



FCC TEST REPORT

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

BWS Tech, Inc.

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

TEL: 82 31 764 0125 FAX: 82 31 764 0126

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.

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

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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.



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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, 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



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4. TESTED SYSTEM DETAILS

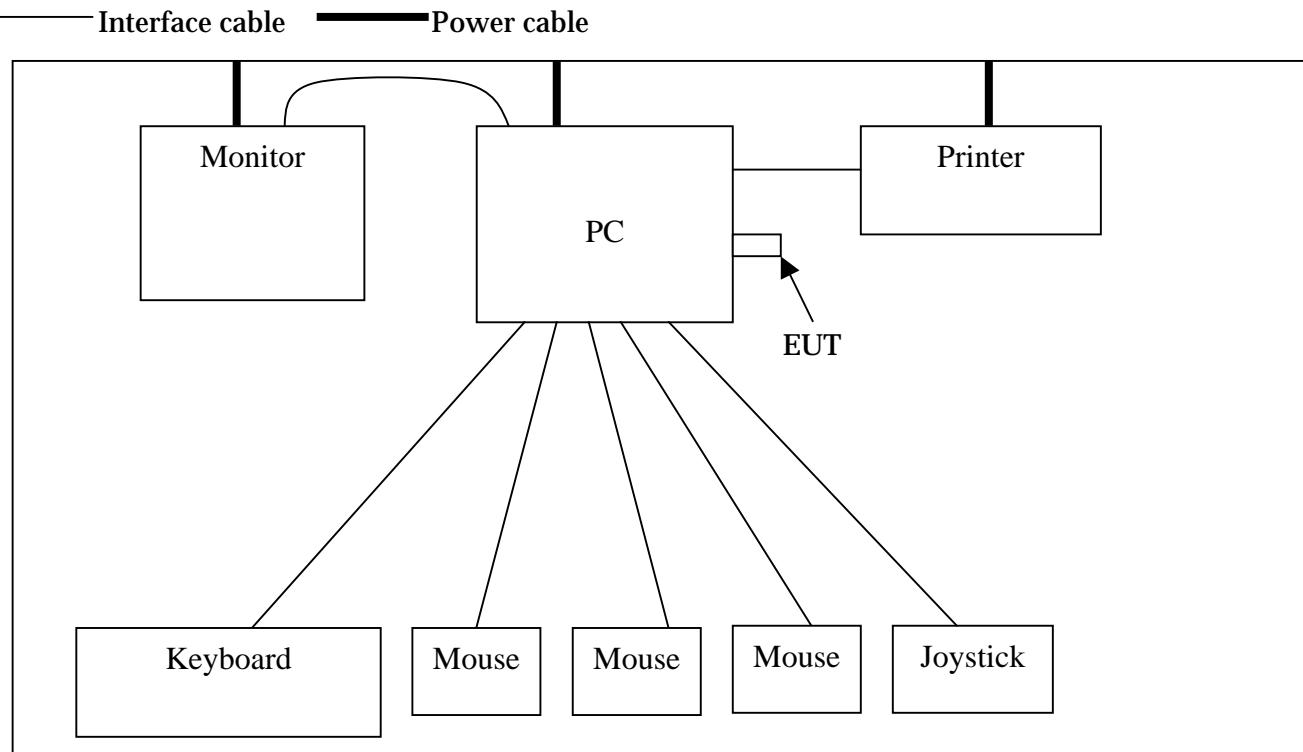
4.1 Peripherals and Others :

| 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>



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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)



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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

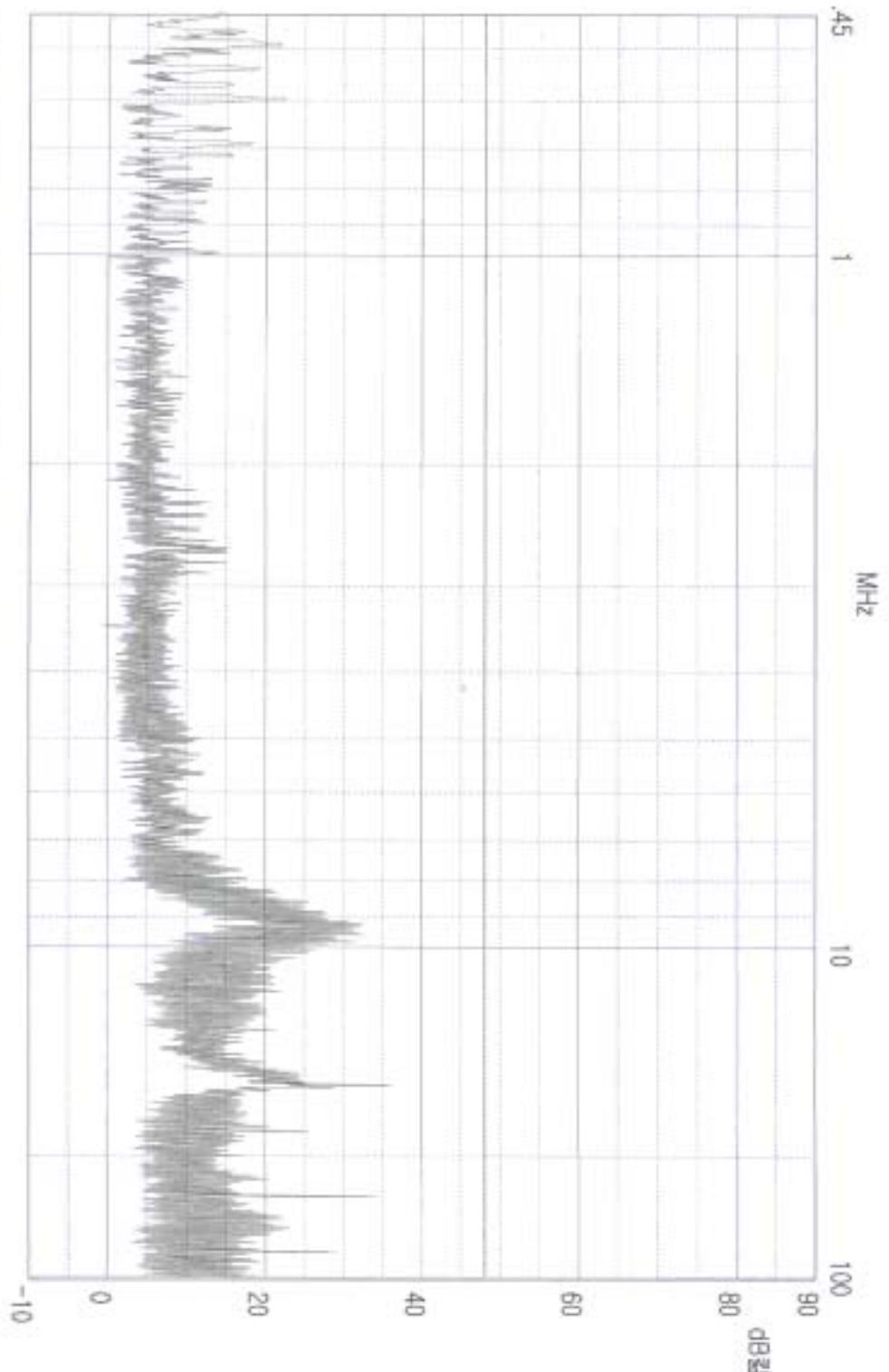
Line N = Neutral

** Measurement using CISPR quasi-peak mode

Tested by **Hyung-Seok Lee**

5.2 RFI Field Strength Measurement

PLOTS OF EMISSIONS

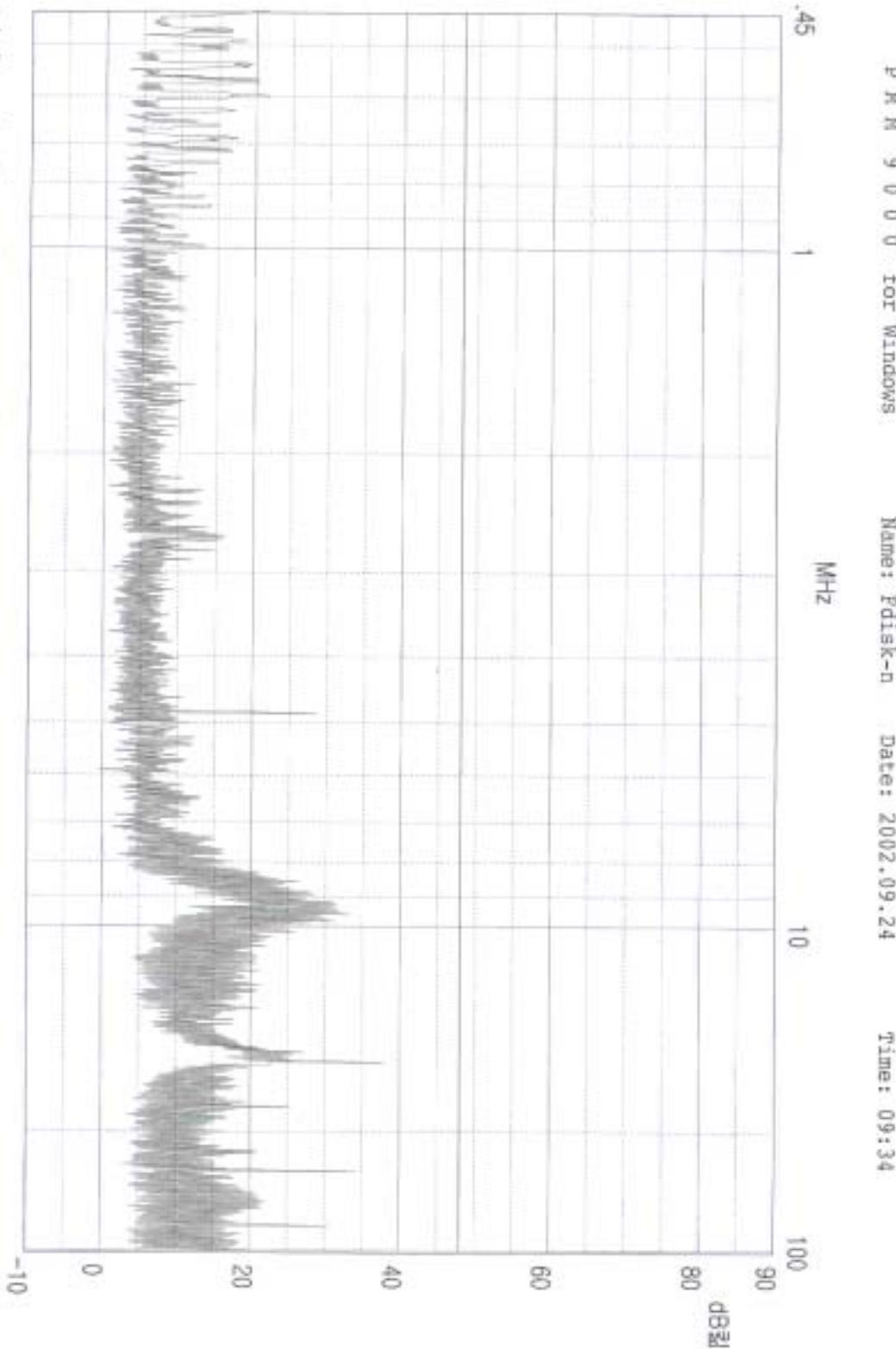




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PLOTS OF EMISSIONS





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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($k=2$)



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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

| MEASUREMENT FREQ (MHz) | MEASUREMENT LEVEL (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 | | 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 | | 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**



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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

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

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

EX. 1.

@ 15.76 MHz Class B limit = 250 μV = 48 dB μV

Reading = 38.00 dB μV (calibrated level)

(38.00/20)

10 = μV

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 $\mu\text{V}/\text{m}$

(37.93/20)

10 = $\mu\text{V}/\text{m}$

Margin = 37.93 - 40.00 = -2.07 dB

2.07 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> |
|---------------------------------|---------------------------------|----------------------|-------------------------|
| 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 |