

Partial FCC Test Report

Report No.: RFBASM-WTW-P20110217

FCC ID: QYLAX200NG

Test Model: AX200NGW

Received Date: Nov. 06, 2020

Test Date: Dec. 15, 2020 ~ Dec. 27, 2020

Issued Date: Jan. 18, 2021

Applicant: Getac Technology Corporation.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration /
Designation Number: 788550 / TW0003



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Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 Summary of Test Results.....	5
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.....	8
3.2.1 Test Mode Applicability and Tested Channel Detail.....	9
3.3 Description of Support Units	11
3.3.1 Configuration of System under Test	11
3.4 General Description of Applied Standards and References	12
4 Test Types and Results	13
4.1 Radiated Emission and Bandedge Measurement	13
4.1.1 Limits of Radiated Emission and Bandedge Measurement	13
4.1.2 Test Instruments	14
4.1.3 Test Procedures.....	15
4.1.4 Deviation from Test Standard	15
4.1.5 Test Set Up	16
4.1.6 EUT Operating Conditions.....	17
4.1.7 Test Results	18
4.2 Conducted Emission Measurement.....	26
4.2.1 Limits of Conducted Emission Measurement	26
4.2.2 Test Instruments	26
4.2.3 Test Procedures.....	27
4.2.4 Deviation from Test Standard	27
4.2.5 Test Setup.....	27
4.2.6 EUT Operating Condition	27
4.2.7 Test Results	28
5 Pictures of Test Arrangements.....	30
Annex A- Band-edge Measurement	31
Appendix – Information of the Testing Laboratories	33

Release Control Record

Issue No.	Description	Date Issued
RFBASM-WTW-P20110217	Original Release	Jan. 18, 2021

1 Certificate of Conformity

Product: Wireless module

Brand: Getac

Test Model: AX200NGW

Sample Status: Mass Product

Applicant: Getac Technology Corporation.

Test Date: Dec. 15, 2020 ~ Dec. 27, 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 : , **Date:** Jan. 18, 2021

Shelly Hsueh / Specialist

Approved by : , **Date:** Jan. 18, 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 -18.67 dB at 0.43000 MHz.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	N/A	Refer to Note
15.247(a)(1) (iii)	Dwell Time on Each Channel	N/A	Refer to Note
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	N/A	Refer to Note
15.247(a)(1)	Maximum Peak Output Power	Pass	Refer to Note
---	Occupied Bandwidth Measurement	N/A	Refer to Note
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -6.94 dB at 2390 MHz.
15.247(d)	Band Edge Measurement	N/A	Refer to Note
15.247(d)	Antenna Port Emission	N/A	Refer to Note
15.203	Antenna Requirement	N/A	No antenna connector is used.

Note:

1. This report is a partial report, only test item of Conducted Emission, Radiated Emission were performed for this report. Other testing data please refer to Intel report no.: 181210-03.TR05 for module (Brand: **Intel® Wi-Fi 6 AX200** , Model: AX200NGW).
2. For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
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	Wireless module
Brand	Getac
Test Model	AX200NGW
Status of EUT	Mass Product
Power Supply Rating	7.4Vdc from battery 19 Vdc from Adapter
Modulation Type	GFSK, π/4-DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Output Power	Refer to module report
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

Product	Brand	Model
Tablet	Getac	T800

2. The following accessories were for the End-product.

Product	Brand	Model	Description
Adapter	FSP	FSP065-RBBN3	I/P: 100-240 Vac, 50-60 Hz, 1.5 A O/P: 19 Vdc, 3.42 A 1.5m cable with 1 core
Battery	Getac	BP2S2P2100S	7.4Vdc, 4200mAh, 32Wh (Min. 4080mAh, 31Wh)
LCD Panel	INNOLUX	HE080IA-06B	8.1"
Photo Camera	FOXLINK	FO20FF-505H	--
Video Camera	FOXLINK	FO80AF-506H	--
SSD	Sandisk	DA4128	128GB
CPU	Intel	Z8750	Speed: 1.6GHz, CPU Pin 1380

3. The antenna information is listed as below.

Ant. Type	Brand	Model	Ant.	Antenna Peak Gain (dBi)			
				2.4GHz/BT	5.2&5.3GHz	5.6GHz	5.8GHz
PIFA	Getac	421122100003	Ant 0	3.16	3.05	3.84	3.84
		421122100001	Ant 1	1.17	3.71	4.27	4.37

4. 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
5. 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)						
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	RE $<$ 1G	PLC	
-	✓	✓	✓	-

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

PLC: Power Line Conducted Emission

Note:

1. “-” means no effect.
2. For radiated emission (below 1GHz) and Power Line Conducted Emission test items chosen the worst maximum power

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

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	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	0	FHSS	8DPSK	3DH5

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.

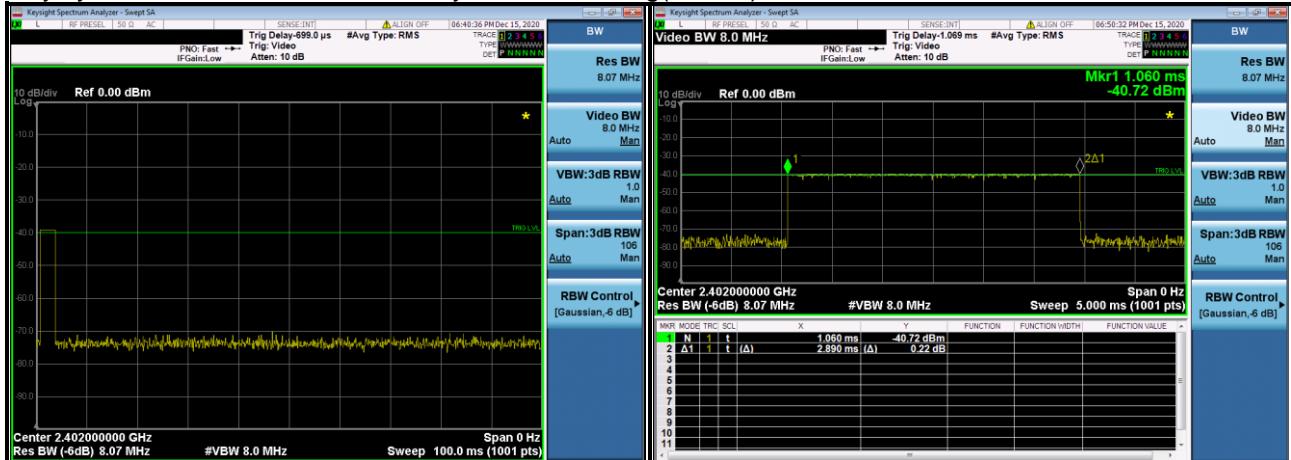
EUT Configure Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Packet Type
-	0 to 78	0	FHSS	8DPSK	3DH5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE \geq 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
RE $<$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Tim Chen
PLC	22 deg. C, 66 % RH	120 Vac, 60 Hz	Tim Chen

3.3 Duty Cycle of Test Signal

Duty cycle = $2.89*1/100 = 0.0289$, Duty factor = $20 * \log(0.0289) = -30.78$



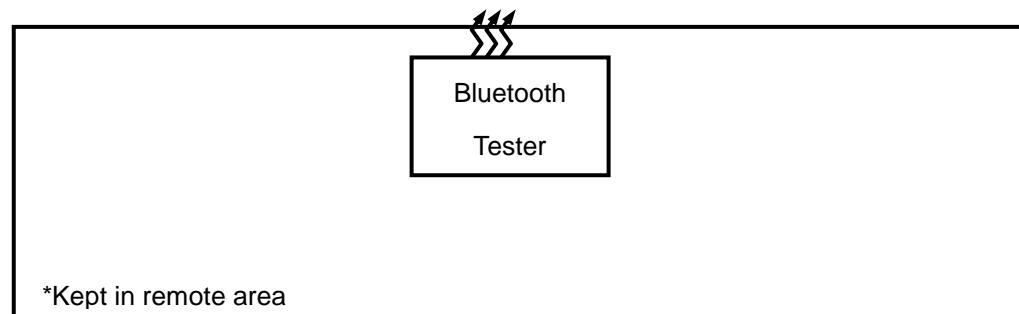
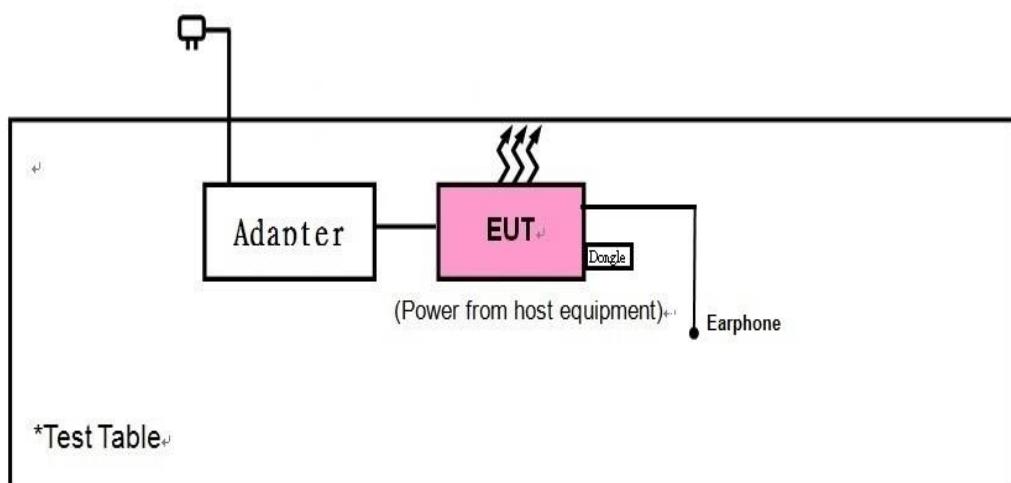
3.4 Description of Support Units

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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
1.	Earphone	Apple	NA	NA	NA	-
2.	USB Dongle	HP	v250W	03	NA	-

No.	Signal Cable Description Of The Above Support Units
1.	1.2m

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 (dB_{uV/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	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 07, 2020	Dec. 06, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 06, 2020	Nov. 05, 2021
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier EMCI	EMC001340	980201	Oct. 21, 2020	Oct. 20, 2021
Bluetooth Tester	CBT	100946	Aug. 06, 2020	Aug. 05, 2022
Preamplifier EMCI	EMC 330H	980112	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 Coaxial Cable EMCI	EMC104-SM-SM-8000	171005	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 07, 2020	Oct. 06, 2021
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 07, 2020	Oct. 06, 2021
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 10.

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:

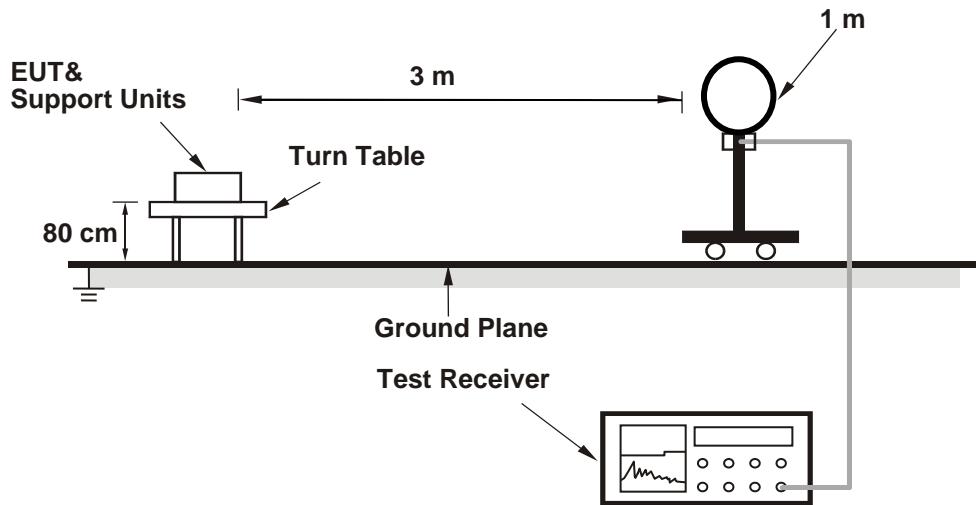
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor. The duty cycle correction factor refer to Chapter 3.3 of this report.
3. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

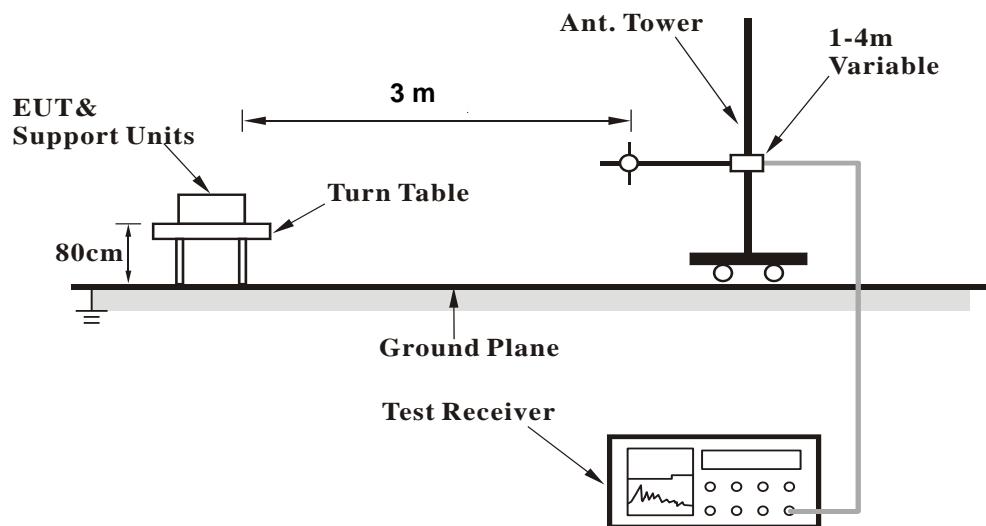
No deviation.

4.1.5 Test Set Up

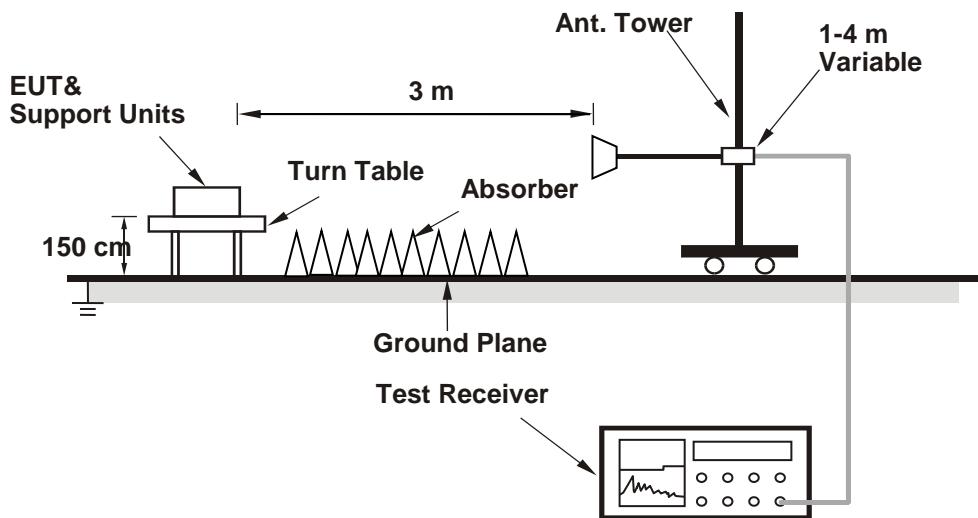
<Radiated Emission below 30 MHz>



<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		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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	46.65	52.57	-5.92	54	-7.35	176	360	Average
2390	47.76	53.68	-5.92	74	-26.24	176	360	Peak
2402	69.52	75.46	-5.94	-----	-----	176	360	Average
2402	100.3	106.24	-5.94	-----	-----	176	360	Peak
4804	10.33	25.97	-15.64	54	-43.67	266	197	Average
4804	41.11	56.75	-15.64	74	-32.89	266	197	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	45.89	51.81	-5.92	54	-8.11	308	187	Average
2390	47.52	53.44	-5.92	74	-26.48	308	187	Peak
2402	65.89	71.83	-5.94	-----	-----	308	187	Average
2402	96.67	102.61	-5.94	-----	-----	308	187	Peak
4804	9.89	25.53	-15.64	54	-44.11	184	22	Average
4804	40.67	56.31	-15.64	74	-33.33	184	22	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2402 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.890ms/100) = -30.78 dB please refer to the plotted duty (see item 3.3).

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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
2441	70.17	75.98	-5.81	-----	-----	175	5	Average
2441	100.95	106.76	-5.81	-----	-----	175	5	Peak
4882	9.56	25.12	-15.56	54	-44.44	318	75	Average
4882	40.34	55.9	-15.56	74	-33.66	318	75	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
2441	65	70.81	-5.81	-----	-----	369	118	Average
2441	95.78	101.59	-5.81	-----	-----	369	118	Peak
4882	11.56	27.12	-15.56	54	-42.44	274	235	Average
4882	42.34	57.9	-15.56	74	-31.66	274	235	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2441 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.890ms/100) = -30.78 dB please refer to the plotted duty (see item 3.3).

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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	68.87	74.57	-5.7	-----	-----	194	5	Average
2480	99.65	105.35	-5.7	-----	-----	194	5	Peak
2487.5	20.02	25.71	-5.69	54	-33.98	194	5	Average
2487.5	50.8	56.49	-5.69	74	-23.2	194	5	Peak
4960	11.86	27.31	-15.45	54	-42.14	126	259	Average
4960	42.64	58.09	-15.45	74	-31.36	126	259	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	62.88	68.58	-5.7	-----	-----	400	122	Average
2480	93.66	99.36	-5.7	-----	-----	400	122	Peak
2487.5	16.62	22.31	-5.69	54	-37.38	400	122	Average
2487.5	47.4	53.09	-5.69	74	-26.6	400	122	Peak
4960	12.48	27.93	-15.45	54	-41.52	194	203	Average
4960	43.26	58.71	-15.45	74	-30.74	194	203	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. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.890\text{ms}/100) = -30.78 \text{ dB}$ please refer to the plotted duty (see item 3.3).

8DPSK

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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	47.06	52.98	-5.92	54	-6.94	176	0	Average
2390	49.32	55.24	-5.92	74	-24.68	176	0	Peak
2402	68.84	74.78	-5.94	-----	-----	176	0	Average
2402	99.62	105.56	-5.94	-----	-----	176	0	Peak
4804	11.01	26.65	-15.64	54	-42.99	138	213	Average
4804	41.79	57.43	-15.64	74	-32.21	138	213	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	45.67	51.59	-5.92	54	-8.33	382	66	Average
2390	47.4	53.32	-5.92	74	-26.6	382	66	Peak
2402	65.71	71.65	-5.94	-----	-----	382	66	Average
2402	96.49	102.43	-5.94	-----	-----	382	66	Peak
4804	10.75	26.39	-15.64	54	-43.25	277	310	Average
4804	41.53	57.17	-15.64	74	-32.47	277	310	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2402 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.890ms/100) = -30.78 dB please refer to the plotted duty (see item 3.3).

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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
2441	69.98	75.79	-5.81	-----	-----	172	5	Average
2441	100.76	106.57	-5.81	-----	-----	172	5	Peak
4882	10.69	26.25	-15.56	54	-43.31	126	322	Average
4882	41.47	57.03	-15.56	74	-32.53	126	322	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
2441	64.23	70.04	-5.81	-----	-----	354	118	Average
2441	95.01	100.82	-5.81	-----	-----	354	118	Peak
4882	11.96	27.52	-15.56	54	-42.04	162	199	Average
4882	42.74	58.3	-15.56	74	-31.26	162	199	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. 2441 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.
4. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: 20Log(Duty cycle) = 20 log (2.890ms/100) = -30.78 dB please refer to the plotted duty (see item 3.3).

EUT Test Condition		Measurement Detail		
Channel		Frequency Range		1 GHz ~ 25 GHz
Input Power		Detector Function		Peak (PK) Average (AV)
Environmental Conditions		Tested By		Tim Chen

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	68.21	73.91	-5.7	-----	-----	194	5	Average
2480	98.99	104.69	-5.7	-----	-----	194	5	Peak
2483.5	26.86	32.56	-5.7	54	-27.14	194	5	Average
2483.5	57.64	63.34	-5.7	74	-16.36	194	5	Peak
4960	12.61	28.06	-15.45	54	-41.39	166	241	Average
4960	43.39	58.84	-15.45	74	-30.61	166	241	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	61.95	67.65	-5.7	-----	-----	400	122	Average
2480	92.73	98.43	-5.7	-----	-----	400	122	Peak
2483.5	22.12	27.82	-5.7	54	-31.88	400	122	Average
2483.5	52.9	58.6	-5.7	74	-21.1	400	122	Peak
4960	12.23	27.68	-15.45	54	-41.77	100	307	Average
4960	43.01	58.46	-15.45	74	-30.99	100	307	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. For Fundamental frequency & harmonic:

The average value of fundamental frequency is: average = peak value + 20log(Duty cycle) where the duty factor is calculated from following formula: $20\text{Log}(\text{Duty cycle}) = 20 \log (2.890\text{ms}/100) = -30.78 \text{ dB}$ please refer to the plotted duty (see item 3.3).

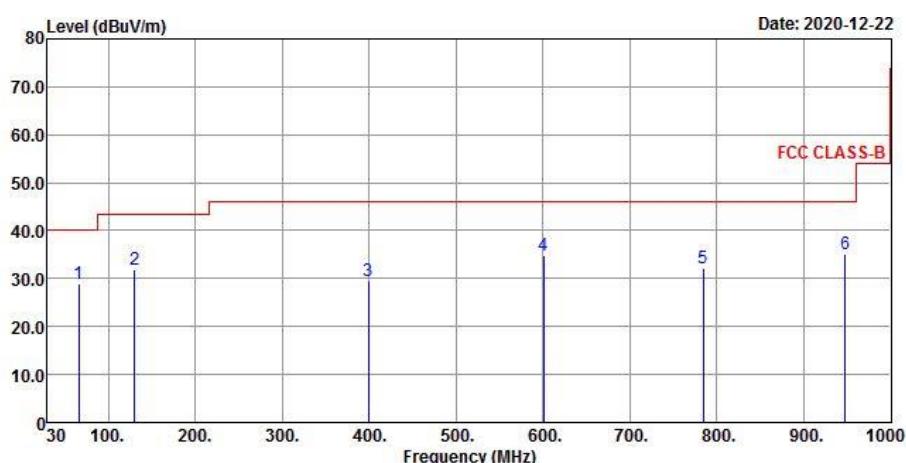
9 kHz ~ 30 MHz Data:

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

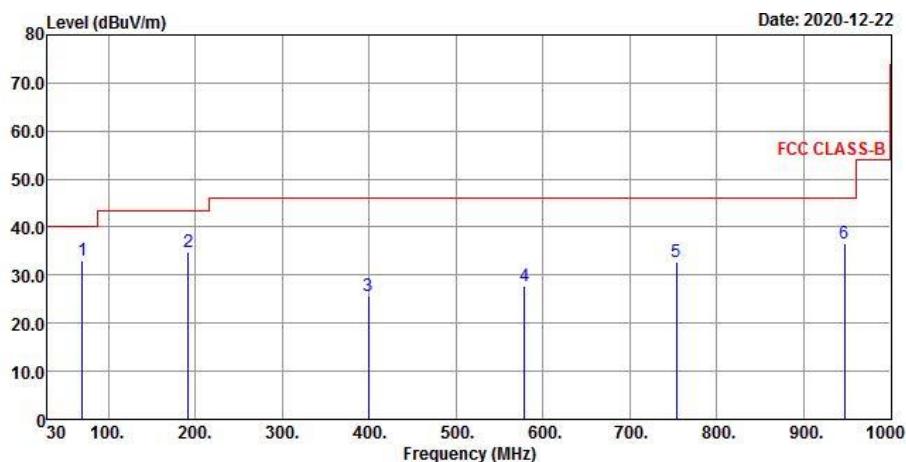
30 MHz ~ 1 GHz Worst-Case Data:

EUT Test Condition		Measurement Detail	
Channel	Channel 0	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Tim Chen

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
69.77	33.03	46.88	-13.85	40	-6.97	100	0	Peak
191.99	34.81	49.53	-14.72	43.5	-8.69	100	0	Peak
399.57	25.57	33.93	-8.36	46	-20.43	100	0	Peak
579.02	27.68	31.12	-3.44	46	-18.32	100	0	Peak
753.62	32.78	31.78	1	46	-13.22	100	0	Peak
946.65	36.55	32.89	3.66	46	-9.45	100	0	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
69.77	33.03	46.88	-13.85	40	-6.97	100	0	Peak
191.99	34.81	49.53	-14.72	43.5	-8.69	100	0	Peak
399.57	25.57	33.93	-8.36	46	-20.43	100	0	Peak
579.02	27.68	31.12	-3.44	46	-18.32	100	0	Peak
753.62	32.78	31.78	1	46	-13.22	100	0	Peak
946.65	36.55	32.89	3.66	46	-9.45	100	0	Peak

Remarks:

1. Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
2. The emission levels of other frequencies were very low against the limit.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 04, 2020	Dec. 03, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 04, 2020	Sep. 03, 2021
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Cond_V7.3.7.4	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 HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

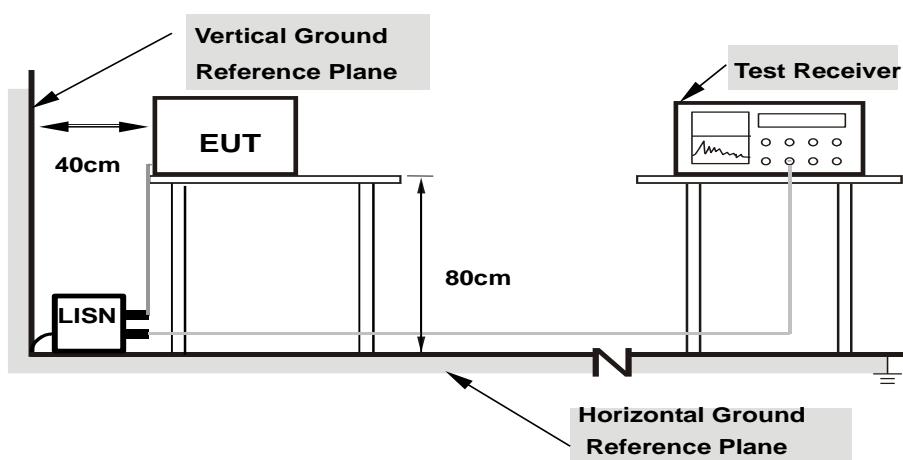
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling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

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz - 30 MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note:

1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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

4.2.6 EUT Operating Condition

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

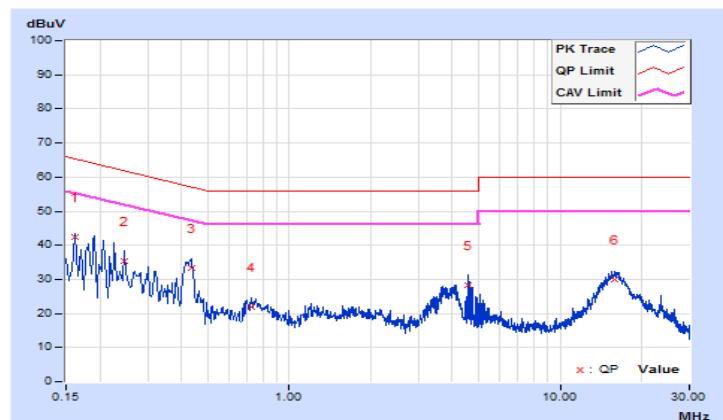
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	22°C, 66%RH
Tested by	Tim Chen	Test Date	2020/12/22

No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	9.65	32.89	19.82	42.54	29.47	65.36	55.36	-22.82	-25.89
2	0.24600	9.66	25.65	15.91	35.31	25.57	61.89	51.89	-26.58	-26.32
3	0.43370	9.66	23.77	18.81	33.43	28.47	57.18	47.18	-23.75	-18.71
4	0.72200	9.67	12.32	6.72	21.99	16.39	56.00	46.00	-34.01	-29.61
5	4.55800	9.74	18.59	4.17	28.33	13.91	56.00	46.00	-27.67	-32.09
6	15.88600	9.85	19.95	11.90	29.80	21.75	60.00	50.00	-30.20	-28.25

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

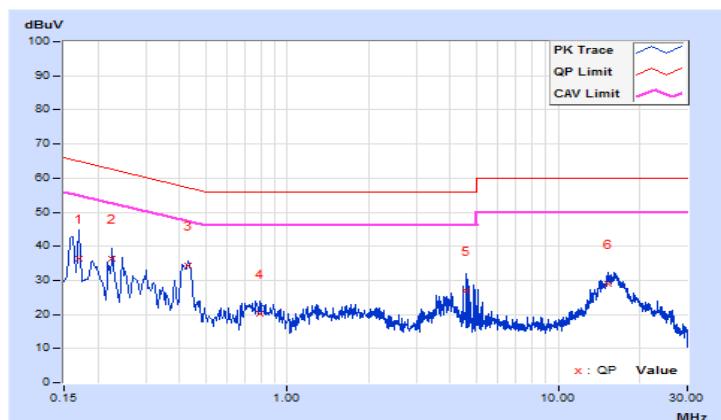


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	22°C, 66%RH
Tested by	Tim Chen	Test Date	2020/12/22

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17000	9.68	26.82	8.52	36.50	18.20	64.96	54.96	-28.46	-36.76
2	0.22600	9.68	26.54	18.10	36.22	27.78	62.60	52.60	-26.38	-24.82
3	0.43000	9.68	24.73	18.90	34.41	28.58	57.25	47.25	-22.84	-18.67
4	0.79000	9.69	10.45	5.65	20.14	15.34	56.00	46.00	-35.86	-30.66
5	4.56200	9.78	17.23	2.84	27.01	12.62	56.00	46.00	-28.99	-33.38
6	15.33800	9.93	19.16	10.31	29.09	20.24	60.00	50.00	-30.91	-29.76

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

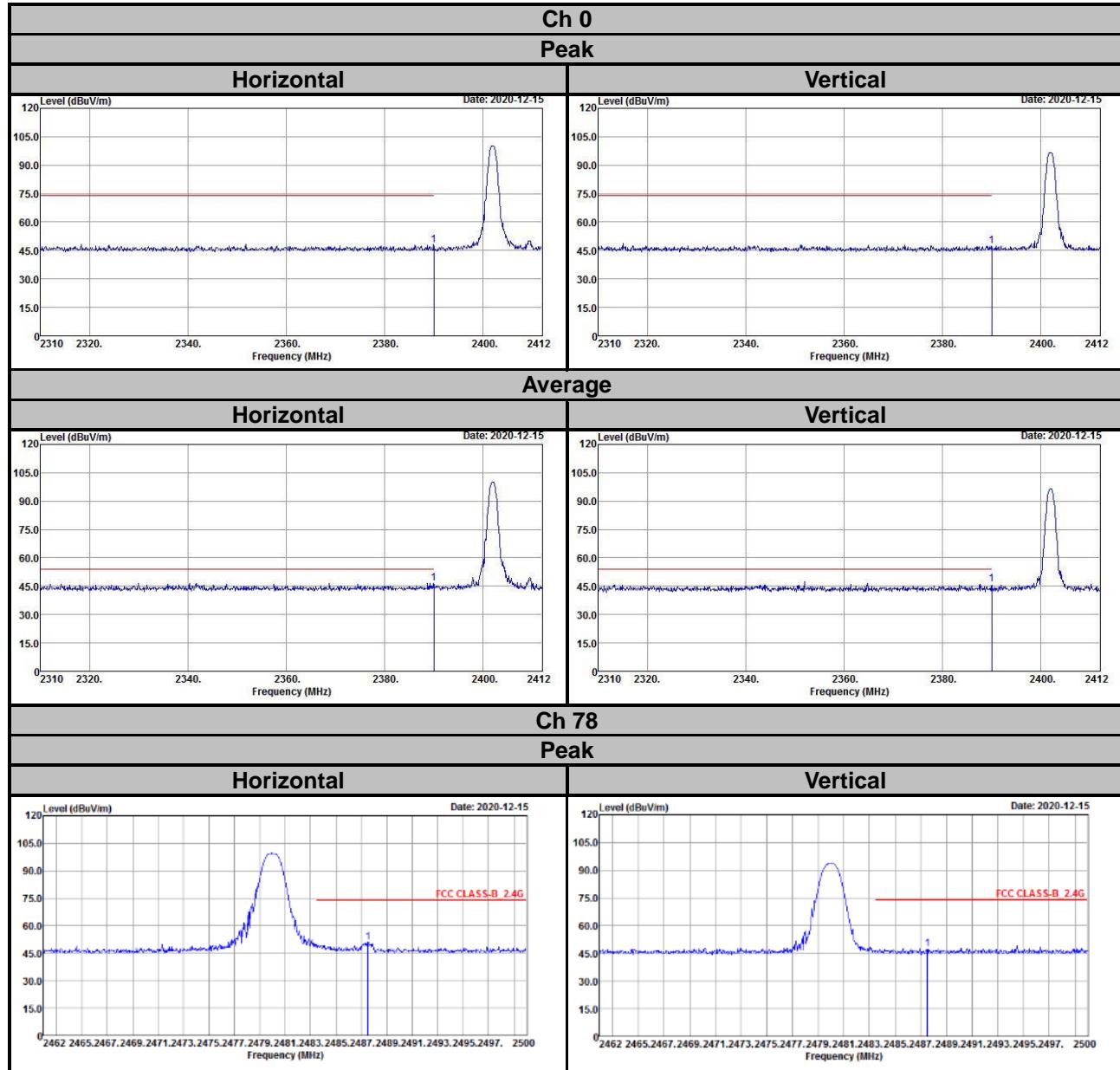


5 Pictures of Test Arrangements

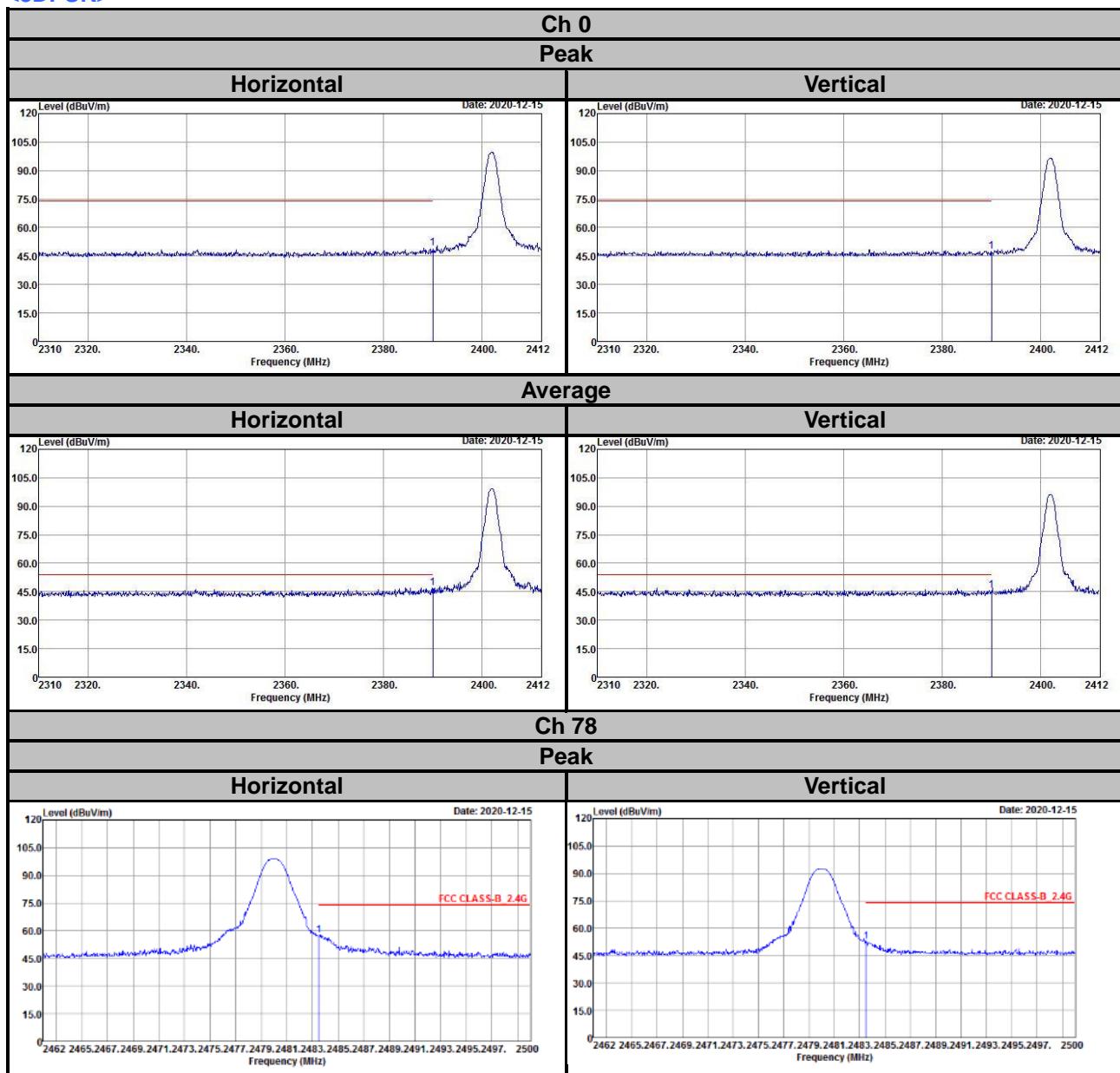
Please refer to the attached file (Test Setup Photo).

Annex A- Band-edge Measurement

<GFSK>



<8DPSK>



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:

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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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