

Partial FCC Test Report

Report No.: RF160613C31-2

FCC ID: PPD-QCNFA344AH

Test Model: QCNFA344A

Received Date: May 30, 2016

Test Date: May 30, 2016 ~ Jun. 09, 2016

Issued Date: Jun. 15, 2016

Applicant: Qualcomm Atheros, Inc.

Address: 1700 Technology Dr San Jose, CA 95110

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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(R.O.C)

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R.O.C



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Release Control Record

Issue No.	Description	Date Issued
RF160613C31-2	Original Release	Jun. 15, 2016

1 Certificate of Conformity

Product: 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card

Brand: Qualcomm Atheros

Test Model: QCNFA344A

Sample Status: Production Unit

Applicant: Qualcomm Atheros, Inc.

Test Date: May 30, 2016 ~ Jun. 09, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Evonne Liu, **Date:** Jun. 15, 2016
Evonne Liu / Specialist

Approved by : Stanley Wu, **Date:** Jun. 15, 2016
Stanley Wu / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	Refer to Note
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.01 dB at 2484 MHz.
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.247(a)(2)	6 dB Bandwidth	N/A	Refer to Note
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	N/A	Refer to Note
15.203	Antenna Requirement	N/A	Refer to Note

Note: Only test item of Maximum Output Power and Radiated Emissions were performed for this report and the conducted data is referring to module report (Report No.: RF150107E06, Issue Date: Mar. 11, 2015).

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand	Qualcomm Atheros
Test Model	QCNFA344A
Status of EUT	Production Unit
Power Supply Rating	3.3 Vdc (host equipment)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20) 9 for 802.11n (HT40)
Output Power	450.738 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT was installed in Portable Computer (Brand: Dell, Model: P56F).
2. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX Function
802.11b	2TX
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

3. The antenna information is listed as below.

Antenna Type	Manuf.	Part Number	Antenna Gain (dBi)			
			2.4GHz	5.3 GHz	5.6 GHz	5.8 GHz
PIFA	ACON	WLAN Main Antenna: APL6Y-700002 WLAN Aux. Antenna: APL6Y-700002	Main: 1.01 Aux.: -0.07	Main: 2.77 Aux.: 0.97	Main: 1.65 Aux.: 1.72	Main: 1.65 Aux.: 1.72
	TE	WLAN Main Antenna: 1556723-1 WLAN Aux. Antenna: 1556723-1	Main: -2.24 Aux.: -1.97	Main: -0.33 Aux.: -2.98	Main: -3.26 Aux.: -2.22	Main: -2.40 Aux.: -2.22

4. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

13 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

9 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	8	2447
4	2427	9	2452
5	2432	10	2457
6	2437	11	2462
7	2442		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	-	-	-

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz
RE<1G: Radiated Emission below 1 GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

NOTE: "-" means no effect.

Radiated Emission Test (Above 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1 GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT20)	1 to 13	13	OFDM	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hsiao
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee

3.3 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

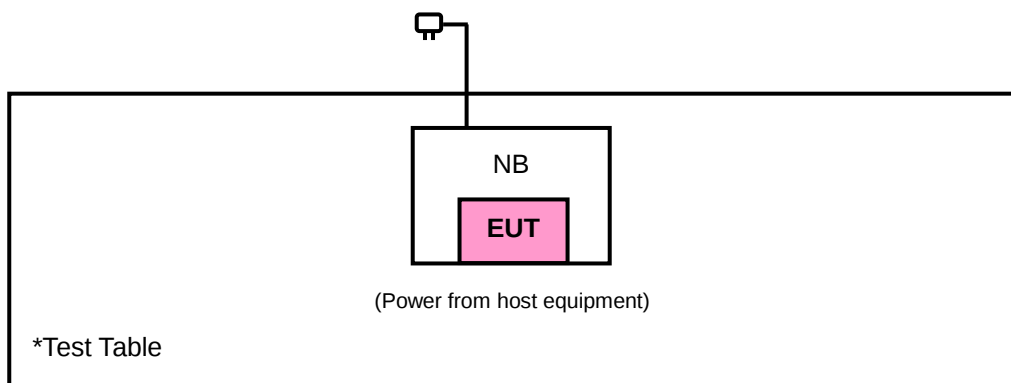
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	NB	N/A	N/A	N/A	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v03r05

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY50010135	Jul. 18, 2015	Jul. 17, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Jan. 19, 2016	Jan. 18, 2017
Bluetooth Tester	CBT	100980	Apr. 27, 2015	Apr. 26, 2017
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Preamplifier Agilent	310N	187226	Jun. 29, 2015	Jun. 28, 2016
Preamplifier Agilent	83017A	MY39501357	Jun. 29, 2015	Jun. 28, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 27, 2015	Jun. 26, 2016
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 27, 2015	Jun. 26, 2016
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

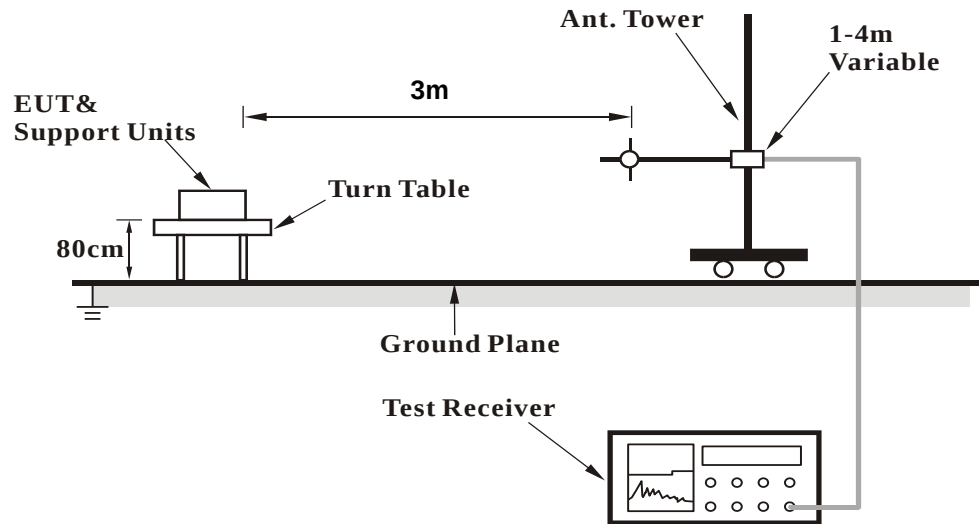
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for RMS Average (Duty cycle < 98 %) for Average detection (AV) at frequency above 1 GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle $\geq 98 \%$) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

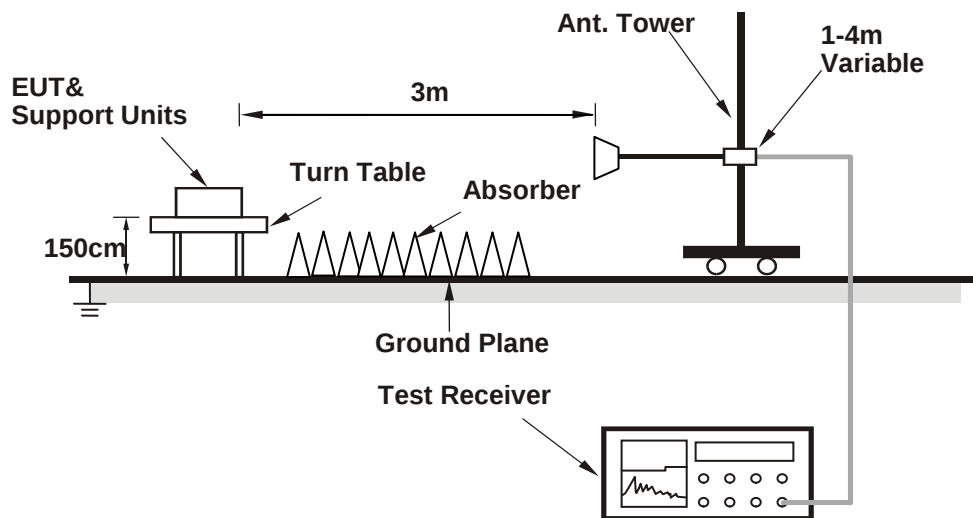
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

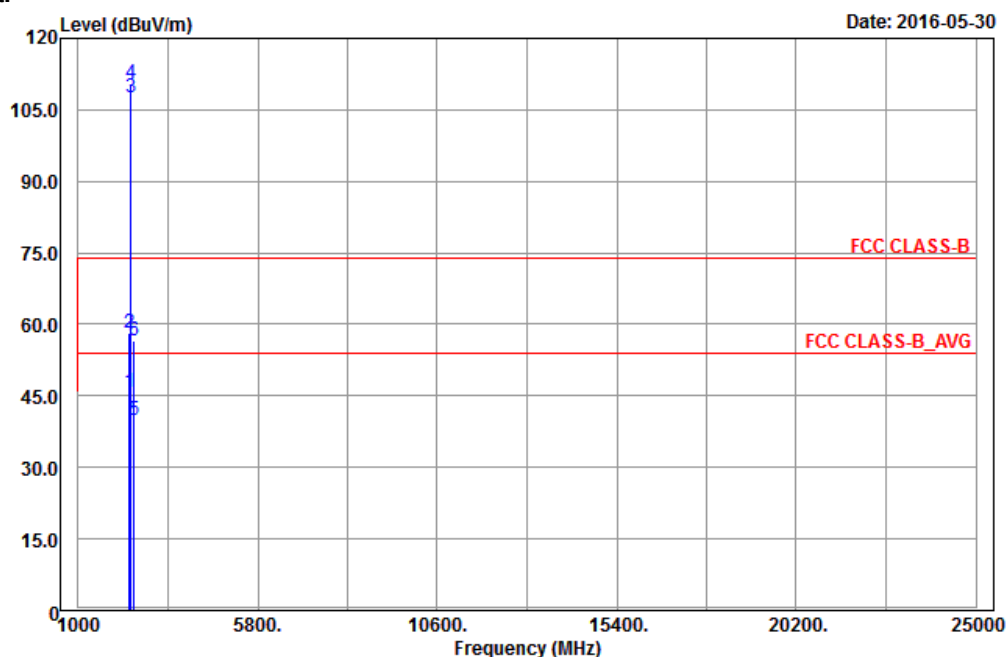
4.1.7 Test Results

Above 1 GHz Data :

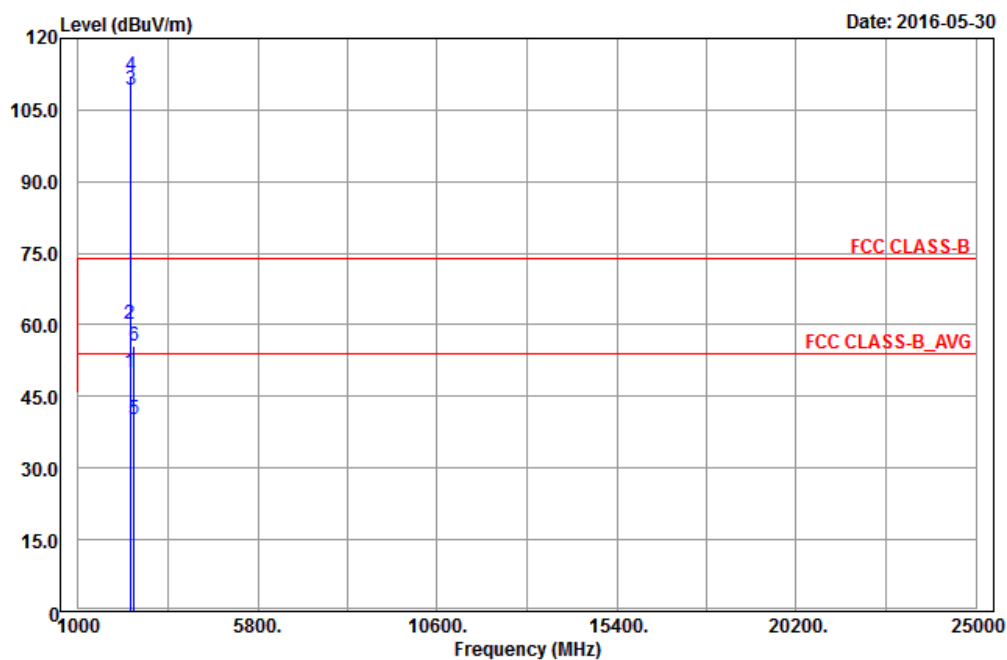
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



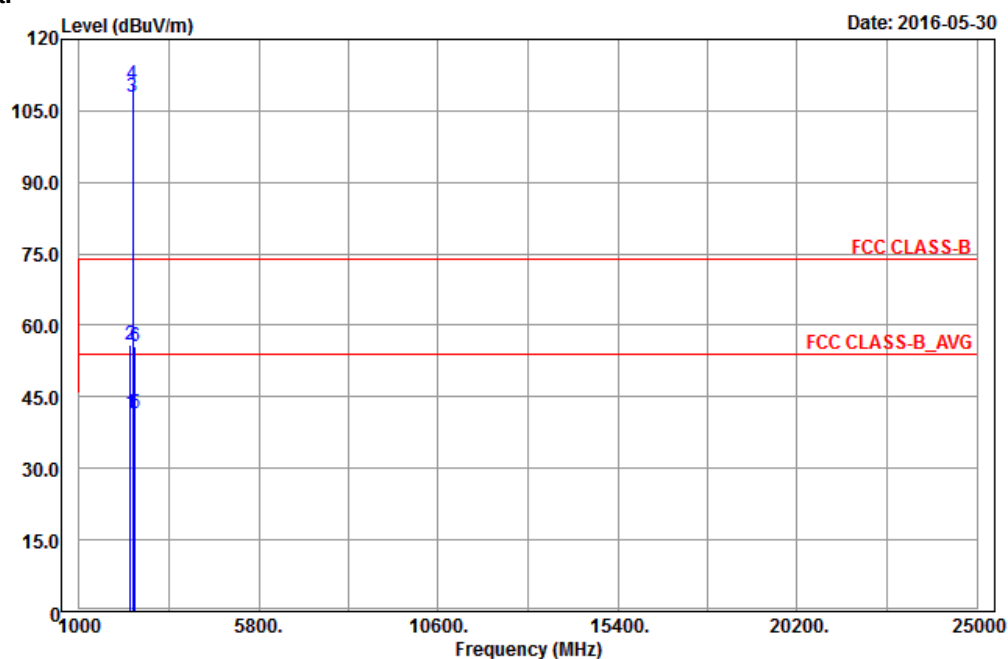
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	45.7	44.04	54	-8.3	31.78	5.37	35.49	234	302	Average
2376	58.12	56.46	74	-15.88	31.78	5.37	35.49	234	302	Peak
2412	107.55	105.78			31.81	5.43	35.47	100	267	Average
2412	110.66	108.89			31.81	5.43	35.47	100	267	Peak
2500	39.92	37.9	54	-14.08	31.9	5.53	35.41	100	267	Average
2500	56.65	54.63	74	-17.35	31.9	5.53	35.41	100	267	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	50.18	48.45	54	-3.82	31.8	5.4	35.47	274	25	Average
2390	60.31	58.58	74	-13.69	31.8	5.4	35.47	274	25	Peak
2412	109.25	107.48			31.81	5.43	35.47	274	24	Average
2412	112.31	110.54			31.81	5.43	35.47	274	24	Peak
2500	40.21	38.19	54	-13.79	31.9	5.53	35.41	274	24	Average
2500	55.63	53.61	74	-18.37	31.9	5.53	35.41	274	24	Peak

Remarks:

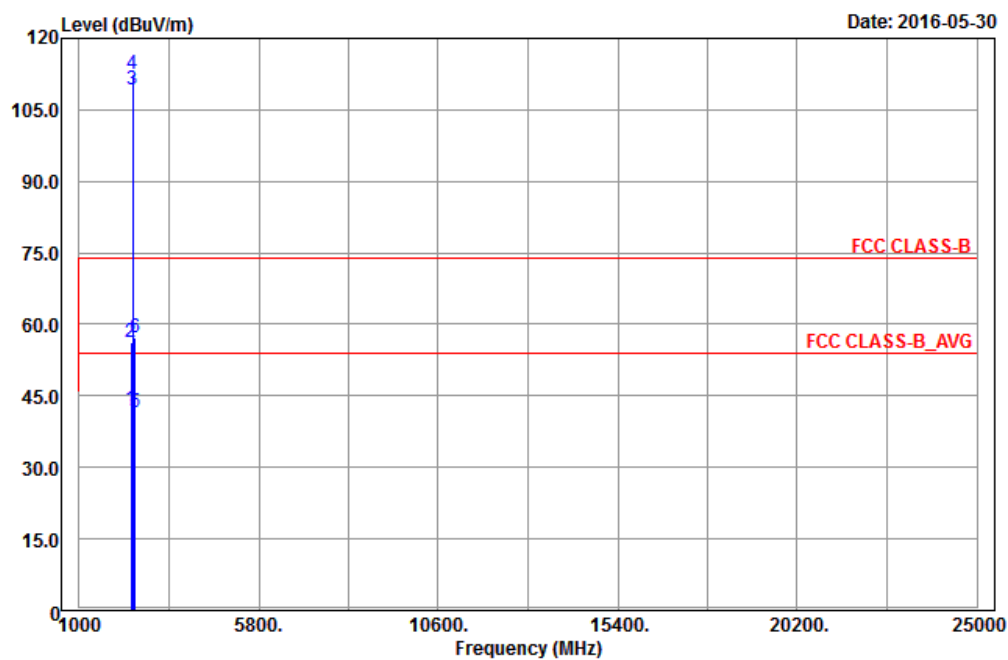
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



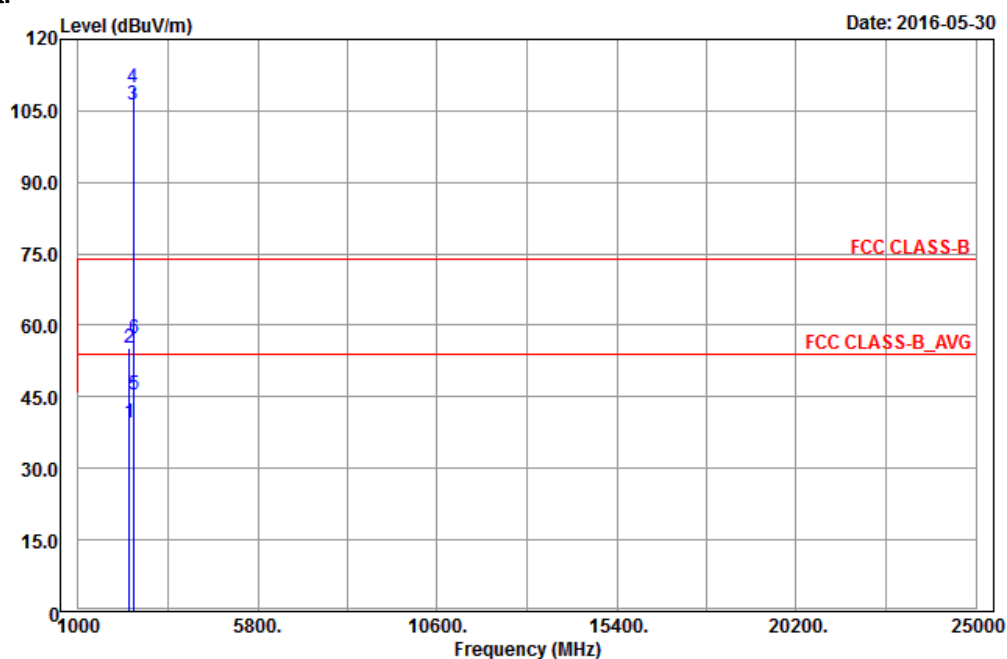
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2366	41.65	40.01	54	-12.35	31.76	5.37	35.49	100	277	Average
2366	55.82	54.18	74	-18.18	31.76	5.37	35.49	100	277	Peak
2437	107.79	105.94			31.85	5.46	35.46	100	277	Average
2437	110.4	108.55			31.85	5.46	35.46	100	277	Peak
2494	41.41	39.39	54	-12.59	31.9	5.53	35.41	100	277	Average
2494	55.63	53.61	74	-18.37	31.9	5.53	35.41	100	277	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	42.2	40.49	54	-11.8	31.8	5.4	35.49	100	24	Average
2386	56.38	54.67	74	-17.62	31.8	5.4	35.49	100	24	Peak
2437	109.31	107.46			31.85	5.46	35.46	100	24	Average
2437	112.39	110.54			31.85	5.46	35.46	100	24	Peak
2496	41.43	39.41	54	-12.57	31.9	5.53	35.41	100	24	Average
2496	57.07	55.05	74	-16.93	31.9	5.53	35.41	100	24	Peak

Remarks:

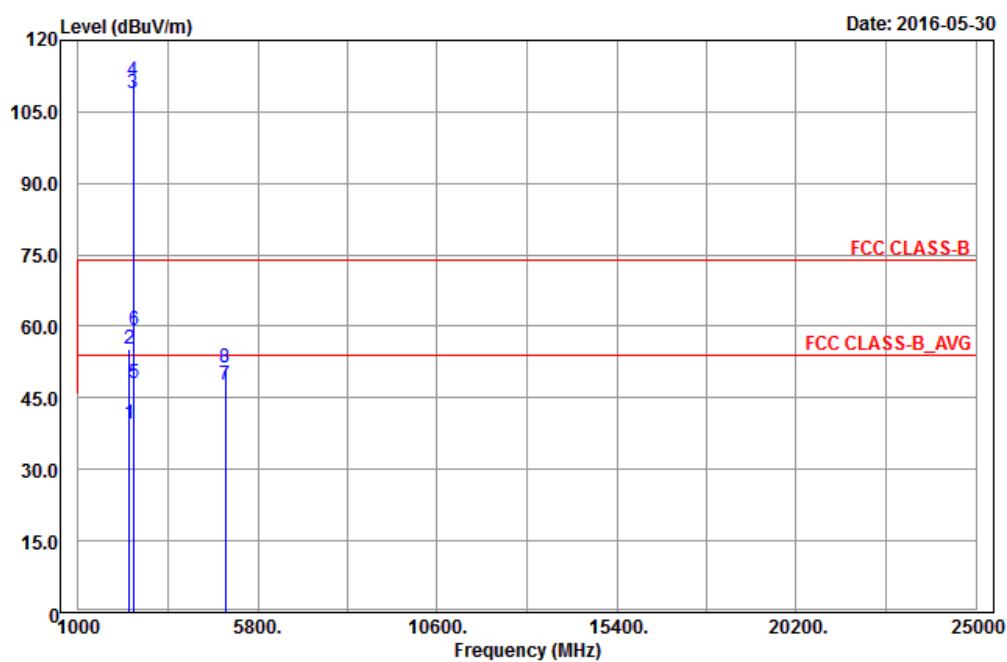
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



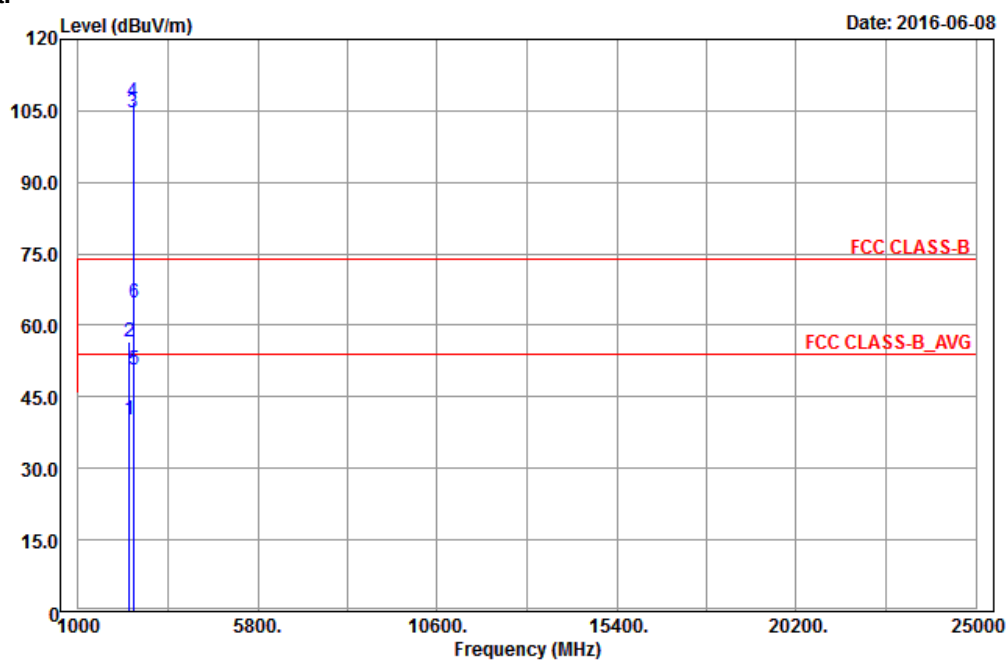
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2362	39.49	37.86	54	-14.51	31.76	5.37	35.5	198	290	Average
2362	55.41	53.78	74	-18.59	31.76	5.37	35.5	198	290	Peak
2462	106.15	104.22			31.87	5.5	35.44	198	290	Average
2462	109.9	107.97			31.87	5.5	35.44	198	290	Peak
2488	45.32	43.31	54	-8.68	31.9	5.53	35.42	160	285	Average
2488	57.24	55.23	74	-16.76	31.9	5.53	35.42	160	285	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	39.56	37.9	54	-14.44	31.78	5.37	35.49	101	24	Average
2376	55.41	53.75	74	-18.59	31.78	5.37	35.49	101	24	Peak
2462	108.81	106.88			31.87	5.5	35.44	101	24	Average
2462	111.58	109.65			31.87	5.5	35.44	101	24	Peak
2484	47.91	45.95	54	-6.09	31.88	5.5	35.42	318	18	Average
2484	59.06	57.1	74	-14.94	31.88	5.5	35.42	318	18	Peak
4924	47.82	39.57	54	-6.18	33.99	8.28	34.02	100	291	Average
4924	51.48	43.23	74	-22.52	33.99	8.28	34.02	100	291	Peak

Remarks:

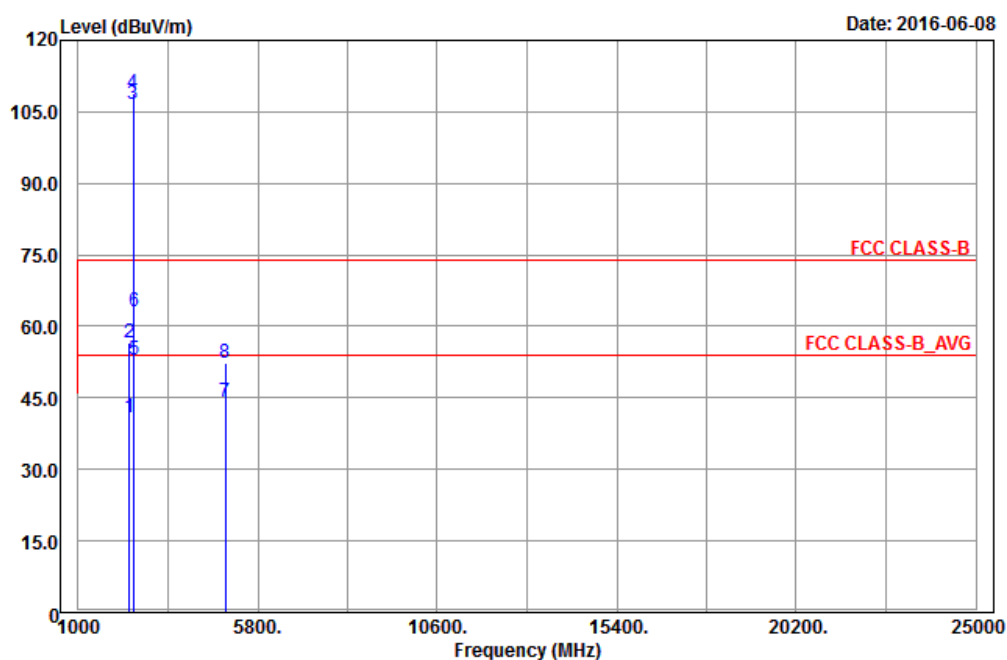
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



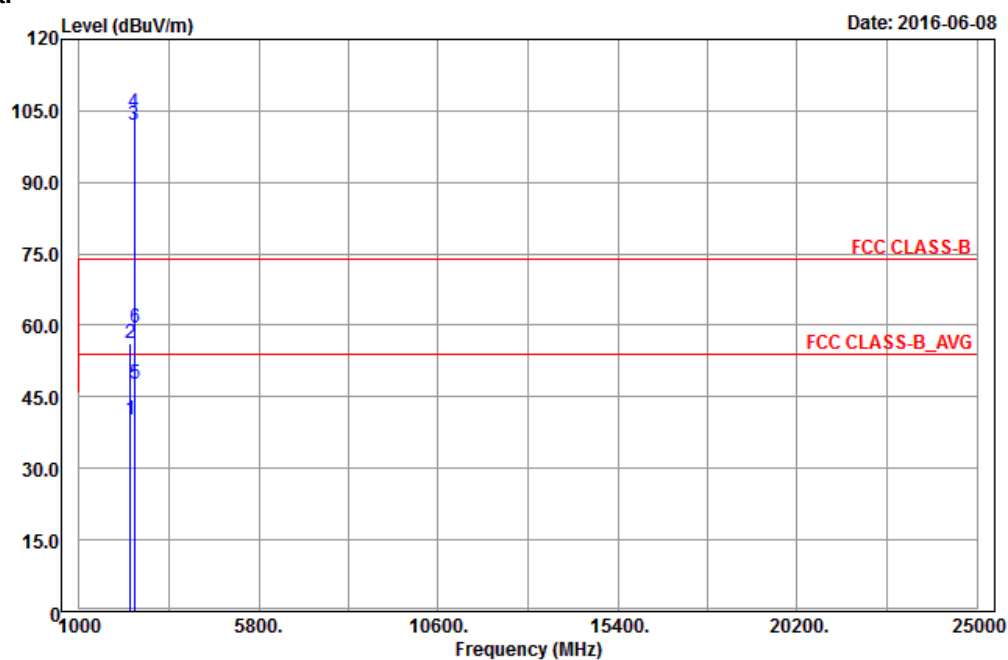
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2360	40.15	38.52	54	-13.85	31.76	5.37	35.5	284	64	Average
2360	56.44	54.81	74	-17.56	31.76	5.37	35.5	284	64	Peak
2467	104.7	102.75			31.87	5.5	35.42	284	64	Average
2467	107.05	105.1			31.87	5.5	35.42	284	64	Peak
2484	50.79	48.83	54	-3.21	31.88	5.5	35.42	284	64	Average
2484	64.71	62.75	74	-9.29	31.88	5.5	35.42	284	64	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2370	40.92	39.26	54	-13.08	31.78	5.37	35.49	102	170	Average
2370	56.69	55.03	74	-17.31	31.78	5.37	35.49	102	170	Peak
2467	106.53	104.58			31.87	5.5	35.42	102	170	Average
2467	109.03	107.08			31.87	5.5	35.42	102	170	Peak
2484	52.95	50.99	54	-1.05	31.88	5.5	35.42	100	182	Average
2484	63.13	61.17	74	-10.87	31.88	5.5	35.42	100	182	Peak
4934	44	35.74	54	-10	33.99	8.29	34.02	104	56	Average
4934	52.2	43.94	74	-21.8	33.99	8.29	34.02	104	56	Peak

Remarks:

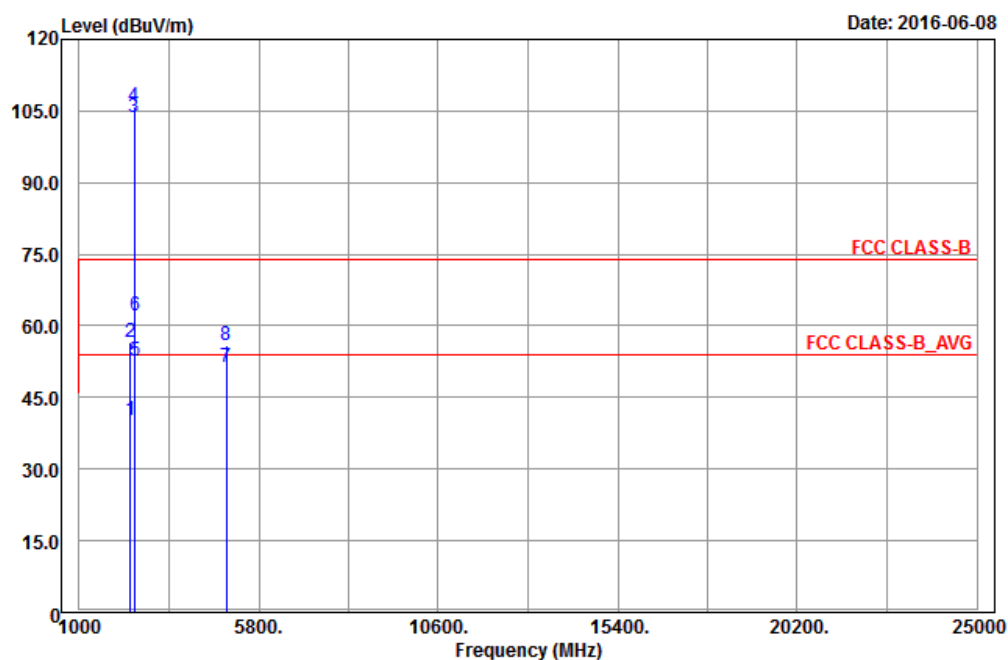
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2467 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	40.38	38.72	54	-13.62	31.78	5.37	35.49	262	60	Average
2376	56.4	54.74	74	-17.6	31.78	5.37	35.49	262	60	Peak
2472	101.97	100.01			31.88	5.5	35.42	262	60	Average
2472	104.49	102.53			31.88	5.5	35.42	262	60	Peak
2484	47.83	45.87	54	-6.17	31.88	5.5	35.42	251	60	Average
2484	59.54	57.58	74	-14.46	31.88	5.5	35.42	251	60	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	40.11	38.45	54	-13.89	31.78	5.37	35.49	100	172	Average
2376	56.48	54.82	74	-17.52	31.78	5.37	35.49	100	172	Peak
2472	103.72	101.76			31.88	5.5	35.42	100	172	Average
2472	106.07	104.11			31.88	5.5	35.42	100	172	Peak
2484	52.5	50.54	54	-1.5	31.88	5.5	35.42	100	178	Average
2484	62.2	60.24	74	-11.8	31.88	5.5	35.42	100	178	Peak
4944	51.49	43.22	54	-2.51	33.99	8.29	34.01	270	5	Average
4944	55.97	47.7	74	-18.03	33.99	8.29	34.01	270	5	Peak

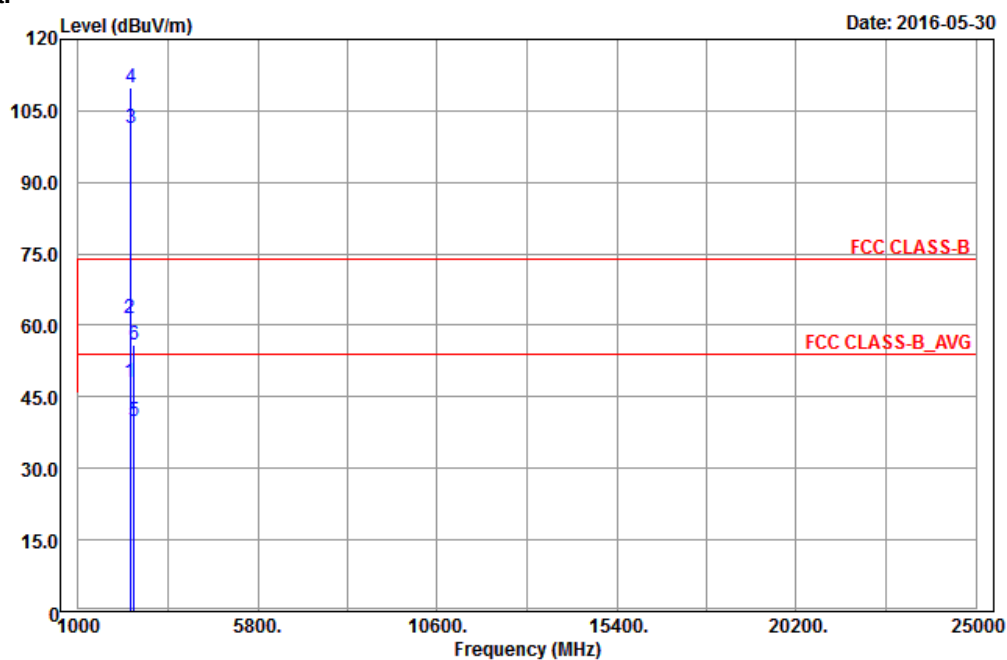
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2472 MHz: Fundamental frequency.

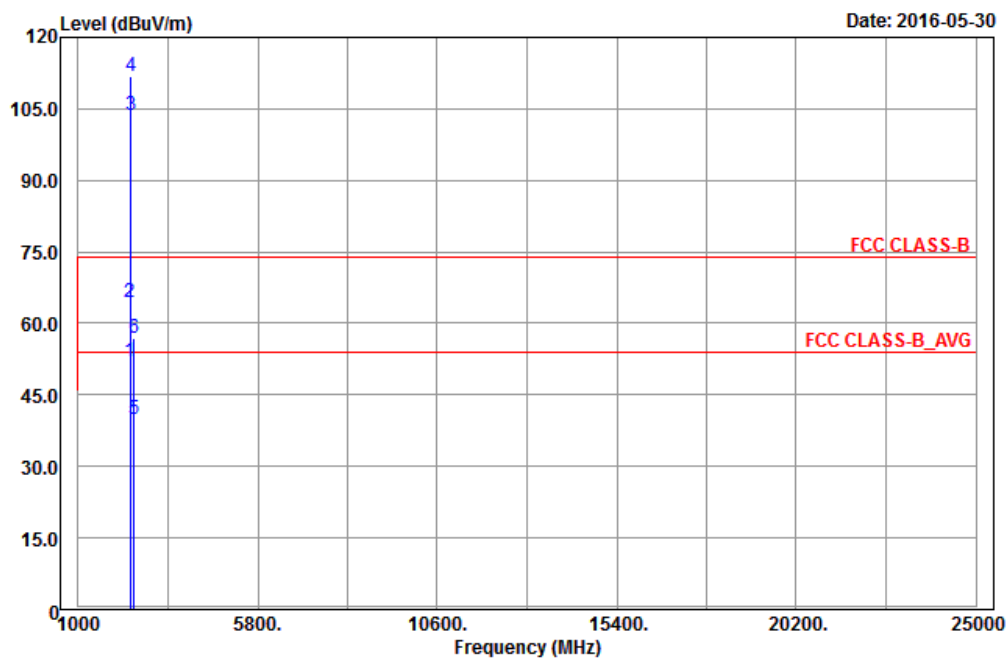
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



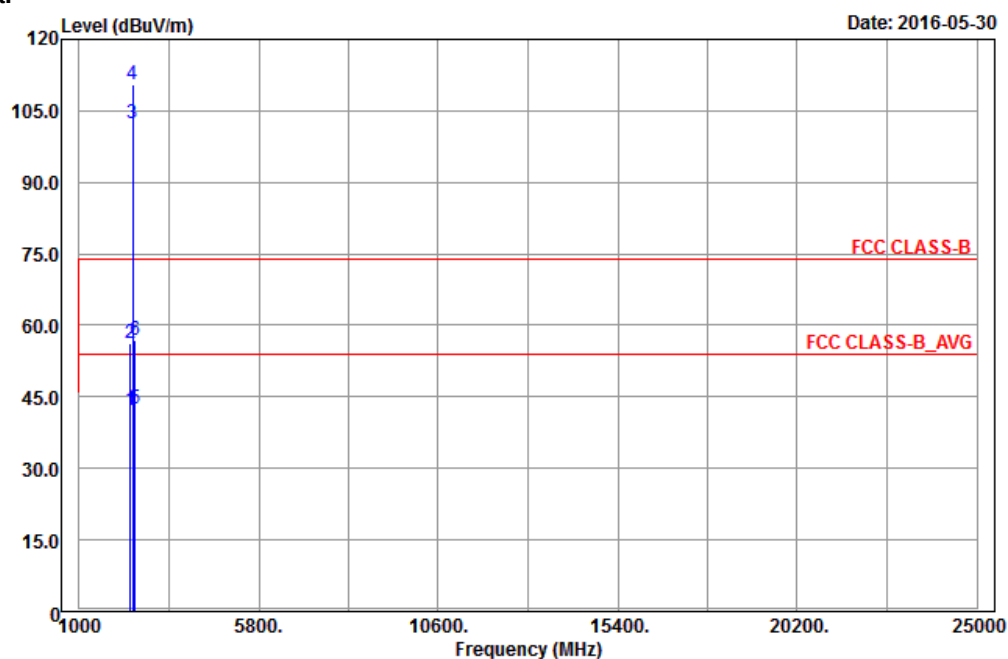
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	48	46.27	54	-6	31.8	5.4	35.47	233	267	Average
2390	61.35	59.62	74	-12.65	31.8	5.4	35.47	233	267	Peak
2412	101.25	99.48			31.81	5.43	35.47	100	267	Average
2412	109.8	108.03			31.81	5.43	35.47	100	267	Peak
2484	39.76	37.8	54	-14.24	31.88	5.5	35.42	100	267	Average
2484	55.91	53.95	74	-18.09	31.88	5.5	35.42	100	267	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.06	50.33	54	-1.94	31.8	5.4	35.47	306	24	Average
2390	64.34	62.61	74	-9.66	31.8	5.4	35.47	306	24	Peak
2412	103.75	101.98			31.81	5.43	35.47	276	24	Average
2412	111.93	110.16			31.81	5.43	35.47	276	24	Peak
2486	39.88	37.89	54	-14.12	31.88	5.53	35.42	276	24	Average
2486	56.8	54.81	74	-17.2	31.88	5.53	35.42	276	24	Peak

Remarks:

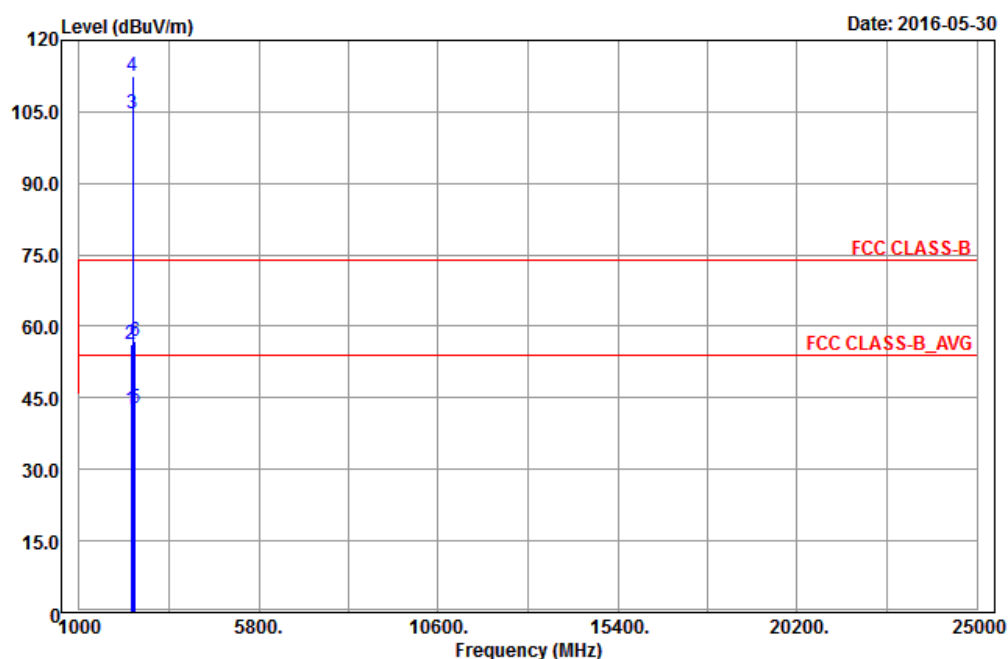
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



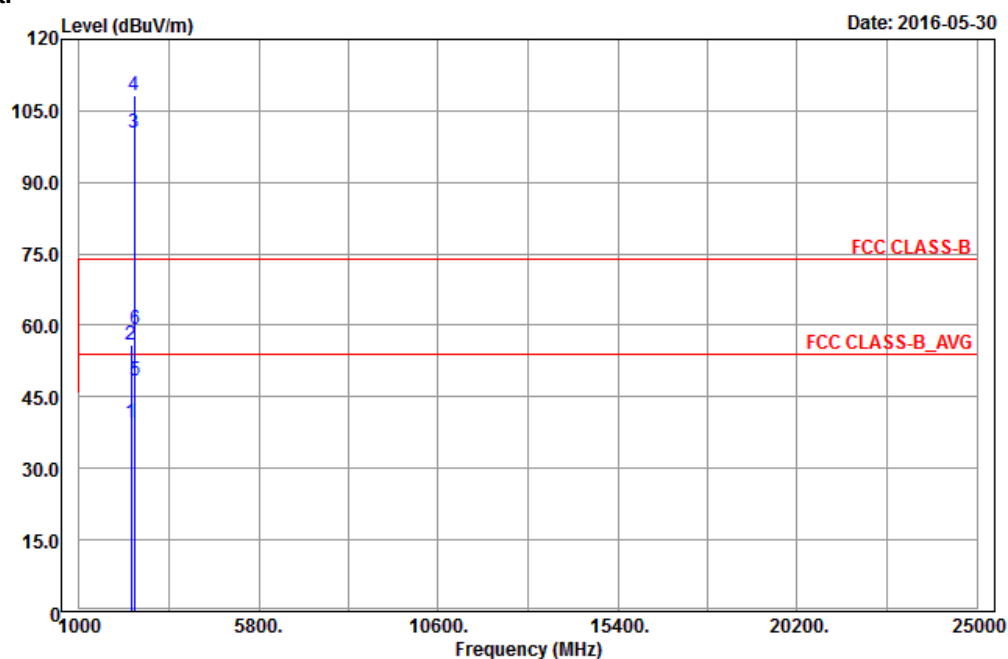
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2358	42.12	40.49	54	-11.88	31.76	5.37	35.5	113	290	Average
2358	56.11	54.48	74	-17.89	31.76	5.37	35.5	113	290	Peak
2437	102.49	100.64			31.85	5.46	35.46	113	290	Average
2437	110.56	108.71			31.85	5.46	35.46	113	290	Peak
2484	42.43	40.47	54	-11.57	31.88	5.5	35.42	113	290	Average
2484	56.96	55	74	-17.04	31.88	5.5	35.42	113	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	42.65	40.94	54	-11.35	31.8	5.4	35.49	100	24	Average
2388	56.12	54.41	74	-17.88	31.8	5.4	35.49	100	24	Peak
2437	104.73	102.88			31.85	5.46	35.46	100	24	Average
2437	112.58	110.73			31.85	5.46	35.46	100	24	Peak
2500	42.78	40.76	54	-11.22	31.9	5.53	35.41	100	24	Average
2500	56.79	54.77	74	-17.21	31.9	5.53	35.41	100	24	Peak

Remarks:

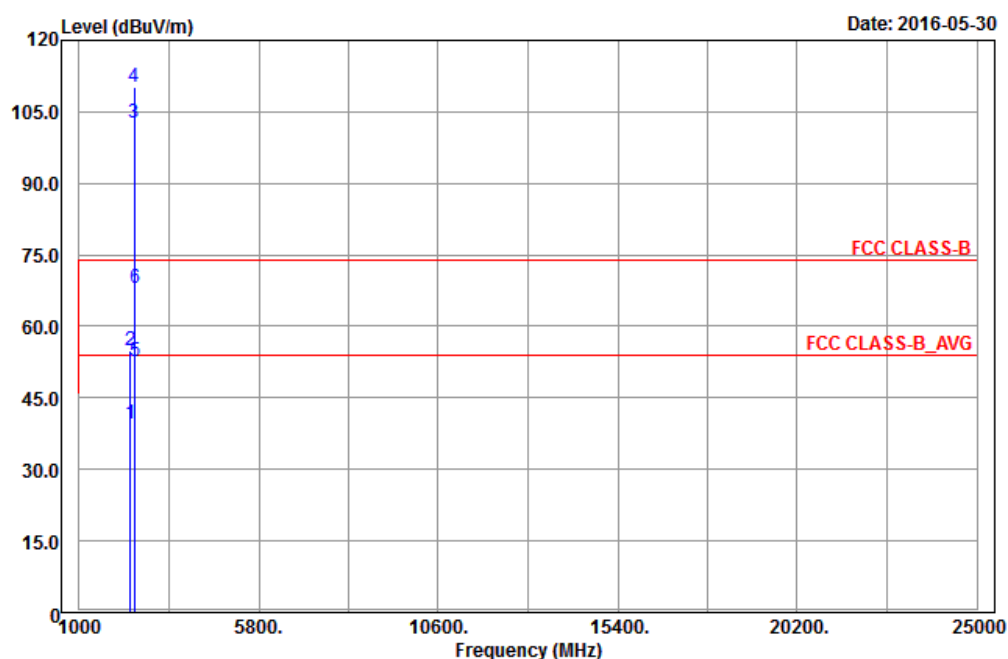
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



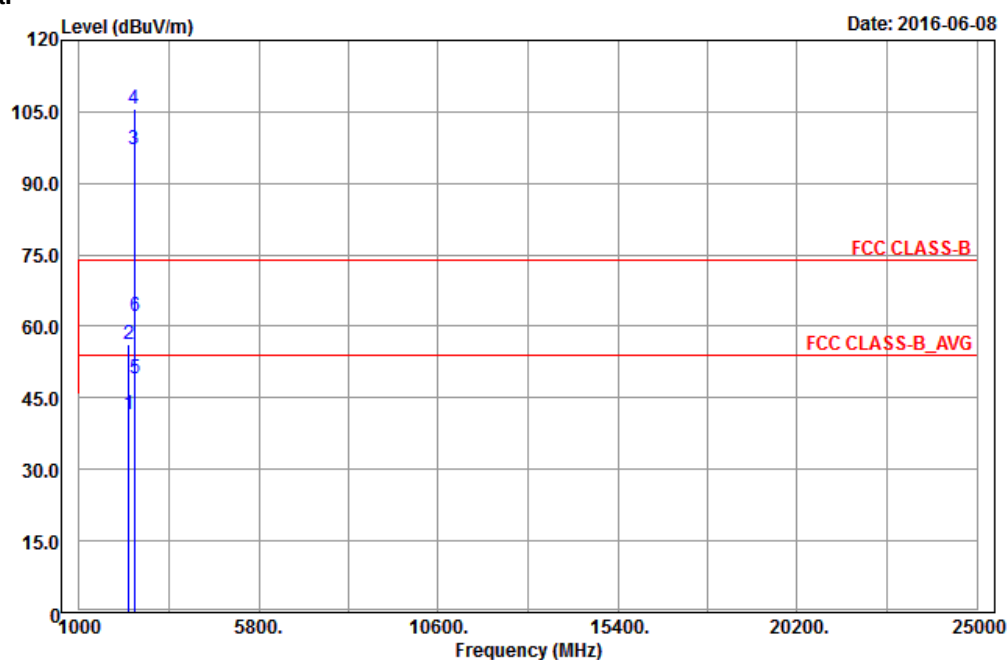
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	39.48	37.82	54	-14.52	31.78	5.37	35.49	198	290	Average
2380	56.07	54.41	74	-17.93	31.78	5.37	35.49	198	290	Peak
2462	100.36	98.43			31.87	5.5	35.44	198	290	Average
2462	108.08	106.15			31.87	5.5	35.44	198	290	Peak
2484	48.38	46.42	54	-5.62	31.88	5.5	35.42	111	290	Average
2484	59.27	57.31	74	-14.73	31.88	5.5	35.42	111	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2358	39.68	38.05	54	-14.32	31.76	5.37	35.5	100	24	Average
2358	55.03	53.4	74	-18.97	31.76	5.37	35.5	100	24	Peak
2462	102.52	100.59			31.87	5.5	35.44	100	24	Average
2462	110.15	108.22			31.87	5.5	35.44	100	24	Peak
2486	52.78	50.79	54	-1.22	31.88	5.53	35.42	102	181	Average
2486	67.98	65.99	74	-6.02	31.88	5.53	35.42	102	181	Peak

Remarks:

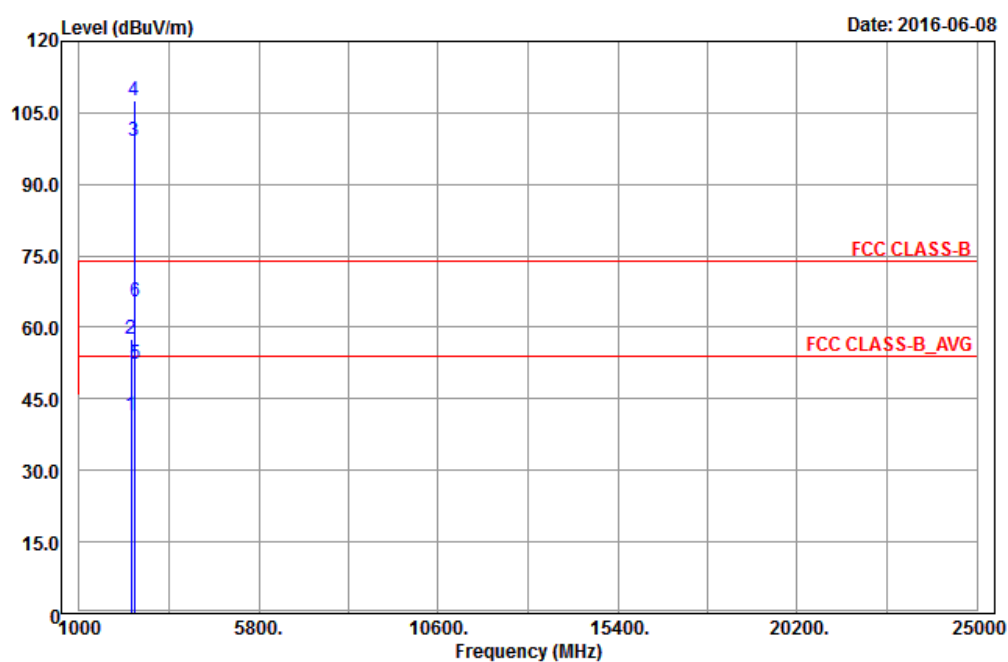
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



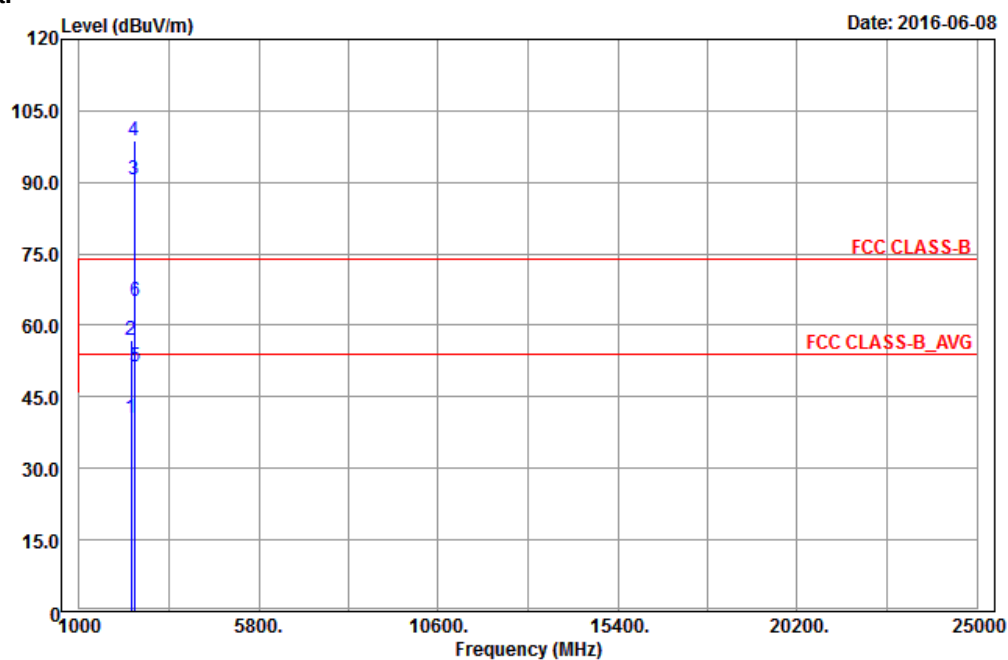
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2328	41.44	39.93	54	-12.56	31.73	5.3	35.52	261	64	Average
2328	56.34	54.83	74	-17.66	31.73	5.3	35.52	261	64	Peak
2467	97.07	95.12			31.87	5.5	35.42	261	64	Average
2467	105.69	103.74			31.87	5.5	35.42	261	64	Peak
2484	48.97	47.01	54	-5.03	31.88	5.5	35.42	261	64	Average
2484	62.17	60.21	74	-11.83	31.88	5.5	35.42	261	64	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	41.5	39.79	54	-12.5	31.8	5.4	35.49	101	170	Average
2388	57.45	55.74	74	-16.55	31.8	5.4	35.49	101	170	Peak
2467	99.15	97.2			31.87	5.5	35.42	101	170	Average
2467	107.45	105.5			31.87	5.5	35.42	101	170	Peak
2484	52.39	50.43	54	-1.61	31.88	5.5	35.42	101	178	Average
2484	65.45	63.49	74	-8.55	31.88	5.5	35.42	101	178	Peak

Remarks:

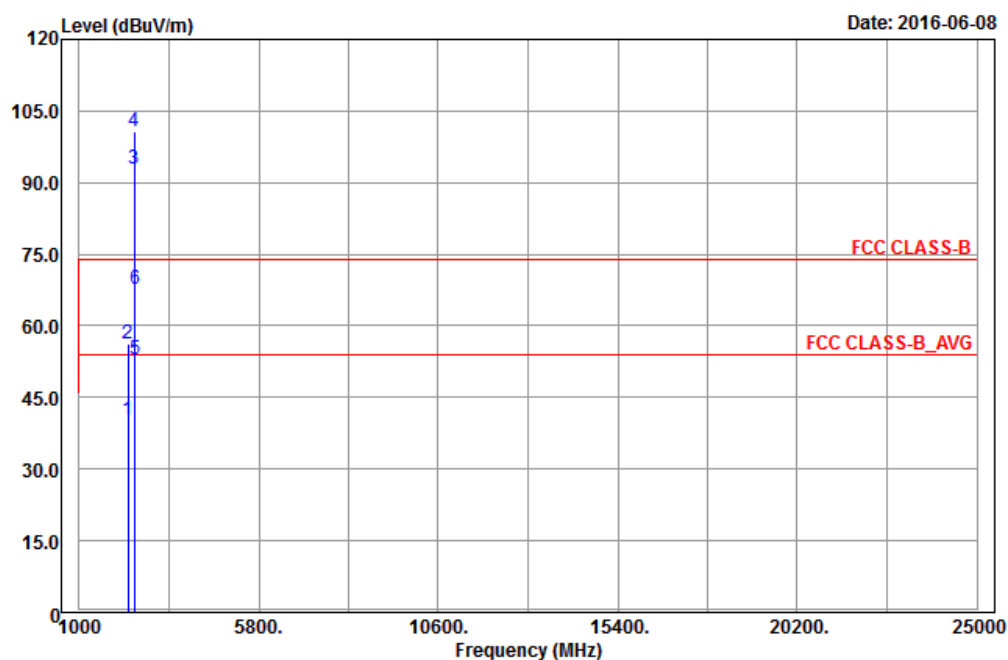
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2378	40.52	38.86	54	-13.48	31.78	5.37	35.49	262	60	Average
2378	57.05	55.39	74	-16.95	31.78	5.37	35.49	262	60	Peak
2472	90.54	88.58			31.88	5.5	35.42	262	60	Average
2472	98.8	96.84			31.88	5.5	35.42	262	60	Peak
2484	51.19	49.23	54	-2.81	31.88	5.5	35.42	254	60	Average
2484	65.19	63.23	74	-8.81	31.88	5.5	35.42	254	60	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2314	40.32	38.83	54	-13.68	31.71	5.3	35.52	100	172	Average
2314	56.19	54.7	74	-17.81	31.71	5.3	35.52	100	172	Peak
2472	92.84	90.88			31.88	5.5	35.42	100	172	Average
2472	100.77	98.81			31.88	5.5	35.42	100	172	Peak
2484	52.98	51.02	54	-1.02	31.88	5.5	35.42	100	179	Average
2484	67.59	65.63	74	-6.41	31.88	5.5	35.42	100	179	Peak

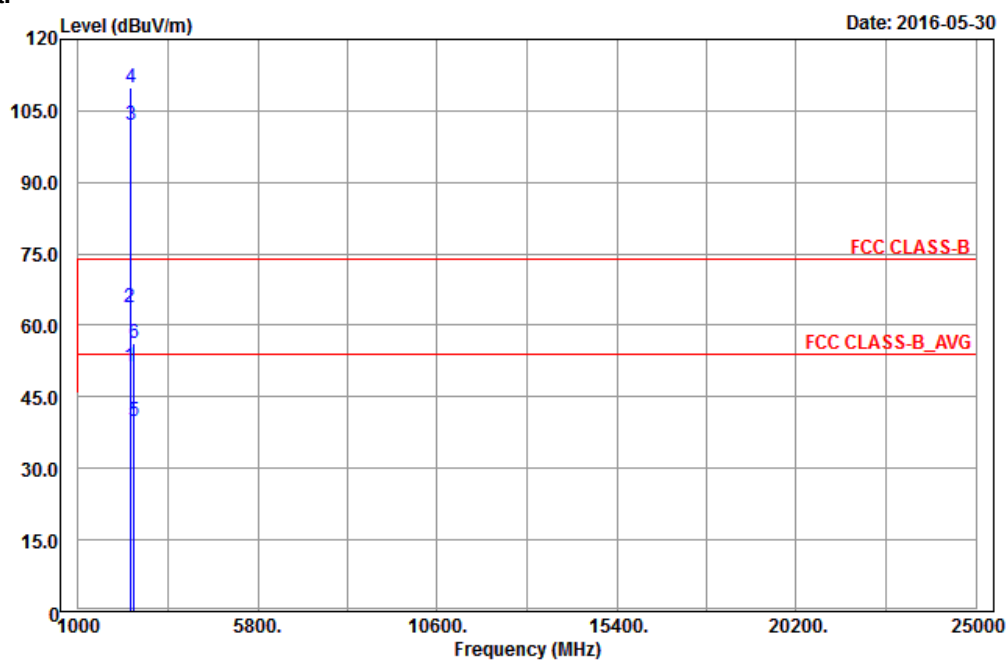
Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.

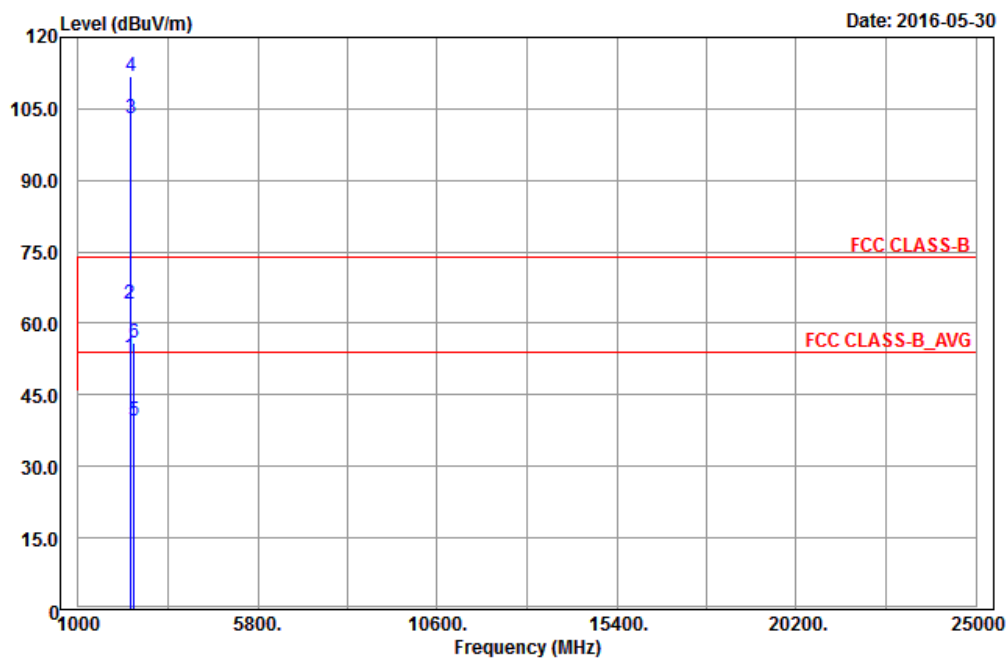
802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



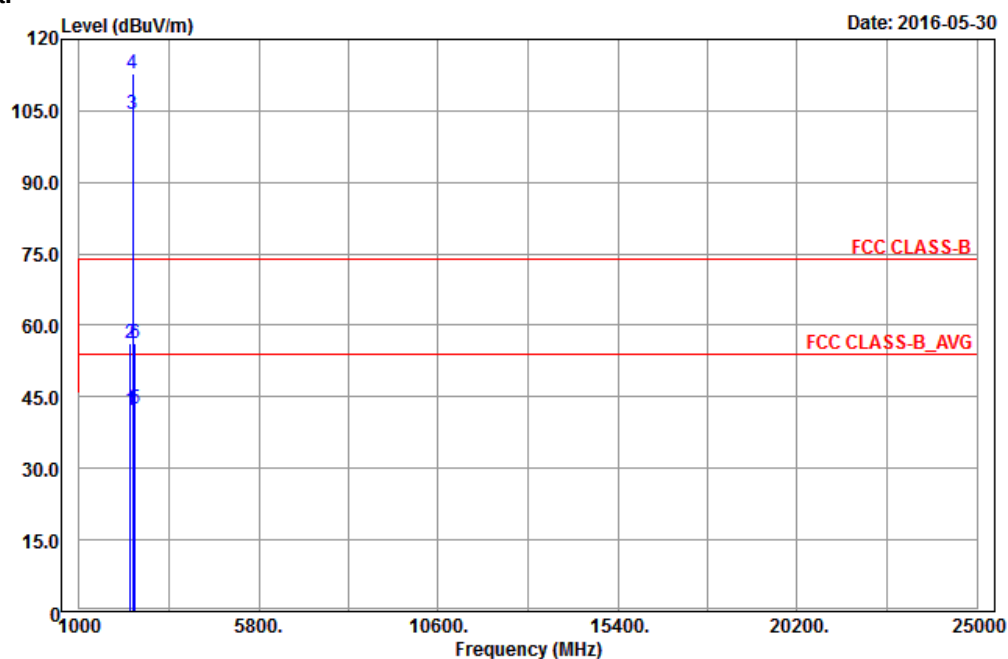
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.26	49.53	54	-2.74	31.8	5.4	35.47	209	267	Average
2390	63.6	61.87	74	-10.4	31.8	5.4	35.47	209	267	Peak
2412	101.9	100.13			31.81	5.43	35.47	100	267	Average
2412	109.99	108.22			31.81	5.43	35.47	100	267	Peak
2484	39.74	37.78	54	-14.26	31.88	5.5	35.42	100	267	Average
2484	56.19	54.23	74	-17.81	31.88	5.5	35.42	100	267	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.9	51.17	54	-1.1	31.8	5.4	35.47	305	24	Average
2390	64.18	62.45	74	-9.82	31.8	5.4	35.47	305	24	Peak
2412	103.02	101.25			31.81	5.43	35.47	275	24	Average
2412	111.84	110.07			31.81	5.43	35.47	275	24	Peak
2488	39.71	37.7	54	-14.29	31.9	5.53	35.42	275	24	Average
2488	55.99	53.98	74	-18.01	31.9	5.53	35.42	275	24	Peak

Remarks:

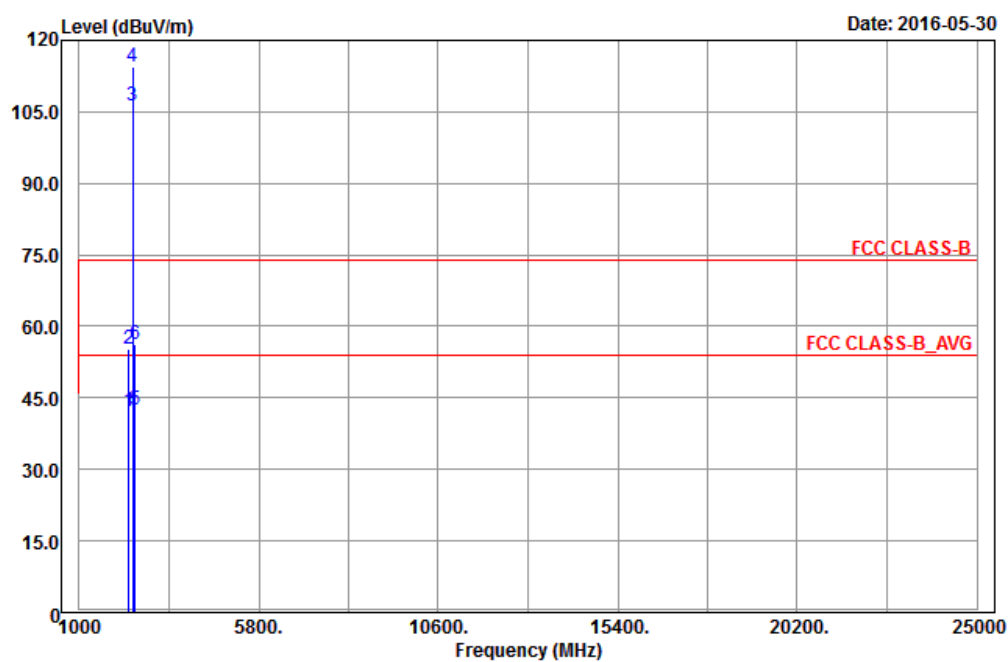
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



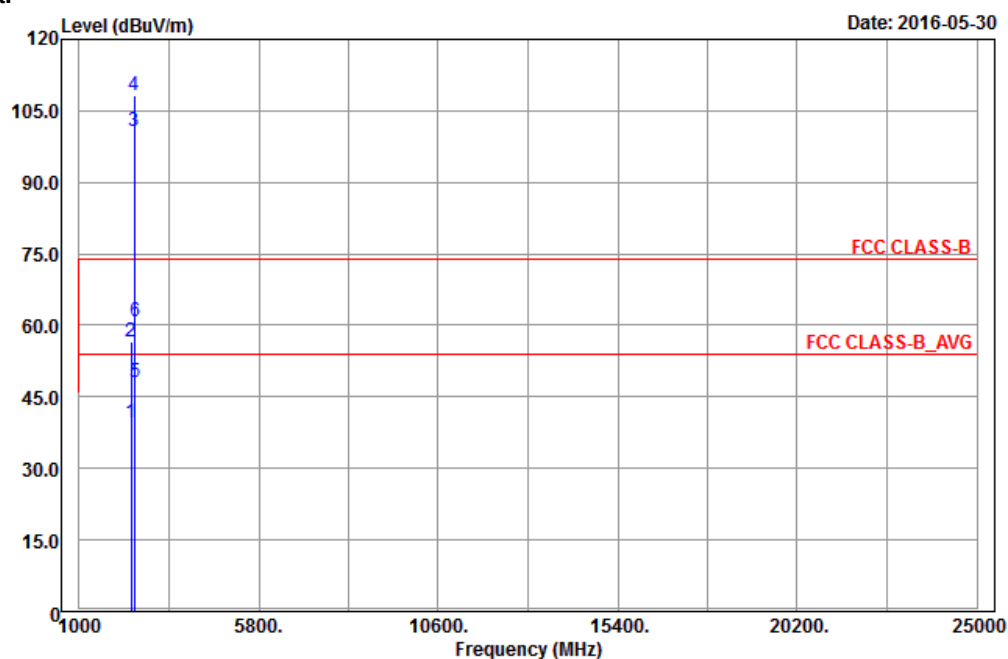
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2366	42.23	40.59	54	-11.77	31.76	5.37	35.49	113	290	Average
2366	56.1	54.46	74	-17.9	31.76	5.37	35.49	113	290	Peak
2437	104.2	102.35			31.85	5.46	35.46	113	290	Average
2437	112.67	110.82			31.85	5.46	35.46	113	290	Peak
2496	42.51	40.49	54	-11.49	31.9	5.53	35.41	113	290	Average
2496	56.2	54.18	74	-17.8	31.9	5.53	35.41	113	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2316	42.15	40.66	54	-11.85	31.71	5.3	35.52	100	24	Average
2316	55.14	53.65	74	-18.86	31.71	5.3	35.52	100	24	Peak
2437	106.16	104.31			31.85	5.46	35.46	100	24	Average
2437	114.4	112.55			31.85	5.46	35.46	100	24	Peak
2486	42.55	40.56	54	-11.45	31.88	5.53	35.42	100	24	Average
2486	56.23	54.24	74	-17.77	31.88	5.53	35.42	100	24	Peak

Remarks:

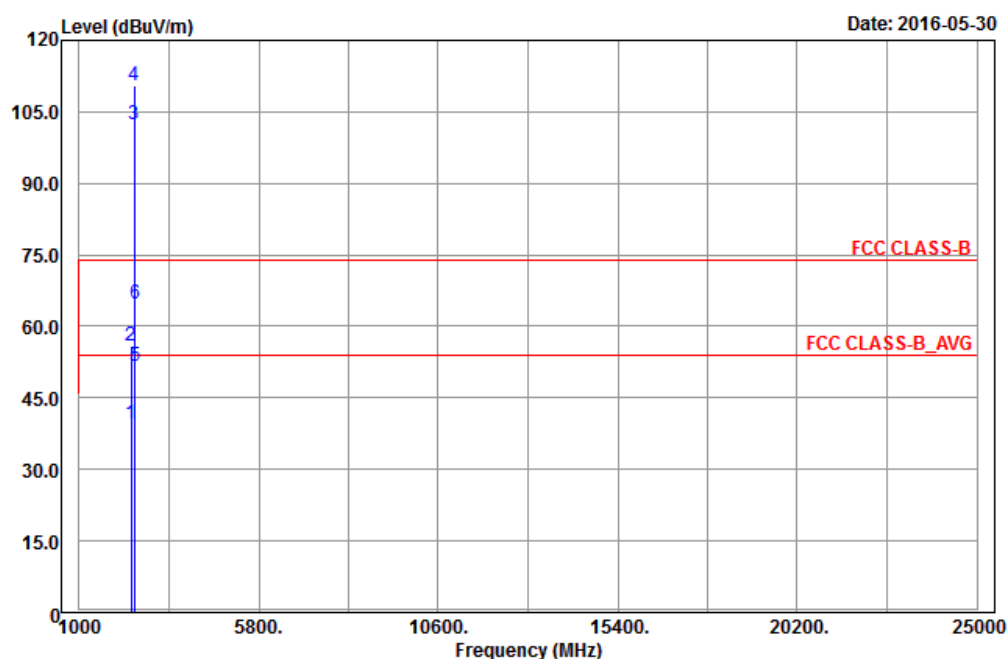
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



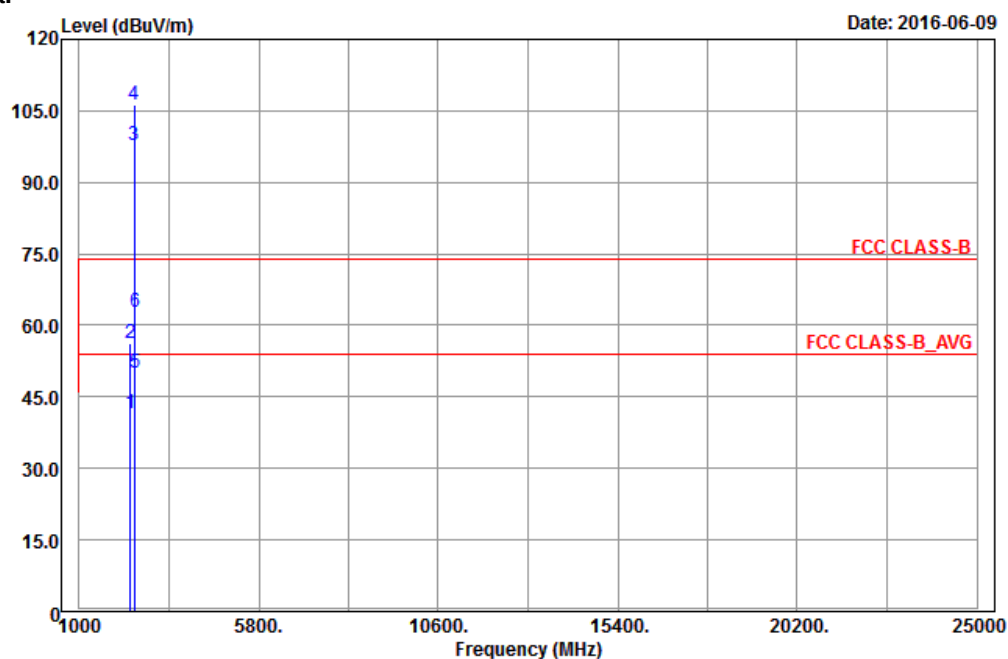
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	39.69	37.96	54	-14.31	31.8	5.4	35.47	198	290	Average
2390	56.59	54.86	74	-17.41	31.8	5.4	35.47	198	290	Peak
2462	100.86	98.93			31.87	5.5	35.44	198	290	Average
2462	108.21	106.28			31.87	5.5	35.44	198	290	Peak
2498	47.98	45.96	54	-6.02	31.9	5.53	35.41	110	290	Average
2498	60.67	58.65	74	-13.33	31.9	5.53	35.41	110	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	39.68	37.97	54	-14.32	31.8	5.4	35.49	100	24	Average
2388	55.8	54.09	74	-18.2	31.8	5.4	35.49	100	24	Peak
2462	102.36	100.43			31.87	5.5	35.44	100	24	Average
2462	110.44	108.51			31.87	5.5	35.44	100	24	Peak
2484	51.53	49.57	54	-2.47	31.88	5.5	35.42	102	181	Average
2484	64.65	62.69	74	-9.35	31.88	5.5	35.42	102	181	Peak

Remarks:

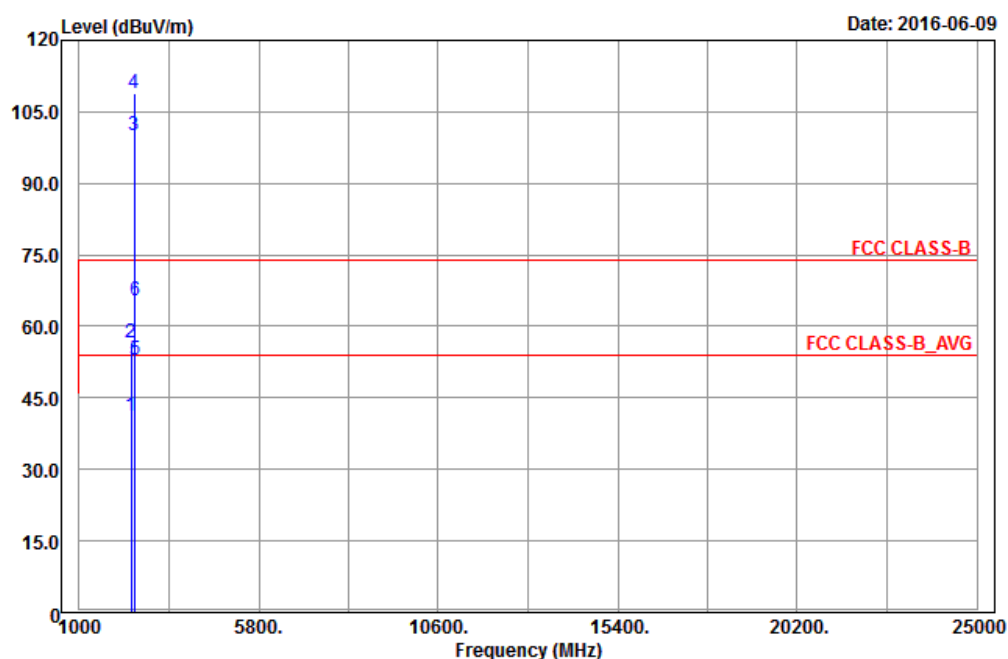
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



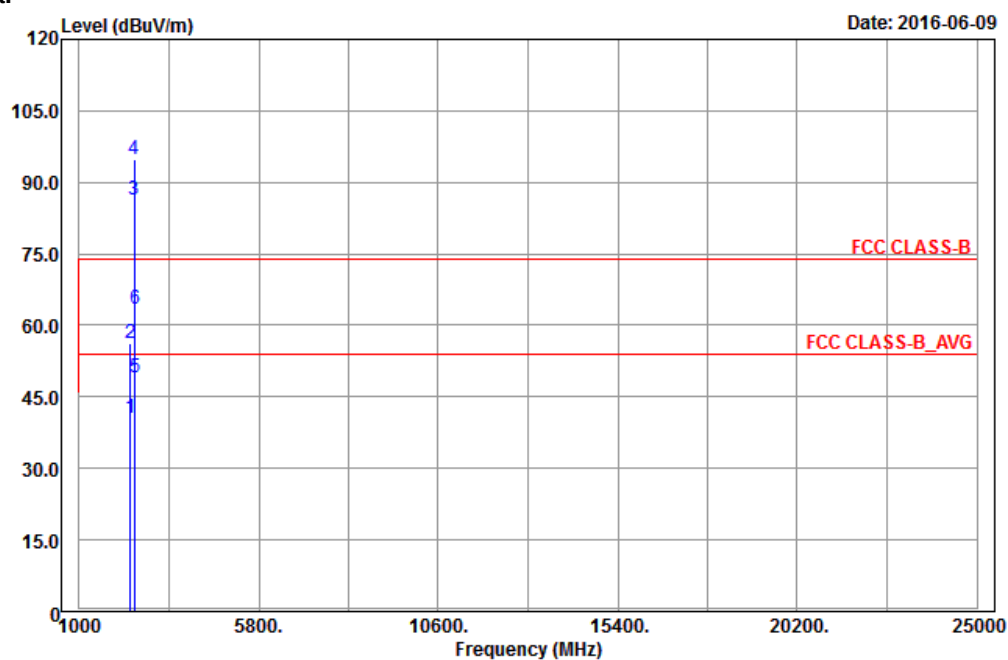
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	41.58	39.92	54	-12.42	31.78	5.37	35.49	261	64	Average
2376	56.2	54.54	74	-17.8	31.78	5.37	35.49	261	64	Peak
2467	97.85	95.9			31.87	5.5	35.42	261	64	Average
2467	106.31	104.36			31.87	5.5	35.42	261	64	Peak
2484	49.93	47.97	54	-4.07	31.88	5.5	35.42	261	64	Average
2484	62.72	60.76	74	-11.28	31.88	5.5	35.42	261	64	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382	41.3	39.61	54	-12.7	31.78	5.4	35.49	101	170	Average
2382	56.66	54.97	74	-17.34	31.78	5.4	35.49	101	170	Peak
2467	100	98.05			31.87	5.5	35.42	101	170	Average
2467	108.74	106.79			31.87	5.5	35.42	101	170	Peak
2484	52.86	50.9	54	-1.14	31.88	5.5	35.42	100	182	Average
2484	65.52	63.56	74	-8.48	31.88	5.5	35.42	100	182	Peak

Remarks:

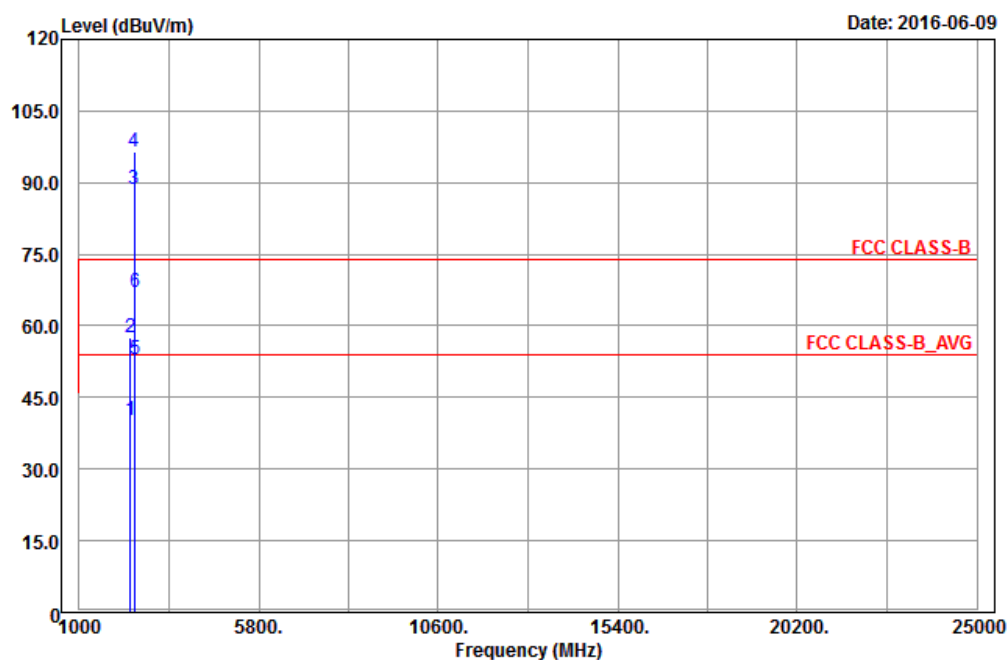
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2364	40.39	38.76	54	-13.61	31.76	5.37	35.5	262	60	Average
2364	56.34	54.71	74	-17.66	31.76	5.37	35.5	262	60	Peak
2472	86.2	84.24			31.88	5.5	35.42	262	60	Average
2472	94.97	93.01			31.88	5.5	35.42	262	60	Peak
2484	49.18	47.22	54	-4.82	31.88	5.5	35.42	258	60	Average
2484	63.55	61.59	74	-10.45	31.88	5.5	35.42	258	60	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2376	40.35	38.69	54	-13.65	31.78	5.37	35.49	100	172	Average
2376	57.46	55.8	74	-16.54	31.78	5.37	35.49	100	172	Peak
2472	88.75	86.79			31.88	5.5	35.42	100	172	Average
2472	96.4	94.44			31.88	5.5	35.42	100	172	Peak
2484	52.99	51.03	54	-1.01	31.88	5.5	35.42	105	169	Average
2484	67.06	65.1	74	-6.94	31.88	5.5	35.42	105	169	Peak

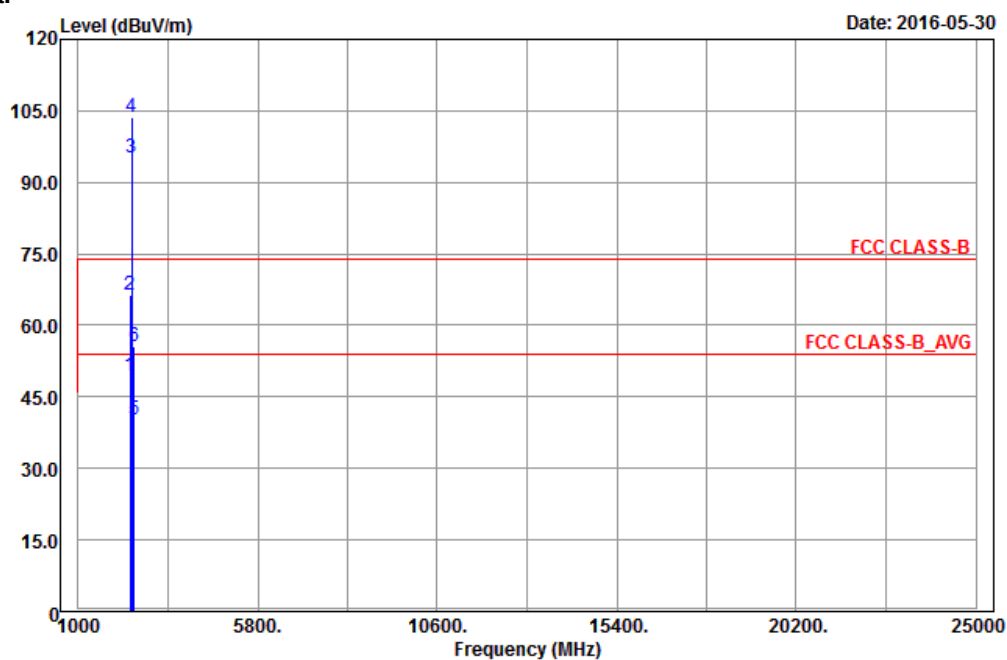
Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2472 MHz: Fundamental frequency.

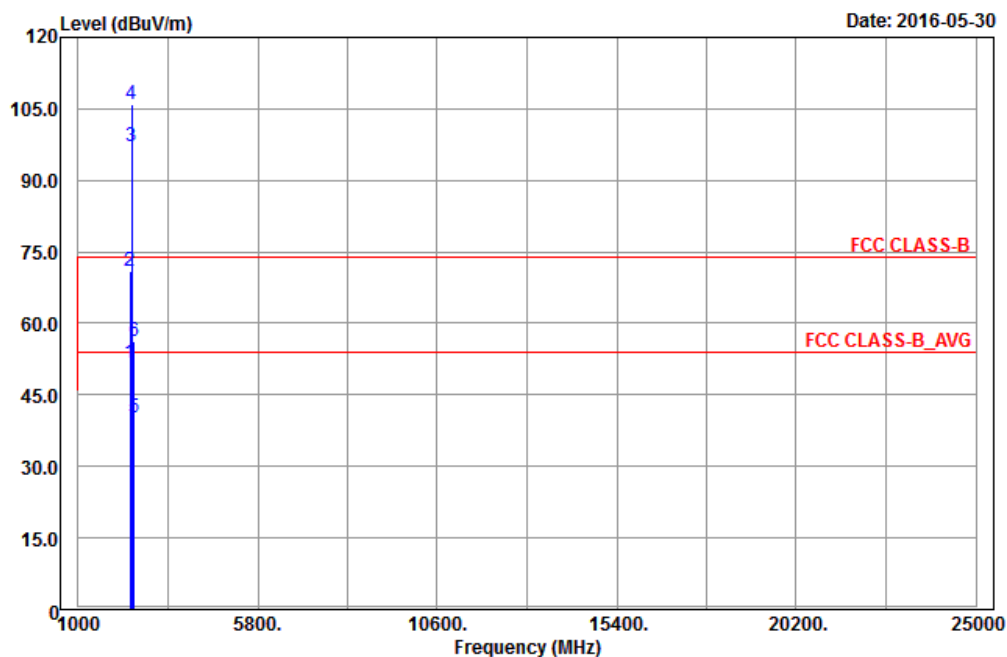
802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



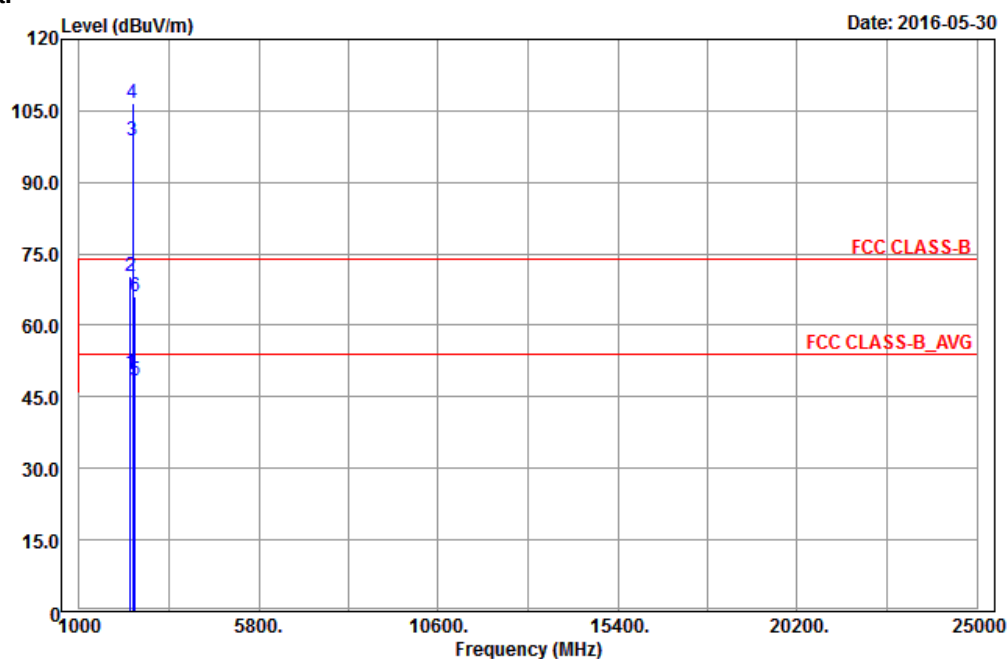
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382	49.28	47.59	54	-4.72	31.78	5.4	35.49	210	267	Average
2382	66.42	64.73	74	-7.58	31.78	5.4	35.49	210	267	Peak
2422	95.11	93.31			31.83	5.43	35.46	100	267	Average
2422	103.66	101.86			31.83	5.43	35.46	100	267	Peak
2484	40.23	38.27	54	-13.77	31.88	5.5	35.42	100	267	Average
2484	55.58	53.62	74	-18.42	31.88	5.5	35.42	100	267	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382	51.72	50.03	54	-2.28	31.78	5.4	35.49	275	24	Average
2382	70.89	69.2	74	-3.11	31.78	5.4	35.49	275	24	Peak
2422	97.06	95.26			31.83	5.43	35.46	309	24	Average
2422	105.82	104.02			31.83	5.43	35.46	309	24	Peak
2500	40.28	38.26	54	-13.72	31.9	5.53	35.41	309	24	Average
2500	56.1	54.08	74	-17.9	31.9	5.53	35.41	309	24	Peak

Remarks:

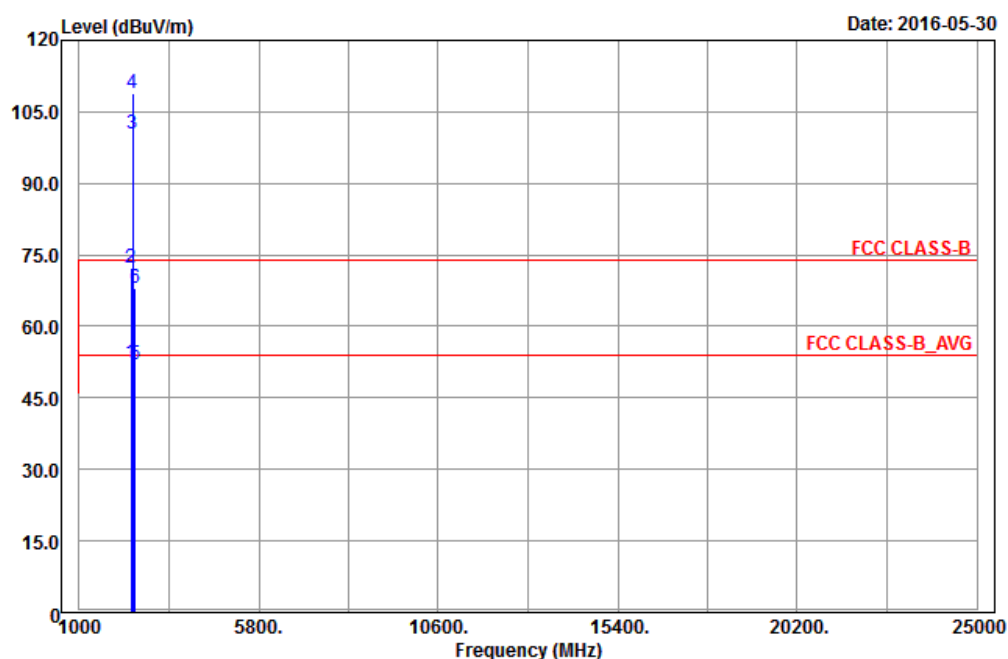
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



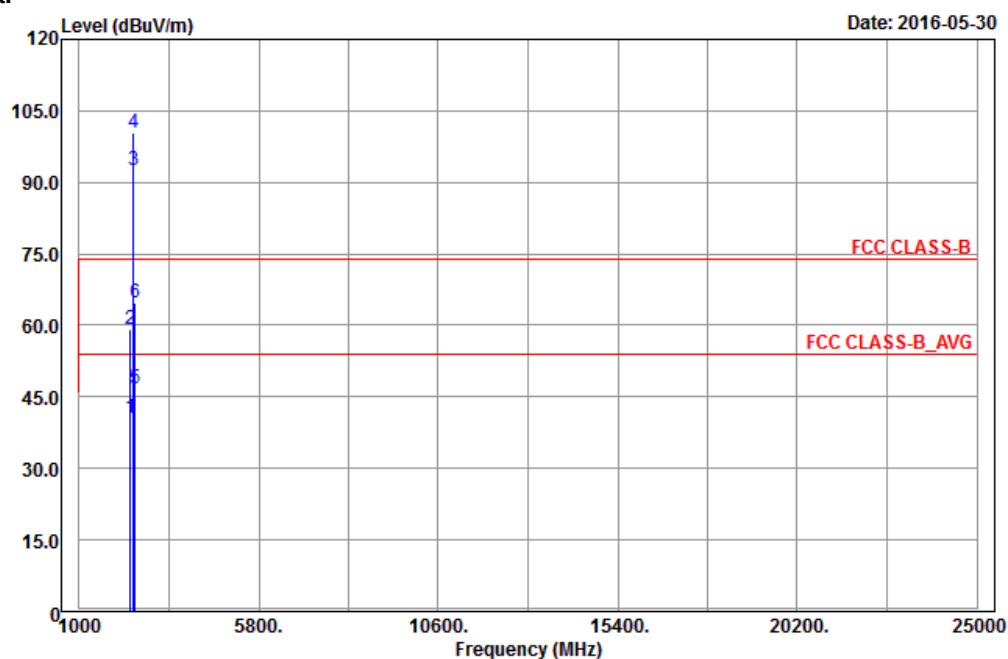
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2374	50.1	48.44	54	-3.9	31.78	5.37	35.49	100	290	Average
2374	70.41	68.75	74	-3.59	31.78	5.37	35.49	100	290	Peak
2437	98.75	96.9			31.85	5.46	35.46	113	290	Average
2437	106.72	104.87			31.85	5.46	35.46	113	290	Peak
2486	48.23	46.24	54	-5.77	31.88	5.53	35.42	110	290	Average
2486	66.07	64.08	74	-7.93	31.88	5.53	35.42	110	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	52.2	50.54	54	-1.8	31.78	5.37	35.49	305	22	Average
2380	72.23	70.57	74	-1.77	31.78	5.37	35.49	305	22	Peak
2437	100.31	98.46			31.85	5.46	35.46	102	24	Average
2437	108.82	106.97			31.85	5.46	35.46	102	24	Peak
2488	51.98	49.97	54	-2.02	31.9	5.53	35.42	101	181	Average
2488	67.96	65.95	74	-6.04	31.9	5.53	35.42	101	181	Peak

Remarks:

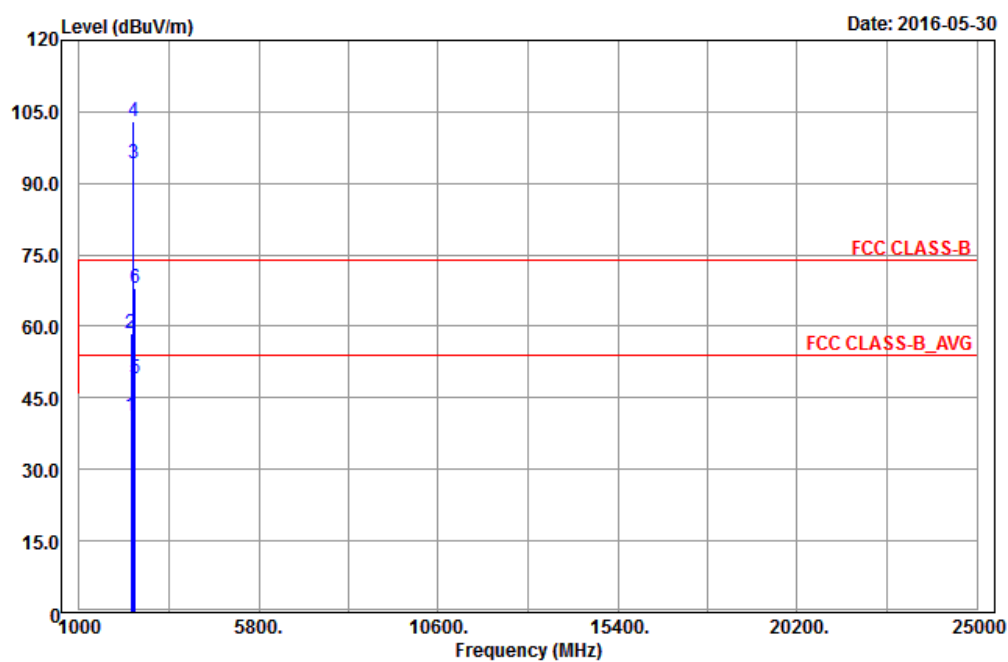
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



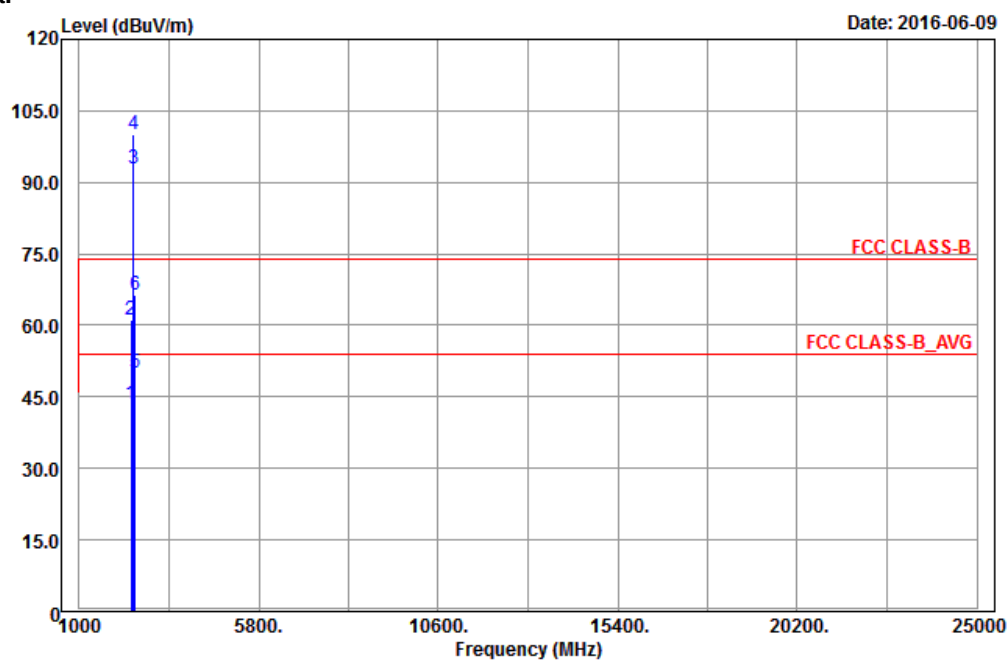
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2364	40.53	38.9	54	-13.47	31.76	5.37	35.5	198	290	Average
2364	59.22	57.59	74	-14.78	31.76	5.37	35.5	198	290	Peak
2452	92.41	90.54			31.85	5.46	35.44	198	290	Average
2452	100.42	98.55			31.85	5.46	35.44	198	290	Peak
2484	46.61	44.65	54	-7.39	31.88	5.5	35.42	255	290	Average
2484	64.61	62.65	74	-9.39	31.88	5.5	35.42	255	290	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	41.2	39.49	54	-12.8	31.8	5.4	35.49	101	9	Average
2388	58.69	56.98	74	-15.31	31.8	5.4	35.49	101	9	Peak
2452	94.31	92.44			31.85	5.46	35.44	101	9	Average
2452	102.87	101			31.85	5.46	35.44	101	9	Peak
2490	48.91	46.9	54	-5.09	31.9	5.53	35.42	103	176	Average
2490	68.01	66	74	-5.99	31.9	5.53	35.42	103	176	Peak

Remarks:

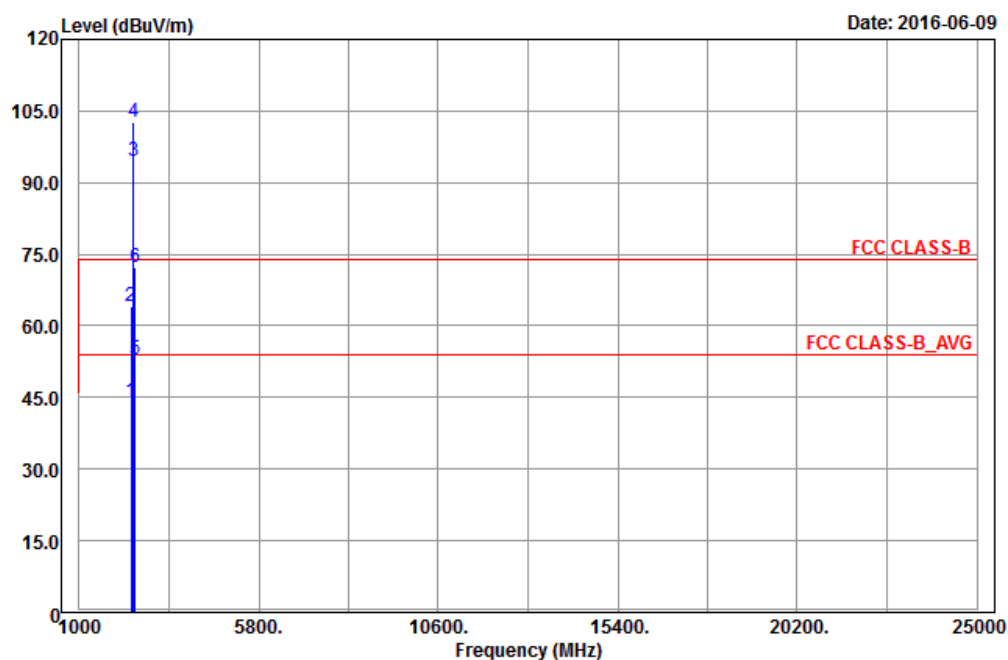
- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2452 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 10	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



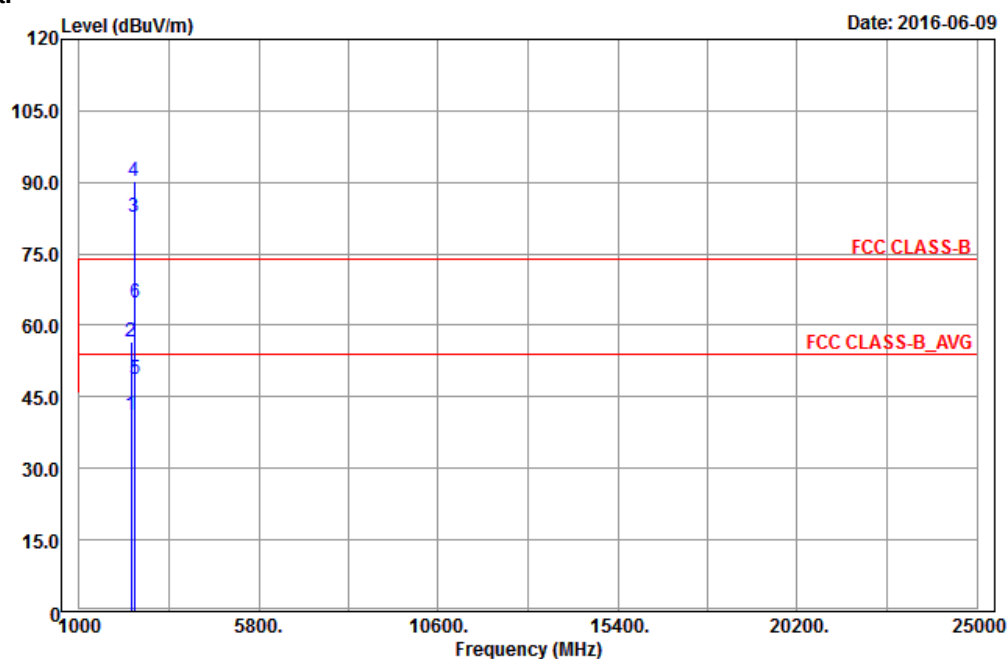
Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2386	43.46	41.75	54	-10.54	31.8	5.4	35.49	261	64	Average
2386	61.23	59.52	74	-12.77	31.8	5.4	35.49	261	64	Peak
2457	92.79	90.9			31.87	5.46	35.44	261	64	Average
2457	100	98.11			31.87	5.46	35.44	261	64	Peak
2486	49.9	47.91	54	-4.1	31.88	5.53	35.42	261	64	Average
2486	66.5	64.51	74	-7.5	31.88	5.53	35.42	261	64	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2382	44.18	42.49	54	-9.82	31.78	5.4	35.49	100	195	Average
2382	63.98	62.29	74	-10.02	31.78	5.4	35.49	100	195	Peak
2457	94.52	92.63			31.87	5.46	35.44	103	171	Average
2457	102.65	100.76			31.87	5.46	35.44	103	171	Peak
2486	52.81	50.82	54	-1.19	31.88	5.53	35.42	101	179	Average
2486	72.19	70.2	74	-1.81	31.88	5.53	35.42	101	179	Peak

Remarks:

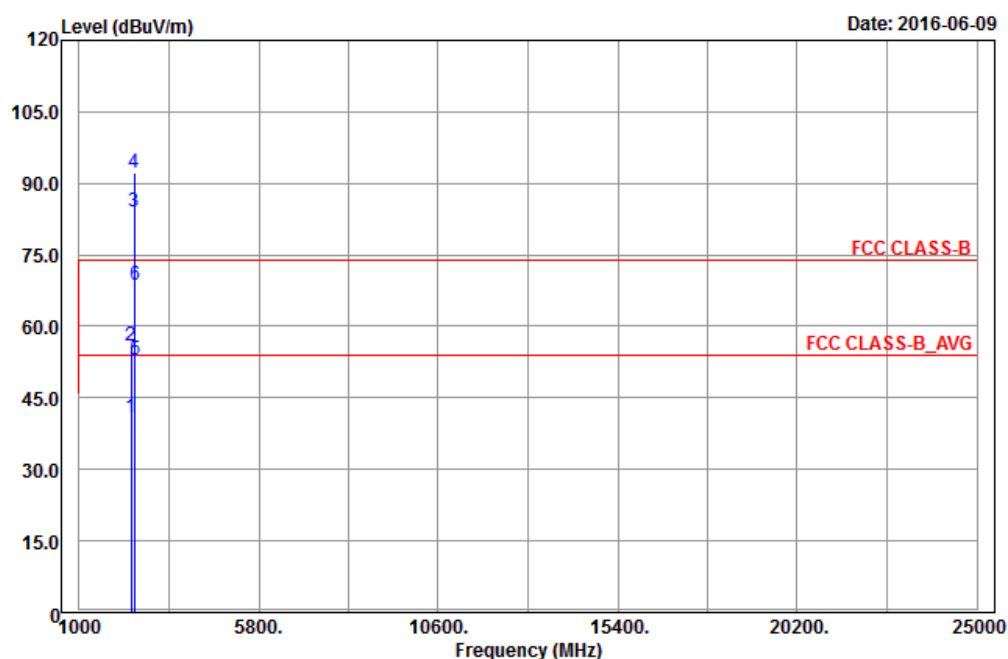
1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
2. 2457 MHz: Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2380	41.04	39.38	54	-12.96	31.78	5.37	35.49	262	60	Average
2380	56.57	54.91	74	-17.43	31.78	5.37	35.49	262	60	Peak
2462	82.83	80.9			31.87	5.5	35.44	262	60	Average
2462	90.11	88.18			31.87	5.5	35.44	262	60	Peak
2484	48.82	46.86	54	-5.18	31.88	5.5	35.42	248	60	Average
2484	64.74	62.78	74	-9.26	31.88	5.5	35.42	248	60	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2388	40.83	39.12	54	-13.17	31.8	5.4	35.49	100	172	Average
2388	55.92	54.21	74	-18.08	31.8	5.4	35.49	100	172	Peak
2462	84.03	82.1			31.87	5.5	35.44	100	172	Average
2462	92.28	90.35			31.87	5.5	35.44	100	172	Peak
2484	52.96	51	54	-1.04	31.88	5.5	35.42	100	177	Average
2484	68.72	66.76	74	-5.28	31.88	5.5	35.42	100	177	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.

9 kHz ~ 30 MHz DATA:

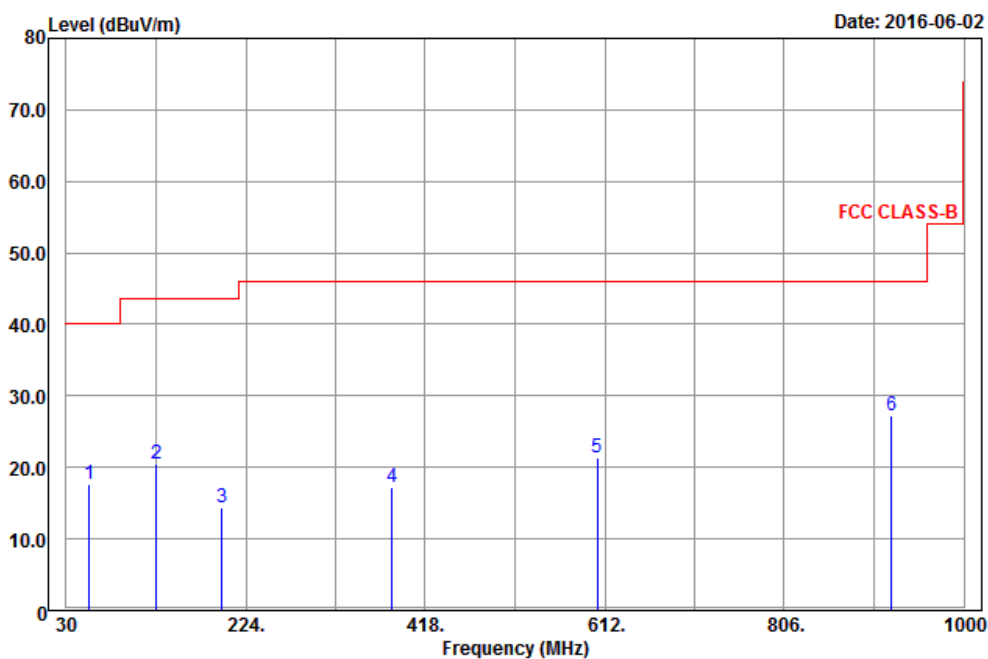
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz WORST-CASE DATA:

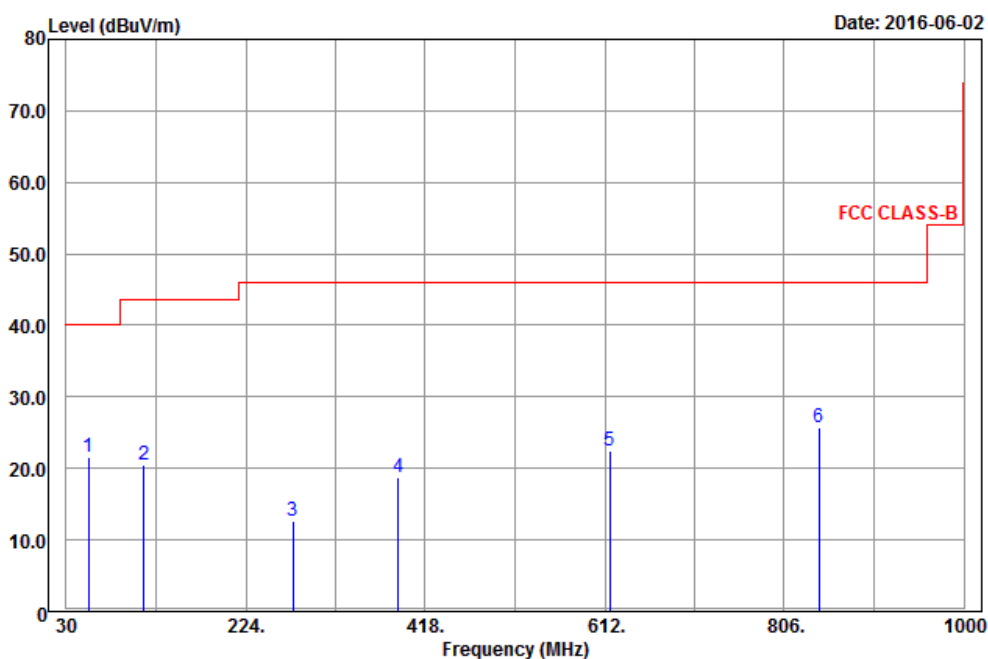
802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Horizontal



Vertical



Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
55.11	17.75	41.81	40	-22.25	7.27	0.9	32.23	104	169	Peak
127.2	20.58	42.37	43.5	-22.92	9.07	1.38	32.24	133	128	Peak
198.21	14.4	34.29	43.5	-29.1	10.79	1.61	32.29	173	145	Peak
381.9	17.2	30.13	46	-28.8	16.9	2.34	32.17	124	153	Peak
603.8	21.3	29.38	46	-24.7	21.24	2.87	32.19	129	164	Peak
921.6	27.33	28.92	46	-18.67	26.2	3.53	31.32	184	116	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
54.03	21.49	45.43	40	-18.51	7.39	0.9	32.23	116	193	Peak
113.7	20.58	42.41	43.5	-22.92	9.14	1.28	32.25	127	146	Peak
275.43	12.69	29.16	46	-33.31	13.71	1.94	32.12	106	138	Peak
388.9	18.76	31.26	46	-27.24	17.35	2.34	32.19	184	169	Peak
617.8	22.48	29.92	46	-23.52	21.81	2.93	32.18	137	142	Peak
843.9	25.76	30.46	46	-20.24	23.75	3.38	31.83	115	124	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

4.2 Conducted Output Power Measurement

4.2.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

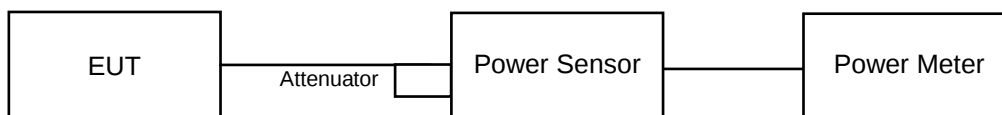
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20 MHz channel widths with $NANT \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedures

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.28	19.86	203.487	23.09	30	Pass
6	2437	20.72	20.29	224.938	23.52	30	Pass
11	2462	20.48	20.28	218.346	23.39	30	Pass
12	2467	18.73	18.24	141.326	21.50	30	Pass
13	2472	15.49	15.35	69.677	18.43	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.85	21.64	298.990	24.76	30	Pass
6	2437	23.30	23.04	415.169	26.18	30	Pass
11	2462	21.98	21.79	308.769	24.90	30	Pass
12	2467	18.20	17.82	126.603	21.02	30	Pass
13	2472	9.68	9.22	17.646	12.47	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.84	21.56	295.975	24.71	30	Pass
6	2437	23.58	23.47	450.365	26.54	30	Pass
11	2462	21.35	21.12	265.878	24.25	30	Pass
12	2467	19.41	19.13	169.144	22.28	30	Pass
13	2472	7.92	7.59	11.936	10.77	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.14	18.01	128.404	21.09	30	Pass
6	2437	23.71	23.34	450.738	26.54	30	Pass
9	2452	16.49	16.33	87.519	19.42	30	Pass
10	2457	16.46	16.29	86.819	19.39	30	Pass
11	2462	8.27	8.11	13.186	11.20	30	Pass

802.11b

Channel	Frequency (MHz)	AVG Power (dBm)		Total Power (dBm)
		Chain 0	Chain 1	
1	2412	17.98	17.88	20.94
6	2437	18.42	18.24	21.34
11	2462	18.17	18.01	21.10
12	2467	11.45	11.11	14.29
13	2472	10.57	10.11	13.36

802.11g

Channel	Frequency (MHz)	AVG Power (dBm)		Total Power (dBm)
		Chain 0	Chain 1	
1	2412	15.54	15.51	18.54
6	2437	17.99	17.88	20.95
11	2462	15.98	15.85	18.93
12	2467	12.13	12.01	15.08
13	2472	2.98	2.78	5.89

802.11n (HT20)

Channel	Frequency (MHz)	AVG Power (dBm)		Total Power (dBm)
		Chain 0	Chain 1	
1	2412	15.57	15.51	18.55
6	2437	18.01	17.94	20.99
11	2462	14.73	14.53	17.64
12	2467	12.56	12.51	15.55
13	2472	0.7	0.55	3.64

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (dBm)
		Chain 0	Chain 1	
3	2422	11.54	11.51	14.54
6	2437	17.71	17.31	20.52
9	2452	9.43	9.33	12.39
10	2457	9.39	9.24	12.33
11	2462	1.05	1.01	4.04

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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