

FCC Test Report

(Co-Located)

Report No.: RF180522C01-5 R1

FCC ID: M82-ARK1124

Model: ARK-1124

Series Model: ARK-1124YXXXXXXXXXXXXXXXXXX, ARK1124YXXXXXXXXXXXXXXXXXX,
EIS-D210WXXXXXXXXXXXXXXXXXX, EISD210WXXXXXXXXXXXXXXXXXX
(X=0-9, A-Z, hyphen, or blank, Y= 0-9, A-Z, hyphen, or blank, except "Y" not be
"D" and "F")

Received Date: May 22, 2018

Test Date: Jun. 22, 2018

Issued Date: Aug. 13, 2018

Applicant: ADVANTECH CO., LTD

Address: No. 1, Alley 20, Lane 26, Rueiguang Rd, Neihu District, Taipei, Taiwan 114

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

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

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

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



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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	9
3.2.1 Test Mode Applicability and Tested Channel Detail	13
3.3 Description of Support Units	15
3.3.1 Configuration of System under Test	15
3.4 General Description of Applied Standards	15
4 Test Types and Results	16
4.1 Radiated Emission and Bandedge Measurement	16
4.1.1 Limits of Radiated Emission and Bandedge Measurement	16
4.1.2 Test Instruments	17
4.1.3 Test Procedures	18
4.1.4 Deviation from Test Standard	19
4.1.5 Test Set Up	19
4.1.6 EUT Operating Conditions	20
4.1.7 Test Results	21
4.2 Conducted Emission Measurement	27
4.2.1 Limits of Conducted Emission Measurement	27
4.2.2 Test Instruments	27
4.2.3 Test Procedures	28
4.2.4 Deviation from Test Standard	28
4.2.5 Test Setup	28
4.2.6 EUT Operating Conditions	28
4.2.7 Test Results	29
4.3 Conducted Out of Band Emission Measurement	33
4.3.1 Limits of Conducted Out of Band Emission Measurement	33
4.3.2 Test Setup	33
4.3.3 Test Instruments	33
4.3.4 Test Procedure	33
4.3.5 Deviation from Test Standard	33
4.3.6 EUT Operating Condition	34
4.3.7 Test Results	34
5 Pictures of Test Arrangements	36
Appendix – Information on the Testing Laboratories	37

Release Control Record

Issue No.	Description	Date Issued
RF180522C01-5	Original release	Jul. 16, 2018
RF180522C01-5 R1	Added WiFi module information	Aug. 13, 2018

1 Certificate of Conformity

Product: Computer

Brand: Advantech

Model: ARK-1124

Series Model: ARK-1124YXXXXXXXXXXXXXXXXXX, ARK1124YXXXXXXXXXXXXXXXXXX,
EIS-D210WXXXXXXXXXXXXXXXXXX, EISD210WXXXXXXXXXXXXXXXXXX
(X=0-9, A-Z, hyphen, or blank, Y= 0-9, A-Z, hyphen, or blank, except "Y" not be "D" and "F")

Sample Status: Engineering sample

Applicant: ADVANTECH CO., LTD

Test Date: Jun. 22, 2018

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 : Pettie Chen , **Date:** Aug. 13, 2018
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Aug. 13, 2018
Bruce Chen / 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
15.207 15.407(b)(6)	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -13.07dB at 23.83287MHz.
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 -2.4dB at 4882.00MHz.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 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	Computer	
Brand	Advantech	
Model	ARK-1124	
Series Model	ARK-1124YXXXXXXXXXXXXXXXXX, ARK1124YXXXXXXXXXXXXXXXXX, EIS-D210WXXXXXXXXXXXXXXXXX, EISD210WXXXXXXXXXXXXXXXXX (X=0-9, A-Z, hyphen, or blank, Y= 0-9, A-Z, hyphen, or blank, except "Y" not be "D" and "F")	
Model Difference	Refer to Note	
Status of EUT	Engineering sample	
Power Supply Rating	12Vdc (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
Modulation Technology	WLAN	DSSS, OFDM
	Bluetooth EDR	FHSS
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: up to 300Mbps 802.11ac: up to 866.7Mbps
	Bluetooth EDR	1/2/3Mbps
	Bluetooth LE	1Mbps
Operating Frequency	WLAN	2.4GHz: 2412 ~ 2472MHz 5.0GHz: 5180~5240MHz, 5260~5320MHz, 5500~5720MHz, 5745~5825MHz
	Bluetooth EDR	2402 ~ 2480MHz
	Bluetooth LE	2402 ~ 2480MHz

Number of Channel	WLAN	2412 ~ 2472MHz: 802.11b, 802.11g, 802.11n (HT20): 13 802.11n (HT40): 9 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 ~ 5720MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 12 802.11n (HT40), 802.11ac (VHT40): 6 802.11ac (VHT80): 3 5745 ~ 5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Number of Channel	Bluetooth EDR	79
	Bluetooth LE	40
Output Power	WLAN	2412~2462MHz: 458.498mW 5180~5240MHz: 38.226mW 5260~5320MHz: 102.085mW 5500~5720MHz: 94.540mW 5745~5825MHz: 105.178mW
	Bluetooth EDR	3.532mW
	Bluetooth LE	0.771mW
Antenna Type	Refer to note	
Antenna Connector	Refer to note	
Accessory Device	Adapter	
Data Cable Supplied	NA	

Note:

1. All models are listed as below. Model ARK-1124 is the representative for final test.

Brand	Model	Description
Advantech	ARK-1124YXXXXXXXXXXXXXX	Marketing purpose
	ARK1124YXXXXXXXXXXXXXX	
	EIS-D210WXXXXXXXXXXXXXX	
	EISD210WXXXXXXXXXXXXXX	

X= 0-9, A-Z, hyphen, or blank

Y= 0-9, A-Z, hyphen, or blank, except "Y" not be "D" and "F"

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

Modulation Mode	TX Function
WLAN 2.4GHz Band	
802.11b	2TX
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
WLAN 5GHz Band	
802.11a	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ac (VHT20)	2TX
802.11ac (VHT40)	2TX
802.11ac (VHT80)	2TX

*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)

3. The EUT with follow antennas gain is listed as table below.

Brand	Model	Antenna Type	Connector Type	Frequency Range	Antenna Gain(dBi)
Cortec Technology Inc.	AN2450-5511BRS	Dipole	SMA Male Reverse	2.4~2.5GHz	2.89
				5.15~5.85GHz	3.58

4. The following configurations are set for EUT.

Item	Specification
CPU	Intel E3940 Quad Core SoC
	Intel N3350 Dual Core SoC

* Intel N3350 Dual Core SoC is the worst case for the final tests.

5. The EUT consumes power from the following adapter.

Adapter	
Brand	FSP GROUP INC.
Model	FSP060-DIBAN2
Input Power	100-240V~, 1.5A, 50-60Hz
Output Power	12.0V/ 5.0A MAX
Power cable	1.4m non-shielded cable with one core

6. The following WiFi module was provided to the EUT.

Model	Chipset	Type
QCNFA364A	QCA6174A	IEEE 802.11ac/a/b/g/n 2X2 MIMO WLAN & Bluetooth M.2 module

7. Both of the Bluetooth and WLAN (5GHz) can transmit simultaneously.

3.2 Description of Test Modes

For 2.4GHz

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

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	12	2467MHz
6	2437MHz	13	2472MHz
7	2442MHz		

9 channels are provided for 802.11n (HT40):

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

For 5180~5240MHz:

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

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

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

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

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	5260MHz	60	5300MHz
56	5280MHz	64	5320MHz

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

Channel	Frequency	Channel	Frequency
54	5270MHz	62	5310MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

For 5500~5720MHz:

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

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz	144	5720 MHz

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

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz	142	5710 MHz

3 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz
138	5690 MHz		

For 5745~5825MHz:

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

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

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission
APCM: Antenna Port Conducted Measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-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 LE	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 0	OFDM
		2402~2480	0 to 39		GFSK
-	802.11n (HT20) + BT EDR	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 39	OFDM
		2402~2480	0 to 78		FHSS

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 LE	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 0	OFDM
		2402~2480	0 to 39		GFSK
-	802.11n (HT20) + BT EDR	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 39	OFDM
		2402~2480	0 to 78		FHSS

Power Line Conducted Emission Test:

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

EUT CONFIGURE MODE	MODE	FREQ. RANGE (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
-	802.11n (HT20) + BT LE	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 0	OFDM
		2402~2480	0 to 39		GFSK
-	802.11n (HT20) + BT EDR	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 39	OFDM
		2402~2480	0 to 78		FHSS

Antenna Port Conducted Measurement:

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

EUT CONFIGURE MODE	MODE	FREQ. RANGE (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY
-	802.11n (HT20) + BT LE	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 0	OFDM
		2402~2480	0 to 39		GFSK
-	802.11n (HT20) + BT EDR	5180~5240 5260~5320 5500~5720 5745~5825	36 to 48 52 to 64 100 to 144 149 to 165	52 + 39	OFDM
		2402~2480	0 to 78		FHSS

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE _≥ 1G	23deg. C, 69%RH	120Vac, 60Hz	Willy Cheng
RE _{<} 1G	24deg. C, 68%RH	120Vac, 60Hz	Willy Cheng
PLC	24deg. C, 66%RH	120Vac, 60Hz	Willy Cheng
APCM	24deg. C, 66%RH	120Vac, 60Hz	Willy Cheng

3.3 Description of Support Units

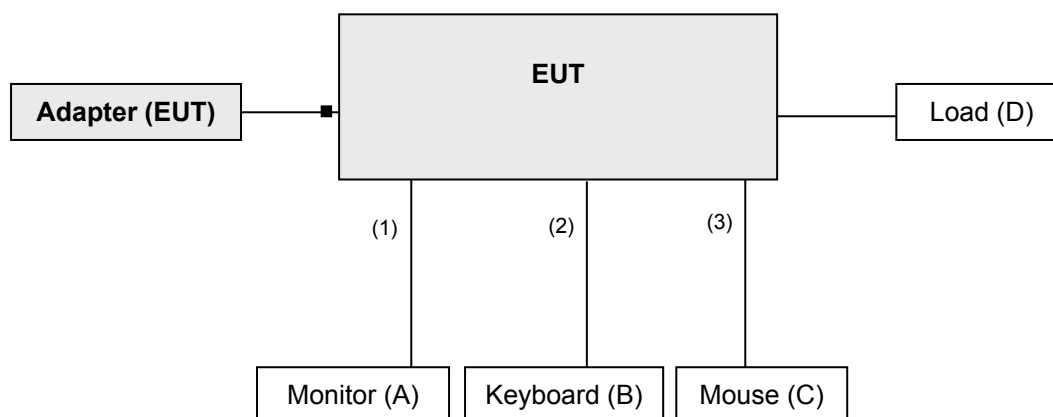
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Monitor	DELL	2001FP	CN-0C0647-466 33-544-06AL	FCC DoC Approved	-
B.	Keyboard	DELL	RT7D50	CN-0J4624-3717 2-44T-000M	FCC DoC Approved	-
C.	Mouse	DELL	MO56U0	516056250	FCC DoC Approved	-
D.	Load	NA	NA	NA	NA	-

Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1	Y	0	-
2.	USB cable	1	1	Y	0	-
3.	USB cable	1	1	Y	0	-
4.	RJ45 cable	2	1.5	N	0	-

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

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 20dB 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 (dBuV/m)	AV:54 (dBuV/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(dBuV/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(dBuV/m) ^{*1} PK: 105.2(dBuV/m) ^{*2} PK: 110.8(dBuV/m) ^{*3} PK: 122.2(dBuV/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.

^{*3} below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

^{*2} below the band edge increasing linearly to 10 dBm/MHz at 25 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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2017	Aug. 20, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2017	Aug. 20, 2018
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-8 000	Cable-CH3-03 (309224+170907)	Sep.11, 2017	Sep. 10, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
26GHz ~ 40GHz Amplifier Agilent	8449B	3008A1960	Aug. 08, 2017	Aug. 07, 2018
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018

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 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

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:

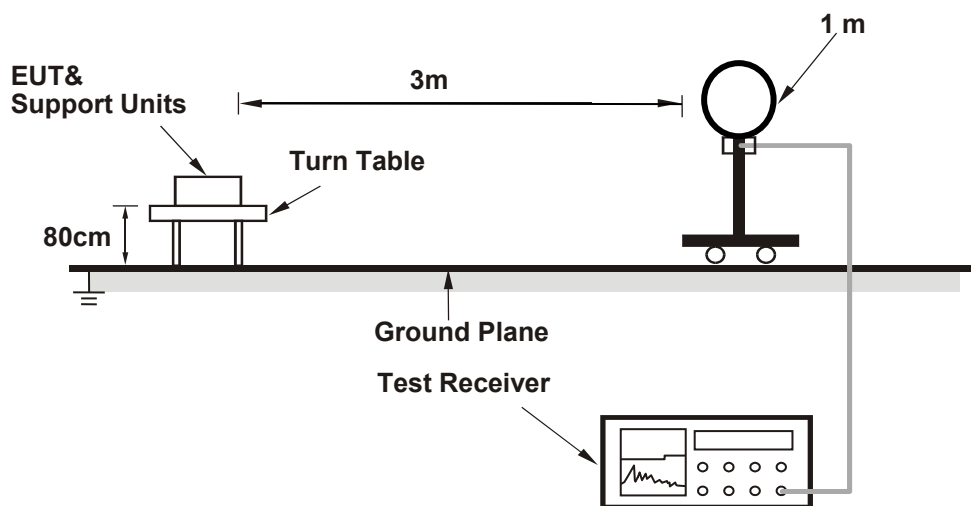
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

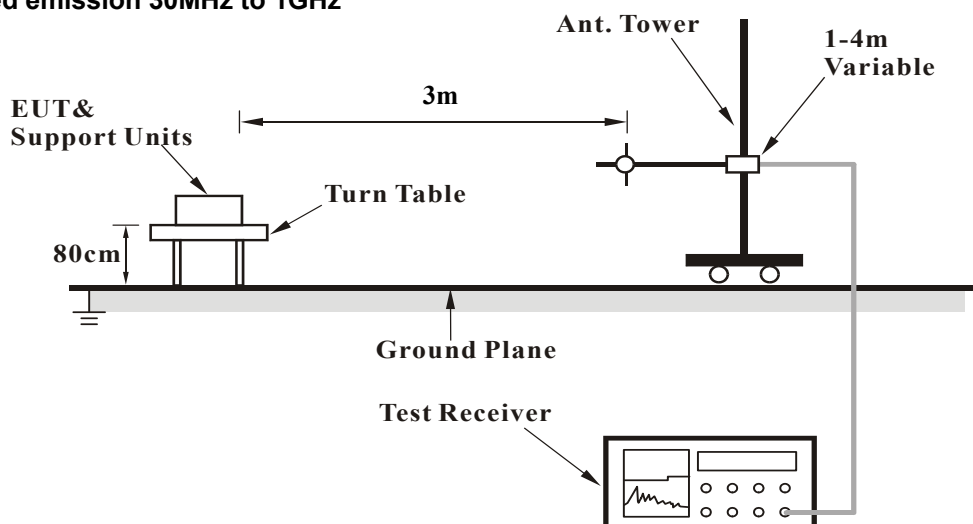
No deviation.

4.1.5 Test Set Up

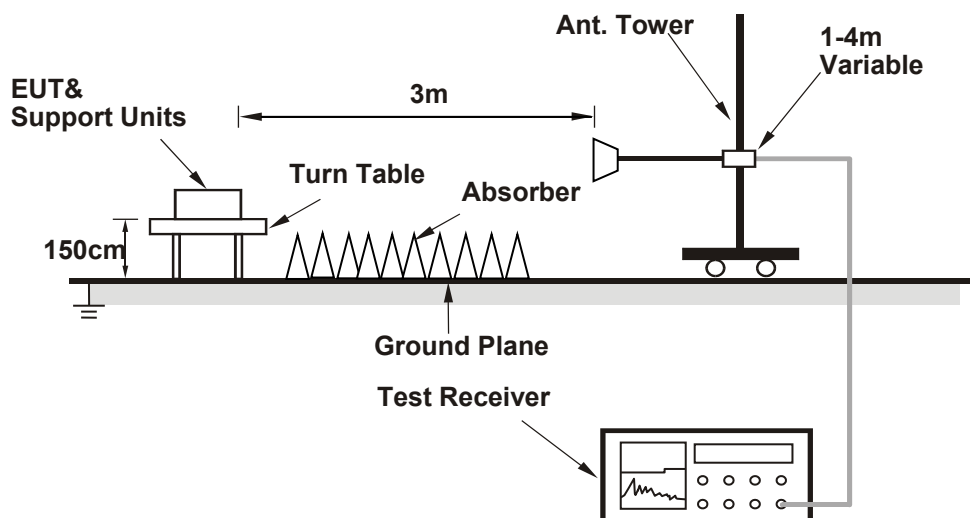
For Radiated emission below 30MHz



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

- The EUT ran test program "QCAQMSL-QLIB" to enable all functions.
- Set the EUT under transmission condition continuously at specific channel frequency.
- The EUT sent "H" patterns to the monitor and the monitor displayed "H" patterns.

4.1.7 Test Results

Above 1GHz Data:

802.11n (HT20): Ch 52 + Bluetooth LE: Ch 0

CHANNEL	CH 0	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	2390.00	57.6 PK	74.0	-16.4	1.72 H	153	24.1	33.5
2	2390.00	46.8 AV	54.0	-7.2	1.72 H	153	13.3	33.5
3	*2402.00	86.3 PK			1.66 H	155	52.9	33.4
4	*2402.00	84.5 AV			1.66 H	155	51.1	33.4
5	4804.00	49.8 PK	74.0	-24.2	2.98 H	144	45.9	3.9
6	4804.00	38.1 AV	54.0	-15.9	2.98 H	144	34.2	3.9
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	2390.00	57.5 PK	74.0	-16.5	1.65 V	188	24.0	33.5
2	2390.00	46.7 AV	54.0	-7.3	1.65 V	188	13.2	33.5
3	*2402.00	92.0 PK			1.67 V	179	58.6	33.4
4	*2402.00	89.9 AV			1.67 V	179	56.5	33.4
5	4804.00	46.5 PK	74.0	-27.5	1.68 V	54	42.6	3.9
6	4804.00	36.2 AV	54.0	-17.8	1.68 V	54	32.3	3.9

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)
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.

CHANNEL	CH 52	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	5150.00	55.7 PK	74.0	-18.3	2.36 H	192	51.8	3.9
2	5150.00	42.3 AV	54.0	-11.7	2.36 H	192	38.4	3.9
3	*5260.00	106.0 PK			2.88 H	201	66.6	39.4
4	*5260.00	95.6 AV			2.88 H	201	56.2	39.4
5	#10520.00	58.5 PK	74.0	-15.5	3.29 H	185	41.7	16.8
6	#10520.00	45.3 AV	54.0	-8.7	3.29 H	185	28.5	16.8
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	5150.00	54.7 PK	74.0	-19.3	3.59 V	323	50.8	3.9
2	5150.00	41.9 AV	54.0	-12.1	3.59 V	323	38.0	3.9
3	*5260.00	112.5 PK			3.71 V	329	73.1	39.4
4	*5260.00	102.0 AV			3.71 V	329	62.6	39.4
5	#10520.00	57.9 PK	74.0	-16.1	2.91 V	182	41.1	16.8
6	#10520.00	44.8 AV	54.0	-9.2	2.91 V	182	28.0	16.8

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)
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.

802.11n (HT20): Ch 52 + Bluetooth EDR: Ch 39

CHANNEL	CH 39	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	*2441.00	91.8 PK			1.48 H	156	58.4	33.4
2	*2441.00	90.4 AV			1.48 H	156	57.0	33.4
3	4882.00	49.9 PK	74.0	-24.1	3.90 H	137	46.3	3.6
4	4882.00	41.4 AV	54.0	-12.6	3.90 H	137	37.8	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	*2441.00	100.0 PK			1.47 V	170	66.6	33.4
2	*2441.00	98.8 AV			1.47 V	170	65.4	33.4
3	4882.00	57.1 PK	74.0	-16.9	1.49 V	65	53.5	3.6
4	4882.00	51.6 AV	54.0	-2.4	1.49 V	65	48.0	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)
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.

CHANNEL	CH 52	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	5150.00	55.5 PK	74.0	-18.5	2.55 H	187	51.6	3.9
2	5150.00	42.1 AV	54.0	-11.9	2.55 H	187	38.2	3.9
3	*5260.00	105.8 PK			2.69 H	193	66.4	39.4
4	*5260.00	95.4 AV			2.69 H	193	56.0	39.4
5	#10520.00	58.2 PK	74.0	-15.8	3.13 H	182	41.4	16.8
6	#10520.00	45.2 AV	54.0	-8.8	3.13 H	182	28.4	16.8
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	5150.00	54.9 PK	74.0	-19.1	3.64 V	312	51.0	3.9
2	5150.00	42.0 AV	54.0	-12.0	3.64 V	312	38.1	3.9
3	*5260.00	112.7 PK			3.64 V	316	73.3	39.4
4	*5260.00	102.3 AV			3.64 V	316	62.9	39.4
5	#10520.00	58.1 PK	74.0	-15.9	2.86 V	183	41.3	16.8
6	#10520.00	45.0 AV	54.0	-9.0	2.86 V	183	28.2	16.8

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)
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): Ch 52 + Bluetooth LE: Ch 0

CHANNEL	CH 52 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	88.23	31.5 QP	43.5	-12.0	1.99 H	57	46.1	-14.6
2	197.11	32.6 QP	43.5	-10.9	1.99 H	4	44.1	-11.5
3	325.43	37.9 QP	46.0	-8.1	1.00 H	196	44.4	-6.5
4	465.42	35.9 QP	46.0	-10.1	1.50 H	271	39.5	-3.6
5	576.25	37.2 QP	46.0	-8.8	1.50 H	144	38.4	-1.2
6	718.18	39.6 QP	46.0	-6.4	1.99 H	98	38.1	1.5
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	30.00	37.4 QP	40.0	-2.6	1.00 V	83	48.5	-11.1
2	88.23	36.9 QP	43.5	-6.6	1.00 V	64	51.5	-14.6
3	169.89	28.3 QP	43.5	-15.2	1.00 V	182	37.2	-8.9
4	346.82	29.7 QP	46.0	-16.3	1.00 V	217	36.1	-6.4
5	465.42	33.4 QP	46.0	-12.6	1.00 V	42	37.0	-3.6
6	722.07	40.0 QP	46.0	-6.0	2.00 V	28	38.3	1.7

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

802.11n (HT20): Ch 52 + Bluetooth EDR: Ch 39

CHANNEL	CH 52 + CH 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	88.23	34.9 QP	43.5	-8.6	2.00 H	41	49.5	-14.6
2	197.11	31.8 QP	43.5	-11.7	1.51 H	19	43.3	-11.5
3	325.43	38.0 QP	46.0	-8.0	1.01 H	197	44.5	-6.5
4	374.04	34.4 QP	46.0	-11.6	1.01 H	277	40.0	-5.6
5	576.25	37.1 QP	46.0	-8.9	1.51 H	137	38.3	-1.2
6	722.07	37.6 QP	46.0	-8.4	2.00 H	302	35.9	1.7
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	31.84	37.3 QP	40.0	-2.7	1.00 V	81	48.3	-11.0
2	41.57	36.3 QP	40.0	-3.7	1.00 V	128	46.0	-9.7
3	88.23	39.7 QP	43.5	-3.8	1.00 V	65	54.3	-14.6
4	323.49	30.0 QP	46.0	-16.0	1.00 V	267	36.5	-6.5
5	465.42	33.7 QP	46.0	-12.3	1.00 V	25	37.3	-3.6
6	477.09	32.6 QP	46.0	-13.4	1.00 V	276	35.9	-3.3

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 26, 2018	Feb. 25, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Conc_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

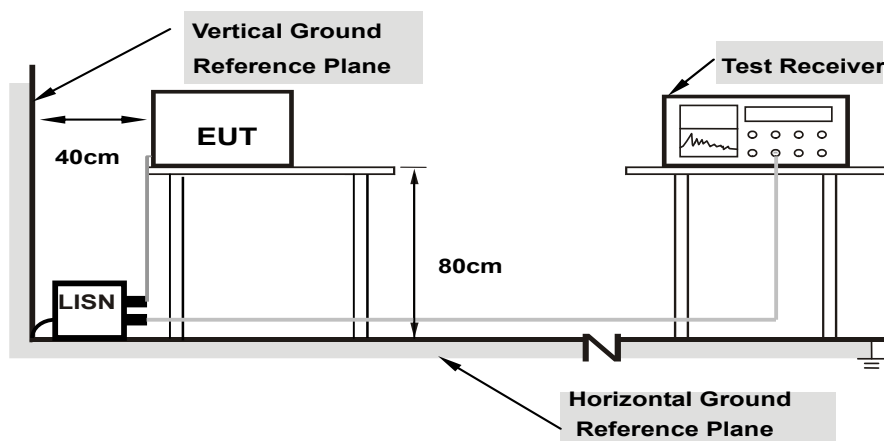
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

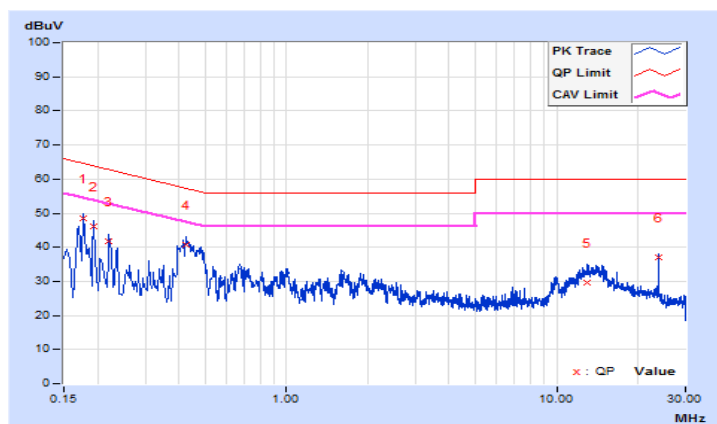
802.11n (HT20): Ch 52 + Bluetooth LE: Ch 0

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 52 + CH 0		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17737	9.67	38.87	22.19	48.54	31.86	64.61	54.61	-16.07	-22.75
2	0.19305	9.67	36.47	20.67	46.14	30.34	63.90	53.90	-17.76	-23.56
3	0.22038	9.67	31.94	16.39	41.61	26.06	62.80	52.80	-21.19	-26.74
4	0.42370	9.67	30.99	21.61	40.66	31.28	57.38	47.38	-16.72	-16.10
5	13.00217	9.90	19.83	14.19	29.73	24.09	60.00	50.00	-30.27	-25.91
6	23.83287	9.96	26.96	26.69	36.92	36.65	60.00	50.00	-23.08	-13.35

Remarks:

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

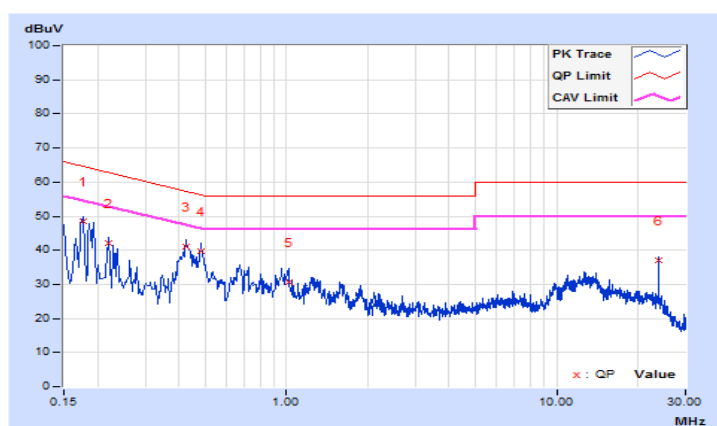


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 52 + CH 0		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17698	9.68	38.83	22.70	48.51	32.38	64.63	54.63	-16.12	-22.25
2	0.22024	9.68	32.49	17.66	42.17	27.34	62.81	52.81	-20.64	-25.47
3	0.42370	9.68	31.24	21.97	40.92	31.65	57.38	47.38	-16.46	-15.73
4	0.48235	9.68	30.15	23.11	39.83	32.79	56.30	46.30	-16.47	-13.51
5	1.01799	9.69	20.98	13.83	30.67	23.52	56.00	46.00	-25.33	-22.48
6	23.83287	10.07	26.84	26.73	36.91	36.80	60.00	50.00	-23.09	-13.20

Remarks:

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



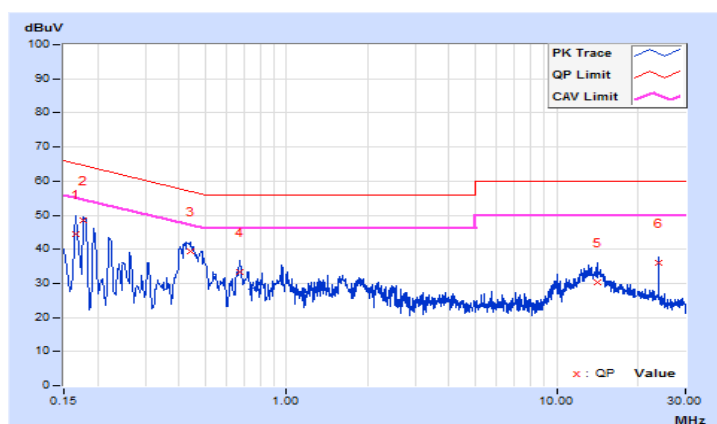
802.11n (HT20): Ch 52 + Bluetooth EDR: Ch 39

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 52 + CH 39		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.67	34.78	14.77	44.45	24.44	65.18	55.18	-20.73	-30.74
2	0.17744	9.67	38.87	22.42	48.54	32.09	64.60	54.60	-16.06	-22.51
3	0.44325	9.67	29.66	23.04	39.33	32.71	57.00	47.00	-17.67	-14.29
4	0.67003	9.68	23.59	16.24	33.27	25.92	56.00	46.00	-22.73	-20.08
5	14.17908	9.91	20.44	14.69	30.35	24.60	60.00	50.00	-29.65	-25.40
6	23.82896	9.96	26.14	25.77	36.10	35.73	60.00	50.00	-23.90	-14.27

Remarks:

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

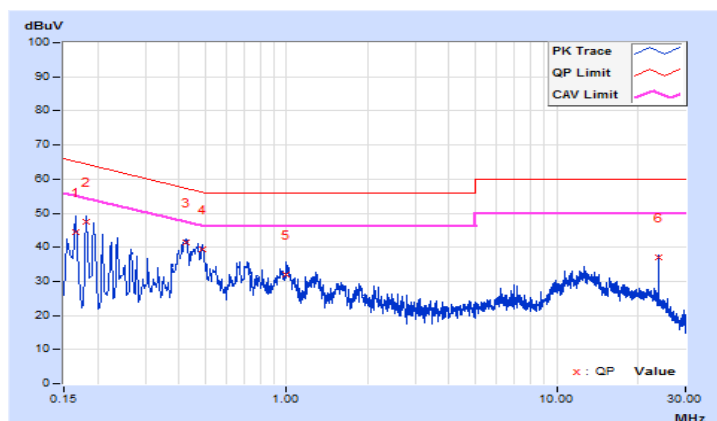


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	CH 52 + CH 39		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16569	9.68	34.83	15.60	44.51	25.28	65.17	55.17	-20.66	-29.89
2	0.18122	9.68	37.67	21.32	47.35	31.00	64.43	54.43	-17.08	-23.43
3	0.42761	9.68	31.62	23.31	41.30	32.99	57.30	47.30	-16.00	-14.31
4	0.48678	9.68	29.82	22.73	39.50	32.41	56.22	46.22	-16.72	-13.81
5	0.99847	9.69	22.43	14.75	32.12	24.44	56.00	46.00	-23.88	-21.56
6	23.83287	10.07	27.02	26.86	37.09	36.93	60.00	50.00	-22.91	-13.07

Remarks:

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

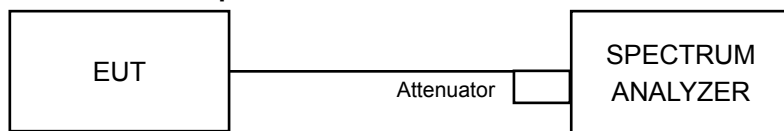


4.3 Conducted Out of Band Emission Measurement

4.3.1 Limits of Conducted Out of Band Emission Measurement

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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 OOB

- Set RBW = 100 kHz.
- Set VBW $\geq$ 300 kHz.
- Ensure that the number of measurement points $\geq$ span/RBW
- According to measurement points to set differ measurement span.
- Detector = Peak.
- Trace Mode = max hold.
- Sweep = auto couple.

4.3.5 Deviation from Test Standard

No deviation.

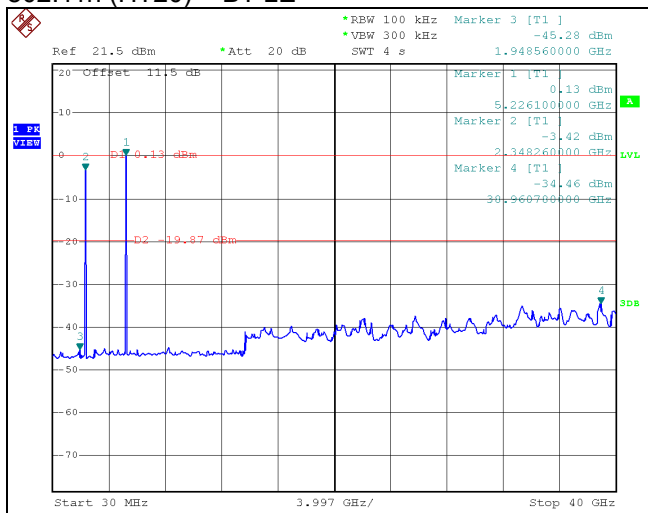
4.3.6 EUT Operating Condition

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

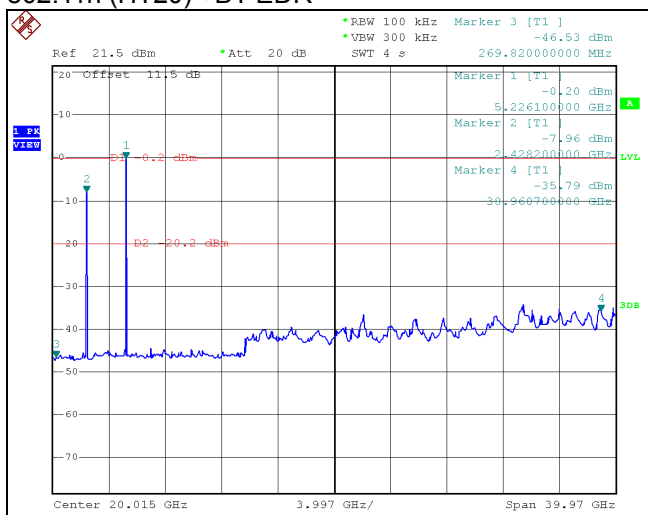
4.3.7 Test Results

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.

802.11n (HT20) + BT LE



802.11n (HT20) +BT EDR



5 Pictures of Test Arrangements

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

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 accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

--- END ---