Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. : 05-IST-0392 **Date of Issue** : January 20, 2006

Model(s) : **EPM-300**
Kind of Product : Digital Audio Player
FCC ID : TQEEPM-300
Applicant : ENOX INC.
Address : Anyang Venturetel Suite #1111, 1107-1, Bisan-dong Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Manufacturer : ENOX INC.
Address : Anyang Venturetel Suite #1111, 1107-1, Bisan-dong Dongan-gu, Anyang-si, Gyeonggi-do, Korea

Test Result ■ **Positive** ☐ **Negative**

Reviewed By

S.J.CHO / EMC Group Manager

Approved By

J.H.LEE / Chief

Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B – Unintentional Radiators, Class B.
- The test report with appendix consists of 32 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued compliance 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 2003.

TABLE OF CONTENTS

Table of contents 2

Information of test laboratory, Environmental conditions, Power used, Product information 3

Descriptions of test

Conducted Emission 4

Radiated Emission 5

Measurement Uncertainty Calculations 6

Equipment Under Test 7

Test Set-Up (Figure) 8

Summary 9

■ **Test Conditions and Data - Emissions**

◆ Conducted Emissions 0.15MHz - 30MHz Applicable

Test Conditions / Data and Plots 10-12

◆ Radiated Emissions 30MHz - 2GHz Applicable

Test Conditions / Data and Plots 13-25

Appendix A. The Photos of Test Setup 26-30

B. The Photos of Equipment Under Test 31-32

Note:

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. ***(FCC Filing Lab.)***
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 4093 FAX : +82 31 333 4094

ENVIRONMENTAL CONDITIONS

Temperature	18 ℃
Humidity	39 %
Atmospheric pressure	1013 mbar

POWER SUPPLY SYSTEM USED

Power supply system	AC 120Vac, 60Hz(PC Power) (Refer to the product information)

PRODUCT INFORMATION

The Equipment Under Test(EUT) is Digital Audio Player of ENOX INC.
(FCC ID : TQEEPM-300)

memory:	128MB
Support:	MPEG 1/2/2.5 Layer3(8 320kbps,VBR) WMA(5~320kbps)ASK,OGG(OGG320kbps).WAV
Battery:	Built-in Li-ion battery (3V)
Interface:	USB 2.0
LCD:	OLED double color
dimension	59(W) x 29(H) x 15.5(D)mm
Weight:	25g
Support OS:	Windows 98SE / ME / 2000 / XP / MAC

- EMC suppression device is not used during the test.
- Please refer to user’s manual.

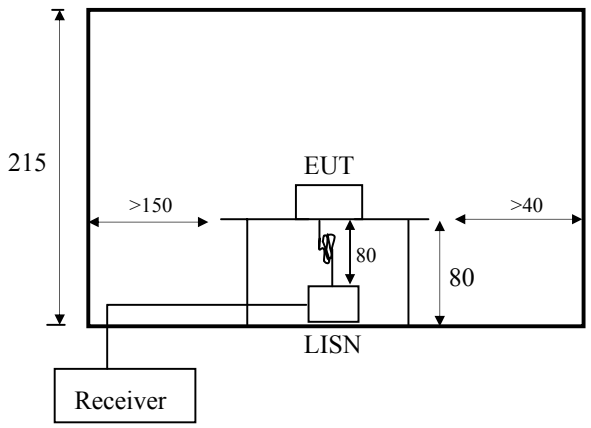
DESCRIPTIONS OF TEST

Conducted Emissions:

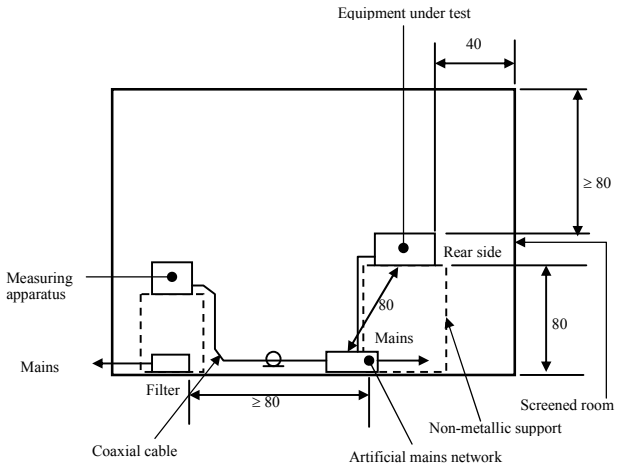
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9KHz.

-Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1m X 1.5m wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The R/S ESH3 and Hyup-Rip KNW-407 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the EMCO LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered 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 EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the R/S receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10kHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



< Side View >



< Concept Drawing >

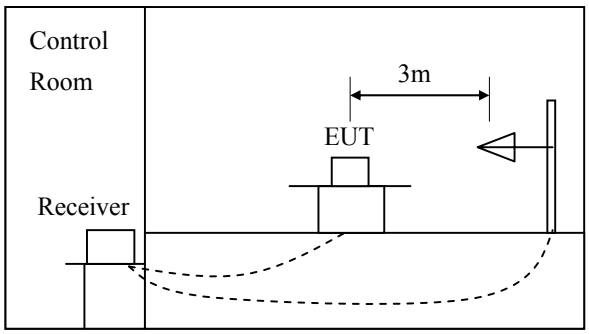
DESCRIPTION OF TEST

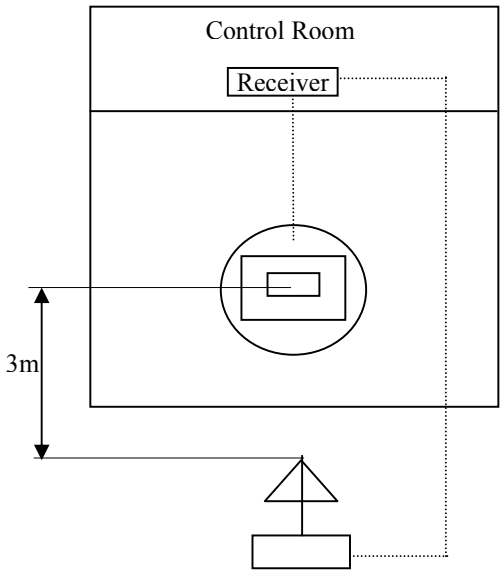
Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

-Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral 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 re-examined by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.





Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Conducted Emissions)	Probability Distribution	Uncertainty (±dB) 0.15-30MHz
Receiver Specification	Rectangular	1.5
LISN Coupling Specification	Rectangular	1.5
Cable and Input Attenuator Calibration	Normal (k=2)	0.5
Mismatch to Reciver	U-Shaped	-0.8 / +0.7
System Repeatability	Normal (k=1)	0.2
Combined Standard Uncertainty	Normal (k=2)	-1.85 / +1.71
Expanded Uncertainty U	Normal (k=2)	-3.7 / +3.42

$U_{c,minus}$ = -1.85, $U_{c,plus}$ = 1.71

U = -3.70 / +3.42 (k=2, 95.45% confidence level)

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties(±dB) 3 m
Antenna		
Factor	Normal (k=2)	0.9968
Frequency Interpolation	Rectangular	0.1039
Height Variation	Rectangular	-2.6 / +1.5
Directivity Difference	Rectangular	-1.0 / +0
Phase Center Location	Rectangular	1.0
Cable Loss	Normal (k=2)	0.5
Receiver		
Voltage Accuracy	Normal (k=2)	2.0
Pulse Response	Rectangular	1.5
Absolute Repetition Rate	Rectangular	1.5
Mismatch to Receiver $\lvert \Gamma_{antenna} \rvert = 0.33$ $\lvert \Gamma_{receiver} \rvert = 0.33$	U-Shaped	-1.0 / +0.9
System Repeatibility	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$U_{c,minus}$ = −2.6048, $U_{c,plus}$ = 2.2775

U = -5.21 / +4.55 (k=2, 95.45% confidence level)

Equipment Under Test

EUT Type :

■ Table-Top. ☐ Floor-Standing.

☐ Table-Top and Floor-Standing(Combination).

Operation – mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

☐ Standby Mode

■ Operational Condition : ■ File up/download mode
■ FM receiving mode
■ Playback mode
■ Voice recording mode

Configuration of the equipment under test :

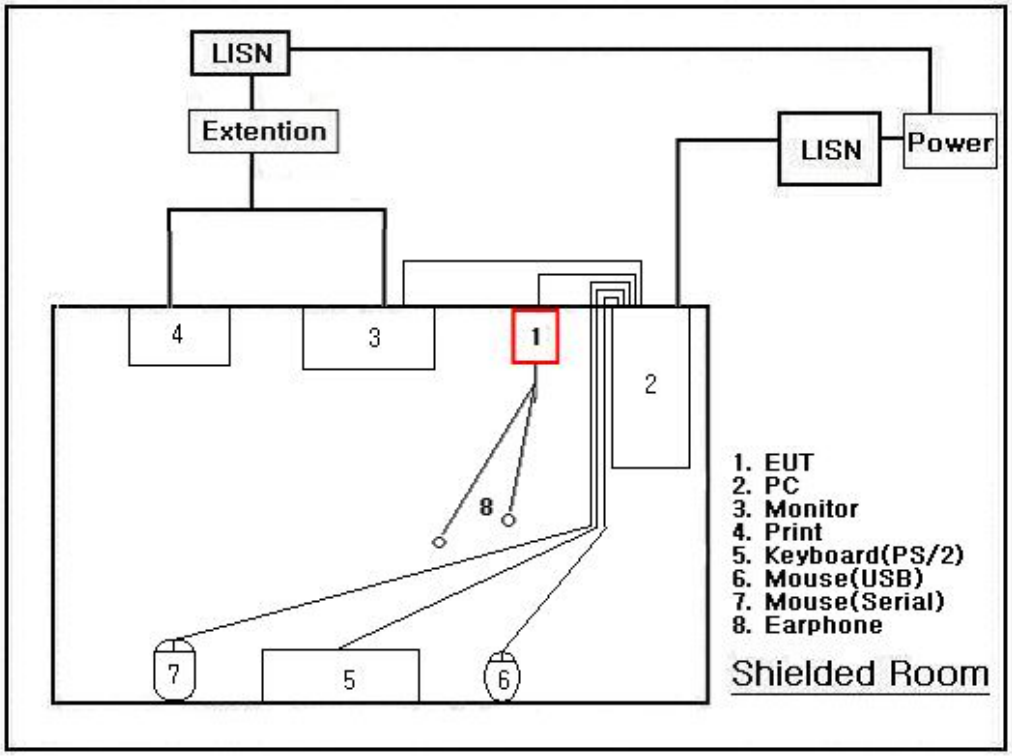
Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.
dx6120MT	Desktop Computer	HP	CNG52000QL
SK-2880	Keyboard(PS/2)	HP	N/A
M-UV69a	Mouse(USB)	HP	N/A
1704FPTt	Monitor	DELL	N/A
M-M28	Mouse(Serial)	Logitech	N/A
A0302380	Printer	Northen Telecom	2633S60168

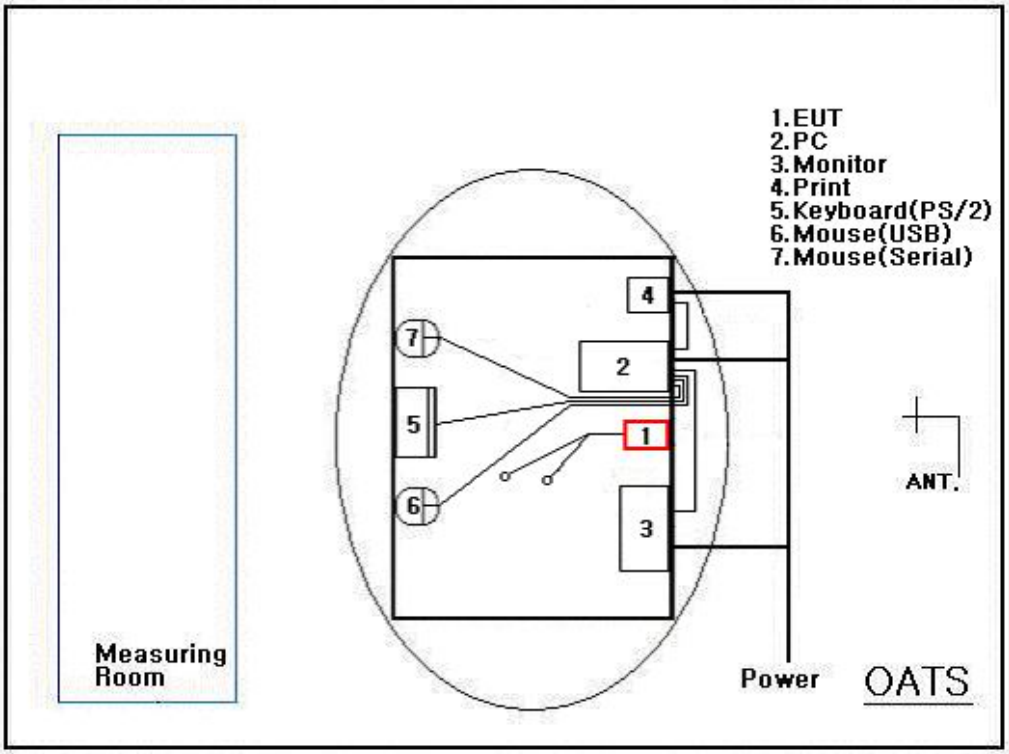
Connecting Interface Cables :
Shielded monitor’s signal cable(with two ferrite core) : 1.5 m
Shielded Printer’s signal cable(without ferrite core) : 1.8 m
Unshielded Keyboard(PS/2) cable(without ferrite core) : 1.8 m
Unshielded Mouse(USB) cable(without ferrite core) : 1.8 m
Unshielded Mouse(Serial) cable(without ferrite core) : 1.8 m
Unshielded USB cable(without ferrite core) : 1.2 m
Unshielded Earphone cable(without ferrite core) : 1.3 m

Note :

Test Set-Up



Conducted Emissions



Radiated Emissions

SUMMARY

Emissions

■ Conducted Emission

The requirements are ● MET ○ Not MET

Minimum limit margin 8.4 dB at 6.142 MHz

Maximum limit exceeding

Remarks : With Neutral phase, for average detect mode.

(File up/download mode)

Find the test data in following pages 10 to 12.

■ Radiated Emission

The requirements are ● MET ○ Not MET

Minimum limit margin 8.0 dB at 150.9 MHz

Maximum limit exceeding

Remarks : File up/download mode.

Find the test data in following page 14 to 19.

Test Date

Begin of Testing : December 24, 2005

End of Testing : January 19, 2006

Prepared By

Note :

- ■ means the test is applicable,
- □ is not applicable.

C.W.Kim / Project Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESH3	Test Receiver	Rohde & Schwarz	Jul. 12, 2005	892108/018
3725/2	LISN	EMCO	Jul. 12, 2005	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 12, 2005	8-883-10
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 12, 2005	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program File up/download mode

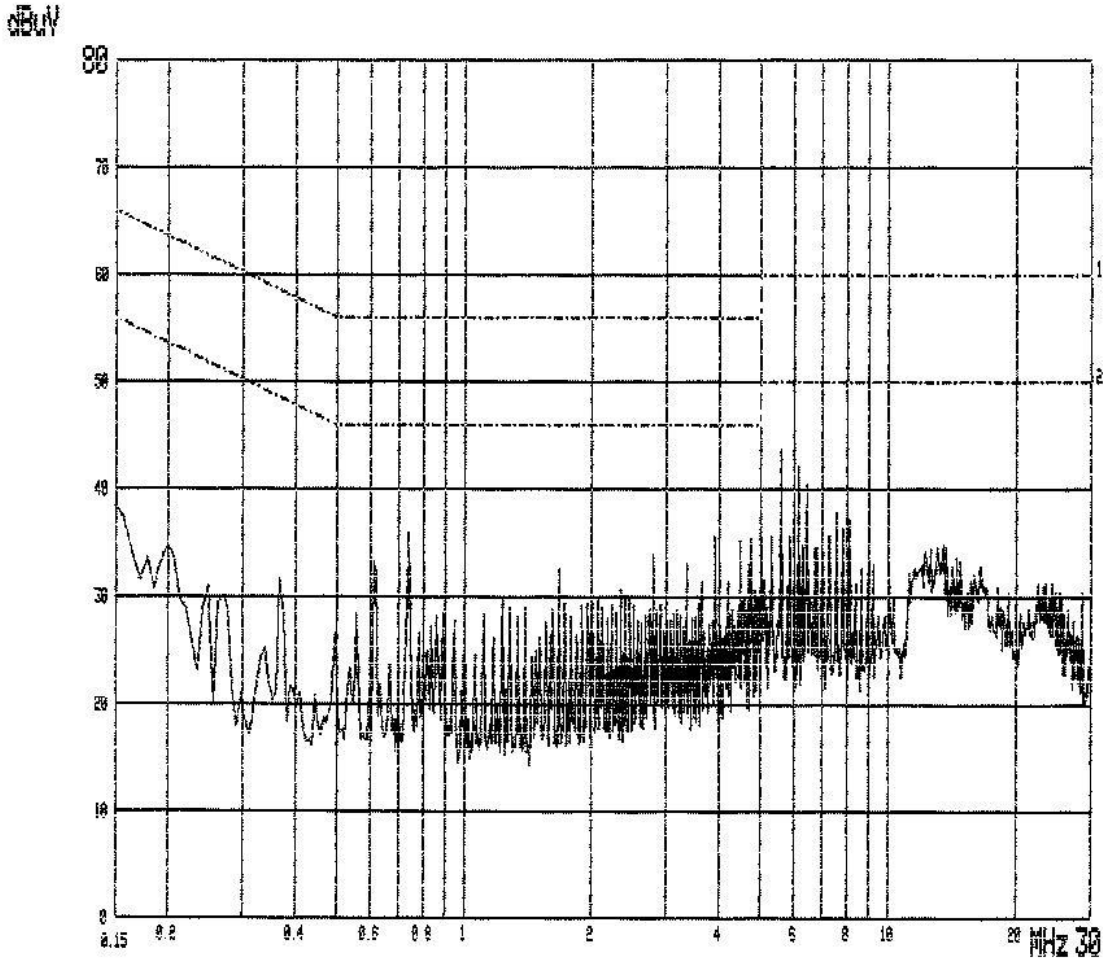
◆ Test Date December 24, 2005

◆ Test Area Conducted room No.1

Note : The equipment used is calibrated in regular for every year.

Conducted Emissions

Live Phase



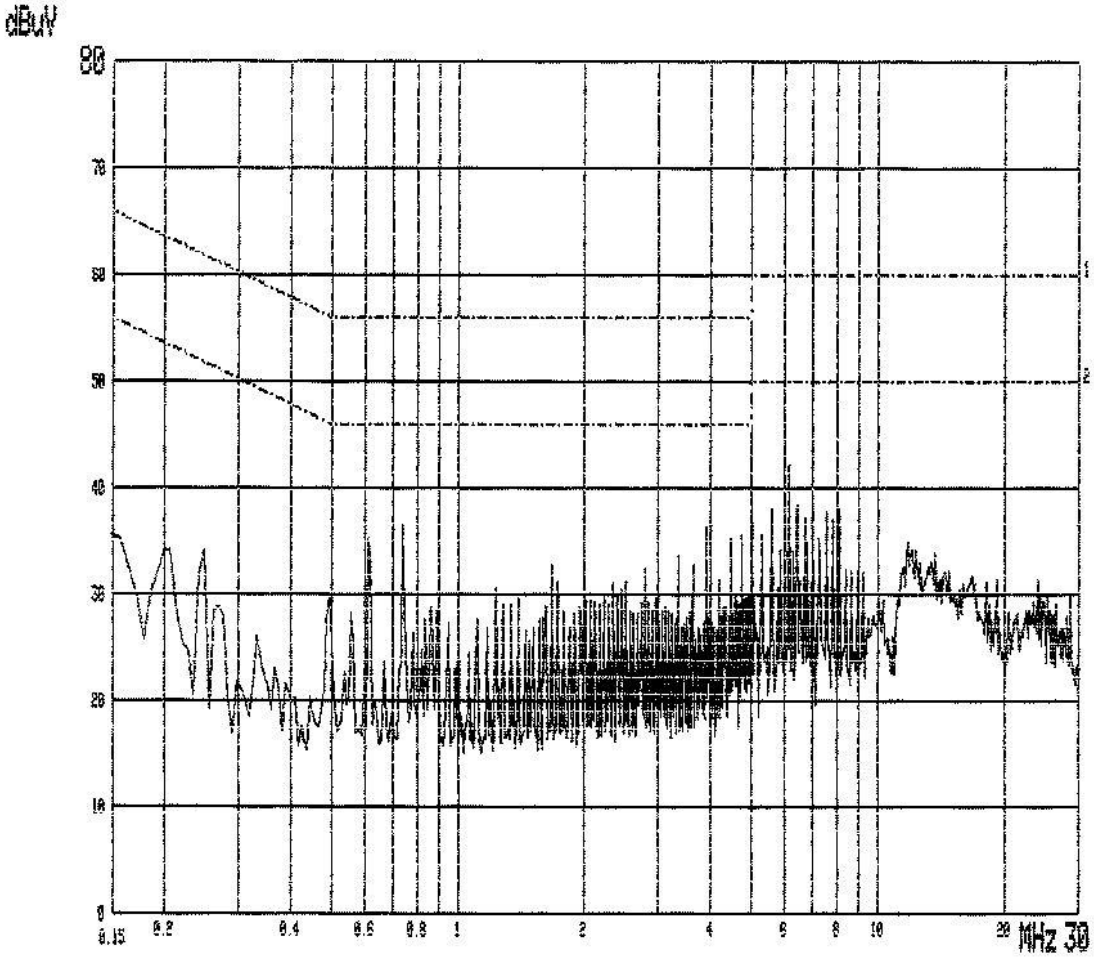
MODEL NAME : EPM-300
120Vac 60Hz PHASE : LIVE

Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.615	33.0	26.4	56.0	46.0	0.3	0.4	33.7	27.1	22.3	18.9
0.739	34.0	25.1	56.0	46.0	0.3	0.4	34.7	25.8	21.3	20.2
5.584	38.7	37.7	60.0	50.0	0.3	0.5	39.5	38.5	20.5	11.5
6.142	40.1	40.5	60.0	50.0	0.3	0.6	41.0	41.4	19.0	8.6
6.421	37.3	37.7	60.0	50.0	0.3	0.6	38.2	38.6	21.8	11.4
6.979	37.3	38.0	60.0	50.0	0.3	0.6	38.2	38.9	21.8	11.1

Note :

Conducted Emissions

Neutral Phase



MODEL NAME : EPM-300
120Vac 60Hz PHASE : NEUTRAL

Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.615	33.2	26.7	56.0	46.0	0.3	0.4	33.9	27.4	22.1	18.6
0.739	33.8	24.9	56.0	46.0	0.3	0.4	34.5	25.6	21.5	20.4
5.584	38.5	37.5	60.0	50.0	0.3	0.5	39.3	38.3	20.7	11.7
6.142	40.3	40.7	60.0	50.0	0.3	0.6	41.2	41.6	18.8	8.4
6.421	37.5	37.9	60.0	50.0	0.3	0.6	38.4	38.8	21.6	11.2
6.979	37.5	38.1	60.0	50.0	0.3	0.6	38.4	39.0	21.6	11.0

Note :

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVS 10	Test Receiver	Rohde & Schwarz	Aug. 22, 2005	839049/004
ESCS 30	Test Receiver	Rohde & Schwarz	Aug. 22, 2005	100171
VULB 9160	Antenna	Schwarzbeck	Aug. 28, 2005	3048

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program
File up/download mode
FM receiving mode
Playback mode
Voice recording mode

◆ Test Date
December 26~27, 2005
January 17~18, 2006

◆ Test Area
Open site No.2

Note : The equipment used is calibrated in regular for every year.

Radiated Emissions

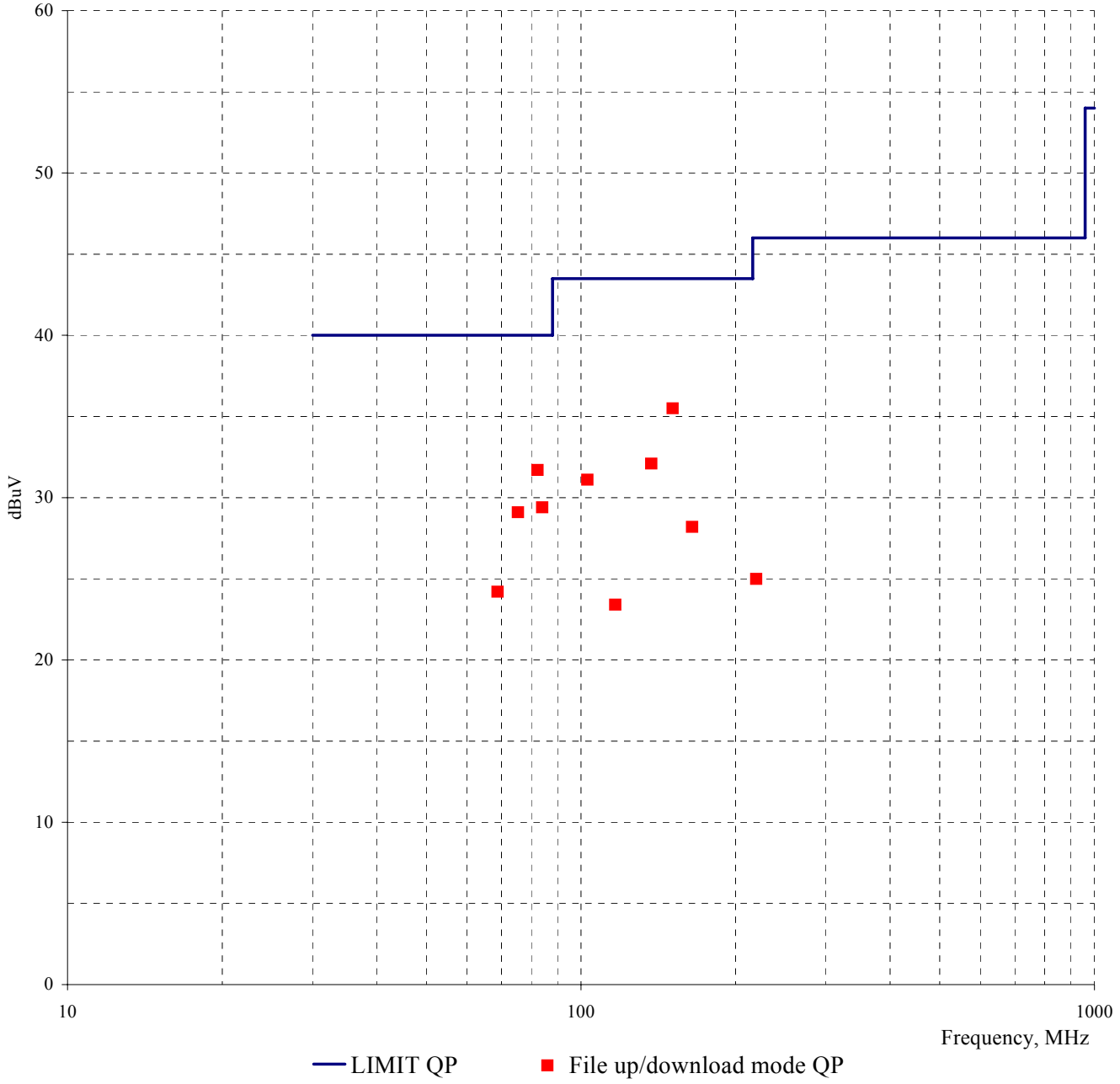
(Disturbance Radiation)

[Applicable]

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
68.8	13.2	9.4	1.6	V	24.2	40.0	15.8
75.4	18.9	8.5	1.7	V	29.1	40.0	10.9
82.3	22.1	7.9	1.7	V	31.7	40.0	8.3
84.0	19.6	8.0	1.8	H	29.4	40.0	10.6
102.9	19.7	9.4	2.0	V	31.1	43.5	12.4
116.6	10.4	10.6	2.4	V	23.4	43.5	20.1
137.1	18.2	11.4	2.5	V	32.1	43.5	11.4
150.9	20.5	12.1	2.9	H	35.5	43.5	8.0
164.6	12.4	12.9	2.9	H	28.2	43.5	15.3
219.5	13.4	8.4	3.2	H	25.0	46.0	21.0

Note: ***File up/download mode***

MEASUREMENT OF DISTURBANCE RADIATION



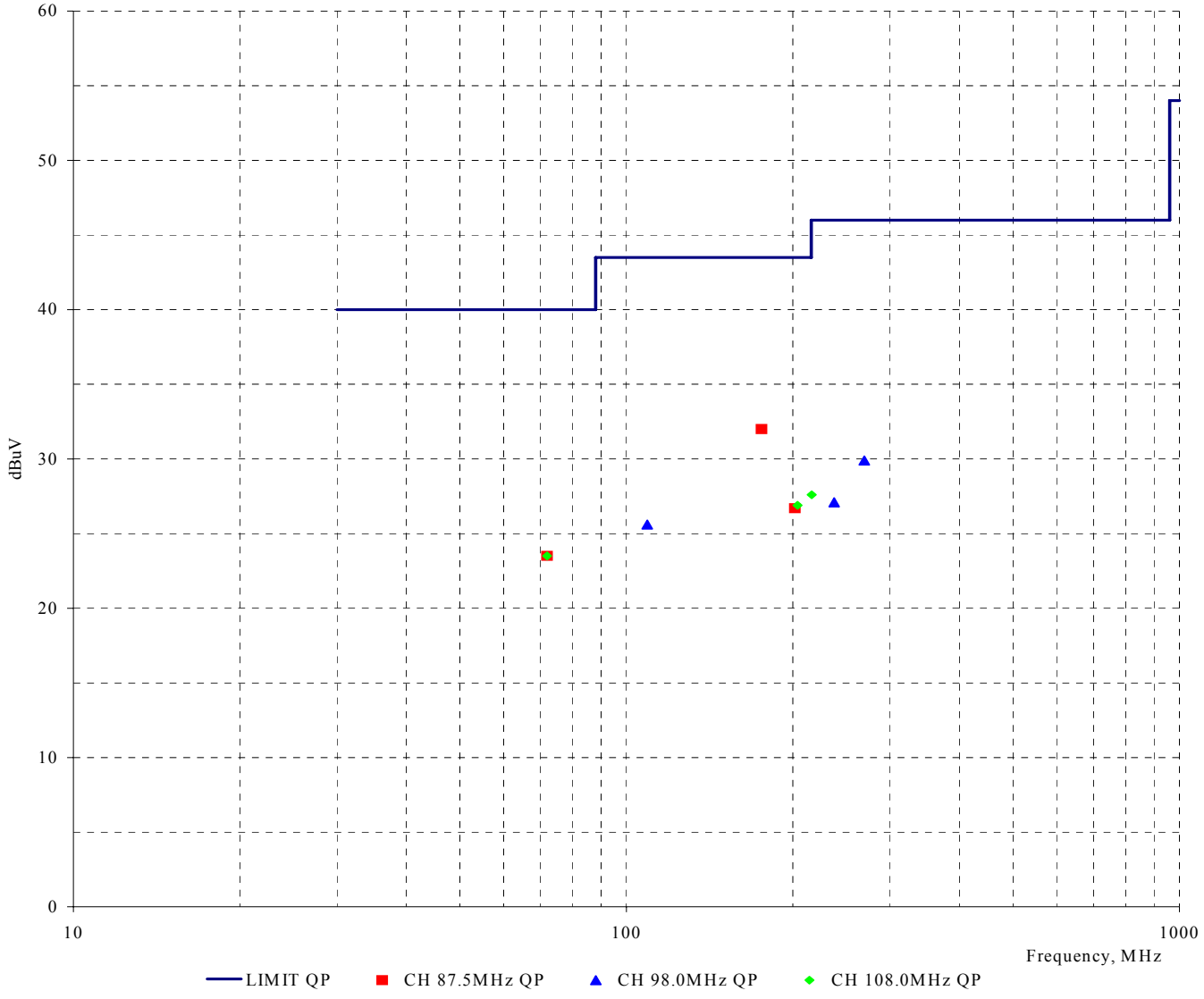
[Applicable]

CH Freq. [MHz]	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
87.5	71.9	12.9	9.0	1.6	V	23.5	40.0	16.5
	175.5	17.4	11.4	3.2	H	32.0	43.5	11.5
	201.7	14.3	9.0	3.4	H	26.7	43.5	16.8
98.0	109.1	14.2	9.3	2.1	H	25.6	43.5	17.9
	237.4	13.4	9.9	3.8	H	27.1	46.0	18.9
	269.2	14.4	11.5	4.0	H	29.9	46.0	16.1
108.0	71.9	12.9	9.0	1.6	H	23.5	40.0	16.5
	203.9	14.8	8.8	3.3	V	26.9	43.5	16.6
	216.3	16.0	8.4	3.2	H	27.6	46.0	18.4

*Note :**FM receiving mode***

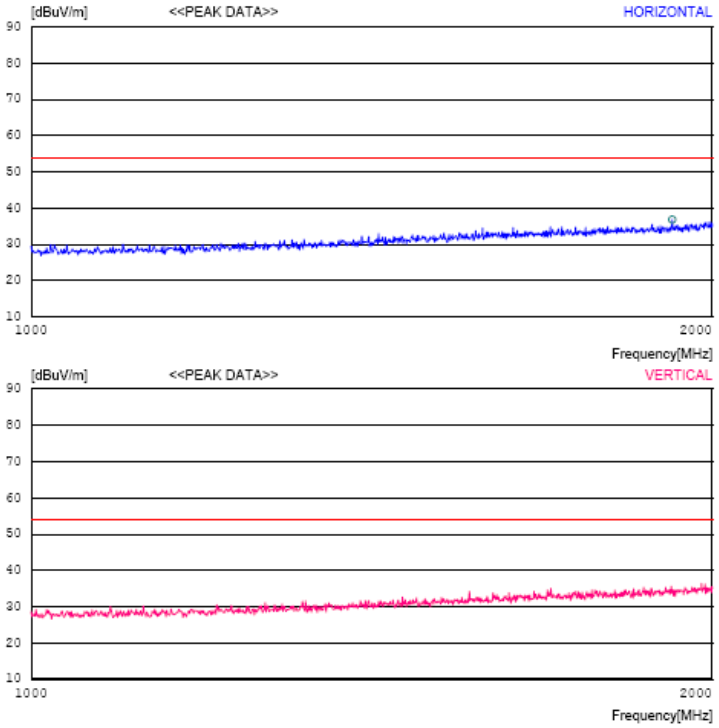
Z axis plane was the worst test result than Y axis plane and X axis plane.

MEASUREMENT OF DISTURBANCE RADIATION

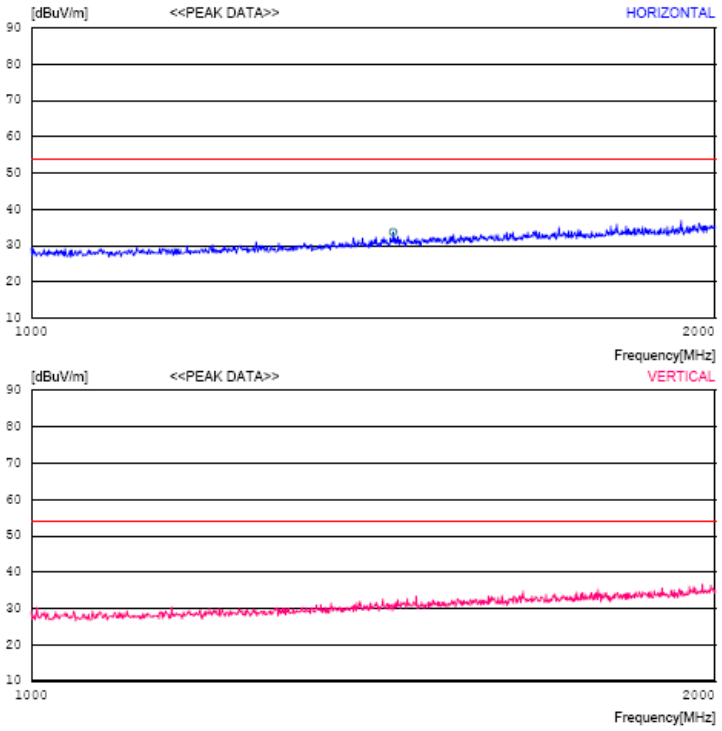


Radiated Emissions

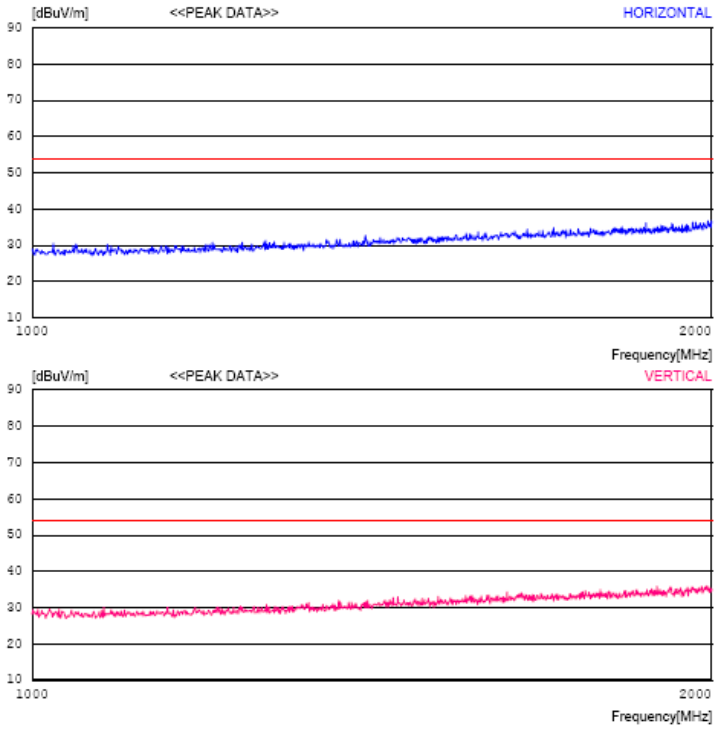
(Disturbance Radiation)



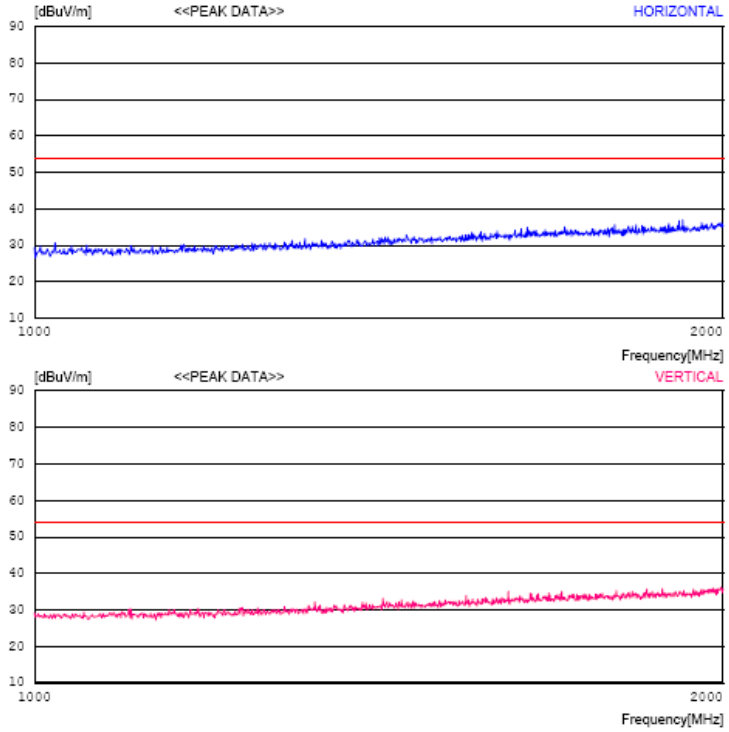
Radiated Emission Test 1GHz – 2GHz(87.5MHz_X axis Plane)



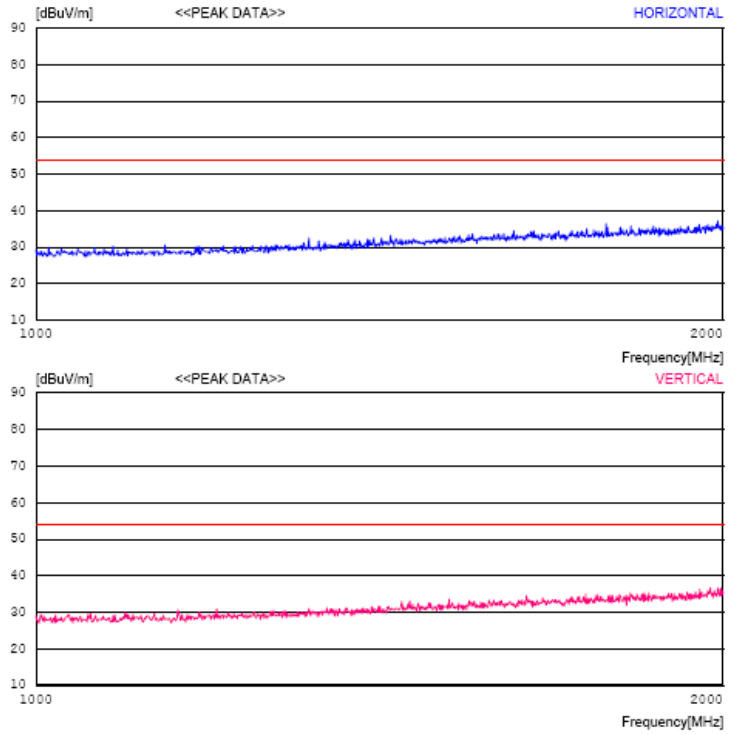
Radiated Emission Test 1GHz – 2GHz(87.5MHz_Y axis Plane)



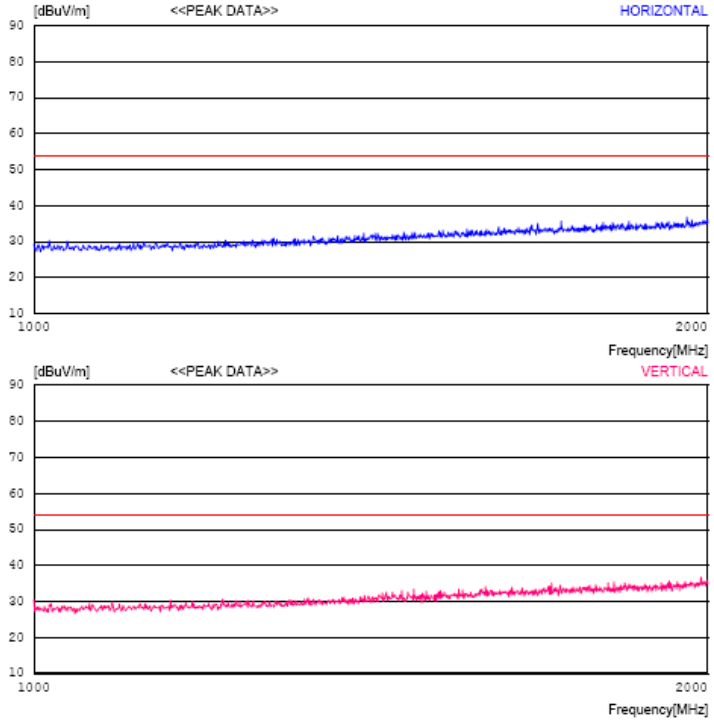
Radiated Emission Test 1GHz – 2GHz(87.5MHz_Z axis plane)



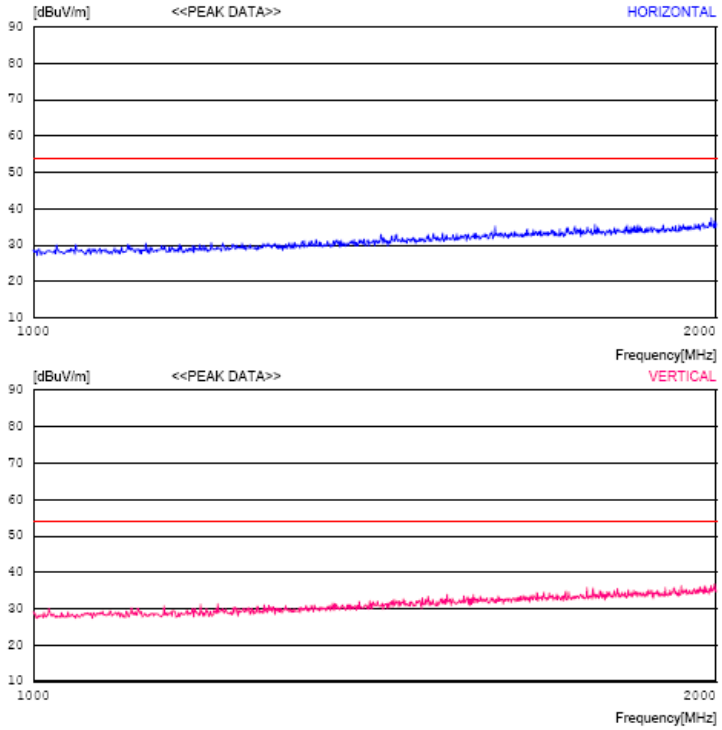
Radiated Emission Test 1GHz – 2GHz(98MHz_X axis Plane)



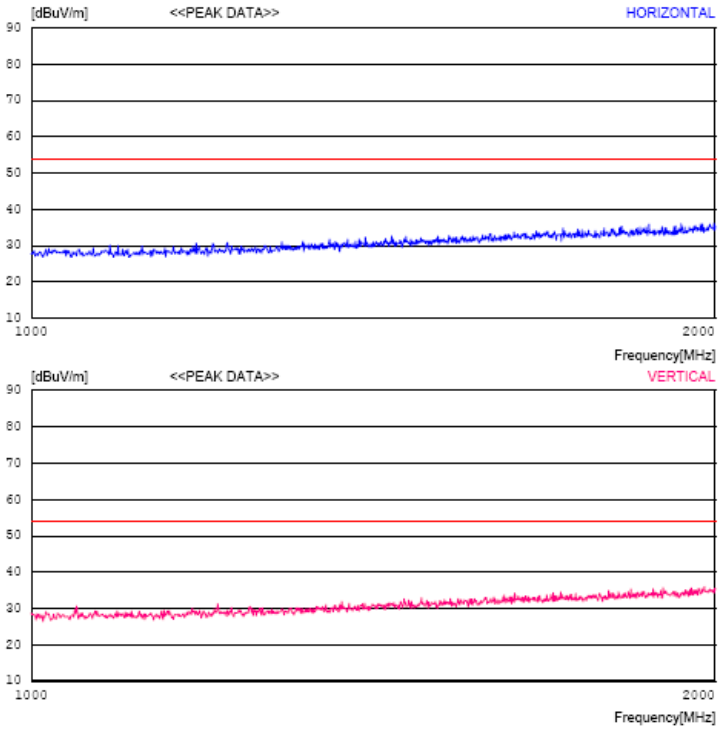
Radiated Emission Test 1GHz – 2GHz(98MHz_Y axis Plane)



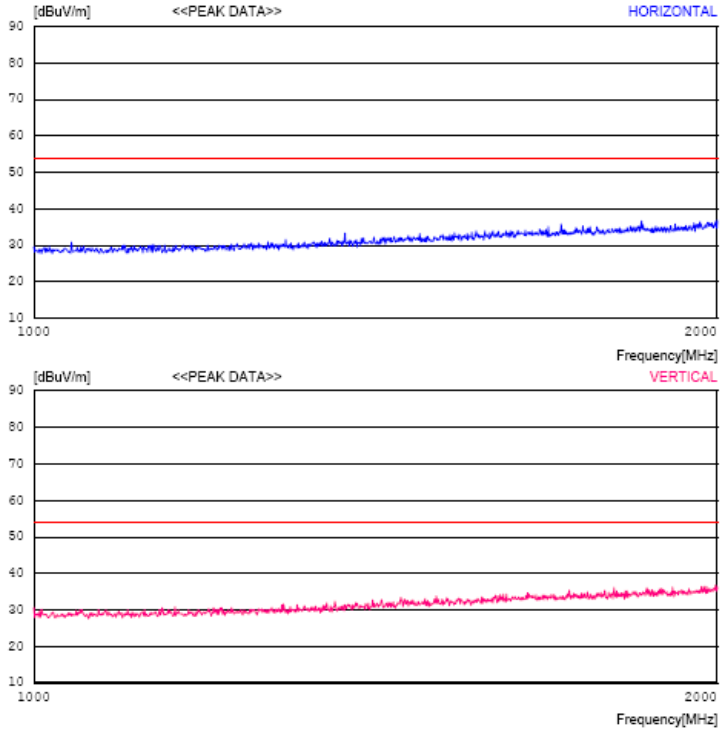
Radiated Emission Test 1GHz – 2GHz(98MHz_Z axis plane)



Radiated Emission Test 1GHz – 2GHz(108MHz_X axis Plane)



Radiated Emission Test 1GHz – 2GHz(108MHz_Y axis Plane)



Radiated Emission Test 1GHz – 2GHz(108MHz_Z axis plane)

Measured Data from 1GHz to 2GHz

The following graphs(87.5MHz_X axis plane) show that all data of full frequencies are meet with the limit. We automatically change our antenna polarity, when measure radiated emission. The spectrum plot was obtained with peak detect mode and maximum hold mode. It was used for plot the R3132 spectrum analyzer, EMCO 3115 Horn antenna.

(Section 15.35)

The peak value evaluation at the frequency of 1.920GHz is

24.3dB(measured) + 26.5dB(antenna factor) + 6.0(cable loss)

– 20dB(corrective factor)

= 36.8dB(less than average limit 54.0dB)

The peak value evaluation is less than the average limit, EUT have the margin relative To peak value more than 10dB for radiated emission for the above 1GHz.

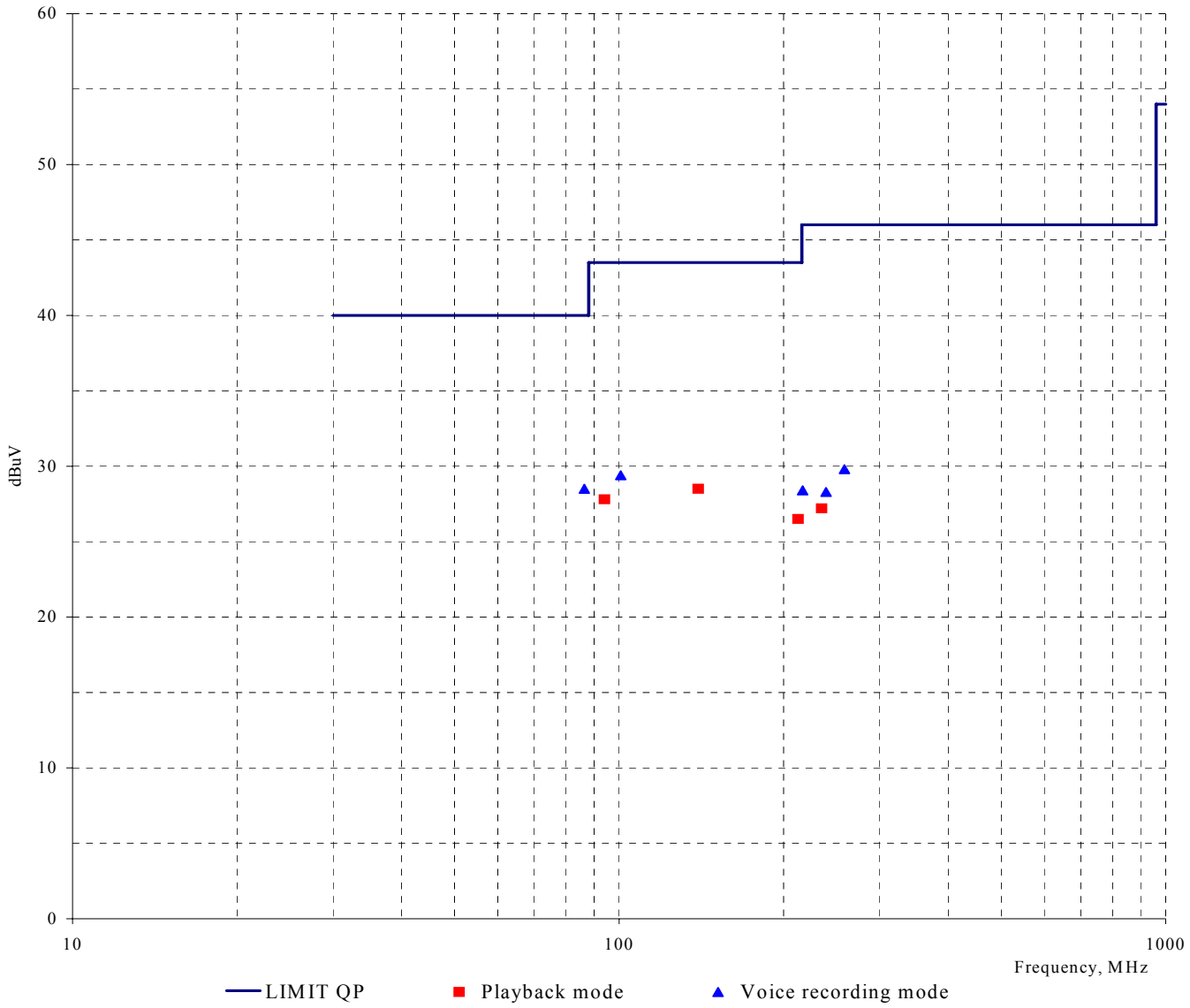
Note:

[Applicable]

Mode	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
Playback	94.0	17.1	8.7	2.0	H	27.8	43.5	15.7
	139.6	13.4	12.5	2.6	V	28.5	43.5	15.0
	212.5	15.1	8.3	3.1	V	26.5	43.5	17.0
	234.7	13.7	9.7	3.8	H	27.2	46.0	18.8
Voice recording	86.4	18.5	8.1	1.9	V	28.5	40.0	11.5
	100.7	17.9	9.5	2.0	V	29.4	43.5	14.1
	216.6	16.8	8.4	3.2	H	28.4	46.0	17.6
	239.0	14.4	10.1	3.8	H	28.3	46.0	17.7
	224.4	14.7	11.1	4.0	H	29.8	46.0	16.2

*Note :**Playback, Voice recording mode***

MEASUREMENT OF DISTURBANCE RADIATION



Appendix A. The Photos of Test Setup

Conducted Emissions(File up/download mode) – Front View

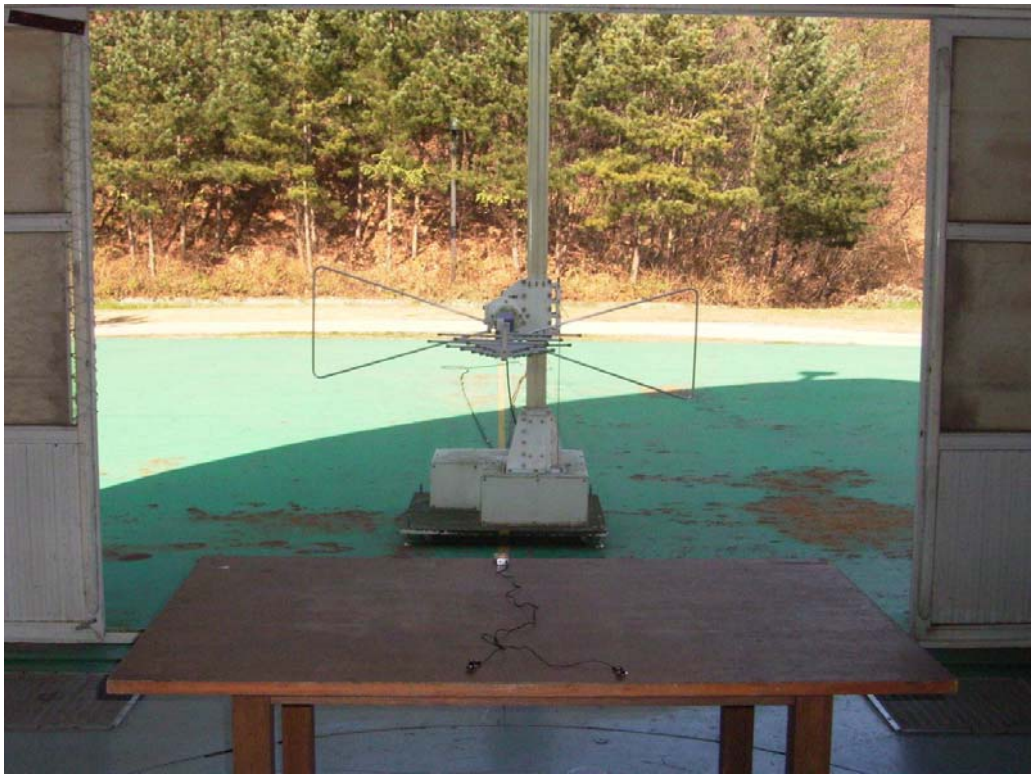
Conducted Emissions(File up/download mode) – Rear View

Appendix A. The Photos of Test Setup

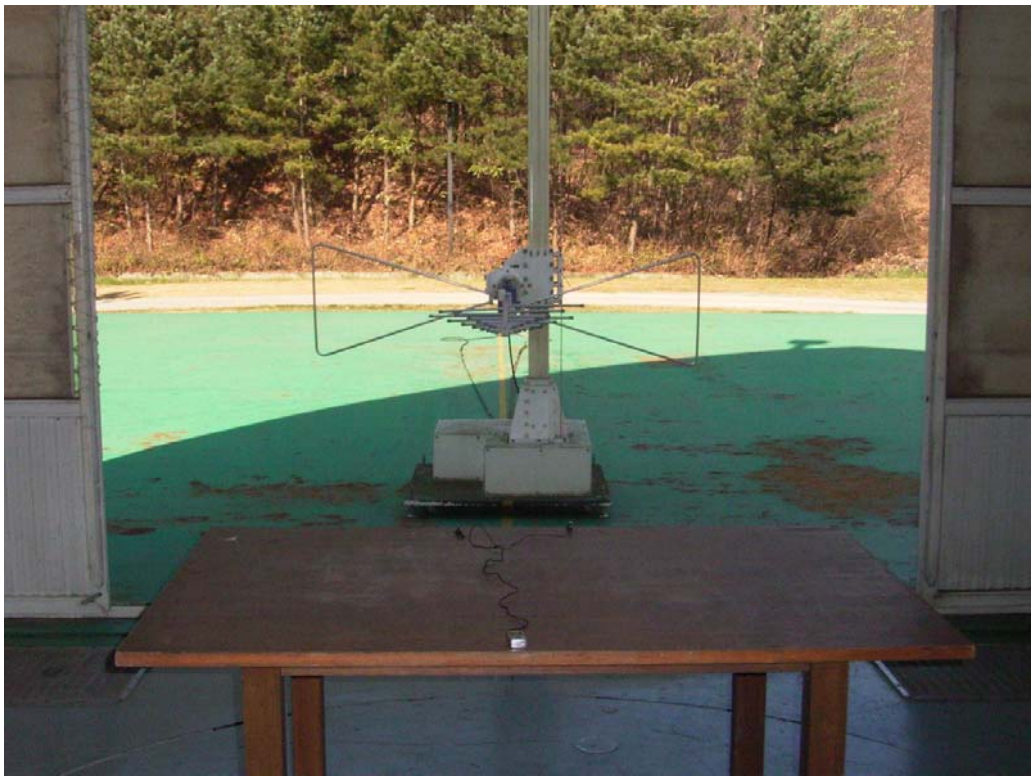
Radiated Emissions(File up/download mode) - Front View

Radiated Emissions(File up/download mode) - Rear View

Appendix A. The Photos of Test Setup(Z axis plane)



Radiated Emissions(FM receiving, Playback, Voice recording mode)–Front View



Radiated Emissions(FM receiving, Playback, Voice recording mode)–Rear View

Appendix A. The Photos of Test Setup(Y axis plane)

Radiated Emissions(FM receiving mode)–Front View

Radiated Emissions(FM receiving mode)–Rear View

Appendix A. The Photos of Test Setup(X axis plane)

Radiated Emissions(FM receiving mode)–Front View

Radiated Emissions(FM receiving mode)–Rear View

Appendix B. The Photos of Equipment Under Test

Front View

Rear View

Appendix B. The Photos of Equipment Under Test

USB Cable

Earphone