

FCC Test Report

Report No.: RFBEDV-WTW-P20090534-3 R2

FCC ID: C3K1950

Test Model: 1950, 1951 (See section 3.1 for more detail)

Received Date: Sep. 29, 2020

Test Date: Sep. 29, 2020 ~ Jan. 13, 2021

Issued Date: Feb. 24, 2021

Applicant: Microsoft Corporation

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

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Taiwan

FCC Registration / 788550 / TW0003

Designation Number: 427177 / TW0011



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Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results.....	6
2.1 Measurement Uncertainty.....	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes.....	9
3.2.1 Test Mode Applicability and Tested Channel Detail.....	10
3.3 Duty Cycle of Test Signal	12
3.4 Description of Support Units	22
3.4.1 Configuration of System under Test	22
3.5 General Description of Applied Standards and References	22
4 Test Types and Results	23
4.1 Radiated Emission and Bandedge Measurement	23
4.1.1 Limits of Radiated Emission and Bandedge Measurement	23
4.1.2 Test Instruments	24
4.1.3 Test Procedures.....	26
4.1.4 Deviation from Test Standard	28
4.1.5 Test Set Up	28
4.1.6 EUT Operating Conditions.....	29
4.1.7 Test Results	30
4.2 Conducted Emission Measurement.....	558
4.2.1 Limits of Conducted Emission Measurement	558
4.2.2 Test Instruments	558
4.2.3 Test Procedures.....	559
4.2.4 Deviation from Test Standard	559
4.2.5 Test Setup.....	559
4.2.6 EUT Operating Conditions.....	559
4.2.7 Test Results	560
4.3 6 dB Bandwidth Measurement.....	564
4.3.1 Limits of 6 dB Bandwidth Measurement.....	564
4.3.2 Test Setup.....	564
4.3.3 Test Instruments	564
4.3.4 Test Procedure	564
4.3.5 Deviation from Test Standard	564
4.3.6 EUT Operating Conditions.....	564
4.3.7 Test Results	565
4.4 Occupied Bandwidth Measurement.....	576
4.4.1 Test Setup.....	576
4.4.2 Test Instruments	576
4.4.3 Test Procedure	576
4.4.4 Deviation from Test Standard	576
4.4.5 EUT Operating Conditions.....	576
4.4.6 Test Results	577
4.5 Conducted Output Power Measurement	585
4.5.1 Limits of Conducted Output Power Measurement.....	585
4.5.2 Test Setup.....	585
4.5.3 Test Instruments	585
4.5.4 Test Procedures.....	585
4.5.5 Deviation from Test Standard	585
4.5.6 EUT Operating Conditions.....	585
4.5.7 Test Results	586

4.6	Power Spectral Density Measurement	595
4.6.1	Limits of Power Spectral Density Measurement.....	595
4.6.2	Test Setup.....	595
4.6.3	Test Instruments	595
4.6.4	Test Procedure	595
4.6.5	Deviation from Test Standard	596
4.6.6	EUT Operating Condition	596
4.6.7	Test Results	597
4.7	Conducted Out of Band Emission Measurement	616
4.7.1	Limits of Conducted Out of Band Emission Measurement.....	616
4.7.2	Test Setup.....	616
4.7.3	Test Instruments	616
4.7.4	Test Procedure	616
4.7.5	Deviation from Test Standard	616
4.7.6	EUT Operating Condition	616
4.7.7	Test Results	617
5	Pictures of Test Arrangements.....	677
	Appendix – Information of the Testing Laboratories	678

Release Control Record

Issue No.	Description	Date Issued
RFBEDV-WTW-P20090534-3	Original Release	Jan. 18, 2021
RFBEDV-WTW-P20090534-3 R1	Revise antenna's information	Feb. 09, 2021
RFBEDV-WTW-P20090534-3 R2	Revise Band-Edge data	Feb. 24, 2021

1 Certificate of Conformity

Product: Portable Computing Device

Brand: Microsoft

Test Model: 1950, 1951 (See section 3.1 for more detail)

Sample Status: Identical Prototype

Applicant: Microsoft Corporation

Test Date: Sep. 29, 2020 ~ Jan. 13, 2021

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 RF characteristics under the conditions specified in this report.

Prepared by :



Date: Feb. 24, 2021

Lena Wang / Specialist

Approved by :



Date: Feb. 24, 2021

Dylan Chiou / Senior Project Engineer

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	Pass	Meet the requirement of limit. Minimum passing margin is -8.34 dB at 0.15000 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.5 dB at 2483.5 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	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	Portable Computing Device
Brand	Microsoft
Test Model	1950, 1951
Model Difference	Refer to Note as below
Status of EUT	Identical Prototype
Power Supply Rating	120 Vac
Modulation Type	WCKK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
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 300 Mbps 802.11ax: up to 574 Mbps
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20), 802.11ax (HE20) 9 for 802.11n (HT40), 802.11ax (HE40)
Output Power	Chain A 79.433 mW Chain B 88.92 mW MIMO 157.236 mW Partial RU Chain A 77.09 mW Chain B 87.297 mW MIMO 154.894 mW
HW Version (Product)	EV2
SW Version (Product)	4.89.137
HW Version (Radio)	N/A
SW Version (Radio)	21.80.2.1
Radio Test Tool & Version	DRTU: 21.80.2.1
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 incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX (SISO mode) / 2TX (MIMO mode)
802.11n (HT40)	1TX (SISO mode) / 2TX (MIMO mode)
802.11ax (HE20)	1TX (SISO mode) / 2TX (MIMO mode)
802.11ax (HE40)	1TX (SISO mode) / 2TX (MIMO mode)

2. All models are listed as below.

Config	Brand	Model	Description
1	Microsoft	1950	The difference between 1950 and 1951 models is the C-Cover. 1950 - Config 1 and 1951 - Config 2
2		1951	

3. The antenna used in this EUT is listed as below table:

	Frequency (MHz)	Type	Model	Brand	Connector	Gain (dBi)
WLAN	2412 ~ 2472 MHz	PIFA	Main (Left Antenna Chain B) / CNA987-16-SK2-C	Shenghai Amphenol Airwave	N/A	2.4
			AUX (Right Antenna Chain A) / CNB674-16-SK2-C			-0.1

4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	Microsoft	P/M	--
Adapter 2	Microsoft	P/N	--

* After pretesting, the adapter 1 was the worst case and chose for final test.

5. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
6. The above EUT information is declared by manufacturer and for more detailed features description, please refers 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), 802.11ax (HE20):

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		

7 channels are provided for 802.11n (HT40), 802.11ax (HE40):

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	
A	-	-	√	-	Config. 1
B	√	√	√	√	Config. 2

Where **RE $\geq$ 1G**: Radiated Emission above 1 GHz
PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1 GHz
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)
B	WLAN	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
		802.11g	1 to 13	1, 2, 3, 6, 11, 12, 13	OFDM	BPSK	6.0
		802.11n (HT20)	1 to 13	1, 2, 3, 6, 11, 12, 13	OFDM	BPSK	6.5
		802.11n (HT40)	3 to 11	3, 4, 5, 6, 9, 10, 11	OFDM	BPSK	13.5
		802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	13.5
	Partial RU	802.11ax (HE20)	1 to 13	1, 2, 10, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 4, 5, 7, 8, 9, 10, 11	OFDMA	BPSK	13.5

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)
B	802.11ax (HE40)	3 to 11	6	OFDMA	BPSK	13.5
	802.11n (HT20)	1 to 13	12	OFDM	BPSK	6.5
	802.11ax (HE40)	3 to 11	11	OFDMA	BPSK	13.5

Power Line Conducted Emission Test:

- ☒ 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)
A, B	802.11ax (HE40)	3 to 11	6	OFDMA	BPSK	13.5

Bandedge Measurement:

- ☒ 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)
B	WLAN	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
		802.11g	1 to 13	1, 2, 3, 6, 11, 12, 13	OFDM	BPSK	6.0
		802.11n (HT20)	1 to 13	1, 2, 3, 6, 11, 12, 13	OFDM	BPSK	6.5
		802.11n (HT40)	3 to 11	3, 4, 5, 6, 9, 10, 11	OFDM	BPSK	13.5
		802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	13.5
	Partial RU	802.11ax (HE20)	1 to 13	1, 2, 10, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 4, 5, 7, 8, 9, 10, 11	OFDMA	BPSK	13.5

Antenna Port Conducted Measurement:

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ 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)
B	WLAN	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	6.5
		802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	13.5
		802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	13.5
	Partial RU	802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	6.5
		802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	13.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥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
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jones Chang
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyoung Wang

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

Duty cycle of test signal is $< 98\%$, duty factor shall be considered.

SISO_Chain A

802.11b: Duty cycle = $8.345/8.4 = 0.993$

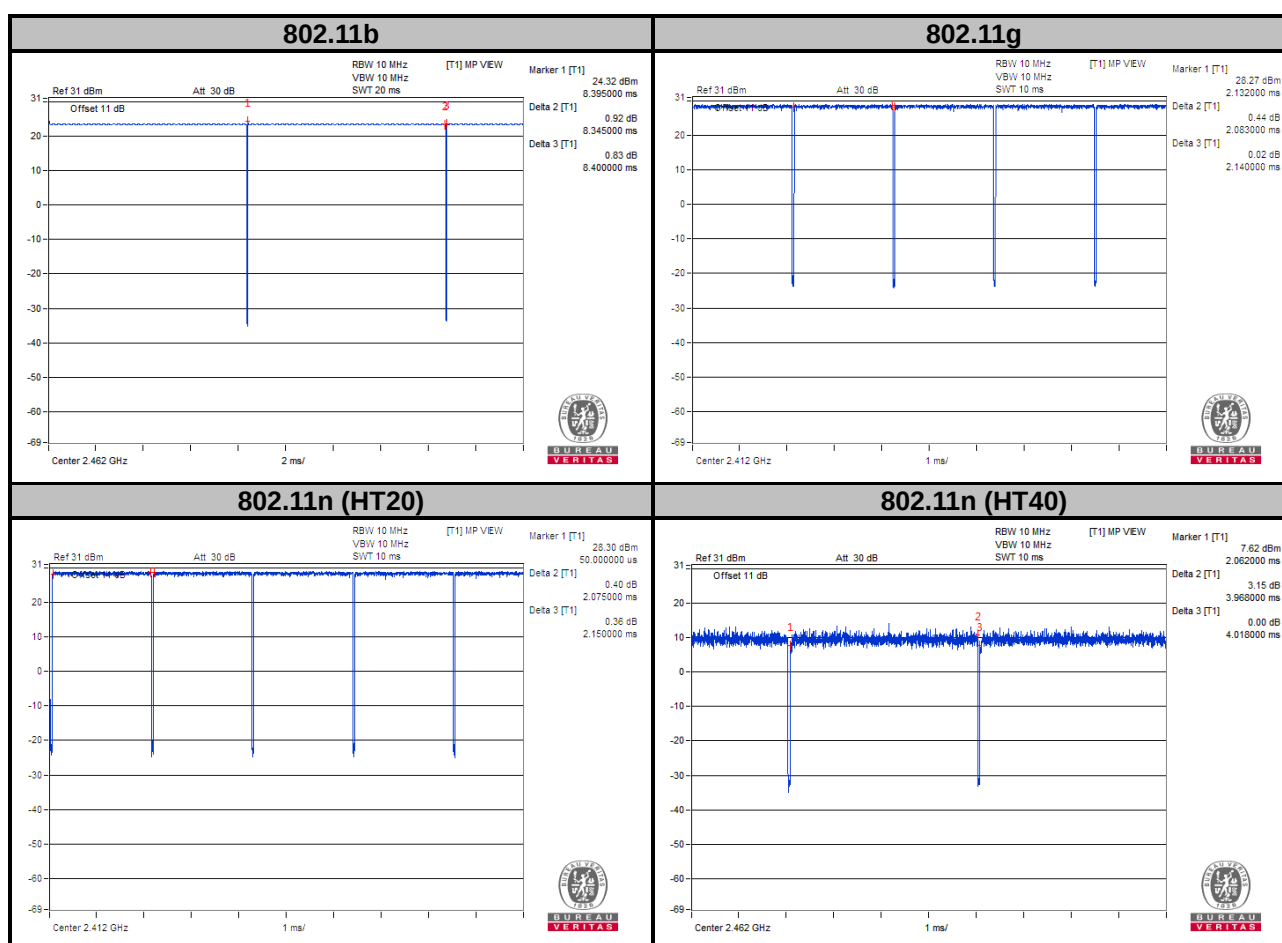
802.11g: Duty cycle = $2.083/2.14 = 0.973$, Duty factor = $10 * \log(1/0.973) = 0.12$

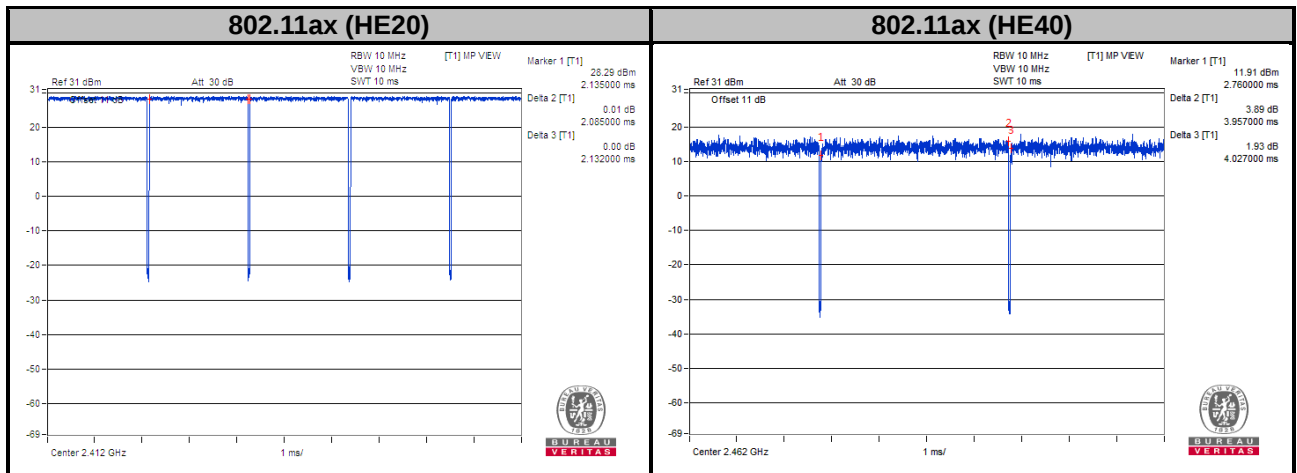
802.11n (HT20): Duty cycle = $2.075/2.15 = 0.965$, Duty factor = $10 * \log(1/0.965) = 0.15$

802.11n (HT40): Duty cycle = $3.968/4.018 = 0.988$

802.11ax (HE20): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE40): Duty cycle = $3.957/4.027 = 0.983$





SISO_Chain B

802.11b: Duty cycle = $8.345/8.4 = 0.993$

802.11g: Duty cycle = $2.077/2.147 = 0.967$, Duty factor = $10 * \log(1/0.967) = 0.14$

802.11n (HT20): Duty cycle = $2.085/2.137 = 0.976$, Duty factor = $10 * \log(1/0.976) = 0.11$

802.11n (HT40): Duty cycle = $3.97/4.018 = 0.988$

802.11ax (HE20): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE40): Duty cycle = $3.96/4.008 = 0.988$



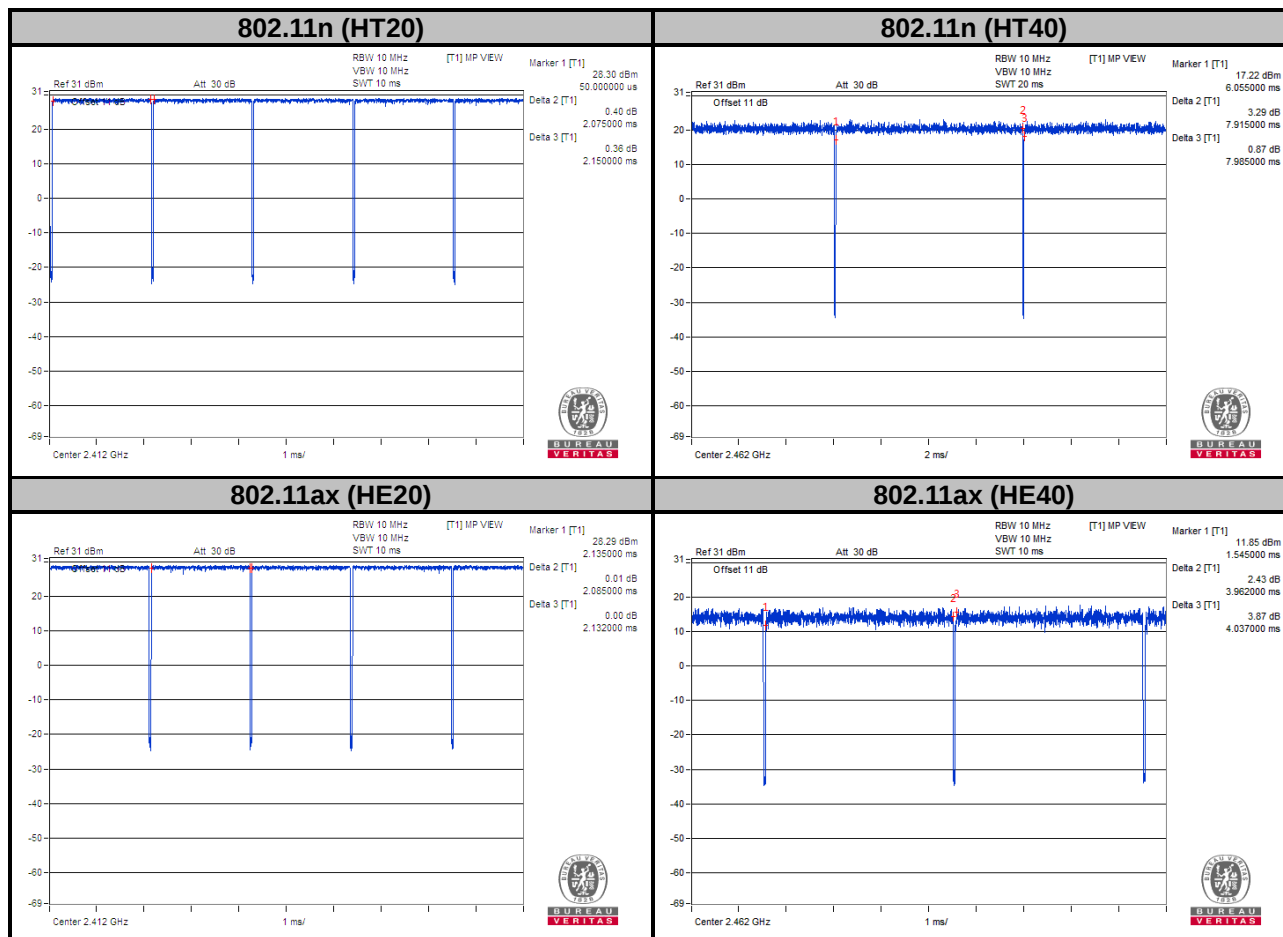
MIMO

802.11n (HT20): Duty cycle = $2.075/2.15 = 0.965$, Duty factor = $10 * \log(1/0.965) = 0.15$

802.11n (HT40): Duty cycle = $7.915/7.985 = 0.991$

802.11ax (HE20): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE40): Duty cycle = $3.962/4.037 = 0.981$



Partial RU SISO_Chain A

802.11ax (HE20) (26, 0): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (26, 8): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (52, 37): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

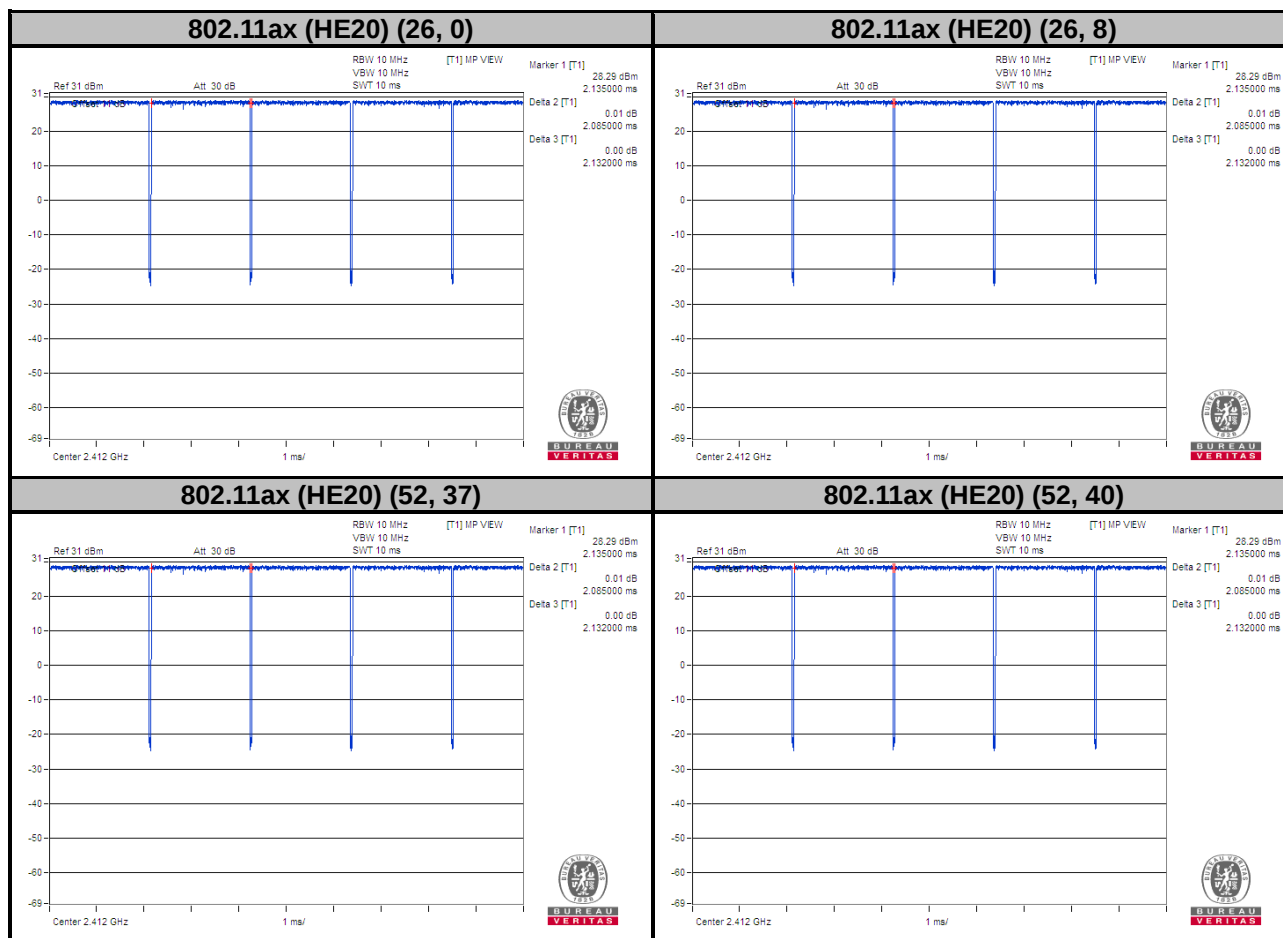
802.11ax (HE20) (52, 40): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (106, 53): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

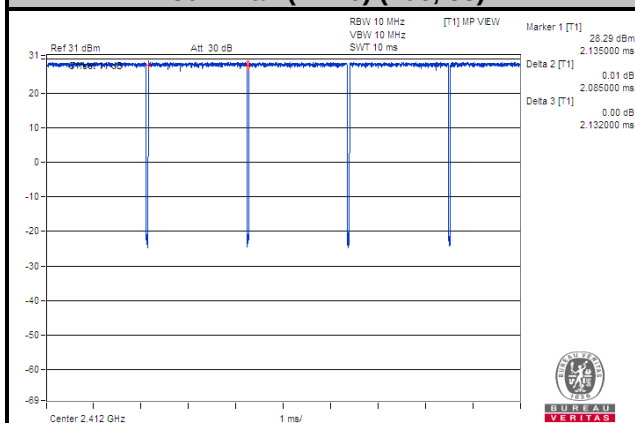
802.11ax (HE20) (106, 54): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE40) (242, 61): Duty cycle = $3.98/4.03 = 0.988$

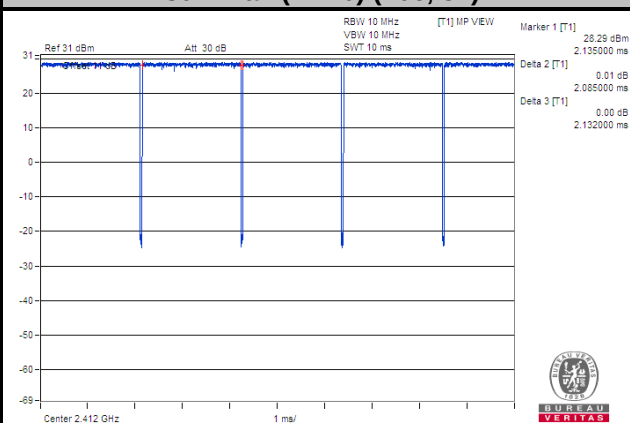
802.11ax (HE40) (242, 62): Duty cycle = $0.285/0.334 = 0.853$, Duty factor = $10 * \log(1/0.853) = 0.69$



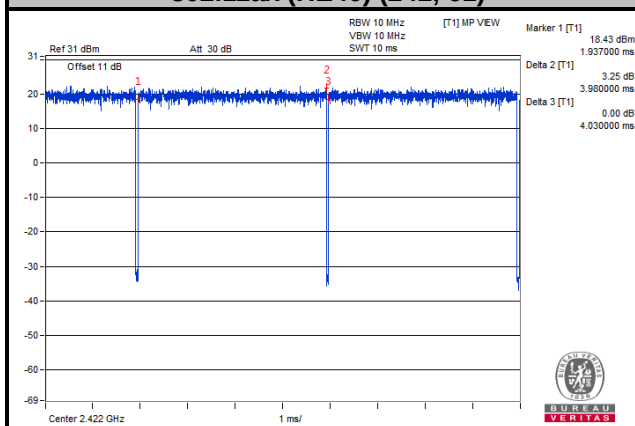
802.11ax (HE20) (106, 53)



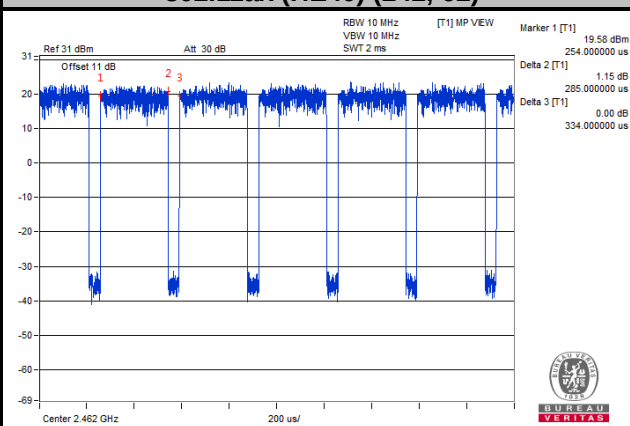
802.11ax (HE20) (106, 54)



802.11ax (HE40) (242, 61)



802.11ax (HE40) (242, 62)



SISO_Chain B

02.11ax (HE20) (26, 0): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE20) (26, 8): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE20) (52, 37): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE20) (52, 40): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

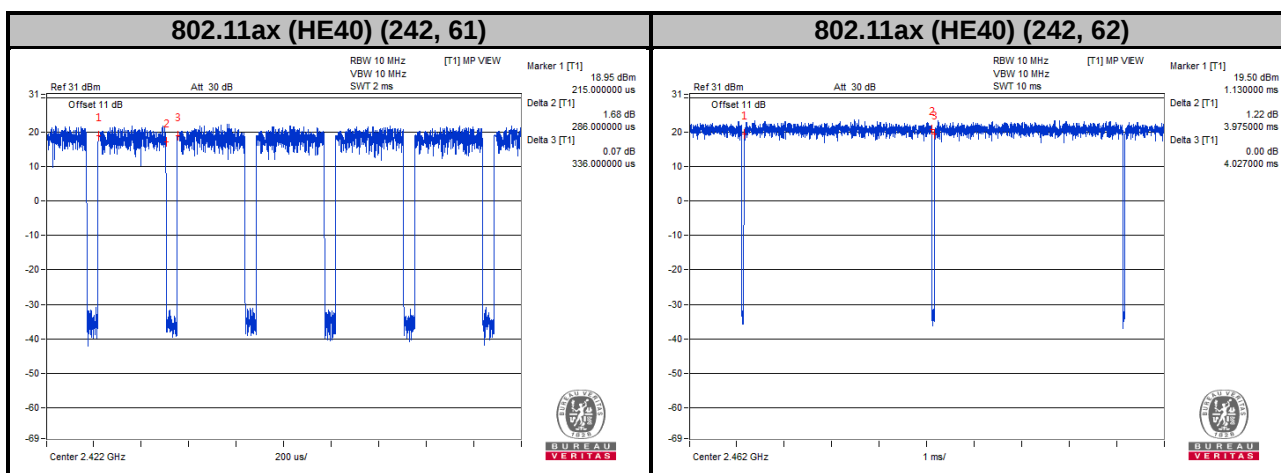
802.11ax (HE20) (106, 53): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE20) (106, 54): Duty cycle = $2.082/2.147 = 0.97$, Duty factor = $10 * \log(1/0.97) = 0.13$

802.11ax (HE40) (242, 61): Duty cycle = $0.286/0.336 = 0.851$, Duty factor = $10 * \log(1/0.851) = 0.70$

802.11ax (HE40) (242, 62): Duty cycle = $3.975/4.027 = 0.987$





MIMO

02.11ax (HE20) (26, 0): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (26, 8): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (52, 37): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (52, 40): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

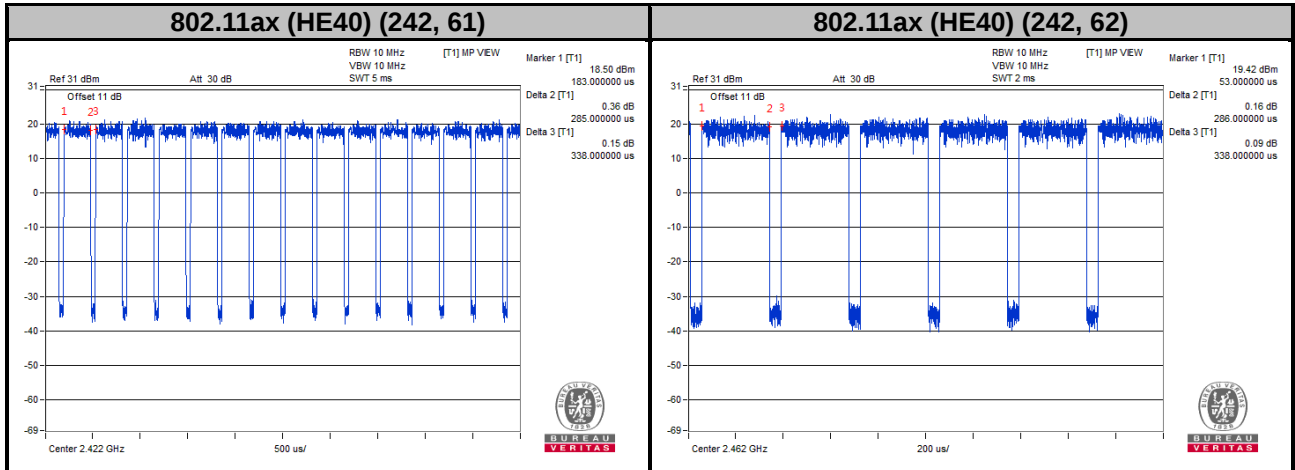
802.11ax (HE20) (106, 53): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE20) (106, 54): Duty cycle = $2.085/2.132 = 0.978$, Duty factor = $10 * \log(1/0.978) = 0.10$

802.11ax (HE40) (242, 61): Duty cycle = $0.285/0.338 = 0.843$, Duty factor = $10 * \log(1/0.843) = 0.74$

802.11ax (HE40) (242, 62): Duty cycle = $0.286/0.338 = 0.846$, Duty factor = $10 * \log(1/0.846) = 0.73$

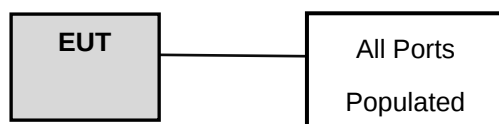




3.4 Description of Support Units

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.

3.4.1 Configuration of System under Test



Note: The EUT is tested with all external accessory ports populated.

3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)

ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02

KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

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	MY52260177	Aug. 24, 2020	Aug. 23, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
			Nov. 09, 2020	Nov. 08, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier Agilent	310N	187226	Jun. 17, 2020	Jun. 16, 2021
Preamplifier Agilent	83017A	MY39501357	Jun. 17, 2020	Jun. 16, 2021
Preamplifier EMCI	EMC 184045	980116	Oct. 08, 2019	Oct. 07, 2020
			Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 17, 2020	Jun. 16, 2021
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 17, 2020	Jun. 17, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 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) or Peak detection (PK) 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 $\geq 1/T$ (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.

SISO_Chain A

802.11b: RBW = 1 MHz, VBW = 10 Hz

802.11g: RBW = 1 MHz, VBW = 10 kHz

802.11n (HT20): RBW = 1 MHz, VBW = 10 kHz

802.11n (HT40): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE20): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40): RBW = 1 MHz, VBW = 10 Hz

SISO_Chain B

802.11b: RBW = 1 MHz, VBW = 10 Hz

802.11g: RBW = 1 MHz, VBW = 10 kHz

802.11n (HT20): RBW = 1 MHz, VBW = 10 kHz

802.11n (HT40): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE20): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE40): RBW = 1 MHz, VBW = 10 Hz

MIMO

802.11n (HT20): RBW = 1 MHz, VBW = 10 kHz

802.11n (HT40): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE20): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40): RBW = 1 MHz, VBW = 10 Hz

Partial RU

SISO_Chain A

802.11ax (HE20) (26, 0): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE20) (26, 8): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 37): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 40): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (106, 53): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE20) (106, 54): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE40) (242, 61): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE40) (242, 62): RBW = 1 MHz, VBW = 10 kHz

SISO_Chain B

802.11ax (HE20) (26, 0): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (26, 8): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 37): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 40): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (106, 53): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE20) (106, 54): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40) (242, 61): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40) (242, 62): RBW = 1 MHz, VBW = 10 Hz

MIMO

802.11ax (HE20) (26, 0): RBW = 1 MHz, VBW = 10 Hz

802.11ax (HE20) (26, 8): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 37): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (52, 40): RBW = 1 MHz, VBW = 3 kHz

802.11ax (HE20) (106, 53): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE20) (106, 54): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40) (242, 61): RBW = 1 MHz, VBW = 10 kHz

802.11ax (HE40) (242, 62): RBW = 1 MHz, VBW = 10 kHz

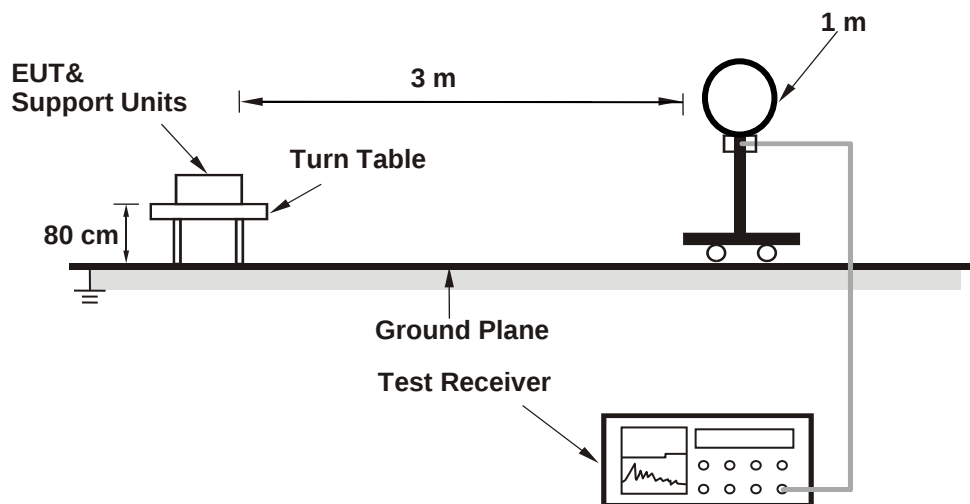
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

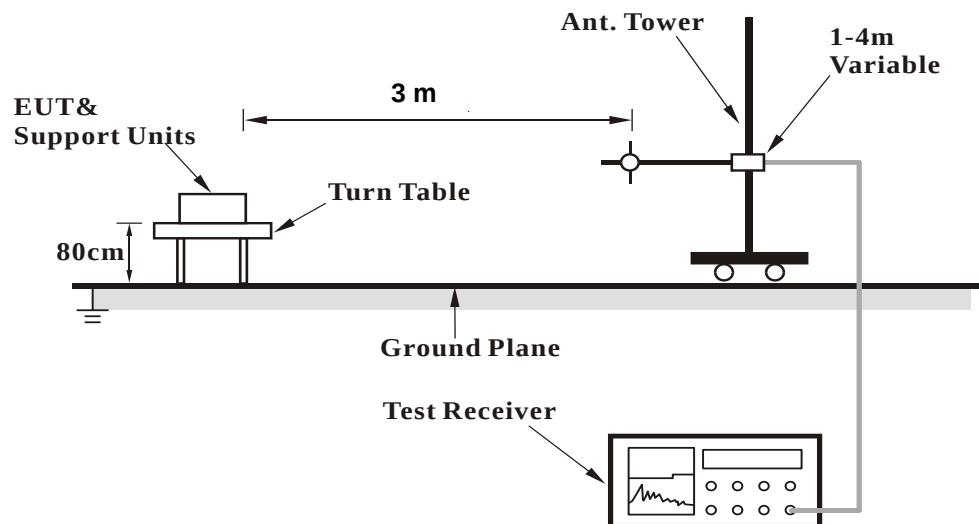
No deviation.

4.1.5 Test Set Up

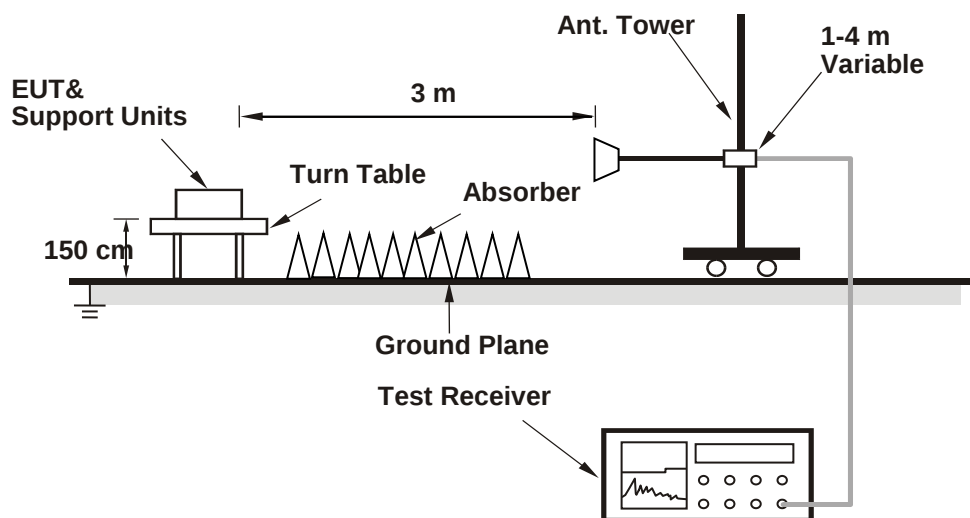
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission 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

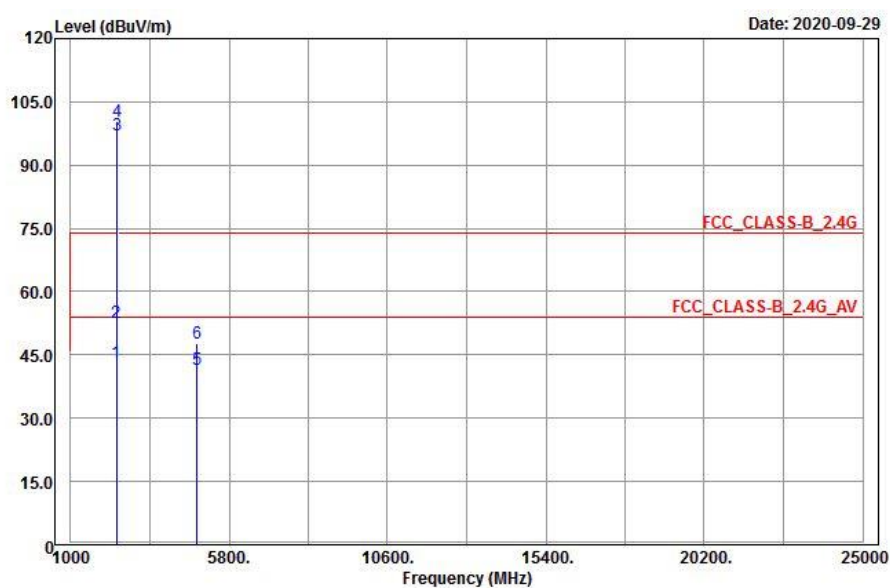
Above 1 GHz Data :

SISO_Chain A

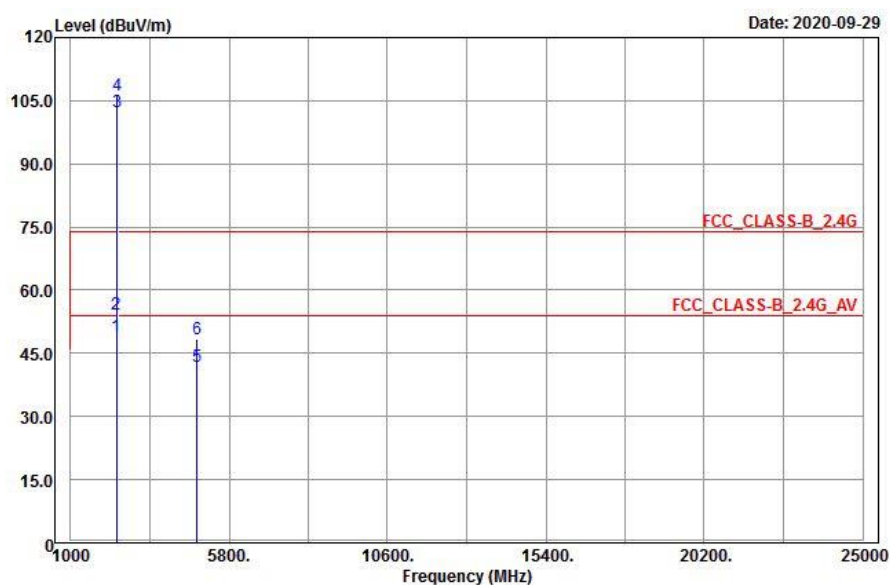
802.11b

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



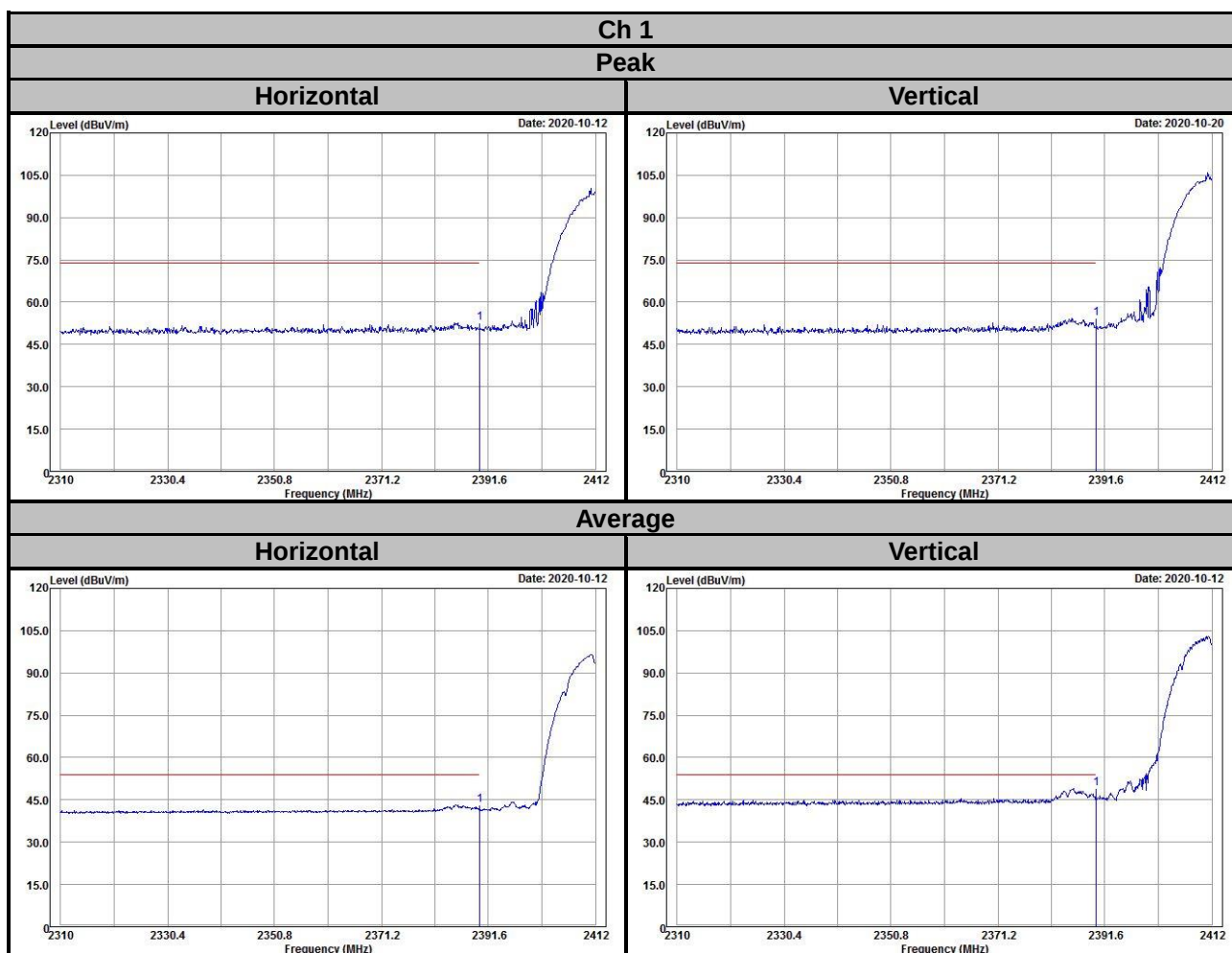
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	43.31	38.81	4.5	54	-10.69	103	63	Average
2390	52.56	48.06	4.5	74	-21.44	103	63	Peak
2412	97.27	92.72	4.55			103	63	Average
2412	100.52	95.97	4.55			103	63	Peak
4824	41.46	31.17	10.29	54	-12.54	132	86	Average
4824	47.61	37.32	10.29	74	-26.39	132	86	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	48.91	44.41	4.5	54	-5.09	110	205	Average
2390	54.24	49.74	4.5	74	-19.76	110	205	Peak
2412	102.47	97.92	4.55			110	205	Average
2412	106.42	101.87	4.55			110	205	Peak
4824	41.74	31.45	10.29	54	-12.26	162	46	Average
4824	48.29	38	10.29	74	-25.71	162	46	Peak

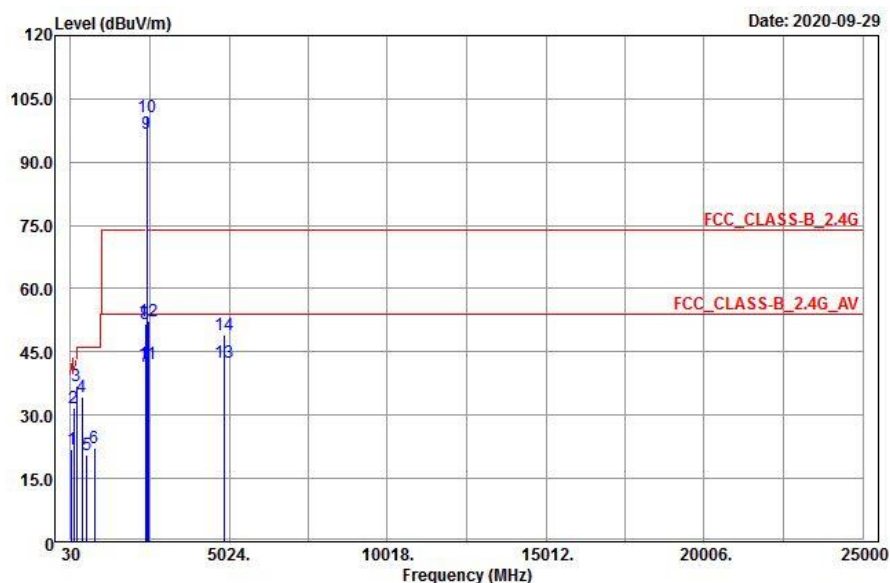
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

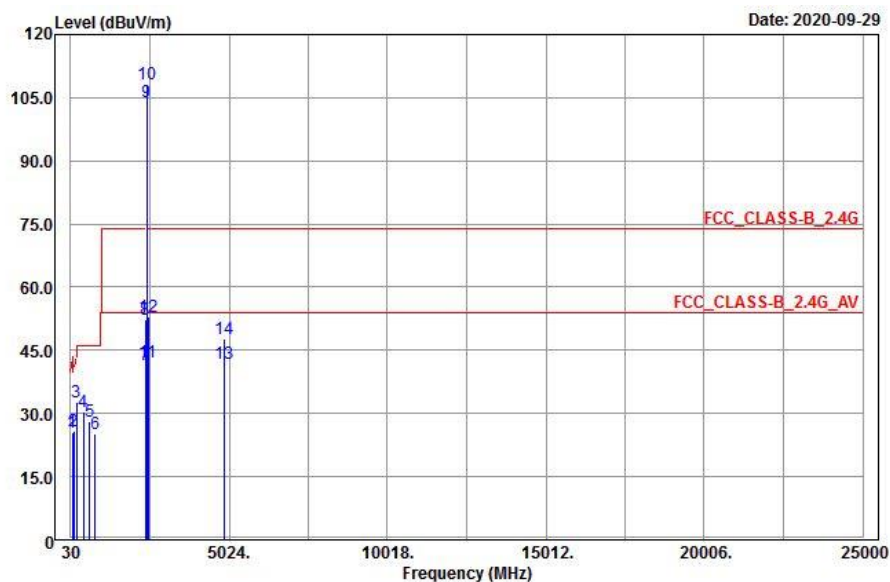


EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	30 MHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Above 1 GHz:Peak (PK)& Average(AV) Below 1 GHz:Peak (PK) or Quasi-Peak(QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
68.88	21.91	41.05	-19.14	40	-18.09	168	121	Peak
124.23	31.62	51.49	-19.87	43.5	-11.88	154	175	Peak
212.52	36.82	54.89	-18.07	43.5	-6.68	131	109	Peak
384	34.22	48.4	-14.18	46	-11.78	180	194	Peak
545	20.67	32.32	-11.65	46	-25.33	154	121	Peak
768.3	22.11	30.37	-8.26	46	-23.89	190	36	Peak
2390	41.53	37.03	4.5	54	-12.47	132	68	Average
2390	51.55	47.05	4.5	74	-22.45	132	68	Peak
2437	96.93	92.34	4.59			132	68	Average
2437	100.82	96.23	4.59			132	68	Peak
2483.5	42.22	37.56	4.66	54	-11.78	132	68	Average
2483.5	52.33	47.67	4.66	74	-21.67	132	68	Peak
4874	42.59	32.38	10.21	54	-11.41	124	198	Average
4874	49.03	38.82	10.21	74	-24.97	124	198	Peak

Antenna Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
75.36	25.48	46.71	-21.23	40	-14.52	112	169	Peak
127.47	25.86	46.05	-20.19	43.5	-17.64	188	205	Peak
225.21	32.55	50.17	-17.62	46	-13.45	164	107	Peak
428.1	30.44	43.97	-13.53	46	-15.56	153	206	Peak
626.2	28.14	38.52	-10.38	46	-17.86	187	102	Peak
802.6	25.27	32.84	-7.57	46	-20.73	154	342	Peak
2390	41.68	37.18	4.5	54	-12.32	160	206	Average
2390	52.25	47.75	4.5	74	-21.75	160	206	Peak
2437	104.09	99.5	4.59			160	206	Average
2437	108.16	103.57	4.59			160	206	Peak
2483.5	42.24	37.58	4.66	54	-11.76	160	206	Average
2483.5	53.08	48.42	4.66	74	-20.92	160	206	Peak
4874	41.87	31.66	10.21	54	-12.13	133	286	Average
4874	47.83	37.62	10.21	74	-26.17	133	286	Peak

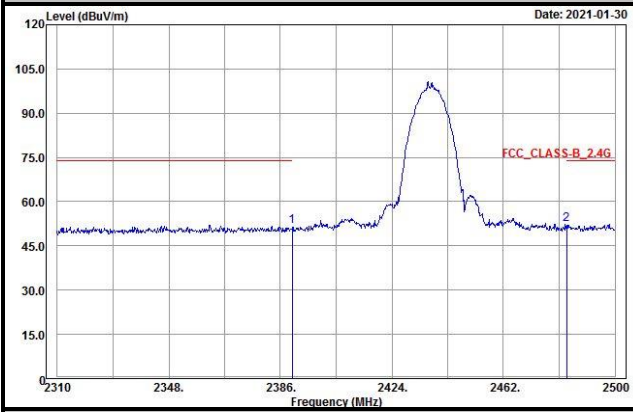
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

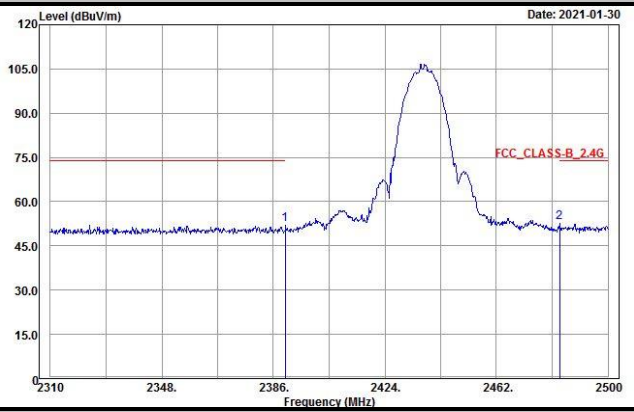
Ch 6

Peak

Horizontal

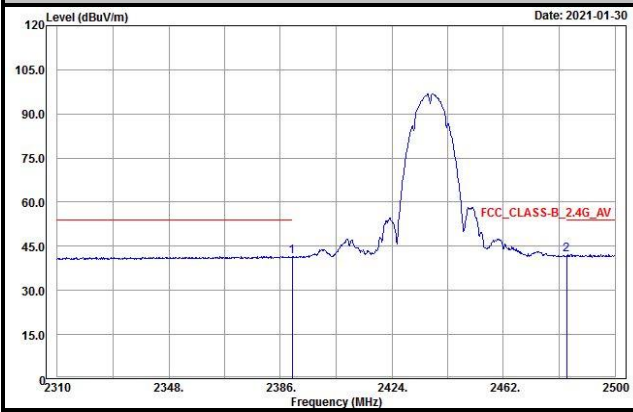


Vertical

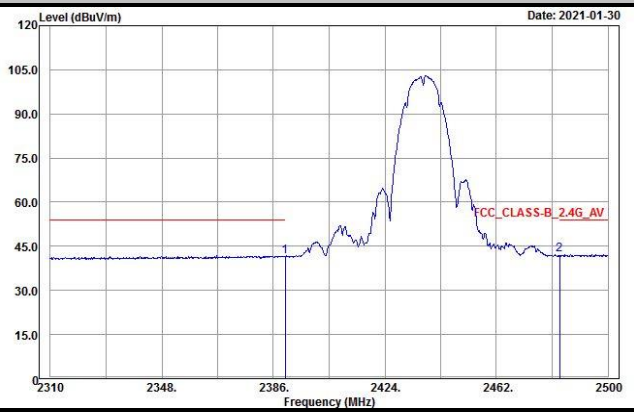


Average

Horizontal

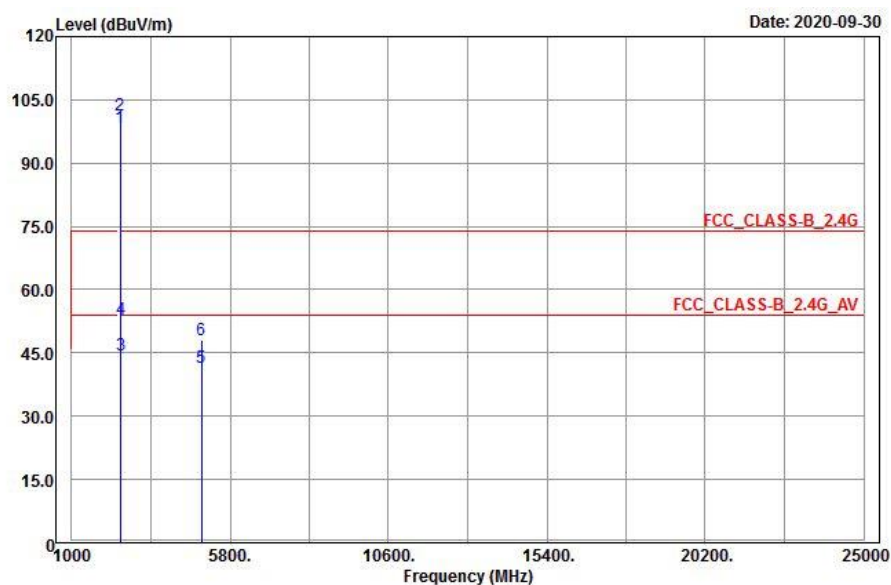


Vertical

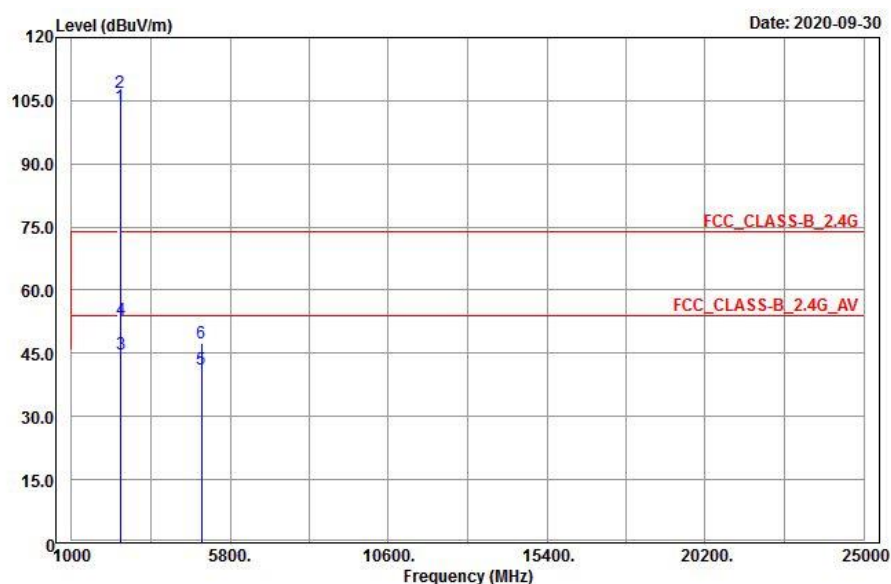


EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	98.58	93.96	4.62			100	60	Average
2462	101.27	96.65	4.62			100	60	Peak
2483.5	44.34	39.68	4.66	54	-9.66	100	60	Average
2483.5	52.81	48.15	4.66	74	-21.19	100	60	Peak
4924	41.62	31.37	10.25	54	-12.38	190	123	Average
4924	47.91	37.66	10.25	74	-26.09	190	123	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	103.65	99.03	4.62			120	198	Average
2462	106.86	102.24	4.62			120	198	Peak
2483.5	44.87	40.21	4.66	54	-9.13	120	198	Average
2483.5	53.12	48.46	4.66	74	-20.88	120	198	Peak
4924	41.16	30.91	10.25	54	-12.84	102	243	Average
4924	47.38	37.13	10.25	74	-26.62	102	243	Peak

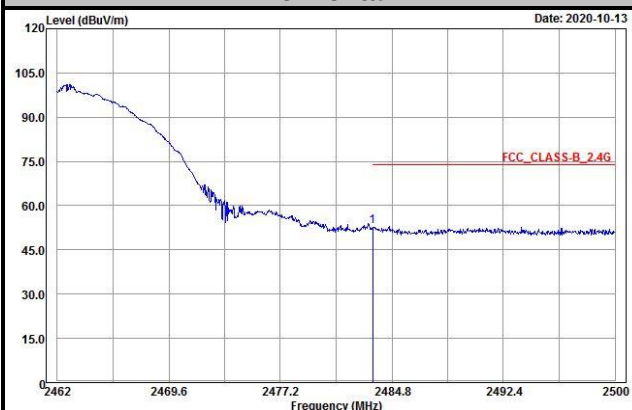
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

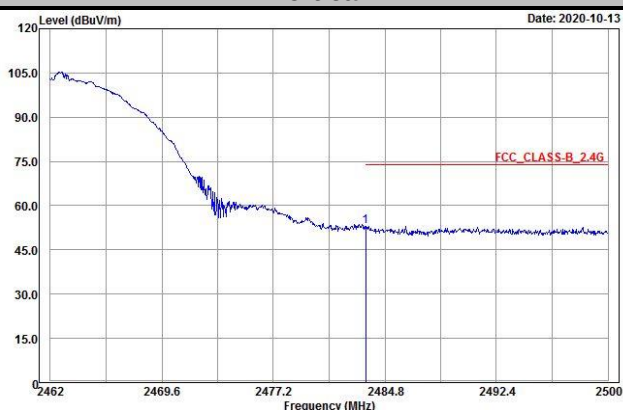
Ch 11

Peak

Horizontal

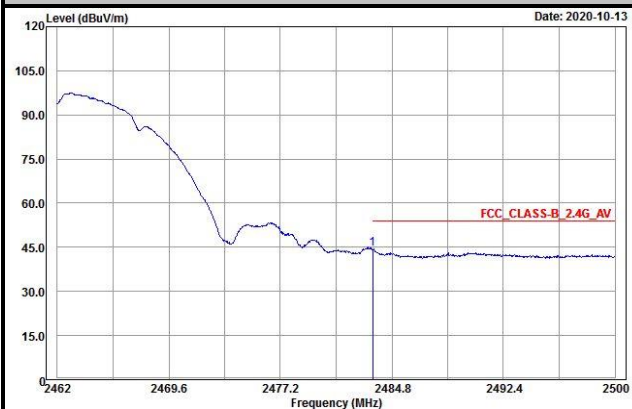


Vertical

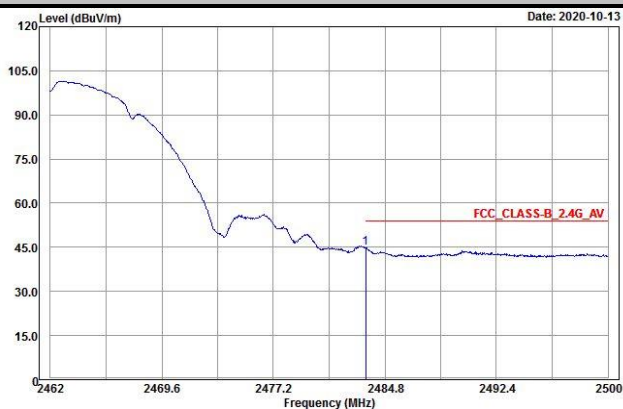


Average

Horizontal

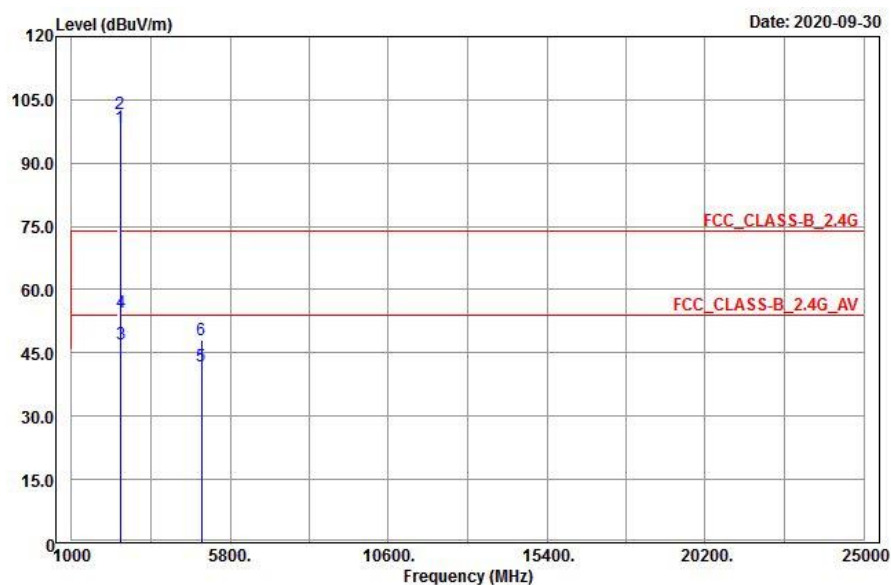


Vertical

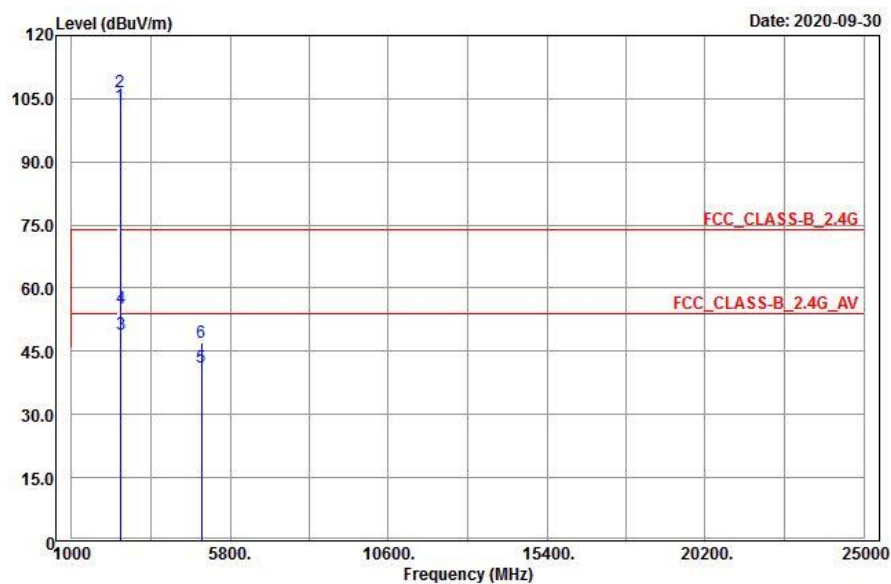


EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	98.34	93.71	4.63			100	60	Average
2467	101.61	96.98	4.63			100	60	Peak
2483.5	47.22	42.56	4.66	54	-6.78	100	60	Average
2483.5	54.66	50	4.66	74	-19.34	100	60	Peak
4934	41.86	31.6	10.26	54	-12.14	181	71	Average
4934	48	37.74	10.26	74	-26	181	71	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	103.48	98.85	4.63			181	200	Average
2467	106.45	101.82	4.63			181	200	Peak
2483.5	48.95	44.29	4.66	54	-5.05	181	200	Average
2483.5	55.16	50.5	4.66	74	-18.84	181	200	Peak
4934	41.22	30.96	10.26	54	-12.78	102	301	Average
4934	47.11	36.85	10.26	74	-26.89	102	301	Peak

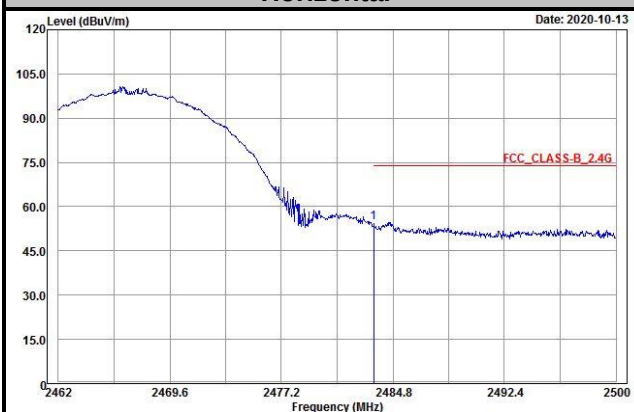
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

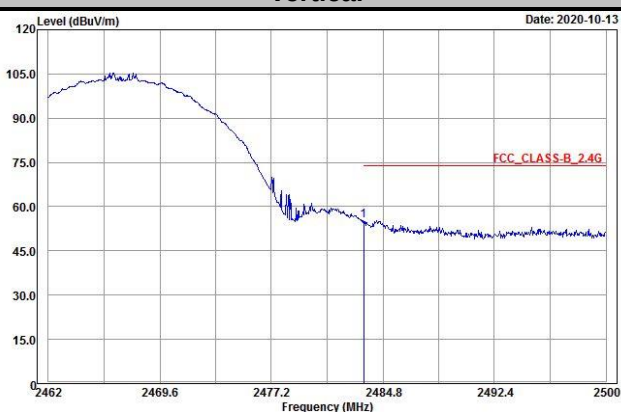
Ch 12

Peak

Horizontal



Vertical

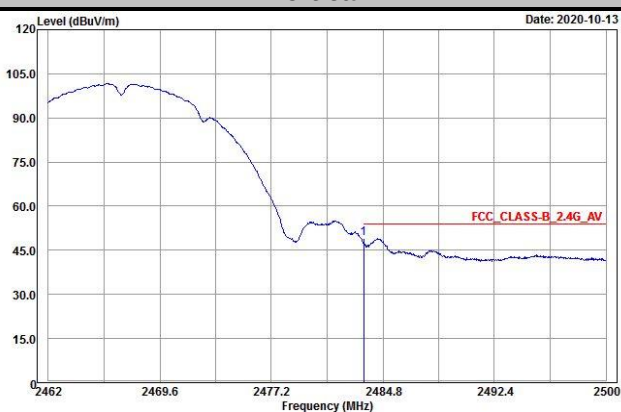


Average

Horizontal

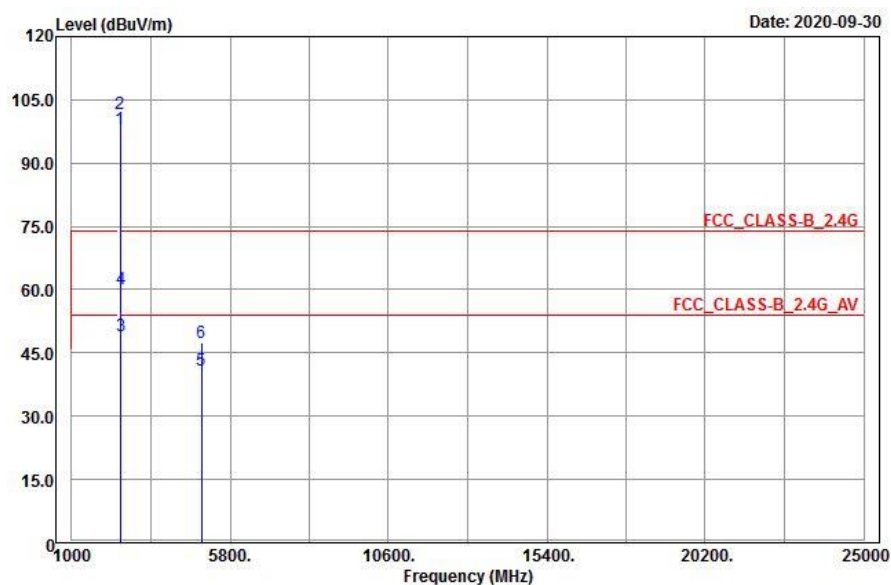


Vertical

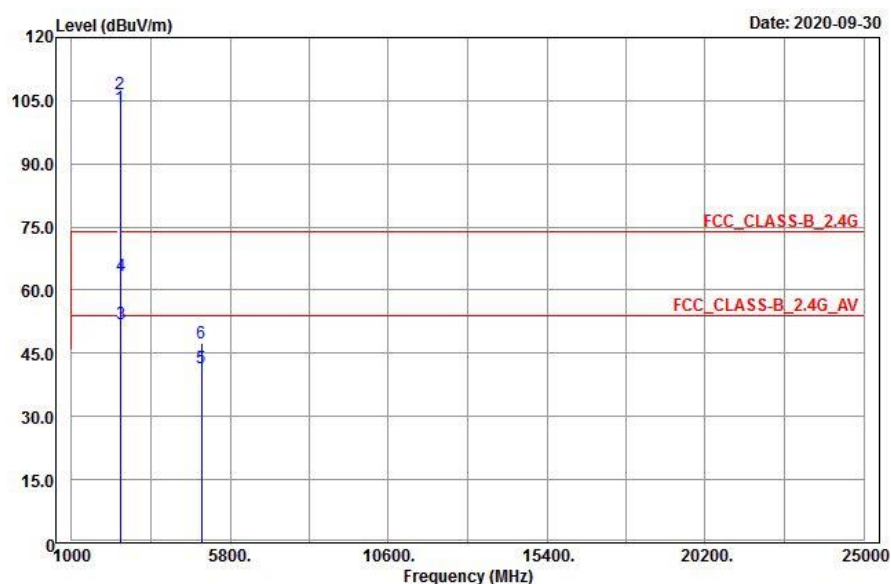


EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	98.18	93.54	4.64			120	60	Average
2472	101.8	97.16	4.64			120	60	Peak
2483.5	49.17	44.51	4.66	54	-4.83	120	60	Average
2483.5	60.31	55.65	4.66	74	-13.69	120	60	Peak
4944	41.01	30.66	10.35	54	-12.99	169	235	Average
4944	47.28	36.93	10.35	74	-26.72	169	235	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	103.39	98.75	4.64			180	218	Average
2472	106.66	102.02	4.64			180	218	Peak
2483.5	51.93	47.27	4.66	54	-2.07	180	218	Average
2483.5	63.42	58.76	4.66	74	-10.58	180	218	Peak
4944	41.48	31.13	10.35	54	-12.52	123	286	Average
4944	47.53	37.18	10.35	74	-26.47	123	286	Peak

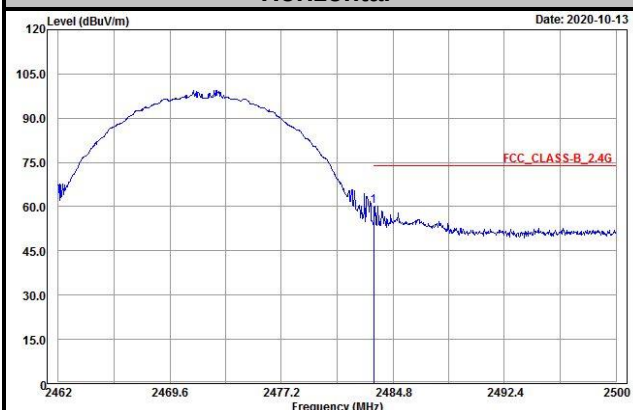
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

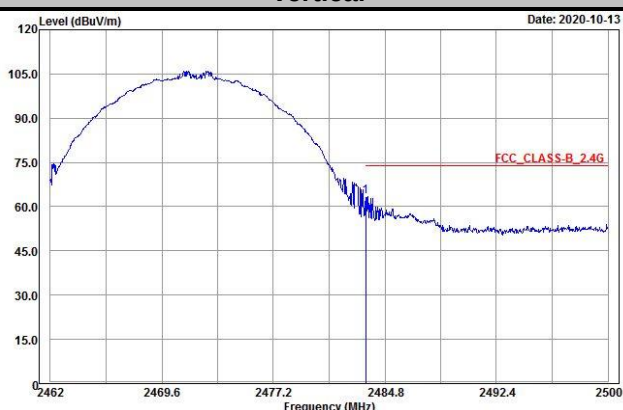
Ch 13

Peak

Horizontal



Vertical



Average

Horizontal



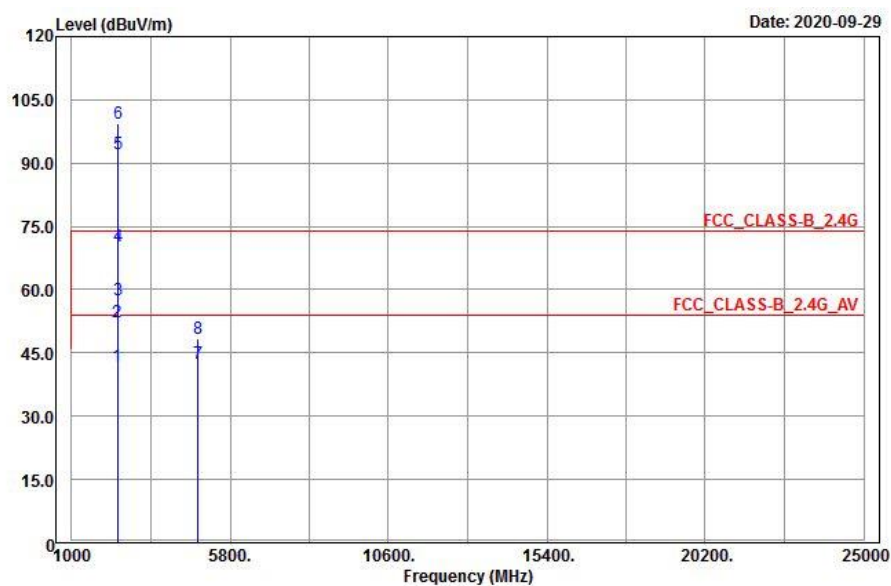
Vertical



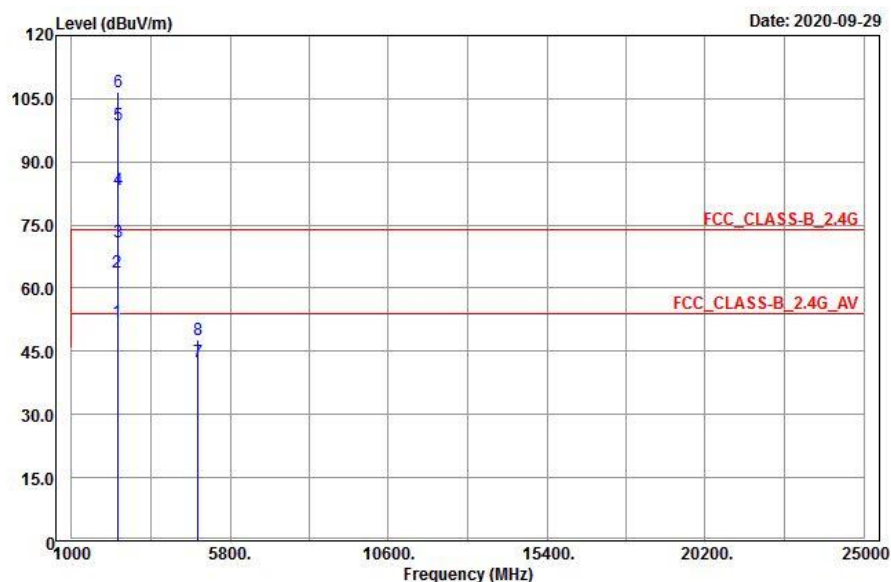
802.11g

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



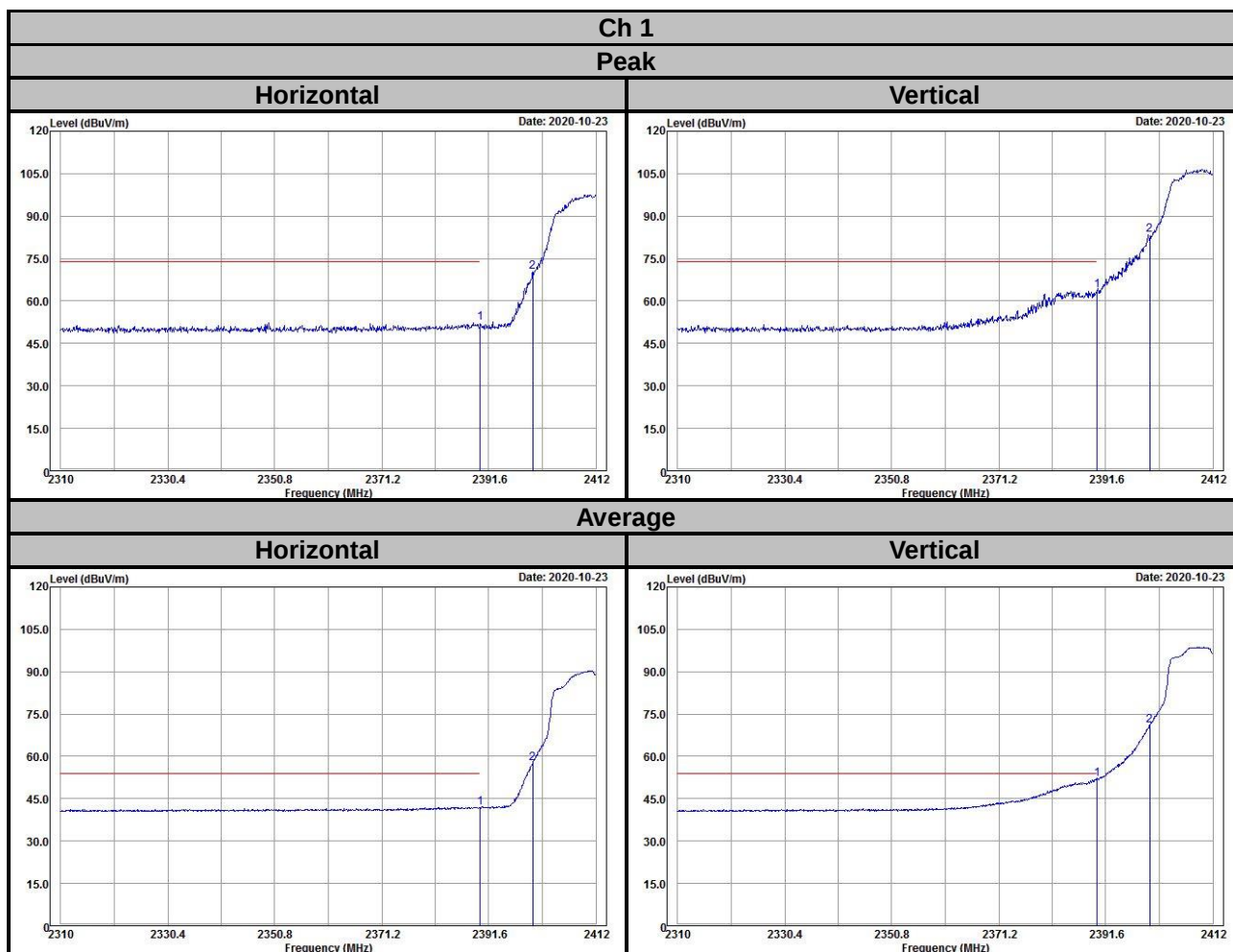
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42	37.5	4.5	54	-12	103	60	Average
2390	52.3	47.8	4.5	74	-21.7	103	60	Peak
2399.99	57.57	53.05	4.52	72.09	-14.52	103	60	Average
2399.99	70.27	65.75	4.52	79.33	-9.06	103	60	Peak
2412	92.09	87.54	4.55			103	60	Average
2412	99.33	94.78	4.55			103	60	Peak
4824	42.53	32.24	10.29	54	-11.47	105	132	Average
4824	48.25	37.96	10.29	74	-25.75	105	132	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.06	47.56	4.5	54	-1.94	110	205	Average
2390	63.8	59.3	4.5	74	-10.2	110	205	Peak
2399.99	70.85	66.33	4.52	78.77	-7.92	110	205	Average
2399.99	83.44	78.92	4.52	86.57	-3.13	110	205	Peak
2412	98.77	94.22	4.55			110	205	Average
2412	106.57	102.02	4.55			110	205	Peak
4824	42.54	32.25	10.29	54	-11.46	105	165	Average
4824	47.58	37.29	10.29	74	-26.42	105	165	Peak

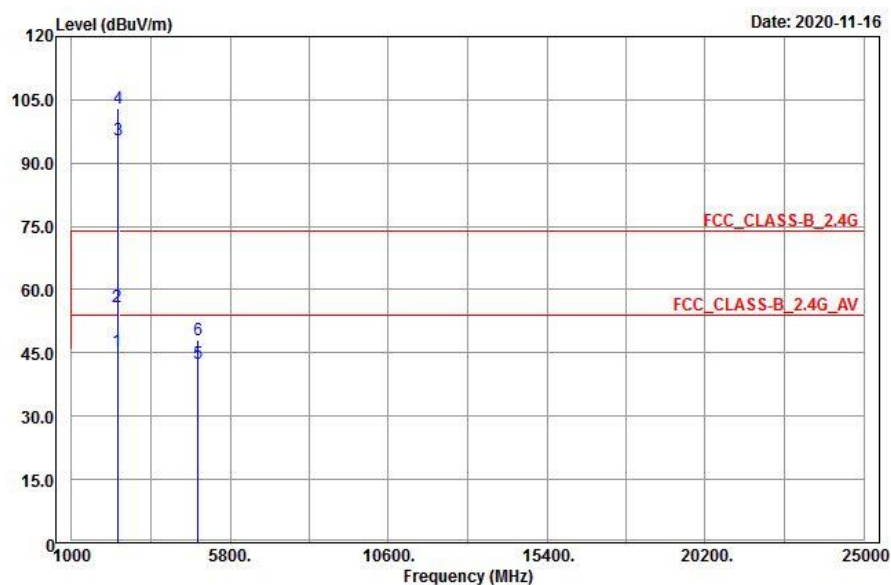
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

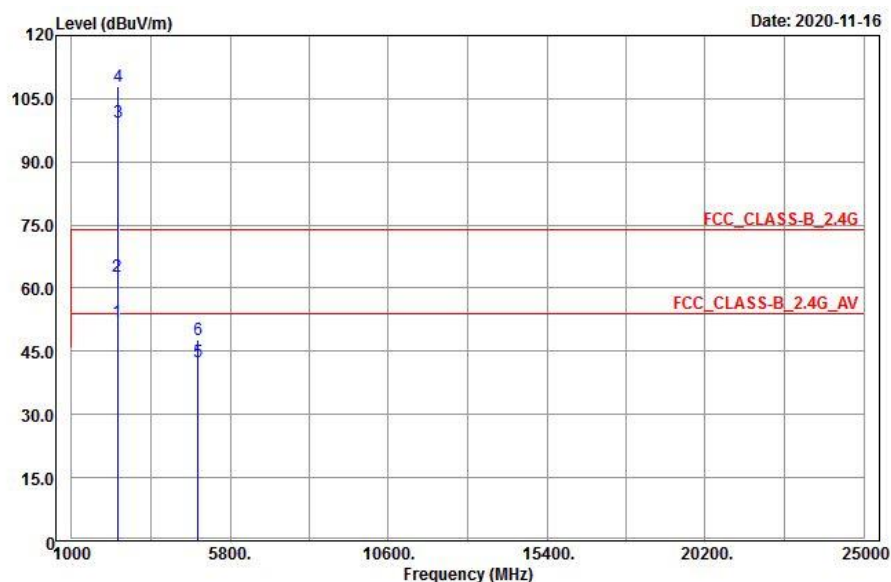


EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



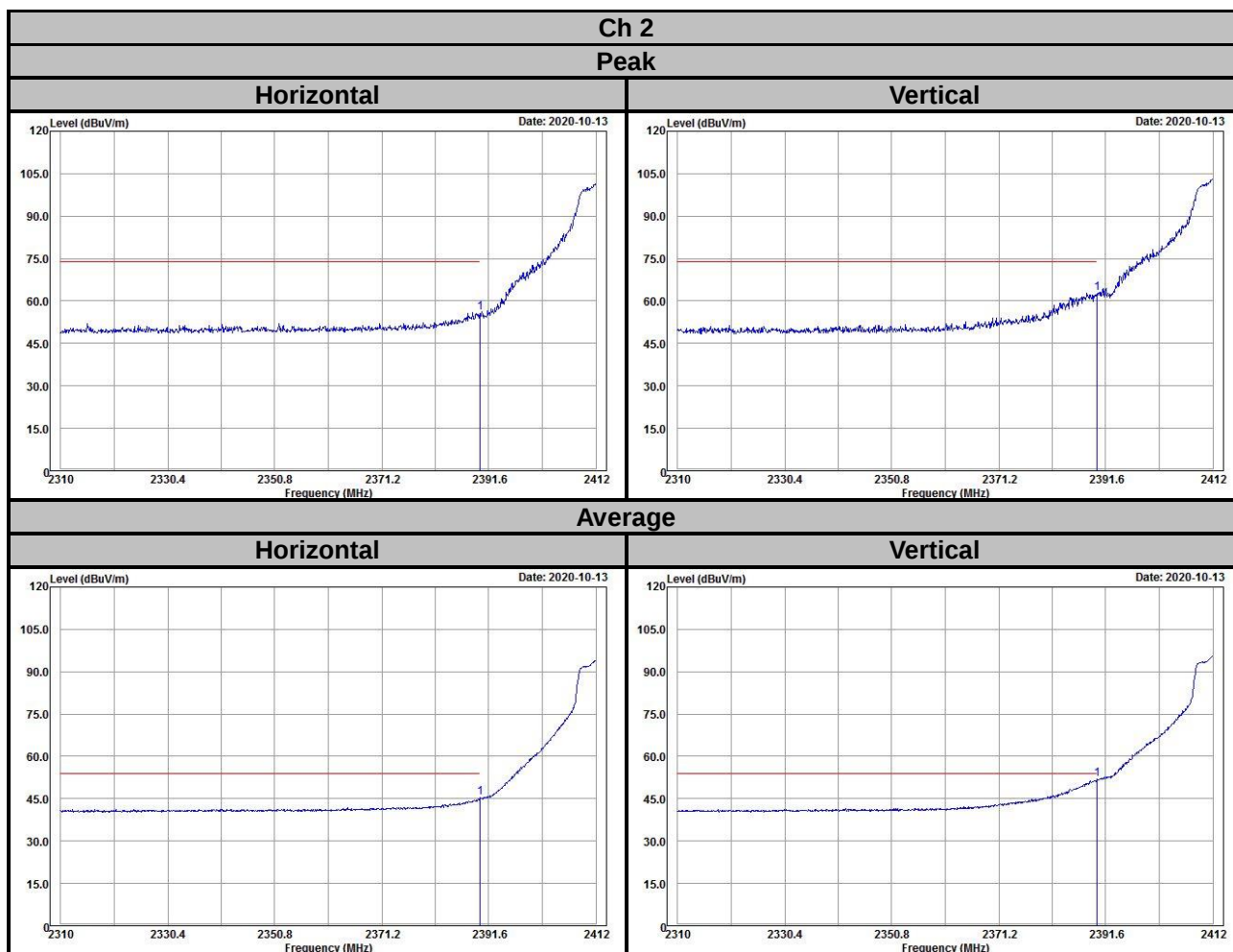
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.38	40.88	4.5	54	-8.62	137	64	Average
2390	55.77	51.27	4.5	74	-18.23	137	64	Peak
2417	95.54	91	4.54			137	64	Average
2417	103.05	98.51	4.54			137	64	Peak
4834	42.39	32.1	10.29	54	-11.61	206	184	Average
4834	48.06	37.77	10.29	74	-25.94	206	184	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.87	47.37	4.5	54	-2.13	100	195	Average
2390	62.82	58.32	4.5	74	-11.18	100	195	Peak
2417	99.41	94.87	4.54			100	195	Average
2417	107.8	103.26	4.54			100	195	Peak
4834	42.61	32.32	10.29	54	-11.39	115	194	Average
4834	47.64	37.35	10.29	74	-26.36	115	194	Peak

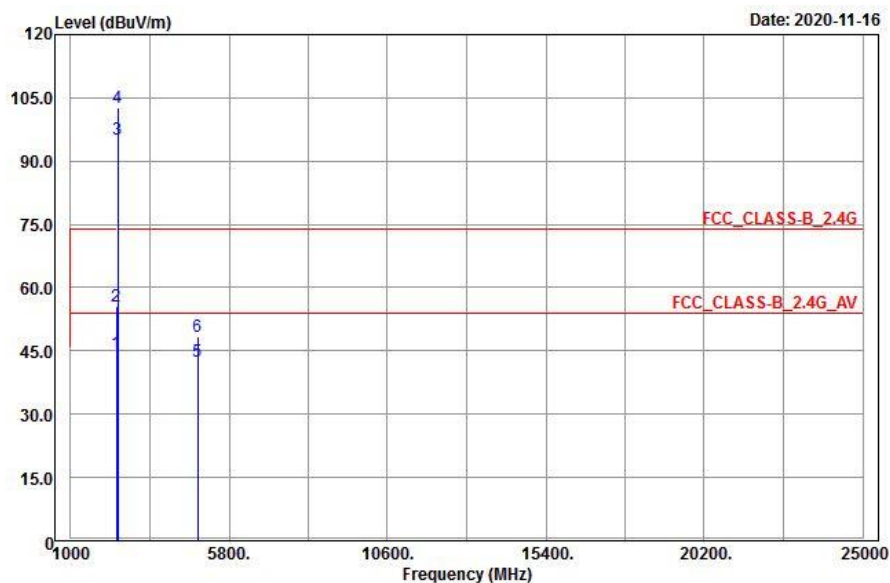
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2417 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

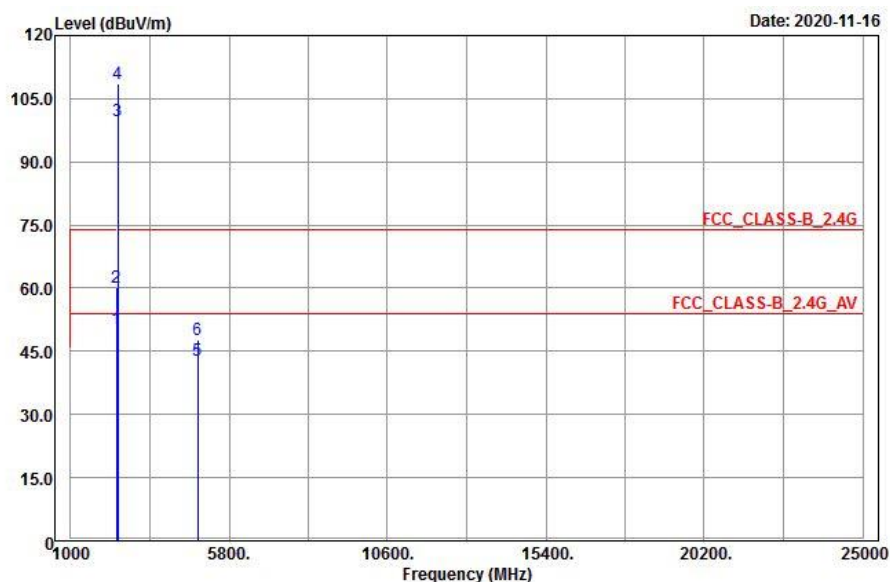


EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



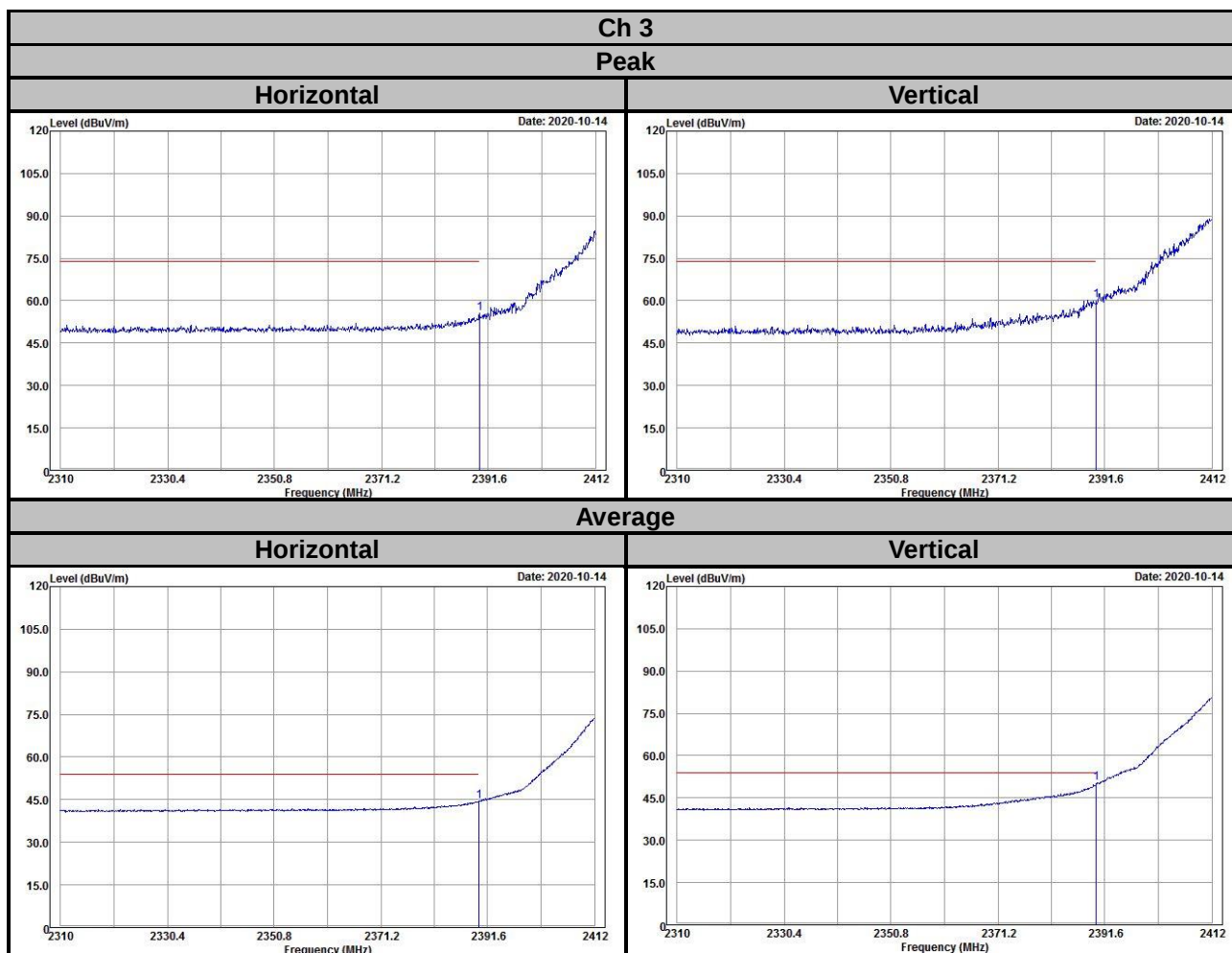
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.37	39.87	4.5	54	-9.63	103	63	Average
2390	55.47	50.97	4.5	74	-18.53	103	63	Peak
2422	95.21	90.65	4.56			103	63	Average
2422	102.65	98.09	4.56			103	63	Peak
4844	42.36	32.13	10.23	54	-11.64	246	108	Average
4844	48.31	38.08	10.23	74	-25.69	246	108	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	50.39	45.89	4.5	54	-3.61	165	217	Average
2390	60.24	55.74	4.5	74	-13.76	165	217	Peak
2422	99.87	95.31	4.56			165	217	Average
2422	108.5	103.94	4.56			165	217	Peak
4844	42.69	32.46	10.23	54	-11.31	132	229	Average
4844	47.75	37.52	10.23	74	-26.25	132	229	Peak

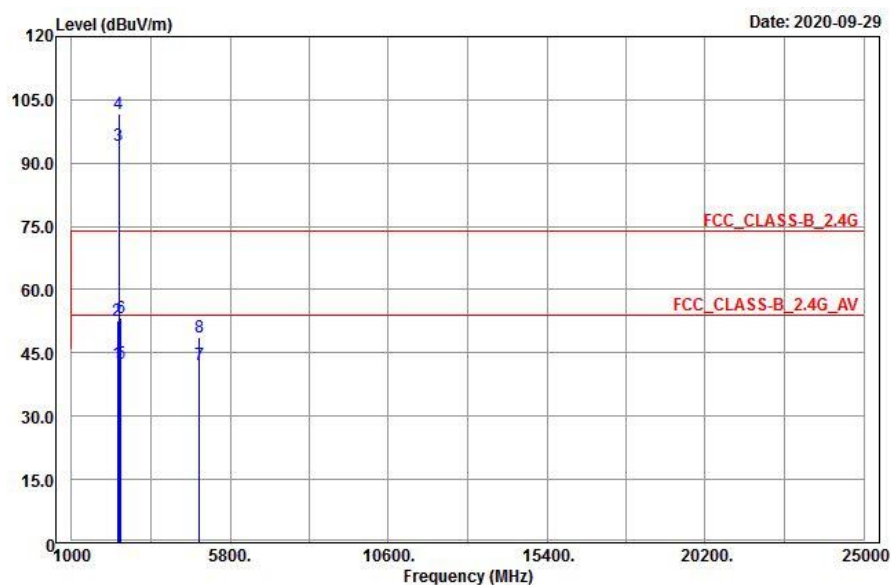
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2422 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

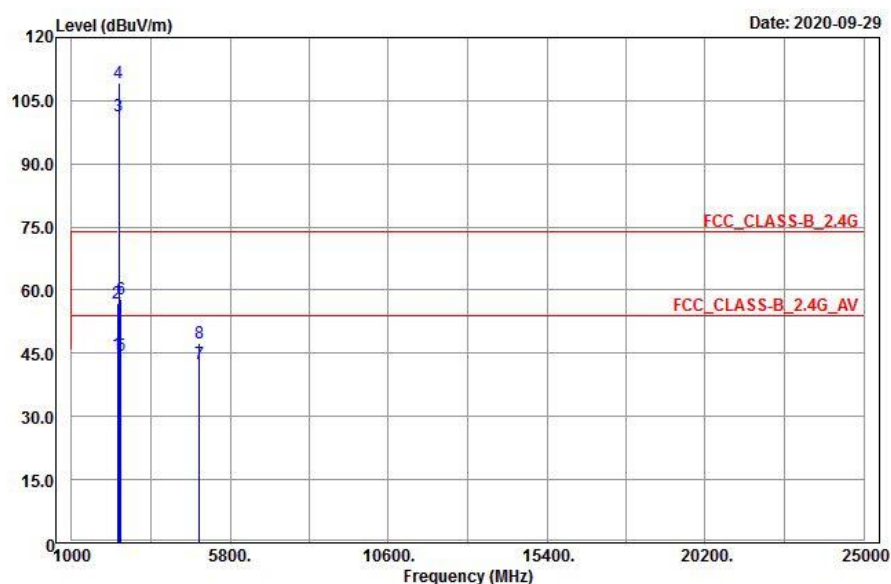


EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42.44	37.94	4.5	54	-11.56	132	68	Average
2390	52.78	48.28	4.5	74	-21.22	132	68	Peak
2437	94.11	89.52	4.59			132	68	Average
2437	101.76	97.17	4.59			132	68	Peak
2483.5	42.6	37.94	4.66	54	-11.4	132	68	Average
2483.5	53.3	48.64	4.66	74	-20.7	132	68	Peak
4874	42.33	32.12	10.21	54	-11.67	143	165	Average
4874	48.71	38.5	10.21	74	-25.29	143	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.92	40.42	4.5	54	-9.08	160	206	Average
2390	56.74	52.24	4.5	74	-17.26	160	206	Peak
2437	101.49	96.9	4.59			160	206	Average
2437	109.23	104.64	4.59			160	206	Peak
2483.5	44.59	39.93	4.66	54	-9.41	160	206	Average
2483.5	57.93	53.27	4.66	74	-16.07	160	206	Peak
4874	42.42	32.21	10.21	54	-11.58	169	167	Average
4874	47.43	37.22	10.21	74	-26.57	169	167	Peak

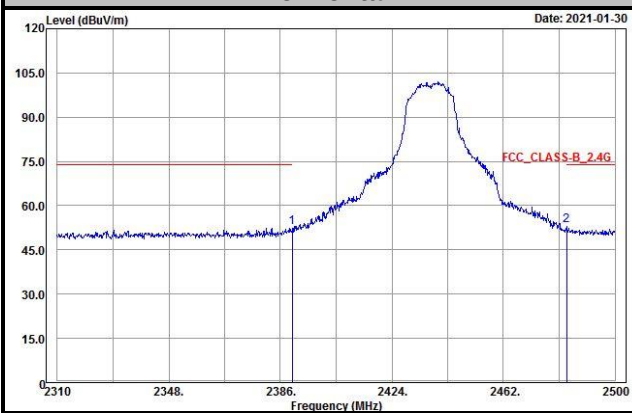
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

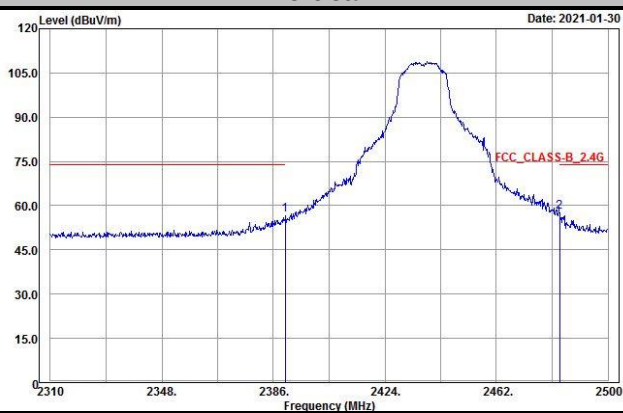
Ch 6

Peak

Horizontal

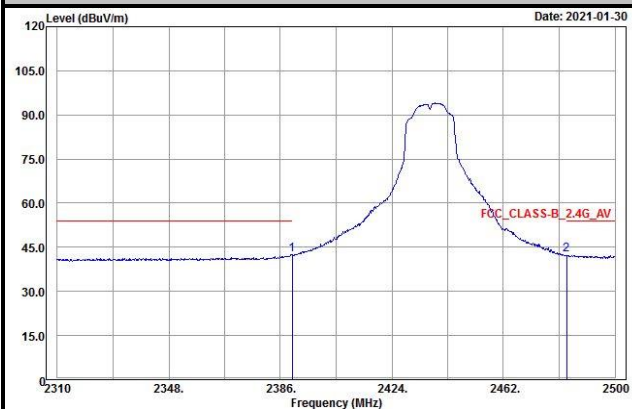


Vertical

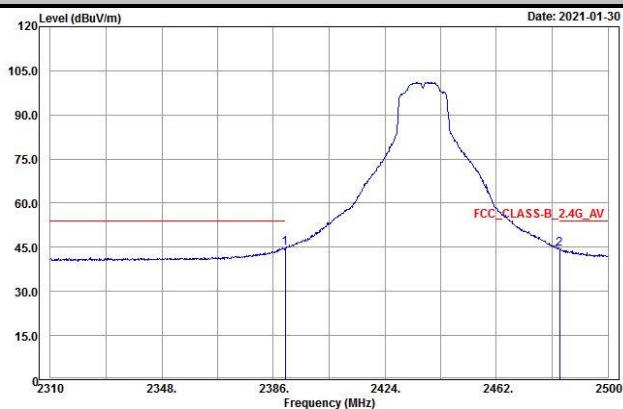


Average

Horizontal

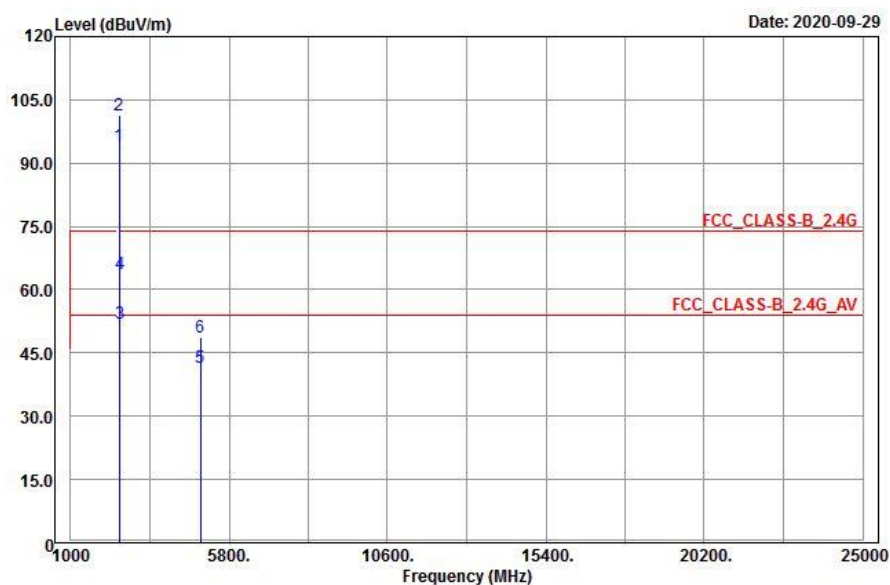


Vertical

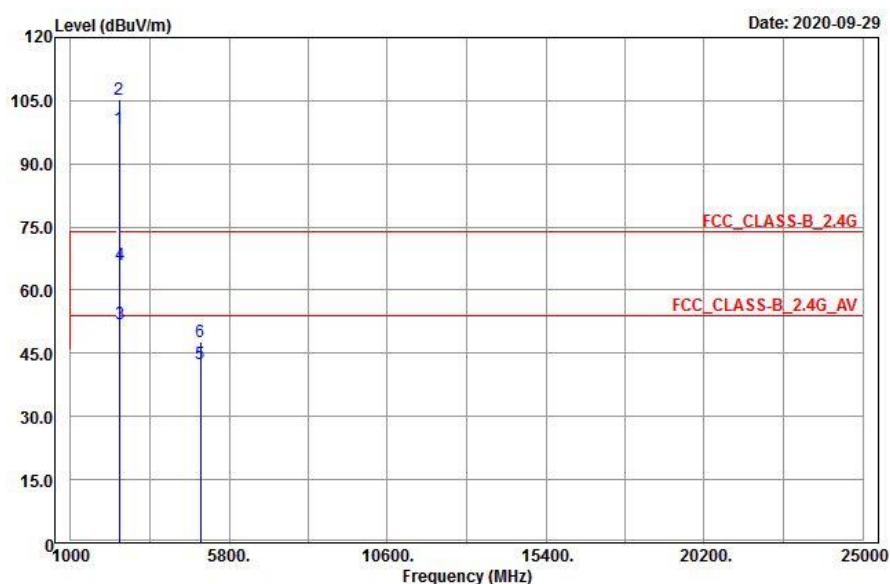


EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	94.19	89.57	4.62			100	60	Average
2462	101.44	96.82	4.62			100	60	Peak
2483.5	51.98	47.32	4.66	54	-2.02	100	60	Average
2483.5	63.78	59.12	4.66	74	-10.22	100	60	Peak
4924	41.5	31.25	10.25	54	-12.5	123	168	Average
4924	48.79	38.54	10.25	74	-25.21	123	168	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	98.42	93.8	4.62			120	198	Average
2462	105.21	100.59	4.62			120	198	Peak
2483.5	52.09	47.43	4.66	54	-1.91	120	198	Average
2483.5	65.98	61.32	4.66	74	-8.02	120	198	Peak
4924	42.45	32.2	10.25	54	-11.55	154	198	Average
4924	47.67	37.42	10.25	74	-26.33	154	198	Peak

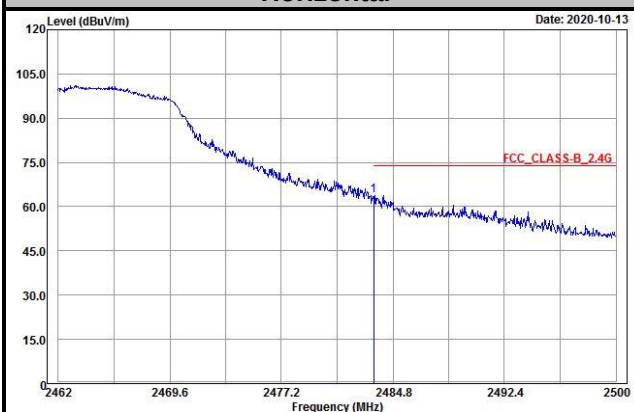
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

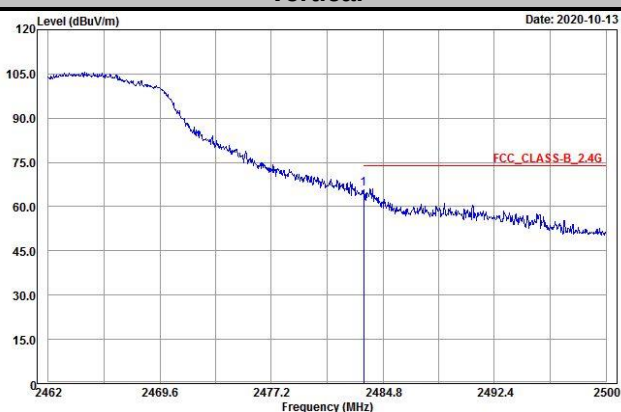
Ch 11

Peak

Horizontal

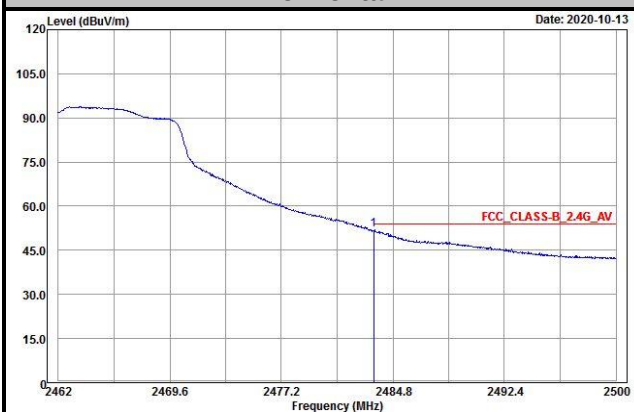


Vertical

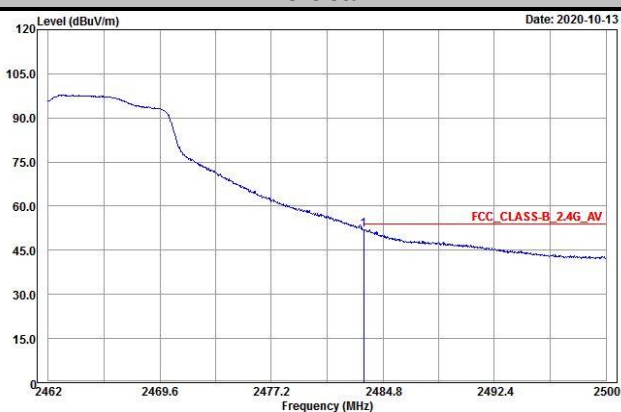


Average

Horizontal

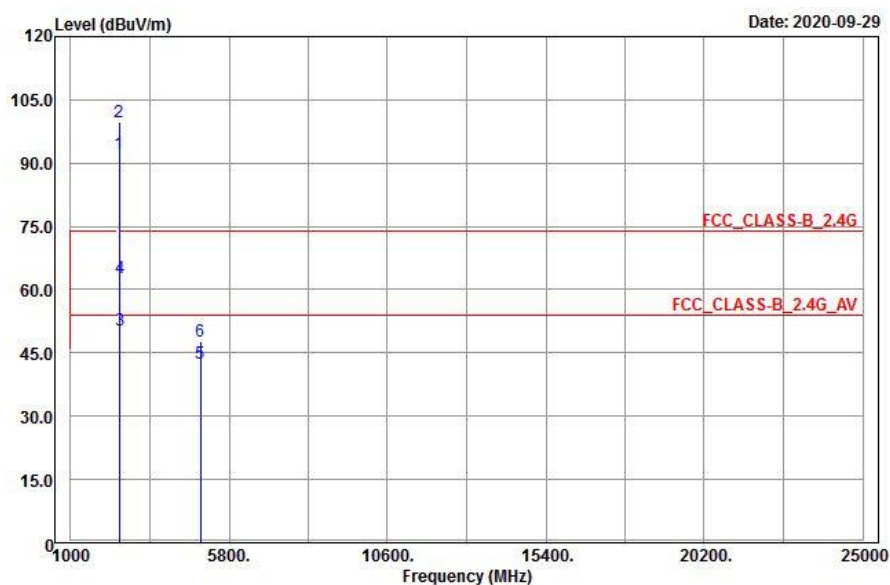


Vertical

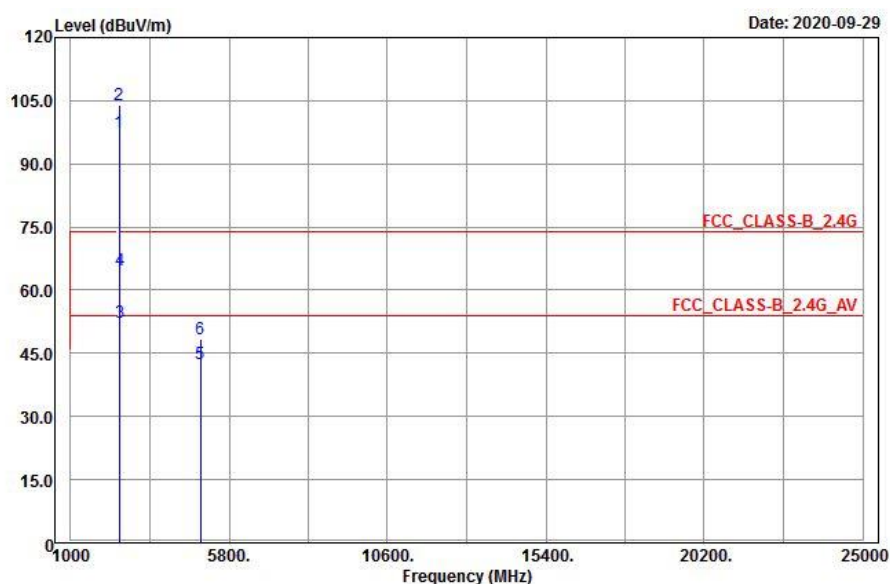


EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	92.16	87.53	4.63			100	60	Average
2467	99.74	95.11	4.63			100	60	Peak
2483.5	50.32	45.66	4.66	54	-3.68	100	60	Average
2483.5	62.77	58.11	4.66	74	-11.23	100	60	Peak
4934	42.51	32.25	10.26	54	-11.49	169	175	Average
4934	47.62	37.36	10.26	74	-26.38	169	175	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	97.44	92.81	4.63			181	200	Average
2467	104.03	99.4	4.63			181	200	Peak
2483.5	52.42	47.76	4.66	54	-1.58	181	200	Average
2483.5	64.82	60.16	4.66	74	-9.18	181	200	Peak
4934	42.52	32.26	10.26	54	-11.48	173	142	Average
4934	48.27	38.01	10.26	74	-25.73	173	142	Peak

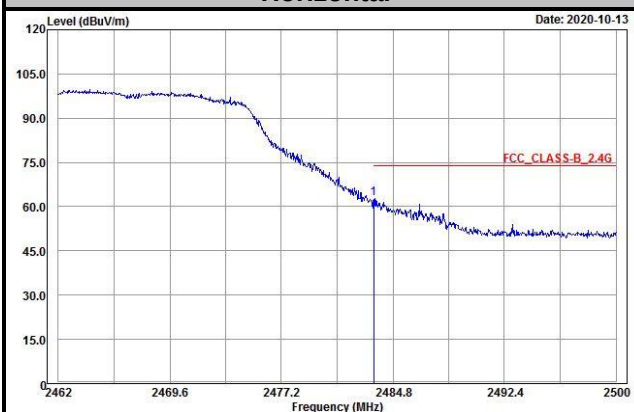
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

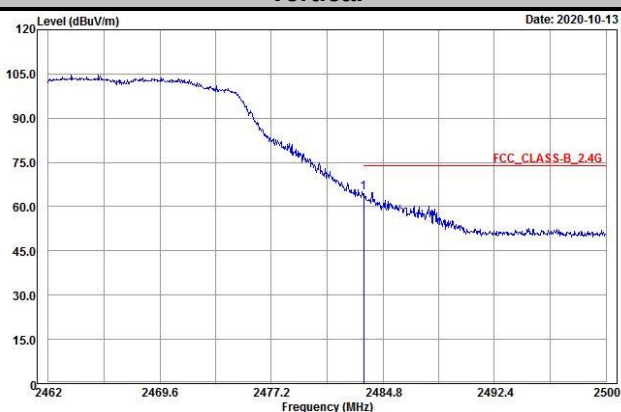
Ch 12

Peak

Horizontal

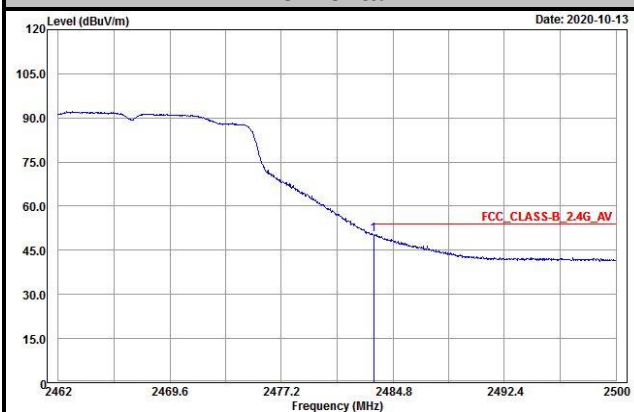


Vertical

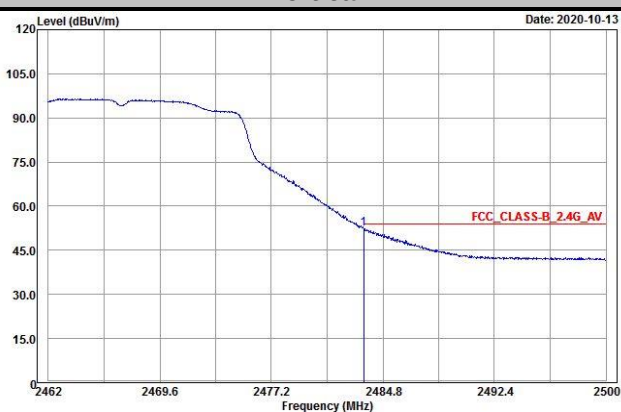


Average

Horizontal

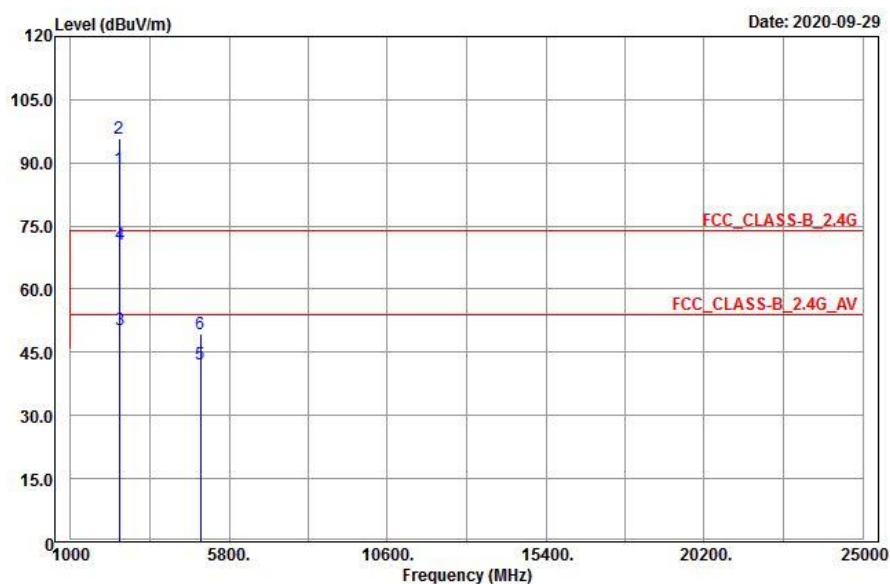


Vertical

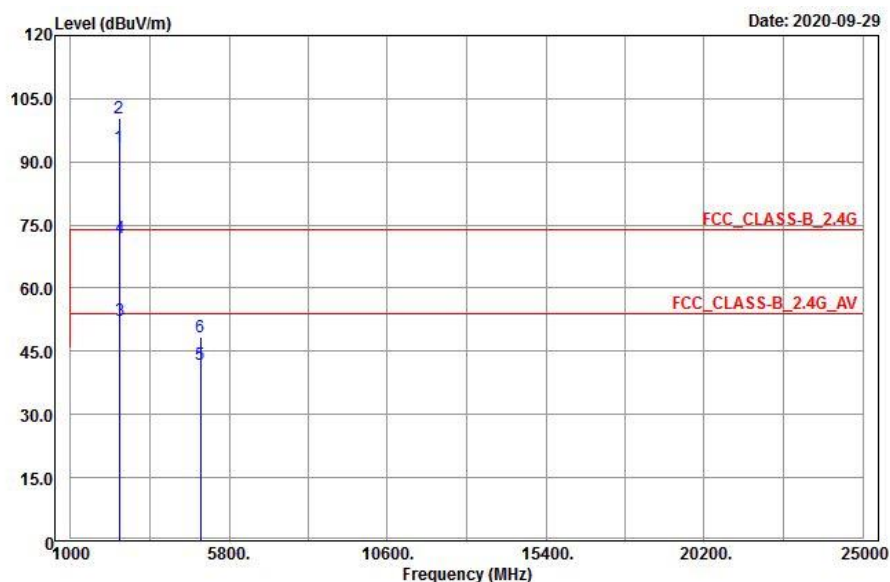


EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	88.48	83.84	4.64			100	60	Average
2472	95.91	91.27	4.64			100	60	Peak
2483.5	50.2	45.54	4.66	54	-3.8	100	60	Average
2483.5	70.74	66.08	4.66	74	-3.26	100	60	Peak
4944	42.04	31.69	10.35	54	-11.96	129	104	Average
4944	49.35	39	10.35	74	-24.65	129	104	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	93.58	88.94	4.64			180	218	Average
2472	100.27	95.63	4.64			180	218	Peak
2483.5	52.37	47.71	4.66	54	-1.63	180	218	Average
2483.5	72.09	67.43	4.66	74	-1.91	180	218	Peak
4944	41.86	31.51	10.35	54	-12.14	128	175	Average
4944	48.38	38.03	10.35	74	-25.62	128	175	Peak

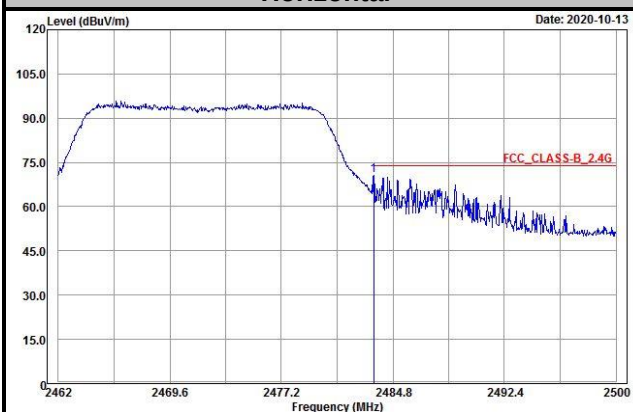
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

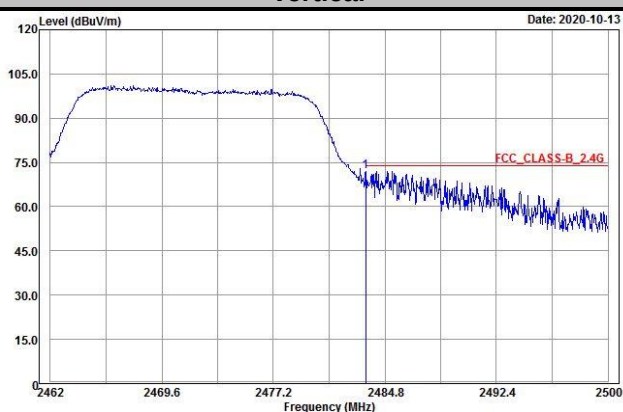
Ch 13

Peak

Horizontal

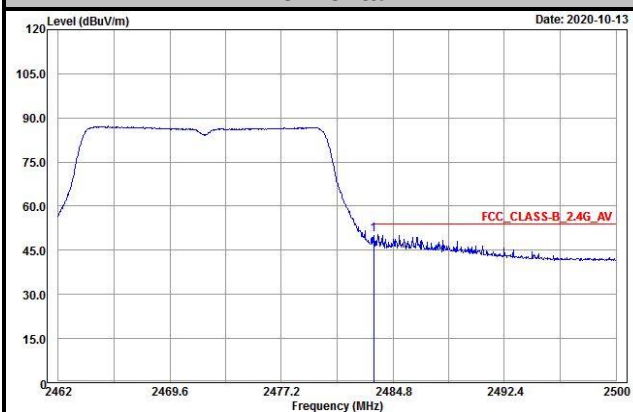


Vertical

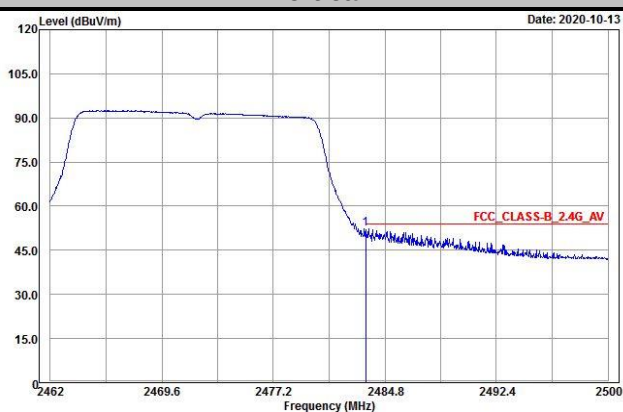


Average

Horizontal



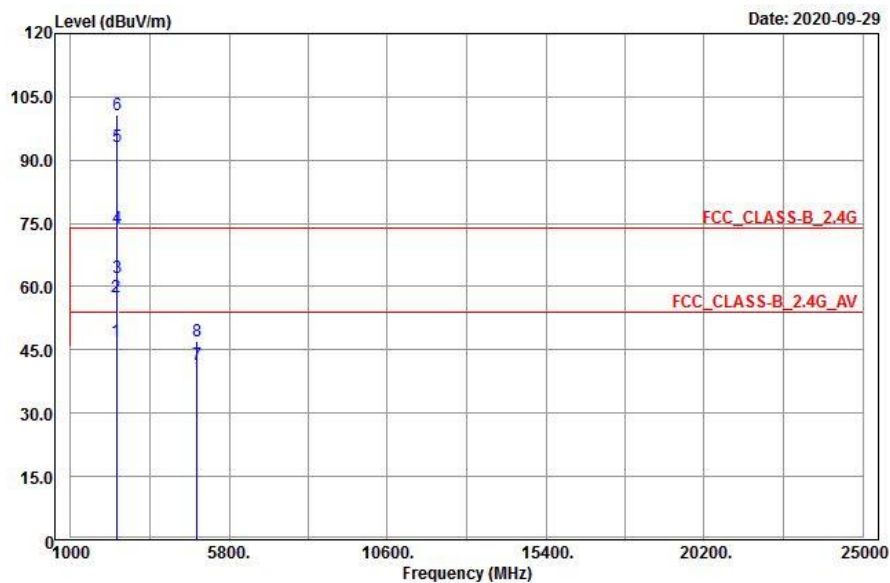
Vertical



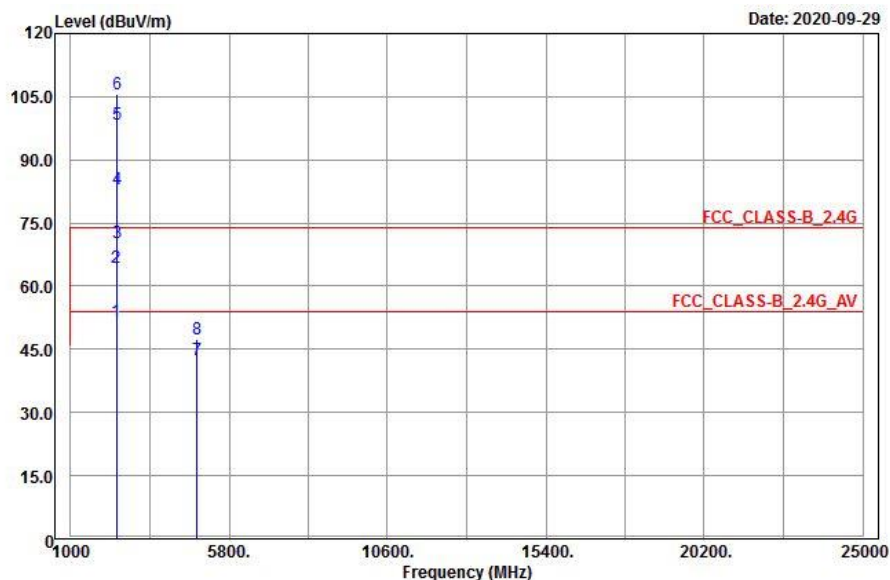
802.11n (HT20)

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



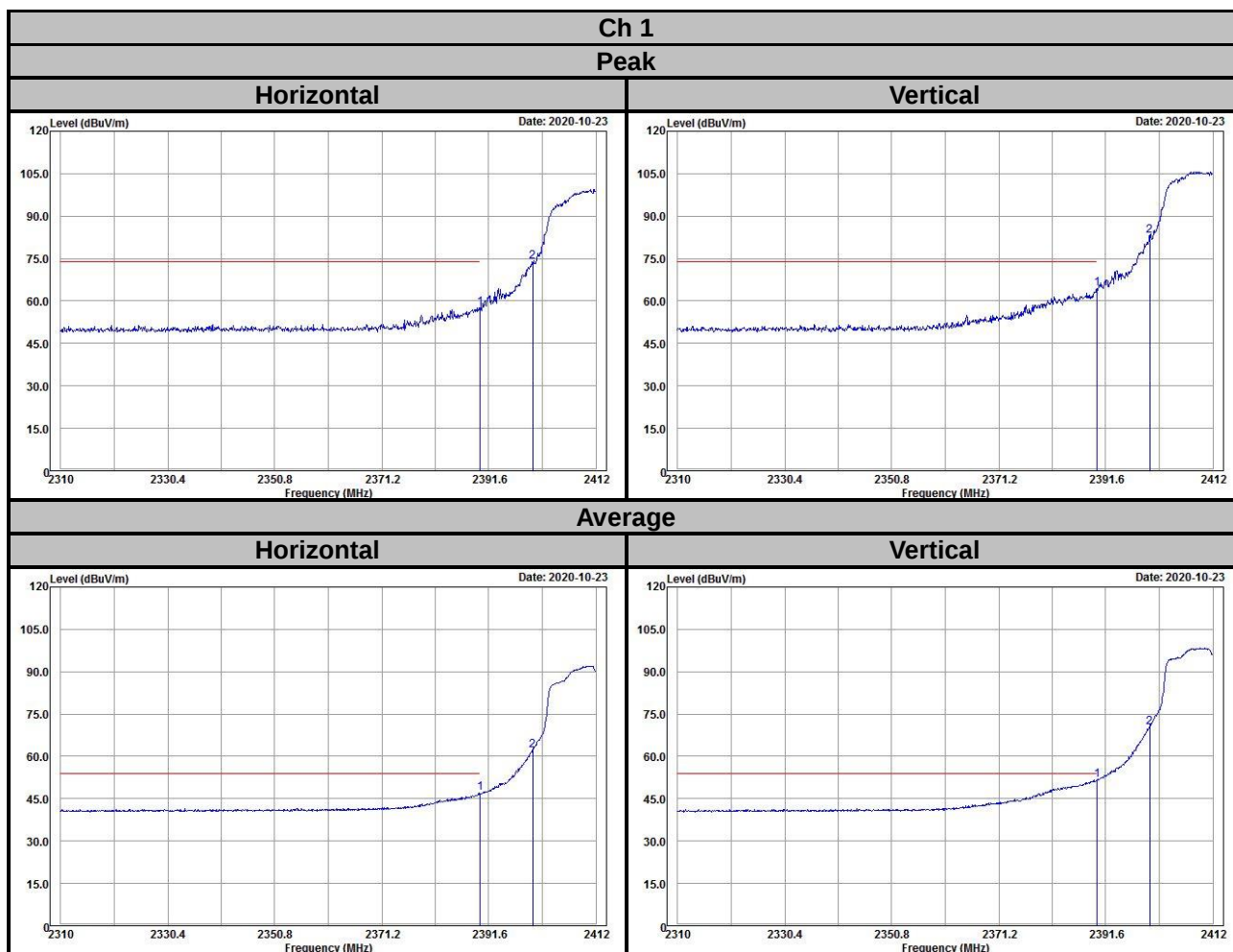
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	46.93	42.43	4.5	54	-7.07	103	63	Average
2390	57.71	53.21	4.5	74	-16.29	103	63	Peak
2399.99	62.2	57.68	4.52	73.22	-11.02	103	63	Average
2399.99	73.78	69.26	4.52	80.83	-7.05	103	63	Peak
2412	93.22	88.67	4.55			103	63	Average
2412	100.83	96.28	4.55			103	63	Peak
4824	41.51	31.22	10.29	54	-12.49	154	198	Average
4824	47.21	36.92	10.29	74	-26.79	154	198	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.71	47.21	4.5	54	-2.29	110	205	Average
2390	64.49	59.99	4.5	74	-9.51	110	205	Peak
2399.99	70.41	65.89	4.52	78.42	-8.01	110	205	Average
2399.99	83.08	78.56	4.52	85.69	-2.61	110	205	Peak
2412	98.42	93.87	4.55			110	205	Average
2412	105.69	101.14	4.55			110	205	Peak
4824	42.54	32.25	10.29	54	-11.46	154	168	Average
4824	47.57	37.28	10.29	74	-26.43	154	168	Peak

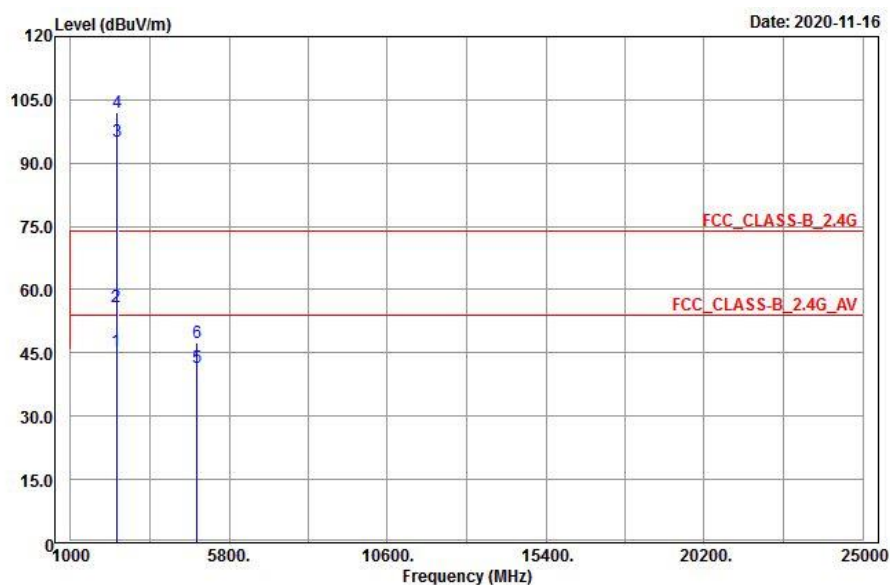
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2412 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

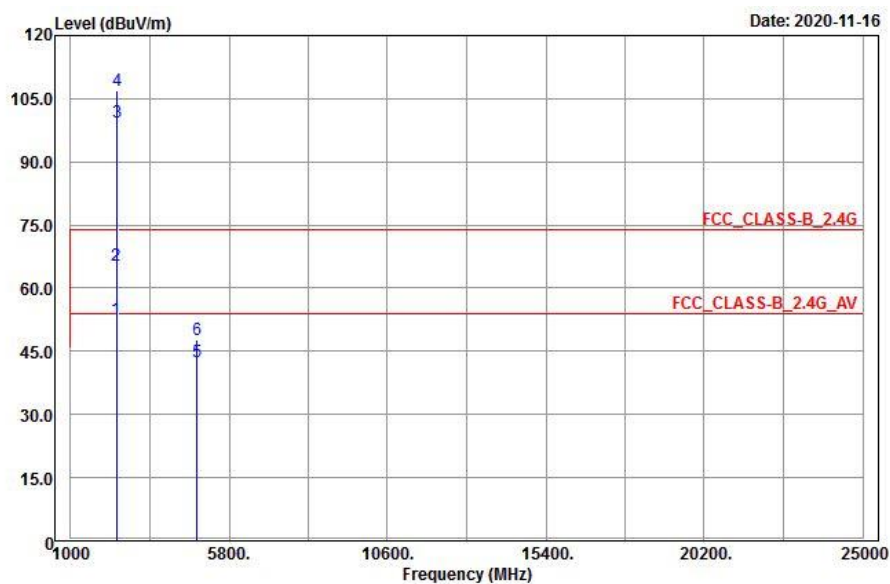


EUT Test Condition		Measurement Detail	
Channel	Channel 2	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



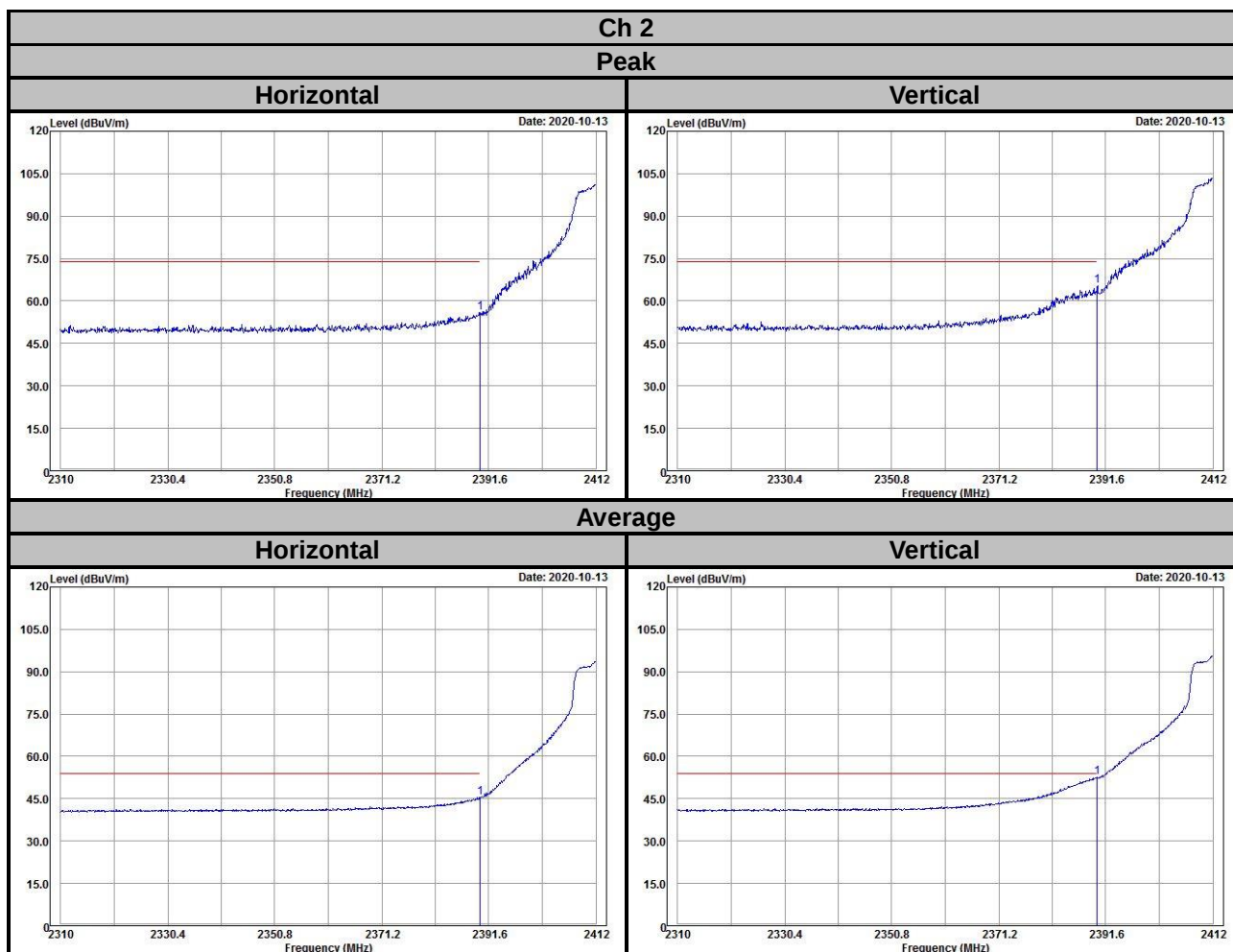
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.59	41.09	4.5	54	-8.41	137	64	Average
2390	55.98	51.48	4.5	74	-18.02	137	64	Peak
2417	95.01	90.47	4.54			137	64	Average
2417	102.12	97.58	4.54			137	64	Peak
4834	41.65	31.36	10.29	54	-12.35	169	201	Average
4834	47.34	37.05	10.29	74	-26.66	169	201	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	52.49	47.99	4.5	54	-1.51	100	195	Average
2390	65.35	60.85	4.5	74	-8.65	100	195	Peak
2417	99.28	94.74	4.54			100	195	Average
2417	106.96	102.42	4.54			100	195	Peak
4834	42.66	32.37	10.29	54	-11.34	137	154	Average
4834	47.6	37.31	10.29	74	-26.4	137	154	Peak

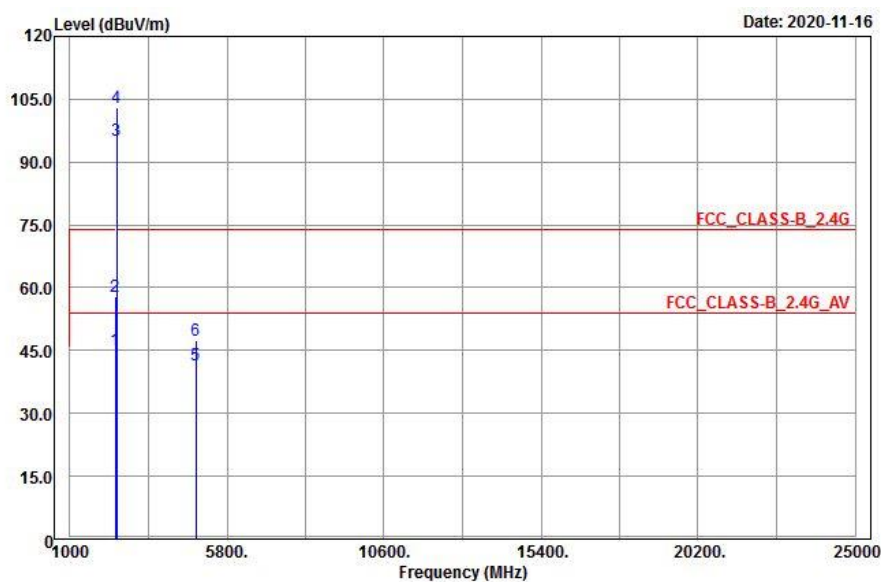
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2417 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

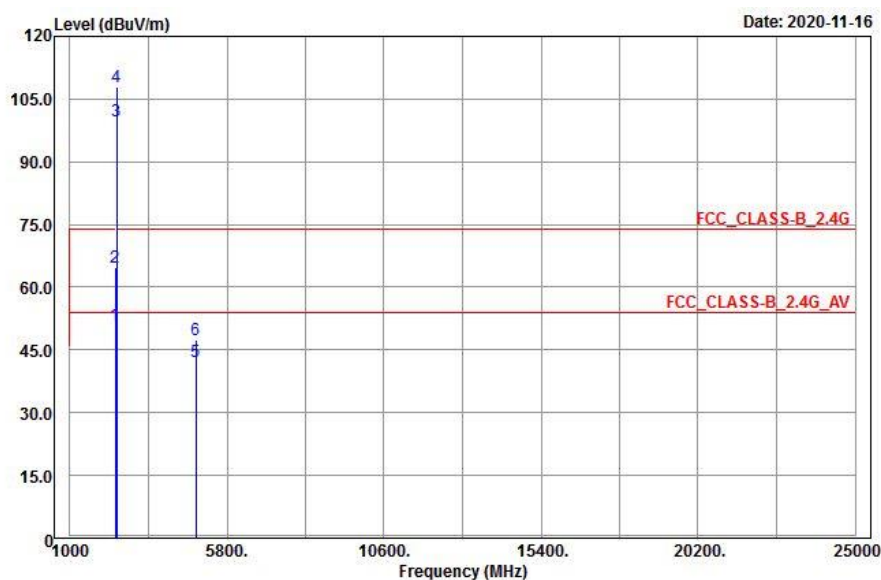


EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



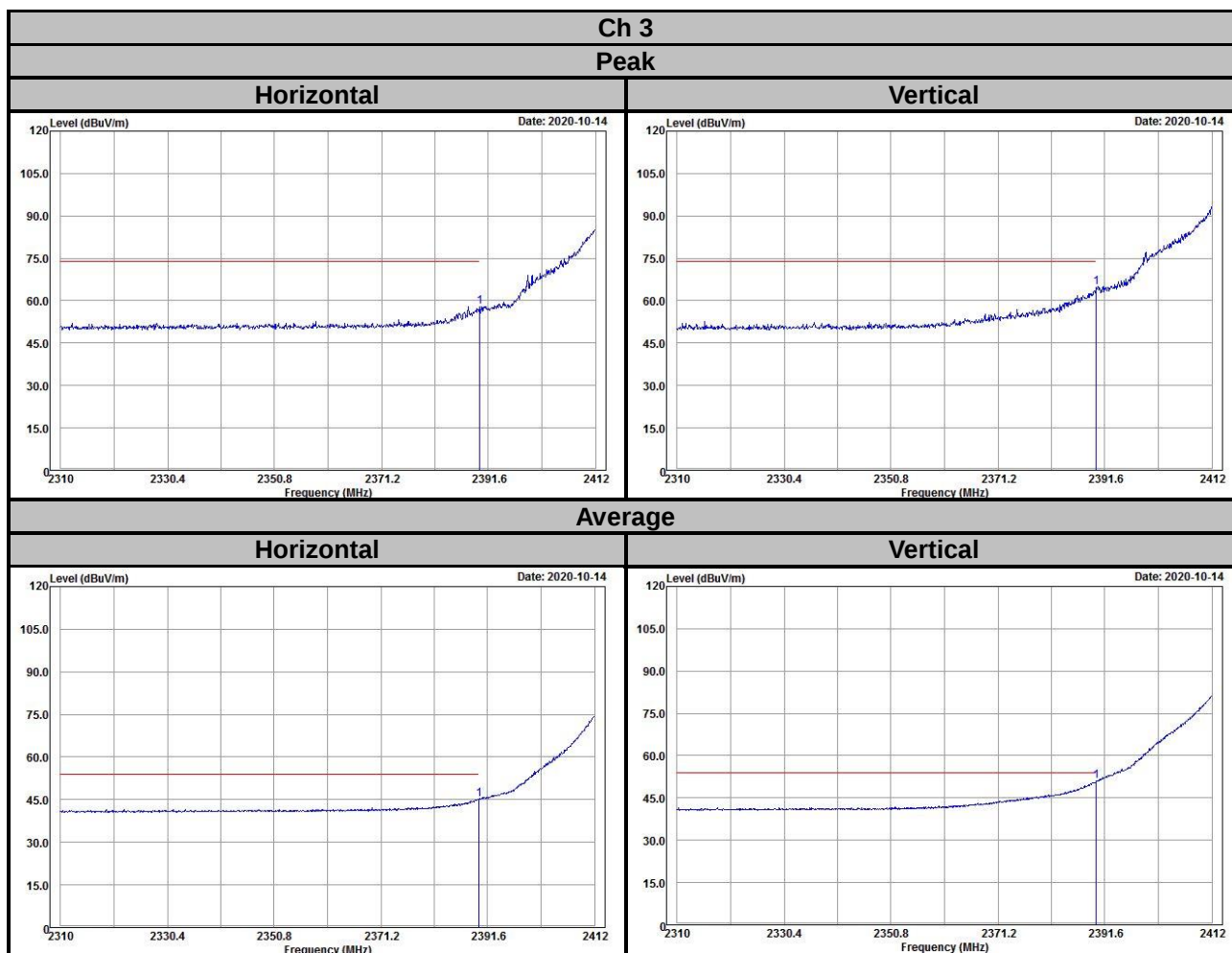
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	45.21	40.71	4.5	54	-8.79	103	63	Average
2390	58.02	53.52	4.5	74	-15.98	103	63	Peak
2422	95.08	90.52	4.56			103	63	Average
2422	102.84	98.28	4.56			103	63	Peak
4844	41.38	31.15	10.23	54	-12.62	238	115	Average
4844	47.45	37.22	10.23	74	-26.55	238	115	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	51.08	46.58	4.5	54	-2.92	165	217	Average
2390	64.72	60.22	4.5	74	-9.28	165	217	Peak
2422	99.58	95.02	4.56			165	217	Average
2422	107.85	103.29	4.56			165	217	Peak
4844	42.29	32.06	10.23	54	-11.71	106	87	Average
4844	47.25	37.02	10.23	74	-26.75	106	87	Peak

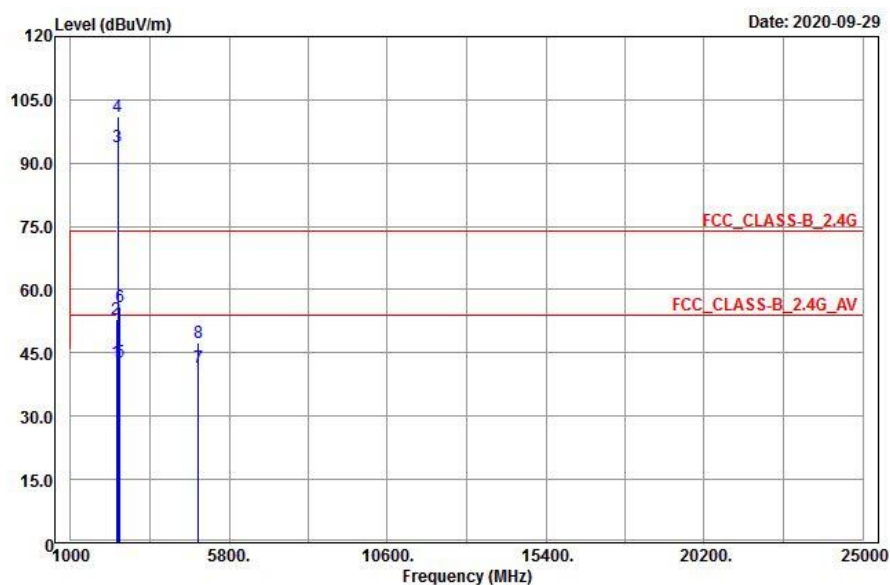
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2422 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

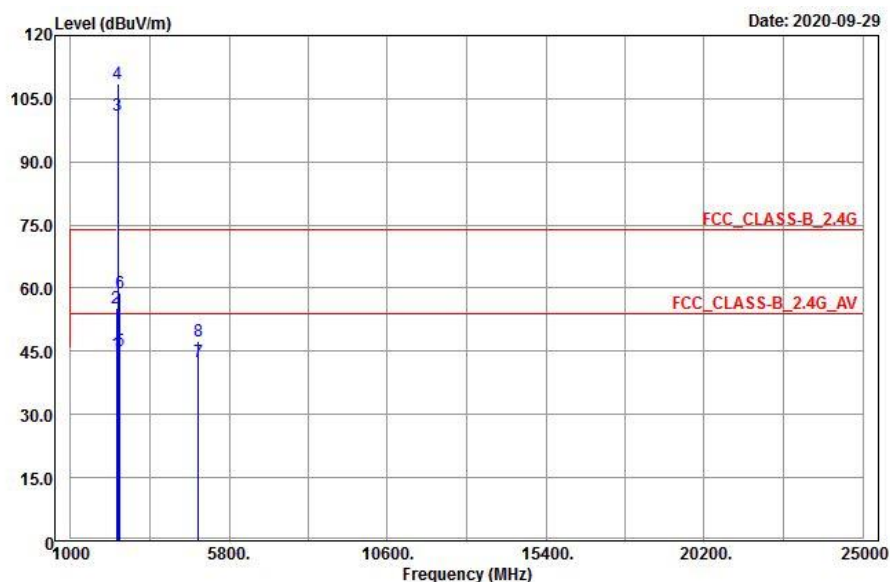


EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	42.71	38.21	4.5	54	-11.29	132	68	Average
2390	52.85	48.35	4.5	74	-21.15	132	68	Peak
2437	93.81	89.22	4.59			132	68	Average
2437	101.08	96.49	4.59			132	68	Peak
2483.5	42.96	38.3	4.66	54	-11.04	132	68	Average
2483.5	56.03	51.37	4.66	74	-17.97	132	68	Peak
4874	41.46	31.25	10.21	54	-12.54	169	172	Average
4874	47.25	37.04	10.21	74	-26.75	169	172	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2390	44.37	39.87	4.5	54	-9.63	160	202	Average
2390	55.15	50.65	4.5	74	-18.85	160	202	Peak
2437	100.88	96.29	4.59			160	202	Average
2437	108.43	103.84	4.59			160	202	Peak
2483.5	45.2	40.54	4.66	54	-8.8	160	202	Average
2483.5	59.02	54.36	4.66	74	-14.98	160	202	Peak
4874	42.45	32.24	10.21	54	-11.55	144	175	Average
4874	47.56	37.35	10.21	74	-26.44	144	175	Peak

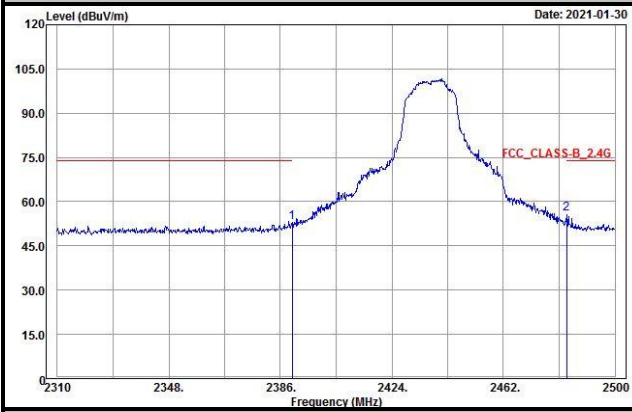
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2437 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

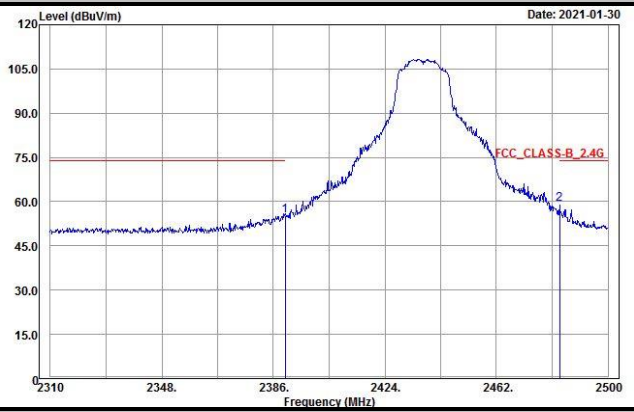
Ch 6

Peak

Horizontal

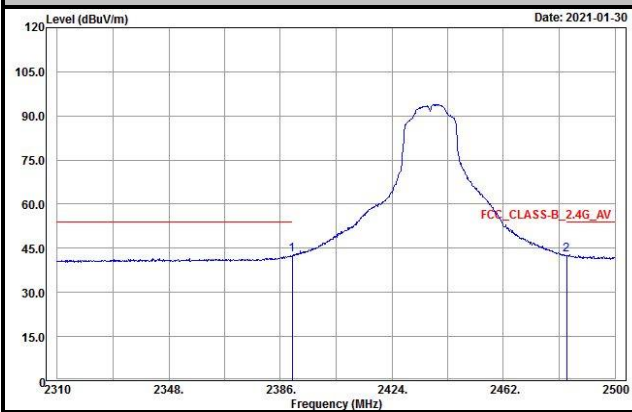


Vertical

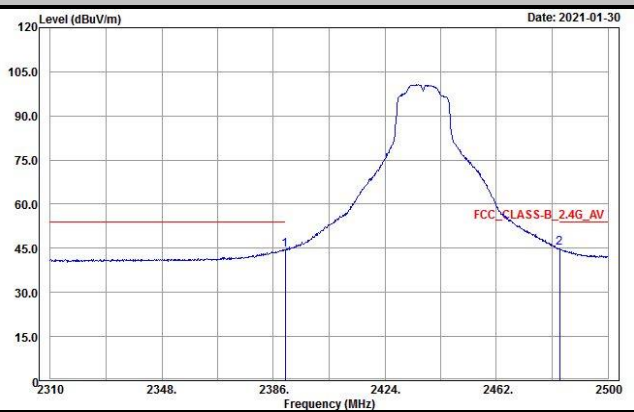


Average

Horizontal

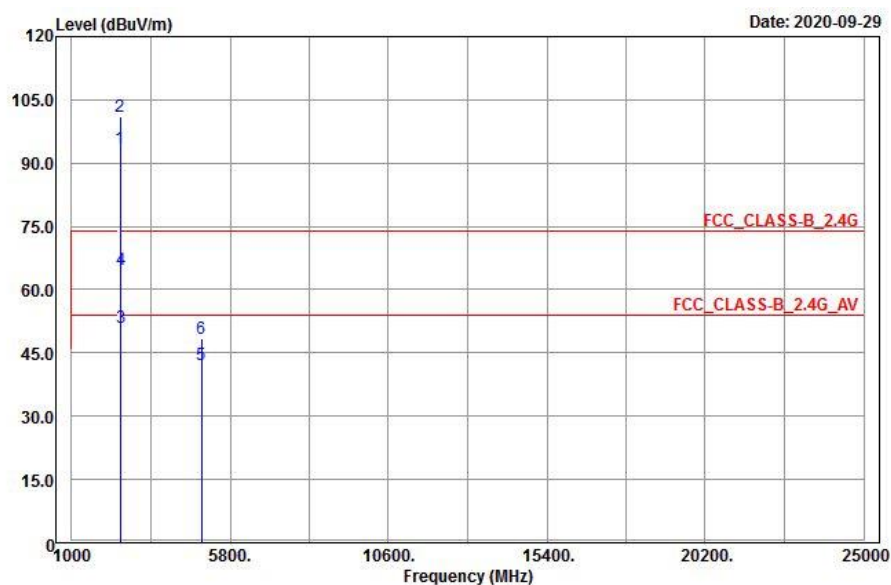


Vertical

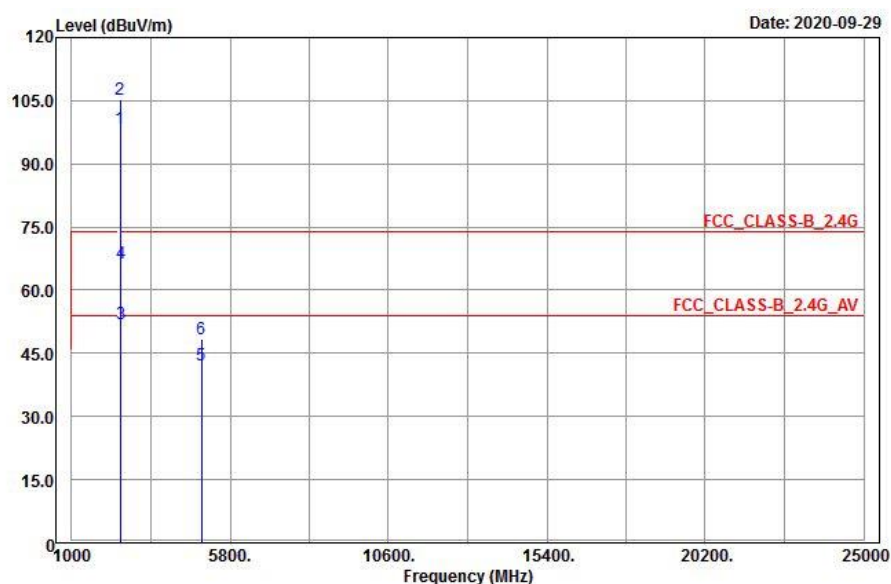


EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	93.48	88.86	4.62			100	60	Average
2462	100.88	96.26	4.62			100	60	Peak
2483.5	51.03	46.37	4.66	54	-2.97	100	60	Average
2483.5	64.67	60.01	4.66	74	-9.33	100	60	Peak
4924	42.13	31.88	10.25	54	-11.87	159	243	Average
4924	48.23	37.98	10.25	74	-25.77	159	243	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2462	98.49	93.87	4.62			120	198	Average
2462	105.22	100.6	4.62			120	198	Peak
2483.5	51.92	47.26	4.66	54	-2.08	120	198	Average
2483.5	66.47	61.81	4.66	74	-7.53	120	198	Peak
4924	42.28	32.03	10.25	54	-11.72	175	169	Average
4924	48.31	38.06	10.25	74	-25.69	175	169	Peak

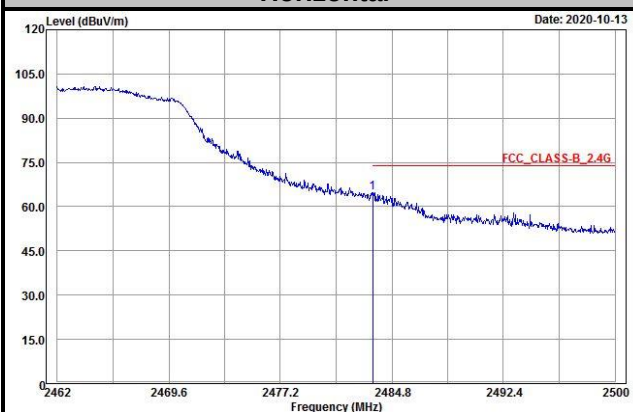
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2462 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

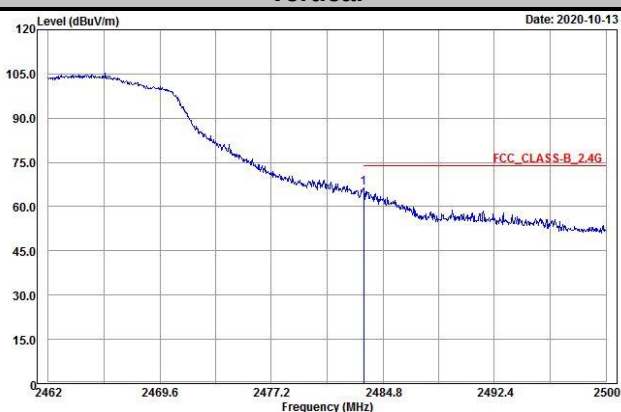
Ch 11

Peak

Horizontal

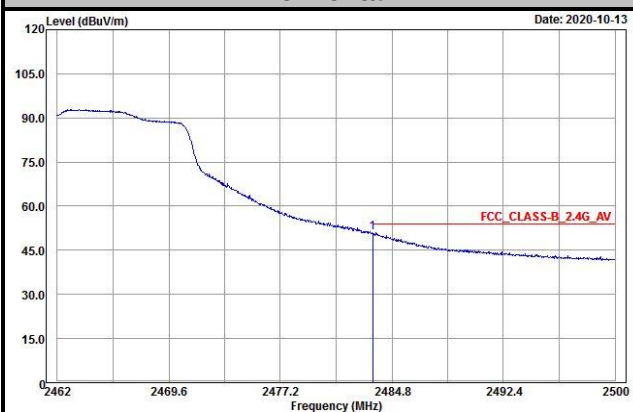


Vertical

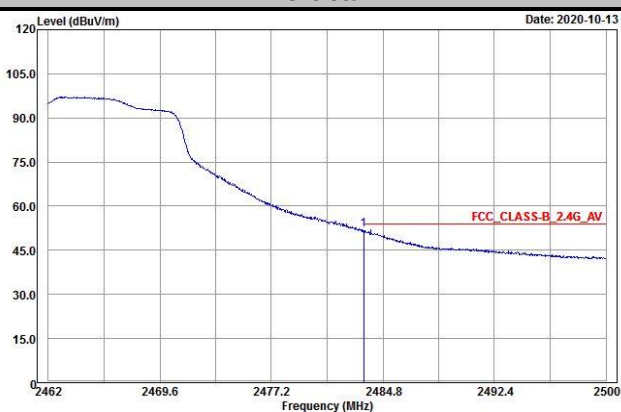


Average

Horizontal

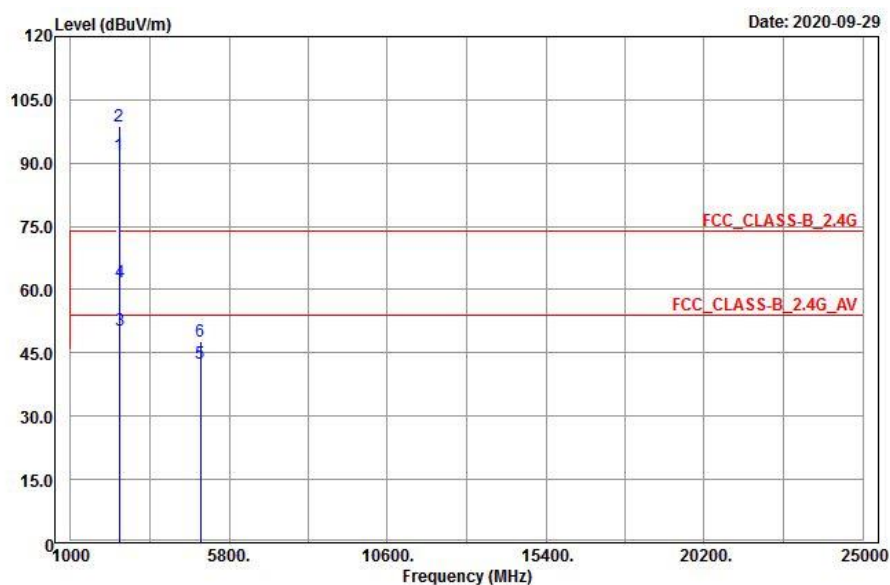


Vertical

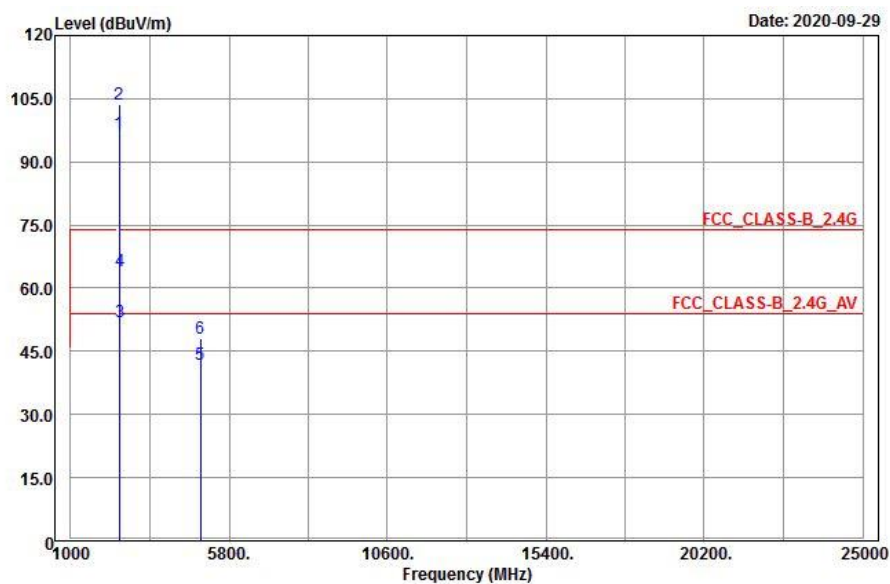


EUT Test Condition		Measurement Detail	
Channel	Channel 12	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	91.83	87.2	4.63			100	60	Average
2467	98.84	94.21	4.63			100	60	Peak
2483.5	50.24	45.58	4.66	54	-3.76	100	60	Average
2483.5	61.64	56.98	4.66	74	-12.36	100	60	Peak
4934	42.59	32.33	10.26	54	-11.41	159	168	Average
4934	47.74	37.48	10.26	74	-26.26	159	168	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2467	96.74	92.11	4.63			181	200	Average
2467	103.8	99.17	4.63			181	200	Peak
2483.5	52.09	47.43	4.66	54	-1.91	181	200	Average
2483.5	63.97	59.31	4.66	74	-10.03	181	200	Peak
4934	41.78	31.52	10.26	54	-12.22	168	140	Average
4934	48.21	37.95	10.26	74	-25.79	168	140	Peak

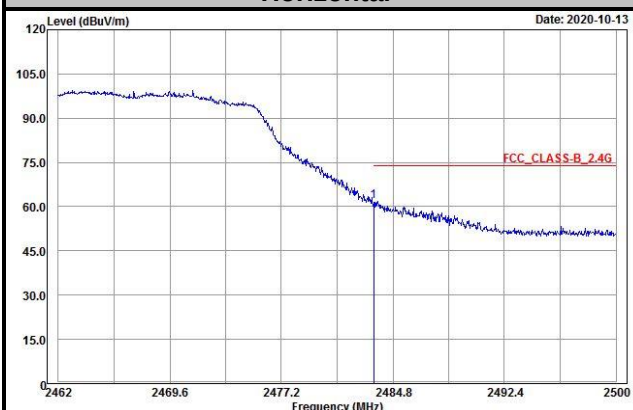
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2467 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

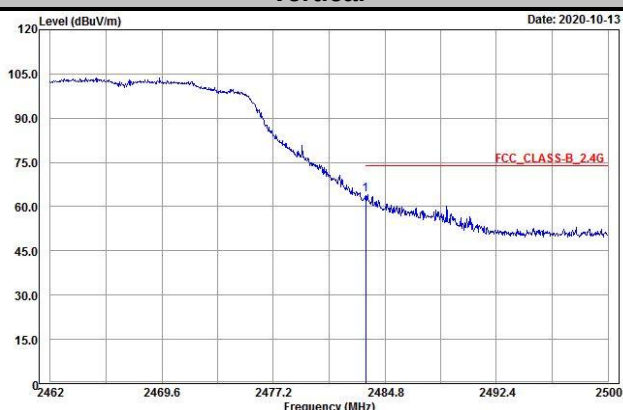
Ch 12

Peak

Horizontal



Vertical

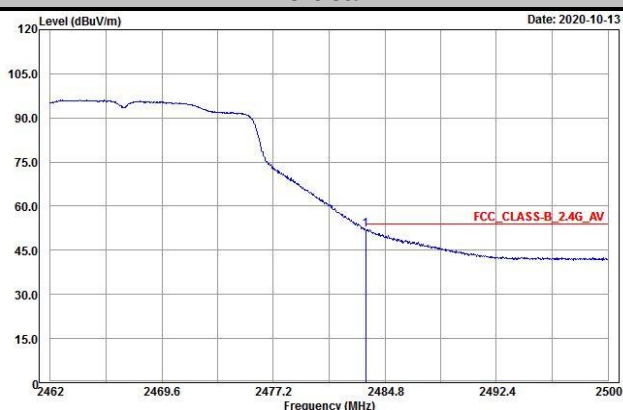


Average

Horizontal

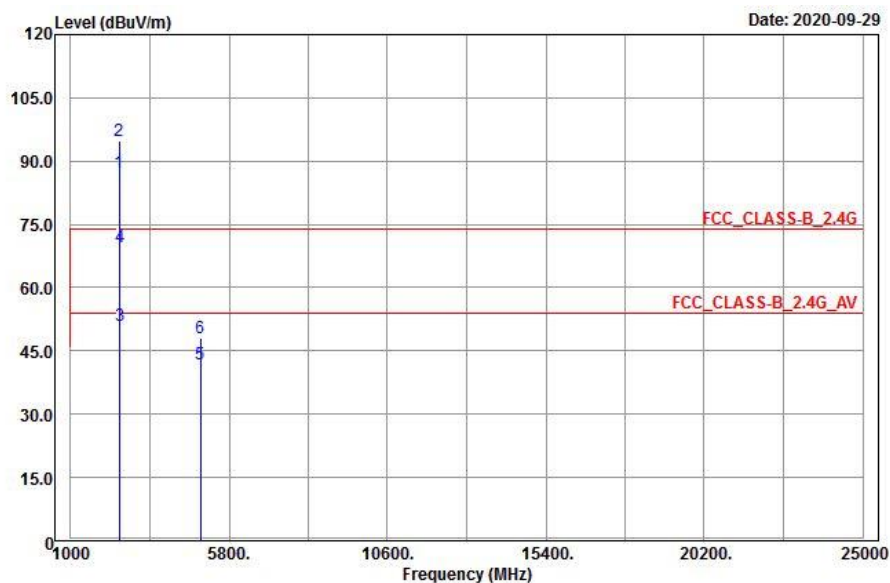


Vertical

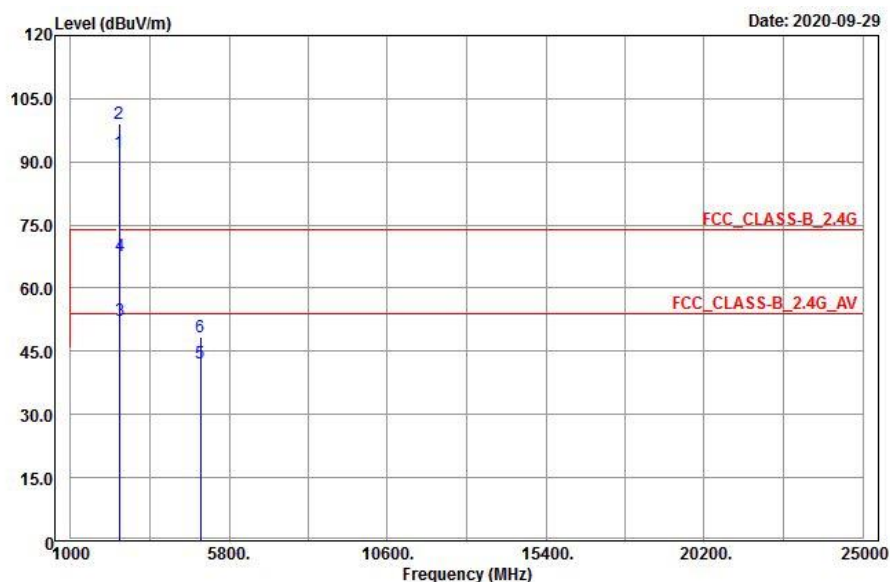


EUT Test Condition		Measurement Detail	
Channel	Channel 13	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Charles Hsiao

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	87.46	82.82	4.64			100	60	Average
2472	94.75	90.11	4.64			100	60	Peak
2483.5	50.88	46.22	4.66	54	-3.12	100	60	Average
2483.5	69.58	64.92	4.66	74	-4.42	100	60	Peak
4934	41.74	31.48	10.26	54	-12.26	190	172	Average
4934	47.92	37.66	10.26	74	-26.08	190	172	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2472	92.18	87.54	4.64			180	218	Average
2472	99.09	94.45	4.64			180	218	Peak
2483.5	52.45	47.79	4.66	54	-1.55	180	218	Average
2483.5	67.55	62.89	4.66	74	-6.45	180	218	Peak
4934	42.26	32	10.26	54	-11.74	185	306	Average
4934	48.53	38.27	10.26	74	-25.47	185	306	Peak

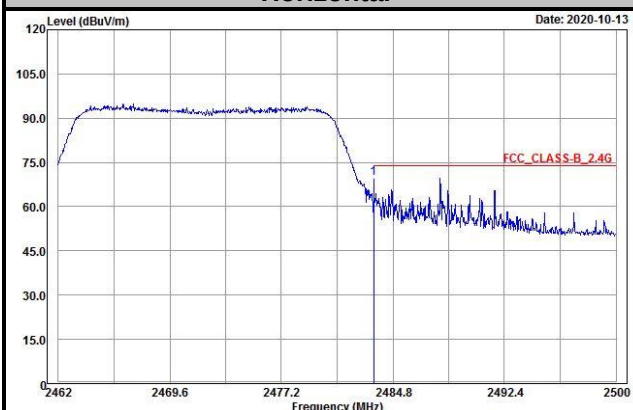
Remarks:

1. Emission Level = Read Level + Factor
Margin Value = Emission Level – Limit value
2. 2472 MHz: Fundamental Frequency.
3. The other emission levels were very low against the limit.

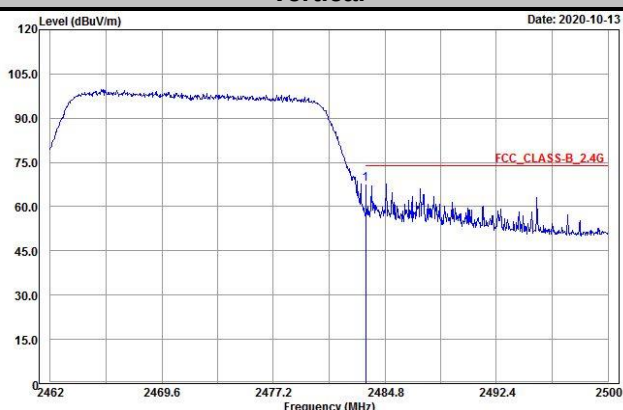
Ch 13

Peak

Horizontal

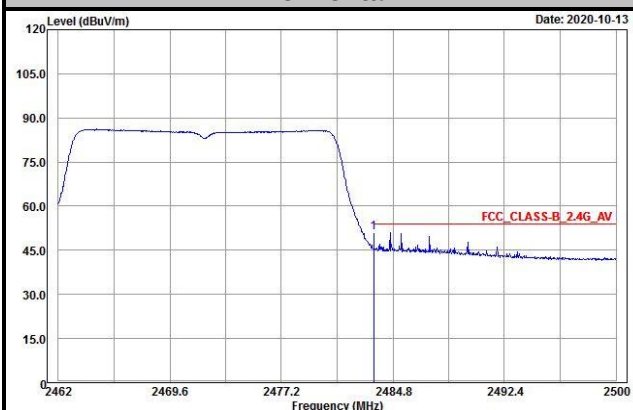


Vertical



Average

Horizontal



Vertical

