

Partial FCC Test Report

Report No.: RF200428C08

FCC ID: QYLAX200NG

Test Model: AX200NGW

Received Date: Apr. 28, 2020

Test Date: May 12 ~ May 29, 2020

Issued Date: Jun. 11, 2020

Applicant: Getac Technology Corporation

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

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**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF200428C08	Original Release	Jun. 11, 2020

1 Certificate of Conformity

Product: Wireless module

Brand: Getac

Test Model: AX200NGW

Sample Status: Identical Prototype

Applicant: Getac Technology Corporation

Test Date: May 12 ~ May 29, 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 : Gina Liu, **Date:** Jun. 11, 2020
Gina Liu / Specialist

Approved by : Dylan Chiou, **Date:** Jun. 11, 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	Pass	Meet the requirement of limit. Minimum passing margin is -3.29 dB at 0.56591 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	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	N/A	Refer to Note
15.205 & 209	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -5.78 dB at 33.88 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	Refer to Note

Note:

- Only test item of Peak Output Power, Radiated Emissions test and AC Power Conducted Emission tests were performed for this report. For other test data, please refer to Intel Report No.: 181210-03.TR05 for module (Brand: Intel, Model: AX200NGW).
- 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) ($\pm$)
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	Identical Prototype
Power Supply Rating	19 Vdc (adapter) 11.1 Vdc (Li-ion battery)
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Transfer Rate	1/2/3 Mbps
Operating Frequency	2402 ~ 2480 MHz
Number of Channel	79
Output Power (Measured Max. Peak)	11.455 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

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

Product	Brand	Model
Notebook	Getac	V110 , V110G6

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

Product	Brand	Model	Description
Adapter	Getac	MTA190474W4	I/P: 100-240 Vac, 50-60 Hz, 1.6 A O/P: 19 Vdc, 4.74 A, 90W
Battery	Getac	BP3S1P2100-S	11.1 Vdc, 2100 mAh
WLAN Module	Getac	AX200NGW	--
LCD Panel 1	New IPS KD	KD116N11-30NP-A9	11.6"
LCD Panel 2	KingDisplay	KD Full HD Panel 800 nits	11.6"
Bottom Camera	Foxlink	FN80AF-443H	8M
RFID	NXP	PN-7462	13.56MHz
Digitizer	Microchip	PIC32MX270	250-290kHz
GPS	GlobalSat	MC1010	--
CPU 1	Intel	Kaby lake	i7-10510U
CPU 2	Intel	Comet lake	i7-10710U
DDR 1	Kingston	N/A	32GB (16GB+16GB)
DDR 2	Kingston	N/A	16GB
SSD 1	Lite-on	N/A	512GB
SSD 2	Sandisk	N/A	1TB
SD Card reader	N/A	N/A	N/A
Smart Card	N/A	N/A	N/A
USB 3.1 (Type C)	N/A	N/A	N/A

3. The antenna information is listed.

Ant. Type	Manufacturer	Parts Number	Frequency (MHz)				
			2400~2500	5150~5250	5250~5350	5470~5725	5725~5850
PIFA	GETAC	WLAN Main Antenna: 421129000002	2.06 dBi	2.40 dBi	3.51 dBi	3.19 dBi	2.26 dBi
		WLAN Aux. Antenna: 421129000003	-0.14 dBi	0.97 dBi	1.67 dBi	1.62 dBi	1.35 dBi

4. The configurations of all SKU are listed as below.

Part	Brand	Model	Specification	Configurations	
				SKU 1	SKU 2
CPU	Intel	Kaby lake	i7-10510U	V	
	Intel	Comet lake	i7-10710U		V
DDR	Kingston	N/A	32GB (16GB+16GB)	V	
	Kingston	N/A	16GB		V
SSD	Lite-on	N/A	512GB	V	
	Sandisk	N/A	1TB		V
LCD Panel	New IPS KD	KD116N11-30NP-A9	11.6"	V	V
	KingDisplay	KD Full HD Panel 800 nits	11.6"	V	
SD Card reader	N/A	N/A	N/A	V	
Smart Card	N/A	N/A	N/A	V	
USB 3.1 (Type C)	N/A	N/A	N/A		V
WLAN/ BT Module	Intel	Intel AX200NGW	--	V	V
GPS	GlobalSat	MC1010	--	V	
Adapter	Getac Technology Corp.	MTA190474W4	100-240V~1.6A 50-60Hz 19V / 4.74A(90.0W)	V	V
Battery	Getac Technology Corp.	BP3S1P2100-S	11.1Vdc, 2100mAh	V	V
Bottom Camera	Foxlink	FN80AF-443H	8M	V	
RFID	NXP	PN-7462	13.56MHz		V
Digitizer	Microchip	PIC32MX270	250-290kHz		V

* After pre-tested all the configurations and found SKU 2 was the worst. Therefore only SKU 2 was for the final test and presented in the test

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)	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	RE<1G	PLC	Power	
-	√	√	√	√	-

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

RE<1G: Radiated Emission below 1 GHz

PLC: Power Line Conducted Emission

Power: Maximum Output Power Measurement

Note:

1. For Radiated emission test, pre-tested GFSK, $\pi/4$ -DQPSK, 8DPSK modulation type and found 8DPSK was the worse, therefore chosen for the final test and presented in the test report.
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

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	78	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	78	FHSS	8DPSK	3DH5

Maximum Output Power Measurement:

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

EUT Configure Mode	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	Tim Chen
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
Power	25 deg. C, 65 % RH	11.1 Vdc	Wayne Lin

3.3 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Getac	V110 , V110G6	N/A	N/A	Provided by Client
B.	Bluetooth Tester	R&S	CBT	100980	N/A	Provided by Lab
C.	Microphone	Labtec	LVA7313	N/A	N/A	Provided by Lab
D.	HDD*2	TOSHIBA	DTB305	45TGCN0IT3ZB 45U6CMSPT3ZB	N/A	Provided by Lab
E.	MODEM	ACEEX	1414V/3	0401008243	IFAXDM1414	Provided by Lab
F.	MONITOR	DELL	U2410	CN-0J257M-7287 2-0A6-08JL	Doc	Provided by Lab
G.	USB MOUSE	DELL	MS111-P	CN-011D3V-7158 1-1CJ-0936	FCC DoC Approved	Provided by Lab
H.	SD Card	Transcend	16GB	N/A	N/A	Provided by Lab
I.	Terminal	N/A	N/A	N/A	N/A	Provided by Lab

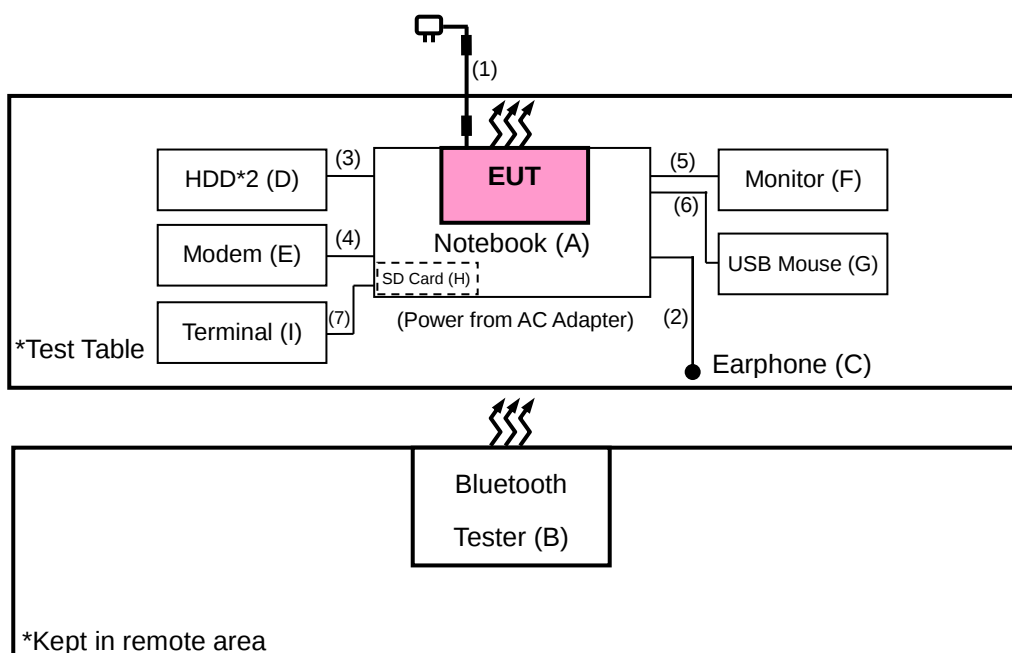
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item B acted as communication partner to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Adapter Cable	1	1.55	Y	2	Accessory of the EUT
2.	Microphone Cable	1	1.0	Y	0	Provided by Lab
3.	USB Cable	1	0.5	N	0	Provided by Lab
4.	RS-232 Cable	1	1.2	Y	0	Provided by Lab
5.	HDMI Cable	1	2.0	Y	0	Provided by Lab HDMI 2.0 (Amber / HDMI-AA120)
6.	USB Cable	1	1.8	Y	0	Provided by Lab
7.	RJ45 Cable	1	1.5	N	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test



3.4 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	N9038A	MY51210203	Mar. 18, 2020	Mar. 17, 2021
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 12, 2019	Dec. 11, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
Broadband Horn Antenna SCHWARZBECK	BBHA 9170	148	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 24, 2019	Nov. 23, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 08, 2019	Nov. 07, 2020
Fixed Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier EMCI	EMC001340	980201	Oct. 14, 2019	Oct. 13, 2020
Bluetooth Tester R&S	CBT	100946	Aug. 09, 2018	Aug. 08, 2020
Preamplifier EMCI	EMC 012645	980115	Oct. 08, 2019	Oct. 07, 2020
Preamplifier EMCI	EMC 184045	980116	Oct. 08, 2019	Oct. 07, 2020
Preamplifier EMCI	EMC 330H	980112	Oct. 08, 2019	Oct. 07, 2020
Power Meter Anritsu	ML2495A	1012010	Sep. 04, 2019	Sep. 03, 2020
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2019	Sep. 03, 2020
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1 000(140807)	Oct. 08, 2019	Oct. 07, 2020
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 08, 2019	Oct. 07, 2020
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 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. 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:

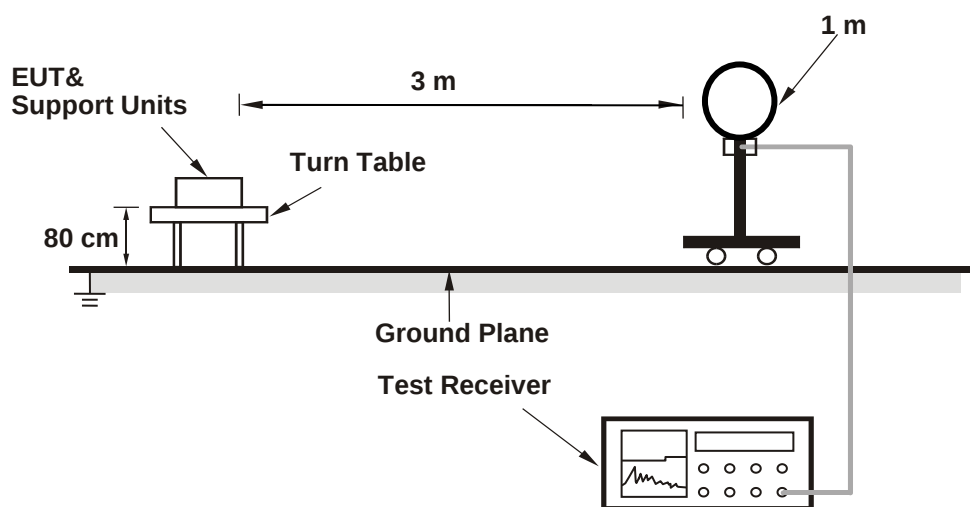
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) 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 $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz. (RBW = 1 MHz, VBW = 1 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

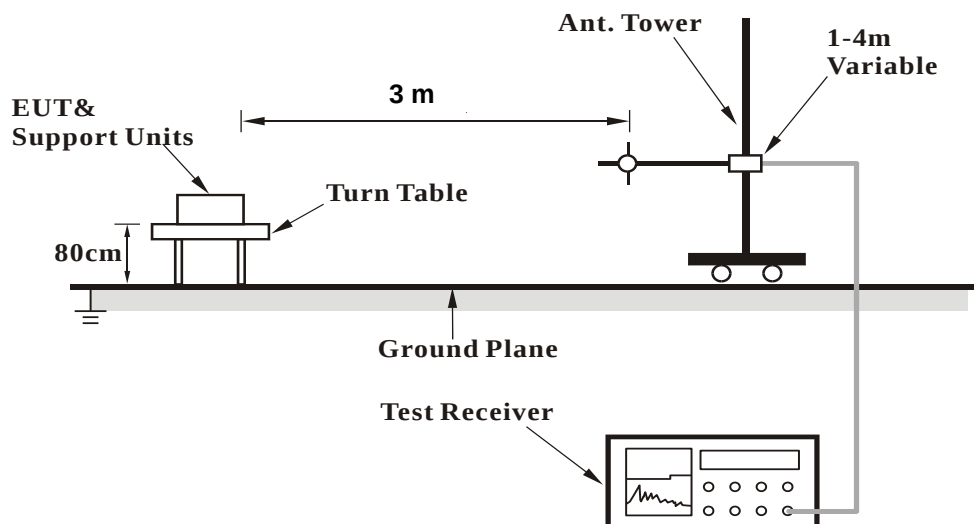
No deviation.

4.1.5 Test Set Up

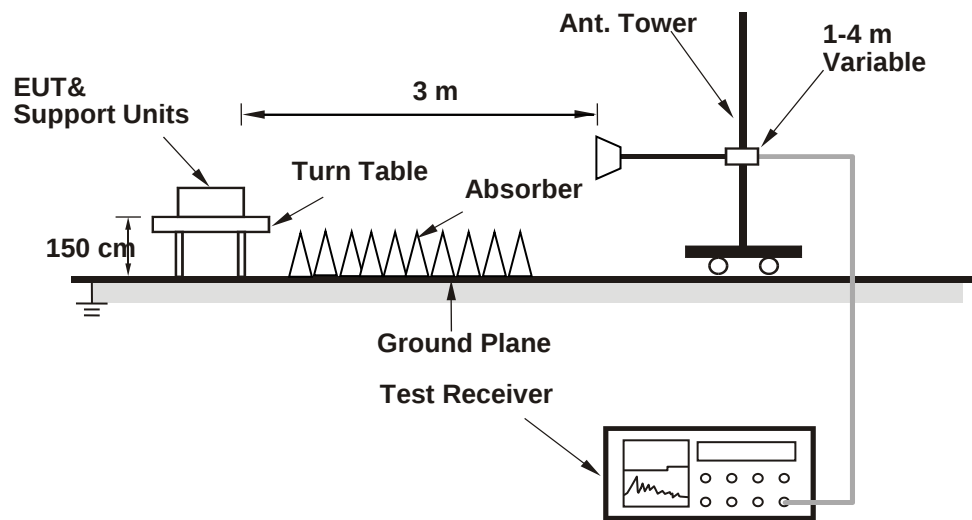
<Radiated Emission below 30 MHz>



<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	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	36.19	42.11	-5.92	54	-17.81	177	235	Average
2390	46.09	52.01	-5.92	74	-27.91	177	235	Peak
2402	101.37	107.31	-5.94	-----	-----	177	235	Average
2402	101.78	107.72	-5.94	-----	-----	177	235	Peak
4804	34	49.64	-15.64	54	-20	125	241	Average
4804	43.16	58.8	-15.64	74	-30.84	125	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
2390	36.29	42.21	-5.92	54	-17.71	400	36	Average
2390	46.49	52.41	-5.92	74	-27.51	400	36	Peak
2402	101.2	107.14	-5.94	-----	-----	400	36	Average
2402	101.57	107.51	-5.94	-----	-----	400	36	Peak
4804	34.72	50.36	-15.64	54	-19.28	107	164	Average
4804	42.79	58.43	-15.64	74	-31.21	107	164	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.

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	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
2381.06	39.16	45.04	-5.88	54	-14.84	153	288	Average
2381.06	46.61	52.49	-5.88	74	-27.39	153	288	Peak
2390	36.02	41.94	-5.92	54	-17.98	153	288	Average
2390	43.88	49.8	-5.92	74	-30.12	153	288	Peak
2441	102.71	108.52	-5.81	-----	-----	153	288	Average
2441	103.12	108.93	-5.81	-----	-----	153	288	Peak
2483.5	36.37	42.07	-5.7	54	-17.63	153	288	Average
2483.5	46.36	52.06	-5.7	74	-27.64	153	288	Peak
4882	34.09	49.65	-15.56	54	-19.91	172	229	Average
4882	42.52	58.08	-15.56	74	-31.48	172	229	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
2380.87	38.91	44.79	-5.88	54	-15.09	392	24	Average
2380.87	46.66	52.54	-5.88	74	-27.34	392	24	Peak
2390	35.84	41.76	-5.92	54	-18.16	392	24	Average
2390	44.91	50.83	-5.92	74	-29.09	392	24	Peak
2441	103.23	109.04	-5.81	-----	-----	392	24	Average
2441	103.65	109.46	-5.81	-----	-----	392	24	Peak
2483.5	36.4	42.1	-5.7	54	-17.6	392	24	Average
2483.5	46.42	52.12	-5.7	74	-27.58	392	24	Peak
4882	34.61	50.17	-15.56	54	-19.39	113	197	Average
4882	43.09	58.65	-15.56	74	-30.91	113	197	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.

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	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	101.81	107.51	-5.7	-----	-----	206	238	Average
2480	102.24	107.94	-5.7	-----	-----	206	238	Peak
2483.5	40.62	46.32	-5.7	54	-13.38	206	238	Average
2483.5	51.19	56.89	-5.7	74	-22.81	206	238	Peak
4960	33.69	49.14	-15.45	54	-20.31	126	244	Average
4960	42.64	58.09	-15.45	74	-31.36	126	244	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	102.67	108.37	-5.7	-----	-----	381	22	Average
2480	103.09	108.79	-5.7	-----	-----	381	22	Peak
2483.5	41.39	47.09	-5.7	54	-12.61	381	22	Average
2483.5	51.83	57.53	-5.7	74	-22.17	381	22	Peak
4960	34.45	49.9	-15.45	54	-19.55	137	211	Average
4960	43.26	58.71	-15.45	74	-30.74	137	211	Peak

Remarks:

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

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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	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	37.84	43.76	-5.92	54	-16.16	177	236	Average
2390	48.59	54.51	-5.92	74	-25.41	177	236	Peak
2402	98.97	104.91	-5.94	-----	-----	177	236	Average
2402	100.86	106.8	-5.94	-----	-----	177	236	Peak
4804	35.09	50.73	-15.64	54	-18.91	163	207	Average
4804	43.47	59.11	-15.64	74	-30.53	163	207	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	37.55	43.47	-5.92	54	-16.45	400	35	Average
2390	48.23	54.15	-5.92	74	-25.77	400	35	Peak
2402	98.94	104.88	-5.94	-----	-----	400	35	Average
2402	100.89	106.83	-5.94	-----	-----	400	35	Peak
4804	33.62	49.26	-15.64	54	-20.38	112	198	Average
4804	42.47	58.11	-15.64	74	-31.53	112	198	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.

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	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
2381.06	38.16	44.04	-5.88	54	-15.84	154	288	Average
2381.06	46.94	52.82	-5.88	74	-27.06	154	288	Peak
2390	36.06	41.98	-5.92	54	-17.94	154	288	Average
2390	44.05	49.97	-5.92	74	-29.95	154	288	Peak
2441	99.4	105.21	-5.81	-----	-----	154	288	Average
2441	101.45	107.26	-5.81	-----	-----	154	288	Peak
2483.5	36.48	42.18	-5.7	54	-17.52	154	288	Average
2483.5	46.5	52.2	-5.7	74	-27.5	154	288	Peak
4882	33.37	48.93	-15.56	54	-20.63	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
2381.06	37.63	43.51	-5.88	54	-16.37	400	146	Average
2381.06	46.68	52.56	-5.88	74	-27.32	400	146	Peak
2390	35.86	41.78	-5.92	54	-18.14	400	146	Peak
2390	44.52	50.44	-5.92	74	-29.48	400	146	Peak
2441	98.88	104.69	-5.81	-----	-----	400	146	Average
2441	100.92	106.73	-5.81	-----	-----	400	146	Peak
2483.5	36.59	42.29	-5.7	54	-17.41	400	146	Average
2483.5	46.24	51.94	-5.7	74	-27.76	400	146	Peak
4882	34.31	49.87	-15.56	54	-19.69	162	199	Average
4882	42.74	58.3	-15.56	74	-31.26	162	199	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.

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	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	98.26	103.96	-5.7	-----	-----	182	288	Average
2480	100.36	106.06	-5.7	-----	-----	182	288	Peak
2483.5	44.59	50.29	-5.7	54	-9.41	182	288	Average
2483.5	54.7	60.4	-5.7	74	-19.3	182	288	Peak
4960	32.61	48.06	-15.45	54	-21.39	125	174	Average
4960	42.55	58	-15.45	74	-31.45	125	174	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	98.87	104.57	-5.7	-----	-----	383	21	Average
2480	101	106.7	-5.7	-----	-----	383	21	Peak
2483.5	45.21	50.91	-5.7	54	-8.79	383	21	Average
2483.5	56.13	61.83	-5.7	74	-17.87	383	21	Peak
4960	33.73	49.18	-15.45	54	-20.27	146	267	Average
4960	42.24	57.69	-15.45	74	-31.76	146	267	Peak

Remarks:

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

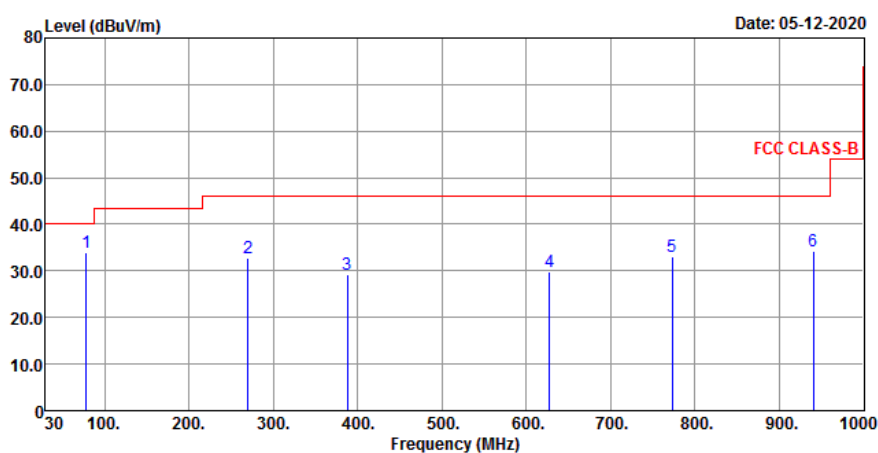
9 kHz ~ 30 MHz Data:

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

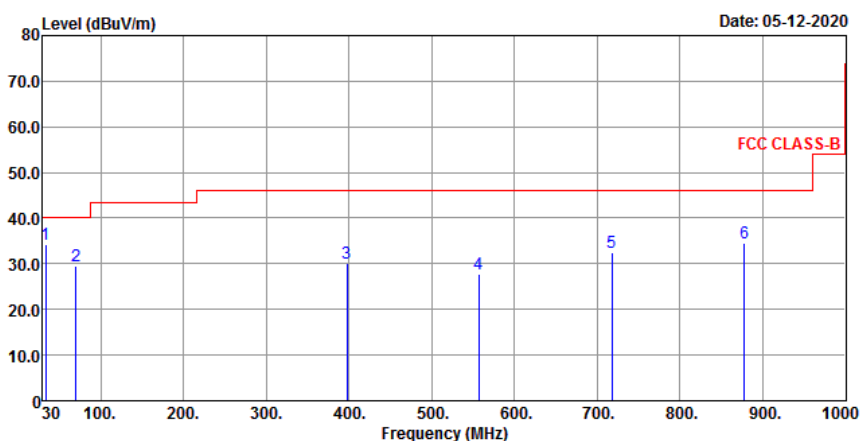
30 MHz ~ 1 GHz Worst-Case Data:

EUT Test Condition		Measurement Detail	
Channel	Channel 78	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	Jisyong Wang

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
78.5	33.9	50	-16.1	40	-6.1	111	162	Peak
269.59	32.62	44.75	-12.13	46	-13.38	102	285	Peak
387.93	29.1	37.7	-8.6	46	-16.9	134	251	Peak
627.52	29.74	31.58	-1.84	46	-16.26	111	162	Peak
773.02	32.97	31.62	1.35	46	-13.03	125	285	Peak
940.83	34.36	30.85	3.51	46	-11.64	145	152	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
33.88	34.22	47.09	-12.87	40	-5.78	111	132	Peak
69.77	29.6	43.45	-13.85	40	-10.4	162	258	Peak
397.63	30.19	38.61	-8.42	46	-15.81	147	152	Peak
556.71	27.62	31.87	-4.25	46	-18.38	102	231	Peak
717.73	32.56	32.85	-0.29	46	-13.44	111	192	Peak
877.78	34.4	31.63	2.77	46	-11.6	145	251	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 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	ESR3	102412	Feb. 17, 2020	Feb. 16, 2021
RF signal cable Woken	5D-FB	Cable-cond2-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 20, 2020	Jan. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2019	Aug. 12, 2020
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 2.
 3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

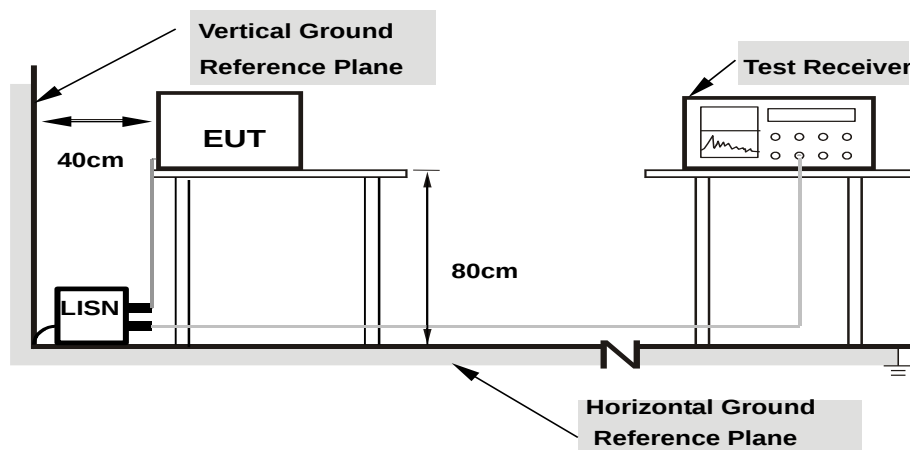
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling 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 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

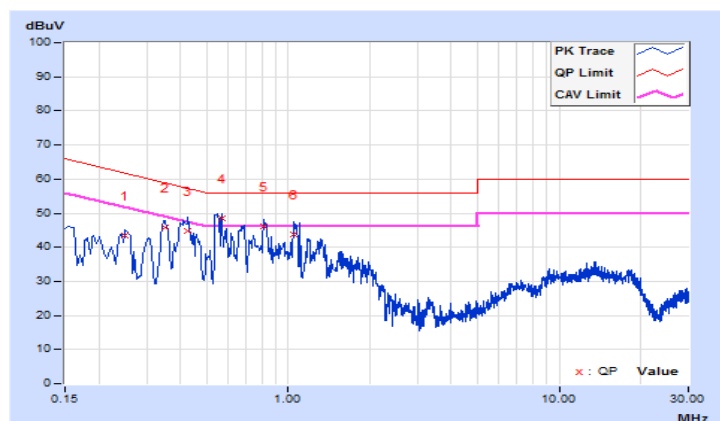
CONDUCTED WORST-CASE DATA : 8DPSK

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2020/5/14

Phase Of Power : Line (L)										
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	0.25000	10.18	33.17	31.57	43.35	41.75	61.76	51.76	-18.41	-10.01
2	0.34943	10.19	35.55	31.46	45.74	41.65	58.98	48.98	-13.24	-7.33
3	0.42465	10.20	34.71	30.81	44.91	41.01	57.36	47.36	-12.45	-6.35
4	0.56591	10.22	38.19	32.49	48.41	42.71	56.00	46.00	-7.59	-3.29
5	0.81000	10.24	35.89	30.95	46.13	41.19	56.00	46.00	-9.87	-4.81
6	1.04600	10.26	33.50	30.10	43.76	40.36	56.00	46.00	-12.24	-5.64

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

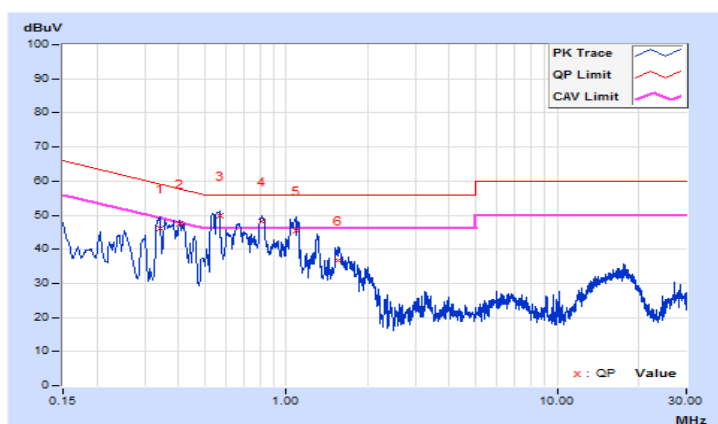


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Jisyong Wang	Test Date	2020/5/14

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	0.34124	10.17	35.97	27.33	46.14	37.50	59.17	49.17	-13.03	-11.67
2	0.40498	10.18	37.33	30.97	47.51	41.15	57.75	47.75	-10.24	-6.60
3	0.56591	10.20	39.60	31.80	49.80	42.00	56.00	46.00	-6.20	-4.00
4	0.80976	10.22	37.96	30.16	48.18	40.38	56.00	46.00	-7.82	-5.62
5	1.09000	10.24	35.26	28.96	45.50	39.20	56.00	46.00	-10.50	-6.80
6	1.55000	10.26	26.32	18.20	36.58	28.46	56.00	46.00	-19.42	-17.54

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



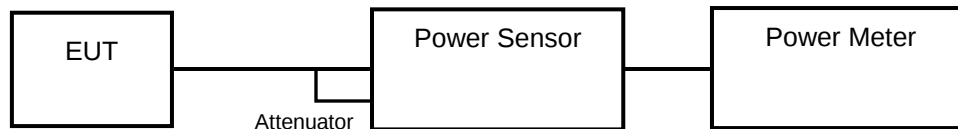
4.3 Maximum Output Power

4.3.1 Limits of Maximum Output Power Measurement

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1 watt.

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.3.7 Test Results

<GFSK>

Channel	Freq. (MHz)	Peak Power		Average Power		Power Limit (mW)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
0	2402	10.328	10.14	9.84	9.93	125 / 1000 ^{Note}	Pass
39	2441	10.814	10.34	10.399	10.17	125 / 1000 ^{Note}	Pass
78	2480	11.455	10.59	11.015	10.42	125 / 1000 ^{Note}	Pass

Note: RF Output Power limit depends on the operating channel numbers, please refer to section 4.3.1 of the results.

<8DPSK>

Channel	Freq. (MHz)	Peak Power		Average Power		Power Limit (mW)	Pass / Fail
		(mW)	(dBm)	(mW)	(dBm)		
0	2402	9.528	9.79	6.871	8.37	125 / 1000 ^{Note}	Pass
39	2441	9.705	9.87	6.637	8.22	125 / 1000 ^{Note}	Pass
78	2480	10.139	10.06	6.516	8.14	125 / 1000 ^{Note}	Pass

Note: RF Output Power limit depends on the operating channel numbers, please refer to section 4.3.1 of the results.

5 Pictures of Test Arrangements

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

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

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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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