FCC Test Report
(Co-Located)

Report No.:	RF190514C12-9
FCC ID:	2ARXKVHE10
Contains module FCC ID:	2ATM8EC25V
Test Model:	VHE10
Series Model:	VHE10XXX (X=A-Z, 0-9, blank or "-")
Received Date:	May 14, 2019
Test Date:	Aug. 07, 2019
Issued Date:	Aug. 08, 2019
Applicant:	Veea Inc
Address:	164 E 83rd Street, New York NY, 10028, USA
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
RF190514C12-9	Original release	Aug. 08, 2019

1 Certificate of Conformity

Product:	veeaHub
Brand:	veeaHub
Test Model:	VHE10
Series Model:	VHE10XXX (X=A-Z, 0-9, blank or "-")
Sample Status:	Engineering sample
Applicant:	Veea Inc
Test Date:	Aug. 07, 2019
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407) FCC Part 27, Subpart F, L ANSI 63.26-2015 ANSI C63.10-2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** Aug. 08, 2019

Celine Chou / Senior Specialist

Approved by : Bruce Chen , **Date:** Aug. 08, 2019

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 Part 27, Subpart F, L ANSI 63.26-2015 ANSI C63.10-2013		
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 53.23MHz.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.1dB at 1720.00MHz.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
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	veeaHub	
Brand	veeaHub	
Test Model	VHE10	
Series Model	VHE10XXX (X=A-Z, 0-9, blank or "-")	
Model Difference	Marketing purposes	
Status of EUT	Engineering sample	
Power Supply Rating	48Vdc (Adapter and POE)	
Operating Frequency	WLAN	2.4GHz: 2412~2462MHz 5.0GHz: 5180~5240MHz, 5745~5825MHz
	Bluetooth EDR	2402~2480MHz
	Bluetooth LE	2402~2480MHz
	Zigbee	2405~2475MHz
	LTE Band 4 (Channel Bandwidth 1.4MHz)	1710.7~1754.3MHz
	LTE Band 4 (Channel Bandwidth 3MHz)	1711.5~1753.5MHz
	LTE Band 4 (Channel Bandwidth 5MHz)	1712.5~1752.5MHz
	LTE Band 4 (Channel Bandwidth 10MHz)	1715.0~1750.0MHz
	LTE Band 4 (Channel Bandwidth 15MHz)	1717.5~1747.5MHz
	LTE Band 4 (Channel Bandwidth 20MHz)	1720.0~1745.0MHz
	LTE Band 13 (Channel Bandwidth 5MHz)	779.5~784.5MHz
	LTE Band 13 (Channel Bandwidth 10MHz)	782.0MHz
Accessory Device	Adapter	
Data Cable Supplied	NA	

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Band	Modulation Mode	Beamforming Mode	TX Function
2.4G	802.11b	Not Support	2TX
	802.11g	Not Support	2TX
	802.11n (HT20)	Not Support	2TX
	802.11n (HT40)	Not Support	2TX
5GHz	802.11a	Not Support	4TX
	802.11n (HT20)	Support	4TX
	802.11n (HT40)	Support	4TX
	802.11ac (VHT20)	Support	4TX
	802.11ac (VHT40)	Support	4TX
	802.11ac (VHT80)	Support	4TX

2. The EUT has two sale types.

Type	Description
A	Without LTE function, BT internal ant.
B	With LTE function, BT external ant.

3. The following RF Modules are for the EUT.

RF Module	Band
Module 1	5180 ~ 5240MHz
Module 2	5745 ~ 5825MHz
Module 3	2412 ~ 2462MHz

4. The EUT uses following adapter and POE.

Adapter	
Brand	EDACPOWER ELEC.
Model	EA1062SGR-480
Input Power	100-240Vac, 50-60Hz, 2.5A
Output Power	48Vdc, 1.35A
Power Line	1.2m DC cable with one core

POE (Support unit)	
Model	APOE02-WM
Output Power	48Vdc

3.2 Description of Test Modes

For WLAN:

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 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

For Bluetooth EDR:

79 channels are provided to this EUT:

Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

For Bluetooth LE:

40 channels are provided to this EUT:

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

For Zigbee:

15 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		

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

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	Frequency Band (MHz)	Available Channel	Tested Channel	Data Rate (Mbps)
A	BT 8DPSK + 802.11g + Module 1: 802.11n (HT20) + Module 2: 802.11n (HT20) + LTE Band 4 (BW: 20MHz)	2402~2480	0 to 78	0 + 6 + + 40 + 149 + 20050	8DPSK
		2412~2462	1 to 11		OFDM
		5180-5240	36 to 48		OFDM
		5745~5825	149 to 165		OFDM
		1720~1745	20050 to 20300		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	Frequency Band (MHz)	Available Channel	Tested Channel	Data Rate (Mbps)
A, B	BT 8DPSK + 802.11g + Module 1: 802.11n (HT20) + Module 2: 802.11n (HT20) + LTE Band 4 (BW: 20MHz)	2402~2480	0 to 78	0 + 6 + + 40 + 149 + 20050	8DPSK
		2412~2462	1 to 11		OFDM
		5180-5240	36 to 48		OFDM
		5745~5825	149 to 165		OFDM
		1720~1745	20050 to 20300		QPSK

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	23deg. C, 70%RH	120Vac, 60Hz	Willy Cheng
RE<1G	23deg. C, 70%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	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	USB Flash	HP	v250W	03	NA	-
D.	USB Flash	HP	v250W	05	NA	-
E.	USB Flash	HP	v250W	09	NA	-
F.	POE	NA	APOE02-WM	NA	NA	Provided by manufacturer

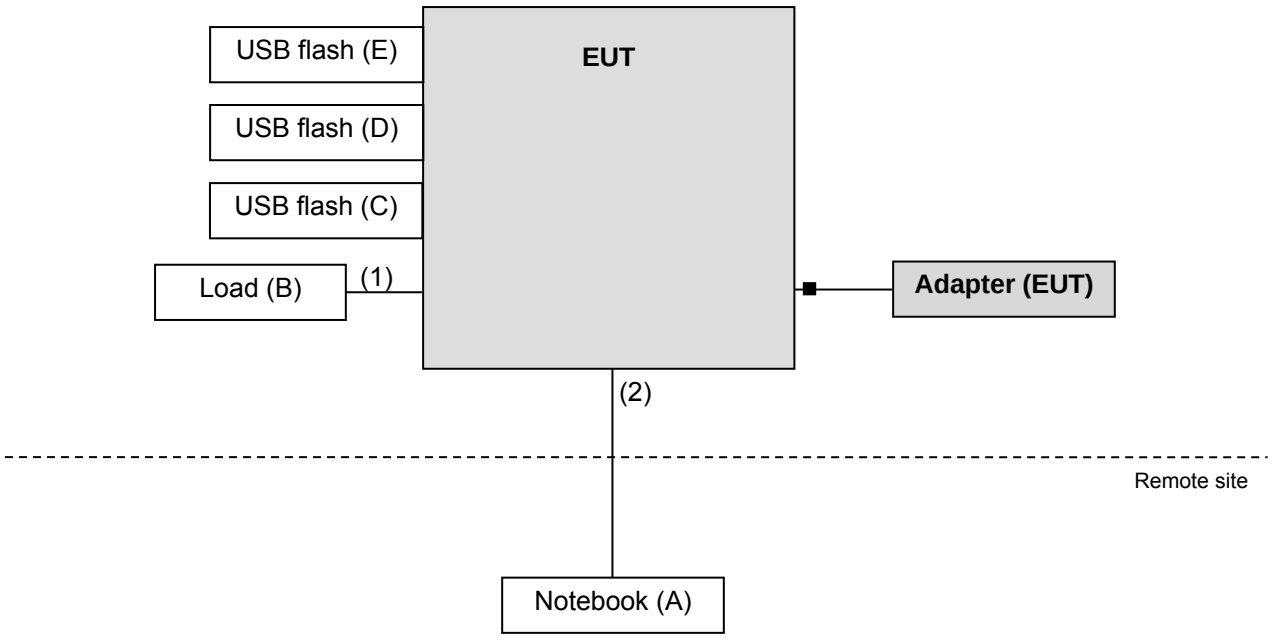
Note:

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.

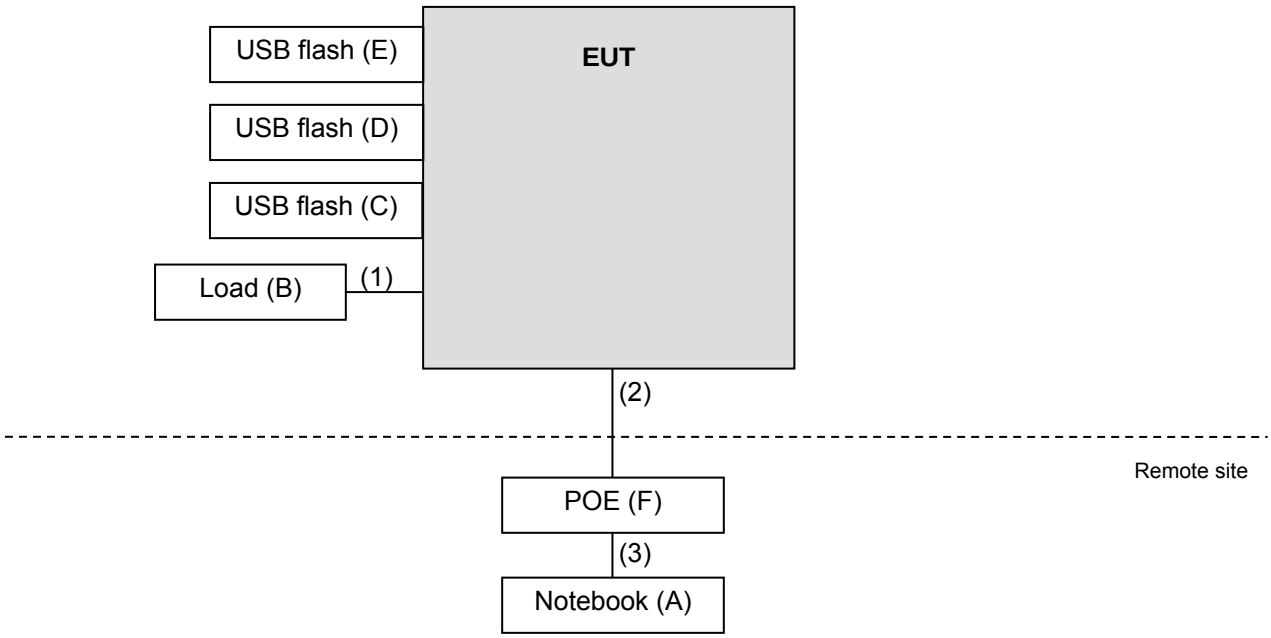
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	1.5	N	0	Cat5e
2.	RJ45 cable	1	5	N	0	Cat5e
3.	RJ45 cable	1	1.5	N	0	Cat5e

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:

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

47 CFR FCC Part 15, Subpart E (Section 15.407)

FCC Part 27, Subpart F, L

ANSI 63.26-2015

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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
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 EMCI	EM-6879	269	Sep. 07, 2018	Sep. 06, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-S M-8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable WOKEN	8D-FB	Cable-CH3-01	Aug. 21, 2018	Aug. 20, 2019
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
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019

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

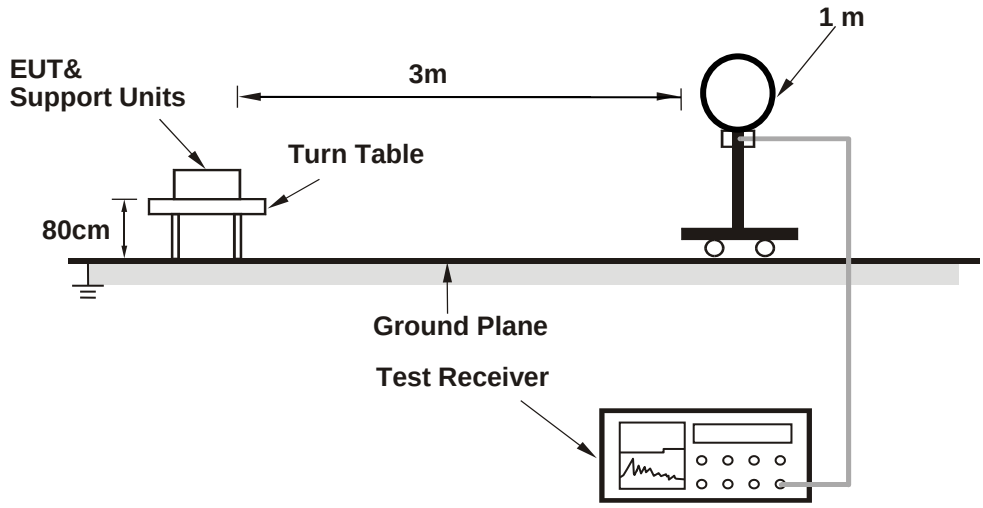
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

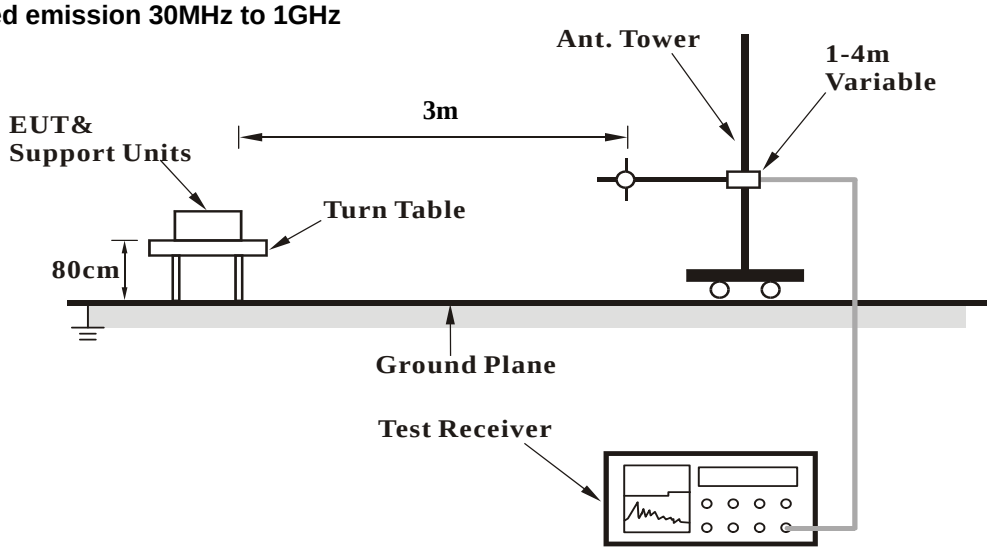
No deviation.

4.1.5 Test Setup

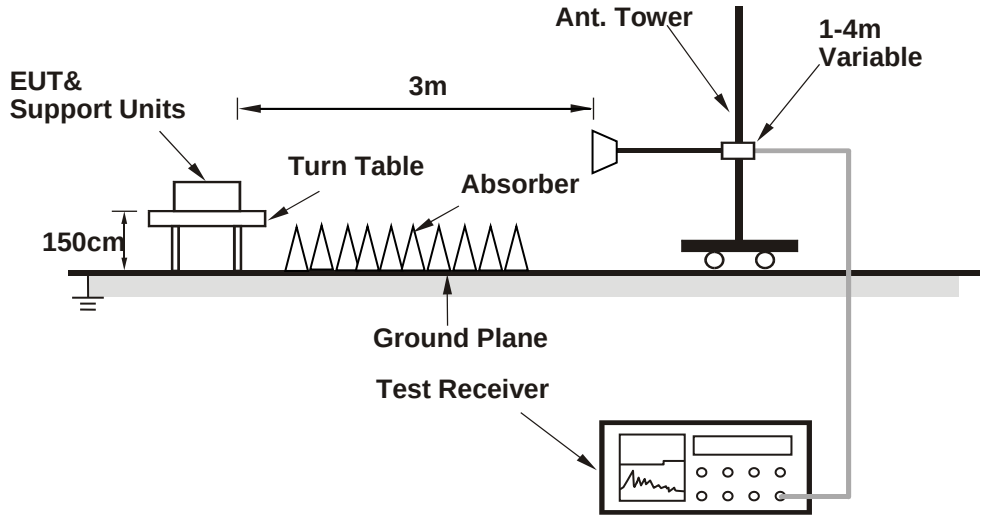
For Radiated emission below 30MHz



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 (CMD) to enable EUT under transmission condition continuously at specific channel frequency.
d. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data:

BT 8DPSK + 802.11g + Module 1: 802.11n (HT20) + Module 2: 802.11n (HT20) + LTE Band 4 (BW: 20MHz)

CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	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	3.24 H	44	27.2	32.9
2	2390.00	47.6 AV	54.0	-6.4	3.24 H	44	14.7	32.9
3	*2402.00	76.5 PK			3.46 H	38	43.6	32.9
4	*2402.00	68.4 AV			3.46 H	38	35.5	32.9
5	*2437.00	117.2 PK			2.58 H	46	84.3	32.9
6	*2437.00	106.5 AV			2.58 H	46	73.6	32.9
7	4804.00	46.3 PK	74.0	-27.7	2.32 H	189	42.7	3.6
8	4804.00	33.3 AV	54.0	-20.7	2.32 H	189	29.7	3.6
9	4874.00	63.5 PK	74.0	-10.5	1.66 H	51	59.5	4.0
10	4874.00	50.4 AV	54.0	-3.6	1.66 H	51	46.4	4.0
11	12185.00	66.6 PK	74.0	-7.4	2.43 H	52	50.7	15.9
12	12185.00	51.3 AV	54.0	-2.7	2.43 H	52	35.4	15.9
13	5150.00	62.0 PK	74.0	-12.0	1.62 H	55	57.6	4.4
14	5150.00	49.1 AV	54.0	-4.9	1.62 H	55	44.7	4.4
15	*5200.00	119.9 PK			1.53 H	49	80.4	39.5
16	*5200.00	108.2 AV			1.53 H	49	68.7	39.5
17	#5644.87	56.2 PK	68.2	-12.0	1.35 H	326	51.7	4.5
18	*5745.00	121.4 PK			1.35 H	326	81.3	40.1
19	*5745.00	109.9 AV			1.35 H	326	69.8	40.1
20	#5935.90	56.8 PK	68.2	-11.4	1.35 H	326	51.5	5.3
21	#10400.00	58.0 PK	68.2	-10.2	2.24 H	157	41.8	16.2
22	11490.00	63.9 PK	74.0	-10.1	1.44 H	39	45.9	18.0
23	11490.00	49.4 AV	54.0	-4.6	1.44 H	39	31.4	18.0

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

BT 8DPSK + 802.11g + Module 1: 802.11n (HT20) + Module 2: 802.11n (HT20) + LTE Band 4 (BW: 20MHz)

CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	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	60.4 PK	74.0	-13.6	2.13 V	340	27.5	32.9
2	2390.00	47.6 AV	54.0	-6.4	2.13 V	340	14.7	32.9
3	*2402.00	99.6 PK			2.34 V	333	66.7	32.9
4	*2402.00	95.1 AV			2.34 V	333	62.2	32.9
5	*2437.00	115.2 PK			1.62 V	318	82.3	32.9
6	*2437.00	104.7 AV			1.62 V	318	71.8	32.9
7	4804.00	48.1 PK	74.0	-25.9	1.39 V	34	44.5	3.6
8	4804.00	36.3 AV	54.0	-17.7	1.38 V	34	32.7	3.6
9	4874.00	61.8 PK	74.0	-12.2	3.96 V	335	57.8	4.0
10	4874.00	48.5 AV	54.0	-5.5	3.96 V	335	44.5	4.0
11	12185.00	67.4 PK	74.0	-6.6	3.49 V	315	51.5	15.9
12	12185.00	52.6 AV	54.0	-1.4	3.49 V	315	36.7	15.9
13	5150.00	67.1 PK	74.0	-6.9	1.57 V	326	62.7	4.4
14	5150.00	52.2 AV	54.0	-1.8	1.57 V	326	47.8	4.4
15	*5200.00	120.4 PK			1.28 V	19	80.9	39.5
16	*5200.00	109.2 AV			1.28 V	19	69.7	39.5
17	#5600.00	58.7 PK	68.2	-9.5	2.32 V	48	54.1	4.6
18	*5745.00	119.6 PK			2.32 V	48	79.5	40.1
19	*5745.00	108.6 AV			2.32 V	48	68.5	40.1
20	#5962.18	58.6 PK	68.2	-9.6	2.32 V	48	53.3	5.3
21	#10400.00	57.9 PK	68.2	-10.3	1.66 V	179	41.7	16.2
22	11490.00	64.9 PK	74.0	-9.1	2.54 V	67	46.9	18.0
23	11490.00	50.8 AV	54.0	-3.2	2.54 V	67	32.8	18.0

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. Margin value = Emission Level – Limit value.
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL		CH 20050					
Antenna Polarity & Test Distance: Horizontal at 3 m (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	**1720.00**	**-15.70**	**21.90**	**1.00**	**22.90**	**30.00**	**-7.10**
Antenna Polarity & Test Distance: Vertical at 3 m (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	1720.00	-21.20	17.30	1.00	18.30	30.00	-11.70

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

CHANNEL		CH 20050					
Antenna Polarity & Test Distance: Horizontal at 3 m (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3440.00	-64.20	-59.90	7.10	-52.80	-13.00	-39.80
Antenna Polarity & Test Distance: Vertical at 3 m (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	3440.00	-61.90	-57.70	7.10	-50.60	-13.00	-37.60

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

Below 1GHz data

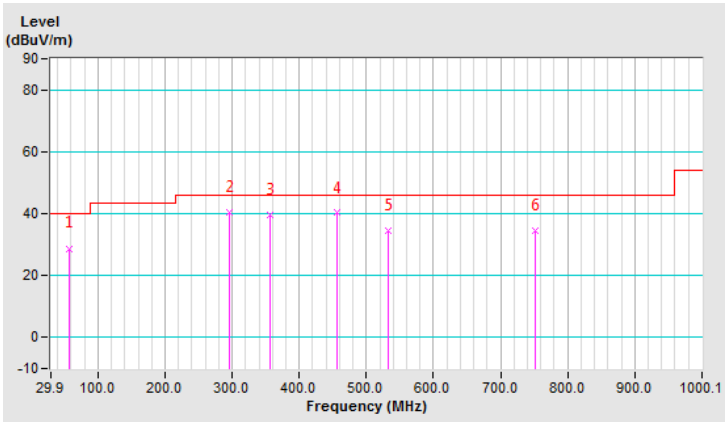
BT 8DPSK + 802.11g + Module 1: 802.11n (HT20) + Module 2: 802.11n (HT20) + LTE Band 4 (BW: 20MHz)

CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	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	57.12	28.8 QP	40.0	-11.2	1.99 H	72	38.9	-10.1
2	296.27	40.6 QP	46.0	-5.4	1.00 H	11	48.2	-7.6
3	356.54	39.4 QP	46.0	-6.6	1.99 H	191	45.9	-6.5
4	455.70	40.2 QP	46.0	-5.8	1.99 H	5	44.6	-4.4
5	533.47	34.4 QP	46.0	-11.6	1.50 H	164	37.5	-3.1
6	751.23	34.3 QP	46.0	-11.7	1.00 H	355	32.5	1.8

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 of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

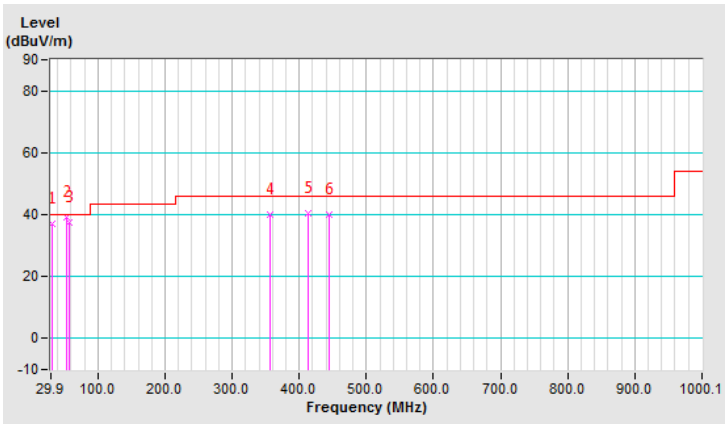


CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

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	36.9 QP	40.0	-3.1	1.00 V	171	48.4	-11.5
2	**53.23**	**39.1 QP**	**40.0**	**-0.9**	**1.00 V**	**334**	**48.9**	**-9.8**
3	57.12	37.6 QP	40.0	-2.4	1.00 V	335	47.7	-10.1
4	356.54	40.2 QP	46.0	-5.8	1.00 V	353	46.7	-6.5
5	412.92	40.3 QP	46.0	-5.7	1.00 V	148	45.6	-5.3
6	444.03	39.8 QP	46.0	-6.2	1.00 V	349	44.2	-4.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The 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.

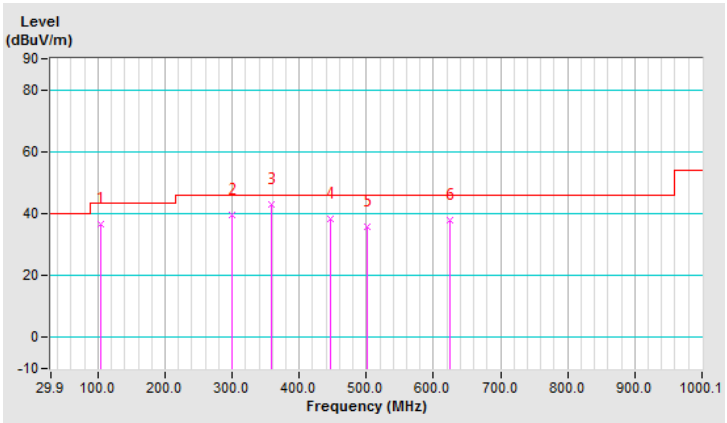


CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	104.37	36.4 QP	43.5	-7.1	1.00 H	88	49.4	-13.0
2	300.64	39.7 QP	46.0	-6.3	1.49 H	357	47.1	-7.4
3	358.96	43.0 QP	46.0	-3.0	1.49 H	311	49.4	-6.4
4	445.79	38.3 QP	46.0	-7.7	1.49 H	188	42.7	-4.4
5	500.68	35.9 QP	46.0	-10.1	1.00 H	143	39.5	-3.6
6	625.13	37.7 QP	46.0	-8.3	1.49 H	197	38.4	-0.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The 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.

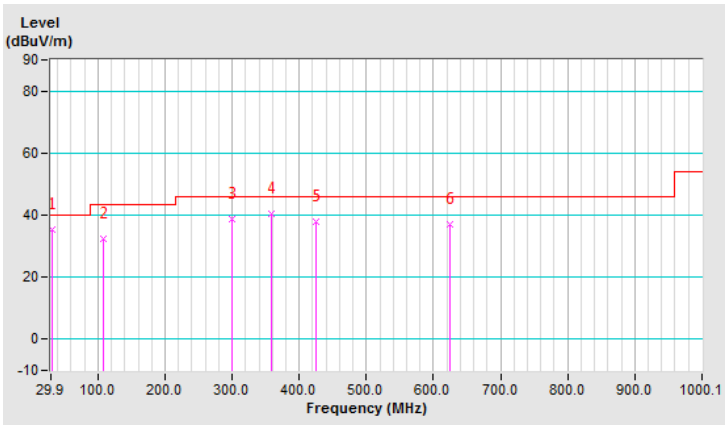


CHANNEL	CH 0 + CH 6 + CH 40 + CH 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	32.64	35.2 QP	40.0	-4.8	1.01 V	106	46.7	-11.5
2	107.89	32.3 QP	43.5	-11.2	1.01 V	29	44.9	-12.6
3	300.34	38.9 QP	46.0	-7.1	1.51 V	99	46.3	-7.4
4	359.12	40.4 QP	46.0	-5.6	1.01 V	337	46.8	-6.4
5	425.79	37.7 QP	46.0	-8.3	1.51 V	187	42.5	-4.8
6	625.24	37.1 QP	46.0	-8.9	1.51 V	221	37.8	-0.7

Remarks:

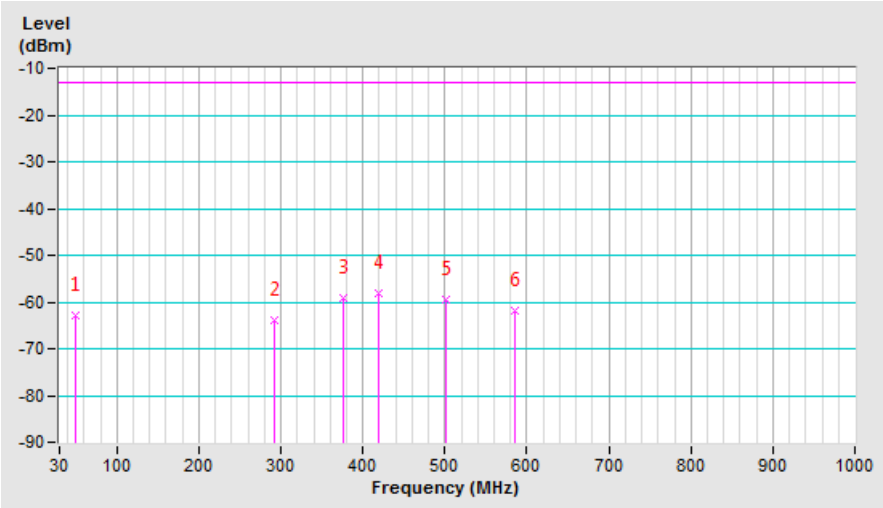
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The 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 20050	FREQUENCY RANGE	Below 1000 MHz
TEST MODE	A		

Antenna Polarity & Test Distance: Horizontal at 3 M (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	49.40	-64.00	-53.60	-9.30	-62.90	-13.00	-49.90
2	291.90	-64.90	-68.90	5.10	-63.80	-13.00	-50.80
3	375.32	-60.30	-64.50	5.30	-59.20	-13.00	-46.20
4	419.94	-59.10	-63.20	5.20	-58.00	-13.00	-45.00
5	501.42	-60.50	-64.30	4.90	-59.40	-13.00	-46.40
6	584.84	-63.10	-66.50	4.50	-62.00	-13.00	-49.00

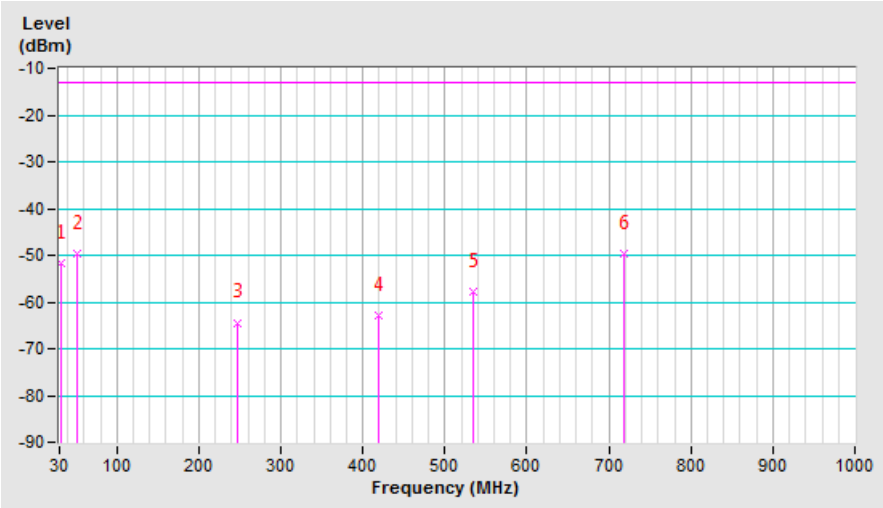
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



CHANNEL	CH 20050	FREQUENCY RANGE	Below 1000 MHz
TEST MODE	A		

Antenna Polarity & Test Distance: Vertical at 3 M (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-52.10	-39.90	-11.90	-51.80	-13.00	-38.80
2	51.34	-50.00	-40.80	-8.90	-49.70	-13.00	-36.70
3	247.28	-64.70	-69.80	5.40	-64.40	-13.00	-51.40
4	419.94	-63.30	-68.20	5.20	-63.00	-13.00	-50.00
5	534.40	-58.10	-62.50	4.70	-57.80	-13.00	-44.80
6	718.70	-49.80	-54.50	5.00	-49.50	-13.00	-36.50

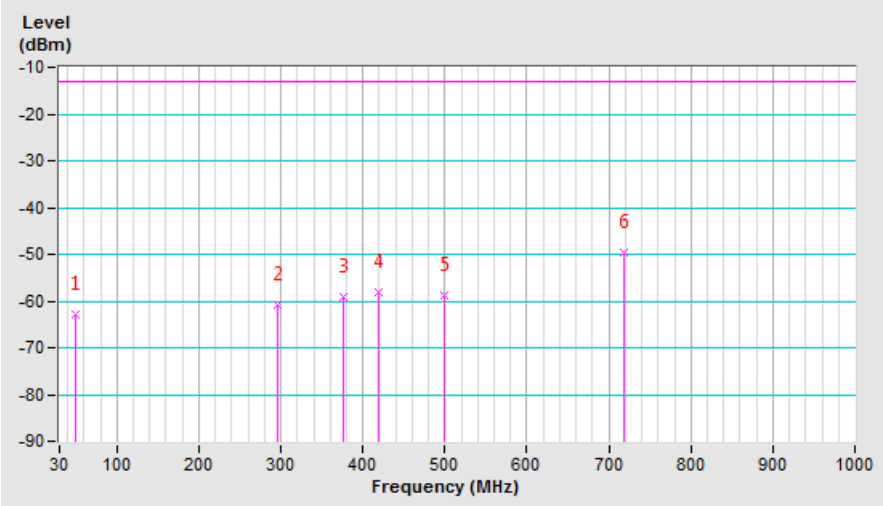
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



CHANNEL	CH 20050	FREQUENCY RANGE	Below 1000 MHz
TEST MODE	B		

Antenna Polarity & Test Distance: Horizontal at 3 M (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	49.40	-64.00	-53.60	-9.30	-62.90	-13.00	-49.90
2	295.78	-61.90	-65.90	5.10	-60.80	-13.00	-47.80
3	375.32	-60.30	-64.50	5.30	-59.20	-13.00	-46.20
4	419.94	-59.10	-63.20	5.20	-58.00	-13.00	-45.00
5	499.48	-59.90	-63.70	4.90	-58.80	-13.00	-45.80
6	718.70	-50.60	-54.50	5.00	-49.50	-13.00	-36.50

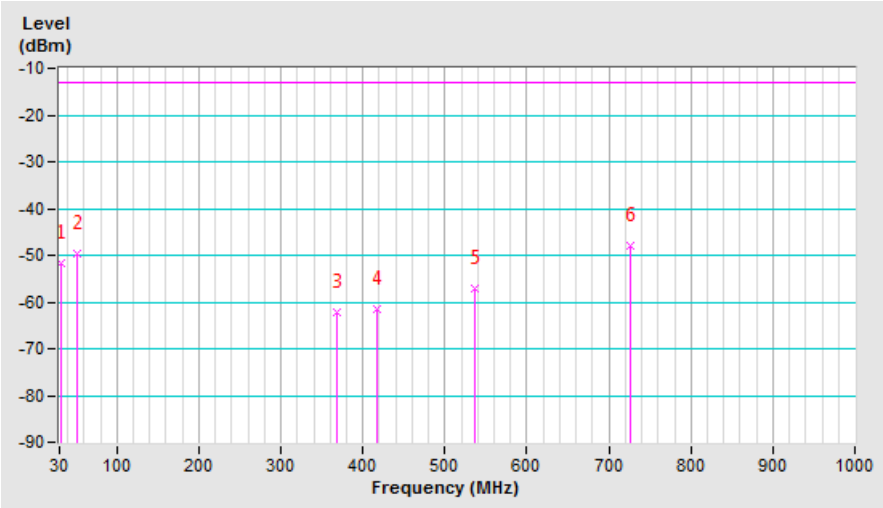
Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).



CHANNEL	CH 20050	FREQUENCY RANGE	Below 1000 MHz
TEST MODE	B		

Antenna Polarity & Test Distance: Vertical at 3 M (For FCC Part 27)							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
1	31.94	-52.10	-39.90	-11.90	-51.80	-13.00	-38.80
2	51.34	-50.00	-40.80	-8.90	-49.70	-13.00	-36.70
3	367.56	-62.50	-67.40	5.20	-62.20	-13.00	-49.20
4	418.00	-61.80	-66.70	5.20	-61.50	-13.00	-48.50
5	536.34	-57.30	-61.70	4.70	-57.00	-13.00	-44.00
6	726.46	-48.20	-52.80	4.90	-47.90	-13.00	-34.90

Remarks:
1. EIRP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB).

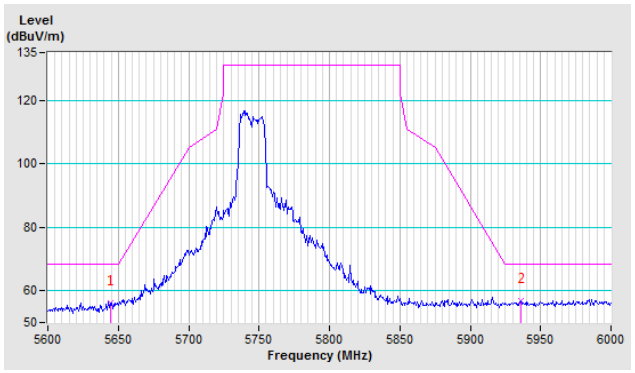
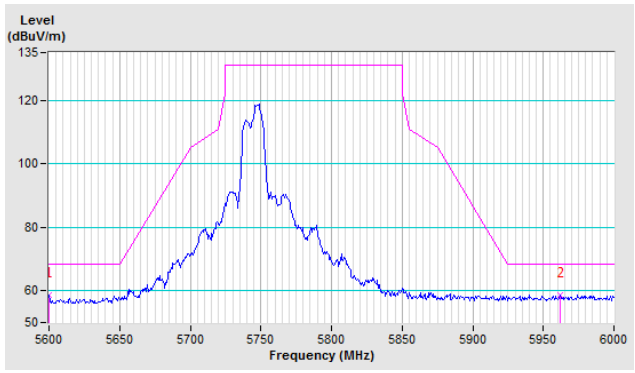


5 Pictures of Test Arrangements

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

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

802.11n (HT20)

CH149	
Horizontal	Vertical
	

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
Web Site: www.bureauveritas-adt.com

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

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