FCC TEST REPORT

for

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

Equipment : Disk Array

Model No. : Indy-2400

FCC ID : NKF-INDY-2400

Filing Type : Certification

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

SPORTON International Inc.

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

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History of this test report

Original Report Issue Date: Apr. 19, 2002

■ No additional attachment.

□ Additional attachment were issued as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

for

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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 **Apr. 09, 2002** 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.	: Indy-2400
FCC ID	: NKF-INDY-2400
Trade Name	: Arena
SCSI Cable x 4	: Shielded, 1m
RS232 Cable	: Shielded, 1m
Power Supply Type	: Switching
AC Power Input	: Non-Shielded, 1.8m, 3 pin

1.4 Feature of Equipment under Test

- Microprocessor: Intel i80303 (64-bit RISC processor)
- Cache Memory: 128MB
  Maximum 512MB
  -- DRAM Slots: One
  -- Module Type: 144 Pin DIMM
  -- DRAM Type: SDRAM
  -- DRAM Speed: PC100/133
- Firmware: Flash EEPROM, 256K x 8
- SCSI I/O Processor: LSI SYM53C1010
- Serial Port: 1x RS232 (Asynchronous) Port
  -- Ba ud Rate: 115,200 (Bits Per Second)
  -- Da ta Bits: 8
  -- Sto p Bit: 1
  -- Pari ty: None
- RAID Levels: 0, 1, 0+1, 3 or 5
- Data Transfer Rate: Up to 160MB/s (Synchronous)
- SCSI ID Assignment: 0 ~ 14
- Tagged-command queuing: Up to 255 simultaneous data requests
- POWER SUPPLY: SH-450MRD/ 450W
- HDD: Maxtor/ 52049H4/ 20.4GB
- HDD: Maxtor/ 9614708/ 61GB
- HDD: Maxtor/ 5T020H2/ 20GB
- HDD: Seagate/ ST36422A/ 6.4GB
- HDD: Western Digital/ AC23200-00LG/ 3249.3MB
- HDD: Quantum/ Fireball^{TM}EX/ 3.2GB
- HDD: Seagate/ ST313620A/ 13.67GB
- HDD: Quantum/ Fireball$_{TM}$PlusLM/ 20.5GB

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 FIC PC, SONY Monitor, DELL PS/2 Keyboard, LOGITECH PS/2 Mouse, HP Printer, ACEEX Modem, MaxTronic Disk Array and EUT for EMI test.
c. The following test modes were performed for Conducted power line test:
   1. mode 1. Upper Power
   2. mode 2. Lower Power
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 (FIC)

FCC ID	: N/A
Model No.	: P2L97
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0037
Data Cable	: Shielded
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 2. -- Monitor (SONY)

FCC ID	: AK8GDM17SE2T
Model No.	: GDM-17SE2T
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0180
Data Cable	: Shielded, 1.15m

Support Unit 3. -- PS/2 Keyboard (DELL)

FCC ID	: GYUM92SK
Model No.	: AT101(DE8M)
Serial No.	: SP0054
Data Cable	: Shielded, 360 degree via metal backshells, 1.9m

Support Unit 4. -- Printer (HP)

FCC ID	: B94C2642X
Model No.	: DeskJet 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, 1.1m

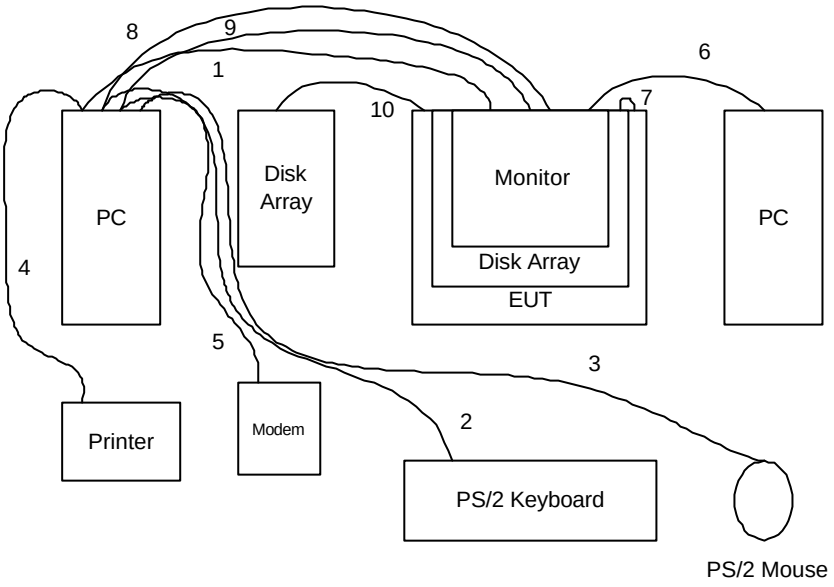
Support Unit 7. – Disk Array (MaxTronic)

FCC ID	: N/A
Model No.	: RackForce
Serial No.	: SP0126
Data Cable	: Shielded, 1m
Remark	: This support device was tested to comply with FCC standards and authorized under a declaration of conformity.

Support Unit 8. – Disk Array (MaxTronic)

FCC ID	: N/A
Model No.	: Aiby
Serial No.	: SP0096
Data Cable	: Shielded, 1m
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 5.
4. The I/O cable is connected from PC to the support unit 4.
5. The I/O cable is connected from PC to the support unit 6.
6. The SCSI cable is connected from PC to the EUT.
7. The SCSI cable is connected from EUT to the support unit 7.
8. The RS232 cable is connected from PC to the EUT.
9. The SCSI cable is connected from PC to the EUT.
10. The SCSI cable is connected from EUT to the support unit 8.

3. Test Software

An executive programs, EMITEST.EXE under WIN 2000, 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.

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. : CL01, OL05

4.2 Standard for Methods of Measurement

ANSI C63.4-1992

4.3 Test in Compliance with

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

4.4 Frequency Range Investigated

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

4.5 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 on the 115 VAC power 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

✍ Spectrum	(HP 8591EM)
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.

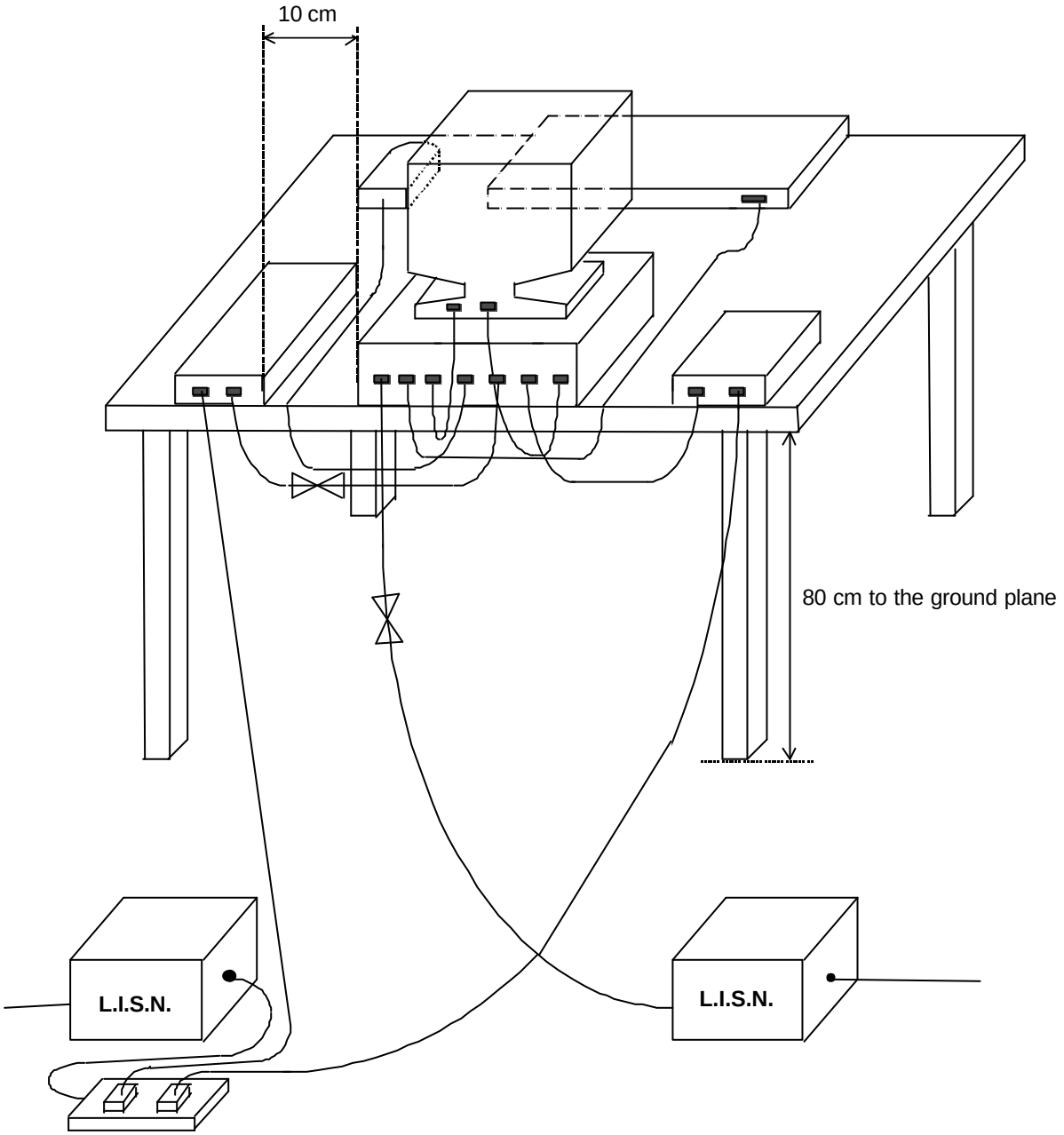
f. Both sides of AC line were checked for maximum conducted interference.

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.

i. If the emission level of the EUT in peak mode was 6 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 6 dB margin will be retested one by one using the quasi-peak method and reported.

5.3 Typical Test Setup Layout of Conducted Powerline



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 : 50%
- Test Date : Apr. 09, 2002
- All emissions not reported here are more than 10 dB below the prescribed limit.

The Conducted Emission test was passed at minimum margin NEUTRAL 0.189 MHz / 50.00 dBuV.

Freq.	Line	Meter Reading				Limits				Margin	
	or	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.
(MHz)	Neutral	(dBuV)	(dBuV)	(uV)	(uV)	(dBuV)	(dBuV)	(uV)	(uV)	(dB)	(dB)
0.189	L	50.10	49.00	319.89	281.84	64.09	54.09	1602.05	506.61	-13.99	-5.09
0.243	L	44.90	44.00	175.79	158.49	62.00	52.00	1258.78	398.06	-17.10	-8.00
0.300	L	43.40	40.10	147.91	101.16	60.25	50.25	1028.79	325.33	-16.85	-10.15
0.189	N	50.90	50.00	350.75	316.23	64.09	54.09	1602.08	506.62	-13.19	-4.09
0.243	N	45.20	44.40	181.97	165.96	62.00	52.00	1258.77	398.06	-16.80	-7.60
0.300	N	43.70	40.50	153.11	105.93	60.25	50.25	1028.78	325.33	-16.55	-9.75

Test Engineer : Jason

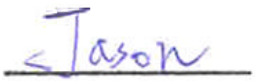
Jason Chang

5.4.2 Test mode : Mode 2

- Frequency Range of Test : from 0.15 MHz to 30 MHz
- Temperature : 23?C
- Relative Humidity : 50%
- Test Date : Apr. 09, 2002
- All emissions not reported here are more than 10 dB below the prescribed limit.

The Conducted Emission test was passed at minimum margin NEUTRAL 0.194 MHz / 46.20 dBuV.

Freq.	Line	Meter Reading				Limits				Margin	
	or	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.	Q.P.	A.V.
(MHz)	Neutral	(dBuV)	(dBuV)	(uV)	(uV)	(dBuV)	(dBuV)	(uV)	(uV)	(dB)	(dB)
0.194	N	49.70	46.20	305.49	204.17	63.87	53.87	1561.28	493.72	-14.17	-7.67
0.248	N	43.10	42.50	142.89	133.35	61.82	51.82	1233.26	389.99	-18.72	-9.32
0.293	N	37.50	36.50	74.99	66.83	60.44	50.44	1052.26	332.75	-22.94	-13.94
0.194	L	49.40	46.20	295.12	204.17	63.87	53.87	1561.31	493.73	-14.47	-7.67
0.248	L	43.20	42.40	144.54	131.83	61.82	51.82	1233.26	389.99	-18.62	-9.42
0.293	L	37.50	36.50	74.99	66.83	60.44	50.44	1052.25	332.75	-22.94	-13.94

Test Engineer : 

Jason Chang

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

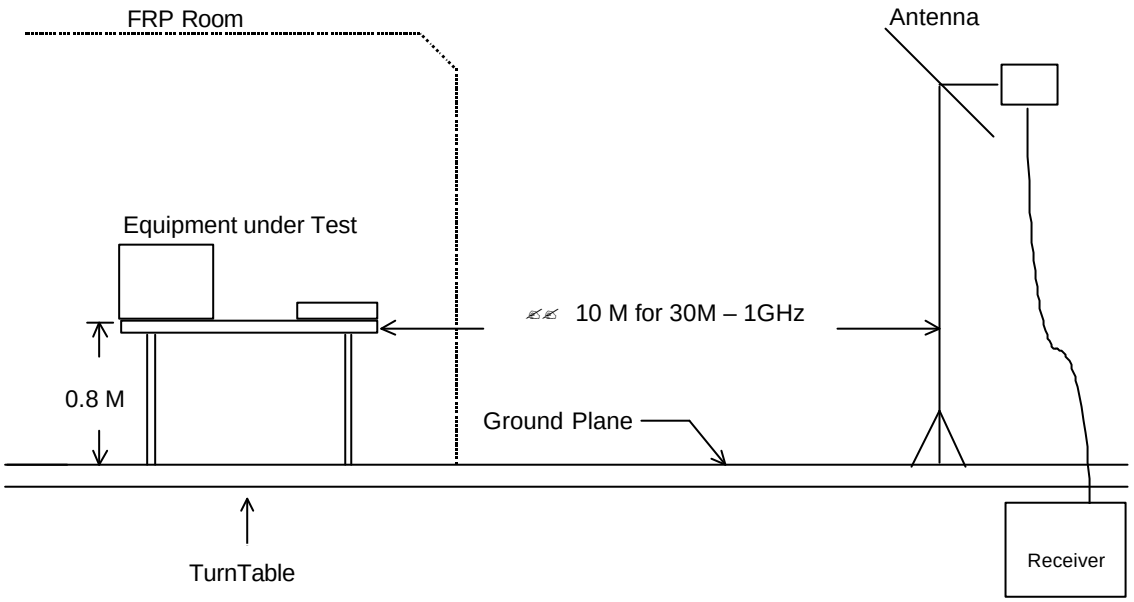
Amplifier	(HP 8447D)
Attenuation	10 dB
RF Gain	25 dB
Signal Input	0.1 MHz to 1.3 GHz

Spectrum Analyzer	(ADVANTEST R3261C)
Attenuation	10 dB
Start Frequency	30 MHz
Stop Frequency	1000 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9 KHz to 2.6 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 6 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 6 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

- Frequency Range of Test : from 30 MHz to 1000 MHz
- Test Distance : 10 M
- Temperature : 22?C
- Relative Humidity : 41 %
- Test Date : Apr. 08, 2002
- Emission level (dBuV/m) = 20 log Emission level (uV/m)
- Corrected Reading : Antenna Factor + Cable Loss + Reading = Emission

The Radiated Emission test was passed at minimum margin:

VERTICAL 665.900 MHz / 34.95 dBuV/m Antenna Height 2.6 Meter , Turntable Degree 214 °.

Frequency	Polarity	Antenna Factor	Cable Loss	Reading	Limits		Emission	Level	Margin
(MHz)		(dB/m)	(dB)	(dBuV)	(dBuV/m)	(uV/m)	(dBuV/m)	(uV/m)	(dB)
656.000	H	19.43	3.45	10.80	37.00	70.79	33.68	48.31	-3.32
740.000	H	19.38	3.78	10.09	37.00	70.79	33.25	45.97	-3.75
59.900	V	6.31	1.03	18.82	30.00	31.62	26.16	20.32	-3.84
450.000	V	16.84	2.89	14.83	37.00	70.79	34.56	53.46	-2.44
665.900	V	19.38	3.48	12.09	37.00	70.79	34.95	55.91	-2.05
720.100	V	19.27	3.67	9.95	37.00	70.79	32.89	44.11	-4.11

Test Engineer : Terry

Terry Chang

7. EMI Suppression Component List

1. Added aluminum foils on the disk housing to contact housing.
   (As the Internal photo No.2)

2. Added a core on the each SCSI cable.
   (As the Internal photo No.2)

3. Added eignt gaskets on the housing to contact top cover.
   (As the Internal photo No.2)

4. Added a copper foil on the chassis of power supply to contact housing.
   (As the Internal photo No.2)

5. Added two gaskets on the housing to contact disk housing.
   (As the Internal photo No.2)

6. Added two gaskets on the housing to contact disk housing.
   (As the Internal photo No.3)

7. Added a aluminum foil on the disk housing to contact housing.
   (As the Internal photo No.3)

8. Added a core on the data cable of control board.
   (As the Internal photo No.4)

9. Added a core on the data cable of LCD PCB.
   (As the Internal photo No.4)

10. Added a aluminum foil under LCD PCB.
    (As the Internal photo No4)

11. Add a alumiunum foil on the front cover.
    (As the Internal photo No.4)

12. Added a gasket on the chassis of HDD to contact housing.
    (As the Internal photo No.5)

13. Added two cores on the DC power output cable of power supply.
    (As the Internal photo No.26)

14. Added a core on the SCSI cable.
    (As the Internal photo No.46)

15. Added two cores on the RS-232 cable at two ends.
    (As the Internal photo No.47)

8. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	17.0	0.8
35	16.0	0.8
40	13.5	0.9
45	9.9	0.9
50	7.4	0.9
55	6.8	1.0
60	6.3	1.0
65	6.3	1.1
70	6.3	1.2
75	6.9	1.5
80	7.5	1.2
85	8.9	1.2
90	10.2	1.3
95	11.0	1.3
100	11.8	1.3
110	11.9	1.4
120	12.0	1.4
130	11.9	1.4
140	11.4	1.5
150	10.9	1.6
160	10.3	1.6
170	9.6	1.7
180	9.5	1.8
190	9.7	1.8
200	9.9	1.9
220	11.2	2.1
240	12.5	2.1
260	13.4	2.0
280	13.8	2.2
300	14.2	2.2
320	14.5	2.3
340	14.8	2.4
360	15.2	2.5
380	15.5	2.6
400	15.8	2.7
450	16.8	2.9
500	17.9	3.0
550	18.9	3.2
600	19.7	3.3
650	19.5	3.4
700	19.2	3.6
750	19.4	3.8
800	19.7	4.1
850	20.4	4.3
900	21.1	4.5
950	22.0	4.6
1000	22.9	4.6

9. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum (CL01)	HP	8591EM	3710A01187	9KHz ~ 1.8GHz	Sep. 21, 2001	Conduction
LISN (CL01)	Rolf Heine	NNB-2/16Z	98009	9KHz ~ 30MHz	Dec. 17, 2001	Conduction
LISN (CL01)	Rolf Heine	NNB-2/16Z	980877	9KHz ~ 30MHz	Dec. 17, 2001	Conduction
Spectrum Analyzer (OL05)	ADVANTEST	R3261C	71720606	9KHz – 2.6GHz	Apr. 11, 2001	Radiation
Amplifier (OL05)	HP	8447D	2944A09068	100KHz –1.3GHz	Oct. 03, 2001	Radiation
Bilog Antenna (OL05)	CHASE	CBL6112A	2287	30MHz -2GHz	Feb. 08, 2002	Radiation
Half-wave dipole antenna (OL05)	EMCO	3121C	9705-1285	28 M - 1GHz	May 17, 2001	Radiation
Antenna Mast (OL05)	EMCO	2075	9806-2160	1MHz – 4MHz	N/A	Radiation

※ 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 ?1=0.09 LISN VSWR ?2=0.33 Uncertainty=20log(1-?1*?2)	U-shaped	0.2
combined standard uncertainty Ue(y)	**normal**	**±1.7**
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	**normal (k=2)**	**±3.4**

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

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 ?1=0.09 Antenna VSWR ?2=0.67 Uncertainty=20log(1-?1*?2)	U-shaped	±0.54	±0.54
combined standard uncertainty Ue(y)	**normal**	**±2.9**	**±2.4**
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	**normal (k=2)**	**±5.8**	**±4.8**

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

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