

FCC PART 15 CLASS B EMI MEASUREMENT AND TEST REPORT

FOR

FORUS ELECTRONICS CO., LTD.
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SEOUL, KOREA

Model Number : FXA-1560

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1. General Information

1.1 Test Facility

The open area test site (OATS) used by Thru Lab. & Engineering to collect radiated and conducted emissions measurement data is located in the 389 JeArm-Rhi, HyangNam-Myun, HwaSung-Gun, KyungKi-Do, Korea.

Test sites at Thru Lab. & Engineering has been fully described in reports submitted to the Federal Communication Commission and the details of the reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The test facility also complies with the radiated and AC line conducted test site criterion in ANSI C63.4-1992. The Federal Communications Commission has the reports on file and is listed under Registration Number 92583. The scope of the accreditation covers the FCC Method - 47 CFR Part 15 or 18 of the Commission's Rules.

1.2 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-1992. All radiated and conducted emission measurements were performed at Thru Lab. & Engineering. The radiated testing was performed at an antenna-to-EUT distance of 10 meters for Class A devices and 3 meters for Class B devices.

1.3 Test Equipment List

Description	Model No.	Serial No.	Manufacturer	Cal. Due	Used
EMI Test Receiver	ESVS 10	830489/001	Rodhe&Schwarz	04/25/2005	RE
Biconical Antenna	94455-1	0977	Eaton	04/25/2004	RE
Log Periodic Antenna	3146	2051	EMCO	04/25/2004	RE
Horn Antenna	SAS-571	414	A.H.Systems	05/09/2004	RE
Spectrum Analyzer	8566B	2311A02394	Hewlett Packard	03/17/2005	RE
Spectrum Display	85662A	2542A12429	Hewlett Packard	03/17/2005	RE
Quasi-Peak Adapter	85650A	2521A00887	Hewlett Packard	03/17/2005	RE
RF Preselector	85685A	2648A00504	Hewlett Packard	03/17/2005	RE
Spectrum Analyzer	R3261C	71720189	Advantest	04/25/2005	
LISN	KNW-242	8-923-2	Kyoritsu	N/A	
LISN	8012-50-R-24	8379121	Solar	N/A	
Plotter	7475A	2210A02802	Hewlett Packard	N/A	
Positioner Set	N/A	N/A	Dongsung Prec.	N/A	RE

1.4 Product Description for Equipment Under Test (EUT)

FORUS ELECTRONICS CO., LTD. FXA-1560 or the "EUT" as referred to this report is MP3 PLAYER

Main Features of EUT are:

Memory Capacity	Internal/128MB/256MB/512MB
Voltage	1.5V
Battery	AAA(General)
LCD	LCD Numerals(4 line 128 × 64 Full Dot Matrix)/Back-lighting
Size(W × H × D)/Weight	33 × 70 × 16mm / 25g(excluding the battery)
Case	ABS
File Transfer Rate	4.8Mbps
Voice Recording	MPEG I , Layer-3, TVF
Noise	90dB
Earphone Output	10mW
Output Frequency Range	87.5MHz ~ 108.0MHz

1.5 Equipment Under Test

Description	Model Number	Serial Number	Manufacturer	Remarks
Host Computer	Satellite Pro 4280	Y901236401	Toshiba Corp	-
MP3 PLAYER	FXA-1560	-	Telewin Inc.	EUT
VGA Monitor	PN-17CT	P225HVER510534	Samsung Electronics	17"
Mouse	1.1A	00489664	Microsoft Corp.	PS/2
Printer	C2605	3221S66649	Hewlett Packard	300dpi
Modem	SM1200A1	71000230	Samsung Electronics	1200bps
Speaker	RP-SP10	6ACSA01550	Matsushita Electronic	-

1.6 Support Equipment

Description	Model Number	Serial Number	Manufacturer	Remarks
Main Board	FSM7SS0	93J571272Y2	Toshiba Corporation	Japan
Hard Drive	MK6014MAP	Y9860027G	Toshiba Corporation	Japan
Floppy Drive	JU-226A202FC	00002445	Panasonic	China
CD-ROM Drive	CD-244E	0485644	TEAC Corporation	Indonesia
CPU	Pentium III	none	Intel Corporation	550MHz
Memory	SDRAM	none	Toshiba Corporation	192MB
Note book Chassis	Satellite Pro 4280	Y9012364 1	Toshiba Corporation	Note Book

1.7 External I/O Cabling

Description	Length (m)	Port/From	Port/To	Remarks
Video Cable	1.2	VGA/Host	Dsub/Monitor	Shielded
Mouse Cable	1.8	Mouse /Host	Mouse	Shielded
Printer Cable	1.5	Parallel/Host	Printer/Centronics	Shielded
Modem Cable	2.0	Serial/Host	Modem/RS232	Shielded
Speaker Cable	1.0	SPKR/Host	Speaker	Shielded
USB Cable	1.0	USB/Host	EUT/USB	Shielded
Ear-Phone Cable	1.5	EAR/EUT	Ear-Phone	Unshielded
Microphone Cable	1.5	MIC/EUT	Microphone	Unshielded

2. System Test Configuration

2.1 Justification

The system was configured for testing in a typical fashion (as normally used by a typical user). Worst case conducted and radiated emissions are presented in section 3.5 and section 4.6 of this report.

The test was performed as below.

1. Connect EUT and Note Book Computer with USB Cable.
2. Opening Windows Midia Player Program on Windows 2000,downloading File from EUT to Note Book Computer and performing the MP3 file in the EUT.

2.2 EUT Exercise

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, supplied by the client, running on Windows 2000 operating system .

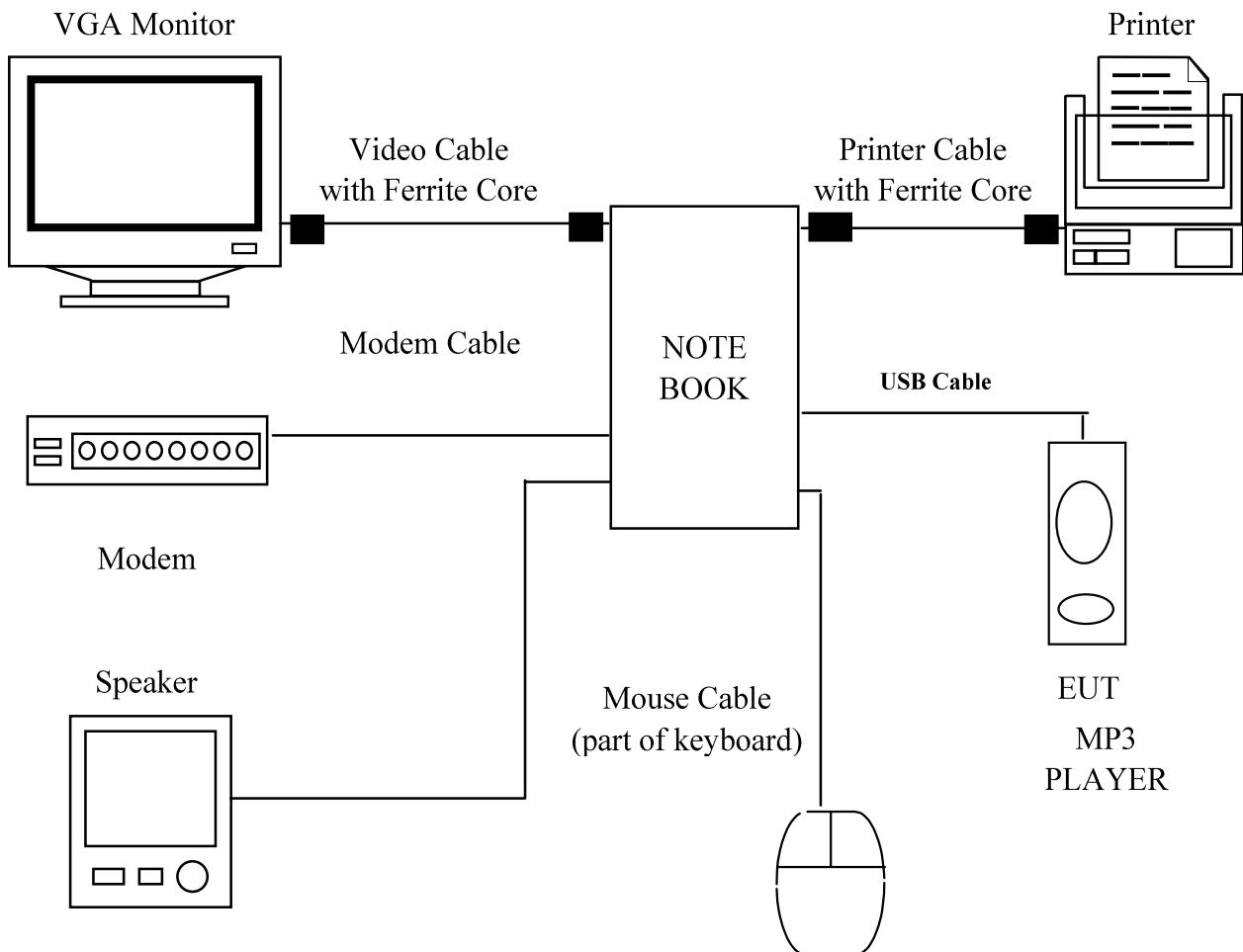
2.3 Special Accessories

As shown in section 2.5, all interface cables used for compliance testing are non-shielded as normally supplied or by use respective component manufacturers.

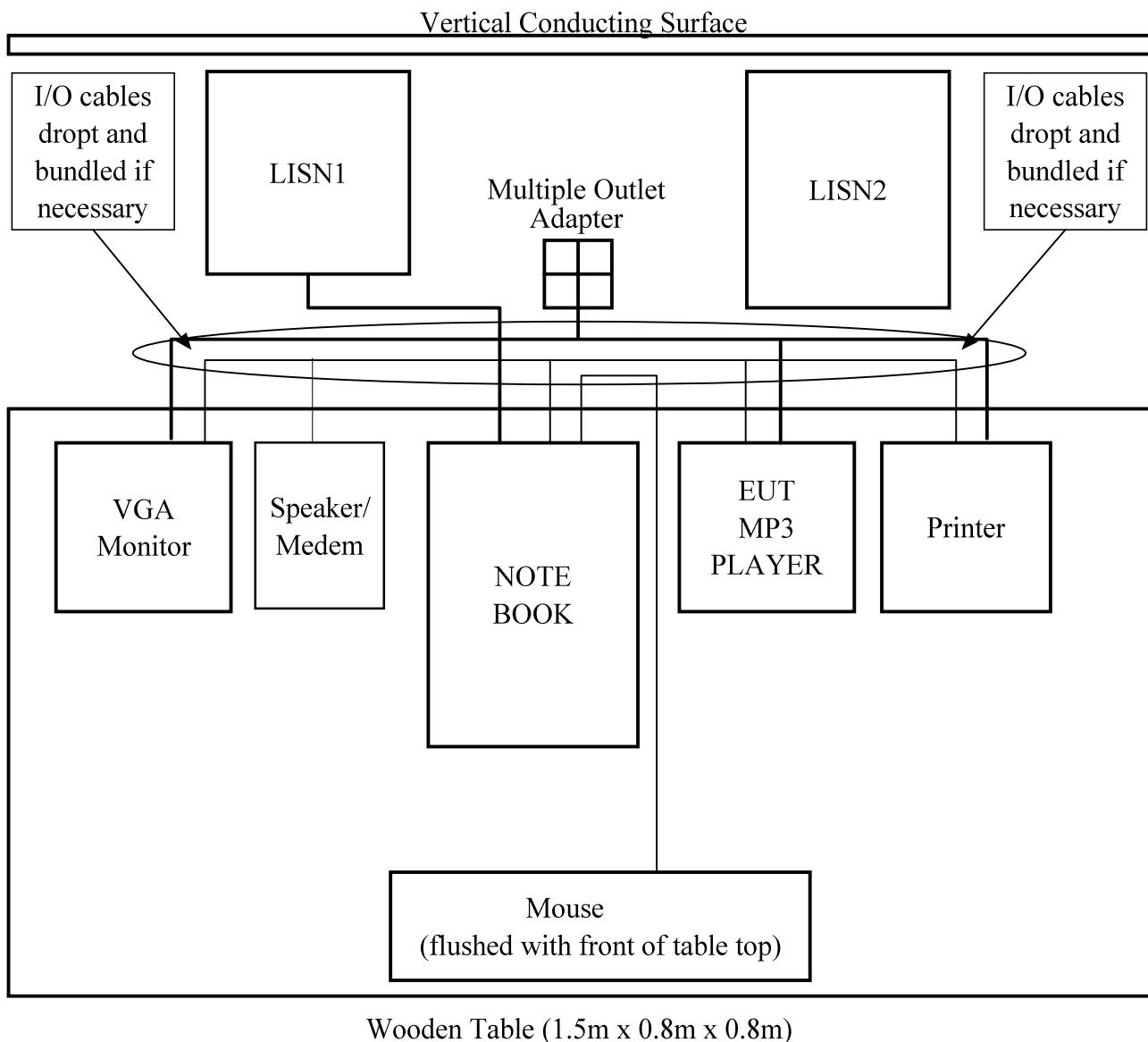
2.4 Block Diagram

The EUT block diagram is presented in Appendix B as reference.

2.5 Configuration of Test System



2.6 Conducted Emission Test Setup Block Diagram



3. Conducted Emission Test

3.1 EUT Setup

The measurement was performed in the screen room of test site, using the setup in accordance with ANSI C63.4-1992 conducted emission measurement procedure.

The EUT was connected with USB cable to Input of Host Computer. The host computer was placed on the center and back edge of the test table. The printer, modem were placed on one side of the host computer with the Monitor and EUT on the other side. The rear of the host computer and all support equipments were flushed with the rear and sides of the tabletop. The Mouse was placed in front of the host computer, flushed with the front of the tabletop.

Spacing between the peripherals was approximately 10 centimeters.

3.2 Test Equipment Setup

The spectrum analyzer was configured during the conduction test in as follows:

Start Frequency	150kHz
Stop Frequency	30MHz
Resolution Bandwidth	9kHz
Sweep Time	Auto
Detector Mode	QP

3.3 Test Procedure

During the conducted emission test, the host computer power cord was connected to the auxiliary outlet of the LISN1 and all other peripherals power cords were connected to the multiple outlet adapter of the LISN2.

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 (less than -4dBuV). Quasi-peak readings are distinguished with a "QP".

The conducted emission test was performed with EUT exercise program loaded, and the emissions were scanned between 0.150MHz to 30MHz on the LINE side and NEUTRAL side, herein referred to as L and N, respectively. The final test data for this test configuration is recorded in the table listed under section 3.5 of this report.

3.4 Summary of Test Results

According to the data in section 3.5, the EUT complied with the FCC Part 15 Class B standards, and had the worst margin reading of:

-16.0 dB at 0.209 MHz in the LINE side with Toshba Corporation AC Adaptor, Model PA2444U AC Adaptor

3.5 Conducted Emission Test Data

Line Conducted Emission				FCC Part15 Class B		
Frequency (MHz)	Amplitude (dBuV)	Detector Qp/Ave/Peak	Phase Line/Neutral	Limit (dBuV/m)		Margin (dB)
				QP	AV	
0.153	35.9	QP	N	66-56	56-46	-30.1
0.172	34.3	QP	N	66-56	56-46	-31.7
0.209	50.0	QP	H	66-56	56-46	-16.0
0.243	45.6	QP	N	66-56	56-46	-20.4
0.338	37.5	QP	H	66-56	56-46	-28.5
0.403	36.8	QP	N	66-56	56-46	-29.2
0.502	34.3	QP	H	56.0	46	-21.7
0.514	31.9	QP	N	56.0	46	-24.1
1.701	30.8	QP	N	56.0	46	-25.2
2.102	29.6	QP	H	56.0	46	-26.4
2.203	28.3	QP	H	56.0	46	-27.7
4.132	27.8	QP	H	56.0	46	-28.2
7.618	28.4	QP	N	60	50	-31.6
8.143	28.9	QP	H	60	50	-31.1
8.193	30.4	QP	N	60	50	-29.6
9.264	30.9	QP	N	60	50	-29.1
9.763	30.5	QP	H	60	50	-29.5
27.145	30.2	QP	N	60	50	-29.8

3.6 Plot of Conducted Emission Test Data

Plot(s) of conducted emission test data for the Toshba Corporation AC Adaptor, Model PA2444U AC Adaptor is presented in Appendix A of this report as reference.

4. Radiated Emission Test

4.1 EUT Setup

The radiated emission tests were performed in the open area test site, using the setup in accordance with ANSI C63.4-1992 radiated emission measurement procedure.

The VGA monitor with EUT and all peripherals were place on the test table same as section 3.1..

Spacing between the peripherals was approximately 10 centimeters.

4.2 Test Equipment Setup

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

Start Frequency	30MHz
Stop Frequency	1000MHz
IF Bandwidth	120kHz
Sweep Time	10msec
Detector Mode	QP

and above 1GHz-5GHz, Horn Atten was used.

4.3 Test Procedure

For the radiated emission test, the host computer and all support equipments power cords was connected to the AC floor outlet.

Maximizing procedure was performed on the six (6) highest emissions to verify that the EUT complied with all installation combination.

The radiated emission test was performed with EUT exercise program loaded, and the emissions were scanned between 30MHz to 1000MHz. At each frequency, the EUT was rotated 360 degrees, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum emission levels. Measurements were taken using both HORIZONTAL and VERTICAL antenna polarization. The final test data for this test configuration is recorded in the table listed under section 4.6 of this report.

4.4 Corrected Amplitude and Margin Calculation

The Corrected Amplitude is calculated by adding the antenna and cable Correction Factor from the Indicated Amplitude reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Indicated Amplitude} + \text{Antenna Factor} + \text{Cable Factor}$$

The Margin column of the data table in section 4.6 indicates the degree of compliance with the applicable limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corrected Amplitude} - \text{Applicable Limit}$$

4.5 Summary of Test Results

According to the data in section 4.6, the EUT complied with the FCC Part 15 Class B standards, and had the worst margin of:

-3.7 dB at 144.05 MHz in the VERTICAL polarization at an antenna-to-EUT distance of 3 meters.

4.6 Radiated Emission Test Result Data

30 - 88 MHz	40.0 dBuV/M MEASURED AT 3 METERS
88 - 216 MHz	43.5 dBuV/M
216 - 960 MHz	46.0 dBuV/M
ABOVE 960 MHz	54.0 dBuV/M

No	Emission Frequency (MHz)	Meter Reading dBuV	Ant. Polar	Correction Factor dB	Cable Loss dB	Field Strength (dBuV/m)	Margin (dBuV)	Limit (dBuV/m)
1	51.14	11.6	H	10.5	1.0	23.2	-16.8	40.0
2	75.01	15.7	V	6.8	1.3	23.8	-16.2	40.0
3	79.10	15.2	H	7.8	1.3	24.3	-15.7	40.0
4	86.21	17.3	H	9.5	1.5	28.3	-11.7	40.0
5	92.84	16.6	V	10.7	1.6	28.8	-14.7	43.5
6	106.85	14.7	H	11.1	1.7	27.5	-16.0	43.5
7	128.05	16.6	V	12.3	1.9	30.8	-12.7	43.5
8	144.05	22.0	V	15.8	2.1	39.8	-3.7	43.5
9	155.00	18.2	V	16.9	2.2	37.3	-6.2	43.5
10	180.65	19.5	V	14.5	2.4	36.4	-7.1	43.5
11	222.80	11.2	H	10.7	2.8	24.7	-21.3	46.0
12	225.18	11.6	H	10.8	2.8	25.2	-20.8	46.0
13	232.20	11.8	H	11.0	2.9	25.7	-20.3	46.0
14	280.86	9.0	V	17.3	3.3	29.6	-16.4	46.0
15	287.88	9.9	H	17.7	3.3	30.9	-15.1	46.0
16	300.70	8.6	V	16.2	3.4	28.2	-17.8	46.0
17	435.16	5.8	H	16.0	4.5	26.3	-19.7	46.0
18	447.92	5.2	H	16.4	4.5	26.1	-19.9	46.0
19	672.16	5.6	V	21.0	6.0	32.6	-13.4	46.0

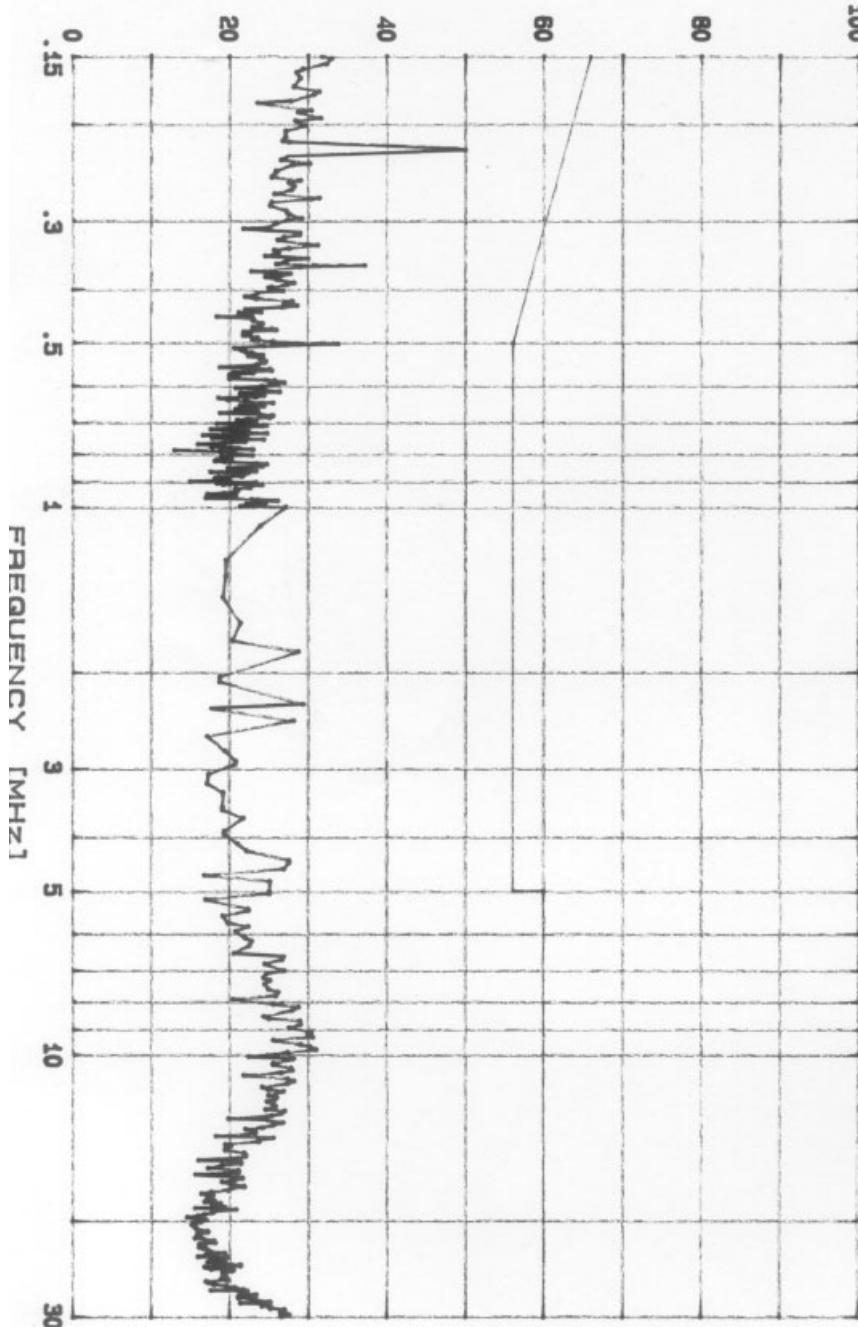


Appendix A - Plot of Conducted Emission Test Data

HOT

LINE CONDUCTION

Limit: [CISPR Pub22] Class B
(0.15 ~ 30MHz)



NEUTRAL

