

FCC/MELLON

DEC 28 1998

FCC TEST REPORT

for

Part 15, Subpart B Class B

Equipment : LCD MONITOR
Model No. : KX5
FCC ID : HFSKX5
Filing Type : Original Grant
Applicant : **QUANTA COMPUTER INC.**
7F, No. 116, Hou Kang St., Shih Lin Dist,
Taipei, Taiwan, R.O.C.

- The test result refers exclusively to the test presented test model / sample.
- Without the written authorization of the test lab., the Test Report may not be copied.

SPORTON International Inc.

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

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FCC TEST REPORT**1. General Description of Equipment under Test****1.1. Applicant**

QUANTA COMPUTER INC.
7F, No. 116, Hou Kang St., Shih Lin Dist,
Taipei, Taiwan, R.O.C.

1.2. Manufacturer

Same as 1.1.

1.3. Basic Description of Equipment under Test

Equipment : LCD MONITOR
Model No. : KX5
FCC ID : HFSKX5
Trade Name : QUANTA
Headphone, Line in DATA CABLE : Non-Shielded
VGA DATA CABLE : Shielded
Power Supply Type : Switching
Power Input Cord : Non-Shielded
Power Output Cord : Shielded

1.4. Feature of Equipment under Test

- LCD (Type) : 15.0 inch TFT color LCD module, 18-bit color, 0.297 mm pixel pitch.
- Input Signal (Video) : RGB analog (0.7 Vp-p, 75 ohms).
- Connectors :
 - Front : Headphone-Out 3.5 mm stereo phone jack.
 - Rear : Video-In Mini D-Sub 15 pin female
 - Line-In 3.5 mm stereo phone jack.
 - Power DC19V (AC adapter).
- Power Saving : On Green 35 WAC (video only).
- Power Adapter :
 - Input 100-240 VAC, 50/60 Hz.
 - Output 19 VDC, 50W.

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 DELL PS/2 Keyboard, PRIMAX PS/2 Mouse, HP Printer, ACEEX Modem, AIWA Stereo Cassette Player, GAINWARD VGA card, J&S Earphone and EUT were connected to the FIC PC for EMI test.
- c. The Following display resolution were investigated during the compliance test:
 1. Horizontal frequency (640x480 to 1,024x768, 31.5 KHz to 60.1 KHz)
 2. Vertical frequency (60 Hz to 75 Hz)
- d. During testing, the monitor AC power cord was plugged into the PC computer-mounted AC outlet and a floor-mounted AC outlet to search the maximum emission.
- e. According to the above tests, we listed the following display modes as the worst cases:
 1. 1,024x768 (non-interlaced 60.1 KHz), refresh rate 75 Hz.
 2. 800x600 (non-interlaced 46.9 KHz), refresh rate 75 Hz.
- f. Frequency range investigated: conduction 450 KHz to 30 MHz, radiation 30 MHz to 1,000 MHz.

2.2. Description of Test System

Support Unit 1. -- PS/2 Keyboard (DELL)

FCC ID	: GYUM92SK
Model No.	: AT101(DE8M)
Power Supply Type	: N/A
Serial No.	: SP0054
Data Cable	: Shielded, 360 degree via metal backshells

Support Unit 2. -- PS/2 Mouse (PRIMAX)

FCC ID	: EMJMUJQ
Model No.	: MUS9J
Power Supply Type	: N/A
Serial No.	: SP0045
Data Cable	: Braided-Shielded, 360 degree via metal backshells

Support Device 3. --- PRINTER (HP)

FCC ID	: B94C2642X
Model No.	: DESK JET 400
Serial No.	: SP1040
Data Cable	: Shielded, 360 degree via metal backshells, 1.35m
Power Supply Type	: Linear, Adapter
Power Cord	: Non-shielded

Support Unit 4. -- Modem (ACEEX)

FCC ID : IFAXDM1414
Model No. : DM1414
Power Supply Type : Linear
Power Cord : N/A
Serial No. : SP0059
Data Cable : Braided-Shielded, 360 degree via metal backshells

Support Unit 5. -- Stereo Cassette Player (AIWA)

FCC ID : N/A
Model No. : HS-J36
Serial No. : SP0060
Data Cable : Non-Shielded

Support Unit 6. -- Earphone (J&S)

Model No. : HS-102
Serial No. : SP0123
Data Cable : Non-Shielded, 1.2m

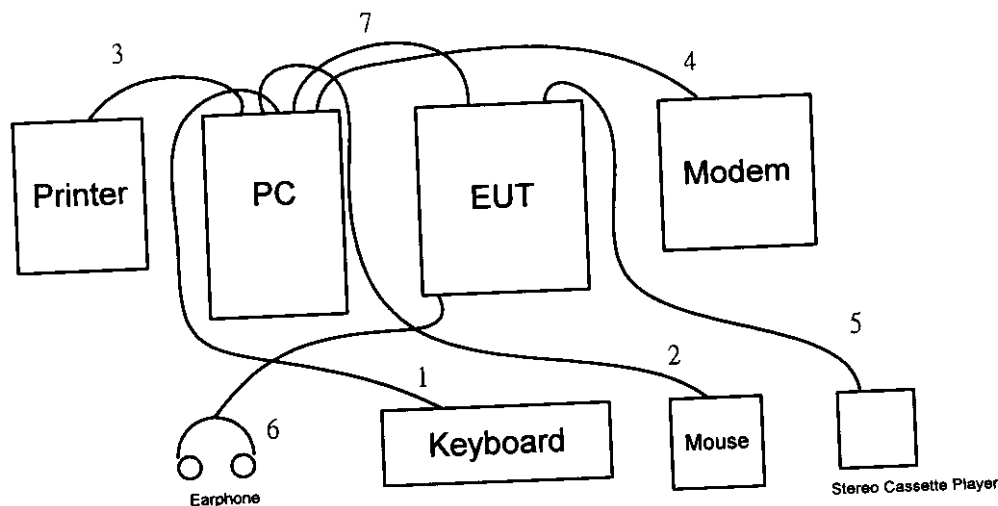
Support Device 7. -- VGA CARD (GAINWARD)

FCC ID : ICUVGA-GW802C
Model No. : S3 Trio 3D
Serial No. : SP1039
Data Cable : Shielded, 1.7m

Support Device 8. --- P.C. (FIC)

FCC ID : N/A
Model No. : P55T2P4
Serial No. : SP1004
Data Cable : Shielded
Power Cord : Non-shielded
Power Supply Type : Switching

(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 to the support unit 1.
2. The I/O cable is connected to the support unit 2.
3. The I/O cable is connected to the support unit 3.
4. The I/O cable is connected to the support unit 4.
5. The I/O cable is connected from EUT to the support unit 5.
6. The I/O cable is connected from EUT to the support unit 6.
7. The I/O cable is connected from EUT to the support unit 7.

3. Test Software

An executive program, EMITEST.EXE & EMCTEST\Video Test under WIN 98, which generates 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 floppy 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 b to f.

4. General Information of Test

4.1. Test Facility

This test was carried out by SPORTON International Inc. in an openarea test site.

Openarea 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

4.2. Standard for Methods of Measurement

ANSI C63.4-1992

4.3. Test in Compliance with

FCC Part 15, Subpart B Class B

4.4. Frequency Range Investigated

- a. Conduction: from 450 kHz to 30 MHz
- b. Radiation : from 30 MHz to 1,000 MHz

4.5. Test Distance

The test distance of radiated emission from antenna to EUT is 3 M.

5. Test of Conducted Powerline

Conducted Emissions were measured from 450 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.

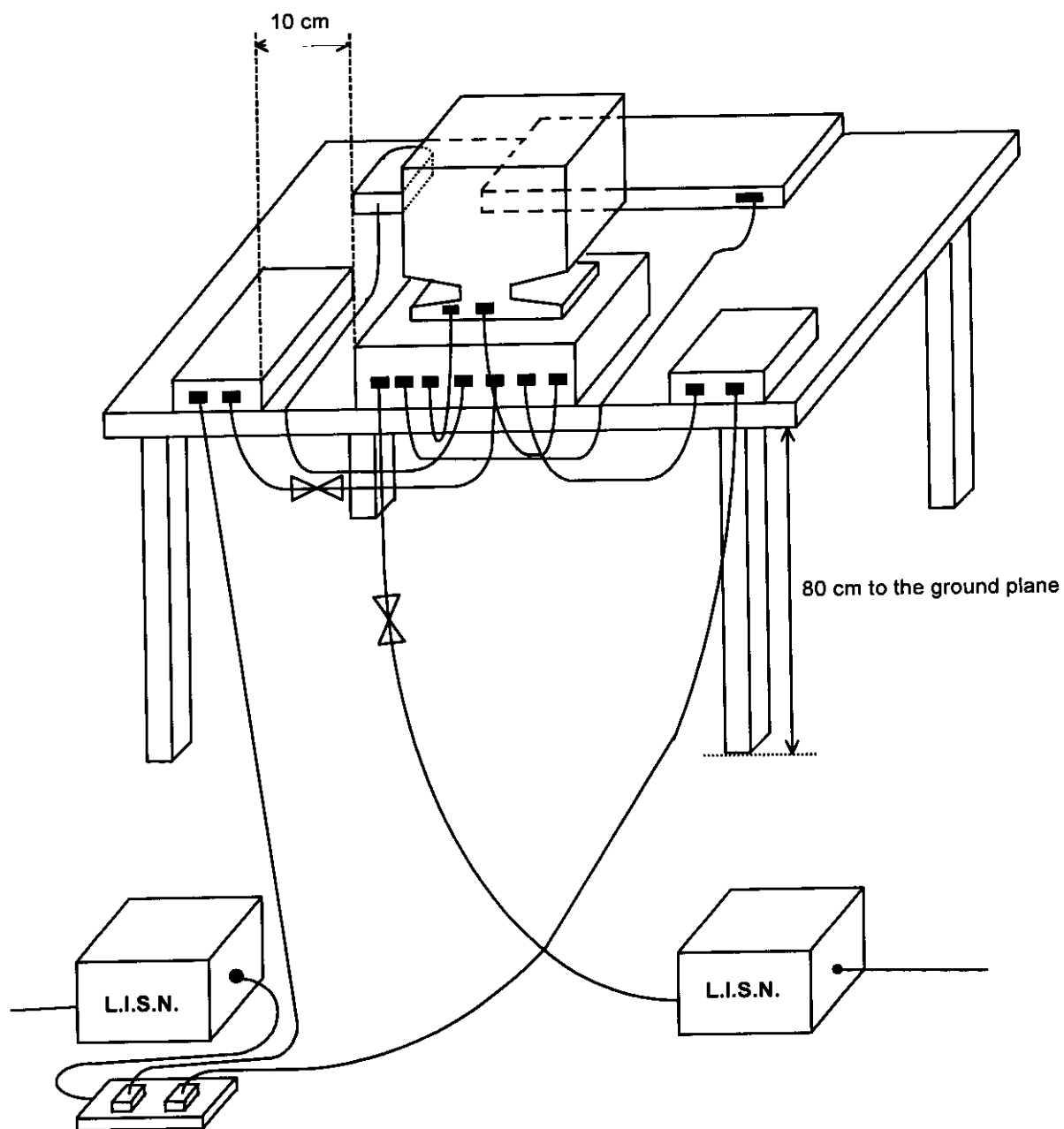
5.1. Major Measuring Instruments

Test Receiver	HP 8591EM
Attenuation	0 dB
Start Frequency	0.45 MHz
Stop Frequency	30 MHz
Step MHz	0.007 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 450 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 : 1024x768 75Hz/60.1K

- Temperature : 24°C
- Relative Humidity : 59 %
- Test Date : Nov. 20, 1998

The Conducted Emission test was passed at minimum margin**LINE 3.770 MHz / 44.70 dBuV.**

Freq. (MHz)	Line/ Neutral	Meter Reading (dBuV)	Meter Reading (uV)	Limits (dBuV)	Limits (uV)	Margin (dB)
3.770	L	44.70	171.79	48.00	251.19	-3.30
4.370	L	44.30	164.06	48.00	251.19	-3.70
2.780	N	43.90	156.68	48.00	251.19	-4.10
3.570	N	42.80	138.04	48.00	251.19	-5.20
4.170	N	41.00	112.20	48.00	251.19	-7.00
4.760	N	44.00	158.49	48.00	251.19	-4.00

Test Engineer : Benny Lee
Benny Lee

5.4.2. Test mode : 800x600 75Hz/46.9K

- Temperature : 24°C
- Relative Humidity : 59 %
- Test Date : Nov. 20, 1998

The Conducted Emission test was passed at minimum margin

LINE 3.380 MHz / 44.10 dBuV.

Freq. (MHz)	Line/ Neutral	Meter Reading (dBuV)	Meter Reading (uV)	Limits (dBuV)	Limits (uV)	Margin (dB)
3.380	L	44.10	160.32	48.00	251.19	-3.90
3.970	L	41.80	123.03	48.00	251.19	-6.20
4.170	L	44.00	158.49	48.00	251.19	-4.00
5.360	L	43.90	156.68	48.00	251.19	-4.10
3.970	N	41.60	120.23	48.00	251.19	-6.40
4.170	N	41.20	114.82	48.00	251.19	-6.80

Test Engineer : Benny Lee
Benny Lee

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 0 dB
 - RF Gain 20 dB
 - Signal Input 0.1 MHz to 1.3 GHz

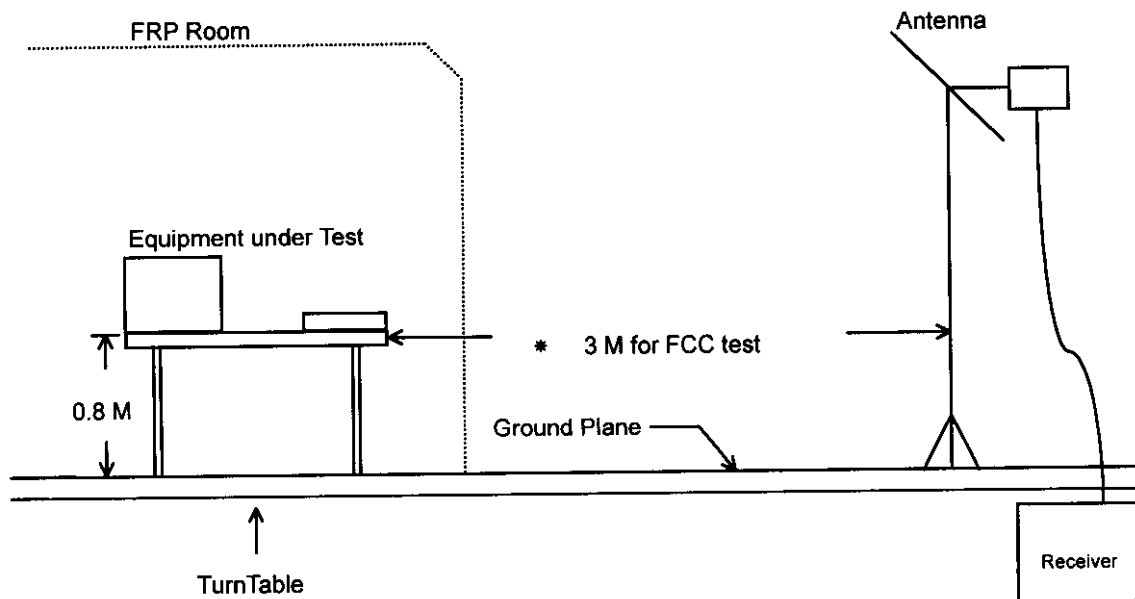
- Spectrum Analyzer (HP 8568B)
 - Attenuation 0 dB
 - Start Frequency 30 MHz
 - Stop Frequency 1000 MHz
 - Resolution Bandwidth 1 MHz
 - Video Bandwidth 1 MHz
 - Signal Input 100 Hz to 1.5 GHz

- Quasi-Peak Adapter (HP 85650A)
 - Resolution Bandwidth 120 KHz
 - Frequency Band 30 MHz to 1 GHz
 - Quasi-Peak Detector ON for Quasi-Peak Mode
OFF for Peak Mode

6.2. Test Procedures

- a. The EUT was placed on a rotatable table top 0.8 meter above ground.
- b. The EUT was set 3 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

6.4.1. Test mode : 1024x768 75Hz/60.1K

- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 77 %
- Test Date : Nov. 16, 1998
- 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

303.200 MHz / 42.20 dBuV (VERTICAL) Antenna Height 2 Meter, Turntable Degree 186 °.

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV)	Level (uV)	Margin (dB)
					(dBuV)	(uV)			
303.200	V	12.88	3.65	25.67	46.00	199.53	42.20	128.82	-3.80
400.800	V	15.51	4.41	20.94	46.00	199.53	40.86	110.41	-5.14
434.230	V	15.98	4.74	20.49	46.00	199.53	41.21	114.95	-4.79
452.800	V	16.27	4.89	20.98	46.00	199.53	42.14	127.94	-3.86
500.800	V	17.43	4.81	19.59	46.00	199.53	41.83	123.45	-4.17
70.400	V	5.15	1.80	26.41	40.00	100.00	33.36	46.56	-6.64

Test Engineer : William Lee
WILLIAM LEE

6.4.2. Test mode : 800x600 75Hz/46.9K

- Test Distance : 3 M
- Temperature : 24°C
- Relative Humidity : 77 %
- Test Date : Nov. 16, 1998
- 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

493.600 MHz / 42.46 dBuV (VERTICAL) Antenna Height 2 Meter, Turntable Degree 194 °.

Frequency (MHz)	Polarity	Antenna Factor (dB)	Cable Loss (dB)	Reading (dBuV)	Limits		Emission (dBuV)	Level (uV)	Margin (dB)
					(dBuV)	(uV)			
432.800	H	15.96	4.73	21.73	46.00	199.53	42.42	132.13	-3.58
494.400	H	17.27	4.81	20.21	46.00	199.53	42.29	130.17	-3.71
53.900	H	6.17	1.50	28.11	40.00	100.00	35.78	61.52	-4.22
311.200	V	13.08	3.77	25.40	46.00	199.53	42.25	129.57	-3.75
439.200	V	16.05	4.79	20.82	46.00	199.53	41.66	121.06	-4.34
493.600	V	17.25	4.81	20.40	46.00	199.53	42.46	132.74	-3.54

Test Engineer : William Lee
WILLIAM LEE

7. Antenna Factor & Cable Loss

Frequency (MHz)	Antenna Factor (dB)	Cable Loss (dB)
30	18.1	1.2
35	15.2	1.3
40	12.6	1.3
45	9.9	1.5
50	7.5	1.5
55	5.8	1.5
60	5.0	1.6
65	4.8	1.6
70	5.1	1.8
75	5.7	1.8
80	6.7	1.8
85	7.8	1.7
90	8.8	1.9
95	9.3	1.9
100	10.0	2.1
110	11.2	2.0
120	11.3	2.2
130	11.3	2.5
140	10.7	2.5
150	9.9	2.5
160	9.3	2.6
170	8.5	2.6
180	8.4	2.8
190	8.2	2.8
200	8.3	2.7
220	8.4	2.9
240	10.9	3.0
260	13.0	3.3
280	12.4	3.6
300	12.8	3.6
320	13.3	3.9
340	13.8	4.0
360	14.4	4.2
380	15.0	4.4
400	15.5	4.4
450	16.2	4.9
500	17.4	4.8
550	19.1	5.3
600	18.4	5.4
650	18.9	6.0
700	18.9	6.1
750	19.7	6.6
800	19.7	6.5
850	20.4	6.5
900	20.5	6.8
950	20.9	7.5
1000	21.2	7.3
2000	26.4	9.7

8. List of Measuring Equipments Used

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver (site 1)	HP	8591EM	3536A00672	9 KHz - 18 GHz	Aug. 27, 1998	Conduction
LISN (site 1)	EMCO	3850/2	9510-1035	50 ohm / 50 uH	Oct. 23, 1998	Conduction
LISN (site 1)	KYORITSU	KNW-47	8-693-10	50 ohm / 50 uH	Oct. 23, 1998	Conduction
EMI Filter (site 1)	CORCOM	MRI-2030	N/A	480 VAC / 30 A	N/A	Conduction
Quasi-peak Adapter (site 3)	HP	85650A	2811A01116	9KHz -1 GHz	Jul. 19, 1998	Radiation
Amplifier (Site 3)	HP	8447D	2944A09068	0.1MHz -1.3GHz	Aug. 27, 1998	Radiation
Spectrum Analyzer (site 3)	HP	8568B	2732A04100	100Hz - 1.5GHz	July 19, 1998	Radiation
Bilog Antenna (Site 3)	CHASE	CBL6112A	2320	30MHz -2GHz	Sep. 10, 1998	Radiation
Half-wave dipole antenna (Site 3)	EMCO	3121C	9705-1285	28 M - 1GHz	May 19, 1998	Radiation
Turn Table (site 3)	EMCO	2080	9711-2022	0 ~ 360 degree	N/A	Radiation
Antenna Mast (site 3)	EMCO	2075	9710-2101	1 m- 4 m	N/A	Radiation