RADIO TEST REPORT

Product	:	Essential Spotlight Camera
Model Name	:	VMC2030
Series Model	:	VMC2032
FCC ID	:	2APLE18300409
Test Regulation	:	FCC 47 CFR Part 15 Subpart C (Section 15.247)
Received Date	:	Jul. 31, 2020
Test Date	:	Aug. 14, 2020 ~ Aug. 27, 2020
Issued Date	:	Sep. 2, 2020
Applicant	:	Arlo Technologies Inc 2200 Faraday Avenue, Suite 150, Carlsbad, CA 92008, USA
Issued By	:	Underwriters Laboratories Taiwan Co., Ltd. Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan

Testing Laboratory
3398

The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report are responsible of the test sample(s) provided by the client only and are not to be used to indicate applicability to other similar products.

REVISION HISTORY

Original Test Report No.: 4789544899-US-R0-V0

Rev.	Test report No.	Date	Page revised	Contents
Original	4789544899-US-R0-V0	Aug. 26, 2020	-	Initial issue
-	4789544899-US-R0-V0	Aug. 27, 2020	P.1, P.4, P.10 P.11 P.12	Modify test date. Add description to section 6.5. Update test plots.
-	4789544899-US-R0-V0	Sep. 2, 2020	P.9	Modify Note 1.

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1. Attestation of Test Results

APPLICANT:	Arlo Technologies Inc 2200 Faraday Avenue, Suite 150, Carlsbad, CA 92008, USA
MANUFACTURER	Funing Precision Component Co., Ltd. Lot B, Que Vo Industrial Zone, Van Duong Ward, Bac Ninh City, Bac Ninh Province, VIETNAM
EUT DESCRIPTION:	Essential Spotlight Camera
BRAND:	Arlo
MODEL:	VMC2030
SERIES MODEL:	VMC2032
SAMPLE STAGE:	Identical Prototype
DATE of TESTED:	Aug. 14, 2020 ~ Aug. 27, 2020

APPLICABLE STANDARDS

STANDARD	Test Results
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Cindy Hsin

Cindy Hsin Date : Sep. 2, 2020
Project Handler

Approved and Authorized By:

WaterNil.Guan

Waternil Guan Date : Sep. 2, 2020
Engineer

2. Summary of Test Results

Summary of Test Results		
FCC Clause	**Test Items**	**Result**
15.247(a)(2)	6dB Bandwidth	Note 1
15.247(b)	Conducted Output Power	Note 1
15.247(e)	Power Spectral Density	Note 1
15.247(d)	Antenna Port Emission	Note 1
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	Note 1

Note:
1. This report is as a supplementary report of UL TW report no.: 4789445245-US-R0-V0. Except that Radiated Emissions and AC Power Conducted Emission, others result refer to the original report.

3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k=2.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.5
RF Conducted	9 kHz - 40GHz	2	1.0
Radiated disturbance below 30MHz	9 kHz - 30 MHz	2	1.9
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	2	5.4
Radiated disturbance above 1GHz	1GHz ~ 40GHz	2	4.7

6. Equipment under Test

6.1. Description of EUT

Product	Essential Spotlight Camera
Brand Name	Arlo
Model Name	VMC2030
Series Model	VMC2032
Operating Frequency	2412MHz ~ 2462MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS7
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20)
Maximum Output Power	802.11b: 25.38 dBm 802.11g: 25.77 dBm 802.11n (HT20): 26.03 dBm
Normal Voltage	5Vdc (adapter or host equipment) 3.63Vdc for battery
S/N	A471037MA0308
Hardware Version	DV2
SW/FW version	20200324-2_mfg

Note:

1. This report is as a supplementary report of UL TW report no.: 4789445245-US-R0-V0. The difference compared with original report are list as below.

Model Name	Difference
VMC2032	- The housing size is different from VMC2030. - Change C3937 from 1.3pF to 0.8Nh (Antenna matching). - Remove C3939 component (Antenna matching). - Add 1.2pF to C112(Antenna matching). - Change C3938 from 1.2pF to 0ohm.(Antenna matching). - Remove C3940 component (Antenna matching). - Change R183 component size from 0603 to 1206. - Remove the CN5 connector and the original place has been cover by the shielding case with the same material. - Antenna gain changed. - Change Battery Cell from 1S2P to 1S4P. *

*: It is only for new model VMC2032.

2. The EUT incorporates a SISO diversity function. Physically, the EUT provides one completed transmitter and one receiver.

Modulation Mode	Tx,Rx Function
802.11b	1TX,1RX
802.11g	1TX,1RX
802.11n (HT20)	1TX,1RX

3. The EUT contains following accessory devices

Product	Brand	Model	Description
Security Mount	Arlo	300-11092-01	-
Mount Screw kit	Arlo	422-50002-01	-
USB Cable	Arlo	310-50001-01	Length: 0.3m

Product	Manufacturer / Trademark	Model	Description
Rechargeable Li-ion Battery	CELXPERT ENERGY CORP	A-11	3.63Vdc, 47.19Wh

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

6.2. Channel List

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

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Radiated Spurious Emission	966-2	23~27°C / 63~69%RH	120Vac / 60 Hz	Aug. 14, 2020 ~ Aug. 27, 2020	Patrick Kuan
AC power Line Conducted Emission	SR1	23~25°C / 60~64%RH	120Vac / 60 Hz	Aug. 18, 2020	Wayne Chen

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

Antenna	Brand Name	Model Name	Antenna Type	Antenna Gain(dBi)
Ant 0	Masterwave	902P00239S0	Monopole	1.7
Ant 1	Masterwave	902P00239S0	Monopole	2.0

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

6.5. Test Mode Applicability and Tested Channel Detail

- 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).
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- The fundamental of the EUT was investigated in three orthogonal axes X/Y/Z, it was determined that X axis was worst-case. Therefore, all final radiated testing was performed with the EUT in X axis.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For USB cable and Antenna diversity, pre-scan radiation has been determined by USB xxx and Antenna 1 (worst case)
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)
- The Output Power measured within 0.5dB compared with the UL TW report no.: 4789445245-US-R0-V0. Output power set using a test utility to be as close as possible to the original granted power, in some cases this may have resulted in a power value slightly above the original granted maximum power. Production power values will not exceed the original granted power.
- For above 1 GHz radiated emission in frequency range (1GHz~26.5GHz) have performed all modes of operation were investigated and the worst-case (CH11) emissions are reported

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11n(HT20)	OFDM	BPSK	1 to 11	1,6,11	MCS0
Radiated Emissions (Below 1GHz)	802.11n(HT20)	OFDM	BPSK	1 to 11	11	MCS0
AC Power Line Conducted Emission	802.11n(HT20)	OFDM	BPSK	1 to 11	11	MCS0

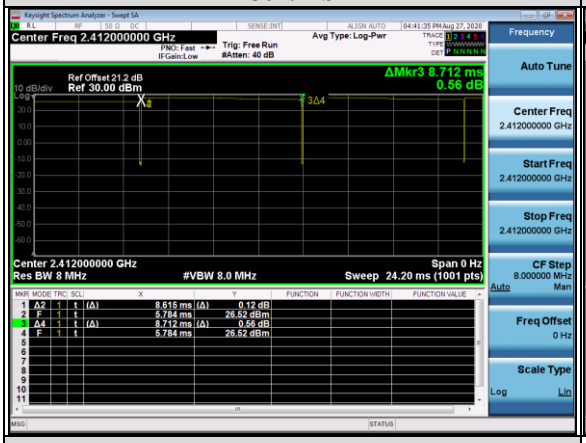
6.6. Duty cycle

802.11b: Duty cycle = 8.615/8.712 = 0.989, Duty cycle of test signal is ≥ 98 %, duty factor is not required.

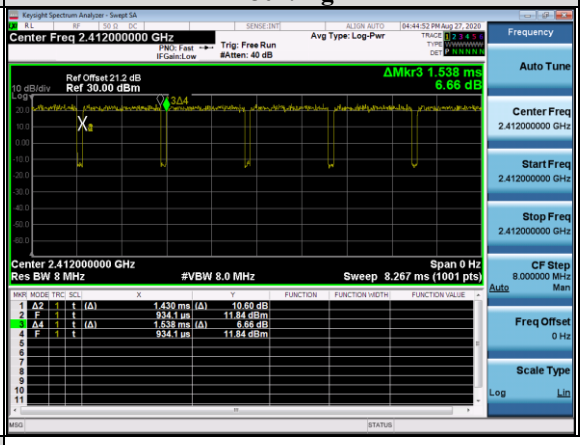
802.11g: Duty cycle = 1.43/1.538 = 0.93, Duty factor = 10 * log(1/0.93) = 0.32

802.11n (HT20): Duty cycle = 1.339/1.447 = 0.925, Duty factor = 10 * log(1/0.925) = 0.34

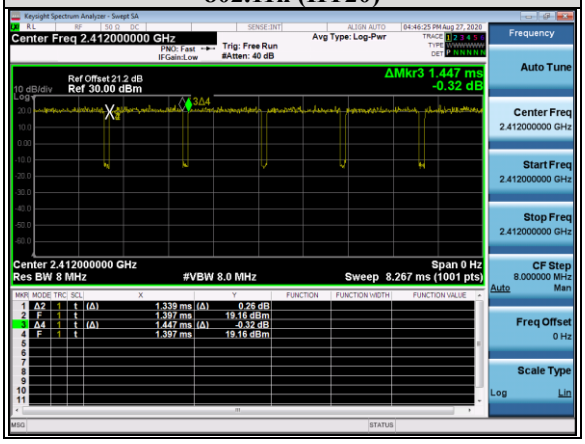
802.11b



802.11g



802.11n (HT20)



7. Test Equipment

Test Equipment List					
Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Cal. Date**	**Cal. Interval**
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 13, 2019	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Dec. 17, 2019	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 19, 2019	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	Jan. 3, 2020	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	Jan. 3, 2020	1 year
Horn Antenna (18-40 GHz)	Schwarzbeck	BBHA 9170	781	Dec. 27, 2019	1 year
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	Jan. 9, 2020	1 year
Preamplifier (1-18 GHz)	EMCI	EMC051835BE	980406	Feb. 4, 2020	1 year
Preamplifier (18-40GHz)	EMCI	EMC184040SEE	980426	May 19, 2020	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	Jul. 2, 2020	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	Jan. 8, 2020	1 year
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	Nov. 19, 2019	1 year
V-LISN 9kHz - 30MHz	Schwarzbeck	NSLK 8127	8127-946	Oct. 17, 2019	1 year
Cables	HARBOUR INDUSTRIES	LL142	170205-5000-1	Feb. 5, 2020	1 year

UL Software		
Description	**Name**	**Version**
Radiated measurement	EZ_EMC	1.1.4.2
AC power Line Conducted Emission	EZ_EMC	1.1.4.2

8. Description of Test Setup

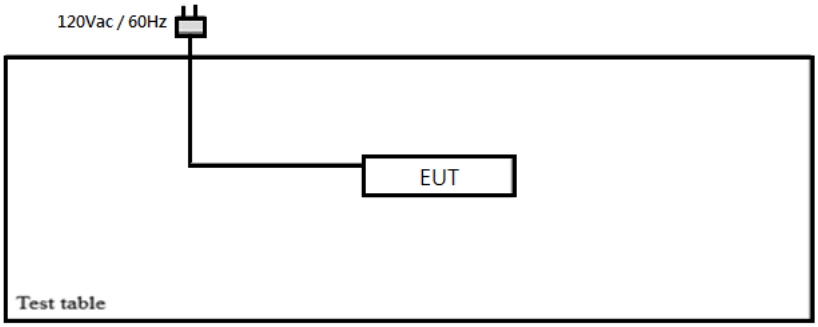
Support Equipment

Equipment	Brand Name	Model Name	S/N	Remark
Notebook	DELL	Latitude E5470	3JFKWF2	N/A

Test Setup

Controlled using a bespoke application (Teraterm469) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



9. Test Results

9.1. Radiated Spurious Emission

Requirements

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 20dB below the highest level of the desired power:

Frequency(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 1000MHz, 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 20dB under any condition of modulation.

Test Procedures

[For 9 kHz ~ 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. For measurement below 30MHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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

[For above 30 MHz]

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
f. The test-receiver system was set to peak and average detects 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:

a. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

b. 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 1GHz.

c. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

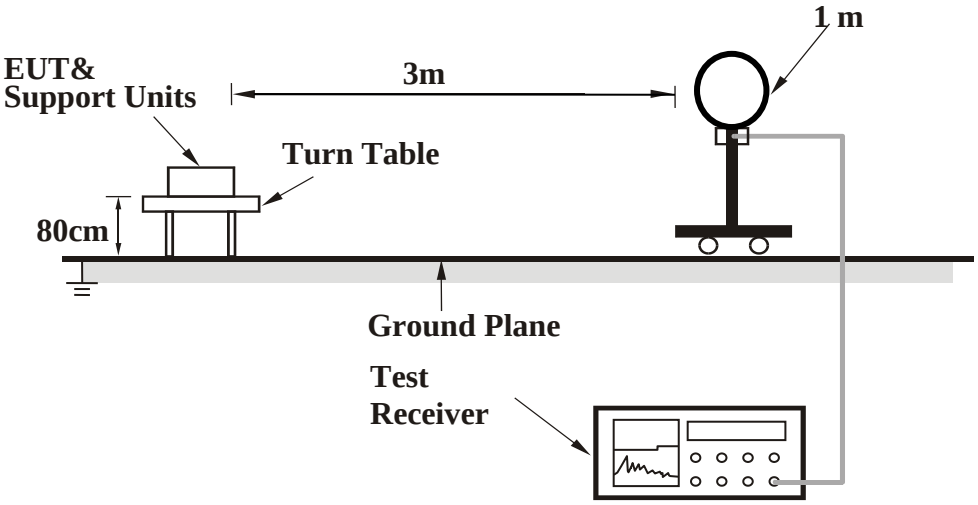
Configuration	Average	
	RBW	VBW
802.11b	1MHz	10 Hz
802.11g		1 kHz
802.11n (HT20)		1 kHz

Note: Refer to section 6.6 for duty cycle.

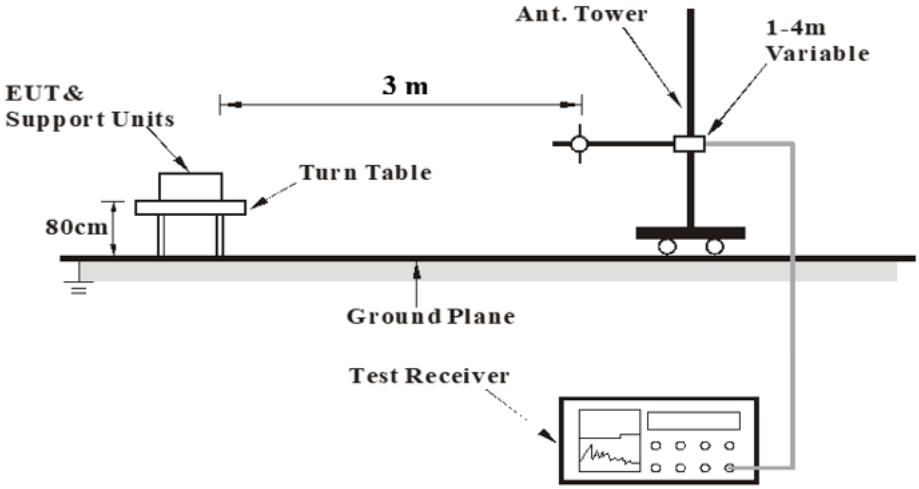
d. All modes of operation were investigated (includes all external accessories) and the worst-case emissions are reported.

Test Setup

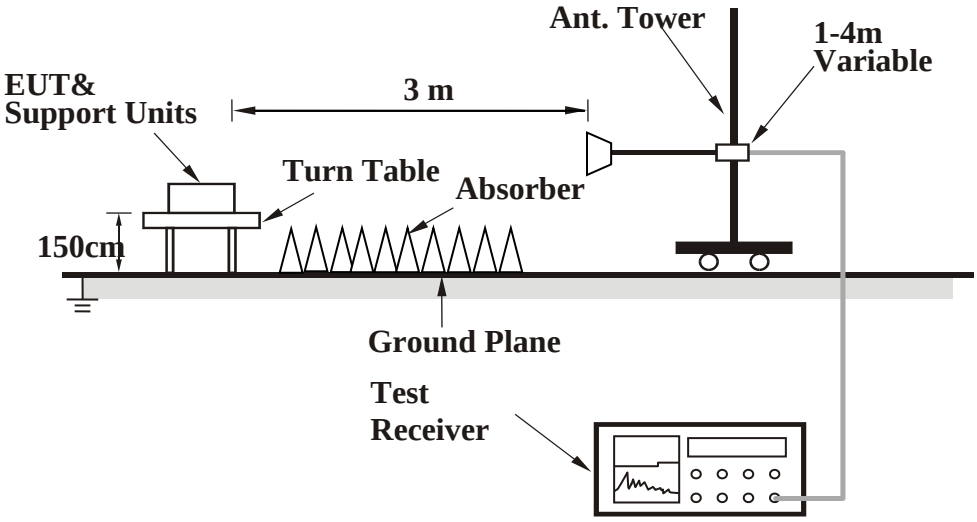
<Frequency Range 9 kHz ~ 30 MHz>



<Frequency Range 30 MHz ~ 1 GHz >



<Frequency Range above 1 GHz>



For the actual test configuration, please refer to the Setup Configurations.

Test Data

Above 1GHz Data

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	2.31 GHz ~ 2.51 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	2389.8	59.19	3.84	63.03	74	-10.97	Peak
@	2412	100.53	3.81	104.34	-	-	Peak
-	2390	48.12	3.84	51.96	54	-2.04	Average
@	2412	91.84	3.81	95.65	-	-	Average
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	2390	60.72	3.84	64.56	74	-9.44	Peak
@	2412	100.98	3.81	104.79	-	-	Peak
-	2390	49.41	3.84	53.25	54	-0.75	Average
@	2412	91.9	3.81	95.71	-	-	Average

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	2.31 GHz ~ 2.51 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	2389.8	56.24	3.84	60.08	74	-13.92	Peak
@	2437	104.86	3.74	108.6	-	-	Peak
-	2485.6	52.94	3.73	56.67	74	-17.33	Peak
-	2389.4	42.42	3.84	46.26	54	-7.74	Average
@	2437	95.94	3.74	99.68	-	-	Average
-	2484	41.43	3.72	45.15	54	-8.85	Average
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	2389.8	57.14	3.84	60.98	74	-13.02	Peak
@	2437	106.06	3.74	109.8	-	-	Peak
-	2483.8	52.67	3.72	56.39	74	-17.61	Peak
-	2389.8	43.55	3.84	47.39	54	-6.61	Average
@	2437	96.69	3.74	100.43	-	-	Average
-	2483.6	42.33	3.72	46.05	54	-7.95	Average

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. The other emission levels were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 26.5 GHz

Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
@	2462	101.7	3.71	105.41	-	-	Peak
-	2484.4	60.72	3.72	64.44	74	-9.56	Peak
@	2462	90.9	3.71	94.61	-	-	Average
-	2483.6	45.56	3.72	49.28	54	-4.72	Average
*	4924	38.56	-0.55	38.01	74	-35.99	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
@	2462	102.11	3.71	105.82	-	-	Peak
-	2485.4	61.33	3.73	65.06	74	-8.94	Peak
@	2462	91.47	3.71	95.18	-	-	Average
-	2483.6	47.4	3.72	51.12	54	-2.88	Average
*	4924	37.79	-0.55	37.24	74	-36.76	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. "@": Fundamental Frequency.
5. " * ": The peak result complies with AVG limit, AVG result is deemed to comply with AVG limit.
6. The other emission levels were very low against the limit.

9 kHz ~ 30 MHz Data

For 9 kHz to 30 MHz radiated emission have performed all modes of operation were investigated. The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

No non-compliance noted:

KDB 414788 D01 OATS and Chamber Correlation Justification

- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

- OATs and chamber correlation testing had been performed and chamber measured test results is the worst case test result.

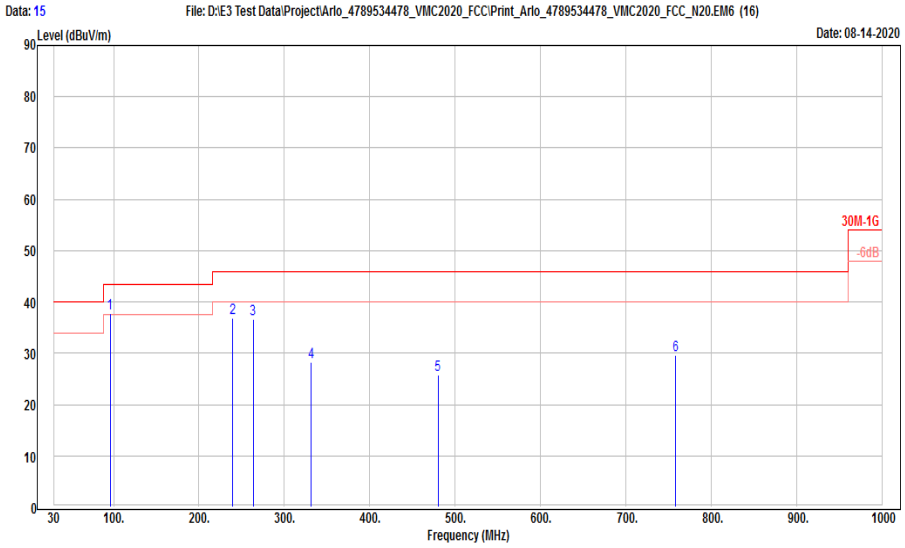
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30m open area test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.

30 MHz ~ 1 GHz Data

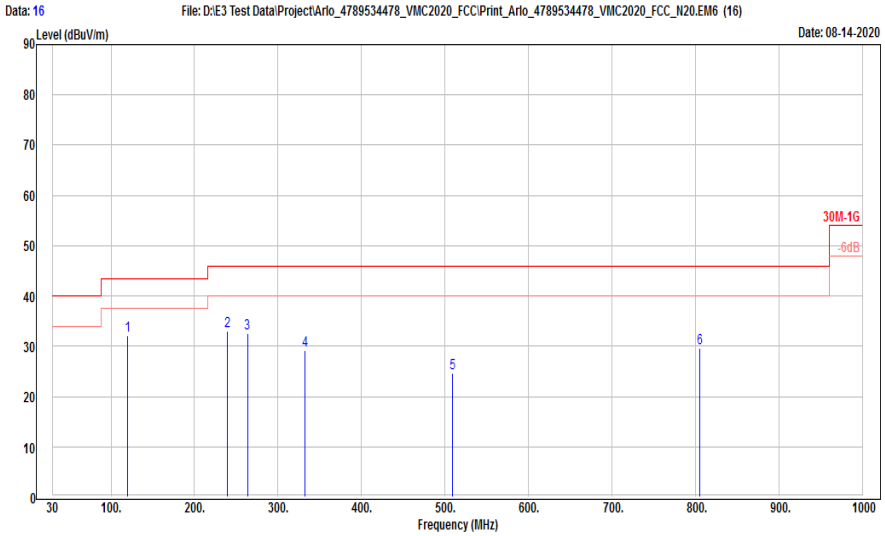
802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	30 MHz ~ 1 GHz

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	95.96	55.06	-17.39	37.67	43.5	-5.83	Peak
-	239.52	49.55	-12.68	36.87	46	-9.13	Peak
-	263.77	48.65	-11.98	36.67	46	-9.33	Peak
-	331.67	38.16	-9.89	28.27	46	-17.73	Peak
-	480.08	31.82	-5.99	25.83	46	-20.17	Peak
-	758.47	29.94	-0.39	29.55	46	-16.45	Peak
Antenna Polarity & Test Distance: Vertical at 3 m							
Notation	**Frequency**	**Reading**	**Correct**	**Result**	**Limit**	**Margin**	**Remark**
	(MHz)	**(dBuV/m)**	**dB/m**	**(dBuV/m)**	**(dBuV/m)**	**(dB)**	
-	120.21	46.48	-14.3	32.18	43.5	-11.32	Peak
-	239.52	45.63	-12.68	32.95	46	-13.05	Peak
-	263.77	44.57	-11.98	32.59	46	-13.41	Peak
-	332.64	38.92	-9.85	29.07	46	-16.93	Peak
-	509.18	29.92	-5.28	24.64	46	-21.36	Peak
-	805.03	29.95	-0.36	29.59	46	-16.41	Peak

Remarks:

1. Result value (dBuV/m) = Reading value (dBuV/m) + Correction Factor (dB/m).
2. Margin(dB) = Result value (dBuV/m) - Limit value (dBuV/m).
3. Correction Factor (dB/m) = Antenna Factor (dBuV/m) + Cable Loss (dB) - Preamp Factor (dB).
4. The peak result complies with QP limit, QP result is deemed to comply with QP limit.
5. The other emission levels were very low against the limit.

9.2. AC Power Line Conducted Emission

Requirements

Frequency (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

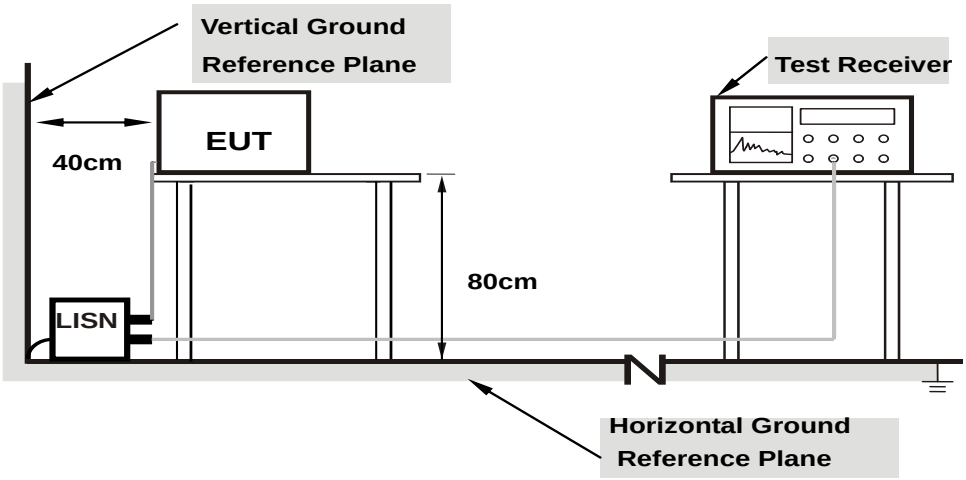
Note:
1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE:
1. The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.
2. The extension cord has been taken into consideration as part of the LISN.

Test Setup



Note: 1.Support units were connected to second LISN.

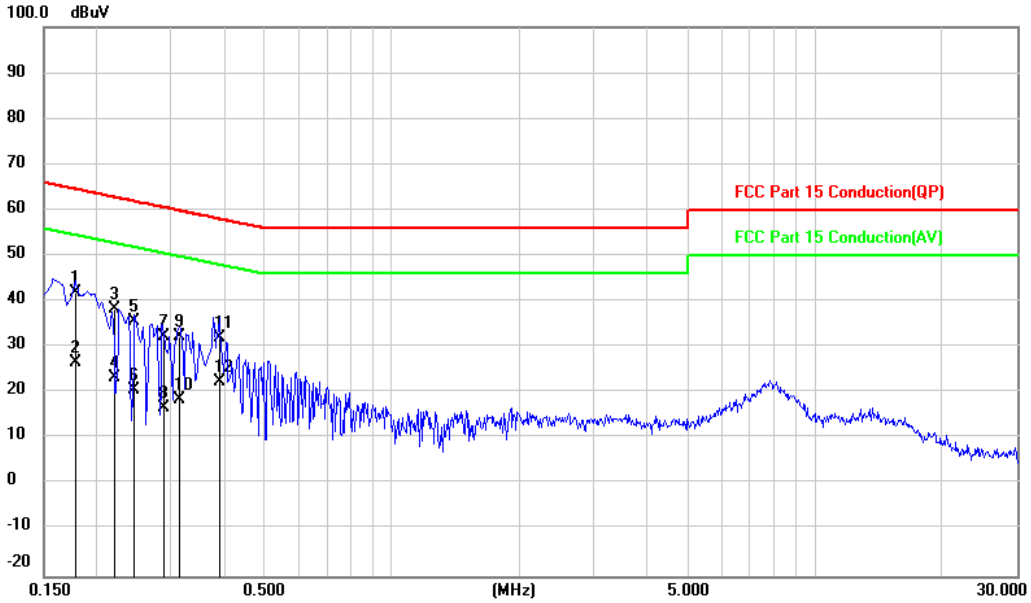
For the actual test configuration, please refer to the Setup Configurations.

Test Data

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	150 kHz ~ 30 MHz

Phase of Power：Line (L)

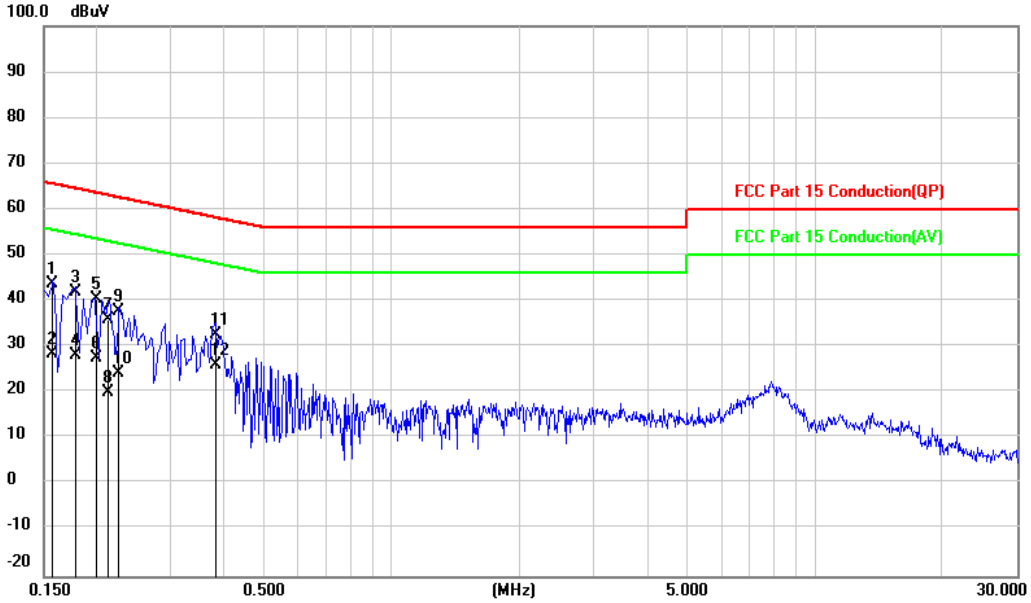


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.1780	41.88	0.06	41.94	64.58	-22.64	QP
2	0.1780	26.74	0.06	26.80	54.58	-27.78	AVG
3	0.2215	38.39	0.06	38.45	62.76	-24.31	QP
4	0.2215	23.21	0.06	23.27	52.76	-29.49	AVG
5	0.2452	35.67	0.06	35.73	61.92	-26.19	QP
6	0.2452	20.59	0.06	20.65	51.92	-31.27	AVG
7	0.2883	32.33	0.06	32.39	60.57	-28.18	QP
8	0.2883	16.79	0.06	16.85	50.57	-33.72	AVG
9	0.3129	32.33	0.06	32.39	59.89	-27.50	QP
10	0.3129	18.49	0.06	18.55	49.89	-31.34	AVG
11	0.3876	31.89	0.06	31.95	58.11	-26.16	QP
12	0.3876	22.51	0.06	22.57	48.11	-25.54	AVG

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

Phase of Power：Neutral (N)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	dB	(dBuV)	(dBuV)	(dB)	
1	0.1558	43.80	0.04	43.84	65.68	-21.84	QP
2	0.1558	28.28	0.04	28.32	55.68	-27.36	AVG
3	0.1782	41.97	0.05	42.02	64.57	-22.55	QP
4	0.1782	28.24	0.05	28.29	54.57	-26.28	AVG
5	0.1997	40.36	0.05	40.41	63.62	-23.21	QP
6	0.1997	27.60	0.05	27.65	53.62	-25.97	AVG
7	0.2124	35.91	0.05	35.96	63.11	-27.15	QP
8	0.2124	19.91	0.05	19.96	53.11	-33.15	AVG
9	0.2243	37.73	0.05	37.78	62.66	-24.88	QP
10	0.2243	24.30	0.05	24.35	52.66	-28.31	AVG
11	0.3823	32.55	0.05	32.60	58.23	-25.63	QP
12	0.3823	26.11	0.05	26.16	48.23	-22.07	AVG

Remarks:

1. Result value (dBuV) = Reading value (dBuV) + Correction Factor (dB)
2. Margin(dB) = Result value (dBuV) - Limit value (dBuV)
3. Correction Factor(dB) = Insertion loss(dB) + Cable loss(dB)
4. The other emission levels were very low against the limit.

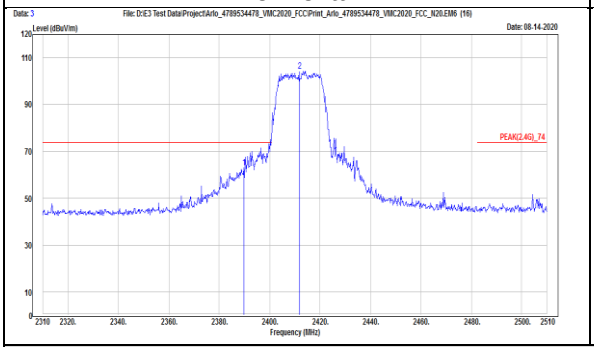
Appendix I Radiated Band Edge Measurement

802.11n (HT20)

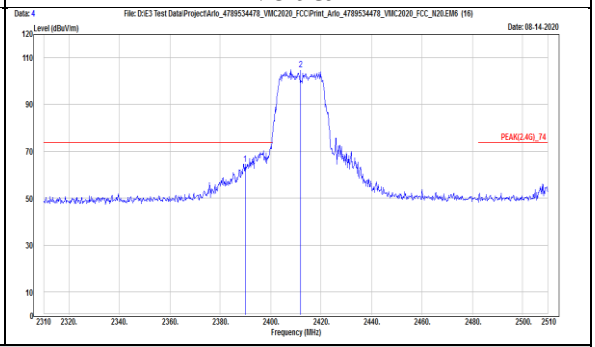
Peak

Ch1

Horizontal

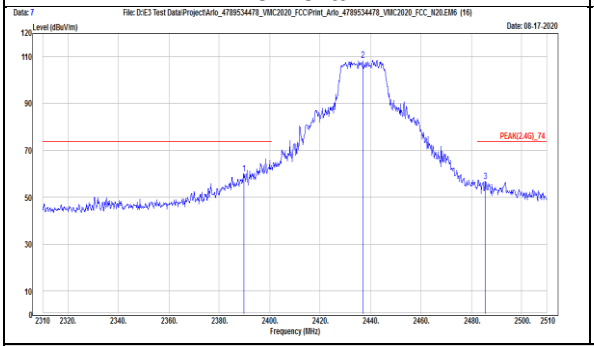


Vertical

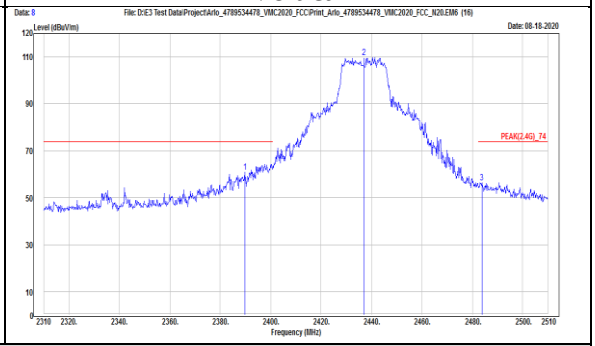


Ch6

Horizontal

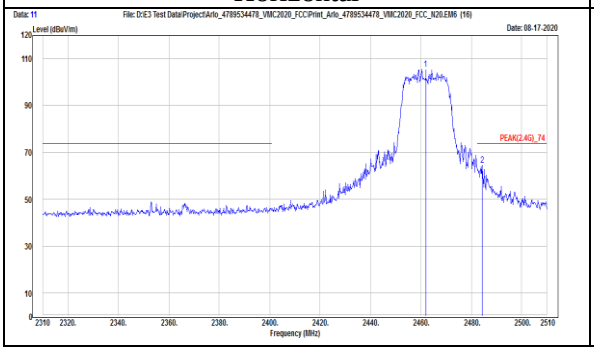


Vertical

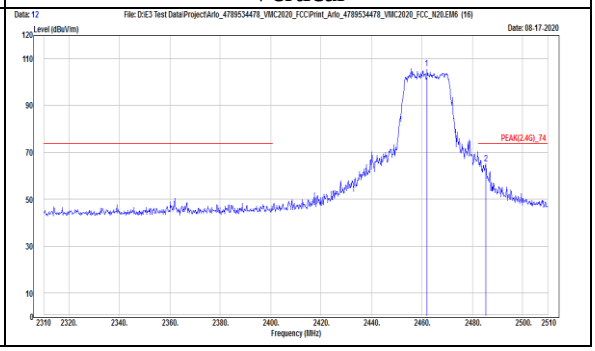


Ch11

Horizontal



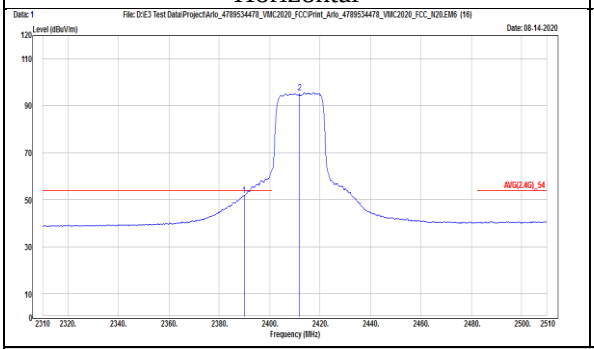
Vertical



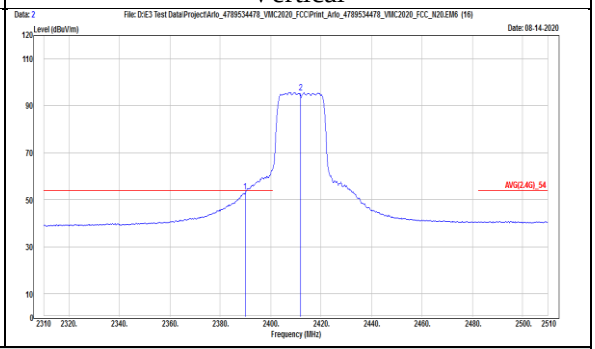
Average

Ch1

Horizontal

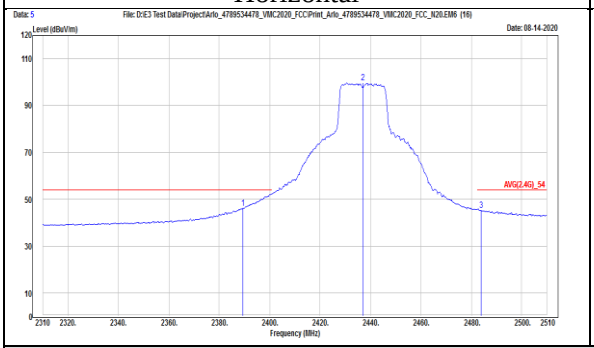


Vertical

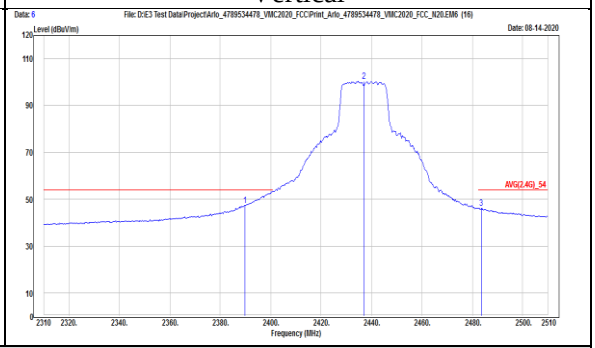


Ch6

Horizontal

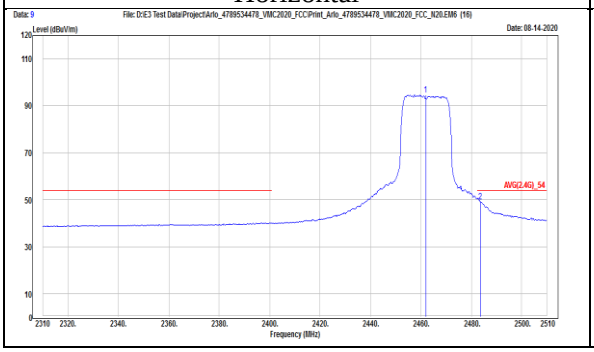


Vertical

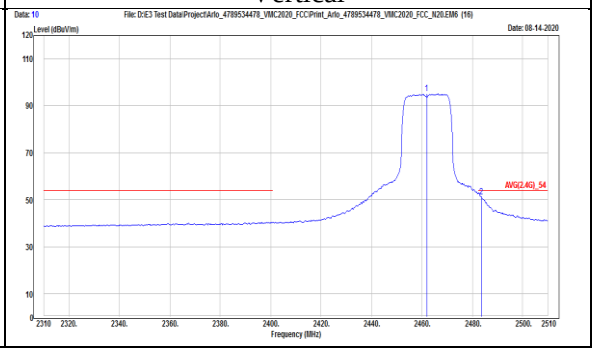


Ch11

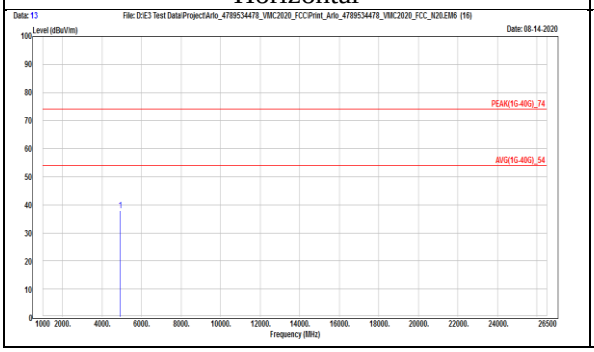
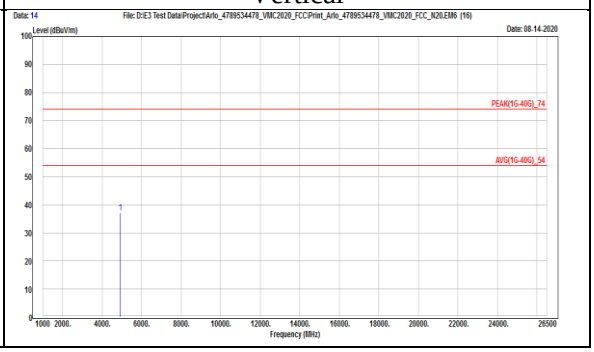
Horizontal



Vertical



Appendix II Radiated Spurious Emission Measurement

802.11n (HT20)

Ch11	
Horizontal	Vertical