JungAng EMC Co., Ltd.

109-2, Yepyung-ri, Kumsa-myun, Youju-kun, Kyungki-do, KOREA
TEL: 82 31 764 0125 FAX:82 31 764 0126

FCC EMI TEST REPORT

Date of Test	**: August 20, 2001**
Test Report No	**: 01JAC014.FCC**
Test Site	**: JungAng EMC Co., Ltd., Korea(31040/SIT 1300F2)**
Trade Name	**: N/A**
Manufacturer	**: SAFE TECHNOLOGY CO.,LTD.**
Address	**: 2F, Union building, 48-18 Songpa-Gu, Seoul, Korea.**
Contact Person	**: Jung Hoo, Lee** **Tel No. : 82-2-418-1513** **Fax No. : 82-2-418-1531**
Product	**: Safe Key**
Model	**: Safe iLand**
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.63.4-2000.

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 ---------- **11**

5.3 Minimum Margin ---------- **13**

5.4 Sample Calculations ---------- **13**

6. Test Equipments ---------- **14**

7. Measurement Photos ---------- **15**

7.1 Setup with RFI Voltage Emission Level ---------- **15**

7.2 Setup with RFI Field Strength Emission Level ---------- **16**

1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	**SAFE TECHNOLOGY CO.,LTD..**
Contact Person	**Jung Hoo, Lee** **Tel No. : 82-2-418-1513** **Fax No. : 82-2-418-1531**
Manufacturer	**SAFE TECHNOLOGY CO.,LTD..** **2F, Union building, 48-18 Songpa-Gu, Seoul, Korea.**

- Trade name **Safetek**
- Model name **Safe iLand**
- EUT Type **Safe Key**
- Classification **FCC Part 15 Subpart B Class B**
- Clock Speed **Main Clock : 11.0592 MHz**
- Rule Part(s) **FCC Part 15 & Part 2**
- Test Procedure(s) **ANSI C63.4(2000)**
- Date of Tests **August. 20, 2001**
- Place of Tests **JungAng EMC Co., Ltd.**

1.2 EUT Description

The EUT is a small size of Safe Key, As using personal computer (Desktop,Notebook) adapted PS2 interface, This product is integration security product that protect all portions of individual PC that hacking is available configurationally. Also, because user hits keyboard, Safe iLand secures all steps that input and process in application program and store information

☑ **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 measurement 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	KAYAK	5064-7432A034598	HP	DoC
Printer	C2106A	3217S91901	HP	B94C2106X
Monitor	VX700	M902080938	Gateway	BGBTFV8705K
Keyboard	RT235BTW	B13BC90L39GU	Compaq	AQ6-22K15
PS2 Mouse	M-S34	F13490N5BGF	Compaq	DZL211029
Safe Key	Safe iLand	-	Safetek	**EUT**
Serial Mouse #1	OK-520	00DAC0231	A4 TECH	DoC
Serial Mouse #2	Pro Mouse II	96002117	NEOTEC	FSUGMZC7
Joystick	GAMEPAD USB	S1050910000564	CREATIVE	DoC

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	PS2 Mouse	Signal cable	1.5	shielded
Computer	Mouse #1,#2	Signal cable	1.5	shielded
Computer	Joystick	Signal cable	1.5	shielded
Computer	Safe Key	Signal cable	1.5	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

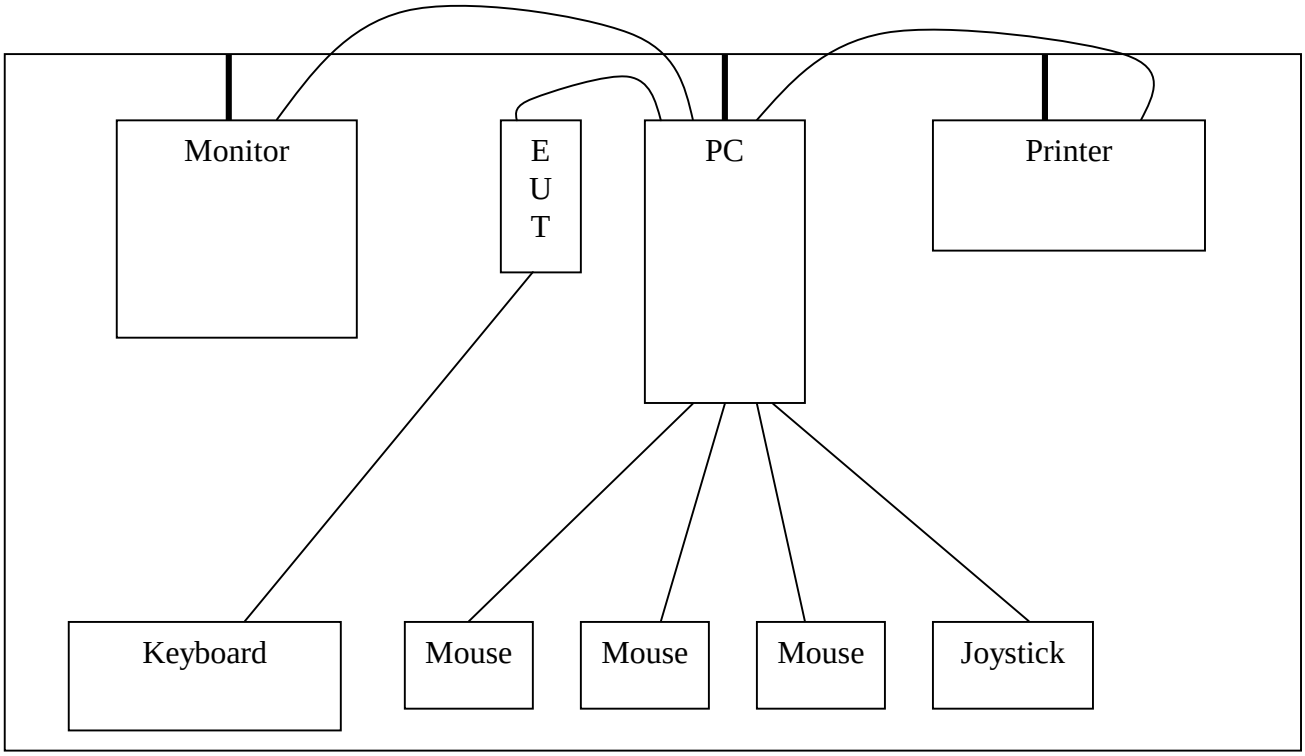


Figure 4-1 System layout

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 / 10 Oct. 2000 / Oct. 2001)

L.I.S.N ..... (L3-25 / 1110K70403 / PMM / 01 Sep. 2000 / Sep. 2001)

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 C63.4-2000 in a Shielded 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.

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 : **Normal operation Mode.**
Test procedure : ANSI C63.4-2000

Date of measurement : Aug. 20, 2001
Temperature : 25 degree C
Humidity : 65 %

Model : **Safe iLand**

Frequency (MHz)	Level (dBuV)	Line	Total Factor (dB)	Result (dBuV)	Result (uV)	Limit (uV)	Margin (dB)
0.532	36.00	N	0.36	36.36	65.77	250.00	11.64
0.638	36.30	H	0.37	36.67	68.16		11.33
1.171	36.80	N	0.42	37.22	72.61		10.78
1.278	38.20	N	0.43	38.63	85.41		9.37
1.384	37.90	N	0.45	38.35	82.70		9.65
1.492	36.20	H	0.47	36.67	68.16		11.33
2.024	34.50	N	0.58	35.08	56.75		12.92
2.238	35.50	N	0.59	36.09	63.75		11.91
2.344	35.90	N	0.60	36.50	66.83		11.50
3.514	34.90	H	0.71	35.61	60.33		12.39
13.570	40.90	H	1.25	42.15	128.09		5.85
15.380	39.50	H	1.28	40.78	109.40		7.22

Table 1. Line Conducted Emission Tabulated Data

Note :

1. All modes of operation were investigated and the worst-case emissions are reported.
   See attached Plots.

2. The limit for Class B digital device is 250 μV (48.0 dBμV) from 450 KHz to 30 MHz.

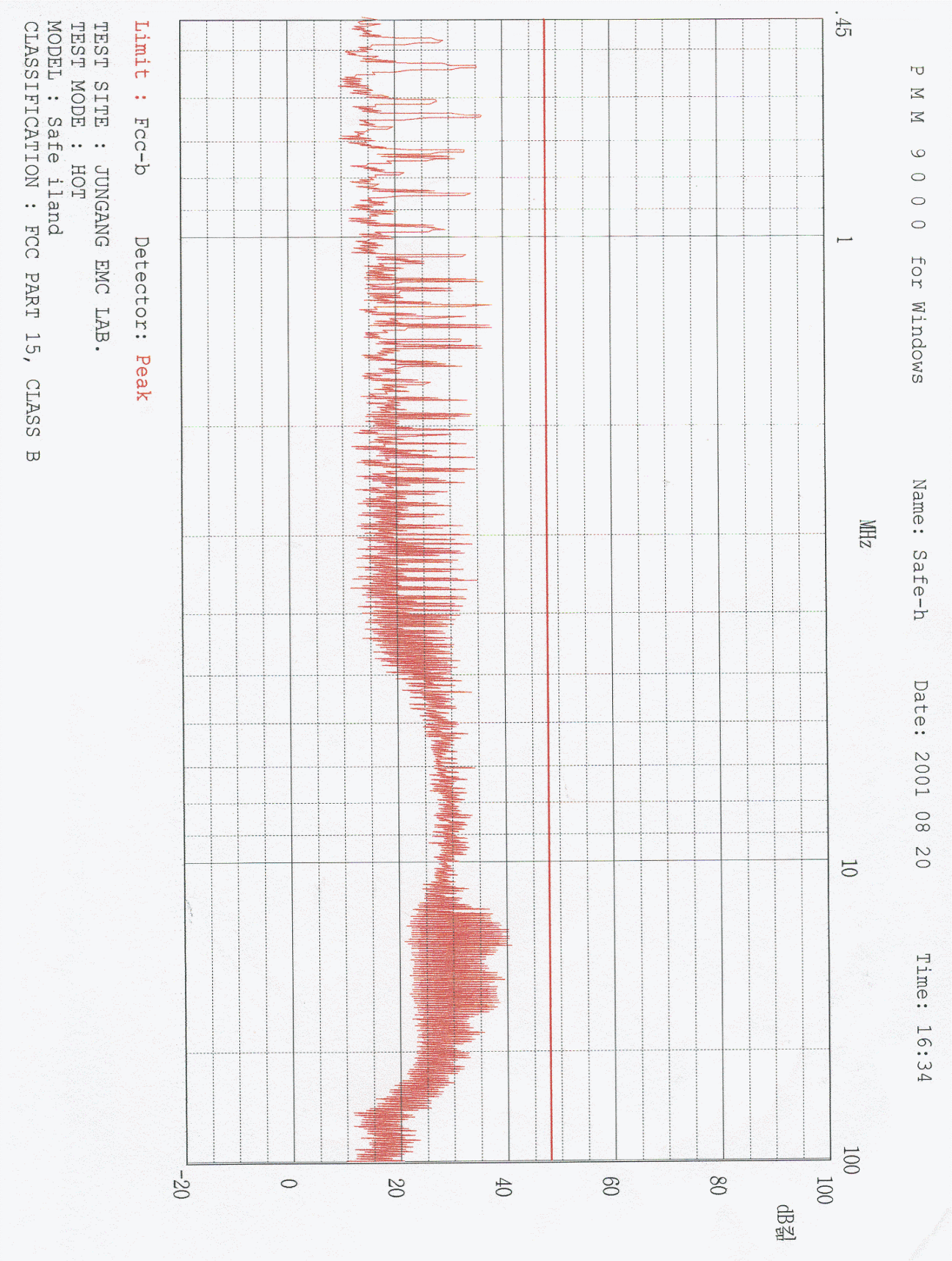
3. Line H = Hot Line N = Neutral

** Measurement using CISPR quasi-peak mode

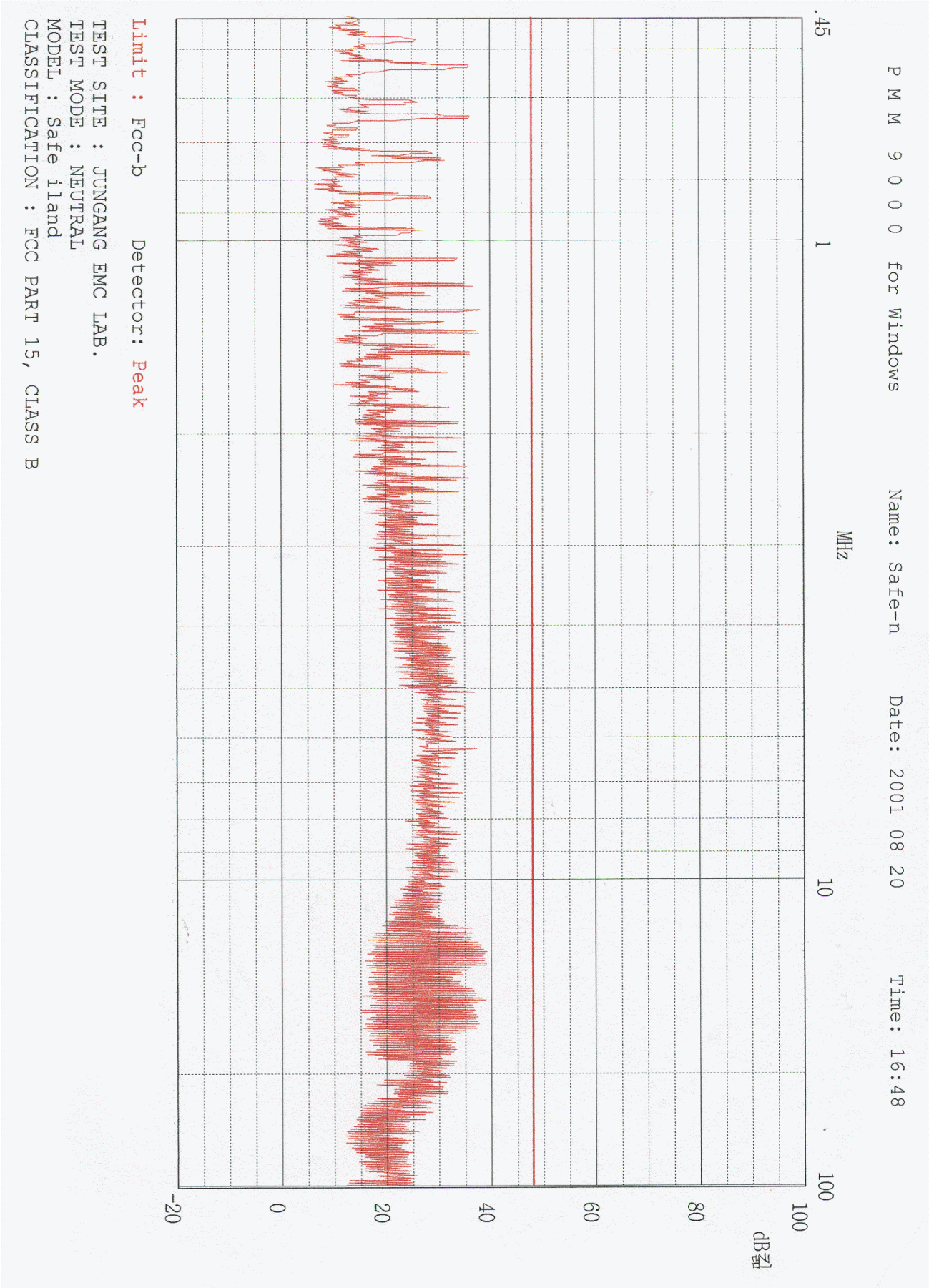
Tested by **Hyung-Seok Lee**

5.2 RFI Field Strength Measurement

PLOTS OF EMISSIONS



PLOTS OF EMISSIONS



5.2.1 Measurement Instrumentation Used

Signal Analyzer ..... (PMM9000 / 3100J70602 / PMM / 10 Oct. 2000 / Oct. 2001)

Spectrum Analyzer.....(R3261 / 61720002 / Advantest / 25 Aug. 2000 / Aug. 2001)

Biconical antenna ..... (BC01 / 0020J70501 / PMM / 10 Oct. 2000 / Oct. 2001)

Log periodic antenna ..... (LP01 / 0020J70501 / PMM / 10 Oct. 2000 / Oct. 2001)

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

5.2.2 Measurement Procedure

Final test was performed according to ANSI C63.4-2000 at the open field site .
Deviations from the standard were none.

The EUT was placed in a 0.8 m 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.

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 : **Normal Operation Mode.**
Test procedure : ANSI C63.4-2000

Date of measurement : Aug. 20, 2001
Temperature : 26 degree C
Humidity : 65 %

Model : **Safe iLand**

Frequency (MHz)	Level (dBuV)	Antenna Pplarity (H/V)	Factor (dB)	Loss (dB)	Level (dBuV/m)	Level (uV/m)	Limit (uV/m)	Margin (dB)
44.21	24.50	V	10.39	1.34	36.23	64.79	100	3.77
66.33	18.30	V	9.37	1.59	29.26	29.04		10.74
110.57	25.20	H	10.18	2.10	37.48	74.82	150	6.02
121.63	14.90	H	11.70	2.23	28.83	27.64		14.67
165.86	14.30	V	13.64	2.64	30.58	33.81		12.92
210.10	9.20	V	10.88	3.03	23.11	14.31		20.39
232.22	13.60	H	11.49	3.23	28.32	26.06	200	17.68
243.28	11.10	H	11.79	3.33	26.22	20.46		19.78
254.34	9.10	H	12.15	3.41	24.66	17.10		21.34
265.39	13.20	H	12.61	3.47	29.28	29.11		16.72
298.57	5.30	H	14.01	3.66	22.97	14.08		23.03
320.69	6.60	H	14.47	3.79	24.86	17.50		21.14

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 μV/m (40.0 dBμV/m) from 30 MHz to 88 MHz, 150 μV/m (43.5 dBμV/m) from 88 MHz to 216 MHz, 200 μV/m(46.0 dBμV/m) from 216 MHz to 960 MHz and 500 μV/m (53.98 dBμV/m) 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

Safe Key	Normal Operation mode	15.38 MHz,	7.22 dB

Radiated emission

Safe Key	Normal Operation mode	44.21 MHz,	3.77 dB

5.4 SAMPLE CALCULATIONS

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

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

EX. 1.

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

Reading = 39.50 dBµV (calibrated level)
Lisn factor + Cable Loss = 1.28 dB
Total = 40.78 dBµV

$10^{(40.78 / 20)}$ = 109.40 µV

Margin = 48 - 40.78 = 7.22dB
7.22 dB ; below limit

EX. 2.

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

Reading = 24.50 dBµV(calibrated level)
Antenna factor + Cable Loss = 11.73 dB
Total = 36.23 dBµV / m

$10^{(36.23 / 20)}$ = 64.78 µV / m

Margin = 40 – 36.23 = 3.77 dB
3.77 dB ; below limit

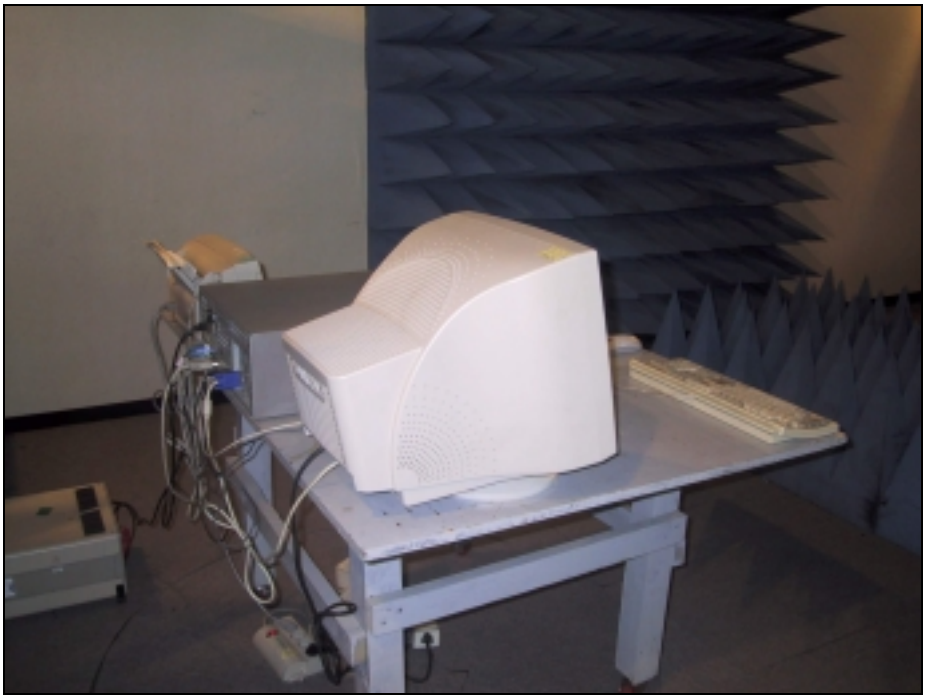
6. TEST EQUIPMENTS

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	00/10/10
Spectrum Analyzer (9kHz – 2.6GHz)	ADVANTEST R3261C	61720002	00/08/25
Amplifier (0.1MHz-1.3GHz)	HP 8447D	2944A08872	-
LISN	PMM L3-25	1110k70403	00/09/01
Biconical Antenna	PMM BC01	0020J70501	00/10/10
Log Periodic Antenna	PMM LP01	0020J70501	00/10/10
Dipole Antenna	SWALZBECK VBA6106A	1277	00/09/05
Dipole Antenna	SWALZBECK UHA9105	91052168	00/09/05
Plotter	HP 7475A	007475A	-
Shield Room 7m x 4m x 4m	SEMITECH -	000815	
Turn Table	JAEMC JAC-2	980723	
Antenna Mast	Dail EMC	970815	

7. MEASUREMENT PHOTOS

7.1 Setup with the Maximized RFI Voltage Emission Level



7.2 Setup with the Maximized RFI Field Strength Emission Level