

# **FCC TEST REPORT**

for

47 CFR, Part 2, Part 15 Subpart B and CISPR PUB. 22

Equipment : Disk Array

Model No. : RackForce II

FCC ID : NKF-RACKFORCEII

Filing Type : Certification

Applicant : **MaxTronic International Co., Ltd.**  
4F, No. 529, Chung Cheng Rd., Hsin Tien City, Taipei Hsien,  
Taiwan, R.O.C.

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***SPORTON International Inc.***

*6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.*

## Table of Contents

History of this test report.....	ii
CERTIFICATE OF COMPLIANCE.....	1
1. General Description of Equipment under Test.....	2
1.1 Applicant.....	2
1.2 Manufacturer .....	2
1.3 Basic Description of Equipment under Test .....	2
1.4 Feature of Equipment under Test .....	3
2. Test Configuration of Equipment under Test .....	4
2.1 Test Manner .....	4
2.2 Description of Test System .....	4
2.3 Connection Diagram of Test System .....	6
3. Test Software .....	7
4. General Information of Test.....	8
4.1 Test Facility .....	8
4.2 Test Voltage .....	8
4.3 Standard for Methods of Measurement.....	8
4.4 Test in Compliance with .....	8
4.5 Frequency Range Investigated .....	8
4.6 Test Distance .....	8
5. Test of Conducted Powerline .....	9
5.1 Major Measuring Instruments.....	9
5.2 Test Procedures.....	10
5.3 Typical Test Setup Layout of Conducted Powerline .....	11
5.4 Test Result of AC Powerline Conducted Emission .....	12
6. Test of Radiated Emission.....	16
6.1 Major Measuring Instruments.....	16
6.2 Test Procedures.....	17
6.3 Typical Test Setup Layout of Radiated Emission.....	18
6.4 Test Result of Radiated Emission .....	19
7. EMI Suppression Component List.....	27
8. Antenna Factor & Cable Loss .....	28
9. List of Measuring Equipment Used .....	29
10. Uncertainty of Test Site .....	30

### History of this test report

Original Report Issue Date: Jun. 01, 2003

No additional attachment.

Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

# CERTIFICATE OF COMPLIANCE

for

47 CFR, Part 2, Part 15 Subpart B and CISPR PUB. 22

Equipment : Disk Array

Model No. : RackForce II

FCC ID : NKF-RACKFORCEII

Applicant : **MaxTronic International Co., Ltd.**  
4F, No. 529, Chung Cheng Rd., Hsin Tien City, Taipei Hsien,  
Taiwan, R.O.C.

**I HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4 - 1992** and the energy emitted by this equipment was ***passed*** both radiated and conducted emission limits. Testing was carried out on **May 27, 2003** at **SPORTON International Inc.** LAB.

   
K. J. Lin  
Manager

***SPORTON International Inc.***

*6F, No.106, Sec. 1, Hsin Tai Wu Rd., Hsi Chih, Taipei Hsien, Taiwan, R.O.C.*

## **1. General Description of Equipment under Test**

### **1.1 Applicant**

MaxTronic International Co., Ltd.  
4F, No. 529, Chung Cheng Rd., Hsin Tien City,  
Taipei Hsien, Taiwan, R.O.C.

### **1.2 Manufacturer**

Same as 1.1.

### **1.3 Basic Description of Equipment under Test**

Equipment	: Disk Array
Model No.	: RackForce II
Trade Name	: Arena
SCSI Cable x 4	: Shielded, 1m
RS232 Cable	: Shielded, 1.8m
TP Cable	: Non-Shielded, 2m
Power Supply Type	: Switching
AC Power Input	: Non-Shielded, 1.8m, 3 pin

**1.4 Feature of Equipment under Test**

Interface : Host Bus	Ultra 160 LVD SCSI *2
Disk Bus	Ultra ATA-100 * 8
Drives	Hot Swap, User Replaceable Up to Eight 3.5" drives ( 1" height )
Maximum Fault Tolerant Capacity	>2 TB
Drive MTBF	>1,000,000 hrs
Host Requirement	Host Independent
Operating Systems	O/S Independent and Transparent
Data Rebuild	Automatic Data Regeneration
LCD Display Panel	2 x 16 Characters
Cooling Fans	12cm Ball Bearing Fan 2 Fans
AC Input Voltage	115 / 230V ( +/-10% ) , 60/50 Hz
Dimensions	350mm(H) * 175mm(W) * 310mm(D)
Weight	11.5 kgs ( W/O Disk Drive )

HDD: Seagate / ST36422A / 75GB

HDD: Seagate / ST313620A / 13.6GB

HDD: Seagate / ST36422A / 6400MB

HDD: IBM / DTLA-307015 / 15.3GB

HDD: Quantum / N143

Adapter: SH-300SPD-P / 300W

## **2. Test Configuration of Equipment under Test**

### **2.1 Test Manner**

- a. The EUT has been associated with personal computer and peripherals pursuant to ANSI C63.4-1992 and configuration operated in a manner which tended to maximize its emission characteristics in a typical application.
- b. The complete test system included COMPAQ PC, SAMSUNG Monitor, Genuine PS/2 Keyboard, LOGITECH PS/2 Mouse, HP Printer, ACEEX Modem, Arena Disk Array and EUT for EMI test.
- c. The following test modes were performed for EMI test:  
Mode 1. POWER\*2 LAN: 10Mbps  
Mode 2. POWER\*1 LAN: 10Mbps
- d. Frequency range investigated: conduction 150 KHz to 30 MHz, radiation 30 MHz to 1000MHz.

### **2.2 Description of Test System**

#### **Support Unit 1. -- Personal Computer (COMPAQ)**

FCC ID	: N/A
Model No.	: Evo D380mx
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

#### **Support Unit 2. -- Monitor (SAMSUNG)**

FCC ID	: N/A
Model No.	: Sync Master 550S
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0013
Data Cable	: Shielded, 1.7m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

## Support Unit 3. -- PS/2 Keyboard (GENUINE)

FCC ID : N/A  
Model No. : K288  
Serial No. : SP0054  
Data Cable : Shielded, 360 degree via metal backshells, 1.3m

## Support Unit 4. -- Printer (HP)

FCC ID : B94C2642X  
Model No. : DJ 400  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0048  
Data Cable : Braided-Shielded, 360 degree via metal backshells, 1.35m

## Support Unit 5. -- PS/2 Mouse (LOGITECH)

FCC ID : DZL211029  
Model No. : M-S34  
Serial No. : SP0108  
Data Cable : Shielded, 1.7m

## Support Unit 6. -- Modem (ACEEX)

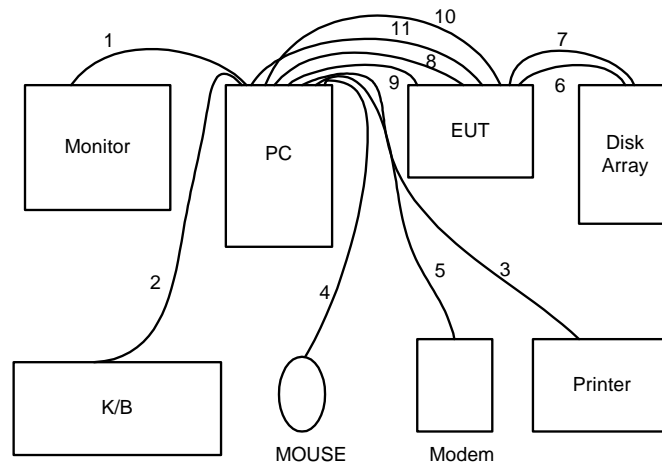
FCC ID : IFAXDM1414  
Model No. : DM1414  
Power Supply Type : Linear  
Power Cord : Non-Shielded  
Serial No. : SP0015  
Data Cable : Shielded, 360 degree via metal backshells, 1.15m

## Support Unit 7. -- Disk Array (Arena)

FCC ID : N/A  
Model No. : Deskforce II  
Serial No. : SP0126  
Remark : This support device was tested to comply with FCC standards and authorized under a declaration of conformity.



### 2.3 Connection Diagram of Test System



1. The I/O cable is connected from PC to the support unit 2.
2. The I/O cable is connected from PC to the support unit 3.
3. The I/O cable is connected from PC to the support unit 4.
4. The I/O cable is connected from PC to the support unit 5.
5. The I/O cable is connected from PC to the support unit 6.
6. The SCSI cable is connected from EUT to the support unit 7.
7. The SCSI cable is connected from EUT to the support unit 7.
8. The SCSI cable is connected from PC to the EUT.
9. The SCSI cable is connected from PC to the EUT.
10. The TP cable is connected from PC to the EUT.
11. The RS232 cable is connected from PC to the EUT.

### **3. Test Software**

An executive programs, EMITEST.EXE under WIN XP, which generate a complete line of continuously repeating " H " pattern was used as the test software.

The program was executed as follows :

- a. Turn on the power of all equipment.
- b. The PC reads the test program from the hard disk drive and runs it.
- c. The PC sends " H " messages to the monitor, and the monitor displays " H " patterns on the screen.
- d. The PC sends " H " messages to the printer, then the printer prints them on the paper.
- e. The PC sends " H " messages to the modem.
- f. The PC sends " H " messages to the internal Hard Disk, and the Hard Disk reads and writes the message.
- g. Repeat the steps from c to f.

At the same time, "COPY" was executed to read and write data from EUT to PC.

## **4. General Information of Test**

### **4.1 Test Facility**

Test Site Location : No. 30-2, Lin 6, Diing-Fwu Tsuen, Lin-Kou-Hsiang,  
Taipei Hsien, Taiwan, R.O.C.  
TEL : 886-2-2601-1640  
FAX : 886-2-2601-1695  
Test Site No. : CO01-LK, OS04-LK

### **4.2 Test Voltage**

115V/ 60Hz

### **4.3 Standard for Methods of Measurement**

ANSI C63.4-1992

### **4.4 Test in Compliance with**

CISPR PUB. 22 and FCC Part 15, Subpart B Class B

### **4.5 Frequency Range Investigated**

- a. Conduction: from 150 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1000 MHz

### **4.6 Test Distance**

The test distance of radiated emission from antenna to EUT is 10 M.

## **5. Test of Conducted Powerline**

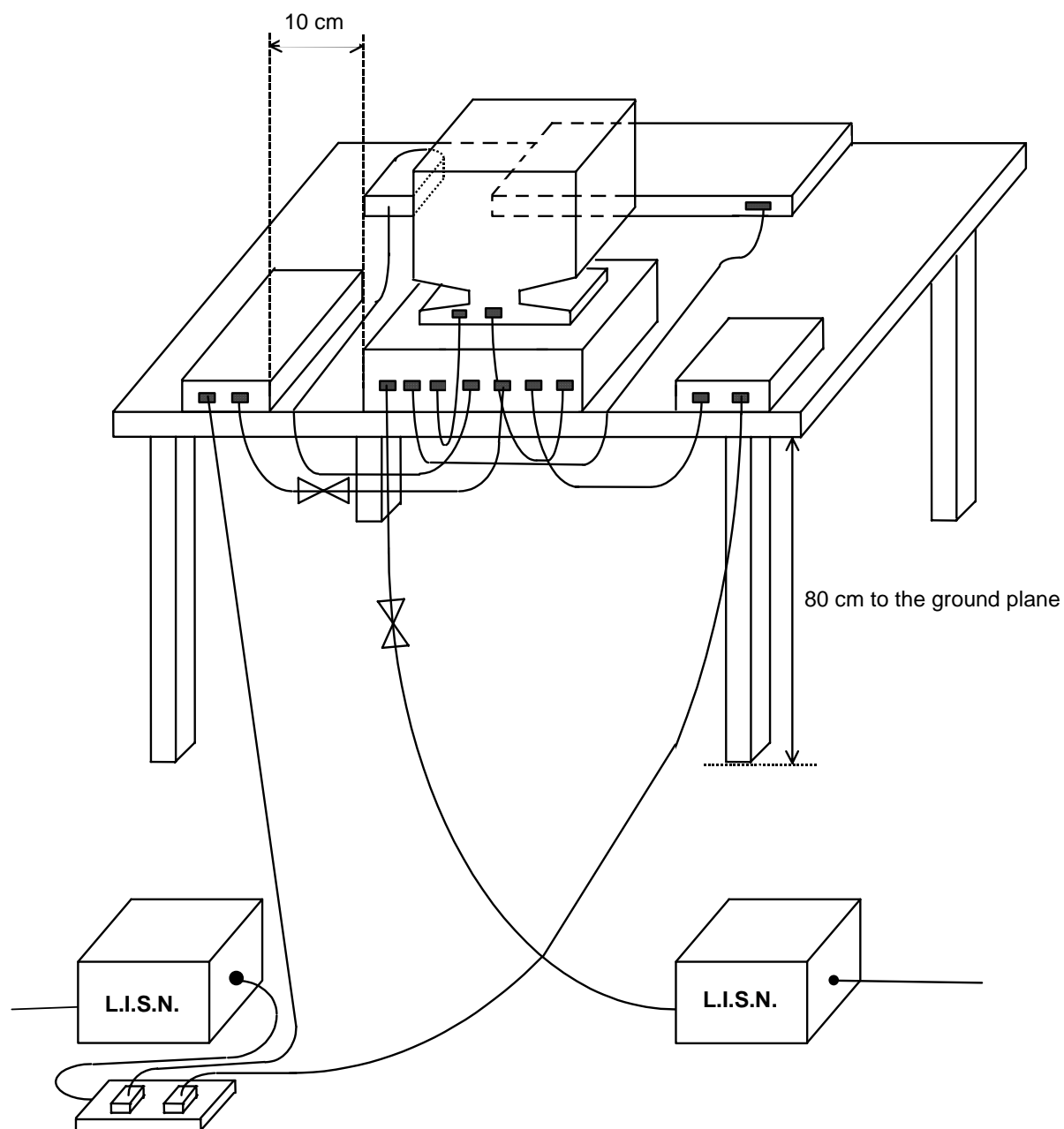
Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz and return leads of the EUT according to the methods defined in ANSI C63.4-1992 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 5.3. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

### **5.1 Major Measuring Instruments**

- Test Receiver ( R&S ESCS 30 )
  - Attenuation 10 dB
  - Start Frequency 0.15 MHz
  - Stop Frequency 30 MHz
  - IF Bandwidth 9 KHz

## **5.2 Test Procedures**

- a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- c. All the support units are connect to the other LISN.
- d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- e. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- f. Both sides of AC line were checked for maximum conducted interference.
- g. The frequency range from 150 kHz to 30 MHz was searched.
- h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

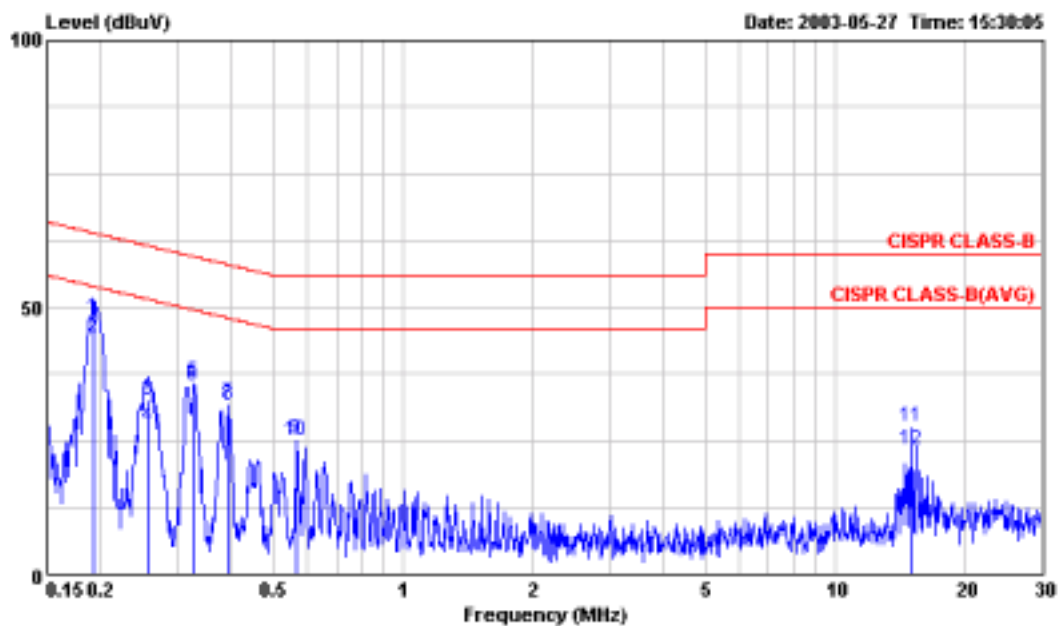


## 5.4 Test Result of AC Powerline Conducted Emission

### 5.4.1 Test Mode: Mode 1

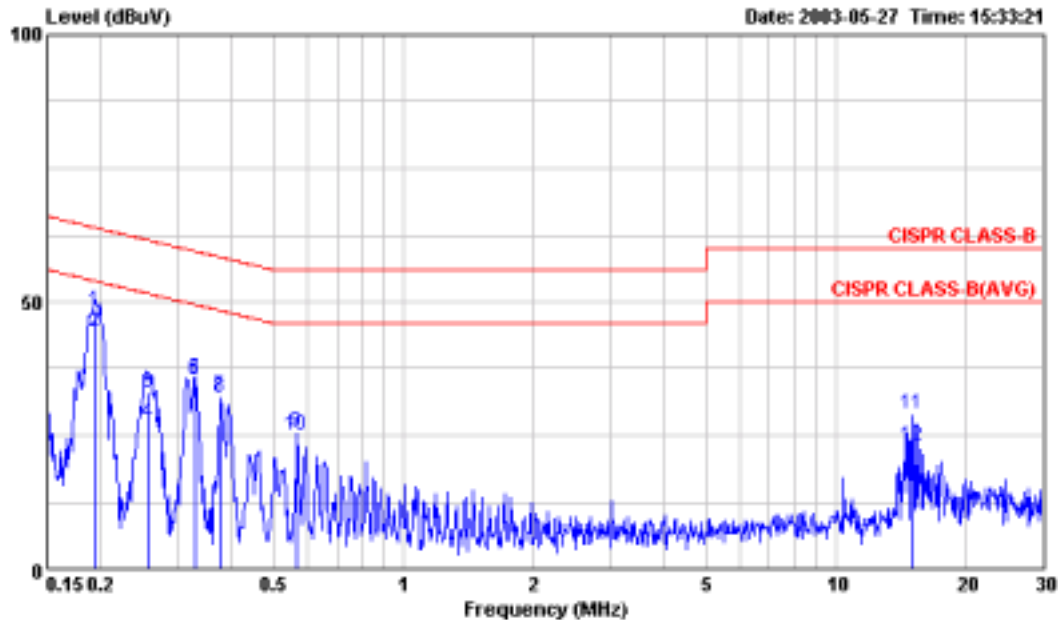
- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature : 23°C
- Relative Humidity : 61%
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table.



Site : CO01-LK  
 Condition : S-B CO01 LISN-91-12-17 NEUTRAL  
 EUT : 磁碟陣列  
 MODEL : RACKFORCE II  
 POWER : 110V/60HZ  
 MEMO : POWER\*2

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.192	47.87	-16.00	63.95	47.77	0.10	0.00	QP
2 @	0.192	44.32	-9.63	53.95	44.22	0.10	0.00	Average
3	0.258	32.65	-28.85	61.50	32.51	0.10	0.04	QP
4 @	0.258	27.72	-23.78	51.50	27.50	0.10	0.04	Average
5 @	0.327	35.97	-23.56	59.53	35.80	0.10	0.07	QP
6 @	0.327	35.39	-14.14	49.53	35.22	0.10	0.07	Average
7	0.393	31.96	-26.04	58.00	31.76	0.10	0.10	QP
8 @	0.393	31.55	-16.45	48.00	31.35	0.10	0.10	Average
9	0.567	25.22	-30.78	56.00	25.02	0.10	0.10	QP
10 @	0.567	24.97	-21.03	46.00	24.77	0.10	0.10	Average
11	15.063	27.56	-32.44	60.00	26.65	0.61	0.30	QP
12	15.063	23.37	-26.63	50.00	22.46	0.61	0.30	Average



Site : CO01-LK  
 Condition : CISPR CLASS-B CO01 LISN-91-12-17 LINE  
 EUT :  
 MODEL : RACKFORCE II  
 POWER : 110V/60HZ  
 MEMO : POWER\*2

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.193	48.20	-15.71	63.91	48.10	0.10	0.00	QP
2 @	0.193	44.27	-9.64	53.91	44.17	0.10	0.00	Average
3	0.258	32.94	-28.55	61.49	32.80	0.10	0.04	QP
4 @	0.258	27.38	-24.11	51.49	27.24	0.10	0.04	Average
5 @	0.329	35.77	-23.71	59.48	35.60	0.10	0.07	QP
6 @	0.329	35.26	-14.22	49.48	35.09	0.10	0.07	Average
7	0.377	32.38	-25.97	58.35	32.19	0.10	0.09	QP
8 @	0.377	31.98	-16.37	48.35	31.79	0.10	0.09	Average
9	0.567	25.50	-30.50	56.00	25.30	0.10	0.10	QP
10 @	0.567	25.15	-20.85	46.00	24.95	0.10	0.10	Average
11	15.061	29.10	-30.90	60.00	28.09	0.71	0.30	QP
12	15.061	23.05	-26.95	50.00	22.04	0.71	0.30	Average

Test Engineer : Neil

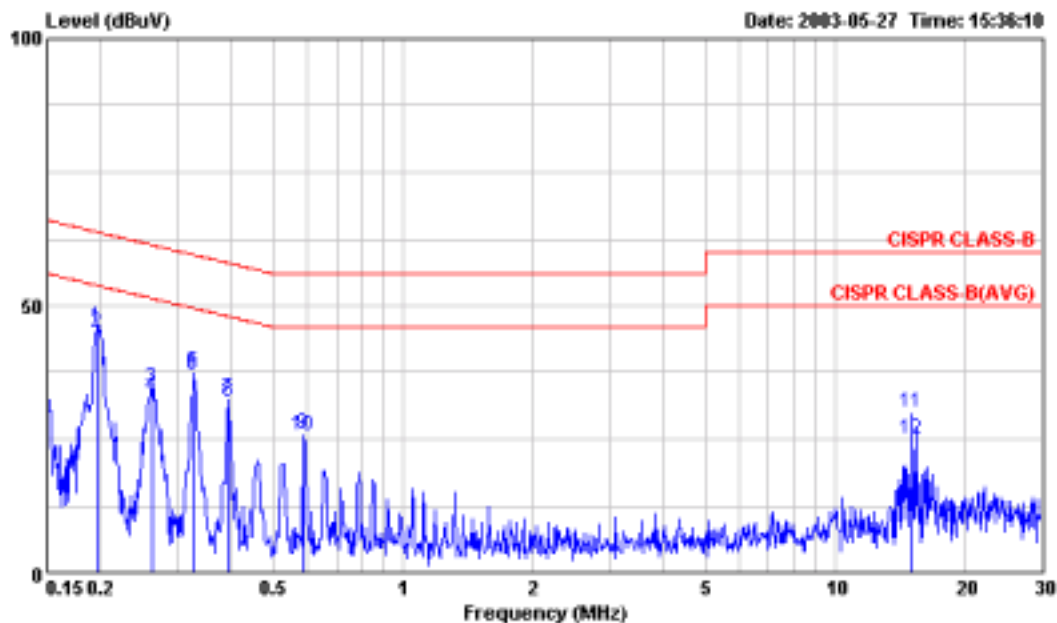
Neil Huang



## 5.4.2 Test Mode: Mode 2

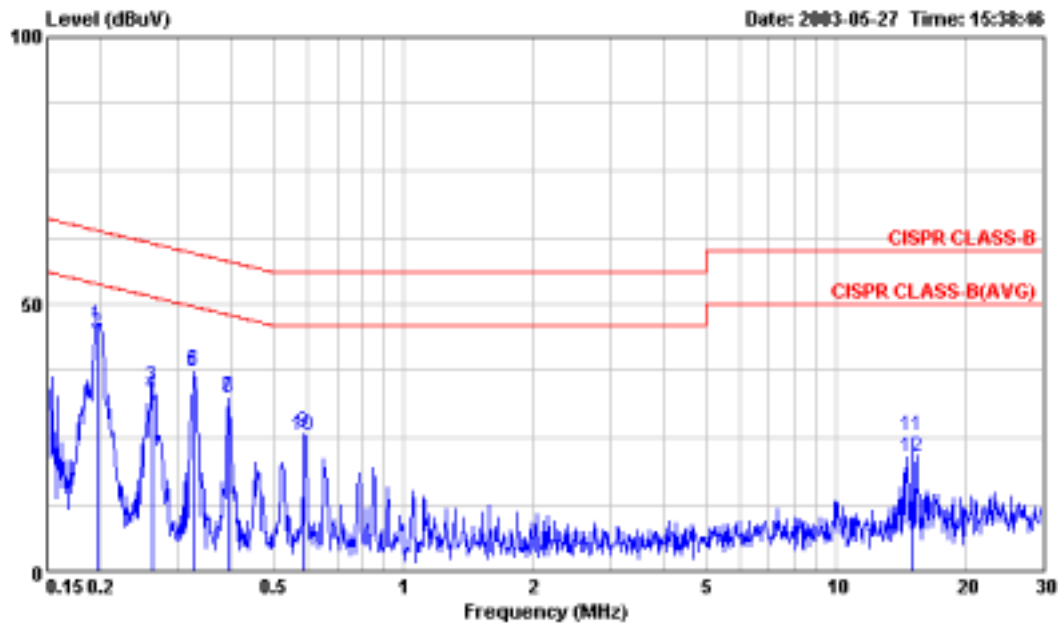
- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature : 23°C
- Relative Humidity : 61%
- All emissions not reported here are more than 10 dB below the prescribed limit.

The test was passed at the minimum margin that marked by the frame in the following table.



Site : CO01-LK  
 Condition : IS-B CO01 LISN-91-12-17 LINE  
 EUT : 磁線陣列  
 MODEL : RACKFORCE II  
 POWER : 110V/60HZ  
 MEMO : POWER\*1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.196	46.02	-17.75	63.77	45.92	0.10	0.00	QP
2 @	0.196	44.84	-8.93	53.77	44.74	0.10	0.00	Average
3	0.263	34.73	-26.61	61.34	34.59	0.10	0.04	QP
4 @	0.263	32.90	-18.44	51.34	32.76	0.10	0.04	Average
5 @	0.327	37.54	-21.99	59.53	37.37	0.10	0.07	QP
6 @	0.327	37.05	-12.48	49.53	36.88	0.10	0.07	Average
7	0.393	32.54	-25.46	58.00	32.34	0.10	0.10	QP
8 @	0.393	32.15	-15.05	48.00	31.95	0.10	0.10	Average
9	0.590	25.99	-30.01	56.00	25.79	0.10	0.10	QP
10 @	0.590	25.57	-20.43	46.00	25.37	0.10	0.10	Average
11	15.063	30.03	-29.97	60.00	29.02	0.71	0.30	QP
12	15.063	24.86	-25.14	50.00	23.85	0.71	0.30	Average



Site : CO01-LK  
 Condition : CISPR CLASS-B CO01 LISN-91-12-17 NEUTRAL  
 EUT : 磁気録音機  
 MODEL : RACKFORCE II  
 POWER : 110V/60HZ  
 MEMO : POWER\*1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.196	45.96	-17.83	63.79	45.86	0.10	0.00	QP
2 @	0.196	44.79	-9.00	53.79	44.69	0.10	0.00	Average
3	0.263	34.63	-26.70	61.33	34.49	0.10	0.04	QP
4 @	0.263	32.90	-18.43	51.33	32.76	0.10	0.04	Average
5 @	0.327	37.77	-21.76	59.53	37.60	0.10	0.07	QP
6 @	0.327	37.21	-12.32	49.53	37.04	0.10	0.07	Average
7	0.393	32.65	-25.35	58.00	32.45	0.10	0.10	QP
8 @	0.393	32.18	-15.82	48.00	31.98	0.10	0.10	Average
9	0.589	25.95	-30.05	56.00	25.75	0.10	0.10	QP
10 @	0.589	25.39	-20.61	46.00	25.19	0.10	0.10	Average
11	15.064	25.40	-34.60	60.00	24.49	0.61	0.30	QP
12	15.064	21.40	-28.60	50.00	20.49	0.61	0.30	Average

Test Engineer : Neil

Neil Huang

## 6. Test of Radiated Emission

Radiated emissions from 30 MHz to 1,000 MHz were measured with a bandwidth of 120 kHz according to the methods defines in ANSI C63.4-1992. The EUT was placed on a nonmetallic stand in the open-field site, 0.8 meter above the ground plane, as shown in section 6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions.

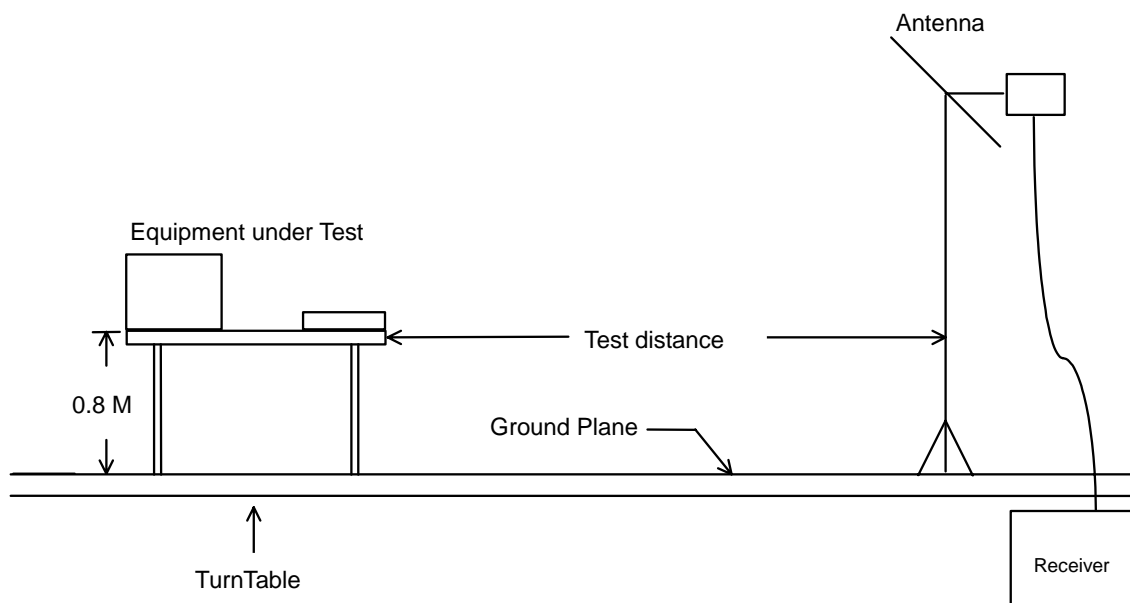
### 6.1 Major Measuring Instruments

- Spectrum Analyzer ( HP 8560E )
  - Attenuation 10 dB
  - Start Frequency 30 MHz
  - Stop Frequency 1000 MHz
  - Resolution Bandwidth 120 KHz
  - Signal Input 30 MHz – 2.9 GHz
  
- Test Receiver ( HP 8546A )
  - Resolution Bandwidth 120 KHz
  - Frequency Band 9 K – 6.5 GHz
  - Quasi-Peak Detector ON for Quasi-Peak Mode  
OFF for Peak Mode
  
- Amplifier ( HP 87405A )
  - RF Gain 25 dB
  - Signal Input 10 MHz – 3 GHz

## **6.2 Test Procedures**

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 10 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
- c. The table was rotated 360 degrees to determine the position of the highest radiation.
- d. The antenna is a half wave dipole and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
- e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
- f. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.

### 6.3 Typical Test Setup Layout of Radiated Emission

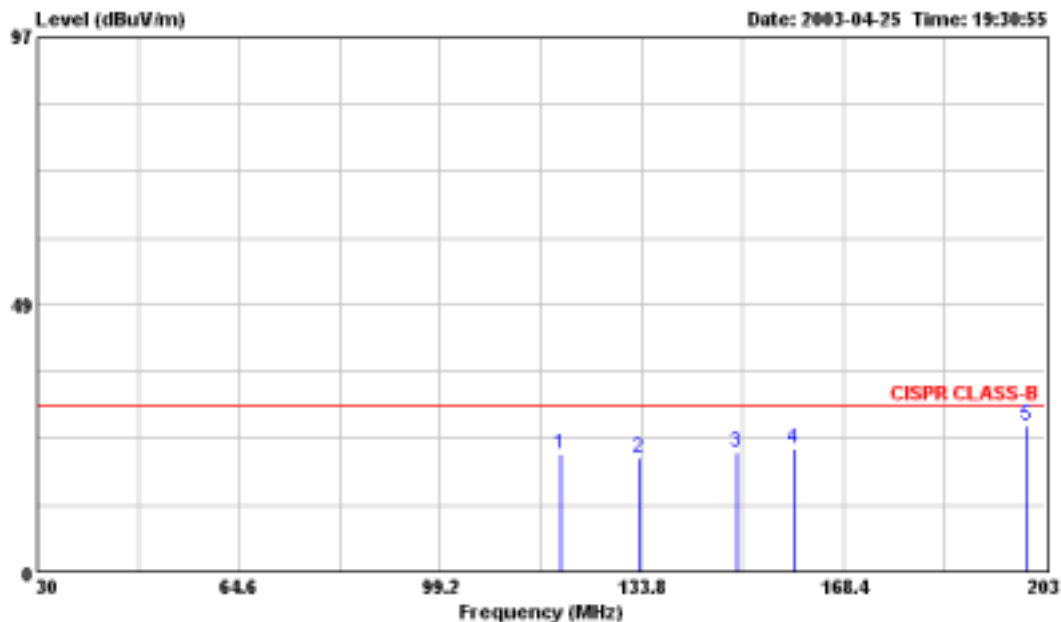


## 6.4 Test Result of Radiated Emission

### 6.4.1 Test Mode: Mode 1

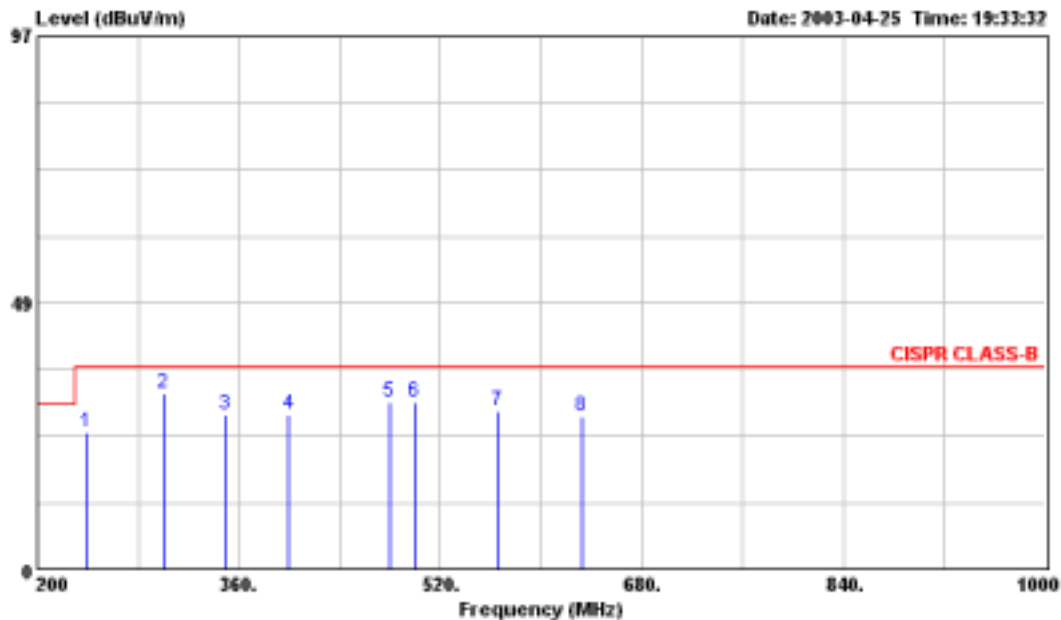
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 10 M
- Temperature : 23°C
- Relative Humidity : 58 %
- Emission level (dBUV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following table.



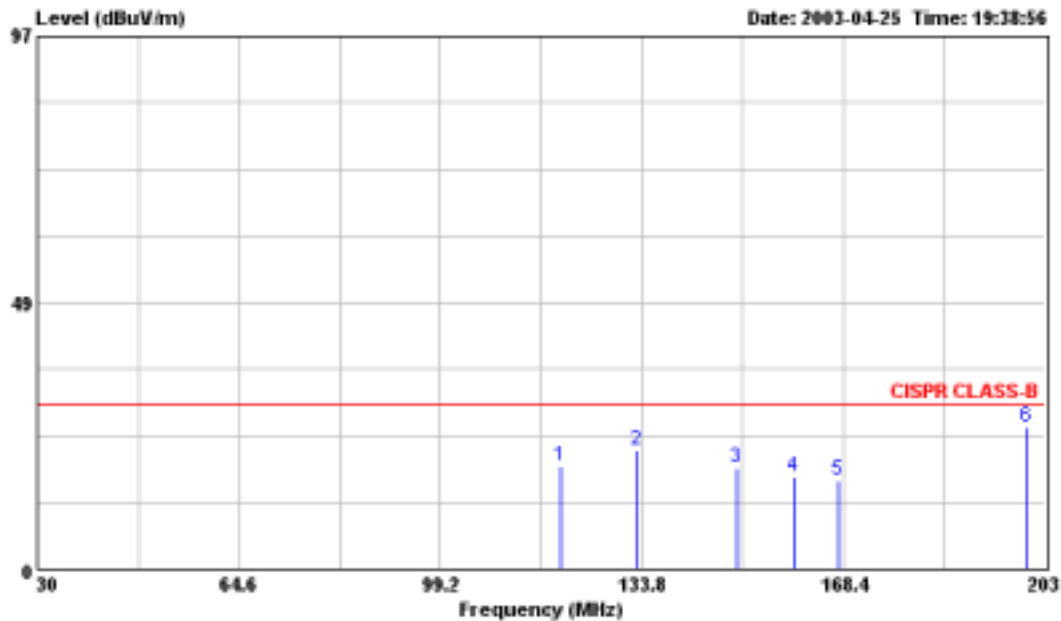
Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 VERTICAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*2)  
 MODE :  
 MEMO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over	Limit	Read	Antenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBUV/m	Limit	Line	Level	Factor	Loss	Factor		Pos	Pos
			dB		dBuV	dB/m	dB	dB		cm	deg
1	120.000	21.44	-8.56	30.00	33.00	11.60	1.84	25.00	Peak	---	---
2	133.280	20.59	-9.41	30.00	32.64	11.01	1.94	25.00	Peak	---	---
3	150.000	21.80	-8.20	30.00	34.66	9.80	2.34	25.00	Peak	---	---
4	160.000	22.38	-7.62	30.00	35.32	9.40	2.64	24.98	Peak	---	---
5 @	200.000	26.59	-3.41	30.00	39.69	8.80	3.00	24.90	Peak	---	---



Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 VERTICAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*2)  
 MODE :  
 MENO : RACKFORCE II  
 : LAN:10M (UTP)

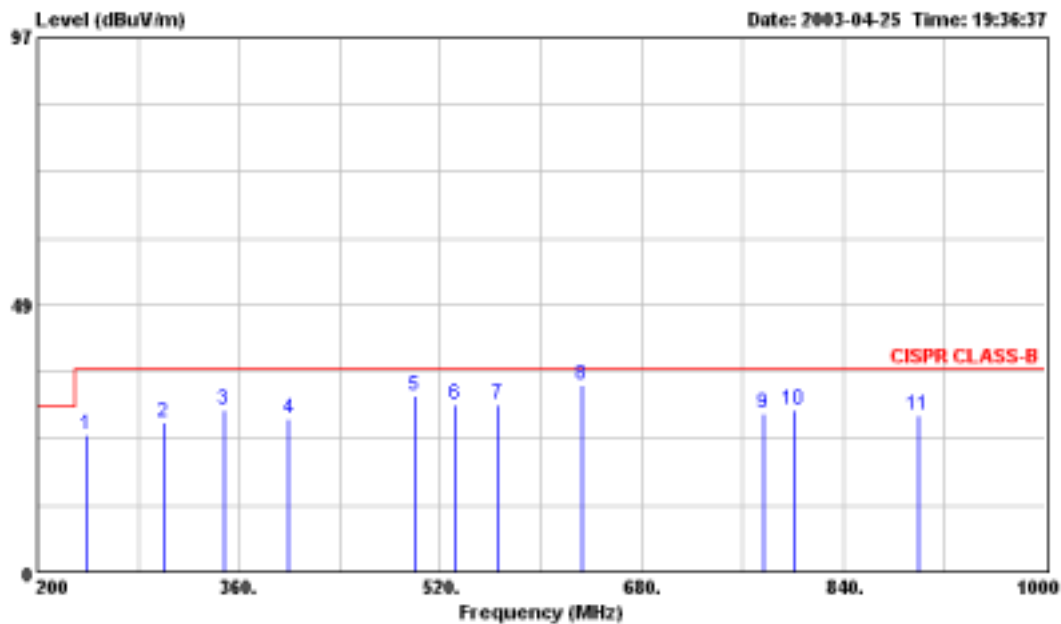
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	240.000	25.04	-11.96	37.00	35.70	11.32	3.00	24.98 Peak	---	---
2	300.000	32.02	-4.98	37.00	41.02	12.90	3.00	24.90 Peak	---	---
3	350.400	28.19	-8.81	37.00	35.50	14.30	3.34	24.95 Peak	---	---
4	400.000	28.21	-8.79	37.00	34.18	15.70	3.33	25.00 Peak	---	---
5	480.000	30.53	-6.47	37.00	34.16	17.14	4.23	25.00 Peak	---	---
6	500.000	30.50	-6.50	37.00	33.50	17.50	4.50	25.00 Peak	---	---
7	566.400	28.87	-8.13	37.00	31.67	18.26	3.94	25.00 Peak	---	---
8	632.800	27.82	-9.18	37.00	30.00	18.79	4.06	25.03 Peak	---	---



Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 HORIZONTAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*2)  
 MODE :  
 MEMO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp			Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor	Remark		Pos	Pos
			dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	120.000	18.61	-11.39	30.00	30.17	11.60	1.84	25.00	Peak	---	---
2	133.110	21.59	-8.41	30.00	33.64	11.01	1.94	25.00	Peak	---	---
3	150.000	18.30	-11.70	30.00	31.16	9.80	2.34	25.00	Peak	---	---
4	160.000	16.88	-13.12	30.00	29.82	9.40	2.64	24.98	Peak	---	---
5	167.540	16.02	-13.98	30.00	29.49	9.08	2.41	24.96	Peak	---	---
6	200.000	25.76	-4.24	30.00	38.86	8.80	3.00	24.90	Peak	---	---





Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 HORIZONTAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*2)  
 MODE :  
 MIMO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp			Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Factor	Loss	Factor	Remark	Pos	Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	240.000	24.87	-12.13	37.00	35.53	11.32	3.00	24.98	Peak	---	---
2	300.000	27.18	-9.82	37.00	36.18	12.90	3.00	24.90	Peak	---	---
3	348.000	29.29	-7.71	37.00	36.66	14.25	3.33	24.95	Peak	---	---
4	400.000	27.88	-9.12	37.00	33.85	15.70	3.33	25.00	Peak	---	---
5	500.000	32.17	-4.83	37.00	35.17	17.50	4.50	25.00	Peak	---	---
6	532.800	30.29	-6.71	37.00	33.33	17.89	4.07	25.00	Peak	---	---
7	566.400	30.37	-6.63	37.00	33.17	18.26	3.94	25.00	Peak	---	---
8	632.800	33.82	-3.18	37.00	36.00	18.79	4.06	25.03	Peak	100	266
9	776.000	28.84	-8.16	37.00	28.83	20.01	5.02	25.02	Peak	---	---
10	800.000	29.30	-7.70	37.00	28.50	20.30	5.50	25.00	Peak	---	---
11	900.000	28.50	-8.50	37.00	28.33	20.50	4.67	25.00	Peak	---	---

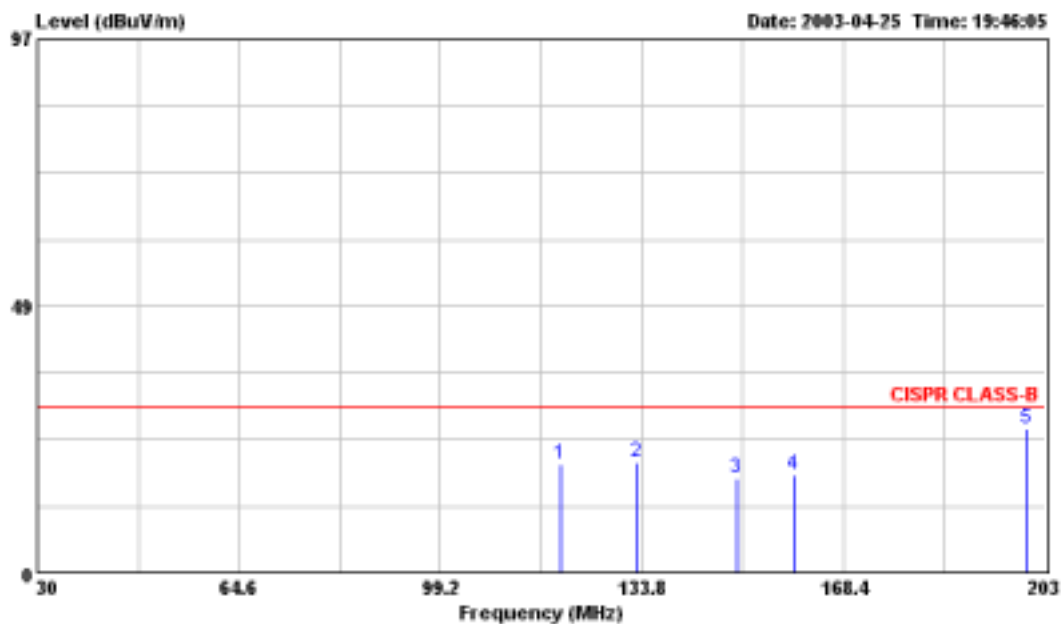
Test Engineer : Benny Lee

Benny Lee

## 6.4.2 Test Mode: Mode 2

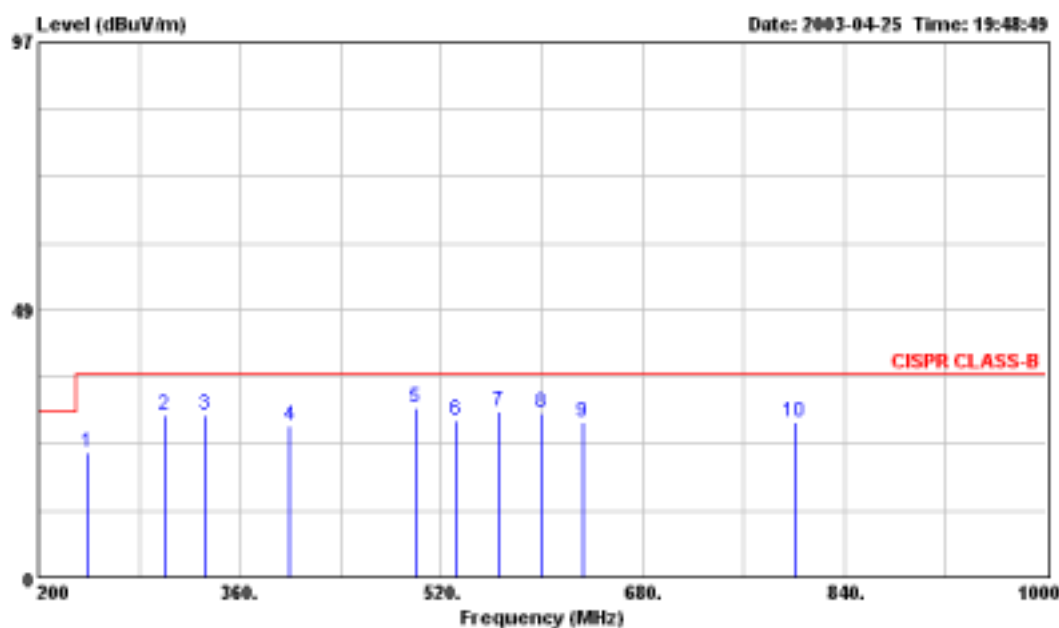
- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 10 M
- Temperature : 23°C
- Relative Humidity : 58 %
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

The test was passed at the minimum margin that marked by the frame in the following table.



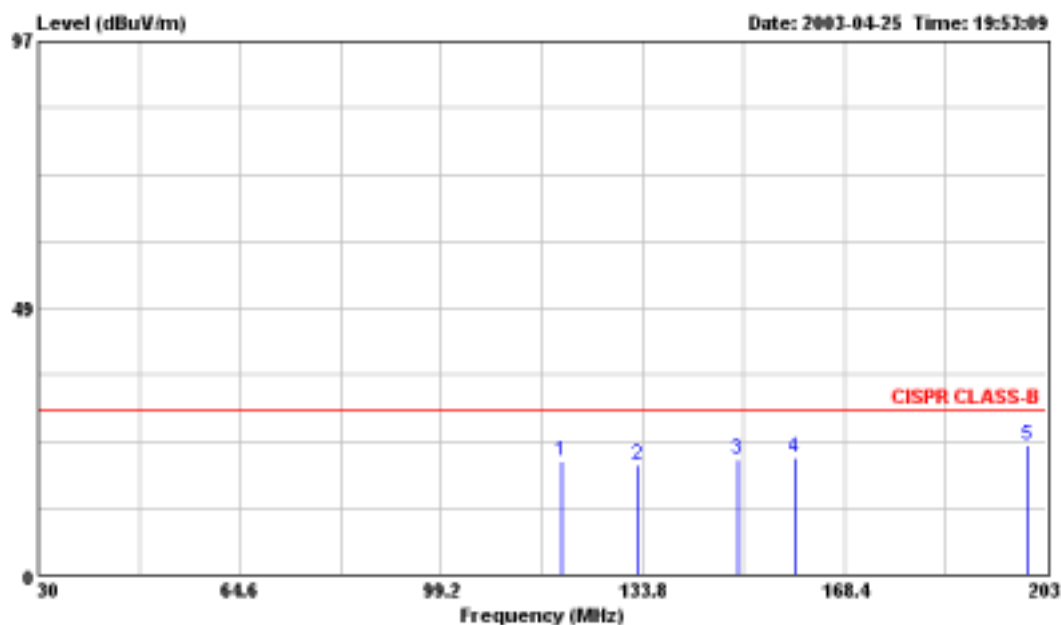
Site : OS04-LK  
Condition : CISPR CLASS-B 10m CHASE2288 HORIZONTAL  
EUT : DISK ARRAY  
POWER : 110VAC (POWER\*1)  
MODE :  
MEMO : RACKFORCE II  
: LAN:10M (UTP)

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp		Ant	Table
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	Pos	Pos
1	120.000	19.61	-10.39	30.00	31.17	11.60	1.84	25.00	Peak	---
2	133.110	20.09	-9.91	30.00	32.14	11.01	1.94	25.00	Peak	---
3	150.000	17.22	-12.78	30.00	30.08	9.80	2.34	25.00	Peak	---
4	160.000	17.71	-12.29	30.00	30.65	9.40	2.64	24.98	Peak	---
5	200.000	26.09	-3.91	30.00	39.19	8.80	3.00	24.90	Peak	400 286



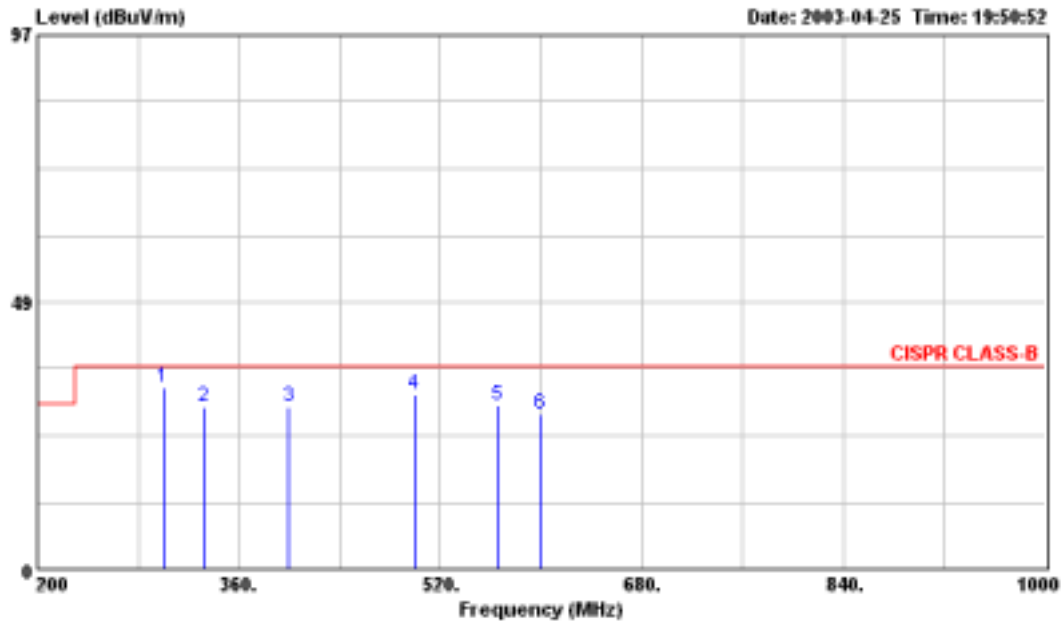
Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 HORIZONTAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*1)  
 MODE :  
 MEMO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over	Limit	ReadAntenna	Cable	Preamp	Remark	Ant	Table
	MHz	dBuV/m	Limit	Line	Level	Loss	Factor		Pos	Pos
			dB	dBuV/m	dBuV	dB	dB		Cm	deg
1	240.000	22.54	-14.46	37.00	33.20	11.32	3.00	24.98 Peak	---	---
2	300.000	29.52	-7.48	37.00	38.52	12.90	3.00	24.90 Peak	---	---
3	332.800	29.44	-7.56	37.00	37.33	13.82	3.22	24.93 Peak	---	---
4	400.000	27.54	-9.46	37.00	33.51	15.70	3.33	25.00 Peak	---	---
5	500.000	30.83	-6.17	37.00	33.83	17.50	4.50	25.00 Peak	---	---
6	532.800	28.45	-8.55	37.00	31.49	17.89	4.07	25.00 Peak	---	---
7	566.400	30.20	-6.80	37.00	33.00	18.26	3.94	25.00 Peak	---	---
8	600.000	29.77	-7.23	37.00	32.00	18.60	4.17	25.00 Peak	---	---
9	632.800	27.99	-9.01	37.00	30.17	18.79	4.06	25.03 Peak	---	---
10	800.000	28.13	-8.87	37.00	27.33	20.30	5.50	25.00 Peak	---	---



Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 VERTICAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*1)  
 MODE :  
 MEMO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamplifier Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		m	deg
1	120.000	20.77	-9.23	30.00	32.33	11.60	1.84	25.00	Peak	---	---
2	133.110	19.93	-10.07	30.00	31.98	11.01	1.94	25.00	Peak	---	---
3	150.000	20.89	-9.11	30.00	33.75	9.80	2.34	25.00	Peak	---	---
4	160.000	21.21	-8.79	30.00	34.15	9.40	2.64	24.98	Peak	---	---
5	200.000	23.59	-6.41	30.00	36.69	8.80	3.00	24.90	Peak	---	---



Site : OS04-LK  
 Condition : CISPR CLASS-B 10m CHASE2288 VERTICAL  
 EUT : DISK ARRAY  
 POWER : 110VAC (POWER\*1)  
 MODE :  
 MENO : RACKFORCE II  
 : LAN:10M (UTP)

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		m	deg
1	300.000	33.02	-3.98	37.00	42.02	12.90	3.00	24.90	Peak	---	---
2	332.800	29.44	-7.56	37.00	37.33	13.82	3.22	24.93	Peak	---	---
3	400.000	29.38	-7.62	37.00	35.35	15.70	3.33	25.00	Peak	---	---
4	500.000	31.83	-5.17	37.00	34.83	17.50	4.50	25.00	Peak	---	---
5	566.400	29.70	-7.30	37.00	32.50	18.26	3.94	25.00	Peak	---	---
6	600.000	28.27	-8.73	37.00	30.50	18.60	4.17	25.00	Peak	---	---

Test Engineer : Benny Lee

Benny Lee

## **7. EMI Suppression Component List**

1. Used aluminum foil to contact HDD case with the slot of case.  
(As the Internal photo No.2)
2. Scraped the cover part with black paint to contact with the top cover, used aluminum foil to contact the slot of HDD with the front panel.  
(As the Internal photo No.20)
3. Used Gasket to strengthen the contact between case and top cover.  
(As the Internal photo No.20)
4. Added core (LF-100) to SCSI cable.  
(As the External photo No.3 & No.4)

## 8. Antenna Factor & Cable Loss

Frequency ( Mhz )	Antenna Factor ( dB )	Cable Loss ( dB )
30	17.8	1.17
35	15.1	1.00
40	12.7	1.17
45	10.2	1.17
50	6.6	1.33
55	6.0	1.50
60	5.4	1.33
65	5.1	1.33
70	4.8	1.00
75	5.8	1.16
80	6.8	1.16
85	7.7	1.50
90	8.6	1.50
95	9.6	1.33
100	10.4	1.50
110	11.0	1.66
120	11.6	1.84
130	11.2	1.84
140	10.5	2.17
150	9.8	2.34
160	9.4	2.64
170	9.0	2.34
180	8.7	2.00
190	8.8	2.33
200	8.8	3.00
220	10.2	2.50
240	11.4	3.00
260	12.2	2.83
280	12.6	3.16
300	12.9	3.00
320	13.5	3.14
340	14.0	3.27
360	14.6	3.34
380	15.1	3.33
400	15.7	3.33
450	16.6	3.83
500	17.5	4.50
550	18.1	3.83
600	18.6	4.17
650	18.9	4.00
700	19.1	4.33
750	19.7	4.50
800	20.3	5.50
850	20.4	4.50
900	20.5	4.67
950	21.0	4.66
1000	21.6	5.00

## 9. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Receiver	R&S	ESCS 30	100174	9 KHz - 2.75 GHz	Dec. 12, 2002	Conduction (CO01-LK)
LISN	Telemeter	NNB-2/16Z	98009	9KHz ~ 30MHz	Dec.17, 2002	Conduction (CO01-LK)
LISN	Telemeter	NNB-2/16Z	98087	9KHz ~ 30MHz	Dec. 17, 2002	Conduction (CO01-LK)
RF Cable-CON	Suhner Switzerland	RG223/U	CB017	9KHz~30MHz	Jan. 08, 2003	Conduction (CO01-LK)
50 ohm BNC type Terminal	NOBLE	50ohm	TM002	50 ohm	May 19, 2003	Conduction (CO01-LK)
Open Area Test Site	SPORTON	OATS-10	OS04-LK	30MHz~1GHz 10m,3m	Aug. 03, 2002	Radiation (OS04-LK)
Spectrum Analyzer	HP	8560E	3728A03190	30MHz – 2.9GHz	Nov. 04, 2002	Radiation (OS04-LK)
Amplifier	HP	87405A	3207A01437	10MHz – 3GHz	Aug. 12, 2002	Radiation (OS04-LK)
Receiver	HP	8546A	3325A00108	9 K – 6.5 GHz	Dec. 28, 2002	Radiation (OS04-LK)
Bilog Antenna	CHASE	CBL6112B	2288	30MHz -2GHz	Jun. 22, 2002	Radiation (OS04-LK)
Turn Table	EMCO	2080	9711-2021	0 ~ 360 degree	N/A	Radiation (OS04-LK)
Antenna Mast	EMCO	2075	9711-2115	1 m- 4 m	N/A	Radiation (OS04-LK)
RF Cable-R10m	BELDEN	RG8/U	CB011	30MHz~1GHz	Jan. 06, 2003	Radiation (OS04-LK)
RF Cable-R03m	BELDEN	RG8/U	CB012	30MHz~1GHz	Jan. 06, 2003	Radiation (OS04-LK)

\* Calibration Interval of instruments listed above is one year.



## 10. Uncertainty of Test Site

### Uncertainty of Conducted Emission Measurement

Contribution	Probability Distribution	150KHz – 30MHz
Cable and I/P attenuator calibration	normal(k=2)	±0.3
RCV/SPA specification	rectangular	±2.5
LISN coupling specification	rectangular	±1.5
Transducer factor frequency interpolation	rectangular	±0.2
Mismatch Receiver VSWR $\Gamma_1=0.09$ LISN VSWR $\Gamma_2=0.33$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	0.2
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±1.7</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±3.4</b>

$$U = \{(0.3/2)^2 + (2.5^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\} = 1.7$$

### Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m	10m
Antenna factor calibration	normal(k=2)	±1.6	±1.6
cable loss calibration	normal(k=2)	±0.3	±0.3
RCV/SPA specification	rectangular	±2.5	±2.5
Antenna Directivity	rectangular	±3	±0.5
Antenna Factor V.S. Height	rectangular	±2	±2
Antenna Factor Interpolation for Frequency	rectangular	±0.25	±0.25
site imperfection	rectangular	±2	±2
Mismatch Receiver VSWR $\Gamma_1=0.09$ Antenna VSWR $\Gamma_2=0.67$ Uncertainty= $20\log(1-\Gamma_1\Gamma_2)$	U-shaped	±0.54	±0.54
<b>combined standard uncertainty Ue(y)</b>	<b>normal</b>	<b>±2.9</b>	<b>±2.4</b>
<b>Measuring uncertainty for a level of confidence of 95% U=2Ue(y)</b>	<b>normal (k=2)</b>	<b>±5.8</b>	<b>±4.8</b>

$$U = \{(1.6/2)^2 + (0.3/2)^2 + (3^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\} = 2.4 \text{ for 10m test distance}$$

$$U = \{(1.6/2)^2 + (0.3/2)^2 + (3^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\} = 2.9 \text{ for 3m test distance}$$