cable	1.8	VGA Port /EUT	Terminator
Unshielded joystick cable	1.5	Game port/ EUT	Joystick
Unshielded Speaker cable	1.2	AUDIO OUT port/ EUT	Speaker
Unshielded Microphone cable	1.3	Audio IN port/ EUT	Microphone
shielded joystick cable x2	1.0	USB port/ EUT	Terminator
Unshielded RJ45 cable	1.2	RJ45 port/ EUT	Terminator

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

The host system was configured for testing in a typical fashion (as a normally used by a typical user).

The EUT was tested in the normal (native) operating mode to represent worst case results during the final qualification test.

Additionally, the Power supply used by the EUT is SPI, M/N: FSP300-60MD.

2.2 EUT Exercise Software

The EUT exercising program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The test software, provided by customer, contained on the hard drive is started the Windows 98 terminal program under the Windows 98 operating system. Once loaded, the program sequentially exercises each system component.

The sequence used is as follows:

1. Lines of Hs scroll across the VGA monitor
2. The modem(s) receives Hs
3. The printer output Hs

This process is continuous throughout all tests. Every process takes around 5 – 10 seconds cycle.

2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are shielded as normally supplied by INMAC and their respective support equipment manufacturers. The VGA monitor, the printer, the modem and all other peripherals featured shielded metal connectors.

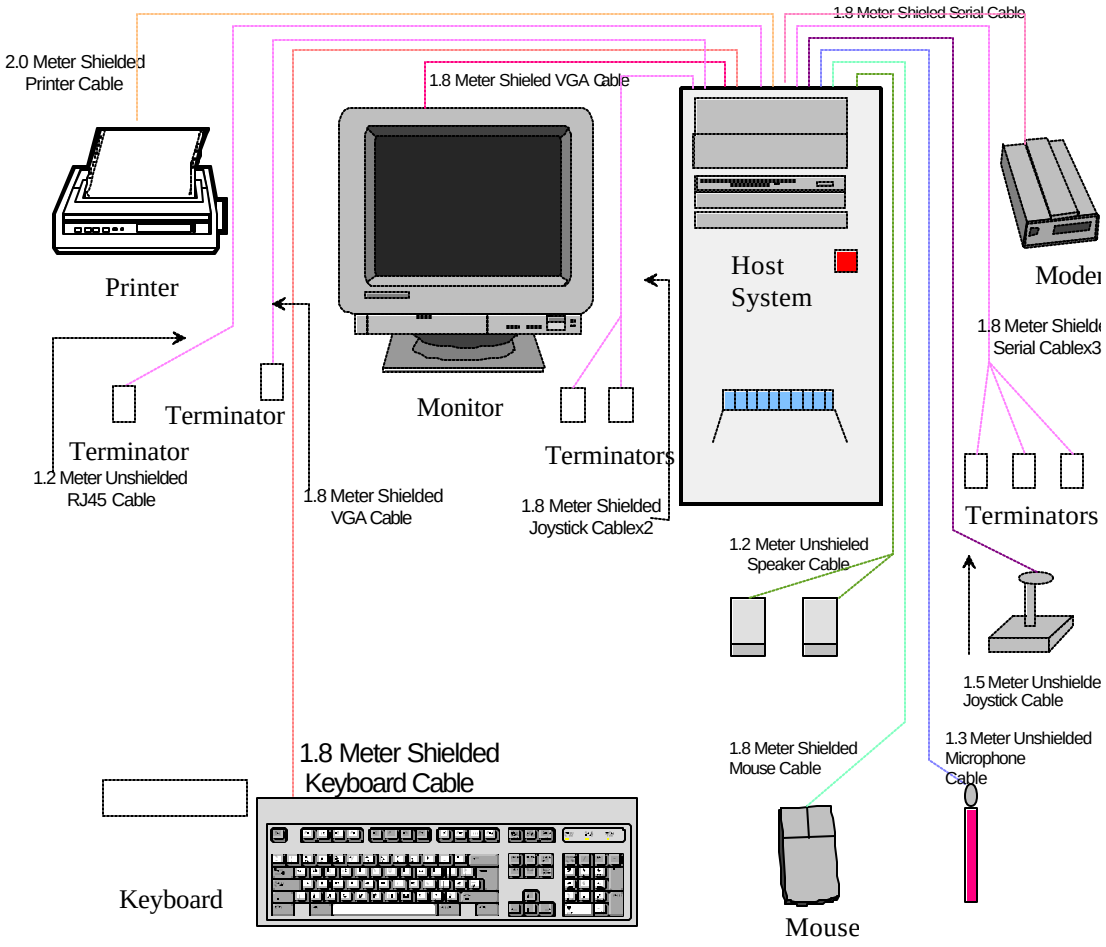
2.4 Schematics / Block Diagram

Appendix A contains a copy of the EUT's schematics diagram as reference.

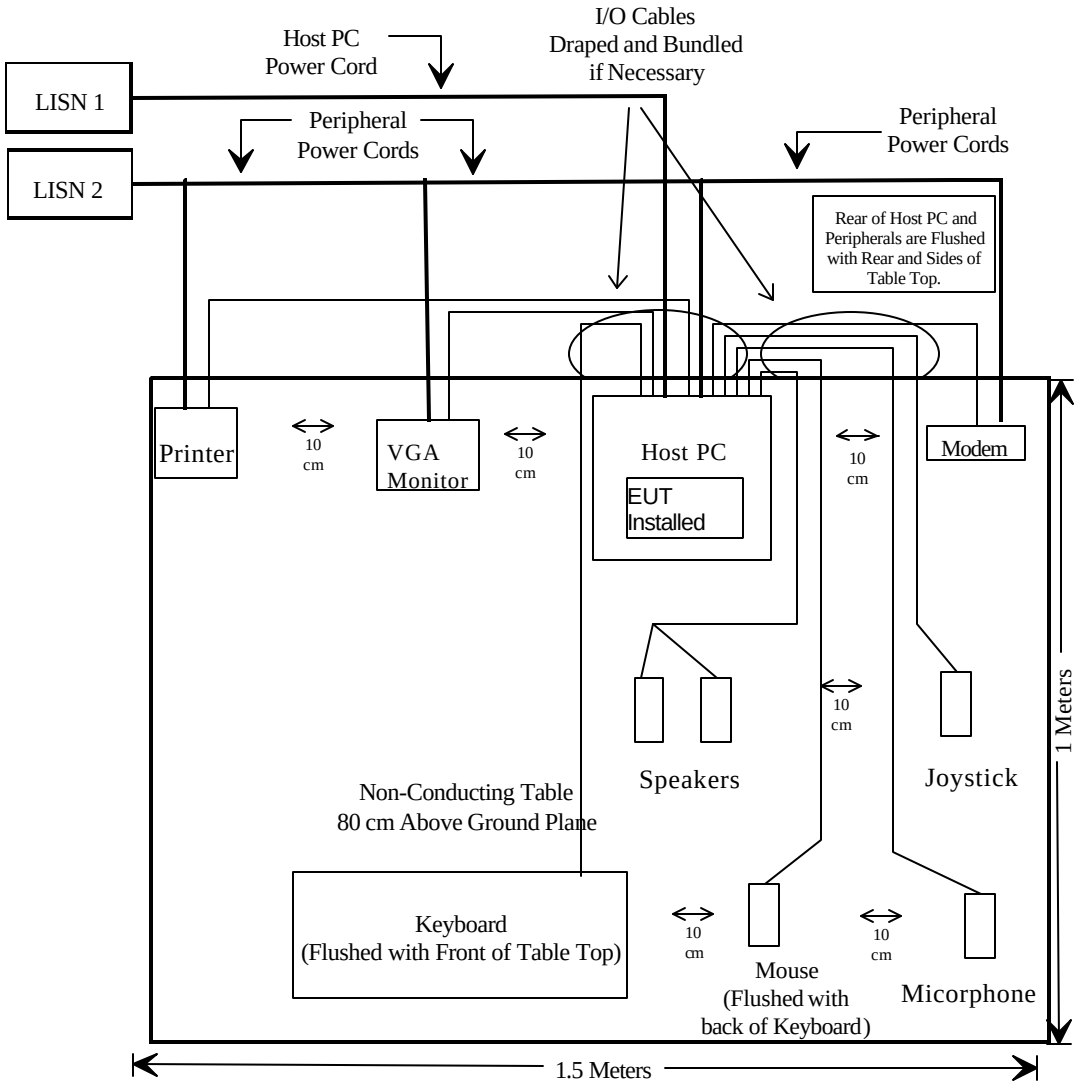
2.5 Equipment Modifications

No modification(s) was made to ensure the EUT to comply with the applicable limits.

2.6 Configuration of Test System



2.7 Test Setup Block Diagram



3 - CONDUCTED EMISSIONS TEST DATA

3.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, and LISN.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement at BACL is $\pm$2.4 dB.

3.2 EUT Setup

The measurement was performed at the **O**pen **A**rea **T**est **S**ite, using the same setup per ANSI C63.4 - 1992 measurement procedure. The specification used was the EN55022 Class B limits.

The host PC (the EUT) was placed on the center of the back edge on the test table with the monitor and the printer on its left in order and the modem on its right. The speakers were placed in front of the EUT with the joystick on its right.

The keyboard was placed directly in front of the monitor, flushed with the front edge of the test table. The mouse and the microphone were placed on the right side of the keyboard, flushed with the rear of the keyboard.

The spacing between the peripherals was 10 centimeters.

The Power supply used by the EUT was connected to 110Vac/60Hz power source.

3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configuration during the conduction test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	10 kHz
Video Bandwidth	10 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

3.4 Test Procedure

During the conducted emission test, the power cord of the Power supply used by EUT was connected to the auxiliary outlet of the first LISN. The host PC system, the VGA monitor and all other equipment power cords were connected to the auxiliary outlet of the second LISN.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combination.

All data was recorded in the peak detection mode. Quasi-peak readings were only performed when an emission was found to be marginal (within -4 dBµV of specified limitation). Quasi-peak readings are distinguished with a "**Qp**".

The EUT was in the normal (native) operating mode during the final qualification test to represent worst case results.

Additionally, the EUT was tested with the SPI Power supply, M/N: FSP300-60MD.

3.5 Summary of Test Results

According to the data in section 3.6, the EUT: *Vorax 5000* complied with the EN55022 Conducted margin for a Class B device, with the *worst* margin reading of:

-18.5 dBm**V** at **12.09 MHz** at **Line** Mode with **SPI** Power supply**, M/N: FSP300-60MD**, 0.15 - 30MHz.

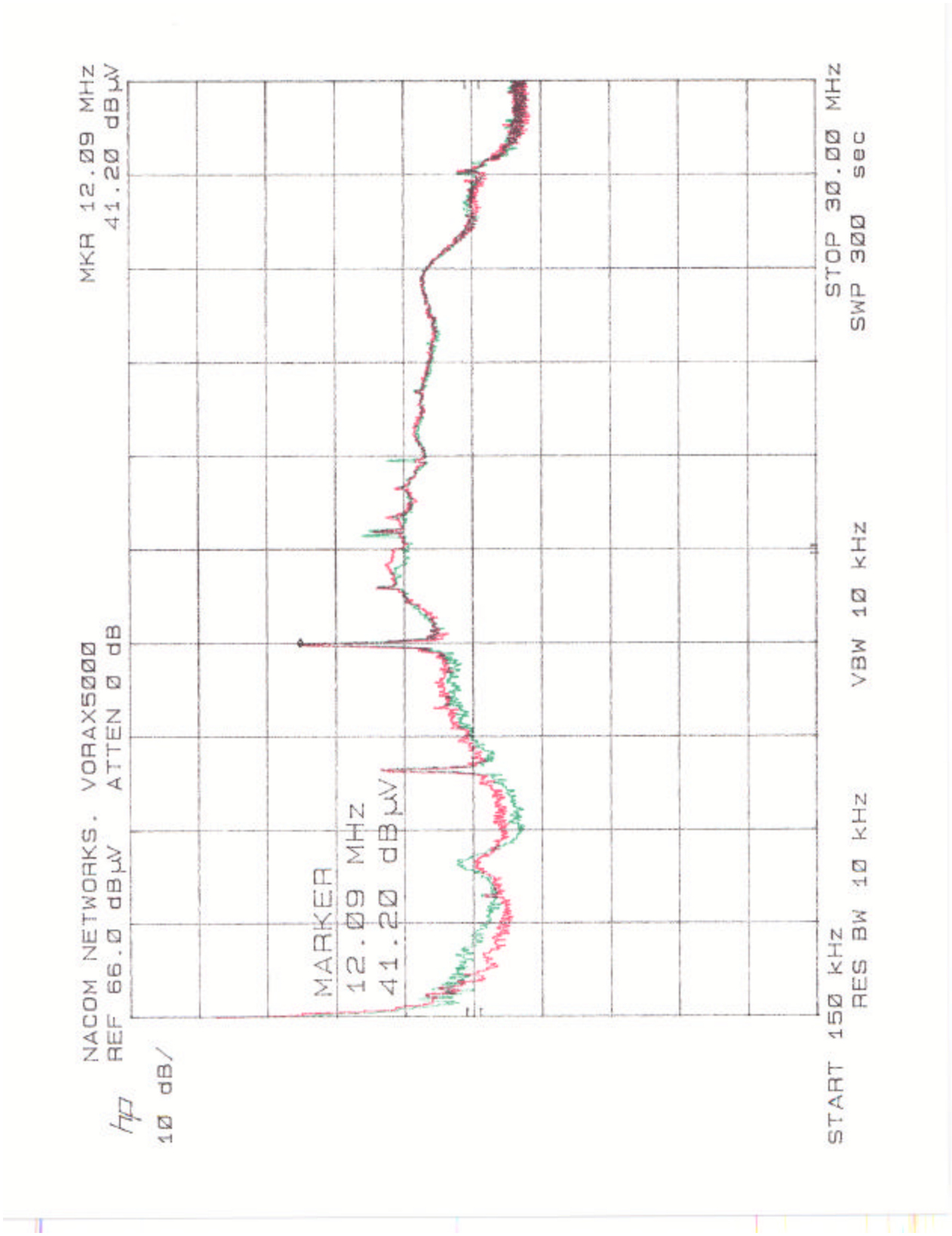
3.6 Conducted Emissions Test Data

3.6.1 Test Data with SPI Power supply, M/N: FSP300-60MD 0.15 - 30 MHz.

LINE CONDUCTED EMISSIONS				EN55022 CLASS B	
Frequency	Amplitude	Detector	Phase	Limit	Margin
MHz	dBµV	Qp/Ave/Peak	Line/Neutral	dBµV	dB
12.09	41.5	QP	Line	60	-18.5
12.12	41.3	QP	Neutral	60	-18.7
15.55	32.2	QP	Neutral	60	-27.8
15.67	30.5	QP	Line	60	-29.5
8.09	29.4	QP	Line	60	-30.6
8.06	29.1	QP	Neutral	60	-30.9

3.7 Plot of Conducted Emissions Test Data

Plot(s) of Conducted Emissions Test Data with SPI Power supply, M/N: FSP300-60MD is presented hereinafter as reference.


MKR 12.09 MHz
41.20 dBµV
NACOM NETWORKS. VORAX5000
REF 66.0 dBµV ATTEN 0 dB
10 dB/
MARKER
12.09 MHz
41.20 dBµV
START 150 kHz
RES BW 10 kHz
VBW 10 kHz
STOP 30.00 MHz
SWP 300 sec

4 - RADIATED EMISSION DATA

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the 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 $\pm$4.0 dB.

4.2 EUT Setup

The radiated emission tests were performed in the open area 10-meter test site, using the setup accordance with the ANSI C63.4 - 1992. The specification used was the EN55022 Class B limits.

The host PC (the EUT) was placed on the center of the back edge on the test table with the monitor and the printer on its left in order and the modem on its right. The speakers were placed in front of the EUT with the joystick on its right.

The keyboard was placed directly in front of the monitor, flushed with the front edge of the test table. The mouse and the microphone were placed on the right side of the keyboard, flushed with the rear of the keyboard.

The spacing between the peripherals was 10 centimeters.

The Power supply used by the EUT was connected to 110Vac/60Hz power source.

4.3 Spectrum Analyzer Setup

According to FCC Rules, the system was tested to 5000 MHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency	30 MHz
Stop Frequency	5000 MHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

4.4 Test Procedure

For the radiated emissions test, the power cord of the Power supply used by the EUT was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.

All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBµV of specified limitation), and are distinguished with a "**Qp**" in the data table.

The EUT was in the normal (native) operating mode during the final qualification test to represent worst case results.

4.5 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:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBµV means the emission is 7dBµV below the maximum limit for EN55022 Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – EN55022 Class B Limit

4.6 Summary of Test Results

According to the data in section 4.7, the EUT: *Vorax 5000* complied with the EN55022 Class B standards, had the worst margin of:

-0.6 dBm**V** at **108.14 MHz** in the **Vertical** polarization, **30 to 5000MHz, 10 meters**

4.7 Radiated Emissions Test Data

4.7.1 Final Test Data, 30 to 5000 MHz, 10 meters.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	EN55022 CLASS B	
Frequency MHz	Ampl. dBmV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBmV/m	Cable dB	Amp. dB	Corr. Ampl. dBmV/m	Limit dBmV/m	Margin dB
108.14	39.8	225	1.0	V	11.4	3.2	25.0	29.4	30	-0.6
960.00	28.5	315	1.0	H	23.7	9.2	25.0	36.4	37	-0.6
82.7	41.5	270	1.5	V	9.6	2.7	25.0	28.8	30	-1.2
116.14	38.0	180	1.0	V	11.9	3.5	25.0	28.4	30	-1.6
312.39	40.8	270	2.2	H	13.9	5.1	25.0	34.8	37	-2.2
133.5	36.6	225	2.5	V	12.6	3.5	25.0	27.7	30	-2.3
80.00	40.3	90	1.0	V	9.6	2.7	25.0	27.6	30	-2.4
232.31	43.2	135	2.5	H	11.3	4.4	25.0	33.9	37	-3.1
333.03	38.0	45	3.0	H	15.4	5.4	25.0	33.8	37	-3.2
132.17	35.6	180	1.0	V	12.6	3.5	25.0	26.7	30	-3.3
190.00	32.8	315	1.2	V	14.4	4.3	25.0	26.5	30	-3.5
280.35	40.9	270	2.5	H	12.6	4.7	25.0	33.2	37	-3.8
272.35	40.6	270	3.0	H	11.7	4.9	25.0	32.2	37	-4.8
172.23	31.0	180	1.0	V	13.3	4.0	25.0	23.3	30	-6.7
268.35	38.7	270	3.0	H	11.7	4.6	25.0	30.0	37	-7.0

There is no indication of emission above 960.00 MHZ.