Test Report
for
FCC Part 15 Subpart B & C

of

Product Name

Notebook Personal Computer

(with Broadcom USB Bluetooth Module BCM92035NMD inside)

Model

IX600

(Brand:Itronix)

Applied by:

Itronix Corporation
801 South Stevens Street
Spokane Washington,99204
USA

Test Performed by:

International Standards Laboratory

No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd.
Lung-Tan Hsiang, Tao Yuan County 325
Taiwan, R.O.C.
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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 15.247)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	Notebook Personal Computer
Model:	IX600
Applied by:	Itronix Corporation
Sample received Date:	2005/07/08
Final test Date :	2005/08/08-2005/08/17
Test Result	PASS
Test Site:	Chamber 02, Conduction 02
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

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 52 pages, including 1 cover page , 2 contents page, and 49 pages for the test description. This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

2. Test Results Summary

The Bluetooth 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(a)	AC Power Line Emissions	Pass	
15.247(b) (1)	Max. Peak Output Power	Pass	
15.209(a)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(a)(1)(iii)	Number of Hopping Frequency Used	Pass	
15.247(a) (1)(ii)	Spectrum Bandwidth Of FHSS device	Pass	
15.247(a)(1)	Hopping Channel Separation	Pass	
15.247(a)(1)(iii)	Dwell Time	Pass	

3. Description of Equipment Under Test (EUT)

Description:	Notebook Personal Computer (with Broadcom USB Bluetooth Module BCM92035NMD inside)
Model No.:	IX600
FCC ID:	KBCIX600-BT
Brand:	Itronix
Bluetooth Module:	Broadcom, Model: BCM92035NMD
Frequency Range:	2402 ~ 2480 MHz
Support channel:	79 Channels
Modulation Skill:	GFSK (1Mbps)
Antennas Type:	AccuWave Antenna made by Etenna Corp. Model No.: EA2400
Antenna Connected:	The antenna is mounted to the PCB of the Bluetooth Module. The user is not possible to change the antenna .
Antenna peak Gain:	3.0 dBi
Power Type of Bluetooth module:	3.3V DC from Notebook PC

The channels and the operation frequency have listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
00	2402	01	2403
02	2404	03	2405
04	2406	05	2407
……			
75	2477	76	2478
77	2479	78	2480

Power Supply Type:	Auto Switching AC Adapter Delta (Model: SADP-65KB D) or Liteon(Model: PA-1700-02)
CPU Type:	Pentium M Dothan 1.8GHz
Hard Disk Device:	HGST (Model: HTS424040M9AT00)
DDR:	512MB Hynix (Model: HYMP564S64P6-C4) or Micron (Model: MT8HTF6464HDY-53EA3) 1024 MB Infineon (Model: HYS64T128021HDL-3.7-A)

DVD-Multi:	TEAC (Model: DW-224E-B83)
DVD-RAM:	TEAC(Model: DV-W28EA)
MDC modem:	Liteon (Model: MDC-003#/A1A)
DC-In:	one
VGA Port:	one
USB2.0 Connector:	two
LAN Connector:	one
Modem Port:	one
PCIMCIA Connector:	one
Docking Connector:	one
Line in:	one
Line out:	one
RS-232 Port:	one
Smart Connector :	one
Express Connector :	one
Battery:	Simplo 6 cell or Simplo 9 cell
LCD:	Enhanced 14.1” XGA TFT (Model: LTD121EC5S)
Inverter:	Sumida (Model : IV12087/T)
Maximum display Resolution:	1024X786 Non-interlaced

EMI Noise Source:
Crystal: 14.318M (X1),32.768M (X2),32.768M(X3),
24.576M(X4),25M(X5),24.576M(X6)

Clock Generator: U44

EMI Solution:
1. add two gaskets on Heatsink
2. add seven gaskets on HDD DOOR

4. TEST RESULTS

4.1 Powerline Conducted Emissions

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)

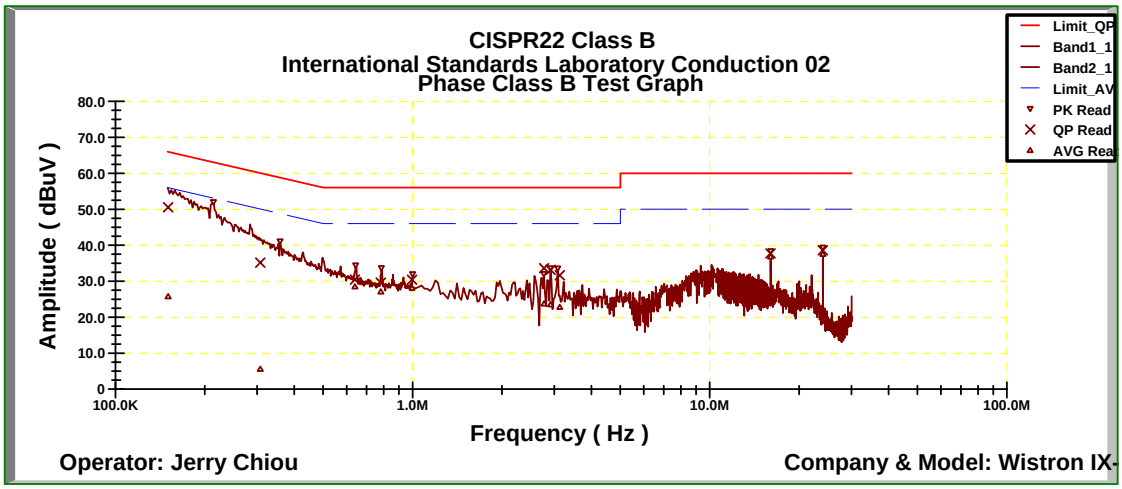
Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 Test Data:

Power Line Conducted Emissions (Hot) Channel 00, 39, 78

Operator:JerryChiou
Temperature(C):25
06:00:42PM,Tuesday,August16,2005 Humidity(%):49

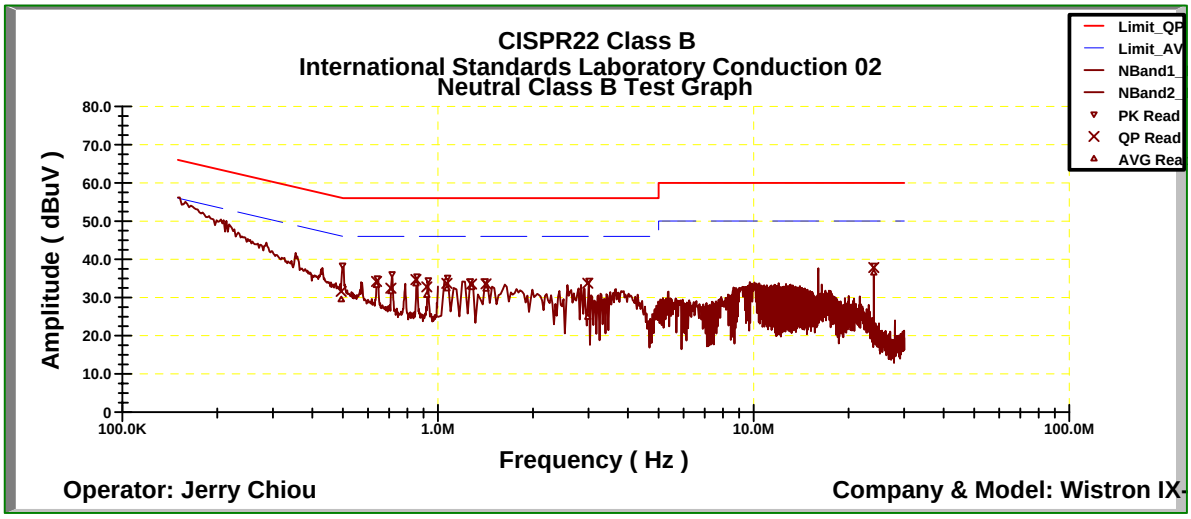
Frequency	LISNLoss	CableLoss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.15052	0.10	0.02	50.53	65.99	-15.45	25.72	55.99	-30.27
0.3073	0.10	0.10	35.13	61.51	-26.38	5.54	51.51	-45.97
0.6398	0.14	0.07	30.44	56.00	-25.56	28.44	46.00	-17.56
0.7821	0.16	0.07	29.58	56.00	-26.42	27.06	46.00	-18.94
0.996	0.20	0.07	30.41	56.00	-25.59	28.05	46.00	-17.95
2.7699	0.20	0.11	33.61	56.00	-22.39	23.71	46.00	-22.29
2.9127	0.20	0.11	33.14	56.00	-22.86	23.48	46.00	-22.52
3.1271	0.20	0.12	31.63	56.00	-24.37	22.76	46.00	-23.24
16.0022	0.48	0.31	37.69	60.00	-22.31	36.77	50.00	-13.23
24.0032	0.88	0.33	38.55	60.00	-21.45	37.48	50.00	-12.52



Power Line Conducted Emissions (Neutral) Channel 00, 39, 78

Operator:JerryChiou WistronIX-600
Temperature(C):25
06:08:44PM,Tuesday,August16,2005 Humidity(%):49

Frequency	LISNLoss	CableLoss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.4938	0.12	0.07	31.58	56.18	-24.60	29.49	46.18	-16.69
0.6388	0.14	0.07	34.16	56.00	-21.84	33.23	46.00	-12.77
0.7091	0.15	0.07	32.44	56.00	-23.56	31.64	46.00	-14.36
0.8516	0.18	0.07	34.68	56.00	-21.32	33.62	46.00	-12.38
0.922	0.19	0.07	32.78	56.00	-23.22	30.64	46.00	-15.36
1.0673	0.20	0.07	33.70	56.00	-22.30	32.33	46.00	-13.67
1.2779	0.20	0.08	33.54	56.00	-22.46	32.69	46.00	-13.31
1.4203	0.20	0.08	33.55	56.00	-22.45	32.26	46.00	-13.74
2.9819	0.20	0.11	33.71	56.00	-22.29	24.91	46.00	-21.09
24.0032	0.46	0.33	37.85	60.00	-22.15	36.49	50.00	-13.51



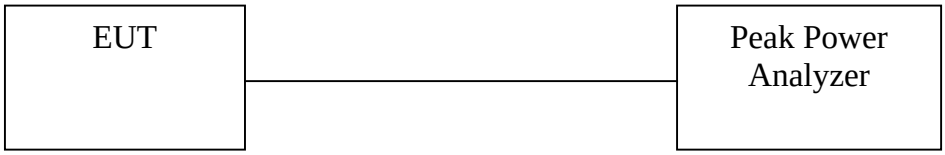
* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 00, 39, 78 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

4.2 FHSS Maximum Peak Output Power

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

4.2.2 Test Setup



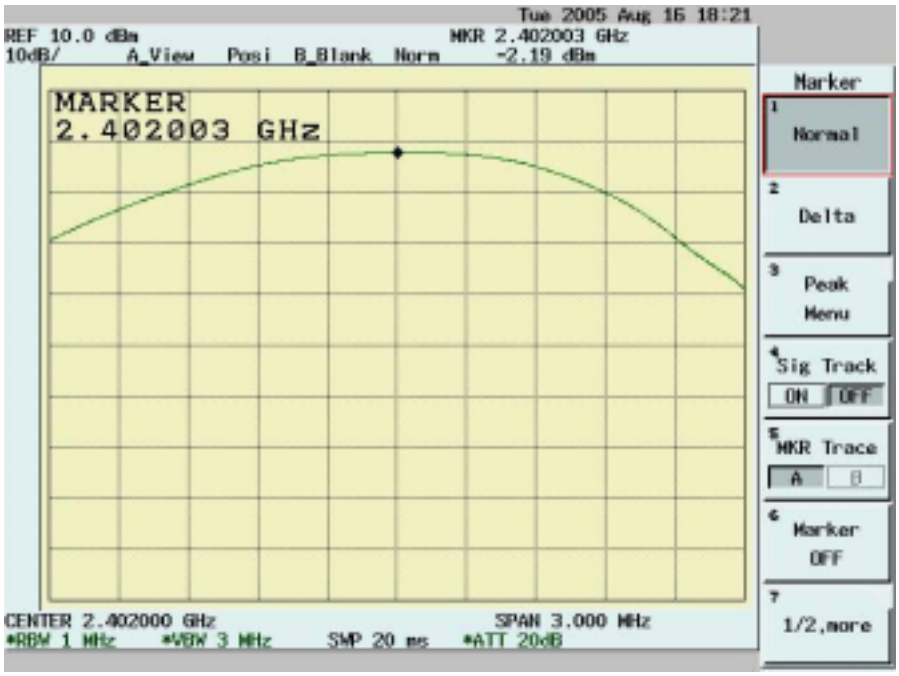
4.2.3 Test Data

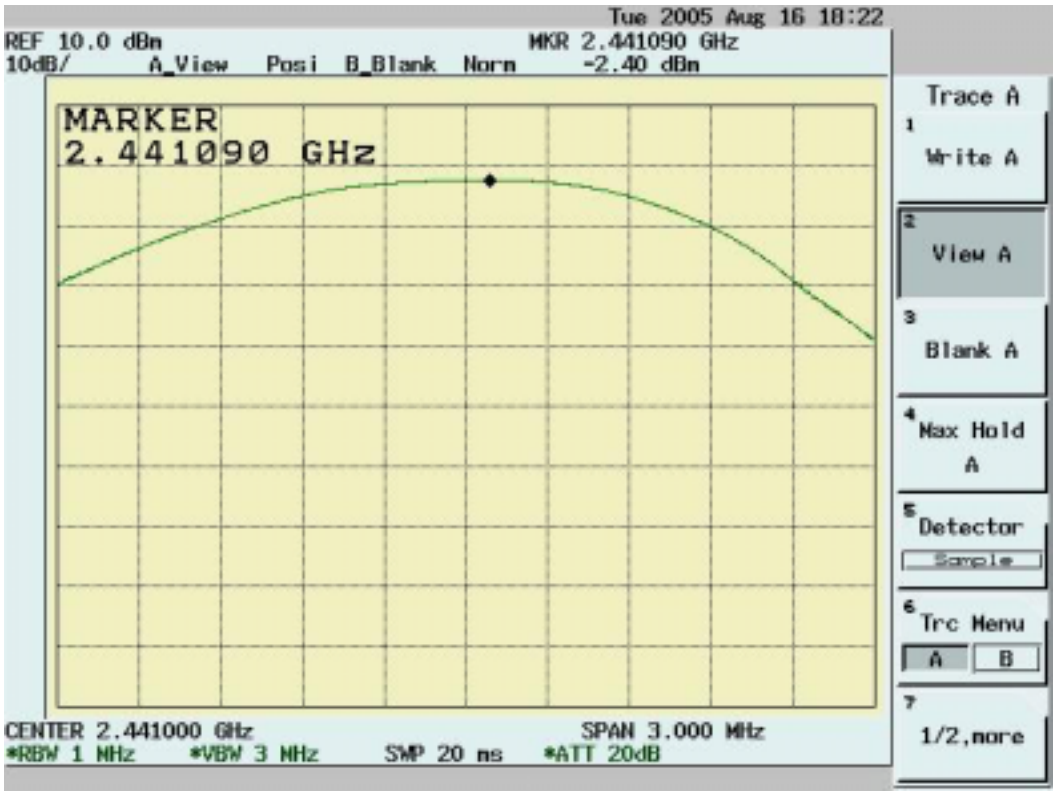
Maximum Peak Output Power

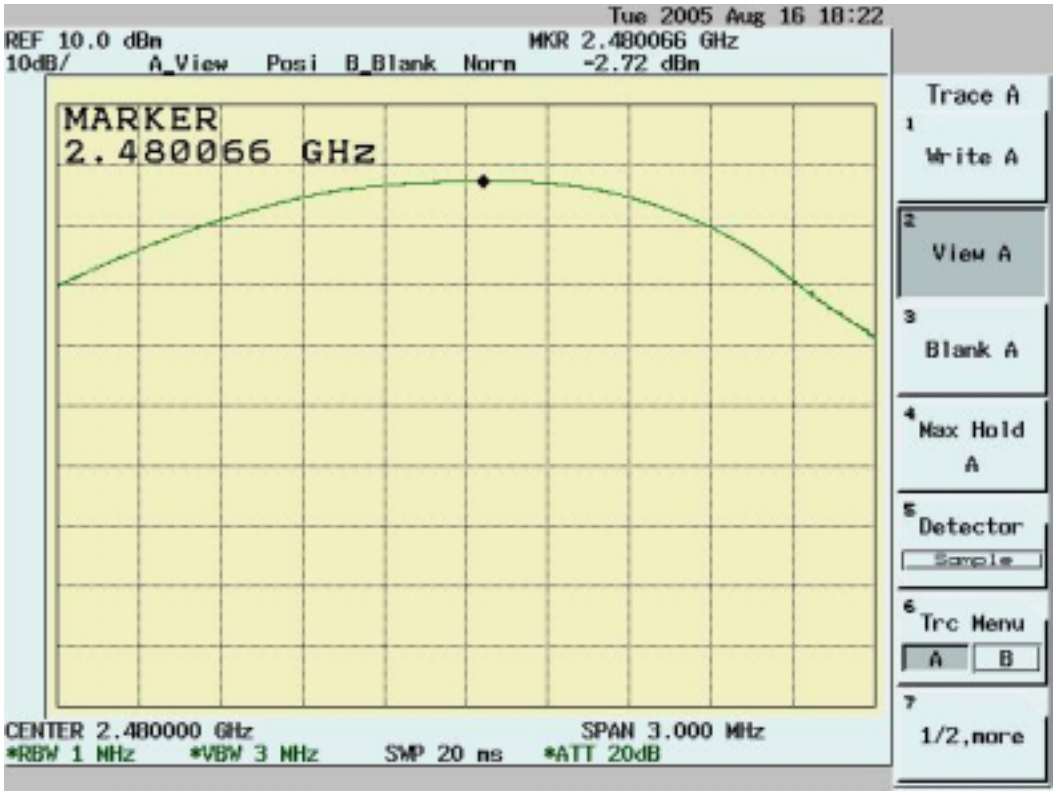
Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	**2412**	-2.19	1.50	0.85	-0.69	30	Pass
39	**2437**	-2.40	1.50	0.81	-0.90	30	Pass
78	**2462**	-2.72	1.50	0.76	-1.22	30	Pass




Tue 2005 Aug 16 18:22
REF 10.0 dBm
MKR 2.441090 GHz
10dB/ A_View Posi B_Blank Norm -2.40 dBm
MARKER
2.441090 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector Sample
6 Trc Menu A B
7 1/2,more
CENTER 2.441000 GHz
SPAN 3.000 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ns *ATT 20dB


Tue 2005 Aug 16 18:22
REF 10.0 dBm
MKR 2.480066 GHz
10dB/ A_View Posi B_Blank Norm -2.72 dBm
MARKER
2.480066 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector Sample
6 Trc Menu A B
7 1/2,more
CENTER 2.480000 GHz
SPAN 3.000 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ns *ATT 20dB

4.3 Radiated Emission Measurement

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.

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.

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.

4.3.3 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)	1MHz

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
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

4.3.4 Test Data (30MHz – 1GHz):

30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 00, 39, 78

Operator:JerryChiou
Temperature(C):23
11:09:26AM,Saturday,July16,2005 Humidity(%):54

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
208.48	21.60	8.48	2.77	0.00	32.85	43.50	-10.65	196.00	301.00
257.95	20.23	12.73	3.17	0.00	36.14	46.00	-9.86	99.00	297.00
282.2	21.92	13.78	3.39	0.00	39.09	46.00	-6.91	99.00	117.00
364.65	21.91	16.11	4.20	0.00	42.22	46.00	-3.78	99.00	134.00
380.17	14.37	16.02	4.31	0.00	34.70	46.00	-11.30	196.00	350.00
405.39	14.16	15.93	4.48	0.00	34.57	46.00	-11.43	196.00	350.00
430.61	18.39	16.08	4.67	0.00	39.14	46.00	-6.86	146.00	336.00
499.48	12.87	17.39	5.28	0.00	35.55	46.00	-10.45	196.00	105.00

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 00, 39, 78

Operator:JerryChiou
Temperature(C):23
11:12:23AM,Saturday,July16,2005 Humidity(%):54

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
282.2	19.20	13.78	3.39	0.00	36.37	46.00	-9.63	153.00	39.00
364.65	22.08	16.11	4.20	0.00	42.39	46.00	-3.61	103.00	336.00
432.55	20.54	16.10	4.69	0.00	41.32	46.00	-4.68	103.00	73.00
633.34	11.69	18.90	6.18	0.00	36.77	46.00	-9.23	196.00	320.00
686.69	10.95	19.00	6.53	0.00	36.48	46.00	-9.52	103.00	353.00
696.39	15.58	19.00	6.60	0.00	41.18	46.00	-4.82	153.00	23.00
829.28	9.25	20.39	7.70	0.00	37.34	46.00	-8.66	103.00	303.00

NOTE:

- During the Pre-test, the EUT has been tested for Channel 00, 39, 78 transmit from 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

4.3.5 Test Data (1GHz – 25 GHz) .

1GHz~ 25 GHz (Horizontal), Channel 00: 2402 MHz

Operator:JerryChiou RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1941.56	49.23PK	30.51	2.56	35.07	47.23PK	54.00av	-6.77	100	47
2193.81	47.45PK	30.96	2.01	35.19	45.23PK	54.00av	-8.77	101	104
2266.23	47.45PK	30.95	1.79	35.19	44.99PK	54.00av	-9.01	101	127
2493.51	47.45PK	30.90	1.40	35.20	44.55PK	54.00av	-9.45	101	198
4804	50.69PK	34.86	2.12	37.69	49.97PK	54.00av	-4.03	100	155
9608	38.91PK	40.66	3.23	34.32	48.48PK	54.00av	-5.52	100	155

1GHz~ 25 GHz (Vertical), Channel 00: 2402 MHz

Operator:JerryChiou RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1939.06	52.45PK	30.49	2.55	35.06	50.43PK	54.00av	-3.57	100	47
2193.81	47.93PK	30.96	2.01	35.19	45.71PK	54.00av	-8.29	101	104
2488.51	50.30PK	30.90	1.42	35.20	47.42PK	54.00av	-6.58	101	196
4804	55.00PK	34.86	2.12	37.69	54.28PK	74.00PK	-19.72	100	147
4804	51.95av	34.86	2.12	37.69	51.23av	54.00av	-2.77	100	147
9608	46.28PK	40.66	3.23	34.32	54.85PK	74.00PK	-19.15	100	147
9608	42.38av	40.66	3.23	34.32	51.95av	54.00av	-2.05	100	147

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.
- " * ": Fundamental Frequency
- "**": Not in the restricted band, Limit level=Fundamental Emission-20dB
- " pk": peak mode
- "av": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- 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.

1GHz~ 25 GHz (Horizontal) , Channel 39 : 2441 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2196.3	47.16PK	30.96	2.00	35.19	44.93PK	54.00av	-9.07	101	105
2256.24	46.66PK	30.95	1.82	35.19	44.24PK	54.00av	-9.76	101	123
2486.01	49.45PK	30.90	1.44	35.20	46.58PK	54.00av	-7.42	101	196
4882	47.83PK	35.15	2.14	37.78	47.34PK	54.00av	-6.66	100	155
9764	42.87PK	40.32	3.31	34.38	52.12PK	54.00av	-1.88	100	155

1GHz~ 25 GHz (Vertical), Channel 39 : 2441 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2296.2	46.05PK	30.94	1.70	35.19	43.50PK	54.00av	-10.50	101	136
2488.51	48.30PK	30.90	1.42	35.20	45.42PK	54.00av	-8.58	101	196
4882	52.61PK	35.15	2.14	37.78	52.12PK	54.00av	-1.88	100	143
9764	45.05PK	40.32	3.31	34.38	54.30PK	74.00PK	-19.7	100	143
9764	42.45av	40.32	3.31	34.38	51.70av	54.00av	-2.3	100	143

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.
- " * ": Fundamental Frequency
- "**": Not in the restricted band, Limit level=Fundamental Emission-20dB
- " pk": peak mode
- "av": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- 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.

1GHz~ 25 GHz (Horizontal), Channel 78: 2480 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2198.8	46.98PK	30.96	1.99	35.19	44.75PK	54.00av	-9.25	101	105
2393.61	46.45PK	30.92	1.43	35.20	43.61PK	54.00av	-10.39	101	167
4960	48.54PK	35.45	2.16	37.87	48.28PK	54.00av	-5.72	100	152
9920	39.77PK	39.98	3.39	34.43	48.70PK	54.00av	-5.3	100	152

1GHz~ 25 GHz (Vertical), Channel 78 : 2480 MHz

Operator:JerryChiou

RBW:1MHz
Humidity(%):40
Temperature(C):27

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1941.56	49.53PK	30.51	2.56	35.07	47.53PK	54.00av	-6.47	100	47
2201.3	45.98PK	30.96	1.99	35.19	43.74PK	54.00av	-10.26	101	106
2333.67	47.34PK	30.93	1.58	35.19	44.67PK	54.00av	-9.33	101	148
4960	48.68PK	35.45	2.16	37.87	48.42PK	54.00av	-5.58	100	143
9920	44.45PK	39.98	3.39	34.43	53.38PK	54.00av	-0.62	100	143

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.
- " * ": Fundamental Frequency
- "**": Not in the restricted band, Limit level=Fundamental Emission-20dB
- " pk": peak mode
- "av": average mode
- "---": No meter reading data due to the emission level is smaller than spectrum noise level.
- 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.

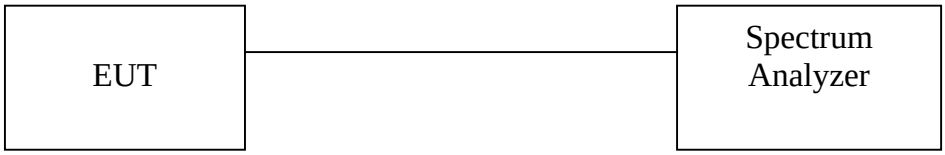
All frequencies from 1GHz to 25 GHz have been tested.

4.4 Band Edge Measurement

4.4.1 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: 2.4GHz, 2.4835GHz.
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

4.4.2 Test Setup (Conducted)



4.4.3 Test Data:

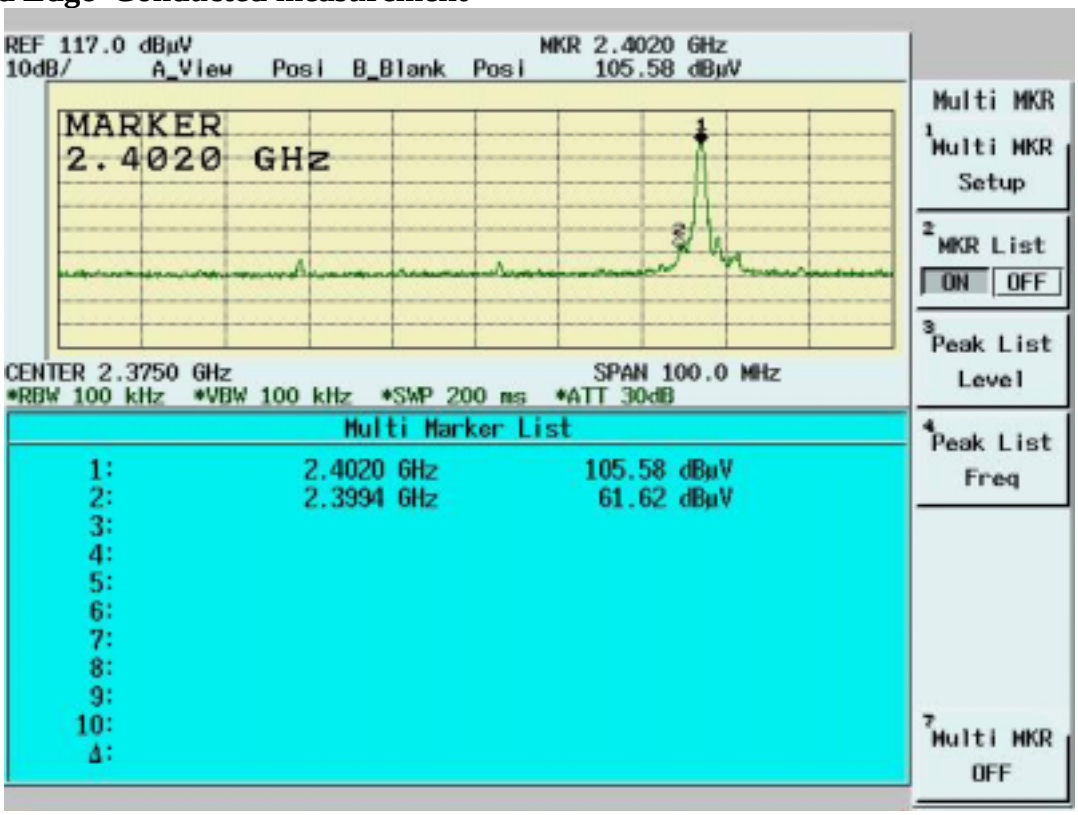
Table: Band Edge measurement (Conducted)

Temperature (℃):25

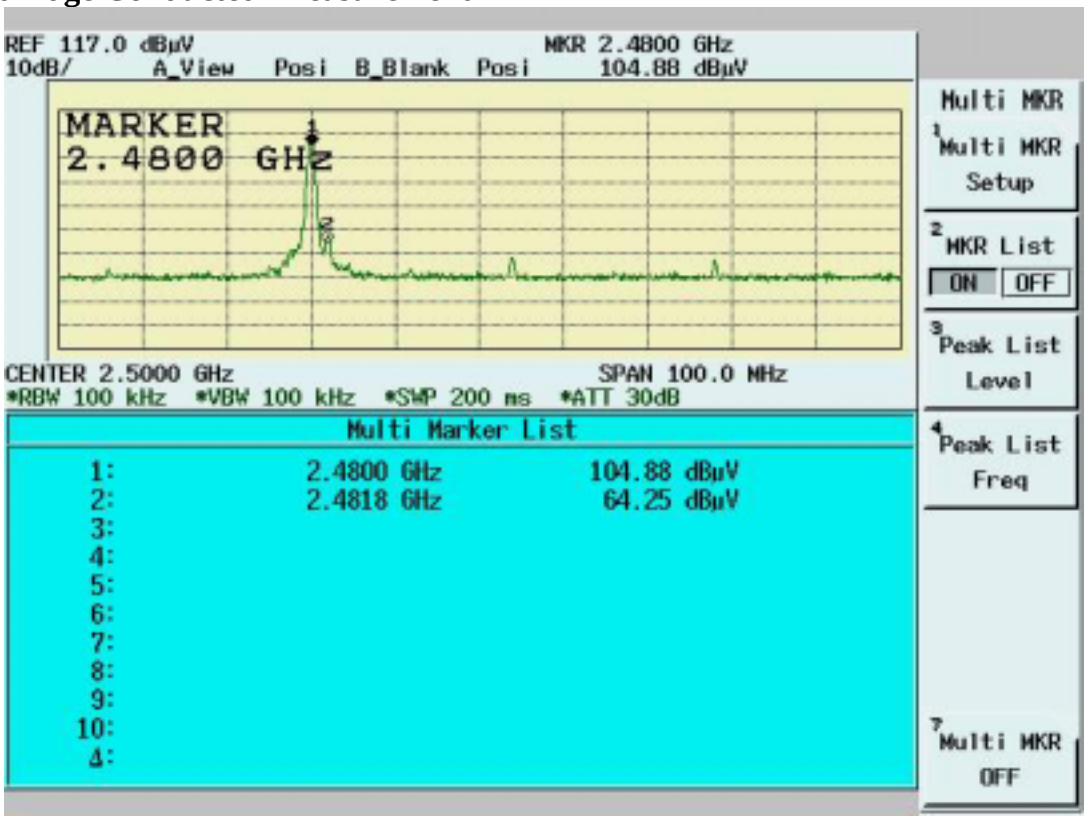
Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402.0	105.6	---	---
Outside band	2399.4	61.6	44.0	Pass
78	2480.0	104.9	---	---
Outside band	2481.8	64.3	40.6	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement



4.4.4 Test Procedure (Radiated)

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: 2.375GHz, 2.500GHz.
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
4. For peak frequency emission level measurement in Restricted Band ,
   Change RBW: 1MHz
   VBW: 10Hz
   Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

4.4.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.4.6 Test Data

Table Band Edge measurement (Radiated)

Test Engineer:Jerry Chiou Temperature (℃):27

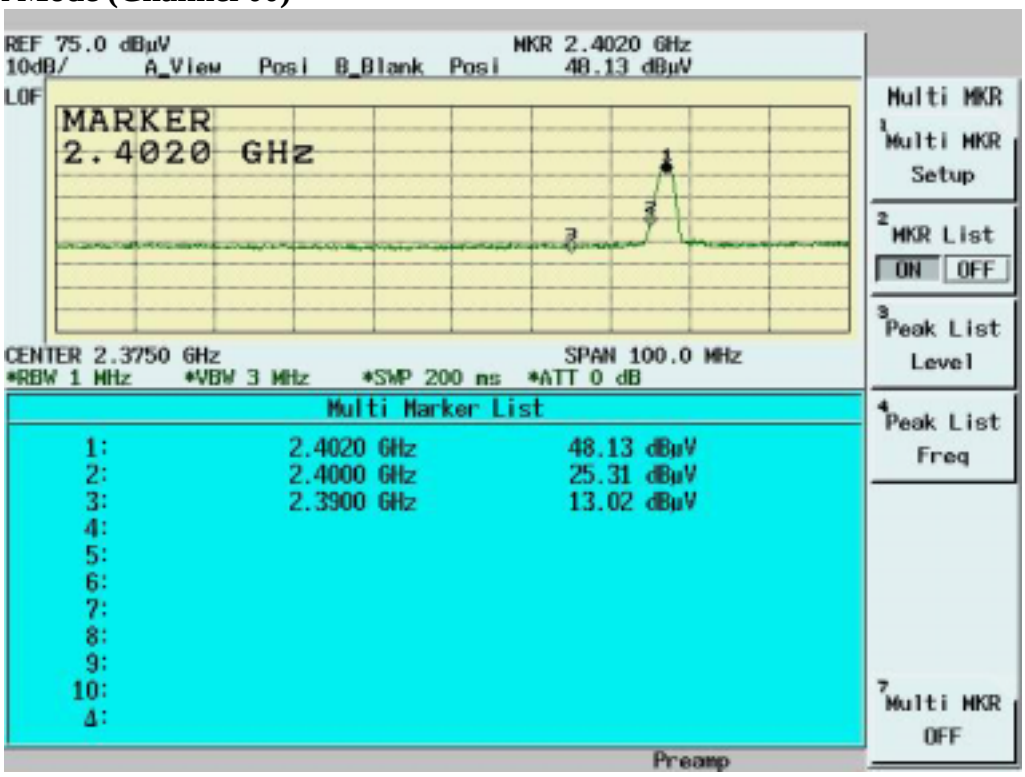
Humidity (%):40

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_00 (average mode)	2402.00	46.96	35.48	82.44	---	---	10Hz	---
Channel_00 (peak mode)	2402.00	48.13	35.48	83.61	---	---	3MHz	---
Outside band (peak mode)	2400.00	25.31	35.48	60.79	22.82	---	3MHz	Pass
Channel_78 (average mode)	2480.00	48.15	35.51	83.66	---	---	10Hz	---
Channel_78 (peak mode)	2480.00	48.94	35.51	84.45	---	---	3MHz	---
Outside band (peak mode)	2482.00	17.03	35.51	52.54	31.91	---	3MHz	Pass
Channel_00 Restricted band (peak mode)	2390.00	13.02	35.47	48.49	---	74	3MHz	Pass
Restricted band (average mode)	2390.00	1.62	35.47	37.09	---	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.50	14.83	35.51	50.34	---	74	3MHz	Pass
Restricted band (average mode)	2483.50	3.16	35.51	38.67	---	54	10Hz	Pass

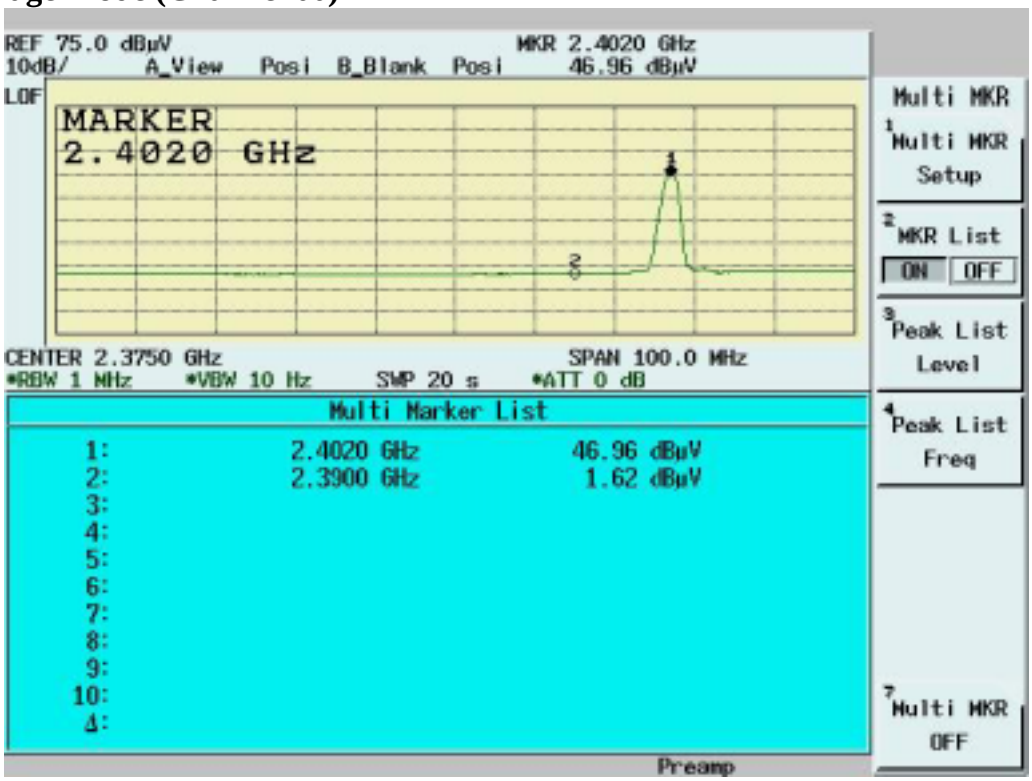
Note:

- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

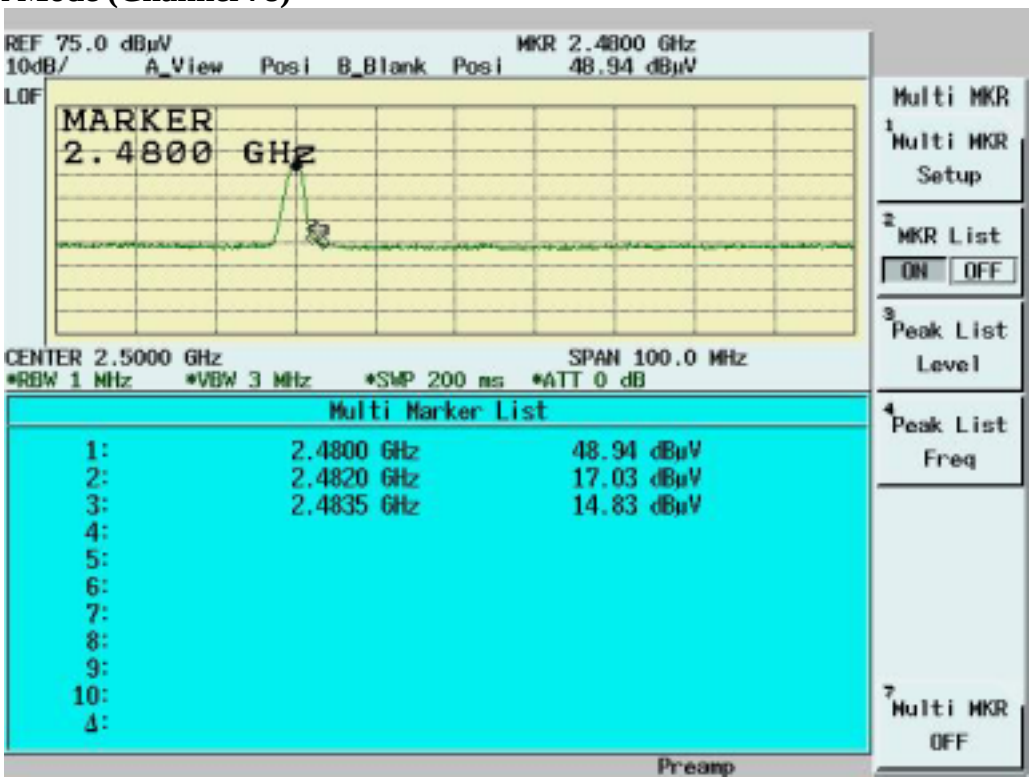
Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 00)



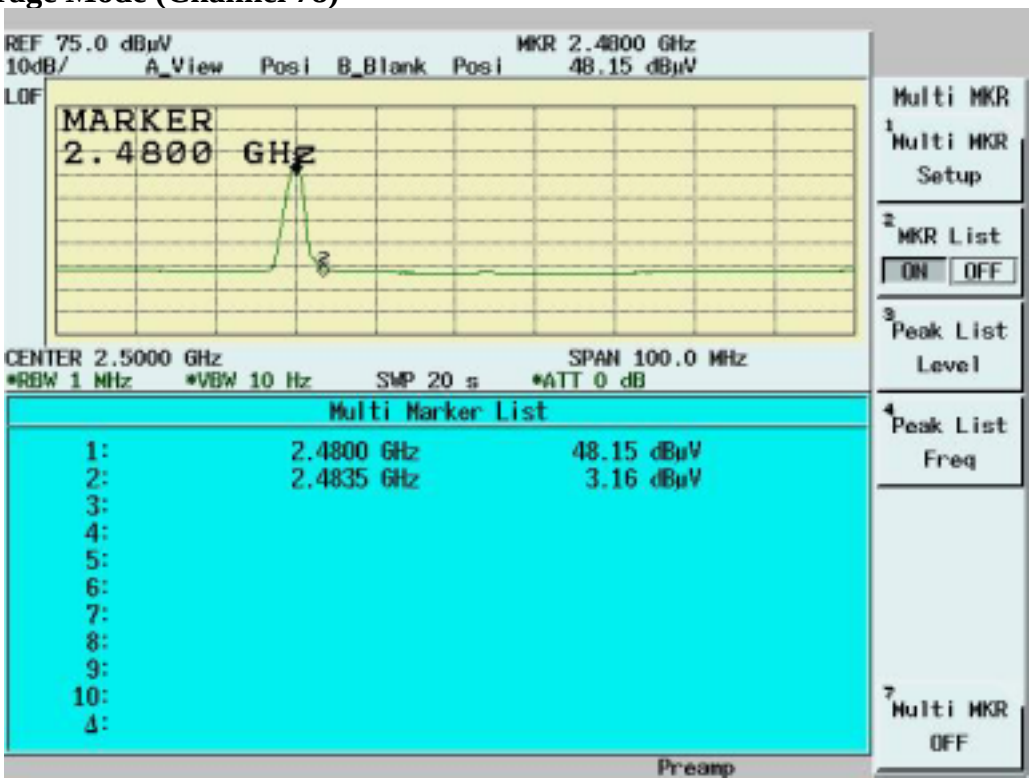
Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 00)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 78)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 78)



4.5 Bandwidth & Hopping Channel Separation

4.5.1 Standard Applicable

According to §15.247(a)(1), frequency hopping system shall have, hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies.

4.5.2 Test Procedure

1.1.1.1 Bandwidth Test Procedure

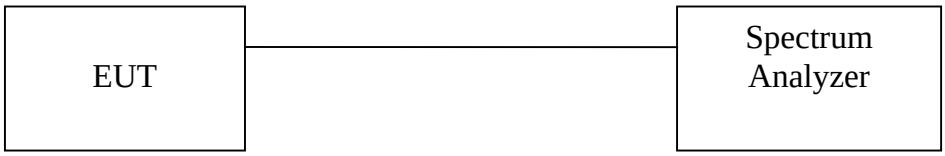
The Transmitter output of EUT was connected to the spectrum analyzer. The 20 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	30KHz
VBW	100KHz

1.1.1.2 Hopping Channel Separation Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
   RBW: 100KHz
   VBW: 300KHz
   SPAN:3MHz
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

4.5.3 Test Setup



4.5.4 Test Data

20dB Bandwidth

Temperature (°C):25

Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	984	≦ 1000	Pass
39	**2441**	980	≦ 1000	Pass
78	**2480**	984	≦ 1000	Pass

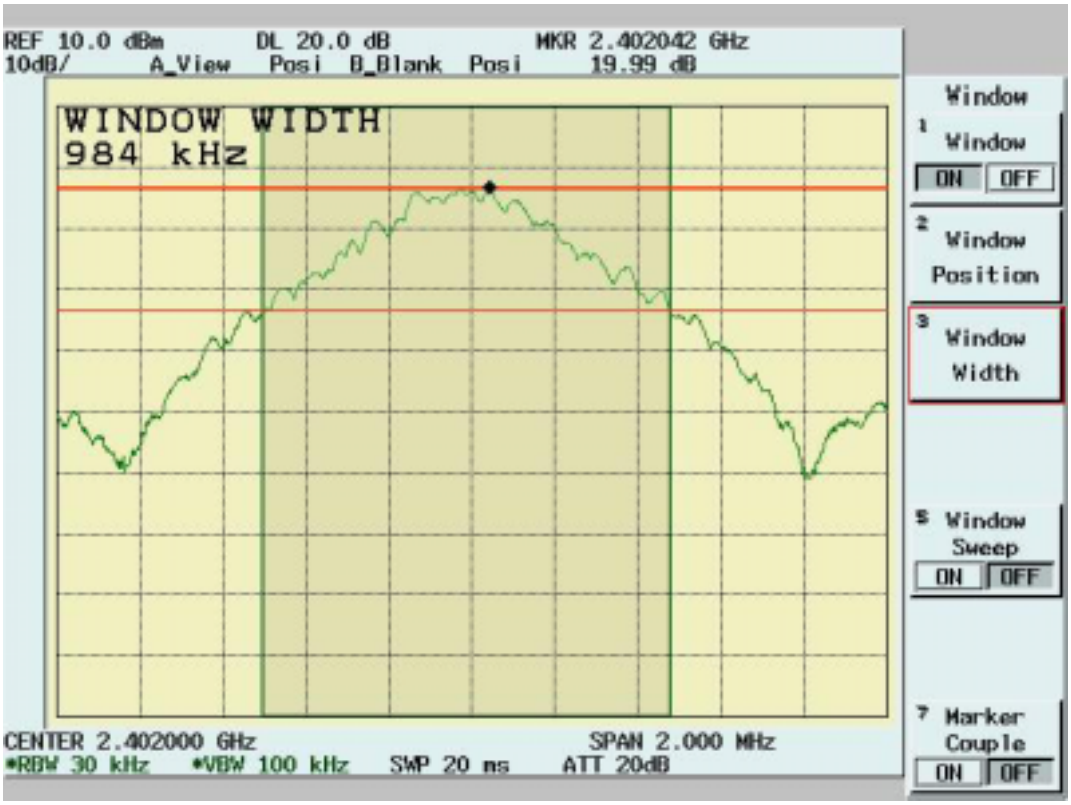
Hopping Channel Separation

Temperature (°C):25

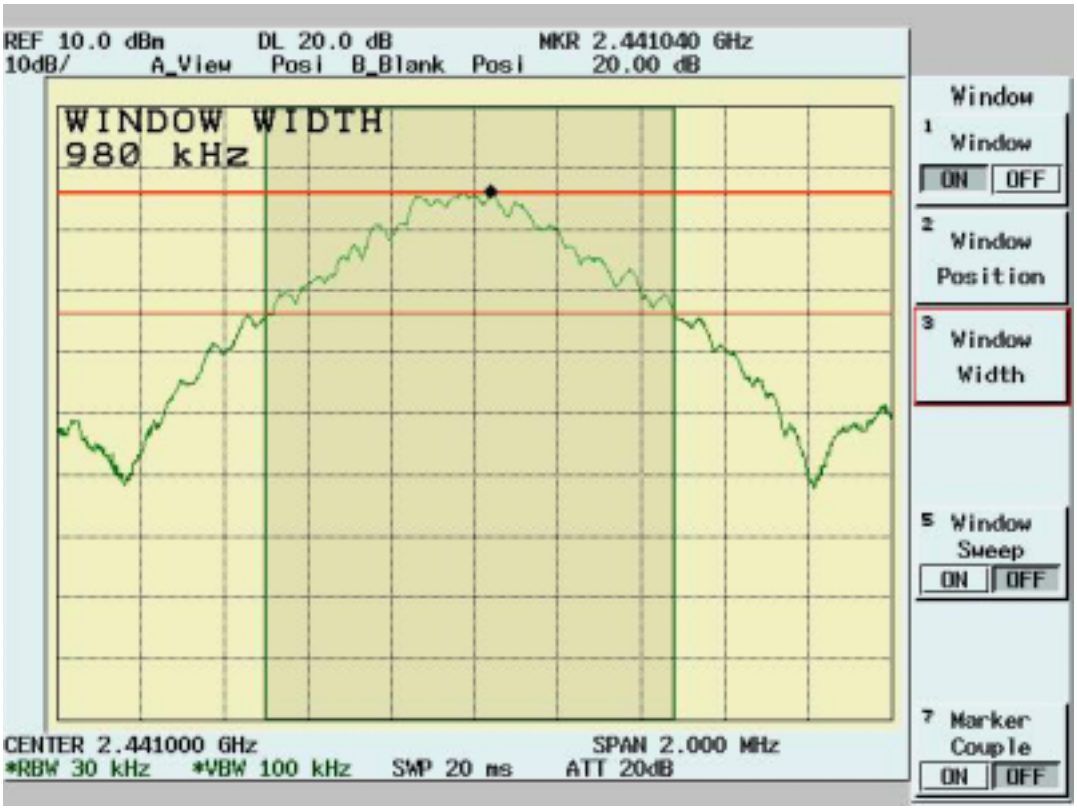
Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	1002	≧ 984	Pass
39	**2441**	999	≧ 980	Pass
78	**2480**	999	≧ 984	Pass

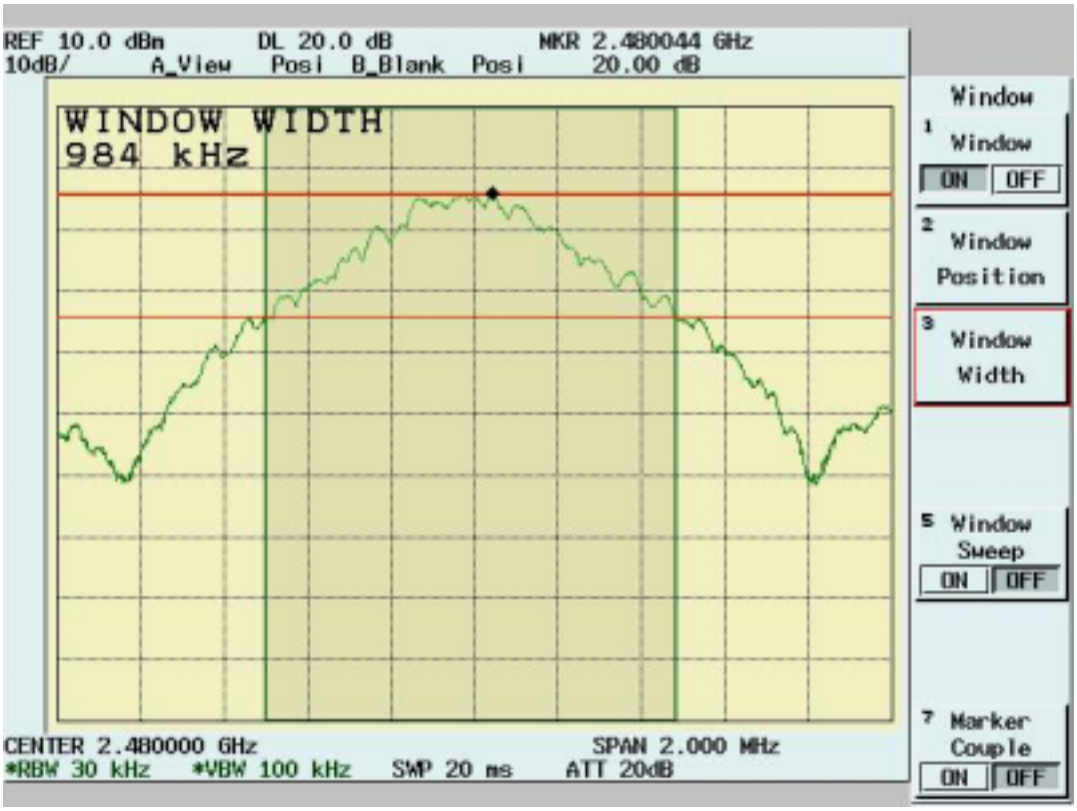
20dB Bandwidth Channel 00:



20dB Bandwidth Channel 39:

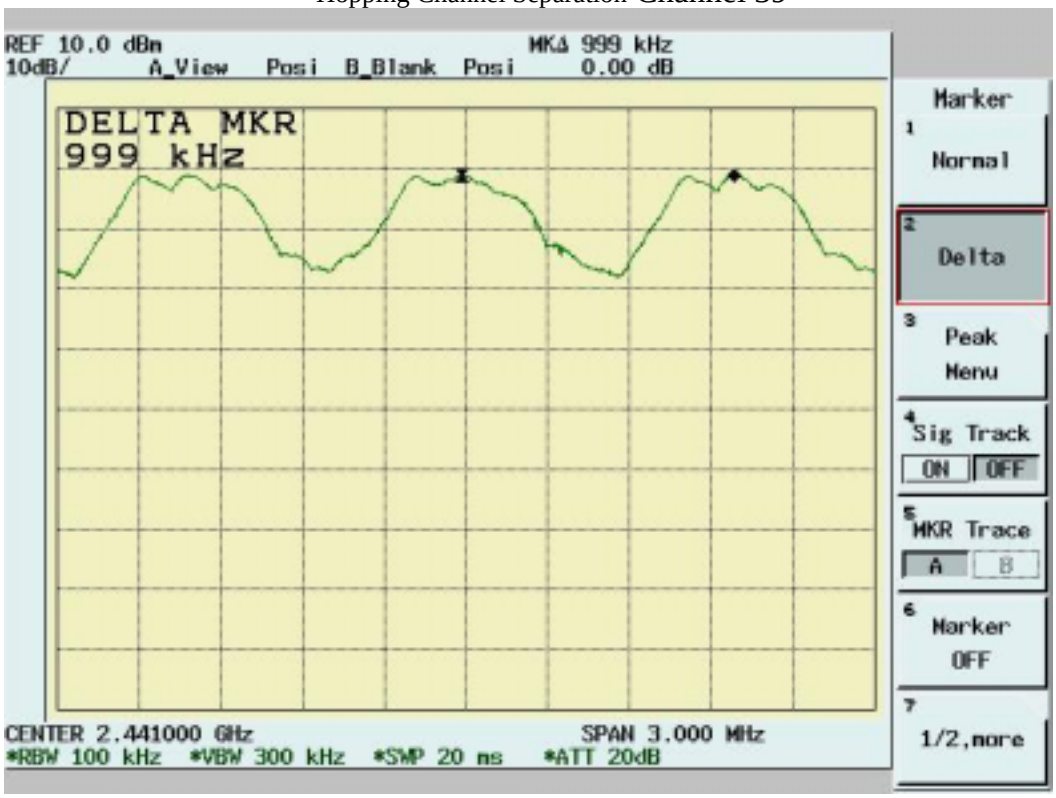


20dB Bandwidth Channel 78:



Hopping Channel Separation Channel 00

Hopping Channel Separation Channel 39



Hopping Channel Separation Channel 78

4.6 Number of Hopping Frequency Used

1.1.2 Test Procedure

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
   Equipment mode: Spectrum analyzer
   RBW: 300KHz
   VBW: 1MHz

2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
3. Repeat above procedures until all frequencies measured were complete.

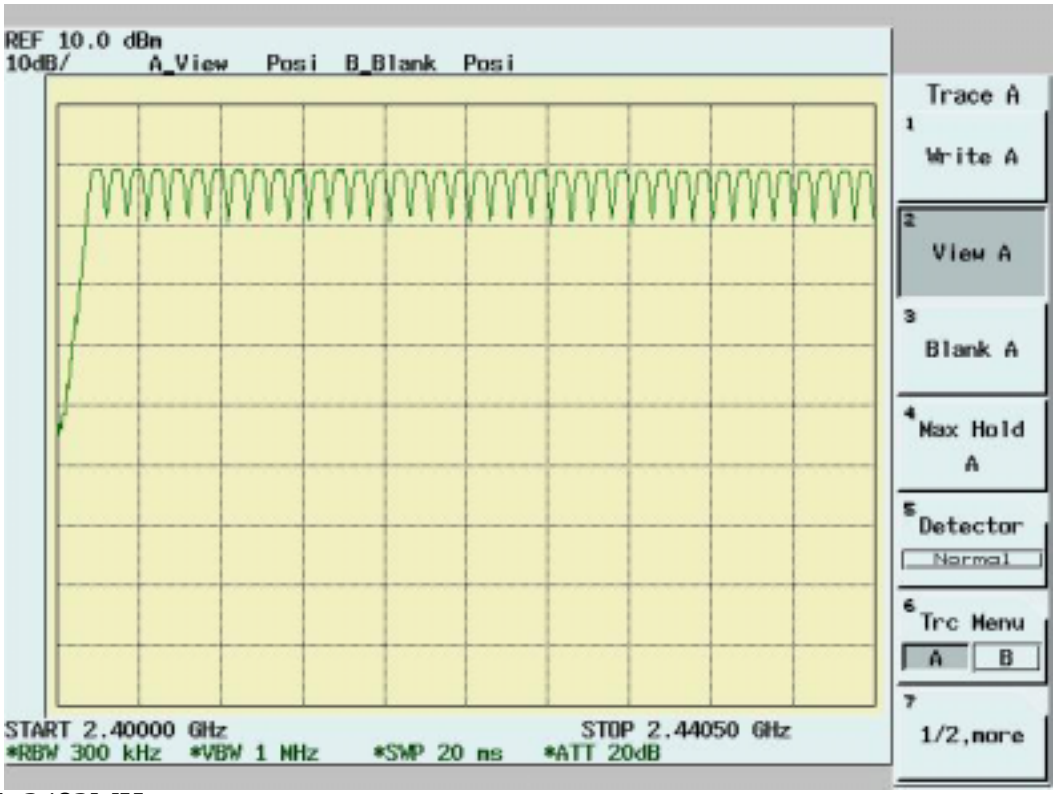
4.6.1 Test Setup

4.6.2 Test Data

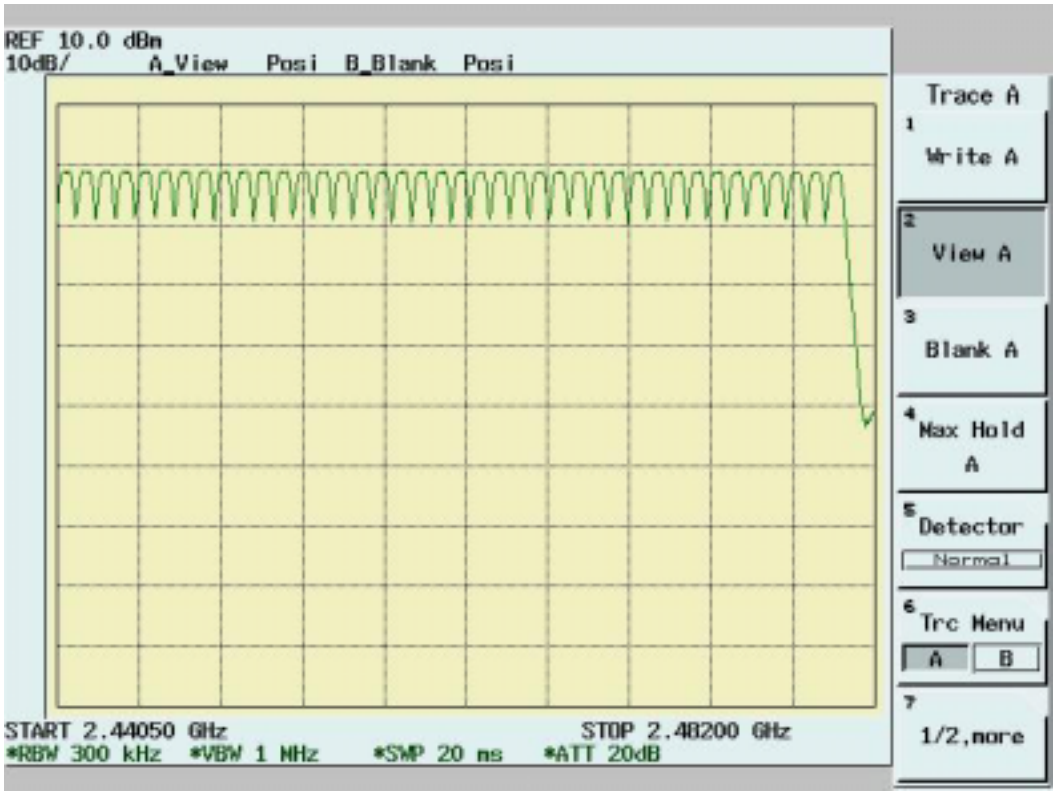
Number of Hopping Frequency Used

Test result	Limit(KHz)	Pass/Fail
79	>75	Pass

2400~2405MHz



2405~2482MHz



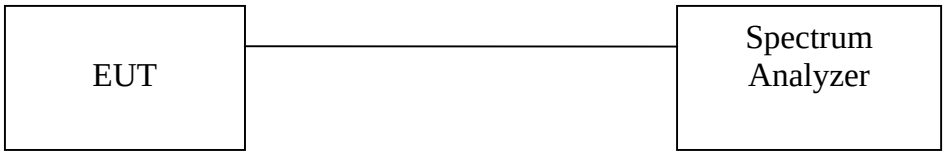
4.7 Dwell Time

4.7.1 Test Procedure

1 Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 1MHz
VBW: 1MHz
SPAN: Zero Span

2 Adjust the center frequency of spectrum analyzer on any frequency be measured.
3 Measure the Dwell Time by spectrum analyzer Marker function.
4 Repeat above procedures until all frequencies measured were complete.

4.7.2 Test Setup



4.7.3 Test Data

Dwell Time

Temperature (℃):25

Test Engineer:Jerry Chiou Humidity (%):55

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2402**	416	266.24	< 400	Pass
DH3	**2402**	1667	355.63	< 400	Pass
DH5	**2402**	2917	373.38	< 400	Pass
DH1	**2441**	416	266.24	< 400	Pass
DH3	**2441**	1667	355.63	< 400	Pass
DH5	**2441**	2917	373.38	< 400	Pass
DH1	**2480**	416	266.24	< 400	Pass
DH3	**2480**	1667	355.63	< 400	Pass
DH5	**2480**	2917	373.38	< 400	Pass

Note:

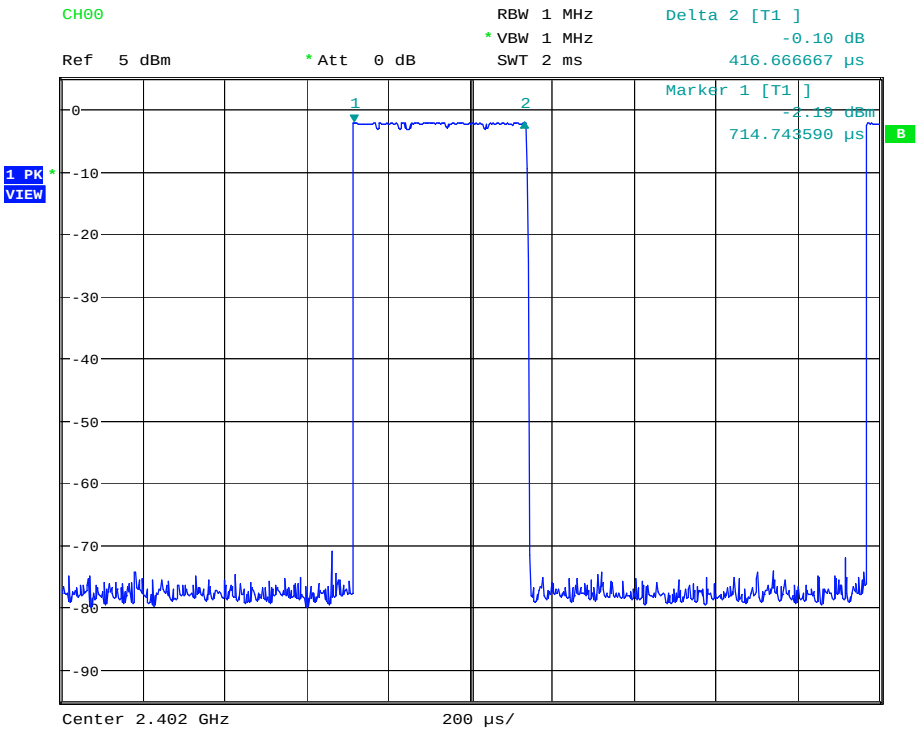
A period time=79x0.4(s)=31.6(s)

CH00 DH1 time slot= 0.416(ms)*(1600/(1*79))*31.6=266.24(ms)
DH3 time slot= 1.667(ms)*(1600/(3*79))*31.6=355.63(ms)
DH5 time slot= 2.917(ms)*(1600/(5*79))*31.6=373.38ms)

CH39 DH1 time slot= 0.416(ms)*(1600/(1*79))*31.6=266.24(ms)
DH3 time slot= 1.667(ms)*(1600/(3*79))*31.6=355.63(ms)
DH5 time slot= 2.917(ms)*(1600/(5*79))*31.6=373.38ms)

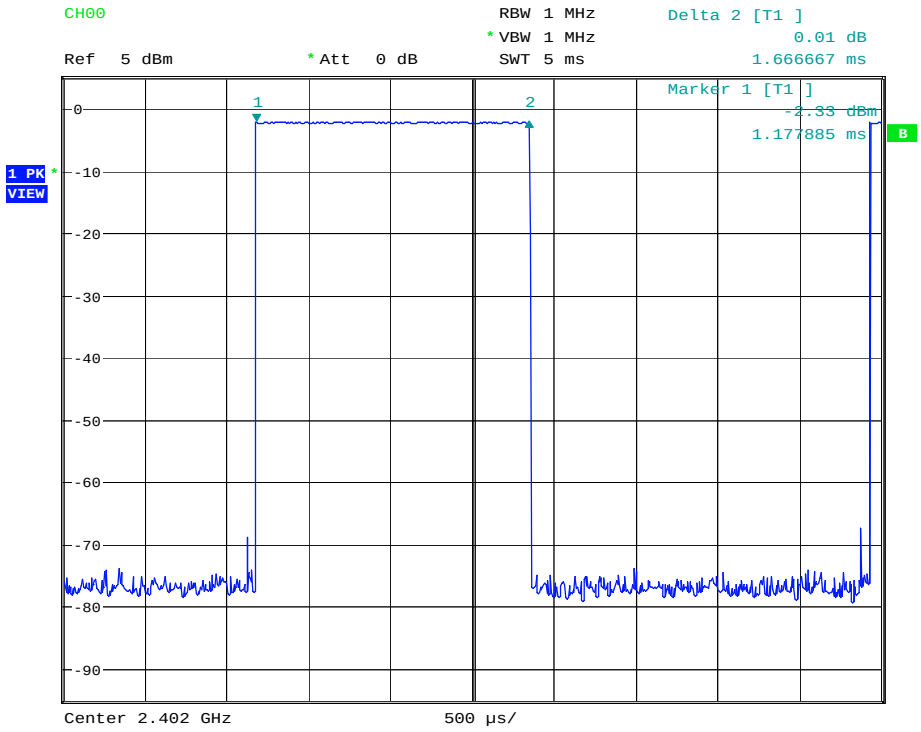
CH78 DH1 time slot= 0.416(ms)*(1600/(1*79))*31.6=266.24(ms)
DH3 time slot= 1.667(ms)*(1600/(3*79))*31.6=355.63(ms)
DH5 time slot= 2.917(ms)*(1600/(5*79))*31.6=373.38ms)

CH00 DH1 DWELL Time



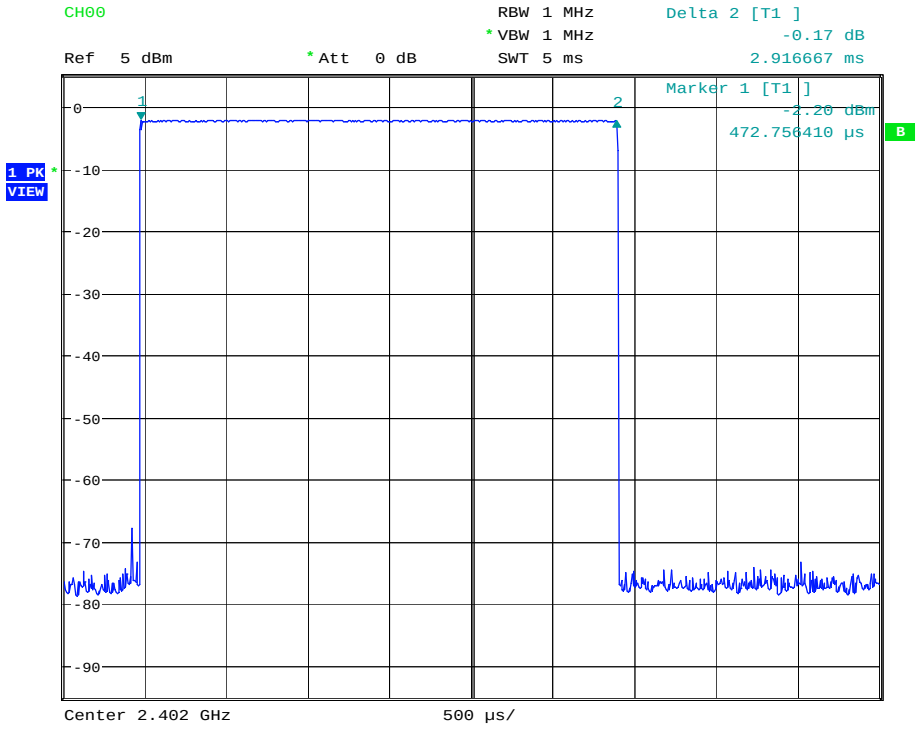
Date: 28.JUL.2005 11:31:25

CH00 DH3 DWELL Time



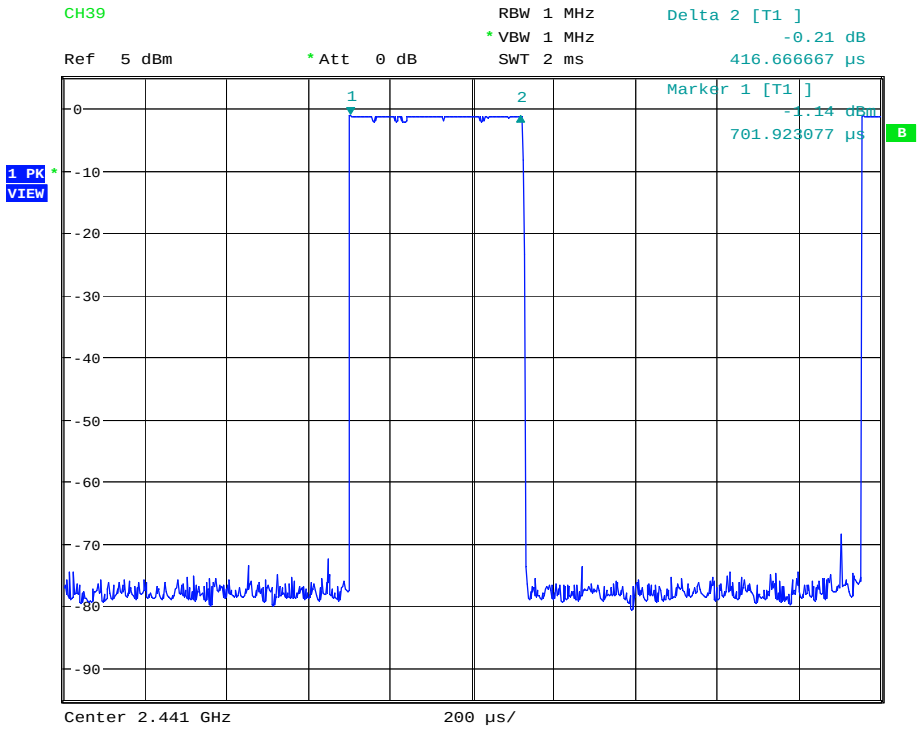
Date: 28.JUL.2005 11:32:37

CH00 DH5 DWELL Time



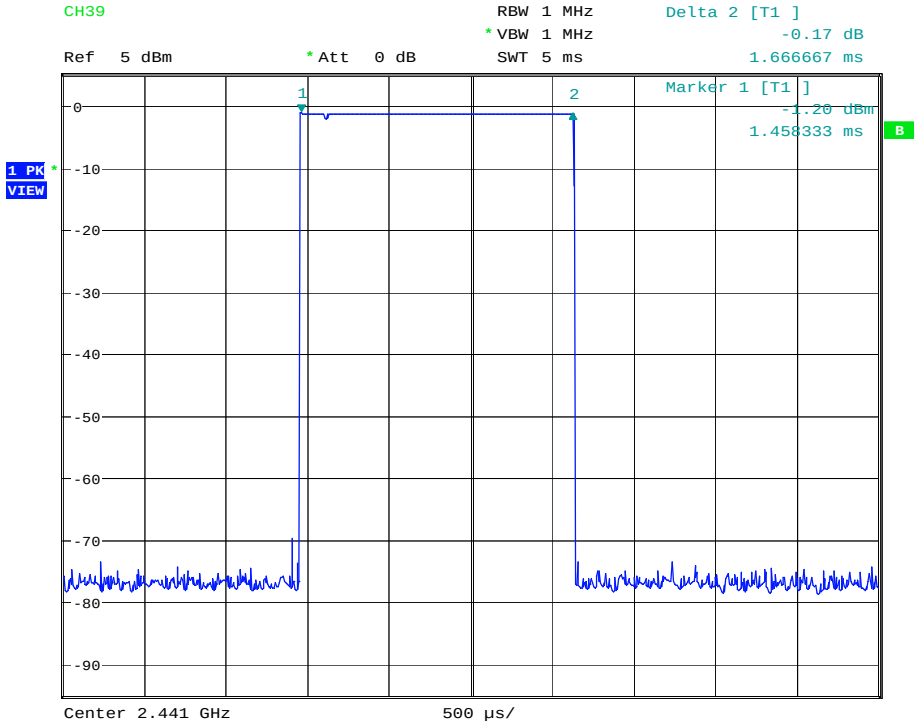
Date: 28.JUL.2005 11:37:06

CH39 DH1 DWELL Time



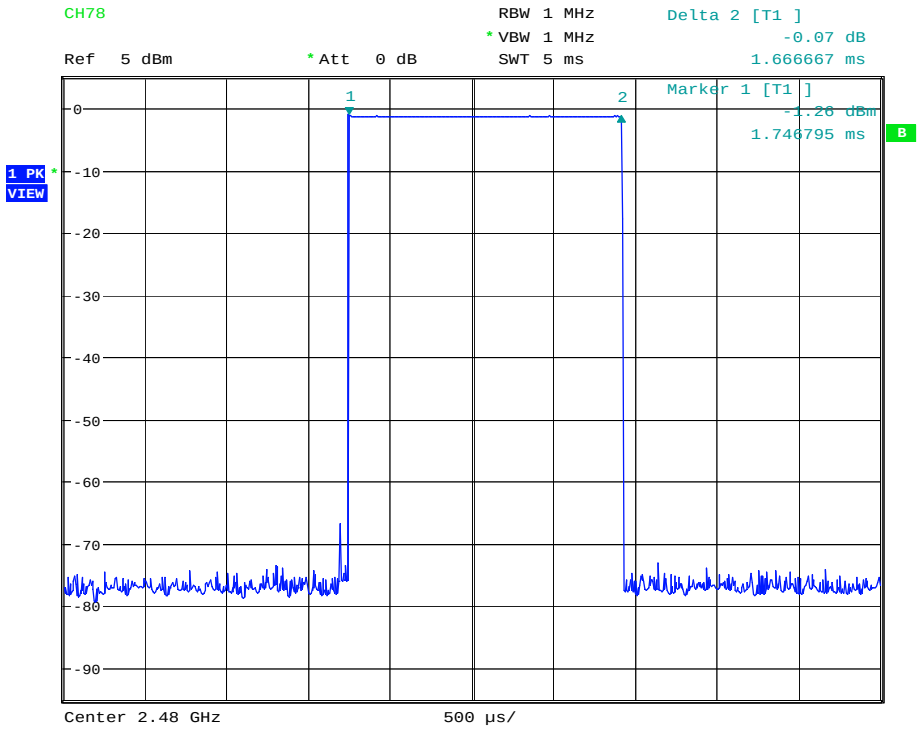
Date: 28.JUL.2005 11:47:31

CH39 DH3 DWELL Time



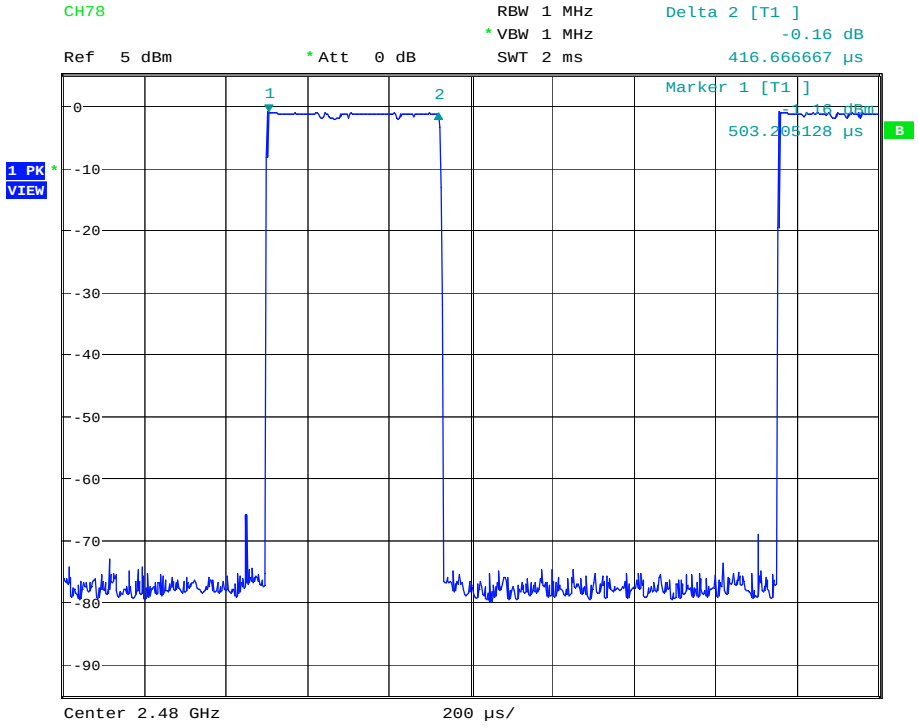
Date: 28.JUL.2005 11:43:51

CH39 DH5 DWELL Time



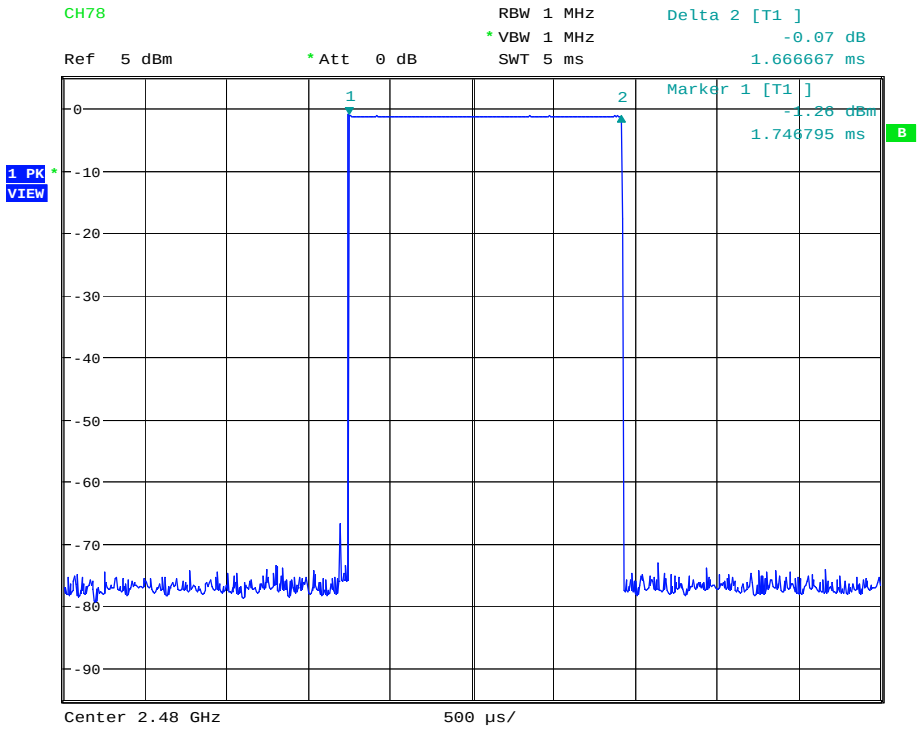
Date: 28.JUL.2005 11:52:20

CH78 DH1 DWELL Time



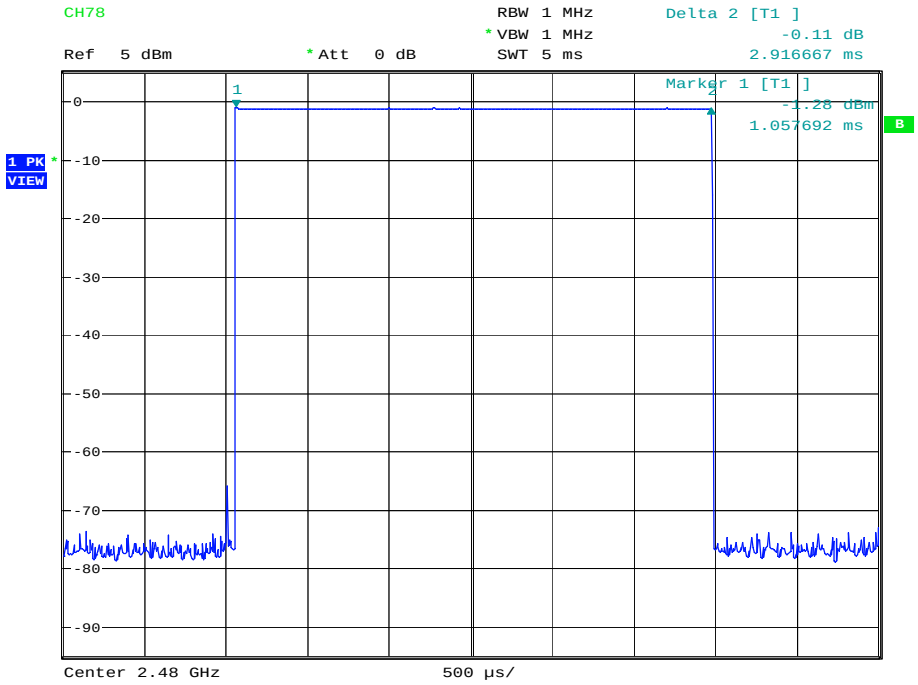
Date: 28.JUL.2005 11:50:15

CH78 DH3 DWELL Time



Date: 28.JUL.2005 11:52:20

CH78 DH5 DWELL Time



Date: 28.JUL.2005 11:54:15

5. Appendix

5.1 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.

5.2 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.

5.3 Appendix C: Test Equipment

5.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	05/20/2005	05/20/2006
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	11/30/2004	11/30/2005
Conduction	EMI Receiver 02	HP	85460A	3448A00183	10/01/2004	10/01/2005
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	05/05/2005	05/05/2006
Conduction	LISN 06	R&S	ESH3-Z5	828874/009	12/18/2004	12/18/2005
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/02/2005	06/02/2006
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	11/16/2004	11/16/2005
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	11/30/2004	12/30/2005
Radiation	EMI Receiver 03	HP	85460A	3448A00209	03/24/2005	03/24/2006
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	02/16/2005	02/16/2006
Radiation	Horn Antenna 02	Com-Power	AH-118	10088	07/22/2005	07/22/2006
Radiation	Horn Antenna 04	Com-Power	AH-826	081-001	01/13/2005	01/13/2006
Radiation	Horn Antenna 05	Com-Power	AH-640	100A	09/22/2004	09/22/2005
Radiation	Microwave Cable RF SK-01	HUBER+SUHNERAG.	Sucoflex 102	22139 /2	07/07/2005	07/07/2006
Chamber 05	Peak Power Analyzer	HP	8990A	3621A01269	02/15/2005	02/15/2006
Chamber 05	Power Sensor Radar	HP	84815A	3318A01828	02/15/2005	02/15/2006
Radiation	Preamplifier 02	MITEQ	AFS44-00102650-40-10P-44	728229	01/28/2005	01/28/2006
Radiation	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	02/28/2005	02/28/2006
Radiation	High Pass Filter 01	HEWLETT-PACKARD	84300-80038	001	N/A	N/A
Radiation	High Pass Filter 02	HEWLETT-PACKARD	84300-80039	005	N/A	N/A
Radiation	Spectrum Analyzer 14	Advantest	R3182	140600028	09/09/2004	09/09/2005

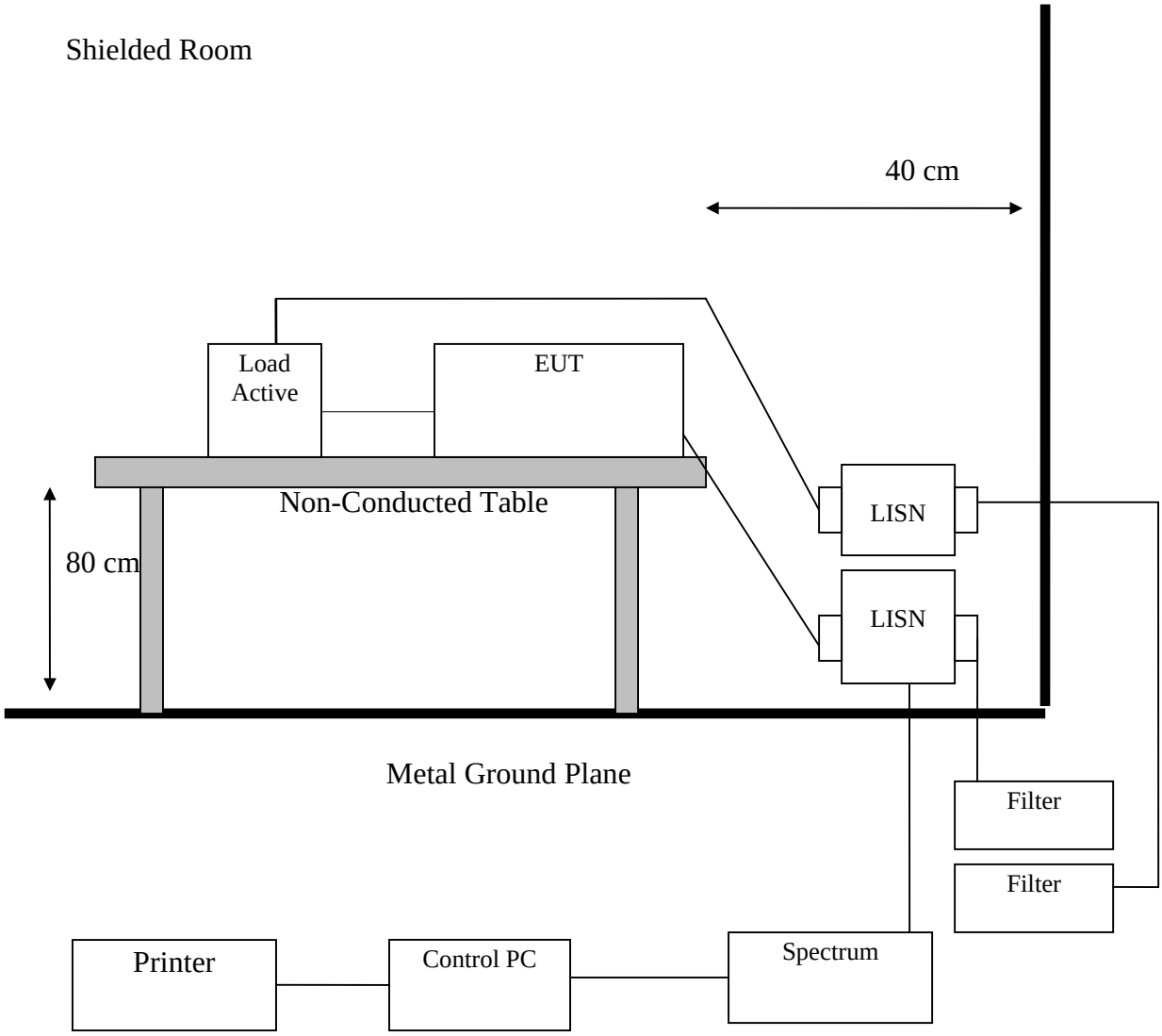
Note: Calibration is traceable to NIST or national or international standards.

5.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

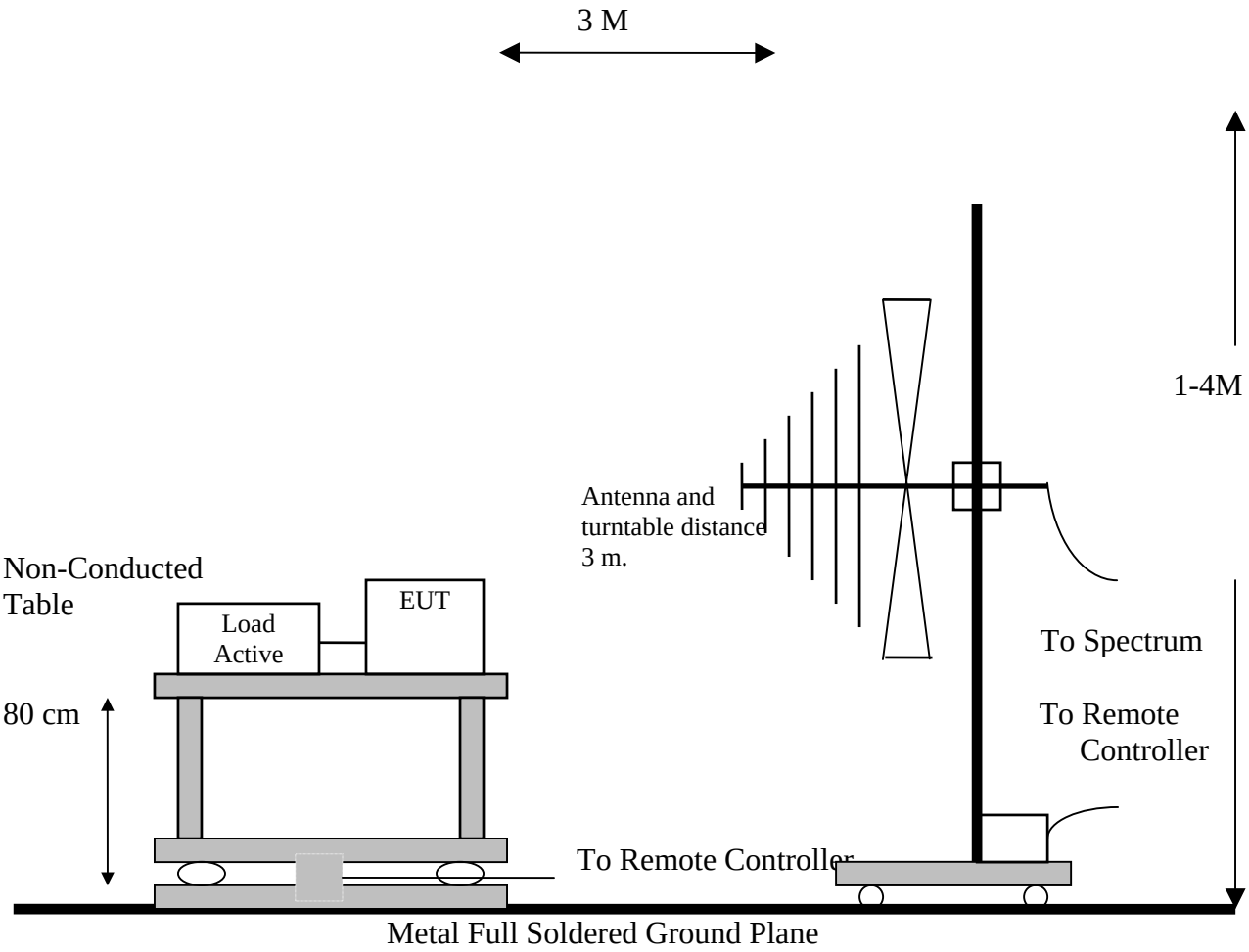
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

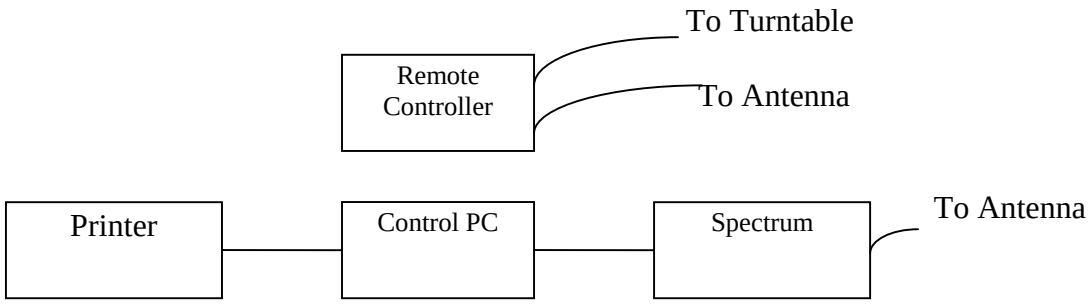
5.4 Appendix D: Layout of EUT and Support Equipment

5.4.1 General Conducted Test Configuration



5.4.2 General Radiation Test Configuration





5.5 Appendix E: Description of Support Equipment

5.5.1 Description of Support Equipment

Support Unit 1.

Description:	DELL USB Mouse
Model Number:	M-UR69
Serial Number:	LNA24412741
Power Supply Type:	N/A
Power Cord:	N/A
FCC ID:	N/A (Comply with FCC DOC)

Support Unit 2.

Description:	Aceex Modem (for serial interface port)
Model Number:	DM1414
Serial Number:	0301000557
Power Supply Type:	Linear, Power Adapter (AC to AC Xfmr, Wall Mounted Type)
Power Cord:	Nonshielded, Without Grounding Pin
FCC ID:	IFAXDM1414

Support Unit 3.

Description:	Acer Monitor
Model:	G781
Serial Number:	999007101214400445T7AA31T
Power Cord:	Non-shielded, Detachable
FCC ID:	(Comply with FCC Standards)

5.5.2 Software for Controlling Support Unit

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

A. Read and write to the disk drives.
B. Send H pattern to the serial port device (Modem).
C. Send H pattern to the video port device (Monitor).
D. The RF software makes the transmitter continuously sending RF signals
E. Repeat the above steps.

	Filename	Issued Date
Broadcom Bluetooth	Bluetool.exe	2005/03/24
Monitor	HH.bat	8/20/1991
Modem 1	Hm.bat	8/20/1991

5.5.3 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 to PC VGA port	1.6M	Shielded, Un-detachable	Metal Head
Modem Data Cable	Modem to PC COM 1 port	1.5M	Shielded, Detachable	Metal Head
Mouse Data Cable	Mouse to PC Mouse port	1.8M	Shielded, Un-detachable	Metal Head

5.6 Appendix F: Accuracy of Measurement

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=2	0.104	k=1	0.052
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.330	k=1	0.165
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	LISN Factor Calibration	Normal	k=2	1.200	k=1	0.600
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	0.850
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**1.701**		

Measurement Uncertainty Calculations:

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

U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

Test Site: Chamber 02-3M

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=2	0.067	k=1	0.034
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.103	k=1	0.052
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	Antenna Factor Calibration	Normal	k=2	1.700	k=1	0.850
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	1.029
7	**Total Uncertainty @95% mim. Confidence Level**	**Normal**	**k=2**	**2.059**		

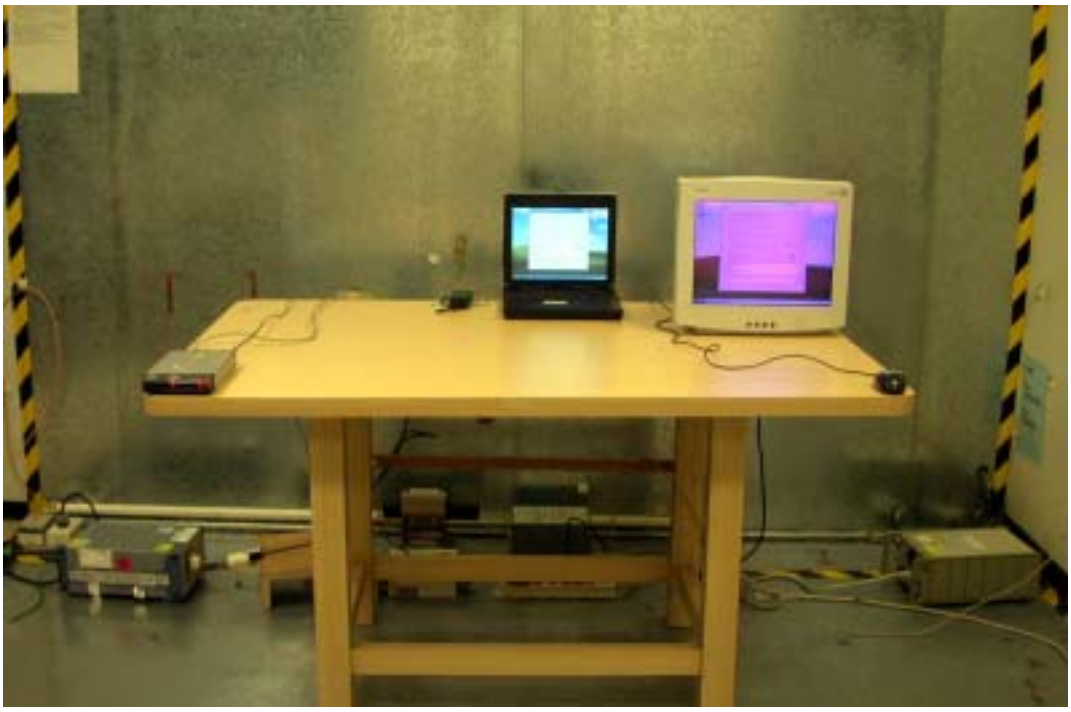
Measurement Uncertainty Calculations:

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

U = 2 * Uc (y)

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS : The treatment of Uncertainty in EMC Measurement.

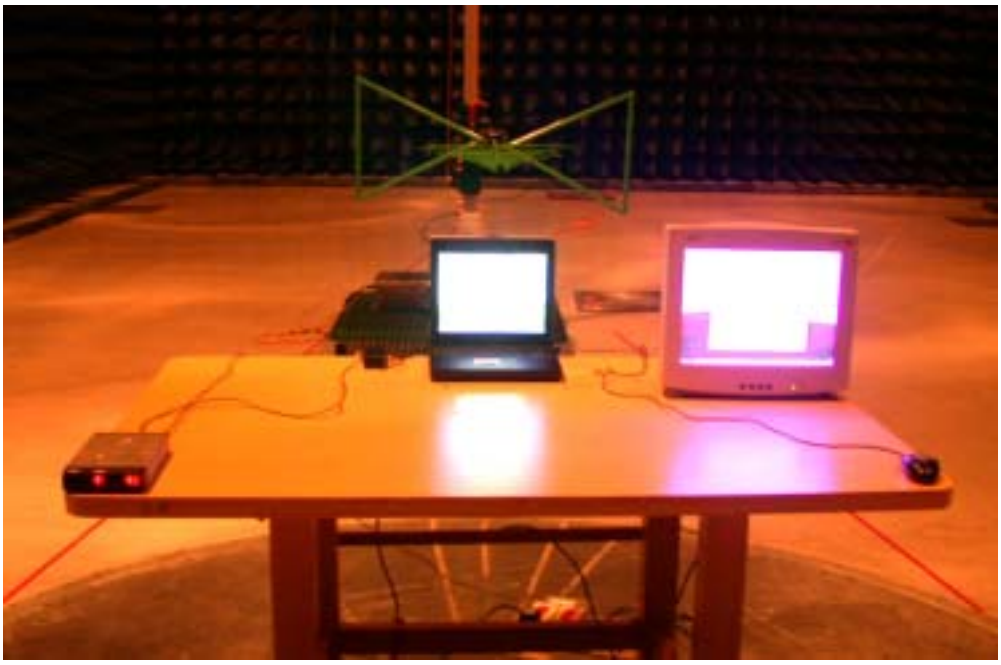
5.7 Appendix G: Photographs of EUT Configuration Test Set Up



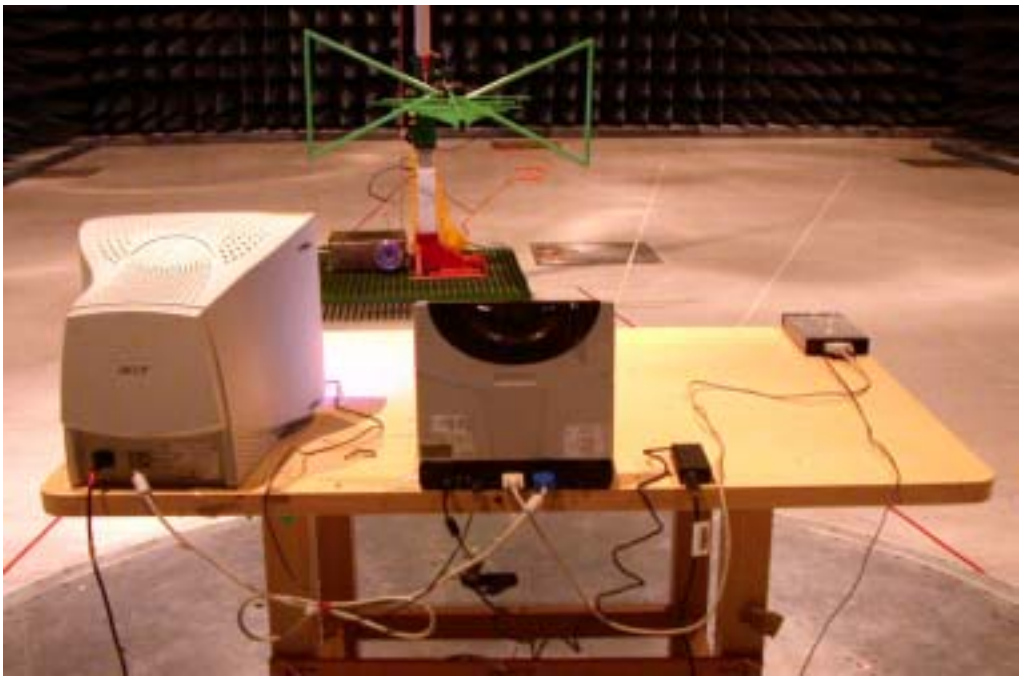
The Front View of Highest Conducted Set-up For EUT

The Back View of Highest Conducted Set-up For EUT

The Front View of Highest Radiated Set-up For EUT



The Back View of Highest Radiated Set-up For EUT



5.8 Appendix H: Antenna Spec.

Please refer to the attached file.