TEST REPORT

of

FCC Part 15 Subpart C

Product : Notebook Computer
(with Wacom Digitizer, Model: SU5E-05W01AU-01X)

Model: **TP00006A**

Brand: lenovo

Applicant: Wistron Corporation

Address: 21th Fl., 88, Sec.1, Hsin Tai Wu Rd.,
Hsichih, Taipei Hsien 221,
Taiwan, R.O.C.

Test Performed by:

International Standards Laboratory
<Lung-Tan LAB>
*Site Registration No.
BSMI: SL2-IN-E-0013; TAF: 0997;IC: IC4067B-1;
VCCI: R-1435, C-1440, T-299, R-2598, C-2845; NEMKO: ELA 113B
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
*Tel : 886-3-407-1718; Fax: 886-3-407-1738

Report No.: **ISL-09LR030FC**
Issue Date : **2009/11/10**

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart C
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	Notebook Computer
Model:	TP00006A
Applied by:	Wistron Corporation
Sample received Date:	2009/10/26
Final test Date :	2009/11/07
Test Result	PASS
Test Site:	Chamber 12, Conduction 03
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
Test Engineer:	Jerry Chiou

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 measurements of the characteristics and the energy 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

Jim Chu/ Director

2. Test Results Summary

The device functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.209	Radiated Emissions 9KHz – 1 GHz	Pass	

3. Description of Equipment Under Test (EUT)

Description: Notebook Computer
Model: TP00006A
Digitizer: Wacom (Model: SU5E-05W01AU-01X)
Digitizer Power Type : 3.3V DC from the host

The operation frequency of Digitizer (SU5E-05W01AU-01X) is listed below:

Frequency(KHz)
531.25
562.5
593.75

Test Configuration

	Configuration 1 (Dual Display)	Configuration 2 (Single Display)
CPU	Intel 2.00GHz	Intel 2.00GHz
LCD	LGD (17"WXGA, Model:LP171WP9-TLB2)+ TMD (10.6"WXGA, Model:LT106DEVDB00)	Samsung (17"WUXGA, Model:LTN170CT08-L01)
Hard Disk Device	FUJITSU 320GB (Model: MJA2320BH) *2	FUJITSU 320GB (Model: MJA2320BH) *2
Power Supply	Lenovo100-240V~, 3.5A (Model: 45N0064) 3pin	Lenovo100-240V~, 3.5A (Model: 45N0060) 3pin

4. TEST RESULTS

4.1 Power line Conducted Emissions [Section 15.207]

4.1.1 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 of the shielded room was located 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 used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 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 the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

4.1.2 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 the 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.

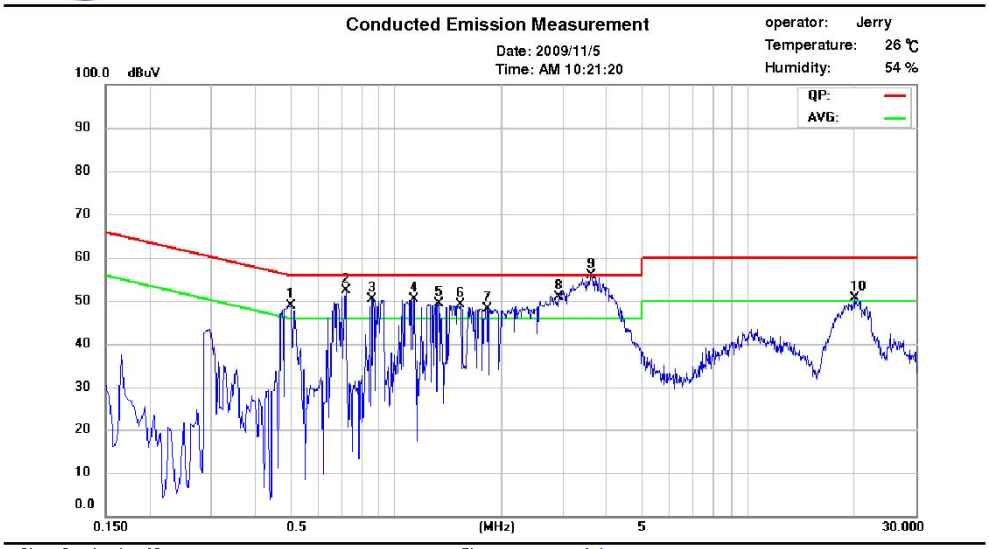
4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 Configuration 1 Test Data:

Power Line Conducted Emissions (Hot) Lowest, Middle, Highest channel

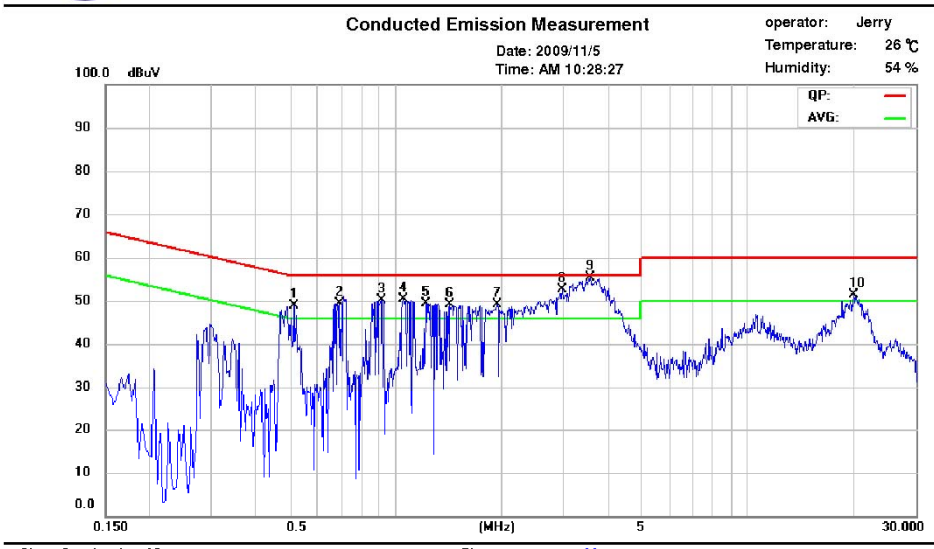
Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road,Lung-Tan Hsiang,
Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718



No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.5088	0.11	0.02	47.97	56.0	-8.03	37.13	46.0	-8.87	
2	0.7213	0.12	0.02	49.19	56.0	-6.81	34.55	46.0	-11.4	
3	0.8576	0.12	0.03	48.82	56.0	-7.18	35.35	46.0	-10.6	
4	1.1294	0.12	0.03	48.82	56.0	-7.18	33.32	46.0	-12.6	
5	1.3235	0.12	0.04	47.41	56.0	-8.59	29.92	46.0	-16.0	
6	1.5283	0.13	0.05	47.33	56.0	-8.67	31.08	46.0	-14.9	
7	1.7960	0.13	0.05	46.01	56.0	-9.99	28.28	46.0	-17.7	
8	2.8704	0.13	0.08	46.93	56.0	-9.07	29.59	46.0	-16.4	
9	3.5640	0.14	0.09	52.76	56.0	-3.24	36.73	46.0	-9.27	
10	20.1006	0.41	0.18	43.37	60.0	-16.6	34.13	50.0	-15.8	

Power Line Conducted Emissions (Neutral) Lowest, Middle, Highest channel

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road,Lung-Tan Hsiang,
Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718



Site: Conduction 03 Phase: N

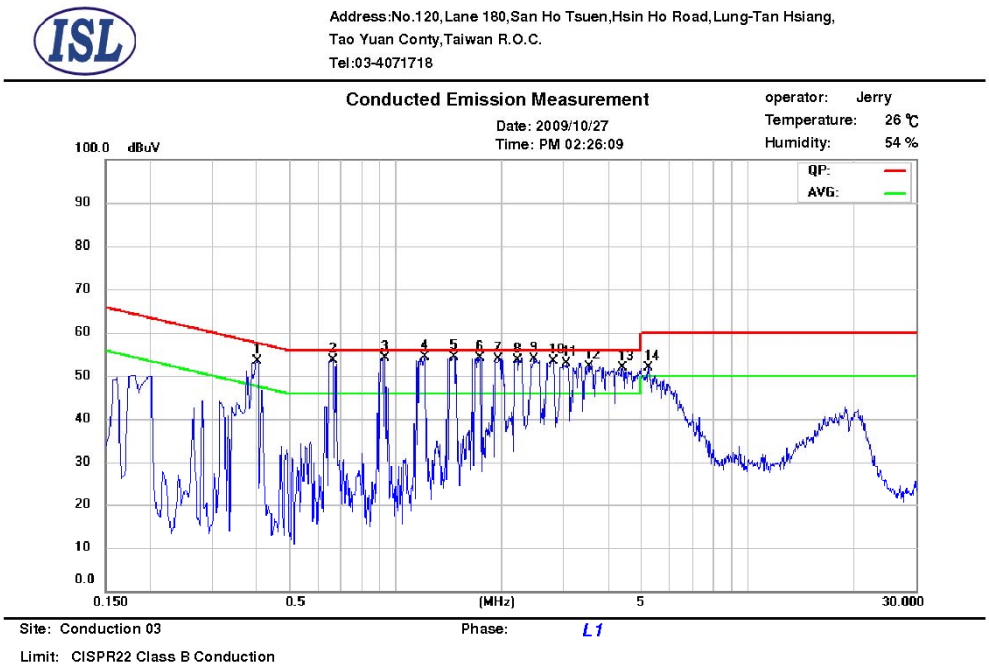
Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.5146	0.09	0.02	47.65	56.0	-8.35	34.41	46.0	-11.5	
2	0.7030	0.08	0.02	48.44	56.0	-7.56	33.54	46.0	-12.4	
3	0.9193	0.08	0.03	49.24	56.0	-6.76	35.00	46.0	-11.0	
4	1.0450	0.08	0.03	48.68	56.0	-7.32	34.39	46.0	-11.6	
5	1.2247	0.08	0.04	47.24	56.0	-8.76	31.03	46.0	-14.9	
6	1.4192	0.08	0.04	47.70	56.0	-8.30	33.12	46.0	-12.8	
7	1.9391	0.09	0.06	46.54	56.0	-9.46	30.00	46.0	-16.0	
8	2.9571	0.1	0.08	50.35	56.0	-5.65	35.86	46.0	-10.1	
9	3.5768	0.11	0.09	53.42	56.0	-2.58	37.82	46.0	-8.18	
10	20.0593	0.48	0.18	43.92	60.0	-16.0	34.48	50.0	-15.5	

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between Lowest, Middle, Highest to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

4.1.5 Configuration 2 Test Data:

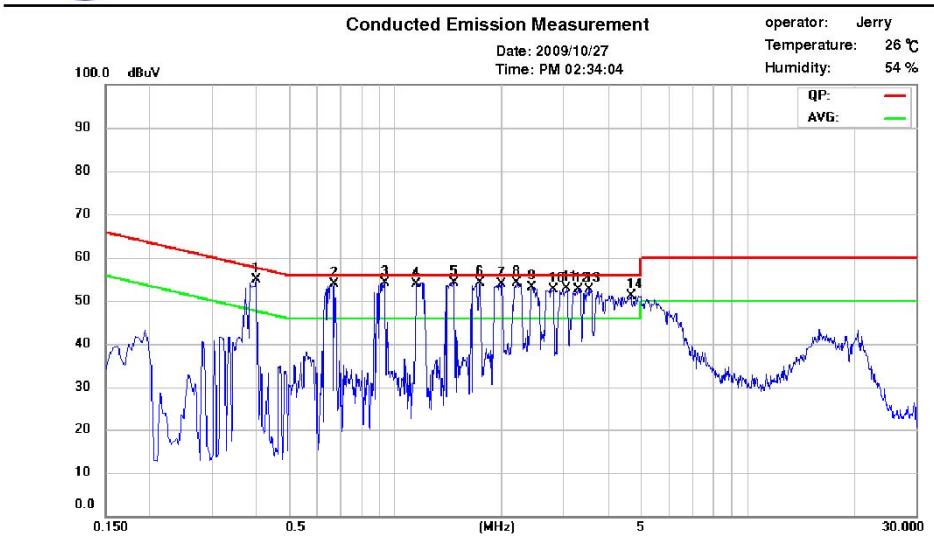
Power Line Conducted Emissions (Hot) Lowest, Middle, Highest channel



No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.4022	0.11	0.02	52.58	57.8	-5.23	43.32	47.8	-4.49	
2	0.6634	0.11	0.02	52.69	56.0	-3.31	42.39	46.0	-3.61	
3	0.9381	0.12	0.03	53.14	56.0	-2.86	39.49	46.0	-6.51	
4	1.2084	0.12	0.04	52.56	56.0	-3.44	36.13	46.0	-9.87	
5	1.4750	0.12	0.04	47.20	56.0	-8.80	26.38	46.0	-19.6	
6	1.7345	0.13	0.05	51.75	56.0	-4.25	33.36	46.0	-12.6	
7	1.9921	0.13	0.06	52.51	56.0	-3.49	36.90	46.0	-9.10	
8	2.2125	0.13	0.06	51.40	56.0	-4.60	34.26	46.0	-11.7	
9	2.4565	0.13	0.07	50.84	56.0	-5.16	33.79	46.0	-12.2	
10	2.8047	0.13	0.08	51.56	56.0	-4.44	36.30	46.0	-9.70	
11	3.0722	0.14	0.08	51.18	56.0	-4.82	35.59	46.0	-10.4	
12	3.5470	0.14	0.09	48.85	56.0	-7.15	31.94	46.0	-14.0	
13	4.4106	0.14	0.1	48.27	56.0	-7.73	34.25	46.0	-11.7	
14	5.1918	0.15	0.11	46.84	60.0	-13.1	33.60	50.0	-16.4	

Power Line Conducted Emissions (Neutral) Lowest, Middle, Highest channel

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road,Lung-Tan Hsiang,
Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718



Site: Conduction 03 Phase: N

Limit: CISPR22 Class B Conduction

No.	Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct. dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
1	0.3983	0.09	0.01	52.71	57.8	-5.18	45.14	47.8	-2.75	
2	0.6637	0.09	0.02	52.69	56.0	-3.31	42.74	46.0	-3.26	
3	0.9381	0.08	0.03	52.30	56.0	-3.70	36.51	46.0	-9.49	
4	1.1490	0.08	0.03	52.66	56.0	-3.34	39.94	46.0	-6.06	
5	1.4676	0.08	0.04	53.04	56.0	-2.96	38.38	46.0	-7.62	
6	1.7392	0.09	0.05	52.22	56.0	-3.78	35.23	46.0	-10.7	
7	1.9980	0.09	0.06	52.44	56.0	-3.56	37.52	46.0	-8.48	
8	2.2070	0.09	0.06	51.13	56.0	-4.87	34.29	46.0	-11.7	
9	2.4595	0.09	0.07	50.24	56.0	-5.76	33.45	46.0	-12.5	
10	2.7670	0.1	0.08	49.58	56.0	-6.42	33.07	46.0	-12.9	
11	3.0257	0.1	0.08	48.98	56.0	-7.02	32.64	46.0	-13.3	
12	3.3078	0.1	0.09	49.41	56.0	-6.59	34.57	46.0	-11.4	
13	3.5573	0.11	0.09	48.64	56.0	-7.36	33.60	46.0	-12.4	
14	4.6562	0.12	0.11	47.82	56.0	-8.18	34.32	46.0	-11.6	

* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between Lowest, Middle, Highest to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

4.2 Fundamental Frequency Measurement

4.2.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

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

4.2.2 Test Procedure

1. The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.
2. Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.
3. The maximum readings by varying the height of the loop antenna fixed in one meters and then rotating the turntable were recorded. EUT's X, Y Z axis, were measured.

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

Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	100Hz
Video Bandwidth (VBW)	100Hz
Measurement Distance	10 m / 3m

Limit Conversion:
FCC section 15.209

Frequency (MHz)	Field Strength (microvolts / meter)	Measurement Distance (meters)
0.490 - 1.705	24000/F(kHz)	30

Ex: Limit of 0.53125 MHz
24000/ 531.25=45.176(microvolts / meter)= 20*log(45.176)dB μ V/m=33.098 dB μ V/m

If D1=30, D2=10
L2= L1(D1/D2)
L2=20log 24000/F(kHz)+40log(D1/D2)=51.18 (dB μ V/m)

4.2.4 Test Data:

4.2.4.1 Lowest Channel 531.25 KHz

Measurement Distance 10m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.53125	17.56	10.45	28.01	52.18	-24.17	H
X	0.53125	19.15	10.45	29.6	52.18	-22.58	V
Y	0.53125	16.62	10.45	27.07	52.18	-25.11	H
Y	0.53125	17.63	10.45	28.08	52.18	-24.1	V
Z	0.53125	16.85	10.45	27.3	52.18	-24.88	H
Z	0.53125	17.48	10.45	27.93	52.18	-24.25	V

Measurement Distance 3m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.53125	21.8	10.45	32.25	73.1	-40.85	H
X	0.53125	21.76	10.45	32.21	73.1	-40.89	V
Y	0.53125	21.2	10.45	31.65	73.1	-41.45	H
Y	0.53125	24.93	10.45	35.38	73.1	-37.72	V
Z	0.53125	20.61	10.45	31.06	73.1	-42.04	H
Z	0.53125	24.88	10.45	35.33	73.1	-37.77	V

4.2.4.2 Middle Channel 562.5 KHz

Measurement Distance 10m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.5625	17.65	10.55	28.2	51.69	-23.49	H
X	0.5625	17.87	10.55	28.42	51.69	-23.27	V
Y	0.5625	18.51	10.55	29.06	51.69	-22.63	H
Y	0.5625	19.59	10.55	30.14	51.69	-21.55	V
Z	0.5625	16.95	10.55	27.5	51.69	-24.19	H
Z	0.5625	19.35	10.55	29.9	51.69	-21.79	V

Measurement Distance 3m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.5625	21.65	10.55	32.2	72.6	-40.4	H
X	0.5625	21.64	10.55	32.19	72.6	-40.41	V
Y	0.5625	20.95	10.55	31.5	72.6	-41.1	H
Y	0.5625	24.32	10.55	34.87	72.6	-37.73	V
Z	0.5625	21.49	10.55	32.04	72.6	-40.56	H
Z	0.5625	24.49	10.55	35.04	72.6	-37.56	V

4.2.4.3 Highest Channel 593.75 KHz

Measurement Distance 10m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.59375	17.53	10.65	28.18	51.22	-23.04	H
X	0.59375	16.7	10.65	27.35	51.22	-23.87	V
Y	0.59375	16	10.65	26.65	51.22	-24.57	H
Y	0.59375	16.18	10.65	26.83	51.22	-24.39	V
Z	0.59375	17.05	10.65	27.7	51.22	-23.52	H
Z	0.59375	17.83	10.65	28.48	51.22	-22.74	V

Measurement Distance 3m

Mode	Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
axis	MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
X	0.59375	21.86	10.65	32.51	72.13	-39.62	H
X	0.59375	21.59	10.65	32.24	72.13	-39.89	V
Y	0.59375	17.67	10.65	28.32	72.13	-43.81	H
Y	0.59375	22.95	10.65	33.6	72.13	-38.53	V
Z	0.59375	19.52	10.65	30.17	72.13	-41.96	H
Z	0.59375	24.06	10.65	34.71	72.13	-37.42	V

4.3 Radiated Emission Measurement [Section [15.209]]

4.3.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground, and set to the axis that worse mode of fundamental frequency measurement.

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

4.3.2 Test Procedure

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

9KHz to 30MHz: The highest emissions between 9KHz to 30MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in 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 Loop antenna height was fixed in one meters, its angle was varied between 0°,22.5°,45°,67.5°,90°,112.5°,135°and 157.5°, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup ac*cording to EMI Receiver/Spectrum Analyzer Configuration.*

30MHz to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also 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.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. 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. During test the EMI receiver and spectrum was setup according to EMI Receiver/Spectrum Analyzer Configuration.

For the test of 2^{nd} to 10^{th} harmonics frequencies , the equipment setup was also refer to EMI Receiver/Spectrum Analyzer Configuration. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

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

Frequency Range Tested:	9KHz~150KHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	300Hz
Video Bandwidth (VBW)	300Hz
Measurement Distance	10 m / 3m

Frequency Range Tested:	150KHz~30MHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	10KHz
Video Bandwidth (VBW)	10KHz
Measurement Distance	10 m / 3m

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	100KHz
Video Bandwidth (VBW)	300KHz
Measurement Distance	3 m

Limit Conversion:
FCC section 15.209

Frequency (MHz)	Field Strength (microvolts / meter)	Measurement Distance (meters)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Ex: Limit of 0.53125 MHz
24000/ 531.25=45.176(microvolts / meter)= 20*log(45.176)dB μ V/m=33.098 dB μ V/m

If D1=30, D2=10
L2= L1(D1/D2)
L2=20log 24000/F(kHz)+40log(D1/D2)=51.18 (dB μ V/m)

4.3.4 Test Data:

4.3.4.1 9KHz – 30MHz Open Field Radiated Emissions

Lowest Channel 531.25 KHz

Measurement Distance 10m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.0625	20.63	10.6	31.23	46.16	-14.93	H
1.0625	20.71	10.6	31.31	46.16	-14.85	V

Measurement Distance 3m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.0625	20.69	10.6	31.29	67.08	-35.79	H
1.0625	20.05	10.6	30.65	67.08	-36.43	V

Middle Channel 562.5 KHz

Measurement Distance 10m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.125	19.56	10.63	30.19	45.67	-15.48	H
1.125	19.39	10.63	30.02	45.67	-15.65	V

Measurement Distance 3m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.125	19.71	10.63	30.34	66.58	-36.24	H
1.125	21.21	10.63	31.84	66.58	-34.74	V

Highest Channel 593.75 KHz

Measurement Distance 10m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.1875	18.86	10.67	29.53	45.2	-15.67	H
1.1875	18.53	10.67	29.2	45.2	-16	V

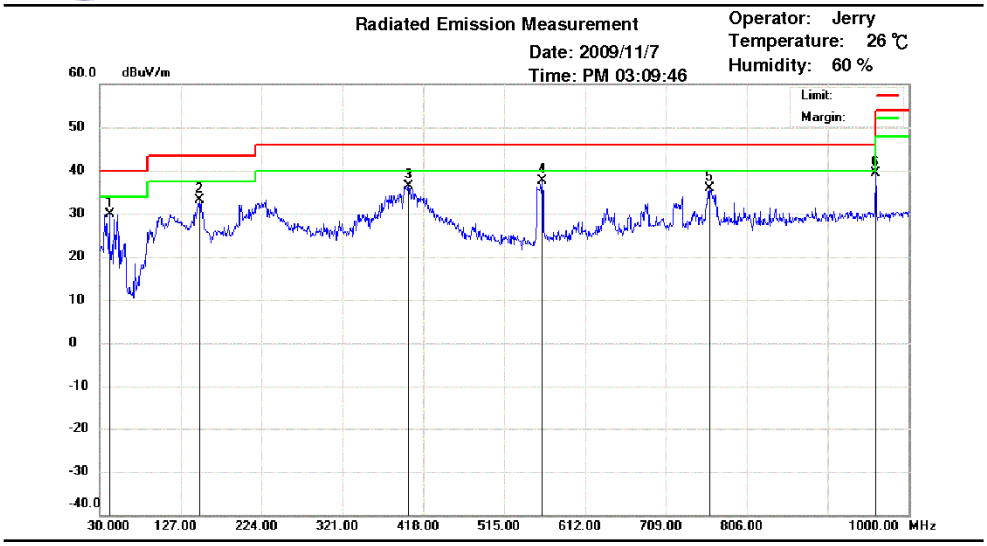
Measurement Distance 3m

Frequency	Rx Amp.	Correction Factor	Correct. Emi.	Limit	Margin	Antenna Polarization
MHz	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1.1875	19.6	10.67	30.27	66.11	-35.84	H
1.1875	19.58	10.67	30.25	66.11	-35.86	V

4.3.4.2 30M – 1GHz Open Field Radiated Emissions

Configuration 1 (Horizontal) Lowest, Middle, Highest channel

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road
,Lung-Tan Hsiang,Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718

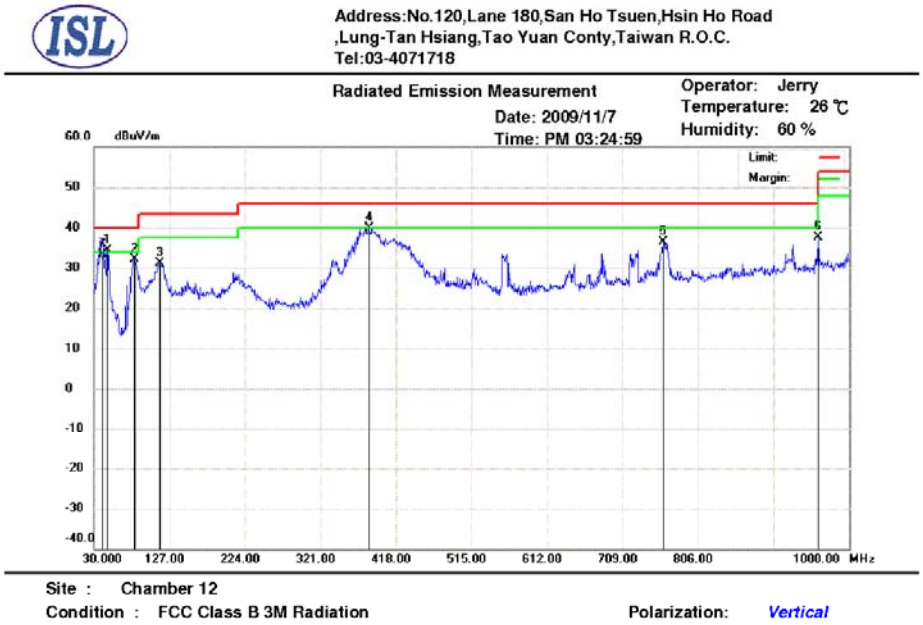


Site : Chamber 12
Condition : FCC Class B 3M Radiation Polarization: *Horizontal*

No.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	41.6400	15.47	13.08	1.43	0	29.98	40.00	-10.02	100	339	peak
2	149.3100	22.98	7.83	2.4	0	33.21	43.50	-10.29	100	232	peak
3	400.5400	18.61	14.01	3.8	0	36.42	46.00	-9.58	323	274	peak
4	560.5900	16.65	16.63	4.44	0	37.72	46.00	-8.28	145	356	peak
5	761.3800	11.22	19.41	5.15	0	35.78	46.00	-10.22	258	338	peak
6	960.2300	11.99	21.6	5.82	0	39.41	54.00	-14.59	100	162	peak

*:Maximum data x:Over limit !:over margin

Configuration 1 (Vertical) Lowest, Middle, Highest channel



No.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	47.4600	23.09	9.68	1.55	0	34.32	40.00	-5.68	390	247	peak
2	82.3800	22.05	8.2	1.92	0	32.17	40.00	-7.83	257	262	peak
3	114.3900	19.02	9.89	2.2	0	31.11	43.50	-12.39	377	319	peak
4	383.0800	22.56	13.59	3.73	0	39.88	46.00	-6.12	100	119	peak
5	761.3800	11.72	19.41	5.15	0	36.28	46.00	-9.72	160	157	peak
6	960.2300	10.11	21.6	5.82	0	37.53	54.00	-16.47	121	242	peak
7	40.6700	18.48	13.57	1.41	0	33.46	40.00	-6.54	100	360	QP

*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, where limits are specified by agencies for both average(or quasi-peak) and peak detection, if the peak measured value complies with the average(or quasi-peak) limit , it is unnecessary to perform an average(or quasi-peak) measurement.
- " peak": peak mode; "QP": quasi-peak mode
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- 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.

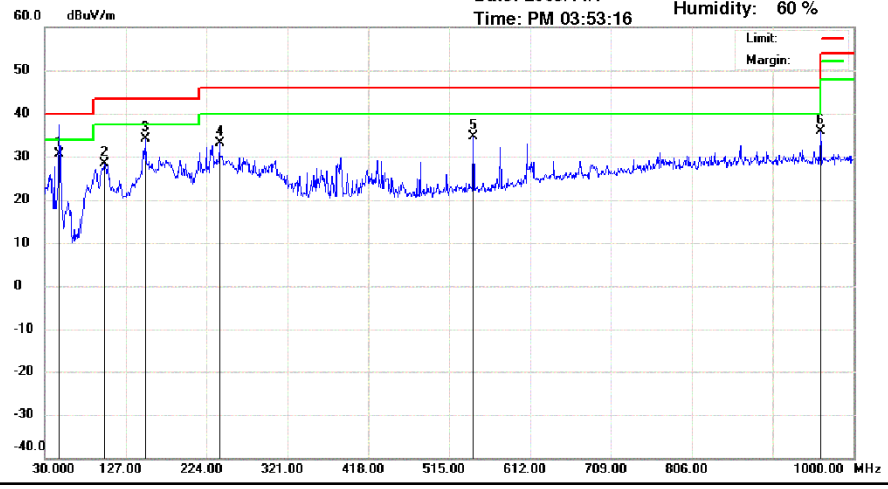
All frequencies from 30MHz to 1GHz have been tested

Configuration 2 (Horizontal) Lowest, Middle, Highest channel

Address:No.120,Lane 180,San Ho Tsuen,Hsin Ho Road
,Lung-Tan Hsiang,Tao Yuan Conty,Taiwan R.O.C.
Tel:03-4071718

Radiated Emission Measurement

Operator: Jerry
Temperature: 26 ℃
Humidity: 60 %
Date: 2009/11/7
Time: PM 03:53:16

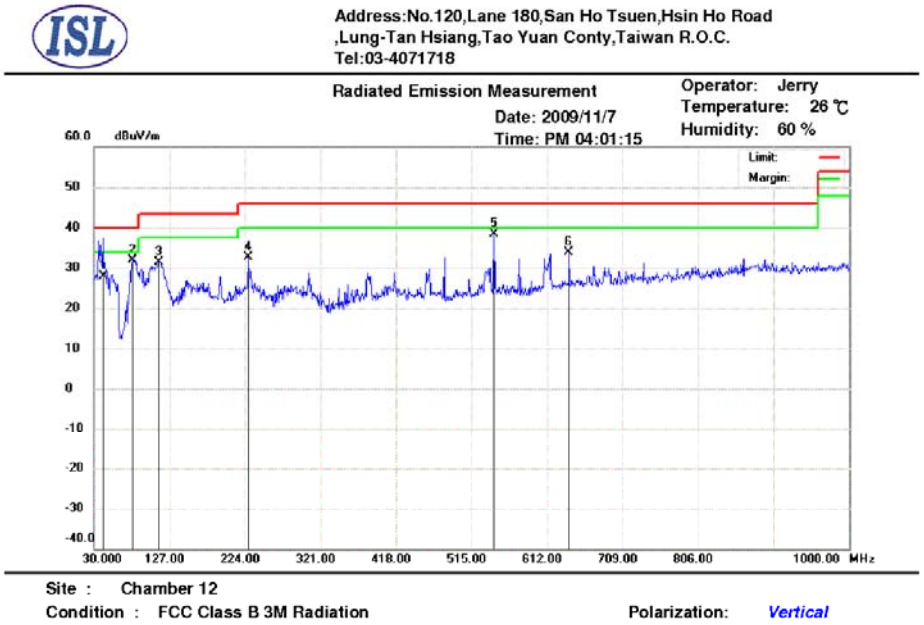


Site : Chamber 12
Condition : FCC Class B 3M Radiation
Polarization: *Horizontal*

No.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	48.3000	19.85	9.09	1.57	0	30.51	40.00	-9.49	100	251	QP
2	101.7800	16.97	9.31	2.12	0	28.40	43.50	-15.10	225	122	peak
3	151.2500	23.82	7.81	2.41	0	34.04	43.50	-9.46	100	1	peak
4	239.5200	20.37	9.88	2.9	0	33.15	46.00	-12.85	210	240	peak
5	544.1000	14.01	16.36	4.38	0	34.75	46.00	-11.25	135	194	peak
6	960.2300	8.55	21.6	5.82	0	35.97	54.00	-18.03	370	232	peak

*:Maximum data x:Over limit !:over margin

Configuration 2 (Vertical) Lowest, Middle, Highest channel



No.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos (cm)	Tab.Pos (deg.)	Detector
1	42.6000	13.79	12.6	1.45	0	27.84	40.00	-12.16	100	72	QP
2	79.4700	22.10	8	1.89	0	31.99	40.00	-8.01	100	218	peak
3	113.4200	19.29	9.87	2.2	0	31.36	43.50	-12.14	243	51	peak
4	227.8800	20.36	9.37	2.88	0	32.61	46.00	-13.39	100	150	peak
5	544.1000	17.62	16.36	4.38	0	38.36	46.00	-7.64	100	117	peak
6	640.1300	10.89	18.14	4.76	0	33.79	46.00	-12.21	364	199	peak

*:Maximum data x:Over limit !:over margin

Note:

- According to the standards used, where limits are specified by agencies for both average(or quasi-peak) and peak detection, if the peak measured value complies with the average(or quasi-peak) limit , it is unnecessary to perform an average(or quasi-peak) measurement.
- " peak": peak mode; "QP": quasi-peak mode
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- 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.

All frequencies from 30MHz to 1GHz have been tested

4.4 Occupied Bandwidth

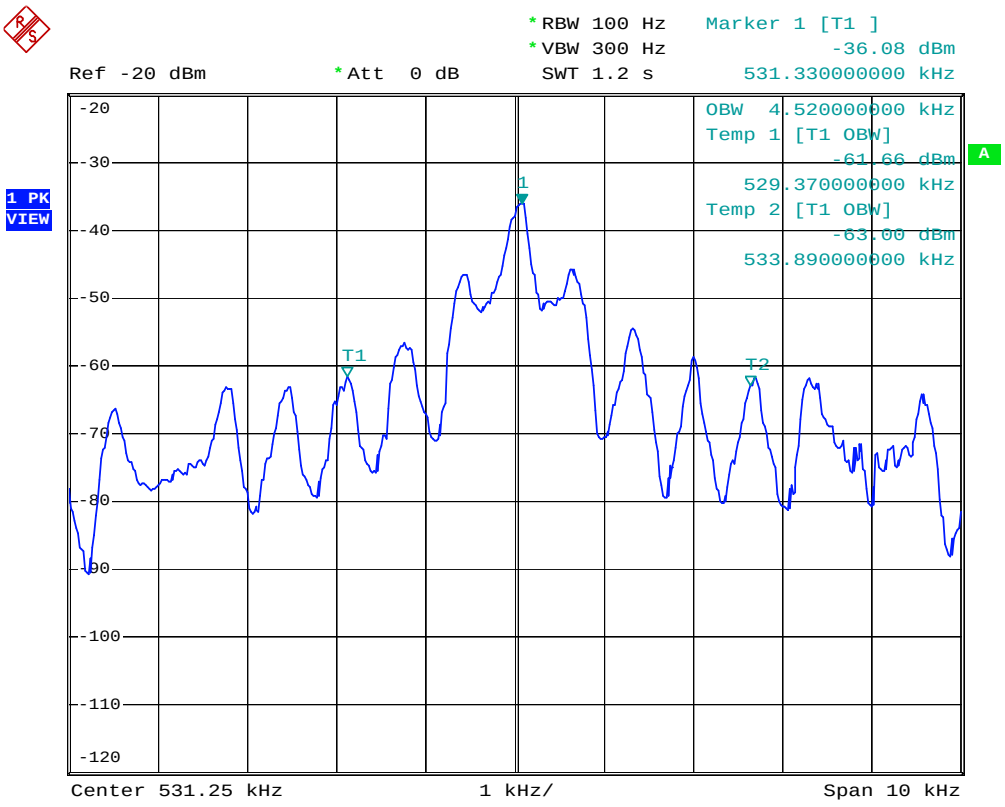
4.4.1 Spectrum Analyzer Configuration

Detector Function:	Sample Detector Peak Hold
Resolution Bandwidth (RBW):	100Hz
Video Bandwidth (VBW)	300Hz
SPAN	10KHz

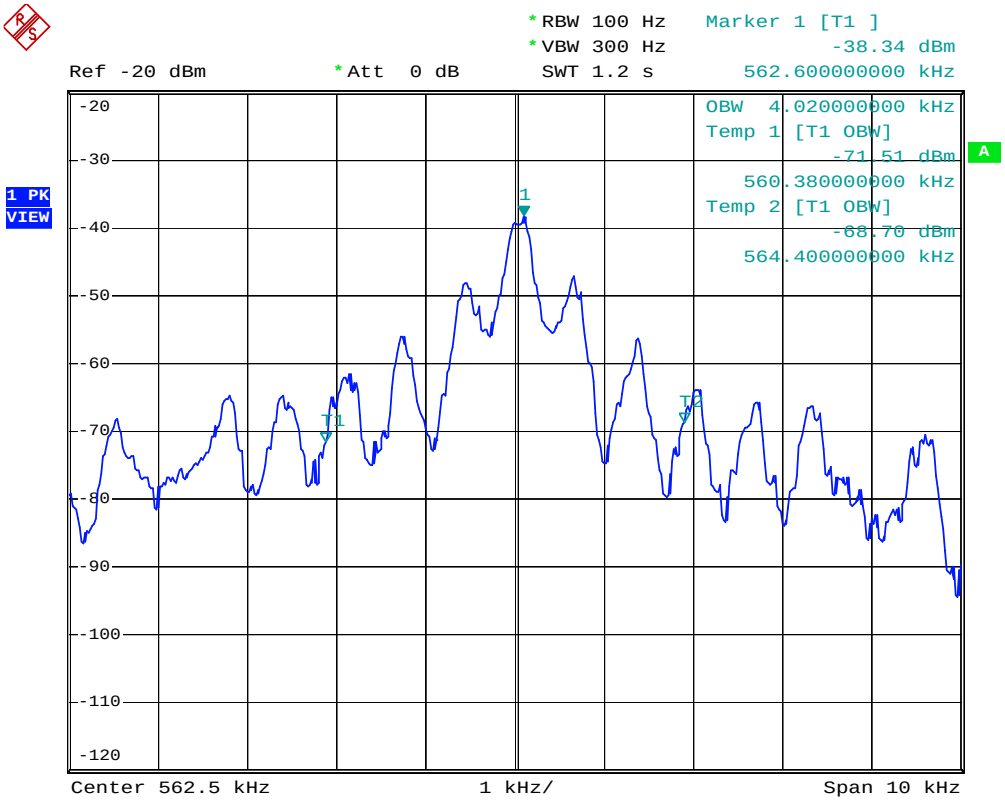
4.4.2 Test Data

Channel	Frequency (KHz)	Occupied Bandwidth (KHz)
Lowest	531.25	4.52
Middle	562.5	4.02
Highest	593.75	4.56

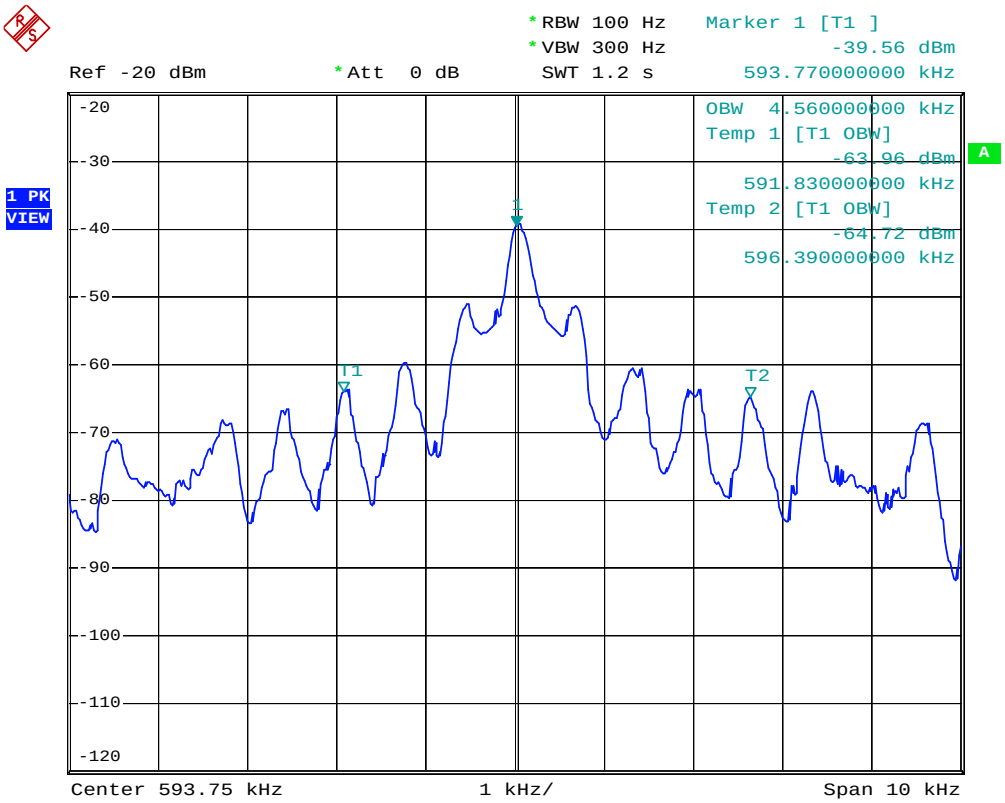
Lowest Channel 531.25 KHz



Middle Channel 562.5 KHz



Highest Channel 593.75 KHz



5. Description of Support Equipment

5.1 Description of Support Equipment

Unit	Model Serial No.	Brand	Power Cord	FCC ID
LCD Monitor	2408WFPb	DELL	Non-shielded, Detachable	FCC DOC
USB Mouse	M-SBJ96 S/N: NA	Dell	Non-shielded, Detachable	FCC DOC
Traveling Disk	U172 S/N: NA	PQI	NA	FCC DoC

5.1.1 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to AC Power Cord Inlet (3-pin)	1.8M	Nonshielded, Detachable	Plastic Head
Monitor Data Cable	Monitor D-SUB Port to EUT VGA Port	1.6M	Shielded, Detachable (with core)	Metal Head
USB Data Cable	Traveling Disk to EUT USB Port	1.2M	Shielded, Un-detachable	Metal Head
USB Data Cable	USB Mouse to EUT USB Port	1.0M	Shielded, Un-detachable	Metal Head

6. Appendix

6.1 Appendix A: Measurement Procedure for Power line 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 required 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 emission. 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.

6.2 Appendix B: 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 10m EMC Chamber

The radiated emissions test will then be repeated on the open site or 10m EMC 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 the 3 or 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. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

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 emission. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

6.3 Appendix C: Test Equipment

6.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction 03	Conduction 03 -1 Cable	WOKEN	CFD 300-NL	Conduction 03 -1	06/08/2009	06/08/2010
Conduction 03	EMI Receiver 11	ROHDE & SCHWARZ	ESCI	100568	06/03/2009	06/03/2010
Conduction 03	ISNT2-02	FCC	FCC-TLISN-T2-02	20413	05/11/2009	05/11/2010
Conduction 03	ISNT4-02	FCC	FCC-TLISN-T4-02	20575	05/04/2009	05/04/2010
Conduction 03	ISNT8-02	FCC	FCC-TLISN-T8-02	20476	05/11/2009	05/11/2010
Conduction 03	LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	05/11/2009	05/11/2010
Conduction 03	LISN 08	FCC Inc.	FCC-LISN-50-25-2-01	07039	06/12/2009	06/12/2010

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber12)	BILOG Antenna 15	Teseq GmbH	CBL 6112D	27622	04/27/2009	04/27/2010
Radiation (Chamber12)	Coaxial Cable Chmb 12-10M-01	PEWC	CFD400-NL	Chmb 12-10M-01	06/15/2009	06/15/2010
Radiation (Chamber12)	EMI Receiver 10	ROHDE & SCHWARZ	ESCI	100567	06/09/2009	06/09/2010
Radiation	Loop Antenna 03	Com-Power	AL-130	17101	05/10/2009	05/10/2010

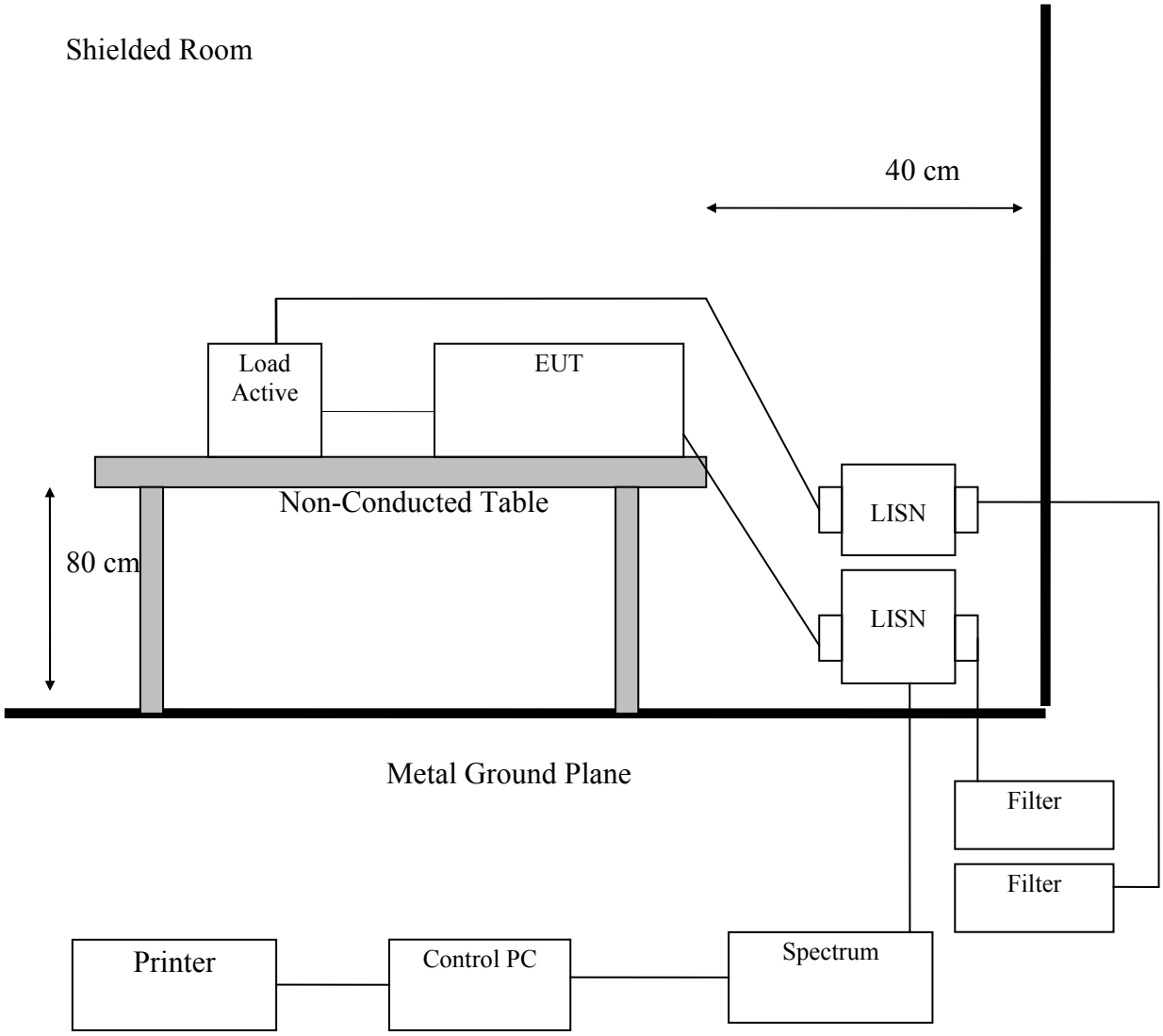
Note: Calibration is traceable to NIST or national or international standards.

6.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Radiation/Conduction	Filename	Version	Issued Date
Lung_Tan Conduction	EZ EMC	1.1.4.2	2/10/2007
Lung_Tan Radiation	EZ EMC	1.1.4.2	1/24/2007

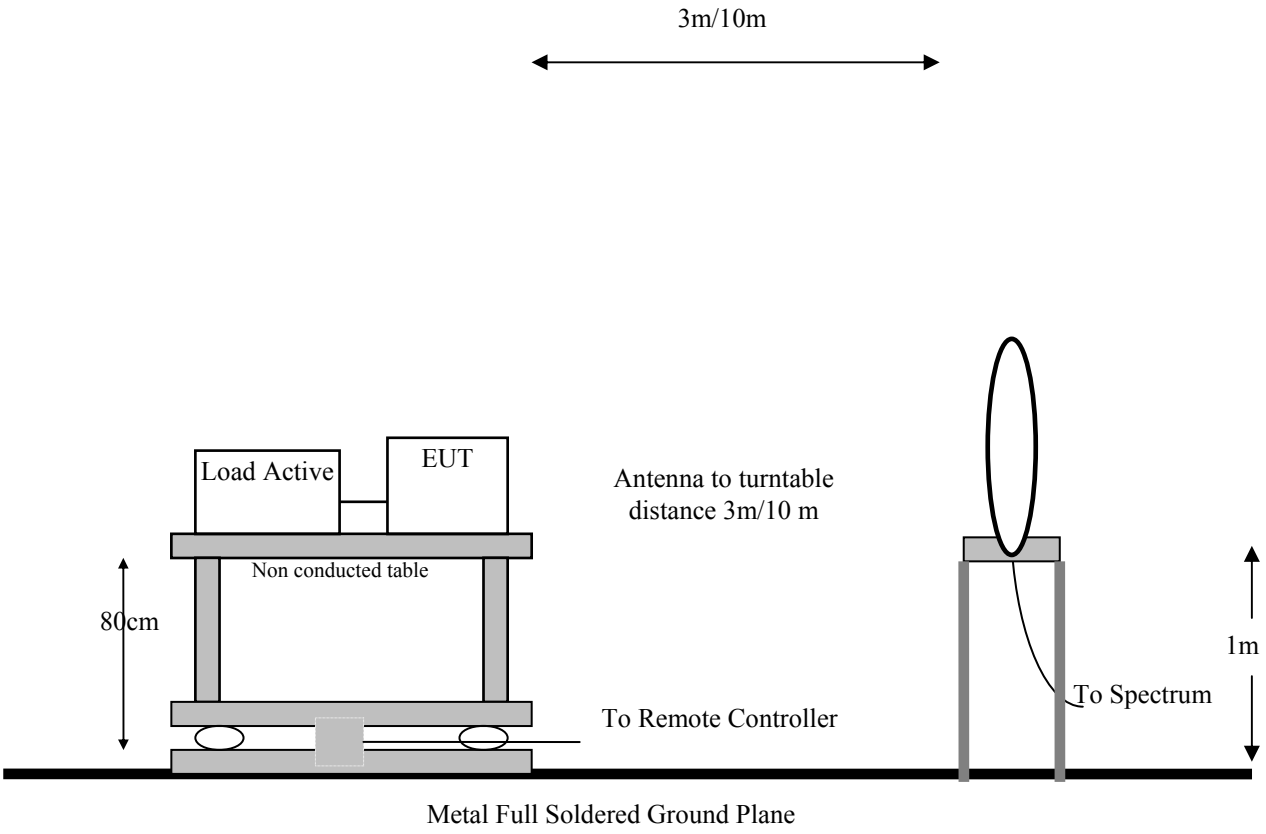
6.4 Appendix D: Layout of EUT and Support Equipment

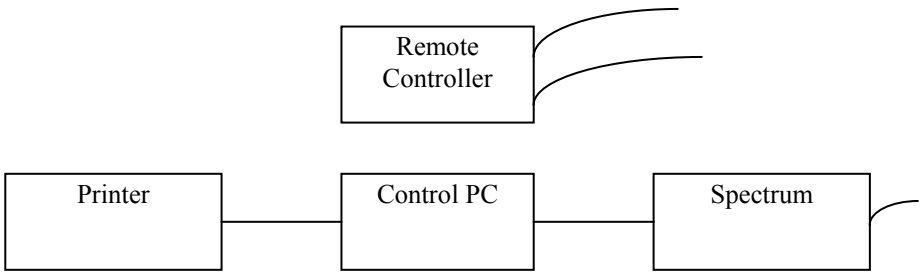
6.4.1 General Conducted Test Configuration



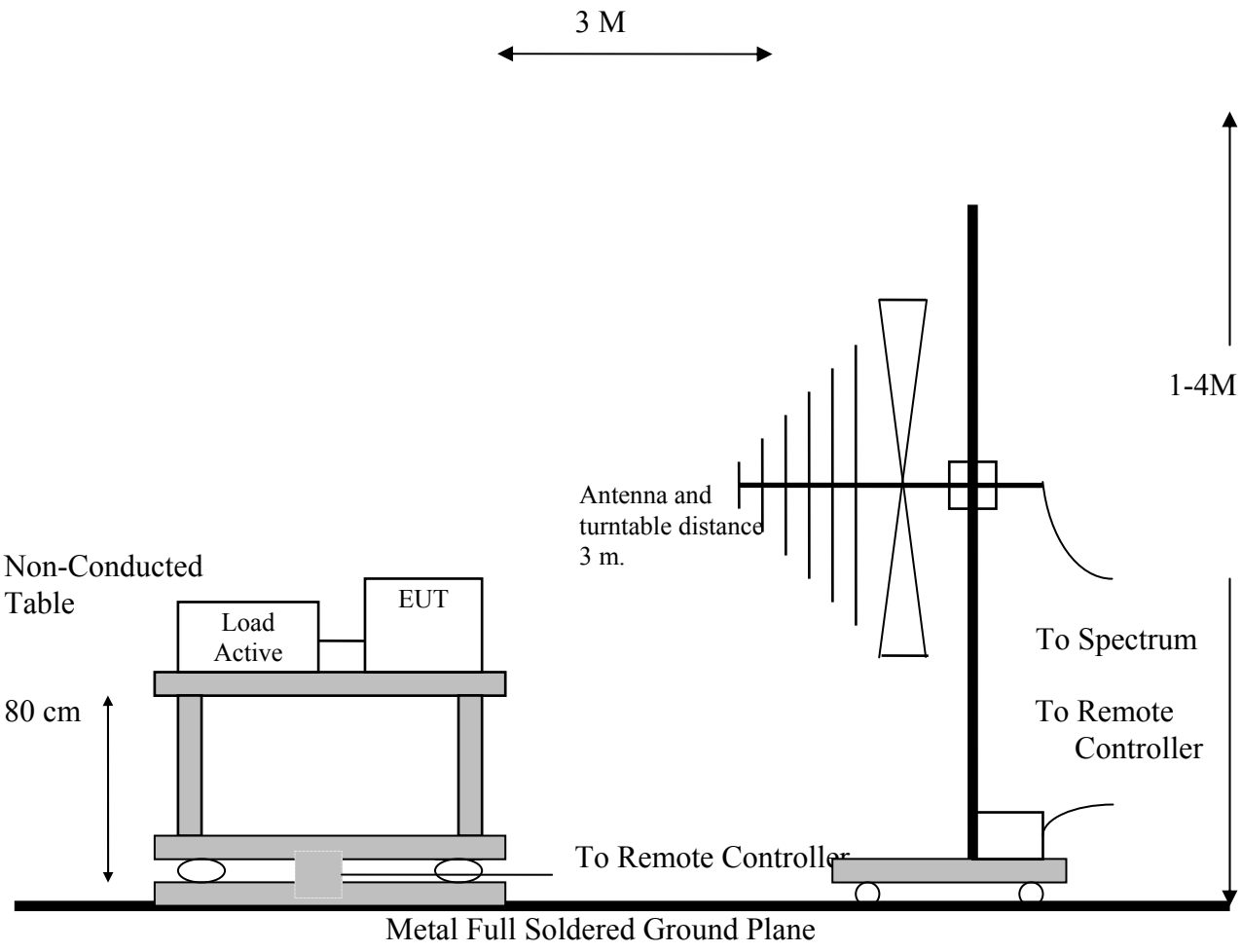
6.4.2 General Radiation Test Configuration

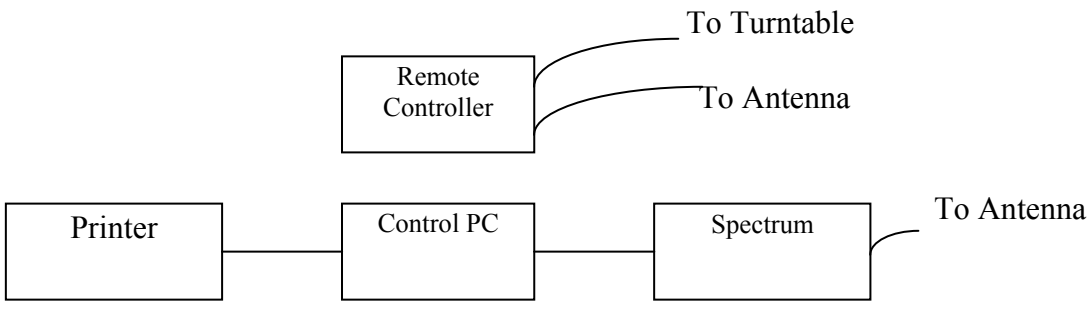
6.4.2.1 9KHz-30MHz





6.4.2.2 30MHz-1GHz





6.5 Appendix E: Accuracy of Measurement

The measurement uncertainty refers to CISPR 16-4-2:2003. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Conduction 02>: ±3.551dB

<Chamber 12 (3M)>
30MHz~1GHz: ±3.306 dB
1GHz~18GHz: ±2.62 dB
18GHz~26GHz: ±3.609 dB
26GHz~40GHz: ±2.702 dB

6.6 Appendix F: Photographs of EUT Configuration Test Set Up

Refer to attach file