TEST REPORT

of

FCC Part 15 Subpart C

Product : Wireless Presenter Mouse

Model: LIBRA-S10H

Brand: **ione**

Applicant: **Ione Technology Inc.**

Address: **8F-1, No. 75, Sec. 1, Hsin Tai Wu Rd., Hsichih, Taipei Hsien, 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-1676, G-17, R-2598, C-2845, T-1464, G-16, G-211, NEMKO: ELA 113B
*Address:
No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325, Taiwan
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Report No.: **ISL-10LR045FC**

Issue Date : **2010/11/22**

This report totally contains 41 pages including this cover page and contents page.

Contents of Report

1. General

1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.249)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	Wireless Presenter Mouse
Model:	LIBRA-S10H
Brand:	**ione**
Applied by:	**Ione Technology Inc.**
Sample received Date:	2010/11/08
Final test Date :	2010/11/19
Test Result	PASS
Test Site:	Chamber 14
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
Test Engineer:	Scott Chien Scott Chien

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

1.2 Test Results Summary

The wireless 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	
15.249	Radiated Emissions 30MHz – 25 GHz	Pass	
15.249	Band Edge Measurement	Pass	

1.3 Test Frequencies of the wireless module

EUT Channel	Test Frequency (MHz)
1	2402.9
9	2439.9
19	2476.9

1.4 Test Conditions

a. Normal test conditions:
Temperature: 25 ^{0}C
Relative Humidity: 50% to 75%

b. During the test, the EUT was set in continuously transmitting mode with a duty cycle of 89%.

c. The channel 1, 9, 19 of EUT were all tested

1.5 Description of Controlling transmitter continuously

During the test, press the EUT function button to make the transmitter continuously send RF signals.

2. Description of Equipment Under Test (EUT)

Description:	**Wireless Presenter Mouse**
Condition:	Pre-Production
Model:	**LIBRA-S10H**
Brand:	ione
FCC ID:	**F2QRFLIBRA-S10HU**
Frequency Range:	2400 - 2483.5 MHz
Operating Range:	2402.9 - 2476.9 MHz
Support channel:	19 Channels
Modulation Skill:	GFSK
Antennas Type:	Printed on PCB
Antenna Connected:	The antenna printed on the PCB of the wireless module .The user is not possible to change the antenna without disassembling the EUT.
Power Type of wireless module:	Battery supply voltage

The channel and the operation frequency of is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2402.9	11	2444.9
02	2408.9	12	2448.9
03	2412.9	13	2452.9
04	2416.9	14	2456.9
05	2420.9	15	2460.9
06	2424.9	16	2464.9
07	2428.9	17	2468.9
08	2432.9	18	2472.9
09	2439.9	19	2476.9
10	2440.9		

3. TEST RESULTS

3.1 Powerline Conducted Emissions

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 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.

3.1.2 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.

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

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

****Remarks: It is not necessary to be tested in this item.**

3.2 Radiated Emission Measurement

3.2.1 EUT Configuration

The equipment under test was set up on the 3 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.

3.2.2 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.

30M 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 ac*cording 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.

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

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	360KHz

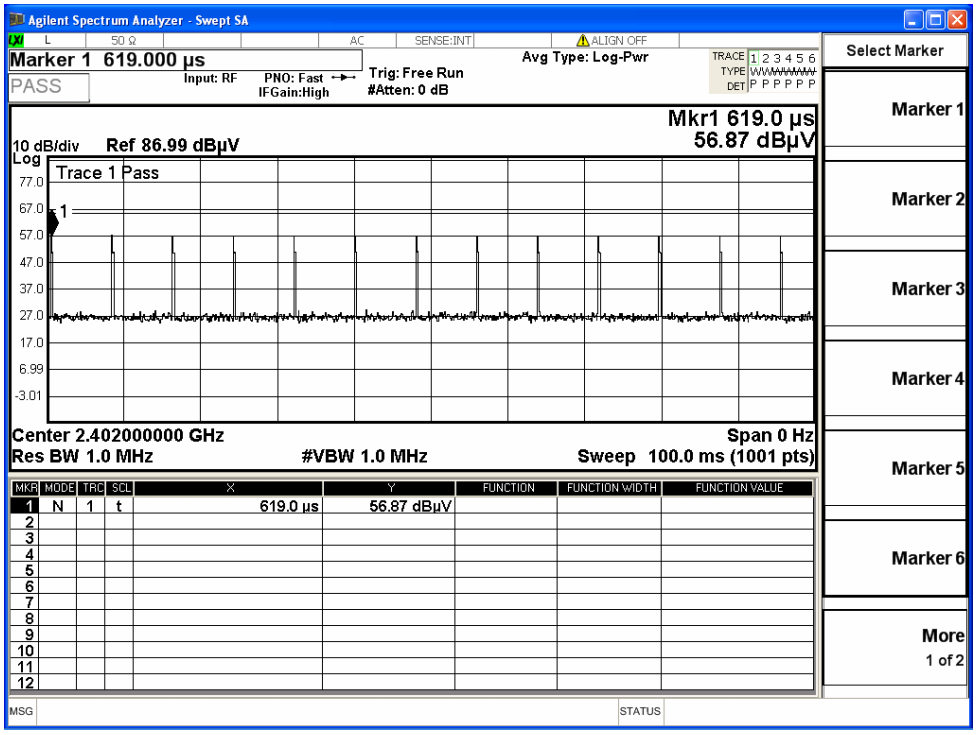
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz

Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode

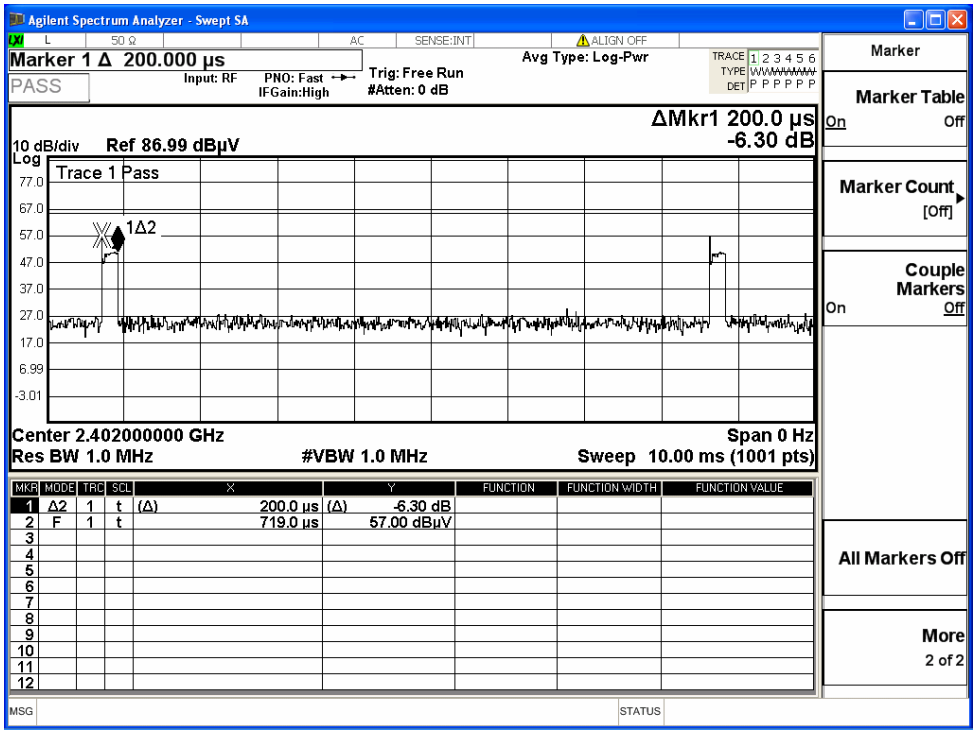
The average value of fundamental frequency is: **-31.7 dB**

Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)

Please refer to page 7. Maximum duty cycle according to FCC part 15.35(b):-20dB



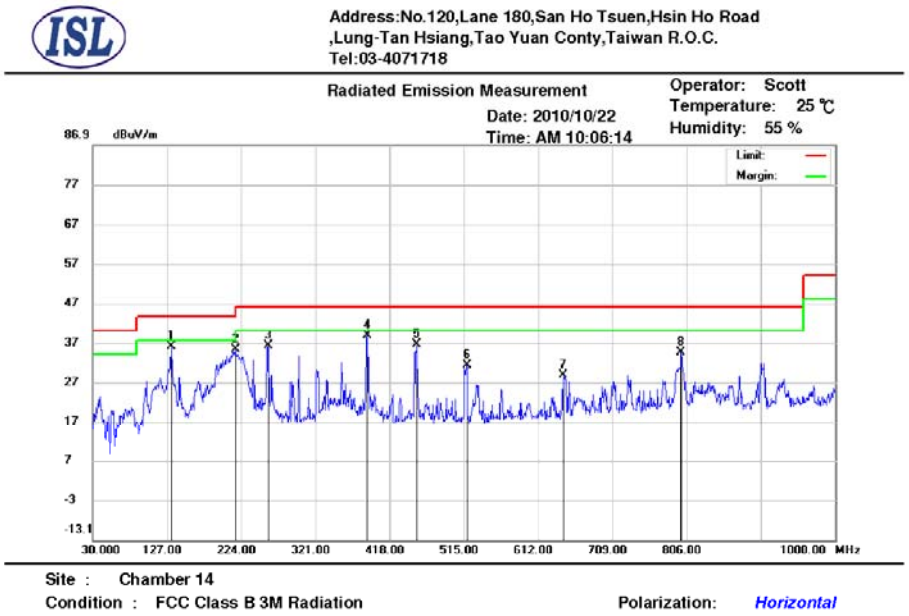
Duty Cycle = (13x0.2ms) / 100 ms = 0.026
Duty Cycle Correction Factor(dB) = 20 x Log (0.026) = -31.7 dB



Note: 200us = 200ms

3.2.4 Test Data:

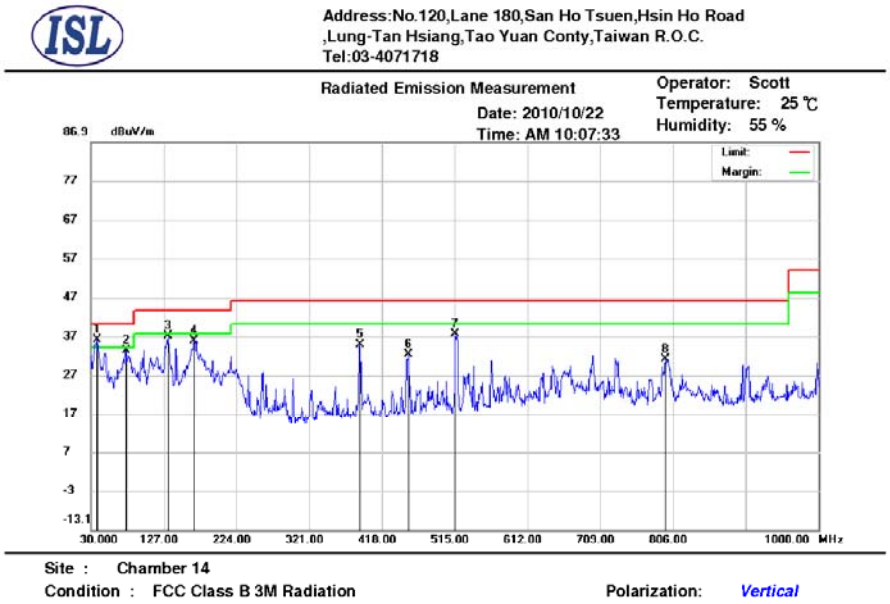
30M – 1GHz Open Field Radiated Emissions (Horizontal) Lowest, Middle, Highest channel



Mk.	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	132.8200	57.54	12.3	0.73	34.43	36.14	43.50	-7.36	241	70	peak
2	216.2400	58.41	10.5	0.9	34.51	35.30	46.00	-10.70	100	47	peak
3	258.9200	56.25	13.51	1	34.4	36.36	46.00	-9.64	100	195	peak
4	388.9000	55.12	16.21	1.18	33.78	38.73	46.00	-7.27	100	264	peak
5	453.8900	51.81	17.15	1.3	33.73	36.53	46.00	-9.47	100	148	peak
6	518.8800	45.68	18.08	1.34	33.71	31.39	46.00	-14.61	353	314	peak
7	644.9800	41.40	19.27	1.5	33.41	28.76	46.00	-17.24	393	318	peak
8	799.2100	45.15	20.59	1.7	32.96	34.48	46.00	-11.52	146	103	peak

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

30M – 1GHz Open Field Radiated Emissions (Vertical) Lowest, Middle, Highest channel



Mk.	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	37.7600	55.52	14.99	0.4	34.77	36.14	40.00	-3.86	100	93	peak
2	76.5600	59.90	7.22	0.6	34.54	33.18	40.00	-6.82	245	316	peak
3	132.8200	58.37	12.3	0.73	34.43	36.97	43.50	-6.53	226	287	peak
4	167.7400	59.28	10.27	0.8	34.49	35.86	43.50	-7.64	201	167	peak
5	388.9000	51.29	16.21	1.18	33.78	34.90	46.00	-11.10	187	242	peak
6	453.8900	47.47	17.15	1.3	33.73	32.19	46.00	-13.81	271	329	peak
7	515.9700	51.88	18.02	1.33	33.71	37.52	46.00	-8.48	153	225	peak
8	796.3000	41.69	20.56	1.69	32.97	30.97	46.00	-15.03	138	163	peak

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

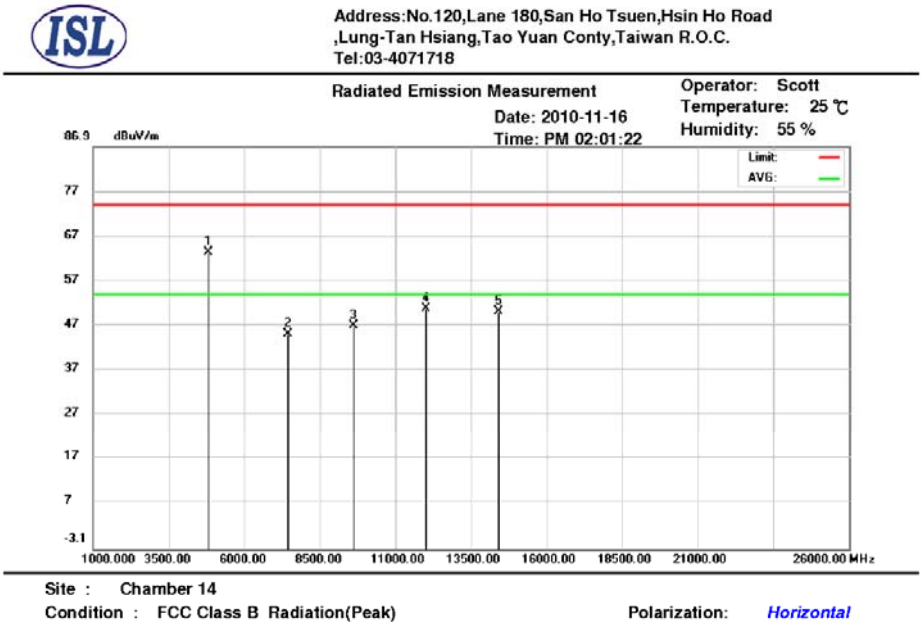
NOTE:

¬ During the Pre-test, the EUT has been tested for Lowest, Middle, Highest channel transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

¬ 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

1GHz~ 25 GHz (Horizontal), Lowest Channel



Mk.	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	4800.000	73.06	34.3	3.42	47.32	63.46	74.00	-10.54	225	65	peak
2	7430.700	51.31	35.81	4.27	46.16	45.23	74.00	-28.77	100	242	peak
3	9611.600	49.01	36.68	4.92	43.56	47.05	74.00	-26.95	338	55	peak
4	12014.500	49.71	38.81	5.6	43.31	50.81	74.00	-23.19	100	157	peak
5	14417.400	51.07	39.55	6	46.57	50.05	74.00	-23.95	211	219	peak

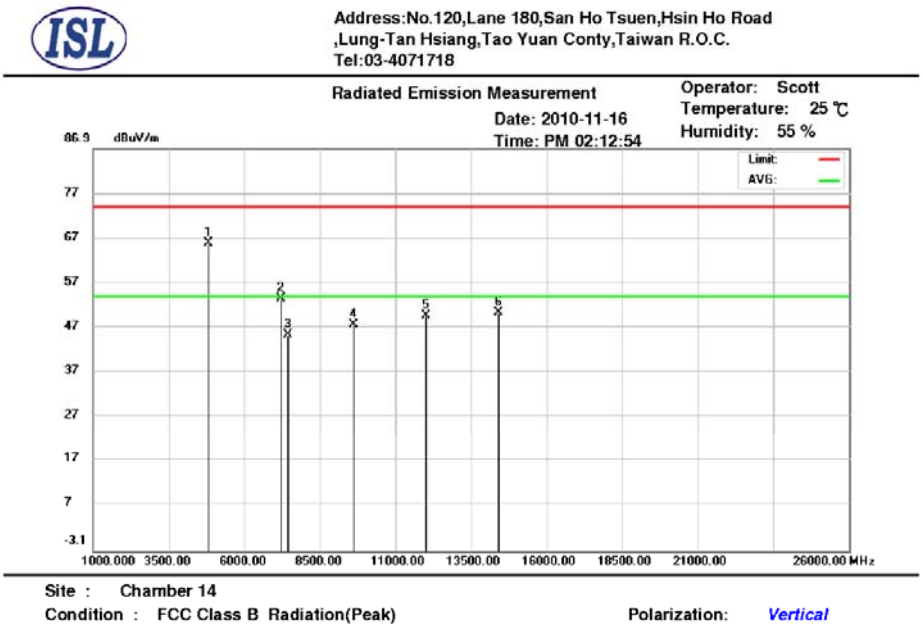
*:Maximum data x:Over limit !:over margin

Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4800.00	63.46	-20	43.46	54	-10.54	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

1GHz~ 25 GHz (Vertical), Lowest Channel



Mk.	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	4800.000	75.57	34.3	3.42	47.32	65.97	74.00	-8.03	275	15	peak
2	7200.000	59.87	35.86	4.18	46.34	53.57	74.00	-20.43	100	24	peak
3	7430.700	51.52	35.81	4.27	46.16	45.44	74.00	-28.56	290	21	peak
4	9611.600	49.64	36.68	4.92	43.56	47.68	74.00	-26.32	100	191	peak
5	12014.500	48.48	38.81	5.6	43.31	49.58	74.00	-24.42	307	102	peak
6	14417.400	51.25	39.55	6	46.57	50.23	74.00	-23.77	100	166	peak

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

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average 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.

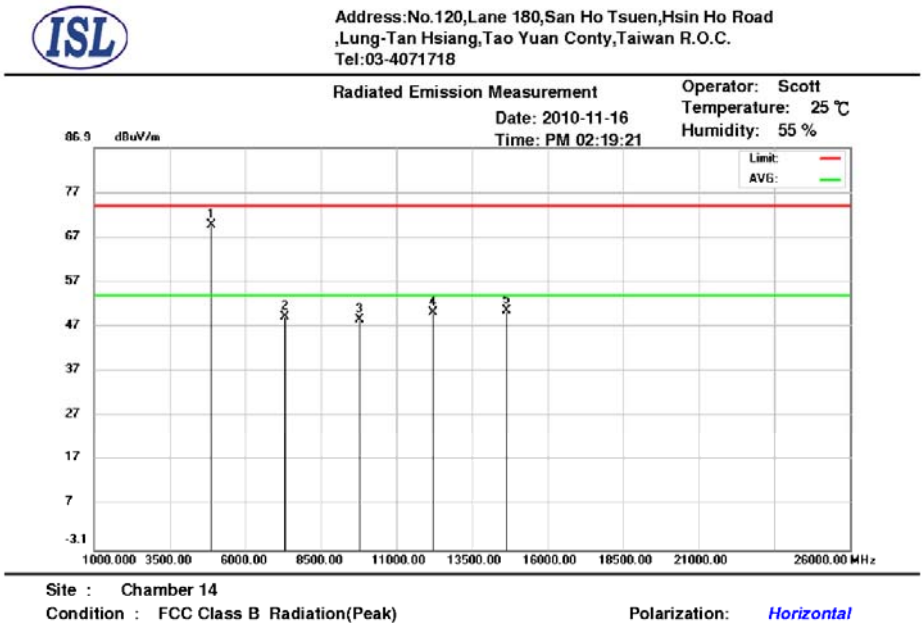
All frequencies from 1GHz to 25 GHz have been tested.

Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4800.00	65.97	-20	45.97	54	-8.03	
2	7200.00	53.57	-20	33.57	54	-20.43	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

1GHz~ 25 GHz (Horizontal), Middle Channel



Mk.	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	4875.000	79.36	34.3	3.45	47.35	69.76	74.00	-4.24	107	189	peak
2	7319.700	55.40	35.84	4.23	46.24	49.23	74.00	-24.77	214	191	peak
3	9759.600	50.11	36.92	4.95	43.5	48.48	74.00	-25.52	217	250	peak
4	12199.500	49.02	38.88	5.64	43.5	50.04	74.00	-23.96	119	299	peak
5	14639.400	51.48	39.76	6.06	46.78	50.52	74.00	-23.48	180	348	peak

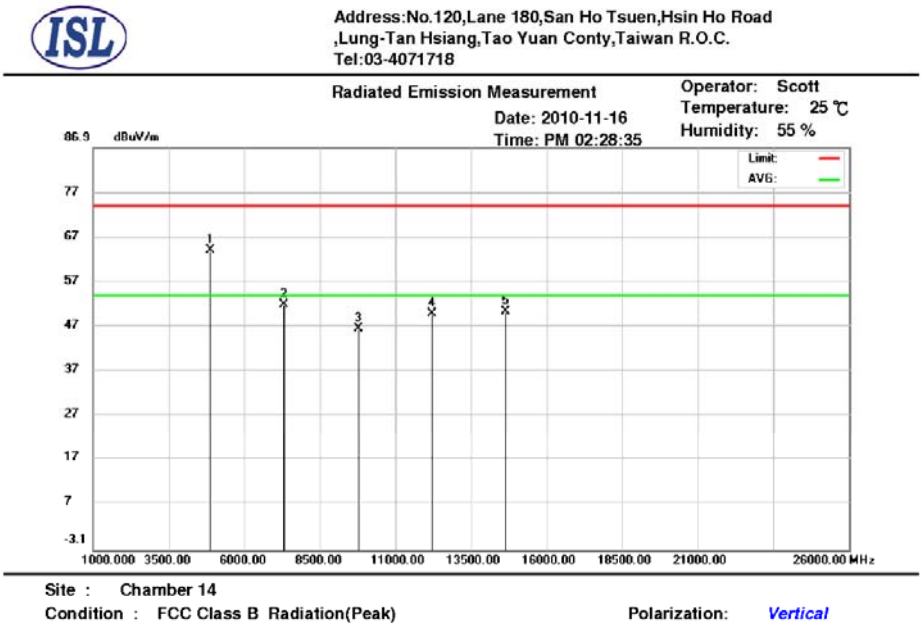
*:Maximum data x:Over limit !:over margin

Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4875.00	69.76	-20	49.76	54	-4.24	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

1GHz~ 25 GHz (Vertical), Middle Channel



Mk.	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	4875.000	73.58	34.3	3.45	47.35	63.98	74.00	-10.02	148	348	peak
2	7325.000	58.14	35.84	4.23	46.24	51.97	74.00	-22.03	199	312	peak
3	9759.600	48.15	36.92	4.95	43.5	46.52	74.00	-27.48	100	8	peak
4	12199.500	48.90	38.88	5.64	43.5	49.92	74.00	-24.08	100	157	peak
5	14639.400	51.40	39.76	6.06	46.78	50.44	74.00	-23.56	268	64	peak

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

Note:

- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average 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 1GHz to 25 GHz have been tested.

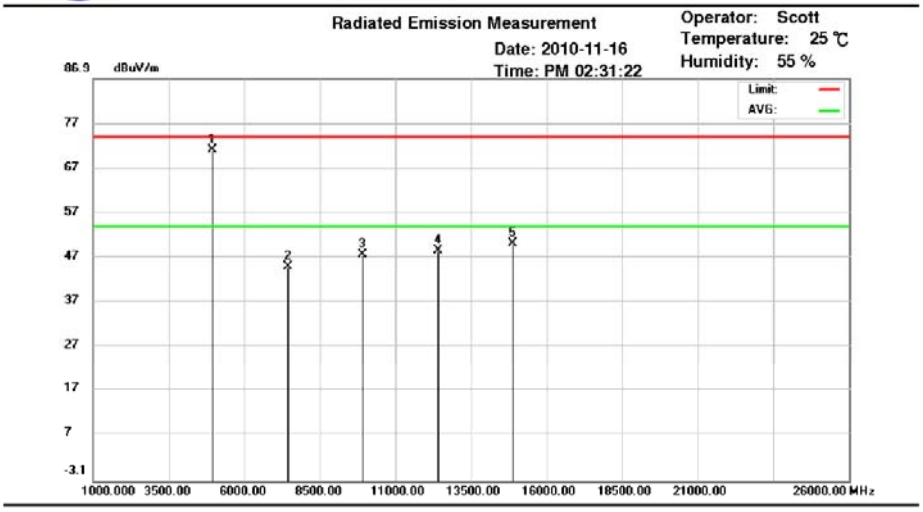
Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4875.00	63.98	-20	43.98	54	-10.02	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

1GHz~ 25 GHz (Horizontal), 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 14
Condition : FCC Class B Radiation(Peak) Polarization: *Horizontal*

Mk.	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	4950.000	80.70	34.3	3.48	47.38	71.10	74.00	-2.90	165	246	peak
2	7430.700	51.03	35.81	4.27	46.16	44.95	74.00	-29.05	209	56	peak
3	9907.600	48.86	37.15	4.98	43.44	47.55	74.00	-26.45	100	31	peak
4	12384.500	47.58	38.95	5.68	43.68	48.53	74.00	-25.47	392	204	peak
5	14861.400	51.11	39.84	6.14	46.92	50.17	74.00	-23.83	100	291	peak

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

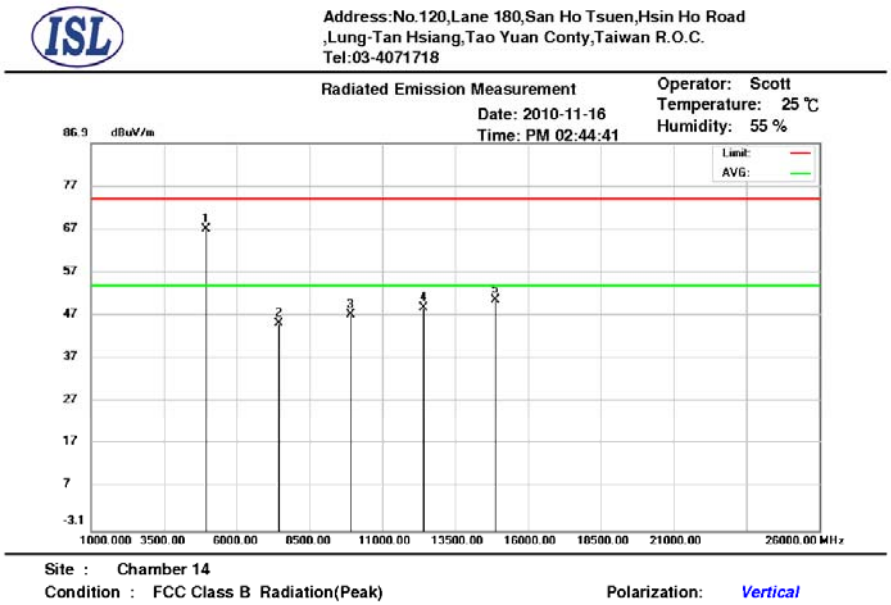
Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4950.00	71.10	-20	51.10	54	-2.9	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)

Maximum duty cycle according to FCC part 15.35(b):-20dB

1GHz~ 25 GHz (Vertical), Highest Channel



Mk.	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	4950.000	76.64	34.3	3.48	47.38	67.04	74.00	-6.96	104	320	peak
2	7430.700	51.23	35.81	4.27	46.16	45.15	74.00	-28.85	100	354	peak
3	9907.600	48.39	37.15	4.98	43.44	47.08	74.00	-26.92	100	297	peak
4	12384.500	47.87	38.95	5.68	43.68	48.82	74.00	-25.18	287	149	peak
5	14861.400	51.45	39.84	6.14	46.92	50.51	74.00	-23.49	288	63	peak

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

Note:

- According to the standards used, where limits are specified by agencies for both average and peak (or quasi-peak) detection, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.
- " peak": peak mode; "avg": average 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 1GHz to 25 GHz have been tested.

Average Detector:

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	4950.00	67.04	-20	47.04	54	-6.96	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

3.3 Band Edge & Fundamental Emission Measurement

3.3.1 Test Procedure

Conducted

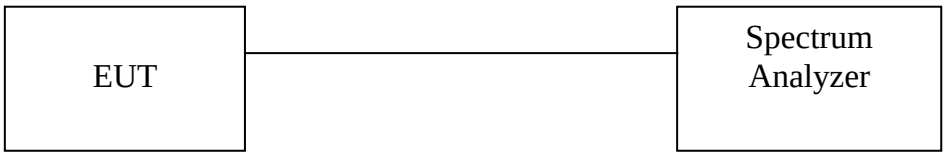
1. The transmitter output of EUT was connected to the spectrum analyzer.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 2.375GHz, 2.5GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

Radiated

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 100KHz
   VBW: 100KHz
   Center frequency: 2.375GHz, 2.5GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

3.3.2 Test Setup

Conducted



Radiated

Same as *Radiated Emission Measurement*

3.3.3 Test Data:

Table: Band Edge measurement

Conducted Test

Temp. (° C): 27

Test Engr: Scott Humidity (%): 65

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Outsideband Limit: >20dB (dB)	Pass/Fail
1	2402.76	95.73	---	---
Outside band	2400	53.58	42.15	Pass
19	2476.78	95.02	---	---
Outside band	2483.54	47.18	47.84	Pass

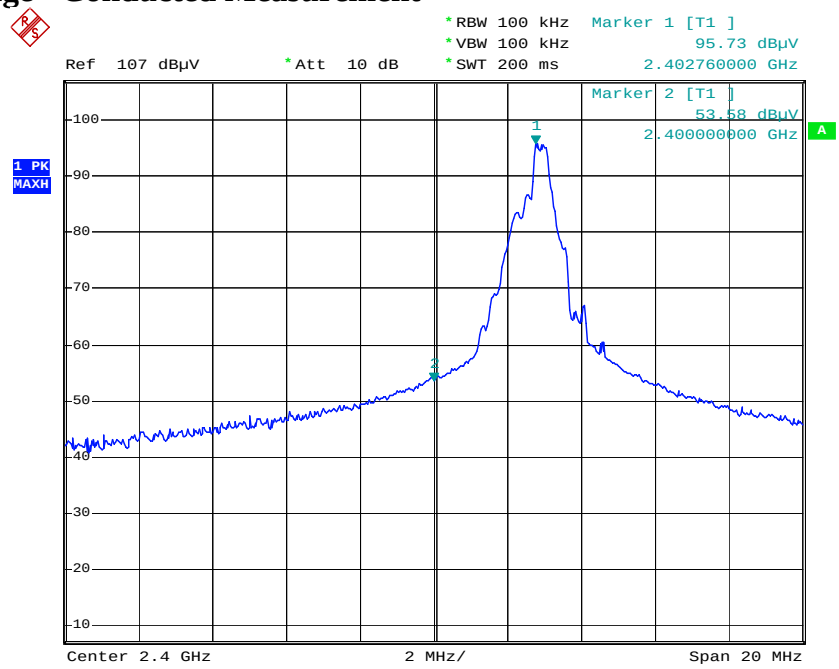
Radiated Test

Temp. (° C): 27

Test Engr: Scott Humidity (%): 60

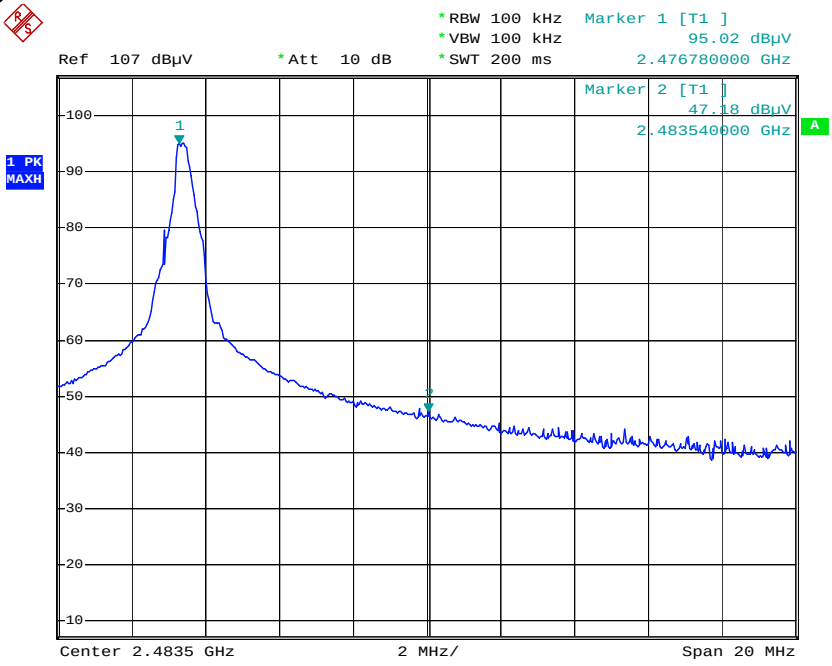
Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Outsideband Limit: >20dB (dB)	Pass/Fail
1	2402.8	53.77	---	---
Outside band	2391.6	29.18	24.59	Pass
19	2476.94	56.36	---	---
Outside band	2483.5	26.81	29.55	Pass

Band Edge Conducted Measurement



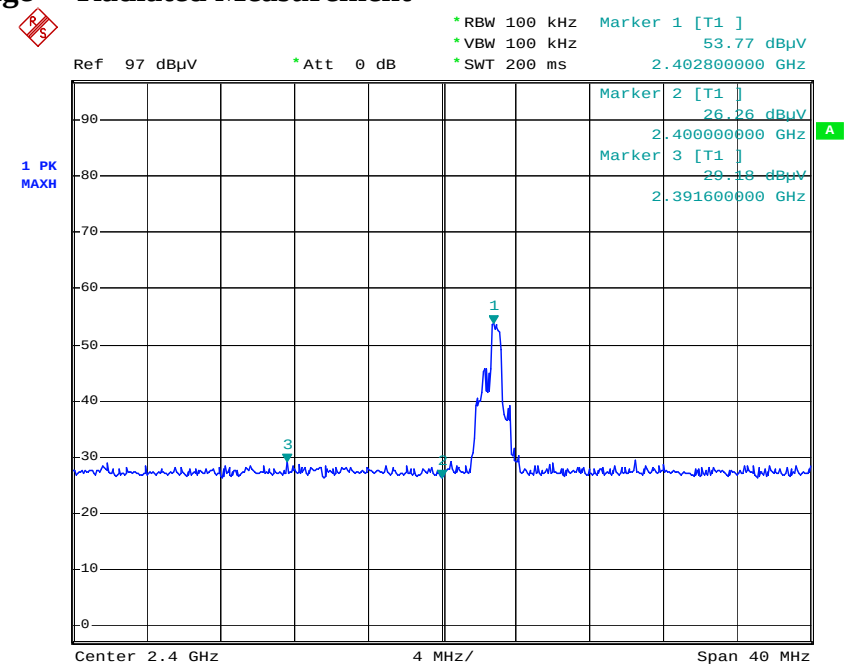
Date: 11.NOV.2010 10:31:03

Band Edge Conducted Measurement



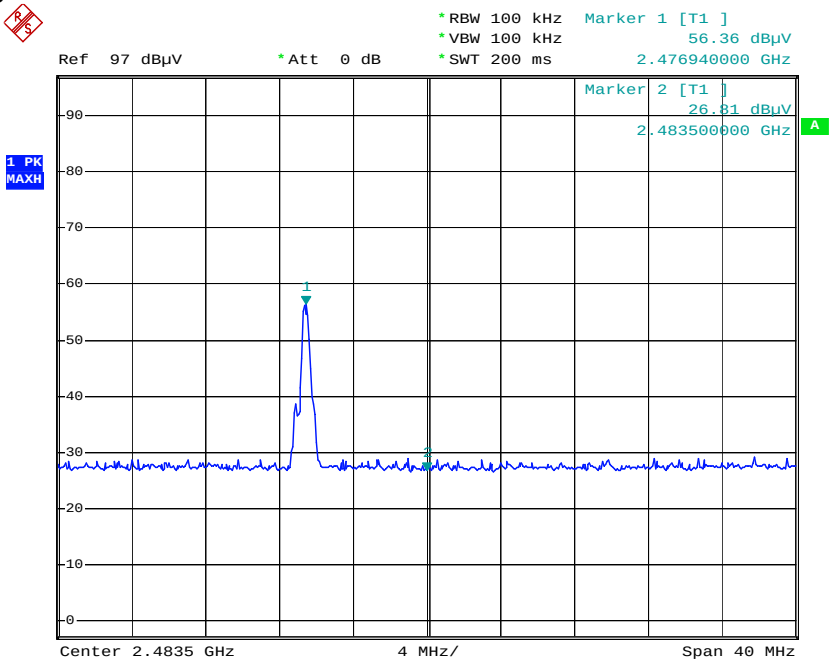
Date: 11.NOV.2010 10:30:09

Band Edge Radiated Measurement



Date: 9.NOV.2010 19:56:44

Band Edge Radiated Measurement



Date: 12.NOV.2010 11:11:57

3.4 Band Edge Restricted Bands & Fundamental Emission Measurement

3.4.1 Test Procedure (Radiated & Fundamental)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
   Equipment mode: Spectrum analyzer
   Detector function: Peak mode
   SPAN: 100MHz
   RBW: 1MHz
   VBW: 3MHz
   Center frequency: 2.39GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of modulation frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band
   Change RBW: 1MHz
   VBW: 3MHz
5. Get the spectrum reading after Maximum Hold function is completed.

3.4.2 Test Setup (Radiated & Fundamental)

Same as *Radiated Emission Measurement*

3.4.3 Test Data

Fundamental Emission X,Y,Z Plane Pretest Data

RBW:1MHz VBW:3MH

X –Plane (channel 1)

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
1	2402.900	58.37	32.34	2.34	0	93.05	114.00	-20.95	Horizontal	peak
Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
2	2402.900	52.26	32.34	2.34	0	86.94	114.00	-27.06	Vertical	peak

Y –Plane (channel 1)

Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
3	2402.900	51.42	32.34	2.34	0	86.10	114.00	-27.90	Horizontal	peak
Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
4	2402.900	57.30	32.34	2.34	0	91.98	114.00	-22.02	Vertical	peak

Z –Plane (channel 1)

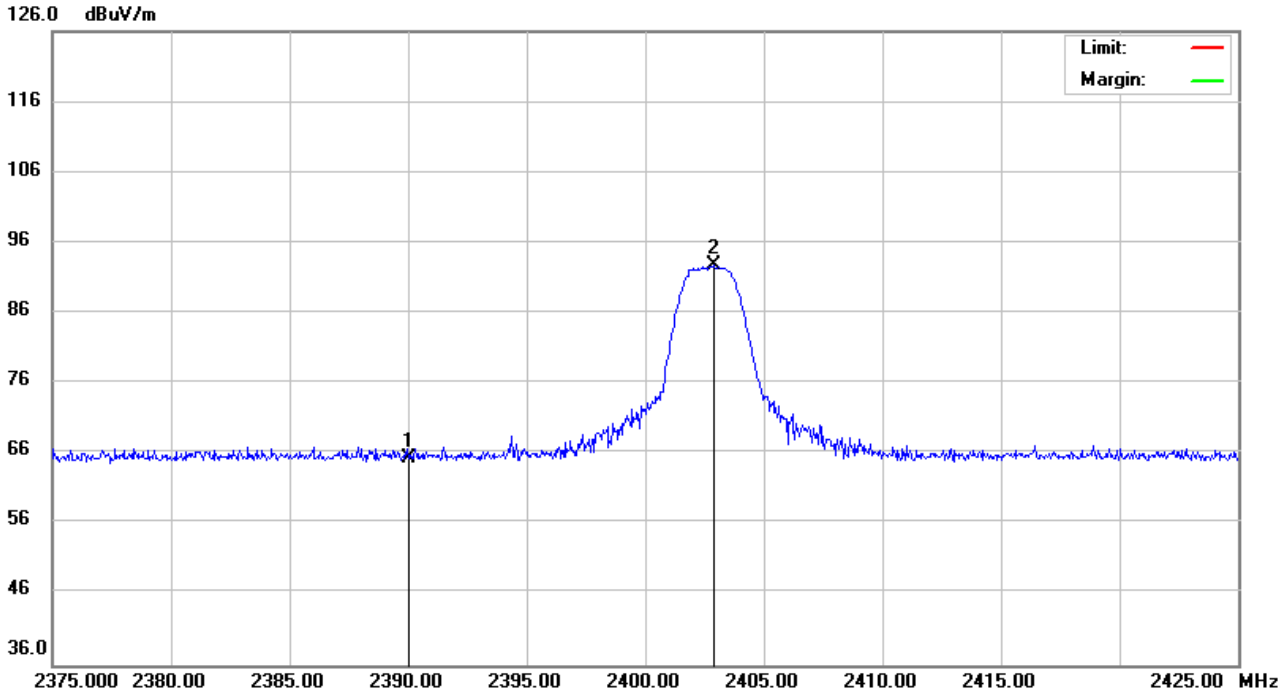
Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
5	2402.900	54.26	32.34	2.34	0	88.94	114.00	-25.06	Horizontal	peak
Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Polarization	Detector
6	2402.900	55.27	32.34	2.34	0	89.95	114.00	-24.05	Vertical	peak

Note:

- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss
- X-Pane(***Horizontal***) of Fundamental is the worse mode

Channel 1: Restricted Bands Measurement & Fundamental Emission (Radiated) (Peak)

RBW:1MHz VBW:3MH;



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Description
1	2390.000	30.29	32.8	2.33	0	65.42	74	-8.58	Channel_1 Restricted band (peak mode)
2	2402.900	57.67	32.82	2.34	0	92.84	114	-21.16	Channel_1 (peak mode)

Note:

- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss
- A margin of -8dB means that the emission is 8dB below the limit.

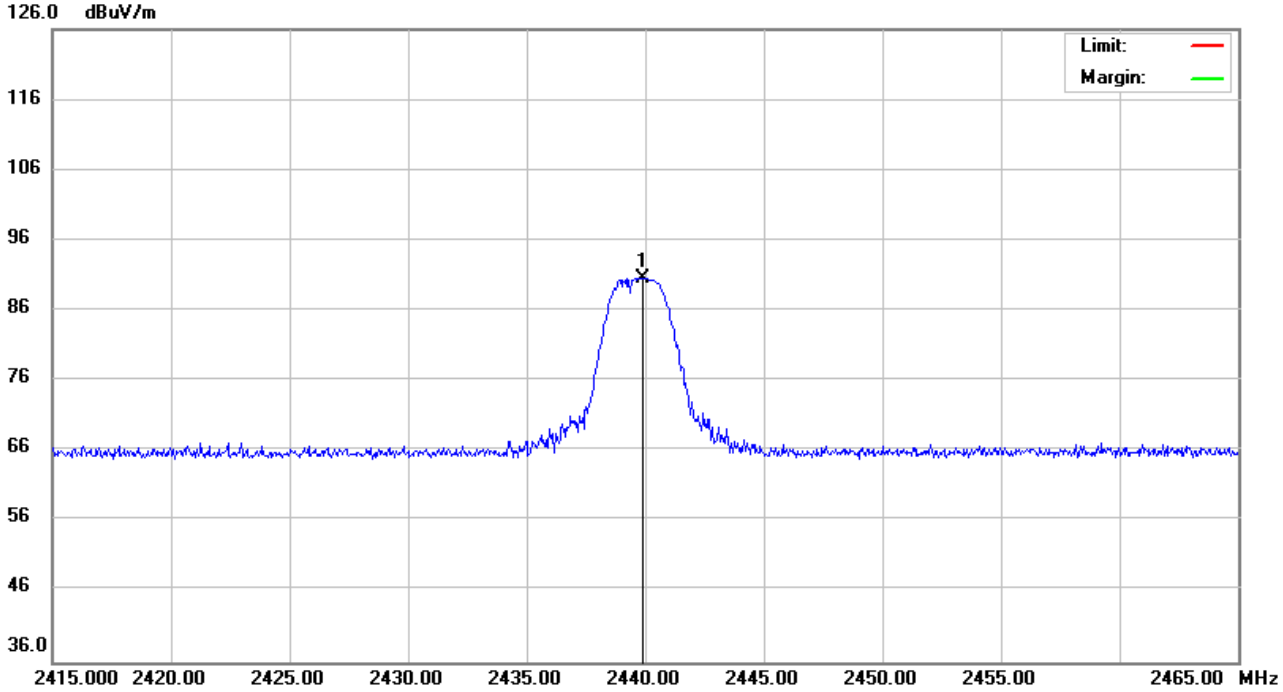
Channel 1: Restricted Bands Measurement & Fundamental Emission (Radiated) (Average)

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	2390.000	65.42	-20	45.42	54	-8.58	
2	2402.900	92.84	-20	72.84	94	-21.16	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

Channel Mid: Fundamental Emission (Radiated) (Peak)

RBW:1MHz VBW: 3MH;



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Description
1	2439.900	55.34	32.89	2.36	0	90.59	114	-23.41	Channel_Mid (peak mode)

Note:

- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss
- A margin of -8dB means that the emission is 8dB below the limit

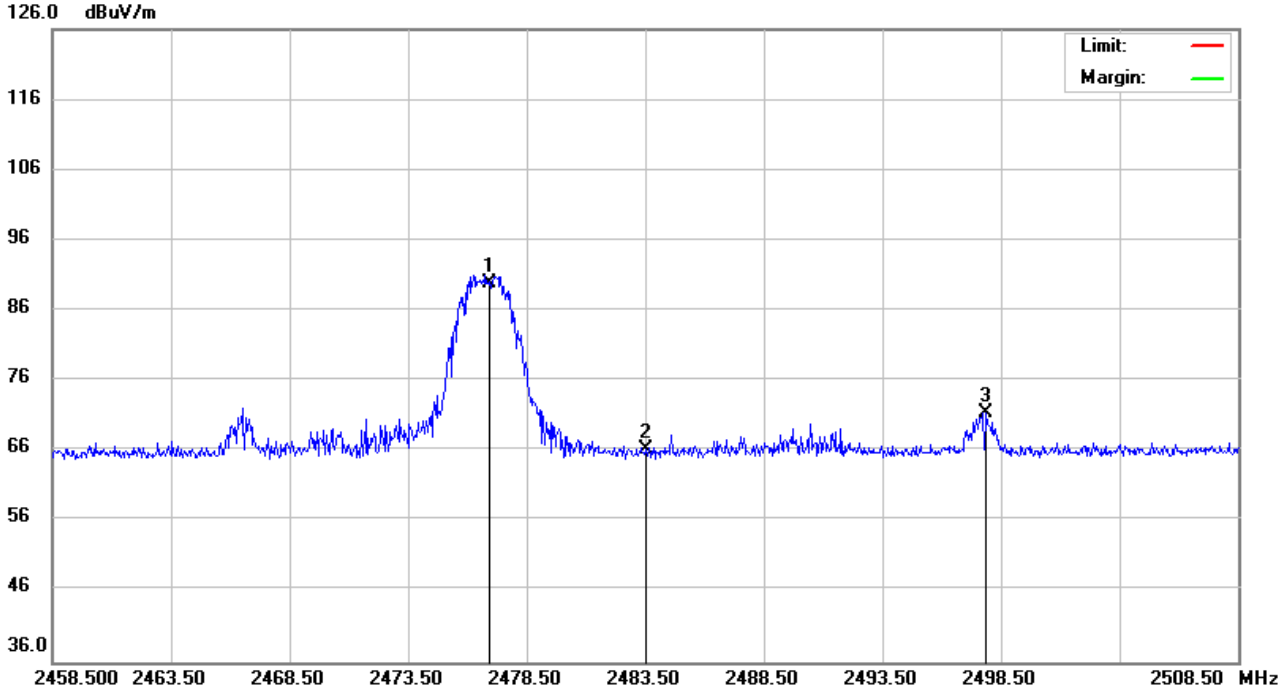
Channel Mid: Fundamental Emission (Radiated) (Average)

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	24390.900	90.59	-20	70.59	94	-23.41	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

Channel 19: Restricted Bands Measurement & Fundamental Emission (Radiated) (Peak)

RBW:1MHz VBW: 3MH



Mk.	Frequency (MHz)	RX_R (dBuV/m)	Ant_F (dB)	Cab_L (dB)	PreAmp (dB)	Emission (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Description
1	2476.900	54.53	32.96	2.39	0	89.88	114	-24.12	Channel_19 (peak mode)
2	2483.500	30.83	32.97	2.39	0	66.19	74	-7.81	Channel_19 Restricted band (peak mode)
3	2497.850	36.13	33	2.4	0	71.53	74	-2.47	Channel_19 Restricted band (peak mode)

Note:

- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss
- A margin of -8dB means that the emission is 8dB below the limit

Channel 19: Restricted Bands Measurement & Fundamental Emission (Radiated) (Average)

Mk.	Frequency (MHz)	Peak Emission (dBuV/m)	Duty Cycle Correction Factor(dB)	Measurement Level (dBuVm)	Limit (dBuV/m)	Margin (dB)	
1	**2476.900**	**89.88**	-20	69.88	94	-24.12	
2	**2483.500**	**66.19**	-20	46.19	54	-7.81	
3	**2497.850**	**71.53**	-20	51.53	54	-2.47	

Note:
The average value of fundamental frequency is: **-31.7 dB**
Duty Cycle Correction Factor(dB) = Peak value + 20log(Duty cycle)
Maximum duty cycle according to FCC part 15.35(b):-20dB

4. Appendix

4.1 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.

4.2 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°. 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 3m EMC Chamber

The radiated emissions test will then be repeated on the open site or 3m 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.

4.3 Appendix C: Test Equipment

4.3.1 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	06/21/2010	06/21/2011
Conduction 03	EMI Receiver 11	ROHDE & SCHWARZ	ESCI	100568	06/18/2010	06/18/2011
Conduction 03	ISNT4-02	FCC	FCC-TLISN-T4-02	20575	05/15/2010	05/15/2011
Conduction 03	ISNT8-02	FCC	FCC-TLISN-T8-02	20476	05/15/2010	05/15/2011
Conduction 03	LISN 07	FCC Inc.	FCC-LISN-50-100-4-02	07040	06/02/2010	06/02/2011
Conduction 03	LISN 08	FCC	FCC-LISN50-25-2-01	07039	06/25/2010	06/25/2011

Location Chmb14	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Radiation (Chamber14)	Spectrum Analyzer 21	Agilent	N9010A	MY49060537	07/13/2010	07/13/2011
Rad. Above 1GHz (Chamber14)	Horn Antenna 06	ETS	3117	00066665	09/28/2010	09/28/2011
Rad. Above 1GHz (Chamber14)	SUCOFLEX 1GHz~26.5GHz cable	HUBER+SUHNER AG.	Sucoflex 104	286305/4	09/30/2010	09/30/2011
Rad. Above 1GHz (Chamber14)	Preamplifier 13	MITEQ	JS44-00101800-25-10P-44	1329256	06/10/2010	06/10/2011
Rad. Above 1GHz (Chamber14)	Spectrum Analyzer 19	R&S	FSP40	100116	10/18/2010	10/18/2011

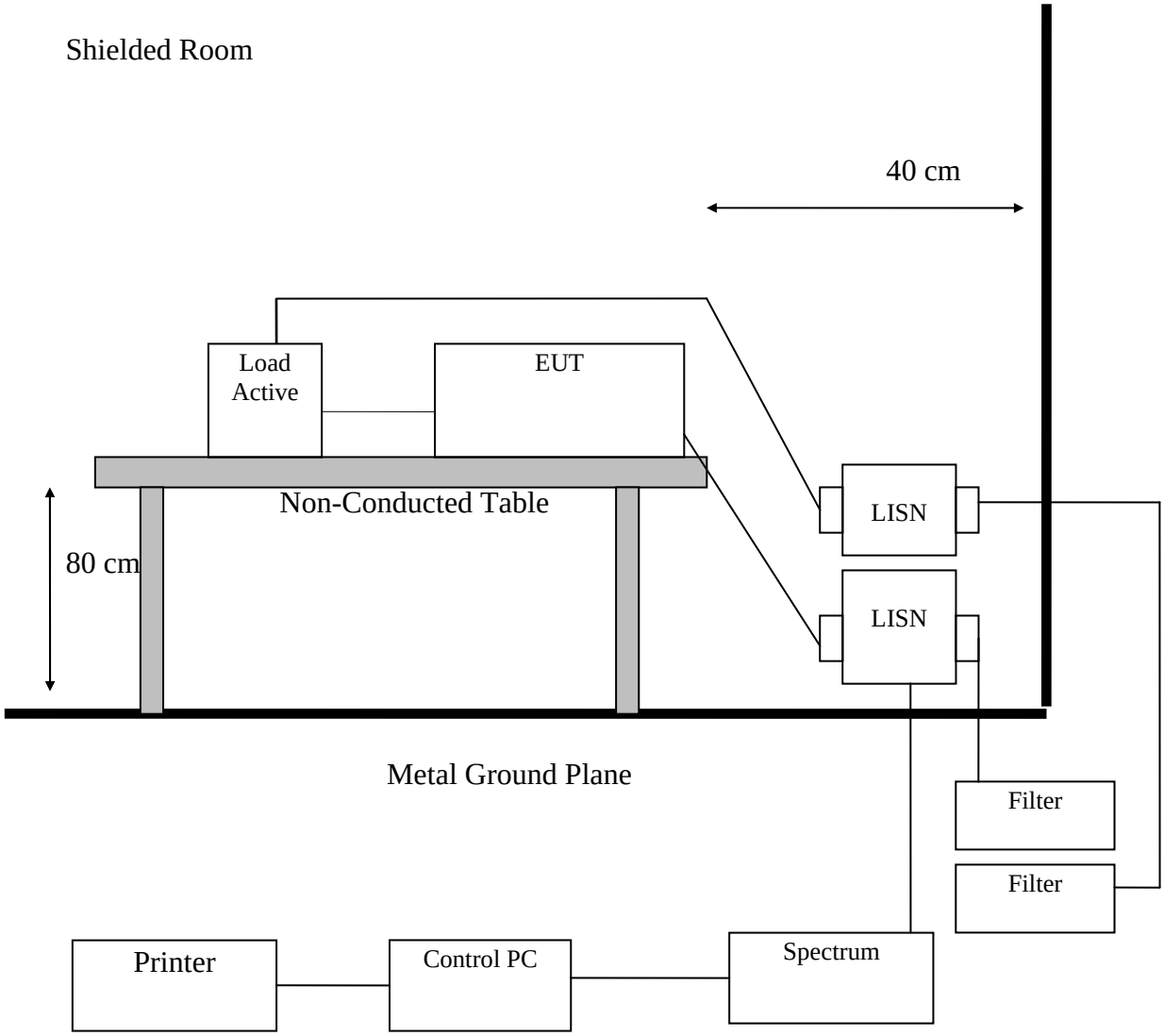
Note: Calibration is traceable to NIST or national or international standards.

4.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

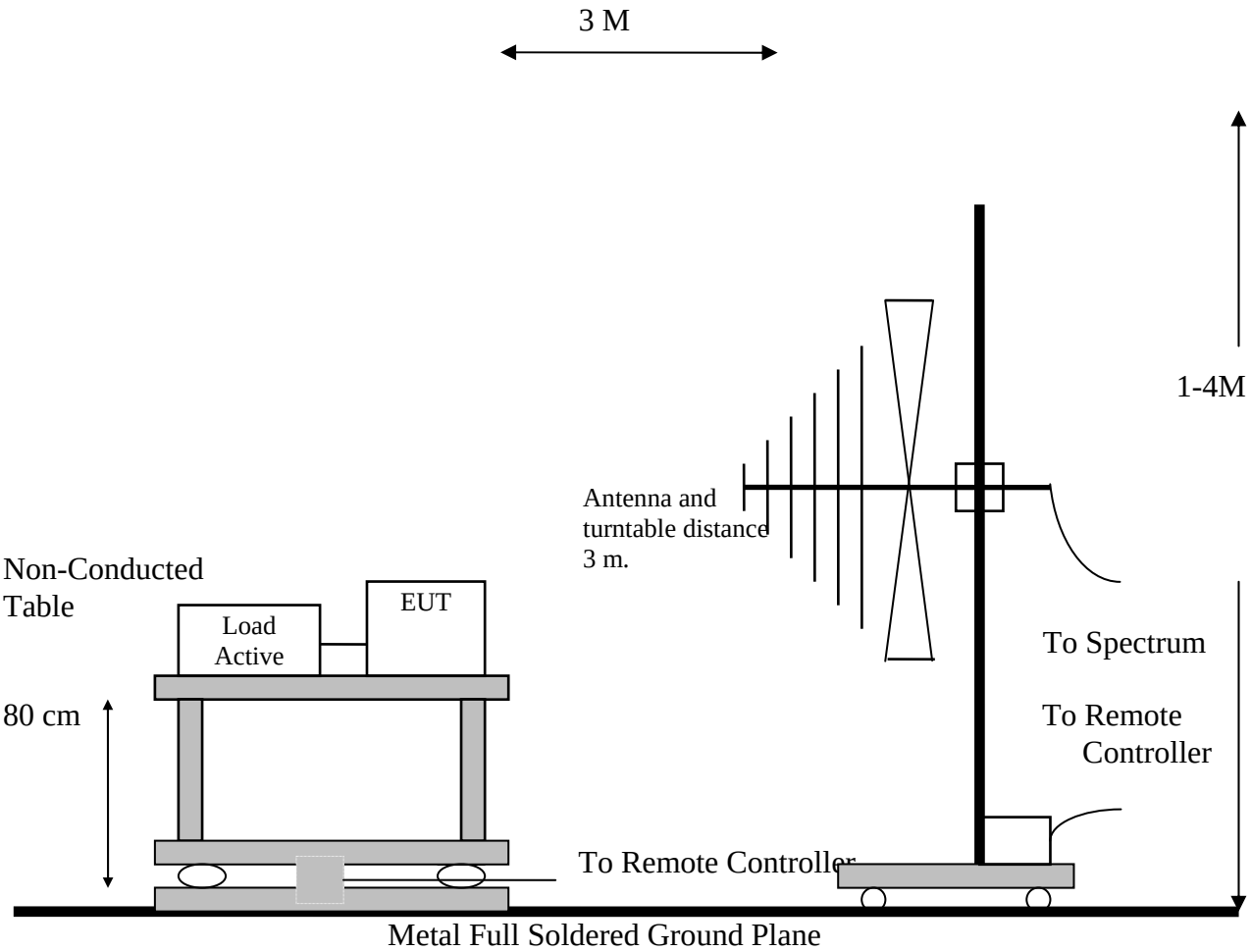
Radiation/Conduction	Filename	Version	Issued Date
Lung_Tan Conduction	EZ EMC	1.1.4.2	2/10/2007
Lung_Tan Radiation	EZ EMC	1.1.4.2	1/24/2007

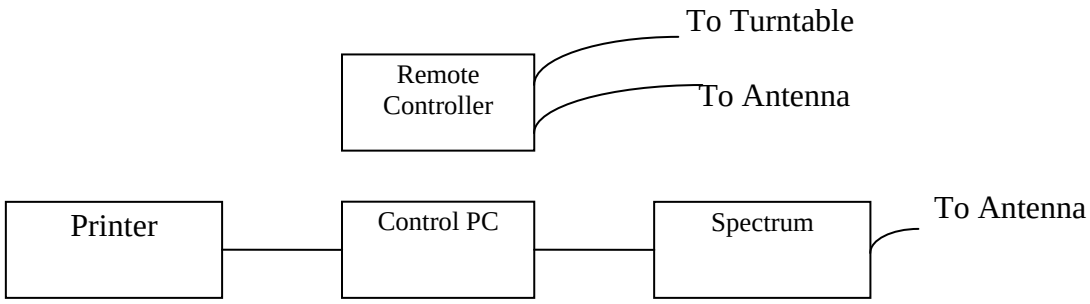
4.4 Appendix D: Layout of EUT and Support Equipment

4.4.1 General Conducted Test Configuration



4.4.2 General Radiation Test Configuration





4.5 Appendix E: Accuracy of Measurement

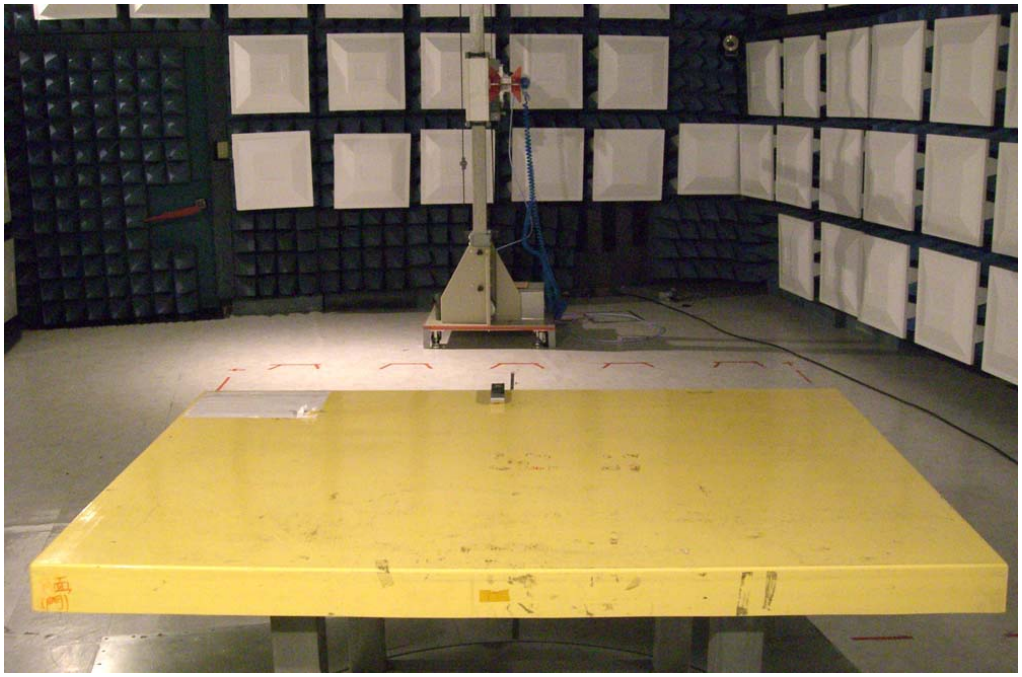
The measurement uncertainty refers to CISPR 16-4-2:2003. The coverage factor k = 2 yields approximately a 95 % level of confidence.

<Chamber 14 (3M)>
Horizontal
30MHz~200MHz: ±4.316 dB
200MHz~1GHz: ±4.587 dB
Vertically
30MHz~200MHz: ±4.420 dB
200MHz~1GHz: ±4.573 dB

1GHz~26.5GHz ±3.722 dB

4.6 Appendix F: Photographs of EUT Configuration Test Set Up

The Front View of Highest Radiated Set-up For EUT



The Back View of Highest Radiated Set-up For EUT