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 : June 13, 2000
Test Report No : 00JAC004.FCC
Test Site : JungAng EMC Co., Ltd., Korea(31040/SIT 1300F2)

Trade Name : AUDIOVOX
Manufacturer : Telian Corporation
Address : 4th Fl, Namjeun B/D, 53-3, Haan-dong, Kwangmyung-Si, Kyungki-Do, Korea

Contact Person : Seung-Hee Park
Tel No. : 82-2-521-3040
Fax No. : 82-2-521-3057

Product : MP3 Player

Model : MP-2000

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

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1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	**Telian Corporation**
Contact Person	**Tel No. : 82-2-521-3040** **Fax No. : 82-2-521-3057**
Manufacturer	**Telian Corporation** **4th Fl, Namjeun B/D, 53-3, Haan-dong,** **KwangMyung-Si, Kyungki-Do, Korea**

- Trade name **AUDIOVOX**
- Model name **MP-2000**
- EUT Type **MP3 Player**
- Classification **FCC Part 15 Subpart B Class B**
- Clock Speed **Main Clock : 14.725 MHz, 20MHz**
- Rule Part(s) **FCC Part 15 & Part 2**
- Test Procedure(s) **ANSI C63.4(1992)**
- Date of Tests **June 13, 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 MPEG 1 layer 3, 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
Monitor	VX700	M902080938	Gateway	BGBTFV8705K
Keyboard	RT235BTW	B13BC90L39GU	Compaq	AQ6-22K15
Mouse #1	M-S34	F13490N5BGF	Compaq	DZL211029
Mouse #2	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	Keyboard	Signal cable	2.0	shielded
Computer	Mouse #1	Signal cable	1.5	shielded
Computer	Mouse #2	Signal cable	1.5	shielded
Computer	MP3 Player	Signal cable	1.2	shielded
Computer	Main Power	Power cable	1.5	Non-shielded
Monitor	Main Power	Power cable	1.5	Non-shielded

4.3 System layout on EUT and peripherals

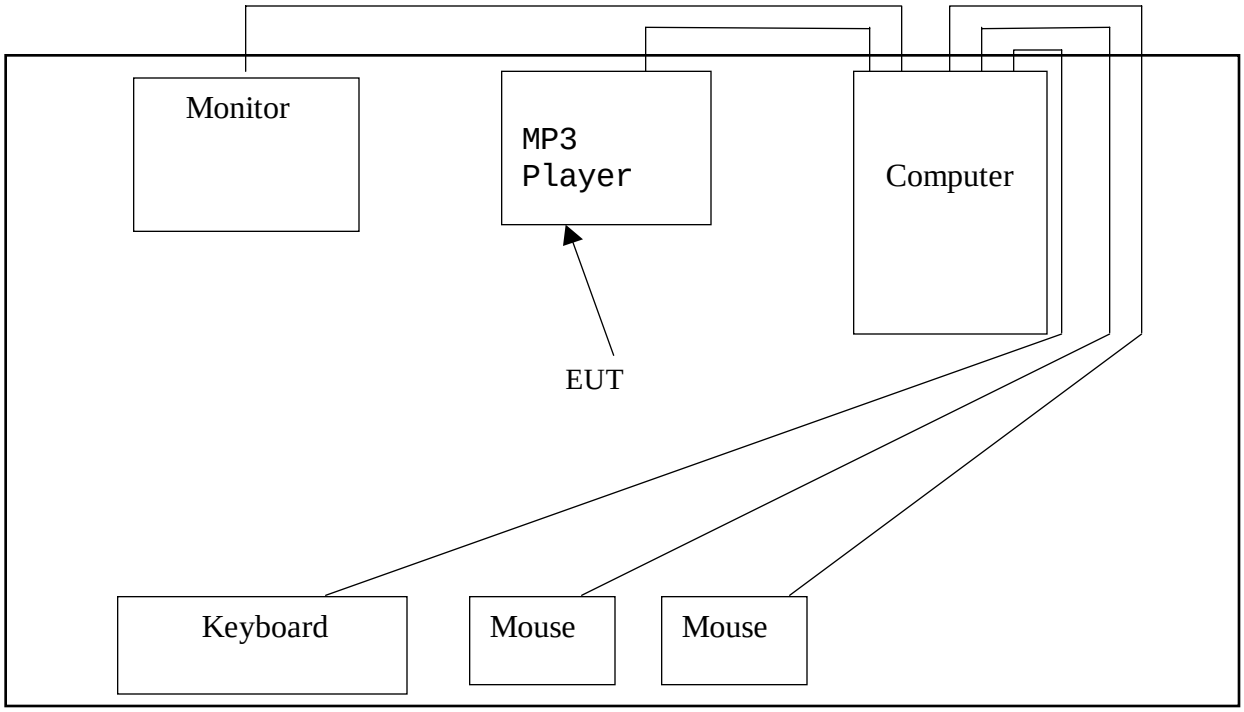


Figure 4-1 System layout

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, 0.8m 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 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 ±1.8dB(k=2)

5.1.5 Test Data

RFI Voltage Measurement Results (0.45 MHz to 30MHz)

Operating mode : **Continuous playing and downloading "MP3" music files from PC.**
Test procedure : ANSI C63.4-1992

Date of measurement : June 13, 2000
Temperature : 25.2 degree C
Humidity : 64 %

Model : **MP-2000**

FREQ(MHz)	LEVEL(dBuV)	LINE	LIMIT(dBuV)	Result(dBuV)	MARGIN(dBuV)
0.733	36.80	N	48	36.80	-11.20
1.157	32.60	H		32.60	-15.40
3.148	36.50	H		36.50	-11.50
13.940	28.50	H		28.50	-19.50
17.000	28.40	H		28.40	-19.60
22.580	27.00	H		27.00	-21.00

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.

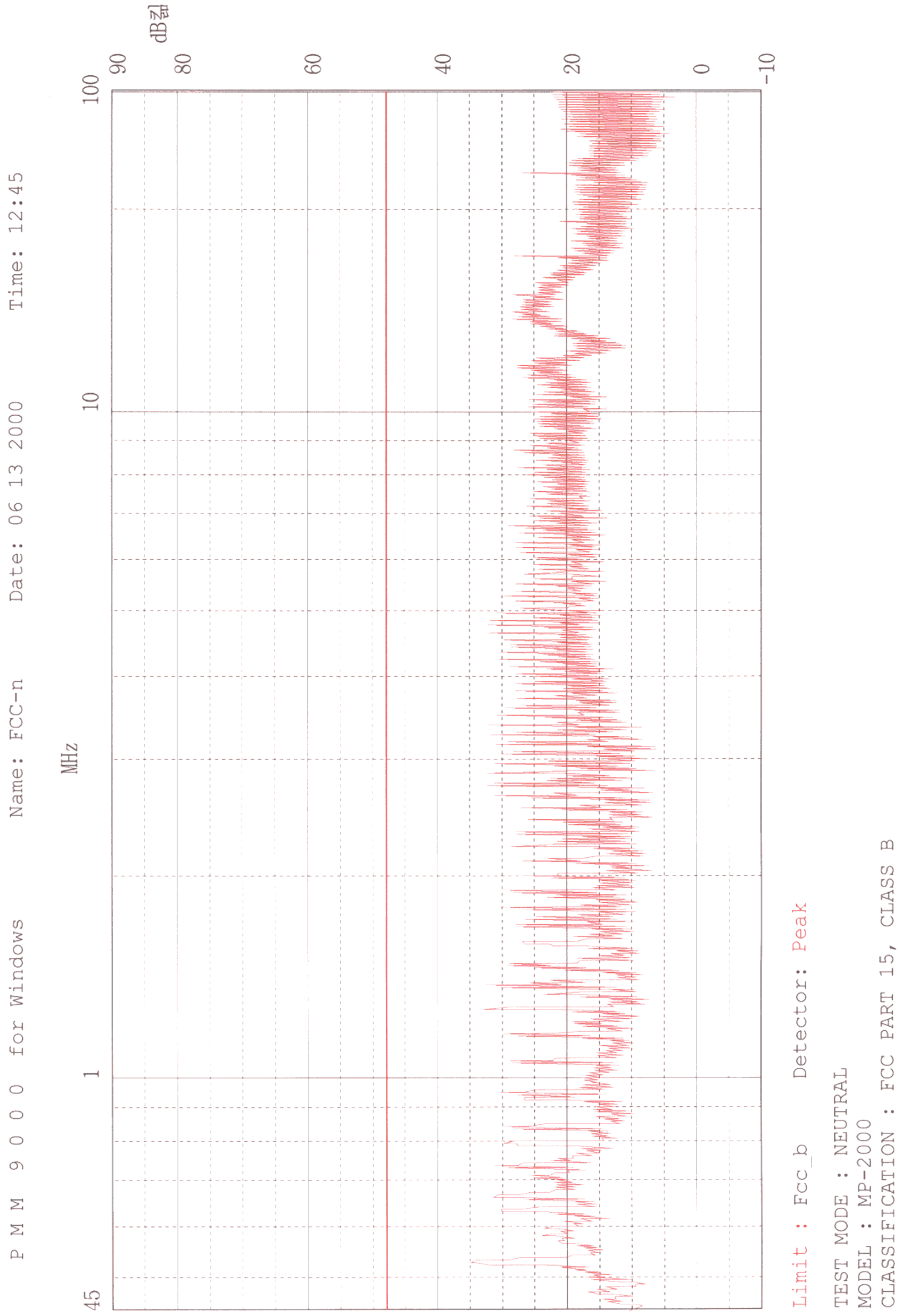
2. The limit for Class B digital device is 250Uv(48dBuV) from 450KHz to 30MHz.

3. Line H = Hot Line N = Neutral

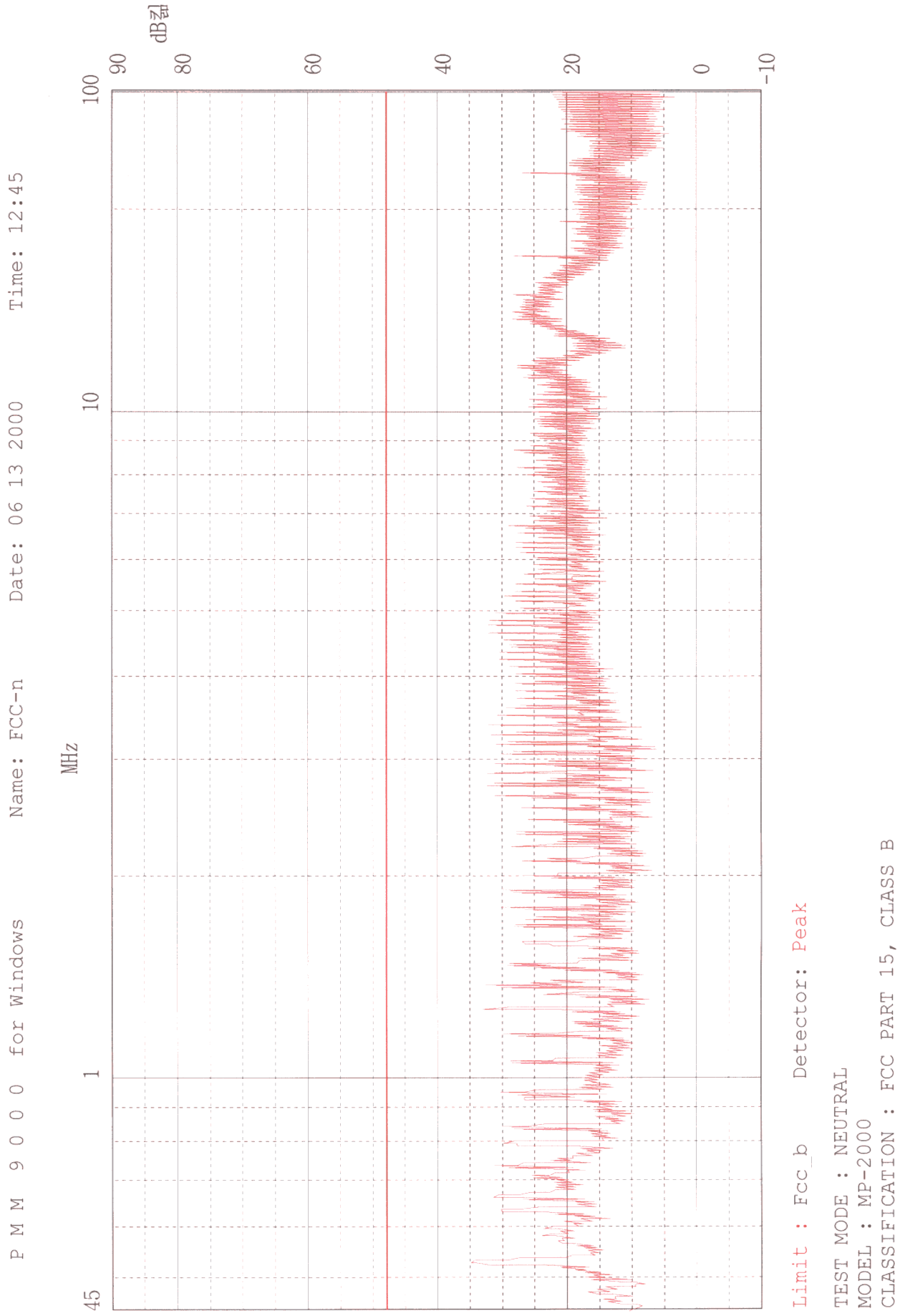
** Measurement using CISPR quasi-peak mode

Tested by **Jae Hyun Sim**

PLOTS OF EMISSIONS



PLOTS OF EMISSIONS



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. 1999 / Aug. 2000)

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 3meter. 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 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 ±3.5dB(k=2)

5.2.5 Test Data

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

Operating mode : **Continuous playing and downloading "MP3" music files from PC.**
Test procedure : ANSI C63.4-1992

Date of measurement : June 13, 2000
Temperature : 25.2 degree C
Humidity : 64 %

Model : **MP-2000**

MEASEMENT FREQ (MHz)	MEASEMENT LEVEL (dBuV)	ANTENNA POLARITY (H/V)	ANTENNA FACTOR (dB)	CABLE LOSS (dB)	LIMIT (dBuV)	FIELD STRENGTH (dBuV/m)	MARGIN (dBuV/m)
116.43	8.40	V	11.31	2.06	43.50	21.77	-21.73
159.71	3.80	H	14.83	2.39		21.02	-22.48
193.27	3.00	V	14.38	2.70		20.08	-23.42
199.94	7.40	V	14.69	2.70		24.79	-18.71
203.28	9.60	H	14.74	2.75		27.09	-16.41
209.95	5.80	H	14.74	2.84		23.38	-20.12
239.98	13.10	H	14.72	3.10	46.00	30.92	-15.08
247.92	12.80	H	14.72	3.14		30.66	-15.34
279.91	10.40	H	14.70	3.39		28.49	-17.51
293.48	12.70	H	14.69	3.47		30.86	-15.14
360.00	11.90	H	16.56	3.70		32.16	-13.84
433.32	8.40	H	16.54	4.17		29.11	-16.89

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 100uV(40dBuV) from 30MHz to 88MHz, 150uV(43.5dBuV) from 88MHz to 216MHz, 200µV(46dBuV) from 216MHz to 960MHz and 500µV (54dBuV) from above 960MHz.

* AFCL = Antenna Factor and Cable Loss
** Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz.
The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

Tested by **Jae Hyun Sim**

5.3 Minimum Margin

Conducted emission

MP3 player	playing and downloading mode	0.733MHz, 11.2 dBuV

Radiated emission

MP3 player	playing and downloading mode	360.00MHz, 13.84 dBuV/m

5.4 SAMPLE CALCULATIONS

dBµV = 20 log 10 (µV/m)

µV = 10 (dBµV/20)

EX. 1.

@ 1.154MHz Class B limit = 250 µV = 48 dBµV

Reading = 21.4 dBµV (calibrated level)
10 (21.4/20) = 11.75 µV

Margin = 21.4 – 48 = -26.6
26.6 **dB below limit**

EX. 2.

@ 33.32MHz Class B limit = 100 µV/m = 40dBµV/m

Reading = 2.20dBµV(calibrated level)
Antenna factor + Cable Loss = 14.55 dB
Total = 16.75dBµV/m
10 (16.75/20) = 6.88 µV

Margin = 16.75 – 40 = -23.2 dBµV/m
23.2dBµV/m below limit

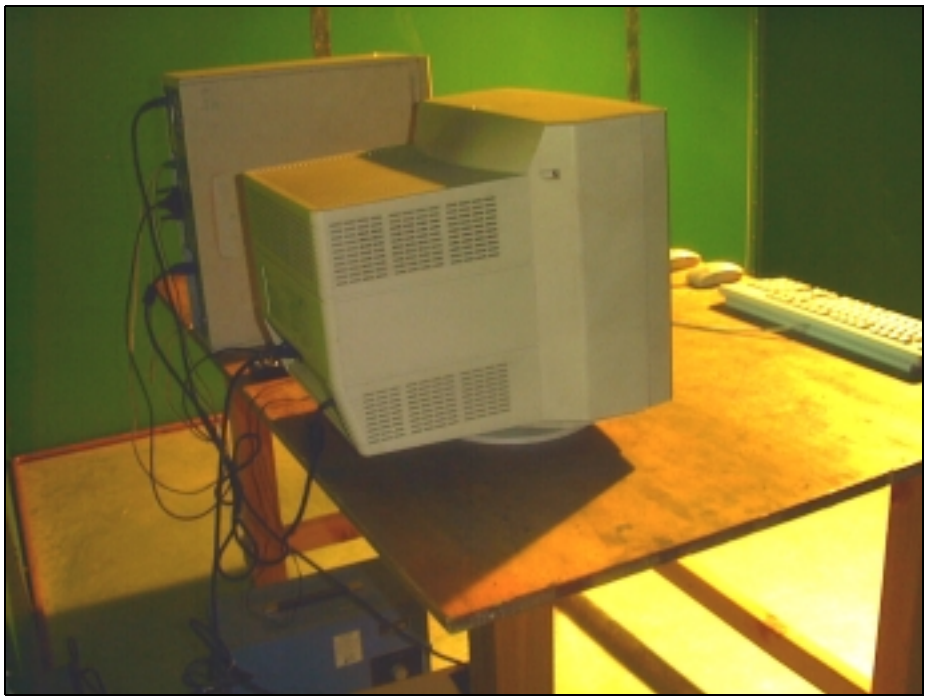
6. TEST EQUIPMENTS

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

Nomenclature	Manufacture Model Number	Serial Number	Calibration Date
Signal Analyzer (9kHz – 1.2GHz)	PMM PMM 9000	3100J70602	99/10/8
Spectrum Analyzer (9kHz – 2.6GHz)	ADVANTEST R3261C	61720002	99/08/19
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 4m x 3.5m x 2.4m	MYUNGJIN EMC 907-MJCO-12		
Turn Table	Dail EMC JAC-2		
Antenna Master	Dail EMC		

7. MEASUREMENT PHOTOS

7.1 Setup with the Maximized RFI Voltage Emission Level



7.2 Setup with the Maximized RFI Field Strength Emission Level

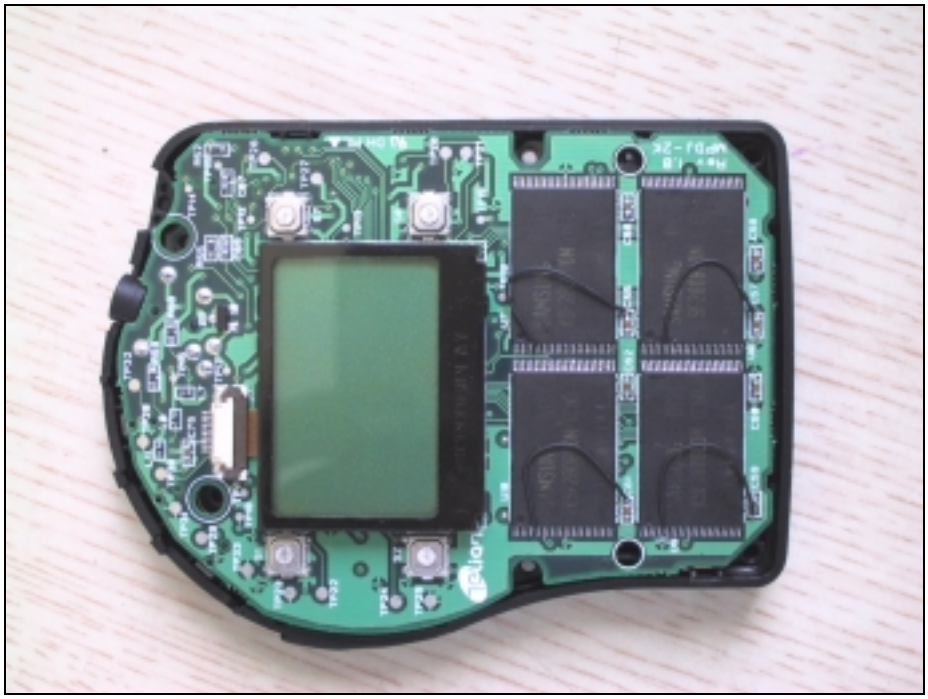
APPENDIX 1

PHOTOS of EUT

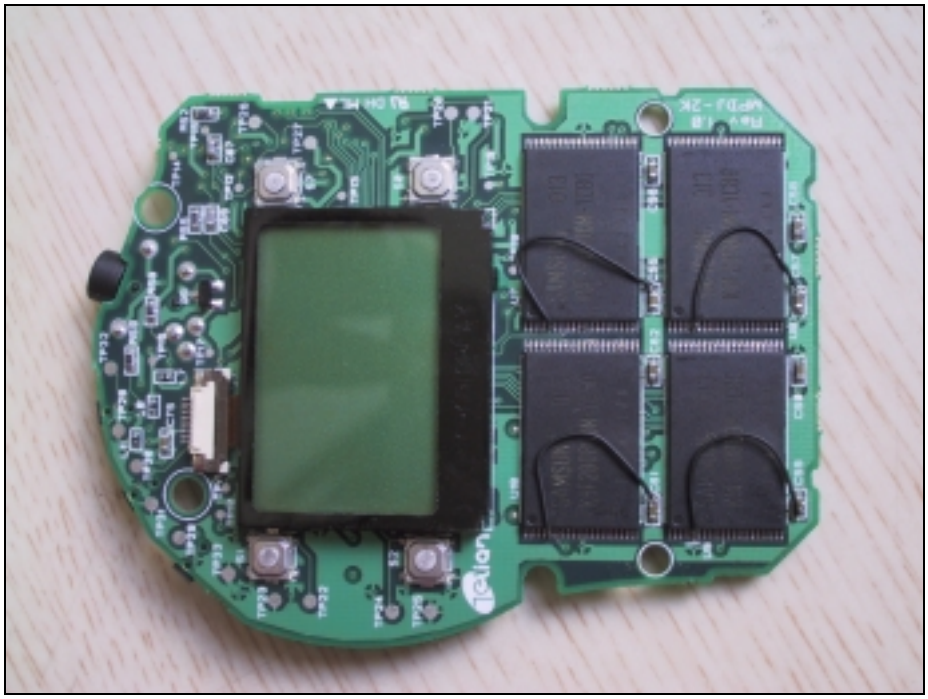
A1-1 External Photo of EUT(Top)

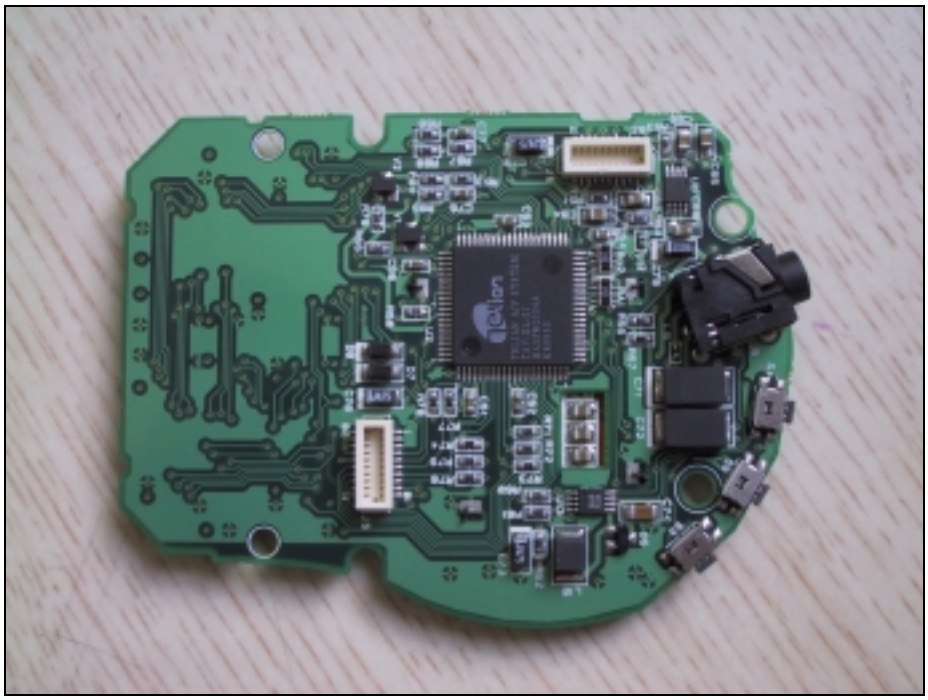
A1-2 External Photo of EUT(Bottom)

A1-3 Internal Photo of EUT

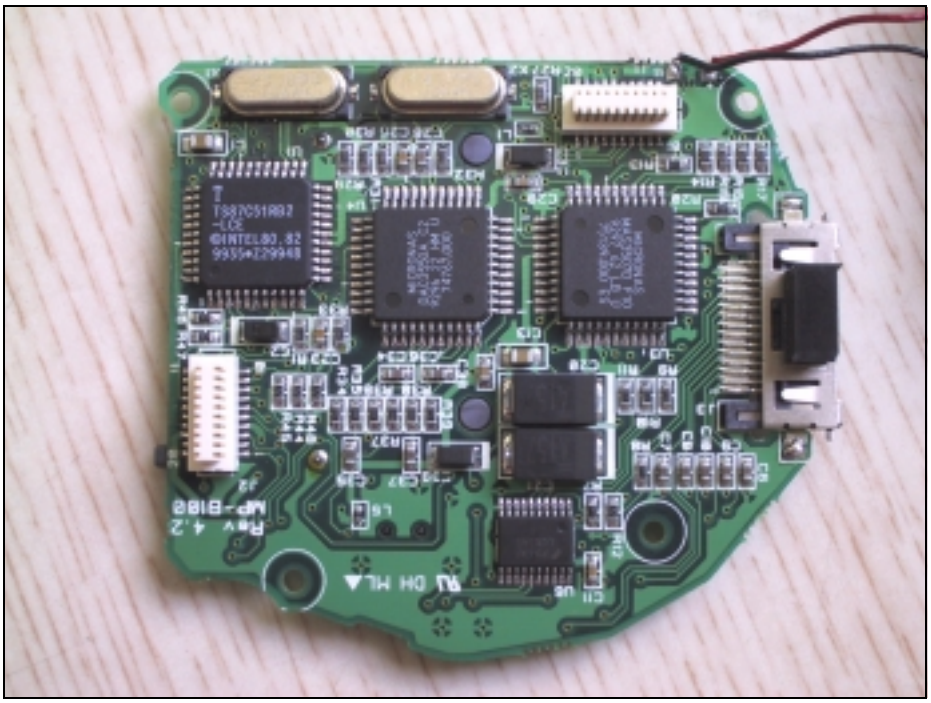


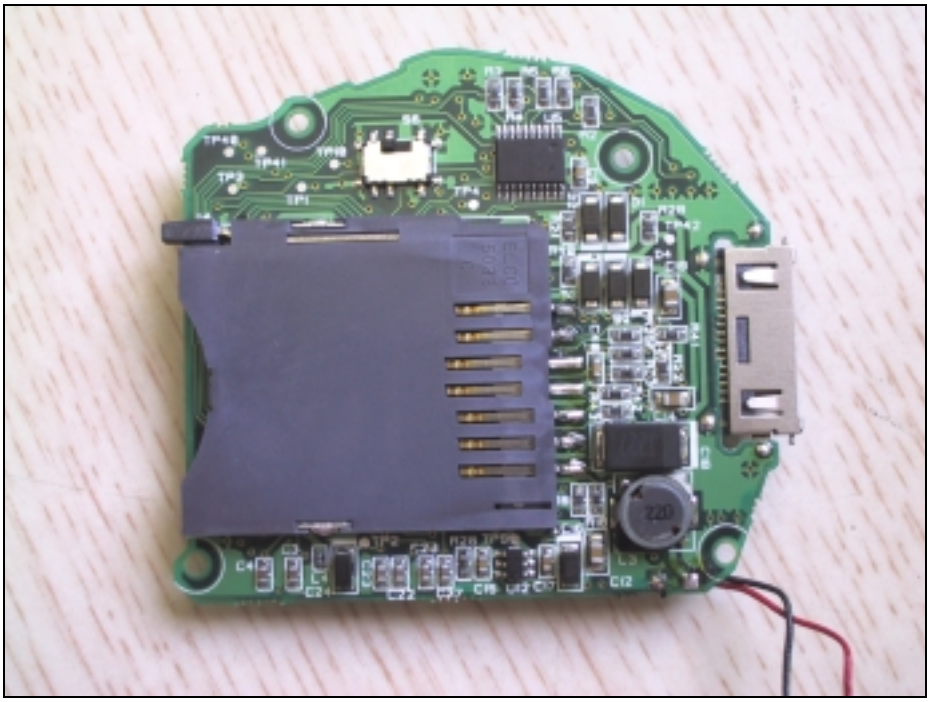
A1-4 Internal Photo of EUT(PCB #1)





A1-5 Internal Photo of EUT(PCB #2)





APPENDIX 2

ID Label and Location

A2-1 Label Requirements

A class B digital equipment subject to certification by the FCC shall carry a warning label which includes the following statements:

> This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This statement should be stuck in a conspicuous location on the device. If impossible, this warning label should be placed in a prominent location in the user's manual.

A2-2 ID Label Drawing and Location

Model No : MP-2000 Serial No : xxxxxxx FCC ID: NPQMP-2000 Telian Corporation

Made in Korea

Label Location:
Bottom side of EUT
(Refer to the photo of bottom)

A2-3 Warning Labels

Operation manuals for Class B computing devices shall contain the following statements or their equivalent :

> Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

NOTE: You are cautioned that any change or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate such equipment.

In case that shielded cables were used on the test, operation manuals shall contain the following statements or their equivalent :

NOTE: This unit was tested with shielded cables on the peripheral devices.

Shielded cables must be used with the unit to insure compliance.

APPENDIX 3

System Block Diagram

System Block Diagram

APPENDIX 4

USER'S MANUAL