



FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

BWS Tech, Inc.

294-9, Jungdae-Dong, Gwangju-City, Gyeonggi-Do 464-080 Korea

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FCC EMI TEST REPORT

Date of Test : September 24, 2002

Test Report No. : BWS-02-EF-0033

Test Site : BWS Tech., Inc. (Registration No. : 553281)

Trade Name : N/A

Manufacturer : P&C N-Tech Co., Ltd.

Address : #803, 188-5, KICOX Venture Center Guro3-dong, Guro-gu, Seoul, Korea

Contact Person : Park, C.G.

Tel No. : 82-2-6300-6303

Fax No. : 82-2-6300-6309

Product Name : USB Drive

Model Name : Fdisk USB Drive

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.

09. 26, 2002

Choi, Jae-Ho

Senior director of BWS Tech., Inc.

TABLE OF CONTENTS

PAGE

BWS Tech., Inc.
<http://www.bws.co.kr>

FCC ID : QNQFDISKUD

Page Number : 1 of 14 pages
Issue Date : Sep. 26, 2002



FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

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	9
5.3 Minimum Margin	13
5.4 Sample Calculations	13
6. Test Equipments	14



FCC TEST REPORT

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1. DESCRIPTION OF DEVICE

1.1 General

Responsible Party	P&C N-Tech Co., Ltd.
Contact Person	Park, C.G. Tel No. : 82-2-6300-6303 Fax No. : 82-2-6300-6309
Manufacturer	P&C N-Tech Co., Ltd. #803, 188-5, KICOX Venture Center Guro3-dong, Guro-gu, Seoul, Korea

- Trade name **N/A**
- Model name **Fdisk USB Drive**
- EUT Type **USB Drive**
- Classification **FCC Part 15 Subpart B Class B**
- Clock Speed **12.000 MHz**
- Rule Part(s) **FCC Part 15 & Part 2**
- Test Procedure(s) **ANSI C63.4-2000**
- Date of Tests **September 24, 2002**
- Place of Tests **BWS Tech, Inc.**

1.2 EUT Description

Fdisk USB drive is next generation storage device which is small size, light weight portable storage. Fdisk use flash memory to read and write data, so important data can be stored several years. And Fdisk use USB port, so data transfer speed is very fast, do not use special power.

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



FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

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, Gyeonggi-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 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

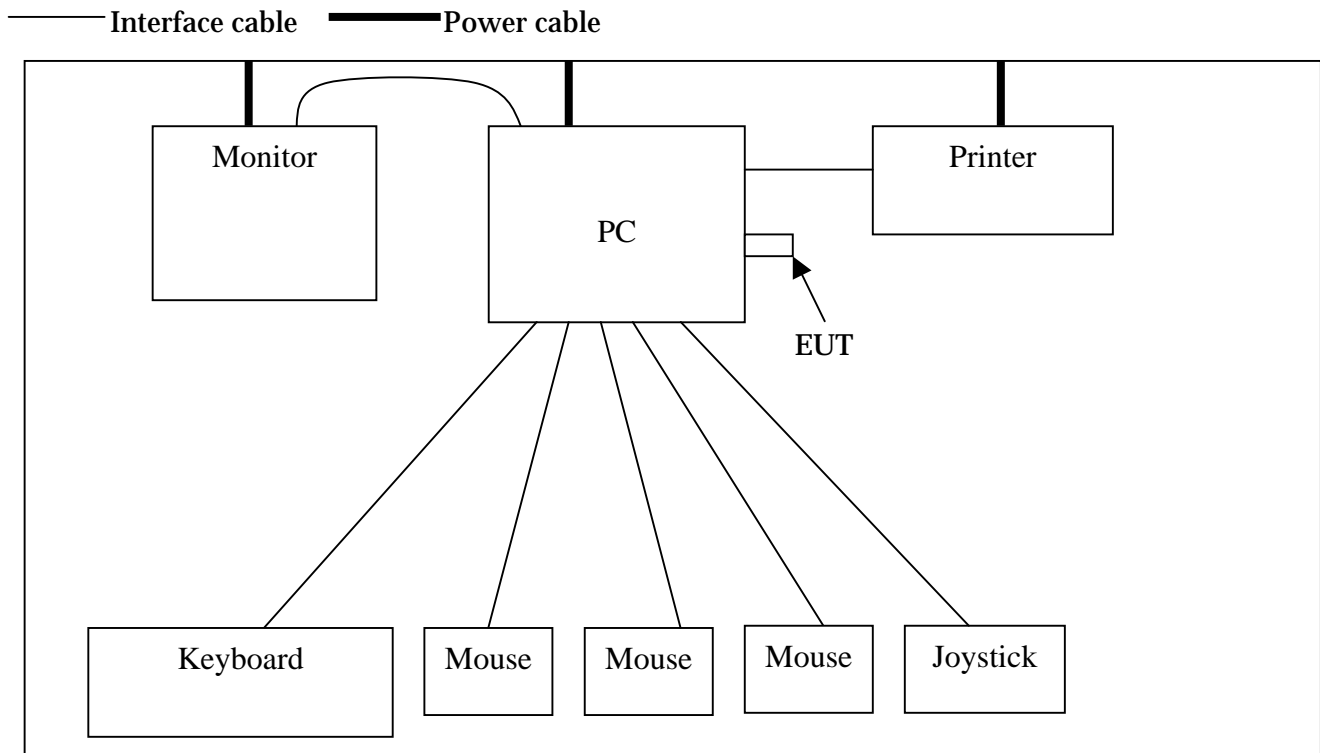
4.1 Peripherals and Others :

Description	Model Name	Serial No.	Manufacturer	FCC ID
Computer	DHM	BQPN61S	Dell Computer Corporation	-
Monitor	75EPLUS	P084H8WN710112	Changzin Electronic	-
Printer	C6464C	TH11RH70Q7	Calcomp Elec	-
Keyboard	RT6856T	B1861917	DIGITAL	AQ6-22K15
PS2 Mouse	OK-520	-	A4 TECH	DZL211029
Serial Mouse #1	AM-767-P	0119592	-	DoC
Serial Mouse #2	OK-520	-	A4 TECH	FSUGMZC7
Joystick	-	-	CREATIVE	DoC
USB Drive	Fdisk USB Drive	-	P&C N-Tech 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	1.0	Shielded
Computer	PS/2 (Mouse)	Signal cable	1.0	Shielded
Computer	SERIAL (Mouse #1, #2)	Signal cable	1.0	Shielded
Computer	MIDI (Joystick)	Signal cable	1.2	Shielded
Computer	PARALLEL (Printer)	Signal cable	1.5	Shielded
Computer	VIDEO (Monitor)	Signal cable	1.0	Shielded
Power Cable	Power	-	1.5	Unshielded
EuT	USB (Computer)	-	-	-

4.3 System layout on EUT and peripherals



<Figure 4-1 System layout>



FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

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.(KNW-242C /8-920-20/ KYORITSU /31 Sep. 2002/Sep. 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 'worse case' 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 exercised in the most unfavorable manner.

5.1.4 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 3.84 dB(k=2)



FCC TEST REPORT

Model No. : Fdisk USB Drive
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5.1.5 Test Data

RFI Voltage Measurement Results (0.45 MHz to 30 MHz)

Operating mode : **'worse case' condition mode**
Test procedure : ANSI C63.4-2000

Date of measurement : September 24, 2002
Temperature : 25 degree C
Humidity : 52 %

Model : **Fdisk USB Drive**

FREQ(MHz)	LEVEL(dBuV)	LINE	LIMIT(dBuV)	Result(dBuV)	MARGIN(dB)
0.594	22.50	V	48.00	22.50	-25.50
9.480	33.20	H		33.20	-14.80
15.760	38.00	H		38.00	-10.00
18.260	25.50	H		25.50	-22.50
22.820	34.30	V		34.30	-13.70
27.380	30.50	H		30.50	-17.50

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 μ V (48.0 dB μ V) from 450 KHz to 30 MHz.

3. Line H = Hot

Line N = Neutral

** Measurement using CISPR quasi-peak mode

Tested by **Hyung-Seok Lee**

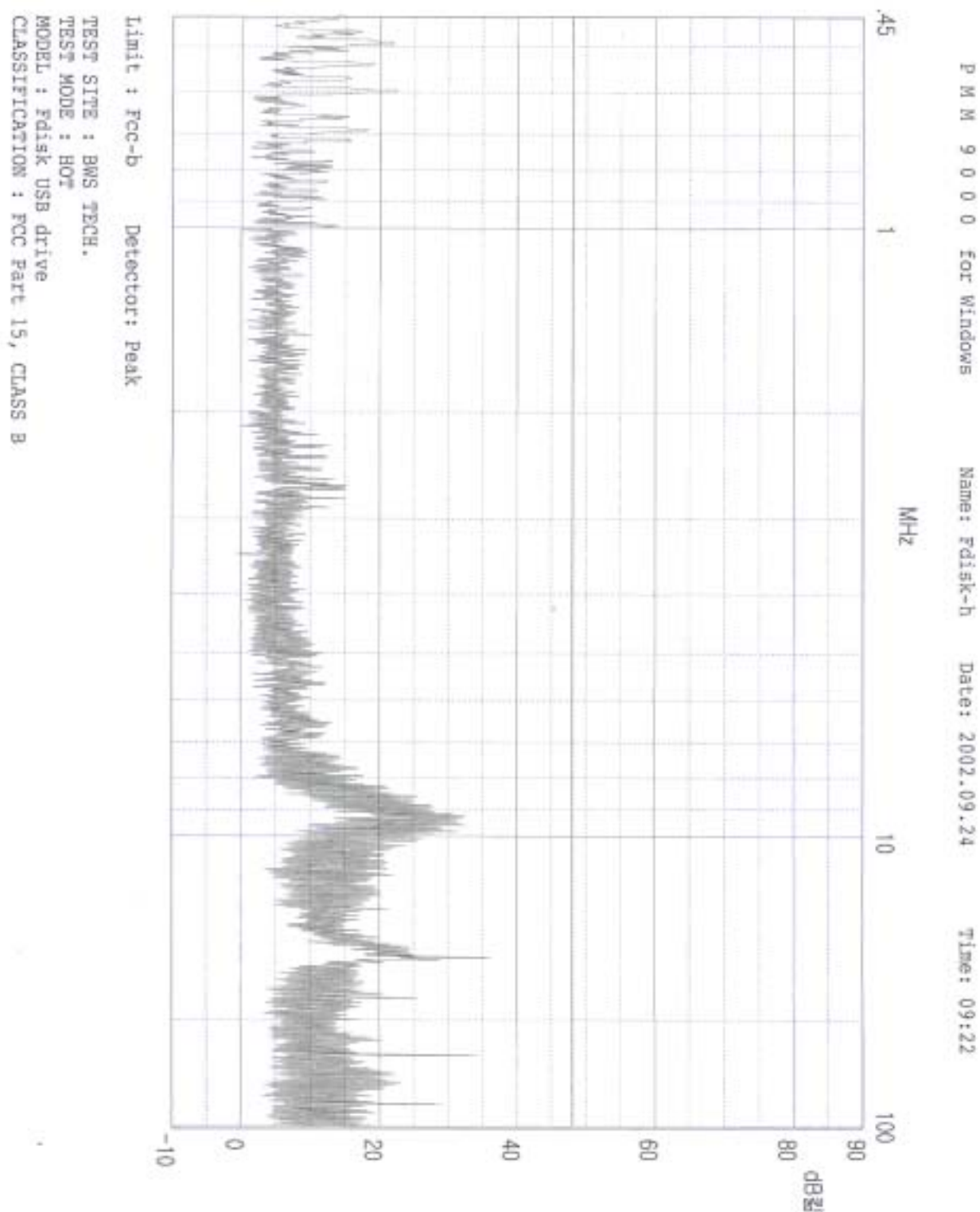


FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

5.2 RFI Field Strength Measurement

PLOTS OF EMISSIONS

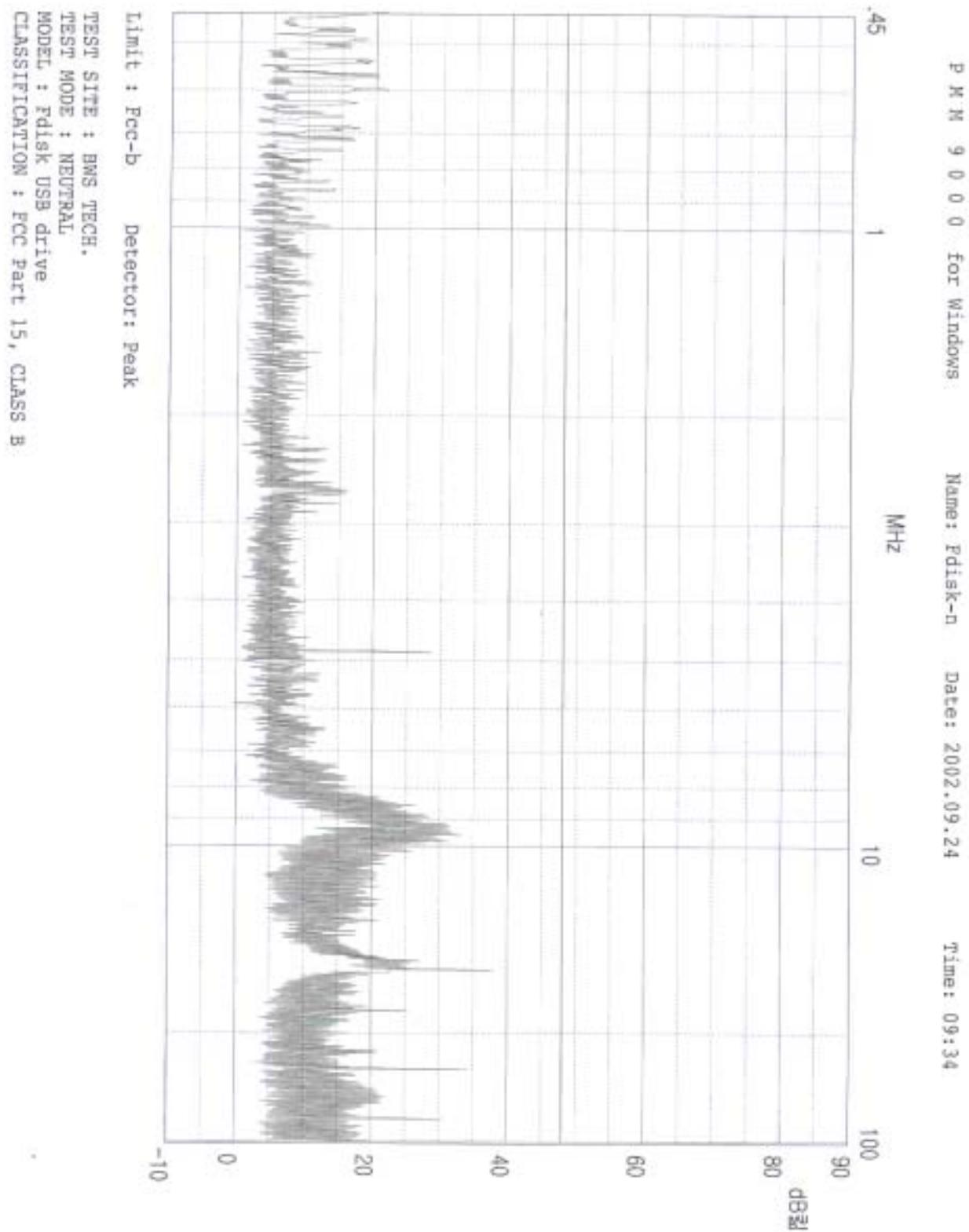




FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

PLOTS OF EMISSIONS





FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

5.2.1 Measurement Instrumentation Used

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

EMC Analyzer.....(E7403A/US39150108/HP/19 Feb. 2002/Feb. 2003)

Biconical antenna (BC01/ 0020H70501/ PMM /17 Oct. 2001/Oct. 2002)

Log periodic antenna (LP01/0020J70501/ PMM /17 Oct. 2001/ Oct. 2002)

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 'worse case' condition 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 ± 5.52 dB(k=2)



FCC TEST REPORT

Model No. : Fdisk USB Drive
Test Report No. : BWS-02-EF-0033

5.2.5 Test Data

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

Operating mode : 'worse case' condition mode
Test procedure : ANSI C63.4-2000

Date of measurement : September 24, 2002
Temperature : 21 degree C
Humidity : 45 %

Model : Fdisk USB Drive

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)
48.00	26.20	V	10.49	1.24	40.00	37.93	-2.07
72.00	24.00	V	8.79	1.53		34.32	-5.68
120.00	22.20	V	11.87	2.15	43.50	36.22	-7.28
144.00	20.60	V	13.98	2.37		36.95	-6.55
168.00	20.30	V	14.77	2.59		37.66	-5.84
192.00	16.80	V	16.13	2.79		35.72	-7.78
240.00	24.50	V	11.58	3.05	46.00	39.13	-6.87
288.00	18.50	H	12.75	3.42		34.67	-11.33
368.64	16.40	H	14.67	3.94		35.01	-10.99
513.25	14.10	H	17.78	4.74		36.62	-9.38
537.25	13.30	H	17.78	4.83		35.91	-10.09
567.25	17.90	H	18.23	5.00		41.13	-4.87

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.

* 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

Fdisk USB Drive 'worse case' condition mode 15.76 MHz, 10.00 dB

Radiated emission

Fdisk USB Drive 'worse case' condition mode 48.00 MHz, 2.07 dB

5.4 SAMPLE CALCULATIONS

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \log_{10} (\mu\text{V}/\text{m}) \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

EX. 1.

@ 15.76 MHz

Class B limit = 250 μV = 48 dB μV

Reading = 38.00 dB μV (calibrated level)

$$\frac{(38.00/20)}{10} = \mu\text{V}$$

Margin = 38.00 - 48 = -10.00
10.00 dB ; below limit

EX. 2.

@ 48.00 MHz

Class B limit = 200 $\mu\text{V}/\text{m}$ = 40.00 dB $\mu\text{V}/\text{m}$

Reading = 26.20 dB μV (calibrated level)

Antenna factor + Cable Loss = 11.73 dB

Total = 37.93 dB $\mu\text{V}/\text{m}$

$$\frac{(37.93/20)}{10} = \mu\text{V}/\text{m}$$

Margin = 37.93 - 40.00 = -2.07 dB
2.07 dB ; below limit



FCC TEST REPORT

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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>
EMC Analyzer	HP E7403A	US39150108	02/02/19
Amplifier (0.1MHz-1.3GHz)	HP 8447E	2945A02712	02/08/19
Biconical Antenna	PMM BC01	0020J70501	01/10/17
Log Periodic Antenna	PMM LP01	0020J70501	01/10/17
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	KYORITSU KNW-242C	8-920-20	02/08/31
Antenna Turntable Controller	JAEMC JAC-2	N/A	N/A
Signal Analyzer	PMM PMM9000	3100570602	02/08/16