Nemko Korea CO., Ltd.

300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

Amac Tek Co., Ltd.
3rd Floor, Seyo Bldg, 161-8, Samsung-1Dong,
Kangnam-Gu, Seoul, 135-881, Korea
Attn : Mr. K. H. Na

Dates of Issue : July 12, 2004
Test Report No. : NK2EE483
Test Site : Nemko Korea Co., Ltd.
EMC site, Korea

MODEL	***PLXHAN-500***
Brand Name	***HANSORI, AMAC***
CONTACT PERSON	**Amac Tek Co., Ltd.** **3rd Floor, Seyo Bldg, 161-8, Samsung-1Dong,** **Kangnam-Gu, Seoul, 135-881, Korea** **Mr. K. H. Na** **Telephone No. : +82 2 539 6958**

Applied Standard: Part 15 & 2
Classification : FCC Class B Device
EUT Type: MP3 Player

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2001.
I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Baek sung hun

Tested By : S. H. Baek
Senior Engineer

Reviewed By : H.H. Kim
Manager & Chief Engineer

TABLE OF CONTENTS

SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

Responsible Party :	Amac Tek Co., Ltd.
Contact Person :	Mr. K. H. Na
Manufacturer :	Amac Tek Co., Ltd. 3rd Floor, Seyo Bldg, 161-8, Samsung-1Dong, Kangnam-Gu, Seoul, 135-881, Korea Tel No.: +82 2 539 6958
Factory :	Amac Tek Co., Ltd. 3rd Floor, Seyo Bldg, 161-8, Samsung-1Dong, Kangnam-Gu, Seoul, 135-881, Korea Tel No.: +82 2 539 6958

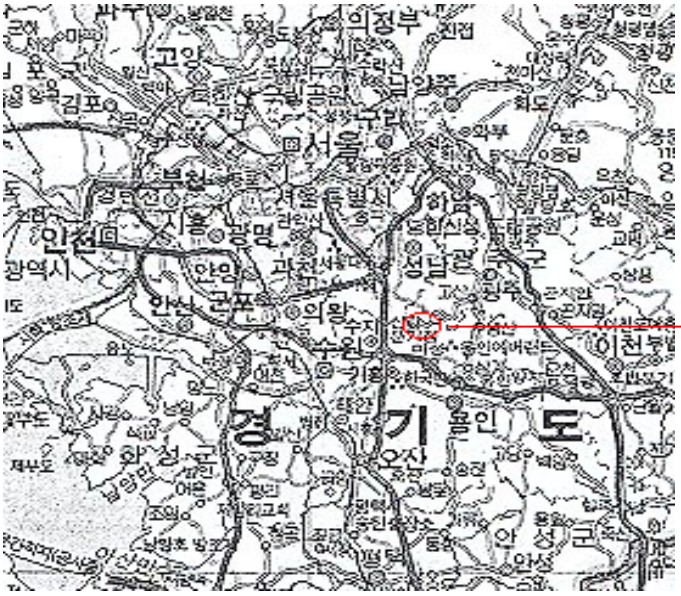
- FCC ID: PLXHAN-500
- Brand Name: HANSORI, AMAC
- EUT Type: MP3 Player
- Voltage: DC 1.5V (size AAA battery)
- Port/Connector USB, Earphone, Line In

- Classification: FCC Class B
- Rule Part(s): FCC Part 15 & Part 2
- Test Procedure(s): ANSI C63.4 (2001)
- Dates of Test: July 01, 2004 to July 05, 2004
- Place of Tests: Nemko Korea Co., Ltd. EMC Site
- Test Report No.: NK2EE483

INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2001) was used in determining radiated and conducted emissions emanating from **Amac Tek Co., Ltd.**
MODEL : **PLXHAN-500, MP3 Player.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address is 300-2, Osan-Ri, Mohyun-Myun, Yongin-City, Kyungki-Do, KOREA
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 kilometers (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 kilometers (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4 on June 06, 2001.



Nemko Korea Co., Ltd.
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Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

TEST CONDITIONS & EUT INFORMATION

Operating During Test

The MP3 player was connected with PC and was measured at upload mode, download mode and play mode for the testing and the worst data recorded.

Support Equipment

MP3 Player (EUT)	Amac Tek Co., Ltd., FCC ID:PLXHAN-500	S/N : N/A
Monitor	Sony EMCS Corp. Model : P992 1.5m Shield AC power cord	S/N : 5904614
Notebook	DELL, Model : PR01X	S/N : 2U444A01
Adaptor (Notebook)	Dongguang Lite Power 2nd Plant Model : PA-1900-02D 1.8m unshield AC power cord 2.0m Shielded DC Cable	S/N : 09T215
Keyboard	SEJIN, Model : 104DYW10-100 1.5m Unshielded Din cable	S/N : OFA024809
PS/2 Mouse	Samsung Electro-Mechanics Model : SMO-5000WX 1.5m Unshielded D-sub cable	S/N : 0404062249
Printer	H.P., Model: C5870A 1.8m shielded D-sub cable	S/N : SG88R131GW
Adaptor (Printer)	YOKOGAWA Model : C4557-60104 1.8m unshielded AC power cable 1.2m unshielded DC power cable	S/N : N/A
Earphone	Amac. 1.0m unshielded, phone Jack	S/N : N/A

EUT Information

Clock:	32.768kHz, 8MHz, 12MHz
Chipset(s):	U1(TPS61010), U12(SM8142BD), J6(HP081020)
Port(s):	Earphone, USB, Line In
Download Speed :	6.8 Mbps
Memory :	128 / 256 / 512MB / 1GB
Size :	30 x 100 x 44 mm
Voice Recording Time :	8 Hours (128MB, 32kbps)

SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	Paragraph No.	Result	Remark
Conducted Emission	15.107	Complies	
Radiated Emission	15.109	Complies	

RECOMMENDATION/CONCLUSION

The data collected shows that the **Amac Tek Co., Ltd.**
FCC ID : **PLXHAN-500, MP3 Player.** complies with § 15.107 and 15.109 of the FCC Rules.
The highest emission observed was at **0.16 MHz** for conducted emissions with a margin of **6.16 dB**, at **613.39 MHz** for radiated emissions with a margin of **6.00 dB**.

SAMPLE CALCULATION

$$\text{dB}\,\mu\text{N} = 20 \log_{10}(\mu\text{N/m})$$

$$\mu\text{N} = 10^{(\text{dB}\,\mu\text{N}/20)}$$

EX. 1.

@57.7 MHz Class B limit = 100 μN/m = 40.0 dB μN/m

Reading = 19.1 dB μN(calibrated level)
Antenna factor + Cable Loss + Amplifier Gain = 10.12 dB
Total = 29.22 dB μN/m
Margin = 40.0 – 29.22 = 10.78
10.78 dB below the limit

DESCRIPTION OF TESTS

Conducted Emissions

The Line conducted emission test facility is located inside a 4 X 7 X 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6.
A 1m X 1.5m wooden table 0.8m height is placed 0.4m away from the vertical wall and 1.5m away from the side of wall of the shielded room
Rohde & Schwarz (ESH3-Z5) and Kyoritsu (KNW-408) of the 50ohm/50uH Line Impedance Stabilization Network(LISN) are bonded to the shielded room.
The EUT is powered from the Rohde & Schwarz LISN and the support equipment is powered from the Kyoritsu LISN. Power to the LISN s are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1/2".
If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs,
All interconnecting cables more than 1 meter were shortened by non inductive bundling (serpentine fashion) to a 1 meter length.
Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT.
The spectrum was scanned from 150kHz to 30MHz with 20msec sweep time.
The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30).
The detector function were set to CISPR quasi-peak mode & average mode.
The bandwidth of receiver was set to 9KHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.
Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

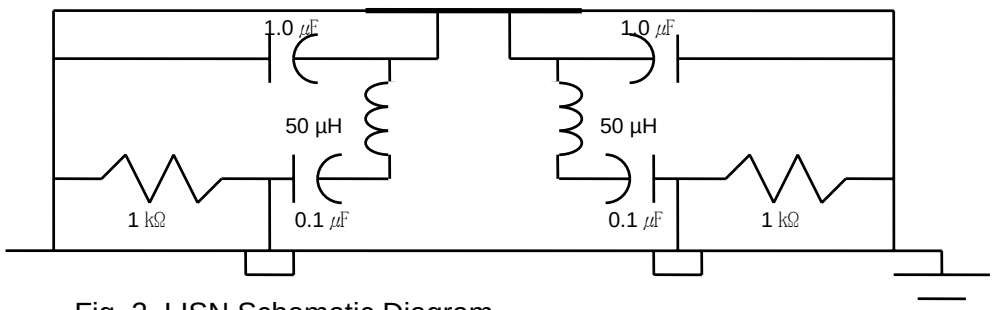


Fig. 2. LISN Schematic Diagram

DESCRIPTION OF TESTS

Radiated Emissions

Preliminary measurement were made indoors at 3 meter using broad band antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The Technology configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna was note for each frequency found.

The spectrum was scanned from 30 to 1000MHz using Biconical log Antenna(ARA, LPB-2520/A). Above 1GHz, Doppels Teg Horn antenna (EMCO, DAA-37121:upto 1~18GHz) was used.

Final Measurements were made outdoors at 3 or 10m test range using Logbicon Super Antenna(Schwarzbeck, VULB9166) or Doppels Teg Horn antenna.(EMCO, DAA-37121)

The test equipment was placed on a wooden table.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was reexamined and investigated using EMI test receiver.(ESCS30)

The detector function was set to CISPR peak mode or quasi-peak mode or Average mode and the bandwidth of the receiver was set to 120KHz or 1MHz depending on the frequency or type of signal.

The half wave dipole antenna was tuned to the frequency found during preliminary radiated measurements.

The EUT support equipment and interconnecting cables were re configured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8m high non- metallic 1.0X 1.5 meter table.

The EUT, support equipment and interconnecting cables were re-arranged and manipulated to maximize each EME emission.

The turn table containing the Technology was rotated; the antenna height was varied 1 to 4meter and stopped at the azimuth or height producing the maximum emission Each emission was maximized by : switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; which ever determined the worst case emission.

Each EME reported was calibrated using the R/S signal generator.

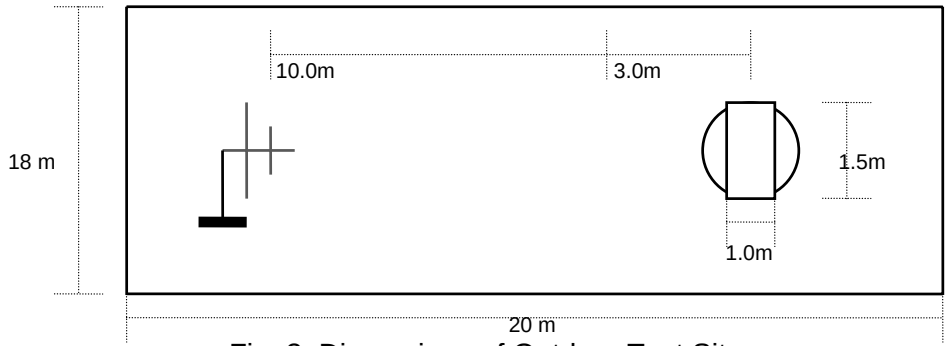


Fig. 3. Dimensions of Outdoor Test Site

Conducted Emissions

FCC ID : PLXHAN-500
Test Mode : download mode

Frequency (MHz)	Level(dBμV)		Line	Limit(dBμV)		Margin(dB)	
	Q-Peak	Average		Q-Peak	Average	Q-Peak	Average
0.15	53.40	47.40	N	66.00	56.00	12.60	8.60
0.16	52.50	49.30	N	65.46	55.46	12.96	6.16
0.20	40.40	32.10	L	63.61	53.61	23.21	21.51
0.25	41.40	35.20	N	61.76	51.76	20.36	16.56
0.50	45.90	37.96	L	56.00	46.00	10.10	8.04
0.93	42.54	36.34	L	56.00	46.00	13.46	9.66
1.27	42.83	35.83	L	56.00	46.00	13.17	10.17
5.42	41.00	32.40	N	60.00	50.00	19.00	17.60
6.96	40.00	31.43	N	60.00	50.00	20.00	18.57
8.11	36.80	30.60	N	60.00	50.00	23.20	19.40

Table 1. Line Conducted Emissions Tabulated Data

NOTES:
1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
3. The limit for Class B device is on the FCC Part section 15.107(a).
4. Line L = Line Line N = Neutral

Tested by ***S. H. Baek***

TEST DATA

Radiated Emissions

FCC ID : PLXHAN-250X
Test Mode : play mode

Frequency (MHz)	Reading (dBμN)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμN/m)	Limit (dBμN/m)	Margin (dB)
114.41	37.80	H	-17.3	20.50	43.50	23.00
140.96	45.32	H	-14.0	31.30	43.50	12.20
143.97	44.94	H	-13.5	31.40	43.50	12.10
154.92	43.11	H	-12.7	30.40	43.50	13.10
156.00	47.23	H	-12.7	34.50	43.50	9.00
164.99	44.83	H	-12.9	31.90	43.50	11.60

Table 2. Radiated Measurements at 3meters

FCC ID : PLXHAN-250X
Test Mode : download mode

Frequency (MHz)	Reading (dBμN)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμN/m)	Limit (dBμN/m)	Margin (dB)
120.07	50.99	V	-17.3	33.70	43.50	9.80
129.70	46.28	H	-15.8	30.50	43.50	13.00
139.47	44.55	H	-14.3	30.30	43.50	13.20
527.47	40.06	H	-5.6	34.50	46.00	11.50
569.04	39.94	H	-4.4	35.50	46.00	10.50
613.39	43.24	H	-3.2	40.00	46.00	6.00

Table 3. Radiated Measurements at 3meters

TEST DATA

Radiated Emissions

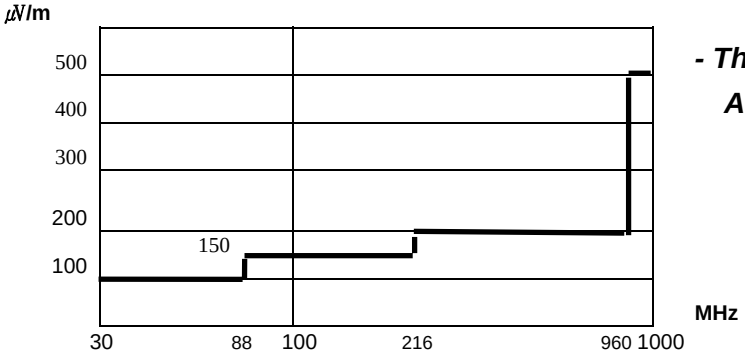
FCC ID : PLXHAN-250X
Test Mode : upload mode

Frequency (MHz)	Reading (dBμN)	Pol* (H/V)	AF+CL+Amp (dB)**	Result (dBμN/m)	Limit (dBμN/m)	Margin (dB)
59.10	41.89	V	-21.6	20.30	40.00	19.70
120.07	39.59	H	-17.3	22.30	43.50	21.20
139.47	39.25	H	-14.3	25.00	43.50	18.50
149.17	34.23	H	-12.7	21.50	43.50	22.00
158.87	36.50	H	-12.8	23.70	43.50	19.80
205.99	36.56	H	-13.6	23.00	46.00	23.00

Table 4. Radiated Measurements at 3meters

FCC ID : PLXHAN-250X
Test Mode : Tune to the broadcasting channels

▶ ***The field strength of HAN-500 was under 20dB below limit.***



- The radiated limits are shown on Figure 4.
Above 1GHz the limit is 500 µV/m.

Fig. 4. Limits at 3 meters

NOTES:

1. All modes of operation were investigated the worst-case emission are reported.

2. *Pol. H =Horizontal V=Vertical

3. **AF+CL+Amp. = Antenna Factor + Cable Loss + Amplifier.

4. All modes of operation were investigated the worst-case emission are reported.

5.The limit for Class B device is on the FCC Part section 15.109(a).

Tested by **S. H. Baek**

PLOTS OF EMISSIONS

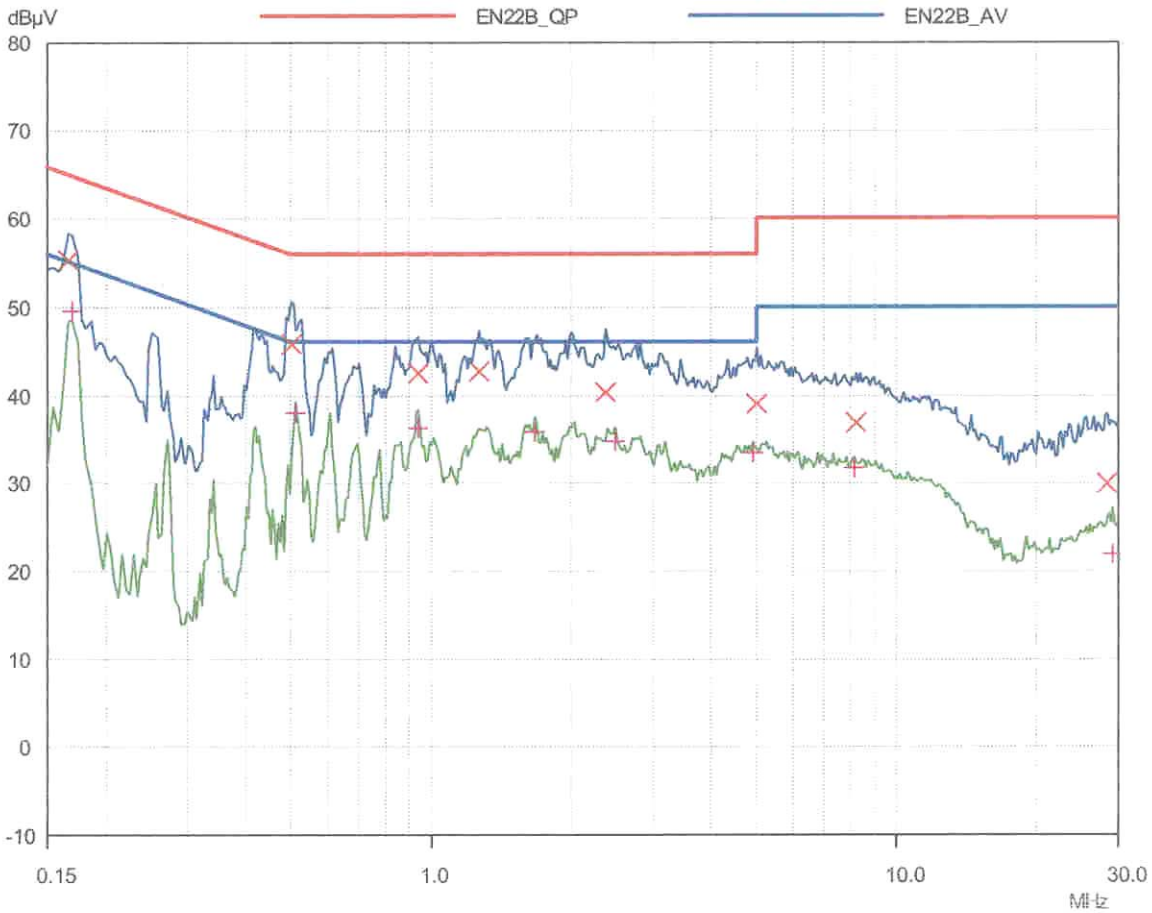
- ***Conducted Emission at the Mains port (Line)***

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:
Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 8
Acc Margin: 30 dB



PLOTS OF EMISSIONS

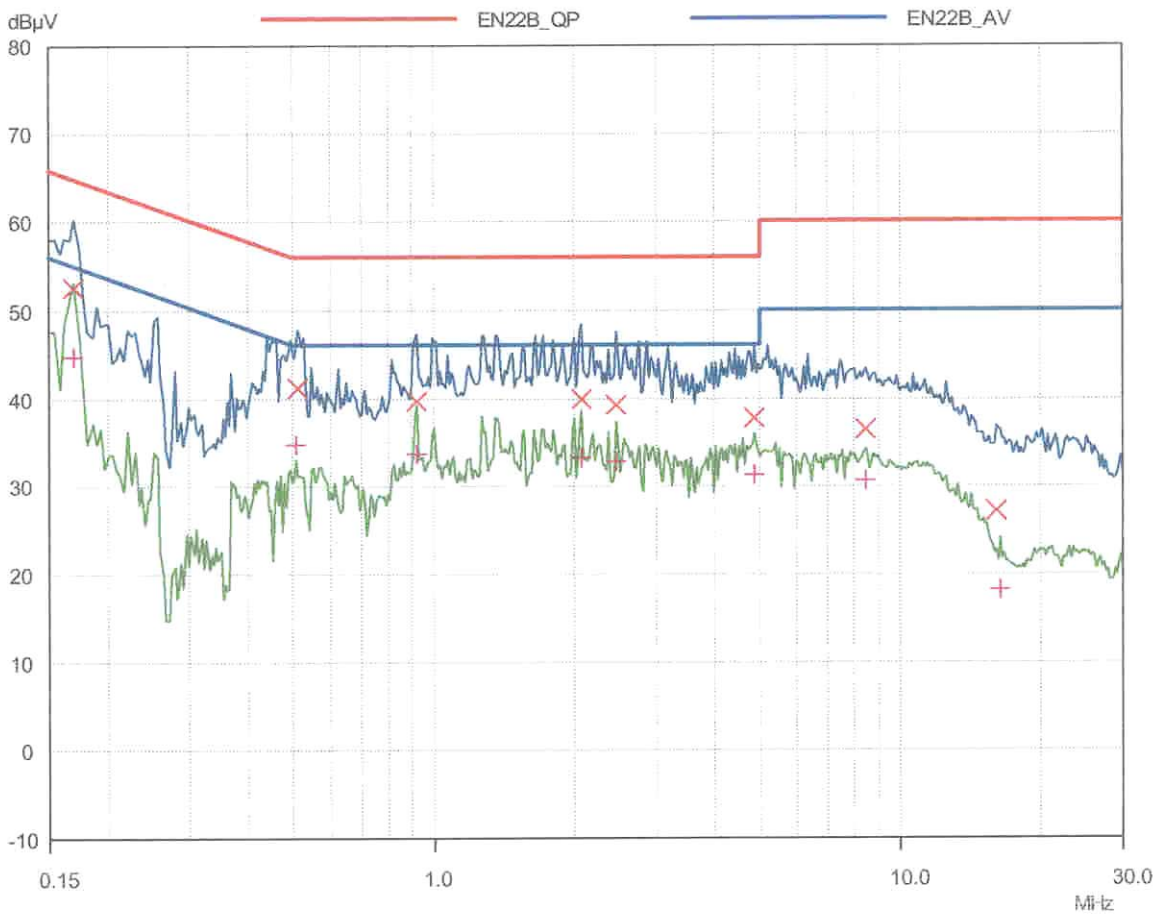
- ***Conducted Emission at the Mains port (Neutral)***

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	3.9063kHz	9kHz	PK+AV	20msec	10 dB	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	150kHz	30MHz	CE_LINE

Final Measurement:
Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 8
Acc Margin: 30 dB



ACCURACY OF MEASUREMENT

The Measurement Uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 with the confidence level of 95%

1. Radiation Uncertainty Calculation

Contribution	***Probability Distribution***	***Uncertainty(+/-dB)***
Antenna Factor	Normal (k=2)	± 0.5
Cable Loss	Normal (k=2)	± 0.04
Receiver Specification	Rectangular	± 2.0
Antenna directivity	Rectangular	± 1.0
Antenna Factor variation with Height		
Antenna Phase Center Variation		
Antenna Factor Frequency Interpolation		
Measurement Distance Variation		
Site Inperfections	Rectangular	± 2.0
Mismatch:Receiver VRC ri=0.3 Antenna VRC rR=0.1(Bi)0.4(Lp) Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	+ 0.25 / - 0.26
System Repeatibilty	Std.deviation	± 0.05
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.77
Expended Uncertainty U	Normal (k=2)	± 3.5

2. Conducted Uncertainty Calculation

Contribution	***Probability Distribution***	***Uncertainty(+/-dB)***
Receiver Specification	Normal (k=2)	± 2.0
LISN coupling spec.	Normal (k=2)	± 0.4
Cable and input attenuator cal.	Rectangular	± 0.4
Mismatch:Receiver VRC ri=0.3 LISN vrc rg=0.1 Uncertainty Limits 20Log(1+/-ri rR)	U-Shaped	± 0.26
System Repeatibilty	Std.deviation	± 0.68
Repeatability of EUT	-	-
Combined Standard Uncertainty	Normal	± 1.18
Expended Uncertainty U	Normal (k=2)	± 2.4

TEST EQUIPMENT

No.	Instrument	Manufacturer	Model	Calibration Date
1	*Test Receiver	R & S	ESCS 30	2003.09
2	*Amplifier	HP	8447F	2004.01
3	*Amplifier	HP	8449B	2004.03
4	Spectrum Analyzer	Advantest	R3265A	2003.12
5	*Spectrum Analyzer	HP	8566B	2004.03
6	*Logbicon Super Antenna	Schwarzbeck	VULB9166	2004.05
7	Doppels Teg Horn	EMCO	DAA-37121	2004.10
8	Dipole Antenna	R & S	VHA9103	2004.05
9	Dipole Antenna	R & S	UHA9105	2004.05
10	Biconical Log Antenna	ARA	LPB-2520/A	2004.05
11	High Voltage Probe	R & S	ESH2-Z3	2003.10
12	Signal Generater	R & S	SMP02	2004.03
13	*LISN	R & S	ESH3-Z5	2003.11
14	LISN	Kyoritsu	KNW-407	2004.03
15	*LISN	Kyoritsu	KNW-408	2003.12
16	CDN	FCC	NCD-T4	2004.05
17	CDN	FCC	NCD-T2	2004.05
18	*Position Controller	EM Eng.	N/A	N/A
19	*Turn Table	EM Eng.	N/A	N/A
20	*Antenna Mast	EM Eng.	N/A	N/A
21	*Anechoic Chamber	EM Eng.	N/A	N/A
22	*Shielded Room	EM Eng.	N/A	N/A

***) Test equipment used during the test**

APPENDIX D – BLOCK DIAGRAM

APPENDIX E – USER'S MANUAL

APPENDIX F – SCHEMATIC DIAGRAMS