

FCC Test Report (Co-Located)

Report No.: RF190119C10-7 R1

FCC ID: 2AA3N-TTR01

Test Model: PLTN-TTR01

Received Date: Jan. 19, 2019

Test Date: Jan. 31 ~ Mar. 12, 2019

Issued Date: Jun. 09, 2020

Applicant: Peloton Interactive Inc.

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

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
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FCC Registration / 788550 / TW0003
Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RF190119C10-7	Original release	Mar. 18, 2019
RF190119C10-7 R1	Revised item 3.3 description of Support Units	Jun. 09, 2020

1 Certificate of Conformity

Product: Peloton Console

Brand: PELOTON

Test Model: PLTN-TTR01

Sample Status: Engineering sample

Applicant: Peloton Interactive Inc.

Test Date: Jan. 31 ~ Mar. 12, 2019

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
47 CFR FCC Part 15, Subpart C (Section 15.249)
47 CFR FCC Part 15, Subpart E (Section 15.407)
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 : Celine Chou , **Date:** Jun. 09, 2020
Celine Chou / Senior Specialist

Approved by : Bruce Chen , **Date:** Jun. 09, 2020
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

Applied Standard:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart C (Section 15.249) 47 CFR FCC Part 15, Subpart E (Section 15.407)		
FCC Clause	Test Item	Result	Remarks
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -1.3dB at 40.67MHz.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	Pass	

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) ($\pm$)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Peloton Console	
Brand	PELTON	
Test Model	PLTN-TTR01	
Sample Status	Engineering sample	
Power Supply Rating	20Vdc from adapter	
Modulation Type	WLAN	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
	Bluetooth EDR	GFSK, $\pi/4$ -DQPSK, 8DPSK
	Bluetooth LE	GFSK
	ANT+	GFSK
Modulation Technology	WLAN	DSSS, OFDM
Transfer Rate	WLAN	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n/ac: up to 300Mbps 802.11ac: up to 867Mbps
	Bluetooth EDR	1/2/3Mbps
	Bluetooth LE	Bluetooth LE 4.0: 1Mbps Bluetooth LE 5.0: 2Mbps
	ANT+	1Mbps
Operating Frequency	WLAN	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5700MHz, 5745 ~ 5825MHz
	Bluetooth EDR	2402 ~ 2480MHz
	Bluetooth LE	2402 ~ 2480MHz
	ANT+	2402 ~ 2480MHz

Number of Channel	WLAN	2412 ~ 2462MHz: 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 5180 ~ 5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5260 ~ 5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500 ~ 5700MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 8 802.11n (HT40), 802.11ac (VHT40): 3 802.11ac (VHT80): 1 5745 ~ 5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
	Bluetooth EDR	79
	Bluetooth LE	40
	ANT+	79
Output Power	WLAN	1TX: 2412 ~ 2462MHz: 339.625mW 5180 ~ 5240MHz: 110.917mW 5260 ~ 5320MHz: 113.501mW 5500 ~ 5700MHz: 190.546mW 5745 ~ 5825MHz: 239.332mW 2TX: 2412 ~ 2462MHz: 426.181mW 5180 ~ 5240MHz: 114.695mW 5260 ~ 5320MHz: 116.155mW 5500 ~ 5700MHz: 248.053mW 5745 ~ 5825MHz: 447.336mW
	Bluetooth EDR	21.429mW
	Bluetooth LE	Bluetooth LE 4.0: 4.853mW Bluetooth LE 5.0: 4.966mW
Field Strength	ANT+	96.7dBuV/m (3m)
Antenna Type	Refer to note	
Antenna Connector	Refer to note	
Accessory Device	Adapter, Exercise Bike	
Cable Supplied	NA	

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function
802.11b	1TX/2TX
802.11g	1TX/2TX
802.11a	1TX/2TX
802.11n (HT20)	1TX/2TX
802.11n (HT40)	1TX/2TX
802.11ac (VHT20)	1TX/2TX
802.11ac (VHT40)	1TX/2TX
802.11ac (VHT80)	1TX/2TX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT consumes power from the following Adapter.

Adapter	
Brand	PELTON
Model	FSP065-APDC8R01
Input Power	100-240Vac, 50-60Hz, 1.7A
Output Power	5Vdc, 3A or 9Vdc, 3A or 20Vdc, 3.25A, 65W Max.
Power Line	AC: 1.7m non-shielded power cable without core DC: 1.5m non-shielded power cable without core attached on adapter

3. The following antennas were provided to the EUT.

Ant. No.	Brand	Model	Type	Connector	Gain (dBi)	
					2.4G	5G
Main	Peloton	UI8(Topaz)	PIFA	i-pex(MHF)	-0.19	0.58
AUX	Peloton	UI8(Topaz)	PIFA	i-pex(MHF)	0.28	2.34

3.2 Description of Test Modes

For 2.4GHz

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

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

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

For 5180 ~ 5240MHz:

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

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

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

For 5260 ~ 5320MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

For 5500 ~ 5700MHz:

8 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

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

3 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
102	5510 MHz	134	5670 MHz
110	5550 MHz		

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
106	5530 MHz

For 5745 ~ 5825MHz:

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

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

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

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		

For Bluetooth LE:

40 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

For ANT+:

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	
A	√	√	EUT + Adapter

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

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
A	802.11g (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2412 ~ 2462	1 to 11	6 + 151	OFDM
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM
A	BT GFSK (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2402 ~ 2480	0 to 78	78 + 151	GFSK
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM
A	ANT+ (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2402 ~ 2480	0 to 78	78 + 151	GFSK
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM

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
A	802.11g (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2412 ~ 2462	1 to 11	6 + 151	OFDM
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM
A	BT GFSK (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2402 ~ 2480	0 to 78	78 + 151	GFSK
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM
A	ANT+ (AUX Ant.) + 802.11n (HT40) (Main Ant.)	2402 ~ 2480	0 to 78	78 + 151	GFSK
		5180 ~ 5240	38 to 46		OFDM
		5260 ~ 5320	52 to 64		OFDM
		5500 ~ 5720	102 to 142		OFDM
		5745 ~ 5825	151 to 159		OFDM

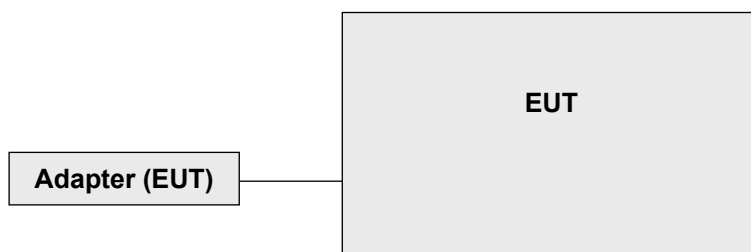
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	22 deg. C, 66% RH	120Vac, 60Hz	Han Wu
RE<1G	21 deg. C, 68% RH	120Vac, 60Hz	Willy Cheng

3.3 Description of Support Units

The EUT has been tested as an independent unit.
Exercise Bike and adapter included as representative accessories.

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:

FCC Part 15, Subpart C (15.247)

FCC Part 15, Subpart C (15.249)

FCC Part 15, Subpart E (15.407)

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

For FCC Part 15, Subpart C (15.247) and FCC Part 15, Subpart E (15.407)

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)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK: -27 (dBm/MHz)	PK: 68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK: -27 (dBm/MHz) ^{*1} PK: 10 (dBm/MHz) ^{*2} PK: 15.6 (dBm/MHz) ^{*3} PK: 27 (dBm/MHz) ^{*4}	PK: 68.2(dBμV/m) ^{*1} PK: 105.2 (dBμV/m) ^{*2} PK: 110.8(dBμV/m) ^{*3} PK: 122.2 (dBμV/m) ^{*4}
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
^{*1} beyond 75 MHz or more above of the band edge.			^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.	
^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.			^{*4} from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.	

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

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

For FCC Part 15, Subpart C (15.249)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 21, 2018	Nov. 20, 2019
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jun. 14, 2018	Jun. 13, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2018	Aug. 07, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Mar. 16, 2018	Mar. 15, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2018	Aug. 07, 2019
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 31, 2018	Jul. 30, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019

- 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 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is 7450F-9.

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:

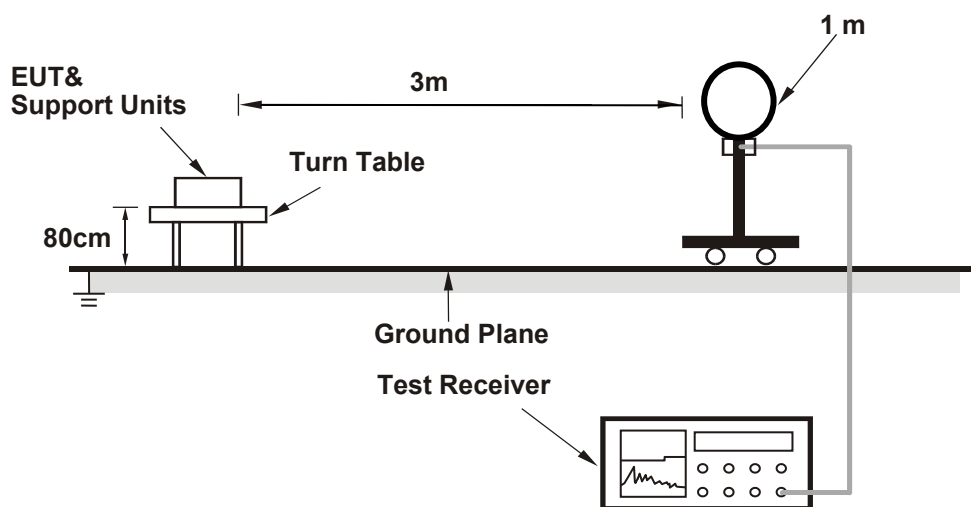
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

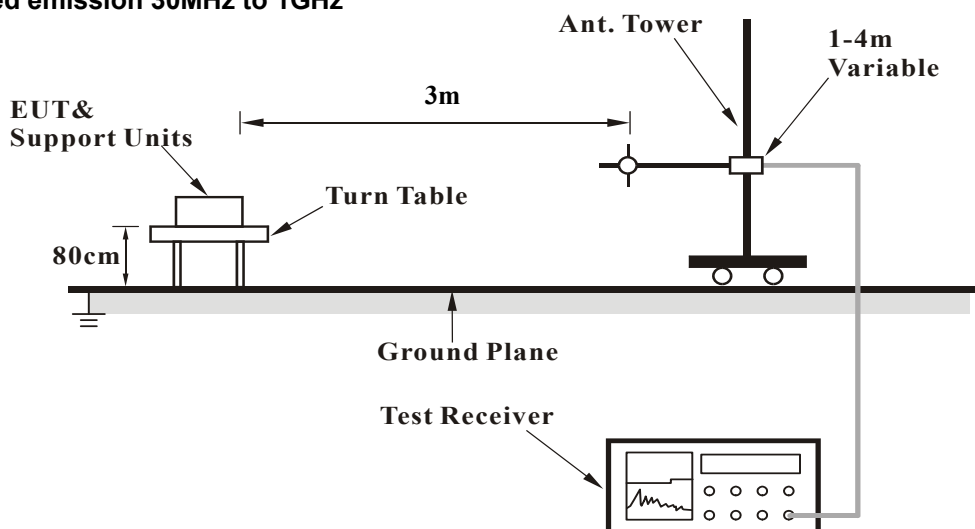
No deviation.

4.1.5 Test Setup

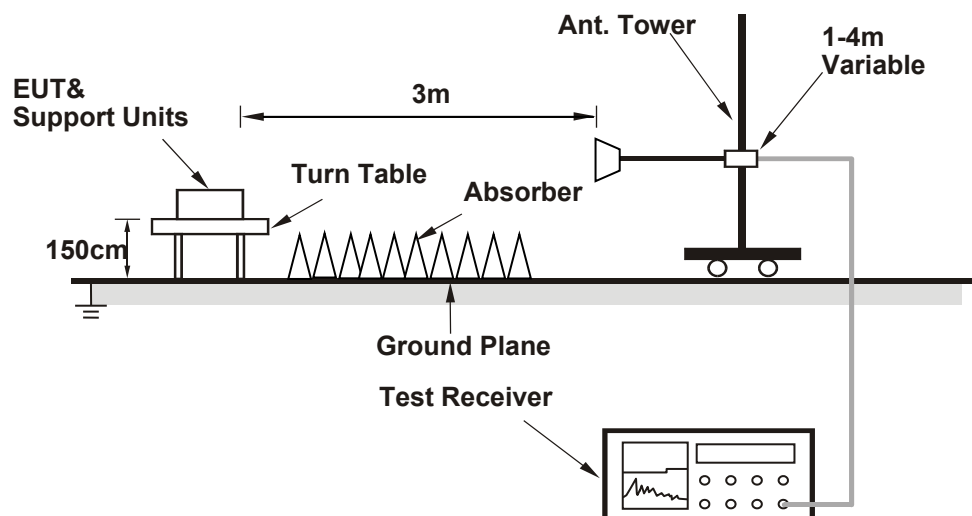
For Radiated emission below 30MHz



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 1GHz Data:

802.11g (AUX Ant.) + 802.11n (HT40) (Main Ant.)

CHANNEL	CH 6 + CH 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.7 PK			1.05 H	253	76.9	31.8
2	*2437.00	99.1 AV			1.05 H	253	67.3	31.8
3	4874.00	39.6 PK	74.0	-34.4	2.55 H	221	39.0	0.6
4	4874.00	27.6 AV	54.0	-26.4	2.55 H	221	27.0	0.6
5	#5612.00	51.3 PK	68.2	-16.9	2.03 H	6	49.9	1.4
6	*5755.00	106.5 PK			2.03 H	6	67.9	38.6
7	*5755.00	96.5 AV			2.03 H	6	57.9	38.6
8	#5977.60	52.5 PK	68.2	-15.7	2.03 H	6	50.0	2.5
9	11510.00	54.6 PK	74.0	-19.4	2.22 H	78	40.7	13.9
10	11510.00	41.9 AV	54.0	-12.1	2.22 H	78	28.0	13.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	109.4 PK			1.05 V	182	77.6	31.8
2	*2437.00	100.3 AV			1.05 V	182	68.5	31.8
3	4874.00	39.9 PK	74.0	-34.1	2.51 V	213	39.3	0.6
4	4874.00	27.5 AV	54.0	-26.5	2.51 V	213	26.9	0.6
5	#5645.60	51.4 PK	68.2	-16.8	1.83 V	131	49.8	1.6
6	*5755.00	106.1 PK			1.83 V	131	67.5	38.6
7	*5755.00	96.2 AV			1.83 V	131	57.6	38.6
8	#5979.20	52.9 PK	68.2	-15.3	1.83 V	131	50.4	2.5
9	11510.00	53.8 PK	74.0	-20.2	2.38 V	111	39.9	13.9
10	11510.00	41.4 AV	54.0	-12.6	2.38 V	111	27.5	13.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BT GFSK (AUX Ant.) + 802.11n (HT40) (Main Ant.)

CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	105.8 PK			2.13 H	296	73.3	32.5
2	*2480.00	102.1 AV			2.13 H	296	69.6	32.5
3	2483.50	55.7 PK	74.0	-18.3	2.11 H	287	23.2	32.5
4	2483.50	47.4 AV	54.0	-6.6	2.11 H	287	14.9	32.5
5	4960.00	40.3 PK	74.0	-33.7	3.06 H	189	40.0	0.3
6	4960.00	27.6 AV	54.0	-26.4	3.06 H	189	27.3	0.3
7	#5644.80	52.4 PK	68.2	-15.8	1.96 H	8	50.8	1.6
8	*5755.00	106.0 PK			2.05 H	8	67.4	38.6
9	*5755.00	96.0 AV			2.05 H	8	57.4	38.6
10	#5979.20	52.8 PK	68.2	-15.4	1.96 H	8	50.3	2.5
11	11510.00	54.5 PK	74.0	-19.5	2.48 H	92	40.6	13.9
12	11510.00	41.7 AV	54.0	-12.3	2.48 H	92	27.8	13.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	106.8 PK			2.55 V	212	74.3	32.5
2	*2480.00	103.5 AV			2.55 V	212	71.0	32.5
3	2483.50	57.5 PK	74.0	-16.5	2.59 V	211	25.0	32.5
4	2483.50	49.6 AV	54.0	-4.4	2.59 V	211	17.1	32.5
5	4960.00	40.4 PK	74.0	-33.6	3.02 V	188	40.1	0.3
6	4960.00	27.0 AV	54.0	-27.0	3.02 V	188	26.7	0.3
7	#5645.60	51.4 PK	68.2	-16.8	1.81 V	130	49.8	1.6
8	*5755.00	106.3 PK			1.81 V	130	67.7	38.6
9	*5755.00	96.4 AV			1.81 V	130	57.8	38.6
10	#5977.60	53.0 PK	68.2	-15.2	1.81 V	130	50.5	2.5
11	11510.00	53.7 PK	74.0	-20.3	2.47 V	115	39.8	13.9
12	11510.00	41.6 AV	54.0	-12.4	2.47 V	115	27.7	13.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

ANT+ (AUX Ant.) + 802.11n (HT40) (Main Ant.)

CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	95.2 PK	114.0	-18.8	1.99 H	307	63.4	31.8
2	*2480.00	61.4 AV	94.0	-32.6	1.99 H	307	29.6	31.8
3	2483.50	55.6 PK	74.0	-18.4	2.22 H	299	23.8	31.8
4	2483.50	45.1 AV	54.0	-8.9	2.22 H	299	13.3	31.8
5	4960.00	40.2 PK	74.0	-33.8	2.94 H	198	36.4	3.8
6	4960.00	6.4 AV	54.0	-47.6	2.94 H	198	2.6	3.8
7	#5643.20	51.3 PK	68.2	-16.9	2.08 H	313	49.7	1.6
8	*5755.00	106.6 PK			2.08 H	313	68.0	38.6
9	*5755.00	96.5 AV			2.08 H	313	57.9	38.6
10	#5927.20	50.9 PK	68.2	-17.3	2.08 H	313	48.5	2.4
11	11510.00	52.9 PK	74.0	-21.1	1.99 H	333	39.0	13.9
12	11510.00	42.1 AV	54.0	-11.9	1.99 H	333	28.2	13.9

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2480.00	96.3 PK	114.0	-17.7	2.32 V	211	64.5	31.8
2	*2480.00	62.5 AV	94.0	-31.5	2.32 V	211	30.7	31.8
3	2483.50	55.4 PK	74.0	-18.6	3.88 V	215	23.6	31.8
4	2483.50	45.1 AV	54.0	-8.9	3.88 V	215	13.3	31.8
5	4960.00	40.1 PK	74.0	-33.9	3.06 V	208	36.3	3.8
6	4960.00	6.3 AV	54.0	-47.7	3.06 V	208	2.5	3.8
7	#5644.00	50.7 PK	68.2	-17.5	1.40 V	358	49.1	1.6
8	*5755.00	106.6 PK			1.40 V	358	68.0	38.6
9	*5755.00	96.3 AV			1.40 V	358	57.7	38.6
10	#5977.60	52.7 PK	68.2	-15.5	1.40 V	358	50.2	2.5
11	11510.00	53.2 PK	74.0	-20.8	1.33 V	32	39.3	13.9
12	11510.00	42.6 AV	54.0	-11.4	1.33 V	32	28.7	13.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data

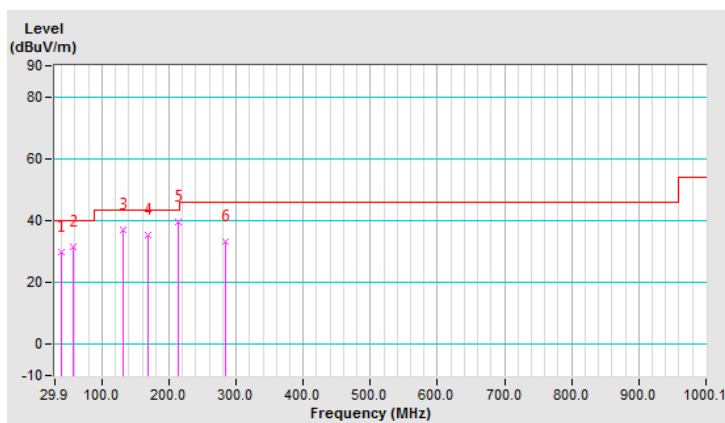
802.11g (AUX Ant.) + 802.11n (HT40) (Main Ant.)

CHANNEL	CH 6 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	39.62	29.9 QP	40.0	-10.1	1.99 H	337	40.3	-10.4
2	57.12	31.7 QP	40.0	-8.3	1.99 H	120	41.8	-10.1
3	131.00	37.0 QP	43.5	-6.5	1.99 H	230	47.5	-10.5
4	167.94	35.5 QP	43.5	-8.0	1.49 H	306	44.8	-9.3
5	214.61	39.5 QP	43.5	-4.0	1.99 H	3	50.4	-10.9
6	284.60	33.3 QP	46.0	-12.7	1.00 H	6	41.0	-7.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

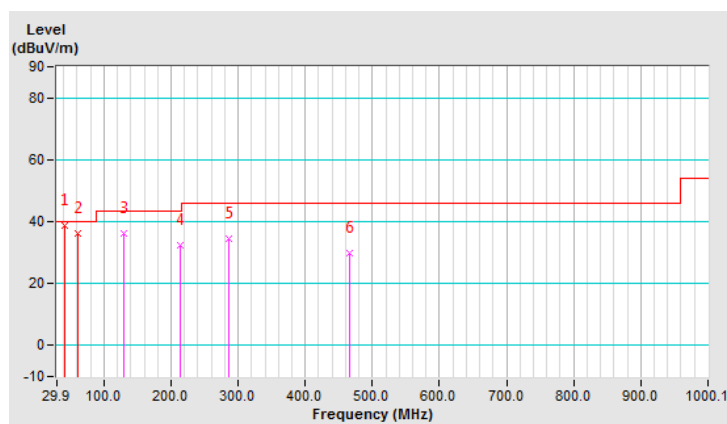


CHANNEL	CH 6 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.67	38.7 QP	40.0	-1.3	1.00 V	86	48.9	-10.2
2	61.77	36.3 QP	40.0	-3.7	1.00 V	32	46.8	-10.5
3	129.06	36.0 QP	43.5	-7.5	1.00 V	33	46.7	-10.7
4	214.61	32.5 QP	43.5	-11.0	1.00 V	325	43.4	-10.9
5	286.55	34.5 QP	46.0	-11.5	1.99 V	322	42.1	-7.6
6	465.42	29.7 QP	46.0	-16.3	1.00 V	30	33.8	-4.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report



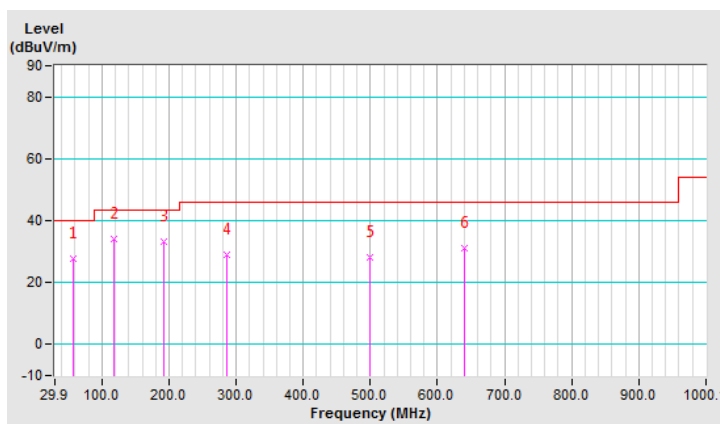
BT GFSK (AUX Ant.) + 802.11n (HT40) (Main Ant.)

CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	27.6 QP	40.0	-12.4	1.99 H	16	37.7	-10.1
2	117.39	33.9 QP	43.5	-9.6	1.49 H	251	45.7	-11.8
3	191.28	33.4 QP	43.5	-10.1	1.49 H	154	44.5	-11.1
4	286.55	29.1 QP	46.0	-16.9	1.00 H	218	36.7	-7.6
5	498.47	28.2 QP	46.0	-17.8	1.49 H	336	31.9	-3.7
6	640.41	31.2 QP	46.0	-14.8	1.99 H	355	31.8	-0.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

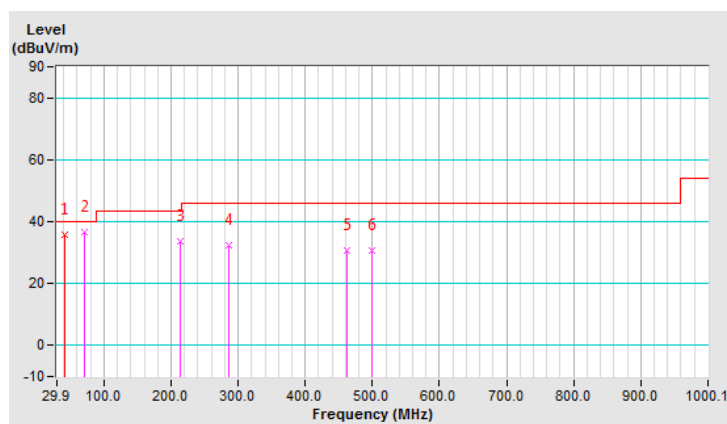


CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	40.73	35.9 QP	40.0	-4.1	1.50 V	163	46.1	-10.2
2	70.26	36.8 QP	40.0	-3.2	1.00 V	211	48.6	-11.8
3	214.61	33.8 QP	43.5	-9.7	1.50 V	236	44.7	-10.9
4	286.55	32.5 QP	46.0	-13.5	1.00 V	255	40.1	-7.6
5	461.53	30.6 QP	46.0	-15.4	1.50 V	297	34.9	-4.3
6	498.47	30.6 QP	46.0	-15.4	2.00 V	118	34.3	-3.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report



ANT+ (AUX Ant.) + 802.11n (HT40) (Main Ant.)

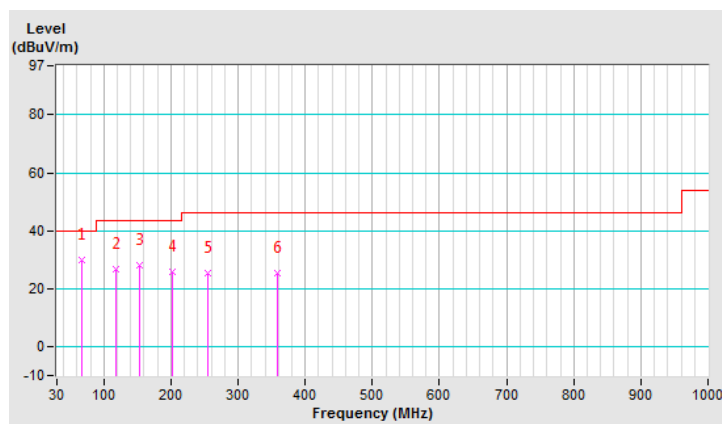
CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	67.83	29.8 QP	40.0	-10.2	1.00 H	4	41.1	-11.3
2	118.27	26.5 QP	43.5	-17.0	1.00 H	80	38.2	-11.7
3	153.19	28.0 QP	43.5	-15.5	1.00 H	82	37.4	-9.4
4	202.66	26.0 QP	43.5	-17.5	1.00 H	129	37.5	-11.5
5	254.07	25.4 QP	46.0	-20.6	1.00 H	62	35.0	-9.6
6	358.83	25.4 QP	46.0	-20.6	1.00 H	204	32.5	-7.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

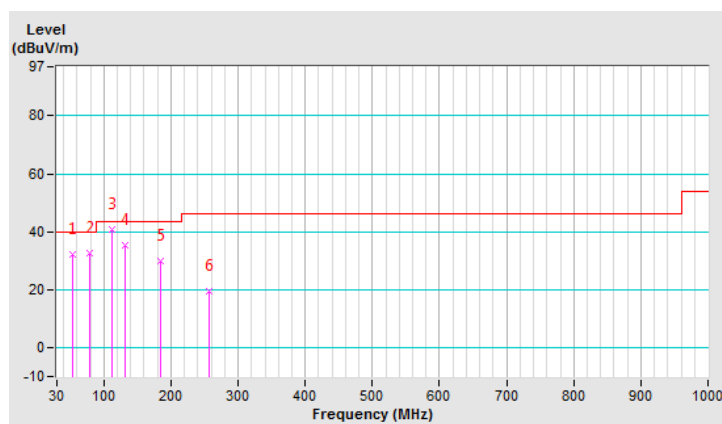


CHANNEL	CH 78 + CH 151	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.28	32.2 QP	40.0	-7.8	1.00 V	221	42.2	-10.0
2	79.47	32.4 QP	40.0	-7.6	1.00 V	321	46.3	-13.9
3	112.45	40.9 QP	43.5	-2.6	1.00 V	1	53.1	-12.2
4	131.85	35.2 QP	43.5	-8.3	1.00 V	304	45.8	-10.6
5	184.23	29.8 QP	43.5	-13.7	1.00 V	15	40.8	-11.0
6	256.01	19.6 QP	46.0	-26.4	1.00 V	11	29.1	-9.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

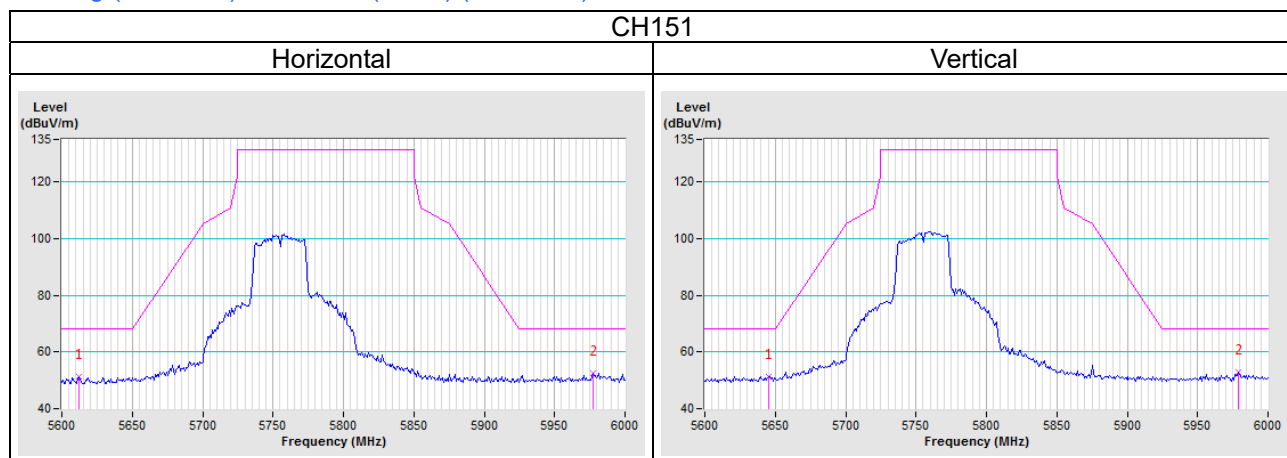


5 Pictures of Test Arrangements

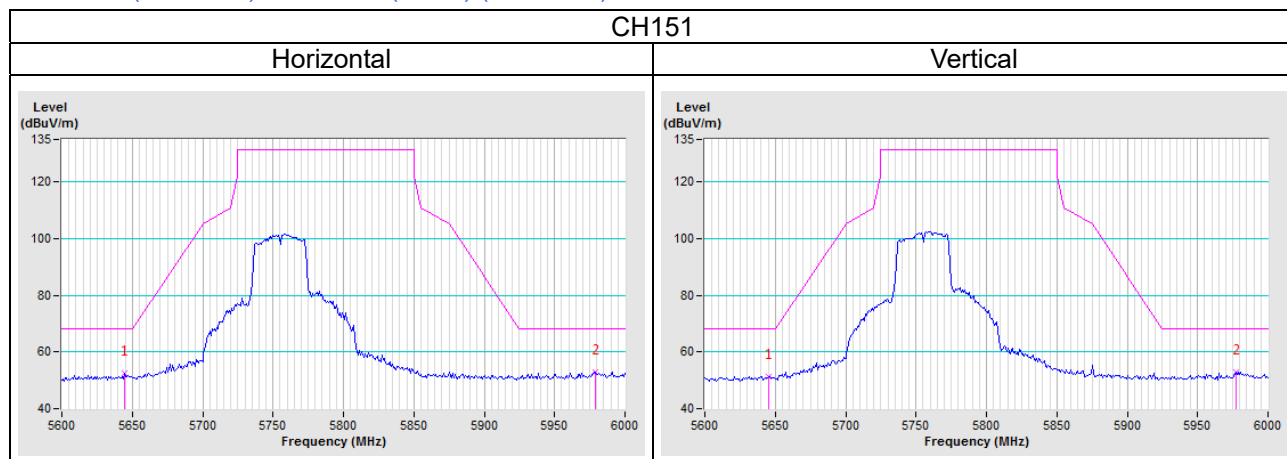
Please refer to the attached file (Test Setup Photo).

Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

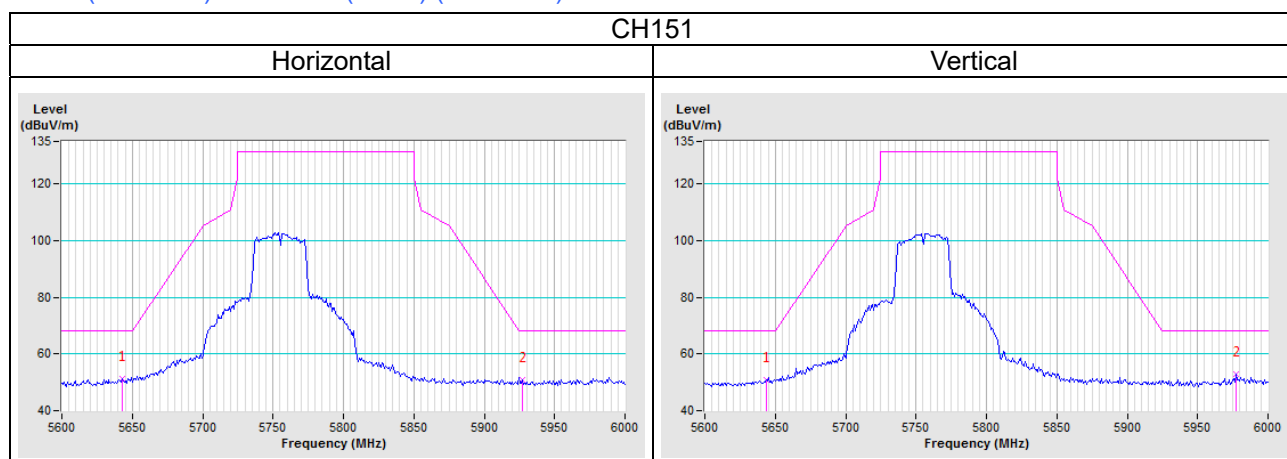
802.11g (AUX Ant.) + 802.11n (HT40) (Main Ant.)



BT GFSK (AUX Ant.) + 802.11n (HT40) (Main Ant.)



ANT+ (AUX Ant.) + 802.11n (HT40) (Main Ant.)



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 and approved according to ISO/IEC 17025.

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

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