

Partial FCC Test Report

Report No.: RF191114C18-2

FCC ID: PPD-QCNFA344AH

Test Model: QCNFA344A

Received Date: Nov. 14, 2019

Test Date: Mar. 21, 2020

Issued Date: Mar. 25, 2020

Applicant: Qualcomm Atheros, Inc.

Address: 1700 Technology Drive, San Jose, CA 95110

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan

FCC Registration /
Designation Number: 427177 / TW0011



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Release Control Record

Issue No.	Description	Date Issued
RF191114C18-2	Original Release	Mar. 25, 2020

1 Certificate of Conformity

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

Brand: Qualcomm Atheros

Test Model: QCNFA344A

Sample Status: Engineering Sample

Applicant: Qualcomm Atheros, Inc.

Test Date: Mar. 21, 2020

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 : Shelly Hsueh, **Date:** Mar. 25, 2020
Shelly Hsueh / Specialist

Approved by : Dylan Chiou, **Date:** Mar. 25, 2020
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	N/A	Refer to Note 1
15.247(a)(1) (iii)	Number of Hopping Frequency Used	N/A	Refer to Note 1
15.247(a)(1) (iii)	Dwell Time on Each Channel	N/A	Refer to Note 1
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note 1
15.247(a)(1)	Maximum Peak Output Power	N/A	Refer to Note 1
---	Occupied Bandwidth Measurement	N/A	Refer to Note 1
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.36 dB at 2483.5 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note 1
15.247(d)	Antenna Port Emission	N/A	Refer to Note 1
15.203	Antenna Requirement	N/A	Refer to Note 1

Note:

1. This report is a partial report according to customer requirements, only test item of Radiated Emissions (above 1GHz) Harmonic and Band Edge Measurement were performed for this report. Other testing data please refer to BV CPS report no.: RF150107E06B-2 for module (Brand: Qualcomm Atheros, Model: QCNFA344A).
2. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
3. 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	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand	Qualcomm Atheros
Test Model	QCNFA344A
Status of EUT	Engineering Sample
Nominal Voltage	20.0 Vdc (adapter)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	N/A

Note:

1. The WLAN/BT module (Brand: Qualcomm Atheros, Model: QCNFA344A) was installed in the EUT.
2. The antenna information is listed as below.

No.	Antenna Type	Manufacturer	Parts Number	Antenna Gain (dBi)				
				BT	WLAN 2.4 GHz	WLAN 5.15~5.35 GHz	WLAN 5.47~5.72 5 GHz	WLAN 5.725~5.8 5 GHz
1	PIFA	Wistron Neweb Corporation	Main Antenna: DQ6615G8600 (81EAA615.G86) Aux. Antenna: DQ6615G8600 (81EAA615.G86)	Aux.: -1.18	Main: -1.80 Aux.: -1.18	Main: -0.26 Aux.: -0.15	Main: -1.13 Aux.: -2.01	Main: -0.80 Aux.: -2.01
2		Wistron Neweb Corporation	Main Antenna: DQ6615G9300 (81EAA615.G93) Aux. Antenna: DQ6615G9300 (81EAA615.G93)	Aux.: -0.53	Main: -2.27 Aux.: -0.53	Main: -0.53 Aux.: -0.29	Main: -1.55 Aux.: -0.82	Main: -1.19 Aux.: -0.99
3		High-Tek Electronics Co., Ltd	Main Antenna: DQ60ACQD063 (0ACQD019089N) Aux. Antenna: DQ60ACQD063 (0ACQD019089N)	Aux.: 0.75	Main: -1.71 Aux.: 0.75	Main: -0.03 Aux.: -0.5	Main: 1.88 Aux.: 0.27	Main: 2.8 Aux.: 0.27
4		High-Tek Electronics Co., Ltd	Main Antenna: DQ60ACQD064 (0ACQD019069N) Aux. Antenna: DQ60ACQD064 (0ACQD019069N)	Aux.: -0.86	Main: 0.05 Aux.: -0.86	Main: 1.74 Aux.: -0.71	Main: 2.27 Aux.: 0.92	Main: 2.87 Aux.: 0.13

3. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	Lenovo	ADLX65YCC3D	I/P: 100-240 Vac, 50-60 Hz, 1.8 A O/P: 20V, 3.25A / 15V, 3A / 9V, 2A / 5V, 2A 1.75M/0core
Adapter	Lenovo	ADLX65YDC3D	I/P: 100-240 Vac, 50-60 Hz, 1.8 A O/P: 20V, 3.25A / 15V, 3A / 9V, 2A / 5V, 2A 1.8M/0core

4. 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

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To	Description
	RE \geq 1G	
-	√	-

Where **RE \geq 1G**: Radiated Emission above 1 GHz

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-" 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.

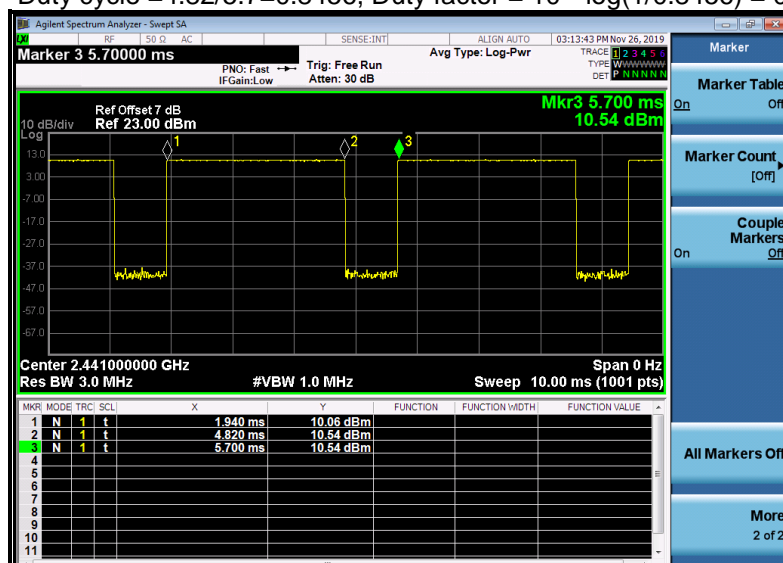
EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	0, 39, 78	FHSS	GFSK	DH5
	0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

Test Condition:

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

3.3 Duty Cycle of Test Signal

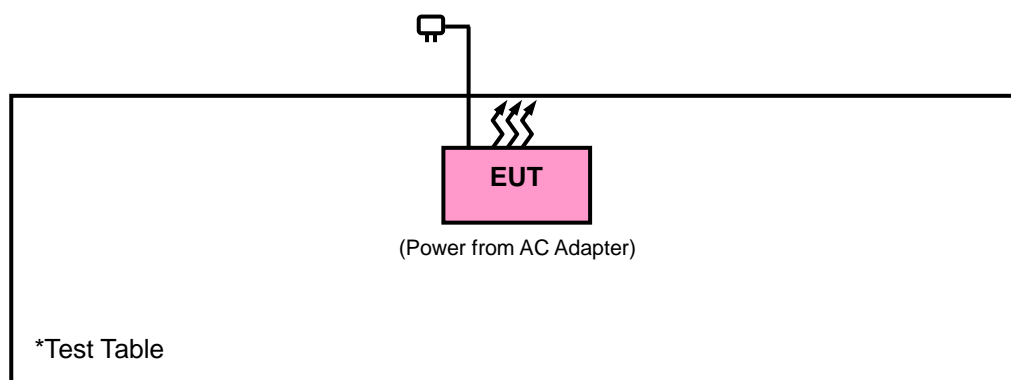
Duty cycle = $4.82/5.7=0.8456$, Duty factor = $10 * \log(1/0.8456) = 0.728$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.4.1 Configuration of System under Test



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 15.247 Meas Guidance v05r02

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:

- The lower limit shall apply at the transition frequencies.
- Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 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. 26, 2019	Aug. 25, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
Preamplifier EMCI	EMC 184045	980116	Oct. 08, 2019	Oct. 07, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 18, 2019	Jun. 17, 2020
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:

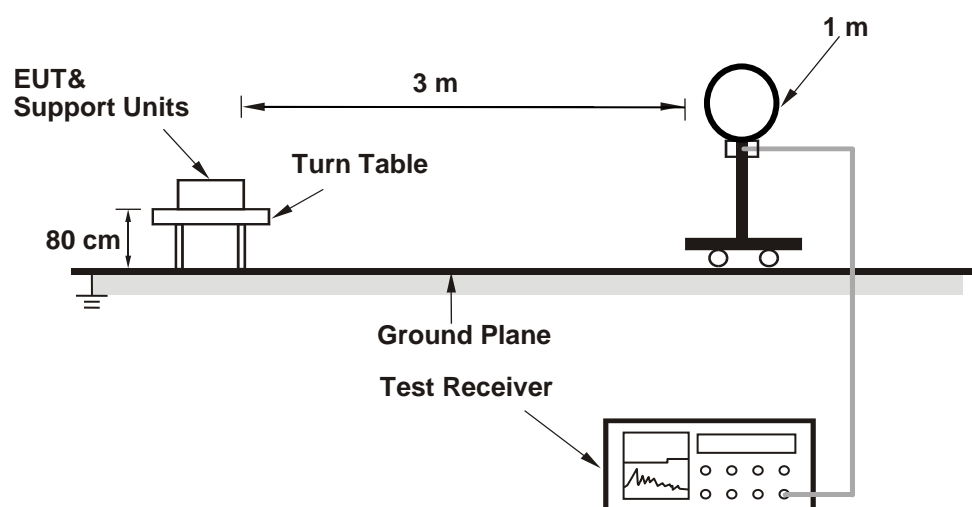
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) 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. (RBW = 1 MHz, VBW = 3 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

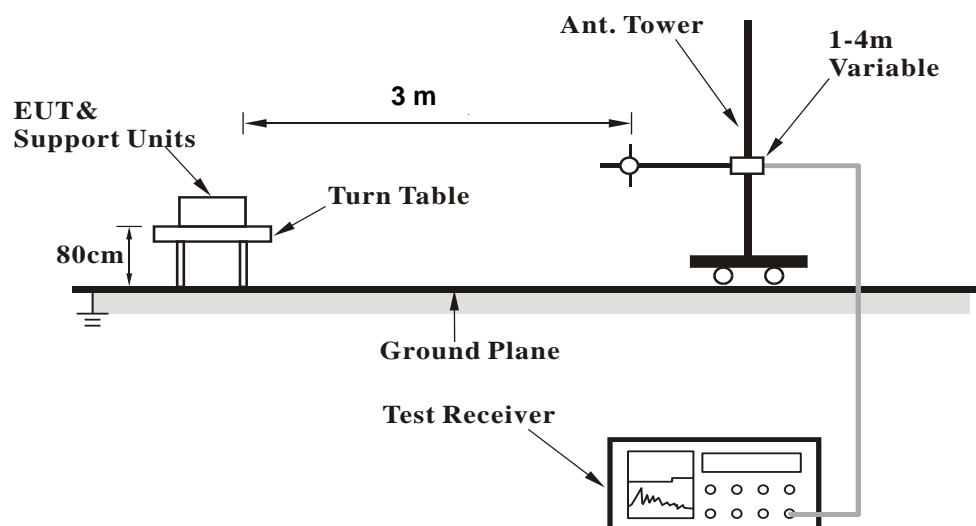
No deviation.

4.1.5 Test Set Up

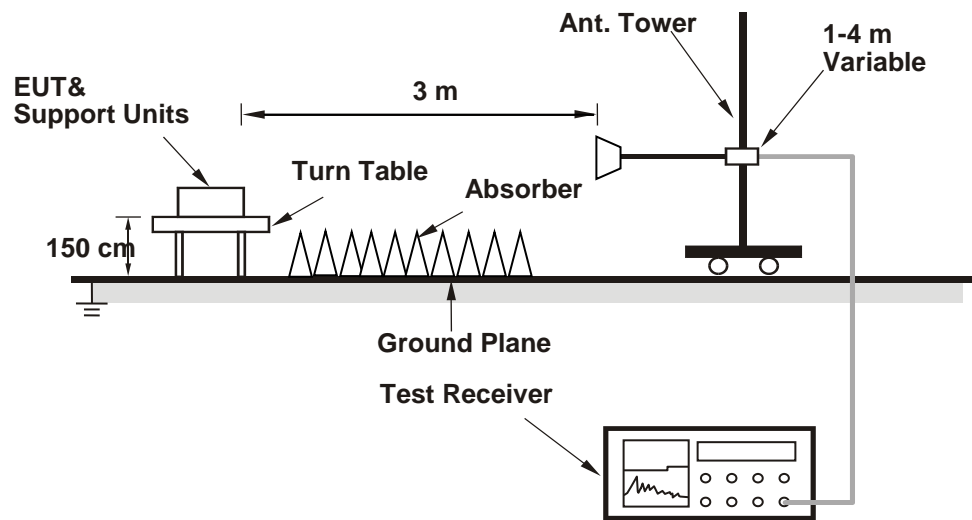
<Radiated Emission below 30 MHz>



<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

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data: GFSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	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	Karl Lee

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	41.03	36.53	4.5	54	-12.97	163	244	Average
2390	51.73	47.23	4.5	74	-22.27	163	244	Peak
*2402	83.05	78.53	4.52			163	244	Average
*2402	86.41	81.89	4.52			163	244	Peak
4804	41.13	30.78	10.35	54	-12.87	188	8	Average
4804	47.19	36.84	10.35	74	-26.81	188	8	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	40.13	35.63	4.5	54	-13.87	321	347	Average
2390	51.72	47.22	4.5	74	-22.28	321	347	Peak
*2402	86.17	81.65	4.52			321	347	Average
*2402	89.94	85.42	4.52			321	347	Peak
4804	41.37	31.02	10.35	54	-12.63	135	222	Average
4804	47.02	36.67	10.35	74	-26.98	135	222	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.
- " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 39	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	Karl Lee

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	40.99	36.49	4.5	54	-13.01	163	244	Average
2390	51.04	46.54	4.5	74	-22.96	163	244	Peak
*2441	82.13	77.55	4.58			163	244	Average
*2441	85.54	80.96	4.58			163	244	Peak
2483.5	41.54	36.88	4.66	54	-12.46	163	244	Average
2483.5	51.97	47.31	4.66	74	-22.03	163	244	Peak
4882	40.98	30.77	10.21	54	-13.02	177	7	Average
4882	47.23	37.02	10.21	74	-26.77	177	7	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	40.97	36.47	4.5	54	-13.03	321	347	Average
2390	51.04	46.54	4.5	74	-22.96	321	347	Peak
*2441	85.36	80.78	4.58			321	347	Average
*2441	88.88	84.3	4.58			321	347	Peak
2483.5	41.43	36.77	4.66	54	-12.57	321	347	Average
2483.5	52.43	47.77	4.66	74	-21.57	321	347	Peak
4882	40.79	30.58	10.21	54	-13.21	137	144	Average
4882	47.97	37.76	10.21	74	-26.03	137	144	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.
- " * ": Fundamental frequency

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

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
*2480	82.37	45.26	37.11			163	244	Average
*2480	85.92	48.81	37.11			163	244	Peak
2483.5	41.64	36.98	4.66	54	-12.36	163	244	Average
2483.5	52.71	48.05	4.66	74	-21.29	163	244	Peak
4960	41.24	30.88	10.36	54	-12.76	158	228	Average
4960	46.74	36.38	10.36	74	-27.26	158	228	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
*2480	85.94	81.3	4.64			321	347	Average
*2480	88.38	83.74	4.64			321	347	Peak
2483.5	41.51	36.85	4.66	54	-12.49	321	347	Average
2483.5	52.11	47.45	4.66	74	-21.89	321	347	Peak
4960	41.37	31.01	10.36	54	-12.63	124	206	Average
4960	46.83	36.47	10.36	74	-27.17	124	206	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2480 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. " * ": Fundamental frequency

8DPSK

EUT Test Condition		Measurement Detail	
Channel	Channel 0	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	Karl Lee

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	40.97	36.47	4.5	54	-13.03	163	244	Average
2390	51.01	46.51	4.5	74	-22.99	163	244	Peak
*2402	83.05	78.53	4.52			163	244	Average
*2402	88.23	83.71	4.52			163	244	Peak
4804	41	30.65	10.35	54	-13	157	208	Average
4804	46.55	36.2	10.35	74	-27.45	157	208	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	41.09	36.59	4.5	54	-12.91	321	347	Average
2390	51.33	46.83	4.5	74	-22.67	321	347	Peak
*2402	85.73	81.21	4.52			321	347	Average
*2402	90.72	86.2	4.52			321	347	Peak
4804	41.6	31.25	10.35	54	-12.4	135	207	Average
4804	47.1	36.75	10.35	74	-26.9	135	207	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2402 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.
- " * ": Fundamental frequency

EUT Test Condition		Measurement Detail	
Channel	Channel 39	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	Karl Lee

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	41.01	36.51	4.5	54	-12.99	163	244	Average
2390	51.72	47.22	4.5	74	-22.28	163	244	Peak
*2441	82.01	77.43	4.58			163	244	Average
*2441	87.04	82.46	4.58			163	244	Peak
2483.5	41.61	36.95	4.66	54	-12.39	163	244	Average
2483.5	51.99	47.33	4.66	74	-22.01	163	244	Peak
4882	40.98	30.77	10.21	54	-13.02	134	166	Average
4882	47.66	37.45	10.21	74	-26.34	134	166	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	40.92	36.42	4.5	54	-13.08	321	347	Average
2390	51.19	46.69	4.5	74	-22.81	321	347	Peak
*2441	85.56	48.51	37.05			321	347	Average
*2441	90.67	53.62	37.05			321	347	Peak
2483.5	41.59	36.93	4.66	54	-12.41	321	347	Average
2483.5	52.01	47.35	4.66	74	-21.99	321	347	Peak
4882	41.66	31.45	10.21	54	-12.34	149	9	Average
4882	47.29	37.08	10.21	74	-26.71	149	9	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2441 MHz: Fundamental frequency.
- The emission levels of other frequencies were very low against the limit.
- " * ": Fundamental frequency

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Karl Lee

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
*2480	82.48	77.84	4.64			163	244	Average
*2480	87.6	82.96	4.64			163	244	Peak
2483.5	41.51	36.85	4.66	54	-12.49	163	244	Average
2483.5	51.76	47.1	4.66	74	-22.24	163	244	Peak
4960	41.36	31	10.36	54	-12.64	145	177	Average
4960	46.78	36.42	10.36	74	-27.22	145	177	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
*2480	85.88	81.24	4.64			321	347	Average
*2480	90.74	86.1	4.64			321	347	Peak
2483.5	41.51	36.85	4.66	54	-12.49	321	347	Average
2483.5	52.58	47.92	4.66	74	-21.42	321	347	Peak
4960	41.02	30.66	10.36	54	-12.98	134	225	Average
4960	47.04	36.68	10.36	74	-26.96	134	225	Peak

Remarks:

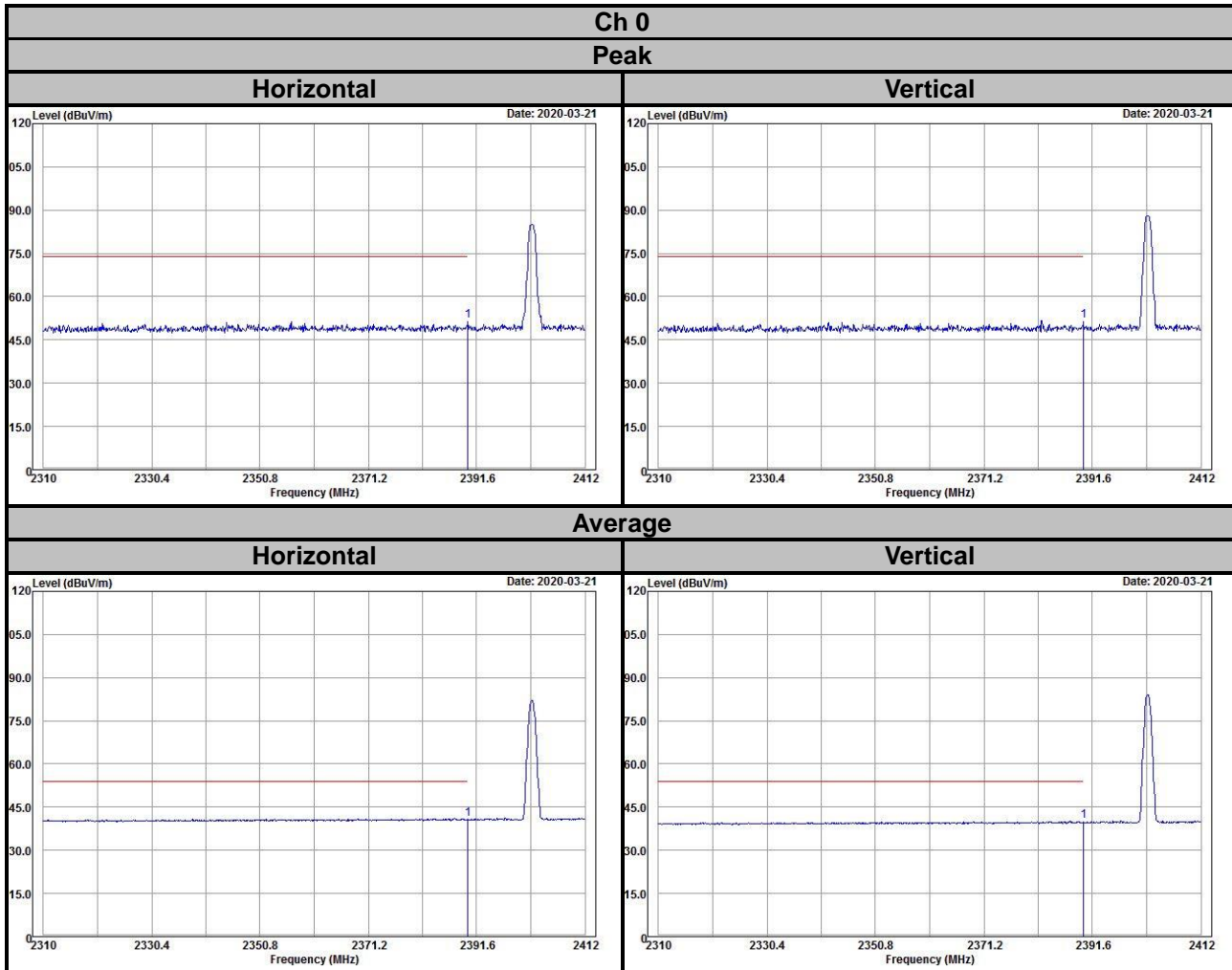
1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2480 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. " * ": Fundamental frequency

5 Pictures of Test Arrangements

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

Annex A- Band-edge measurement

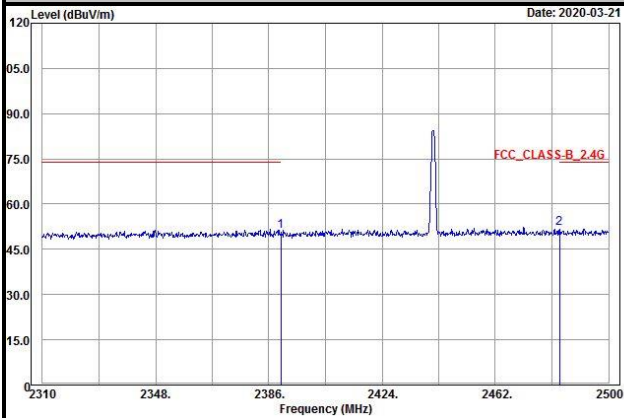
GFSK



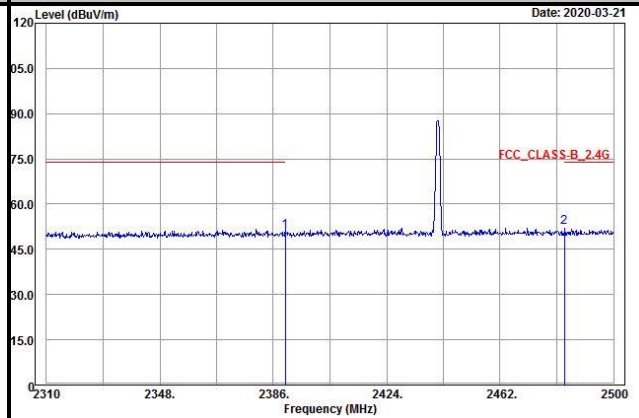
Ch 39

Peak

Horizontal

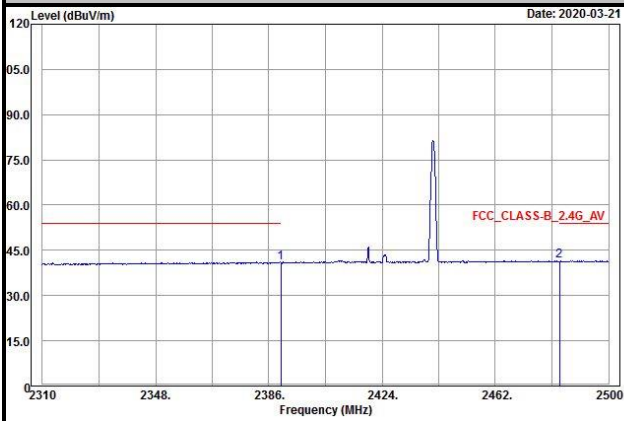


Vertical

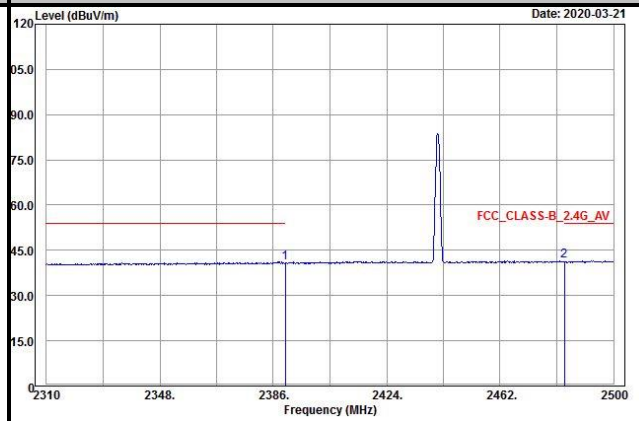


Average

Horizontal



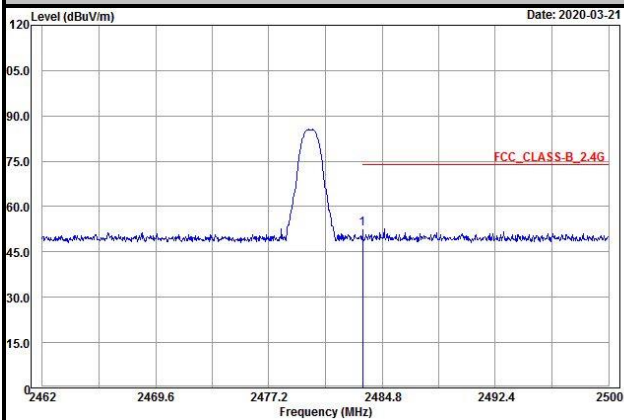
Vertical



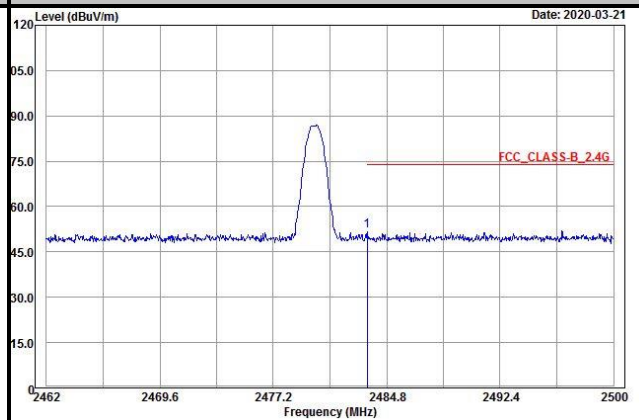
Ch 78

Peak

Horizontal

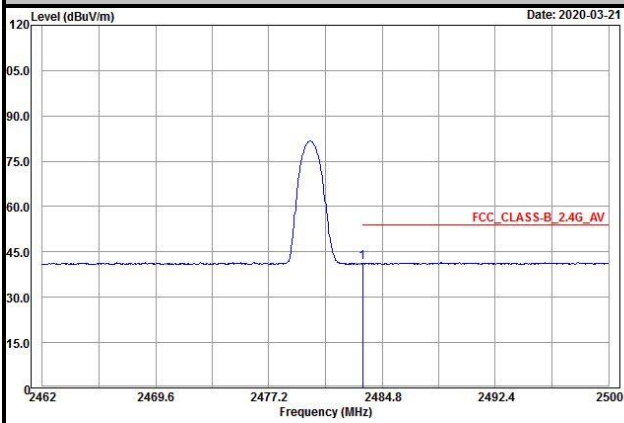


Vertical

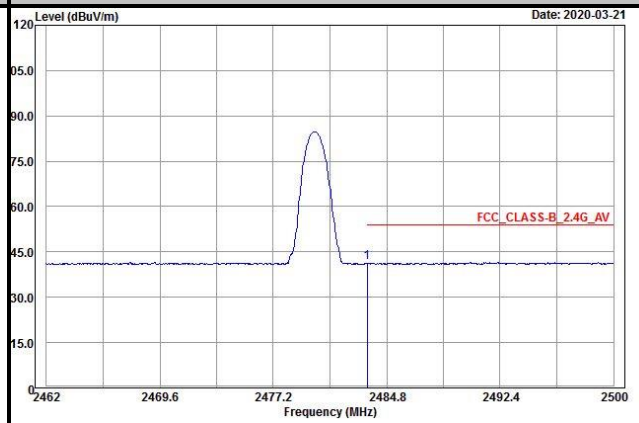


Average

Horizontal



Vertical

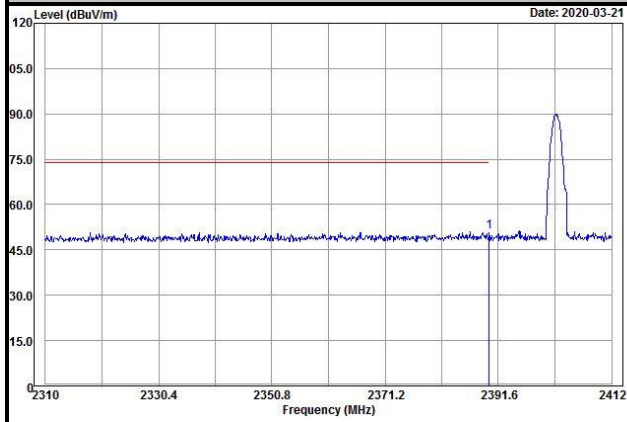


8DPSK

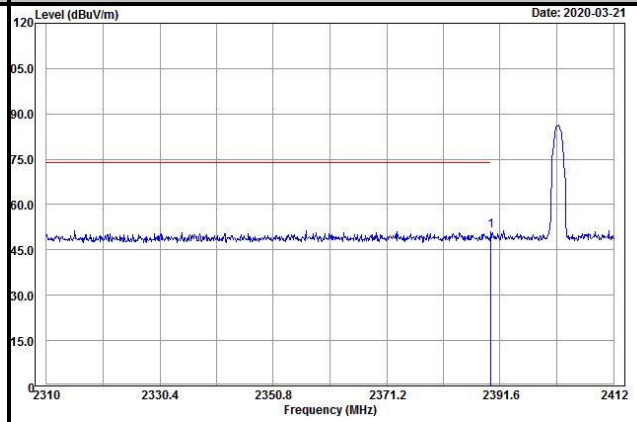
Ch 0

Peak

Horizontal

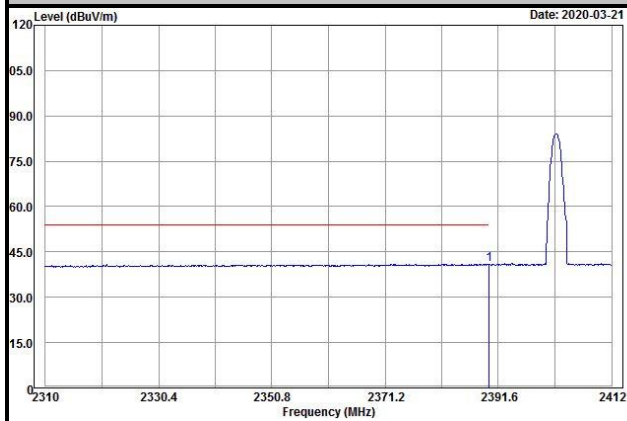


Vertical

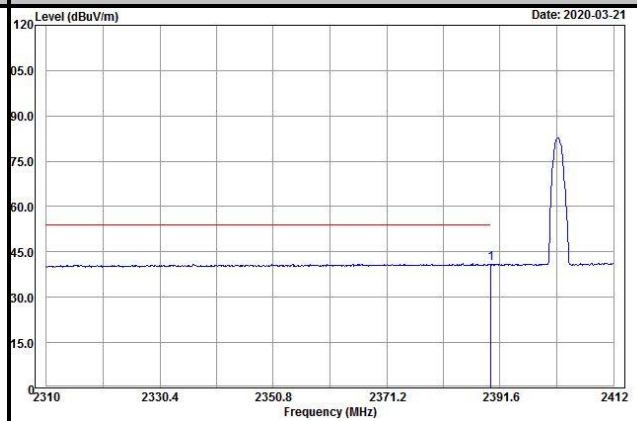


Average

Horizontal



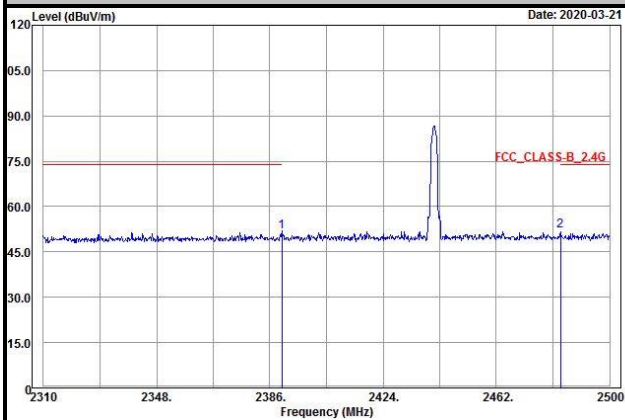
Vertical



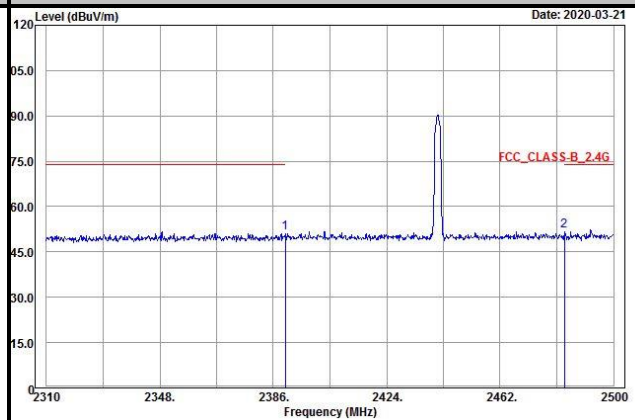
Ch 39

Peak

Horizontal

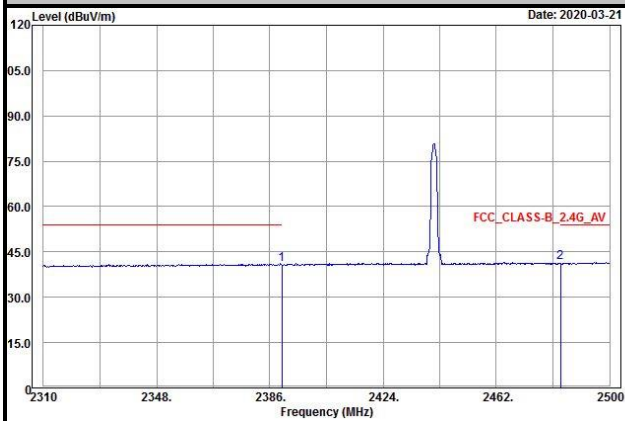


Vertical

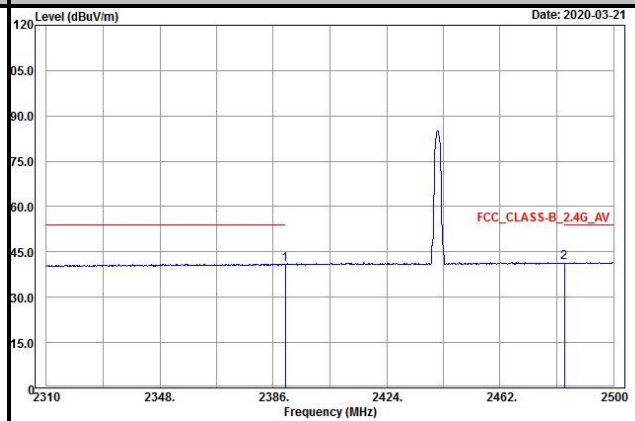


Average

Horizontal



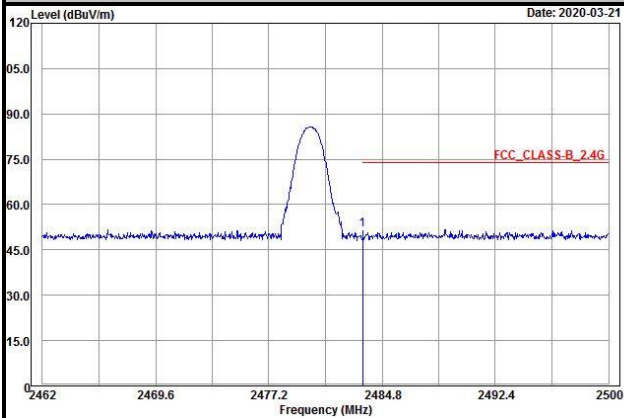
Vertical



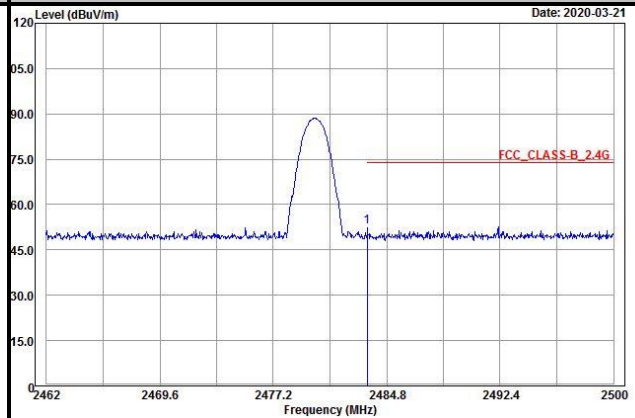
Ch 78

Peak

Horizontal

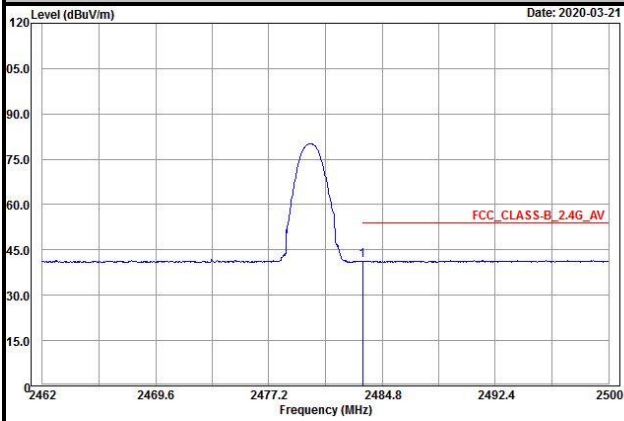


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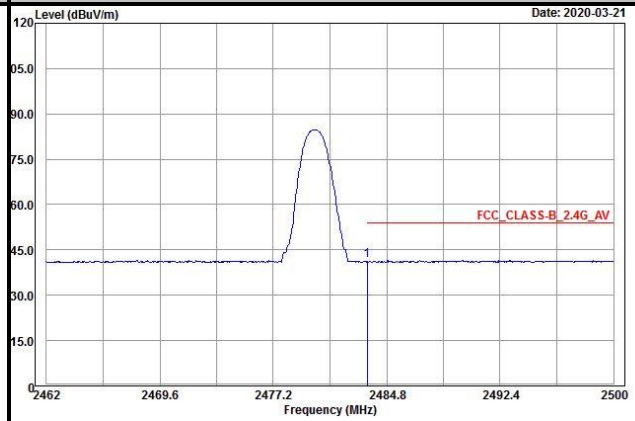


Average

Horizontal



Vertical



Annex B- Maximum Output Power

Average Power

Channel	Frequency (MHz)	Output Power (mW)		Output Power (dBm)	
		GFSK	8DPSK	GFSK	8DPSK
0	2402	2.547	4.06	4.06	2.10
39	2441	2.884	4.60	4.60	2.55
78	2480	2.931	4.67	4.67	2.74

Appendix – Information of the Testing Laboratories

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

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

Lin Kou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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