

FCC TEST REPORT

for

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

Equipment : Disk Array

Model No. : Aiby

FCC ID : NKF-AIBY

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.

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History of this test report

Original Report Issue Date: Mar. 20, 2002

☒ 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. : Aiby

FCC ID : NKF-AIBY

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 Mar. 08, 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.	: Aiby
FCC ID	: NKF-AIBY
Trade Name	: Arena
SCSI Cable	: 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: 64MB
 - 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 SYM53C896
- ✂✂ 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
- ✂✂ Serial Port: 1 x RS232 (Asynchronous) Port
- ✂✂ RAID Levels: 0, 1, 0+1, 3 or 5
- ✂✂ Data Transfer Rate: Up to 80MB/s (Synchronous)
- ✂✂ SCSI ID Assignment: 0 ~ 14
- ✂✂ Tagged-command queuing: Up to 255 simultaneous data requests
- ✂✂ POWER SUPPLY: High Quality/ SH200ATX/ 200W
- ✂✂ HDD: Maxtor/ 52049H4/ 20GB
- ✂✂ HDD: Maxtor/ 5T020H2/ 20GB
- ✂✂ HDD: Maxtor/ 9614708/ SN N803LFSC
- ✂✂ HDD: Seagate/ ST313620A/ 13.6GB

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 ASUS PC, REALsync Monitor, GATEWAY PS/2 Keyboard, LOGITECH PS/2 Mouse, HP Printer, ACEEX Modem, MaxTronic Disk Array and EUT for EMI test.
- c. 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 (ASUS)

FCC ID	: N/A
Model No.	: A7V133
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 (REALsync)

FCC ID	: N/A
Model No.	: DJ72
Power Supply Type	: Switching
Power Cord	: Non-Shielded
Serial No.	: SP0180
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 (GATEWAY)

FCC ID	: N/A
Model No.	: G9900H
Serial No.	: SP0054
Data Cable	: Shielded, 360 degree via metal backshells, 1.2m

Support Unit 4. -- Printer (HP)

FCC ID	: B94C2642X
Model No.	: C2642A
Power Supply Type	: Linear
Power Cord	: Non-Shielded
Serial No.	: SP0048
Data Cable	: Braided-Shielded, 360 degree via metal backshells, 1.8m

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

FCC ID	: DZL211029
Model No.	: M-S34
Serial No.	: SP0101
Data Cable	: Shielded, 1.9m

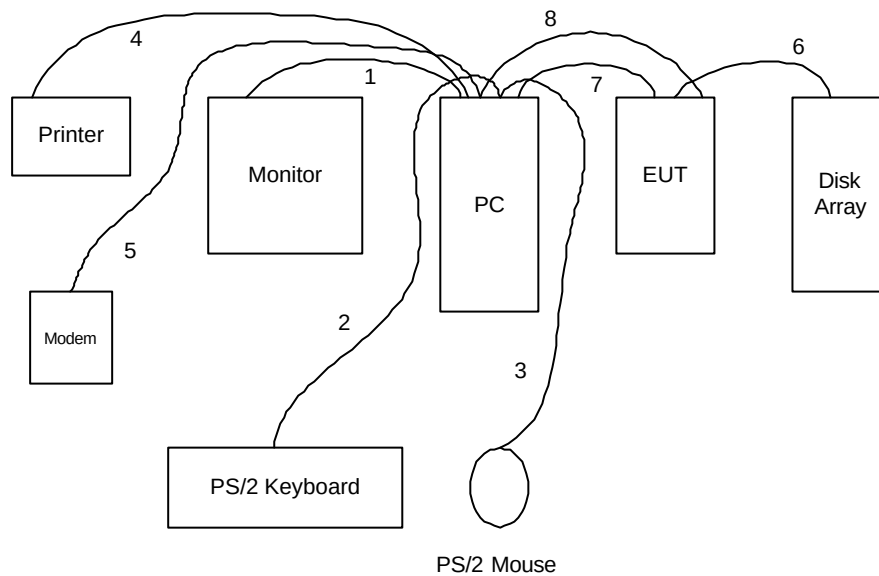
Support Unit 6. -- Modem (ACEEX)

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.	: DeskForce
Serial No.	: SP0125
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 EUT to the support unit 7.
7. The RS232 cable is connected from PC to the EUT.
8. The SCSI cable is connected from PC to the EUT.

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.

At the same time, the following programs were executed:

- Executed "Test.Bat 1" to read and write data from EUT to PC.
- Executed "Test.Bat 2" to read and write data from Disk Array to PC via EUT.

4. General Information of Test

4.1 Test Facility

This test was carried out by SPORTON International Inc.

Test Site Location : No. 52, Hwa Ya 1St Road, Hwa Ya Technology Park,
Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
TEL : 886-3-3273456
FAX : 886-3-3180055

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.

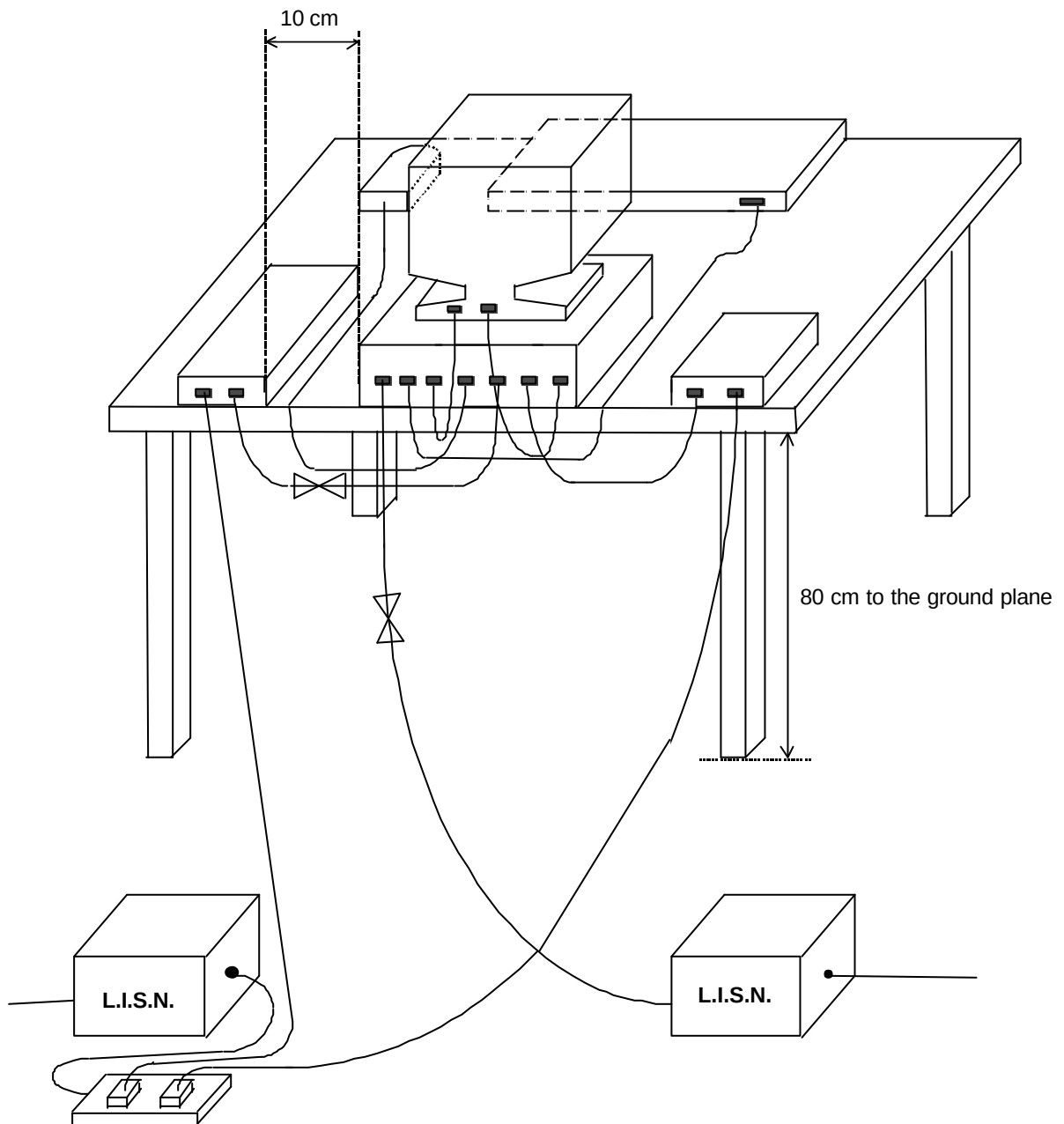
5.1 Major Measuring Instruments

<i>EE</i> Test Receiver	(RAHDE&SCHEARZ 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.
- 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



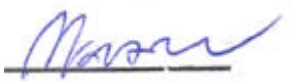
5.4 Test Result of AC Powerline Conducted Emission

- ~~/~~ Frequency Range of Test : from 0.15 MHz to 30 MHz
~~/~~ Temperature : 23°C
~~/~~ Relative Humidity : 41%
~~/~~ Test Date : Mar. 08, 2002
~~/~~ All emissions not reported here are more than 10 dB below the prescribed limit.

The Conducted Emission test was passed at minimum margin **LINE 0.502 MHz / 42.93 dBuV.**

Freq. (MHz)	Line or Neutral	Meter Reading				Limits				Margin	
		Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dBuV)	A.V. (dBuV)	Q.P. (uV)	A.V. (uV)	Q.P. (dB)	A.V. (dB)
0.200	L	51.26	50.32	365.59	328.10	63.61	53.61	1515.40	479.21	-12.35	-3.29
0.299	L	46.35	45.98	207.73	199.07	60.27	50.27	1031.64	326.23	-13.92	-4.29
0.502	L	43.27	42.93	145.71	140.12	56.00	46.00	630.96	199.53	-12.73	-3.07
0.200	N	51.28	50.44	366.44	332.66	63.61	53.61	1515.40	479.21	-12.33	-3.17
0.300	N	46.57	46.20	213.06	204.17	60.24	50.24	1028.35	325.19	-13.67	-4.04
0.502	N	43.01	42.74	141.42	137.09	56.00	46.00	630.96	199.53	-12.99	-3.26

Test Engineer :



Mason Lu

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.

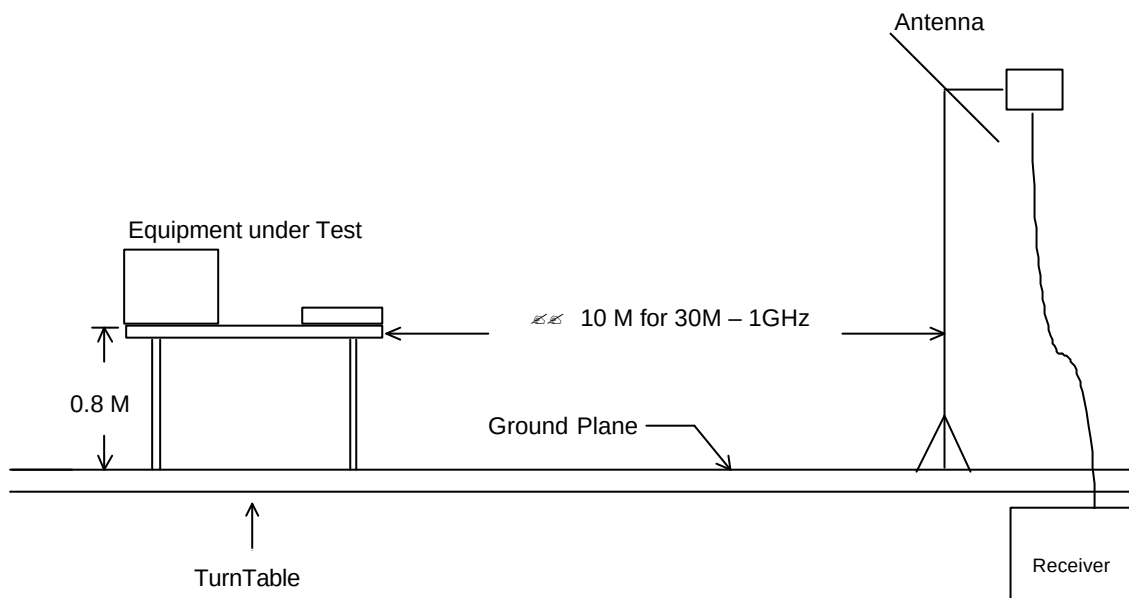
6.1 Major Measuring Instruments

<i>REC</i> Amplifier	(ADVENTEST BB525C)
Attenuation	10 dB
RF Gain	30 dB
Signal Input	9 KHz to 3 GHz
<i>REC</i> Spectrum Analyzer	(RAHDE&SCHEARZ FSP7)
Attenuation	10 dB
Start Frequency	30 MHz
Stop Frequency	100 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	1 MHz
Signal Input	9 KHz to 7 GHz
<i>REC</i> Test Receiver	(RAHDE&SCHEARZ ESI7)
Resolution Bandwidth	120 KHz
Frequency Band	20 Hz to 7 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 : 22.1°C
~~/~~ Relative Humidity : 42 %
~~/~~ Test Date : Mar. 07, 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:

HORIZONTAL 360.200 MHz / 33.90 dBuV/m Antenna Height 3.85 Meter , Turntable Degree 85 °.

Frequency (MHz)	Polarity	Antenna Factor (dB/m)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV/m)	Level (uV/m)	Margin (dB)
					(dBuV/m)	(uV/m)			
30.540	H	16.06	1.18	8.67	30.00	31.62	25.91	19.75	-4.09
165.540	H	9.94	2.54	13.41	30.00	31.62	25.89	19.70	-4.11
360.200	H	15.03	3.71	15.16	37.00	70.79	33.90	49.55	-3.10
165.540	V	9.94	2.51	13.89	30.00	31.62	26.34	20.75	-3.66
428.100	V	16.90	4.12	12.71	37.00	70.79	33.73	48.58	-3.27
943.300	V	21.25	6.06	5.04	37.00	70.79	32.35	41.45	-4.65

Test Engineer :



Mason Lu

7. EMI Suppression Component List

1. The housing was coated with copper.
(As the Internal photo No.1)
2. Add two ferrite cores on the LCD cable.
(As the Internal photo No.2)
3. Add four gaskets on the PC side to contact housing.
(As the Internal photo No.3)
4. A EMI filter board is added near by the AC inlet.
(As the Internal photo No.16)
5. Add two ferrite cores on the both end of the serial cable.
(As the Internal photo No.29)

8. Antenna Factor & Cable Loss

Frequency (MHz)	HORIZONTAL Antenna Factor (dB)	HORIZONTAL Cable Loss (dB)	VERTICAL Antenna Factor (dB)	VERTICAL Cable Loss (dB)
30	16.25	1.18	16.21	1.21
35	15.32	1.21	14.53	1.20
40	13.98	1.29	13.75	1.30
45	11.49	1.39	11.43	1.39
50	8.21	1.41	8.36	1.41
55	6.78	1.46	6.87	1.49
60	5.35	1.63	5.37	1.63
65	5.62	1.67	5.63	1.63
70	5.88	1.52	5.88	1.70
75	6.82	1.79	6.86	1.79
80	7.75	1.76	7.83	1.76
85	8.94	1.85	9.03	1.83
90	9.93	1.92	10.03	1.91
95	10.60	1.96	10.62	1.96
100	11.26	2.03	11.21	2.00
110	11.46	2.11	11.43	2.10
120	11.67	2.19	11.67	2.19
130	11.61	2.26	11.65	2.23
140	11.29	2.33	11.38	2.26
150	10.97	2.41	11.11	2.36
160	10.30	2.48	10.31	2.45
170	9.68	2.58	9.67	2.54
180	9.42	2.66	9.41	2.62
190	9.53	2.71	9.53	2.71
200	9.63	2.76	9.65	2.79
220	10.34	2.89	10.37	2.92
240	11.02	3.02	10.06	3.05
260	11.72	3.15	11.75	3.19
280	12.38	3.29	12.40	3.34
300	10.37	3.43	13.07	3.48
320	13.70	3.52	13.71	3.59
340	14.37	3.60	14.38	3.68
360	15.03	3.70	15.05	3.78
380	15.67	3.83	15.69	3.87
400	16.33	3.95	16.36	3.97
450	17.25	4.10	17.31	4.22
500	18.18	4.41	18.28	4.40
550	18.26	4.63	18.37	4.59
600	18.34	4.76	18.46	4.76
650	19.22	5.02	19.30	5.00
700	20.09	5.25	20.13	5.26
750	20.44	5.59	20.48	5.48
800	20.78	5.52	20.83	5.47
850	21.08	5.74	21.11	5.67
900	21.37	5.89	21.39	5.92
950	21.25	6.03	21.22	6.08
1000	21.13	6.26	21.06	6.04

9. List of Measuring Equipment Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	RAHDE&SCH EARZ	ESCS 30	838251/002	9 KHz – 2750 MHz	Nov. 28, 2001	Conduction
LISN (EUT)	MessTec	NNB-2/16Z	2001-004	9 KHz – 30 MHz	May. 08. 2001	Conduction
LISN (Support Unit)	MessTec	NNB-2/16Z	2001-007	9 KHz – 30 MHz	May. 08. 2001	Conduction
EMI Filter	LINDGREN	LRE-2060	1004	< 450 Hz	N/A	Conduction
EMI Filter	LINDGREN	N6006	201052	0 ~ 60 Hz	N/A	Conduction
Spectrum Analyzer	RAHDE&SCH EARZ	FSP7	838858/014	9KHz – 7GHz	Jan. 9, 2002	Radiation
Spectrum Analyzer	RAHDE&SCH EARZ	FSP7	838858/013	9KHz – 7GHz	Jan. 23, 2002	Radiation
Receiver	RAHDE&SCH EARZ	ESI7	838496/009	20Hz – 7GHz	Feb. 02, 2002	Radiation
Bilog Antenna	SCHAFFNER	CBL6112B	2722	30MHz – 2GHz	Dec. 24, 2001	Radiation
Bilog Antenna	SCHAFFNER	CBL6112B	2723	30MHz - 2GHz	Dec. 24, 2001	Radiation
Amplifier	ADVENTEST	BB525C	CH100001	9KHz – 3GHz	Nov. 15, 2001	Radiation
Amplifier	ADVENTEST	BB525C	CH100002	9KHz – 3GHz	Nov. 15, 2001	Radiation
Turn Table	HD	DS630	CH100011	0 ? 360 degree	N/A	Radiation
Antenna Mast	HD	MA240	MA240/557	1 m - 4 m	N/A	Radiation
Antenna Mast	HD	MA240	MA240/572	1 m - 4 m	N/A	Radiation

※ Calibration Interval of instruments listed above is one year.

10. Uncertainty of Test Site

Uncertainty of Radiated Emission Measurement

Contribution	Probability Distribution	3m	10m
Antenna factor calibration	normal(k=2)	± 1	± 1
cable loss calibration	normal(k=2)	± 0.3	± 0.3
RCV/SPA specification	rectangular	± 2	± 2
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	± 2.7	± 2.2
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	± 5.4	± 4.4

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 0.5^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.2 \text{ for 10m test distance}$$

$$U = \sqrt{\{(1/2)^2 + (0.3/2)^2 + (2^2 + 3^2 + 2^2 + 0.25^2 + 2^2)/3 + (0.54)^2/2\}} = 2.7 \text{ for 3m test distance}$$

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
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	± 1.66
Measuring uncertainty for a level of confidence of 95% U=2Ue(y)	normal (k=2)	± 3.32

$$U = \sqrt{\{(0.3/2)^2 + (2^2 + 1.5^2 + 0.2^2)/3 + (0.2)^2/2\}} = 1.66$$

Appendix B. Normalized Site Attenuation

**Calibrated by
Austrian Research Centers
SEIBERSDORF**



ACCREDITED TESTING LABORATORY (NR. 32)
for Electromagnetic Compatibility

TEST REPORT NO. EH-H16/01

On: **Normalised Site Attenuation, Chamber Factor
Field Uniformity and Transmission Loss Measurements**

Ordered by: **SIDT Europe**

Address: **Route d'Hesdin-Ramecourt
62130 Saint Pol Sur Ternoise
France**

Subject: **Semi Anechoic Chamber 1, 2, 3 and 4, at
SPORTON International Inc.
Taiwan**

Internal Order No.: **EH-1.92.00004-H171**

L/C N°: **OACAB1-00016.0C**

Technical responsibility:

Test performed by:

Date: **25.06.2001**

Number of Pages: **48**

Comments:

The test results refers exclusively to the test subject.

The production or transmission of extracts of the present report is subject to authorisation by the testing laboratory