



FCC TEST REPORT

Model No. : EVR-150
Test Report No. :
BWS-03-EF-0003

EMI TEST REPORT

BWS Tech, Inc.

294-9, Jungdae-Dong, Gwangju-City, Gyeonggi-Do 464-080 Korea
TEL: 82 31 764 0125 FAX: 82 31 764 0126

Date of Test : February 05, 2003
Test Report No. : BWS-03-EF-0003
Test Site : BWS Tech., Inc. (Registration No. : 553281)

Trade Name : ERATECH
Applicant : ERATECH Co., Ltd.
Address : Poongyang B/D 2F, 410-4, Dogok-Dong,
Kangnam-Gu, Seoul, Korea
Contact Person : Gye-Je Oh
Tel No. : 82-2-576-0760
Fax No. : 82-2-529-3821

Product Name : Voice Recorder
Model Name : EVR-150
FCC ID : QNJEVER-150
FCC Rule Part(s) : FCC Part 15 Subpart B Class B
Classification : Class B

The device bearing the trade name and model specified above has been complied with the applicable technical standards as described in this test 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 our test personnel were made under my supervision.

I assume the responsibility for the completeness of these measurements and for the qualification of all our personnel conducting this testing.

Feb. 13, 2003

K. Young Kim
Chief Engineer
Laboratory Division



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1. DESCRIPTION OF DEVICE

1.1 General

Applicant	ERATECH Co., Ltd. Poongyang B/D 2F, 410-4, Dogok-Dong, Kangnam-Gu, Seoul, Korea
Contact Person	Gye-Je Oh Tel No. : 82-2-576-0760 Fax No. : 82-2-529-3821

- Trade name **ERATECH**
- Model name **EVR-150**
- EUT Type **Voice Recorder**
- Classification **Part 15 Class B Computing Device Peripheral (JBP)**
- Clock Speed **32.768kHz**
- Rule Part(s) **FCC Part 2 & Part 15 Subpart B Class B**
- Test Procedure(s) **ANSI C63.4-2000**
- Date of Tests **February 5, 2003**
- Test Lab **BWS Tech, Inc.**

1.2 EUT Descriptions

- Beatsounds is portable digital music player, it can playback various digital audio format.
- It can save high quality audio, sound or voice recordings as permanent MP3 files on a PC.

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



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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 Dec. 26, 2001 that was submitted to the FCC. Our site and facility had been accepted in a letter dated Dec. 26, 2001(Registration No. : 553281) :

BWS Tech, Inc.

Address : 294-9, Jungdae-Dong, Gwangju-City, Kyunggi-Do 464-080 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 Dec. 08, 2000.

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 s are close to these limits.

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

3.2 Modifications to the EUT : None



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4. TESTED SYSTEM DETAILS

4.1 Peripherals and Others :

Description	Model Name	Serial No.	Manufacturer	FCC ID
Computer(Test 6)	VDHM(Optiplex GX240)	-	Dell	-
Monitor	M782	BH68-00440P-02	SAMSUNG	-
Printer	C6464C	TH11RH70Q7	Calcomp Elec	-
Keyboard	SK-8110	04N729	SILITEK	AQ6-22K15
PS2 Mouse	M-SAW34	LZE21070425	SUZHOU	DZL211029
Serial Mouse #1	AM-767-P	0119592	-	DoC
Serial Mouse #2	OK-520	-	A4 TECH	FSUGMZC7
Joystick	Plug & Play GamePad	-	Microsoft	DoC
Voice Recorder	EVR-150	-	ERATECH Co., Ltd.	EUT

4.2 Type of Cables Used:

Device from	Device to	Type of Cable	Length	Type of shield
Computer	PS/2 (Keyboard)	Signal cable	2.1	Unshielded
Computer	PS/2 (Mouse)	Signal cable	1.8	Unshielded
Computer	SERIAL (Mouse #1, #2)	Signal cable	1.5	Unshielded
Computer	MIDI (Joystick)	Signal cable	1.8	Unshielded
Computer	PARALLEL (Printer)	Signal cable	1.9	Shielded
Computer	VIDEO (Monitor)	Signal cable	1.8	Shielded
Power Cable	Power	-	1.5	Unshielded
EUT	USB (Computer)	Signal cable	1.0	Unshielded
EUT	Line In	Signal cable	6.0	Unshielded

4.3 System layout on EUT and peripherals

— Interface cable — Power cable

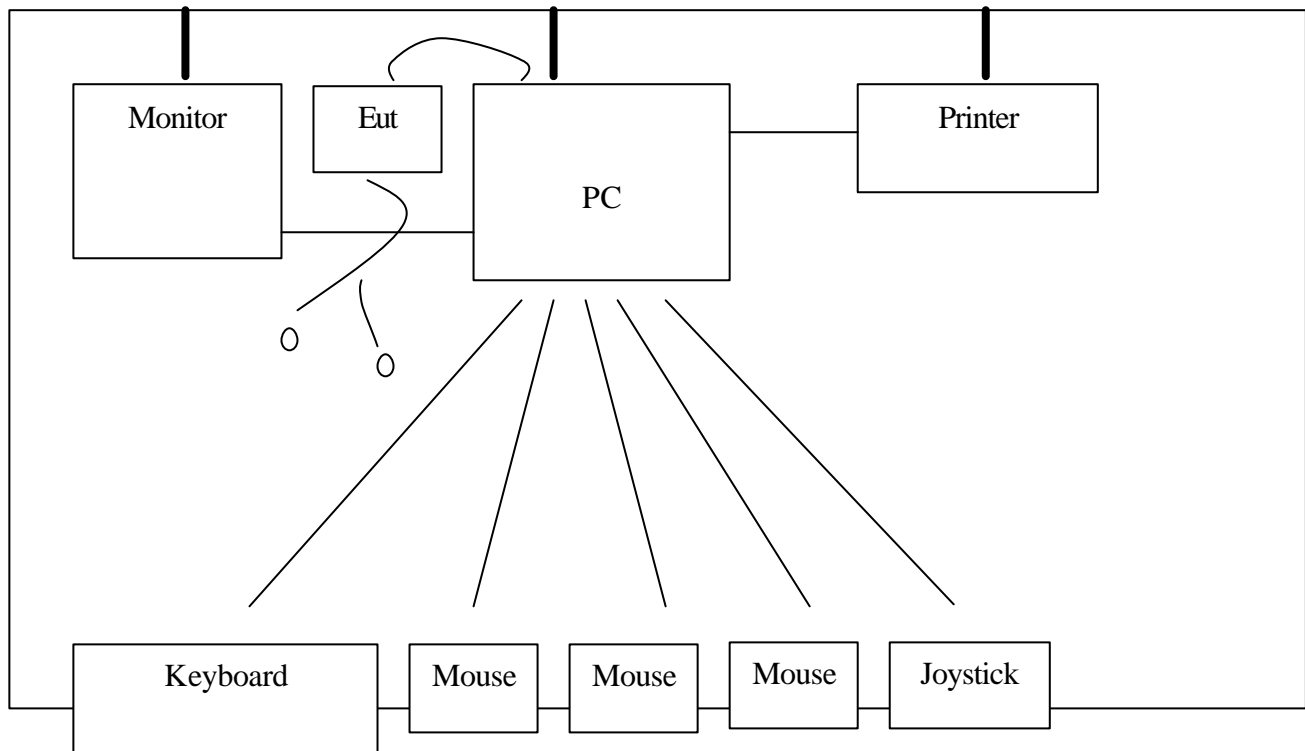


Figure 4-1 System layout>



5. TEST RESULT

5.1 RFI Voltage Measurement

5.1.1 Measurement Instrumentation Used

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

Signal Analyzer... .. (PMM9000/3100570602/PMM/Aug. 16, 2002/Aug. 2003)

A.M.N. (L3-25/1110K70403/PMM/Oct. 02, 2002/Oct. 2003)

A.M.N. (KNW-242C/8-920-20/KYORITSU/Aug. 31, 2002/Aug. 2003)

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

Shield Room (JASH01/---/SEMITECH/---/---)

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 'worst case(pc-download mode)' condition mode.** We reported at maximum emission levels.

5.1.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and measured in worst case.

5.1.4 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 3.51 dB(k=2)



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5.1.5 Test Data

RFI Voltage Measurement Results (0.150MHz to 30 MHz)

Operating mode : PC Download mode

Date of measurement : February 5, 2003

Test procedure : ANSI C63.4-2000

Temperature : 5 degree C

Humidity : 25 %

Model : **EVR-150**

Frequency (MHz)	Level (dBuV)	Line	Total Factor (dB)	Result (dBuV)	Limit (Quasi-peak) (dBuV)	Margin (dB)
0.158	51.30	N	0.03	51.33	65.9	-14.57
0.178	32.40	N	0.03	32.43	65.3	-32.87
0.180	34.00	N	0.03	34.03	65.1	-31.07
0.203	47.40	N	0.10	47.50	64.6	-17.10
0.239	26.50	H	0.10	26.60	63.6	-37.00
0.314	36.40	N	0.22	36.62	61.4	-24.78
0.508	20.80	N	0.30	21.10	56.0	-34.90
0.709	15.00	N	0.30	15.30	56.0	-40.70
0.785	13.10	N	0.30	13.40	56.0	-42.60
0.941	12.00	H	0.35	12.35	56.0	-43.65
1.226	11.50	H	0.43	11.93	56.0	-44.07
2.423	14.20	N	0.57	14.77	56.0	-41.23
10.740	20.90	H	1.06	21.96	60.0	-38.04
11.040	22.80	H	1.07	23.87	60.0	-36.13
11.510	25.50	H	1.11	26.61	60.0	-33.39
11.870	23.50	H	1.14	24.64	60.0	-35.36
16.580	20.60	H	1.24	21.84	60.0	-38.16
20.030	19.10	H	1.35	20.45	60.0	-39.55

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 2000-630 $\mu\text{V}/\text{m}$ (66-56 dB $\mu\text{V}/\text{m}$) from 0.15 MHz to 0.5 MHz, 630 $\mu\text{V}/\text{m}$ (56 dB $\mu\text{V}/\text{m}$) from 0.5 MHz to 5 MHz, 1000 $\mu\text{V}/\text{m}$ (60 dB $\mu\text{V}/\text{m}$) from 5 MHz to 30 MHz

3. Line H = Hot , Line N = Neutral

** Measurement using CISPR quasi-peak mode

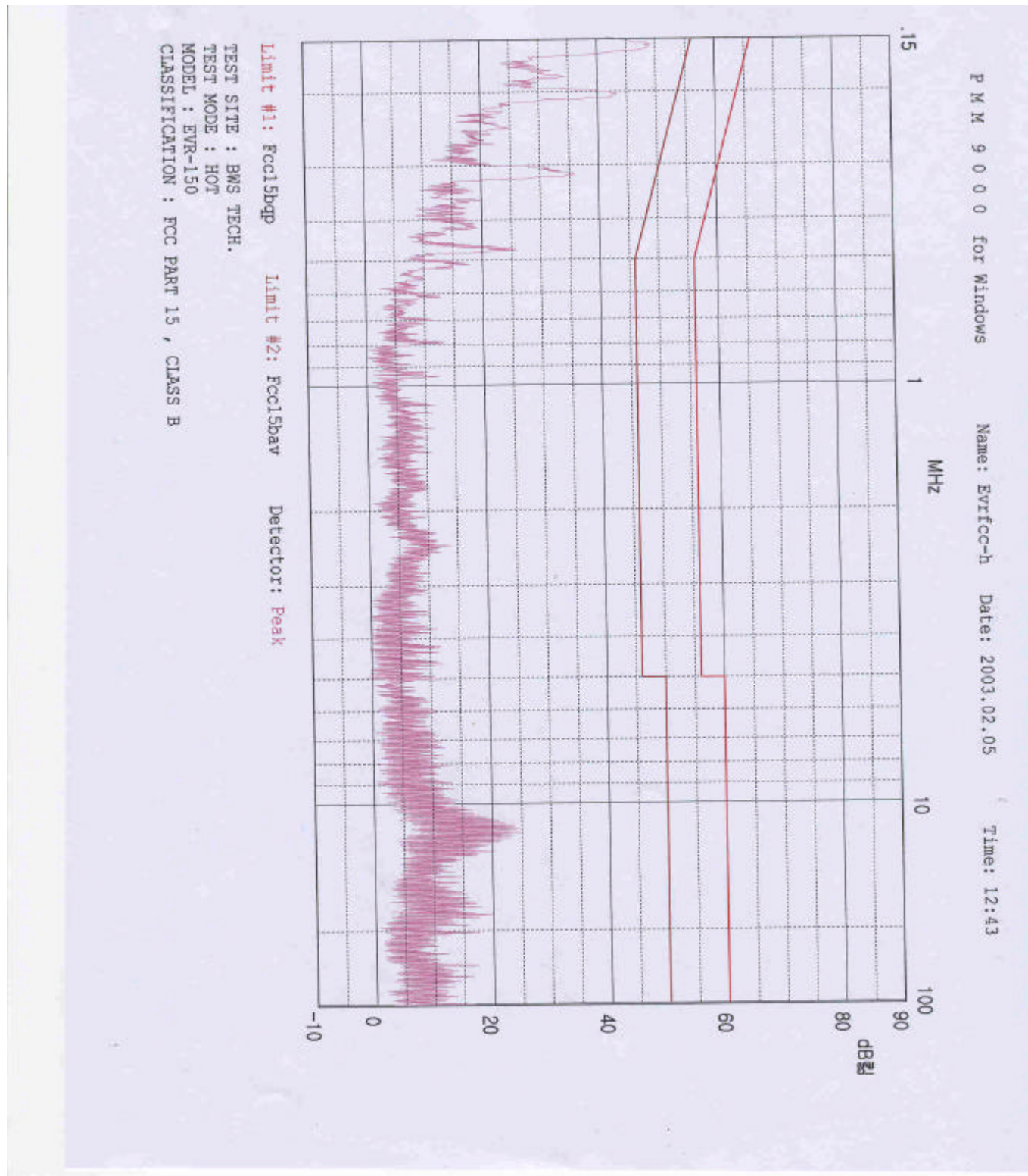
Tested by *Shim Min-Seob*



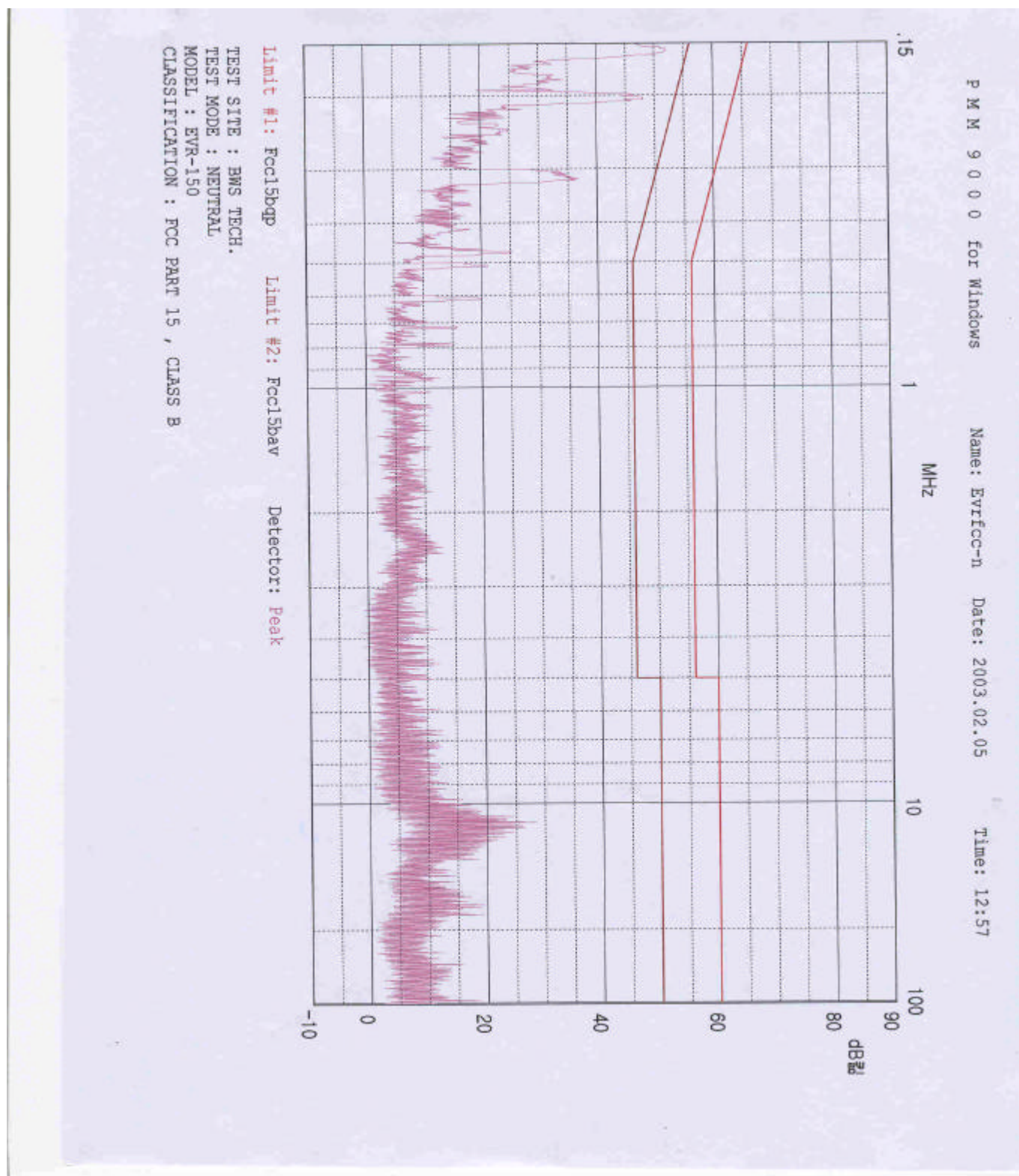
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PLOTS OF EMISSIONS



PLOTS OF EMISSIONS





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5.2 RFI Field Strength Measurement

5.2.1 Measurement Instrumentation Used

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

Signal Analyzer... .. (PMM9000/3100570602/PMM/Aug. 16, 2002/Aug. 2003)
Spectrum Analyzer... .. (R3261C/61720002/ADVANTEST/ Aug. 22, 2002/ Aug. 2003)
Amplifier... .. (8447E/2945A02712/HP/ Aug. 19, 2002/Aug. 2003)
Biconical antenna----- (BBA9106/ --- / SWALZBECK /Sep. 12, 2002/Sep. 2003)
Log periodic antenna----- (UPA6109/ --- / SCHAFFNER / Sep. 12, 2002/Sep. 2003)
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 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 'worst case(pc-download mode)' condition mode.**

The reported data is determined at a maximum emission levels.

5.2.3 Operation Modes

EUT was tested according to the specifications given by the manufacturer, and reported the worst emissions.

5.2.4 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at ± 4.34 dB(k=2)



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5.2.5 Test Data

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

Operating mode : PC Download mode
Test procedure : ANSI C63.4-2000

Date of measurement : February 5, 2003
Temperature : 7 degree C
Humidity : 46 %

Model : **EVR-150**

MEASEMENT FREQ (MHz)	MEASEMEN TLEVEL (dBuV)	ANTENNA POLARITY (H/V)	ANTENNA FACTOR (dB)	CABLE LOSS (dB)	LIMIT (dBuV/m)	FIELD STRENGTH (dBuV/m)	MARGIN (dBuV)
35.74	16.10	V	16.55	1.11	40.00	33.76	-6.24
119.99	16.90	V	12.73	2.23		31.86	-11.64
132.96	14.20	V	13.77	2.34		30.31	-13.19
143.98	19.60	V	14.48	2.45		36.53	-6.97
149.99	18.70	V	14.67	2.49		35.86	-7.64
196.68	16.70	H	16.01	2.97		35.68	-7.82
240.01	16.80	H	17.28	3.22	46.00	37.30	-8.70
331.94	12.90	H	14.02	3.89		30.81	-15.19
398.14	16.90	H	15.25	4.26		36.41	-9.59
499.99	13.90	H	17.85	4.81		36.56	-9.44
659.49	16.80	H	20.72	5.70		43.22	-2.78
930.05	11.70	H	24.23	6.87		42.80	-3.20

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 μ V/m (40.0 dB μ V/m) from 30 MHz to 88 MHz,
150 μ V/m (43.5 dB μ V/m) from 88 MHz to 216 MHz, 200 μ V/m (46.0 dB μ V/m) from 216 MHz to
960 MHz and 500 μ V/m (53.98 dB μ V/m) from above 960 MHz.

* Measurements were performed using CISPR quasi-peak mode. Above 1 GHz, peak detector function mode was used with 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 **Shim Min-Seob**



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5.3 Minimum Margin

Conducted emission

EVR-150 @PC download mode 0.158 MHz, 14.57dB

Radiated emission

EVR-150 @PC download mode 659.49 MHz, 2.78 dB

5.4 SAMPLE CALCULATIONS

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

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

EX. 1.

@ 0.158 MHz

Class B limit = 2000-630 μV = 66-56 dB μV

Reading = 51.30 dB μV (calibrated level)

Cable Loss = 0.03

Total = 51.33 dB μV

$$10^{(51.33/20)} = \mu\text{V}$$

Margin = 51.33 - 65.90 = -14.57

14.57 dB ; below limit

EX. 2.

@ 659.49 MHz

Class B limit = 200 $\mu\text{V}/\text{m}$ = 46.00 dB $\mu\text{V}/\text{m}$

Reading = 16.80 dB μV (calibrated level)

Antenna factor + Cable Loss = 26.42 dB

Total = 43.22 dB $\mu\text{V}/\text{m}$

$$10^{(43.22/20)} = \mu\text{V}/\text{m}$$

Margin = 43.22 - 46.00 = -2.78 dB

2.78 dB ; below limit



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6. TEST EQUIPMENTS

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

<u>Nomenclature</u>	<u>Manufacture Model Number</u>	<u>Serial Number</u>	<u>Calibration Date</u>
Signal Analyzer	PMM PMM9000	3100570602	02/08/16
EMC Analyzer	HP E7403A	US39150108	02/02/19
Spectrum Analyzer	ADVANTEST E7403A	61720002	02/08/22
Amplifier (0.1MHz-1.3GHz)	HP 8447E	2945A02712	02/08/19
Biconical Antenna	SWALZBECK BBA9106	N/A	02/09/12
Log Periodic Antenna	SCHAFFNER UPA6109	N/A	02/09/12
Plotter	HP 7475A	007475A	N/A
Shield Room 7m x 4m x 4m	SEMITECH	000815	N/A
Turn Table	JAEMC JAC-2	N/A	N/A
Antenna Mast	Dae-il EMC JAC-1	N/A	N/A
Artificial Mains Network	PMM L3-25	1110K70403	02/10/02
Artificial Mains Network	KYORITSU KNW-242C	8-920-20	02/08/31
Antenna Turntable Controller	JAEMC JAC-2	N/A	N/A