EN55022 / CISPR 22 / AS/NZS CISPR 22 Class B

EMI TEST REPORT

of

Product Name

Notebook Personal Computer

Model

M230

Applied by:

MITAC Technology Corporation
4F, No.1, R&D Road 2,
Hsinchu Science-Based industrial Park, Hsinchu 300
Taiwan,R. O. C.

Test Performed by:

International Standards Laboratory

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1. General

1.1 Certification of Accuracy of Test Data

Standards:	EN55022: 1998/A1: 2000/A2: 2003 AS/NZS CISPR 22: 2004 Class B
Equipment Tested:	Notebook Personal Computer
Model:	M230
Applied by	MITAC Technology Corporation
Sample received Date:	2006/08/16
Final test Date:	refer to the date of test data
Test Result	**PASS**
Report Engineer:	Erin Duan
Test Engineer:	Benson Chen Benson Chen

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the radiated and power line conducted electromagnetic emissions generated by sample equipment under test at the time of the test.

The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature

Eddy Hsiung

Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 36 pages, including 1 cover page , 1 contents page, and 34 pages for the test description.

1.2 Applicant Information

Applicant:	MITAC Technology Corporation 4F, No.1, R&D Road 2, Hsinchu Science-Based industrial Park, Hsinchu 300 Taiwan,R. O. C.

1.3 Operation Environment

Test Site:	Chamber 02; Conduction 02	
Test Distance	10M	
Temperature	refer to each site test data	
Humidity:	refer to each site test data	
input power:	Conduction input power:	AC 230 V / 50 Hz
	Radiation input power:	AC 230 V / 50 Hz

2. Power Main Port Conducted Emissions

2.1 Configuration and Procedure

2.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall was 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit of standards used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms impedance termination was connected to the test instrument. The excess length of the power cord was folded back and forth at the center of the lead to form a bundle 30cm to 40cm in length.

Any changes made to the configuration or modifications made to EUT during testing, are noted in the following test record.

If EUT has an extra auxiliary AC outlet which can provide power to an external monitor, all measurements will be made with the monitor power from EUT-mounted AC outlet and then from floor-mounted AC outlet.

2.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on both hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dß below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dß below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

2.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

2.2 Test Data:

Table 2.2.1 Power Line Conducted Emissions (Hot)

Operator: Benson Chen
Temperature (C): 25
08:22:13 PM, Friday, September 1, 2006 Humidity (%): 58

Frequency	LISN Loss	Cable Loss	QP Corrct.	QP Limit	QP Margin	AVE Corrct.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.6409	0.10	0.07	40.50	56.00	-15.50	37.41	46.00	-8.59
0.7004	0.10	0.07	35.73	56.00	-20.27	29.88	46.00	-16.12
0.7053	0.10	0.07	38.44	56.00	-17.56	34.36	46.00	-11.64
0.8958	0.10	0.07	39.63	56.00	-16.37	37.97	46.00	-8.03
0.9606	0.10	0.07	41.16	56.00	-14.84	39.20	46.00	-6.80
1.7279	0.18	0.08	45.22	56.00	-10.78	38.34	46.00	-7.66
1.8603	0.14	0.09	41.11	56.00	-14.89	31.88	46.00	-14.12
2.0478	0.10	0.09	45.34	56.00	-10.66	37.28	46.00	-8.72
2.1792	0.11	0.09	42.71	56.00	-13.29	35.61	46.00	-10.39
2.4978	0.12	0.10	42.08	56.00	-13.92	38.00	46.00	-8.00

* Note:
Margin = Corrected Amplitude - Limit
Corrected Amplitude = Receiver Reading + LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit

Table 2.2.2 Power Line Conducted Emissions (Neutral)

Operator: Benson Chen
Temperature (C): 25
08:26:22 PM, Friday, September 1, 2006 Humidity (%): 58

Frequency	LISN Loss	Cable Loss	QP Corrct.	QP Limit	QP Margin	AVE Corrct.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.15	0.10	0.02	50.02	66.00	-15.98	26.84	56.00	-29.16
0.150017	0.10	0.02	49.92	66.00	-16.08	27.03	56.00	-28.97
0.15252	0.10	0.02	48.96	65.93	-16.97	26.84	55.93	-29.09
0.2581	0.10	0.08	45.92	62.91	-16.99	40.21	52.91	-12.70
1.7301	0.13	0.08	44.14	56.00	-11.86	38.37	46.00	-7.63
1.7925	0.12	0.09	43.10	56.00	-12.90	36.95	46.00	-9.05
1.9846	0.10	0.09	44.52	56.00	-11.48	32.55	46.00	-13.45
2.1149	0.10	0.09	45.82	56.00	-10.18	38.25	46.00	-7.75
2.4979	0.10	0.10	40.15	56.00	-15.85	38.25	46.00	-7.75

* Note:
Margin = Corrected Amplitude - Limit
Corrected Amplitude = Receiver Reading + LISN Loss + Cable Loss
A margin of -8dB means that the emission is 8dB below the limit

3. Telecommunication Port Conducted Emissions

3.1 Configuration and Procedure

3.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall was 40cm to the rear of the EUT. The excess length of the power cord was folded back and forth at the center of the lead to form a bundle 30cm to 40cm in length. The distance between EUT and CDN is 80cm. CDN is connected to the reference ground plane.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

3.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The content of the software consist of both periodic and pseudo-random messages.

The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

3.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150KHz--30MHz
Detector Function:	Quasi-Peak / Average Mode
Resolution Bandwidth:	9KHz

****Remarks: This EUT has no telecommunication ports, so it is not necessary to be tested.**

4. Radiated Disturbance Emissions

4.1 Configuration and Procedure

4.1.1 EUT Configuration

The equipment under test was set up on a non-conductive table 80cm above ground, on open field or chamber. The excess length of the power cord was folded back and forth at the center of the lead to form a bundle 30cm to 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If EUT has an extra auxiliary AC outlet which can provide power to an external monitor, all measurements will be made with the monitor power from EUT-mounted AC outlet and then from floor-mounted AC outlet.

4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The maximum emission was measured by varying the height of antenna and then by rotating the turntable. Both polarization of antenna, horizontal and vertical, were measured.

The highest emissions between 30 MHz to 1000 MHz were analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

4.1.3 Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	30MHz--1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth:	120KHz

4.2 Test Data:.

Table 4.2.1 Radiated Emissions (Horizontal)

Operator: Benson Chen
Temperature (C): 22
03:57:50 PM, Friday, September 1, 2006 Humidity (%): 50

Frequency	RX_R	Ant_F	Cab_L	PreAmp	Emission	Limit	Margin	Ant.Pos	Table Pos
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg.
95.96	11.00	9.91	1.54	0.00	22.45	30.00	-7.55	177	208
132.82	8.34	11.63	1.75	0.00	21.73	30.00	-8.27	111	134
143.49	7.74	10.85	1.85	0.00	20.44	30.00	-9.56	136	159
165.8	8.84	9.75	2.01	0.00	20.60	30.00	-9.40	331	193
186.17	10.18	9.11	2.13	0.00	21.43	30.00	-8.57	318	238
195.87	12.20	9.12	2.23	0.00	23.55	30.00	-6.45	335	151
288.02	11.13	13.00	2.77	0.00	26.90	37.00	-10.10	164	295
294.81	14.64	13.10	2.81	0.00	30.55	37.00	-6.45	125	232
298.69	12.91	13.17	2.84	0.00	28.93	37.00	-8.07	126	195
331.67	10.20	13.96	2.98	0.00	27.14	37.00	-9.86	136	121
365.62	10.91	14.84	3.20	0.00	28.95	37.00	-8.05	146	118
374.35	9.62	15.08	3.26	0.00	27.95	37.00	-9.05	148	136
397.63	8.70	15.73	3.36	0.00	27.79	37.00	-9.21	155	185
432.55	9.93	16.39	3.55	0.00	29.87	37.00	-7.13	195	257
442.25	7.14	16.56	3.59	0.00	27.29	37.00	-9.71	207	277
491.72	9.13	17.28	3.80	0.00	30.22	37.00	-6.78	178	213
532.46	4.85	18.44	4.05	0.00	27.34	37.00	-9.66	309	135
540.22	7.29	18.69	4.08	0.00	30.06	37.00	-6.94	342	120
639.16	6.08	18.93	4.49	0.00	29.51	37.00	-7.49	198	131
687.66	6.06	18.92	4.70	0.00	29.68	37.00	-7.32	121	111
737.13	4.25	19.57	4.93	0.00	28.75	37.00	-8.25	320	187
875.84	4.39	20.40	5.51	0.00	30.31	37.00	-6.69	254	112
938.89	49.55	20.81	5.66	0.00	76.03	37.00	39.03	227	108
1000	3.43	21.30	5.76	0.00	30.49	37.00	-6.51	206	15

1. The frequency 938.89MH of WCDMA host signal.

* Note:
Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meter, Frequency: under 1000MHz
Horn Antenna Distance: 3 meter, Frequency: 1000MHz—18GHz

Table 4.2.2 Radiated Emissions (Vertical)

Operator: Benson Chen
Temperature (C): 22
03:57:50 PM, Friday, September 1, 2006 Humidity (%): 50

Frequency	RX_R	Ant_F	Cab_L	PreAmp	Emission	Limit	Margin	Ant.Pos	Table Pos
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg.
37.76	5.71	14.12	1.01	0.00	20.84	30.00	-9.16	137	209
44.55	11.35	10.36	1.06	0.00	22.78	30.00	-7.22	282	149
47.46	11.37	9.02	1.09	0.00	21.47	30.00	-8.53	337	142
84.32	12.59	7.76	1.46	0.00	21.81	30.00	-8.19	218	100
95.96	12.10	9.91	1.54	0.00	23.55	30.00	-6.45	177	208
124.09	9.97	12.27	1.69	0.00	23.93	30.00	-6.07	175	72
132.82	9.50	11.63	1.75	0.00	22.88	30.00	-7.12	111	134
143.49	8.65	10.85	1.85	0.00	21.35	30.00	-8.65	136	159
147.37	10.09	10.46	1.92	0.00	22.47	30.00	-7.53	171	277
187.14	10.81	9.09	2.14	0.00	22.04	30.00	-7.96	339	253
294.81	12.35	13.10	2.81	0.00	28.26	37.00	-8.74	125	232
364.65	10.10	14.81	3.19	0.00	28.10	37.00	-8.90	145	116
399.57	8.15	15.79	3.37	0.00	27.30	37.00	-9.70	156	189
430.61	10.08	16.35	3.54	0.00	29.97	37.00	-7.03	193	253
435.46	9.45	16.44	3.56	0.00	29.45	37.00	-7.55	199	263
491.72	6.48	17.28	3.80	0.00	27.57	37.00	-9.43	178	213
499.48	6.77	17.39	3.85	0.00	28.01	37.00	-8.99	171	198
540.22	7.48	18.69	4.08	0.00	30.25	37.00	-6.75	342	120
624.61	4.52	18.85	4.41	0.00	27.78	37.00	-9.22	213	160
639.16	4.74	18.93	4.49	0.00	28.17	37.00	-8.83	198	131
687.66	3.70	18.92	4.70	0.00	27.32	37.00	-9.68	121	111
737.13	4.12	19.57	4.93	0.00	28.62	37.00	-8.38	320	187
884.57	4.23	20.44	5.53	0.00	30.19	37.00	-6.81	272	112
938.89	34.09	20.81	5.66	0.00	60.57	37.00	23.57	227	108

1. The frequency 938.89MH of WCDMA host signal.

* Note:
Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss – Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit
BILOG Antenna Distance: 10 meter, Frequency: under 1000MHz
Horn Antenna Distance: 3 meter, Frequency: 1000MHz—18GHz

5. Appendix

5.1 Appendix A: Measurement Procedure for Main Power Port Conducted Emissions

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum measurement. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

5.2 Appendix B: Measurement Procedure for Telecommunication Port Conducted Emissions

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

The EUT, any support equipment, and any interconnecting cables were arranged and moved to get the maximum measurement.

Power to the EUT was provided through the LISN which has the Impedance (50 Ohm/50uH) vs. Frequency Characteristic in accordance with the standard. Power to the LISN was filtered to eliminate ambient signal interference and this filter was bonded to ground. Peripheral equipment to provide a functional system (support equipment) for EUT testing was powered through a ganged, metal power outlet box bonded to the ground. AC input power for the auxiliary power outlets was obtained from the same filtered source that provides input power to the LISN.

If the EUT is supplied with a flexible power cord, if the power cord length in excess of 1 m, the excess cable shall be bundled at approximate center of the power cord with the bundles 30 cm to 40 cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall be 1 meter in length. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information could be useful in reducing their amplitude.

5.3 Appendix C: Test Procedure for Radiated Emissions

Preliminary Measurements in the Anechoic Chamber

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

Measurements on the Open Site or Chamber

The radiated emissions test will then be repeated on the open site or chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum measurement. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

5.4 Appendix D: Test Equipment

5.4.1 Test Equipment List

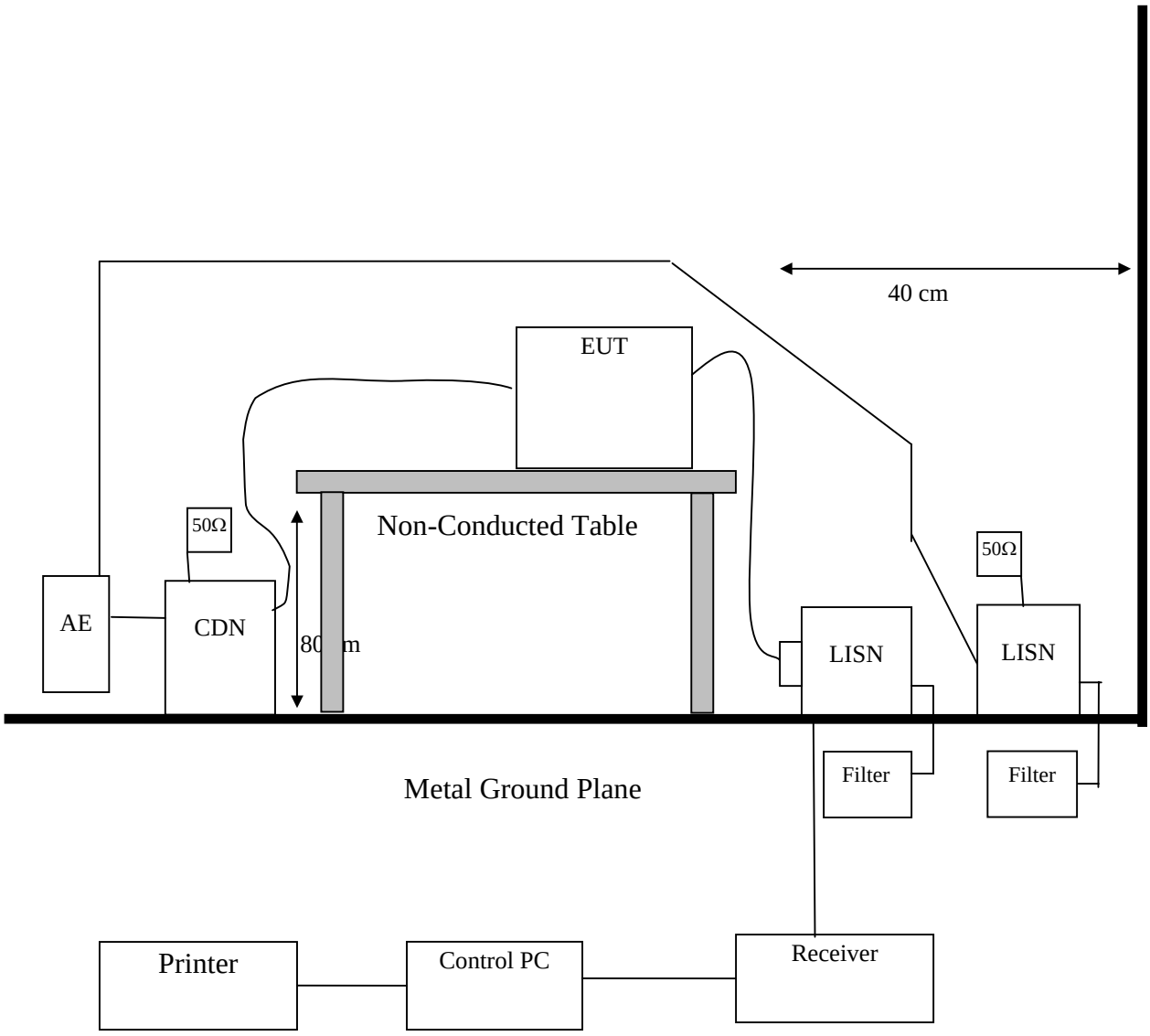
Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Capacitive Voltage Probe	FCC Inc.	F-CVP-1	68	07/11/2006	07/11/2007
Conduction	Current Probe	Schaffner	SMZ 11	18030	01/24/2006	01/24/2007
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conductio n02	11/30/2004	11/30/2006
Conduction	EMI Receiver 03	HP	85460A	3448A00209	03/24/2006	03/24/2007
Conduction	ISN T4	Schaffner	ISN T400	16593	12/29/2005	12/29/2006
Conduction	ISN T4 02	FCC	F-CMISN-CA T5	02003	12/29/2005	12/29/2006
Conduction	LISN 04	EMCO	3810/2	9604-1429	12/30/2005	12/30/2006
Conduction	LISN 06	R&S	ESH3-Z5 831.5518.52	828874/009	12/13/2005	12/13/2006
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/12/2006	06/12/2007
Radiation	Coaxial Cable Chmb 02-10M	MIYAZAKI	8D-FB	Chmb 02-10M	07/12/2006	07/12/2007
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	11/30/2004	11/30/2006
Radiation	EMI Receiver 02	HP	85460A	3448a00183	10/05/2005	10/05/2006
Radiation	Loop Antenna 01	R&S	HFH2-Z2	881056/46	02/25/2006	02/25/2007
Radiation	Spectrum Analyzer 13	Advantest	R3182	121200411	02/17/2006	02/17/2007
Rad. Above 1Ghz	Horn Antenna 02	Com-Power	AH-118	10088	07/22/2006	07/22/2007
Rad. Above 1Ghz	Horn Antenna 04	Com-Power	AH-826	081-001	03/24/2006	03/24/2007
Rad. Above 1Ghz	Horn Antenna 05	Com-Power	AH-640	100A	09/30/2005	09/30/2006
Rad. Above 1Ghz	Microwave Cable RF SK-01	HUBER+SUH NER AG.	Sucoflex 102	22139 /2	10/17/2005	10/17/2006
Rad. Above 1Ghz	Preamplifier 02	MITEQ	AFS44-00102 650-40-10P-44	728229	11/28/2005	11/28/2006
Rad. Above 1Ghz	Preamplifier 10	MITEQ	JS-26004000-2 7-5A	818471	N/A	N/A
Rad. Above 1Ghz	Spectrum Analyzer 07	Advantest	R3182	110600649	04/20/2006	04/20/2007

5.4.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

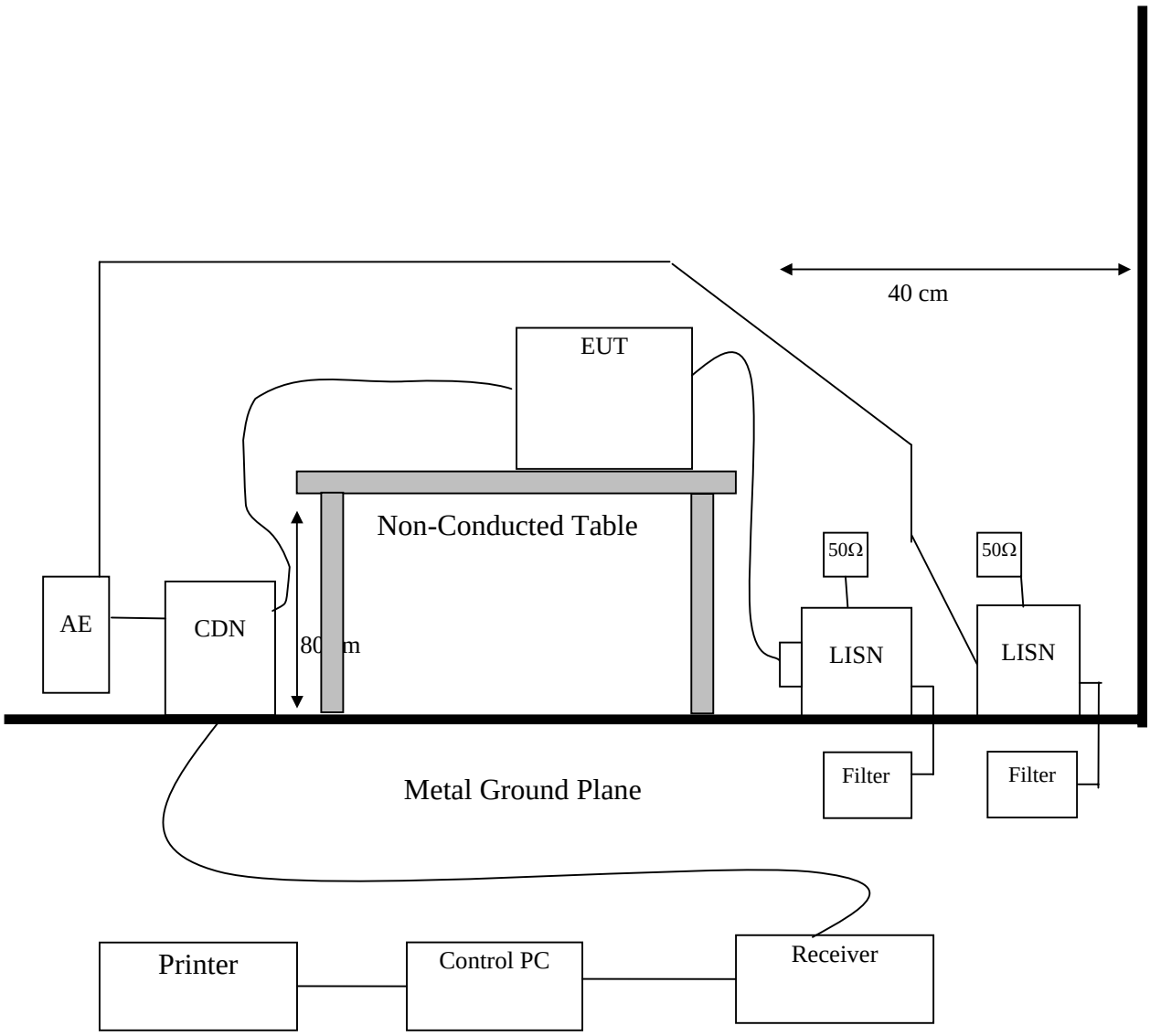
Radiation/Conduction	Filename	Version	Issued Date
Hsichih Conduction	Tile.exe	2.0.P	2/12/2002
Hsichih Radiation	Tile.exe	2.0.P	2/12/2002
Lung_Tan Conduction	Tile.exe	2.3.B	12/30/2003
Lung_Tan Radiation	Tile.exe	2.3.B	12/30/2003

5.5 Appendix E: Layout of EUT and Support Equipment

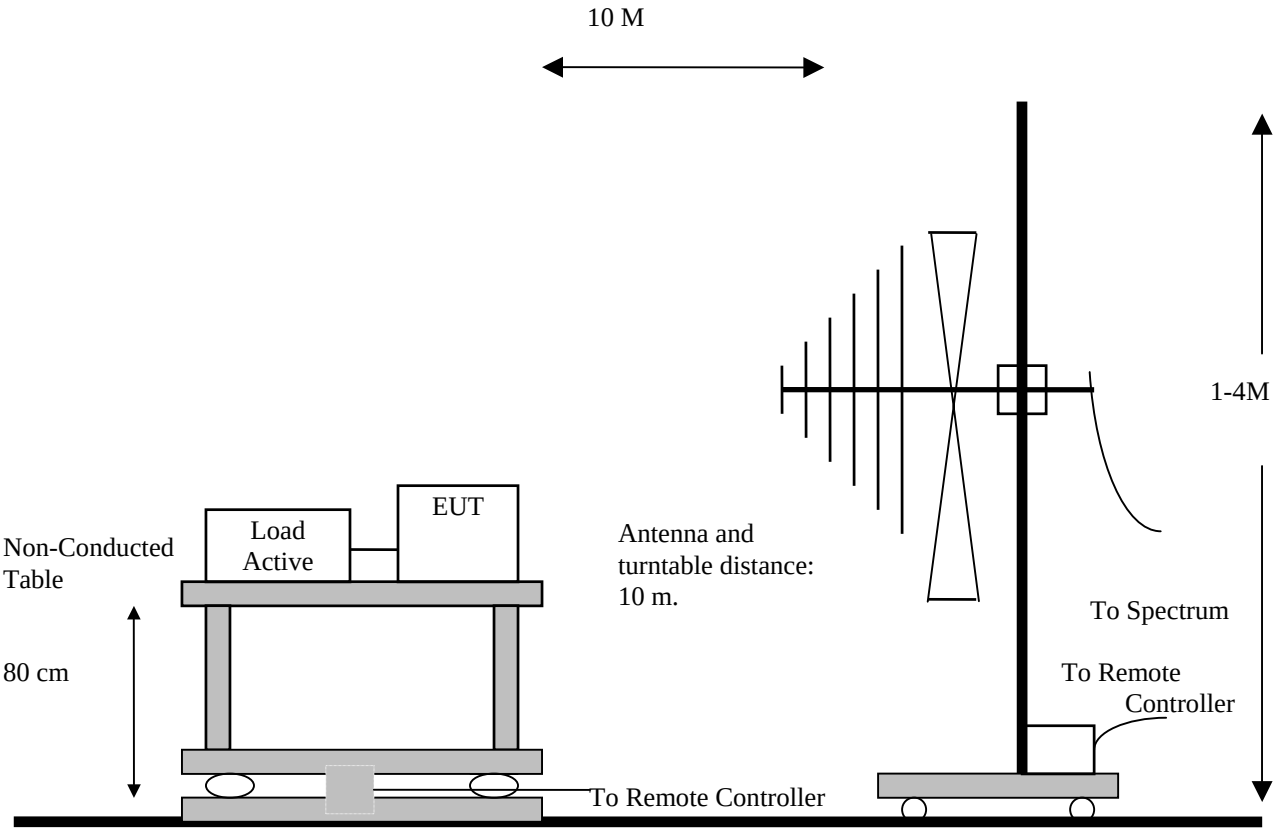
5.5.1 General Power Main Port Conducted Test Configuration



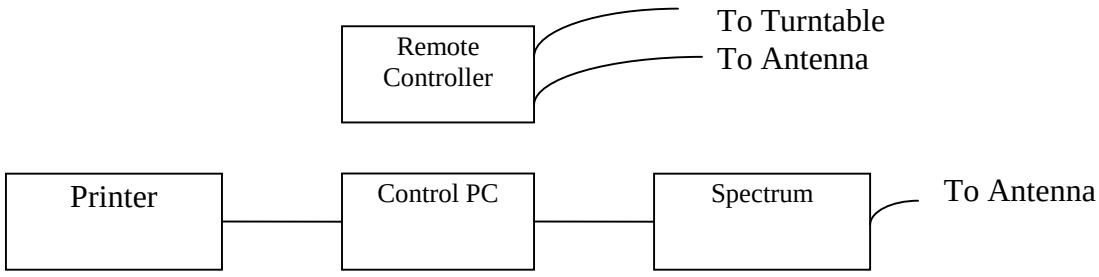
5.5.2 General Telecommunication Port Conducted Emission Test Configuration



5.5.3 General Radiation Test Configuration



Metal Full Soldered Ground Plane



5.6 Appendix F: Description of Support Equipment

5.6.1 Description of Support Equipment

SUPPORT UNIT 1

Description:	DELL Notebook Personal Computer
Model:	Latitude D400
Serial Number:	N/A
CPU:	Pentium M- 1.5GHz(FSB 400 MHz)
A/C Adapter Type:	HIPRO 65W(Model:HP-OQ065B83)3 Pins
Hard Disk Driver:	Toshiba (Model: MK4019GAX) 40 GB
MDC Modem:	Conexant (Model: RD01-D480)
VGA Connector:	One 15 Pins
Serial Connector:	One 9 Pins
RJ11 Connector:	One 2 Pins
RJ45 Connector:	One 8 Pins
USB Connector:	Two 4 Pins
1394 Connector:	One 4 Pins
Smart Card Slot:	One
PCMCIA Slot:	One
Earphone Port:	One
Microphone Port:	One
Power In Port:	One
Battery:	Sanyo 6-cell (Model: 6T087)
RAM:	Nanya DDR 256MB x 1
LCD Panel and Inverter:	Toshiba 12.1”XGA (Model: LTM12C505D)；RICOH KEIKI Inverter (Model: K3E19T5 0090)
Power Cord:	Non-shielded, Detachable

SUPPORT UNIT 2

Description:	24” LCD Monitor
Manufacturer :	DELL
Model Number:	2405FPW
Serial Number	N/A
Power Supply Type:	AC 100~240V 50~60Hz
DC Output Port:	one
VGA Port:	one
DVI Port:	one
Power In:	one
USB Port:	five
Video Port:	one
S-Video In:	one
Y/PB/PR Port:	one
CF Port:	one
SM Port:	one
MS Port:	one
SD/MMC Port:	one
FCC ID:	N/A
Power Cable:	Non-shielded, Detachable

SUPPORT UNIT 3

Description:	External HDD
Model:	F12-UF
Serial Number:	NA
Power Adaptor:	YHI(Model:YS-1015U12)
1394 Port:	one 6-Pins
USB:	one 4-Pins
Power In:	one
Power Cable:	Non-shielded, Detachable, (Can Dismantle)

SUPPORT UNIT 4

Description:	External HDD
Model:	F12-UF
Serial Number:	NA
Power Adaptor:	YHI(Model:YS-1015U12)
1394 Port:	one 6-Pins
USB:	one 4-Pins
Power In:	one
Power Cable:	Non-shielded, Detachable, (Can Dismantle)

SUPPORT UNIT 5

Description:	External HDD
Model:	F12-UF
Serial Number:	NA
Power Adaptor:	YHI(Model:YS-1015U12)
1394 Port:	one 6-Pins
USB:	one 4-Pins
Power In:	one
Power Cable:	Non-shielded, Detachable, (Can Dismantle)

SUPPORT UNIT 6

Description:	Aceex Modem (for serial interface port)
Model Number:	DM1414
Serial Number:	0301000558
Power Supply Type:	Linear, Power Adapter (AC to AC Xfmr, Wall Mounted Type)
Power Cord:	Nonshielded, Without Grounding Pin
FCC ID:	IFAXDM1414

SUPPORT UNIT 7

Description:	HP Printer (for parallel interface port)
Model Number:	C2642A
Serial Number:	TH84T1N3J3
Power Supply Type:	AC Adaptor (HP Model: C2175A)
Power Cord:	Non-shielded, Detachable
Data Cable:	Shielded, Detachable, With Metal Hood
FCC ID:	B94C2642X

SUPPORT UNIT 8

Description:	ATA Microphone and HeadSet
Model Number:	1221K
Serial Number:	N/A
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	N/A

SUPPORT UNIT 9

Description:	ATA Flash Card
Model Number:	VIKING 32MB
Serial Number:	N/A
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	N/A (Comply with FCC DOC)

SUPPORT UNIT 10

Description：	Wireless LAN/Broadband/ISDN Router
Model：	914I
Serial Number：	N/A
AC-AC Adaptor：	OEM (Model: AA-091ABM) 2-pin
Power Cord：	Non-shielded, Detachable

SUPPORT UNIT 11

Description:	Bluetooth Access Point with Broadband Router
Model**:**	Billionton
FCC ID:	NLF-APBTCS1
Serial Number:	06042600001
AC-AC Adaptor:	SPEC LIN (Model: SL05A106-U) 2-pin
Power Cord：	Non-shielded, Detachable

5.6.2 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

1. Send H pattern to the displays.(Monitor).
2. Read and write data the EUT hard disk.
3. Read and write data the external hard disk through EUT USB port.
4. Read and write data the PCMCIA Card through PCMCIA Slot.
5. Send signal to the parallel port.(printer).
6. Send signal to the serial port.(Modem).
7. Send audio signal to the Microphone and HeadSet through Headphone Port.
8. Receive audio signal from Microphone and HeadSet through Microphone Port.
9. Play movie file from optic drive(DVD-ROM).
10. Receive and transmit package of EUT to the NB through LAN port.
11. Receive and transmit packet of EUT to wireless router through wireless LAN.
12. Receive and transmit signal of EUT to the NB through exchanger and modem port.
13. Receive and transmit signal of EUT to Bluetooth Access Point with Broadband Router.
14. Receive and transmit packet to EUT through WCDMA card.
15. Repeat the steps above.

	Filename	Issued Date
Monitor	EMITEST.EXE	5/1/1990
External Hard Disk Case	Winthrax.exe	5/21/1996
Optical Driver	Windows Media player.exe	2002/12/26
Hard Disk	Winthrax.exe	5/21/1996
Printer	EMITEST.EXE	5/1/1990
Modem	EMITEST.EXE	5/1/1990
Microphone and HeadSet	Windows Media player.exe	2002/12/26
LAN	Ping.exe	
Telephone	Hypertrm.exe	06/08/2000
Wireless LAN/Broadband/ISDN Router	Ping.exe	
Bluetooth Access Point with Broadband Router	Ping.exe	
PCMCIA Card	Winthrax.exe	5/21/1996
WCDMA card	Mobilink Network Connection Manager	3/15/2006

5.6.3 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cable	110V (~240V) to EUT SPS	1.8M	Non-shielded, Detachable	Plastic Head
Telephone Data Cable	EUT RJ 11 to NB RJ 11 Port	33 feet	Non-shielded, Detachable	RJ-11, Plastic Head
LAN Data Cable	EUT LAN Port to NB LAN Port	33 feet	Non-shielded, Detachable	RJ-45, Plastic Head
Monitor Data Cable	Monitor to D-SUB Port EUT VGA Port	1.8M	Shielded, Detachable (with core)	Metal Head
Printer Data Cable	Printer to EUT parallel Port	1.8M	Shielded, Detachable	Metal Head
Audio Data Cable	Microphone and HeadSet to EUT Line In Port and Line Out Port	2.0M	Non-shielded, Un-Detachable	Plastic Head
USB Data Cable *2	USB external hard disk to EUT USB Port	1.8M	Shielded, Un-detachable	Metal Head
1394B Data Cable	USB external hard disk to EUT 1394B Port	1.2M	Shielded, Un-detachable	Metal Head
Modem Data Cable	Modem to EUT serial Port	1.8M	Shielded, Detachable	Metal Head

5.7 Appendix G: Description of Equipment Under Test

EUT

Description:	Notebook Personal Computer
Condition:	Pre-Production
Model:	M230
Serial Number:	N/A
CPU:	Intel YONAH,1.667GHZ
Adapter Type:	Auto Switching AC Adapter EPS (Model: F10903-A)
Hard Disk Driver:	Toshiba (Model:MK4032GSX) 40G or Toshiba (Model:MK8032GSX) 80G or Toshiba (Model:MK1234GSX) 120G
DVD Dual:	Panasonic (Model:UJ-840) or Panasonic (Model:UJ-850)
Modem Card:	ASKEY (Model: RD-02-D330)
Wireless LAN Card:	Intel(Model:WM3945ABG)
WCDMA card:	Novatel(Model:EU740)
Bluetooth Module:	Tecom(Model:BT3014)
USB Connector:	two 4 pin
RJ11 Connector:	one 2 pin
Serial Port:	one 9 pin
RJ45 Connector:	one 8 pin(10/100Mbps)
Parallel Port:	one 25 pin
VGA Connector:	one
Line out Port:	one
Line-in Port:	one
PCMCIA Slot:	two
DC IN Port:	one
1394B Port:	one
Battery:	MSL (Model: BP-LC2400/33-01SI)
LCD:	CHI MEI(Model:N150P5-L02 Rev C1) or Toshiba(Model: LTD141ECGA)
DDR:	Infineon(Model:PC2-4200S-444-11-AD) 512MB
Power Cord:	Non-shielded, Detachable

Test configuration:

configuration	LCD	LAN speed	CPU	Adapter Type	Hard Disk	DVD Dual	Modem Card	Wireless LAN Card	Battery	DDR
1	CHI MEI(Model:N150P5-L02 Rev C1)	100 Mbps	Intel YONAH, 1.667 GHZ	EPS (Model: F10903-A)	Toshiba (Model:MK1234GSX)	Panasonic (Model: UJ-850)	ASKEY (Model: RD-02-D330)	Intel (Model: WM3945ABG)	MSL (Model: BP-LC2400/33-01SI)	Infineon(Model:PC2-4200S-444-11-AD)
2	Toshiba(Model: LTD141ECGA)	100 Mbps	Intel YONAH, 1.667 GHZ	EPS (Model: F10903-A)	Toshiba (Model:MK1234GSX)	Panasonic (Model: UJ-840)	ASKEY (Model: RD-02-D330)	Intel(Model:WM3945ABG)	MSL (Model: BP-LC2400/33-01SI)	Infineon Model:PC2-4200S-444-11-AD)
3	CHI MEI(Model:N150P5-L02 Rev C1)	10 Mbps	Intel YONAH, 1.667 GHZ	EPS (Model: F10903-A)	Toshiba (Model:MK4032GSX)	Panasonic (Model: UJ-850)	ASKEY (Model: RD-02-D330)	Intel(Model:WM3945ABG)	MSL (Model: BP-LC2400/33-01SI)	Infineon(Model:PC2-4200S-444-11-AD)
4	Toshiba(Model: LTD141ECGA)	10 Mbps	Intel YONAH, 1.667 GHZ	EPS (Model: F10903-A)	Toshiba (Model:MK8032GSX)	Panasonic (Model: UJ-840)	ASKEY (Model: RD-02-D330)	Intel(Model:WM3945ABG)	MSL (Model: BP-LC2400/33-01SI)	Infineon(Model:PC2-4200S-444-11-AD)

All types of LCD、LAN speed、CPU、Adapter Type、Hard Disk、DVD Dual、Modem Card、Wireless LAN Card、Battery、DDR with related components have been tested, only shown the worst data using the following configuration in this report.

configuration	LCD	LAN speed	CPU	Adapter Type	Hard Disk	DVD Dual	Modem Card	Wireless LAN Card	Battery	DDR
1	CHI MEI(Model:N150P5-L02 Rev C1)	100 Mbps	Intel YONAH,1.667GHZ	EPS (Model: F10903-A)	Toshiba (Model:MK1234GSX)	Panasonic (Model:UJ-850)	ASKEY (Model: RD-02-D330)	Intel(Model:WM3945ABG)	MSL (Model: BP-LC2400/33-01SI)	Infineon(Model:PC2-4200S-444-11-AD)

EMI Noise Source:
Crystal: 25MHz (X501),98.3MHz(X502), 10MHz (X503),14.318MHz (X504), 32.768KHz (X505),27MHz(X506),
Clock Generator: U523

EMI Solution:
1. Adding Spring*6 on main board(whether if photograph report enclosure page 4 getting red arrow 1,2,3,4,5,6 point show)
2. Adding Spring*3 on I/O Board(whether if photograph report enclosure page 7 getting red arrow 7,8,9 point show)
3. Adding Gasket on I/O Board(whether if photograph report enclosure page 7 getting red arrow 10 point show)
4. Adding Copper on main board(right side)(whether if photograph report enclosure page 7 getting red arrow 11 point show)
5. Adding shielded tape on LCD Signal cable(whether if photograph report enclosure page 17 getting red arrow 12 point show)
6. Adding shielded tape on case(whether if photograph report enclosure page 18 getting red arrow 16,17 point show)
7. Adding Gasket on case(whether if photograph report enclosure page 18 getting red arrow 14,15,18,19 point show)
8. Adding Copper on Panel board(whether if photograph report enclosure page 18 getting red arrow 13 point show)
9. Adding Copper on LCD Panel behind(whether if photograph report enclosure page 19 getting red arrow 21 point show)
10. Adding aluminum foil on LCD Panel behind (whether if photograph report enclosure page 19 getting red arrow 20 point show)
11. Adding core(K5B RH 14.2*28.5*8) on 1394B data cable (whether if photograph report enclosure page 35 getting red arrow 22,23 point show)

5.8 Appendix H: Uncertainty of Measurement

The measurement uncertainties mentioned below refer to CISPR 16-4: 2002 Uncertainty in EMC measurements.

Test Site: Conduction 02

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=1	0.058	k=1	0.058
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.144	k=1	0.072
3	Receiver: Sine wave voltage	Normal	k=2	0.500	k=2	0.250
4	Receiver: Pulse amplitude response	Rectangular	k=1.73	0.500	k=1	0.289
5	Receiver: Pulse repetition rate response	Rectangular	k=1.73	0.500	k=1	0.289
6	Receiver: Noise floor proximity	Normal	k=1.73	0.500	k=1	0.250
7	LISN Loss Calibration	Normal	k=2	1.200	k=1	0.600
8	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
9	Combined Standard Uncertainty Uc(y)	Normal			k=1	0.954
10	**Total Uncertainty @95% minimum Confidence Level**	**Normal**			**k=2**	**1.908**

Measurement Uncertainty Calculations:
Uc (y) = square root ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)
U = 2 * Uc (y)

Test Site: Chamber 02-10M (30M~1GHz)

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
			k	(dB)	k	(dB)
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	1	0.067	1	0.067
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	1	0.103	1	0.103
3	Antenna Factor Calibration	Normal	2	1.400	1	0.700
4	Receiver: Sine wave voltage	Normal	2	0.470	1	0.235
5	Receiver: Pulse amplitude response	Rectangular	1.73	1.600	1	0.925
6	Receiver: Pulse repetition rate response	Rectangular	1.73	0.400	1	0.231
7	Receiver: Noise floor proximity	Normal	2	0.500	1	0.250
8	Mismatch: antenna-receiver	U-shaped	1.5	1.000	1	0.667
9	Antenna: AF freq. Interpolation	Rectangular	1.73	0.300	1	0.173
10	Antenna: Directivity difference	Rectangular	1.73	1.000	1	0.578
11	Antenna: Balance	Rectangular	1.73	0.300	1	0.173
12	Site separation distance	Rectangular	1.73	0.300	1	0.173
13	Cable Loss Calibration	Normal	2	1.000	1	0.500
14	Combined Standard Uncertainty Uc(y)	Normal			1.000	1.628
15	**Total Uncertainty @95% minimum Confidence Level**	**Normal**			**2.000**	**3.256**

Measurement Uncertainty Calculations:
Uc (y) = square root ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)
U = 2 * Uc (y)

Test Site: Chamber 02-3M (1G~18Ghz)

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
			k	(dB)	k	(dB)
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	1	0.039	1	0.039
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	1	0.072	1	0.072
3	Antenna Factor Calibration	Normal	2	1.700	1	0.850
4	Receiver: Sine wave voltage	Normal	2	0.470	1	0.235
5	Receiver: Pulse amplitude response	Rectangular	1.73	1.600	1	0.925
6	Receiver: Pulse repetition rate response	Rectangular	1.73	0.400	1	0.231
7	Receiver: Noise floor proximity	Normal	2	0.500	1	0.250
8	Mismatch: antenna-receiver	U-shaped	1.5	1.000	1	0.667
9	Antenna: AF freq. Interpolation	Rectangular	1.73	0.300	1	0.173
10	Antenna: Directivity difference	Rectangular	1.73	1.000	1	0.578
11	Antenna: Balance	Rectangular	1.73	0.300	1	0.173
12	Site separation distance	Rectangular	1.73	0.300	1	0.173
13	Cable Loss Calibration	Normal	2	1.000	1	0.500
14	Combined Standard Uncertainty Uc(y)	Normal			1.000	1.695
15	**Total Uncertainty @95% minimum Confidence Level**	**Normal**			**2.000**	**3.391**

Measurement Uncertainty Calculations:

$Uc(y) = \text{square root}\ (u_1(y)^2 + u_2(y)^2 + \ldots\ldots\ldots + u_n(y)^2)$

$U = 2 * Uc(y)$

Test Site: Chamber 02-3M (18G~26Ghz)

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
			k	(dB)	k	(dB)
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	1	0.060	1	0.060
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	1	0.094	1	0.094
3	Antenna Factor Calibration	Normal	2	2.000	1	1.000
4	Receiver: Sine wave voltage	Normal	2	0.470	1	0.235
5	Receiver: Pulse amplitude response	Rectangular	1.73	1.600	1	0.925
6	Receiver: Pulse repetition rate response	Rectangular	1.73	0.400	1	0.231
7	Receiver: Noise floor proximity	Normal	2	0.500	1	0.250
8	Mismatch: antenna-receiver	U-shaped	1.5	1.000	1	0.667
9	Antenna: AF freq. Interpolation	Rectangular	1.73	0.300	1	0.173
10	Antenna: Directivity difference	Rectangular	1.73	1.000	1	0.578
11	Antenna: Balance	Rectangular	1.73	0.300	1	0.173
12	Site separation distance	Rectangular	1.73	0.300	1	0.173
13	Cable Loss Calibration	Normal	2	1.000	1	0.500
14	Combined Standard Uncertainty Uc(y)	Normal			1.000	1.777
15	**Total Uncertainty @95% mim. Confidence Level**	**Normal**			**2.000**	**3.554**

Measurement Uncertainty Calculations:

Uc (y) = square root ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)

U = 2 * Uc (y)

Test Site: Chamber 02-3M (26G~40Ghz)

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
			k	(dB)	k	(dB)
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	1	0.044	1	0.044
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	1	0.089	1	0.089
3	Antenna Factor Calibration	Normal	2	2.000	1	1.000
4	Receiver: Sine wave voltage	Normal	2	0.470	1	0.235
5	Receiver: Pulse amplitude response	Rectangular	1.73	1.600	1	0.925
6	Receiver: Pulse repetition rate response	Rectangular	1.73	0.400	1	0.231
7	Receiver: Noise floor proximity	Normal	2	0.500	1	0.250
8	Mismatch: antenna-receiver	U-shaped	1.5	1.000	1	0.667
9	Antenna: AF freq. Interpolation	Rectangular	1.73	0.300	1	0.173
10	Antenna: Directivity difference	Rectangular	1.73	1.000	1	0.578
11	Antenna: Balance	Rectangular	1.73	0.300	1	0.173
12	Site separation distance	Rectangular	1.73	0.300	1	0.173
13	Cable Loss Calibration	Normal	2	1.000	1	0.500
14	Combined Standard Uncertainty Uc(y)	Normal			1.000	1.776
15	**Total Uncertainty @95% mim. Confidence Level**	**Normal**			**2.000**	**3.553**

Measurement Uncertainty Calculations:

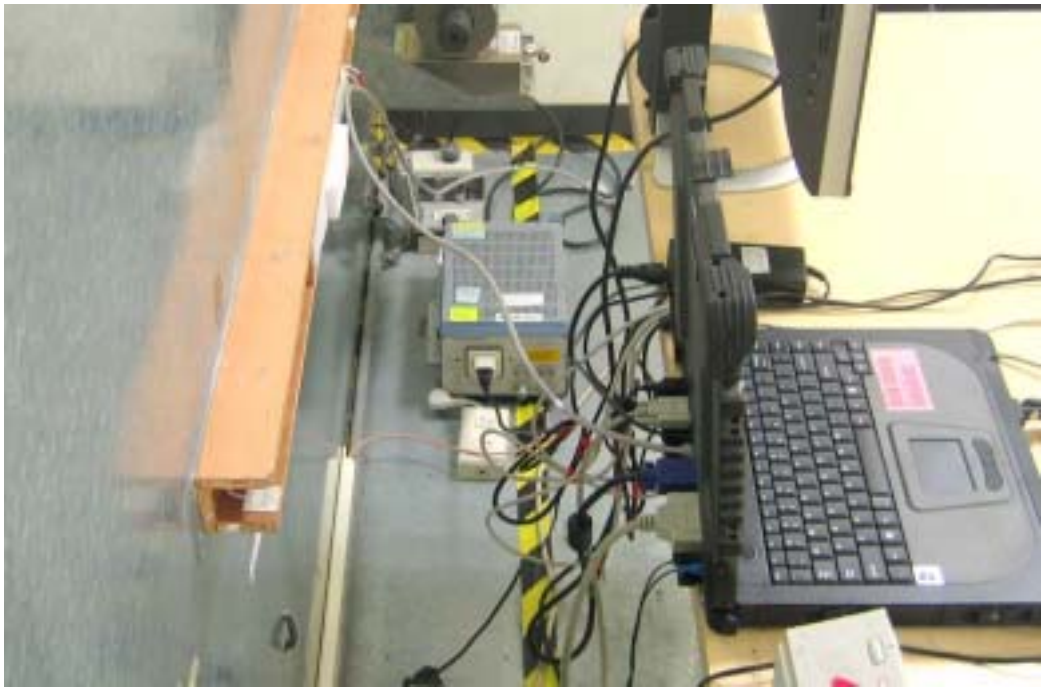
Uc (y) = square root ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)

U = 2 * Uc (y)

5.9 Appendix I: Photographs of EUT Configuration Test Set Up

Front View of Highest Main Power Port Conducted Emission and Telecommunication Port Conducted Emission

Back View of Highest Main Power Port Conducted Emission and Telecommunication Port Conducted Emission



Front View of Highest Radiated Emission Test.

Back View of Highest Radiated Emission Test.