

Canada Test Report (Co-Located)

Report No.: IC181217C37-6 R2

IC: 10395A-H2A

Model Name: H2A

Received Date: Dec. 17, 2018

Test Date: Mar. 19, 2019 ~ Mar. 21, 2019

Issued Date: May 08, 2019

Applicant: Google LLC

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

ISED CAB Identifier: TW2021



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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	5
2.2 Modification Record	5
3 General Information.....	6
3.1 General Description of EUT	6
3.2 Description of Test Modes	8
3.2.1 Test Mode Applicability and Tested Channel Detail	11
3.3 Description of Support Units	12
3.3.1 Configuration of System under Test	12
3.4 General Description of Applied Standards	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	16
4.1.5 Test Setup.....	16
4.1.6 EUT Operating Conditions.....	17
4.1.7 Test Results	18
4.2 Conducted Out of Band Emission Measurement.....	25
4.2.1 Limits of Conducted Out of Band Emission Measurement.....	25
4.2.2 Test Setup.....	25
4.2.3 Test Instruments	25
4.2.4 Test Procedure	25
4.2.5 Deviation from Test Standard	25
4.2.6 EUT Operating Condition	25
4.2.7 Test Results	26
5 Pictures of Test Arrangements	27
Annex A- Band-edge measurement	28
Appendix – Information on the Testing Laboratories	29

Release Control Record

Issue No.	Description	Date Issued
IC181217C37-6	Original Release	Mar. 22, 2019
IC181217C37-6 R1	Update test instrument date of calibration	Apr. 19, 2019
IC181217C37-6 R2	Update the BT harmonic test method and report to leverage the duty cycle relaxation factor to improve the compliance margin	May 08, 2019

1 Certificate of Conformity

Product: Interactive Video Streaming Device

Model Name: H2A

Sample Status: Engineering Sample

Applicant: Google LLC

Test Date: Mar. 19, 2019 ~ Mar. 21, 2019

Standards: Canada RSS-247 Issue 2 (2017-02)

Canada RSS-Gen Issue 5 (2018-4)

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:

May 08, 2019

Gina Liu / Specialist

Approved by :



Date:

May 08, 2019

Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard:	Canada RSS-247 Issue 2 (2017-02) Canada RSS-Gen Issue 5 (2018-4)		
Canada Clause	Test Item	Result	Remarks
RSS-247 5.5 6.2.1.2 6.2.2.2 6.2.3.2 6.2.4.2	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.3dB at 11570MHz.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 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	Interactive Video Streaming Device	
Model Name	H2A	
Status of EUT	Engineering Sample	
Power Supply Rating	24.0 Vdc (adapter)	
Modulation Type	WLAN	256QAM, 64QAM, 16QAM, QPSK, BPSK
	Bluetooth EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK
Transfer Rate	WLAN	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0 Mbps 802.11n: up to 150.0 Mbps 802.11ac: up to 433.3 Mbps
	Bluetooth EDR	1/2/3 Mbps
Operating Frequency	WLAN	5180 ~ 5240 MHz, 5260 ~ 5320 MHz, 5500 ~ 5720 MHz, 5745 ~ 5825 MHz
	Bluetooth EDR	2402 ~ 2480 MHz
Number of Channel	WLAN	5180 ~ 5240 MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) 5260 ~ 5320 MHz: 4 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80) 5500 ~ 5720 MHz: 9 for 802.11a, 802.11n (HT20) 4 for 802.11n (HT40) 2 for 802.11ac (VHT80) 5745 ~ 5825 MHz: 5 for 802.11a, 802.11n (HT20) 2 for 802.11n (HT40) 1 for 802.11ac (VHT80)
	Bluetooth EDR	79
Output Power	WLAN	47.098 mW for 5180 ~ 5240 MHz 76.208 mW for 5260 ~ 5320 MHz 75.162 mW for 5500 ~ 5720 MHz 78.343 mW for 5745 ~ 5825 MHz
	Bluetooth EDR	7.379 mW
Antenna Type	WLAN	PIFA antenna with 5 dBi gain
	Bluetooth EDR	PIFA antenna with 1.7 dBi gain
Antenna Connector	i-pex(MHF)	
Product HW Version	EVT	
Product SW Version	173539	
Radio HW Version	EVT	
Radio SW Version	173539	
Accessory Device	Refer to Note as below	
Cable Supplied	Refer to Note as below	

Note:

1. The EUT provides one completed transmitter and one receiver.

Modulation Mode	Tx Function
802.11a	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX
802.11ac (VHT20)	1TX
802.11ac (VHT40)	1TX
802.11ac (VHT80)	1TX

* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT accessories list refers to EUT Photo.pdf.

3.2 Description of Test Modes

For 5180 ~ 5240 MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220
40	5200	48	5240

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	46	5230

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
42	5210

For 5260 ~ 5320 MHz

4 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
52	5260	60	5300
56	5280	64	5320

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
54	5270	62	5310

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
58	5290

For 5500 ~ 5720 MHz

9 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
100	5500	132	5660
104	5520	136	5680
108	5540	140	5700
112	5560	144	5720
116	5580		

4 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
102	5510	134	5670
110	5550	142	5710

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
106	5530	138	5690

For 5745 ~ 5825 MHz:

5 channels are provided for 802.11a, 802.11n (HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	161	5805
153	5765	165	5825
157	5785		

2 channels are provided for 802.11n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency (MHz)
155	5775

For Bluetooth EDR:

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	OB	
-	√	√	√	-

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

OB: Conducted Out-Band Emission Measurement

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	BT EDR + 802.11a	2402 ~ 2480	0 to 78	78 + 157	FHSS
		5745 ~ 5825	149 to 165		BPSK

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	BT EDR + 802.11a	2402 ~ 2480	0 to 78	78 + 157	FHSS
		5745 ~ 5825	149 to 165		BPSK

Conducted Out-Band Emission Measurement

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

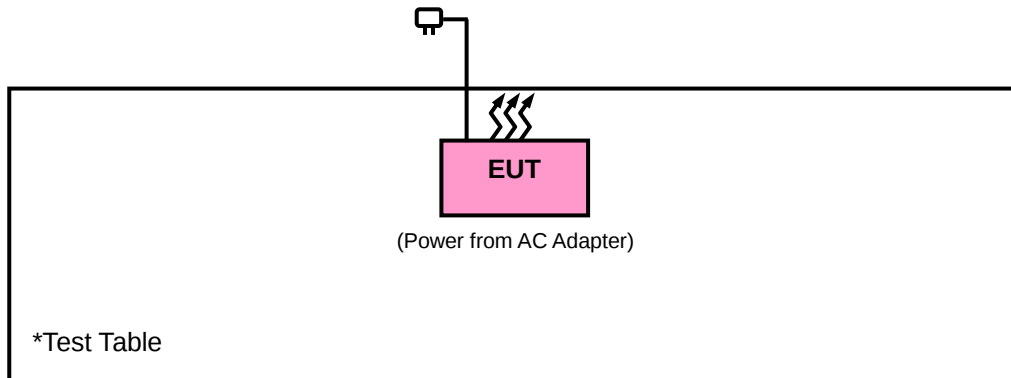
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE$\geq$1G	25 deg. C, 65 % RH	120Vac, 60Hz	Thomas Wei
RE<1G	25 deg. C, 65 % RH	120Vac, 60Hz	Thomas Wei
OB	25 deg. C, 65 % RH	120Vac, 60Hz	Thomas Wei

3.3 Description of Support Units

The EUT has been tested as an independent unit.

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

The EUT is a RF Product. According to the specification of the EUT declared by the manufacturer, it must comply with the requirements of the following standards:

Canada RSS-247 Issue 2 (2017-02)

Canada RSS-Gen Issue 5 (2018-4)

KDB 789033 D02 General UNII Test Procedure New Rules v02r01

ANSI C63.10-2013

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

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 30dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

Applicable To		Limit	
789033 D02 General UNII Test Procedure New Rules v02r01		Field Strength at 3m	
		PK:74 (dBμV/m)	AV:54 (dBμV/m)
Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	RSS-247 6.2.1.2	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	RSS-247 6.2.2.2		
5470~5725 MHz	RSS-247 6.2.3.2		
5725~5850 MHz	RSS-247 6.2.4.2	PK:-27 (dBm/MHz) ^{*d} PK:10 (dBm/MHz) ^{*c} PK:15.6 (dBm/MHz) ^{*b} PK:27 (dBm/MHz) ^{*a}	PK: 68.2(dBμV/m) ^{*d} PK:105.2 (dBμV/m) ^{*c} PK: 110.8(dBμV/m) ^{*b} PK:122.2 (dBμV/m) ^{*a}
a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges; b. 15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges; c. 10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and d. -27 dBm/MHz at frequencies more than 75 MHz above or below the band edges.			

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3} \text{ } \mu\text{V/m, where P is the eirp (Watts).}$$

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Mar. 16, 2018	Mar. 15, 2019
			Mar. 18, 2019	Mar. 17, 2020
Spectrum Analyzer Agilent	N9010A	MY52220314	Dec. 13, 2018	Dec. 12, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Jan. 21, 2019	Jan. 20, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-472	Nov. 23, 2018	Nov. 22, 2019
Horn Antenna SCHWARZBECK	BBHA 9120D	9120D-969	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna	HLA 6121	45745	Jun. 14, 2018	May 18, 2019
Preamplifier EMCI	EMC 012645	980115	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 184045	980116	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC 330H	980112	Oct. 12, 2018	Oct. 11, 2019
Preamplifier EMCI	EMC001340	980201	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 12, 2018	Oct. 11, 2019
Power Meter Anritsu	ML2495A	1012010	Sep. 05, 2018	Sep. 04, 2019
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2018	Sep. 03, 2019
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM- 1000(140807)	Oct. 12, 2018	Oct. 11, 2019
RF Coaxial Cable WOKEN	8D-FB	Cable-Ch10-01	Oct. 12, 2018	Oct. 11, 2019
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 test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is 7450F-10.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- 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 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. 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 detect 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:

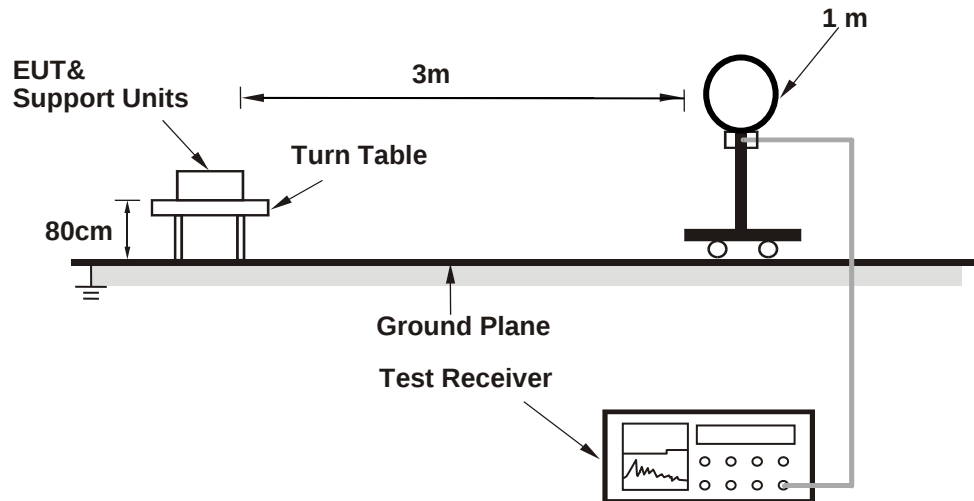
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. For WLAN 5G test, the resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. For BT test, the minimum hopping channels are 15 for GFSK, QPSK and 8PSK. The max duration time (on time) for each channel is 2.98 ms. $2.98 \times 15 = 44.7$ ms. Therefore, the max pulse number for each channel shall be 3 within 100ms. The duty cycle relaxation factor = $20 \times \log(2.98 \times 3 / 100) = -20.97$ dB.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

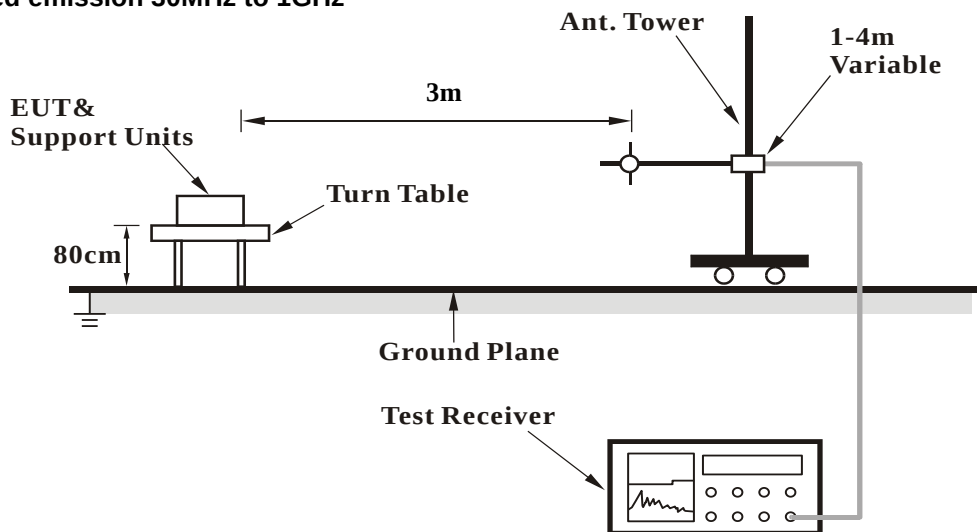
No deviation.

4.1.5 Test Setup

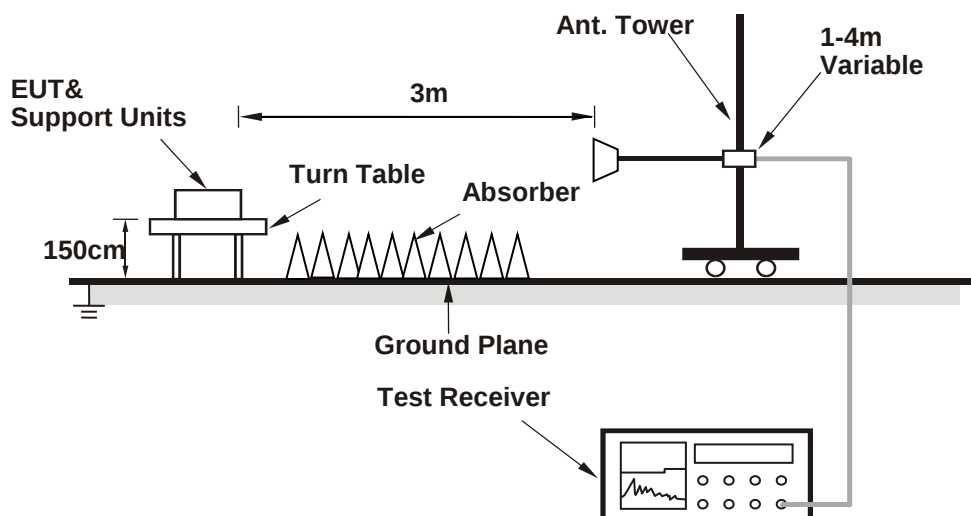
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

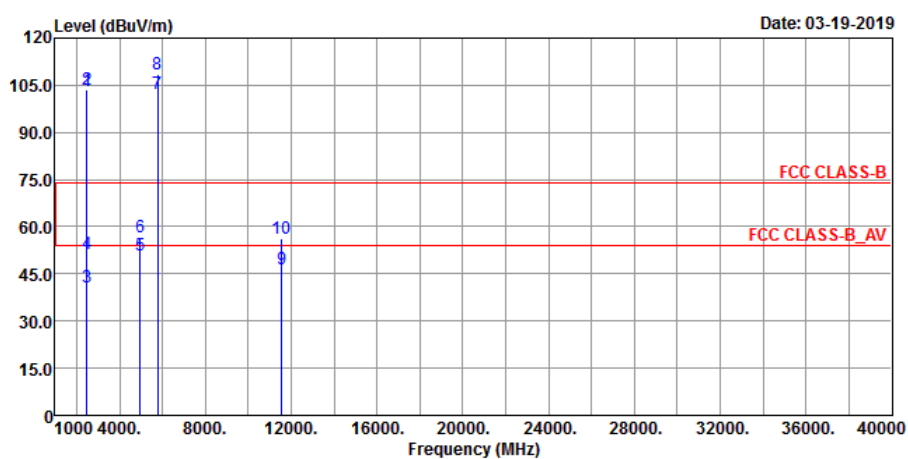
Above 1 GHz Data :

BT EDR + 802.11a

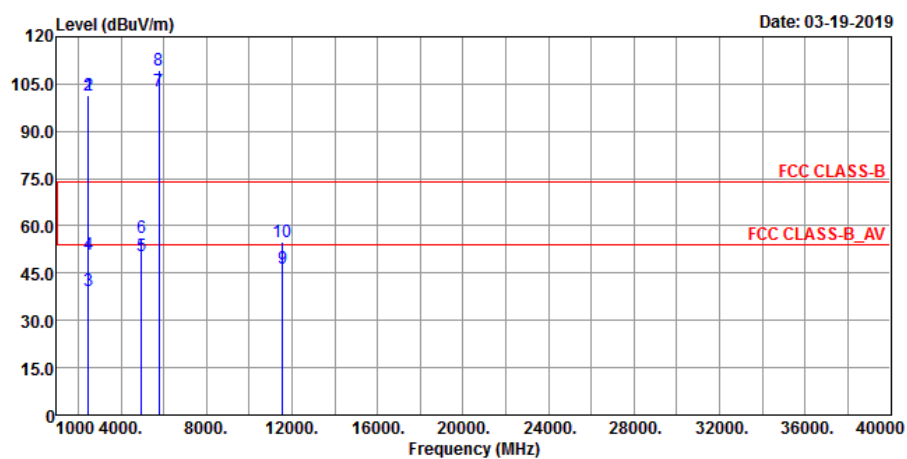
EUT Test Condition		Measurement Detail	
Channel	CH 78 + CH 157	Frequency Range	1 GHz ~ 40 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Thomas Wei

<Spurious Emission>

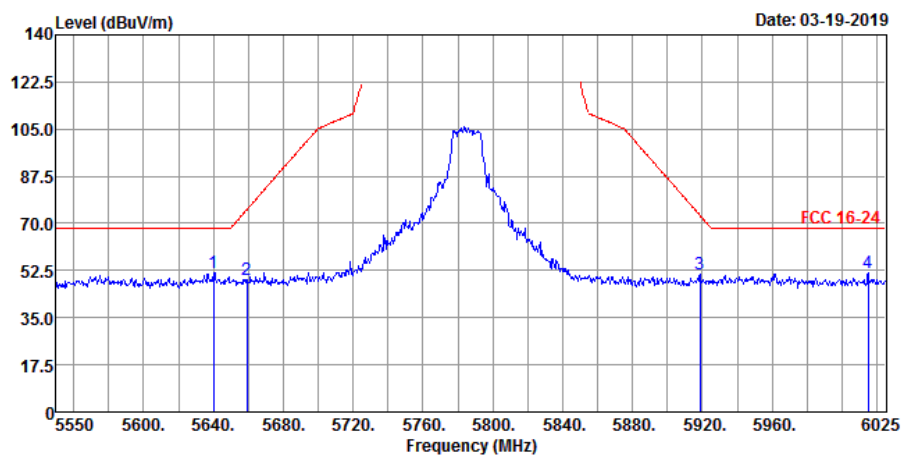
Horizontal



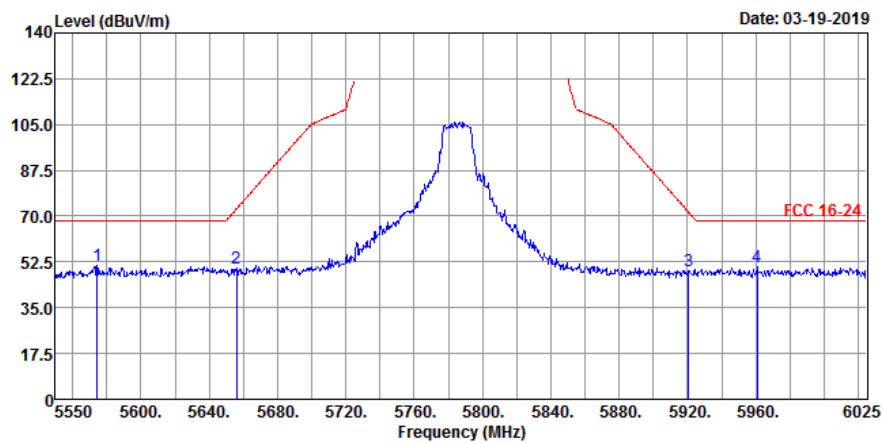
Vertical



<Out of Band Emission (OOBE)> Horizontal



Vertical



<Spurious Emission>

Antenna Polarity & Test Distance: Horizontal at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	82.62	87.98			27.53	4.43	37.32	179	186	Average
2480	103.59	108.95			27.53	4.43	37.32	179	186	Peak
2483.6	30.61	35.97	54	-23.39	27.53	4.43	37.32	179	186	Average
2483.6	51.58	56.94	74	-22.42	27.53	4.43	37.32	179	186	Peak
4960	35.81	50.43	54	-18.19	31.4	6.9	52.92	130	195	Average
4960	56.78	71.4	74	-17.22	31.4	6.9	52.92	130	195	Peak
5785	102.09	100.55			32.26	6.82	37.54	226	146	Average
5785	108.65	107.11			32.26	6.82	37.54	226	146	Peak
11570	46.54	48.66	54	-7.46	40.13	10.76	53.01	162	219	Average
11570	56.26	58.38	74	-17.74	40.13	10.76	53.01	162	219	Peak

Antenna Polarity & Test Distance: Vertical at 3 m

Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
2480	80.63	85.99			27.53	4.43	37.32	229	290	Average
2480	101.6	106.96			27.53	4.43	37.32	229	290	Peak
2483.64	30.09	35.45	54	-23.91	27.53	4.43	37.32	229	290	Average
2483.64	51.06	56.42	74	-22.94	27.53	4.43	37.32	229	290	Peak
4960	35.28	49.9	54	-18.72	31.4	6.9	52.92	159	61	Average
4960	56.25	70.87	74	-17.75	31.4	6.9	52.92	159	61	Peak
5785	102.95	101.41			32.26	6.82	37.54	145	48	Average
5785	109.34	107.8			32.26	6.82	37.54	145	48	Peak
11570	46.7	48.82	54	-7.3	40.13	10.76	53.01	146	115	Average
11570	55.04	57.16	74	-18.96	40.13	10.76	53.01	146	115	Peak

<Out of Band Emission (OOBE)>

Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5640.25	51.44	49.98	68.2	-16.76	32.04	6.7	37.28	226	146	Peak
5659.25	49.29	47.86	75.07	-25.78	32.06	6.71	37.34	226	146	Peak
5918.6	50.95	49.1	72.92	-21.97	32.49	6.86	37.5	226	146	Peak
6015.025	51.44	49.37	68.2	-16.76	32.67	6.9	37.5	226	146	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
5574.225	51.11	49.67	68.2	-17.09	31.92	6.64	37.12	145	48	Peak
5655.925	49.97	48.54	72.6	-22.63	32.06	6.71	37.34	145	48	Peak
5920.5	49.33	47.48	71.52	-22.19	32.49	6.86	37.5	145	48	Peak
5960.875	50.59	48.66	68.2	-17.61	32.57	6.87	37.51	145	48	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2480 MHz & 5785 MHz: Fundamental Frequency
- *: Out of Restricted Band
- The emission levels of other frequencies were very low against the limit
- For Bluetooth test, the average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
20 log (Duty cycle) = 20 log (2.98 ms *3 / 100 ms) = -20.97 dB
Please refer to the plotted duty

9 kHz ~ 30 MHz Data:

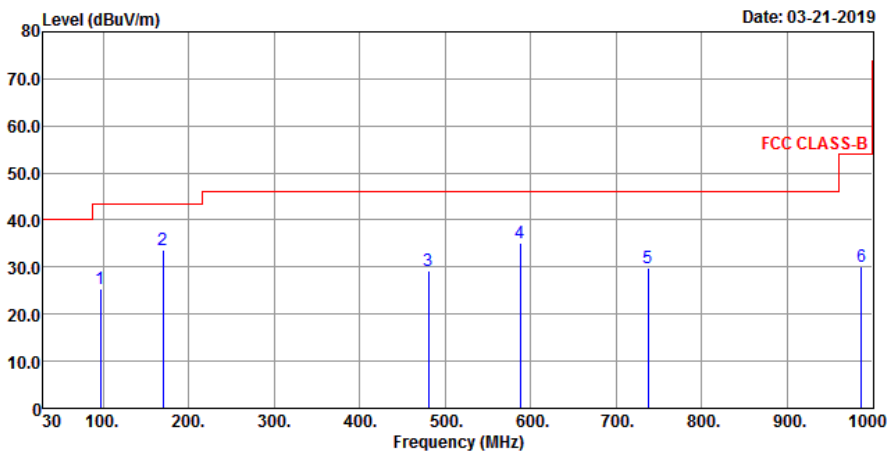
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

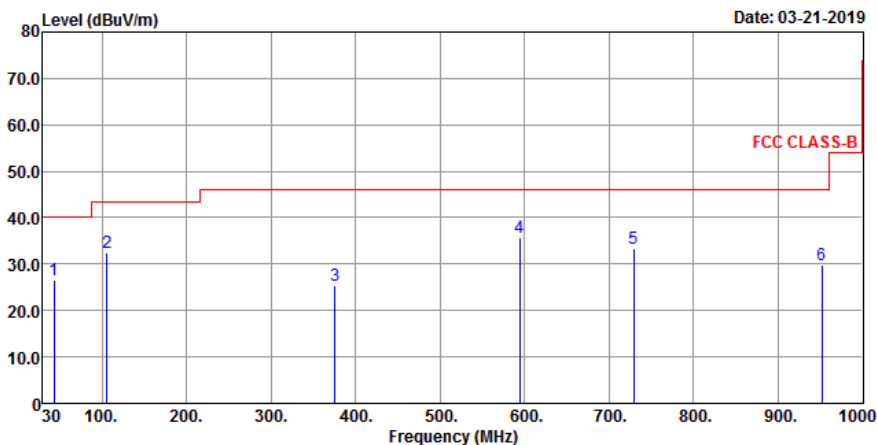
BT EDR + 802.11a

EUT Test Condition		Measurement Detail	
Channel	CH 78 + CH 157	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



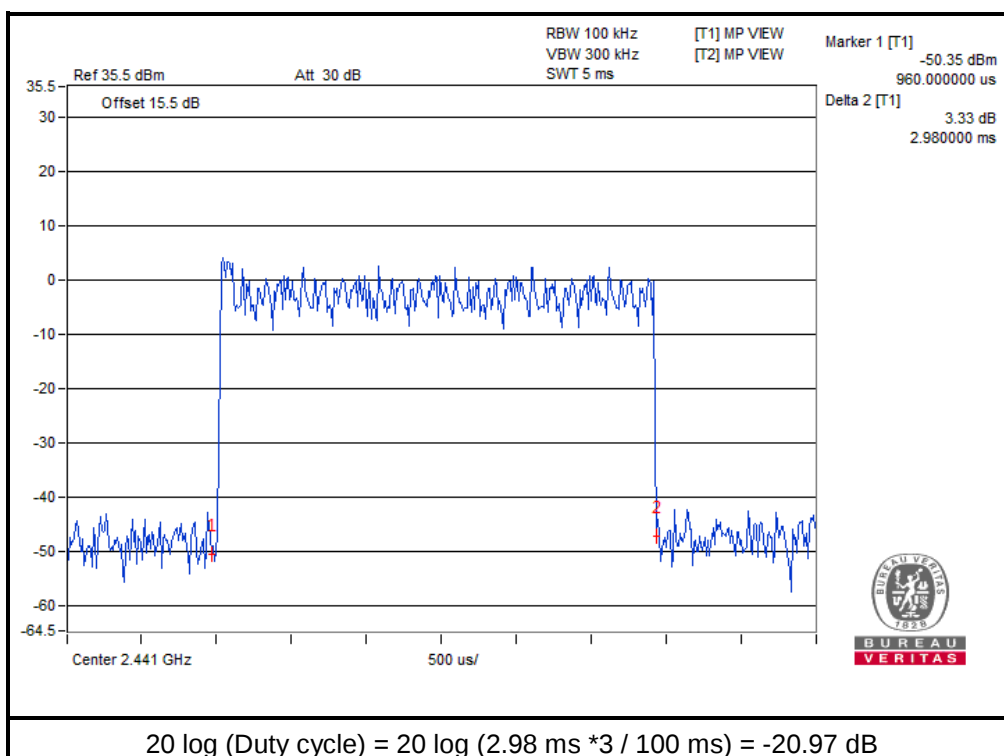
Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
96.93	25.32	47.71	43.5	-18.18	8.83	0.74	31.96	156	251	Peak
169.68	33.73	52.63	43.5	-9.77	11.76	1.07	31.73	165	231	Peak
480.08	29.31	41.82	46	-16.69	16.93	2.41	31.85	147	152	Peak
587.75	35.15	45.13	46	-10.85	19.32	2.84	32.14	165	295	Peak
737.13	29.9	36.61	46	-16.1	21.34	3.46	31.51	111	152	Peak
986.42	30	33.37	54	-24	23.99	4.39	31.75	165	231	Peak
Antenna Polarity & Test Distance: Vertical at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
43.58	26.69	43.71	40	-13.31	13.59	0.5	31.11	165	253	Peak
105.66	32.5	54	43.5	-11	9.62	0.77	31.89	111	162	Peak
375.32	25.35	40.55	46	-20.65	14.75	1.99	31.94	145	251	Peak
594.54	35.68	45.51	46	-10.32	19.48	2.88	32.19	165	231	Peak
729.37	33.22	40.16	46	-12.78	21.23	3.43	31.6	198	265	Peak
951.5	29.87	33.67	46	-16.13	23.8	4.24	31.84	165	231	Peak

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- The emission levels of other frequencies were very low against the limit

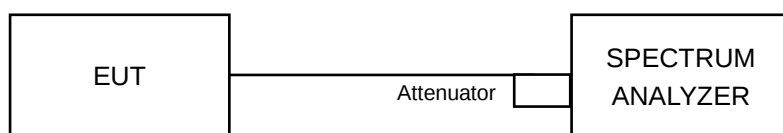


4.2 Conducted Out of Band Emission Measurement

4.2.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW $\geq$ 300 kHz.
- Detector = average.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

- Set RBW = 100 kHz.
- Set VBW $\geq$ 300 kHz.
- Detector = average.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

4.2.5 Deviation from Test Standard

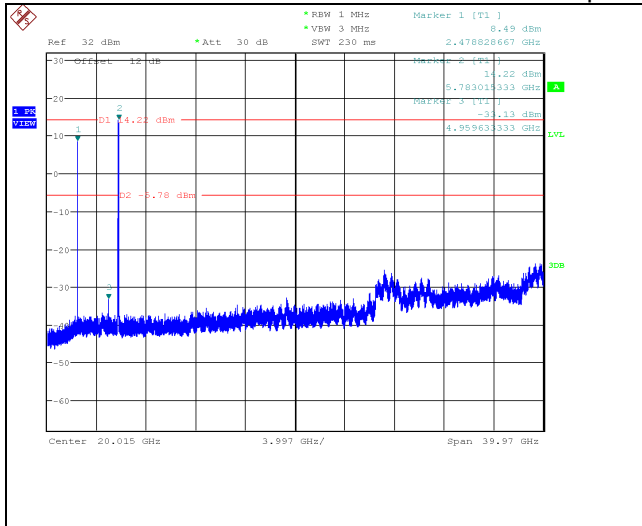
No deviation.

4.2.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

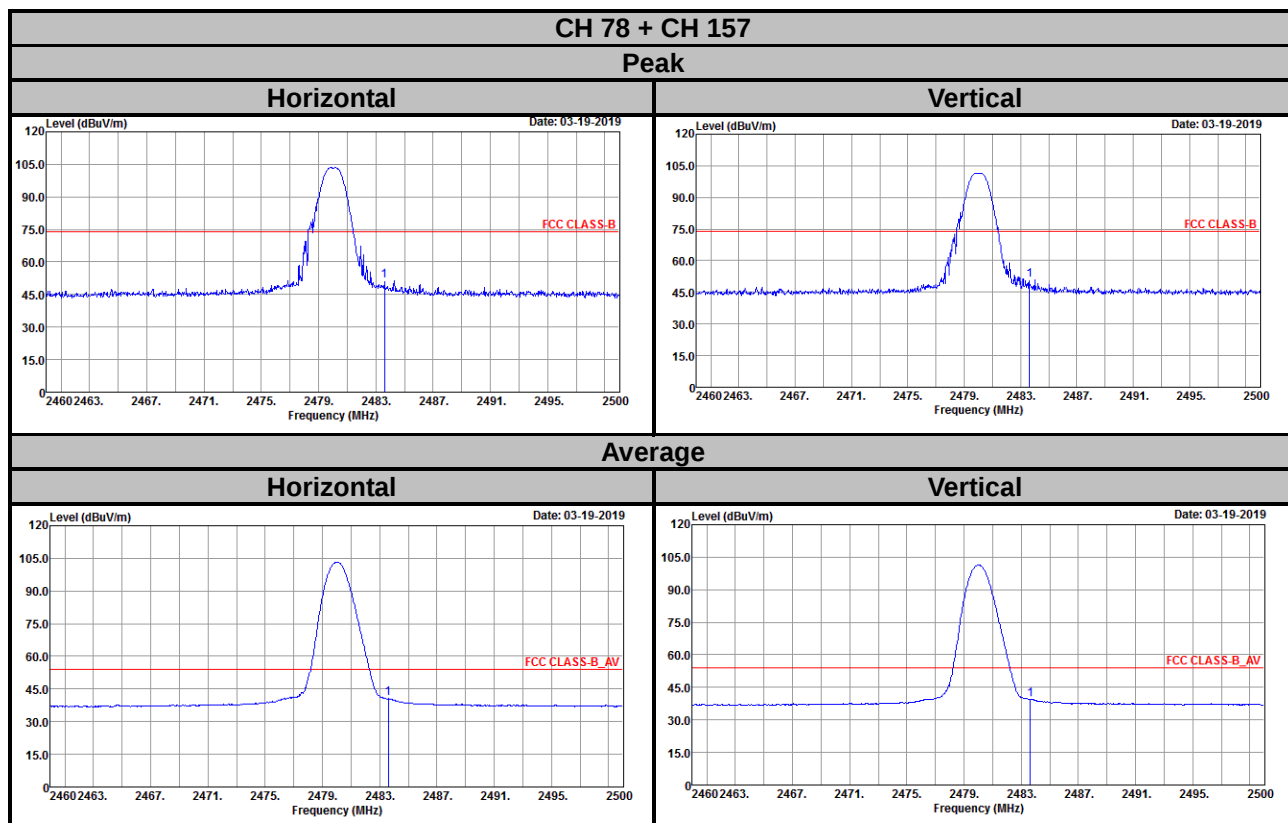
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



5 Pictures of Test Arrangements

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

Annex A- Band-edge measurement



Appendix – Information on 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 and approved 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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