

Test Report for FCC Part 15 Subpart B & C

of

Product Name

Bluetooth VoIP Phone

Model

CP20

Applied by:

Wistron Corporation
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Hsichih, Taipei Hsi
Taiwan, R.O.C.

Test Performed by:

International Standards Laboratory

Lung-Tan LAB

Site Registration No.

BSMI: SL2-IN-E-0013; TAF: 0997; NVLAP: 200234-0;
IC: IC4164-1; VCCI: R-1435, C-1440; NEMKO: ELA 113B

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HC LAB: NVLAP:200234-0; VCCI: R-341, C-354; NEMKO: ELA 113A; BSMI: SL2-IN-E-0037; SL2-R1-E-0037; CNLA: 1178; IC: IC4067

LT LAB: NVLAP:200234-0; VCCI: R-1435, C-1440; NEMKO: ELA 113B; BSMI: SL2-IN-E-0013; CNLA: 0997; IC: IC4164-1

ISL-T10-R2-3

Contents of Report

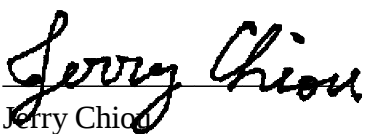
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1. General

1.1 Certification of Accuracy of Test Data

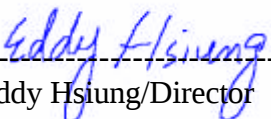
Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	Bluetooth VoIP Phone
Model:	CP20
Applied by:	Wistron Corporation
Sample received Date:	2007/02/15
Final test Date :	2007/03/05-2007/03/09
Test Result	PASS
Test Site:	Chamber 02, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data

Test Engineer: 
Jerry Chio

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 56 pages, including 1 cover page, 2 contents page, and 53 pages for the test description. This report must not be used 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.: CP20
 Bluetooth Module: Cambridge Silicon Radio (Model: BC4-EXT)
 Frequency Range: 2402 ~ 2480 MHz
 Support channel: 79 Channels
 Modulation Skill: GFSK (1Mbps)
 Antennas Type: PIFA (CP20-1, made by J-THREE INTERNATIONAL HOLDING CO.,LTD)
 Antenna Connected: The Antenna is clip on the back, use to cover with EUT. The user is not possible to change the antenna without disassembling the card phone.
 Antenna peak Gain: -2 dBi
 Power Type of Bluetooth module: 3.7 V DC from Rechargeable Battery
 Battery Charging: Charge via Express Socket (3.3V) 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

Express Connector: one 26 pins
 Front: Speak
 Power Button
 Pair/Link Button
 Speakerphone Button
 Flank: Volume up/down button

EMI Noise Source:
 Crystal:13MHz(XT1)

EMI Solution:
 1. Adding copper on battery.
 2. Adding copper over speaker.

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 6dB 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 6dB below the applicable average limits, the emissions were also measured with the average detectors.

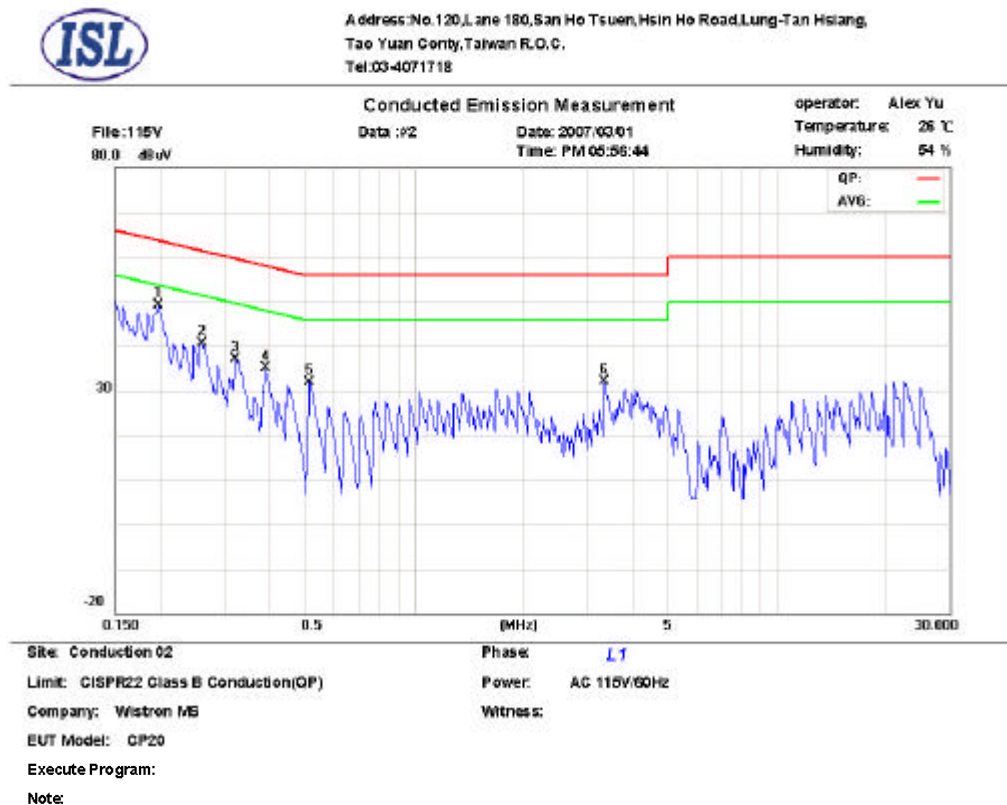
The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

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



Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct dBuV	QP Limit dBuV	QP Margin dB	AVG Correct dBuV	AVG Limit dBuV	AVG Margin dB	Note
* 0.1965	0.1	0.04	45.60	63.7	-18.1	37.30	53.7	-16.4	
0.2589	0.13	0.08	40.50	61.4	-20.9	32.70	51.4	-18.7	
0.3200	0.16	0.1	34.90	59.7	-24.8	27.00	49.7	-22.7	
0.3893	0.19	0.09	30.90	58.0	-27.1	26.20	48.0	-21.8	
0.5155	0.2	0.07	27.80	56.0	-28.2	24.50	46.0	-21.5	
3.3458	0.33	0.12	22.00	56.0	-34.0	13.70	46.0	-32.3	

*:Maximum data x:Over limit

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



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

Conducted Emission Measurement

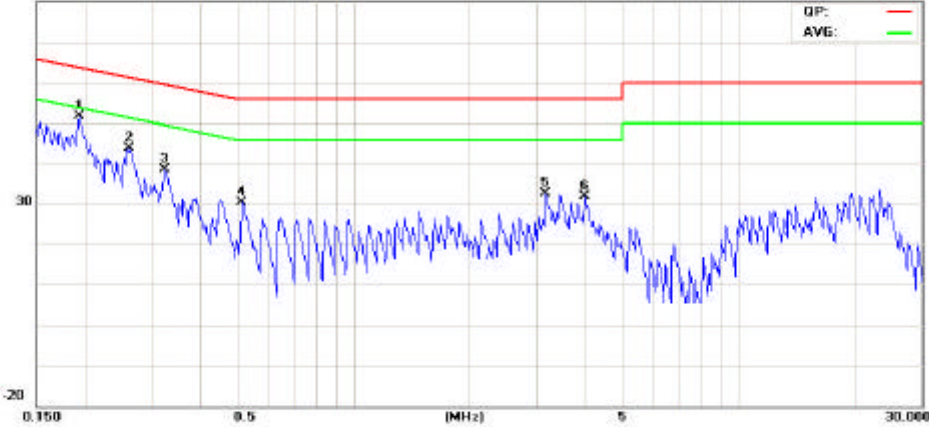
operator: Alex Yu
Temperature: 26 °C
Humidity: 54 %

File: 115V
89.0 dBuV

Date: #1

Date: 2007/03/01

Time: PM 05:52:43



Site: Conduction 02

Phase: N

Limit: CISPR22 Class B Conduction(QP)

Power: AC 115V/60Hz

Company: Wistron M8

Witness:

EUT Model: CP20

Execute Program:

Note:

Frequency MHz	LISN Loss dB	Cable Loss dB	QP Correct dBuV	QP Limit dBuV	QP Margin dB	AVG Correct. dBuV	AVG Limit dBuV	AVG Margin dB	Note
* 0.1934	0.1	0.04	46.60	63.8	-17.2	37.40	53.8	-16.4	
0.2616	0.13	0.08	38.40	61.3	-22.9	30.00	51.3	-21.3	
0.3234	0.16	0.1	36.30	59.6	-23.3	27.50	49.6	-22.1	
0.5155	0.2	0.07	28.60	56.0	-27.4	22.70	46.0	-23.3	
3.1563	0.2	0.12	21.90	56.0	-34.1	18.00	46.0	-28.0	
3.9895	0.2	0.14	23.70	56.0	-32.3	12.40	46.0	-33.6	

*:Maximum data x:Over limit

* 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 spectrum analyzer.

4.2.2 Test Setup



4.2.3 Test Data

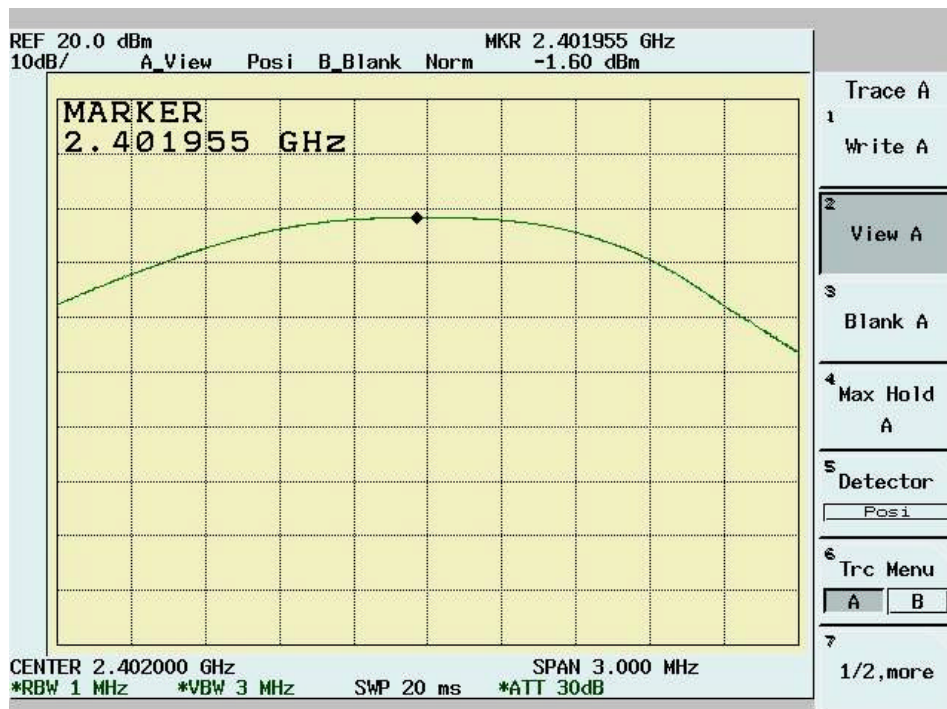
Maximum Peak Output Power

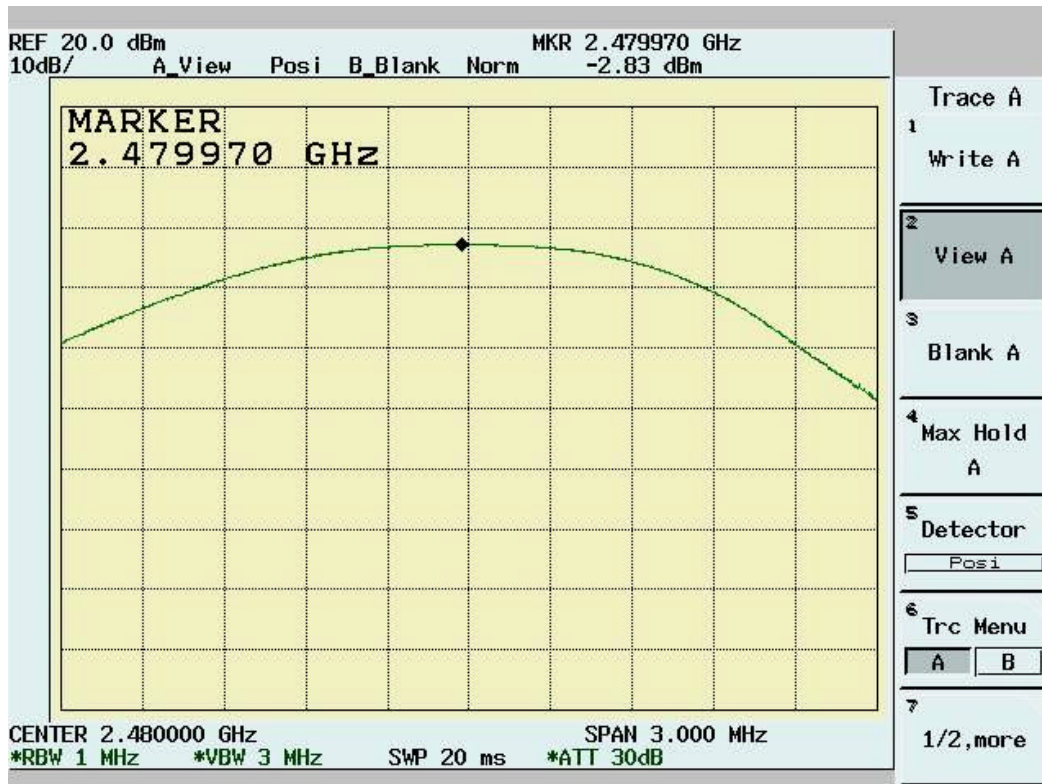
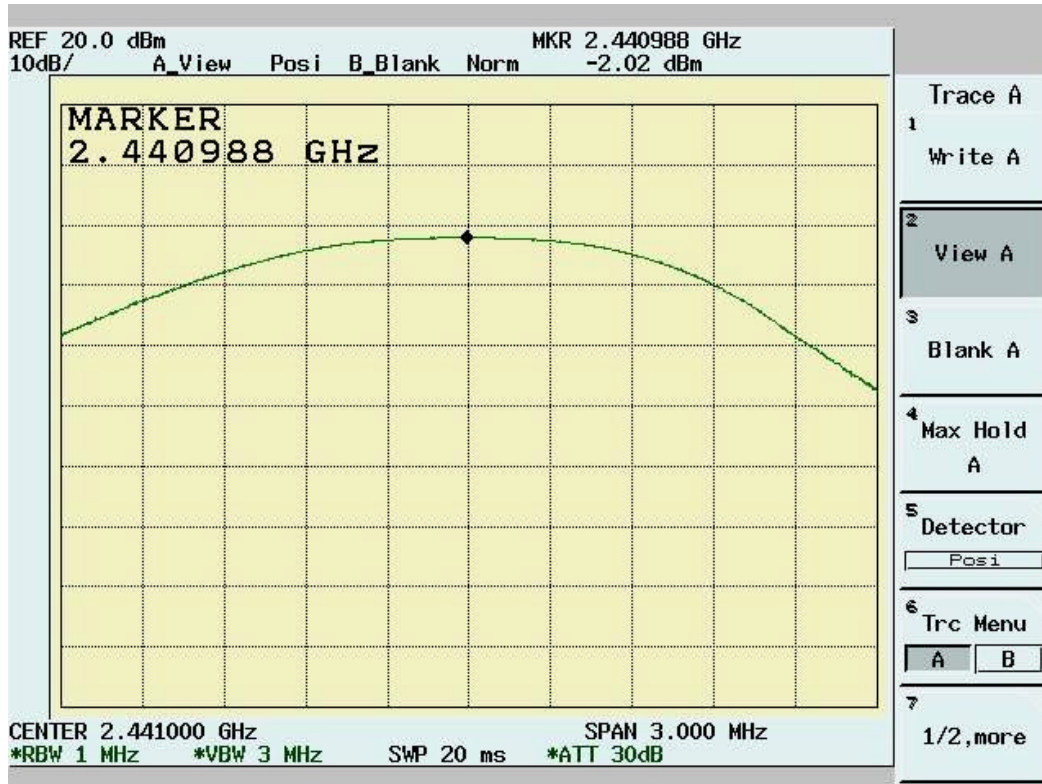
Temperature ():25

Humidity (%):55

Test Engineer:Jerry Chiou

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	2402	-1.60	1.10	0.89	-0.50	30	Pass
39	2441	-2.02	1.10	0.81	-0.92	30	Pass
78	2480	-2.83	1.10	0.67	-1.73	30	Pass





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 according to EMI Receiver/Spectrum Analyzer Configuration.

For the test of 2nd to 10th 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)

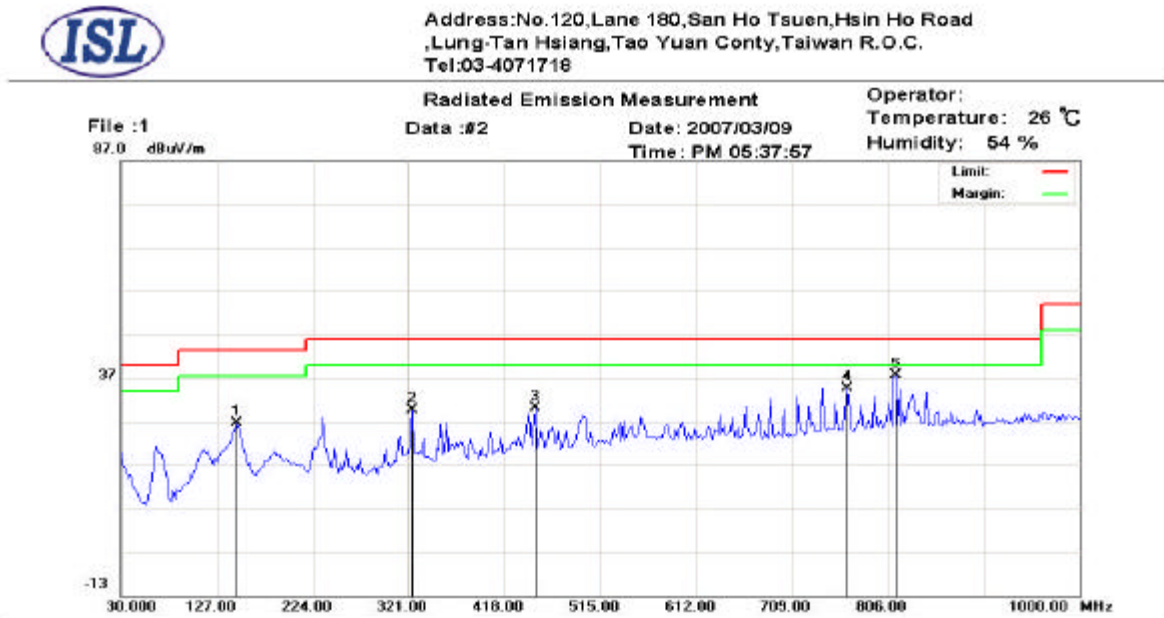
Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz

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



Site : Chamber 02

Condition : FCC Class B 3M Radiation

Company :

EUT Model:

Execute Program :

Note :

Polarization: Horizontal

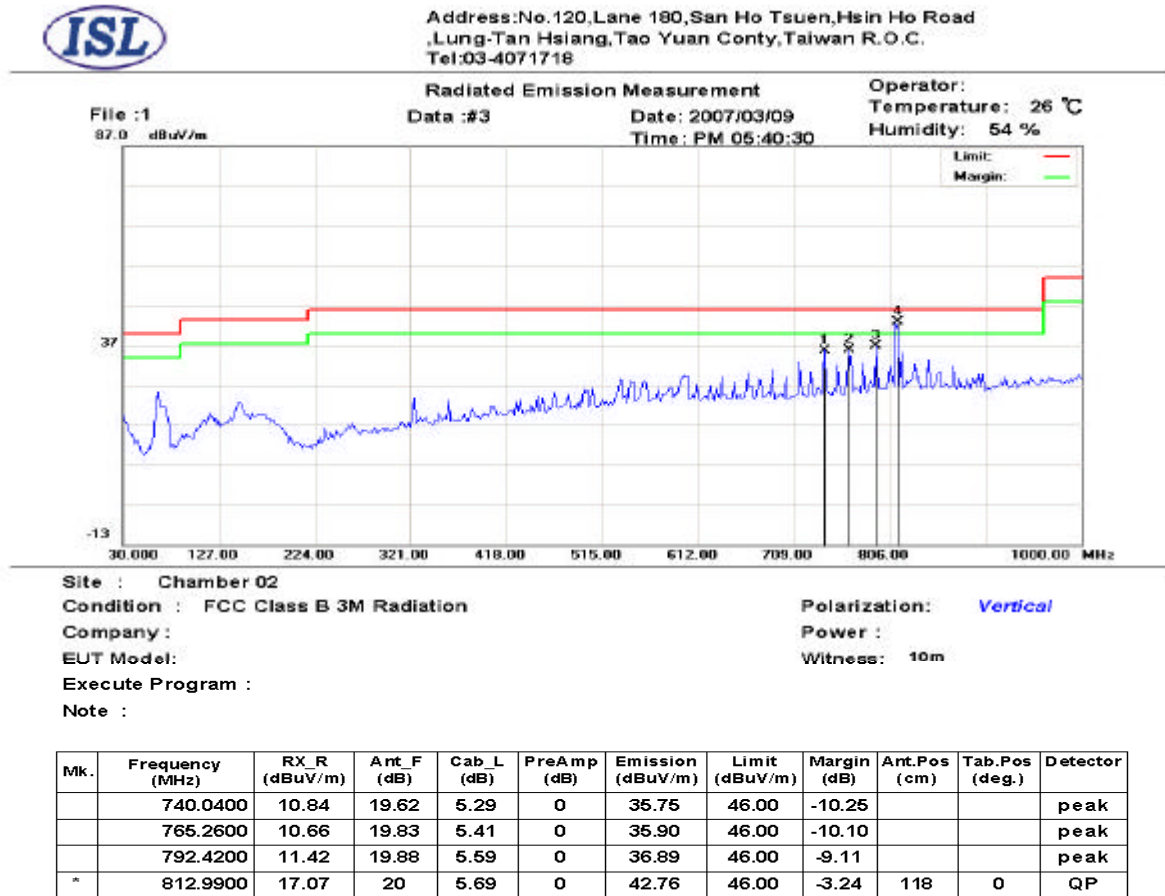
Power :

Witness: 10m

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
	146.4000	14.27	10.56	1.92	0	26.75	43.50	-16.75			peak
	324.8800	12.55	13.8	3.18	0	29.53	46.00	-16.47			peak
	449.0400	9.55	16.68	3.85	0	30.08	46.00	-15.92			peak
	765.2600	9.37	19.83	5.41	0	34.61	46.00	-11.39			peak
*	813.7600	11.98	20.01	5.69	0	37.68	46.00	-8.32			peak

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

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



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

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(%):59
Temperature(C):22

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	38.98pk	27.66	2.31	23.75	45.20pk	54.00av	-8.80	101	70
4789.21	43.70pk	34.00	5.14	27.53	55.31pk	74.00pk	-18.69	100	21
4803.92	24.50av	34.00	5.14	27.53	36.11av	54.00av	-17.89	100	21
7193.81	37.17pk	37.98	3.83	26.61	52.37pk	54.00av	-1.63	101	137
9598.4	38.36pk	38.92	3.91	24.87	56.32pk	74.00pk	-17.62	102	8
9607.8	21.00av	38.92	3.91	24.87	38.96av	54.00av	-15.04	102	8

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity(%): 59
Temperature(C): 22

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
1599.4	42.80pk	27.63	2.30	23.75	48.99pk	54.00av	-5.01	101	71
4789.21	41.28pk	34.00	5.14	27.53	52.89pk	54.00av	-1.11	100	21
7193.81	34.84pk	37.98	3.83	26.61	50.04pk	54.00av	-3.96	101	137
9598.4	35.94pk	38.92	3.91	24.87	53.90pk	54.00av	-0.10	102	8

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(%):59

Temperature(C):22

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	38.82pk	27.87	2.32	23.75	45.26pk	54.00av	-8.74	101	69
4876.12	43.33pk	34.33	5.13	27.41	55.38pk	74.00pk	-18.62	100	12
4887.42	24.11av	34.33	5.13	27.41	37.54av	54.00av	-17.84	100	12
7309.69	41.98pk	38.44	3.89	26.56	57.75pk	74.00pk	-16.25	101	154
7328.91	26.11av	38.44	3.89	26.56	45.63av	54.00av	-12.12	101	154
9757.74	41.30pk	38.64	4.02	24.76	59.19pk	74.00pk	-14.81	101	5
9771.32	25.78av	38.64	4.02	24.76	48.86av	54.00av	-10.33	101	5

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

Operator:JerryChiou

RBW:1MHz
Humidity(%):59
Temperature(C):22

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	43.39pk	27.87	2.32	23.75	49.83pk	54.00av	-4.17	101	69
4876.12	41.05pk	34.33	5.13	27.41	53.10pk	54.00av	-0.90	100	12
7309.69	40.78pk	38.44	3.89	26.56	56.55pk	74.00pk	-17.45	101	154
7314.56	23.66av	38.44	3.89	26.56	41.98av	54.00av	-14.57	101	154
9757.74	37.59pk	38.64	4.02	24.76	55.49pk	74.00pk	-18.51	101	5
9762.33	21.14av	38.64	4.02	24.76	40.53av	54.00av	-14.96	101	5

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: Jerry Chiou

RBW: 1MHz
Humidity(%): 59
Temperature(C): 22

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
1164.84	44.44pk	25.26	2.19	24.00	47.88pk	54.00av	-6.12	102	101
1332.17	45.63pk	26.03	2.21	23.88	49.99pk	54.00av	-4.01	101	89
1651.85	40.20pk	28.08	2.34	23.75	46.87pk	54.00av	-7.13	101	67
4948.55	41.73pk	34.60	5.13	27.31	54.15pk	74.00pk	-19.85	100	5
4959.87	25.54av	34.60	5.13	27.31	38.11av	54.00av	-16.04	100	5
7425.57	42.04pk	38.90	3.95	26.52	58.37pk	74.00pk	-15.63	101	171
7432.54	26.72av	38.90	3.95	26.52	47.42av	54.00av	-10.95	101	171
9902.6	42.18pk	38.38	4.12	24.67	60.01pk	74.00pk	-13.99	101	2
9914.5	27.49av	38.38	4.12	24.67	51.33av	54.00av	-8.68	101	2

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

Operator: Jerry Chiou

RBW: 1MHz
Humidity(%): 59
Temperature(C): 22

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
1134.87	45.13pk	25.12	2.19	24.03	48.40pk	54.00av	-5.60	102	103
1511.99	43.25pk	26.90	2.24	23.75	48.64pk	54.00av	-5.36	101	77
1651.85	44.60pk	28.08	2.34	23.75	51.27pk	54.00av	-2.73	101	67
4948.55	39.20pk	34.60	5.13	27.31	51.62pk	54.00av	-2.38	100	5
7425.57	38.63pk	38.90	3.95	26.52	54.97pk	74.00pk	-19.03	101	171
7441.69	26.12av	38.90	3.95	26.52	43.43av	54.00av	-11.54	101	171
9902.6	37.26pk	38.38	4.12	24.67	55.09pk	74.00pk	-18.91	101	2
9911.4	25.11av	38.38	4.12	24.67	44.03av	54.00av	-11.06	101	2

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)

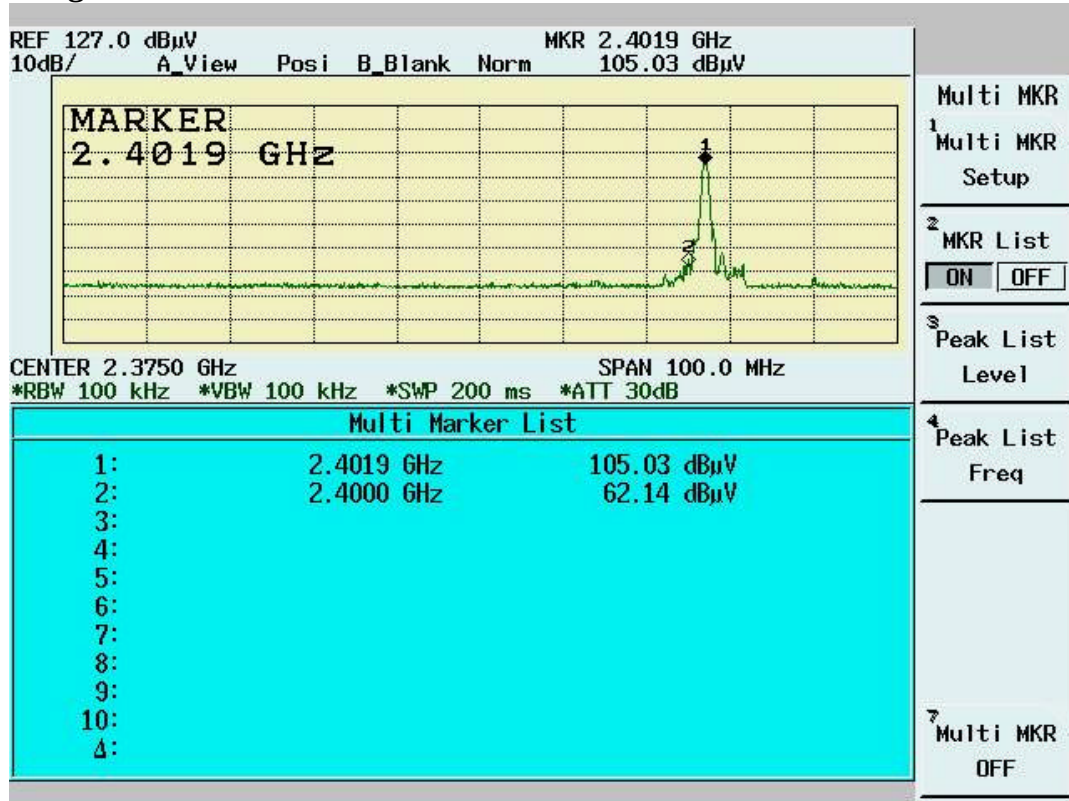
Temperature ():25

Test Engineer:Jerry Chiou

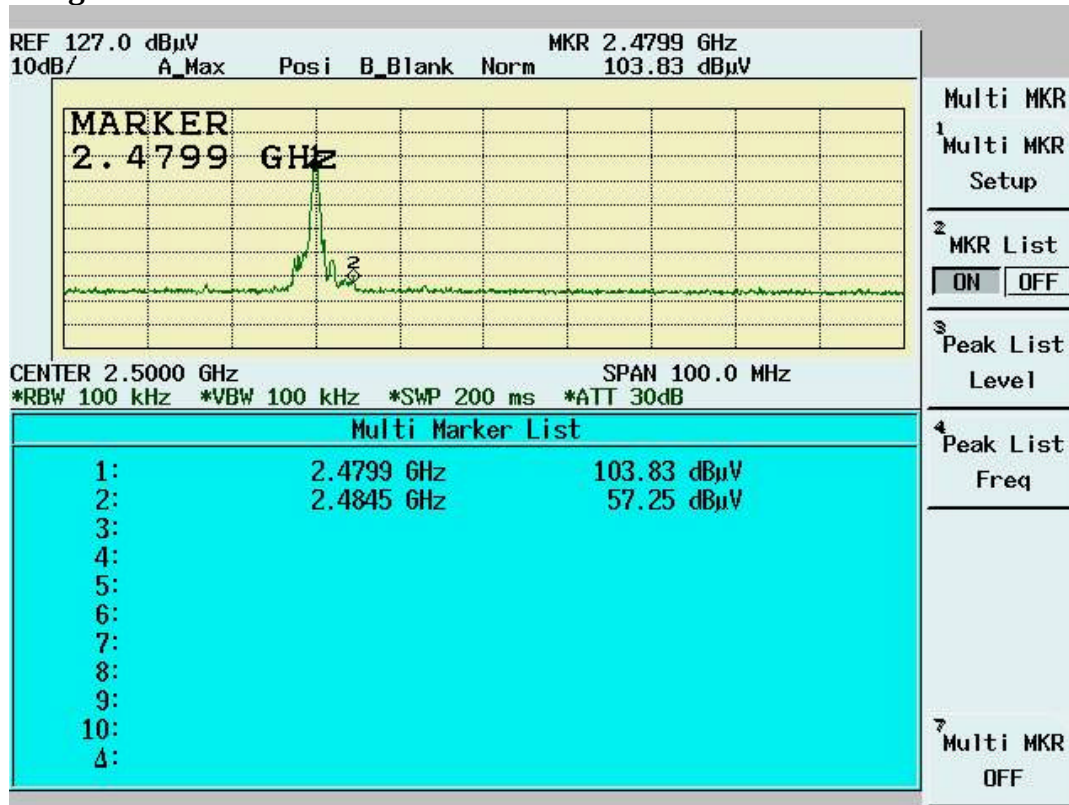
Humidity (%):55

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2401.9	105.0	---	---
Outside band	2400.0	62.1	42.9	Pass
78	2479.9	103.8	---	---
Outside band	2484.5	57.3	46.6	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 (): 22

Data Rate

Humidity (%): 60

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)	2402.50	26.33	35.48	61.81	---	---	10Hz	---
Channel_00 (peak mode)	2402.00	62.51	35.48	97.99	---	---	3MHz	---
Outside band (peak mode)	2400.00	39.36	35.48	74.84	23.15	---	3MHz	Pass
Channel_78 (average mode)	2480.40	24.17	35.51	59.68	---	---	10Hz	---
Channel_78 (peak mode)	2479.90	58.51	35.51	94.02	---	---	3MHz	---
Outside band (peak mode)	2483.50	18.26	35.51	53.77	40.25	---	3MHz	Pass
Channel_00 Restricted band (peak mode)	2389.40	16.18	35.47	51.65	---	74	3MHz	Pass
Restricted band (average mode)	2389.00	5.77	35.47	41.24	---	54	10Hz	Pass
Channel_78 Restricted band (peak mode)	2483.50	18.26	35.51	53.77	---	74	3MHz	Pass
Restricted band (average mode)	2483.50	6.59	35.51	42.10	---	54	10Hz	Pass

Note:

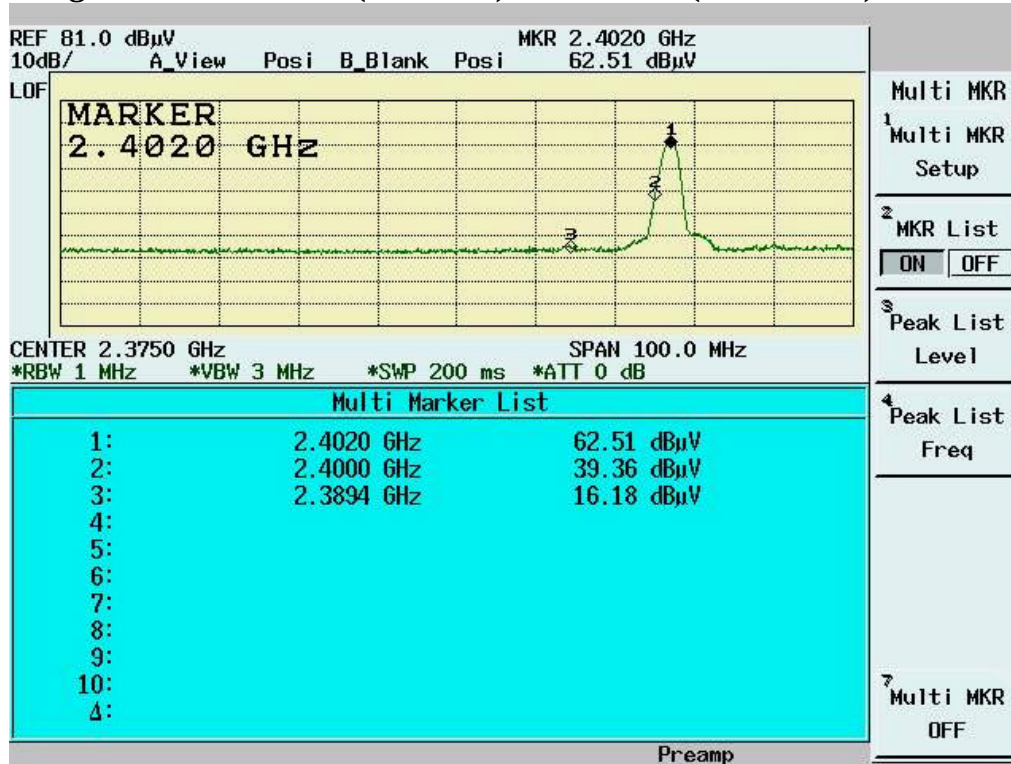
- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level = Spectrum Reading + Correction Factor
- Correction Factor = Antenna Factor + cable loss - amplifier gain
- Both Horizontal and Vertical polarization have been tested and the worst data is listed above.

International Standards Laboratory

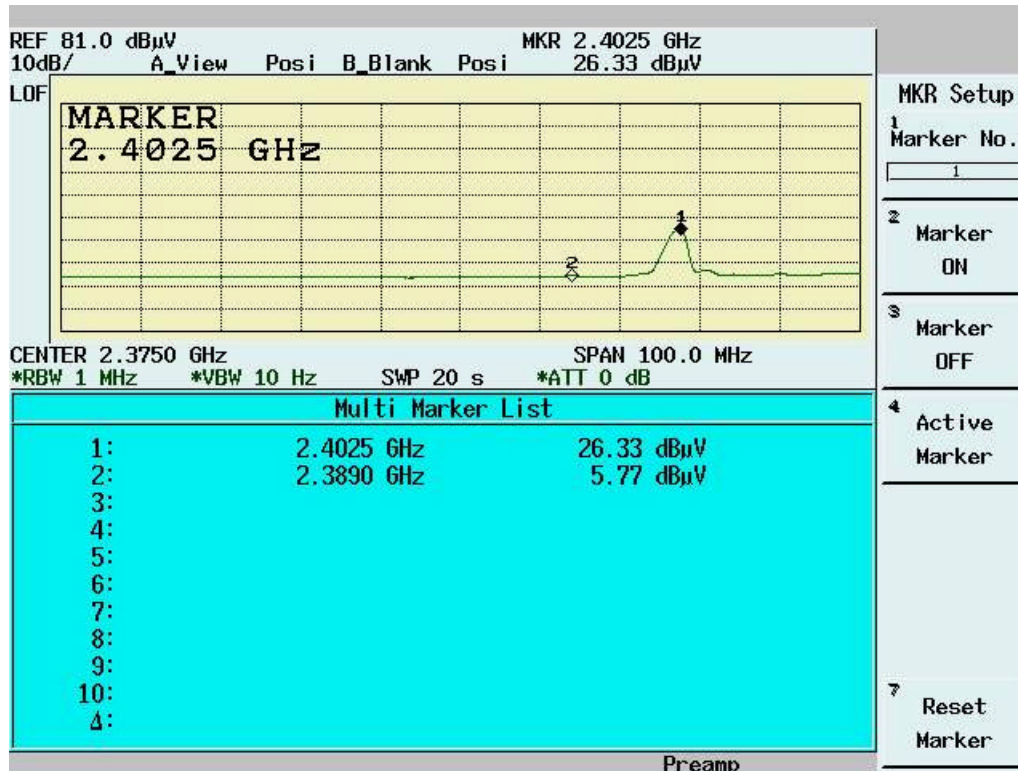
Report Number: 07LR010FC

HC LAB: NVLAP:200234-0; VCCI: R-341, C-354; NEMKO: ELA 113A; BSMI: SL2-IN-E-0037; SL2-R1-E-0037; CNLA: 1178; IC: IC4067
 LT LAB: NVLAP:200234-0; VCCI: R-1435, C-1440; NEMKO: ELA 113B; BSMI: SL2-IN-E-0013; CNLA: 0997; IC: IC4164-1

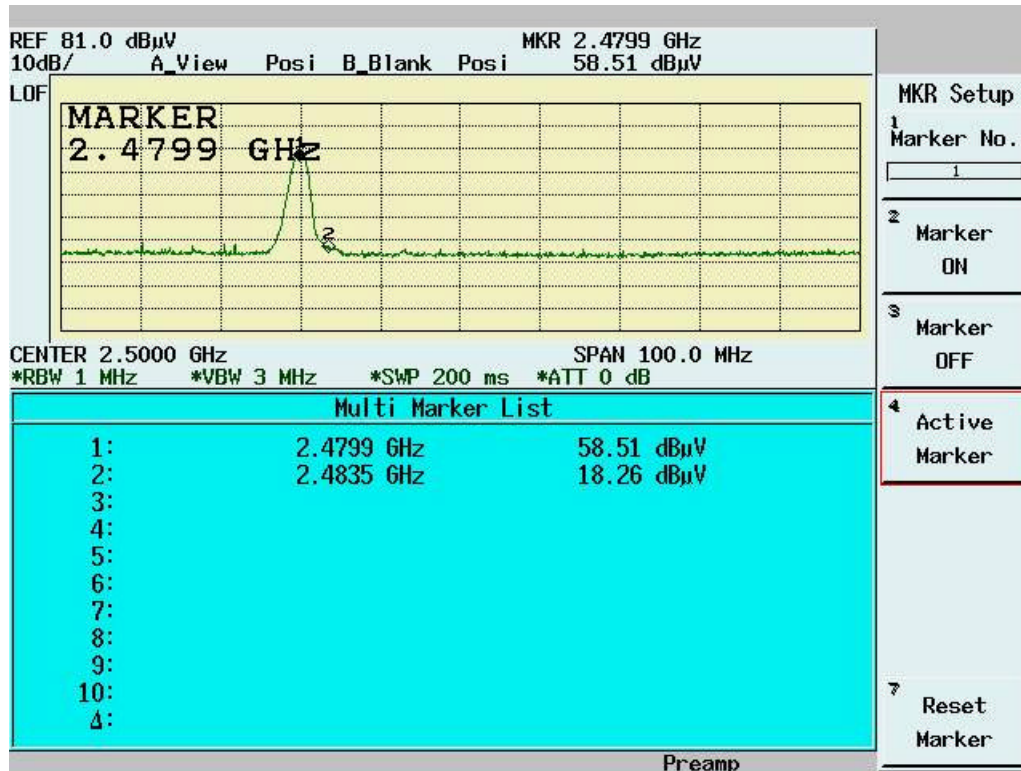
Band Edge Restricted Band (Radiated)-Peak Mode (Channel 00)



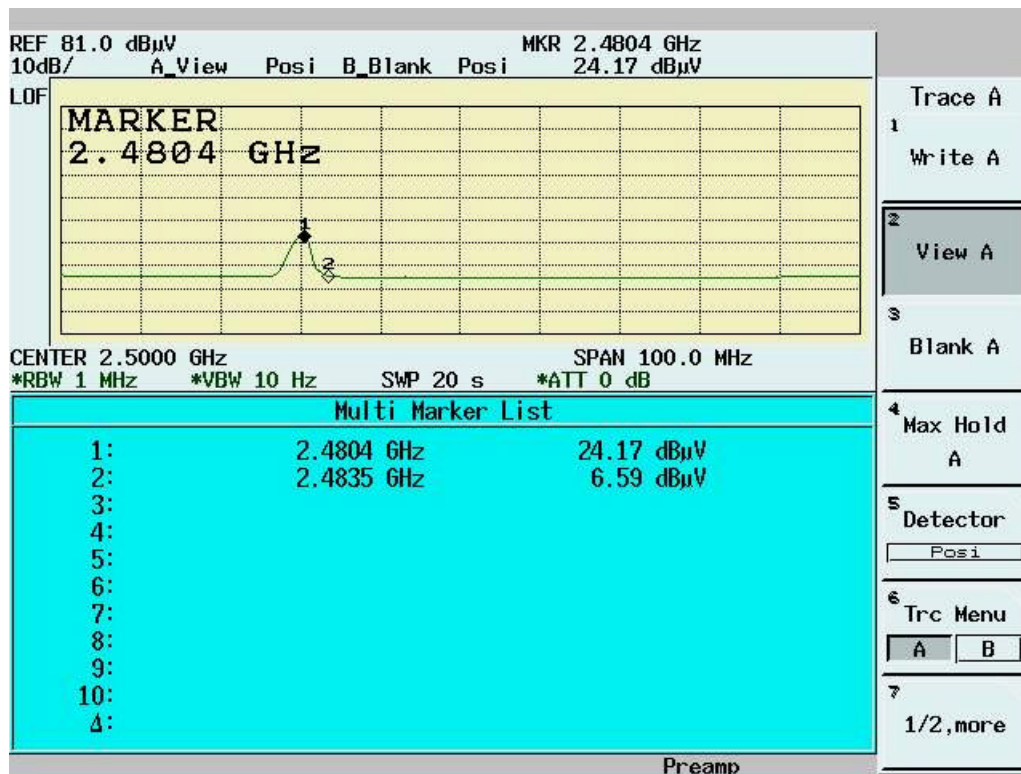
Band Edge Restricted Band (Radiated)-Average Mode (Channel 00)



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 ():25

Test Engineer:Jerry Chiou

Humidity (%):55

Channel	Frequency (MHz)	20dB Bandwidth (KHz)	Limit (KHz)	Pass/Fail
00	2402	892	1000	Pass
39	2441	892	1000	Pass
78	2480	900	1000	Pass

Hopping Channel Separation

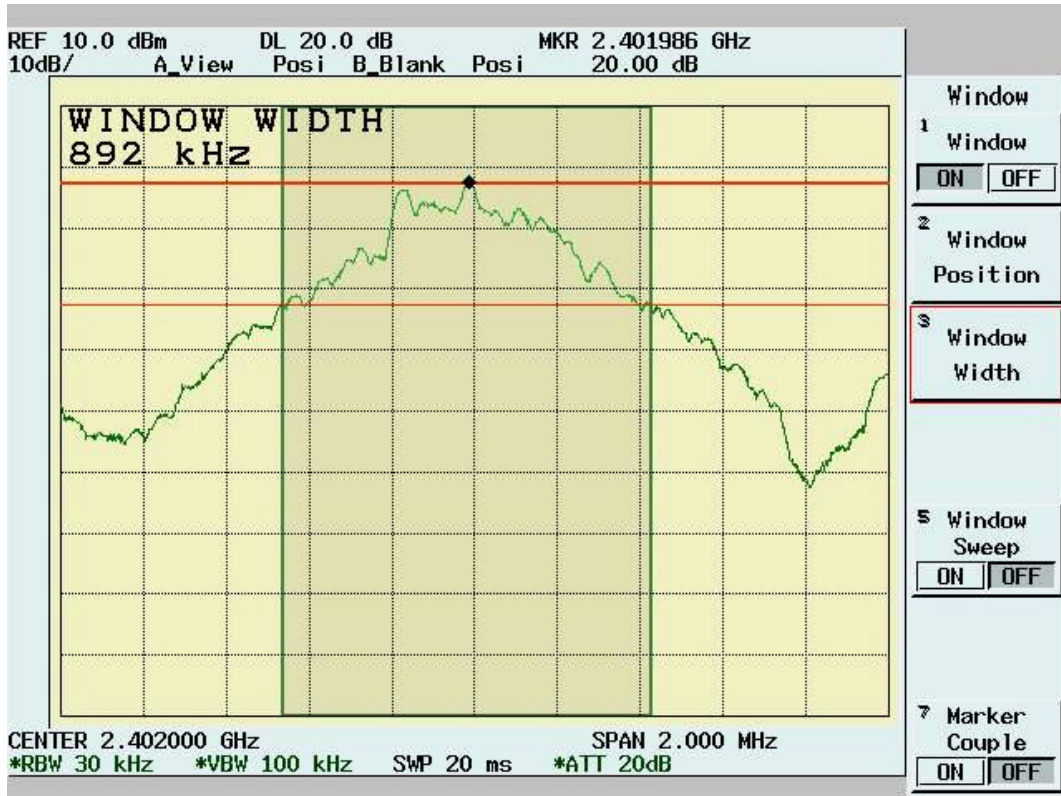
Temperature ():25

Test Engineer:Jerry Chiou

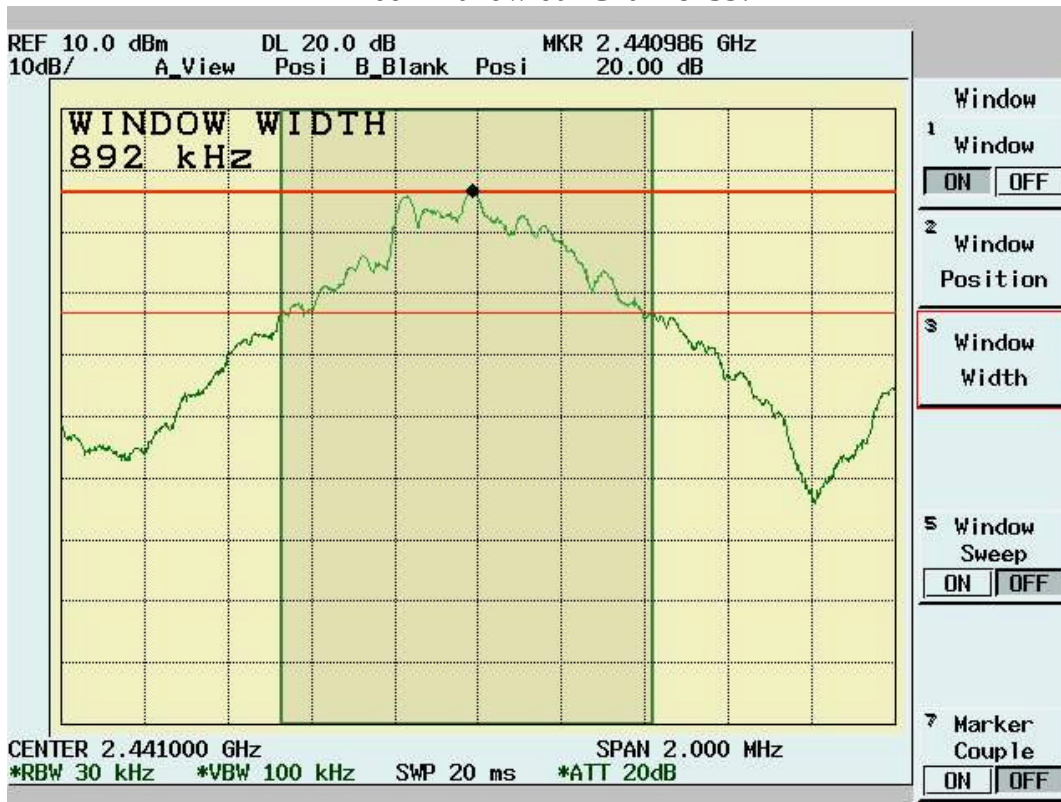
Humidity (%):55

Channel	Frequency (MHz)	Separation (KHz)	Limit (KHz)	Pass/Fail
00	2402	999	892	Pass
39	2441	996	892	Pass
78	2480	996	900	Pass

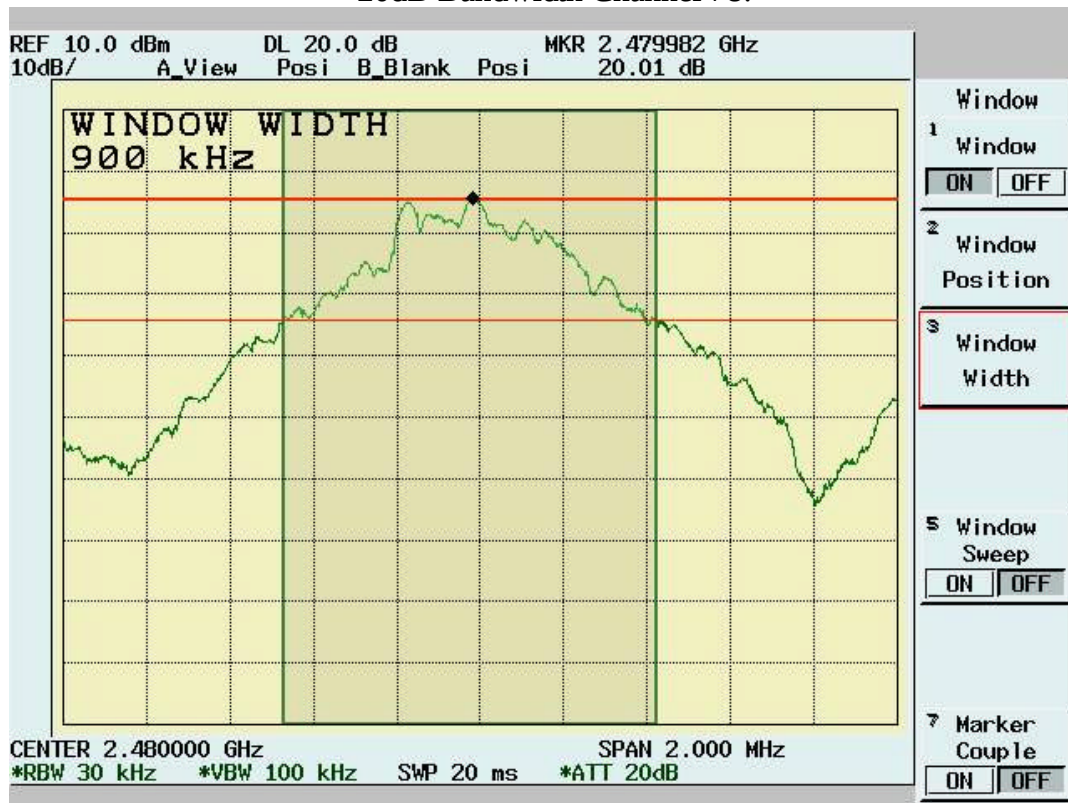
20dB Bandwidth Channel 00:



20dB Bandwidth Channel 39:



20dB Bandwidth Channel 78:



Hopping Channel Separation Channel 00

