

FCC Test Report

(Co-Located)

Report No.: RF180108C15E-1

FCC ID: Q6G-AP225W

Test Model: W-118

Received Date: Jan. 08, 2018

Test Date: Nov. 13 ~ Nov. 14, 2019

Issued Date: Nov. 19, 2019

Applicant: WatchGuard Technologies, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / 788550 / TW0003
Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RF180108C15E-1	Original release.	Nov. 19, 2019

1 Certificate of Conformity

Product: AP225W

Brand: WatchGuard

Test Model: W-118

Sample Status: Engineering sample

Applicant: WatchGuard Technologies, Inc.

Test Date: Nov. 13 ~ Nov. 14, 2019

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:** Nov. 19, 2019
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Nov. 19, 2019
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 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 -0.9dB at 2390.00MHz.

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) (±)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	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	AP225W	
Brand	WatchGuard	
Test Model	W-118	
Status of EUT	Engineering sample	
Power Supply Rating	12Vdc from Adapter 54Vdc from POE	
Modulation Type	WLAN	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
	Bluetooth LE	GFSK
	Zigbee	O-QPSK
Modulation Technology	WLAN	DSSS, OFDM
Transfer Rate	WLAN	802.11b: 11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 600Mbps 802.11ac: up to 867Mbps
	Bluetooth LE	1Mbps
	Zigbee	250kbps
Operating Frequency	WLAN	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5180 ~ 5240MHz, 5260 ~ 5320MHz, 5500 ~ 5700MHz, 5745 ~ 5825MHz
	Bluetooth LE	2402 ~ 2480MHz
	Zigbee	2405 ~ 2480MHz
Number of Channel	WLAN	2412 ~ 2462MHz: 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) 5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5260 ~ 5320MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5500 ~ 5700MHz: 11 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 5 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80) 5745 ~ 5825MHz: 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	Bluetooth LE	40

	Zigbee	16
Output Power		2.4GHz Band: Radio 1: CDD Mode: 383.857mW Beamforming Mode: 139.841mW 5GHz Band: Radio 2: CDD Mode: 5180~5240MHz: 264.627mW 5260~5320MHz: 177.636mW 5500~5700MHz: 214.340mW 5745~5825MHz: 455.118mW Beamforming Mode: 5180~5240MHz: 129.777mW 5260~5320MHz: 88.824mW 5500~5700MHz: 107.178mW 5745~5825MHz: 227.574mW
	WLAN	
	Bluetooth LE	1.641mW
	Zigbee	1.629mW
Antenna Type	Refer to note	
Antenna Connector	Refer to note	
Accessory Device	NA	
Data Cable Supplied	NA	

Note:

1. This report is prepared for FCC class II permissive change. This report is a supplementary report to the original BV CPS report no.: RF180108C15D-4. Difference compared with the original report is adding 5260~5320MHz and 5500~5700MHz band. Therefore, the EUT was re-tested and presented in the test report.

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

2.4GHz Band			
Modulation Mode	TX Function	Beamforming	Remark
802.11b	2TX	Not Support	Radio 1
802.11g	2TX	Not Support	
802.11n (HT20)	2TX	Support	
802.11n (HT40)	2TX	Support	
802.11b	2RX	Not Support	Radio 3 (Scanning only)
802.11g	2RX	Not Support	
802.11n (HT20)	2RX	Not Support	
802.11n (HT40)	2RX	Not Support	
5GHz Band			
Modulation Mode	TX Function	Beamforming Mode	Remark
802.11a	2TX	Not Support	Radio 2
802.11n (HT20)	2TX	Support	
802.11n (HT40)	2TX	Support	
802.11ac (VHT20)	2TX	Support	
802.11ac (VHT40)	2TX	Support	
802.11ac (VHT80)	2TX	Support	
802.11a	2RX	Not Support	Radio 3 (Scanning only)
802.11n (HT20)	2RX	Not Support	
802.11n (HT40)	2RX	Not Support	
802.11ac (VHT20)	2RX	Not Support	
802.11ac (VHT40)	2RX	Not Support	
802.11ac (VHT80)	2RX	Not Support	

* 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)

* For 802.11n, CDD mode is the worst case for final radiated emission and power line conducted emission tests after pretesting CDD mode and beamforming mode.

3. The EUT consumes power from following Adapter and POE. (Support unit only)

Adapter	
Brand	Powertron Electronics Corp.
Model	PA1024-120IB200
Input Power	100-240Vac, 50-60Hz, 0.6A
Output Power	12Vdc / 2.0A 24W Max
Power Cord	1.5m non-shielded cable with one core 0.5m non-shielded cable without core

POE	
Brand	EnGenius
Model	EPA5006GAT
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	54Vdc, 0.6A

4. The EUT uses following antennas.

Type	PIFA						PIFA
Connector	IPEX						-
Radio	1		2		3		BT/Zigbee
Frequency (MHz)	2400-2500		5150-5850		2400-2500 & 5150-5850		2400-2500
Antenna	1	2	3	4	5	6	BT/Zigbee
Gain (dBi)	3.67	4.31	5.72	5.99	2.51 / 4.83	2.78 / 4.80	2.76

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), 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 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	5290 MHz

For 5500 ~ 5700MHz

11 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		

5 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		

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530MHz	122	5610 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 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 Zigbee:

16 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
11	2405	15	2425	19	2445	23	2465
12	2410	16	2430	20	2450	24	2470
13	2415	17	2435	21	2455	25	2475
14	2420	18	2440	22	2460	26	2480

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO		DESCRIPTION
	RE $\geq$ 1G	RE<1G	
A	√	√	Power from adapter
B	-	√	Power from PoE

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

PLC: Power Line Conducted Emission

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane**.
2. "-": Means no effect.

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	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 116 + CH 0	BPSK
	Radio 2: 802.11a	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	BT LE	2402~2480	0 to 39		GFSK
A	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 0	BPSK
	BT LE	2402~2480	0 to 39		GFSK
A	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 116 + CH 11	BPSK
	Radio 2: 802.11a	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Zigbee	2405~2480	11 to 26		O-QPSK
A	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 11	BPSK
	Zigbee	2405~2480	11 to 26		O-QPSK

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, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 116 + CH 0	BPSK
	Radio 2: 802.11a	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	BT LE	2402~2480	0 to 39		GFSK
A, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 0	BPSK
	BT LE	2402~2480	0 to 39		GFSK
A, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 116 + CH 11	BPSK
	Radio 2: 802.11a	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Zigbee	2405~2480	11 to 26		O-QPSK
A, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 11	BPSK
	Zigbee	2405~2480	11 to 26		O-QPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	22 deg. C, 68% RH	120Vac, 60Hz	Willy Cheng
RE<1G	22 deg. C, 68% 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.	Notebook	Lenovo	80Q7	PF0KUGU6	FCC DoC Approved	-
B.	Adapter	Powertron	PA1024-120IB200	NA	NA	Provided by manufacturer
C.	Load	NA	NA	NA	NA	-
D.	POE	EnGenius	EPA5006GAT	NA	NA	Provided by manufacturer

Note:

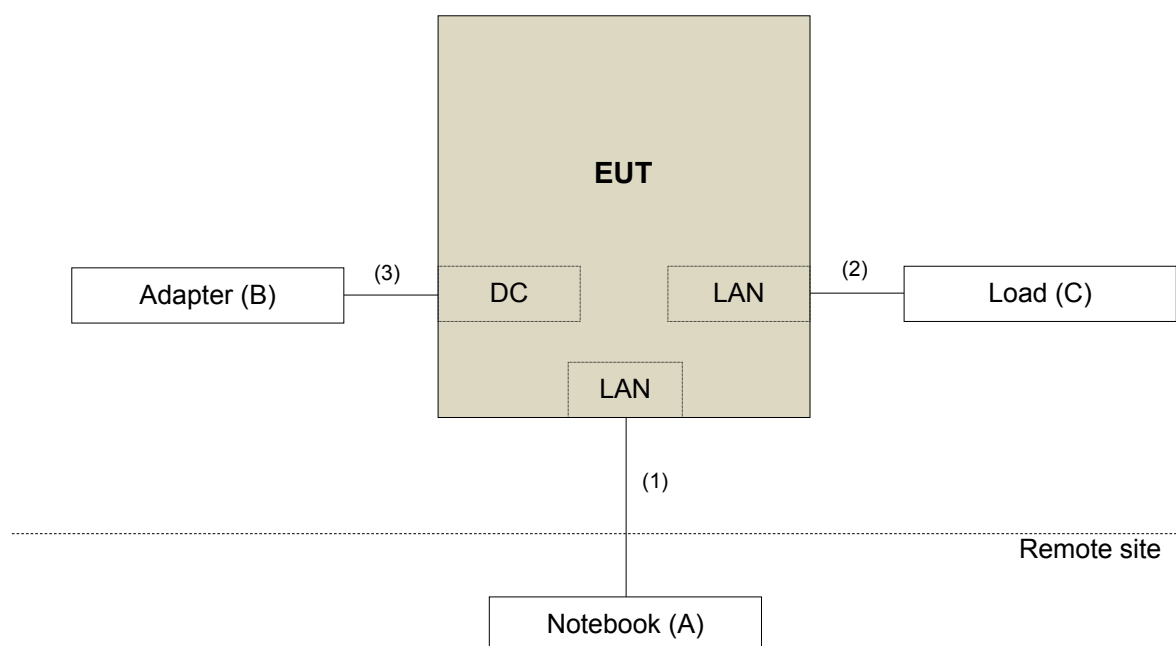
1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	10	N	0	-
2.	RJ45, Cat5e	4	3	N	0	-
3.	Power Cord	1	1.0	N	0	-
4.	RJ45, Cat5e	1	3	N	0	-

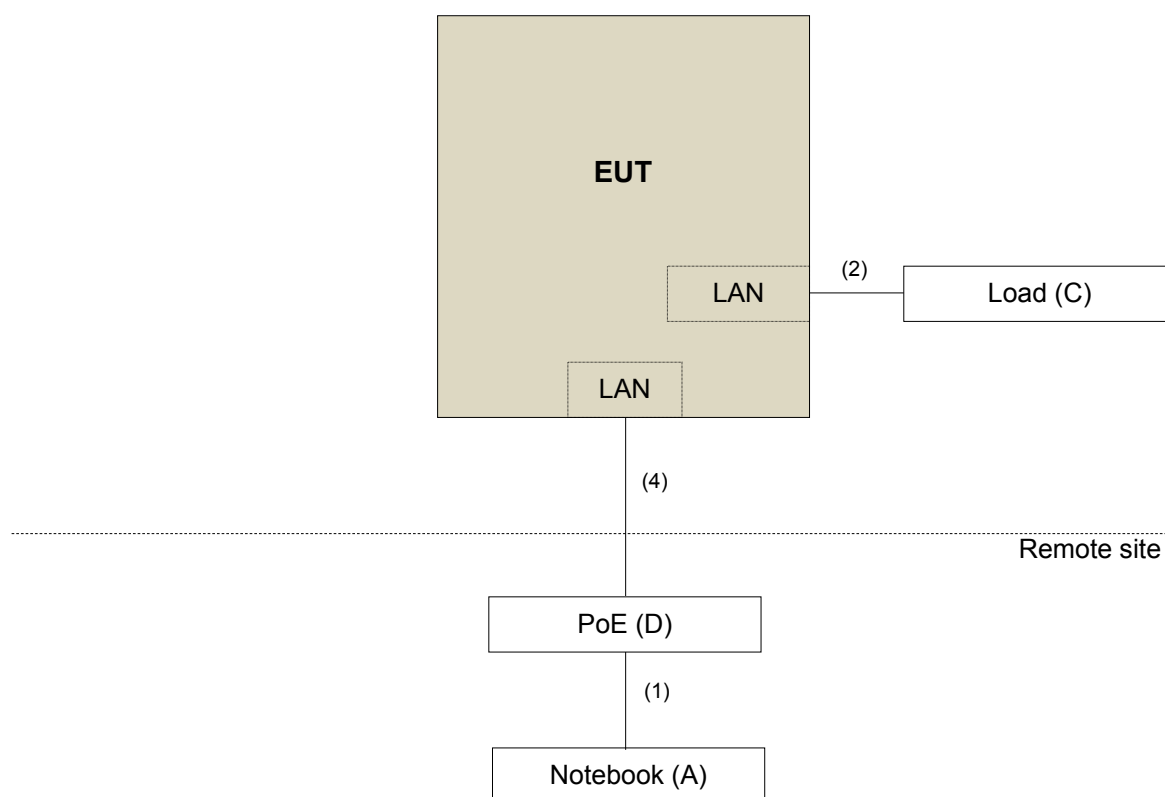
Note: The core(s) is(are) originally attached to the cable(s).

3.3.1 Configuration of System under Test

Test Mode A



Test Mode B



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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
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
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY5519000 7/MY55210005	Jul. 15, 2019	Jul. 14, 2020

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.

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:

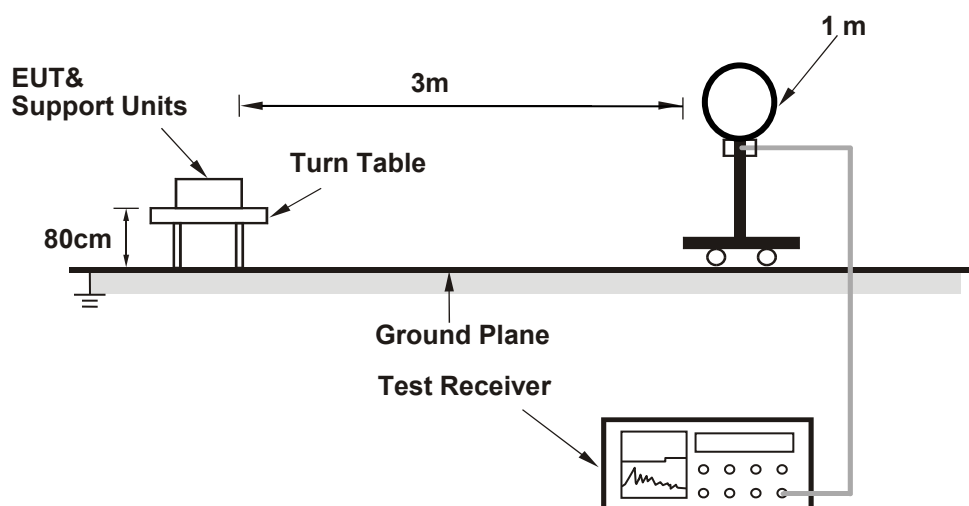
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

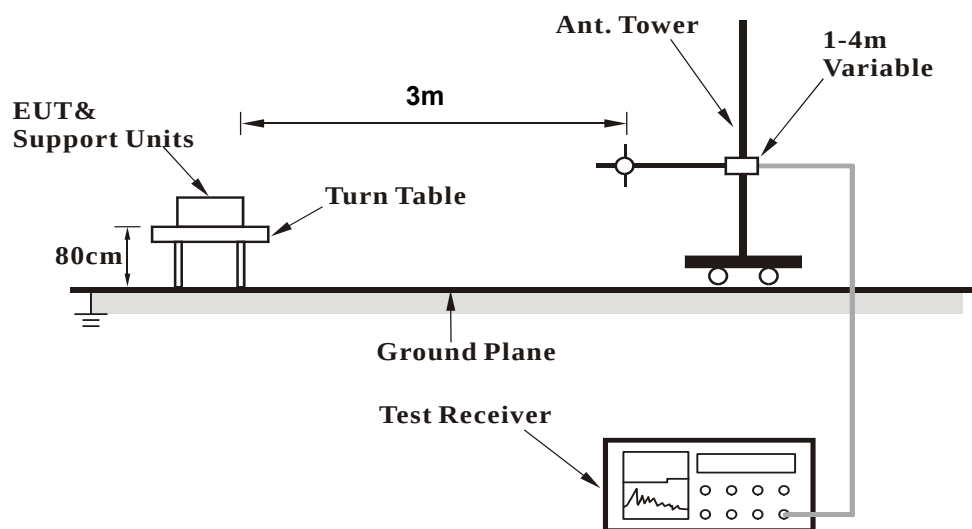
No deviation.

4.1.5 Test Setup

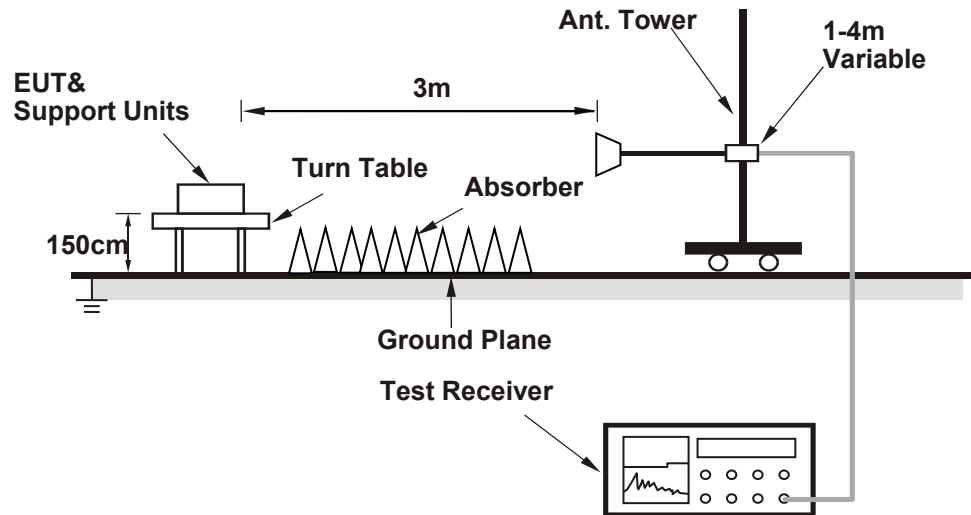
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz Data:

Radio 1: 802.11g + Radio 2: 802.11a + BT LE

CHANNEL	CH 6 + CH 116 + 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	71.6 PK	74.0	-2.4	1.52 H	6	38.1	33.5
2	2390.00	53.1 AV	54.0	-0.9	1.52 H	6	19.6	33.5
3	*2402.00	90.1 PK			1.19 H	33	56.7	33.4
4	*2402.00	83.3 AV			1.19 H	33	49.9	33.4
5	*2437.00	115.5 PK			1.24 H	319	82.1	33.4
6	*2437.00	104.1 AV			1.24 H	319	70.7	33.4
7	2483.50	64.2 PK	74.0	-9.8	1.39 H	322	31.0	33.2
8	2483.50	48.6 AV	54.0	-5.4	1.39 H	322	15.4	33.2
9	4804.00	49.0 PK	74.0	-25.0	2.12 H	68	45.4	3.6
10	4804.00	36.9 AV	54.0	-17.1	2.12 H	68	33.3	3.6
11	4874.00	51.0 PK	74.0	-23.0	2.09 H	19	47.5	3.5
12	4874.00	45.0 AV	54.0	-9.0	2.09 H	19	41.5	3.5
13	*5580.00	117.1 PK			1.19 H	26	77.1	40.0
14	*5580.00	106.0 AV			1.19 H	26	66.0	40.0
15	11160.00	60.0 PK	74.0	-14.0	1.91 H	256	42.3	17.7
16	11160.00	45.7 AV	54.0	-8.3	1.91 H	256	28.0	17.7

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	CH 6 + CH 116 + CH 0	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	61.9 PK	74.0	-12.1	2.41 V	322	28.4	33.5
2	2390.00	46.9 AV	54.0	-7.1	2.41 V	322	13.4	33.5
3	*2402.00	93.0 PK			1.09 V	345	59.6	33.4
4	*2402.00	89.0 AV			1.09 V	345	55.6	33.4
5	*2437.00	109.6 PK			1.39 V	311	76.2	33.4
6	*2437.00	98.8 AV			1.39 V	311	65.4	33.4
7	2483.50	61.2 PK	74.0	-12.8	2.45 V	306	28.0	33.2
8	2483.50	46.2 AV	54.0	-7.8	2.45 V	306	13.0	33.2
9	4804.00	53.8 PK	74.0	-20.2	1.76 V	299	50.2	3.6
10	4804.00	39.9 AV	54.0	-14.1	1.76 V	299	36.3	3.6
11	4874.00	50.1 PK	74.0	-23.9	2.90 V	341	46.6	3.5
12	4874.00	43.0 AV	54.0	-11.0	2.90 V	341	39.5	3.5
13	*5580.00	118.8 PK			1.61 V	0	78.8	40.0
14	*5580.00	107.9 AV			1.61 V	0	67.9	40.0
15	11160.00	59.7 PK	74.0	-14.3	1.88 V	260	42.0	17.7
16	11160.00	45.8 AV	54.0	-8.2	1.88 V	260	28.1	17.7

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Radio 1: 802.11g + BT LE

CHANNEL	CH 6 + 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	60.3 PK	74.0	-13.7	1.76 H	8	26.8	33.5
2	2390.00	46.7 AV	54.0	-7.3	1.76 H	8	13.2	33.5
3	*2402.00	89.8 PK			1.51 H	6	56.4	33.4
4	*2402.00	82.1 AV			1.51 H	6	48.7	33.4
5	*2437.00	113.9 PK			1.55 H	6	80.5	33.4
6	*2437.00	102.8 AV			1.55 H	6	69.4	33.4
7	2483.50	61.6 PK	74.0	-12.4	1.44 H	3	28.4	33.2
8	2483.50	49.2 AV	54.0	-4.8	1.44 H	3	16.0	33.2
9	4804.00	49.6 PK	74.0	-24.4	1.89 H	176	46.0	3.6
10	4804.00	36.6 AV	54.0	-17.4	1.89 H	176	33.0	3.6
11	4874.00	51.1 PK	74.0	-22.9	1.98 H	133	47.6	3.5
12	4874.00	45.2 AV	54.0	-8.8	1.98 H	133	41.7	3.5
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	2390.00	62.2 PK	74.0	-11.8	1.08 V	294	28.7	33.5
2	2390.00	46.7 AV	54.0	-7.3	1.08 V	294	13.2	33.5
3	*2402.00	93.8 PK			1.05 V	330	60.4	33.4
4	*2402.00	89.7 AV			1.05 V	330	56.3	33.4
5	*2437.00	110.5 PK			1.23 V	299	77.1	33.4
6	*2437.00	100.0 AV			1.23 V	299	66.6	33.4
7	2483.50	61.2 PK	74.0	-12.8	1.86 V	304	28.0	33.2
8	2483.50	47.2 AV	54.0	-6.8	1.86 V	304	14.0	33.2
9	4804.00	54.1 PK	74.0	-19.9	2.99 V	325	50.5	3.6
10	4804.00	41.2 AV	54.0	-12.8	2.99 V	325	37.6	3.6
11	4874.00	50.0 PK	74.0	-24.0	2.83 V	204	46.5	3.5
12	4874.00	42.7 AV	54.0	-11.3	2.83 V	204	39.2	3.5

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.

Radio 1: 802.11g + Radio 2: 802.11a + Zigbee

CHANNEL	CH 6 + CH 116 + CH 11	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	71.0 PK	74.0	-3.0	1.50 H	273	37.5	33.5
2	2390.00	52.3 AV	54.0	-1.7	1.50 H	273	18.8	33.5
3	*2405.00	96.5 PK			1.60 H	280	63.1	33.4
4	*2405.00	92.8 AV			1.60 H	280	59.4	33.4
5	*2437.00	114.7 PK			1.41 H	296	81.3	33.4
6	*2437.00	104.0 AV			1.41 H	296	70.6	33.4
7	2483.50	62.3 PK	74.0	-11.7	1.66 H	300	29.1	33.2
8	2483.50	47.5 AV	54.0	-6.5	1.66 H	300	14.3	33.2
9	4810.00	47.9 PK	74.0	-26.1	1.85 H	166	44.3	3.6
10	4810.00	36.8 AV	54.0	-17.2	1.85 H	166	33.2	3.6
11	4874.00	51.0 PK	74.0	-23.0	2.10 H	140	47.5	3.5
12	4874.00	44.7 AV	54.0	-9.3	2.10 H	140	41.2	3.5
13	*5580.00	116.6 PK			1.43 H	3	76.6	40.0
14	*5580.00	106.0 AV			1.43 H	3	66.0	40.0
15	11160.00	60.7 PK	74.0	-13.3	1.90 H	108	43.0	17.7
16	11160.00	45.9 AV	54.0	-8.1	1.90 H	108	28.2	17.7

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	CH 6 + CH 64 + CH 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

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	62.5 PK	74.0	-11.5	2.93 V	319	29.0	33.5
2	2390.00	47.9 AV	54.0	-6.1	2.93 V	319	14.4	33.5
3	*2405.00	92.0 PK			2.12 V	307	58.6	33.4
4	*2405.00	87.8 AV			2.12 V	307	54.4	33.4
5	*2437.00	109.4 PK			2.32 V	327	76.0	33.4
6	*2437.00	99.4 AV			2.32 V	327	66.0	33.4
7	2483.50	61.3 PK	74.0	-12.7	3.09 V	294	28.1	33.2
8	2483.50	46.2 AV	54.0	-7.8	3.09 V	294	13.0	33.2
9	4810.00	55.4 PK	74.0	-18.6	1.93 V	265	51.8	3.6
10	4810.00	40.1 AV	54.0	-13.9	1.93 V	265	36.5	3.6
11	4874.00	49.6 PK	74.0	-24.4	3.00 V	358	46.1	3.5
12	4874.00	43.7 AV	54.0	-10.3	3.00 V	358	40.2	3.5
13	*5580.00	118.5 PK			1.64 V	329	78.5	40.0
14	*5580.00	108.1 AV			1.64 V	329	68.1	40.0
15	11160.00	59.6 PK	74.0	-14.4	2.11 V	260	41.9	17.7
16	11160.00	46.3 AV	54.0	-7.7	2.11 V	260	28.6	17.7

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.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Radio 1: 802.11g + Zigbee

CHANNEL	CH 6 + CH 11	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	60.1 PK	74.0	-13.9	1.46 H	59	26.6	33.5
2	2390.00	47.0 AV	54.0	-7.0	1.46 H	59	13.5	33.5
3	*2405.00	92.5 PK			1.40 H	29	59.1	33.4
4	*2405.00	91.8 AV			1.40 H	29	58.4	33.4
5	*2437.00	113.0 PK			1.43 H	28	79.6	33.4
6	*2437.00	101.8 AV			1.43 H	28	68.4	33.4
7	2483.50	61.5 PK	74.0	-12.5	1.54 H	30	28.3	33.2
8	2483.50	49.0 AV	54.0	-5.0	1.54 H	30	15.8	33.2
9	4810.00	48.8 PK	74.0	-25.2	2.37 H	199	45.2	3.6
10	4810.00	34.7 AV	54.0	-19.3	2.37 H	199	31.1	3.6
11	4874.00	50.7 PK	74.0	-23.3	2.04 H	199	47.2	3.5
12	4874.00	44.8 AV	54.0	-9.2	2.04 H	199	41.3	3.5
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	2390.00	61.7 PK	74.0	-12.3	2.66 V	287	28.2	33.5
2	2390.00	47.0 AV	54.0	-7.0	2.66 V	287	13.5	33.5
3	*2405.00	88.2 PK			2.56 V	213	54.8	33.4
4	*2405.00	85.7 AV			2.56 V	213	52.3	33.4
5	*2437.00	110.0 PK			2.42 V	247	76.6	33.4
6	*2437.00	99.0 AV			2.42 V	247	65.6	33.4
7	2483.50	61.5 PK	74.0	-12.5	2.61 V	283	28.3	33.2
8	2483.50	46.8 AV	54.0	-7.2	2.61 V	283	13.6	33.2
9	4810.00	53.8 PK	74.0	-20.2	2.02 V	319	50.2	3.6
10	4810.00	40.4 AV	54.0	-13.6	2.02 V	319	36.8	3.6
11	4874.00	48.9 PK	74.0	-25.1	2.88 V	310	45.4	3.5
12	4874.00	43.0 AV	54.0	-11.0	2.88 V	310	39.5	3.5

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

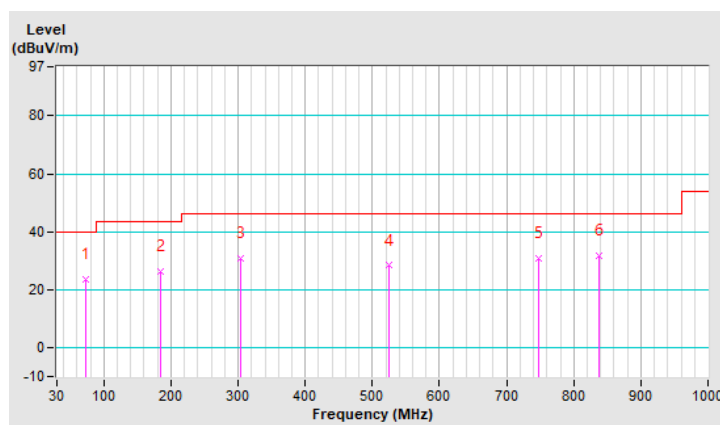
Radio 1: 802.11g + Radio 2: 802.11a + BT LE

CHANNEL	CH 6 + CH 116 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	72.67	23.5 QP	40.0	-16.5	1.99 H	78	40.0	-16.5
2	185.44	26.3 QP	43.5	-17.2	1.49 H	210	42.1	-15.8
3	304.04	31.0 QP	46.0	-15.0	1.00 H	208	43.6	-12.6
4	525.69	28.3 QP	46.0	-17.7	1.49 H	177	37.4	-9.1
5	747.34	31.0 QP	46.0	-15.0	1.99 H	19	35.8	-4.8
6	836.78	31.5 QP	46.0	-14.5	1.99 H	68	35.0	-3.5

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. 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.

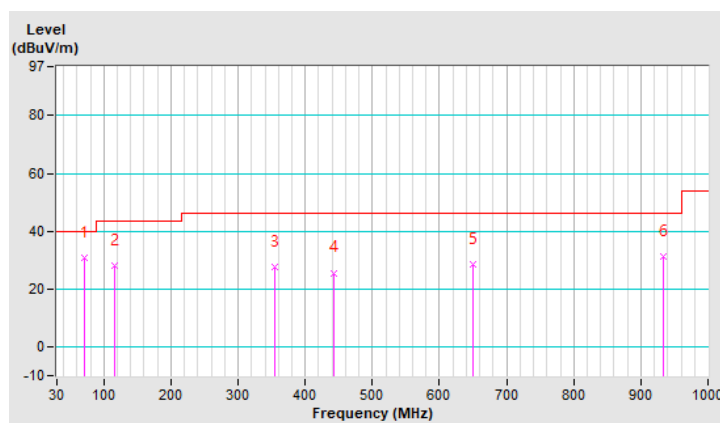


CHANNEL	CH 6 + CH 116 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	70.73	30.8 QP	40.0	-9.2	1.49 V	346	47.0	-16.2
2	115.45	28.1 QP	43.5	-15.4	1.00 V	46	44.7	-16.6
3	354.60	27.5 QP	46.0	-18.5	1.00 V	161	39.5	-12.0
4	442.09	25.6 QP	46.0	-20.4	1.00 V	116	35.8	-10.2
5	650.13	28.4 QP	46.0	-17.6	1.49 V	2	35.0	-6.6
6	933.99	31.2 QP	46.0	-14.8	1.00 V	112	33.3	-2.1

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.
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.



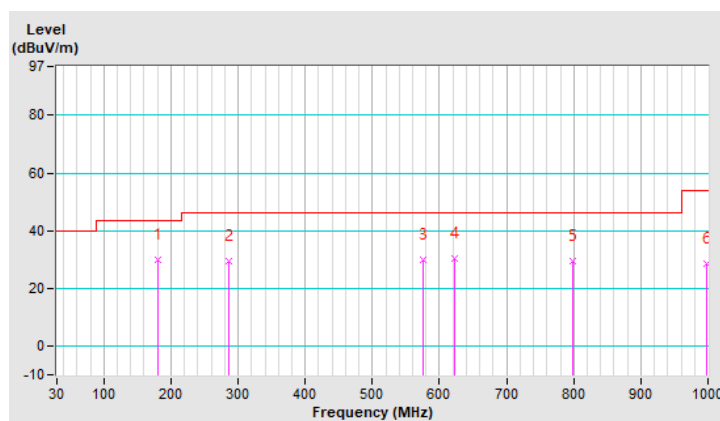
Radio 1: 802.11g + BT LE

CHANNEL	CH 6 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	181.55	30.0 QP	43.5	-13.5	1.50 H	0	45.3	-15.3
2	286.55	29.6 QP	46.0	-16.4	1.00 H	15	42.6	-13.0
3	576.25	29.8 QP	46.0	-16.2	1.00 H	329	37.8	-8.0
4	622.91	30.4 QP	46.0	-15.6	1.00 H	349	37.3	-6.9
5	797.89	29.4 QP	46.0	-16.6	2.00 H	352	33.8	-4.4
6	998.16	28.5 QP	54.0	-25.5	1.00 H	334	29.6	-1.1

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.
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.

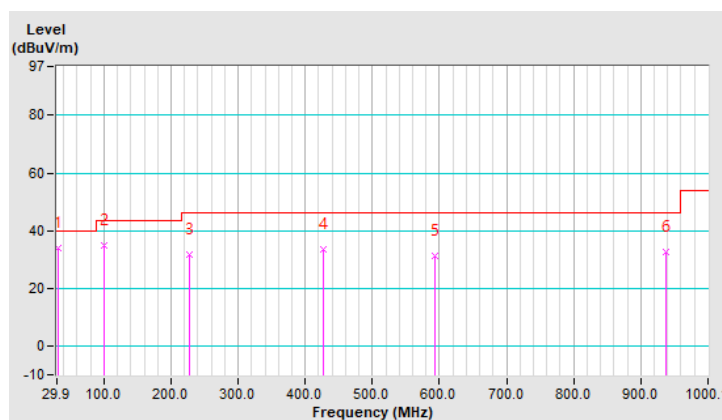


CHANNEL	CH 6 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	34.2 QP	40.0	-5.8	1.50 V	0	50.2	-16.0
2	99.89	35.1 QP	43.5	-8.4	1.00 V	6	53.6	-18.5
3	228.22	31.7 QP	46.0	-14.3	1.00 V	35	48.0	-16.3
4	426.53	33.5 QP	46.0	-12.5	1.00 V	6	44.0	-10.5
5	593.74	31.4 QP	46.0	-14.6	1.50 V	22	38.9	-7.5
6	937.88	32.4 QP	46.0	-13.6	2.00 V	16	34.4	-2.0

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. 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.



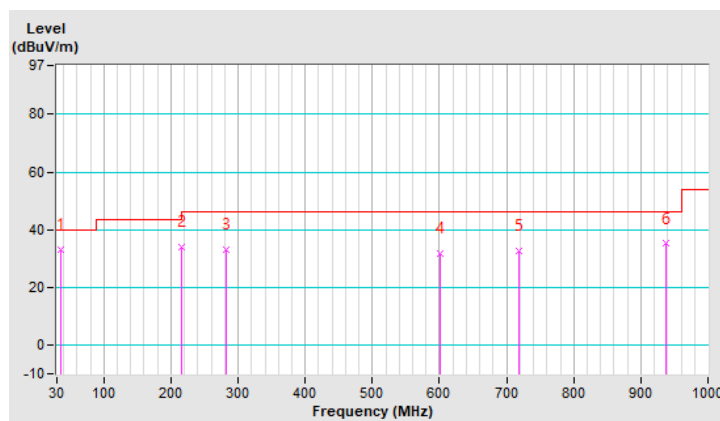
Radio 1: 802.11g + Radio 2: 802.11a + Zigbee

CHANNEL	CH 6 + CH 116 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	35.73	32.9 QP	40.0	-7.1	1.00 H	193	48.5	-15.6
2	216.55	34.0 QP	46.0	-12.0	1.49 H	359	50.4	-16.4
3	282.66	32.9 QP	46.0	-13.1	1.00 H	85	46.0	-13.1
4	601.52	31.9 QP	46.0	-14.1	1.00 H	127	39.2	-7.3
5	718.18	32.7 QP	46.0	-13.3	1.49 H	359	38.4	-5.7
6	937.88	35.1 QP	46.0	-10.9	1.49 H	359	37.1	-2.0

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. 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.

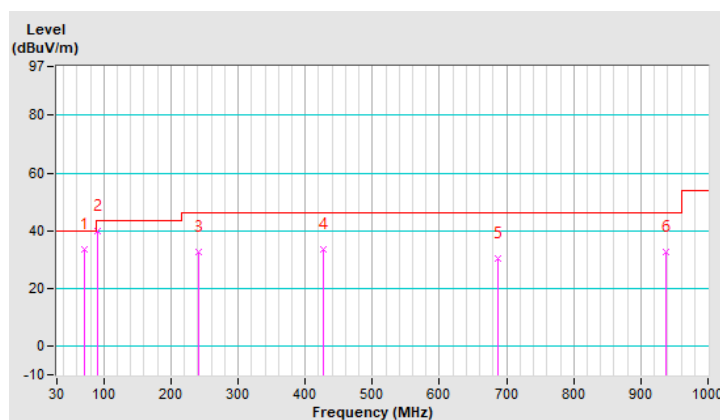


CHANNEL	CH 6 + CH 116 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	70.73	33.3 QP	40.0	-6.7	1.50 V	8	49.5	-16.2
2	90.17	40.0 QP	43.5	-3.5	1.00 V	6	59.5	-19.5
3	241.83	32.5 QP	46.0	-13.5	1.00 V	6	47.4	-14.9
4	426.53	33.5 QP	46.0	-12.5	1.00 V	6	44.0	-10.5
5	687.07	30.4 QP	46.0	-15.6	1.00 V	6	36.6	-6.2
6	937.88	32.4 QP	46.0	-13.6	2.00 V	6	34.4	-2.0

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. 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.



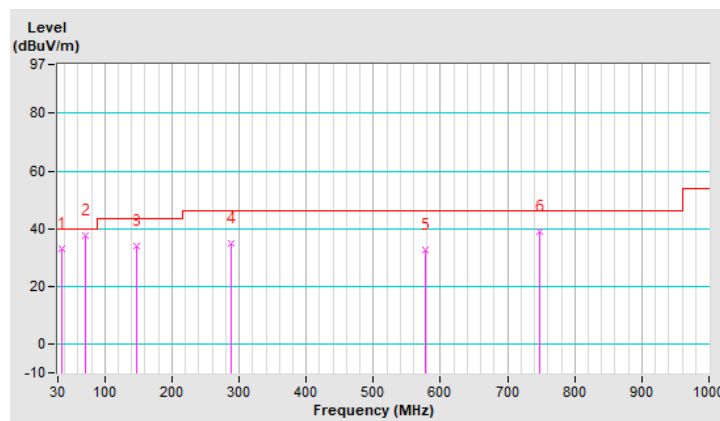
Radio 1: 802.11g + Zigbee

CHANNEL	CH 6 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	35.73	32.9 QP	40.0	-7.1	1.00 H	193	48.5	-15.6
2	70.73	37.6 QP	40.0	-2.4	1.49 H	359	53.8	-16.2
3	146.56	33.8 QP	43.5	-9.7	1.00 H	132	47.8	-14.0
4	288.49	35.1 QP	46.0	-10.9	1.00 H	229	48.1	-13.0
5	578.19	32.7 QP	46.0	-13.3	1.00 H	139	40.6	-7.9
6	747.34	39.0 QP	46.0	-7.0	1.00 H	85	43.8	-4.8

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
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.

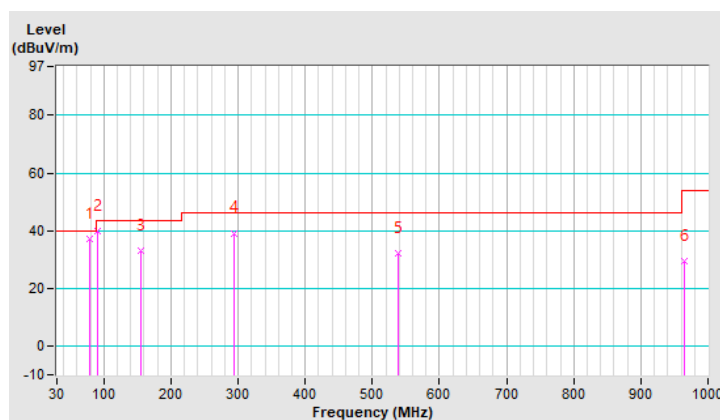


CHANNEL	CH 6 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

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	78.51	37.2 QP	40.0	-2.8	1.00 V	6	55.0	-17.8
2	90.17	40.0 QP	43.5	-3.5	1.50 V	133	59.5	-19.5
3	154.33	32.9 QP	43.5	-10.6	1.00 V	6	46.7	-13.8
4	294.32	39.2 QP	46.0	-6.8	1.00 V	6	52.1	-12.9
5	539.30	32.3 QP	46.0	-13.7	1.00 V	8	41.4	-9.1
6	965.10	29.5 QP	54.0	-24.5	1.00 V	6	31.2	-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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
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.



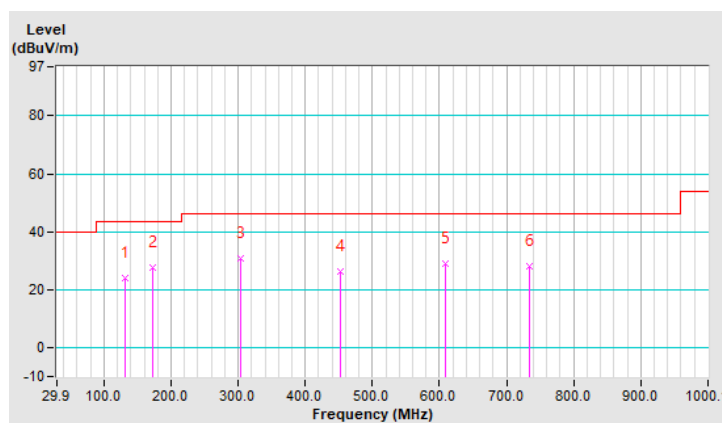
Radio 1: 802.11g + Radio 2: 802.11a + BT LE

CHANNEL	CH 6 + CH 116 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	131.00	24.2 QP	43.5	-19.3	1.49 H	230	39.5	-15.3
2	171.83	27.7 QP	43.5	-15.8	1.99 H	246	42.0	-14.3
3	304.04	31.0 QP	46.0	-15.0	1.00 H	208	43.6	-12.6
4	451.81	26.3 QP	46.0	-19.7	1.99 H	54	36.4	-10.1
5	609.30	29.0 QP	46.0	-17.0	1.49 H	286	36.2	-7.2
6	733.73	27.9 QP	46.0	-18.1	2.00 H	6	32.9	-5.0

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. 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.

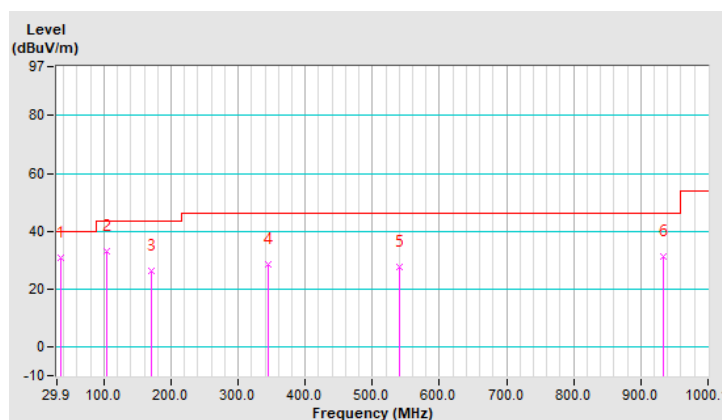


CHANNEL	CH 6 + CH 116 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	35.73	30.7 QP	40.0	-9.3	2.00 V	202	46.3	-15.6
2	103.78	33.0 QP	43.5	-10.5	1.00 V	95	51.1	-18.1
3	169.89	26.4 QP	43.5	-17.1	1.50 V	166	40.5	-14.1
4	344.87	28.6 QP	46.0	-17.4	1.00 V	166	40.7	-12.1
5	541.25	27.8 QP	46.0	-18.2	1.00 V	161	36.6	-8.8
6	933.99	31.2 QP	46.0	-14.8	1.50 V	112	33.3	-2.1

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.
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.



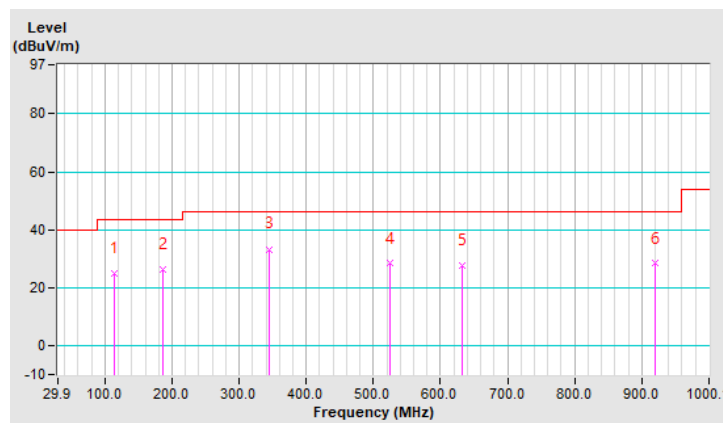
Radio 1: 802.11g + BT LE

CHANNEL	CH 6 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	113.50	24.7 QP	43.5	-18.8	1.49 H	249	41.5	-16.8
2	185.44	26.3 QP	43.5	-17.2	1.49 H	210	42.1	-15.8
3	344.87	33.3 QP	46.0	-12.7	1.00 H	216	45.4	-12.1
4	525.69	28.3 QP	46.0	-17.7	1.49 H	177	37.4	-9.1
5	632.63	27.8 QP	46.0	-18.2	1.00 H	289	34.4	-6.6
6	920.38	28.3 QP	46.0	-17.7	1.00 H	8	30.3	-2.0

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. 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.

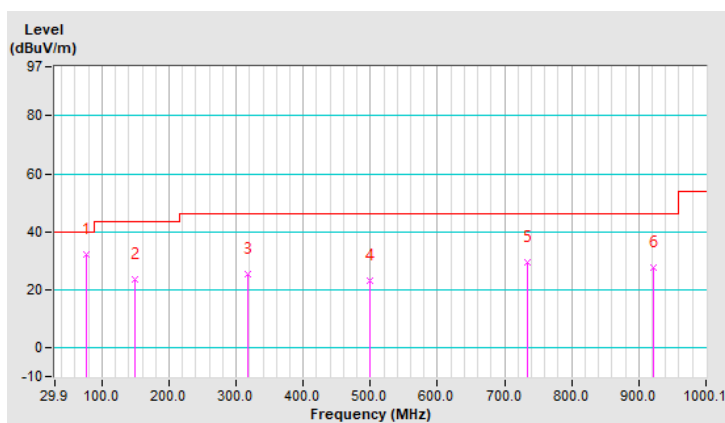


CHANNEL	CH 6 + CH 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	76.56	32.1 QP	40.0	-7.9	1.50 V	132	49.4	-17.3
2	148.50	23.4 QP	43.5	-20.1	1.00 V	126	37.2	-13.8
3	317.65	25.2 QP	46.0	-20.8	1.50 V	173	37.5	-12.3
4	498.47	23.2 QP	46.0	-22.8	1.00 V	173	32.6	-9.4
5	734.68	29.6 QP	46.0	-16.4	2.00 V	72	34.6	-5.0
6	922.33	27.6 QP	46.0	-18.4	1.00 V	354	29.6	-2.0

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. 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.



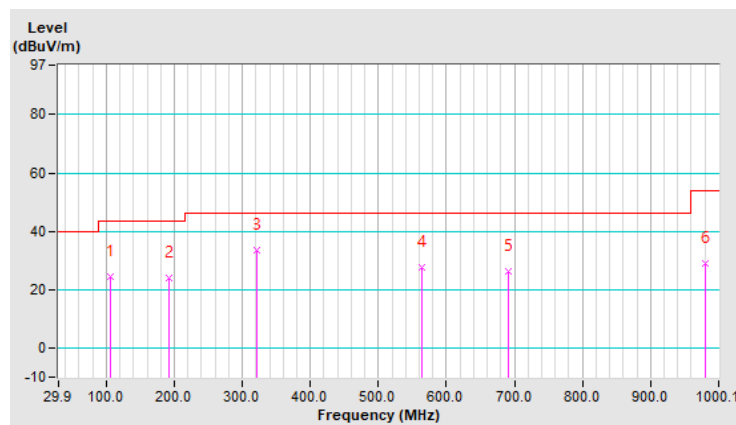
Radio 1: 802.11g + Radio 2: 802.11a + Zigbee

CHANNEL	CH 6 + CH 116 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	106.73	24.3 QP	43.5	-19.2	1.49 H	260	42.0	-17.7
2	193.22	24.0 QP	43.5	-19.5	1.49 H	203	40.5	-16.5
3	321.54	33.6 QP	46.0	-12.4	1.00 H	195	45.9	-12.3
4	564.58	27.6 QP	46.0	-18.4	1.49 H	193	35.9	-8.3
5	690.96	26.3 QP	46.0	-19.7	2.00 H	153	32.4	-6.1
6	980.66	28.8 QP	54.0	-25.2	1.50 H	0	30.2	-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.
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.

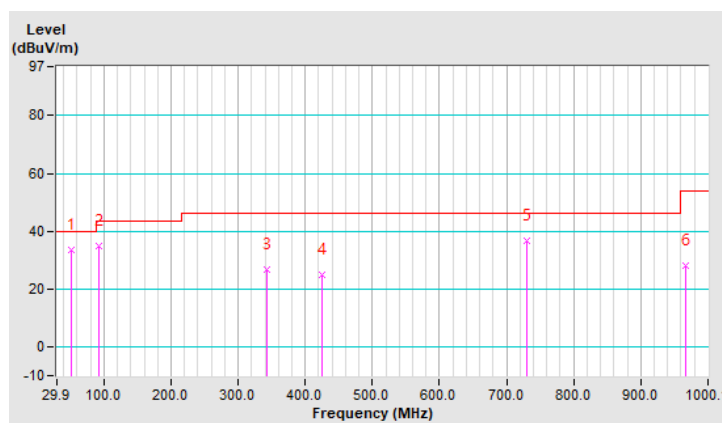


CHANNEL	CH 6 + CH 116 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	52.29	33.3 QP	40.0	-6.7	2.00 V	355	47.4	-14.1
2	93.12	35.1 QP	43.5	-8.4	1.50 V	115	54.5	-19.4
3	342.93	26.6 QP	46.0	-19.4	1.00 V	179	38.7	-12.1
4	424.59	25.0 QP	46.0	-21.0	1.00 V	294	35.6	-10.6
5	730.84	36.9 QP	46.0	-9.1	2.00 V	121	42.0	-5.1
6	966.05	28.0 QP	54.0	-26.0	1.00 V	149	29.7	-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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
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.



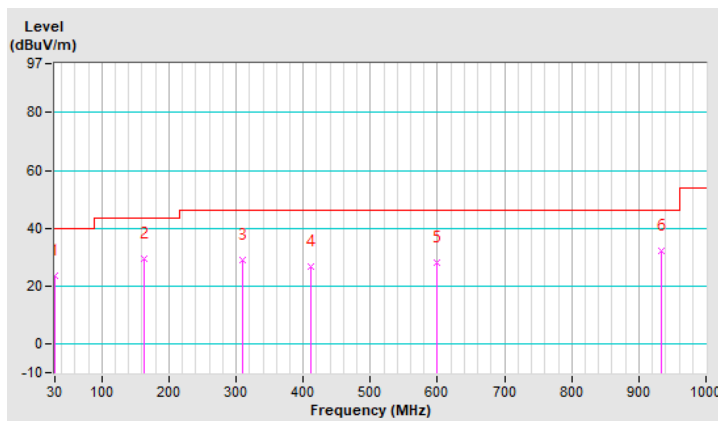
Radio 1: 802.11g + Zigbee

CHANNEL	CH 6 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	30.90	23.7 QP	40.0	-16.3	1.50 H	249	39.7	-16.0
2	163.11	29.6 QP	43.5	-13.9	1.00 H	259	43.6	-14.0
3	309.82	28.9 QP	46.0	-17.1	2.00 H	126	41.4	-12.5
4	411.92	26.9 QP	46.0	-19.1	1.00 H	303	37.9	-11.0
5	599.63	28.1 QP	46.0	-17.9	2.00 H	188	35.4	-7.3
6	933.99	32.2 QP	46.0	-13.8	1.00 H	29	34.3	-2.1

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.
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.

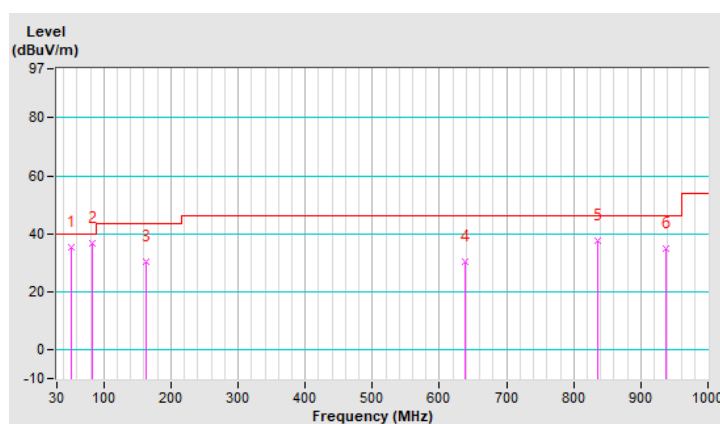


CHANNEL	CH 6 + CH 11	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

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	52.29	35.2 QP	40.0	-4.8	1.50 V	299	49.3	-14.1
2	83.40	36.6 QP	40.0	-3.4	1.50 V	151	55.5	-18.9
3	163.11	30.4 QP	43.5	-13.1	1.99 V	142	44.4	-14.0
4	638.46	30.4 QP	46.0	-15.6	1.00 V	79	37.0	-6.6
5	834.78	37.7 QP	46.0	-8.3	1.99 V	104	41.2	-3.5
6	936.94	35.1 QP	46.0	-10.9	1.00 V	191	37.2	-2.1

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.
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).

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 accredited and approved according to ISO/IEC 17025.

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

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Hsin Chu EMC/RF/Telecom Lab

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Email: service.adt@tw.bureauveritas.com

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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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