



JungAng EMC Co., Ltd.

109-2, Yepyung-ri, Kumsa-myun, Youju-kun, Kyungki-do, KOREA
TEL: 82 2 571 8217 FAX: 82 31 764 0126

FCC EMI TEST REPORT

Date of Test : September 4 - 5, 2000

Test Report No : 00JAC011.FCC

Test Site : JungAng EMC Co., Ltd., Korea(31040/SIT 1300F2)

TradeName : N/A

Manufacturer : UNITECH ELECTRONICS CO., LTD.

Address : 12F, Chung-Jin Bldg, 53-5, Won Hyo Ro 3Ga, Yong San-Gu, Seoul, Korea

Contact Person : Byung-Cheol Yoo / Manager

Tel No. : 82-2-3271-7800

Fax No. : 82-2-3271-7824

Product : MP3 Player

Model : ROME II (UP-322)

Fcc Rule Part(s) : FCC Part 15 Subpart B

Classification : Class B

The device bearing the trade name and model 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 C.63.4-1992.

I attest to the accuracy of data and all measurement 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 qualification of all persons taking them.

TaeHyun Nam
President-JungAng EMC Co., Ltd.
<http://www.jaemc.co.kr>

TABLE OF CONTENTS PAGE

1. Description of device	3
1.1 General	3
1.2 EUT Description	3
2. Test facility	4
3. Summary of results	4
3.1 Electromagnetic Emission	4
3.2 Modifications to the EUT	4
4. Tested system details	5
4.1 Peripherals and Others	5
4.2 Type of Cables Used	5
4.3 System layout on EUT and peripherals	6
5. Test result	7
5.1 RFI Voltage Measurement	7
5.2 RFI Field Strength Measurement	13
5.3 Minimum Margin	15
5.4 Sample Calculations	15
6. Test Equipments	16
7. Measurement Photos	17
7.1 Setup with RFI Voltage Emission Level	17
7.2 Setup with RFI Field Strength Emission Level	18
Appendix 1 Photos of EUT	21
Appendix 2 ID Label and Location	25
Appendix 3 System Block Diagram	28

1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	UNITECH ELECTRONICS CO., LTD.
Contact Person	Byung-Cheol Yoo Tel No. : 82-2-3271-7800 Fax No. : 82-2-3271-7824
Manufacturer	UNITECH ELECTRONICS CO., LTD. 12F, Chung-Jin Bldg, 53-5, Won Hyo Ro 3Ga, Yong San-Gu, Seoul, Korea

- Trade name **N/A**
- Model name **ROME II (UP-322)**
- EUT Type **MP3 Player**
- Classification **FCC Part 15 Subpart B Class B**
- Clock Speed **Main Clock : 14.725 MHz, 16 MHz, 48 MHz**
- Rule Part(s) **FCC Part 15 & Part 2**
- Test Procedure(s) **ANSI C63.4(1992)**
- Date of Tests **September 4 - 5, 2000**
- Place of Tests **JungAng EMC Co., Ltd.**

1.2 EUT Description

The EUT is the device which is playing Audio Sound Track with formatted to MP3 standard mode. MP3 file means MPEG1 layer3, a standard compression method providing an excellent quality audio. MP3 makes users possible to enjoy the high quality sound of the downloaded MP3 music files from the Internet or the other audio content with the 1/12 size of commercial CD audio files.

Note. This report may be reproduced in full. Partial reproduction may only be made with the written permission of the laboratory. The results in this report is only applied to the sample(s) tested.

Note. Please refer to the duties and responsibilities of the Responsible Party attached.

2. TEST FACILITY

The open field test site and conducted measurement facility used for this measurement, is located following address. This site was fully described in a report dated Nov. 24, 1998, that was submitted to the FCC. Our site and facility had been accepted in a letter dated Nov. 24, 1998(31040/SIT) :

JungAng EMC Co., Ltd.

Address : 109-2, Yepyung-ri, Kumsa-myun, Youju-kun, Kyungki-do, Korea

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 October 19, 1992.

3. SUMMARY OF RESULTS

3.1 Electromagnetic Emission

RFI Voltage Measurement.....**PASS**

RFI Field Strength Measurement.....**PASS**

Although the measured emissions indicate that the EUT complies with the required limits, some measurements are close to these limits.

When the uncertainty of measurement is considered, there is some possibility that the EUT may not be compliant.

3.2 Modifications to the EUT : None

4. TESTED SYSTEM DETAILS

4.1 Peripherals and Others :

Description	Model Name	Serial No.	Manufacturer	FCC ID
Computer	DESKPRO	7836BVD20016	Compaq	DoC
Printer	C2106A	3217S91901	HP	B94C2106X
Monitor	VX700	M902080938	Gateway	BGBTFV8705K
Keyboard	RT235BTW	B13BC90L39GU	Compaq	AQ6-22K15
Mouse #1	M-S34	F13490N5BGF	Compaq	DZL211029
Mouse #2	OK-520	00DAC0231	A4 TECH	DoC
Mouse #3	898W	5883A001	Han Long	HLA311001
Mouse #4	Pro Mouse II	96002117	NEOTEC	FSUGMZC7

4.2 Type of Cables Used:

Device from	Device to	Type of Cable	Length	Type of shield
Computer	Monitor	Signal cable	1.0	shielded
Computer	Printer	Signal cable	1.8	shielded
Computer	Keyboard	Signal cable	2.0	shielded
Computer	Mouse #1,#2	Signal cable	1.5	shielded
Computer	Mouse #3,#4	Signal cable	1.5	shielded
Computer	MP3 Player	Signal cable	1.5	shielded
MP3 Player	Ear-phone	Signal cable	2.0	Non-shielded
Computer	Main Power	Power cable	1.5	Non-shielded
Monitor	Main Power	Power cable	1.5	Non-shielded
Printer	Main Power	Power cable	1.5	Non-shielded

4.3 System layout on EUT and peripherals

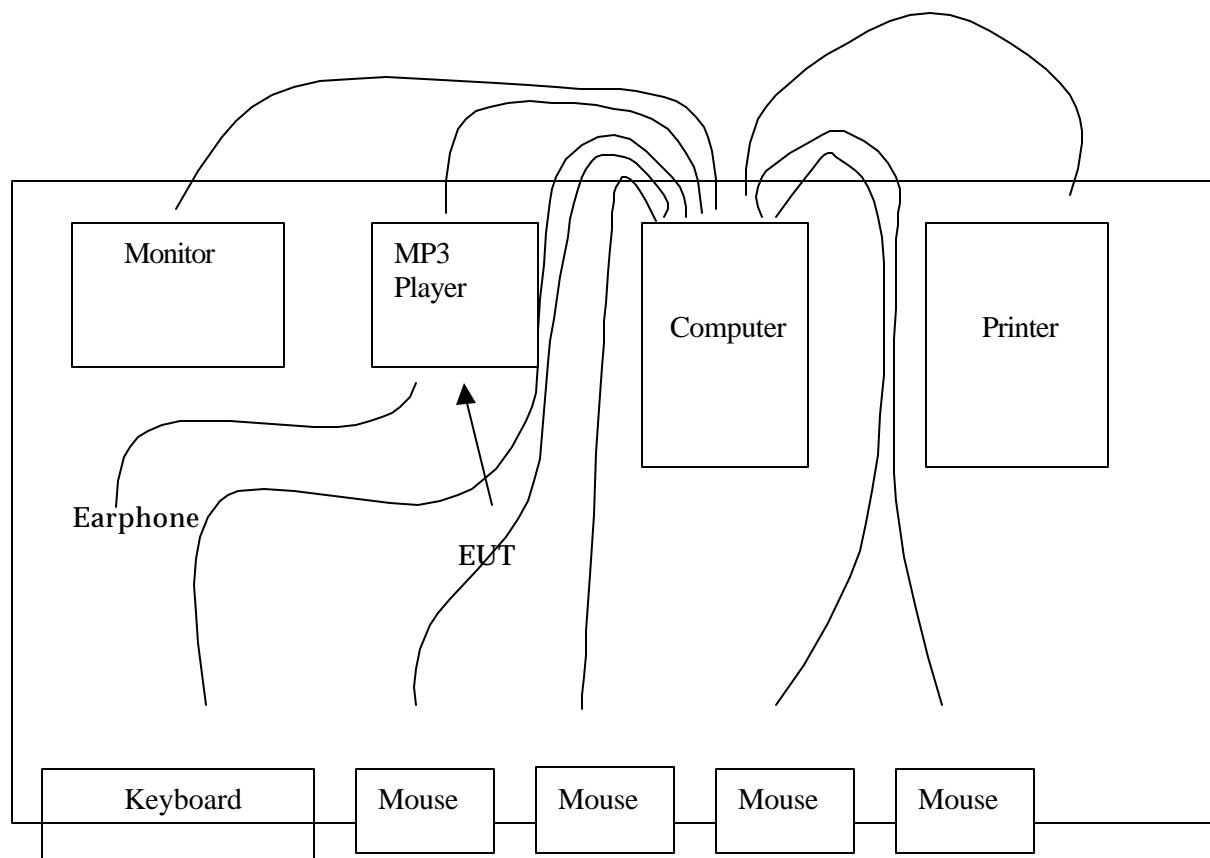


Figure 4-1 System layout

5. TEST RESULT

5.1 RFI Voltage Measurement

5.1.1 Measurement Instrumentation Used

(model/serial no./manufacturer/last calibration/next calibration)

Signal Analyzer.....(PMM9000/3100J70602/PMM/08 Oct. 1999/Oct. 2000)

L.I.S.N.....(L3-25/1110K70403/PMM/30 Sep. 1999/Oct. 2000)

Coaxial cable.....(RG213U/---/MARLOW/-/-)

Shield Room.....(JASH01/JAC01/DAIL EMC/---/---)

5.1.2 Measurement Procedure

The power line conducted interference measurement were performed according to ANSI C63.4-1992 in a Shield room placed on a table, 0.8 m high over a metal floor.

It was located more than required distance away from the shielded enclosure wall.

Deviations from the standard was none. The EUT was plugged into the LISN and the frequency range of interest scanned. **We measured device in normal operation mode.** We reported at maximum emission levels.

5.1.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and exercised in the most unfavorable manner.

The EUT was operated with continuously playing “MP3” music program through earphone. Also

the test was measured while the EUT was downloading the MP3 files from computer system.

5.1.4 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 1.8 dB($k=2$)

5.1.5 Test Data

RFI Voltage Measurement Results (0.45 MHz to 30 MHz)

Operating mode : **Continuous playing and downloading “MP3” music files from PC.**

Test procedure : ANSI C63.4-1992

Date of measurement : Sep. 5, 2000

Temperature : 21.6 degree C

Humidity: 61%

Model : **ROME II (UP-322)**

FREQ (MHz)	LEVEL(dBuV)	LINE	LIMIT(dBuV)	Result(dBuV)	MARGIN(dBuV)
0.509	42.60	H	48	42.60	-5.40
0.552	42.30	H		42.30	-5.70
0.578	42.20	H		42.20	-5.80
0.619	42.00	H		42.00	-6.00
0.826	42.00	H		42.00	-6.00
0.927	44.60	H		44.60	-3.40
1.097	42.40	H		42.40	-5.60
1.446	43.30	H		43.30	-4.70
1.672	43.00	H		43.00	-5.00
1.979	42.80	H		42.80	-5.20
2.111	43.20	H		43.20	-4.80
2.714	42.10	H		42.10	-5.90

Table 1. Line Conducted Emission Tabulated Data

Note :

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

See attached Plots.

2. The limit for Class B digital device is 250 uV(48 dBuV) from 450 kHz to 30 MHz.

3. Line H = Hot

Line N = Neutral

** Measurement using CISPR quasi-peak mode

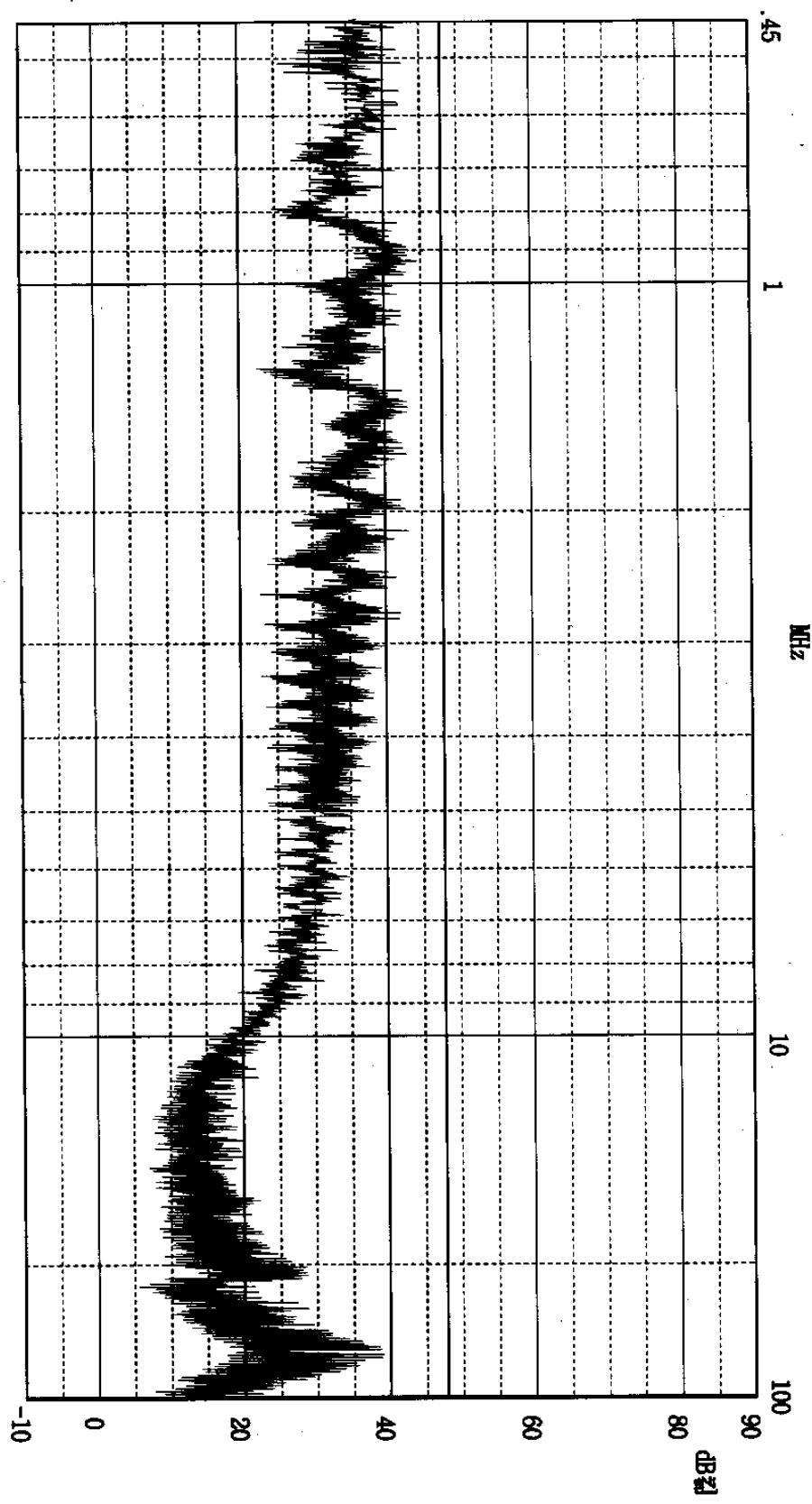


Tested by **Hyung-Seok Lee**

PLOTS OF EMISSIONS (Play)

P M M 9 0 0 0 for Windows

Name: Up322-h Date: 09 05 2000 Time: 19:46

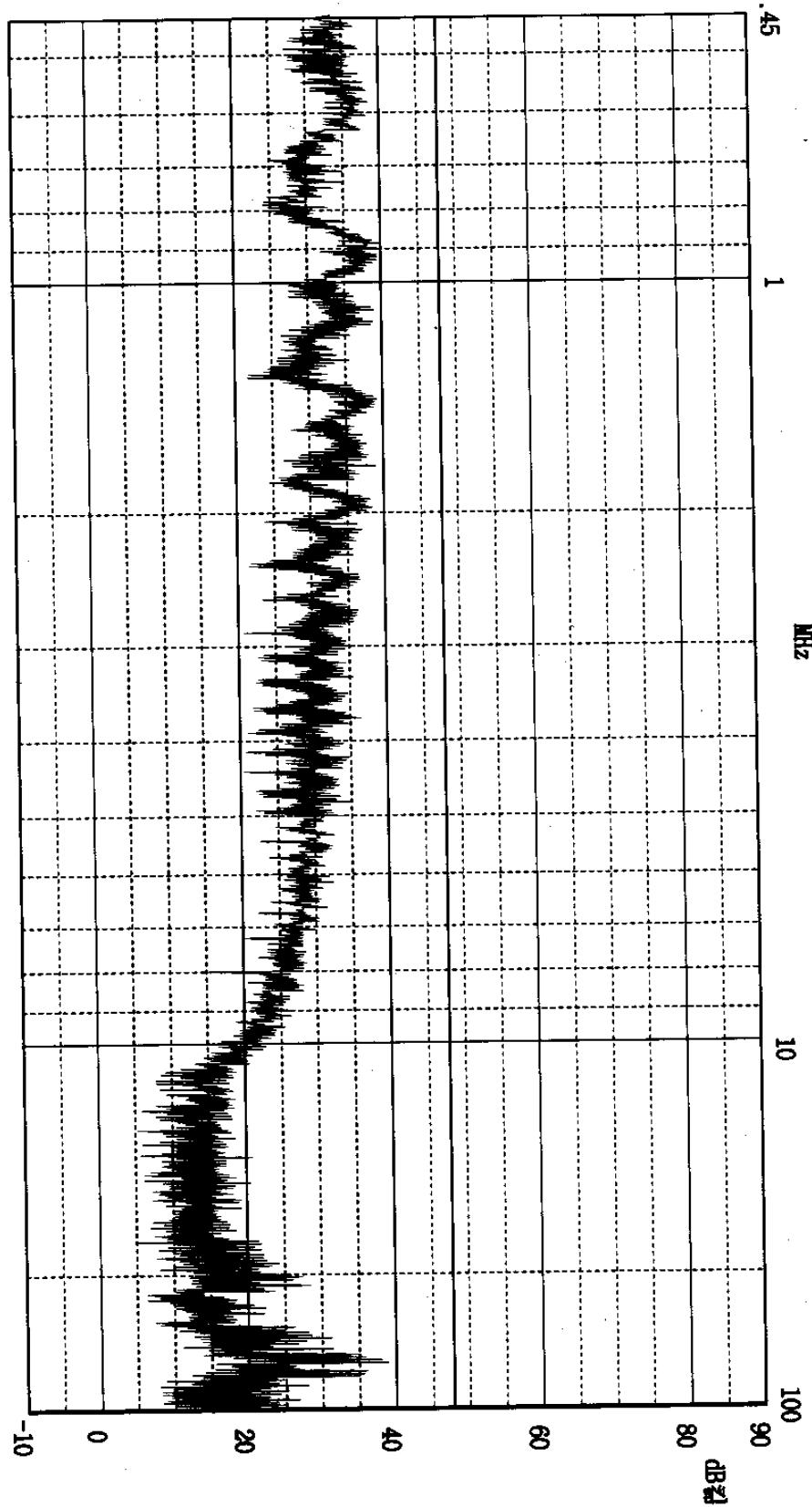


PLOTS OF EMISSIONS (Play)

P M M 9 0 0 0 for Windows

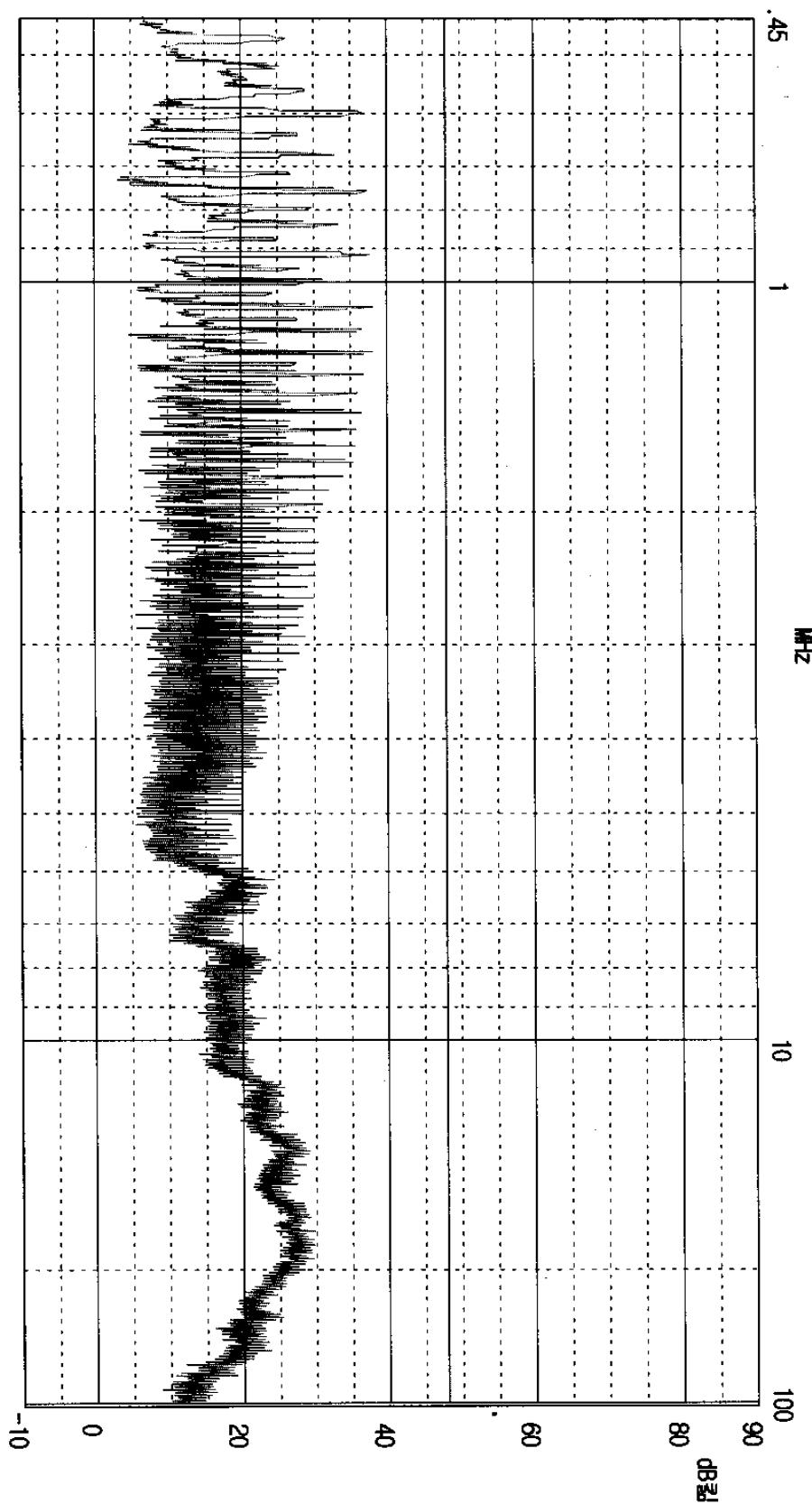
Name: UP322-n Date: 09 05 2000

Time: 19:45



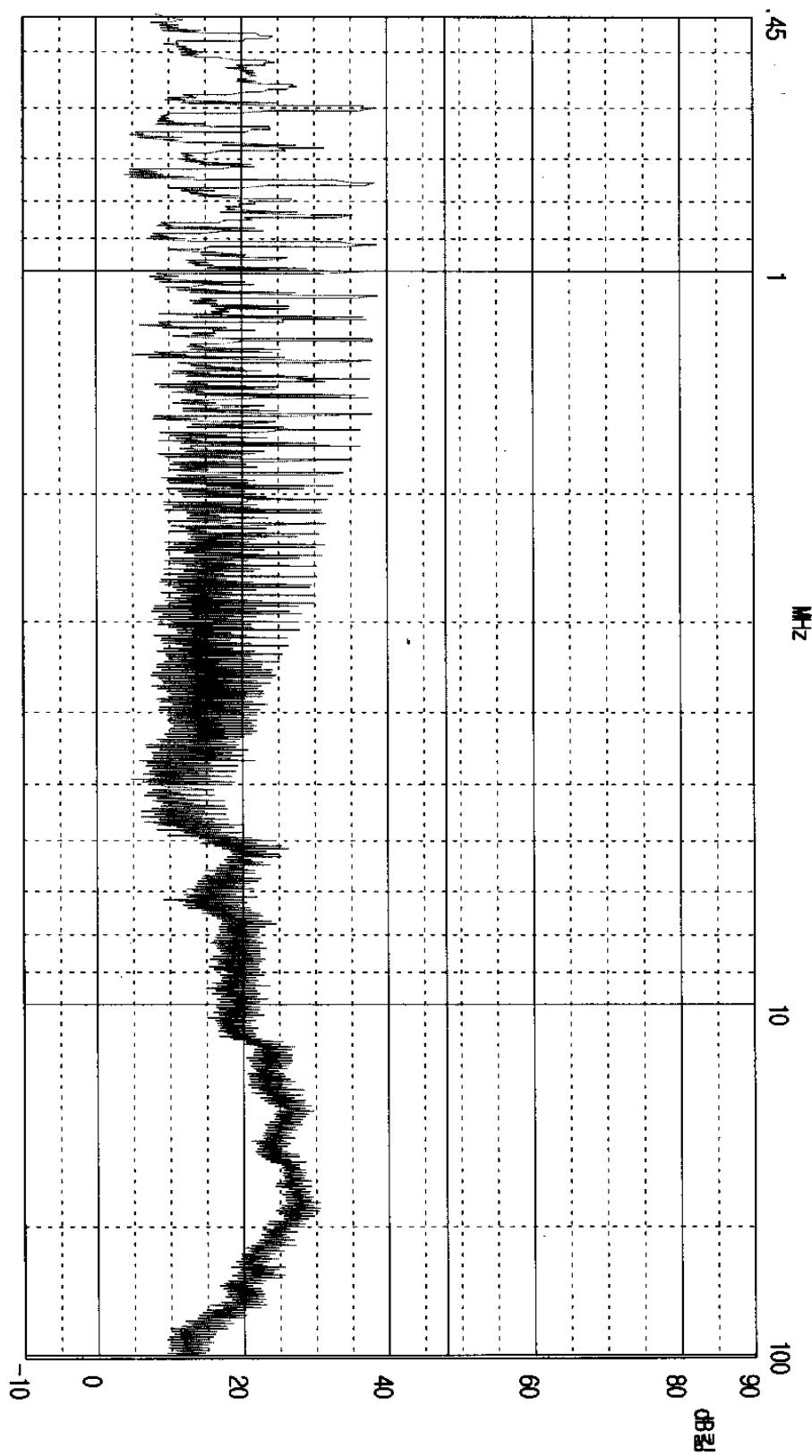
PLOTS OF EMISSIONS (Downloading)

P M M 9 0 0 0 for Windows
Name: UP322-h Date: 09 05 2000 Time: 14:17



PLOTS OF EMISSIONS (Downloading)

Limit : Fcc_b Detector: Peak
TEST SITE : JUNGANG EMC LAB.
TEST MODE : HOT
MODEL : ROME II (UP-322)
CLASSIFICATION : FCC PART 15, CLASS B



5.2 RFI Field Strength Measurement

5.2.1 Measurement Instrumentation Used

Signal Analyzer.....(PMM9000/3100J70602/PMM/08 Oct. 1999/Oct. 2000)

Spectrum Analyzer.....(R3261/61720002/Advantest/19 Aug. 2000/Aug. 2001)

Biconical antenna.....(BC01/0020J70501/PMM/08 Oct. 1999/Oct. 2000)

Log periodic antenna.....(LP01/0020J70501/PMM/08 Oct. 1999/Oct.'2000)

Coaxial cable.....(RG213U/---/MARLOW/---)

5.2.2 Measurement Procedure

Final test was performed according to ANSI C63.4-1992 at the open field site .

Deviations from the standard was none.

The EUT was placed in a 0.8m high table along with the peripherals. The turn table was separated from the antenna with the distance of 3 meter. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum.

The frequencies and amplitudes of maximum emission were measured at varying azimuths, antenna heights and antenna polarities. **We measured device in normal operation mode .**
We reported at maximum emission levels.

5.2.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and exercised in the most unfavorable manner.

The EUT was operated with continuously playing “MP3” music program through earphone.

Also

the test was measured while the EUT was downloading the MP3 files from computer system.

5.2.4 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at ± 3.5 dB($k=2$)

5.2.5 Test Data

RFI Field Strength Measurement Results(30 MHz to 1000 MHz)

Operating mode : **Continuous playing and downloading “MP3” music files from PC.**

Test procedure : ANSI C63.4-1992

Date of measurement : Sep. 4, 2000

Temperature : 23.0 degree C

Humidity: 61%

Model : **ROME II (UP-322)**

MEASUREMENT FREQ (MHz)	MEASUREMENT LEVEL (dBuV)	ANTENNA POLARITY (H/V)	ANTENNA FACTOR (dB)	CABLE LOSS (dB)	LIM II (dBuV)	FIELD STRENGTH (dBuV/m)	MARGIN (dBuV/m)
135.48	4.20	V	14.42	2.25	43.50	20.87	-22.63
158.06	4.60	H	14.84	2.38		21.82	-21.68
180.64	4.00	V	14.31	2.60		20.91	-22.59
200.46	15.80	V	14.74	2.70		33.24	-10.26
203.22	7.40	V	14.74	2.75		24.89	-18.61
267.28	5.60	H	14.71	3.27		23.58	-22.42
293.53	4.00	H	14.69	3.47		22.16	-23.84
338.69	9.40	H	16.31	3.49		29.20	-16.80
383.85	7.10	H	15.97	3.85		26.92	-19.08
400.92	14.30	H	15.53	4.10		33.93	-12.07
429.01	4.50	H	16.42	4.15		25.07	-20.93
474.17	2.10	H	17.41	4.37		23.88	-22.12

Table 2. Radiated Measurements at 3meters.

Note :

1. All modes of operation were investigated and the worst-case emissions are reported.
2. The limit for Class B digital device is 100 uV(40 dBuV) from 30 MHz to 88 MHz, 150 uV(43.5 dBuV) from 88 MHz to 216 MHz, 200 μV(46 dBuV) from 216 MHz to 960 MHz and 500 μV (54 dBuV) from above 960 MHz.

* AFCL = Antenna Factor and Cable Loss

** Measurements using CISPR quasi-peak mode. Above 1 GHz, peak detector function mode is using a resolution bandwidth of 1 MHz and a video bandwidth of 1 MHz.

The peak level complies with the average limit. Peak mode is used with linearly polarized horn

antenna and low-loss microwave cable.

Tested by Hyung-Seok Lee

5.3 Minimum Margin

Conducted emission

MP3 Player playing and downloading mode 0.927 MHz, 3.40 dBuV

Radiated emission

MP3 Player playing and downloading mode 200.46 MHz, 10.26 dBuV/m

5.4 SAMPLE CALCULATIONS

$$\text{dB}\mu\text{V} = 20 \log 10 (\mu\text{V}/\text{m})$$

$$\mu\text{V} = 10 \quad (\text{dB}\mu\text{V}/20)$$

EX. 1.

@ 1.672 MHz

Class B limit = 250 μ V = 48 dB μ V

Reading = 43.00 dB μ V (calibrated level)

(43.0/20)

$$10 = 141.25 \mu\text{V}$$

$$\text{Margin} = 43.0 - 48 = -5.0$$

5.0 dBuV ; below limit

EX. 2.

@ 400.92 MHz

Class B limit = 200 μ V/m = 46 dB μ V/m

Reading = 14.3 dB μ V(calibrated level)

Antenna factor + Cable Loss = 19.63 dB

Total = 33.93 dB μ V/m

(33.93/20)

$$10 = 49.72 \mu\text{V}$$

Margin = $33.93 - 46 = -12.07 \text{ dB}\mu\text{V/m}$
12.07 dB μ V/m ; below limit

6. TEST EQUIPMENTS

The listing below denotes the test equipments utilized for the test(s).

<u>Nomenclature</u>	<u>Manufacture</u>	<u>Serial Number</u>	<u>Calibration</u>
	<u>Model Number</u>		<u>Date</u>
Signal Analyzer (9kHz – 1.2GHz)	PMM PMM 9000	3100J70602	99/10/8
Spectrum Analyzer (9kHz – 2.6GHz)	ADVANTEST R3261C	61720002	00/08/19
Amplifier (0.1MHz-1.3GHz)	HP 8774D	2944A08872	-
LISN	PMM L3-25	1110k70403	99/09/30
LISN	KYORITSU KNW-242C	8-920-20	99/09/30
Biconical Antenna	PMM BC01	0020J70501	99/10/8
Log Periodic Antenna	PMM LP01	0020J70501	99/10/8
Dipole Antenna	SWALZBECK VBA6106A	1277	99/12/16
Dipole Antenna	SWALZBECK UHA9105	91052168	99/12/16
Plotter	HP 7475A	7475A	-
Shield Room	MYUNGJIN EMC		

4m x 3.5m x 2.4m 907-MJCO-12

Turn Table Dail EMC
 JAC-2

Antenna Master Dail EMC