FCC Test Report

(Co-Located)

Report No.:	RF180108C15A-1
FCC ID:	TOR-W118
Test Model:	W-118
Received Date:	Jan. 08, 2018
Test Date:	Mar. 22 ~ Mar. 27, 2018
Issued Date:	Apr. 17, 2018
Applicant:	Mojo Networks, Inc.
Address:	339 N. Bernardo Avenue, Suite #200, Mountain View, California United States 94043
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

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF180108C15A-1	Original release.	Apr. 17, 2018

1 Certificate of Conformity

Product:	Wall Jack Access Point
Brand:	Mojo
Test Model:	W-118
Sample Status:	Engineering sample
Applicant:	Mojo Networks, Inc.
Test Date:	Mar. 22 ~ Mar. 27, 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:** Apr. 17, 2018

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Apr. 17, 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
15.205 / 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 -0.6dB at 30.90MHz.

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	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	Wall Jack Access Point	
Brand	Mojo	
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	WLAN	2.4GHz Band: Radio 1: CDD Mode: 406.510mW Beamforming Mode: 147.911mW Radio 3: CDD Mode: 75.873mW 5GHz Band: Radio 2: CDD Mode: 5180 ~ 5240MHz: 277.997mW 5260 ~ 5320MHz: 192.064mW 5500 ~ 5700MHz: 237.718mW 5745 ~ 5825MHz: 460.176mW Beamforming Mode: 5180 ~ 5240MHz: 139.008mW 5260 ~ 5320MHz: 95.940mW 5500 ~ 5700MHz: 118.850mW 5745 ~ 5825MHz: 230.104mW Radio 3: CDD Mode: 5180 ~ 5240MHz: 53.633mW 5260 ~ 5320MHz: 53.888mW 5500 ~ 5700MHz: 55.371mW 5745 ~ 5825MHz: 51.192mW
	Bluetooth LE	1.730mW
	Zigbee	1.722mW
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 BVADT report no.: RF180108C15A. 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	2TX	Not Support	Radio 3
802.11g	2TX	Not Support	
802.11n (HT20)	2TX	Not Support	
802.11n (HT40)	2TX	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	2TX	Not Support	Radio 3
802.11n (HT20)	2TX	Not Support	
802.11n (HT40)	2TX	Not Support	
802.11ac (VHT20)	2TX	Not Support	
802.11ac (VHT40)	2TX	Not Support	
802.11ac (VHT80)	2TX	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 ande 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
Connecter	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≥1G	RE<1G	
A	√	√	Power from adapter
B	-	√	Power from PoE

Where **RE≥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 **Z-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 1 + CH 0	BPSK
	Radio 2: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Radio 3: 802.11g	2412~2462	1 to 11		BPSK
	BT LE	2402~2480	0 to 39		GFSK
A	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 64 + CH 0	BPSK
	Radio 3: 802.11n (HT20)	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 116 + CH 1 + CH 11	BPSK
	Radio 2: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Radio 3: 802.11g	2412~2462	1 to 11		BPSK
	Zigbee	2405~2480	11 to 26		O-QPSK
A	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 64 + CH 11	BPSK
	Radio 3: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	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 1 + CH 0	BPSK
	Radio 2: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Radio 3: 802.11g	2412~2462	1 to 11		BPSK
	BT LE	2402~2480	0 to 39		GFSK
A, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 64 + CH 0	BPSK
	Radio 3: 802.11n (HT20)	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 116 + CH 1 + CH 11	BPSK
	Radio 2: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Radio 3: 802.11g	2412~2462	1 to 11		BPSK
	Zigbee	2405~2480	11 to 26		O-QPSK
A, B	Radio 1: 802.11g	2412~2462	1 to 11	CH 6 + CH 64 + CH 11	BPSK
	Radio 3: 802.11n (HT20)	5260~5320 5500~5700	52 to 64 100 to 140		OFDM
	Zigbee	2405~2480	11 to 26		O-QPSK

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23 deg. C, 65% RH	120Vac, 60Hz	Willy Cheng
RE<1G	23 deg. C, 65% RH 22 deg. C, 68% RH	120Vac, 60Hz	Adair Peng

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:

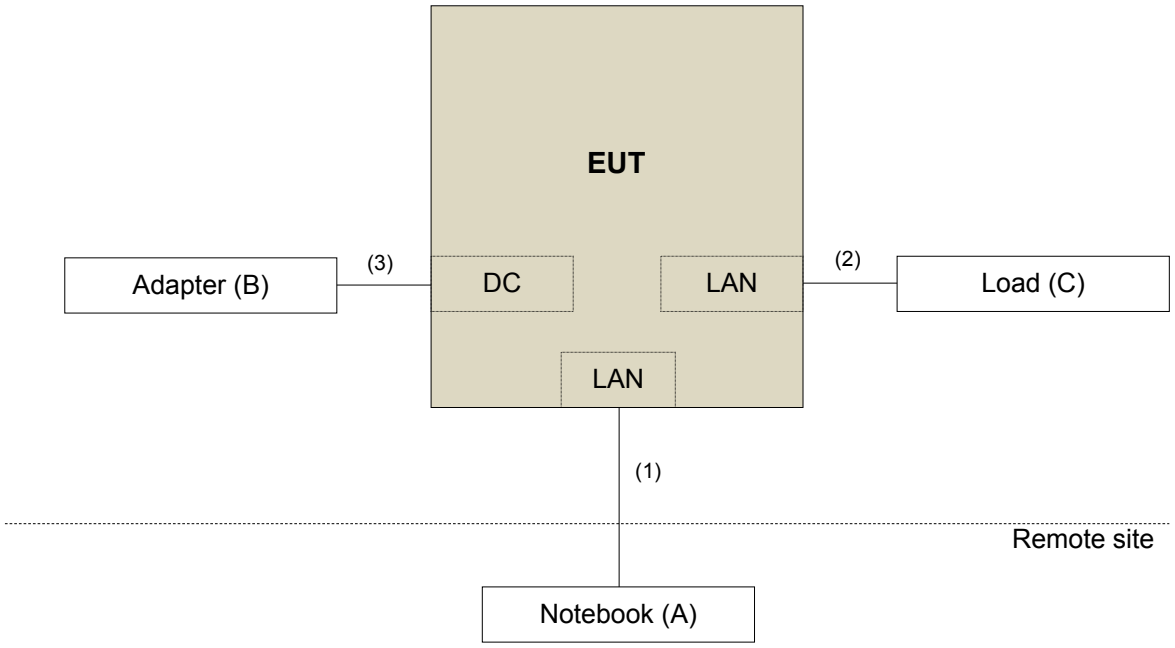
1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

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	-

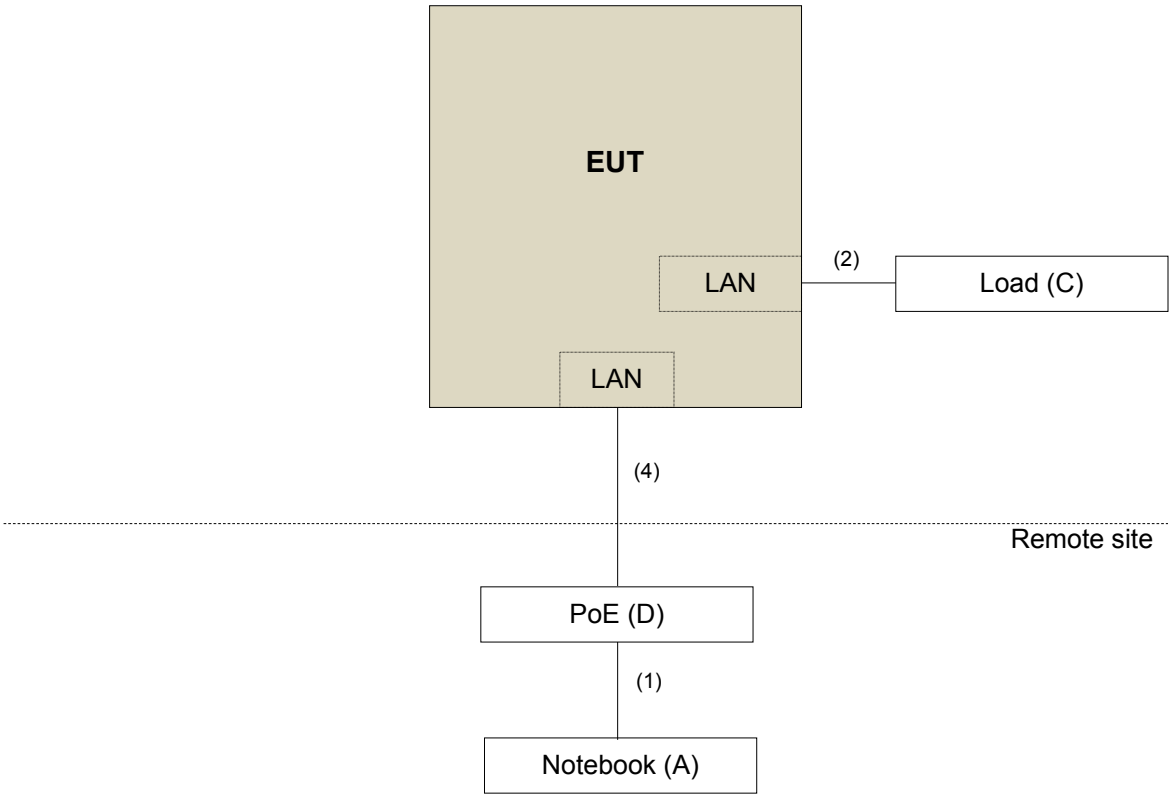
Note: The core(s) is(are) originally attached to the cable(s).

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

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v02r01</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK:74 (dBμV/m)</td><td>AV:54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK:-27 (dBm/MHz)</td><td rowspan="3">PK:68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK:-27 (dBm/MHz) *1
PK:10 (dBm/MHz) *2
PK:15.6 (dBm/MHz) *3
PK:27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1
PK:105.2 (dBμV/m) *2
PK: 110.8(dBμV/m) *3
PK:122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

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

$E = \frac{1000000\sqrt{30P}}{3}$ μV/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 02, 2017	May 01, 2018
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. 05, 2017	Apr. 04, 2018
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-8000	Cable-CH3-03 (309224+170907)	Sep.11, 2017	Sep. 10, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	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

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. Both X and Y axes 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:

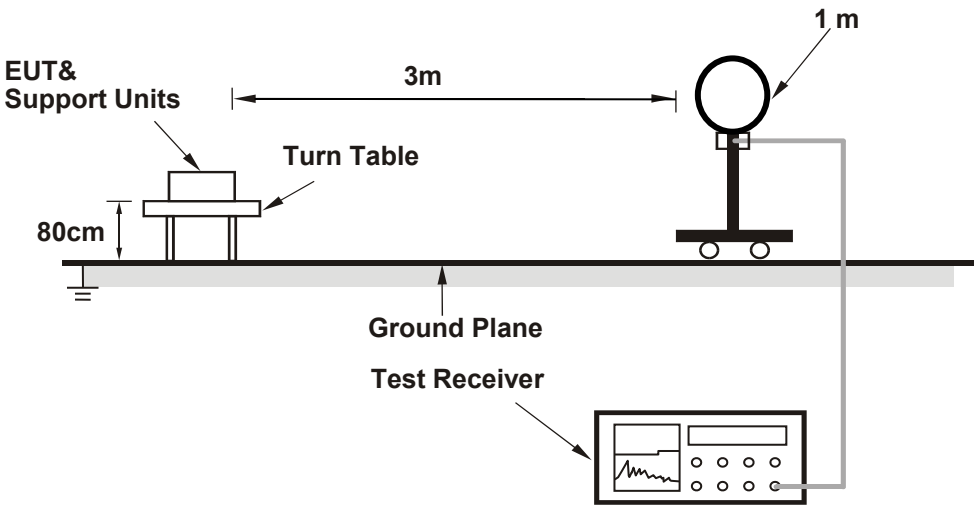
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 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

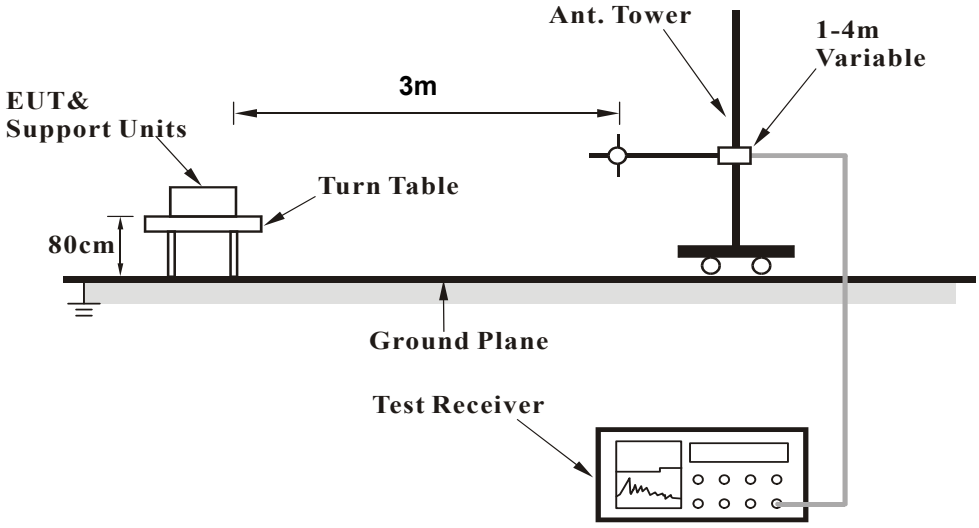
No deviation.

4.1.5 Test Setup

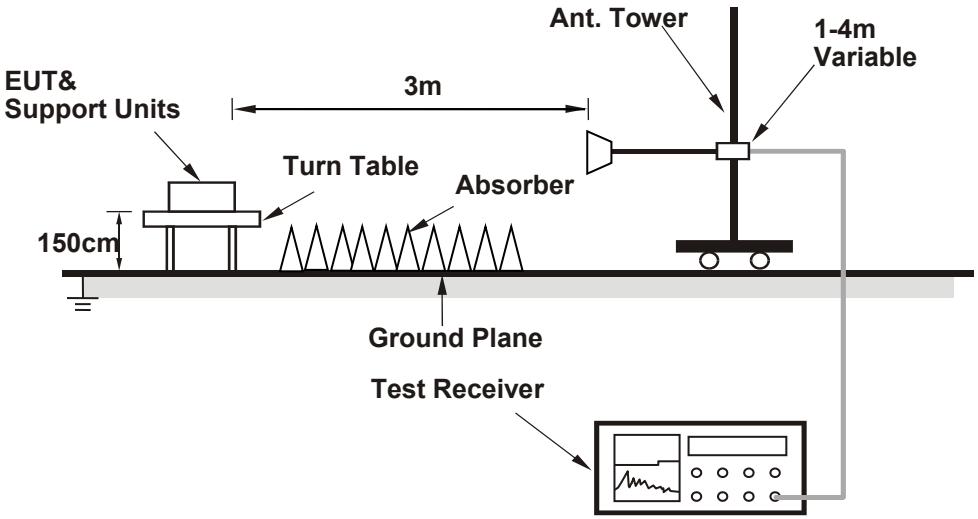
For Radiated emission below 30MHz



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

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. 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.
d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz Data:

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + BT LE

CHANNEL	CH 6 + CH 116 + CH 1 + 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	71.7 PK	74.0	-2.3	1.44 H	356	38.2	33.5
2	2390.00	53.2 AV	54.0	-0.8	1.44 H	356	19.7	33.5
3	#2402.00	90.3 PK			1.16 H	323	56.9	33.4
4	#2402.00	83.3 AV			1.16 H	323	49.9	33.4
5	*2412.00	108.0 PK			1.51 H	355	74.6	33.4
6	*2412.00	98.3 AV			1.51 H	355	64.9	33.4
7	#2437.00	115.4 PK			1.22 H	318	82.0	33.4
8	#2437.00	104.3 AV			1.22 H	318	70.9	33.4
9	2483.50	64.6 PK	74.0	-9.4	1.33 H	322	31.4	33.2
10	2483.50	48.8 AV	54.0	-5.2	1.33 H	322	15.6	33.2
11	4804.00	48.8 PK	74.0	-25.2	2.02 H	49	45.2	3.6
12	4804.00	36.8 AV	54.0	-17.2	2.02 H	49	33.2	3.6
13	4824.00	51.5 PK	74.0	-22.5	1.99 H	24	47.8	3.7
14	4824.00	38.2 AV	54.0	-15.8	1.99 H	24	34.5	3.7
15	4874.00	50.8 PK	74.0	-23.2	2.11 H	19	47.3	3.5
16	4874.00	44.9 AV	54.0	-9.1	2.11 H	19	41.4	3.5
17	*5580.00	117.3 PK			1.10 H	20	77.3	40.0
18	*5580.00	106.0 AV			1.10 H	20	66.0	40.0
19	11160.00	60.3 PK	74.0	-13.7	1.89 H	226	42.6	17.7
20	11160.00	46.0 AV	54.0	-8.0	1.89 H	226	28.3	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 1 + 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	62.0 PK	74.0	-12.0	3.41 V	332	28.5	33.5
2	2390.00	47.0 AV	54.0	-7.0	3.41 V	332	13.5	33.5
3	#2402.00	93.1 PK			1.04 V	343	59.7	33.4
4	#2402.00	89.2 AV			1.04 V	343	55.8	33.4
5	*2412.00	97.8 PK			1.55 V	138	64.4	33.4
6	*2412.00	87.6 AV			1.55 V	138	54.2	33.4
7	#2437.00	110.2 PK			1.32 V	111	76.8	33.4
8	#2437.00	99.0 AV			1.32 V	111	65.6	33.4
9	2483.50	61.0 PK	74.0	-13.0	3.15 V	306	27.8	33.2
10	2483.50	46.0 AV	54.0	-8.0	3.15 V	306	12.8	33.2
11	4804.00	54.0 PK	74.0	-20.0	1.79 V	294	50.4	3.6
12	4804.00	40.2 AV	54.0	-13.8	1.79 V	294	36.6	3.6
13	4824.00	54.9 PK	74.0	-19.1	1.77 V	335	51.2	3.7
14	4824.00	41.1 AV	54.0	-12.9	1.77 V	335	37.4	3.7
15	4874.00	50.2 PK	74.0	-23.8	2.97 V	341	46.7	3.5
16	4874.00	43.1 AV	54.0	-10.9	2.97 V	341	39.6	3.5
17	*5580.00	119.1 PK			1.57 V	359	79.1	40.0
18	*5580.00	108.1 AV			1.57 V	359	68.1	40.0
19	11160.00	59.4 PK	74.0	-14.6	1.83 V	268	41.7	17.7
20	11160.00	45.5 AV	54.0	-8.5	1.83 V	268	27.8	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 + Radio 3: 802.11n (HT20) + BT LE

CHANNEL	CH 6 + CH 64 + 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	60.4 PK	74.0	-13.6	1.71 H	308	26.9	33.5
2	2390.00	46.8 AV	54.0	-7.2	1.71 H	308	13.3	33.5
3	#2402.00	89.9 PK			1.11 H	316	56.5	33.4
4	#2402.00	82.1 AV			1.11 H	316	48.7	33.4
5	*2437.00	114.1 PK			1.55 H	286	80.7	33.4
6	*2437.00	103.0 AV			1.55 H	286	69.6	33.4
7	2483.50	61.7 PK	74.0	-12.3	1.44 H	313	28.5	33.2
8	2483.50	49.1 AV	54.0	-4.9	1.44 H	313	15.9	33.2
9	4804.00	49.5 PK	74.0	-24.5	1.89 H	76	45.9	3.6
10	4804.00	36.3 AV	54.0	-17.7	1.89 H	76	32.7	3.6
11	4874.00	50.9 PK	74.0	-23.1	1.99 H	33	47.4	3.5
12	4874.00	45.0 AV	54.0	-9.0	1.99 H	33	41.5	3.5
13	*5320.00	106.4 PK			1.89 H	331	66.9	39.5
14	*5320.00	96.8 AV			1.89 H	331	57.3	39.5
15	5350.00	57.7 PK	74.0	-16.3	1.72 H	333	53.9	3.8
16	5350.00	46.6 AV	54.0	-7.4	1.72 H	333	42.8	3.8
17	10640.00	62.5 PK	74.0	-11.5	1.88 H	307	45.5	17.0
18	10640.00	50.0 AV	54.0	-4.0	1.88 H	307	33.0	17.0

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. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	CH 6 + CH 64 + 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	62.1 PK	74.0	-11.9	3.08 V	294	28.6	33.5
2	2390.00	46.8 AV	54.0	-7.2	3.08 V	294	13.3	33.5
3	#2402.00	93.7 PK			1.04 V	329	60.3	33.4
4	#2402.00	89.8 AV			1.04 V	329	56.4	33.4
5	*2437.00	110.5 PK			1.33 V	99	77.1	33.4
6	*2437.00	100.2 AV			1.33 V	99	66.8	33.4
7	2483.50	61.4 PK	74.0	-12.6	2.86 V	302	28.2	33.2
8	2483.50	47.1 AV	54.0	-6.9	2.86 V	302	13.9	33.2
9	4804.00	53.9 PK	74.0	-20.1	1.99 V	325	50.3	3.6
10	4804.00	41.0 AV	54.0	-13.0	1.99 V	325	37.4	3.6
11	4874.00	49.7 PK	74.0	-24.3	2.83 V	304	46.2	3.5
12	4874.00	42.6 AV	54.0	-11.4	2.83 V	304	39.1	3.5
13	*5320.00	114.8 PK			1.77 V	341	75.3	39.5
14	*5320.00	104.2 AV			1.77 V	341	64.7	39.5
15	5350.00	65.5 PK	74.0	-8.5	1.58 V	332	61.7	3.8
16	5350.00	50.4 AV	54.0	-3.6	1.58 V	332	46.6	3.8
17	10640.00	62.5 PK	74.0	-11.5	1.66 V	281	45.5	17.0
18	10640.00	49.7 AV	54.0	-4.3	1.66 V	281	32.7	17.0

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. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + Zigbee

CHANNEL	CH 6 + CH 64 + CH 1 + 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	71.2 PK	74.0	-2.8	1.58 H	263	37.7	33.5
2	2390.00	52.4 AV	54.0	-1.6	1.58 H	263	18.9	33.5
3	#2405.00	97.5 PK			1.65 H	288	64.1	33.4
4	#2405.00	93.7 AV			1.65 H	288	60.3	33.4
5	#2412.00	108.2 PK			1.55 H	349	74.8	33.4
6	#2412.00	98.5 AV			1.55 H	349	65.1	33.4
7	*2437.00	115.2 PK			1.31 H	302	81.8	33.4
8	*2437.00	104.3 AV			1.31 H	302	70.9	33.4
9	2483.50	62.8 PK	74.0	-11.2	1.66 H	308	29.6	33.2
10	2483.50	48.1 AV	54.0	-5.9	1.66 H	308	14.9	33.2
11	4810.00	48.4 PK	74.0	-25.6	1.89 H	66	44.8	3.6
12	4810.00	36.8 AV	54.0	-17.2	1.89 H	66	33.2	3.6
13	4824.00	52.0 PK	74.0	-22.0	2.01 H	31	48.3	3.7
14	4824.00	38.2 AV	54.0	-15.8	2.01 H	31	34.5	3.7
15	4874.00	52.0 PK	74.0	-22.0	2.09 H	48	48.5	3.5
16	4874.00	45.1 AV	54.0	-8.9	2.09 H	48	41.6	3.5
17	*5580.00	117.6 PK			1.23 H	43	77.6	40.0
18	*5580.00	106.2 AV			1.23 H	43	66.2	40.0
19	11160.00	61.2 PK	74.0	-12.8	1.96 H	208	43.5	17.7
20	11160.00	46.2 AV	54.0	-7.8	1.96 H	208	28.5	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 1 + 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	62.8 PK	74.0	-11.2	3.33 V	319	29.3	33.5
2	2390.00	48.3 AV	54.0	-5.7	3.33 V	319	14.8	33.5
3	#2405.00	92.9 PK			1.12 V	305	59.5	33.4
4	#2405.00	88.7 AV			1.12 V	305	55.3	33.4
5	#2412.00	97.3 PK			1.67 V	184	63.9	33.4
6	#2412.00	87.5 AV			1.67 V	184	54.1	33.4
7	*2437.00	110.4 PK			1.32 V	127	77.0	33.4
8	*2437.00	99.3 AV			1.32 V	127	65.9	33.4
9	2483.50	61.3 PK	74.0	-12.7	3.09 V	294	28.1	33.2
10	2483.50	46.3 AV	54.0	-7.7	3.09 V	294	13.1	33.2
11	4810.00	55.2 PK	74.0	-18.8	1.83 V	265	51.6	3.6
12	4810.00	40.2 AV	54.0	-13.8	1.83 V	265	36.6	3.6
13	4824.00	55.3 PK	74.0	-18.7	1.64 V	331	51.6	3.7
14	4824.00	41.2 AV	54.0	-12.8	1.64 V	331	37.5	3.7
15	4874.00	50.6 PK	74.0	-23.4	3.01 V	356	47.1	3.5
16	4874.00	43.7 AV	54.0	-10.3	3.01 V	356	40.2	3.5
17	*5580.00	119.4 PK			1.68 V	325	79.4	40.0
18	*5580.00	108.4 AV			1.68 V	325	68.4	40.0
19	11160.00	59.9 PK	74.0	-14.1	2.14 V	268	42.2	17.7
20	11160.00	46.0 AV	54.0	-8.0	2.14 V	268	28.3	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 + Radio 3: 802.11n (HT20) + Zigbee

CHANNEL	CH 6 + CH 64 + 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	1.86 H	309	26.6	33.5
2	2390.00	47.0 AV	54.0	-7.0	1.86 H	309	13.5	33.5
3	#2405.00	93.5 PK			1.38 H	299	60.1	33.4
4	#2405.00	92.3 AV			1.38 H	299	58.9	33.4
5	*2437.00	113.8 PK			1.43 H	288	80.4	33.4
6	*2437.00	102.8 AV			1.43 H	288	69.4	33.4
7	2483.50	61.5 PK	74.0	-12.5	1.54 H	309	28.3	33.2
8	2483.50	48.8 AV	54.0	-5.2	1.54 H	309	15.6	33.2
9	4810.00	49.8 PK	74.0	-24.2	1.77 H	99	46.2	3.6
10	4810.00	35.7 AV	54.0	-18.3	1.77 H	99	32.1	3.6
11	4874.00	51.1 PK	74.0	-22.9	2.04 H	49	47.6	3.5
12	4874.00	45.3 AV	54.0	-8.7	2.04 H	49	41.8	3.5
13	*5320.00	106.7 PK			1.79 H	324	67.2	39.5
14	*5320.00	97.0 AV			1.79 H	324	57.5	39.5
15	5350.00	57.6 PK	74.0	-16.4	1.63 H	312	53.8	3.8
16	5350.00	46.3 AV	54.0	-7.7	1.63 H	312	42.5	3.8
17	10640.00	62.7 PK	74.0	-11.3	2.02 H	307	45.7	17.0
18	10640.00	50.1 AV	54.0	-3.9	2.02 H	307	33.1	17.0

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. " * ": 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	61.9 PK	74.0	-12.1	2.96 V	267	28.4	33.5
2	2390.00	47.0 AV	54.0	-7.0	2.96 V	287	13.5	33.5
3	#2405.00	89.2 PK			1.16 V	313	55.8	33.4
4	#2405.00	86.5 AV			1.16 V	313	53.1	33.4
5	*2437.00	110.8 PK			1.42 V	117	77.4	33.4
6	*2437.00	99.8 AV			1.42 V	117	66.4	33.4
7	2483.50	61.5 PK	74.0	-12.5	2.62 V	284	28.3	33.2
8	2483.50	46.8 AV	54.0	-7.2	2.62 V	284	13.6	33.2
9	4810.00	54.8 PK	74.0	-19.2	2.05 V	313	51.2	3.6
10	4810.00	41.2 AV	54.0	-12.8	2.05 V	313	37.6	3.6
11	4874.00	49.9 PK	74.0	-24.1	2.86 V	318	46.4	3.5
12	4874.00	42.9 AV	54.0	-11.1	2.86 V	318	39.4	3.5
13	*5320.00	115.1 PK			1.89 V	316	75.6	39.5
14	*5320.00	104.6 AV			1.89 V	316	65.1	39.5
15	5350.00	65.1 PK	74.0	-8.9	1.44 V	283	61.3	3.8
16	5350.00	50.0 AV	54.0	-4.0	1.44 V	283	46.2	3.8
17	10640.00	62.7 PK	74.0	-11.3	1.84 V	299	45.7	17.0
18	10640.00	49.3 AV	54.0	-4.7	1.84 V	299	32.3	17.0

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. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + BT LE

CHANNEL	CH 6 + CH 116 + CH 1 + 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	30.90	39.1 QP	40.0	-0.9	1.50 H	349	55.1	-16.0
2	70.73	36.0 QP	40.0	-4.0	1.00 H	199	52.2	-16.2
3	270.99	31.6 QP	46.0	-14.4	1.00 H	258	45.1	-13.5
4	407.09	30.8 QP	46.0	-15.2	1.50 H	355	41.8	-11.0
5	747.34	38.2 QP	46.0	-7.8	1.50 H	97	43.0	-4.8
6	932.05	36.4 QP	46.0	-9.6	1.00 H	312	38.4	-2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	**30.90**	**39.4 QP**	**40.0**	**-0.6**	**1.00 V**	**304**	**55.4**	**-16.0**
2	92.12	39.0 QP	43.5	-4.5	1.50 V	330	58.6	-19.6
3	218.50	36.4 QP	46.0	-9.6	1.00 V	255	52.7	-16.3
4	298.21	37.8 QP	46.0	-8.2	1.00 V	133	50.6	-12.8
5	403.20	38.1 QP	46.0	-7.9	1.50 V	199	49.2	-11.1
6	933.99	35.7 QP	46.0	-10.3	1.00 V	320	37.8	-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

Radio 1: 802.11g + Radio 3: 802.11n (HT20) + BT LE

CHANNEL	CH 6 + CH 64 + 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	35.73	31.5 QP	40.0	-8.5	1.00 H	159	47.1	-15.6
2	57.12	36.0 QP	40.0	-4.0	1.50 H	354	50.4	-14.4
3	88.23	31.2 QP	43.5	-12.3	1.50 H	254	50.7	-19.5
4	270.99	31.6 QP	46.0	-14.4	1.00 H	15	45.1	-13.5
5	731.79	28.2 QP	46.0	-17.8	1.00 H	110	33.3	-5.1
6	932.05	36.4 QP	46.0	-9.6	1.00 H	297	38.4	-2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	29.90	36.0 QP	40.0	-4.0	1.50 V	77	52.1	-16.1
2	41.57	36.2 QP	40.0	-3.8	1.00 V	303	50.8	-14.6
3	90.17	40.0 QP	43.5	-3.5	1.00 V	159	59.5	-19.5
4	208.77	35.2 QP	43.5	-8.3	1.50 V	229	51.9	-16.7
5	296.27	38.8 QP	46.0	-7.2	1.00 V	6	51.6	-12.8
6	414.87	35.4 QP	46.0	-10.6	1.00 V	244	46.4	-11.0

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

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + Zigbee

CHANNEL	CH 6 + CH 116 + CH 1 + 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	31.5 QP	40.0	-8.5	1.50 H	8	47.1	-15.6
2	57.12	36.0 QP	40.0	-4.0	1.50 H	354	50.4	-14.4
3	88.23	31.2 QP	43.5	-12.3	1.00 H	209	50.7	-19.5
4	270.99	31.6 QP	46.0	-14.4	1.00 H	309	45.1	-13.5
5	747.34	38.2 QP	46.0	-7.8	1.50 H	349	43.0	-4.8
6	932.05	36.4 QP	46.0	-9.6	1.00 H	177	38.4	-2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	41.57	36.2 QP	40.0	-3.8	1.50 V	133	50.8	-14.6
2	97.95	36.4 QP	43.5	-7.1	1.00 V	197	55.0	-18.6
3	199.05	35.0 QP	43.5	-8.5	1.50 V	229	51.8	-16.8
4	288.49	39.7 QP	46.0	-6.3	1.50 V	287	52.7	-13.0
5	385.70	34.1 QP	46.0	-11.9	1.00 V	110	45.5	-11.4
6	933.99	34.9 QP	46.0	-11.1	1.00 V	99	37.0	-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

Radio 1: 802.11g + Radio 3: 802.11n (HT20) + Zigbee

CHANNEL	CH 6 + CH 64 + 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	31.84	34.5 QP	40.0	-5.5	1.50 H	254	50.5	-16.0
2	57.12	38.9 QP	40.0	-1.1	1.50 H	359	53.3	-14.4
3	84.34	38.1 QP	40.0	-1.9	1.50 H	222	57.2	-19.1
4	146.56	33.8 QP	43.5	-9.7	1.00 H	132	47.8	-14.0
5	216.55	34.0 QP	46.0	-12.0	1.50 H	333	50.4	-16.4
6	294.32	36.9 QP	46.0	-9.1	1.00 H	103	49.8	-12.9
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	41.57	36.2 QP	40.0	-3.8	1.50 V	199	50.8	-14.6
2	84.34	38.9 QP	40.0	-1.1	1.00 V	258	58.0	-19.1
3	204.89	37.1 QP	43.5	-6.4	1.00 V	341	54.0	-16.9
4	288.49	39.7 QP	46.0	-6.3	1.50 V	89	52.7	-13.0
5	414.87	35.4 QP	46.0	-10.6	1.00 V	243	46.4	-11.0
6	933.99	34.9 QP	46.0	-11.1	1.50 V	6	37.0	-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

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + BT LE

CHANNEL	CH 6 + CH 116 + CH 1 + 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	35.73	24.0 QP	40.0	-16.0	1.00 H	78	39.6	-15.6
2	111.56	25.0 QP	43.5	-18.5	1.49 H	242	42.2	-17.2
3	162.11	31.4 QP	43.5	-12.1	1.49 H	244	45.3	-13.9
4	335.15	34.8 QP	46.0	-11.2	1.00 H	200	46.9	-12.1
5	428.48	30.2 QP	46.0	-15.8	1.99 H	52	40.6	-10.4
6	585.97	29.2 QP	46.0	-16.8	1.49 H	188	37.0	-7.8
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	49.34	32.8 QP	40.0	-7.2	1.00 V	46	46.9	-14.1
2	94.06	35.9 QP	43.5	-7.6	1.00 V	115	55.1	-19.2
3	162.11	29.4 QP	43.5	-14.1	1.00 V	141	43.3	-13.9
4	335.15	29.4 QP	46.0	-16.6	1.00 V	120	41.5	-12.1
5	554.86	28.7 QP	46.0	-17.3	1.00 V	167	37.3	-8.6
6	659.85	28.0 QP	46.0	-18.0	1.00 V	3	34.6	-6.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

Radio 1: 802.11g + Radio 3: 802.11n (HT20) + BT LE

CHANNEL	CH 6 + CH 64 + 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	70.73	26.3 QP	40.0	-13.7	1.99 H	105	42.5	-16.2
2	97.95	25.1 QP	43.5	-18.4	1.99 H	106	43.7	-18.6
3	152.39	31.3 QP	43.5	-12.2	1.99 H	258	45.1	-13.8
4	340.99	34.9 QP	46.0	-11.1	1.00 H	208	47.0	-12.1
5	747.34	31.0 QP	46.0	-15.0	1.99 H	19	35.8	-4.8
6	937.88	33.0 QP	46.0	-13.0	1.49 H	251	35.0	-2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	33.1 QP	40.0	-6.9	1.00 V	301	47.5	-14.4
2	107.67	31.5 QP	43.5	-12.0	1.00 V	96	49.1	-17.6
3	160.17	28.2 QP	43.5	-15.3	1.00 V	135	42.0	-13.8
4	340.99	27.4 QP	46.0	-18.6	1.00 V	181	39.5	-12.1
5	745.40	36.4 QP	46.0	-9.6	1.00 V	303	41.2	-4.8
6	920.38	27.3 QP	46.0	-18.7	1.00 V	159	29.3	-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

Radio 1: 802.11g + Radio 2: 802.11n (HT20) + Radio 3: 802.11g + Zigbee

CHANNEL	CH 6 + CH 116 + CH 1 + 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	43.51	20.9 QP	40.0	-19.1	1.49 H	136	35.4	-14.5
2	92.12	26.4 QP	43.5	-17.1	1.99 H	106	46.0	-19.6
3	150.45	29.1 QP	43.5	-14.4	1.99 H	258	42.8	-13.7
4	255.44	23.5 QP	46.0	-22.5	1.00 H	197	37.9	-14.4
5	368.21	27.0 QP	46.0	-19.0	1.00 H	343	38.7	-11.7
6	574.30	28.6 QP	46.0	-17.4	1.49 H	198	36.7	-8.1
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	37.68	30.3 QP	40.0	-9.7	1.00 V	142	45.6	-15.3
2	99.89	33.0 QP	43.5	-10.5	1.00 V	92	51.5	-18.5
3	121.28	23.9 QP	43.5	-19.6	1.00 V	70	39.9	-16.0
4	296.27	25.8 QP	46.0	-20.2	1.00 V	156	38.6	-12.8
5	725.96	24.3 QP	46.0	-21.7	1.00 V	10	29.7	-5.4
6	840.67	26.0 QP	46.0	-20.0	1.00 V	10	29.5	-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

Radio 1: 802.11g + Radio 3: 802.11n (HT20) + Zigbee

CHANNEL	CH 6 + CH 64 + 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	35.73	22.3 QP	40.0	-17.7	1.99 H	266	37.9	-15.6
2	152.39	26.1 QP	43.5	-17.4	1.00 H	264	39.9	-13.8
3	189.33	21.2 QP	43.5	-22.3	1.99 H	278	37.4	-16.2
4	350.71	25.3 QP	46.0	-20.7	1.50 H	119	37.4	-12.1
5	640.41	27.6 QP	46.0	-18.4	1.00 H	18	34.2	-6.6
6	819.28	25.4 QP	46.0	-20.6	1.00 H	333	29.1	-3.7
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	86.28	35.2 QP	40.0	-4.8	1.50 V	123	54.6	-19.4
2	101.84	33.3 QP	43.5	-10.2	1.00 V	118	51.6	-18.3
3	162.11	29.4 QP	43.5	-14.1	1.99 V	141	43.3	-13.9
4	340.99	29.1 QP	46.0	-16.9	1.00 V	132	41.2	-12.1
5	580.13	27.7 QP	46.0	-18.3	1.99 V	58	35.6	-7.9
6	932.05	30.2 QP	46.0	-15.8	1.00 V	32	32.2	-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 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:

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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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