

FCC Test Report (Co-Located)

Report No.: RFBEMI-WTW-P23090647-4

FCC ID: NOIKBN365

Test Model: N365

Received Date: 2023/9/27

Test Date: 2023/11/9 ~ 2023/11/27

Issued Date: 2023/12/15

Applicant: NETRONIX, INC.

Address: No. 945, Boai St., Jubei City, Hsin-Chu, 30265, Taiwan

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

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

Test Location: (1) No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
(2) No. 70, Wenming Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)

FCC Registration / (1)198487 / TW2021
Designation Number:
(2) 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBEMI-WTW-P23090647-4	Original Release	2023/12/15

1 Certificate of Conformity

Product: Electronic Display Device

Brand: Rakuten kobo

Test Model: N365

Sample Status: Engineering sample

Applicant: NETRONIX, INC.

Test Date: 2023/11/9 ~ 2023/11/27

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)

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 :

Vera Huang

Date:

2023/12/15

Vera Huang / Specialist

Approved by :

Jeremy Lin

Date:

2023/12/15

Jeremy Lin / 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 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 -10.5dB at 34.9MHz.
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.

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) ($\pm$)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.00 dB
	30MHz ~1000MHz	2.93 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	1.76 dB
	18GHz ~ 40GHz	1.77 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Electronic Display Device
Brand	Rakuten kobo
Test Model	N365
Sample Status	Engineering sample
Power Supply Rating	3.7 Vdc from battery 5 Vdc from adapter or host equipment

WLAN 2.4G:

Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	Up to 72.2 Mbps
Operating Frequency	2.412 GHz ~ 2.462 GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11
Output Power	295.121 mW (24.70 dBm)

WLAN 5G:

Modulation Type	802.11a/n: BPSK, QPSK, 16QAM, 64QAM 802.11ac: BPSK, QPSK, 16QAM, 64QAM, 256QAM
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n (HT20/40): up to 150Mbps 802.11ac (VHT20/40/80): up to 433.3Mbps
Operating Frequency	5.18 GHz ~ 5.24 GHz 5.745 GHz ~ 5.825 GHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20):9 802.11n (HT40), 802.11ac (VHT40):4 802.11ac (VHT80):2
Output Power	5.18 GHz ~ 5.24 GHz : 24.491 mW (13.89 dBm) 5.745 GHz ~ 5.825 GHz : 34.041 mW (15.32 dBm)

BT:

Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3 Mbps
Operating Frequency	2.402 GHz ~ 2.48 GHz
Number of Channel	79
Output Power	2.877 mW (4.59 dBm)

BT LE:

Modulation Type	GFSK
Modulation Technology	DTS
Transfer Rate	Up to 1 Mbps
Operating Frequency	2.402 GHz ~ 2.48 GHz
Number of Channel	40
Output Power	2.742 mW (4.38 dBm)

Note:

1. The EUT uses following accessories.

USB Cable	Brand	LUXSHARE-ICT
	Model	LB93US005-1H
	Material	TPE
	Signal Line	Shieled: Y, 1.0M, Core: N/A

2. The antenna information is listed as below.

Antenna No.	Gain (dBi)		Antenna Type	Connector Type
	2400~2483.5 MHz	5.15~5.85GHz		
1	3.91	3.41	Chip	N/A

* Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

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

2.4 GHz Band		
Modulation Mode	TX & RX Configuration	
802.11b	1TX	1RX
802.11g	1TX	1RX
802.11n (HT20)	1TX	1RX
5 GHz Band		
Modulation Mode	TX & RX Configuration	
802.11a	1TX	1RX
802.11n (HT20)	1TX	1RX
802.11n (HT40)	1TX	1RX
802.11ac (VHT20)	1TX	1RX
802.11ac (VHT40)	1TX	1RX
802.11ac (VHT80)	1TX	1RX

3.2 Description of Test Modes

WLAN:

For 2.4GHz

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

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

For 5180 ~ 5240MHz:

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channels are provided for 802.11ac (VHT80):

Channel	Frequency
42	5210 MHz

For 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

BT EDR:

79 channels are provided for BT-EDR:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (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		

BT LE:

40 channels are provided for BT-LE:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (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

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 1GHz

RE<1G: Radiated Emission below 1GHz

OB: Conducted Out of Band Emission Measurement

Note:

1. For Radiated, pre-scan Power from AC Adapter via USB Cable / Laptop via USB Cable / Battery and find the worst case as a representative test condition. The worst case was found when power from Laptop via USB Cable.
2. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. The worst case was found when positioned on Y-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
-	802.11n (HT20) + BT EDR	2412-2462	1 to 11	6 + 78	OFDM
		2402-2480	0 to 78		GFSK
-	802.11ac (VHT80) + BT EDR	5745-5825	155	155 + 78	OFDM
		2402-2480	0 to 78		GFSK

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
-	802.11n (HT20) + BT EDR	2412-2462	1 to 11	6 + 78	OFDM
		2402-2480	0 to 78		GFSK
-	802.11ac (VHT80) + BT EDR	5745-5825	155	155 + 78	OFDM
		2402-2480	0 to 78		GFSK

Conducted Out of 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.

EUT Configure Mode	Mode	Freq. Range (MHz)	Available Channel	Tested Channel	Modulation Technology
-	802.11n (HT20) + BT EDR	2412-2462	1 to 11	6 + 78	OFDM
		2402-2480	0 to 78		GFSK
-	802.11ac (VHT80) + BT EDR	5745-5825	155	155 + 78	OFDM
		2402-2480	0 to 78		GFSK

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	22 deg. C, 68% RH	120Vac, 60Hz	Greg Lin
RE<1G	22 deg. C, 69% RH	120Vac, 60Hz	Greg Lin
OB	22 deg. C, 70% RH	120Vac, 60Hz	Greg Lin

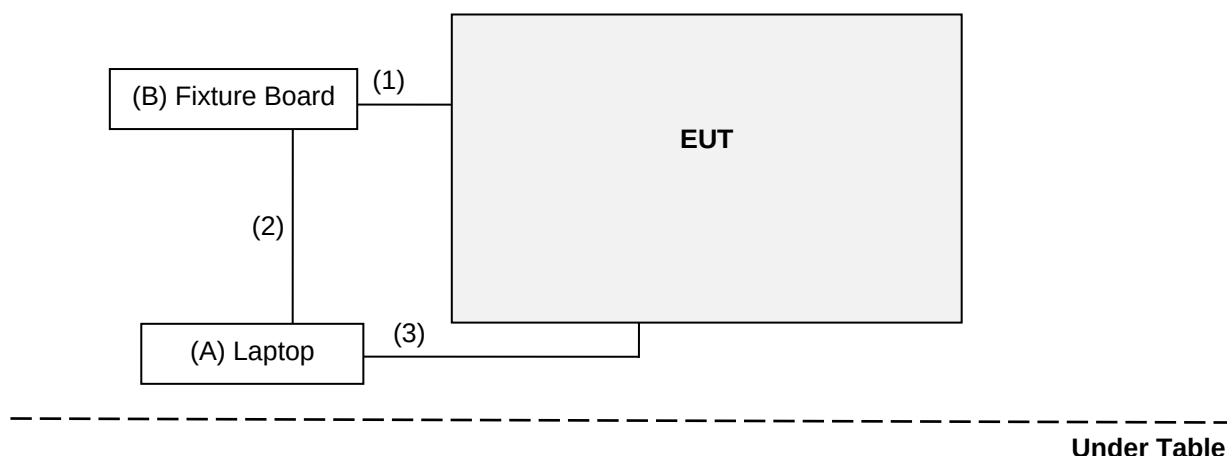
3.3 Description of Support Units

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.	Laptop	Lenovo	20J4 MD A003TW	PF-11H9AK	N/A	Provided by Lab
B.	Fixture Board	N/A	N/A	N/A	N/A	Supplied by applicant

No.	Cable Descriptions	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Qty.)	Remark
1.	Console Cable	1	0.6	No	0	Supplied by applicant (for RF Setup)
2.	USB Cable	1	1	Yes	0	Supplied by applicant
3.	USB Cable	1	1	Yes	0	Accessory of EUT

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 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 WLAN 2.4G & BT

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:

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.

For WLAN 5G

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:

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

4.1.2 Test Instruments

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower Max-Full	MFT-151SS-0.5T	N/A	N/A	N/A
Bi-log Broadband Antenna Schwarzbeck	VULB9168	9168-1213	2023/10/13	2024/10/12
Pre-amplifier EMCI	EMC001340	980201	2023/9/27	2024/9/26
Pre_Amplifier EMCI	EMC330N	980782	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	5D-NM-BM	140903+140902	2023/1/7	2024/1/6
	EMCCFD400-NM-NM-500	201233	2023/1/16	2024/1/15
	EMCCFD400-NM-NM-3000	201235	2023/1/16	2024/1/15
	EMCCFD400-NM-NM-9000	201236(with PAD)	2023/1/16	2024/1/15
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	N/A	N/A	N/A
Spectrum Analyzer ROHDE & SCHWARZ	FSW43	101866	2023/1/10	2024/1/9
Test Receiver ROHDE & SCHWARZ	ESR3	102782	2022/12/12	2023/12/11
Turn Table Max-Full	MF-7802BS	N/A	N/A	N/A
Turn Table Controller Max-Full	MF-7802BS	MF780208674	N/A	N/A
Horn Antenna RFSPIN	DRH18-E	210103A18E	2022/11/13	2023/11/12
			2023/11/12	2024/11/11
Horn Antenna Schwarzbeck	BBHA 9170	9170-1049	2022/11/13	2023/11/12
			2023/11/12	2024/11/11
Pre_Amplifier EMCI	EMC118A45SE	980808	2022/12/29	2023/12/28
	EMC184045SE	980788	2023/1/16	2024/1/15
RF Coaxial Cable EMCI	EMC101G-KM-KM-2000	201254	2023/1/16	2024/1/15
	EMC101G-KM-KM-3000	201257	2023/1/16	2024/1/15
	EMC101G-KM-KM-5000	201260	2023/1/16	2024/1/15
	EMC104-SM-SM-1000	210102	2023/1/16	2024/1/15
	EMC104-SM-SM-3000	201231	2023/1/16	2024/1/15
	EMC104-SM-SM-9000	201243	2023/1/16	2024/1/15

Notes:

1. The test was performed in WM - 966 chamber 8.
2. Tested Date: 2023/11/9 ~ 2023/11/24

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:

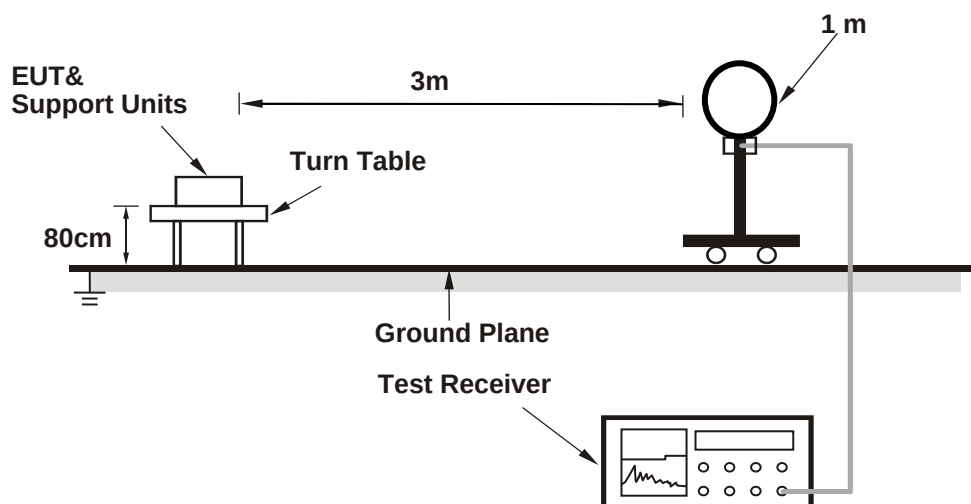
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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. (802.11n (HT20): RBW = 1MHz, VBW = 10Hz; 802.11ac (VHT80): RBW = 1MHz, VBW = 2kHz)
4. For BT: The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1GHz. For fundamental and harmonic signal measurement, according to ANSI C63.10 section 7.5, the average value = peak value + duty cycle correction factor.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

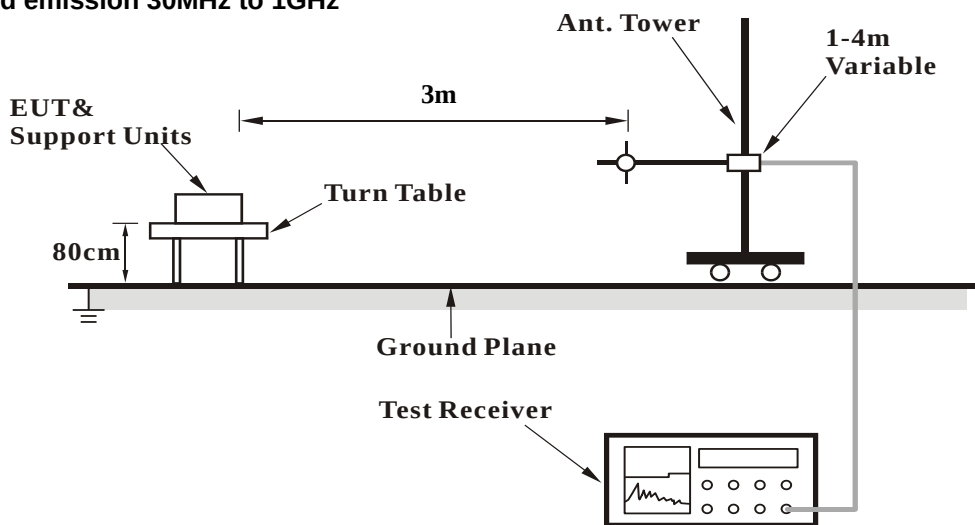
No deviation.

4.1.5 Test Setup

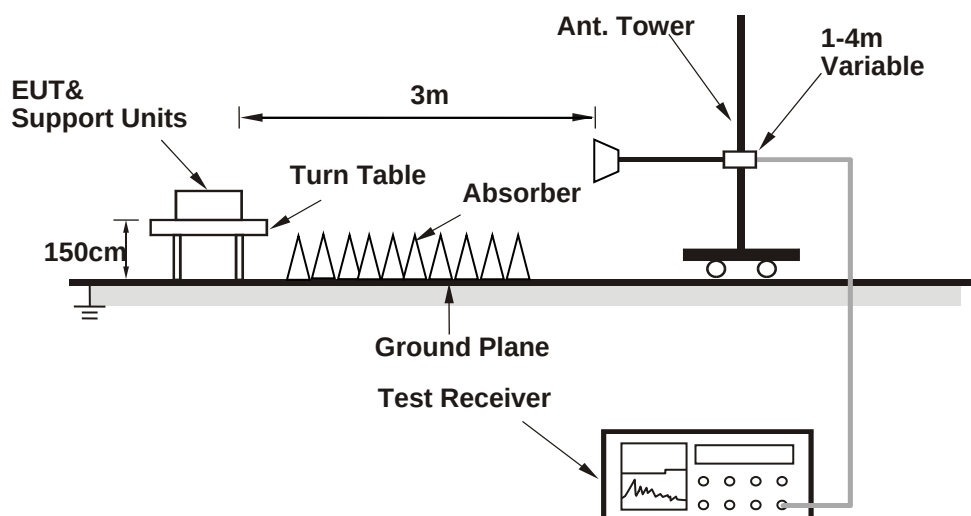
For Radiated emission below 30MHz



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

Controlling software (teraterm v4.80) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

802.11n (HT20) + BT-EDR

Channel	CH 6 + CH 78	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	*2437.0	107.7 PK			1.18 H	206	75.4	32.3
2	*2437.0	97.6 AV			1.18 H	206	65.3	32.3
3	*2480.0	99.9 PK			1.16 H	298	67.6	32.3
4	*2480.0	69.4 AV			1.16 H	298	37.1	32.3
5	2483.5	53.0 PK	74.0	-21.0	1.16 H	298	56.5	-3.5
6	2483.5	22.5 AV	54.0	-31.5	1.16 H	298	26.0	-3.5
7	4874.0	50.2 PK	74.0	-23.8	1.26 H	184	46.7	3.5
8	4874.0	36.0 AV	54.0	-18.0	1.26 H	184	32.5	3.5
9	4882.0	47.4 PK	74.0	-26.6	1.04 H	289	43.8	3.6
10	4882.0	16.9 AV	54.0	-37.1	1.04 H	289	13.3	3.6
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	*2437.0	111.0 PK			1.03 V	116	78.7	32.3
2	*2437.0	101.0 AV			1.03 V	116	68.7	32.3
3	*2480.0	104.0 PK			1.19 V	138	71.7	32.3
4	*2480.0	73.5 AV			1.19 V	138	41.2	32.3
5	2483.5	54.0 PK	74.0	-20.0	1.19 V	138	57.5	-3.5
6	2483.5	23.5 AV	54.0	-30.5	1.19 V	138	27.0	-3.5
7	4874.0	50.9 PK	74.0	-23.1	1.16 V	138	47.4	3.5
8	4874.0	36.9 AV	54.0	-17.1	1.16 V	138	33.4	3.5
9	4882.0	48.4 PK	74.0	-25.6	1.34 V	208	44.8	3.6
10	4882.0	17.9 AV	54.0	-36.1	1.34 V	208	14.3	3.6

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.
7. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$$

802.11ac (VHT80) + BT-EDR

Channel	CH 155 + CH 78	Detector Function	Peak (PK) Average (AV)
Frequency Range	1GHz ~ 25GHz		

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	*2480.0	99.8 PK			1.09 H	306	67.5	32.3
2	*2480.0	69.3 AV			1.09 H	306	37.0	32.3
3	2483.5	53.9 PK	74.0	-20.1	1.09 H	206	57.4	-3.5
4	2483.5	23.4 AV	54.0	-30.6	1.09 H	206	26.9	-3.5
5	4960.0	47.7 PK	74.0	-26.3	1.07 H	287	43.7	4.0
6	4960.0	17.2 AV	54.0	-36.8	1.07 H	287	13.2	4.0
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	*2480.0	103.9 PK			1.24 V	135	71.6	32.3
2	*2480.0	73.4 AV			1.24 V	135	41.1	32.3
3	2483.5	54.1 PK	74.0	-19.9	1.24 V	135	57.6	-3.5
4	2483.5	24.6 AV	54.0	-29.4	1.24 V	135	28.1	-3.5
5	4960.0	48.4 PK	74.0	-25.6	1.41 V	205	44.4	4.0
6	4960.0	17.9 AV	54.0	-36.1	1.41 V	205	13.9	4.0

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": The radiated frequency is out of the restricted band.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{Duty cycle}) = 20 \log(3 \text{ ms} / 100 \text{ ms}) = -30.5 \text{ dB}$$

Channel	CH 155 + CH 78	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	*5775.0	99.6 PK			2.09 H	251	57.2	42.4
2	*5775.0	89.2 AV			2.09 H	251	46.8	42.4
3	11550.0	55.8 PK	74.0	-18.2	1.22 H	173	46.3	9.5
4	11550.0	41.6 AV	54.0	-12.4	1.22 H	173	32.1	9.5
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	*5775.0	100.7 PK			1.03 V	64	58.3	42.4
2	*5775.0	90.5 AV			1.03 V	64	48.1	42.4
3	11550.0	56.8 PK	74.0	-17.2	1.17 V	129	47.3	9.5
4	11550.0	42.7 AV	54.0	-11.3	1.17 V	129	33.2	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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data

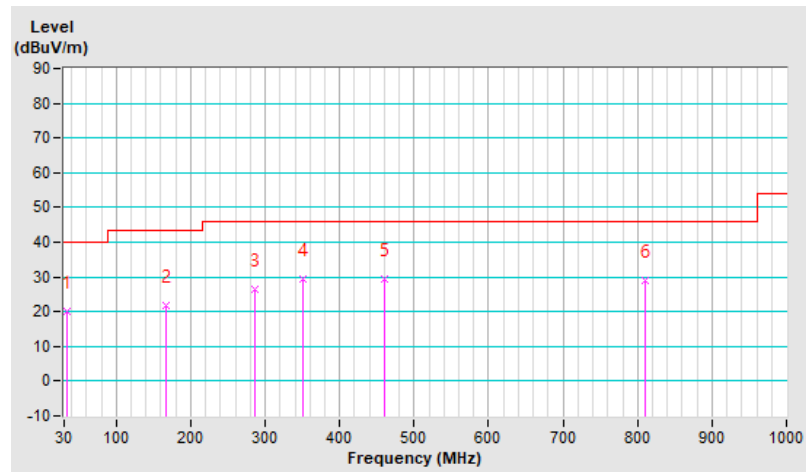
802.11n (HT20) + BT-EDR

Channel	CH 6 + CH 78	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	33.9	20.1 QP	40.0	-19.9	1.50 H	184	34.1	-14.0
2	167.7	21.8 QP	43.5	-21.7	1.00 H	135	34.9	-13.1
3	286.1	26.3 QP	46.0	-19.7	1.25 H	208	39.2	-12.9
4	351.1	29.2 QP	46.0	-16.8	1.00 H	204	40.7	-11.5
5	460.7	29.2 QP	46.0	-16.8	1.50 H	2	37.5	-8.3
6	810.9	29.0 QP	46.0	-17.0	1.25 H	2	31.4	-2.4

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

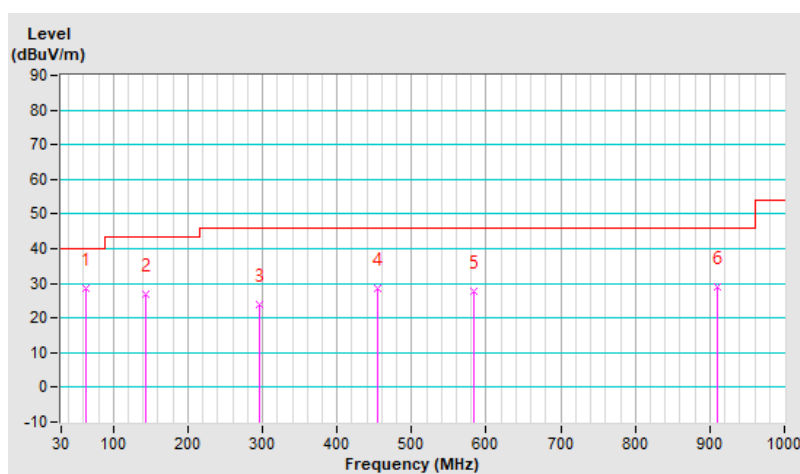


Channel	CH 6 + CH 78	Detector Function	Quasi-Peak (QP)
Frequency Range	9kHz ~ 1GHz		

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	63.0	28.6 QP	40.0	-11.4	1.00 V	264	42.6	-14.0
2	142.5	26.8 QP	43.5	-16.7	1.25 V	284	40.1	-13.3
3	296.8	23.7 QP	46.0	-22.3	1.50 V	16	36.3	-12.6
4	453.9	28.4 QP	46.0	-17.6	1.00 V	216	36.8	-8.4
5	582.9	27.9 QP	46.0	-18.1	1.25 V	26	33.8	-5.9
6	909.8	29.0 QP	46.0	-17.0	1.00 V	276	29.9	-0.9

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 of frequency range 30MHz~1000MHz.
4. Margin value = Emission Level – Limit value
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



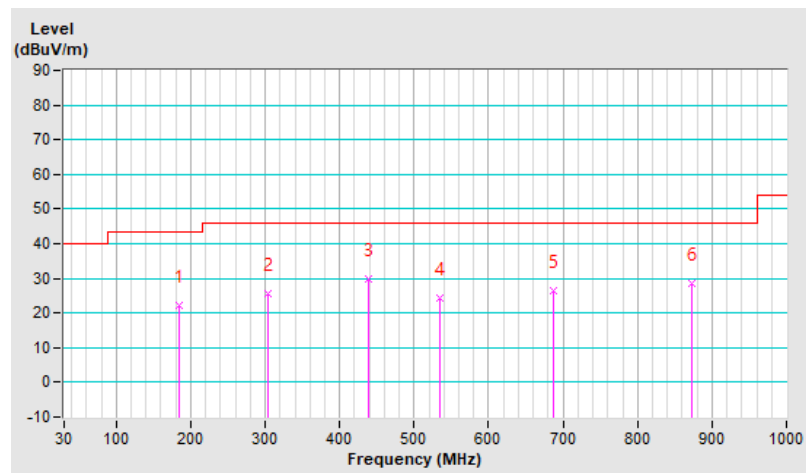
802.11ac (VHT80) + BT-EDR

Channel	CH 155 + CH 78	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	185.2	22.1 QP	43.5	-21.4	1.50 H	224	37.4	-15.3
2	304.5	25.7 QP	46.0	-20.3	1.00 H	196	38.1	-12.4
3	438.4	29.9 QP	46.0	-16.1	1.25 H	19	38.8	-8.9
4	535.4	24.4 QP	46.0	-21.6	1.25 H	179	31.5	-7.1
5	686.7	26.3 QP	46.0	-19.7	1.00 H	2	30.4	-4.1
6	872.0	28.7 QP	46.0	-17.3	1.50 H	166	30.1	-1.4

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

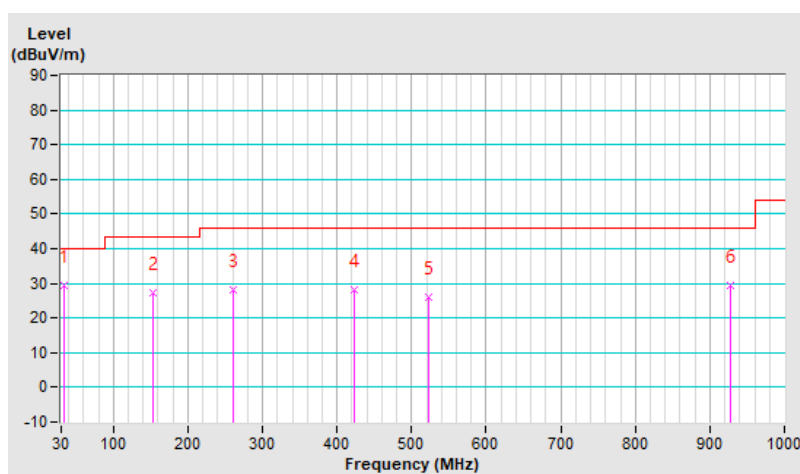


Channel	CH 155 + CH 78	Detector Function	Quasi-Peak (QP)
Frequency Range	9kHz ~ 1GHz		

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	34.9	29.5 QP	40.0	-10.5	1.25 V	90	43.6	-14.1
2	154.2	27.4 QP	43.5	-16.1	1.00 V	291	40.1	-12.7
3	259.9	28.1 QP	46.0	-17.9	1.00 V	230	42.2	-14.1
4	423.8	28.1 QP	46.0	-17.9	1.50 V	306	37.6	-9.5
5	522.8	26.1 QP	46.0	-19.9	1.00 V	36	33.3	-7.2
6	928.2	29.3 QP	46.0	-16.7	1.50 V	334	30.0	-0.7

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 frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

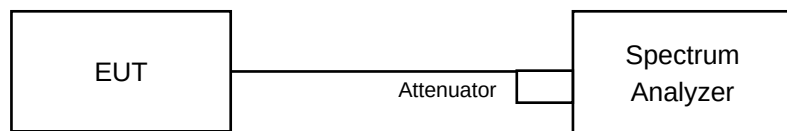


4.2 Conducted Out of Band Emission Measurement

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

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
PXA Signal Analyzer Keysight	N9030A	MY54490260	2023/7/13	2024/7/12
Signal Analyzer R&S	FSV40	101042	2023/9/5	2024/9/4
		101544	2023/5/9	2024/5/8
Software	ADT_RF Test Software V6.6.5.4	N/A	N/A	N/A

Notes:

1. The test was performed in LK - Oven
2. Tested Date: 2023/11/27

4.2.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW $\geq$ 300 kHz.
- Detector = peak.
- 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 OOB

- Set RBW = 100 kHz.
- Set VBW $\geq$ 300 kHz.
- Detector = peak.
- 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.

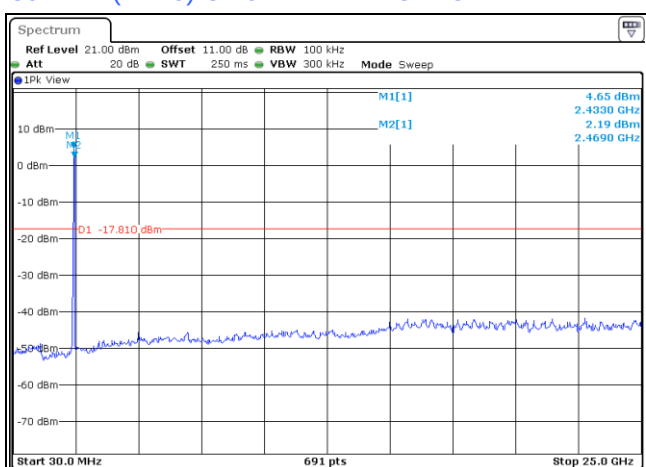
4.2.6 EUT Operating Condition

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

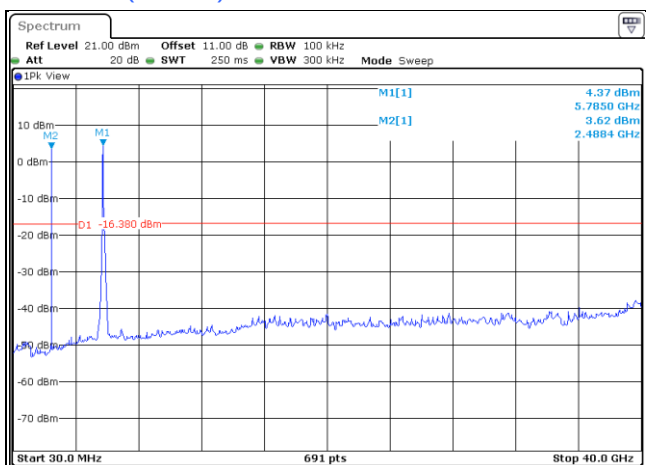
4.2.7 Test Results

The spectrum plots are attached on the following pages. H1 line indicates the highest level, and H2 line indicates the 20dB offset below H1. It shows compliance with the requirement.

802.11n (HT20) Ch 6 + BT EDR Ch 78



802.11ac (VHT80) Ch 155 + BT EDR Ch 78



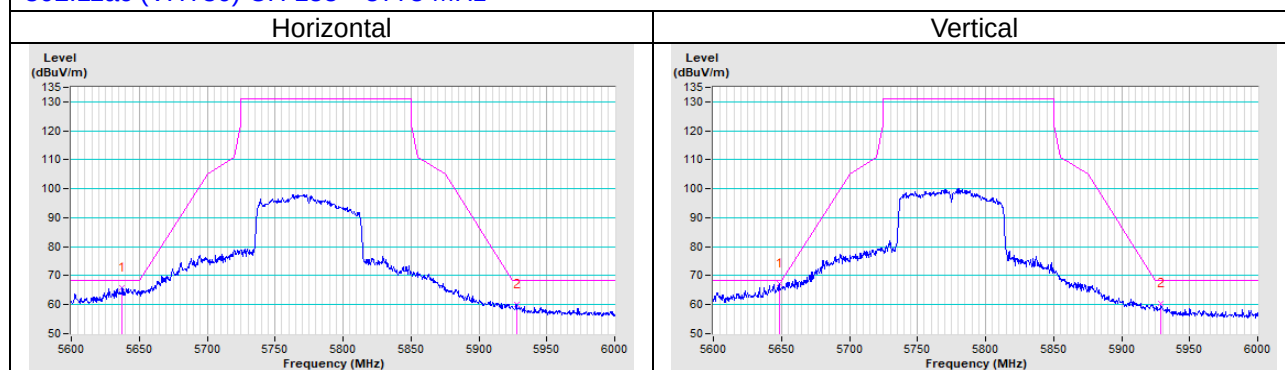
5 Pictures of Test Arrangements

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

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

802.11ac (VHT80) + BT-EDR

802.11ac (VHT80) CH 155 : 5775 MHz



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.

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

Lin Kou EMC/RF Lab

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Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

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Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

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

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