Test Report
for
FCC Part 15 Subpart B & C

of

Product Name

Bluetooth VoIP Phone

Model

VT25010

(Brand: acer)

Applied by:

Wistron Neweb Corporation
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Science-based Industrial Park,Hsinchu 300,
Taiwan, R. O. C.

Test Performed by:

International Standards Laboratory

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1. General

1.1 Certification of Accuracy of Test Data

Standards:	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:	Bluetooth VoIP Phone
Model:	VT25010
Applied by:	Wistron Neweb Corporation
Sample received Date:	2006/02/23
Final test Date :	2006/03/01
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/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 51 pages, including 1 cover page , 2 contents page, and 48 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:	Bluetooth VoIP Phone
Model No.:	VT25010
Brand:	acer
Bluetooth Module:	Cambridge Silicon Radio (Model: BC4-EXT)
Frequency Range:	2402 ~ 2480 MHz
Support channel:	79 Channels
Modulation Skill:	GFSK (1Mbps)
Antennas Type:	printed Antenna
Antenna Connected:	The Antenna is layout in the PCB, the user is not possible to change the antenna.
Antenna peak Gain:	1.13 dBi
Power Type of Bluetooth module:	3.7 V DC from Rechargeable Battery
Battery Charging:	Charge via PCMCIA Directly (5V) from 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

PCMCIA Connector:	one 68 pins
Front:	Speak Power Button Pair/Link Button Speakerphone Button
Flank:	Volume up/down button

EMI Noise Source:
Crystal:13MHz(X1),26MHz(on Bluetooth Module Y1)

EMI Solution: none

4. TEST RESULTS (Bluetooth)

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)

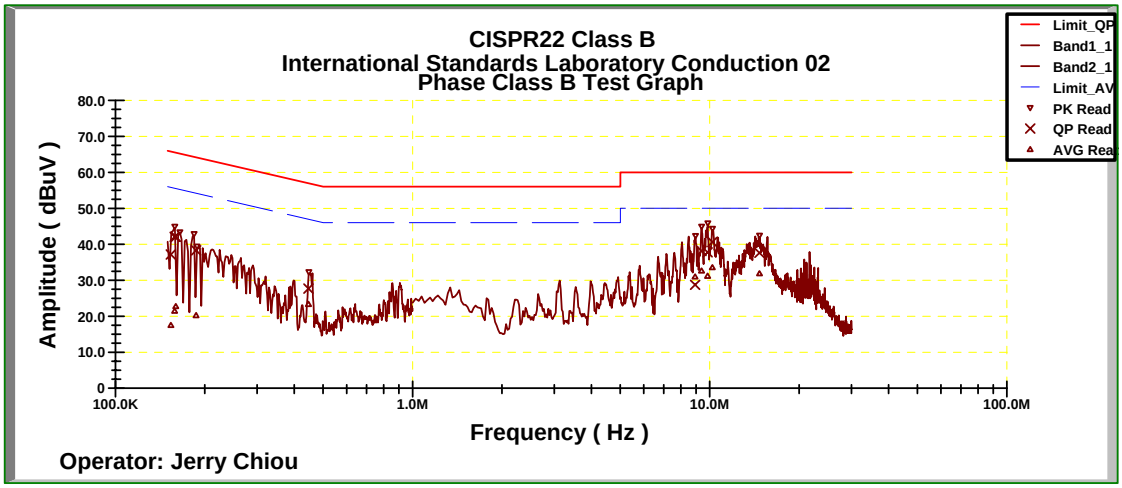
Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 Test Data:

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

Operator:JerryChiou
Temperature(C):22
Humidity(%):55

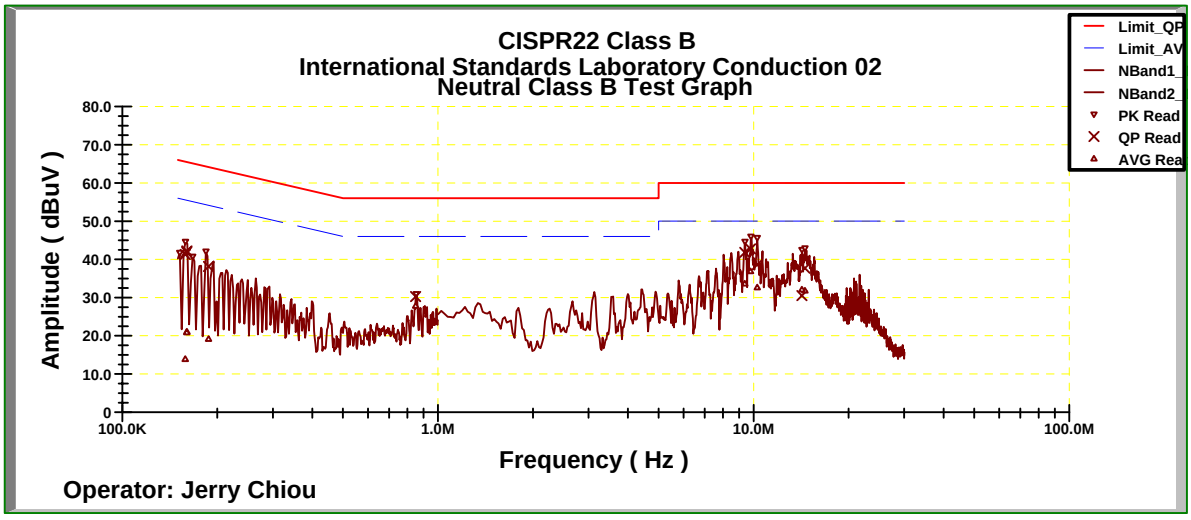
Frequency	LISNLoss	CableLoss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.153741	0.15	0.02	37.16	65.89	-28.74	17.46	55.89	-38.44
0.15827	0.16	0.02	42.05	65.76	-23.71	21.41	55.76	-34.36
0.15971	0.16	0.03	42.08	65.72	-23.64	22.71	55.72	-33.01
0.18683	0.19	0.04	38.29	64.95	-26.66	20.21	54.95	-34.74
0.44653	0.10	0.08	27.66	57.53	-29.87	23.30	47.53	-24.22
8.92428	0.42	0.20	28.72	60.00	-31.28	30.93	50.00	-19.07
9.37511	0.44	0.20	38.10	60.00	-21.90	32.59	50.00	-17.41
9.83293	0.47	0.21	37.74	60.00	-22.26	31.13	50.00	-18.87
10.1932	0.48	0.21	40.61	60.00	-19.39	33.53	50.00	-16.47
14.6887	0.69	0.29	37.61	60.00	-22.39	31.84	50.00	-18.16



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

Operator:JerryChiou
Temperature(C):22
Humidity(%):55

Frequency	LISNLoss	CableLoss	QPCorrct.	QPLimit	QPMargin	AVECorrct.	AVELimit	AVEMargin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.15828	0.10	0.02	41.26	65.76	-24.50	13.88	55.76	-41.88
0.15998	0.10	0.03	41.87	65.71	-23.85	20.85	55.71	-34.87
0.16023	0.10	0.03	42.18	65.71	-23.53	21.08	55.71	-34.63
0.18768	0.10	0.04	38.13	64.92	-26.79	19.16	54.92	-35.77
0.85	0.10	0.07	30.24	56.00	-25.76	27.80	46.00	-18.20
9.36911	0.25	0.20	41.79	60.00	-18.21	33.63	50.00	-16.37
9.77034	0.26	0.21	42.72	60.00	-17.28	36.87	50.00	-13.13
10.2639	0.27	0.21	38.58	60.00	-21.42	32.62	50.00	-17.38
14.2147	0.38	0.29	30.49	60.00	-29.51	32.06	50.00	-17.94
14.5306	0.39	0.29	37.68	60.00	-22.32	31.81	50.00	-18.19



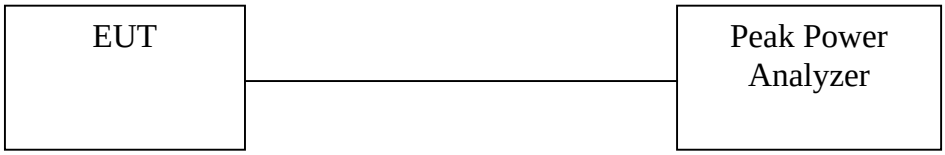
* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 00, 39, 78 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

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



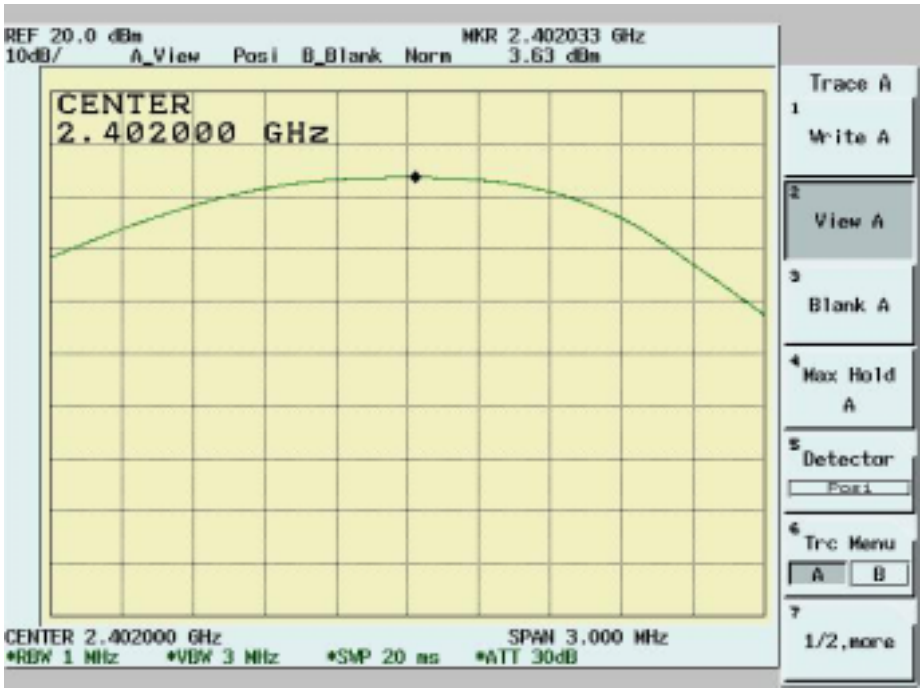
4.2.3 Test Data

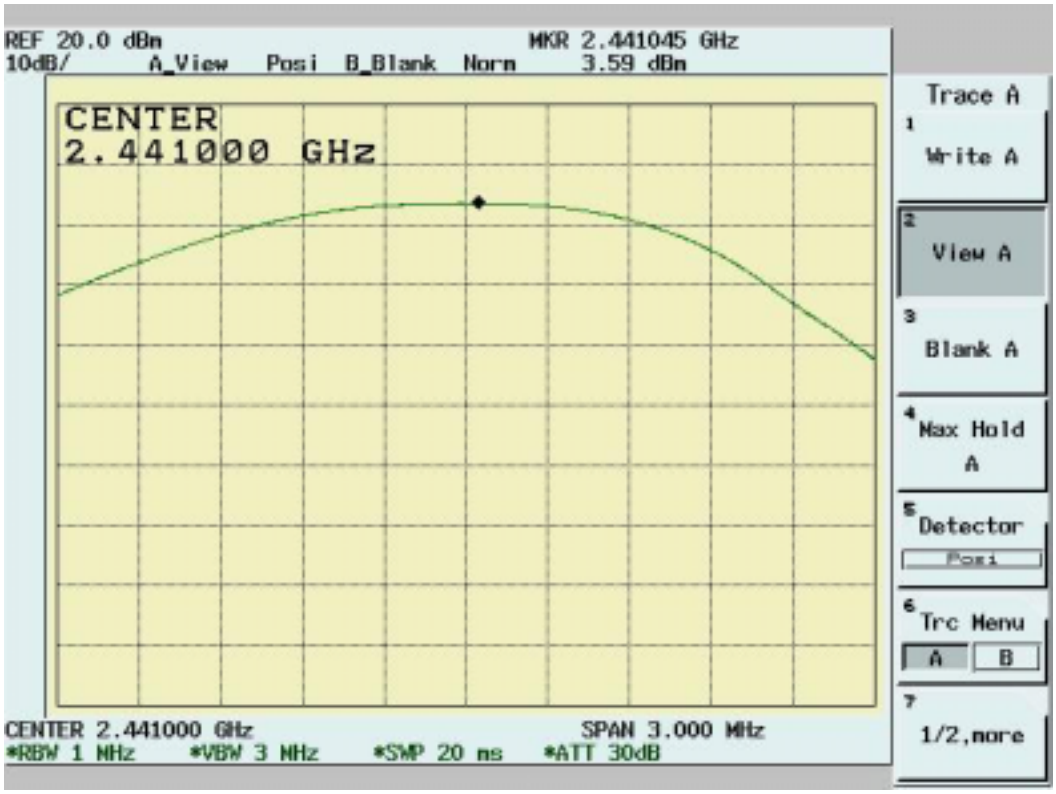
Maximum Peak Output Power

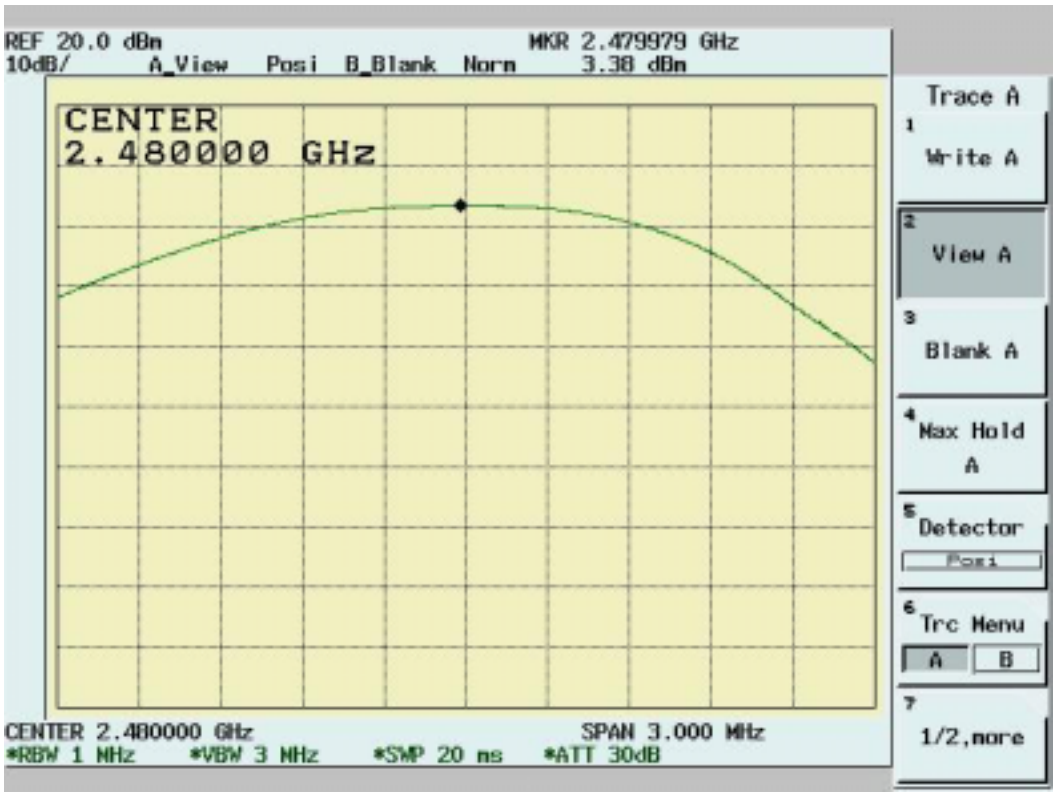
Temperature (℃):25

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**	3.63	0.70	2.71	4.33	30	Pass
39	**2437**	3.59	0.70	2.69	4.29	30	Pass
78	**2462**	3.38	0.70	2.56	4.08	30	Pass




REF 20.0 dBm
MKR 2.441045 GHz
10dB/ A_View Posi B_Blank Norm 3.59 dBm
CENTER
2.441000 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
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 30dB


REF 20.0 dBm
MKR 2.479979 GHz
10dB/ A_View Posi B_Blank Norm 3.38 dBm
CENTER
2.480000 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
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 30dB

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):24
Humidity(%):50

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)
109.54	16.84	11.44	2.10	0.00	30.39	43.50	-13.11	103.00	193.00
241.46	27.98	10.42	3.30	0.00	41.70	46.00	-4.30	103.00	144.00
259.89	22.68	12.99	3.44	0.00	39.10	46.00	-6.90	103.00	127.00
273.47	26.70	13.47	3.56	0.00	43.73	46.00	-2.27	103.00	259.00
329.73	22.06	16.08	4.19	0.00	42.33	46.00	-3.67	103.00	292.00
416.06	14.02	16.00	4.87	0.00	34.89	46.00	-11.11	103.00	325.00
532.46	7.86	18.18	5.81	0.00	31.85	46.00	-14.15	103.00	127.00
927.25	1.61	20.98	8.92	0.00	31.51	46.00	-14.49	199.00	333.00

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

Operator:JerryChiou
Temperature(C):24
Humidity(%):50

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)
68.8	21.62	5.40	1.68	0.00	28.70	40.00	-11.30	199.00	103.00
105.66	23.17	10.98	2.05	0.00	36.20	43.50	-7.30	103.00	29.00
127.97	27.44	11.36	2.26	0.00	41.06	43.50	-2.44	103.00	144.00
143.49	22.85	10.02	2.50	0.00	35.37	43.50	-8.13	103.00	226.00
241.46	27.37	10.42	3.30	0.00	41.09	46.00	-4.91	103.00	144.00
280.26	20.49	13.62	3.64	0.00	37.76	46.00	-8.24	103.00	226.00
330.7	19.37	16.08	4.19	0.00	39.65	46.00	-6.35	103.00	160.00

NOTE:

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

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
1601.9	55.11pk	27.22	2.22	34.40	50.15pk	54.00av	-3.85	101	70

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
1601.9	53.52pk	27.22	2.22	34.40	48.56pk	54.00av	-5.44	101	70

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
1222.28	53.73pk	25.62	1.94	34.05	47.25pk	54.00av	-6.75	102	97
1626.87	57.83pk	27.41	2.23	34.45	53.02pk	54.00av	-0.98	101	69

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
1626.87	53.83pk	27.41	2.23	34.45	49.02pk	54.00av	-4.98	101	69

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
1651.85	57.69pk	27.61	2.24	34.50	53.04pk	54.00av	-0.96	101	67

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
1651.85	55.02pk	27.61	2.24	34.50	50.37pk	54.00av	-3.63	101	67

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.

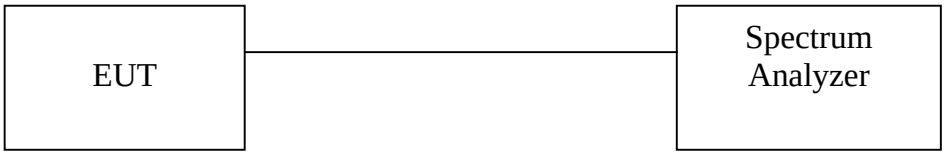
All frequencies from 1GHz to 25 GHz have been tested.

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:

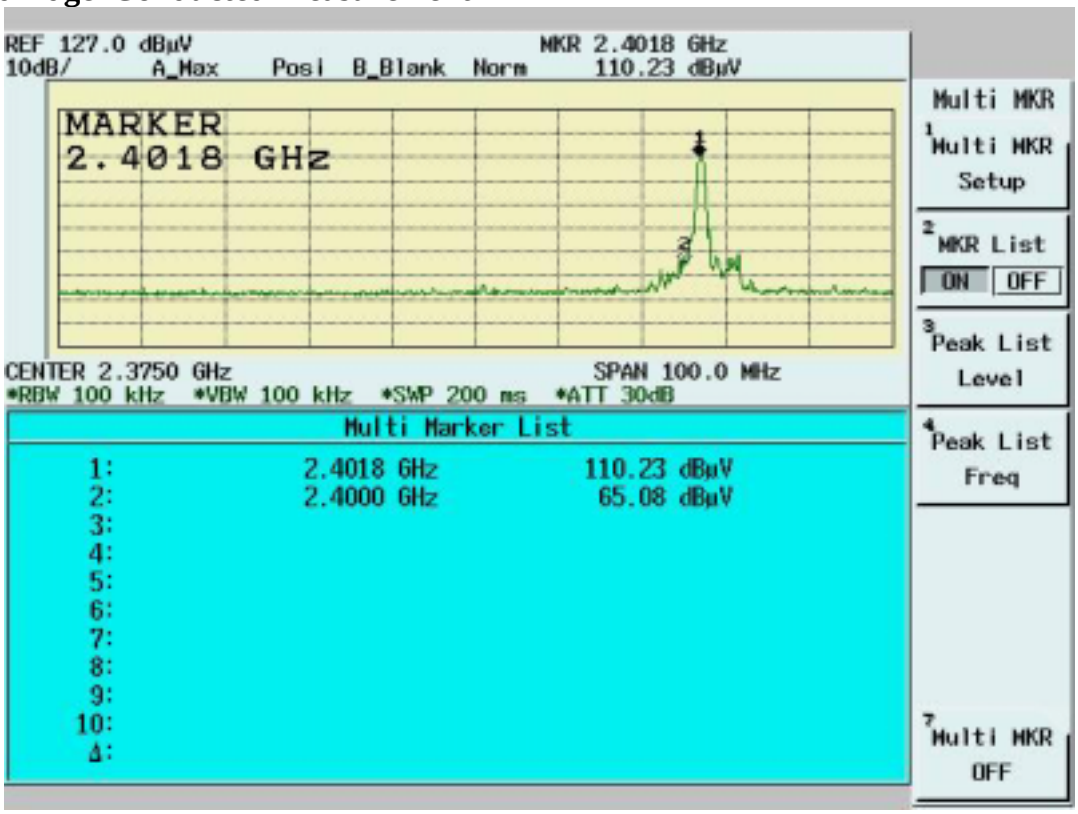
Table: Band Edge measurement (Conducted)

Temperature (℃):25

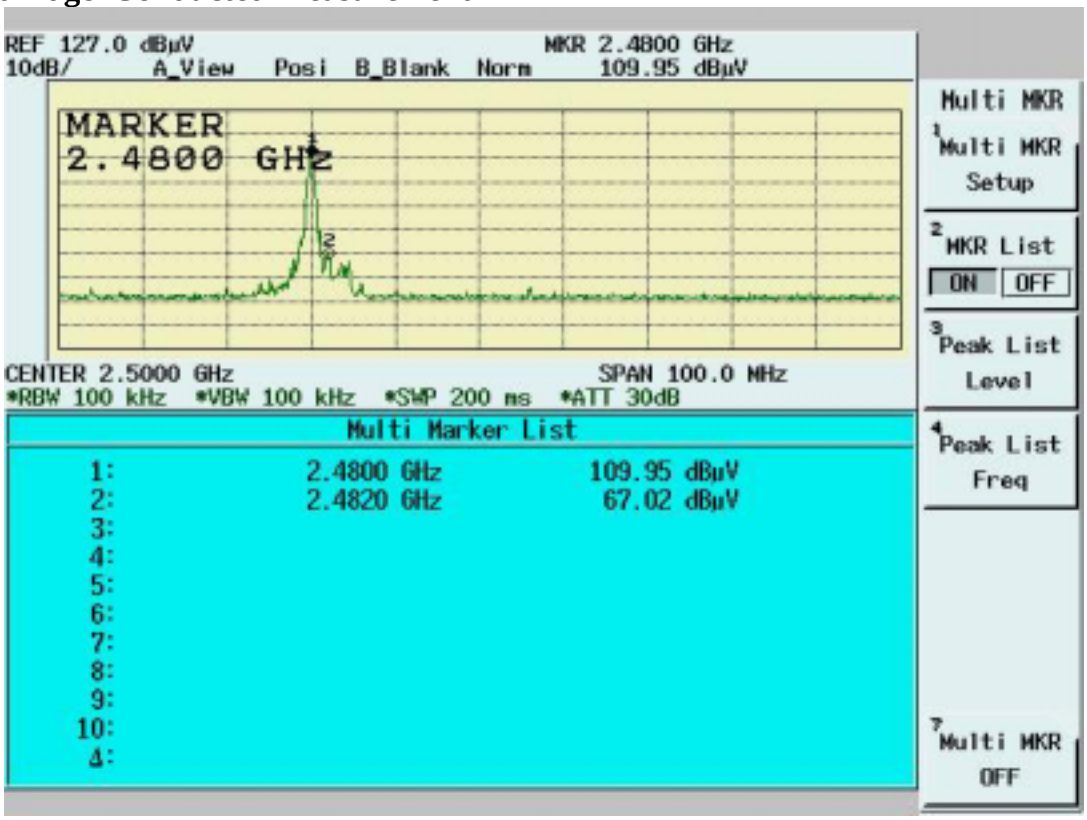
Test Engineer:Jerry Chiou Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2401.8	110.2	---	---
Outside band	2400.0	65.1	45.2	Pass
78	2480.0	110.0	---	---
Outside band	2482.0	67.0	42.9	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

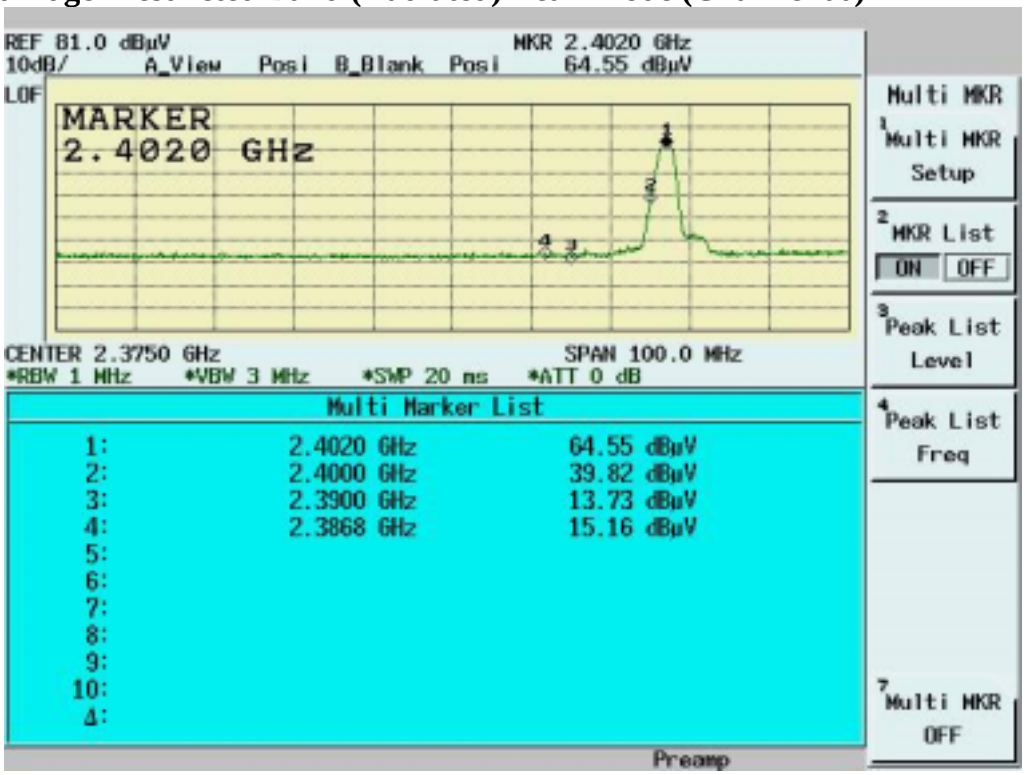
Data Rate Humidity (%):40

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)	2402.20	27.63	35.48	63.11	---	---	10Hz	---
Channel_00 (peak mode)	2402.00	64.55	35.48	100.03	---	---	3MHz	---
Outside band (peak mode)	2400.00	39.82	35.48	75.30	24.73	---	3MHz	Pass
Channel_78 (average mode)	2480.20	28.51	35.51	64.02	---	---	10Hz	---
Channel_78 (peak mode)	2480.00	66.40	35.51	101.91	---	---	3MHz	---
Outside band (peak mode)	2483.50	25.74	35.51	61.25	40.66	---	3MHz	Pass
Channel_00 Restricted band (peak mode)	2386.80	15.16	35.47	50.63	---	74	3MHz	Pass
Restricted band (average mode)	2390.00	5.09	35.47	40.56	---	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.60	26.28	35.51	61.79	---	74	3MHz	Pass
Restricted band (average mode)	2484.00	10.08	35.51	45.59	---	54	10Hz	Pass

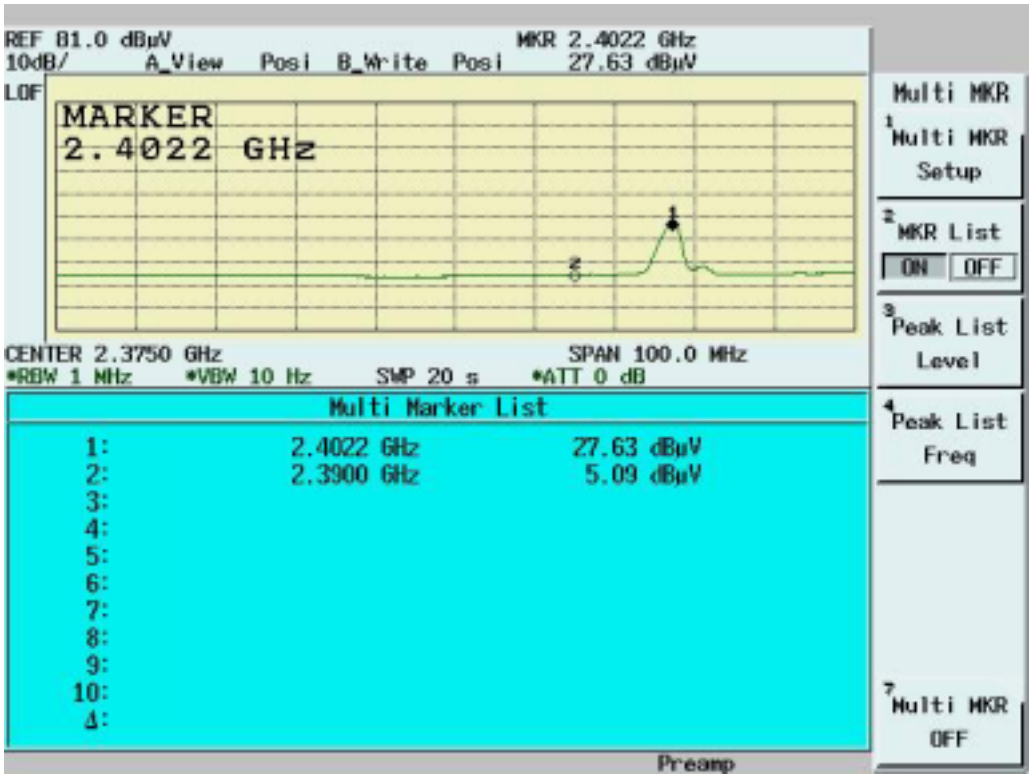
Note:

- 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.

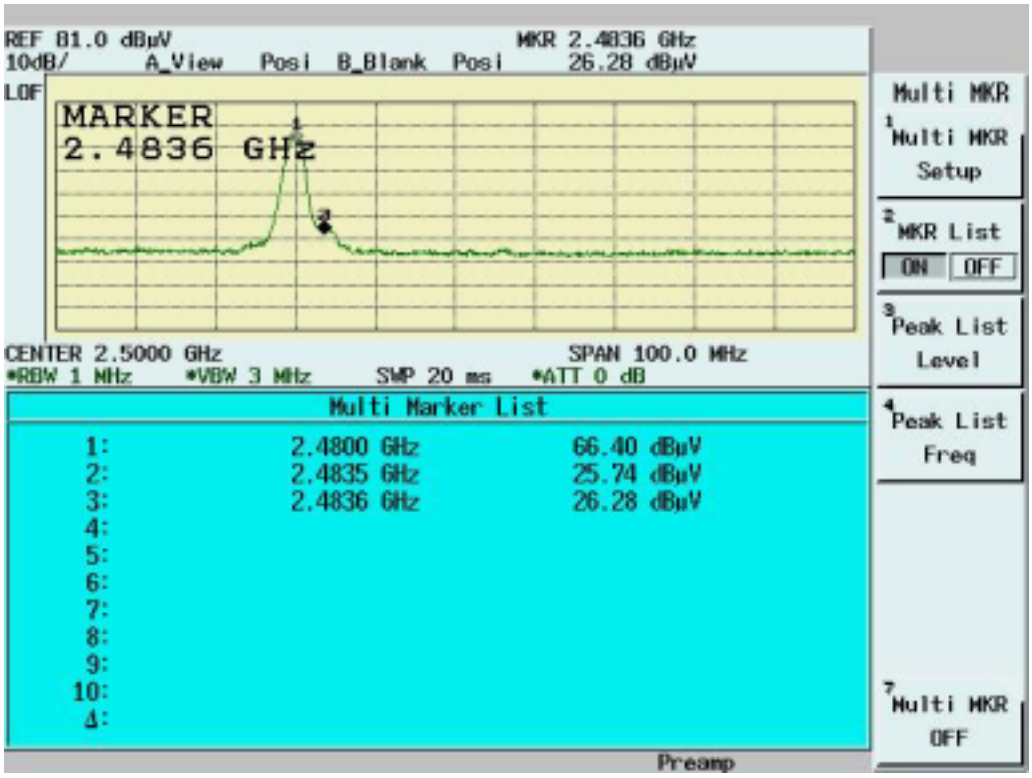
Band Edge Restricted Band (Radiated)-Peak Mode (Channel 00)



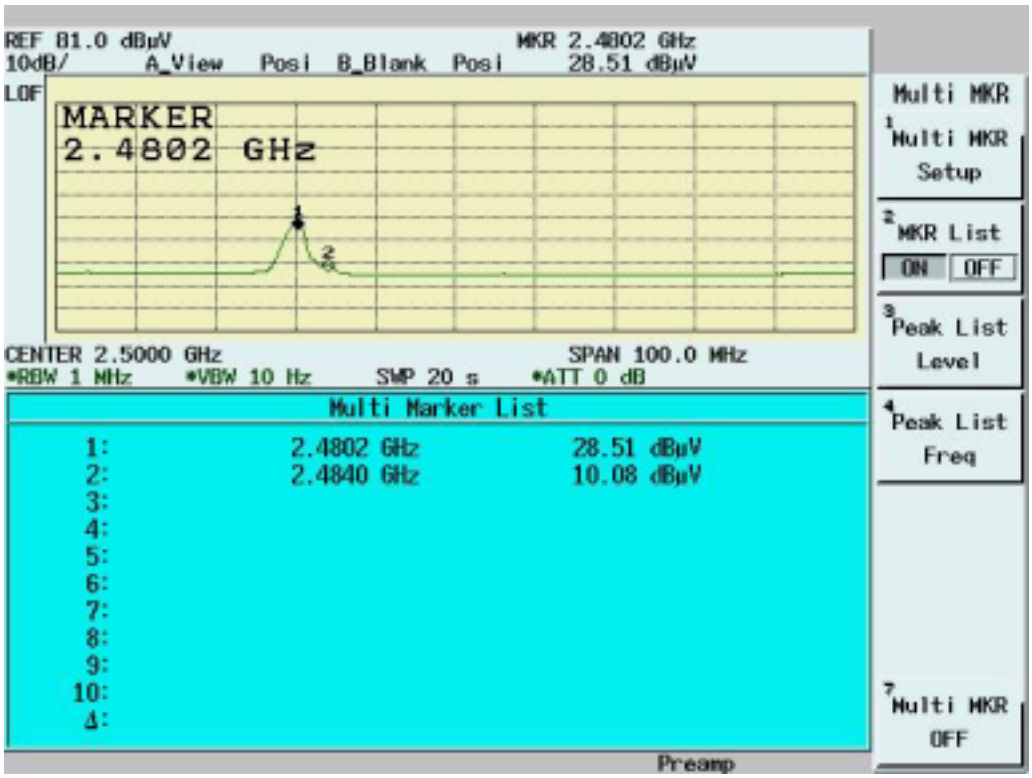
Band Edge Restricted Band (Radiated)-Average Mode (Channel 00)



Band Edge Restricted Band (Radiated)-Peak Mode (Channel 78)



Band Edge 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

- Bandwidth Test Procedure

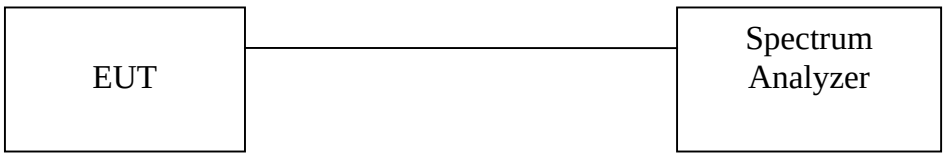
The Transmitter output of EUT was connected to the spectrum analyzer. The 20 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

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

- 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**	844	≦ 1000	Pass
39	**2441**	844	≦ 1000	Pass
78	**2480**	844	≦ 1000	Pass

Hopping Channel Separation

Temperature (°C):22

Test Engineer:Mailes Hsieh Humidity (%):25

Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	**2402**	999	≧ 844	Pass
39	**2441**	999	≧ 844	Pass
78	**2480**	999	≧ 844	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

4.6.1 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.

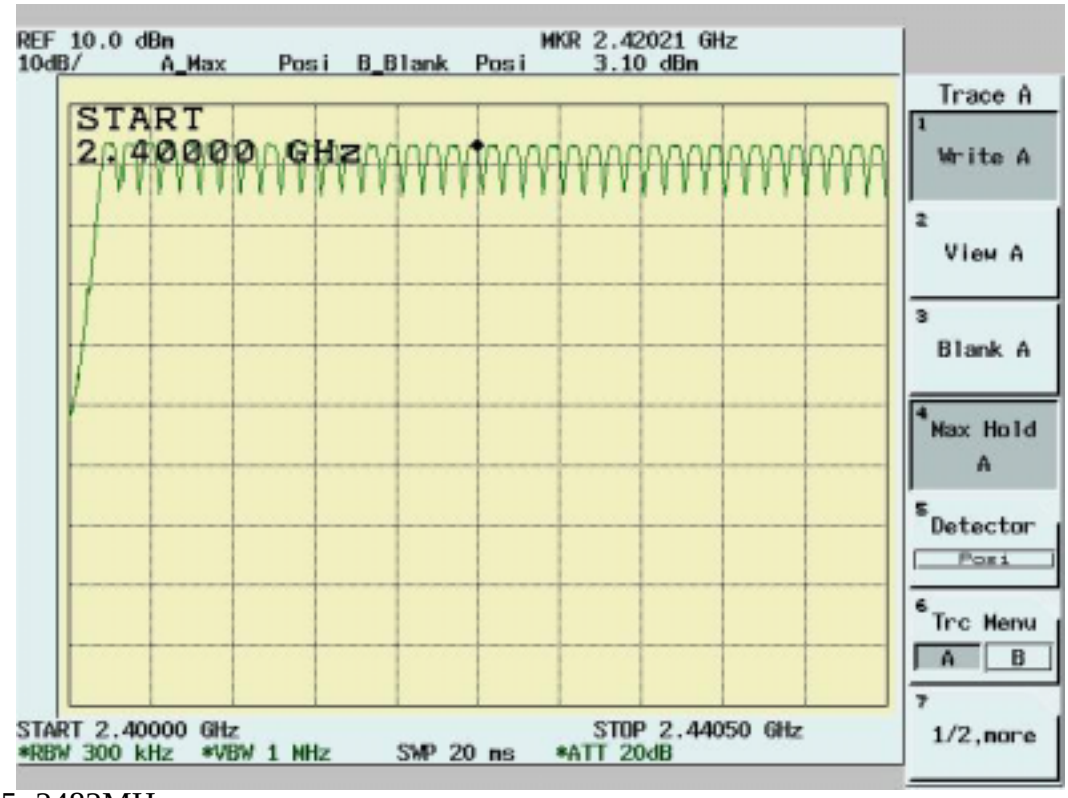
4.6.2 Test Setup

4.6.3 Test Data

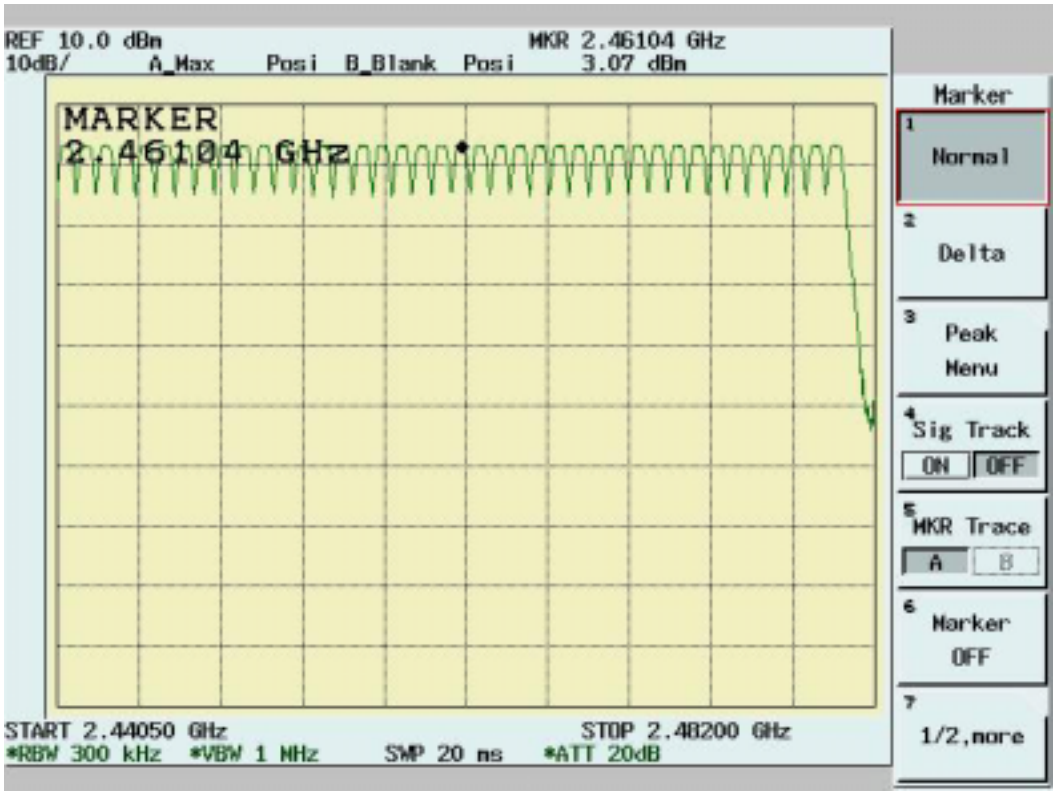
Number of Hopping Frequency Used

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

2400~2405MHz



2405~2482MHz



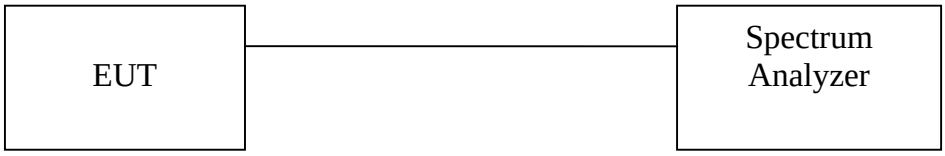
4.7 Dwell Time

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**	410	262.40	< 400	Pass
DH3	**2402**	1664	354.99	< 400	Pass
DH5	**2402**	2912	372.74	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2441**	414	264.96	< 400	Pass
DH3	**2441**	1664	354.99	< 400	Pass
DH5	**2441**	2912	372.74	< 400	Pass

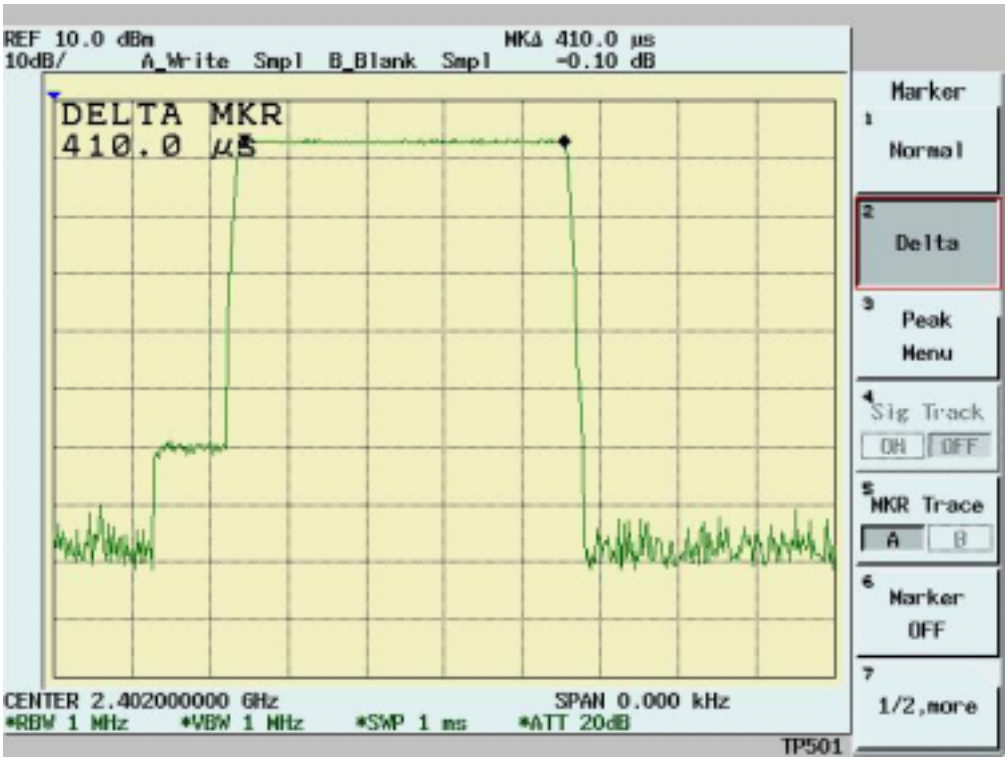
Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Pass/Fail
DH1	**2480**	414	264.96	< 400	Pass
DH3	**2480**	1668	355.84	< 400	Pass
DH5	**2480**	2920	373.76	< 400	Pass

Note:

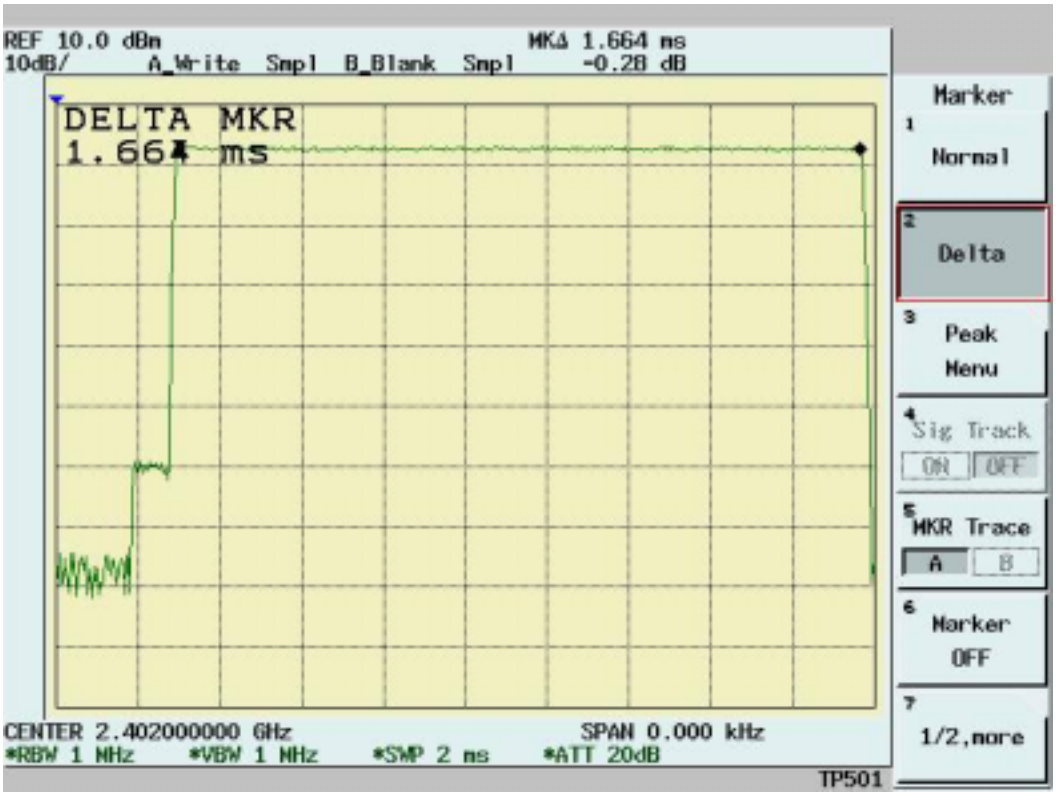
A period time=79x0.4(s)=31.6(s)

CH00	DH1 time slot=	410 (μs)*(1600/(1*79))*31.6=	262.40 (ms)
	DH3 time slot=	1664 (μs)*(1600/(3*79))*31.6=	354.99 (ms)
	DH5 time slot=	2912 (μs)*(1600/(5*79))*31.6=	372.74 (ms)
CH39	DH1 time slot=	414 (μs)*(1600/(1*79))*31.6=	264.96 (ms)
	DH3 time slot=	1664 (μs)*(1600/(3*79))*31.6=	354.99 (ms)
	DH5 time slot=	2912 (μs)*(1600/(5*79))*31.6=	372.74 (ms)
CH78	DH1 time slot=	414 (μs)*(1600/(1*79))*31.6=	264.96 (ms)
	DH3 time slot=	1668 (μs)*(1600/(3*79))*31.6=	355.84 (ms)
	DH5 time slot=	2920 (μs)*(1600/(5*79))*31.6=	373.76 (ms)

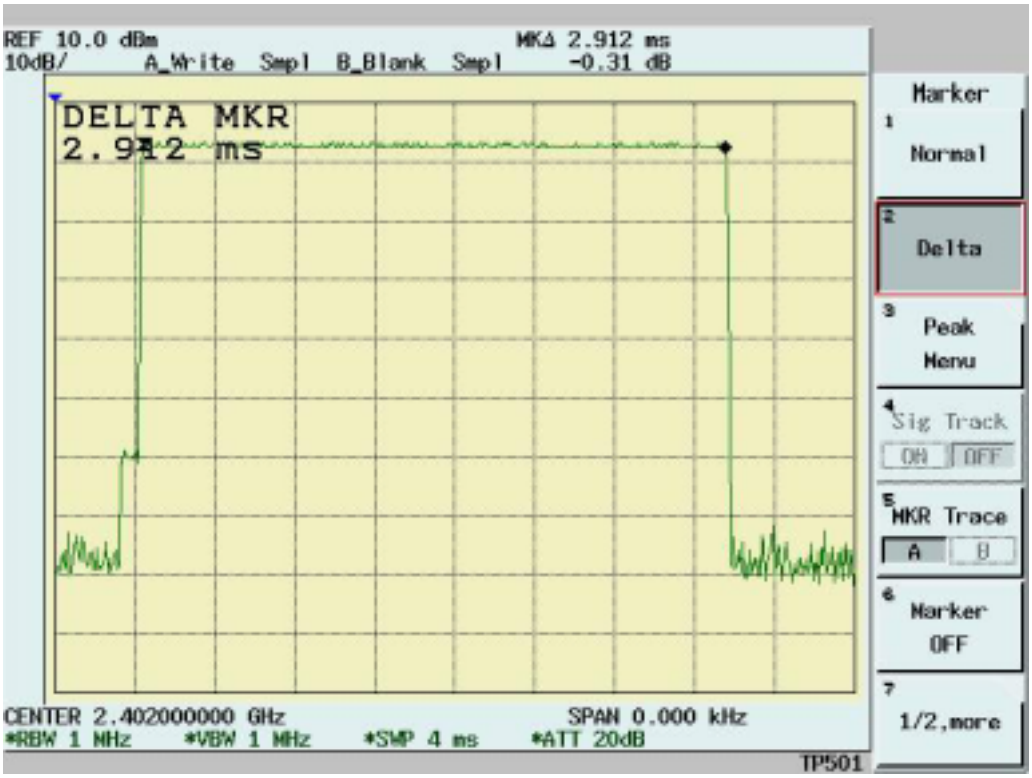
Channel 00 DH1:



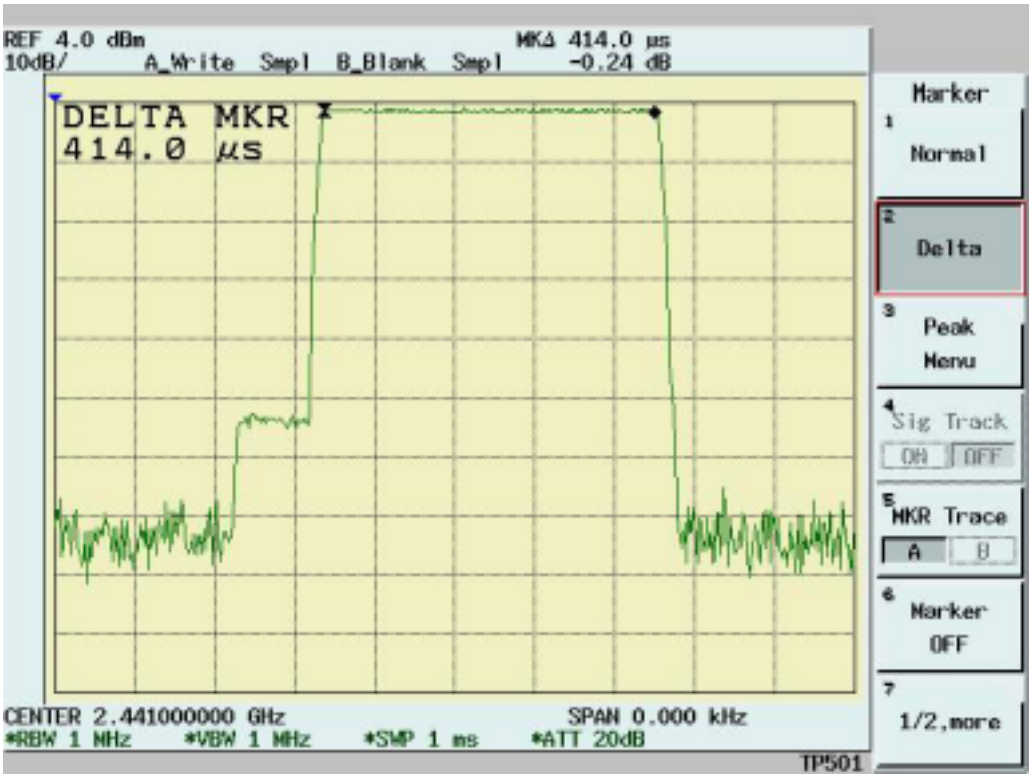
Channel 00 DH3:



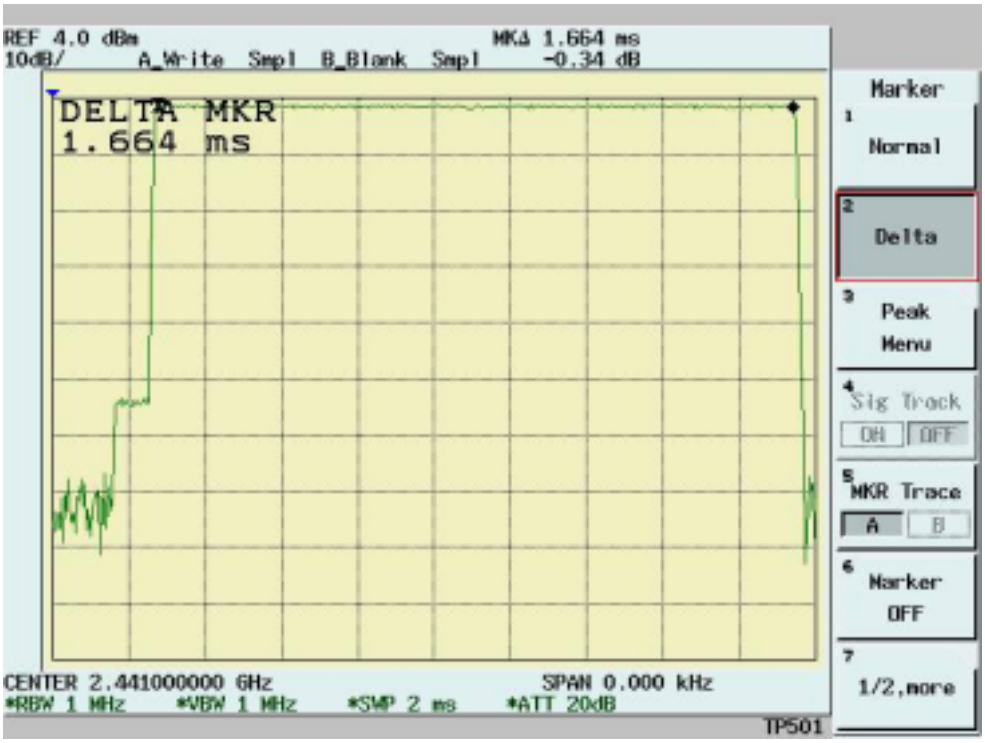
Channel 00 DH5:



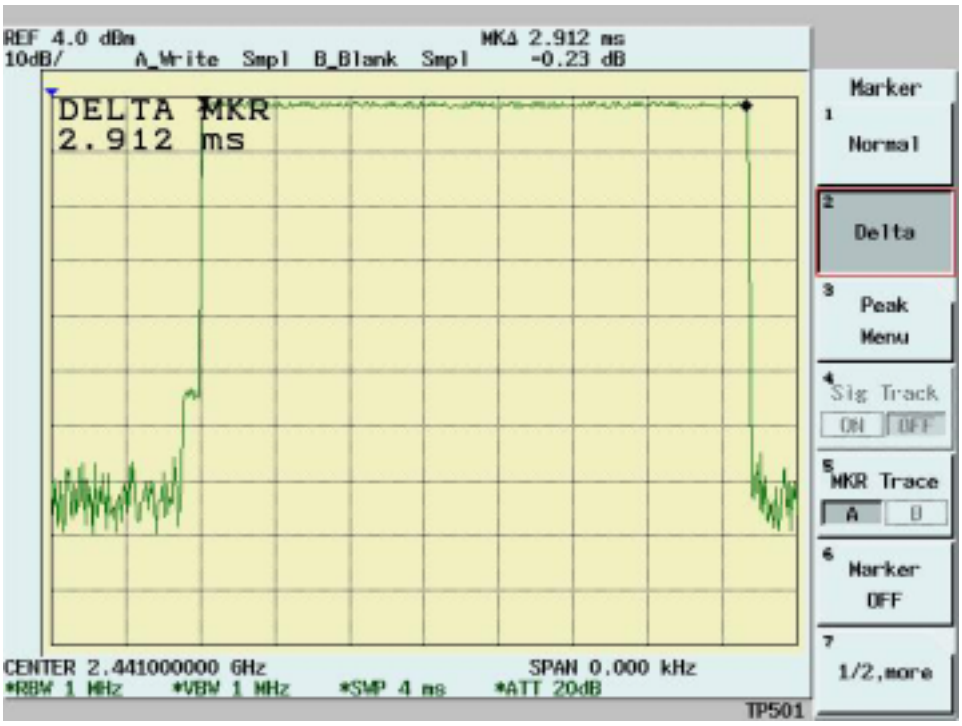
Channel 39 DH1:



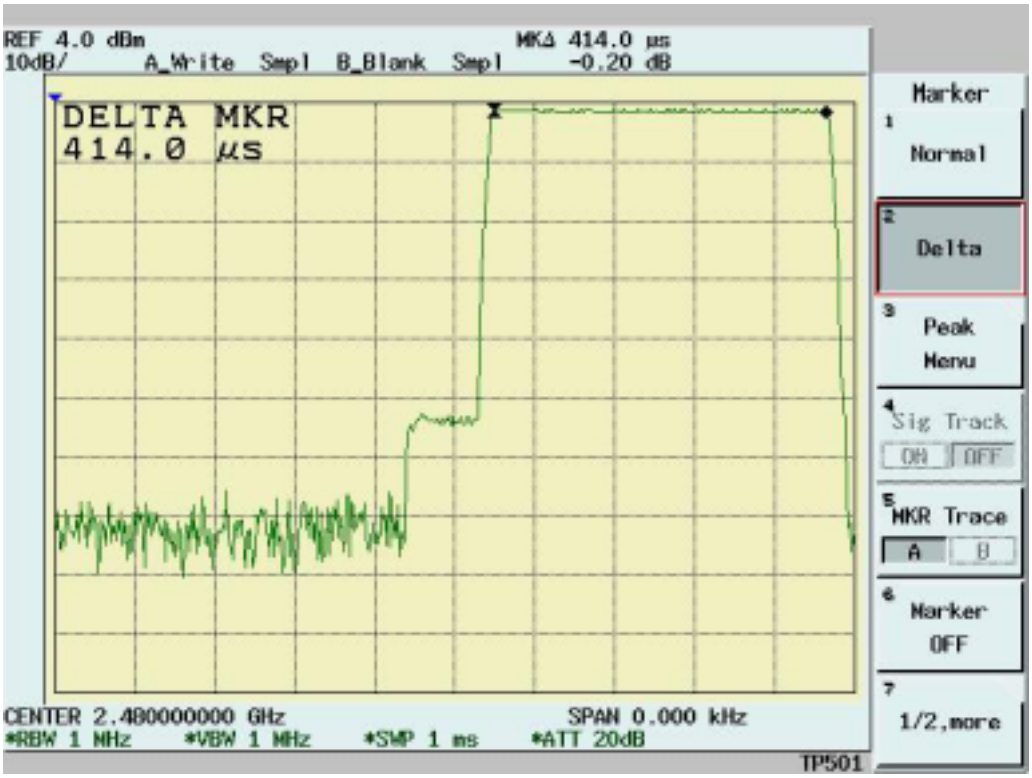
Channel 39 DH3:



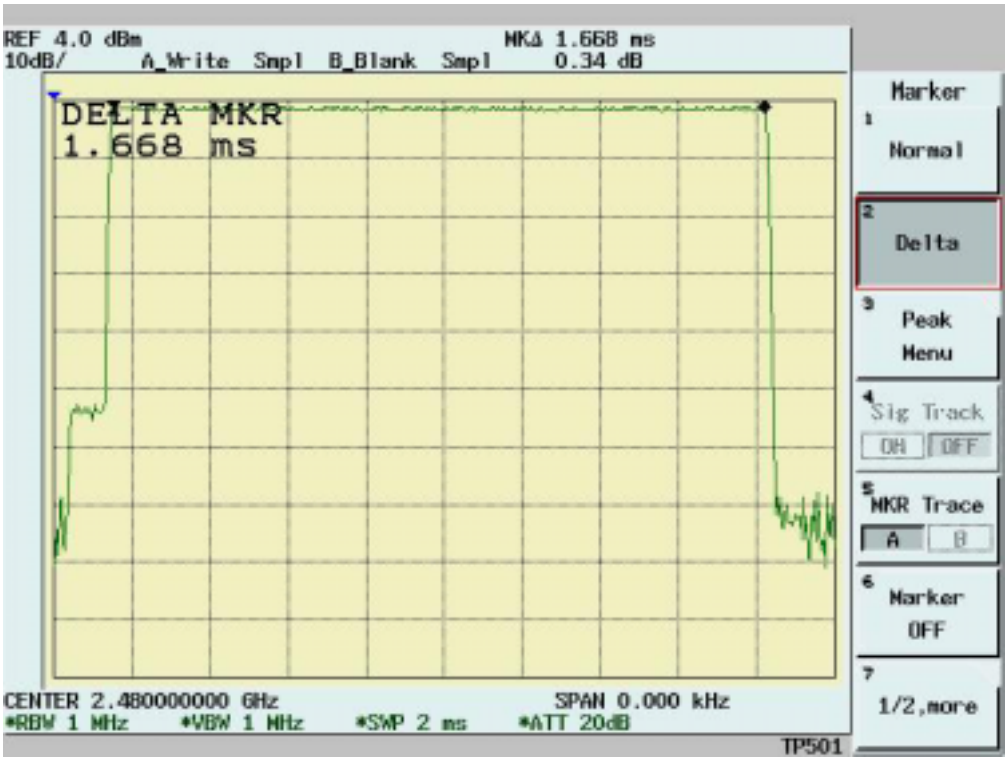
Channel 39 DH5:



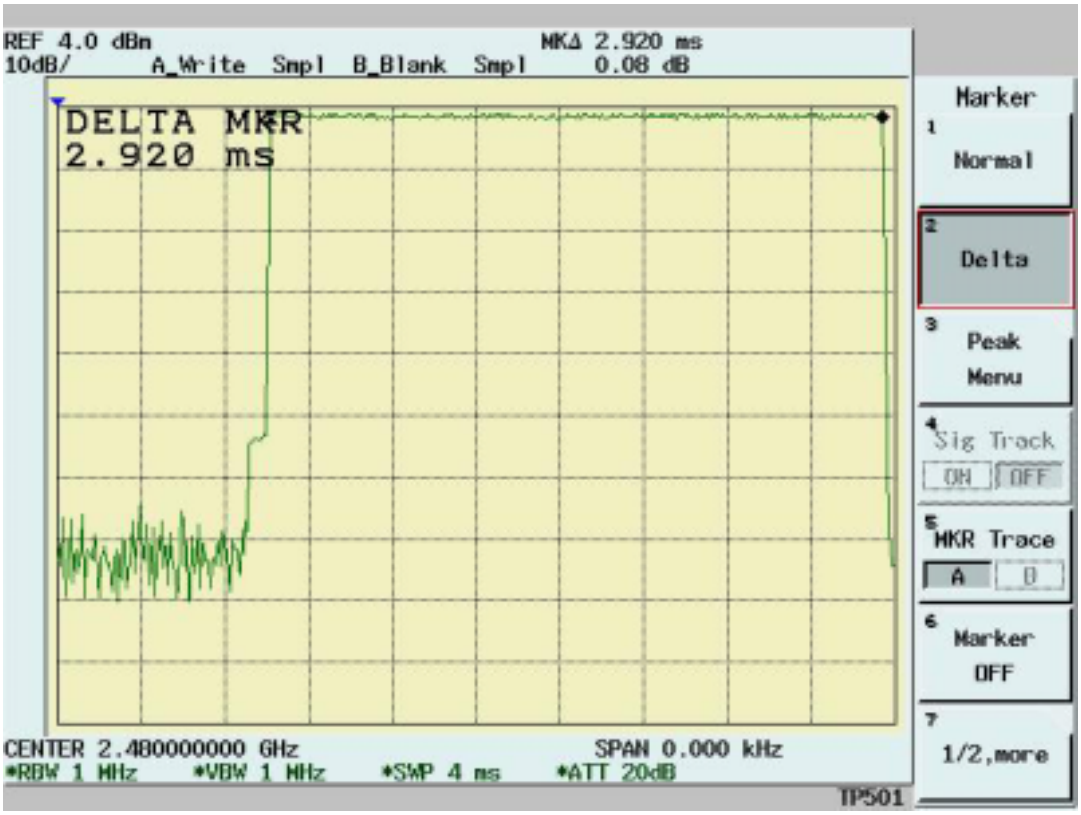
Channel 78 DH1:



Channel 78 DH3:



Channel 78 DH5:



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	11/30/2006
Conduction	EMI Receiver 02	HP	85460A	3448A00183	10/01/2005	10/01/2006
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	05/05/2005	05/05/2006
Conduction	LISN 06	R&S	ESH3-Z5	828874/009	12/13/2005	12/13/2006
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/07/2005	06/07/2006
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	12/30/2006
Radiation	EMI Receiver 03	HP	85460A	3448A00209	03/24/2005	03/24/2006
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	02/17/2006	02/17/2007
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	01/13/2006	01/13/2007
Radiation	Horn Antenna 05	Com-Power	AH-640	100A	09/30/2005	09/30/2006
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	02/15/2006	02/15/2007
Chamber 05	Power Sensor Radar	HP	84815A	3318A01828	02/15/2006	02/15/2007
Radiation	Preamplifier 02	MITEQ	AFS44-00102650-40-10P-44	728229	11/28/2005	11/28/2006
Radiation	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	11/22/2005	11/22/2006
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 07	Advantest	R3182	110600649	04/21/2005	04/21/2006

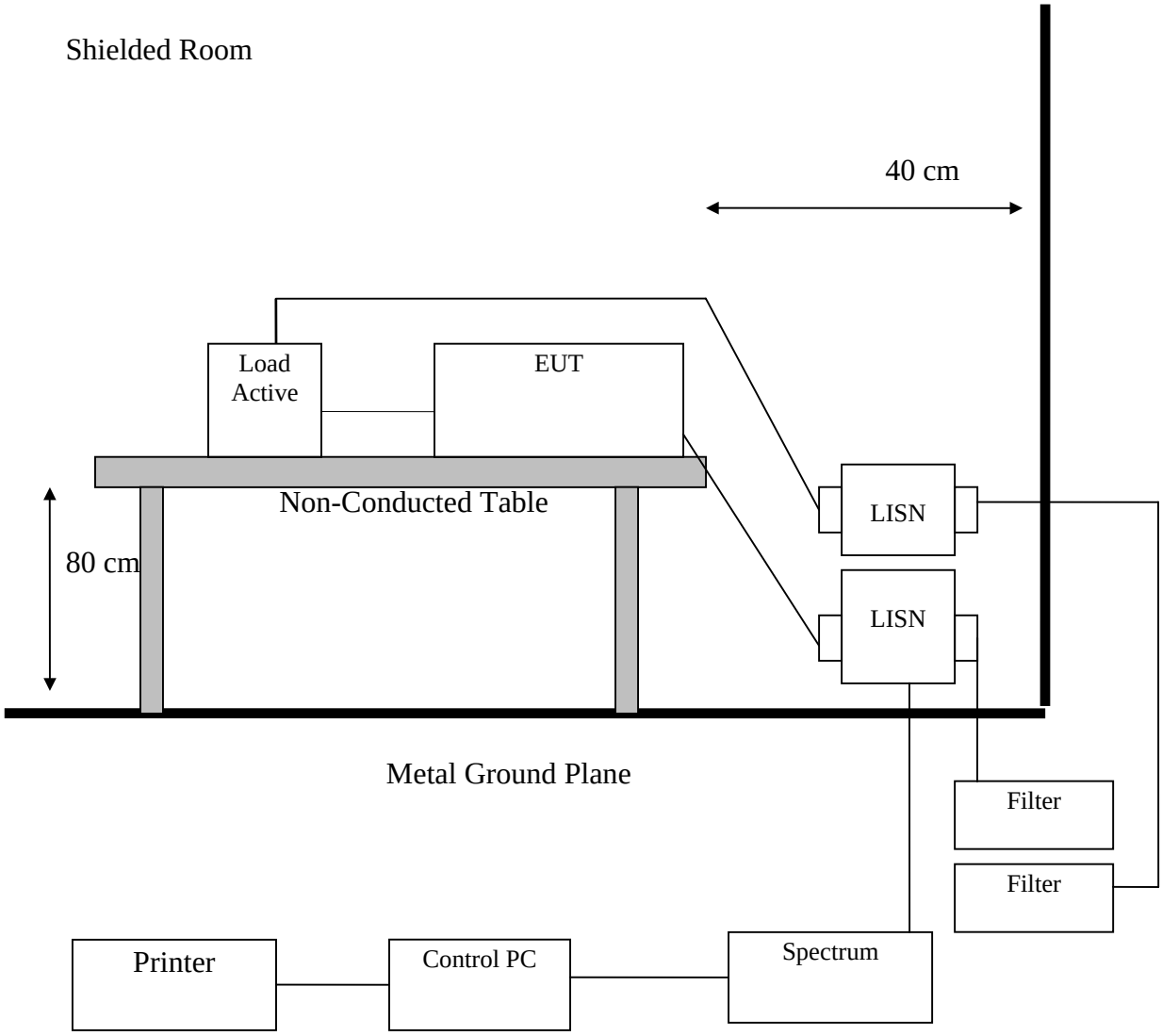
Note: Calibration is traceable to NIST or national or international standards.

5.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

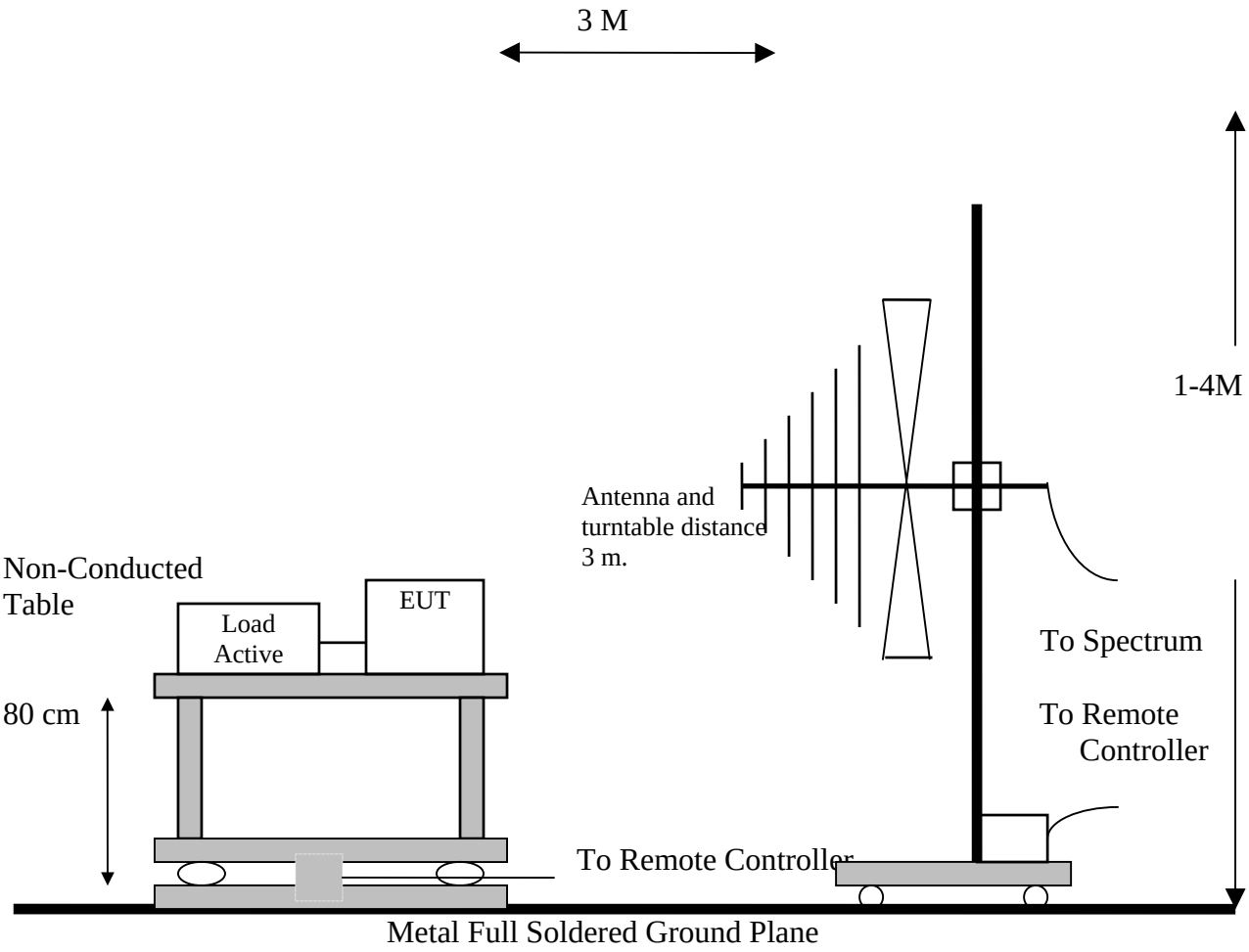
Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

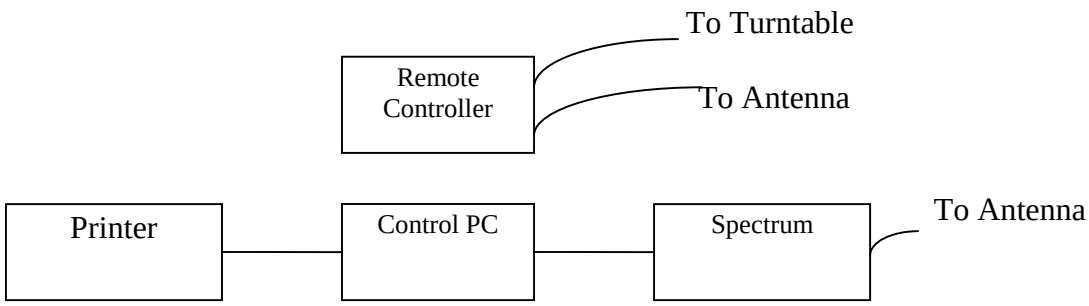
5.4 Appendix D: Layout of EUT and Support Equipment

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 Notebook Personal Computer
Model:	Latitude D400
Serial Number:	N/A
CPU:	Pentium M- 1.5GHz(FSB 400 MHz)
A/C Adapter Type:	LITEON 65W (Model PA-1650-05D) 3 Pins
Hard Disk Driver:	Toshiba (Model: MK4019GAX) 40 GB
MDC Modem:	Conexant (Model: RD01-D480)
VGA Connector:	One 15 Pins
Serial Connector:	One 9 Pins
RJ11 Connector:	One 2 Pins
RJ45 Connector:	One 8 Pins
USB Connector:	Two 4 Pins
1394 Connector:	One 4 Pins
Smart Card Slot:	One
PCMCIA Slot:	One
Earphone Port:	One
Microphone Port:	One
Power In Port:	One
Battery:	Sanyo 6-cell (Model: 6T087)
RAM:	Nanya DDR 256MB x 1
LCD Panel and Inverter:	Toshiba 12.1”XGA (Model: LTM12C505D)； RICOH KEIKI Inverter (Model: K3E19T5 0090)
Power Cord:	Non-shielded, Detachable

Support Unit 2.

Description:	Philips Monitor
Model:	109P40
Serial Number:	BZ000421172019
Power Cord:	Non-shielded, Detachable
FCC ID:	A3KM092

Support Unit 3.

Description:	Dell USB Mouse
Model Number:	MO56UC
Serial Number:	N/A
Power Supply Type:	From EUT USB PORT
Power Cord:	N/A
FCC ID:	N/A (complied with FCC DOC)

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. The RF software makes the transmitter continuously sending RF signals
C. Repeat the above steps.

	Filename	Issued Date
CSR BlueSuite 1.22	Bluetest.exe	2005/12/23

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
USB Mouse Data Cable	USB Mouse to PC USB port	1.8M	Shielded, Un-detachable	Metal Head
Monitor Data Cable	Monitor to PC VGA Port	1.6M	Shielded, 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 ($u_1 (y)^2 + u_2 (y)^2 + ...+u_n (y)^2$)

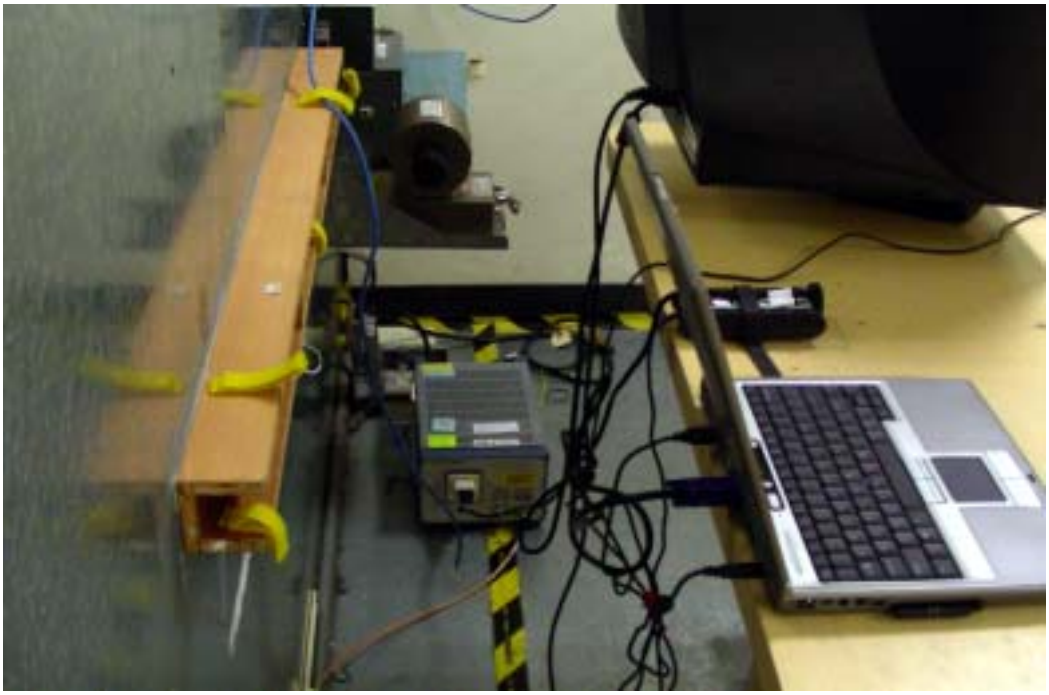
U = 2 * Uc (y)

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

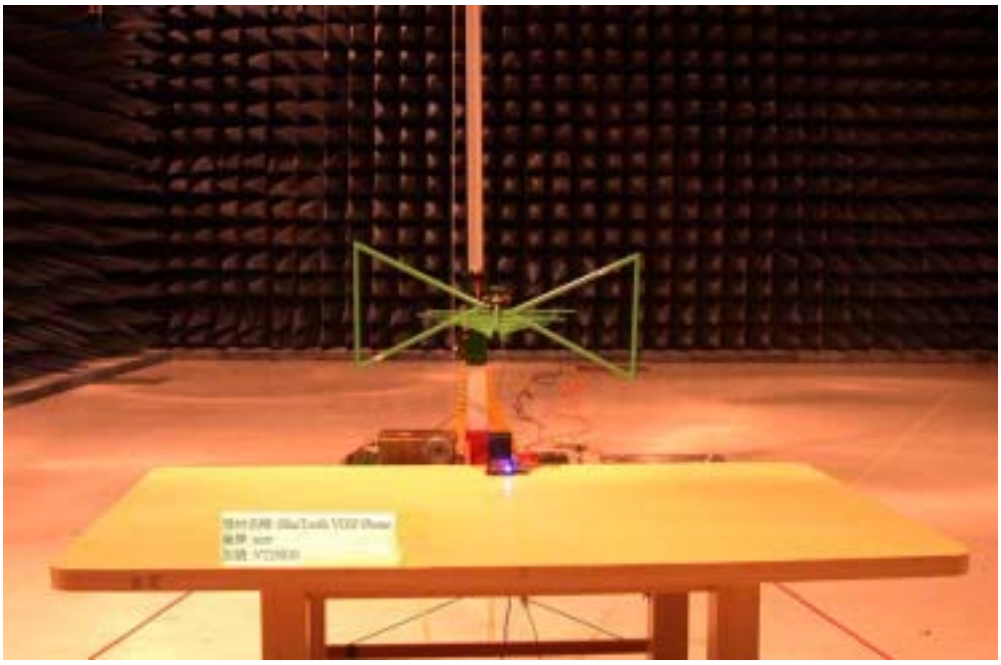
5.7 Appendix G: Photographs of EUT Configuration Test Set Up

The Front View of Highest Conducted Set-up For EUT

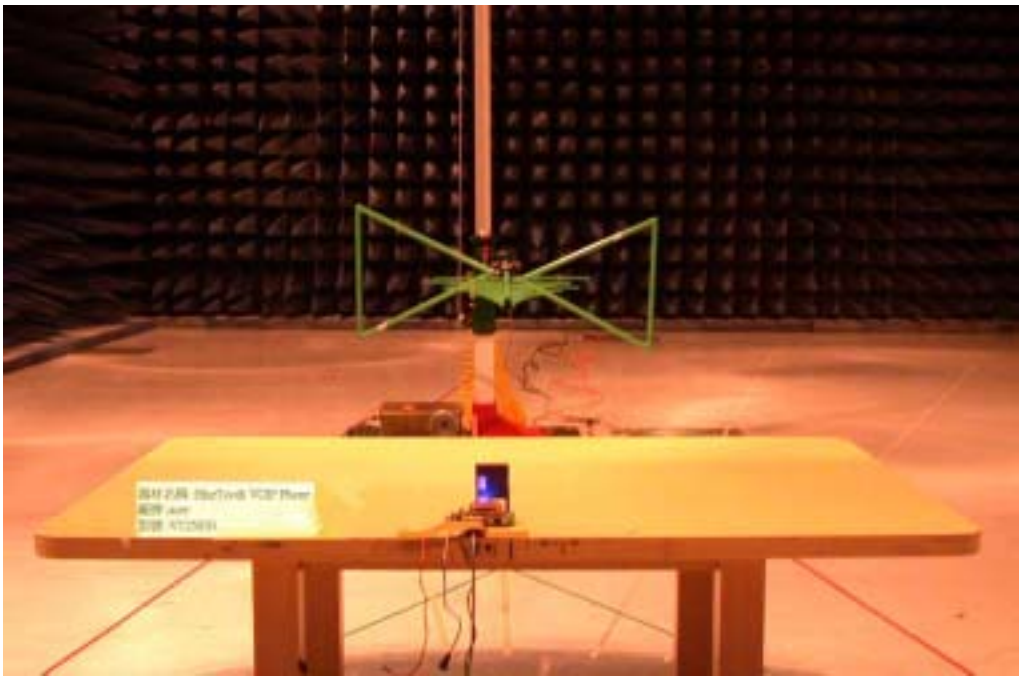
The Back View of Highest Conducted Set-up For EUT



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.