Test Report
for
FCC Part 15 Subpart B & C

of

Product Name

MINIBLUE

Model

MB100

(Brand: LIGHTEN DIGITAL)

Applied by:

LIGHTEN DIGITAL TECHNOLOGY CO.,LTD
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Kushan District, Kaohsiung 804
Taiwan, R. O. C.

Test Performed by:

International Standards Laboratory

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LT LAB:NVLAP:200234-0;VCCI: R-1435,C-1440;NEMKO:ELA 113b,113d;BSMI:SL2-IN-E-0013;CNLA:0997
ISL-T10-R29-1

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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:	MINIBLUE
Model:	MB100
Applied by:	LIGHTEN DIGITAL TECHNOLOGY CO.,LTD
Sample received Date:	2005/04/06
Final test Date :	2005/04/12
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:	Mailes Hsieh

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 57 pages, including 1 cover page , 2 contents page, and 54 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:	MINIBLUE
Model No.:	MB100
Brand:	LIGHTEN
Bluetooth Module:	Micro-Star International Co. LTD. (Model: MS-55162)
Frequency Range:	2402 ~ 2480 MHz
Support channel:	79 Channels
Modulation Skill:	GFSK (1Mbps)
Antennas Type:	Multilayer Chip Antenna made by Advanced Ceramic X Corp. Part No.: AT7020-B2R4HAA
Antenna Connected:	The chip antenna is mounted to the PCB of the EUT. The user is not possible to change the antenna .
Antenna peak Gain:	2.0 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

Audio out/Power In Port:	one
Front:	Back Button Play/Forward Button Stop Button Volume - Volume + LED for Charge LED for Power On LED for BlueTooth
Rear:	Record Button BlueTooth Button

EMI Noise Source:
Crystal:16MHz,24MHz

EMI Solution:
1.Add one core on USB Cable near EUT, Vendor: KingCore Type:KCF-50-B13*13*21mm.Clock Generator: U52

EMI Solution:
1. Added one conductive cloth between the center iron and hot sink .
2. 2. Add one gaskets on cardbus .

4. TEST RESULTS

4.1 Powerline Conducted Emissions

4.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

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 shown on the figure 1 of ANSI C63.4-2001.

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)

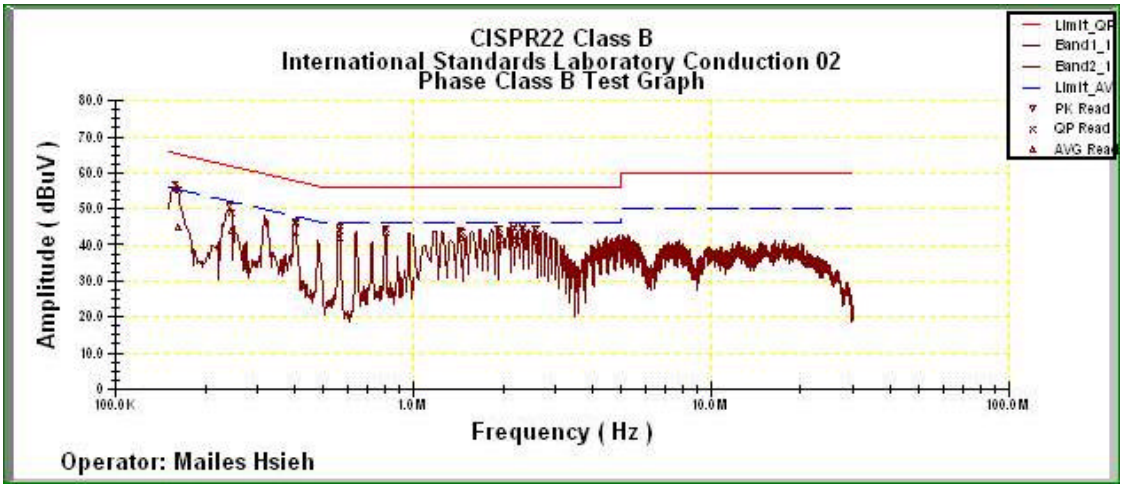
Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 Test Data:

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

Operator:MailesHsieh
Temperature(C):24
Humidity(%):59

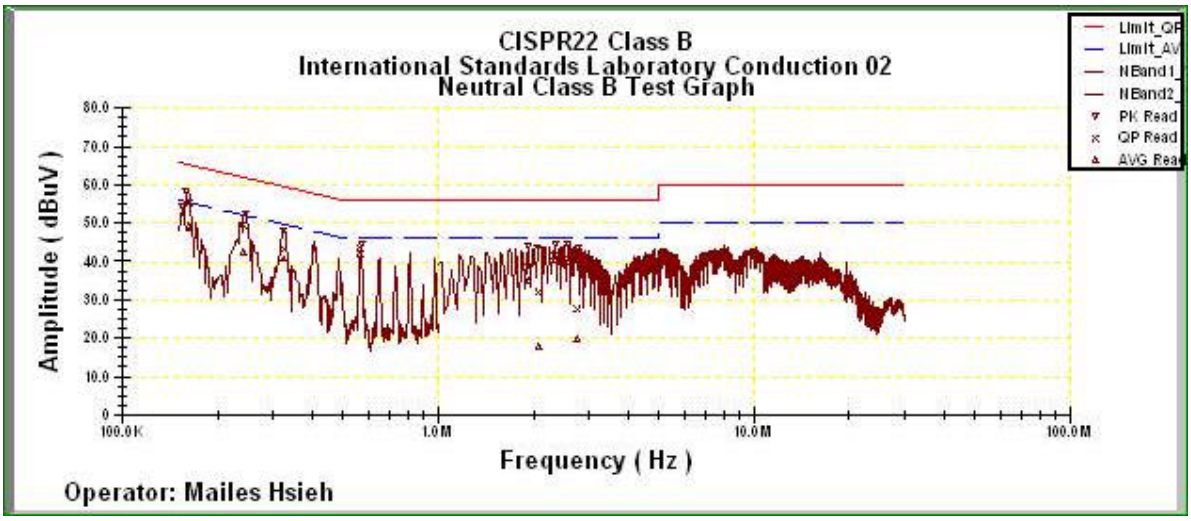
Frequency MHz	LISNLoss (dB)	CableLoss (dB)	QPCorrct. Amp.(dBuV)	QPLimit (dBuV)	QPMargin (dB)	AVECorrct. Amp.(dBuV)	AVELimit (dBuV)	AVEMargin (dB)
0.16174	0.10	0.03	55.33	65.66	-10.34	44.93	55.66	-10.73
0.24408	0.10	0.07	48.87	63.31	-14.44	43.97	53.31	-9.35
0.40263	0.10	0.08	46.12	58.78	-12.67	43.13	48.78	-5.65
0.56445	0.13	0.07	44.11	56.00	-11.89	41.87	46.00	-4.13
0.80563	0.17	0.07	44.55	56.00	-11.45	43.04	46.00	-2.96
1.44925	0.26	0.08	43.59	56.00	-12.41	42.00	46.00	-4.00
1.93401	0.21	0.09	44.53	56.00	-11.47	41.15	46.00	-4.85
2.17576	0.20	0.09	44.78	56.00	-11.22	41.33	46.00	-4.67
2.33749	0.20	0.10	44.87	56.00	-11.13	42.06	46.00	-3.94
2.57946	0.20	0.10	44.16	56.00	-11.84	40.83	46.00	-5.17



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

Operator:MailesHsieh
Temperature(C):24
Humidity(%):59

Frequency MHz	LISNLoss (dB)	CableLoss (dB)	QPCorrct. Amp.(dBuV)	QPLimit (dBuV)	QPMargin (dB)	AVECorrct. Amp.(dBuV)	AVELimit (dBuV)	AVEMargin (dB)
0.16216	0.10	0.03	55.29	65.65	-10.37	49.28	55.65	-6.37
0.16277	0.10	0.03	55.39	65.64	-10.25	48.44	55.64	-7.19
0.24053	0.10	0.07	49.43	63.41	-13.99	42.28	53.41	-11.13
0.3244	0.10	0.10	43.41	61.02	-17.61	40.72	51.02	-10.30
0.56303	0.13	0.07	43.60	56.00	-12.40	42.00	46.00	-4.00
1.92966	0.20	0.09	38.41	56.00	-17.59	34.95	46.00	-11.05
2.07969	0.20	0.09	31.89	56.00	-24.11	17.74	46.00	-28.26
2.33421	0.20	0.10	41.56	56.00	-14.44	40.31	46.00	-5.69
2.57361	0.20	0.10	40.90	56.00	-15.10	40.03	46.00	-5.97
2.74182	0.20	0.11	27.50	56.00	-28.50	19.79	46.00	-26.21



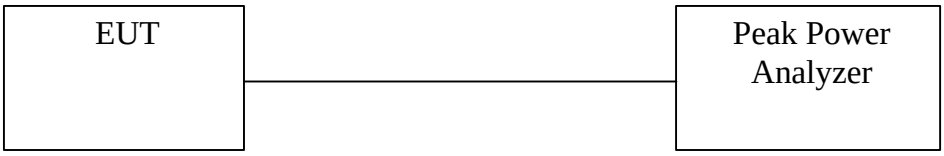
* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 00, 39, 78 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

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

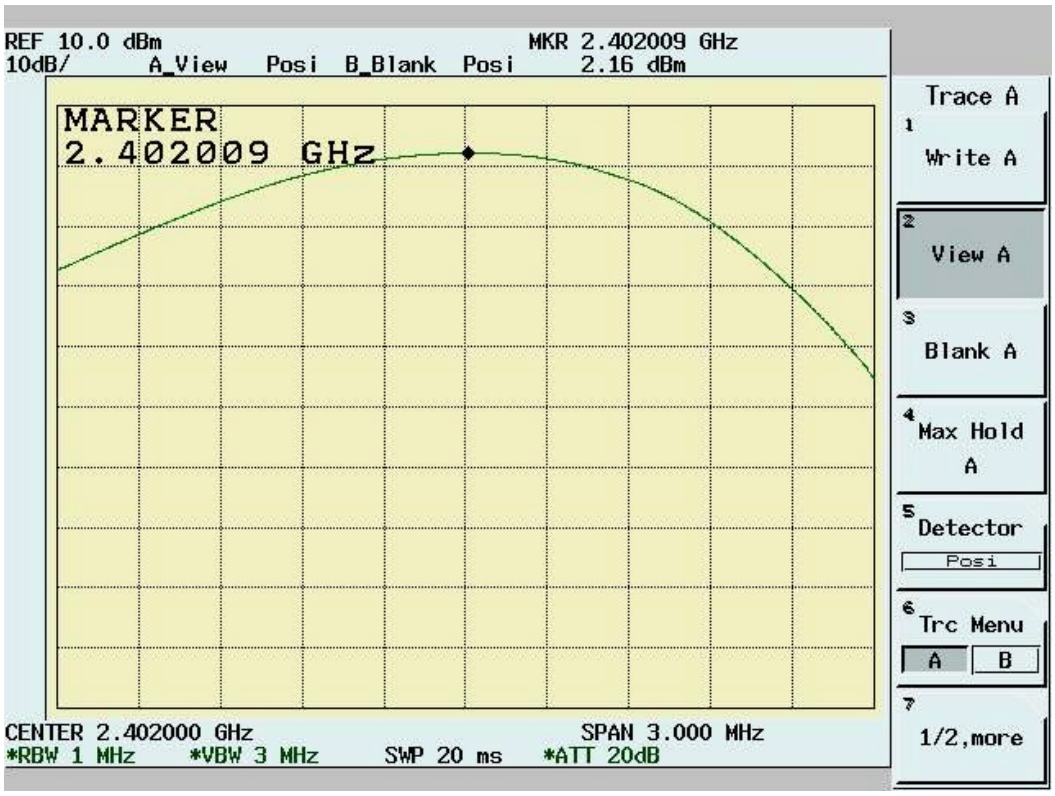
Temp. (deg. C): 19

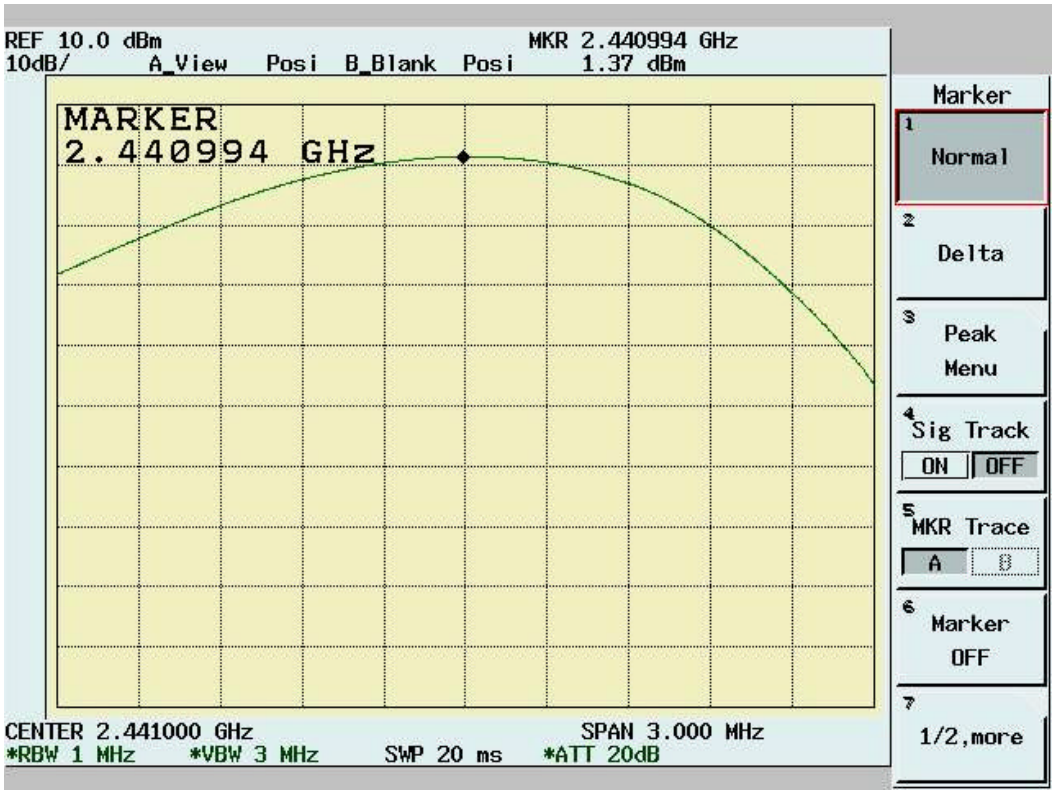
Test Engr: Mailes Hsieh

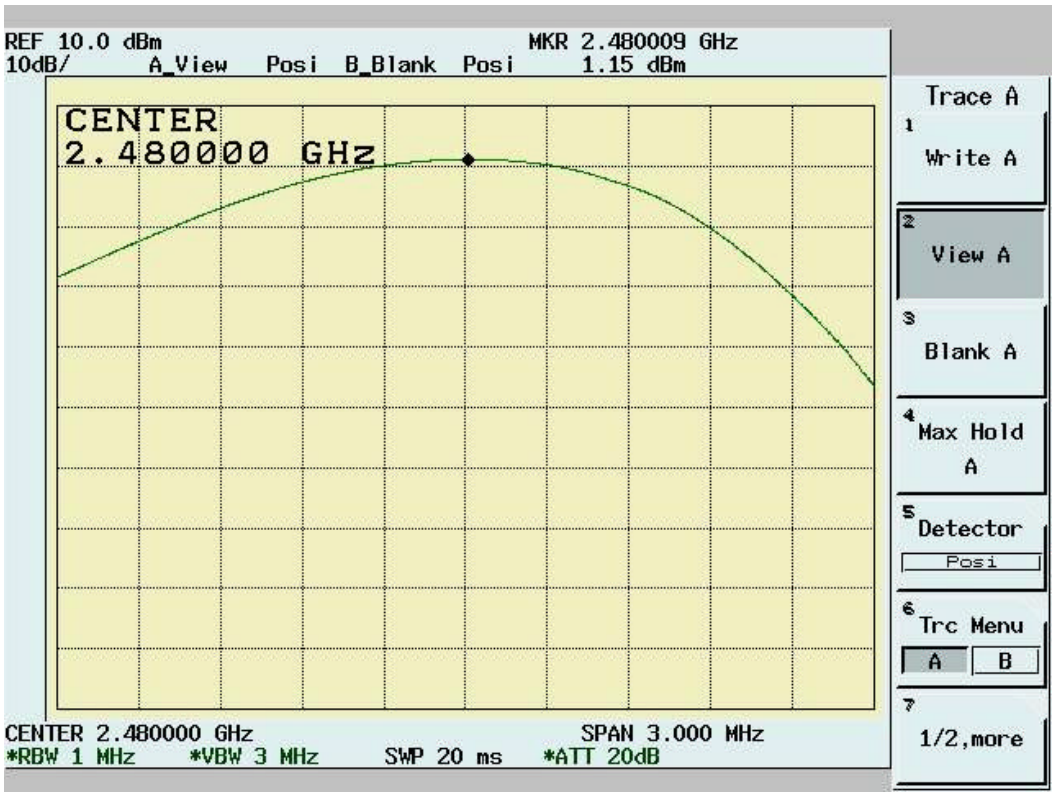
Humidity (%): 43

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
00	2402	2.16	0.5	1.85	2.66	30	Pass
39	2441	1.37	0.5	1.54	1.87	30	Pass
78	2480	1.15	0.5	1.46	1.65	30	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.


REF 10.0 dBm
10dB/ A_View Posi B_Blank Posi
MKR 2.402009 GHz
2.16 dBm
MARKER
2.402009 GHz
CENTER 2.402000 GHz
SPAN 3.000 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ms *ATT 20dB
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


REF 10.0 dBm
10dB/ A_View Posi B_Blank Posi
MKR 2.440994 GHz
1.37 dBm
MARKER
2.440994 GHz
CENTER 2.441000 GHz
SPAN 3.000 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ms *ATT 20dB
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more


REF 10.0 dBm
10dB/ A_View Posi B_Blank Posi
MKR 2.480009 GHz
1.15 dBm
CENTER
2.480000 GHz
CENTER 2.480000 GHz
SPAN 3.000 MHz
*RBW 1 MHz *VBW 3 MHz SWP 20 ms *ATT 20dB
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

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 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

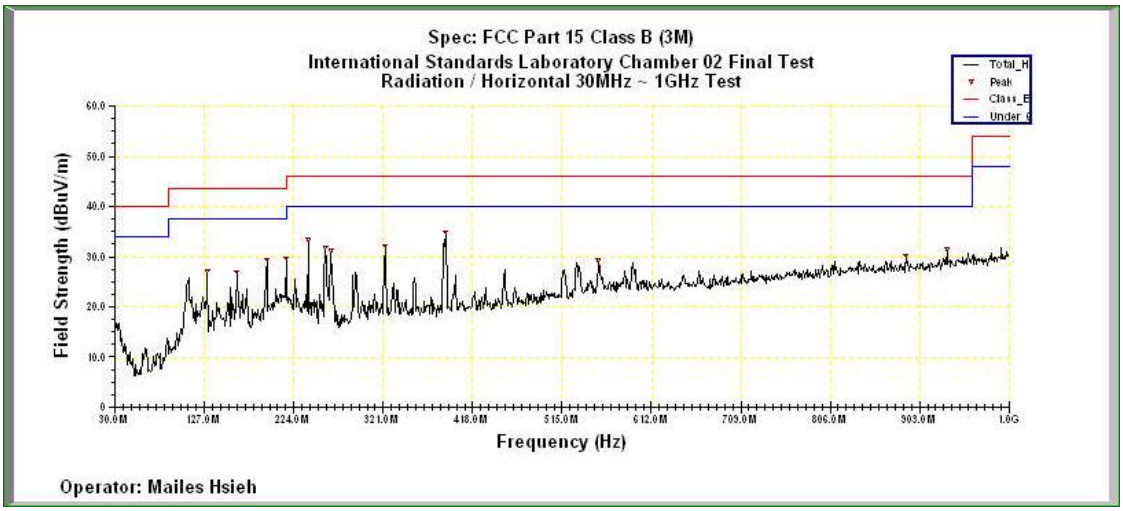
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

4.3.4 Test Data (30MHz – 1GHz):

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

Operator:MailesHsieh
Temperature(C):21
Humidity(%):51

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)
194.90	18.06	8.70	2.66	0.00	29.42	43.50	-14.08	303.00	122.00
215.27	18.51	8.35	2.82	0.00	29.67	43.50	-13.83	202.00	8.00
239.52	20.12	10.14	3.03	0.00	33.29	46.00	-12.71	202.00	336.00
257.95	16.07	12.63	3.17	0.00	31.88	46.00	-14.12	202.00	8.00
263.77	15.07	12.90	3.20	0.00	31.17	46.00	-14.83	202.00	25.00
322.94	14.37	13.92	3.86	0.00	32.15	46.00	-13.85	102.00	352.00
388.90	14.91	15.54	4.36	0.00	34.82	46.00	-11.18	202.00	107.00
553.80	4.94	18.81	5.56	0.00	29.30	46.00	-16.70	102.00	188.00
888.45	1.73	20.45	8.08	0.00	30.27	46.00	-15.73	202.00	303.00
933.07	2.27	20.86	8.31	0.00	31.45	46.00	-14.55	303.00	254.00



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

Operator:MailesHsieh
Temperature(C):21
Humidity(%):51

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)
86.26	14.92	7.59	1.81	0.00	24.32	40.00	-15.68	102.00	41.00
129.91	16.16	11.40	2.16	0.00	29.72	43.50	-13.78	153.00	186.00
239.52	17.72	10.14	3.03	0.00	30.90	46.00	-15.10	202.00	336.00
263.77	14.18	12.90	3.20	0.00	30.28	46.00	-15.72	202.00	25.00
323.91	16.77	13.93	3.87	0.00	34.58	46.00	-11.42	102.00	352.00
354.95	12.42	14.46	4.14	0.00	31.02	46.00	-14.98	153.00	348.00
386.96	15.13	15.48	4.35	0.00	34.97	46.00	-11.03	153.00	137.00
453.89	12.15	16.39	4.89	0.00	33.43	46.00	-12.57	102.00	335.00
516.94	7.37	17.94	5.32	0.00	30.64	46.00	-15.36	102.00	302.00
529.55	8.33	18.27	5.37	0.00	31.97	46.00	-14.03	102.00	123.00

NOTE:

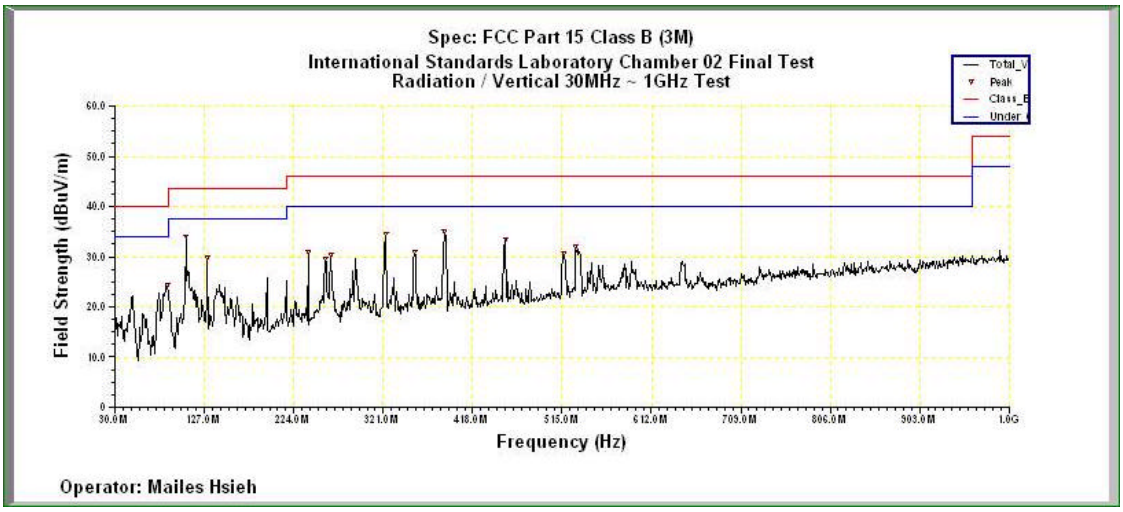
✍✍ During the Pre-test, the EUT has been tested for Channel 00, 39, 78 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

✍✍ 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

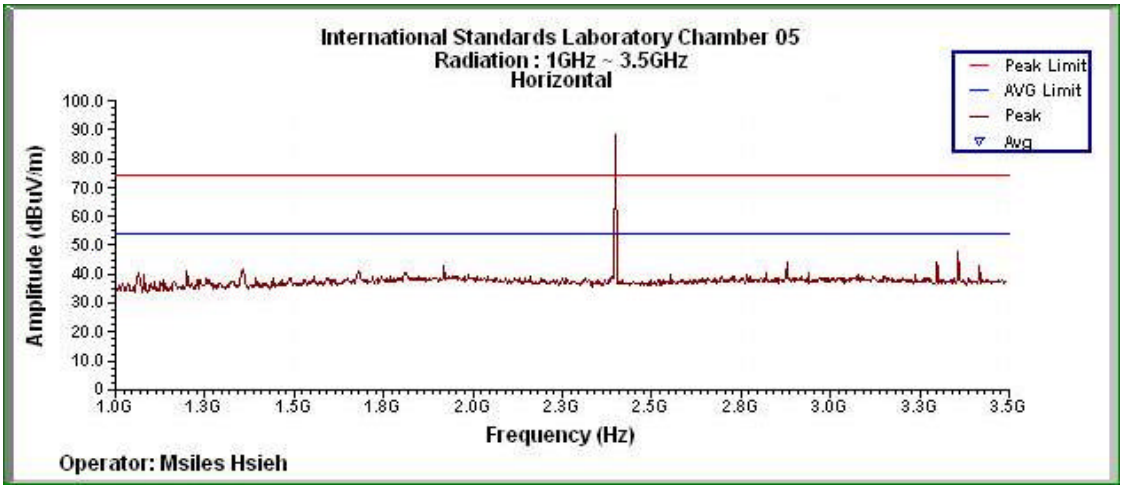


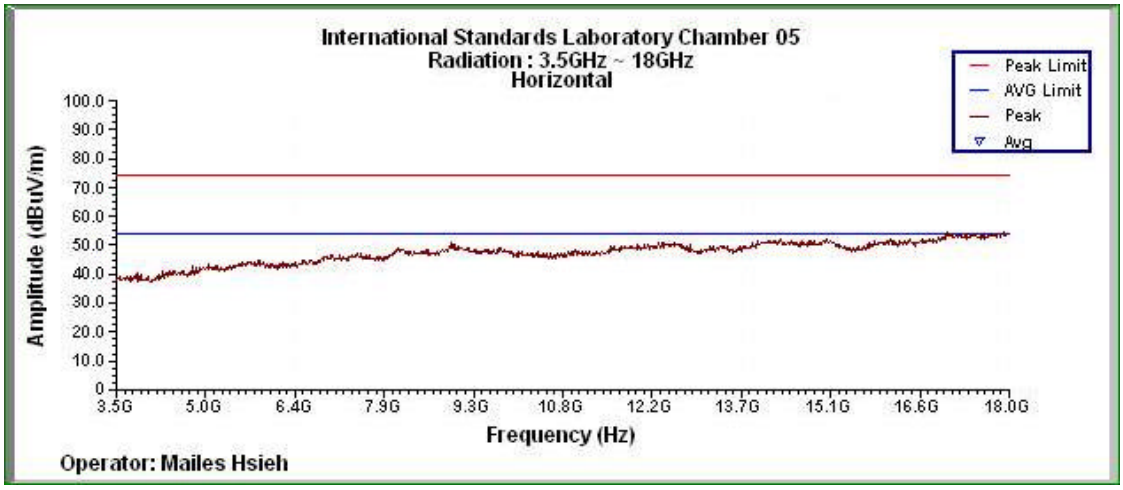
4.3.5 Test Data (1GHz – 25 GHz) .

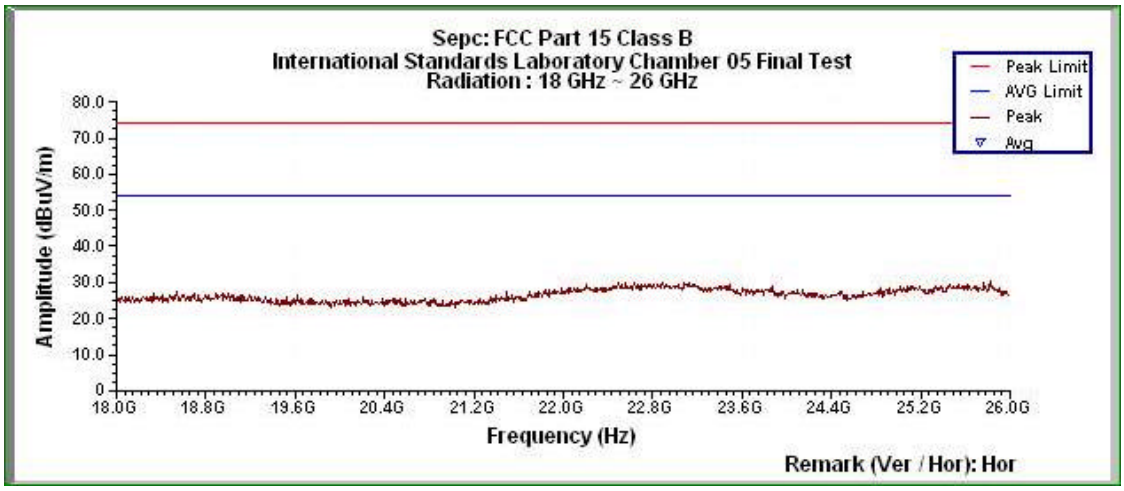
1GHz~ 25 GHz (Horizontal), Channel 00: 2402 MHz

Operator:MailesHsieh RBW:1MHz
Humidity(%):37
Temperature(C):25

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)
1919.08	45.04pk	30.32	2.54	35.02	42.88pk	54.00av	-11.12	100	49
2878.12	46.26pk	31.05	1.43	34.86	43.88pk	54.00av	-10.12	103	319
3357.64	50.53pk	31.39	1.64	35.53	48.02pk	54.00av	-5.98	103	265
7206.00	--	--	--	--	--	54.00av	--	--	--
9608.00	--	--	--	--	--	54.00av	--	--	--
12010.0	--	--	--	--	--	54.00av	--	--	--
14412.0	--	--	--	--	--	54.00av	--	--	--
16814.0	--	--	--	--	--	54.00av	--	--	--
19216.0	--	--	--	--	--	54.00av	--	--	--
21618.0	--	--	--	--	--	54.00av	--	--	--
24020.0	--	--	--	--	--	54.00av	--	--	--




International Standards Laboratory Chamber 05
Radiation : 3.5GHz ~ 18GHz
Horizontal
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh


Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Hor

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

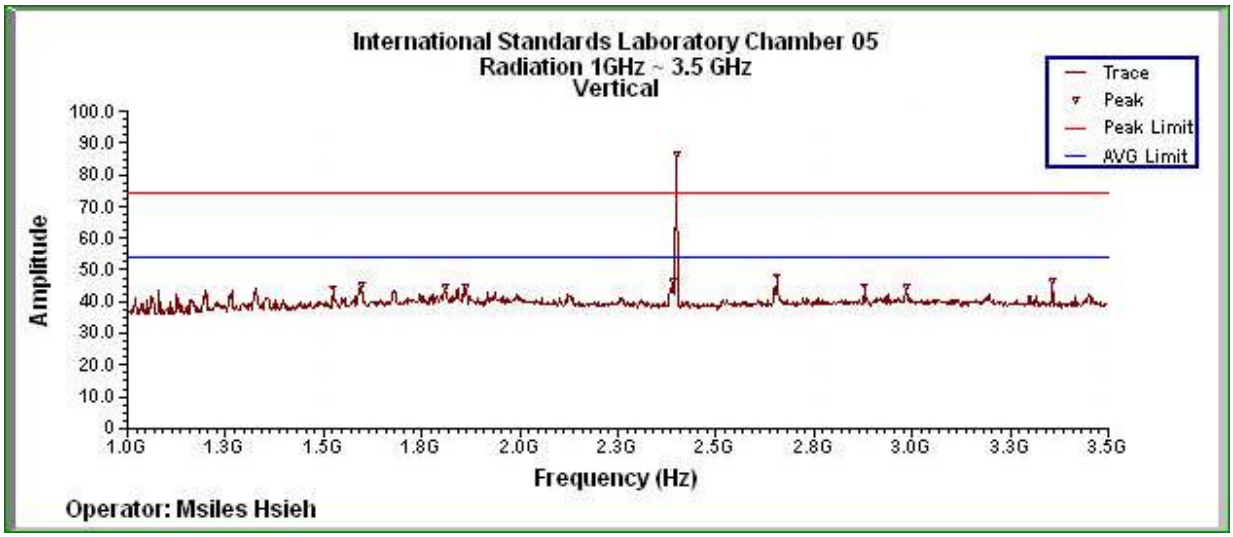
Operator:MailesHsieh RBW:1MHz
Humidity(%):37
Temperature(C):25

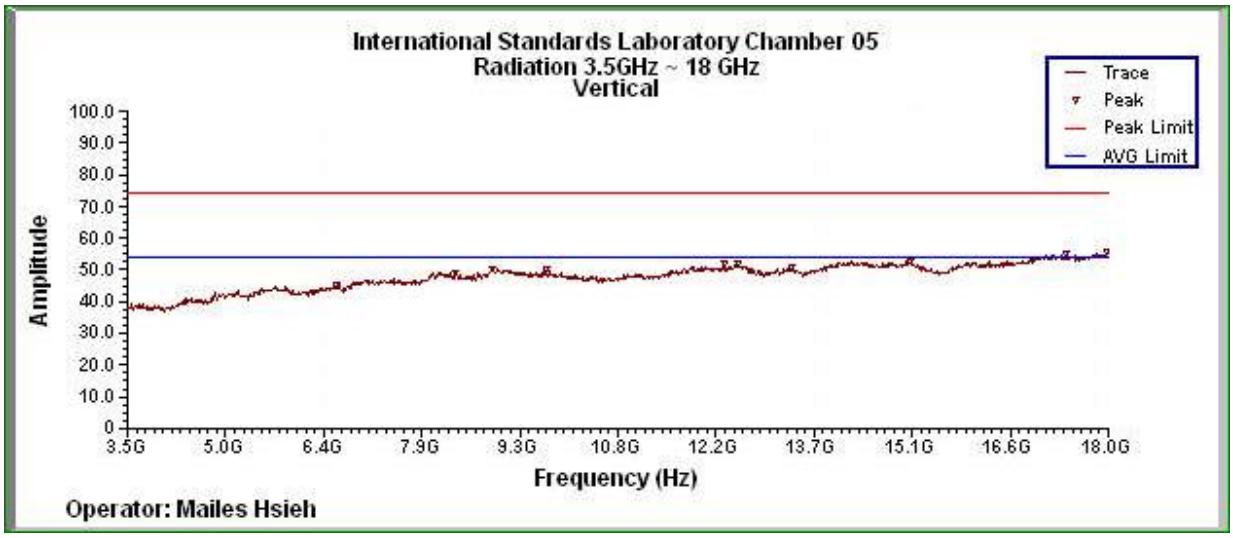
Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
1596.90	49.62pk	27.61	2.30	34.39	45.14pk	54.00av	-8.86	101	71
2391.11	49.24pk	30.92	1.42	35.20	46.38pk	54.00av	-7.62	101	166
3357.64	48.81pk	31.39	1.64	35.53	46.30pk	54.00av	-7.70	103	265
7206.00	--	--	--	--	--	54.00av	--	--	--
9608.00	--	--	--	--	--	54.00av	--	--	--
12010.0	--	--	--	--	--	54.00av	--	--	--
14412.0	--	--	--	--	--	54.00av	--	--	--
16814.0	--	--	--	--	--	54.00av	--	--	--
19216.0	--	--	--	--	--	54.00av	--	--	--
21618.0	--	--	--	--	--	54.00av	--	--	--
24020.0	--	--	--	--	--	54.00av	--	--	--

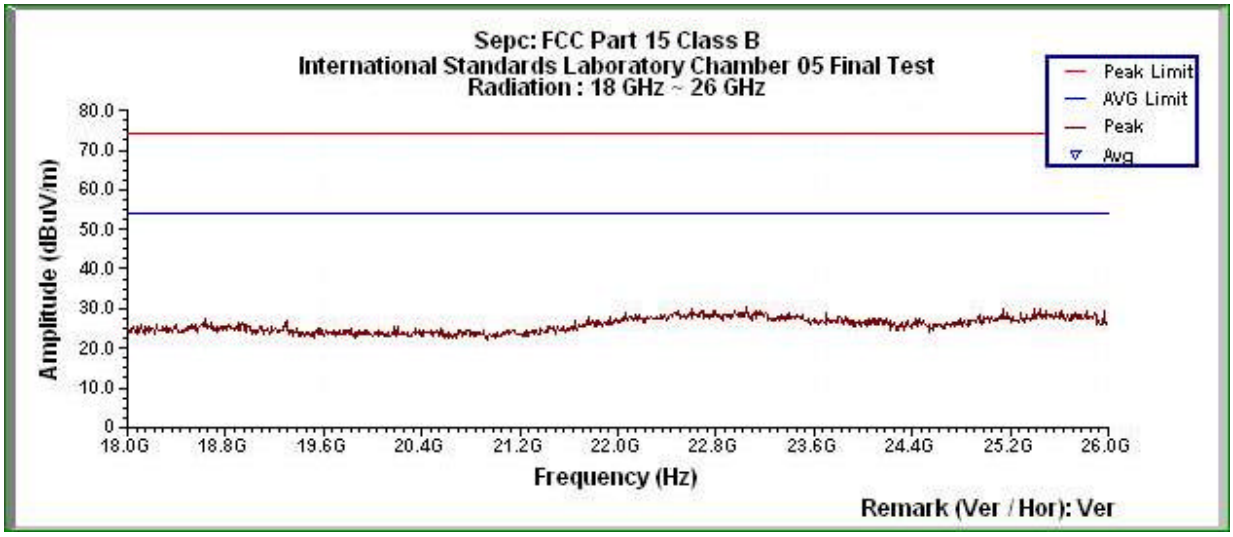
Note:

- According to ANSI C63.4-2001 8.3.1.2 Notes(1):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.




International Standards Laboratory Chamber 05
Radiation 3.5GHz ~ 18 GHz
Vertical
Trace
Peak
Peak Limit
AVG Limit
Amplitude
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh

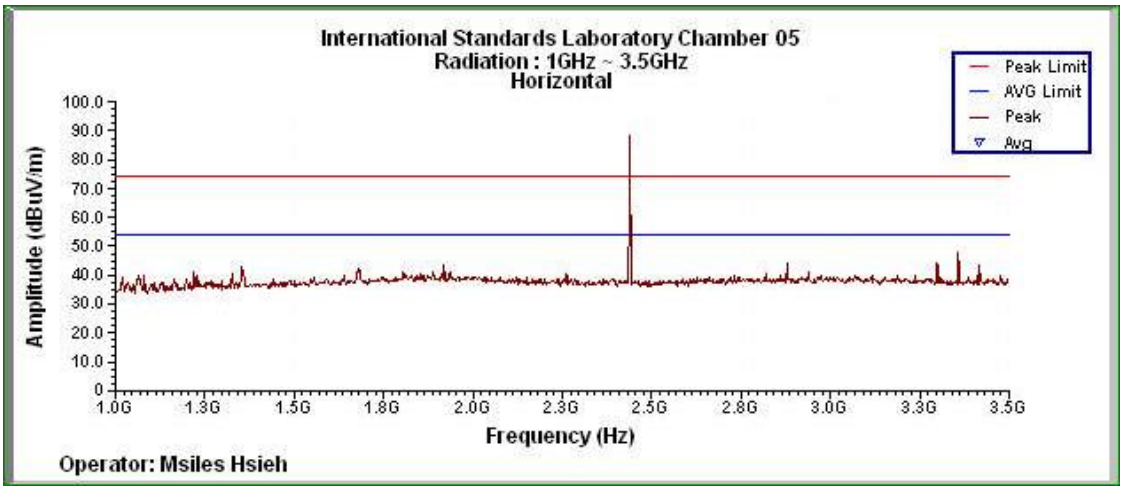

Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Ver

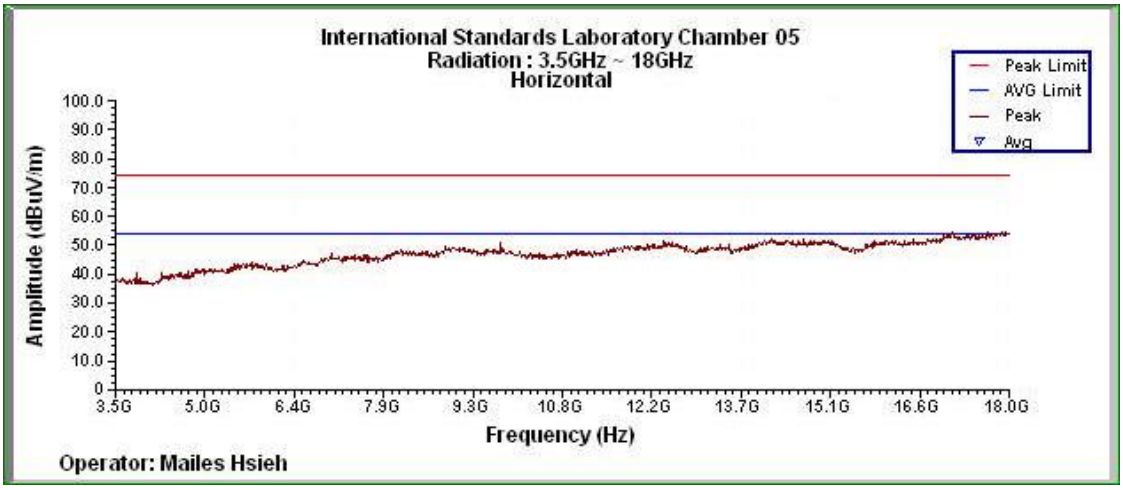
1GHz~ 25 GHz (Horizontal) , Channel 39 : 2441 MHz

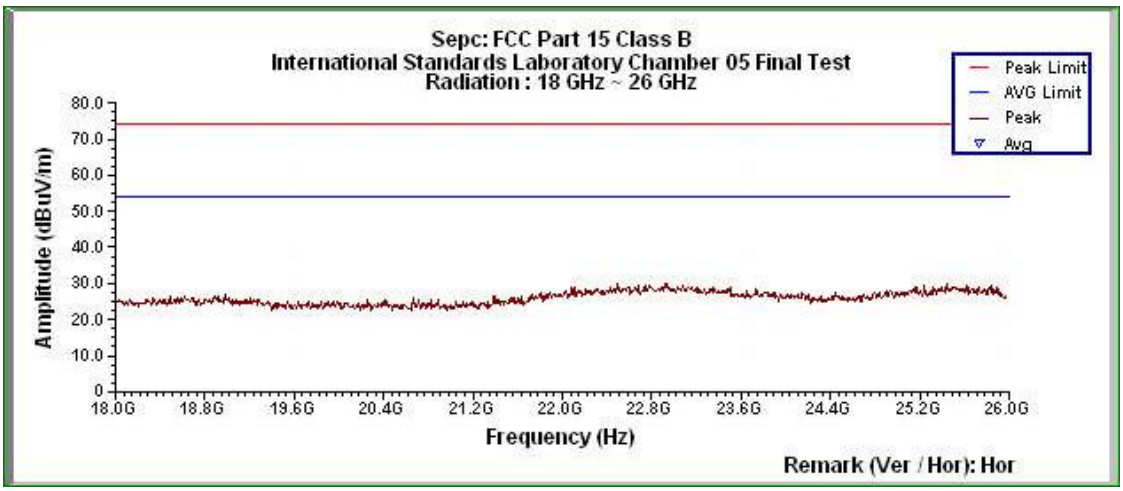
Operator:MailesHsieh

RBW:1MHz
Humidity(%):37
Temperature(C):25

Frequency MHz	RxAmp. (dBuV)	AntFact (dB/m)	CableLoss (dB)	PreAmpGain (dB)	Corrct.Emi. (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant.Pos. (cm)	TablePos. (deg)
1354.65	48.68pk	26.13	2.21	34.12	42.90pk	54.00av	-11.10	101	88
2878.12	46.69pk	31.05	1.43	34.86	44.31pk	54.00av	-9.69	103	319
3357.64	50.40pk	31.39	1.64	35.53	47.89pk	54.00av	-6.11	103	265
7323.00	--	--	--	--	--	54.00av	--	--	--
9760.74	41.66pk	40.33	3.30	34.37	50.93pk	54.00av	-3.07	101	5
12205.0	--	--	--	--	--	54.00av	--	--	--
14646.0	--	--	--	--	--	54.00av	--	--	--
17087.0	--	--	--	--	--	54.00av	--	--	--
19528.0	--	--	--	--	--	54.00av	--	--	--
21969.0	--	--	--	--	--	54.00av	--	--	--
24410.0	--	--	--	--	--	54.00av	--	--	--




International Standards Laboratory Chamber 05
Radiation : 3.5GHz ~ 18GHz
Horizontal
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh


Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Hor

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

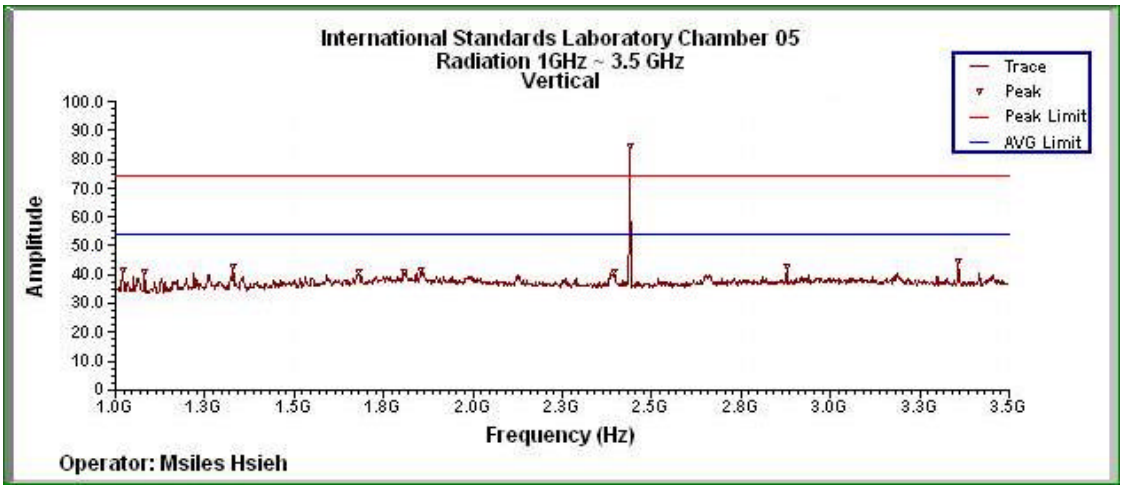
Operator:MailesHsieh RBW:1MHz
Humidity(%):37
Temperature(C):25

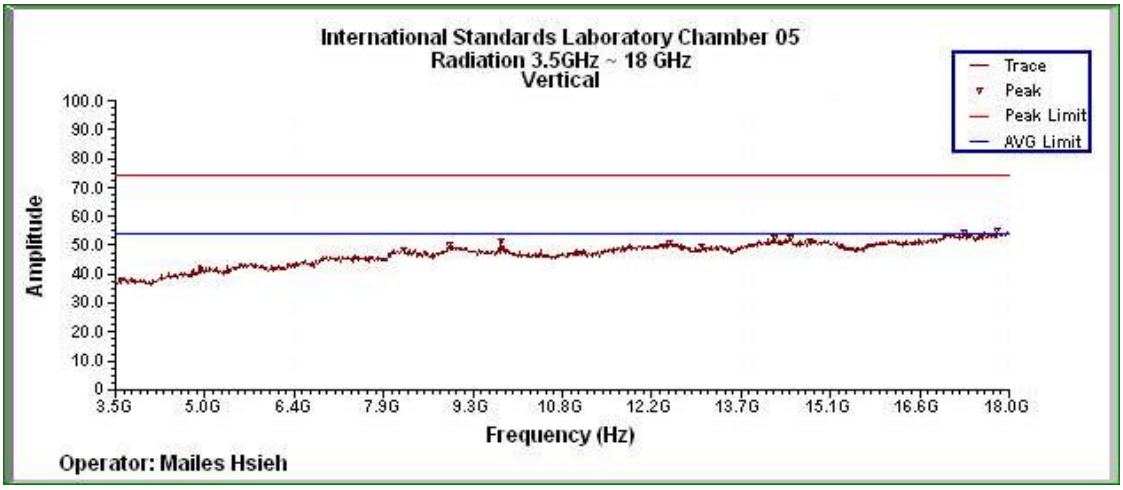
Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
1329.67	48.66pk	26.02	2.21	34.11	42.77pk	54.00av	-11.23	101	89
1854.15	44.22pk	29.77	2.49	34.89	41.59pk	54.00av	-12.41	100	53
3357.64	47.13pk	31.39	1.64	35.53	44.62pk	54.00av	-9.38	103	265
7323.00	--	--	--	--	--	54.00av	--	--	--
9760.74	42.34pk	40.33	3.30	34.37	51.61pk	54.00av	-2.39	101	5
12205.0	--	--	--	--	--	54.00av	--	--	--
14646.0	--	--	--	--	--	54.00av	--	--	--
17087.0	--	--	--	--	--	54.00av	--	--	--
19528.0	--	--	--	--	--	54.00av	--	--	--
21969.0	--	--	--	--	--	54.00av	--	--	--
24410.0	--	--	--	--	--	54.00av	--	--	--

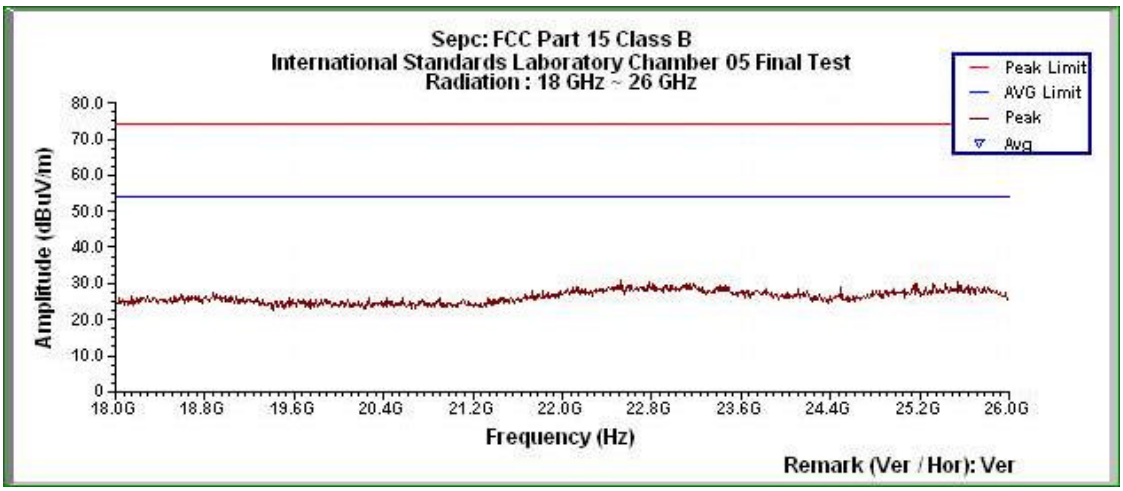
Note:

- According to ANSI C63.4-2001 8.3.1.2 Notes(1):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.



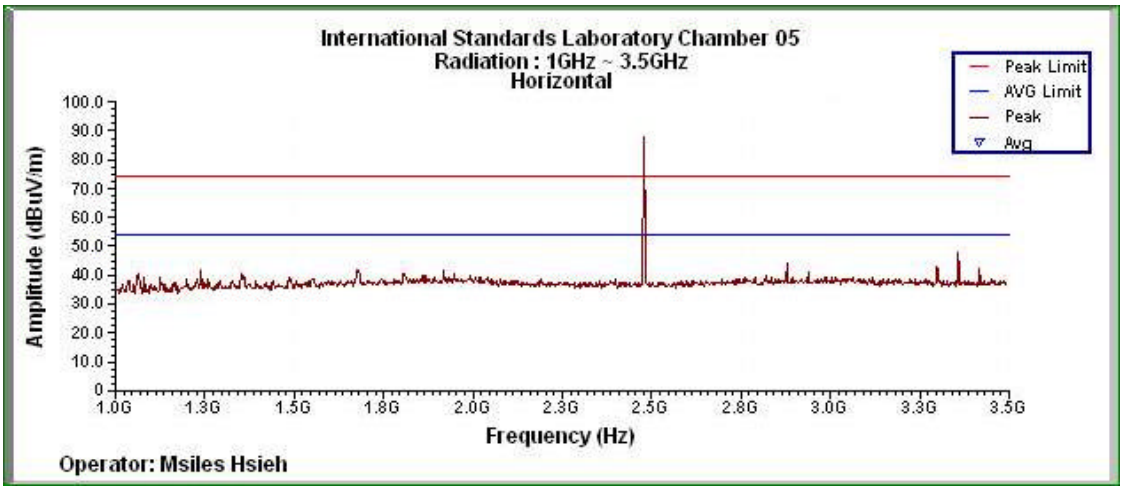

International Standards Laboratory Chamber 05
Radiation 3.5GHz ~ 18 GHz
Vertical
Trace
Peak
Peak Limit
AVG Limit
Amplitude
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh

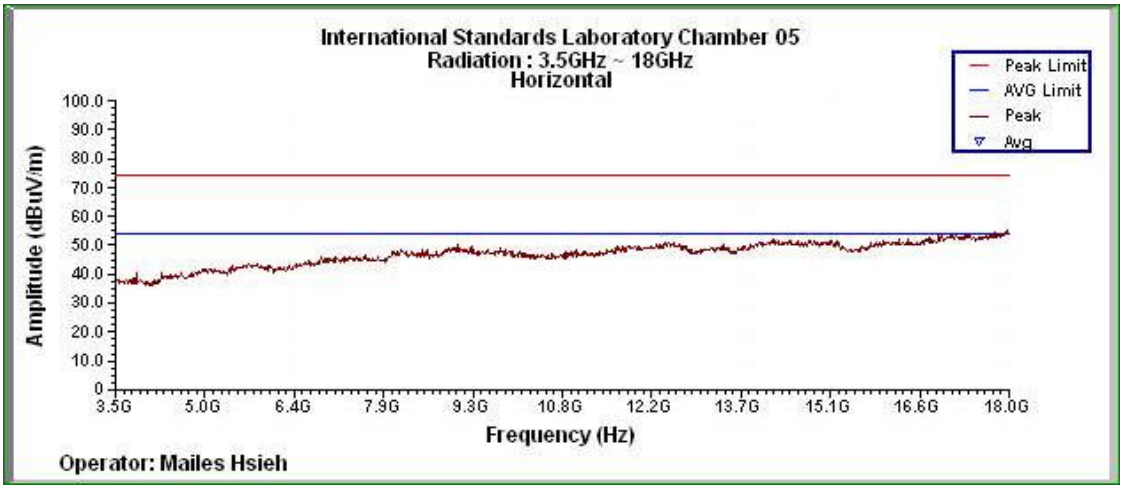

Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Ver

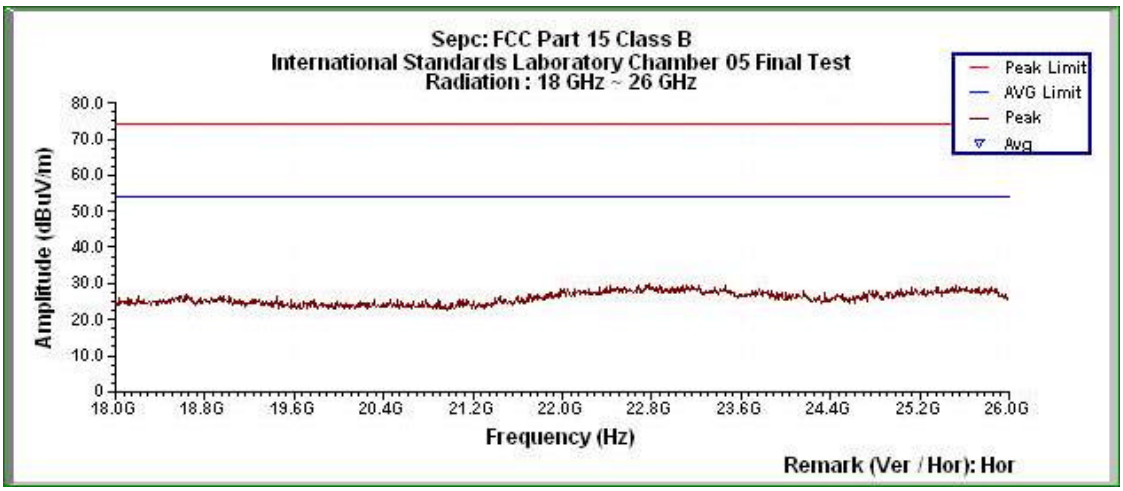
1GHz~ 25 GHz (Horizontal), Channel 78: 2480 MHz

Operator:MailesHsieh RBW:1MHz
Humidity(%):37
Temperature(C):25

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
1676.82	45.84pk	28.29	2.36	34.55	41.94pk	54.00av	-12.06	101	65
3297.70	45.49pk	31.34	1.60	35.40	43.04pk	54.00av	-10.96	103	280
3357.64	50.29pk	31.39	1.64	35.53	47.78pk	54.00av	-6.22	103	265
4960.00	--	--	--	--	--	54.00av	--	--	--
7440.00	--	--	--	--	--	54.00av	--	--	--
9920.00	--	--	--	--	--	54.00av	--	--	--
12400.0	--	--	--	--	--	54.00av	--	--	--
14880.0	--	--	--	--	--	54.00av	--	--	--
17360.0	--	--	--	--	--	54.00av	--	--	--
19840.0	--	--	--	--	--	54.00av	--	--	--
22320.0	--	--	--	--	--	54.00av	--	--	--
24800.0	--	--	--	--	--	54.00av	--	--	--




International Standards Laboratory Chamber 05
Radiation : 3.5GHz ~ 18GHz
Horizontal
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh


Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Hor

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

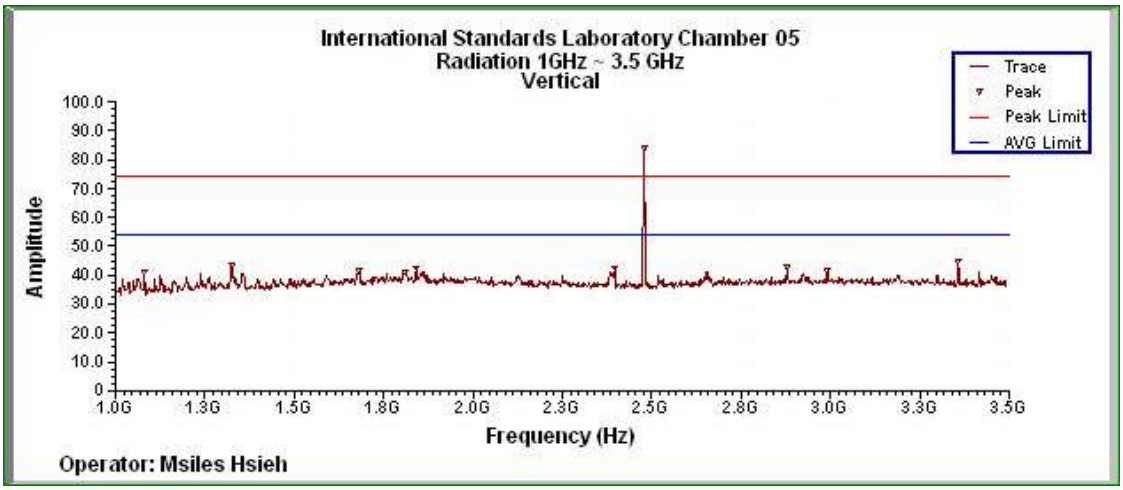
Operator:MailesHsieh RBW:1MHz
Humidity(%):37
Temperature(C):25

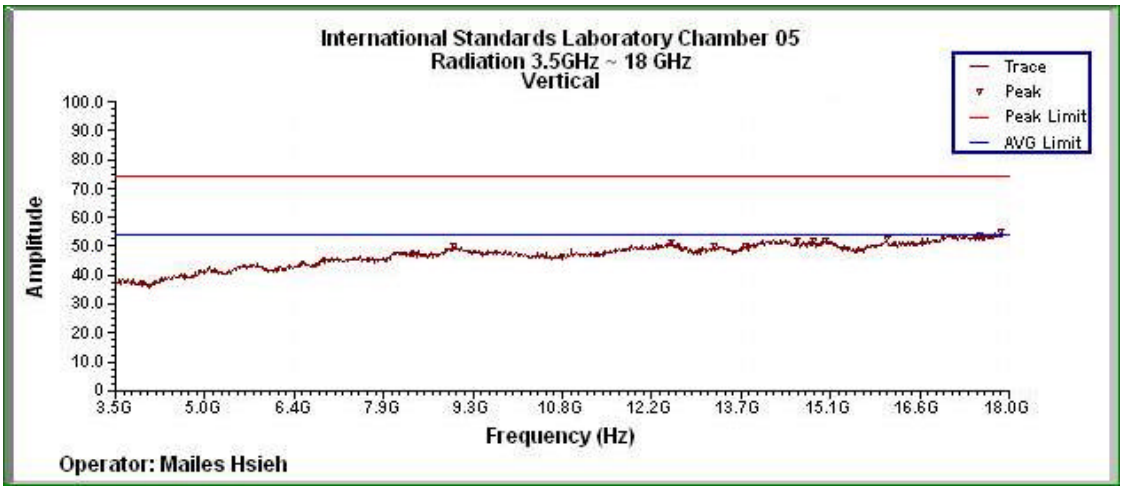
Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
1327.17	49.18pk	26.00	2.21	34.11	43.29pk	54.00av	-10.71	101	89
2398.60	45.32pk	30.92	1.46	35.20	42.51pk	54.00av	-11.49	101	168
3357.64	47.35pk	31.39	1.64	35.53	44.84pk	54.00av	-9.16	103	265
7440.00	--	--	--	--	--	54.00av	--	--	--
9920.00	--	--	--	--	--	54.00av	--	--	--
12400.0	--	--	--	--	--	54.00av	--	--	--
14880.0	--	--	--	--	--	54.00av	--	--	--
17360.0	--	--	--	--	--	54.00av	--	--	--
19840.0	--	--	--	--	--	54.00av	--	--	--
22320.0	--	--	--	--	--	54.00av	--	--	--
24800.0	--	--	--	--	--	54.00av	--	--	--

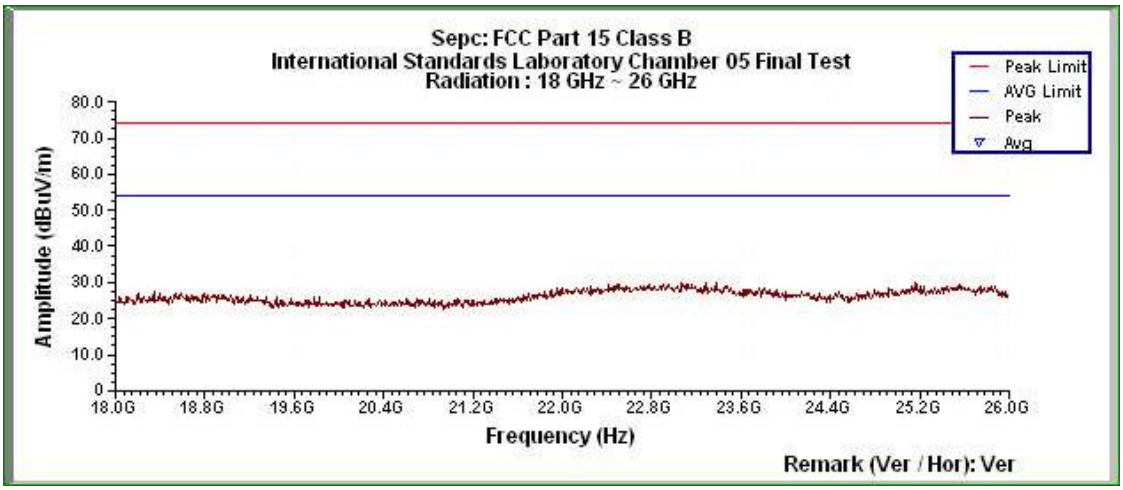
Note:

- According to ANSI C63.4-2001 8.3.1.2 Notes(1):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.




International Standards Laboratory Chamber 05
Radiation 3.5GHz ~ 18 GHz
Vertical
Trace
Peak
Peak Limit
AVG Limit
Amplitude
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
3.5G
5.0G
6.4G
7.9G
9.3G
10.8G
12.2G
13.7G
15.1G
16.6G
18.0G
Frequency (Hz)
Operator: Mailes Hsieh

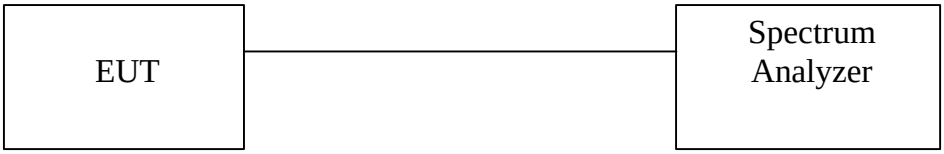

Sepc: FCC Part 15 Class B
International Standards Laboratory Chamber 05 Final Test
Radiation : 18 GHz ~ 26 GHz
Peak Limit
AVG Limit
Peak
Avg
Amplitude (dBuV/m)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0
18.0G
18.8G
19.6G
20.4G
21.2G
22.0G
22.8G
23.6G
24.4G
25.2G
26.0G
Frequency (Hz)
Remark (Ver / Hor): Ver

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)

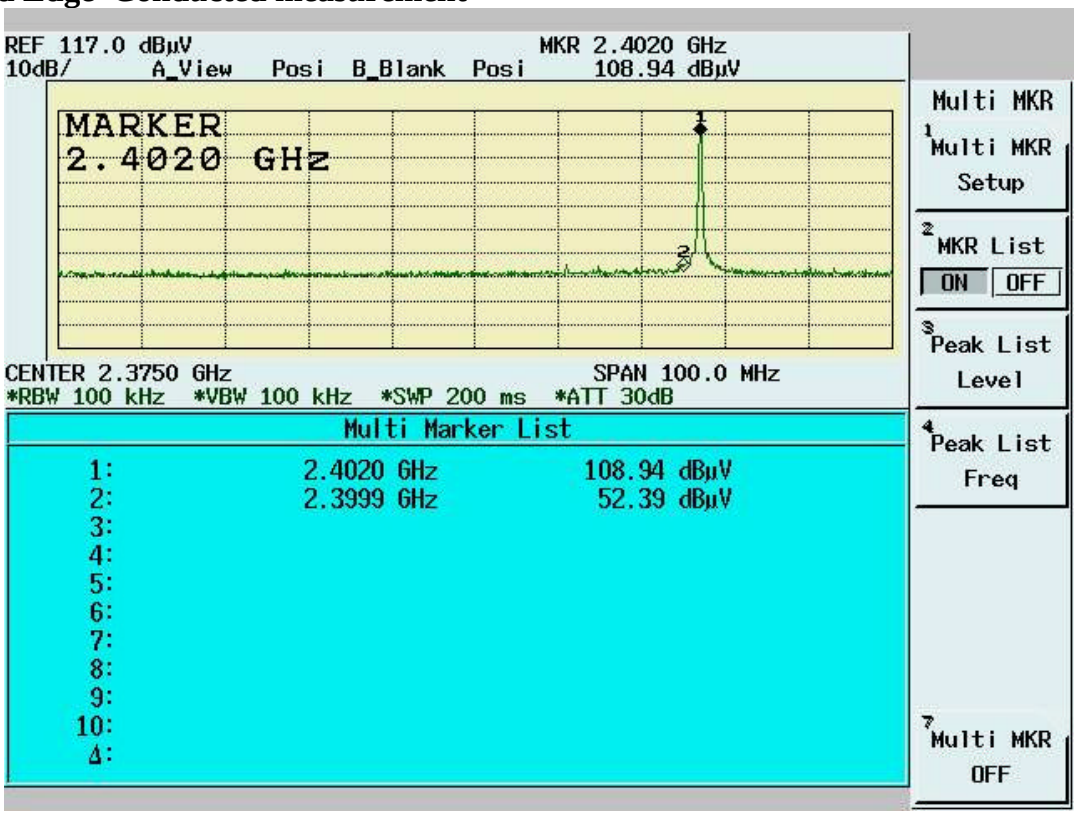
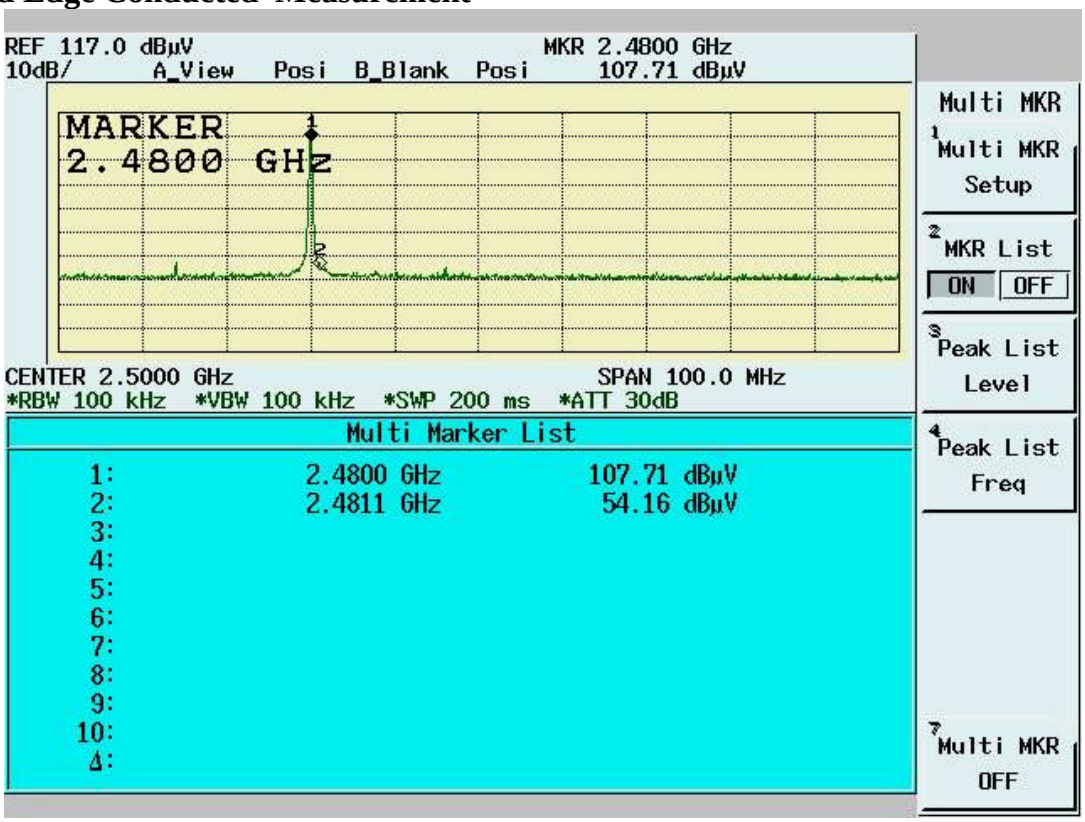
Temp. (deg. C): 19

Test Engr: Mailes Hsieh Humidity (%): 43

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
00	2402	108.94	---	---
Outside band	2399.9	52.39	56.55	Pass
78	2480	107.71	---	---
Outside band	2481.1	54.16	53.55	Pass

Note: Two RF output(MAIN & AUX) have been test,the worse data shown above.

Band Edge Conducted measurement



Band Edge Conducted Measurement