FCC ID PER PART 15 CLASS B

EMI MEASUREMENT AND TEST REPORT

For

Electrone Americas Ltd., Co.

2920 NW Boca Raton Blvd., #12
Boca Raton, FL 33431

FCC ID: P2OKB-9003-US

November 13, 2001

This Report Concerns:	**Equipment Type:**
☒ Original Report	Mini Keyboard - ITE

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Test Date: November 5, 2001

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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

The *Electrone Americas Ltd., Co.*'s KB-*9003-US* or the "EUT" as referred to in this report is a mini keyboard which measures approximately 10.25 "L x 5.65"W x 1.0"H.

The test data in this report was only good for the test sample. It may have deviation for other test samples.

1.2 Objective

This Class B report is prepared on behalf of *Electrone Americas Ltd., Co.* 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 conducted and radiated margin for Information Technology Equipment.

1.3 Related Submittal(s)/Grant(s)

No Related Submittals.

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, Suite 2, 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

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8564E	08303	12/6/01
HP	Spectrum Analyzer	8593B	2919A00242	12/20/01
HP	Amplifier	8349B	2644A02662	12/20/01
HP	Quasi-Peak Adapter	85650A	917059	12/6/01
HP	Amplifier	8447E	1937A01046	12/6/01
A.H. System	Horn Antenna	SAS0200/571	261	12/27/01
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	12/28/01
Com-Power	LISN	LI-200	12208	12/20/01
Com-Power	LISN	LI-200	12005	12/20/01
BACL	Data Entry Software	DES1	0001	12/20/01

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

1.7 Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	PC SYSTEM	520	AM707AR	DOC
HP	Printer	2225C	2821914783	DS16XU2225
KDS	Monitor	KD-1731	00891265478	EVOKD-1731
EVEREX	Modem	EV-945	None	E3E5UVEV-945
Microsoft	Mouse	1.1APS2	01234316	C3KKPMS

1.8 Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	Motherboard	V72MA 98125	11S9133B10002AM 707FZ	DOC
Panasonic	3.5”Floppy Drive	N4847	JU-256A276P	DOC
Maxtor	Hard Drive	90845D4	A4153EBC C 108	DOC
LG	CD-ROM	CR-8322B	11S36L8727ZJ17C M302121	IU09TB060CRB
Fortron Source	Power Supply	FSP 145-50NI	W17178420 (9843)	DOC
IBM	Chassis	520	AM 707AR	None
Diamond	VGA Card	Build –In	3890000054567	DOC
IBM	Sound Card	Build-In	None	None
3COM	Modem Card	0800 94VO	23RCB7AA9FTG	DOC
3COM	Ethernet Card	3C905C-TXM	EA-0001026DE010	None

1.9 External I/O Cabling List and Details

Cable Description	Length (M)	Port/From	To
Shielded Mouse Cable	1.8	PS/2 Mouse Port/Host	Mouse
Shielded Video Cable	1.8	Video Port/Host	Monitor
Shielded Printer Cable	2.8	Parallel Port/Host	Printer
Shielded Serial Cable	2.0	Serial Port/Host	Modem
Shielded KB Cable	2.0	PS/2 KB Port/Host	EUT

2 - SYSTEM TEST CONFIGURATION

2.1 Justification

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

The following I/O ports were also provided by the host system: two serial port, one parallel port, two USB port, one PS/2 keyboard port, one PS/2 mouse port, one floppy interface connector, and two IDE interface connectors.

The parallel port (LPT1), PS/2 mouse port and serial port were also tested along with an Fortron Source power supply.

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 software, H pattern, contained on the hard drive, is started in a DOS window 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 monitor.
2. The modem(s) receives Hs.
3. The printer output Hs.

The complete cycle takes approximately 5 - 10 seconds and the process is continuously repeated.

2.3 Special Accessories

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

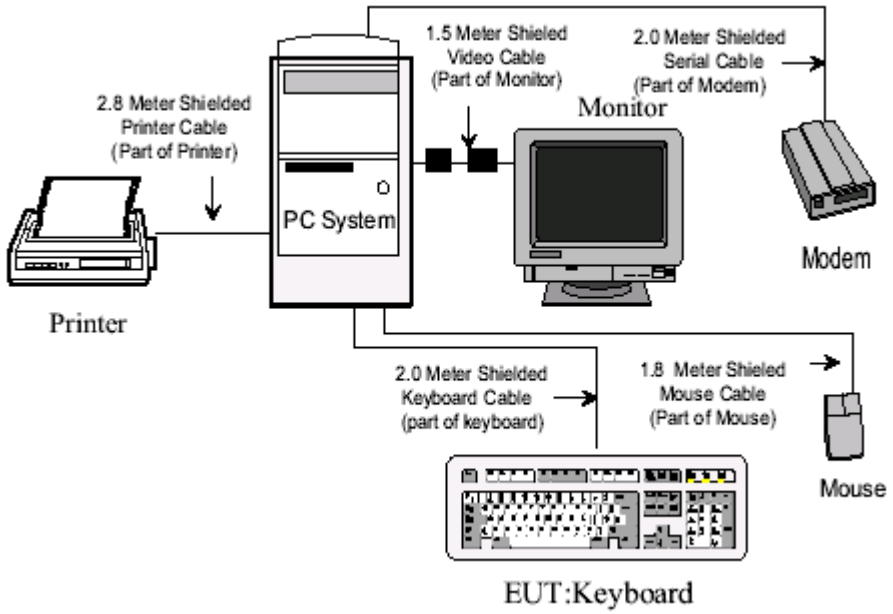
2.4 Block Diagram

Appendix A of this report contains a copy of the EUT's block diagram as reference.

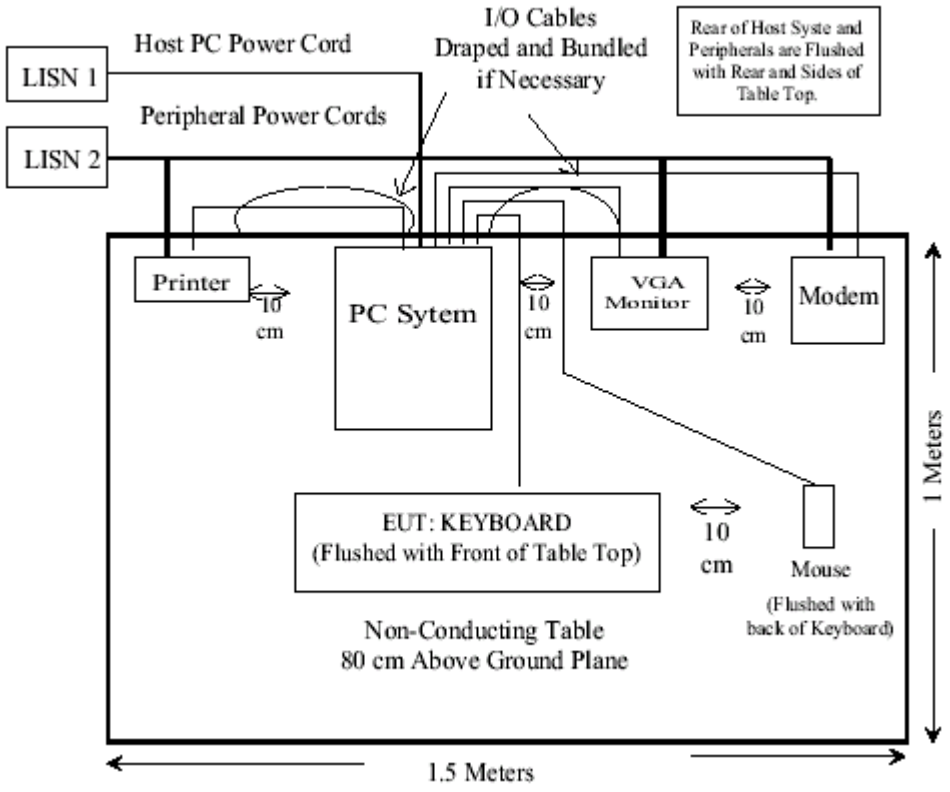
2.5 Equipment Modifications

No modification(s) were necessary for the EUT to comply with the applicable standards and 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 ±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. Specification used was with the EN55022 Class B limits.

The EUT was connected to PS/2 KB port of the host PC system. The PC system was connected to 110 VAC / 60 Hz power source and it was placed on the center back edge of the test table with the monitor, and the modem on one side in sequence. The printer was placed on the other side of the Host PC system. The rear of the host system and other peripherals were placed flushed with the rear of the tabletop.

The EUT keyboard was placed directly in front of the monitor. The mouse was placed next to the keyboard. The rear of the mouse was flushed with the back of the test table.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along edge of the test table and bundled when necessary.

3.3 Spectrum Analyzer Setup

The spectrum analyzer was set with the following configurations during the conducted emission test:

Start Frequency	150 kHz
Stop Frequency	30 MHz
Sweep Speed	Auto
IF Bandwidth	100 kHz
Video Bandwidth	100 kHz
Quasi-Peak Adapter Bandwidth	9 kHz
Quasi-Peak Adapter Mode	Normal

3.4 Test Procedure

During the conducted emission test, the EUT power adapter power cord was connected to the auxiliary outlet of the first LISN with the host system, VGA monitor and all support equipment power cords connected to the second LISN.

Since the EUT has only one operating mode, this mode was tested with the EVER Power supply to represent worst case results for the final qualification test. Therefore, these results were used for final test data recorded in the table listed under section 3.6 of this report.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance using 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 limitations). Quasi-peak readings are distinguished with a "**Qp**".

3.5 Summary of Test Results

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

-20.9 dBµV at **0.15 MHz** in the ***Line*** mode for the Fortron Source, M/N: FSP 145-50NI power supply

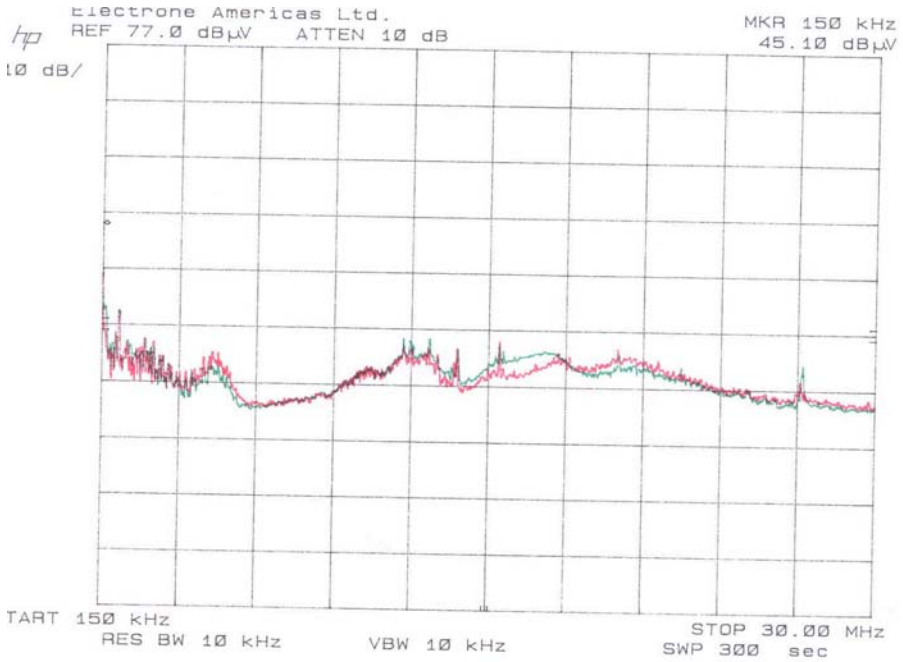
3.6 Conducted Emissions Test Data

3.6.1 Test Data for Fortron Source Power Supply, model FSP 145-50NI, 0.15 ~ 30 MHz.

LINE CONDUCTED EMISSIONS				EN55022 CLASS B	
Frequency MHz	Amplitude dBµV	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit dBµV	Margin dB
0.15	45.1	QP	Line	66	-20.9
0.84	29.5	QP	Neutral	56	-26.5
0.84	29.5	QP	Line	56	-26.5
0.15	36	QP	Neutral	66	-30.0
11.82	25.3	QP	Line	60	-34.7
15.52	25.0	QP	Neutral	60	-35.0

3.7 Plot of Conducted Emissions Test Data

Plot of Conducted Emissions test data for the EVER power supply, model FSP 145-50NI is presented hereinafter as reference.



4 - RADIATED EMISSION DATA

4.1 Measurement Uncertainty

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

4.2 EUT Setup

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

The EUT was connected to PS/2 KB port of the host PC system. The PC system was connected to 110 VAC / 60 Hz power source and it was placed on the center back edge of the test table with the monitor, and the modem on one side in sequence. The printer was placed on the other side of the Host PC system. The rear of the host system and other peripherals were placed flushed with the rear of the tabletop.

The EUT keyboard was placed directly in front of the monitor. The mouse was placed next to the keyboard. The rear of the mouse was flushed with the back of the test table.

The spacing between the peripherals was 10 centimeters.

External I/O cables were draped along edge of the test table and bundled when necessary.

4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33, the system was tested to 1000 MHz.

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

Start Frequency	30 MHz
Stop Frequency	1000 MHz
Sweep Speed	Auto
IF Bandwidth	100 KHz
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 EUT, host system, VGA monitor and all support equipment power cords were connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliance 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 limitations), and are distinguished with a "**Qp**" in the data table.

The data recorded in the table listed under section 4.7 of this report were used to represent worst case results.

The parallel port (LPT1), PS/2 mouse and serial ports were also tested.

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 Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. - Class B Limit

4.6 Summary of Test Results

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

-5.3 dBμV at **120.00 MHz** in the **Vertical** polarization with Mid – Tower PC System, 10 meters.

4.7 Radiated Emissions Test Result Data

4.7.1 Final Test Data30 ~ 1000MHz, 10 meters.

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTEI AMPLITUDI	EN55022 CLASS B	
Frequency	Ampl.	Angle	Height	Polar	Antenna	Cable	Amp.	Corr. Ampl.	Limit	Margin
MHz	dBμV/m	Degree	Meter	H/ V	dBμV/m	dB	dB	dBμV/m	dBμV/m	dB
120.00	34.2	180	1.2	V	12.1	3.4	25	24.7	30	-5.3
114.00	34.2	90	1.2	V	11.7	3.2	25	24.1	30	-5.9
456.12	32.6	45	1.5	V	17.1	6.0	25	30.7	37	-6.3
216.00	34.2	120	2.0	H	10.1	4.2	25	23.5	30	-6.5
414.25	33.2	0	2.0	H	15.8	5.8	25	29.8	37	-7.2
119.80	32.0	90	1.2	H	11.9	3.5	25	22.4	30	-7.6
384.00	32.4	180	2.0	H	15.2	5.6	25	28.2	37	-8.8
324.00	33.2	180	1.2	V	13.9	5.4	25	27.5	37	-9.5
216.00	30.5	200	1.2	V	10.1	4.2	25	19.8	30	-10.2
240.00	34.9	90	2.0	H	11.3	4.6	25	25.8	37	-11.2
42.00	29.8	270	1.2	V	12.1	1.9	25	18.8	30	-11.2
264.34	32.9	0	1.2	V	11.7	4.8	25	24.4	37	-12.6